

a.2 Aggregates

Submit test results for aggregate quality in accordance with ASTM C 33. Where there is potential for alkali-silica reaction, provide results of tests conducted in accordance with ASTM C 227 or ASTM C 1260. Submit results of all tests during progress of the work in tabular and graphical form as noted above, describing the cumulative combined aggregate grading and the percent of the combined aggregate retained on each sieve.

a.3 Admixtures

Submit test results in accordance with ASTM C 494 and ASTM C 1017 for concrete admixtures, ASTM C 260 for air-entraining agent, and manufacturer's literature and test reports for corrosion inhibitor and anti-washout admixture. Submitted data shall be based upon tests performed within 6 months of submittal.

a.4 Cement

Submit test results in accordance with ASTM C 150 Portland cement. Submit current mil data.

a.5 Water

Submit test results in accordance with ASTM D 512 and ASTM D 516.

b. Submit Certificates for the following:

b.1 Curing concrete elements

Submit proposed materials and methods for curing concrete elements.

b.2 Form removal schedule

Submit proposed materials and methods for curing concrete elements.

b.3 Concrete placement and compaction

Submit technical literature for equipment and methods proposed for use in placing concrete. Include pumping or conveying equipment including type, size and material for pipe, valve characteristics, and the maximum length and height concrete will be pumped. No adjustments shall be made to the mixture design to facilitate pumping.

Submit technical literature for equipment and methods proposed for vibrating and compacting concrete. Submittal shall include technical literature describing the equipment including vibrator diameter, length, frequency, amplitude, centrifugal force, and manufacturer's description of the radius of influence under load. Where flat work is to be cast, provide similar information relative to the proposed compacting screed or other method to ensure dense placement.

b.4 Mixture designs

Provide a detailed report of materials and methods used, test results, and the field test strength (fcr) for marine concrete required to meet durability requirements.

2. The Contractor shall submit shop drawings and erection drawings for formwork and scaffolding at least 14 days prior to commencing the work.

Each shop drawing and erection drawing shall bear the signature of a Contractor's qualified Engineer. Details of all proposed formwork to be prefabricated and formwork to produce special finishes shall be submitted to the Engineer for approval before any materials are ordered. If the Engineer so requires, samples of proposed formworks shall be constructed and concrete placed at the Contractor's expense so that the proposed methods and finished effect can be demonstrated.

The Contractor shall submit shop drawings showing reinforcing bar placing and bar lists for the Engineer's approval. Such shop drawings shall show also supplemental bars for forming, strengthening frames of bars of sufficient rigidity to withstand forces during placing concrete. If necessary, shaped steel may be added to improve rigidity of the frame of bar.

Such shop drawings shall clearly indicate bar sizes, spacing, location and quantities of reinforcement, mesh, chairs, spacers and other details to be as per ACI Manual of Standard Practice for Detailing Reinforced Concrete Structures.

Details shall be prepared for placement of reinforcement where special conditions occur, including most congested areas and connection between pre-cast concrete and concrete in-situ.

All shop drawings shall be reviewed by the Engineer within seven (7) days after receiving them. At least two (2) days prior to pouring concrete, the Contractor shall submit to the Engineer a pouring permit for his inspection and approval.

MATERIAL REQUIREMENTS

CEMENT

Unless otherwise specified in the Drawings, only one (1) brand of cement shall be used for any individual structure. In determining the approved mix, only Portland cement shall be used as the cementitious material.

1. Portland Cement: ASTM C 150

Type II (for general use, more especially when moderate Sulfate resistance is desired)

ADMIXTURE (IF NECESSARY)

Unless otherwise required by field conditions, admixture may be used subject to the expressed approval of the Engineer. The cost of which shall already be included in the unit cost bid of the Contractor for the concrete.

1. Air Entraining Admixture shall conform to ASTM C 260.
2. Admixture other than air entraining agent shall conform to ASTM C 494.
3. Admixture containing chloride ions, or other ions producing deleterious effect shall

not be used.

AGGREGATES

1. Crushed Coarse Aggregate

Conforming to ASTM C 33 and having nominal sizes passing 38.0 mm to 19.0 mm, 19.0 mm to 9.5 mm to No. 4 sieve. The material shall be well graded between the limits indicated and individually stockpiled. It shall be the Contractor's responsibility to blend the materials to meet the gradation requirements for various types of concrete as specified herein.

Nominal sizes for combined gradation shall be as follows:

ASTM Sieves	Nominal Size of Coarse Aggregates			
	% by Weight Passing			
	40mm	25mm	19mm	10mm
50.0mm (2")	100	-	-	-
38.0mm (1 1/2")	95 - 100	100	-	-
31.8mm (1 1/4")	-	90 - 100	100	-
25.0mm (1")	-	-	90 - 100	-
19.0mm (3/4")	35 - 70	25 - 90	-	100
16.0mm (5/8")	-	-	20 - 55	85 - 100
9.5mm (3/8")	10 - 30	0 - 10	0 - 10	0 - 20
No. 4	0 - 5			

2. Fine Aggregate

ASTM C 33 except for gradation which has been revised to meet local conditions unless otherwise required by the Engineer, grading of fine aggregate shall be as follows:

ASTM Sieves	% by Weight Passing
9.5mm (3/8")	100
No.4	90 - 100
No. 8	80 - 100
No. 16	50 - 90
No. 30	25 - 60
No. 50	5 - 30
No. 100	0 - 10

- a. Grading of fine aggregates shall be reasonably uniform and fineness modulus thereof shall not vary more than 0.2 from that of the representative sample in which mix proportions of concrete are based.
- b. Due care shall be taken to prevent segregation.

WATER

The mixing water shall be clear and apparently clean. If it contains quantities or substances that discolor it or make it smell or taste unusual or objectionable, or cause suspicion, it shall not be used unless service records of concrete made with it (or other information) indicated that it is not injurious to the quality, shall be subject to the acceptance criteria as shown in Table 6.3 and Table 6.4 or as designated by the purchaser.

When wash water is permitted, the producer will provide satisfactory proof or data of non-detrimental effects if potentially reactive aggregates are to be used. Use of wash water will be discontinued if undesirable reactions with admixtures or aggregates occur.

Table 6.3 Acceptance Criteria for Questionable Water Supplies

Test	Limits
Compressive strength, min. % Control at 7 days	90
Time of Setting deviation from control	from 1:00 earlier to 1:30 later
Time of Setting (Gillmore Test) Initial Final Set	No marked change No marked change
Appearance	Clear
Color	Colorless
Odor	Odorless
Total Solids	500 parts/million max.
PH value	4.5 to 8.5

Table 6.4 Chemical Limitation for Wash Water

	Limits
Chemical Requirements, Minimum Concentration	
Chloride as $\text{Cl}^{(-)}$ expressed as a mass percent of cement when added to the $\text{Cl}^{(-)}$ in the other components of the concrete mixtures shall not exceed the following levels:	
1. Prestressed Concrete	0.06 percent
2. Conventionally reinforced concrete in a moist environment and exposed to chloride	0.10 percent
3. Conventionally reinforced concrete in a moist environment but not exposed to chloride	0.15 percent
4. Above ground building construction where the concrete will stay dry	No limit for corrosion
Sulfate as SO_4 , ppm ^A	3,000
Alkalies as $(\text{Na}_2\text{O} + 0.658 \text{ K}_2\text{O})$, ppm	600
Total Solids, ppm	50,000

Wash water reused as mixing water in concrete may exceed the listed concentrations of sulfate if it can be shown that the concentration calculated in the total mixing water, including mixing water on the aggregate and other sources, does not exceed that stated limits.

Water will be tested in accordance with, and shall meet the suggested requirements of AASHTO T 26.

Water known to be of potable quality may be used without test.

CURING MATERIALS

1. Impervious Sheet Materials

ASTM C 171 type, optional, except that polyethylene film, if used, shall be white opaque.

2. Burlap of commercial quality, non-staining type, consisting of 2 layers minimum.

3. Membrane Forming Curing Compound

ASTM C 309; submit evidence that product conforms to specifications.

JOINTING MATERIALS

1. Sealant

Sealant shall be multi-component, polyurethane base compound, gray in color, self-leveling for horizontal joints, 2 part polythremdyne, terpolymer compound, gray in color, non-sag for vertical joints.

Sealant shall be compatible with materials in contact and to perform satisfactorily under salt water and traffic conditions, and be capable of making joint watertight and allow movement 25% of the width of joint in any direction.

Sealant shall be guaranteed against leakage, cracking, crumbling, melting, shrinkage, running, loss of adhesion for a period of five years from the date of acceptance of work.

2. Joint backing shall be expanded extruded polyethylene, low density, oval in shape to fit the joints as indicated on the drawings and to be compatible with sealant.
3. Where required, primer shall be compatible with joint materials and installed in accordance with manufacturer's instructions.
4. Joint filler shall conform to ASTM D1751 (AASHTO M213) non-extruding, resilient bituminous type. Filler shall be furnished for each joint in single piece for depth and width required for joint, unless otherwise authorized by the Engineer. When more than one piece is authorized for a joint, abutting ends shall be fastened and hold securely to shape by stapling or other positive fastening.

EPOXY BONDING COMPOUND

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 and 16°C; or Class C if placement temperature is above 16°C.

REINFORCEMENT

Steel reinforcement, other than Steel for Pre-stressing, used in Reinforced Concrete, shall conform to ASTM and PNS as follows:

ASTM Designation A615 - Deformed Billet Steel Bars for Concrete Reinforcement.
Minimum yield strength of 276 MPa (40,000 psi).

PNS 49 - Steel Bars for Concrete Reinforcement

TIE WIRE

Tie wire shall be plain, cold drawn annealed steel wire 1.6 mm diameter.

SAMPLES AND TESTING

1. Cement

Sampled either at the mill or at the site of work and tested by an independent commercial or government testing laboratory duly accredited by the Bureau of Research and Standards (BRS) of the DPWH, Department of Science and Technology (DOST) or the Department of Trade and Industry (DTI) at no additional cost to PPA. Certified copies of laboratory test reports shall be furnished for each lot of cement and shall include all test data, results, and certificates that the sampling and testing procedures are in conformance with the Specifications. No cement shall be used until notice has been given by the Engineer that the test results are satisfactory. Cement that has been stored, other than in bins at the mills, for more than 3 months after delivery to the Site shall be re-tested before use. Cement delivered at the Site and later found after test to be unsuitable shall not be incorporated into the permanent works.

2. Aggregates: Tested as prescribed in ASTM C 33

At least 28 days prior to commencing the work, the Contractor shall inform the Engineer of the proposed source of aggregates and provide access for sampling.

Gradation tests will be made on each sample without delay. All other aggregates tests required by these Specifications shall be made on the initial source samples, and shall be repeated whenever there is a change of source. The tests shall include an analysis of each grade of material and an analysis of the combined material representing the aggregate part of the mix.

3. Reinforcement

Certified copies of mill certificates shall accompany deliveries of steel bar reinforcement. If requested by the Engineer additional testing of the materials shall be made at the Contractor's expense.

4. Concrete Tests

For test purposes, provide 1 set of three (3) concrete cylinder samples taken from each day's pouring and to represent not more than 75 cu.m. of concrete class or fraction thereof of concrete placed. Samples shall be secured in conformance with ASTM C 172. Tests specimens shall be made, cured, and packed for shipment in accordance with ASTM C 31. Cylinders will be tested by and at the expense of the Contractor in accordance with ASTM C 39. Test specimens will be evaluated separately by the Engineer, for meeting strength level requirements for each with concrete quality of ACI 318. When samples fail to conform to the requirements for strengths, the Engineer shall have the right to order a change in the proportions of the concrete mix for the remaining portions of the work at no additional cost to the Authority.

5. Test of Hardened Concrete in or Removed from the Structure

When the results of the strength tests of the concrete specimens indicates the concrete as placed does not meet the Specification requirements or where there are other evidences that the quality of concrete is below the specification requirement in the opinion of the Engineer, tests on cores of in-place concrete shall be made in conformance with ASTM C 42.

Core specimens shall be obtained by the Contractor and shall be tested. Any deficiency shall be corrected or if the Contractor elects, he may submit a proposal for approval before the load test is made. If the proposal is approved, the load test shall be made by the Contractor and the test results evaluated by the Engineer in conformance with Chapter 20 of ACI 318. The cost of the load tests shall be borne by the Contractor. If any concrete shows evidence of failure during the load test, or fails the load test as evaluated, the deficiency be corrected in a manner approved by the Engineer at no additional cost to the Authority.

6. Chemical Admixtures/Additives

The admixtures/additives if approved shall conformed to ASTM C 494 and ASTM C 1017. The testing shall be conducted with cement and aggregate proposed for the Project. The admixtures/additives shall be tested and those that have been in storage at the Project Site for longer than six (6) months shall not be used until proven by retest to be satisfactory.

Samples of any admixtures/additives proposed by the Contractor shall be submitted for testing at least 56 days in advance of use, which shall require approval of the Engineer. Testing of admixtures/additives proposed by the Contractor including test mixing and cylinder

test shall be at the Contractor's expense.

7. Jointing Materials and Curing Compound Samples

At least 28 days prior to commencing the work, the Contractor shall submit to the Engineer for his approval samples of the following materials proposed for use together with manufacturer's certificate.

- a. 10 kg of joint sealant
- b. 1m length of joint filler
- c. 5 li. of curing compound
- d. 1m length of joint backing

The Engineer shall deliver to the Contractor his assessment on the materials within seven (7) days after receiving them.

EXECUTION

DELIVERY, STORAGE AND HANDLING OF MATERIALS

1. Cement

Do not deliver concrete until vapor barrier, forms, reinforcement, embedded items, and chamfer strips are in place and ready for concrete placement. ACI 301 and ASTM A 934 for job site storage of materials. Protect materials from contaminants such as grease, oil, and dirt. Ensure materials can be accurately identified after bundles are broken and tags removed.

Immediately upon receipt at the Site, the cement shall be stored separately in a dry weathertight, properly ventilated structures with adequate provisions for prevention of absorption of moisture. Storage accommodations for concrete materials shall be subject to approval and shall afford easy access for inspection and identification of each shipment in accordance with test reports.

Cement shall be delivered to the Site in bulk or in sound and properly sealed bags and while being loaded or unloaded and during transit to the concrete mixers whether conveyed in vehicles or in mechanical means, cement shall be protected from weather by effective coverings. Efficient screens shall be supplied and erected during heavy winds.

If the cement is delivered in bulk, the Contractor shall provide, at his own cost, approved silos of adequate size and numbers to store sufficient cement to ensure continuity of work and the cement shall be placed in these silos immediately after it has been delivered to the Site. Approved precautions shall be taken into consideration during unloading to ensure that the resulting dust does not constitute a nuisance.

If the cement is delivered in bags, the Contractor shall provide, at his own cost, perfectly waterproofed and well ventilated sheds having a floor of wood or concrete raised at least 0.5m above the ground. The sheds shall be large enough to store sufficient cement to ensure continuity of the work and each consignment shall be stacked separately therein to permit easy access for inspection, testing and approval. Upon delivery, the cement shall at once be placed in these sheds and shall be used in the order in which it has been delivered.

Cement bags should not be stacked more than 13 bags high. All cement shall be used within two months of the date of manufacture. If delivery conditions render this impossible, the Engineer may permit cement to be used up to three (3) month after manufacturing, subject to such conditions including addition of extra cement as he shall stipulate.

2. Aggregate

All fine and coarse aggregate for concrete shall be stored on close fitting, steel or concrete stages design with drainage slopes or in bins of substantial construction in such a manner as to prevent segregation of sizes and to avoid the inclusion of dirt and other foreign materials in the concrete. All such bins shall be emptied and cleaned at intervals of every six (6) months or as required by the Engineer. Each size of aggregate shall be stored separately unless otherwise approved by the Engineer.

Stockpiles of coarse aggregate shall be built in horizontal layers not exceeding 1.2 m in depth to minimize segregation.

FORMWORK

1. Forms

Designed, constructed, and maintained so as to insure that after removal of forms the finished concrete members will have true surfaces free of offset, waviness or bulges and will conform accurately to the indicated shapes, dimensions, lines, elevations and positions. Form surfaces that will be in contact with concrete shall be thoroughly cleaned before each use.

2. Design

Studs and wales shall be spaced to prevent deflection of form material. Forms and joints shall be sufficiently tight to prevent leakage of grout and cement paste during placing of concrete. Junction of formwork panels shall occur at vertical control joints, and construction joints. Forms placed on successive units for continuous surfaces shall be fitted in accurate alignment to assure smooth completed surfaces free from irregularities and signs of discontinuity. Temporary opening shall be arranged to wall and where otherwise required to facilitate cleaning and inspection. Forms shall be readily removable without impact, shock, or damage to the concrete.

3. Form Ties

Factory fabricated, adjustable to permit tightening of the forms, removable or snap-off metal of design that will not allow form deflection and will not spall concrete upon removal. Bolts and rods that are to be completely withdrawn shall be coated with a non-staining bond breaker. Ties shall be of the type which provide watertight concrete.

4. Chamfering

External corners that will be exposed shall be chamfered, beveled, or rounded by mouldings placed in the forms or as indicated in the drawings.

5. Coatings

Forms for exposed surfaces shall be coated with form oil or form-release agent before reinforcement is placed. The coating shall be a commercial formulation of satisfactory and proven performance that will not bond with, stain, or adversely affect concrete surfaces, and shall not impair subsequent treatment of concrete surfaces depending upon bond or adhesion nor impede the wetting of surfaces to be cured with water or curing compounds. The coating shall be used as recommended in the manufacturer's printed or written instructions. Forms for unexposed surfaces may be wet with water in lieu of coating immediately before

placing of concrete. Surplus coating on form surfaces and coating on reinforcement steel and construction joints shall be removed before placing concrete.

6. Removal of Forms shall be done in a manner as to prevent injury to the concrete and to insure complete safety of the structure after the following conditions have been met. Where the structure as a whole is supported on shores, forms for beam and girder sides, and similar vertical structural members may be removed before expiration of curing period. Care shall be taken to avoid spalling the concrete surface or damaging concrete edges. Wood forms shall be completely removed.

Minimum stripping and striking time shall be as follows unless otherwise approved by the Engineer.

Vertical sides of beams, walls, and columns, lift not 12 hours exceeding 1.2 m

Vertical sides of beams and walls, lift exceeding 1.2 m 36 hours Softlifts of main slabs and beams (props left under) 5 days

Removal of props from beams and mains slabs and other work 10 days

7. Control Test

If the Contractor proposes to remove forms earlier than the period stated above, he shall be required to submit the results of control tests showing evidence that concrete has attained sufficient strength to permit removal of supporting forms. Cylinders required for control tests shall be provided in addition to those otherwise required by this Specification. Test specimens shall be removed from molds at the end of 24 hours and stored in the structure as near the points as practicable, the same protection from the elements during curing as is given to those portions of the structure which they represent, and shall not be removed from the structure for transmittal to the laboratory prior to expiration of three fourths of the proposed period before removal of forms. Cylinders will be tested by and at the expense of the Contractor. Supporting forms or shoring shall not be removed until control test specimens have attained strength of at least 160 kg/sq cm. The newly unsupported portions of the structure shall not be subjected to heavy construction or material loading.

REINFORCEMENT

1. Reinforcement

Fabricated to shapes and dimensions shown and shall be placed where indicated. Reinforcement shall be free of loose or flaky rust and mill scale, or coating, and any other substance that would reduce or destroy the bond. Reinforcing steel reduced in section shall not be used. After any substantial delay in the work, previously placed reinforcing steel for future bonding shall be inspected and cleaned. Reinforcing steel shall not be bent or straightened in a manner injurious to the steel or concrete. Bars with kinks or bends not shown in the drawings shall not be placed. The use of heat to bend or straighten reinforcing steel shall not be permitted. Bars shall be moved as necessary to avoid interference with other reinforcing steel, conduits, or embedded items. If bars are moved more than one bar diameter, the resulting arrangement of bars including additional bars necessary to meet structural requirements shall be approved before concrete is placed. In slabs, beams and girders, reinforcing steel shall not be spliced at points of maximum stress unless otherwise indicated. Unless otherwise shown in the drawings, laps or splices shall be 40 times the reinforcing bar diameter.

2. The nominal dimensions and unit weights of bars shall be in accordance with the following table:

Nominal Diameter (mm)	Nominal Perimeter (mm)	Nominal Sectional Area (sq. mm)	Unit Weight (kg/m)
10	31.4	78.54	0.616
12	37.7	113.10	0.888
16	50.3	201.10	1.579
20	62.8	314.20	2.466
25	78.5	490.90	3.854
28	88.0	615.70	4.833
32	100.5	804.20	6.313
36	113.1	1,017.60	7.991
40	125.7	1,256.60	9.864
50	157.1	1,963.50	15.413

3. Welding of reinforcing bars shall only be permitted where shown; all welding shown shall be performed in accordance with AWS D 12.1.
4. Exposed reinforcement bars, dowels and plates intended for bonding with future extensions shall be protected from corrosion.
5. Supports shall be provided in conformance with ACI 315 and ACI 318, unless otherwise indicated or specified.
6. Concrete Protection for Reinforcement
- The minimum concrete cover of reinforcement shall be as shown below unless otherwise indicated in the drawings.
 - Tolerance for Concrete Cover of Reinforcing Steel other than Tendons.

Minimum Cover

7.5cm or more (marine structures and concrete cast against and permanently exposed to earth)

DESIGN STRENGTH OF CONCRETE

Concrete for structural parts or members such as beams, slabs, curtain wall, pile caps and fender/mooring blocks shall develop a minimum 28-day compressive cylinder strength of 24 MPa (3,500 psi) as indicated in the drawings. While for pre-stressed concrete piles a compressive strength of 35 MPa (5,000psi).

TRIAL BATCH FOR CONCRETE

Thirty (30) calendar days before the start of concreting works, the Contractor shall submit design mixes and the corresponding test result made on sample thereof. Sampling and testing shall be in

accordance with the ASTM Standard procedures for sampling and testing for the particular design strength(s) required.

The particulars of the mix such as the slump and the proportionate weights of cement, saturated surface dry aggregates and water used shall be stated.

The design mix for concrete to be used shall be submitted together with at least three (3) standard cylinder samples for approval at least one (1) month prior to the start of each concreting schedule. Such samples shall be prepared in the presence of the Engineer.

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

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

Slump Test shall be made in conformance with ASTM C143, and unless otherwise specified by the Engineer, slump shall be within the following limits:

Structural Element	Slump for Vibrated Concrete	
	Minimum	Maximum
Pavement Concrete	25mm	50mm
Pre-cast Concrete	50mm	70mm
Lean Concrete	100mm	200mm
Sacked Concrete	25mm	50mm
All other Concrete	50mm	90mm

Sampling : Provide suitable facilities and labor for obtaining representative samples of concrete for the Contractor's quality control and the Engineer's quality assurance testing. All necessary platforms, tools and equipment for obtaining samples shall be furnished by the Contractor.

MIXING CONCRETE

1. GENERAL

- a. Concrete shall be thoroughly mixed in a mixer of an approved size and type that will insure a uniform distribution of the materials throughout the mass.
- b. All concrete shall be mixed in mechanically operated mixers. Mixing plant and equipment for transporting and placing concrete shall be arranged with an ample auxiliary installation to provide a minimum supply of concrete in case of breakdown of machinery or in case the normal supply of concrete is disrupted. The auxiliary supply of concrete shall be sufficient to complete the casting of a section up to a construction joint that will meet the approval of the Engineer.
- c. Equipment having components made of aluminum or magnesium alloys, which would be in contact with plastic concrete during mixing, transporting or pumping of

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 m³ 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 03 : CONSTRUCTION JOINTS

SCOPE OF WORK

This item shall consist of the manufacturing and installation of construction joints / expansion joints in accordance with the details, and at the locations, lines, grades and dimensions shown in the drawings.

MATERIAL REQUIREMENTS

1. All construction joints / expansion joints shall be hot-dipped galvanized inside and out in accordance with international standards for galvanizing BS EN1460.
2. Painted finish shall be rejected.
3. All steel gratings and angle bars for construction joints / expansion joints shall be hot-dipped galvanized except for the nuts, washers and bolts which shall be stainless steel.
4. Welding shall be in accordance with the AWS Code and as herein specified or any other welding standard, approved by the Engineer.

The Contractor shall be required to submit test certificates for steel materials for the construction / expansion joints used in its manufacture; and for hot-dip galvanizing which shall meet or exceed the specifications under "Zinc Coating".

EXECUTION

DELIVERY, STORAGE AND INSTALLATION

1. Upon delivery at site, the hot-dipped galvanized construction joints / expansion joints shall not be subjected to the following activities:
 - a. Re-fabrication
 - b. Cutting
 - c. Grinding
 - d. Welding
 - e. Sawing
 - f. Any hot works or similar activities
2. Stainless steel nuts and bolts may be tack welded using stainless steel welding rods.
3. The construction joints / expansion joints shall not be exposed to sea water and other corrosive chemicals or substances prior to installation.

ITEM 04 : ZINC (HOT-DIP GALVANIZED) COATINGS ON IRON AND STEEL

SCOPE OF WORK

This specification covers the requirements for zinc coating (galvanizing) by the hot-dip process on iron and steel products made from rolled pressed and forged shapes, casting, plates, bars and strips.

This specification covers both fabricated and un-fabricated products, for example, assembled steel products, structural steel fabrications, large tubes already bent or welded before galvanizing, and wire work fabricated from uncoated steel wire. It also covers steel forgings and iron castings incorporated into pieces fabricated before galvanizing or which are too large to be centrifuged (or otherwise handled to remove excess galvanizing bath metal).

MATERIAL REQUIREMENTS

STEEL OR IRON

The specification, grade or designation, and type and degree of surface contamination of the iron or steel in articles to be galvanized shall be supplied by the purchaser to the hot-dip galvanizer prior to galvanizing.

The presence in steels and weld metal, in certain percentages, of some elements such as silicon, carbon and phosphorus tends to accelerate the growth of the zinc-iron alloy layer so that the coating may have a matte finish with a little or no outer zinc layer.

EXECUTION

FABRICATION

The design and fabrication of the product to be galvanized shall be in accordance to the plans and specifications. ASTM Practices A 143, A 384 and A 385 provide guidance for steel fabrication for optimum hot-dip galvanizing and shall be complied with in both design and fabrication.

CASTINGS

The composition of heat treatment of iron and steel castings shall conform to specifications designated by the purchaser. Some types of castings have been known to show potential problems being embrittled during normal thermal cycle of hot-dip galvanizing. The requirements for malleable iron castings to be galvanized are stipulated in ASTM specification A 47.

ZINC

The zinc used in the galvanizing bath shall conform to ASTM Specification B 6. If a zinc alloy is used as the primary feed to the galvanizing bath, then the base material used to make that alloy shall conform to ASTM Specification B 6.

BATH COMPOSITION

The molten metal in the working volume of the galvanizing bath shall contain not less than an average value of 98.0% zinc by weight.

COATING PROPERTIES

Table 1 – Minimum Average Coating Thickness Grade by Material Category

Material Category	All Specimens Tested Steel Thickness Range (Measured), mm (in.)				
	< 1/16 (<1.6)	1/16 to < 1/8 (1.6 to < 3.2)	1/8 to < 3/16 (3.2 to 4.8)	> 3/16 to < 1/4 (> 4.8 to < 6.4)	≥ 1/4 (≥ 6.4)
Structural Shapes & Plate	45	65	75	85	100
Strip and Bar	45	65	75	85	100
Pipe and Tubing	45	45	75	75	75
Wire	35	50	60	65	80

COATING THICKNESS

The average thickness of coating for all specimens tested shall conform to the requirements of Table 1 for the categories and thickness of the material being galvanized. Minimum average thickness of coating for any individual specimen is one coating grade less than that required in Table 1. Where products consisting of various material thicknesses or categories are galvanized, the coating thickness grades of each thickness range and material category of material shall be shown in Table 1. The specification of coating thickness heavier than those required by Table 1 shall be subject to mutual agreement between the galvanizer and Engineer.

For articles whose surface area is greater than 100,000 mm² (160 in.²) (multi-specimen articles), each test article in the sample must meet the appropriate minimum average coating thickness grade requirements of Table 1. Each specimen coating thickness grade comprising that overall average for each test article shall average not less than one coating grade below that required in Table 1.

For articles whose surface area is equal to or less than 100,000 mm² (160 in.²) (single-specimen articles), the average of all test articles in the sample must meet the appropriate minimum average coating thickness grade requirements of Table 1. For each test article, its specimen coating thickness shall not be less than one coating grade below that required in Table 1.

No individual measurement or cluster of measurements at the same general location on a test specimen shall be cause for rejection under this specification provided that when those measurements are averaged with the other dispersed measurements to determine the specimen coating thickness grade for that specimen, the requirements of the above specifications as appropriate are met.

The coating thickness grades in Table 1 represent the minimum value obtainable with a high level of confidence for the ranges typically found in each material category. While most coating thicknesses will be in excess of those values, some materials in each category may be less reactive (for example, because of chemistry or surface condition) than other materials of the steel category spectrum. Therefore, some articles may have a coating grade at or close to the minimum requirements shown in Table 1. In such cases, the precision and accuracy of the coating thickness measuring technique should be taken into consideration when rejecting such articles for coating thickness below that is required by this specification.

FINISH

The coating shall be continuous (except as provided below), and as reasonably smooth and uniform in thickness as the weight size and shape of the item. Except for local excess coating thickness which would interfere with the use of the product or make it dangerous to handle (edge tears or spikes), rejection for non-uniform coating shall be made only for plainly visible excess coating not related to design factors such as holes, joints, or special drainage problems. Since surface smoothness is a relative term, minor roughness that does not interfere with the intended use of the product, or roughness that is related to the as-received (un-galvanized) surface condition, steel chemistry to zinc shall not be grounds for rejection.

Surfaces that remain uncoated after galvanizing may be renovated in accordance with the methods in ASTM Practice A 780 provided that the following conditions are met:

1. Each area subject to renovation shall be 25mm (1 in.) or less in its narrowest dimension.
2. The total area subject to renovation on each article shall be no more than $\frac{1}{2}$ of 1% of the accessible surface area to be coated on that article, or 22,500mm² (36 in.²) per ton of piece weight, whichever is less. Inaccessible surface areas are those which cannot be reached for appropriate surface preparation and application of repair materials as described in ASTM Practice A 780.
3. The thickness of renovation shall be that is required by the thickness grade for the appropriate material category and thickness range in Table 1 in accordance with the coating thickness requirements, except that for renovation using zinc paints, the thickness of renovation shall be 50% higher than that required by table 1, but not greater than 0.0254mm (4.0 mils).
4. When areas requiring renovation exceed the criteria previously provide, or are inaccessible for repair, the coating shall be rejected.

THREADED COMPONENTS IN ASSEMBLIES

The zinc coating on external threads shall not be subjected to a cutting, rolling or finishing tool operation, unless specifically authorized by the purchaser. Internal threads may be tapped or retapped after galvanizing. Coatings shall conform to the requirements of ASTM Specification A 153/A 153 M.

APPEARANCE

Upon shipment from the galvanizing facility, galvanized articles shall be free from uncoated areas, blisters, flux deposits and gross dross inclusions. Lumps, projections, globules or heavy deposits of zinc which will interfere with the intended use of the material will not be permitted. Plain holes of 12.5mm (1/2 in.) diameter or more shall be clean and reasonably free from excess zinc. Marks in the zinc coating caused by tongs or other items used in handling the article during the galvanizing operation shall not be cause for rejection unless such marks have exposed the base metal, and the bare metal areas exceed the criteria provided in number 1 and 2 of Subsection "Finish".

Whenever dross is present in a form other than finely dispersed pimples in the coating and is present in such amount as to be susceptible to mechanical damage, it will be considered as "gross".

ADHERENCE

The zinc coating shall withstand handling consistent with the nature and thickness of the coating and the normal use of the article, without peeling or flaking. Although some material may be formed after galvanizing, in general the zinc coating on the articles covered by this specification is too heavy to permit severe bonding without damaging the coating.

SAMPLING

A lot is a unit of production or shipment from which a sample may be taken for testing. Unless otherwise agreed upon between the galvanizer and the purchaser, or established within this specification, the lot shall be as follows:

1. For testing at a galvanizer's facility, a lot is one or more articles of the same type and size comprising a single order or a single delivery load, whichever is smaller, or any number of articles identified as a lot by the galvanizer, when these have been galvanized within a single production shift and in the same bath.
2. For test by the purchaser after delivery, the lot consists of the single order or the single delivery load, whichever is smaller, unless the lot identify, established in accordance with the above, is maintained and clearly indicated in the shipment by the galvanizer.

The method of selection and number of test specimens shall be agreed upon between the galvanizer and the purchaser. Otherwise, the test specimens shall be selected random from each lot. In this case, the minimum number of specimens from each lot shall be as follows:

Number of Pieces in Lot	Number of Specimens
3 or less	All
4 to 500	3
501 to 1,200	5
1,201 to 3,200	8
3,201 to 10,000	13
10,001 and over	20

A test specimen which fails to conform to any requirement of this specifications shall not be used to determine the conformance to other requirements.

TEST REQUIREMENTS

Magnetic Thickness Measurements:

The thickness of the coating shall be determined by magnetic thickness gauge measurements in accordance with ASTM Practice E 376. For each specimen, five or more measurements shall be made at points widely dispersed throughout the volume occupied by the specimen so as to represent as much as practical, the entire surface area of the test specimen. The average of the five or more measurements thus made for each specimen is the specimen coating thickness.

For articles whose surface area is greater than 100,000 mm² (160 in²), in the average of the three specimen coating thickness grades comprising each test article is the average coating thickness for that test article. A specimen must be evaluated for each steel category and material thickness within the requirements for each specimen of the test article

For articles whose surface area is equal to or less than 100,000 mm² (160 in²), the average of all specimen coating thickness grades is the average coating thickness for the sample.

The use of magnetic measurement method is appropriate for larger articles, and may be appropriate for smaller articles when such is practical using ASTM Practice E 376.

Stripping Method

The average weight of coating may be determined by stripping a test article, a specimen removed from a test article, or group of test articles in the case of very small items such as nails, etc., in accordance with Test method ASTM A 90/A 90m. The weight of coating per unit area thus determined is converted to equivalent coating thickness values in accordance with Table 2, Coating Thickness Grade (rounding up or down as appropriate). The thickness of coating thus obtained is the test article coating thickness, or in the case of a specimen removed from a test article, is the specimen average coating thickness.

Table 2 – Coating Thickness Grade ^A

Coating Grade	mils	oz/ft ²	μm	g/m ²
35	1.4	0.8	35	245
40	1.4	1.0	45	320
50	2.0	1.2	50	355
55	2.2	1.3	55	390
60	2.4	1.4	60	425
65	2.6	1.5	65	460
75	3.0	1.7	75	530
80	3.1	1.9	80	565
85	3.3	2.0	85	600
100	3.9	2.3	100	705

^A Conversions in Table 2 are based on the metric thickness value equivalents from the next earlier version, using conversion factors consistent with Table X 2.1 in Specification A 653/A 653M, rounded to the nearest 5 μm (0.0002 in.). The conversion factors used are: mils = μm x 0.03937; oz/ft² = μm x 0.002316; g/m² = μm x 7.067.

Weighing Before or After Galvanizing

The average of coating may be determined by weighing articles before and after galvanizing, subtracting the first weigh from the second and dividing the result by the surface area. The first weigh shall be determined after pickling and drying, and the second after cooling to ambient temperature. The weight of coating per unit area thus determined is converted to equivalent coating thickness values according to Table 2 (rounding up or down as appropriate). The thickness of coating thus obtained is the test article coating thickness.

Microscopy

The thickness of coating may be determined by cross-sectional and optical measurement in accordance with ASTM Test Method B 487. The thickness thus determined is a point value. No less than five such measurements shall be made at locations on the test article which are as widely dispersed as practical, so as to be representative of the whole surface of the test article. The average of no less than five such measurement is the specimen coating thickness.

Adhesion

Determine adhesion of the zinc coating to the surface of the base metal by cutting or prying with the point of a stout knife, applied with considerable pressure in a manner tending to remove a portion of the coating. The adhesion shall be considered inadequate if the coating flakes off in the form of a layer of the coating so as to expose the base metal in advance of the knife point. Do not use testing carried out at edges or corners (points of lowest coating adhesion) to determine adhesion of the coating. Likewise, do not use removal of small particles of the coating by paring or whittling to determine failure.

Embrittlement

Test for embrittlement may be made in accordance with ASTM Practice A 143

The galvanized article should withstand a degree of bending substantially the same as the ungalvanized article. Flaking or spalling of the galvanized coating is not be constructed as an embrittlement failure.

Inspection, Rejection and Retest

The material shall be inspected at the galvanizer's plant prior to shipment. However, by agreement the purchaser may make the tests which govern the acceptance or rejection of the materials in his own laboratory or elsewhere.

When inspection of materials to determine conformity with the visual requirements of Subsection "Finish" warrants rejection of a lot, the galvanizer may sort the lot and submit it once again for acceptance after he has removed any nonconforming articles and replace them with conforming articles.

Materials have been rejected for reasons other than embrittlement may be stripped and regalvanized, and again submitted for inspection and test at which time they shall conform to the requirements of this inspection.

Transport and Storage

Galvanized components shall, wherever possible, be transported and stored under dry, well-ventilated conditions to prevent the formation of wet storage staining.

Either zinc phosphate or chromate passivation treatment after galvanizing may be used to minimize the wet storage staining which may occur on articles unable to be stored in dry, well-ventilated conditions.

Provided the coating thickness complies with the requirements of Subsection "Coating Thickness", no further remedial action is required to the stained areas.

ITEM 05 : DEMOLITION AND REMOVAL WORKS

DESCRIPTION

The work includes the furnishing of all labor, materials and equipment required to carry out the demolition and removal of old structures, port accessories and obstructions including demolition of miscellaneous concrete curbs etc., as required for the execution of the Contract.

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

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

GENERAL PROVISIONS

1. The Contractor shall be deemed to have satisfied himself of the site conditions, and to have included in his unit prices provision for all risks that may arise during or in connection with the work.
2. The demolition shall be carried out by approved methods and equipment such as concrete breakers, gas-cutters, hydraulic jacks, compressed air disintegrators, etc., however, no blasting shall be used unless approved in writing by the Engineer and after obtaining the written permission of the concerned authorities.
3. The Contractor shall provide suitable equipment, skilled labor and appropriate temporary works such as scaffoldings to ensure safety in his demolition works as well as in the adjacent area.
4. Contractor shall demolish all the structural members above the level on which the subsequent and permanent works under this Contract will begin. To this end, the temporary construction works such as excavation shall be conducted by the Contractor.
5. Materials coming from the demolition works, except general earth, shall remain the property of the Procuring Entity, the designated part of which shall be stored by the Contractor at places specified by the Engineer/ Accepting authority. Receiving copy of Turn-Over Report shall be provided.
6. In case of demolition of wharf deck and platform, the contractor shall ensure that no debris will be remained/deposited at seabed.

INTERFERENCE WITH PORT OPERATIONS

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

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

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

STORAGE AND DUMPING

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

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

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

The approximate distance of the disposal site from the project site is about five (5) kms., as designated by the PMO thru the implementing office.

EXECUTION

1. Prior to the commencement of demolition works, the alignments of the new construction works to existing structure shall be checked.
2. The width and alignment of portion of existing structure to be demolished shall be marked by paint.
3. With these lines as guides, concrete shall be broken and reinforcing bars cut, such that panels or portions of the structure can be lifted out for disposal elsewhere outside of the operational work area.
4. Rocks removed from existing slope protection shall be stored for re-use in new construction.
5. Demolish pavements, curbs, fences, utilities, services, navigation aids and the likes as determined in the field for each project and as shown on the drawings or as directed by the Engineer.
6. Materials coming from the demolition works shall be properly disposed by the Contractor.

SAFETY

During the course of survey and clearing, any obstacles which are recognized and seemed to be explosive or hazardous to workers shall be removed from the site by the proper Authority.

At the end of each day's work, the Contractor shall keep the workplace in safe condition and clean so that no part is in danger of falling or creating hazard to personnel or equipment.

ITEM 06 : 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 07 : 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.

2438 (8 ft.)

(Name of Project and Location)

CONTRACTOR

EFFECTIVITY OF CONTRACT


CONTRACT COMPLETION DATE

CONTRACT COST

IMPLEMENTING OFFICE

SOURCE OF FUND

PHILIPPINE
PORTS
AUTHORITY



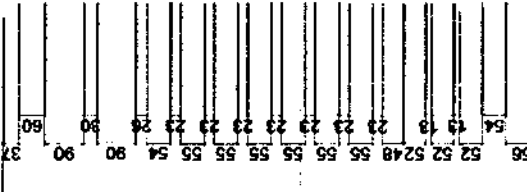
37mm YELLOW BORDER LINE

WHITE BACKGROUND

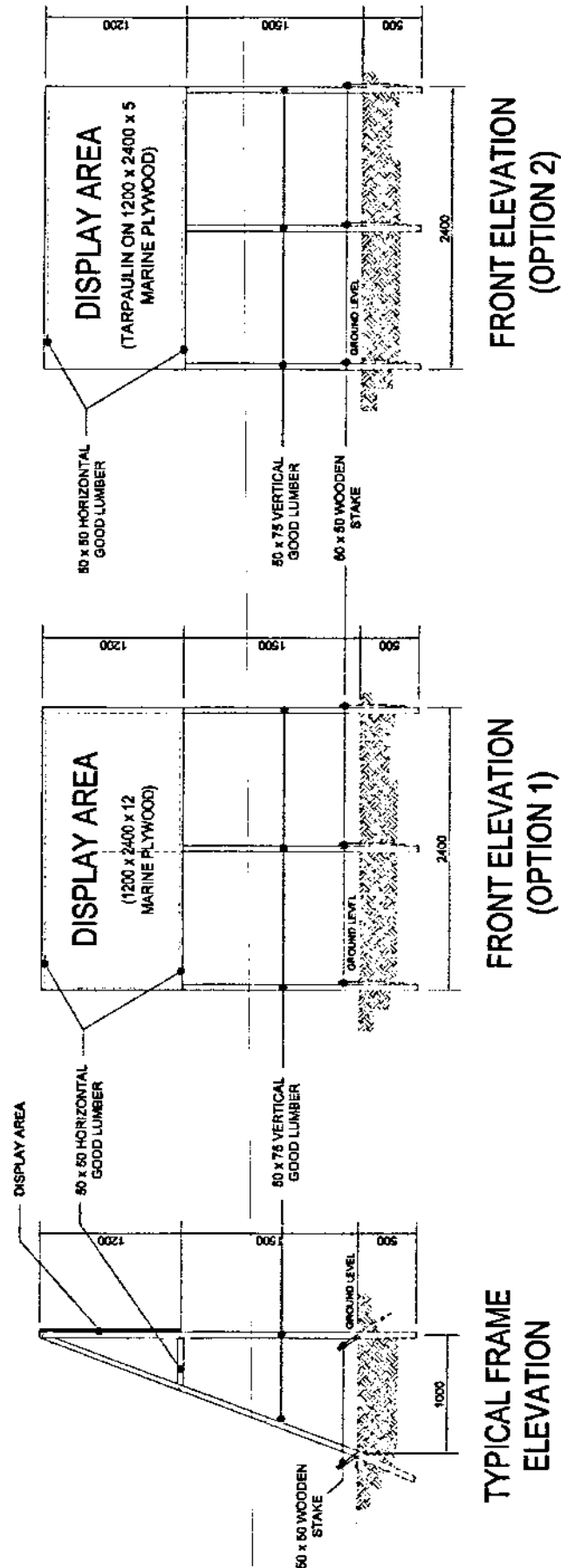
ARIAL BLACK TEXT

ARIAL DARK BLUE TEXT

1219 (4 ft.)



STANDARD PROJECT BILLBOARD



BILLBOARD FRAME

(NOT TO SCALE, ALL DIMENSIONS ARE IN MILLIMETERS)

ITEM 08 : 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.

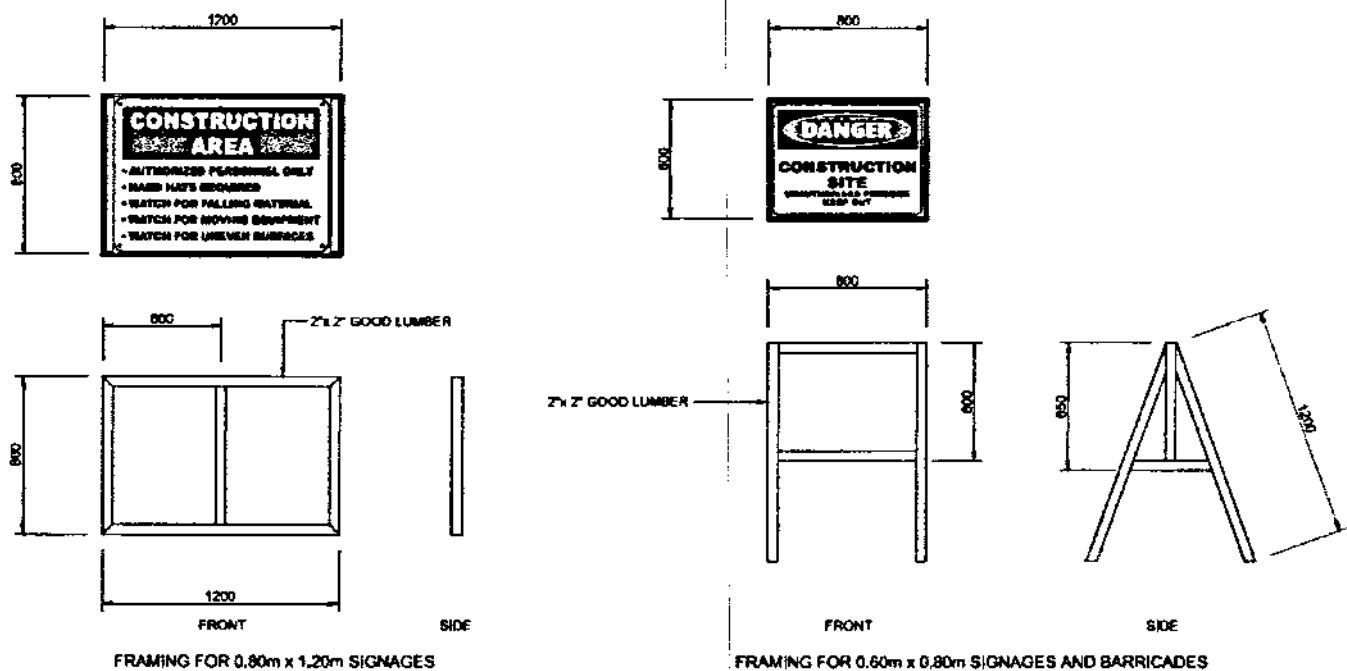
SPECIFICATION

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 09 | Development Plan, Vicinity Map, General Notes and List of Drawings |
| 02 of 09 | General Plan |
| 03 of 09 | Piling Plan @ RC Pier Extension, Piling Plan @ RC Platform |
| 04 of 09 | Typical Reinforcement of RC Pier Extension and RC Platform |
| 05 of 09 | Section Detail (RC Pier Extension), Pile Schedule |
| 06 of 09 | Section Detail (RC Platform), Construction Joint |
| 07 of 09 | Detail of Pile Cap, Detail of Mooring Tee-Head and Fender Attachment |
| 08 of 09 | Detail of Rubber Dock Fender (V-500H X 2000L), Detail of 50-Ton Mooring Bollard |
| 09 of 09 | Detail of 600mmØ X 13mm thick Tubular Steel Pile |

SECTION VIII

BILL OF QUANTITIES
and
ATTACHMENTS

BILL OF QUANTITIES
SALOMAGUE PORT EXPANSION PROJECT
Port of Salomague, Cabugao, Ilocos Sur

NO. (1)	DESCRIPTION OF WORK (2)	UNIT (3)	QTY. (4)	UNIT PRICE (Pesos) (5)	AMOUNT (Pesos) (4) x (5)
BILL NO. 1	GENERAL EXPENSES				
1.01	Mobilization, demobilization and cleaning	lot	1		
1.02	Rental of temporary site office and residence for the Engineer and staff	mo.	16		
1.03	Maintain temporary site office and residence for the Engineer and staff	mo.	16		
1.04	Provide Construction Safety and Health Program in the execution of the	mo.	16		
TOTAL FOR BILL NO. 1					

BILL OF QUANTITIES
SALOMAGUE PORT EXPANSION PROJECT
Port of Salomague, Cabugao, Ilocos Sur

NO. (1)	DESCRIPTION OF WORK (2)	UNIT (3)	QTY. (4)	UNIT PRICE (Pesos) (5)	AMOUNT (Pesos) (4) x (5)
BILL NO. 2	CONSTRUCTION OF RC PLATFORM (Back-up Area)				
2.01	Supply and deliver to site steel pipe piles (A252 Grade 2, 600mm Ø x 13mm thk)	m.t	1,143		
2.02	Application of polyurethane external coating and mastic filler for steel pipe piles (Polyurethane : 32-10 @ 1,500 microns dry film thickness or	sq.m.	1,282		
2.03	Splice steel pipe piles as directed by the engineer	no	170		
2.04	Supply and install 9mm thk reinforcing band tip for steel pipe piles	no	170		
2.05	Handle, pitch and drive steel pipe vertical piles (600mm x 13mm thk)	l.m	3,850		
2.06	Handle, pitch and drive steel pipe batter piles (600mm Ø x 13mm thk)	l.m.	2,220		
2.07	Extract clogged materials from steel pipe piles	cu.m.	133		
2.08	Supply and place 3,500 psi concrete filler for steel pipe piles	cu.m	813		
2.09	Supply and install reinforcing steel cage for steel pipe piles	kg	207,859		
2.10	Cutting of driven steel pipe piles up to cut-off elevation including turn-over to authority of excess piles	no.	170		
2.11	Supply and place 3,500 psi concrete for superstructure	cu.m.	920		
2.12	Supply and install steel reinforcement for superstructure	kg.	148,324		

BILL OF QUANTITIES
SALOMAGUE PORT EXPANSION PROJECT
 Port of Salomague, Cagugao, Ilocos Sur

NO. (1)	DESCRIPTION OF WORK (2)	UNIT (3)	QTY. (4)	UNIT PRICE (Pesos) (5)	AMOUNT (Pesos) (4) x (5)
2.13	Supply and install hot-dipped galvanized 100mm x 100mm x 10mm angle bar for construction joints including dowel bars	l.m.	120		
2.14	Chippoff existing rc curb, flush to deck level and smoothened with mortar	l.m.	30		
TOTAL FOR BILL NO. 2					-

BILL OF QUANTITIES
SALOMAGUE PORT EXPANSION PROJECT
Port of Salomague, Cabugao, Ilocos Sur

NO. (1)	DESCRIPTION OF WORK (2)	UNIT (3)	QTY. (4)	UNIT PRICE (Pesos) (5)	AMOUNT (Pesos) (4) x (5)
BILL NO. 3	CONSTRUCTION OF RC PIER EXTENSION				
3.01	Supply and deliver to site steel pipe piles (A252 Grade 2, 600mm Ø x 13mm thk)	m.t	732		
3.02	Application of polyurethane external coating and mastic filler for steel pipe piles (Polyurethane : 32-10 @ 1,500 microns dry film thickness or	sq.m.	815		
3.03	Splice steel pipe piles as directed by the engineer	no	108		
3.04	Supply and install 9mm thk reinforcing band tip for steel pipe piles	no	108		
3.05	Handle, pitch and drive steel pipe vertical piles (600mm x 13mm thk)	l.m	1,890		
3.06	Handle, pitch and drive steel pipe batter piles (600mm Ø x 13mm thk)	l.m.	1,998		
3.07	Extract clogged materials from steel pipe piles	cu.m.	85		
3.08	Supply and place 3,500 psi concrete filler for steel pipe piles	cu.m	521		
3.09	Supply and install reinforcing steel cage for steel pipe piles	kg	132,953		
3.10	Cutting of driven steel pipe piles up to cut-off elevation including turn-over to authority of excess piles	no.	108		
3.11	Supply and place 3,500 psi concrete for superstructure	cu.m.	662		
3.12	Supply and install steel reinforcement for superstructure	kg.	95,896		

BILL OF QUANTITIES
SALOMAGUE PORT EXPANSION PROJECT
 Port of Salomague, Cabugao, Ilocos Sur

NO. (1)	DESCRIPTION OF WORK (2)	UNIT (3)	QTY. (4)	UNIT PRICE (Pesos) (5)	AMOUNT (Pesos) (4) x (5)
BILL NO. 3	CONSTRUCTION OF RC PIER EXTENSION				
3.01	Supply and deliver to site steel pipe piles (A252 Grade 2, 600mm Ø x 13mm thk)	m.t	732		
3.02	Application of polyurethane external coating and mastic filler for steel pipe piles (Polyurethane : 32-10 @ 1,500 microns dry film thickness or	sq.m.	815		
3.03	Splice steel pipe piles as directed by the engineer	no	108		
3.04	Supply and install 9mm thk reinforcing band tip for steel pipe piles	no	108		
3.05	Handle, pitch and drive steel pipe vertical piles (600mm x 13mm thk)	l.m	1,890		
3.06	Handle, pitch and drive steel pipe batter piles (600mm Ø x 13mm thk)	l.m.	1,998		
3.07	Extract clogged materials from steel pipe piles	cu.m.	85		
3.08	Supply and place 3,500 psi concrete filler for steel pipe piles	cu.m	521		
3.09	Supply and install reinforcing steel cage for steel pipe piles	kg	132,953		
3.10	Cutting of driven steel pipe piles up to cut-off elevation including turn-over to authority of excess piles	no.	108		
3.11	Supply and place 3,500 psi concrete for superstructure	cu.m.	662		
3.12	Supply and install steel reinforcement for superstructure	kg.	95,896		

BILL OF QUANTITIES
SALOMAGUE PORT EXPANSION PROJECT
Port of Salomague, Cabugao, Ilocos Sur

NO. (1)	DESCRIPTION OF WORK (2)	UNIT (3)	QTY. (4)	UNIT PRICE (Pesos) (5)	AMOUNT (Pesos) (4) x (5)
3.13	Supply and deliver to site rubber dock fender (V-500H x 2000L) including accessories	set	23		
3.14	Install rubber dock fender including accessories	set	23		
3.15	Supply and deliver to site mooring bollard (50T, T-head) including accessories	set	12		
3.16	Install mooring bollard including accessories	set	12		
3.17	Supply and install hot-dipped galvanized 100mm x 100mm x 10mm angle bar for construction joints including dowel bars	l.m.	18		
3.18	Chipoff existing rc curb, flush to deck level and smoothened with mortar	l.m.	9		
TOTAL FOR BILL NO. 3					

BILL OF QUANTITIES
SALOMAGUE PORT EXPANSION PROJECT
Port of Salomague, Cabugao, Ilocos Sur

NO. (1)	DESCRIPTION OF WORK (2)	UNIT (3)	QTY. (4)	UNIT PRICE (Pesos) (5)	AMOUNT (Pesos) (4) x (5)
BILL NO. 4	REIMBURSABLE ITEMS				
4.01	Provide reimbursable items necessary in the implementation of the project as determined by the Authority	lot	1	3,604,194.44	3,604,194.44
TOTAL FOR BILL NO. 4					3,604,194.44

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 m²

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

CONSTRUCTION OF RC PLATFORM

Item 2.01 Supply and deliver to site steel pipe sheet piles (A252 Grade 2, 600mmØ x 13mm thk.)

The quantity to be paid for shall be the actual weight in metric tons of steel pipe sheet piles (A252 Grade 2, 600mmØ x 13mm thk.), 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 2.02 Application of polyurethane external coating and mastic filler for steel pipe sheet piles (Polyurethane: 32-10 @ 1,500 microns dry film thickness or equivalent)

The quantity to be paid for shall be the actual area in square meter of polyurethane external coating (Polyurethane: 32-10 @ 1,500 microns dry film thickness or equivalent), applied on the steel pipe sheet piles 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 Splice steel pipe piles as directed by the engineer

The quantity to be paid for shall be the actual number of steel pipe piles, spliced as directed by the engineer, 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 install 9mm thk. reinforcing band tip for steel pipe piles

The quantity to be paid for shall be the actual number of reinforcing band tip (9mm thk.), 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 2.05 Handle, pitch and drive steel pipe vertical piles (600mm Ø x 13mm thk.)

The quantity to be paid for shall be the actual length in linear meter of steel pipe vertical piles (600mm Ø x 13mm thk.), handled, pitched and driven in accordance with the plans and specifications, measured from the tip of piles to cut-off elevation and accepted by the Engineers. 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 Handle, pitch and drive steel pipe batter piles (600mm Ø x 13mm thk.)

The quantity to be paid for shall be the actual length in linear meter of steel pipe batter piles (600mm Ø x 13mm thk.), handled, pitched and driven in accordance with the plans and specifications, measured from the tip of piles to cut-off elevation and accepted by the Engineers. 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 Extract clogged materials from steel pipe piles

The quantity to be paid for shall be the actual volume in cubic meter of clogged materials from the steel pipe piles, extracted 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 place 3,500 psi concrete filler for steel pipe piles

The quantity to be paid for shall be the actual volume in cubic meter of 3,500 psi concrete filler for steel pipe piles, 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 2.09 Supply and install reinforcing steel cage for steel pipe piles

The quantity to be paid for shall be the actual weight in kilogram of reinforcing steel cage for steel pipe piles, 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 2.10 Cutting of driven steel pipe piles up to cut-off elevation including turn-over to Authority of excess piles

The quantity to be paid for shall be the actual number of steel pipe piles, cut-off to required elevation including turn-over to Authority of excess piles, 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 Supply and place 3,500 psi concrete for superstructure

The quantity to be paid for shall be the actual volume in cubic meter of 3,500 psi concrete, 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 2.12 Supply and install steel reinforcements for superstructure

The quantity to be paid for shall be the actual weight in kilogram of steel reinforcements, 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 2.13 Supply and install hot-dipped galvanized 100mm x 100mm x 10mm angle bar for construction joints including dowel bars

The quantity to be paid for shall be the actual length in linear meter of hot-dipped galvanized angle bar (100mm x 100mm x 10mm) for construction joints including dowel bars, 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 Chip off of existing RC curb, flush to deck level and smoothened with mortar

The quantity to be paid for shall be the actual length in linear meter of existing RC curb, flushed to deck level and smoothened with mortar 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

CONSTRUCTION OF RC PIER EXTENSION

Item 3.01 Supply and deliver to site steel pipe sheet piles (A252 Grade 2, 600mmØ x 13mm thk.)

The quantity to be paid for shall be the actual weight in metric tons of steel pipe sheet piles (A252 Grade 2, 600mmØ x 13mm thk.), 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 3.02 Application of polyurethane external coating and mastic filler for steel pipe sheet piles (Polyurethane: 32-10 @ 1,500 microns dry film thickness or equivalent)

The quantity to be paid for shall be the actual area in square meter of polyurethane external coating (Polyurethane: 32-10 @ 1,500 microns dry film thickness or equivalent), applied on the steel pipe sheet piles 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 3.03 Splice steel pipe piles as directed by the engineer

The quantity to be paid for shall be the actual number of steel pipe piles, spliced as directed by the engineer, 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 3.04 Supply and install 9mm thk. reinforcing band tip for steel pipe piles

The quantity to be paid for shall be the actual number of reinforcing band tip (9mm thk.), 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 3.05 Handle, pitch and drive steel pipe vertical piles (600mm Ø x 13mm thk.)

The quantity to be paid for shall be the actual length in linear meter of steel pipe vertical piles (600mm Ø x 13mm thk.), handled, pitched and driven in accordance with the plans and specifications, measured from the tip of piles to cut-off elevation and accepted by the Engineers. The contract unit price shall be full compensation for furnishing all materials, labor, equipment, tools and incidentals necessary to complete the work.

Item 3.06 Handle, pitch and drive steel pipe batter piles (600mm Ø x 13mm thk.)

The quantity to be paid for shall be the actual length in linear meter of steel pipe batter piles (600mm Ø x 13mm thk.), handled, pitched and driven in accordance with the plans and specifications, measured from the tip of piles to cut-off elevation and accepted by the Engineers. The contract unit price shall be full compensation for furnishing all materials, labor, equipment, tools and incidentals necessary to complete the work.

Item 3.07 Extract clogged materials from steel pipe piles

The quantity to be paid for shall be the actual volume in cubic meter of clogged materials from the steel pipe piles, extracted 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 3.08 Supply and place 3,500 psi concrete filler for steel pipe piles

The quantity to be paid for shall be the actual volume in cubic meter of 3,500 psi concrete filler for steel pipe piles, 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 3.09 Supply and install reinforcing steel cage for steel pipe piles

The quantity to be paid for shall be the actual weight in kilogram of reinforcing steel cage for steel pipe piles, 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 3.10 Cutting of driven steel pipe piles up to cut-off elevation including turn-over to Authority of excess piles

The quantity to be paid for shall be the actual number of steel pipe piles, cut-off to required elevation including turn-over to Authority of excess piles, 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 3.11 Supply and place 3,500 psi concrete for superstructure

The quantity to be paid for shall be the actual volume in cubic meter of 3,500 psi concrete, 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 3.12 Supply and install steel reinforcements for superstructure

The quantity to be paid for shall be the actual weight in kilogram of steel reinforcements, 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 3.13 Supply and deliver to site rubber dock fender (V-type 500H x 2000L) including accessories

The quantity to be paid for shall be the actual quantity in set of rubber dock fender (V-type 500H x 2000L) 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 3.14 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 3.15 Supply and deliver to site mooring bollard (50T, T-head) including accessories

The quantity to be paid for shall be the actual quantity in set of mooring bollard (50T, 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 3.16 Install mooring bollard 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 3.17 Supply and install hot-dipped galvanized 100mm x 100mm x 10mm angle bar for construction joints including dowel bars

The quantity to be paid for shall be the actual length in linear meter of hot-dipped galvanized angle bar (100mm x 100mm x 10mm) for construction joints including dowel bars, 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 3.18 Chip off of existing RC curb, flush to deck level and smoothened with mortar

The quantity to be paid for shall be the actual length in linear meter of existing RC curb, flushed to deck level and smoothened with mortar 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. 4

REIMBURSABLE ITEMS

Item 4.01 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

2	units	Crane Barge (319 GW, minimum) with 60T crane, owned
2	units	Crawler Crane (30T, minimum), owned
2	unit	Pile Hammer (Diesel, 7,500 kg.m.), owned
2	units	Drop Hammer (2T, minimum), owned/leased
2	units	Concrete Mixer (1-bagger, minimum), owned
2	units	Concrete Vibrator (3.5 hp, minimum), owned
2	units	Bar Cutter (electric, 25mm dia min.), owned
2	units	Bar Bender (electric, 25mm dia min.), owned
2	units	Dump Truck (8 cu.m., minimum), owned
1	unit	Water Truck with pump (1,000 gal., minimum), owned
2	units	Suction Hose (100mm, minimum), owned
1	unit	Centrifugal Trash Pumps (100mm, 16hp), owned
1	unit	Air-Compressor (250 cfm, minimum), owned
2	units	Jack Hammer, owned
2	units	Welding Machine (400 amp., minimum), owned
2	units	Oxy/Acetylene Cutting Outfit, owned
2	units	Tugboat (500hp, minimum), owned/leased
1	unit	Payloader (1.06cu.m., 93 hp, minimum), owned/leased
2	units	Concrete Bucket, owned/leased
2	units	Transit Mixer (5-6 cu.m. cap., minimum), owned/leased

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

75	pcs.	Hard Hats
75	pcs.	Gloves
4	pcs.	Goggles
2	pcs.	Aprons
8	pcs.	Safety Belts
75	pcs.	Safety Shoes
8	pcs.	Life Lines

Safety Devices

1	lot	Barricades
1	lot	Warning signs
2	units	Fire extinguisher

Medical and First Aid System - For sixteen (16) 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 **Salomague Port Expansion Project, Port of Salomague, Cabugao, Ilocos Sur**;
- (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	₱
2	Construction of RC Platform	
3	Construction of RC Pier Extension	
4	Reimbursable Items	
	TOTAL AMOUNT OF BID (including VAT)	₱

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 **Salomague Port Expansion Project, Port of Salomague, Cabugao, Ilocos Sur 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 :

1. 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.
2. This Statement shall be supported by:
 - a. Notice of Award and / or Notice to Proceed.
 - b. 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. Off-shore pile driving of steel pipe piles	I.m.	4,979						
2. Reinforced Concrete Works	cu.m.	1,458						

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, 1st, 2nd & 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) ¹⁾	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	Materials Engineer - One (1) year
Project Engineer - Three (3) years	Materials Engineer I - for projects costing up to 100M
Foreman - Five (5) years	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 (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 *Salomague Port Expansion Project, Port of Salomague, Cabugao, Ilocos Sur*.

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) Make 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 *Salomague Port Expansion Project, Port of Salomague, Cagayan, Ilocos Sur*.

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 *Salomague Port Expansion Project, Port of Salomague, Cagayan, Ilocos Sur*.

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. CONSTRUCTION OF RC PLATFORM (Back-up Area)

(Area = 60.00m x 30.00m = 1,800.00 sq.m)

1. Chipping of existing rc curb, flush to deck level (30 l.m.)
2. Supply and drive A252 Grade 2, 600mmØ x 13m thk. Steel pipe piles (1,143m.t. equivalent to 6,070 l.m.) including application of polyurethane external coating (1,282 sq.m.), cutting (170 pcs.), splicing (170 pcs.) and installation of reinforcing band tip (170 pcs)
3. Supply and place 3,500 psi concrete filler (813 cu.m.) and reinforcing steel cage (207,859 kgs of various sizes) for steel pipe piles including extraction of clogged materials (133 cu.m.)
4. Supply and place 3,500 psi concrete (920 cu.m.) and reinforcing steel bars (148,324 kgs of various sizes) for superstructure

B. CONSTRUCTION OF RC PIER EXTENSION

(Area = 120.00m x 9.00m = 1,080.00sq.m.)

1. Chipping of existing rc curb, flush to deck level (9 l.m.)
2. Supply and drive A252 Grade 2, 600mmØ x 13m thk. Steel pipe piles (732 m.t. equivalent to 3,888 l.m.) including application of polyurethane external coating (815 sq.m.), cutting (108 pcs.), splicing (108 pcs) and installation of reinforcing band tip (108 pcs)
3. Supply and place 3,500 psi concrete filler (521 cu.m.) and reinforcing steel cage (132,953 kgs of various sizes) for steel pipe piles including extraction of clogged materials (85 cu.m.)
4. Supply and place 3,500 psi concrete (662 cu.m.) and reinforcing steel bars (95,896 kgs of various sizes) for superstructure
5. Supply and install mooring bollard, 50 tons, T-head (12 sets) and rubber dock fender, V-type, (V500H x 2000L, 23 sets)

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	13	14	15	16
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)

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)
TOTAL		

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 SALOMAGUE PORT EXPANSION PROJECT
PORT OF SALOMAGUE, CABUGAO, ILOCOS SUR

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 Pert/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