

Portland cement concrete, shall not be used.

- d. Concrete mixers shall be equipped with adequate water storage and a device for accurately measuring and automatically controlling the amount of water used.
- e. Materials shall be measured by weighing. The apparatus provided for weighing the aggregates and cement shall be suitably designed and constructed for this purpose. The accuracy of all weighing devices except that for water shall be such that successive quantities can be measured to within one percent of the desired amounts. The water measuring device shall be accurate to plus or minus 0.5 percent. All measuring devices shall be subject to the approval of the Engineer. Scales and measuring devices shall be tested at the expense of the Contractor as frequently as the Engineer may deem necessary to insure their accuracy.
- f. Weighing equipment shall be insulated against vibration or movement of other operating equipment in the plant. When the entire plant is running, the scale reading at cut-off shall not vary from the weight designated by the Engineer by more than one percent for cement, 1-½ percent for any size of aggregate, or one percent for the total aggregate in any batch.
- g. Manual mixing of concrete shall not be permitted unless approved by the Engineer.

## 2. MIXING CONCRETE AT SITE

- a. Concrete mixers may be of the revolving drum or the revolving blade type and the mixing drum or blades shall be operated uniformly at the mixing speed recommended by the manufacturer.

The pick-up and throw-over blades of mixers shall be restored or replaced when any part or section is worn 20 mm or more below the original height of the manufacturer's design. Mixers and agitators which have an accumulation of hard concrete or mortar shall not be used.

- b. When bulk cement is used and the volume of the batch is 0.5 m<sup>3</sup> or more, the scale and weigh hopper for Portland cement shall be separate and distinct from the aggregate hopper or hoppers.

The discharge mechanism of the bulk cement weigh hopper shall be interlocked against opening before the full amount of cement is in the hopper. The discharging mechanism shall be interlocked against opening when the amount of cement in the hopper is underweight by more than one percent or overweight by more than 3 percent of the amount specified.

- c. When the aggregates contain more water than the quantity necessary to produce a saturated surface dry condition, representative samples shall be taken and the moisture content determined for each kind of aggregate.
- d. The batch shall be so charged into the mixer that some water enter in advance of cement and aggregates. All water shall be in the drum by the end of the first quarter of the specified mixing time.
- e. Cement shall be batched and charged into the mixer by such means that it will not result in loss of cement due to the effect of wind, or in accumulation of cement on surfaces of conveyors or hoppers, or in other conditions which reduce or vary the required quantity of cement in the concrete mixture.

- f. Where required, synthetic fibrous reinforcement shall be added directly to the concrete mixer after placing the sufficient amount of mixing water, cement and aggregates.
- g. The entire contents of a batch mixer shall be removed from the drum before materials for a succeeding batch are placed therein. The materials composing a batch except water shall be deposited simultaneously into the mixer.
- h. All concrete shall be mixed for a period of not less than 3 minutes after all materials, including water, are in the mixer. During the period of mixing, the mixer shall operate at the speed for which it has been designed.
- i. Mixers shall be operated with an automatic timing device that can be locked by the Engineer. The time device and discharge mechanism shall be so interlocked that during normal operation no part of the batch will be discharged until the specified mixing time has elapsed.
- j. The first batch of concrete materials placed in the mixer shall contain a sufficient excess of cement, sand, and water to coat the inside of the drum without reducing the required mortar content of the mix. When mixing is to cease for a period of one hour or more, the mixer shall be thoroughly cleaned.
- k. In case of rubble concrete, proper mixture and placing of concrete and stones/rocks shall be in accordance to the approved plan. Methodology of work shall be approved by the Engineer.

### 3. MIXING CONCRETE IN TRUCKS

- a. Truck mixers, unless otherwise authorized by the Engineer, shall be of the revolving drum type, watertight, and so constructed that the concrete can be mixed to insure a uniform distribution of materials throughout the mass. All solid materials for the concrete shall be accurately measured and charged into the drum at the proportioning plant. Except as subsequently provided, the truck mixer shall be equipped with a device by which the quantity of water added can be readily verified. The mixing water may be added directly to the batch, in which case a tank is not required. Truck mixers may be required to be provided with a means by which the mixing time can be readily verified by the Engineer.
- b. The maximum size of batch in truck mixers shall not exceed the minimum rated capacity of the mixer as stated by the manufacturer and stamped in metal on the mixer. Truck mixing shall, unless otherwise directed, be continued for not less than 100 revolutions after all ingredients, including water, are in the drum. The mixing speed shall not be less than 4 rpm, nor more than 6 rpm.
- c. Mixing shall begin within 30 minutes after the cement has been added either to the water or aggregate, but when cement is charged into a mixer drum containing water or surface-wet aggregate and when the temperature is above 32 °C, this limit shall be reduced to 15 minutes. The limitation in time between the introduction of the cement to the aggregate and the beginning of the mixing may be waived when, in the judgment of the Engineer, the aggregate is sufficiently free from moisture, so that there will be no harmful effects on the cement.
- d. When a truck mixer is used for transportation, the mixing time in stationary mixer may be reduced to 30 seconds and the mixing completed in a truck mixer. The mixing time in truck mixer shall be as specified for truck mixing.

## JOINTS

1. No reinforcement, corner protection angles or other fixed metal items shall be run continuously through joints containing expansion-joint filler, through crack-control joints in slabs on grade and vertical surfaces.

2. **Preformed Expansion Joint Filler**

- a. **Joints with Joint Sealant**

At expansion joints in concrete slabs to be exposed, and at other joints indicated to receive joint sealant, preformed expansion-joint filler strips shall be installed at the proper level below the elevation with a slightly tapered, dressed-and-oiled wood strip temporarily secured to the top thereof to form a groove. When surface dry, the groove shall be cleaned of foreign matter, loose particles, and concrete protrusions, then filled flush approximately with joint sealant so as to be slightly concave after drying.

- b. **Finish of concrete at joints**

Edges of exposed concrete slabs along expansion joints shall be neatly finished with a slightly rounded edging tool.

- c. **Construction Joints**

Unless otherwise specified herein, all construction joints shall be subject to approval of the Engineer. Concrete shall be placed continuously so that the unit will be monolithic in construction. Fresh concrete may be placed against adjoining units, provided the set concrete is sufficiently hard not to be injured thereby. Joints not indicated shall be made and located in a manner not to impair strength and appearance of the structure. Placement of concrete shall be at such rate that the surface of concrete not carried to joint levels will not have attained initial set before additional concrete is placed thereon. Lifts shall terminate at such levels as are indicated or as to conform to structural requirements as directed. If horizontal construction joints are required, a strip of 25mm square-edged lumber, beveled to facilitate removal shall be tacked to the inside of the forms at the construction joint. Concrete shall be placed to a point 25mm above the underside of the strip. The strip shall be removed one hour after the concrete has been placed. Any irregularities in the joint line shall be leveled off with a wood float, and all laitance removed. Prior to placing additional concrete, horizontal construction joints shall be prepared.

Construction Joint which is not indicated in the Drawings shall be located as to least affect the strength of the structure. Such locations will be pointed out by the Engineer.

## PREPARATION FOR PLACING

Hardened concrete, debris and foreign materials shall be removed from the interior of forms and from inner surfaces of mixing and conveying equipment. Reinforcement shall be secured in position, and shall be inspected, and approved before placing concrete. Runways shall be provided for wheeled concrete-handling equipment. Such equipment shall not be wheeled over reinforcement nor shall runways be supported on reinforcement.

Notice of any concreting operations shall be served to the Engineer at least three (3) days ahead of each schedule.

## PLACING CONCRETE

### 1. Handling Concrete

Concrete shall be handled from mixers and transported to place for final deposit in a continuous manner, as rapidly as practicable, and without segregation or loss of ingredients until the approved unit of work is completed. Placing will not be permitted when the sun, heat, wind or limitations of facilities furnished by the Contractor prevent proper finishing and curing of the concrete. Concrete shall be placed in the forms, as close as possible in final position, in uniform approximately horizontal layers not over 40cm deep. Forms splashed with concrete and reinforcement splashed with concrete or form coating shall be cleaned in advance of placing subsequent lifts. Concrete shall not be allowed to drop freely more than 1.5m in unexposed work nor more than 1.0 m in exposed work; where greater drops are required, tremie or other approved means shall be employed.

### 2. Time Interval between Mixing and Placing

Concrete mixed in stationary mixers and transported by non-agitating equipment shall be placed in the forms within 30 minutes from the time ingredients are charged into the mixing drum. Concrete transported in truck mixers or truck agitators shall be delivered to the site of work, discharged in the forms within 45 minutes from the time ingredients are discharged into the mixing drum. Concrete shall be placed in the forms within 15 minutes after discharged from the mixer at the jobsite.

### 3. Hot Weather Requirements

The temperature of concrete during the period of mixing while in transport and/or during placing shall not be permitted to rise above 36 °C. Any batch of concrete which had reached a temperature greater than 36 °C at any time in the aforesaid period shall not be placed but shall be rejected, and shall not thereafter be used in any part of the permanent works.

#### a. Control Procedures

Provide water cooler facilities and procedures to control or reduce the temperature of cement, aggregates and mixing handling equipment to such temperature that, at all times during mixing, transporting, handling and placing, the temperature of the concrete shall not be greater than 36 °C.

#### b. Cold Joints and Shrinkage

Where cold joints tend to form or where surfaces set and dry too rapidly or plastic shrinkage cracks tend to appear, concrete shall be kept moist by fog sprays, or other approved means, applied shortly after placement, and before finishing.

#### c. Supplementary Precautions

When the aforementioned precautions are not sufficient to satisfy the requirements herein above, they shall be supplemented by restricting work during evening or night. Procedure shall conform to American Concrete Institute Standard ACI 305.

### 4. Conveying Concrete by Chute, Conveyor or Pump

Concrete may be conveyed by chute, conveyor, or pump if approved in writing. In requesting approval, the Contractor shall submit his entire plan of operation from the time of discharge of concrete from the mixer to final placement in the forms, and the steps

to be taken to prevent the formation of cold joints in case the transporting of concrete by chute, conveyor or pump is disrupted. Conveyors and pumps shall be capable of expeditiously placing concrete at the rate most advantageous to good workmanship. Approval will not be given for chutes or conveyors requiring changes in the concrete materials or design mix for efficient operation.

**a. Chutes and Conveyors**

Chutes shall be of steel or steel lined wood, rounded in cross section rigid in construction, and protected from overflow. Conveyors shall be designed and operated and chute sections shall be set, to assure a uniform flow of concrete from mixer to final place of deposit without segregation of ingredients, loss of mortar, or change in slump. The discharged portion of each chute or conveyor shall be provided with a device to prevent segregation. The chute and conveyor shall be thoroughly cleaned before and after each run. Waste material and flushing water shall be discharged outside the forms.

- b.** Pumps shall be operated and maintained so that a continuous stream of concrete is delivered into the forms without air pockets, segregation or changes in slump. When pumping is completed, concrete remaining in the pipeline shall be ejected and wasted without contamination of concrete already placed. After each operation, equipment shall be thoroughly cleaned and the flushing water shall be splashed outside the forms.

**5. Wall and Abutments**

No load shall be placed upon finished walls, foundations or abutments until authorized by the Engineer. Minimum time before loading shall be 7 days.

**6. Concrete Placing on Wharf**

When placing concrete on wharf decks, the Contractor shall:

Ensure that rate of placing is sufficient to complete proposed placing, finishing and curing operations within the scheduled time; that experienced finishing machine operators and concrete finishers are provided to finish the deck; that curing equipment and finishing tools and equipment are at the site of work and in satisfactory condition for use.

Immediately prior to placing, the Contractor shall place scaffolding and wedges and make necessary adjustments. Care shall be taken to ensure that settlement and deflection due to added weight of concrete will be minimal. The Contractor shall provide suitable means to readily permit measurement of settlement deflection as it occurs.

Should any event occur which, in opinion of the Engineer, would prevent the concrete conforming to specified requirements, the Contractor shall discontinue placing of concrete until corrective measures are provided satisfactory to the Engineer. If satisfactory measures are not provided prior to initial set of concrete in affected areas, the Contractor shall discontinue placing concrete and install a bulkhead at a location determined by the Engineer. Concrete in place beyond bulkheads shall be removed. The Contractor shall limit the size of casting to that which can be finished before beginning of initial set.

## COMPACTION

1. Immediately after placing, each layer of concrete shall be completed by internal concrete vibrators supplemented by hand-spading, rodding, and tamping. Tapping or other external vibration of forms will not be permitted unless specifically approved by the Engineer. Vibrators shall not be used to transport concrete inside the forms. Internal vibrators submerged in concrete shall maintain a speed of not less than 7,000 impulses per minute. The vibrating equipment shall at all times be adequate in number of units and power to properly consolidate all concrete.
2. Spare units shall be on hand as necessary to insure such adequacy. The duration of vibrating equipment shall be limited to the time necessary to produce satisfactory consolidation without causing objectionable segregation. The vibrator shall not be inserted into the lower courses that have begun to set. Vibrator shall be applied vertically at uniformly spaced points not further apart than the visible effectiveness of the machine.

## EPOXY BONDING COMPOUND

Before depositing new concrete on or against concrete that has set, the surfaces of the set concrete shall be thoroughly cleaned so as to expose the coarse aggregate and be free of laitance, coatings, foreign matter and loose particles. Forms shall be re-tightened. The cleaned surfaces shall be moistened, but shall be without free water when concrete is placed. ASTM C 881. Provide Type I for bonding hardened concrete to hardened concrete; Type II for bonding freshly mixed concrete to hardened concrete; and Type III as a binder in epoxy mortar or concrete, or for use in bonding skid-resistant materials to hardened concrete. Provide Class B if placement temperature is between 4 to 16 °C; or Class C if placement temperature is above 16°C.

## FINISHES OF CONCRETE

Within 12 hours after the forms are removed, surface defects shall be remedied as specified herein. The Temperature of the concrete, ambient air and mortar during remedial work including curing shall be above 10 °C. Fine and loose material shall be removed. Honeycomb, aggregate pockets, voids over 13mm in diameter, and holes left by the rods or bolts shall be cut out to solid concrete, reamed, thoroughly wetted, brush-coated with neat cement grout, and filled with mortar. Mortar shall be a stiff mix of one part Portland cement to not more than 2 parts fine aggregate passing the No. 16 mesh sieve, with a minimum amount of water. The color of the mortar shall match the adjoining concrete color. Mortar shall be thoroughly compacted in place. Holes passing entirely through walls shall be completely filled from the inside face by forcing mortar through the outside face. Holes which do not pass entirely through wall shall be packed full. Patchwork shall be finished flush and in the same plane as adjacent surfaces. Exposed patchwork shall be finished to match adjoining surfaces in texture and color. Patchwork shall be damp-cured for 72 hours. Dusting of finish surfaces with dry material or adding water to concrete surfaces will not be permitted.

## CONCRETE FINISHING DETAILS

### 1. Concrete Paving

After concrete is placed and consolidated, slabs shall be screeded or struck off. No further finish is required.

### 2. Smooth Finish

Required only where specified; screed concrete and float to required level with no coarse aggregate visible. After surface moisture has disappeared and laitance has been removed, the surface shall be finished by float and steel trowel. Smooth finish shall consist of thoroughly wetting and then brush coating the surfaces with cement to not more than 2 parts

fine aggregate passing the no. 30 mesh sieve and mixed with water to the consistency of thick paint.

3. Broom Finish

Required for paving; the concrete shall be screeded and floated to required finish level with no coarse aggregate visible. After the surface moisture has disappeared and laitance has been removed, surface shall be float-finished to an even, smooth finish. The floated surfaces shall be broomed with a fiber bristle brush in a direction transverse to the direction of the main traffic.

## **ITEM 04 : STEEL AND METAL WORKS**

### **GENERAL**

General Requirements contain provisions and requirements essential to these specifications; and apply to this Section, whether or not referred to herein.

### **SCOPE OF WORK**

The work includes the furnishing of all labor, materials, equipment and other incidentals necessary for the fabrication and installation of structural steel and miscellaneous metal works as specified in relevant items of these specifications and as indicated on the drawings.

### **SUBMITTAL**

1. Before placing orders for materials for the steel and metal works, the Contractor shall submit to the Engineer for approval shop drawings for all steelwork. All project shop drawings shall show the dimension of all parts, method of construction, bolts, welding sectional areas and other details.
2. The detail of connections shown on the shop drawings shall be such as to minimize formation of pockets to hold condensation, water or dirt. A minimum gap between abutting angles and the like shall be provided wherever possible to eliminate any traps and facilitate maintenance painting.
3. No materials shall be ordered nor fabrication commenced until the shop drawings are approved by the Engineer.

### **STORAGE OF MATERIALS**

Structural materials, either plain or fabricated, shall be stored above the ground upon platforms, skids, or other supports. Materials shall be kept free from dirt, grease, and other foreign matter and shall be protected from corrosion.

### **MATERIAL REQUIREMENTS**

1. Unless specified herein all steel structures and metals shall conform with the requirements of "Steel and Metal Works." Connections where details are not specified or indicated herein, shall be designed in accordance with the American Institute of Steel Construction (AISC), Manual of Steel Construction, latest edition.
2. Structural steel works consisting of channels, gusset plates and other structural steel shape shall be as indicated on the drawings and shall be structural carbon steel conforming to ASTM A 36. Shapes shall be as given in AISC, Manual of Steel Construction.
3. High strength structural bolts, shall conform to ASTM A 325, Types 1 or 2. Nuts shall conform to ASTM A 560, Grade A, heavy hex style, except nuts 38 mm (1-1/2 inch) may be provided in hex style. Washers shall conform to ANSI B 18.22.1, Type B.
4. Electrodes for arc welding shall be E70 series conforming to American Welding Society Specifications A5.1.
5. Tests are required under the ASTM Standards for steel to be used in the Works and shall be carried out in the presence of the Engineer and at least four (4) days notice must be given to him of the dates proposed for such tests. Four (4) calendar days notice on which fabricated steelwork will be ready for inspection in the Contractor's yard.



6. Standard bolt shall conform to ASTM A 307 Carbon Steel Externally Threaded Standard Fasteners.

## EXECUTION

## QUALIFICATION

Qualification of steel fabricators, erectors and welders shall comply with the requirements.

## FABRICATION REQUIREMENTS

### 1. Workmanship

Fabrication shall be performed within the permissible tolerance by the approved fabricator. All workmanship shall be of the best quality with respect to internationally recognized standards of practice.

### 2. Cutting

Low-carbon structural steel may be cut by machine-guided torch instead of by shears or saw. Harmful notches, burrs, irregularities, etc., shall not be developed at the cut surface.

### 3. Contact Faces

Contact surfaces between bases or other elements bearing directly upon bearing plates shall be ground or milled as necessary for full effective bearing. Edges for welding shall likewise be properly prepared.

### 4. Bolt Holes

Bolt holes shall be according to engineering practice and as specified in these specifications. Gas burning of holes will not be permitted.

### 5. High Strength Bolt Assembly Preparation

Surfaces of high strength bolted parts in contact with bolt heads and nuts shall not have a slope of more than 1:20 with respect to a plane normal to the bolt axis.

Where the surface of a high strength bolted part has a slope of more than 1:20, a beveled washer shall be used to compensate for lack of parallelism.

High strength bolted parts shall fit solidly together when assembled and shall not be separated by gaskets or any other interposed compressible materials.

When assembled, all joint surfaces including those adjacent to washers shall be free of scale except tight mill scale, and shall be free from dirt, loose scale, burrs, and other defects that would prevent solid seating of parts.

Contact surfaces of friction-type joints shall be free from oil, paint, lacquer or galvanizing.

### 6. Welding

All welding shall be done only by welders certified as to their ability to perform in accordance with accepted testing requirement.

Welding of parts shall be in accordance with structural standards and the Standard Code for

Arc and Gas Welding in Building Construction of AWS, and shall only be done where shown, specified, or permitted by the Engineer.

Damage to galvanized areas by welding shall be thoroughly cleaned with wire brushing and all traces of welding flux and loose or cracked zinc coating shall be removed prior to painting. The cleaned area shall be painted with two coats of zinc oxide-zinc dust paint. The paint shall be properly compounded with a suitable vehicle in the ratio of one part zinc oxide to four parts zinc dust by weight. As an alternative to the above, the Contractor may submit for approval the use of a galvanizing rod or galvanizing solder to repair damaged areas.

The welding machine shall be a stable welder, and have suitable functions for the dimension of materials to be welded. The auxiliary tools used for welding shall perform sufficiently and adequately.

The welding machine used for field welding shall be of readily adjustable for electric current.

#### 7. Shop Assembly

Structural units furnished shall be assembled in the shop. An inspection shall be made to determine that the fabrication and the matching of the component parts are correct.

Jigs shall be used for the assembly of units as much as possible to maintain appropriate position of mutual materials.

Approval of the Engineer shall be required when drilling temporary bolt holes or welding temporary support to the assembled structure.

The tolerances shall not exceed those allowed by codes and each unit assembled shall be closely checked to insure that all necessary clearances have been provided and that binding does not occur in any moving part.

In order to maintain accurate finished dimensions and shape, appropriate reverse strain or restraint shall be provided as required. Assembly and disassembly work shall be performed in the presence of the Engineer, unless waived in writing by the Engineer any errors or defects disclosed shall be immediately remedied by the Contractor.

Before disassembly for shipment, component parts of the structures shall be match marked to facilitate erection in the field.

### FABRICATION TOLERANCES

#### 1. Dimensional Tolerances for Structural Work

Dimensions shall be measured by means of an approved calibrated steel tape at the time of inspection. Unevenness of plate work shall not exceed the limitation of the standard mill practice as specified in the American Institute of Steel Construction, "Manual of Steel Construction".

## 2. Camber

Reverse camber in any structural steel members in excess of 1/1,000 of the span length shall cause rejection. The minimum dead load camber for any structural steel member shall be as allowed by Code, or otherwise specified.

## INSPECTION AND TEST OF WELDING

### 1. Inspection of Welding

Inspection of welding shall be executed for the following work phases.

#### a. Before Welding

Scum, angle of bevel, root clearance, cleaning of surface to be welded, quality of end tab, drying of welding rod.

#### b. During Welding

Welding procedure, diameter of coil and wire, type of flux, welding current and voltage, welding speed, welding rod position, length of arc, melting, cleaning of slag of each level under surface chapping, supervision of welding rod.

#### c. After Execution of Welding

Assurance of bead surface, existence of harmful defects, treatment of crater, quality of slag removal, size of fillet, dimension of extra fill of butt welding, treatment of end tab.

### 2. Testing of Welding

Twenty percent (20%) of welds contributing in the overall strength of the structure and which will be inaccessible for the inspection in service shall be tested.

Welding shall be tested by ultrasonic test to the extent specified herein or as directed by the Engineer.

Where partial inspection is required, the ultrasonic test shall be located at random on the welds so as to indicate typical welding quality.

If ten percent (10%) of the random ultrasonic tested indicate unacceptable defect, the remaining eighty percent (80%) of the welding shall be tested. Repair welding required shall be ultrasonic tested after the repairs are made.

## CORRECTIONS

In lieu of the rejection of an entire piece or member containing welding which is unsatisfactory or which indicates inferior workmanship, corrective measures may be permitted by the Engineer whose specific approval shall be obtained for making each correction. Defective or unsound welds or base steel shall be corrected either by removing and replacing the entire weld, or as follows.

1. Excessive convexity or overlap shall be reduced by grinding.
2. Undercuts, lack of weld shall be repaired with necessary reinforcement of weld after removal of any foreign materials such as slag, dust, oil, etc.

3. Any defects such as slag inclusions, incomplete fusion, or inadequate joint penetration, shall be completely removed, cleaned and re-welded.
4. Cracks in welds or base steel, shall be removed to sound steel throughout their length and 5cm beyond each end of the crack, followed by welding. The extent of the crack, depth and length, shall be ascertained by the use of acid etching, magnetic particle inspection or other equally positive means.

The removal of welded steel shall be done by chipping, grinding, oxygen cutting, oxygen gouging, or air carbon arc gouging and in such a manner that the remaining welded steel or base steel is not nicked or undercut. Defective portions of the welding shall be removed without substantial removal of the base steel.

## INSTALLATION

### 1. Installation Program

#### a. Prerequisite Condition

Prior to executing steel fabrication and field installation, the Contractor shall prepare a comprehensive installation program including engineering supervision organization, fabrication procedures, field installation procedures, material application, machinery applications, inspection procedure, scope and standard of quality judgment, and submit to the Engineer for approval.

#### b. Special Technical Engineering

Special technical engineering different from contract specifications can be applied upon receiving approval of the Engineer.

### 2. Installation Requirement

#### a. Setting of Anchor Bolt and Others

- a. 1. Anchor bolts shall be set in accurate position by using templates.
- a. 2. The setting method shall be proposed to the Engineer for his approval before setting starts.
- a. 3. The threads of bolt shall be cured with an appropriate method against rust and/or any damage before tightening.
- a. 4. Non-shrink mortar shall be placed under base plates, well cured to obtain the sufficient strength before bearing loads are applied to base plates.

#### b. Temporary Bracing

- b. 1. Temporary bracing shall be installed as necessary to stay assemblies and assume loads against forces due to transport, erection operations or other work.
- b. 2. Temporary bracing shall be maintained in place until permanent work is properly connected and other construction installed as necessary for support, bracing or staying of permanent work.
- b. 3. Extent and quality of temporary bracing shall be as necessary against wind

and other loads, including seismic loads not less than those for which the permanent structure is designed to resist.

**c. Adequacy of Temporary Connections**

During erection, temporary connection work shall be securely made by bolting and/or welding for all dead load, wind and erection stresses.

**d. Alignment**

No permanent bolting or welding shall be done until the alignment of all parts with respect to each other shall be true within the respective tolerances required.

**e. Field Welding**

e. 1. Any shop paint or surfaces adjacent to joints where field welding is to be executed shall be wire brushed to remove paint/primer.

e. 2. Field welding shall conform to the requirements specified herein, except as approved by the Engineer.

**f. High Strength Bolts**

Final tightening of high strength bolts shall be done by using manufacturer's power operated equipment without any overstress to the threads.

**g. Correction of Errors**

g. 1. Corrections of minor misfits by use of drift pins, and reaming, chipping or cutting will be permitted and shall be provided as part of erection work.

g. 2. Any errors to be corrected or adjusted, preventing proper assembly, shall be immediately reported to the Engineer, and such corrections or adjustments shall be made as necessary and approved by the Engineer.

g. 3. Cutting or alterations other than as approved will not be permitted.

**h. Erection**

h. 1. Erection and installation shall be as per approved shop drawings.

h. 2. Each structural unit shall be accurately aligned by the use of steel shims, or other approved methods so that no binding in any moving parts or distortion of any members occurs before it is finally fastened in place.

h. 3. Operations, procedures of erection and bracing shall not cause any damage to works previously placed nor make overstress to any of the building parts or components. Damage caused by such operations shall be repaired as directed by the Engineer at no extra cost to the Employer.

## **GALVANIZING**

### **PREPARATION**

All mild steel parts exposed to weather shall be hot-dipped galvanized after fabrication in accordance with the requirements of ASTM A 123 or ASTM A 153. Prior to galvanizing, the surfaces shall be

cleaned of dirt, weld splatter, grease, slag, oil, paint or other deleterious matters. The steel surfaces shall be chemically de-scaled and cleaned with the same abrasive blast or other suitable method as approved by the Engineer.

## COATING

The zinc coating shall consist of uniform layers of commercially pure zinc free from abrasions, cracks blisters, chemical spots or other imperfections, and shall adhere firmly to the surface of the steel. The weight of zinc coating per square meter of actual surface shall not be less than 550 grams. Any surface damaged subsequent to galvanizing shall be given two coats of approved zinc rich paints.

## PAINTING

This work shall consist of the preparation of the metal surfaces, the application, protection and drying of the painted surfaces, and supplying of all tools, tackle, scaffolding, labor and materials necessary for the entire work. Painting shall be applied in the field or shop as approved by the Engineer.

Unless otherwise specified or approved, all painting work for structural steel shall comply with the requirements of this Section.

## SHOP PAINTING

All structural steel shall be given a shop primer after fabrication and cleaning before delivery to the site.

All steel work shall be thoroughly dried and cleaned of all loose mill scale, rust and foreign matters by means of sand blasting or other suitable methods approved by the Engineer before shop painting shall be applied. Each individual piece shall be painted prior to assembly. Portions where field welding or field contact with concrete is required shall not be painted.

Except for galvanized surfaces and items to be encased in concrete, clean ferrous metal surfaces shall be given one coat of Amerlock 400 Epoxy Primer at 100 Microns or approved equal. Additional coat shall be applied to surfaces that will be concealed or inaccessible for finish painting by Amerlock 400, Top Coat at 150 Microns with color or equivalent.

## FIELD PAINTING

After erection, the Contractor shall thoroughly prepare and clean the entire surface of all structural steel from all dirt, grease, rust or other foreign matters. The entire surface of all members shall then be field painted.

## MATERIALS

### 1. Structural Steel Work

- a. After surface preparation, steelwork shall be given one coat of approved prefabricating primer.
- b. Before final assembly of steelwork at the fabricator's shop, two shop coats of special red lead primer shall be applied to the surface of sections to be in permanent contact, meeting faces and all other concealed surfaces. After final assembly, but before delivery to the project site, the steelwork shall likewise be given two shop coats of special red lead primer.

## 2. Galvanized Steelwork

All galvanized steelwork shall be treated with zinc chromate two-pack etch primer followed by one coat of non-etch zinc chromate primer.

## 3. Miscellaneous Metal Work

Unless otherwise specified in other Sections of the Specifications or shown on the drawing, miscellaneous metal works such as ladders, structural steel ladder rungs, etc. shall be given two shop coats of epoxy primer and two coats of epoxy enamel.

# CONSTRUCTION METHODS

## 1. Cleaning of Surfaces

Surfaces of metal to be painted shall be thoroughly cleaned; removing rust, loose mill scale, dirt, oil or grease, and other foreign substances. Unless cleaning is to be done by sand blasting, all weld areas, before cleaning is started, shall be neutralized with a proper chemical, after which they shall be thoroughly rinsed with water.

Three methods of cleaning are provided herein. The particular method to be used shall be as directed by the Engineer.

## 2. Hand Cleaning

The removal of rust, scale, and dirt shall be done by the use of metal brushes, scrapers, chisels, hammers or other effective means. Oil and grease shall be removed by the use of gasoline or benzene.

Bristle or wood fiber brushes shall be used for removing loose dirt.

## 3. Sandblasting

All steel shall be cleaned by sandblasting. The sandblasting shall remove all loose mill scale and other substances. Special attention shall be given to cleaning of corners and re-entrant angles. Before painting, sand adhering to the steel in corners and elsewhere shall be removed. The cleaning shall be approved by the Engineer prior to any painting which shall be done as soon as possible before rust forms.

## 4. Flame Cleaning

All metal, except surface inside boxed members and other surfaces which shall be inaccessible to the flame cleaning operation after the member is assembled, shall be flame cleaned in accordance with the following operations.

- a. Oil, grease, and similar adherent matter shall be removed by washing with a suitable solvent. Excess solvent shall be wiped from the work before processing with subsequent operations.
- b. The surface to be painted shall be cleaned and dehydrated (free from occluded moisture) by the passage of oxyacetylene flames which have an oxygen to acetylene ratio of at least 1.0. The oxyacetylene flames shall be applied to the surfaces of the steel in such a manner and at such speed that the surfaces are dehydrated; dirt, rust loose scale in the form of blisters or scabs, and similar foreign matters are freed by the rapid, intense heating by the flames. The number arrangement and manipulation of the flames shall be such that all parts of the surfaces

to be painted are adequately cleaned and dehydrated.

- c. Promptly after the application of the flames, the surfaces of the steel shall be wire brushed, hand scraped wherever necessary, and then swept and dusted to remove all free materials and foreign particles.
- d. Paint shall be applied promptly after the steel has been cleaned and while the temperature of the steel is still above that of the surrounding atmosphere.

## 5. Weather Conditions

### a. Exterior Coatings

Coatings to surface shall not be applied during foggy or rainy weather, or under the following surface temperature conditions: below 4°C, or over 35°C, unless approved by the Engineer.

### b. Interior Coatings

Coatings shall be applied when surfaces to be painted are dry and the following surface temperatures can be maintained: between 18 to 35°C during the application.

## 6. Application

- a. Paint shall be factory tinted and mixed. All paint shall be field mixed before applying in order to keep the pigments in uniform suspension.

### b. Field Painting

When the erection work is complete, including all bolting and straightening of bent metal, all adhering rust, scale, dirt, grease or other foreign materials shall be removed as specified above.

As soon as the Engineer has examined and approved each steel and metal works structures, all field bolts, all welds, and any surfaces from which the top or first coat of paint has become worn off, or has otherwise come defective shall be cleaned and thoroughly covered with one coat of paint.

Surfaces to be bolted and surfaces which shall be in contact with concrete, shall not be painted. Surfaces which shall be inaccessible after erection shall be painted with such field coats as are required. When the paint applied for retouching the shop coat has thoroughly dried, and the field cleaning has been satisfactorily completed, such field coats as are required shall be applied. In no case shall a succeeding coat be applied until the previous coat is dry throughout the full thickness of the paint film. All small cracks and cavities which were not sealed in a watertight manner by the first field coat shall be filled with a pasty mixture of red lead and linseed oil before the second coat is applied.

The following provision shall apply to the application of both coats. To secure a maximum coating on edges of plates or shapes, bolt heads and other parts subjected to special wear and attack, the edges shall first be striped with a longitudinal motion and the bolt heads with a rotary motion of the brush, followed immediately by the general painting of the whole surface, including the edges and bolt heads.



The application of the second field coat shall be deferred until adjoining concrete work has been placed and finished. If concreting operations have damaged the paint, the surface shall be re-cleaned and repainted.

**c. General Manners**

Painting shall be done in a neat and workmanlike manner. Paint may be applied with hand brushes or be spraying, except aluminum paint which preferably shall be applied by spraying. By either method the coating of paint applied shall be smoothly and uniformly spread so that no excess paint shall collect at any point. If the work done by spraying is not satisfactory to the Engineer hand brushing shall be required.

**d. Brushing**

When brushes are used, the paint shall be so manipulated under the brush as to produce a smooth, uniform, even coating in close contact with the metal or with previously applied paint, and shall be worked into all corners and crevices.

**e. Spraying**

Power spraying equipment shall be used to apply the paint in a fine spray. Without the addition of any paint, the sprayed area shall be immediately followed by brushing, when necessary, to secure uniform coverage and to eliminate wrinkling, blistering and air holes.

**f. Removal of Paint**

If the painting is unsatisfactory to the Engineer the paint shall be removed and the metal thoroughly cleaned and repainted.

## ITEM 05 : PILING WORKS (PSCSP)

### SCOPE OF WORK

This section covers the minimum requirements for the fabrication, hauling, spotting, driving and finishing of the containment structure.

The Contractor may however, adopt, in addition to this minimum requirements additional provisions as may be necessary to insure the successful prosecution of the piling works.

### MATERIAL REQUIREMENTS

#### PRE-STRESSED CONCRETE SHEET PILES

Pre-stressed concrete sheet piles shall be constructed in accordance with the standard practice employed for the particular system specified and as directed by the Engineer subject to the following clauses.

1. Pre-stressed concrete sheet piles shall be of readymade products of approved fabricator regularly engaged in the production of pre-stressed concrete piles.
2. If an alternative system of pre-stressing to that shown in the Drawings is proposed by the Contractor, full details, procedures and explanations shall be submitted in writing to the Engineer for his approval. When approved for the work, the provisions of this Specification and such other provisions as he may require shall be fully satisfied.
3. Concrete strength, wires/strands, bars to be used for pre-stressed concrete work shall be as specified in the Drawings.
4. The Contractor shall submit the casting method including pre-stressing, application of stress and casting schedule and shall obtain the approval of the Engineer before commencement of fabrication of the piles.
5. The Contractor shall arrange for the Engineer to have free access to the place of manufacture of the piles.
6. Casting of pre-stressed concrete piles shall be in a manner that there shall be no leakage of concrete or grout into the space to be occupied by the steel. The ducts shall be of the correct cross-section, the ends being formed out as shown on the Drawings or as required by the pre-stressing system in use. Adequate means, subject to the Engineer's approval, shall be employed to ensure that their location is maintained exactly throughout the concreting operations. Passage shall be provided in the locations indicated on the Drawings for the injection and escape of grout and the release of air.

Piles shall be cast on a horizontal platform in approved steel moulds and details of the formwork and methods of concreting shall be as specified. The concreting of each pile shall be completed on one continuous operation and no interruption shall be permitted.

The pile butt must be formed truly square to the axis of the pile. Provision for standard splicing shall be provided unless otherwise ordered by the Engineer.

7. Anchorages shall be made from steel of a suitable quality to withstand permanently the forces imposed upon them, and shall in general be in accordance with the normal practice of the proprietors of the pre-stressing system in use.

8. Application of stress, grouting of pre-stressing cables, protection of pre-stressing cable anchorages and other necessary steps to complete the pre-stressing process shall conform to the standard practice of the pre-stressing system in use or as directed by the Engineer.
9. When the stress has been transferred to the pile, the pile shall exhibit no curvature in its length on any face greater than 3 millimeters deviation along a chord of 15 meters (1 in 500).
10. Pre-cast pre-stressed units shall be lifted only by lifting holes as indicated in the Drawings, or when not provided can be lifted by slings placed securely at corresponding points. Units shall be kept in the upright position at all times and shock shall be avoided. Any unit considered by the Engineer to have become sub-standard in any way shall be rejected and replaced by an acceptable unit.
11. Each pre-stressed member is to be uniquely and permanently marked to show its type, date of casting, length of pile and any control markings as ordered by the Engineer
12. Forms shall conform to the geometry of the pile with the provision of chamfer as shown on the Drawings.
13. Not less than five (5) cylindrical specimens shall be made for each casting batch of which at least two (2) shall be reserved for 28-day test, one (1) for 7-day, one (1) for 14-day, and one (1) test prior to lifting of pre-stressed concrete piles from the casting bed. Lifting of piles shall only be done if the result of the compressive strength has reached at least 60% of the specified compressive strength.
14. The Contractor shall splice the pile as shown on the drawings or other methods approved by the Engineer.

#### **TIE – RODS and FITTINGS**

All components of tie-rod assemblies to be supplied, assembled and installed by the Contractor shall be in Steel 45 (441 MPa) refer to PPA design manual and in accordance with the applicable requirements of the ASTM standards. The tie-rods shall have upset treaded ends and the minimum yield point shall be as shown on the drawings.

Bolts for assembly of structural steel and for connections or special sections shall conform to ASTM A325 and ASTM A 307 or as specified on the Drawings.

#### **EXECUTION**

Uncapped pile heads shall be protected against damage by the use of appropriate pile driving caps and/or cushions to centralize the driving impact.

The pile headers shall be of sufficient rigidity and fixity to hold the pile firmly in position and true alignment during driving operations.

A diesel pile hammer shall be used for driving the pre-stressed concrete piles.

The required weight of ram for the diesel pile hammer is 2.5 to 3.5 tons or at least 25% (1/4) of the weight of sheet pile.

The fall of hammer shall not exceed 6m. (19.18 ft.) and shall be of uniform frequency to avoid injury to the piles.

Piles driven shall be held firmly in position in axial alignment with the hammer by means of leads of adequate length. Approved cushions shall be provided to the pile butts.

Piling shall commence from the interior outward as the lateral displacement of soil may influence driving and heaving of already driven piles.

Every effort shall be made to drive continuously without interruption.

The Contractor shall repair all damages to piles during driving. A minimum cut - off allowance, not less than 600 mm shall be provided for all corrections at in-place splices and at all the pile heads for removal after completion of the driving.

The piles which have been uplifted after being driven shall be re-driven to the required penetration after completing other activities in the nearby areas. As heaving is anticipated, survey benchmarks should be established and elevations must be taken of the driven piles adjoining the piles being driven to avoid pile displacement affected by the swell rise of sub-soil structures.

#### LENGTH OF PILES

The length of piles indicated in the drawings are predetermined lengths considering the actual soil classification and/or behavior based on geotechnical consultancy report.

#### INTERRUPTED DRIVING

When driving is stopped before final penetration is reached and/or refusal is attained, the record of pile penetration shall be taken only after a minimum of 30 cm. (12 in.) total penetration has been obtained on resumption of driving.

#### ALIGNMENT TOLERANCE

Piles driven shall be within the allowable tolerance in alignment of 10 cm. (4 in.) in any direction.

#### DAMAGED AND MISDRIVEN PILES

1. Piles shall not be more than 10 cm. (4 in.) out of place at cut-off level. All vertical piles shall not be more than 2% out of plumb.
2. Any pile damaged by improper driving or driven out of its proper location, or driven out of elevation fixed on the plans, shall be corrected correspondingly at the Contractor's expense by any of the following methods:
  - a. Withdrawal of the pile and replacement by a new pile.
  - b. Driving a second pile adjacent to the defective one.
  - c. Splicing an additional length.

The method to be adopted in each case shall be at the discretion of the Engineer.

#### OBSTRUCTION

Where boulders or other obstructions make it impossible to drive certain piles in the location shown and to the required bearing strata, the Engineer may order additional pile or piles driven at other suitable location.

## **PILE DRIVING RECORDS**

The Contractor shall keep records of each pile driven and shall furnish the Engineer two (2) signed typewritten/computerized copies. The records shall show the number of blows per 0.50 m. of initial penetration taken from the free fall elevation of the pile down to penetration depth of 5.0 m., the penetration under the last 10 blows, and the calculated safe load according to the Hiley's Formula as stated in bearing power of piles.

## **TESTING OF MATERIALS**

The requirements regarding testing of concrete and reinforcement used in reinforced concrete piles and sheet piles shall be in accordance with "Reinforced Concrete".

However, the Engineer may conduct the necessary testing at the approved fabricator's casting yard whenever he considers necessary. Tests shall be carried out at the Contractor's expense.

## **STORAGE AND HANDLING OF PILES**

When raising or transporting piles, the Contractor shall provide slings or other equipment to avoid any appreciable bending of the pile or cracking of the concrete. Pile materials damaged in handling or driving shall be removed from the site and replaced by the Contractor at his expense.

Concrete piles shall be so handled at all times as to avoid breaking or chipping of the edges.

## **PILE CHIPPING**

Each pile shall be chipped-off to required elevation as indicated in the drawing. The contractor shall ensure that no damaged/cracked on the main pile will occurred after each chipping. Reinforcement from driven piles (dowels and strand) shall not be cut and will be incorporated to the construction of deck. Splicing of dowels are allowed in case of pile cutting due to early refusal.

**ITEM 06 : PILING WORKS (RC CORNER SHEET PILE)**

**SCOPE OF WORK**

This section covers the minimum requirements for the fabrication, hauling, spotting, driving and finishing of the pier extension and back-up area.

The Contractor may however, adopt, in addition to this minimum requirements additional provisions as may be necessary to insure the successful prosecution of the piling works.

**MATERIAL REQUIREMENTS**

**PRE-CAST REINFORCED CONCRETE (CORNER SHEET PILES)**

Pre-cast reinforced concrete (piles, sheet corner piles and sheet piles) shall be constructed in accordance with the standard practice employed for the particular system specified and as directed by the Engineer subject to the following clauses.

1. The Contractor shall submit the casting method including casting schedule and shall obtain the approval of the Engineer before commencement of fabrication of the piles.
2. Pre-cast reinforced concrete (corner sheet piles) shall be supplied in accordance with the details and sections shown in the drawings. The class of concrete and quality of reinforcing steel shall be in accordance with the provisions of the specification for "Reinforced Concrete" unless otherwise noted in the drawings.
3. Casting of RC (corner sheet piles) shall be done with the length lying horizontally. The pile yard must be reasonably level and the ground sufficiently compact or hard, stable and not subject to any settlement, scour or erosion.
4. Pre-cast units shall be lifted only by lifting bars as indicated in the drawings, or when not provided can be lifted by slings placed securely at corresponding points. Units shall be kept in the upright position at all times and shock shall be avoided. Any unit considered by the Engineer to have become sub-standard in any way shall be rejected and replaced by an acceptable unit.
5. Each pre-cast member is to be uniquely and permanently marked to show its type, date of casting and length of pile.
6. Forms shall conform to the geometry of the pile with the provision of chamfer as shown on the Drawings.

**PRE-CAST REINFORCED CONCRETE**

Precast concrete for R.C. corner sheet piles and its reinforcement shall conform to the requirement of "Reinforced Concrete".

1. Fabrication Yard and Equipment shall be products of approved manufacturers regularly engaged in pile production of the same size or larger for a period of three years or more. However, the Contractors may be allowed to manufacture R.C piles upon presentation to the Engineer of proof that they have past experienced in manufacturing RC piles from their previous contracts having the same or bigger requirements.

Before casting of piles is started, approval shall be obtained of casting method, the casting yard and storage site and equipment. The Contractor shall provide all equipment necessary

for the fabrication of piles. Special care shall be made for curing, handling and transport of piles.

## 2. Casting and Fabrication

Piles shall be cast separately. The formwork for the piles shall have an even and solid bed and be constructed so that the piles can be easily removed from the form. The formwork and its placing shall be approved before casting of concrete. The formwork shall not be removed from its bed until the concrete has attained a compressive strength of at least 70% of its required 28 day strength.

The pile shall not be removed from its casting bed until it has reached its full 28 day compressive strength. Piles shall be moist cured for a period of 28 days after casting.

The Contractor shall determine the points where the piles will be supported during handling, transportation and storage. Care shall be taken to prevent piles from any damage during transportation. If the piles are placed in stacks, the supporting points at each layer shall be vertically over one another and the location of the supporting points shall be approved by the Engineer.

## 3. Formwork

Forms shall conform to the applicable provisions in Section, "Reinforced Concrete" Chamfers shall be provided at each corner of piles as indicated on the Drawings.

## 4. Marking

After the concrete has hardened, the piles shall be marked in approved format in durable paint indicating:

- a. Serial Number, marked close to both ends
- b. Date of casting, marked as (a)
- c. Date of arrival, marked as (b)
- d. Length of pile, marked as (c)
- e. Position of lifting points as approved by the Engineer
- f. Meter marks in two faces, throughout the length

## TIE – RODS and FITTINGS

All components of tie-rod assemblies to be supplied, assembled and installed by the Contractor shall be in accordance with the applicable requirements of the ASTM standards. The tie-rods shall have upset treaded ends and the minimum yield point shall be as shown on the drawings.

Bolts for assembly of structural steel and for connections or special sections shall conform to ASTM A325 and ASTM A 307 or as specified on the Drawings.

## GENERAL REQUIREMENTS

### Pile Length

Pile lengths shown on the Drawings are for estimating purposes only and are based upon probable lengths remaining in place in the completed structure.

1. Test piles of length shown on the drawings shall be driven at such points as designated by the Engineer that they may be left in place, cut off, and become a part

of the permanent structure. From their performance under driving, the Engineer will determine the lengths of piles required.

This pile shall be longer than ordinary piles shown in the pile schedule to provide for contingencies due to variations in soil behavior. Pile penetration observed per blow of the hammer shall be recorded. If refusal is observed while the required penetration is not yet obtained, the Contractor shall continue driving the pile with the aid of water jets. Water jets shall be carried out in all respect with rigorous control and not to detriment the surrounding ground or any part of the Works.

If necessary, test pile/s shall be spliced and re-driven until the bearing power and penetration are acceptable to the Engineer.

2. Lengths of regular piles shall be computed by the Hiley's Formula or other formulas accepted by the Engineer.

The above shall not be construed to mean that driving may stop when such penetration as shown on the plans has been secured, but that driving shall continue in every case until the total penetration obtained is satisfactory to the Engineer, regardless of the fact that sufficient bearing capacity as determined by the formula may be obtained at a lesser depth.

## **EXECUTION**

Uncapped pile heads shall be protected against damage by the use of appropriate pile driving caps and/or cushions to centralize the driving impact.

The pile headers shall be of sufficient rigidity and fixity to hold the pile firmly in position and true alignment during driving operations.

A pile hammer shall be used for driving the pre-stressed concrete piles.

The required weight of ram for the diesel pile hammer is 2.5 tons.

The fall of hammer shall not exceed 6m. (19.18 ft.) and shall be of uniform frequency to avoid injury to the piles.

Piles driven shall be held firmly in position in axial alignment with the hammer by means of leads of adequate length. Approved cushions shall be provided to the pile butts.

Piling shall commence from the interior outward as the lateral displacement of soil may influence driving and heaving of already driven piles.

Every effort shall be made to drive continuously without interruption.

The Contractor shall repair all damages to piles during driving. A minimum cut - off allowance, not less than 600 mm shall be provided for all corrections at in-place splices and at all the pile heads for removal after completion of the driving.

The piles which have been uplifted after being driven shall be re-driven to the required penetration after completing other activities in the nearby areas. As heaving is anticipated, survey benchmarks should be established and elevations must be taken of the driven piles adjoining the piles being driven to avoid pile displacement affected by the swell rise of sub-soil structures.



## LENGTH OF PILES

The length of piles indicated in the drawings are predetermined lengths considering the actual soil classification and/or behavior based on geotechnical consultancy report. Pile driven to the required penetration but failed to develop the required bearing power shall be spliced and re-driven to attain at least the minimum required bearing power.

## INTERRUPTED DRIVING

When driving is stopped before final penetration is reached and/or refusal is attained, the record of pile penetration shall be taken only after a minimum of 30 cm. (12 in.) total penetration has been obtained on resumption of driving.

## ALIGNMENT TOLERANCE

Piles driven shall be within the allowable tolerance in alignment of 10 cm. (4 in.) in any direction.

## DAMAGED AND MISDRIVEN PILES

1. Piles shall not be more than 10 cm. (4 in.) out of place at cut-off level. All vertical piles shall not be more than 2% out of plumb.
2. Any pile damaged by improper driving or driven out of its proper location, or driven out of elevation fixed on the plans, shall be corrected correspondingly at the Contractor's expense by any of the following methods:
  - a. Withdrawal of the pile and replacement by a new pile.
  - b. Driving a second pile adjacent to the defective one.
  - c. Splicing an additional length.

The method to be adopted in each case shall be at the discretion of the Engineer.

## OBSTRUCTION

Where boulders or other obstructions make it impossible to drive certain piles in the location shown and to the required bearing strata, the Engineer may order additional pile or piles driven at other suitable location.

## PILE DRIVING RECORDS

The Contractor shall keep records of each pile driven and shall furnish the Engineer two (2) signed typewritten/computerized copies. The records shall show the number of blows per 0.50 m. of initial penetration taken from the free fall elevation of the pile down to penetration depth of 5.0 m., the penetration under the last 10 blows, and the calculated safe load according to the Hiley's Formula as stated in bearing power of piles.

## TESTING OF MATERIALS

The requirements regarding testing of concrete and reinforcement used in reinforced concrete piles and sheet piles shall be in accordance with "Reinforced Concrete".

However, the Engineer may conduct the necessary testing at the approved fabricator's casting yard whenever he considers necessary. Tests shall be carried out at the Contractor's expense.

## STORAGE AND HANDLING OF PILES

When raising or transporting piles, the Contractor shall provide slings or other equipment to avoid any appreciable bending of the pile or cracking of the concrete. Pile materials damaged in handling or driving shall be removed from the site and replaced by the Contractor at his expense.

Concrete piles shall be so handled at all times as to avoid breaking or chipping of the edges.

## PILE CHIPPING

Each pile shall be chipped-off to required elevation as indicated in the drawing. The contractor shall ensure that no damaged/cracked on the main pile will occurred after each chipping. Reinforcement from driven piles (dowels and strand) shall not be cut and will be incorporated to the construction of deck. Splicing of dowels are allowed in case of pile cutting due to early refusal.

## **ITEM 07 : ROCKWORKS**

### **SCOPE OF WORK**

The work includes the furnishing of all labor, materials and equipment required for the rock works including armour rocks, underlayer and rock fill in accordance with the Specifications and as indicated in the drawings or as directed by the Engineer.

### **SETTING OUT OF WORKS**

#### **1. Topographic/Hydrographic Survey**

Prior to commencement of Works, the Contractor together with the Engineer shall conduct topographic and hydrographic surveys in order to establish the actual field condition or bathymetry of the project site. The said survey shall be used as the basis of quantity measurement.

2. The Contractor shall set out the Works and shall solely be responsible for the accuracy of such undertaking. Visible construction markers shall be used to clearly define horizontal limits prior to placing of any material.

### **MATERIAL REQUIREMENTS**

1. All rocks to be used shall be angular, hard, durable and not likely to disintegrate in seawater. Rock layers to be installed should more or less be "global in shape", "angular in surface" and should avoid "river run rocks". Rocks that are sub-angular may be subject to the approval of the Engineer. Rounded or well rounded pieces will not be accepted.
2. All rocks shall have a minimum unit weight of 2,650 kg per cubic meter (specific gravity 2.65) of solid materials when measured dry.
3. Rocks with specific gravity higher than the above specified is preferable and will readily be accepted. But no adjustment (increase) in the contract price will be made on this account.
4. Rocks of the primary cover layer shall be sound, durable and hard. It shall be free from laminations, weak cleavages, and undesirable weathering, and shall be of such character that it will not disintegrate from the action of the air, seawater, or in handling and placing. All stone shall be angular quarry stone.
5. All rocks shall conform to the following test designations:

Apparent specific gravity	ASTM C 127
Abrasion	ASTM C 535

### **EXECUTION**

#### **QUARRY SITE AND ROCK QUANTITY**

1. It is the Contractor's responsibility to make necessary surveys / investigations on quarry sites applicable to the Works, taking into consideration the nature of the rock works required under the Contract such as required quality, total quantity and daily required quantity, transportation method and route etc.,
2. The Contractor shall submit data on characteristics of proposed quarry sites together with the location of sites, test results of their products and samples for the approval of the Engineer.

3. When the Contractor intends to operate a quarry for the Works, the Contractor shall take all the responsibilities in connection with its operation including, but not limited to, obtaining all necessary permits and approvals, payment of safety measures or like (if any), provisions and maintenance of safety measures and temporary access roads, all of private and public roads and temporary jetties to be used to transport quarried materials and the compliance with all regulations etc. required by the authorities having jurisdiction over any part of the operation.

Should any explosive be used in the quarry operations, the Contractor shall be responsible to meet laws and regulations, wherever applicable, established by the Local Government and Central Government Department concerned.

4. Despite the Engineer's previous approval of the natural rock and borrow pits, the Engineer reserves the right to suspend any operation in connection with the rock, if, in its opinion, such rock is not suitable for the work. In such case, the Contractor shall comply with the Engineer's instructions.
5. The finish bulkhead shall be true to grade and section. The spaces/voids between rocks shall be filled/sealed with 2 kg. to 16 kg. rocks and shall be approved by the Engineer before placing geotextile filter thereon to prevent the filling materials (soil and sand) from escaping to cause scouring and settlement of finished surface.

#### STORAGE OF MATERIALS

Quarried rock materials shall be stored by weight/class or in a manner approved by the Engineer and in a yard kept clean, free from undesirable materials.

#### SAMPLING TEST

1. Thirty (30) days prior to commencement of rock works, samples and test results of rock material which conforms to the Specifications called for in the Contract shall be submitted to the Engineer for evaluation and approval.
2. Rock samples from different sources and of different classes shall also be submitted, together with test results and its corresponding certificates, for the Engineer's approval.
3. Rocks accepted at the quarries before shipments or at the site before placement shall not be used as a waiver. The Engineer has the right to reject any inferior rock quality.
4. Samples for each class of approved materials are to be kept in the field for comparison/checking of delivered rock materials. A test shall be required for every 1,500 cu.m.

#### CROSS-SECTIONS OF COMPLETED ROCKWORK

Cross-sections showing the elevations of the completed rock works and the terrain of the existing seabed prior to construction shall go together with every progress report and request for progress or final payment.

Rock works which was previously paid should be easily identified from sections being requested for payment.

**ITEM 08 : GEOTEXTILE FABRIC****SCOPE OF WORK**

This work covers all the following requirements regarding the installation of geotextile (filter fabric) in accordance with the lines, grades, and dimensions shown in the drawings.

**MATERIAL REQUIREMENTS**

The geotextile fabric shall meet the following requirements in full. If required, a sample of 1.0 sq.m. shall be supplied to the Engineer for approval and retention for purposes of comparative testing against materials randomly sampled from the site.

**1. PHYSICAL PROPERTIES**

- a. The geotextile material shall be a nonwoven needle punched type comprising of needle punched polypropylene fibers or its equivalent.
- b. The geotextile material shall be UV stabilized to ensure retention of minimum 70% original tensile strength after 90 days exposure to sunlight. The manufacturer shall submit test results to the Engineer for approval.
- c. The geotextile must be highly resistant to long term contact with damp cementitious substances or acid or alkali solutions in the pH range 2-13. The manufacturer shall submit test data to ensure resistance of the polymer.

**2. MECHANICAL AND HYDRAULIC PROPERTIES**

The geotextile supplier is required to certify that the materials delivered to site will be proven to meet or exceed the following properties:

TECHNICAL PROPERTIES	UNIT	MINIMUM	TEST STANDARD
<b>A. Physical Characteristics:</b>			
Minimum Mass (per unit area)	(g/m <sup>2</sup> )	540	ASTM D5261
Thickness (F=2 kpa)	mm	4.5	ASTM D5199
<b>B. Mechanical Properties:</b>			
Tensile Strength (md/cd)	kN/m	13/22	ASTM D4595
Tensile elongation (md/cd)	%	90/40	ASTM D4595
CBR Puncture Resistance	N	3000	ASTM D6241
<b>C. Hydraulic Properties:</b>			
Effective Opening Size (O <sub>90</sub> Wet Sieving)	(mm)	0.08	ASTM D4751
Water Permeability: Permittivity	(s <sup>-1</sup> )	0.5	ASTM D4491

**Note:****Tolerances:**

Mechanical Properties	-1.0% of the Minimum Value
Hydraulic Properties	-1.0% of the Minimum Value

**EXECUTION**

1. The geotextile shall be delivered to site with an outer wrapper to protect it from exposure to the elements.
2. Prior to laying of geotextile filter, stone filler shall be placed between gaps or voids of armour / core rocks as likewise mentioned in the requirements of Item "Rock Works".
3. The non-wooven geotextile filter shall be installed and lay manually at site as per design drawings. The filter shall be laid lengthwise down slopes and appropriately anchored along the top edge.
4. The Engineer reserves the right to sample geotextile delivered to site for individual quality control testing at the contractor's expense. A material not meeting the manufacturer's certified values will be rejected from the site.
5. The geotextile shall be proven to resist dynamic puncture damage when subject to impact stress from stone armour (200-400 kg.) dropped from a minimum height of 2.0 m. and should be laid on at least 1-foot sand and gravel bedding. Geotextile failing to resist puncture shall not be accepted.
6. To facilitate site Quality Assurance, each roll of geotextile delivered to site shall be clearly labeled with brand name, grade, and production batch number.
7. Geotextile overlaps shall be at least 1.0 m unless otherwise stated on the drawings. Alternatively, geotextile overlaps are to be heat-welded or sewn using appropriate polypropylene or other synthetic thread and portable hand sewing equipment.

**ITEM 09 : RECLAMATION AND FILL**

**SCOPE OF WORK**

This item shall consist of the construction of back-up area in accordance with the Specifications and in conformity with the lines, grades, and dimensions shown on the Plans or established by the Engineer.

The area to be upgraded shall be as indicated on the Drawings.

The works includes furnishing of all labor, materials and equipment required to complete/finish the upgrading of the area in accordance with the Drawings and the Specifications.

The following major items of works are included:

1. Supply and fill of suitable materials to places required to upgrade elevation of areas as shown in the drawings.
  - a. Compaction of fill materials
  - b. Supply and placing of filter fabric
2. The work may also include the construction of temporary dike or structure to enclose the reclamation material before the completion of a permanent waterfront containment structure.

**MATERIAL REQUIREMENTS**

1. Filling Materials

a. General

All sources of filling materials shall be approved by the Engineer.

Appropriate quantities of sample of all materials to be used in the Works shall be submitted for acceptance and approval by the Engineer thirty (30) days before the commencement of work.

General filling shall consist of approved material from approved sources of suitable grading obtained from excavation, quarries or borrow pits, without excess fines, clay or silt, free from vegetation and organic matter.

Sample of approved materials shall be kept/stored in the field for ready reference/comparison of the delivered materials.

The Contractor shall ensure that adequate quantities of required materials that comply with the specifications and quality approved by the engineer are available at all times.

b. Fill Materials other than Dredged/Excavated Materials

Fill materials for reclamation purposes other than dredged materials shall be pit sand, quarry run, gravel or mine tailings. The fill material shall be of the same quality or better as approved by the Engineer.

**c. Type of Filling Materials**

**c.1 Selected Fill Materials**

All materials used for fill shall be free of rock boulders, wood, scrap materials, organic matters and refuse.

The material shall not have high organic content and shall meet the following requirements:

- i. Not more than 10 percent by weight shall pass the No. 200 sieve (75 microns).
- ii. Maximum particles size shall not exceed 75 mm.
- iii. The fill materials shall be capable of being compacted in the manner and to the density of not less than 95%.
- iv. The material shall have a plasticity index of not more than 6 as determined by AASHTO T 90.
- v. The material shall have a soaked CBR value of not less than 25% as determined by AASHTO T 193.

**c.2 Sand and Gravel Fill**

The materials shall be composed of at least 50% sand and 50% gravel in terms of volume and shall be free from rock boulders, wood, scrap, vegetables, and refuse. The materials shall not have organic content and the maximum particle size shall not exceed 100mm diameter. Source of materials shall be river or mountain quarry or manufactured.

**c.3 Excavated Materials**

The excavated materials shall be used for backfilling as directed by the Engineer.

**EXECUTION**

**Reclamation and Fill**

**a. General**

The Contractor shall be responsible for all ancillary earthworks that are necessary for the reception of the fill material and including, all spout handling, temporary dike or shoring construction where necessary, temporary protection to dikes in the sea and drainage of excess water.

The arrangements of these ancillary earthworks shall be laid out in consultation with the Engineer and to the Engineer's satisfaction and care shall be taken to minimize the loss of fill.

- b.** Replacement, backfilling and reclamation may be done by any method acceptable to the Engineer. Prior to start of Work, the Contractor shall submit his method and sequence of performing the works to the Engineer for approval. However, the Engineer's approval of the method and sequence of construction shall not release the Contractor from the responsibility for the adequacy of labor and equipment.



- c. The Engineer shall approve the type of material to be used as fill prior to its placement. If the material is rejected, such material shall be deposited into areas designated or as directed by the Engineer.
- d. Reclamation of fill material shall be placed in horizontal layers not exceeding 200mm (8 inches), loose measurement, and shall be compacted as specified before the next layer is placed. Effective spreading equipment shall be used on each lift to obtain uniform thickness prior to compacting. As the compaction of each layer progresses, continuous leveling and manipulating will be required to assure uniform density. Water shall be added or removed, if necessary, in order to obtain the required density. Removal of water shall be accomplished through aeration by plowing, blading, dicing, or other methods satisfactory to the Engineer.

Dumping and rolling areas shall be kept separate, and no lift shall be covered by another until the necessary compaction is obtained.

Hauling and leveling equipment shall be so routed and distributed over each layer of the fill in such a manner as to make use of compaction effort afforded thereby and to minimize rutting and uneven compaction.

### **TRIAL SECTION**

Before finish grade construction is started, the Contractor shall spread and compact trial sections as directed by the Engineer. The purpose of the trial sections is to check the suitability of the materials and the efficiency of the equipment and construction method which is proposed to be used by the Contractor. Therefore, the Contractor must use the same material, equipment and procedures that he proposes to use for the main work. One trial section of about 500 m<sup>2</sup> shall be made for every type of material and/or construction equipment/procedure proposed for use.

After final compaction of each trial section, the Contractor shall carry out such field density tests and other tests required as directed by the Engineer.

If a trial section shows that the proposed materials, equipment or procedures in the Engineer's opinion are not suitable for sub-base, the material shall be removed at the Contractor's expense, and a new trial section shall be constructed.

If the basic conditions regarding the type of material or procedure change during the execution of the work, new trial sections shall be constructed.

### **CROSS-SECTIONS OF COMPLETED RECLAMATION**

Cross-sections showing the elevations of the completed reclamation and the terrain of the existing seabed prior to construction shall go together with every progress report and request for progress or final payment.

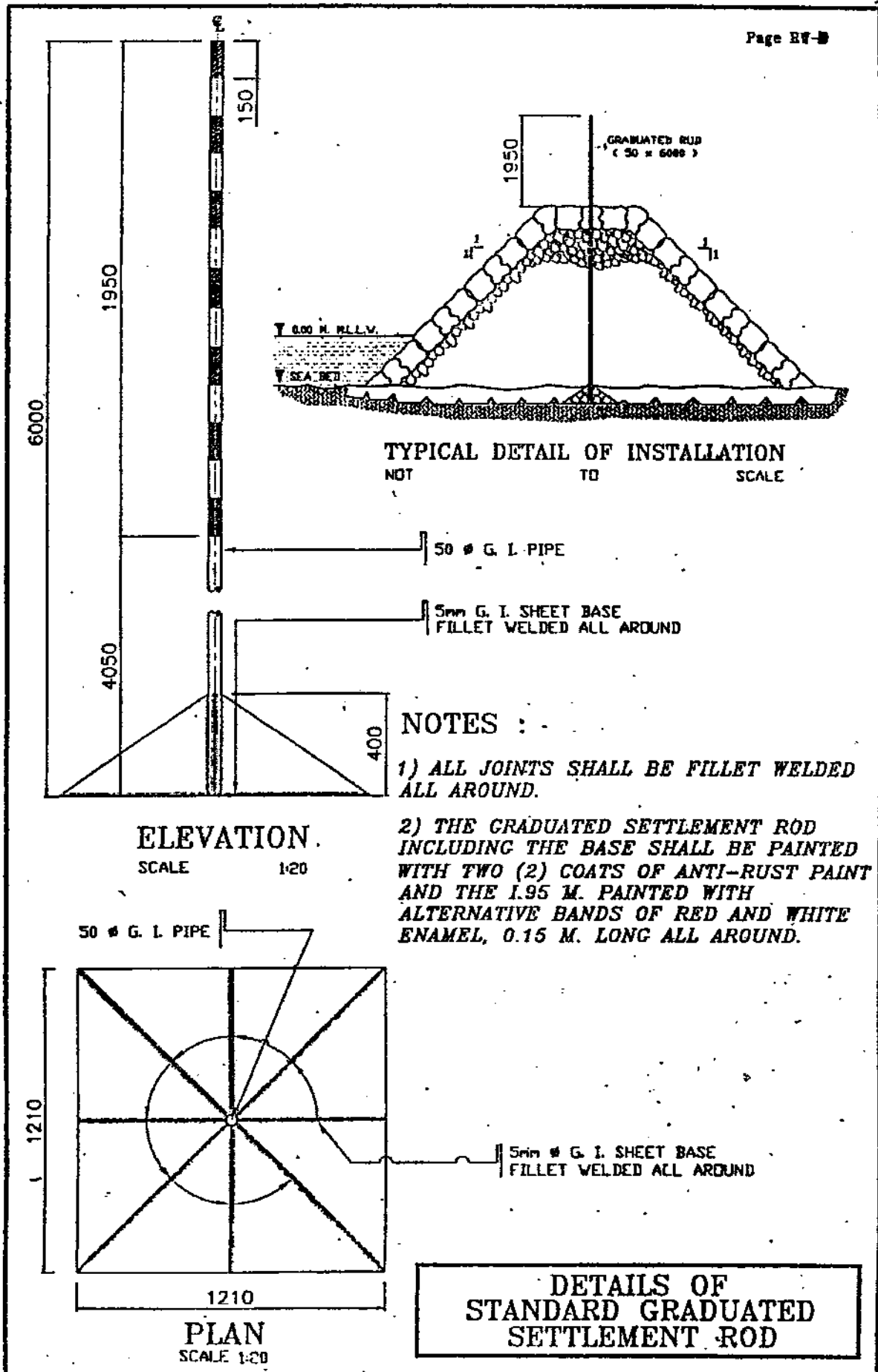
### **FIELD COMPACTION TEST**

Field Density tests to determine the percent of compaction of the material (selected fill, aggregate base course, etc) shall be conducted. Compaction of each layer thereafter shall continue until a field density of 95 percent of the maximum dry density in accordance with AASHTO T/180 Method D has been achieved. In place density determination shall be made in accordance with AASHTO T191/ASTM D 1556.

### **TOLERANCE**

Elevation : plus 5 cm.

Page RF-B



## ITEM 10 : AGGREGATE BASE COURSE

### SCOPE OF WORK

This Item shall consist of furnishing, placing and compacting an aggregate base course on a prepared subgrade/subbase in accordance with this Specification and lines, grades, thickness and typical cross-sections shown on the Plans or as established by the Engineer.

### MATERIAL REQUIREMENTS

Aggregate base course shall consist of hard, durable particles or fragments of crushed stone, crushed slag or crushed or natural gravel and filler of natural or crushed sand or other finely divided mineral matter. The composite material shall be free from vegetable matters and lumps or balls of clay, and shall be of such nature that it can be compacted readily to form a firm, stable base.

In some areas where the conventional base course materials are scarce or non-available, the use of 40% weathered limestone blended with 60% crushed stones or gravel shall be allowed, provided that the blended materials meet the requirements of this Item.

The base material shall conform to the grading requirements of Table 3.1, whichever is called for in the Bill of Quantities.

**Table 3.1 Grading Requirements**

Sieve Designation		Mass Percent Passing	
Standard mm	Alternate US Standard	Grading A	Grading B
50	2"	100	
37.5	1 - 1/2"	-	100
25.0	1"	60 - 85	-
19.0	3/4"	-	60 - 85
12.5	1/2"	35 - 65	-
4.75	No. 4	20 - 50	30 - 55
0.425	No. 40	5 - 20	8 - 25
0.075	No. 200	0 - 12	2 - 14

The portion of the material passing the 0.075mm (No. 200) sieve shall not be greater than 0.66 (two-thirds) of the fraction passing the 0.425mm (No. 40) sieve.

The portion of the material passing the 0.425mm (No. 40) sieve shall have a liquid limit of not greater than 25 and a plasticity index of not more than 6 as determined by AASHTO T89 and T90, respectively.

The coarse aggregate retained on a 2.00mm (No. 10) sieve shall have a mass percent of wear not exceeding 50 by the Los Angeles Abrasion Test as determined by AASHTO T 96.

The material passing the 19mm (3/4 inch) sieve shall have a minimum soaked CBR-value of 80% tested according to AASHTO T 193. The CBR-value shall be obtained at the maximum dry density determined according to AASHTO T 180, Method D.

If filler, in addition to that naturally present, is necessary for meeting the grading requirements or for satisfactory bonding, it shall be uniformly blended with the crushed base course material on the road or in a pugmill unless otherwise specified or approved. Filler shall be obtained from sources approved by the Engineer, free from hard lumps and shall not contain more than 15 percent of material retained on the 4.75mm (NO. 4) sieve.

## **EXECUTION**

### **PLACING**

The aggregate base material shall be placed at a uniform mixture on a prepared sub-base (selected fill) in a quantity which will provide the required compacted thickness. When more than one layer is required, each layer shall be shaped and compacted before the succeeding layer is placed.

The placing of material shall begin at the point designated by the Engineer. Placing shall be from vehicles especially equipped to distribute the material in a continuous uniform layer or windrow.

The layer or windrow shall be of such size that when spread and compacted the finished layer be in reasonably close conformity to the nominal thickness shown on the Plans.

When hauling is done over previously placed material, hauling equipment shall be dispersed

Compaction of each layer shall continue until a field density of at least 100 percent of the maximum dry density determined in accordance with AASHTO T 180, Method D has been achieved. In-place density determination shall be made in accordance with AASHTO T 191/ASTM D 1556.

## TRIAL SECTION

Before finish grade construction is started, the Contractor shall spread and compact trial sections as directed by the Engineer. The purpose of the trial sections is to check the suitability of the materials and the efficiency of the equipment and construction method which is proposed to be used by the Contractor. Therefore, the Contractor must use the same material, equipment and procedures that he proposes to use for the main work. One trial section of about 500 m<sup>2</sup> shall be made for every type of material and/or construction equipment/procedure proposed for use.

After final compaction of each trial section, the Contractor shall carry out such field density tests and other tests required as directed by the Engineer.

If a trial section shows that the proposed materials, equipment or procedures in the Engineer's opinion are not suitable for subbase, the material shall be removed at the Contractor's expense, and a new trial section shall be constructed.

If the basic conditions regarding the type of material or procedure change during the execution of the work, new trial sections shall be constructed.

## SURVEYS AND SETTING OUT WORKS

Before the commencement of the pavement works, the Contractor together with the Engineer shall conduct topographic survey which will form the basis of quantity measurement.

The Contractor shall set out the works and shall be solely responsible for the accuracy of such setting-out.

Prior to placement of any material, the Contractor shall establish visible construction markers to clearly define horizontal limits of the Work.

## TOLERANCES

The aggregate base course shall be laid to the designed level and transverse slopes shown on the Plans. The allowable tolerances shall be in accordance with following:

Permitted variation from design THICKNESS OF LAYER	± 10 mm
Permitted variation from design LEVEL OF SURFACE	+ 5 mm -10 mm
Permitted SURFACE IRREGULARITY Measured by 3-m straight-edge	5 mm
Permitted variation from design CROSSFALL OR CAMBER	± 0.2%
Permitted variation from design LONGITUDINAL GRADE over 25 m in length	± 0.1%

## ITEM 11 : PORTLAND CEMENT CONCRETE PAVEMENT

### SCOPE OF WORK

The works include the furnishing of all labor, materials and equipment required for the construction of gravel base course and concrete pavement. The works shall be in accordance with the lines and grades shown on the Drawings and in conformity with the Specifications.

### MATERIAL REQUIREMENTS

#### Cement

Portland cement shall conform to the requirements of the Section "Reinforced Concrete".

#### Fine Aggregate

The fine aggregate shall be well-graded from coarse to fine and shall conform to the requirements of the Section "Reinforced Concrete".

#### Coarse Aggregate

Coarse aggregate shall conform to the requirements of the Section "Reinforced Concrete".

#### Water

Clean, fresh, potable water shall be used for the mixing of all concrete and mortar and shall be from a source approved by the Engineer. Sea water or brackish water shall not be used.

#### Admixture

Admixture shall only be used with the written permission of the Engineer. If air-entraining agents, water reducing agents, set retarders or strength accelerators are permitted to be used, they shall not be used in greater dosages than those recommended by the manufacturer, or as permitted by the Engineer. The cost shall be considered as already in the Contractor's unit cost bid for concrete.

### TIE BARS AND SLIP BARS

Tie bars shall be deformed bars conforming to the requirements specified in AASHTO M 31 or M 42, except that rail steel shall not be used for tie bars that are to be bent and re-straightened during construction, sizes as indicated on the Drawings. The deformed bars shall be Grade 40 and shall be shipped in standard bundles, tagged and marked in accordance with the Code of Standard practice of the Concrete Reinforcement Steel Institute.

Slip bars shall be smooth round steel bars conforming to the requirements specified in AASHTO M 31 or plain M 42.

#### Joint Filler

Poured filler for joint shall conform to the requirements of AASHTO M173.

## EXECUTION

### Concrete Class

The concrete for pavement shall satisfy the following requirements:

Minimum 28-day comprehensive strength	:	24 MPa
Minimum Flexural Strength	:	3.8 MPa
Maximum Aggregate size	:	25 mm
Maximum water cement ratio	:	0.52

### Proportioning, Consistency and Mixing of Concrete

The proportioning, consistency and mixing of concrete shall conform to the requirements of the Section "Reinforced Concrete".

### Preparation

The base shall be watered and thoroughly moistened prior to placing of the concrete.

### Formwork Construction

Formwork shall comply with the requirements of the Section "Reinforced Concrete". Forms shall be of steel, of an approved section and shall be straight and of a depth equal to thickness of the pavement at the edge. The base of the forms shall be of sufficient width to provide necessary stability in all directions. The flange braces must extend outward on the base not less than  $\frac{2}{3}$  the height of the form.

All forms shall be rigidly supported on a bed of thoroughly compacted material during the entire operation of placing and finishing the concrete. They shall be set with their faces vertical so as to produce a surface complying with the required tolerance.

Adjacent lanes may be used in lieu of forms for supporting finishing equipment provided that proper protection is afforded to the concrete of the adjacent lanes to prevent damage, and provided further that the surface of the concrete carrying the finishing equipment does not vary by more than 3mm in each meter length. Adjacent lanes in lieu of forms may not be used until the concrete is at least seven (7) days old. Flanged wheels of the finishing equipment shall not be operated on the concrete surface. The inside edge of supporting wheels of the finishing machine shall not operate closer than 100mm from the edge of the concrete lane.

Alternative to placing forms, slip-forming may be used. Slip-form paving equipment shall be equipped with the traveling side forms of sufficient dimensions, shape and strength to support the concrete laterally for a sufficient length of time during placement to produce pavement of the required cross section. No abrupt changes in longitudinal alignment of the pavement will be permitted. The horizontal deviation shall not exceed 20mm from the proper alignment established by the Engineer.

## Joins

All joins, longitudinal, transverse, etc., shall be constructed as shown on the Drawings and shall be clean and free of all foreign material after completion of shoulder work prior to acceptance of the work and in accordance with the following provisions:

### Longitudinal and Transverse Contact Joins:

Longitudinal contact joins are joins formed between lanes that are poured separately. Transverse contact joins are joins formed between segments of a lane that are poured separately. Transverse contact joins shall be formed perpendicular to pavement centerline at the end of each day of concrete placing, or where concreting has been stopped for 30 minutes or longer but not nearer than 1.5 meters from sawed contraction joins. All contact joins shall have faces perpendicular to the surface of the pavement. Tie bars of the size, length and spacing shown on the Drawings shall be placed across longitudinal and transverse contact joins.

## Placing Concrete

The concrete shall be deposited and spread in order that segregation will not occur and place a uniform layer of concrete whose thickness is approximately 20 mm greater than that required for the finished pavement is placed. Rakes shall not be used for handling concrete.

In order to prevent the introduction into the concrete of earth and other foreign materials, the men whose duties require them to work in the concrete, shall in general, confine their movements to the area already covered with fresh concrete. Whenever it becomes necessary for these men to step out of the concrete, their footwear shall be washed or otherwise thoroughly cleaned before returning to the concrete. Repeated carelessness with regard to this detail will be deemed sufficient cause for removing and replacing such worker.

During the operation of striking off the concrete, a uniform ridge of concrete at least 70 mm in height shall be maintained ahead of the strike-off screed for its entire length. Except when making a construction joint, the finishing machine shall at no time be operated beyond that point where this surplus can be maintained in front of the strike-off screed.

After the first operation of the finishing machine, additional concrete shall be added to all low places and honeycombed spots and the concrete rescreeded. In any rescreeding, a uniform head of concrete shall be maintained ahead of the strike-off for its entire length. Honeycombed spots shall not be eliminated by tamping or grouting.

Workers on the job shall have mobile footbridges at their disposal so that they need not walk on the wet concrete.

In conjunction with the placing and spreading, the concrete shall be thoroughly spaded and vibrated along the forms, bulkhead, and joins.

The internal vibrators shall be of pneumatic, gas-driven, or electric type, and shall operate at a frequency of not less than 3,200 pulsations per minute.

Whenever the placing of the concrete is stopped or suspended for any reason, for a period of 30 minutes or longer, a suitable bulkhead shall be placed so as to produce a vertical transverse joint. If an emergency stop occurs within 2.5 meters of the contraction or an expansion joint the concrete shall be removed back to the joint. When the placing of the concrete is resumed, the bulkhead shall be removed and a new concrete placed and vibrated evenly and solidly against the face of previously deposited concrete. Any concrete



in excess of the amount needed to complete a given section or that has been deposited outside the forms shall not be used in the work.

The Contractor shall provide suitable equipment for protecting the fresh concrete in case of rain, such as screens which will cause the rain water to run off beyond the edges of the paving, rain proof tarpaulins or other methods approved by the Engineer. The equipment shall be sufficient to shelter from rain all areas equal to that paved in two hours of work.

### Finishing Concrete

The concrete shall be compacted and finished by a mechanical, self-propelled finishing machine of approved type, having two independently operated screeds. If a machine possessing only one screed is approved, the screed will not be less than 450 mm wide and shall be equipped with compensating springs to minimize the effect of the momentum of the screed on the side forms. The number of driving wheels, the weight of the machine and the power of the motor shall be so coordinated as to prevent slippage. The top of the forms and the surface of the finishing machine wheels shall be kept free from concrete or dirt.

The machine shall at all times be in first-class mechanical condition and shall be capable of compacting and finishing the concrete as herein described. Any machine which causes displacement of the side forms from the line or grade to which they have been properly set, or causes undue delay due to mechanical difficulties, shall be removed from the work and replaced by a machine meeting the Specifications.

The finishing machine shall be operated over each section of pavement two or more times and at such intervals as will produce the desired results. Generally, two passes of the finishing machine are considered the maximum desirable.

The concrete shall be vibrated, compacted, and finished by a vibratory finishing machine. The vibratory machine shall meet the requirements for ordinary finishing, and shall be one of the following type:

1. The machine shall have two independently operated screeds; the front screed shall be equipped with vibratory units with a frequency of not less than 3,500 pulsations per minute. There shall be not less than one vibratory unit for each 2.5 meters length or portion thereof, of vibratory screed surface. The front screed shall not be less than 300mm wide and shall be equipped with a "bull nose" front edge built on a radius of not less than 50mm. This type of vibratory finishing machine shall be operated in such manner that each section of pavement will receive at least one vibratory pass, but not more than two passes, unless otherwise directed, or ;
2. The machine shall be equipped with an independently operated vibratory "pan" (or pans) and two (2) independently operated screeds, the "pan" shall be mounted in a manner that will permit it to come in contact with the forms and will permit vibration of the full width of lane simultaneously.

There shall be not less than one vibratory unit for each 2 m. length or portion thereof, of vibrating pan surface. The vibratory units in any individual pan shall be synchronized and have a frequency of not less than 3,500 pulsations per minute. The front screed shall be capable of operating in a position that will strike off the concrete at a sufficient height above the top of the forms to allow for proper compaction with the vibrating pan. This type of vibratory finishing machine shall be operated in such manner that each section of pavement will receive at least one vibratory pass but not more than two passes, unless otherwise directed.

After the final pass of the finishing machine and when the concrete has started to dry, the surface of the pavement shall be finished with an approved longitudinal float. The float may be operated either manually or by mechanical means. The float may be either of wood or metal shall be straight and smooth and light in weight so as not to displace or sink into the concrete surface.

To be effective, the float shall be at least 300mm wide and 3m long. When manually operated, the float shall be moved from edge to edge with a wiping motion and advance one (1) meter or more.

The succeeding trip shall overlap the previous trip. A light smoothing lute at least 3 meters long may be used provided approved by the Engineer.

The surface of the pavement shall be tested by the Contractor, before the final belting, with an approved standard straightedge 3 meter in length. Irregularities so detected shall be corrected immediately. Special attention shall be given to the concrete adjacent to transverse joints to insure that the edges thereof are not above the grade specified or the adjacent concrete below grade. All depressions or projections shall be corrected before any initial set has developed in the concrete.

After the concrete has been brought to the required grade, contour and smoothness, it shall be finished by passing over the concrete a drag of one or two burlap clothes, which give the surface the required roughness. The vehicles used to carry these cloths may be independent of the concrete-laying machine or may be incorporated with it and may be operated either by hand or mechanically.

Hand finishing will be permitted only on variable width sections of the pavement and other places where the use of the finishing machine would be impractical. Hand finishing shall be accomplished by means of the hand-operated strike-off template of either steel or steel-shod wood construction. The striking template shall be operated forward with a combined longitudinal and transverse motion and shall be so manipulated that neither end will be raised off the side forms. A similar tamper shall be used for tamping the concrete.

As soon as the concrete has attained its initial set, the edges of the pavement, the longitudinal joints, the construction dummy and expansion joints not sawn shall be carefully finished with an edging tool having radius of at least 5mm. The tools, the special accessories for cutting impressed joints and methods of workmanship shall be such as will produce a joint whose edges are of the same quality of concrete as the other portion of the pavement. Methods and workmanship which make use of excess mortar or grout in this area shall be eliminated. Unnecessary tool marks shall be eliminated during work, and the edges left smooth and true to line.

### Striking Forms

Forms shall remain in place at least 12 hours after the concrete has been placed. When working conditions are such that the early strength gain of the concrete is delayed, the forms shall remain in place for a longer period, as directed by the Engineer. Bars or heavy load shall not be used against the concrete when still in the forms. Any damage to concrete resulting from form removal shall be repaired promptly by the Contractor as directed by the Engineer without any additional payment to the Contractor.

### Curing Concrete

Unless otherwise ordered by the Engineer, curing of concrete shall be done by any method specified in the Section "Reinforced Concrete".

### Cleaning and Sealing Joints

After completion of the required curing and before opening of the pavement to traffic, all joints shall be thoroughly cleaned of all concrete aggregate fragments or other materials.

After removal of side forms, the ends at transverse expansion joints at the edges of the pavement shall be carefully cleaned of any concrete within the expansion spaces for the entire depth of slab, care being taken not to injure the ends of the joints. Expansion and contraction joints shall then be poured with a hot joint sealer to the depth as indicated on the Drawings. Joint sealer shall be poured using approved hand pouring pots, with liquid at a temperature not less than that recommended by the approved manufacturer.

### Opening to Traffic

The pavement shall be closed to traffic, including the vehicles of the Contractor, for a period of 10 days after the concrete is placed or longer if in the opinion of the Engineer, the weather conditions make it necessary to extend this time. The Contractor shall furnish, place and maintain satisfactory barricades and lights as directed, to exclude all traffic from the pavement.

Any damage to the pavement due to traffic shall be repaired or replaced at the expense of the Contractor. Paving mixers, mechanical concrete spreaders and finishers and other heavy paving equipment shall not be operated on completed concrete lanes in order to construct alternate lanes until after the regular curing period is completed. Even then, planks shall be laid on the finished pavement or other precautions taken to prevent damage to the concrete pavement.

### Pavement Smoothness, Thickness and Tolerance

Portland cement concrete pavement shall be constructed to the designed level and transverse slope shown on the Drawing. The allowable tolerance shall be as listed hereunder:

- |    |  |         |
|----|--|---------|
| 1. | Permitted variation from design thickness of layer | + - 5mm |
| 2. | Permitted variation from design level of surface   | + - 5mm |

The thickness of the pavement will be determined by measurement of cores from the completed pavement in accordance with AASHTO T 148.

The completed pavement shall be accepted on a lot basis. A lot shall be considered as 2,500 sq.m of pavement. The last unit in each slab constitutes a lot in itself when its length is at least  $\frac{1}{2}$  of the normal lot length. If the length of the last unit is shorter than  $\frac{1}{2}$  of the normal lot length, it shall be included in the previous lot.

Other areas such as intersections, entrances, crossovers, ramp, etc., will be grouped together to form a lot. Small irregular areas may be included with other unit areas to form a lot.

## **ITEM 12 : MOORING AND FENDERING SYSTEM**

### **SCOPE OF WORK**

1. The work includes furnishing of all labor, materials and equipment to complete the installation of mooring bollards and fenders in piers/wharves.
2. The work shall include the supply, transport, handling, storage and installation of fenders systems in the newly constructed piers.
3. The Contractor shall furnish and install the necessary fittings as shown on the drawings and/or 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.

### **MATERIAL REQUIREMENTS**

#### **MOORING SYSTEM**

Designated load capacity of mooring bollards shall be as shown in the drawings, and shall be referred to as the maximum load capacity. The mooring bollards shall be at rupture stage upon reaching the maximum load capacity.

Mooring bollards shall be of the dimensions, weights, capacities and designs as shown in the drawings and shall be fabricated by approved manufacturer with cast steel conforming to the requirements indicated in the plan/drawings, or approved equivalent.

The size of the bolts, nuts and washers shall be in accordance with the specifications provided in the plans/drawings. The anchor plate shall be connected to the holding down bolt as shown in the plans/drawings. All bolts, nuts, washers etc., that are exposed shall be hot-dip galvanized.

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

The upper part of bollards and base plates which are not embedded in concrete shall be painted. The surface of bollards 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 120m micron thickness in accordance with JIS K5623 or the approved standard.

#### **Base Steel:**

Chemical composition and mechanical properties of base metal to be used for fabrication of mooring bollard and its accessories shall comply with ASTM A36 and other required standard stated therein.

**Concrete Foundation :**

Concrete foundation for mooring bollards shall conform to the requirements of the Section concerning "Reinforced Concrete".

**Visual Inspection :**

All mooring bollards delivered to Site shall be inspected by the Engineer for any signs of flaws or defect inimical to usage.

**Mill Test Certificates:**

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

**Test 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 Specifications and the best of workmanship.

## FENDER SYSTEM

The rubber fenders should comply with the performance requirements specified in the table provided on the plan/drawings of RDF.

### PHYSICAL PROPERTIES OF MATERIALS

The rubber for the fenders shall be of high quality natural rubber, synthetic rubber or mixed rubber blended with carbon black used in the rubber industry and shall have sufficient resilience and anti-ageing, weathering, abrasion, wear and oil resistant properties. The rubber dock fenders shall be free from bubbles, cracks and other harmful defects.

The physical properties of the rubber compound used for the fenders shall comply with the following requirements:

**Physical Properties and Test Method**

Test Item		Properties	Test Method	
Physical Test	Before Aging	Tensile Strength	Test piece: Dumbell No. 3	ASTM D412
		Elongation		ASTM D1456
		Hardness	Spring Type hardness test (Type A)	ASTM D2240
	After Aging	Tensile Strength	Aging by air heating: 70±1°C x 96 hours.	ASTM D412
		Elongation		ASTM D1456
		Hardness		ASTM D2240
	Compression Test		Heat treatment: 70±1°C x 22 hours.	ASTM D395

Note: Equivalent Standards are acceptable.

### FITTINGS AND ANCHORAGE

Anchor bolts and connecting hardware shall be fabricated using type of steel specified (ASTM A36) and to the required shapes and sizes shown on the approved plan/drawings.

### TESTING, SAMPLING, INSPECTION, ACCEPTANCE, MARKING AND PACKAGING

#### Testing

Sample rubber dock fenders that shall be incorporated in the project shall be subjected to tests. It shall pass the required energy absorption and reaction force at a certain deflection as indicated in the plan.

The Contractor shall be required to submit test certificates showing compliance to the above requirements. The test certificates shall be certified by an independent testing institute / organization recognized by the Authority.

Ten percent (10%) of the total number of fenders to be supplied and rounded to a unit shall be tested for performance. The fender shall be compressed repeatedly three (3) times to the maximum deflection at the speed from 2 to 8 cm. per minute. The load and deflection values shall be recorded with the precision of 0.1tf and 0.5mm respectively. The results shall be plotted in the form of load-deflection-energy absorption curves. The average data obtained in the second and third test loading shall be considered as performance values.

### Inspection

All fenders of each type shall be inspected for compliance to specified dimensions and all fenders shall be inspected for any sign of flaw or defect inimical to its use.

All anchor bolts and fittings shall be inspected. The material used for the fabrication of bolts and fittings shall be covered by the manufacturer's certified mill certificate and shall be verified by the Authority.

### Acceptance Tolerance

The acceptance tolerance shall be based on the following:

1. Fender Dimension

Length	:	-2% to +4%
Width	:	-2% to +4%
Height	:	-2% to +4%
Thickness	:	-2% to +8%

2. Anchor Bolt Holes in Fender

Diameter of the Hole	:	+2.0mm
Pitch of the Hole	:	+4.0mm

3. Acceptance tolerance for all fenders supplied shall be as follows:

E = Energy absorption,	$E \geq$ Specified E but not less than 10% of the specified E
R = Reaction force,	$R \leq$ Specified R but not more than 10% of the specified R

## Marking

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

1. Fender type and manufacturer's name or trade mark
2. Production serial number
3. Date of manufacture or its abbreviation
4. Main dimensions
5. Project identification as follows:

Name of Port/Project : \_\_\_\_\_

Year supplied : \_\_\_\_\_

## Packaging

The fenders shall be packaged on wooden crate or wrapped individually with Polypropylene sheets except when shipped containerized. The bolts and fittings should be placed in crates and suitably treated for protection when transported by sea and stored in port areas.

## EXECUTION

### MOORING / FENDERING SYSTEM

All units shall be installed at the locations shown on the drawings and as directed by the Engineer.



**ITEM 13 : PROJECT BILLBOARD**

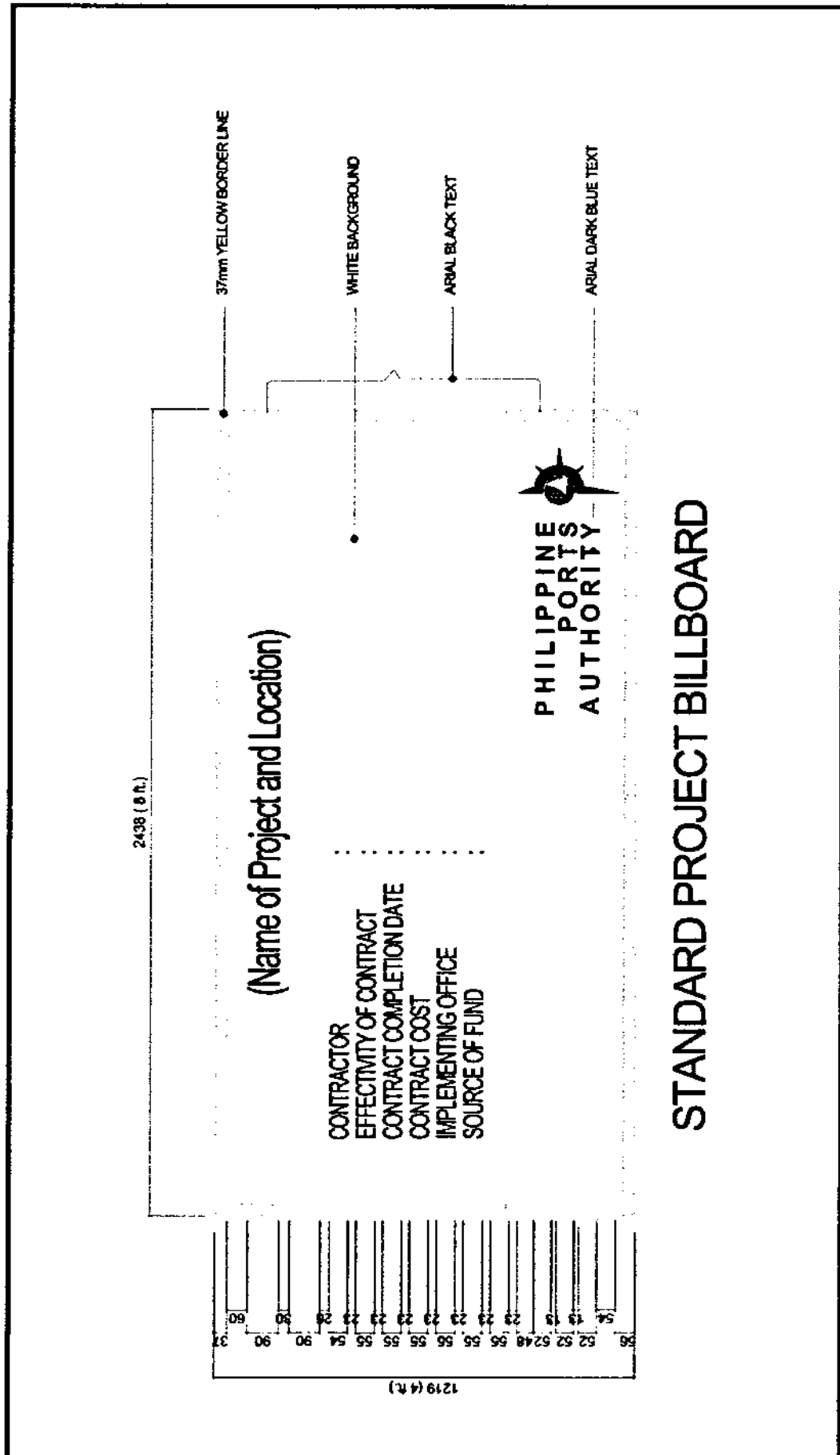
**SPECIFICATION**

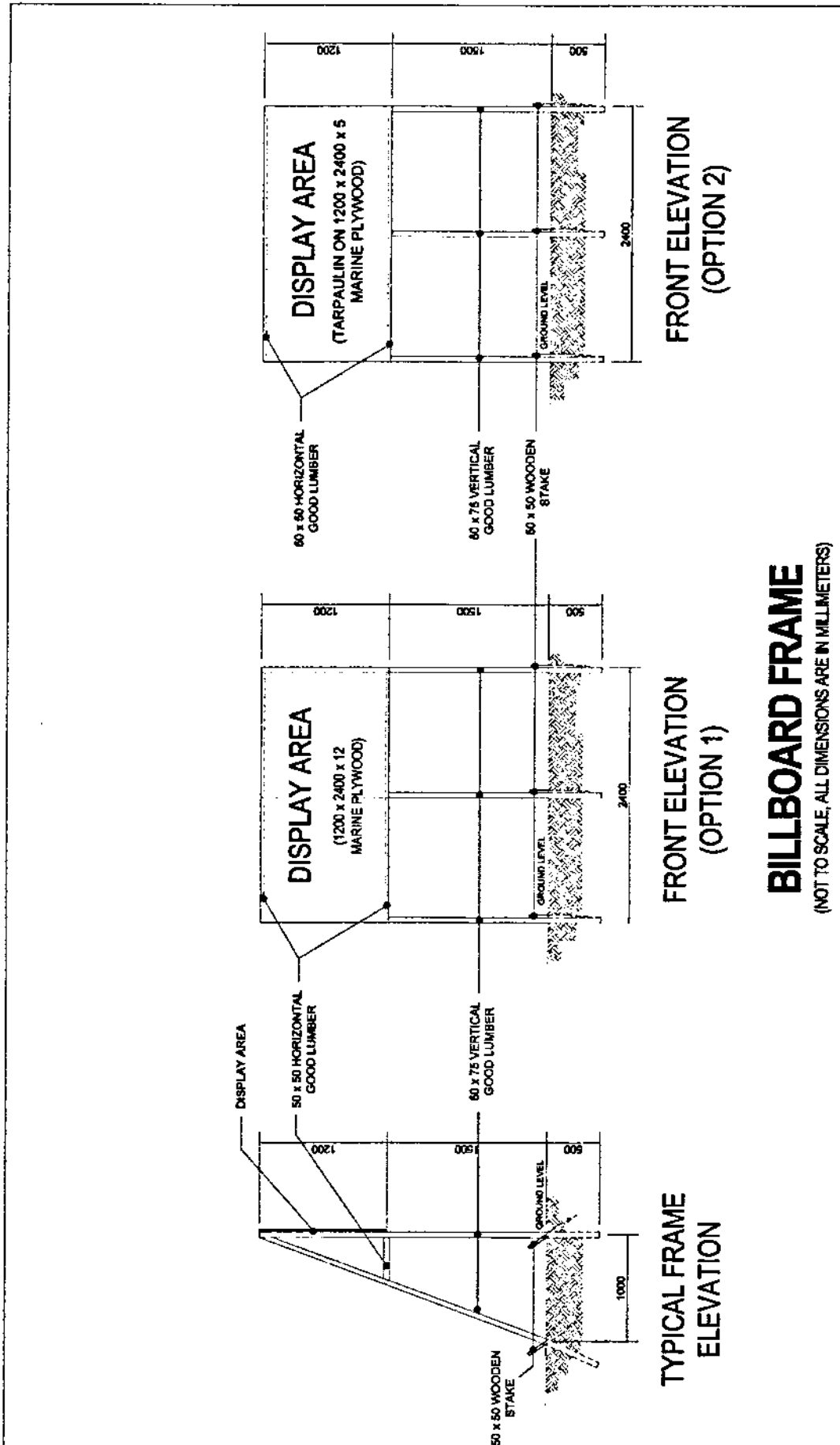
The Project Billboard shall be installed at location(s) designated by the Engineer.

The size and specifications of materials for the standard billboard shall be 4ft. x 8ft. (1,200mm x 2,400mm) using ½ inch (12mm) marine plywood or tarpaulin poster on 3/16 inch (5mm) marine plywood.

Project billboards shall not contain Name(s) and/or picture(s) of any personages.

See attached drawings for further details of the standard billboard.





# **BILLBOARD FRAME** (NOT TO SCALE, ALL DIMENSIONS ARE IN MILLIMETERS)

## ITEM 14 : SAFETY SIGNAGES AND BARRICADES

### DESCRIPTION

This work includes the furnishing and installing of safety signages and barricades in accordance with the specifications and to the details shown below in the drawings, or as directed by the Engineer.

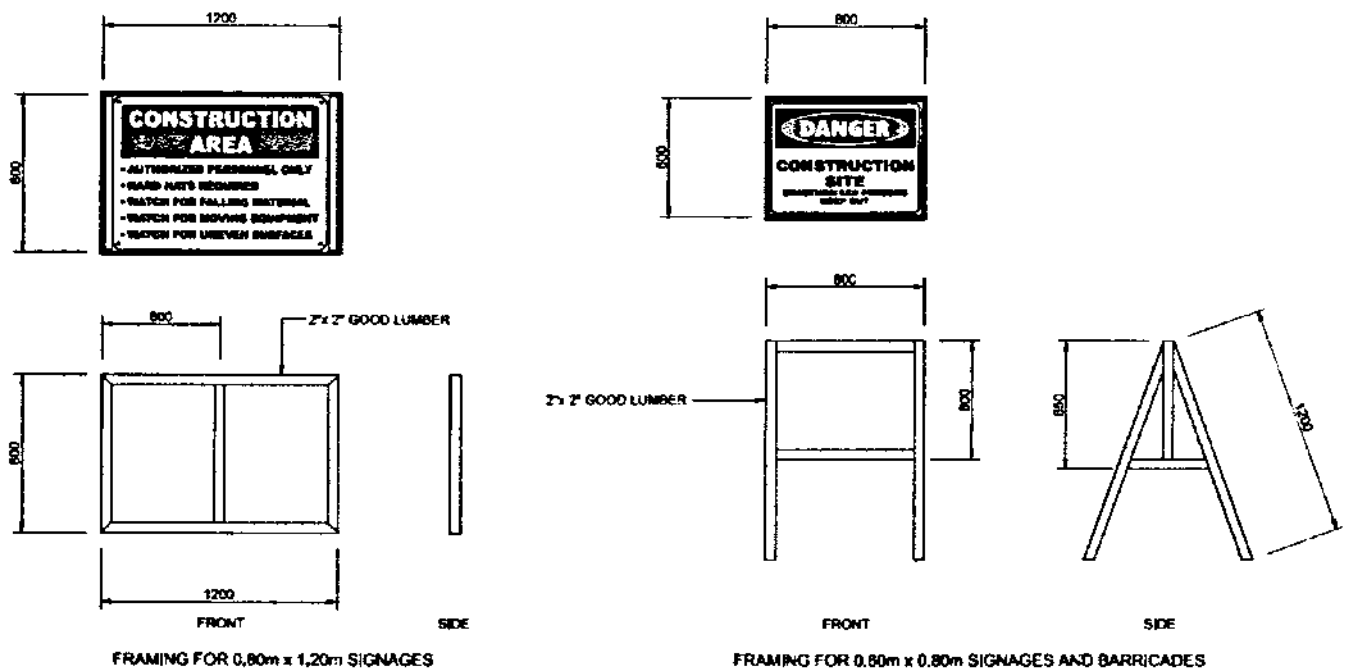
### SPECIFICATION

The Signage's and Barricades shall be installed at location(s) designated by the Engineer.

The sizes of the standard signages shall be 2-2/3ft x 4ft (800mm X 1,200mm) for fixed type and 2ft x 2-2/3ft (600mm x 800mm) for mobile type. For barricade standard 2ft x 2-2/3ft (600mm x 800mm) shall be provided.

The materials to be used for signages and barricades are ½ inch (12mm) marine plywood or tarpaulin poster on 2" x 2" (50mm x 50mm) good lumber frame (see drawing below).

The printing or painting shall be the discretion of the Engineer.



## STANDARD PLAN FOR SIGNAGES AND BARRICADES

**SECTION VII**

**PROJECT DRAWINGS**

## SECTION VII

# PROJECT DRAWINGS (SEE ISSUED APPROVED PLANS)

### LIST OF DRAWINGS:

#### CONSTRUCTION OF BACK-UP AREA

01 of 12	Development Plan, Vicinity Map, General Notes and List of Drawings
02 of 12	General Plan, Piling Layout Plan
03 of 12	Station 0+0.00m, 0+10.00m, 0+15.43m
04 of 12	Station 0+40.00m, 0+60.00m, 0+75.2m
05 of 12	Station A0+0.00m, Ma0+11.58m, A0+31.53m
06 of 12	Station A0+51.58m, Detail of Deadman, Detail of Continuous Anchor Block, Detail of Anchor Block (@Mooring Bollard)
07 of 12	Layout Plan for Security Fence, Detail of Pavement Joints, Detail of Proposed Security Fence, Detail of Concrete Post
08 of 12	Detail of Anchor Bolt (Normal), Detail of Rubber Duck Fender V-Type 500H x 1500L, 25Ton Mooring Tee Head, Detail of Plate Washers
09 of 12	Detail of Block-1 (B-1), Block-2 & 2a and Block-3 & 3a Typical Detail of Lifting Handle of Concrete Blocks
10 of 12	Detail of Retaining Wall-1 and 2, Detail of 1 Ton Capacity Mooring Cleat Detail of Proposed Stairlanding, Detail of Stairlanding Curb
11 of 12	Detail of R.C. Corner Sheet Piles
12 of 12	Detail of Pre-Stressed Concrete Sheet Pile

**SECTION VIII**

**BILL OF QUANTITIES**  
**and**  
**ATTACHMENTS**

**BILL OF QUANTITIES**  
**CONSTRUCTION OF BACK-UP AREA**  
Port of Getafe, Bohol



NO. (1)	DESCRIPTION OF WORK (2)	UNIT (3)	QTY. (4)	UNIT PRICE (Pesos) (5)	AMOUNT (Pesos) (4) x (5)
<b>BILL NO.</b>	<b>2 BACK-UP AREA</b>				
2.01	Demolish and dispose existing pavement	sq.m.	299		
2.02	Excavate existing seabed	cu.m.	11,568		
2.03	Excavation of existing fill materials prior for the construction of retaining wall & transition ramp.	cu.m.	60		
2.04	Supply and place 3,500 psi concrete for rc curb, retaining wall, coping wall, mooring block, anchor block, and stailanding.	cu.m.	541		
2.05	Supply and install steel reinforcement for rc curb, retaining wall, coping wall, mooring block, anchor block, and stailanding.	kg.	56,864		
2.06	Supply and install 50mm Ø Stainless pipe railings	l.m.	73		
2.07	Supply, fabricate and install Concrete blocks including lifting handle	cu.m.	229		
2.08	Supply and deliver to site 0.35m x 0.60m PSC sheet piles	l.m.	6,447		
2.09	Supply and deliver to site R.C. Corner piles a) R.C. Corner pile No. 1 b) R.C. Corner pile No. 2 c) R.C. Corner pile No. 3 d) R.C. Corner pile No. 4 e) R.C. Corner pile No. 5 f) R.C. Corner pile No. 6 g) R.C. Corner pile No. 7	l.m. l.m. l.m. l.m. l.m. l.m. l.m.	21 21 21 21 21 21 21		



**BILL OF QUANTITIES**  
**CONSTRUCTION OF BACK-UP AREA**  
Port of Getafe, Bohol



NO. (1)	DESCRIPTION OF WORK (2)	UNIT (3)	QTY. (4)	UNIT PRICE (Pesos) (5)	AMOUNT (Pesos) (4) x (5)
2.10	Handle, pitch and drive PSC sheet piles and RC corner piles	l.m.	6,594		
2.11	Chipping of newly driven PSC sheet piles & R.C. Corner piles including disposal	no.	314		
2.12	Supply and place 50-100 kg. Core rocks	cu.m.	11,178		
2.13	Supply and Install Geotextile Fabric	sq.m.	1,846		
2.14	Supply and place Sand and Gravel fill	cu.m.	17,179		
2.15	Supply, spread and compact Selected fill	cu.m.	4,495		
2.16	Supply, spread and compact aggregate base course	cu.m.	61		
2.17	Construct portland cement concrete pavement (250mm thk.) including dowel bars and construction joints	sq.m.	299		
2.18	Supply and install Tie-rod including accessories a) 50mm Ø x 10m b) 55mm Ø x 15.00m tie-rod c) 55mm Ø x 2.00m	set set set	8 79 3		
2.19	Supply and deliver to site rubber dock fender (V-type, 500H x 1500L) including accessories	set	8		
2.20	Install rubber dock fender and accessories	set	8		

**BILL OF QUANTITIES**  
**CONSTRUCTION OF BACK-UP AREA**  
 Port of Getafe, Bohol



NO. (1)	DESCRIPTION OF WORK (2)	UNIT (3)	QTY. (4)	UNIT PRICE (Pesos) (5)	AMOUNT (Pesos) (4) x (5)
2.21	Supply and deliver to site mooring bollard (25 Tons, T-head) including accessories	set	4		
2.22	Install mooring bollards (T-head type) and accessories	set	4		
2.23	Supply and deliver to site 1-Ton capacity mooring cleats including accessories	set	9		
2.24	Install mooring cleats and accessories	set	9		
2.25	Construction of security fence including accessories	t.m.	45		
<b>TOTAL FOR BILL NO. 2</b>					

**BILL OF QUANTITIES**  
**CONSTRUCTION OF BACK-UP AREA**  
 Port of Getafe, Bohol



NO. (1)	DESCRIPTION OF WORK (2)	UNIT (3)	QTY. (4)	UNIT PRICE (Pesos) (5)	AMOUNT (Pesos) (4) x (5)
<b>BILL NO. 3</b>	<b>REIMBURSABLE ITEMS</b>				
3.01	Provide reimbursable items necessary in the implementation of the project as determined by the Authority	lot	1	2,945,385.05	2,945,385.05
<b>TOTAL FOR BILL NO. 3</b>					<b>2,945,385.05</b>

## **BASIS OF PAYMENT FOR WORK ITEMS INCLUDED IN THE PROPOSAL**

The work items included in the proposal and the basis of payments are as follows:

### **BILL NO. 1**

#### **GENERAL EXPENSES**

**Item 1.01      Mobilization, demobilization and cleaning**

The quantity to be paid for shall be the minimum equipment requirement enumerated in the bid documents mobilized, demobilized and cleaning of the site and accepted by the Engineer. The contract lump sum price shall be full compensation for furnishing all materials, labor, equipment, tools and incidentals necessary to mobilize and demobilize all the minimum equipment requirement enumerated in the bid documents including cleaning of the site. Fifty percent (50%) of the total amount shall be payable after the mobilization activity while the remaining (50%) payable after demobilization and cleaning.

**Item 1.02      Rental of temporary site office and residence for the Engineer and staff**

The quantity to be paid for shall be the actual rental for temporary site office and residence for the engineer and staff and accepted by the Engineer. The contract unit price shall be full compensation for furnishing all materials, labor, equipment, tools and incidentals necessary for the provision of temporary site office and residence for the engineer and staff at least 48.00 m<sup>2</sup>

**Item 1.03      Maintain temporary site office and residence for the Engineer and staff**

The quantity to be paid for shall be the actual services rendered in maintaining the site office and accepted by the Engineer. The contract unit price shall be full compensation for furnishing all materials, labor, equipment, tools and incidentals necessary to complete the maintenance of the temporary site office and residence as well as other expenses such as provision for electric power, telephone bill, potable water supply, janitorial and security services.

**Item 1.04      Provide construction safety and Health Program in the execution of the project**

The quantity to be paid for shall be the actual implementation of construction safety and health program and accepted by the Engineer. The contract unit price shall be full compensation for furnishing all materials, labor, equipment, tools and incidentals necessary to complete the implementation of the Construction Safety and Health Program, as required and approved by the Department of Labor and Employment (DOLE).

## **BILL NO. 2**

### **BACK-UP AREA**

**Item 2.01      Demolish and dispose existing pavement**

The quantity to be paid for shall be the actual area in square meter of existing pavement, demolished and disposed, in accordance with the plans and specifications and accepted by the Engineer. The contract unit price shall be full compensation for furnishing all materials, labor, equipment, tools and incidentals necessary to complete the work.

**Item 2.02      Excavate existing seabed**

The quantity to be paid for shall be the actual volume in cubic meter of existing seabed excavated in accordance with the plans and specifications and accepted by the Engineer. The contract unit price shall be full compensation for furnishing all materials, labor, equipment, tools and incidentals necessary to complete the work.

**Item 2.03      Excavation of existing fill materials prior to the construction of retaining wall and transition ramp**

The quantity to be paid for shall be the actual volume in cubic meter of existing fill materials excavated prior to the construction of retaining wall and transition ramp in accordance with the plans and specifications and accepted by the Engineer. The contract unit price shall be full compensation for furnishing all materials, labor, equipment, tools and incidentals necessary to complete the work.

**Item 2.04      Supply and place 3,500 psi concrete for the rc curb, retaining wall, coping wall, mooring block, anchor block and stairlanding**

The quantity to be paid for shall be the actual volume in cubic meter of 3,500 psi concrete for the rc curb, retaining wall, coping wall, mooring block, anchor block and stairlanding, supplied and set-in-place in accordance with the plans and specifications and accepted by the Engineer. The contract unit price shall be full compensation for furnishing all materials, labor, equipment, tools and incidentals necessary to complete the work.

**Item 2.05      Supply and install steel reinforcements for the rc curb, retaining wall, coping wall, mooring block, anchor block and stairlanding**

The quantity to be paid for shall be the actual weight in kilogram of reinforcing steel bars for the rc curb, retaining wall, coping wall, mooring block, anchor block and stairlanding, supplied and installed in accordance with the plans and specifications and accepted by the Engineer. The contract unit price shall be full compensation for furnishing all materials, labor, equipment, tools and incidentals necessary to complete the work.

**Item 2.06      Supply and Install 50mmØ Stainless pipe railings**

The quantity to be paid for shall be the actual length in linear meter of 50mmØ Stainless pipe railings, supplied and installed in accordance with the plans and specifications and accepted by the Engineer. The contract unit price shall be full compensation for furnishing all materials, labor, equipment, tools and incidentals necessary to complete the work.

**Item 2.07      Supply, fabricate and install concrete blocks including lifting handle**

The quantity to be paid for shall be the actual volume in cubic meter of concrete blocks including lifting handle, supplied and set-in-place in accordance with the plans and specifications and accepted by the Engineer. The contract unit price shall be full compensation for furnishing all materials, labor, equipment, tools and incidentals necessary to complete the work.

**Item 2.08      Supply and deliver to site 0.35m x 0.60m PSC sheet piles**

The quantity to be paid for shall be the actual length in linear meter of 0.35m x 0.60m PSC sheet piles, supplied and delivered to site in accordance with the plans and specifications and accepted by the Engineer. The contract unit price shall be full compensation for furnishing all materials, labor, equipment, tools and incidentals necessary to complete the work.

**Item 2.09      Supply and deliver to site RC corner sheet piles**

- a) RC sheet corner pile no. 1
- b) RC sheet corner pile no. 2
- c) RC sheet corner pile no. 3
- d) RC sheet corner pile no. 4
- e) RC sheet corner pile no. 5
- f) RC sheet corner pile no. 6
- g) RC sheet corner pile no. 7

The quantity to be paid for shall be the actual length in linear meter of RC corner sheet piles of various sizes, supplied and delivered to site in accordance with the plans and specifications and accepted by the Engineer. The contract unit price shall be full compensation for furnishing all materials, labor, equipment, tools and incidentals necessary to complete the work.

**Item 2.10      Handle, pitch and drive PSC sheet piles and RC corner sheet piles**

The quantity to be paid for shall be the actual length in linear meter of PSC sheet piles and RC corner sheet piles to be handled, pitched and driven in accordance with the plans and specifications and accepted by the Engineer. The contract unit price shall be full compensation for furnishing all materials, labor, equipment, tools and incidentals necessary to complete the work.

**Item 2.11      Chipping of newly driven PSC sheet piles and RC corner sheet piles including disposal of debris**

The quantity to be paid for shall be the actual length in linear meter of newly driven PSC sheet piles and RC corner sheet piles to be chipped off up to required elevation including disposal of debris in accordance with the plans and specifications and accepted by the Engineer. The contract unit price shall be full compensation for furnishing all materials, labor, equipment, tools and incidentals necessary to complete the work.

**Item 2.12      Supply and place 50-100 kg. Core rocks**

The quantity to be paid for shall be the actual volume in cubic meter of 50-100 kg. Core rocks, supplied and set-in-place in accordance with the plans and specifications and accepted by the Engineer. The contract unit price shall be full compensation for furnishing all materials, labor, equipment, tools and incidentals necessary to complete the work.

**Item 2.13      Supply and install geotextile fabric**

The quantity to be paid for shall be the actual area in square meter of geotextile filter fabric, supplied and installed in accordance with the plans and specifications and accepted by the Engineer. The contract unit price shall be full compensation for furnishing all materials, labor, equipment, tools and incidentals necessary to complete the work.

**Item 2.14      Supply and place sand and gravel fill**

The quantity to be paid for shall be the actual volume in cubic meter of sand and gravel fill, supplied and set-in-place in accordance with the plans and specifications and accepted by the Engineer. Hydrographic/Topographic Surveys before and after placing of sand and gravel fill shall be made to determine the actual elevations along the cross sections and the actual quantities for payment. Volume due to settlement as established using settlement plates shall also be considered for payment. The contract unit price shall be full compensation for furnishing all materials, labor, equipment, tools and incidentals necessary to complete the work.

**Item 2.15      Supply, spread and compact selected fill**

The quantity to be paid for shall be the actual volume in cubic meter of selected fill to be supplied, spread and compacted in accordance with the plans and specifications and accepted by the Engineer. The contract unit price shall be full compensation for furnishing all materials, labor, equipment, tools and incidentals necessary to complete the work.

**Item 2.16      Supply, spread and compact aggregate base course**

The quantity to be paid for shall be the actual volume in cubic meter of aggregate base course, to be supplied, spread and compacted in accordance with the plans and specifications and accepted by the Engineer. The contract unit price shall be full compensation for furnishing all materials, labor, equipment, tools and incidentals necessary to complete the work.

**Item 2.17      Construct portland cement concrete pavement (PCCP, 250mm thk.) including dowel bars and construction joints**

The quantity to be paid for shall be the actual area in square meter of portland cement concrete pavement (PCCP, 250mm thk.) including dowel bars and construction joints to be constructed in accordance with the plans and specifications and accepted by the Engineer. The contract unit price shall be full compensation for furnishing all materials, labor, equipment, tools and incidentals necessary to complete the work.

**Item 2.18      Supply and install tie-rod including accessories**

- a) 50mmØ x 10m
- b) 55mmØ x 15m
- c) 55mmØ x 2.00m

The quantity to be paid for shall be the actual quantity in set of tie-rod of various sizes and length including accessories, supplied and installed in accordance with the plans and specifications and accepted by the Engineer. The contract unit price shall be full compensation for furnishing all materials, labor, equipment, tools and incidentals necessary to complete the work.

**Item 2.19      Supply and deliver to site rubber dock fender (V-type 500H x 1500L) including accessories**

The quantity to be paid for shall be the actual quantity in set of rubber dock fender (V-type 500H x 1500L) including accessories, supplied and delivered to site in accordance with the plans and specifications and accepted by the Engineer. The contract unit price shall be full compensation for furnishing all materials, labor, equipment, tools and incidentals necessary to complete the work.

**Item 2.20      Install rubber dock fender including accessories**

The quantity to be paid for shall be the actual quantity in set of rubber dock fenders including accessories, installed in accordance with the plans and specifications and accepted by the Engineer. The contract unit price shall be full compensation for furnishing all materials, labor, equipment, tools and incidentals necessary to complete the work.

**Item 2.21      Supply and deliver to site mooring bollard (25T, T-head) including accessories**

The quantity to be paid for shall be the actual quantity in set of mooring bollard (25T, T-head) including accessories, supplied and delivered to site in accordance with the plans and specifications and accepted by the Engineer. The contract unit price shall be full compensation for furnishing all materials, labor, equipment, tools and incidentals necessary to complete the work.

**Item 2.22      Install mooring bollard (T-head) including accessories**

The quantity to be paid for shall be the actual quantity in set of mooring bollard including accessories, installed in accordance with the plans and specifications and accepted by the Engineer. The contract unit price shall be full compensation for furnishing all materials, labor, equipment, tools and incidentals necessary to complete the work.

**Item 2.23      Supply and deliver to site 1-Ton capacity mooring cleats including accessories**

The quantity to be paid for shall be the actual quantity in set of 1-Ton capacity mooring cleats including accessories, supplied and delivered to site in accordance with the plans and specifications and accepted by the Engineer. The contract unit price shall be full compensation for furnishing all materials, labor, equipment, tools and incidentals necessary to complete the work.

**Item 2.24      Install mooring cleats accessories**

The quantity to be paid for shall be the actual quantity in set of mooring cleats and accessories, installed in accordance with the plans and specifications and accepted by the Engineer. The contract unit price shall be full compensation for furnishing all materials, labor, equipment, tools and incidentals necessary to complete the work.

**Item 2.25      Construction of security fence including accessories**

The quantity to be paid for shall be the actual length in linear meter of security fence including accessories to be constructed in accordance with the plans and specifications and accepted by the Engineer. The contract unit price shall be full compensation for furnishing all materials, labor, equipment, tools and incidentals necessary to complete the work.



**BILL NO. 3**

**REIMBURSABLE ITEMS**

- Item 3.01      Provide reimbursable items necessary in the Implementation of the project as determined by the Authority.**

The quantity to be paid for shall be the actual quantity of determined items by the Authority deemed necessary in the implementation of the project, supplied, delivered and accepted by the Authority. Payment for said items shall be made only upon complete delivery/acceptance of such. The contract lump sum price shall be full compensation for providing all determined items. The Contractor's Profit and Overhead, Contingencies and Miscellaneous (OCM) should not be included in the cost of said items. The amount of bid should be fixed as indicated in the amount stated in the Bid Data Sheet [ITB Clause 13.1(a)] and as provided in the Bill of Quantities (BOQ). Claims for payment shall be supported by Official Receipt(s) (OR) and at least three (3) canvasses. The amount to be paid for shall be the price indicated in the OR but should not exceed the contract lump sum price. The determined items shall be the property of PPA. Operation and maintenance shall be borne by PPA.

## **FACILITIES TO BE PROVIDED FOR THE ENGINEER & HIS STAFF**

### **TEMPORARY FACILITIES OF THE CONTRACTOR**

The Contractor shall provide and maintain such temporary offices, stores, workshops, latrines, housing and messing accommodations as are necessary. The location, dimension and layout of such buildings and places shall be subject to the approval in writing of the Engineer. By the end of the contract, the Contractor shall remove all buildings and the area shall be cleared and graded as required by the Engineer.

### **SITE OFFICE AND RESIDENCE FOR THE ENGINEER & STAFF**

The Contractor shall provide and maintain a temporary site office and residence with an area of at least 48 square meters for use of the Engineer and staff, including all the necessary electricity, water, communication services and consumables.

**MINIMUM EQUIPMENT REQUIREMENTS**

1	unit/s	Air-Compressor (250 cfm, minimum), owned/leased
1	unit/s	Backhoe (0.40 cu.m., 94.30 hp, minimum), owned/leased
1	unit/s	Batching Plant (30 cu.m., minimum), owned/leased
1	unit/s	Clamshell, owned
1	unit/s	Concrete Cutter, owned
2	unit/s	Concrete Mixer (1-bagger, minimum), owned
1	unit/s	Concrete Bucket, owned
1	unit/s	Concrete Screeder, owned
2	unit/s	Concrete Vibrator (3.5 hp, minimum), owned
1	unit/s	Crane Barge (319 GW, minimum) with 60T crane, owned/leased
1	unit/s	Crawler Crane (30T, minimum), owned/leased
1	unit/s	Pile Hammer (Diesel, 10,500 kg.m.), owned/leased
1	unit/s	Diving Equipment (complete), owned/leased
1	unit/s	Drop Hammer (2T, minimum), owned
2	unit/s	Dump Truck (8 cu.m., minimum), owned
2	unit/s	Bar Bender (electric, 25mm dia min.), owned
2	unit/s	Bar Cutter (electric, 25mm dia min.), owned
1	unit/s	Jack Hammer, owned/leased
1	unit/s	Oxy/Acetylene Cutting Outfit, owned
1	unit/s	Payloader (80 hp, minimum), owned/leased
1	unit/s	Plate Compactor (5 hp, minimum), owned
1	unit/s	Road Grader (125 hp, minimum), owned/leased
1	unit/s	Road Roller (12.05T, vibratory, minimum), owned/leased
2	unit/s	Transit Mixer (5-6 cu.m. cap., minimum), owned/leased
1	unit/s	Tugboat (500hp, minimum), owned/leased
1	unit/s	Water Truck with pump (1,000 gal., minimum), owned
2	unit/s	Welding Machine (400 amp., minimum), owned
1	unit/s	Cargo Truck (5T, minimum), owned

## **CONSTRUCTION SAFETY AND HEALTH REQUIREMEN**

The Contractor shall implement the construction safety and health program in accordance with the applicable provisions of the Occupational Safety and Health Standards (OSHS) of the Department of Labor and Employment (DOLE).

The Contractor, subject to the approval of the Engineer shall provide and maintain throughout the duration of the contract a medical room with at least 15 square meters together with all necessary supplies to be sited in the Contractor's main area.

The Contractor shall provide the following minimum requirements:

### **LABOR**

- |   |     |                           |
|---|-----|---------------------------|
| 1 | no. | Safety Engineer / Officer |
| 1 | no. | Nurse / Health Officer    |

### **EQUIPMENT / MATERIALS**

#### **Personnel Protective Equipment**

- |    |      |              |
|----|------|--------------|
| 49 | pcs. | Hard Hats    |
| 49 | pcs. | Gloves       |
| 7  | pcs. | Goggles      |
| 1  | pcs. | Aprons       |
| 1  | pcs. | Safety Belts |
| 49 | pcs. | Safety Shoes |
| 1  | pcs. | Life Lines   |

#### **Safety Devices**

- |   |       |                   |
|---|-------|-------------------|
| 1 | lot   | Barricades        |
| 1 | lot   | Warning signs     |
| 2 | units | Fire extinguisher |

Medical and First Aid System                      -                      For twelve (12) mos.

### **NOTE:**

The Contractor shall provide the above-cited minimum construction safety and health requirements or as required by the Engineer.

**SECTION IX**

**BIDDING FORMS**

## Bid Form

Date: \_\_\_\_\_

ITB No: \_\_\_\_\_

To: **Philippine Ports Authority**  
Bonifacio Drive, South Harbor,  
Port Area, Manila

We, the undersigned, declare that:

- (a) We have examined and have no reservation to the Bidding Documents, including Addenda, for the Contract **Construction of Back-up Area, Port of Getafe, Bohol**;
- (b) We offer to execute the Works for this Contract in accordance with the Bid and Bid Data Sheet, General and Special Conditions of Contract accompanying this Bid;

The total price of our Bid, excluding any discounts offered below is:

BILL NO	DESCRIPTION	TOTAL AMOUNT
1	General Expenses	P
2	Back-up Area	
3	Reimbursable Items	
	<b>TOTAL AMOUNT OF BID (including VAT)</b>	<b>P</b>

The discounts offered and the methodology for their application are: insert information;

- (c) Our Bid shall be valid for a period of 120 days from the date fixed for the Bid submission deadline in accordance with the Bidding Documents, and it shall remain binding upon us and may be accepted at any time before the expiration of that period;
- (d) If our Bid is accepted, we commit to obtain a Performance Security in the amount of insert percentage amount percent of the Contract Price for the due performance of the Contract;
- (e) Our firm, including any subcontractors or suppliers for any part of the Contract, have nationalities from the following eligible countries: insert information;

- (f) We are not participating, as Bidders, in more than one Bid in this bidding process, other than alternative offers in accordance with the Bidding Documents;
- (g) Our firm, its affiliates or subsidiaries, including any subcontractors or suppliers for any part of the Contract, has not been declared ineligible by the Funding Source;
- (h) We understand that this Bid, together with your written acceptance thereof included in your notification of award, shall constitute a binding contract between us, until a formal Contract is prepared and executed; and
- (i) We understand that you are not bound to accept the Lowest Calculated Bid or any other Bid that you may receive.
- (j) We likewise certify/confirm that the undersigned, is the duly authorized representative of the bidder, and granted full power and authority to do, execute and perform any and all acts necessary to participate, submit the bid, and to sign and execute the ensuing contract for the **Construction of Back-up Area, Port of Getafe, Bohol** of the **Philippine Ports Authority**.
- (k) We acknowledge that failure to sign each and every page of this Bid Form, including the Bill of Quantities, shall be a ground for the rejection of our bid.

Name: \_\_\_\_\_

In the capacity of: \_\_\_\_\_

Signed: \_\_\_\_\_

Duly authorized to sign the Bid for and on behalf of: \_\_\_\_\_

Date: \_\_\_\_\_

**STATEMENT OF ALL ON-GOING GOVERNMENT AND PRIVATE CONTRACTS,  
INCLUDING CONTRACTS AWARDED BUT NOT YET STARTED, WHETHER SIMILAR OR NOT SIMILAR IN NATURE**

Name of the Contract or Title Of the Project 1]	Owner's Name and Address	Nature/ Scope of Work 2]	Contractor's Role (in percentage) 3]	Total Contract Value At			Date of Award 5]	Value of Outstanding Works	Estimated Time of Completion	% of Accomplishment		Contract Duration 5]	
				Award	Project Completion	Escalated Value to Present Prices 4]				Planned	Actual	Start	Completed
A) Government Contracts i. On-going ii. Awarded but not yet started B) Private Contracts i. On-going ii. Awarded but not yet started													

**NOTE:**

- 1] As appearing or defined in the contract entered/executed by the parties
- 2] With special reference to the Scope of Works as described/enumerated in the advertised Invitation To Bid.
- 3] Indicate whether as Sole Contractor, Sub-Contractor or Member in a Joint Venture / Consortium
- 4] Indicate the FOREX used if Contract Value is expressed in a currency other than the Philippine Peso. Specify the "Escalation Factor" used to escalate the Contract Value from completion date to the advertisement date of the Invitation to Bid per section 23.11.2 (3) of R.A. 9184.
- 5] State Month and Year.

This Statement shall be supported by:  
a) Notice of Award and/or Contract  
b) Notice to Proceed

\_\_\_\_\_  
Name of Firm/Applicant

\_\_\_\_\_  
Authorized Signing Official

\_\_\_\_\_  
Date



**STATEMENT OF THE BIDDER'S SINGLE LARGEST COMPLETED CONTRACT (SLCC) SIMILAR TO THE CONTRACT TO BE BID**

Name of the Contract or Title Of the Project	Owner's Name and Address	Nature/Scope of Work	Contractor's Role and Percentage Of Participation	Total Contract Value At		Date of Award	Value of Outstanding Works	Contract Duration	
				Award	Completion			Start	Completed

**NOTE :**

- The prospective bidder must have completed an SLCC that is similar to the contract to be bid, and whose value, adjusted to current prices using the PSA consumer price indices, must be at least fifty percent (50%) of the ABC to be bid.
- This Statement shall be supported by:
  - Notice of Award and / or Notice to Proceed.
  - Project Owner's Certificate of Final acceptance issued by the owner other than the Contractor or Constructors Performance Evaluation System (CPES) Final Rating, which must be at least satisfactory.

\_\_\_\_\_  
Name of Firm/Applicant

\_\_\_\_\_  
Authorized Signing Official

\_\_\_\_\_  
Date

## EXPERIENCE RECORD ON SIMILARLY COMPLETED PROJECTS

Similar Major Operations of Work 1]	Unit of Measure	Quantity	Title of the Project				Unit of Measure	Quantity
			Title of the Project	Title of the Project	Title of the Project	Title of the Project		
1. RC pile driving works (off-shore)	l.m.	3,297						
2. Reinforced Concrete Works	cu.m.	271						
3. Rock Works (50-100 kg./pc.)	cu.m.	5,589						
4. Placing of Fill Materials	cu.m.	10,837						
5. Construction of Portland Cement Concrete Pavement (PCCP)	sq.m.	150						

NOTE: 1] Submit the Certificate of Completion/Certificate of Acceptance by the project owner, Final Recapitulation/Bill of Quantities and/or Constructor Performance Evaluation System (CPES) ratings, 1<sup>st</sup>, 2<sup>nd</sup> & Final visit (if applicable). Projects with no Certificate of Completion/Acceptance and Recapitulation/Bill of Quantities shall not be considered.

2] The Owner's Certificate of Final Acceptance; or the Constructors Performance Evaluation Summary (CPES) Final Rating and/or the Certificate of Completion, must be satisfactory.

Name of Firm/Applicant

Authorized Signing Official

Date

(Revised Form : September 2012)

## FINANCIAL DATA

- A. The prospective bidder's audited Financial Statements, showing, among others, the prospective bidder's total and current assets and liabilities, stamped "RECEIVED" by the Bureau of Internal Revenue (BIR), or its duly accredited and authorized institutions, for the preceding calendar year which should not be earlier than two (2) years from the date of bid submission.

	Year
1. Total Assets	
2. Current Assets	
3. Total Liabilities	
4. Current Liabilities	
5. Net worth (1-3)	
6. Net Working Capital (2-4)	

- B. The computation of the bidders Net Financial Contracting Capacity (NFCC) must be at least equal to the ABC to be bid, as follows:

NFCC = [ (Current assets minus current liabilities) (15) ] minus the value of all outstanding or uncompleted portions of the projects under ongoing contracts, including awarded contracts yet to be started coinciding with the contract to be bid.

NFCC = \_\_\_\_\_

Attached herewith are certified true copies of the audited financial statements stamped received by the BIR or BIR authorized collecting agent for the latest/immediately preceding calendar year.

\_\_\_\_\_  
Name of Firm/Applicant

\_\_\_\_\_  
Authorized Signing Official

Date: \_\_\_\_\_

### NOTES:

If Partnership or Joint Venture, each Partner or Member Firm of Joint venture shall submit separate financial statements.

## LIST OF CONTRACTOR'S PERSONNEL

I hereby declare that the following key personnel enumerated below, with attached resume/bio-data, including valid PRC License, for the various positions / functions, are available for the project applied for:

Position of Key Personnel	Name	No. of Key Personnel	Similar Experience in the Position (Years) <sup>1)</sup>	Total Experience in the Position (Years)	Attachment(s)	Annex(es)
Project Manager					PRC License (CE Preferred) Complete Qualification and Experience Data Certificate of Commitment	Annex " " _
Project Engineer					PRC License (CE Preferred) Complete Qualification and Experience Data Certificate of Commitment	Annex " " _
Materials Engineer					PRC License (CE Preferred) Submit Valid and Renewed DPWH Certificate of Accreditation Submit Accreditation Identification Card as Materials Engineer Complete Qualification and Experience Data Certificate of Commitment	Annex " " _
Construction Safety and Health Officer					Certificate of Safety and Health Construction Related Course issued by DOLE Accredited Trainings Complete Qualification and Experience Data Certificate of Commitment	Annex " " _
Foreman					Complete Qualification and Experience Data Certificate of Commitment	Annex " " _
Other Position(s)					Complete Qualification and Experience Data Certificate of Commitment	Annex " " _

NOTE: 1. Minimum qualification requirements: (work experience is similar in nature and complexity to the project to be bid with regard to Registration Particulars of the Contractor's License)

Project Manager - Five (5) years  
Project Engineer - Three (3) years  
Foreman - Five (5) years  
Materials Engineer - One (1) year  
Materials Engineer I - for projects costing up to 100M  
Materials Engineer II - for projects costing more than 100M

Name of Firm/Applicant

Authorized Signing Official

Date

REVISED FORM (September 2012)

## LIST OF CONTRACTOR'S EQUIPMENT UNITS

I hereby declare that the following equipment listed below which are owned, leased or under purchase agreement are in good operating condition and are available for the duration of the project:

DESCRIPTION (Type, Model, Make)	No. of Unit(s)	Capacity Output 2]	Owned, Leased and/or under purchase agreement 1]	Submitted Proof of Ownership/Leased/ Purchase Agreement (Mark as Annex "A.....Z")	OTHER INFORMATION(S) (As Applicable)				
					Manufacturer	Engine Serial No.	Chassis No./ Name of Vessel	Location	Status

1] Indicate if owned or leased as listed in the Checklist/Bidding Documents. For owned equipment, as required, submit proof of ownership (i.e. deed of sale, sales invoice, official receipt). For Water Truck, Dump Truck and Transit Mixer submit LTO Certificate of Registration and valid Official Receipt. For owned barge/tugboat, submit Marina Certificate of Ownership and valid Cargo Ship Safety Certificate. For newly purchased barge/tugboat, submit Deed of Sale together with an application for Marina Certificate of Ownership duly received/authenticated by Marina with corresponding valid Cargo Ship Safety Certificate. For leased equipment, submit duly notarized copy of lease contract together with a copy of the Marina Owner's (Lessor's) Certificate and valid Cargo Ship Safety Certificate.

2] The unit of each equipment shall be as indicated in the Checklist/Bidding Documents, i.e GW (for crane barge), DWT (for deck barge and hopper barge), TON (for crane, road roller and drop hammer), kg.-m/blow (for diesel hammer), cu.m (for dump truck), hp. (for tugboat, road grader, bulldozer and concrete vibrator), cfm (for compressor), gal. (for water truck with pump), amp. (for welding machine), bagger (for concrete mixer).

Name of Firm/Applicant

Authorized Signing Official

Date

REVISED FORM (January 2011)

## OMNIBUS SWORN STATEMENT FOR SOLE PROPRIETORSHIP

REPUBLIC OF THE PHILIPPINES)  
CITY OF \_\_\_\_\_)SS

### AFFIDAVIT

I (Name), of legal age, (Civil Status), (Nationality), and residing at (Address), after having been duly sworn in accordance with law, do hereby depose and state that:

1. I am the sole proprietor or authorized representative of (Name of Bidder) with office address at \_\_\_\_\_:
2. As the owner and sole proprietor or authorized representative of (Name of Bidder), I have full power and authority to do, execute and perform any and all acts necessary to participate, submit the bid, and to sign and execute the ensuing contract for (Name of Project) of the Philippine Ports Authority, (as shown in the attached duly notarized "Special Power of Attorney" for the authorized representative);
3. (Name of Bidder) is not "blacklisted" or barred from bidding by the Government of the Philippines or any of its agencies, offices, corporations, or Local Government Units, foreign government / foreign or international financing institution whose blacklisting rules have been recognized by the Government Procurement Policy Board;
4. Each of the documents submitted in satisfaction of the bidding requirements is an authentic copy of the original, complete, and all statements and information provided therein are true and correct;
5. (Name of Bidder) is authorizing the Head of the Procuring Entity or its duly authorized representative(s) to verify all the documents submitted;
6. The owner or sole proprietor is not related to the Head of Procuring Entity, members of the Bids and Awards Committee (BAC), the Technical Working Group, and the BAC Secretariat, the head of the Project Management office or the end – user unit, and the project consultants by consanguinity or affinity up to the third civil degree;
7. (Name of Bidder) complies with existing labor laws and standards; and
8. (Name of Bidder) is aware of and has undertaken the following responsibilities as a Bidder:
  - a) Carefully examine all of the Bidding Document;
  - b) Acknowledge all conditions, local or otherwise, affecting the implementation of the contract;
  - c) Made an estimate of the facilities available and needed for the contract to be bid, if any; and
  - d) Inquire or secure Supplemental / Bid Bulletin(s) issued for the *Construction of Back-up Area, Port of Getafe, Bohol*.

9. (Name of Bidder) did not give or pay directly or indirectly, any commission, amount, fee, or any form of consideration, pecuniary or otherwise, to any person or official, personnel or representative of the government in relation to any procurement project or activity.

IN WITNESS WHEREOF, I have hereunto set my hand this \_\_\_\_ day of \_\_\_\_ 20\_\_ at \_\_\_\_\_, Philippines.

\_\_\_\_\_  
Bidder's Representative / Authorized Signatory

**SUBSCRIBED AND SWORN** to before me this \_\_\_\_ day of [month] [year] at [place of execution], Philippines. Affiant/s is/are personally known to me and was/were identified by me through competent evidence of identity as defined in the 2004 Rules on Notarial Practice (A.M. No. 02-8-13-SC). Affiant/s exhibited to me his/her [insert type of government identification card used], with his/her photograph and signature appearing thereon, with no. \_\_\_\_\_ and his/her Community Tax Certificate No. \_\_\_\_\_ issued on \_\_\_\_ at \_\_\_\_\_.

Witness my hand and seal this \_\_\_\_ day of [month] [year].

**NAME OF NOTARY PUBLIC**

Serial No. of Commission \_\_\_\_\_  
Notary Public for \_\_\_\_\_ until \_\_\_\_\_  
Roll of Attorneys No. \_\_\_\_\_  
PTR No. \_\_\_\_\_ [date issued], [place issued]  
IBP No. \_\_\_\_\_ [date issued], [place issued]

Doc. No. \_\_\_\_\_  
Page No. \_\_\_\_\_  
Book No. \_\_\_\_\_  
Series of \_\_\_\_\_

## OMNIBUS SWORN STATEMENT FOR PARTNERSHIP OR COOPERATIVE

REPUBLIC OF THE PHILIPPINES)  
CITY OF \_\_\_\_\_)SS

### AFFIDAVIT

I (Name), of legal age, (Civil Status), (Nationality), and residing at (Address), after having been duly sworn in accordance with law, do hereby depose and state that:

1. I am the duly authorized and designated representative of (Name of Bidder) with office address at (Address);
2. I am granted full power and authority to do, execute and perform any and all acts necessary to participate, submit the bid, and to sign and execute the ensuing contract for (Name of Project) of the Philippine Ports Authority, accompanied by the duly notarized Special Power of Attorney, Board/Partnership Resolution or Secretary's Certificate (whichever is applicable);
3. (Name of Bidder) is not "blacklisted" or barred from bidding by the Government of the Philippines or any of its agencies, offices, corporations, or Local Government Units, foreign government / foreign or international financing institution whose blacklisting rules have been recognized by the Government Procurement Policy Board;
4. Each of the documents submitted in satisfaction of the bidding requirements is an authentic copy of the original, complete, and all statements and information provided therein are true and correct;
5. (Name of Bidder) is authorizing the PPA General Manager or its duly authorized representative(s) to verify all the documents submitted;
6. None of the officers and members of (Name of Bidder) is related to the PPA General Manager, members of the Bids and Awards Committee (BAC), the Technical Working Group, and the BAC Secretariat, the head of the Project Management office or the end- user unit, and the project consultants by consanguinity or affinity up to the third civil degree;
7. (Name of Bidder) complies with existing labor laws and standards; and
8. (Bidder) is aware of and has undertaken the following responsibilities as a Bidder:
  - a) Carefully examine all of the Bidding Document;
  - b) Acknowledge all conditions, local or otherwise, affecting the implementation of the contract;
  - c) Made an estimate of the facilities available and needed for the contract to be bid, if any; and
  - d) Inquire or secure Supplemental / Bid Bulletin(s) issued for the *Construction of Back-up Area, Port of Getafe, Bohol*.



9. (Name of Bidder) did not give or pay directly or indirectly, any commission, amount, fee, or any form of consideration, pecuniary or otherwise, to any person or official, personnel or representative of the government in relation to any procurement project or activity.

IN WITNESS WHEREOF, I have hereunto set my hand this \_\_\_\_ day of \_\_\_\_ 20\_\_ at \_\_\_\_\_, Philippines.

\_\_\_\_\_  
Bidder's Representative / Authorized Signatory

**SUBSCRIBED AND SWORN** to before me this \_\_\_\_ day of [month] [year] at [place of execution], Philippines. Affiant/s is/are personally known to me and was/were identified by me through competent evidence of identity as defined in the 2004 Rules on Notarial Practice (A.M. No. 02-8-13-SC). Affiant/s exhibited to me his/her [insert type of government identification card used], with his/her photograph and signature appearing thereon, with no. \_\_\_\_\_ and his/her Community Tax Certificate No. \_\_\_\_\_ issued on \_\_\_\_ at \_\_\_\_\_.

Witness my hand and seal this \_\_\_\_ day of [month] [year].

**NAME OF NOTARY PUBLIC**

Serial No. of Commission \_\_\_\_\_

Notary Public for \_\_\_\_\_ until \_\_\_\_\_

Roll of Attorneys No. \_\_\_\_\_

PTR No. \_\_\_\_\_ [date issued], [place issued]

IBP No. \_\_\_\_\_ [date issued], [place issued]

Doc. No. \_\_\_\_\_

Page No. \_\_\_\_\_

Book No. \_\_\_\_\_

Series of \_\_\_\_\_

## OMNIBUS SWORN STATEMENT FOR CORPORATION OR JOINT VENTURE

REPUBLIC OF THE PHILIPPINES)  
CITY OF \_\_\_\_\_)SS

### AFFIDAVIT

I ( Name ), of legal age, (Civil Status), (Nationality), and residing at (Address), after having been duly sworn in accordance with law, do hereby depose and state that:

1. I am the duly authorized and designated representative of (Name of Bidder) with office address at \_\_\_\_\_:
2. I am granted full power and authority to do, execute and perform any and all acts necessary to participate, submit the bid, and to sign and execute the ensuing contract for (Name of Project) of the Philippine Ports Authority, accompanied by the duly notarized Special Power of Attorney, Board Resolution or Secretary's Certificate;
3. (Name of Bidder) is not "blacklisted" or barred from bidding by the Government of the Philippines or any of its agencies, offices, corporations, or Local Government Units, foreign government / foreign or international financing institution whose blacklisting rules have been recognized by the Government Procurement Policy Board;
4. Each of the documents submitted in satisfaction of the bidding requirements is an authentic copy of the original, complete, and all statements and information provided therein are true and correct;
5. (Name of Bidder) is authorizing the PPA General Manager or its duly authorized representative(s) to verify all the documents submitted;
6. None of the officers, directors, and controlling stockholders of (Name of Bidder) is related to the PPA General Manager, members of the Bids and Awards Committee (BAC), the Technical Working Group, and the BAC Secretariat, the head of the Project Management office or the or end- user unit, and the project consultants by consanguinity or affinity up to the third civil degree;
7. (Name of Bidder) complies with existing labor laws and standards; and
8. (Name of Bidder) is aware of and has undertaken the following responsibilities as a Bidder:
  - a) Carefully examine all of the Bidding Document;
  - b) Acknowledge all conditions, local or otherwise, affecting the implementation of the contract;
  - c) Made an estimate of the facilities available and needed for the contract to be bid, if any; and
  - d) Inquire or secure Supplemental / Bid Bulletin(s) issued for the *Construction of Back-up Area, Port of Getafe, Bohol*.

9. (Name of Bidder) did not give or pay directly or indirectly, any commission, amount, fee, or any form of consideration, pecuniary or otherwise, to any person or official, personnel or representative of the government in relation to any procurement project or activity.

IN WITNESS WHEREOF, I have hereunto set my hand this \_\_\_\_ day of \_\_\_\_ 20\_\_ at \_\_\_\_\_, Philippines.

\_\_\_\_\_  
Bidder's Representative / Authorized Signatory

**SUBSCRIBED AND SWORN** to before me this \_\_\_\_ day of [month] [year] at [place of execution], Philippines. Affiant/s is/are personally known to me and was/were identified by me through competent evidence of identity as defined in the 2004 Rules on Notarial Practice (A.M. No. 02-8-13-SC). Affiant/s exhibited to me his/her [insert type of government identification card used], with his/her photograph and signature appearing thereon, with no. \_\_\_\_\_ and his/her Community Tax Certificate No. \_\_\_\_\_ issued on \_\_\_\_ at \_\_\_\_\_.

Witness my hand and seal this \_\_\_\_ day of [month] [year].

**NAME OF NOTARY PUBLIC**

Serial No. of Commission \_\_\_\_\_

Notary Public for \_\_\_\_\_ until \_\_\_\_\_

Roll of Attorneys No. \_\_\_\_\_

PTR No. \_\_\_\_\_ [date issued], [place issued]

IBP No. \_\_\_\_\_ [date issued], [place issued]

Doc. No. \_\_\_\_\_

Page No. \_\_\_\_\_

Book No. \_\_\_\_\_

Series of \_\_\_\_\_

REPUBLIC OF THE PHILIPPINES)  
CITY OF \_\_\_\_\_)S.S.

**BID-SECURING DECLARATION**  
Invitation to Bid No. \_\_\_\_\_

To : Philippine Ports Authority  
Bonifacio Drive, South Harbor,  
Port Area, manila

I, the undersigned, declare that:

1. I understand that, according to your conditions, bids must be supported by a Bid Security, which may be in the form of a Bid-Securing Declaration.
2. I/We accept that: (a) I/we will be automatically disqualified from bidding for any contract with any procuring entity for a period of two (2) years upon receipt of your Blacklisting Order; and, (b) I/we will pay the applicable fine provided under Section 6 of the Guidelines on the Use of Bid Securing Declaration, within fifteen (15) days from receipt of the written demand by procuring entity for the commission of acts resulting to the enforcement of the bid securing declaration under Sections 23.1 (b), 34.2, 40.1 and 69.1, except 69.1(f), of the IRR of RA 9184; without prejudice to other legal action the government may undertake:
3. I understand that this Bid-Securing Declaration shall cease to be valid on the following circumstances:
  - (a) Upon expiration of the bid validity period, or any extension thereof pursuant to your request;
  - (b) I am declared ineligible or post-disqualified upon receipt of your notice to such effect, and (i) I failed to timely file a request for reconsideration or (ii) I filed a waiver to avail of said right;
  - (c) I am declared as the bidder with the Lowest Calculated Responsive Bid, and I have furnished the performance security and signed the Contract.

IN WITNESS WHEREOF, I have hereunto set my hand this \_\_\_\_\_ day of \_\_\_\_\_ 20 \_\_\_\_ at \_\_\_\_\_, Philippines.

\_\_\_\_\_  
Name of Bidder's Authorized Representative  
(Signatory's Legal Capacity)  
AFFIANT

**SUBSCRIBED AND SWORN** to before me this \_\_\_\_ day of *[month]* *[year]* at *[place of execution]*, Philippines. Affiant/s is/are personally known to me and was/were identified by me through competent evidence of identity as defined in the 2004 Rules on Notarial Practice (A.M. No. 02-8-13-SC). Affiant/s exhibited to me his/her *[insert type of government identification card used]*, with his/her photograph and signature appearing thereon, with no. \_\_\_\_\_.

Witness my hand and seal this \_\_\_\_ day of *[month]* *[year]*.

**NAME OF NOTARY PUBLIC**

Serial No. of Commission \_\_\_\_\_  
Notary Public for \_\_\_\_\_ until \_\_\_\_\_  
Roll of Attorneys No. \_\_\_\_\_  
PTR No. \_\_, *[date issued]*, *[place issued]*  
IBP No. \_\_, *[date issued]*, *[place issued]*  
Doc. No. \_\_\_\_  
Page No. \_\_\_\_  
Book No. \_\_\_\_  
Series of \_\_\_\_.

## CONSTRUCTION METHODOLOGY

Name of Project : \_\_\_\_\_  
Proposed Project Description : \_\_\_\_\_  
Location : \_\_\_\_\_

### MINIMUM SCOPE OF CONSTRUCTION METHODOLOGY

#### A. BACK-UP AREA

1. Demolition and disposal of existing concrete pavement (299 sq.m.)
2. Excavation of existing seabed (11,568 cu.m.)
3. Excavation of existing fill materials (60 cu.m.)
4. Supply and placing of concrete (541 cu.m.)
5. Supply and installation of steel reinforcement (56,864 kg.)
6. Supply and installation of concrete blocks (229 cu.m.)
7. Supply, driving and chipping of PSC sheet piles and corner piles (6,594 l.m.)
8. Supply and installation of core rocks (11,178 cu.m.)
9. Supply and placing of fill materials (21,674 cu.m.)
10. Supply and placing of aggregate base course (61 cu.m.)
11. Construction of Portland cement concrete pavement (299 sq.m.)
12. Supply and installation of Tie-rods (90 sets)
13. Supply and installation of rubber dock fenders and mooring bollards (21 sets)
14. Construction of Security Fence (45 l.m.)

#### NOTES:

The narrative construction method will guide and familiarize the contractor and the PPA on how the project shall be carried out in accordance with the highest standard of workmanship.

The construction method shall be consistent with the Bar Chart / S-Curve Schedule, Equipment Schedule and Manpower Schedule.

\_\_\_\_\_  
Signature  
(Authorized Signing Official)

**MANPOWER SCHEDULE**

Name of Project : \_\_\_\_\_

Proposed Project Description : \_\_\_\_\_

Location : \_\_\_\_\_

MANPOWER (Minimum)	CONTRACT DURATION (_____ Calendar Days)											
	M O N T H L Y											
	1	2	3	4	5	6	7	8	9	10	11	12
Project Manager												
Project Engineer												
Materials Engineer												
Construction Safety and Health Officer												
Foreman												
Specify other applicable positions, ie.:												
- Carpenter												
- Steelman												
- Mason												
- Electrician												
- Rigger												
- Others												

\_\_\_\_\_  
Signature  
(Authorized Signing Official)

## EQUIPMENT UTILIZATION SCHEDULE

**Name of Project** : \_\_\_\_\_

**Proposed Project Description** : \_\_\_\_\_

**Location** : \_\_\_\_\_

[illegible]

Signature  
(Authorized Signing Official)



## CASHFLOW BY QUARTER AND PAYMENT SCHEDULE

Name of Project: : \_\_\_\_\_

Proposed Project Description : \_\_\_\_\_

Location : \_\_\_\_\_

Project Duration (days or months)	Payment Schedule (Monthly, in Pesos)	Cash flow (Quarterly, in Pesos)
<b>TOTAL</b>		

### NOTES

- The cash flow by quarter and payment schedule should be consistent with the Bar Chart and S-curb.
- Payment schedule shall not be more than once a month.

\_\_\_\_\_  
Signature  
(Authorized Signing Official)

**SECTION X**  
**CONTRACT FORM**

Republic of the Philippines  
**PHILIPPINE PORTS AUTHORITY**  
PPA Building, Bonifacio Drive, South Harbor,  
Port Area, Manila, Philippines

**CONTRACT**  
**FOR THE CONSTRUCTION OF BACK-UP AREA**  
**PORT OF GETAFE, BOHOL**

This Contract made and entered into this \_\_\_\_\_ day of \_\_\_\_\_ 2019, in Manila, Philippines, by and between:

**PHILIPPINE PORTS AUTHORITY**, a government instrumentality created under Presidential Decree No. 857, as amended, with principal office at PPA Building, Bonifacio Drive, South Harbor, Port Area, Manila, represented herein by its duly authorized General Manager, **JAY DANIEL R. SANTIAGO**, and hereinafter referred to as "PPA";

- and -

\_\_\_\_\_, duly organized and existing in accordance with Philippine laws, with office and business address at \_\_\_\_\_, represented in this act by its \_\_\_\_\_, as evidenced by \_\_\_\_\_, a copy of which is hereto attached and made an integral part hereof as Annex "A", and hereinafter referred to as "CONTRACTOR."

**WITNESSETH:**

WHEREAS, in accordance with Republic Act No. 9184 and its 2016 Implementing Rules and Regulations (IRR), PPA advertised and posted on the PPA website and PhilGEPS, as well as on its bulletin board, an Invitation to Bid for the \_\_\_\_\_;

WHEREAS, in response to the said advertisement \_\_\_\_\_ bidders submitted their respective bids for the foregoing project;

WHEREAS, after the opening of bids on \_\_\_\_\_ and the conduct of bid evaluation and post-qualification, the bid submitted by the CONTRACTOR at its unit and lump sum prices set forth in its proposal was found to be the \_\_\_\_\_ Bid in the amount of \_\_\_\_\_ PESOS ( ), Philippine Currency;

WHEREAS, pursuant to Head Office BAC Resolution No. \_\_\_\_\_ Series of \_\_\_\_\_, award of contract was made to the CONTRACTOR in a Notice of Award dated \_\_\_\_\_, in the amount of \_\_\_\_\_ PESOS ( ), after submission of the required documents within the prescribed period and compliance to the conditions stipulated in the IRR;

WHEREAS, the CONTRACTOR duly accepted the award by signing its Conforme on the said Notice of Award;

NOW, THEREFORE, for and in consideration of the foregoing premises and the mutual stipulations herein contained, PPA and the CONTRACTOR have agreed, as follows:

1. In this Contract, words and expressions shall have the same meanings as are respectively assigned to them in the attached Contract Documents.
2. The following documents shall form part of this Contract:
  - A. Bid Documents consisting of the following:
    - A.1 Invitation to Bid;
    - A.2 Instructions to Bidders;
    - A.3 Bid Data Sheet;
    - A.4 General and Special Conditions of Contract;
    - A.5 Specifications
    - A.6 Drawings/Plans;
    - A.7 Addenda and/or Supplemental/Bid Bulletins, if any;
  - B. Technical and Financial Proposals;
  - C. Performance Security;
  - D. Notice of Award of Contract with the Contractor's Conforme thereto; and
  - E. Other contract documents that may be required by existing laws and PPA, such as:
    - E.1 Construction Schedule and S-Curve;
    - E.2 Manpower Schedule;
    - E.3 Construction Methods;
    - E.4 Equipment Utilization Schedule;
    - E.5 Construction Safety and Health Program approved by the DOLE;
    - E.6 Per/CPM
    - E.7 Duly Approved Program of Works and Cost Estimates;
    - E.8 Certificate of Availability of Funds;
    - E.9 Abstract of Bids; and
    - E.10 Resolution of Award
3. In consideration of the payments to be made by PPA, the CONTRACTOR commits to complete the Works and remedy any defects therein in conformity with the provisions of this Contract and Contract Documents.
4. In consideration of the execution and completion of the Works and remedying any defects therein, PPA commits to pay the Contract Price or such other sum as may become payable under the provisions of this Contract and Contract Documents.

5. This Contract shall become effective after the same shall have been signed by the Parties hereof.

IN WITNESS WHEREOF, the Parties have hereunto signed this Contract on the date and place first hereinabove written.

PHILIPPINE PORTS AUTHORITY

TIN No. \_\_\_\_\_

By:

JAY DANIEL R. SANTIAGO

General Manager

WITNESSES:

\_\_\_\_\_

ACKNOWLEDGMENT