Section VI - Technical Specifications

Specifications
Repair of Damaged Port Facilities , Port of Polillo, Quezon

1 DEMOLITION AND REMOVAL WORKS

1.1 DESCRIPTION

The work includes the furnishing of all labor, materials and equipment required to carry out the demolition and removal of obstructions, portions of existing piers including extraction/cutting of timber and r.c. piles at required depth and demolition of miscellaneous buildings, pavements, fences, utilities, navigation aids and wrecks etc., as required for the execution of the Contract.

The Contractor shall submit the proposed methodology or procedure of demolition work with detailed drawings and calculations if necessary, to the Engineer for approval, before the execution of the Works.

The Contractor shall keep all pavements and landing areas to and from the site of the disposal area clean and free of mud, dirt and debris during and after the execution of disposal. Disposal of debris and materials shall be as directed by the Engineer

For off-shore obstructions to pile driving and dredging, survey shall be executed by the Contractor with the Engineer before any demolition and removal of wrecks commence and shall be as directed by the Engineer.

1.2 GENERAL PROVISIONS

1. The Contractor shall be deemed to have satisfied himself of the site conditions, and to have included in his unit prices provision for all risks that may arise during or in connection with the work.

2. The demolition work shall be carried out by approved methods and equipment such as concrete breakers, gas-cutters, hydraulic jacks, compressed air disintegrators, etc., however, no blasting shall be used unless approved in writing by the Engineer and after obtaining the written permission of the concerned Authorities.

3. The Contractor shall provide suitable equipment, skilled labor and appropriate temporary works such as scaffoldings to ensure safety in his demolition works as well as in the adjacent area.

4. The Contractor shall demolish all the structural members above the level on which the subsequent and permanent works under this Contract will begin. To this end, the temporary construction works such as excavation shall be conducted by the Contractor.

5. Materials coming from the demolition works, except general earth, shall remain the property of the Procuring Entity, the designated part of which shall be stored by the Contractor at places specified by the Engineer's authorized Representative.

1.3 INTERFERENCE WITH PORT OPERATIONS

1. During the execution of the work, the Contractor shall not interfere with the shipping, navigation and other traffic in the port.

2. The Contractor shall make arrangements with the operations people on the schedule of demolition and related works to keep port operation activities undisturbed at all times.

3. Prior to commencement of the demolition works, the Contractor shall inform/announce to port users the schedule of disconnection of utilities.

1.4 STORAGE AND DUMPING

Prior to the commencement of the demolition work, the Engineer shall submit to the Contractor a list in which all the materials to be salvaged and overhauled, as property of PPA and the location of their storage shall be described. Materials embedded in concrete units shall not be salvaged.

The Contractor shall separate materials to be salvaged from debris. Salvaged materials shall be loaded, transported and unloaded by the Contractor at the specified locations.

Debris, if it does not contain any pollutant in the opinion of the Contractor may be dumped at the offshore area.

The Contractor may dump debris on land areas but out of the site, which areas shall be procured and prepared at his own expense. In this case, safety measures shall be undertaken in the transporting, unloading, covering and others as requested by the Engineer.

1.5 EXECUTION

1. Prior to the commencement of demolition works, the alignments of the new construction works to existing pier shall be checked.

2. The width and alignment of portion of existing structure to be demolished shall be marked by paint.

3. With these lines as guides, concrete shall be broken and reinforcing bars cut, such that panels or portions of the structure can be lifted out for disposal elsewhere outside of the operational work area.

4. Extract concrete piles with care in order not to damage existing or adjacent structures, equipment or materials.

5. Piles (timber/concrete) for demolition/extraction shall be done with care and/or to the required level indicated in the plan as shown in the drawings.

6. Rocks removed from existing slope protection shall be stored for reuse in new construction.

7. Demolish buildings, pavements, curbs, fences, utilities, services, navigation aids and the like as determined in the field for each project and as shown on the drawings or as directed by the Engineer.

8. Materials coming from the demolish works shall be properly disposed by the Contractor.

1.6 SAFETY

At the end of each day's work, the site shall be left in safe condition, so that no part is in danger of toppling, or falling or creating hazards to personnel or equipment.

1.7 MEASUREMENT AND PAYMENT

Demolition and removal, unless otherwise noted, shall be measured by number or unit quantities or lump sums as appropriate for each class of work for each category. Cost of disposal of debris shall be incidental to the work and shall not be paid for separately.

Demolition and removal of existing pavement shall be measured and paid for under this section unless such pavement falls within or above the new subgrade, in which case, measurement and payment shall be under "Roads and Pavements."

The price listed above shall be full compensation for all labor, materials, tools and equipment and all incidental works necessary for the successful completion of work.

2. REINFORCED CONCRETE

2.1 GENERAL

All works falling under this category shall include reinforced concrete for all kinds and parts of any reinforced concrete structure.

2.2 MATERIALS

a.) Cement

Cement used shall be Type I Portland conforming to the requirements of the latest revision of ASTM C 150 "Standard Specifications for Portland Cement".

b.) Coarse Aggregates

Coarse Aggregates shall be washed, well graded, hard pieces of gravel, crushed gravel or rock conforming to the requirements of ASTM C 33 "Standard Specification for Concrete Aggregates".

c.) Fine Aggregates

Fine Aggregates shall be washed sand, stone screenings or other inert materials of same characteristics, or any combination thereof composed

Standard laboratory strength test for the 7, 14 and 28 days periods shall be taken to all concrete samples in addition to routine field tests, at cost to the Contractor. Only design mixes represented by test proving the required strength for 7, 14 and 28 days tests shall be allowed.

The cost of sampling, handling and transporting samples from jobsite to the laboratory and the cost of subsequent tests made until the desired mix is attained shall be for the account of the Contractor.

2.6 CONCRETE PROPORTION AND CONSISTENCY

Concrete proportion should produce mix consistencies that will work readily into angles and corners of the forms and around reinforcements irrespective of the method of placing employed, without permitting the materials to segregate or excess water to collect on the surface of the concrete and with separated individual particles of aggregates showing coating of mortar with proportionate amount of sand. The total aggregate in the proportion used shall be such that when sieved, the weight passing the No.4 standard sieve shall be thirty percent (30) of the total.

The methods used for measuring materials going into the concrete mix shall permit easy checking and control of proportions at any time during the work.

2.7 MIXING OF CONCRETE

All concrete used shall be machine-mixed at the site. Each batch shall be mixed at the mixer's design speed, for at least 1-112 minutes after all concrete materials are simultaneously placed in the mixer. The ideal rotation speed of the mixer shall be between 14 and 20 rpm.

All mix contents of the mixer shall be thoroughly removed before any succeeding batch is placed.

The materials for the first batch shall contain sufficiently excess cement, sand and water to coat the inside walls of the mixer without reducing the required mortar content of the mix.

The mixer shall be provided with devices for accurately measuring and controlling the amount of water used in each batch and for automatically recording the number of revolutions of the mixer.

Hand mixing of concrete will only be allowed in case of mixer breakdown, in which case it shall be stopped as soon as pouring for the particular section is completed, or at a construction joint as directed by the Engineer.

Re-tempering or remixing of partially hardened concrete with the addition of water will not be permitted.

2.8 PLACING OF CONCRETE

a.) Concrete shall be placed in the presence of the Engineer only after the forms, reinforcing bars and other spaces to receive the concrete have been inspected and approved by him.

b.) Concrete shall be placed only when wind and weather conditions will allow proper placement and curing of the concrete. Notice of any concreting operations shall be served to the Engineer at least three (3) days ahead of each schedule.

c.) Mixed concrete shall be deposited in its final position within a practicable time. Each succeeding fresh deposit for particular structural member shall be placed at a practicable rate to prevent cold joints. Each successive fresh deposit of concrete shall be vibrated vertically at uniformly spaced points and levels, of such duration and intensity to compact the concrete thoroughly but shall be discontinued the moment segregation of materials is noticed.

d.) Where concreting operations involve a fall more than 1.50 meters (4.92 feet), the fresh concrete shall be poured through approved sheet metal conduit or pipes. The pipes shall be kept full of concrete and its lower end kept below the surface of concrete throughout the pouring operations.

e.) Deposition of concrete shall be in such a way as to prevent segregation of the materials and the displacement of the reinforcement. Placing shall be done preferably with the use of buggies, buckets or wheel-borrows. Troughs, conveyors and pipes and the manner of use of each one shall be with the expressed permission of the Engineer.

f.) Each layer of concrete shall be placed approximately normal as possible in uniform layers not exceeding 0.30 meter, unless otherwise ordered. The rate of placing concrete in the forms shall preferably be 0.025 meter (0.082 feet) vertical rise per minute.

2.9 CONSTRUCTION JOINT

During stoppage of concrete pouring operations, and when jointing of old concrete becomes necessary, the following point should be observe:

a.) Construction joint not indicated in the drawings shall be located as to least affect the strength of the structure. Such locations will be as pointed out by the Engineer.

2.10 FORMS AND FALSEWORK

All forms and falsework to be used in the work must be designed, and constructed by the Contractor, for rigidity and adequacy for carrying the loads of the fresh concrete and/or additional superimposed construction loads. The Authority may from time to time verify the adequacy and safety of such temporary works and may require the Contractor to submit detailed designed drawings of forms and falseworks proposed to be used. Approval of such drawings or design of forms, however, shall not relieve the Contractor of his liability on resulting imperfections or damages to the finished concrete, or other damages which may directly result therefrom.

Forms may be re-used but shall be scrapped by a wire brush of all clinging mortar. Bulges should be planed and realigned prior to its use.

Prior to placing concrete form surfaces should be oiled for easy form removal. However, the oil coating should not be so thick as to stain and soften the concrete surface. Oil coatings should be applied before rebars are placed.

2.11 CURING AND WATERPROOFING

All concrete shall be cured for at least 14 days after the date of placing in accordance with the approved and accepted methods.

2.12 FINISHING OF CONCRETE SURFACES

Concrete surfaces shall conform accurately to the form, alignment, grades and sections shown in the drawings or as prescribed by the Engineer. It shall be free from bulges, ridges, honeycombing or roughness of any kind, and shall be of a reasonably smooth wood float finish.

2.13 TREATMENT OF SURFACE DEFECTS

All irregular concrete surfaces, voids, holes, honeycombs exposed after removal shall be repaired by the Contractor in such a way that the repaired surface will be acceptable under paragraph 21.12 above.

2.14 ARCHITECTURAL FINISH

All exposed concrete exterior surfaces shall be given an architectural finish as directed by the Engineer.

2.15 PLACING OF REINFORCEMENT

Metal reinforcement shall be placed as accurately detailed on drawings and properly secured by approved means.

All bars shall be cold bent unless approved otherwise by the Engineer. Minimum distance between parallel bars shall be one and one half (1 1/2) times the diameter for round bars and twice the side dimension for square bars. The clear distance between bars shall not be less that 2.54 cm. (1 in.) nor is less than one and one third (1 1/3) times the maximum size of the coarse aggregate, whichever bigger.

All reinforcing steel shall be cleaned of all rust or scale and deleterious materials which tend to destroy the bond between the concrete and the steel.

2.16 REINFORCING BAR SPLICES

Generally, splice/s of reinforcement at points of maximum stress specially in slabs, beams and girders shall be avoided. Such splice/s may however be approved by the Engineer in writing provided the lap if bonded or butt welded is sufficient to transfer tensile stress between bars by at least 125 of the specified yield strength of the reinforcing bar. For adjacent bars splices shall be staggered.

2.17 READY-MIXED CONCRETE

Where ready-mixed concrete is used, the requirements specified for batching, mixing and transporting shall be in accordance with the requirements set forth in ASTM C94 Specifications for Ready-Mixed Concrete unless otherwise specified.

a.) The Contractor shall notify the Engineer seven (7) days in advance before any continuous phase of concreting operations is started. Upon notification, the Engineer shall have the right to inspect the ready-mixed concrete supplier's plant/equipment and all materials and/or sources thereof. The Contractor must coordinate with the supplier and must provide safe and adequate guidance for the Engineer or his representative in conducting such examinations.

b.) For all ready-mixed concrete delivered to site of work, discharge shall be completed within one hour after the addition of cement to the aggregates or before, the drum is revolved 25 times, whichever comes first. Under conditions contributing to the stiffening of concrete especially during hot weather, the time required between the introduction of cement to the aggregates and discharge of the mix may still be reduced by the Engineer.

c.) Truck mixers shall be equipped with counters indicating the number of revolutions of the drums which shall be automatically actuated at the time of starting mixers at mixing speed.

d.) Each batch or truck delivery of concrete shall be mixed inside the drum for not less than 70 revolutions of the drum at the rate of rotation designated by the equipment manufacturer. Additional mixing if ordered by the Engineer shall be at the speed designated as agitating speed by the manufacturer of the equipment.

e.) Concrete for individual batches or deliveries should be of uniform consistency, mix and grading. If slump tests of a minimum 2 samples taken within 15 minutes of each other at approximately 15 and 85 discharge load give values differing more than 2.54 ern. (1 in.) when the specified slump is 76 mm. (3 in.) , use of the particular mixer in the work shall be stopped until corrections are made to prevent such conditions, which shall be confirmed by further slump tests.

f.) Every batch of ready-mixed concrete delivered at the job site shall be accompanied by a ticket furnished in accordance with Section 15 of ASTM 94. The time when the materials were batched shall also be indicated.

g.) Non-agitating equipment or combination truck and trailer equipment for transporting concrete will not be permitted.

h.) The Authority reserves the right to verify from time to time the quality and quantity of materials used in every cement batch from the batching plant. The Contractor shall be aware of this provision and make the proper arrangement with the concrete supplier.

2.18 TEST ON CONCRETE

Test on concrete shall be in accordance with the following:

a.) Concrete samples for tests shall be secured and molded in accordance with ASTM C 172 - "Method of sampling Concrete", and ASTM C31 - "Method of making Curing, Concrete Compression and Flexure Test specimens in the field".

b.) Strength tests on samples shall be made in accordance with ASTM C39 - "Standard Method of Test for Compressive Strength of Molded Concrete Cylinder".

Not less than four (4) cylindrical specimens shall be made for each test of which at least two (2) shall be reserved for 28-day lest. Not less than one (1) test shall be made for every fifty (50) cubic meters of concrete but in no case less than one (1) test for each day's concreting.

Samples shall be taken by the Contractor under close supervision of the Engineer; and shall be delivered as soon as practicable for testing, at his expense, to the designated laboratories.

The average strength of test samples representing any definite class of concrete used as well as the average of any five (5) consecutive strength tests representing the class of concrete shall be equal to or greater than the specified strength and not more than one (1) strength test in ten (10) shall have an average value less than 90 of the specified strength.

If the test results indicate strength values less than the required, the Project Manager shall have the right to order a change in the concrete proportion used for the remaining work, or in the procedure of curing the concrete.

2.19 LIQUIDATED DAMAGES

For failure to meet the specified strength required for concrete, designed, prepared and laid by him, the Contractor shall pay the AUTHORITY a liquidated damages, not as penalty or forfeiture the following, to be applied only to the quantity of concrete which the particular sample/s represent.

a.) Payment of 30 percent contract unit cost per cubic meter of concrete affected, for test resulting to strength between 90 to 100 percent of specified strength;

b.) Payment of 50 percent contract unit cost per cubic meter of concrete affected, for test resulting to strength between 80 to 90 percent of that specified strength;

c.) Non-payment and removal and replacement at cost to the Contractor of all concrete affected for resulting to strengths below 80 percent of that specified, all in accordance with ACI - 318, and at cost to the Contractor.

2.20 FIELD TESTS

Field tests as may be deemed necessary to check on the quantity of the materials and mixtures and the manner of construction employed shall be conducted by the Project Engineer assigned to the project. And when such tests result to values less than that tolerated by standards set in applicable provisions of the ASTM Specifications referred to herein, or contrary to accepted good Engineering practice, the Contractor shall comply to any instructions given by the Project Engineer to upgrade the materials used and method of construction employed.

3. MOORING AND FENDER SYSTEMS

3.1 GENERAL

3.1.1 SCOPE OF WORK

1. The work includes furnishing of all labor, materials and equipment to complete the installation of mooring bollards, bitts, cleats and fenders in new piers.

2. The work shall include the supply, transport, handling, storage and installation of fender systems in the newly constructed piers.

3. The work shall include the furnishing, driving, cutting off and binding of timber piles in clusters (dolphins) in the new trestles as shown on the drawings and in accordance with this specification.

4. The Contractor shall furnish and install the necessary fittings for a complete job as shown on the drawings and/or as specified. Supplementary parts necessary to complete and install each item of works shall be included whether or not shown or specified. The Contractor shall furnish to relevant trades all anchors, fastenings, inserts, fittings, fixtures or the like to be installed on or required for securing the works.

   The Contractor shall submit shop drawings of all fitting works prior to placing orders and commencement of any fabrication.

3.1.2 MOORING SYSTEM

1. Designated load capacity of mooring bollards, bitt and cleats shall be as shown on the drawings, and shall refer to the safe working load. The bollards shall be capable of withstanding a proof test load of 1.5 times the safe working load.

2. The following publications listed below shall form a part of these Specifications to the extent indicated by the reference thereto.

Publication

G 5101 SC 46, Carbon Steel
G 3101 SS 41, Rolled Steel for General Structures
JIS B0205 Standard M Screw
JIS B1181 Hexagon Nut

3. Bollards at the new berth shall be installed at the edge of concrete decks of piers.

3.1.3 RUBBER FENDER SYSTEMS

1. Material for fender systems such as rubber fenders, anchor bolts and templates shall be supplied by the Contractor.

2. The Contractor shall install the fender system properly according to the drawings and the instructions prepared by the Engineer.

3. Performance Requirements

The fenders shall be procured in accordance with the performance characteristics, under 45%-50% fender deflection, specified hereunder:

Type of Fender	Min. Energy Absorption (Ton-M)	Max. Reaction Force (Ton)
(1)	1.0	15
(2)	1.8	20
(3)	2.8	32

4. Types of Fenders

Type (1) = 200 mm in height and 1000 mm in length
Type (2) = 250 mm in height and 1500 mm in length
Type (3) = 300 mm in height and 1500 mm in length

5. Manufacturing Rubber Main Body Rubber fenders shall be manufactured at the factories of approved makers.

Basic manufacturing methods shall be as follows:

- Shape of rubber main body: refer to the Drawings
- Fabrication of rubber main body shall be completed at the factory
- No connection of main body shall be permitted out of the factory
- Steel plate shall be embedded in the deck sides of rubber main body.
- The Contractor shall submit manufacturer's methods of manufacturing for approval by the Engineer.

3.1.4 SUBMITTALS

1. Shop drawings and/or catalogues of mooring bollards, bitts, cleats and rubber fenders indicating size, weight and mounting requirements shall be submitted for approval of the Engineer.

2. No materials or fitting shall be ordered without prior approval of the Engineer.

3.2 MATERIAL REQUIREMENTS

3.2.1 MOORING SYSTEM

1. Mooring bollards, bitts and cleats shall be of the dimensions, weights, capacities and design in accordance with shop drawings approved by the Engineer and shall be fabricated by approved manufacturers with cast steel conforming to the following requirements or approved equivalent.

Part	Spec. (JIS or its equivalent)	Grade
Body	JIS G5101 3	Grade SC46
Anchor	JIS G3101 2	Grade SS41
Bolts	JIS B0205	M64-6
Nut	JIS B1181 1 Class 3	Grade 1 4T, N64-6
Washer	JIS B1256	Steel Bars
Foundation Plate	JIS G3101 2 or JIS G5101	Grade SS41 Grade 3 SC46

The size of the bolts, nuts and washers shall be in accordance with the specifications of the manufacturer. However, the length of the bolts shall be as indicated on the drawings. The anchor plate shall be connected to the holding down bolt with 12.5 mm weld, as shown on the drawings. All bolts, nuts, washers, etc. that are exposed shall be galvanized to the satisfaction of the Engineer. Provide lead cover for exposed threads of galvanized anchor bolts.

Samples of the bolts, nuts, washers and anchor plates shall be submitted to the Engineer for approval before being used in the Works.

a) The upper parts of bollards, bitts, and cleats not embedded in concrete shall be painted. The surface of bollards and bitts shall be cleaned thoroughly by wire brush or other means prior to painting to remove rust or any other contamination which may interfere with bond of paint to metal.

   The exposed surface shall be coated with rust proof paint and finishing paint, which shall be coal-tar epoxy of 120 micron thickness in accordance with JIS K5623 or the approved standard.

b) Alternative

   The Contractor can submit to the Engineer's approval cleats, bitts or bollards different from these specifications but with the capacities indicated in the drawings.

c) Visual Inspection

   All bollards, bitts and cleats delivered to site shall be inspected by the Engineer for any signs of flaws or defects inimical to usage.

d) Mill Test Certificates

Two (2) copies of mill test reports shall be submitted certifying that materials meet the specified standards.

e) Tests and Inspection

Inspection of all materials and methods of fabrication shall be carried out by the Contractor. However, the Engineer reserves the right to inspect all facilities at any time during the manufacture to ensure that the materials and workmanship are in accordance with the specifications and the best workmanship.

3.2.2 RUBBER FENDER SYSTEM

1. Physical Properties

Material for rubber fenders will be one of the international accepted materials.

Test methods shall conform to JIS K6301 or equivalent.

The rubber material used for rubber fenders shall be a compound of natural rubber and synthetic rubber of high quality having sufficient resilience, anti-aging, weather and wear resistant property according to the following table.

	Property	Requirement	Test Method (JIS K6301)
Tension test (before aging)	Hardness (HS)	77 max.	Spring type Hardness type
	Tensile Strength (kg/cm^2)	160 min.	Test piece Dumbell No. 3
	Elongation (%)	350 min.	
Tension test (after aging)	Hardness	+8 max. from original value	Air heating 70 °C x 96 hrs.
	Tensile Strength (kg/cm^2)	not less than 80% of original value	
	Elongation	not less than 80% of original value	
Tear resistance (kg/cm^2)	Inner rubber	70 min.	Test piece
	Outer rubber	60 min.	
Compression Set (%)		30 max.	
Oil Resistance (volume change)	Industrial gasoline (%)	60 max. 20 max.	25 °C x 24 hrs.

2. Anchor

Anchor Bolts and connecting hardware shall be fabricated from type SUS 304 stainless steel to the required shapes and sizes as shown on the approved shop drawings, and conforming to JIS G 4303 or equivalent.

3. Testing

The Contractor shall be required to submit test certificates showing compliance to the above requirements. The test certificates should be certified by an independent inspection organization recommended by the Contractor and approved by the Engineer.

One fender of each type (1, 2 & 3) selected at random shall be tested for performance. The fender shall be compressed repeatedly three times to the minimum deflection at speed from 2 to 8 cm. per minute.

The load and deflection values shall be recorded with a precision of 0.5 mm. The results shall be plotted in the form of load-deflection-energy absorption curves. The average data obtained in the second and third test loadings shall be considered as performance values. The tests and reporting shall be carried by an approved laboratory and shall be supervised and certified by the independent inspection organization.

If any of the tested fenders fail to satisfy the performance requirements, retesting shall be conducted on one piece for every 10 fenders of the same type. If the second sample still fails the test, all the remaining fenders of this type shall be tested.

4. Sampling of Specimen

The specimens of rubber shall be taken at the mixing stage directly from each batch of rubber compound for manufacturing of fenders. The specimens shall be tested for compliance with the requirements.

5. Inspection for Dimension

The fenders shall be inspected by the independent inspection organization.

One fender out of five fenders of each type shall be inspected for compliance with dimensions.

Five percent (5%) of anchor bolts and fittings shall be selected at random and inspected. Materials for bolts and fittings to be covered by certified steel manufacturer's mill sheet shall be verified by the independent inspection organization.

6. Acceptance Tolerance

The acceptance tolerances shall be as stipulated in the following:

a. Fender Dimension

	Length	Width	Height	Thickness
Tolerance	+4% -2%	+4% -2%	+4% -2%	+8% -2%

b. Anchoring Bolt Holes in Fender

	Diameter of the Hole	Pitch of the Hole
Tolerance	+2 mm	+4 mm

c. As basis for acceptance of all finished fenders supplied, a tolerance of +10% on the performance requirements indicated will be acceptable.

The cost of tests and inspection required herein are all for the Contractor's account.

7. Marking

All fender units shall be clearly numbered and marked. Each fender shall have the following marking:

a. Fender type and manufacturer's name or trademark

b. Production serial number

c. Date of manufacturing

d. Main dimensions (length, height)

e. Bill number in accordance with the project code specified in the Bill of Quantities.

8. Warranty

The Contractor shall guarantee the fenders against any defects that are attributable to faulty design and manufacture and shall also guarantee the performance of the fenders under normal working conditions. The guarantee shall be for a minimum period of 12 months from the date of the issuance of Taking-Over Certificate of the Works.

During the period of guarantee, repairs and replacement of defective fender units and/or material shall be carried by the Contractor at his own cost.

3.3 EXECUTION

3.3.1 MOORING SYSTEM

All bollards, bitts and cleats shall be installed at the locations shown on the drawings and in accordance with the approved manufacturer's recommendations and shop drawings, and as directed by the Engineer.

3.3.2 RUBBER FENDER SYSTEM

All fenders shall be installed at the locations shown on the drawings and in accordance with the approved manufacturer's recommendations and shop drawings.

3.4 MEASUREMENT AND PAYMENT

1. Measurement and payment of the quantities of bollards, bitts and cleats shall each be based on the number of sets of bollards, bitts and cleats completely installed (excluding concrete base/foundation) with anchor bolts and certified by the Engineer.

   Reinforced concrete base/foundation of mooring bollards and bitts to be installed on piers shall not be paid separately and such shall be included under pay-item for Concrete Works of pier.

   Separate measurement shall be made for reinforced concrete base/foundation of mooring bollards and bitts to be installed on structures other than pier which shall be paid for per cubic meters of concrete and per kilograms of reinforcing bars.

2. Measurement and payment of the quantities of rubber fender system shall be based on the number of sets of rubber fender systems completely installed with anchor bolts with necessary sleeves and certified by the Engineer.

3. Payment stated above shall be full compensation for all labor, materials and equipment and all preparatory and incidental works necessary to complete the work.

4. WATERROOFING

4.1 SCOPE OF WORK

This Item shall consist of furnishing all waterproofing materials, labor, tools, equipment and other facilities and undertaking the proper installation works required as shown on the plans and in accordance with this specification.

4.2 MATERIAL REQUIREMENTS

a. Primer shall be of asphalt cold applied, free from water and other foreign matters, and shall conform to the specifications requirement defined in ASTM D-41.

b. Built-up membrane shall be made of smoothly woven fibers that are impervious to acid, heat, dampness and totting. It should permit complete penetration of asphalt compound or bituminous coating in the woven glass fiber.

c. Preformed membrane shall be self-sealing flexible cold applied bituminous sheets bonded to 0.15mm thick polyethylene film.

d. Mopping Materials

1) Type A soft adhesive self-sealing asphalt for structure below ground level

2) Type B where asphalt is not exposed on temperature exceeding 51.7 Celsius structure above ground level.

3) Type C where asphalt is exposed on vertical surface in direct sunlight or above temperature of 51.7 Celsius structure above ground level.

4.3 CONSTRUCTION REQUIREMENTS

Roof decks, balconies, toilet and bathrooms, gutters, parapet walls and other areas indicated on the plans to be waterproofed shall first be rendered with cement-based waterproofing before any type of waterproofing is applied.

a. Application Procedure

1) Prior to application of membrane concrete surfaces should be sound and cured without the use of curing compound. Apply a coat of concrete neutralized to remove oil dirts and other contaminants.

2) Apply asphalt primer at the rate of one gallon per 100 square feet evenly by spraying or by paint brush.

3) Application shall be done one direction strip by and overlapping each other to assure uniform thickness.

4) Allow primer to dry until it is ready to receive next coat or layer as specified in the manufacturing instructional manual.

5) As soon as primer coating is workable, lay a single layer of preformed or built- up membrane conforming to size and shape of the surface area to be covered.

6) Carefully layside and end laps in order to assure an even thickness throughout the whole surface area to be covered.

7) When the whole surface area is completely covered apply a single coat of asphalt primer at the rate of 3 to 4 gallons per (100 square feet).

8) Meshes of treated woven glass fibers shall not be completely closed or sealed by the primer coat, but shall sufficiently open to allow successive moppings of the ply material to seep through.

9) Cover ply not more than the minimum amount of surfacing necessary to prevent sticking on ply.

10) After application surface shall be uniformly smooth, free from irregularities folds and knots.

11) Repeat the procedures until 5 plies has been satisfactorily installed or as many as may layers required or as specified in the plans.

12) Where weather disturbance interrupt the work and exposing the membrane to moisture remove the layer exposed to moisture and repeat procedure until completion of the process.

b. Protective Coating

1) Where laying of the built-up or preformed membrane conforms with the number of plies required as shown on the plans lay a mixture or sand mastic in the proportion of one part asphalt or bituminous material and four parts coarse screened sand by volume. With a steel trowel at an average of 3 mm thick over the surface of membrane.

2) Then at the rate of one gallon per (100 square feet) apply aluminum heat reflecting finish thoroughly over the dried sand mastic coating.

c. Metal Cap Flashing

1) Provide cap flashing gauge 24 G.I. where shown on the plans.

2) Where cap flashing is connected to preformed lock in through-wall form upper edge of cap flashing to engage in preformed lock. Mallet lock down tight to provide a spring action against base flashing.

3) Then at the rate of one gallon per (100 square feet) apply aluminum heat reflecting finish thoroughly over the dried sand mastic coating.

4) Where cap flashing is terminated in raked joints or in prepared masonry or stone reglet fasten flashing with wedge every 12 inches and fill reglet on vertical surfaces continuous with plastic cement and on horizontal surfaces, continuous with molten lead.

5. CEILING

5.1 SCOPE OF WORK

The work shall included all labor, materials and equipment necessary to install ceiling materials, complete as shown on the drawings and as specified herein.

5.2 MATERIALS REQUIREMENTS

a. Ceiling shall be 0.70mm thk. Jameca Lay Perfor Border Type, powder coated bone white on CMT runners and 5mm thk. Marine Plywood on 50mm by 50mm ceiling joists as specified herein or as indicated in the drawings.

b. Ceiling materials and accessories shall be carefully handled and stored to prevent damage to the surface and edges.

6. DOORS AND WINDOWS

6.1 SCOPE OF WORK

The work shall include the supply and installation of all doors and windows as indicated in the drawings.

6.2 MATERIALS REQUIREMENTS

a. Doors

1) Flush doors shall be hollow core from Tanguile kiln-dried frames with 6mm thick marine plywood as indicated. Other flush doors shall have a Tanguile kiln-dried wood louver for ventilation purposes.

2) Swing aluminum door shall have a polyester powder coated aluminum frame (exterior) or epoxy/polyester powder coated aluminum frame (interior) as indicated in the drawings.

3) Wood door frames shall be of the design, size and thickness as indicated. This shall be set plumb and true, and well-braced to prevent distortions. Frames in masonry or concrete walls shall be secured as indicated, and shall be Guijo or Yakal, good grade

b. Windows - All windows shall be of polyester powder coated frame (exterior use) or epoxy/polyester powder coated (interior) aluminum window frame. It shall be of fixed window, half-fixed and half-open sliding window, half-fixed and half-open sliding window below a fixed window as indicated in the drawings.

c. Glass - Glass shall be provided in locations as indicated and the corresponding type specified on architectural drawings. Each glass have the manufacturer's label showing the type, thickness, and quality of glass. Labels shall not be removed until the glazing has been approved.

1) Clear glass shall be 6.35 mm thick for doors and 5.50 mm thick for windows. It shall be heat-strengthened for fixed window panes with a clear rubber sealant nearly and properly installed.

2) Reflective type glass shall be 6.35 mm thk. For doors and windows and shall be heat strengthened tempered glass.

3) Wired glass or fire-rated glass shall be 6.30 mm thick.

4) Glazing materials and accessories such as weather-stripping, glazing sealant, gasket, channel, beads, clips, primer, masking tape, edge spacer and others shall comply with all pertinent codes and regulations and

shall be as recommended by the glass manufacturer as approved by the Engineer.

6.3 INSTALLATION

All doors and windows shall be leveled, hung plumbed and fitted accurately. It shall be installed without forcing or distortion so that sills and heads are level and jambs are plumb. Frames shall be securely anchored into the supporting construction.

Apply hardware's with fastenings of the size, quality, quantity and finish to provide workable system. After installation, protect hardware from paint, stains, blemishes and other damages until acceptance of the word. After hardware is checked. Keys shall be tagged, identified and deliver to the Owner. All errors in cutting and fittings, and all damages to adjoining work shall be corrected, repaired and finished as directed.

Work instruction on glass fittings and installation should strictly follow a standard precautionary measure to avoid damage or breakage on glass and to secure total work safety. Glass shall be provided with caution stickers to call attention. Upon completion of the building, cracked, broken or imperfect glass or glass which has been set improperly shall be replaced. Glass surface shall be thoroughly cleaned, with labels, paint spots, putty, and other defacements removed, and shall be clean at the time the work is accepted.

7. FINISHES

7.1 SCOPE OF WORK

The work covered by this section consist of furnishing all labor, materials, equipment, tools and incidentals necessary to undertake, complete all finishing works and painting for the buildings as indicated on the drawings and as specified herein.

Wall, floor, ceiling and other finishing works shall include but are not limited to the following:

1. Plain cement plaster (steel trowel) finish painted with acrylic latex paint for exterior and interior CHB (Concrete Hollow Blocks) wall;
2. Glazed tile wainscoting for toilet;
3. Vinyl tile finish;
4. Vitrified ceramic tiles for toilet floor;
5. Pebble wash-out finish;
6. Non-skid Ceramic Tiles
7. Plain cement steel trowel floor finish with non-metallic floor hardener;

8. Rubbed concrete finish, painted with acrylic latex paint for exposed R.C. Ceiling (bottom of roof slab and beams)

9. Fiber Cement Board for Ceiling

7.2 SUBMITTAL

1. Shop drawings for all finishing and painting works for the building shall be submitted in advance to allow twenty eight days for review and approval. Shop drawings shall indicate materials and details of finishing works. The Contractor shall be responsible for all errors of detailing and fabrication, and for the correct finishing work items shown on the shop drawings.

2. The Contractor, before placing order for the finishing materials shall submit to the Engineer for approval representative samples of finishing materials. No placing of orders for material for finishing works shall be made without his approval.

3. Samples of all walls finishes, measuring not less than 1000 mm x 1000 mm shall be submitted to the Engineer for approval as to its finish texture and workmanship.

7.3 MATERIAL REQUIREMENTS

7.3.1 WALL FINISHES AND COUNTERTOPS

1. Plain Cement Plaster Finish

   a. Sand shall be clean and hard material. Sand shall be free from deleterious substances and conforming with the requirements of ASTM C 33.

   b. Cement shall be Portland cement conforming with the requirements of ASTM Designation C 150.

   c. Water shall be clean and potable.

   d. Bonding compound shall conform to ASTM C 631.

   e. Hydrate lime shall conform to ASTM C 206.

   f. Synthetic fibrous reinforcement shall conform to BS 5139 or ASTM C 1116.

2. Wall Ceramic Tiles

   a. Wall tiles shall be 100 mm x 100 mm glazed ceramic wainscoting Color as per Engineer's approval.

   b. Trimmers and moulding shall be lustrous, glazed with size and color corresponding to wall tiles.

c. Portland cement, sand, bonding compound, lime and water shall conform with Sub-section 4.13.2.1.1 above.

3. Marble

a. Marble shall be local natural mined and polished for toilet countertops, fascia and splashboard. Dimensions as shown on the Drawings.

b. Shall be sound material with uniform and favorable working qualities and with very limited natural faults.

c. Color, veining and quality shall be approved by Engineer.

d. Veining shall run vertically on all vertical surfaces and direction of veining shall continue in same directions over horizontal surfaces except as directed by the Engineer.

e. Marble components shall be factory fabricated and finished and delivered ready for installation without further preparation or modification.

f. Sealer

1) Shall be a commercial penetrating type free from harmful alkali or acid content and especially prepared for marble work.
2) Shall have a Ph factor between 7 and 9.
3) Shall not discolor.
4) Shall produce a slip resistant surface.
5) Shall have a flash point not less than 35 degree C.

g. Cleaning fluid

1) Shall be commercial neutral liquid type especially prepared for marble work.
2) Shall have a Ph factor between 7 and 9.
3) Shall be free from crystallizing salts or water soluble alkaline salts.
4) Shall be biodegradable and phosphate free.

7.3.2 FLOOR FINISHES

1. Vinyl Tile Finish

a. Vinyl tiles shall be 3 mm thick x 300 mm x 300mm. Samples of the tile for color selection shall be submitted and approved by the Engineer.
b. Waterproof contact adhesive shall be as recommended by the tile manufacturer and approved by the Engineer.

2. Vitrified Ceramic Unglazed Tiles

a. Vitrified ceramic unglazed floor tiles shall be 100 mm x 100 mm, white for toilets and as shown on the drawings or to be designated by the Engineer.
b. Portland cement, sand and water shall conform with the requirements specified in Sub-section 8.2.1.1 above.
c. Vitrified ceramic unglazed floor tiles shall be delivered in the manufacturer's original unbroken packages or containers that are labeled plainly with the manufacturer's name and brand. Containers shall be grade scaled. Materials shall be stored in dry weather tight enclosures, and shall be handled in a manner that will prevent the inclusion of foreign materials and damage by water or dampness.

3. Plain Cement Floor Finish

a. Portland cement, sand, bonding compound and water shall conform with the requirements specified in Sub-section 8.2.1.1 above.
b. Mortar shall be one part of Portland cement to three parts sand.
c. Hardener shall be non-metallic floor hardener, delivered in cartons, cans or bags to the construction site with the labels installed and seals unbroken.

4. Non-skid ceramic floor tiles

Non-skid ceramic tiles shall be 100mm x 200mm white ceramic tiles to be used [for kitchen] as shown on the Drawings.

5. Pebble Washout Finish

a. Pebble shall be no. 10, and in black color, sound pea gravel, clean, hard, wash river gravel, well selected and graded, rounded non-slip type and not flaky.

Portland cement shall be the best commercial standard conforming to ASTM C 150, type I. Black cement of U.S. brand shall be added to Portland cement base for desired effect.

7.3.3 CEILING FINISHES

1. Rubbed Concrete Finish

Portland cement, sand, bonding compound and water shall conform with the requirements specified in Sub-section 8.2.1.1 above.

2. Gypsum Ceiling Board

Gypsum board to be used for ceiling shall be 13 mm thick and 1.2 m wide and shall conform with ASTM C36. Joint treatment materials and fastening system shall be as recommended by the gypsum board manufacturer and as approved by the Engineer.

3. Fiber Cement Board

Plain fiber cement board on metal frame shall be 6mm thick for interior ceiling and 9 mm thick of exterior ceiling.

4. Fiberglass Ceiling Board

Fiberglass ceiling board shall be fashionetone, fissured design, and 600mm x 600mm x 19mm in dimension.

7.4 EXECUTION

7.4.1 WALL FINISHES

1. Plain Cement Plaster Steel Trowel Finish

a. Preparation of Surfaces

All surfaces shall be cleaned and projections, dust, loose particles and other materials, which would prevent good bond, shall be removed.

Plaster shall not be applied directly to concrete and masonry surfaces coated with bituminous compounds and surfaces previously painted or plastered.

All surfaces shall be thoroughly wetted before plastering.

b. Trial Mix

A trial mix of at least three (3) different water-cement ratios for a proposed mix shall be prepared under full scale conditions and adequate workability. The proportions by weight of cement to the weight of sand shall not be less than one part of Portland cement to two parts of sand.

The proportion of cement-sand and water necessary to produce the cement plaster of the required consistency shall be subject to the approval of the Engineer. Such approval may be withdrawn at any time and a change in proportions may be required. Based on the approved mix proportions, the Contractor shall prepare a list showing the number of kilograms of the various materials to be used in the cement plaster finish mix.

No cement plaster finish shall be started without an approved trial mix by the Engineer.

c. Cement Plaster Finish Application

A brown coat with sufficient pressure shall be applied to fill the gaps, and to secure a good bond. Moistened for 48 hours, each coat of cement plaster shall be kept after application and allow to dry.

A finish coat shall be applied after the brown coat has set. The brown coat shall be moistened before application of the finish coat. Finish coat shall be floated to plumb, even planes and surfaces.

Final plaster finishes shall be rubber sponged.

d. Tolerance

The Contractor shall finish plaster work plumb, level, square and true within tolerance of 3 mm in 3 meters, without cracks and other imperfections.

e. Patching and Cleaning

Upon completion of the building, and when directed, all loose, cracked, damaged or defective plastering shall be cut out and re-plastered in a satisfactory and approved manner.

2. Wall Tiles

a. Mortar Preparation

All mortar setting beds shall be mixed by volume in the proportion of 1 part Portland cement and 3 parts dry sand and not more than 1/10 part hydrated lime.

Mortar materials shall be measured in approved containers, which will insure that the specified proportions of materials will be controlled and accurately maintained during the progress of the work. Measuring materials with shovels, "shovel count", will not be permitted. Unless specified otherwise, mortar shall be mixed in proportions by volume, in an approved mortar box.

The quantity of water shall be controlled accurately and uniformly. The aggregates shall be introduced and mixed in such manner that the materials will be distributed uniformly throughout the mass. A sufficient amount of water shall be added gradually and the mass further mixed until a mortar of the elasticity necessary for purpose intended is obtained. Mortar boxes, pans and wall surfaces shall be kept clean and free from debris or dried mortar. The mortar shall be used before the initial set of the cement has occurred. Re-tempering of mortar in which cement has started to set will not be allowed.

b. Application of Wall Tile

Interior masonry shall be clean, thoroughly dry, sound and sufficiently rough to provide strong mechanical bond. Surfaces shall be evenly damped immediately prior to the application of the scratch coat.

Scratch coat shall be applied to masonry, as backing for wall tile, not less than 24 hours or more than 48 hours before starting the tile setting. The scratch coat shall not be less than 6 mm from the face of the masonry. The scratch coat shall be applied with sufficient pressure to ensure a proper bond with the base for the setting bed. While the mortar is still plastic, the scratch coat shall be cut with a trowel at all internal vertical angles for the depth of the coat with the full height of the tile bed and shall be cross scratched, in 25 mm centers for the extent of the tile bed.

Immediately before the application of mortar setting bed, the scratch coat shall be moistened thoroughly but not saturated. Temporary screeds shall be applied to the scratch coat with mortar to provide a true and plumb surface, the proper distance back from the finished wall line. The setting bed shall be applied, rotted and floated flush with the screeds over an area not greater than the area to be covered with the tile while the bed remains plastic. The thickness of the setting bed shall not exceed 15 mm and the mortar shall not be re-tempered. The setting bed shall be cut with a trowel at all internal corners as specified for the scratch coat.

Mounted tiles shall be soaked in clean water a minimum of one hour before they are set. Absorptive mounted tiles shall be damped by placing sheets on a wetted cloth in a shallow pan before setting. A skim coat of neat Portland cement mortar, mixed with water to the consistency of a pasty, thick cream, shall be applied 0.8 mm to 1.6 mm thick to the mortar setting bed, or to the back of each tile as laid. The tiles shall then be pressed firmly on the setting bed and tamped until flush and in the plane of the other tiles. The tiles shall be applied before the mortar bed has taken its initial set.

Intersections and returns shall be formed accurately. Where cutting of tiles is necessary it shall be done at the internal angles of the walls or wainscots. Cutting and drilling tiles shall be done neatly without marring the surfaces. The cut edges of tiles against trim, built-in fixtures, and similar surfaces shall be ground and jointed carefully. The tiles shall fit closely with plumbing fixtures and around electric outlets, pipes and fittings, so that the plates or escutcheons will properly overlap the tiles. Wainscots shall be within one half of the heights indicated without cutting of the tiles.

Bases, caps, bull-nose corners, and all other trimmers moulded or shaped features, and accessories shall be backed thoroughly with mortar and set firmly into place. All lines shall be kept straight and true, and all finished surfaces brought to true and even planes, straight and plumb, and internal corners squared and external corners rounded.

Horizontal joints shall be maintained level and vertical joints plumb and in alignment. The completed work shall be free of broken, cracked, damaged or otherwise faulty tiles.

Joints shall be parallel and uniform in width, plumb, level and in alignment. End joints in broken-joint work shall be made as far as practicable, on the center line of adjoining tiles. Except in special arrangement and design, as indicated or specified, square tiles shall be set with straight joints, and oblong tiles shall be set with broken joints.

Joint widths shall be uniform and spaced to accommodate the tile in the given spaces with a minimum of cutting. Tiles shall be wetted, if they have become dry, before applying grout. Joints 3mm or less in width shall be grouted with a neat Portland cement grout of the consistency of thick cream. Other joints shall be pointed with mortar consisting of one part Portland cement and two parts pointing sand. The grout for walls and other vertical surfaces shall contain non-staining white Portland cement. Grout and pointing mortar shall be forced into joints by using trowel, brush or finger application.

Before the grout or mortar sets, the joints of cushion edge tiles shall be struck or tooled to the depth of cushion, filling all skips or gaps, and the joints of square edge tiles shall be filled completely flush with their surface. Dark cement shall not show through grouted white joints. Care shall be taken to avoid scratching glazed finishes. All mortar or grout shall be removed before it has set or hardened.

c. Cleaning and Curing

All completed tile work shall be thoroughly sponged and washed diagonally across joints, and finally polished with clean, dry cloth. Acid cleaning of unglazed tile, when necessary, shall not be done within ten days after setting tile. All metal shall be covered with an approved grease and the tile shall be wetted with clean water, before tile is cleaned with 10% muriatic acid solution. After acid cleaning, the tile shall be flushed with clean water, and the grease coating on metal shall be removed. Acid cleaners shall not be used on glazed tile.

d. Protection

Tiled walls outside corners (external angles) shall be protected with board corner strips in areas used as passage ways by workmen. Extreme care should be taken not to disturb walled tiled until mortar has fully set.

7.4.2 FLOOR FINISHES

1. Vinyl Tiles

No vinyl tile work shall start until the Engineer has approved the time when such work shall start.

The Contractor shall furnish and install all vinyl tiles and base where and as shown on the drawings or as specified. The temperature shall be maintained at 22°C for 48 hours before, during and 48 hours after the application of tiles.

Vinyl tile shall be laid in accordance with the approved manufacturers recommended method of laying.

Waterproof contact adhesive shall be applied both on the floor and tile, spread evenly and allowing 10 minutes drying time prior to installation.
Tiles shall be laid with close, straight joints, bedded in contact adhesive in accordance with method approved and rolled with roller of sufficient weight to press tile firmly in place and provide smooth, plush surfaces at the joints. Tiles shall be fitted close to all pipes, base and other intersection surfaces.

All finished floors shall be protected in a manner that will prevent the finish from any damage. The Contractor shall remove and replace any defective materials and/or workmanship or damage of the finished floors.

2. Vitrified Ceramic Tiles

a. Mortar Preparation

Mortar mix proportion and preparation shall be in accordance with the requirements in paragraph b of sub-section 8.3.1.

b. Surface Preparation

Surfaces to receive the tiles shall be clean, free of dust, dirt, oil, grease, and other deleterious substances. Floor tile operations in spaces receiving wall tile shall not be started until wall tile installation has been completed. Before tile is applied with a dryset mortar bed, the structural floor shall be tested for levelness or uniformity of slope by flooding it with water. Areas where the water ponds shall be filled and leveled with mortar and shall be retested before the setting bed is applied.

c. Placing of Setting Beds and Floor Tile

Mortar setting beds shall have a minimum thickness of 20 mm for floors. The structural concrete slab shall be soaked thoroughly with clean fresh water on the day before the setting bed is to be applied. Immediately preceding the application of the setting bed, the structural slab shall again be wetted thoroughly, but no free water shall be permitted to remain on the surface.

A skim coat of neat Portland cement mortar shall then be applied not more than 4 mm thick. The mortar shall be spread until its surface is true and even and thoroughly compacted, either level or sloped uniformly for drainage, as the case

requires. A setting bed, as large as can be covered with tile before the mortar has reached its initial set, shall be placed on one operation; but in the event that more setting mortar has been placed than can be covered, the unfinished portion shall be removed and cut back to a clean beveled edge.

All mounted tiles shall be soaked in clean water a minimum of one hour before they are set. Absorptive mounted tile shall be dampened by placing sheets on a wetted cloth in a shallow pan before setting. No free water shall remain on the tiles at the time of setting. Before the initial set has taken place in the setting bed, a skim coat of neat Portland cement mortar, 0.7mm to 1.6mm thick, shall be trowelled or brushed over the setting bed and/or the back of the tile, or a thin layer of Portland cement, 0.79 mm to 2 mm thick, may be hand-dusted uniformly over the setting bed and worked lightly with a trowel or brush until thoroughly damp.

The tiles shall then be pressed firmly upon the setting bed, and beaten into the mortar until true and even with the plane of the finished floor line. Beating and leveling shall be completed within one hour after placing tiles or sheets. Borders and defined lines shall be laid before the field or body of the floor. Where floor drains are provided, the floors shall be sloped to drain properly to the drains. Intersections and returns shall be formed accurately.

Cutting of tile, where necessary, shall be done along the outer edges of the floor. As far as practicable, no tiles of less than half size shall be used. Cutting and drilling of tiles shall be done neatly without marring the tile surfaces. The cut edges of tile against trim, bases, thresholds, pipes, built-in fixtures, and similar surfaces shall be ground and jointed carefully. Tile shall fit closely and neatly at all plumbing fixtures and around electrical outlets, pipes and fittings so that cover plates or escutcheons will overlap the tiles properly.

Tiles shall be secured firmly in place and loose tiles or tiles sounding hollow shall be removed and replaced. All lines shall be kept straight, parallel, and true, and all finished surfaces brought to true and even planes. The inner edges of borders shall be kept straight and, where practicable, shall form right angles at all returns. The paper and glue shall be removed from mounted tile, without using excess water, within one hour after installing the tiles.

Joints shall be parallel and uniform in width, plumb, level and in alignment. End joints in broken-joint work shall be made as far as practicable, on the center lines of adjoining tiles. Except in special arrangement and design, as indicated or specified, square tiles shall be set with straight joints, and oblong tiles shall be set with broken joints.

Joint widths shall be uniform and spaced to accommodate the tile in the given spaces with a minimum of cutting. Tiles shall be wetted, if they have become dry, before applying grout. Joints 3.2 mm or less in width shall be grouted with a neat Portland cement grout of the consistency of thick cream. Other joints shall be pointed with mortar consisting of one part Portland cement and two parts pointing sand.

The grout or mortar for joints on floors shall be white Portland cement or as specified by the Engineer. Grout painting mortar shall be forced into joints by using trowel, brush or finger application. Before the grout or mortar sets, the joints of cushion edge tile shall be struck or tooled to the depth of the cushion, filling all skips or gaps, and the joints of square edged tiles shall be filled completely flush with their surface. Dark cement shall not be seen through grouted white joints.

All surplus mortar or grout shall be removed before it has set or hardened.

d. Cleaning and Curing

Floors shall be covered with waterproofed paper with all joints lapped at least 96 mm and allowed to damp cure for at least 72 hours before foot traffic is permitted thereon.

All completed tile work shall be thoroughly sponged and washed diagonally across joints, and finally polished with clean, dry cloth. Acid cleaning of unglazed tile, when necessary, shall not be done within ten days after setting the tile. All metal shall be covered with approved grease and the tile shall be wetted with clean water, before tile is cleaned with 10% muriatic acid solution. After acid cleaning, the tile shall be flushed with clean water, and the grease coating on metal shall be removed.

Finished tile floors shall be covered with clean building paper before foot traffic is permitted on them. Board walkways shall be placed on floors that are to be continuously used as passage ways by workmen. Thresholds shall be covered with boards. Tiles vertical outside corners (external angles) shall be protected with board corners strips in areas used as passage by workmen.

3. Plain Cement Floor Finish with Non-metallic Floor Hardener

a. Trial Mix

No plain cement floor finish work shall be started without the approval of the Engineer of the trial mix.

b. Application

The concrete sub-floor shall be cleaned and projection, dust, loose particles and other materials which would prevent good bond shall be removed. The sub-floor surface shall be moistened

but not soaked, dry cement shall then be sprinkled over it and the mortar shall be spreaded on the setting bed. The surface shall be tamped to assure a good bond over the entire area and screeded to provide a smooth and level bed at proper height.

Mortar mix shall be one part Portland cement to three parts sand. Following the placing of leveling concrete on the floor and after the concrete is free from excess water, a dry mixture of 2 parts of floor hardener and 1 part Portland cement shall be uniformly dusted over the floor. Three kilograms of floor hardener shall be used for every square meter of flooring or in accordance with approved manufacturer's specifications. The dry mixture shall be floated thoroughly into the surface which shall be finished by steel trowelling and cured by water or curing compound for seven (7) days.

4. Pebble washout Finish

   a. Trial Mix

      No exposed aggregate or pebble wash-out finish shall be started without the approval of the Engineer of the trial mix.

   b. Preparation of Surface

      All surface shall be cleansed and projections, dust, loose particles and other material which would prevent the good bond shall be removed.

   c. Placing

      The well graded "pea" gravel shall be trowelled or floated into the cement-mortar finish (1:2 mix), pressed into it to an even surface after the mortar has been placed even but before the initial set.

      All exposed gravel, covering about 90-95% of the mortar surface shall not be fully embedded into the cement mortar bedding.

      At the proper time, "pea" graven finish of mortar splatter shall be cleaned and exposed with brush and water leaving it clean in its natural color and texture.

5. Protection

   a. Before turn over of the building to the Owner, wash pebble surfaceswith 1 part muriatic acid to 6 parts clean water.
   b. Apply an overlapping strokes of watershield using brush or by low pressure spraying. Dries to a tack-free surface in 4-6 hours and cures to form an effective water repellant film in approximately 24 hours.
   c. Protect finished surface with specified hardeners and sealants.

8. PLUMBING WORKS

8.1 SCOPE OF WORK

The work shall include furnishing of all materials and equipment and perform all labor necessary to complete installation, testing and operation of the plumbing system in accordance with the applicable drawings and this specification.

It is not intended that the drawings shall show every pipe, fittings, valves and appliances. All such items, whether specifically mentioned or not, or indicated on the drawings, shall be furnished and installed if necessary to complete the system in accordance with the best practice of the plumbing trade and to the satisfaction of the Owner.

8.2 REQUIREMENTS ON PERMITS

Execute the work in full accordance with the requirements of all governmental agencies having jurisdiction thereof as well as with the requirements and/or recommendation of the National Plumbing Code of the Philippines and all applicable laws, codes and ordinances.

Secure and pay for all necessary approvals, permits, inspection, royalties for the use of any patented devices or system, and other similar obligations before starting work, and turn over the official records of the granting permits to the Owner without additional cost.

8.3 MATERIAL

Plumbing Fixtures - Toilet and bath accessories shall be as manufactured or distributed by "American Standard". The Contractor shall furnish and install all indicated toilet and bath accessories including all required fittings as approved and accepted by the Engineer.

a. Water closet

b. Lavatory

c. Floor drain

d. Soap holder and paper holder - All toilet/bath rooms will be provided with soap holder, toilet paper holder and chrome plated towel racks,

e. Faucet for lavatory shall be in chrome-finish.

f. Bath and shower fitting shall be in chrome-finish.

g. Towel Rail shall be tubular stainless steel, 2.7mm diameter, and 0.54m long.

Pipes and Fittings:

a. Soil, waste and vent pipes shall be Cast-iron (CI) pipes, service weight, Schedule 40. Diameter shall be as indicated in the drawings. It shall conform to ASTM A716 or A74.

b. Water pipes shall be Galvanized Iron (GI) pipes, schedule 40. Diameter shall be as indicated in the drawings. It shall conform to ASTM A120.

c. Drainage pipes shall be reinforced concrete pipes (RCP). Diameter shall be as indicated in the drawings.

d. Downspout shall be polyvinyl chloride (PVC) pipes, schedule 40 75mm diameter or specified in the plans. It shall conform to ASTM D2729.

e. Clean-outs shall be provided in all soil, storm or waste lives at every change in direction greater than 45 degrees, size same as the pipe served.

   Clean-outs shall be extended to an easily accessible place or where indicated on the drawings.

f. Pipe sleeves shall be installed and properly secured in place at all points where pipes passes through masonry or concrete. Pipe sleeves shall be PVC pipe, Schedule 40.

g. Pipe hangers, inserts and supports shall be provided to all horizontal runs of pipes and shall be hanged with adjustable wrought iron or malleable iron pipe hangers spaced not over 1.5 meters apart for PVC pipes and 3.0 meters apart for iron pipes.

h. Gate valve shall be bronze with screwed ends and will be used as shut-off valves,

i. Angle, check and glove valves shall be bronze and type suitable for applications.

j. Floor drains shall be stainless steel with strainer size 100mm x 100mm with stainless fastening screws.

Use of materials not specified in these specifications maybe allowed provided such alternatives have been approved by the Owner.

8.4 EXECUTION

All installation works shall be in conformity with the NPCP.

Plumbing fixtures shall be installed on locations as shown. Surface of fastening devices exposed after installation shall have the same finish as the attached accessory. Accessories shall be protected until the installations are accepted.

The fixtures shall be securely anchored and installed flushed with the finished walls, and shall completely concealed when the fixtures are installed.

Piping shall be installed as shown on the drawings, as recommended by the manufacturer and as directed during installation, straight and as direct as possible, forming right angles or parallel line with building walls and other pipes, and neatly spaced. Before being placed in position, pipes and fittings shall be cleaned carefully. All pipes shall be maintained in a clean condition.

All piping shall be properly supported or suspended on stands, clamps, hangers, or equivalent of approved design. Supports shall be installed in such a manner to permit pipe free expansion and contraction while minimizing vibration. Do not install pipes in a manner that interferes with other pipes, ducts, conduits, equipment and adjacent structure of the building. All pipes shall be cut accurately to measurement and shall be worked into place without springing and forcing. Changes in pipe shall be made with reducing fittings. The position, arrangement and connection of pipes, fixtures, drains, valves and similar items indicated on the drawings shall be followed as closely as possible.

Trenches for all underground pipes shall be executed to the required depth and grade as shown on the drawings or as directed by the Engineer. Pipelines shall have been tested, inspected and approved by the Engineer prior to backfilling.

Plumbing system and equipment, after complete installation, shall be given an in service test. All defects disclosed by test shall be rectified and the test repeated. All labor, material and equipment used for tests shall be provided by the contractor. Piping shall be subjected to a hydrostatic pressure test, field leakage test and disinfection.

The Contractor shall furnish to the Owner a written guarantee covering the satisfactory operations of the plumbing installation. This shall be for a period of one year after the date of acceptance. During this period, the Contractor shall repair or replace any defective work and pay for any repair or replacement lost. All damages due to improper use or caused by the Owner or his representatives/employees shall be at the Owner's expense.

9. ELECTRICAL WORKS

9.1 SCOPE OF WORK

a) The work to be done shall consist of fabricating, trenching, furnishing, delivering and installing of electrical materials/fixtures completed in accordance with all the details of the electrical works as shown on the drawings including materials, labor, tools and equipment and all incidental works as found necessary.

b) Refer to electrical plans/drawings for location and extent of work involved.

9.2 GENERAL REQUIREMENTS

a) All works shall be done in accordance with the requirements of the publications and agencies having jurisdiction, as well as the requirements of the approved standards.

1. National Fire Protection Association - (NFPA)

2. National Electrical Manufacturer Association - (NEMA)

3. Underwriter Laboratories, Inc. - (UL)

4. Philippine Electrical Code - (PEC)
   Philippine National Standard - (PNS)

5. Federation Specification :
   Circuit Breaker, Molded Case, Branch
   Circuit and Service

6. American National Standard Institute - (ANSI)

7. American Society for Testing and Materials - (ASTM)

8. Illuminating Engineering Society - (IES)

b) The electrical power will be tapped from the nearest available utility company power system. The Contractor shall coordinate the exact route of the supply cable and distribution with the PPA Engineer and authorized/proper authority in the area Voltages shall be 220 volt, single phase, 60 Hertz, AC.

c) The Contractor shall employ a licensed Registered Electrical Engineer or Master electrician to perform or to supervise and to conduct for continuous inspection of all electrical work.

d) The Contractor shall first obtain approval from the Authority before procurement, fabrication or delivery of electrical materials to the site. Partial submittals will not be acceptable and will be returned without review. Submittals shall include the Manufacturer's Name, Trade Name, Place of Manufacture, Catalog Model or Number, Nameplate Data, Size, Layout Dimensions, Capacity, Project Specification and Paragraph Reference, Technical Society Publication References and other information necessary to establish contract compliance of each item to be furnished.

e) All excavations, fill and backfill and concrete works involved herein, shall be carried to the required elevations and shall conform to the provisions of specification under Earthwork and Concrete Construction of this tender document.

f) The materials and equipment to be furnished shall be standard products of reputable manufacturer engaged in the reproduction of such materials and equipment.

g) All permits and electrical fees required for this work shall be obtained at the expense of the Contractor. The Contractor shall furnish the Engineer-in-Charge, the final Certificates of Inspections and approval from the proper government authorities after the completion of work. The Contractor shall prepare all as- built plans and all other paper works as required by the enforcing authorities.

9.3 MATERIALS REQUIREMENT

a. All electrical materials, fixtures and equipment under by this Contract shall be
furnished and installed by the Contractor.

b. All materials, fixtures and equipment to be supplied shall be as shown in the drawings and shall be in accordance with the requirements of these specifications which shall apply to manufacturing, testing and supply of same materials and equipment.

c. All electrical materials whether specifically described or not shall be of the best grade and all workmanship shall be of first class in every aspect.

All electrical equipment and materials supplied shall be suitable in every respect for operation in a hot tropical climate near the sea and suitable for operation at ambient temperature up to 40° C.

Any electrical materials and equipment found not meeting the requirements of relevant standards, or of these specifications shall be rejected by the Engineer.

All materials used in this Contract shall meet the requirements described in this specification, or otherwise approved by the Engineer and shall comply with the approved standard.

9.4 PRODUCTS

WIRES AND CABLES

The conductor material to be furnished and installed shall be of copper wire Heat Resistant Thermoplastic type "THHN ". All conductors shall be rated 600 volts insulation and shall be standard for all sizes.

LIGHTING FIXTURES AND ACCESSORIES

Fixture shall conform to NEMA standard as illustrated in the plans. Illustration shall be indicative of the desired general type and shall not restrict selection of fixture to any particular manufacturer. Locally fabricated or manufactured fixture of similar design with equivalent light distribution and brightness characteristics having equal finish and quality, shall be acceptable as approved.

Die-cast aluminum housing with electrocoat gray finish shall have adjustable mogul base socket (street side), multi-photometric distribution available, and photo-electric control (PE), completely wire to the following components: 400 watts High Pressure Sodium Lamp (HOPS), HPF reactor ballast, single voltage 240 volt, with capacitor and igniter.

70 watts High Pressure Sodium Lamp (HPS)- Pole Park Light enclosed on a fiberglass dome cover and glass bottom diffuser. Mounting post shall be tapered 3000 mm height as shown on the drawing.

LAMP POST

The lamp post/s shall be furnished installed and tested for the perimeter and park lighting as shown in the plans. The post/s . shall be dimensioned for a wind velocity of 185 krn/hr. It shall be locally fabricated or manufactured. The post shall be zinc electroplated, prime-coated with red lead and shall be painted at site with the final coating preferably aluminum paint to be approved by the Engineer.

HANDHOLE

The handhole shall be of the type noted in the drawings and shall be constructed in accordance with the applicable details as indicated.

DUCTBANK

The contractor shall construct underground ductbank of individual conduit encased in concrete as shown in the drawing.

PANEL BOARD

The contractor shall furnish and install panel board as shown on the drawing. Panel Board shall contain molded case circuit breaker flush mounted type, magnetic contactor, push button switches and 5,5 mm2 bare soft drawn copper grounding conductor. Connection shall be made by connecting one end to the body of the panel and the other end to the copper weld ground rod.

9.5 EXECUTION

a. The Contractor shall furnish and install electrical materials as shown in the drawings. A licensed Electrical Engineer or Master Electrician is required to implement the installation of the electrical system. A licensed electrical contractor shall oversee/conduct the installation of the Main Circuit Breaker above 200 amperes.

b. Electrical installation shall conform to the requirements of Philippine Electrical Code (PEC) and the other approved standards.

c. The contractor shall install all electrical works with the supervision of the qualified Registered Electrical Engineer (REE) or Master Electrician. AH electrical installation applications regardless of capacity and voltage whether new, addition or revision shall be accompanied by electrical plans signed and sealed by a duly licensed Professional Electrical Engineer (PEE).

9.6 INSTALLATION

Lamp Post: shall be mounted!/ anchored to a reinforced concrete foundation with base plates, anchor bolts standard nuts and washers as shown in the drawing.

Pole Setting: Depth as shown in the drawing.

Construction of reinforced concrete lamp post foundation , hand holes and duct bank with steel covers shall be in accordance with the shape and dimensions as shown in the drawing.

Excavations / backfilling required before /after installation of lamp post and parking area lighting and trench shall conform to the provisions of Earthwork and Concrete Construction.

Grounding : Each lamp post shall be grounded at the base by ground lugs and ground conductor connected to a ground electrode . The grounding electrodes shall be cone pointed, sectional copper clad steel 15 mmΦ by 1000 mm meter long.

Service Entrance, Overhead : Rigid Steel Conduit Pipe (RSCP) from the service equipment to the service entrance fitting weather head outside the building.

Service Entrance Conduit Underground: (Unplasticized Polyvinyl Chloride), (UPVC). The underground portion shall encased in concrete and shall be installed as shown on the drawing.

9.7 WORKMANSHIP

The work throughout shall be executed in the best and most thorough manner under the direction of and at the satisfaction of the Registered Electrical Engineer or Master Electrician, who will interpret the intent meaning of the drawings and specification and shall have the power to reject any work and materials which in his judgement, are not in full accordance therewith.

9.8 TESTING OPERATIONS

When the electrical installation is completed, the Contractor shall test the installed electrical materials and equipment in the presence of Registered Electrical Engineer or Master Electrician. The system shall be free from any defects, shorts or grounds. All necessary instruments and personnel required for the testing shall be furnished by the Contractor at no extra cost to the Authority.

10. PAINTING AND COATING

10.1GENERAL

The work included in this section consists of the furnishing of all labor, materials, tools and all appurtenant work in connection with painting and coatings in accordance with these specifications. All paints and coatings shall be applied by painting subcontractors and workmen approved by thd Engineer.

10.2SCOPE

The following surfaces to be painted except where otherwise specified or shown:

a) Metal surfaces and above ground piping.

b) All exposed concrete.
c) All structural and miscellaneous metal.
d) All equipment furnished without factory finished surfaces.
e) All exposed steel mullions, tubular frames, door frames, steel sash and metal windows
f) All sheet metal and ferrous metal trim.
g) Interior and exterior surfaces of the building including all concrete block masonry.

The following surfaces are not to be painted:

a) Ferrous metals having approved plating or factory paint finishes.
b) Non-ferrous metals, unless otherwise specified or indicated; galvanized metal shall not be considered a non-ferrous metal.
c) Equipment with factory finished surfaces unless otherwise specified.

No concrete, wood, metal or any other surface requiring protection shall be left unpainted even not specifically defined herein.

10.3RIGHT OF REJECTION

Exterior painting or interior finishing shall be done under conditions which shall not jeopardize the appearance or quality of the painting or finishing in any way. The Engineer shall have the right, to reject all material or work that is unsatisfactory, and require the replacement of either or both at the expense of the Contractor.

10.4PROTECTION OF THE WORK

The Contractor shall endeavor to protect the work of others during the time is in progress. The Contractor shall be responsible for any and all damage to any other work in the course of the painting job.

Protective coverings shall be used to protect floors, fixtures, and equipment while painting. Care shall be exercised to prevent paint being spattered onto surfaces which are not to be painted.

10.5WORKMANSHIP

All painting work shall be first class and in accordance with the best standard practices of the trade.

The Contractor shall examine carefully all surfaces to be painted and before beginning any work, shall make sure that the work of other trades has been installed in a workman like condition ready to receive paint. Metal surfaces shall be clean, dry and free from mill scale, rust, grease, oil or any other substance which could affect the quality of the painting.

Paint shall be applied in the right consistency and each coat shall be brushed evenly free of brash marks, sags and runs.[1] Care shall be exercised to avoid lapping of paint on glass or hard wares. Paint shall be sharply applied to required lines. Finished paint surfaces shall be free from defects or blemishes. Surfaces from which such paint cannot be removed satisfactorily shall be

painted or repainted, as required to produce a finish satisfactory to the Engineer.

Succeeding paint coating shall be applied only when the previous coat is hard and dry. All painting materials shall be used strictly in accordance with the manufacturer's directions, spread or flowed smoothly with proper film thickness and without runs, sags skips or other defects.

10.6STORAGE OF MATERIAL

All painting materials and equipment not for immediate use shall be stored in a room approved by the Engineer for that purpose. The receiving, opening and mixing of all paint materials shall be done in this room.

Necessary precautions shall be taken to prevent fire. Rags, waste, and other materials, soiled with paint shall be removed from the premises at the end of each day's work or stored in metal containers with metal covers.

10.7PREPARATION OF PAINT

Paint containers shall be delivered to the jobsite in manufacturer's unopened containers and shall be opened only when required for use. Paint shall be mixed only in the designated room or space in the presence of the Engineer or his representative. Paint shall be thoroughly stirred or agitated to uniformly smooth consistency suitable for proper application. Unless otherwise specified or approved, no materials shall be reduced, changed, or used except in accordance with manufacturer's label or tag on container. In all cases, paint shall be prepared and handled in a manner that will prevent deterioration and contamination with pollutants.

10.8CLEAN-UP

Upon completion of work, the Contractor shall remove all surplus materials. All paint spills shall be removed and entire premises shall be cleaned of all rubbish, and debris, caused by the work. Finished surfaces shall be presented clean and free from blemishes and is acceptable in every way. All glass shall be cleaned of paint spots and polished before the job is presented for acceptance by the owner.

10.9MATERIALS

a) Materials - A complete list of materials proposed for use shall be submitted by the Contractor for the Engineer's approval. The Contractor may substitute other paint materials for those specified in Section 27.12 provided written approval from the Engineer is received stating that said proposed substitute materials are equal to that specified and are approved for use. The painting material shall be delivered to the job site in its original containers properly labeled without evidence of tampering, substitution of contents, or of deterioration.

b) Color and Samples - All finish colors shall be as selected by the Owner. In multicoated work using color pigmented paints, each coat shall have sufficient variation of color to easily distinguish it from preceding coat.

Using specified or approved materials, 3 sample panels of each finish, including all coats thereof shall be prepared and submitted for the Owner's approval. Complete work shall match approved colors and samples.

10.10 PREPARATION OF SURFACES

a) General - Except as otherwise specified, surfaces to be painted shall be clean, smooth and dry. The Contractor shall report to the Engineer in writing any surface which cannot be properly prepared for painting. If work is commenced before defects have been reported and corrected, any resulting unsatisfactory finish shall be rectified at no cost to the PPA.

b) Concrete and Masonry - All concrete and masonry surfaces shall be cured thirty days prior to painting. Dirt, dust, oil, grease, efflorescence and other deleterious matter shall be removed and surface roughened when necessary to insure good paint adhesion. The method of surface preparation shall be left to the discretion of the Contractor, but results obtained shall be satisfactory to the Engineer. Before application of resin emulsion paint, surfaces shall be prepared in accordance with manufacturer's directions. Before application of oil base or latex paints, surfaces shall be tested for presence of alkali; if alkali is present, neutralize as recommended by the manufacturer of the paint materials to be applied.

c) Plaster - Dirt, dust, loose plaster and other deleterious matter which would prevent good paint adhesion shall be removed. All holes, cracks and depression shall be neatly filled with patching plaster, mixed and applied to match existing plaster. Patches shall be sanded flush and smooth and properly sealed before applying prime coat. After priming surfaces, suction spots shall be touched up with additional prime coat material until surfaces evidence a uniform coating. Enamel undercoats on smooth plaster shall be sandpapered by hand (with No. 00 sandpaper) and dusted clean before applying succeeding coat.

d) Metal - Dirt, scale and rust shall be removed by scraping, wire brushing and sanding or sandblasting as required. Oil and grease shall be removed with mineral spirits or appropriate solvent. Before painting ferrous metal surfaces, including galvanized ferrous metal, surfaces shall be pre-treated with approved phosphoric acid etching cleaner in accordance with the manufacturer's direction to produce a chemically clean surface. Unless already performed in accordance with specifications of other sections, abrasions and bare spots in shop prime coatings shall be touched up with metal primer matching the shop coatings. Enamel undercoats shall be sandpapered by hand (with No. 00 sandpaper) and dusted clean before applying succeeding coat.

e) Woodwork - Unless already properly sanded, woodwork shall be sandpapered smooth by hand. Before priming surfaces, knots, pitch pockets and sap streaks shall be thoroughly cleaned of residue and touched up with shellac varnish coating. After priming surface, nail holes, cracks and depressions shall be neatly filled with putty or other approved filler, colored to match required finish. Enamel undercoats

shall be sanded by hand (with No. 00 sandpaper) and dusted clean before applying succeeding coat.

10.11 APPLICATION OF PAINT

a) General - All painting and finishing shall be performed by skilled craftsmen. Each coat of paint shall be applied with the right consistency, evenly, free of laps, sags and runs and cut sharply to required lines. Paint shall be applied only under dry and dust free conditions that will insure properly finished surfaces, free of defects and blemishes unless otherwise directed by the engineer. Paint shall not be applied when temperature is likely to be above 90°F. Sufficient time shall be allowed between application of coats. All primer and intermediate coats shall be unscarred and completely integral at time of application of each succeeding coat. The Engineer shall be notified when each coat has been applied and is ready for inspection; until coat is inspected and approved by the Engineer, no succeeding coats shall be applied. Whenever the coats of a dark colored paint are specified the first coat shall contain sufficient powdered aluminum to act as an indicator for proper coverage when applying the second coat

b) Method of Application - Paint should be applied by brush, spray, or other application method approved by the Engineer.

c) Priming and Back painting

1. Priming - Before installation, all surfaces of millwork which are to be painted shall be primed giving particular attention to sealing of cross-grained surfaces. In all cases, all work shall be primed as soon as possible after installation, as required, or in case of prefabricated items, at fabricators shop or mill before shipment, if practicable. Except as otherwise specified, priming shall consist of first coat herein after specified under "Finishes".

2. Back-Painting - Woodwork, millwork and casework to be installed against concrete masonry or plaster shall be back painted with one coat of exterior oil paint.

10.12 PAINTING SYSTEMS

Williams/ Architectural Items No.	MANUFACTURER Dutch Boy Number	Sherwin Or Equivalent
a) Exterior Finishes		
1. On Concrete Walls Two Coats, Concrete Masonry Paint	A69EXZ	55BOO
2. Unprimed Ferrous Metal Including G.I. Roofing		

First coat:
Rush inhibit Ferrous
Metal primer 20724 B16RXI

Second coat:
Exterior Enamel 20-125 A71EX2

3. On Concrete Blocked Walls

First coat:
Concrete block primer
Sealer 103 B56WX3

Second coat :
Concrete Masonry Paint 55BOO A69EX2

Third coat:
Concrete Masonry Paint 55BOO A69EX2

4. On Wood

First coat:
Exterior wood primer 25F A71EX3

Second coat :
Exterior Enamel 10X A71EX3

Third coat:
Exterior Enamel 10X A71EX3

b. Interior Finishes

Location of the various finishes are listed in the Finish Schedule on the drawings or else will be confirmed by the PP A.

1. On primer and coat metal two
Coats of interior semigloss
Enamel or as indicated in the
Schedule finish 22101 B7WX3

2. On Plaster

First Coat:
Pigmented sealer 103 B56WX3

Third Coat:		
Interior flat enamel	23-001	B7WX3

4. Wood Stain Finish

Oil Stain with filler	23-11	A48N2
Boiled on top coat	36-001	A38NX23

5. Wood Lacquer Finish

Wood paste Filler w/ natural	23-11	A48N2
Oil top coat of lacquer	68-064	970EX0

c) Non-Architectural Items
(Piping, Valves, equipment, etc.)

1. Piping, valves equipment
Etc. in rooms are to be painted

2. Galvanized pipe and ducts

Primer - one coat	70-56	B50ZX
Finish - one coat	22-101	B7WX3

3. Black Steel Pipes

Primer - one coat	0.41	B16RX
Finish - one coat	22-101	B7WX3

4. Mechanical items

a. Ungalvanized Ferrous Metal

Primer - one coat	37-745	B16RX1
Finish - one coat	22-101	B7WX3

b. Galvanized Ferrous Metal 70.56 B50AX1

Primer - one coat	22-101	B7WX3
Finish - one coat		

c. Submerged Galvanized Ferrous Metal

Primer - one coat	60-709	C45NX19

d. Berried Miscellaneous Ferrous surface, valves and flange joints (excl. pipe)

Primer - one coat	Coal-tar enamel or match Adjacent pipe coating (if any)