SPECIFICATIONS
CONSTRUCTION OF A MULTI-PURPOSE BUILDING
FOR RIVIERA RESIDENTIAL ESTATES, SILANG, CAVITE

SECTION 1-A
SITE WORK

PART 1: GENERAL

1.01 SCOPE

This work shall consist of performing site work and earthwork for building work in accordance with the details shown on the plans. Site work shall consist of clearing and grubbing, demolition and grading to the required elevation of the Project Site. Earth work for building work shall consist of excavation for footings, foundations, walls, slabs, tanks, manholes, filling under slabs backfilling; trenching; backfilling holes resulting from removal of existing facilities; and any other earthwork, not mentioned, but necessary to complete the building work.

1.02 STANDARDS

The Contractor shall provide for the protection of the public, employees and property in accordance with the applicable requirements of the National Building Code of the Philippines and its Implementing Rules and Regulations, which by reference is made a part of this Specification, including sections relative to the protection of the public, excavation, foundation, walls, trenches and excavating equipment.

1.03 SITE CONDITION

A. Existing underground piping and conduit: The location of existing underground piping and conduit involve in the work
B. Existing surface or planted areas; Existing surfaces or planted areas that are removed, broken or damaged by the Contractor’s operation shall be restored to their original condition except as otherwise shown on the plans or specified herein. Restoration materials shall be equal or better than the original materials.

1.04 DUST CONTROL

Take appropriate action to check the spread of dust to areas within the vicinity of the project site and to avoid the creation of a nuisance in the surrounding area. Do not use water if it results in hazardous or objectionable conditions such as flooding or pollution. Comply with all dust regulations imposed by the local air pollution agency.

1.05 QUALITY ASSURANCE

A. Quality Assurance; Develop and perform quality assurance program to ensure proper materials are placed, met or exceeded.
B. The Contractor shall perform all required construction materials tests in an independent testing agency with at least five (5) years of experience on similar
projects/tests. Expenses for testing of materials/concrete samples/field density
tests shall be shouldered by the Contractor.

C. AFPRSBS Engineer shall witness the respective tests to be performed and be
furnished copies of test results.

1. For paved areas and building slabs sub-grades, perform field density tests on
sub-grades and each fill layer at the rate of one test per 100 square meters
of area of overlaying building slab or paved area.
2. For backfills, perform field density test at 15 meters maximum on center at
elevations to be determined but no greater than one meter vertical intervals
in general in each top three 200 mm fill layers.

D. The Contractor shall cooperate with the Testing agency in every respect in the
performance of the required tests.

E. If the Field Density/compaction test for slab base fail to meet the standard, the
AFPRSBS Engineer shall require additional compaction and testing at the
expense of the contractor, and may require complete removal and replacement
at the expense of contractor

1.06 SUBMITTALS

Testing agency reports: The following reports are to be submitted in triplicate copies
directly to the AFPRSBS Engineer by the Testing Agency, with the copy to the
Contractor and others where indicated.

1. Report and certification of granular fill and borrow material.
2. Field density test reports.
3. Tests on concrete aggregates

PART 2 :PRODUCTS

2.01 BACKFILL MATERIALS

A. Structure and trench backfill shall be free of organic materials, expansive soils,
trash, and stones having a maximum dimension greater than 150mm and other
deleterious material and shall be suitable for the required compaction. Gravel
without sand matrix shall not be used except as free draining granular material
beneath slabs and footings.

B. Granular fills for Building Slabs shall be clean, crushed stone or grave conforming
to ASTM C33.
C. Sand shall be clean, washed sand, free from clay or organic material graded such
that 100 percent passes the 6mm sieve, 90 percent to 100 percent passes the
4.75mm sieve and not more than 5 percent passes the 75 um sieve size.
PART 3: EXECUTION

3.01 PREPARATION

A. Reference Points: Provide and maintain throughout construction benchmarks and other reference points on and off site.

B. Preparation of the site: Maintain properly perimeter in a controlled condition relative to drainage, stability, etc. No item shall be removed from site without verification in writing from the developer prior to removal.

1. Remove all existing topsoil encountered. Removed all soils unsuitable for general fills/backfill.
2. Remove all existing concrete, masonry, rubble and paving to a depth of 600 mm below building slab areas.

C. All materials, including topsoil removed from clearing operations shall be disposed of as specified.

3.02 EXCAVATION

Excavate, for all work, to the lines and elevations required. Side forms will be required for all concrete work, unless omission of forms is requested by the contractor and accepted by the AFPRSBS Engineer. The contractor shall bear the cost of any additional concrete volume required beyond the minimum profiles and dimension of the footings or as detailed. Where forms are required, excavation shall be made sufficiently large to permit placing and removal of forms, installation of waterproofing and for inspection hereof.

A. Footing Excavation

The footing depths shown on the plans shall be changed to suit field conditions when directed by the AFPRSBS Engineer. Solid rock at or near required depths shall not be disturbed. Unsuitable material shall be excavated down to firm bearing as directed by the AFP-RSBS Engineer.

B. Limits of the excavation shall allow for adequate working space for installing materials and as required for safety of personnel. Such working space excavation shall be replaced in kind and compared at Contractor’s expense.

C. Do not excavate below elevations shown on the drawings without the written authorization of the AFPRSBS Engineer. In case of over-depth excavation for footings, this shall be backfilled with concrete or such other material recommended by the Contractor and approved by the AFPRSBS Engineer. Relative compaction shall not be less than 95 percent.

D. At locations and to the limits shown on the plans, unsuitable material below the bottom of the foundation or footing shall be removed and replaced with select backfill in accordance with placing and compacting requirements for backfill.

E. Dewatering
Excavations shall be kept clear of standing water. Water shall be removed by pumping if necessary. Water removed from excavation shall be carried away from the building site and disposed of in a manner that will not harm State or adjacent property.

F. Excavation shall not utilize blasting techniques of any type.

G. If the test results and inspection indicate that the soil/rock strata is not acceptable, the footing depth shall be increased as directed by the AFP-RSBS Engineer, or at the option of the Engineer, larger footing with a lower bearing capacity may be used.

H. Sub-grade of all footings shall be level and clean of all loose soil, dirt, debris, and standing water prior to acceptance for placing concrete.

3.03 FILLING

A. General

Prior to placing any fill and prior to compacting and sub-grade, the Contractor shall demonstrate the compaction method or methods, and the equipment that he proposes to use, will provide the degrees of compaction herein after specified. Material for fills shall consist of acceptable material obtained from required excavation on site or from borrow sources. All materials shall be reviewed by the Testing Agency and may be reviewed by the Engineer.

B. Backfill shall be placed and compacted in horizontal loose layers, spread, mix and place in such manner as to produce a uniform thickness of materials. Not more than 200 mm thick prior to compaction, and to the lines and grades shown on the plans or to original ground.

C. Granular fills for building slabs. Provide clean granular fill beneath all concrete building slabs to be placed on grade. Fill shall be placed to the depth indicated in the drawings. Compact fill with vibratory or tamping methods to key the stone into firm base and overlay with sand as required providing a smooth surface to receive the vapor barrier.

D. After structures are in place and forms are removed, wood and other debris shall be removed from excavations before placing backfill.

3.04 COMPACTATION

A. General

Unless otherwise noted below, all backfill shall be compacted to a relative compaction maximum density at optimum moisture, of 95 percent.

B. Compact Original Ground

Original ground within 400 mm of the top of concrete slabs shall be compacted to a relative compaction of not less than 95 percent.
C. Structure Backfill

Structure backfill and select backfill shall be compacted to a relative compaction of not less than 95 percent

D. Trench Backfill

Trench backfill placed beneath slabs or paved areas shall be compacted to a relative compaction of no less than 95 percent.

3.05 DISPOSAL

A. Surplus Material

Surplus material from the excavation shall be disposed of at the site of the work as directed by the Engineer. Material from the excavation shall be disposed from the premises and shall be removed and disposed of outside the right-of-way.

B. Remove and transport Debris and rubbish in a manner that will prevent spillage on streets of adjacent areas. Clean up spillage from streets and adjacent areas.

C. Comply with the Developer’s and local official’s hauling disposal regulations.

3.06 FIELD QUALITY

A. When the excavation is substantially completed to grade, the Contractor shall notify the Engineer. No concrete shall be placed until the Engineer has approved the foundation.
PART 1: GENERAL

1.01 SUMMARY

A. Provide soil treatment for termite control as herein specified for all areas and surfaces in contact with the ground.

1.02 SUBMITTALS

A. PRODUCT DATA: submit manufacturer’s technical data and application instructions.

1.03 QUALITY ASSURANCE

A. In addition to requirements of these specifications, comply with manufacturer’s instruction and recommendation for work, including preparation of substrate and application.

B. Engage a professional pest control operator, licensed in accordance with regulations of governing authorities for application of soil treatment solution.

1.04 JOB CONDITIONS

A. Restrictions: Do not apply soil treatment solution until excavating, filling and grading operations are completed, except as otherwise required in construction operations.

B. To ensure penetration, do not apply soil treatment to excessively wet soils or during inclement weather. Comply with handling and application instructions of the soils toxicant manufacturer.

1.05 DELIVERY AND STORAGE:

Insecticides shall be delivered to project site in sealed and labelled containers as supplied by manufacturer or formulator. The label shall be complete with application instructions and bear the Environmental Protection Agency registration number in accordance with the Federal Insecticide, Fungicide and Rodenticide Act or label of the Foreign Manufacturer. Temporary storage of insecticides utilized at the project site shall be allowed subject to the following: where provisions are made to prevent unauthorized entry, and where separation from water system and buildings is sufficient to prevent contamination by run-off percolation, windblown particles or vapour.

PART 2: PRODUCTS

2.01 MATERIALS: use an emulsible concentrate termiticide concentrate for dilution with water, specially formulated to prevent infestations by termites. Fuel oil will not be permitted as diluents. Provide a solution consisting of one of the following chemical
elements and concentrations. Other chemicals no classified under any of the following are not acceptable

A. Chloropyrifos: 1.0 percent in water emulsion.
B. Permethrin: 0.5 percent in water emulsion.

PART 3 : EXECUTION

A. Surface Preparation: remove foreign matter which could decrease effectiveness of treatment on areas to be treated, loosen, rake and level soil to be treated except previously compacted areas under slabs and foundations. Toxicants may be applied before placement of compacted fill under slabs, if recommended by toxicant manufacturer. Use power sprayer for soil treatment application.

B. Application Rates: Apply soil treatment solution as follows:

Under slab-on grade structures, treat soil before concrete slab are placed, using the following rates of application:

a. Apply 4 gallons of chemical solution per 10 lin. Ft to soil in critical areas under slab including the entire excavated trench for perimeter tie-beam or wall footing.
b. Apply one gallon of chemical solution per 10-sq. Ft as an overall treatment to compacted soil or gravel or other course absorbent material.
c. Apply 4 gallons of chemical solution per 10 lin. Ft of trench, for each foot of depth from grade to footing, along outside edge of building. Dig a trench 6” to 8” wide along outside of foundation to a depth of not less than 12”. Punch holes to top of footing at not more than 12” o.c, and apply chemical solution. Mix chemical solution with the soil as it is being replaced in trench.

C. At expansion joints, control joints. And areas where slabs will be penetrated, apply at rate of 4 gals. Per 10 lin. Ft. Of joint line.

D. Post signs in areas of application to warn workers that soil termiticide treatment has been applied. Remove signs where areas are covered by other construction.

E. Reapply soil treatment solution to areas disturbed by subsequent excavation. Landscape grading, or other construction activities following application.

F. The Engineer/ representation shall be present at all time during the mixing out of the Termicides with water and the actual application. No pouring of concrete shall be allowed in areas mentioned in part 3, paragraph 3.01 ‘B] and [C] without the certification/approval of Engineer that soil treatment has been completed as specified.
1.01 SCOPE

A. Furnish materials and equipment and perform labor required to complete all cast-in-place or pre-cast concrete formwork.

B. All pertinent provisions of the general condition shall form part of this section.

1.02 STANDARD AND REFERENCES

A. Where the specifications refer to a specific standard, other authoritative standards that ensure an equal or higher quality than the standards mentioned will also be acceptable it will be incumbent on the contractor to verify the equal or higher quality and submit comparative standards (both specified and proposed standards) for review.

B. All work shall be done in accordance with the minimum requirements of the National Structural Code of the Philippines (NSCP), 1992 and Building Code Requirements for Reinforced Concrete ACI 318-95 except as modified herein and the applicable provisions and recommendations of ACI standard 347, “Recommended Practice for Concrete Formwork”.

1.03 SUBMITTALS

Shop drawings of formwork when required by the AFP-RSBS Engineer shall be submitted for approval before fabrication and erection of such formwork. Thus, the Contractor shall provide four (4) sets of shop drawings

1.04 APPROVAL

A. Provide adequately braced forms that will produce correctly aligned concrete able to meet specific weights and side pressure of newly placed concrete.

B. Choose form fittings that are adequate to the purpose.

C. Exercise care in the choice of surface forms and form fittings that will be in contact with concrete.

PART 2 : PRODUCTS

2.01 MATERIALS

A. FORMS

Ally plywood that will be used shall be moisture resistant

1. For concrete works, use not less than 3/8 in. thick plywood forms.
2. Coco lumber, galvanize iron or equivalent shall be used for formworks.

**PART 3: EXECUTION**

3.01 QUALITY ASSURANCE

A. Develop a Quality Assurance Program which ensures the tightness of forming system to avoid leakage and evaluate form surface finish prior to each use to maintain concrete finish surfaces and structural integrity required in the complete work.

3.02 PREPARATION

A. Check all forms to conform to the shape, lines and dimensions of the members as called for in the plans.

B. Check all formwork for plumbness and correct alignment.

C. Provide openings in column forms for cleaning and inspection preferably at lowest points of pour lifts immediately before depositing concrete.

D. Coat all forms with nox-crete coating or other approved form oil before reinforcement is placed. Remove all surplus oil on form surfaces

3.03 FORMS AND SHORINGS

A. Removal

1. Removal of Forms: Prevent concrete damage during form removal. After placing concrete, forms shall remain in place for the following minimum time period not necessarily consecutive, where minimum temperatures specified in paragraph entitled "Curing Period and Minimum Temperatures"

<table>
<thead>
<tr>
<th>ELEMENT</th>
<th>TIME PERIOD (Days Minimum)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walls, columns, sides of beams and girders, and slabs on grade</td>
<td>1</td>
</tr>
<tr>
<td>Joist, beam, or girder soffits: Clear span between structural support</td>
<td></td>
</tr>
<tr>
<td>Under 10 feet</td>
<td>14</td>
</tr>
<tr>
<td>Under 10 feet</td>
<td>21</td>
</tr>
</tbody>
</table>
2. Special Requirements for Reduced Time Period to Form Removal:

Forms may be removed earlier than specified if ASTM C 39 test results of field cured samples from a representative portion of the structure indicate that the concrete has reached 85 percent (minimum) of the design strength.

3. Exercise due care while stripping forms and protect corners subsequently against chipping or other damage by approved means.

4. The results of suitable control tests shall be used as evidence that the concrete has attained sufficient strength to permit removal of shoring and supporting forms. Cylinders required for control test shall be made in addition to those required by this specification.

3.04 TOLERANCE LIMITS

Set and maintain concrete forms so as insure completed work within the following tolerance limits.

A. Variation from the Plumb

1. In the lines and surfaces of columns, piers, walls and risers:
   In 3.00 m (10 feet) ---------------- 6 mm (1/4 inch)

2. For exposed corner columns, control joints, grooves and other conspicuous lines:
   In 3.0 m (10 feet) -----------------6 mm (1/4 inch)

B. Variation from the level of from the grade indicated on the drawings:

1. In floors (before removal of forms), ceiling beams, soffits and risers:
   In 3.0 m (10 feet) ----------------- 6 mm (1/4 inch)
   In any way or 20 feet 6mm max) -----------------10mm (3/8 inch)
   In 12.0m (40 feet) or more -------------------10mm (3/8 inch)

2. For exposed lintels, sills, parapets, horizontal grooves. And other conspicuous lines:
   In any way or (20 feet)
   6.0m max -----------------------------6 mm (1/2 inch)

C. Variations of the linear building lines from the established position in plan and related position of columns, walls and partitions:

1. In any way or (20 feet)
   6.0 m max --------------------------------- 12mm (1/2 inch)

D. Variation in the sizes and location of sleeves, floor openings and in thickness of slabs and walls

   Openings ------------------------------------- 6mm (1/4 inch)

E. Variation in cross-sectional dimensions of columns and beams and in thickness of slabs and walls
F. Footings

1. Variation of dimension in plan
   Minus ---------------------------------------- 12mm (1/4 inch)
   Plus ---------------------------------------- 50mm (2 inch)
SECTION 2-B
CONCRETE REINFORCEMENT

PART 1: GENERAL

1.01 SCOPE

A. Furnish materials and equipment and perform labor required to complete, steel reinforcing bars, bar supports and, miscellaneous reinforcement accessories.

B. All pertinent Provisions of the General Conditions form part of this section.

1.02 STANDARDS and REFERENCES

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

B. Except as modified by governing codes and by the contract Documents, comply with the applicable provisions and recommendations of NSCP, UBC, PCA, ACI, ASTM, and AWS

C. All reinforcements shall be new billet steel with denominations and characteristics meeting the PNS 49/ASTM A615/A706 Standard.

D. Straightening of reinforcements by applying heat e.g. blow torching shall not be allowed. Pull out tests and increased anchorage, embedment and lap lengths will be required if reinforcement deformations are not in full compliance with PNS 49, ASTM A615/A706. The minimum increase will be twenty five percent additional lengths for all laps, splices, embedment, anchorages, hooks, etc.

1.03 SUBMITTALS

Shop drawings of each reinforcing steel detail and placement drawings shall be submitted for approval in accordance with the requirements of the GENERAL CONDITIONS. Installation of steel reinforcements shall not be allowed until the AFP-RSBS Engineer Has approved the required shop drawings. Shop drawings shall be in accordance with the “Manual of Standard Practice for Detailing Reinforced Concrete Structures” (ACI 315)

1.04 PROTECTION AND STORAGE

Protect steel reinforcement adequately from rusting by storing on supports above ground and provide proper cover (e.g. tarpaulins, etc)

1.05 TESTING

Tests shall conform to ASTM a370 (Methods and Definition for Mechanical Testing of Steel Products.) Testing of steel products shall be shouldered by the Contractor without additional costs to the Developer.
1.06 MEASUREMENT AND PAYMENT

For deduction or addition on the contract sum due to deletion or extra work involved, the steel reinforcement shall be measured by weight either in kilograms. The contractor shall be paid based on the steel weight as per unit prices submitted on bid breakdown.

PART 2 : PRODUCTS

2.01 MATERIALS

A. Steel Bars

1. Shall be new and free from rust, oil grease, scale, defects or kinks or other coating which will impair the bond.

2. Shall conform to the Philippines National Standard (PNS) 49 and/or to ASTM A615 (Grade 40) and ASTM A706 (Grade 60) Specification for Deformed Billet Steel Bars for Concrete Reinforcement.

PART 3 : EXECUTION

3.01 QUALITY ASSURANCE

A. Quality Assurance: Prepare a Quality Assurance Program for testing of all materials, fabrication, splices, spacing’s and welding and submit to the Construction Manager for review and approval. Perform all tests and submit reports as herein specified or as maybe required by the AFPRSBS Engineer. The Quality Assurance Testing shall be performed by an independent Testing Agency & shall be shouled by the contractor.

B. Quality Control: all reinforcing steelwork shall be subjected to detailed evaluation and tests by the AFPRSBS Engineer.

3.02 PREPARATION

A. Before placing reinforcement and before pouring of concrete, remove all loose rust, mill scale, oil, or other adhering materials, which tend to reduce or destroy bond between concrete and reinforcement.

3.03 PLACING REINFORCEMENT

A. Steel Reinforcement

1. Placing shall be in accordance with the approved shop drawings or plans furnished by the developer.

2. Reinforcement for slabs shall be secured in position by spacer bars and chairs. Spacer bars shall be lapped not less than 125mm. in slabs on ground.
Pre-cast concrete blocks may be substituted for chairs. The strength of concrete blocks shall be equal or greater than the designed strength of slab.

B. Bar Spacing

Spacing of bars shall be done in accordance with the ACI-Building Code or as follows:

1. Clear distance between parallel bars shall be one and one half (1-1/2) times the diameter bars.

2. Clear distance shall not be less than 1-1/3 times the maximum size of aggregates, nor less than 25mm (1”).

3. Where bars are used in two or more layers, the bars in the upper layers shall be placed directly above those in the lower layers at a clear distance of not less than 25 mm (1”)

3.04 OFFSET AND SPLICE IN REINFORCEMENT

A. Splices

1. Generally, avoid splices in slabs, beams, and girders at points of maximum stress splices shall be shown in the reinforcing steel shop drawings for approval of the Construction Manager.

2. Splices in adjacent bars shall be staggered a maximum distance of forty (40) bars diameters.

B. Offsets

Where changes in cross section of columns occur, longitudinal bars shall be offset in a region where lateral support is afforded. The slope of offset shall not be more than one (1) horizontal to six (6) vertical. The ties shall be spaced 75 mm (3”) on center for a distance of 300 mm (1-foot) below and above the point offset.
PART 1: GENERAL

1.01 SCOPEx

A. Furnish material and equipment and perform labor required to complete proportioning mixing, placement, curing and finishing concrete.

B. All pertinent provisions of the General Conditions form a part of this section.

1.02 STANDARDS and REFERENCES

A. Where the Specifications refer to a specific STANDARD, other authoritative standards which ensure an equal or higher quality than the standards mentioned will also be acceptable. It will be incumbent on the Contractor to verify the equal or higher quality and submit comparative standards (both specified and proposed standards) review.

B. Except as modified by governing codes and by the Contract Documents, comply with the applicable provisions and recommendations of NSCP, UBC, PCA, ACI, ASTM, and AWS.

C. This specification section shall govern all concrete work for the complete project except where more stringent or specialized requirements are indicated. All work shall be performed to secure for the entire project a homogeneous concrete having the required strength surface finish, materials, durability and weathering resistance, without planes of weakness or other structural defects, and free of honeycombs, air pockets, voids, projections, offsets of plane and other defacement of concrete. Be fully responsible for any defect or damage in the building arising from faulty materials or workmanship by allowing cost for remedial measures in order to complete the work in accordance with the Contract Documents.

D. No alterations or substitutions of the structural systems shown on the drawings shall be allowed without the approval of the AFPRSBS Engineer.

E. Supervise and coordinate all phases of concreting works.

F. Construction system and techniques shall be properly selected and maintained throughout the concrete construction phase. Adequate spare equipment, parts, additional components and repair facilities shall be available for all tools and equipment.

G. All materials shall be tested and approved by the Engineer before use.

1.03 PROTECTION AND STORAGE

A. Cement – store in dry, water tight, properly ventilated structure.
B. Aggregate – prevent from inclusions of foreign matter. Maintain storage piles in a manner that will afford good drainage. Prevent segregation of particle size.

C. Admixtures – store to prevent deterioration or intrusion of foreign matters.

1.04 SUBMITTALS

A. Concrete Mix Design

B. Samples

Submit samples of cement and aggregates proposed for exposed architectural concrete work for approval, giving names, sources and descriptions of the material.

C. Reports

Submit 3 copies of mix design and test results.

D. Notifications

Submit schedule of pours and location at least two (2) days prior to date of pouring for approval.

1.05 MEASUREMENT AND PAYMENT

For deduction or addition on the contract sum due to deletion or extra work involved, measure cast-in-place concrete in cubic meter and base payment on the actual poured volume using the unit prices on the bid breakdown.

1.06 DESIGN STRENGTH OF CONCRETE

All strengths of concrete shall be Footing, Tie Beams, Columns and Beams-3,000 psi in 28 days slab on ground, canopy-2,500 psi in 28 days.

PART 2: MATERIALS

2.01 MATERIALS

A. Cement

Use only one brand of cement throughout the duration of the project. Portland cement shall conform to the Standard specifications for Portland cement (ASTM Designation C-1510 latest revision) for type 1 Portland cement.

B. Concrete Aggregates

1. Use well-graded, clean hard particles of gravel or crushed rock conforming to the “STANDARD SPECIFICATIONS FOR CONCRETE AGGREGATES” (ASTM Designation C-33 latest revision).
2. Maximum size of aggregate shall not be larger than 1/5 of the narrowest dimension between sides of the forms nor larger than 20mm (3/4") of the maximum clear spacing between reinforcing bars, and in no case larger than 38 mm (1-1/2").

C. Water

Use only potable water that is clean and free from injurious amounts of oil, acids, alkali organic materials and other deleterious substances.

D. Sand

Clean river, sand, free from organic and other deleterious matter. Sand from salt water is not allowed.

E. Concrete Additives

1. Admixtures shall be used in strict compliance with the manufacturers printed instructions and shall be certified by the manufacturer to be suitable for use during hot weather extremes.

2. Calcium chloride is not allowed. Secure approval of the AFP-RSBS Engineer before using any additive.

F. Epoxy Bonding Compound

ASTM C861, Type II, Class C if placement temperature is between 40 and 60 degree F. Provide Grade 1 or 2 for horizontal surfaces and Grade 3 for vertical surfaces.

G. Grout

Non-shrink, non-metallic grout shall be free of gas producing or gas releasing agents, oxidizing catalyst, and chlorides.

2.02 METHOD OF DETERMINING CONCRETE AND PROPORTIONS

Submit at least three (3) mix design obtained from samples made in accordance with "STANDARD METHOD OF MAKING AND CURING CONCRETE COMPRESSION and STANDARD METHOD OF TEST FOR COMpressive STRENGTH OF MOLDED CONCRETE CYLINDERS" (ASTM Designation C-39) for each strength required stating the proposed slump and the proportional weights of cement., saturated dry aggregates, and water. Theses mixes shall be tested at 2 days and 7 days to determine the projected 28-day strength. The projected-28 day strength should be 15% higher than the required ultimate strength. No substitution of materials shall be allowed without the written approval of the Engineer.
2.03 CONCRETE PROPORTIONS AND CONSISTENCY

A. Cement and Aggregate

Make proportions so as to produce a concrete mixture which will work readily into the corners and angles of the forms and around reinforcement with the method of placing materials to avoid segregation or accumulation of excess water on the surfaces.

B. Measurement

1. Measure concrete materials such that the proportions can be accurately controlled and easily checked at any time during work.

2. Conform measurement of materials for ready mixed concrete to STANDARD SPECIFICATIONS FOR READY MIXED CONCRETE. ASTM Designation C-94, where applicable.

3. Never exceed the water content by 0.5 liter per kilogram of cement for all portions in the structure. Allow job mix adjustment of water content only on permission of the AFPRSBS Engineer provided that cement is also added to keep the original water cement ratio of the design mix. Limit slumps to the following:

<table>
<thead>
<tr>
<th>Portion of Structure</th>
<th>Slump (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Columns, beams, girders, slabs</td>
<td>75-150</td>
</tr>
<tr>
<td>Foundation elements, bedded Slabs and</td>
<td>50-125</td>
</tr>
<tr>
<td>cantilevered beams and slab</td>
<td></td>
</tr>
<tr>
<td>Walls and thin vertical structures</td>
<td>100-150</td>
</tr>
</tbody>
</table>

PART 3 : EXECUTION

3.01 QUALITY ASSURANCE

A. Quality control: Concrete work shall be subject to detailed inspection and test at the plant and in the field by the Engineer. The extent, duration and amount of testing and/or evaluation are entirely at the discretion of the Engineer.

B. For both Quality Assurance Testing and Quality Control testing:

1. Facilitate preparation of samples of construction materials.

2. Inform the Engineer with at least two (2) days advance notice when concrete is to be placed. Secure approved pouring request prior to concreting.

3. Provide storage facilities for concrete test specimen

4. Provide material samples and access to materials as required for evaluation
a. In case of failed samples of concrete in-placed, a minimum of three (3) concrete cores shall be taken for each area indicated by the AFP-RSBS engineer. Said samples shall be tested according to specifications.

b. Impact hammer testing shall be limited to comparative analysis and shall not be acceptable as a basis for actual concrete strength determination.

c. Testing additional concrete specimen for early breaks, etc., for construction purposes

d. Verify the conformance of the materials (cement, aggregates, water and admixtures) to specifications in the plant prior to batching ready mix concrete.

e. For each 35 cubic meters of each different concrete type or portion thereof cast per day, perform the following tests in accordance with the applicable standards.

Five strength test using 150 millimeters x 300 millimeters cylinders per ASTM C31 (Making and Curing Concrete Test Specimens in the Field) and ASTM C39 (Compressive Strength of Cylindrical concrete Specimens made from a mix selected at random. Break two cylinders at age 7 days, and two cylinders at age 28 days, and the last cylinder at 56 days. Additional test specimen maybe casted for construction progress control purposes.

d. Slump test each truck at time of deposit: ASTM C142-74.

e. Allow for taking and performing additional test as directed up to 25 percent more than indicated. Although any test shall be allowed, the additional predominant tests will be for slump and compressive strength of concrete and cement. Test specimen maybe cured by immersion

f. Provide at least monthly tests on aggregates, cements, admixtures, grout, foaming agents, etc.

3.02 PREPARATION

A. Inspect and clean all forms and check all installation before placing concrete

B. Wet surfaces thoroughly and grout before placing concrete.

C. Clean all laitance from previous pouring and possibly expose aggregates before renewing pouring.

3.03 DEPOSITING CONCRETE

A. Do not start placing of concrete until the forms and reinforcing for the whole unit to be poured have been completed, cleaned, inspected and approved.

B. Do depositing without segregation, re-handling or flowing of concrete. Chutes exceeding 6.0m in length shall not be allowed.
C. In placing concrete, never let it drop freely for height exceeding 1.5m

D. Keep conveyors full of concrete and keep ends buried in the newly placed concrete as pouring progresses.

E. Never allow placing of concrete without vibrators. Avoid segregation due to over vibration

F. Construction Joints

1. If possible, do concreting continuously until section is complete. When stoppage of concrete operations occur, place construction joints either horizontally or vertically as indicated by the AFPRSBS Engineer and should be provided with shear keys or dowels to develop bond.

2. Roughen and clean construction joints and before placing of concrete, wet and slush with cement mortar.

G. Concrete slabs which will receive topping shall be free from dirt, greases or other foreign matter.

H. Depositing of concrete shall not be permitted if the excavated pits are filled with water.

3.04 PROTECTION

A. Hot Weather Protection: ACI 305. When air temperature or form temperature exceeds 32 degrees Celsius control concreting as follows:

1. Dampen forms, reinforcing steel and faces of previously placed concrete at construction joints.

2. Protect forms and reinforcing steel and faces of previously placed and concrete at construction joints.

3. Cool formwork to a maximum of 32 degrees Celsius.

4. Cool cement, aggregates and water to provide concrete temperature at time of mixing not exceeding 32 degrees Celsius.

5. Provide water reducing (retarding) admixture when maximum daily shade air temperature exceeds 27 degrees Celsius. When maximum daily shade air temperature exceeds 32 degrees Celsius, admixture usage may require increases above normal dosages.

6. Place curing and protective coverings as quickly as possible as the concrete hardens and finishing operations will allow. Protect concrete against premature drying and excessively hot temperature, especially high ambient heat and low humidity conditions.
7. Regardless of the above specified provisions, take all necessary additional measures to avoid flash set, excessive evaporation, plastic shrinkage cracks and excessive shrinkage.

3.05 CURING CONCRETE

A. Finished Surface

1. Keep concrete continuously wet or moist for at least one week after placing.

2. Begin curing as soon as concrete has attained initial set.

3. Spray floors and vertical surfaces with an approved curing compound. However, membrane curing compound shall not be used where floor hardener, resilient floor tile or other applied finishes or surface treatments are to be subsequently applied.

B. Use curing additives for minimum of 48 hours.

3.06 REPAIR OF CONCRETE

A. Imperfections:

1. Complete repair within 24 hours after removal of forms.

2. Remove fins neatly from exposed surfaces.

3. Remove damaged or honeycombed concrete and replace with special epoxy based surfaces.

3.07 FLOOR FINISHES

It shall be noted carefully by the Contractor to prepare slabs suitable in surface and elevation to receive finishes.

3.08 TEST OF CONCRETE

A number of tests on concrete are required during the progress of the work. At least four (4) cylindrical specimens shall be made for each test of which two shall be reserved for the 28-day test. At least one test shall be made for each day’s concreting. Samples shall be secured and molded in accordance with ASTM specification C172 and C31. The Contractor shall provide the samples to be taken at the place of deposit. The cost of transporting to the approved testing laboratory and testing of samples and sample materials that has failed the testing shall be borne by the Contractor.

The average strength of test samples representing each of class pf concrete shall be equal to or greater than the specified strength and not more than ten (10%) percent of the strength tests shall have values less than the specified strength.

Where test fail to give the required strengths, the AFPRSBS may obtain concrete core samples from the poured concrete and have their compressive strength determined.
by a competent testing authority which shall be taken as a conclusive evidence of its strength and integrity, provided the coring will not impair the safety of the structure and can be satisfactorily replaced. The cost of testing of core sample which failed to meet the specified strength shall be for the account of the contractor.

All concrete structure where the test failed to meet the specified strength using the core and load testing shall be removed immediately at the Contractors expense.

3.09 INSPECTION

The Contractor shall notify the AFPRSBS Engineer at least two (2) days prior to the scheduled concrete pouring to allow ample time for inspection. No concrete pouring shall be allowed without the written approval of the AFPRSBS Engineer.
PART 1: GENERAL

1.01 RELATED DOCUMENTS

Drawings and general provisions of contract, including General and Supplementary Conditions, shall apply to work for this section.

1.02 SUMMARY

Extent of concrete floor topping is shown on drawings or in schedule of finishes.

1.03 REFERENCES

Comply with a requirement of Section “Concrete Work” and as herein specified.

PART 2: PRODUCTS

2.01 CEMENT AND AGGREGATES

A. Portland Cement: ASTM C 150

Furnish gray cement.

B. Standard Aggregate: ASTM C 33 and as follows:

1. Fine Aggregate, consisting of sand of crushed stone screenings, clean, hard, free from deleterious matter. Grade by weight to pass sieves as follows:
   a. 3/8” : 100 percent
   b. No. 4 : 95-100 percent
   c. No. 8 : 80-90 percent
   d. No. 16 : 50-75 percent
   e. No. 30 : 30-50 percent
   f. No. 50 : 10-20 percent
   g. No. 100 : 2-5 percent

2. Coarse aggregate consisting of gravel or crushed stone, clean, heard, free from deleterious matter. Grade by weight to pass sieves as follows:

   a. ½” : 100 percent
   b. 3/8 : 30-50 percent
   c. No. 4 : 0-15 percent
   d. No. 8 : 0-5 percent
C. Miscellaneous Materials

1. Epoxy Adhesive: ASTM C 881, two-component material suitable for use on dry or damp surfaces. Provide material “Type”, “Grade” and “Class” to suit project requirements.

2. Concrete Hardener: Non-Metallic Floor Hardener. Medium Traffic. To be used also for indicated straight-to-finish concrete floor slabs.

2.02 TOPPING MIXING

A. Standard Topping:

1. Design mix to produce topping material with the following characteristics.

   a. Compressive Strength: 2,500 psi

2.03 MIXING

A. Provide batch type mechanical mixer for mixing topping material at project site. Equip batch mixer with a suitable charging hopper, water storage tank, and a water measuring device. Use only mixers which are capable of mixing aggregates, cement and water into a uniform mix within specified time, and of discharging mix without segregation.

B. Mix each batch of 2 cu. Yards or less for at least 1 1/2 minutes after ingredients are in mixer increase mixing (15 secs) additional cu. Yd. or fraction thereof.

PART 3: EXECUTION

3.01 CONDITION OF SURFACES

A. Topping Applied to hardened Concrete: Remove dirt, loose material, oil, grease, paint or other contaminants, leaving a clean surface.

   1. When base slab surface is unacceptable for good bonding, roughen surface by chipping or scarifying before cleaning.

B. Prior to placing topping mixture, thoroughly dampen slab surface but do not leave standing water. Apply specified epoxy adhesive over dampened surface. Place topping mix while epoxy adhesive is still tack.

C. Joints: Mark locations of joints in base slab so that joints in top course will be placed directly over them.

3.02 PLACING AND COMPACTING

A. Float Finish: Spread topping mixture evenly over prepared base to the required elevation and strike-off. Use highway straight edge, bull float, or Darby to level surface. After the topping has stiffened sufficiently to permit the operation, and water sheen has disappeared, float the surface at least twice to a uniform sandy
texture. Re-straighten where necessary with highway straight edge. Uniformly slope surface to drains.

B. Where joints are required, construct to match and coincide with joints in base slab. Provide other joints as shown.

3.03 TROWEL FINISH

A. After floating, begin first trowel finish operation using power driven trowels. Continue trowelling until surface is ready to receive final trowelling. Begin final trowelling when a ringing sound is produced as trowel is moved over surface.

B. Continue final trowel operation to produce finished surface free of trowel marks, uniform in texture and appearance.

C. Apply non-metallic hardener as per manufacturer’s recommendation for indicated areas.
SECTION 3-A
CONCRETE UNIT MASONRY

PART 1 : GENERAL

1.01 SCOPE

Furnish materials and equipment and perform labor required to complete concrete unit masonry.

1.02 STANDARDS AND REFERENCES

A. Where the specifications refer to a specific standard or other authoritative standards which ensure an equal or higher quality than the standards mentioned will also be acceptable. It will be incumbent on the contractor to verify which is of higher quality and submit comparative standards (both specified and proposed standards) for review.

B. Except as modified by governing codes and by the Contract Documents, the Contractor shall comply with the applicable provisions and recommendations of the NCMA “Guide Specification for Concrete Masonry”.

1.03 HANDLING AND STORAGE

A. Handle in a manner to prevent undue chipping and breakage.

B. Protect storage piles, stacks or bins from traffic.

C. Provide platforms to protect boom piles from contact with soil.

1.04 VISUAL INSPECTION

A. All units shall be sound and free from cracks or other defects that would interfere with the proper placing of the unit or impair the strength or permanence of the construction.

B. Units that are intended to serve as a base for plaster shall have sufficiently rough surface to afford good bond.

PART 2 : PRODUCTS

2.01 MATERIALS

A. Masonry Unit: 5”x8”x16”, 6”x8x16” or 4”x8”x16” Concrete Hollow Block Units of standard manufacturer, machine vibrated with even texture and well defined edges. Conforming to Philippine National Standard (PNS) 16, Type I, Class A, with a minimum compressive strength of 700 psi for building walls.

1. Aggregates: ASTM C 33 or C 331 except grading of aggregates as stipulated in ASTM C 33 and testing of lightweight aggregates for drying shrinkage as stipulated in ASTM C 331 will not be required.
2. Kind and Shapes: in addition to the requirements specified, concrete masonry units of the various kinds shall conform to the specifications referenced below.

   a. Hollow Concrete Masonry Units: ASTM C-129, Grade N, Type I, Normal Weight, non-load bearing; 700 psi at 28 days.

B. Mortar Portland cement mortar for laying concrete blocks shall consist of 1 part Portland cement, 4 parts sand. Mortar materials shall be accurately measured by volume and thoroughly mixed until evenly distributed throughout the batch. Unless otherwise approved materials shall be mixed in a batch mechanical mixer.

C. Reinforcing bars: the steel reinforcing bars shall conform to PNS 49/ASTM A615

**PART 3 : EXECUTION**

3.01 QUALITY ASSURANCE

   A. Design Criteria: Provide concrete masonry walls having a compressive strength of 5 Mpa (700 psi) kilopascals when tested in accordance with ASTM E447, Method

   B. Allow three (3) blocks to be tested per 1000 pcs, delivery of CHB.

B. Allowable Tolerances

   1. Plumb and Level : 7millimiters in 3 meters, non-cumulative
   2. Joint, Width : Plus or minus 3 millimeters
   3. Offset Between Units : .5 millimeters to a length of 3.00 meters.

C. Quality Control: All reinforced masonry work may be subjected to detailed evaluation and tests in shop and field by AFPRSBS Engineer. The extent, duration, and amount of testing and/or evaluation is entirely at the discretion of the AFPRSBS Engineer.

3.02 CONCRETE UNIT MASONRY

   A. Lay all masonry units plumb, true to line, level and with accurately spaced course

   B. Keep bond plumb throughout. Keep corners and reveals plumb and true.

   C. Install built-in anchors, wall plugs and accessories to masonry as erection progresses.

   D. Bed solidly each course in Portland Cement Mortar. Keep all units damp when laid

   E. Grout all cells every five (5) layers.

   F. Wedge units terminating against beam or slab soffits tightly with mortar and reinforcement properly secured to dowels
G. Consult drawings as to the schedule of reinforcements.

H. Masonry Joints

1. Unless otherwise specified or detailed on plans, make horizontal and vertical mortar joints 10 mm (3/8) thick with full mortar coverage on the face shells and on the beds. Fill surrounding cells with grout at every five (5) layers.

2. All joints shall be pointed.

3. Do not permit furrowing of the mortar.

I. Stock Bond shall be used for CHB layout.

3.03 UNFINISHED WORK

A. Step back unfinished work for joining with a new work.

B. Before new work is started, remove all loose mortar and wet the exposed joint thoroughly not less than one hour before laying new work.

3.04 CLEANING

Wash finished surface in a manner most appropriate and satisfactory to the Construction Manager. No cement dusting is permitted for any plaster finish.
PART 1: GENERAL

1.01 SCOPE OF WORK

A. Provide all required reinforcements, stiffener posts, lintel beams, dowels, etc. for the complete execution of reinforced unit masonry work.

1.02 SUBMITTALS

A. SAMPLES

1. Anchors and Ties- Two of each type proposed for use.
2. Concrete Masonry Units- Five stretcher units for each type or size.
3. Joint Reinforcement- one piece of each type of reinforcement, including corner and wall intersection pieces, showing at least two cross joints
4. Aggregates- Take one sample of the source from each stockpile for each type of aggregate specified herein. Collect each sample by taking three incremental samples at random from the source material to make a composite sample of not less than 10 pounds.
5. Reinforcing bars- one (1) tensile and one (1) bend test per diameter of reinforcing bar per 7,000 kg. delivery.

B. CERTIFIED LABORATORY TEST REPORTS: reports all tests listed below:

1. Concrete Masonry Units- Compressive strength, linear drying shrinkage, unit weight, and absorption of each type of unit.

C. SHOP DRAWINGS

1. The contractor shall provide three (3) sets of shop drawings of CHB wall construction and showing length of lintel beams and stiffener columns, including plans, elevations and details showing treatment of reinforcing at turns and offsets, intersections of similar and dissimilar materials, tops bottoms and ends of walls; control and expansion joints; and wall openings show details of positioning devices for vertical reinforcing bars.

1.03 DELIVERY, HANDLING AND STORAGE Handle, store and protect masonry unit to avoid chipping, breakage or contract with the soil. Keep anchors, ties, steel reinforcing bars and joint reinforcement free of rust and loose scale. Reject rusted steel reinforcing, anchors, ties and joint reinforcement. Deliver cement in unbroken bags, barrels or other sealed containers. Keep cementitious materials dry. Store and handle cement to prevent the inclusion of foreign materials. Store aggregates in a manner to avoid combination or segregation.
PART 2 : PRODUCTS

2.01 MATERIALS FOR MORTAR AND GROUT

A. SOURCES OF MATERIALS: Do not change the source of materials which will affect the appearance of the finished work after the work has started without permission of the AFPRSBS Engineer.

B. AGGREGATE FOR MORTAR

1. ASTM C 144

2. Aggregate used in mortar for joints ¼ inch or less shall conform to ASTM C 144

C. AGGREGATE FOR GROUT

1. Fine aggregate : ASTM C 404

2. Gravel: ASTM C 404 except that 100 percent shall pass the 3/8 inch screen and not more than 5 percent shall pass the 3/8 inch screen and not more than 5 percent shall pass the no. 8 sieve.

3. Coarse aggregate: ASTM C 404, size No. 8 or ASTM C 33, ¾ inch maximum size as for size of grout space.

D. PORTLAND CEMENT : ASTM C150

E. WATER: Potable and Clean

2.02 MORTAR MIXES

A. PROPORTIONS: Comply with ASTM C 270 proportion specifications.

1. Provide compressive strength at 2,500 psi, at 28 days

2.03 GROUT MIXTURES

A. Proportions: mix in laboratory established proportions to attain a compressive strength at 28 days of not less than 2,500 pounds per square inch when tested in accordance with ASTM 31 for fine aggregate and ASTM C 39 for grout containing coarse aggregate.

2.04 MASONRY UNITS

A. CONCRETE MASONRY UNITS

1. Aggregates: ASTM C 33 or C 331 except grading of aggregates as stipulated in ASTM C 33 and testing of light weight aggregates for drying shrinkage as stipulated in ASTM C 331 will not be required.
2. Kinds and shapes: in addition to the requirements specified, concrete masonry units if the various kinds shall conform to the specifications referenced below.

   a. Hollow concrete Masonry Units: ASTM C-129, Grade N, Type I, Normal Weight, non-load bearing; 700 psi 28 days.

2.05 DEFORMED REINFORCING BARS STM A 615, Grade 230 for 10mm dia, bars and grade 275 for 12mm dia. Bars and bigger.

   a. CONCRETE HOLLOW BLOCKS SIZES: Location as indicated on the drawings.

      A. 5/4” thk. X 8” high x 16” long
         (125mm x 200mm x 400mm)

      B. 6” thk. X 8” high x 16” long
         (150mm x 200mm x 400)

      C. 4” thk. X 8” high x 16” long
         (100mm x 200mm x 400mm)

PART 3 : EXECUTION

3.01 PREPARATION OF CONCRETE SURFACES

   A. Clean laitance, dust, dirt oil, organic matter or other foreign materials from concrete surface upon which reinforced masonry is to be placed. Use sand blasting, if necessary to remove laitance from pores and to expose the aggregate.

3.02 FORMS AND SHORES

   A. Where required, construct forms to the shapes, lines and dimensions of the members indicated Construct forms sufficiently rigid to prevent deletions which may result in cracking or other damage to supported masonry and sufficiently tight to prevent leakage of mortar and grout. Do not remove supporting forms or shores until the supported masonry has acquired sufficient strength to support safely its weight and any construction loads to which it may be subjected. In no case shall supporting forms or shores be removed in less than 10 days. Wait at least 16 hours after grouting masonry columns or walls before applying uniform loads and wait an additional 48 hours before applying concentrated loads.

3.03 LAYING MASONRY UNITS

   A. WET MASONRY UNITS: Do not wet concrete masonry units. Do not lay units having a film of water on the surface

   B. EMBEDDED ITEMS: Build-in anchors, wall plugs, accessories, flashings, pipe sleeves and other items required to be built-in as the masonry progresses. Fill cells receiving anchor bolts and cells of the first course below bearing plates with mortar or grout. Fill spaces around metal doorframes and other built-in items
with mortar. Point openings around flush-mounted electrical outlet boxes in wet locations, including the flush joint above the box with mortar. Do not embed any aluminum items.

C. Bond beams and lintel beams shall be provided above every opening to carry masonry work or refer to structural works.

D. Stiffener Columns: Lintel beams shall be provided every 3000mm span of Masonry Works.

E. UNFINISHED WORK: Step back unfinished work for jointing with new work. Do not use toothing without the written approval of AFP-RSBS Engineering. Remove loose mortar and thoroughly clean the exposed joints before laying new work.

F. PLACING UNITS: Lay hollow masonry units so as to preserve the vertical continuity of cells filled with grout. The minimum clear horizontal dimensions of vertical cores shall be 2 inches by 3 inches. Masonry bond units at corners. Anchor intersections by reinforcing bars or stirrups as indicated. Space back-up courses to level with facing courses where metal ties occur. Adjust each unit to its final position while mortar is still soft and plastic. If any unit is disturbed after mortar has stiffened, remove and relay in fresh mortar. Keep chases and spaces to be grouted free from mortar and other debris. Keep units in exposed masonry surfaces free from chipped edges or other imperfections detracting from the appearance of the finished work when viewed from a distance of ten feet.

G. ANCHORS: Refer to structural plans.

H. TOLERANCES: Lay masonry plum, true to line, with courses level. Keep bond pattern plumb throughout.

**Lay masonry within the following tolerances:**

1. Maximum variation from the plumb in the lines and surfaces of columns, walls and arises:
   a. In adjacent masonry units-1/8 inch (3mm)
   b. In 10 feet (3.0m)-1/4 inch (6mm)
   c. In any story of 20 feet maximum-3/8 inch (10mm)
   d. In 40 feet (12mm) or more-1/2 inch (12mm)

2. Maximum variations from the plumb for external corners, expansion joints and other conspicuous lines:
   In any storey or 20 feet (6.0m) maximum- ¼ inch (6mm)

3. Maximum variations from the level or grades indicated on the drawings for exposed lintels sills, parapets, horizontal grooves, and other conspicuous lines.
   In any bay or 20 feet (6.0m) maximum – ¼ inch (6mm)

4. Maximum variations of the linear building lines from the established position in plan and related portion of columns, walls and partitions:
In any bay or 20 feet (6.0m) maximum – ½ inch (12mm)

5. Maximum variation in cross sectional dimensions of columns and in thickness of walls:
   a. Minus 1.4 inch (35mm)
   b. Plus – 1.2 inch (30mm)

I. BOND PATTERN: Lay masonry units in stack bond.

J. CUTTING AND FITTING: Wherever possible, use full units of the proper size in lieu of cut units. Use power masonry saws for cutting and fitting. Concrete masonry units shall be wet cut. Make cut edges clean, true and sharp. Make openings carefully so that wall plates cover plates or escutcheons required by the installation will completely conceal the openings and will be aligned at the bottom with the masonry joints. Cut webs of hollow masonry units to the minimum required for proper installation. Provide reinforced concrete lintels, above openings over 12 inches (300mm) wide for pipes, duct, and cable trays unless steel sleeves are used.

K. JOINTING: Mortar joints shall be finished as follows:

1. Flush Joints: Flush cut joints is concealed masonry surfaces, joints above electrical outlet boxes in wet areas and surface to be plastered. Make flush cut joints by cutting off the mortar flush with the face of the wall.

L. JOINTS WIDTHS: Make joint widths as follows:

   1. Concrete Masonry Units: 3/8 inch wide (10mm)

M. CONTROL JOINTS: Provide in masonry walls and partitions where indicated. Construct control joints in accordance with the details, using special control joint units, metal sash jamb units and control joint keys, or open and stretcher units. Caulk control joints in exposed exterior surfaces and in exposed interior masonry surfaces.

N. Concrete hollow blocks shall be layed to a maximum of 5 layers. No additional layer shall be layed until the grout and mortar has already hardened.

3.04 PLACING REINFORCING STEEL: Prior to placing grout, clean all reinforcement bars of loose, flackey, rust, scale, grease, mortar, or other coating which might destroy or reduce its bond with the mortar. Details of reinforcement shall be as indicated. Do not bend or straighten reinforcing in a manner injurious to the steel. Do not use bars with kinks or bends as shown on the drawings. Placement of reinforcement shall be inspected and approved prior to placing grout Splice vertical bars only where indicated.

A. Positioning bars: Position vertical bars accurately at the center line of the wall. Maintain as minimum clearance between parallel bars of the diameter of the reinforcement. Hold vertical reinforcing in place using metal supports, centering clips spacers, ties or caging devices located near the ends of each bat and at intermediate intervals of not more than 192 diameters of the reinforcements.
Wire column and pilasters tie in position around the vertical steel. Laying ties in mortar joints will not be permitted.

B. Splices: Locate splices only as indicated stagger splices of adjacent bars at least 24 inches (600mm). Lap bars a minimum of 40 diameters of the reinforcement or two feet whichever is greater. Welded or mechanical connections shall develop the full strength of the reinforcement.

Vertical and Horizontal Reinforcement: Refer to the Structural plans.

3.05 PLACING GROUT

A. WALL BRACING: Brace wall against wind and other forces during construction. Allow sufficient time between lifts to preclude displacement of solid masonry units or cracking face shells of hollow masonry units. If blowouts, misalignments or cracking of face shells should occur during construction, tear down and rebuild the wall.

B. GROUTING AND CLEANOUT HOLES

1. Clean-outs: Provide clean-out holes at the bottom of every pour in cores containing vertical reinforcement when the height of the grout pour exceeds 49 inches (1200mm) establish a new series of clean-outs if grouting operations are stopped for more than 4 hours. Clean-outs shall be not less than 3 by 4 inch (75mm x 100mm) openings cut from one face shell. Manufacturer's standard cut-out units may be used at the Contractor's option. Do not plug clean-out holes until masonry work, reinforcement and final cleaning of the grout spaces have been completed and inspected.

2. Grout holes: Provide grouting holes in labs, spandrel beams and in-place overhead construction. Locate holes over vertical reinforcing bars. Provide additional openings spaced not more than 16 inches on centers where grouting of all hollow unit masonry is indicated. Openings shall not be less than 4 inches (100mm) in diameter or by 4 inches (75mm x 100mm) in horizontal dimensions. Upon completion of grouting operations, plug grouting holes and finish to match surrounding surfaces.

3. Maximum laying of concrete hollow blocks to be grouted shall be five (5) layers. All CHB cells shall be filled with grout except cells with reinforcement which shall be filled with mortar.

C. GROUTING EQUIPMENT

1. Grout pumps: Do not pump through aluminum tubes. Operate pumps to produce a continuous stream of grout with air pockets. Upon completion of each day's pumping eject grout from pipeline without contamination or segregation of the grout. Remove waste materials and debris from the equipment. Dispose waste materials, debris, and all flushing water outside the masonry.

2. Vibrators: Internal vibrators shall maintain a speed of not less than 5000 impulses per minute when submerged in grout. Maintain at least one spare
vibrator, at the site at all times. Apply vibrators at uniformly spaced points not further apart than the visible effectiveness of the machine. Limit duration of vibration to the time necessary to produce satisfactory consolidation without causing segregation.

D. PLACEMENT: Use a hand bucket, concrete hopper or grout pump. Place grout in final position within 1-1/2 hours after mixing. Where grouting is discontinued for more than one hour, stop the grout on inch (35mm) below the top of a course to form a key at pour joints. Place grout so as to completely fill the grout spaces without segregation of the aggregates. Do not inset vibrators into lower pours that are in a semi-solidified state.

3.06 POINTINGS AND CLEANING: After mortar joints have attained their initial set but prior to hardening, completely remove mortar and grout daubs or splashing from exposed masonry surfaces. Before completion of the work, rake out all defects in joints in exposed masonry surfaces; fill with mortar and tool to match existing joints. Do not use metal tools or metal brushes for cleaning.

Concrete Masonry Units: Dry brush exposed concrete masonry unit surfaces at the end of work each day and after any required pointing. Use stiff-fiber bristled brushes only.
PART 1: GENERAL

1.01 SCOPE OF WORK

A. The work to be undertaken in this section shall comprise the furnishing, fabrication, re-assembly in site, painting delivery, erection, and installation of all structural steel materials including anchor bolts. Base plates, erection bolts, bracing and all other structural steel work indicated in the plans or specified herein.

1.02 STANDARDS AND REFERENCES

A. The work under these sections shall comply with the applicable requirements of the following codes and specifications:


2. ASEP-Handbook of Structural Steel Shapes and Section 1987.


6. American Society for Testing and Material (ASTM)

1.03 WELDER’S QUALIFICATIONS

A. All welders, welding operator and trackers to be employed shall have been qualified by tests as prescribed in Section 5 of AWS D1. !-77 of the American Welding Society.

B. All welders who will be employed in this project shall have passed at least the 4g position test as certified by any of the following independent testing companies:

1. Industrial Inspection (International), Inc.

2. Metal Industries Research and Development Center

1.04 FABRICATION OF STEEL TRUSSES:

A. All structural steel trusses shall be fabricated on site. Prior to fabrication, materials shall be inspected and approved by AFP-RSBS Engr. Test results of materials shall also be submitted
B. All material shall be properly protected and so loaded as to prevent damage in transit.

1.05 SUBMITTAL OF DOCUMENTS

A. The following documents shall be submitted to the AFPRSBS Engineer by the Contractor for approval.

1. Shop Drawing

The contractor, upon award of the contract, shall prepare 3 sets of shop (fabrication) drawings of all structural steel, for the approval of the AFPRSBS Engineer. These drawings shall show all the detailed requirements necessary for the fabrication and installation of the structures based on the AISC specifications' latest edition.

2. Fabrication and Installation Procedure

   a. Method of Construction
   b. Work Sequence
   c. Welder's name, age, experience, certificate of qualification
   d. Welding Standards
   e. Paint and Painting Method
   f. Inspection procedure

PART 2 :PRODUCTS

2.01 MATERIALS

A. Materials, products, or equipment are specified by reference to a specific standard or to a specific manufacturer, materials, products, or equipment which will ensure an equal or higher quality than the standards mentioned. It will be incumbent upon the Contractor to verify the quality and submit comparative data (both specified and proposed data) for review and approval by the AFPRSBS Engineer.

2.01 STRUCTURAL STEEL

A. Structural steel shall comply with the provisions of ASTM specifications appropriate for the grade designated on drawings (ASTM A36)

B. Quality: Sound, free from loose mill scale, cracks, laminations and slag inclusions.
2.03 WELDED ELECTRODES

A. Welded electrodes shall comply with the provisions of AWS “Structural Welding Code” and specification A5.1, A5.5, A5.17, A5.18 and A5.20.

B. Anchor Bolts: Use A354 Grade BC

2.05 PAINTS

A. Prime Paint: Zinc Chromate

B. Zinc Rich Paint: DOD-P-21035A; weight not less than 2.5 kilograms per liter.

2.06 MISCELLANEOUS MATERIALS

A. Provide miscellaneous materials or accessories as indicated on Drawings or required by standard construction practice.

B. Provide supplemental structural steel support framing around minor floor openings where indicated in the Drawings.

PART 3: EXECUTION

3.01 FABRICATION

A. General: Fabricate per AISC Specifications. Materials shall be properly marked for field assembly identification.

B. Planning and Milling: Mill bearing surfaces to true planes.

C. Connections shall be as indicated on drawings. All splice connections for shall be shown on the shop drawings and submit for review and approval of the AFPRSBS Engineer prior to fabrication.

D. Connections shall be detailed by the fabricator based on information indicated on drawings. Detailing shall be performed using engineering design and standard construction practice in accordance with AISC.

E. No combination of bolts and welds shall be used for stress transmission in the same face of any connection.

F. Automatic or semi-automatic welding maybe used per AWS Procedure.

G. Welding, filler metal and welding technique and procedures shall be in accordance with AISC Specification for the “Design, Fabrication and Erection of Structural Steel for Buildings,” and AWS “Structural Welding Code” and “Filler Metal Specifications”.

H. All steel shall be clean particularly in areas where painting, welding, bolting and stud welding will be performed.
I. Welding processes other than shielded metal arc or submerge arc maybe used provided procedure qualification test in accordance with the American Welding Society are made for such purpose.

J. Welds not specified shall be continuous fillet welds, using not less than minimum fillet as specified by AWS.

K. All Welding sequences shall be such as to reduce the residual stresses to minimum value

L. The toughness and notch sensitivity of the steel shall be considered in the formation of all welding procedures to prevent premature fracture.

M. Welded connections shall be detailed and designed to minimize accumulation and concentration of through-thickness strains due to weld shrink age.

N. Repair: All defective welding process and materials shall be repaired using acceptable method or replaced by the Contractor at his expense

3.02 PREPARATION OF SURFACES AND PAINTING

A. General: Do not paint when ambient temperature is below 7 degrees Celsius. Paint in dry weather or under cover. Apply paint by brush or spray over dry dust free surface per manufacturer’s direction.

B. Prime Paint:

1. Surface Preparation: Clean surfaces of loose mill scale, dirt, dust and other foreign matter by use of suitable tools; hand toll cleaner per SSPC-3. Remove oil and grease with volatile solvents per SSPC-1

2. Application: Apply one coat to surface where indicated; dry film thickness not less than 0.05 millimeters.

C. Field Painting:

1. Field paint all bolt heads and nuts, welds, abrasions and any unpainted portion of the steel structure.

2. Apply primer prior to field painting.

3. The completed steel work shall be cleaned of all foreign materials.

3.03 QUALITY ASSURANCE

A. Quality Control: All materials, fabrication and welds are subject to evaluation and testing. Perform all tests and evaluations and submit reports as herein specified and as maybe required by the AFPRSBS Engineer and performed by an independent Testing Agency.

B. Provide the following for the Quality Control testing and evaluation by the AFPRSBS Engineer:
1. A complete set of fabrication and erection drawings.
2. Representative sample pieces required for testing.
3. Proper facilities, including scaffolding, temporary work platforms, for the proper evaluation and inspection of the work in the shop and in field.

C. Welding during fabrication and installation structural steel shall be in accordance with AWS and confirmed by the AFPRSBS Engineer. In addition to non-destructive testing by visual methods, magnetic particle, ultrasonic and radiographic testing shall be made of welds at random.

3.07 CONNECTIONS

A. No welding or bolting shall be done until most of the structures to be connected have been properly aligned.

3.08 SPLICES

A. Field splices shall not be made on trusses unless extreme length, depth, or weight would make shipment with complete penetration butt welds.

B. Shop splices of main members or parts thereof, including individual truss members shall be made with complete penetration butt welds.

3.09 WELDING

A. The technique of welding, the workmanship, appearance and quality welds used, and the method use in correcting non-conforming work shall be in accordance with the structural welding code, AWS D11-77, of the American Welding Society.

B. The electrode shall be of classification number ASTM E70XX and shall be suitable for the type of welding, recommended power supply, type of coating, and other conditions of intended use in accordance with the instruction in each container.

C. The welding equipment shall be of the type that will produce proper current so that the operator may produce satisfactory welds. The welding machine shall be NEMA rated at 400 AMPS, 25-40 arc-volt capacity or approved equal.

D. All shields welding shall be done by direct current.

E. Surface to be welded shall be free from loose scale, rust, grease, paint, and foreign material except that mill scale which withstands vigorous wire brushing may remain. A light film of licensed oil may likewise be disregarded. Joint surfaces shall be free from fins end tears.

F. Finished members shall be true to line and free from twists, bends and open joints.

G. Connection may be tested by ultrasound, radiographic or any non-destructive test as directed by the AFP-RSBS Engr. All expenses for the testing shall be for the account of the Contractor.
H. Welds that do not pass the non-destructive test may be redone twice the most. Should the same weld fail for the third time, the structural members affected should be replaced.

I. Structural welds shall be as defined by AISC necessary for the development of strength between adjoining pieces of steel.

J. Welder’s qualification record (AWS D1.1 Appendix E) shall be made available for the Developer’s authorization to proceed upon request. All welders and welding operators shall be qualified per AWS D1.1 Section 5, and shall have certificates on file for the Developer’s review at any time during fabrication. The Developer reserves the right to require the testing or re-testing of welders for qualification in accordance with the AWS Code, Section 6.4. All costs and material required for the qualification of welders shall be at the Contractor’s expenses.

K. Welds made by welders that are not pre-qualified or that have not been properly qualified and had no authorization to proceed shall be rejected and completely removed.

3.10 PRE-ASSEMBLY PAINTING

A. All surfaces shall be dried free from rust, scale and grease prior to painting.

B. The truss structure shall be painted. Use of Zinc chromate primer is required. Paint coating shall not be less than 175 grams sq.m. (25 microns per coat).

3.12 REJECTION

A. Structure or parts thereof and materials used, indicating irremediable or injurious defects improper fabrication, excessive repairs, or non-compliance with this specification, shall be subject to rejection. They shall also be subject to rejection if such conditions are discovered after acceptance of the Contractor’s works.

3.13 FIELD MEASUREMENT

A. The contractor shall make actual measurements in the field to verify or supplement dimensions shown on structural drawings. The Contractor shall ensure that his work will fit properly to all existing structures.

3.14 INSPECTION

A. The AFPRSBS Engineer shall have full access at all times and at all points where work is being done or where materials are stored and shall have full authority to reject or order to repair any work or material that fails to conform with the terms of the Contract.

B. The AFPRSBS Engineer, in addition to the visual inspection, may order weld testing by radiographic or any other standard non-destructive testing method at the places and location as selected by the Construction Contractor. All welding rejected by the AFPRSBS Engineer because of defects discovered by testing or visual inspection shall be corrected at the expense of the Contractor.
PART 1 : GENERAL

1.01 DESCRIPTION OF WORK

A. Extent of insulation work is shown on drawings and indicated by provisions of this section.

B. Applications of insulation specified in this section include the following:
   1. Thermal insulation for under sub-roofing and over purlins.

1.02 SUBMITTALS

A. PRODUCT DATA

1. Submit manufacturer’s product literature and installation instruction for each type of insulation material required.
2. Submit manufacturer’s product literature and installation instruction for fasteners and adhesive and tapes required for the work.
3. Submit “6x12” samples of insulation required.

B. Shop Drawings: Submit four (4) sets shop drawings for installation of foam insulation.

1.03 DELIVERY, STORAGE, AND HANDLING

A. General Protection: protect insulation from physical damage and from becoming wet and soiled. Comply with manufacturer’s recommendation for handling, storage and protection during installation.

PART 2 : PRODUCTS

2.01 INSULATION MATERIALS

A. Product used as basis:

   12mm foam with aluminum foil vapor barrier at both face.

2.02 AUXILIARY INSULATING MATERIALS

A. Adhesive for Bonding Foam Insulation: Type recommended by insulation manufacturer, and complying with requirements for fire performance characteristics.

B. Aluminum Foil Adhesive Tape: As recommended by the insulation Manufacturer.
C. Aluminum Foil (Vapor Retarder): 0.3-mil reflective aluminum foil laminated with scrim reinforcing to plastic-coated Kraft paper; laboratory-tested vapor transmission rating of 0.03 perms.

PART 3: EXECUTION

3.01 INSPECTION AND PREPARATION

A. Require installer to examine substrates and conditions under which insulation work is to be performed. Obtain installer’s written report listing conditions detrimental to performance of work in this section. Do not proceed with installation of insulation until unsatisfactory conditions have been corrected.

B. Clean substrates of substances harmful to insulation or aluminum foil including removal or projections which might puncture insulation.

3.02 INSTALLATION, GENERAL

A. Comply with manufacturer’s instruction for particular conditions of installation in each case.

B. Extend insulation full thickness as shown over entire area to be insulated. Cut and fit tightly around obstruction, and fill voids with insulation. Remove projections which interfere with placement.

C. Apply a single layer of 12mm insulation or ½ thickness, unless otherwise shown or required to make up total thickness.

D. Seal overlapping joints in aluminum foil with adhesives per manufacturer’s printing directions. Seal butt joints and fastener penetrations with tape of type recommended by aluminum foil manufacturer. Locate all joints over framing members or other solid substrates.

E. Seal joints caused by pipes, conduits, electrical boxes and similar items penetrating aluminum foil with cloth or aluminized tape of type recommended by manufacturer to create an airtight seal between penetrating objects and aluminum foil.

F. Repair all tears or punctures in aluminum foil immediately before concealment by other work. Cover with tape or another layer of aluminum foil.

3.03 PROTECTION

A. General: Protect installed insulation from harmful weather exposures and from possible physical abuses, where possible by non-delayed installation of concealing work or, where that is not possible, by temporary covering or enclosure.
PART 1: GENERAL REQUIREMENTS

1.01 SUMMARY

A. Extent of roofing is indicated on drawings. Drawings also indicate location, extent and types of special shapes, flashing and accessory items.

B. Types of roofing applications specified in this section include long span maxi elite roofing 0.5mm thick.

1.02 SUBMITTALS

A. Product Data: Submit manufacturer’s detailed technical product data, installation instruction and recommendations, including necessary data to document that materials to comply with requirements.

B. Samples: Submit full range of sample for color and texture selection. After initial selection, submit, for verification purposes, 2 full size units each type of roofing tile color, style and texture selected.

1.03 DELIVERY, STORAGE AND HANDLING

A. Deliver roof to jobsite location as near as possible to point of installation

PART 2: PRODUCTS

2.01 MATERIAL

A. Long span tile roofing, with drip molds/anti-leak channel. Include specifically shaped, color matched units as indicated or required for eaves, ridges, hips, valleys and other conditions. Sample of roofing shall be submitted and subject for approval prior to purchase.

B. Roofing Accessory Items:

1. As recommended by the roofing tile manufacturer.

PART 3: EXECUTION

3.01 EXAMINATION

A. Examine substrate and conditions under which roofing is to be performed; notify AFP-RSBS Engineer in writing of unsatisfactory conditions. Do not proceed with roofing installation until unsatisfactory conditions have been corrected.
PART 1: GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Condition and shall apply to work of this section.

1.02 DESCRIPTION OF WORK

A. Definition: “DOOR HARDWARE” includes items known commercially as finish hardware which are required for swing/sliding doors, except special types of unique and non-matching hardware specified in the same section as the door and door frame.

B. Extents of door hardware required are indicated on drawings and schedules.

C. Types of door hardware required includes the following:

1. Hinges
2. Locksets
3. Cabinet Hardware
4. Extension Flush Bolts
5. Door Bumper/Stoppers

1.03 QUALITY ASSURANCE

A. Manufacturer: Obtain each type of hardware (latch and locksets, hinges, closers, etc.) from a single manufacturer, although several may be indicated as offering/products complying with requirements.

1.04 SUBMITTALS

A. Product Data; Submit manufacturer’s technical product data each item of hardware. Include whatever information may be necessary to show compliance with requirements and include instructions for installation and for maintenance of operating parts and finish.

B. Hardware Schedule: Submit final hardware schedule in manner indicated below. Coordinate hardware with doors, frames and related work to ensure proper size, thickness, hand, function and finish hardware.

1. Final Hardware Schedule Content: Based on finish hardware indicated, organize hardware schedule into “hardware sets” indicating complete designations of every item required for each door or opening. Include the following information:

a. Type, Style, Function, Size and finish of each hardware item.
b. Name and manufacturer of each item.
c. Fastenings and other pertinent information.
d. Location of hardware set cross referenced to indications on drawings both on floor plans and in door and frame schedule.
e. Explanations of all abbreviations, symbols, codes, etc. contained in schedule.
f. Mounting location for hardware.

2. Submittal Sequences: Submit schedule at earliest possible date particularly where acceptance of hardware schedule must precede fabrication of other work (e.g. hollow metal frames) which is critical in the project construction schedule. Include with schedule the product data, samples, shop drawings of other work affected by finish hardware, and other information essential to the coordinated review of hardware schedule.

3. Keying Schedule: Submit separate detailed schedule indicating clearly how the owner’s final instructions on keying of locks has been fulfilled.

C. Samples: Prior to submittal of the final hardware schedule and prior to final ordering of finish hardware, submit one sample of each type of exposed hardware unit, finished as required, and tagged with full description for coordination with schedule.

1. Samples will be returned to the supplier. Units are acceptable and remain undamaged through submittal, review and field comparison procedures may, after final check of operation, be used in the work, within limitations of keying coordination requirements

PART 2 : PRODUCTS

2.01 MATERIALS AND FABRICATION

A. Hand of Door: Drawings show direction of slide, swing or hand of each other door leaf. Furnish each item of hardware for proper installation and operation of door movement as shown.

B. Base Metals: Produce hardware units of basic metal and forming method indicated using manufacturer’s standard metal alloy composition, temper and hardness, but in no case of lesser (commercially recognized) quality than specified for applicable hardware units by applicable ANSI A156 series for each type of hardware item and with ANSI A156.18 for finish designations indicated. Do not furnish “optional” material or forming method for those indicated, except as otherwise specified.

C. Fasteners: Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation. Do not provide hardware which has been prepared for self-tapping sheet metal screws, except as specifically indicated.

D. Furnish screws for installation, with each hardware item. Provide Philips flat head screws except as otherwise indicated. Finish exposed (exposed under any
condition) screws to match hardware finish or, if exposed in surfaces of other work, to match finish of such other work as closely as possible, including “prepared for paint” in surfaces to receive painted finish.

E. Provide concealed fasteners for hardware units which are exposed when door is closed except to extent no standard units or type specified are available with concealed fasteners. Do not use thru-bolts for installation where bolt or nut on opposite face is exposed in other work, except where it is not feasible to adequately reinforce the work. In such cases, provide sleeves for each thru-bolt or use sex screw fasteners.

F. Tools and Maintenance Instructions for Maintenance: Furnish a complete set of specialized tools and maintenance instructions as needed for Developer’s continued adjustment, maintenance, removal and replacement of finish hardware.

2.03 HARDWARE ITEMS: Hardware items shall conform to respective specifications and standards and to requirements specified herein.

A. Hinges: ANSI A156.1: Construct loose pin hinges for exterior doors and interior doors facing corridors and reverse opening doors, so that pins will be non-removable when door is closed. Hinges shall bear name of trademark of manufacturer. Provide types of hinges, sizes, finish, design options and quantity per door for specific openings as specified herein under paragraph entitled “Hardware List” and “Hardware Schedule”.

B. Locks and Latches: ANSI A156.2 Series 4000 Grade 2. Locks and latches of the same series shall be the product of the same manufacturer. Lock cylinders shall have not less than 6 pin tumblers. Provide trim for locks and latches of wrought construction and of decorative design as specified herein. Provide type of locks and latches as specified under “Hardware List” and “Hardware Schedule”.

C. Auxiliary Locks: ANSI A156.5 Grade 2: Locks of same series shall be product of said manufacturer. Provide decorative design trim for locks. Provide trim items with straight, beveled or smoothly rounded sides, corners, and edges. Legibly mark on the lock and latches where it can be seen after installation, the name manufacturer, or a trademark by which it can be seen after installation the name of manufacturer of a trademark it can be readily identified. Provide type of auxiliary locks for specific openings, as specified under paragraph “Hardware List” and “Hardware Schedule”.

D. Provide architectural door trims and auxiliary hardware as required in the “Hardware List” and “Hardware Schedule”.

2.04 KEYING SYSTEM: Provide keyed cylinders to provide keying system.

Provide change keys in individual envelopes for each cylinder delivered. Envelopes shall have respective door identification numbers. Stamp each change key with change number and stamp each master key set symbol as applicable.
2.05 FASTENERS:

Supply fasteners of proper type, quantity and finish hardware. Supply fasteners exposed to weather of non-ferrous metal or stainless steel and match finish of trim as closely as possible. Use fasteners of type necessary to accomplish a permanent installation. Use full-thread wood screws.

2.06 FINISHES: ANSI/BHMA 156.18

A. Locksets : Brass Finish
B. Hinges : Brass Finish
C. Other finish hardware to be similar to finish of locksets, unless otherwise indicated.

2.07 KEY CABINET: ANSI A156.5 as selected by the owner.

Provide hinged-panel type cabinet below kitchen counter top.

PART 3 : EXECUTION

3.01 INSTALLATION OF HARDWARE:

Install hardware following manufacturer’s instructions.

3.02 ACCEPTANCE

After installation, protect hardware from paint, stains, blemishes, and other damages until acceptance of work. Submit notice of operation testing seven (7) days before scheduled inspection for substantial completion, so that testing can be witnessed. Hinges, locks, latches, blots, holders, closers, and other items shall be adjusted to operate properly. Also demonstrate that tagged keys operate respective locks. Checked, Deliver tagged keys, to Project Manager. Correct, repair, and finish as directed errors in cutting and fitting and damage to adjoining work.

3.03 LOCATION OF HARDWARE ON HINGED DOORS

Locate as follows, unless indicated or specified herein:

A. Locks: Locate knobs so that center line of strike is 1.00M (nominal) above finish floor level.

B. Deadlocks: Mount deadlocks so that centerline of cylinder and strike is 1.00M (nominal) above finish floor level.

C. Hinges: Locate as follows:

   Top Hinge: Not over 9-3/4 inches from inside of frame rabbet at head to centerline of hinge.
Bottom Hinge: Not over 10-3/8 inches above bottom of door frame centerline of hinge.

Center Hinge: Locate at equal distances between top and center hinges.

Intermediate Hinges: Locate at equal distances between top and center hinges.

3.04 HARDWARE LIST

A. LOCKSETS shall be of acceptable product and subject to approval by AFPRSBS Engineer.

B. INVISIBLE HINGES

1. Provide SOSS invisible hinges where required, dull chrome finish. Number and size of invisible hinges shall be as per Manufacturer’s recommendations and as approved by the AFPRSBS Engineer.

2. CABINET HARDWARE shall be of acceptable brand and subject to approval by the AFPRSBS Engineer.

3. Provide the following cabinet hardware and accessories:

   a. Self-closing concealed hinges, chrome finish:
      
      a.1 Acceptable Design and approved by AFPRSBS Engineer.
      
      a.2 No. of hinges per door leaf:
      
      2 hinges – Doors up to 900mm height
      3 hinges – Doors up to 1600mm height
      4 hinges – Doors up to 2000mm height
      5 hinges – Doors up to 2400mm height

   b. Cabinet door pulls: Solid brass, design as selected by the AFPRSBS Engineer.

   c. Cabinet Lock
      
      c.1 Acceptable brand and approved by AFPRSBS Engineer.

3.05 ADJUST AND CLEAN

A. Adjust and check each operating item of hardware and each door to ensure proper operation or function of every unit. Replace units which cannot be adjusted to operate freely and smoothly as intended for the application made.

B. Clean adjacent surfaces soiled by hardware installation.
C. Final Adjustment: Wherever hardware installation is made more than one month prior to acceptance or occupancy of a space or area, return to work during the week prior to acceptance or occupancy, and make final check and adjustment of all hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors.

D. Instruct Owner’s personnel in proper adjustment and maintenance of hardware finishes, during the final adjustment of hardware.
PART 1 : GENERAL

1.01 SUMMARY

A. Extent of glass and glazing work is indicated on drawings and schedules.

B. Types of work in this section include glass and glazing for:

   1. Fixed Glass Panels
   2. Main Entrance Door
   3. Window glass

1.02 QUALITY ASSURANCE

A. Glazing Standards: Comply with recommendations of Flat Glass Marketing Association (FGMA) “Glazing Manual” and “Sealant Manual” except where more stringent requirements are indicated. Refer to those publications for definitions of glass and glazing terms not otherwise defined in this section or other referenced standards.

B. Safety Glazing Standard: Where safety glass is indicated or required by authorities having jurisdiction, provide type of products indicated which comply with ANSI Z97.1 and testing requirements of 16 CFR Part 1201 for category II materials.

C. Single Source Responsibility for Glass: To ensure consistent quality of appearance and performance, provide materials produced by a single manufacturer or fabricator for each kind and condition of glass indicated and composed of primary glass obtained from a single source for each type and class required.

1.03 DELIVERY, STORAGE, AND HANDLING

A. Protect glass and glazing materials during delivery, storage and handling to comply with manufacturer’s directions and as required to prevent edge damage to glass, and damage to glass and glazing materials from effects of moisture including condensation, of temperature changes, of direct exposure to sun, and from other causes.

PART 2 : PRODUCTS

2.01 GLASS AND PRODUCTS, GENERAL

A. Primary Glass Standard: Provide primary glass which complies with ASTM C 1036 requirements, including those indicated by reference to type, class, quality, and if applicable, form, finish, mesh and pattern, where indicated.
B. Sizes: Fabricate glass to sizes required for glazing openings indicated, with edge clearances and tolerances complying with recommendations of glass manufacturer. Provide thickness as recommended by glass manufacturer for application indicated.

2.02 PRIMARY GLASS PRODUCTS

A. Clear Float Glass: Type I (transparent glass, flat), Class 1 (clear), Quality q3 (glazing select).
   1. Thickness: 6mm thick
   2. For window glazing

2.03 ELASTOMERIC GLAZING SEALANTS & PREFORMED GLAZING TAPES

A. General: Provide products of type indicated and complying with the following requirements:
   1. Compatibility: Select glazing sealants and tapes of proven compatibility with other materials with which they will come into contact, including glass products, and glazing channel substrates, under conditions of installation and service, as demonstrated by testing and field experience.
   2. Suitability: Comply with recommendations of sealant and glass manufacturers for selection of glazing sealants and tapes which have performance characteristics suitable for applications indicated and conditions at time of installation.
   3. Elastomeric Sealant Standard: Provide manufacturer’s standard chemically curing elastomeric sealant of base polymer indicated which complies with ASTM C 920 requirements, including those for type S or M, Grade NS, Class 25, uses NT. Use for channel or metal sash where required.
   4. Colors: Provide color of exposed sealants indicated, or if not otherwise indicated, as selected by architect from manufacturer’s standard colors.

B. One-part Non-Acid-Curing Silicone Glazing Sealant: Type S; Grade NS, Class 25; Uses NT, G, A and, as applicable to uses indicated, O; and complying with the following requirements for modulus and additional joint movement capability.
   1. Low Modulus: Tensile strength of 45 PSI or less at 100% elongation when tested per ASTM D 412 after 14 days at 77°F (20°C) and 50% relative humidity, location of application per manufacturer’s recommendation.
   2. Available Products: Subject to compliance with requirements, glazing sealants shall be One-part Non-Acid Curing Low-Module Silicone Glazing Sealant subject to approval by AFPRSBS Engineer.
PART 3 : EXECUTION

3.01 EXAMINATION

A. Require glazier to inspect work of glass framing erector for compliance with manufacturing and installation tolerances, including those for size, squareness, offsets at corners; for presence and functioning of weep system; for existence of minimum required face or edge clearances; and for effective sealing of joinery. Obtain Glaziers’ written report listing conditions detrimental to performance of glazing work to proceed until unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Clean glazing channels and other framing members to receive glass, immediately before glazing. Remove coatings which are not firmly bonded to substrates. Remove lacquer from metal surfaces where elastomeric sealants are indicated for use.

3.03 GLAZING, GENERAL

A. Comply with combine printed recommendations of glass manufacturers of sealants, gaskets, and other glazing materials, except where more stringent requirements are indicated, including those of referenced glazing standards.

B. Glazing channel dimensions as indicated in details are intended to provide for necessary bit on glass, minimum edge and face clearances, and adequate sealant thickness, with reasonable tolerances. Adjust as required by job conditions at time of installation.

C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by pre-construction sealant-substrate testing.

3.04 PROTECTION AND CLEANING

A. Protect exterior glass from breakage immediately upon installation by use of crossed streamers attached to framing and held away from glass. Do not apply markers to surfaces of glass. Remove nonpermanent labels and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove immediately by method recommended by glass manufacturer.

C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less often than once a month, for build-up of dirt, scum, alkali deposits or staining. When examination reveals presence of these forms of residue, remove by method recommended by glass manufacturer.

D. Remove and replace glass which is broken, chipped, cracked, abraded or damaged in other ways during construction period, including natural causes, accidents and vandalism.
E. Wash glass on both faces not more than 4 days prior to scheduled date for inspection intended to establish date of turn-over of project. Wash glass by method recommended by glass manufacturer.
PART 1: GENERAL

1.01 SUMMARY

A. This Section includes the following types of cement board construction:

1. Cement board screw-attached to steel framing and furring members at interior/exterior ceiling.

   a. All exposed edges, corners, and as indicated on drawings, of cement board installations shall be provided with cornice.

1.02 DEFINITIONS

A. Cement Board Construction Terminology: Refer to ASTM C 11 and GA 505 for definitions of terms of cement board construction not otherwise defined in this section of other referenced standards.

1.03 SUBMITTALS

A. Product data from manufacturers for each type of product specified.

B. Samples of the following:

   1. 2ftx4ftx ¼inch cement board mounting showing joint treatment and framing:

1.04 QUALITY ASSURANCE

A. Single Source Responsibility: Obtain each type of cement board and related joint treatment materials from a single manufacturer.

1.05 DELIVERY, STORAGE & HANDLING

A. Deliver materials in original packages, containers or bundles bearing brand name and identification of manufacturer or supplier.

B. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic and other causes. Neatly stack cement boards flat to prevent sagging.

C. Handle cement boards to prevent damage to edges, ends and surfaces. Do not bend or otherwise damage metal corner beads, shadow line beads and trims.

PART 2: PRODUCTS

2.01 MANUFACTURERS

a. Cement board shall be of acceptable brand and subject to approval by AFPRSBS Engineer.
2.02 STEEL FRAMING COMPONENTS FOR SUSPENDED & FURRED CEILINGS

A. General: Provide components which comply with ASTM C 754 for materials and sizes, and as recommended by cement board manufacturer.

B. Channels: Cold rolled steel, 0.0598 inch minimum thickness of base (uncoated) metal.

C. Steel Rigid Furring Channel: ASTM C 643, hat shaped, depth of 7/8 inch or as otherwise indicated, 0.0270 inch thick minimum, gauge no. 22.

D. Wall Angle

2.03 CEMENT BOARD

A. General: Provide cement board of types indicated in maximum lengths available to minimize end-to-end joints.

B. Cement Board: ASTM C 36 and as follows:
   1. Edges: Recessed (tapered)
   2. Thickness: 6 mm (1/4 in.)

PART 3 : EXECUTION

3.01 EXAMINATION

A. Examine substrates to which ceiling construction attaches or abuts, preset hollow metal frames, cast-in-place anchors, and structural framing, with installer present, for compliance with requirements for installation tolerances and other conditions affecting performances of ceiling construction. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Ceiling Anchorages: Coordinate installation of ceiling suspension system with installation of overhead structural schemes to ensure that inserts and other structural anchorage provisions have been installed to receive anchors in a manner that will develop their full strength and at spacing required to support ceiling.

   1. Furnish concrete inserts and other devices indicated, to other trades for installation well in advance of time needed for coordination with other construction.
3.03 INSTALLATION OF STEEL FRAMING FOR SUSPENDED AND FURRED CEILINGS

A. Secure hangers to structural support by connecting directly to structure where possible, otherwise connect to cast-in-concrete inserts or other anchorage devices or fasteners as indicated.

   1. Do not attach hangers to underside of concrete slabs with powder-actuated fasteners.

B. Do not connect or suspend steel framing from ducts, pipes or conduits.

C. Keep hangers and braces 2 inches clear of ducts, pipes and conduits.

D. Sway brace suspended steel framing with hangers used for support.

E. Install suspended steel framing components in sizes and at spacing indicated but not less than that required by steel framing installation standard.

   1. Channel Hangers: 4 ft. on center
   2. Carrying Channels (main runners): 4 ft. on center.
   3. Furring Channels (furring members): 24 inches on center.
   4. Wall angles

F. Installation Tolerances: Install steel framing components for suspended ceilings so that cross furring members of grid are level within 1/8 inch in 12 ft. as measured both lengthwise on each member and transversely between parallel members.

G. Clip furring members to main runners and to other structural supports as indicated.

3.04 APPLICATION & FINISHING OF CEMENT BOARD, GENERAL

A. Cement Board application and finishing standard: Install and finish cement board to comply with ASTM C 840.

B. Install cement boards in 0.60m x 1.20 m dimension with v-cut joints.

C. Install exposed cement board with face side out. Do not install imperfect, damages or damp boards. Butt boards together for alight contact at edges and ends with not more than 1/16 inch open space between boards. Do not force into place.

3.05 FINISHING OF CEILING

A. General: Apply to joint treatment at cement board joints (both directions); penetrations; fastener heads, surface defects and elsewhere as required to prepare work or decoration.

B. Pre-fill open joints, using setting type joint compound.
3.06 PROTECTION

A. Provide final protection and maintain conditions, in a manner suitable to installer, which ensures cement board construction without being damaged or deteriorated at time of turn-over.
SECTION 7-B
CORAMIC TILES

PART 1 : GENERAL

1.01 GENERAL

A. This Section includes the following:

1. Ceramic tiles for floor and wall installations, where indicated.

1.02 SUBMITTALS

A. Product data for each type of product specified.

B. Shop drawings indicating tile patterns and locations and widths of expansion, contraction, control and isolation joints in tile substrates and finished tile surfaces.

C. Samples for verification purposes of each item. Prepare samples of size, color and texture variations in sets showing full range of variations expected.

Each type and composition of tile and for each color and texture required, at least 12 inches square or minimum of 4 full size tile units, mounted on plywood or hardboard backing and grouted.

1.03 DELIVERY, STORAGE AND HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use.

B. Prevent damage or contamination to materials by water, foreign matter, and other causes.

C. Handle ceramic tile with temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units.

PART 2 : PRODUCTS

2.01 MATERIALS

A. All materials shall be subject to approval by the AFPRSBS Engineer prior to purchase. Samples of respective materials shall be submitted for approval.

2.02 CERAMIC TILE PRODUCTS

A. Respective tiles to be used as basis:

1. Floor tiles for entrance, events hall, office, and kitchen/pantry: 600mm x 600mm semi glazed tiles
2. Granite slab for kitchen counter.
3. 600m x 600m semi-glazed tiles on flooring of restroom
4. 600m x 600m glazed tile on rest room walls

2.03 SETTING & GROUTING MATERIALS

B. Latex-Portland Cement Mortar: ANSI A 118.4
C. Latex-Portland cement Mortar: ANSI A 118.6, color as selected by AFPRSBS Engineer.
D. Tile grout shall be approved by AFPRSBS Engineer.

PART 3: EXECUTION

3.01 EXAMINATION

A. Examine substrates and areas where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performances of installed tile.
1. Verify that substrates for setting tile are firm, dry, clean, and free from oil or waxy films and curing compounds.
2. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of works, and similar items located in or behind tile has been completed before installing tile.

3.02 INSTALLATION, GENERAL

A. Extend tile work into recesses under or behind equipment and fixtures to form a complete Covering without interruptions except as otherwise shown. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
B. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so that plates, collars or covers overlap tile.
C. Jointing Pattern: Unless otherwise shown, lay tile in grid pattern. Align joints when adjoining tiles on floor, base, walls, and trim are same size. Layout tile work and center tile fields in both directions in each space or on wall area. Adjust to minimize tile cutting. Provide uniform joint widths unless otherwise shown. Provide tile spacer to maintain similar gaps in between tiles.
D. Lay out tile wainscots to next full tile dimensions indicated.
E. Expansion Joints: Locate expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated during installation
of setting materials, mortar beds, and tile. Do not saw cut joints after installation of tiles.

1. Locate joints in tile surfaces directly above joints concrete substrates.

2. Prepare joints and apply sealants to comply with requirements of Section 07900 “Joint Sealers”.

F. Grout tile to comply with the requirements of the following installation standards:

1. For ceramic tile grouts, (latex-Portland cement) comply with ANSI A108.10

3.03 CLEANING AND PROTECTION

A. Cleaning: Upon completion of placement and grouting, clean all ceramic tile surfaces to remove foreign matter.

1. Remove grout residue from tile as soon as possible, in methods recommended by the grout manufacturer.

2. Unglazed tile may be cleaned with acid solutions only when permitted by tile and grout manufacturer’s printed instructions, but no sooner than 14 days after installation. Protect metal surfaces, cast iron, and vitreous plumbing fixtures from effects of acid cleaning. Flush surface with clean water before and after cleaning. Protect plumbing system.

3. Remove temporary protective coating by methods recommended by coating manufacturer that is acceptable to tile and grout manufacturer. Trap and remove coating to prevent it from clogging drains.

B. Finished Tile Work: Leave finished installation clean and free of cracked, chipped, broken, unbounded and otherwise defective tile work.

C. Provide final protection and maintain conditions in a manner acceptable to manufacturer and installer to ensure that tile is without damage or deterioration at time of turn-ver.

1. When recommended by tile manufacturer, apply a protective coat of neutral protective cleaner to completed tile walls and floors. Protect installed tile work with Kraft paper or other heavy covering during construction period to prevent staining, damage, and wear.

2. Prohibit foot and wheel traffic from tile floors, for at least 7 days after grouting is completed.

D. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.
PART 1: GENERAL

1.01 SUMMARY

A. This section includes surface preparation, painting, and finishing of exposed interior and exterior items and surfaces.

1. Surface preparation, priming and finish coats specified in this section are in addition to shop priming and surface treatment specified under other sections.

B. Paint exposed surfaces whether or not colors are designated in “schedules”, except where a surface or material is specifically indicated not to be painted or is to remain natural. Where an item or surface is not specifically mentioned, paint the same as similar adjacent materials or surfaces. If color or finish is not designated, the Architect will select from standard colors or finishes available.

C. Painting is not required on prefinished items, finished metal surfaces, concealed surfaces, operating parts, and labels.

1.02 DEFINITIONS

A. “Paint” includes coating systems, primers, emulsions, enamels, stains, sealers and fillers, and other applied materials whether used as prime, intermediate, or finish coats.

1.03 SUBMITTALS

A. Product data: Manufacturer’s technical information, label analysis and application instructions for each material proposed for use.

1. List each material and cross-reference the specific coating and finish system and application. Identify each material by the manufacturer’s catalog number and general classification.

B. Samples for initial color selections in the form of manufacturer’s color charts.

1. After color selection, the Architect will furnish color chips for surfaces to be coated.

C. Samples for verification purposes: Provide samples of each color and material to be applied, with texture to simulate actual conditions, on representative samples of the actual substrate. Define each separate coat, including block fillers (putty) and primers. Use representative colors when preparing samples for review. Resubmit until required sheen, color, and textures are achieved.

1. Provide a list of material and application for each coat of each sample. Label each sample as to location and application.
2. Submit samples on the following substrates for the Architect’s review of color and texture only.

A. Concrete: Provide 8 inch square samples for each color and finish.

B. Concrete Masonry: Provide two 4” x 8” samples of masonry, with mortar joint in the center, for each finish and color.

C. Painted Wood: Provide two 12” x 12” samples of each color and material on hardboard.

D. Wood Paneling: Provide 12” x 12” finished sample.

E. Ferrous Metal: Provide two 4” square samples of flat metal and two 8” long samples of solid metal for each color and finish.

F. Provide 12” square samples for each color and finish.

1.04 QUALITY ASSURANCE

A. Single Source Responsibility: Provide primers and undercoat paint produced by the same manufacturer as the finish coats.

B. Coordination of Work: Review other sections in which primers are provided to ensure compatibility of the total systems for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.

1. Notify AFP-RSBS Engineer of problems anticipated using the materials specified.

C. Field Samples: On wall surfaces and other exterior and interior components, duplicate finishes of prepared samples. Provide full-coat finish samples on at least 100 sq. ft. of surface until required sheen, color and texture are obtained; simulate finished lightning conditions for review of in-place work.

1. Final acceptance of colors will be from job-applied samples.

2. The Architect will select one room or surface to represent and conditions for each type of coating and substrate to be painted. Apply coatings in this room or surface in accordance with the schedule or as specified. After finishes are accepted, this room or surface will be used for evaluation of coating systems of a similar nature.

D. Material Quality: Provide the manufacturer’s best quality trade sale paint material of the various coating types specified. Paint materials containers not displaying manufacturer’s product identification will not be acceptable.

Proprietary names used to designate colors or materials are not intended to imply that products named are required or to exclude equal products of other manufacturers.
1.05 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to the job site in the manufacturer’s original, unopened packages and containers bearing manufacturer’s name and label.

B. Store materials not in use in tightly covered containers in a well-ventilated area. Maintain containers used in storage in a clean condition, free of foreign materials and residue.

1. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing and application.

1.06 SAFETY PRECAUTIONS, FIRE HAZARDS

A. Smoking is strictly prohibited in work premises and storage area and all other areas where flammable, combustible, or similar hazardous materials are stored in use, or in the process of application. No smoking signs shall be posted in all prohibited areas.

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

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

D. Portable fire extinguishers shall be provided where needed and inspected and maintained in accordance with NFPA Standard No. 10. Extinguishers shall be suitably placed, distinctly marked, readily accessible and maintained in a fully charged and operable condition.

E. Persons engaged in work using harmful substances or producing irritants such as dust or fumes shall wear masks and suitable clothing.

F. When persons are exposed to epoxy resins, hydrocarbons, solvents, or other dermatitis producing substances, ointment recommended by manufacturer for specific exposure shall be available.

G. Workers shall not be allowed to cook or eat within the project work area.

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

1.07 JOB

A. Do not apply paint when raining, or on damp or wet surfaces.
PART 2 : PRODUCTS

2.01 MANUFACTURERS DATA

A. Submit complete manufacturer’s data for all the paints and varnishes to be used which include compatible admixtures and coating requirements.

PART 3 : EXECUTION

3.01 EXAMINATION

A. Examine substrates and conditions under painting will be performed for compliance with requirements for application of paint. Do not begin paint application until satisfactory conditions have been corrected.

1. Start of painting will be construed as the Applicator’s acceptance of surfaces and conditions within a particular area.

3.02 PREPARATION

A. General Procedures: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items in place that are not to be painted, or provide surface-applied protection prior to surface preparation and painting. Remove these items if necessary for complete painting of the items and adjacent surfaces. Following completion of painting operations in each space or area, have items reinstalled by workers skilled in the trades involved.

1. Clean surfaces before applying paint or surface treatments. Remove oil and grease prior to cleaning. Schedule cleaning and painting so that dust and contaminants from the cleaning process will not fall on wet, newly painted surfaces.

B. Surface Preparation: Clean and prepare surfaces to be painted in accordance with the manufacturer’s instructions for each particular substrate condition and as specified.

1. Provide barrier coats over incompatible primers or remove and re-prime. Notify AFP-RSBS Engineer in writing of problems anticipated with using the specified finish-coat material with substrates primed by others.

2. Cementitious Materials: Prepare concrete, concrete masonry block and cement plaster surfaces to be painted. Remove efflorescence, chalk, dust, dirt, grease, oils and release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.

   a. Use abrasive blast-cleaning methods if recommended by the paint-manufacturer.

   b. Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause
blistering and burning of finish paint, correct this condition before application. Do not paint surfaces where moisture content exceeds that permitted in manufacturer’s printed directions.

3. Wood: Clean surfaces of dirt, oil and other foreign substances with scrapers, mineral spirits and sandpaper, as required. Sand surfaces exposed to view smooth and dust off.
   a. Scrape and clean small, dry seasoned knots and apply a thin coat white shellac or other recommended knot sealer before application of primer. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.
   b. Prime, stain, or seal wood to be painted immediately upon delivery. Prime edges, ends, faces, undersides, and backsides of wood.
   c. When transparent finish is required, backprime with spar varnish.
   d. Backprime paneling on interior partitions where masonry, plaster or other wet wall construction occurs on backside.
   e. Seal tops, bottoms, and cutouts of unprimed wood doors with heavy coat of varnish or sealer immediately upon delivery.

4. Ferrous Metals: Clean non-galvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with recommendations of the Steel Structures Painting Council.
   a. Touch up bare areas and shop-applied prime coats that have been damaged. Wire brush, clean with solvents recommended by the paint manufacturer, and touch up with the same primer as the shop coat.
   b. Galvanized Surfaces: Clean galvanized surfaces with non-petroleum based solvents so that surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.

C. Materials Preparation: Carefully mix and prepare paint materials in accordance with manufacturer’s directions.

1. Maintain containers used in mixing and application of paint in a clean condition, free of foreign materials and residue.

2. Stir material before application to produce a mixture of uniform density; stir as required during application. Do not stir surface film into material. Remove films and, if necessary, strain material before using.

3. Use only thinners approved by the paint manufacturer, and only within recommended limits.
D. Tinting: Tint each undercoats a lighter shade to facilitate identification of each coat where multiple coats of the same material are applied. Tint undercoats to match the color of the finish coat, but provide sufficient differences in shade of undercoats to distinguish each separate coat.

3.03 APPLICATION

A. Apply paint in accordance with manufacturer’s directions. Use applicators and techniques best suited for substrate and type of material being applied.

B. Do not paint over dirt, rust scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.

C. Application of neutralizers shall be in accordance with the manufacturer’s standards.
   1. Paint colors, surface treatments, and finishes as indicated in “schedules,” or if not indicated, as directed by the AFP-RSBS Engineer.
   2. Provide finish coats that are compatible with primers used.
   3. The number of coats and film thickness required is the same regardless of the application method. Do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer. Sand between applications where sanding is required to produce an even smooth surface in accordance with the manufacturer’s directions.
   4. Apply additional coats when undercoats, stains, or other conditions show through final coat of paint until paint film is of uniform finish, color, and appearance. Give special attention to ensure that surfaces, including edges, corners, crevices, welds, and exposed fasteners, receive a dry film thickness equivalent to that of flat surfaces.
   5. The term “exposed surfaces” includes areas visible when permanent built-in fixtures, grilles, and similar components are in place. Extend coatings in these areas as required to maintain the system’s integrity and provide desired protection.
   6. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Paint surfaces behind permanently fixed equipment or furniture with prime coat only before final installation of equipment.
   7. Paint interior surfaces of ducts, where visible through registers or grilles, with a flat, non-specular black paint.
   8. Paint backsides of access panels and removable or hinged covers to match exposed surfaces.
   9. Finish interior of wall and base cabinets and similar field-finished casework to match exterior.
   10. Finish exterior doors on tops, bottoms, and side edges same as exterior faces.
11. Sand lightly between each succeeding enamel or varnish coat.

12. Omit primer on metal surfaces that have been shop-primed and touch up painted.

D. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.

1. Allow sufficient time between successive coats to permit proper drying. Do not recoat until paint has dried to where it feels firm, and does not deform or feel sticky under moderate thumb pressure and where application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.

E. Minimum Coating Thickness: Apply materials at less than the manufacturer’s recommended spreading rate. Provide a total dry film thickness of the entire system as recommended by the manufacturer.

F. Putty: Apply putty to concrete and masonry surfaces at a rate to ensure complete coverage or pores filled.

G. Prime Coats: Before application of finish coats, apply a prime coat of material as recommended by the manufacturer to material that is required to be painted or finished and has not been prime coated by others. Re-coat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears.

H. Pigmented (Opaque) Finishes: Use multiple coats to produce a glass-smooth surface film of even luster. Provide a finish free of laps, cloudiness, color, irregularity, runs, brush marks, orange peel, nail holes, or other surface imperfections.

I. Transparent (Clear) Finishes: Use multiple coats to produce a glass-smooth surface film of even luster. Provide a finish free of laps, cloudiness, color, irregularity, runs, brush marks, orange peel, nail holes, or other surface imperfections.

J. Completed Work: Match approved samples of color, texture, and coverage. Remove, refinish, or repaint work not in compliance with specified requirements.

3.04 CLEANING

A. Cleanup: At the end of each working day, remove empty cans, rags, rubbish, and other discarded paint materials from the site.

B. Upon completion of painting, clean glass and paint-spattered by washing and scraping, using care not to scratch or damage adjacent finished surfaces.

3.05 PROTECTION

A. Protect work of other trades, whether to be painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting, as acceptable to the Architect.
B. Provide “wet paint” signs to protect newly painted finishes. Remove temporary protective wrappings provided by others for protection of their work after completion of painting operations.

1. At completion of construction activities of other trades, touch up and restore damage or defaced painted surfaces.

3.06 EXTERIOR PAINT SCHEDULE

A. Rubbed Concrete Ceiling Under slabs and Beams, Fiber Cement Eaves and Precast Concrete and GFRG Eaves Vents Design: Two (2) finish coats of acrylic solvent-paint, plain finish over primer:

1. Primer: As per manufacturer’s recommendation.

2. 1st, and 2nd Coats: Acrylic solvent paint.

B. Exterior Plaster Finish: Two (2) finish coats of acrylic solvent-paint, textured finish over primer and acrylic cast.

3.07 INTERIOR PAINT SCHEDULE

A. General: Provide the following paints systems for the various substrates, as indicated.

1. Cement Board Ceiling: Two (2) finish coats of semi-gloss acrylic latex paint over primer:

   a. Primer: Latex based interior white primer (FS-TT-P-650).
   b. 1st, and 2nd Coats: Semi-gloss acrylic latex paint for walls.
   c. Use semi-gloss finish for ceiling.

2. Plastered CHB Walls/Double wall fiber cement board: Two (2) finish coats of semi-gloss acrylic latex-based paint over sealer:

   a. Sealer: As per manufacturer’s recommendation.
   b. 1st, and 2nd Coats: Semi-gloss acrylic latex based paint.

3. Indicated Woodwork (Interior surfaces): Two (2) coats of semi-gloss enamel paint over primer and sealer.

   a. Primer and Sealer: As per manufacturer’s recommendation.
   b. 1st, and 2nd Coats: Semi-gloss enamel paint.


   a. Lacquer Primer Surface: As per manufacturer’s recommendation
   b. Lacquer Spot Putty: As per manufacturer’s recommendation
   c. Lacquer Primer Surface: As per manufacturer’s recommendation
   d. Lacquer Enamel Topcoats: As per manufacturer’s recommendation
5. Ferrous Metal (Stair Steel Balusters, Railings, LPG storage Grille Doors, security grille, window grille, window stall & fence):
   a. Flat Enamel Finish: Two (2) Coats gloss enamel finish over epoxy primer.
   b. 1\textsuperscript{st} and 2\textsuperscript{nd} Coats: Gloss enamel paint.
   c. Finish Coat: Exterior Alkyd Flat Enamel

6. Zinc Coated Metal:
   a. Full-Gloss Enamel Finish: Two (2) coats glass enamel finish over galvanized metal primer.
   b. Primer: Galvanized metal primer (FS TT-P-641).
   c. 1\textsuperscript{st} and 2\textsuperscript{nd} Coats: Gloss enamel paint.

7. Natural Finish Woodwork:
   a. Rubbed Varnish Finish: Two (2) finish coats over shellac plus filler on open-grain wood.
      a. First Coat: Cut Shellac (FS TT-S-300).
      c. Second Coat: Oil Rubbing Varnish (FS TT-V-86).
      d. Third Coat: Oil Rubbing Varnish (FS TT-V-86).
      e. Final Coat: Polyurethane Finish (treads, shoe moulds & kicker plate moulding only).
1.01 SUMMARY

A. The General Conditions apply to all work under this section of the Specifications.

1.02 SCOPE OF WORK:

A. Unless otherwise specified, the Contractor or his sub-contractor, shall furnish all materials, tools, equipment, apparatus, appliances, accessories, transportation, labor and supervision required for the complete installation and testing of the Plumbing System ready for use in accordance with the acceptable practice of the Plumbing Trade as listed herein but not limited to the following:

1. The Plumbing contractor is required to refer to all architectural, structural and electrical plans and investigate all possible interference and conditions affecting his work.

2. All work shall comply with the pertinent provisions of the Plumbing Code of the concerned city, the Code on Sanitation of the Phil., and/or the National Plumbing Code of the Philippines.

3. Water supply and distribution system for the building.

4. All building sanitary drains waste and venting systems including floor drains and A/C drains.

5. Sewage collection and disposal system including sewer junction boxes, sewer manholes and sewage holding tank up to existing sewer main.

6. Building storm drainage system and tapping to existing subdivision sewer/drainage system.

7. Testing for leakage of all water supply and distribution system, drains, waste, sewer and venting system plus pressure testing and disinfection of the water supply and distribution system.

8. Excavation and backfilling in connection with the work shall be included.

9. Preparation and submittal of one (1) set original and five (5) sets of “as-built” plans.

1.03 WORK NOT INCLUDED

A. Construction of all Septic Tanks shall be Civil Works.

B. All electrical power wirings, except that furnished as an integral part of factory assembled equipment except as otherwise specified herein.

C. Painting except as required by the Plumbing Code and a specified herein.
1.04 NOTES ON DRAWINGS

A. The drawings show the general arrangement of all pipings. However, where local and/or actual conditions at the jobsite necessitate a deviation or rearrangement, the Contractor shall prepare and submit the new arrangement for the AFPRSBS Engineer’s approval.

B. Small scaled drawings do not possibly indicate all offsets, fittings and other parts of the system required. The Contractor shall arrange such work accordingly, furnishing such fittings, traps, valves, and accessories as may be required to meet such conditions.

1.05 APPLICABLE SPECIFICATIONS, CODES, ORDINANCES, PERMITS & FEES

A. The work covered in this contract is to be installed according to the specs., codes, ordinances and requirements of the following:

   1. National Plumbing Code of the Philippines
   2. The Code on Sanitation of the Philippines
   3. Dept. of Environment & Natural Resources
   4. Ordinances of concerned city or municipality

B. The Contractor shall assist the Developer in securing all construction permits. All fees in connection thereto shall be at the Developer’s expense. The Contractor shall furnish the Developer final certificates of inspection necessary for the Occupancy Permit.

1.06 WORKMANSHIP & COORDINATION WITH TRADES:

A. All work shall be performed in first class and neat workmanship by plumbers skilled in their trades and such plumbers shall be acceptable to the AFPRSBS Engineer.

B. The Sanitary Engineer/ Contractor is required to refer to the General Conditions and to all architectural, structural, electrical and auxiliary plans and specs, and shall investigate all possible interferences and conditions affecting his work.

PART 2 : PRODUCT

2.01 GENERAL

A. Except as specified, the Contractor shall submit for the AFPRSBS Engineer’s approval, four (4) copies of a complete list of manufacturer’s names of all equipment and materials he proposes to use prior to purchase of the same.

B. The contractor shall assume the cost of and the entire responsibility for any change in the work as shown on contract drawings which may be occasioned by approval of materials other than those specified.
2.02 PIPES AND FITTINGS SCHEDULE

A. Cold water Lines – for interior toilets & baths, kitchen, risers, downfeeds. &
distribution lines PPR Pipes and fittings shall be used.

B. Sewer Line – shall be polyvinyl chloride soil pipe (PVCSP) and fittings, for all
horizontal runs and soil stacks and collectors conforming to ASTM D2729I. Fittings
shall be solvent cement joined conforming to ASTM D2564.

C. Vent Pipes, Downspouts and Storm Drains – shall be polyvinyl chloride (PVC) pipe
and fittings conforming to ASTM D2729. Fittings shall be solvent cement joined
conforming to ASTM D2564.

2.03 VALVES

A. Gate valve – shall be rising stem, all bronze, female threaded, min. of 150 psig
working connection.

2.04 OTHER MATERIALS

A. Drains : Samples for the following drains shall be submitted for approval prior to
purchase:

1. Roof drain
2. Floor/Shower
3. Floor (Hubless)
4. Deck
5. Plant box

B. Hose Bibbs – 20mm. Standard hose connection, male tapered threads, polished
chromium plated.

C. Outdoor Pipe Lines, Appurtenances

D. Drainage Junction Boxes – 140 kg./sq.cm. reinforced concrete with steel grating as
cover.

PART 3 : IDENTIFICATION & APPROVAL OF MATERIALS

A. Each length of pipe, fittings, traps, fixtures, and device used in the Plumbing System
shall have cast stamped or marked on it, the manufacturer’s trade mark or name,
the weight, type and classes of the product when so required by the Bureau of
Standards.

PART 4 : SUBSTITUTION & TESTING OF MATERIALS

A. Materials intended to be substituted for those originally specified shall be accepted
only after a formal request for substitution, accompanied by:

1. Reasons for substitutions;
2. Certificate of test indicating quality, compared to those originally specified.

3. Cost comparisons with material originally specified. Requests shall be submitted to the Construction Manager for evaluation at least 15 working days before installation of subject material is due.

B. The cost of transporting to the approved testing laboratory and cost of testing of samples that have failed to meet the standard shall be borne by the contractor.

C. Results of tests shall be submitted to the AFPRSBS Engineer for evaluation at least 15 days before the material is due for installation on the job.

**PART 5 : SOIL, WASTE, DRAIN AND VENT PIPES:**

**5.01 GENERAL**

All PVC and drainage pipes shall be pitched 6mm. per 300mm. (2%) but in no case flatter than 3mm per 300mm. (1%).

**5.02 SUPPORTS**

A. Horizontal lines shall be supported by well secured length heavy duty strap hangers or floor chairs as required. Vertical lines shall be secured strongly by hooks to the building frame, and suitable bracket or chairs shall be provided at the floors from which they start.

B. PVC pipes in trenches/underground shall be laid true to line and grade on a stable and suitably prepared foundation, each section of the pipe being properly bedded.

C. In soft ground liable to settlement, a gravel base 300mm. deep and twice the width of the pipes shall be rolled or tampered. Backfilling shall be carefully placed and tampered for the purpose, in such a manner that the pipelines or connections are not disturbed.

**5.03 TRAPS**

A. Every plumbing fixture shall be separately trapped by a vented water sealed trap as close to the mixture outlets as the conditions will allow, but in no case at a distance greater than 600mm. Traps shall be of the same diameter as the waste pipes from the fixtures which they shall serve. All traps shall have a water seal of at least 32mm. with a brass thumbscrew clean-out at the bottom of the seal.

**5.04 VENT**

A. Vent shall be taken from the crown for the fixtures, except for water closet traps, in which case, the branch line shall be vented below the trap and above all small waste inlets, so connected as to prevent obstructions. Each vent pipe shall be run separately above the fixtures into the adjacent soil pipes, as distance not more than 1.50 meters.
B. A vent line shall be provided where ever practicable; a direct extension of a soil or waste line

C. Main vent risers, 4.5 meters long or more, if any, shall be connected at the foot of the main waste or soil pipes but below the lowest vent outlet, by a 45deg. connection.

D. All vertical soil or vent pipes shall be carried up at least 300mm. above the ceiling/roof space of the building and the open top ends are to be entirely and securely covered using the “MaxiVent or MiniVent System”, whichever applies, by STUDOR.

E. Vent pipes in roof spaces shall be run as close as possible to the underside of roof with horizontal piping pitched down to stacks without forming traps. Where an end or circuit vent pipe from fixtures occurs, it shall be connected to the main vent or vent stack.

5.05 ROUGHING-IN

A. Roughing-in for pipes and fixtures shall be carried along with the building construction. Correctly located openings with the proper sizes shall be provided where required on the walls and floors for the passage of pipes. All items to be embedded in concrete shall be thoroughly clean and free from all rust, dirt, scale, and paint.

5.06 FITTINGS

A. All changes in pipe size on soil, waste and drain lines shall be made with reducing fittings or reducers. All changes in direction shall be made by the appropriate use of 45deg. Wyes, or long sweep bends, except that sanitary tees may be used on vertical stacks. Short quarter bends or elbows may be used in soil and waste lines where the change in directions is from the horizontal to the vertical, e.g. the discharge from the water closet.

5.07 JOINTS AND CONNECTIONS

A. All joints shall be air and water tight. For joining pipes, the following methods shall be used:

1. Galvanized wrought iron or steel pipe – screwed or threaded joints, use sealant.
2. Polyvinyl chloride (PVC) pipes – socket type with PVC cement.
3. Copper tubing – standard fittings, soldered joints

PART 6 : WATER DISTRIBUTION SYSTEM

6.01 INSTALLATION

A. The piping shall be extended to all fixtures, outlets and equipment from the gate valves installed in the branch near the riser.
B. Unions shall be provided where required for accessible disconnection.

C. All pipes shall be cut accurately to the right measurements and shall be worked in place without springing or facing. Care shall be taken so as not to weaken the structural portions of the building.

D. All service pipes, valves, and fittings shall be kept at sufficient distance from work to permit finished covering of not less than 15mm from such work or from finished covering of the different service.

E. Change in pipe size shall be made with reducer fittings.

F. Accessible Contraction – expansion joints shall be made where necessary. Horizontal runs of pipe over 15mm in length shall be anchored to walls or the supporting structure about midway along the run to force expansion and contraction equally towards the ends.

PART 7 : EXCAVATION, PIPE LAYING, AND BACKFILLING

7.01 TRENCHES

A. Trenches for all underground pipe lines shall be excavated to the required depths and grades. Bell holes shall be provided so that the pipe will rest on well-tamped solid ground for its entire length. Where rock is encountered, excavation shall to a depth 150mm below the pipe bottom and laid out with approved filling materials.

7.02 CONCRETE PROTECTION

A. All pipes, except concrete pipes and PVC pipes that will run underground, shall be protected with class B concrete casing, a minimum of 100mm around the pipe perimeter and 250mm below the finish grade.

7.03 MATERIALS

A. Materials for backfilling shall be free of debris or big rocks. Backfill materials shall be placed in horizontal layers, properly moistened and compacted to an optimum density that will prevent excessive settlement and shrinkage.

PART 8 : MISCELLANEOUS

8.01 CLEANOUTS

A. Cleanout shall be of the same size as the pipe, the location of which is extended to an easily accessible place.

8.02 TRAPS

A. Every plumbing fixture or equipment requiring connections to the drainage system shall be equipped with a trap, except for fixtures that have a built-in trap.
B. Each trap shall be placed as near as possible to the fixture. No fixture shall have double-trapped.

8.03 VALVES AND HOSE BIBBS

A. Valves shall be provided on all water supplies to fixtures as specified.

B. Hose bibs shall be made of brass with 15mm male inlet threads, hexagon shoulders, and 20mm connections.

PART 9 : FIXTURES, FITTINGS, AND ACCESSORIES

9.01 Manufacturer’s brochure shall be submitted for approval to AFPRSBS Engineer for approval prior to purchase of the sanitary fixtures below. Delivered fixtures shall be inspected and approved prior to installation.

1. Waterclosets
2. Lavatories
3. Faucets
4. Stainless steel Kitchen Sink:

9.02 PLUMBING FIXTURES, FITTINGS & ACCESSORIES

A. Water Closets

1. Complete with bowl, tank, seat and cover, tank fittings and bolt caps. Vitreous china, free standing tank and bowl combination. Low water consumption, flushes on 1.6 gallons. Round front, siphon action bowl with bottom outlet and extended rear shelf. Closed-coupled tank, equipped with water-saver tank fittings. Contours on bowl shall be eclosed (not visible). Colon trap way. Box rim design.

2. Location: Restroom (events hall & office)
3. Color: Regular
4. Minimum Size: 742mm x 510mm x 735mm

B. Lavatory

1. Vitreous china lavatory, with base enclosure of fittings and serves as support of lavatory

2. Location: Restroom (events hall & office)
3. Color: to match water closet color
4. Nominal Dimension: 19 ¼” x 16 ¼”

C. Kitchen Sink (Pantry)
   1. Design: Single tub with integral drying area on one side
   2. Color: Stainless Steel
   3. Acceptable Brand

D. Faucets shall be of acceptable brands. Samples for approval prior to purchase.

9.03 FITTINGS, EXCEPT FAUCETS:

A. WATERCLOSET, LAVATORY, KITCHEN SINK AND SERVICE SINK SUPPLY PIPES AND stops: Supply pipes shall be S.S. flexible hose. Angle valves shall be stainless steel.

B. LAVATORY AND KITCHEN SINK TRAPS: Cast-Brass, P-Trap with cleanout and wall flange.

C. Supply and drain plumbing service fittings not listed above shall be as selected by the AFPRSBS Engineer.

D. Water closet shall be installed using Cast-brass floor flanges.

PART 10: EXCAVATION FOR STORM & SANITARY (SEWER DRAINAGE SYSTEM)

A. General. The Contractor shall do all excavation of whatever substances encountered below depth shown on drawing. Excavated materials not required as fill or backfill shall be removed from site as directed by the Construction Manager and properly disposed by the Contractor. Excavation for accessories shall have 300mm minimum depth and 60mm maximum clearance on all sides. Excavation shall not be carried below the required depth. Excess excavation below required level shall be backfilled at the Contractor’s expense, with earth, sand, gravel, thoroughly tamped, or concrete, as directed by the Construction Manager. Unstable soil shall be removed and replaced with gravel or crushed stone, which shall then be thoroughly tamped.

PART 11: PRESSURE TESTS FOR WATER LINES:

11.01

A. After the pipes have been installed, the joints completed, and with joints exposed for examination, all newly installed pipes or any valve section therefore shall be subjected to a hydrostatic pressure, 1-1/2 times the designated working pressure of the system.

B. The duration of each pressure test shall be at least 10 minutes long unless otherwise specified by the AFPRSBS Engineer.

C. Each section of pipeline shall be slowly filled with water, and the specified test pressure, measured at the point of lowest elevation, shall be applied by means of a
pump connected to the pipe in a manner satisfactory to the Construction Manager. During the filling of the pipe and before applying the test pressure, all air shall be expelled from the pipeline. To accomplish this, tapping shall be made at the highest elevation. After completing the tests, the taps shall then be tightly plugged unless otherwise specified. During the test, all exposed pipes, fittings, valves, joints, and couplings shall then carefully and thoroughly examine. If found to be defective, they be removed and replaced with sound materials at the Contractor’s expense. The test shall then be repeated until satisfactory results are achieved.

11.02 DEFECTIVE WORK:

A. If the inspection or tests show any defect, such defective work or material shall be replaced and the test shall be repeated until satisfactory to the AFPRSBS Engineer.

B. All pipe repairs shall be made with new materials at the expense of the Contractor.

PART 12 : CLEANING

A. All exposed metal surfaces shall free from grease, dirt, and other foreign materials

B. All plumbing fixtures shall be properly protected from abuse and damage during the construction stage. The fixtures shall be cleaned upon completion & prior to acceptance of work.

C. All equipment, pipes, valves, and fittings shall be cleaned from grease and sludge which may have accumulated during the installation and construction period. Any clogging, discoloration, or damage to other parts of the building due to negligence of the Contractor shall then be repaired by the Contractor.
PART 1 : GENERAL REQUIREMENTS

1.01 GENERAL

The general conditions and provisions of the Civil Work Contract not in conflict with these Specifications and the drawings form part of and are included in this section of these Specifications.

1.02 WORK DESCRIPTION

The work of the CONTRACTOR consists of furnishing all plans, labor, equipment, and materials performing all operations in connection with the electrical system shown on the Drawings, complete and in accordance with the Specifications and Drawings and subject to all terms and conditions of the Contract, and all other labor and materials not specifically mentioned under Sections, to bring the electrical system to operating conditions and ready for use by the Developer.

A. The scope of work of the CONTRACTOR includes the following:

1. Complete electrical system from service entrance to meter center.
2. A system of lighting and power wiring including feeders, branch circuits and wire gutters.
3. Supply and installation of all lighting fixtures and wiring devices.
4. Supply and installation of panel boards, individual air circuit breaker & breaker gutter.
5. Complete Telephone System (Conduit and Plate Cover Only)
6. Complete House phone conduit and wires
7. Complete CATV system (conduit and plate cover only)
8. Complete fire alarm system.
9. Complete grounding system.
10. Complete testing of electrical system.
11. Painting of electrical works and equipment.
12. Grouting of opening in floors and walls after all conduits are in place and sealing of all such opening if not used.
13. Procurement of wiring permit and securing of Certificate of Electrical Inspection (C.E.I.). Fees shall be paid for by the Developer.
14. Anything that has been omitted in any item of work or any materials usually furnished which are necessary for the completion of the electrical work as outline herein. Such item must be included in this division of work.

B. WORKS NOT INCLUDED:

1. Motor and Controls
2. Telephone Apparatus
3. Wires and Cables for telephone and CATV.
1.03 CODES & STANDARDS

A. Building Codes

All electrical works shall be in accordance with the following codes and agencies:

1. The Philippine Electrical Code (1992)
2. The National Building Code of the Philippines
3. The National Electrical Code (NFPA 70) - 1996 Edition
5. Fire Code of the Philippines (FCP)
6. The National Fire Protection code (NFPC)

B. Material Standards:

Publications and Standards of the organizations listed below are applicable to materials specified herein.

1. American Society for Testing and Materials Publications (ASTM)
2. Underwriter’s Laboratories, Inc. (UL)
3. National Electrical Manufactures Association (NEMA)
4. Institute of Electrical and Electronic Engineers (IEEE)
6. American National Standards Institute (ANSI)

1.04 RELATED PROVISION DESCRIBE ELSEWHERE

1.041 Permit

Secure Certificate of Electrical Inspection upon completion of the project necessary to secure Occupancy permit for the building. Deliver all certificates of said inspections issued by authorities having jurisdiction over the work.

1.042 Visits to Site

The CONTRACTOR is advised to visit to site, familiarize himself with the local conditions and facilities, the nature of work, and ascertain such other condition that may affect his work. He will be deemed to have done this before preparing his proposal and no subsequent claim for inaccurate information will be entertained.

1.043 Leaving the Site

The CONTRACTOR shall not withdraw from this site until the Developer has agreed that no further work is necessary.

1.044 Suspension or Delays

The CONTRACTOR shall not suspend or fail to make proper progress with the work without justifiable cause. The Developer shall have the right to take over the work and all the materials on the site and make arrangements to have the work completed...
by others if the Contractor fails to resume the work without cause within fifteen days after receipt of the Developer’s written notice.

1.45 Cleaning Up

During the process of the work and on the completion of the project, the CONTRACTOR shall remove from the premises all dirt, debris, rubbish and waste materials caused by him in the performance of his work. He shall remove all tools, scaffolding and surplus materials after completion and acceptance of work.

1.05 SUBMITTALS

1.051 Shop Drawings and Product Data

A. The Contractor shall submit for approval by the Construction Manager data of materials and equipment to be incorporated in the work. Submittals shall be supported by descriptive materials, catalogs, cuts, diagrams, performance curves, and charts published by the manufacturer to show conformance to specification and drawing requirements; model numbers alone will not be accepted. Provide complete electrical characteristics and physical dimensions. Show required access and clearances to be maintained for working space and compliance with the Philippine Electrical Code.

B. Provide samples of each of the following items of equipment:

- Panel Board & ACB
- Conduits & Fittings
- Wires & Cables
- Boxes
- Wiring Devices

C. Provide shop drawings pertaining to construction methodology that needs approval from the AFPRSBS Engineer.

1.052 Record Drawings:

A. The Contractor shall maintain on a daily basis at the project site a complete set of "As-Built Drawings" reflecting an accurate dimensional record of all buried or concealed work.

B. Record dimensions shall clearly and accurately delineate the work as installed; locations shall be suitably identified by at least two (2) dimensions to a Permanent structure.

C. The Contractor shall mark all "As-Built Drawings" on the front lower right hand corner with a rubber stamp impression that states the following: "As-Built Drawings to be used for recording "Field Deviations and Dimensional Data Only"

D. The Contractor shall submit to the AFPRSBS Engineer As-Built Drawings in the form of one reproducible Sepia and five (5) sets of blue print.
1.06 STORAGE, DELIVERY, HANDLING and PROTECTION

A. The CONTRACTOR shall make all arrangement for the temporary storage of materials and pay for the provisions of the necessary electricity supply required for the work and shall clear away all temporary installation before or upon completion of the work.

B. Provide protection against direct sunlight, rain, sand, wind or heat for materials or equipment delivered to the site to be incorporated into the works.

C. Equipment and materials shall not be installed until such time as the environmental conditions of the job site are suitable. Equipment or materials damaged or which are subjected to the elements are unacceptable and to be removed from the premises and replaced.

PART 2 : PRODUCT

2.01 MATERIAL

A. Conduits shall be intermediate Metallic Conduit (IMC) hot-dip galvanized mild steel pipe 10-ft. long including couplings. For PVC pipes, the same shall be schedule 40 of an acceptable brand.

B. Wires and cables shall be insulated for 600 volts. Feeder and branch circuit wires and cables shall be type TW or THW as required by Drawings.

C. Conduit fitting shall be U.S. Underwriter Laboratory (U.L.) listed or approved local equipment.

D. Outlet boxes shall be hot-dip galvanized or cast metals as required. Thickness of pressed steel boxes shall not be less than gage # 16.

E. Panel board and cabinet shall be dead-front-type with covers. Cabinet shall be made of sheet of the following thickness of mat and trim if no single dimension exceeds 24 inches and no surface area is over 360 square inches.

No. 12 U.S. gauge tub, mat and trim if no single dimension exceeds 60 inches and no surface area over 1,500 square inches.

No. 10 U.S. gauge tub, mat and trim for any cabinet larger than the foregoing.

Door up to 30 inches high shall be equipped with push lock and door over 30 inches shall be equipped with 'T’ handles.

F. Lighting Fixtures

Fluorescent fixtures shall be equipped with HPF Pre-heat thermal protected ballast, spring loaded lamp holder, and standard white lamp. Fixture housing shall be baked enamel, white interior, and gage # 22 minimum galvanized steel unless otherwise noted.
The Contractor shall submit samples of other type of lightning fixtures for the approval of the AFPRSBS Engineer.

G. Wiring devices shall be subject for approval. Receptacles for general use shall be 15 amperes, 220 volts “grounding type”.

**PART 3 : EXECUTION**

### 3.01 INSTALLATION

**A. Standard of Workmanship**

The CONTRACTOR shall execute all work in a neat and workmanlike manner and shall do all necessary work whether it is clearly specified in these Specifications or shown in the drawing or not. All work shall be done in accordance with the best practices employed in modern electrical installations.

The CONTRACTOR shall employ only competent and efficient workmen and shall upon written request of the AFPRSBS Engineer, discharge or otherwise remove from work any employee who is in the opinion of the AFPRSBS Engineer is careless or incompetent or who obstruct the progress of the work or acts contrary to instruction or conduct himself improperly.

**B. Conformity with Plans and Allowance Deviation**

These Specifications and Drawings indicate the general layout of the system and the CONTRACTOR shall be responsible for the proper installation of the system without substantial alteration or modification.

Wherever field conditions or exigencies of construction make departure from these Specification and Drawing necessary, details of such departure and reason thereof shall be submitted without delay to the AFPRSBS Engineer and no departure shall be made without written approval of the latter.

**C. Removal of Defective or Unauthorized Work**

Any defective work, whether the result of poor workmanship, defective materials, damage through carelessness, or any other cause, found to exist prior to acceptance, or payment of the work shall be removed immediately and replaced by work and materials which shall conform to the Specifications, or otherwise shall be remedied in an acceptable manner.

All materials not conforming to the requirements of the Technical/Specification shall be considered as defective.

Non-defective materials, the defect of which has been subsequently corrected, shall not be re-used until approval has been given by the CAFPRSBS Engineer.
D. Cutting and Patching

The CONTRACTOR shall do all cutting and patching required by the work by engaging men who are skilled in the particular trade to do the work. Surfaces obtained by cutting and patching shall exactly match surrounding works so that there will be no evidence of alteration or patching.

E. Injury to Persons or Damage to Property

The CONTRACTOR shall be responsible for all injury to persons and damage to property caused during the performance of the works by his workers and shall be liable for any claims against the Developer on account of such injury and/or damage. The Contractor shall likewise take necessary precaution to protect the property of the Developer against rain or other inclement weather during the performance of his work. The CONTRACTOR shall be liable for any such damage or loss.

3.02 QUALITY CONTROL

The Contractor shall conduct the following testing of all electrical system to assure that the system is safe and free from fault:

Ground Test - the entire installation shall be free from improper grounds and from short circuits. Each panel shall be tested with mains connected to the feeder, branches connected and switches closed. All fixtures in place and permanently connected. Lamps removed or omitted from the sockets and all switches closed. Each individual power equipment connected for proper and intended operation. In no case shall the resistance be less than that allowed by the Regulation for electrical equipment of building. Failures shall be corrected in a manner satisfactory to the AFPRSBS Engineer.

Performance Test - the Electrical Contractor shall test all system of the entire electrical installation for proper operational conditions.

Phase Test - the electrical Contractor shall determine correct rotation of all motors and phase of the entire power installation before final connection to the line. Final connection of main feeder buses to the main circuit breakers of the switchgear shall only be made after correct phase relation with the Power Company's primary line.