2. Manufacturer's Data

Submittals for each manufactured item shall be manufacturer's brochure products, equipment drawings, diagrams, performance and characteristic curves, and catalogue cuts.

3. Standard Compliance

When materials or equipment must conform to the standards of organizations such as the American National Standards Institute (ANSI), American Society for Testing and Materials (ASTM), National Electrical Manufacturers Association (NEMA), American Society of Mechanical Engineers (ASME), Air Movement and Control Association, Inc. (AMCA), American Refrigeration Institute (ARI), and Underwriters' Laboratories (UL), proof of such conformance shall be submitted to the Engineers for approval. If an organization uses a label or listing to indicate compliance with a particular standard, the label or listing will be acceptable evidence, unless otherwise specified in the individual sections. In lieu of the label or listing, the Contractor shall submit a certificate from an independent testing organization which is competent to perform acceptable testing and is approved by the Owner or his authorized representative. The certificate shall state that the item has been tested in accordance with the specified organization's test methods and that the item conforms to the specified organization's standard. For materials and equipment whose compliance with organizational standards or specifications is not regulated by an organization using its own listing or label as proof of compliance, a certificate of compliance from the manufacturer shall be submitted for approval. The certificate shall identify the manufacturer, the product, and the referenced standard and shall simply state that the manufacturer certifies that the product conforms to all requirements of the project specification and of the reference standards listed. The edition or the revised version of such codes and standards current at the date twenty eight (28) days prior to date of bid submission shall apply. During Contract execution, any changes in such codes and standards shall be applied after approval by the Owner.

4. Codes, Inspection, Permits and Fees

a. The work under this contract shall conform to the latest requirements of:

1) Philippine National Building Code

2) Regulations of the Local Municipality

b. Nothing contained in these specifications or shown on the drawings shall be construed as to conflict with the National and local ordinances or laws. All such laws and ordinances are made a part of these Specifications.

c. All construction permits and fees for this work shall be obtained at the expense of the Contractor. The Contractor shall furnish the Owners and Engineers the final certificates of inspection and approval from the appropriate government authorities.

OPERATION AND MAINTENANCE MANUAL

Furnish an operation and maintenance manual for each item of equipment. Furnish three (3) copies of the manual bound in hardback binders or an approved equivalent. Furnish one complete manual prior to the time that the equipment are performed and furnish the remaining manuals before the contract is completed. Inscribe the following identification on the cover: the words OPERATION AND MAINTENANCE MANUAL, the name and location of equipment or the building, the name of the Contractor, and the contract number. The manual shall include the names, addresses, and the telephone numbers of each subcontractor installing the equipment, and of the local representatives for each item of equipment. The manual shall have a table of contents and be assembled to

conform to the table of contents with the tab sheets placed before instructions covering the subject. The instructions shall be legible and easily read, with large sheets of drawings folded in. The manual shall include: wiring and control diagrams with data to explain detailed operation and control of each item of equipment; a control sequence describing start-up, operation and shutdown; description of the function of each principal item of equipment; the procedure for starting; the procedure for operating; shutdown instructions; installation instructions; maintenance instructions; lubrication schedule including type, grade, temperature range, and frequency, safety precautions, diagrams, and illustrations; test procedures; performance data; and parts list. The parts list for equipment shall indicate the sources of supply, recommended spare parts, and the service organizations which is reasonably convenient to the project site. The manual shall be complete in all respect for equipment, controls, accessories, and associated appurtenances provided.

POSTED OPERATING INSTRUCTIONS

Furnish approved operating instructions for each system and principal item of equipment for the use of the operation and maintenance personnel. The operating instructions shall include wiring diagrams, control diagrams, and control sequence for each principal item of equipment. Operating instructions shall be printed or engraved and shall be framed under glass or in an approved laminated plastic and posted where directed by the Owner. Operating instructions shall be attached to or posted adjacent to each principal item of equipment and include directions for start up, proper adjustment, operating, lubrication, shut down, safety precautions, procedure in the event of equipment failure, and other areas as recommended by the manufacturer of each item of equipment. Operating instructions exposed to the weather shall be made of weatherproof materials or shall be suitably enclosed to be weather protected. Operating instructions shall not fade when exposed to sunlight and shall be secured to prevent easy removal or peeling.

SAFETY

1. Rotating Equipment Safety

    Couplings, motor shafts, gears and other exposed rotating or rapidly moving parts shall be fully guarded. The guards shall be cast iron or expanded metal. Guard parts shall be rigid and suitably secured and shall be readily removable without disassembling the guarded unit.

INSTRUCTION TO OWNER'S PERSONNEL

When specified in other sections, the Contractor shall furnish the services of competent instructors who will give full instruction to the designated personnel in the adjustment, operation, and maintenance, including pertinent safety requirements of the equipment or system specified. Each instructor shall be thoroughly familiar with all the parts of the installation and shall be trained in operating theory as well as practical operation and maintenance work. Instruction shall be given during the first regular work week after the equipment or system has been accepted and turned over to the Owner for regular operation. The number of man-days (8 hours) of instruction furnished shall be as specified in other sections. When more than 4 man-days of instruction are specified, approximately half of the time shall be used for classroom instruction. All other time shall be used for instruction with the equipment or system. When significant changes or modifications in the equipment or system are made under the terms of contract, additional instruction shall be provided to acquaint the operating personnel with the changes or modifications.

DELIVERY AND STORAGE

Equipment and materials shall be handled, stored, and protected to prevent damage before, during, and after installation, in accordance with the manufacturer's recommendations and as approved. Damaged or defective items shall be replaced without cost to the Owner.

STANDARD PRODUCTS/SERVICE AVAILABILITY

1. Materials and Equipment

   Materials and equipment shall be standard products of manufacturer regularly engaged in the manufacture of such products, which are of a similar material, design and workmanship. The standard products shall have been in satisfactory commercial or industrial use for seven years prior to bid opening. The seven year use shall include applications of equipment and materials under similar circumstances and of similar size as specified for the Project. The equipment shall be soled exclusively by a single, stable distributor with after sales capability.

2. Experience Required

   The five (5) years experience must be satisfactorily completed by a product which has been sold or is offered for sale on the commercial market through advertisements, manufacturers' catalogues, or brochures.

3. Alternative Service Record

   Products having less than a five-year field service record will be acceptable if a certified record of satisfactory field operation for not less than 6000 hours, exclusive of the manufacturer's factory or laboratory tests can be shown.

4. Service Record

   The equipment items shall be supported by service organizations. The Contractor shall submit a certified list of qualified permanent service organizations for support of the equipment which includes their addresses and qualifications. These service organizations shall reasonably be convenient to the equipment installation and able to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.

5. Manufacturer's Nameplate
   Each item of equipment shall have a nameplate bearing the manufacturer's name, address, model number, and serial number affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.

SAFETY REQUIREMENTS

Belts, pulleys, chains, gears, couplings, projecting set screws, keys, and other rotating parts located so that any person can come in close proximity thereto shall be fully enclosed or properly guarded in accordance with OSHA 29 CFR 1910.219. High temperature equipment and piping so located as to endanger personnel or create a fire hazard shall be properly guarded or covered with insulation of a type as specified herein. Items such as catwalks, ladders, and guardrails shall be provided where required for safe operation and maintenance of the equipment.

MANUFACTURER'S RECOMMENDATIONS

Where installation procedures or any part are required to be in accordance with the manufacturer's recommendations of the material being installed, printed copies of these recommendations shall be furnished to the Owners and Engineers prior to installation. Installation of the item will not be allowed to proceed until the recommendations are received. Failure to furnish these recommendations can be cause for rejection of the material.

ELECTRICAL REQUIREMENTS

Electrical components of mechanical equipment and systems such as motors, starters, and controls shall be provided under this Item and shall be as specified herein and as necessary for complete and operable system. Extended voltage range motors will not be permitted. Interconnecting wiring for components of packaged equipment shall be provided as an integral part of the equipment.

ELECTRICAL MOTORS

1. All electrical motors of sizes and types as specified for driving air conditioning and ventilating equipment shall be furnished and erected under this section. All motors shall be of proper power and speed to suit the specified makes of equipment. If other makes of equipment are accepted in any case, the proper adjustment of motor speed and power including affected changes in electrical system circuit breakers and wiring must be included without additional cost to the Owner. Technical data shall be submitted for approval before the equipment is purchased.

2. All motor ratings shall be as specified on the drawings.

3. Generally, all motors shall be constant speed, squirrel-cage type motors and energy efficient except as otherwise listed on plans. Single phase motors shall be capacitor start induction-run or split phase type as approved for the service.

4. All belt-connected motors shall have adjustable bases and set screws to maintain proper belt tension, and shall be provided with proper belt guards.

5. All motors and accessories shall comply in all respect with NEMA Standards. Types shall be as required by Local Code.

6. All motors shall be furnished with type "B" insulation and tropical fungus proofing according to NEMA standards.

CHANGES IN WORK DUE TO APPROVAL OF ALTERNATE MATERIALS

Assure the cost of, and the entire responsibility for any changes in the work shown on the Contract Documents which may be occasioned by approval of materials proposed by the Contractor other than those specified.

GUARANTEE

Furnish the Owner a written guarantee covering the satisfactory operation of the mechanical installation in all its parts for a period of one (1) year after date of final acceptance of work. During this period, repair or replace any defective work, materials or equipment furnished and installed without any cost to the Owner. Include with this guarantee certificate of every material supplier engaged by this trade of the project.

AS-BUILT DRAWINGS

1. The Contractor shall, during the progress of work, keep record of all deviations of the actual installation from that shown on the Contract Drawings.

2. Upon completion of work, the Contractor shall submit two (2) copies of the as-built drawings, signed by the Contractor's Registered Professional Mechanical Engineer and Owner Project Inspector, indicating the work as actually and finally installed, including new information not originally shown in Contract Drawings.

3. Approval of as-built drawings by the Engineer shall be a requirement for final acceptance of the completed works and of final payment.

QUALITY ASSURANCE

1. Surveys and Measurements:

   a. The Contractor shall base measurements, both horizontal and vertical, from established benchmarks. All work shall agree with these established lines and levels. Verify all measurements at site and check the correctness of same as related to the work.

   b. Should the Contractor discover any discrepancy between actual measurements and those indicated, which prevents following good practice or intent of the drawings and specifications, he shall notify the Owner's representative and shall not proceed with his work until he has received instructions from the Owner's representative upon referring the matter to the Engineer.

2. Drawings and Minor Modification:

   a. Drawings are diagrammatic and indicate the general arrangement of the system and work included in the contract. Drawings are not to be scaled. The drawing and details shall be examined for exact location of fixtures and equipment by verifying actual site conditions.

   b. The Contractor shall follow drawings in laying out work and check drawing of other trades to verify spaces in which work will be installed. Maintain maximum headroom and space conditions at all points. Where headroom or space conditions appear inadequate, Owner's representative shall be notified before proceeding with installation, if directed by the Owner's representative, the Contractor shall, without extra charge, make reasonable modifications and the layout as needed to prevent conflict with work of other trades or for proper execution of the work.

   c. Materials and Workmanship

   All materials and apparatus required for the work, except as specified otherwise, shall be new of first class quality, and shall be furnished, delivered, erected, connected and finished in every detail, and shall be so selected and arranged as to fit properly into the building spaces. Where no specific kind or quality of materials is given, first class standard articled shall be furnished.

ITEM 27 : UNITARY AIR-CONDITIONING SYSTEMS

GENERAL

"Mechanical General Requirements" applies to this Item with additions and modification specified herein.

GENERAL REQUIREMENTS

1. Unitary Air-Conditioning System

Air conditioning units in retail stores shall be supplied and installed by the tenant. Capacity of equipment shall not be less than that indicated. In the NFPA standards and SMACNA manuals referred herein, the advisory provisions shall be considered to be mandatory, as though the word "shall" had been substituted for "should" wherever it appears. Reference to the "authority having jurisdiction" shall be interpreted to mean the Engineer.

2. Refrigerant Piping, Fittings and Accessories

Refrigerant piping assembly as used in this section includes pipes, flanges, bolting, gaskets, valves, relief devices, fittings, and the pressure containing parts of other piping components. It also includes hangers and supports and other equipment items necessary to prevent overstressing the pressure containing parts.

a. Piping

ANSI 15 and ANSI B31.5. Compatible with fluids for which they are being used and capable of withstanding the pressures and temperatures of the service that they are handling.

b. Tubing

Refrigerant piping shall be seamless copper tubing, hard drawn, type K, ASTM B88. Tubing used for refrigerant service shall be cleaned, sealed, capped or plugged prior to being shipped from the manufacturer's plant. Fittings for copper tubing shall be wrought copper or bronze, brazing or solder joint type ANSI B16.18 or ANSI B16.22. Copper flared type tubing may be made only in annealed copper tubing ASTM B280 and in nominal sizes smaller than one- inch only for connection to equipment and no larger than 1-3/8 inches diameter for other connections. Flanges shall be of bronze ANSI B16.24.

3. Corrosion Prevention

Unless specified otherwise, equipment fabricated from ferrous metals that do not have a zinc coating shall be treated for prevention of rust with a factory coating or paint system that will withstand 125 hours in a salts-pray fog test except that equipment located outdoors shall be tested for 500 hours. The salt-spray fog test shall use a 20 percent sodium chloride solution. Immediately after completion of the test, the coating shall show no signs of blistering, wrinkling or cracking, no loss of adhesion, and the specimen shall show no signs of rust creep age beyond 1/8 inch on either side of the scratch mark. The film thickness of the factory coating or paint system applied on the equipment shall be not less than film thickness used on the test specimen.

4. Safety Standards

a. Design, Manufacture and Installation of Mechanical Refrigeration Equipment: ASHRAE Safety Code for Mechanical Refrigeration.

b. Machinery Guards: Fully guard drive mechanisms, or other moving parts. Provide guards fabricated of steel and expanded metal, rigidly mounted, and readily removed without disassembly.

MATERIAL REQUIREMENTS

Unitary Air –Conditioning System – Split Type Inverter

1. General

The air-conditioning systems shall be designed, constructed, and rating tested in accordance with ARI Standard 210 for unitary air-conditioning equipment of capacities below 135,000 Btu's per hour and ARI Standard 300 for unitary equipment with capacities of 135,000 Btu's per hour and greater. Units shall be ARI certified. Units with capacities below 135,000 Btu's per hour shall be listed in the ARI Directory of Certified Unitary Air-Conditioners.

2. Performance Rating

Cooling capacity of unit shall meet the sensible heat requirements and total requirements indicated. In selecting unit size, make true allowance for "sensible to total heat ratio" to satisfy required sensible cooling capacity. Submittals shall include catalogue selection data which accounts for sensible to total heat ratio, entering air-conditions at evaporator, and condenser air-conditions.

3. Air Conditioners, Ceiling Cassette Type Inverter

The air conditioning system has a 4-way air distribution with auto sweep, it can cool an adjacent room using of the 4-way airflow outlets The fresh air intake device and additional outlet grille can condition the air in an adjoining room using one of its 4-way airflow sides..

4. Compressors

Provide hermetic, semi-hermetic rotary, or screw type provided with all the minimum standard equipment and accessories listed therein. Compressor speed for compressors above 20 tons shall not exceed 1750 rpm. Provide compressors with automatic capacity reduction of at least 50 percent for units over 10 tons. Compressors shall start unloaded. Provide each compressor with devices to protect the compressor from short-cycling when shut-down by safety controls. Provide a pump-down cycle of the non-recycling start type for each compressor 20 tons and over. Provide compressors with vibration isolators. Compressor motor shall be suitable for electric power characteristics as indicated. Motor shall conform to NEMA NG-1. Motor starters shall conform to NEMA ICS. Motors shall be constant speed, squirrel-cage induction, open type or hermetically sealed, low starting current, high-torque type, and shall be furnished with reduced voltage or and magnetic across-the-line type motor starter with weather-resistant enclosures

5. Coils

a. Cooling coils shall conform to ARI 410 and to paragraph entitled, Cooling Coils. Coils shall be the type indicated or specified herein.

b. The air-cooled condenser coil shall be extended-surface fin-and-tube type with seamless copper or aluminum construction. Aluminum alloy conforming to ASTM B210, alloy 1100, shall be used for the tubes, and aluminum alloy conforming to chemical requirements of ASTM B209, alloy 7072, shall be used for fins and sheets. Fins shall be soldered or mechanically bonded to tubes and installed in a metal casing. Coils shall be air tested under water for leakage. After testing, dry coils for remote type units to remove free moisture, and cap to prevent entrance of foreign matter. Evacuate and seal coils at the factory.

7. Filter Boxes

Provide filter boxes with either hanged access doors or removable panels. Filter boxes shall have racks for filters arranged for angle pattern. Filters shall be of type indicated and shall conform to paragraph hereinafter entitled, "Filters".

8. Mixing Boxes

Mixing boxes shall be of physical size to match the basic unit and include equal sized flanged openings, each sized to handle full air flow. Arrangement of openings shall be as indicated. Provide openings with dampers of opposed blade type. All damper shafts shall be connected together by one continuous linkage bar. Arrange dampers for manual operation so that when one starts to close from its opened position, the other starts to open from its closed position.

9. Controls

a. Condenser Controls

Provide load pressure control to insure condensing temperature for proper system operation at all ambient temperatures down to 40°F.

b. Condenser Start-up Control Provide condenser with a start-up control package which permits start-up compressor regardless of low ambient temperatures. Package shall temporarily bypass system low pressure-start to permit start-up whenever minimum ambient temperature is below design evaporator coil suction temperature.

10. Refrigerant Circuits

Entire refrigerant circuit shall be dehydrated, purged, and charged with refrigerant and oil at factory. Factory oil charge shall be the full amount required for operation. Factory charge for refrigerant shall be the full amount required for operation.

11. Corrosion Protection

Units shall be factory corrosion protected in accordance with paragraph entitled, Corrosion Prevention.

COOLING COILS

1. Direct-Expansion Coils

Direct-expansion coils shall be fin-and-tube type constructed of seamless copper or aluminum tubes and copper or aluminum fins mechanically bonded or soldered or helically wound to tubes. Casing and tube support sheets shall be not lighter than 16-gauge (0.0635-inch nominal thickness) galvanized steel, formed to provide structural strength. Suction header shall be seamless copper tubing or seamless or resistance welded steel tube with copper connection. Supply header shall consist of a distributor to distribute the refrigerant liquid through seamless copper tubing, equally to all the circuit in the coil. Tubes shall be circuited to insure minimum pressure drop and maximum heat transfer. Circulating shall permit refrigerant flew from liquid inlet to suction outlet without causing oil staging or restricting refrigerant flow in coil. Rack coil shall be tested at the factory under water at not less than 300 psi air pressure and shall be suitable for 200 psi working pressure. Each coil shall be completely dehydrated and scaled at the factory upon completion of pressure tests. Coil shall be mounted for counter flow service.

2. Filters

Filter shall be of the sectional or panel cleanable type and be capable of filtering the entire air supply.

3. Manometers

Provide inclined-type manometers for filter stations of 2,000 cfm capacity or larger including filters furnished as integral parts of air handling units and filters installed separately. Manometers shall be of sufficient length to read at least one inch of water column, shall be graduated in 1/10 inches, and equipped with spirit level. Equip each manometer with over-pressure safety traps to prevent loss of oil, and two three-way vent valves for checking zero setting.

CLEANING, PAINTING AND IDENTIFICATION

Cleaning, painting and identification of piping shall be as specified under, "Painting" of "Building Works".

IDENTIFICATION TAGS AND PLATES

Provide equipment, thermometers, valves, and controllers with tags numbered and stamped for their use. Plates and tags shall be of brass or suitable non-ferrous material, securely mounted or attached. Minimum letter and numeral size shall be 1/8 inch.

EXECUTION

INSTALLATION

Application and installation practices for unitary air-conditioning systems shall conform to the requirements of an acceptable industry standard for installation of unitary systems.

1. General

Install equipment and components in a manner to insure proper and sequential operation of the equipment and its controls. Installation of equipment not covered herein or in manufacturer's instructions shall be installed as recommended by manufacturer's representative. Provide proper foundations for mounting of equipment, accessories, appurtenances, piping and controls including, but not limited to, supported vibration isolators, stands, guides, anchors, clamps, and brackets. Foundations for equipment shall conform to equipment manufacturer's recommendation, unless otherwise shown in the drawings. Set anchor bolts and sleeves accurately using properly constructed templates. Anchor bolts shall be of adequate length and provided with welded-on plates on the head end embedded in the concrete. Level equipment bases, using jacks or steel wedges, and neatly grouted-in with a non-shrinking type of grouting mortar. Locate equipment so that working space is available for all necessary servicing such as shaft removal, disassembling compressor cylinders and pistons, replacing or adjusting drives, motors, or shaft seals, access to water heads and valves of shell and tube equipment, tube cleaning or replacement, access to automatic controls, refrigerant charging, lubrication, oil draining and working clearance under overhead lines. Provide electric isolation between dissimilar metals for the purpose of minimizing galvanic corrosion.

2. Unitary Air-Conditioning System

Install system as indicated, in accordance with the requirements of ASHRAE 15-76 and as recommended in the manufacturer's installation and operational instructions.

3. Electrical Work

Electric motor driven equipment specified herein shall be provided complete with motors, motor starters, and controls. Electrical equipment and wiring shall be in accordance with "Electrical General Requirements" . Motor starters shall be provided complete with properly sized thermal overload protection and other appurtenances necessary for the motor control wiring required for controls and devices but not indicated.

4. Piping

a. Piping Sleeves
Pipe sleeves shall be as Galvanized Iron, Schedule 20.

b. Provide refrigerant driers, sight glass liquid indicators, moisture indicators, and strainers in refrigerant piping for remote installations when not furnished by the manufacturer as part of the equipment.

c. Locate strainers close to equipment they are to protect. Provide a strainer in the common refrigerant liquid supply to two or more thermal valves in parallel when each thermal valve has a built-in strainer. Install strainers with screen down and in direction of flow as indicated on strainers body.

d. Solenoid valves shall be installed in horizontal lines with stem vertical and with flow in direction indicated on the valve. If not incorporated as internal part of the valve, provide strainers upstream of the solenoid valve. Provide service valves upstream of the solenoid valve, upstream of the strainer, and downstream of the solenoid valve. Remove the internal parts of the solenoid valve when brazing the valve.

5. Auxiliary Drain Pans, Drain Connections, and Drain Lines

Provide auxiliary drain pans under all drain pans of the units located above finished ceilings or over mechanical or electrical equipment where condensate overflow over unit drain pan may cause damage to ceilings, piping, and equipment below. Provide drain lines for all drain and auxiliary drain pans. Trap the drain from bottom pan of air-conditioning units to insure complete pan drainage. Drain lines shall be full size of opening.

6. Air Filters

Provide access panels for all concealed valves, controls, dampers, and other fittings requiring inspection and maintenance.

7. Inspection Plates and Test Holes

Inspection plates and test holes where required in casings for air balance measurements shall conform to SMACMA High Pressure Low Velocity Duct Construction Standards. Test holes shall be a factory-fabricated, air-tight, non-corrosive test hole with screw cap and gasket. Extend cap through insulation.

8. Flashing and Pitch Pockets

Provide flashing and pitch pockets for equipment support and roof penetrations and flashing where piping or ductwork passes through exterior walls.

FIELD TESTS AND INSPECTIONS

1. Tests

All tests shall be performed and materials and equipment required for test shall be furnished by the Contractor. Tests after installation and prior to acceptance shall be performed in the presence of a representative of the Owner and subject to his approval. Equipment and material certified as having been successfully tested by the manufacturer in accordance with referenced specifications and standards will not require retesting before installation. Equipment and materials not tested at the place of manufacturer will be tested before or after installation, as applicable, where necessary to determine compliance with referenced specifications and standards.

2. Leak Testing

Upon completion of installation of the air-conditioning equipment, test all factories as well as field refrigerant piping with an electronic-type leak detector to acquire leak tight refrigerant systems. If leaks are detected at the time of installation or during the guarantee period, remove the entire refrigerant charge from the system, correct the leaks and retest the system.

3. Evacuation, Dehydration, and Charging

After system is found to be without leaks, evacuate the system using a reliable gauge and a vacuum pump capable of pulling a vacuum of at least 1 mm lig absolute. Evacuate system in strict compliance with the triple evacuation and blotter method or in strict accordance with equipment manufacturer's printed instructions. System leak testing, evacuation, dehydration, and charging with refrigerant shall comply with the requirement contained in an acceptable industry standard.

4. Start-Up and Operation Tests

The air-conditioning system and its components shall be started and initially placed under operation and checked to see that it is functioning correctly. Adjust safety and automatic control instruments as necessary to place them in proper operation and sequence. The operational test shall be not less than 8 hours.

5. Performance Tests

Upon completion of evacuation, charging, start-up, final leak testing, and proper adjustment of controls, the system shall be performance tested to demonstrate that it complies with the performance and capacity requirements of the specifications and plans. Test the system for not less than 8 hours, during which time hourly readings shall be recorded. At the end of the test period, the readings shall be averaged and the average shall be considered to be the system performance.

6. Sound Tests, Air-conditioners, Unitary, Split Type

Sound pressure level measurements shall be conducted on units designated by the Owner. Calculate sound power levels by ASHRAE Systems Handbook and Product Directory. Submit test results and calculations.

ITEM 28 : EXHAUST EQUIPMENT

EXHAUST EQUIPMENT

GENERAL

"Mechanical General Requirements" applies to this Item with additions and modification specified herein.

SCOPE OF WORK

1. Furnish materials that are new, of first-class quality.
2. Install all materials in strict accordance with the manufacturer's instructions and specifications.

PRODUCTS

MATERIAL REQUIREMENTS

1. Bathroom Ceiling Mounted Exhaust Fan

The exhaust fans shall be of the built-in ceiling type, ceiling mounted, suitable for operation. Sizes and capacities are based on models or approved equal. Brand and models indicated herein is for the purpose of establishing product quality, capacities and dimensions. Other brands satisfying the same shall likewise be accepted, subject to the approval of the owner and Engineer In-Charge. The capacities of the units shall be as shown on the Drawings.

2. Wall Mounted Propeller Exhaust Fan (Optional)

The wall-mounted propeller exhaust fan shall be direct-drive three blade type with a steel mounting plate. Capacity of the fan shall be as shown on the drawings. Fan blades shall be constructed of steel or aluminum. The fan hub shall be of heavy construction and shall be of steel or semi-steel, and the blades shall be riveted to the hub. Fan blade shall be quiet in operation and shall be statically and dynamically balanced at the factory. Motor and Drive shall be of the condenser motor type, tightly sealed and dust proof with non-lubricating ball bearings. The fan shall be provided with automatic shutters to prevent air from re-entering the fan when fan is off. The fan control switch shall be located as near as possible to the fan.

EXECUTION

1. Install the fan securely to the ceiling.
2. Install back-draft dampers and check to make sure they are free to open and close.
3. Connect power and check rotation of fan.

ITEM 29 : DISTRIBUTION TRANSFORMER

SCOPE OF WORK

The work to be done shall consist of supplying and delivering and installing distribution transformers completed in accordance with all the materials submitted by Local Electric Cooperative of Pantukan Davao de Oro, (NORDECO), including labor, tools and equipment and all incidental works as found necessary.

GENERAL REQUIREMENTS

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

1. American National Standard Institute - (ANSI)
2. Institute of Electrical and Electronics Engineers - (IEEE)
3. National Electrical Manufacturer Association - (NEMA)
4. Philippine Electrical Code - (PEC)
   Philippine National Standard - (PNS)

b) Materials Requirements

- Distribution Transformer,
- Conventional
- Pole Type
- Oil Immersed
- Self –Cooled
- Single Phase, 1Ø, 60hz
- 65 °C Temperature rise

Capacity	:	KVA
Primary Voltage	:	7.62 / 13.2 Y kV 2-2.5% taps FCAN and 2-2.5% taps FCBN Available on tap changer for de-energized operation
Primary BIL Rating	:	95kV
Secondary Voltage	:	120 /240V
Secondary BIL Rating	:	30kV
Percent Impedance	:	ANSI Standard
HV/LV Conductor	:	Copper / Aluminum
Insulating Fluid	:	Mineral Oil
Core	:	Silicon Core
NLL	:	190W
LL	:	650W

c) Standard Test Reports:

1. Routine Tests
   - Turn Ratio Test
   - Voltage Ratio Test

- o No Load Loss & Load Loss Test
- o Impedance Voltage Test
- o Applied Potential Test
- o Induced Potential Test

2. Type of Test
   - o Impulse test
   - o Temperature Rise Test

PRODUCTS (DISTRIBUTION TRANSFORMER)

External Features
- o High Voltage Bushing
- o Low Voltage Bushing
- o Tank and Cover
- o Pressure Relief Valve
- o Tank and Low Voltage Grounding Provision
- o Externally Operated No-Load Tap Changer
- o Radiators

Internal Features
- o Core Coil Assembly
- o Winding Material
- o Insulating Di-Electric Fluid
- o Coil Support

PRODUCTS (GENERAL DESCRIPTION)

1. **High Voltage Bushing**, the cover mounted and tank - wall high voltage bushing is made of wet processed porcelain suitable for both copper and aluminum conductors.

2. **Low Voltage Bushing**, single or double eyebolt or spade terminal made of wet process porcelain.

3. **Tank and Cover**, manufactured from hot-rolled steel sheets and pressure tested to ensure a leak free enclosure. Grit blasted or chemically treated to remove every trace of scale, rust or oil, for better paint adhesion. Outer and inner surfaces are primed with epoxy primer for rust prevention, and the outer surface is coated with polyurethane.

4. **Pressure Relief Valve** gradually releases excess pressure and is designed for outdoor condition.

5. **Tank and Low Voltage Grounding Provisions**, provided to help prevent damage to the transformer during electrical surges.

6. **Externally Operated No-Load Tap Changer**, provides up to five (5) primary voltage for convenient changing of high voltage tap connection at no –load.

7. **Radiators**, made of hot-rolled steel sheets, are provided for higher KVA units for added cooling surface.

8. **Core Coil Assembly** uses a superior transformer insulation system and is permanently centered in the tank using a close fitted steel frame. Materials used for our coils are either silicon-iron for our blue and silver series or Amorphous metal for our gold line.

9. **Winding Material**, distribution transformer uses a combination of standard copper-aluminum or copper-copper winding materials.

10. **Insulating –Di- Electric Fluid**, used are either mineral oil or an environment friendly high fire point fluid.

11. **Coil Support** used compatible materials to hold the coil in place and restrain it during short circuit-circuit conditions. Core clamps and clamp angles are also used to ensure that the core and windings are effectively secured even during mechanical stress.

EXECUTION

INSTALLATION

Shall be in accordance with the code and requirements specified herein.

GROUNDING

Ground all exposed non-current-carrying metallic parts of electrical equipment.

WORKMANSHIP

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

TESTING OPERATIONS

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

GUARANTEE

Upon completion and before final acceptance of the work, the Contractor shall furnish the Engineer with a written guarantee stating that all works executed are free from defects on materials and workmanship. The guarantee shall be for a period of one year from the date of final acceptance. Any work that becomes defective during the said period shall be corrected / replaced by the Contractor at his own expense in a manner satisfactory to the Authority.

ITEM 30 : PROJECT BILLBOARD

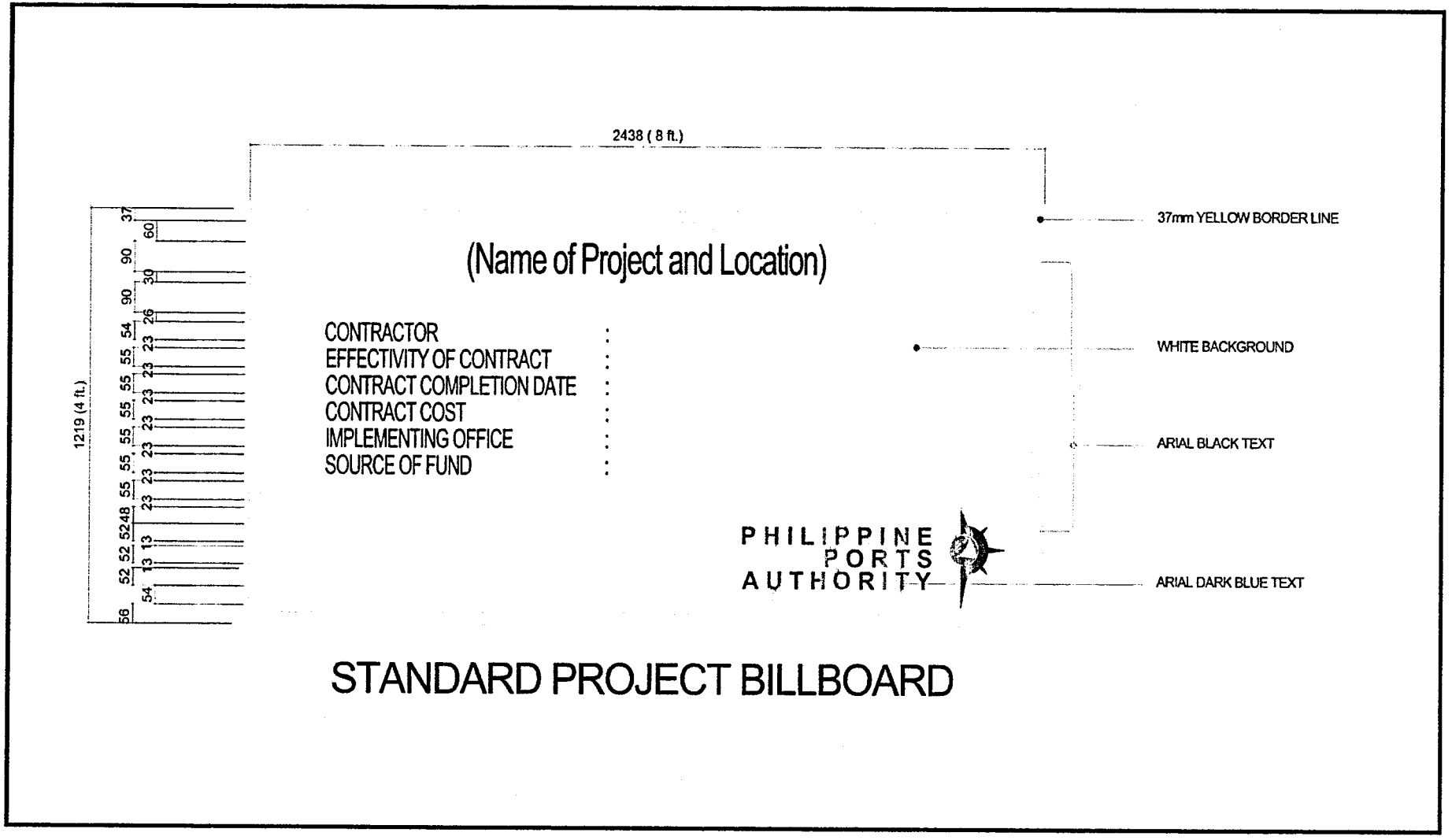
SPECIFICATION

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

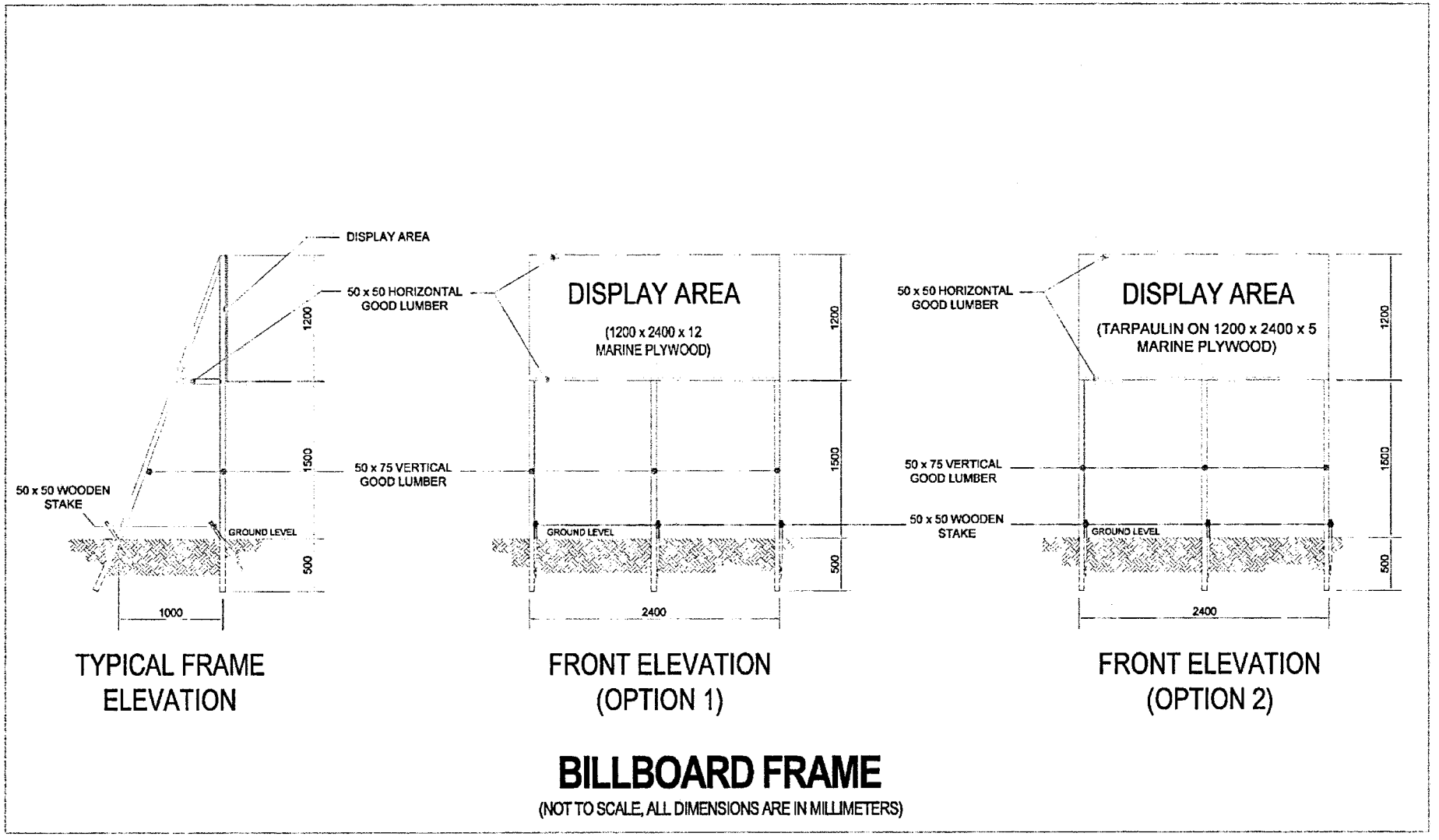
The size and specifications of materials for the standard billboard shall be 4ft. x 8ft. (1,200mm x 2,400mm) using ½ inch (12mm) marine plywood or tarpaulin poster on 3/16 inch (5mm) marine plywood.

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

See attached drawings for further details of the standard billboard.



STANDARD PROJECT BILLBOARD



BILLBOARD FRAME

(NOT TO SCALE, ALL DIMENSIONS ARE IN MILLIMETERS)

ITEM 31 : 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.

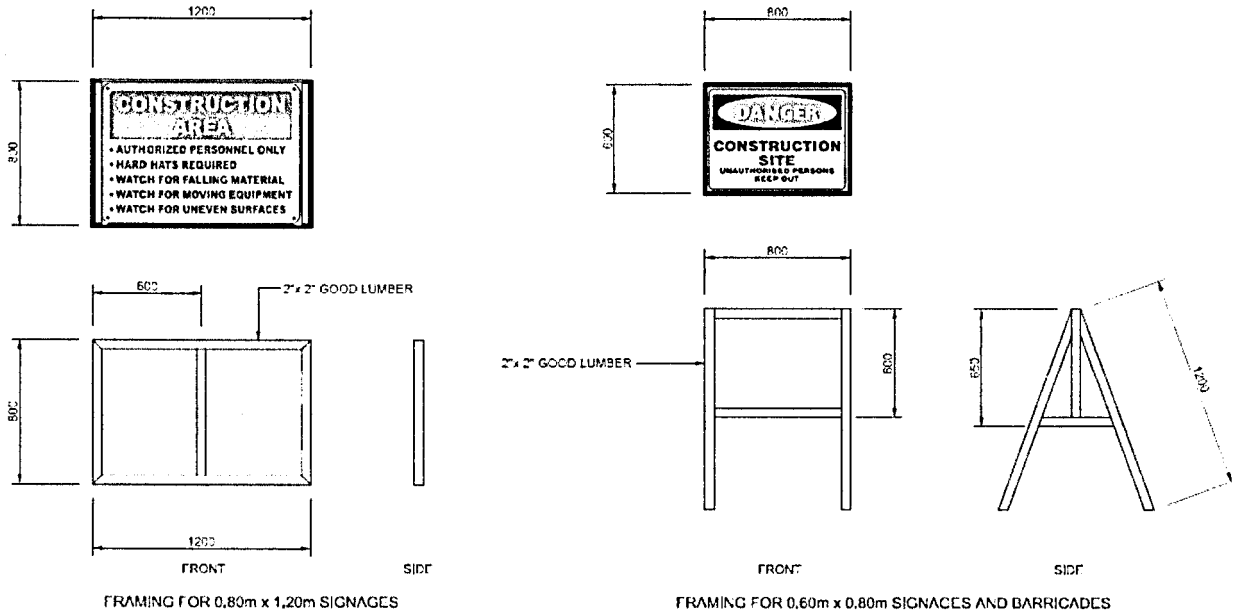
SPECIFICATION

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

DRAWINGS
(APPROVED PLANS)

DRAWINGS AND APPROVED PLANS
(SEE ISSUED APPROVED PLANS)

LIST OF DRAWINGS:

CONSTRUCTION OF PORT OPERATIONAL AREA AND RC PIER WITH RORO RAMP, AND UPGRADING OF ROCK CAUSEWAY

01 OF 28	-	• DEVELOPMENT PLAN, GENERAL NOTES, DESIGN PARAMETERS, LIST OF DRAWINGS AND LOCATION MAP
02 OF 28	-	• PLANS SHOWING EXISTING FACILITIES
03 OF 28	-	• GENERAL PLAN
04 OF 28	-	• PORT OPERATIONAL PLAN
05 OF 28	-	• SHEET PILING PLAN
06 OF 28	-	• STATION 0+000 & STATION 0+010
07 OF 28	-	• STATION 0+020 & STATION 0+030
08 OF 28	-	• STATION 0+040 & STATION 0+052.75
09 OF 28	-	• LINE 0+000 & LINE 0+010
10 OF 28	-	• LINE 0+020 & LINE 0+030
11 OF 28	-	• LINE 0+040, LINE 0+050 & LINE 0+059
12 OF 28	-	• KEY SHEET PILING PLAN, DETAIL OF WALE SPLICE, CHANNEL/WALE SECTION, PILE CONNECTOR & DETAIL OF TIE ROD
13 OF 28	-	• DETAIL OF RETAINING WALL - 1, DETAIL OF RETAINING WALL - 2, DETAIL OF RETAINING WALL - 3, DETAIL OF ANCHOR WALL & TYPICAL PORTLAND CEMENT CONCRETE PAVEMENT DETAILS
14 OF 28	-	• TYPICAL PLAN OF CHB FENCE, TYPICAL ELEVATION OF CHB FENCE, DETAIL OF CHB FENCE & DETAIL OF COLUMN/RC CURB
15 OF 28	-	• R.C. WHARF PLAN, SCHEDULE OF MOORING BOLLARDS (TEE-HEAD) & SCHEDULE OF FENDERING SYSTEM (V-TYPE)
16 OF 28	-	• R.C. WHARF PILING PLAN & PILE SCHEDULE (800mm x 13mm STEEL PIPE PILES)
17 OF 28	-	• OFFSHORE ELEVATION OF R.C. WHARF
18 OF 28	-	• TYP. LONGITUDINAL ELEVATION OF R.C WHARF
19 OF 28	-	• TYPICAL TRANSVERSE SECTION OF R.C. WHARF & TYPICAL TRANSVERSE SECTION OF R.C. WHARF WITH MOORING/FENDER BLOCK
20 OF 28	-	• WHARF SLAB REINFORCEMENT DETAIL & RORO RAMP SLAB REINFORCEMENT DETAIL
21 OF 28	-	• TYPICAL CONNECTION OF TUBULAR STEEL PILE, SECTION D, SECTION E, SECTION F & DETAIL OF BACKING CYLINDER PLATE AT SPLICING

22 OF 28	-	• DETAIL OF MOORING/FENDERING BLOCK AND BOLLARD ATTACHMENT AT WHARF
23 OF 28	-	• DETAIL OF CURTAIN WALL, DETAIL OF CONSTRUCTION JOINT, PILE CAP FOR VERTICAL PILES & PILE CAP FOR COUPLE PILES
24 OF 28	-	• TYP. TRANSVERSE BEAM REINFORCEMENT OF R.C. WHARF & TYP. LONGITUDINAL BEAM REINFORCEMENT OF R.C. WHARF
25 OF 28	-	• SECTION H, SECTION I, SECTION J, SECTION K, SECTION L & SECTION M
26 OF 28	-	• TYP. TRANSVERSE BEAM REINFORCEMENT OF RORO RAMP, FENDER BEAM REINFORCEMENT OF RORO RAMP & TYP. BEAM REINFORCEMENT OF RORO
27 OF 28	-	• TYP. TRANSVERSE BEAM DETAIL, TYP. LONGITUDINAL BEAM DETAIL, FENDER BEAM DETAIL & DETAIL OF STEEL RAMP PROTECTION
28 OF 28	-	• DETAIL OF V-TYPE RUBBER DOCK FENDER (500H x 1500L) & DETAIL OF 35 TON MOORING TEE-HEAD

FIELD OFFICE, GATE COMPLEX, PUMP HOUSE

ARCHITECTURAL SHEETS

A -01 of 04	-	• PERSPECTIVE • TABLE OF CONTENTS
A -02 of 04	-	• VICINITY MAP • SITE DEVELOPMENT PLAN • LEGEND
A -03 of 04	-	• FLOOR PLAN • ROOF PLAN • REFLECTED CEILING PLAN • WALL PARTITION LAYOUT • FRONT ELEVATION • REAR ELEVATION • LEFT SIDE ELEVATION • RIGHT SIDE ELEVATION • SECTION THRU X-X' • SECTION THRU Y-Y'
A -04 of 04	-	• SCHEDULE OF DOORS AND WINDOWS • TOILET DETAILS • BLOW-UP OF RAMP & RAILING @ BOARDING AREA • KITCHEN CABINET DETAILS

STRUCTURAL SHEETS

S-01 of 05	-	• STRUCTURAL GENERAL NOTES & STANDARDS
S -02 of 05	-	• STRUCTURAL STANDARD DETAILS
S-03 of 05	-	• STRUCTURAL STANDARD DETAILS

S -04 of 05 -
- FIELD OFFICE FOUNDATION PLAN
- FIELD OFFICE WALL FOOTING LAYOUT PLAN
- FIELD OFFICE ROOF BEAM FRAMING PLAN
- FIELD OFFICE DETAIL OF COLUMN/FOOTING (C-1/F1)
- TYPICAL BEAM DETAIL
- BEAM SCHEDULE

S -05 of 05 -
- FIELD OFFICE ROOF FRAMING PLAN
- TRUSS DIAGRAM
- SCHEDULE OF STEEL TRUSSES
- SLAB ON GRADE REINFORCEMENT DETAILS
- TYPICAL DETAILS OF CANOPY SLAB
- DETAIL OF STEP-UP

ELECTRICAL SHEETS

E - 01 of 05 -
- LIGHTING LAYOUT PLAN
- POWER LAYOUT PLAN
- AIR CONDITION UNIT POWER LAYOUT PLAN
- DATA/TELEPHONE LAYOUT PLAN
- FIRE DETECTION AND ALARM LAYOUT PLAN
- LIGHTNING PROTECTION LAYOUT PLAN
- LEGEND

E - 02 of 05 -
- LOAD SCHEDULE
- RISER DIAGRAM
- FDAS SINGLE LINE DIAGRAM
- TELEPHONE SINGLE LINE DIAGRAM
- NOTES ON FDAS
- NOTES ON DATA/TELEPHONE

E - 03 of 05 -
- MECHANICAL EQUIPMENT SCHEDULE (CEILING MOUNTED CASSETTE TYPE AIR CONDITION)
- SPLIT TYPE AIR CONDITION

E - 04 of 05 -
- SINGLE LINE DIAGRAM
- SCHEDULE OF LOAD
- DETAIL OF DUCT BANK
- PEDESTAL POST DETAIL
- ELECTRICAL HAND HOLE DETAIL
- RISER DIAGRAM
- LEGEND

E - 05 of 05 -
- SERVICE ENTRANCE LAYOUT PLAN
- GENERAL NOTES
- LEGEND

PORT LIGHTING

PL - 01 of 02 -
- PORT LIGHTING LAYOUT PLAN
- GENERAL NOTES
- LEGEND

PL - 02 of 02 -
- INTEGRATED SOLAR LAMP POST
- DETAIL OF SOLAR LAMP POST FOUNDATION
- SPECIFICATION

PLUMBING SHEETS

P - 01 of 04 -
- DETAILS OF SEPTIC TANK
- DETAILS OF AREA DRAIN
- DETAILS OF VSTR
- GENERAL NOTES AND SPECIFICATIONS
- MATERIAL SPECIFICATIONS
- SCHEDULE OF PIPE (SEWER LINE)
- SCHEDULE OF PIPE (WATER LINE)

P - 02 of 04 -
- SITE PLUMBING SYSTEM KEY PLAN
- BLOW-UP PLUMBING LAYOUT
- LEGENDS

P - 03 of 04 -
- FIELD OFFICE SEWER AND STORM WATER DRAINAGE PLAN
- FIELD OFFICE ROOF STORM WATER DRAINAGE PLAN
- BLOW-UP T&B / PANTRY SEWER AND STORM WATER DRAINAGE PLAN
- BLOW-UP T&B / PANTRY WATER DISTRIBUTION LAYOUT PLAN
- DETAIL OF TRENCHING, BEDDING & BACKFILLING OF PIPES
- PIPE CONNECTION DETS.
- SCHEDULE OF PIPES AND LEGENDS

P - 04 of 04 -
- FIELD OFFICE SEWER ISOMETRIC LAYOUT
- FIELD OFFICE WATER DISTRIBUTION ISOMETRIC LAYOUT
- FIELD OFFICE STORM WATER DRAINAGE LAYOUT
- SCHEDULE OF PIPE AND LEGENDS

GATE COMPLEX

GC - 01 of 09 -
- PERSPECTIVE
- SITE DEVELOPMENT PLAN
- KEY PLAN
- LEGEND

GC - 02 of 09 -
- FLOOR PLAN
- REFLECTED CEILING PLAN
- FRONT ELEVATION
- REAR ELEVATION
- RIGHT SIDE ELEVATION
- LEFT SIDE ELEVATION
- LEGEND

GC - 03 of 09 -
- SECTION THRU X-X'
- SECTION THRU Y-Y'
- ROOF DECK PLAN
- FLOOR TILE LAYOUT PLAN
- WALL PARTITION LAYOUT PLAN
- LEGEND

GC - 04 of 09 -
- SCHEDULE OF DOORS AND WINDOWS
- SCHEDULE OF GATES
- BLOW-UP DETAILS (GATE LOCK)
- LOGO AND SIGNAGE DETAIL

GC - 05 of 09 -
- FOUNDATION PLAN
- ROOF DECK FRAMING PLAN LOWER SEGMENT
- ROOF DECK FRAMING PLAN UPPER SEGMENT
- GENERAL NOTES

GC - 06 of 09 -
- DETAIL OF COLUMN/FOOTING (C1/F1)
- DETAIL OF COLUMN/FOOTING (C1/RW)
- DETAIL OF COLUMN/FOOTING (C2/F2)
- SLAB DETAILS
- DETAIL OF WALL FOOTING
- CONCRETE EDGING

GC - 07 of 09 -
- TYPICAL SLAB REINFORCEMENT DETAIL
- TYPICAL BEAM REINFORCEMENT AT COLUMN SUPPORT
- TYPICAL DETAIL OF CURTAIN WALL
- BEAM SCHEDULE

GC - 08 of 09 -
- GATE COMPLEX LIGHTING LAYOUT PLAN
- GATE COMPLEX POWER LAYOUT PLAN
- NOTES ON LIGHTING LAYOUT PLAN
- LOAD SCHEDULE
- RISER DIAGRAM
- LEGEND

GC - 09 of 09 -
- GATE AND GUARDHOUSE SEWER AND STORM WATER DRAINAGE PLAN
- ROOF SEWER AND STORM WATER DRAINAGE PLAN
- GUARDHOUSE - BLOW-UP TOILET SEWER AND STORM WATER DRAINAGE PLAN & ISOMETRIC
- GUARDHOUSE - BLOW-UP TOILET WATER DISTRIBUTION LAYOUT PLAN & ISOMETRIC
- GATE AND GUARDHOUSE STORM WATER DRAINAGE ISOMETRIC LAYOUT
- HOSEBIBB CONNECTION DETAIL
- FIXTURE MOUNTING DETAILS

PUMP HOUSE

PH- 01 of 04 -
- FLOOR PLAN
- REFLECTED CEILING PLAN
- ROOF PLAN
- FRONT ELEVATION
- REAR ELEVATION
- RIGHT SIDE ELEVATION
- LEFT SIDE ELEVATION
- SECTION THRU A
- SECTION THRU B
- SCHEDULE OF DOORS AND WINDOWS

PH- 02 of 04 -
- FOUNDATION LAYOUT PLAN
- RETAINING WALL & SLAB LAYOUT PLAN
- ROOF DECK & ROOF BEAM LAYOUT PLAN
- RETAINING WALL DETAIL
- TYP. DETAIL OF ROOF BEAM
- DETAIL OF MANHOLE COVER
- COLUMN DETAIL
- GENERAL NOTES

PH- 01 of 04 -
- PUMP HOUSE LIGHTING LAYOUT PLAN .
- PUMP HOUSE POWER LAYOUT PLAN
- SCHEDULE OF LOAD
- DETAIL OF DUCT BANK
- RISER DIAGRAM
- LEGEND

PH- 01 of 04 -
- PUMP HOUSE PLUMBING PLAN
- WATER SUPPLY SCHEMATIC DIAGRAM
- DETAIL OF FLOAT VALVE
- DETAIL OF LADDER RUNG
- DETAIL OF AIR VENT
- GENERAL NOTES AND SPECIFICATIONS
- SCHEDULE OF EQUIPMENT
- LEGEND AND SYMBOLS

SECTION VIII

BILL OF QUANTITIES and ATTACHMENTS

SECTION VIII – BILL OF QUANTITIES

TABLE OF CONTENTS

		PAGE
1.	1a Bid Summary	1-1
	1b Bill of Quantities	1
2.	Annex 1 (Basis of Payments)	7
3.	Annex 2 (Facilities to be Provided)	17
4.	Annex 3 (Minimum Equipment Requirements)	18
5.	Annex 4 (Construction Safety and Health Requirements)	19
6.	Annex 5 (Minimum Testing Requirements)	20

BID SUMMARY

PANTUKAN PORT IMPROVEMENT AND EXPANSION PROJECT

Port of Pantukan, Davao de Oro

NO.	DESCRIPTION OF WORK	AMOUNT (Pesos)
BILL NO. 1	GENERAL EXPENSES	
BILL NO. 2	REMOVAL, DISPOSAL AND EXCAVATION WORKS	
BILL NO. 3	CONSTRUCTION OF PORT OPERATIONAL AREA AND UPGRADING OF ROCK CAUSEWAY	
BILL NO. 4	CONSTRUCTION OF RC PIER W/ RORO RAMP	
	BID PRICE	

Name of Firm

Name of Bidder/Authorized Representative
(Signatory's Legal Capacity)

Date

BILL OF QUANTITIES
PANTUKAN PORT IMPROVEMENT AND EXPANSION PROJECT
Port of Pantukan, Davao de Oro

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	Construct field office for the Engineer and staff and turn-over to Authority upon project completion	lot	1		
1.03	Maintain field office and residence for the Engineer and staff	mo.	20		
1.04	Provide Construction Safety and Health Program in the execution of the project.	mo.	20		
	TOTAL FOR BILL NO. 1				

Name of Bidder/Authorized Representative
(Signatory's Legal Capacity)

BILL OF QUANTITIES
PANTUKAN PORT IMPROVEMENT AND EXPANSION PROJECT
Port of Pantukan, Davao de Oro

NO. (1)	DESCRIPTION OF WORK (2)	UNIT (3)	QTY. (4)	UNIT PRICE (Pesos) (5)	AMOUNT (Pesos) (4) x (5)
BILL NO.	**2 REMOVAL, DISPOSAL AND EXCAVATION WORKS**				
2.01	Remove existing damaged fenders including accessories and turn over to the authority	set	6		
2.02	Remove existing mooring bollard including accessories and turn over to the authority	set	3		
2.03	Demolish RoRo Ramp superstructure including proper disposal of debris	sq.m.	360		
2.04	Cutting existing piles up to MLLW including proper disposal of debris	no.	53		
2.05	Remove existing PCCP including proper disposal of debris	sq.m.	324		
2.06	Removal and disposal of existing RC curb	l.m.	132		
2.07	Scraping of existing aggregate base course material	cu.m.	65		
2.08	Demolish and dispose existing temporary guard house and turn over items with value to the Authority	sq.m.	11		
2.09	Subgrade preparation	sq.m.	324		
2.10	Remove existing lamp post including accessories and turn-over to authority	set	13		
2.11	Excavate portion of existing seabed prior to placing of rocks	cu.m.	2,318		
2.12	Excavation and backfilling works for the electrical and plumbing works	cu.m.	51		
	TOTAL FOR BILL NO. 2				

Name of Bidder/Authorized Representative
(Signatory's Legal Capacity)

BILL OF QUANTITIES
PANTUKAN PORT IMPROVEMENT AND EXPANSION PROJECT
Port of Pantukan, Davao de Oro

NO. (1)	DESCRIPTION OF WORK (2)	UNIT (3)	QTY. (4)	UNIT PRICE (Pesos) (5)	AMOUNT (Pesos) (4) x (5)
BILL NO.	**3 CONSTRUCTION OF PORT OPERATIONAL AREA AND UPGRADING OF ROCK CAUSEWAY**				
3.01	Supply and deliver to site Z-type steel sheet piles including pile connectors	m.t.	281		
3.02	Handle, pitch and drive Z-type steel sheet pile including connectors	l.m.	1,760		
3.03	Supply and install dowel bars including welding for steel sheet piles	kg.	2,003		
3.04	Supply and install steel waling and splice plate for the steel sheet piles including accessories	kg.	6,648		
3.05	Supply, place and compact gravel bedding	cu.m.	24		
3.06	Supply and place 3,500 psi. concrete for retaining wall, anchor wall and electrical works	cu.m.	422		
3.07	Supply and install steel reinforcement for retaining wall, anchor wall and electrical works	kg.	35,465		
3.08	Supply and place 1,000 kg. armour rocks	cu.m.	923		
3.09	Supply and place 50-100 kg. core rocks	cu.m.	2,379		
3.10	Supply and install 44mmø x 15.00 meters tie-rod (steel 45) including accessories	set	50		
3.11	Supply and install geotextile filter fabric	sq.m.	2,209		
3.12	Supply and place sand and gravel fill	cu.m.	5,085		

Name of Bidder/Authorized Representative
(Signatory's Legal Capacity)

BILL OF QUANTITIES
PANTUKAN PORT IMPROVEMENT AND EXPANSION PROJECT
Port of Pantukan, Davao de Oro

NO. (1)	DESCRIPTION OF WORK (2)	UNIT (3)	QTY. (4)	UNIT PRICE (Pesos) (5)	AMOUNT (Pesos) (4) x (5)
3.13	Supply, place and compact aggregate sub-base course	cu.m.	1,561		
3.14	Supply, spread and compact aggregate base course	cu.m.	422		
3.15	Construct portland cement concrete pavement (300mm thk) including dowel bars and construction joint	sq.m.	2,112		
3.16	Construct guardhouse and gate including all accessories and other appurtenances	lot	1		
3.17	Construct pumphouse including appurtenances	lot	1		
3.18	Construct CHB fence with cyclone mesh and barbed wire including other accessories	l.m.	159		
3.19	Supply deliver and install port lighting system	lot	1		
3.20	Supply and install distribution transformer including metering, bill deposit, testing and calibration fee	lot	1		
	TOTAL FOR BILL NO. 3				

Name of Bidder/Authorized Representative
(Signatory's Legal Capacity)

BILL OF QUANTITIES
PANTUKAN PORT IMPROVEMENT AND EXPANSION PROJECT
Port of Pantukan, Davao de Oro

NO. (1)	DESCRIPTION OF WORK (2)	UNIT (3)	QTY. (4)	UNIT PRICE (Pesos) (5)	AMOUNT (Pesos) (4) x (5)
BILL NO.	**4 CONSTRUCTION OF RC PIER W/ RORO RAMP**				
4.01	Supply and deliver to site 800mm dia. x 13mm thk steel pipe piles	m.t	2,059		
4.02	Supply and apply polyurethane external coating for steel pipe piles (min. thickness = 1,500 microns)	sq.m.	9,750		
4.03	Handle, pitch and drive vertical steel pipe piles	l.m.	4,664		
4.04	Handle, pitch and drive batter steel pipe piles	l.m.	3,496		
4.05	Removal of clogged materials inside the driven steel pipe piles	cu.m.	897		
4.06	Supply and install reinforcing steel cage for the steel pipe piles	kg.	394,503		
4.07	Supply and place 3,500 psi concrete filler inside the steel pipe piles	cu.m.	1,986		
4.08	Splicing of steel pipe piles	no.	182		
4.09	Supply and place 3,500 psi concrete for superstructures	cu.m.	1,210		
4.10	Supply and install steel reinforcement for superstructures	kg.	190,662		
4.11	Suppy and install (BWT 100mm x 12mm), hot-dipped galvanized construction joints including dowel bars	l.m.	53		
4.12	Supply and install WT4x33.5 HDG iron for steel ramp protection including dowel bars	set	9		

Name of Bidder/Authorized Representative
(Signatory's Legal Capacity)

BILL OF QUANTITIES
PANTUKAN PORT IMPROVEMENT AND EXPANSION PROJECT
Port of Pantukan, Davao de Oro

NO. (1)	DESCRIPTION OF WORK (2)	UNIT (3)	QTY. (4)	UNIT PRICE (Pesos) (5)	AMOUNT (Pesos) (4) x (5)
4.13	Supply and deliver to site rubber dock fender (V-type, 500H x 1500L) including accessories	set	18		
4.14	Install rubber dock fender and accessories	set	18		
4.15	Supply and deliver to site mooring bollard (35 ton cap, T-head) including accessories	set	13		
4.16	Install mooring bollards (T-head type) and accessories	set	13		
	TOTAL FOR BILL NO. 4				

Name of Bidder/Authorized Representative
(Signatory's Legal Capacity)

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 Construct field office for the Engineer and staff and turn-over to Authority upon project completion

The quantity to be paid for shall be the actual lot of field office to be constructed for the engineer and staff, turned over to Authority upon project completion 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 field office for the engineer and staff.

Item 1.03 Maintain field office and residence for the Engineer and staff

The quantity to be paid for shall be the actual services rendered in maintaining the field 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 field 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

REMOVAL, DISPOSAL AND EXCAVATION WORKS

Item 2.01 Remove existing damaged fenders including accessories and turn over to the authority

The quantity to be paid for shall be the actual set of existing damaged fenders including accessories to be removed and turned over to the authority 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 Remove existing mooring bollard including accessories and turn over to the authority

The quantity to be paid for shall be the actual set of existing mooring bollard including accessories to be removed and turned over to the authority 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 Demolish RoRo Ramp superstructure including proper disposal of debris

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

Item 2.04 Cutting existing piles up to MLLW including proper disposal of debris

The quantity to be paid for shall be the actual number of existing piles to be cut up to MLLW, including proper disposal of debris in accordance with the plans and specifications and accepted by the Engineer. The contract unit price shall be full compensation for furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the work.

Item 2.05 Remove existing PCCP including proper disposal of debris

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

Item 2.06 Removal and disposal of existing RC curb

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

Item 2.07 Scraping of existing aggregate base course material

The quantity to be paid for shall be the actual volume in cubic meter of existing aggregate base course material to be scraped 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 Demolish and dispose existing temporary guard house and turn over items with value to the Authority

The quantity to be paid for shall be the actual area in square meter of existing temporary guard house to be demolished and disposed including turning over of items with value to the authority 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 Subgrade preparation

The quantity to be paid for shall be the actual area in square meter of subgrade material to be prepared 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 Remove existing lamp post including accessories and turn-over to authority

The quantity to be paid for shall be the actual set of existing lamp post including accessories to be removed and turned over to the authority 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 Excavate portion of existing seabed prior to placing of rocks

The quantity to be paid for shall be the actual volume in cubic meter of existing seabed to be excavated prior to placing of core rocks 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 Excavation and backfilling works for the electrical and plumbing works

The quantity to be paid for shall be the actual volume in cubic meter of existing fill materials to be excavated prior to the electrical and plumbing works including backfilling thereafter, 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 PORT OPERATIONAL AREA AND UPGRADING OF ROCK CAUSEWAY

Item 3.01 Supply and deliver to site Z-type steel sheet piles including pile connectors

The quantity to be paid for shall be the actual weight in metric ton of z-type steel sheet piles including pile connectors to be 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 Handle, pitch and drive Z-type steel sheet pile including connectors

The quantity to be paid for shall be the actual length in linear meter of z-type steel sheet pile including connectors to be handled, pitched and driven in accordance with the plans and specifications and accepted by the Engineer. The contract unit price shall be full compensation for furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the work.

Item 3.03 Supply and install dowel bars including welding for steel sheet piles

The quantity to be paid for shall be the actual weight in kilogram of dowel bars including welding for steel sheet piles to be 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 3.04 Supply and install steel waling and splice plate for the steel sheet piles including accessories

The quantity to be paid for shall be the actual weight in kilogram of steel waling and splice plate for the steel sheet piles including accessories to be 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 Supply, place and compact gravel bedding

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

Item 3.06 Supply and place 3,500 psi. concrete for retaining wall, anchor wall and electrical works

The quantity to be paid for shall be the actual volume in cubic meter of 3,500 psi concrete to be supplied and set-in-place for the retaining wall, anchor wall and electrical works 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 3.07 Supply and install steel reinforcement for retaining wall, anchor wall and electrical works

The quantity to be paid for shall be the actual weight in kilogram of steel reinforcement to be supplied and installed for the retaining wall, anchor wall and electrical works 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 1,000 kg. armour rocks

The quantity to be paid for shall be the actual volume in cubic meter of 1,000 kg. armour rocks to be supplied and set-in-place in accordance with the plans and specifications and accepted by the Engineer. Hydrographic/Topographic Surveys before and after placing of armour rocks shall be made to determine the actual elevations along the cross sections and the actual quantities for payment. Volume due to settlement as established using settlement plates shall also be considered for payment. The contract unit price shall be full compensation for furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the work.

Item 3.09 Supply and place 50-100 kg. core rocks

The quantity to be paid for shall be the actual volume in cubic meter of 50-100 kg. core rocks to be supplied and set-in-place in accordance with the plans and specifications and accepted by the Engineer. Hydrographic/Topographic Surveys before and after placing of core rocks shall be made to determine the actual elevations along the cross sections and the actual quantities for payment. Volume due to settlement as established using settlement plates shall also be considered for payment. The contract unit price shall be full compensation for furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the work.

Item 3.10 Supply and install 44mmø x 15.00 meters tie-rod (steel 45) including accessories

The quantity to be paid for shall be the actual set of 44mmø x 15.00 meters tie-rod (steel 45) including accessories to be 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 3.11 Supply and install geotextile filter fabric

The quantity to be paid for shall be the actual area in square meter of geotextile filter fabric to be 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 3.12 Supply and place sand and gravel fill

The quantity to be paid for shall be the actual volume in cubic meter of sand and gravel fill to be supplied and set-in-place in accordance with the plans and specifications and accepted by the Engineer. Hydrographic/Topographic Surveys before and after placing of sand and gravel fill shall be made to determine the actual elevations along the cross sections and the actual quantities for payment. Volume due to settlement as established using settlement plates shall also be considered for payment. The contract

unit price shall be full compensation for furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the work.

Item 3.13 Supply, place and compact aggregate sub-base course

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

Item 3.14 Supply, spread and compact aggregate base course

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

Item 3.15 Construct portland cement concrete pavement (300mm thk) including dowel bars and construction joint

The quantity to be paid for shall be the actual area in square meter of portland cement concrete pavement (300mm thk) including dowel bars and construction joint, to be constructed in accordance with the plans and specifications and accepted by the Engineer. The contract unit price shall be full compensation for furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the work.

Item 3.16 Construct guardhouse and gate including all accessories and other appurtenances

The quantity to be paid for shall be the actual lot of works required to complete the construction of guardhouse and gate including all accessories and other appurtenances, 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 Construct pumphouse including appurtenances

The quantity to be paid for shall be the actual lot of works required to complete the construction of pumphouse including appurtenances, 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 Construct CHB fence with cyclone mesh and barbed wire including other accessories

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

Item 3.19 Supply, deliver and install port lighting system

The quantity to be paid for shall be the actual lot of works required to complete the supply, delivery and installation of port lighting system 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 3.20 Supply and install distribution transformer including metering, bill deposit, testing and calibration fee

The quantity to be paid for shall be the actual lot of works required to complete the supply and installation of distribution transformer including metering, bill deposit, testing and calibration fee 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

CONSTRUCTION OF RC PIER W/ RORO RAMP

Item 4.01 Supply and deliver to site 800mm dia. x 13mm thk steel pipe piles

The quantity to be paid for shall be the actual weight in metric ton of steel pipe piles (800mm dia. x 13mm thk) to be 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 4.02 Supply and apply polyurethane external coating for steel pipe piles (min. thickness = 1,500 microns)

The quantity to be paid for shall be the actual area in square meter of steel pipe piles surfaces to be supplied and applied with polyurethane external coating (min. thickness = 1,500 microns) 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 4.03 Handle, pitch and drive vertical steel pipe piles

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

Item 4.04 Handle, pitch and drive batter steel pipe piles

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

Item 4.05 Removal of clogged materials inside the driven steel pipe piles

The quantity to be paid for shall be the actual volume in cubic meter of clogged materials inside the driven steel pipe piles to be removed 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 4.06 Supply and install reinforcing steel cage for the steel pipe piles

The quantity to be paid for shall be the actual weight in kilogram of reinforcing steel cage for the steel pipe piles to be 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 4.07 Supply and place 3,500 psi concrete filler inside the steel pipe piles

The quantity to be paid for shall be the actual volume in cubic meter of 3,500 psi concrete filler for the steel pipe piles to be 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 4.08 Splicing of steel pipe piles

The quantity to be paid for shall be the actual number of steel pipe piles to be spliced 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 4.09 Supply and place 3,500 psi concrete for superstructures

The quantity to be paid for shall be the actual volume in cubic meter of 3,500 psi concrete to be supplied and set-in-place for superstructures 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 4.10 Supply and install steel reinforcement for superstructures

The quantity to be paid for shall be the actual weight in kilogram of steel reinforcement to be supplied and installed for superstructures 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 4.11 Supply and install (BWT 100mm x 12mm), hot-dipped galvanized construction joints including dowel bars

The quantity to be paid for shall be the actual length in linear meter of (BWT 100mm x 12mm), hot-dipped galvanized construction joints including dowel bars to be 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 4.12 Supply and install WT4x33.5 HDG iron for steel ramp protection including dowel bars

The quantity to be paid for shall be the actual set of WT4x33.5 HDG iron for steel ramp protection including dowel bars to be 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 4.13 Supply and deliver to site rubber dock fender (V-type, 500H x 1500L) including accessories

The quantity to be paid for shall be the actual set of rubber dock fender (V-type, 500H x 1500L) including accessories to be 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 4.14 Install rubber dock fender and accessories

The quantity to be paid for shall be the actual set of rubber dock fender and accessories to be 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 4.15 Supply and deliver to site mooring bollard (35 ton cap, T-head) including accessories

The quantity to be paid for shall be the actual set of mooring bollard (35 ton cap, T-head) including accessories to be 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 4.16 Install mooring bollards (T-head type) and accessories

The quantity to be paid for shall be the actual set of mooring bollards (T-head type) and accessories to be 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.

FACILITIES TO BE PROVIDED FOR THE ENGINEER & HIS STAFF

CONSTRUCTION OF SITE OFFICE AND RESIDENCE FOR THE ENGINEER & STAFF

The Contractor shall construct a site office and residence for the Engineer and his staff in accordance with the plans and specifications, as indicated in the approved field office plans.

Upon completion of the project, the said office will be turned-over to the PMO.

MINIMUM MAJOR EQUIPMENT REQUIREMENTS

2	unit/s	Air Compressor (250 cfm, minimum), owned
1	unit/s	Backhoe (0.50 cu.m., 94.30hp, minimum), owned/leased
2	unit/s	Centrifugal Trash pumps, owned/leased
1	unit/s	Clamshell, owned
1	unit/s	Concrete cutter, owned
1	unit/s	Concrete Mixer (1 bagger, minimum), owned
1	unit/s	Concrete bucket, owned
1	unit/s	Concrete Screeder, owned
2	unit/s	Concrete Vibrator (3.5 hp, minimum), owned
1	unit/s	Crane Barge (319T GW, minimum) with 60T crane, owned/leased
1	unit/s	Crawler Crane (30T, minimum), owned/leased
1	unit/s	Pile Hammer (Diesel, 7,500 kg.m., min. or hydraulic equivalent), owned/leased
1	unit/s	Drop Hammer (2T, minimum), owned
1	unit/s	Dump Truck (10T net capacity., minimum), owned
4	unit/s	Bar Bender (electric, 25mm dia min.), owned
4	unit/s	Bar Cutter (electric, 25mm dia min.), owned
2	unit/s	Jackhammer, owned
2	unit/s	Oxy/Acetylene cutting outfit, owned
1	unit/s	Payloader (110 hp, minimum), owned/leased
1	unit/s	Plate Compactor (5 hp, minimum), owned
1	unit/s	Road Grader (125 hp, minimum), owned/leased
1	unit/s	Road Roller (10T, vibratory, minimum), owned/leased
2	unit/s	Transit Mixer (10T net cap., minimum), owned/leased
1	unit/s	Tugboat (500hp, minimum), owned/leased
1	unit/s	Water Truck with pump (1,000 gal., minimum), owned
2	unit/s	Welding Machine (400 amp., minimum), owned
1	unit/s	Cargo Truck (2T net capacity, min.), owned

CONSTRUCTION SAFETY AND HEALTH REQUIREMENT

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:

L A B O R

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

EQUIPMENT / MATERIALS

Personnel Protective Equipment

63	pc.	Hard Hats
63	pc.	Gloves (rubberized)
63	pc.	Safety Glasses/Goggles (clear)
126	pc.	Long sleeve T-shirt
8	pc.	Aprons
4	pc.	Safety Belts
63	pair	Safety Shoes
4	set	Life Lines

Safety Devices

1	lot	Barricades
1	lot	Warning signs (Signages)
2	unit/s	Fire extinguisher (10kg)

Medical and First Aid System - Twenty (20) mos.

NOTE:

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

PPA MEMORANDUM CIRCULAR
No 02
Series of 2016
Attachment

REVISED SCHEDULE OF MINIMUM TEST REQUIREMENTS OF CONSTRUCTION MATERIALS FOR PPA INFRASTRUCTURE PROJECTS

Materials/Items of Work	*Required Tests*	*Minimum Incremental Frequency of Tests*
I. Construction of Pier/Wharf, Platform and Ramp		
Structural Concrete (SC)		
A Portland Cement	Quality Test	For every 2,000 bags (40kg) or fraction thereof
B Fine Aggregate	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
C Coarse Aggregate	Quality Test for Grading, Bulk Specific Gravity, Absorption and Abrasion	For every 1,500 cubic meter or fraction thereof
D Water	Certificate from the Engineer or Quality Test for Density and Chloride Content	One per source
E Steel Bars	Mill Certificate and Quality Test for Chemical Composition and Mechanical Properties	For every 10,000 kg or fraction thereof
F Concrete	Compressive Strength on cylinder samples	1 set consisting of 3 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
	Slump Test	For every mix
G Admixture and Concrete Curing Materials	Quality Test	One per shipment
Piling (P)		
A Concrete Piles	Fabrication Report	One per fabrication
1 Concrete	Same test as for SC (F)	Same frequency as SC (F)
2 Steel Bars	Same test as for SC (E)	Same frequency as SC (E)
3 High Tension Strand	Test for Chemical Composition and Mechanical Properties	For every 20000kg or fraction thereof

Materials/Items of Work	Required Tests	Minimum Incremental Frequency of Tests
4 Coarse Aggregates	Same Test as for SC (C)	Same frequency as SC (C)
5 Fine Aggregates	Same Test as for SC (B)	Same frequency as SC (B)
B Steel Pipe Piles	Fabrication Report, Mill Certificate and Quality Test for Chemical and Mechanical properties	One per fabrication
1 Steel	Chemical Composition (refer below)	
	- Under 14" (355 60mm) Outside Diameter	2 from 200 pipe of fraction thereof
	- 14" to 36" (355 6 to 914mm) Outside Dia	2 from 100 pipe or fraction thereof
	- Over 36" (914mm) Outside Diameter	2 from 3000ft (914m) or fraction thereof
	Mechanical/Tensile	One (1) tension test shall be made on one length or fraction thereof of each size, or one piece of skelp representing each lot of 200 lengths or fraction thereof of each size
2 Polyurethane Coating	Mill Certificate and Quality Test	One per fabrication
3 Concrete	Same test as for SC (F)	Same frequency as SC (F)
4 Fine Aggregate	Same test as for SC (B)	Same frequency as SC (B)
5 Coarse Aggregate	Same test as for SC (C)	Same frequency as SC (C)
6 Steel Bars	Same Test as SC (E)	Same frequency as SC (E)
7 Water	Same Test as SC (D)	Same frequency as SC (D)
Rubber Dock Fenders (RDF)	Physical Test	All units
	Performance Test for Energy Absorption and Reaction Force	All units
Accessories		
Washer and Fixing Bolt, Anchor Bolt	Physical Test	All units
	Quality Test for Chemical Composition and Mechanical Properties	One per fabrication

PPA MEMORANDUM CIRCULAR
No 02
Series of 2016
Attachment

Page 3 of 10

Materials/Items of Work	***Required Tests***	***Minimum Incremental Frequency of Tests***
Mooring Bollard (MB) and Accessories (Hexagon Nuts, Plain Washer, Anchor Ring and Anchor Bolt)	Physical Test Quality Test for Chemical Composition and Mechanical Properties	All Units One per fabrication
II. Construction of Back-Up Area, Causeway and Pavement Sheet Piling (SP)		
A Concrete Sheet Piles		
1 Concrete	Same test as for SC (F)	Same frequency as SC (F)
2 Steel Bars	Same test as for SC (E)	Same frequency as SC (E)
3 High Tension Strands	Same test as for P (A 3)	Same frequency as P (A 3)
4 Fine Aggregates	Same test as for SC (B)	Same frequency as SC (B)
5 Coase Aggregates	Same Test as for SC (C)	Same frequency as SC (C)
B Steel Pipe Piles		
1 Steel	Same test as for P (B1)	Same frequency as P (B1)
2 Concrete	Same test as for SC (F)	Same frequency as SC (F)
3 Fine Aggregate	Same test as for SC (B)	Same frequency as SC (B)
4 Steel Bars	Same test as for SC (E)	Same frequency as SC (E)

PPA MEMORANDUM CIRCULAR
No 02
Series of 2016
Attachment

Page 4 of 10

Materials/Items of Work	***Required Tests***	***Minimum Incremental Frequency of Tests***
Rocks	Test for Apparent Specific Gravity and Abrasion	For every 1,500 cubic meter or fraction thereof
Geotextile Filter	Physical and Mechanical Test Mill Certificate	One per batch One per batch
Sand and Gravel Fill	Quality Test for Organic Impurities and Grading	For every 1,500 cubic meter or fraction thereof
Selected Fill	Quality Test for Grading, Plasticity and Laboratory Compaction Test Laboratory California Bearing Ratio (CBR) Field Density Test	For every 1,500 cubic meter or fraction thereof For every 2,500 cubic meter or fraction thereof 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
Aggregate Base Course	Quality Test for Grading and Plasticity Quality Test for Grading, Plasticity, Abrasion and Laboratory Compaction Test Laboratory California Bearing Ratio (CBR) Field Density Test	For every 300 cubic meter or fraction thereof For every 1,500 cubic meter or fraction thereof Same frequency as Selected Fill Same frequency as Selected Fill
Portland Cement Concrete Pavement (PCCP)		
A Portland Cement	Same test as for SC (A)	Same frequency as SC (A)
B Fine Aggregate	Same test as for SC (B)	Same frequency as SC (B)
C Coarse Aggregate	Same test as for SC (C)	Same frequency as SC (C)
D Water	Same test as for SC (D)	Same frequency as SC (D)
E Steel Bars (Dowels)	Same test as for SC (E)	Same frequency as SC (E)
F Joint Filler	Quality Test	One (1) per shipment

Materials/Items of Work	***Required Tests***	***Minimum Incremental Frequency of Tests***
G Admixture and Concrete Curing Material	Same test as for SC (G)	Same frequency as SC (G)
H Concrete	Same test as for SC (F)	Same frequency as SC (F)
	Flexural Test	3 beam samples for every 330 sq m or fraction thereof
I Completed Pavement	Core Test	1 set (3 specimen) for every 2,500 sq m and fraction thereof
Interlocking Concrete Blocks		
A Cement	Same test as for SC (A)	Same frequency as SC (A)
B Fine Aggregate	Same test as for SC (B)	Same frequency as SC (B)
C Coarse Aggregate	Same test as for SC (C)	Same frequency as SC (C)
D Water	Same test as for SC (D)	Same frequency as SC (D)
E Admixture & Concrete Curing Materials	Same test as for SC (G)	Same frequency as SC (G)
F Completed Blocks	Physical Test and Compressive Strength	6 blocks per day of fabrication
Cement Treated Base Course (CTB)		
A Portland Cement	Same test as for SC (A)	Same frequency as SC (A)
B Fine & Coarse Aggregates	Quality Test for Grading, Abrasion and Soundness	For every 1,500 cubic meter or fraction thereof
C Water	Same test as for SC (D)	Same frequency as SC (D)
D Completed CTB	Field Density Test	For every layer of 150mm of compacted depth at least one group of three In-situ density test every 500 sq m or fraction thereof
Retaining Wall/Coping Wall/RC Curb/RC Ditch/Shear Key/Concrete Blocks\Lean Concrete		
A Portland Cement	Same test as for SC (A)	Same frequency as SC (A)
B Fine Aggregate	Same test as for SC (B)	Same frequency as SC (B)

Materials/Items of Work	***Required Tests***	***Minimum Incremental Frequency of Tests***
C Coarse Aggregates	Same test as for SC (C)	Same frequency as SC (C)
D Water	Same test as for SC (D)	Same frequency as SC (D)
E Steel Bars	Same test as for SC (E)	Same frequency as SC (E)
F Admixture and Concrete Curing	Same test as for SC (G)	Same frequency as SC (G)
G Concrete	Same test as for SC (F)	Same frequency as SC (F)
Tie Rod		
A Steel	Same test as for SC (E)	One per batch
B Assembly	Performance Test (Tension)	One per batch
Tie Bars and Dowels	Same test as for SC (E)	For every 10,000 kg or fraction thereof per Tie bars and Dowels
Pipe Culverts and Storm Drains		
A Pipes	Test for Strength, Absorption and Physical	For every 50 pieces
B Mortar or Joint	Same Test as for SC (A,B and D) Alternative Test Same test as for SC (F) and Inspection Report	For every 25 pieces
Concrete Hollow Blocks		
A Portland Cement	Same test as for SC (A)	Same frequency as SC (A)
B Fine Aggregates	Same test as for SC (B)	Same frequency as SC (B)
C Water	Same test as for SC (D)	Same frequency as SC (C)
D Concrete	Same test as for SC (F)	Same frequency as SC (F)
E Completed CHB	Quality Test	One for every 500 pieces or fraction thereof
Construction Joints (CJ)		
A Angle Bars	Test for Physical and Mechanical Properties	One per batch
B Steel Bars	Same test as for SC (E)	One per batch
C Zinc (Hot Dip Galvanizing) Coatings	Physical Test for Appearance, Stripping, Weighing, Adherence and Adhesion	All units
	Coating Thickness Magnetic Thickness Measurement	1 set (3 specimen) for every 100,000 sq mm or fraction thereof

PPA MEMORANDUM CIRCULAR
No 02
Series of 2016
Attachment

Page 7 of 10

Materials/Items of Work	***Required Tests***	***Minimum Incremental Frequency of Tests***
Sacked Concrete		
A Cement	Same test as for SC (A)	Same frequency as SC (A)
B Fine Aggregates	Same test as for SC (B)	Same frequency as SC (B)
C Coarse Aggregates	Same test as for SC (C)	Same frequency as SC (C)
D Water	Same test as for SC (D)	Same frequency as SC (D)
E Concrete	Same test as for SC (F)	Same frequency as SC (F)
F Sack (jute)	Physical Test	One for every 50 pieces
Rubble Concrete		
A Cement	Same test as for SC (A)	Same frequency as SC (A)
B Fine Aggregates	Same test as for SC (B)	Same frequency as SC (B)
C Coarse Aggregates	Same test as for SC (C)	Same frequency as SC (C)
D Water	Same test as for SC (D)	Same frequency as SC (D)
E Concrete	Same test as for SC (F)	Same frequency as SC (F)
F Rocks	Same test as for ROCKS	Same frequency as ROCKS
Earthworks		
A Sub-grade preparation	Grading Test Plasticity Test (LL,PL,PI) Laboratory Compaction Test	For every 1,500 cubic meter or fraction thereof
	Density Test	For every layer of 150mm of compacted depth at least one group of three In-situ density test every 500 sq m or fraction thereof
B Structure Excavation	If excavated materials shall be used as Backfill Grading Test Plasticity Test (LL,PL,PI) Laboratory Compaction Test	For every 1,500 cubic meter or fraction thereof
	Density Test	For every layer of 150mm of compacted depth at least one group of three In-situ density test every 500 sq m or fraction thereof

PPA MEMORANDUM CIRCULAR
No 02
Series of 2016
Attachment

Materials/Items of Work	*Required Tests*	*Minimum Incremental Frequency of Tests*
III Port Operations Building/Passenger Terminal Building/Transit Shed/Warehouse		
STRUCTURAL WORKS	Refer to Structural Concrete (SC) and Piling Works (P)	
ARCHITECTURAL WORKS		
Ceramic – Filled Liquid Membrane / Water Proofing, Hydrophobic Poreblocking Ingredients with Superplasticizer	Physical Property, Mechanical and Chemical Property, Leak Test / Flood Test	One per shipment
Paint	Quality Test	One 4-L can for every 100 cans or fraction thereof
Ceramic Tile	Inspection and Evaluation Report from the Engineer	One per shipment
Stainless Steel	Inspection and Evaluation Report from the Engineer	One per shipment
Roofing Materials	Inspection and Evaluation Report from the Engineer	One per shipment
Ceiling Materials	Inspection and Evaluation Report from the Engineer	One per shipment
ELECTRICAL AND MECHANICAL WORKS		
Wires / Cables	Inspection and Evaluation Report from the Engineer Testing and Commissioning	One per shipment
Electrical Devices	Inspection and Evaluation Report from the Engineer Testing and Commissioning	One per shipment
Fire Alarm System	Inspection and Evaluation Report from the Engineer Testing and Commissioning	One per item
Wiring Devices	Inspection and Evaluation Report from the Engineer Testing and Commissioning	One per shipment

Materials/Items of Work	Required Tests	Minimum Incremental Frequency of Tests
Protective Devices	Inspection and Evaluation Report from the Engineer Testing and Commissioning	One per shipment
Telephone System	Inspection and Evaluation Report from the Engineer Testing and Commissioning	One per item
CCTV System	Inspection and Evaluation Report from the Engineer Testing and Commissioning	One per item
CATV System	Inspection and Evaluation Report from the Engineer Testing and Commissioning	One per item
Background Music and Paging System	Inspection and Evaluation Report from the Engineer, Testing and Commissioning	One per item
Air Conditioning Units & Ventilation	Inspection and Evaluation Report from the Engineer Testing and Commissioning	One per item
Conduit Pipes	Inspection and Evaluation Report from the Engineer Testing and Commissioning	One per item
Lighting Fixtures	Inspection and Evaluation Report from the Engineer Testing and Commissioning	One per item
PLUMBING WORKS		
Pipes	Inspection and Evaluation Report from the Engineer Testing and Commissioning	One per item