

Section VI

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# Specifications

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# INTRODUCTION

## 1. **Equivalency of Standards and Codes**

Whenever reference is made in the Contract 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 region, other authoritative standards that ensure a substantially equal or higher quality than the standards and codes specified, will be accepted subject to the Engineer'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 Owner's Representative at least 28 days prior to the date when the Contractor desires to use them for the Owner's Representative consent. In the event the Owner's Representative determines that such proposed deviations do not ensure substantially equal or higher quality, the Contractor shall comply with the standards specified in the documents.

## 2. **The Standard Specifications**

The Standard Specifications applicable to this Contract shall be the Republic of the Philippines, Department of Public Works and Highways (DPWH) "Standard Specifications" for Highways, Bridges and Airports (Volume II) 2013 or latest edition and orders of the department. "Item" herein refers to the item number with the Standard Specifications.

## 3. **Special Specifications**

To supplement the Standard Specifications, reference should be made to the attached Special Specifications for the special item of works and the Environmental Special Specifications.

## 4. **Other Generally-Accepted Principles and Practices in Civil Engineering**

The generally-accepted principles and practices in Civil Engineering are hereby adopted in so far as they do not run in conflict with established specifications.



## **DEFINITION OF TERMS**

Whenever the following terms are used in these specifications, the intent and meaning shall be interpreted as follows:

### **AASHTO**

The American Association of State Highway and Transportation Officials, the successor association to AASHTO.

### **ASTM**

The American Society for Testing and Materials

### **BS**

British Standard Institution.

### **BRS**

Bureau of Research and Standard

### **DOST**

Department of Science & Technology

### **DTI**

Department of Trade & Industry

### **CONTRACT**

The written agreement covering the works to be performed. The Contract shall include, but is not limited to: The Contract Agreement, the Conditions of Contract, the Contract Specifications, drawings, plans and other legal requirements as may be required.

### **CONTRACTOR**

The party or parties on whose behalf the Bid was submitted including its or their respective permitted assignees and where the Contractor comprises more than one party and the context so requires, each and every such party.

### **PROJECT SITE**

The project site refers to the whole road network including related structures within the Subic Bay Freeport Zone

### **ENGINEER/PROJECT-IN-CHARGE FOR SBMA**

Any person, firm or company appointed by the owner, Subic Bay Metropolitan Authority (SBMA) to perform the duties set out in the Conditions of Contract.

### **LABORATORY**

The official testing laboratories of the Contractor as required.

### **MATERIALS**

Any substance specified or required for use in the construction of the Contract work.

### **PLANS**

The official drawings or exact reproductions which show the location, character, dimensions and details of works to be done.

**WORK**

The furnishing of all labor, materials, tools, equipment and incidentals necessary or convenient to the Contractor's performance of all duties and obligations imposed by the Contract.

**SPECIFICATIONS**

The meaning as identified on the Contract conditions and requirements.

For additional Definition of Terms and interpretations, please refer to clauses applicable in the Conditions of Contract.

## PART A: ENABLING WORKS

### A.1 Provision of 4x2 Pick Up Type Service Vehicle for the Engineer on Rental Basis

#### A. Description

The Contractor shall provide within seven (7) calendar days upon receipt of Notice to Proceed until receipt of Certificate of Completion, the following:

1 unit – 4 x 2 Pick-up, double cab, not older than local model year 2016 2500 cc Diesel Engine with Air Condition, in good running operational condition.

**The above vehicle must be used by the Engineer and his staff, duly driven by Contractor assigned driver, for official/project-related purposes only.**

The vehicle to be provided must be to the satisfaction of the Engineer.

The vehicle shall comply in all respect, with relevant Philippine National or Local Laws, statutes and regulations and shall be provided with comprehensive insurance, spare tire and wheel and all necessary tools.

The Contractor shall provide full time qualified and competent driver who shall be under direct supervision by the Contractor in coordination with the Engineer or his duly delegated representatives. The driver shall report to work from 8:00 AM until 5:00 PM on official working days and/or outside of this regular working hours as approved by the Procuring Entity's Representative, within the contract period and will sign in & out at the daily time record book at the Engineer's office.

The Contractor shall maintain the vehicle in good running condition and shall be supplied with appropriate fuel and lubricant during the contract period.

**The Contractor shall be solely responsible for all activities related to the operation and bill of maintenance of the vehicle as well as its registration, provision of passes, access stickers and the like, and for providing fully comprehensive insurance until and including the date of Contractor's receipt of Certificate of Completion; all costs thereof being at the Contractor's expense.**

During the time that the vehicle or the driver is not available due to maintenance and or repair periods or absence of the driver, The Contractor shall provide alternate vehicle/driver of the same type/performance to be approved by the Engineer. **Note that SBMA employees should not be allowed to drive the vehicle at any time or day within the project duration and/or until Contractor's receipt of Certificate of Completion. More explicitly, SBMA employees should not be allowed to use the vehicle other than as specified herein (by the Engineer and his staff, duly driven by Contractor assigned driver, for official/project-related purposes only) within the project duration and/or Contractor's receipt of Certificate of Completion.**

The Contractor shall immediately pull-out/demobilize the vehicle as soon as Certificate of Completion is issued by the Procuring Entity.

**B. Method of Measurement**

Vehicles for the Engineer shall be measured by Month.

**C. Basis of Payment**

The accepted quantities, measured as prescribe above, shall be paid for at the contract unit price, for the pay item listed below that is included in the Bill of Quantities, which price and payment shall constitute full compensation for the provision of the Vehicle for the Engineer including all other incidentals necessary to complete this item.

Payment will be made under:

Pay Item No.	Description	Unit of Measurement
A.1	Provision of 4x2 Pick Up Type Service Vehicle for the Engineer on Rental Basis	Month

**A.2 Project Billboard / Signboard**

**A. Description**

This item shall consist of furnishing, installing and maintaining during the duration of the project, the project information signboard of the type specified in accordance with this Specifications and the details as shown in the drawings. Location for signboard shall be identified by the Project-in-Charge for SBMA.

The Project Information Signboard shall be a tarpaulin signboard that must be suitably framed for outdoor display at the project location, and shall be posted as soon as the award has been made.

**B. Material Requirements**

Sign Panel

The panel for the project informational signboard shall be the standard 8 ft. x 8 ft. white tarpaulin suitably framed. The design and format of the tarpaulin, as shown in the drawings, shall have the following specifications:

- Resolution : 70 dpi
- Font : Helvetica
- Font Size : Main Information – 3”  
: Sub-Information – 1”
- Font Color : Black

Posts and Frames

The post and frames shall be hard wood of the specie indicated on the drawings.

Hardware

All hardware shall be of the kind and size specified on the drawings or as approved by the Project-in-Charge for SBMA.

**C. Construction Requirements**

Location

The project information signs shall be installed at the area designated by the Project-in-Charge for SBMA.

Excavation and Backfilling

Holes shall be excavated to the required depths of the bottom of the posts as shown on the drawings.

Erection of Posts

The posts shall be erected vertically in position at the locations identified by the Project-in-Charge for SBMA.

Installation of Sign Panel

The sign panel shall be erected in accordance with the details shown on the drawings. Any chipping or bending of the sign panel shall be considered as sufficient cause to require replacement of the panel at the expense of the Contractor.

**D. Method of Measurement and Basis of Payment**

The accepted quantity, measured by the number of each, shall be paid for at the contract unit price for Project Information Signboard which price and payment shall constitute full compensation for furnishing and placing all materials including all labor, utilization of tools and equipment and incidentals necessary to complete the work prescribed in this item.

Payment will be made under:

Pay Item No.	Description	Unit of Measurement
A.2	Project Billboard / Signboard	Each

**A.3 Occupational Safety and Health Program**

**A. Description**

This item shall be in accordance with DOLE Department Order NO. 13, otherwise known as Guidelines Governing Occupational Safety and Health in the Construction Industry.

Personal Protective Equipment (PPE): All PPE and devices shall be in accordance with the requirement of the Occupational Safety and Health Standards (OSHS) and should pass the test conducted and/or standard sets by the Occupational Safety and Health Center (OSHC). The Contractor shall provide the required PPE for all its workers needing such equipment. All other persons entering the construction site must wear the necessary PPE. The following PPE and signages required for the project is listed below;

**PPE**

- |                   |                              |
|-------------------|------------------------------|
| a) Safety Shoes   | 1,195.00 man-days (at least) |
| b) Safety Vest    | 1,195.00 man-days (at least) |
| c) Working Gloves | 1,074.00 man-days (at least) |
| d) Rubber Boots   | 859.00 man-days (at least)   |
| e) Rain Coat      | 859.00 man-days (at least)   |
| f) Dust Mask      | 1,074.00 man-days (at least) |
| g) Safety Helmet  | 1,195.00 man-days (at least) |
| h) Safety goggle  | 1,074.00 man-days (at least) |

**Signages**

- |                              |                    |
|------------------------------|--------------------|
| a) Proper PPE Signages       | 2.00 pc (at least) |
| b) Safety First (SF-1)       | 1.00 pc (at least) |
| c) Safety First (SF-2)       | 1.00 pc (at least) |
| d) Hard Hat Area             | 1.00 pc (at least) |
| e) Construction Entrance     | 1.00 pc (at least) |
| f) Construction Exit         | 1.00 pc (at least) |
| g) Authorized Personnel Only | 1.00 pc (at least) |

Safety and Health Officer/Personnel: The Contractor shall have over-all management and coordination of all safety and health officers/personnel responsible for ensuring compliance with the pertinent DOLE Guidelines within the construction site. All full time *safety, health and first aider personnel shall report at least 1,440 man-hours* and must be accredited by DOLE.

Construction Safety Signage and Barricades: Mandatory provision of safety and warning signs shall be in place on the construction site and nearby area to warn the workers and general public of the hazards existing in the worksite. Signs shall conform to the standard requirements of the OSHS.

Safety on Construction Equipment: All heavy equipment operators must be accredited and certified by TESDA while heavy equipment shall be tested and certified by DOLE recognized association/organization.

Construction Safety Signage and Barricades: Mandatory provision of safety and warning signs shall be in place on the construction site and nearby area to warn the workers and general public of the hazards existing in the worksite. Signs shall conform to the standard requirements of the OSHS. (see Traffic Management)

## B. Method of Measurement and Basis of Payment

The accepted quantity, measured by lump sum, shall be paid for at the contract unit price for Construction Safety and Health Program which price and payment shall constitute full compensation for all the works and incidentals necessary to complete the work prescribed in this item.

Payment will be made under:

Pay Item No.	Description	Unit of Measurement
A.3	Occupational Safety and Health Program	Lump Sum

## A.4 Mobilization / Demobilization

### A. Description

Mobilization: When the Contractor has executed the transport and furnishing of all necessary manpower including equipment but not limited to as tabulated below as well as all necessary preparations and requirements for the execution of permanent works.

MINIMUM EQUIPMENT REQUIREMENT				
Item No.	*Major	Equipment Description	Capacity	No. of Units
1	✓	One Bagger Mixer	4.0 - 6.0 ft <sup>3</sup> /min	1
2	✓	Bar Cutter	(20mm Maximum Rebar Ø Grade 40)	1
3	✓	Plate Compactor	5 Hp	1
4	✓	Welding Machine, 300 amp.	48 Hp	1
5	✓	Pnuematic Breakers, Hand Held	4 Hp	1
6	✓	Jackhammer	-	1
7	✓	Air Compressor	130 Hp	1
8	✓	Dump Truck	12 cubic yards	1
9	✓	Concrete Saw, 14" blade dia.	7.5 Hp	1
10	✓	Payloader	110 Hp	1

The Contractor shall begin mobilizing manpower and construction equipment as soon as the site has been formalized.

Mobilized equipment required in the contract shall be duly listed by the Contractor for approval, and, shall not be removed from the site by the same without prior written approval from the Project-in-Charge for SBMA.

All Contractor's initial mobilization costs such as planning and designing all temporary works and facilities and making submittals to the Project-in-Charge for SBMA, recruiting and transferring staff, obtaining all necessary government licenses, permits, clearances, etc., and any other costs involved in preparing to carry out the permanent works as stipulated in the contract and / or as required by the Project-in-Charge for SBMA, shall not be paid separately but shall be included in the unit prices in general or specific overheads.

All items prescribed above shall comprise the general aspects of the Mobilization Phase.

Demobilization: When the Contractor has moved out all its manpower and equipment that are no longer necessary, and when the area is cleaned and satisfactory to SBMA.

Upon completion of the Project, the Contractor shall clear all the areas under contract to the satisfaction of SBMA including the dismantling of temporary facilities, hauling of salvaged materials to designated areas and clearing, transport and disposal of all construction debris. The contractor shall also pullout all existing manpower and equipment as duly approved by the Project-in-Charge for SBMA.

Costs incurred in demobilization shall be included in this item.

All items prescribed above shall comprise the general aspects of the Demobilization Phase.

**D. Method of Measurement and Basis of Payment**

The accepted quantity, measured by lump sum, shall be paid for at the contract unit price for Mobilization and Demobilization which price and payment shall constitute full compensation for all the works and incidentals necessary to complete the work prescribed in this item.

Payment will be made under:

Pay Item No.	Description	Unit of Measurement
A.4	Mobilization / Demobilization	Lump Sum

**A.5 Environmental Management and Monitoring**

**A. General Description**

Waste Disposal:



1. The Contractor shall provide for its workers adequate and appropriate sanitary facilities, i.e. provision of portable toilet in accordance with guidelines to be provided by the Ecology Center, and ensure that all sewage is disposed of, if and as necessary, by a SBMA accredited sewage disposal company.
2. The Contractor shall ensure that oil and grease and other related hazardous wastes, such as paints, concrete epoxies admixtures, etc., which are generated during Contract implementation shall be properly contained, handled and disposed of outside SBMA Secured Area in accordance with provisions of Chapter VII of DAO 29 (IRR of RA 6969, otherwise known as the Toxic Substances and Hazardous and Nuclear Wastes Control Act of 1990). Disposal shall be done by a DENR and SBMA accredited hauler and transporter, who shall advise the disposal site.
3. The Contractor shall provide the Ecology Center with Material Safety Data Sheets (MSDS), to be supplied by the materials suppliers, for hazardous chemicals it intends to use (painting, coating, termite control, soil poisoning, etc.). These shall be properly stored, handled and disposed of in accordance with provisions of DAO 29 (see 2. above).
4. The Contractor shall ensure that recyclable items such as metal scraps shall be stored in an appropriate manner and reused to the fullest extent feasible. All materials remaining after completion of the Project shall be either recycled or disposed of in SBMA approved disposal site. The designated disposal site is at the Olongapo City Landfill.
5. The Contractor is prohibited from maintaining a garbage dump within its leased premises. Construction debris and spoils such as excess and/or broken concrete, hollow blocks, tiles, etc. shall be disposed of in SBMA approved Landfill (see 4. above). All wastes shall be properly contained and disposed of in this landfill. The Contractor shall secure a dumping permit for each truckload of waste to be disposed of in SBMA approved disposal site. Cost and requirements for disposal are the following:
  - a. Hauling by the Contractor
    - Tipping Fee of Php 1,800 for every two (2) tons or one (1) dump truck load.
    - Requirements to be processed by the Contractor:
      - i. Certification from the end user/implementing department of the project, which is the SBMA Engineering Dept.
      - ii. Clearances from the (i) Solid Waste Management Division of the SBMA Maintenance and Transportation Department, (ii) SBMA Procurement and Property Management Department and (iii) the Bureau of Customs in the Subic Bay Freeport Zone.
  - b. Hauling through the SBMA's Maintenance Services

- Service Charge of Php 4,500.00 for every two (2) tons or one (1) dump truck load.
  - Requirements and/or clearances will be processed by the Solid Waste Management Division of the SBMA Maintenance and Transportation Department.
6. For debris and spoils which are unacceptable in SBMA approved Landfill because of their size, such as large metal and concrete scraps/sections, the Contractor shall dispose of these in a site located within the Secured Area of SBMA to be identified by the Engineering Department and/or Ecology Center.

Protected Areas:

7. No trees may be cut, pruned unless a joint inspection with the Proponent and the Ecology Center is done and a permit to do so has been issued by the Ecology Center. Hence, the Proponent shall comply with the SBMA Guidelines for Allowable Tree Cutting and Trimming within Subic Bay Freeport Zone.
8. The Contractor shall minimize effect of construction activities to mangrove areas. In case it is really necessary to touch portions of these areas, contractor shall submit a Mangrove Rehabilitation Program of the EC for approval prior to infringement of these areas.
9. All construction and related activities shall be limited to the identified right-of-way (ROW), unless approved by the Engineer. The Contractor shall not create trails and the like outside of the designated ROW and laydown areas, especially in forested areas, unless approved by the Engineer. Likewise, Contractor shall ensure light and other electrical equipment are kept away from trees and grasses. The Contractor is liable for fully restoring any area scarred or damaged outside of designated ROW's.
10. The Contractor shall ensure that no fishing, hunting, or collection of wild plants and animals is undertaken by his staff or the staff of his Sub-Contractors on or adjacent to the site. The Contractor shall be fully penalized as provided for by law.

Environmental Quality:

11. The Contractor shall strictly adhere to DENR standards on dust and smoke emissions as provided for in Section 62 of DAO 14. The Contractor shall also follow noise standards as provided for in Section 78 of PD 984. SBMA shall reserve the right to refuse entry into the Freeport at any vehicle which fails to comply with such standards. The Contractor shall be penalized for vehicles failing to comply with standards.
12. The Contractor shall ensure that all trucks use tarpaulins (spill catchers) to cover their top loads in order to prevent construction debris from falling on the roads. In the event of falling debris, the Contractor must take all necessary actions to recover the same. He shall be responsible for keeping the roads within the Freeport used by the Contractor's construction vehicles free from dirt and debris. Failure to do so will result in the imposition of necessary fines and penalties.

13. The Contractor shall ensure cleanliness of his leased premises and construction site at all times. This means that all construction materials shall be properly stored. He shall also ensure regular maintenance of trucks, vehicles and equipment. Failure to do so shall result in the imposition of necessary fines and penalties.
14. The Contractor shall conduct his construction activities so that they shall not be a nuisance and/or safety hazard to the public. A Traffic Management Plan shall be prepared by the Contractor and approved by the Engineer.
15. Contractor shall provide its personnel appropriate personal protective equipment including, as deemed necessary, eye and face protective devices, hard hats, safety shoes, electrical protective devices, respirators, gloves, ear plugs/muffs, etc. The appropriate protective devices must be worn as necessary. Mandatory safety provisions in accordance with standard industry practice must be strictly observed. The Contractor shall prepare a Health and Safety plan for approval and appoint/designate a Safety Officer to oversee the implementation of all safety requirements and guidelines.
16. The Contractor shall conduct monthly effluent monitoring of water bodies, potentially affected by the project including parameters such as color, temperatures, TSS, oil and grease and BOD as mandated with provisions of Section 5 of DAO 35.
17. Throughout the Contract period, the Contractor shall provide for adequate temporary drainage at all locations along the project to prevent damage from rainfall and flooding in the form of erosion, loss of strength, contamination, etc. to adjacent pavements, water bodies/streams, etc.

## **Provision of One (1) Unit Portable Toilet**

### **A. Description**

This item shall consist of provision of one (1) unit portable toilet on rental basis including cleaning and disposal services and all other incidentals necessary to complete the work in accordance with this Specification or as directed by the Engineer.

The Contractor must ensure that portable toilets are to be compliant with all applicable codes, regulations, and industry standards, including proper disposal.

The Contractor and service provider agreement shall be in satisfaction to the Engineer in accordance to the Environmental Management Program required for the duration of the project.

### **B. Basis of Payment**

The accepted quantities, measured as Month, shall be paid for at the contract unit price, for the pay item listed below that is included in the Bill of Quantities, which price and payment shall constitute full compensation for the provision for Portable Toilet including all other incidentals necessary to complete this item.

Payment will be made under:

<b>Pay Item No.</b>	<b>Description</b>	<b>Unit of Measurement</b>
A.5	Environmental Management and Monitoring	Lump Sum

## **OTHER INSTRUCTIONS TO CONTRACTOR**

### **Photographs and Contract Documentation**

Provide necessary documents as stipulated in the contract and as required by the Project-in-Charge for SBMA including photographs taken at the jobsite at the specified stages of the contracted work or as again directed by the Project-in-Charge for SBMA.

At all instances requiring progress photograph presentation, the following guidelines must be maintained:

- Size : 5R
- Type: Smooth surface, glossy print, single weight paper with white base mounted on muslin or on double weight glossy paper.
- Photographs and prints must be of professional quality; clear, in focus, with high resolution and sharpness, and with minimum distortion.
- Photographs must be of the same view position of the works to show continuous progress of the works until the works are completed or as directed by the Project-in-Charge for SBMA.
- Photographer should identify each photograph location or by such other means as acceptable to the Project-in-Charge for SBMA, to enable future photographs to be taken from the same location and position.

Progress photographs shall not be measured and paid but shall be considered part of necessary documents to be provided as stipulated in the contract and as required by the Project-in-Charge for SBMA.

### **Material Testing**

Seven (7) days upon receipt of the notice to proceed, The Contractor together with the Materials Engineer of SBMA shall jointly undertake sampling and testing of all material requirements of the contract, the Contractor intends to use for this project. The Materials Engineer of SBMA will see to it that extra sample be set aside in his/her office for future reference purposes.

All tests shall be normally carried out on the site, except that certain special tests may, subject to the approval of the Materials Engineer for SBMA, be carried out at an approved independent accredited testing laboratory. The Contractor shall, if so approved, make all necessary arrangements for the supply and delivery of samples to, and collection of samples from such independent Laboratory. Unless otherwise specified, the Contractor shall arrange for one (1) copy of the independent testing laboratory' test certificate to be delivered to the Materials Engineer for SBMA not less than three (3) days before the materials covered by the relevant test certificate are incorporated in the Works, and test certificates shall be relatable to the materials from which the sample was taken.

Accredited Testing Laboratory: Testing of materials shall be carried out, conducted or be performed at testing laboratory accredited by the Bureau of Research and Standard (BRS) of the

**SCHEDULE OF MINIMUM TEST REQUIREMENTS**

ITEMS OF WORK	MINIMUM TEST REQUIREMENTS
Removal of Structures & Obstruction	None
Clearing & Grubbing	None
Masonry Units	Test: 1-Q, Quality Test for every 10,000 units or fraction thereof
Structural Concrete	<p>* <i>This item shall consist of furnishing, bending, and placing and finishing concrete in all structures except pavements.</i></p> <p>Cement Quantity: (40 kg/bag) Class A ----- 9.0 bags/cu.m. of concrete Class B ----- 8.0 bags/cu.m. of concrete Tests: For every 2000 bags or fraction thereof 1-Q, Quality Test</p> <p>B. Fine Aggregate Quantity: cu.m./cu.m. of concrete For Rounded    For Angular Class A ----- 0.50 ----- 0.54 Class B ----- 0.45 ----- 0.52 Class C ----- 0.53 ----- 0.59 Tests: For every 1500 cu.m or fraction thereof a. For a source not yet tested or failed in previous quality test 1-Q, Quality Test for: Grading, Elutriation (Wash), Bulk Specific Gravity, Absorption, Mortar Strength, Soundness, Organic Impurities, Unit Weight, % Clay Lumps and Shale b. For a source previously tested and passed quality test: 1-Q, Quality Test for: Grading, Elutriation (Wash), Bulk Specific Gravity, Absorption, and Mortar Strength For every 75 cu.m. or fraction thereof: 1-G, Grading Test</p> <p>C. Coarse Aggregates Quantity: cu.m./cu.m. of concrete For Rounded    For Angular Class A ----- 0.77 ----- 0.68 Class B ----- 0.82 ----- 0.73 Class C ----- 0.70 ----- 0.68 Class P ----- 0.68 ----- 0.65 Tests: For every 1500 cu.m or fraction thereof a. For a source not yet tested or failed in previous quality tests: 1-Q, Quality Test for: Grading, Bulk Specific Gravity, Absorption, Abrasion, Soundness and Unit Weight b. For a source previously tested and passed quality test:</p>

	<p>1-Q, Quality Test for Grading, Absorption, Bulk Specific Gravity and Abrasion  For every 75 cu.m. or fraction thereof:  1-G, Grading Test  D. Water  1-Certificate from Project Engineer  1-Q, Quality Test, if source is questionable  E. Premolded Filler for expansion joints  1-Q, Quality Test on each thickness of filler for each shipment</p> <p>F. Steel Reinforcement  1-Q, Quality Test for every 10,000 kg or fraction thereof for each size  G. Concrete  Compressive strength test on concrete cylinder samples. 1 set consisting of 3 concrete cylinder samples shall be taken from each day's pouring and to represent not more than 75 cu.m of concrete or fraction thereof</p>
Timber Structures	<p>* This item shall consist of construction of timber structures to the dimensions, lines and grades as shown on the plans.</p> <p>Tests:  1 – Q, Quality Test or Manufacturer's Certificate for each type of material used</p> <p>1 – IR, Inspection Report for each type and shipment of timber</p>
Metal Structures	<p>* This work shall consist of steel structures portions of composite structures, constructed in reasonably close conformity with the lines, grades and dimension.</p> <p>1-Q, Quality Test or Mill Test Certificate for each type of materials used  1-Inspection Report for each type and shipment of metal used</p>
Paint	<p>1-Q, One 20-L can for every 100 cans or fraction thereof or  1-Q, one 4-L can for every 100 cans or fraction thereof</p>

All Quality/Material Testing requirements shall not be measured and paid separately but shall be considered integral with the other pay items of the contract.

**As-stake & As-built Plans**

Within seven (7) calendar days upon receipt of Notice to Proceed, the Contractor shall initiate joint as-stake survey with the Project-in-Charge for SBMA to make certain the work scope and quantities as originally proposed for the contract, the Contractor shall provide qualified surveyor, rod-man, utility personnel and traffic personnel with necessary protective equipment, safety gears, tools, and gadgets to perform the work safely and efficiently.

The Contractor shall provide and maintain surveying equipment necessary for this purpose.

During and after each phase of work, joint surveys shall be done which will serve as basis to every interim payment certificate being submitted by the contractor.

The Contractor is responsible for the production of the plans, and presentation of the survey data as designed and approved by the Project-in-Charge for SBMA.

As the work progresses, the Project-in-Charge for SBMA may instruct additional surveys that may or may not be included in the project and which the Contractor must be willing to comply.

As-built plans will be based from the compiled summary of all the individual surveys for all of the completed work items.

### **Water and Electrical Charges**

SBMA shall provide assistance for necessary coordination for the provision of water and electrical supply for project related activities by the Contractor during the duration of the contract.

Necessary temporary connections/extensions, etc. (labor and materials) shall be provided by the Contractor upon identification by the Project-in-Charge for SBMA of the source/tapping point for water and electrical supply to be used for the project. The Contractor shall dismantle all temporary connections/extensions, etc., and restore to original state the sources of the utility supplies upon project completion.

In case no source/tapping point can be found within the site, the Project-in-Charge for SBMA and the Contractor shall agree with any means that will satisfy the needs for water and electrical supply during the duration of the project.

Note that all expenses incurred, tapping, consumption and restoration, for this item shall be shouldered by the Contractor.



## **PART B: STRUCTURAL WORKS**

### **B.1. DEMOLITION WORKS**

- B.1.1 Removal including hauling and disposal of Roof Sheet**
- B.1.2 Removal including hauling and disposal of Metal Canopy**
- B.1.3 Removal including hauling and disposal of Ceiling including Frames**
- B.1.4 Removal including hauling and disposal of Container Van**
- B.1.5 Removal including hauling and disposal of Dry Walls along existing store room**
- B.1.6 Demolition including disposal of CHB Walls for proposed windows and door opening**
- B.1.7 Removal including hauling and disposal of Existing Glass Panel Windows**
- B.1.8 Removal including hauling and disposal of Existing Glass Panel Door**
- B.1.9 Removal including hauling and disposal of Existing Vinyl Floor Tiles**
- B.1.10 Removal including hauling and disposal of Existing Overhead Ads Frames**

### **A. General Description**

The works includes furnishing of all materials, equipment and labor required to complete the removal, dismantling, hauling and disposal as itemized below:

Roof Sheet	354.45 square meters
Metal Canopy	19.08 square meters
Ceiling including frames	346.38 square meters
Container Van	1.00 Lot
Dry Walls along existing store room	90.67 square meters
CHB Walls for proposed windows and door opening	17.49 square meters
Existing Glass Panel Windows	44.67 square meters
Existing Glass Panel Door	4.94 square meters
Existing Vinyl Floor Tiles	307.79 square meters
Existing Overhead Ads Frames	15.35 square meters

Correct Handling shall be observed during removal/dismantling so as not to damage, deforms and stressed the materials.

In the events of damage of the materials is not greatly affected, immediate repair shall be done as directed, otherwise, replace the materials with a new one at no additional cost to the contract.

Removed materials that are not deformed/damaged and/or in good condition but are not to be re-used, must be properly documented and to be turned over to PPMD of SBMA.

Disposal procedure and requirements must be in accordance with the requirements of the SBMA.

**B. Method of Measurement and Basis of Payment**

The accepted quantities, provided and installed as prescribed, shall be paid for at the contract unit price for each of the particular pay items that are listed in the Bill of Quantities. The payment shall constitute full compensation for provision for furnishing and placing all labor, tools and equipment and other incidentals necessary to complete the work prescribed in this item.

Payment will be made under:

<b>Pay Item No.</b>	<b>Description</b>	<b>Unit of Measurement</b>
B.1.1	Removal including hauling and disposal of Roof Sheet	Square Meter
B.1.2	Removal including hauling and disposal of Metal Canopy	Square Meter
B.1.3	Removal including hauling and disposal of Ceiling including frames	Square Meter
B.1.4	Removal including hauling and disposal of Container Van	lot
B.1.5	Removal including hauling and disposal of Dry Walls along existing store room	Square Meter
B.1.6	Demolition including and disposal of CHB Walls for proposed windows and door opening	Square Meter
B.1.7	Removal including hauling and disposal of Existing Glass Panel Windows	Square Meter
B.1.8	Removal including hauling and disposal of Existing Glass Panel Door	Square Meter

B.1.9	Removal including hauling and disposal of Existing Vinyl Floor Tiles	Square Meter
B.1.10	Removal including hauling and disposal of Existing Overhead Ads Frames	Square Meter

## **B.2 EARTHWORKS**

### **B.2.1 Clearing and Grabbing**

### **B.2.3 Trimming**

#### **A. Description**

This item shall consist of clearing, grubbing, removing and disposing all vegetation and debris as designated in the Contract, except those objects that are designated to remain in place or are to be removed in consonance with other provisions of this Specification. The work shall also include the preservation from injury or defacement of all objects designated to remain.

#### **B. Construction Requirements**

##### **General**

The Project-in-Charge for SBMA will establish the limits of work and designate all trees, shrubs, plants and other things to remain. The Contractor shall preserve all objects designated to remain. Paint required for cut or scarred surface of trees or shrubs selected for retention shall be an approved asphaltum base paint prepared especially for tree surgery.

Clearing shall extend one (1) meter beyond the toe of the fill slopes or beyond rounding of cut slopes as the case maybe for the entire length of the project unless otherwise shown on the plans or as directed by the Engineer and provided it is within the right of way limits of the project, with the exception of trees under the jurisdiction of the Forest Management Bureau (FMB).

##### **Clearing and Grubbing**

All surface objects and all trees, stumps, roots and other protruding obstructions, not designated to remain, shall be cleared and/or grubbed, including mowing as required, except as provided below:

- (1) Removal of undisturbed stumps and roots and nonperishable solid objects with a minimum depth of one (1) meter below subgrade or slope of embankment will not be required.
- (2) In areas outside of the grading limits of cut and embankment areas, stumps and nonperishable solid objects shall be cut off not more than 150 mm (6 inches) above the ground line or low water level.
- (3) In areas to be rounded at the top of cut slopes, stumps shall be cut off flush with or below the surface of the final slope line.
- (4) Grubbing of pits, channel changes and ditches will be required only to the depth necessitated by the proposed excavation within such areas.
- (5) In areas covered by cogon/talahib, wild grass and other vegetations, top soil shall be cut to a maximum depth of 150 mm below the original ground surface or as designated by the Engineer and disposed outside the clearing and grubbing limits as indicated in the typical roadway section.

Except in areas to be excavated, stump holes and other holes from which obstructions are removed shall be backfilled with suitable material and compacted to the required density.

If perishable material is burned, it shall be burned under the constant care of component watchmen at such times and in such a manner that the surrounding vegetation, other adjacent property, or anything designated to remain on the right of way will not be jeopardized. If permitted, burning shall be done in accordance with applicable laws, ordinances, and regulation.

The Contractor shall use high intensity burning procedures, (i.e., incinerators, high stacking or pit and ditch burning with forced air supplements) that produce intense burning with little or no visible smoke emission during the burning process. At the conclusion of each burning session, the fire shall be completely extinguished so that no smoldering debris remains.

In the event that the Contractor is directed by the Engineer not to start burning operations or to suspend such operations because of hazardous weather conditions, material to be burned which interferes with subsequent construction operations shall be moved by the Contractor to temporary locations clear of construction operations and later, if directed by the Engineer, shall be placed on a designated spot and burned.

Materials and debris which cannot be burned and perishable materials may be disposed off by methods and at locations approved by the Engineer, on or off the project. If disposal is by burying, the debris shall be placed in layers with the material so disturbed to avoid nesting. Each layer shall be covered or mixed with earth material by the land-fill method to fill all voids. The top layer of material buried shall be covered with at least 300 mm (12 inches) of earth or other approved material and shall be graded, shaped and compacted to present a pleasing appearance. If the disposal location is off the project, the Contractor shall make all necessary arrangements with property owners in writing for obtaining suitable disposal locations which are outside the limits of view from the project.

The cost involved shall be included in the unit bid price. A copy of such agreement shall be furnished to the Engineer. The disposal areas shall be seeded, fertilized and mulched at the Contractor's expense.

Woody material may be disposed off by chipping. The wood chips may be used for mulch, slope erosion control or may be uniformly spread over selected areas as directed by the Engineer. Wood chips used as mulch for slope erosion control shall have a maximum thickness of 12 mm (1/2 inch) and faces not exceeding 3900 mm<sup>2</sup> (6 square inches) on any individual surface area. Wood chips not designated for use under other sections shall be spread over the designated areas in layers not to exceed 75 mm (3 inches) loose thickness. Diseased trees shall be buried or disposed off as directed by the Engineer.

All merchantable timber in the clearing area which has not been removed from the right of way prior to the beginning of construction shall become the property of the Contractor, unless otherwise provided.

Low hanging branches and unsound or unsightly branches on trees or shrubs designated to remain shall be trimmed as directed. Branches of trees extending over the roadbed shall be trimmed to give a clear height of 6 m (20 feet) above the roadbed surface. All trimming shall be done by skilled workmen and in accordance with good tree surgery practices.

Timber cut inside the area staked for clearing shall be felled within the area to be cleared.

**D. Basis of Payment**

The accepted quantities, measured as prescribed in Section C, shall be paid for at the Contract unit price for each of the Pay Items listed below that is included in the Bill of Quantities, which price and payment shall be full compensation for furnishing all labor, equipment, tools and incidentals necessary to complete the work prescribed in this Item.

Payment will be made under:

<b>Pay Item No.</b>	<b>Description</b>	<b>Unit of Measurement</b>
B.2.1	Clearing and Grubbing	Square Meter
B.2.3	Trimming	Square Meter

**B.2.2 Structural Excavation (manual)**

**B.2.4 Disposal of excavated materials**

**B.2.5 Backfilling and compaction of imported materials**

**A. Description**

This item shall consist of necessary excavation for foundation of the concrete lined ditch and box culvert including stockpiling/disposal/recycling of excavated materials and all other incidentals necessary to complete the work.

**B. Construction Requirements**

Structure excavation shall be done in accordance with this Specification and in conformity with the lines, grades and dimensions shown on the original and as-staked plans.

Excavated area that were not shown on the original and as-staked plans shall not be paid, but will be considered as a subsidiary obligation of the Contractor under other Contract Items including other expenses resulting from such excess.

Provision for clearing and disposal of unnecessary materials shall not be measured and paid separately but shall be considered integral with this item. The disposal of unnecessary materials shall be the location to be designated by the Project-in-Charge for SBMA. Note that disposal procedures and requirements must be in accordance with SBMA policies.

Recyclable excavated materials shall be stockpiled/stored and/or hauled to the manner and location (within the Freeport Zone) identified by the Project-in-Charge for SBMA for turned over to SBMA.

**C. Method of Measurement and Basis of Payment**

The accepted quantity, measured by the number of cubic meter, shall be paid for at the contract unit price for Structure Excavation (Common Soil), which price and payment shall constitute full compensation for all labor, utilization of tools and equipment and incidentals necessary to complete the work prescribed in this item.

Payment will be made under:

<b>Pay Item No.</b>	<b>Description</b>	<b>Unit of Measurement</b>
B.2.2	Structure Excavation (Manual)	Cubic Meter

**B.2.6 Soil Treatment**

**A. Description**

This Item shall consist of furnishing and applying termite control chemicals, including the use of equipment and tools in performing such operations in accordance with this Specification.

**B. Material and Construction Requirements**

Material and construction requirements shall conform to the latest DPWH: Standard Specifications for Public Works Structures Volume III.

**C. Method of Measurement**

Liquid termite control chemicals or toxicants shall be measured by the actual area in square meters in the cordoning and drenching of lot areas and soil poisoning of granular fill.

The quantity to be paid for shall be determined and accepted by the Project-in-Charge for SBMA.

**D. Basis of Payment**

The accepted quantities, measured as prescribed in Section C shall be paid for at the Contract Unit Price for Termite Control Work or Soil Poisoning which price and payment shall be full compensation for furnishing and applying termite control chemicals including the use of equipment and tools, labor and incidentals necessary to complete the work prescribed in this Item.

Payment will be made under:

Pay Item No.	Description	Unit of Measurement
B.2.6	Soil Treatment	Square Meter

**B.3 CONCRETE WORKS**

**B.3.1 Concrete Formworks**

**B.3.2 19mm Dia Grade 40 reinforcing Steel Bars**

**B.3.3 10mm Dia Grade 40 reinforcing Steel Bars**

**A. Description**

This item shall consist of furnishing, bending, fabricating and placing of steel reinforcing of the type, size, shape and grade required in accordance with this Specifications and in conformity with the requirements shown on the Plans or as directed by the Engineer.

**B. Material Requirements**

Reinforcing steel shall meet the requirements of Item 701, Reinforcing Steel and Wire Rope.

## C. Construction Requirements

### Order Lists

Before materials are ordered, all order lists and bending diagrams shall be furnished by the Contractor, for approval of the Engineer. The approval of order lists and bending diagrams by the Engineer shall in no way relieve the Contractor of responsibility for the materials furnished in accordance with such lists and diagrams to make them comply with the Plans shall be borne by the Contractor.

### Protection Material

Steel reinforcement shall be stored above the surface of the ground upon platforms, skids, or other supports and shall be protected as far as practicable from mechanical injury and surface deterioration caused by exposure to conditions producing rusts, loose scale, paint grease, oil, or other foreign materials. Reinforcement shall be set free from injurious defects such as cracks and laminations. Rust, surface seams, surface irregularities or mill scale will not be cause for rejection, provided the minimum dimensions, cross-sectional area and tensile properties of a hand wire brushed specimen meets the physical requirements of the size and grade of steel specified.

### Bending

All reinforcing bars requiring bending shall be cold-bent to the shapes shown on the Plans or required by the Engineer. Bars shall be bent around a circular pin having the following diameters (D) in relation to the diameter of the bar (d):

Nominal diameter d,mm	Pin diameter (D)
10 to 20	6d
25 to 28	8d
32 and greater	10d

Bends and hooks in stirrups or ties may be bent to the diameter of the principal bar enclosed therein.

### Placing and Fastening

All steel reinforcement shall be accurately placed in the position shown on the Plans or required by the Engineer and firmly held there during the placing and setting of the concrete. Bars shall be tied at all intersections except where spacing is less than 300 mm in each direction, in which case, alternate intersections shall be tied. Ties shall be fastened on the inside.

Distance from the forms shall be maintained by means of stays, blocks, ties, hangers, or other approved supports, so that it does not vary from the position indicated in the Plans by more than 6 mm. Blocks for holding reinforcement from contact with the forms shall be precast mortar blocks of approved shapes and dimensions. Layers of bars shall



be separated by precast mortar blocks or by other equally suitable devices. The use of pebbles, pieces of broken stone or brick, metal pipe and wooden blocks shall not be permitted. Unless otherwise shown on the Plans or required by the Engineer, the minimum distance between bars shall be 400 mm. Reinforcement in any member shall be placed and then inspected and approved by the Engineer before the placing of concrete begins. Concrete placed in violation of this provision may be rejected and removal may be required. If fabric reinforcement is shipped in rolls, it shall be straightened before being placed. Bundled bars shall be tied together at not more than 1.8 m intervals.

**Splicing**

All reinforcement shall be furnished in the full lengths indicated on the Plans. Splicing of bars, except where shown on the Plans, will not be permitted without the written approval of the Engineer. Splices shall be staggered as far as possible and with a minimum separation of not less than 40 bar diameters. Not more than one-third of the bars may be sliced in the same cross-section, except where shown on the Plans. Unless otherwise shown on the Plans, bars shall be lapped a minimum distance of:

Splice Type	Grade 40 Min. lap	Grade 60 Min. lap	But not less than
Tension	24 bar dia.	36 bar dia.	300 mm
Compression	20 bar dia.	24 bar dia.	300 mm

In lapped splices, the bars shall be placed in contact and wired together. Lapped splices will not be permitted at locations where the concrete section is insufficient to provide minimum clear distance of one and one-third maximum size of coarse aggregate between the splice and the nearest adjacent bar. Welding of reinforcing steel shall be done only if detailed on the Plans or if authorized by the Engineer in writing. Spiral reinforcement shall be spliced by lapping at least one and a half turns or by butt welding unless otherwise shown on the Plans.

**Lapping of Bar Mat**

Sheets of mesh or bar mat reinforcement shall overlap each other sufficiently to maintain a uniform strength and shall be securely fastened at the ends and edges. The overlap shall not be less than one mesh in width.

**D. Method of Measurement and Basis of Payment**

The quantity of reinforcing steel to be paid for will be the final quantity placed and accepted in the complete structure.

Payment will be made under:

Pay Item No.	Description	Unit of Measurement
--------------	-------------	---------------------

B.3.2	19 mm Dia Grade 40 Reinforcing Steel Bar	Kilograms
B.3.3	10 mm Dia Grade 40 Reinforcing Steel Bar	Kilograms

### **B.3.4 Cast-in-place Concrete**

#### **A. Description**

These Items shall consist of furnishing of all necessary materials, tools, equipment and labor necessary to complete the execution of the masonry works using Concrete Hollow Blocks as shown on the Plans and herein specified.

#### **B. Material Requirements**

The materials shall conform to the requirement of ITEM 1046 – Masonry Works, DPWH D.O. No. 80 Series of 2018 and specified in the following specifications:

##### **Hydraulic Cement**

Hydraulic Cement shall conform to the applicable requirements of Portland Cement under Division II: Concrete Works.

##### **Aggregates**

Aggregates shall conform to the applicable requirements of Concrete Aggregates under Division II: Concrete Works.

##### **Water**

Water shall conform to the applicable requirements of Water under Division II: Concrete Works.

##### **Reinforcing Steel**

Reinforcing steel shall conform to the applicable requirements of Reinforcing Steel under Division II: Concrete Works.

Use 10 mm dia. deformed steel for dowels, vertical and horizontal bars on CHB at ground floor exterior and interior walls:

Vertical Bars	: 600mm O.C.
Development	: 264mm
Horizontal Bars	: every 3 layers
Reinforcement	: 10mm grade 33
Splicing	: 348 mm

Use 12mm dia. deformed steel for dowels, vertical and horizontal bars on CHB Parapet Walls:

Vertical Bars	: 400mm O.C.
Development	: 264mm
Horizontal Bars	: every 3 layers
Reinforcement	: 10mm grade 33
Splicing	: 348 mm

### **Mortar**

- a. Mortar Proportions: Mortar shall consist of sand, cement and water conforming to the requirements under Division II: Concrete Works, mixed in the proportion of one (1) part cement to three (3) parts sand by volume, sufficient water to obtain the required consistency.
- b. Mortar Joint: shall be uniform in thickness and the average thickness of any three consecutive joint shall be approximately 9.5 mm. Changing in coursing or bending after the work is started will not be permitted. Exposed joints shall be tolled slightly concave with around or other approved slightly larger than the width of the edge of the units, compressing and seating the surface of the joints.
- c. Jointing and Cleaning: Upon completion of all work, all holes in joints of exposed masonry surface shall be joined by completely filling with mortar. After jointing all exposed masonry surfaces shall be wetted and then cleaned with a solution of 10 percent by volume of muriatic (hydrochloric) acid applied with stir fiber brushes leaving the masonry clean. Masonry surfaces shall be rinsed down with clean, clear water.

### **Concrete Hollow Blocks (Non-load bearing CHB)**

Width, height and length of concrete hollow blocks shall be  $\pm 3.20$  mm from the specified dimension shown on the Plans.

CHB – 150, 125 & 100 mm concrete hollow blocks shall be of standard machine vibrated and shall have fine and even texture and well define edges. The minimum compressive strength is 350 psi.

### **Cement Plaster Finish**

All hollow blocks wall surface to be applied with plain cement finish will be cleaned and evenly wet slashed with a wash of neat cement and sand followed by 1:3 cement mortar mix 3/8" thick which shall be applied with wooden float.

## **C. Construction Requirements**

### **C.1 Concrete Hollow Blocks**

#### **C.1.1 Mixing**

Concrete shall be mixed well using the proportion specified by the Engineer. Hand mixing shall be done, using shovels, on a level concrete slab or steel plate. Mix aggregate and cement until the color is uniform. Spread the mixture out, sprinkle water over the surface and mix. Continue with this process until the right amount of water has been mixed in. Mixture shall be free from impurities such as dirt and grass.

If batch mixer is used, accurate timing and measuring devices shall be observed as per manufacturer's recommendation.

#### **C.1.2 Moulding**

Hand operated machines shall be used as manufacturer's recommendation.

The mould of a powered machine should be filled until six (6) to eight (8) cycles of compaction are required to bring the compacting head to its stops.

Demoulding or removal of the mould shall be done carefully so that the fresh blocks are not damaged. Fresh blocks shall be protected from rain with plastic sheets or any suitable covering during the first day and from the drying effects of the sun and wind until curing starts.

#### **C.1.3 Curing**

After being removed from the mold, the Concrete Hollow Blocks (CHB) shall be covered with a plastic sheet or tarpaulin and kept damp and shaded for at least seven (7) days in order to effectively cure. This can be achieved by continually spraying them with water or keeping them under water in tanks.

#### **C.1.4 Installation**

1. All masonry work shall be laid true to line, level, plumb and neat in accordance with the Plans.
2. Units shall be cut accurately to fit all plumbing ducts, opening for electrical works, and all holes shall be neat patched.

3. No construction support shall be attached to the wall except where specifically permitted by the Engineer in Charge.
4. Masonry unit shall be sound, dry, clean and free from cracks when placed in the structure.
5. Proper masonry units shall be used to provide for all window, doors, bond beams, lintels, plasters etc., with a minimum of unit cutting.
6. Where masonry units cutting is necessary, all cuts shall be neat and true to line.
7. Units shall be placed while the mortar is soft and plastic. Any unit disturbed to the extent that the initial bond is broken after initial positioning shall be removed and re-laid in fresh mortar.
8. Mortar should not be spread too far ahead of units, as it will stiffen and lose plasticity, especially in hot weather. Mortar that has stiffened should not be used. ASTM C270, Standard Specification for Mortar for Unit Masonry required that mortar be used within 2 ½ hours of initial mixing.

#### C.1.5 Reinforcement for Concrete Hollow Blocks

Requirement shall be done in accordance with the structural Plans as to size, spacing and other requirements of Reinforcing Steel under Division II: Concrete Works.

#### C.1.6 Finish and Appearance

1. All units shall be sound and free of cracks or other defects that interfere with the proper placement of the unit or significantly impair the strength or permanence of the construction. Minor cracks, incidental to the usual method of manufacture or minor chipping resulting from customary methods of handling in shipment and delivery, are not grounds for rejection.
2. Where units are to be used in exposed wall construction, the face or faces that are to be exposed shall not show chips or cracks, not otherwise permitted, or other imperfections when viewed from a distance of not less than 6.1 m under diffused lighting.
  - a. Five (5) percent of a shipment containing chips, not larger than 25.4 mm in any dimension, or crack not wider than 0.5 mm and not longer than 25 percent of the nominal height of the unit, is permitted.

3. The color and texture of units shall be specified by the purchaser. The finished surfaces that will be exposed in place shall conform to an approved sample, consisting of not less than four (4) units, representing the range of texture and color permitted.
4. A shipment shall not contain more than five (5) percent of units, including broken unit that do not meet the requirements of the above provisions.

**C.1.7 Sampling and Testing for Concrete Hollow Blocks**

Method of Sampling for Quality Test shall be as follows:

1. One (1) Quality Test for every 10,000 units or fraction thereof.
2. Six (6) specimens to be submitted for one (1) quality test in which three (3) specimens for Compression Test and the remaining three (3) for Moisture Content and Water Absorption.

Units shall be tested in accordance with ASTM C140, Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units and ASTM C426, Standard Test Method for Linear Drying Shrinkage of Concrete Masonry Units.

**C.1.8 Storage and Handling of Masonry Works**

The blocks shall be stored in such a way as to avoid contact with moisture at site. They shall be stock-piled on planks or other supports free from contact with ground and covered to protect against wetting. The block shall be handled with care and damaged units shall be rejected.

**D. Method of Measurement and Basis of Payment**

The accepted quantities, measured as prescribed, shall be paid for based on the contract unit price for each of the particular pay items that are listed in the Bill of Quantities. The payment shall constitute full furnishing and placing all materials including all labor, equipment, tools and incidentals necessary to complete the work prescribed in this Item.

Payment will be made under:

<b>Pay Item No.</b>	<b>Description</b>	<b>Unit of Measurement</b>
B.3.1	Concrete Formworks	Square Meter
B.3.4	Cast-in-place Concrete	Cubic Meter

**B.4 STRUCTURAL STEEL**

**B.4.1 150X150 mm X 1.9 mm thick Rafter**

**B.4.2 50X100 mm X 1.9 mm thick C-Purlins**

**B.4.3 50X150 mm X 1.9 mm thick C-Purlins**

**B.4.4 100X100 mm X 6 mm thick Angle Bar**

**B.4.6 Fabricated Metal Roofing Accessories (Flashing)**

**B.4.7 Fabricated Metal Roofing Accessories (Ridge Roll)**

**B.4.8 Fabricated Metal Roofing Accessories (Gutter)**

**A. Description**

This work shall consist of steel structures and the steel structure portions of composite structures, constructed in reasonably close conformity with the lines, grades and dimensions shown on the Plans or established by the Engineer.

The work will include the furnishing, fabricating, hauling, erecting, welding and painting of structural metals called for in the Special Provision or shown on the Plans. Structural metals will include structural steel, rivet, welding, special and alloy steels, steel forgings and castings and iron castings. This work will also include any incidental metal construction not otherwise provided for, all in accordance with these Specifications, Plans and Special Provisions.

**B. Material Requirements**

Materials shall meet the requirements of Item 712, Structural Metal; Item 409, Welded Structural Steel; and Item 709, Paints of DPWH Standard Specifications, Volume II & III (Blue Book) and specified in the following specifications:

**1. Structural Steel Sections**

All Structural Steel shall be of tested quality. The Material Specification shall conform to standard of ASTM Grade 36 unless otherwise specified on the Plans.

Wherever the material is procured by the contractor, the Contractor shall submit the test certificated conforming to the said standards of all steel materials used for fabrication. All structural steel shall be free from blisters, rust, scales, seams, lamination, cracks, fissures and other surface defects.

**a. Structural Steel Columns and Intermediate Columns**

Use Wide Flange, W12x96

**b. Structural Steel Beams**

Use Wide Flange, W12x96

- c. Structural Steel Rafters  
Use Structural Channel, 2 - C5x9
- d. Steel C-Purlins and Steel Fascia Frame  
Use Light Channel, LC 150mm x 65mm x 6.0mm x 2.0mm
- e. Cleats  
Use L 50 x 50 x 6 mm thk
- f. Structural Steel Plate  
25mm thk x 400mm x 400mm – Base Plate

2. Bolts

Anchor bolts including nut and washers conform to the standard of ASTM A325 or A490 high Strength and shall be 12mm (5/8") diameter x 25 mm long and 16mm diameter x 300mm anchor bolts.

3. Filler Metal & Flux for Welding

Welding electrodes shall be of 70 ksi yield strength

4. Sag Rod

10mm diameter plain round bar Grade-33 with bolt and nut

5. Paint

Paint for steel materials under this section shall be epoxy primer and top with epoxy enamel, silver grey color.

**C. Construction Requirements**

1. Quality Assurance / Quality Control

Standards

Materials must comply with standards specified in American Institute of Steel Construction (AISC) 9<sup>th</sup> Editions of American Iron and Steel Institute (AISI), American Society for Testing and Materials (ASTM).

2. Submittals

Submit shop drawings and samples of materials to be used and secure approval from SBMA prior to installation.

2.1 Materials Data



- a. Submit within 20 days after the awarding of contract:
  - (1) Complete lists of item to be furnished supplied and installed under this section.
  - (2) Specifications, mill certifications, certified test reports, welding procedures and other relevant documents.
  - (3) Materials handling procedures on site and fabrication plan.

## 2.2 Samples

Accompanying the above submittals, submit samples of the following:

- (1) Structural Steel Sections – 300 mm for ea. Section
- (2) Machine bolt – 1 pc. for each size
- (3) Round bar – 1 pc. @ 300 mm
- (4) M.S. plates 200 x 200 – 1 pc. for each thickness
- (5) Welding Rods – 1 box
- (6) Painting – color chart and specifications

## 3. Materials Handling

### a. Protection

Adequate means necessary to protect the materials covered by this section shall be employed before during and after installation and to protect the works and materials of all other trades.

### b. Replacements

In the events of damage by which the structural specifications and properties of the materials is not greatly affected immediate repair shall be done as directed, otherwise, replace the material with new one at no additional cost to the contract.

### c. Storage

- (1) Materials under this section shall be stored in such a manner that they are protected from direct exposure to weather.
- (2) Correct handling shall be observed during loading, unloading and transferring so as not to deform and primarily stressed the materials.
- (3) All materials shall not be laid directly to ground. They shall be properly piled at clearance accessible during hauling.
- (4) Rust protection coating shall be primarily supplied prior to transportation or site delivery.

#### **D. Method of Measurement and Basis of Payment**

The accepted quantities, measured as prescribed, shall be paid for based on the contract unit price for each of the particular pay items that are listed in the Bill of Quantities. The payment shall constitute full compensation for Steel Works including all labor, equipment, tools and incidentals necessary to complete the work prescribed in this Item.

Payment will be made under:

<b>Pay Item No.</b>	<b>Description</b>	<b>Unit of Measurement</b>
B.4.1	150 x 50 mm x 1.9 mm thick Rafter	kilograms
B.4.2	50 x 100 mm x 1.9 mm thick C - Purlins	kilograms
B.4.3	50 x 150 mm x 1.9 mm thick C - Purlins	kilograms
B.4.4	100 x 100 mm x 6 mm thick Angle Bar	kilograms
B.4.6	Fabricated Metal Roofing Accessories (Flashing)	linear meters
B.4.7	Fabricated Metal Roofing Accessories (Ridge Roll)	linear meters
B.4.8	Fabricated Metal Roofing Accessories (Gutter)	linear meters

#### **B.4.5 GA 24 Pre-painted Roof Sheet**

##### **A. Description**

The works include furnishing all prepainted metal sheet materials, tools and equipment including and labor required in undertaking the proper installation complete as shown on the Plans and in accordance with this specification.

See drawings and details for sizes and location of work required.

##### **B. Construction Requirements**

Before any installation work is commenced, the Contractor shall ascertain that the top face of the purlins are in proper alignment. Correct the alignment as necessary to have the top faces of the purlins on an even plane.

Fitting and installation of long span prepainted rib type roofing including fabricated metal roofing accessories/components as well as application of supplementary materials to make the roof unit watertight and leak proof including painting of installed incidentals.

1. Submittals

Submit shop drawings and samples of materials to be used and secure approval prior to installation.

- i. Prepainted roof sheet color & thickness swatch – 3 pcs.
- ii. Fabricated metal roofing accessories/components color & thickness swatch – 3 pcs. each
- iii. Tek Screws – 10 pcs.
- iv. Silicone Sealant – 2 Tubes

2. Handling/Lifting/Positioning of Sheets

Sheets shall be handled carefully to prevent damage to the paint coating. Lift all sheets or sheet packs on to the roof frame with the overlapping down-turned edge facing towards the side of the roof where installation will commence, otherwise sheets will have to be turned end-to-end during installation.

3. Installation Procedure

Roofing Sheets Installation

- a. Lay down the long span roofing sheet starting from the end opposite the prevailing wind.
- b. Lay and install the first sheet with the turned down edge towards the outside of the area to be covered.
- c. Overlay the next sheet, in such a manner that the exposed edge is turned down and the covered edge is turned up

Or, adapt installation procedure provided in the instruction manual for each type of Architectural moulded rib profile section.

Flashing and Counter Flashing

- a. Provide flashings and counter-flashings at all critical points where water may seep through.
- b. Where corrugations run parallel to the walls, corrugate one wing of the flashing sheet to match corrugation of roof sheet while other wing shall go up against the walls and counter flashed.

4. Gutter, Valleys, Flashing, Ridge and Hip Rolls

Gutters, valleys, flashing, ridge and hip rolls shall be fastened where indicated on the Plans by self-tapping screws or galvanized iron straps and rivets.

5. End Laps

In case handling or transport consideration requires to use two or more end lapped sheets to provide full length coverage for the roof run, install each line of sheets from bottom to top or from eave line to apex of roof framing. Provide 150 mm minimum end lap.

6. Anchorage/Fastening

- a. For steel frame up to 4.5 mm thk., use selfdrilling screw no. 12 x 35 mm long hexagonal head with neoprene washer.
- b. For steel frame up to 4.5 mm thk., use selfdrilling screw no. 12 x 35 mm long hexagonal head with neoprene washer.
- c. Side lap fastener, use selfdrilling screw no. 10 x 16 mm long hexagonal head with neoprene washer.
- d. Valley fastened to steel supports, use selfdrilling screws, hexagonal head with neoprene washer. Drill size is 5 mm diameter.

7. Cutting of Sheets

- a. In cutting prepainted steel roofing sheets and accessories to place the exposed color side down. Cutting shall be carried out on the ground and not over the top of other prepainted roofing product.
- b. Power cutting or drilling to be done or carried out on prepainted products already installed or laid in position, the area around holes or cuts shall be masked to shield the paint from hot fillings.

8. Storage and Protection

Prepainted steel roofing, walling products and accessories should be delivered to the jobsite in strapped bundles. Sheets and/or bundles shall be neatly stacked in the ground and if left in the open it shall be protected by covering the stack materials with loose tarpaulin.

**C. Material Requirements**

All prepainted metal sheets and roofing accessories shall be oven baked painted true to profiles indicated on the Plans.

1. Pre-painted Roofing Sheets (for Roofing and Side Cladding)

Pre-painted roofing sheets shall be fabricated from cold rolled galvanized iron sheets specially tempered steel for extra strength and durability. It shall conform

to the material requirements defined in PNS 67:1985. Profile section in identifying the architectural moulded rib to be used are as follows:

- a. Base Metal Thickness: 0.60 mm
- b. Rib Height: 25 mm (at least)
- c. Length: Long Span
- d. Color: TBD (must be approved by SBMA prior to Installation)
- e. Protective Coatings: Zinc-Aluminum – 34.4 microns (244 gm/m<sup>2</sup>)
- f. Paint Coatings: Top coat – 15.20 microns  
Bottom coat – 6.8 microns

2. Fabricated Roofing Accessories

Gutters and flashings shall be preformed from Ga. #24 (0.60mm thk) cold-rolled plain galvanized iron sheets specially tempered steel with matching shapes and fittings as per drawings. Prepainted with zinc protective coatings.

3. Fasteners and Fixation

Use appropriate connectors as recommended by the manufacturer and approved by the Engineer/Architect in Charge. Paint same color as roof all exposed fixation and fastening devices. Apply fasteners in a neat, consistent, even and standard manner. Apply strip of butyl rubber-based caulking compound along all end lap joints and passing over pre-drilled fixation holes, fixation of metal sheet to tubular purlins and when lapped over another metal sheet. For fixation of flashings, use Tek screws for roof eaves area, where roof frames are exposed. Teck screw shall be not less 12 pcs per sq.m

4. Fascia Frame

Use 2 – LC 150mm x 65mm x 6.0mm x 2.0 mm thk (welded connections)

5. Side Cladding Framing

Use LC 75mm x 50mm x 1.8 mm thk (see Plans for locations)

**D. Method of Measurement and Basis of Payment**

The accepted quantities, measured by actual area covered or length installed, shall be paid for based on the contract unit price for each of the particular pay items that are listed in the Bill of Quantities. The payment shall constitute full compensation for Roofing and Cladding installation including labor, materials, tools and incidentals necessary to complete the work prescribed in this section.

Payment will be made under:

Pay Item No.	Description	Unit of Measurement
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B.4.5	GA 24 Pre-painted Roof Sheet	Square Meter
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## **B.5 CEMENTITIOUS DECK AND UNDERLAYMENT**

### **B.5.1 Concrete topping to receive floor finishes 20mm thick**

#### **A. Description**

These Items shall consist of furnishing of all necessary materials, tools, equipment and labor necessary to complete the execution of the masonry works using Concrete Hollow Blocks as shown on the Plans and herein specified.

#### **B. Material Requirements**

The materials shall conform to the requirement of ITEM 1046 – Masonry Works, DPWH D.O. No. 80 Series of 2018 and specified in the following specifications:

##### **Hydraulic Cement**

Hydraulic Cement shall conform to the applicable requirements of Portland Cement under Division II: Concrete Works.

##### **Aggregates**

Aggregates shall conform to the applicable requirements of Concrete Aggregates under Division II: Concrete Works.

##### **Water**

Water shall conform to the applicable requirements of Water under Division II: Concrete Works.

##### **Reinforcing Steel**

Reinforcing steel shall conform to the applicable requirements of Reinforcing Steel under Division II: Concrete Works.

Use 10 mm dia. deformed steel for dowels, vertical and horizontal bars on CHB at ground floor exterior and interior walls:

Vertical Bars	: 600mm O.C.
Development	: 264mm
Horizontal Bars	: every 3 layers
Reinforcement	: 10mm grade 33
Splicing	: 348 mm

Use 12mm dia. deformed steel for dowels, vertical and horizontal bars on CHB Parapet Walls:

Vertical Bars	: 400mm O.C.
Development	: 264mm
Horizontal Bars	: every 3 layers
Reinforcement	: 10mm grade 33
Splicing	: 348 mm

### **Mortar**

- a. Mortar Proportions: Mortar shall consist of sand, cement and water conforming to the requirements under Division II: Concrete Works, mixed in the proportion of one (1) part cement to three (3) parts sand by volume, sufficient water to obtain the required consistency.
- b. Mortar Joint: shall be uniform in thickness and the average thickness of any three consecutive joint shall be approximately 9.5 mm. Changing in coursing or bending after the work is started will not be permitted. Exposed joints shall be tolled slightly concave with around or other approved slightly larger than the width of the edge of the units, compressing and seating the surface of the joints.
- c. Jointing and Cleaning: Upon completion of all work, all holes in joints of exposed masonry surface shall be joined by completely filling with mortar. After jointing all exposed masonry surfaces shall be wetted and then cleaned with a solution of 10 percent by volume of muriatic (hydrochloric) acid applied with stir fiber brushes leaving the masonry clean. Masonry surfaces shall be rinsed down with clean, clear water.

### **Concrete Hollow Blocks (Non-load bearing CHB)**

Width, height and length of concrete hollow blocks shall be  $\pm 3.20$  mm from the specified dimension shown on the Plans.

CHB – 150, 125 & 100 mm concrete hollow blocks shall be of standard machine vibrated and shall have fine and even texture and well define edges. The minimum compressive strength is 350 psi.

### **Cement Plaster Finish**

All hollow blocks wall surface to be applied with plain cement finish will be cleaned and evenly wet slashed with a wash of neat cement and sand followed by 1:3 cement mortar mix 3/8" thick which shall be applied with wooden float.

## **C. Construction Requirements**

### **C.1 Concrete Hollow Blocks**

#### **C.1.1 Mixing**

Concrete shall be mixed well using the proportion specified by the Engineer. Hand mixing shall be done, using shovels, on a level concrete slab or steel plate. Mix aggregate and cement until the color is uniform. Spread the mixture out, sprinkle water over the surface and mix. Continue with this process until the right amount of water has been mixed in. Mixture shall be free from impurities such as dirt and grass.

If batch mixer is used, accurate timing and measuring devices shall be observed as per manufacturer's recommendation.

#### **C.1.2 Moulding**

Hand operated machines shall be used as manufacturer's recommendation.

The mould of a powered machine should be filled until six (6) to eight (8) cycles of compaction are required to bring the compacting head to its stops.

Demoulding or removal of the mould shall be done carefully so that the fresh blocks are not damaged. Fresh blocks shall be protected from rain with plastic sheets or any suitable covering during the first day and from the drying effects of the sun and wind until curing starts.

#### **C.1.3 Curing**

After being removed from the mold, the Concrete Hollow Blocks (CHB) shall be covered with a plastic sheet or tarpaulin and kept damp and shaded for at least seven (7) days in order to effectively cure. This can be achieved by continually spraying them with water or keeping them under water in tanks.

#### **C.1.4 Installation**

1. All masonry work shall be laid true to line, level, plumb and neat in accordance with the Plans.
2. Units shall be cut accurately to fit all plumbing ducts, opening for electrical works, and all holes shall be neat patched.



3. No construction support shall be attached to the wall except where specifically permitted by the Engineer in Charge.
4. Masonry unit shall be sound, dry, clean and free from cracks when placed in the structure.
5. Proper masonry units shall be used to provide for all window, doors, bond beams, lintels, plasters etc., with a minimum of unit cutting.
6. Where masonry units cutting is necessary, all cuts shall be neat and true to line.
7. Units shall be placed while the mortar is soft and plastic. Any unit disturbed to the extent that the initial bond is broken after initial positioning shall be removed and re-laid in fresh mortar.
8. Mortar should not be spread too far ahead of units, as it will stiffen and lose plasticity, especially in hot weather. Mortar that has stiffened should not be used. ASTM C270, Standard Specification for Mortar for Unit Masonry required that mortar be used within 2 ½ hours of initial mixing.

#### C.1.5 Reinforcement for Concrete Hollow Blocks

Requirement shall be done in accordance with the structural Plans as to size, spacing and other requirements of Reinforcing Steel under Division II: Concrete Works.

#### C.1.6 Finish and Appearance

1. All units shall be sound and free of cracks or other defects that interfere with the proper placement of the unit or significantly impair the strength or permanence of the construction. Minor cracks, incidental to the usual method of manufacture or minor chipping resulting from customary methods of handling in shipment and delivery, are not grounds for rejection.
2. Where units are to be used in exposed wall construction, the face or faces that are to be exposed shall not show chips or cracks, not otherwise permitted, or other imperfections when viewed from a distance of not less than 6.1 m under diffused lighting.
  - a. Five (5) percent of a shipment containing chips, not larger than 25.4 mm in any dimension, or crack not wider than 0.5 mm and not longer than 25 percent of the nominal height of the unit, is permitted.

3. The color and texture of units shall be specified by the purchaser. The finished surfaces that will be exposed in place shall conform to an approved sample, consisting of not less than four (4) units, representing the range of texture and color permitted.
4. A shipment shall not contain more than five (5) percent of units, including broken unit that do not meet the requirements of the above provisions.

**C.1.7 Sampling and Testing for Concrete Hollow Blocks**

Method of Sampling for Quality Test shall be as follows:

1. One (1) Quality Test for every 10,000 units or fraction thereof.
2. Six (6) specimens to be submitted for one (1) quality test in which three (3) specimens for Compression Test and the remaining three (3) for Moisture Content and Water Absorption.

Units shall be tested in accordance with ASTM C140, Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units and ASTM C426, Standard Test Method for Linear Drying Shrinkage of Concrete Masonry Units.

**C.1.8 Storage and Handling of Masonry Works**

The blocks shall be stored in such a way as to avoid contact with moisture at site. They shall be stock-piled on planks or other supports free from contact with ground and covered to protect against wetting. The block shall be handled with care and damaged units shall be rejected.

**D. Method of Measurement and Basis of Payment**

The accepted quantities, measured as prescribed, shall be paid for based on the contract unit price for each of the particular pay items that are listed in the Bill of Quantities. The payment shall constitute full furnishing and placing all materials including all labor, equipment, tools and incidentals necessary to complete the work prescribed in this Item.

Payment will be made under:

<b>Pay Item No.</b>	<b>Description</b>	<b>Unit of Measurement</b>
B.5.1	Concrete Topping to receive floor finishes 20 mm thick	square meters

## **PART C: ARCHITECTURAL WORKS**

### **C.1 MASONRY**

**C.1.1 150mm thick CHB walls**

**C.1.2 Wall Plastering to new CHB walls**

**C.1.3 Skim coating to existing walls and structural members (Interior)**

**C.1.4 Skim coating to existing walls and structural members (Exterior)**

**C.1.5 Concrete Moulding along Façade Columns 100 x 50 mm**

**C.1.6 Concrete Moulding along Façade Headwall 250 x 205 mm**

**C.1.7 Concrete Moulding along Façade Parapet Wall 100 x 50 mm**

**C.1.8 Concrete Moulding along Façade Parapet Wall 35 x 20 mm**

#### **A. Description**

These Items shall consist of furnishing of all necessary materials, tools, equipment and labor necessary to complete the execution of the masonry works using Concrete Hollow Blocks as shown on the Plans and herein specified.

#### **B. Material Requirements**

The materials shall conform to the requirement of ITEM 1046 – Masonry Works, DPWH D.O. No. 80 Series of 2018 and specified in the following specifications:

##### **Hydraulic Cement**

Hydraulic Cement shall conform to the applicable requirements of Portland Cement under Division II: Concrete Works.

##### **Aggregates**

Aggregates shall conform to the applicable requirements of Concrete Aggregates under Division II: Concrete Works.

##### **Water**

Water shall conform to the applicable requirements of Water under Division II: Concrete Works.

##### **Reinforcing Steel**

Reinforcing steel shall conform to the applicable requirements of Reinforcing Steel under Division II: Concrete Works.

Use 10 mm dia. deformed steel for dowels, vertical and horizontal bars on CHB at ground floor exterior and interior walls:

Vertical Bars	: 600mm O.C.
Development	: 264mm
Horizontal Bars	: every 3 layers
Reinforcement	: 10mm grade 33
Splicing	: 348 mm

Use 12mm dia. deformed steel for dowels, vertical and horizontal bars on CHB Parapet Walls:

Vertical Bars	: 400mm O.C.
Development	: 264mm
Horizontal Bars	: every 3 layers
Reinforcement	: 10mm grade 33
Splicing	: 348 mm

### **Mortar**

- a. Mortar Proportions: Mortar shall consist of sand, cement and water conforming to the requirements under Division II: Concrete Works, mixed in the proportion of one (1) part cement to three (3) parts sand by volume, sufficient water to obtain the required consistency.
- b. Mortar Joint: shall be uniform in thickness and the average thickness of any three consecutive joint shall be approximately 9.5 mm. Changing in coursing or bending after the work is started will not be permitted. Exposed joints shall be tolled slightly concave with around or other approved slightly larger than the width of the edge of the units, compressing and seating the surface of the joints.
- c. Jointing and Cleaning: Upon completion of all work, all holes in joints of exposed masonry surface shall be joined by completely filling with mortar. After jointing all exposed masonry surfaces shall be wetted and then cleaned with a solution of 10 percent by volume of muriatic (hydrochloric) acid applied with stir fiber brushes leaving the masonry clean. Masonry surfaces shall be rinsed down with clean, clear water.

### **Concrete Hollow Blocks (Non-load bearing CHB)**

Width, height and length of concrete hollow blocks shall be  $\pm 3.20$  mm from the specified dimension shown on the Plans.

CHB – 150, 125 & 100 mm concrete hollow blocks shall be of standard machine vibrated and shall have fine and even texture and well define edges. The minimum compressive strength is 350 psi.

## **Cement Plaster Finish**

All hollow blocks wall surface to be applied with plain cement finish will be cleaned and evenly wet slashed with a wash of neat cement and sand followed by 1:3 cement mortar mix 3/8" thick which shall be applied with wooden float.

## **C. Construction Requirements**

### **C.1 Concrete Hollow Blocks**

#### **C.1.1 Mixing**

Concrete shall be mixed well using the proportion specified by the Engineer. Hand mixing shall be done, using shovels, on a level concrete slab or steel plate. Mix aggregate and cement until the color is uniform. Spread the mixture out, sprinkle water over the surface and mix. Continue with this process until the right amount of water has been mixed in. Mixture shall be free from impurities such as dirt and grass.

If batch mixer is used, accurate timing and measuring devices shall be observed as per manufacturer's recommendation.

#### **C.1.2 Moulding**

Hand operated machines shall be used as manufacturer's recommendation.

The mould of a powered machine should be filled until six (6) to eight (8) cycles of compaction are required to bring the compacting head to its stops.

Demoulding or removal of the mould shall be done carefully so that the fresh blocks are not damaged. Fresh blocks shall be protected from rain with plastic sheets or any suitable covering during the first day and from the drying effects of the sun and wind until curing starts.

#### **C.1.3 Curing**

After being removed from the mold, the Concrete Hollow Blocks (CHB) shall be covered with a plastic sheet or tarpaulin and kept damp and shaded for at least seven (7) days in order to effectively cure. This can be achieved by continually spraying them with water or keeping them under water in tanks.

#### **C.1.4 Installation**

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

2. Units shall be cut accurately to fit all plumbing ducts, opening for electrical works, and all holes shall be neat patched.
3. No construction support shall be attached to the wall except where specifically permitted by the Engineer in Charge.
4. Masonry unit shall be sound, dry, clean and free from cracks when placed in the structure.
5. Proper masonry units shall be used to provide for all window, doors, bond beams, lintels, plasters etc., with a minimum of unit cutting.
6. Where masonry units cutting is necessary, all cuts shall be neat and true to line.
7. Units shall be placed while the mortar is soft and plastic. Any unit disturbed to the extent that the initial bond is broken after initial positioning shall be removed and re-laid in fresh mortar.
8. Mortar should not be spread too far ahead of units, as it will stiffen and lose plasticity, especially in hot weather. Mortar that has stiffened should not be used. ASTM C270, Standard Specification for Mortar for Unit Masonry required that mortar be used within 2 ½ hours of initial mixing.

#### C.1.5 Reinforcement for Concrete Hollow Blocks

Requirement shall be done in accordance with the structural Plans as to size, spacing and other requirements of Reinforcing Steel under Division II: Concrete Works.

#### C.1.6 Finish and Appearance

1. All units shall be sound and free of cracks or other defects that interfere with the proper placement of the unit or significantly impair the strength or permanence of the construction. Minor cracks, incidental to the usual method of manufacture or minor chipping resulting from customary methods of handling in shipment and delivery, are not grounds for rejection.
2. Where units are to be used in exposed wall construction, the face or faces that are to be exposed shall not show chips or cracks, not otherwise permitted, or other imperfections when viewed from a distance of not less than 6.1 m under diffused lighting.
  - a. Five (5) percent of a shipment containing chips, not larger than 25.4 mm in any dimension, or crack not wider than 0.5

mm and not longer than 25 percent of the nominal height of the unit, is permitted.

3. The color and texture of units shall be specified by the purchaser. The finished surfaces that will be exposed in place shall conform to an approved sample, consisting of not less than four (4) units, representing the range of texture and color permitted.
4. A shipment shall not contain more than five (5) percent of units, including broken unit that do not meet the requirements of the above provisions.

**C.1.7 Sampling and Testing for Concrete Hollow Blocks**

Method of Sampling for Quality Test shall be as follows:

1. One (1) Quality Test for every 10,000 units or fraction thereof.
2. Six (6) specimens to be submitted for one (1) quality test in which three (3) specimens for Compression Test and the remaining three (3) for Moisture Content and Water Absorption.

Units shall be tested in accordance with ASTM C140, Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units and ASTM C426, Standard Test Method for Linear Drying Shrinkage of Concrete Masonry Units.

**C.1.8 Storage and Handling of Masonry Works**

The blocks shall be stored in such a way as to avoid contact with moisture at site. They shall be stock-piled on planks or other supports free from contact with ground and covered to protect against wetting. The block shall be handled with care and damaged units shall be rejected.

**D. Method of Measurement and Basis of Payment**

The accepted quantities, measured as prescribed, shall be paid for based on the contract unit price for each of the particular pay items that are listed in the Bill of Quantities. The payment shall constitute full furnishing and placing all materials including all labor, equipment, tools and incidentals necessary to complete the work prescribed in this Item.

Payment will be made under:

Pay Item No.	Description	Unit of Measurement
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C.1.1	150 mm thick CHB walls	square meters
C.1.2	Wall Plastering to new CHB walls	square meters
C.1.3	Skim coating to existing walls and structural members (Interior)	square meters
C.1.4	Skim coating to existing walls and structural members (Exterior)	square meters
C.1.5	Concrete Moulding along Facade Columns 100 x 50 mm	linear meters
C.1.6	Concrete Moulding along Façade Headwall 250 x 205 mm	linear meters
C.1.7	Concrete Moulding along Façade Parapet Wall 100 x 50 mm	linear meters
C.1.8	Concrete Moulding along Façade Parapet Wall 35 x 20 mm	linear meters

## **C.2 WALL PARTITIONS**

### **C.2.1 100 mm thick Dry wall partitions**

#### **A. Description**

The work consists of furnishing all labor, materials, accessories and equipment necessary to cover the installation of drywall partition on metal studs to be painted with High Quality Flat Latex paint of all areas shown on the drawings and specified herein.

The gypsum board shall be installed only by an approved gypsum board installer/contractor. The contractor shall furnish all labor, materials and equipment necessary for the complete ceiling board installation as shown in the drawings and as specified.

See drawings and details for sizes and location of work required.

#### **B. Material Requirements**

Materials shall conform to respective specifications and standards and to the requirements specified herein. Provide gypsum board manufactured from asbestos-free materials.

##### *B.1 Wall Board*



- a. Gypsum Board: 12mm thick, with specially formulated core affording increased fire resistance rating tested in compliance with Underwriter's Laboratories Fire Resistance Directory.
- b. Embedding Compound: Specifically formulated and manufactured for use in embedding tape at gypsum board joints and completely compatible with tape, substrate and fasteners.
- c. Finishing or Topping Compound: Specifically formulated and manufactured for use as a finishing compound.
- d. Joint Tape: Cross-laminated, tapered edge, reinforced paper, or special tape recommended by the manufacturer.
- e. Screws: Use special designated steel screws as recommended by the manufacturer of the gypsum board for the screw application of gypsum board to steel or wood framing.
- f. Corner Bead and Edge Trim: Fabricated from corrosive protective coated steel or plastic designed for its intended use. Flanges shall be free of dirt, grease and other materials that may adversely affect the bond of joint treatment.

## *B.2 Wall Framing*

- a. Metal Studs – 0.60mm thk x 50mm x 100mm, GI, hot-dip galvanized steel with protective zinc coating; spaced at 600mm O.C. bothways; provide additional horizontal/lateral support as necessary.
- b. Metal Tracks – 0.60mm thk x 50mm x 100mm, GI, hot-dip galvanized steel with protective zinc coating; top and bottom
- c. Fasteners – use manufacturer's recommended size (blind rivets, drive pin etc.)

## *B.3 Painting*

- a. Any top quality, acceptable first-class paints shall be used to meet the standards of grade and quality desired for the work.
- b. Materials of one manufacturer shall not be applied over that of another, except in the case of shop primer coat.
- c. Colors, Gloss and Texture  
Color scheme shall be as selected and approved by SBMA. Coordinate with PWTSG/Engineering Department. Tint prime and undercoats approximately to the shade of the final coat but sufficient variation to distinguish them from the preceding coat.

## **C. Construction Requirements**

### *C.1 Submittal*

Submit manufacturer's product specifications including certified laboratory test reports and other data as required to show compliance with the specification. Submit drawings showing details and sections, system thickness, and any other detailed information necessary to describe installation. Submit samples of gypsum board in manufacturer's memorandum size, and core samples of type required by project.

### *C.2 References*

Where the Specifications refer to a specific standard, other authoritative standards that ensure an equal or higher quality than the standards mentioned will also be acceptable. It will be incumbent on the Contractor to verify the equal or higher quality and submit comparative standards for review.

### *C.3 Delivery, Storage and Handling*

- a. Deliver materials in the original packages, containers, or bundles with each bearing the brand name, applicable standard designation and name of manufacturer, supplier.
- b. Neatly stack gypsum board flat to prevent sagging or damage to the edges, ends and surfaces.
- c. Keep materials dry storing inside a sheltered building. Where necessary to store gypsum board outside, store off the ground, properly supported on a level platform, and protected from direct exposure to rain, sunlight and other extreme weather conditions. Provide adequate ventilation to prevent condensation.

## **D. Execution**

### *D.1 Inspection*

- a. Examine the substrates, adjoining construction and the conditions under which the work is to be installed. Do not proceed with the work until unsatisfactory conditions have been corrected.
- b. Verify that framing and furring are securely attached and of sizes and spacing to provide a suitable substrate to receive gypsum board. Verify that all blocking, headers and supports are in place. Do not proceed with work until framing and furring are acceptable for application of gypsum board.
- c. Verify that surfaces of gypsum board and framing to be bonded with an adhesive are free of dust, dirt, grease and other foreign matter. Do not proceed with work until surfaces are acceptable for application of gypsum board with adhesive.

### *D.2 Installation*

#### *D.2.1 Wall Framings*

- a. Prior to the commencement of fabrication of framing, contractor shall submit fabrication and erection drawings to Architect/Engineer-in-charge and obtain approval.
- b. Align and secure top and bottom runners/tracks.
- c. Fit runners under and above opening; secure intermediate studs to same spacing as wall studs.
- d. Install studs vertically at spacing indicated on drawings.
- e. Align stud web openings horizontally.
- f. Secure studs to tracks using crimping method. Do not weld.
- g. Stud splicing is not permissible.
- h. Fabricate corners using a minimum of three studs.
- i. Double stud at wall openings, door and window jambs, not more than 2 inches (50mm) from each side of openings.
- j. Coordinate installation of bucks, anchors and blocking with electrical, mechanical and other

work to be placed within or behind the stud framing.

- k. Blocking: Use wood blocking secured to studs. Provide blocking for support of plumbing fixture, toilet partitions, wall cabinets, toilet accessories, hardware and opening frames.

#### *D.2.2 Gypsum Boards*

- a. Apply gypsum board to framing and furring members in accordance with plans and specification and the requirements specified herein. Apply gypsum board with separate boards in moderate contact; do not force in place. Stagger end joints of adjoining boards. Neatly fit abutting end and edge joints. Use gypsum board and substrate members may be bonded together with an adhesive, except where prohibited by fire rating.
- b. The gypsum board shall be fixed by recommended gypsum screws at 200mm max. to the metal studs.
- c. All gypsum board installation and application methods must conform to gypsum board manufacturers recommended installation procedures, details and handbook.

#### *D.2.3 Finishing of Gypsum Board*

- a. Fill openings around cut outs with acoustical sealant as recommended by manufacturer. Pre-fill joints of wallboard having eased edges in accordance with gypsum board manufacturer's direction.
- b. Reinforce joints and interior corners with joint reinforcing tape set in joint compound.
- c. Fill joints, fastener heads, trim, recesses, cracks and other depressions with joint compound. Finish smooth and flush as recommended by manufacturer so that location of joints, nail, screws and other items will not be visible after painting.
- d. Patch surface defects in gypsum board to a smooth, uniform appearance, ready to receive finish as specified.
- e. Apply one (1) coat primer and two (2) coats of High-Quality Semi-Gloss Latex paint.

#### *D.2.4 Adjusting and Cleaning*

After installation, thoroughly clean exposed surface and restore damaged work to its original condition or replace with new work.

### **E. Method of Measurement and Basis of Payment**

The accepted quantities, measured by actual area covered/installed, shall be paid for based on the contract unit price for each of the particular pay items that are listed in the Bill of Quantities. The payment shall constitute full compensation including labor, materials, tools and incidentals necessary to complete the work prescribed in this section.

Payment will be made under:

Pay Item No.	Description	Unit of Measurement
C.2.1	100mm thick dry wall partitions	Square Meter

**C.2.2 Frameless Glass partition with frosted sticker design**

**A. Description**

This section covers the furnishing of all materials, labor, equipment and everything listed, mentioned in the drawings and in performing all operations necessary for the supply/fabrication and installation of glass partitions including all finish hardware and other incidentals necessary to complete the works.

Locations – for location of works refer to the plan.

**B. Material Requirements**

Materials shall conform to respective specifications and standards and to the requirements specified herein as follows:

*Dry wall partitions at*

- a. Glass Partition – 12 mm thk Frameless Clear Tempered
- b. Finish – Frosted Sticker
- c. Dimension – 2.8 m width x 1.80 m height (verify on Plans)

*Frameless glass partition at meeting area*

- a. Glass Partition – 12 mm thk Frameless Clear Tempered
- b. Finish – Frosted Sticker
- c. Dimension – 2.8 m width x 1.80 m height (verify on Plans)

**C. Construction Requirements**

Administrative Requirements

Coordination

- 1. Coordinate installation of glass panel partitions with installation of floor, wall and ceiling construction to comply with substrate tolerance requirements of partition manufacturer.
- 2. Coordinate installation of anchors and secondary structural members indicated on approved glass panel partition shop drawings and specified in other sections.

Preinstallation Conference

Conduct conference at Project Site.

Action Submittals

- 1. Product Data: For each glass panel partition and door component specified, including:

- a. Glass panels.
  - b. Frame and sill tracks (if there is).
2. Shop Drawings: For fixed glass panel partitions.
- a. Include plans, elevations, sections and details. Provide numbered panel installation sequence.
  - b. Show locations and requirements for tracks, bracing, blocking and attachments to other work.
3. Samples for Verification: For each exposed component including hardware, for each color and finish selected, of size indicated below:
- a. Glass: Units 300 mm (12") square.
  - b. Exposed / Unexposed Frame, Track and/or Sill Members: Not less than 150 mm (6") long.
  - c. Hardware: One of each type of exposed door hardware items.

Information Submittals

- 1. Qualification Data: For qualified installer.
- 2. Warranty: Sample of unexecuted manufacturer warranty.

Quality Assurance

- 1. Installer Qualifications: Experienced Installer equipped and trained for installation of glass panel partitions required for this Project with record of successful completion of not less than five project similar scope.
- 2. Single Source Responsibility: Provide glass panel partitions and associated hardware by a single manufacturer through a single source.
- 3. Mockups: Provide mockup consisting of initial sections of tracks, frames and glass panels with operating doors and hardware, in location as directed by Engineer/Architect in Charge. Proceed with work upon approval of mockup by Engineer/Architect in Charge.

**D. Method of Measurement and Basis of Payment**

The accepted quantities, measured as prescribed, shall be paid for based on the contract unit price for each of the particular pay items that are listed in the Bill of Quantities. The payment shall constitute full compensation for supply & installation of glass partitions including all labor, tools and incidentals necessary to complete the works prescribed in this section.

Payment will be made under:

Pay Item No.	Description	Unit of Measurement
C.6.2	Supply and install 12mm thk Frameless Clear Tempered Glass with Frosted Sticker Shower Partition with Door	Set

### **C.3 CEILING WORKS**

#### **C.3.1 Ficem Board to common area and offices**

##### **C.3.1a Ficem Board to consumer's lounge cove light**

#### **C.3.2 Acoustic ceiling board to costumer lounge**

#### **C.3.3 152mmx 0.50mm thick Pre-painted Spandrels on 0.50mm metal furring frames**

##### **A. Description**

The work consists of furnishing all labor, materials, accessories and equipment necessary to cover all areas shown in the drawings and specified herein.

The acoustical ceiling board shall be installed only by an approved acoustical ceiling board installer/contractor. The contractor shall furnish all labor, materials and equipment necessary for the complete installation as shown on the drawings and as specified herein.

##### **B. Material Requirements**

###### Materials

###### 1. Acoustical Tile Ceiling Units

All panels shall be of Class A, Flame Spread. 15 mm (at least) thick panels, 600 mm x 600 mm in size should not be used where relative humidity will exceed 85%. Panels thicker than 1" are not restricted by humidity conditions.

Ceiling tiles consist of a rigid glasswool baseboard faced with an attractive and durable white vinyl film.

###### 2. Ceiling Suspension System

- a. Type: Exposed grid
- b. Structural Classification: Heavy duty for main runners and cross tee.
- c. Finish: Surfaced exposed to view shall be of uniform width and shall be powder coated.
- d. Accessories: Provide wall or edge moldings and cornices.
- e. Hanger Rods: use manufacturer recommended type.

##### **C. Construction Requirements**

###### C.1 References

Where the Specifications refer to a specific standard, other authoritative standards which ensure an equal or higher than the standards mentioned will also be acceptable. It will be incumbent on the Contractor to verify the equal or higher quality and submit comparative standards for review.

###### C.2 Submittals

1. Shop Drawings: Submit shop drawings and manufacturers' data for the following items:
  - a. Reflected Ceiling Plans showing location of components, including electrical lighting fixtures layout.
2. Samples: Submit samples of the following items:
  - a. Acoustical Tiles
  - b. Edge Mounting
  - c. Suspension Runner
  - d. End Mounting

### C.3 Delivery and Storage

Store acoustical board in a dry place. Do not place in contact with floors or walls. Ceiling panel packages must be protected against marring, soil or damage during storage and installation. Cover the bottom of tiles with moisture proof materials and allow for circulation under cover to prevent condensation. Acoustical tiles must not be subjected to water.

### C.4 Execution

1. Inspection
  - a. Examine surfaces to receive directly attached acoustical units for unevenness, irregularities, and dampness that would affect quality and execution of the work.
  - b. Examine the substrates, adjoining construction and the conditions under which the work is to be installed. Do not proceed with the work until unsatisfactory conditions have been corrected.
2. Installation
  - a. Install materials and systems in accordance with manufacturers' printed instructions. Use procedures that will minimize damage or soiling of the units during installation.
  - b. Ceiling suspension system is to be installed with the approval of the Engineer for installation of metal ceiling suspension system for acoustical tile and lay in panels.
  - c. Space hangers 1200 mm on center each direction. Install additional hangers where required to support framing around beams, ducts, columns, grills and other penetrations through the ceiling.
  - d. Keep main runners and carrying channels clear of abutting walls and partitions. Provide at least two main runners for each ceiling span.
  - e. Edges of ceiling tiles shall be in close contact with metal supports and in true alignment.
3. Adjusting and Cleaning

Clean soiled or discoloured unit surfaces after installation. Touch up scratches, abrasions, voids and other defects in painted surfaces. Removed damaged or improperly installed units and install new materials.

4. Extra Stock

Maintenance Materials: Delivery to the Owner at the Project site, five (5) acoustical units for each 100 units installed. Store in location directed in unopened containers and in a manner recommended by the Engineer.

**D. Method of Measurement and Basis of Payment**

The accepted quantities, measured as prescribed, shall be paid for based on the contract unit price for each of the particular pay items that are listed in the Bill of Quantities. The payment shall constitute full including all labor, tools and incidentals necessary to complete the work prescribed in this Item.

Payment will be made under:

<b>Pay Item No.</b>	<b>Description</b>	<b>Unit of Measurement</b>
C.3.1	Ficem board to common area and offices	Square Meter
C.3.1a	Ficem board to costumer's lounge cove light	Square Meter
C.3.2	Acoustic ceiling board to costumer lounge	Square Meter
C.3.3	152mmx0.50mm thick Pre-painted Spandrels on 0.50mm metal furring frames	Square Meter

**C.4 DOOR AND WINDOWS**

**C.4.1 700x2100mm PVC Door including frame, hardware and lockset to toilets**

**C.4.2 900x2100mm Wooden Panel Door including frame, hardware and lockset**

**C.4.3 1800x2100mm, two-way swing, ¼'thick, brown tinted glass door on analok finish aluminum frames including frame, hardware and lockset**

**A. Description**

This section covers the furnishing of all materials, labor, equipment and everything listed, mentioned in the drawings and in performing all operations necessary for the supply/fabrication and installation of the doors, frames and jamb including painting and all finish hardware and other incidentals necessary to complete the works. See drawings and details for sizes and location of work required.



## **B. Construction Requirements**

### Submittal

Submit drawings showing details and sections, system thickness and other detail information necessary to describe the installation. Secure approval from SBMA prior to installation. Also clearly show details for each frame types, elevations of each door type, conduction of opening with various wall thickness and materials, typical and special details of door construction method of assembling sections, location, reinforcement and installation requirements for door finishes, hardware, size, shape and thickness of materials.

## **C. Material Requirements**

Materials shall conform to respective specifications and standards and to the requirements specified herein as follows:

1. *Double Leaf, Double Swing Glass Panel Door (D-1)*
  - a. Glass Door – 12 mm thk. Frameless Tempered Glass (Clear)
  - b. Jamb/Frame – Aluminum, Analok Finish
  - c. Dimensions – 1800 x 2100 mm (as shown on plans)
  - d. Connections – Top & Bottom Patch Connectors
  - e. Handle – H-type, 2 feet (at least)
  - f. Complete with Standard Accessories
  
2. *Single Leaf, Single Swing PVC Door with Louver (D-2)*
  - a. Door jamb – 50 x 100 mm (2"x4") wooden door jamb
  - b. Door type – 40mm wooden
  - c. Dimensions – 900 x 2100 mm (as shown on plans)
  - d. Hinges – three (3) sets of hinges (heavy duty) on each door.
  - e. Locket – One (1) set of lockset (heavy duty)
  
3. *Single Leaf, Single Swing PVC Door with Louver (D-3)*
  - a. Door jamb – 50 x 100 mm (2"x4") PVC door jamb
  - b. Door type – 40mm PVC door with louver
  - c. Dimensions – 700 x 2100 mm (as shown on plans)
  - d. Hinges – three (3) sets of hinges (heavy duty) on each door.
  - e. Locket – One (1) set of lockset (heavy duty)

## **D. Method of Measurement and Basis of Payment**

The accepted quantities, measured as prescribed, shall be paid for based on the contract unit price for each of the particular pay items that are listed in the Bill of Quantities. The payment shall constitute full compensation including all labor, tools and incidentals necessary to complete the works prescribed in this section.

Payment will be made under:

Pay Item No.	Description	Unit of Measurement
C.4.1	700x2100mm PVC Door including frame, hardware and lockset to Toilets	Set
C.4.2	900x2100mm Wooden Panel Door including frame, hardware and lockset	Set
C.4.3	1800x2100mm, two-way swing, 1/4" thick, brown tinted Glass Door on analok finish aluminum frames including hardware and lockset	Set

**C.4.4 600x600mm, 6mm thick clear glass awning window on steel framing**

**C.4.5 1200x1200mm, 8mm thick clear glass awning window on steel framing**

**C.4.6 1200x2140mm, 10mm thick brown tinted glass panel on analok finish aluminum frames**

**C.4.7 12mm thick Reflective tempered glass panel, frameless**

#### **A. Description**

##### 1. Scope

This section covers the furnishing of all materials, labor, equipment and everything listed, mentioned in the drawings and in performing all operations necessary for the supply and installation of the glass windows and glass partitions and all finish hardware and other incidentals necessary to complete the works.

##### 2. Submittals

Submit shop drawings and samples of materials to be used and secure approvals from SBMA prior to installation.

#### **B. Material Requirements**

1. Materials – Supply and install new fixed and glass awning window (*see plans for schedule of windows*)

##### *Fixed Window (W-1)*

- a. Glass Window – 10 mm thk. Frameless Tempered Glass (Clear)
- b. Window Type – Fixed
- c. Window Frame – Aluminum, Analok Finish
- d. Dimensions – (*as shown on plans*)
- e. Complete with Standard Accessories

*Fixed Window (W-2)*

- a. Glass Window – 10 mm thk. Frameless Tempered Glass (Clear)
- b. Window Type – Fixed
- c. Window Frame – Aluminum, Analok Finish
- d. Dimensions – 1200 x 2140 mm (*as shown on plans*)
- e. Complete with Standard Accessories

*Awning Window (W-3)*

- a. Glass Window – 6 mm thk. Frameless Tempered Glass (Clear)
- b. Window Type – Awning, 2-panels
- c. Window Frame – Steel
- d. Dimensions – 600 x 600 mm (*as shown on plans*)
- e. Complete with Standard Accessories

*Awning Window (W-4)*

- a. Glass Window – 8 mm thk. Frameless Tempered Glass (Clear)
- b. Window Type – Awning, 2-panels
- c. Window Frame – Steel
- d. Dimensions – 1200 x 1200 mm (*as shown on plans*)
- e. Complete with Standard Accessories

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

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

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

Weatherstrip shall be first class quality flexible vinyl forming an effective seal and without adverse deformation when installed.

Glazing shall conform to the requirements specified in Item 1012 of DPWH Standard Specifications for Public Works Structures Volume III.

**C. Construction Requirements**

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

## 1. Installation Procedure

- a. Main frame shall consist of head, sill and jamb.
- b. Window Sash
- c. Window panel shall be jointed at corners with miter and fixed rigidly to ensure weather tightness.
- d. Sliding windows shall be provided with nylon sheave. Sliding panels shall be suspended with concealed roller overhead tracks with bottom guide pitch outward and slotted for complete drainage. The sliding panels shall be provided with interior handles. The locking device shall be a spring loaded extruded latch that automatically engages special frame hips.
- e. All joints between metal surface and masonry shall be fully caulked.
- f. Aluminum parts in contact with steel members shall be properly insulated by a coat of zinc chromate, primer/bituminous paint applied to the steel surface.
- g. Weatherstrip shall be furnished on edges at the meeting stiles.

## 2. Shop Finish

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

## 3. Protection

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

## 4. Replacements

In the events of damage by which the structural specifications and properties of the materials is not greatly affected immediate repair shall be done as directed, otherwise, replace the material with new one at no additional cost to the contract.

## 5. Cleaning

- a. The Contractor does not only protect all entrance units during the construction phase but shall also be responsible for removal of protective materials and cleaning the aluminum surface including glazing before work is accepted by the Architect/Engineer in Charge.
- b. Aluminum shall be thoroughly cleaned with kerosene or gasoline diluted with water and then wipe surface using clean cloth rags.
- c. No abrasive cleaning materials shall be permitted in cleaning surface

## **D. Method of Measurement and Basis of Payment**

The accepted quantities, measured as prescribed, shall be paid for based on the contract unit price for each of the particular pay items that are listed in the Bill of Quantities. The payment shall constitute full compensation including all labor, tools and incidentals necessary to complete the works prescribed in this section.

Payment will be made under:

Pay Item No.	Description	Unit of Measurement
C.4.4	600x600mm, 6mm thick clear glass awning window on steel framing	Set
C.4.5	1200x1200mm, 8mm thick clear glass awning window on steel framing	Set
C.4.6	1200x2140mm, 10mm thick brown tinted Glass panel on analok finish aluminum frames	Set
C.4.7	12mm thick Reflective tempered glass panel, frameless	Square Meters

#### **C.4.8 10mm thick PVC Accordion Wall**

##### **A. Description**

This section covers the furnishing of all materials, labor, equipment and everything listed, mentioned in the drawings and in performing all operations necessary for the supply/fabrication and installation of the accordion wall, frames and jamb and all finish hardware and other incidentals necessary to complete the works. See drawings and details for sizes and location of work required.

##### **B. Construction Requirements**

Submittal

Submit drawings showing details and sections, system thickness and other detail information necessary to describe the installation. Secure approval from SBMA prior to installation. Also clearly show details for each frame types, elevations of each door type, conduction of opening with various wall thickness and materials, typical and special details of door construction method of assembling sections, location, reinforcement and installation requirements for door finishes, hardware, size, shape and thickness of materials.

##### **C. Material Requirements**

Materials shall conform to respective specifications and standards and to the requirements specified herein as follows:

*PVC Accordion Wall (D-4)*

- a. Door – 10 mm thk. PVC Accordion Wall
- b. Jamb/Frame – PVC
- c. Dimensions – 2270 x 2700 mm (as shown on plans)
- d. Complete with Standard Accessories

*PVC Accordion Wall (D-5)*

- a. Door – 10 mm thk. PVC Accordion Wall
- b. Jamb/Frame – PVC
- c. Dimensions – 3000 x 2700 mm (as shown on plans)
- d. Complete with Standard Accessories

**D. Method of Measurement and Basis of Payment**

The accepted quantities, measured as prescribed, shall be paid for based on the contract unit price for each of the particular pay items that are listed in the Bill of Quantities. The payment shall constitute full compensation including all labor, tools and incidentals necessary to complete the works prescribed in this section.

Payment will be made under:

Pay Item No.	Description	Unit of Measurement
C.4.8	10mm thick PVC Accordion Wall	Square Meters

**C.5 FINISHES**

**C.5.1 Homogenous Floor Tiles to common area**

**C.5.2 600 x 600mm Non-Skid Ceramic Floor Tiles to entrance/waiting area**

**C.5.3 300 x 300mm Non-Skid Ceramic Floor Tiles to toilet area**

**C.5.4 300 x 300mm Non-Skid Ceramic Wall Tiles to toilet area**

**C.5.5 500 x 500mm Carpet Floor Tiles**

**A. Description**

This section consists of furnishing all floor and wall tile finish materials, tools and equipment including labor required in undertaking the proper installation of walls and floor finishes as shown on the Plans and in accordance with this Specification.

## B. Submittals

- a. Submit product specifications including certified laboratory test reports and other data as required to show compliance with the specification. Submit drawings showing details sections, system thickness, and any other detailed information necessary to describe installation.
- b. Submit samples of the following items:
  - Homogeneous Floor tiles,  $\pm 12\text{mm} \times 600\text{mm} \times 600\text{mm}$
  - Non-skid ceramic floor tiles,  $\pm 12\text{mm} \times 600\text{mm} \times 600\text{mm}$
  - Non-skid ceramic floor tiles,  $\pm 6\text{mm} \times 300\text{mm} \times 300\text{mm}$
  - Non-skid ceramic wall tiles,  $\pm 6\text{mm} \times 300\text{mm} \times 300\text{mm}$
  - Carpet Floor tiles,  $\pm 6\text{mm} \times 500\text{m} \times 500\text{m}$
  - Recommended Adhesive for each type of floor and wall tiles
- c. Immediate submittal of samples to secure final approval from SBMA should be initiated by the contractor; Project delay(s) concerning delivery schedule, and the likes, is/are not considered ground(s) for project time extension.
- d. Contractor should turnover 5 approved samples for each floor tile and 10 approved samples for wall tiles; free of charge.

## C. Material Requirements

Materials shall conform to respective specifications and standards and to the requirements specified herein as follows:

1. Homogeneous Floor Tiles (Common Area)
  - a. Sizes of tiles: 600mm x 600mm  
(see Plans for location)
  - b. Thickness:  $\pm 12\text{ mm}$
  - c. Specifications: Homogenous Ceramic Tiles
  - d. Colors: All porcelain tiles shall be in colors selected by SBMA from the above submitted samples.
  - e. Adhesive: Shall be manufacturer's recommended type or of approved type by the SBMA Project Architect/Engineer in Charge.
  - f. Tile Grout: Provide minimal tile grout lines.
2. Non-skid Ceramic Floor Tiles (entrance/waiting area)
  - a. Sizes of tiles: 600mm x 600mm  
(see Plans for location)

- b. Thickness:  $\pm 12\text{mm}$
  - c. Specifications: Non-skid Ceramic Floor Tiles
  - d. Colors: All porcelain tiles shall be in colors selected by SBMA from the above submitted samples.
  - e. Adhesive: Shall be manufacturer's recommended type or of approved type by the SBMA Project Architect/Engineer in Charge.
  - f. Tile Grout: Provide minimal tile grout lines.
3. Non-Skid Ceramic Floor Tiles (toilet area)
- a. Sizes of tiles: 300mm x 300mm
  - b. Thickness:  $\pm 6\text{mm}$
  - c. Specifications: Non-skid Ceramic Floor Tiles
  - d. Colors: Shall be in colors selected by SBMA from the above submitted samples.
  - e. Adhesive: Shall be manufacturer's recommended type or of approved type by the SBMA Project Architect/Engineer in Charge.
3. Non-Skid Ceramic Wall Tiles (toilet area)
- a. Sizes of tiles: 300mm x 300mm
  - b. Thickness:  $\pm 6\text{mm}$
  - c. Specifications: Non-skid Ceramic Wall Tiles
  - d. Colors: Shall be in colors selected by SBMA from the above submitted samples.
  - e. Adhesive: Shall be manufacturer's recommended type or of approved type by the SBMA Project Architect/Engineer in Charge.
5. Carpet Floor tiles (Back Office and Manager's Office)
- a. Sizes of tiles: 500mm x 500mm
  - b. Thickness:  $\pm 6\text{mm}$
  - c. Specifications: Carpet floor tiles
  - d. Colors: Shall be in colors/design selected by SBMA from the above submitted samples.
  - e. Adhesive: Shall be manufacturer's recommended type or of approved type by the SBMA Project Architect/Engineer in Charge.

#### **D. Execution**

1. Installation of tiles – shall be installed only by qualified installer/contractor.



2. Final cleaning – sponge and wash specified work thoroughly. Final polish with clean cloth. Use only manufacturer’s recommended polisher compound for cleaning.

**E. Method of Measurement and Basis of Payment**

The accepted quantities, measured as prescribed, shall be paid for based on the contract unit price for each of the particular pay items that are listed in the Bill of Quantities. The payment shall constitute full compensation including all labor, tools and incidentals necessary to complete the works prescribed in this section.

Payment will be made under:

<b>Pay Item No.</b>	<b>Description</b>	<b>Unit of Measurement</b>
C.5.1	Homogenous Floor Tiles to common area	Square Meter
C.5.2	600x600mm Non-skid Ceramic Floor Tiles to entrance/waiting area	Square Meter
C.5.3	300x300mm Non-skid Ceramic Floor Tiles to toilet area	Square Meter
C.5.4	300x300mm Non-skid Ceramic Wall Tiles to toilet area	Square Meter
C.5.5	500x500mm Carpet Floor Tiles	Square Meter

**C.5.6 Painting Works to Ficem Board ceiling**

**C.5.7 Painting Works to Drywalls**

**C.5.8 Painting Works to Plastered and Skim Coated interior masonry walls**

**C.5.9 Painting Works to Plastered and Skim Coated exterior masonry walls**

**C.5.10 Painting Works to wood door panels and frames**

**C.5.11 Painting Works to roof framing**

**A. Description**

The work under this section consists of furnishing all labor, painting equipment, scaffolding, and protective coverings required for the painting and finishing of all

surfaces as designated in the drawings and specifications.

The term "paint" as herein includes emulsions, latex, paints, varnishes, sealers, and other coatings, whether used as prime, intermediate, or finish coats.

## **B. Construction Requirements**

### **1. Quality Assurance**

The SBMA reserves the right to subject materials samples to test at his expense. If such material sample test does not meet the specified standards, the cost will be charged to the Contractor.

Number of coats, where specified, shall be in minimum. Contractor shall apply as many as are required to meet specifications for solid, uniform appearance. Where film thickness in mils is specified, spot checks will be made to determine compliance with specified thickness.

### **2. Submittals**

Submit two (2) samples of each and every color or finish (including all coats). Where the same color or finish is to be applied over different materials, samples of each shall be submitted on different materials, where practical.

Sample size shall be 152 mm x 152 mm.

### **3. Delivery, Handling and Storage**

Deliver specified materials to the jobsite in manufacturer's unopened sealed containers with manufacturer's name, brand name, type of paint, analysis showing all important constituents of the paint, color or paint and instructions for thinning.

Handle specified item and/or its components in such manner as to prevent damage or deformation. Properly secure same from harmful elements or damage by other Work prior to its incorporation into the Project.

Store materials in a well-ventilated space designated for the storage and mixing of paint. Materials delivered to the site shall be properly stored as to minimize exposure to extremes of temperature.

### **4. Protection**

Protect paint materials from damage, providing for adequate storage space. Take all necessary precautions to prevent fire, such as keeping oily rags in U.L. approved metal containers or removing from building at end of each day's work.

All work fittings, furniture, etc. are to be suitably protected during execution of work. Splashes on floors, walls, etc. are to be removed during progress of work and overall, left clean and perfect on completion.

No exterior or exposed painting shall be carried out under adverse weather conditions, such as extremes of temperature, during rain, fog, etc. or if there is excessive dust in the air.

The material manufacturer shall state the lead content on the label of any paint product container based on metal percentage of the total solids.

#### 5. Repair of Defective Work

Restore all defective or damage work to initial condition.

All voids, cracks, etc. will be repaired with proper material.

Damaged shop coats on metal shall be spot painted with appropriate metal primer.

Defective or damaged items and/or components which cannot be repaired or restored it initial conditions shall be removed and replace to the satisfaction of the Project-in-Charge for SBMA at no additional cost to the SBMA.

#### 6. Cleaning

Upon completion of the project, painting contractor shall remove all paint spots from all finished work and shall remove all empty cans and leave the entire premises free from rubbish or other debris caused by his work. He shall clean off all surfaces free from paint spots and smears and shall present the work clean and free from all types of blemishes.

### **C. Material Requirements**

Any top quality, acceptable first-class paints shall be used to meet the standards of grade and quality desired for the work.

Materials of one manufacturer shall not be applied over that of another, except in the case of shop primer coat.

#### Colors, Gloss and Texture

Color scheme shall be as selected and approved by the Project-in-Charge for SBMA. Coordinate with PWTSG/Engineering Department. Tint prime and undercoats approximately to the shade of the final coat but with sufficient variation to distinguish them from the preceding coat.

### **D. Execution**

#### General

- Examine work-in-place on which specified work is to be applied to ensure the conditions are satisfactory for application of specified materials. Report in writing, to the Project-in-Charge for SBMA defects which may influence satisfactory completion and performance of the work. Absence of such notification shall be construed as acceptance of work-in-place.
- Do not apply paint in damp or rainy weather or until surfaces have thoroughly dried from the effects of such weather.
- Before the start of painting, remove finish hardware, accessories, plates, lighting fixtures, and similar items approved by the Architect. Use only skilled workmen in the applicable building trade for removal and reinstallation of finished items in place.

#### Surface Preparation as Applied to Various Substrate

**Ferrous Metal:** Steel and iron surfaces that not have been prime coat-painted shall be cleaned and painted with specified red metal primer. Before finish painting, shop-prime coat painted steel and from surfaces, remove grease, rust, scale and dust spots with metal primer. Where steel and iron surfaces have a heavy coating of rust or scale, it shall be removed by wire brushing or sand blasting as necessary to produce a satisfactory surface for painting.

#### Paint Application

**General:** Specified work shall be done by skilled painters in a workman-like manner. All spaces shall be broom cleaned before painting started. Surfaces to be painted shall be cleaned, dry, smooth and adequately protected from dampness. Each coat of paint shall be allowed to dry at least 24 hours before succeeding coat is applied. Finished work shall be uniform, of approved color, smooth and free from runs, sags, defective coverage, clogging or excessive flooding. If surface area is not adequately covered as determined by the Project-in-Charge for SBMA, further coat shall be applied to the Satisfaction of the Project-in-Charge for SBMA. Edges of paint adjoining other materials or colors shall be sharp and clean without overlapping.

**Methods of Painting:** Apply paints in accordance with the manufacturer's specifications.

**Coatings:** Consecutive coats of paints are to be slightly differing tints except in case of white. Each coat shall be allowed to harden before the next is applied. Rubbing down between coats is to be done with fine abrasive paper.

**Metal Work:** Metal work shall not be left in an exposed or unsuitable situation for an undue period before completing the painting process. Stopping and filling shall be deemed to be included for all metal works and plaster works specified to be painted. Only suitable materials should be used to produce a surface ready for priming and painting.

Final Touch-Ups: At completion, touch-up and restore finish where damaged and leave in good condition.

### Painting Schedule

As specified hereunder or per manufacturer's direction.

#### A. Concrete

##### Interior & Exterior Masonry

1. For Interior Walls: one (1) coat flat latex paint and one (2) coat semi-gloss latex paint
2. For Exterior Walls: one (1) coat flat latex paint and two (2) coats semi-gloss latex paint

Primer – Acrylic Concrete Primer and Sealer  
Finish – 100% Acrylic Latex Paint

#### B. Gypsum Board

For Interior Walls/Ceiling: one (1) coat flat latex paint and one (1) coat semi-gloss latex paint

Color/paint shall be selected or approved by SBMA.

#### C. Structural Steel Members

one (1) coat epoxy primer paint and one (1) coat epoxy enamel paint

- General: Painting system shall be applied to surfaces as scheduled. All surfaces shall be smooth finished prior to painting.
- Film Thickness: As recommended by paint manufacturer for the paint specified, include thickness in mils and number of coats.
- Paint Systems: New surfaces and existing surfaces made bare by cleaning operations shall receive the following coatings conforming to the respective specifications listed.

#### Mechanical and Electrical Items

- Paint all apparatus, equipment piping, conduit, enclosures and support; except copper, galvanized and cast-iron surfaces in concealed spaces and surfaces to receive a covering.

- All metal surfaces within exposed spaces shall be given a suitable prime coat and two (2) finish coats.
- No name plate, rotating shafts, bearing, bronze, electrical windings or valve stems shall be painted nor shall any part furnished in nickel or chrome plated be painted.
- All metal surfaces in concealed spaces except copper, cast-iron, aluminum and galvanized iron shall be given one coat of rust-inhibitor prime coat.

**Adjusting and Cleaning**

Remove paint spots, oil or stains from surfaces not requiring painting. Touch-up damaged or soiled finish to match adjacent surfaces.

**Protection**

Provide suitable coverings to protect surfaces not requiring painting.

Remove or protect items such as hardware, hardware accessories, plates, lighting fixtures and similar items placed prior to painting. Reposition or remove protection upon completion of each space.

**E. Method of Measurement**

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

**F. Basis of Payment**

The accepted quantities, measured as prescribed, shall be paid for at the contract unit price per square meter which price and payment shall constitute full compensation for furnishing and placing all materials including labor, equipment, tools and incidentals necessary to complete the work prescribed in this Item.

Payment will be made under:

<b>Pay Item No.</b>	<b>Description</b>	<b>Unit of Measurement</b>
C.5.6	Painting Works to Ficem board ceiling	Square Meter
C.5.7	Painting Works to Drywalls	Square Meter
C.5.8	Painting Works to Plastered and skim coated interior masonry walls	Square Meter

C.5.9	to Plastered and skim coated exterior masonry walls	Square Meter
C.5.10	Painting Works to wood door panels and frames	Square Meter
C.5.11	Painting Works to roof framing	Square Meter

**C.6 SPECIALTIES**

**C.6.1 Water Closet**

**C.6.2 Toilet Bidet hand spray**

**C.6.3 Wall hung Lavatory with faucet**

**C.6.4 Kitchen Sink with faucet to pantry**

**C.6.5 Tissue Holder**

**C.6.6 Grab Bar**

**C.6.7 Soap Dispenser**

**A. Description**

This section shall consist of furnishing all materials, tools and equipment and fixtures required as shown on the Plans for the satisfactory performance of the entire plumbing system including installation and/or tapping to main line in accordance with the latest edition of the National Plumbing Code, and this Specification.

**B. Material Requirements**

All piping materials, fixtures and appliances fitting accessories whether specifically mentioned or not but necessary to complete this section shall be furnished and installed.

**1. Sanitary Pipes and Fittings**

Pipes and fittings for sanitary lines as approved alternative shall be Unplasticized Polyvinyl Chloride Pipes and Fittings (UPVC).

Pipes shall be PVC sanitary pipes series 1000 for sewer line (see Plans for the sizes).

Pipes and fittings shall be made of virgin materials conforming to specification requirements defined in ASTM D-2241 and PNS 65: 1986. Fittings shall be molded type and designed for solvent cement joint connection for water lines and rubber O-ring seal joint for sanitary lines.

Cleanouts shall be 100mm and 75mm diameter PVC with plug for exterior (verify on Plans).

## 2. Water Supply Pipes and Fittings

- a. Pipes shall be galvanized iron pipe schedule 40 conforming to specification requirements defined in ASTM A-120 with threaded connection (see Plans for the sizes). Under roads where necessary shall be suitably protected.

Fittings shall be malleable iron Type II, galvanized iron conforming to specification requirements defined in ASTM A338.

- b. Valves

Valves for water supply shall be bronze body with threaded ends rated 21.0 kg-f/cm. square. All valves shall be gate valves unless otherwise specified. Gate valves shall have solid wedge body and discs conforming to specification requirements defined in ASTM B-62. Globe valves shall have plug type discs with ferrule threaded ends and bronze body.

- c. Unions

Unions on ferrous pipe 50mm diameter and smaller shall be malleable iron.

- d. Water Meter

Water meter required to be furnished by the Contractor shall be of the type tested and approved by SUBICWATER.

## 3. Septic Tank

Septic tank shall be provided as shown on the Plans including all pipe vents and fittings. The various construction materials such as concrete masonry shall conform to the corresponding Items of this Specifications. Inlet and outlet pipes shall conform to the latest edition of the National Plumbing Code.

## 4. Plumbing Fixtures and Fittings

All fittings and trimmings for fixtures shall be chromium-plated and polished brass unless otherwise approved. Exposed traps and supply pipes for fixtures shall be connected to the roughing in, piping system at the wall unless otherwise indicated on the Plans. Built-in fixtures shall be watertight with provision of water supply and drainage outlet, fittings and trap seal. Unless otherwise specified, all plumbing fixtures shall be made of vitreous china complete with fittings.

Use succeeding materials as applicable and as prescribed on the plans:

- a. Water Closet – shall be tank type, wash down, close-coupled, Grade A Vitreous China material, round-front, consumes 3/4.5 liters per flush with seat and cover including angle valve, flexible hose and other fittings. Model make and color shall be approved by the Architect/Engineer in Charge.



- b. Lavatory – shall be under-counter type, Grade A Vitreous China material, ellipse shape, complete with single-lever faucet, supply pipe, angle valve, p-trap and mounting accessories. Model make and color shall be approved by the Architect/Engineer in Charge.
  - c. Lavatory – shall be pedestal type, Grade A Vitreous China material, ellipse shape, complete with single-lever faucet, supply pipe, angle valve, p-trap and mounting accessories. Model make and color shall be approved by the Architect/Engineer in Charge.
  - d. Urinal – shall be Grade A Vitreous China material, color, wall-mounted wash-out with extended shields and integral flush spreader, concealed wall-hanger pockets, 19mm top spud complete with fitting and mounting accessories. Model make and color shall be approved by the Architect/Engineer in Charge.
5. Bathroom and Toilet Accessories
- a. Bidet – shall be hand-held, stainless steel complete with holder, fitting and accessories. Model make shall be approved by the Architect/Engineer in Charge. Model/make shall be approved by Architect/Engineer in Charge.
  - b. Shower head and fitting shall be movable, heavy duty rainshower head type with escutcheon arm at least 10" long complete with stainless steel shower valve and control lever, all exposed surface to be stainless finish. Model/make shall be approved by Architect/Engineer in Charge.
  - c. Glass shower rack/shelf shall be 500mm (L) x 125mm (W) x 6mm (T) clear glass with stainless steel frame/holder, chrome finish. Model/make shall be approved by Architect/Engineer in Charge.
  - d. Grab bar shall be made of tubular stainless steel pipe provided with safety grip and mounting flange. Model/make shall be approved by Architect/Engineer in Charge.
  - e. Floor drains shall be made of stainless steel concealed type, anti-clogging, anti-pest, deodorant measuring  $\pm 4"$  ( $\pm 110\text{mm}$ ) square, and provided with detachable stainless strainer, expanded metal lath type. Model/make shall be approved by Architect/Engineer in Charge.
  - f. Toilet paper holder shall be stainless steel type, wall mounted. Model/make shall be approved by Architect/Engineer in Charge.
  - g. Flush Valve, lever type, metal alloy, chrome plated, heavy duty (for urinal).
  - h. Faucet(s), single-lever, single-hole, stainless steel finish (for lavatory and kitchen sink(s)). Model/make shall be approved by Architect/Engineer in Charge.
  - i. Hose bibb(s) shall be made of bronze cast finish.
  - j. Floor Cleanout shall be 150 x 150mm (for 100mm dia. PVC pipe) and 125 x 125mm (for 75mm dia. PVC pipe), stainless steel for interior use. Model/make shall be approved by Architect/Engineer in Charge.

- k. Decorative Wall Vent Cover shall be stainless steel material. Model/make shall be approved by Architect/Engineer in Charge.
6. Special Plumbing Fixtures
- a. Kitchen sink shall be made of stainless steel self rimming, single compartment complete with supply fittings, strainer, p-trap and other accessories.
  - b. Grease traps shall be made of stainless steel, 2 sets of 4 GPM and 1 set of 10 GPM capacity complete with accessories.
7. Roof Drains, Downspout and Steel Grating

Contractor shall provide, fit and/or install necessary drains with strainers, where shown on the Plans. Each drain with strainer shall fit the size of the corresponding downspout (or roof leader) over which it is to be installed and in conformity with the following schedule:

- a. Downspouts shall be polyvinyl chloride (PVC), 75mm diameter in size (series 1000). Provide stainless steel strainer and secured with metal straps 2" wide, painted finish.
- b. Steel grating shall be made of hot rolled ASTM A36 flat bar, 6mm x 50mm with 6mm x 50mm x 50mm angle bar frame, painted with one (1) coat primer and one (1) coat enamel paint. Submit shop drawings for the design approval.

Furnish and install adaptors, couplings and devices required for complete connections of all sanitary plumbing fixtures and trims other than those supplied by the owner.

All fixtures shall be completely new, free from defects, function efficiently and shall be cleaned and ready for use and acceptance.

All plumbing fixtures and equipment shall be installed free and open in a manner to provide easy access for cleaning and shall be furnished with brackets, cleats, plates and anchors required to support the fixtures and equipment rigidly in place.

Provision for water connection application and water meter installation including tapping to main service pipe shall be facilitated by the Contractor to the Service Provider and later on to be turned over to SBMA upon completion of the project.

**C. Scope of Works**

As per Pay Item enumeration

**D. Specifications and Standards**

Standard References:

ASTM American Society for Testing and Materials  
ASTM 2729-71 PVC pipes and fittings  
ANSI American National Standards Institute  
AWWA American Water Works Association  
NPCP National Plumbing Code of the Philippines

## E. Construction Requirements

The Contractor before any installation work is started shall carefully examine the Plans and shall investigate actual structural and finishing work condition affecting all his work. Where actual condition necessitates a rearrangement of the approved pipe layout, the Contractor shall prepare Plan(s) of the proposed pipe layout for approval by the Architect/Engineer in Charge.

1. Installation of Soil, Waste, Drain and Vent Pipes
  - a. All PVC soil and drainage pipes shall be pitch 6mm per 300mm but in no case flatter than 3mm per 300mm.
  - b. Horizontal lines shall be supported by well secured length heavy strap hangers. Vertical lines shall be secured strongly by hooks to the building frame and a suitable brackets or chairs shall be provided at the floor from which they start.
  - c. All main vertical soil and waste stacks shall be extended full size to and above the roof line to act as vents, except otherwise indicated on the Plans.
  - d. Vent pipes in roof spaces shall be run as close as possible to underside of roof with horizontal piping pitched down to stacks without forming traps. Vertical vent pipes may be connected into one main vent riser above the highest vented fixtures.
  - e. Where an end or circuit vent pipe from any fixtures is connected to a vent line serving other fixtures, the connections shall be at least 1.20 m above the floor on which the fixtures are located.
  - f. Horizontal waste line receiving the discharge from two or more fixtures shall be provided with end vents unless separate venting of fixtures is noted on the Plans.
  - g. All changes in pipe sizes on soil and waste lines shall be made with reducing fittings and recessed reducers. All changes in directions shall be made by appropriate use of 45 degrees wyes, half wyes, long sweep quarter bends or elbows may be used in soil and waste lines where the change in direction of flow is from the horizontal to the vertical and on the discharge from waste closets. Where it becomes necessary to use short radius fittings in other locations, the approval of the Engineer in Charge shall be obtained prior to installation of the same.
  - h. Cleanouts at the bottom of each soil stack and waste stack, interior downspout and where else indicated shall be the same size as the pipe up to and including 102mm (152mm, for larger pipes).
  - i. Vent pipe shall be flashed and made watertight at the roof with ferrule lead sheet. Flashing shall be turned down into pipes.
  - j. Each fixtures and place of equipment requiring connection to the drainage system except fixtures with continuous waste shall be equipped with a trap. Each trap shall be placed as near to the fixture as possible.

## 2. Water Pipes, Fittings and Connections

All water pipings inside the building and underground, 100mm diameter and smaller shall be galvanized iron threaded pipe with malleable iron fittings.

- a. The water piping shall be extended to all fixtures, outlets and equipment from the gate valves installed in the branch near the riser.
- b. The cold water system shall be installed with a fall towards a main shutoff valve and drain. Ends of pipes and outlets shall be capped or plugged and left ready for future connections.
- c. Mains and Branches
  - i. All pipes shall be cut accurately to measurements and shall be worked into place without springing or forcing. Care shall be taken so as not to weaken the structural portions of the building.
  - ii. All piping above the ground shall be run parallel with the lines of the building unless otherwise indicated on the Plans.
  - iii. All service pipes, valves and fittings shall be kept at sufficient distance from other work to permit finished covering not less than 12.5mm from such work or from finished covering on the different service.
  - iv. No water piping shall be buried in floors, unless specifically indicated on the Plans and approved by the Architect/Engineer in Charge.
  - v. Changes in pipes shall be made with reducing fittings.
- d. Valves and Hose Bibbs
  - i. Valves shall be provided on all supplied fixtures as herein specified.
  - ii. Valve shall not be installed with its stem below the horizontal. All valves shall be gate valves unless otherwise indicated on the Plans.
  - iii. Valves up to and including 50mm diameter shall be threaded ends, rough bodies and finished trimmings, except those on chromium plated brass pipe.
  - iv. Valves 63mm in diameter and larger shall have iron bodies, brass mounted and shall have either screws or flange ends.
  - v. Hose bibbs shall be made of brass with 12.5mm inlet threads, hexagonal shoulders and 19mm male.

## 3. Fixtures, Equipment and Fastenings

- a. All fixtures and equipment shall be supported and fastened in a safe and satisfactory workmanship as practiced.
- b. All fixtures, where required to be wall mounted on concrete or concrete hollow block wall, fasten with brass expansion bolts. Expansion bolts shall be 6mm

diameter with 20mm threads to 25mm in to solid concrete, fitted with loose tubing or sleeves of proper length to acquire extreme rigidity.

- c. Inserts shall be securely anchored and properly flushed into the walls. Inserts shall be concealed and rigid.
  - d. Bolts and nuts shall be horizontal and exposed. It shall be provided with washers and chrome plated finish.
4. Plates and Flashing
- a. Plates to cover exposed pipes passing through floor finished walls or ceiling shall be fitted with chrome plated cast brass plates or chrome plated cast iron or steel plates on ferrous pipes.
  - b. Plates shall be large enough to cover and close the hole around the area where pipes pass. It shall be properly installed to insure permanence.
  - c. Roof areas penetrated by vent pipes shall be rendered watertight by metal sheet flashing and counter flashing. It shall extend at least 150mm above the pipe and 300mm along the roof.
5. Protection and Cleaning
- a. During installation of fixtures and accessories and until final acceptance, protect items with strippable plastic or other approved means to maintain fixtures in perfect conditions.
  - b. All exposed metal surfaces shall be polished clean and rigid of grease, dirt or other foreign materials upon completion.
  - c. Upon completion, thoroughly clean all fixtures and accessories to leave the work in polished condition.
6. Inspection, Warranty Test and Disinfection

All pipes, fittings, traps, fixtures, appurtenances and equipment of the plumbing and drainage system shall be inspected and approved by the Architect/Engineer in Charge to ensure compliance with all requirements of all Codes and Regulations referred to in this Specification.

- a. Drainage System Test
  - i. The entire drainage and venting system shall have all necessary openings which can be plugged to permit the entire system to be filled with water to be level of the highest stack vent above the roof.
  - ii. The system shall hold this water for full 30 minutes during which time there shall be no drop greater than 102mm.
  - iii. Where only a portion of the system is to be tested, the test shall be conducted in the same manner as described for the entire system except that a vertical stack 3.00m highest horizontal line to be tested may be installed and filled with water to maintain sufficient pressure or water pump may be used to supply the required pressure.

- iv. If and when the Architect/Engineer in Charge decides that an additional test is needed, such as an air to smoke test on the drainage system, the Contractor shall perform such test without any additional cost.

b. Water Test on System

- i. Upon completion of the roughing-in and before connecting fixtures the entire cold water piping system shall be tested at a hydrostatic pressure 1 ½ times the expected working pressure in the system during operation and remained tight and leak-proofed.
- ii. Where piping system is to be concealed the piping system shall be separately in manner similar to that described for the entire system and in the presence of the Architect/Engineer in Charge or his duly designated representative.

c. Defective Work

- i. All defective materials replaced and tested will be repeated until satisfactory performance is attained.
- ii. Any material replaced for the satisfactory performance of the system made shall be at the expense of the Contractor.
- iii. Caulking of screwed joints or holes will not be permitted.

d. Disinfection

- i. The entire water distribution system shall be thoroughly flushed and treated with chlorine before it is operated for public use.
- ii. Disinfection materials shall be liquid chlorine or hypochlorite and shall be introduced in a manner approved as practiced or approved by the Architect/Engineer in Charge into the water distribution system.
- iii. After a contact period of not less than sixteen hours, the heavily chlorinated water shall be flushed from the system with potable water.
- iv. Valves for the water distribution system shall be opened and closed several times during the 16 hours chlorination treatment is done.

7. As-Built Drawings

Upon completion of the work, the Contractor shall submit two sets of prints with all as-built changes shown on the drawings in a neat workmanship manner. Such prints shall show changes or actual installation conditions of the plumbing system in comparison with the original drawings.

**F. Submittals**

- a. Submit manufacturer's product specifications including certified laboratory test reports and other data as required to show compliance with the specification. Submit drawings showing details and sections, system thickness, and any other detailed

information necessary to describe installation. Submit samples for each plumbing fixtures and accessories as specified in the pay item in manufacturer's memorandum size, and core samples of type required by project.

- b. Submit shop drawings and secure approval prior to installation.
- c. Immediate submittal of samples to secure final approval from SBMA should be initiated by the Contractor; Project delay(s) concerning delivery schedule, and the likes, is/are not considered ground(s) for project time extension.

**G. Method of Measurement and Basis of Payment**

The accepted quantities shall be paid for based on the contract unit price for each of the particular pay items that are listed in the Bill of Quantities. The payment shall constitute full compensation for the installation of sanitary and water lines, plumbing fixtures and accessories, sewerage and storm system including all labor, equipment, tools and incidentals necessary to complete the work prescribed in this item.

Note that the exact amount incurred and billed by the Service Provider due to water connection application and installation shall be paid.

Payment will be made under:

<b>Pay Item No.</b>	<b>Description</b>	<b>Unit of Measurement</b>
C.6.1	Water Closet	Set
C.6.2	Toilet Bidet Hand Spray	Set
C.6.3	Wall hung Lavatory with faucet	Set
C.6.4	Kitchen Sink with faucet to pantry	Set
C.6.5	Tissue Holder	Set
C.6.6	Grab bar	Set
C.6.7	Soap Dispenser	Set

**C.6.8 Granite Counter Top to pantry and information Booth**

**A. Description**

This section consists of furnishing all materials, tools and equipment including labor required in undertaking the proper installation of granite stone slab on reinforced concrete countertop as shown on the Plans and in accordance with this Specification.

## **B. Material Requirements**

### 1. Granite Stone Slab

- a. Size: 600mm width with 200mm (back splash) and 300mm (siding)
- b. Thickness:  $\pm 25$ mm
- c. Colors: All granite stone slab shall be in colors selected by SBMA from the above submitted samples.
- d. Adhesive: Shall be manufacturer's recommended type or of approved type by the SBMA Project Architect/Engineer in Charge.

### 2. Reinforced Concrete Countertop

- a. Dimension: 100mm thk. x 600mm width
- b. Concrete Mixture: Class B
- c. Reinforcement: 10mm diameter RSB
- d. Material and construction requirements shall conform to the DPWH: Standard Specifications for Public Works Structures, Vol. III (1995) under Item 900: Reinforced Concrete

## **C. Construction Requirements**

### C.1 Submittals

- a. Submit product specifications including certified laboratory test reports and other data as required to show compliance with the specification. Submit drawings showing details sections, system thickness, and any other detailed information necessary to describe installation.
- b. Submit samples of the following item/s:
  - Granite Stone Slab,  $\pm 25$ mm (1")
  - Porcelain floor tiles,  $\pm 12$ mm x 600mm x 600mm
- c. Immediate submittal of samples to secure final approval from SBMA should be initiated by the contractor; Project delay(s) concerning delivery schedule, and the likes, is/are not considered ground(s) for project time extension.

### C.2 Execution

Granite stone slab shall be installed only by an approved installer/contractor.

## **D. Method of Measurement and Basis of Payment**

The accepted quantities, measured as prescribed, shall be paid for based on the contract unit price for each of the particular pay items that are listed in the Bill of Quantities. The payment shall constitute full compensation including all labor, tools and incidentals necessary to complete the works prescribed in this section.

Payment will be made under:



Pay Item No.	Description	Unit of Measurement
C.6.8	Granite Counter Top to Pantry and Information booth	Square Meter

### C.6.9 Trash bin

#### A. Description

The work to be done under this section of these specification consist of all work and materials incidental to the proper completion of the installation, trash bins at the subject premises s. All works shall be in accordance with the governing codes and regulations and with specifications, except where it shall conflict with such codes, etc. which, later shall then govern. The requirements in regards to materials and workmanship specify the required standards for the furnishing of all labor, materials and appliances necessary for the complete installation of the work specified herein and indicated on the drawings

#### B. Material Requirements

*Trash Bins for toilet (4 sets)*

Material- Stainless Steel Step Trash Bin  
Capacity- 5L  
Shape- Round

#### D. Method of Measurement and Basis of Payment

The accepted quantities, measured as prescribed, shall be paid for based on the contract unit price for each of the particular pay items that are listed in the Bill of Quantities. The payment shall constitute full compensation including all labor, tools and incidentals necessary to complete the works prescribed in this section.

Payment will be made under:

Pay Item No.	Description	Unit of Measurement
C.6.9	Trash Bins	set

## PART D: MECHANICAL WORKS

- D.1 1.5HP wall-mounted Air Conditioning Unit (Inverter)
- D.1 2HP wall-mounted Air Conditioning Unit (Inverter)
- D.1 3TR floor-mounted Air Conditioning Unit (Inverter)

### A. Description

This item shall consist of furnishing and installation of air conditioning, refrigeration and ventilation systems, inclusive of necessary electrical connections, ductworks, grilles, pipes and condensate and all other necessary accessories, ready for service in accordance with the Plans and Specifications.

### B. Material Requirements

The types, sizes, capacities, quantities and power characteristics of the compressor, evaporator, condenser chilled water pump and condenser water pump shall be as specified or shown on the Plans.

#### a. Refrigerant Pipes

Refrigerant pipes shall be copper tubing, type L or K or black steel pipe, Schedule 40 for size of 100mm diameter and smaller. Pipes over 100mm shall be black steel pipe Schedule 40.

Black steel pipe shall be standard seamless, lap welded, or electric resistant welded for size 50 mm diameter and larger, screw type for size 38mm diameter and smaller, fittings for copper tubing shall be cast bronze fitting designed expressly for brazing.

#### b. Pipes for Cooling Water

Chilled and condenser cooling water pipes shall be black steel pipe, Schedule

40.

Pipes and fittings for size 50 mm diameter and smaller shall be screwed type. Pipes and fittings for size 62 mm diameter and larger shall be welded or flanged type.

#### c. Pipe Insulations

Insulations shall be performed fiberglass or its equivalent.

The insulating materials shall be covered with 100 mm x 13 mm thick polyethylene film which shall be overlapped not less than 50 mm. Pipe insulation

shall be adequately protected at point of support by means of suitable metal shield to avoid damage from compression. Insulated pipes, valves and fittings located outdoors shall be provided with metal jackets.

d. Ductworks

Ducts shall be galvanized sheet steel of not less than the following gauges:

1. No.26 for 300 mm wide and smaller
2. No.24 for 350 mm to 750 mm wide
3. No. 22 for 775 mm to 1500 mm wide
4. No. 20 for 1525 mm to 2250 mm wide
5. No. 18 for 2275 mm to 2500 mm or larger
6. For aluminum sheets use one gauge higher

Joints and stiffeners of ducts using slip joints shall be as follows:

1. 300 mm wide and smaller, without barcing
2. 325 mm to 750 mm wide, brace with 25mm x 25 mm x 3 mm steel angles
3. 775 mm to 1500 mm, brace with 31 mm x 31 mm x 3 mm steel angles
4. 1525 mm up, brace with 38 mm x 38 mm x 3 mm steel angles

Stiffeners shall be located not more than 1200 mm from each joint.

e. Ductwork Insulation

The application insulation materials shall be rigid board made of polystyrene or equivalent 25 mm thick for ground and top floor, 13 mm thick for intermediate floor.

Galvanized metal bands for ducts shall be secure and spaced 300 mm minimum center to center and corners shall be protected with galvanized metal angles.

f. Diffusers

The type, shape, capacity, size and location shall be as shown in the Plans.

Diffusers shall be complete with frame and gasket, equalizing deflector and volume control indicated or specified and shall have factory-applied prime coat of paint.

Samples of supply and return air diffusers shall be submitted for approval before mass fabrication and installation.

g. Dampers

Dampers shall be of same materials as duct, at least one gauge heavier and shall have accessible location, complete with locking damper in position.

Where necessary, splitters, butterflies and louvers damper deflecting vanes for control of air volume and direction and for balancing the system shall be provided whether or not they are indicated on the Plans.

h. Fire Damper

Main duct shall be provided with proper fire dampers of the fusible link actuated type.

Access door shall be provided in ductwork for renewal fusible link and to reset damper.

i. Equivalent Foundation

Foundation shall be provided and shall conform to the recommendation of the manufacturer of the equipment. Equipment shall be leveled on foundation by means of jacks or steel wedges. All spaces between equipment bases and concrete foundations shall be filled with cement mortar.

j. Electrical Works

Power supply shall be provided by the Contractor at the pull box installed inside the machine room and furnish and install the main circuit breaker and starter with suitable ratings and capacities, conduits, wirings, fittings, devices and all other equipment and electrical connections needed to complete the electrical installation of the system. All electrical works shall comply with the latest edition of the Philippine Electrical Code, with the applicable ordinance of the local government and all rules and requirements of the local power company.

**C. Construction Requirements**

The air conditioning system shall be entirely automatic in operation and shall not require the presence of an attendant except for periodic inspection for lubrication. All equipment and materials shall be inspected upon delivery and shall be tested after installation. Piping shall not be buried, concealed, or insulated until it has been inspected, tested and approved. Walls, floors and other parts of the building and equipment damaged by contractor in the prosecution of the work shall be replaced as shown on the Plans.

**D. Operating Tests**

Refrigerating equipment shall be tested for 8-hours per day for three consecutive days or longer when so directed, under the supervision of manufacturers qualified and authorized representative, who will make necessary adjustments and instruct designated plant operating personnel for each operation and maintenance of refrigerating equipment and controls.

Operating test of complete air conditioning system shall be 6-hours minimum for each system. Test of air flow, temperature and humidity shall be made to

demonstrate that each complies with the requirements of the Plans and Specifications.

**E. Guarantee and Services**

All equipment, materials and workmanship shall be guaranteed for a period of one (1) year from date of acceptance at any time within the period of guarantee and upon notification, the contractor shall repair and rectify the deficiencies, including replacement of parts or entire units.

**F. Miscellaneous**

The owner shall provide with three (3) bound copies “AS BUILT” diagrams, shop drawings, part lists, serial number and inventory of equipment including manufacturers operating and maintenance manuals.

All standard tools and equipment shall be furnished for proper and regular maintenance of installed equipment.

**G. Method of Measurement and Basis of Payment**

The accepted quantities, provided and installed as prescribed, shall be paid for at the contract unit price for each of the particular pay items that are listed in the Bill of Quantities. The payment shall constitute full compensation for provision for furnishing and placing all labor, tools and equipment and other incidentals necessary to complete the work prescribed in this item.

Pay Item No.	Description	Unit of Measurement
D.1	1.5 HP Wall-mounted Air Conditioning Units (Inverter)	set
D.2	2 HP Wall-mounted Air Conditioning Units (Inverter)	set
D.3	3TR Floor-mounted Air Conditioning Units (Inverter)	set

## **PART E: ELECTRICAL WORKS**

- E.1 Wires and wiring devices (20CL)**
- E.2 Conduit, Boxes and fittings**
- E.3 Power Load Center, Switchgear and Panel Boards**
- E.4 Lighting Fixtures**
- E.5 Fire Alarm System (15CL)**
- E.6 Telephone System (15CL)**
- E.7 Local Network System (15CL)**

### **A. Description**

The work to be done under this section of these specifications consist of furnishing all labor, materials, accessories and equipment including all other incidentals necessary to complete the works. All works shall be in accordance with the governing codes and regulations and with the specifications, except where same shall conflict with such codes, etc. which, later shall then govern. The requirements in regards to materials and workmanship specify the required standards for the furnishing of all labor, materials and appliances necessary for the complete installation of the work specified herein and indicated on the drawings.

### **B. Scope of Works**

The work shall consist of but not limited to the following

- a. Provisions for the project supervision, supply of all labor, materials and equipment required for the following:

Installation of new lighting fixture, wires, conduit, convenience outlet, circuit breakers, panel board, exhaust fan and other incidentals necessary for competing the works.

- b. Other Work Items

Coordination works with SBMA Engineering Department during construction phase.

Cleaning and housekeeping.

Conduct insulation & functionality test of all the wires installed before operation or after completion

## C. Details

Materials- shall conform to respective manufacturer's specifications and standards and to the requirements specified herein:

- a. Lighting fixtures
  - i. Ceiling mounted lighting fixture shall be 2x20W LED tube light, 1200mmX600mm, 220V, 60HZ, minimum burning life hours of 25,000 hrs. w/ louver type diffuser.
  - ii. Surface mounted lighting fixture shall be 1x20W LED tube light, 1200mmX300mm, 220V, 60HZ, minimum burning life hours of 25,000 hrs. w/ frosted diffuser.
  - iii. Pin light shall be 6inch diameter, metal casing, 9W LED bulb minimum 25000 burning life hours, 220V, 60HZ with glass diffuser
  - iv. Battery operated Emergency lights, maintenance free, 230Vac, 6VDC, 10watts, Sealed Lead Acid Battery, AC Pilot & Test Switch
  - v. Exist Signage, aluminum finish, Clear acrylic panels, LED lights low energy consumption, sealed nickel cadmium battery up to 90 minutes capacity.
- b. Switches
  - i. Switches shall be flush mounted, 250V, rated 15A, 60HZ
  - ii. Switches shall be quiet type, illuminated, spring loaded and the cover plates shall be subject to the approval of the SBMA
- c. Convenience Outlet
  - i. Convenience outlet shall be 15Amp rated, simplex type, NEMA 5-15R, grounding type with hard plastic plate wall.
- d. Exhaust fan units
  - i. Exhaust fan unit shall be ceiling mounted, 40-80Watts, 300 mm size, 100CFM, 220V, 60HZ
- e. Wires and Cables

- i. Wires and Cables shall be soft-drawn and annealed copper.
- ii. Wires and Cables shall be plastic insulated for 600V, THHN for line conductor and TW for ground conductor.
- iii. All wires shall be stranded
- iv. Bare copper wire for grounding electrode
- v. All wires shall be color coded, green for ground conductor, white for neutral line conductor and black for line conductor.
- vi. Wires shall be labeled and tag after installation.
- vii. Wire connectors and Terminals for use with copper shall conform to UL 486A.

f. Circuit Breakers

- i. Circuit breakers shall be thermal magnetic type with quick melt, quick trip free operating mechanism with contacts.
- ii. Circuit breakers shall be bolt-on type complying with NEMA and UL standard
- iii. Enclosure of circuit breaker shall be galvanized steel, gauge #16 and weather proof (NEMA 3R), painted in gray enamel finish.
- iv. Individual circuit breakers for air conditioning units must be mounted securely on the wall.

g. Conduit

- i. Intermediate Metal Conduit (IMC): UL 1242, zinc coated steel only
- ii. Fittings for IMC shall be threaded type. Split couplings are not acceptable.
- iii. Rigid Steel Conduit (Zinc-Coated): ANSI C80.1.

h. Panel Boards

- i. Panel board Enclosure shall be hot-dip galvanized steel. Thickness of the enclosure shall be code gauge and no less than gauge #16 in NEMA 1 enclosure
- ii. Main circuit breaker for Power panel shall be molded case bolt-on type complying with NEMA and UL standards minimum 10kAIC.
- iii. Branch circuit breaker for Power Panel shall be molded case bolt-on type complying with NEMA and UL standards



- iv. Busbars shall be made of copper and shall be supported on bases independent of the circuit breaker. Main buses and back pans shall be designed so that circuit breakers may be changed without machining, drilling or tapping. Separate grounding and neutral bus shall be provided.
  
- i. Conventional Fire Alarm System
  - i. Smoke Detector
    - 1. Type – Ionization Smoke Detector (Conventional Type)
    - 2. Sensitivity – Standard and fixed at 3% per meter
    - 3. System Configuration – Zonal only
    - 4. Isolation – per zone
  - ii. Wiring – 2 wires every zone
  - iii. Alarm Horn/Bell shall be surface-mounted, grill vibrating type alarm horns, suitable for use in an electrically-supervised circuit. Horns shall have a minimum sound output rating of at least 90 decibels at 1 meter
  - iv. Manual Pull Station shall be non-coded type with mechanical reset features. Locate stations as indicated on design drawings. All stations shall be surface mounted at 1200 millimeter above the finished floor. Each station shall be provided with screw-type terminals of proper number and type to perform functions required.

#### **D. Drawings and Specification**

The contract drawing and specifications are complementary to each other and any labor or materials called for by either, whether or not called for by both, if necessary for the successful operation of any of the particular type of equipment furnished and installed without additional cost to the Owner.

All dimension locations of fixtures, equipment, boxes, outlets, and other electrical fixtures shall be verified on the electrical plans, architectural drawings and actual site condition/location.

#### **E. Intent**

It is not intended that the drawings shall show every pipes, fittings, boxes and equipment. All such items whether specifically mentioned or not, or indicated on the drawings, shall be furnished and installed if necessary to complete the system in accordance with the best practice of the electrical trade and to the satisfaction of the SBMA

#### **F. Site Investigation**

The Contractor is required to visit the site and to ascertain himself to the local conditions and facilities that may affect his work. He will be deemed to have done this before preparing his proposal and any subsequent claims on the ground of inadequate or inaccurate information will not be entertained.

#### **G. Shop Drawings**

The Contractor shall submit to SBMA, for approvals, all shop drawings where the details and connections are not shown on the drawings or deviations thereof but required for the work. The Contractor shall certify the drawing details and conform to the intent of the drawings and specifications.

#### **H. Codes and Standards**

The work under this contract is to be installed with reference to the latest requirement of the following:

Philippine Electrical Code (Latest Edition)  
Subic Enerzone  
National Electrical Manufacturers Association (NEMA)

#### **I. Material Requirements**

Quality Assurance – All materials to be used shall be new and shall conform to the reference codes and standards.

Alternate Materials – Use of any material, not specified in this specifications may be allowed provided such alternate has been approved by SBMA and provided further that a test, if required, shall be done by an approved agency in accordance with generally accepted standards.

#### **J. Construction Requirements/Method**

Workmanship

- a. The work throughout shall be executed in the best and most thorough manner to the satisfaction of the SBMA, who will jointly interpret the meaning of the drawings and specifications and shall have power to reject any work and materials, which in their judgment, are not in full accordance therewith.
- b. The Contractor shall provide the services of a qualified Electrical Engineer to supervise the complete installation of equipment and systems and who shall be available for conduction the final acceptance test.

- c. All equipment shall be installed in accordance with the manufacturer's standard.

#### Conduit System

Conduit shall have no more than four (4) 90 degrees bends in any run. When it becomes necessary to have more than four 90 degrees bends, an intermediate pull box shall be installed to facilitate pulling-in of wires and cables.

#### Wires and Cables

All wires and cables shall be new in every aspect and continuous from junction to junction as may be necessary.

#### Lighting System

- a. Lighting System shall be complete in every aspect, all as indicated on the plans or specification. Mounting height of switches and special fixture shall be as indicated or as per standard practice.
- b. All wiring shall be installed, in general, concealed in the structure, except as noted or as required.

#### Grounding System

All metallic conduits, panel boards and equipment-requiring grounding system shall be properly grounded and bonded by means of copper straps, Earth grounding system is applicable.

### **K. Method of Measurement and Basis of Payment**

The accepted quantities shall be paid for based on the contract unit price for each of the particular pay items that are listed in the Bill of Quantities. The payment shall constitute full compensation for all electrical works including all labor, equipment, tools and incidentals necessary to complete the work prescribed in this item.

Payment will be made under:

<b>Pay Item No.</b>	<b>Description</b>	<b>Unit of Measurement</b>
E.1	Wires and wiring devices (20 CL)	Lump sum
E.2	Conduit, Boxes and fittings	Lump sum

E.3	Power Load Center, Switchgear and Panel Boards	Lump sum
E.4	Lighting Fixtures	Lump sum
E.5	Fire Alarm System (15CL)	Lump sum
E.6	Telephone System (15CL)	Lump sum
E.7	Local Area Network System (15CL)	Lump sum

## **PART F: PLUMBING WORKS**

### **F.1 Sewer pipes and Fittings**

### **F.2 Cold water pipes and fittings**

### **F.3 Storm pipes and fittings**

#### **A. Description**

This section shall consist of furnishing all materials, tools and equipment and fixtures required as shown on the Plans for the satisfactory performance of the entire plumbing system including installation and/or tapping to main line in accordance with the latest edition of the National Plumbing Code, and this Specification.

#### **B. Material Requirements**

All piping materials, fixtures and appliances fitting accessories whether specifically mentioned or not but necessary to complete this section shall be furnished and installed.

##### **8. Sanitary Pipes and Fittings**

Pipes and fittings for sanitary lines as approved alternative shall be Unplasticized Polyvinyl Chloride Pipes and Fittings (UPVC).

Pipes shall be PVC sanitary pipes series 1000 for sewer line (see Plans for the sizes).

Pipes and fittings shall be made of virgin materials conforming to specification requirements defined in ASTM D-2241 and PNS 65: 1986. Fittings shall be molded type and designed for solvent cement joint connection for water lines and rubber O-ring seal joint for sanitary lines.

Cleanouts shall be 100mm and 75mm diameter PVC with plug for exterior (verify on Plans).

##### **9. Water Supply Pipes and Fittings**

a. Pipes shall be galvanized iron pipe schedule 40 conforming to specification requirements defined in ASTM A-120 with threaded connection (see Plans for the sizes). Under roads where necessary shall be suitably protected.

Fittings shall be malleable iron Type II, galvanized iron conforming to specification requirements defined in ASTM A338.

##### **b. Valves**

Valves for water supply shall be bronze body with threaded ends rated 21.0 kg-f/cm. square. All valves shall be gate valves unless otherwise specified. Gate valves shall have solid wedge body and discs conforming to specification requirements defined in ASTM B-62. Globe valves shall have plug type discs with ferrule threaded ends and bronze body.

##### **c. Unions**

Unions on ferrous pipe 50mm diameter and smaller shall be malleable iron.

d. Water Meter

Water meter required to be furnished by the Contractor shall be of the type tested and approved by SUBICWATER.

10. Septic Tank

Septic tank shall be provided as shown on the Plans including all pipe vents and fittings. The various construction materials such as concrete masonry shall conform to the corresponding Items of this Specifications. Inlet and outlet pipes shall conform to the latest edition of the National Plumbing Code.

11. Plumbing Fixtures and Fittings

All fittings and trimmings for fixtures shall be chromium-plated and polished brass unless otherwise approved. Exposed traps and supply pipes for fixtures shall be connected to the roughing in, piping system at the wall unless otherwise indicated on the Plans. Built-in fixtures shall be watertight with provision of water supply and drainage outlet, fittings and trap seal. Unless otherwise specified, all plumbing fixtures shall be made of vitreous china complete with fittings.

Use succeeding materials as applicable and as prescribed on the plans:

- a. Water Closet – shall be tank type, wash down, close-coupled, Grade A Vitreous China material, round-front, consumes 3/4.5 liters per flush with seat and cover including angle valve, flexible hose and other fittings. Model make and color shall be approved by the Architect/Engineer in Charge.
- b. Lavatory – shall be under-counter type, Grade A Vitreous China material, ellipse shape, complete with single-lever faucet, supply pipe, angle valve, p-trap and mounting accessories. Model make and color shall be approved by the Architect/Engineer in Charge.
- c. Lavatory – shall be pedestal type, Grade A Vitreous China material, ellipse shape, complete with single-lever faucet, supply pipe, angle valve, p-trap and mounting accessories. Model make and color shall be approved by the Architect/Engineer in Charge.
- d. Urinal – shall be Grade A Vitreous China material, color, wall-mounted wash-out with extended shields and integral flush spreader, concealed wall-hanger pockets, 19mm top spud complete with fitting and mounting accessories. Model make and color shall be approved by the Architect/Engineer in Charge.

12. Bathroom and Toilet Accessories

- a. Bidet – shall be hand-held, stainless steel complete with holder, fitting and accessories. Model make shall be approved by the Architect/Engineer in Charge. Model/make shall be approved by Architect/Engineer in Charge.
- b. Shower head and fitting shall be movable, heavy duty rainshower head type with escutcheon arm at least 10" long complete with stainless steel shower valve and

control lever, all exposed surface to be stainless finish. Model/make shall be approved by Architect/Engineer in Charge.

- c. Glass shower rack/shelf shall be 500mm (L) x 125mm (W) x 6mm (T) clear glass with stainless steel frame/holder, chrome finish. Model/make shall be approved by Architect/Engineer in Charge.
- d. Grab bar shall be made of tubular stainless steel pipe provided with safety grip and mounting flange. Model/make shall be approved by Architect/Engineer in Charge.
- e. Floor drains shall be made of stainless steel concealed type, anti-clogging, anti-pest, deodorant measuring  $\pm 4"$  ( $\pm 110$ mm) square, and provided with detachable stainless strainer, expanded metal lath type. Model/make shall be approved by Architect/Engineer in Charge.
- f. Toilet paper holder shall be stainless steel type, wall mounted. Model/make shall be approved by Architect/Engineer in Charge.
- g. Flush Valve, lever type, metal alloy, chrome plated, heavy duty (for urinal).
- h. Faucet(s), single-lever, single-hole, stainless steel finish (for lavatory and kitchen sink(s)). Model/make shall be approved by Architect/Engineer in Charge.
- i. Hose bibb(s) shall be made of bronze cast finish.
- j. Floor Cleanout shall be 150 x 150mm (for 100mm dia. PVC pipe) and 125 x 125mm (for 75mm dia. PVC pipe), stainless steel for interior use. Model/make shall be approved by Architect/Engineer in Charge.
- k. Decorative Wall Vent Cover shall be stainless steel material. Model/make shall be approved by Architect/Engineer in Charge.

### 13. Special Plumbing Fixtures

- a. Kitchen sink shall be made of stainless steel self rimming, single compartment complete with supply fittings, strainer, p-trap and other accessories.
- b. Grease traps shall be made of stainless steel, 2 sets of 4 GPM and 1 set of 10 GPM capacity complete with accessories.

### 14. Roof Drains, Downspout and Steel Grating

Contractor shall provide, fit and/or install necessary drains with strainers, where shown on the Plans. Each drain with strainer shall fit the size of the corresponding downspout (or roof leader) over which it is to be installed and in conformity with the following schedule:

- a. Downspouts shall be polyvinyl chloride (PVC), 75mm diameter in size (series 1000). Provide stainless steel strainer and secured with metal straps 2" wide, painted finish.

- b. Steel grating shall be made of hot rolled ASTM A36 flat bar, 6mm x 50mm with 6mm x 50mm x 50mm angle bar frame, painted with one (1) coat primer and one (1) coat enamel paint. Submit shop drawings for the design approval.

Furnish and install adaptors, couplings and devices required for complete connections of all sanitary plumbing fixtures and trims other than those supplied by the owner.

All fixtures shall be completely new, free from defects, function efficiently and shall be cleaned and ready for use and acceptance.

All plumbing fixtures and equipment shall be installed free and open in a manner to provide easy access for cleaning and shall be furnished with brackets, cleats, plates and anchors required to support the fixtures and equipment rigidly in place.

Provision for water connection application and water meter installation including tapping to main service pipe shall be facilitated by the Contractor to the Service Provider and later on to be turned over to SBMA upon completion of the project.

### **C. Scope of Works**

As per Pay Item enumeration

### **D. Specifications and Standards**

Standard References:

ASTM American Society for Testing and Materials  
ASTM 2729-71 PVC pipes and fittings  
ANSI American National Standards Institute  
AWWA American Water Works Association  
NPCP National Plumbing Code of the Philippines  
PD1096 National Building Code of the Philippines

### **E. Construction Requirements**

The Contractor before any installation work is started shall carefully examine the Plans and shall investigate actual structural and finishing work condition affecting all his work. Where actual condition necessitates a rearrangement of the approved pipe layout, the Contractor shall prepare Plan(s) of the proposed pipe layout for approval by the Architect/Engineer in Charge.

1. Installation of Soil, Waste, Drain and Vent Pipes
  - a. All PVC soil and drainage pipes shall be pitch 6mm per 300mm but in no case flatter than 3mm per 300mm.
  - b. Horizontal lines shall be supported by well secured length heavy strap hangers. Vertical lines shall be secured strongly by hooks to the building frame and a suitable brackets or chairs shall be provided at the floor from which they start.
  - c. All main vertical soil and waste stacks shall be extended full size to and above the roof line to act as vents, except otherwise indicated on the Plans.



- d. Vent pipes in roof spaces shall be run as close as possible to underside of roof with horizontal piping pitched down to stacks without forming traps. Vertical vent pipes may be connected into one main vent riser above the highest vented fixtures.
  - e. Where an end or circuit vent pipe from any fixtures is connected to a vent line serving other fixtures, the connections shall be at least 1.20 m above the floor on which the fixtures are located.
  - f. Horizontal waste line receiving the discharge from two or more fixtures shall be provided with end vents unless separate venting of fixtures is noted on the Plans.
  - g. All changes in pipe sizes on soil and waste lines shall be made with reducing fittings and recessed reducers. All changes in directions shall be made by appropriate use of 45 degrees wyes, half wyes, long sweep quarter bends or elbows may be used in soil and waste lines where the change in direction of flow is from the horizontal to the vertical and on the discharge from waste closets. Where it becomes necessary to use short radius fittings in other locations, the approval of the Engineer in Charge shall be obtained prior to installation of the same.
  - h. Cleanouts at the bottom of each soil stack and waste stack, interior downspout and where else indicated shall be the same size as the pipe up to and including 102mm (152mm, for larger pipes).
  - i. Vent pipe shall be flashed and made watertight at the roof with ferrule lead sheet. Flashing shall be turned down into pipes.
  - j. Each fixtures and place of equipment requiring connection to the drainage system except fixtures with continuous waste shall be equipped with a trap. Each trap shall be placed as near to the fixture as possible.
2. Water Pipes, Fittings and Connections

All water pipings inside the building and underground, 100mm diameter and smaller shall be galvanized iron threaded pipe with malleable iron fittings.

- a. The water piping shall be extended to all fixtures, outlets and equipment from the gate valves installed in the branch near the riser.
- b. The cold water system shall be installed with a fall towards a main shutoff valve and drain. Ends of pipes and outlets shall be capped or plugged and left ready for future connections.
- c. Mains and Branches
  - i. All pipes shall be cut accurately to measurements and shall be worked into place without springing or forcing. Care shall be taken so as not to weaken the structural portions of the building.
  - ii. All piping above the ground shall be run parallel with the lines of the building unless otherwise indicated on the Plans.

- iii. All service pipes, valves and fittings shall be kept at sufficient distance from other work to permit finished covering not less than 12.5mm from such work or from finished covering on the different service.
  - iv. No water piping shall be buried in floors, unless specifically indicated on the Plans and approved by the Architect/Engineer in Charge.
  - v. Changes in pipes shall be made with reducing fittings.
- d. Valves and Hose Bibbs
- i. Valves shall be provided on all supplied fixtures as herein specified.
  - ii. Valve shall not be installed with its stem below the horizontal. All valves shall be gate valves unless otherwise indicated on the Plans.
  - iii. Valves up to and including 50mm diameter shall be threaded ends, rough bodies and finished trimmings, except those on chromium plated brass pipe.
  - iv. Valves 63mm in diameter and larger shall have iron bodies, brass mounted and shall have either screws or flange ends.
  - v. Hose bibbs shall be made of brass with 12.5mm inlet threads, hexagonal shoulders and 19mm male.
3. Fixtures, Equipment and Fastenings
- a. All fixtures and equipment shall be supported and fastened in a safe and satisfactory workmanship as practiced.
  - b. All fixtures, where required to be wall mounted on concrete or concrete hollow block wall, fasten with brass expansion bolts. Expansion bolts shall be 6mm diameter with 20mm threads to 25mm in to solid concrete, fitted with loose tubing or sleeves of proper length to acquire extreme rigidity.
  - c. Inserts shall be securely anchored and properly flushed into the walls. Inserts shall be concealed and rigid.
  - d. Bolts and nuts shall be horizontal and exposed. It shall be provided with washers and chrome plated finish.
4. Plates and Flashing
- a. Plates to cover exposed pipes passing through floor finished walls or ceiling shall be fitted with chrome plated cast brass plates or chrome plated cast iron or steel plates on ferrous pipes.
  - b. Plates shall be large enough to cover and close the hole around the area where pipes pass. It shall be properly installed to insure permanence.
  - c. Roof areas penetrated by vent pipes shall be rendered watertight by metal sheet flashing and counter flashing. It shall extend at least 150mm above the pipe and 300mm along the roof.

5. Protection and Cleaning

- a. During installation of fixtures and accessories and until final acceptance, protect items with strippable plastic or other approved means to maintain fixtures in perfect conditions.
- b. All exposed metal surfaces shall be polished clean and rigid of grease, dirt or other foreign materials upon completion.
- c. Upon completion, thoroughly clean all fixtures and accessories to leave the work in polished condition.

6. Inspection, Warranty Test and Disinfection

All pipes, fittings, traps, fixtures, appurtenances and equipment of the plumbing and drainage system shall be inspected and approved by the Architect/Engineer in Charge to ensure compliance with all requirements of all Codes and Regulations referred to in this Specification.

a. Drainage System Test

- i. The entire drainage and venting system shall have all necessary openings which can be plugged to permit the entire system to be filled with water to be level of the highest stack vent above the roof.
- ii. The system shall hold this water for full 30 minutes during which time there shall be no drop greater than 102mm.
- iii. Where only a portion of the system is to be tested, the test shall be conducted in the same manner as described for the entire system except that a vertical stack 3.00m highest horizontal line to be tested may be installed and filled with water to maintain sufficient pressure or water pump may be used to supply the required pressure.
- iv. If and when the Architect/Engineer in Charge decides that an additional test is needed, such as an air to smoke test on the drainage system, the Contractor shall perform such test without any additional cost.

b. Water Test on System

- i. Upon completion of the roughing-in and before connecting fixtures the entire cold water piping system shall be tested at a hydrostatic pressure 1 ½ times the expected working pressure in the system during operation and remained tight and leak-proofed.
- ii. Where piping system is to be concealed the piping system shall be separately in manner similar to that described for the entire system and in the presence of the Architect/Engineer in Charge or his duly designated representative.

c. Defective Work

- i. All defective materials replaced and tested will be repeated until satisfactory performance is attained.

- ii. Any material replaced for the satisfactory performance of the system made shall be at the expense of the Contractor.
- iii. Caulking of screwed joints or holes will not be permitted.

d. Disinfection

- i. The entire water distribution system shall be thoroughly flushed and treated with chlorine before it is operated for public use.
- ii. Disinfection materials shall be liquid chlorine or hypochlorite and shall be introduced in a manner approved as practiced or approved by the Architect/Engineer in Charge into the water distribution system.
- iii. After a contact period of not less than sixteen hours, the heavily chlorinated water shall be flushed from the system with potable water.
- iv. Valves for the water distribution system shall be opened and closed several times during the 16 hours chlorination treatment is done.

7. As-Built Drawings

Upon completion of the work, the Contractor shall submit two sets of prints with all as-built changes shown on the drawings in a neat workmanship manner. Such prints shall show changes or actual installation conditions of the plumbing system in comparison with the original drawings.

**F. Submittals**

- d. Submit manufacturer's product specifications including certified laboratory test reports and other data as required to show compliance with the specification. Submit drawings showing details and sections, system thickness, and any other detailed information necessary to describe installation. Submit samples for each plumbing fixtures and accessories as specified in the pay item in manufacturer's memorandum size, and core samples of type required by project.
- e. Submit shop drawings and secure approval prior to installation.
- f. Immediate submittal of samples to secure final approval from SBMA should be initiated by the Contractor; Project delay(s) concerning delivery schedule, and the likes, is/are not considered ground(s) for project time extension.

**G. Method of Measurement and Basis of Payment**

The accepted quantities shall be paid for based on the contract unit price for each of the particular pay items that are listed in the Bill of Quantities. The payment shall constitute full compensation for the installation of sanitary and water lines, plumbing fixtures and accessories, sewerage and storm system including all labor, equipment, tools and incidentals necessary to complete the work prescribed in this item.

Note that the exact amount incurred and billed by the Service Provider due to water connection application and installation shall be paid.

Payment will be made under:

<b>Pay Item No.</b>	<b>Description</b>	<b>Unit of Measurement</b>
F.1	Sewer pipes and fittings	Lump Sum
F.2	Cold Water pipes and fittings	Lump Sum
F.3	Storm pipes and fittings	Lump Sum

**F.4 Catch Basins and Handholes**

**F.4.1 Concrete Formworks**

**F.4.2 10 mm dia. Grade 40 Reinforcing Steel Bars**

**F.4.3 Cast-in-place Concrete**

**A. Description**

These Items shall consist of furnishing of all necessary materials, tools, equipment and labor necessary to complete the execution of the masonry works using Concrete Hollow Blocks as shown on the Plans and herein specified.

**B. Material Requirements**

The materials shall conform to the requirement of ITEM 1046 – Masonry Works, DPWH D.O. No. 80 Series of 2018 and specified in the following specifications:

**Hydraulic Cement**

Hydraulic Cement shall conform to the applicable requirements of Portland Cement under Division II: Concrete Works.

**Aggregates**

Aggregates shall conform to the applicable requirements of Concrete Aggregates under Division II: Concrete Works.

**Water**

Water shall conform to the applicable requirements of Water under Division II: Concrete Works.

**Reinforcing Steel**

Reinforcing steel shall conform to the applicable requirements of Reinforcing Steel under Division II: Concrete Works.

Use 10 mm dia. deformed steel for dowels, vertical and horizontal bars on CHB at ground floor exterior and interior walls:

Vertical Bars	: 600mm O.C.
Development	: 264mm
Horizontal Bars	: every 3 layers
Reinforcement	: 10mm grade 33
Splicing	: 348 mm

Use 12mm dia. deformed steel for dowels, vertical and horizontal bars on CHB Parapet Walls:

Vertical Bars	: 400mm O.C.
Development	: 264mm
Horizontal Bars	: every 3 layers
Reinforcement	: 10mm grade 33
Splicing	: 348 mm

### **Mortar**

- a. Mortar Proportions: Mortar shall consist of sand, cement and water conforming to the requirements under Division II: Concrete Works, mixed in the proportion of one (1) part cement to three (3) parts sand by volume, sufficient water to obtain the required consistency.
- b. Mortar Joint: shall be uniform in thickness and the average thickness of any three consecutive joints shall be approximately 9.5 mm. Changing in coursing or bending after the work is started will not be permitted. Exposed joints shall be tolled slightly concave with rounded or other approved slightly larger than the width of the edge of the units, compressing and seating the surface of the joints.
- c. Jointing and Cleaning: Upon completion of all work, all holes in joints of exposed masonry surface shall be filled by completely filling with mortar. After jointing all exposed masonry surfaces shall be wetted and then cleaned with a solution of 10 percent by volume of muriatic (hydrochloric) acid applied with stiff fiber brushes leaving the masonry clean. Masonry surfaces shall be rinsed down with clean, clear water.

### **Concrete Hollow Blocks (Non-load bearing CHB)**

Width, height and length of concrete hollow blocks shall be  $\pm 3.20$  mm from the specified dimension shown on the Plans.

CHB – 150, 125 & 100 mm concrete hollow blocks shall be of standard machine vibrated and shall have fine and even texture and well define edges. The minimum compressive strength is 350 psi.

### **Cement Plaster Finish**

All hollow blocks wall surface to be applied with plain cement finish will be cleaned and evenly wet slashed with a wash of neat cement and sand followed by 1:3 cement mortar mix 3/8" thick which shall be applied with wooden float.

## **C. Construction Requirements**

### **C.1 Concrete Hollow Blocks**

#### **C.1.1 Mixing**

Concrete shall be mixed well using the proportion specified by the Engineer. Hand mixing shall be done, using shovels, on a level concrete slab or steel plate. Mix aggregate and cement until the color is uniform. Spread the mixture out, sprinkle water over the surface and mix. Continue with this process until the right amount of water has been mixed in. Mixture shall be free from impurities such as dirt and grass.

If batch mixer is used, accurate timing and measuring devices shall be observed as per manufacturer's recommendation.

#### **C.1.2 Moulding**

Hand operated machines shall be used as manufacturer's recommendation.

The mould of a powered machine should be filled until six (6) to eight (8) cycles of compaction are required to bring the compacting head to its stops.

Demoulding or removal of the mould shall be done carefully so that the fresh blocks are not damaged. Fresh blocks shall be protected from rain with plastic sheets or any suitable covering during the first day and from the drying effects of the sun and wind until curing starts.

#### **C.1.3 Curing**

After being removed from the mold, the Concrete Hollow Blocks (CHB) shall be covered with a plastic sheet or tarpaulin and kept damp and shaded for at least seven (7) days in order to effectively cure. This can be achieved by continually spraying them with water or keeping them under water in tanks.

#### **C.1.4 Installation**

1. All masonry work shall be laid true to line, level, plumb and neat in accordance with the Plans.
2. Units shall be cut accurately to fit all plumbing ducts, opening for electrical works, and all holes shall be neat patched.
3. No construction support shall be attached to the wall except where specifically permitted by the Engineer in Charge.
4. Masonry unit shall be sound, dry, clean and free from cracks when placed in the structure.
5. Proper masonry units shall be used to provide for all window, doors, bond beams, lintels, plasters etc., with a minimum of unit cutting.
6. Where masonry units cutting is necessary, all cuts shall be neat and true to line.
7. Units shall be placed while the mortar is soft and plastic. Any unit disturbed to the extent that the initial bond is broken after initial positioning shall be removed and re-laid in fresh mortar.
8. Mortar should not be spread too far ahead of units, as it will stiffen and lose plasticity, especially in hot weather. Mortar that has stiffened should not be used. ASTM C270, Standard Specification for Mortar for Unit Masonry required that mortar be used within 2 ½ hours of initial mixing.

#### C.1.5 Reinforcement for Concrete Hollow Blocks

Requirement shall be done in accordance with the structural Plans as to size, spacing and other requirements of Reinforcing Steel under Division II: Concrete Works.

#### C.1.6 Finish and Appearance

1. All units shall be sound and free of cracks or other defects that interfere with the proper placement of the unit or significantly impair the strength or permanence of the construction. Minor cracks, incidental to the usual method of manufacture or minor chipping resulting from customary methods of handling in shipment and delivery, are not grounds for rejection.
2. Where units are to be used in exposed wall construction, the face or faces that are to be exposed shall not show chips or cracks, not otherwise permitted, or other imperfections when viewed from a distance of not less than 6.1 m under diffused lighting.



- a. Five (5) percent of a shipment containing chips, not larger than 25.4 mm in any dimension, or crack not wider than 0.5 mm and not longer than 25 percent of the nominal height of the unit, is permitted.
3. The color and texture of units shall be specified by the purchaser. The finished surfaces that will be exposed in place shall conform to an approved sample, consisting of not less than four (4) units, representing the range of texture and color permitted.
4. A shipment shall not contain more than five (5) percent of units, including broken unit that do not meet the requirements of the above provisions.

#### C.1.7 Sampling and Testing for Concrete Hollow Blocks

Method of Sampling for Quality Test shall be as follows:

1. One (1) Quality Test for every 10,000 units or fraction thereof.
2. Six (6) specimens to be submitted for one (1) quality test in which three (3) specimens for Compression Test and the remaining three (3) for Moisture Content and Water Absorption.

Units shall be tested in accordance with ASTM C140, Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units and ASTM C426, Standard Test Method for Linear Drying Shrinkage of Concrete Masonry Units.

#### C.1.8 Storage and Handling of Masonry Works

The blocks shall be stored in such a way as to avoid contact with moisture at site. They shall be stock-piled on planks or other supports free from contact with ground and covered to protect against wetting. The block shall be handled with care and damaged units shall be rejected.

### **D. Method of Measurement and Basis of Payment**

The accepted quantities, measured as prescribed, shall be paid for based on the contract unit price for each of the particular pay items that are listed in the Bill of Quantities. The payment shall constitute full furnishing and placing all materials including all labor, equipment, tools and incidentals necessary to complete the work prescribed in this Item.

Payment will be made under:

<b>Pay Item No.</b>	<b>Description</b>	<b>Unit of Measurement</b>
F.4.1	Concrete Formworks	Square Meter
F.4.2	10mm dia. Grade 40 Reinforcing Steel Bars	Kilograms
F.4.3	Cast-in-place Concrete	Cubic Meter