REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF FINANCE
ROXAS BOULEVARD CORNER P. OCAMPO SR. STREET
MANILA 1004

Renovation of Department of Finance 8th Floor EDPC Building

November 2021
ITB No. 2021-22-G

Preface

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

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

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

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

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

a. All the documents listed in the Table of Contents are normally required for the procurement of Infrastructure Projects. However, they should be adapted as necessary to the circumstances of the particular Project.

b. Specific details, such as the "*name of the Procuring Entity*" and "*address for bid submission*," should be furnished in the Instructions to Bidders, Bid Data Sheet, and Special Conditions of Contract. The final documents should contain neither blank spaces nor options.

c. This Preface and the footnotes or notes in italics included in the Invitation to Bid, BDS, General Conditions of Contract, Special Conditions of Contract, Specifications, Drawings, and Bill of Quantities are not part of the text of the final document, although they contain instructions that the Procuring Entity should strictly follow.

d. The cover should be modified as required to identify the Bidding Documents as to the names of the Project, Contract, and Procuring Entity, in addition to date of issue.

e. Modifications for specific Procurement Project details should be provided in the Special Conditions of Contract as amendments to the Conditions of Contract. For easy completion, whenever reference has to be made to specific clauses in the Bid Data Sheet or Special Conditions of Contract, these terms shall be printed in bold typeface on Sections I (Instructions to Bidders) and III (General Conditions of Contract), respectively.

f. For guidelines on the use of Bidding Forms and the procurement of Foreign-Assisted Projects, these will be covered by a separate issuance of the Government Procurement Policy Board.

TABLE OF CONTENTS

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

Notes on the Invitation to Bid

The Invitation to Bid (IB) provides information that enables potential Bidders to decide whether to participate in the procurement at hand. The IB shall be posted in accordance with Section 21.2 of the 2016 revised IRR of RA No. 9184.

Apart from the essential items listed in the Bidding Documents, the IB should also indicate the following:

a. The date of availability of the Bidding Documents, which shall be from the time the IB is first advertised/posted until the deadline for the submission and receipt of bids;

b. The place where the Bidding Documents may be acquired or the website where it may be downloaded;

c. The deadline for the submission and receipt of bids; and

d. Any important bid evaluation criteria.

The IB should be incorporated into the Bidding Documents. The information contained in the IB must conform to the Bidding Documents and in particular to the relevant information in the Bid Data Sheet.

INVITATION TO BID FOR PROCUREMENT OF RENOVATION OF DEPARTMENT OF FINANCE 8TH FLOOR EDPC BUILDING

1. The **Department of Finance**, through the **authorized appropriations under the FY 2022 National Expenditure Program,** intends to apply the sum of **Ninety-Seven Million Pesos (₱97,000,000.00)** being the Approved Budget for the Contract (ABC) to payments under the contract for the **Procurement of Renovation of Department of Finance 8th Floor EDPC Building**. Bids received in excess of the ABC shall be automatically rejected at bid opening.

2. The **Department of Finance** now invites bids for the above Procurement Project. Completion of the Works is required **within 240 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 DOF BAC Secretariat and inspect the Bidding Documents at the address given below during office hours from Mondays to Fridays at 9:00 AM to 3:00 PM.

5. A complete set of Bidding Documents may be acquired by interested bidders on **November 27 to December 20, 2021** from given address and website/s below and upon payment of the applicable fee for the Bidding Documents, pursuant to the latest Guidelines issued by the GPPB, in the amount of **Fifty Thousand Pesos (₱50,000.00)**.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 **Department of Finance** will hold a Pre-Bid Conference[1] on **December 6, 2021 2:00 PM** through video conferencing or webcasting *via* **Google Meet.** Interested bidders may send a letter of intent containing names and email addresses of participants, which shall be open to prospective bidders.

7. Bids must be duly received by the BAC Secretariat through (i) manual submission at the office address as indicated below or (ii) online or electronic submission as indicated below, or (iii) both on or before **December 20, 2021 1:00 PM**. Late bids shall not be accepted.

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

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 **December 20, 2021, 2:00 PM** at **DOF Library, G/F DOF Building, Roxas Boulevard, Malate, Manila** and/or via **Google Meet.** Bids will be opened in the presence of the bidders' representatives who choose to attend the activity.

10. The Schedule of bidding activities is as follows:

ACTIVITIES	SCHEDULE
Advertisement/Posting of Invitation to Bid	November 27, 2021
Issuance and Availability of Bidding Documents	Starting November 27, 2021
Pre-Bid Conference	December 6, 2021, 2:00 PM
Last Day of Request for Clarification	December 10, 2021 (by email)
Last Day for Issuance of Supplemental Bid Bulletin	December 13, 2021
Deadline for Submission of Bids	December 20, 2021, 1:00 PM
Opening of Bids	December 20, 2021, 2:00 PM

11. The **Department of Finance** 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.

12. For further information, please refer to:

    Eden C. Zamora
    DOF BAC Secretariat, Procurement Management Division
    7/F EDPC Building, BSP Complex, Roxas Boulevard, Manila
    Email Address: bac@dof.gov.ph
    Telephone No.: 5317-6363 loc. 2189 or 8526-4786
    Website: www.dof.gov.ph

13. You may visit the following websites:

    For downloading of Bidding Documents: https://www.dof.gov.ph/about/procurement/

    For online bid submission: The link will be shared upon purchase of bidding documents.

GIL S. BELTRAN

Undersecretary and

DOF BAC Chairperson

Section II. Instructions to Bidders

Notes on the Instructions to Bidders

This Section on the Instruction to Bidders (ITB) provides the information necessary for bidders to prepare responsive bids, in accordance with the requirements of the Procuring Entity. It also provides information on bid submission, eligibility check, opening and evaluation of bids, post-qualification, and on the award of contract.

1. Scope of Bid

The Procuring Entity, Department of Finance invites Bids for the **Procurement of Renovation of Department of Finance 8th Floor EDPC Building**, with Project Identification Number **ITB No. 2021-22-G.**

The Procurement Project (referred to herein as "Project") is composed of **one (1) lot**, the details of which are described in Section VII (Technical Specifications).

2. Funding Information

2.1. The GOP through the source of funding as indicated below for **2022** in the amount of **Ninety-Seven Million Pesos (₱97,000,000.00)**.

2.2. The source of funding is: **NGA, the National Expenditure Program**

3. Bidding Requirements

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

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

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

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

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

5. Eligible Bidders

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

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

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

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

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

6. Origin of Associated Goods

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

7. Subcontracts

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

The Procuring Entity has prescribed that: **Subcontracting is allowed. The portions of Project and the maximum percentage allowed to be subcontracted are indicated in the BDS, which shall not exceed fifty percent (50%) of the contracted Works.**

7.1. *[If Procuring Entity has determined that subcontracting is allowed during the bidding , state:]*The Bidder must submit together with its Bid the documentary requirements of the subcontractor(s) complying with the eligibility criterial stated in **ITB** Clause 5 in accordance with Section 23.4 of the 2016 revised IRR of RA No. 9184 pursuant to Section 23.1 thereof.

7.2. *[If subcontracting is allowed during the contract implementation stage, state:]* The Supplier may identify its subcontractor during the contract implementation stage. Subcontractors identified during the bidding may be changed during the implementation of this Contract. Subcontractors must submit the documentary requirements under Section 23.1 of the 2016 revised IRR of RA No. 9184 and comply with the eligibility criteria specified in **ITB** Clause 5 to the implementing or end-user unit.

7.3. Subcontracting of any portion of the Project does not relieve the Contractor of any liability or obligation under the Contract. The Supplier will be responsible

for the acts, defaults, and negligence of any subcontractor, its agents, servants, or workmen as fully as if these were the Contractor's own acts, defaults, or negligence, or those of its agents, servants, or workmen.

8. Pre-Bid Conference

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

9. Clarification and Amendment of Bidding Documents

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

10. Documents Comprising the Bid: Eligibility and Technical Components

10.1. The first envelope shall contain the eligibility and technical documents of the Bid as specified in **Section IX. Checklist of Technical and Financial Documents**.

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

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

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

10.5. A List of Contractor's major equipment units, which are owned, leased, and/or under purchase agreements, supported by proof of ownership, certification of availability of equipment from the equipment lessor/vendor for the duration of

the project, as the case may be, must meet the minimum requirements for the contract set in the **BDS**.

11. Documents Comprising the Bid: Financial Component

11.1. The second bid envelope shall contain the financial documents for the Bid as specified in **Section IX. Checklist of Technical and Financial Documents**.

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

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

12. Alternative Bids

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

13. Bid Prices

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

14. Bid and Payment Currencies

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

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

15. Bid Security

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

15.2. The Bid and bid security shall be valid until **one hundred twenty (120) calendar days from the bid opening**. 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

Notes on the Bid Data Sheet (BDS)

The Bid Data Sheet (BDS) consists of provisions that supplement, amend, or specify in detail, information, or requirements included in the ITB found in Section II, which are specific to each procurement.

This Section is intended to assist the Procuring Entity in providing the specific information in relation to corresponding clauses in the ITB and has to be prepared for each specific procurement.

The Procuring Entity should specify in the BDS information and requirements specific to the circumstances of the Procuring Entity, the processing of the procurement, and the bid evaluation criteria that will apply to the Bids. In preparing the BDS, the following aspects should be checked:

a. Information that specifies and complements provisions of the ITB must be incorporated.

b. Amendments and/or supplements, if any, to provisions of the ITB as necessitated by the circumstances of the specific procurement, must also be incorporated.

Bid Data Sheet

<table>
<tr><th>ITB Clause</th><th></th></tr>
<tr><td>5.2</td><td>For this purpose, contracts similar to the Project refer to contracts which have the same major categories of work, which shall be:

Refer to the renovation and construction which includes Architectural, Sanitary/Plumbing Fire Protection, Mechanical and Electrical Works.</td></tr>
<tr><td>7.1</td><td>Subcontracting is allowed only for the specialty works such as: Sanitary/Plumbing, fire protection, mechanical and electrical works.</td></tr>
<tr><td>10.3</td><td>No further instruction.</td></tr>
<tr><td>10.4</td><td>The key personnel must meet the required minimum years of experience set below:

<u>Key Personnel</u> <u>General Experience</u>
<table>
<tr><td>Position</td><td>Experience</td></tr>
<tr><td>Project Manager</td><td>10 years</td></tr>
<tr><td>Project Engineer</td><td>10 years</td></tr>
<tr><td>Electrical Engineer</td><td>10 years</td></tr>
<tr><td>Mechanical Engineer</td><td>10 years</td></tr>
<tr><td>Safety Engineers</td><td>10 years</td></tr>
<tr><td>Foreman</td><td>5 years</td></tr>
<tr><td>Skilled Workers</td><td>5 years</td></tr>
</table></td></tr>
<tr><td>10.5</td><td>The minimum major equipment requirements are the following:

<u>Specify required equipment supported by proof of ownership,</u> 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.</td></tr>
<tr><td>12</td><td>Alternative Bid/s shall not be accepted.</td></tr>
<tr><td>15.1</td><td>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 One Million Nine Hundred Forty Thousand Pesos (₱1,940,000.00) [2% of ABC], 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 Four Million Eight Hundred Fifty Thousand Pesos (₱4,850,000.00) [5% of ABC] if bid security is in Surety Bond.</td></tr>
<tr><td>19.2</td><td>Partial Bid is not allowed.</td></tr>
<tr><td>20</td><td>No further instruction.</td></tr>
<tr><td>21</td><td>Additional contract documents relevant to the Project that may be required by existing laws and/or the Procuring Entity, such as construction schedule and S-curve, manpower schedule, construction methods, equipment utilization schedule, construction safety and health program approved by the DOLE, and other acceptable tools of project scheduling.</td></tr>
</table>

Section IV. General Conditions of Contract

Notes on the General Conditions of Contract

The General Conditions of Contract (GCC) in this Section, read in conjunction with the Special Conditions of Contract in Section V and other documents listed therein, should be a complete document expressing all the rights and obligations of the parties.

Matters governing performance of the Contractor, payments under the contract, or matters affecting the risks, rights, and obligations of the parties under the contract are included in the GCC and Special Conditions of Contract.

Any complementary information, which may be needed, shall be introduced only through the Special 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

4.1. 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.

4.2. 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

Notes on the Special Conditions of Contract

Similar to the BDS, the clauses in this Section are intended to assist the Procuring Entity in providing contract-specific information in relation to corresponding clauses in the GCC found in Section IV.

The Special Conditions of Contract (SCC) complement the GCC, specifying contractual requirements linked to the special circumstances of the Procuring Entity, the Procuring Entity's country, the sector, and the Works procured. In preparing this Section, the following aspects should be checked:

a. Information that complements provisions of the GCC must be incorporated.

b. Amendments and/or supplements to provisions of the GCC as necessitated by the circumstances of the specific purchase, must also be incorporated.

However, no special condition which defeats or negates the general intent and purpose of the provisions of the GCC should be incorporated herein.

Special Conditions of Contract

<table>
<tr><th>GCC Clause</th><th></th></tr>
<tr><td>2</td><td>The Intended Completion Date is 240 calendar days on start date to be defined in the issuance of the Notice to Proceed (7 days upon receipt).

Note: The Contract duration shall be reckoned from the start date indicated in the NTP.</td></tr>
<tr><td>4.1</td><td>The Procuring Entity shall give the possession of site by phase. The Procuring Entity will give the possession of the succeeding phases based on the submitted Program of Works by the Contractor.</td></tr>
<tr><td>4.0</td><td>The Contractor shall employ the following Key Personnel:
<table>
<tr><th>Position</th><th>Experience</th></tr>
<tr><td>Project Manager</td><td>10 years</td></tr>
<tr><td>Project Engineer</td><td>10 years</td></tr>
<tr><td>Electrical Engineer</td><td>10 years</td></tr>
<tr><td>Mechanical Engineer</td><td>10 years</td></tr>
<tr><td>Safety Engineers</td><td>10 years</td></tr>
<tr><td>Foreman</td><td>5 years</td></tr>
<tr><td>Skilled Workers</td><td>5 years</td></tr>
</table>

Upon issuance of Notice of Award, the Curriculum Vitae (CV), PRC License, NBI Clearance and COVID-19 vaccination card as proof that said personnel is fully vaccinated must be submitted by each of the Key Personnel prior to deployment.</td></tr>
<tr><td>6</td><td>The site investigation reports are based on the walk through or actual site inspection by the Contractor with the representative/s of the Procuring Entity. The conduct of site survey or investigation by the Contractor will determine if there is a difference between the actual site condition and the details presented in the bid documents. The Certificate of Site Inspection issued by the representative/s of the Procuring Entity shall be an integral part of the technical documents and part of the eligibility requirements.</td></tr>
<tr><td>7.2</td><td>No further instruction</td></tr>
<tr><td>10</td><td>Dayworks are applicable at the rate shown in the Contractor’s original Bid.</td></tr>
<tr><td>11.1</td><td>The Contractor shall submit the updated Program of Work to the Procuring Entity’s Representative within Seven (7) days after the issuance of the Notice of Award.</td></tr>
<tr><td>11.2</td><td>The amount to be withheld for late submission of an updated Program of Work is One percent (1%) of the Contract Cost. Reckoning date for the submission of the updated Program of Work is within 7 days upon receipt of the Notice of Award.</td></tr>
<tr><td>13</td><td>The amount of the advance payment is (mobilization fee) is equivalent to not more than Ten percent (10%) of the Contract price shall be granted to the Contractor upon request.</td></tr>
<tr><td>14</td><td>The first progress billing shall be allowed only after 30% physical accomplishments of the project. Subsequent progress billing shall be</td></tr>
</table>

	after 60%, 80% and 100% accomplishments verified and certified by the Procuring Entity's representative/s. **Materials and equipment delivered on the site but not installed shall not be included for payment.**
15.1	The date by which operating and maintenance manuals are required Five (5) days after the issuance of the Certificate of Completion and subject for submission before the issuance of Certificate of Acceptance. The date by which "as built" drawings are required Five (5) days after the issuance of the Certificate of Completion and subject for submission before the issuance of Certificate of Acceptance.
15.2	The amount to be withheld for failing to produce "as built" drawings and/or operating and maintenance manuals by the date required is Five percent (5%) of the Contract Cost.

Section VI. Specifications

SCOPE OF WORKS

PROJECT:
Renovation of DOF, Package 4 – 8th Floor EDPC Building

LOCATION:
DOF, EDPC Building, BSP Complex, Roxas Blvd., cor. P. Ocampo St., Manila

AREA:
4,500 square meters

SCOPE OF WORK:
The scope of work for the renovation project is composed of architectural, electrical, mechanical, plumbing and fire protection.

SITE INVESTIGATION:
The issuance of Certificate of Site Inspection during the procurement process is a proof that the Contractor understood the actual site condition of the project site. It also shows that all concerns with regard to the project site were addressed by the Department.

FOR CONSTRUCTION DRAWINGS:
The Department will provide copies of the For Construction Drawings (FCDs) prior to the issuance of the Notice to Proceed. The issued FCDs will be discussed during the Pre-Construction Conference.

PRE-CONSTRUCTION CONFERENCE:
The Department will conduct Pre-Construction Conference to discuss all necessary requirements and rules and regulations during the implementation of the project including the work permits and the Bangko Sentral ng Pilipinas (BSP) House rules and regulations. The Minutes of the said Pre-Construction Conference will be approved by the Department and the Contractor before the "Start Date" of the Project.

POSSESSION OF SITE:
The project site will be turned over to the Contractor by phase in consideration of the existing offices in the project site. The Contractor shall install board-up to avoid any work interruption of the other offices that will be in the 8th floor during the construction of a particular phase of the project site. The duration for the installation of board-up is included in the construction duration. The Department will provide the lay-out which will also reflect the phasing scheme.

PROGRAM OF WORK:
The Contractor should submit the updated program of work seven (7) days after the issuance of the Notice of Award including with the PERT–CPM and S-Curves.

ADVANCE PAYMENT:
The mobilization fee will be equal to 10% of the Contract Cost. (Annex E, 4.1 Advance Payment of the 2016 Revised -IRR of RA No. 9184)

PROGRESS PAYMENT:
The first progress billing shall be allowed only after 30% physical accomplishments of the whole project. Subsequent progress billing shall be after 60%, 80% and 100% accomplishments verified and certified by the Procuring Entity's representative/s.
Materials and equipment delivered on the site but not installed shall not be included for payment.

RETENTION MONEY
Progress payments are subject to retention of ten percent (10%) referred to as the "retention money". The total retention money shall be due for release upon final acceptance of the works. (Annex E, 6.0 Retention Money of the 2016 Revised-IRR of RA No. 9184)

TEMPORARY FACILITIES and STAGING AREA:
A portion of the Women's Park Parking Area will be provided to the Contractor for the location of Temporary Facilities and Staging Area on the "Start Date".

VARIATION ORDERS – CHANGE ORDER/EXTRA WORK ORDER:
Variation Orders may be issued by the Department to cover any increase/decrease in quantities. Including the introduction of new work items that are not included in the original contract or reclassification of work items that are either due to change of plans, design or alignment to suit actual field conditions resulting in disparity between the preconstruction plans used for purposes of bidding and the "as stake plans" or construction drawings prepared after a joint survey by the Contractor and the Government after award of the contract, provided that the cumulative amount of the positive or additive Variation Order does not exceed 10% of the original contract cost.

EQUIVALENCY AND CODES:
Whenever reference is made in the contracts to specific standards and codes to be met by the goods and materials to be furnished and work performed or tested the provisions of the latest current edition or revision of the relevant standards and codes in effect shall apply, unless otherwise expressly stated in the Contract. Where such standards and codes are national, or relate to a particular country or regions, other administrative standards that ensure a substantially equal or higher quality than the standards and codes specified will be accepted prior to the Procuring Entity's Representative's prior review and written consent. Differences between the standards specified and the proposed alternative standards shall be fully described in writing by the Contractor and submitted to the Procuring Entity's Representative at **least twenty-eight (28) days** prior to the date when the Contractor desires the Procuring Entity's Representative's consent. In the event Procuring Entity's Representative determines that's such proposed deviations do not ensure substantially equal; or higher, the Contractor shall comply with the standards specified in the documents.

CERTIFICATE OF COMPLETION:
The issuance of the Certificate of Completion will be after the validation by the representative/s of the procuring entity that all scope of works including the variation orders and the rectified punchlist.

ARCHITECTURAL WORKS TECHNICAL SPECIFICATIONS

I. GENERAL REQUIREMENTS

SECTION 1: DEFINITION OF TERMS

1.1 **CONTRACTOR** shall mean the person, company or firm whose proposal has been accepted by the Owner and includes is personally authorized representative, successors or permitted assignees. He is responsible to the Owner thru the Project Manager and Construction Manager.

1.2 **SUB-CONTRACTOR or SUPPLIER** shall mean any person, firm or corporation entering into agreement with the Contractor for the performance of the Contractor's obligation or any part thereof under the Contract. He is responsible to the Owner thru the Project Manager.

1.3 **CONTRACT** shall mean the written agreement entered into by the Owner and the Contractor for the performance of work shown on the drawings and as described in the Specification, including the information for Bidders, the Proposal and all bid documents issued by the Owner prior to the opening of bids.

1.4 **SPECIFICATION**shall mean written or printed description of work to be done describing qualities of materials and mode of construction.

1.5 **DRAWINGS** shall mean the drawings issued together with the Specification to prospective bidders, showing the location, characteristics, extent, form and details of the work to be done under the Contract.

1.6 **APPROVED** means approval in writing including subsequent written information of previous verbal approval. "Approval" shall also mean the same thing abovementioned.

SECTION 2 : DRAWINGS AND SPECIFICATION

2.1 It is the intent of the specification and drawings that all materials, labor, tools, equipment and plant and services, supervision, which are required to dully complete the work as shown and specified therein are to be done so by the Contractor.

2.2 The Drawings and Specification are meant to be complementary to each other and what is called for by one shall be called for by both.

Any apparent conflict between the Drawings and Specification and any controversial or unclear points in either shall in writing to Architect. Failure of the contractor to inform the architect within fifteen (15) calendar days after the award of contract, the final decision of the architect is executory for implementation. The contractor shall report ring during construction. At the completion of the work, said copy of the plans shall be submitted to the owner for its copy and file.

SECTION 3 : REFERENCE LINES AND ELEVATION

3.1 The Contractor shall establish stakes, marking lines and elevation required for construction work, referred from reference points and elevation pointed out by Engineer/Architect. The contractor shall be responsible for maintaining the correct alignment and position of these stakes as required by the Engineer throughout the life of the Contract. The Contractor shall use surveyor's transit in determining all control lines and elevation required for the construction work.

SECTION 4 : MATERIALS AND EQUIPMENT INCORPORATED IN THE WORK

4.1 All materials and equipment to be incorporated in the work shall be new, of current manufacture and conforming to the requirements of the drawings and the specification. The Project Manager may require the contractor to its manufacturer of materials to make actual testing of samples prior to installation. For all approved materials, the contractor shall submit a warranty certificate to the owner during, on or before the turnover of the project.

4.2 Mere inspection, acceptance and certification for payment of any equipment or materials as part of the work which are found defective, non-complying after inspection does not release the contractor from the responsibility of replacing or repairing it at his own expense.

SECTION 5 : CONTRACTOR'S RESPONSIBILITY OF THE CONTRACT WORK

5.1 The Contractor shall be responsible for the complete work or portion thereof until that it is wholly turned over and accepted by the Owner through the Project Manager or Construction Manager. He shall repair or restore and rebuild at his expense any damage thereto due to faults and action of elements, or other causes except damages due to enforceable or cataclysmic natural phenomena.

5.2 For accidents:

5.2.1 The contractor shall bear all losses or damages from accidents, which may occur to a person or persons on account of the prosecutors of work until possession is taken over by the Owner.

5.2.2 The contractor shall hold himself of solely responsible for all liabilities under the existing compensation laws regarding injuries and/or death of workmen connected with this work.

SECTION 6 : LAWS, RULES AND REGULATIONION

6.1 The Contractor shall comply with all national and local laws, rules and regulations regarding the health and safety or workmen, wages, labor codes, tax laws, buildings and construction rules and regulation and shall save the Owner, Architects, Engineers and The Project Manager or CM harmless in any0 third party claims and liabilities resulting from Contractor's noncompliance therewith.

SECTION 7: PERMITS AND LICENSES

7.1 The Contractor at his expense shall obtain all necessary permits and licenses and charges, taxes, and fees for the lawful prosecution of the contract.

SECTION 8 : CONTRACT TIME

8.1 The work to be done under this Contract shall consist of furnishing of all labor, materials (except those furnished by the Owner or by Others) equipment, supervision, facilities and performing all other related works necessary for the complete construction within the time specified in the Proposed Time Schedule attached in strict compliance with the contract drawings, specification and other related documents. The Bidders shall examine the site, drawings, specification schedules and all instruct. Failure to do so will be at the Bidder's that is aware of any concurs with all of the requirements or conditionincorporated in the invitation to bid.

SECTION 9 : PROGRESS SCHEDULES

9.1 The Contractor shall submit progress schedules showing the order of his proposed work sequences complete with the dates within which such work sequences will be started and completed. Such schedules shall be submitted within seven (7) calendar

days after the receipt of Notice To Award/To Proceed and subject to the approval of the Construction Manager and Owner. The contractor shall also submit their S-curve, Critical Path Method (CPM), and Bar chart for the project. This should follow the prescribed form.

SECTION 10 :SANITARY PROVISION AND FIRE PROTECTION

10.1 The Contractor's employees and men shall use designated comfort rooms outside the construction site and he shall be responsible for clean up of such comfort rooms upon leaving the place of work each day and after completion of the project.

10.2 The Contractor shall provide, as many portable fire extinguishers deemed necessary while performing the work.

10.3 The Contractor shall take extra care in the storage of flammable materials.

10.4 There shall be no smoking, cooking or eating allowed at the site premises during and after work. Eating, and smoking shall only be allowed at a designated area, and the contractor shall be responsible for proper clean up thereafter.

SECTION 11: AUTHORITY OF THE PROJECT MANAGER/ CONSTRUCTION MANAGER

11.1 The Project Manager/Construction Manager shall decide on any and all quest, which may arise as to the quality and acceptability of materials furnished and work performed and as to the manner of performance and rate of progress of work, and shall decide on all , which may arise as to the acceptable fulfillment of the terms of the Contract.

SECTION 12 : ADJUSTMENTS OF DISPUTES

12.1 Claims for adjustments of disputes must be made and submitted in writing by the Contractor within ten (10) days after the date of issue of the order dealing therewith and any disagreement with the interpretation of the plans and/or the Specification, made by the Engineer/Architect, must likewise be asserted and submitted in writing by the Contractor within ten (10) days from the date of such interpretation.

SECTION 13 : INSPECTION

13.1 The Project Manager/Construction Manager shall be allowed access to all parts of the work at all times and shall be furnished such information and assistance by the contractor as may be required to make a complete and detailed inspection.

SECTION 14 : REMOVAL OF DEFECTIVE AND UNAUTHORIZED WORK

14.1 Any defective work whether the result of poor workmanship of defective materials, damages through carelessness, or of other cause, found to exist prior to acceptance of or final payment for the work, shall be removed immediately, replaced by work and materials conforming to the Specification, or shall be remedied otherwise in an acceptable manner.

14.2 Work done contrary to or regardless of the instruct of the Project Manager or C.M. work done beyond the lines shown on the plans or as given, except as therein provided, or extra work correction work done without authority will be considered as unauthorized and will not be paid for. All correction work of any description and removal and replacement of unsatisfactory materials shall be done at the contractor's expense.

SECTION 15 : FINAL INSPECTION

15.1 Upon due notice from the Contractor of presumptive completion of the entire project, the Project Manager or Construction Manager shall make a semi final inspection, and if all construction contemplated by the contract is found completed to his satisfaction, such inspection shall constitute final acceptance and the contractor shall be notified of such acceptance in writing ten (10) days or as soon as thereafter as practicable. 7

15.2 If, however, at any semi-final inspection, any work in whole or in part is found unsatisfactory, the Project Manager or Construction Manager. shall give the contractor instruct which he shall forthwith comply with and execute. Another inspection shall be made which shall constitute the final inspection if the work has been found complete & satisfactorily implemented.

SECTION 16 : SUPERINTENDENCE AND SUPERVISION

16.1 The Contractor shall assign a competent Project Engineer and necessary assistants such as Architectural Draftsman, Engineers and Safety Engineer, satisfactory to the Construction Manager and Project Technical Group. The Superintendent shall represent the Contractor at his absence and all direct given to him by the construction shall be as binding as if given to the Contractor.

SECTION 17 : AS-BUILT DRAWINGS

17.1 The Contractor shall maintain at the jobsite two sets of full sized contract drawings showing any deviation which have been made from the contract drawings, including buried or concealed construction and utility features which are revealed during the course of construction special attention shall be given to recording the horizontal and vertical location of all buried utilities that differ from the contract drawings. These drawings shall be available for review by the Project Manager/Construction Manager (CM) at all times. Upon completion of the work the marked 5 sets of prints and one set of reproducible as-built drawings on Mylar or sepia prints shall be delivered to the Project Manager. Requests for partial payments will not be approved if the marked prints are delivered to the Project Manager/Construction Manager.

SECTION 18 : UAP DOCUMENT 301 / OTHER CONDITION

18.1 All applicable articles and clauses of the general condition, which are not in conflict with the condition herein stated, shall form part of this document.

18.2 OTHER CONDITION

18.2.1 Coordinate with the Architect thru the construction manager for any discrepancies found in all drawings and specification before execution of work.

18.2.2 Coordinate with other trades to avoid conflict prior for final implementation of work.

18.2.3 Other materials not mentioned in all construction documents (drawings and specification) but are necessary for the proper completion of the work must be furnished and executed by the contractor without entailing any additional cost involved.

18.2.4 Verify actual condition and dimens in the field of work and fit detail accordingly. Submit shop drawings for Architects final approval prior for final execution and implementation of the work.

SAFETY, SANITATION AND SECURITY REQUIREMENTS

SECTION 1 : CONTRACTOR'S ACCIDENT PREVENTION PLAN FORMAT

1.1 The following guidance is provided for the preparation of contractor accident prevention plans. The accident prevention plan needs to address the following:

A. Administrative Section

1. Administrative responsibilities for affecting the Accident Prevention Plan. (Identification and accountability of Contractor's Safety Engineer Responsible for accident prevention and enforcement of condition stipulated in this section).
2. Local requirements, if any, which must be complied with: i.e., noise control, traffic problems, etc.
3. Method the prime Contractor proposes to control and coordinate work of his Subcontractors.
4. Plans for layout of temporary construction buildings and facilities, including how Contractor plans to control those of Subcontractors.
5. Plans for initial indoctrination, continued safety education, and training for the Contractor's employees.
6. Plans for traffic control and marking of hazards to cover haul roads, street intersect, utilities, restricted areas, etc.
7. Plans for maintaining continued job cleanup, safe access and egress.
8. Plans for fire protection and dealing with emergencies (ambulance service, fires, etc.).
9. Plans for inspection of the jobsite by competent persons including reports to be kept, results of the inspect, and corrective act taken.
10. Procedures to be used for accident investigation.
11. Details of fall protection systems
12. Procedure for security of site, personnel and materials.

B. Accident Reporting

1. All accidents which occur shall be investigated and reported in accordance with requirements of agency having jurisdiction.

C. Prohibit

1. Smoking shall not be allowed within work and storage premises.
2. Drinking of liquor of any kind shall not be allowed within the site.
3. Gambling of any type is strictly prohibited within the site.
4. Carrying of firearms, knives, blades, and other such instruments is strictly prohibited within the site.

SECTION 2 : SANITATION

2.1 Water

1. Adequate supply of potable drinking water shall be supplied to workers.
2. Drinking water shall be dispensed by means which prevents contamination.

2.2 Toilets

1. Toilets shall be so construed that the occupants shall be protected against weather and falling objects.
2. Adequate ventilation and lighting shall be provided and all windows and vents screened.

3. Provision for routinely servicing and cleaning all toilets and disposing of the sewage shall be established before placing toilet facilities into operation. The method of sewage disposal and location selected shall be in accordance with local health regulation.

2.3 Washing Facilities

1. Washing facilities shall be provided to maintain healthful and sanitary condition.

2. Each washing facility shall be maintained in a sanitary condition.

2.4 Food Service

1. Mess facilities shall be operated and maintained in compliance with the health and sanitation authority.

2. An adequate number of sturdy waste receptacles shall be provided in the food service area. They shall be emptied at least daily and maintained in a sanitary condition. They shall be provided with solid tight fitting covers and plastic bag garbage liner.

3. All food service operation shall be carried out in a sanitary manner, kept uncontaminated throughout the storage, preparation, and serving process.

4. Workers shall not be allowed to eat within the project work area. Contractor shall provide a separate area for eating facilities.

2.5 Mosquito and Pest Control

1. Regular mosquito fogging, fumigation and extermination of cockroaches, flies and rodents for workers sleeping quarters and work area shall be conducted once a month during the construction duration.

SECTION 3 : MEDICAL AND FIRST AID REQUIREMENTS

3.1 General

1. Prior to start of work, arrangements shall be made for medical facilities, ambulance service and medical personnel to be available for prompt attention to the injured and consultation on occupational health.

2. Communication and transportation to effectively care for injured workers shall be provided. A properly equipped emergency first aid unit shall be provided during work hours at site.

3. Identification and directional markers shall be provided to readily denote location of first aid stat.

4. When persons are expose to epoxy resins, hydrocarbons, solvents, cement, lime or other dermatitis- producing substances, ointment recommended by the manufacturer for the specific exposure shall be available.

5. First aid station shall be in accordance with the recommendation of a licensed physician.

6. The contents of first aid kits shall be checked by Contractor at least weekly when work is in progress to insure that expended items are replaced.

7. A qualified first aid attendant shall be on duty in the station at all hours when work is in progress.

SECTION 4 : PERSONAL PROTECTION APPAREL AND SAFETY EQUIPMENT

4.1 General

1. Personal protective devices shall be used as required.

2. Hard-hats and shoes shall be worn by all persons who are engaged in work.

3. Welding operation shall require goggles, face masks, shields, or helmets, suitable to the type of work.

4. Drop lines, lanyards and lifelines independently attached or attended, shall be used when performing such work on hazardous areas or other unguarded location.

5. Uniform: All works shall wear T-shirts, color coded and marked by company name per trade. All workers shall wear I.D.

6. Masks and suitable clothing shall be sworn by persons, engaged in work using toxic or harmful substances or producing irritants such as dust or fumes. Gloves shall be provided to workers whose nature of work calls for such protection.

4.2 Protective Headgear

1.1 All persons working on or visiting non-administrative activities (i.e., construction, operation, and maintenance) shall be provided with and required to wear protective headgear.

SECTION 5 : LIGHTING

5.1 General

5.1.1 Construction site offices, stairways, passageways, construction roads and working areas shall be lighted while work is in progress by at least the following minimum light intensities:

LIGHTING INTENSITY

FACILITY NAME OF FUNCTION FOOT-CANDLES

Accessways – General Indoor - 5

Accessways – General Outdoor - 3

Administrative Areas (Offices, Conference Rooms) - 50

Construction Areas

- Indoor – General - 10
- Outdoor – General - 3
- Concrete Placement Operation - 10
- Excavation and Fill Areas - 5

Exitways, Walkways, Ladders, Stairways - 10

Mechanical and Electrical Equipment Rooms - 10

First Aid Stat - 30

Toilets and Wash Rooms - 10

General Underground Work Areas - 10

5.1.2 All stairways, floor openings, pits, shafts, excavation, etc. into which people can accidentally fall shall be adequately lighted. Lighting shall be connected to emergency genset. All stairs within the basement construction shall be provided with emergency lights of nickel cadmium rechargeable battery type.

SECTION 6 : MATERIAL HANDLING, STORAGE AND DISPOSAL

6.1 General

6.1.1 All material in bags, containers, bundles, or stored in tiers with loading to be confined within the structure design shall be stacked, limited in height so that it is stable and secured against sliding or collapse.

6.1.2 Accessways shall be kept clear.

6.1.3 Flammable and combustible liquids in a storage building shall be in a NO SMOKING area and separated from combustible construction.

6.1.4 Unauthorized persons shall be prohibited from entering storage areas. All persons shall be in a safe position while materials are being loaded or unloaded.

6.1.5 Materials will not be moved over or suspended above personnel unless positive precaution have been taken to protect the personnel from falling objects.

6.1.6 Persons shall not work or pass under elevation work areas unless protected by overhead protection.

6.1.7 Where the movement of materials may be hazardous to persons, taglines or other devices shall be used to control the loads being handled by hoisting equipment. They shall be nonconductive when used near energized lines.

6.2 Lumber

6.2.1 Lumber shall be stacked to be stable and self-supporting in dry areas.

6.2.2 Reusable lumber shall have all nails withdrawn before it is stacked for storage.

6.3 Floor, Walls and Partition Blocks

6.3.1 Blocks shall be stacked in tiers on solid, level surfaces.

6.3.2 When masonry blocks are stacked higher than 6 feet, the stack shall be tapered back one-half block per tier above the 6-foot level.

6.4 Reinforcing, Sheet and Structural Steel

6.4.1 Reinforcing steel shall be stored in orderly piles away from walkways and roadways.

6.4.2 Structural steel shall be securely piled to prevent members sliding off or the pile toppling over.

6.5 Cylindrical Material

6.5.1 Structural steel, poles, pipe, bar stock, and other cylindrical materials, unless racked shall be stacked and blocked so as to prevent spreading or tilting.

6.6 Sand, Gravel and Crush Stone Operation

6.6.1 Standards for the safe sloping and control of pit walls shall be established and followed by the operation.

6.6.2 Loose, unconsolidated material shall be stripped for a safety distance (at least l0 feet) from the top of pit or quarry walls, and shall be sloped to the angle of repose.

6.6.3 Persons shall not work near or under dangerous banks. Overhanging banks shall be removed and unsafe ground condition shall be corrected, or the areas shall be barricaded and posted.

6.6.4 Baffle boards, screens, cribbing, or other suitable barriers should be provided where movement of material into cuts constitutes a safety hazard.

6.7 Housekeeping

6.7.1 All stairways, passageways, gangways, and accessways shall be kept free of materials, supplies and obstruct at all times. 14

6.7.2 Loose or light material shall not be stored or left on floors that are not closed in, unless it is safely secured.

6.7.3 Tools, materials, extension cords, hose, or debris shall not cause tripping or other hazard.

6.7.4 Tools, materials, and equipment subject to displacement or falling shall be adequately secured.

6.7.5 Empty bags having contained lime, cement, and other dust-producing material shall be removed periodically as specified by the designated authority.

6.7.6 Protruding nails in scrap boards, planks and timbers shall be removed, hammered in, or bent over flush with the wood unless placed in containers or trucks for removal.

6.7.7 Walkways, runways and sideways shall be kept clear of excavation material or other obstruct and no sideways shall be undermined unless shored to carry a minimum live load of one hundred and twenty-five (l25) pounds per square foot (6l0.3 kg/sm).

6.7.8 Form and scrap lumber and debris shall be cleared from work areas, passageways and stairs in and around building storage yards and other structures.

6.7.9 All storage and construction sites shall be kept free from the accumulation of combustible materials. Regular procedure shall be established for cleanup of the area as specified by the designated authority.

6.7.10 Rubbish or combustible material shall be kept from areas where flammable and combustible liquids are stored, handled, or processed.

6.7.11 Accumulation of flammable and combustible liquids on floors, walls, etc. is prohibited. All spills of flammable and combustible liquids shall be cleaned up immediately.

6.7.12 Contractors shall provide sufficient personnel and equipment to insure compliance with all housekeeping requirements.

6.7.13 Contractors will inspect the work area daily for adequate housekeeping and record unsatisfactory findings on the daily inspection report.

6.8 Waste Material Disposal

6.8.1 Scrap lumber shall be placed in piles or waste material and rubbish shall be placed in containers.

6.8.2 Chutes for debris shall be enclosed except for openings equipped with closures at or about floor level for the insertion of materials. Openings shall not exceed 48 inches (l.22m) in height measured along the wall of the chute. Openings at all stories below the top floor shall be kept closed when not in use.

6.8.3 Whenever materials are dropped to any point lying outside the exterior walls of the building, an enclosed chute shall be used. 15

6.8.4 When debris that cannot be handled by chutes is dropped, the area onto which the material is dropped shall be enclosed with barricades not less than 42 inches (l.07m) high and not less than 6 feet (l.83m) back from the projected edge of the opening above. Signs warning of the hazard of falling material shall be posted at each level.

SECTION 7: FIRE PREVENTION

7.1 Fire Protection

7.1.1 Recommendation of NFPA shall be complied within situation not covered in this Section. Where local building codes are established, the most stringent requirements shall apply.

7.1.2 Fires and open flame devices shall not be left unattended.

7.1.3 Smoking shall be prohibited in all areas where flammable combustible, or similar hazardous materials are stored, except in those location specifically designated by the authorities. NO SMOKING signs will be posted in all prohibited areas.

7.2 Flammable and Combustible Materials

7.2.1 All storage, handling, or use of flammable and combustible materials shall be under the supervision of qualified persons.

7.2.2 Electrical lighting shall be the only means used for artificial illumination in areas where flammable materials are present. All electrical equipment and installation shall be in accordance with the National Electrical Code for hazardous location.

SECTION 8 : FIRE PROTECTION

8.1 First Aid Fire Protection

8.1.1 Portable fire extinguishers shall be provided where needed and inspected and maintained in accordance with local Fire Department.

8.1.2 Fire extinguishers shall be suitably placed, distinctly marked, readily accessible, and maintained in a fully charged and operable condition. In accordance with National Fire Protection Association Standard No.l0.

8.1.3 Fire barrels and buckets shall be painted red, marked”For Fire Only". Barrels shall be kept filled at all times.

8.2 Water Supply and Distribution

8.2.1 Water supply and distribution facilities for firefighting shall be provided and maintained in accordance with recommendation of National Fire Protection Association. 16

8.2.2 Vehicles, equipment, materials, and supplies shall not be placed so that access to fire hydrants and other firefighting equipment is obstructed.

8.3 Miscellaneous

8.3.1 When outside help is relied upon for fire protection, a written arrangement shall be made. Standpipe and hydrant connect must be compatible with the equipment of the local fire department.

8.3.2 Emergency Fire, Police and Hospital telephone numbers and reporting instruct shall be conspicuously posted.

SECTION 9: ROPES, SLINGS, CHAINS AND HOOKS

9.1 General

9.1.1 The use of ropes, slings, and chains shall be in accordance with the safe recommendation of their manufacturer and equipment manufacturer. Rigging equipment shall not be loaded in excess of its recommended safe working load as prescribed in latest edition of ANSI B 30.9, Appendix C, and the table in l7. F.0l.

9.1.2 All hooks used to support human loads or loads that pass over personnel shall be closed.

9.1.3 The use of open hooks is prohibited in rigging to lift any load where there is danger of relieving the tension on the hook due to the load or hook catching or fouling.

9.1.4 All equipment for material handling shall be inspected prior to use on each shift and as necessary during its use to insure that it is safe. Defective equipment shall be removed from service.

SECTION 10: MACHINERY AND MECHANIZED EQUIPMENT

10.1 General

10.1.1 Contractor shall designate a competent person to be responsible for the inspection of all machinery and equipment daily and during use to make sure it is in safe operation condition. Tests shall be made at the beginning of each shift during which the equipment is to be used to determine that the brakes and operation systems are in proper working condition.

10.1.2 Machinery or equipment shall not be operation in a manner that will endanger persons or property nor shall the safe operation speeds or loads be exceeded.

10.1.3 All mobile equipment and the area in which they are operational shall be adequately illuminated while work is in progress.

SECTION 11 : RAMPS. RUNWAYS, PLATFORMS, SCAFFOLDS AND TOWERS

11.1 General

11.1.1 Load-bearing structures shall be designed, constructed and maintained in accordance with safety standards and requirement specifically approved by the

designated authority. If these structures, including such accessories as braces, brackets, trusses, screw legs and ladders, are damaged or weakened from any cause they shall be repaired or replaced immediately.

11.1.2 Planning shall be supported or braced to prevent excessive spring or deflection and secured and supported to prevent tipping or displacement.

11.1.3 Employees on ramps, scaffolds, roofs, floors, or other working surfaces from which they may fall 6 feet (l.8m) or more or working over dangerous operation shall be protected by guardrails with intermediate rail and toeboard, catch platforms, temporary floors, safety nets, safety belts, or equivalent.

11.1.4 Overhead protection shall be provided for area exposed to hazards from falling objects.

11.2 Standard Railing

11.2.1 A standard railing shall consist of top rail, intermediate rail, toeboard, and posts, and shall have a vertical height of approximately 42 inches (l.07m) from upper surface of top rail to floor, platform, runaway, or ramp level. The top rail shall be smooth-surfaced throughout the length of the railing. The intermediate rail shall be halfway between the top rail and the floor, platform, runaway, or ramp. The ends of the rails shall not overhang the terminal posts except where such overhang does not constitute a projection hazard.

11.2.2 Railings receiving heavy stresses from employees trucking or handling materials shall be provided additional strength by the use of heavier stock, closer spacing of posts, bracing, or by other means.

11.2.3 A stair railing shall be of construction similar to a standard guardrail but the vertical height shall be not more than 34 inches (86.36 cm) nor less than 30 inches (76.2 cm) from upper surface of top rail to surface of tread in line with face of riser at forward edge of tread.

SECTION 12: EXCAVATION

12.1 General

12.1.1 The sides of all excavation in which employees are exposed to danger from moving ground shall be guarded by a shoring system, 18

sloping of ground, or other equivalent means. All slopes except for solid rock, hard shale, or cemented sand and gravel shall be excavated to at least the angle of repose. The angle of repose shall be flattened when an excavation has water condition, silty materials, loose boulders, and areas where erosion and slide planes appear.

12.1.2 Diversion ditches, dikes, polyethylene sheets, or other means shall be used to prevent surface water entering an excavation and to provide drainage of the area adjacent to the excavation.

12.1.3 Boulders, stumps, or other materials that may slide or roll into the excavation shall be removed or made safe.

12.1.4 Guardrails, fences, or barricades and warning lights or other illumination maintained from sunset to sunup shall be placed at all excavation which are adjacent to paths, walkways, sidewalks, driveways, and other pedestrian or vehicle thoroughfares.

12.1.5 Walkways or bridges with guardrails shall be provided where people or equipment are required or permitted to cross over excavation.

SECTION 13 : WORK IN CONFINED SPACES

13.1 General

13.1.1 Prior to entry into confined or enclosed spaces, a positive procedure to eliminate or control the hazards shall be established.

13.1.2 Enclosed spaces shall include water tanks, pits, vaults, shafts, or other confined spaces, or any place with limited ventilation.

13.1.3 Hazards considered shall include toxic material and vapors, flammable materials and vapors, asphyxiation, and lack of oxygen.

13.1.4 Mechanical exhaust ventilation sufficient to maintain a healthy working atmosphere shall be provided.

13.1.5 Persons working in confined or enclosed spaces shall have a safety harness and life line with an attendant if the atmosphere has oxygen deficiency or contamination sufficient to require respiratory protection. The attendant shall be assigned no other duties. A signal system shall be established.

SECTION 14 : FLOOR AND WALL OPENINGS

14.1 General

14.1.1 All floor and roof holes, such as elevationor pits, sump pits, shafts, stairs, ramps another opening into which persons can accidentally fall shall be guarded by a securely anchored railing with intermediate rail, and toeboard.

TEMPORARY FACILITIES

SECTION 1 : GENERAL

1.1 Summary

1.1.1 This Section specifies requirements for temporary services and facilities, including utilities, construction and support facilities, security and protection.

1.1.2 Temporary utilities required include but are not limited to:

1. Water service and distribution.
2. Temporary electric power and light.

1.1.3 Temporary construction and support facilities required include but are not limited to:

1. Field offices and storage sheds.
2. Temporary roads and paving.
3. Sanitary facilities, including drinking water.
4. Dewatering facilities and drains.
5. Temporary enclosures.
6. Hoists and temporary elevationor use
7. Temporary Project identification signs and bulletin boards.
8. Waste disposal services.
9. Rodent and pest control.
10. Construction aids and miscellaneous services and facilities.

1.1.4 Security and protection facilities required include but are not limited to:

1. Temporary fire protection.
2. Barricades, warning signs, lights.
3. Sidewalk bridge or enclosure fence for the site.
4. Environmental protection.

1.2 Submittals

1.2.1 Temporary Utilities: Submit a schedule indicating implementation and termination of each temporary utility within 15 days of the date established for commencement of the work.

1.3 Quality Assurance 20

1.3.1 Regulation: Comply with industry standards and applicable laws and regulation if authorities having jurisdiction, including but not limited to:

1. Building Code requirements.
2. Health and safety regulation.
3. Utility company regulation.
4. Police, Fire Department and Rescue Squad rules.
5. Environmental protection regulation.

1.3.2 Standards: Comply with NFPA Code 24l, "Building Construction and Demolition Operation,"ANSI-A10 Series standards for "Safety Requirements for Construction and Demolition," and NECA Electrical Design Library "Temporary Electrical Facilities."

1. Refer to "Guidelines for Bid Condition for "Temporary Job Utilities and Services," prepared jointly by AGC and ASC, for industry recommendation.

1.3.3 Electrical Services: Comply with NEMA, NECA and UL standards and regulation for temporary electric service. Install service in compliance with National Electric Code (NFPA 70).

1.3.4 Inspect: Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certificate and permits.

1.4 Project Condition

1.4.1 Temporary Utilities: Prepare a schedule indicating dates for implementation and termination of each temporary utility. At the earliest feasible time, when acceptable to the Owner, change over from use of temporary service to use of the permanent service.

1.4.2 Condition of Use: Keep temporary services and facilities clean and neat in appearance. Operation in a safe and efficient manner. Take necessary fire prevention measures. Do not overload facilities, or permit them to interfere with progress. Do not allow hazardous dangerous or unsanitary condition, or public nuisances to develop or persist on the site.

SECTION 2 : PRODUCTS

2.1 Materials

2.1.1 General: Provide new materials; if acceptable to the Architect, undamaged previously used materials in serviceable condition may be used. Provide materials suitable for the use intended.

2.1.2 Lumber and Plywood: Comply with requirements as per manufacturer's standards.

2.1.3 Roofing Materials: Provide pre-formed metal roofing on roofs of job built temporary offices, shops and sheds, as approved by the Project Manager.

2.1.4 Paint: Comply with requirements based on manufacturer's standards.

1. For job-built temporary offices, shops, sheds, fences and other exposed lumber and plywood, provide exterior grade acrylic-latex emulsion over exterior primer.
2. For sign panels and applying graphics, provide exterior grade alkyd gloss enamel over exterior primer.
3. For interior walls of temporary offices, provide two coats interior latex flat wall paint.

2.1.5 Tarpaulins: Provide waterproof. Fire-resistant, UL labeled tarpaulins with flame-spread rating of l5 or less. For temporary enclosures provide translucent nylon reinforced laminated polyethylene or polyvinyl chloride fire retarding tarpaulins.

2.1.6 Water: Provide potable water approved by local health authorities.

2.1.7 Open-Mesh Fencing: Provide ll-gauge, galvanized 50mm, chain link fabric fencing l800 mm high with galvanized barbed wire top strand and galvanized steel pipe posts, 38mm I.D. for line posts and 64mm I.D. for corner posts, when required by the Project Manager.

2.2 EQUIPMENT

2.2.1 General: Provide new equipment; if acceptable to the Architect, undamaged, previously used equipment in serviceable condition may be used. Provide equipment suitable for use intended.

2.2.2 Water Hoses: Provide 200mm heavy-duty, abrasion-resistant, flexible rubber hoses 30000 mm long, with pressure rating greater than the maximum pressure of the water distribution system; provide adjustable shut-off nozzles at hose discharge.

2.2.3 Electrical Outlets: Provide properly configured NEMA polarized outlets to prevent insertion of 110-120 volt plugs into higher voltage outlets. Provide receptacle outlets equipped with ground-fault circuit interrupters, reset button and pilot light, for connection of power tools and equipment.

2.2.4 Electrical Power Cords: Provide grounded extension cords; use "hard-service" cords where exposed to abrasion and traffic. Provide waterproof connectors to connect separate lengths of electric cords, if single lengths will not reach areas where construction activities are in progress

2.2.5 Lamps and Light Fixtures: Provide general service incandescent lamps of wattage required for adequate illumination. Provide guard cages or tempered glass enclosures, where exposed to breakage. Provide exterior fixtures where exposed to moisture.

2.2.6 Temporary Offices: Provide prefabricated or mobile units or similar job-built construction with lockable entrances, operable windows and serviceable finishes. Provide heated and air-conditioned units on foundat adequate for normal loading.

2.2.7 Temporary Toilet Units: Provide self-contained single-occupant toilet units of the chemical, aerated recirculation, or combustion type, properly vented and fully enclosed with a glass fiber reinforced polyester shell or similar non-absorbent material.

2.2.8 First aid Supplies: Comply with governing regulation.

2.2.9 Fire Extinguishers: Provide hand-carried, portable UL-rated, class "A" fire extinguishers for temporary offices and similar spaces. In other location provide hand-carried, portable, UL-rated, class "ABC dry chemical extinguishers or a combination of extinguishers of NFPA recommended classes for the exposures.

2.2.10 Comply with NFPA 10 and 241 for classification, extinguishing agent and size required by location and class of fire exposure. 22

SECTION 3: EXECUTION

3.1 Installation

3.1.1 Use qualified personnel for installation of temporary facilities. Location facilities where they will serve the Project adequately and result in minimum interference with performance of the Work. Relocation and modify facilities as required.

3.1.2 Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed, or are replaced by authorized use of completed permanent facilities.

3.2 Temporary Utility Installation

3.2.1 General: Engage the appropriate local utility company to install temporary service or connect to existing service. Where the company provides only part of the service, provide the remainder with matching, compatible materials and equipment; comply with the company's recommendation.

1. Arrange with the company and existing users for a time when service can be interrupted, where necessary, to make connect for temporary services. Provide adequate capacity at each stage of construct. Prior to temporary utility availability, provide trucked-in services.
2. Obtain easements to bring temporary utilities to the site, where the Owner's easements cannot be used for that purpose.
3. Use Charges: Cost or use charges for temporary facilities are not chargeable to the Owner or Architect, and will not be accepted as a basis of claims for a change order.

3.2.2 Water Service: Install water service and distribution piping of sizes and pressures adequate for construct until permanent water service is in use.

1. Sterilization: Sterilize temporary water piping prior to use.

3.2.3 Temporary Electric Power Services: Provide weather-proof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics during construction period. Include meters, transformers, overload protected disconnects, automatic ground-fault interrupters and main distribution switch gear.

1. Except where overhead service must be used, install electric power service underground.
2. Power Distribution System: Install wiring overhead, and rise vertically where least exposed to damage. Where permitted, wiring circuits not exceeding 125 Volts, AC 20 ampere rating, and lighting circuits may be nonmetallic sheathed cable where overhead and exposed for surveillance.

3.2.4 Temporary Lighting : Whenever overhead floor or roof deck has been installed, provide temporary lighting with local switching.

1. Install and operation temporary lighting that will fulfill security and protection requirements, without operating the entire system, and will provide adequate illumination for construction operation and traffic. 23

3.2.5 Sewers and Drainage: If sewers are available, provide temporary connect to remove effluent that can be discharged lawfully. If sewers are not available or cannot be used, provide drainage ditches, dry wells, stabilization ponds and similar facilities. If neither sewers nor drainage facilities can be lawfully used for discharge of effluent, provide containers to remove and dispose of effluent off the site in a lawful manner.

1. Filter out excessive amounts of soil, construction debris, chemicals, oils and similar contaminants that might clog sewers or pollute waterways discharge.
2. Connect temporary sewers to the municipal system as directed by the sewer department officials.
3. Maintain temporary sewers and drainage facilities in a clean, sanitary condition. Following heavy use, restore normal condition promptly.

3.2.6 Provide earthen embankments and similar barriers in and around excavation and subgrade construction, sufficient to prevent flooding by runoff of storm water from heavy rains.

3.3 Temporary Construction and Support Facilities Installation

3.3.1 Location field offices, storage sheds, sanitary facilities and other temporary construction and support facilities for easy access.

1. Maintain temporary construction and support facilities until near Substantial Completion. Remove prior to Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities under condition acceptable to the Owner.

3.3.2 Provide incombustible construction for offices, shops and sheds location within the construction area, or within 30 feet of building lines. Comply with requirements of NFPA 24l.

3.3.3 Field Offices: Provide weathertight temporary offices of sufficient size to accommodate required office personnel at the Project site. Keep the office clean and orderly for use for small progress meetings. Furnish and equip offices as follows:

1. Furnish with a desk and chairs, a 4-drawer file cabinet, plan table and plan rack and a 6-shelf bookcase.
2. Equip with a water cooler and private toilet complete with water closet, lavatory and mirror-medicine cabinet unit.

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

3.3.5 Temporary Paving: Construct and maintain temporary roads and paving to adequately support the indicated loading and to withstand exposure to traffic during the construction period. Location temporary paving for roads, storage areas and parking where the same permanent facilities will be location. Review proposed modification to permanent paving with the Architect.

1. Paving: Comply with manufacturer’s standards.
2. Coordinate temporary paving development with subgrade grading compaction, installation and stabilization of subbase, and installation of base and finish courses of permanent paving.
3. Install temporary paving to minimize the need to rework the installation and to result in permanent roads and paved areas that are without damage or deterioration when occupied by the Owner.
4. Delay installation of the final course of permanent asphalt concrete paving until immediately before Substantial Completion. Coordinate with weather condition to avoid unsatisfactory results.
5. Extend temporary paving in and around the construction area as necessary to accommodate delivery and storage of materials, equipment usage, administration and supervision.

3.3.6 Sanitary Facilities include temporary toilets, wash facilities and drinking water fixtures. Comply with regulation and health codes for the type, number, location operation and maintenance of fixtures and facilities. Install where facilities will best service the Project's needs.

1. Provide toilet tissue, paper towels, paper cups and similar disposable materials for each facility. Provide covered waste containers for used material.
2. Toilets: Install self-contained toilet units. Shield toilets to ensure privacy. Use of pit-type privies will not be permitted.

3.3.7 Wash-Facilities: Install wash facilities supplied with potable water at convenient location for personnel involved in handling materials that require wash-up for a

healthy and sanitary condition. Dispose of drainage properly. Supply cleaning compounds appropriate for each condition.

1. Provide safety shower, eye-wash fountains and similar facilities for convenience, safety and sanitary of personnel.

3.3.8 Drinking Water Fixtures: Provide drinking water fountains where indicated, including paper supply.

3.3.9 Drinking Water Facilities: Provide containerized tap-dispenser bottled-water type drinking water units, including paper supply.

1. Where power is accessible, provide electric water coolers to maintain dispensed water temperature at 45 to 55 deg F (7 to l3 deg C).

3.3.10 Dewatering Facilities and Drains: For temporary drainage and dewatering facilities and operation not directly associated with construction activities dewatering requirements of applicable Division-2 Sect. Where feasible, utilize the same facilities. Maintain the site, excavation and construction free of water.

3.3.11 Temporary Enclosures: Provide temporary enclosure for protection of construction in progress and completed, from exposure, foul weather, other construction operation and similar activities.

1. Where heat is needed and the permanent building enclosure is not complete, provide temporary enclosures where there is no other provision for containment of heat. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous condition and effects.
2. Install tarpaulins securely, with incombustible wood framing and other materials. Close openings of 200 square meters or less with plywood or similar materials.
3. Close openings through floor or roof decks and horizontal surfaces with load-bearing wood-framed construction.
4. Where temporary wood or plywood enclosure exceeds 9.00 square meters in area, use UL-labeled fire-retardant treated material for framing and main sheathing.

3.3.12 Temporary Lifts and Hoists: Provide facilities for hoisting materials and employees. Truck cranes and similar devices used for hoisting materials are considered “tools and equipment" and not temporary facilities.

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

1. Project Identification Signs: Engage an experienced sign painter to apply graphics. Comply with details indicated.
2. Temporary Signs: Prepare signs to provide directional information to construction personnel and visitors.

3.3.14 Temporary Exterior Lighting: Install exterior yard and sign lights so that signs are visible when work is being performed.

3.3.15 Collection & Disposal of Waste: Collect waste from construction areas and elsewhere daily. Comply with requirements of NFPA 24l for removal of combustible waste material and debris. Enforce requirements strictly. Do not hold materials more than 7 days requirements strictly. Do not hold materials more than 7 days during normal weather or 3 days when the temperature is expected to rise above 80 deg F (27 deg C). Handle hazardous, dangerous, or unsanitary waste materials separately from other waste by containerizing properly. Dispose of material in a lawful manner.

3.3.16 Rodent & Pest Control: Before deep foundation work has been completed, retain a local exterminator or pest control company to recommend practice to minimize attraction and harboring of rodents, roaches and other pests. Employ this service to perform extermination and control procedures at regular intervals so the Project will be relatively free of pests and their residues at Substantial Completion. Perform control operation in a lawful manner using environmentally safe materials.

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

3.4 Security and Protection Facilities Installation

3.4.1 Except for use of permanent fire protection as soon as available, do not change over from use of temporary security and protection facilities to permanent facilities until substantial completion, or longer as requested by the Architect.

3.4.2 Temporary Fire Protection: Until fire protection needs are supplied by permanent facilities, install and maintain temporary fire protection facilities of the types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA l0 "Standard for Portable Fire Extinguishers" and NFPA 24l "Standard for Safeguarding Construction, Alterat and Demolition Operation".

1. Location of fire extinguishers where convenient and effective for their intended purpose, but not less than one extinguisher on each floor at or near each usable stairwell.
2. Store combustible materials in containers in fire-safe location.
3. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire protection facilities, stairways and other access routes for fighting fires. Prohibit smoking in hazardous fire exposure areas.
4. Provide supervision of welding operation, combustion type temporary heating units, and similar sources of fire ignition.

3.4.3 Permanent Fire Protection: At the earliest feasible date in each area of the project, complete installation of the permanent fire protection facility, including connected services, and place into operation and use. Instruct key personnel on use of facilities.

3.4.4 Barricades, Warning Signs & Lights: Comply with standards and code requirements for erection of structurally adequate barricades. Paint with appropriate colors, graphics and warning signs to inform personnel and the public of the hazard being protected against. Where appropriate and needed provide lighting, including flashing red or amber lights.

3.4.5 Enclosure Fence: When excavation begins, install an enclosure fence with lockable entrance gates. Location where indicated, or enclose the entire site or the portion determined sufficient to accommodate construction operation. Install in a manner that will prevent people, dogs and other animals from easily entering the site, except by the entrance gates.

3.4.6 Covered Walkway : Erect a structurally adequate protective covered walkway for a passage of persons along the adjacent public street. Coordinate with entrance gates, other facilities and obstruct. Comply with regulation of authorities having jurisdiction.

1. Construct using scaffold or shoring framing, waterproofed wood plank overhead decking, protective plywood enclosure walls, handrails, barricades, warning signs, lights, safe and well drained walkways and similar provision for protection and safe passage. Extend the backwall beyond the structure to

complete the enclosure fence. Paint and maintain in a manner acceptable to the Owner and Architect.

3.4.7 Security Enclosure & Lock-up: Install substantial temporary enclosure of partially completed areas of construction. Provide locking entrances to prevent unauthorized entrance, vandalism, theft and similar violation of security.

1. Storage: Where materials and equipment must be stored, and are of value or attractive for theft, provide a secure lock-up. Enforce discipline in connection with the installation and release of material to minimize the opportunity for theft and vandalism.

3.4.8 Environmental Protection: Provide protection, operation temporary facilities and conduct construction in ways and by methods that comply with environmental regulation, and minimize the possibility that air, waterways and subsoil might be contaminated or diluted, or that other undesirable effects might result. Avoid use of tools and equipment which produce harmful noise. Restrict use of noise making tools and equipment to hours that will minimize complaints from persons or firms near the site.

3.5 Operation, Termination and Removal

3.5.1 Supervision: Enforce strict discipline in use of temporary facilities. Limit availability of temporary facilities to essential and intended uses to minimize waste and abuse.

3.5.2 Maintenance: Maintain facilities in good operation in condition until removal. Protect from damage by elements.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation and similar facilities on a 24 hour day basis where required to achieve indicated results and to avoid possibility of damage.

2. Protection: freezing. Maintain markers for underground lines. Protect from damage during excavation operation.

3.5.3 Termination & Removal: Unless the Architect requests that it be maintained longer, remove each temporary facility when the need has ended, or when replaced by authorized use of a permanent facility, or no later than substantial completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with the temporary facility. Repair damaged work, clean exposed surfaces and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of the Contractor. The Owner reserves the right to take possession of Project identification signs.

2. Remove temporary paving that is not intended for or acceptable for integration into permanent paving. Where the area is intended for landscape development remove soil and aggregate fill that does not comply with requirements for fill or subsoil in the areas. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances which might impair growth of plant materials or lawns. Repair or replace street paving, curbs and sidewalks at the temporary entrances, as required by the governing authority.

3. At Substantial Completion, clean and renovate permanent facilities that have been used during the construction period, including but not limited to :

a. Replace air filters and clean inside of ductwork and housings.

b. Replace significantly worn parts and parts that have been subject to unusual operationing condition.

c. Replace lamps that are burned out noticeably dimmed by substantial hours of use.

FINAL CLEANING

SECTION 1 : GENERAL

1.1 Summary

1.1.1 This Section specifies administrative and procedural requirements for final cleaning at Substantial Completion.

1.2 Environmental Requirements: Conduct cleaning and waste disposal operation in compliance with local laws and ordinances. Comply fully with federal and local environmental and anti-pollution regulation.

1. Do not dispose of volatile wastes such as mineral spirits, oil or paint thinner in storm or sanitary drains.

2. Burning or burying of debris, rubbish or other waste material on the premises will not be permitted.

SECTION 2 : PRODUCTS

2.1 Cleaning Agents: Use cleaning materials and agents recommended by the manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property, or that might damage finished surfaces.

SECTION 3: EXECUTION

3.1 Progress Cleaning

3.1.1 Retain all stored items in an orderly arrangement allowing maximum access, not impeding drainage or traffic, and providing the required protection of materials.

3.1.2 Do not allow the accumulation of scrap, debris, waste materials and other items not required for construction of this work.

3.1.3 At least twice each week, and more often if necessary, completely removes all scrap, debris, waste material from the jobsite.

3.1.4 Provide adequate storage for all items awaiting removal from the jobsite, observing all requirements for fire protection and protection of the ecology.

3.1.5 Weekly, and more if necessary, inspect all arrangement of materials stored on the site; restack, tidy, or otherwise service all arrangements to meet the requirements of subparagraph "1" above.

3.1.6 Weekly, and more often if necessary, sweep all areas clean, "Clean" for the purpose of this subparagraph, shall be interpreted as meaning free from dust and other material capable of being removed by use of reasonable effort and handheld broom.

3.1.7 As required preparatory to installation of succeeding materials, clean the structures or pertinent port thereof to the degree of cleanliness recommended by the manufacturer of the succeeding material, using all equipment and materials required to achieve the required cleanliness.

3.1.8 Following the installation of finish floor materials, clean the finish floor daily (and more often if necessary) at all times while work is being performed in the space in which finish materials have been installed. "Clean", for the purpose of this subparagraph, shall be interpreted as meaning free from all foreign material which, in the opinion of the Project Manager, may be injurious to the finish floor material.

3.2 Final Cleaning

3.2.1 General: Provide final cleaning operation when indicated. Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit of work to the condition expected from a commercial building cleaning and maintenance program. Comply with manufacturer's instruction.

1. Comply the following cleaning operation before requesting inspection for Certification of Substantial Completion for the entire project or a portion of the project.

3.2.2 Complete the following cleaning operation before requesting inspection for Certification of Substantial Completion for the entire project or a portion of the project.

1. Clean the Project site, yard and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste materials, litter and foreign substances. Sweep paved areas broom clean. Remove petro-chemical spills, stains and other foreign deposits. Rake grounds that are neither planted nor paved, to a smooth even-textured surface.
2. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
3. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics and similar spaces.
4. Broom clean concrete floors in unoccupied spaces.
5. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
6. Remove labels that are not permanent labels.

Touch-up and otherwise repair and restore marred exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored, or that shown evidence of repair or restoration. Do not paint over “UL" and similar labels, including mechanical and electrical name plates.

8. Wipe surfaces of mechanical and electrical equipment, elevation or equipment and similar equipment. Remove excess lubrication, paint and mortar droppings and other foreign substances.
9. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
10. Clean light fixtures, lamps, globes and reflectors to function with full efficiency. Replace burned out bulbs, and defective and noisy starters in fluorescent and mercury vapor fixtures.
11. Leave the Project clean and ready for occupancy.

3.2.3 Pest Control: Engage an experienced licensed exterminator to make a final inspection, and rid the Project of rodents, insects, and other pests. Comply with regulation of local authorities.

3.2.4 Removal of Protection: Remove temporary protection and facilities installed during construction to protect previously completed installation during the remainder of the construction period.

3.2.5 Compliance: Comply with governing regulation and safety standards for cleaning operation. Remove waste materials from the site and dispose of in a lawful manner.

1. Where extra materials of value remain after completion of associated construction have become the Owner's property, dispose of these materials as directed.

2. Except as otherwise specifically provided, "clean", for the purpose of this Article, shall be interpreted as meaning the level of cleanliness generally provided by skilled cleaners using commercial quality building maintenance equipment and materials.

3.3 Cleaning During Owner's Occupancy

3.3.1 Should the Owner requires occupancy of the work or any portion thereof prior to its completion by the Contractor and acceptance by the Owner, responsibilities for interim and final cleaning of the occupied spaces shall be as determined by the Project Manager in accordance with the General Condition of the Contract.

ARCHITECTURAL WORKS TECHNICAL SPECIFICATION

SECTION 1 : WALL WORKS

1.1 Contractor to construct drywall partition using 12mm thick fiber cement board on both faces with 0.6mm thick x 100mm x 50mm metal studs on 100mm x 50mm x 0.6mm thick metal tracks. Metal stud framing shall be 400mm on center both ways (horizontal and vertical framing). Contractor to consider necessary consumables and accessories required for drywall construction.

1.2 Contractor to construct drywall partition using 12mm thick fiber cement board on both faces with 0.6mm thick x 100mm x 50mm metal studs on 100mm x 50mm x 0.6mm thick metal tracks; and 2-50mm thick 60kg bare blanket type thermal and sound mineral insulation material (submit sample for approval). Metal stud framing shall be 400mm on center both ways (horizontal and vertical framing). Contractor to consider necessary consumables and accessories required for drywall construction.

1.3 Contractor to use 100mm thick concrete hollow blocks with cement plaster on one side and 10mm thick x 300mm x 600mm glazed porcelain wall tile cladding with heavy-duty tile adhesive, complete with tile grout. Contractor to provide reinforcement deformed steel bar for Concrete Hollow Blocks (CHB) standard installation. For further reference, see structural plan and specification.

1.4 Existing marble wall cladding subject for surface repair and crystallization works as per manufacturer's standards.

SECTION 2 : WALL FINISHES

2.1 For all existing interior walls and column surfaces to be retained: contractor shall clean and plaster all damaged surfaces when necessary using skimcoat, following the manufacturer's standard, prior to application of one (1) coat flat latex paint primer and two (2) coats semi-gloss latex paint. Contractor to submit paint swatches for approval.

2.2 New CHB cement plastered walls painting. Contractor to apply skimcoat plaster on both sides and provide necessary preparation prior to final painting as per painting manufacturer's standards; apply one (1) coat acrylic latex flat paint primer and apply two (2) coats acrylic latex semi-gloss top coat paint. Contractor to submit sample swatches for approval.
2.3 New drywall partition subject for painting. Contractor to apply gauze at all joints, putty and sand to cover connections and surface imperfect prior to final application of one (1) coat acrylic latex flat paint primer and apply two (2) coats acrylic latex semi-gloss top coat paint with as per painting manufacturer's specification. Contractor to submit sample swatches for approval. 33

2.4 New toilet wall tiles. Contractor to supply, deliver and install 10mm x 300mm x 600mm glazed porcelain tiles using heavy duty tile adhesive and with anti-bacterial tile grout. Contractor to submit tile samples and tile grout swatches for approval.
2.5 Fiber cement board drywall drop wall painting. Contractor to apply gauze at all joints, putty and sand to cover connections and surface imperfections prior to final application of one (1) coat latex flat paint primer and apply two (2) coats latex semi-gloss top coat paint with as per painting manufacturer's specification. Contractor to submit sample swatches for approval.
2.6 Contractor to retain, repair and crystallize existing marble wall finishes in elevator lobby, verify plans for actual location. Contractor to submit methodology for review and approval prior to crystallization works.

SECTION 3 : FLOOR FINISHES

3.1 Office areas shall be 7mm thick x 500mm x 500mm integrated tufted pattern loop solution dyed 100% synthetic fiber with 4.0mm pile height. Primary carpet tile backing shall be polyester spun bonded and secondary backing shall be condensed vinyl with fiberglass reinforcement; to be installed using carpet tile adhesive as per manufacturer or installer's standards. Contractor to submit sample swatches for approval. Contractor to apply self-levelling cement topping on areas needing surface repair.
3.2 Vinyl tiles shall be 300mm x 300mm x 3mm thick homogenous and resilient type. Contractor to apply self-levelling cement topping at areas subject for vinyl tiles installation as per manufacturer's standard specification. Verify architectural plans for actual location and submit sample for approval.
3.3 Contractor to supply, deliver and install 600mm x 600mm x 12mm thick porcelain tiles with anti-bacterial tile adhesive and tile grout between joints to match existing floor tiles at hallway area. Verify architectural plans for actual location and submit sample for approval.
3.6 Contractor to supply, deliver and install 12mm thick x 600mm x 600mm non-skid, non-vitreous porcelain tiles for toilet flooring. Contractor to use tile adhesive and apply anti-bacterial tile grout at joints, submit tile sample and tile grout swatches for approval.
3.7 The contractor to supply, deliver and install 1.2mm thick x 100mm wide powder coated aluminum door threshold at all doors. Submit sample section and finishes for approval.

SECTION 4 : CEILING FINISHES

4.1 General ceiling works. Ceiling shall be 9mm thick gypsum board on 0.40mm thick x 19mm x 50mm furring channel spaced every 600mm on center both ways and

0.80mm thick x 12mm x 38mm carrying channel spaced every 1200mm on-center both ways; connected to concrete slab using steel angle, no.8 hanger rod, suspension clip and rod joiner system spaced every 600mm on center. Gypsum board surface shall be applied with gauze and to be applied with gypsum putty to cover screws and joints, following manufacturer's standards prior to application of one (1) coat latex flat primer and one (1) coat latex flat top coat paint as per painting manufacturer's standards. Contractor to submit sample swatches for approval.

Contractor to install 25mm x 25mm aluminum w section shadow line profile for all ceiling perimeter, submit sample for approval.

4.2 For all toilet ceiling works. Ceiling shall be 6mm thick fiber cement board on 0.40mm thick x 19mm x 50mm furring channel spaced every 600mm on-center with 0.80mm thick x 12mm x 38mm carrying channel spaced every 1200mm on-center both ways; connected to concrete slab. Contractor use steel angle, no.8 hanger rod, suspension clip and rod joiner system spaced every 600mm on center. Gypsum board surface shall be applied with gauze and to be applied with gypsum putty to cover screws and joints, following manufacturer's standards prior to application of one (1) coat acrylic latex flat paint primer and two (2) coats acrylic latex flat top coat paint as per painting manufacturer's standards. Contractor to submit sample swatches for approval.

Contractor to install 25mm x 25mm aluminum w section shadow line profile for all ceiling perimeter, submit sample for approval.

4.3 Contractor to supply, deliver and install 25mm x 25mm W section aluminum profile for shadow line moulding between walls and ceiling as shown in the plan. Contractor to secure ceiling using necessary fasteners and accessories as per manufacturer's standards. Shadow gap shall be painted to match ceiling paint finish as per paint manufacturer's standards.

4.4 Contractor to supply, deliver and install 15mm thick x 600mm x 600mm acoustic board panel complete with aluminum tee runner system complete with necessary hanger and accessories as per manufacturer's standards. Submit sample acoustic board for approval.

4.5 Existing ceiling to be retained. Existing aluminum framing to be retained and existing acoustic ceiling panel to be retained. Verify reflected ceiling plan for areas where existing ceiling finish is to be retained.

4.6 Existing ceiling system at BLGF area to be retained. Contractor to retained existing and replace worn out or dilapidated ceiling panels with existing dismantled panels from NTRC and FIRB area that are in good condition. Excess panels subject for turn over to end user.

SECTION 5 : LIGHTING FIXTURES

5.1 Contractor to supply, deliver and install 12 watts, 1200 lumens, 6000-6500k/daylight recessed type LED panel light fixture in powder coated aluminum casing with glass polycarbonate cover. Contractor to submit sample for approval.

5.3 Contractor to supply, deliver and install 6 watts, 600 lumens, 2000-2500k/warm white recessed type LED panel light fixture in powder coated aluminum casing with glass polycarbonate cover. Contractor to submit sample for approval.

5.4 Contractor to supply, deliver and install 600mm x 600mm x 12mmH 48W, 4800 lumens, 6000-6500k/daylight slim type LED panel ceiling light fixture with aluminum housing, 100-240Vac Input and 26-30Vdc Output and optical PMMA diffuser. Contractor to submit sample for approval.

5.5 Contractor to supply, deliver and install 300mm x 1200mm x 12mmH 48W daylight slim type LED panel ceiling light fixture with aluminum housing, 100-240Vac Input and 26-30Vdc Output and optical PMMA diffuser. Contractor to submit sample for approval.

5.6 Contractor to supply, deliver and install LED twin head emergency light, 2 x 3 watts, in injection molded thermoplastic ABS housing, with Ni-cd battery. Submit sample for approval.

5.9 LED ceiling mounted signage. Supply, delivery and installation of acrylic type ceiling mounted signage with 4 x 1500mcd 110 deg. LED, green letter color and 600mAh rechargeable Ni-Cd battery for fire exit and toilet signage.

SECTION 6 : DOORS AND WINDOWS

6.1 Glass doors

a. Glass panel shall be 12mm thick clear tempered glass.

b. Top and bottom framing shall be powder coated aluminum FD100 framing aluminum profile. Contractor to submit sample framing section and sample swatches for approval.

c. Hardware. Supply, deliver and install recessed type double action floor spring hinge with hold open function and 1.5mm thick stainless steel universal cover plate; and top pivot hinge. Contractor to submit sample for approval.

d. Door handles. 32mm diameter x 900mm height H-type stainless steel handle in satin finish complete with necessary accessories as per manufacturer's standard. Contractor to submit sample for approval.

e. Accessories. Supply, deliver and install deadbolt lock at bottom glass rail in satin finish. Contractor to verify compatible lock in consideration with manufacturer's standard. Submit sample of accessories for approval.

f. Frosted sticker. Contractor to supply, deliver and install frosted sticker glass doors, 70% of surface area on one side. Contractor to submit sample stickers and install to actual location as per designer's approval.

6.2 **Existing metal doors (Fire exits, AHU room doors, and existing electrical room door)**

a. Door panel. Existing door panel to be retained.

b. Door jamb. Existing door jamb to be retained.

c. Hardware. Existing hardware to be retained.

d. Accessories. Existing accessories to be retained.

e. Finish. Existing door panel and jamb subject for repainting; contractor to repair existing surface and apply necessary putty as per painting manufacturer's standard and to apply one (1) coat epoxy paint primer and two (2) coats epoxy top coat as per painting manufacturer's standard specification. Contractor to submit swatches for approval.

6.3 **Flush Doors with louver panel (Toilet doors and slop sink door)**

a. Flush door. 44mm thick flush door panel with kiln dried wood frame and 6mm thick marine plywood face on both faces as per fabrication standards. Contractor to use kiln dried hardwood material frame for all wood doors. Contractor to supply and install 600mm x 600mm louver panel with wooden louver blades in 50mm x 50mm solid wood frame. Contractor to submit shop drawing for approval.

b. Door jamb. 50mm x 100mm kiln dried solid wood door jamb.

c. Hardware.

a. Hinges. Use 90mm x 90mm x 4mm loose pin butt hinge. Contractor to provide 3 sets per door panel for 2100mm height door leaves and 4 sets per door panel for 2400mm height door leaves.

b. Lockset – use stainless steel standard-duty lever type entrance door lockset in satin nickel finish. Contractor to submit sample for approval.

d. Accessories.

a. Door closer. Supply, deliver and concealed door closer (overhead with slide channel and hold open function) for 50kg in satin nickel finish. Contractor to submit sample for approval.

b. Door stopper. Supply, deliver and install stainless steel zinc alloy base door stopper in satin nickel finish with block rubber per door. Contractor to submit sample for approval.

c. For toilets. Contractor to supply, deliver and install 3mm thick 100mm diameter stainless steel chrome plated sign plate as required. Contractor to submit sample for approval.

e. Finish. Contractor to apply faux wood stain color with clear gloss top coat lacquer; contractor to follow manufacturer's standards for wood stain and top coat application. Contractor to submit sample for approval.

6.4 **Flush Doors with louver panel (Storage room doors)**

a. Flush door. 44mm thick flush door panel with kiln dried wood frame and 6mm thick marine plywood face on both faces as per fabrication standards. Contractor to use kiln dried hardwood material frame for all wood doors. Contractor to supply and install 600mm x 600mm louver panel with wooden louver blades in 50mm x 50mm solid wood frame. Contractor to submit shop drawing for approval.

b. Door jamb. 50mm x 100mm kiln dried solid wood door jamb.

c. Hardware.

a. Hinges. Use 90mm x 90mm x 4mm loose pin butt hinge. Contractor to provide 3 sets per door panel for 2100mm height door leaves and 4 sets per door panel for 2400mm height door leaves.

b. Lockset – use stainless steel standard-duty lever type entrance door lockset in satin nickel finish. Contractor to submit sample for approval.

d. Accessories.

a. Door closer. Supply, deliver and concealed door closer (overhead with slide channel and hold open function) for 50kg in satin nickel finish. Contractor to submit sample for approval.

b. Door stopper. Supply, deliver and install stainless steel zinc alloy base door stopper in satin nickel finish with block rubber per door. Contractor to submit sample for approval.

e. Finish. Contractor to apply faux wood stain color with clear gloss top coat lacquer; contractor to follow manufacturer's standards for wood stain and top coat application. Contractor to submit sample for approval.

6.5 **PWD Wood Panel Door with louver panel**

a. Flush door. 44mm thick flush door panel with kiln dried wood frame and 6mm thick marine plywood face on both faces as per fabrication standards. Contractor to use kiln dried hardwood material frame for all wood doors. Contractor to supply and install 600mm x 600mm louver panel with wooden louver blades in 50mm x 50mm solid wood frame. Contractor to submit shop drawing for approval.

b. Door jamb. 50mm x 100mm kiln dried solid wood door jamb.

c. Hardware.

a. Hinges. Supply, deliver and install recessed type double action floor spring hinge with hold open function and 1.5mm thick stainless steel universal cover plate; and top pivot hinge. Contractor to submit sample for approval.

b. Lockset – supply, deliver and install stainless steel barrel bolt in satin nickel finish. Contractor to submit sample for approval.

d. Accessories.

a. Door closer. Supply, deliver and concealed door closer (overhead with slide channel and hold open) for 50kg in satin nickel finish. Contractor to submit sample for approval.

b. Door stopper. Supply, deliver and install stainless steel zinc alloy base door stopper in satin nickel finish with block rubber per door. Contractor to submit sample for approval.

c. For toilets. Contractor to supply, deliver and install 3mm thick 100mm diameter stainless steel chrome plated sign plate as required. Contractor to submit sample for approval.

d. Kick plate. Contractor to supply, deliver and install 2mm thick x 300mm x 900mm stainless steel kick plate on both faces screwed to door in satin finish.

e. Push plate. Contractor to supply, deliver and install 2mm thick x 125mm x 400mm stainless steel push plate on both faces screwed to door in satin finish.

e. Finish. Contractor to apply water based wood stain color with clear gloss top coat lacquer; contractor to follow manufacturer's standards for wood stain and top coat application. Contractor to submit sample for approval.

6.6 **Operable partition**

a. Operable partition with fabric finish on both side, with STC rating of 50. 102mm thick panel with architectural grade aluminum alloy panel trim, 12mm MDF or 12mm gypsum board with Gauge 20 steel sheet with 50mm thick rockwool at 60kg/cu.m. Complete with retractable upper and floor seals, fixed sweep seals, single action spring loaded cam and spindle with compensating pressure seal mechanism; rail track shall be of architectural grade aluminum alloy with precision bearings. Supplier must have 5 years warranty on materials excluding panel finish. Contractor to submit fabric swatches for approval. Contractor to submit shop drawing prior to purchase for approval.

SECTION 7 : GLASS WORKS

7.1 Glass partition. Supply, delivery and installation of 12 thick tempered glass in powder coated aluminum FD100 frame. Contractor to submit sample section and powder coating swatches for approval.

7.2 Frosted sticker. Contractor to supply, deliver and install frosted sticker at all glass areas with 70% coverage area. Contractor to submit sample stickers for approval. Contractor to verify with interior designer frosted sticker design.

7.3 Facial Mirror. Contractor to supply, deliver and install new 6mm thick facial mirror with 6mm thick marine plywood backing, complete with black screw 6 x 1, S-5 tox, and dow corning non-acetic clear sealant for all toilets. Contractor to submit sample for approval.

7.4 Back Painted Glass Writing Board. Contractor to supply, deliver and install new 6mm thick tempered back painted glass writing board with non-glare properties for

projector purposes with 6mm thick marine plywood backing, complete with black screw 6 x 1, S-5 tox, and dow corning non-acetic clear sealant for all toilets. Contractor to submit sample for approval.

7.5 Existing glass partitions to be retained and relocated. Contractor to dismantle existing glass partitions as per plan and relocate as per new location, verify construction plan. All hardware and accessories are subject for reuse and subject to the contractor's safekeeping. The contractor shall have all dismantled items inspected by the project manager for documentation and all damage and missing hardware and accessories after documentation shall be replaced and repaired by the general contractor in his own expense.

SECTION 8 : MASONRY WORKS

8.1 Lavatory Counter shall be 18mm - 20mm thick granite with 100mm height sinepa. Subsurface shall be 100mm thick reinforced concrete with 10mm diameter deformed reinforcing bars spaced every 600mm O.C. both ways with dowels connected and welded to existing CHB wall partition reinforcing bars. Contractor to submit shop drawing and granite swatches for approval. Contractor to use 45 degrees bird's beak splashboard edge termination and submit sample granite swatches for approval.

8.2 Lavatory Counter to be provided with 150mm height 18mm - 20mm thick granite splash board along perimeter wall. Contractor to use 45 degrees bird's beak splashboard edge termination and submit sample granite swatches for approval.

8.3 Pantry Counter. 18mm – 20mm thick granite counter top with 100mm height sinepa with 45 degrees bird's beak edging termination. Contractor to provide 2 pieces 18mm thick marine plywood substrate mounted on top of base cabinets, bottom board surface subject for 0.8mm thick high pressure laminate white stipple finish. Provide 150mm thick 18mm – 20mm thick granite splash board along wall perimeter with 45 degrees bird's beak edging termination. Contractor to submit shop drawing and granite swatches for approval.

8.4 Cashier counter. 18mm - 20mm thick granite counter with 100mm height fascia on 18mm thick marine plywood substrate with 3mm thick x 50mm x 50mm angular horizontal framing spaced every 600mm and 3mm thick x 75mm x 75mm angular steel framing spaced every 600mm vertical support and bolted to wall and floor. Contractor to provide 6mm thick marine plywood board under cladding in latex painted finish as per manufacturer's standard to cover framing. Contractor to submit shop drawing prior to purchase and implementation.

SECTION 9 : TOILET PARTITION

9.1 Contractor to use 12mm thick machine pressed laminated phenolic board substrate partition with high scratch and impact resistance. Contractor to submit sample of swatches for approval.

9.2 Contractor to use stainless steel indicators, rising hinges brackets, 100mmH adjustable foot, and stopper with hook and toilet paper holder. Contractor to submit samples for approval.

9.3 Contractor to supply, deliver and install aluminum edge and corner profile. Contractor to submit sample section for approval.

9.4 Urinal partition and ledge. Contractor to use 12mm thick phenolic board partition and ledge as per plan, complete with necessary hangers and accessories as per manufacturer and installer's standard. Contractor to submit samples for approval.

SECTION 10 : TOILET FIXTURES

10.1 Water closet – 690mmL x 368mmW x 400mmH elongated type, wash down, vitreous china made, and flush valve type, compatible with 1.1, 1.28 and 1.6 GPF, top inlet commercial toilet with s-trap. Toilet seat shall be soft-close with antibacterial properties; complete with necessary accessories, seals and connectors as per manufacturer's standard. Contractor to submit sample or proposal for approval.
10.2 Water closet sensor type flush valve – Water closet flush valve shall be manual self-closing toilet flush valve with 1.6 GPF; complete with necessary accessories and connectors as per manufacturer's standard. Submit sample for approval.
10.3 Bidet spray – shall be in stainless steel finish (0.25kg weight); complete with necessary accessories and connectors as per manufacturer's standard. Contractor to submit sample or proposal for approval.
10.4 Urinal – 330mm x 315mm x 600mm vitreous china/porcelain, wall hung, top-inlet flushing urinal; 0.5- 2 Liters per flush, complete with necessary accessories, seals and connectors as per manufacturer's standard. Contractor to submit sample or proposal for approval.
10.5 Urinal flush valve – Urinal flush valve shall be manual self-closing urinal flush valve complete with necessary accessories as per manufacturer's standards. Submit product catalogue for approval.
10.6 Lavatory basin (Common toilets) – 600mm x 450mm x 150mm vitreous china; Grade A/ porcelain, vessel type wash basin with round overflow ring, complete with all pipes and fittings. Contractor to submit sample or proposal for approval.
10.7 Basin faucet (Common and PWD toilets) – basin faucet shall be automatic sensor type 220-240v; complete with necessary accessories and connectors as per manufacturer's standard. Contractor to submit sample for approval.
10.8 Under counter wash basin (PWD toilet) – 540mm x 425mm x 170mm depth vitreous china/porcelain, under counter type wash basin with round overflow ring, complete with all pipes and fittings. Contractor to submit sample or proposal for approval.
10.9 Shower fixture. Contractor to supply, deliver and install 3.5kw single point splash proof shower water heater with ELCB, thermal cut-out flow sensor and complete with slide bar and soap holder. Contractor to present product catalogue and specifications for approval.
10.10 Slop sink faucet. Contractor to supply, deliver and install wall mounted brass lever handle heavy-duty hose bibb, made of 100% brass material, capable of enduring pressure rating of 375 psi, 2-way. Submit sample for approval.
10.11 Fixed PWD SS handrail –32mm diameter x 600mm length SUS 304 round tubular steel grab bar with wall plates, escutcheon covers and mounting accessories as per manufacturer' standards.
10.12 Upturned PWD toilet grab bar – 32mm diameter x 600mm length SUS 304 upturned and ergonomic round tubular steel grab bar complete with wall plates, hinges and mounting accessories as per manufacturer's standards.
10.13 Toilet paper roll holder with cover plate – stainless steel SUS 304 surface mounted toilet paper roll with cover lid complete with necessary accessories as per manufacturer's standards. Submit sample for approval.
10.14 Automatic soap dispenser – 700mL 110mmL x 100mmW x 165mmH ABS plastic automatic sensor soap dispenser powered by 4 pcs 1.5V AA batteries complete with necessary mounting accessories. Submit sample for approval.
10.15 Shower curtain rod – aluminum chrome finish telescope shower rod curtain. Submit sample for approval.

10.16 Shower curtain – 1800mm height polyester waterproof shower curtain complete with hook rings.

SECTION 11 : PANTRY FIXTURES AND ACCESSORIES

11.1 Pantry sink – chrome finish stainless steel L796mm x W498mm x D180mm single bowl upper-counter insert type kitchen sink with drain board with corrosion resistance property. Contractor to provide necessary seals at perimeter as per manufacturer's standards.

11.2 Pantry sink faucet mixer – stainless steel chrome finish faucet mixer faucet with brass fittings H121 x L222mm with minimal lead traces in waterways and corrosion resistance.

11.3 The contractor to supply, deliver and install 0.75HP – 250v continuous feed type food waste disposer with permanent magnet motor, torque master grinding system, 3-bolt mounting system, corrosion resistance, bio shield, removable splashguards, 2700rpm, 1400mL capacity and wall air switch. Submit product catalogue and specifications for approval.

SECTION 12 : MISCELLANEOUS WORKS

12.1 Built-in undercounter cabinetry works. Contractor to supply, deliver and install 18mm thick marine plywood substrate with 0.8mm high pressure laminate finish on both faces (faux wood high pressure laminate for exterior and white stipple high pressure laminate for interior) and 1.0mm thick PVC edgeband to match approved HPL finish; provide 2 layers of adjustable shelves using 18mm thick marine plywood substrate with 0.8mm thick white stipple finish HPL on all faces and 1.0mm thick PVC edgeband to match laminate. Cutting, lamination and edging are to be machine applied. Hardware and accessories shall be continuous aluminum flush pull handle, SUS 304 soft-close concealed cabinet hinges, shelf support fir adjustable shelves and necessary accessories as per manufacturer's standards. Contractor to verify pantry counter detail for reference; submit sample of hardware, laminate swatches, and shop drawing for architect's approval prior to fabrication.

12.2 Built-in overhead cabinetry works. Contractor to supply, deliver and install 18mm thick marine plywood substrate with 0.8mm high pressure laminate finish on both faces (faux wood high pressure laminate for exterior and white stipple high pressure laminate for interior) and 1.0mm thick PVC edgeband to match approved HPL finish; provide 2 layers of adjustable shelves using 18mm thick marine plywood substrate with 0.8mm thick white stipple finish HPL on all faces and 1.0mm thick PVC edgeband to match laminate. Cutting, lamination and edging are to be machine applied. Hardware and accessories shall be SUS 201 satin stainless half–H type 288mmL cabinet handle, SUS 304 soft-close concealed cabinet hinges, shelf support fir adjustable shelves and necessary accessories as per manufacturer's standards. Contractor to verify pantry counter detail for reference; submit sample of hardware, laminate swatches, and shop drawing for architect's approval prior to fabrication.

SECTION 13 : WATERPROOFING WORKS

13.1 Existing and new toilets, and slop sink flooring and its perimeter walls 300mm from finish floor line subject for water proofing application. Contractor to use cementitious crystallization waterproofing using crystalline waterproofing

formulation of selected blends of cement, fine quartz sand and active chemical constituents; with excellent adhesion to all cement based substrates. Contractor to follow manufacturer's standards for application. Contractor to submit proposals for approval. Contractor to conduct flood testing per area for 24 hours and to submit flood test certification per area for verification and confirmation of construction project manager.

SECTION 14: OTHER CONSIDERATIONS

14.1 The contractor shall consider all necessary guidelines in consideration with COVID-19 prevention and management such as:

 DPWH DO No 35, Series of 2020 – Construction Safety Guidelines for the Implementation of All DPWH Infrastructure Projects During the COVID-19 Public Health Crisis.

 DPWH DO No 39, Series of 2020 – Revised Construction Safety Guidelines for the Implementation of Infrastructure Projects During the COVID-19 Public Health Crisis, repealing Department Order No. 35, Series of 2020.

 Other pertinent Government Guidelines that is required for consideration due to COVID-19 Pandemic.

End of Specification

MECHANICAL WORKS TECHNICAL SPECIFICATIONS

1.01 GENERAL DESCRIPTION:

A. The work to be done under this Specification consists of the fabrication, furnishing, delivery and installation, complete in all details, testing and commissioning of this subcontract, at the subject premises and all work materials incidental to the proper completion of the installation, except those where same shall conflict with Codes, etc.., which latter shall then govern. The requirements with regard to materials and workmanship specify the required standard for the furnishing of all labor, materials, and appliances necessary for complete installation of the work specified herein and indicated in the drawings. The Specifications are intended to provide a broad outline of the required equipment, but are not intended to include all details of design and construction.
The term "Contractor" in this specification means "Sub-contractor" unless otherwise specified.

B. SCOPE OF WORK

Under this section of the specifications, provide all labor, materials and equipment and perform all the work necessary for the complete execution of all the work as shown on Drawings and Specified in this specification.
Scope of work shall include but not be limited to the following principal items of work for Air-Conditioning and Mechanical Ventilation System, Smoke Extraction System, Pressurization System, Fresh Air System, Gas Piping System and Carbon Monoxide Monitoring System.

1. Supply and installation of air conditioning ductwork and accessories such as dampers, diffusers, test holes, access panels.

2. Supply and installation of balancing valves and automatic air vents.

3. Supply and installation of insulation for ductwork, chilled water piping and air conditioning equipment.

4. Supply and installation of variable refrigerant flow (vrf) air conditioning equipment, electrical panels and controls.

5. Supply and installation of automatic control for air conditioning unit.

6. Supply and installation of refrigerant pipes, special pipes and pipe insulation.

7. Testing balancing and commissioning

8. Free maintenance for a period of 12 months after practical completion

9. Supply of manufacturer's recommended spare parts.

10. Furnishing and installation of instruction and identifications boards, charts, signs and markers, to include operating methods and instructions.

11. Priming and finish painting of cladded and exposed piping and other part of chilled water and refrigerant piping.

12. Miscellaneous items and other related materials required for the satisfactory completion of the air conditioning and ventilation system to include metal works, hangers, supports, anchors, bolts, bracing, vibration isolators, equipment concrete pads, and its accessories.

13. Securing and payment of permits, licenses and bonds for the construction purposes, including approval from local government unit.

14. Contingency to include the furnishing of written one (1) year warranty upon completion works.

15. Securing and payments of all Contractor's taxes, VAT, etc.

16. Furnishing and installation of instruction and identifications boards, charts, signs and markers, to include operating methods and instructions.

17. Priming and finish painting of cladded and exposed piping and other part of chilled water and refrigerant piping.

18. Preparation and submission of As-Built drawings in reproducible sheets including two (2) white prints copies at no cost to the Owner(s).

C. WORK NOT INCLUDED:

1. All builder's work,
2. All cutting and patching of concrete openings.
3. Electric power terminating to disconnect.
4. Water supply to equipment connection.

D. BUILDING PROVISION

Certain provisions have been made in the Building for the accommodation of the installation. These provisions include space allocation, holes through beams and structural slabs, etc. the provisions so made are shown on the Drawings. Before proceeding with the Works, the Sub-Contractor is to check and confirm that the provisions are satisfactory for the Works, and where necessary, additional information and requirements is to be furnished.

It is the Sub-Contractor's responsibility to ensure that the Main Contractor is informed of all holes and any other provision requested in the structure.

Any subsequent structural openings required due to negligence in providing sleeves beforehand shall be at the expense of the Sub-Contractor unless they are covered on a duly authorized variation order issued by the Project Manager.

All pipe sleeves shall be supplied and installed by the Sub-Contractor. The Main Contractor shall ensure that the fixing is good and the sleeves will not be shifted or moved by concreting or by the trades.
It is also the Sub-Contractor's responsibility to check and ensure that all holes, openings etc., are provided correctly during construction of the building.

PART 2.00

2.01 OTHER APPLICABLE STANDARD OR CODE FOR TGIS SUB-CONTRACT:

A. CODE:

1. Applicable local ordinances of Municipal Government.

2. Philippine Mechanical Engineering Code 2012

3. Philippine Plumbing Code.

4. National Electrical Code.

5. Philippine Electrical Code.

B. STANDARD:

1. Underwriters Laboratories (UL)
2. American Society of Testing and Material (ASTM)

3. American National Standard Institute (ANSI)

4. National Electrical Manufacturer's Association (NEMA)

5. American Society of Mechanical Engineers (ASME)

6. Factory Material Engineering Corporation (FM)

7. National Fire Protection Association (NFPA)

8. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE)

9. American Refrigeration Institute (ARI)

Proof of conformance shall be submitted to the Project Manager for approval.
Nothing contained in these specifications or shown on the drawings shall be constructed as to conflict with national and local ordinances or laws of the Philippines. All such laws and ordinance form part of this specification.

2.02 SERVICE AND MAINTENANCE DURING DEFECTS: LIABILITY PERIOD:

A. During the Defects Liability Period, in addition to requirements included in applicable specifications, the sub-contractor shall be entirely responsible for:

1. Carrying out regular inspections and full servicing of all plant installed under this specification.

2. Providing a "call-out" service for breakdowns, at any time during the "Plant Operating Hours" specified below.

B. If, during the Defects Liability Period any item of equipment should fail as a result of lack of proper servicing, faulty materials or workmanship, or defective equipment design, then promptly replace all such equipment at no cost and with minimum inconvenience to the Owner.

1. Allow to work overtime to meet the requirements.

2. Where overseas equipment is involved, allow to airfreight any parts needed.

3. If, during the Defects Liability Period, system and/or equipment cease to operate within the design parameters for the Work, then promptly attend to such deficiencies and rectify them without delay.

4. The cost of providing the above service shall be included in the bid.

C. The sub-contractor's order for all equipment shall include the warranty service for same, for the duration of the specified Defects Liability Period. This is to ensure that the manufacturer or supplier's agent is responsible for the servicing of his own equipment.

2.03 PAINTING:

1. All works except steel with chrome plated finish, aluminum, copper or stainless steel shall be primed and painted unless otherwise approved by the Project Manager.

2. Before painting, the surface of the metal works shall be completely clean and free from rust, scale and grease.

3. Non-galvanized surfaces other than nuts, bolts and washers that may have to be removed for maintenance purpose, shall receive painting comprising the primary coat of rust inhibiting paint, three coats of the finished color. If the Project Manager consider painting not satisfactory, more coating shall be applied without extra cost.

4. Painting of cased electrical equipment, electrical accessories, and electrical fittings to meet the color requirements, stipulated in this specification, is not allowed.

5. All exposed metal parts such as cover plates for any pipe fittings, conduit and accessories, etc. shall be painted with a suitable color to match the interior finish of a particular location as approved by the Project Manager.

6. Submit color samples and material of the finishing coats to the Project Manager for approval prior to any painting.

7. Paints of synthetic material such as PVC or plastic shall be chemically compatible with the material being painted.

8. Paints of synthetic materials shall be as recommended by the material manufacturers.

9. Paints for special materials shall be as recommended by the material manufacturers.

10. Rubber and neoprene products shall not be painted.

11. Non-galvanized metal work fabricated on site inside false ceiling and pipe duct shall be painted with minimum two (2) coats of primer and rust inhabiting coat. Overcoat finish is not required. Manufacture Product in false ceiling and pipe duct such as pipes, air handling unit, fan coil unit, light fittings, electrical panels shall be painted as specified unless it is complete with galvanized surface.

2.04 LONG-TERM GUARANTEES:
A. All long-term guarantees extending beyond Defects Liability Period shall be turned over to Owner at Final Completion. These shall be assigned in favor of the Owner.

2.05 BASIC SUBMITTAL ITEMS:
The following states the basic submittal which shall be included in additional to these specified elsewhere:

A. MANUFACTURER'S DATA:
1. VRF
2. AHU
3. Fan Coil Unit
4. Electric Motor Controls
5. Motors
6. Automatic Control
7. Insulation
8. Valves
9. Fittings
10. Water Treatment
11. Electrical switchgear, cables, starters, etc.
13. Motor control centers and control panels.
14. Filters
15. Diffusers and air fittings
16. Valves and water side fitting and gas side fitting
17. Automatic temperature controls (Direct Digital Controls)
18. Fire rated sealant

B. SHOP DRAWINGS:
1. VRF outdoor unit installation
2. VRF indoor unit installation
3. Plans related to latest false ceiling plans
4. Ductwork and pipe work installation

C. CERTIFICATE OF COMPLIANCE:
1. Insulation
2. Adhesive
3. Sheet metal
4. Pipe material
5. Electrical Accessories
6. Controls
7. Fire rated sealant

D. TYPE TEST CERTIFICATE:
1. All motor control centers
2. Electrical switchgears and starters

SECTION 15100 DUCTWORK AND ACCESSORIES

1.01 GENERAL REQUIREMENTS

Section 15000, "General Requirements, Mechanical," with the additions and modifications specified herein, applies.

A. SCOPE OF WORK

The work involves the supply and installation of ductworks and its accessories including dampers, fire dampers, hangers, diffusers, registers, grilles, troffers, flexible ducts, sound attenuators, filters, louvers, access panels flow and pressure test ports.

1.02 SMACNA DUCT CONSTRUCTION MANUALS:

The SMACNA recommendations shall be considered as mandatory requirements. Substitute the word "shall" for the world "should" in these manuals.

1.03 CORROSION PREVENTION

Special protection is not required for equipment that has a zinc coating conforming to ASTM A 386 or a duplex coating of zinc and paint. Where expressly stipulated in equipment requirements paragraph below, the affected equipment item shall be protected by the manufacturer with a corrosion inhibiting coating or paint system that has been proved capable of satisfactorily withstanding the following test. Test method shall be ASTM B 117. Period of test shall be 125 hours for equipment intended for installation indoors; test period shall be 500 hours for equipment which will be installed outdoors or which will be otherwise subjected to marine atmosphere. Each specimen shall have a standard scratch as defined ASTM D 1654.

A. CRITERIA:

Upon completion of exposure, coating or paint shall show no indication of deterioration or loss of adhesion. Nor shall there be indication of rust or corrosion extending further than 3mm on either side of original scratch.

B. THICKNESS OF COATING

Thickness of coating or paint system on the actual equipment shall be identical to that on the test specimens with respect to materials, conditions of application, and dry film thickness.

1.04 DIMENSIONS

Duct sizes given in the drawings are clear internal dimensions and allowance shall be made for both internal and external insulation and/or acoustic linings where applicable.

2.01 SHEET METAL MATERIALS:

A. GALVANIZED STEEL SHEET

ASTM A52 designation G.90 galvanized and lock forming quality. Thickness and weight shall not be less than that specified in Chapter "DUCT CONSTRUCTION" of ASHRAE HANDBOOK.

C. GALVANIZED STEEL HOT DIPPED AFTER FABRICATION:

ASTM A23
Galvanized steel shall be as manufactured by Philsteel, APO/Puyat Steel

2.02 SHEET METAL WORK:

A. All sheet metal work for the air conditioning and ventilation system shall be furnished, installed, completely connected, cleaned, tested and, adjusted by the Sub-Contractor. This shall include the following major items of work.

B. DUCTWORK FOR CONVENTONAL SYSTEMS:

1. All sheet metal work exposed to the weather and elsewhere as indicated on the drawings, shall be built substantially as shown, of galvanized steel or aluminum steel sheet properly braced and supported and secured to the building construction and/or equipment. Wherever not otherwise specified thickness shall be as follows:

Larger Dimension (US)	Galvanized	Aluminum
Up to 600mm	No. 26 US Gauge	No. 24 US Gauge
600mm to 1200mm	No. 18 US Gauge	No. 20 US Gauge
1200mm and larger	No. 16 US Gauge	No. 18 US Gauge

2. All other ductwork for conventional system, except where otherwise specified, shall be built of best bloom galvanized iron or aluminum of the following thicknesses.

Larger Dimension (US)	Galvanized	Aluminum
Up to 300mm	No. 26 US Gauge	No. 24 US Gauge
325mm to 750mm	No. 24 US Gauge	No. 22 US Gauge
775mm and 1350mm	No. 22 US Gauge	No. 20 US Gauge
1375mm to 2100mm	No. 20 US Gauge	No. 18 US Gauge
Above 2100mm	No. 18 US Gauge	No. 16 US Gauge

3. All exhaust ductwork securing kitchen shall be formed from 304 stainless steel sheet ductworks shall have soldered seams and low points shall have a drain sump. Air tight access door shall be provided every bend and 4m length of minimum size 450 x 450mm. Thickness is similar to that for galvanized iron but with one commercial size larger. Accessories, e.g. damper splitter etc. shall be of stainless steel.

4. Duct shall be braced as follows:

Larger Dimension of Duct (mm)	Size of Brazing Angles (mm)	Distance Between Bracing (mm)
65 – 100	25 x 25 x 3	1.20m
Above	38 x 38 x 3	0.60m

Angle bracing shall be carried around all four sides of duct.

5. Kitchen exhaust duct shall be black iron steel US Gauge#16 with fully welded connection.

2.03 FLEXIBLE DUCTS

UL 181, Class 1. Use to connect between rigid ducts and outlets or terminals. There shall be no erosion, delamination, loose fibers, or odors from the ducts into the air stream. Minimum working pressure shall be 350mm water positive and 40mm negative for low velocity flexible ducts. Flexible ducts shall be maximum 2.40 meters in length. Minimum bend radius shall be twice of the duct diameter.

A. MATERIALS:

Interlocking spiral or helical corrugated type constructed of aluminum.

B. INSULATION AND VAPOR BARRIER:

ASTM C 553; 25mm nominal thickness and 32 kg/m3 density. The insulation shall be sheathed with vapor barrier having a maximum permeability of 0.02 perm per ASTM E96, Procedure C. THERMOBREAK or approved equal.

C. JOINTS

Make airtight slip-joints sealed with pressure-sensitive vapor seal adhesive tape or duct sealer and secured with sheet metal screws. To prevent insulation compression, place 50mm wide by 25mm thick closed cell foam plastic spacers over the joints under vapor barriers. To provide a vapor tight joint, use a corrosion-resistant steel aluminum clamp over such spacers.

2.04 DUCTWORK INSULATION

Use in low pressure ducting particularly on branch ducts. It can operate at 996 Pascal (4") water column static pressure and velocities of 25.4 m/sec (5000 fpm).

A. MATERIALS:

Closed Cell Crosslinked Polyolefin Insulation, made of material such as Polyethelene based Crosslinked, factory applied reinforced aluminum foil and acrylic adhesive backing, 25 kg/cu.m density, maximum 0.32 w/mK at 20ºC, non-hydroscopic, water vapor permeability better than 0.8gm/02/24 hours (90% RG, 38ºC), -80 to 100 ºC service temperature. Class 1 or better fire ratings.

B. VAPOR BARRIER:

The exterior surface shall be fire resistant foil scrim kraft facing. The interior shall be coated with thermosetting acrylic polymer.

C. JOINTS:

Joints are pre-molded double density slip-joint edges.

1.05 ACOUSTICAL DUCT LINING

Flexible or rigid mineral fiber lining. Lining shall not be less than 25mm and where applicable shall be of sufficient thickness to be thermally equivalent to the thickness of insulation of ductwork. Duct sizes indicated shall be increased to compensate for the thickness of lining.

2.06 CASINGS AND PLENUMS:

A. FIELD-FABRICATED COMPONENTS:

Unless otherwise indicated, metal thickness, reinforcements, joint sealing, and fabrication and erection of equipment casings and plenums shall conform to ASHRAE STANDARD.

B. FACTORY-FABRICATED COMPONENTS:

Factory-fabricated and insulated sheet metal may be used if conforming to paragraph "Field-Fabricated Components." The panels shall be of modular design pretested for structural strength, thermal control, condensation control, and acoustical control. The panel joints shall be sealed and access doors shall be gasketed to prevent air leakage. Insulate access doors. Fasteners shall be corrosion resistant.

2.07 DRIP PANS:

Each cooling coil section in both field and factory assembled casings shall be provided with a stainless or galvanized steel drip pan not less than 18-gauge with drain connections. Drip pan shall collect, confine, and disposed of all condensate from cooling coils and attachments, including headers, return bends, distributors, and un-insulated pipe and fittings. Where individual eliminator blades are in section (not in one piece from top to bottom of coil bank), provide auxiliary drip through bottom of each section with drains to drip pans. Insulate drip pans with water impervious insulation of sufficient thickness to prevent condensation formation on the exterior at ambient condition to be encountered.

2.08 DIFFUSERS, REGISTERS, AND GRILLES
A. MATERIAL AND FINISHES:

Construct diffusers, registers and grilles of steel unless otherwise specified. Exterior and exposed edges shall be rolled, or otherwise stiffened and rounded.
Steel part shall factory zinc-phosphate treated prior to priming and painting or have a baked-on enamel finish. Linear diffuser shall be colored anodized aluminum and outdoor air fitting shall be stainless steel. Colors shall be selected or approved by the architect.

2.09 DAMPERS AND DIFFUSERS
A. CEILING DIFFUSERS

Equip with baffles or other devices required to provide air distribution pattern. Provide factory fabricated, single key, volume dampers. Except linear air diffusers, interna; parts shall be removable through the diffuser neck for access to the duct and without the use of special tools.

B. CIRCULAR, SQUARE AND RECTAGULAR DIFFUSER:

Each ceiling diffuser shall consist of four or more concentric circular elements designed to deliver air radially in a generally horizontal direction without excess smudging of the ceiling. The interior elements of the square and rectangular ceiling diffusers may be circular, square or rectangular as manufacturer's standard.

C. PERFORATED PLATE DIFFUSER:

Provide adjustable one-way, two-way, three-way or four-way air patter controls as indicated. Mount perforated diffuser plates flush with finished ceiling. Diffuser face-plates shall not sag or deflect when operating under design conditions.

D. LINEAR AIR DFFUSERS:

Joints between diffuser sections shall appear as hairline cracks. Provide alignment slots for insertion of key strips or other concealed means to align exposed butt edges of diffusers. Equip with plaster frames when mounted in plaster ceiling. Do not use screws and bolts in exposed face of frames or flanges. Metal-fill and ground smooth corner-joints of steel frame and flanges exposed below ceiling. Furnish separate pivoted or hinged adjustable air volume-damper and separate deflection blades. Volume and deflection blades shall be structurally rigid.

E. REGISTERS:

Supply register shall be double-deflection type. Provide volume dampers furnished by the manufacturer. Volume damper shall be of the group operated, opposed blade type and key adjustable by inserting key through face of register. Operating mechanism shall not project through any part of the register face.

F. GRILLES:

Construct and finish as specified above for registers, except that volume dampers shall be omitted.

2.10 DUCT SLEEVES AND PREPARED OPENINGS
A. DUCT SLEEVES AND CLOSURE COLLARS:

Fabricate from 20 gage galvanized steel. Where sleeves are installed in bearing walls or partitions use black steel pipe, standard weight, instead.
B. PREPARED OPENINGS:

Provide 25mm clearance between the ducts and the sleeve.
C. ACCESS DOORS

Door frame shall be welded in place airtight or bolted with air tight foam rubber gasket. Door shall be rigid and airtight with foam rubber gaskets and two or more galvanized steel hinges and tension fasteners. Provide doors as large as practical. Mount doors, if possible, so that air pressure holds them closed.
2.11 DAMPERS AND LOUVERS:

Shall be 2-gauge heavier than ducts in which installed. Dampers shall be opposed-blade type. The construction shall be aluminum or galvanized steel with interlocking edges and maximum 10 inch blade width. Conform to ASHRAE STANDRDS.

A. BACKDRAFT DAMPER (GRAVITY DAMPERS OR SHUTTERS):

Factory fabricated, with delicately balanced blades that open automatically when the fan starts and closed by gravity when the fan stops. Provide the edges of blades with felt or rubber strips to prevent rattling.

B. MANUAL VOLUME DAMPERS:

Balancing, factory-fabricated type. Equip dampers with accessible mechanism such as quadrant operators or 5mm rods brought through the side of ducts with locking set screw and airtight bushings. All air fittings shall be chrome plated with all volume control dampers in both supply and exhaust systems. Quadrants operators and rods will be marked to indicate damper position.

C. LOUVERS:

Fixed type. Fold or bead the edges of the louver blades to exclude driving rain. Louver frame shall be made of 16 gauge aluminum. Provide insect screen constructed of the same type metal as the louvers. Louver depth shall be as indicated.

1. Bird Screens:

With 12mm by 12mm mesh, 1.6mm diameter aluminum wire or 0.33 diameter stainless steel wire. Insect screen frames shall be grooved type with vinyl or neoprene spline insert for securing screen cloth.

2. External Louvers:

Weather proof external louver shall be supplied and installed by the Mechanical Contractor unless otherwise specified.

SECTION 15200 CHILLED WATER PIPING

1.01 GENERAL REQUIREMENTS

Section 15000, "General Requirements, Mechanical," with the additions and modifications specified herein, applies.

1.02 DESCRIPTION OF WORK:

1. Provide the piping system as specified in this section including chilled water, condenser water, and condensate piping, flanges, bolting, gaskets, valves, fittings, pressure containing assemblies, flow measuring equipment and flow control equipment, pressure gauge, thermometers, air release vents, expansion tank, flexible connection, hangers supports, seismic restraints.
2. Miscellaneous piping such as drain pipes bleed off, make-up and vent pipes.
3. Hydrostatic and radiographic testing of pipes.
4. Cleaning, flushing and painting.

1.03 PRESSURE RATING:

In this Section, all components for chilled water and condenser water pipes including pipes, fittings, flanges, valves of all types, strainer, non-return valves etc., shall have working pressure rated at 150 psi unless otherwise stated.

PART 2.00 – PRODUCTS

2.01 WATER PIPING, FITTINGS AND ACCESSORIES:

Materials and dimensions in accordance with ANSI B31.1 Water Piping Systems as used in this paragraph include Chilled Water, Condensing Water piping systems. Piping system shall

be suitable for specified herein shall be compatible with system fluids, and capable of the pressures and temperatures indicated or specified.

A. CHILLED WATER PIPING

Provide Seamless or welded Schedule 40 black steel pipe conforming to ASTM A53, grade A, standard weight.

B. CONDENSATE WATER PIPING AND CONDENSING WATER MAKE-UP WATER PIPING

Provide galvanized mild steel pipe.

C. FITTING FOR STEEL CHILLED WATER PIPING

Malleable iron conforming to ANSI B16.3, Class 150. Fittings sized 40mm and smaller shall be threaded. For pipe sized larger than 50mm the fittings shall be butt-welding type. Flanges shall be welding neck type. All fittings shall be suitable for 1380 kPa (200 psi) hot and cold water service for floors subjected to medium pressure it shall be 210 kpa. working pressure for floors subjected to high pressure. Convoluted steel flanges conforming to ASME Code Section 8 may be used in lieu of ANSI B16.5 flanges.

D. UNIONS:

1. Unions (threaded) for Steel Pipe:

Class 150 50mm and smaller, malleable iron, ground joint and brass seat.

2. Dielectric Union:

Provide insulated union of galvanized steel and female threaded on end. Union shall have water impervious insulation barrier capable of limiting galvanic current to one percent of the short circuit current in a corresponding bimetallic joint. When dry, insulation shall be able to withstand a 600 volt breakdown test.

E. FLANGES:

The raised faces shall be removed when used with flanges having a flat face.

1. Steel flanges:

ANSI B16.5 forged steel, welding type or convoluted stud type conforming to ASME Code Section 8.

2. Cast Iron Screwed Flanges: ANSI B16.1.

3. Bronze Screwed Flanges: ANSI B16.24.

Pipes of 65mm bore and larger connection to valves, equipment and pipe run in plant lower AHU room shall be jointed with flanges unless with the prior approval of the Project Manager. All bolts shall be cadmium plated steel for steel and cast iron flange. Galvanized steel flange shall be applied for galvanized pipe.

F. END CONNECTIONS:

1. Steel Piping

50mm and smaller shall be screwed, socket welded, or grooved; steel piping 65mm and larger shall be flanged, buttwelded, or grooved.
a. Screwed Joints

Thread in accordance with ANSI B2.1
b. Bolting of Flanges:

Material used for bolts and studs shall conform to ASTM A307, grade B, and material for nuts shall conform to ANSI B18.2.1 and ANSI B18.3.2 with threads conforming to ANSI B.1. coarse type with class 2A fit for bolts and studs, and class 2B fir for nuts. Bolts or studs shall extend completely through the nuts and may have reduced shanks of a diameter less than the diameter at root threads. Carbons steel bolts shall have American Standard regular square or heavy hexagon heads and shall have American Standard heavy semi-finished hexagonal nuts.
c. Gaskets:

Fluorinated elastomers, suitable for the pressure and temperature ranges encountered, and compatible with grooves in flanges faces.
d. Branch and Main Pipe Connection:

When branch pipe of 40mm and smaller (galvanized as black steel) is connected to 100mm diameter or smaller main pipe sweep butt weld tee, screw reducing tee or standard tee with reducing bushing shall be applied. For branch pipes or 40mm and smaller tp 125mm and larger main pipe or 50mm and larger to 150mm and larger main pipe, direct butt weld to main pipe wall using weld-o-lets are acceptable.

2.02 VALVES:

Gate, Globe, Angle, Check, Special, and Related Equipment: Shall conform to the following paragraphs. End connections shall conform to paragraph “End Connections” Valves shall have rising stems and shall open when turned counterclockwise.

A. GATE VALVES:

1. Bronze Gate Valves, 50mm and Smaller:

Bronze gate valves, 50mm and smaller, shall be of the wedge disc, rising stem, inside screw type, shall have solder joint ends when used with copper tubing.
2. Steel Gate Valves:

Valves shall be of the open stem and yoke type with solid wedge or flexible wedge disc, with trim of heat and corrosion-resistant steel as recommended by the manufacturer for conditions indicated.
3. Cast Iron Gate Valves, 65mm up to and including 150mm.

Valves shall be open stem and yoke type with valve trim of bronze.

B. GLOBE AND ANGLE VALVES:

1. Bronze type, 50mm and Smaller:

Shall be class specified and screw joint.
2. Steel Type:

Shall have heat and corrosion resistant trim as recommended by the manufacturer for the conditions indicated and provided with tapped drains and brass plugs.
3. Cast Iron Type, 65mm and Larger

Shall have bronze trim, and shall be provided with tapped drains and brass plugs.

C. CHECK VALVES

1. Bronze Type, 50mm and Smaller:

Shall be of the regrinding swing check valve type, and shall be of the 200 pound class.
2. Shall have heat and corrosion-resistant trim as recommended by the manufacturer for the conditions indicated.

3. Swing Check Valves: Shall have bolted caps.

4. Lift Check Valves, 50mm and Smaller: Shall have bolted caps:

5. Cast Iron Check Valves 500mm and Larger:

Shall have bronze trim, and shall be of the non-slam, eccentric disc type for centrifugal pump discharge service. Swing (recoil type) for size from 100 and larger.

D. BALANCING VALVES:

Manual Type:
1. Up to 50mm = Bronze body, regrinding renewable seat ring area plug, rising stem, union bonnet.
2.
3. 65mm to 150mm = Iron body, regrinding renewable seat ring and plug, stainless steel trimmed rising stem.

4. Valves shall have connection for pressure drop measurement and protective caps.

5. Valves shall have concealed presetting and the presetting value shall have readable graduation. There shall be a memory stop to allow closing of the valve and reopened to set point without disturbing the balance.

6. Provide and turnover to the Owner two (2) sets of calibrated direct reading meter for the balancing valves provided. Balancing valves shall be Bell & Gossett, Taco, Armstrong or approved equal.

Automatic Flow Control
1. Automatic flow control valve shall be factory set to limit water flow rate within plus or minus 5% of calibrated rate. Provide duct tile iron body for 65mm dia. and bigger and bronze body for 50mm dia. and below.

2. Internal working parts shall be passivated stainless steel, shall have body pressure tapping for flow measurement.

3. Provide a meter kit supplied by the manufacturer with indicating gauge, quick connector and conversion charts and operating manuals.

4. The automatic flow control valves shall be as manufactured by the Griswold Controls, Flow Con, W.A. Kates Co. or approved equivalent.

E. CONTROL VALVES

A. Valves used for fan coil shall be modulating type. Valve body and seat materials shall be bronze. The inner valve and stem materials shall be stainless steel. The valve shall be of the 2-way types. Valve shall be of the spring return type that will return to their normal position in the absence of control power. The valve shall close upon loss of power. The valve shall have rangeability of 100 to 30, a pressure drop of 42 kPa at full opening and leakage of 0.03% of the flow in cubic meters per hour per every 100 kPa pressure drop.

B. Valve size 50mm and smaller shall be screwed and supplied with union fittings.

F. BALL VALVES:

Valve design shall permit inspection and repair of seats and seals without removing the valve body from the line.

G. DRAIN VALVES:

Shall be gate valves and shall not be smaller than 20mm nominal pipe size, shall have threaded ends, and shall be provided with hose nipple adapters for connecting a hose to lead to a convenient floor drain. The valves shall be manually operated.

H. AIR VENT VALVES:

Shall be manually operated general service type. The valve shall be provided with bronze bodies for size of 12mm and cast iron for size 30mm and above 300 series corrosion resistant steel float, linkage and removable seat of hardened corrosion resistant steel. Air vent valves on water coil shall have not less than 3mm threaded end connections. Valves shall be suitable for hot or cold water service. The valves shall be 30mm pipe size for water mains and 12mm pipe size, minimum for all other applications. Air vent valves shall be provided at all highpoints in the water piping system, at all water coils, and as indicated.

2.03 THERMOMETERS:

A. Thermometer shall be of the mercury-in-glass, red reading type, with 225mm Celcius scale of proper range for the service, accurate to ½ a scale division, enclosed in metal, glass covered case, with magnified mercury columns, stainless steel separable socket connection, straight or angle-mounted as required, and installed in piping systems in such a manner as to be easily read. Provide thermometer wells extension necks where required to clear insulation.

B. **INSTALL WHERE INDICATED ON PLANS AND/OR SCHEMATIC DIAGRAMS AS FOLLOWS:**

1. In supply and return of each chilled water coil and coil assembly in air handling units.

2. Inlet and outlet of fan coil units, provide thermometer wells.

2.04 PRESSURE GAUGES:

A. Pressure gauge shall be Grade A, accurate within 1%, of the Bourdon Tube, spring type, with 100mm~150mm dials (unless otherwise indicated) and with calibrating screws. Gauges shall have plain cases with screwed rings and be fished in black enamel. Each gauge shall be installed with necessary piping, including a shut-off cock and pressure snubber. Gauges shall

not be installed until systems are cleaned. Pressure gauge ranged shall be such that the position of the pointer during normal operation will be 50% of dial range.

B. PRESSURE GAUGE SHALL BE PROVIDED WHERE INDICATED AND AS FOLLOWS:

1. Discharge and suction side of each chilled water incming main line.

2. Supply and return of each main chilled water coil.
3.

2.05 PIPE HANGERS AND SUPPORTS

Black Steel and Galvanized Steel Pipes

Nominal Bore of Pipe (mm)	Spacing (m)
15	1.8
20	2.1
25	2.4
32	2.4
40	2.7
50	3.0
65	3.4
80	3.4
100	3.7
125	4.0
150	4.0

Steel hanger rods minimum sizes or equivalent shall not be less than the following:
12mm rod: up to and including 100mm pipe
19mm rod: Over 100mm and including 200mm pipe

2.01 PIPE SLEEVES

Pipes and tubing which penetrate the building structure shall be provided with pipe sleeves. Materials of pipe sleeves shall be the same as the material of pipe work. Sleeves shall be securely retained in position and location before and during construction. Space between pipe and sleeve, or between insulation of pipe sleeves, shall not be less than 6mm between outside of pipe or insulation, and inside wall sleeves. Pack the annular space with hemp or fiberglass, and seal with elastic cement. Sleeves for un-insulated pipes shall have ends flush with finished wall surfaces and pipe or tubing with outside perimeter of pipe caulked to the sleeve. Sleeves for insulated pipes shall sxtend from 12mm from concrete or masonry ceiling or wall faces and outside perimeter of the insulation shall be caulked to the sleeve on both sides of the faces. Terminal ends of pipes insulation shall be sealed with mastic. Sleeves for lines passing through floors shall extend 75mm above finished floor slab, and shall be caulked to the slab. Lines passing through exterior walls and roof areas shall be equipped with flashing and counter flashing as indicated or as approved to for a watertight roof seal.

2.07 FLEXIBLE CONNECTIONS:

Install flexible connectors or bellow expansion joints as shown on drawings. Flexible section shall consist of rubber, tetraflouroethylene resin, corrosion resistant steel, bronze, monel orgalvanized steel. The material used and the configuration shall be suitable for pressure, temperature and circulation medium. The flexible connection shall be suitable for the service intended. The flexible connection may be reinforce with metal retaining rings, with built-in braided wire reinforcement and restriction bolts or with wire braid cover suitable for the service intended.

2.08 PIPING INSULATION:

CLOSED CELL FLEXIBLE RUBBER

Preformed or sheet foam closed cell flexible rubber insulation fire and smoke rated and maximum K factor of 3.7 X 10 (-2) W/mK at 20ºC.

ITEM	NOMINAL SIZE (MM)	THICKNESS OF INSULATION (MM)
Chilled Water Supply and Return Pipes	Up to 40mm	40
	50mm and above	50
	Located Outdoor	65

SECTION 15400 – VARIABLE REFRIGERANT (FLOW / VOLUME) SYSTEM

1.0 GENERAL REQUIREMENTS

Section 15000, "General Requirements, Mechanical," with the additions and modifications specified herein, applies. The contract drawings indicate the extent and general arrangement of the air conditioning system. Equipment, ductwork, and piping arrangement shall fit into space allotted and shall allow adequate acceptable clearances for installation, replacement, entry, servicing, and maintenance.

A. STANDARD PRODUCTS:

Materials and equipment shall be standard products of a manufacturer regularly engaged in the manufacture of such products, which are of similar material, design and workmanship. The standard products shall have been in satisfactory use for at least 2 years prior to bid opening. The 2-year use shall include application of equipment and materials under similar circumstances and similar size. The 2-years

B. SCOPE OF WORK

The work involves the supply and installation of Variable Refrigerant Flow (VRF) / Variable Refrigerant Volume (VRV) system, consists of an outdoor unit equipped with inverter and dual compressor(s), one or more indoor units integrated system controls, and interconnecting field-provided refrigerant pipe containing various fittings including factory supplied "Branch Kits".

2.0 VARIABLE REFRIGERANT FLOW (VRF) SYSTEM

2.01 OUTDOOR UNIT

1. Unit shall be air cooled, VRF / VRV multi split system consisting of one, two or three outdoor units (combined as one) and multiple indoor units, each having capability to cool the area or room independently.

2. Inverter compressor shall have multi discharge port for optimized pressure control and better balancing. The compressor should have concentrated winding motor and vector control to achieve higher output and better efficiency.

3. Total piping length should be up to 1000 meters, must also have a maximum pipe run of 160 meters and 70m level difference without any oil traps. The 70m level difference is based on the case where the outdoor unit is located above the indoor unit. The level difference is of a maximum of 40m when outdoor unit is located below the indoor unit. The level difference between indoor units in one refrigerant circuit shall be within 18m. Both indoor unit and outdoor unit are factory assembled and tested.

4. Outdoor coils shall be blue-finned coated for extra protection against harsh environment and corrosion.

A. REFRIGERANT CIRCUIT

1. The refrigerant circuit shall include an accumulator, plural electronic expansion valves, one or two oil separators, a receiver and liquid and gas shutoff valves. Filter drier and crankcase heaters are also built in.

2. The outdoor unit shall have scroll type compressor. The indoor unit shall be equipped with an electronic control valve to control refrigerant flow individually.

3. Heat exchanger coil must be three rows and it should have distributor for better heat transfer.

4. Safety Devices: The following safety devices shall be part of the outdoor unit; high pressure switch, fused crankcases heater, fusible plug, thermal protectors for compressor and fan motor, over current protection for inverters, short recycling protection timer.

5. Oil recovery system: Unit shall be equipped with an oil recovery system to ensure stable operation with long refrigerant piping.

6. Oil Equalized System: The outdoor unit with two compressors shall be equipped with an oil equalized system to avoid unbalance oil level.

B. CONTROLS

1. Outdoor unit shall have a minimum of 12 capacities steps to meet load fluctuation and indoor unit individual control in case of inverter series.

2. VTCC or Variable Temperature and Capacity control shall be used to maintain a correct room temperature.

3. Unit shall be equipped with a self-diagnosis circuit for easy maintenance and service

4. The unit shall be operated individually and each having a remote controller with an on/off switch, a fan speed selector, a timer, a thermostat setting button and LCD which indicates temperature setting, operation mode, malfunctions code and filter cleaning timing etc.

5. The remote controller shall memorize the latest malfunction code for easy maintenance.

6. Up to 16 indoor units can be controlled by a single wired remote controller. Group controller must be capable to connect and control 128 indoor units.

C. ACCESSORIES

The following accessories shall be provided:

1. Branch pipe with insulation for quick work and smooth refrigerant flow

2. Wired or wireless remote control.

D. CASING

The outdoor case shall be constructed with galvanized steel finished with powder coat baked enamel paint. Each unit should have removable inspection panel with enough space clearance to allow access to service tool connection, dip switches, auto addressing and error codes. The outdoor unit frame should be completely factory assembled, piped and wired. Should there be dual and triple frame outdoor unit, the pipes should be field connected with factory designed and supplied Y-branch kits to manifold them together into a single refrigerant circuit.

E. REFRIGERANT SYSTEM

The refrigeration system shall consist of a single refrigeration circuit and uses R410A or approved equal refrigerant. The outdoor unit is provided with factory installed components, including refrigerant strainer, check valves, oil separator, accumulator, reversing valve, electronic controlled expansion valve, high and low side charging ports, high pressure safety switch, service valves and interconnecting piping.

F. COMPRESSORS

The outdoor unit shall be equipped with digitally controlled inverter-driven hermetically scroll compressor to modulate capacity from a variable of 15 to 150 Hz in 0.5 Hz increments.

G. OUTDOOR UNIT COILS

The outdoor unit coils shall be of the nonferrous construction with louvers fins on copper tubing, and are protected with an integral metal guard. Coil fins should have factory applied corrosion resistant material with hydrophilic coating.

H. FANS AND MOTORS

The outdoor unit shall include two direct drives, variable speed propeller type fans. The fan motors should have inherent protection, permanently lubricated bearings, and are variable speed with a maximum speed of up to 1,100 rpm. Raised guard should be provided to limit contact with moving parts. The outdoor unity should be vertical discharge type airflow with static pressure capability of up to 0.32”WG.

I. ELECTRICAL

The outdoor unit shall be rated at 480V, 60Hz, 3-phase and should be capable of operating within voltage limits of (=/-10%) rated voltage with overcurrent protection.

2.02 INDOOR UNIT

The indoor units shall be factory assembled, wired, piped, and provided with an internally factory mounted electronic expansion valve, control circuit board, fan, and motor. Each should be designed to operate using 208~230V / 60Hz / 1 Ph power with voltage variation of (+/-10%). The refrigeration circuit should be pressure-tested at the factory and shipped with a holding charge of dry nitrogen gas. The indoor unit shall also be equipped of non-metallic condensate drain pan with insulated flexible condensate drain hose to connect the unit drain pan nipple to a field-provided condensate drain pipe.
The unit coils should be minimum of two rows and are composed of copper tubes with mechanically bonded aluminium fins pressure tested at a minimum of 550 psig.

A. MICROPROCESSOR CONTROLS

The unit shall be provided with an integrated microprocessor-based controller. The controller shall be capable of performing functions necessary to operate the system without the use of a wall mounted controller. The unit shall have temperature thermistor factory mounted in the return air stream. The field supplied communication cable between the indoor units and the outdoor unit shall be of the minimum of 18 AWG, 2-conductor, stranded, ad shielded cable, terminated via screw terminals on the control boards. The microprocessor control boards shall provide the following functions: self-diagnostics, auto restart following power restoration, test run, and will operate the indoor unit using one of five operating modes:
A single indoor unit shall be capable of being controlled by up to two local wired controllers. The microprocessor controls space temperature using the value provided by the temperature senor sensing a space temperature that is farthest away from the temperature set-point.
If the unit is provided with an optional wall mounted local or central controller, displayed diagnostic codes shall be specific, alpha-numeric, and provide the service technician with a reason for the code displayed.

B. INDOOR UNIT COIL

Indoor unit coils shall have minimum of two rows and are composed of copper tubes with mechanically bonded aluminum fins. Coils are pressure tested at a minimum of 551 psig. Units are provided with either a 45° flare or brazed refrigerant pipe connections.
Indoor coils shall be blue-finned coated for extra protection against harsh environment and corrosion.

C. CASING

The unit casing shall be designed to mount on a vertical surface and come complete with an installation mounting template guide and a separate hanging bracket. The unit case is manufactured with coated metal. Cold surfaces are covered with a coated polystyrene insulating material. The unit case is manufactured using ABS polymeric resin and comes with a light matte finish color. The front surface of the unit has an architectural flat panel smoked mirror finish.

D. FAN ASSEMBLY AND CONTROL

The unit should have a single, direct-drive, cross flow tangential Sirocco fan made of high strength polymeric resin material. The fan motor should be brushless, digitally-controlled, design with permanently lubricated and sealed ball bearings. The fan/motor assembly is mounted in vibration attenuating rubber grommets. The fan speed shall be controlled using a microprocessor-based direct digital control algorithm that provides pre-programmed fan

speeds and Fan Only modes and four speeds in the Cooling mode. Fan settings are high, medium, and low. The fan speed algorithm provides a field-selectable fixed-speed or auto-speed setting that changes the fan speed based on the difference between the controller set-point and space temperature.

A. AIR FILTER

Return air is filtered shall have a removable, washable pre-filter equipped with a plasma filter. Filter access is from the front of the unit without the use of tools.

SECTION 15500 NOISE, VIBRATION AND SEISMIC CONTROL

1.01 GENERAL REQUIREMENTS:

The provisions of Section 15000, "General Requirements, Mechanical", apply to this section.

1.02 DESCRIPTION OF WORK:

Provide and install noise, vibration and seismic control as part of supplied equipment or independently from them as specified in this section.

1.03 MACHINERY VIBRATION CRITERIA

Mechanical and electrical machinery and associated piping and ductwork shall be mounted on vibration isolators and seismic snubbers as indicated as indicated or specified and required to minimize transmission of vibrations and structure borne to the building structure or spaces of from the building structure to the machinery.

Minimum isolation efficiencies shall be as follow:

a)	Centrifugal fans with over 900mm wheel and unspecified equipment	95% at rotor speed
b)	Equipment installed at plantroom. Guestroom floors except fan coil units	90% at rotor speed
c)	Screw compressors in roof	98% at rotor speed
d)	Fan coil unit	90% at rotor speed
e)	Pumps at basement and centrifugal fan less 900mm wheel	90% at rotor speed

A. VIBRATION CLASSES

Rotating and reciprocating machinery shall be balanced statically and dynamically. The machinery supporting structure shall not have any natural frequencies within plus or minus 20 percent of the operating speeds. The machinery, when mounted and in operation shall not exceed self-excited vibration velocities given in Table 1 at the points of measurement, operating conditions, and vibration sensitivity range of 10 to 100 Hz specified in ISO 2372. Note, vibration classes in Table 1 are not the same stated in ISO Standard 2372.

TABLE 1
Vibration Classes
Root Mean Square (RMS) Vibration Limit
Velocities in Inches Per Second

	Rotating Machinery		Reciprocating Machinery	
Vibration Class	Rigid & Heavy Rigid & Heavy Foundation (1)	Soft Mounted (2)	Rigid & Heavy Rigid & Heavy Foundation (1)	Soft Mounted (2)
I	0.11	0.18	0.28	0.44
II	0.28	0.44	0.70	1.11

(1) Isolator static deflection less than 0.1 inch
(2) Isolator static deflection greater than 0.3 inch

B. VIBRATION LIMITS:
The RMS vibration limit velocities Table 1 apply to measurements with a filter turned to the operating speed in series with the vibration measuring instrument on the machinery mounted in the vertical, horizontal, and axial directions. These measurements shall be taken at the lowest operating speeds of the components generating self-excited vibration velocities.

C. VIBRATION ANALYZER:
Use a portable analyzer conforming with ISO 954, and with testing equipment and calibration standard referenced to the National Bureau of Standards. The vibration pick up and connecting cable and indicator set shall be operable without damage between -18ºC and 44ºC temperature range at a maximum relative humidity of 95 percent. Analyzer shall be complete with battery pack or 120 volt AC, 60Hz cord, manual, scope jack, DC recorder outlets, and necessary accessories. Analyzer shall contain a tunable filter over the range of one to 10,000 Hz with a maximum 5 percent load band width at 3dB down points.

D. VIBRATION ISOLATION APPLICATION:

The type of isolation, base, and minimum static Deflection shall be as required for each specific equipment application, but not less than that given in the Vibration Isolation Schedule, when supported on a solid, minimum 2406 kg per cubic meter, concrete structural floor slab having a thickness of not less than 100mm. Should vibration isolators installed for the machinery prove inadequate to prevent transmission of machinery vibrations to the building structure or limit machinery vibration originated noise in the building spaces to their specific noise criteria levels and, if the specific limits of Table 1 are exceeded, the isolators shall be replaced with units having the largest deflection that can be practically installed, not less than 25mm greater than the functioning isolators up to a total unit deflection of 125 mm.

E. VIBRATION ISOLATION SCHEDULE AND SELECTION CRITERIA:
The minimum vibration isolation materials and equipment required for each piece of vibration isolated machinery shall be as indicated and selected for the lowest speed of the operating machinery as specified in clause 1.03.
The following correction shall be added to the selection based on massive floor on grade for the concrete slab of this building.

Operating Speed	Allowance
600	25 mm
900	12 mm
1200	11 mm
1500	8 mm
3600	5 mm

F. VIBRATION ISOLATOR PROCUREMENT:

For each piece of machinery to be isolated from vibration, the machinery base, vibration isolators, seismic snubbers, and other associated materials and equipment shall be supplied as coordinated package by a single manufacturer or by the machinery manufacturer. Procure isolators selected to provide a uniform loading and deflection even when the machinery weight is not evenly distributed. This requirement does not include the flexible connectors or the hangers for the associated piping and ductwork.

1.04 SUBMITTALS: Submit the following:

A. MANUFACTURER'S VIBRATION ISOLATION MATERIALS AND EQUIPMENT DATA:

1. Vibration Isolators
2. Seismic Snubber
3. Vertical Stops
4. Flexible Connectors
5. Flexible Duct Connectors
6. Silencers
7. Acoustic Wall Lining

For each type and size of spring type isolators, the spring outside diameter, deflection, operating spring height, solid spring height, the ratio of the outside diameter to the spring height, the load to deflection ratio of the springs, and weight and sizes of structural steel members.

B. CERTIFICATE OF COMPLIANCE:

1. Neoprene
2. Flexible Pipe and Duct Connectors

C. ACOUSTIC TREATMENT:

1. Submit complete catalogue information and shop drawings for sound attenuators including Octave band mid-frequency curves, dynamic insertion loss, pressure drop, materials, etc.
2. Submit noise level curves at octave band mid-frequency for Air Handling Unit. Fans, and Fan Coil Unit for approval.
3. Pressure loss thru the duct lining, acoustic silencers shall be allowed for in the estimation of fan pressure.
4. The Sub-Contractor shall submit calculation supporting selection of air side equipment such as diffuser, opposed blade damper. This calculation has to be prepared and signed by an approved acoustic specialist.
5. Galvanized perforated sheet catalogue.
6. All acoustic treatment calculation and proposal shall be prepared by an approved acoustic specialist.

2.01 MATERIALS AND EQUIPMENT:
Vibration isolators, flexible connectors and seismic snubbers, their components and materials shall be designed for replacement.

A. CORROSSION PROTECTION:
Steel parts of vibration isolators and seismic snubber, except springs, shall be hot dipped galvanized in accordance with ASTM A123. Where steel parts are exposed to the wether, galvanized coating shall be at least 2 ounces of zinc per square foot of surface. Springs shall be neoprene coated.

B. NEOPRENE:
Neoprene material used in vibration isolators and seismic snubbers shall be oil resistant in ccordance with ASTM D 471.

C. FLOOR MOUNTED ISOLATORS:
1. Neoprene Isolation Pads:
Provide neoprene pads at least 6mm thick with cross-ribbed or waffle design. For concentrated loads, provide steel bearing plates bonded or cold cemented to the pads. Size pads for not more than 345 kPa (50 psi) or as recommended by the pad manufacturer.
2. Neoprene Isolator
Provide molded neoprene isolators having steel base plates with mounting holes and at the top, steel mounting plates with mounting holes or threaded insert. Neoprene element shall be designed for operating on a straight line deflection curve abd loaded so that deflection does not exceed 15 percent of the free height of the elements. Elements shall be type and size coded with molded letters or numbers or color coded for capacity identification. Metal parts of neoprene elements shall be completely embedded in neoprene.

D. SPRING ISOLATORS AND PROTECTED SPRING ISOLATORS:
Provide spring isolators or protected spring isolators that are adjustable including laterally stable free standing springs with horizontal stiffness at least 80 percent of the vertical (axial) stiffness. If included, machine attached and floor attached restraining elements shall be separated from metal-to-metal contact by neoprene cushions 3mm thick minimum. Neoprene acoustic friction pads at least 6mm thick shall be provided.
1. Springs:
Springs shall be securely fastened to base and compression plates and designed so spring ends remain parallel during and after deflection to operating height. Outside coil diameter shall be at least 0.8 of the operating height. At operating height, spring shall have additional travel to complete (solid) compression equal to at least 50 percent of the operating deflection to control (solid) compression equal to at least 50 percent of the operating deflection.
2. Mounting and Adjustments:
Provide base and compression plates with mounting holes or threaded fittings. Adjustment leveling bolts shall be rigidly bolted to match machinery or base.

E. SUSPENSION TYPE ISOLATORS:
Provide hangers with suspension type isolators encased in open steel brackets. Isolate hanger rods from isolator steel brackets with neoprene grommets.
1. Suspension Type Neoprene Isolators:

Provide hangers with molded neoprene elements which conform with requirements for "Neoprene Isolators" except that elements shall be double deflection type with at least 9mm deflection.

2. Suspension Type Spring Isolators:

Provide hangers with springs and molded neoprene elements in series. Spring shall conform with requirements for "Neoprene Isolators". Provide isolators with adjustable spring preloading devices where required to maintain constant pipe elevations during installation and when pipe operational loads are transferred to the spring.

F. VERTICAL STOPS:

Stops shall be designed to be out of contact during machinery operation and to act as blocking devices during erection.

G. STEEL EQUIPMENT BASES, PLATFORMS, RAILS AND SADDLES:

Fabricate equipment bases, platforms, rails in accordance with AISC Manual of Steel Construction with AISC structural steel shapes of ASTM A36 steel. Welding shall conform to AWS D1.1. Design and sizes shall be as recommended by the machinery manufacturer and as indicated. Provide machinery bases, platform, rails and saddles of sufficient strength to resist distortion during construction and when machinery is in operation. Design calculations shall show that the maximum stress in any structural steel member will not exceed that allowed by AISC Manual of Steel Construction during machinery operation. Beams shall have a minimum depth of 1/12th of the longest dimension of the base and of the corresponding width and weight given in Table 3.

END OF SPECIFICATION

ELECTRICAL WORKS TECHNICAL SPECIFICATIONS

SECTION 26 00 00 BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Safety considerations for outdoor substations.
2. Raceways.
3. Building wire and connectors.
4. Supporting materials for electrical components.
5. Concrete equipment bases/pads.
6. Touchup painting.
7. Sleeves for raceways & cables.
8. Sleeve seals.
9. Electrical identification.

1.2 ACRONYMS & ABBREVIATIONS

A. EMT: Electrical metallic tubing.
B. FMC: Flexible metal conduit.
C. RSC: Rigid steel conduit.
D. LFMC: Liquidtight flexible metal conduit.
E. RNC: Rigid nonmetallic conduit, Unplasticized Polyvinyl Chloride.
F. PEC: Philippine Electrical Code
G. NFPA: National Fire Protection Association
H. ANSI: American National Standards Institute
I. IMC: Intermediate metal conduit

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver components in factory-fabricated water resistant packaging.
B. Handle components carefully to avoid damage to components, enclosures and finish.
C. Store components in a clean, dry space and protect from weather.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in PEC 2009, Article 1.1, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
B. Compliant with the Latest Edition of Philippine Electrical Code.

1.6 WORK COORDINATION

A. Coordinate chase block-outs, sleeves, and openings with general construction work and arrange in building structure during progress of construction to facilitate the electrical installations that follow.

1. Set inserts and sleeves in poured-in-place concrete, masonry, and other structural components as they are constructed.

B. Sequence, coordinate, and integrate installing electrical materials and equipment for efficient flow of the Work. Coordinate installing large equipment requiring positioning before closing in the building.
C. Coordinate electrical service connections to components furnished by utility companies.

1. Coordinate installation and connection of underground or overhead utility and service, including provision for electric-metering facility.
2. Comply with requirements of the local government and of the utility company.

D. Coordinate location of access for electrical equipment that are concealed/recessed.

Access doors and panels as specified Architectural Schedule.
E. Where electrical identification devices are applied to field-finished surfaces, coordinate installation of identification devices with completion of finished surface.
F. Where electrical identification markings and devices will be concealed by acoustical ceilings and similar finishes, coordinate installation of these items before ceiling installation.

PART 2 - PRODUCTS

2.1 SAFETY CONSIDERATIONS FOR OUTDOOR SUBSTATIONS

A. Signage: Provide warning signage in English, and/or pictograph indicating "DANGER — HIGH VOLTAGE" according to signage requirements of Section 11.8.
B. Metal Enclosures: Use metal enclosures around all live parts.
C. Locks: Provide key interlocks on switchgear doors to prevent access to live parts.
D. Clearances: Refer to the Latest Edition of the Philippine Electrical Code and National Electrical Safety Code (ANSI C.2) for adequate clearances.

2.2 RACEWAYS/CONDUITS & FITTINGS

A. EMT: ANSI C80.3, zinc-coated steel, with compression fittings and/or set screw type. (shall
B. FMC: Zinc-coated steel. ,
C. LFMC: Zinc-coated steel with sunlight-resistant and mineral-oil-resistant plastic jacket.
D. RNC: NEMA TC 2, Schedule 40 PVC, with NEMA TC3 fittings.
E. IMC: ANSI C80.6, UL safety standard 1242, coated in hot galvanized coating on exterior.
F. Raceway Fittings: Specifically designed for the raceway type used.

2.3 CONDUCTORS

A. Conductors, 3.5mm2 and Smaller: Solid copper.
B. Conductors, Larger Than 3.5mm2: Stranded copper.
C. Insulation: Thermoplastic, rated at 75 deg. C minimum.
D. Wire Connectors and Splices: Units of size, ampacity rating, material, type, and class suitable for service indicated.

2.4 SUPPORTING MATERIALS

A. Material: Cold-formed steel, with corrosion-resistant coating acceptable to authorities having jurisdiction.
B. Metal Items for Use Outdoors or in Damp Locations: Hot-dip galvanized steel.
C. Slotted-Steel Channel Supports: Flange edges turned toward web, and 14-mm-diameter slotted holes at a maximum of 50 mm o.c., in webs.
D. Slotted-Steel Channel Supports: Comply with "Metal Fabrications" for slotted channel framing.
1. Channel Thickness: Selected to suit structural loading.
2. Fittings and Accessories: Products of the same manufacturer as channel supports.

E. Nonmetallic Channel and Angle Systems: Structural-grade, factory-formed, glass-fiber resin channels and angles with 14-mm- diameter holes at a maximum of 203 mm o.c., in at least one surface.
1. Fittings and Accessories: Products of the same manufacturer as channels and angles.
2. Entire electrical system shall be fully rated.
F. Raceway and Cable Supports: Manufactured clevis hangers, riser and strut clamps, straps, ceiling trapeze hangers, wall brackets, and spring-steel clamps or click-type hangers.
G. Pipe Sleeves: ASTM A 53, Type E, Grade A, Schedule 40, galvanized steel, plain ends.
H. Cable Supports for Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug for non-armored electrical cables in riser conduits. Plugs

have number and size of conductor gripping holes as required to suit individual risers. Body constructed of malleable-iron casting with hot-dip galvanized finish.
I. Expansion/Anchor: Carbon-steel wedge or sleeve type.
J. Toggle Bolts: All-steel springhead type.
K. Powder-Driven Threaded Studs: Heat-treated steel.

2.5 CONCRETE BASES
A. Concrete Forms and Reinforcement Materials:
B. Concrete: 20.7-MPa, 28-day compressive

2.6 TOUCHUP PAINT
A. For Equipment: Equipment manufacturer's paint selected to match installed equipment finish.
B. Galvanized Surfaces: Zinc-rich paint recommended by item manufacturer.
C. Prevention of Corrosion: For all outdoor applications and all indoor applications in a harsh environment (salt air). Metallic materials shall be protected against corrosion. Equipment enclosures shall have the standard finish and corrosion resistant coating by the manufacturer when used for most indoor installations.
D. Panelboards: Ability to remove access covers is required for maintenance activities. No equipment shall be mounted within 900 mm of the front of the panel.
E. Field Testing: Final test data shall be provided to the COR for forwarding to the Systems Engineer/Condition Monitoring Office/Predictive Testing Group for inclusion in the Maintenance Database.

2.7 SLEEVES FOR RACEWAYS AND CABLES
A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.
B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral water stop, unless otherwise indicated.
C. Sleeves for Rectangular Openings: Galvanized sheet steel with minimum 1.3- or 3.5-mm (0.052- or 0.138-inch) thickness as indicated and of length to suit application.
D. Coordinate sleeve selection and application with selection and application of fire stopping.

2.8 SLEEVE SEALS
A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.
1. Sealing Elements: EPDM interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
2. Pressure Plates: Stainless steel. Include two for each sealing element.
3. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.9 ELECTRICAL SPECIFICATION
A. Refer to Section 26 01 00 “Electrical Idenfication”.

PART 3 - EXECUTION
3.1 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION
A. Comply with NECA 1.
B. Measure indicated mounting heights to bottom of unit for suspended items and to center/top of unit for wall-mounting items.

C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.
D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.
E. Right of Way: Give to raceways and piping systems installed at a required slope.
F. Electrical equipment shall be designed and rated to operate in unusual environmental conditions such as wind-blown sand, salt atmosphere, flooding, ultraviolet rays due to altitude, high winds, etc. Where standard ratings are not available to match environmental conditions, equipment shall be derated as required to compensate for factors such as high altitude and ambient temperature. Equipment installed in conditioned spaces shall be designed and rated for the conditioned ambient.

3.2 RACEWAY APPLICATION

A. Use the following raceways for outdoor installations:
1. Exposed: IMC or EMT
2. Concealed: RNC
3. Underground, Single Run: uPVC.
4. Connection to Vibrating Equipment: LFMC.
5. Boxes and Enclosures: NEMA 250 for boxes and Type 4x for enclosures.
B. Use the following raceways for indoor installations:
1. Exposed: IMC or EMT
2. Concealed: RNC
3. Connection to Vibrating Equipment: FMC; except in wet or damp locations, use LFMC.
4. Damp or Wet Locations: IMC.
5. Boxes and Enclosures: NEMA 250 for boxes, and Type 1 for enclosures, unless otherwise indicated.

3.3 RACEWAY AND CABLE INSTALLATION

A. Conceal raceways and cables, unless otherwise indicated, within finished walls, ceilings, and floors.
B. Install raceways and cables at least 150 mm away from parallel runs of water pipes.
Locate horizontal raceway runs above water piping.
C. Use temporary raceway caps to prevent foreign matter from entering.
D. Make conduit bends and offsets so ID is not reduced. Keep legs of bends in the same plane and straight legs of offsets parallel, unless otherwise indicated.
E. Use raceway and cable fittings compatible with raceways and cables and suitable for use and location.
F. Install raceways embedded in slabs in middle third of slab thickness where practical, and leave at least 25-mm-concrete cover.
1. Secure raceways to reinforcing rods to prevent sagging or shifting during concrete placement/pouring.
2. Space raceways laterally to prevent voids in concrete.
3. Make bends in exposed parallel or banked runs from same centerline to make bends parallel. Use factory elbows only where elbows can be installed parallel; otherwise, provide field bends for exposed parallel raceways.
G. Install pull string in empty raceways. Use monofilament/nylon plastic line with not less than (90-kg) tensile strength. Leave atleast (300 mm) of slack at each end of the pull wire.

H. Install telecommunications and signal system raceways, 50 mm and smaller, in maximum lengths of 45 m and with a maximum of two 90-degree bends or equivalent. Separate lengths with pull or junction boxes where necessary to comply with these requirements in addition to requirements above.
I. Connect motors and equipment subject to vibration, noise transmission, or movement with a maximum of 1830-mm flexible conduit. Install LFMC in wet or damp locations.
Install separate ground conductor across flexible connections.
J. Set floor boxes level and trim after installation to fit flush to finished floor surface.

3.4 WIRING METHODS FOR POWER, LIGHTING, AND CONTROL CIRCUITS
A. Feeders: Type THHN/THWN insulated conductors in raceway.
B. Underground Feeders and Branch Circuits: Type THWN insulated conductors in raceway.
C. Branch Circuits: Type THHN/THWN insulated conductors in raceway.
D. Remote-Control Signaling and Power-Limited Circuits: Type THHN/THWN insulated conductors in raceway for Classes 1, 2, and 3, unless otherwise indicated.
E. LVSG: Type THHN/THWN insulated conductors in raceway and Type "SIS" for control circuits.

3.5 WIRING INSTALLATION
A. Install splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
B. Install wiring at outlets with at least 300 mm of slack conductor at each outlet. Pigtailing conductors is not permitted.
C. Connect outlet and component connections to wiring systems and to ground. Tighten electrical connectors and terminals, according to manufacturer's published torquetightening values. If manufacturer's torque values are not indicated, use those specified in
UL 486A.

3.6 ELECTRICAL SUPPORTING MATERIALS APPLICATION
A. Damp Locations and Outdoors: Hot-dip galvanized materials or nonmetallic, U-channel system components.
B. Dry Locations: Steel materials.
C. Support Clamps for PVC Raceways: Click-type clamp system.
D. Selection of Supports: Comply with manufacturer's written instructions.
E. Strength of Supports: Adequate to carry present and future loads, times a safety factor of at least four; minimum of 90-kg design load.

3.7 SUPPORT INSTALLATION
A. Install support devices to securely and permanently fasten and support electrical components.
B. Install individual and multiple raceway hangers and riser clamps to support raceways.
Provide Clamps, Attachments, and other hardware necessary for hanger assemblies and for securing hanger rods and conduits.
C. Support parallel runs of horizontal raceways together on trapeze- or bracket-type hangers.
D. Size supports for multiple raceway installations so capacity can be increased by a 25 percent minimum in the future.
E. Support individual horizontal raceways with separate, malleable-iron pipe hangers or clamps.
F. Install 6-mm diameter or larger threaded steel hanger rods, unless otherwise indicated.
G. Spring-steel fasteners specifically designed for supporting single conduits or tubing may be used instead of malleable-iron hangers for 38-mm and smaller raceways serving lighting

and receptacle branch circuits above suspended ceilings and for fastening raceways to slotted channel and angle supports.
H. Arrange supports in vertical runs so the weight of raceways and enclosed conductors is carried entirely by raceway supports, with no weight load on raceway terminals.
I. Simultaneously install vertical raceway supports with conductors.
J. Separately support cast boxes that are threaded to raceways and used for fixture support.
Support sheet-metal boxes directly from the building structure or by bar hangers. If bar hangers are used, attach bar to raceways on opposite sides of the box and support the raceway with an approved fastener not more than 610 mm from the box.
K. Install metal channel racks for mounting cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices unless components are mounted directly to structural elements of adequate strength.
L. Install sleeves for cable and raceway penetrations of concrete slabs and walls unless coredrilled holes are used. Install sleeves for cable and raceway penetrations of masonry and fire-rated gypsum walls and of all other fire-rated floor and wall assemblies. Install sleeves during erection of concrete and masonry walls.
M. Securely fasten electrical items and their supports to the building structure, unless otherwise indicated. Perform fastening according to the following unless other fastening methods are indicated:
1. Masonry: Toggle bolts on hollow masonry units and expansion bolts on solid masonry units.
2. New Concrete: Concrete inserts with machine screws and bolts.
3. Existing Concrete: Expansion bolts.

4. Instead of expansion bolts, threaded studs driven by a powder charge and provided with lock washers may be used in existing concrete.
5. Steel: Welded threaded studs or spring-tension clamps on steel.
a. Field Welding: Comply with AWS D1.1.
6. Welding to steel structure may be used only for threaded studs, not for conduits, pipe straps, or other items.
7. Light Steel: Sheet-metal screws.
8. Fasteners: Select so the load applied to each fastener does not exceed 25 percent of its proof-test load.

3.8 IDENTIFICATION MATERIALS AND DEVICES

A. Install at locations for most convenient viewing without interference with operation and maintenance of equipment.
B. Coordinate names, abbreviations, colors, and other designations used for electrical identification with corresponding designations indicated in the Contract Documents or required by codes and standards. Use consistent designations throughout Project.
C. Self-Adhesive Identification Products: Clean surfaces before applying.
D. Tag and label circuits designated to be extended in the future. Identify source and circuit numbers in each cabinet, pull and junction box, and outlet box. Color-coding may be used for voltage and phase identification.
E. Install continuous underground detectable (WARNING tapes) during trench backfilling, for exterior underground power, control, signal, and communication lines located directly above power and communication lines. Locate 150 to 200 mm below finished grade. If width of multiple lines installed in a common trench or concrete envelope does not exceed 400 mm, overall, use a single line marker.
F. Color-code 400/230 Volts system secondary service, feeder, and branch-circuit conductors throughout the secondary electrical system as follows:

1. Phase A: Red.
2. Phase B: Yellow.
3. Phase C: Blue.
4. Neutral: White.
5. Ground: Green.

G. Install warning, caution, and instruction signs where required and needed to ensure safe operation and maintenance of electrical systems and associated systems. Install engraved plastic-laminated instruction signs where instructions are needed for system or equipment operation. Install metal-backed butyrate signs for outdoor items.

H. Install engraved-laminated emergency-operating signs with white letters on red background with minimum 9-mm-high lettering for emergency instructions on power transfer, load shedding, and other emergency operations.

3.9 UTILITY COMPANY ELECTRIC-METERING EQUIPMENT

A. Install equipment according to utility company's requirements. Provide grounding and empty conduits as required by utility company.

3.10 FIRESTOPPING

A. Apply firestopping to cable and raceway penetrations of fire-rated floor and wall assemblies to achieve fire-resistance rating of the assembly.

3.11 CONCRETE BASES/PADS

A. Construct concrete bases of dimensions indicated, but not less than 100 mm (4 inches) wider, in lateral directions, than supported unit. Follow supported equipment manufacturer's anchorage recommendations and setting templates for anchor-bolt and tie locations, unless otherwise indicated. Use 20.7-MPa, 28-day compressive-strength concrete and reinforcement as specified in Division Section "Cast-in-Place Concrete."

3.12 FIELD QUALITY CONTROL

A. Inspect installed components for damage and faulty work, including the following:
   1. Raceways.
   2. Building wire and connectors.
   3. Supporting materials for electrical components.
   4. Electrical identification.
   5. Electric-metering components.
   6. Concrete bases.
   7. Electrical demolition/dismantling.
   8. Cutting and patching for electrical construction.
   9. Touchup painting.

B. Test electric-metering for proper operation, accuracy, and usability of output data.
   1. Connect a load of known kW rating, 1.5 kW minimum, to a circuit supplied by the metered feeder.
   2. Turn off circuits supplied by the metered feeder and secure them in the "off" condition.
   3. Run the test load continuously for eight hours, minimum, or longer to obtain a measurable meter indication. Use a test load placement and setting that ensure continuous, safe operation.

4. Check and record meter reading at end of test period and compare with actual electricity used based on test load rating, duration of test, and sample measurements of supply voltage at the test load connection. Record test results.

5. Repair or replace malfunctioning metering equipment or correct test setup; then retest. Repeat for each meter in installation until proper operation of entire system is verified.

3.13 REFINISHING AND TOUCHUP PAINTING

A. Refinish and touch up paint. Paint materials and application requirements are specified in Division Section "Painting."

1. Clean damaged and disturbed areas and apply primer, intermediate, and finish coats to suit the degree of damage at each location.

2. Follow paint manufacturer's written instructions for surface preparation and for timing and application of successive coats.

3. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.

4. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 26 00 00

SECTION 26 01 01 CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes building wires and cables and associated connectors, splices, and terminations for wiring systems rated 600 V and less.

B. Related Sections include the following:

1. Division 26-series Sections for single-conductor and multiconductor cables, cable splices, and terminations for electrical distribution systems with 2001 to 35,000 V.

1.2 QUALITY ASSURANCE

A. Testing Agency Qualifications: Testing agency as defined by OSHA in 29 CFR 1910.7 or a member company of the International Electrical Testing Association and that is acceptable to authorities having jurisdiction.

1. Testing Agency's Field Supervisor: Person currently certified by the International Electrical Testing Association or the National Institute for Certification in Engineering Technologies to supervise on-site testing specified in Part 3.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in PEC 2009, Article 1.1, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Comply with the Latest Edition of Philippine Electrical Code (PEC).

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

A. Conductor Material: Copper only complying with NEMA WC 5 or 7; solid conductor for 2.0mm diameter only, stranded for 5.5 mm2 and larger. Copper shall be 99 percent conductivity and hard drawn.

B. Conductor Insulation Types: Type THHN-THWN, THW and XLPE.

2.2 CONNECTORS AND SPLICES

A. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

PART 3 - EXECUTION

3.1 CONDUCTOR AND INSULATION APPLICATIONS

A. Service Entrance: Type XLPE 133% insulation level single conductors in raceway.

B. Exposed Feeders: Type THHN-THWN, single conductors in raceway.

C. Feeders Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN and THW, single conductors in raceway.

D. Feeders Concealed in Concrete, below Slabs-on-Grade, and in Crawlspaces: Type THHNTHWN and THW, single conductors in raceway.

E. Exposed Branch Circuits, including in Crawlspaces: Type THHN-THWN and THW, group conductors in raceway.

F. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN and THW, group conductors in raceway.

G. Branch Circuits Concealed in Concrete and below Slabs-on-Grade: Type THHN-THWN and

THW, group conductors in raceway.

H. Underground Feeders and Branch Circuits: Type THHN-THWN and THW, group conductors in raceway.

I. Fire Alarm Circuits: Fire Rated Cable, in raceway.

J. Class 1 Control Circuits: Type THHN-THWN, in raceway.

K. Class 2 Control Circuits: Type THHN-THWN, in raceway.
L. Neutral Conductor: Where a secondary distribution system requires a neutral conductor, a full-sized neutral conductor shall be used throughout the system, such that that neutral conductor is not shared with any other branch circuit or feeder. If the secondary distribution system supports computers or other equipment that generates harmonics, double size neutrals shall be run from the subpanel boards feeding this equipment back to the MDP or service entrance. Neutral buses shall be sized to accommodate these conductors. Insulated equipment grounding conductors run with branch circuits shall be installed such that that conductor is not shared with any other branch circuit.

3.2 INSTALLATION
A. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.
B. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
C. Use pulling means; including fish tape, cable, rope, and basket-weave wire/cable grips that will not damage cables or raceway.
D. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
E. Support cables according to Section 26 00 00 "Basic Electrical Materials and Methods".
F. Seal around cables penetrating fire-rated elements according to Section 26 00 00 Part 3.10 "Fire Stopping".
G. Identify and color-code conductors and cables according to Section 26 00 00 Part 3.8 "Identification Materials and Devices".
H. Install outdoor underground feeders in concrete encased ductbank.
I. Each electronic equipment rack shall be fed by an individual circuit breaker protected branch circuit.

3.3 CONNECTIONS
A. Tighten electrical connectors and terminals according to manufacturers published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A.
B. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
    1. Use oxide inhibitor in each splice and tap conductor for aluminum conductors.
C. Wiring at Outlets: Install conductor at each outlet, with at least 300 mm of slack.

3.4 FIELD QUALITY CONTROL
A. Testing: Perform the following field quality-control testing:
    1. After installing conductors and cables and before electrical circuitry has been energized, test for compliance with requirements.
    2. Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Section 7.3.1. Certify compliance with test parameters.
B. Test Reports: Prepare a written report to record the following:
    1. Test procedures used.
    2. Test results that comply with requirements.
    3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

END OF SECTION 26 01 01

SECTION 26 02 01 GROUNDING AND BONDING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes grounding of electrical systems and equipment. Grounding requirements specified in this Section may be supplemented by special requirements of systems described in other Sections.

B. Standards and Code References:

1. PEC – Philippine Electrical Code, Latest Edition

1.2 QUALITY ASSURANCE

A. Testing Agency Qualifications: Testing agency as defined by OSHA in 29 CFR 1910.7 or a member company of the International Electrical Testing Association and that is acceptable to authorities having jurisdiction.

1. Testing Agency's Field Supervisor: Person currently certified by the International Electrical Testing Association to supervise on-site testing specified in Part 3.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in PEC 2009, Article 1.1, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Comply with PEC 2009, Article 2.90 when interconnecting with lightning protection system.

PART 2 - PRODUCTS

2.1 GROUNDING CONDUCTORS

A. For insulated conductors, comply with Section 26 01 01 "Conductors and Cables."

B. Material: Aluminum, copper-clad aluminum, and copper.

C. Equipment Grounding Conductors: Insulated with green-colored insulation.

D. Grounding Electrode Conductors: Stranded copper cable.

E. Underground Conductors: Bare, tinned, stranded, unless otherwise indicated.

F. Bare Copper Conductors: Comply with the following:

1. Solid Conductors: ASTM B 3.
2. Assembly of Stranded Conductors: ASTM B 8.
3. Tinned Conductors: ASTM B 33.

G. Copper Bonding Conductors: As follows:

1. Bonding Cable: 100 mm2 copper conductor.
2. Bonding Conductor: 30 mm2 or 16 mm2, stranded copper conductor.
3. Bonding Jumper: Bare copper tape, braided bare copper conductors, terminated with copper ferrules; 42 mm wide and 1.5 mm thick.
4. Tinned Bonding Jumper: Tinned-copper tape, braided copper conductors, terminated with copper ferrules; 42 mm wide and 1.5 mm thick.

H. Grounding Bus: Bare, annealed copper bars of rectangular cross section, with insulators as shown on drawings.

2.2 CONNECTOR PRODUCTS

A. Comply with IEEE 837 and UL 467; listed for use for specific types, sizes, and combinations of conductors and connected items.

B. Bolted Connectors: Bolted-pressure-type connectors, or compression type.

C. Welded Connectors: Exothermic-welded type, in kit form, and selected per manufacturer's written instructions.

2.3 GROUNDING ELECTRODES

A. Ground Rods: Stainless steel.

B. Ground Rods

1. Size: 21 mm diameter by 3000 mm long

C. Test Wells: Provide handholes as shown in the drawings.

PART 3 - EXECUTION

3.1 APPLICATION

A. Use only copper conductors for both insulated and bare grounding conductors in direct contact with earth, concrete, masonry, crushed stone and similar materials.

B. In raceways, use insulated equipment-grounding conductors.

C. Exothermic-Welded Connections: Use for connections to structural steel and for underground connections, except those at test wells.

D. Equipment Grounding Conductor Terminations: Use bolted pressure clamps.

E. Ground Rod Clamps at Test Wells: Use bolted pressure clamps with at least two bolts.

F. Grounding Bus: Install in electrical room and in rooms housing service equipment, and elsewhere as indicated.

1. Use insulated spacer; space 25.4 mm from wall and support from wall 150 mm above finished floor, unless otherwise indicated.
2. At doors, route the bus up to the top of the doorframe, across the top of the doorway, and down to the specified height above the floor.

G. Underground Grounding Conductors: Use bare-copper conductor, 95 mm2 minimum.

Bury at least 600 mm below grade or bury 300 mm above duct bank when installed as part of the duct bank.

3.2 EQUIPMENT GROUNDING CONDUCTORS

A. Comply with PEC, Article 2.50, for types, sizes, and quantities of equipment grounding conductors, unless specific types, larger sizes, or more conductors than required by PEC are indicated.

B. Install equipment grounding conductors in all feeders and circuits.

C. Install insulated equipment grounding conductor with circuit conductors for the following items, in addition to those required by PEC:

1. Feeders and branch circuits.
2. Lighting circuits.
3. Receptacle circuits.
4. Single-phase motor and appliance branch circuits.
5. Three-phase motor and appliance branch circuits.
6. Flexible raceway runs.

D. Busway Supply Circuits: Install insulated equipment grounding conductor from the grounding bus in the switchgear, switchboard, or distribution panel to equipment grounding bar terminal on busway.

E. Computer Outlet Circuits: Install insulated equipment grounding conductor in branchcircuit runs from computer-area power panels or power-distribution units.

F. Isolated Grounding Receptacle Circuits: Install an insulated equipment grounding conductor connected to the receptacle grounding terminal. Isolate grounding conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service, unless otherwise indicated.

G. Isolated Equipment Enclosure Circuits: For designated equipment supplied by a branch circuit or feeder, isolate equipment enclosure from supply raceway with a nonmetallic raceway fitting listed for the purpose. Install fitting where raceway enters enclosure, and

install a separate equipment grounding conductor. Isolate equipment grounding conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service, unless otherwise indicated.
H. Nonmetallic Raceways: Install an equipment grounding conductor in nonmetallic raceways unless they are designated for communications cables.
I. Air-Duct Equipment Circuits: Install an equipment grounding conductor to duct-mounted electrical devices operating at 230 V, 60 Hz and more, including air cleaners and heaters.
Bond conductor to each unit and to air duct.
J. Signal and Communication Systems: For alarm, voice, data, and other communication systems, provide insulated grounding conductor in raceway from grounding electrode system to each service location, terminal cabinet, telecommunications rooms, and central equipment location.
K. Metal Poles Supporting Outdoor Lighting Fixtures: Provide a grounding electrode in addition to installing a separate equipment grounding conductor with supply branchcircuit conductors.
L. Common Ground Bonding with Lightning Protection System: Bond electrical power system ground directly to lightning protection system grounding conductor at closest point to electrical service grounding electrode. Use bonding conductor sized same as system grounding electrode conductor, and install in conduit.

3.3 COUNTERPOISE

A. Ground the steel framework of the building with a driven ground rod at the base of every corner column and at intermediate exterior columns at distances not more than 18 m apart. Provide a grounding conductor (counterpoise), electrically connected to each ground rod and to each steel column, extending around the perimeter of the building. Use tinned-copper conductor not less than 100 mm2 for counterpoise and for tap to building steel. Bury counterpoise not less than 450 mm below grade and 600 mm from building foundation.

3.4 INSTALLATION

A. Ground Rods: Install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes.
1. Drive ground rods until tops are 305 mm below finished floor or final grade, unless otherwise indicated.
2. Interconnect ground rods with grounding electrode conductors. Use exothermic welds, except at test wells and as otherwise indicated. Make connections without exposing steel or damaging copper coating.
B. Grounding Conductors: Route along shortest and straightest paths possible, unless otherwise indicated. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
C. Bonding Straps and Jumpers: Install so vibration by equipment mounted on vibration isolation hangers and supports is not transmitted to rigidly mounted equipment. Use exothermic-welded connectors for outdoor locations, unless a disconnect-type connection is required; then, use a bolted clamp. Bond straps directly to the basic structure taking care not to penetrate any adjacent parts. Install straps only in locations accessible for maintenance.
D. Metal Water Service Pipe: Provide insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes by grounding clamp connectors. Where a dielectric main water fitting is installed, connect grounding conductor to street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.

E. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with grounding clamp connectors.
F. Bond interior metal piping systems and metal air ducts to equipment grounding conductors of associated pumps, fans, blowers, electric heaters, and air cleaners. Use braided-type bonding straps.
G. Bond each aboveground portion of gas piping system upstream from equipment shutoff valve.
H. Install one test well for each service at the ground rod electrically closest to the service entrance. Set top of well flush with finished grade or floor.
I. Under Ground (Concrete-Encased Grounding Electrode): Fabricate according to PEC, using a minimum of 6 m of bare copper conductor not smaller than 30 mm2. If concrete foundation is less than 6 m long, coil excess conductor within the base of the foundation. Bond grounding conductor to reinforcing steel in at least four locations and to anchor bolts. Extend grounding conductor below grade and connect to building grounding grid or to a grounding electrode external to concrete.

3.5 CONNECTIONS

A. General: Make connections so galvanic action or electrolysis possibility is minimized.
Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.

1. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer to order of galvanic series.
2. Make connections with clean, bare metal at points of contact.
3. Make aluminum-to-steel connections with stainless-steel separators and mechanical clamps.
4. Make aluminum-to-galvanized steel connections with tin-plated copper jumpers and mechanical clamps.
5. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.

B. Exothermic-Welded Connections: Comply with manufacturer's written instructions. Welds that are puffed up or that show convex surface indicating improper cleaning are not acceptable.
C. Equipment Grounding Conductor Terminations: For 10mm2 and larger, use pressure-type grounding lugs. 10mm2 and smaller grounding conductors may be terminated with winged pressure-type connectors.
D. Noncontact Metal Raceway Terminations: If metallic raceways terminate at metal housings without mechanical and electrical connection to housing, terminate each conduit with a grounding bushing. Connect grounding bushings with a bare grounding conductor to grounding bus or terminal in housing. Bond electrically non-continuous conduits at entrances and exits with grounding bushings and bare grounding conductors, unless otherwise indicated.
E. Connections at Test Wells: Use compression-type connectors on conductors and make bolted- and clamped-type connections between conductors and ground rods.
F. Tighten screws and bolts for grounding and bonding connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
G. Compression-Type Connections: Use hydraulic compression tools to provide correct circumferential pressure for compression connectors. Use tools and dies recommended by connector manufacturer. Provide embossing die code or other standard method to make a visible indication that a connector has been adequately compressed on grounding conductor.

H. Moisture Protection: If insulated grounding conductors are connected to ground rods or grounding buses, insulate entire area of connection and seal against moisture penetration of insulation and cable.'

3.6 UNDERGROUND DISTRIBUTION SYSTEM GROUNDING

A. Duct Banks: Install a grounding conductor with at least 50 percent ampacity of the largest phase conductor in the duct bank.

B. Manholes and Handholes: Install a driven ground rod close to wall and set rod depth so 100 mm will extend above finished floor. If necessary, install ground rod before manhole is placed and provide an 80mm2 bare, tinned-copper conductor from ground rod into manhole through a waterproof sleeve in manhole wall. Protect ground rods passing through concrete floor with a double wrapping of pressure-sensitive tape or heat-shrunk insulating sleeve from 50 mm above to 150 mm below concrete. Seal floor opening with waterproof, nonshrink grout.

C. Connections to Manhole Components: Connect exposed-metal parts, such as inserts, cable racks, pulling irons, ladders, and cable shields within each manhole or handhole, to ground rod or grounding conductor. Make connections with 25mm2 minimum, stranded, harddrawn copper conductor. Train conductor's level or plumb around corners and fasten to manhole walls. Connect to cable armor and cable shields as recommended by manufacturer of splicing and termination kits.

D. Pad-Mounted Transformers and Switches: Install two ground rods and counterpoise circling pad. Ground pad-mounted equipment and noncurrent-carrying metal items associated with substations by connecting them to underground cable and grounding electrodes. Use tinned-copper conductor not less than 35mm2 for counterpoise and for taps to equipment ground pad. Bury counterpoise not less than 450 mm below grade and 150 mm from the foundation.

3.7 FIELD QUALITY CONTROL

A. Testing: Engage a qualified testing agency to perform the following field quality-control testing:

B. Testing: Perform the following field quality-control testing:

1. After installing grounding system but before permanent electrical circuitry has been energized, test for compliance with requirements.
2. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, and at ground test wells. Measure ground resistance not less than two full days after the last trace of precipitation, and without the soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance. Perform tests, by the fall-of-potential method according to IEEE 81.
3. Provide drawings locating each ground rod and ground rod assembly and other grounding electrodes, identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results. Maximum valve of ground resistance is 5 ohms.
4. Excessive Ground Resistance: If resistance to ground exceeds specified values, drive additional ground rods until resistance meets specified values.

END OF SECTION 26 02 01

SECTION 26 27 26 WIRING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Single and duplex receptacles, ground-fault circuit interrupters, and integral surge suppression units.
2. Single- and double-pole snap switches and dimmer switches.
3. Device wall plates.
4. Floor service outlets and multioutlet assemblies.

1.2 ACRONYMS & ABBREVIATIONS

A. EMI: Electromagnetic interference.
B. GFCI: Ground-fault circuit interrupter.
C. PVC: Polyvinyl chloride.
D. TVSS: Transient voltage surge suppressor.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.
B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.
C. Field quality-control test reports.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of wiring device through one source from a single manufacturer.
B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in PEC 2017, Article 1.1 and marked for intended use.
C. Comply with the Latest Edition of Philippine Electrical Code (PEC).

PART 2 - PRODUCTS

2.1 WIRING DEVICES, GENERAL

A. Wiring Devices: Provide U.S. NEMA type wiring devices and associated devices, boxes, and covers. Receptacles other than 230-volt general-purpose convenience outlets shall be marked on the cover plates with voltage, amperage, phase, and frequency. Matching plugs shall be provided.
B. Wire and Cable: Select types of insulation according to the application. See the PEC for insulation types, operating temperatures, ambient temperature, and voltage classes. Cable and wire sizes, types, and insulation shall be properly specified by the A/E using Philippine standards in order to obtain the highest quality transmission for security, data, and other signal cables. Provide solid conductors for conductors sized 5.5 mm2 and smaller. Provide stranded conductors for conductors sized 8.0 mm2 and larger. Provide copper branch circuits and feeder conductors sized at 125 percent of full load capacity. Use full-sized neutral conductor and a separate ground conductor for each circuit. Circuits and feeders that supply power for electronic equipment may require an oversized neutral to compensate for high harmonic neutral currents. Such feeders must be identified in the design and the neutral increased to a minimum of two times full rated size. Non-metallic sheathed cable (“Romex”) is prohibited, and armored or metal clad cable, Types AC or MC is prohibited except as permitted in limited applications by DE/EEB.

C. Overload Protection: Copper conductors shall be provided overload protection in accordance with NEC Table 310-6. Overload protection shall not exceed 15A for 2.5 mm2 conductors, 20A for 3.5 mm2 conductors or 30A for 5.5 mm2 conductors.

2.2 RECEPTACLES

A. Receptacles, General: General-purpose receptacles shall be installed on 15 and 20-amp branch circuits, and shall be of the grounding type with effective grounding contacts. NEMA type 5-20R receptacles, 20A, 300 Volts rated shall be used in all spaces. Flexible arrangements, such as for floor outlets or cable trays in office areas shall be provided to allow for partition rearrangement. An underfloor duct system shall not be used. G.F.C.I. protection shall be provided for receptacles in bathrooms, kitchen, and other wet areas and outdoors per PEC requirements. G.F.C.I. circuit breakers may be required in lieu of protection at the receptacle. Provide receptacle outlet as indicated in the plan.

B. Straight-Blade and Twist Locking Receptacles: Heavy-Duty grade. NEMA 6-20R, 20A, 400 Volts rated.

C. GFCI Receptacles shall not be used. Outlets designated for GFCI protection shall be fed from a GFCI circuit breaker. One GFCI breaker, rated for 10mA ground fault trip, 60Hz, 230V (line to neutral) shall be installed in an enclosure adjacent to the first receptacle in the branch circuit. This breaker will provide ground fault protection for all receptacles in the circuit.

D. Provide one 20 A and one 15 A cord plug cap for each duplex receptacle, and two of each for each quadruplex receptacle. Plug caps shall be of the grounding type, utilizing only screw terminals for terminating conductors.

2.3 SWITCHES

A. Single- and Double-Pole Switches: Comply with DSCC W-C-896F.

B. Snap Switches: Heavy-Duty grade, quiet type.

2.4 WALL PLATES

A. Single and combination types to match corresponding wiring devices.

1. Plate-Securing Screws: Metal with head color to match plate finish.
2. Material for Finished Spaces: 1-mm- thick, brushed stainless steel.
3. Material for Unfinished Spaces: Galvanized steel

2.5 FLOOR SERVICE FITTINGS

A. Type: Modular, flush-type, dual-service units suitable for wiring method used.

B. Power Receptacle: NEMA Configuration 5-20R, unless otherwise indicated. Colors to match interior color scheme approved by the Architect.

C. Signal Outlet: Blank cover with bushed cable opening, unless otherwise indicated.

2.6 FINISHES

A. Color:

1. All device faceplate shall be approved by the Architect.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install devices and assemblies level, plumb, and square with building lines.

B. Install wall dimmers to achieve indicated rating after derating for ganging according to manufacturer's written instructions.

C. Install unshared neutral conductors on line and load side of dimmers according to manufacturers' written instructions.

D. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical, and with grounding terminal of receptacles on top. Group adjacent switches under single, multi-gang wall plates where possible.
E. Remove wall plates and protect devices and assemblies during painting.
F. Adjust locations of floor service outlets to suit arrangement of partitions and furnishings.

3.2 CONNECTIONS

A. Ground equipment according to Section 26 02 01 "Grounding and Bonding."
B. Connect wiring according to Section 26 01 01 "Conductors and Cables."
C. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A.

3.3 FIELD QUALITY CONTROL

A. Perform the following field tests and inspections and prepare test reports:

1. After installing wiring devices and after electrical circuitry has been energized, test for proper polarity, ground continuity, and compliance with requirements.

2. Test GFCI operation with both local and remote fault simulations according to manufacturer's written instructions.

B. Remove malfunctioning units, replace with new units, and retest as specified above.

END OF SECTION 26 27 26

SECTION 26 28 03 PANELBOARDS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes load centers and panelboards, overcurrent protective devices, and associated auxiliary equipment rated 600 V and less for the following types:

1. Lighting and appliance branch-circuit panelboards.
2. Distribution panelboards.
3. Transient voltage surge suppressor panelboards.

1.2 ACRONYMS & ABBREVIATIONS

A. Retain abbreviations that remain after this Section has been edited.
B. EMI: Electromagnetic interference.
C. GFCI: Ground-fault circuit interrupter.
D. RFI: Radio-frequency interference.
E. RMS: Root mean square.
F. SPDT: Single pole, double throw.
G. TVSS: Transient voltage surge suppressor.

1.3 SUBMITTALS

A. Product Data: For each type of panelboard, overcurrent protective device, transient voltage suppression device, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.
B. Shop Drawings: For each panelboard and related equipment.

1. Dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings. Include the following:
    a. Enclosure types and details.
    b. Bus configuration, current, and voltage ratings.
    c. Short-circuit current rating of panelboards and overcurrent protective devices.
    d. Features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
2. Wiring Diagrams: Power, signal, and control wiring.

C. Qualification Data: For testing agency.
D. Field quality-control test reports including the following:

1. Test procedures used.
2. Test results that comply with requirements.
3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

E. Panelboard Schedules: For installation in panelboards. Submit final versions after load balancing.
F. Operation and Maintenance Data: For panelboards and components to include in emergency, operation, and maintenance manuals. Include:

1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.
2. Time-current curves, including selectable ranges for each type of overcurrent protective device.

1.4 QUALITY ASSURANCE

A. Testing Agency Qualifications: Testing agency that is a member company of the Inter National Electrical Testing Association and that is acceptable to authorities having jurisdiction.

B. Electrical Components, Devices, and Accessories: labeled as defined in PEC 2017, Article 1.1, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Comply with NEMA PB 1.

D. Comply with Latest Edition of PEC.

1.5 PROJECT CONDITIONS

A. Environmental Limitations: Rate equipment for continuous operation under the following conditions, unless otherwise indicated:

1. Ambient Temperature: Not exceeding 40 deg C (104 deg F).
2. Altitude: Not exceeding 2000 m (6600 feet).

B. Service Conditions: NEMA PB 1, usual service conditions, as follows:

1. Ambient temperatures within limits specified.
2. Altitude not exceeding 2000 m (6600 feet).

C. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Post or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:

1. Notify COR no fewer than two days in advance of proposed interruption of electrical service.
2. Do not proceed with interruption of electrical service without COR's written permission.

D. Unusual Service Condition: Engine generator equipment and installation shall operate under the following conditions.

1. High salt-dust content in the air due to sea-spray evaporation.

1.3 COORDINATION

A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping and encumbrances to workspace clearance requirements.

1.4 EXTRA MATERIALS

A. Keys: Six spares of each type of panelboard cabinet lock.

PART 2 - PRODUCTS

2.1 FABRICATION AND FEATURES

A. Enclosures: Flush or surface-mounted cabinets. NEMA PB 1, Type 1, to meet environmental conditions at installed location.

1. Outdoor Locations: NEMA 250, Type 4x.
2. Kitchen Areas: NEMA 250, Type 4X, stainless steel.
3. Other Wet or Damp Indoor Locations: NEMA 250, Type 3R.
4. Hazardous Areas Indicated on Drawings: NEMA 250, Type 7C.
5. Separate neutral and grounding buses for all panelboards.

B. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box.

C. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover.

D. Finish: Manufacturer's standard enamel finish over corrosion-resistant treatment or primer coat.
E. Directory Card: With transparent protective cover, mounted inside metal frame, inside panelboard door.
F. Bus: Hard-drawn copper, 98 percent conductivity.
G. Bus Bars of Power Distribution and Branch Circuit Panelboards: Provide hard drawn copper. The neutral bus shall be isolated from both the ground bus and the cabinet, except at the service entrance or at the output of separately derived systems and shall be grounded in accordance with the Latest Edition of PEC.
H. Main and Neutral Lugs: Compression type suitable for use with conductor material.
I. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment ground conductors; bonded to steel enclosure.
J. Service Equipment Label: UL labeled for use as service equipment for panelboards with main service disconnect switches.
K. Future Devices: Mounting brackets, bus connections, and necessary appurtenances required for future installation of devices.
L. Isolated Equipment Ground Bus: Adequate for branch-circuit equipment ground conductors; insulated from steel enclosure.
M. Neutral Bus: Neutral bus rated 100 percent of phase bus and suitable for nonlinear loads.
N. Split Bus: Vertical buses divided into individual vertical sections.
O. Skirt for Surface-Mounted Panelboards: Same gage and finish as panelboard front with flanges for attachment to panelboard, wall, and ceiling or floor.
P. Gutter Barrier: Arrange to isolate individual panel sections.
Q. Column-Type/Free Standing Panelboards: Narrow gutter extension, with cover, to overhead pull box equipped with ground and neutral terminal buses. Feed-through Lugs:
Compression type suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.
R. Provide 10 percent spare circuit breakers, 20 percent spaces for future breakers, and 20 percent overall spare current carrying capacity for future expansion.

2.2 PANELBOARD SHORT-CIRCUIT RATING
A. Fully rated to interrupt symmetrical short-circuit current available at terminals.

2.3 LOAD CENTERS
A. Overcurrent Protective Devices: Bolt-on, full-module circuit breaker.
B. Conductor Connectors: Mechanical type for main, neutral, and ground lugs and buses.

2.4 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS
A. Branch Circuit Panelboards: Branch protective devices in panelboards shall be of the Bolton type circuit breakers. Locate panelboards at the utility area nearest the center of the load. Panelboards shall have main circuit breakers. Where multiple section panelboards are required, each section shall have a main breaker. Size panels as noted above.
B. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.
C. Doors: Front mounted with concealed hinges; secured with flush latch with twist lock; keyed alike.

2.5 DISTRIBUTION PANELBOARDS

A. Power Distribution Panelboards serving three-phase motors and other power equipment shall be of circuit breaker type. Size the panel bus, lugs, and circuit breakers to match the ratings indicated in the Overcurrent Protective device coordination system fault level.

B. Doors: Front mounted, except omit in fused-switch panelboards; secured with vault-type latch with twist lock; keyed alike.

C. Main Overcurrent Protective Devices: Circuit breaker.

D. Branch overcurrent protective devices shall be one of the following:

1. For Circuit-Breaker Frame Sizes 125 A and Smaller: Bolt-on circuit breakers.
2. For Circuit-Breaker Frame Sizes Larger Than 125 A: Bolt-on circuit breakers; plug-in circuit breakers where individual positive-locking device requires mechanical release for removal.
3. Fused switches.

2.6 TRANSIENT VOLTAGE SURGE SUPPRESSION (TVSS)

A. Transient voltage disturbances from commercial power systems associated with lightning storms and switching surges externally, as well as harmonics generated by adjustable speed drives and SCR power supplies associated with UPS equipment internally may cause stress and damage to electrical equipment. Therefore, transient voltage surge protection is required at the service entrance to all buildings, at all main distribution panels and all secondary power panels. The TVSS protection shall be provided in accordance with Specification 26 "Transient Voltage Suppression".

2.7 OVERCURRENT PROTECTIVE DEVICES

A. Molded-Case Circuit Breaker: NEMA AB 1, with interrupting capacity to meet available fault currents.

1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 800 A and larger.
2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with frontmounted, field-adjustable trip setting.
3. Electronic Trip Unit Circuit Breakers: RMS sensing; field-replaceable rating plug; with the following field-adjustable settings:
    a. Instantaneous trip.
    b. Long- and short-time pickup levels.
    c. Long- and short-time time adjustments.
    d. Ground-fault pickup level, time delay, and I2t response.
4. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller; let-through ratings less than NEMA FU 1, RK-5.
5. Integrally Fused Circuit Breakers: Thermal-magnetic trip element with integral limiter-style fuse listed for use with circuit breaker; trip activation on fuse opening or on opening of fuse compartment door.
6. GFCI Circuit Breakers: Single- and two-pole configurations with 30-mA trip sensitivity.

B. Molded-Case Circuit-Breaker Features and Accessories. Standard frame sizes, trip ratings, and number of poles.

1. Lugs: Compression style, suitable for number, size, trip ratings, and material of conductors.
2. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HACR for heating, air-conditioning, and refrigerating equipment.

3. Ground-Fault Protection: Remote-mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.

4. Communication Capability: Circuit-breaker-mounted, Universal-mounted, Integral or Din-rail-mounted communication module with functions and features compatible with power monitoring and control system.

5. Shunt Trip: 220 or 240 V trip coil energized from separate circuit, set to trip at 55 percent of rated voltage.

C. Fused Switch: NEMA KS 1, Type HD; clips to accommodate specified fuses; lockable handle.

2.8 CONTROLLERS

A. Motor Controllers: NEMA ICS 2, Class A combination controller equipped for panelboard mounting and including the following accessories:

1. Individual control-power transformers.
2. Fuses for control-power transformers.
3. Bimetallic-element overload relay.
4. Melting-alloy overload relay.
5. Indicating lights.
6. Seal-in contact.
7. Four convertible auxiliary contacts.
8. Push buttons.
9. Selector switches.

B. Contactors: NEMA ICS 2, Class A combination controller equipped for panelboard mounting and including the following accessories:

1. Individual control-power transformers.
2. Fuses for control-power transformers.
3. Indicating lights.
4. Seal-in contact.
5. One convertible auxiliary contacts.
6. Push buttons.
7. Selector switches.

C. Controller Disconnect Switches: Adjustable instantaneous-trip circuit breaker, integrally mounted and interlocked with controller.

1. Auxiliary Contacts: Integral with disconnect switches to de-energize external control-power source.

D. Contactors in Main Bus: NEMA ICS 2, Class A, mechanically held general-purpose controller.

1. Control-Power Source: Control-power transformer, with fused primary and secondary terminals, connected to main bus ahead of contactor connection.
2. Control-Power Source: 220 V branch circuit.

2.9 ACCESSORY COMPONENTS AND FEATURES

A. Furnish accessory set including tools and miscellaneous items required for overcurrent protective device test, inspection, maintenance, and operation.

B. Furnish portable test set to test functions of solid-state trip devices without removal from panelboard.

C. Fungus Proofing: Permanent fungicidal treatment for panelboard interior, including overcurrent protective devices and other components.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install panelboards and accessories according to NEMA PB 1.1.

B. Comply with mounting and anchoring requirements specified in Division 26 Section "Seismic Controls for Electrical Work."

C. Mounting Heights: Top of trim 1880 mm above finished floor, unless otherwise indicated.

D. Mounting: Plumb and rigid without distortion of enclosure. Mount recessed panelboards with fronts uniformly flush with wall finish.

E. Circuit Directory: Create a directory to indicate installed circuit loads after balancing panelboard loads. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are not acceptable.

F. Install filler plates in unused spaces.

G. Provision for Future Circuits at Flush Panelboards: Stub four 25mm Ø empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in the future. Stub four 25mm Ø empty conduits into raised floor space or below slab not on grade.

H. Wiring in Panelboard Gutters: Arrange conductors into groups and bundle and wrap with wire ties after completing load balancing.

3.2 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs as specified in Section 26 00 00 Part 3.8 "Identification Materials and Devices".

B. Panelboard Nameplates: Label each panelboard with engraved metal or laminated-plastic nameplate mounted with corrosion-resistant screws.

3.3 CONNECTIONS

A. Install equipment grounding connections for panelboards with ground continuity to main electrical ground bus.

B. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.4 FIELD QUALITY CONTROL

A. Prepare for acceptance tests as follows:

1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

B. Testing: After installing panelboards and after electrical circuitry has been energized, demonstrate product capability and compliance with requirements.

1. Procedures: Perform each visual and mechanical inspection and electrical test indicated in NETA ATS, Section 7.5 for switches and Section 7.6 for molded-case circuit breakers. Certify compliance with test parameters.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

C. Balancing Loads: After Substantial Completion, but not more than 60 days after Final Acceptance, measure load balancing and make circuit changes as follows:

1. Measure as directed during period of normal system loading.
2. Perform load-balancing circuit changes outside normal occupancy/working schedule of the facility and at time directed. Avoid disrupting critical 24-hour services

such as fax machines and online data-processing, computing, transmitting, and receiving equipment.

3. After circuit changes, recheck loads during normal load period. Record all load readings before and after changes and submit test records.

4. Tolerance: Difference exceeding 20 percent between phase loads, within a panelboard, is not acceptable. Rebalance and recheck as necessary to meet this minimum requirement.

D. Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each panelboard. Remove panel fronts so joints and connections are accessible to portable scanner.

1. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each panelboard 11 months after date of Substantial Completion.

2. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.

3. Record of Infrared Scanning: Prepare a certified report that identifies panelboards checked and describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.5 ADJUSTING

A. Set field-adjustable switches and circuit-breaker trip ranges.

3.6 CLEANING

A. On completion of installation, inspect interior and exterior of panelboards. Remove paint splatters and other spots. Vacuum dirt and debris; do not use compressed air to assist in cleaning. Repair exposed surfaces to match original finish.

END OF SECTION 26 28 03

PLUMBING WORKS TECHNICAL SPECIFICATIONS

SECTION 15400: PLUMBING WORKS

PW 100 GENERAL

1.01 SUMMARY:

A. The General Conditions apply to all work under this section of the Specifications.

1.02 SCOPE OF WORK:

A. Unless otherwise specified, the Contractor or his sub - contractor shall furnish all materials, tools, equipment, apparatus, appliances, accessories, transportation, labor & supervision required for the complete installation and testing of the Plumbing System ready for use in accordance with the best practice of the Plumbing Trade as listed herein but not limited to the following:

1. The Plumbing Contractor is required to refer to all architectural, structural, mechanical fire protection & electrical plans & investigate all possible interference & conditions affecting his work.
2. All work shall comply with the pertinent provisions of the Plumbing Code of the concerned city, the Code on Sanitation of the Phil., & /or the National Plumbing Code of the Philippines.
3. Supply and installation of cold water supply & distribution system from existing water line stub-out of the building distribution system up to fixtures.
4. Supply and installation of all sanitary drains, waste and venting systems including floor drains, up to existing tapping point.
5. Supply and installation of all condensate drains up to existing tapping point.
6. Installation of all new plumbing fixtures provision with trims and accessories as shown on plans.
7. Removal of existing plumbing fixture and layout that will be found at site not needed.
8. Testing for leakage of all waste, sewer and venting system plus pressure testing and disinfection of the new water supply and distribution system.
9. Securing of all permits and licenses as required including water connection.
10. Preparation and submittal of three (3) sets of as-built plans & one (1) set of reproducible prints
11. Furnishing of written one (1) year warranty on the plumbing system.

1.03 WORK NOT INCLUDED:

A. All electrical power wiring except that furnished as an integral part of factory assembled equipment except as otherwise specified herein.
B. Painting except as required by the Plumbing Code and as specified herein.

1.04 NOTES ON DRAWINGS:

A. The drawings show the general arrangement of all piping. However, where local &/or actual conditions at the job site necessitate a deviation or rearrangement, the Contractor shall prepare & submit the new arrangement for the Architect's approval.
B. Small scale drawings do not possibly indicate all offset, fittings and other parts of the system required. The Contractor shall arrange such work accordingly, furnishing such fittings, traps valves and accessories as may be required to meet such conditions.

1.05 APPLICABLE SPECIFICATION, CODES, ORDINANCES, PERMITS & FEES:

A. The work covered in this contract it to be installed according to the specification codes, ordinances and requirements of the following:

1. National Plumbing Code of the Philippines
2. The Code on Sanitation of the Philippines
3. Department of Environment and Natural Resources
4. Ordinances of Concerned City or Municipality

B. All construction permits and fees required for the work shall be obtained by and at the expense of the contractor. The contractor shall furnish the Owner final certificates of inspection after the completion of the work.

1.06 WORKMANSHIP AND COORDINATION WITH TRADES:

A. All work shall be performed in first class and neat workmanship by mechanics skilled in their work shall be satisfactory to the Engineer.

B. The Plumbing Contractor is required to refer to the General Conditions & to all architectural, structural electrical, mechanical & fire protection plans and specifications, and shall investigate all possible interference's and conditions affecting his work.

PW 200 PRODUCT

2.01 GENERAL:

A. Except as specified, the Contractor shall submit for the Engineers approval, four (4) copies of a complete list of manufacturer's names of all equipment and materials he proposes to use, within seven (7) days after award of contract.

B. The Contractor shall assume the cost of and the entire responsibility for any change in the work as shown on contract drawings which may be occasioned by approval of materials other than those specified.

2.02 PIPES AND FITTINGS SCHEDULE

A. **Cold Water Lines** - Shall be PPRC (Polyethylene Randon Copolymer) Class PN-25.

Fittings shall be fusion weld type. Conforming to German Technology DIN 8077-8078 ans

ASTM 1281-93. Similar to "UNITEC, ECOSAN" brand or approved equal.

B**. Sewer & Waste Line** - shall be polyvinyl chloride (PVC) pipes series 1000, "EMERALD,

MOLDEX, ATLANTA" brand or approved equal.

C. **Vent Pipes** - shall be polyvinyl chloride (PVC) pipes series 1000, "EMERALD, MOLDEX,

ATLANTA" brand or approved equal.

D. **FCU Waste Pipes** - shall be polyvinyl chloride (PVC) pipes series 1000, "EMERALD,

MOLDEX, ATLANTA" brand or approved equal.

2.03 VALVES

A. **Gate Valve** 65 mm Ø & smaller, rising stem, all bronze, female threaded min. of 125 psig. Working connection. Approved model, "Honeywell, Tozen, Crane, Kitz" or approved equal.

2.04 OTHER MATERIALS

A. **Drains** - "JAMAN (JPI)" as indicated or approved equal:

B. **Water Meter** - (size indicated on the Plans) “Badger”, “Arad” or “Asahi” or local water approved.
C. **Hose Bibbs** - 25-mm Ø standard hose connection, male tapered threads, polished chromium plated.

2.05 JOINTING
A. **Flanged Joint Gasket** - GARLOCK OR EQUAL.
B. **Screwed Joints** - U.S. Federal Specifications GG-P-251
C. **PVC Pipes and Fittings** - PVC cement or as per the Manufacture’s recommendations.
D. **Dissimilar Pipes** - Adapter fittings shall be used.

PW 300 IDENTIFICATION AND APPROVAL OF MATERIALS

A. Each length pipe, fittings, traps, fixtures and device used in the Plumbing System shall have cast, tamped or marked on it, the manufacturer’s trade mark or name, the weight, type and classes of product when so required by the Standard.
B. Within seven (7) days after award of the Contract, the Contractor shall submit for the Architect’s approval, the names of suppliers & materials proposed including trade names & / or samples of the materials if deemed necessary.
C. Brand names mentioned in this Specification are only for the purposes of indicating the desired quality and design.

PW 400 SUBSTITUTION AND TESTING OF MATERIALS

A. Materials intended to be substituted for those originally specified shall be accepted only after a formal request for substitution, accompanied by:

1. Reasons for substitutions;
2. Certificate of test indicating quality, compared to those originally specified.
3. Cost comparisons with material originally specified. Requests shall be submitted to the Architect for evaluation at least 15 working days before installation of subject material is due.

B. Cost of testing of materials, whether on originally specified items or on substitutions, shall be to the account of the Contractor.
C. Results of tests shall be submitted to the Architect for evaluation at least 15 days before the materials is due for installation on the job.

PW 500 SOIL, WASTE, DRAIN AND VENT PIPES

5.01 GENERAL
A. Soil and waste pipes and vent pipes shall be polyvinyl chloride (PVC) pipes. Fitting on all dry vents shall be polyvinyl chloride (PVC) pipe.

5.2 SUPPORTS
A. Horizontal lines shall be supported by well-secured length heavy-duty strap hangers or floor chairs as required. Vertical lines shall be secured strongly by hooks to the building frame and a suitable bracket or chairs shall be provided at the floors from which they start.

5.03 TRAPS
A. Every plumbing fixtures shall be separately trapped by a vented water sealed trap as close to the fixture outlets as the conditions allow, but in no case at a distance greater than 600 mm.

In case of the upper or the only fixture on a soil extended full size through the roof, a vent shall not be required when said fixture has its center stack. Traps shall be of the same diameter as the waste pipes from the fixtures which they shall serve, all traps shall have a water seal of at least 32 millimeters with a brass thumbscrew cleanout at the bottom of the seal.

5.04 VENT

A. Vent shall be taken from the crown of the fixtures, except for water closet traps, in which case, the branch line shall be vented below and trap and above all small waste inlets, so connected as to prevent obstructions. Each vent pipe shall be run separately above the fixtures into the adjacent soil pipes, a distance not more than 1.50 meters. If more than this distance, the vent shall run independently through the roof.

B. A vent line shall be wherever practicable, direct extension of a soil or waste line.

C. Main vent risers at 4.5 meters along or more shall be connected at the roof with the main water or soil pipes below the lowest vent outlet with a forty - five degree (450) connection.

D. All vertical soil or vent pipes shall be carried up at least 600 mm above the roof of the building and the open side ends are to be entirely and securely covered with gals. 16 mesh copper cloth.

E. Vent pipes in roof spaces shall be run as close as possible to the underside of roof with horizontal piping pitched down to stacks without forming traps. Where an end or circuit vent pipe from fixtures it shall be connected into the main vent or vent stack.

5.05 ROUGHING - IN

A. Roughing - in for pipes and fixtures shall be carried along with the building construction. Correctly located openings of proper sizes shall be provided where required in the walls and floors for the passage of pipes all items to be embedded in concrete shall be thoroughly clean and free from all rust, scale and paint.

5.06 FITTINGS

A. All changes in pipes sizes on soil, waste and drain lines shall be made with reducing fittings or reducers. All changes in direction shall be made by the appropriated use of forty - five degrees (450) wyes, or long sweep bends, except that sanitary tees may be used on vertical stacks. Short quarter bends or elbows may be used in soil and waste lines where the change in direction is from the horizontal to the vertical and on the discharge from the water closet.

5.07 JOINTS AND CONNECTIONS

A. All joints shall be air and watertight. For joining pipes, the following shall be used:

1. Hubless cast iron soil and waste pipes and fittings, sleeve type coupling gasket joints.
2. Galvanized wrought iron or steel pipe, screwed or threaded joints, use sealant.
3. Polyvinyl chloride (PVC) pipes, socket type with PVC cement.

PW 600 COLD WATER DISTRIBUTION SYSTEM

6.01 INSTALLATION

A. The piping shall be extended to all fixtures, outlets and equipment from the gate valves installed in the branch near the riser.
B. Unions shall be provided where required for disconnection.
C. All pipes shall be cut accurately to measurements and shall be worked into place without springing or facing. Care shall be taken so as not to weaken the structural portions of the building.
D. All service pipes valves and fittings shall be kept at sufficient distance from work to permit finished covering not less than 15 mm from such work or from finished covering on the different service.
E. Changes in pipes shall be made with reducing fittings.
F. Accessible Contraction - expansion joints shall be made wherein necessary. Horizontal runs of pipe over 15 m. in the length shall be anchored to wall or the supporting structure midway on the run to force expansion and contraction equally towards the ends.

PW 700 MISCELLANEOUS

7.01 CLEANOUTS

A. Cleanouts shall be of the same size as the pipe, the location of which is extended to an easily accessible place.

7.02 TRAPS

A. Every plumbing fixtures of equipment requiring connections to the sanitary / drainage system shall be equipped with a trap.
B. Each trap shall be placed as near as possible to the fixture. No fixture shall be double - trapped.

7.03 VALVES AND HOSE BIBBS

A. Valves shall be provided on all water supplies to fixtures as specified.
B. Hose Bibbs shall be made of brass with 15 mm make male inlet threads hexagon shoulders and 20 mm connections.

7.04 PIPE HANGERS INSERTS AND SUPPORTS

A. Horizontal runs of pipe shall be hung with adjustable wrought iron or malleable iron pipe hangers spaced not over 3 m apart, except hub and spigot soil pipes which shall have hangers spaced not over 1.52 m apart and located near the hub.
B. Hangers shall have short turnbuckles or other approved means of adjustment.
C. Inserts shall be of cast steel and shall be of type to receive a machine bolt or nut after installation.
D. Vertical runs of pipes shall be supported by wrought iron clamps or collars spaced not more than 9 m apart.
E. Water and Vent Pipes - 65 mm and larger; band type 6.4 mm x 25 mm flat mild steel or black iron with 15 mm round rod with plates and nuts; 50 mm and smaller split ring type with 10 mm iron rods with inserts plates; toggle bolts, clamps or expansion shield.

7.05 PIPES SLEEVES

A. Pipes sleeves shall be installed and properly secured in place at all points where pipes pass through masonry or concrete.

B. Pipe sleeves shall be of sufficient diameter to provide approximately 6.4-mm clearance around the pipe of insulation.

C. Pipe sleeves in walls and partitions shall be of cast iron, wrought iron or steel pipe. Pipes sleeves in concrete beams or concrete slabs shall be wrought iron or steel pipe.

D. The space between the pipes and sleeves shall be made water tight by inserting a picked oakum gasket and filling the remaining space with poured lead caulking thoroughly.

PW 800 FIXTURES, FITTINGS AND ACCESSORIES

A. Refer to Architectural Specifications.

PW 900 TEST AND DISINFECTION:

9.01 PRESSURE TESTS FOR WATER LINES:

A. After the pipe have been installed, the joints completed and with joints exposed for examination, all newly installed pipe or any valve section therefore, shall be subjected to hydrostatic pressure 1 ½ the designed working pressure of the system or as specified by the Architect.

B. The duration of each pressure test shall be at least 2 hours unless otherwise specified the Architect.

C. Each section of pipeline shall be slowly filled water and the specified test pressure, measured at the point of lowest elevation, shall be applied by means of a pump connected to the pipe in a manner satisfactory to the Architect. During the filling of the pipe and before applying the test pressure, all air shall be expelled from the pipeline. To accomplish this type shall be made, if necessary, at point of highest elevation, and after completion of the test the taps shall be tightly plugged unless otherwise specified.

During the test, all exposed pipes, fittings, valves, joints and couplings will be carefully examined. if found to be cracked or defective, they shall be removed and replaced by the Contractor with sound materials at his expense. The test shall then be repeated until satisfactory results are obtained.

9.02 DEFECTIVE WORK:

A. If the inspection or test shows any defect, such defective work or material shall be replaced and the test shall be repeated until satisfactory to the Architect.

B. All repairs to piping shall be made with new material at the expense of the contractor.

C. No caulking of screwed joints of holes will be accepted.

PW 1000 CLEANING:

A. All exposed metal surfaces shall be free of grease, dirt or other foreign materials.

B. Chrome or nickel-plated piping, fittings and trimmings shall be polished upon completion.

C. All plumbing fixtures shall be properly protected from use and damage during the construction stage. The fixtures shall be cleaned to the satisfaction of the Architect upon completion and prior to acceptance of work.

D. All equipment, pipes, valves and fittings shall be cleaned of grease and sludge which may have accumulated. Any clogging, discoloration or damage to other parts of the building due to the system shall be repaired by the Contractor.

PW 1100 PAINTING AND PROTECTION:

A. All exterior of piping to be installed in or through concrete floor fill or fill floors and underground shall be given one coat of acid resisting paint having a bituminous base.
B. Pipe hanger supports all other ironwork in concealed spaces shall be painted with one coat of asphalt.
C. Exposed galvanized iron pipes and fittings that are asphalt coated shall be given two coats of shellac prior to application of two coats of all paint as directed by the Architect of his authorized representative.

PW 1200 COLOR CODE FOR EXPOSED PIPES:

A. All exposed piping shall be adequately and durably identified by distinctive colored paints as follows:

ITEM	COLOR CODE
Cold water pipe	Blue
Storm water pipe	Aluminum
Sewage pipe	Black
Vent pipe	Green
Waste pipe	Gray

PW 1300 WARRANTY & "AS-BUILT" PLANS:

A. All works, equipment and fixtures shall be guaranteed by the Contractor for satisfactory service for a minimum period for one (1) year.
B. The Contractor shall submit to the Owner, in reproducible form plus three (3) sets of white prints, the complete plans of the entire system as actually built. The cost of those shall be borne by the Contractor. Submittal of "AS-BUILT" Plans shall be a condition to final payment.
C. Equipment that should have the Owner(s) minimum guaranteed against defective designs, materials and workmanship.

PW 1400 RESPONSIBILITY:

A. The General Contractor shall be responsible for the coordination among the different trades on the job in order to finish the work in the least possible time, in strict accordance with the Plans and Specifications.
1. Throughout the construction period open ends of all installed pipe lines shall be kept closed by temporary plugs.
2. Fire extinguisher system shall be provided by the Contractor during the construction period. This shall be of sufficient capacity to put out any fire that may break out due to construction operations.

3. A temporary potable water supply shall be made available to construction workers at every floor as construction progresses.
4. A temporary human excreta disposal system shall be provided by the Contractor to serve the workers during the construction period.

- End of Specifications –

FIRE PROTECTION WORKS TECHNICAL SPECIFICATIONS

FPS 200: SCOPE OF WORKS

A. Furnishing of all materials, labor, tools, equipment and accessories for the complete installation, testing and adjustment, ready for use of the proposed automatic fire sprinkler system.

B. The works essentially shall include, but shall not necessarily be limited to the following items:

1. Supply/relocate and install complete with the automatic fire sprinkler system (AFSS) consisting of new supply fire lines, branch lines, fittings, valves, hangers, trims and its accessories required to complete the system.
2. All openings through which fire may spread from one floor to the other, such as holes through floors made for the passage of plumbing pipes and electrical circuits shall be sealed with fire resistant / or fire stopping materials.
3. Supply/relocate and install complete with the sprinkler heads including spares and cabinet for sprinkler system tools and stocks, trims and its accessories required to complete the system.
4. Furnishing and installation of instruction and identifications boards, charts, signs and markers, to include operating methods and instructions.
5. Priming and finish painting (red) of cladded and exposed piping and other part of sprinkler system except for sprinkler heads.
6. Complete testing and commissioning, start-up of the floor Automatic Fire Sprinkler System in accordance with NFPA-13, to include cleaning, draining, adjusting and inspecting.
7. Miscellaneous items and other related materials required for the satisfactory completion of the sprinkler system to include metal works, hangers, supports, anchors, bolts, bracing and its accessories.
8. Securing and payment of permits, licenses and bonds for the construction purposes, including approval from the Fire Department having jurisdictions.
9. Contingency to include the furnishing of written one (1) year warranty upon completion works of sprinkler system.
10. Preparation and submission of As-Built drawings in reproducible sheets including two (2) white prints copies at no cost to the Owner(s).
11. Securing and payments of all Contractor's taxes, VAT, etc.

FPS 300: WORK NOT INCLUDED

A. The following items of works will be supplied and done by others.

1. All cutting and patching shall be made by the General Contractor, except us a specifically noted and modified herein.
2. All electric power wirings, except that are furnished as an integral part of factory assembled equipment, except as otherwise specified herein shall be by Electrical Contractor.
3. Supply and installation of fire doors shall be by General Contractor.
4. Fire alarm and fire station for the alarm system shall be by Electrical Contractor.

FPS 400: APPLICABLE SPECIFICATIONS CODES, ORDINANCES, PERMITS AND FEES

A. The work covered in this contract is to be installed according to the specifications, codes, ordinances and requirements of the following:

1. Fire Code of the Philippines
2. National Building Code of the Philippines
3. Fire Department Ordinances of concerned municipality.
4. NFPA Codes References:

NFPA NO. 10 - Latest edition
NFPA NO. 13 - Latest edition
NFPA NO. 14 - Latest edition
NFPA NO. 20 - Latest edition
NFPA NO. 01 - Latest edition
NFPA NO. 75 - Latest edition
NFPA NO. 101 - Latest edition

B. All construction permit and fees required for the work shall be obtained by and at the expense of the Contractor. The Contractor's shall furnish the Architect, the Engineer and the Owner final certificates of inspection and approval from the government authorities having jurisdiction after the completion of the work.

C. The Contractor's shall obtain all necessary allowances, pays, royalties, etc. In connection with the use of any patented device or system and shall save the Owner harmless from any claim or lawsuit arising from such use.

FPS 500: SHOP DRAWINGS, SAMPLES AND OTHER SUBMITTALS

A. The Contractor's shall prepare and submit for approval the following:

1. Manufacturer's catalog, sheets, marked as necessary to indicate materials or equipment being furnished for the following items:
    a. Sprinkler heads, sprinkler wrench and spare cabinets
    b. Valves, flow controls, test and drain assembly.
2. List of miscellaneous materials proposed, including pipe, fittings, valves, etc.
3. Field test reports
4. Such other similar information the Engineer may require.

FPS 600 SUBSTITUTION AND TESTING OF MATERIALS

A. Materials intended to be substituted for these originally specified shall be accepted only after a formal request for substitution, accompanied by:

1. Reasons for substitutions;
2. Certificate of test indicating quality, compared to those originally specified.
3. Cost comparisons with material originally specified. Requests shall be submitted to the Architect/or Engineer subject for evaluation at least fifteen (15) working days before installation of subject material.

B. Cost of testing of materials, whether on originally specified items or on substitutions, shall be to the account of the Contractor.

C. Results of tests shall be submitted to the Architect /or Engineer for evaluation at least fifteen (15) days before the material is due for installation on the Jobsite.

FPS 700 NOTES ON DRAWINGS:

A. The Drawings show the general arrangement of all piping. However, where local and/or actual conditions at the Jobsite necessitate a deviation or rearrangement, the Contractor's shall prepare and submit the new arrangement/shop drawings for the Architect's and/or Engineers final approval.

B. Small scale drawings do not possibly indicate all offset, fittings and other parts of the system required. The Contractor shall arrange such work accordingly, furnishing such valves, hangers, supports, fittings, trims and its accessories as may be required to complete the system in accordance to NFPA-13 Standard Installation of Sprinkler System.

FPS 800: WORKMANSHIP AND COORDINATION OF WORK WITH OTHERS

A. The Contractor shall be held fully responsible for the work of any manufacturer or sub - contractor supplying materials to or performing work for; as it is intended that the entire Fire Protection System shall be ready in every respect for satisfactory and efficient operation when finally delivered to the Owners.

B. The Contractor shall assume full responsibility and shall provide the services of a qualified Engineer to supervise the complete installation of equipment and to conduct the final acceptance tests.

C. The work throughout shall be executed in the most thorough and satisfactory manner in accordance with the best practices of the trade.

FPS 900: SPRINKLER HEADS

A. Type :

Automatic. Quick response. Standard 15 mm Ø diameter orifice, bulb type, upright, pendent or sidewall heads. Pendent heads (recessed type) shall be provided with aluminum escutcheon or approved equivalent to fit into ceiling boards or ceiling runners. Flush or concealed type pendent units shall be accepted as substitute. Heads shall be UL Inc. approved, of one brand all throughout similar to "TYCO", "VICTAULIC", "RELIABLE" brand or approved equal and/or shall be standard product of a reputable manufacturer.

B. Head Rating and Type:

Common Area	Standard quick response, pendent, semi-recessed type sprinkler heads rating @ 1350 F to 1650 F (for use in maximum ceiling temp. of 1000 F)	Chrome finish

C. Pipe Thread and Valve Seat - 15 mm diameter nominal (Conventional).
- 20 mm diameter nominal (extended).

D. Spare Sprinkler Heads:

Furnished spare heads as required in the code and maintenance service part list for a period of at least one (1) year reckoned from the date after termination of warranty.

(165°F)

1. Semi Recessed Pendent Type - 6 pcs.

E. Sprinkler Tong - 3 pcs. required

F. Sprinkler Wrench - 3 pcs. required

FPS 1000: PIPINGS - GENERAL

A. Where American Standards are specified, other approved national or local standards may be acceptable, provided copies of these standard Specifications are forwarded to the Engineer for his approval.

B. Black iron, schedule 40 pipes, ASTM A-120 for feed mains, cross mains, branch lines. Similar to

"Supreme, Superior" or approved equal.

C. All side piping shall be installed by means of screwed or flanged fittings. Flanged joint shall be used at all sprinkler risers and provided with 1.6 mm thick long fiber asbestos, cross laminated gasket "cranite".

D. Torch cutting shall not be permitted as means of modifying or repairing sprinkler system.

E. All welding shall be "shop welding" only and shall be done by electric arc welding process.

F. Teflon type shall be used for screwed joints.

FPS 1100: FITTINGS - GENERAL

A. Sprinkler system fitting shall be extra heavy pattern. Whenever a change in pipe size is made, one piece of reducing fitting shall be used. Provide mechanical grooved couplings at riser pipes of every floor.

B. All fittings shall be of malleable iron fittings.

C. Steel pipe flangers mating with steel equipment flangers shall have the same facing as mating flange.

D. Screwed union shall not be used on pipes larger than 50 mm (2"). Coupling and unions of pipes other than screwed type shall be of types approved specifically for sprinkler used.

FPS 1200: SWAY BRACES, HANGERS, SUPPORTS AND SEISMIC BRACINGS

A. Sway Bracing: Steel flat bars, structural grade 7 mm minimum thickness, with corrosion protection; shape /or type as shown on plans.

1. Sway Bracings Installation;

1.1 Adequate sway bracing shall be provided to oppose longitudinal or transverse pipe movements.

1.2 Lateral bracings shall withstand a force equal to 50% of the weight of the water contained in piping, valves and fittings. Spacing shall be 40 ft. (12m) maximum distances along main lines.

1.3 Longitudinal bracing shall with stand a force equal to 50% of the weight of crossmain and feedmain within the zone of water contained in piping, valves and fittings. Spacing shall be 80 ft. (24 m) maximum distances along main lines.

1.4 Piping anchorages shall not be scured on two (2) dissimilar parts of the building which will move differently.

B. Pipe Hangers : Steel flat bars, structural grade, 7 mm minimum thickness, with corrosion protection, shape as shown on plans and 13 mm diameter bars with corrosion protection as shown on plans.

1. Hangers Installation;

1.1 Approved inserts may be used for the support of hangers, anchorages in concrete. Expansion shield should be used in a horizontal position on the sides of concrete beams and shall be above the bottom reinforcements.

1.2 Increaser couplings shall be attached immediately adjacent to the expansion shields.

1.3 When pipes 100 mm diameter and larger are supported in the vertical position, the supports shall be at a minimum spacing of 3.0 meters (10') on center. Holes in concrete for expansion shield shall be made of the proper size and depth, as specified for the type of shield used, to provide a uniform contact with the shield over its entire length and circumference.

1.4 Maximum distance between hangers shall be 3.65 meters (12') for size 25mm (1"). Provide at least one hanger for each length of branch line, one between each two cross main branches, one hanger for each 4.75 meters (15') length of feed mains. The distance between the hanger and the center line of upright sprinkler shall be not less than 76 mm (3").

FPS 1300: PIPES SLEEEVES

A. MATERIALS:

1. Through fittings - cast iron
2. Below Grade-cast iron or standard weight iron pipe
3. Above Grade - steel pipe

B. INSTALLATION:

1. Minimum clearance between the pipe & sleeve shall not be less than 25 mm (1") for pipes, 25 mm (1") to 89 mm (3-½") and 50 mm (2") clearance between pipes 100 mm (4") and larger. The clearance between pipes and sleeves shall be filled with non - combustible flexible materials such as asbestos rope and furnished with semi-hardening mastic flush.
2. Floor sleeves shall extended at least 76 mm (3") above the top of the wearing surface.
3. Drains, fire department connections, test manifolds and other auxiliary pipings connected to risers shall not be cemented into walls or floors.

FPS 1400: FIRESTOPPING MATERIALS

A. Materials:

1. Firestop compounds and damning materials shall be UL listed and shall conform to the requirements of qualified designers or Manufacturers approved modifications, as supported by engineering reports. Similar to "Hilti", "Metacaulk" brand or approved equal.

2. The penetration seal materials must be unaffected by moisture and must maintain the integrity of the wall or floor assembly for its rated time period when tested in accordance with ASTM E814 (UL 1479). The system shall be UL listed classified for up to and including three (3) hours.

3. Fire stopping materials shall be asbestos and lead free and shall not incorporate oil not require the use of hazardous solvents.

4. All fire stopping materials shall be manufactured by one manufacturer thru out the completion of the project.

5. Do not proceed with installation of fire stop materials when temperatures exceeded the Manufacturer recommendation limitations for installations.

B. PREPARATIONS

1. Clean substrate of dirt, dust, grease, oil, loose materials, rust or other matter that may affect proper fittings or adhesion of the firestopping materials.

2. Clean metal and glass surfaces with a non-alcohol solvent.

C. INSTALLATION

1. Installation of firestops shall be performed by an applicator / installer qualified and trained by the manufacturer. Installation be performed in strict accordance with manufacturer's detail installation procedures.

2. Apply firestops in accordance with fire test reports, fire resistance requirements, acceptable sample installation and Manufacturer's recommendations.

3. Unless specified and approved all insulation used in conjunction with through penetrations shall remain intact and undamaged and may not be removed.

4. Seal holes and penetrations to ensure an effective smoke seal.

5. In areas of high traffic, protect firestopping materials from damaged. If the opening is large, install firestopping materials capable of supporting the weight of a human load.

6. Insulation types specified in other sections shall not be installed in lieu of firestopping materials specified herein.

7. All combustible penetrants (e.g. non-metallic or insulated metallic pipes) shall have firestopping using products and system tested in a configuration representative of the field condition.

8. When required to properly contain firestopping materials within opening, damming or packing materials may utilized. Combustible damning material must be move after appropriate curing. Non-combustible damming materials may be left as a permanent components of the firestop system.

D. CLEANING

1. Remove spilled and excess materials adjacent to firestopping without damaging adjacent surface.

2. Leave finished work in neat, clean condition with on evidence of spillovers or damage to adjacent surfaces.

FPS 1500: PIPE PAINTING

A. Sprinkler heads, valve stems and the like shall not be painted.

B. After installation and test and before the installation of ceiling fixtures or boards, all pipings shall be prime painted and coated with two coats of gloss red quick drying enamel.

C. Paint to be used shall be of low VOC type as specified by the Architect/ Engineer.

FPS 1600: MARKERS, INSTRUCTION AND IDENTIFICATION SIGNBOARD

These signboards shall be made of gauge No. 14 black iron sheet with baked enamel finish and letter instruction as shown on the plans. Additional signboards shall be mounted on the unobstructed area for easy identification reading. Paints shall be basically gloss fire red and white.

FPS 1700 : ACCEPTANCE TESTS

A. The Contractor shall conduct tests in the presence of inspector or authority having jurisdiction (The Philippine Fire Protection Association of Fire Protection Associates).

B. Isolated leak tests or partial tests of areas may be performed prior to installation of ceiling materials in the area to preclude any damage and during the total system final tests.

C. To remove foreign materials which may have entered the piping during installation of same, flushing or underground connection is required before sprinkler piping is connected.

D. Hydrostatic Tests:

1. Minimum tests pressure shall not be less than to 200PSI on the system pressure. Exceeding System pressure requirements to the minimum test pressure shall be tested applying additional test pressure of 50PSIG on the system for at least twenty four (24) hours minimum.
2. No visible leakage for inside sprinkler piping will be allowed. For underground mains and laid - ins, exceeding the permissible leakage or joints necessary repair shall be made.
3. All control valve water pressure to ensure proper operating tests. Use clean, non - corrosive water.
4. Fire connection shall be tested (part of base building works).

E. The Contractor shall furnish the Owner a written statement to the effect that the work covered by the Contract has been completed and tested, before requesting for final approval of the installation from the Fire Department Authority.

F. Testing of drainage facilities shall be made by opening the main drain valve while the control valve is wide open.

G. Test certificate shall be filled out and signed by the Owner's and Contractor's representative.

H. System operations and maintenance chart shall be submitted to the Owners upon completion of the Contract. This shall include, among others, the locations of the control valves and care of the new equipment.

FPS 1800: MINOR MODIFICATIONS AND TIME COMPLETION

A. The plans as drawn should show conditions as accurately as it is possible to indicate them in scale. The plans are diagrammatically and do not necessarily show all fittings, etc. necessary to fit the building conditions. The locations of valves, fittings and the fixture shown on the plans are approximately. The Contractor shall be responsible for the proper location in order to make them in compliance with Architectural details and instructions.

B. The Contractor shall complete the work herein described in accordance with the specific schedules set by the Owners in accordance with General Contractor's Schedule of Work.

FPS 1900 : GUARANTEE

The Contractor shall guarantee that the installed sprinkler system complies with the requirements of the authorities and free from all defective workmanship and materials and will remain so, for a period of one (1) year from the date to final inspection and acceptance of the work. Any defect appearing within one year shall be corrected by the Contractor at no additional cost to the Owner.

FPS 2000 : CONTRACTOR'S RESPONSIBILITY

A. The Contractor shall provide temporary fire protection system during the construction period. This shall be of sufficient capacity to put any fire that may break out due to construction operations. This is in addition to temporary fire extinguisher required.

B. The Contractor shall identify and save the Owner, the Architect and the Consulting Engineer Harmless from and against all liabilities for damage to property occasioned by any or omission of this Contractor's on any of this Sub-contractors including any and all expenses, legal or otherwise which may be insured by the Owner, the Architect or the Consulting Engineer, in the defense of any claims, action or suits.

C. The General Contractor shall be responsible for the coordination among the different trades on the Jobsite in order to finish the Works in the least possible time, in strict compliance and in accordance with the Plans and Specifications.

D. Throughout the construction period open ends of all installed fire lines, crossmain, branch lines, riser nipples, drop nipples and other related pipings shall be kept closed by temporary plugs. E. All installed fire lines risers, dry stand pipes, FCV and ITC drain line stack and other related pipings shall not be used to conduct dirty construction wash water especially those with cement mixes to avoid possible clogging.

F. Temporary potable water supply shall be made available to construction workers as construction progresses.

G. A temporary human excreta disposal system shall be provided by the Contractor to serve the Workers during the construction period.

- END OF SPECIFICATIONS –

AUXILIARY WORKS TECHNICAL SPECIFICATIONS

Contents

SECTION 27 11 16 COMMUNICATIONS CABINETS, RACKS, FRAMES, AND ENCLOSURES

PART 1 – GENERAL

1.1 SUMMARY

A. The work covered in this section consists of the furnishing and installation of all necessary labor, supervision, materials, equipment, tests, and services to install communications cabinets, racks, frames and enclosures.

B. Standards and Codes References:

1. ANSI/EIA RS– 310D
2. ANSI/TIA/EIA – 569B and all addenda for Commercial Building Standard for Telecommunication Pathways and Spaces.
3. ANSI/J-STD 607-A – Commercial Building Grounding (Earthing) and Bonding Requirement for Telecommunication.
4. ANSI/TIA/EIA – 606-A and all addenda for Administration Standard for Commercial
Telecommunications Infrastructure.
5. ANSI/TIA/EIA – 568-B.1 and all addenda for commercial Building Telecommunication
Cabling Standard Part I: General Requirements.
6. ANSI/NECA/BICSI 568-2001 – Standard for Installing Commercial Building Telecommunications Cabling
7. PEC – Philippine Electrical Code, Latest Edition.
8. PECE – Philippine Electronics Code, Latest Edition.

1.2 SUBMITTALS

A. Provide detail elevation drawings of each equipment cabinet in the TRs, ERs. Drawing shall be in scale not less than 1:20.

B. Provide manufacturer's literature and sample of telecommunications installation materials.

C. Provide resumes and certifications of field personnel meeting qualification requirements in the Quality Assurance section of this specification section. Submit a minimum of 6 months prior to installation of cabinets, racks, frames, and enclosures for communications.

1.3 QUALITY ASSURANCE

A. Contractor Qualifications: Contractor shall have on staff a Registered Communications Distribution Designer (RCDD) certified by BICSI. The RCDD shall inspect the work in progress and certify the work at the completion of the project. Installation field supervisor must be certified by BICSI at the technician level. 50 percent of the installation technicians assigned to this project shall be either certified by BICSI at the installer level or trained and certified by the manufacturer to install or test cabling. Untrained technicians assigned to this project shall be trained and certified at no cost to the Owner Representative.

B. Comply with PECE, NEC, ANSI/TIA/EIA, and BICSI installation manual.

1.4 COORDINATION

A. Coordinate layout and installation of cabinets, racks, frames, and enclosures with communications cabling installation, data switches, termination fields and patch panels, and all other equipment to mount inside cabinets, enclosure, racks, etc.

B. Adjust arrangements and locations of equipment in ERs and TRs to accommodate and optimize arrangement and space requirements as approved by the Owner Representative.

C. Coordinate with other sections as required ensuring that the entire work will be carried out in orderly, complete, and organized fashion.

PART 2 – PRODUCTS

2.1 GENERAL

A. Open freestanding equipment rack shall not be permitted.

2.2 EQUIPMENT

A. Equipment cabinet shall be either freestanding or wall mounting equipment cabinet/enclosures and size as required in the drawings. Equipment cabinet shall be modular steel unit and equipped with the following:

1. Fans for ventilation.
2. Hinged doors with reversible swing and lock for protection.
3. Contain rail conforming to EIA RS-310-D standard for mounting standard 482-mm equipment.
4. Grounding busbar kit inside equipment rack.
5. Transparent front door and vented rear door.
6. Power strip with surge protection and have a minimum of 6-receptacle outlets on the power strip.
7. Vertical wire management extending the full height of the rack including both sides: front and back.
8. Contain knockouts for cable accessed along the top, bottom, or rear panels.
9. Wall mount Equipment cabinet shall have dual locking hinges for front and backaccess.
10. Freestanding cabinets shall be accessible from both front and back.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Verify installation methods specified by the manufacturer prior to installation.
B. Ensure the cabinets will fit the footprint allocated prior to attempting installation.
C. Connect ground busbar in cabinet/rack to TBB or TMGB.
D. Securely fasten floor mounted cabinets/racks to the floor with anchors, expansion bolts, etc. Coordinate with structural engineer for proper type and use of bolts.
E. Plan for the space needed for installation of both equipment and cable.
F. Support the top of the floor mounted cabinet/rack by bracing it to the wall, support barrier, or ladder rack. Consult a seismic engineer when seismic bracing is required.
G. Plan for the equipment to be installed in the cabinet/rack. Ensure that the open space recommendations are adhered to for airflow between electronic equipment. Also ensure that is adequate space for cable so that bend radius and separation requirements are met.

END OF SECTION 27 11

SECTION 27 11 23 COMMUNICATIONS CABLE MANAGEMENT AND LADDER RACK

PART 1 – GENERAL

1.1 SUMMARY

A. This Section includes cable management materials, equipment, and installation practices required for a fully operational, certified telecommunication cabling system compliant with all applicable codes and standards.

B. Standards and Codes References:

1. ANSI/TIA/EIA – 568B.1 and all addenda for Commercial Building Telecommunication Cabling Standard Part 1: General Requirements.
2. ANSI/TIA/EIA – 569-B and all addenda for Commercial Building Standard for Telecommunication Pathways and Spaces.
3. ANSI/NECA/BICSI 568-2001 – Standard for Installing Commercial Building Telecommunications Cabling.
4. PECE – Philippine Electronics Code, Latest Edition.
5. ANSI/J-STD-607A "Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications".

1.2 SUBMITTAL

A. Shop drawings: Include the following:

1. Provide detail elevation drawings of each equipment cabinet in the TRs, ERs. Drawing shall be in scale not less than 1:20.
2. On the drawings include a material schedule of telecom equipment that will be used at each TRs and ERs including manufacture, part number, name, quantities, and function.

B. Provide manufacturer's literature and sample of telecommunications installation materials.

C. Provide resumes and or copies of certifications for field personnel a minimum of six months prior to installation of communications equipment and cabling in accordance with the Quality Assurance section of this specification.

1.3 QUALITY ASSURANCE

A. Contractor Qualifications: Contractor shall have on staff a Registered Communication Distribution Designer (RCDD) certified by Building Industry Consulting Service International (BICSI). The RCDD shall inspect the work in progress and shall certify the work at the completion of the project. Installation field supervisor must be certified by BICSI at the technician level. 50 percent of the installation technicians assigned to this project shall be either certified by BICSI at the installer level or trained and certified by the manufacturer to install or test the cable. Untrained technicians assigned to this project shall be trained and certified at no cost to Owner Representative.

B. Obtain cable management and ladder rack and all accessories through one single manufacture.

C. Match components and interconnection for optimum future performance.

D. Comply with PECE, NEC, ANSI TIA/EIA, and BISCI Installation Manual.

1.4 COORDINATION

A. Coordinate the work in this section with other sections as required ensuring that the entire work will be carried out in orderly, complete, and organized fashion.

PART 2 – PRODUCT

2.1 CABLE MANAGEMENT AND LADDER RACKS

A. General: Equipment and components shall not be intermixed between different manufactures.

B. Manufacturers: Provide equipment and components from the following manufacturer or manufacturer approved by the Project Director:

C. Ladder rack shall have a maximum load with minimal deflection is 433lb/mm. when supported every 1.5 meters.

D. Ladder rack shall be constructed of rectangular steel tubing.

E. All accessories shall be from one single manufacturer.

F. Field constructed accessories such as transitions, splices, bends, etc are prohibited.

G. Provide radii and bends for smooth cable transitions for turns and drops.

H. Radii and bends shall be constructed of the same material as the ladder rack.

I. Provide junction splices to join pieces of ladder rack.

J. Junctions for ladder rack shall be used to allow transitions in various directions.

K. Junctions for ladder rack shall be constructed of solid tubular steel.

L. Junctions for ladder rack shall be UL listed.

M. Metal D-rings may be used to route and cable inside telecommunications rooms and equipment rooms.

N. Minimal size of D-rings shall be 50mm.

O. D-ring edges shall be rolled to prevent scratches and nicks of cable jacket

P. Metal D-rings shall be corrosion resistant and fire resistant.

Q. Cable straps shall be manufactured for the specific use of bundling cable.

2.2 J-HOOKS

A. Provide equipment from the following manufacturer or manufacturer approved by the Project Director:

B. J-hooks shall have a wide base.

C. J-hooks shall have a galvanized finish.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine pathway elements intended for cables. Check raceways, cable trays, and other elements for compliance with space allocations, installation tolerances, hazards to cable installation, and other conditions affecting installation. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with all requirement ANSI/TIA/EIA 568-B.1, B.2, and B.3 and EIA 569-B standards.

B. Provide sufficient support for ladder racks and installed cables.

C. Install J-hook at 1.22 m or 1.52 m interval.

D. Bridle rings are not allowed.

E. Installation of J-hooks is limited to transitions from cable tray to conduit drops. Any other applications must be approved by USG.

F. Allowance for change and expansion:

1. Horizontal Distribution Expansion: Provide 25 percent minimum for pathways, number of outlets and termination devices in TR.
2. Backbone expansion: Provide 50 percent minimum of pathways.

G. Provide horizontal wire management above and below each patch panel (copper and fiber) and switches.
H. Provide horizontal cable management on the back of each copper patch panel.
I. For equipment cabinets/enclosures provide vertical cable management extending the full height of the rack including both sides.
J. Cable ties shall be installed loosely, so that they do not damage or deform the cable. They shall be able to spin around the bundled cable.
K. Cables may not be bundled with tape, rope, rubber bands, etc.

3.3 GROUNDING

A. Bond all ladder rack and other metallic hardware used for communication distribution to the nearest grounding busbar. Ensure that bonding breaks through paint to bare metallic surface of all painted metallic hardware.

END OF SECTION 27 11 23

SECTION 27 51 16 PUBLIC ADDRESS SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes building background music and public address system and installation of system components and equipment conforming to applicable codes and standards.

B. Related Sections include the following:

1. Consumer Electronics Association (CEA)
   CEA-310-E (2005) Racks, Panels, and Associated equipment
2. Institute of Electrical and Electronics Engineers (IEEE)
   IEEE C62.41 (1991; R1995) Recommended Practice for Surge Voltages in Low-Voltage
   AC Power Circuits
3. Underwriters Laboratories (UL)
   UL 1449 (2006) Surge Protective Devices

1.2 SUBMITTALS

A. Make submittals for the background music and public address system in accordance with the requirements of this specification.

B. The Contractor shall submit a fully technical and mechanical description of every piece of equipment and cables to be used, including manufacturer's technical literature.

C. The Contractor shall provide a description of the methods proposed to show that the actual performance will be in accordance with the specifications for technical performance, including necessary test methods, procedures, and equipment that will be used.

D. Submit shop drawings to include the following:

1. System Diagram.
2. Floor plan layouts, sectional view and installation details.

E. Submit samples of cables and other components as required.

F. Submit as-built drawings to include the following:

1. Floor plan layouts, sectional view and installation details.
2. List of major components and their place in the system.
3. Synopsis of the numbering scheme and cross connect log.

G. Submit O&M manuals, including test results.

1.3 QUALITY ASSURANCE

A. Electronic Components: Comply with latest applicable standards of EIA; PEC; standard industry grade; types and ratings commonly available in local distributor without prior written approval from the Project Manager.

B. Entire system, including mounting, installing, connecting, aligning, testing and adjusting, to be the responsibility of one contractor.

C. Engineer in-charged shall be a duly Registered Electronics Engineer supervised by a Professional Electronics Engineer as required by R.A. 9292 and the IRR of revised National Building Code.

D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in PEC 2017, Article 1.1, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

PART 2 - PRODUCTS

2.1 STANDARD PRODUCTS

Material and Equipment to be provided shall be the standard products of a manufacturer regularly engaged in the manufacture of such products, and shall essentially duplicate material and equipment that have been in satisfactory use at least 2 years. All components used in the system shall be commercial designs that comply with the requirements specified.

A. Identical Items

1. Items of the same classification shall be identical. This requirement includes equipment, modules, assemblies, parts, and components.

B. Nameplates

1. Each major component of equipment shall have the manufacturer's name, address, model and catalog number, and serial number on a plate secured to the equipment.

2.2 Mixer-Preamplifier

Mixer-preamplifier shall as a minimum conform to the following specifications:

Rated Output:	18 dB
Frequency Response:	Plus or Minus 1 dB, 20 Hz – 20 kHz
Distortion:	Less than 0.5%, 20 Hz – 20 kHz
Signal to noise:	Microphone – 60 dB
	Aux – 70 dB
Inputs:	5 independent balanced low-impedance transformer-isolated
Input Sensitivity:	Microphone – 0.003V
Aux	– 0.125V
Magnetic Cartridge	– 0.0005V
Input Channel Isolation:	80 dB
Tone Controls:	Plus or minus 10 dB range at 50 and 15kHz
Power Requirement:	230Vac 60Hz

2.3 Power Amplifiers

Power amplifiers as a minimum conform to the following specifications:

Rated Power Output (RPO):	480watts RMS
Frequency Response:	Plus or Minus 3dB, 20Hz – 20 kHz
Distortion:	Less than 2% at RPO, 600Hz – 13 kHz
Input Impedance:	50k ohm unbalanced
Output Impedance:	Balanced 4 and 8 ohms
Output Voltage:	70V or 100V
Power Requirement:	230Vac 60Hz

2.4 Mixer Amplifiers

Mixer amplifier shall as a minimum conform to the following specifications:

Rated Power Output (RPO):	(35) (60) (125) watts RMS
Frequency Response:	Plus or Minus 3dB, 20Hz – 20 kHz
Distortion:	Less than 1% at RPO, 60 – 13 kHz
Inputs:	2 microphones (high impedance or
	Low-impedance unbalanced
	2 Aux. (high-impedance)

Output Impedance:	Balanced 4 and 8 ohms
Output Voltage:	70V or 100V
Power Requirement:	230Vac 60Hz

2.5 Microphone Input Modules

Microphone input modules shall as a minimum conform to the following specifications:

Rated Power Output (RPO):	0.25V into 10k ohms 1.0V into 10k ohms
Frequency Response:	Plus or Minus 2dB, 20Hz – 20 kHz
Distortion:	Less than 0.5% at RPO, 20Hz – 20 kHz
Inputs:	4 transformer – coupled balanced 150 ohm
Input Sensitivity:	0.003V
Input Channel Isolation:	70 dB minimum

2.6 Microphones

A. Desk Microphone

Microphones shall as a minimum conform to the following specifications:

Element:	Dynamic
Pattern:	Cardioid
Frequency Response:	50 – 12 kHz
Impedance:	Low Impedance mic (150 – 400 ohms)
Front – to – back Ratio:	20 dB
Selector Switches:	Selector switches for zone shall be (integral microphone) or (separate console adjacent to microphone)

B. Gooseneck Microphone

Gooseneck microphone shall meet the minimum requirements of the desk microphone.

C. Microphone Jack

Each outlet for microphones shall consist of a standard outlet box, flush mounted, and fitted with a three-pole, polarized, locking type, female microphone jack and a corrosion resistant-steel device plate.

2.7 Loudspeakers

A. Cone Speaker

The cone speaker shall as a minimum conform to the following specifications:

Application:	(Waffle Baffle) (Ceiling)
Frequency Range:	60 – 12 kHz
Power Rating:	Normal – (7) Watts Peak – (10) Watts
Voice Coil Impedance:	8 ohms
Line Matching	
Transformer Type:	100V
Capacity:	4 watts
Magnet:	10 ounces or greater
Primary Taps:	0.5, 1, 2 and 4 watts
Primary Impedance:	25V – 1250, 625, and 312 ohms 70.7V – 10k, 5k, and 2.5k ohms

B. Horn Speaker
The horn speaker shall as a minimum conform to the following specifications:

Application:	(Indoor) (Outdoor) (Weatherproof)
Frequency Response:	400 – 14 kHz
Power Taps:	100V line – 2.5, 5, 10, 15, and 20 watts
Impedance:	5000, 2500, 1300, 670, 330, 90, and 45 ohms
Power rating:	Normal – 7 Watts
	Peak – 15 Watts

C. Dual Horn Speaker
The dual horn speaker shall meet the minimum requirements of horn speaker except the dispersion shall be 100 degrees.

D. High Output Speaker Enclosures
1. High output speaker enclosures shall be of the tuned-port design for precise balancing and tuning of the speaker. The enclosures shall be constructed throughout of 19.1mm 3/4 inch high density board, with screwed and glued joints, durably braced, and padded with fiberglass where acoustically required.

E. Waffle Baffle Speaker Enclosures

1. The waffle baffle speaker shall be of particle board instruction covered with (walnut laminate) and complete with (black) cloth grille. Baffle shall feature 9.5 degree slope to provide directional sound dispersion offset in the direction of radiation. Wall baffle enclosure shall come equipped with a wall mounting bracket designed to assure a rigid mounting to any flat surfaces.

F. Ceiling Speaker Enclosures

1. Ceiling speaker enclosure shall be constructed of heavy gauge cold steel with interior undercoating and 38mm 1 1/2 inch thick high density fiberglass 24kg per cubic meter 1- 1/2lbs per cu. ft. the unit shall be (round) (square) and designed for (recessed) (surface) installations which will be accomplished via (standard screw) (torsion spring) (flange mount) mounting. Recessed models shall have a rust-preventive, (textured black coating) and the surface mount unit finished in textured (white). Enclosure shall include four triple compound conduit knockouts.

2.8 Speaker Switching Panel
A. Selector Switches
B. System Power Supply

2.9 AM/FM Equipment
A. AM/FM Tuner

AM/FM tuner shall be rack-mounted and shall as a minimum conform to the following characteristics:

Tuning Range:	AM – 540 to 1605 kHz
	FM – 88 to 108 MHz
Selectivity:	60 dB on FM
	40 dB on AM

Sensitivity:	FM – 1.5 microvolts AM – 2.0 microvolts
Capture Ratio:	1.0 dB
Readout/selection:	Digital
Other Features:	Phased Lock Loop (PLL)
Power Requirement:	230Vac, 60 Hz

2.10 Compact Disc Player

Player shall have three beam laser pickup, dual Digital – to – Analog converters, random access and random mode programmable playback. The CD player shall be a six (6) disc CD player with three (3) Playback Modes (Single Disc, All Disc, Custom), three (3) Random Play Modes (Single Disc, All Disc, Custom) and eight (8) Repeat Modes. Player shall as a minimum conform to the following:

Frequency:	10 – 20 kHz plus or minus 1 dB
Signal-to-noise:	Minimum of 100 dB
Dynamic Range:	Minimum of 96 dB
Total Harmonic Distortion:	Maximum of 0.005% at 1 kHz
Channel Separation:	Minimum of 100 dB at 1 kHz
Quantization:	Minimum of 18 bits linear per channel
Conversation Rate:	Minimum 8 x oversampling
Disc Size:	5 inch
Disc Player Type:	Multi-disc
Power Requirement:	230Vac, 60 Hz

2.11 Priority Relays and Controls

Priority relays and controls required to accomplish operations specified shall be provided. Relays shall be completely enclosed with a plastic dust cover for maximum protection against foreign matter, and shall be plug-in type. Relays shall be provided with a diode wired across the relay coil for transient suppression and shall be installed utilizing factory-prewired, rack-mounted receptacle strips. Coil shall be maximum 24V dc.

2.12 Switches and Controls

A. Radio System Control Switch

The loudspeaker in each room, or group of speakers in a room, shall be provided with a flush program channel selector rotating-switch knob. A volume control shall be installed with a switch at each station and shall be of the auto transformer type and set so that the maximum volume is sufficient for the area while not disturbing adjacent areas. If music is turned down or off, the paging signal shall override controls except speakers designated for music only. (Each device plate shall be satin-finished, corrosion-resisting steel permanently marked to indicate the channel selected.)

B. Remote Loudspeaker ON/OFF Switches

Remote switches shall be (key-operated) (toggle switch) 2-pole, wall-mounted, single gang type with engraved switch plates finished to match the approved finish of electrical wall switches. Low-voltage priority override relays shall be provided as part of the switches with all wiring to the racks to allow override of the ON/OFF switches for priority announcements.

C. Remote Loudspeaker Volume Controls

Remote volume controls shall be an auto transformer type with demented 3 dB steps and an OFF position. The controls shall be wall-mounted in single-gang outlet boxes and furnished with engraved switching plates finished to match approved finish of electrical wall switches

2.13 Equipment Racks

Equipment shall be mounted on 482.6mm and 9 inch racks in accordance with CEA-310-E and located as shown on drawings. Ventilated rear panels, solid side panels, and solid top panels shall be provided. Equipment racks shall be provided with lockable front panels that limit access to equipment. The lockable front shall not cover items that require operator access such as am/fm tuner, CD player, or tape player. Rack cooling shall be through (perforations or louvers in front panels to ensure adequate ventilation of equipment) (top rack mounted fan.) The racks and panels shall be factory finished with a uniform baked enamel over rust inhibiting primer.

2.14 Cables

A. Speaker Cable

Cables shall be of the gauge required depending upon the cable run length. In no case shall cable be used which is smaller than 18 AWG. Insulation on the conductors shall be Rigid Non-metallic Conduit (RNC) or an equivalent synthetic thermoplastic not less than 0.2 mm 0.009 inch. Cable shall be jacketed with Rigid Non-metallic Conduit (RNC) (Fluoropolymer) compound. The jacket thickness shall be 0.5mm 0.02 inch minimum.

B. Microphone Cable

Cables conductor shall be stranded copper 20 AWG. Insulation on the conductors shall be Rigid Non-metallic Conduit (RNC) or an equivalent synthetic thermoplastic not less than 0.2 mm 0,009 inch. Cable shall be shielded 100% of aluminum polyester foil with a bare 22 gauge stranded soft copper drain conductor. The jacket thickness shall be 0.5mm 0.02 inch minimum.

C. Antenna Cable

Antenna coaxial cable shall have 75 ohm plus or minus 2 ohm. Attenuation of the coaxial cable span between the antenna and amplifier shall not exceed 2.5 dB at 108MHz.

2.15 Terminals

A. Terminals shall be (solderless, tool-crimped pressure) type.

2.16 Surge Power

A. Power Line Surge Protection

Major components of the system such as power amplifiers, mixer- preamplifiers, and tuners, shall have a device, whether internal or external, which provides protection against voltage spikes and current surges originating from commercial power sources per IEEE C62.41 B3 combination waveform. Fuses shall not be used for surge protection. The surge protector shall be rated for a maximum let thru voltage of 350V ac (neutral-to-ground). Surge protection device shall be UL listed and labeled as having been tested in accordance with UL 1449.

B. Signal Surge Protection

Major components of the system shall have internal protection circuits which protects the component from mismatched loads, direct current, and shorted output lines. Communication

cables/conductors shall have surge protection installed at each point where it exits or enters a building.

2.17 Telephone Interface Module

Telephone Interface module shall provide one way all call paging access from telephone to PA system. Paging shall be accomplished by the building telephone system instruments interconnected to the PA system via an interface module to allow telephone dial up access to the paging amplifier. Interface module shall produce an alert tone in the associated speakers on activation. Telephone interface module shall as a minimum to conform to the following specifications:

Impedance:	600 ohms
Frequency Response:	100 Hz to 10 kHz
70V Input Impedance:	200k ohms
Output Level:	400mV rms
Input Power Requirement:	12 – 24V dc (from power supply)
Access requirement:	Electronic (analog) or IA2 line key (line card required) PABX loop or ground-start trunk port, or dedicated single-line phone.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:

Install all system components and appurtenances in accordance with the manufacturer's instructions and as specified herein.

B. Equipment Racks:

Racks shall be mounted side-by-side and bolted together. Items of the same function shall be grouped together, either vertically or side-by-side. Controls shall be symmetrically arranged at a height as shown. Audio input and interconnections shall be made with approved shielded cable and plug connectors; output connections may be screw terminal type. All connections to power supplies shall utilize standard male plug and female receptacle connectors with the female receptacle being the source side of the connection. Inputs, outputs, interconnections, test points, and relays shall be accessible at the rear of the equipment rack for maintenance and testing. Each item shall be removable from the rack without disturbing other items or connections. Empty space in equipment racks shall be covered by blank panels so that the entire front of the rack is occupied by panels.

C. Wiring:

Wiring shall be installed in rigid metallic conduit, intermediate metal conduit, cable tray, or electric metallic tubing. Wiring for signal circuits shall terminate on identified terminal blocks in cabinets and master station enclosures. Terminate audio circuits on identified terminal blocks in cabinets and master stations. Cable shield shall be grounded at all points of termination.

1. Signal Wiring and Control Wiring

   Type of signal and control wires and number of conductors shall be provided as recommended by the intercommunication system manufacturer, and as necessary to provide a complete and operable system.

D. Grounding:

All grounding practices shall comply with PEC article 2.50. The antenna mast shall be separately grounded. Equipment shall be grounded to the serving panelboard ground bus through a green grounding conductor. Metallic conduits serving the equipment shall be isolated on the equipment end with an insulating bushing to prevent noise from being transferred to the circuit. Equipment racks shall be grounded to the panelboard ground bus utilizing a #8 conductor. Grounding conductor shall be terminated to the rack using connector suitable for that purpose.

3.2 SYSTEM CONFIGURATION & OPERATION

A. The system shall be able to broadcast the alarm status as detected by the Semi Addressable Fire Detection System status to the affected area/s so that the building occupants can be properly apprised of the existing situation. The different alarm status and the corresponding messages that are to be broadcast are as follows:

1. Pre Alarm Mode

This is the mode that the Fire Detection System goes into when a single detector is triggered and sends a signal to its Zone Monitor Unit of the Semi Addressable Fire Detection System. In this mode, the Fire Detection System sends a signal to the Voice Evacuation System to automatically broadcast the Pre Alarm Mode Warning Message over the speaker zones in the floor where the triggered detector is located. The message continuously cycles until the system upgrades to Confirmed Alarm Mode or the system is manually reset after it is verified to be a false alarm or when the fire has been contained.

2. Confirmed Alarm Mode

This is the mode of the Fire Detection System goes into when another detector connected to a different Zone Monitor Unit is again triggered in the same floor of the building after the system goes into Pre Alarm Mode or when a manual call point anywhere in the system is activated or the Confirmed Alarm Mode countdown time expires. In this mode, the system automatically generates the broadcast of the confirmed Alarm Mode Message on all speakers in the affected floor of the building. The message gives an instruction to the building occupants in the affected floor only to evacuate the area. The message continuously cycles until the Fire Detection System goes into the General Evacuation Mode or it is manually reset when the fire has been contained.

3. General Evacuation Mode

This is the mode that the entire Fire Detection System enters into when the responding fire brigade decides that the fire is out of control and the building has to be evacuated. The General Evacuation Message is activated manually and broadcast on all speakers inside the building using the fireman's microphone. The message gives an instruction to all building occupants in all areas of the building to immediately leave the building premises. When the detected fire alarm condition has been contained, an All Clear Message shall be manually broadcast over all speaker zones in the building.

3.3 FIELD QUALITY CONTROL

A. Acceptance Tests:

1. After installation has been completed, contractor shall conduct an acceptance test in the presence of contracting officer or its representative, to demonstrate that the equipment

operates in accordance with specification requirements. Contractor shall notify the contracting officer (2 weeks) prior to performance of tests. The acceptance tests shall include originating and accepting messages at specified stations, at proper volume levels, without cross-talk or noise from other links or non-designated units.

2. Retesting:
Rectify deficiencies indicated by tests and completely reset work affected by such deficiencies at contractor's expense.

3.4 IDENTIFICATION
A. All audio/visual system provisions shall be clearly identified to indicate their intended use. Identification in finished areas shall be concealed inside boxes.

END OF SECTION 27 51 16

SECTION 28 23 23 VIDEO SURVEILANCE & SEC. MANAGEMENT SYSTEM

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. The intent of this specification is to provide a complete security system, (CCTV). All equipment, devices and installation materials required to for the completion of the project shall be furnished whether or not specifically enumerated herein or on the electronic plans. The specification covers minimum requirements and is not intended to preclude provision of equipment or methods that exceeds the requirements.

B. The Contractor or Installer shall review all project plans and specifications completely and be familiar with the requirements of the system.

C. The Contractor or Installer shall furnish and install a complete Closed-Circuit Television (CCTV) system as shown in the plans and drawings. All installation to be done shall be in accordance with the applicable codes and standards and governed by existing rules and regulations of the locality and Local Government Unit (LGU) and other concerned agencies.

D. CCTV system to be installed shall be IP based. The system shall be wired as Structured Cabling System (UTP Cabling).

E. The Contractor or Installer shall be responsible for ensuring that a complete, satisfactory and working system is provided.

1.2 SUMMARY

A. This section specifies a Video Surveillance Control & Management Systems, including requirements for system components listed below:

1. Cameras
2. Video Recorders

1.3 CODE REQUIREMENTS

The following publications or its applicable portions are included as requirements of this section:

1. ANSI/TIA/EIA/ – 568B, Commercial Building Telecommunication Cabling Standards
2. ANSI/TIA/EIA/ – 569-A, Commercial Building Standard for Telecommunication Pathways and Splices
3. ANSI/J-STD – 607-A, Commercial Building Grounding (Earthing) and Bonding Requirement for Telecommunication.
4. ANSI/NECA/BICSI 568-2001, Standard for Installing Commercial Building Telecommunications Cabling
5. NFPA70, National Electrical Code
6. UL 294, Access Control System Units
7. Philippine Electrical Code
8. Philippine Electronic Code

Conflict: Where applicable codes and standards differ, apply the more stringent requirement. Where codes and standards conflict, consult with Engineer for proper resolution prior to action.

1.4 SYSTEM DESCRIPTION

A. Provide a Video Surveillance Control, Management System and Access Control System that shall have the option to either be centrally controlled through a Facility-wide Security Network (in junction with CCTV and/or Fire Alarm System) or function as separate stand-alone sub-systems.

B. Equipment: the system shall consist of, but not limited to, the following:

1. Security Camera with proper enclosures
2. Sequential Switchers
3. Digital/Network Video Recorders
4. Monitors
5. Computer User-Interface
6. Equipment Racks and necessary accessories
7. Door control and Monitoring
8. Controlled-Access Tumstile
9. Elevator Control
10. Vehicle Access
11. Alarm/Panic Buttons
12. Walk-Through Metal Detectors (WTMD)

C. Apparatus for validating access to sub-systems in statement above shall be, but not limited to, one or any combination of the following:

1. Access Credential (card, fob, etc.) with appropriate data encoders and readers
2. Numeric or Alphanumerical Keypad
3. Biometric Reader

D. In addition, the sub-systems shall have support to any apparatus for both communications and power supply; implying that a single access card, keypad or biometrics reader of any manufacturer can be coupled to any or all sub-systems present.

E. Upon request of the Owner, any of this apparatus shall have the option for integration to a daily-time record system that shall track employee's attendance and reasonably implement any Owner's policy.

1.5 QUALITY ASSURANCE

A. Manufacturer: Regularly engaged in the production of CCTV equipment and recording devices, of types, sizes and electrical characteristics required whose products have been in satisfactory use in similar service for not less than 5 years.

B. Installer: Qualified with at least 5 years of successful installation experience on projects with CCTV systems installation work similar to the requirement of this project. The installer shall be an authorized factory representative of the supplied equipment, and employ full time, factory trained technicians.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in PEC 2009, Article 1.1, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

D. Comply with the Latest Edition of Philippine Electronic Code (PEC), NFPA 70, ANSI TIA/EIA, and BICSI Installation Manual.

E. The Contractor shall be responsible for all supervision, commissioning, tests and adjustment for the system. Suck work shall be performed by or under direct supervision of a fully-licensed Electronics Engineer and/or a certified Security Personnel.

F. Upon completion of the work, the Contractor shall present documentation to the Owner before commissioning of the system.

1.6 SUBMITTALS

A. Product Data: Submit manufacturer's data on all equipment, and cable, including but not limited to, roughing-in diagrams and instructions for installation, operation and maintenance, suitable for inclusion in maintenance manuals.

B. Shop drawings for the system provided under this section of the specification shall contain but not limited to the following:

1. Specification data sheets on each individual system component.
2. Complete wiring diagrams for all devices and control panels.
3. Conduit layouts on project floor plans, including wire and cable types and count in each conduit run.
4. Mounting details and location of cameras.
5. Battery calculation that substantiate requirement for a minimum standby operation of all CCTV systems and devices for a minimum of 4 hours.
6. Voltage Drop calculations for any voltage outputs to ensure proper operating voltage at the device.
7. Test Plans for all devices.

C. Manuals: Submit simultaneously with the shop drawings, complete operating & maintenance manuals, including technical data sheets. Provide a clear and concise description of operation that gives, in detail, the information required to properly operate the equipment and system. Wiring diagram shall indicate internal wiring for each device and the interconnection between the items of equipment.

D. Provide complete sets of as-built drawing to the owner including any deviations from the submittal data and shop drawings, complete programming, installation, operation and maintenance information including all access codes and user data bases.

E. As-Built Drawings: Submit Record Drawings prior to system acceptance with the following information:

1. Floor plans of the building identifying locations of all pertinent equipment and camera, including type of camera.
2. Identify and tag Surveillance devices, riser and branch conduits, junction and pull boxes.
3. Riser diagram of the system, including wire count and conduit sizes installed.

F. Operation and Maintenance Manuals: Reference document containing the following information.

1. As-Built Drawings
2. Product Submittal for all installed equipment
3. Manufacturer's Maintenance Manual and Procedures.
4. Complete Operating Instructions
5. Certification that the system complied with Contract Documents and applicable codes.

1.7 WARRANTY

The equipment supplier shall guarantee the equipment for a period of two (2) years to be free from inherent defects in materials and workmanship. Any defective part or equipment shall be repaired or replaced free of charge.

PART 2 - PRODUCTS

2.1. MANUFACTURER

All products for the system shall be of a single manufacturer, as produced by the following or approved equivalent:

- Pelco
- Honeywell
- ASIS Technologies
- ADC Technology

2.2. SYSTEM DEVICES

A. CAMERA

 The IP cameras shall be certified for its intended use.

 The camera shall have CCD or CMOS sensors of ½.8" progressive scan or 1/3 type, 1920x1080 @ 30 fps, dual stream, digital WDR (Wide Dynamic Range), 3D DNR (Digital Noise Reduction, up to 30M IR range, POE (Power Over Ethernet) IP67,1K10 (Indoor & Outdoor type) and shall be capable of colored-video transmission.

 The camera shall have digital signal processing and automatic gain control (AGC) with a signal-to-noise ratio (SNR) of 30dB or better.

 As minimum, the camera shall require an illumination of 0.7 lux for usable video and shall have option for inclusion of filter for deployment in dark areas.

 It shall be capable of automatic day/night switching and brightness adjustment and automatic/manual white balance.

 It shall provide Wide Dynamic Range and be equipped with fixed or varifocal lens, as specified by manufacturer.

 Camera display resolution shall be at least 500 horizontal TV lines, while at least (6) megapixels for megapixel camera.

 Video frame rate shall be as per manufacturer's specifications. The frame rate can be field adjusted, through computer user-interface and Video Recorder settings.

 The camera shall provide simultaneous support for both Motion JPEG and H.264. The H.264 implementation shall include support for both Constant Bit Rate (CBR) and Variable Bit Rate (VBR). The camera shall provide configurable compression levels.

 The camera shall provide support for restricting access to pre-defined IP addresses only. It shall also support IEEE 802. IX authentication.

 The camera shall support IP, TCP, RTP/UDP, RTSP and HITP network protocols as a minimum. It shall be equipped with proper LAN port for transmission. Data rate transmission shall be as per manufacturer's specifications.

 PTZ Camera Enclosures should be manufactured with vandal resistant casing, NEMA 4x rated, with at least a fan and temperature sensor inside the enclosure.

 Cameras that are Power-over-Ethernet (POE) enabled shall abide by IEE 802.3af standards. The camera shall also have the alternative option to be powered through a DC or AC source that is rated for the camera. For PTZ cameras, provide appropriate AC source through a separate injector.

 Camera accessories (brackets, fittings, etc.) shall be vandal-proof and heavy-duty. Dome and/or box type enclosures are per Owner, Architect, Engineer and/or site condition requirements. For outdoor cameras, heavy-duty environmental enclosure with appropriate IP rating shall be used.

B. VIDEO RECORDER

 The Video Recorder shall be installed as desktop or rackmount type; with redundant power supply and appropriately-sized UPS. It shall support either NTSC or PAL signal systems and shall have recommended sixteen (16) channels with real time monitoring.

 Frame rates for video recording shall accommodate multiple frame frequency settings but with a minimum of five (5) frames per second (fps) and a maximum of 30 fps. Video recording resolution shall also accommodate multiple display settings but with a minimum of 320 x 1080P resolution.

 The Recorder shall support Motion-JPEG (M-JPEG), MPEG-I, MPEG-4 or H.264 to H.265 video compression technologies. Internal data storage of the recorder shall be at minimum of 4TB, configured in appropriate RAID technology for increased storage reliability. There shall be an option for the unit to have CD or DVD optical drives for external data storage center.

 Video Analytics (e.g. motion and object detection, object counting, tampering, motion direction, etc.) with corresponding alarms shall be a feature of the recorder. It shall be also support video playback, video encryption, and video search (through date, time or camera unit). Camera supported up to 6 megapixels resolution recording.
 Its computer user-interface shall have system configuration and diagnostics and parameter settings with support for Remote-User Access. Security feature of the interface shall have at least three levels of user-access with different code settings for each. At a minimum: the lowest level of user-access with different code settings for each. At a minimum: the lowest level of user-access shall only be licensed to monitor video.
 It shall have support for TCP/IP and LAN.
 16-channel network cameras can be connected with 160m. incoming bandwith.
 It shall also have auxiliary input and output terminals for the other required interface.

C. VIDEO MANAGEMENT SOFTWARE
 The Surveillance Network shall be managed by a Video Management System.
 It shall be capable of viewing recording and archiving live video up to unlimited number of network cameras in one PC Server.
 It shall be capable of continuous and event-triggered recording.
 It shall have remote access, the very least, through a web browser.
 User Log-On: Password shall be configured with user specific password/s.
 Video Retention: A minimum of 30 days with minimum record rate of five (5) fps and resolution of 640 x 1080. Compression type should be H.264.
 All Firmware found in products shall be the latest and up to-date provided by the manufacturer.

2.3. BANDWIDTH MANAGEMENT
 The network of the Surveillance system shall control network traffic by limiting maximum bandwidth to a selected value and support at least Gigabit switching. POE Switches shall be as per chosen manufacturer.

2.4. MONITORS
 Security Monitors Shall be 32 inches high resolution, color video monitors that shall be installed in desktop or rack mount configuration.

2.5. WIRES AND CONDUIT

Wires
 Wiring shall be in accordance to the Philippine Electronics Code (PECE).
 Wiring for CCTV shall be UTP cables
 Wiring shall be listed or approved by a recognized testing agency.

Conduit
 Wiring shall be in accordance to the Philippine Electronics Code (PECE).
 Number of conductors in conduit or raceway shall not exceed to percentage fill specified in Philippine Electrical Code.
 PVC conduit shall be schedule 40 and shall be embedded.

2.6. APPARATUS FOR VALIDATING ACCESS
A. ACCESS CARD

1. The Access Card shall be a contactless smart card that shall meet ISO/IEC 7810 specifications for card construction and durability; with possible exception for thickness, which is upon request of Owner.
2. The card shall be a passive device and shall meet ISO 15693 and 14443B2 standards. It shall contain a 64-bit unique serial number and shall support EEPROM memory and multi-application memory.
3. All radio frequency (RF) communication (13.56MHz or 125KHz) between card and reader shall result in an accurate reading of the access card.
4. The card shall also have the option to be printed with custom graphics on its face, through thermal transfer printing, etc.; and have a single slot punch on the short side to double as personal identification (ID).

B. KEY FOB

1. Electronic Key Fobs shall meet ISO 15693 and 14443B2 standards. It shall be constructed of durable injection molded polycarbonate plastic, taking a suitable and inconspicuous shape that can be placed on a key ring or lanyard. It shall not carry any personal identification of the person or of the property, unless otherwise specified.
2. The key fob shall be a passive device and shall contain a 64-bit unique serial number and shall support EEPROM memory and multi-application memory.
3. All radio frequency (RF) communication (13.56MHz or 125KHz) between key fob and reader shall be encrypted using a secure algorithm. Presentation at any angle within one (1) inch of a reader shall result in an accurate reading of the electronic key fob.

C. DATA ENCODER

1. The Data Encoder and its accompanying software shall be compatible with the selected credential. It shall meet necessary standards for data encoding in the selected type of credential. It shall be connected to a computer (PC) to support field programming of access control or user data and custom security keys. It shall support TCP/IP, Weigand, RS232 or RS485 network communications.
2. The encoder shall use encryption on all serial data transmission to and from the PC and shall encrypt all files before storing them on the PC hard drive. It shall be capable of encrypting access control and user data that is stored on the credential using Data Encryption Standard (DES) or triple-DES algorithms. The encoder shall also support field programming of reader configuration credential used to configure and program matching security keys into the readers.

D. ACCESS CREDENTIAL READER

1. Access Credential Reader shall be compatible with the chosen access credential technology.
2. It shall be certified for its intended use and shall be made of robust and rugged material and properly rated for either indoor or outdoor installation. Hardware installation shall either be integrated to an access control equipment (turnstile, etc.), wall-mount or stand-alone with its own separate pedestal or stanchion. The reader shall source its power form the chosen access control panel.
3. The reader shall have a read range of at least two (2) inches and shall have flash memory to allow future feature enhancements to be added in the field. It shall support transmit frequencies of either 13.56MHz or 125KHz.
4. Audio and/or visual notification of access shall be present in the form of buzzer and/or LCD display. It shall also support TCP/IP, Weigand, RS232, RS422 or RS485 network communications.

5. The numeric or alphanumeric keypad, especially the keypad itself, shall be certified for its intended use and shall be made of robust and rugged material and properly rated for either indoor or outdoor installation. The keypad shall source its power form the chosen access control panel.
6. The keypad shall either be fixed-pad or a scramble-pad that varies key positions upon every access. Audio and/or visual notification of access shall be present in the form of buzzer and/or LCD display. It shall also support TCP/IP, RS232, RS422 or RS486 network communications.
7. The keypad shall have an Administrator account which shall have the capability of manual operation and resetting all keypad settings.
8. Aesthetic qualifications of the keypad shall be reviewed and approved by the Owner and/or Architect.

E. BIOMETRIC READERS

1. Biometric readers shall provide reliable personal recognition schemes to either confirm or determine the identity of an individual. It shall have automatic recognition of individuals based on features derived from the following minimum characteristics listed below, aside from cards, tokens, keys or passwords and personal identification number (PIN).
    a. Fingerprint
    b. Palm Print
    c. Face Recognition
    d. Iris Recognition
    e. Gait (pattern of movement)
    f. Voice
2. These readers shall be certified for its intended use and shall be made of robust and rugged material and properly rated for either indoor or outdoor installation.The reader shall source its power form the chosen access control panel.
3. Audio and/or visual notification of access shall be present in the form of buzzer and/or LCD display. It shall also support TCP/IP, RS232, RS422 or RS485 network communications.
4. Aesthetic qualifications of the reader shall be reviewed and be approved by the Owner and/or Architect.

2.7. ACCESS CONTROL SUB-SYSTEMS

A. DOOR CONTROL

1. Door control and monitoring system shall consist of doors installed with security hardware (SHW) like electromagnetic door contracts, electric door strikes, etc. Selected doors are located in the plan, properly identified by the Owner, Architect and/or Engineer.
2. Control Panels shall accommodate at least two (2) doors with SHW. This panel shall contain the logic circuits required for operation and an integral power supply (12/24Vdc or appropriate low-voltage AC supply), with the option for battery back-up. The panel shall have communication capabilities in TCP/IP, RS232, RS422 or RS485. The panel shall have the option for manual operation.
3. In the event of emergency or power failure, all control on doors shall be released, regardless of configuration (Fail-Safe or Fail-Secure).

4. Electromagnetic door contacts shall be ruggedly constructed, all-weather type, free of any moving parts, self-contained and with a minimum holding force of 600lbs.

5. Electric door strikes shall be made of corrosion resistant stainless steel. It shall operate 'silently' or with buzzer.

6. Aesthetic qualifications of these SHW shall be reviewed and be approved by the Owner and/or Architect. The Contractor shall consult the Architect's Door Schedule for proper coordination and installation.

B. TURNSTILE

1. Turnstile with controlled access shall have an appropriate IP rating for its intended use. Aesthetic qualifications of this type of turnstile shall be reviewed and approved by the Owner and/or Architect.

2. It shall have audio and/or visual notification for traffic flow (green arrow = through, red 'X' = halt).

3. Throughput of the turnstile shall depend on the 'make' of the turnstile (waistheight or full-height) and the type of facility it is deployed in, as a minimum, a throughput of 15 persons per minute (ppm) is acceptable.

4. Turnstile Control Panels shall accommodate at least two (2) turnstiles with controlled access. This panel shall contain the logic circuits required for operation and an integral power supply (12/24Vdc) or appropriate low-voltage AC supply), with the option for battery back-up. The panel shall have communication capabilities in TCP/IP, RS232, RS42 or RS485. The panel shall have the option for manual operation.

5. In the event of emergency or power failure, all control on turnstiles shall be released, rendering it free-access for traffic.

C. ELEVATOR CONTROL

1. Elevator Control shall provide access to the use of elevators and/or access to a specific floor or group of floors.

2. The controls shall have interface with the elevator manufacturer's control equipment to restrict individual floor select buttons. Once granted valid access, the programmed floor select buttons shall activate; allowing access to that specific floor or group of floors.

3. Control Panels for elevator control shall manage at least eight (80 storeys per elevator. It shall contain the logic circuits required for operation and an integral power supply (12/24Vdc or appropriate AC supply), with the option for battery back-up. The panel shall have communication capabilities in TCP/IP, RS232, RS422 or RS485. The panel shall have the option for manual operation.

4. In the event of emergency or power failure, all control on elevators shall be released, reverting to normal elevator operation.

5. For Hotel and Residential installation, the Building Manager/Hotel Operator shall have the option to integrate their Guest/Resident and Staff Key Card System with the Elevator Control.

D. VECHICLE ACCESS

1. Vehicle Access shall consist of security barriers (booms, gates, vehicle barriers, etc.) installed in the entrance and exit of a facility.

2. Control Panels for vehicle access shall accommodate at least two (2) security barriers and its corresponding equipment (motors, pumps, etc.). It shall contain the logic circuits required for operation and an integral power supply (12/24Vdc or appropriate low-voltage AC supply), with the option for battery back-up. The panel shall have communication capabilities in TCP/IP, RS232, RS422 or RS485. The panel shall have the option for manual operation.

3. In the event of emergency or power failure, all security barriers shall be released or maintain deployment, depending on the nature of emergency and the type of facility.
4. Motor operated gate shall be made of heavy steel material and shall be allweather type. It shall be automatic and shall open and close in a linear motion and once closed it shall present as a formidable obstacle for vehicles.
5. Vehicle barrier shall be made of heavy steel material and shall be all-weather type. It shall be automatic and controlled by hydraulic pumps. At its guard position, it shall present as a formidable obstacle for vehicles.
6. Motorized boom barrier shall be made of steel, be all-weather type and automatic.
7. Vehicle sensors (loop sensors, infra-red, RFID, etc.) and/or apparatus for validating access (statement 1.11) shall be utilized at the specified ends of the checkpoint to activate the security barriers. These sensors shall make the security barriers automatically remain in the open position while a vehicle is still within the designated checkpoint area.

E. ALARM/PANIC BUTTONS
1. Alarm and Panic Buttons shall function as an alarm initiating device when a certain area of or the facility is under duress or when and emergency situation arises.
2. This device shall be certified for its intended use and shall be made of high impact fire-retardant ABS plastic. Activating device shall either be a non-latching push-button, a toggle switch or a retracting lever that can be pulled. Upon activation, the device shall either trigger a silent alarm or a general alarm, depending on Owner's initiative.
3. Control Panels for alarm and panic buttons shall accommodate at least four (4) buttons. It shall contain the logic circuits required for operation and an integral power supply (12/24Vdc or appropriate low-voltage AC supply), with the option for battery back-up. The panel shall have communication capabilities in TCP/IP, RS232, RS422 or RS485.

F. WALK-THROUGH METAL DETECTOR
1. Walk-Through Metal Detectors (WTMD) shall have an appropriate IP rating and certification for either indoor or outdoor installation. It shall function within the limits set by international standards for human safety and shall be safe for pregnant women, individuals with pacemakers and magnetic recording materials.
2. Aesthetic qualifications shall be reviewed and approved by the Owner and/or Architect.
3. The WTMD shall have multiple individual zones for proper discrimination and reliable detection of threat items. The unit shall have interference suppression and have audio and/or visual notification for detection.
4. WTMD Power shall be through AC mains, with the use of the unit's own Power Supply Unit; with battery back-up that shall supply the WTMD for at least four (4) hours, in the event of power failure.
5. The WTMD shall have the option for communication capabilities in TCP/IP, RS232, RS422 or RS485.

PART 3 - EXECUTION

3.1 INSTALLATION

A. The Contractor shall carefully follow instruction in documentation provided by the manufacturer to ensure all steps have been taken to provide a reliable, easy-to-operate system.
B. The Contractor shall be responsible for provision and installation of all system components, conduit and wiring.
C. All equipment shall be tested and configured in accordance with the instruction provided by the manufacturer prior to installation.

D. All firmware found in products shall be the latest and most up-to-date provided by the manufacturer.
E. Installation of equipment devices that pertain to other work in the contract shall be closely coordinated with the appropriate subcontractors.
F. All installation shall be in strict accordance with the Contract Documents, Manufacturers installation and wiring recommendations and comply with Philippine Electrical Code (PEC).
G. Camera orientation in the plans is the diagrammatical representation of their 'home' field of view.
H. Mounting height of exterior camera shall be 2700mm from any climbable surface
I. The contractor shall at all times keep the construction area, including storage areas used by him, free from accumulations of waste materials rubbish and prior to completion of work remove materials or rubbish from and about the premises and all tools, scaffolding, equipment, and materials not the property of the Owner.
J. Upon completion of the construction, the Contractor shall leave the work and premises in a condition satisfactory to the Owner and Engineer.
K. Access Credential Readers/Biometrics Readers installation shall either integrated to an access control equipment (turnstile, etc.), wall-mount or stand-alone with its own separate pedestal or stanchion.
L. Doors with SHW can be installed with or without apparatus for validating access (car reader, keypad, biometric reader), as per Owner, Architect and/or Engineer requirements.
M. Vehicle Access used for commercial parking; automatic computer/coded ticket dispenser shall be installed at the entrance of the parking lot. Payment will be don at the payment booth and the ticket shall be validated by a ticket reader at the exit. At bot entrance and exit, there shall be a vehicle access barrier that is chosen by the Owner.
N. Alarm/Panic Buttons installation shall be coordinated with Owner and Architect. Generally, these are located in readily accessible places to qualified personnel but not in view access of the public.
O. The Contractor shall at all times keep the construction area, including storage areas used by him, free form accumulations of waste materials or rubbish and about the premises and all tools, scaffolding, equipment, and materials not the property of the Owner.
P. Upon completion of the construction, the Contractor shall leave the work and premises in a condition satisfactory to the Owner and Engineer.

3.2 WIRING INSTALLATION

A. All CCTV conduits and junction boxes shall be separate from alt other systems, properly tagged and identified and principally routed above the ceiling properly supplied.
B. Unless otherwise specified, all branch conduits shall be EMT with a minimum diameter of 20mm.
C. CCTV System wiring shall be separate from all other systems.
D. All wires shall be new and free from mechanical failures, like short circuit, short to ground, etc.
E. All signal wiring shall be free from splices, taps and joints.
F. Both equipment and cable pathways shall be properly grounded and bonded by means of copper straps.
G. Access Control System wiring shall be separate from all other systems.
H. Access Control Terminal Block indicated in the plans shall function as a pullbox. No terminations or splicing shall occur in this apparatus.

3.3 CONDUIT

A. All CCTV conduits and junction boxes shall be separate from all other systems, properly tagged and identified and principally routed above the ceiling properly supplied.

B. Unless otherwise specified, all branch conduits shall be EMT with a minimum diameter of 20mm.

C. Seal all conduit penetrations through wall (fire-rated, or not), floors and rooms with firerated sealant.

D. All Access Control System conduits and junction boxes shall be separate from all other systems, tagged and principally routed above the ceiling properly supplied.

E. Conduit fill shall not exceed 40 percent of interior cross-sectional area where three or more cables are contained within a single conduit.

F. Seal all conduit penetrations through walls (fire-rated, or not), floors and rooms with fire-rated sealant.

3.4 TESTING

A. before any testing or energizing, check for correct connections and test cables and wires for short circuits, ground faults, continuity, and insulation.

B. Verify activation of all individual cameras.

C. Perform preliminary simulation of system and verify that alarm signal actuates.

D. Upon completion of construction, conduct system-wide test of Surveillance System.

E. Verify that requirements of Contract and Specifications are met.

F. Upon completion of construction, conduct system-wide of Access Control System.

G. Correct deficiencies observed in all tests.

H. Document Test Results and Observations in the form of a test log. Submit test log upon completion of test.

3.5 COMMISSIONING

A. Provide written notice to all concerned for Final Testing (commissioning).

B. Conduct commissioning exercise in the presence of Owner’s Representative and Building Property Management Personnel.

C. Document Test Results Observations in the form of a test log. Submit test log upon completion of test.

D. Testing: The owner representative will procure the services of an independent test firm to perform acceptance testing of each section or the infrastructure and inspect the installation to ensure all work has been performed in accordance with all contract document.

a. All testing will be witnessed by the designer and owner’s maintenance representative.

b. The Contractor shall be present during acceptance testing to replace/repair all work that fails contractor is financially responsible for all cost incurred to the Owner Representative's testing firm due to repair/replacement of failed cable, terminations, equipment, etc. during acceptance testing acceptance testing shall not begin until all work is complete.

3.6 FIELD QUALITY CONTROL

A. Recommend the Contractor Recommend the Contractor to perform preliminary walkthrough to check for installation quality, accurate performance of work and to verify engineering diagrams.

3.7 TRAINING

A. Training shall be provided by the installer or product manufacturer free of charge to the assigned personnel for proper operation of equipment.
B. All training shall be conducted during normal business hours at a date and time of mutual convenience.
C. Training shall be conducted by a trainer who is factory certified in installation, programming, maintenance and operation of all supplied components.
D. Train and demonstrate Building Property Management Representative Personnel in understanding, operation, maintenance and troubleshooting of the Surveillance System. Provide information to the Owner an estimate or number or hours or training required.
E. Train and demonstrate Building Property Management Representative Personnel in understanding, operation, maintenance and troubleshooting of the Access Control System. Provide information to the Owner an estimate or number or hours or training required.

END OF SECTION 28 23 23

SECTION 28 31 64 FIRE DETECTION AND ALARM SYSTEM

PART 1 – GENERAL

1.1. GENERAL REQUIREMENTS

A. The work to be done in this Technical Specification consists of the Electrical and Auxiliary Systems and related works, such as but not limited to fabrication, supply, delivery, and installation – complete in all aspects. All works and materials incidental to the completion of the project shall be included herein, except portions of works explicitly stated to be done by others. All works shall be in accordance with the latest edition of the Philippine Electronics Code, the regulations of the locality, the manufacturer's standards, the requirements of the utility company and this Specification. This specification provides a broad outline of the required system and associated equipment, but not includes all details of equipment's design and construction.

B. Standards and Codes References:

1. Philippine Electronics Code (PECE)
2. Philippine Electrical Code (PEC)
3. National Building Code of the Philippines (NBCP)
4. Fire Code of the Philippines (RA 9514)
5. National Fire Alarm and Signaling Code (NFPA 72)

C. Addressable, "open protocol" FDAS shall be provided.

1.2. SYSTEM DESCRIPTION

A. General: Provide a complete, non-coded addressable, microprocessor-based fire alarm system with initiating devices, notification appliances, and monitoring and control devices as indicated on the drawings and as specified herein.

B. Software: The fire alarm system shall allow for loading and editing instructions and operating sequences as necessary. The system shall be capable of on-site programming to accommodate system expansion and facilitate changes in operation. All software operations shall be stored in a non-volatile programmable memory within the fire alarm control unit. Loss of primary and secondary power shall not erase the instructions stored in memory. System shall be capable of storing dual configuration programs with one active and one in reserve. Panel shall be capable of full system operation during a new configuration download.

C. History Logs: The system shall provide a means to recall alarms and trouble conditions in chronological order for the purpose of recreating an event history. A separate alarm and trouble log shall be provided.

D. Recording of Events: Record all alarm, supervisory, and trouble events by means of system printer. The printout shall include the type of signal (alarm, supervisory, or trouble) the device identification, date and time of the occurrence. The printout differentiates alarm signals from all other printed indications.

E. Wiring/Signal Transmission:

- Transmission shall be hard-wired using separate individual circuits for each zone of alarm operation, as required or addressable signal transmission, dedicated to fire alarm service only.
- Circuit Supervision: Circuit faults shall be indicated by a trouble signal at the FACP. Provide a distinctive indicating audible tone and alphanumeric annunciation.
- Constant Supervision Audio: When provided, audio notification appliance circuits shall be supervised during standby by monitoring for DC continuity to end-of-line resistors.

F. Remote Access:

1. A personal computer or technician's laptop, configured with terminal emulation software shall have the ability to access the FACP for diagnostics, maintenance reporting and information gathering.

G. Required Functions: The following are required system functions and operating features:

1. Priority of Signals: Fire alarm events have highest priority. Subsequent alarm events are queued in the order received and do not affect existing alarm conditions. Priority Two, Supervisory and Trouble events have second-, third-, and fourth-level priority, respectively. Signals of a higher-level priority take precedence over signals of lower priority even though the lower-priority condition occurred first. Annunciate all events regardless of priority or order received.

2. Noninterfering: An event on one zone does not prevent the receipt of signals from any other zone. All zones are manually resettable from the FACP after the initiating device or devices are restored to normal. The activation of an addressable device does not prevent the receipt of signals from subsequent addressable device activations

3. Annunciation: Operation of alarm and supervisory initiating devices shall be annunciated at the FACP and the remote annunciator, indicating the type of device, the operational state of the device (i.e alarm, trouble or supervisory) and shall display the custom label associated with the device.

4. Selective Alarm: A system alarm shall include:

a. Indication of alarm condition at the FACP and the annunciator(s).

b. Identification of the device /zone that is the source of the alarm at the FACP and the annunciator(s).

c. Operation of audible and visible notification appliances until silenced at FACP.

d. Selectively closing doors normally held open by magnetic door holders on the fire floor, floor above and floor below.

e. Unlocking designated doors.

f. Shutting down supply and return fans serving zone where alarm is initiated.

g. Closing smoke dampers on system serving zone where alarm is initiated.

h. Initiation of smoke control sequence.

i. Transmission of signal to the supervising station.

j. Initiation of elevator Phase I functions (recall, shunt trip, illumination of indicator in cab, etc.) in accordance with ASME/ANSI A17.1, when specified detectors or sensors are activated, as appropriate.

5. Supervisory Operations: Upon activation of a supervisory device such as a fire pump power failure, tamper switch, the system shall operate as follows:

a. Activate the system supervisory service audible signal and illuminate the LED at the control unit and the remote annunciator.

b. Pressing the Supervisory Acknowledge Key will silence the supervisory audible signal while maintaining the Supervisory LED "on" indicating off-normal condition.

c. Record the event in the FACP historical log.

d. Transmission of supervisory signal to the supervising station.

e. Restoring the condition shall cause the Supervisory LED to clear and restore the system to normal.

6. Alarm Silencing: If the "Alarm Silence" button is pressed, all audible and visible alarm signals shall cease operation.

7. System Reset

a. The "System Reset" button shall be used to return the system to its normal state. Display messages shall provide operator assurance of the sequential steps ("IN PROGRESS", "RESET COMPLETED") as they occur. The system shall verify all circuits or devices are restored prior to resetting the system to avoid the potential for re-alarming the system. The display message shall indicate "ALARM PRESENT, SYSTEM RESET ABORTED".

b. Should an alarm condition continue, the system will remain in an alarmed state.

8. A manual evacuation (drill) switch shall be provided to operate the notification appliances without causing other control circuits to be activated.

H. Smoke Detectors: Maintenance and testing service providing the following shall be included with the base bid:

1. Biannual sensitivity reading and logging for each smoke sensor.

2. Scheduled biannual threshold adjustments to maintain proper sensitivity for each smoke sensor.

3. Threshold adjustment to any smoke sensor that has alarmed the system without the presence of particles of combustion.

4. Scheduled biannual cleaning or replacement of each smoke detector or sensor within the system.

5. Semi-annual functional testing of each smoke detector or sensor using the manufacturer's calibrated test tool.

6. Written documentation of all testing, cleaning, replacing, threshold adjustment, and sensitivity reading for each smoke detector or sensor device within the system.

7. The initial service included in the bid price shall provide the above listed procedures for a period of five years after owner acceptance of the system.

I. Audible Alarm Notification: By voice evacuation and tone signals on loudspeakers in areas as indicated on drawings.

1. Automatic Voice Evacuation Sequence:

a. The audio alarm signal shall consist of an alarm tone for a maximum of five seconds followed by an automatic digital voice message. At the end of the voice message, the alarm tone shall resume. This sequence shall sound continuously until the "Alarm Silence" switch is activated.

b. All audio operations shall be activated by the system software so that any required future changes can be facilitated by authorized personnel without any component rewiring or hardware additions.

J. Manual Voice paging

1. The system shall be configured to allow voice paging. Upon activation of any speaker manual control switch, the alarm tone shall be sounded over all speakers in that group.

2. The control panel operator shall be able to make announcements via the push-to-talk paging microphone over the pre-selected speakers.

3. Total building paging shall be accomplished by the means of an "All Call" switch.

K. Firefighter's phone: Provide a supervised, two-way communication system between the Command Center/main fire alarm control panel and emergency phones.

1. The firefighter's phone system shall be capable of handling single or simultaneous conversations with all phones connected into the system. As many as six phones shall be able to be connected into the active conversation.

2. The phone system circuits shall be designed to prevent static, hum or other interference for clear, intelligible two-way conversation between all phones of the system.

3. The phone system circuits shall be supervised, such that the FACP shall be able to differentiate between whether a handset has been plugged into the emergency phone jack and whether the circuit has a shorted wire.

4. A beeping busy signal shall indicate to the person attempting to use a remote phone that the signal is being received at the control unit and that the lines are intact.

5. The act of plugging a handset into an emergency phone jack or removal of any phone from its normal hook position shall cause an audible and visual indication at the control unit. Picking up of the master phone and acknowledgment of the phone circuit shall silence the tone and allow for direct two-way communications.

6. The act of unplugging handsets in use and replacement of remote phones to their cradle shall restore normal supervisory functions.

7. Provide emergency phone jacks as shown on the plans. Each jack shall be mounted on a stainless-steel single gang plate with the words "Fire Emergency Phone" screened on each.

8. Provide a minimum of five (5) pluggable emergency phones within a storage cabinet.

L. Fire Suppression Monitoring:

1. Water flow: Activation of a water flow switch shall initiate general alarm operations.

2. Sprinkler valve tamper switch: The activation of any valve tamper switch shall activate system supervisory operations.

M. Power Requirements:

1. The control unit shall receive AC power via a dedicated fused disconnect circuit.

2. The system shall be provided with sufficient battery capacity to operate the entire system upon loss of normal AC power in a normal supervisory mode for a period of 24 hours with 10 minutes of alarm operation at the end of this period. The system shall automatically transfer to battery standby upon power failure. All battery charging and recharging operations shall be automatic.

3. All circuits requiring system-operating power shall be 24 VDC and shall be individually fused at the control unit.

4. The incoming power to the system shall be supervised so that any power failure will be indicated at the control unit. A green "power on" LED shall be displayed continuously at the user interface while incoming power is present.

5. The system batteries shall be supervised so that a low battery or a depleted battery condition, or disconnection of the battery shall be indicated at the control unit and displayed for the specific fault type.

6. The system shall support NAC Lockout feature to prevent subsequent activation of Notification Appliance Circuits after a Depleted Battery condition occurs in order to make use of battery reserve for front panel annunciation and control.

7. The system shall support 100% of addressable devices in alarm or operated at the same time, under both primary (AC) and secondary (battery) power conditions.

8. Loss of primary power shall sound a trouble signal at the FACP. FACP shall indicate when the system is operating on an alternate power supply.

1.3. SUBMITTALS

A. General: Submit the following according to condition of contract

1. Product Data: Product data sheets for the system components highlighted to indicate the specific products, features, or functions required to meet this specification. Alternate or as-equal submitted under this contract must provide a detailed line-by-line comparison of how the submitted product meets, exceeds, or does not comply with the specification.
2. Wiring diagrams for the manufacturer.
3. Shop drawings showing system details including location of FACP, all devices, circuiting and details of graphic annunciator.
4. System power and battery charts with performance graphs and voltage drop calculations to assure that the system will operate in accordance with the prescribed backup time periods and under all voltage conditions per UL, PECE CODE and NFPA standards.
5. System operation description including method of operation and supervision of each type of circuit and sequence of operations for all manually and automatically initiated system inputs and outputs. A list of all input and output points in the system shall be provided with a label indicating location or use of IDC, SLC, NAC, relay, sensor, and auxiliary control circuits.
6. Operation instruction for FACP.
7. Operation and maintenance data for inclusion in Operating and Maintenance Manual. Include data for each type product, including all features and operating sequences, both automatic and manual. Provide the names, addresses, and telephone numbers of service organizations.
8. Product certification signed by the manufacturer of the fire alarm system components certifying that their products comply with indicated requirements.
9. Record of field tests of system.

B. Submission to Authority Having Jurisdiction: In addition to routine submission of the above material, make an identical submission to the authority having jurisdiction. Include copies of shop drawings as required to depict component locations to facilitate review. Upon receipt of comments from the Authority, make resubmissions, if required, to make clarifications or revisions to obtain approval.

C. Qualifications: Qualified personnel include individuals who can demonstrate experience on similar system and have the following qualifications:

1. Factory trained and certified in fire alarm system design.
2. Licensed or certified by a local authority.

1.4. QUALITY ASSURANCE

A. Installation personnel shall be supervised by persons who are qualified and experienced in the installation, inspection, and testing of fire alarm systems.

B. Each and every item of the Fire Alarm System shall be listed under the appropriate category by Underwriters Laboratories, Inc. (UL), and shall bear the “UL “label.

C. Comply with Philippine Electronics Code Book 2 Fire Detection and alarm System.

1.5. MAINTENACE ASSSURANCE

A. Maintenance Service Contract: Provide maintenance of fire alarm systems and equipment for a period of 12 months, using factory-authorized service representatives.

B. Basic Services: Systematic, routine maintenance visits on a quarterly basis at times scheduled with the Owner. In addition, respond to service calls within 24 hours of

notification of system trouble. Adjust and replace defective parts and components with original manufacturer's replacement parts, components, and supplies.
C. Additional Services: Perform services within the above 12-month period not classified as routine maintenance or as warranty work when authorized in writing. Compensation for additional services must be agreed upon in writing prior to performing services.
D. Renewal of Maintenance Service Contract: No later than 60 days prior to the expiration of the maintenance services contract, deliver to the Owner a proposal to provide contract maintenance and repair services for an additional one-year term. Owner will be under no obligation to accept maintenance service contract renewal proposal.

1.6. EXTRA MATERIALS
A. General: Furnish extra materials, packaged with protective covering for storage, and identified with labels clearly describing contents as follows:
1. Break Rods for Manual Stations: Furnish quantity equal to 15 percent of the number of manual stations installed; minimum of 6 rods.
2. Notification Appliances: Furnish quantity equal to 10 percent of each type and number of units installed, but not less than one of each type.
3. Smoke Detectors or Sensors, Fire Detectors, and Flame Detectors: Furnish quantity equal to 10 percent of each type and number of units installed but not less than one of each type.
4. Detector or Sensor Bases: Furnish quantity equal to 2 percent of each type and number of units installed but not less than one of each type.
5. Printer Ribbons: Furnish 6 spare printer ribbons.

1.7. COORDINATION
A. Coordinate the work in this section with other sections as required ensuring that the entire work will be carried out in orderly, complete, and organized fashion.

1.8. SYSTEM REQUIREMENTS
A. **Positive alarm sequence** provides a timed delay of general alarm signal in a building and at a supervising station. This gives a trained responder up to 3 minutes to investigate the cause of an alarm signal. The time limits to acknowledge the alarm signal and reset the system are designed to assure all alarm system functions are actuated in the event personnel are not available to acknowledge, investigate and reset the alarm. The presignal feature is usually used only in special occupancies where fire does not necessarily pose an immediate threat to the occupants.

B. The signal from an automatic fire detection device selected for positive alarm sequence operation shall be acknowledge at the control unit by trained personnel within 15 seconds of annunciating in order to initiate the alarm investigation phase. If the signal is not acknowledged within 15 seconds, notification signals in accordance with the building evacuation or relocation plan and remote signals shall be automatically and immediately activated.
C. Trained personnel shall have up to 180 seconds during the alarm investigation phase to evaluate the fire condition and reset the system. If the system is not reset during the investigation phase, notification signals in accordance with the building evacuation or relocation plan and remote signals shall be automatically and immediately activated.
D. If a second automatic fire detector selected for positive alarm sequence is actuated during the alarm investigation phase, notification signals in accordance with the building evacuation or relocation plan and remote signals shall be automatically and immediately activated.
E. The system shall provide means for bypassing the positive alarm sequence.

PART 2 – PRODUCT

1.1. EQUIPMENT

A. Equipment constructed and installed in conformity with the Code shall be listed for the purpose for which it is used. Fire alarm system components shall be installed in accordance with manufactures installation instruction and Philippine Electronics Code book 2, chapter 3 – "Installation Requirements".

1.2. Fire Alarm Control Panel (FACP)

A. A system component that receives inputs from automatic and manual fire alarm devices and might supply power to detection devices and to a transponder(s) or off premises transmitter(s).

B. FACP shall be properly protected in any possibility of damage by induced transients in accordance with the requirements of Latest Edition of Philippine Electronics Code.

C. The FACP shall be key operated, located within a locked enclosure, or arranged to provide equivalent protection against unauthorized use.

D. The following FACP hardware shall be provided:

1. Power limited base panel with red cabinet and door, 240 VAC input power.
2. 2,000-point capacity where (1) point equals (1) monitor (input) or (1) control (output).
3. 2,000-points of Network Annunciation at FACP Display when applied as a Network node.
4. 2,000 points of annunciation where one (1) point of annunciation equals:
    a. 1 LED driver output on a graphic driver or 1 switch input on a graphic switch input module.
    b. 1 LED on panel or 1 switch on panel.

5. From all battery charging circuits in the system provide battery voltage and ammeter readouts on the FACP LCD Display.
6. One Auxiliary Relay, SPDT 2A @32VDC, programmable as a trouble relay, either as normally energized or de-energized, or as an auxiliary control.
7. Power Supplies with integral intelligent Notification Appliance Circuit Class A for system expansion.
8. Four (4) form "C" Auxiliary Relay Circuits (Form C contacts rated 2A @ 24VDC, resistive), operation is programmable for trouble, alarm, supervisory of other fire response functions. Relays shall be capable of switching up to ½ A @ 120VAC, inductive.
9. The FACP shall support (6) RS-232-C ports and one service port.
10. Remote Unit Interface: supervised serial communication channel for control and monitoring of remotely located annunciators and I/O panels.
11. Modular Network Communications Card.

1.3. System Components

A. Heat Sensing Fire Detector (Rate of Rise).

1. Thermal Sensor: Combination fixed-temperature and rate-of-rise unit with plug-in base and alarm indication lamp; 135-deg F fixed-temperature setting except as indicated.
2. Thermal sensor shall be of the epoxy encapsulated electronic design. It shall be thermistor-based, rate-compensated, self-restoring and shall not be affected by thermal lag.
3. Sensor fixed temperature sensing shall be independent of rate-of-rise sensing and] programmable to operate at 135-deg F or 155-deg F. Sensor rate-of-rise temperature detection shall be selectable at the FACP for either 15-deg F or 20-deg F per minute

4. Sensor shall have the capability to be programmed as a utility monitoring device to monitor for temperature extremes in the range from 32-deg F to 155-deg F.

B. Smoke Sensing Fire Detector. (Photoelectric)

1. General: Comply with UL 268, "Smoke Detectors for Fire Protective Signaling Systems." Include the following features:

- Factory Nameplate: Serial number and type identification.
- Operating Voltage: 24 VDC, nominal.
- Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore normal operation.
- Each sensor base shall contain an LED that will flash each time it is scanned by the Control Unit (once every 4 seconds). In alarm condition, the sensor base LED shall be on steady.
- Each sensor base shall contain a magnetically actuated test switch to provide for easy alarm testing at the sensor location.
- Each sensor shall be scanned by the Control Unit for its type identification to prevent inadvertent substitution of another sensor type. Upon detection of a "wrong device", the control unit shall operate with the installed device at the default alarm settings for that sensor; 2.5% obscuration for photoelectric sensor, 135-deg F and 15-deg F rate-of-rise for the heat sensor, but shall indicate a "Wrong Device" trouble condition.
- The sensor's electronics shall be immune from nuisance alarms caused by EMI and RFI.
- Sensors include a communication transmitter and receiver in the mounting base having a unique identification and capability for status reporting to the FACP. Sensor address shall be located in base to eliminate false addressing when replacing sensors.
- Removal of the sensor head for cleaning shall not require the setting of addresses.

2. Type: Smoke sensors shall be of the photoelectric or combination photoelectric / heat type.
3. Bases: Relay output, sounder and isolator bases shall be supported alternatives to the standard base.

C. Addressable manual Pull Stations.

1. Description: Addressable single- or double-action type, red LEXAN, with molded, raised-letter operating instructions of contrasting color. Station will mechanically latch upon operation and remain so until manually reset by opening with a key common with the control units.

D. Voice Alarm: Provide an emergency communication system, integral with the FACP, including voice alarm system components, microphones, amplifiers, and tone generators. Features include:

1. Amplifiers comply with UL 1711, "Amplifiers for Fire Protective Signaling Systems." Amplifiers shall provide an onboard local mode temporal coded horn tone as a default backup tone. Test switches on the amplifier shall be provided to test and observe amplifier backup switchover. Each amplifier shall communicate to the host panel amplifier and NAC circuit voltage and current levels for display on the user interface. Each amplifier shall be capable of performing constant supervision for non-alarm audio functions such as background music and general paging.
2. All announcements are made over dedicated, supervised communication lines. All risers shall support Class A wiring for each audio channel.

3. Status annunciator indicating the status of the various voice alarm speaker zones and the status of fire fighter telephone two-way communication zones.

E. Fire fighters' telephone communication system: Arrange system to use dedicated, two-way, supervised voice communication links between the FACP and remote fire fighters' telephone stations throughout the building.

F. Cabinet: Lockable steel enclosure. Arrange unit so all operations required for testing or for normal care and maintenance of the system are performed from the front of the enclosure. If more than a single unit is required to form a complete control unit, provide exactly matching modular unit enclosure.

G. Alphanumeric Display and System Controls: Panel shall include an 80-character LCD display to indicate alarm, supervisory, and component status messages and shall include a keypad for use in entering and executing control commands.

1. The system shall have the capability to provide expanded content, multi-line, operator interface displays as indicated on the drawings and specifications. The expanded content multi-line displays shall be Quarter-VGA (QVGA) or larger and be capable of supporting a minimum of 854 standard ASCII characters to minimize or eliminate the levels of navigation required for access to information when responding to critical emergencies and abnormal system conditions. The QVGA operator interface shall provide operator prompts and six contexts sensitive soft-keys for intuitive operative.

a. Expanded content, multi-line operator interfaces shall be capable of providing the following functions:

1.a. Dual language operation with Instant-Switch language selection during runtime.

1.b. Activity display choices for:

 First 8 Events.

 First 5 Events and Most Recent Event (with first and most recent event time and date stamps).

 First Event and Most Recent Event (with first and most recent event time and date stamps).

 Scrollable List Display displays a scrollable list of active points for the event category (alarm, priority 2, supervisory, or trouble) selected. The position in this list will be the last acknowledged point (not flashing) at the top followed by the next 7 unacknowledged points (flashing).

 General Event Status (alarm, priority 2, supervisory, or trouble in system).

 Site plan.

1.c. Equal or hierarchal priority assignment. In systems with two or more operator interfaces, each operator interface shall be programmable to allow multiple operator interfaces to have equal operation priority or to allow hierarchal priority control to be assigned to individual operator interfaces (locations).

1.d. Up to 50 custom point detail messages for providing additional point specific information in detailed point status screens.

1.e. Bitmap file import for operator interface display of site plan and background watermark images. Site plan status icons shall indicate area status for highest priority active events.

b. Expanded content, multi-line displays shall have the capability to provide Dual-Language operation as indicated on the drawings and specifications.

1.a. language selection shall be via a switch on the operator interface panel. Operator interface panels shall support instant-language-switchover during runtime to allow the operator to toggle between languages each time the language selection switch is operated, without requiring complicated multi-step processes.

1.b. Both one-byte and two-byte characters shall be supported.

1.4. Fire Fighters Telephones

1. Telephone Hand Sets: High-impact plastic handset, heavy-duty coil cord, and hook switch; connected to the FACP by means of dedicated, supervised communication lines. Handsets have a dynamic receiver and a carbon transmitter, operating on 24VDC.

2. A black master telephone handset with a push to talk button and a flexible-coiled selfwinding five (5) foot cord shall be provided and recessed within a protective unit-mounted enclosure at the command center.

3. Cabinet: Flush- or surface-mounted as indicated, 18-gage, minimum, painted steel with a latched hinged door with trim labeled "Fire Fighters' Phone." Size to accommodate handset and cord.

1.5. Remote CRTS, PC annunciator and printers

1. Each RS-232-C port shall be capable of supporting and supervising a remote Printer; the

FACP shall support as many as two (2) remote displays. The Fire Alarm Control Panel shall support five (5) RS-232-C ports.

1.6. Remote LCD annunciator

1. Provide a remote LCD Annunciator, where required, with the same "look and feel" as the

FACP operator interface. The Remote LCD Annunciator shall use the same Primary Acknowledge, Silence, and Reset Keys; Status LEDs and LCD Display as the FACP.

2. Annunciator shall have super-twist LCD display with two lines of 40 characters each.

Annunciator shall be provided with four (4) programmable control switches and associated LEDs.

3. Under normal conditions the LCD shall display a "SYSTEM IS NORMAL" message and the current time and date.

4. Should an abnormal condition be detected the appropriate LED (Alarm, Supervisory or Trouble) shall flash. The unit audible signal shall pulse for alarm conditions and sound steady for trouble and supervisory conditions.

5. The LCD shall display the following information relative to the abnormal condition of a point in the system:

- 40-character custom location label.
- Type of device (e.g., smoke, pull station, waterflow).
- Point status (e.g., alarm, trouble).

6. Operator keys shall be key switch enabled to prevent unauthorized use. The key shall only be removable in the disabled position. Acknowledge, Silence and Reset operation shall be the same as the FACP.

1.7. Emergency Power Supply

A. General: Components include battery, charger, and an automatic transfer switch.

B. Battery: Sealed lead-acid or nickel cadmium type. Provide sufficient capacity to operate the complete alarm system in normal or supervisory (non-alarm) mode for a period of 24 hours. Following this period of operation on battery power, the battery shall have sufficient capacity to operate all components of the system, including all alarm notification devices in alarm mode for a period of 10 minutes.

1.8. Addressable Circuit Interface Modules

A. Addressable Circuit Interface Modules: Arrange to monitor or control one or more system components that are not otherwise equipped for addressable communication. Modules shall be used for monitoring of waterflow, valve tamper, non-addressable devices, and for control of AHU systems.

B. Addressable Circuit Interface Modules will be capable of mounting in a standard electric outlet box. Modules will include cover plates to allow surface or flush mounting. Modules will receive their operating power from the signaling line circuit or a separate two wire pair running from an appropriate power supply, as required

C. All Circuit Interface Modules shall be supervised and uniquely identified by the control unit. Module identification shall be transmitted to the control unit for processing according to the program instructions. Modules shall have an on-board LED to provide an indication that the module is powered and communicating with the FACP. The LEDs shall provide a troubleshooting aid since the LED blinks on poll whenever the peripheral is powered and communicating.

1.9. Wires and Conduits

A. Wires

1. Wiring shall be in accordance to Philippine Electrical Code (P.E.C.).
2. Wiring for fire alarm shall be not less than to 18AWG (1.0 mm dia.). Only copper conductors shall be permitted to use for fire alarm.
3. Wiring shall be Listed or approved by a recognized testing agency.
4. Wiring shall be fire resistance if not installed in metallic conduit or not embedded.

B. Conduit

1. Conduit shall be in accordance to Philippine Electrical Code (P.E.C.).
2. Number of conductors in conduit or raceway shall not exceed to percentage fill specified in Philippine Electrical Code.
3. RNC conduit shall be scheduled 40 and shall be embedded.

PART 3 – EXECUTION

3.1. INSTALLATION, GENERAL

A. Install system components and all associated devices in accordance with applicable NFPA Standards and manufacturer's recommendations.

B. Installation personnel shall be supervised by persons who are qualified and experienced in the installation, inspection, and testing of fire alarm systems. Examples of qualified personnel shall include, but not be limited to, the following:

- Factory trained and certified personnel.
- Personnel licensed or certified by state or local authority.

3.2. EQUIPMENT INSTALLATION

A. Furnish and install a complete Fire Alarm System as described herein and as shown on the plans. Include sufficient control unit(s), annunciator(s), manual stations, automatic fire detectors, smoke detectors, audible and visible notification appliances, wiring, terminations, electrical boxes, and all other necessary material for a complete operating system.

B. Existing Fire Alarm Equipment shall be maintained fully operational until the new equipment has been tested and accepted
C. Equipment Removal: After acceptance of the new fire alarm system, disconnect and remove the existing fire alarm equipment and restore damaged surfaces. Package operational fire alarm and detection equipment that has been removed and deliver to the Owner. Remove from the site and legally dispose of the remainder of the existing material
D. Water-Flow and Valve Supervisory Switches: Connect for each sprinkler valve required to be supervised
E. Device Location-Indicating Lights: Locate in the public space immediately adjacent to the device they monitor
F. Install manual station with operating handle 48 inches (1.22 m) above floor. Install wall mounted audible and visual notification appliances not less than 80 inches (2.03 m) above floor to bottom of lens and not greater than 96 inches (2.44 m) above floor to bottom of lens
G. Mount outlet box for electric door holder to withstand 80 pounds pulling force
H. Make conduit and wiring connections to sprinkler flow switches, sprinkler valve tamper switches, fire suppression system control panels, duct smoke detectors.

3.3. PREPARATION
A. Coordinate work of this Section with other affected work and construction schedule.

3.4. WIRING INSTALLATION
A. System Wiring: Wire and cable shall be a type listed for its intended use by an approval agency acceptable to the Authority Having Jurisdiction and shall be installed in accordance with the appropriate articles from the current approved edition of NFPA 70: National Electric Code (NEC).
B. Contractor shall obtain from the Fire Alarm System Manufacturer written instruction regarding the appropriate wire/cable to be used for this installation. No deviation from the written instruction shall be made by the Contractor without the prior written approval of the Fire Alarm System Manufacturer.
C. Color Coding: Color-code fire alarm conductors differently from the normal building power wiring. Use one color code for alarm initiating device circuits wiring and a different color code for supervisory circuits. Color-code notification appliance circuits differently from alarm initiating circuits. Paint fire alarm system junction boxes and covers red.
D. Terminate circuit in control panel for Class "A" supervision.
E. Ethernet circuits shall be provided to the Fire Alarm Control Panel and Graphical Workstation
Remote Clients as shown on the plans.

3.5. FIELD QUALITY CONTROL
A. Manufacturer's Field Services: Provide services of a factory-authorized service representative to supervise the field assembly and connection of components and the pretesting, testing, and adjustment of the system.
B. Service personnel shall be qualified and experienced in the inspection, testing, and maintenance of fire alarm systems. Examples of qualified personnel shall be permitted to include, but shall not be limited to, individuals with the following qualifications:

- Factory trained and certified.
- Certified by a state or local authority.
- Trained and qualified personnel employed by an organization listed by a national testing laboratory for the servicing of fire alarm systems.

C. Pretesting: Determine, through pretesting, the conformance of the system to the requirements of the Drawings and Specifications. Correct deficiencies observed in pretesting. Replace malfunctioning or damaged items with new and retest until satisfactory performance and conditions are achieved.

D. Inspection:

- Inspect equipment installation, interconnection with system devices, mounting locations, and mounting methods.
- Verify that units and controls are properly installed, connected, and labeled and that interconnecting wires and terminals are identified.

E. Acceptance Operational Tests:

1. Perform operational system tests to verify conformance with specifications:
   - Each alarm initiating device installed shall be operationally tested. Each device shall be tested for alarm and trouble conditions. Contractor shall submit a written certification that the Fire Alarm System installation is complete including all punch-list items. Test battery operated emergency power supply. Test emergency power supply to minimum durations specified. Test Supervising Station Signal Transmitter. Coordinate testing with Supervising Station monitoring firm/entity.
   - Test each Notification Appliance installed for proper operation. Submit written report indicating sound pressure levels at specified distances.
   - Test Fire Alarm Control Panel and Remote Annunciator.
2. Provide minimum 10 days' notice of acceptance test performance schedule to Owner, and local Authority Having Jurisdiction.

F. Retesting: Correct deficiencies indicated by tests and completely retest work affected by such deficiencies. Verify by the system test that the total system meets the Specifications and complies with applicable standards.

G. Report of Tests and Inspections: Provide a written record of inspections, tests, and detailed test results in the form of a test log. Use NFPA 72 Forms for documentation.

H. Final Test, Record of Completion, and Certificate of Occupancy: Test the system as required by the Authority Having Jurisdiction in order to obtain a certificate of occupancy. Provide completed NFPA 72 Record of Completion form to Owner and AHJ.

3.6. CLEANING AND ADJUSTING

A. Cleaning: Remove paint splatters and other spots, dirt, and debris. Clean unit internally using methods and materials recommended by manufacturer.

B. Occupancy Adjustments: When requested within one year of date of Substantial Completion, provide on-site assistance in adjusting sound pressure levels and adjusting controls and sensitivities to suit actual occupied conditions. Provide up to three visits to the site for this purpose.

3.7. TRAINING

N. Provide the services of a factory-authorized service representative to demonstrate the system and train Owner's maintenance personnel as specified below.

1. Train Owner's maintenance personnel in the procedures and schedules involved in operating, troubleshooting, servicing, and preventive maintaining of the system. Provide a minimum of 8 hours' training.
2. Schedule training with the Owner at least seven days in advance.

END OF SECTION 28 31 64

Section VII. Drawings

[Will be provided upon purchase of Bidding Documents.]

Section VIII. Bill of Quantities

LOCATION : ROXAS BLVD. CORNER P. OCAMPO STREET, MANILA CITY
PROJECT : DEPARTMENT OF FINANCE 8TH FLOOR EDPC BUILDING RENOVATION
DATE:
SUBJECT: BID FORM

DOF 8th FLOOR EDPC BUILDING RENOVATION BID FORM						
ITEM NO.	ITEM DESCRIPTION AND LOCATION	QUANTITY	UNIT	DIRECT UNIT COST	TOTAL COST	REMARKS
Architectural Works Bid Form						
I.	GENERAL REQUIREMENTS					
1.01	All insurances such as bonds and guarantee performance bonds, third party insurance and surety bond against down payment and retention bond, building permit and occupancy permit.	1.00	lot			
1.02	Mobilization and demobilization of workers, tools and equipment	1.00	lot			
1.03	Temporary facilities and temporary utilities	1.00	lot			
1.04	Safety and security, daily cleaning and maintenance works	1.00	lot			
1.05	All demolition works and dismantling including hauling of debris (Verify as per technical specifications)	1.00	lot			
	Demolish all existing walls and partitions as stated in the plan.					
	Excavate floor and slab based on architectural and structural plans					
	Dismantle existing ceiling finishes except for bottom of slab ceiling.					
	Dismantle all existing doors, door jambs, hardware and accessories and turnover all items to the owner for proper handling except for doors to be retained					
	Dismantle all existing glass partition and accessories and turnover all items to the owner for proper handling					
	Dismantle all existing lighting fixtures and electrical devices on site and all items are subject for turnover to the owner for proper handling.					
	Dismantle all existing AC equipment on site subject for replacement and turnover all items to the over for proper handling					
	Dismantle all existing utility lines, conduits, pipes and ductworks subject for replacement as per plan					
	Demolish and dismantle all existing floor finishes as per plan.					
	Demolish and dismantle all existing wall cubicle partition and floor tiles at existing toilets.					
	Demolish all existing CHB toilet partitions at common toilets.					
	Demolish existing lavatory counter at existing toilets					
	Dismantle all existing toilet fixtures and accessories for replacement					

ITEM NO.	ITEM DESCRIPTION AND LOCATION	QUANTITY	UNIT	DIRECT UNIT COST	TOTAL COST	REMARKS
	Dismantle existing wall mounted facial mirror at existing toilets.					
	Demolish existing walls and slab affected for the accommodation of new elevator shaft.					
	Dismantle existing all built-up furniture not to be retained as per plan					
1.07	As-buit drawings. Including all disciplines	1.00	lot			
	SUBTOTAL COST:					
II.	FLOOR WORKS					
2.01	500mm x 500mm integrated tufted pattern loop solution dyed 100% synthetic fiber with 4.00mm pile height carpet tiles with Polyester spunbouned primary backing and condensed vinyl with fiberglass reinforcement secondary backing at offices and other areas shown in the plans	3,337.88	sq.m.			
2.02	10mm thk. x 600mm x 600mm non-skid, non-vitreous porcelain tiles for toilets and other areas indicated in the plans	84.05	sq.m.			
2.03	3mm thk. x 300mm x 300mm homogenous and resilient type Vinyl tiles, with primer and water-based acrylic floor adhesive at security, pantry, storage and other areas shown in the plans	537.55	sq.m.			
2.04	Self-levelling cement topping for areas with vinyl and carpet tiles as shown in the plans	3,875.43	sq.m.			
2.05	Existing hallway tiles to be retained and subject for regrouting to match existing tile color.	211.38	sq.m.			
	SUBTOTAL COST:					
III.	WALL WORKS					
3.02	100mm thick drywall partition using 12mm thk. fiber cement board with vertical and horizontal metal studs spaced every 400mm on center, both ways.	712.16	sq.m.			
3.03	100mm thick drywall partition using 12mm thk. fiber cement board with vertical and horizontal metal studs spaced every 400mm on center, both ways, with 100mm thick compressed lightweight thermal and acoustic rockwool insulation.	309.15	sq.m.			
3.04	100mm thick concrete hollow blocks with 25mm thick plaster on both sides complete with horizontal and vertical steel reinforcing bars	150.00	sq.m.			
3.05	Exisiting marble wall finish subject for crystallization for areas shown in the plans	69.33	sq.m.			
	SUBTOTAL COST:					
IV.	WALL FINISHES					
4.01	10mm-12mm thick x 300mm x 600mm glazed porcelain wall tiles for all toilets and other areas shown in the plans	303.81	sq. m			
	SUBTOTAL COST:					
V.	CEILING WORKS					
5.01	9mm thk. Gypsumboard on 600mm x 600mm furring channel horinztal and vertical with 1200mm x 1200mm hanger both ways with 50mm shadow gap between walls and ceiling as per plan	2,230.24	sq.m.			

ITEM NO.	ITEM DESCRIPTION AND LOCATION	QUANTITY	UNIT	DIRECT UNIT COST	TOTAL COST	REMARKS
5.02	6mm thk. Fiber cement board on 600mm x 600mm furring channel both ways with 1200mm x 1200mm hanger both ways with 50mm shadow gap between walls and ceiling as per plan	101.68	sq.m.			
5.03	15mm thick x 600mm x 600mm acoustic board panel complete with tee and main runners, hanger rods and accessories as per manufacturer's standards.	475.95	sq.m.			
	SUBTOTAL COST:					
VI.	PAINTING WORKS					
6.01	Painting of new partitions and repainting of existing walls using latex paint for interior wall surfaces as per manufacturer's standard as shown in the plans	3,964.80	sq.m.			
6.02	All ceiling works shall be painted with latex paint as per manufacturer's standard as shown in the plans	2,331.92	sq.m.			
	SUBTOTAL COST:					
VII.	DOORS AND WINDOWS					
7.01	D01. 2400mm x 900mm; 12mm thick double-swing single tempered glass door with powder coated top and bottom FD100 frame, complete with necessary hardware and accessories as per manufacturer's standard. Contractor to verify schedule of doors.	30.00	sets			
7.02	D02. 2400mm x 1800mm; 12mm thick double-swing double tempered glass door with powder coated top and bottom FD100 frame, complete with necessary hardware and accessories as per manufacturer's standard. Contractor to verify schedule of doors.	20.00	sets			
7.03	D03. 2100mm x 900mm; 44mm thick kiln dried flush door with louver panel, with 50mm x 100mm kiln dried solid wood door jamb in faux wood stain finish with clear gloss top coat lacquer, complete with hardwares and accessories as per plan.	23.00	sets			
7.04	D04. 2100mm x 1800mm; 44mm thick kiln dried flush door with louver panel double door, with 50mm x 100mm kiln dried solid wood door jamb in faux wood stain finish with clear gloss top coat lacquer, complete with hardwares and accessories as per plan.	1.00	set			
7.05	D05. Existing steel door panel and door jamb subject for surface repair and repainting.	6.00	sets			
7.06	D06. 2500mm x 7500mm; Equally- divided operable partition with fabric finish on both side, with STC rating of 50, complete with hardwares and accessories as per plan.	1.00	set			
7.07	D07. 2100mm x 900mm toilet door; 44mm thick kiln dried flush door with louver panel, with 50mm x 100mm kiln dried solid wood door jamb in faux wood stain finish with clear gloss top coat lacquer, complete with hardwares and accessories as per plan.	4.00	set			

ITEM NO.	ITEM DESCRIPTION AND LOCATION	QUANTITY	UNIT	DIRECT UNIT COST	TOTAL COST	REMARKS
7.08	D08. 2100mm x 100mm PWD toilet door; 44mm thick kiln dried flush door with louver panel, with 50mm x 100mm kiln dried solid wood door jamb in faux wood stain finish with clear gloss top coat lacquer, complete with hardwares and accessories as per plan.	1.00	set			
7.09	D09. 2100mm x 600mm janitor's room door; 44mm thick kiln dried flush door with louver panel, with 50mm x 100mm kiln dried solid wood door jamb in faux wood stain finish with clear gloss top coat lacquer, complete with hardwares and accessories as per plan.	1.00	set			
7.10	D10. Shower room door panel using 12mm thick laminated solid phenolic board partition complete with necessary hardware and accessories as per manufacturer's standards.	2.00	sets			
7.11	Powder coated aluminum threshold to be provided for every termination of different floor finishes	98.91	l.m			
	SUBTOTAL COST:					
VIII.	GLASS WORKS					
8.01	12mm thick tempered glass in FD 100 powder-coated aluminum framing including sealant application and frosted sticker for all glass partitions as shown in the plans	978.02	sq.m.			
8.02	Facial Mirror with 6mm thick marine plywood backing for toilets as shown in the plans	18.28	sq.m			
8.03	Graphicote with 6mm thick marine plywood backing for meeting rooms as shown in the plans	44.81	sq.m			
8.04	Supply, delivery and installation of 12mm thick tempered glass with holes for cashier area as per plan, complete with hardware and silicone sealants as per manufacturer's standard.	7.03	sq.m			
	SUBTOTAL COST:					
IX.	MASONRY WORKS					
9.01	18-20mm thk. granite pantry countertop including 150mm height splashboard and 100mm height sinepa on 2 pcs. 18mm thick marine plywood substrate moutned on top of modular base cabinet complete with necessary accessories and chemicals as per manufacturer's standards.	10.94	sq.m			
9.02	18-20mm thk. lavatory granite countertop including 150mm height splashboard and 100mm height sinepa on 75mm thick reinforced concrete substrate complete with rebars, complete with necessary accessories and chemicals as per manufacturer's standards.	15.86	sq.m			
9.03	18mm- 20mm thick granite counter with 1 pc. 18 mm thick plywood subsurface with angular bar framing at cashier counter. Contractor to verify location as per plan.	3.72	sq.m			
	SUBTOTAL COST:					
X.	LIGHTING FIXTURES					
10.01	12 watts daylight recessed type LED light fixture	630.00	sets			

ITEM NO.	ITEM DESCRIPTION AND LOCATION	QUANTITY	UNIT	DIRECT UNIT COST	TOTAL COST	REMARKS
10.02	6 watts warm white recessed type LED light fixture	241.00	sets			
10.03	600mm x 600mm x 12mmH 48W daylight slim type LED panel ceiling light fixture with aluminium housing, 100-240Vac Input and 26-30Vdc Output and optical PMMA diffuser for offices, elevator lobby and other areas as shown in the plans	229.00	set			
10.04	2 x 3W LED twin head emergency light	185.00	set			
10.05	LED type ceiling mounted acrylic signage for fire exit and toilet signages	12.00	sets			
	SUBTOTAL COST:					
XI.	TOILET FIXTURES					
11.01	Water closet	17.00	set			
11.02	Water Closet lever-type flush valve	17.00	set			
11.03	Bidet spray	17.00	set			
11.04	Urinal	5.00	set			
11.05	Urinal flush valve self-closing	5.00	set			
11.06	Vessel type porcelain basin	13.00	set			
11.07	Basin Faucet (electronic sesnsor type)	14.00	set			
11.08	3.5kW Single point splash proof shower water heater unit	2.00	sets			
11.09	Slop Sink Faucet, 2-way brass lever-type	1.00	set			
11.10	Undercounter porcelain wash basin	1.00	set			
11.11	Telescopic shower curtain rod, aluminum chrome finish	2.00	set			
11.12	Waterproof polyester shower curtain with hook rings	2.00	set			
11.13	Stainless steel SUS 304 2-tier towel rack with shelf storage and hanger rods	2.00	set			
11.14	Toilet paper roll holder with cover lid	17.00	sets			
11.15	700mL automatic sensor type soap dispenser	14.00	sets			
11.16	32mm diameter x 600mmL Stainless steel SUS 304 ergonomic and upturned grab bar	1.00	set			
11.17	32mm diameter x 600mmL Stainless steel SUS 304 fixed wall mounted grab bar	1.00	set			
	SUBTOTAL COST:					
XII.	TOILET PARTITION					
12.01	Toilet partition and ledge. 12mm thick machine pressed laminated phenolic board substrate partitions with high scratch and impact resistance with aluminium edge and corner profile, complete with stainless steel/ aluminum hardware and accessories as per manufacturer's standards.	1.00	lot			
12.02	Urinal partition and ledge. 12mm thick machine pressed laminated phenolic board substrate partitions with high scratch and impact resistance with aluminium edge and corner profile for urinal partition and ledge	1.00	lot			
	SUBTOTAL COST:					
XIII.	PANTRY FIXTURES AND ACCESSORIES					
13.01	Pantry sink – chrome finish stainless steel L796mm x W498mm x D180mm single bowl upper-counter sink with drain board with corrosion resistance property for pantry	4.00	sets			

ITEM NO.	ITEM DESCRIPTION AND LOCATION	QUANTITY	UNIT	DIRECT UNIT COST	TOTAL COST	REMARKS
13.02	Pantry sink faucet mixer – stainless steel chrome finish L-spout sink mixer complete with necessary accessories as per manufacturer's standards.	4.00	sets			
13.03	0.75HP – 225v food waste disposer, with stainless steel grind elements and 1180mL stainless steel grind chamber for pantry	4.00	set			
	SUBTOTAL COST:					
XIV.	MISCELLANEOUS WORKS					
14.01	3000mm length 18mm thick laminated marine plywood board under counter and overhead cabinets complete with stainless steel concealed hinges, continuous extruded aluminum handles, with adjustable shelves and necessary accessories as per manufacturers standard.	3.00	sets			
14.02	2840mm length 18mm thick laminated marine plywood board under counter and overhead cabinets complete with stainless steel concealed hinges, continuous extruded aluminum handles, with adjustable shelves and necessary accessories as per manufacturers standard.	1.00	set			
14.03	3500mm length 18mm thick laminated marine plywood board under counter and overhead cabinets complete with stainless steel concealed hinges, continuous extruded aluminum handles, with adjustable shelves and necessary accessories as per manufacturers standard.	1.00	set			
	SUBTOTAL COST:					
XV.	WATER PROOFING WORKS					
15.01	Cementitious crystallization waterproofing using crystalline waterproofing formulation for toilet as per manufacturer's specification	147.98	sqm			
	SUBTOTAL COST:					
	ARCHITECTURAL WORKS TOTAL COST:					
Electrical and Auxiliary Works Bid Form						
XXIX.	PANEL BOARDS, TRANSFORMERS & CIRCUIT BREAKERS					
29.01	PP1, 230V, 3P+G, NEMA 1, SURFACE MOUNTED	1.00	assy			
29.01.01	Main: 1 - EZC F 125AT, 160AF, 3P, 25KAIC, 230V, MCCB					
29.01.02	Brs: 24 - iC60 N 20AT, 63AF, 2P, 10KAIC, 230V, MCB					
29.02	PP2, 230V, 3P+G, NEMA 1, SURFACE MOUNTED	1.00	assy			
29.02.01	Main: 1 - EZC F 125AT, 160AF, 3P, 25KAIC, 230V, MCCB					
29.02.02	Brs: 24 - iC60 N 20AT, 63AF, 2P, 10KAIC, 230V, MCB					
29.03	PP3, 230V, 3P+G, NEMA 1	1.00	assy			
29.03.01	Main: 1 - EZC F 125AT, 160AF, 3P, 25KAIC, 230V, MCCB					
29.03.02	Brs: 24 - iC60 N 20AT, 63AF, 2P, 10KAIC, 230V, MCB					

ITEM NO.	ITEM DESCRIPTION AND LOCATION	QUANTITY	UNIT	DIRECT UNIT COST	TOTAL COST	REMARKS
29.04	PACU-EDPC 8F, 480V, 3P+G, NEMA 1, SURFACE MOUNTED	1.00	assy			
29.04.01	Main: 1 - EZC F 400AT, 400AF, 3P, 36KAIC, 230V, MCCB					
29.04.02	Brs: 12 - iC60 N 60AT, 63AF, 3P, 18KAIC, 230V, MCB					
29.04.03	2 - iC60 N 70AT, 100AF, 3P, 18KAIC, 230V, MCB					
29.04.04	Space: 1 - 63AF, 3P					
29.05	2BGU7A, 480V, 3P+G, NEMA 1, SURFACE MOUNTED	1.00	assy			
29.05.01	Main: 1 - EZC F 500AT, 600AF, 3P, 36KAIC, 230V, MCCB					
29.05.02	Brs: 7 - iC60 N 100AT, 63AF, 3P, 18KAIC, 230V, MCB					
29.05.03	2 - iC60 N 70AT, 100AF, 3P, 18KAIC, 230V, MCB					
29.05.04	Space: 1 - 63AF, 3P					
29.06	8DP, 230V, 3P+G, NEMA 1, SURFACE MOUNTED	1.00	assy			
29.06.01	Main: 1 - EZC F 300AT, 400AF, 3P, 36KAIC, 230V, MCCB					
29.06.02	Brs: 3 - EZC F 100AT, 100AF, 3P, 25KAIC, 230V, MCCB					
29.06.03	Space: 2 - 100AF, 3P					
29.07	50kVA 480V/ 230 DRY TYPE TRANSFORMER (to 7th floor)	1.00	assy			
29.08	300kVA 480V/ 230 DRY TYPE TRANSFORMER	1.00	assy			
	SUBTOTAL COST:					
XXX.	LIGHTING SYSTEM					
30.01	WIRING DEVICES					
30.01.01	National one gang switch	38.00	set			
30.01.02	National two gang switch	38.00	set			
30.01.03	National three gang switch	24.00	set			
30.02	CONDUITS					
30.02.01	15mmØ EMT conduits	680.00	pc/s			
30.02.02	15mmØ EMT elbow	330.00	pc/s			
30.02.03	15mmØ EMT coupling	680.00	pc/s			
30.02.04	15mmØ EMT connector	380.00	pc/s			
30.02.05	15mmØ EMT Locknut & Bushing	380.00	pc/s			
30.02.06	15mmØ flexible metal conduit	215.00	lm			
30.02.07	15mmØ straight connector	195.00	pc/s			
30.02.08	15mmØ angle connector	195.00	pc/s			
30.02.09	20mmØ EMT conduits	156.00	pc/s			
30.02.10	20mmØ EMT elbow	67.00	pc/s			
30.02.11	20mmØ EMT coupling	156.00	pc/s			
30.02.12	20mmØ EMT connector	321.00	pc/s			
30.02.13	20mmØ EMT Locknut & Bushing	321.00	pc/s			
30.02.14	20mmØ flexible metal conduit	43.00	pc/s			
30.02.15	20mmØ straight connector	192.00	pc/s			
30.02.16	20mmØ angle connector	192.00	pc/s			
30.03	BOXES					
30.03.01	4" x 4" x 2" Octagonal Box, Gauge 16, Zinc-Chromate	989.00	pc/s			
30.03.02	6" x 6" x 4" Pull Box, Gauge 16, Zinc-Chromate	1.00	pc/s			
30.03.03	4-11/16" x 4-11/16" Square Box, Gauge 16, Zinc-Chromate	400.00	pc/s			
30.03.04	2" x 4" Utility Box, Gauge 16, Zinc-Chromate	110.00	pc/s			

ITEM NO.	ITEM DESCRIPTION AND LOCATION	QUANTITY	UNIT	DIRECT UNIT COST	TOTAL COST	REMARKS
30.04	WIRES & CABLES					
30.04.01	3.5mm² Cu. THHN	4,589.00	lm			
30.04.02	5.5mm² Cu. THHN	967.00	lm			
	SUBTOTAL COST:					
XXXI.	POWER SYSTEM					
31.01	WIRING DEVICES					
31.01.01	Duplex Convenience Outlet	700.00	sets			
31.01.02	Single Convenience Outlet, Grounding Type	42.00	sets			
31.02	CONDUITS					
31.02.01	15mmØ EMT conduits	2,432.00	pc/s			
31.02.02	15mmØ EMT elbow	510.00	pc/s			
31.02.03	15mmØ EMT coupling	2,432.00	pc/s			
31.02.04	15mmØ EMT connector	1,621.00	pc/s			
31.02.05	15mmØ EMT Locknut & Bushing	1,621.00	pc/s			
31.02.06	20mmØ EMT conduits	267.00	pc/s			
31.02.07	20mmØ EMT elbow	129.00	pc/s			
31.02.08	20mmØ EMT coupling	267.00	pc/s			
31.02.09	20mmØ EMT connector	182.00	pc/s			
31.02.10	20mmØ EMT Locknut & Bushing	182.00	pc/s			
31.02.11	25mmØ EMT conduits	327.00	pc/s			
31.02.12	25mmØ EMT elbow	164.00	pc/s			
31.02.13	25mmØ EMT coupling	367.00	pc/s			
31.02.14	25mmØ EMT connector	367.00	pc/s			
31.02.15	25mmØ EMT Locknut & Bushing	281.00	pc/s			
31.02.16	32mmØ EMT conduits	7.00	pc/s			
31.02.17	32mmØ EMT elbow	4.00	pc/s			
31.02.18	32mmØ EMT coupling	7.00	pc/s			
31.02.19	32mmØ EMT connector	5.00	pc/s			
31.02.20	32mmØ EMT Locknut & Bushing	5.00	pc/s			
31.02.21	50mmØ EMT conduits	62.00	pc/s			
31.02.22	50mmØ EMT elbow	31.00	pc/s			
31.02.23	50mmØ EMT coupling	62.00	pc/s			
31.02.24	50mmØ EMT connector	47.00	pc/s			
31.02.25	50mmØ EMT Locknut & Bushing	47.00	pc/s			
31.02.26	80mmØ IMC conduits	13.00	pc/s			
31.02.27	80mmØ IMC elbow	7.00	pc/s			
31.02.28	80mmØ IMC coupling	13.00	pc/s			
31.02.29	80mmØ IMC Locknut & Bushing	11.00	pc/s			
31.03	BOXES & PULL BOXES					
31.03.01	4" x 4" Octagonal Box, Gauge 16, Zinc-Chromate	567.00	pc/s			
31.03.02	4-11/16" x 4-11/16" Square Box, Gauge 16, Zinc-Chromate	220.00	pc/s			
31.03.03	2" x 4" Utility Box, Gauge 16, Zinc-Chromate	742.00	pc/s			
31.04	WIRES & CABLES					
31.04.01	3.5mm² Cu. THHN	12,128.00	lm			
31.04.02	5.5mm² Cu. THHN	3,456.00	lm			
31.04.03	14mm² Cu. THHN	2,528.00	lm			
31.04.04	30mm² Cu. THHN	100.00	lm			
31.04.05	38mm² Cu. THHN	46.00	lm			
31.04.06	60mm² Cu. THHN	2,169.00	lm			
31.04.07	200mm² Cu. THHN	167.00	lm			
	SUBTOTAL COST:					
XXXII.	FIRE DETECTION ALARM SYSTEM					
32.01	CONDUIT & FITTINGS					
32.01.01	20mmØ EMT conduits	230.00	pc/s			
32.01.02	20mmØ EMT elbow	110.00	pc/s			

ITEM NO.	ITEM DESCRIPTION AND LOCATION	QUANTITY	UNIT	DIRECT UNIT COST	TOTAL COST	REMARKS
32.01.03	20mmØ EMT coupling	230.00	pc/s			
32.01.04	20mmØ EMT connector	253.00	pc/s			
32.01.05	20mmØ Locknut & Bushing	253.00	pc/s			
32.01.06	20mmØ flexible metal conduit	167.00	lghts			
32.01.07	20mmØ straight connector	167.00	pc/s			
32.01.08	20mmØ angle connector	147.00	pc/s			
32.02	BOXES & PULL BOXES					
32.02.01	4" x 4" x 2" Octagonal Box, Gauge 16, Zinc-Chromate	134.00	pc/s			
32.02.02	Square Box w/ cover	13.00	pc/s			
32.02.03	Utility Box	56.00	pc/s			
32.02.04	Miscellaneous Materials	1.00	pc/s			
32.02.05	Fabricated Pullbox, 300mm x 300mm x 200mm	1.00	pc/s			
32.03	WIRES & CABLES					
32.03.01	Twisted Pair #16 (MINIRAL INSULATION FRC)	1,056.00	lm			
32.04	EQUIPMENTS & DEVICES					
32.04.01	manual pull station	7.00	pc/s			
32.04.02	horn with strobe light	43.00	set			
32.04.03	strobe light	5.00	set			
32.04.04	smoke detector	74.00	pc/s			
32.04.05	Detector Base	74.00	pc/s			
	SUBTOTAL COST:					
XXXIII.	LAN/TELEPHONE SYSTEM					
33.01	CONDUIT & FITTINGS					
33.01.01	25mmØ EMT conduits	321.00	pc/s			
33.01.02	25mmØ EMT elbow	112.00	pc/s			
33.01.03	25mmØ EMT coupling	321.00	pc/s			
33.01.04	25mmØ EMT connector	96.00	pc/s			
33.01.05	25mmØ Locknut & Bushing	96.00	pc/s			
33.01.06	32mmØ EMT conduits	1,467.00	lghts			
33.01.07	32mmØ EMT elbow	718.00	pc/s			
33.01.08	32mmØ EMT coupling	1,467.00	pc/s			
33.01.09	32mmØ EMT connector	1,140.00	pc/s			
33.01.10	32mmØ Locknut & Bushing	1,140.00	pc/s			
33.02	BOXES & PULL BOXES					
33.02.01	4" x 4" x 2" Octagonal Box, Gauge 16, Zinc-Chromate	130.00	pc/s			
33.02.02	2" x 4" Utility Box, Gauge 16, Zinc-Chromate	629.00	pc/s			
33.02.03	Square Box w/ cover	34.00	pc/s			
33.02.04	Fabricated Pullbox, 300mm x 300mm x 200mm	1.00	pc/s			
33.03	WIRES & CABLES					
33.03.01	CAT 5e Cable	8,562.00	lm			
33.04	EQUIPMENTS & DEVICES					
33.04.01	Socket	450.00	pc/s			
	SUBTOTAL COST:					
XXXIV.	CCTV SYSTEM					
34.01	CONDUIT & FITTINGS					
34.01.01	25mmØ EMT conduits	187.00	pc/s			
34.01.02	25mmØ EMT elbow	58.00	pc/s			
34.01.03	25mmØ EMT coupling	187.00	pc/s			
34.01.04	25mmØ EMT connector	32.00	pc/s			
34.01.05	25mmØ Locknut & Bushing	32.00	pc/s			
34.02	BOXES & PULL BOXES					
34.02.01	Fabricated Pullbox, 300mm x 300mm x 200mm	1.00	pc/s			
34.02.02	Octagonal Box w/ cover	24.00	pc/s			
34.02.03	Square Box w/ cover	8.00	pc/s			

ITEM NO.	ITEM DESCRIPTION AND LOCATION	QUANTITY	UNIT	DIRECT UNIT COST	TOTAL COST	REMARKS
34.02.04	Miscellaneous Materials	1.00	pc/s			
34.03	WIRES & CABLES					
34.03.01	Cat5e UTP Cable, 4 Pairs	521.00	lm			
34.04	EQUIPMENTS & DEVICES					
34.04.01	Varifocal type, Infrared, fished eye type cctv camera	18.00	pcs			
	SUBTOTAL COST:					
XXXV.	PA SYSTEM					
35.01	CONDUIT & FITTINGS					
35.01.01	15mmØ EMT conduits	750.00	pc/s			
35.01.02	15mmØ EMT elbow	240.00	pc/s			
35.01.03	15mmØ EMT coupling	750.00	pc/s			
35.01.04	15mmØ EMT connector	120.00	pc/s			
35.01.05	15mmØ Locknut & Bushing	120.00	pc/s			
35.02	BOXES & PULL BOXES					
35.02.01	Fabricated Pullbox, 300mm x 300mm x 200mm	1.00	pc/s			
35.02.02	Octagonal Box w/ cover	88.00	pc/s			
35.02.03	Square Box w/ cover	29.00	pc/s			
35.02.04	Miscellaneous Materials	1.00	pc/s			
35.03	WIRES & CABLES					
35.03.01	2C-1.6mmØ audio cable	2,217.00	lm			
35.04	EQUIPMENTS & DEVICES					
35.04.01	Metal Ceiling Speaker, 6 Watts tapping	98.00	pc/s			
	SUBTOTAL COST:					
	ELECTRICAL WORKS TOTAL COST:					
Sanitary and Plumbing Works Bid Form						
I.	FACILITY SANITARY SEWERAGE					
1.10	Sanitary Sewer Line					
	Supply and installation of Polyvinyl Chloride (PVC) pipes, Series 1000 II or approved equal, including fittings, painting, sleeves, supports, hangers and other miscellaneous items as shown and as required to complete the system					
1.1.1	100mm diameter	96.00	lm			
1.1.2	75mm diameter	75.00	lm			
1.1.3	50mm diameter	95.00	lm			
1.20	Vent Line (Horizontal and Vertical)					
	Supply and installation of Polyvinyl Chloride (PVC) pipes, Series 1000 II or approved equal, including fittings, painting, sleeves, supports, hangers and other miscellaneous items as shown and as required to complete the system					
1.2.1	75mm diameter	47.00	lm			
1.2.2	50mm diameter	370.00	lm			
	Supply and installation of Floor Clean-out					
1.2.3	100mm diameter jointing to PVC Pipe	5.00	lm			
1.2.4	75mm diameter jointing to PVC Pipe	7.00	lm			
1.30	Drains					
	Supply and installation of drains including adaptors and p-trap as required, setting in concrete, making good around with approved grouting					
	Floor Drain					
1.3.1	50mm diameter jointing to PVC Pipe	16.00	pc/s			
	Shower Drain					
1.3.2	50mm diameter jointing to PVC Pipe	2.00	pc/s			

ITEM NO.	ITEM DESCRIPTION AND LOCATION	QUANTITY	UNIT	DIRECT UNIT COST	TOTAL COST	REMARKS
1.40	Grease trap					
	Supply and installation of grease trap, complete with removable stainless wire basket, 6mm thick hot dipped checkered steel plate cover, round bar lifting handle and all other necessary accessories and connections					
1.4.1	Grease trap; stainless steel Capacity: 4 GPM	4.00	pc/s			
1.50	Plumbing Fixtures					
	Fix only including all necessary adaptors and fittings necessary to finish the work.					
1.5.1	Water Closet	19.00	pc/s			
1.5.2	Lavatory	14.00	pc/s			
1.5.3	Urinal	6.00	pc/s			
1.5.4	Sink	4.00	pc/s			
1.5.5	Slop Sink	1.00	pc/s			
1.5.6	Shower Head	2.00	pc/s			
II.	AIRCON DRAINAGE PIPING					
2.10	Aircon Drain Line (Collectors and risers)					
	Supply and installation of Polyvinyl Chloride (PVC) pipes, Series 1000 II or approved equal, including fittings, painting, sleeves, supports, hangers and other miscellaneous items as shown and as required to complete the system					
2.1.1	50mm diameter	303.00	lm			
2.1.2	25mm diameter	489.00	lm			
2.20	Plumbing Insulation					
	Supply and installation of 20mm thick, pre-molded elastomeric closed cell rubber insulation, wrapped with polyethylene tape and clad with GA-26 aluminum sheets, including vapor barrier and other miscellaneous items as shown and as required to complete the system					
	Condensate Insulation					
2.2.1	50mm diameter	303.00	lm			
2.2.2	25mm diameter	489.00	lm			
III.	FACILITY WATER DISTRIBUTION					
3.10	Cold Water Line (Main line,Horizontal and Vertical)					
	High Density Polypropylene Random Copolymer (PPR) pipes, Class PN-20 including fittings, painting, sleeves, support, hangers, and other miscellaneous items as shown and as required to complete the system.					
3.1.1	15mm diameter	113.00	lm			
3.1.2	20mm diameter	40.00	lm			
3.1.3	25mm diameter	45.00	lm			
3.1.4	32mm diameter	53.00	lm			
3.1.5	40mm diameter	29.00	lm			
3.1.6	50mm diameter	5.00	lm			
3.20	Supply and Install of Hosebibb					
3.2.1	15mm diameter	1.00	pc/s			
3.30	Supply and install of Gate Valves					
3.3.1	15mm diameter	6.00	pc/s			
3.3.2	20mm diameter	2.00	pc/s			
3.3.3	25mm diameter	3.00	pc/s			
3.3.4	32mm diameter	3.00	pc/s			

ITEM NO.	ITEM DESCRIPTION AND LOCATION	QUANTITY	UNIT	DIRECT UNIT COST	TOTAL COST	REMARKS
3.3.5	40mm diameter	3.00	pc/s			
3.3.6	50mm diameter	1.00	pc/s			
IV.	**The following are in respect of the whole of the Plumbing Installations**					
4.10	Sealing, packing and fire proofing wherever required where pipes, conduits, cables or trunking pass through slabs, walls, beams and the like	1.00	item			
4.20	providing samples	1.00	item			
4.30	providing identification, color coding and labelling	1.00	item			
4.40	providing approved shop drawings consisting of five (5) sets for distribution	1.00	item			
4.50	providing "as-built" drawings consisting of five (5) sets of paper prints and including one (1) set of negatives	1.00	item			
4.60	providing operation and maintenance manuals consisting of five (5) sets	1.00	item			
4.70	testing and commissioning including making good all defects and re-testing as necessary and leaving all in sound and perfect working order on completion	1.00	item			
4.80	instructing the Owner's representatives in operation, maintenance and service of completed installation; a period of twelve (12) months from the date of issuance of Certificate of Completion	1.00	item			
4.90	maintenance including labor and parts replacement; a period of twelve (12) months from the date of issuance of Certificate of Completion	1.00	item			
4.10	disinfecting the whole water distribution system issuing of the certificate of isurance that the whole system is free from contamination	1.00	item			
	PLUMBING WORKS TOTAL COST:					
Fire Protection Works Bid Form						
I.	**Sprinkler Heads**					
	Supply and installation of concealed sprinkler heads, 25mm dia B.I. piping and other miscellaneous items as shown and as required to complete the system					
1.10	Relocation of existing pendent heads	315.00	pc/s			
1.20	Additional (new) concealed type sprinkler heads	57.00	pc/s			
1.30	Deletion of sprinkler heads	-	pc/s			
II.	**10Lbs Portable Fire Extinguisher**	77.00	pc/s			
III.	**Data Center Fuppression System**	1.00	lot			
IV.	**SUNDRIES**					
	The following are in respect of the whole of Fire Protection Installations					
4.10	Sealing, packing and fire proofing wherever required where pipes, conduits, cables or trunking pass through slabs, walls, beams and the like	1.00	item			
4.20	providing samples	1.00	item			
4.30	providing identification, color coding and labelling	1.00	item			

ITEM NO.	ITEM DESCRIPTION AND LOCATION	QUANTITY	UNIT	DIRECT UNIT COST	TOTAL COST	REMARKS
4.40	providing approved shop drawings consisting of five (5) sets for distribution	1.00	item			
4.50	providing "as-built" drawings consisting of five (5) sets of paper prints and including one (1) set of negatives	1.00	item			
4.60	providing operation and maintenance manuals consisting of five (5) sets	1.00	item			
4.70	testing and commissioning including making good all defects and re-testing as necessary and leaving all in sound and perfect working order on completion	1.00	item			
4.80	instructing the Owner's representatives in operation, maintenance and service of completed installation; a period of twelve (12) months from the date of issuance of Certificate of Completion	1.00	item			
4.90	maintenance including labor and parts replacement; a period of twelve (12) months from the date of issuance of Certificate of Completion	1.00	item			
4.10	disinfecting the whole water distribution system issuing of the certificate of isurance that the whole system is free from contamination	1.00	item			
4.11	others; miscellaneous and consumables or any items not stated herein necessary to complete the system	1.00	item			
	FIRE PROTECTION WORKS TOTAL COST:					
Mechanical Works Bid Form						
I.	**GENERAL REQUIREMENTS**					
1.10	All insurances such as bonds and guarantee performance bonds, third party insurance and surety bond against down payment and retention bond	1.00	lot			
1.20	Mobilization and demobilization of workers, tools and equipments	1.00	lot			
1.30	Temporary facilities and temporary utilities	1.00	lot			
1.40	Safety and security, daily cleaning and maintenance works	1.00	lot			
1.50	Demolition and hauling of debris	1.00	lot			
	SUBTOTAL COST:					
II.	**AIR CONDITIONING UNIT**					
2.00	**VRF OUTDOOR UNIT**					
	ACCUV-1-01, 20HP Variable Refrigerant Flow Air Cooled Condensing Unit. Blue Fin Coated	1.00	set			
	ACCUV-1-02, 20HP Variable Refrigerant Flow Air Cooled Condensing Unit. Blue Fin Coated	1.00	set			
	ACCUV-1-03, 20HP Variable Refrigerant Flow Air Cooled Condensing Unit. Blue Fin Coated	1.00	set			
	ACCUV-2-01, 12HP Variable Refrigerant Flow Air Cooled Condensing Unit. Blue Fin Coated	1.00	set			
	ACCUV-2-02, 12HP Variable Refrigerant Flow Air Cooled Condensing Unit. Blue Fin Coated	1.00	set			
	ACCUV-2-03, 20HP Variable Refrigerant Flow Air Cooled Condensing Unit. Blue Fin Coated	1.00	set			
	ACCUV-3-01, 16HP Variable Refrigerant Flow Air Cooled Condensing Unit. Blue Fin Coated	1.00	set			

ITEM NO.	ITEM DESCRIPTION AND LOCATION	QUANTITY	UNIT	DIRECT UNIT COST	TOTAL COST	REMARKS
	ACCUV-3-02, 18HP Variable Refrigerant Flow Air Cooled Condensing Unit. Blue Fin Coated	1.00	set			
	ACCUV-3-03, 18HP Variable Refrigerant Flow Air Cooled Condensing Unit. Blue Fin Coated	1.00	set			
	ACCUV-4-01, 16HP Variable Refrigerant Flow Air Cooled Condensing Unit. Blue Fin Coated	1.00	set			
	ACCUV-4-02, 18HP Variable Refrigerant Flow Air Cooled Condensing Unit. Blue Fin Coated	1.00	set			
	ACCUV-4-03, 18HP Variable Refrigerant Flow Air Cooled Condensing Unit. Blue Fin Coated	1.00	set			
	VRF INDOOR UNIT					
	ACUV 1-03, 1.6 HP, Wall Mounted Unit	1.00	set			
	ACUV 1-05, 5.0 HP, 4-Way Ceiling Cassette	5.00	set			
	ACUV 1-07, 1.6 HP, Wall Mounted Unit	1.00	set			
	ACUV 1-09, 1.6 HP, Wall Mounted Unit	1.00	set			
	ACUV 2-02, 5.0 HP, 4-Way Ceiling Cassette	6.00	set			
	ACUV 2-03, 1.25 HP, Wall Mounted Unit	1.00	set			
	ACUV 2-05, 2.0 HP, Wall Mounted Unit	1.00	set			
	ACUV 2-06, 2.0 HP, Wall Mounted Unit	1.00	set			
	ACUV 2-07, 1.0 HP, Wall Mounted Unit	1.00	set			
	ACUV 3-03, 2.0 HP, Wall Mounted Unit	1.00	set			
	ACUV 3-04, 1.6 HP, Wall Mounted Unit	1.00	set			
	ACUV 4-04, 1.6 HP, Wall Mounted Unit	1.00	set			
	ACUV 4-06, 5.0 HP, 4-Way Ceiling Cassette	7.00	set			
	ACCESSORIES					
	Outdoor "Y" Branch Kit	12.00	set			
	Indoor "Y" Branch Kit	59.00	set			
	Standard Wired Remote Controller (Thermostat)	56.00	set			
	VRF Control for BMS	1.00	set			
	OTHERS					
	Refrigerant Pipe Valves for VRF Indoor Unit	120.00	set			
	Refrigerant Pipes, Pipe Insulation and Control Wires and Refrigerant Charge	1.00	lot			
	Electrical Wirings, Panel Boards and other signal wires	1.00	lot			
	SUBTOTAL COST:					
3.00	CHILLED WATER PIPES AND ACCESSORIES					
	100mmØ ASTM ERR B.I Pipe	24.00	lm			
	100mmØ Balancing Valve	2.00	pcs			
	100mmØ (50MM THK.) Elastomeric Rubber Insulation	10.00	lm			
	20mmØ Automatic Air Vent	4.00	lm			
	Flanges, elbows, and other Pipe Accessories, test ports	1.00	lot			
	SUBTOTAL COST:					
4.00	PRECSION AIR CONDITIONING UNIT					
	3 TR Floor Mounted, Split, Variable Type A/C Unit	2.00	pcs			
	5 TR Floor Mounted, Split, Variable Type A/C Unit	2.00	pcs			
	SUBTOTAL COST:					
5.00	DUCTWORK AND ACCESSORIES					
	Galvanized Iron Sheet					
	US Ga. # 24	1,050.00	sq.m.			
	Flexible Duct c/w insulation and vapor barrier					

ITEM NO.	ITEM DESCRIPTION AND LOCATION	QUANTITY	UNIT	DIRECT UNIT COST	TOTAL COST	REMARKS
	250 dia.	630.00	lm			
	25mm thk. Crosslinked Polyolefin Insulation c/w vapor barrier and adhesive	920.00	sqm			
	25mm thk. Internal linings	535.00	sqm			
	400X400 Damper	2.00	lot			
	SUBTOTAL COST:					
5.00	AIR DIFFUSERS					
	1000x100mm Linear Bar Grille c/w Opposed Blade Damper, Aluminum Type	48.00	pcs			
	350X350 4-Way Ceiling Diffuser c/w Opposed Blade Damper	180.00	pcs			
	SUBTOTAL COST:					
6.00	OTHERS					
	Duct and Pipe Hangers, Equipment Support, noise and vibration isolators, volume control dampers	1.00	lot			
	Consumables, canvass, flexible duct, sealant, etc	1.00	lot			
	Testing and Commissioning and Miscellaneous Items other miscellaneous items to complete the system	1.00	lot			
	SUBTOTAL COST:					
	MECHANICAL WORKS TOTAL COST:					
	TOTAL PROJECT COST:					

Submitted by:

Annex A

Steps on How to Zip and Upload Files using Electronic Bid Submission

1. Scan or convert the bid documents to PDF format.

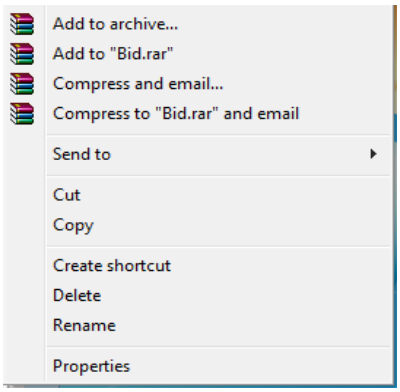
2. Download the free WinRAR software (rarlab.com) and install.

3. Create two (2) New Folders.

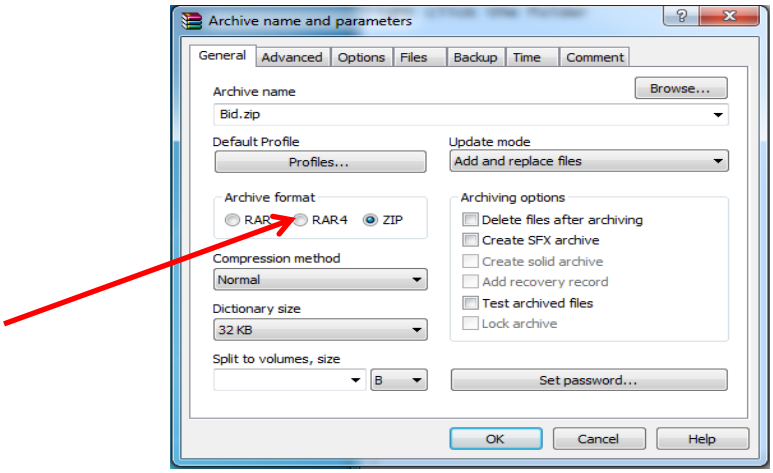
4. Rename the folders with these formats:
   a. Technical Bid ITB No. <Insert ITB No.><Insert Name of Company>
   b. Financial Bid ITB No. <Insert ITB No.><Insert Name of Company>

5. Put the scanned bid documents inside the folders in PDF format.

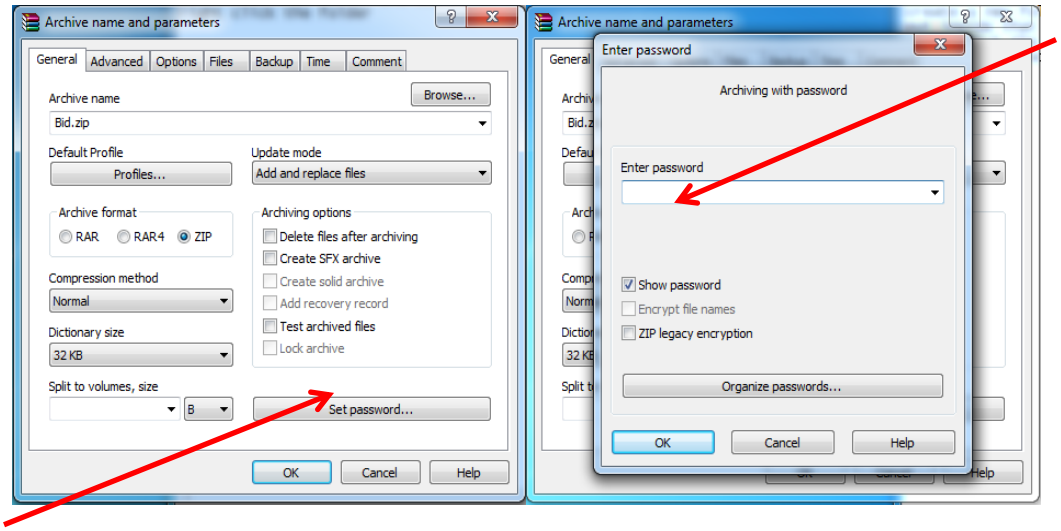
6. Right click the folder and select “Add to archive…”



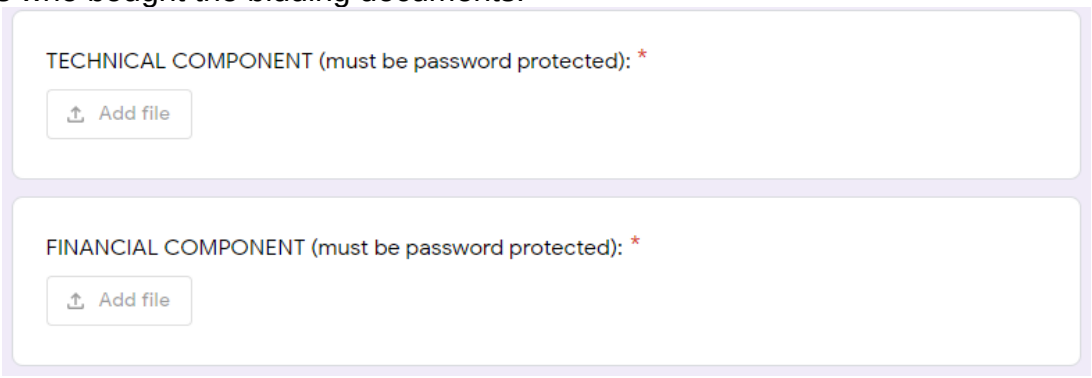
7. Select ZIP as “Archive Format”



8. Click “Set password” and enter the password



9. Upload the ZIP file with password in the online link to be shared only to bidders who bought the bidding documents:



Section IX. Checklist of Technical and Financial Documents

Notes on the Checklist of Technical and Financial Documents

The prescribed documents in the checklist are mandatory to be submitted in the Bid, but shall be subject to the following:

a. GPPB Resolution No. 09-2020 on the efficient procurement measures during a State of Calamity or other similar issuances that shall allow the use of alternate documents in lieu of the mandated requirements; or

b. any subsequent GPPB issuances adjusting the documentary requirements after the effectivity of the adoption of the PBDs.

The BAC shall be checking the submitted documents of each Bidder against this checklist to ascertain if they are all present, using a non-discretionary "pass/fail" criterion pursuant to Section 30 of the 2016 revised IRR of RA No. 9184.

Checklist of Technical and Financial Documents

I. TECHNICAL COMPONENT ENVELOPE

Class "A" Documents

Legal Documents

☐ (a) Valid PhilGEPS Registration Certificate (Platinum Membership) (all pages);
or

☐ (b) Registration certificate from Securities and Exchange Commission (SEC), Department of Trade and Industry (DTI) for sole proprietorship, or Cooperative Development Authority (CDA) for cooperatives or its equivalent document;
and

☐ (c) Mayor's or Business permit issued by the city or municipality where the principal place of business of the prospective bidder is located, or the equivalent document for Exclusive Economic Zones or Areas;
and

☐ (e) Tax clearance per E.O. No. 398, s. 2005, as finally reviewed and approved by the Bureau of Internal Revenue (BIR).

Technical Documents

☐ (f) Statement of the prospective bidder of all its ongoing government and private contracts, including contracts awarded but not yet started, if any, whether similar or not similar in nature and complexity to the contract to be bid; **and**

☐ (g) Statement of the bidder's Single Largest Completed Contract (SLCC) similar to the contract to be bid, except under conditions provided under the rules;
and

☐ (h) Philippine Contractors Accreditation Board (PCAB) License;
or
Special PCAB License in case of Joint Ventures;
and registration for the type and cost of the contract to be bid; **and**

☐ (i) Original copy of Bid Security. If in the form of a Surety Bond, submit also a certification issued by the Insurance Commission;
or
Original copy of Notarized Bid Securing Declaration; **and**

(j) Project Requirements, which shall include the following:

☐ a. Organizational chart for the contract to be bid;

☐ b. List of contractor's key personnel (*e.g.*, Project Manager, Project Engineers, Materials Engineers, and Foremen), to be assigned to the contract to be bid, with their complete qualification and experience data;

☐ c. List of contractor's major equipment units, which are owned, leased, and/or under purchase agreements, supported by proof of ownership or certification of availability of equipment from the equipment lessor/vendor for the duration of the project, as the case may be; **and**

☐ (k) Original duly signed Omnibus Sworn Statement (OSS);
and if applicable, Original Notarized Secretary's Certificate in case of a

corporation, partnership, or cooperative; or Original Special Power of Attorney of all members of the joint venture giving full power and authority to its officer to sign the OSS and do acts to represent the Bidder.

Financial Documents

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

☐ (m) The prospective bidder's computation of Net Financial Contracting Capacity (NFCC).

Class "B" Documents

☐ (n) If applicable, duly signed joint venture agreement (JVA) in accordance with RA No. 4566 and its IRR in case the joint venture is already in existence;

or

duly notarized statements from all the potential joint venture partners stating that they will enter into and abide by the provisions of the JVA in the instance that the bid is successful.

II. FINANCIAL COMPONENT ENVELOPE

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

Other documentary requirements under RA No. 9184

☐ (p) Original of duly signed Bid Prices in the Bill of Quantities; **and**

☐ (q) Duly accomplished Detailed Estimates Form, including a summary shee indicating the unit prices of construction materials, labor rates, and equipmen rentals used in coming up with the Bid; **and**

☐ (r) Cash Flow by Quarter.

Bid Form for the Procurement of Infrastructure Projects

[shall be submitted with the Bid]

BID FORM

Date : _____
Project Identification No. : _____

To: [name and address of Procuring Entity]

Having examined the Philippine Bidding Documents (PBDs) including the Supplemental or Bid Bulletin Numbers *[insert numbers],* the receipt of which is hereby duly acknowledged, we, the undersigned, declare that:

a. We have no reservation to the PBDs, including the Supplemental or Bid Bulletins, for the Procurement Project: *[insert name of contract];*

b. We offer to execute the Works for this Contract in accordance with the PBDs;

c. The total price of our Bid in words and figures, excluding any discounts offered below is: *[insert information]*;

d. The discounts offered and the methodology for their application are: *[insert information]*;

e. The total bid price includes the cost of all taxes, such as, but not limited to: *[specify the applicable taxes, e.g. (i) value added tax (VAT), (ii) income tax, (iii) local taxes, and (iv) other fiscal levies and duties],* which are itemized herein and reflected in the detailed estimates,

f. Our Bid shall be valid within the a period stated in the PBDs, and it shall remain binding upon us at any time before the expiration of that period;

g. If our Bid is accepted, we commit to obtain a Performance Security in the amount of *[insert percentage amount]* percent of the Contract Price for the due performance of the Contract, or a Performance Securing Declaration in lieu of the the allowable forms of Performance Security, subject to the terms and conditions of issued GPPB guidelines[2] for this purpose;

h. We are not participating, as Bidders, in more than one Bid in this bidding process, other than alternative offers in accordance with the Bidding Documents;

i. We understand that this Bid, together with your written acceptance thereof included in your notification of award, shall constitute a binding contract between us, until a formal Contract is prepared and executed; and

---

[2] currently based on GPPB Resolution No. 09-2020

j. We understand that you are not bound to accept the Lowest Calculated Bid or any other Bid that you may receive.

k. We likewise certify/confirm that the undersigned, is the duly authorized representative of the bidder, and granted full power and authority to do, execute and perform any and all acts necessary to participate, submit the bid, and to sign and execute the ensuing contract for the [Name of Project] of the [Name of the Procuring Entity*].*

l. We acknowledge that failure to sign each and every page of this Bid Form, including the Bill of Quantities, shall be a ground for the rejection of our bid.

Name: _____

Legal Capacity: _____

Signature: _____

Duly authorized to sign the Bid for and behalf of: _____

Date: _____

Bid Securing Declaration Form

[shall be submitted with the Bid if bidder opts to provide this form of bid security]

REPUBLIC OF THE PHILIPPINES)
CITY OF _____) S.S.

BID SECURING DECLARATION
Project Identification No.: *[Insert number]*

To: *[Insert name and address of the Procuring Entity]*

I/We, the undersigned, declare that:

1. I/We understand that, according to your conditions, bids must be supported by a Bid Security, which may be in the form of a Bid Securing Declaration.

2. I/We accept that: (a) I/we will be automatically disqualified from bidding for any procurement contract with any procuring entity for a period of two (2) years upon receipt of your Blacklisting Order; and, (b) I/we will pay the applicable fine provided under Section 6 of the Guidelines on the Use of Bid Securing Declaration, within fifteen (15) days from receipt of the written demand by the procuring entity for the commission of acts resulting to the enforcement of the bid securing declaration under Sections 23.1(b), 34.2, 40.1 and 69.1, except 69.1(f),of the IRR of RA No. 9184; without prejudice to other legal action the government may undertake.

3. I/We understand that this Bid Securing Declaration shall cease to be valid on the following circumstances:

    a. Upon expiration of the bid validity period, or any extension thereof pursuant to your request;
    b. I am/we are declared ineligible or post-disqualified upon receipt of your notice to such effect, and (i) I/we failed to timely file a request for reconsideration or (ii) I/we filed a waiver to avail of said right; and
    c. I am/we are declared the bidder with the Lowest Calculated Responsive Bid, and I/we have furnished the performance security and signed the Contract.

IN WITNESS WHEREOF, I/We have hereunto set my/our hand/s this ____ day of *[month] [year]* at *[place of execution]*.

[Insert NAME OF BIDDER OR ITS AUTHORIZED REPRESENTATIVE]
[Insert signatory's legal capacity]
Affiant

[Jurat]
[Format shall be based on the latest Rules on Notarial Practice]

Contract Agreement Form for the Procurement of Infrastructure Projects (Revised)

[not required to be submitted with the Bid, but it shall be submitted within ten (10) days after receiving the Notice of Award]

CONTRACT AGREEMENT

THIS AGREEMENT, made this *[insert date]* day of *[insert month]*, *[insert year]* between *[name and address of PROCURING ENTITY]* (hereinafter called the "Entity") and *[name and address of Contractor]* (hereinafter called the "Contractor").

WHEREAS, the Entity is desirous that the Contractor execute *[name and identification number of contract]* (hereinafter called "the Works") and the Entity has accepted the Bid for *[contract price in words and figures in specified currency]* by the Contractor for the execution and completion of such Works and the remedying of any defects therein.

NOW THIS AGREEMENT WITNESSETH AS FOLLOWS:

1. In this Agreement, words and expressions shall have the same meanings as are respectively assigned to them in the Conditions of Contract hereinafter referred to.

2. The following documents as required by the 2016 revised Implementing Rules and Regulations of Republic Act No. 9184 shall be deemed to form and be read and construed as part of this Agreement, *viz.*:

   a. Philippine Bidding Documents (PBDs);
   - i. Drawings/Plans;
   - ii. Specifications;
   - iii. Bill of Quantities;
   - iv. General and Special Conditions of Contract;
   - v. Supplemental or Bid Bulletins, if any;

   b. Winning bidder's bid, including the Eligibility requirements, Technical and Financial Proposals, and all other documents or statements submitted;

   Bid form, including all the documents/statements contained in the Bidder's bidding envelopes, as annexes, and all other documents submitted (*e.g.*, Bidder's response to request for clarifications on the bid), including corrections to the bid, if any, resulting from the Procuring Entity's bid evaluation;

   c. Performance Security;

   d. Notice of Award of Contract and the Bidder's conforme thereto; and

   e. Other contract documents that may be required by existing laws and/or the Procuring Entity concerned in the PBDs. **Winning bidder agrees that additional contract documents or information prescribed by the GPPB that are subsequently required for submission after the contract**

execution, such as the Notice to Proceed, Variation Orders, and Warranty Security, shall likewise form part of the Contract.

3. In consideration for the sum of *[total contract price in words and figures]* or such other sums as may be ascertained, *[Named of the bidder]* agrees to *[state the object of the contract]* in accordance with his/her/its Bid.

4. The *[Name of the procuring entity]* agrees to pay the above-mentioned sum in accordance with the terms of the Bidding.

IN WITNESS whereof the parties thereto have caused this Agreement to be executed the day and year first before written.

[Insert Name and Signature]	*[Insert Name and Signature]*
[Insert Signatory's Legal Capacity]	*[Insert Signatory's Legal Capacity]*
for:	*for:*
[Insert Procuring Entity]	*[Insert Name of Supplier]*

Acknowledgment

[Format shall be based on the latest Rules on Notarial Practice]

Omnibus Sworn Statement (Revised)

[shall be submitted with the Bid]

REPUBLIC OF THE PHILIPPINES)
CITY/MUNICIPALITY OF _____) S.S.

AFFIDAVIT

I, [Name of Affiant], of legal age, [Civil Status], [Nationality], and residing at [Address of Affiant], after having been duly sworn in accordance with law, do hereby depose and state that:

1. *[Select one, delete the other:]*

   [If a sole proprietorship:] I am the sole proprietor or authorized representative of [Name of Bidder] with office address at [address of Bidder];

   [If a partnership, corporation, cooperative, or joint venture:] I am the duly authorized and designated representative of [Name of Bidder] with office address at [address of Bidder];

2. *[Select one, delete the other:]*

   [If a sole proprietorship:] As the owner and sole proprietor, or authorized representative of [Name of Bidder], I have full power and authority to do, execute and perform any and all acts necessary to participate, submit the bid, and to sign and execute the ensuing contract for [Name of the Project] of the [Name of the Procuring Entity], as shown in the attached duly notarized Special Power of Attorney;

   [If a partnership, corporation, cooperative, or joint venture:] I am granted full power and authority to do, execute and perform any and all acts necessary to participate, submit the bid, and to sign and execute the ensuing contract for [Name of the Project] of the [Name of the Procuring Entity], as shown in the attached [state title of attached document showing proof of authorization (e.g., duly notarized Secretary's Certificate, Board/Partnership Resolution, or Special Power of Attorney, whichever is applicable;)];

3. [Name of Bidder] is not "blacklisted" or barred from bidding by the Government of the Philippines or any of its agencies, offices, corporations, or Local Government Units, foreign government/foreign or international financing institution whose blacklisting rules have been recognized by the Government Procurement Policy Board, **by itself or by relation, membership, association, affiliation, or controlling interest with another blacklisted person or entity as defined and provided for in the Uniform Guidelines on Blacklisting;**

4. Each of the documents submitted in satisfaction of the bidding requirements is an authentic copy of the original, complete, and all statements and information provided therein are true and correct;

5. [Name of Bidder] is authorizing the Head of the Procuring Entity or its duly authorized representative(s) to verify all the documents submitted;

6. *[Select one, delete the rest:]*

   [If a sole proprietorship:] The owner or sole proprietor is not related to the Head of the Procuring Entity, members of the Bids and Awards Committee (BAC), the Technical

Working Group, and the BAC Secretariat, the head of the Project Management Office or the end-user unit, and the project consultants by consanguinity or affinity up to the third civil degree;

[If a partnership or cooperative:] None of the officers and members of *[Name of Bidder]* is related to the Head of the Procuring Entity, members of the Bids and Awards Committee (BAC), the Technical Working Group, and the BAC Secretariat, the head of the Project Management Office or the end-user unit, and the project consultants by consanguinity or affinity up to the third civil degree;

[If a corporation or joint venture:] None of the officers, directors, and controlling stockholders of *[Name of Bidder]* is related to the Head of the Procuring Entity, members of the Bids and Awards Committee (BAC), the Technical Working Group, and the BAC Secretariat, the head of the Project Management Office or the end-user unit, and the project consultants by consanguinity or affinity up to the third civil degree;

7. *[Name of Bidder]* complies with existing labor laws and standards; and

8. *[Name of Bidder]* is aware of and has undertaken the responsibilities as a Bidder in compliance with the Philippine Bidding Documents, which includes:

   a. Carefully examining all of the Bidding Documents;
   b. Acknowledging all conditions, local or otherwise, affecting the implementation of the Contract;
   c. Making an estimate of the facilities available and needed for the contract to be bid, if any; and
   d. Inquiring or securing Supplemental/Bid Bulletin(s) issued for the *[Name of the Project]*.

9. *[Name of Bidder]* did not give or pay directly or indirectly, any commission, amount, fee, or any form of consideration, pecuniary or otherwise, to any person or official, personnel or representative of the government in relation to any procurement project or activity.

10. **In case advance payment was made or given, failure to perform or deliver any of the obligations and undertakings in the contract shall be sufficient grounds to constitute criminal liability for Swindling (Estafa) or the commission of fraud with unfaithfulness or abuse of confidence through misappropriating or converting any payment received by a person or entity under an obligation involving the duty to deliver certain goods or services, to the prejudice of the public and the government of the Philippines pursuant to Article 315 of Act No. 3815 s. 1930, as amended, or the Revised Penal Code.**

IN WITNESS WHEREOF, I have hereunto set my hand this __ day of ___, 20__ at _____, Philippines.

[Insert NAME OF BIDDER OR ITS AUTHORIZED REPRESENTATIVE]
[Insert signatory's legal capacity]
Affiant

[Jurat]
[Format shall be based on the latest Rules on Notarial Practice]

STATEMENT OF ONGOING GOVERNMENT & PRIVATE CONTRACTS INCLUDING CONTRACTS AWARDED BUT NOT YET STARTED

Business Name : _____

Business Address : _____

Name of Contract/Location Project Cost	a. Owner Name b. Address c. Telephone Nos.	Nature of Work	Contractor's Role		a. Date Awarded b. Date Started c. Date of Completion	% of Accomplishment		Value of Outstanding Works/Uncompleted Portion
			Description	%		Planned	Actual	
Government								
Private								
						Total Cost		

*Continue in a separate sheet if necessary..

Note: This statement shall be supported with:

1 Notice of Award and/or Contract
2 Notice to Proceed issued by the owner
3 Certificate of Accomplishments signed by the owner or Project Engineer

Submitted by : _____

(Printed Name and Signature)

Designation : _____
Date : _____

STATEMENT OF SINGLE LARGEST COMPLETED CONTRACT (SLCC) SIMILAR TO THE PROJECT

Business Name:

Business Address:

Name of Contract	d. Owner Name e. Address f. Telephone Nos.	Nature of Work	Contractor's Role		d. Amount at Award e. Amount at Completion f. Date of Completion	a. Date Awarded b. Contract Effectivity c. Date Completed
			Description	%		
Government						
Private						

*Continue in a separate sheet if necessary..

Note: This statement shall be supported with:
1 Contract
2 CPES rating sheets and/or Certificate of Completion
3 Certificate of Acceptance

Submitted by

Designation:
Date


Republic of the Philippines
gppb
Government Procurement Policy Board