Section VI. Specifications

Notes on Specifications

A set of precise and clear specifications is a prerequisite for Bidders to respond realistically and competitively to the requirements of the Procuring Entity without qualifying or conditioning their Bids. In the context of international competitive bidding, the specifications must be drafted to permit the widest possible competition and, at the same time, present a clear statement of the required standards of workmanship, materials, and performance of the goods and services to be procured. Only if this is done will the objectives of economy, efficiency, and fairness in procurement be realized, responsiveness of Bids be ensured, and the subsequent task of bid evaluation facilitated. The specifications should require that all goods and materials to be incorporated in the Works be new, unused, of the most recent or current models, and incorporate all recent improvements in design and materials unless provided otherwise in the Contract.

Samples of specifications from previous similar projects are useful in this respect. The use of metric units is mandatory. Most specifications are normally written specially by the Procuring Entity or its representative to suit the Works at hand. There is no standard set of Specifications for universal application in all sectors in all regions, but there are established principles and practices, which are reflected in these PBDs.

There are considerable advantages in standardizing General Specifications for repetitive Works in recognized public sectors, such as highways, ports, railways, urban housing, irrigation, and water supply, in the same country or region where similar conditions prevail. The General Specifications should cover all classes of workmanship, materials, and equipment commonly involved in construction, although not necessarily to be used in a particular Works Contract. Deletions or addenda should then adapt the General Specifications to the particular Works.

Care must be taken in drafting specifications to ensure that they are not restrictive. In the specification of standards for goods, materials, and workmanship, recognized international standards should be used as much as possible. Where other particular standards are used, whether national standards or other standards, the specifications should state that goods, materials, and workmanship that meet other authoritative standards, and which ensure substantially equal or higher quality than the standards mentioned, will also be acceptable. The following clause may be inserted in the SCC.

Sample Clause: Equivalency of Standards and Codes

Wherever 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 Procuring Entity's Representative's prior review and written consent. Differences between the standards specified and the proposed alternative standards shall be fully described in writing by the Contractor and submitted to the Procuring Entity's Representative at least twenty-eight (28) days prior to the date when the Contractor desires the Procuring Entity's Representative's consent. In the event the Procuring Entity'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.

These notes are intended only as information for the Procuring Entity or the person drafting the Bidding Documents. They should not be included in the final Bidding Documents.

REPUBLIC OF THE PHILIPPINES
Department of Health
NATIONAL CENTER FOR MENTAL HEALTH
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BIDS AND AWARDS COMMITTEE

SECTION VI: SPECIFICATIONS

INSTRUCTION: Bidders must state here either "Comply" or "Not Comply" against each of the individual parameters of each Specification stating the corresponding performance parameter of the equipment offered. Statements of "Comply" or "Not Comply" must be supported by evidence in a Bidders Bid and cross-referenced to that evidence. Evidence shall be in the form of manufacturer's un-amended sales literature, unconditional statements of specification and compliance issued by the manufacturer, samples, independent test data etc., as appropriate. A statement that is not supported by evidence or is subsequently found to be contradicted by the evidence presented will render the Bid under evaluation liable for rejection. A statement either in the Bidders statement of compliance or the supporting evidence that is found to be false either during Bid evaluation, post-qualification or the execution of the Contract may be regarded as fraudulent and render the Bidder or supplier liable for prosecution subject to the provisions of ITB Clause 3.1(a) (ii) and/or GCC Clause 2.1(a)(ii).

Technical Specifications Particulars	Requirements	Statement of Compliance
1. **Application of the INFRASTRUCTURE PROJECT NO. 02-2023** (Completion of Patient's Finance Records Building)	**SCOPE OF WORKS** **I. GENERAL REQUIREMENTS** a. Mobilization. b. Construction of temporary site facility. c. Fabrication and installation of Construction billboard. d. Fabrication and installation of COA billboard. e. Fabrication and installation of Health and Safety Reminder billboard	
	II. CONCRETE AND MASONRY WORKS a. Restoration of some wall plastering around electrical outlets. b. Construction of plant boxes and walk way access to Pavilion 2	
	III. CEILING SYSTEM WORKS a. Fabrication and installation of required ceiling joists, fiber cement board, etc. to complete the ceiling system.	
	IV. ELECTRICAL WORKS	

	a. Installation and testing of required electrical fixtures and lines to complete the electrical system. b. Testing and Commissioning.	
	V. TILING WORKS a. Installation of required 60cm x 60cm homogenous floor tiles on the whole storage area.	
	VI. PAINTING WORKS a. Application of painting materials and finishes on all required surfaces (Exterior and Interior wall, Ceiling and etc.). Acrylic paint for interior walls and ceiling and elastomeric paint for exterior walls. b. Painting of miscellaneous pre-finished items such as grills, railings and wooden cabinet as per plan specifications.	
	VII.CLEARING/GRUBBING/HAULING a. Hauling of demolished materials and excavated adobe soil. b. Clearing of site from construction debris in preparation for project turn-over. c. Submission of required engineering documents and As-built plans. d. Demobilization.	
CONFORME:		
(Company Name)		

GENERAL TECHNICAL SPECIFICATIONS

GENERAL REQUIREMENTS

1.1 Scope of Work

The contractor shall furnish all materials, equipment, transportation, tools, supplies plant, labor and suspension required to complete satisfactorily the construction mof the proposed subject project as shown on the drawings and specifications.

The contractor shall coordinate his work with all parties (implementing section/end-users) to ensure proper phasing of the approved schedule of work based from their submitted PERT – CPM.

1.2 Mobilization and Demobilization

The contractor upon receipt of the notice to proceed shall immediately mobilize and transport his plant, equipment, materials and employees to the site and demobilize or remove the same at the completion of subproject.

1.3 Contractors Field Office and Facilities

1.3.1 Security

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

Identification cards of construction workers and engineers and other staff shall be supplied by the contractor. It should be worn at all times inside the NCMH compound.

1.4 Compliance with Contract Requirements

1.4.1 Control of On Site Construction

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

(1) Review of Contract Documents to make sure that material, equipment and products have been tested, submitted and approved.

(2) Physical examination of materials and equipment to assure its conformity to the specification, plans, shop drawing and other data.

(3) As soon as the work has been started, the Contractor shall conduct initial inspection to check and review the workmanship in compliance with the contract requirements for a particular item of work.

(4) The Contractor shall perform these inspections on a regular basis to assure continuing compliance with the contract requirements until completion of a particular type of work.

1.4.2 Pre-Construction Meetings

Prior to the start of construction, Contractor's material men whose presence is required must attend pre construction meetings as directed for the purpose of discussing the execution of work. In this conference the contractor determines the necessary precautions in mitigating the effect of construction on environmental aspect and medical services.

1.4.3 Progress Meetings

Progress meetings shall be called upon by the following for the purpose of discussing the implementation of the work:

(1) When called upon by the Project Manager of NCMH or his representative for the purpose of discussing the execution of work. Contractor's material men whose presence is necessary or requested must attend progress meetings. Each of such meeting shall be held at the time and place designated by the Project Manager or his representative. Decisions and instructions agreed in these meetings should be binding and conclusive on the contract. Minutes of these meetings shall be recorded and reasonable number of copies shall be furnished to the Contractor for distribution to various materials men and vendors involved.

(2) The Contractor may also call for a progress meeting for the purpose of coordinating, expediting and scheduling the work. In such meeting Contractor's material men or vendors, whose presence is necessary or requested to attend.

1.4.4 Progress Report

The Contractor shall prepare and submit progress reports to the project manager every 15 days after the start of the project up to its completion, showing the work completed, work remaining to be done, status of construction equipment and materials at the site.

1.4.5 Survey Data

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

1.4.6 Shop Drawing

The Contractor shall submit and furnish shop drawings and samples accompanied with the provision of the Conditions of Contract. The term "Shop Drawing" as used herein

shall be understood to include detailed design calculations, construction drawings, lists, graphs supplemental specifications and others.

(1) Transmittal forms shall be filled out in typewritten or ink with no alterations or inter line actions unless initialized dates before submittal. Shop drawings shall be submitted as the same size as the contract drawing when practicable, but in no case it shall exceed dimension of the contract drawings. The Contractor shall make preliminary check of all shop drawings for compliance with the contract documents and he shall stamp each print with statement of compliance with the requirements. The contractor may authorize his supplier to deal with the Project Manager with regard to the shop drawings, however ultimate responsibility for accuracy and completeness in the submittal shall remain with the Contractor.

(2) The said shop drawing and transmittal shall be submitted at time sufficiently early, to allow review of the same by the Project Manager and to accommodate the rate of construction progress required under the contract. The contractor shall submit print copies of show drawing with transmittal forms, and copies of brochures with transmittal forms as required by the Project Manager.

(3) Any shop drawing and samples submitted not accompanied by transmittal forms of where all applicable items on the forms are not completed would be returned for resubmission. The Project Manager who will check and evaluate mentioned shop drawing would retain print copy for his file and return the rest to the Contractor with notation. Returned show drawing marked "No Exceptions Taken" or "Make Corrections Noted", means formal revision of said drawings will not be required. If it is remarked "Amend Resubmit" or "Rejected-Resubmit", the Contractor shall revise said drawing and shall submit revised drawing to the Project Manager.

(4) The Project Manager shall process the submission and indicate the appropriate action on the shop drawing and transmittal forms. Construction of an item shall not commence before the Project Manager has reviewed the pertinent shop drawing and returned it to the Contractor, marked as mentioned above. Revisions indicated on shop drawing shall be considered as changes necessary to meet the requirements of the contract drawings and specifications, and shall not be taken as the bases of claims of extra work. The Contractor shall have no claim for damages or extension of time due to any delay, resulting from having Contractors make the required revisions, unless review by the Project Manager was delayed beyond reasonable period of time and unless the Contractor can establish that such delay in revision in delay of the project.

(5) Resubmitted procedure shall follow the same procedure as the initial submittal.

1.4.7 Construction Photographs

The Contractor shall take photographs during the process of the work once a month, all taken where directed by the Project Manager. At the completion of the project final photographs shall be sent to the NCMH project in charge. The photographs shall be neatly labeled, dated and identified in a little box in the lower right hand corner, showing the date of exposure, project name, location and direction of view or may take using geotag application. The contractor shall take photographs of the existing condition of the site before commencement of work to ensure such status. Any damage on the site/area due to contractor's on-going work shall be restored at his own expense.

All photograph files shall be retained by the Contractor until completion of the work at which time they shall become the property of the NCMH.

1.4.8 Cleaning-up

The Contractor shall at all times keep the construction area, including storage used by him, free from accumulations of waste material or rubbish. All construction wastes should be brought out by the contractor with approved request/gate pass from the hospital authority. Upon completion of construction, the contractor shall restore all areas that were damaged and affected by the construction works and leave the site and premises clean, neat and workmanlike conditions satisfactory to NCMH.

1.4.9 Documents to be submitted

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

(1) The guarantee required by the Conditions of Contract and any other extended guarantees stated in the technical sections of the specifications.

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

1.5 Method of Measurement and Basis of Payment

Cost incurred in providing and maintaining Contractor's field office, temporary light and power, temporary toilet, water and security services, including cost of mobilization and demobilization, and cost incurred in the compliance of contract requirements shall not be measured and paid separately, same shall be deemed to be included in the cost of other items work, as part of the Contractor's construction overheads.

2.0 SITE WORK

2.1 Scope of Work

The section includes site clearing, earthwork and site drainage and utilities construction of septic tank in accordance with the drawing and specification.

2.2 Applicable Documents

The latest edition of the following Standards and Specifications shall form part of these specifications:

ASTM	American Society for Testing and Materials.
C131	Resistance to Abrasion of Small Size Coarse Aggregate by use of the Los Angeles Machine.

D698	Moisture-Density Relations of Soils using 5.5 lb. (2.5 kg) Rammer and 12 in (304.8 mm) Drop
D1556	Density of Soil in place by the Sand Cone Method
D1557	Moisture-Density Relations of Soils using 10 lb. (4.5 kg) Rammer and 18 in (457 mm) Drop.
D2487	Classification of Soils for Engineering Purposes
C-14	Concrete Sewer, Storm Drain and Culvert Pipe.
C-76/C-497	Class II Reinforced Concrete pipes
A-74	Cast Iron Soil Pipes and Fittings

Other pipes shall conform to the latest ASTM requirements.

2.3 Material Requirements:

2.3.1 Selected Fill Material

Selected fill materials shall consist of pit run gravel, disintegrated rock, sand and or other similar materials. The material shall not contain more than 35% passing the No. 200 sieve; and fraction of the material passing the No. 40 sieve shall have a liquid limit not greater than 35 and plasticity index not greater than 12.

2.3.2 Gravel Fill

Gravel fill shall consist of hard durable particles or fragments of stones or gravel. It shall be clean and free from vegetable matters, lumps or balls of clay and other deleterious material. The proportion of the material passing the 0.075 mm (No. 200) sieve shall not be greater than 0.66 (two thirds) of the fraction passing the 0.425 mm (No. 40) sieve. The fraction passing the 0.425 mm (No. 40) sieve shall have a liquid limit of not more than 25 plasticity index of not more than 6 as determined by AASHTO T89 and T90. Gravel bedding 100 mm (4") in depth or as shown on the drawing shall be placed, spread and compacted through tamping and underneath footing, slabs, on fill and slabs on grade.

2.3.3 Base and Sub-Base Course

Aggregate sub-base shall consist of pit run gravel, talus rock, disintegrated granite, sand, shale cinders, coral or other similar materials, or additional filler for blending, selected under the direction of the Consultant. The maximum dimension of any particle shall not be greater than two-thirds of the required thickness of the layer in which it is to be placed. Over-sized materials if present shall be removed at the pit by screens, or hand picking. If necessary, to obtain proper uniformity, mixing shall blend additional filler. The fraction to aggregate sub-base materials including any additional filler passing the 0.075 mm (No. 200) sieve shall not be more than two-thirds (2/3) of that passing the 0.425 mm (No. 40) sieve. The fraction passing the 0.425-mm sieve shall have a liquid limit not greater than 25 and plasticity index of not more than 6.

2.3.4 Concrete for Site Work

Concrete materials for the site work shall be in accordance with Section 3, concrete, of these specifications. Cement shall be proportioned as follows:

Description of Structure	Compressive Strength
1.) For sidewalks, walkways, catch basins and man holes	1.72 Mpa (2500 psi) at 28 days

2.4 Construction Requirements

2.4.1 Earthwork

1. Site Demolition

All superficial obstructions shall be demolished and removed from the site to disposal areas approved by the Consultant.

2. Filling and Backfilling

Fill and backfill materials shall consist of suitable materials from excavation or from approved borrow areas, and shall be free from roots, wood scraps, vegetations, and other extraneous materials and from large clods of earth or stones greater than 100 mm. No fill material shall be placed until the surface to be filled has been approved.

(a) Filling and Backfilling for Structures and Trenches

Filling around structures shall be placed as the construction work progress, insofar practicable. Backfilling of trenches shall progress as rapidly as construction and testing will permit. In backfilling pipe trenches, approved backfill shall be compacted in 200 mm layers to a depth of 150 mm over the pipe and the remainder of the trench depth shall be backfilled and compared in 300 mm layers; for trenches under road pavements and concrete floor slabs, the backfill shall be placed and compacted in 200 mm layers to the top of the trench.

(b) Embankment Construction

Before placing fill material, the surface upon which it will be placed shall scarified to insure good bonding between the existing surface and the fill material. Where embankments are to be constructed on sloping ground with slopes steeper than 1 vertical to 4 horizontals, the new fill shall be cut into or benched as the embankment is brought up in layers in such a manner that the embankment material will bond with the existing surface. The size of each bench shall be subject to approval and shall depend on the equipment to be used.

3. Equipment

Equipment used in the performance of the work shall be subject to approval of the project manager. The quality of compaction equipment shall be adequate to assure thorough uniform compaction as rapidly as material is placed. In all areas not accessible to rollers or compactors, the fill shall be compacted with mechanical hand tampers.

4. Compaction

In fill areas, the top 200mm shall be compacted to a density of at least 95 percent of maximum density and the remaining depth of fill to not less than 90 percent pf maximum density; except that under ramps pavements and concrete floor slabs, compaction shall not be less than 85 percent of the maximum density for the entire depth of fill. Unless otherwise indicated where the existing sub-grade in cuts have a density of less than 95 percent, all materials to a depth of 150mm or to such greater depth as maybe specified, shall be compacted not less than 95 percent of the maximum density. Soil moisture during compacting shall be controlled between 80 and 110 percent of optimum moisture content determined in accordance with AASHTO Method T99-84.

5. Disposal of Surplus Excavated Materials

Any surplus material from the excavation and grading operations shall be disposed and spread in spoil areas designated by the Project Manager except for the materials classed as rubbish and debris, which shall be deposited in the spoil areas shall be graded to a reasonably uniform surface.

2.4.2 Soil Poisoning and Termite Control

This item shall consist of furnishing and applying soil treatment for termite control.

At the time soil poisoning is to be applied, the soil to be treated shall be in friable condition with low moisture content so as to allow uniform distribution of the toxicant agents. Toxicant shall be applied at least twelve (12) hours prior to placement of concrete, which shall be in contact with treated materials.

Treatment of the soil on the exterior sides of the foundation walls, grade beams and similar structures shall be done prior to final grading and planting or landscaping work to avoid disturbance of the toxicant barriers by such operations.

Areas to be covered by concrete slab shall be treated before placement of granular fill used as capillary water barrier at a rate of 12 liters per square meter with Type 1 working solution after it has been compacted and set to required elevation.

1. MATERIAL REQUIREMENTS

Termite control chemicals or toxicants shall be able to immediately exterminate termites or create barriers to discourage entry of subterranean termites into the building areas. The toxicants maybe classified into the following types and according to use.

1.1 Type I Liquid Termite Concentrate

This type of toxicant shall be specified for drenching soil beneath foundations of the proposed buildings. The concentrate shall be diluted with water in the proportion of 1 liter of concentrate materials to 65 liters of water or as specified by the manufacturer.

1.2 Type II Liquid Termicide Ready Mixed Solution

This type of toxicants that comes in ready mixed solution shall be used as wood preservative by drenching wood surfaces to the point of run-off.

2. CONSTRUCTION REQUIREMENTS

Before any termite control work is started, the contractor shall undertake thorough examination of the site so that the appropriate method for soil poisoning can be applied. The Contractor shall coordinate with other related trades through the Engineer to avoid delay that may arise during the different phases of application of the termite control chemicals.

2.1 Soil Poisoning and Termite Control Treatment

2.1a When soil show termite infestation, this method shall be applied. The building area shall be thoroughly drenched with Type 1 working solution at the rate of 24 liters per square meter.

When Powder Termicide is to be applied to eradicate subterranean termites, careful application and precaution shall be given considering that this toxicant is fatal to animal and human lives.

2.1b Prior to application of soil poisoning chemical, the soil to be treated shall be in friable condition with low moisture content so as to allow uniform distribution of the toxicant agents. Toxicant shall be applied at least twelve (12) hours prior to placement of concrete, which shall be in contact with treated materials.

2.1c Treatment of the soil on the exterior sides of the foundation walls, grade beam and similar structures shall be done prior to the final grading and planting or landscaping work to avoid disturbance of the toxicant barriers by such operations.

2.1d Areas to be covered by concrete slap shall be treated before placement of granular fill used as capillary water barrier at a rate of 12 liters per square meter with Type I working solution after it has been compacted and set to required elevation.

2.1e Where the application of wood preservative is necessary, the Contractor shall use Type II working solution as recommended by the manufacturer.

All wood materials not pressure treated shall be treated with Type II ready mixed solution as herein called for or as directed by the supervising Architect or Engineer.

2.1f The Contractor shall give in Service Guarantee covering the treatment of termite infestation or the repetition of the above stated termite control services without extra cost to the Owner if any infestation of recurrence or infestation occurs during the guarantee period of one year.

2.4 Method of Measurement and Basis of Payment

Measurement of accomplished quantities shall be of the ff. methods:

(1) Lump sum payment shall be provided for the following:

a. Site demolition and clearing shall be deemed to include the cost of salvaging of materials, preservation, storage and disposal.

b. Construction of septic tank holding and water storage tank (including reservoir and piping) shall be considered to include the cost of excavation and backfilling, bedding, forms and false work, curing, fasteners and incidentals to complete each item of work.

c. Subsurface waste water infiltration system shall be deemed to include the cost of excavation, disposal, gravel filter, silt barrier, overflow and distribution pipes and incidental works to complete this item.

(2) The volume of structural excavation to be paid for shall be the number of cubic meters measured in original position of material acceptably excavated in conformity with the plans or as directed by the Payment of quantities accomplished shall be deemed to include the cost of disposal of excess and unsuitable materials, shoring, bracing, water control works and other operations necessary to complete this item.

(3) The volume of backfill materials from excavation; fill materials from common borrow; top soiling; construction of embankment; sub-base and base course preparations; and compacted gravel fill bedding to be paid for shall be the number of cubic meters measured in the final position of materials actually provided and installed to include where applicable, furnishing, placing, spreading and compaction in accordance with the plans and specifications and disposal of excess and unsuitable materials, if any.

(4) The work item for soil treatment is as stipulated in Sub-Section 2. Soil Poisoning, shall be measured and paid for per square meter area of works accomplished and accepted. Payment of work accomplished shall be made based on dimensions shown in the drawings and stipulated in the specifications.

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

3.0 CONCRETE

3.1 Scope of Work

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

3.2 Reference Standards

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

ACI	American Concrete Institute
211-01	Standard Practice for Selecting Proportions for Normal and Heavyweight Concrete
301	Concrete, Structural for Building
309R	Standard Practice for Consolidation of Concrete

318	Building Code Requirements for Reinforced Concrete
AASHTO	American Association of State Highway and Transport Officials
M173	Concrete Joint Sealer, Hot-Poured Elastic Type Performed Expansion Joint Filler Concrete
ASTM	American Society for Testing Materials
C33	Concrete Aggregates
C31	Standard Practice for Making, Curing Concrete Test Specimen in the Field
C39	Comprehensive Strength of Cylindrical Concrete Specimen
C42	Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
C94	Standard Specification for Ready-Mixed Concrete
C143	Standard Test Method for Slump of Portland Cement Concrete
C150	Portland Cement, Specification for
C309	Liquid Membrane-Forming Compounds for Curing Concrete

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3.3 Material Requirement

3.3.1 General

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

3.3.2 Cement

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

3.3.3 Water

Water shall be clean and free from injurious amounts of oils, acids, alkalics, salts, organic materials, or other substances that may be deleterious to concrete or steel.

3.3.4 Admixtures

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

3.3.5 Fine Aggregates

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

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

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

3.3.6 Coarse Aggregates

Coarse aggregate shall consist of washed gravel, crushed stone or rock, or a combination thereof conforming to ASTM C33. The coarse aggregate, as delivered to the batching plant, shall have uniform and stable moisture content. The approval of deposits shall not be construed as constituting the approval of all materials taken from the deposits, and the Contractor shall be held responsible for the specified quality of all such materials used in the work. Coarse aggregate shall consist of hard, tough, durable, clean and uncoated particles. All foreign materials and dust shall be removed by adequate shall be generally rounded or cubical, and the coarse aggregate shall be reasonably free from flat and elongated particles. A thin, flat and elongated particle can be as defined as a particle having a maximum dimension greater than five times the

minimum dimension. The coarse aggregate shall be graded from fine too coarse. It shall be separated into size groups.

The grading of the aggregate within the separated size groups as delivered to the mixer shall be as follows:

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

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

Use 38 mm (1 ½") coarse for footings

3.3.7 Reinforcing Steel

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

3.3.8 Forms

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

3.3.9 Storage of Materials

(1) Cement

Cement in bags shall be stored in a suitable weatherproof structure as airtight as practicable. Floors shall be elevated above the ground, sufficient to prevent the absorption of moisture. Bags shall be stocked close together to reduce circulation of air but shall not be stocked against outside walls. The manner of storage shall permit easy access for inspection and identification of each shipment. Cement that has been stored for so long that there may be doubt of its quality shall be tested by standard mortar tests

to determine its suitability for use, and shall not be used without approval of the Project Manager.

(2) Aggregates

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

(3) Reinforcing Steel

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

3.4 Construction Requirements

3.4.1 Concrete Proportion

The proportion of all materials in concrete shall be subject to the approval of the Project Manager. The Contractor shall employ at his own expense an approved testing laboratory, which shall design the mix proportions in accordance with ACI 211.01. Strength requirements shall be 20.7 Mpa (3000 psi) for footing, columns, beams, slabs and stairs lavatory counter, wash basin; 17.2 Mpa (2500 psi) for ramp, slab on grade, water meter box, grease trap; and 13.8 Mpa (2000 psi) for lean concrete or as required by the Project Manager. The adequacy of this test shall be verified by a test on a minimum of 6 cylinders; 3 tested at 7 days, 3 at 38 days, in accordance with ASTM C39.

If, at any time during construction, the concrete resulting from the approved mix design proves t be unsatisfactory for any reason such as too much water, lack of sufficient plasticity to prevent segregation, honeycomb, etc., or insufficient strength, the Contractor shall notify the testing, laboratory and the Project Manager. The laboratory shall modify the design, subject to the approval of the Project Manager until satisfactory concrete is obtained.

3.4.2 Concrete Samples and Testing

Sampling and testing of concrete shall be done by and at the expense of the Contractor. Throughout the period that the concrete is being poured into cylinder shall be taken from fresh concrete from the forms.

The rests shall be made for each 10 cu. m. of concrete or fraction thereof for each portion of structure as may required by the Project Manager as follows:

1. Compression Tests:

At least two (2) sets of samples consisting of three (3) concrete cylinder specimens per set shall be made. Fresh concrete shall be placed inside standard 150 x 300 mm cylindrical mould in three (3) separate equal layers and rodded separately with 25 strokes with a 16 mm diameter. Surface shall be leveled with trowel and samples are to be labeled to identify the class, strength of concrete, date taken and part of structure samples are taken. The samples shall be cured in accordance with ASTM C31.

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

2. Slump Tests

Slump tests shall be performed t determine the consistency or workable fluidity of freshly mixed concrete in the field. At least two slump tests shall be made and the sample of concrete from which the test specimens are made shall be representative of the entire batch and shall conform to the procedures are specified in ASTM C143.

Freshly mixed concrete shall be placed in the slump cone 100 x 200 mm x 300 mm in three (3) equal layers. Each layer shall be rodded with 25 strokes of the 16-mm diameters tamping rod with the tamping end rounded to a hemispherical tip of the same diameter. The mould shall be leveled and lifted at once and then measure the slump action immediately by getting the difference in height between the height of the mould and the top of the slumped concrete.

The slump tests shall be performed to determine the consistency or workable fluidity of freshly mixed concrete in the files. At least two slump tests shall be made and the sample of concrete from which test specimens are made shall be representative of the entire batch and shall conform to the procedures as specified in ASTM C143.

The slump for vibrated concrete shall be 50 mm minimum and 100 mm maximum, provided that the required strength of concrete is obtained.

3. Test Reports

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

4. Additional Tests

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

3.4.3 Mixing Concrete

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

1. Site Mixed Concrete

All structural concrete shall be machine-mixed for at least 1 ½ minutes after all materials including water are in the mixing drum. The time elapse between the introduction of the mixing of water to the cement and aggregate and placing of the concrete in final position shall not exceed 45 minutes. Placing of the material in the mixer shall be done in such a way that the first batch of concrete materials in the mixer shall contain sufficient excess cement, sand and water to coat the inside of the drum without reducing the cement content of the mix to be discharged. The retempering of concrete, placing additional cement, aggregate or water during mixing period shall not be permitted.

No hand mixing shall be allowed, except in case of emergency of breakdown during pouring operations, subject to the approval of the Project Manager.

3.4.4 Concrete Placing

Concrete shall be placed only after all formworks, materials to be embedded, and preparation of surface involved in the placing have been inspected and approved by the Project Manager. The Contractor shall provide equipment and shall employ methods that will minimize separation of aggregates from the concrete mix.

Water shall be removed from excavation before concrete is deposited. Flow of water shall be diverted through proper side drains to a pump, or removed by other approved methods to avoid washing over freshly deposited concrete. Hardened concrete, debris and foreign materials shall be removed from the interior of forms and from inner surfaces of mixing and conveying equipment. Reinforcements shall be secured in position, inspected and approved before pouring concrete. Runaways shall not be provided for wheeled concrete-handling equipment's, such equipments shall not be wheeled over reinforcement nor shall runaways be supported by reinforcements.

Concrete shall be handled from the mixer to the place of final deposits as rapidly as practicable by methods, which shall prevent segregation or loss of the ingredients. It shall be deposited in the forms in approximately layers and as nearly as practicable in its final position to avoid re-handling.

Conveying or handling of concrete by the use of inclined chutes or pipes of more than three (3) meters shall not be permitted. Dumping of concrete into buggies, buckets or wheelbarrows with a free fall of more than one (1) meter shall not be permitted. When placing operations would involve dropping of concrete more than 1 ½ meters, it shall be deposited through a sheet metal or other approved conveyor. AS for practicability, the conveyor shall be kept full of concrete during placing and their lower ends shall be kept buried in the newly placed concrete. After the initial set of concrete, the forms shall not be jarred and no strain shall be placed on the ends of the reinforcing bar, which are being projected.

Concrete in columns shall be placed in one continuous operation. Concrete in girders, beams and slabs in superstructures shall be poured in a monolithic and continuous manner. No construction joint shall be allowed on any part of the structure without the approval of the Project Manager.

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

3.3.4 Protection and Curing

1. General

Concrete surfaces exposed to conditions causing premature drying shall be protected as soon as possible with canvas, straw, burlap and or other satisfactory material and kept moist; or if the surfaces are not covered they shall be kept moist by flushing or sprinkling, as directed by the Project Manager. All concrete shall be moist cured for a period of not less than seven (7) consecutive days after placing by an approved method or combination of methods applicable to local conditions.

2. Moist Cutting

The surface of the concrete shall be kept continuously wet water for a period of seven (7) days, by spraying or covering with burlap or other approved material thoroughly saturated with water and keeping the covering wet by spraying or intermittent hosing. Water for curing shall be generally lean and free from any element, which might cause objectionable staining or discoloration of the concrete.

3.4.6 Repairs to the Concrete

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

shall be reworked to a smooth surface to match adjacent areas and to present a new appearance.

3.4.7 Forms

(1) General

Forms shall be used whenever necessary to confine the concrete and shape it to the required lines and dimensions, or to protect the concrete from contamination. Forms shall have sufficient strength to withstand the pressure resulting from placement and vibration of the concrete, and shall be maintained rigidly in correct position. Forms shall be sufficiently tight to prevent loss of mortar from the concrete. Forms for exposed surface shall be lines with form grade plywood. Bolts and roods used for interval ties shall be so arranged that when the forms are removed, they shall not be less than two (2) centimeters from the formed surface.

Removal of forms or shoring is subject to approval by the engineer, and under no circumstances shall bottom form and shoring be removed until after the members have acquired sufficient strength to support their weight and the load thereon. Forms shall remain in place for a minimum time as follows:

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

Beams ------- 14 days

Re-shore immediately after stripping beams and girders that support subsequent formwork.

(2) Cleaning and Oiling Forms

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

(3) Removal of Forms

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

Element	Time Period
Walls columns, sides of beams and girders,	
and slabs on grade	1

Pan joist forms (side only): 76 cm (30 inches)		
Wide or less over 76 cm (30 inches) wide		3
Where design live:	less than the dead load	greater than dead load
Joist, beam or girder, soffits: (Clear span between structural support):		
Under 3.00 m (10 ft.)	7	4
3.00 m (10 ft) to 6.00 m (20 ft.)	14	7
Over 6.00 m (20 ft)	21	14
One-way floor slabs: (Clear span between structural supports)		
Under 3.00 m (10 ft)	4	4
3.00 m (10 ft) to 6.00m (20 ft)	7	4
Over 6.00m (20 ft)	10	7

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

3.4.8 Reinforcing Steel

(1) General

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

(2) Cutting and Bending

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

The Project Manager may require the contractor to prepare and submit bar cutting schedule prior to fabrication of reinforcing steel bars.

(3) Placing Reinforcement

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

3.4.9 Joints in Concrete

(1) Construction Joints

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

(2) Expansion and Contraction Joints

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

(3) Preformed Strips

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

3.5 SELF-LEVELLING CONCRETE

3.5.1 Standards – All aspects of the installation must be in accordance with the requirements of BS 8204 (Installation of Resilient floor coverings) and BS 8203 (Installation of textile floor coverings) and supplementary specifications.

3.5.2 Preparation – The surface should be free of oil, grease, weak material, laitance and contaminates. All sub-floors, including concrete and highly polished surfaces (e.g.

power floated concrete, marble, terrazzo and ceramic tiles), should always be mechanically textured. The floor should then be either vacuumed or swept clean.

3.5.3 All surfaces must be primed with Acrylic Primer (Porous substrates) and Epoxy Primer (non-porous substrates).

3.5.4 Mixture – in single units of the ratio of 20kg powder to 3.6-3.8 liters of water. Do not add extra water because long term performance may be impaired. A 65mm by 40mm flow ring should be filled with pre-mixed Self-levelling compound. Using a Flow chart, a spend ratio of between 230mm and 260mm should be obtained to ensure that a correct mix is passing through the pump. After applying the material onto the primed floor, simply use a hand trowel to spread. Maximum application thickness of 6mm on to epoxy primer.

3.5.5 Protection and Completion – Ensure the screed is not subject to draughts during the first 6 hours of curing as this may lead to cracking and crazing. Take up doorways with polythene to prevent air movement. Prevent contamination by following trades (e.g. plastering), including water spillage.

3.5.6 Cleaning-Immediately after use all tools and equipment should be cleaned with water. Cured material can be removed mechanically or by acid etching.

3.6 Methods of Measurement and Basis of Payment

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

a. The volume to be paid for under this item shall be the number of cubic meters of concrete placed and accepted. Payment for concrete shall be constructed to include the cost of forms, false works, curing, fasteners and accessories necessary to complete this item of work.

b. The quantities for reinforcing steel to be paid for shall be the final quantity placed and accepted in the completed structure. No measurement for payment shall be made for splices added by the Contractor for his convenience. Payment for the accepted quantities for reinforcing steel shall be deemed to include the cost tie wires, separators, wire, supports, hangers, chairs and other materials necessary to complete the work.

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

4.0 MASONRY

4.1 Scope of Work

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

4.2 Applicable Documents

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

ASTM America Society for Testing Materials

C144	Standard Specification for Aggregate for Masonry Mortar
PSA	Product Standards Agency Publications (Philippines)
PNS 16	Specification of Concrete Hollow Blocks

4.3 Material Requirements

4.3.1 Concrete Hollow Blocks

Concrete hollow blocks shall be a standard product of recognized manufacturer to PNS 16, as indicated on the drawings. Exterior and interior masonry units shall be non-load bearing units. However, load-bearing units may be provided in lieu of non-load bearing units. For non-load bearing units, the required compressive strength shall be 25 kg/cm^2 or 2.48 Mpa.

4.3.2 Cement, Reinforcing Steel and Water

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

4.4 Construction Requirements

4.4.1 Workmanship

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

4.4.2 Mortar Mixing

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

4.4.3 Proportion of Mortar Grout

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

4.4.4 Use of Fine and Coarse Grout

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

4.4.5 Mortar Joints

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

4.4.6 Concrete Masonry Unit

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

4.4.7 Reinforcement

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

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

For Vertical Bars:

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

(24") on centers

100 mm (4") CHB	-	10 mm (3/8") dia. At 600 mm
For horizontal bars:	-	12 mm (1/2") dia at 600 mm (24") on center (every third Course) for 150 mm (6") and 100 m (4") CHBs.

4.4.8 Bounding and Anchoring

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

4.4.9 Grout Placement

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

4.4.10 Tests and Test Reports

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

4.5 Method of Measurement and Basis of Payment

In measuring the quantity of masonry units for payment, the dimensions to be used shall be as shown on the plans or as directed by the Project Manager in writing. Projections extended beyond the faces of the wall shall not be included. The area to be paid for in this section shall be the number of square meters of concrete masonry wall and partition placed and accepted in accordance with the plans and specifications. Payment of accomplished work shall be deemed to include the cost of mortar grout, reinforcing steel, tie wires, false work and other necessary works to complete this item.

The quantity of concrete masonry walls and partition shall be paid for at the contract unit price shown in the bid schedule, which payment shall be full compensation for furnishing and placing all materials, labor, equipment, tools and incidentals necessary to complete the work.

5.0 FINISHES

5.1 Scope of Work

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

5.2 Material Requirement

5.2.1 Plastering Works

(1) Portland Cement

Cement shall conform to ASTM standard C150, Type 1

(2) Sand

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

(3) Lime

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

(4) Water

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

5.2.2 Tile Works

(1) Floor Tiles

Tiles shall be standard grade, unglazed vitrified tiles, and 6 mm thick. Color and pattern shall be as specified in the drawing or as approved by the Project Manager.

For all other floor finishes not indicated below, refer to schedule or call-out specifications of finishes indicated in the plan.

- 600 mm x 600 mm Glazed Wall Tiles;
- 600mm x 6000mm Homogenous Floor Tiles;
- 600mm x 600mm Non-Skid Floor Tiles;
- Granite (verify dimension on plan).

Accessories – soap holders and paper holders shall be recessed type to follow color specified.

Vinyl floor tile wherever indicated in the drawing shall be 2.0mm thick or otherwise specified in the plans. Verify color, design and pattern.

Rubber Nosing shall be installed on all stair steps.

5.2.3 Seamless Vinyl (Rolled Vinyl)

DESCRIPTION

Total Thickness	EN 428	mm	2.00
Weight	EN 430	g/sq. m	2750
Width of sheet	EN 426	cm	200
Length of sheet	EN 426	lm	20
Coverage	-	sq. m	40
Tile size	EN 427	mm	-

CLASSIFICATION

Norm/Product Specification	-	-	EN 649
	ASTM F 1913-04	-	Compliant
European Classification	EN 685	class	34-43
Fire rating	AS ISO9239	kW/m²	10.4
	-	Smoke%/min	90
Slip resistance	AS4586-2013 (App A)	group	P4
	AS4586-2013 (App D)	group	R9
Static electrical propensity	EN 1815	kV	<2

PERFORMANCE

Wear resistance	EN 660.2	mm²	≤2.0
Wear group	EN 649	group	T
Type binder content	ISO 10581	type	I

Dimensional stability	EN 434	%	≤0.40	
Residual indentation	EN 433	mm	~0.02	
Castor chair test (type W)	EN 425	-	OK	
Thermal conductivity	EN 12 524		W/(m.K)	0.25
Colour fastness	EN 20 105 – B02	degree	≥6	
Surface treatment Evercare™	-		-	
Chemical product resistance(1)	EN 423	class	OK	
Anti-bacterial activity >99% (E. coli – S. aureus-MRSA)(2)	ISO 22196		- inhibits growth	

ENVIRONMENT/INDOOR AIR QUALITY

VOC	ASTMD5116	mg/m²/hr(24hr)	<0.005
Certification	-	-	Floorscore®

(2) GROUT MATERIALS

As required by the Project Manager or as follows:

Portland Cement Grout:

Scratch Coat: 1 part Portland cement to 5 parts damp sand to 1/5 part hydrated lime.

Mortar Bed: 1 part Portland cement to 5 parts sand to ½ part hydrated lime.

Bond Coat: neat Portland cement paste.

(3) Wall and Wainscoting Tiles

It shall be 6-mm thick, standard grade, glazed vitrified tiles. Color and pattern shall be as shown in the drawing or as approved by Tiles shall be free from lamination, serrated edges, chipped off corners and other imperfections affecting their quality, appearance and strength.

5.2.3 Paints

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

1. Material Requirements

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

2. Preparation of Surfaces

Inspect all surfaces in regard to their suitability to receive a finishing. In the event that imperfection due to materials or workmanship appear on any surfaces after the application of the paint the coat of any correction shall be borne by the contractor. Damage to any painted finished due to carelessness or negligence of other shall be corrected.
Neutralizer shall quality surface conditioner to be diluted with water neutralize lime activity in new exterior and interior concrete surfaces improving paint adhesion and durability.

Touch all knots, pitch streaks and sappy spots with shellac or other approved sealer. Putty nail holes, cracks, etc., after the first coat with non-shrinking putty of a color to match that of the finish.
Prepare masonry works surfaces to be painted by removing all dirt, dust, oil and grease stain sand efflorescence. Masonry surfaces to be painted shall be free from alkali and thoroughly dry before paint is applied. Before applying succeeding coats, primers and undercoats shall be completely integral and performing the function for which they are specified. Properly prepare and touch up all scratches, abrasions, or any other disfigurement and remove any foreign matter before proceeding with following coat. Do not apply final coat on interior work until after other trades are finished with their work in any given area in normal sequence and all materials and debris removed and the premises left in satisfactory broom clean condition as approved. Remove or protect hardware accessories plates, lighting, fixtures and similar items placed prior top paintings, reposition or remove protection upon completion of each space. Disconnect equipment adjacent to walls where necessary move to permit painting wall surfaces, and following completion of painting, replace and reconnect. Except where otherwise noted or specified all paints shall be applied in three (3) coats (priming body and finish coats). Each coat shall be roller applied (except as otherwise noted) spread evenly and in full covering body.

3. Patching Compound, patching compound shall be fine powder material that can be mixed into putty consistency with oil base primers and paints to fill minor surface dents and imperfections.

4. Natural Wood Paste Filler, wood paste filler shall be quality filler ready mixed in can for filling and sealing open grains of interior wood. It shall produce a level finish for succeeding coats of paints, lacquer and other related products.

5. Application

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

6. Paint Schedule

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

Exterior walls

Cement plaster over concrete use:

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

Exterior and interior Work

Frames steel windows and grating use:

1. Wash all metal surfaces with mineral sprints or detergents to remove any dirt or grease before applying materials. Where rust or scale is present,

wire brush or sand paper clean before painting. Treat rusty portions with Metal Etching Solution # 71 or approve equivalent. Rinse and let dry.

2. Coat PRIMER paint
3. Coats QD Enamel

Interior Work

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

1. 1 priming coat flat washable paint
2. 2 finish coat semi gloss paint.

Cabinets

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

5.3 Construction Requirements

9.3.1 Cement Finish on Masonry Walls

(1) General

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

(2) Mixing of Plaster

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

(3) Proportioning Plaster

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

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

(4) Application of Plaster

Surface to receive plaster must be free from structural defects and shall be thoroughly dampened prior to application of plaster.

Plaster base coats shall be applied with sufficient pressure and the plaster shall be sufficiently plastic to provide good bond on masonry base. The base coat shall be compacted and straightened to a true surface without the application of water and the entire surface shall be floated to receive the finish coat. The finish coat shall be applied to a thickness approximately 3 mm before the scratch coat has set. Maximum finish free from blemishes or irregularities. Trawling shall be continued until the finish surface sets. Immediately after setting, surfaces shall be soured vigorously with clean burlap or cement bag paper or brush to remove the sheen finish produced by trawling.

Plaster work shall be finished level, plumb, square and true, within a tolerance of 3mm in meters without waves, blisters, pits, crazing, discoloration, projections or other imperfections. Plaster work shall be formed carefully around angles and contours, and well up to screens. Special care shall be taken to prevent consequent dropping of applications. There must be no visible junction marks where one day's work adjoins another. Finished work shall be protected in an approved manner to prevent damage.

(5) Portland Cement Plaster

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

(6) Patching and Pointing

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

(7) Curing and Protection

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

(8) Cleaning

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

5.3.2 Cement Finish on Concrete Floor Slabs

(1) General

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

(2) Finishing Requirements

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

(3) Finishing Procedures

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

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

(4) Screened Finish

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

(5) Floated Finish

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

(6) Trowelled Finish

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

(7) Broomed Finish

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

(8) Mixing of Red Cement

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

(9) Application of Cement Finishes

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

5.3.3 Other Cement Finish

(1) Patching of Surface Defects

Before tile is applied with a dry-set mortar bed, the structural floor shall be tested for levelness or uniformity of slope by flooding it with water. Areas with ponds shall be filled, leveled and resetting before the setting bed is applied. The slab shall be soaked thoroughly with clean water on the day before the setting bed is applied. Immediately preceding the application of the setting bed, the slab shall again be wetted thoroughly but, no free water shall then be applied not more than 1.5 mm thick. The mortar shall be spread until its surface is true and even and thoroughly compacted, either level or sloped uniformly for drainage, where required. A setting bed, as far as can be covered with the tile before the mortar have reached its initial set, must be placed in one (1) operation, but in the event that more setting mortar has been placed that can be covered, the unfinished portion shall be removed and cut back to a clean leveled edge.

(b) Application of Floor Tile

All tiles to be soaked in clean water to a minimum of one (1) hour before they are installed. Placing tile on a wetted cloth in a shallow pan before installing shall damp absorptive mounted tile. Before the initials set has taken place in the setting bed, a skim of Portland cement mortar 75 mm to 1.5 mm thick may be hand over the setting bed plain Portland cement. 75 mm and 1.5 mm thick may be hand dusted uniformly over the setting bed and worked lightly with a trowel or brush until thoroughly damp. The tiles shall then be pressed firmly upon the setting bed, and carefully tapped into the mortar until true and even with the place of the finished floor base. Tapping and leveling shall be completed within one (1) hour after placing tiles. Borders and defined lines shall be laid before the field or body of the floor. Where floor drain is provided, the floor shall be sloped properly to the drains. Cutting of tiles, where necessary, shall be done along the outer edges of the tile against trim, base, thresholds, pipes, built-in fixtures and similar surfaces and shall be geared and joined carefully. Tiles shall be secured firmly in place, and loose tiles or tiles sounding hollow shall be removed and replaced to the satisfaction of the Project Manager. All lines shall be kept straight, parallel and true all finished surface brought to true and even planes.

(4) Wall Tiling

(a) Preparation of Surfaces

Scratch coat shall be applied on prepared surface to serve as backing for wall tiles, not less than 24 hours or more than 48 hours before starting the tile setting. Temporary screeds shall be applied to the scratch coat to provide a true and plumb surface to the proper distance back from the finished wall. The setting bed shall be applied, rotted and floated flushed with the screeds over an area n greater than will be covered with the tile while the bed remains plastic. The thickness of the setting bed shall not exceed 20 mm and the mortar shall not be tempered.

(b) Application of Wall Tile

Tiles shall be soaked in clean water for a minimum of one (1) hour before they are installed. A skim coat Portland cement mortar mixed with water to the consistency of thick cream. 75 mm thick shall be applied to the mortar setting bed, or to the back of each tile. The tiles shall then be pressed firmly upon the setting bed and tapped until flush and even plane of the other tiles. The tiles shall be applied before the mortar bed has taken its initial set. Intersections and returns shall be formed accurately. All lines shall be kept straight and true; and all finished corners rounded. Horizontal joints shall be maintained level and vertical joints plumb alignment.

(5) Jointing

Joints shall be parallel and uniform in width, plumb, level and in alignment. End joints in broken-joint shall be made, as far as practicable, on the centerline of the adjoining tiles. Joint widths shall be uniform and measured to accommodate the tiles in the given spaces with a minimum curing.

(6) Grouting

Grouting shall be done using the approved materials of the Project Manager. Grouting shall be done as soon as the mortar beds have sufficiently set. All cement shall be Portland cement, colored or white, as required. Where light colored mortar is required in joints, mixture of white cement and non-fading mineral oxide shall be used to produce the desired color. The quantity of mineral oxides shall not exceed 10% of the volume of the cement in any case.

(7) Cleaning

Upon completion of grouting, the tile shall be thoroughly cleaned and maintained in this condition until completion of the contract.

5.3.5 Painting

(1) General

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

(2) Color and Samples

The Project Manager shall in accordance with the color schemes shown in the drawings or as direct all colors.

Sample panels of selected colors, as least (1) meter square in area shall be prepared for approval by the Project Manager prior to the application.

(3) Workmanship

Skilled workers shall do all work in a workmanlike manner. Paints shall be evenly applied and free from sags, runs, crawls and other defects. All coats shall be of proper consistency and well brushed out or rolled on so as to show a minimum brush or rolled marks. Brushes or rollers shall be clean and in good condition.

All coats shall be thoroughly dry before the succeeding coat is applied. Allow at least twenty-four (24) hours or more between applications of coat. For exterior painting during rainy season, allow one (1) week drying time before the succeeding coat is applied.

Painting coats as specified are intended to cover surfaces perfectly, its surfaces are not fully covered, further coats shall be applied to attain the desired evenness of the paint application. All finishes shall be uniform as to sheen, color and texture. Paint may be applied by spray method, except when, in the opinion of the spraying in any particular

application would produce unsatisfactory results. The Contractor shall provide all drop cloths and other covering requisite to the protection of the floors and other work.

Each surface shall be inspected carefully before applying any finish; and if surface is not in proper condition, they shall be notified to that effect in writing, otherwise the Contractor shall be held responsible for any defects in the finishes arising there from. Should a coat of paint be applied to a certain area and defects shall be knocked out and re-plastered by the Contractor and repainted to the satisfaction of the Project Manager.

(4) Inspection of Surfaces

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

(5) Concrete Surfaces

(a) Surface Preparation

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

(b) Finishing:

For exterior and interior concrete surfaces and all other surface with cement plaster finish, use flat concrete paint with the specified brand approved by the Project Manager.

First Coat- Apply flat concrete paint thinned with ½ liter water per 4 liters of paint; tint with latex tinting color to closely match color of topcoat or use premixed paint. Dry for 3 to 6 hours.

Intermediate Coat- Repair all minor surface imperfection with paint putty made by mixing paint with patching compound powder. Let it dry for 24 hours, and then smoothen the surface with sand paper, before applying the intermediate coat.

Final Coat- Apply semi-gloss or gloss paint tinted with latex tinting color to the shade specified.

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

(6) Wood Surfaces

(a) Surface Preparations

Plane the surface of wood with sandpaper to remove roughness, loose edges, slivers, slingers then clean to remove dust. All frames in contact with concrete or plaster shall

be treated with an anti-termite solution or solution or equivalent before applying paints. Set the nail heads into the wood, fill holes, cracks and defects. Dry for three (3) hours and clean surface with sandpaper to smoothen the surface.

(b) Finishing

For all woodwork, use gloss latex house paint with the specified brand approved by the Project Manager.

First Coat- Apply paint thinned with ½ liter water per 4 liters of paint.

Second Coat- Apply latex thinned with latex tinning colors to the shade specified for 4 to 6 hours.

5.4 Method of Measurement and Basis of Payment

The finished area to be paid for under each item shall be measured by the number of square meter painted surfaces accepted in accordance with the plans and specifications. The cost of plastering works, tinting color, thinner, sand paper, putty including mixing, application, curing, false work and protection work shall be deemed to be included in the contract unit price for each pay item as shown in the bid schedule.

The finished area to be paid for tiles surfaces shall be measured by the number of square meter accepted in accordance with the plans and specifications. The cost of tile trims, plastering, grout adhesive, rubber nosing and other required materials as per plans shall be deemed to be included in the contract unit price for each pay item as shown in the bid schedule.

The accepted quantities measured as stipulated above shall be paid for at the contract unit price for each of the particular pay item listed below, which price and payment shall be fill compensation for furnishing and placing all materials, labor, equipment, tools and incidentals necessary to completer each work item.

7.0 ELECTRICAL WORKS

6.1 Scope of Work

All work under these specifications shall consist of furnishing/cause to furnish materials, labor, tools, appliances, and all other services necessary unless otherwise indicated to complete and make ready for operation, the electrical power, lighting, and other utility system described herein and/or indicated in the electrical plans including owner-furnished equipment and fixtures. In accordance with the electrical plans and these specifications.

1) Roughing-in and wiring for lighting, power, telephone, fire alarm, nurse call, and paging system.
2) Supply and install/cause to install primary metering.
3) Supply, installation, and testing of panel boards, and disconnect switches.
4) Supply and installation of underground feeder system included in the plan to powerhouse.
5) Supply and installation of boxes, pull boxes, auxilliary gutters, wire gutters, bus bar gutters, circuit breaker gutters and the like.

6) Supply and installation of lighting fixtures, switches, ceiling fans, and power outlets.
7) Supply and installation of hangers and supports of conduits for power, feeder and sub-feeder system and auxiliary system.
8) Painting of electrical works covering conduits, boxes, hangers, gutters, and the like.
9) Testing for electrical system:
    a. Insulation resistance test
    b. Ground resistance test
    c. Continuity test
    d. Operational test
    e. Polarity check
    f. Phase balancing check

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

6.2 CODE REGULATIONS

All materials and equipments to be used in the electrical installations and construction shall be in accordance with the provisions of the latest edition of the Philippine Electrical Code and the pertinent ordinances of the municipality wherein the project is located.

All work shall comply with the rules and regulations of the local power utility company in so far as they are concerned in providing the respective permanent services to the building.

6.3 DRAWINGS AND SPECIFICATIONS

The electrical plans and these specifications are meant to be complementary to each other, and what is called for in one shall be as binding as if called for by both.

Any permanent conflict between the electrical plans and this specification and any unclear points of controversial matter in either shall be referred to the owner's assigned representative for final decision.

Upon final completion of the work herein described, the electrical contractor shall furnish the Owner two (2) copies of the "As-built" plans for future reference and maintenance purposes.

The electrical plans indicate the general layout of the complete electrical system, arrangement of feeders, circuit outlets, switches, controls, panel boards, service equipment and other work. Field verification of the scale dimensions on the plane must be made, since actual locations, distances and levels will be governed by actual field conditions.

The Electrical Contractor shall check architectural, structural and plumbing plans if necessary to resolve such conflicts. The Electrical Contractor shall notify the architect and secure approval and agreement on necessary adjustments before installation is started.

6.4 PERMITS AND INSPECTION

The Electrical Contractor shall obtain all necessary permits and certificates of electrical inspection from the proper government authorities concerned, required both for the performance of the work involved and the operation of the system upon completion of the work.

The Electrical Contractor shall pay all the fees necessary to secure the above-mentioned permits and certificates.

The Electrical Contractor shall at his own expense, reproduce the electrical plans to the necessary scale and size, complete them with all the necessary information and requirements as maybe required by the government authorities concerned with the approval of plans.

The Electrical Contractor shall coordinate with the local power company regarding the power facilities and secure approval of the power requirements.

6.5 MATERIALS AND WORKMANSHIP

All materials to be used shall be brand new, with trade name, unused, and shall in every case be the best where such standards have been established for the particular type of materials used.

Trade/brand name of materials indicated in the specifications are recommendatory in nature and are included for the purpose of uniformity in bids. If trade/brand names other than those indicated are to be used during construction, brochures and samples shall be submitted to the owner's representative for approval.

Only skilled workmen using proper tools and equipment shall be employed during the entire course of the installation work. All workmanship shall be of the best quality and all works shall be done in accordance with the best engineering practice of the trade involved.

6.6 WIRING METHOD

Lighting and Power Branch Circuit – uPVC pipes concealed in ceilings and double walls and/or embedded in concrete walls/slabs. All uPVC pipes ran underground outside of buildings shall be buried not less than 40mm below natural grade line and enclosed in concrete envelope. All concrete envelopes passing under roadways or areas accessible to vehicles shall be steel reinforced up to 1.0m from the edge of the roadway.

Low Voltage Service Entrance and All Feeders – rigid steel conduit, exposed/concealed in ceiling/double walls, embedded in concrete walls/slabs or ran underground encased in concrete.

All Other Auxiliary Layout – uPVC pipes concealed in ceilings/double walls and/or embedded in concrete walls/slabs.

Use flexible metal pipe for connection between junction boxes inside ceiling and lightings and other fixtures using approved fittings.

All boxes, cabinets and other equipments shall be flush-mounted unless specified/approved otherwise.

All boxes for lighting outlets, convenience outlets, tumbler switches and other devices shall be unless specified, galvanized pre-painted or uPVC and other approved products of reputable manufacturers. Cut ends of conduits shall be reamed and cleaned to remove burr and sharp edges. Threads cut on conduits shall be the same thread dimensions as factory cut conduit threads. Conduits joints shall be made straight and true. Elbows and offsets and changes in direction and runs shall be uniform. Bends shall be made without kinking or destroying the cross-sectional contours of the conduits. Conduit terminals shall be provided at outlet boxes and cabinets with locknuts and bushing. Conduits shall be continuous from outlet and from outlet to pull boxes and cabinets in the manner that the conduit system shall be electrically continuous.

Where conduit runs are exposed, they shall be supported at an interval of not more than 0.75 m maximum with proper clamps and bolts or expansion shields or other means of support.

All splices, taps, junction in wires larger than 8.0 sq.mm. shall be done with solderless connectors of suitable sizes and properly insulated with rubber tapes and protected by friction tapes, so that the insulation strength shall at least be equal to the insulation of the conductors they join.

Unless otherwise specified, the type of wires to be used shall either be THW or THHN.Smallest size of wire to be used for lighting and power unless otherwise indicated shall be 3.5 sq.mm.

6.7 FEEDERS

Feeders shall be laid out in accordance with the riser diagram shown in the electrical plans.

Unless otherwise specified type THW or THHN wires shall be used for feeder lines. The wires and conduits sizes shown in the electrical plans shall be the minimum sizes to be used.

6.8 WALLS SWITCHES AND RECEPTACLES

All wall switches shall be flush type and mounted 1.40 meters above finish floor line unless otherwise specified.

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

6.9 MAIN SWITCHES, TRANSFER SWITCHES, PANELBOARDS

The cabinets for the above shall be of standard sizes and shall be gauge #16. Circuit breakers shall be as specified in the plan and shall be followed at all times.

6.10 LIGHTING FIXTURES

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

All fluorescent fixtures housing shall be of US Gauge 22 minimum.

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

6.11 WATER PUMP

The Electrical Contractor shall install a complete wiring and conduit system including circuit breaker.

The Electrical contractor shall; supply, install, test and commission the water pump and accessories such as motor, starter, ground fault protection, water level controller, etc.

6.12 AUXILIARY SYSTEMS

The Electrical Contactor shall, after completion, submit a complete schematic wiring diagram of the above to the owner's representative.

Method of Measurement and Basis of Payment

The work done under this item shall be quantified per length and/or number of units as provided in the Bill of Quantities, tested and accepted to the satisfaction of the Project Manager. The accepted quantities measured shall be paid at the contract unit price and payment shall be full compensation including labor, materials (wires, pipes, fittings, etc.) and incidentals necessary to complete this Item.

Basis of Payment

All work performed and measured and as provided for in the Bill of Quantities shall be paid for the Unit Bid of Contract Unit Price which payment shall constitute full compensation including labor, materials, tools and incidentals necessary to complete this Item

NOTE: *THE CONTRACTOR'S PROPOSAL SHALL COVER ALL ITEMS AND OTHER INCIDENTAL WORKS NECESSARY TO COMPLETE EACH ITEM OF WORKS MENTIONED ABOVE. IN CASE OF DISCREPANCIES BETWEEN THE ABOVE MENTIONED SPECIFICATIONS IN THE BILL OF QUANTITIES, THE CONTRACTOR MUST IMMEDIATELY COORDINATE WITH THE CONCERNED OFFICE FOR VERIFICATION.*