Philippine Ports Authority
PORT MANAGEMENT OFFICE – MINDORO
Engineering Services Division
San Antonio, Port Area, Calapan City
Oriental Mindoro

REPAIR OF CAUSEWAY, ROCK BULKHEAD AND PAVEMENT DAMAGED BY TYPHOON "QUINTA"
PORT OF POLA, ORIENTAL MINDORO

TECHNICAL SPECIFICATIONS

I. GENERAL CONDITION

The Work generally consist of furnishing of all labor, materials and equipment required to carry out and complete the ***Repair of Causeway, Rock Bulkhead and Pavement Damaged by Typhoon "Quinta", Port of Pola, Oriental Mindoro*** in accordance with the contract drawings and in conformity with these specifications.

PLANS AND SPECIFICATIONS

All drawings, whether in small scale or detailed, are intended to correspond with specifications to form part thereof and the contract documents. Where figures are given, they are to be followed in preference to measurement by scale. Anything shown on the drawings but not indicated in the specifications or vice-versa or anything not expressly set forth in either, but which is reasonably implied, shall be furnish and installed as though specifically shown and mentioned in both, without extra cost to PPA.

II. PROJECT SIGNBOARD

The Contractor shall prior to start of physical activities, install two project billboards consisting of the Project Name and Location, Contractor, Contract Cost, Date Started, Contract Completion Date, Implementing Office, and Source of Fund. The Contractor shall coordinate with the PPA Project Engineer in fixing the location of said billboards including its contents, make and dimensions. The dimension and/or area of each billboard shall, however, not be less than 1.22m x 2.44m (2.88 sq.m.) or tarpaulin posted on 1/4 inch marine plywood.

III. SCOPE OF WORKS

1.00 General Expenses

1.01 Mobilization, Demobilization and Cleaning Up

The Contractor shall mobilize and put into work all personnel, plant, and equipment required to undertake the works. The minimum equipment required to be mobilized at site are the following:

Equipment Description	Quantity
Concrete Mixer (1-bagger)	One Unit
Concrete Vibrator (3.5 hp)	One Unit

Bar Cutter (Electric, 25mm Ø Min)	One Unit
Bar Bender (Electric, 25mm Ø Min)	One Unit
Conc. Cutter, 5HP	One Unit
Wheel Mounted Backhoe(0.40 cu.m.,95HP) with breaker	One Unit
Backhoe (0.52cu.m. 90hp)	One Unit
Backhoe (0.40cu.m. 91hp)	One Unit
Payloader (1.06 cu.m., 93hp)	One Unit
Road Grader (125hp)	One Unit
Road Roller (10T/130HP vibratory)	One Unit
Water Truck (16,000 liters) with pump	One Unit
Dump Truck (6 cu.yd.)	One Unit
Truck Mounted Crane, 35T	One Unit
Truck Mounted Crane, 5T	One Unit
Crawler Crane (36T)	One Unit

2.00 Repair of Causeway. Rock Bulkhead and Pavement

2.01 Demolish and Dispose of Existing Concrete Pavement, Retaining Wall, Bollard Block, R.C. Seat and Gutter

The work includes the furnishing of all labor and equipment required to carry out the demolition and disposal of damaged structure including removal of existing concrete pavement, retaining wall, bollard block, r.c. seat and gutter as shown on the Drawings and as instructed by the PPA Engineer.

Waste materials shall be hauled and dumped in the area designated by the engineer/PPA representative while salvaged materials shall be turned over to the Authority.

2.02 Excavation Works Including Disposal of Unsuitable Items

The work includes the furnishing of all labor and equipment required to carry out the excavation of unsuitable materials as instructed by the PPA Engineer.

Excavation

All excavations shall be carried out to the lengths, width, and depths necessary to complete the work as shown on the drawings and as instructed by the PPA Engineer.

The Contractor shall as deem necessary take all necessary precautions to ensure that excavated surfaces are kept clean and dry. The Contractor shall keep the excavated areas or trenches free from ground water or water from any other sources.

The Contractor shall provide all temporary support or sheathing or any other measure necessary to prevent excavated earth surface from any movement or cave-in.

All surplus materials shall be disposed of at disposal areas designated by the PPA Engineer or at such disposal area approved for use by local

authorities. Recoverable materials intended to be used for backfilling of trenches shall be stored/stockpiled at a location approved/directed by the PPA Engineer.

2.03 Re-arrangement of Core Rocks (100 to 200 kg.) including Concrete Grout

The work shall include but not limited to the furnishing of all labor, materials and equipment required for the rock works including core rocks, under layer and rock fill in accordance with the Specifications and as indicated in the drawings or as directed by the Engineer.

SETTING OUT OF WORKS

1. Topographic/Hydrographic Survey

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

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

EXECUTION

QUARRY SITE AND ROCK QUANTITY

1. It is the Contractor's responsibility to make necessary surveys / investigations on quarry sites applicable to the Works, taking into consideration the nature of the rock works required under the Contract such as required quality, total quantity and daily required quantity, transportation method and route etc.,

2. The Contractor shall submit data on characteristics of proposed quarry sites together with the location of sites, test results of their products and samples for the approval of the Engineer.

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

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

4. Despite the Engineer's previous approval of the natural rock and borrow pits, the Engineer reserves the right to suspend any operation in connection with the rock, if, in its opinion, such rock is not suitable for the work. In such case, the Contractor shall comply with the Engineer's instructions.

5. The finish bulkhead shall be true to grade and section. The spaces/voids between rocks shall be filled/sealed with 2 kg. to 16 kg. rocks and shall be approved by the Engineer before placing geotextile filter thereon to prevent the filling materials (soil and sand) from escaping to cause scouring and settlement of finished surface.

CROSS-SECTIONS OF COMPLETED ROCKWORK

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

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

2.04 Re-arrangement of Armour Rocks (1000 kg.) including Concrete Grout

- Refer to Item 2.03 for specification for re-arrangement of core rocks (100 to 200 kg.)

2.05 Supply and Place Additional Armour Rocks (1000 kg.) and Core Rocks (100 to 200 kg.)

The work shall include but not limited to the furnishing of all labor, materials and equipment required for the rock works including armour rocks, underlayer and rock fill in accordance with the Specifications and as indicated in the drawings or as directed by the Engineer.

SETTING OUT OF WORKS

- Refer to Item 2.03

MATERIAL REQUIREMENTS

1. All rocks to be used shall be angular, hard, durable, and not likely to disintegrate in seawater. Rock layers to be installed should more or less be "global in shape", "angular in surface" and should avoid "river run rocks". Rocks that are sub-angular may be subject to the approval of the Engineer. Rounded or well-rounded pieces will not be accepted.

2. All rocks shall have a minimum unit weight of 2,650 kg per cubic meter (specific gravity 2.65) of solid materials when measured dry.

3. Rocks with specific gravity higher than the above specified is preferable and will readily be accepted. But no adjustment (increase) in the contract price will be made on this account.

4. Rocks of the primary cover layer shall be sound, durable, and hard. It shall be free from laminations, weak cleavages, and undesirable weathering, and shall be of such character that it will not disintegrate from the action of the air, seawater, or in handling and placing. All stone shall be angular quarry stone.

5. All rocks shall conform to the following test designations:

Apparent specific gravity	ASTM C 127
Abrasion	ASTM C 535

EXECUTION

QUARRY SITE AND ROCK QUANTITY

- Refer to Item 2.03

STORAGE OF MATERIALS

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

SAMPLING TEST

1. Thirty (30) days prior to commencement of rock works, samples and test results of rock material which conforms to the Specifications called for in the Contract shall be submitted to the Engineer for evaluation and approval.

2. Rock samples from different sources and of different classes shall also be submitted, together with test results and its corresponding certificates, for the Engineers approval.

3. Rocks accepted at the quarries before shipments or at the site before placement shall not be used as a waiver. The Engineer has the right to reject any inferior rock quality.

4. Samples for each class of approved materials are to be kept in the field for comparison/checking of delivered rock materials. A test shall be required for every 1,500 cu.m.

CROSS-SECTIONS OF COMPLETED ROCKWORK

- Refer to Item 2.03

2.06 Supply and Place Concrete Blocks

The work shall include but not limited to the furnishing of all labor, materials, equipment, and incidentals necessary to complete the supply and placing of 3500psi concrete for concrete blocks.

Concrete

The work shall include but not limited to the supply and placing of concrete inclusive of transport in accordance with these specifications and as shown on the Drawings.

Specifications of the materials comprising the concrete mixture shall conform to the following:

Cement – the cement to be used shall be ordinary Portland cement, ASTM Type 1 designation C150. Quality test for every 2,000 bags (40kg) or fraction thereof is required.

Fine Aggregate – for concrete and mortar shall be clean and complying with ASTM C33 specifications for concrete aggregates. The sand shall come from approved sources and sand which in the opinion of the PPA Engineer has become contaminated shall be rejected and removed from site. Quality test for grading, elutriation (wash), bulk specific gravity, absorption, mortar strength, soundness, organic impurities, unit weight, % clay lumps and shale for every 1,500 cubic meter or fraction thereof is required.

Coarse Aggregate – shall comply with ASTM C33 specification. It may either be natural gravel or stone crushed to the desired size and shall only be obtained from approved quarries. Quality test for grading, bulk specific gravity, absorption, and abrasion for every 1,500 cubic meter or fraction thereof is required.

Water – clean fresh potable water shall be used for the mixing of all concrete and mortar mixtures. Sea water shall not be used at any time. Certificate from the Engineer or quality test for density and chloride contest per source is required.

Concrete mixer shall be stationary mixer i.e. one bagger mixer. The mixer must be capable of combining the materials into a uniform mixture and of discharging this mixture without segregation.

Prior to placing of concrete, debris, dirt, and other foreign materials shall be removed from the interior of the forms and from inner surface of mixing equipment. Temperature steel reinforcing bars shall be secured in position and shall be inspected and approved by the PPA Engineer before placing the concrete.

Concrete shall be handled from the one bagger mixer and placed to final deposit in a continuous manner, as rapidly as practicable and without segregation or loss of ingredients until the activity of placing concrete is completed.

Ideally, the temperature of concrete during the period of mixing, transport and placing should not be more than 32º C. 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.

Where applicable, immediately after placing, each layer of concrete shall be compacted by internal concrete vibrators supplemented by hand spading, rodding, and tamping, as necessary.

Concrete shall be protected adequately from injurious action by sun, rain, flowing water and mechanical injury and shall not be allowed to dry out from the time it is placed until the expiration of the minimum curing periods specified herein. Curing shall be accomplished by moist curing or by application of liquid membrane forming compound.

As the work progresses, cylinder samples shall be taken and tested in accordance with standards for testing of concrete cylinder samples. One set consisting of three concrete cylinder samples shall be taken from each day’s pouring and to represent not more than 75 cu.m. of concrete or

fraction thereof. Tests will be made at 7 and 28 days from time of sampling. The average of the strengths of the three cylinders tested shall not be lower than the specified compressive strength of 3,500 psi.

Slump test for every mix of concrete is required.

Quality test for admixture and concrete curing materials per shipment is required.

2.07 Supply and Place Geotextile Fabric

The work shall include the furnishing of all labor, materials, equipment, and other incidentals necessary to complete the laying of geotextile fabric in accordance with the sizes, length, width shown on the Drawings and as directed by the PPA Engineer.

Geotextile shall be of an approved standard product of woven filter fabric and shall be composed of polyester and shall be proven to resist dynamic puncture damage when subject to impact stress from stone armor (200-400 kg) dropped from a minimum height of 2.0m. Geotextile failing to resist puncture shall not be accepted. Prior to ordering of the geotextile material sample and brochures shall be approved by the Engineer.

MATERIAL REQUIREMENTS

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

1. PHYSICAL PROPERTIES

   a. The geotextile material shall be a nonwoven needle punched type comprising of needle punched polypropylene fibers or its equivalent

   b. The geotextile material shall be UV stabilized to ensure retention of minimum 70% original tensile strength after 90 days exposure to sunlight. The manufacturer shall submit test results to the Engineer for approval.

   c. The geotextile must be highly resistant to long term contact with damp cementitious substances or acid or alkali solutions in the pH range 2-13. The manufacturer shall submit test data to ensure resistance of the polymer.

2. MECHANICAL AND HYDRAULIC PROPERTIES

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

TECHNICAL PROPERTIES	UNIT	MINIMUM	TEST STANDARD
A. Physical Characteristics:			
Minimum Mass (per unit area)	(g/m^2)	540	ASTM D5261

Thickness (F=2 kpa)	mm	4.5	ASTM D5199

B. Mechanical Properties:

Tensile Strength (md/cd)	kN/m	13/22	ASTM 04595
Tensile elongation (md/cd)	%	90/40	ASTM D4595
CBR Puncture Resistance	N	3000	ASTM D6241

C. Hydraulic Properties:

Effective Opening Size (O9o Wet Sieving)	(mm)	0.08	ASTM D4751
Water Permeability: Permittivity	(s-1)	0.5	ASTM D4491

Note:

Tolerances:

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

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1. The geotextile shall be delivered to site with an outer wrapper to protect it from exposure to the elements.

2. Prior to laying of geotextile filter, stone filler shall be placed between gaps or voids of armour/core rocks as likewise mentioned in the requirements of Item 'Rock Works".

3. The non-woven geotextile filter shall be installed and lay manually at site as per design drawings. The filter shall be laid lengthwise down slopes and appropriately anchored along the top edge.

4. The Engineer reserves the right to sample geotextile delivered to site for individual quality control testing at the contractor's expense. A material not meeting the manufacturer's certified values will be rejected from the site.

5. The geotextile shall be proven to resist dynamic puncture damage when subject to impact stress from stone armour (200-400 kg.) dropped from a minimum height of 2.0 m. and should be laid on at least 1-foot sand and gravel bedding. Geotextile failing to resist puncture shall not be accepted.

6. To facilitate site Quality Assurance, each roll of geotextile delivered to site shall be clearly labeled with brand name, grade, and production batch number.

7. Geotextile overlaps shall be at least 1.0 m unless otherwise stated on the drawings. Alternatively, geotextile overlaps are to be heat-welded or sewn using appropriate polypropylene or other synthetic thread and portable hand sewing equipment.

2.08 Supply, Spread and Compact Selected Filling Materials

The work includes the furnishing of all labor and equipment required to carry out the supply, spread and compact filling materials as instructed by the PPA Engineer.

Embankments shall be constructed of suitable materials, in consonance with the following definitions:

1. Suitable Material – Material which is acceptable in accordance with the Contract and which can be compacted in the manner specified in this Item. It can be common material or rock.

   Selected Borrow, for topping – soil of such gradation that all particles will pass a sieve with 75 mm (3 inches) square openings and not more than 15 mass percent will pass the 0.075 mm (No. 200) sieve, as determined by AASHTO T 11. The material shall have a plasticity index of not more than 6 as determined by ASSHTO T 90 and a liquid limit of not more than 30 as determined by AASHTO T 89.

2. Unsuitable Material – Material other than suitable materials such as:
   (a) Materials containing detrimental quantities of organic materials, such as grass, roots, and sewerage.
   (b) Organic soils such as peat and muck.
   (c) Soils with liquid limit exceeding 80 and/or plasticity index exceeding 55.
   (d) Soils with a natural water content exceeding 100%.
   (e) Soils with very low natural density, 800 kg/m3 or lower.
   (f) Soils that cannot be properly compacted as determined by the Engineer.

Required Test

Quality test for grading, plasticity, abrasion, and laboratory compaction test for every 1,500 cubic meter or fraction thereof.

Laboratory California Bearing Ratio (CBR) for every 2,500 cubic meter or fraction thereof.

Field density test for every layer of 150mm of compacted depth at least one group of three In-situ density test for every 500 sq.m. or fraction thereof.

The selected fill shall be laid according to its prescribed thickness and width as indicated on the Drawings and/or as directed by the PPA Engineer.

Placing of gravel base course materials shall not be allowed unless compaction requirements have been complied with as directed by the PPA Engineer.

2.09 Supply, Spread and Compact Sand and Gravel Filling Materials

The work includes the furnishing of all labor and equipment required to carry out the supply, spread and compact filling materials as instructed by the PPA Engineer.

Refer to Item 2.08

2.10 Supply, Spread and Compact 200mm Thick Gravel Base Course Materials

The work includes the furnishing of all labor and equipment required to carry out the supply, spreading and compaction of 200mm thick base course materials as instructed by the PPA Engineer.

Aggregate base course materials shall be natural gravel or crushed stone of maximum size of 19 mm. It shall be clean and free from vegetable matters lumps or balls of clay and other deleterious substances. The material shall be of such nature that it can be compacted readily to form a firm and stable base.

Required Test

Quality test for grading and plasticity for every 300 cubic meters of fraction thereof.

Quality test for grading, plasticity, abrasion, and laboratory compaction test for every 1,500 cubic meter or fraction thereof.

Laboratory California Bearing Ratio (CBR) for every 2,500 cubic meter or fraction thereof.

Field density test for every layer of 150mm of compacted depth at least one group of three In-situ density test for every 500 sq.m. or fraction thereof.

The base course bedding shall be laid according to its prescribed thickness and width as indicated on the Drawings and/or as directed by the PPA Engineer.

Placing of concrete shall not be allowed unless compaction requirements have been complied with as directed by the PPA Engineer.

2.11 Supply and Place 3500 psi Concrete for Retaining Wall, RC Seat, Gutter, Slope Protection, Bollard Block, Concrete Pedestal and Concrete Battery Box

The work shall include but not limited to the furnishing of all labor, materials, equipment, and incidentals necessary to complete the supply and placing of 3500psi concrete for retaining wall, r.c. seat, gutter, slope protection, bollard block, concrete pedestal and concrete battery box.

Refer to Item 2.06

2.12 Supply and Place Reinforcing Steel Bars for Retaining Wall, RC Seat, Gutter, Slope Protection, Bollard Block, Concrete Pedestal and Concrete Battery Box

The work shall consist of the supply and installation of the reinforcing steel bars for retaining wall, r.c. seat, gutter, slope protection, bollard block, concrete pedestal and concrete battery box.in accordance with the sizes, number, and shape of RSB indicated on the Drawings and in the approved bar cutting schedule.

Steel reinforcement used shall have deformed surfaces and shall conform to ASTM as follows:

16 mm Ø and above – ASTM 305, Min. Yield Strength of 414 MPa

12 mm Ø and below – ASTM A615-74a, Min. Yield Strength of 275 Mpa

Reinforcement shall be free of loose or flaky rusts and mill scale, or coating and any other substance that would reduce or destroy the bond with concrete. Wire brushing of the concrete may be required before fixing in order to achieve the required condition. Reinforcement shall not be bent or straightened in a manner injurious to the steel or concrete. The use of heat to bend or straighten reinforcement shall not be permitted. Bars with developed cracks or splits shall be rejected and replaced.

Splices and overlapping in reinforcement where applicable shall conform to current standards and accepted engineering practice. Lap lengths shall not be less than 40 times the reinforcing bar diameter or as shown on the drawings or otherwise directed by the PPA Engineer. All laps shall be staggered or made at points where steel stress has fallen to less than half the allowable stress. Where lap shall not be staggered or be made at points of reduced stress, lap length shall be increased by 30%.

Mill Certificate and quality test for chemical composition and mechanical properties for every 10,000 kilograms or fraction thereof.

2.13 Supply and Place 3500 psi Concrete for Pavement

The work shall include but not limited to the furnishing of all labor, materials, equipment, and incidentals necessary to complete the supply and placing of 3500psi concrete for pavement.

Refer to Item 2.06

2.14 Supply and Place Reinforcing Steel Bars for Pavement

The work shall consist of the supply and installation of the reinforcing steel bars for ramp deck in accordance with the sizes, number, and shape of RSB indicated on the Drawings and in the approved bar cutting schedule.

Refer to Item 2.12

2.15 Installation of Mooring Bollard (25T, T-Head) including Accessories

The work shall include furnishing of all labor, materials, equipment and other incidentals necessary to complete the reinstallation of 25T Mooring Bollard (T-Head type) including supply and installation of bolts and other accessories in accordance with the sizes, distances and design shown on the Drawings and as directed by the PPA Engineer.

Materials to be used shall be:

- Mooring Bollard (owner supplied)
- High Tensile Anchor Bolts and nuts

The size of the bolts, nuts and washer shall be in accordance with the specification provided in the plan/drawings. The anchor plate shall be

connected to the holding down bolt as shown in the drawings. All bolts, nuts, washers, etc. that are exposed shall be galvanized to the satisfaction of the Engineer.

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

Visual Inspection

All mooring delivered to site shall be inspected by the Engineer for any sign of flaws o 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.

2.16 Installation of LED Solar Street Lights including Accessories

The work shall include but not limited to the furnishing of all labor, materials, equipment, and incidentals necessary to complete the installation of LED solar streetlights including accessories.

Materials to be used shall be:

- 112W LED Solar Streetlight (Cool White) including wires and accessories (owner supplied)

The work shall include furnishing of all labor, materials, and equipment necessary to complete the electrical works as shown on the drawings and/or as directed by the PPA Engineer.

IV. MEASUREMENT FOR PAYMENT

In accordance with Section II Scope of Works of this Technical Specifications, the pertinent items of work described therein and to be executed by the contractor shall be measured and paid for according to the following terms:

- All scope of works, activities shall be paid in accordance with the unit price for said item of works done/completed indicated in the Bill of Quantities (BOQ), plan and certified by the PPA Engineer.

V. As-Built Drawings and Photographs

1.00 Photographs taken before, during and after completion of the project shall be submitted as part of the documentary requirements for the progress billing.

2.00 At the completion of the Project, the Contractor shall prepare three (3) sets of “As-built” Drawings which shall be submitted to the PPA, PMO-Mindoro as part of the documentary requirements for the formers final

billing. The as-built drawings shall indicate therein all the original items of work, changes, deviations, and additional work items (if any), undertaken by the contractor to complete the project. The as-built drawings shall bear the title block prescribed by the PPA and shall be signed by the contractor’s authorized representative prior to submission to PPA, PMO-Mindoro.

Section VII.

Drawings

Section VIII.

Bill of Quantities