

**CONCRETE****CLASSES OF CONCRETE AND USAGE**

## 1. Strength Requirement

Classes	Size of Aggregate (mm)	fc' = MPa	Specified Compressive Strength – 28 days fc' = Psi
C	19	21	3,000
D	25	17	2,500

## 2. Usage: The class of concrete to be used shall be as follows:

- a. Class C Concrete : For beams and concrete pedestals, slabs on fill
- b. Class D Concrete : Leveling concrete

**SLUMP TEST**

Tests shall be made in conformity with ASTM C 143, and unless otherwise specified by the Engineer, slump shall be within the following limits:

Structural Element	Slump for Vibrated Concrete	
	Minimum (mm)	Maximum (mm)
Precast concrete	80	180
Wall, column and beam 25cm max. thickness	80	180
Concrete slab	80	150
Lean concrete	70	150

**CONCRETE COVER FOR REINFORCEMENT**

Minimum concrete cover for reinforcement shall be as follows:

Net Concrete Cover	Minimum Cover (mm)
- Concrete cast against and permanently exposed to earth	75
- Concrete exposed to earth or weather:	
Primary reinforcement	50
Stirrups, ties, and spirals	40
- Concrete deck slabs:	
Top reinforcement	50
Bottom reinforcement	35
- Concrete not exposed to weather nor in contact with ground:	
Primary reinforcement	40
Stirrups, ties and spirals	25

## MASONRY

### GENERAL

Division 1, "General Requirements," contain provisions and requirements essential to these Specifications and apply to this Section, whether or not referred to herein.

### SCOPE OF WORK

This Section includes the furnishing of all labor and materials to complete the work as shown on the drawings and specified herein. The works shall include but not necessarily be limited to the following:

1. Supply and installation of concrete hollow block (CHB) walls with reinforcement
2. Plastering
3. Installing temporary works like scaffolding, platforms, steps, etc.

### GENERAL PROVISIONS

The following publications of the issues below but referred to thereafter by basic designation only, form a part of these specifications to the extent indicated by the reference thereto:

American Society for Testing and Materials (ASTM) Publications:

A 615 Deformed and Plain Billet-Steel Bars for Concrete Reinforcement

A 33 Concrete Aggregates

C 129 Specification for Non-Load Bearing Concrete Masonry Units

C 144 Specification for Aggregate for Masonry Mortar

C 270 Mortar for Unit Masonry

### MATERIAL REQUIREMENTS

Materials shall conform to the respective specifications and other requirements specified below:

#### CONCRETE HOLLOW BLOCKS (CHB):

CHB shall be of standard manufacture, machine vibrated with fine and even texture and well-defined edges and conforming with the requirements of ASTM C 129. Unless otherwise specified on the Drawings, It shall have a minimum compressive strength of  $[2.45 \text{ MPa (350 psi)}/4.5 \text{ MPa (650 psi)}]$ . CHB shall be uniform and essentially smooth as normally achieves by standard molding methods and shall be free from any cracks, flaws or other defects.

**BEDDING MORTAR:**

Mortar shall be composed of 1 part of Portland cement, 3 parts of sand and ½ part of lime. It shall have a compressive strength of *[14 MPa (2,000 psi)]* at 28 days and shall comply with property specifications for type N mortar set forth in ASTM Specification C 270 and as modified herein, proportioned and tested in an approved laboratory at the expense of the Contractor. When tested for water retention, the mortar shall have a flow after suction, of 75 percent or more when mixed to an initial flow of 125 to 140 percent. When tested for compressive strength, mortar shall be mixed to a flow of 100 to 115 percent. Aggregate for mortar shall conform to ASTM C 144.

**PLASTER:**

Plaster shall comply with the same specification as those for bedding mortar and will include the use of synthetic fibrous reinforcement of type and dosage recommended by the manufacturer.

**REINFORCING STEEL BARS AND RODS:**

ASTM Specification A 615 with minimum yield strength of *[230 MPa (33,400 psi)]* for 10 mm diameter and *[276 MPa (40,000 psi)]* for 12 mm diameter.

**SAMPLES AND TESTING**

1. The following shall be submitted for approval and in addition, representative samples shall be taken periodically from on-the-site stockpiles as required for testing or checking during the progress of the work.

Anchors and ties	: Two of each type proposed for use.
Concrete Hollow Blocks	: Shapes, sizes and kinds in sufficient numbers to show full range of quality and texture.

2. Sampling and testing, unless otherwise specified, shall be performed by an approved independent commercial testing laboratory at the expense of the Contractor. Certified copies of laboratory test reports, including all test data, shall be submitted at least 10 days before delivery of the units or mortar materials represented by the tests to the project site.
3. Mortar shall be laboratory-proportioned and tested. Certified copies of approved laboratory-established proportions shall be submitted with the required test reports and test data. Approved laboratory-established proportions shall not be changed and materials with different physical or chemical characteristics shall not be used in mortar for the work unless additional evidence is furnished that the mortar meets the specified requirements.

## ERECTION

### 1. GENERAL

- No unit having a film of water on its surface shall be laid. Masonry shall be laid plumb, true to line, with level courses accurately spaced. Bond pattern shall be kept plumb throughout. Corners and reveals shall be plumb and true. Vertical joints shall be shoved tight. Each unit shall be adjusted to final position while mortar is still soft and plastic. Any unit that is disturbed after mortar has stiffened shall be removed and relaid with fresh mortar. Courses shall be so spaced that backing masonry will level off, flush with the face work at all joints where ties occur. Chases and rake-out joints shall be kept free from mortar or other debris.
2. Anchorage to concrete. Anchorage to abutting columns shall be provided only where indicated. Details shall be as indicated including anchorage to underside of beams and slabs.
  3. Cutting and fitting, including that required to accommodate the work of others shall be done by masonry mechanics. Wherever possible, full units of the proper size shall be used in lieu of cut units. Cut edges shall be clean, true and sharp. Openings shall be carefully cut, formed or otherwise neatly made for recessed items and for electrical, plumbing, or other mechanical installations so that wall plates, cover plates, or escutcheons required by the installation will completely conceal the openings and will have bottoms in alignment with lower edge of masonry joints. Webs of hollow masonry units shall be cut to the minimum required for the installation. Reinforced masonry lintels shall be provided as indicated above openings over 300mm wide, for pipes, ducts and cable trays, unless steel sleeves are used.
  4. Embedded Items: Spaces around built-in items shall be filled with mortar. Openings around flush-mounted electrical outlet boxes in wet locations shall be pointed flush with mortar including flush joints above the boxes. Anchors, ties, accessories, flashing, pipe sleeves and other items required to be built-in shall be built-in as the masonry work progresses. Anchors, ties, and joint reinforcement shall be fully embedded in mortar.
  5. Unfinished work shall be stepped back for jointing with new work. Tothing may be resorted to only when specifically approved. Before laying new work, loose mortar shall be removed and the exposed joint shall be thoroughly cleaned.
  6. Protection: Surfaces of masonry not being worked on shall be properly protected at all times. At the end of each workday period and when rain is imminent, the top of exposed masonry shall be covered with a strong non-staining waterproof membrane well secured in place and in a manner that will prevent moisture. Adequate provisions shall be made during construction to prevent damages by wind.
  7. Mortar: Materials shall be accurately measured in laboratory established proportions and mixed with as much water as may be necessary to produce the wettest workable consistency possible. Mortar shall be placed in final position within one hour after mixing. Mortar not used or that has started to set within this time interval shall be discarded.

8. **Jointing:** Joints in exposed-to-view except control joints, joints to be pointed or caulked or sealed, and openings around flush-mounted electrical outlet boxes in wet locations shall be tooled slightly concave with the mortar thoroughly compacted and pressed against the edges of the units. Tooling shall be done when the mortar has been thumbprint hard. The tooled joint shall be finished to uniformly straight and true lines and surfaces, smooth and free of tool marks.
9. **Placing Reinforcing Steel**

Prior to placing grout, all reinforcement shall be cleaned of loose, flaky rust, scale, grease, mortar, grout or other coating which might destroy or reduce its bond with grout. Details of reinforcement shall be as indicated in the drawings. Reinforcing shall not be bent or straightened in a manner injurious to the steel. Bars with kinks or bends not shown on the drawings shall not be used. Placement of reinforcement shall be inspected and approved prior to placing grout. One piece vertical bars extending from floor to floor or roof above shall be provided. Vertical bars shall be spliced only where indicated.

- a. **Positioning Bars**

Vertical bars shall be positioned accurately at the centerline of the wall. A minimum clearance between the bars and masonry units of 12mm and between parallel bars of one diameter of the reinforcement shall be maintained. Vertical reinforcing shall be held in place using metal supports, centering clips, spacers, ties or caging devices located near the ends of each bar and at intermediate intervals of not more than 192 diameters of the reinforcement.

- b. **Splices**

Splices shall be located only as indicated. Splices shall be staggered in adjacent bars at least 600 mm. Bars shall be lapped a minimum of 40 diameters of the reinforcement.

## **PAINTING AND CLEANING**

Mortar daubs or splashing, before setting or hardening, shall be completely removed from masonry unit surfaces that will be exposed or painted. Before completion of the work, all defects in joints or masonry to be exposed or painted shall be raked out as necessary, filled with mortar, and tooled to match existing joints. Masonry surfaces shall not be cleaned, other than removing excess surface mortar until mortar in joints has hardened. Masonry hardened surfaces shall be left clean, free of mortar daubs, dirt, stain and discoloration, including scum from cleaning operations and with tight mortar joints throughout. Metal tools and metal brushes shall not be used for cleaning.

## **MEASUREMENT AND PAYMENT**

1. Quantities of unit masonry to be paid for shall be units or number of square meters of various thicknesses, types, kinds and/or sizes of respective items of work required as shown or specified and as installed and accepted in completed work.
2. Measurement of unit masonry shall be the area of one face of each respective type and thickness of walls and partitions required, determined by overall horizontal and vertical dimensions thereof.

3. No separate measurement will be made for grouting, forming of joints to be sealed, base stud lintel, and other auxiliary work required except for reinforcing steel bars which shall be measured for payment in kilograms computed from the theoretical unit mass for sizes of bars multiplied by length of bars as shown on approved shop drawings except where specified otherwise.
4. No separate measurement will be made for individual detail items of this work not listed herein nor for compliance with various detail requirements applicable to this work; as such shall be considered incidental to work as specified above.
- 5.

## **CARPENTRY**

### **GENERAL**

Division 1, "General Requirements," contain provisions and requirements essential to these specifications; and apply to this Section, whether or not referred to herein.

### **SCOPE OF WORK**

The work shall consist of furnishing all materials, tools, labor, equipment and incidentals necessary to perform and complete the carpentry works as indicated on the drawings and specified herein together with the supervision necessary to the work involved.

The work shall include the doors jambs and other wood works under various items of the specification.

### **DELIVERY AND STORAGE**

The Contractor shall protect lumber against dampness and from the weather during and after delivery.

The Contractor shall stack lumber in a manner to insure proper ventilation and drainage, at least 150 mm above ground. Lumber shall be stored under cover, not exposed to extreme temperature and humidity and in a manner to provide air circulation around all surfaces of each piece.

Interior millwork product such as doors, etc. shall not be stored or installed into the buildings until concrete masonry work and plaster are thoroughly dry.

### **SHOP DRAWING**

Shop drawings for all carpentry and other woodwork items as required shall be submitted sufficiently in advance of need to allow for review and approval. Shop drawings shall indicate materials and details of construction, methods of fastening, and erection details.

Materials shall not be delivered to the site until after the approved shop drawings have been returned to the Contractor. The Contractor shall be responsible for all errors of detailing and fabrication, and for the correct fitting of fabricated items shown on the shop drawings.

**WORKMANSHIP**

All wood finish works shall be true to details, clean and sharply defined. Panels must be set to allow for free movement in case of swelling or shrinkage. Means of fastening various parts together shall be concealed and as shown on the drawings or as directed by the Engineer.

**MATERIAL REQUIREMENTS****GENERAL**

1. Lumber shall either be kiln dried or as directed by the Engineer and shall be free from imperfections that will impair its strength and finish.
2. Lumber shall be of the best grade available of the respective kinds required for the various parts of the work, well-seasoned, thoroughly dry, sound, straight, free from warps, loose or unsound knots. Lumber with cuts, shakes or other imperfections impairing its strength, durability or appearance shall not be used. All exposed surfaces shall be smooth unless otherwise indicated on the drawings or specified.
3. Any lumber equally good for the purpose intended may be substituted for the kind specified upon prior written approval of the Engineer.

**MATERIALS**

1. Kiln dried tanguile lumber, sound, hard and free from defects shall be used for:
  - a. Exterior and interior millwork, siding and finish and trim, as shown on the drawings;
  - b. Wood doors, frames and panels,
  - c. Cabinet works;
2. Yakal shall be used for all doors and window jambs, transom bars, wood plates and other woodwork in contact with concrete or masonry.
3. Apitong: Sound and thoroughly seasoned, warp free, treated with pressure impregnated preservative, smooth and level on one side or whenever in contact with paneling.

Unless otherwise indicated on the Drawings, use Apitong, pressure treated for all truss members and rafters; and carpentry; except where in contact with concrete.

## 4. Plywood

Plywood shall conform to Commercial Standard PSI and shall be of local manufacture.

Plywood to be varnished shall be tanguile or kalantas veneers (as indicated), ribbon grained, water resistant, Class B and of the thickness indicated.

Plywood to be painted shall be tanguile veneer ordinary rotary-cut, water resistant, Class C and of the thickness indicated.

Plywood exposed to the outside elements or where indicated shall be waterproof or marine plywood and of the thickness indicated.

The minimum number of plies required for plywood shall be as follows:  
3 plies for 4mm to 9mm thick, and 4 plies for 11mm to 19mm thick. Plywood to be pressure-preservative treated shall be fully-waterproof glue type. Grade for preservative-treated plywood shall not be less than that specified for the specific use. Plywood shall be clean and smoothly sanded on 2 sides. Shelves are considered exposed.

- a. 19mm thick plyboard for built-in cabinets
- b. 6 mm thick tanguile plywood for ceilings on wood frame and elsewhere as shown in drawings, and for flush type marine hollow core doors for toilets as shown in drawings.

Skeletal wood framing and other woodworks not otherwise specified herein shall be coated/treated with wood preservative.

Grading of Plywood - Each sheet of plywood shall bear the mark identifying the plywood as to wood species, glue type, and grade.

## 5. Fastenings

Fastenings shall be common nails, glue or specified, flat-head wood screws (F.H.W.S), round-head wood screws (R.H.W.S), bolts or lag screws where specified or called for shall be used. Conceal fastenings as much as possible; where not possible, locate them in inconspicuous places. Where nailing is permitted through woodwork smooth-finished face, conceal nail heads.

Nails - shall be of the smooth shank, zinc coated, common wire nails of local manufacture, and of types and sizes best suited for the purpose.

Wood Screws - shall be brass or cadmium plated, of the best available commercial quality, and of types and sizes suited for the purpose.

## MOISTURE CONTENT

1. Lumber treated with water-borne preservatives shall be dried to a moisture content not exceeding 19 percent after treatment.
2. Interior finishing lumber shall be kiln-dried, and at the time of delivery to the building site, the moisture content shall not exceed 12 percent for material 25mm or less in thickness, and shall not exceed 15 percent for material over 25mm in thickness.
3. Woodwork that is assembled or built-up of more than one piece at the mill, except doors, shall have a moisture content not in excess of 12 percent at time of delivery to the site.

## SUBSTITUTION

Any lumber equally good for the purpose intended may be substituted for the kinds specified, subject to the approval of the Engineer. Provided, however, that in the substitution of a cheaper kind of lumber to that which is specified, a reduction in the contract price equal to the difference in the cost of the two kinds of lumber will be made.

## EXECUTION

### ERECTION

1. Timber construction assembled with nails and spikes.
  - a. For wire nails, the tensile strength shall be not less than 60kg/mm<sup>2</sup> and for wrought and pressed nails not less than 40kg/mm<sup>2</sup>.
  - b. Unless otherwise specified, square spikes with countersunk square heads shall be used of a length not less than 2 ½ times the minimum dimension of the timbers to be fastened together.
  - c. When nailing timbers together, the units to be fastened shall be butted together and be nailed perpendicularly to their surfaces. Heads of nails and spikes shall be driven flush with the surface of the timber.
  - d. Points of spikes or nails emerging from the timber shall be turned over transversely to the wood fibers. Care shall be taken that the timbers do not split during nailing.
  
2. Timber construction assembled with bolts
  - a. The bolts used for assembling timber shall be of steel conforming to the requirements of ASTM Designation A307. The tensile strength of bolt steel shall be between 34 and 55kg/mm<sup>2</sup>. Members shall be drilled accurately for bolting with suitable washers provided under heads and nuts.
  - b. Bolts, washers, nuts, and fish-plates shall be galvanized.
  - c. Washer plates for bolt heads and nuts shall have the following dimensions:  
  
For 13mm bolts use 7.5 x 75mm washers  
For 19mm bolts use 10 x 100mm washers  
For 25mm bolts use 13 x 130mm washers  
For 38mm bolts use 20 x 200mm washers
  - d. Bolt holes in timber shall be drilled with a drill having a diameter slightly smaller than that of the bolt so that the bolt has to be forced into the hole. The bolts shall be re-tightened several times as requested by the Engineer in order to ascertain that the bolts have obtained a suitable and stable degree of tension.
  
3. Timber construction assembled with screws
  - a. The screws used for assembling the timer shall comply with relevant ASTM Designations.
  - b. Undersized screw holes shall be drilled in advance. Screws shall not be hammered into holes.

## FINISH

The Contractor shall mill, fabricate and erect interior finish products as indicated on the drawings. Machine-sand cut joints at the mill shall be hand sand smooth.

Joints shall be made tight and in a manner to prevent shrinkage. The Contractor shall secure trim with fine finishing nails, screws, or glue where required and nails shall be set for putty topping.

### WOOD DOORS, JAMBS AND HEADERS

Door frames shall be set plumb and level and braced until built-in.

Anchor wood frames in masonry with approved metal anchors on each side of jamb. Top and bottom anchors shall be placed 200mm from head and floor unless indicated on the drawings or directed by the Engineer.

### HARDWARE INSTALLATION

Accurately fit and finish hardware items required.

If surface-applied hardware is fitted and applied before painting, remove all such items except butts and re-install after painting.

## ROOFING

### SCOPE OF WORK

The work shall include but not limited to all labor, materials, tools, equipment and incidentals necessary to furnish and install the roofing sheets including fittings, flashing caps, ridge rolls, gutters and construction of concrete eaves and canopy excluding waterproofing, to provide completely sound water tight roof for the buildings as shown on the Drawings and specified herein.

### MATERIAL REQUIREMENTS

#### ROOFING SHEETS

##### a. Galvanized Iron Roofing

Long span, pre-painted with high grade polyester paint over epoxy primer Galvanized iron roofing [rib/corrugated] type, highly resistant to corrosion and shall comply with the following:

1. Minimum metal base thickness of 0.60mm
2. Minimum paint thickness  
10 microns for bottom coat  
25 microns for top coat
3. Minimum metal base yield stress of 550 MPa

## HANDLING AND STORAGE

Sheet shall be lifted directly and shall not be dragged over the other sheets or over rough surfaces.

When working on a roof, the workers shall wear flat rubber soled shoes.

Tool shall be handled carefully to prevent them from sliding over the coated surface.

When installation work is completed, all metal off-cuts, used nails and other metallic scrap shall be removed from roof area.

When using drills, hacksaws, or files in the roof area, care shall be taken that metal particles and fillings are swept off the roof immediately.

If not required for immediate use, sheets or bundles shall be staked and clear off the ground. If left in the open, sheets shall be protected by loose tarpaulin or similar covers.

Bundles shall not be left expose to the weather.

## CONCRETE EAVES AND CANOPY MATERIALS

Concrete materials shall comply with the requirements in Section 3.2, Concrete Works.

Reinforcing Steel bars shall likewise conform with the requirements in Section 3.2, Concrete Works.

## FIXED METAL LOUVER VENTILATOR

Louver blades shall be gauge # 18 pressed steel.

## SAMPLES

Samples shall be submitted for Engineer's approval before any order for roofing materials be made by the Contractor.

## INSTALLATIONS

### ROOFING SHEETS

#### 1. GI Sheets

At least 28 days before laying of roofing sheet start, the Contractor shall submit for approval of the Engineer, shop drawings indicating materials and method of installation. No roofing sheets laying work shall commence without the Engineer's approval of the shop drawings and work method.

Laying shall start from the end opposite the side from where the prevailing monsoon is coming from. The first sheet shall be laid and installed with the turned-down edge towards the outside of the area to be covered. The next sheet shall be overlapped to the previous sheet in such a manner that the exposed edge is turned down and the covered edge is turned up. The overlapped edge in the side shall be with the rib having the anti-capillary groove. End and side laps including flashing shall be as approved by the Engineer.

The straps shall be fixed and fastened with the fastener and washer as shown on the Drawings.

## 2. Translucent Fiberglass Skylights

Installation of skylights shall be coordinated with and shall follow the sequence of the laying of the roofing sheets. Overlap of skylight panels shall not be less than 300mm at the ends and 2-1/2 corrugations at the sides. No nails shall be used for fastening the skylights panels. All the sheets shall be secured to the purlins with stove bolts and clips complete with one cadmium washer and one rubber washer on top and below the sheet.

All sheets shall be secured to the purlins. Side laps shall be bolted at the center of purlin spaces. Mastics solvents and sealers listed as unsatisfactory to acrylic panels shall not be used.

## CONCRETE EAVES AND CANOPY

Construction of concrete eaves and canopy shall be in accordance with Section 3.2, "Concrete Works" as shown on the Drawings and as directed by the Engineer.

Waterproofing shall be in accordance with Section 4.9, "Concrete Waterproofing".

## MEASUREMENT AND PAYMENT

The quantities to be paid for shall be measured as follows and as indicated on the pay items

1. Roofing sheets and sidings by the area in square meters of roofing sheets or sidings.
2. Ridge rolls by the length in linear meter of ridge rolls
3. Flashing by the length in linear meter of flashing
4. Steel fixed louver vents by the area in square meter of fixed metal louver ventilator
5. The quantity of concrete eaves and canopy to be paid for shall be measured in accordance with Section 3.2, "Concrete Works".

Payment shall constitute full compensation for furnishing all labor, materials, tools and equipment and other incidentals necessary to complete the work.

## CEILING AND WALL INSULATIONS

### GENERAL

Division 1, "General Requirements," contain provisions and requirements essential to these Specifications; and apply to this section, whether or not referred to herein.

### SCOPE OF WORK

The work covered in this section shall include all labor, materials, tools, equipment and incidentals necessary to furnish and install pre-fabricated insulated panels and door including aluminum coving angle, joiner mould, capping and ceiling suspension system, door hardware and other accessories to provide a completely sound watertight ice storage as shown on the Drawings and specified herein.

### GENERAL PROVISIONS

1. Pre-fabricated insulated panels and door shall be a product of a single manufacturer.
2. Trade names of the materials or components indicated in the specifications are intended only to show the standard of the materials or component on which the design of the particular work is based and also to avoid ambiguous descriptions of the materials or components on the drawings.

The indication of trade names, therefore, shall in no way be considered to limit the acceptability of other products of equal or better functions, performances, reliability and durability.

### SUBMITTALS

Samples, specifications and construction procedures proposed for use shall be submitted to the Engineer for approval.

### DELIVERY AND STORAGE

Pre-fabricated insulated panels and door shall be supplied and delivered in their finished form. They shall be stored at a place properly protected from rain and sunlight. Extended, outdoor exposure shall not be allowed. Insulation materials shall not become wet or soil. Contractor shall comply with manufacturer's recommendation for handling, storage and protection during installation.

### MATERIAL REQUIREMENTS

1. 100 mm thick pre-fabricated insulated panels for wall, ceiling and door with a core of polystyrene foam, machine laminated onto pre-painted continuous steel sheets.

**Technical Description**

<b>Specifications</b>	
Dimension	1200 mm width by any length
Thickness	100 mm
Weight	13.2 kg/m <sup>2</sup>
Surface	Plain
Skins	0.60 mm thick steel, 350 g/m <sup>2</sup> (nominal) zinc coating with oven baked epoxy primer and polyester finish. Color – off white
Core	Self-extinguishing polystyrene foam, density 16 kg/m <sup>3</sup>
<b>Structural Properties</b>	
Compressive Strength	110 kn/m <sup>2</sup> at 10% compression
Shear Strength	670 kn/m <sup>2</sup>
<b>Insulation Properties</b>	
Vapor Permeability	NIL
Temperature Range	+80°C to –150°C
Thermal Conductivity	3.5 x 10 <sup>-2</sup> with m/°C @ 25°C
<b>Fire Properties (Composite Panel)</b>	
Surface Flame Spread	Class O (BS476, Pt7 1971)
Early Fire Hazard Properties	Range 0-20 (ASK 1530 Pt3)
<b>Surface Properties</b>	
Surface Scratch Resistance	2000 g (DEF 1053)
Corrosion Resistance	
Salt Spray test	No blistering, undercutting or loss of paint adhesion after 1200 hours (ASTM B 117-64)
Humidity resistance	Paint unaffected after 3000 hours (ASK 41 Method 452.1)
Water Immersion	Paint unaffected after 3000 hours
Weather Resistance	Surface unaffected after 5 years exposure to industrial, marine and sub-tropical conditions.

**2. Accessories**

Manufacturer's standard for the item required or type best suited for the intended use.

**4.10.3****EXECUTION**

Install pre-fabricated insulated panels and door according to the direction of the manufacturer.

#### 4.10.4 MEASUREMENT AND PAYMENT

Quantities of pre-fabricated insulated wall and ceiling panels including insulated door and accessories to be paid for shall be measured by lump sum for each building installed, completed, tested, approved and certified for payment by the Engineer.

Payment shall constitute full compensation for furnishing and installation of pre-fabricated insulated panels and door including all labor, equipment, tools, accessories and other incidentals necessary to complete the work prescribed in this item.

### FINISHES

#### GENERAL

Division 1, "General Requirements," contain provisions and requirements essential to these Specifications; and apply to this section, whether or not referred to herein.

#### SCOPE OF WORK

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

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

1. Plain cement plaster (steel trowel) finish painted with acrylic latex paint for exterior and interior CHB (Concrete Hollow Blocks) wall;
2. Glazed tile wainscoting for toilet;
3. Vinyl tile finish;
4. Vitrified ceramic tiles for toilet floor;
5. Pebble wash-out finish;
6. Non-skid Ceramic Tiles
7. Plain cement steel trowel floor finish with non-metallic floor hardener;
8. Rubbed concrete finish, painted with acrylic latex paint for exposed R.C. Ceiling (bottom of roof slab and beams)
9. Fiber Cement Board for Ceiling

## SUBMITTAL

1. Shop drawings for all finishing and painting works for the building shall be submitted in advance to allow twenty eight days for review and approval. Shop drawings shall indicate materials and details of finishing works. The Contractor shall be responsible for all errors of detailing and fabrication, and for the correct finishing work items shown on the shop drawings.
2. The Contractor, before placing order for the finishing materials shall submit to the Engineer for approval representative samples of finishing materials. No placing of orders for material for finishing works shall be made without his approval.
3. Samples of all walls finishes, measuring not less than 1000 mm x 1000 mm shall be submitted to the Engineer for approval as to its finish texture and workmanship.

## MATERIAL REQUIREMENTS

### WALL FINISHES AND COUNTERTOPS

1. Plain Cement Plaster Finish
  - a. Sand shall be clean and hard material. Sand shall be free from deleterious substances and conforming with the requirements of ASTM C 33.
  - b. Cement shall be Portland cement conforming with the requirements of ASTM Designation C 150.
  - c. Water shall be clean and potable.
  - d. Bonding compound shall conform to ASTM C 631.
  - e. Hydrate lime shall conform to ASTM C 206.
  - f. Synthetic fibrous reinforcement shall conform to BS 5139 or ASTM C 1116.
2. Wall Ceramic Tiles
  - a. Wall tiles shall be 100 mm x 100 mm glazed ceramic wainscoting Color as per Engineer's approval.
  - b. Trimmers and moulding shall be lustrous, glazed with size and color corresponding to wall tiles.
  - c. Portland cement, sand, bonding compound, lime and water shall conform with Sub-section 4.13.2.1.1 above.
3. Marble
  - a. Marble shall be local natural mined and polished for toilet countertops, fascia and splashboard. Dimensions as shown on the Drawings.
  - b. Shall be sound material with uniform and favorable working qualities and with very limited natural faults.
  - c. Color, veining and quality shall be approved by Engineer.

- d. Veining shall run vertically on all vertical surfaces and direction of veining shall continue in same directions over horizontal surfaces except as directed by the Engineer.
- e. Marble components shall be factory fabricated and finished and delivered ready for installation without further preparation or modification.
- f. Sealer
  - 1) Shall be a commercial penetrating type free from harmful alkali or acid content and especially prepared for marble work.
  - 2) Shall have a Ph factor between 7 and 9.
  - 3) Shall not discolor.
  - 4) Shall produce a slip resistant surface.
  - 5) Shall have a flash point not less than 35 degree C.
- g. Cleaning fluid
  - 1) Shall be commercial neutral liquid type especially prepared for marble work.
  - 2) Shall have a Ph factor between 7 and 9.
  - 3) Shall be free from crystallizing salts or water soluble alkaline salts.
  - 4) Shall be biodegradable and phosphate free.

## FLOOR FINISHES

### 1. Vinyl Tile Finish

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

### 2. Vitrified Ceramic Unglazed Tiles

- a. Vitrified ceramic unglazed floor tiles shall be 100 mm x 100 mm, white for toilets and as shown on the drawings or to be designated by the Engineer.
- b. Portland cement, sand and water shall conform with the requirements specified in Sub-section 4.13.2.1.1 above.
- c. Vitrified ceramic unglazed floor tiles shall be delivered in the manufacturer's original unbroken packages or containers that are labeled plainly with the manufacturer's name and brand. Containers shall be grade scaled. Materials shall be stored in dry weathertight enclosures, and shall be handled in a manner that will prevent the inclusion of foreign materials and damage by water or dampness.

### 3. Plain Cement Floor Finish

- a. Portland cement, sand, bonding compound and water shall conform with the requirements specified in Sub-section 4.13.2.1.1 above.
- b. Mortar shall be one part of Portland cement to three parts sand.
- c. Hardener shall be non-metallic floor hardener, delivered in cartons, cans or bags to the construction site with the labels installed and seals unbroken.

### 4. Non-skid ceramic floor tiles

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

### 5. Pebble Washout Finish

- a. Pebble shall be no. 10, and in black color, sound pea gravel, clean, hard, wash river gravel, well selected and graded, rounded non-slip type and not flaky. Portland cement shall be the best commercial standard conforming to ASTM C 150, type I. Black cement of U.S. brand shall be added to Portland cement base for desired effect.

## CEILING FINISHES

### 1. Rubbed Concrete Finish

Portland cement, sand, bonding compound and water shall conform with the requirements specified in Sub-section 4.13.2.1.1 above.

### 2. Gypsum Ceiling Board

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

### 3. Fiber Cement Board

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

### 4. Fiberglass Ceiling Board

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

## EXECUTION

### WALL FINISHES

#### 1. Plain Cement Plaster Steel Trowel Finish

##### a. Preparation of Surfaces

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

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

All surfaces shall be thoroughly wetted before plastering.

##### b. Trial Mix

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

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

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

##### c. Cement Plaster Finish Application

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

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

Final plaster finishes shall be rubber sponged.

##### d. Tolerance

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

e. Patching and Cleaning

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

2. Wall Tiles

a. Mortar Preparation

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

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

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

b. Application of Wall Tile

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

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

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

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

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

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

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

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

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

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

c. **Cleaning and Curing**

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

d. **Protection**

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

## **FLOOR FINISHES**

### **1. Vinyl Tiles**

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

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

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

Waterproof contact adhesive shall be applied both on the floor and tile, spread evenly and allowing 10 minutes drying time prior to installation.

Tiles shall be laid with close, straight joints, bedded in contact adhesive in accordance with method approved and rolled with roller of sufficient weight to press tile firmly in place and provide smooth, plush surfaces at the joints. Tiles shall be fitted close to all pipes, base and other intersection surfaces.

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

### **2. Vitrified Ceramic Tiles**

a. **Mortar Preparation**

Mortar mix proportion and preparation shall be in accordance with the requirements in paragraph b of sub-section 4.13.3.1.

**b. Surface Preparation**

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

**c. Placing of Setting Beds and Floor Tile**

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

A skim coat of neat Portland cement mortar shall then be applied not more than 4 mm thick. The mortar shall be spread until its surface is true and even and thoroughly compacted, either level or sloped uniformly for drainage, as the case requires. A setting bed, as large as can be covered with tile before the mortar has reached its initial set, shall be placed on one operation; but in the event that more setting mortar has been placed than can be covered, the unfinished portion shall be removed and cut back to a clean beveled edge.

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

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

Cutting of tile, where necessary, shall be done along the outer edges of the floor. As far as practicable, no tiles of less than half size shall be used. Cutting and drilling of tiles shall be done neatly without marring the tile surfaces. The cut edges of tile against trim, bases, thresholds, pipes, built-in fixtures, and similar surfaces shall be ground and jointed carefully. Tile shall fit closely and neatly at all plumbing fixtures and around electrical outlets, pipes and fittings so that cover plates or escutcheons will overlap the tiles properly. Tiles shall be secured firmly in place and loose tiles or tiles sounding hollow shall be removed and replaced. All lines shall be kept straight, parallel, and true, and all finished surfaces brought to true and even planes. The inner edges of borders shall be kept straight and, where practicable, shall form right angles at all returns. The paper and glue shall be removed from mounted tile, without using excess water, within one hour after installing the tiles.

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

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

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

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

#### d. Cleaning and Curing

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

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

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

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

#### a. Trial Mix

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

#### b. Application

The concrete sub-floor shall be cleaned and projection, dust, loose particles and other materials which would prevent good bond shall be removed. The sub-floor surface shall be moistened but not soaked, dry cement shall then be sprinkled over it and the mortar shall be spreaded on the setting bed. The surface shall be tamped to assure a good bond over the entire area and screeded to provide a smooth and level bed at proper height.

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

## CEILING FINISH

### 1. Rubbed Concrete Finish

After removal of forms, the rubbing of concrete shall be started as soon as its condition will permit. Immediately before starting this work, the concrete shall be kept thoroughly saturated with water for a minimum period of three hours. Sufficient time shall have elapsed before the wetting down to allow the mortar used in the pointing of holes, honeycomb spots, broken corners or edges and other defects to thoroughly set. Surfaces to be finished shall be rubbed with a minimum coarse carborundum stone using a small amount of mortar on each face. The mortar shall be composed of cement and fine sand mixed in the proportions used in the concrete being finished. Rubbing shall be continued until all form marks, projections and irregularities have been removed, all voids have been filled, and a uniform surface has been obtained. The face produced by this rubbing shall be left in place at this time.

After all concrete above the surface being created has been cast, the final finish shall be obtained by rubbing with a fine carborundum stone and water. This rubbing shall be continued until the entire surface is of smooth texture and uniform color.

After the final rubbing is completed and the surface has dried, it should be rubbed with burlap to remove loose powder and shall be left free from all unsound patches, paste, powder and objectionable marks.

### 2. Gypsum Ceiling Board

The board shall be installed in accordance with ASTM C 840 and the requirements specified on the Specifications and Drawings. Neatly fit abutting end and edge joints. Use gypsum board of maximum practical length. Cut out gypsum board as required to make neat close joints around openings. Apply gypsum board in accordance with ASTM C840.

### 3. Fiber Cement Board

- a. Install fiber cement board in accordance with approved layouts on metal grid supports not more than 50 cm apart. When structural supporting members are set at such spacing that the above requirements cannot be complied with, adequate intermediate supports shall also be provided.
- b. Each board shall be tightly and rigidly secured in place and free from unnecessary movement.
- c. Each board shall be set square, straight, plumb and/or level, accurately positioned at locations and to layouts required, with adjacent like units or members accurately aligned.

- d. Board joints shall be tightly abutting and flush across adjacent units.
- e. The installation shall be free from exposed fastenings, unnecessary cuts or holes, other than as particularly shown, specified or approved.
- f. Exposed surfaces shall be completely clean and free from dust, dirt, smudges, fingerprints, scratches, dents, warping, waviness, buckling, broken parts or units, chips, cracks, misaligned or improperly fitted joints, stains, discoloration or other defects or damage.

#### 4. Fiberglass Ceiling Board

Edges of ceiling board shall be in close contact with the metal supports and in true alignment. Arrange units so that units less than 1/2 width are minimized.

#### 4.13.4 MEASUREMENT AND PAYMENT

The quantity of finishing work to be paid for shall be measured by the number of square meters of various types of finishes installed, applied, completed and accepted by the Engineer.

Payment of above item of work shall constitute full compensation for completed work and certified for payment by the Engineer.

## PAINTING

### GENERAL

Division 1, "General Requirements," contain provisions and requirements essential to these Specifications; and apply to this section, whether or not referred to herein.

### SCOPE OF WORK

This Section covers the surface preparation, coating materials and application of coatings systems required for the Works.

The work shall consist of furnishing of all labor, materials, equipment and other incidentals necessary for the supply of painting materials and the complete painting of surfaces as shown on the drawings in accordance with this Specification and as directed by the Engineer.

The term paint as hereinafter used includes emulsion paints, varnishes, oils, pigments, thinner and dryers.

All exposed metal surfaces, except metal surfaces embedded in concrete, shall be painted unless otherwise specified.

## STANDARD

The following publications listed below, but referred to thereafter by basic designation only, forms a part of these Specifications to the extent indicated by the reference thereto:

Steel Structures Painting Council (SSPC) U.S. Specification JIS K 5628 Red-lead Zinc Chromate Anti-Corrosive Paint.

## SUBMITTAL

1. The Contractor shall submit work method statements with lists of materials to the Engineer for approval twenty eight days before the starting of works. This statement shall include following items:
  - a. Type of paint and manufacturer
  - b. Manufacturer's specifications
  - c. Storage and delivery of materials
  - d. Surface preparation
  - e. Finish painting and drying
  - f. Touch-up painting, if any
  - g. Equipment
2. The Contractor, before placing order for the painting materials, shall submit to the Engineer for approval samples of materials. No placing of orders for material shall be made without his approval.

## MIXING AND THINNING

Mixing and thinning of paint shall be done in accordance with the approved manufacturer's printed instructions. The pot life of each paint as stated by the manufacturer shall not be exceeded.

## WEATHER CONDITION

The paint shall not be applied when the relative humidity is above 85 percent. The paint shall not be applied in rain, wind, fog, dust or mist.

## APPLICATION

Workmanship shall be first class in every respect. All work shall be done in a workmanship manner so that the finished surfaces shall be free from runs, chop, ridges, waves, laps and unnecessary brush marks. All coats shall be applied in such manner as to produce an even film of uniform thickness. Edges, corners, crevices, welds and rivets shall receive special attention to ensure that they receive an adequate thickness of paint.

All painting shall be done by thoroughly experienced workmen.

Safety regulations shall be adhered to at all times, including the wearing of respirators by persons engaged on assisting in spray painting. Adjacent areas and installation shall be protected by the use of cloths or other approved precautionary measures.

Plain enamel and varnish shall be applied carefully with good clean brushes or approved spraying equipment, except that the initial coat on any surface shall be applied with brush. Sufficient time shall be allowed between coats to assure thorough drying and each coat shall be in proper condition before receiving the next coat.

Sanding and dusting as required shall be performed between coats in varnishing work. Finish coat shall be smooth and free from runs, sags, and other defects. Exterior paint shall not be applied during rainy days.

All paint when applied shall provide a satisfactory film and smooth, even surface. Paint shall be thoroughly stirred and kept at a uniform consistency during application. Powdered metallic pigments added at the time of use shall be mixed by adding the powder in small increments to about one-third of the base paint or vehicle, with thorough mixing to obtain a smooth paste. The remainder of the base paint shall then be thoroughly stirred in.

Different brands of emulsion paints shall not be mixed prior to application of the materials.

Where necessary to suit conditions of surface temperature, weather and method of application, the package paint may be thinned immediately prior to application in accordance with the approved manufacturer's directions, but not in excess of 125 cc of suitable thinner per liter (one pint per gallon). Before using, the paint shall be mixed to a uniform consistency and shall be stirred frequently during application.

Paints other than water-thinned paints shall be applied only to surfaces which are completely free of moisture as determined by sight or touch and only such combinations of humidity to be painted as will cause evaporation rather than condensation.

Surfaces which have been cleaned, pretreated and/or otherwise been prepared for painting shall be primed or painted with one coat of finish paint as soon as practicable after such preparation has been completed, but in any event prior to any deterioration of the prepared surfaces.

The first coat of paint on all exterior surfaces shall be applied by brush. Interior prime coats and all other subsequent coats on either exterior or interior surfaces may be applied by brush or spray. Whenever spraying is permitted all areas inaccessible to spray painting shall be coated by brushing or other suitable means. Brushes to be used for application of water-emulsions shall be soaked in water for a period of 2 hours prior to use.

All cloths and cotton waste which might constitute a fire hazard shall be placed in closed metal containers or destroyed at the end of each day.

Upon completion of the work, all staging, scaffolding, and containers shall be removed from the site or destroyed in a manner approved by the Engineer. Paint spots, or stains upon adjacent surfaces shall be removed and the entire job left clean and acceptable to the Engineer.

No smoking shall be permitted in the vicinity where painting is going on.

## TOUCH-UP PAINTING

Touch-up painting shall be done with the same paint as used for the original coat. The resulting minimum dry film shall be the same as for the original coat.

Touch-up painting shall include cleaning and painting of field connections, welds and all damaged or defective paint and rusted areas.

During touch-up painting, only loose, cracked, brittle or non-adherent paint shall be removed during cleaning. All exposed edges shall be feathered. Touch-up painting shall be performed in a manner which will minimize damage to sound paint. Rust spots shall be thoroughly cleaned and edges of the existing paint shall be scraped back to sound material.

## DRYING

1. No primer or paint shall be forced to be dried under conditions which will cause cracking, wrinkling, blistering, formation of pores which would detrimentally affect the condition of the paint.
2. No drier shall be added to the paint unless specified in the approved manufacturer's instructions.
3. Painted surfaces shall be protected from dust, dirt, and the elements of the weather until dry to the fullest extent practicable.
4. After drying, any areas of paint damaged from any cause shall be removed, the surface again prepared and then touched-up with the same paint and to the same thickness as the undamaged areas as specified in sub-section 4.14.3.7 above.

## HANDLING

1. Precautions shall be taken to minimize damage to paint films resulting from stacking for drying.
2. Paint which is damaged in handling shall be scraped off and touched up with the same paint and in the same thickness as was previously applied to the damaged area at Contractor's expense.

## INSPECTION

1. All works and materials supplied under this Specification shall be subject to inspection by the Engineer.
2. The Contractor shall correct such works or replace such materials found defective under these Specifications at his own expense.

## MEASUREMENT AND PAYMENT

1. The quantity of painting work to be paid for shall be made by the area in square meters of painting works completed and accepted by the Engineer on each type of works, except marine works as indicated in the Bill of Quantities, which payment shall constitute full compensation for the completed work and certified for full payment by the Engineer.

2. Measurement for painting of materials of port facilities, Division 3 are included in the individual work items of structural steel, and fender systems. No separate measurement for painting will be made for port facilities.

## **PLUMBING AND SANITARY WORKS**

### **SCOPE OF WORK**

The work covered for this section shall consist of furnishing all labor, tools, equipment, materials and incidentals necessary for the complete installation, testing and operation of the plumbing and sanitary system within the buildings and premises in accordance with these Specifications and as shown on the drawings or as directed by the Engineer. The septic tank and their effluent and discharge pipelines shall be part of other section of these specifications.

### **MATERIAL REQUIREMENTS**

#### **SUBMITTAL**

1. The Contractor shall submit his work method statement with necessary shop drawings to the Engineer for approval twenty eight (28) days before the start of the works.

Shop drawings shall be dated and shall contain the name of the project and location of the subject item in the shop drawing which is to be installed.

The Engineer will review and approve or return for correction all shop drawings with reasonable promptness. The Contractor shall make any corrections required and file with the Engineer three (3) corrected copies of the shop drawings.

2. The drawings shall indicate the general arrangement of all pipings, however, where actual conditions necessitate re-arrangement in opinion of the Contractor and/or the Engineer, the Contractor shall prepare and submit to the Engineer for approval, twenty eight (28) days before placing the order for materials, shop drawings of the proposed re-arrangement. Because of the small scale of the drawings, shop drawings to indicate all offsets, fittings and accessories shall be prepared. The Contractor shall carefully examine the drawings and shall carefully investigate actual structural and finish conditions affecting all his work.
3. The Contractor shall be responsible for the proper fitting of materials, equipment and accessories without substantial alteration and at no cost to the Employer.
4. The Contractor shall be responsible for the proper coordination of the work and shall provide all necessary clearance where necessary.

#### **STANDARDS**

Use of materials shall further be governed by other requirement imposed on other sections of these Specifications. Materials shall be subject to tests necessary to ascertain their fitness if the Engineer so requires. All works shall comply with the pertinent provisions of the Plumbing Code of the concerned city or town, the Code on Sanitation of the Philippines, and/or the National Plumbing Code of the Philippines.

## MATERIALS

### 1. Identification of Materials

Each length of pipe, fittings, traps, fixtures and devices used in the plumbing work shall have cast, stamped or indelibly marked on it, the approved manufacturer's trademark or name, the weight, type and class of product when so required by the standards mentioned above.

### 2. Alternative Materials

Use of any material not specified in this Specification may be allowed provided such alternate has been approved by the Engineer and provided further that a test, if required, shall be done by an approved agency in accordance with generally accepted standards.

### 3. Soil, Waste, Drain, Vent Pipes and Fittings

Soil, waste and vent pipes shall be unplasticized Polyvinyl Chloride (uPVC) pipes. Diameter shall be as indicated on the Drawings. It shall conform to ASTM D 1784 or ASTM D 2729.

Drainage pipes shall be reinforced concrete pipes (RCP), diameter shall be as indicated on the Drawings.

### 4. Jointing Material

The joint material for uPVC pipes shall be PVC solvent cement as recommended by the approved pipe manufacturer.

### 5. Water Supply Pipes

Water supply pipes shall be polypropylene random-80 (PPR-80) pipes PN 20 conforming to DIN Standards DIN 1988/DIN 8078, German made. Jointing shall be fusion welded.

### 6. Cleanouts, Plugs and Tee

Cleanouts shall be of the same material as the pipe to be fitted. Cleanouts installed in connection with uPVC hubs and spigot pipes shall consist of a long sweep quarter bend of  $\frac{1}{4}$  as shown on the drawings.

### 7. Pipe Sleeves

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

### 8. Downspout

All downspout shall be unplasticized polyvinyl chloride (uPVC) pipe class DWV conforming to ASTM D2729 or ASTM D1784 for sanitary pipes, Series 1000.

## 9. Splash Block

Provide splash blocks at the outlet of downspout emptying at grade which shall be made of pre-cast concrete, with smooth finished counter sunk dishes sloped to drain away from the building. Dimensions as shown on the Drawings.

## 10. Roof Strainers

The Contractor shall provide fittings and install 100 mm 0 G.I. mesh wire strainers where shown or indicated on the drawings and/or where the Engineer directs. Each strainer shall fit the size of the corresponding downspout which is to be installed.

## 11. Shower, Floor and Urinal Drain

Shower and floor drains shall be made of stainless steel non-tilting grate, perforated or slotted. Urinal drains shall be cast iron dome type drain.

## 12. Pipe hangers, Inserts and Support

- a. Pipe hangers shall be wrought iron, malleable iron pipe hangers spaced not over 1.5meters apart for uPVC pipes and 3.0meters apart for iron pipes. Chain straps, perforated bars or wire hangers will not be permitted.

Hangers shall have short turnbuckles or other approved means of adjustment. Turnbuckles may be omitted on hangers where space does not permit their use. Trapeze hangers may be used in lieu of separate hangers for pipes running parallel to each other and close together.

- b. Inserts shall be of cast iron or cast steel and shall be of a type to receive a machine bolt head or nut after installation.
- c. Wrought iron clamps or collars shall be used to support vertical runs of pipes.

## 13. Unions

Union pipe 50 mm in diameter and smaller shall be malleable iron. Union on water piping 63mm in diameter and larger shall be flanged pattern and shall be of galvanized (zinc coated) cast iron. Gaskets for flange unions shall be of best quality fiber plastic or leather.

## 14. Valves

Valves shall be cast bronze or brass body. Chrome plated finish for all fixture taps and faucets and natural finish for all others, like hose bibbs, gate valves and which are not tapped directly to a plumbing fixture. Concrete valve boxes shall be installed where required and will be of sufficient size for operating the valve.

## 15. Fixtures

### a. Water Closets

All water closets for toilets as shown on the drawings shall be TANK TYPE, white with complete fittings and mounting accessories.

### b. Lavatories

- 1) Lavatory (Wall Hung): Shall be vitreous china, wall hung lavatory with rear overflow holes, fitting ledge suitable for single faucet holes on centers complete with faucet, standard fittings, trap and lavatory brackets and other accessories.
- 2) Lavatory (Countertop Lavatory): Shall be vitreous china, oval or round shaped countertop lavatory with front overflow hole, complete with faucet, supply valve and fittings with P-trap. Fitting ledge suitable for single hole on center.

### c. Urinals

- 1) Urinals for all comfort buildings shall be built-in urinal trough as shown on the drawings.
- 2) Urinals: Shall be vitreous china, wall-hung washout urinal, flushing rim, integral trap, 19mm top and shall be provided with water saving flush system .

### d. Service Sinks

Service sinks where indicated or shown on the Drawings shall be stainless steel, with single bowl and with complete U.S. or Japan imported fittings.

### e. Slope Sinks

Stop sink shall be 24"x20" acid resisting enamel on Cast-Iron with concealed hanger and faucet.

Hose bibb shall be of brass finish.

### f. Soap Holder

Soap holder and toilet paper holder shall be vitreous china, wall mounted. All toilet/bath rooms will be provided with soap holder, toilet paper holder and chrome plated towel racks.

### g. Faucet for lavatory

Faucet for lavatory shall be in chrome-finish.

### h. Bath and shower fitting

Bath and shower fitting shall be chrome-finish.

i. Towel Rail

Towel rail shall be tubular stainless steel, 2.7mm diameter, and 0.54m long or as specified in the drawings.

j. Curtain rod

Curtain rod shall be tubular stainless steel, 19mm diameter or as specified in the drawings.

k. Grab Bar

Grab bar shall be tubular stainless steel, 25mm diameter or as specified in the drawings.

#### 16. Concrete, Reinforcing Steel, Pipe and Steel Plate

Materials for wash pits, catch basins and manholes shall conform to the requirements as follows:

- a. Concrete materials shall conform with the requirements of Section 3.2, "Concrete Works" and shall be Class C concrete with a 28-day minimum compressive strength of 21 MPa (3000 psi).
- b. Reinforcing steel shall be as shown on the drawings and shall conform with the requirements of reinforcing steel bars in Section 3.2, "Concrete Works."
- c. Pipes shall be as shown on the drawings and shall comply with the relevant item of the particular pipe.
- d. Steel plates shall be as shown on the Drawings and shall comply with Section 4.6, "Steel and Metal Works".

#### 17. Non-reinforced Concrete Pipe

Non-reinforced concrete pipe shall be as shown on the Drawings and shall conform with the requirements of non-reinforced concrete pipes AIC latest edition. Concrete shall be with a 28-day minimum compressive strength of 20.7 MPa.

#### 18. Valve for Drinking Fountain

Valve where drinking fountain will be connected shall be polished brass pipe and shall have red enameled handle.

### EXECUTION

All installation works shall be in conformity with the National Plumbing Code of the Philippines (NPCP).

## EXCAVATION, TRENCHES AND BACKFILLING

1. Trenches for all underground pipelines shall be excavated to the required depth. The bottom of trenches shall be tamped hard and graded to secure the required fill. Bell holes shall be excavated so that pipes will rest on solid ground for their entire length.

Rocks where encountered, shall be excavated to a depth of 150 mm below the bottom of the pipe and before the pipe is laid, the space between the bottom of the pipe and the rock shall be filled with sand. Sewer and water pipes shall be laid in separate trenches.

2. After pipelines have been tested, inspected and approved by the Engineer and prior to backfilling, all forms shall be removed and the excavation shall be cleaned of all trash and debris.

Materials for backfilling shall consist of acceptable excavated soil, borrow of sand, gravel or other materials approved by the Engineer and shall be free from trash, lumber or other debris. Backfilling shall be placed in horizontal layers not exceeding 150 mm in thickness and properly moistened to approximate optimum requirements. Each layer shall be compacted by hand or machine tamper or by other suitable equipment to a density that will prevent excessive settlement or shrinkage.

Backfilling shall be brought to a suitable elevation above grade to provide for anticipated settlement and shrinkage thereof.

Water pipes shall have a sand cushion 150 mm below and above the pipes.

## INSTALLATION OF SOIL, WASTE DRAINS OR VENT PIPES

1. Horizontal Drainage Pipe and Vent Piping

Horizontal waste pipes 75 mm in diameter and smaller shall have a minimum grade of 6.5 mm per 0.30 m and for 100 mm diameter and larger, 3.2 mm per 0.30 m. All main vertical soil and waste stacks shall be extended full size above the roof line as vents, except where otherwise specifically shown.

Where practicable, two (2) or more vent pipes shall be connected together and extended as one pipe through the roof. Vent pipes in roof spaces shall be run as close as possible to the underside of roof with horizontal piping pitched to stacks using fittings as required without forming traps in pipes.

Vertical pipe vents may be connected to a vent line carrying other fixtures. The connection shall be at least 1.20 m above the floor on which the fixtures are located to prevent the use of vent lines as waste. Horizontal waste lines receiving the discharge from two (2) or more fixtures shall be provided with vents, unless separate venting of fixtures is noted.

2. Fittings

All changes in pipe sizes on soil waste lines shall be made with reducing fittings or recessed reducers. All changes in direction shall be made by the appropriate use of forty five (45) degree wyes. Long sweep quarter bends or elbows may be used in soil and waste lines where the change in direction of flow is from the horizontal to the vertical and on the discharge from water closets.

Where it becomes necessary to use short radius fittings in any location, the approval of the Engineer shall be obtained before they are installed.

### 3. Joints

#### a. PVC Soil Pipe

All joints in uPVC soils, waste and vent pipe shall be accomplished by the use of PVC solvent cement.

- b. All joints for uPVC shall be accomplished by applying the manufacturer's recommended solvent before connection to the pipe.

### 4. Cleanouts

Cleanouts at the bottom of each soil stack, waste stack and where else indicated shall be the same size as the pipe.

Cleanouts on floors shall be by uPVC plug adapter fit into the hub and fitted with uPVC screw plugged flush with the floor.

Cleanout shall be provided at every change in direction greater than 45 degrees.

### 5. Flashings

All pipes passing through the roof shall be provided with lead flashings. All flashings shall be built to 40 lbs. bituminous felts and shall extend up to the pipe and down-over to top of pipe at least 150 mm and along the roof not less than 300 mm and shall lap over flashing to make a weatherproof joint.

### 6. Traps

Each fixture and piece of equipment requiring connections to the drainage system, except fixtures with continuous waste shall be equipped with a trap. Traps shall be specified to be supplied with the fixtures. Each trap shall be placed as near to the fixtures as possible. Traps installed on threaded pipes shall be recessed drainage pattern.

### 7. Pipe Sleeves, Hangers and Supports

Pipe sleeves shall be installed and properly secured in place at all points where pipes pass through masonry or concrete except unframed floors on earth.

Pipes shall not be permitted to pass through footings or beams unless noted on the drawings.

Pipe sleeves in floors shall extend not less than 25 mm and not more than 50 mm above the finished floor. After installation of the pipe, the space around the pipe shall be packed with plastic material and made watertight. Flashing shields for sleeves passing through waterproofing membrane shall be thoroughly mopped into the membrane. The space between the pipe and sleeves shall be made watertight by inserting approved sealing and caulking materials.

## INSTALLATION OF WATER PIPES, FITTINGS AND CONNECTIONS

### 1. Gate Valves and Outlets

Gate valves shall be installed close to the point of connection to the existing service line outside the building. The piping shall be extended to all fixture outlets and equipment from the gate valves. Outlets where indicated shall be capped or plugged and left ready for future connections.

### 2. Mains, Branches and Runouts

All runs of piping shall be installed as shown on the drawings. The piping shall be cut accurately to measurements, and installed at the building site by the Contractor and shall be worked into place without springing or forcing. Care shall be taken not to weaken the structural portions of the buildings.

All pipes above ground shall be run parallel with the lines of the building unless otherwise shown on the drawings. Branch pipes from service lines may be taken off on top of mains, bottom of mains or side of mains, using such cross over fittings as may be required by structural or installation conditions.

All service pipes, valves and fittings shall be kept at sufficient distance from the other work to permit finished covering not less than 6.5 mm from such other work and not less than 13 mm between finished covering on different services. No water piping shall be buried in floors unless specifically indicated on the drawings or approved. Changes in pipe sizes shall be made with reducing fittings.

The use of long screws and bushings is prohibited.

### 3. Joints

Joints and connections in the plumbing system shall be gas-tight and watertight for the pressures required by test.

After cutting and before threading all pipes shall be reamed and shall have burrs removed. All screwed joints shall be applied with an approved graphite compound or TEFLON tape to facilitate connections. Threads shall be full cut and not more than three threads on the pipe shall remain exposed.

Caulking of threaded joints or top to prevent leaks shall not be permitted. Unions shall be provided where required for disconnection. Threaded swing bolts shall be used for branch connections to risers and mains.

### 4. Unions

Where required unions shall not be concealed in walls, ceilings or partitions.

### 5. Tests

The following tests shall be conducted by the Contractor at his expense under the supervision of the Engineer.

#### a. Tests for Drainage and Venting System

The entire drainage and venting system shall have necessary openings plugged to permit the entire system to be filled with water to the level of the highest vent stack above the roof. The system shall hold the water for 30 minutes with a drop not greater than 100 mm.

**b. Sterilization**

The entire water supply piping system shall be sterilized with a solution containing not less than fifty (50) parts per million of available chlorine, either liquid chlorine or a solution of sodium hypochlorite. The sterilizing solution shall remain in the system for a period of not less than 8 hours during which time all valves and faucets shall be opened and closed several times. After sterilization, the solution shall be flushed from the system with clean water until the residual chloride content is not more than 0.2 parts per million.

**c. Pressure Test for Water Lines**

- 1) After the pipe have been installed, the joints completed and with joints exposed for examination, all newly installed pipe or any valve section, thereof, shall be subjected to hydrostatic pressure one and one half (1½) the designed working pressure of the system or as specified by the Engineer.
- 2) The duration of each pressure test shall be at least 20 minutes unless otherwise specified by the Engineer.
- 3) Each section of pipeline shall be slowly filled with water and the specified test pressure, measured at the point of lowest elevation, shall be applied by means of a pump connected to the pipe in a manner satisfactory to the Engineer. During the filling of the pipe and before applying the test pressure, all air shall be expelled from the pipeline. To accomplish this, tap shall be made if necessary, at the highest point of the pipe under test and after completion of the test, the taps shall be tightly plugged unless otherwise specified. During the test, all exposed pipes, fittings, valves, joint and couplings will be carefully examined. If found to be cracked or defective, they shall be removed and replaced by the Contractor with sound materials at his expense. The test shall then be repeated until satisfactory results are obtained.

**d. Leakage Test for Water Lines**

- 1) Leakage test shall be conducted after satisfactory completion of the pressure test and shall consist of an examination of all exposed joints for leakage as well as an overall leakage test of the completed pipeline.
- 2) The pressure to be maintained during the test shall be the designed working pressure of the system.
- 3) Leakage test shall be made only after a minimum of 24 hours after the pipe to be tested has been filled with water.
- 4) The duration of each leakage test shall be two hours unless otherwise specified by the Engineer.
- 5) Each section of pipeline shall be slowly filled with water and the specified test pressure, measured at the point of lowest elevation shall be applied by means of a positive displacement type pump and reservoir connected to the pipe in a manner satisfactory to the Engineer.
- 6) Before starting the leakage test, all air shall be expelled from the pipe. All exposed pipes, fittings, valves and joints shall be examined for leakage during the test.
- 7) Allowable leakage rate per 100 joints per inch of Pipe Diameter at Pressure Stipulated.

PRESSURE		LEAKAGE RATE	
psi	kg/cm <sup>2</sup>	liters/hr	liters/2 hrs
50	3.5	1.45	2.90
75	5.3	1.75	3.50
100	7.0	2.05	4.10
125	8.8	2.30	4.60
150	10.5	2.50	5.00
200	14.0	2.90	5.80

e. Defective Work

- 1) If the inspection or test shows any defect, such defective work or material shall be replaced and the test shall be repeated until satisfactory to the Engineer.
- 2) All repairs to piping shall be made with new materials at the expense of the Contractor.
- 3) No caulking of screwed joints or holes will be accepted.

#### ASSEMBLY, INSTALLATION AND CONNECTION OF FIXTURES

Fixtures shall be supported and fastened in a satisfactory manner. Where secured to concrete or masonry work walls, fixtures and equipment shall be fastened with brass bolts or machine screws in lead-sleeve type anchorage units or with brass expansion bolts. Expansion bolts shall enter 7.5 cm into solid concrete or masonry works and shall be fitted with loose tubing or sleeves of proper length to bring expansion sleeves into the solid concrete masonry walls.

Where wood screws are used, screws shall go into solid pieces set between studs. Where through-bolts are used, bolts shall be provided with plates or washers at back set, so that they will be concealed by plaster. Bolts and nuts shall be hexagonal and exposed nuts, cap nuts, and screw heads shall be provided with chromium plated brass washers.

#### PROTECTION OF FIXTURES

Pipe openings shall be closed with caps or plugs during installation. Fixtures shall be tightly covered and protected against dirt, water and chemical injury. At the completion of all works, all fixtures shall be thoroughly cleaned and delivered in a condition satisfactory to the Engineer.

#### FIXTURES AND FASTENING

All fixtures shall be supported and fastened in a satisfactory manner as follows:

1. Where secured to concrete or concrete hollow block walls, they shall be fastened with one quarter inch brass bolts with twenty threads to the inch and of sufficient length to extend at least 7.5 cm into solid concrete or hollow block work, fitted with loose tubing or sleeve insert and shall be securely anchored and installed flush with the finished wall and shall be completely concealed when the fixtures are installed.
2. Where through-bolts are used, they shall be provided with plates or washers back set so that heads, nuts and washers will be concealed by plaster. Bolts and nuts shall be hexagonal. Exposed bolts, nuts, capnuts and screw heads shall be provided with chromium plated brass washers.

## GUARANTEE

Upon completion and before final acceptance of the equipment installation, the Contractor shall furnish the Engineer a written guarantee stating that all equipment installed under this Section free from defects. The guarantee shall be for a period of one (1) year from the date of final acceptance of the work. Any part of the equipment that becomes defective during the term of the guarantee shall be replaced, renewed and/or made good by the Contractor, at his own expense and in a manner satisfactory to the Engineer.

Guarantees made by the approved manufacturers or suppliers beyond one year, shall be transferred to PPA without any expense on his part.

## AS-BUILT DRAWINGS

Upon completion of and before final acceptance of the work, the Contractor shall prepare, at his own expense, and submit to the Engineer as-built drawings showing conditions of the work actually performed.

Where as-built drawings are required for a submission to enforcing authorities, same shall be submitted first to the Engineer for verification and checking. One (1) set of the drawings duly approved by the proper enforcing authorities shall be submitted to the Engineer together with the reproducible originals.

## CLEANING UP

Upon completion of the work, all parts of the installation shall be thoroughly cleaned of grease, metal cuttings and sludge which may have accumulated during the testing operation.

## PLUMBING, FIXTURES AND TOILET ACCESSORIES INSTALLATION

All installation works shall be as shown on the drawings and shall conform to the applicable standards set forth by the Philippine National Plumbing Code. All fixtures shall be fastened and/or supported in accordance with the given requirements.

## MEASUREMENT AND PAYMENT

The quantity of plumbing and sanitary works within the buildings and its premises to be paid for shall be measured as indicated in the Bill of Quantities as follows:

1. Water closets, urinals, lavatories and service sink by the number of fixtures installed, completed, tested and approved and certified for payment by the Engineer.
2. Complete plumbing system for water supply inside the building (PPR pipes, fittings and accessories) by the lump sum for each building installed, completed, tested, approved and certified for payment by the Engineer.
3. Complete sanitary sewer works inside the building including all sewer pipes, fittings, septic tank, earthwork, etc. by the lump sum for each building installed, completed, tested, approved and certified for payment by the Engineer.
4. Reinforced concrete pipes for building drainage systems by the number of linear meters installed, tested, approved and certified for payment by the Engineer.
5. No separate payment for concrete and reinforcing bars for urinal trough and catch basin as this is included under pay-item for concrete works.

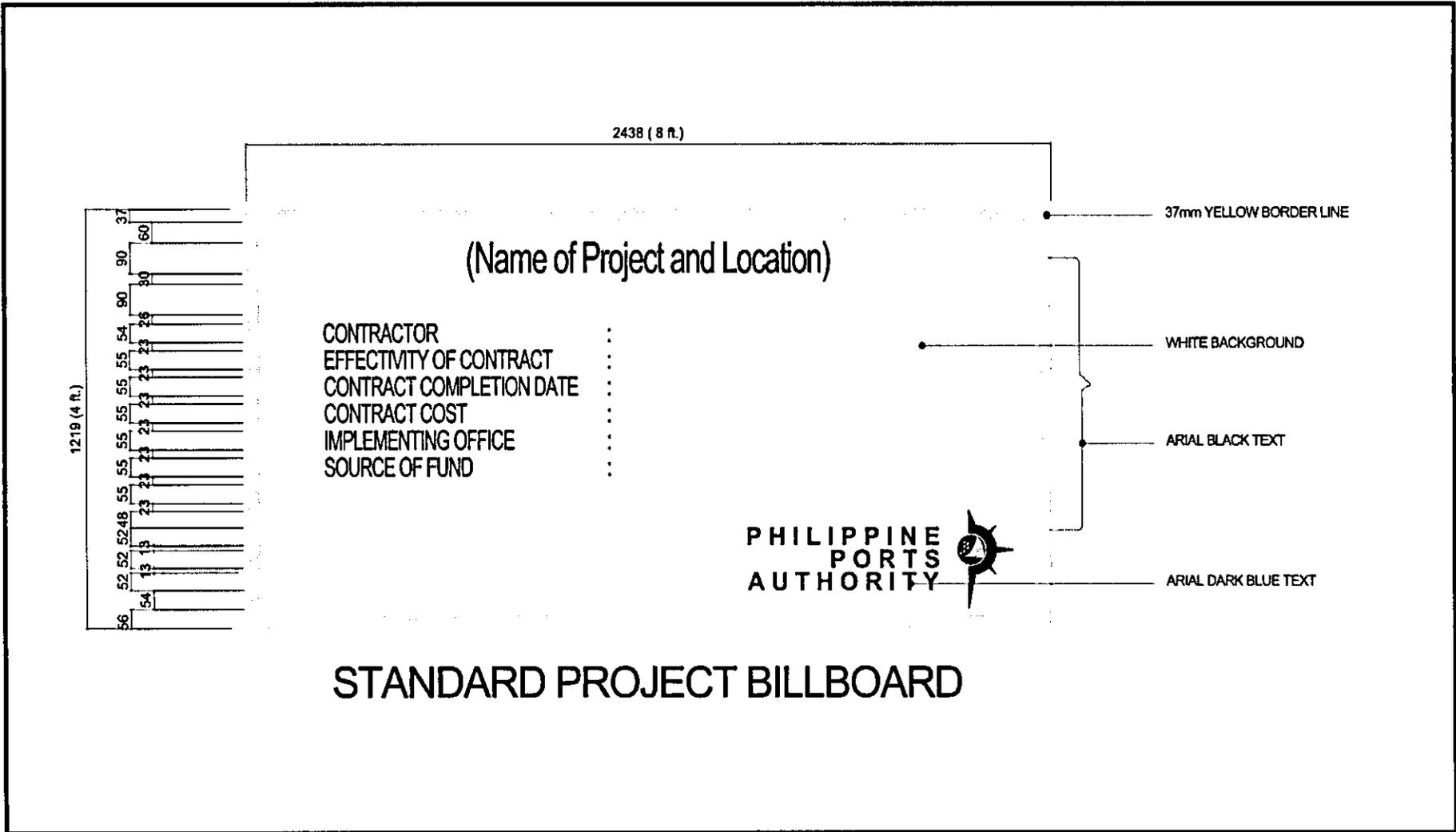
**ITEM 11 : PROJECT BILLBOARD****SPECIFICATION**

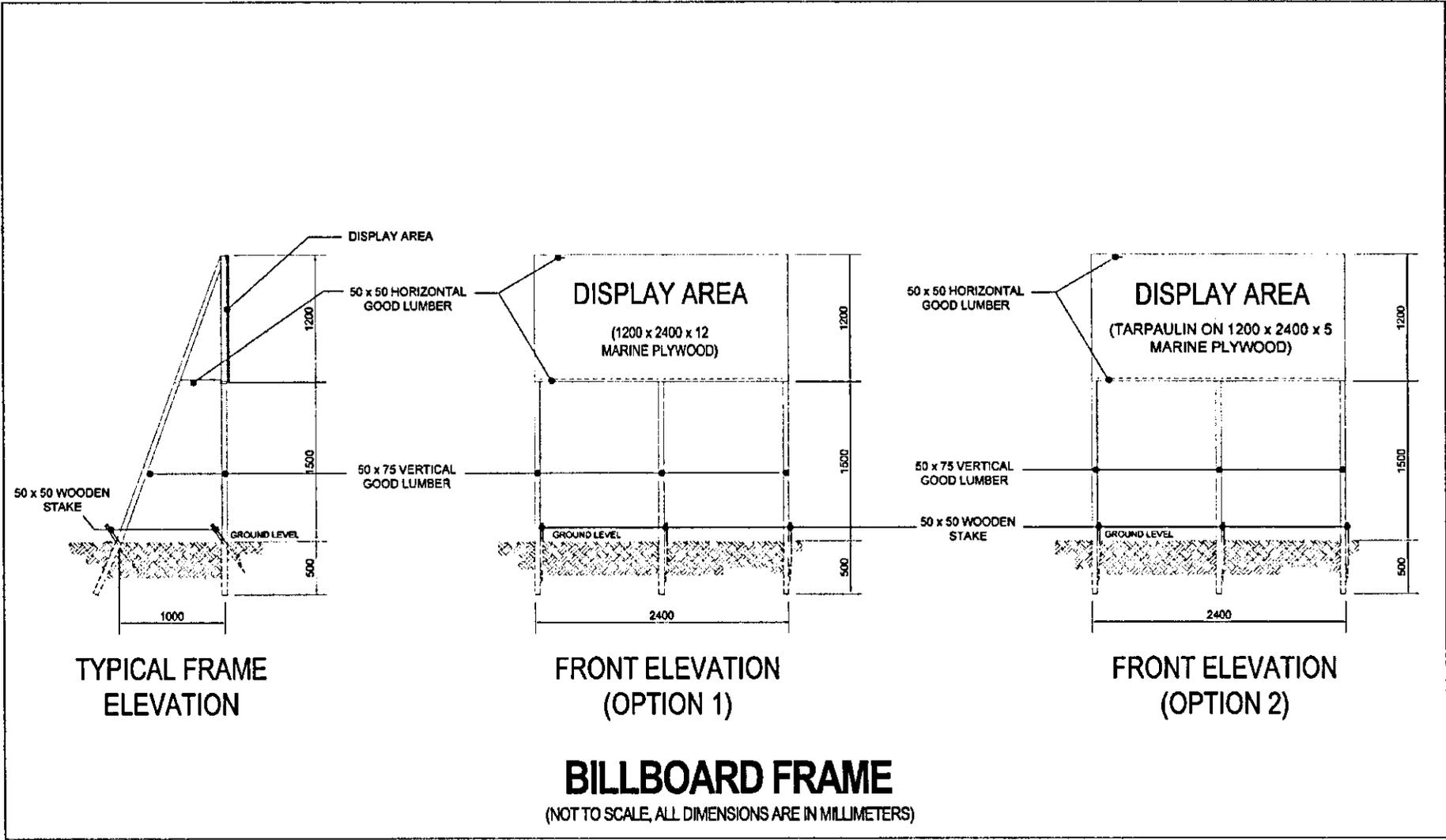
The Project Billboard shall be installed at location(s) designated by the Engineer.

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.





*SECTION VII*

*DRAWINGS  
(APPROVED PLANS)*

# SECTION VII

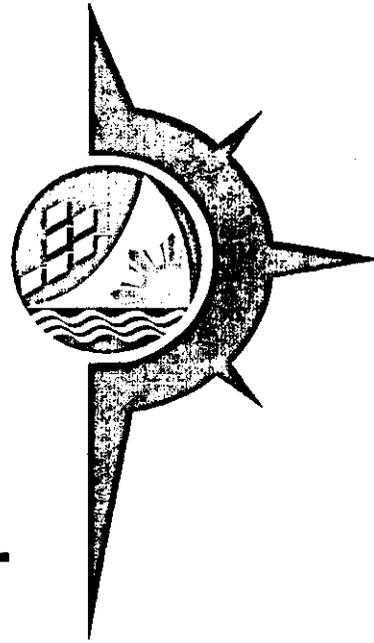
## DRAWINGS AND APPROVED PLANS (SEE ISSUED APPROVED PLANS)

### LIST OF DRAWINGS:

- 1 of 33 - Site Development Plan, Vicinity Map
- 2 of 33 - Passenger Terminal Building Plan
- 3 of 33 - Reflected Ceiling Plan
- 4 of 33 - Comfort Room Floor Plan, Comfort Room Section
- 5 of 33 - Comfort Room Section and Details
- 6 of 33 - Comfort Room Section and Details
- 7 of 33 - Comfort Room Section and Details
- 8 of 33 - Plumbing Layout, Waterline Layout
- 9 of 33 - Isometric Plumbing Layout
- 10 of 33 - Electrical Plan
- 11 of 33 - Canopy Design, Perspective View, Plan
- 12 of 33 - Roof Framing Plan, Front Elevation
- 13 of 33 - PTB Elevations
- 14 of 33 - Canopy Details
- 15 of 33 - Canopy Details
- 16 of 33 - Port Road Reblocking Plan
- 17 of 33 - Road Section Details
- 18 of 33 - Road Pavement Plan

- 19 of 33 - Seawall and Back-up Area Plan**
- 20 of 33 - Seawall and Back-up Area Development Plan**
- 21 of 33 - Retaining Wall Section**
- 22 of 33 - Excavation Detail**
- 23 of 33 - Retaining Wall & Filling of Armour Rock Detail**
- 24 of 33 - Retaining Wall Section**
- 25 of 33 - Retaining Wall Detail**
- 26 of 33 - Retaining Wall Detail**
- 27 of 33 - Seawall Detail**
- 28 of 33 - Section of Seawall**
- 29 of 33 - Passenger Terminal Building Repainting**
- 30 of 33 - Passenger Terminal Building Elevations and Section**
- 31 of 33 - Perimeter Fence for Repainting**
- 32 of 33 - Perimeter Fence for Repainting**
- 33 of 33 - Fence Elevations**

PHILIPPINE  
PORTS  
AUTHORITY



**PMO NEGROS ORIENTAL  
/ SQUIJOR**

**CONSTRUCTION PLANS**

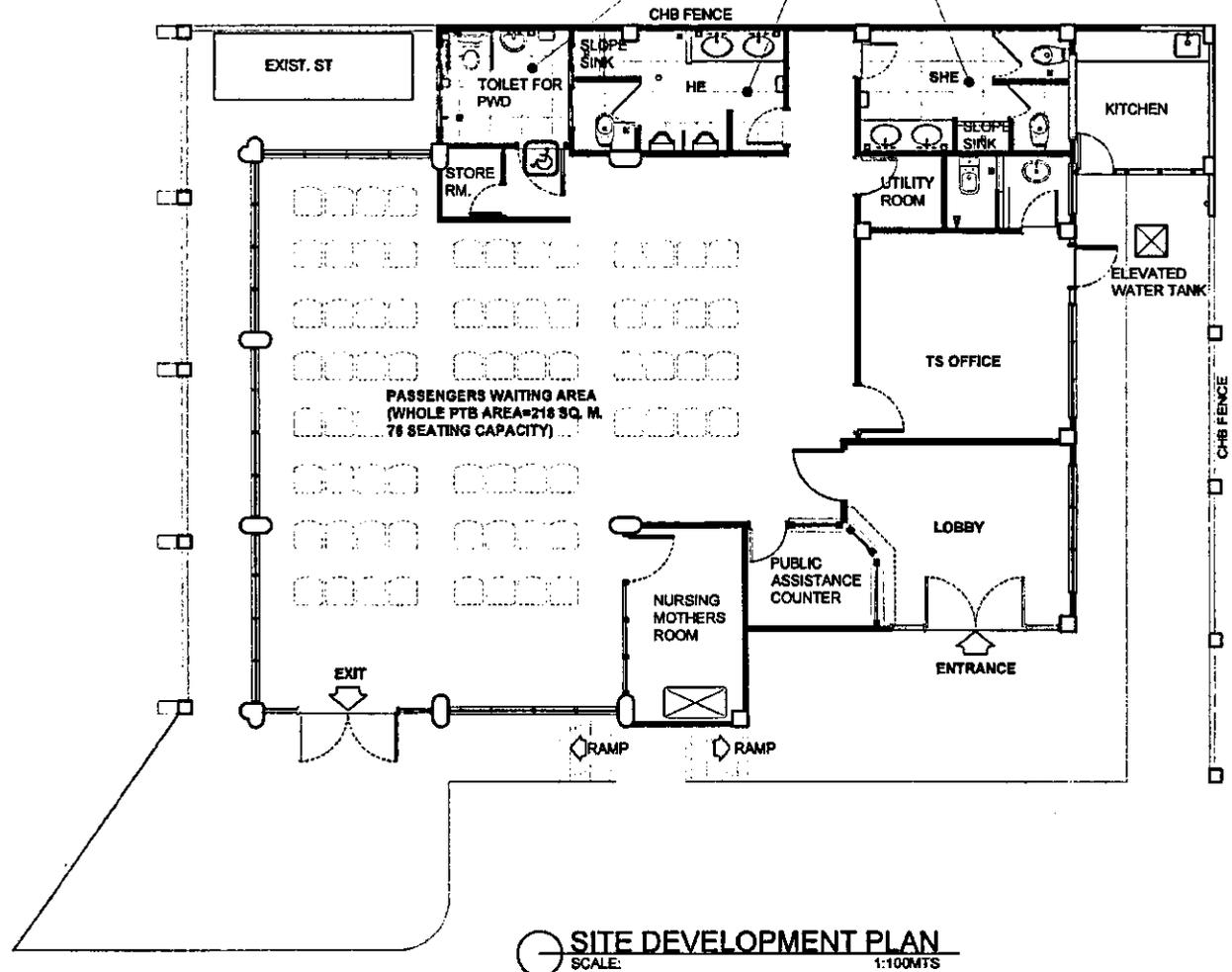
**RESTORATION OF DAMAGED CONCRETE PAVEMENT, COVERED WALKWAY,  
PASSENGER TERMINAL BUILDING, SCOURED PORTION OF SEAWALL &  
REPAINTING OF SECURITY FENCE**

**Port of Bulado**

**Bulado, Guihulngan City, Negros Oriental**

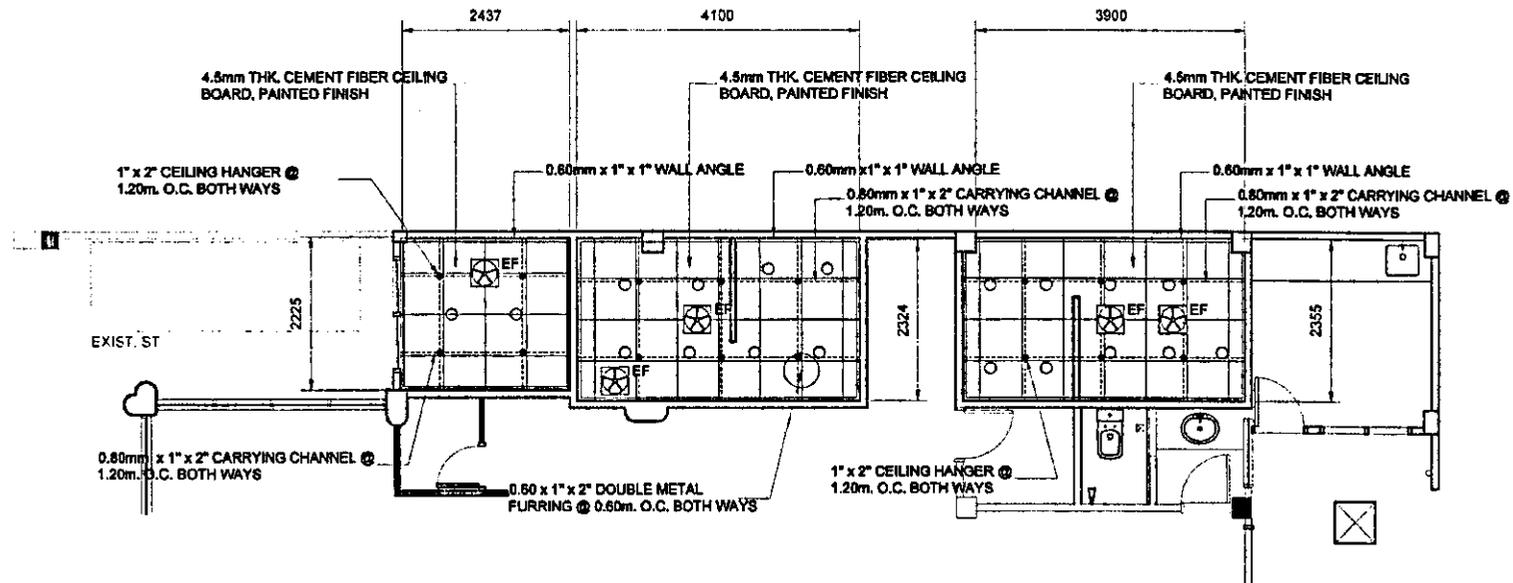


REPLACEMENT OF DAMAGED TOILET FIXTURES,  
 REPLACEMENT OF WATER LINES, DRAIN PIPES, & WASTE PIPES  
 REPLACEMENT OF OLD PARTITIONS  
 REPLACEMENT OF FLOOR & WALL TILES  
 REPLACEMENT OF GRANITE COUNTER TOP  
 REPLACEMENT OF ENTIRE CEILING  
 TOTAL REVAMP OF ELECTRICAL SYSTEM OF CR  
 ADDITIONAL 2 PWD FLIP UP GRAB BAR



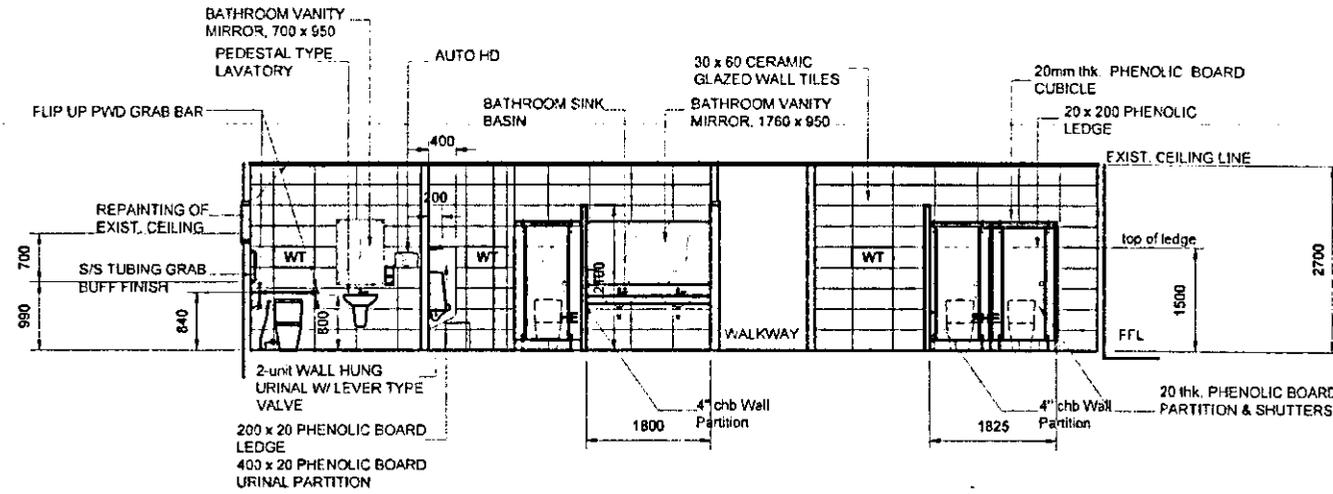
**SITE DEVELOPMENT PLAN**  
 SCALE: 1:100METS

<p><b>PHILIPPINE PORTS AUTHORITY</b>  <small>PMO - Negros Oriental        Siquijor</small></p>	<p><b>PROJECT TITLE:</b>        RESTORATION OF DAMAGED CONCRETE PAVEMENT, COVERED WALKWAY,        PASSENGER TERMINAL BUILDING, SCOURED PORTION OF SEAWALL &amp;        REPAIRING OF SECURITY FENCE        REPAIR OF a Part of Bulado  <b>LOCATION:</b> PORT OF BULADO, GURUJUNGAN CITY</p>	<p><b>SHEET CONTENTS:</b>        AS SHOWN</p>	<p><b>PREPARED BY:</b>        JOHN PAUL L. TINDOC  <small>Public Services Assistant</small></p>	<p><b>CHECKED BY:</b>        JOEL S. ARENA  <small>Principal Engineer A</small></p>	<p><b>RECOMMENDING APPROVAL:</b>        HUBERT P. MITMIT  <small>ESD Manager</small></p>	<p><b>APPROVED:</b>        SARAH R. MIJARES  <small>Port Manager</small></p>	<p><b>SHEET NO.:</b>        2        33</p>
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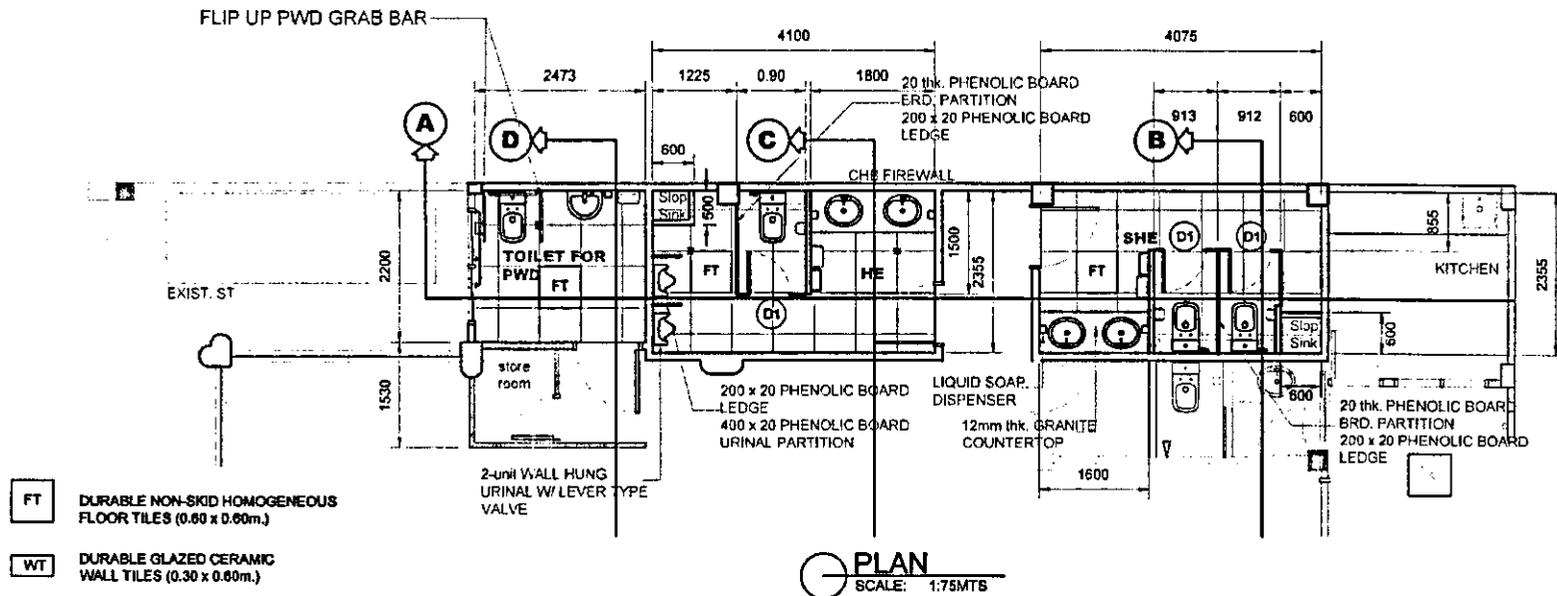


REFLECTED CEILING PLAN  
SCALE: 1:75MTS

<p>PHILIPPINE PORTS AUTHORITY PHO - Negros Oriental Siquay</p>	<p>PROJECT TITLE: RESTORATION OF DAMAGED CONCRETE PAVEMENT, COVERED WALKWAY, PASSENGER TERMINAL BUILDING, SCOURED PORTION OF SEAWALL &amp; REPAINTING OF SECURITY FENCE REPAIR OF Port of Balabado</p>	<p>SHEET CONTENTS: AS SHOWN</p>	<p>PREPARED BY: JOHN PAUL L. TINDOC Public Services Assistant</p>	<p>CHECKED BY: JOEL S. LARENA Principle Engineer A</p>	<p>RECOMMENDING APPROVAL: HUBERT P. MITMIT ESD Manager</p>	<p>APPROVED: SARAH R. MIJARES Port Manager</p>	<p>SHEET NO.: 3 33</p>
	<p>LOCATION: PORT OF BULADO, GUBULINGAN CITY</p>						

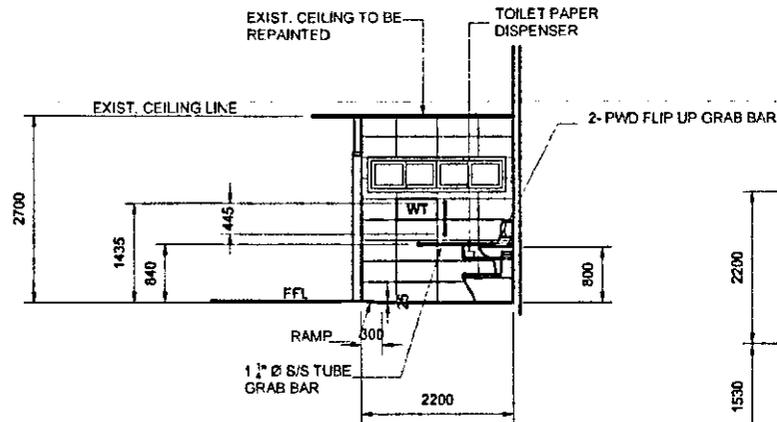


SECT./ELEV. @ A  
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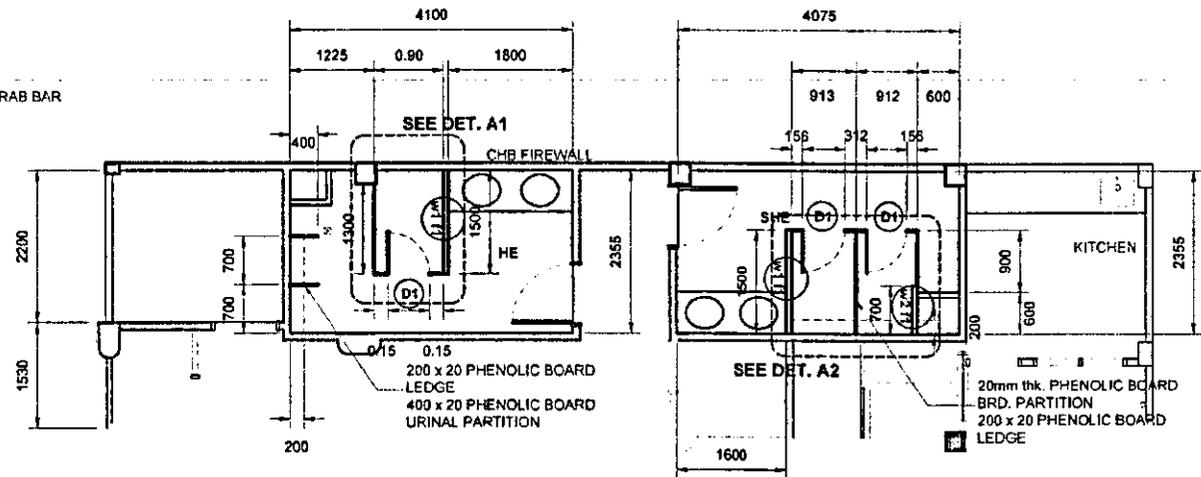


PLAN  
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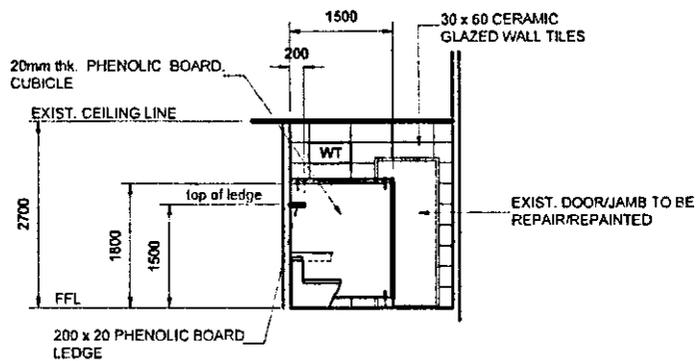
<b>PHILIPPINE PORTS AUTHORITY</b> <small>PWO - Negros Oriental Sector</small>	<b>PROJECT TITLE:</b> RESTORATION OF DAMAGED CONCRETE PAVEMENT, COVERED WALKWAY, PASSENGER TERMINAL BUILDING, SCOURED PORTION OF SEAWALL & REPAIRING OF SECURITY FENCE <small>REPAIR OF - Part of Bulado</small> LOCATION: PORT OF BULADO, GURUJUNGAN CITY	<b>SHEET CONTENTS:</b> AS SHOWN	<b>PREPARED BY:</b> JOHN PAUL TINDOC <small>Public Services Assistant</small>	<b>CHECKED BY:</b> JOEL S. ARENA <small>Principal Engineer A</small>	<b>RECOMMENDING APPROVAL:</b> HUBERT MITMIT <small>ESD Manager</small>	<b>APPROVED:</b> SARAH R. MIJARES <small>Port Manager</small>	<b>SHEET NO.:</b> 4 33



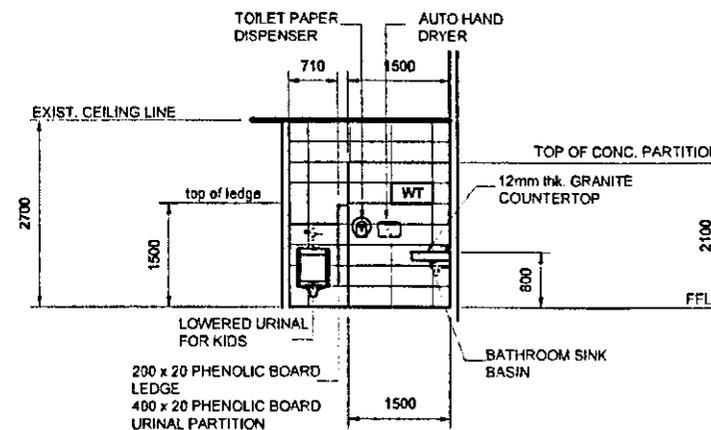
**SECTION @ D**  
1:75 M.



**PARTITION WALL PLAN (20mm thk. PHENOLIC BOARD & 4" CHB)**  
1:75 M.

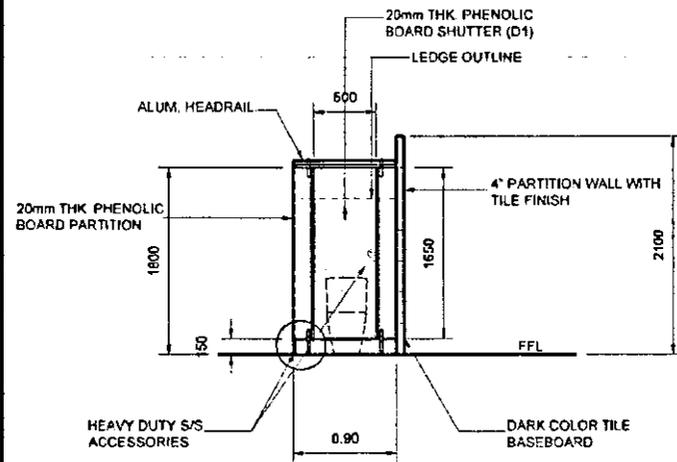


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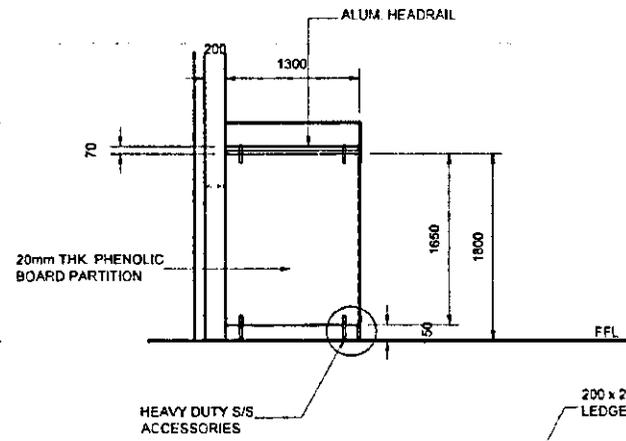


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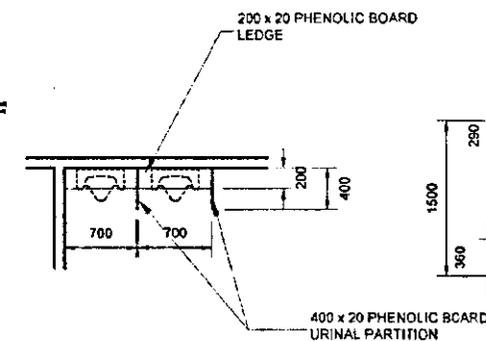
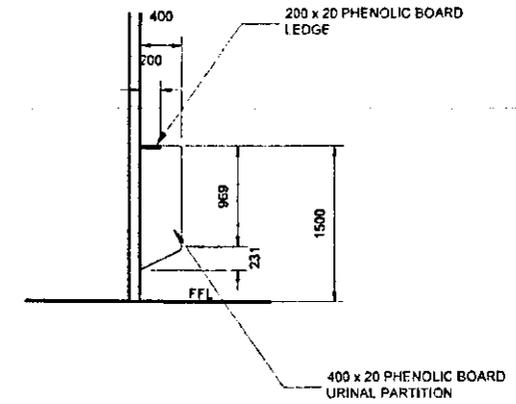
<p>PHILIPPINE PORTS AUTHORITY P.O. - Negros Oriental Siquijor</p>	<p>PROJECT TITLE: RESTORATION OF DAMAGED CONCRETE PAVEMENT, COVERED WALKWAY, PASSENGER TERMINAL BUILDING, SCOURED PORTION OF SEAWALL &amp; REPAINTING OF SECURITY FENCE REPAIR OF a Part of Seaside LOCATION: PORT OF BULADO, GUIHLINGAN CITY</p>	<p>SHEET CONTENTS: AS SHOWN</p>	<p>PREPARED BY: <i>John Paul L. Tindoc</i> JOHN PAUL L. TINDOC Public Services Assistant</p>	<p>CHECKED BY: <i>Joel S. Larena</i> JOEL S. LARENA Principal Engineer A</p>	<p>RECOMMENDING APPROVAL: <i>Hubert P. Mitmit</i> HUBERT P. MITMIT ESD Manager</p>	<p>APPROVED: <i>Sarah M. Mijares</i> SARAH M. MIJARES Port Manager</p>	<p>SHEET NO.: 5 33</p>
			<p>PHILIPPINE PORTS AUTHORITY</p>				



elev. @ E

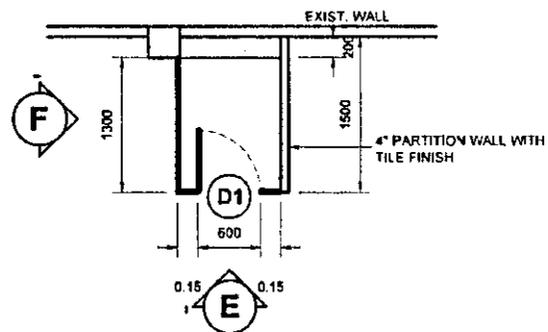


elev. @ F



urinal partition

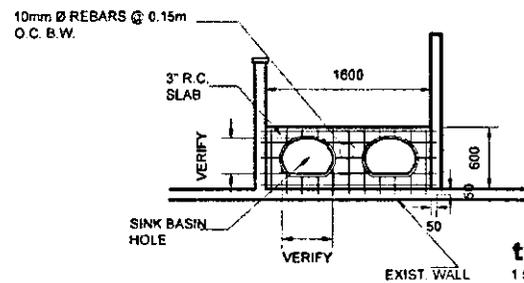
1.50 M.



toilet cubicle

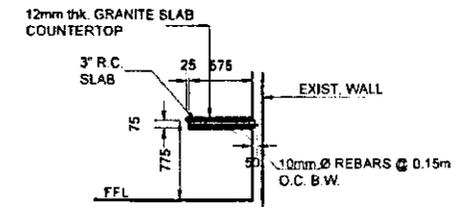
DET. A1

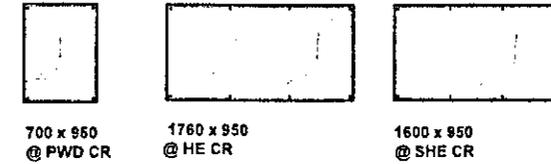
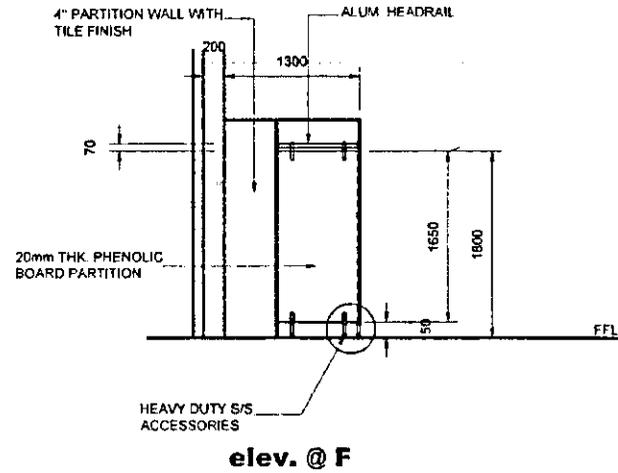
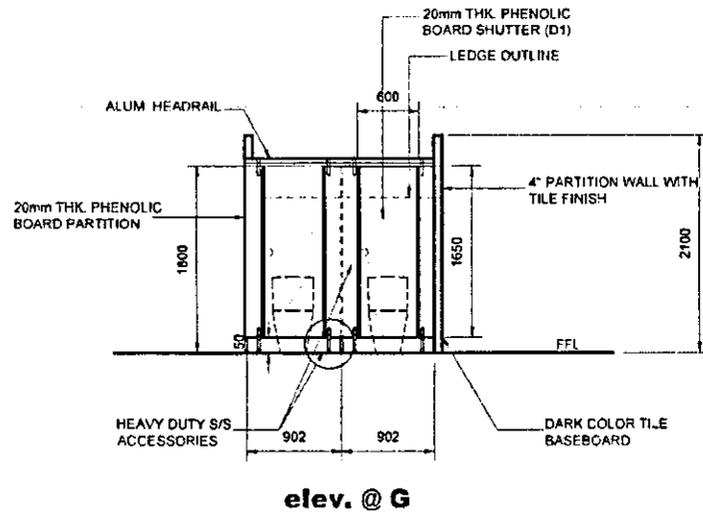
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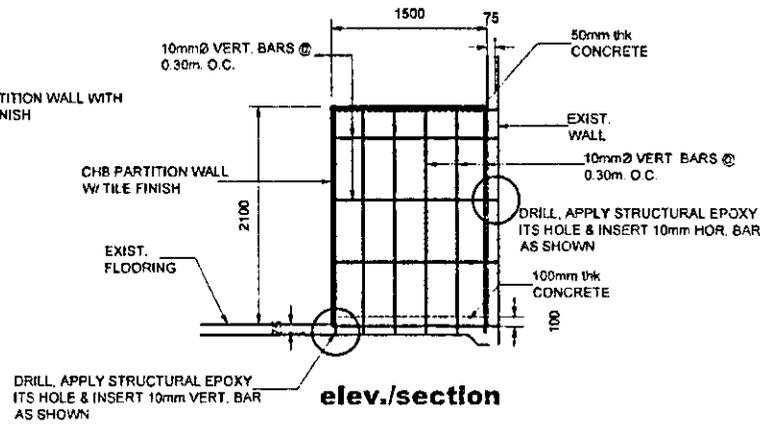
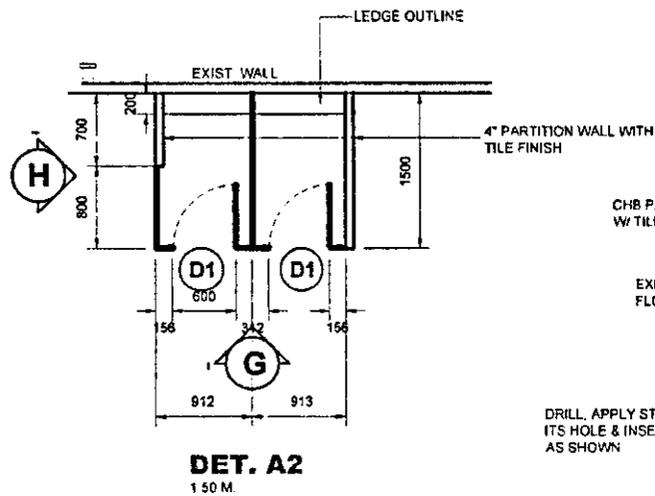
typ. rc countertop det.

1.50 M.

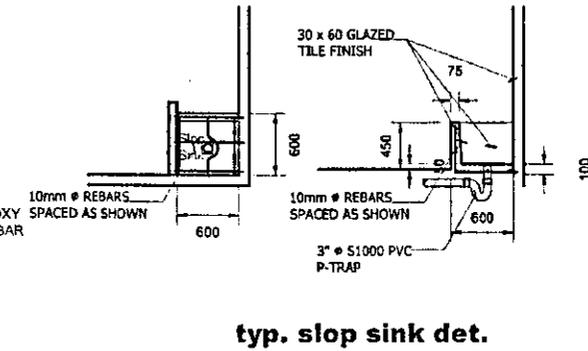


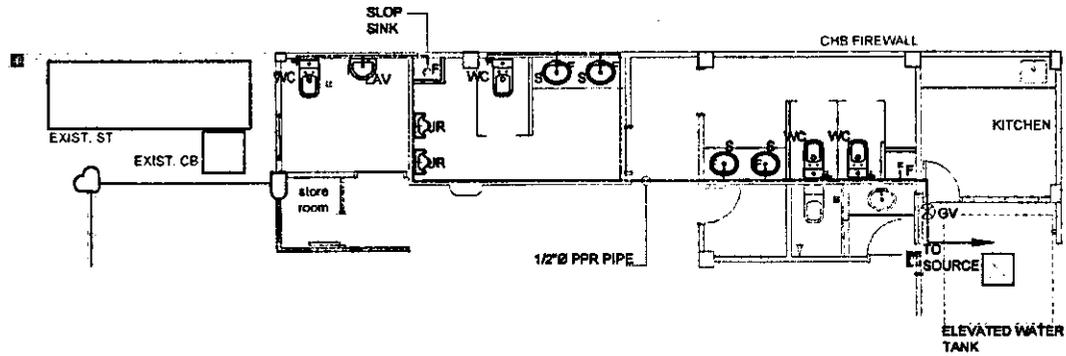


**vanity mirrors**



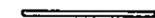
**typ. chb partition wall det.**



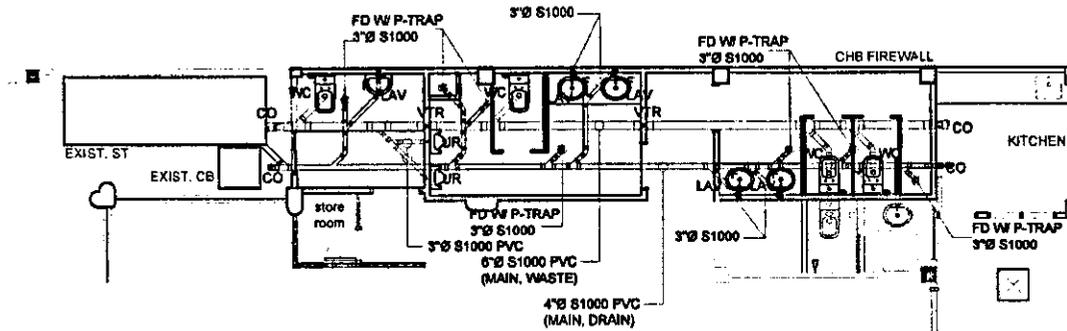


**WATER LINE LAY-OUT**  
175 M.

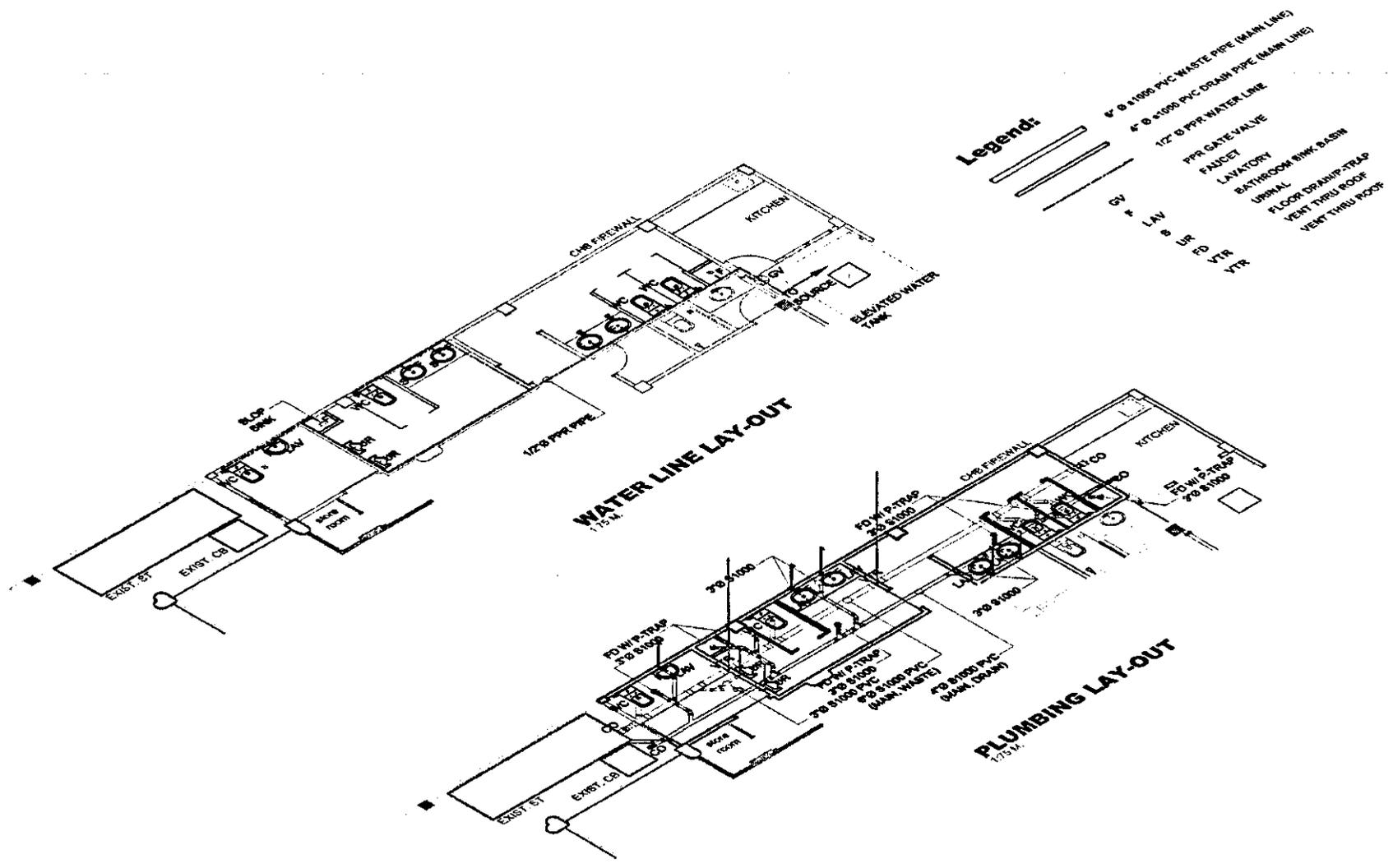
**Legend:**

-  6" Ø x1000 PVC WASTE PIPE (MAIN LINE)
-  4" Ø x1000 PVC DRAIN PIPE (MAIN LINE)
-  1/2" Ø PPR WATER LINE

- GV PPR GATE VALVE
- F FAUCET
- LAV LAVATORY
- S BATHROOM SINK BASIN
- UR URINAL
- FD FLOOR DRAIN/P-TRAP
- VTR VENT THRU ROOF



**PLUMBING LAY-OUT**  
175 M.



- Legend:**
- 4" Ø 11000 PVC WASTE PIPE (MAIN LINE)
  - 4" Ø 4000 PVC DRAIN PIPE (MAIN LINE)
  - 1/2" Ø PPR WATER LINE
  - PPR GATE VALVE
  - FAUCET
  - LAVATORY
  - BATHROOM SINK BASIN
  - URINAL
  - FLOOR DRAIN TRAP
  - VENT THRU ROOF
  - VENT THRU ROOF

**ISOMETRIC**

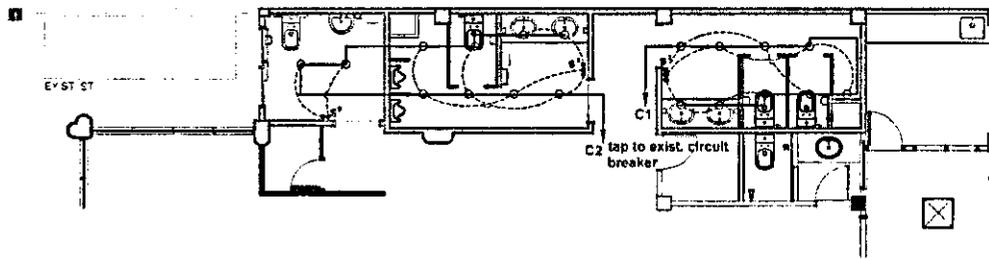
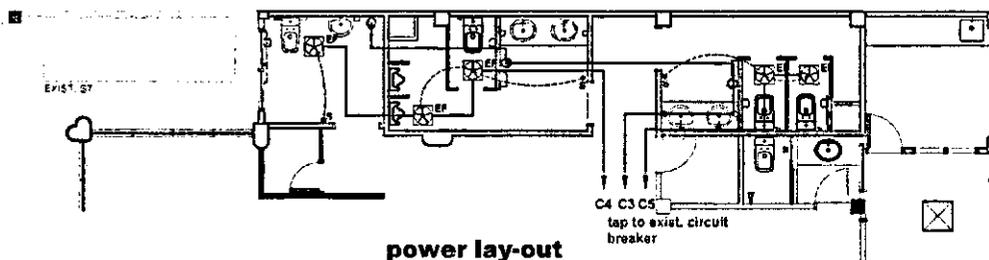
<p><b>PHILIPPINE PORTS AUTHORITY</b>  <small>PAO - Negros Oriental</small>  <small>Sevier</small></p>	<p><b>PROJECT TITLE:</b>          RESTORATION OF DAMAGED CONCRETE PAVEMENT, COVERED WALKWAY, PASSENGER TERMINAL BUILDING, SCOURED PORTION OF SEAWALL &amp; REPAIRING OF SECURITY FENCE  <b>REPAIR OF Part of Bulado</b>  <b>LOCATION:</b> PORT OF BULADO, GUIHULNGAN CITY</p>	<p><b>SHEET CONTENTS:</b>          AS SHOWN</p>	<p><b>PREPARED BY:</b>    <b>JOHN PAUL L. TINDOC</b>  <small>Public Services Assistant</small></p>	<p><b>CHECKED BY:</b>    <b>JOEL S. ARENA</b>  <small>Principal Engineer A</small></p>	<p><b>RECOMMENDING APPROVAL:</b>    <b>HUBERT P. MITMIT</b>  <small>ESD Manager</small></p>	<p><b>APPROVED:</b>    <b>SARAH R. MIJARES</b>  <small>Port Manager</small></p>	<p><b>SHEET NO.:</b>    <b>9</b>  <b>33</b></p>
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**SCHEDULE OF LOADS**

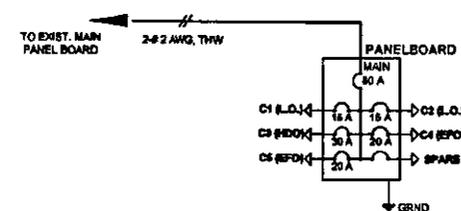
PANEL BOARD	CCT NO.	DESCRIPTION/ATTACH COMPUTATION	VA	VOLTS	POLE/PHASE	AMPS	PROTECTION (ACB)	No. SIZE & TYPE OF WIRE	SIZE & TYPE OF TUBING/ MOLDING
PB	C1	8 - 14 W. LED BULB	128	220	250 - 00	0.57	15 AT	2 - 2.5 mm <sup>2</sup> THHN, # 14	Ø 122 Ø FLEXITUBE
	C2	10 - 14 W. LED BULB	140	220	250 - 00	0.63	15 AT	2 - 2.5 mm <sup>2</sup> THHN, # 14	Ø 122 Ø FLEXITUBE
	C3	3 - 2500W. C.O. (EFO)	7500	220	250 - 00	34.09	30 AT	2 - 2.5 mm <sup>2</sup> THHN, # 10 AWG	Ø 342 Ø FLEXITUBE
	C4	3 - 100W. C.O. (EFO)	300	220	250 - 00	1.36	20 AT	2 - 2.5 mm <sup>2</sup> THHN, # 12	Ø 342 Ø FLEXITUBE
	C5	2 - 100W. C.O. (EFO)	200	220	250 - 00	0.90	20 AT	2 - 2.5 mm <sup>2</sup> THHN, # 12	Ø 342 Ø FLEXITUBE
	SPARE								
	MAN		8266	220	250 - 00	37.24	50 AT	2 - 14 mm <sup>2</sup> THHN, # 6 AWG	1" Ø RSC PIPE

**LEGEND:**

- HDO HAND DRYER OUTLET
- EFO EXHAUST FAN OUTLET
- ☐ PANEL BOARD
- CIRCUIT HOMERUN
- ⊗ HAND DRYER OUTLET (HD) 200 W DUPLEX CONV. OUTLET
- ⊙ 200 W DUPLEX CONVENIENCE OUTLET
- ⊗ EFO EXHAUST FAN OUTLET (EFO) 100 W SINGLE CONV. OUTLET

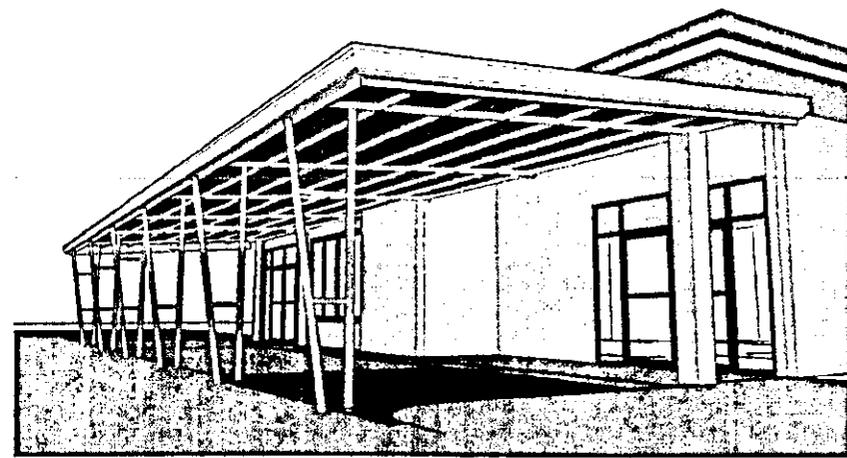
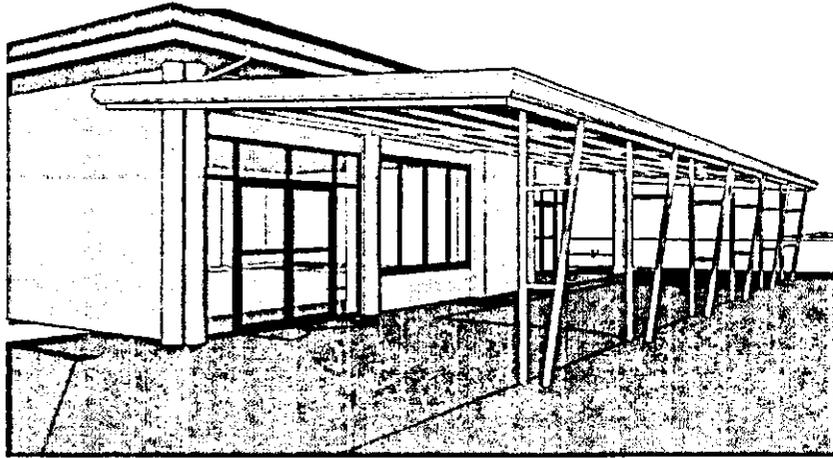


**SINGLE LINE DIAGRAM**

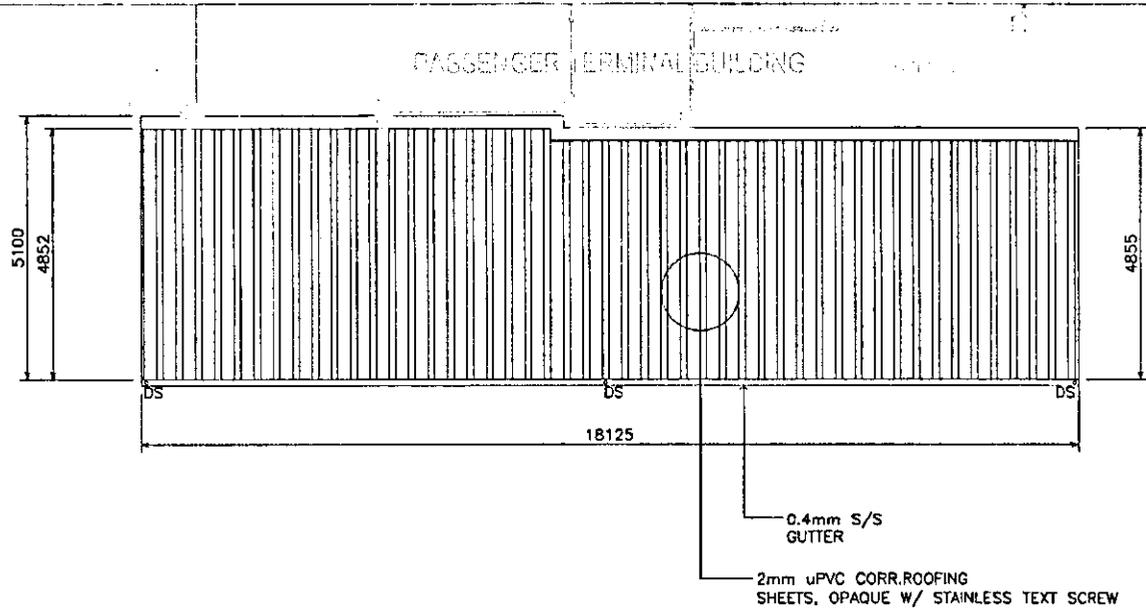


**ELECTRICAL PLAN**

<p><b>PHILIPPINE PORTS AUTHORITY</b> PMO - Negros Oriental Sejor</p>	<p><b>PROJECT TITLE:</b> RESTORATION OF DAMAGED CONCRETE PAVEMENT, COVERED WALKWAY, PASSENGER TERMINAL BUILDING, SCOURED PORTION OF SEAWALL &amp; REPAIRS OF SECURITY FENCE REPAIR OF Part of Building LOCATION: PORT OF BULADO, GUIULINGAN CITY</p>	<p><b>SHEET CONTENTS:</b> AS SHOWN</p>	<p><b>PREPARED BY:</b> JOHN PAUL TINDOC Public Services Assistant</p>	<p><b>CHECKED BY:</b> JOEL S. LARENA Principal Engineer A</p>	<p><b>RECOMMENDING APPROVAL:</b> HUBERT MITMIT ESD Manager</p>	<p><b>APPROVED:</b> SARAH B. MIJARES Port Manager</p>	<p><b>SHEET NO.:</b> 10 33</p>



**PERSPECTIVE**



**ROOF PLAN**  
SCALE: 1:100MTS



**PROJECT TITLE:**  
RESTORATION OF DAMAGED CONCRETE PAVEMENT, COVERED WALKWAY,  
PASSENGER TERMINAL BUILDING, SCoured PORTION OF SEAWALL &  
REPAIRING OF SECURITY FENCE  
**REPAIR OF - Part of Bulado**  
**LOCATION:** PORT OF BULADO, GUIHULNGAN CITY

**SHEET CONTENTS:**  
AS SHOWN

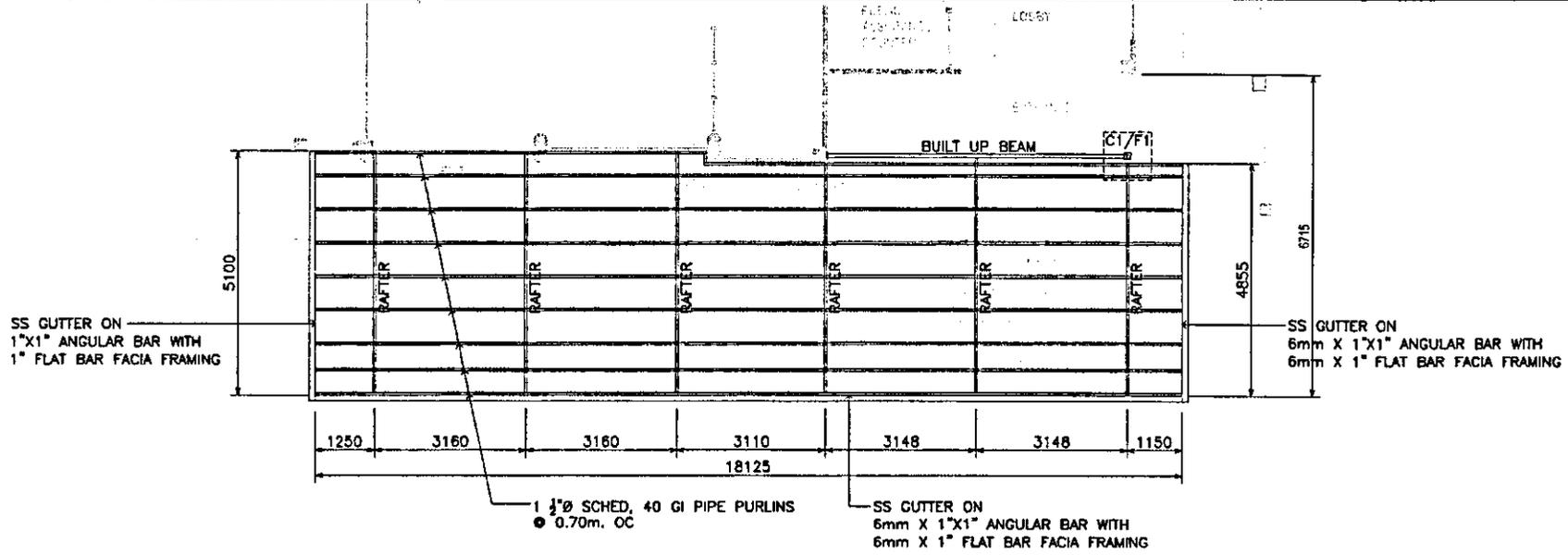
**PREPARED BY:**  
*[Signature]*  
**JOHN PAUL L. TINDOC**  
Public Services Assistant

**CHECKED BY:**  
*[Signature]*  
**JOEL S. LARENA**  
Principal Engineer A

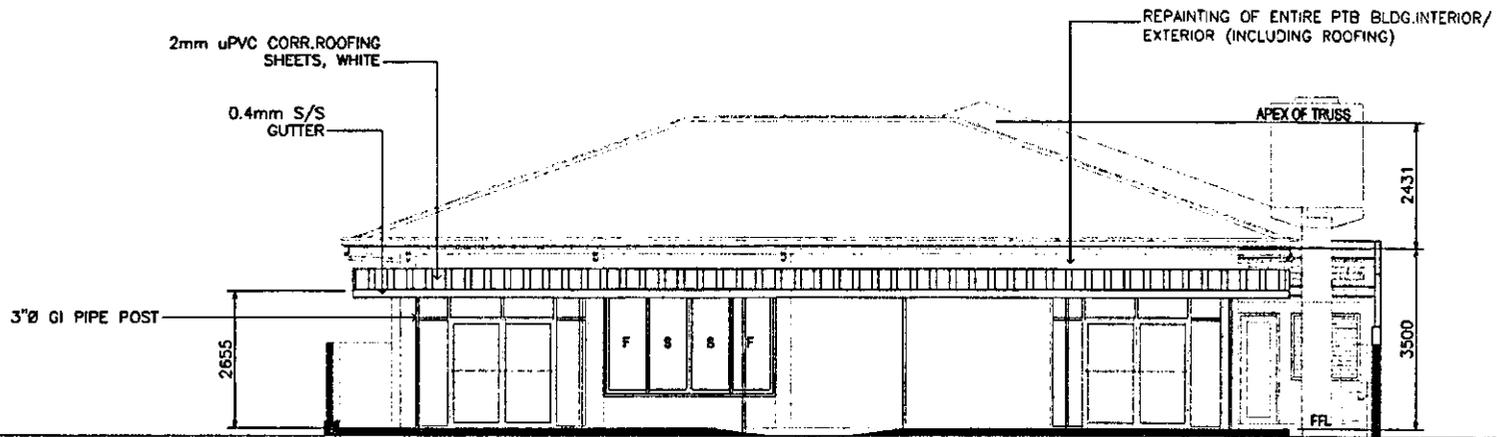
**RECOMMENDING APPROVAL:**  
*[Signature]*  
**HUBERT T. MITMIT**  
ESD Manager

**APPROVED:**  
*[Signature]*  
**SARAH B. MDARES**  
Pop Manager

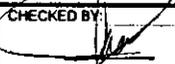
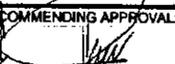
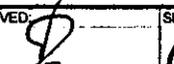
**SHEET NO.:**  
**11**  
**33**

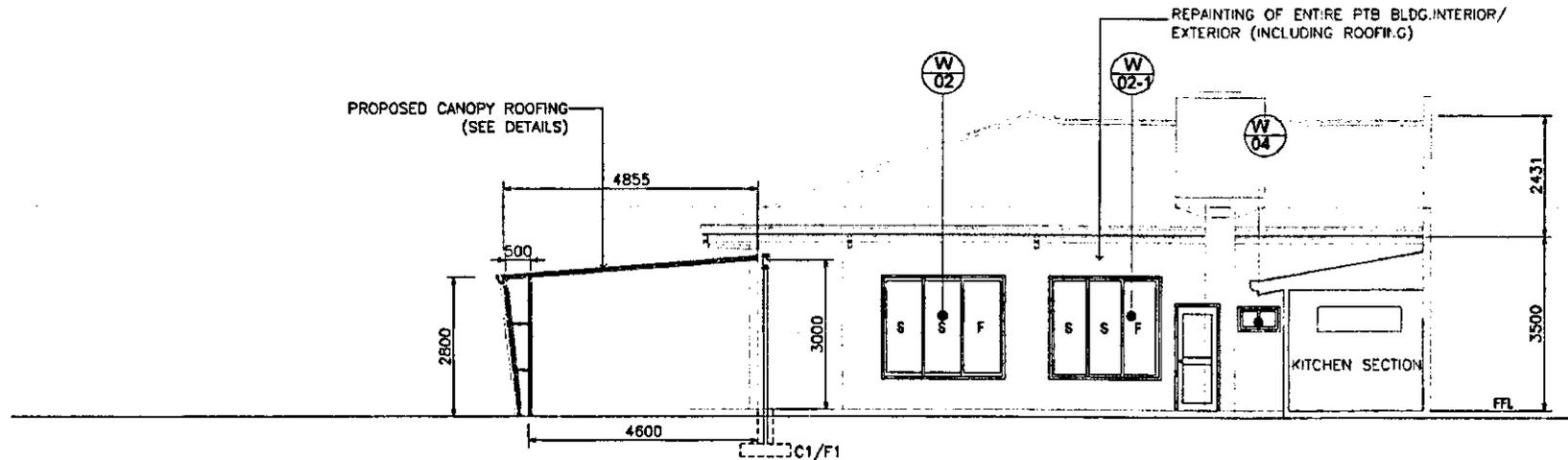


**ROOF FRAMING PLAN**  
SCALE: 1:100MTS

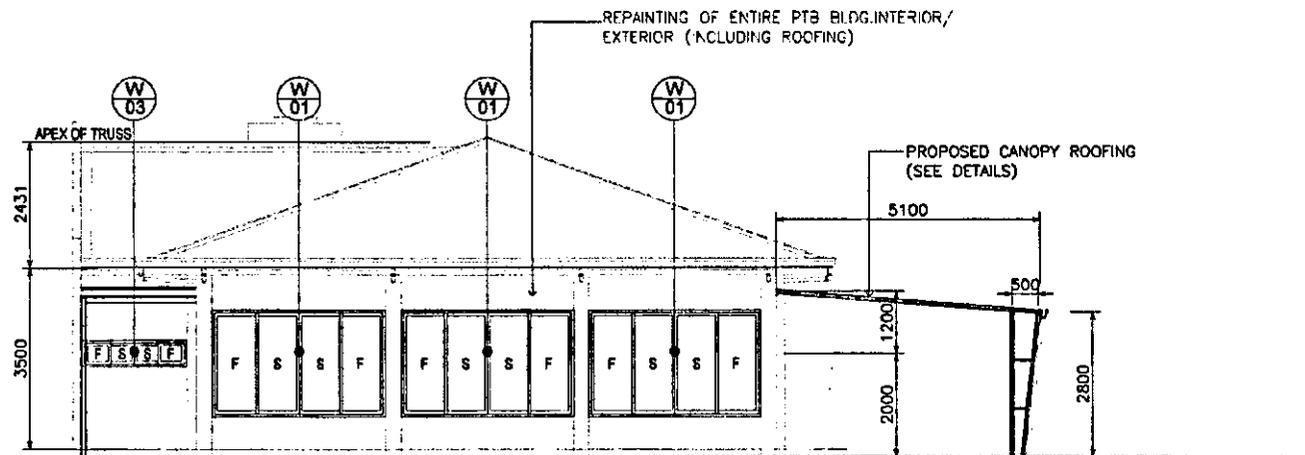


**FRONT ELEVATION**  
SCALE: 1:100MTS

 <b>PHILIPPINE PORTS AUTHORITY</b> <small>PHO - Negros Oriental</small> <small>Squijar</small>	<b>PROJECT TITLE:</b> RESTORATION OF DAMAGED CONCRETE PAVEMENT, COVERED WALKWAY, PASSENGER TERMINAL BUILDING, SCOURED PORTION OF SEAWALL & REPAIRING OF SECURITY FENCE REPAIR OF Port of Bulado LOCATION: PORT OF BULADO, GUIHULNGAN CITY	<b>SHEET CONTENTS:</b> AS SHOWN	<b>PREPARED BY:</b>  <b>JOHN PAUL L. TINDOC</b> <small>Public Services Assistant</small>	<b>CHECKED BY:</b>  <b>JOEL S. LARENA</b> <small>Principal Engineer A</small>	<b>RECOMMENDING APPROVAL:</b>  <b>HUBERT P. MITMIT</b> <small>ESD Manager</small>	<b>APPROVED:</b>  <b>SARAH R. MIJARES</b> <small>Port Manager</small>	<b>SHEET NO.:</b> 

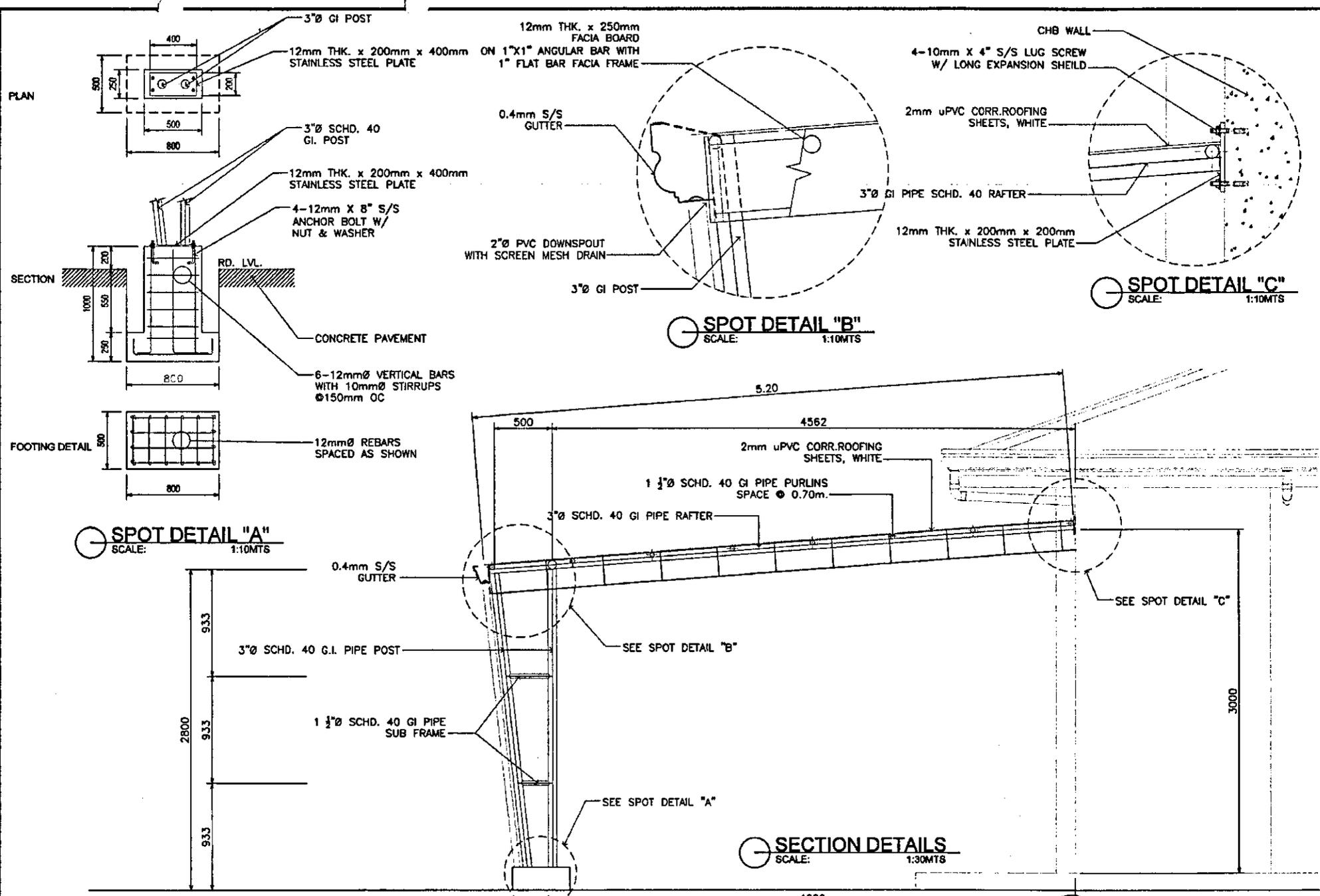


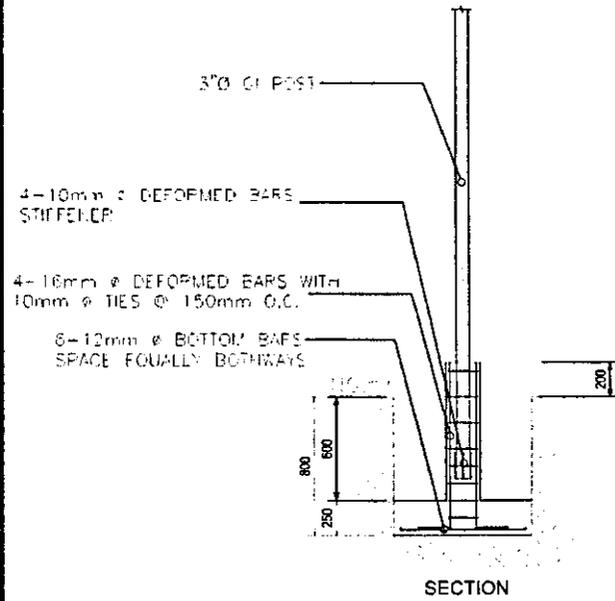
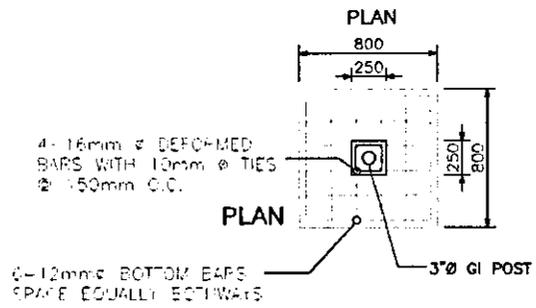
**RIGHT ELEVATION**  
SCALE: 1:100MTS



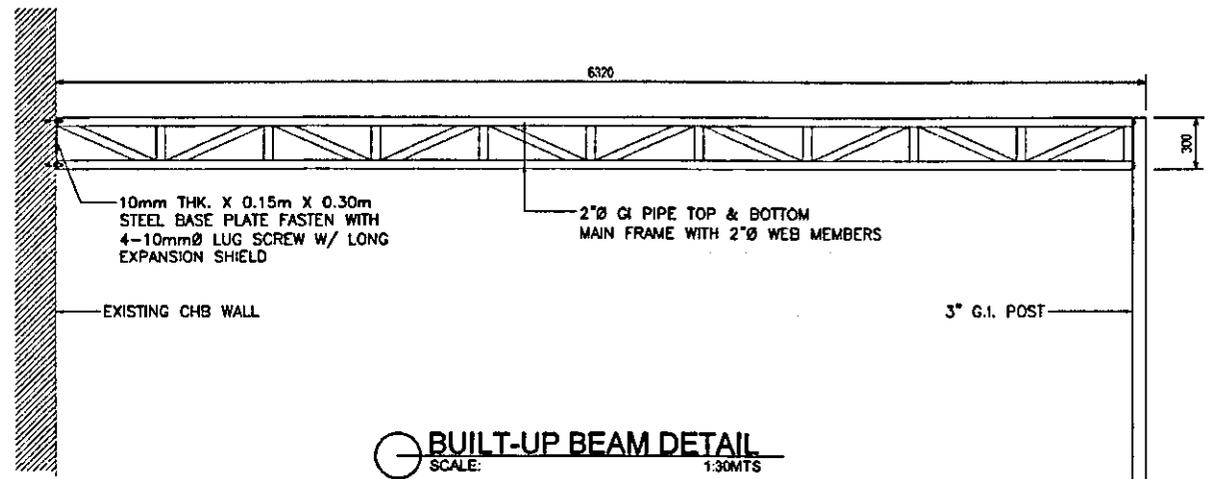
**LEFT ELEVATION**  
SCALE: 1:100MTS

<p><b>PHILIPPINE PORTS AUTHORITY</b> PFA - Negros Oriental Siquijor</p>	<p><b>PROJECT TITLE:</b> RESTORATION OF DAMAGED CONCRETE PAVEMENT, COVERED WALKWAY, PASSENGER TERMINAL BUILDING, SCOURED PORTION OF SEAWALL &amp; REPAINTING OF SECURITY FENCE</p>	<p><b>SHEET CONTENTS:</b> AS SHOWN</p>	<p><b>PREPARED BY:</b> JOHN PAUL L. TINDOC Public Services Assistant</p>	<p><b>CHECKED BY:</b> JOEL S. LARENA Principal Engineer A</p>	<p><b>RECOMMENDING APPROVAL:</b> HUBERT P. MITMIT ESD Manager</p>	<p><b>APPROVED:</b> SARAH R. MIJARES Port Manager</p>	<p><b>SHEET NO.:</b> 13 33</p>
	<p><b>REPAIR OF - Part of Bulado</b> LOCATION: PORT OF BULADO, GUIHULNGAN CITY</p>						

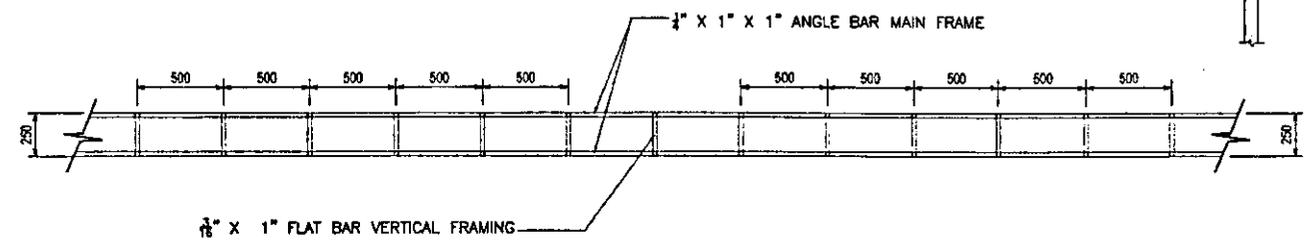




**C1/F1 DETAIL**  
SCALE: 1:30MTS



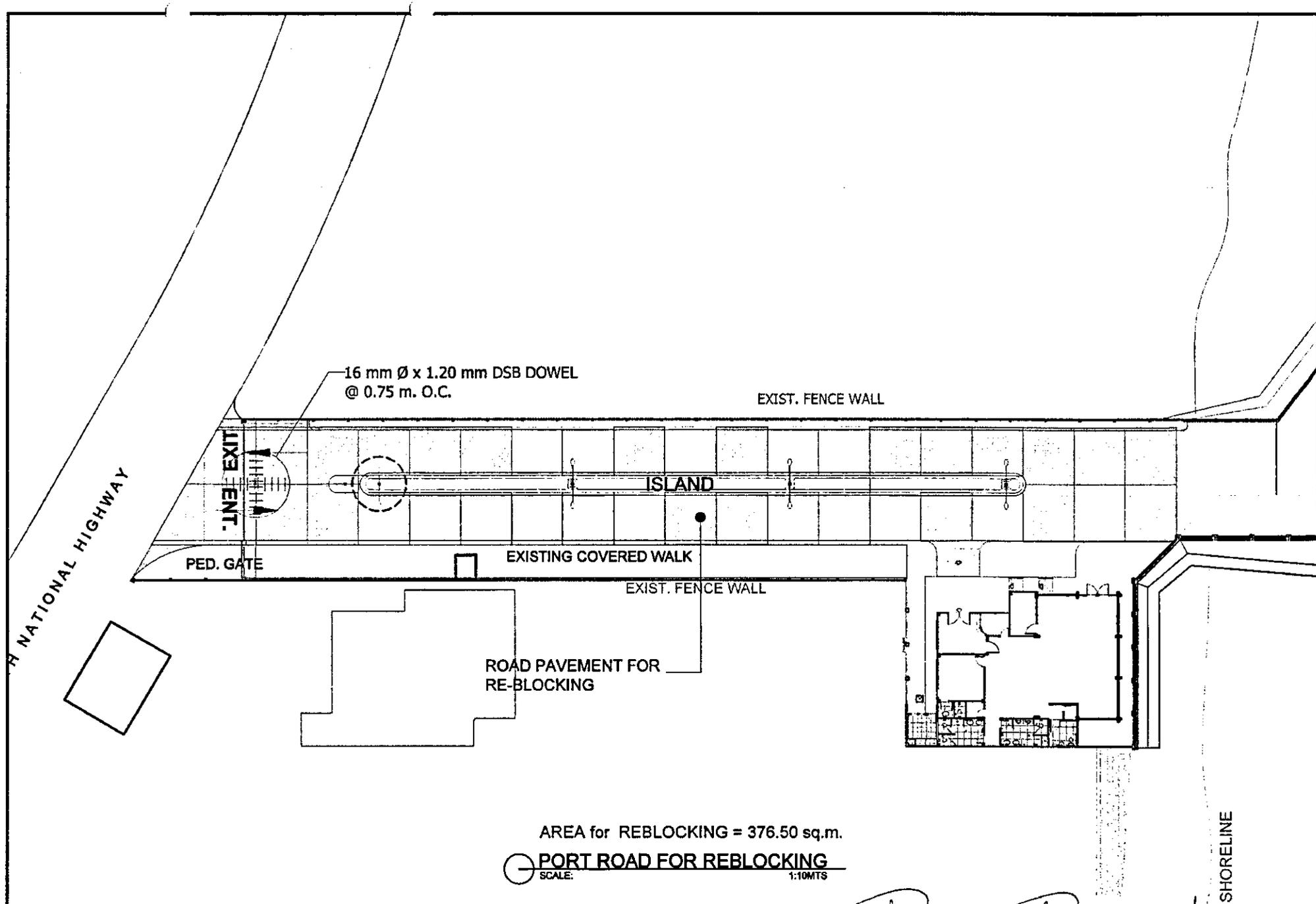
**BUILT-UP BEAM DETAIL**  
SCALE: 1:30MTS

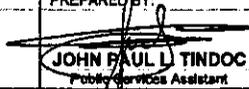


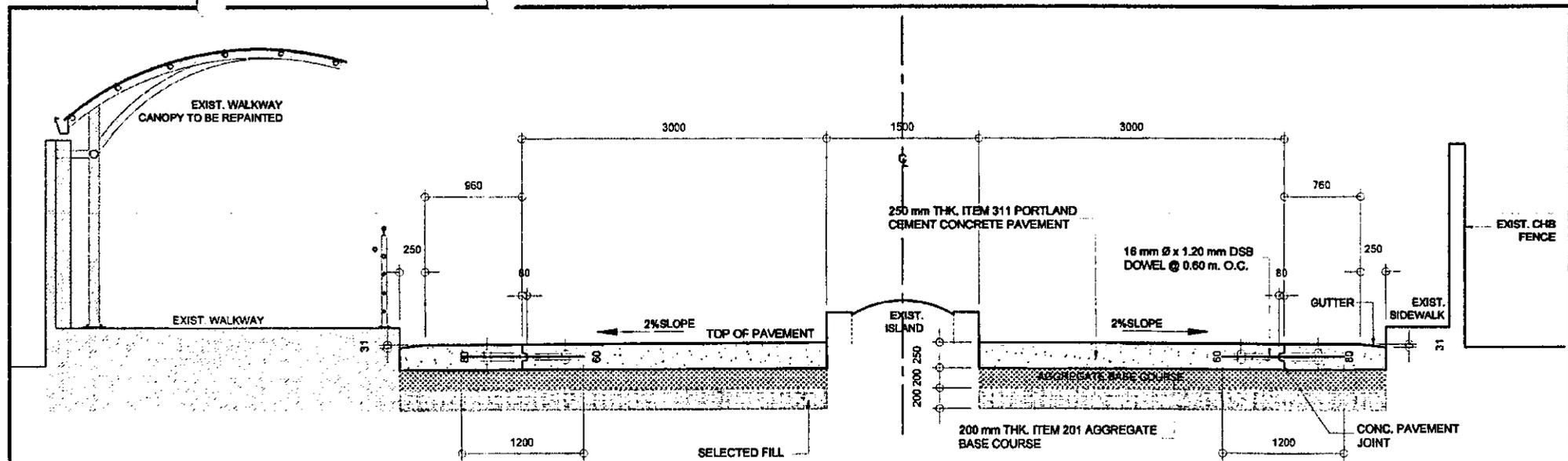
**FACIA FRAME DETAIL**  
SCALE: 1:30MTS

- NOTE:
1. ALL GI. PIPES AND OTHER METALLIC MATERIALS SHALL BE APPLIED WITH RUST CONVERTER TO ELIMINATE RUST.
  2. ALL GI. PIPES AND OTHER METALLIC MATERIALS SHALL BE PAINTED WITH 1 COAT EPOXY PRIMER AND 2 COATS OF EPOXY TOP COAT.
  3. STAINLESS GUTTER SHALL BE PAINTED WITH 1 COAT ZINC CHROMATE YELLOW & 2 COATS OF EPOXY TOP COAT (INTERIOR & EXTERIOR)

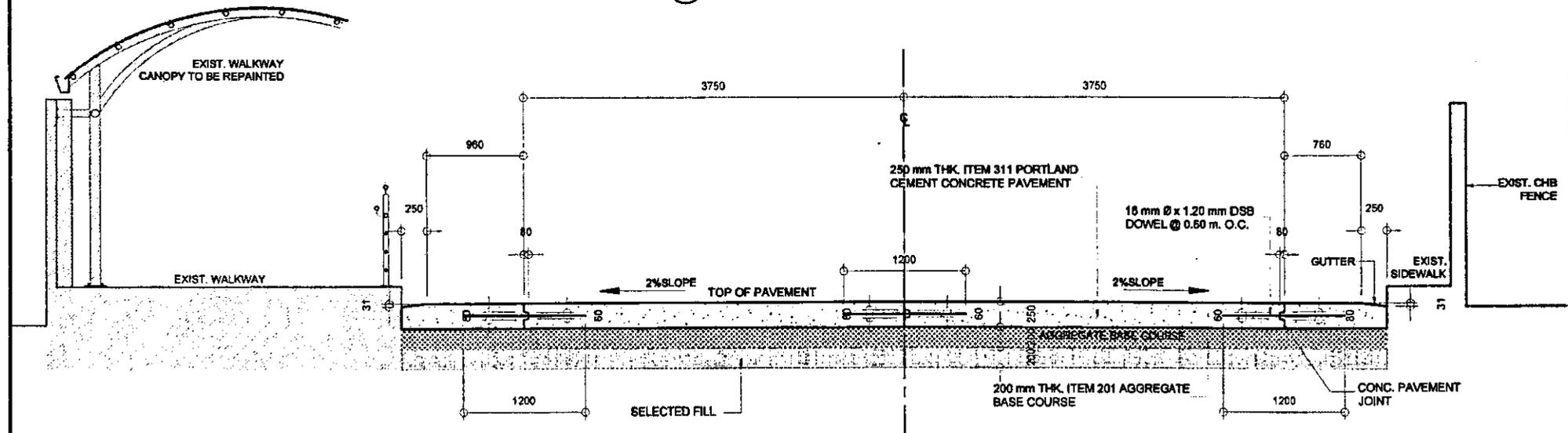
<p>PHILIPPINE PORTS AUTHORITY</p> <p>PHO - Negros Oriental</p>	<p>PROJECT TITLE:</p> <p>RESTORATION OF DAMAGED CONCRETE PAVEMENT, COVERED WALKWAY, PASSENGER TERMINAL BUILDING, SCOURED PORTION OF SEAWALL &amp; REPAIRING OF SECURITY FENCE</p> <p>REPAIR OF a Part of Bulado</p> <p>LOCATION: PORT OF BULADO, GUIHULNGAN CITY</p>	<p>SHEET CONTENTS:</p> <p>AS SHOWN</p>	<p>PREPARED BY:</p> <p>JOHN PAUL L. TINDOC Public Services Assistant</p>	<p>CHECKED BY:</p> <p>JOEL S. LARENA Principal Engineer A</p>	<p>RECOMMENDING APPROVAL:</p> <p>HUBERT P. MITMIT ESD Manager</p>	<p>APPROVED:</p> <p>SARAH R. MIJARES Port Manager</p>	<p>SHEET NO.:</p> <p>15 33</p>
	<p>PHILIPPINE PORTS AUTHORITY</p>						



 <p><b>PHILIPPINE PORTS AUTHORITY</b>  <small>PHC - Negros Oriental        Siquijor</small></p>	<p><b>PROJECT TITLE:</b>        RESTORATION OF DAMAGED CONCRETE PAVEMENT, COVERED WALKWAY,        PASSENGER TERMINAL BUILDING, SCOURED PORTION OF SEAWALL &amp;        REPAINTING OF SECURITY FENCE        REPAIR OF Port of Bulado  <b>LOCATION:</b> PORT OF BULADO, GUIBELINGAN CITY</p>	<p><b>SHEET CONTENTS:</b>        AS SHOWN</p>	<p><b>PREPARED BY:</b>    <b>JOHN PAUL L. TINDOC</b>  <small>Public Services Assistant</small></p>	<p><b>CHECKED BY:</b>    <b>JOEL S. LARENA</b>  <small>Principal Engineer A</small></p>	<p><b>RECOMMENDING APPROVAL:</b>    <b>HUBERT P. MITMIT</b>  <small>ESD Manager</small></p>	<p><b>APPROVED:</b>    <b>SARAH B. MIJARES</b>  <small>Port Manager</small></p>	<p><b>SHEET NO.:</b>  </p>
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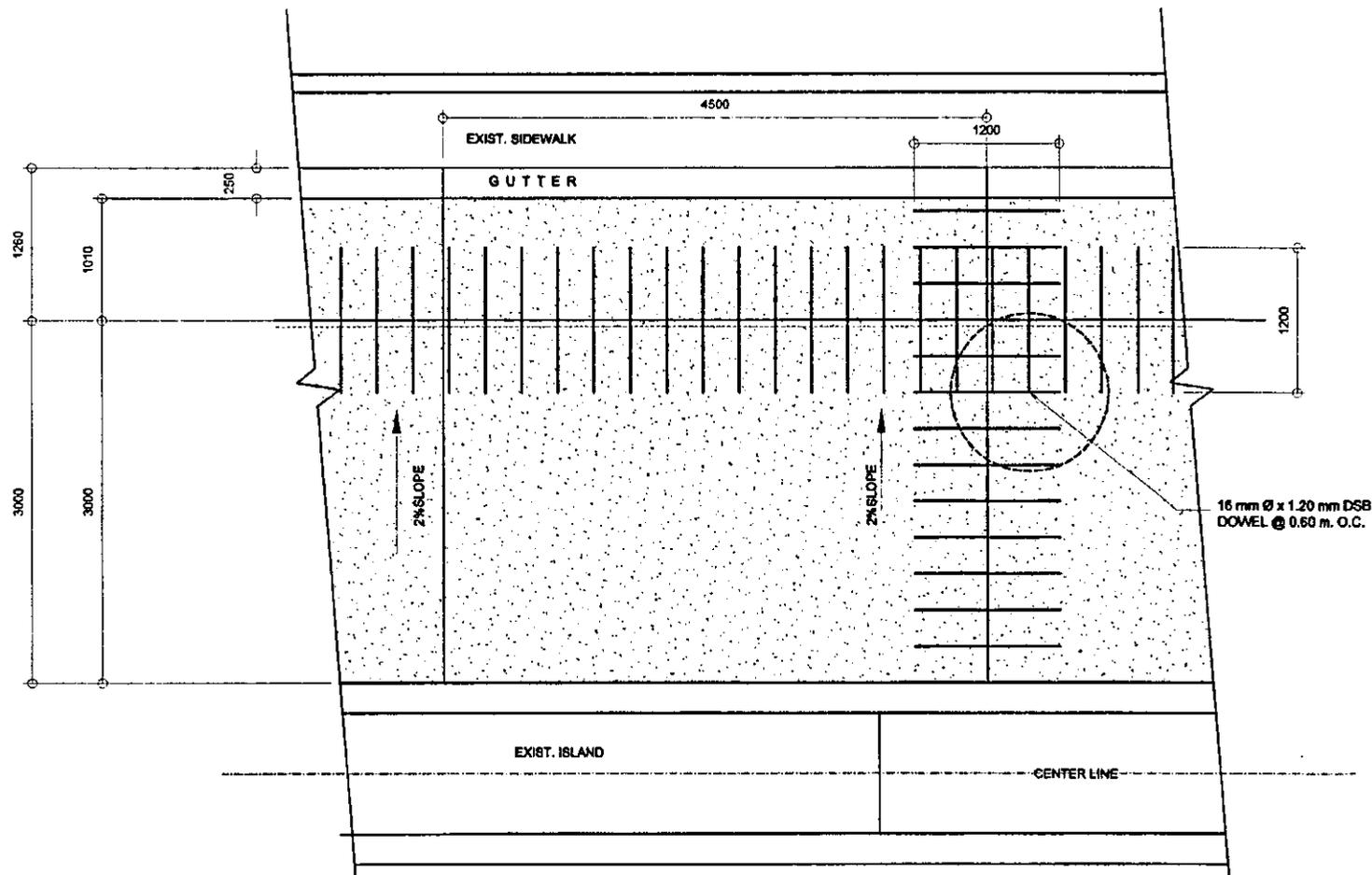


**TYPICAL ROAD SECTION @ ISLAND PORTION**  
SCALE: 1:40MTS



**TYPICAL ROAD SECTION @ ENTRANCE AREA**  
SCALE: 1:40MTS

<p><b>PHILIPPINE PORTS AUTHORITY</b> 740 - Negros Oriental Siquijor</p>	<p><b>PROJECT TITLE:</b> RESTORATION OF DAMAGED CONCRETE PAVEMENT, COVERED WALKWAY, PASSENGER TERMINAL BUILDING, SCURED PORTION OF SEAWALL &amp; REPAIRING OF SECURITY FENCE REPAIR OF Port of Bulado</p>	<p><b>SHEET CONTENTS:</b> AS SHOWN</p>	<p><b>PREPARED BY:</b> JOHN PAUL L. TINDOC Public Services Assistant</p>	<p><b>CHECKED BY:</b> JOEL S. LARENA Principal Engineer A</p>	<p><b>RECOMMENDING APPROVAL:</b> HUBERT F. MITMIT ESD Manager</p>	<p><b>APPROVED:</b> SARAH R. MUJARES Port Manager</p>	<p><b>SHEET NO.:</b> 17 33</p>
	<p><b>LOCATION:</b> PORT OF BULADO, GUBHULGAN CITY</p>						



**ROAD PAVEMENT PLAN**  
SCALE: 1:40MTS

<p><b>PHILIPPINE PORTS AUTHORITY</b> PWA - Negros Oriental Siquijor</p>	<p><b>PROJECT TITLE:</b> RESTORATION OF DAMAGED CONCRETE PAVEMENT, COVERED WALKWAY, PASSENGER TERMINAL BUILDING, SCOURED PORTION OF SEAWALL &amp; REPAINTING OF SECURITY FENCE REPAIR OF Port of Butado</p>	<p><b>SHEET CONTENTS:</b> AS SHOWN</p>	<p><b>PREPARED BY:</b> <i>John Paul Tindoc</i> JOHN PAUL TINDOC Public Services Assistant</p>	<p><b>CHECKED BY:</b> <i>Joel S. Larena</i> JOEL S. LARENA Principal Engineer A</p>	<p><b>RECOMMENDING APPROVAL:</b> <i>Hubert P. Mitmit</i> HUBERT P. MITMIT ESD Manager</p>	<p><b>APPROVED:</b> <i>Sarah R. Mijares</i> SARAH R. MIJARES Port Manager</p>	<p><b>SHEET NO.:</b> 18 33</p>
	<p>LOCATION: PORT OF BUTADO, GUIHULINGAN CITY</p>						

**PROJECT TITLE:**  
 RESTORATION OF DAMAGED CONCRETE PAVEMENT, COVERED WALKWAY, PASSENGER TERMINAL BUILDING, SCOURED PORTION OF SEAWALL & REPAIR OF A Part of Seawall  
**LOCATION:** PORT OF BULOBO, GULHANGAN

**SHEET CONTENTS:**  
 AS SHOWN

**PREPARED BY:**  
 JOHN PAUL L. TINDOC  
 Civil Services Assistant

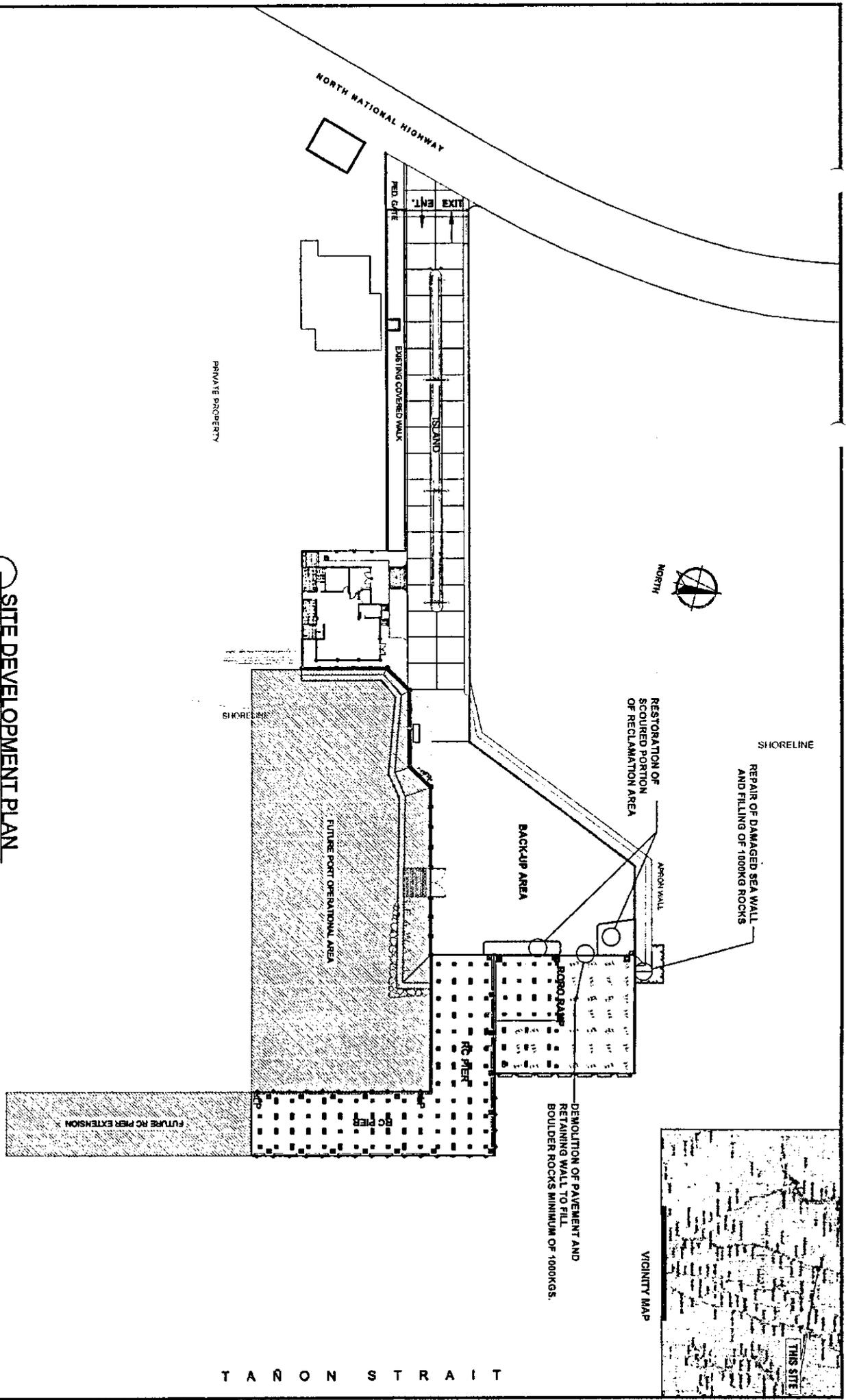
**CHECKED BY:**  
 JOEL S. LARENA  
 Principal Engineer A

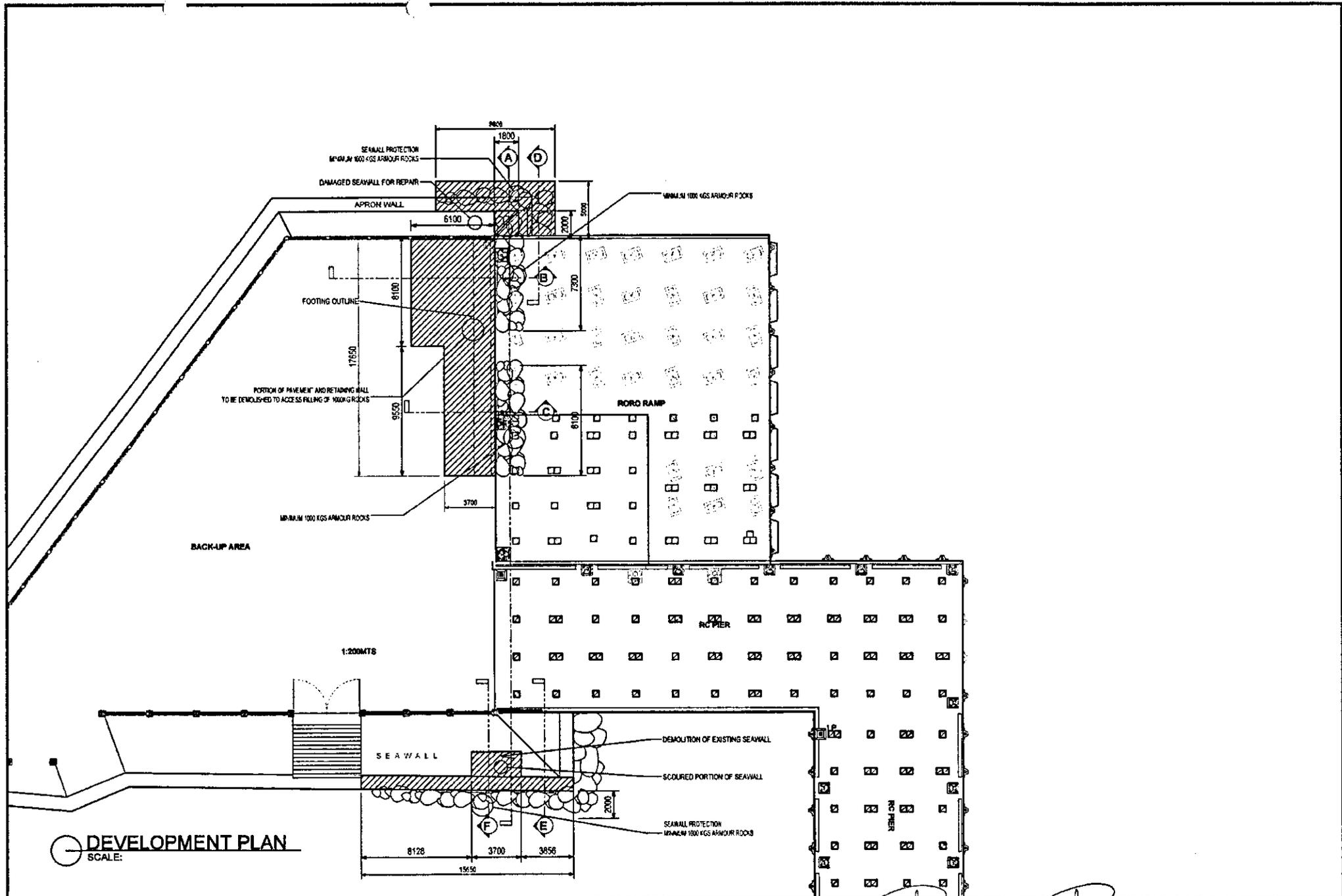
**RECOMMENDING APPROVAL:**  
 HUBERT MITMIT  
 ESD Manager

**APPROVED:**  
 SARAYR. MILARES  
 Port Manager

**SHEET NO.:**  
 19  
 33

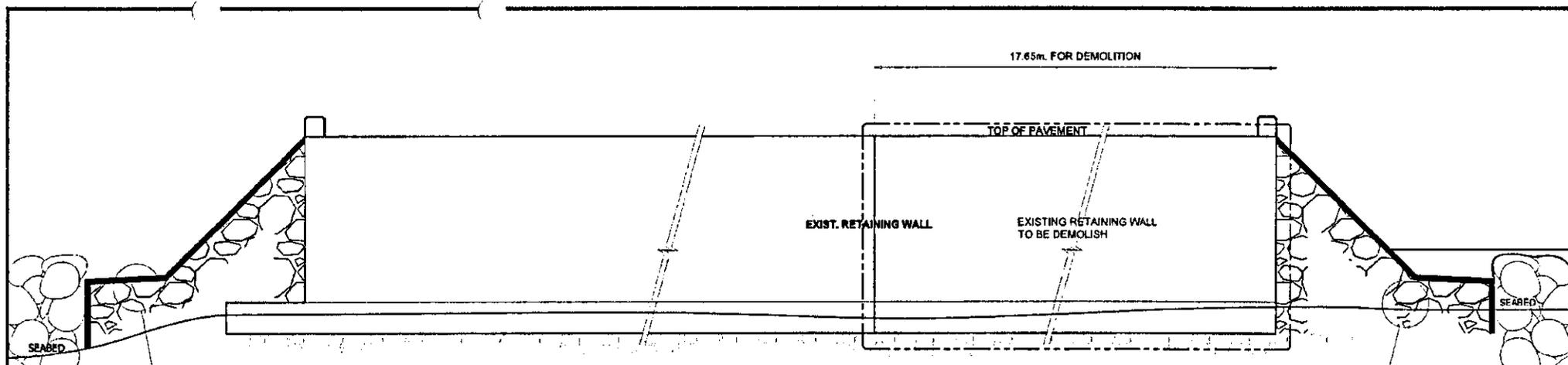
**SITE DEVELOPMENT PLAN**  
 SCALE: 1:200M.TS





**DEVELOPMENT PLAN**  
SCALE:

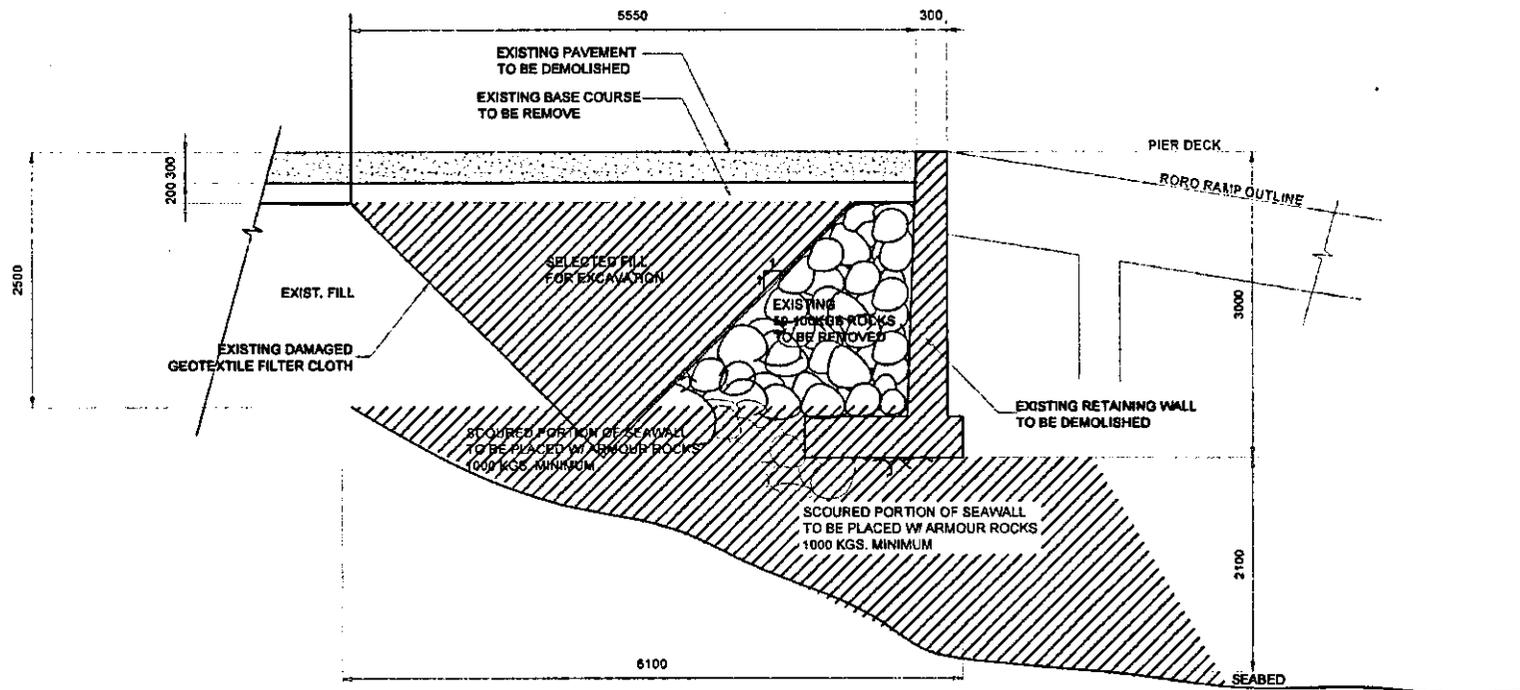
<p><b>PHILIPPINE PORTS AUTHORITY</b> PMO - Negros Oriental Squad</p>	<p><b>PROJECT TITLE:</b> RESTORATION OF DAMAGED CONCRETE PAVEMENT, COVERED WALKWAY, PASSENGER TERMINAL BUILDING, SCOURED PORTION OF SEAWALL &amp; REPAIRING OF SECURITY FENCE <b>REPAIR OF - Part of Bulado</b> <b>LOCATION:</b> PORT OF BULADO, GUILINGGAN</p>	<p><b>SHEET CONTENTS:</b> AS SHOWN</p>	<p><b>PREPARED BY:</b> <i>John Paul L. Tindoc</i> <b>JOHN PAUL L. TINDOC</b> Public Service Assistant</p>	<p><b>CHECKED BY:</b> <i>Joel S. Larena</i> <b>JOEL S. LARENA</b> Principal Engineer A</p>	<p><b>RECOMMENDING APPROVAL:</b> <i>Hubert P. Antmit</i> <b>HUBERT P. ANTMIT</b> ESD Manager</p>	<p><b>APPROVED:</b> <i>Sarah R. Mijares</i> <b>SARAH R. MIJARES</b> Port Manager</p>	<p><b>SHEET NO.:</b> 20 33</p>
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DAMAGE APRON WALL  
TO BE REPAIR  
SEE SECTION "E" & "F"

**SECT./EL. @ A**  
SCALE: 1:50 M.

SEE DETAIL @ SECTION "C"



**RETAINING WALL DETAIL (EXISTING)**  
**SECT./EL. @ B**

<p>PHILIPPINE PORTS AUTHORITY</p> <p>PHO - Negros Oriental Saver</p>	<p>PROJECT TITLE: RESTORATION OF DAMAGED CONCRETE PAVEMENT, COVERED WALKWAY, PASSENGER TERMINAL BUILDING, SCOURED PORTION OF SEAWALL &amp; REPAINTING OF SECURITY FENCE REPAIR OF Part of Bulado LOCATION: PORT OF BULADO, GURJULANGAN</p>	SHEET CONTENTS:	PREPARED BY:	CHECKED BY:	RECOMMENDING APPROVAL:	APPROVED:	SHEET NO.:
		AS SHOWN	JOHN PAUL TINDOC Public Services Assistant	JOEL S. LARENA Principal Engineer A	HUBERT P. MITMIT ESD Manager	SARAH B. MIJARES Port Manager	21 33