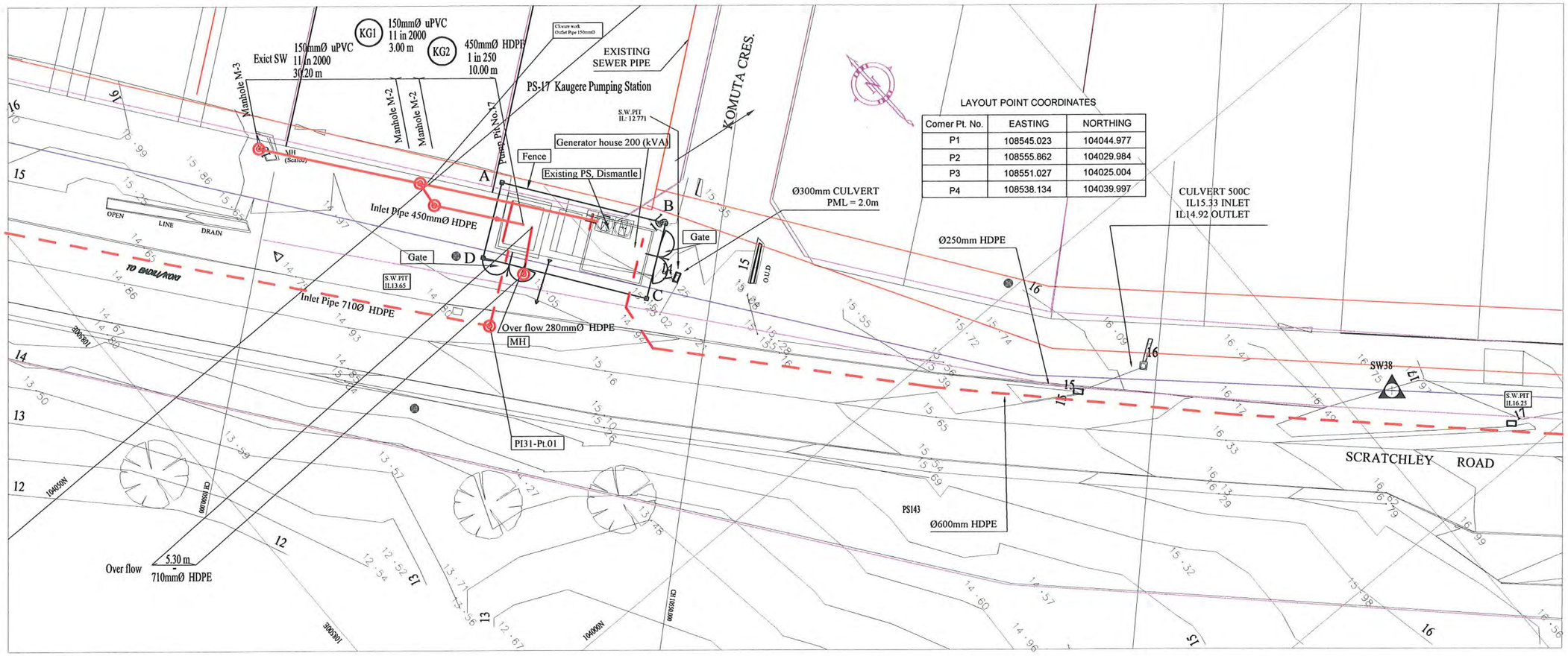


PLAN VIEW
Scale : 1:500

LEGEND

- PROPOSED SEWER
- NEW MANHOLE
- EXISTING MANHOLE TO BE MODIFIED
- POWER POLE WITH OVERHEAD POWER LINES
- POWER POLE WITH LIGHT
- ELECTRICITY TRANSMISSION TOWER
- ELECTRICITY PIT
- UNDER GROUND POWER CABLE
- TELECOM PIT
- TELECOM MARKER POST
- TELECOM LINE
- WATER VALVE BOX
- STOP VALVE
- WATER TAP
- FIRE HYDRANT
- WATER METER
- EXISTING SEWER PIPE
- TREE
- WATER LINE
- FENCE LINE WITH GATE
- BITUMEN SEALED ROAD

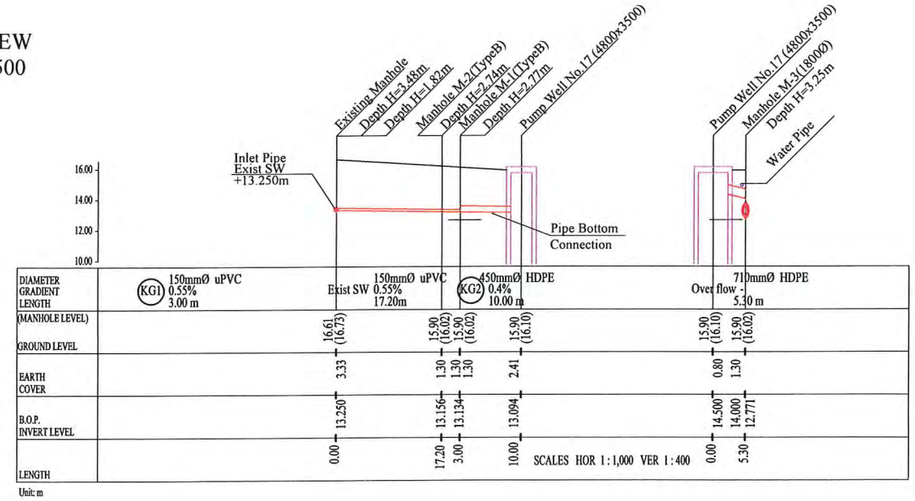
NOTE: CADASTRAL BOUNDARIES TAKEN FROM DCDB

1) LOCATION OF UNDERGROUND UTILITIES SHOWN ON THESE PLANS ARE APPROXIMATE ONLY. CONTRCTOR SHALL BE RESPONSIBLE FOR PROTECTING AND MAINTAINING ALL EXISTING UTILITIES IN OPERATION.

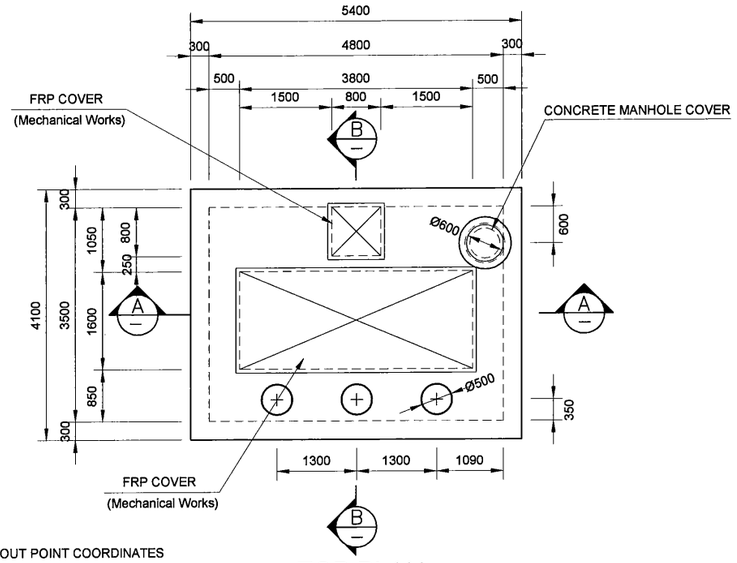
2) UNDERGROUND UTILITY SERVICES TO RESIDENTIAL, PUBLIC AND COMMERCIAL BUILDINGS OR OTHER FACILITIES HAVE NOT BEEN SHOWN BUT SHALL BE LOCATED AND PROTECTED IN A SIMILAR MANNER AS DESCRIBED ABOVE BY THE CONTRACTOR

3) INVERT MODIFICATION IS INCLUDED IN THE CONTRACT
INVERT LEVEL OF NEW PIPE ≧ EXISTING PIPE BOTTOM LEVEL +20mm
INVERT LEVEL OF NEW PIPE - EXISTING PIPE BOTTOM LEVEL ≧+600mm
DROP PIPE IS REQUIRED

4) MINIMUM COVER IS 60cm FOR UNPAVED ROAD
90cm FOR ASPHALT/CONCRETE PAVED ROAD IF NOT DESCRIBED ON THE DRAWING
Type A - Soil/others
Type B - Asphalt(Road)
Type C - Walkway (Concrete)



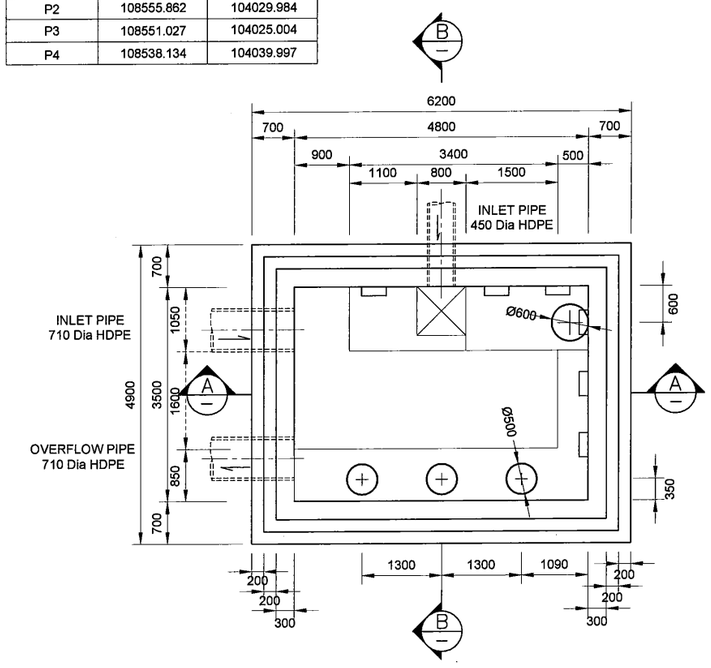
PROJECT: PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT (POMSSUP)		TITLE: PS-17 Kaugere Pumping Station, General Layout, Inlet Pipe & Over Flow Pipe Plan and Profile	
CLIENT: INDEPENDENT PUBLIC BUSINESS CORPORATION PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT PROJECT MANAGEMENT UNIT (PMU) JAPAN INTERNATIONAL COOPERATION AGENCY	CONSULTANTS : NJS CONSULTANTS CO., LTD. - JAPAN	NOTES :	REVISIONS: REV. / DATE / DESCRIPTION
APPROVED by PMU: Project Director Lot G.Zauya	DATE: 1. Dec 2011	SCALE: AS SHOWN	
CHECKED by CONSULTANT Project Manager T.Fuji	DATE: 1. Dec 2011	DRAWING NO.: PS-KG-CC-01	



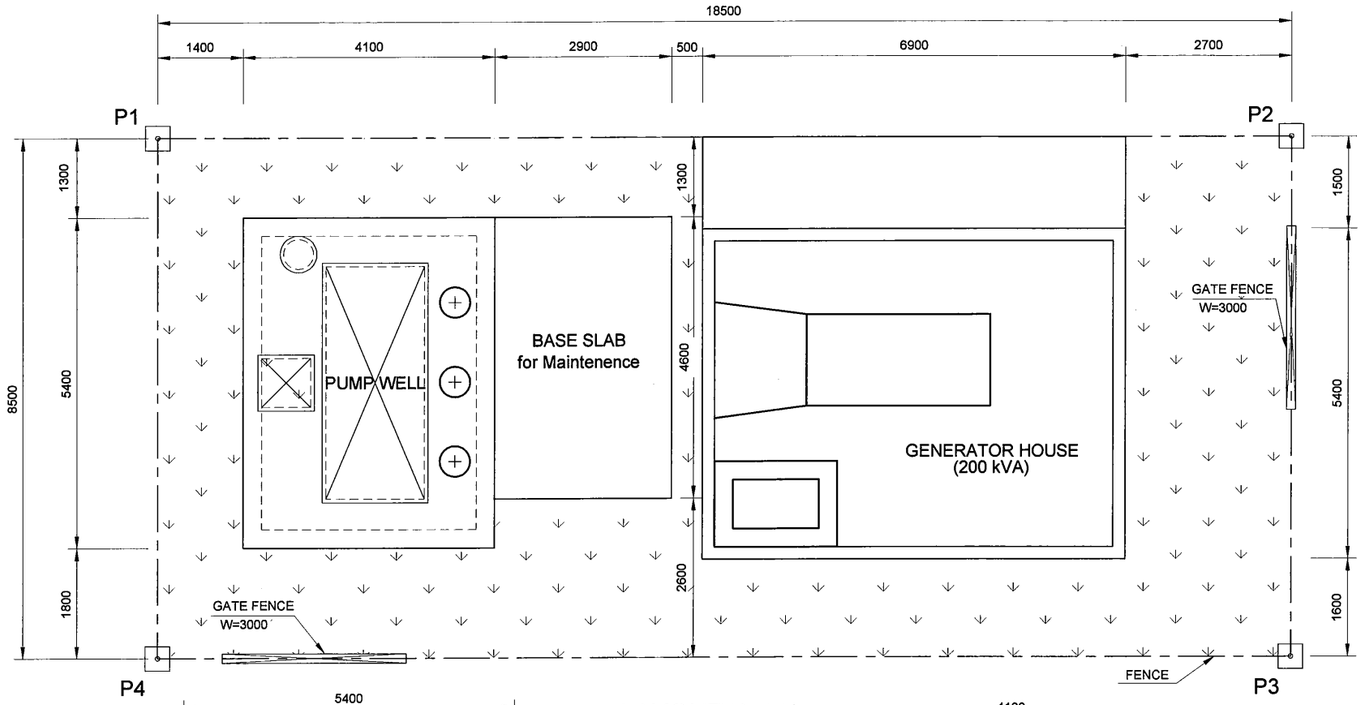
TOP PLAN

LAYOUT POINT COORDINATES

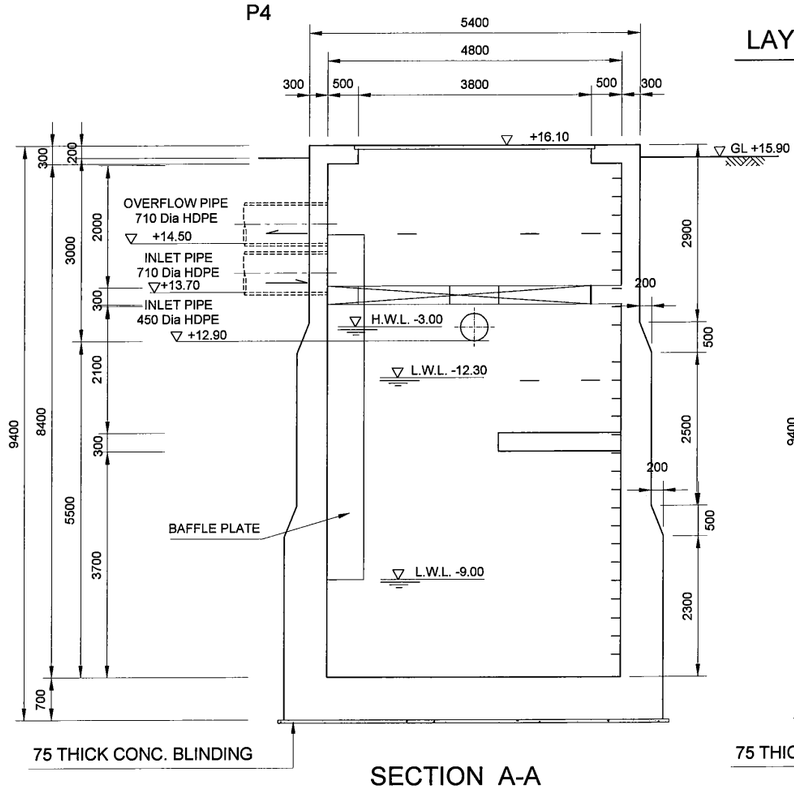
Corner Pt. No.	EASTING	NORTHING
P1	108545.023	104044.977
P2	108555.862	104029.984
P3	108551.027	104025.004
P4	108538.134	104039.997



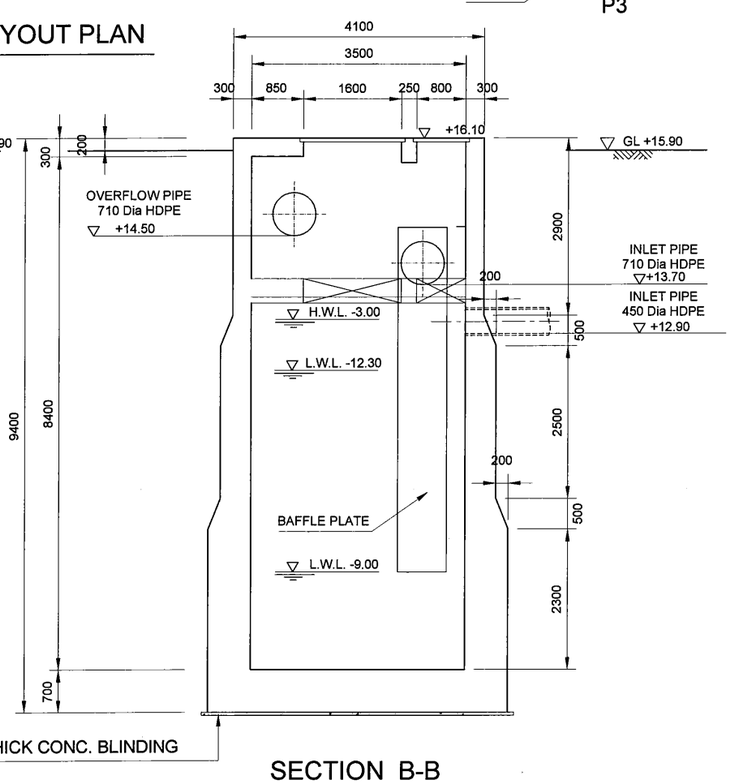
BASE PLAN



LAYOUT PLAN



SECTION A-A



SECTION B-B

NOTES

1. ALL INSIDE CONCRETE SURFACE OF TOP AND SIDE WALL IN PUMP WELL SHALL BE PAINTED BY VINYL ESTER RESIN OR EQUIVALENT WITH 1mm THICKNESS AFTER HARDENING
2. REFER TO STD DRAWINGS FOR MISCELLANEOUS WORKS SUCH AS HANDRAIL, COVER, STEP LADDER, STAIR, STOP LOG AND EXPANTION JOINT

PROJECT: PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT (POMSSUP)

TITLE: PS-17 Kaugere Pumping Station - Layout, Pump Well Plan and Section

CLIENT: INDEPENDENT PUBLIC BUSINESS CORPORATION
PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT
PROJECT MANAGEMENT UNIT (PMU)
JAPAN INTERNATIONAL COOPERATION AGENCY

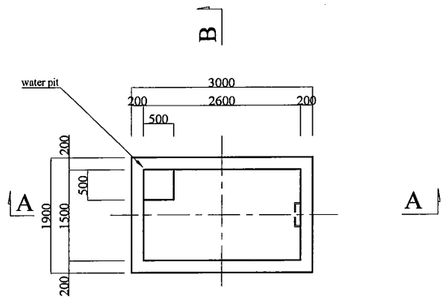
CONSULTANTS : NJS CONSULTANTS CO., LTD. - JAPAN

NOTES :

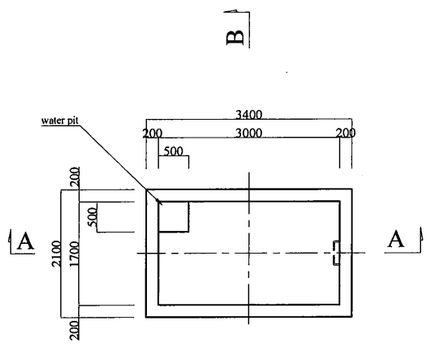
REVISIONS		
REV.	DATE	DESCRIPTION

APPROVED by PMU: Project Director, Lot G.Zauya — DATE: 1. Dec 2011 — SCALE: 1/100

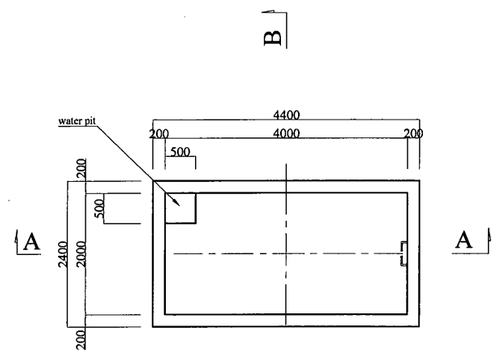
CHECKED by CONSULTANT: Project Manager, T.Fuji — DATE: 1. Dec 2011 — DRAWING NO.: PS-KG-CC-02



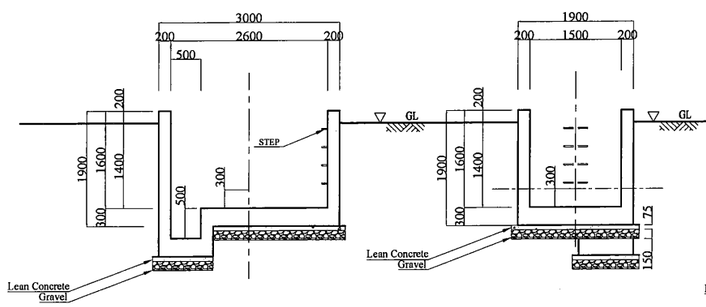
A TYPE TOP PLAN



B TYPE TOP PLAN

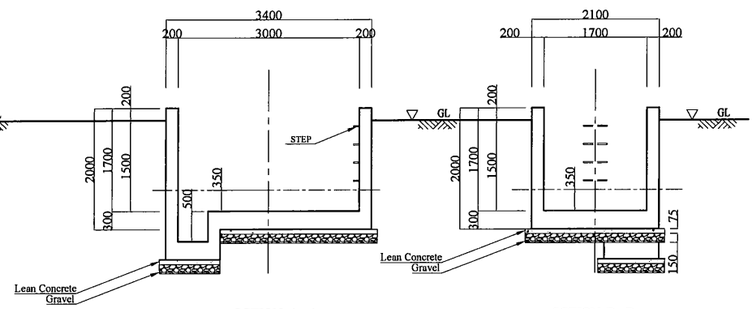


C TYPE TOP PLAN



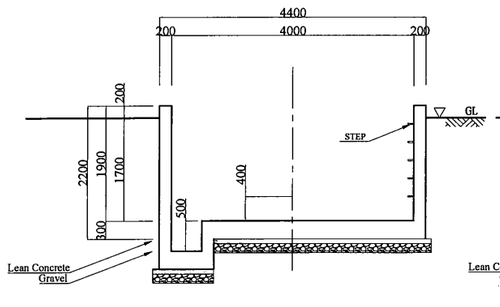
SCTION A - A

SCTION B - B

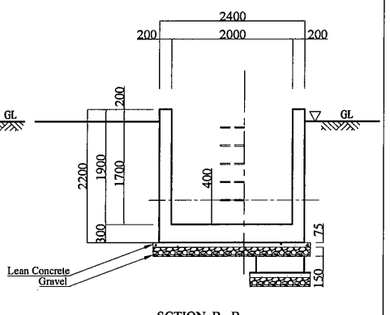


SCTION A - A

SCTION B - B



SCTION A - A



SCTION B - B

PROJECT:
PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT (POMSSUP)

TITLE:
Valve Pit

CLIENT:
INDEPENDENT PUBLIC BUSINESS CORPORATION
PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT
PROJECT MANAGEMENT UNIT (PMU)
JAPAN INTERNATIONAL COOPERATION AGENCY

CONSULTANTS :
NJS CONSULTANTS CO., LTD. - JAPAN

NOTES :

REVISIONS		
REV.	DATE	DESCRIPTION

APPROVED by PMU:
Project Director
Lot G.Zauya

DATE: 1. Dec 2011

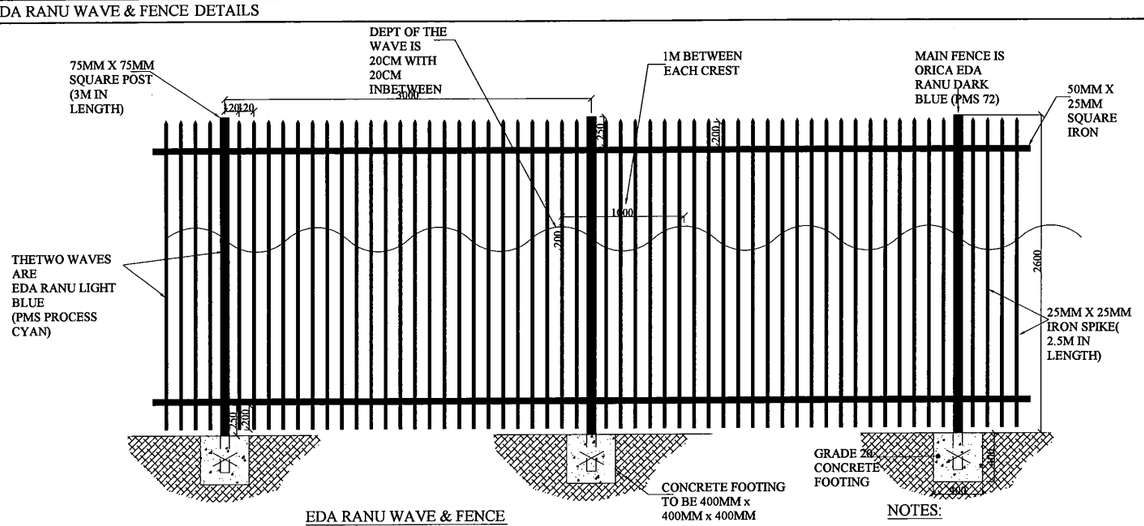
SCALE: 1/100

CHECKED by CONSULTANT
Project Manager
T.Fuji

DATE: 1. Dec 2011

DRAWING NO.: PS-GE-CC-02

EDA RANU WAVE & FENCE DETAILS

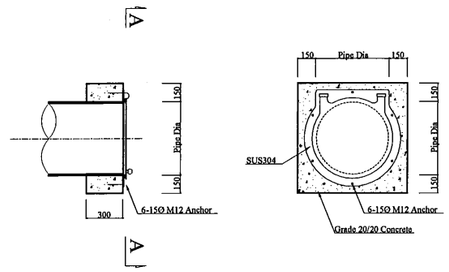


EDA RANU WAVE & FENCE DETAILS
SCALE 1:50

NOTES:

1. THE POST AND SPIKE FENCE SHOULD BE EXTENDED TO CLOSE ANY GAP CREATED BY DRAIN OR LOWER GROUND.
2. PAINTING SHOULD INCLUDE FIRST COAT METAL PRIMER AND TWO COATS OF GLOSS ENAMEL(DARK BLUE PMS 72 & LIGHT BLUE PMS PROCESS CYAN).

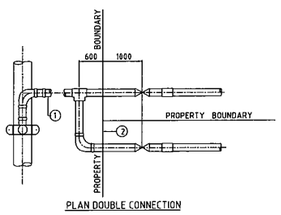
FLAP GATE DETAILS



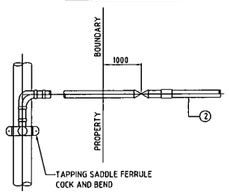
FLAP GATE DETAILS

SECTION

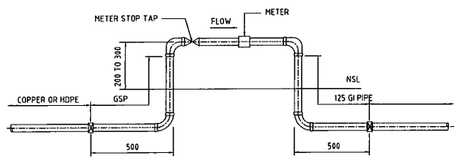
DETAIL OF METER & STOP TAP INSTALLATION



PLAN DOUBLE CONNECTION



PLAN SINGLE CONNECTION



DETAIL OF METER & STOP TAP INSTALLATION

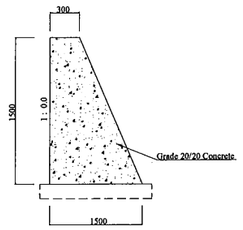
NOTES:

1. INSTALLATION BY THE SUBDIVIDER SHALL INCLUDE THE CONNECTION FROM THE MAIN TO THE METER STOP TAP
2. THE METER SHALL BE PROVIDED AND INSTALLED BY THE COMMISION AFTER COMPLETION AND APPROVAL OF THE INTERNAL ALLOTMENT PLUMBING
3. THE SUBDIVIDER SHALL INSTALL THE CONNECTION S BEFORE TESTING THE MAIN AND SHALL HAVE THE FERRULE COCK OPEN AND THE METER STOP TAP CLOSED DURING TESTING
4. ON COMPLETION OF TESTING THE FERRULE COCK SHALL BE CLOSED
5. COVER TO CONNECTION PIPE SHALL BE 600 MINIMUM IN AREAS SUBJECT TO TRAFFIC, 300 MINMUM ELSEWHERE
6. NORMINAL DIAMETERS 1 COPPER 25
   HDPE 32
   GSP 25

   2 COPPER 20
   HDPE 20
   GSP 15

SERVICE CONNECTIONS

RETAINING WALL DETAIL



RETAINING WALL DETAIL

NOTES:

1. Examine the foundation separately and perform deal with suitable.
2. Perform stable calculation, Install a fence etc.
3. Design drain separately by field condition.
4. Make the interval of a expansion joint less than 10 meter.

PROJECT: PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT (POMSSUP)

TITLE: Appurtenant Details (1)

CLIENT: INDEPENDENT PUBLIC BUSINESS CORPORATION
PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT
PROJECT MANAGEMENT UNIT (PMU)
JAPAN INTERNATIONAL COOPERATION AGENCY

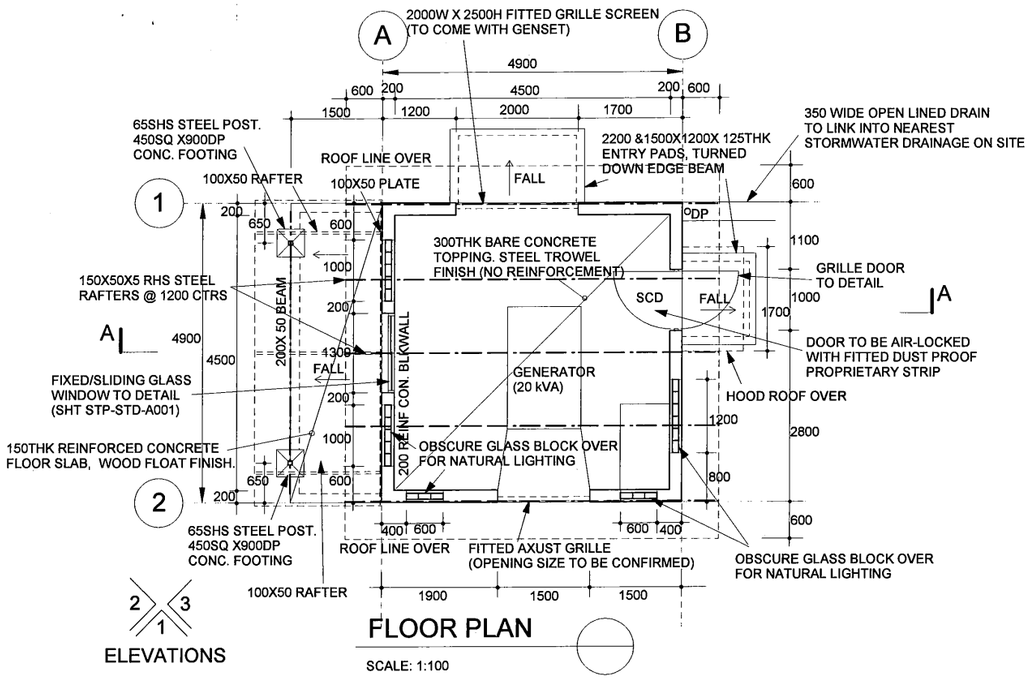
CONSULTANTS : NJS CONSULTANTS CO., LTD. - JAPAN

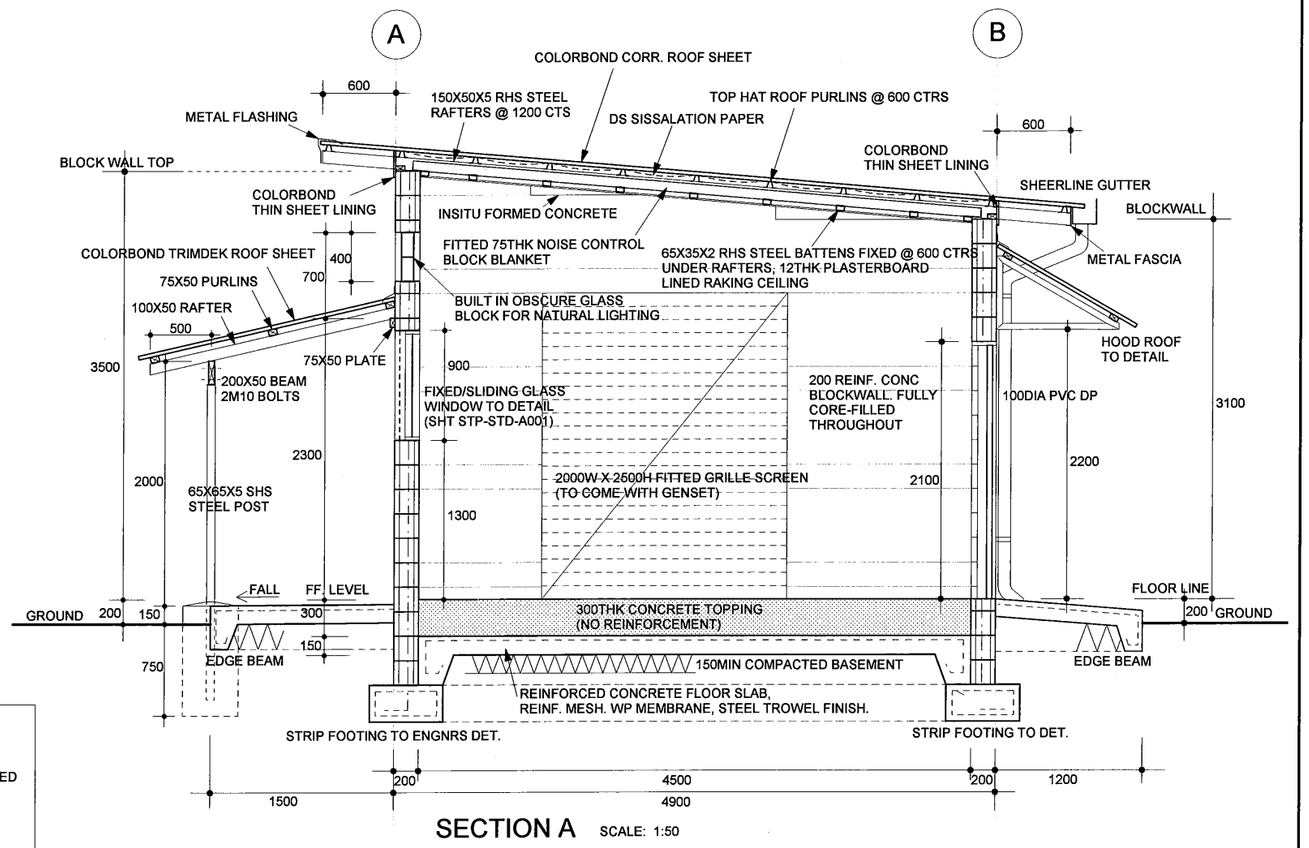
NOTES :

REVISIONS		
REV.	DATE	DESCRIPTION

APPROVED by PMU: Project Director Lot G.Zauya — DATE: 1. Dec 2011 — SCALE: 1/100

CHECKED by CONSULTANT Project Manager T.Fuji — DATE: 1. Dec 2011 — DRAWING NO.: PS-GE-CC-03



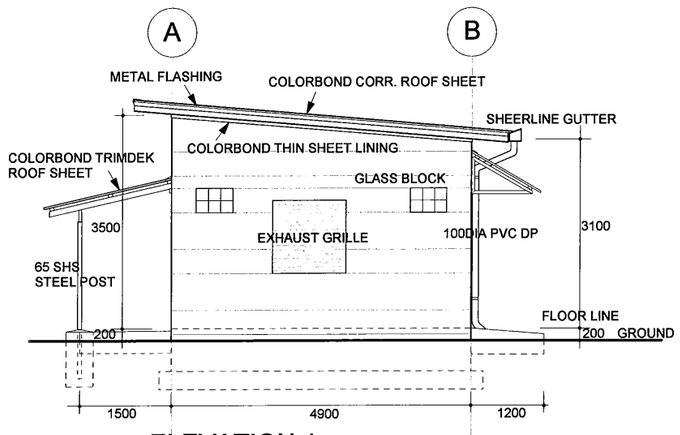


SECTION A SCALE: 1:50

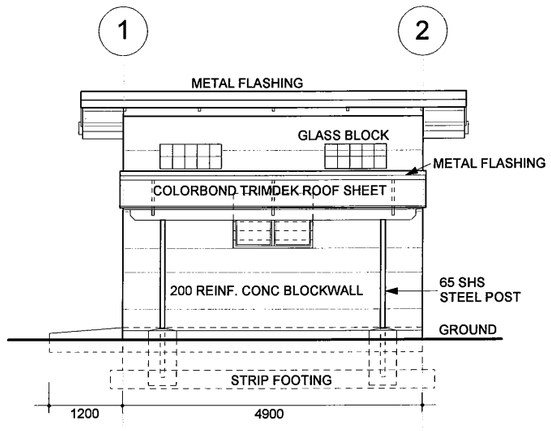
FINISHES SCHEDULE (SIMILARLY FOR ALL GENERATOR HOUSES)

MATERIAL	LOCATION	FINISH	COLOUR
EXTERNAL			
CONC.	ENTRY PAD	WOOD FLOAT & BROOM FINISH	
CONC.	BLK WALLS	2X ACRYLIC GLOSS	TO BE SELECTED
METAL	WALL CLADDING & HOOD	TRIMDEK 0.48 BMT	COLORBOND
	ROOF SHEETING	CORRUGATED	COLORBOND
	FLASHING	COLORBOND	COLORBOND
	EXPOSED FFRAMES	SHOP PRIME, SITE PRIME WITH LUXAPOXY 4 FOLLOWED BY LUXATHANE 2 PACK	BEIGE
TIMBER	ROOF FRAMES,	OIL PRIME, 2 ACRYLIC SEMI GLOSS	TO BE SELECTED
INTERNAL			
CONC.	FLOOR	STEEL TROWEL FINISH	
CONC. BLK WALLS		PLASTERED & 2X ACRYLIC GLOSS	TO BE SELECTED
TIMBER & PLASTERBOARD	WALL & CEILING LINING	2X ACRYLIC SEMI GLOSS	TO BE SELECTED

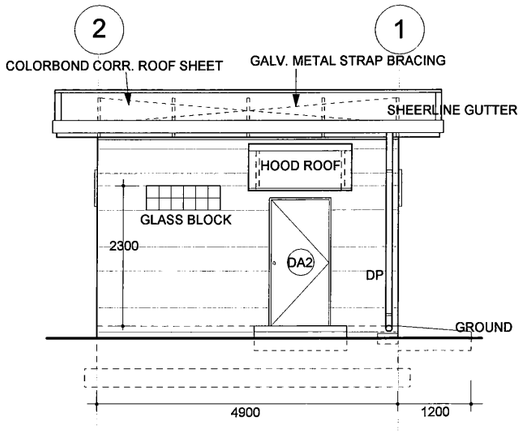
NOTE:
- ALL STEEL MATERIALS, UNLESS SPECIFIED ARE TO BE PRE GALVANISED OR STAINLESS STEEL. CUTS AND WELDS TO BE IMMEDIATELY PROTECTED WITH COLD GAL. PRIMED AND WHOLE WORKS PAINTED WITH OIL BASE GAL PRIMER, UNDERCOAT & GLOSS FINISH COATS.



ELEVATION 1 SCALE: 1:100

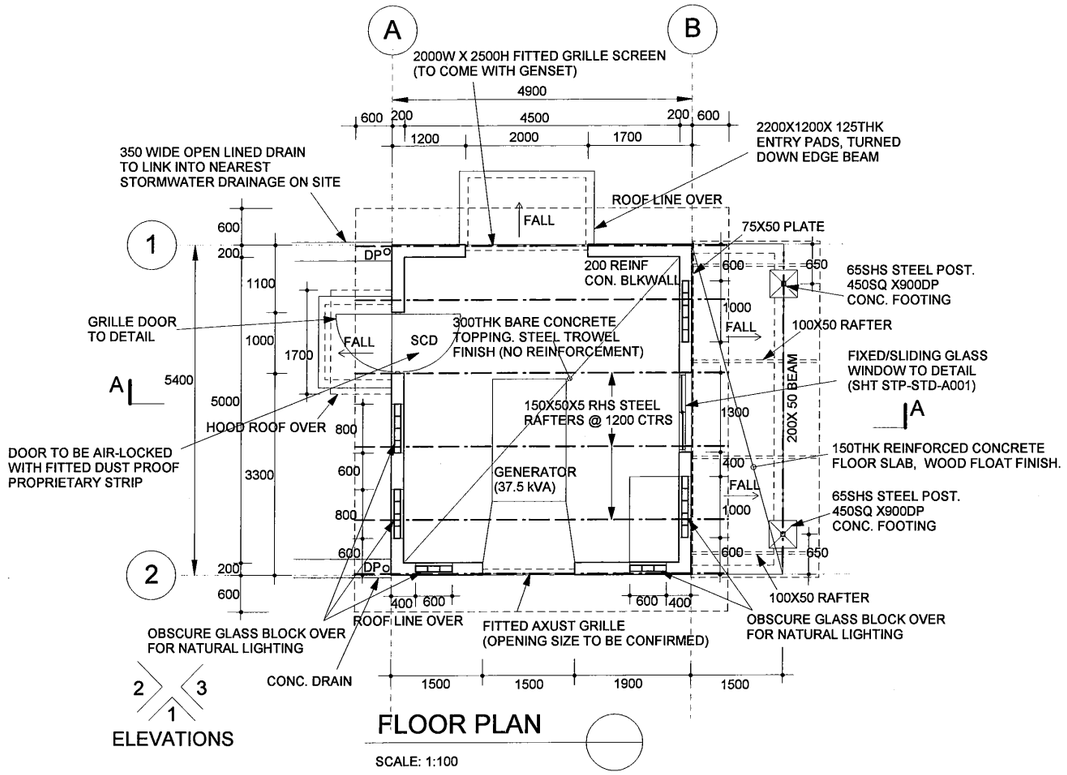


ELEVATION 2 SCALE: 1:100



ELEVATION 3 SCALE: 1:100

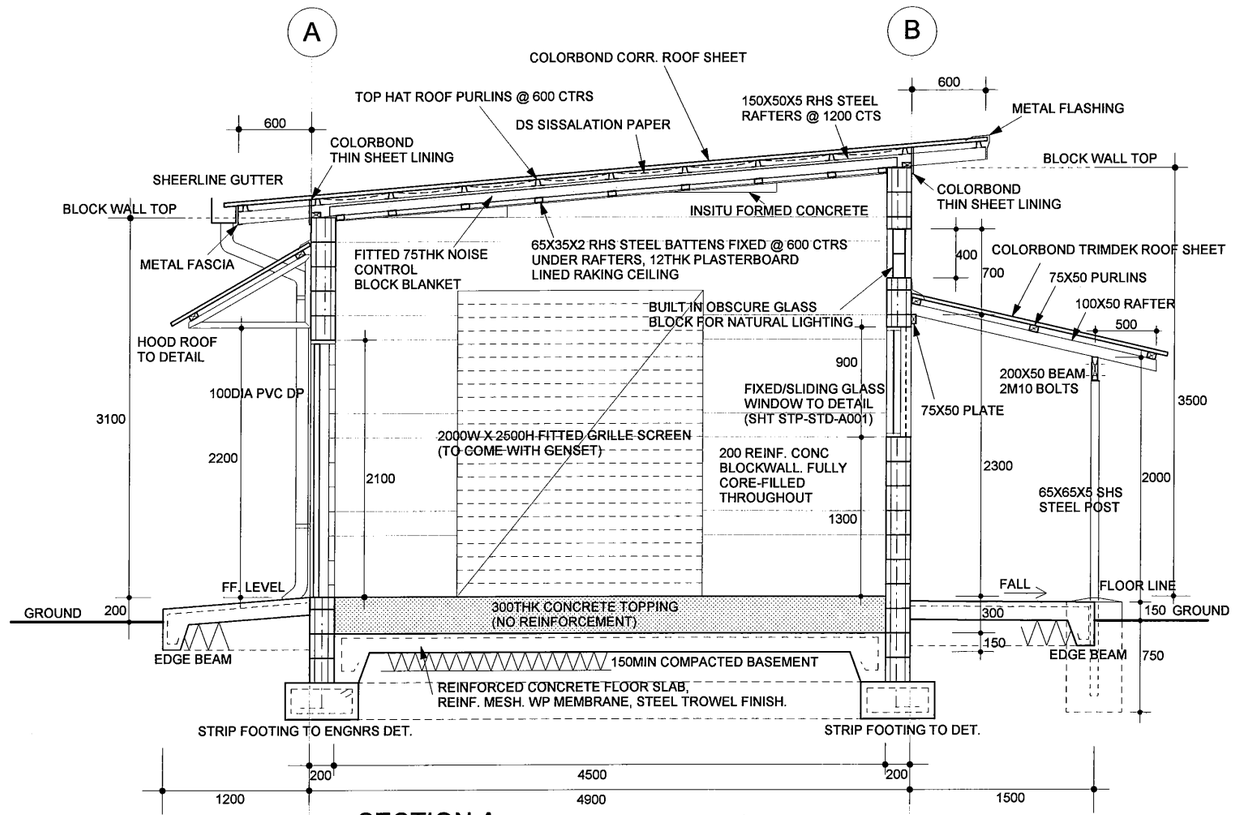
PROJECT: PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT (POMSSUP)	TITLE: Pumping Station - GENERATOR HOUSE - Floor Plan, Section & Elevations (Type 20 kVA)
CLIENT: INDEPENDENT PUBLIC BUSINESS CORPORATION; PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT; PROJECT MANAGEMENT UNIT (PMU); JAPAN INTERNATIONAL COOPERATION AGENCY	CONSULTANTS : NJS CONSULTANTS CO., LTD. - JAPAN
NOTES :	REVISIONS (REV. / DATE / DESCRIPTION)
APPROVED by PMU: Project Director Lot G.Zauya	DATE: 1. Dec 2011
CHECKED by CONSULTANT Project Manager T.Fuji	DATE: 1. Dec 2011
SCALE: 1/50 & 1/100	DRAWING NO.: PS-GH-A001



FLOOR PLAN

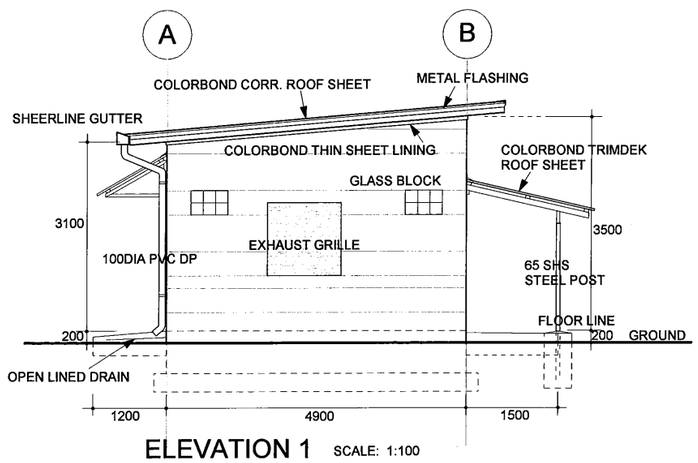
SCALE: 1:100

NOTE:
REFER TO SHT N0 (SP-GH-A001) FOR INFORMATION ON FINISHES SCHEDULE AND STEEL MATERIALS SPECIFICATION

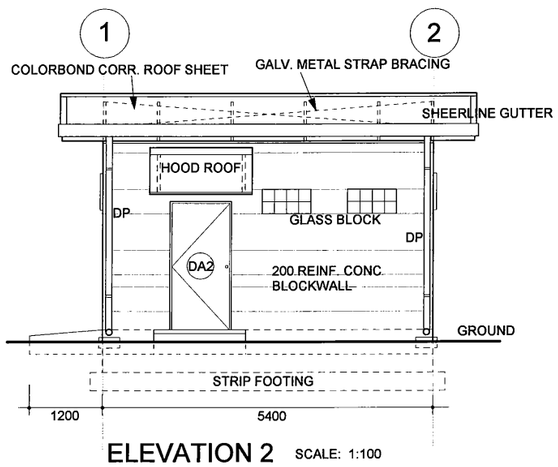


SECTION A

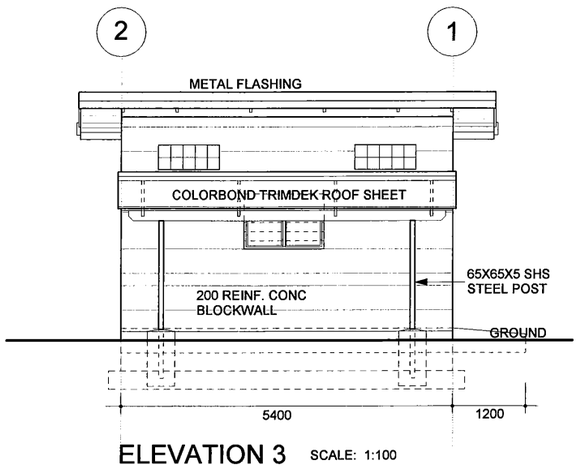
SCALE: 1:50



ELEVATION 1 SCALE: 1:100

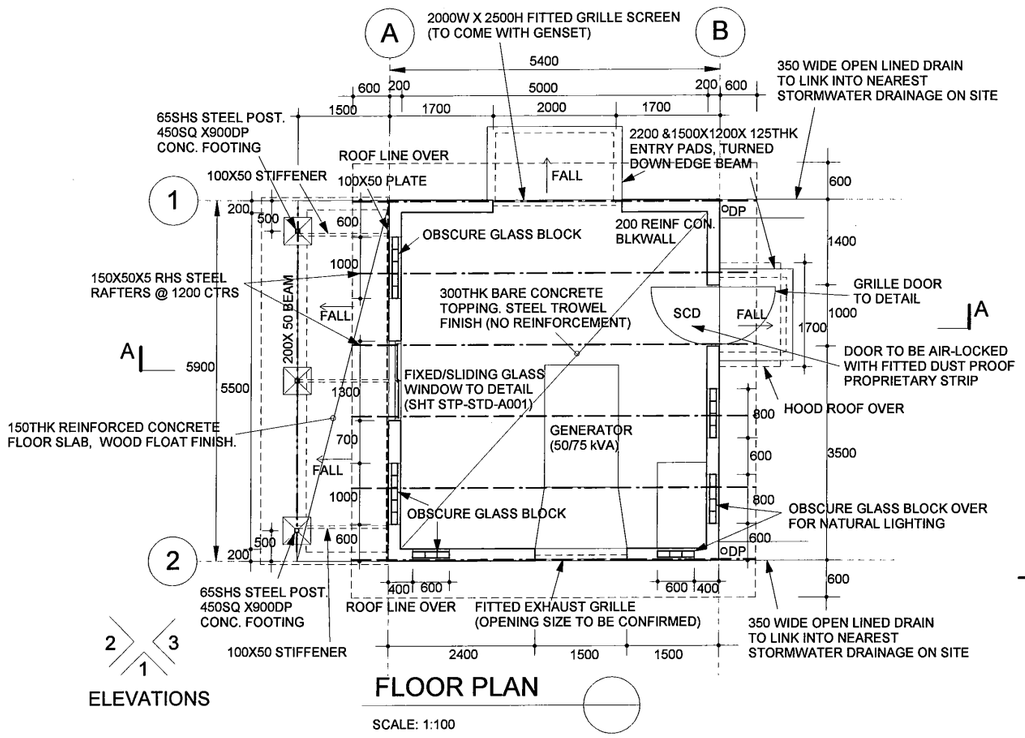


ELEVATION 2 SCALE: 1:100



ELEVATION 3 SCALE: 1:100

PROJECT: PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT (POMSSUP)		TITLE: Pumping Station - GENERATOR HOUSE - Floor Plan, Section & Elevations (Type 37.5 kVA)	
CLIENT: INDEPENDENT PUBLIC BUSINESS CORPORATION; PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT; PROJECT MANAGEMENT UNIT (PMU); JAPAN INTERNATIONAL COOPERATION AGENCY	CONSULTANTS : NJS CONSULTANTS CO., LTD. - JAPAN	NOTES :	REVISIONS: REV. / DATE / DESCRIPTION
APPROVED by PMU: Project Director, Lot G.Zauya	DATE: 1. Dec 2011	SCALE: 1/50 & 1/100	
CHECKED by CONSULTANT: Project Manager, T.Fuji	DATE: 1. Dec 2011	DRAWING NO.: PS-GH-A002	



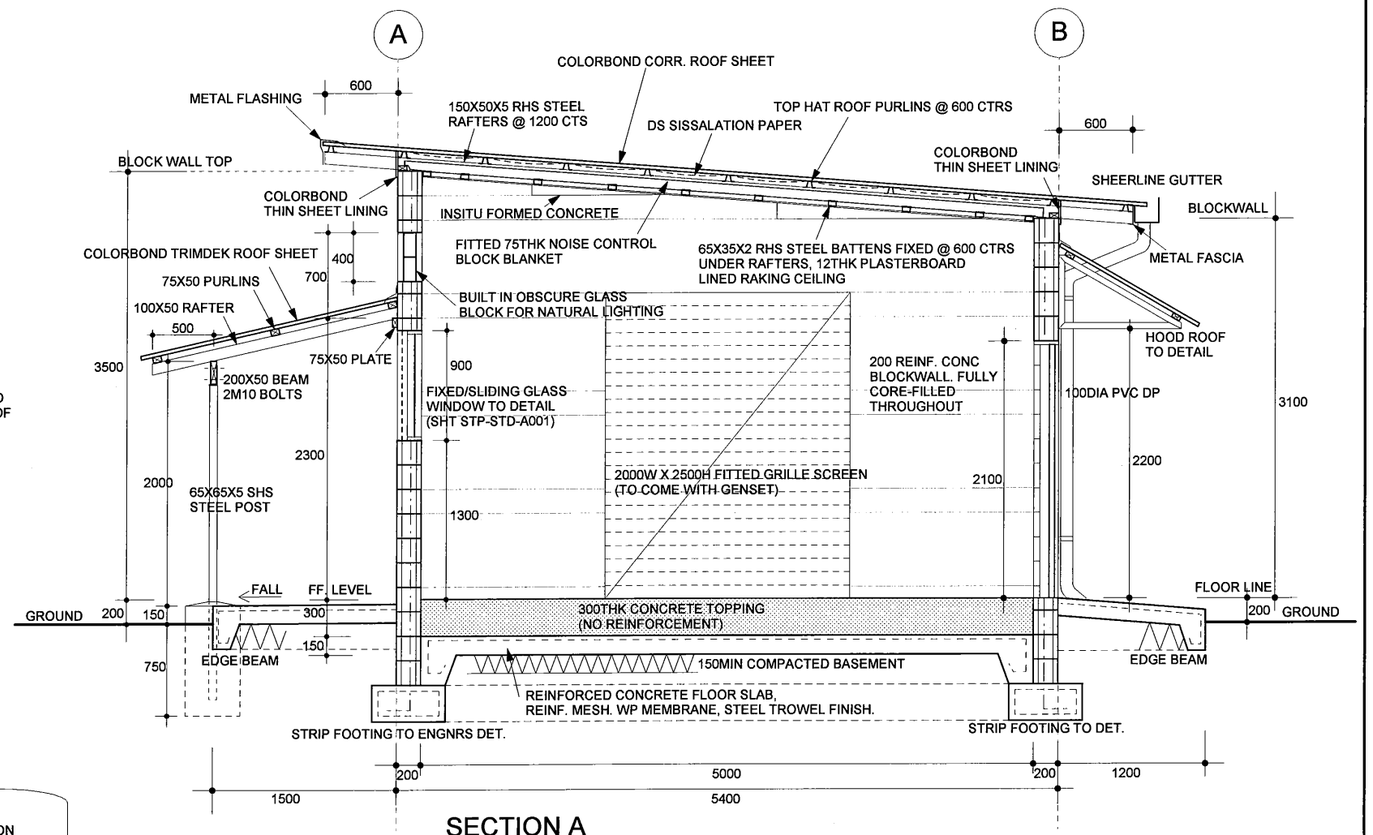
2 3 1

ELEVATIONS

FLOOR PLAN

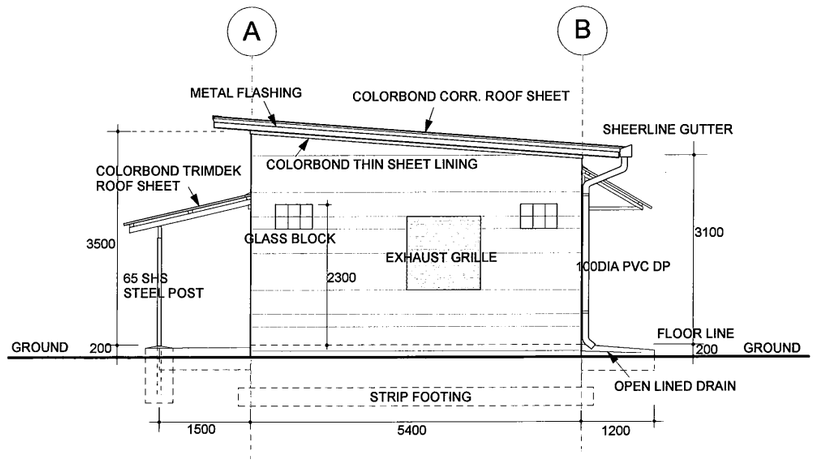
SCALE: 1:100

NOTE:
REFER TO SHT N0 (SP-GH-A001) FOR INFORMATION ON FINISHES SCHEDULE AND STEEL MATERIALS SPECIFICATION



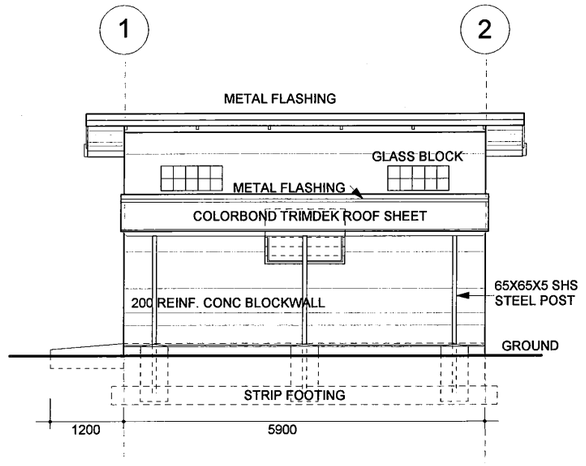
SECTION A

SCALE: 1:50



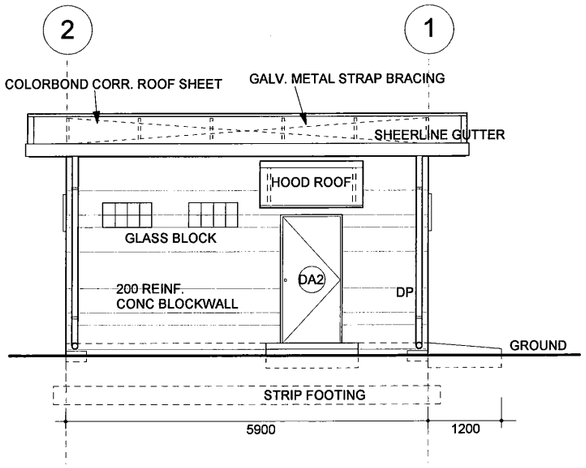
ELEVATION 1

SCALE: 1:100



ELEVATION 2

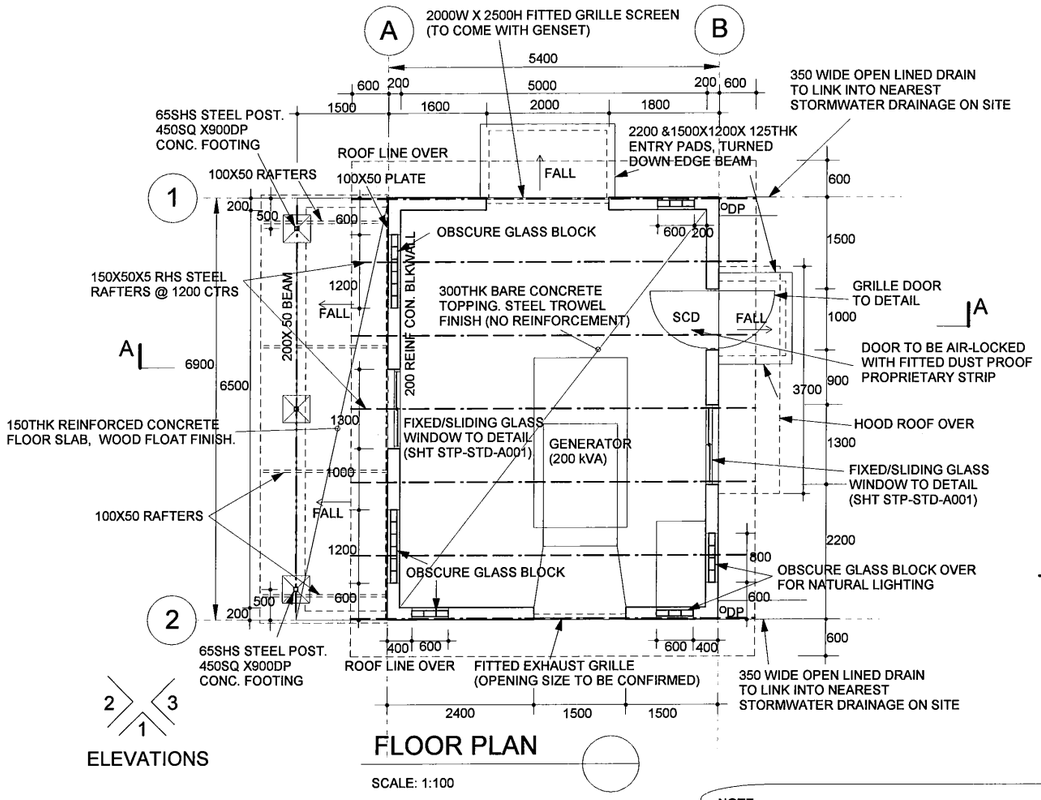
SCALE: 1:100

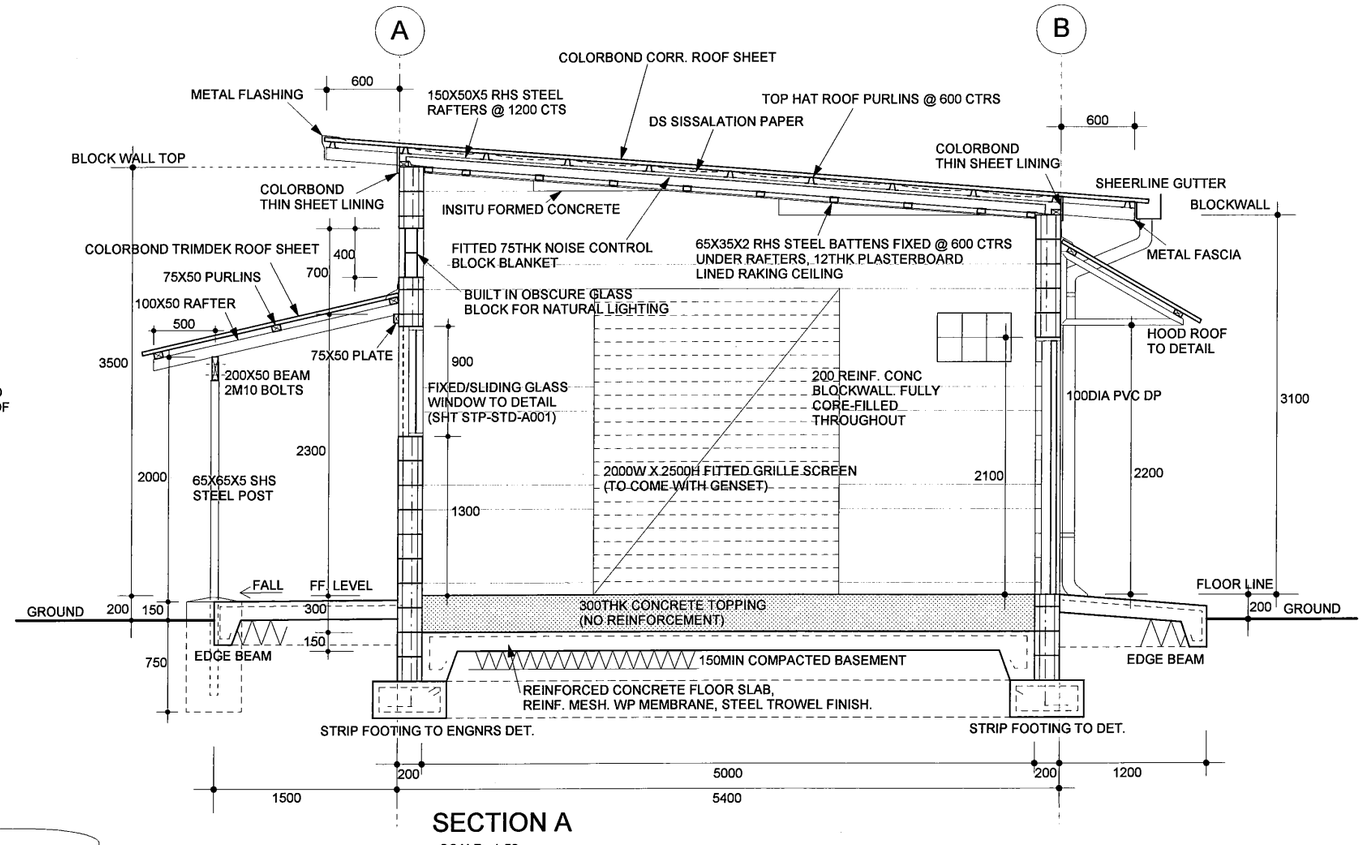


ELEVATION 3

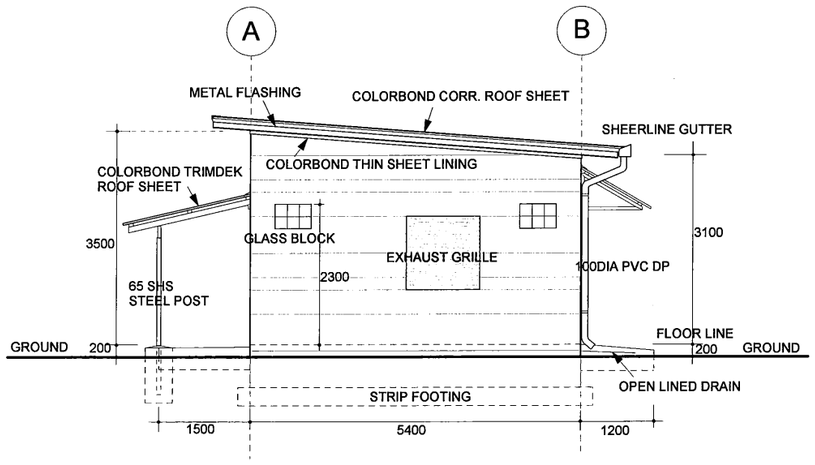
SCALE: 1:100

PROJECT: PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT (POMSSUP)		TITLE: Pumping Station - GENERATOR HOUSE - Floor Plan, Section & Elevations (Type 50/75 kVA)	
CLIENT: INDEPENDENT PUBLIC BUSINESS CORPORATION PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT PROJECT MANAGEMENT UNIT (PMU) JAPAN INTERNATIONAL COOPERATION AGENCY	CONSULTANTS : NJS CONSULTANTS CO., LTD. - JAPAN	NOTES :	APPROVED by PMU: Project Director Lot G.Zauya CHECKED by CONSULTANT Project Manager T.Fuji
REVISIONS: REV. / DATE / DESCRIPTION			DATE: 1. Dec 2011 DATE: 1. Dec 2011
SCALE: 1/50 & 1/100			DRAWING NO.: PS-GH-A003

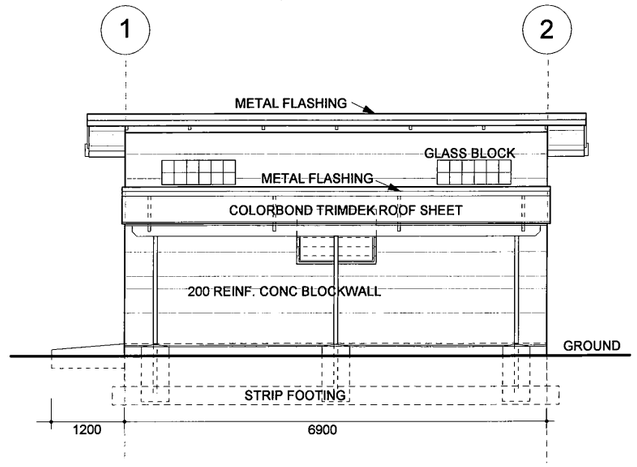




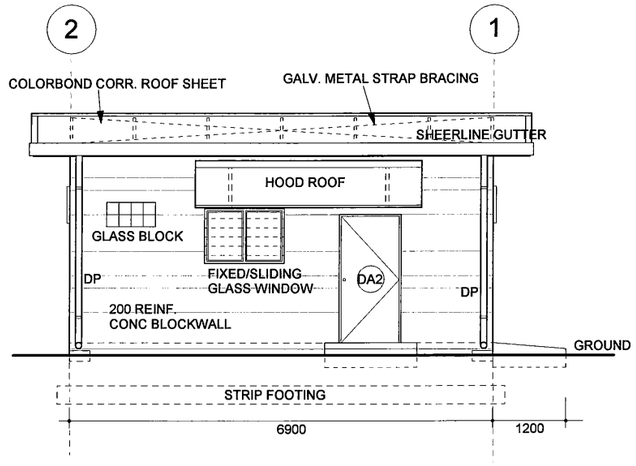
NOTE:
REFER TO SHT N0 (SP-GH-A001) FOR INFORMATION ON FINISHES SCHEDULE AND STEEL MATERIALS SPECIFICATION



ELEVATION 1
SCALE: 1:100

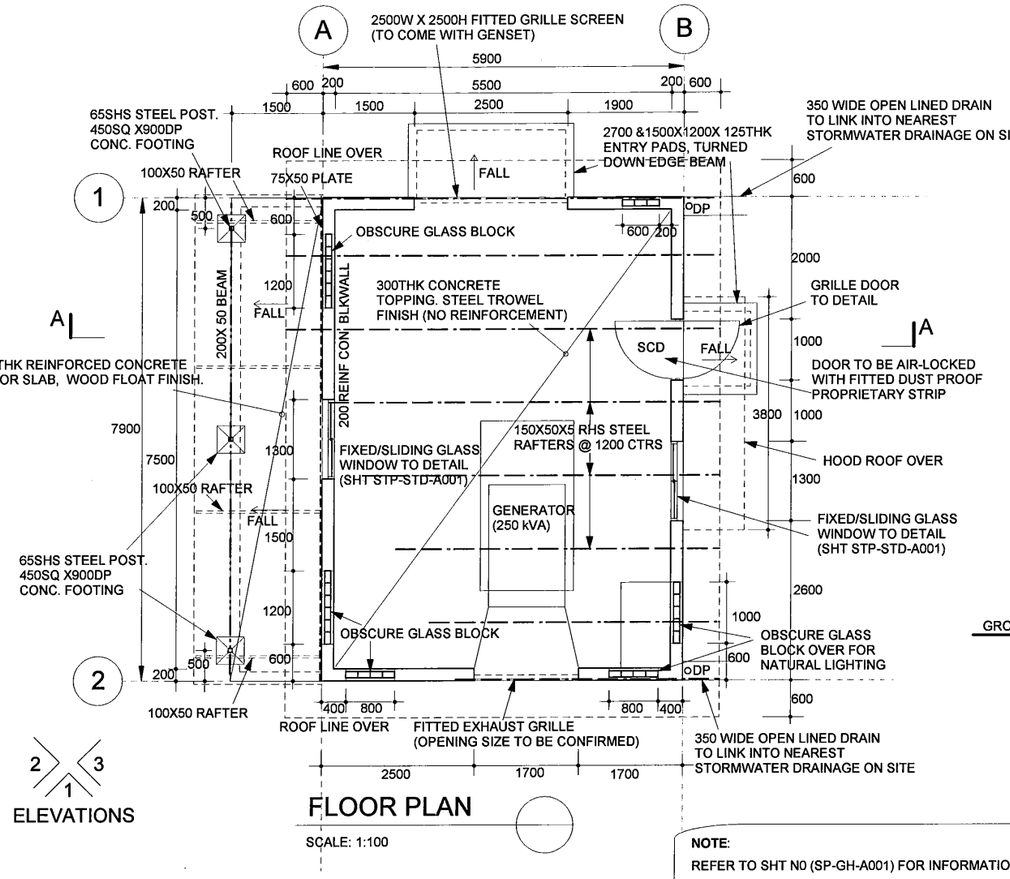


ELEVATION 2
SCALE: 1:100



ELEVATION 3
SCALE: 1:100

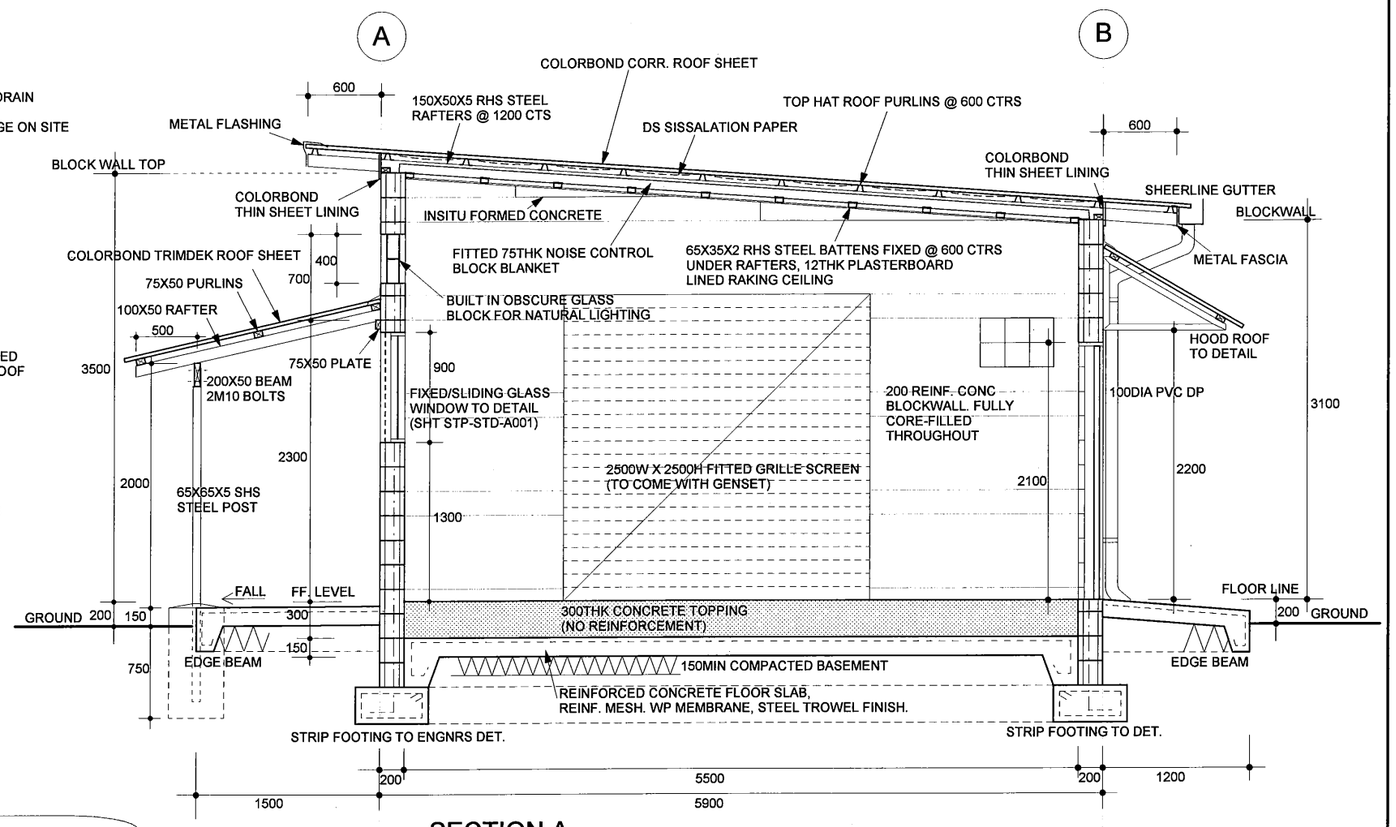
PROJECT: PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT (POMSSUP)		TITLE: Pumping Station - GENERATOR HOUSE - Floor Plan, Section & Elevations (Type 200 kVA)	
CLIENT: INDEPENDENT PUBLIC BUSINESS CORPORATION PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT PROJECT MANAGEMENT UNIT (PMU) JAPAN INTERNATIONAL COOPERATION AGENCY	CONSULTANTS : NJS CONSULTANTS CO., LTD. - JAPAN	NOTES :	REVISIONS: REV. / DATE / DESCRIPTION APPROVED by PMU: Project Director — Lot G.Zauya — DATE: 1. Dec 2011 — SCALE: 1/50 & 1/100 CHECKED by CONSULTANT: Project Manager — T.Fuji — DATE: 1. Dec 2011 — DRAWING NO.: PS-GH-A004



FLOOR PLAN

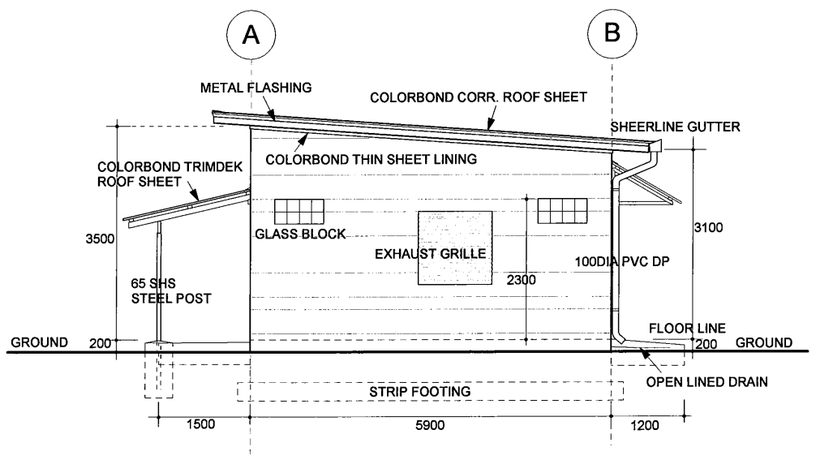
SCALE: 1:100

NOTE:
REFER TO SHT N0 (SP-GH-A001) FOR INFORMATION ON
FINISHES SCHEDULE AND STEEL MATERIALS SPECIFICATION



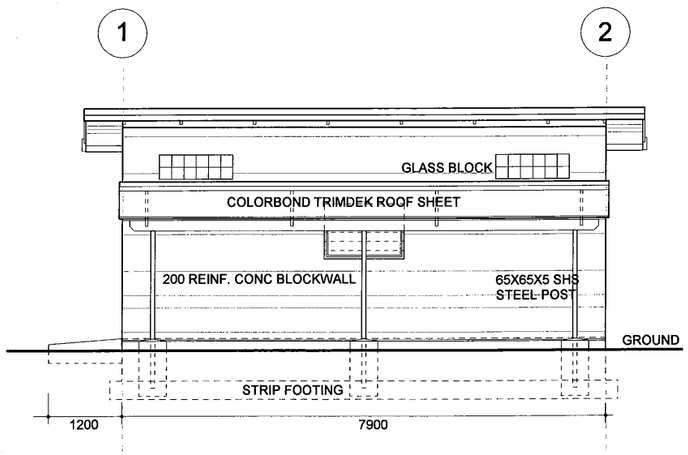
SECTION A

SCALE: 1:50



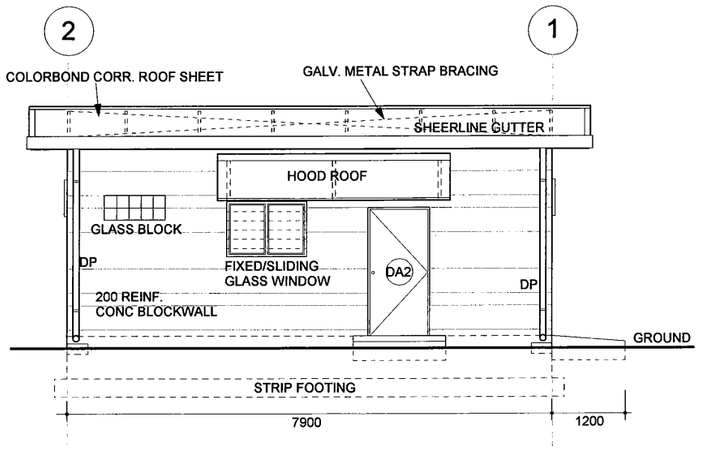
ELEVATION 1

SCALE: 1:100



ELEVATION 2

SCALE: 1:100



ELEVATION 3

SCALE: 1:100

PROJECT: PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT (POMSSUP)		TITLE: Pumping Station - GENERATOR HOUSE - Floor Plan, Section & Elevations (Type 250 kVA)	
CLIENT: INDEPENDENT PUBLIC BUSINESS CORPORATION; PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT; PROJECT MANAGEMENT UNIT (PMU); JAPAN INTERNATIONAL COOPERATION AGENCY	CONSULTANTS : NJS CONSULTANTS CO., LTD. - JAPAN	NOTES :	REVISIONS: REV. / DATE / DESCRIPTION
APPROVED by PMU: Project Director, Lot G.Zauya	DATE: 1. Dec 2011	SCALE: 1/50 & 1/100	
CHECKED by CONSULTANT Project Manager, T.Fuji	DATE: 1. Dec 2011	DRAWING NO.: PS-GH-A005	

GENERAL

G1 This building is situated in an earthquake zone and has been designed and detailed to resist seismic forces. Any variation to either structural or non-structural elements may significantly alter the eartquake response of the building and impair its safety.

ANY PROPOSED ALTERATIONS MUST BE REFERRED TO THE STRUCTURAL DESIGN ENGINEER.

G2 These drawings shall be read in conjunction with all Architectural and other consultants Drawings and Specifications and with such other written instructions as may be issued during the course of contract. All discrepancies shall be referred to Superintendant for decision before proceeding with the work.

G3 All dimensions relevant to setting out and off-site works shall be verified by the Contractor before construction and fabrication is commenced. The Engineers drawings shall not be scaled.

G4 During construction the contractor shall be responsible for maintaining the structure in a stable condition and ensuring no part shall be overstressed under construction activities.

G5 Workmanship and materials are to be in accordance with the relevant current PNGS and SAA standards including all amendments and the local statutory Authorities, except where varied by the the contract documents.

G6 Requirements to comply with a particular code or standard is deemed to refer to the latest edition with all relevant amendments and to include all other codes or standards associated with or referred to in the noted code or standard.

G7 No holes or chases other than those indicated on the structural drawings shall be made without the approval of the Superintendant.

G8 Prior to ordering materials or carrying out any work that may be affected, the Contractor shall submit the following information for approval in accordance with the drawings and specification. These proposals shall include all information neccessary for approval including the following:

1) Source and supplier of materials and products.

2) Cerificates and results of any tests already carried out.

3) Details of tests to be carried out both on and off site.

4) Location of any testing to be carried out off site.

5) Details of any seperate labratory, authority or other body to carry out tests.

The approval of substitution of materials shall be sought from the Superintendant.

All dimensions are in millimetres unless stated otherwise. All levels are expressed in metres.

G9 All props and formwork for beams and slabs shall be removed before construction of any masonry walls or partitions on the floor.

G10 All Non-Load Bearing Walls shall be kept clear of the underside of beams and slabs clearance shall not be less than 20mm unless otherwise shown.

G11 Where proprietary products are specified they shall be manufactured and used in accordance with the manufacturer's specifications and recommendations.

G12 Design loads to Papua New Guinea Standard 1001.

1) Wind - Basic Design Velocity 28m/sec
Terrain Category 3

2) Seismic - Zone 4

FOUNDATION

F1 Founding levels are provisional and are subject to the Superintendant's approval of the bearing strata.

F2 Anticipated bearing material: Undisturbed Natural Ground.

F3 Required allowable bearing strength of foundation material 550 kPa

F4 All water and loose material shall be removed from the base prior to pouring any concrete.

F5 Compacted fill under slabs and minor strip footings shall comply with the following:

a) Material shall be selected from an approved source, shall be free of vegetable matter and ball of clay, and shall comply with the following requirements.

(i) CBR value after 4 days soaking, not less than 25 when compacted to at least 95% maximum dry density as determined by AS1289 Test No. E1.1

(ii) Maximum linear shrinkage 6%

(iii) Grading

SIEVE SIZE (mm)	BY WEIGHT PASSING
37.5	100
19.0	60 - 100
9.5	40 - 80
4.75	30 - 60
2.36	20 - 45
0.425	15 - 30
0.075	3 - 15

(iv) The fraction passing the 75 micron sieve shall not exceed 2/3 that passing the 425 micron sieve.

(v) The fraction retained on the 2.36mm sieve shall consist of hard durable particles or fragments of stone, gravel or sand and shall not include any material that breaks up when alternately wetted and dried.

(vi) The fraction passing the 425 micron sieve shall have a liquid limit not greater than 30 and a plasticity index not greater than 10.

F6 Over excavating under footings shall be made good with 10 MPa mass concrete.

CONCRETE

C1 All workmanship and material shall be in accordance with PNG 1002.

C2 Minimum cover (mm) to all reinforcement unless otherwise shown shall be as follows:

REINFORCEMENT COVERS

Minimum reinforcement cover requirements to be in accordance with AS3600 - 1988
Exposure classification listed below:

Exterior faces of members (above ground) : B1
Interior faces of members : A1
Members below ground : A2

In addition reinforcement cover shall not be less than :

BASE SLAB : 75mm

BASE WALL : 75mm

COVER SLAB : 75mm TOP

C3 Sizes of concrete elements do not include thickness of applied finishes.

C4 Reinforcement is represented diagrammatically and not neccessarily shown.

C5 Splices in reinforcement shall be made only in the positions shown or as otherwise approved by the Superintendant.

C6 Welding of reinforcement shall not be permitted.

C7 All reinforcement shall be securely supported in its correct position during concreting by approved bar chains, spacers or support bars.

C8 Reinforced symbols:
"Y" denotes hot rolled deformed bars grade 410Y to AS 1302
"S" denotes deformed bars grade 2305 to AS 1302.
"R" denotes plain round bars grade 230R to AS 1302.

C9 Laps, unless noted otherwise, shall be : 40 x bar diameter for rounds and 350mm for fabric.

C10 Bending radii, unless noted otherwise, shall be to PNGS 1002.

C11 Cover will be maintained during casting concrete by the use of plastic chairs and/or mortar blocks 1:2 mix at maximum 500mm centres in each directions. For work in contact with the ground chairs are to be supported on sheet plates.

C12 Reinforcement shall not be exposed for prolonged periods such as to permit the development of scale

C13 Reinforcement and formwork are to be checked by the Superintendant prior to pouring. The Superintendant is to be given 24 hours notice for a check and a futher 24 hours for any remedial work required prior to concrete placement.

C14 All conduits to be placed above bottom reinforcement and below top reinforcement - minimum spacing between conduits 25mm.

C15 Formwork shall be designed and constructed in accordance with AS 3610.

C16 Concrete components and quality shall be as follows, unless noted otherwise;

Element	F'c (MPa)	Water/Cement Ratio
BASE SLAB	40	0.55
BASE WALL	40	0.55
COVER SLAB	40	0.55

C17 Three test cylinders are to be taken from each sample (sampling in accordance with PNGS 1002.) One cylinder to be tested at seven days, the other two at 20 days. Where ready mix concrete is supplied each truck will constitute a batch in applying PNGS 1002.

C18 The Contractor shall submit for approval his proposals for curing of all insitu concrete work, at least 7 days prior to any pour taking place.

C19 Construction Joints to be cleaned of all loose and foreign materials, scabbled and wetted immediately before continuing the following concreting. Construction Joints other than those indicated on the drawing shall not be made without approval.

CONCRETE MASONRY

B1 All concrete block masonry is to be executed in accordance with the current edition of:

PNGS 1004 - Reinforced Masonry Structures Code.
AS 2733 - Concrete Masonry Units.

B2 Concrete masonry blocks shall have characteristics compressive strength of F'b = 12 MPa and 16 MPa at specific locations denoted as SW1 - SW39.

B3 All blocks shall be laid dry and wetting shall not be permitted during or after laying.

B4 Channel stretcher blocks and lintel blocks shall be used to form bond beams and lintels respectively. Top groove blocks shall be used elsewhere where horizontal reinforcement is required. Otherwise blocks shall conform to AS 2733.

B5 All blocks must be cured for minimum of 28 days before transportation to site.

B6 Clean out blocks are to be used for core filled cavities and all mortar droppings are to be removed from the bottom cavities before grouting.

B7 Mortar shall comply with AS 1475. Part 1, Appendix A. The mix proprtions of table A1 shall be adjusted to give an average compressive strength of 8 MPa.

B8 Mortar joints to be 10mm thick with blocks fully bedded and perpends filled.

B9 Grout for corefilling shall comply with AS 1475, Part 1, Section 2.
Characteristic compressive strength F'c = 15 MPa Slump 225. Batching by volume is not permitted.

B10 Corefilling is to be placed for the full height in lifts of not more than 1200mm in height. A minimum delay period of one hour and max, three hours shall be observed between lifts. All cores are to be filled unless noted otherwise.

B11 Corefilling shall be thoroughly compacted into place with the aid of small immersion vibrators.

B12 The corefilling at the top of each lift shall be kept down at a distance of 25mm from the top of the blockwork and this surface shall be thoroughly scabbled before any further blocks are laid or concrete poured.

B13 Masonry walls shall be cured for at least three (3) days before corefilling is placed.

B14 All masonry must be approved by the Superintendant before corefilling takes place.

B15 Vertical reinforcement at any level shall be correctly positioned and securely tied to starters projecting from construction below prior to placing blocks.

B16 Reinforcement is to be left undisturbed for at least 12 hours after corefilling. Any reinforcement showing signs of seperation from the corefilling may render that section of the wall liable to rejection.

B17 Minimum cover to reinforcement : 12mm from inside face of block.

B18 Vertical bars shall be placed with laps at not less than 1600mm centres, unless noted otherwise.

B19 Laps, unless noted otherwise, shall be : 40 x bar diameter.

B20 All bars are to be cogged around openings and openings are to have a bond beam over them.

B21 At the completion of a day's work and during wet weather top and sides of all walls shall be covered to prevent rain penetration to cores or wetting of blocks.

B22 Control joints in blockwork to be at 4m maximum spacing.

STRUCTURAL STEELWORK

S1 All workmanship and materials shall be in accordance with PNGS 1003.

S2 Steel grade - 300 MPa.

S3 Plates, unless noted otherwise, shall be 8mm thick.

S4 Bolts, unless noted otherwise, shall be 16mm diameter, Grade 4.6/s, bolts 20mm diameter and greater shall be Grade 8.8/s.

S5 Welds, unless noted otherwise, shall be 6mm continuous fillet weld.

S6 Welding electrodes shall be class E 41XX.

S7 WElding shall be performed by an experienced qualified operator in accordance with PNGS 1016.

S8 The contractor shall verify that all members can be assembled and erected properly, prior to erection on site.

S9 Before fabrication is commenced the Contractor shall submit copies of the shop drawings to the Superintendant for review. Review does not include checking of dimensions.

S10 Reference shall be made to the Architect's drawings for additional drillings, cleats, fixings, etc.

S11 The contractor shall provide and leave in place until permanent bracing elements are constructed, such temporary bracing as is neccessary to stabilise the structure during erection.

S12 The ends of all tubular members are to be sealed with nominal thickness plates and continuous fillet weld unless otherwise shown.

S13 Unless otherwise specified all steelwork shall be sand blasted to remove all rust and scaled and painted one shop coat of inorganic zinc silicate primer min. 40 micron thickness. Members encased in concrete, fire spray or HSTF bolted connections must not be painted.

S14 All base plates shall be temporarily supported and dry pack grouted with 3:1 sand cement grout in a just wet condition.

S15 Cold formed steelwork shall comply with AS 1530, roll formed from hot-dipped zinc-rolled steel grade G450-Z200 to AS 1397.

S16 All steelwork exposed to the weather including bolts and fixings shall be hot dipped galvanised unless noted otherwise.

TIMBER

T1 Timber materials and workmanship shall comply with AS 1720.

T2 Timber shall be seasoned to moisture content not exceeding 15%, unless noted otherwise.

T3 Where unseasoned timber is specified, in no case shall timber be used having a moisture content exceeding 30% at the time of fabrication.

T3 Timber shall have strength properties not less than that shown below:

Stress Grade - F11
Strength Group - SD4
Joint Group - J3

In the absence of mechanical stress, grading timber shall be visually stress graded in accordance with AS 2082.

T4 The Contractor is required to submit details of the proposed species of timber for approval. If unidentified species are proposed, evidence must be provided from the Papua New Guinea Office of Forestry of identification and compliance with the specified properties.

T5 All sizes quoted are the final dressed sizes of finished timber unless noted otherwise.

T6 The Contractor shall verify that all members can be assembled and erected properly.

T7 Any variations shall be referred to the Superintendant for approval.

T8 Steel Components shall comply with PNGS 1003 Steel grade 250.

T9 Bolt holes are to be of same nominal diameter as bolts, drilled through assembled timber.

T10 Washers, unless noted otherwise, shall be provided under all bolt heads and nuts as follows:
Against timber, 65 x 65 x 5 square washers.
Against steel, standard round washers.

T11 All bolts, nuts and washers shall be galvanised in accordance with AS 1214.

T12 All bolts shall be retightened at completion of construction.

T13 Where neccessary timber shall be chamfered locally to just clean fillet welds connection plates, etc.

T14 Preservative treatment is to be provided as follows : dip diffused.

DESIGN LOADS

BASEMENT LEVEL

DEAD LOAD: 40 kPa

LIVE LOAD:
- STAIRS 4.0 kPa

- MECHANICAL LOADS FROM VARIOUS MECHANICAL FACILITIES
- HYDROSTATIC PRESSURE LOAD
- EARTH PRESSURE LOAD
- EARTHQUAKE PRESSURE LOAD
- HYDRODYNAMIC PRESSURE LOAD

This drawing is certified to comply with the Structural Engineering provisions of the Regulations under the Building Act Chapter 301 of the Revised Laws of Papua New Guinea

Name: Mr. L.J. Stocks
Registered Structural Engineer No: 0394152

TENDER ISSUE

PROJECT: PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT (POMSSUP)

TITLE: PS-01,PS-02,PS-03,PS-04,PS-05,PS-10,PS-11,PS-13,PS-14,PS-15,PS-16 & PS-17 Pumping Station - STRUCTURAL NOTES

CLIENT: INDEPENDENT PUBLIC BUSINESS CORPORATION
PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT
PROJECT MANAGEMENT UNIT (PMU)
JAPAN INTERNATIONAL COOPERATION AGENCY

CONSULTANTS : NJS CONSULTANTS CO., LTD. - JAPAN

NOTES :

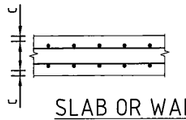
REVISIONS

ISSUE	REV.	DATE	CHKED	DESCRIPTION	BY
TENDER	-	14/11/2011	LJS	ISSUE FOR TENDER	GV

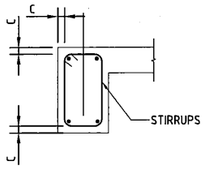
APPROVED by PMU: Project Director Lot G.Zauya — DATE: 1. Dec 2011 — SCALE: 1/100

CHECKED by CONSULTANT Project Manager T.Fuji — DATE: 1. Dec 2011 — DRAWING NO.: PS-S001

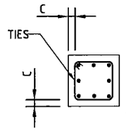
MINIMUM CONCRETE COVER



SLAB OR WALL

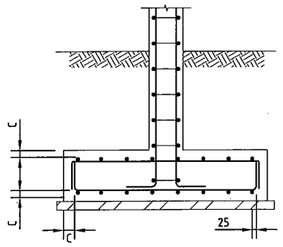


GIRDER OR BEAM

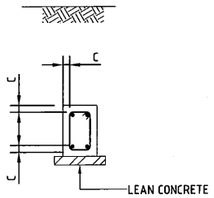


COLUMN OR PEDESTAL

ABOVE GRADE CONCRETE



FOOTING



GRADE BEAM

FOUNDATION

THE MINIMUM CONCRETE COVER OVER REINFORCING BARS SHALL BE AS INDICATED BELOW.

- ELEMENT EXPOSED TO WATER/SPILLAGE (CATCH BASIN/MANHOLE/SPILL BASIN etc	- 75mm
- OTHER STRUCTURE	- 65mm

THE REQUIREMENTS STIPULATED ABOVE SHALL NOT BE APPLIED TO THE FOLLOWING REINFORCED CONCRETE ITEMS :

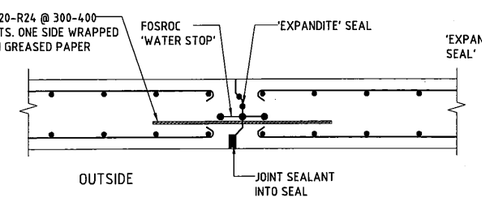
a) CONCRETE PIPES
- AS PER MANUFACTURER'S STANDARD.

b) FIREPROOFING (WITH GALVANISED WIRE MESH)

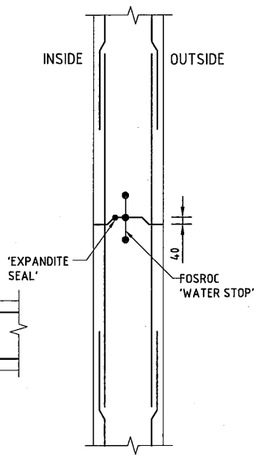
c) DITCH LINING/ SLOPE PROTECTION

d) CONCRETE PAVING

NOTE: FOR CONCRETE CAST AGAINST GROUND (WITHOUT FORMWORK) MINIMUM CONCRETE COVER (C) SHALL BE 75mm.

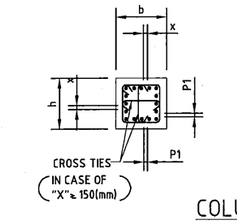


RECTANGULAR STRUCTURES

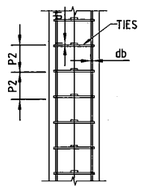


TYPICAL EXPANSION JOINT DETAIL FOR CIRCULAR LIQUID RETAINING STRUCTURE

SPACING LIMITS

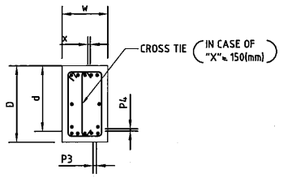


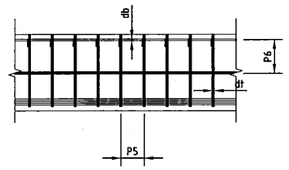
COLUMN



P1 ≥ hagg x 4/3 (mm)
1.5db,
40 (mm)
WHICHEVER IS GREATER

P2 ≤ 15 db or 300(mm) or
SMALLEST CROSS SECTIONAL DIMENSION OF COLUMN
WHICHEVER IS SMALLER





P3 ≥ hagg x 4/3 (mm)
db
WHICHEVER IS GREATER
hagg = 20(mm)

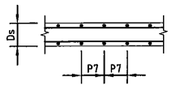
P4 ≥ 25(mm)

P5 ≤ D/2 or 300mm
WHICHEVER IS SMALLER

P6 ≤ 300(mm)

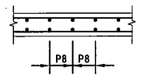
GIRDER AND BEAM

PRIMARY REINFORCEMENT



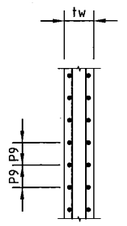
P7 ≤ 2Ds or 300 (mm)
WHICHEVER IS SMALLER

SECONDARY REINFORCEMENT

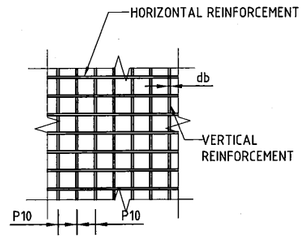


P8 ≤ 2Ds or 300 (mm)
WHICHEVER IS SMALLER

SLAB



P9 ≤ 350(mm)
≤ 2.5tw
≤ 4db



P10 ≤ 350(mm)
≤ 2.5tw
≤ 4db

WALL

NOTE : VERTICAL REINFORCEMENT NEED NOT BE ENCLOSED BY LATERAL TIES IF VERTICAL REINFORCEMENT AREA IS NOT GREATER THAN 0.01 TIMES GROSS CONCRETE AREA, OR WHERE VERTICAL REINFORCEMENT IS NOT REQUIRED AS COMPRESSION REINFORCEMENT.

FOR WALLS GREATER THAN 200mm THICK, THE VERTICAL AND HORIZONTAL REINFORCEMENT SHALL BE PROVIDED IN TWO GRIDS, ONE NEAR EACH FACE OF THE WALL.

NOTES:

1. FOR GENERAL NOTES, SEE DWG No. PGLN-YK-CSZZZ-900100.

2. LEGEND
   - hagg : NOMINAL MAXIMUM SIZE OF AGGREGATE = 20mm
   - d : EFFECTIVE DEPTH
   - db : SIZE OF LONGITUDINAL BARS (mm)
   - N : BAR SYMBOL
   - dt : SIZE OF TIES
   - s : SPACING
   - D : BEAM HEIGHT
   - w : BEAM WIDTH
   - b,h : COLUMN SECTION
   - tw : THICKNESS OF WALL

3. SPACING OF TIES AND STIRRUPS SHALL BE IN ACCORDANCE WITH AS 3600-2001

3-1 TIES SPACING (P2)
MAXIMUM TIE SPACING SHALL NOT EXCEED THE FOLLOWING VALUE
- -15db
- -SMALLEST CROSS SECTIONAL DIMENSION OF COLUMN
- -300mm

} WHICHEVER IS SMALLER

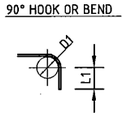
3-2 STIRRUP SPACING (P5)
MAXIMUM STIRRUP SPACING SHALL NOT EXCEED THE FOLLOWING VALUE:
- -D/2
- -15db
- -300mm

} WHICHEVER IS SMALLER

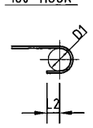
STANDARD HOOKS AND BENDS

FOR MAIN REINFORCEMENT

90° HOOK OR BEND



180° HOOK

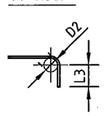


(mm)

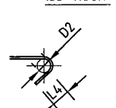
BAR SIZE	MIN.BEND DIA. D1	MIN.EXTENSION L1	MIN.EXTENSION L2
N12	60	120	70
N16	80	135	70
N20	100	160	80
N24	120	195	100
N28	140	225	115
N32	160	260	130
N36	180	290	145
N40	200	320	160

FOR TIES AND STIRRUPS REINFORCEMENT

90° HOOK

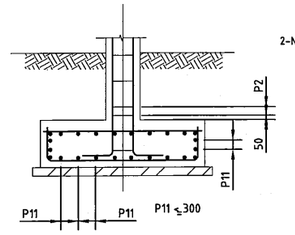


135° HOOK

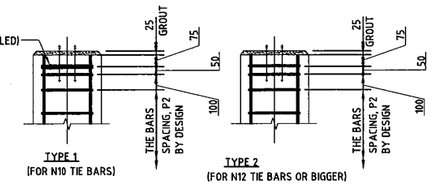


(mm)

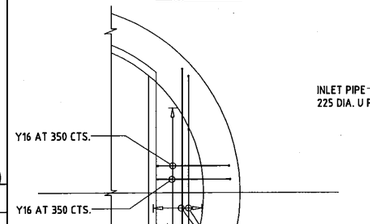
BAR SIZE	MIN.BEND DIA. D2	MIN.EXTENSION L3	MIN.EXTENSION L4
N10	40	135	100
N12	50	160	120



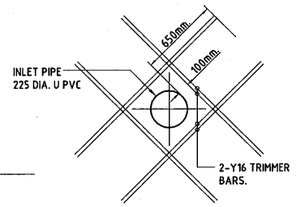
FOOTING



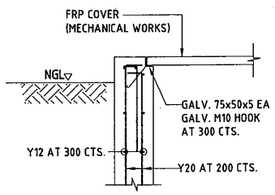
STIRRUP DETAIL FOR TOP OF PEDESTAL



DETAIL 1
SCALE 1:50



TYP. DETAIL
SCALE 1:50



DETAIL 2
SCALE 1:50

This drawing is certified to comply with the Structural Engineering provisions of the Regulations under the Building Act Chapter 301 of the Revised Laws of Papua New Guinea

Name: Mr. L.J. Stocks
Registered Structural Engineer No: 0394152

TENDER ISSUE

PROJECT: PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT (POMSSUP)

TITLE: PS-01,PS-02,PS-03,PS-04,PS-05,PS-10,PS-11,PS-13,PS-14,PS-15,PS-16 & PS-17 Pumping Station - TYPICAL DETAILS & NOTES

CLIENT: INDEPENDENT PUBLIC BUSINESS CORPORATION
PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT
PROJECT MANAGEMENT UNIT (PMU)
JAPAN INTERNATIONAL COOPERATION AGENCY

CONSULTANTS : NJS CONSULTANTS CO., LTD. - JAPAN

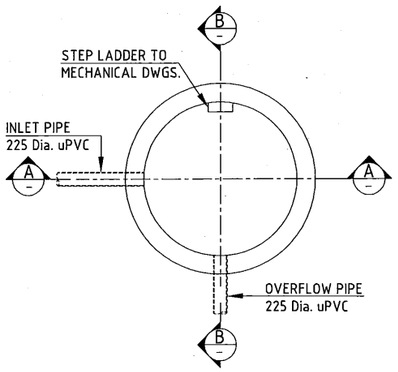
NOTES :

REVISIONS

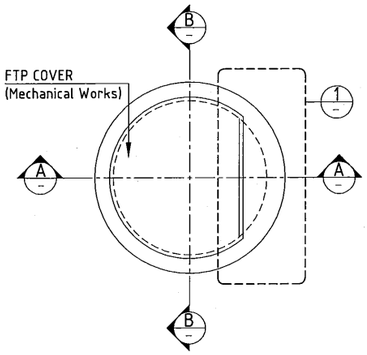
ISSUE	REV.	DATE	CHKED	DESCRIPTION	BY
TENDER	-	14/11/2011	LJS	ISSUE FOR TENDER	GV

APPROVED by PMU: Project Director Lot G.Zauya — DATE: 1. Dec 2011 — SCALE: 1/100

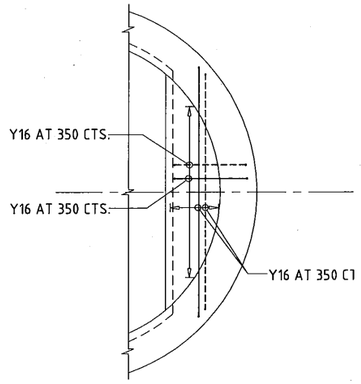
CHECKED by CONSULTANT Project Manager T.Fuji — DATE: 1. Dec 2011 — DRAWING NO.: PS-S001a



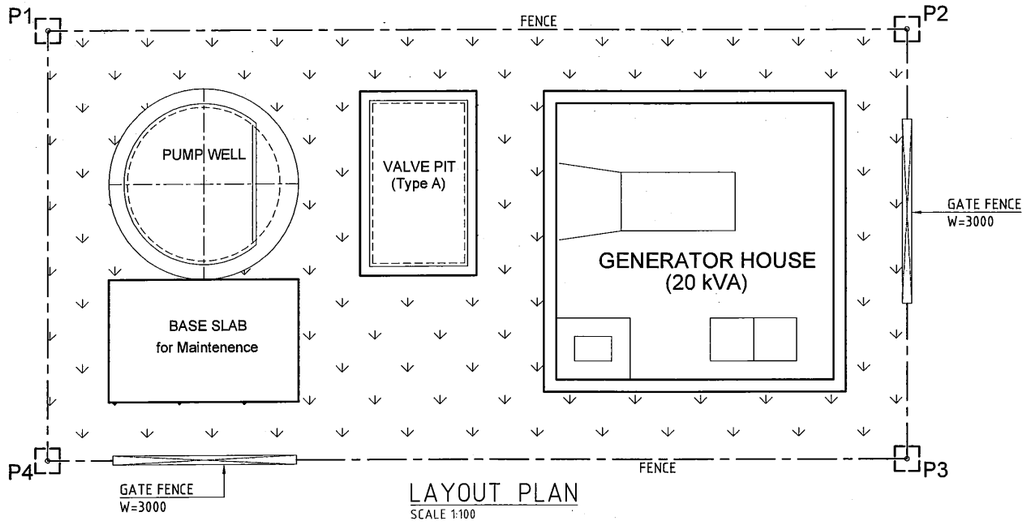
BASE PLAN
SCALE 1:100



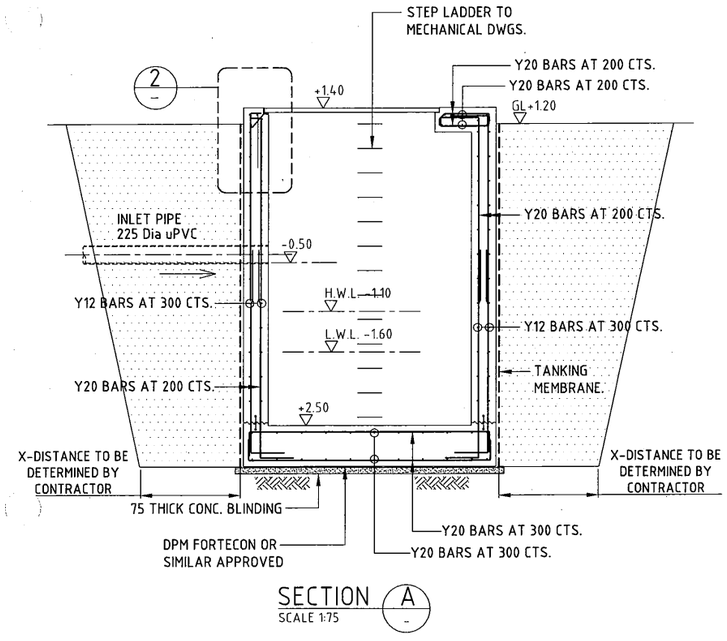
TOP PLAN
SCALE 1:100



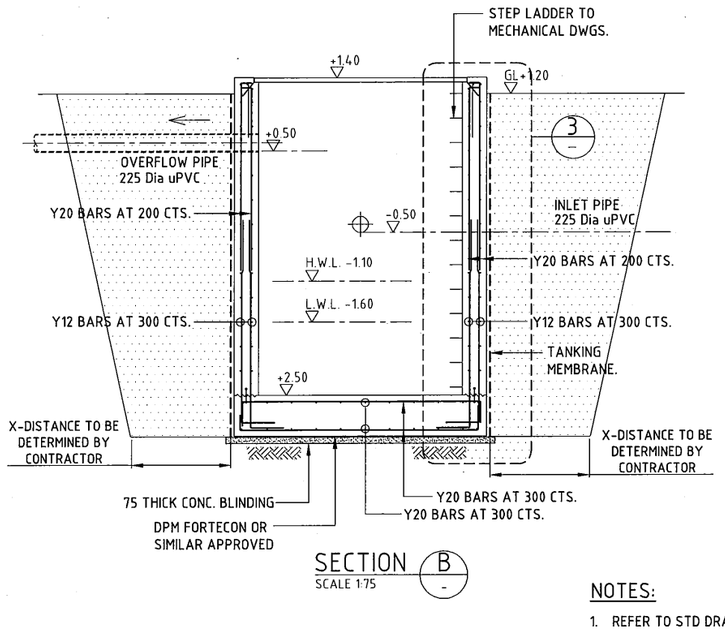
DETAIL 1
SCALE 1:50



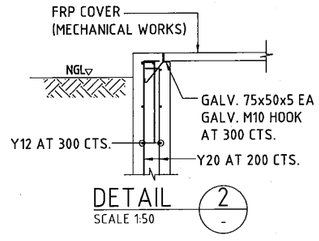
LAYOUT PLAN
SCALE 1:100



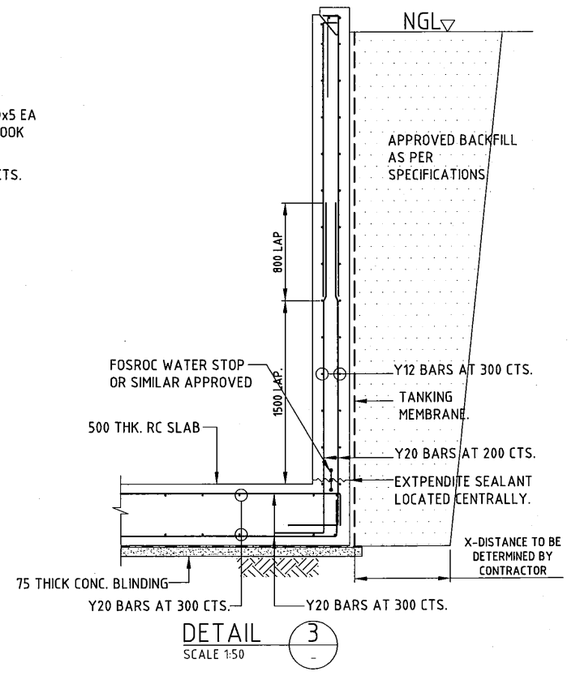
SECTION A
SCALE 1:75



SECTION B
SCALE 1:75



DETAIL 2
SCALE 1:50



DETAIL 3
SCALE 1:50

NOTES:

1. REFER TO STD DRAWINGS FOR MISCELLANEOUS WORKS SUCH AS HANDRAILS, COVER, STEP LADDER, STAIR, STOP LOG AND EXPANSION JOINT.
2. EXTENT OF BULK EXCAVATION TO BE DETERMINED BY THE CONTRACTOR.
3. CONCRETE GRADE - F'c-40MPa
4. CONCRETE COVER AS FOLLOWS:
   RC WALL - 75mm
   BASE SLAB - 75mm
   SUSPENDED SLAB - 65mm
5. REFER TO SHEET STP-S001a FOR ALL THE TYPICAL DETAILS AND REBAR ARRANGEMENTS.

This drawing is certified to comply with the Structural Engineering provisions of the Regulations under the Building Act Chapter 301 of the Revised Laws of Papua New Guinea

Name: Mr. L.J. Stocks
Registered Structural Engineer No: 0394152

TENDER ISSUE

PROJECT: PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT (POMSSUP)

TITLE: PS-1 Kanudi Pumping Station - Layout, Pump Well Plan and Section

CLIENT: INDEPENDENT PUBLIC BUSINESS CORPORATION
PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT
PROJECT MANAGEMENT UNIT (PMU)
JAPAN INTERNATIONAL COOPERATION AGENCY

CONSULTANTS: NJS CONSULTANTS CO., LTD. - JAPAN

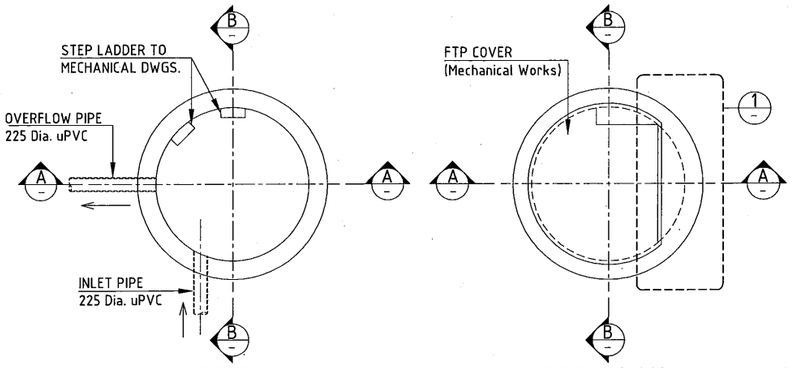
NOTES:

REVISIONS

ISSUE	REV.	DATE	CHKED	DESCRIPTION	BY
TENDER	-	14/11/2011	LJS	ISSUE FOR TENDER	GV

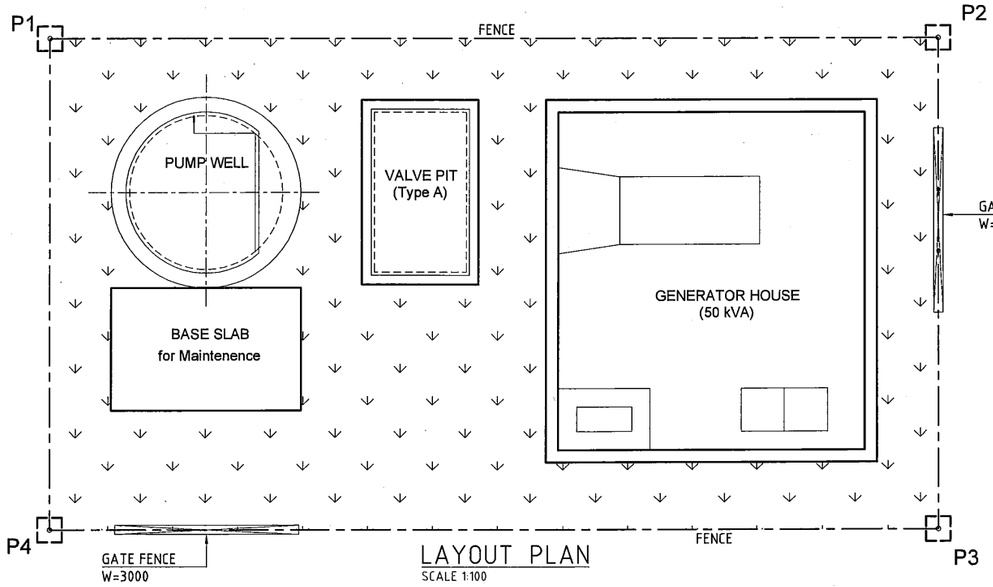
APPROVED by PMU: Project Director Lot G.Zauya
DATE: 1. Dec 2011
SCALE: 1/100

CHECKED by CONSULTANT Project Manager T.Fuji
DATE: 1. Dec 2011
DRAWING NO.: PS-KN-C02



BASE PLAN
SCALE 1:100

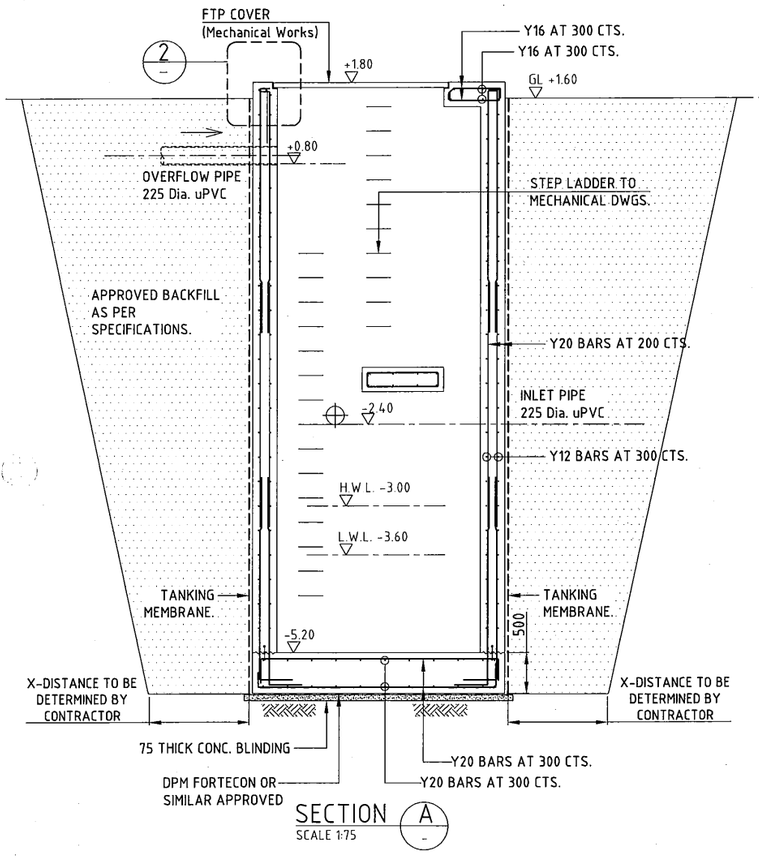
TOP PLAN
SCALE 1:100



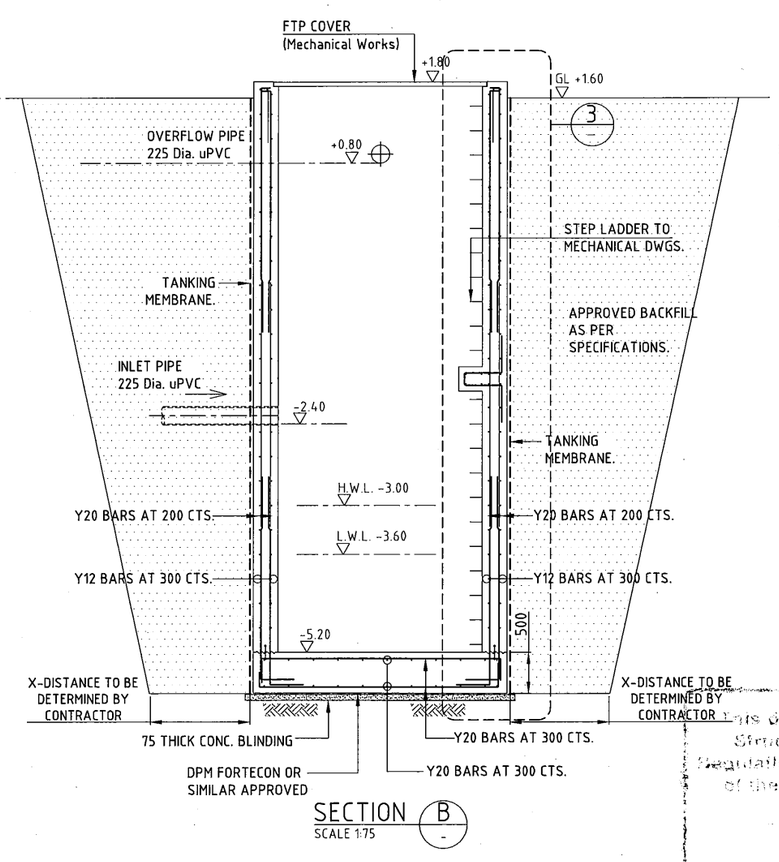
LAYOUT PLAN
SCALE 1:100

NOTES:

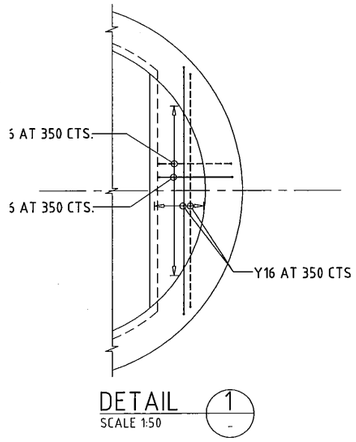
1. REFER TO STD DRAWINGS FOR MISCELLANEOUS WORKS SUCH AS HANDRAILS, COVER, STEP LADDER, STAIR, STOP LOG AND EXPANSION JOINT.
2. EXTENT OF BULK EXCAVATION TO BE DETERMINED BY THE CONTRACTOR.
3. CONCRETE GRADE - F'c-40MPa
4. CONCRETE COVER AS FOLLOWS:
   RC WALL - 75mm
   BASE SLAB - 75mm
   SUSPENDED SLAB - 65mm
5. REFER TO SHEET STP-S001a FOR ALL THE TYPICAL DETAILS AND REBAR ARRANGEMENTS.



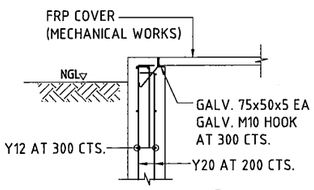
SECTION A
SCALE 1:75



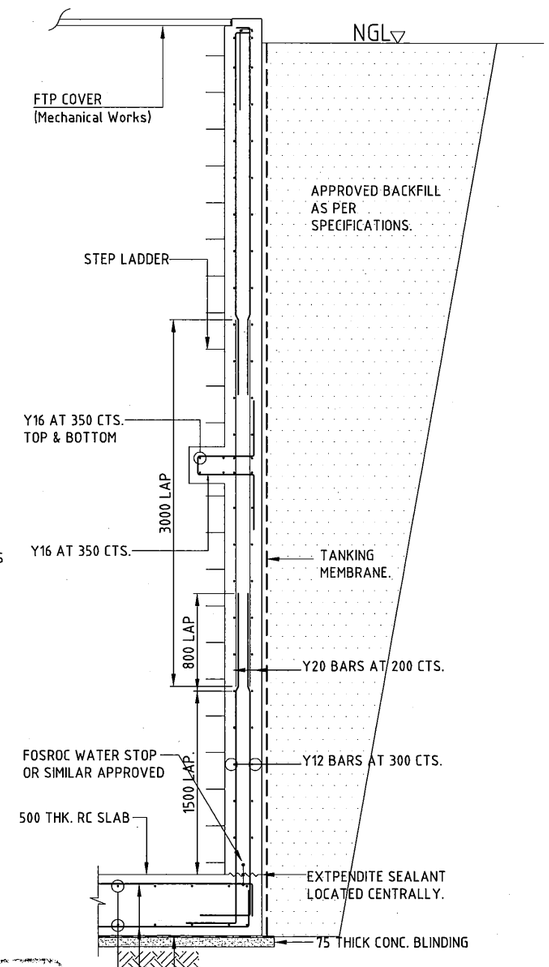
SECTION B
SCALE 1:75



DETAIL 1
SCALE 1:50



DETAIL 2
SCALE 1:50



DETAIL 3
SCALE 1:50

This drawing is certified to comply with the Structural Engineering provisions of the Regulations under the Building Act Chapter 291 of the Revised Laws of Papua New Guinea

TENDER ISSUE

PROJECT: PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT (POMSSUP)

TITLE: PS-2 Idubada Pumping Station - Layout, Pump Well Plan and Section

CLIENT: INDEPENDENT PUBLIC BUSINESS CORPORATION
PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT
PROJECT MANAGEMENT UNIT (PMU)
JAPAN INTERNATIONAL COOPERATION AGENCY

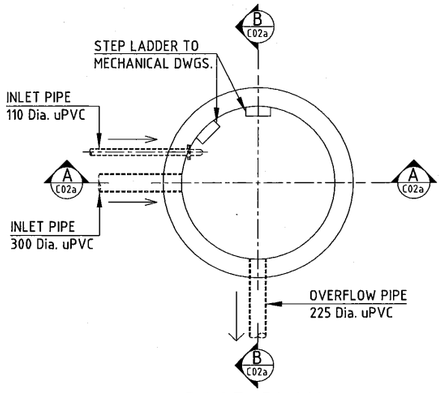
CONSULTANTS : NJS CONSULTANTS CO., LTD. - JAPAN

NOTES :

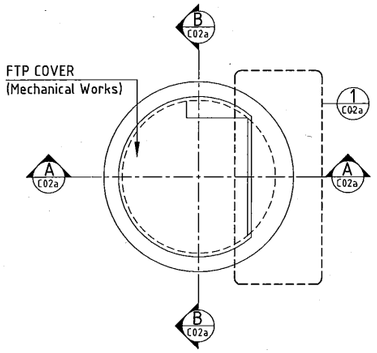
REVISIONS					
ISSUE	REV.	DATE	CHKED	DESCRIPTION	BY
TENDER	-	14/11/2011	LJS	ISSUE FOR TENDER	GV

APPROVED by PMU: Project Director Lot G.Zauya — DATE: 1. Dec 2011 — SCALE: 1/100

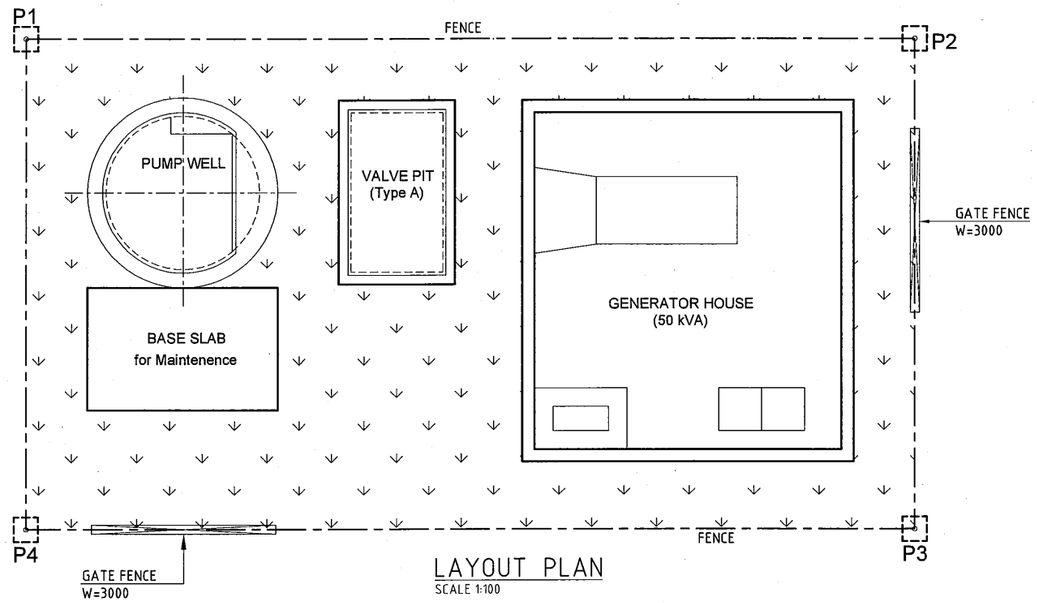
CHECKED by CONSULTANT Project Manager T.Fuji — DATE: 1. Dec 2011 — DRAWING NO.: PS-IB-C02



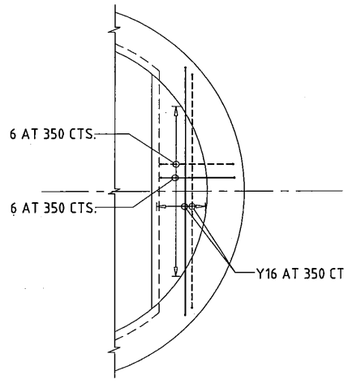
BASE PLAN
SCALE 1:100



TOP PLAN
SCALE 1:100



LAYOUT PLAN
SCALE 1:100



DETAIL 1
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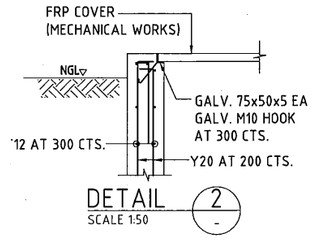


DETAIL 2
SCALE 1:50

NOTES:

1. REFER TO STD DRAWINGS FOR MISCELLANEOUS WORKS SUCH AS HANDRAILS, COVER, STEP LADDER, STAIR, STOP LOG AND EXPANSION JOINT.
2. EXTENT OF BULK EXCAVATION TO BE DETERMINED BY THE CONTRACTOR.
3. CONCRETE GRADE - F'c-40MPa
4. CONCRETE COVER AS FOLLOWS:
   RC WALL - 75mm
   BASE SLAB - 75mm
   SUSPENDED SLAB - 65mm
5. REFER TO SHEET STP-S001a FOR ALL THE TYPICAL DETAILS AND REBAR ARRANGEMENTS.

This drawing is certified to comply with the Structural Engineering provisions of the Regulations under the Building Act Chapter 301 of the Revised Laws of Papua New Guinea

Name: Mr. L.J. Stocks
Registered Structural Engineer No: 0394152

TENDER ISSUE

PROJECT: PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT (POMSSUP)

TITLE: PS-3 Hagara Pumping Station - Layout, Pump Well Plan and Section

CLIENT: INDEPENDENT PUBLIC BUSINESS CORPORATION
PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT
PROJECT MANAGEMENT UNIT (PMU)
JAPAN INTERNATIONAL COOPERATION AGENCY

CONSULTANTS : NJS CONSULTANTS CO., LTD. - JAPAN

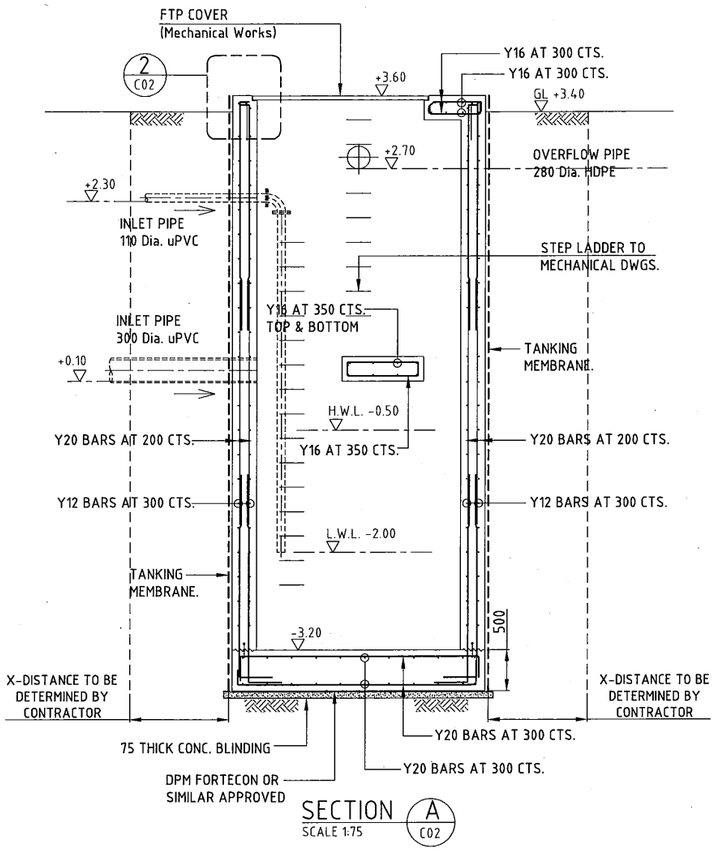
NOTES :

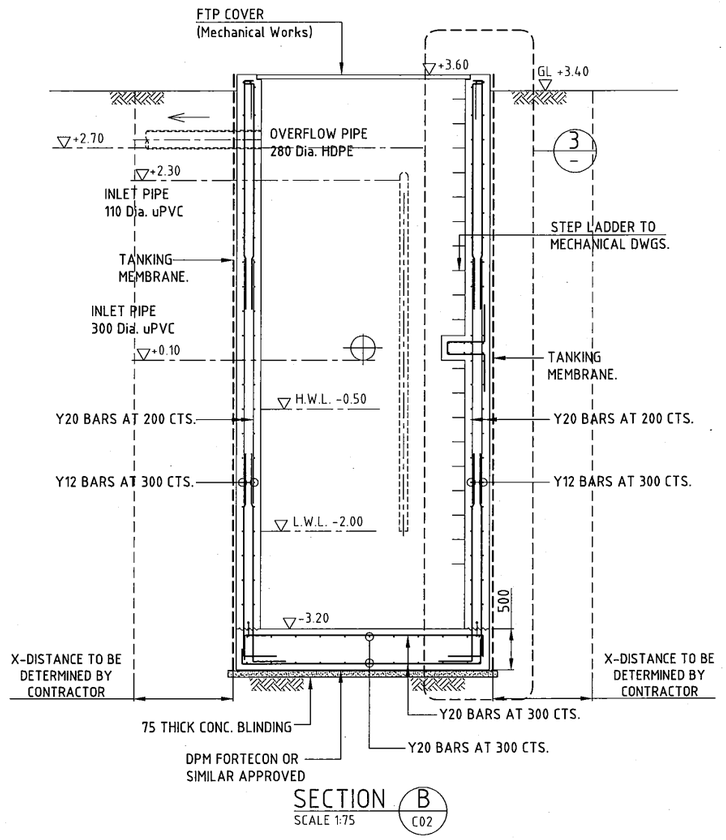
REVISIONS

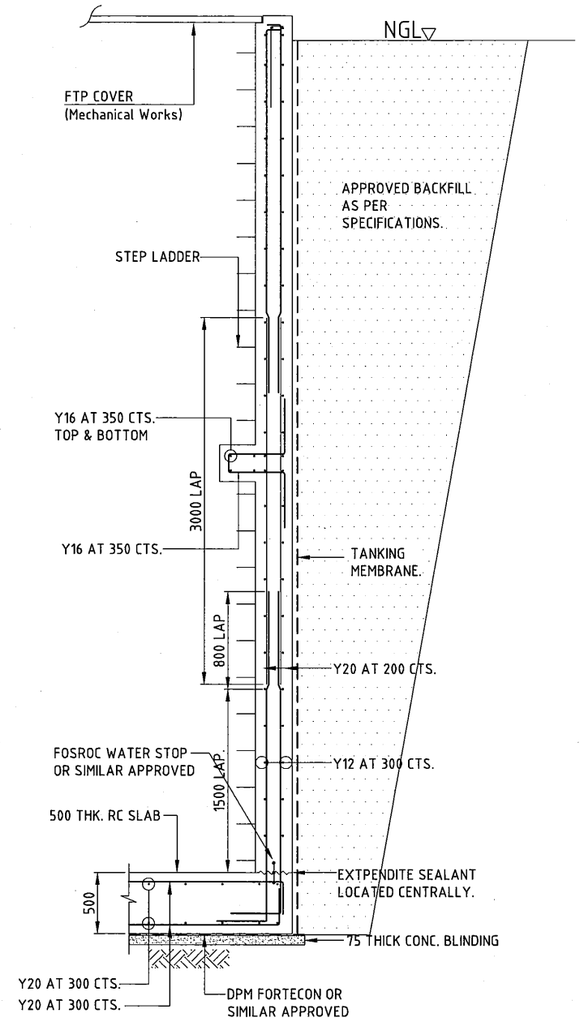
ISSUE	REV.	DATE	CHKED	DESCRIPTION	BY
TENDER	-	14/11/2011	LJS	ISSUE FOR TENDER	GV

APPROVED by PMU: Project Director Lot G.Zauya — DATE: 1. Dec 2011 — SCALE: 1/100

CHECKED by CONSULTANT Project Manager T.Fuji — DATE: 1. Dec 2011 — DRAWING NO.: PS-HG-C02







This drawing is certified to comply with the Structural Engineering provisions of the Regulations under the Building Act Chapter 301 of the Revised Laws of Papua New Guinea

Name: Mr. L.J. Stocks
Registered Structural Engineer No: 0394152

TENDER ISSUE

PROJECT: PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT (POMSSUP)

TITLE: PS-3 Hagara Pumping Station - Layout, Pump Well Plan and Section

CLIENT: INDEPENDENT PUBLIC BUSINESS CORPORATION
PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT
PROJECT MANAGEMENT UNIT (PMU)
JAPAN INTERNATIONAL COOPERATION AGENCY

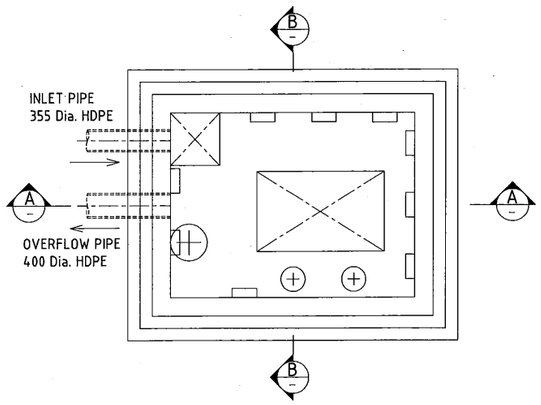
CONSULTANTS: NJS CONSULTANTS CO., LTD. - JAPAN

NOTES:

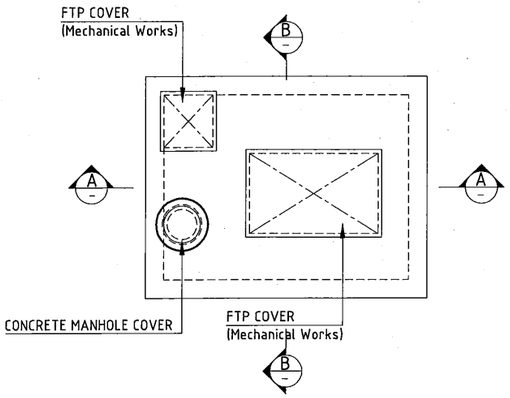
REVISIONS					
ISSUE	REV.	DATE	CHKED	DESCRIPTION	BY
TENDER	-	14/11/2011	LJS	ISSUE FOR TENDER	GV

APPROVED by PMU: Project Director Lot G.Zauya — DATE: 1. Dec 2011 — SCALE: 1/100

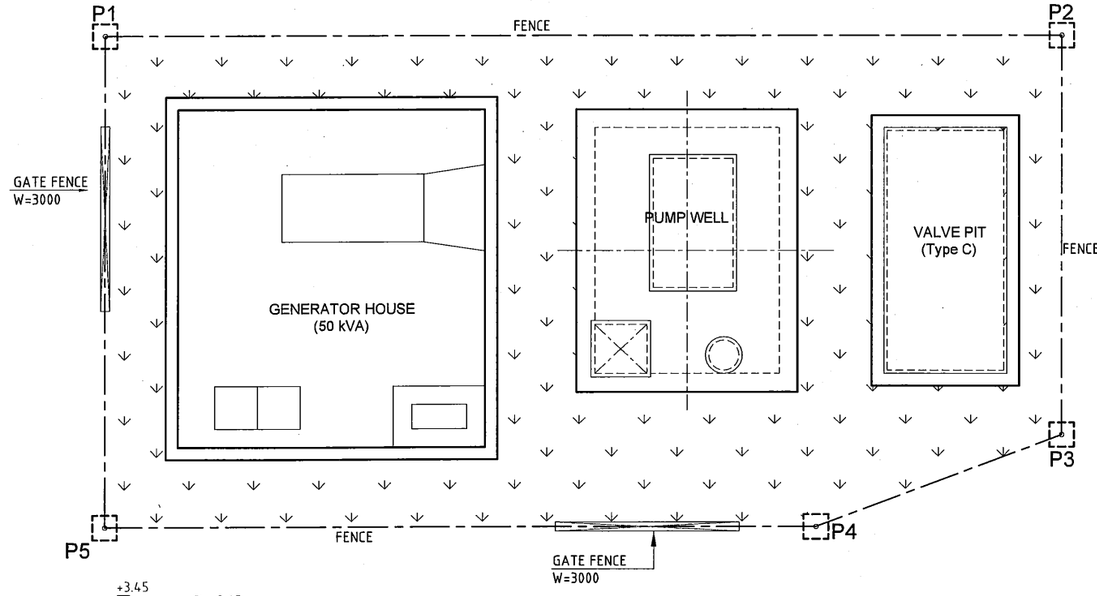
CHECKED by CONSULTANT Project Manager T.Fuji — DATE: 1. Dec 2011 — DRAWING NO.: PS-HG-C02a



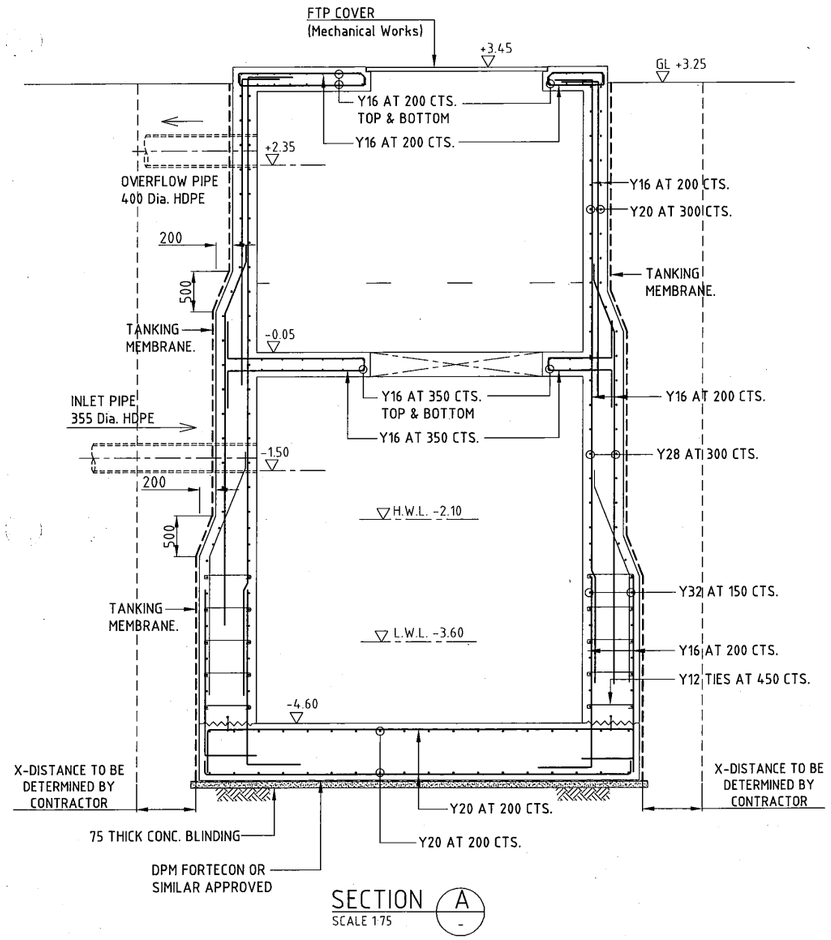
BASE PLAN
SCALE 1:100



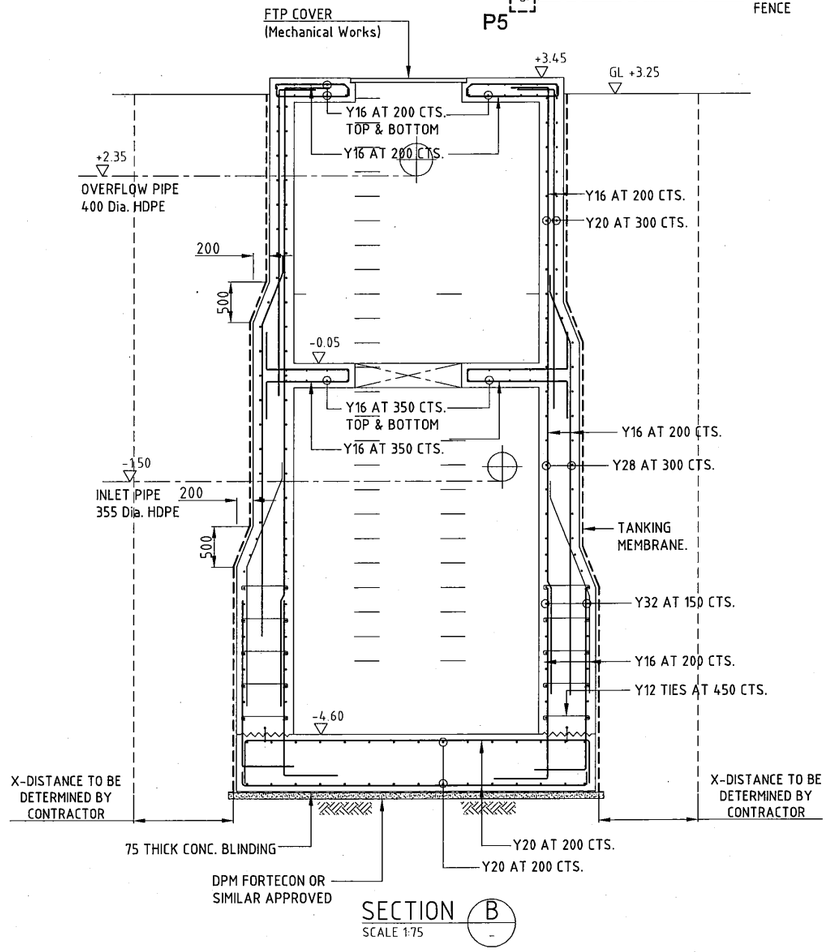
TOP PLAN
SCALE 1:100



LAYOUT PLAN
SCALE 1:100



SECTION A
SCALE 1:75



SECTION B
SCALE 1:75

NOTES:

1. REFER TO STD DRAWINGS FOR MISCELLANEOUS WORKS SUCH AS HANDRAILS, COVER, STEP LADDER, STAIR, STOP LOG AND EXPANSION JOINT.
2. EXTENT OF BULK EXCAVATION TO BE DETERMINED BY THE CONTRACTOR.
3. CONCRETE GRADE - F'c-40MPa
4. CONCRETE COVER AS FOLLOWS:
   RC WALL - 75mm
   BASE SLAB - 75mm
   SUSPENDED SLAB - 65mm
5. REFER TO SHEET STP-S001a FOR ALL THE TYPICAL DETAILS AND REBAR ARRANGEMENTS.

This drawing is certified to comply with the Structural Engineering provisions of the Regulations under the Building Act Chapter 301 of the Revised Laws of Papua New Guinea

Name: Mr. L.J. Stocks
Registered Str... No: 0294152

TENDER ISSUE

PROJECT: PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT (POMSSUP)

TITLE: PS-4 Hanuabada Pumping Station - Layout, Pump Well Plan and Section

CLIENT: INDEPENDENT PUBLIC BUSINESS CORPORATION
PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT
PROJECT MANAGEMENT UNIT (PMU)
JAPAN INTERNATIONAL COOPERATION AGENCY

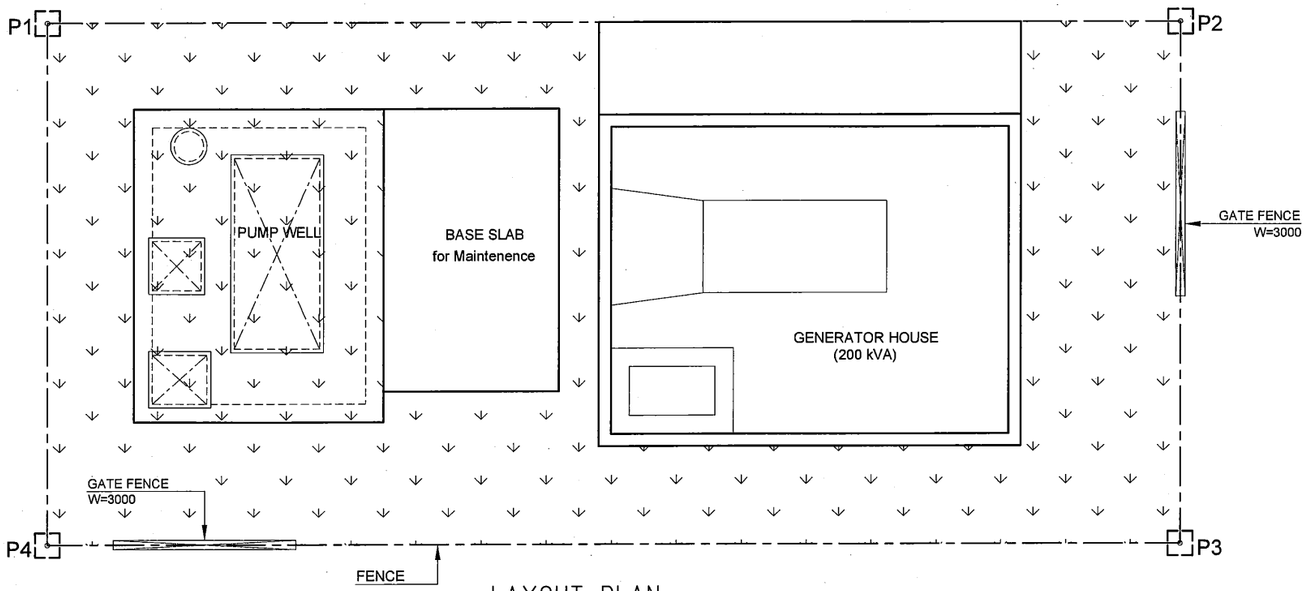
CONSULTANTS : NJS CONSULTANTS CO., LTD. - JAPAN

NOTES :

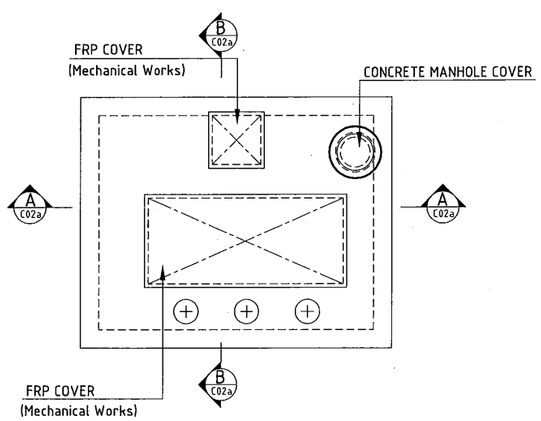
REVISIONS					
ISSUE	REV.	DATE	CHKED	DESCRIPTION	BY
TENDER	-	14/11/2011	LJS	ISSUE FOR TENDER	GV

APPROVED by PMU: Project Director Lot G.Zauya	DATE: 1. Dec 2011	SCALE: 1/100
CHECKED by CONSULTANT Project Manager T.Fuji	DATE: 1. Dec 2011	DRAWING NO.: PS-HB-C02

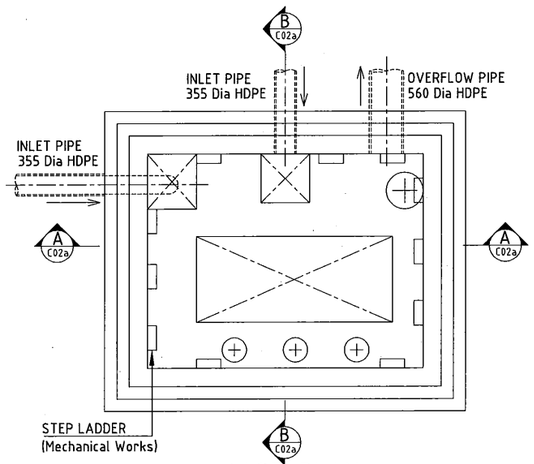
7



LAYOUT PLAN
SCALE 1:100



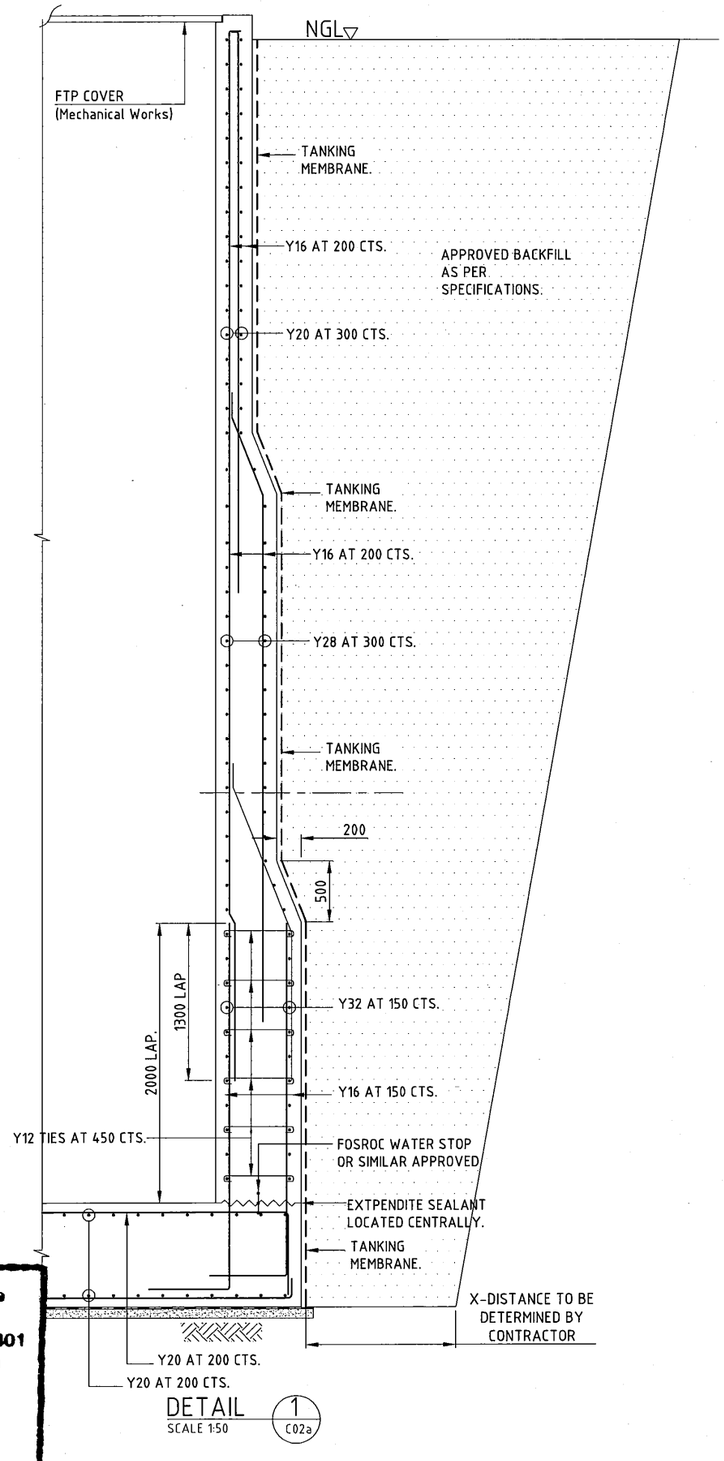
TOP PLAN
SCALE 1:100



BASE PLAN
SCALE 1:100

NOTES:

1. REFER TO STD DRAWINGS FOR MISCELLANEOUS WORKS SUCH AS HANDRAILS, COVER, STEP LADDER, STAIR, STOP LOG AND EXPANSION JOINT.
2. EXTENT OF BULK EXCAVATION TO BE DETERMINED BY THE CONTRACTOR.
3. CONCRETE GRADE - F'c-40MPa
4. CONCRETE COVER AS FOLLOWS:
   RC WALL - 75mm
   BASE SLAB - 75mm
   SUSPENDED SLAB - 65mm
5. REFER TO SHEET STP-S001a FOR ALL THE TYPICAL DETAILS AND REBAR ARRANGEMENTS.



DETAIL 1 C02a
SCALE 1:50

This drawing is certified to comply with the Structural Engineering provisions of the Regulations under the Building Act Chapter 301 of the Revised Laws of Papua New Guinea

Name: Mr. L.J. Stocks
Registered Structural Engineer No: 0394152

TENDER ISSUE

PROJECT: PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT (POMSSUP)

TITLE: PS-5 Konedobu Pumping Station - Layout, Pump Well Plan and Section

CLIENT: INDEPENDENT PUBLIC BUSINESS CORPORATION
PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT
PROJECT MANAGEMENT UNIT (PMU)
JAPAN INTERNATIONAL COOPERATION AGENCY

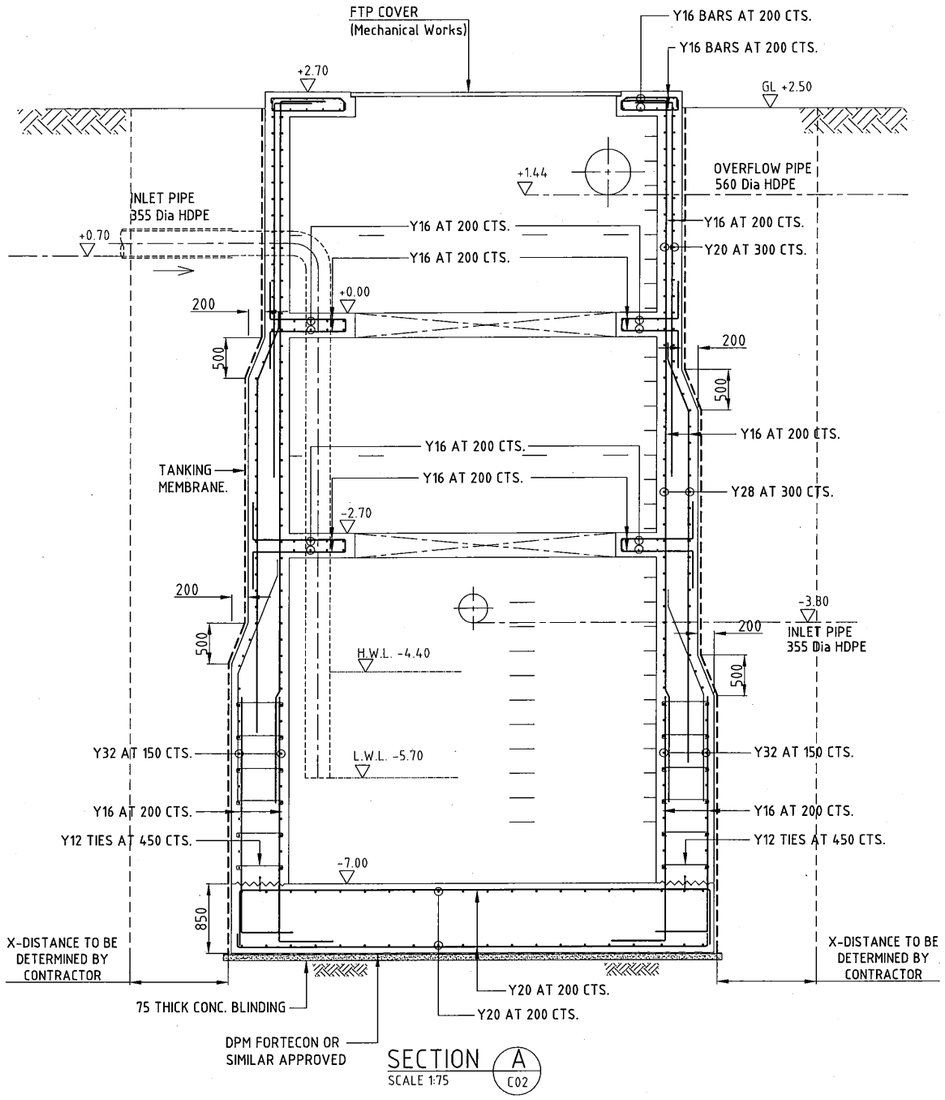
CONSULTANTS : NJS CONSULTANTS CO., LTD. - JAPAN

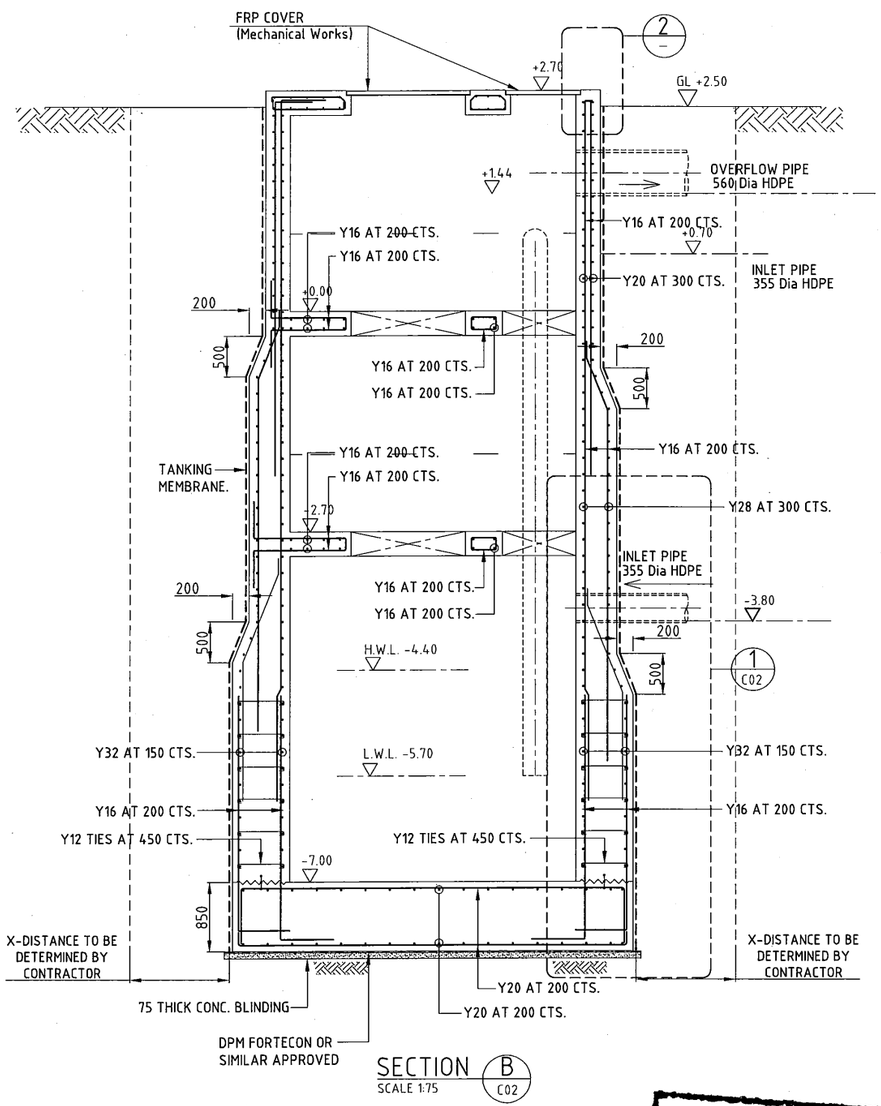
NOTES :

REVISIONS

ISSUE	REV.	DATE	CHKED	DESCRIPTION	BY
TENDER	-	14/11/2011	LJS	ISSUE FOR TENDER	GV

APPROVED by PMU: Project Director Lot G.Zauya
DATE: 1. Dec 2011
SCALE: 1/100
CHECKED by CONSULTANT Project Manager T.Fuji
DATE: 1. Dec 2011
DRAWING NO.: PS-KD-C02





This drawing is certified to comply with the Structural Engineering provisions of the Regulations under the Building Act Chapter 301 of the Revised Laws of Papua New Guinea

Name: Mr. L.J. Stocks
Registered Structural Engineer No: 0394152

TENDER ISSUE

PROJECT: PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT (POMSSUP)

TITLE: PS-5 Konedobu Pumping Station - Layout, Pump Well Plan and Section

CLIENT: INDEPENDENT PUBLIC BUSINESS CORPORATION
PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT
PROJECT MANAGEMENT UNIT (PMU)
JAPAN INTERNATIONAL COOPERATION AGENCY

CONSULTANTS : NJS CONSULTANTS CO., LTD. - JAPAN

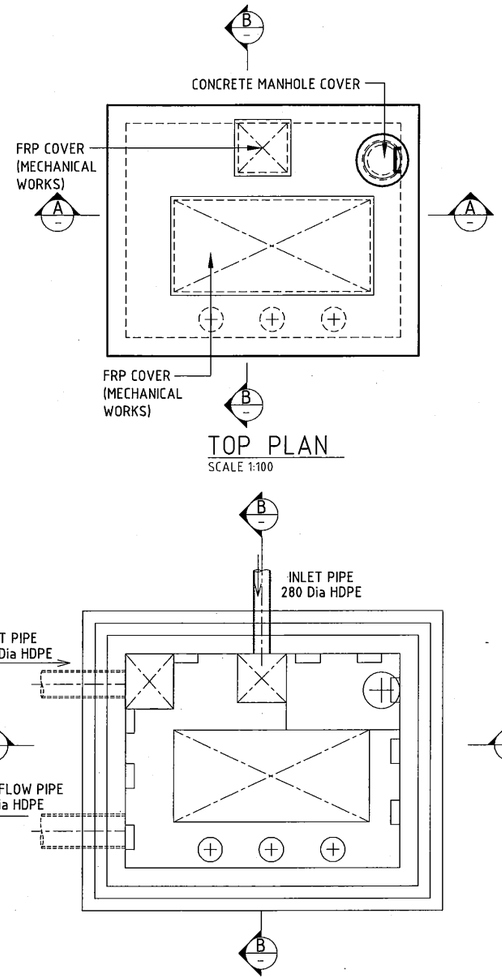
NOTES :

REVISIONS

ISSUE	REV.	DATE	CHKED	DESCRIPTION	BY
TENDER	-	14/11/2011	LJS	ISSUE FOR TENDER	GV

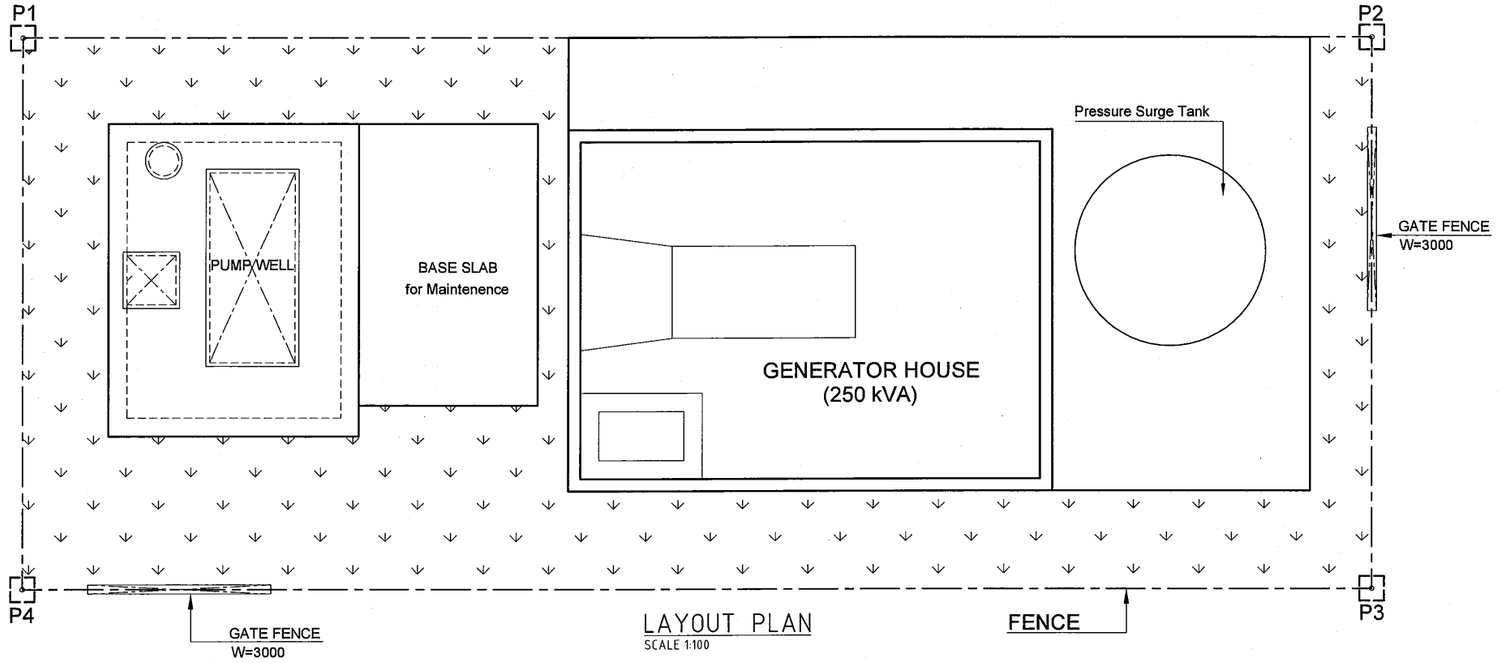
APPROVED by PMU: Project Director Lot G.Zauya — DATE: 1. Dec 2011 — SCALE: 1/100

CHECKED by CONSULTANT Project Manager T.Fuji — DATE: 1. Dec 2011 — DRAWING NO.: PS-KD-C02a



TOP PLAN
SCALE 1:100

BASE PLAN
SCALE 1:100



LAYOUT PLAN
SCALE 1:100

NOTES:

1. REFER TO STD DRAWINGS FOR MISCELLANEOUS WORKS SUCH AS HANDRAILS, COVER, STEP LADDER, STAIR, STOP LOG AND EXPANSION JOINT.
2. EXTENT OF BULK EXCAVATION TO BE DETERMINED BY THE CONTRACTOR.
3. CONCRETE GRADE - F'c-40MPa
4. CONCRETE COVER AS FOLLOWS:
   RC WALL - 75mm
   BASE SLAB - 75mm
   SUSPENDED SLAB - 65mm
5. REFER TO SHEET STP-S001a FOR ALL THE TYPICAL DETAILS AND REBAR ARRANGEMENTS.

This drawing is certified to comply with the Structural Engineering provisions of the Regulations under the Building Act Chapter 301 of the Revised Laws of Papua New Guinea

Name: Mr. L.J. Stocks
Registered Structural Engineer No: 0394152

TENDER ISSUE

PROJECT: PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT (POMSSUP)

TITLE: PS-10 Lawes Road Pumping Station - Layout, Pump Well Plan and Section

CLIENT: INDEPENDENT PUBLIC BUSINESS CORPORATION
PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT
PROJECT MANAGEMENT UNIT (PMU)
JAPAN INTERNATIONAL COOPERATION AGENCY

CONSULTANTS : NJS CONSULTANTS CO., LTD. - JAPAN

NOTES :

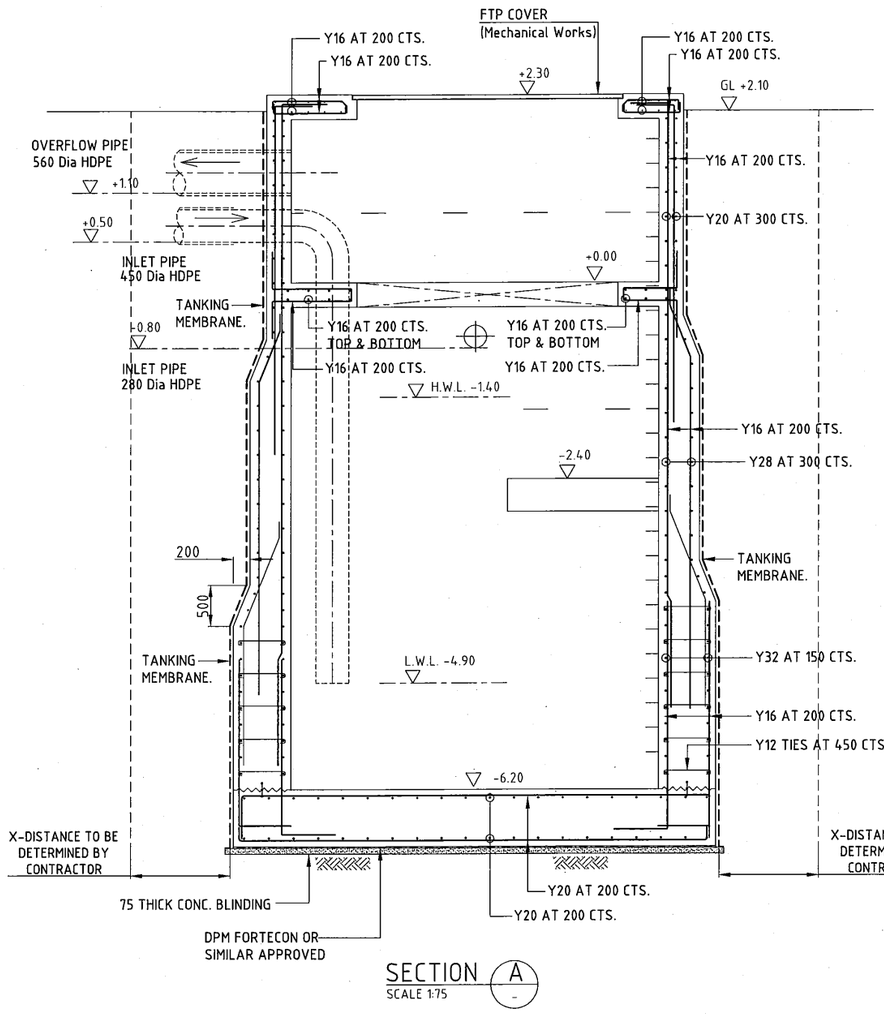
REVISIONS

ISSUE	REV.	DATE	CHKED	DESCRIPTION	BY
TENDER	-	14/11/2011	LJS	ISSUE FOR TENDER	GV

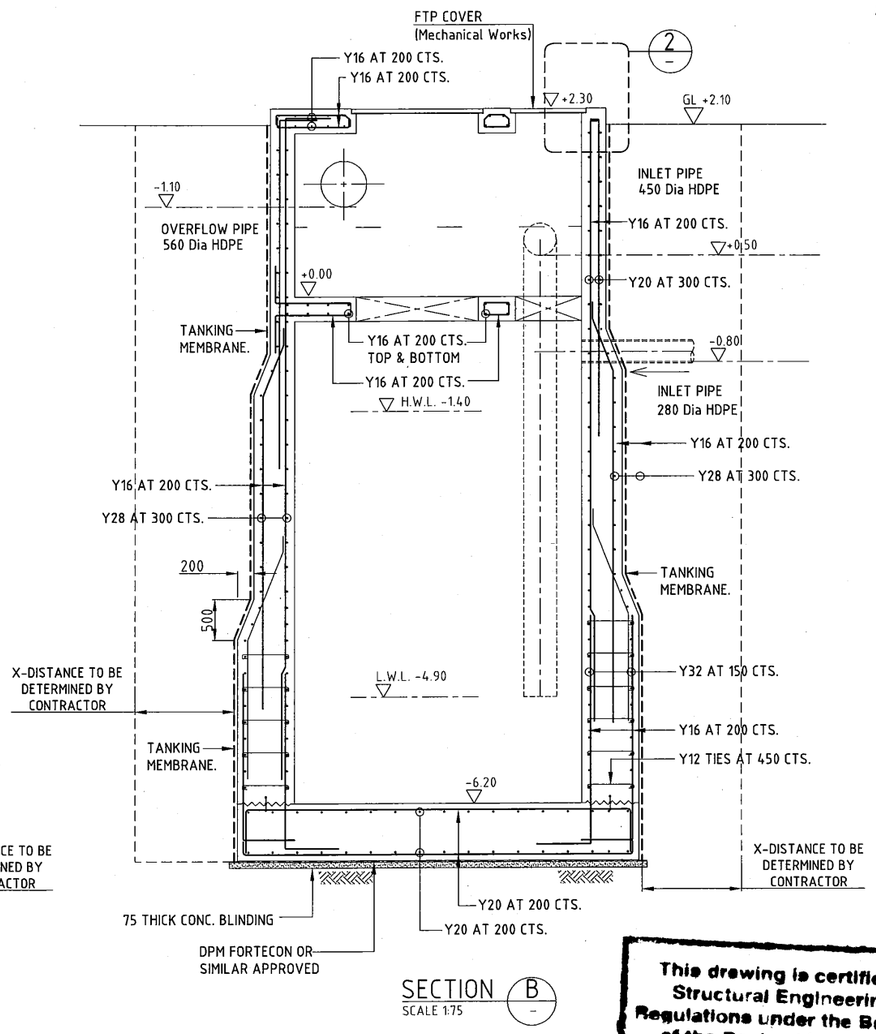
APPROVED by PMU: Project Director, Lot G.Zauya — DATE: 1. Dec 2011 — SCALE: 1/100

CHECKED by CONSULTANT: Project Manager, T.Fuji — DATE: 1. Dec 2011 — DRAWING NO.: PS-LR-C02

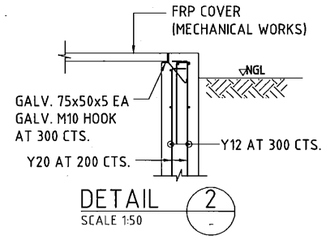
10



SECTION A
SCALE 1:75



SECTION B
SCALE 1:75



DETAIL 2
SCALE 1:50

This drawing is certified to comply with the Structural Engineering provisions of the Regulations under the Building Act Chapter 301 of the Revised Laws of Papua New Guinea

Name: Mr. L.J. Stocks
Registered Structural Engineer No: 0394152

TENDER ISSUE

PROJECT: PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT (POMSSUP)

TITLE: PS-10 Lawes Road Pumping Station - Layout, Pump Well Plan and Section

CLIENT: INDEPENDENT PUBLIC BUSINESS CORPORATION
PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT
PROJECT MANAGEMENT UNIT (PMU)
JAPAN INTERNATIONAL COOPERATION AGENCY

CONSULTANTS : NJS CONSULTANTS CO., LTD. - JAPAN

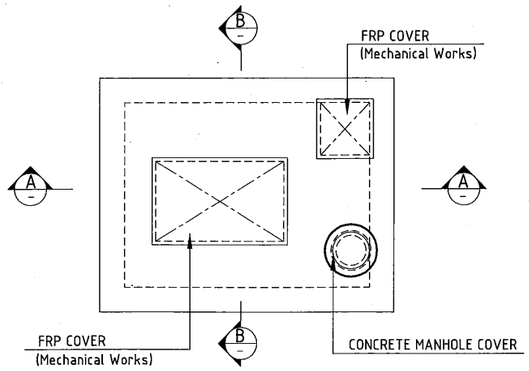
NOTES :

REVISIONS

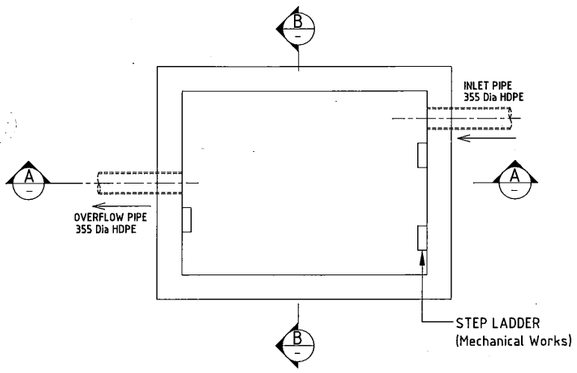
ISSUE	REV.	DATE	CHKED	DESCRIPTION	BY
TENDER	-	14/11/2011	LJS	ISSUE FOR TENDER	GV

APPROVED by PMU: Project Director Lot G.Zauya — DATE: 1. Dec 2011 — SCALE: 1/100

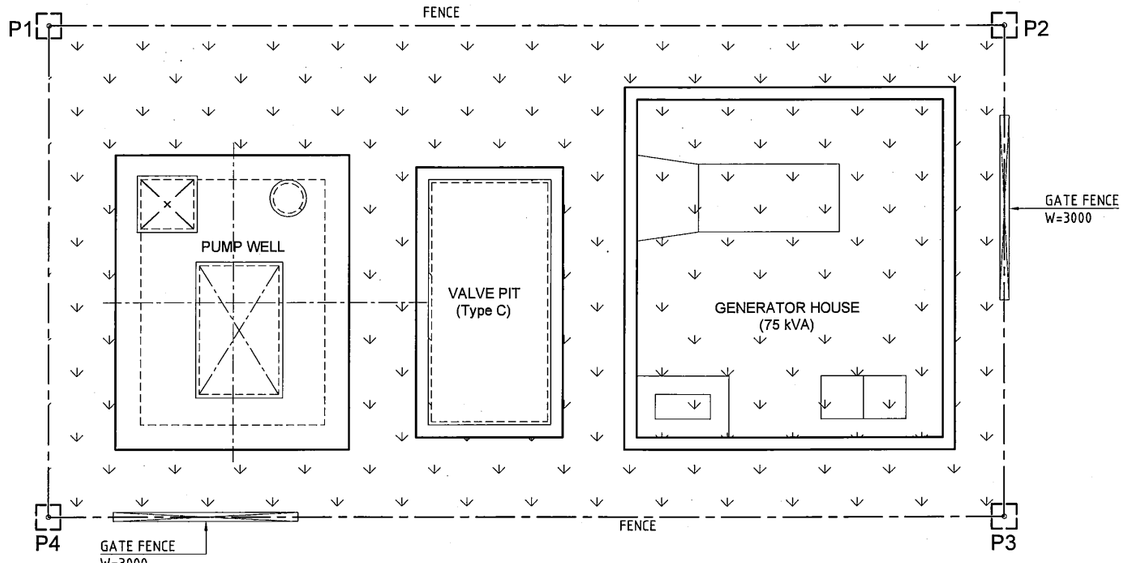
CHECKED by CONSULTANT Project Manager T.Fuji — DATE: 1. Dec 2011 — DRAWING NO.: PS-LR-C02a



TOP PLAN
SCALE 1:100



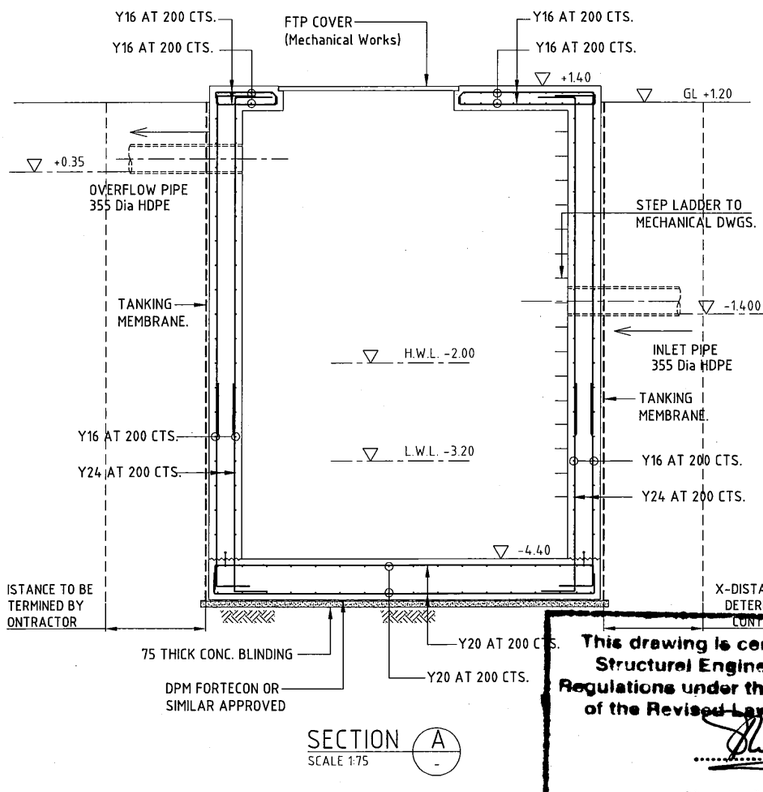
BASE PLAN
SCALE 1:100



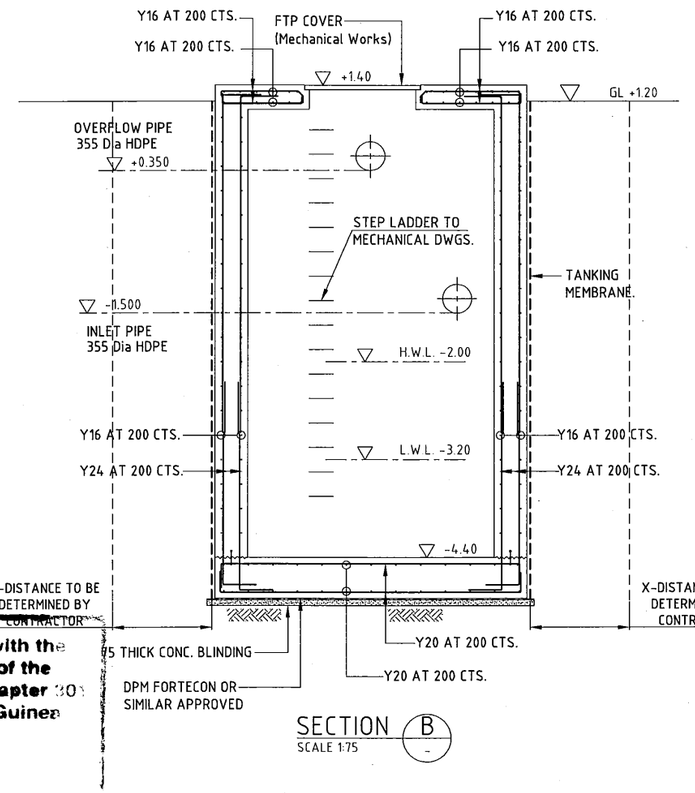
LAYOUT PLAN
SCALE 1:100

NOTES:

1. REFER TO STD DRAWINGS FOR MISCELLANEOUS WORKS SUCH AS HANDRAILS, COVER, STEP LADDER, STAIR, STOP LOG AND EXPANSION JOINT.
2. EXTENT OF BULK EXCAVATION TO BE DETERMINED BY THE CONTRACTOR.
3. CONCRETE GRADE - F'c-40MPa
4. CONCRETE COVER AS FOLLOWS:
   RC WALL - 75mm
   BASE SLAB - 75mm
   SUSPENDED SLAB - 65mm
5. REFER TO SHEET STP-S001a FOR ALL THE TYPICAL DETAILS AND REBAR ARRANGEMENTS.



SECTION A
SCALE 1:75



SECTION B
SCALE 1:75

This drawing is certified to comply with the Structural Engineering provisions of the Regulations under the Building Act Chapter 30 of the Revised Laws of Papua New Guinea

Name: Mr. L.J. Stocks
Registered Structural Engineer No: 039415

TENDER ISSUE

PROJECT:
PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT (POMSSUP)

TITLE:
PS-11 Koki Pumping Station - Layout, Pump Well Plan and Section

CLIENT:
INDEPENDENT PUBLIC BUSINESS CORPORATION
PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT
PROJECT MANAGEMENT UNIT (PMU)
JAPAN INTERNATIONAL COOPERATION AGENCY

CONSULTANTS :
NJS CONSULTANTS CO., LTD. - JAPAN

NOTES :

REVISIONS

ISSUE	REV.	DATE	CHKED	DESCRIPTION	BY
TENDER	-	14/11/2011	LJS	ISSUE FOR TENDER	GV

APPROVED by PMU:
Project Director
Lot G.Zauya

DATE: 1. Dec 2011

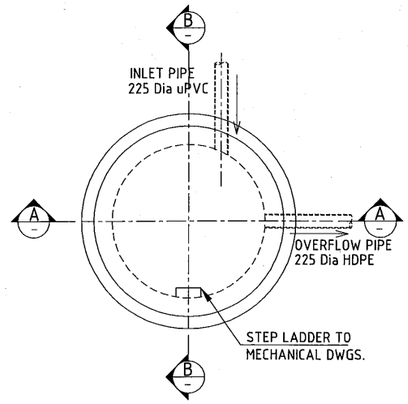
SCALE: 1/100

CHECKED by CONSULTANT
Project Manager
T.Fuji

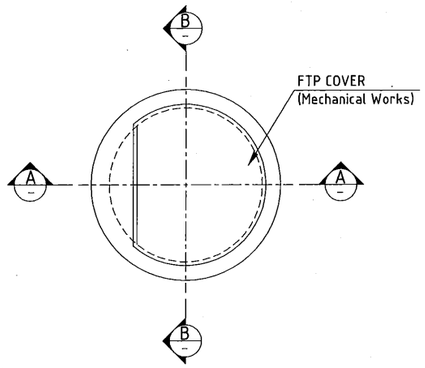
DATE: 1. Dec 2011

DRAWING NO.: PS-KK-C02

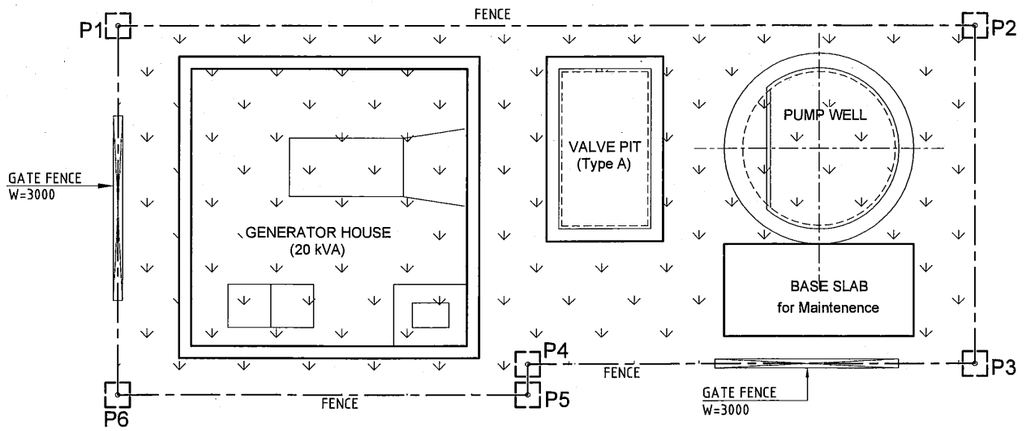
12



BASE PLAN
SCALE 1:100



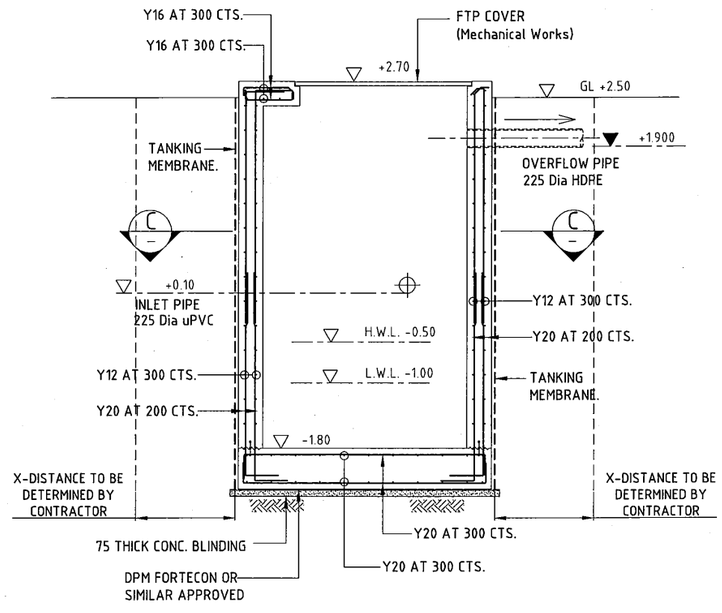
TOP PLAN
SCALE 1:100



LAYOUT PLAN
SCALE 1:100

NOTES:

1. REFER TO STD DRAWINGS FOR MISCELLANEOUS WORKS SUCH AS HANDRAILS, COVER, STEP LADDER, STAIR, STOP LOG AND EXPANSION JOINT.
2. EXTENT OF BULK EXCAVATION TO BE DETERMINED BY THE CONTRACTOR.
3. CONCRETE GRADE - F'c-40MPa
4. CONCRETE COVER AS FOLLOWS:
   RC WALL - 75mm
   BASE SLAB - 75mm
   SUSPENDED SLAB - 65mm
5. REFER TO SHEET STP-S001a FOR ALL THE TYPICAL DETAILS AND REBAR ARRANGEMENTS.



SECTION A
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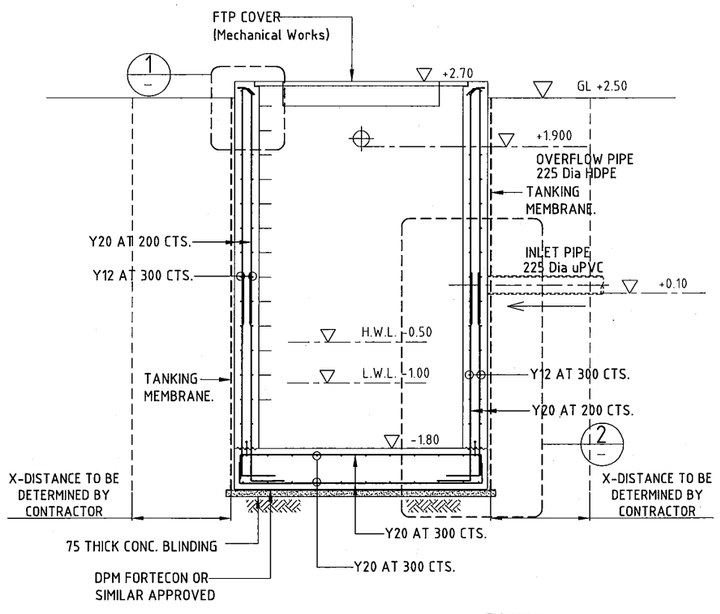
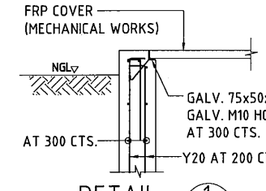
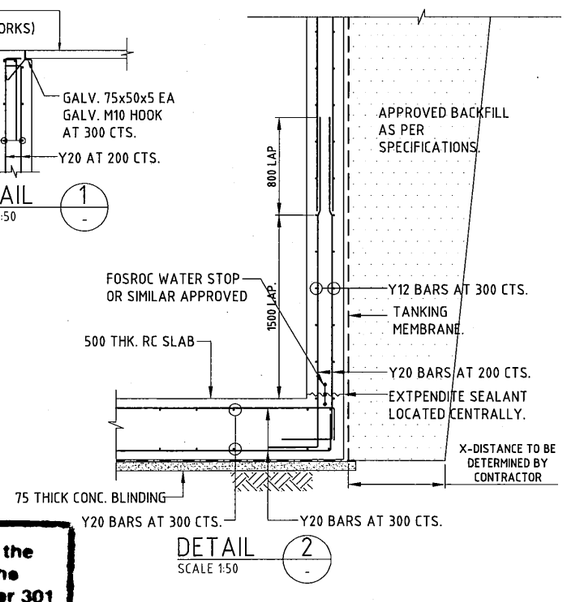


SECTION B
SCALE 1:75



DETAIL 1
SCALE 1:50



DETAIL 2
SCALE 1:50

This drawing is certified to comply with the Structural Engineering provisions of the Regulations under the Building Act Chapter 301 of the Revised Laws of Papua New Guinea

Name: Mr. L.J. Stocks
Registered Structural Engineer No: 0394152

TENDER ISSUE

PROJECT:
PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT (POMSSUP)

TITLE:
PS-13 Kila Police Pumping Station - Layout, Pump Well Plan and Section

CLIENT:
INDEPENDENT PUBLIC BUSINESS CORPORATION
PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT
PROJECT MANAGEMENT UNIT (PMU)
JAPAN INTERNATIONAL COOPERATION AGENCY

CONSULTANTS:
NJS CONSULTANTS CO., LTD. - JAPAN

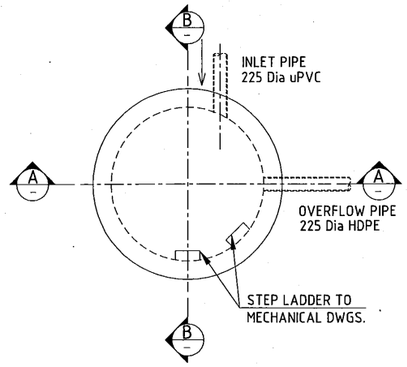
NOTES:

REVISIONS

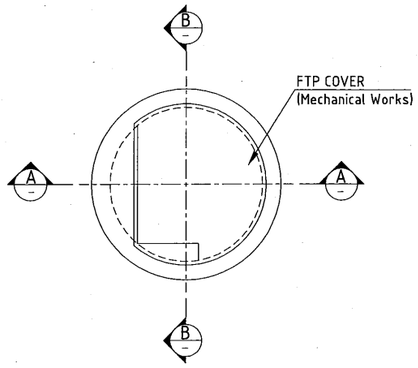
ISSUE	REV.	DATE	CHKED	DESCRIPTION	BY
TENDER	-	14/11/2011	LJS	ISSUE FOR TENDER	GV

APPROVED by PMU:
Project Director
Lot G.Zauya
DATE: 1. Dec 2011
SCALE: 1/100

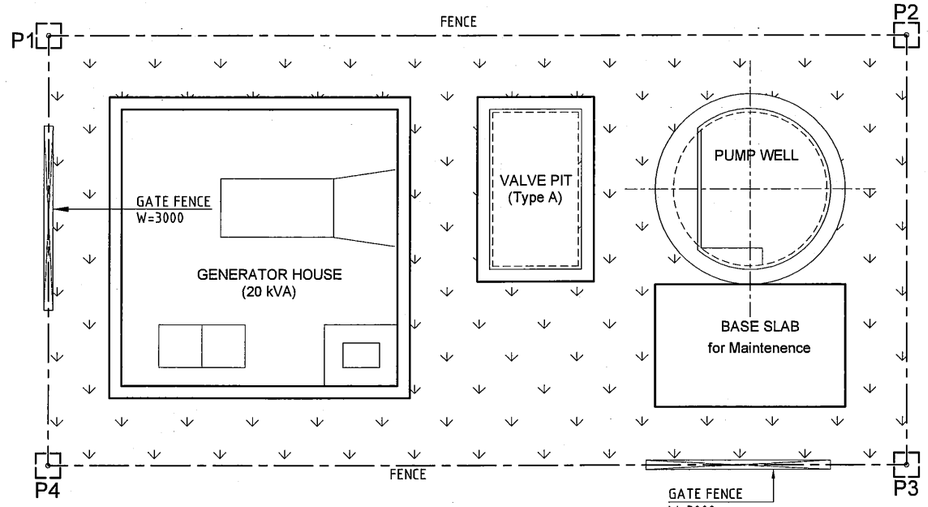
CHECKED by CONSULTANT
Project Manager
T.Fuji
DATE: 1. Dec 2011
DRAWING NO.: PS-KP-C02



BASE PLAN
SCALE 1:100



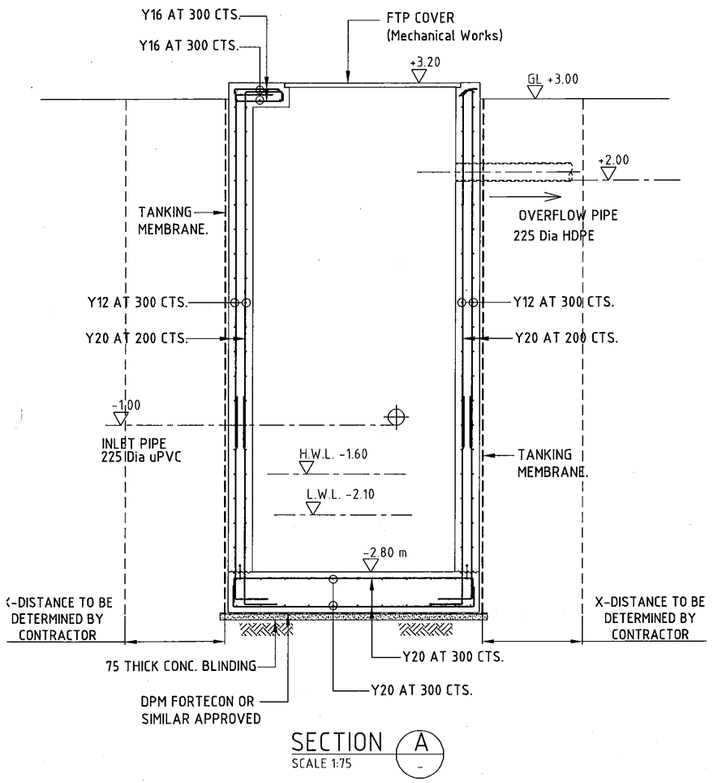
TOP PLAN
SCALE 1:100



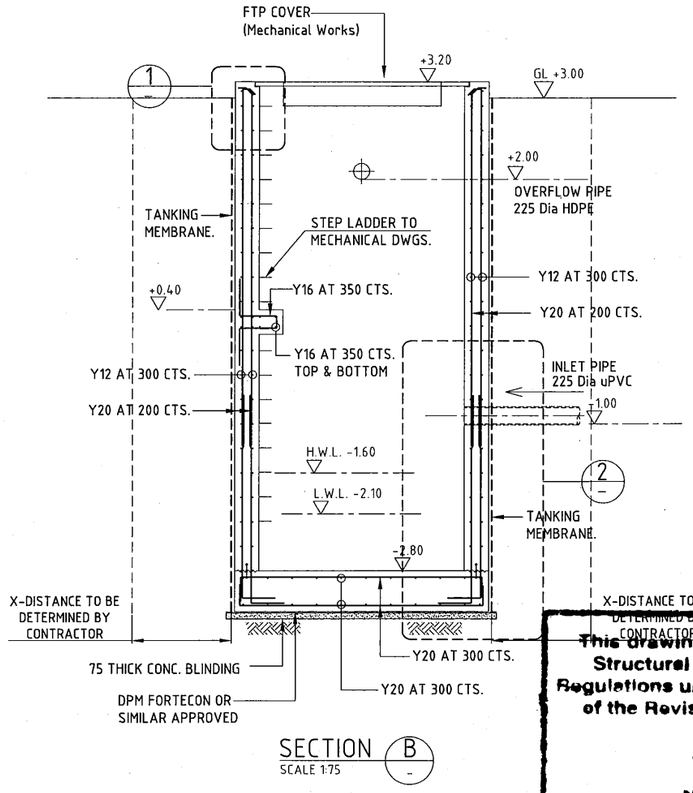
LAYOUT PLAN
SCALE 1:100

NOTES:

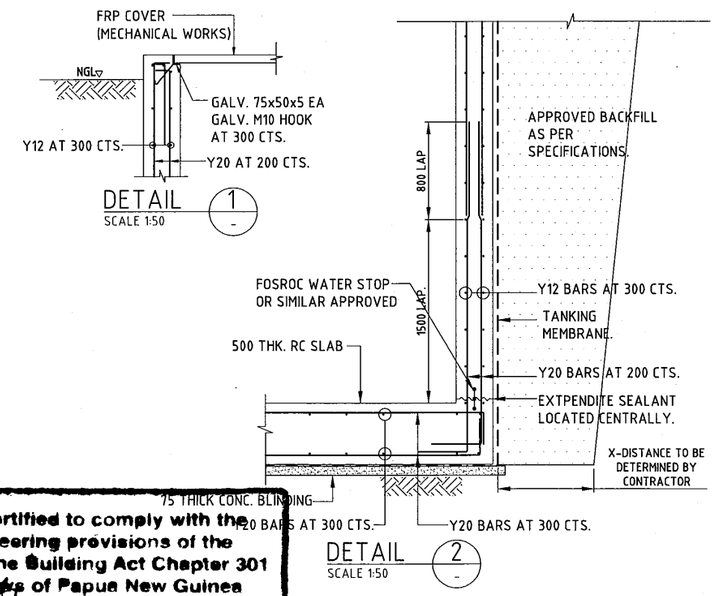
1. REFER TO STD DRAWINGS FOR MISCELLANEOUS WORKS. SUCH AS HANDRAILS, COVER, STEP LADDER, STAIR, STOP LOG AND EXPANSION JOINT.
2. EXTENT OF BULK EXCAVATION TO BE DETERMINED BY THE CONTRACTOR.
3. CONCRETE GRADE - F'c-40MPa
4. CONCRETE COVER AS FOLLOWS:
   RC WALL - 75mm
   BASE SLAB - 75mm
   SUSPENDED SLAB - 65mm
5. REFER TO SHEET STP-S001a FOR ALL THE TYPICAL DETAILS AND REBAR ARRANGEMENTS.



SECTION A
SCALE 1:75



SECTION B
SCALE 1:75



DETAIL 1
SCALE 1:50

DETAIL 2
SCALE 1:50

This drawing is certified to comply with the Structural Engineering provisions of the Regulations under the Building Act Chapter 301 of the Revised Laws of Papua New Guinea

Name: Mr. L.J. Stocks
Registered Structural Engineer No: 0394152

TENDER ISSUE

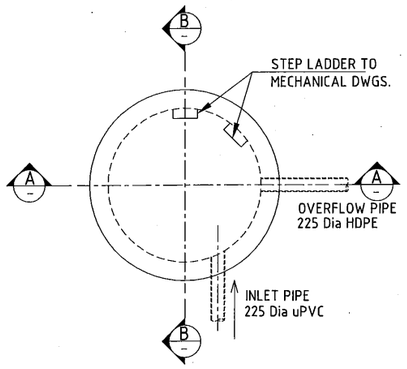
PROJECT: PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT (POMSSUP)	TITLE: PS-14 Konebada Pumping Station - Layout, Pump Well Plan and Section
CLIENT: INDEPENDENT PUBLIC BUSINESS CORPORATION PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT PROJECT MANAGEMENT UNIT (PMU) JAPAN INTERNATIONAL COOPERATION AGENCY	CONSULTANTS : NJS CONSULTANTS CO., LTD. - JAPAN

NOTES :

REVISIONS

ISSUE	REV.	DATE	CHKED	DESCRIPTION	BY
TENDER	-	14/11/2011	LJS	ISSUE FOR TENDER	GV

APPROVED by PMU: Project Director Lot G.Zauya	DATE: 1. Dec 2011	SCALE: 1/100
CHECKED by CONSULTANT Project Manager T.Fuji	DATE: 1. Dec 2011	DRAWING NO.: PS-KB-C02



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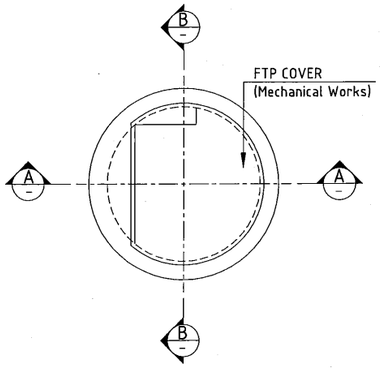

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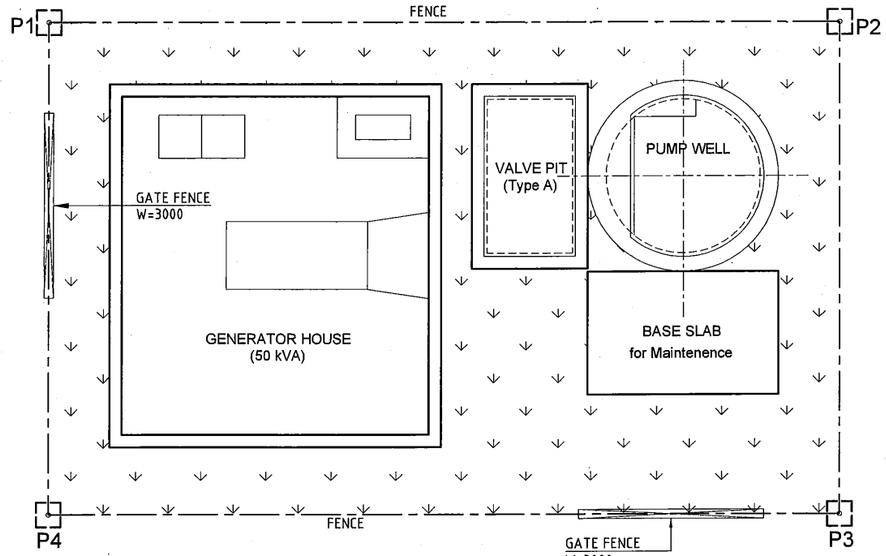

LAYOUT PLAN
SCALE 1:100

NOTES:

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4. CONCRETE COVER AS FOLLOWS:
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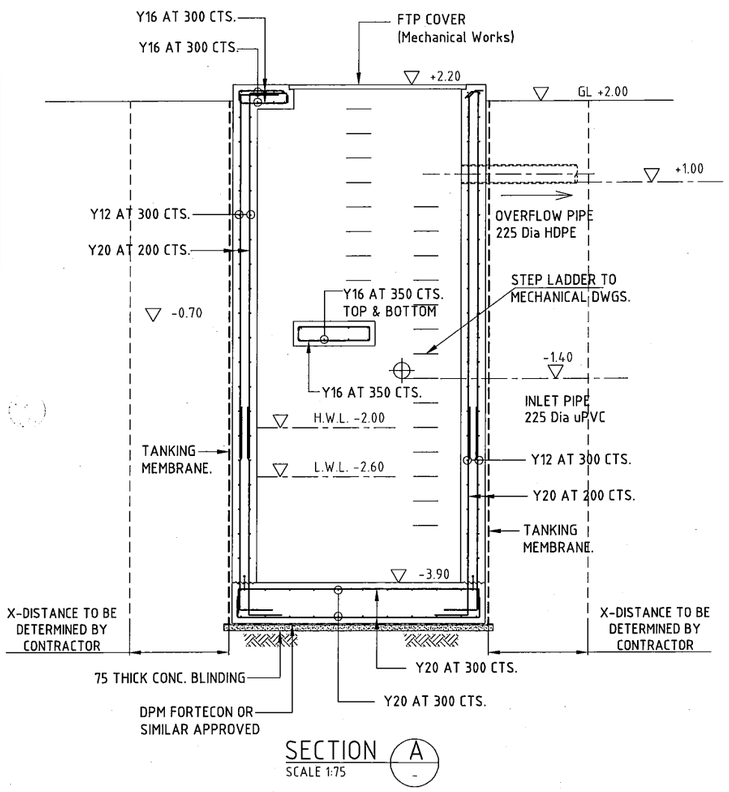

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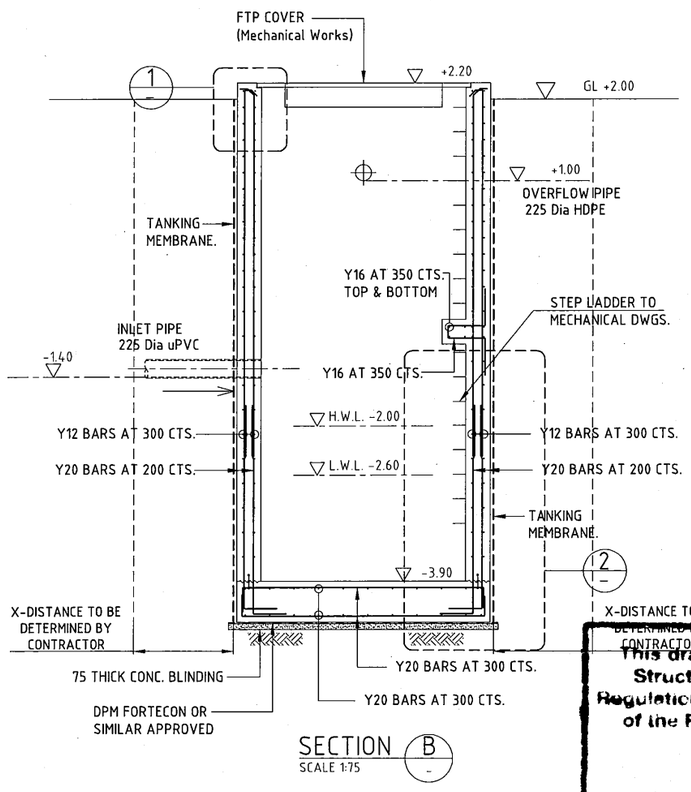

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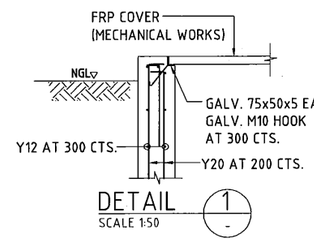

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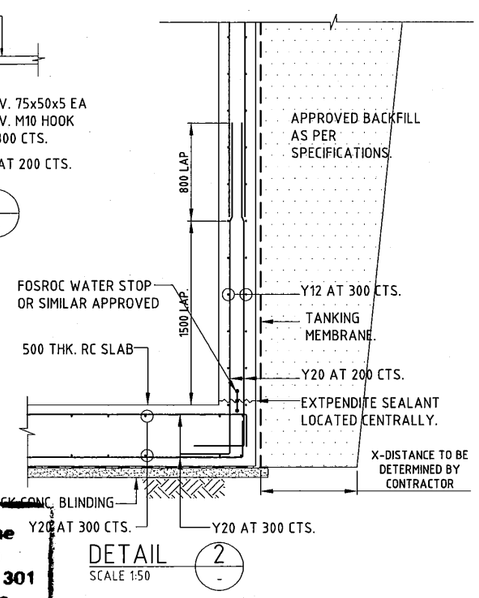

DETAIL 2
SCALE 1:50

This drawing is certified to comply with the Structural Engineering provisions of the Regulations under the Building Act Chapter 301 of the Revised Laws of Papua New Guinea

Name: Mr. L.J. Stocks
Registered Structural Engineer No: 0394152

TENDER ISSUE

PROJECT:
PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT (POMSSUP)

TITLE:
PS-15 Gabutu Pumping Station - Layout, Pump Well Plan and Section

CLIENT:
INDEPENDENT PUBLIC BUSINESS CORPORATION
PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT
PROJECT MANAGEMENT UNIT (PMU)
JAPAN INTERNATIONAL COOPERATION AGENCY

CONSULTANTS :
NJS CONSULTANTS CO., LTD. - JAPAN

NOTES :

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ISSUE	REV.	DATE	CHKED	DESCRIPTION	BY
TENDER	-	14/11/2011	LJS	ISSUE FOR TENDER	GV

APPROVED by PMU:
Project Director
Lot G.Zauya

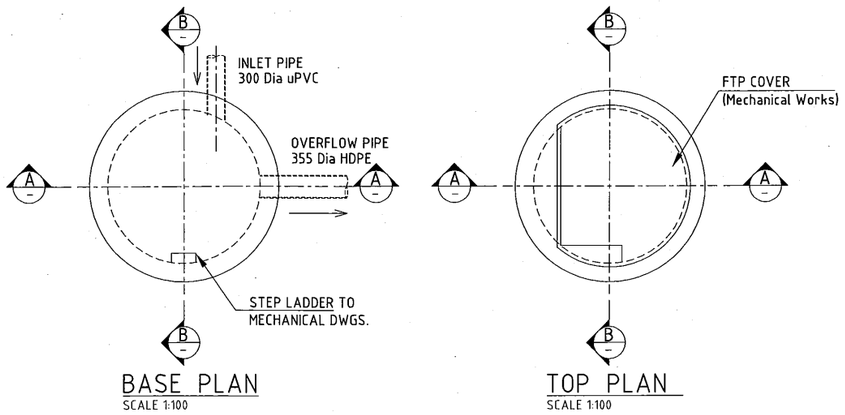
DATE: 1. Dec 2011

SCALE: 1/100

CHECKED by CONSULTANT
Project Manager
T.Fuji

DATE: 1. Dec 2011

DRAWING NO.: PS-GB-C02



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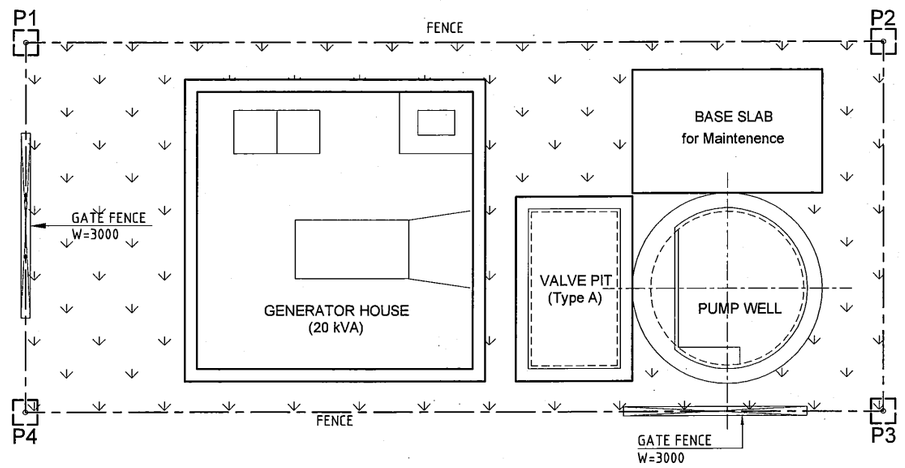
SCALE 1:100

TOP PLAN
SCALE 1:100



LAYOUT PLAN
SCALE 1:100

NOTES:

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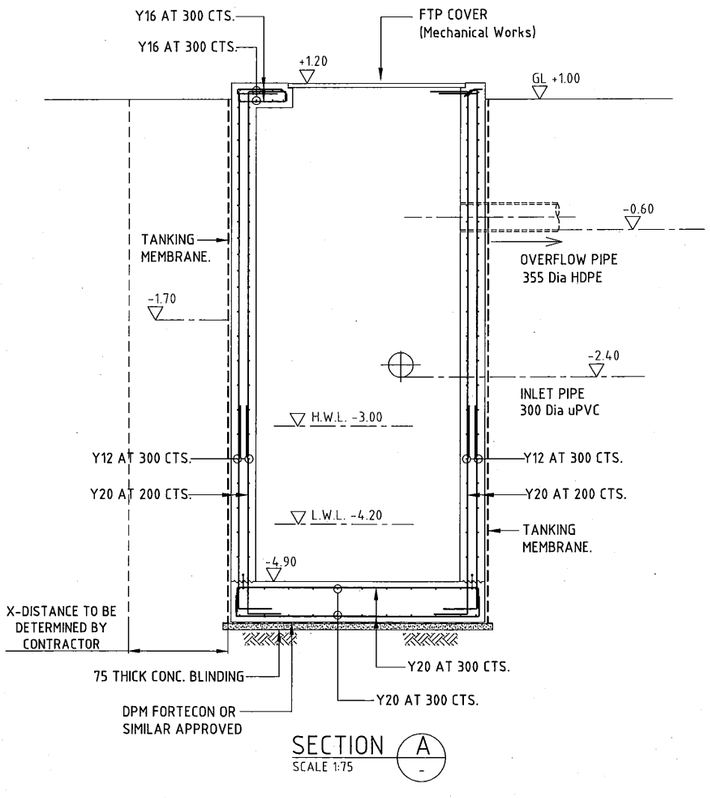

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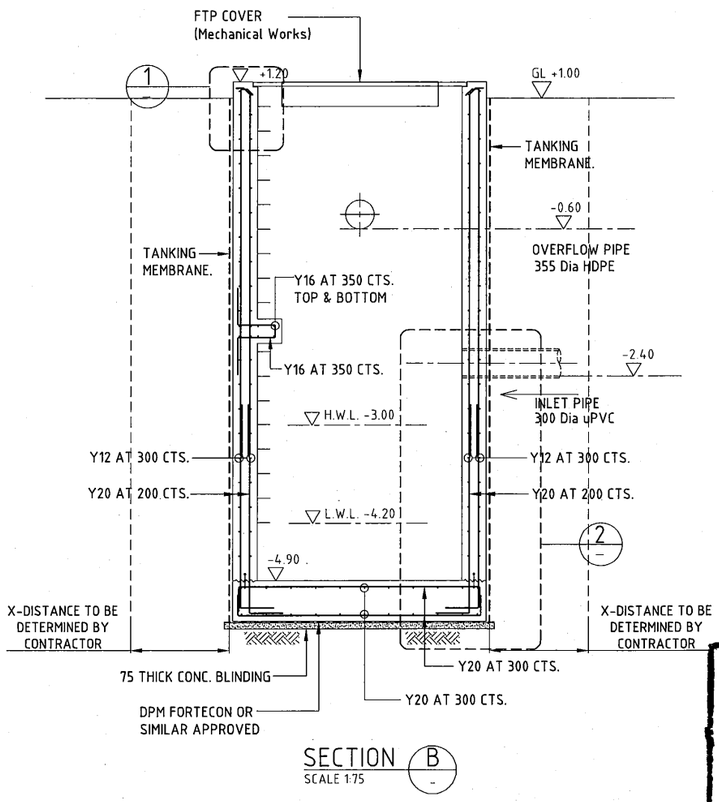

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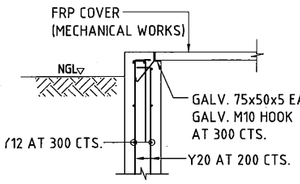

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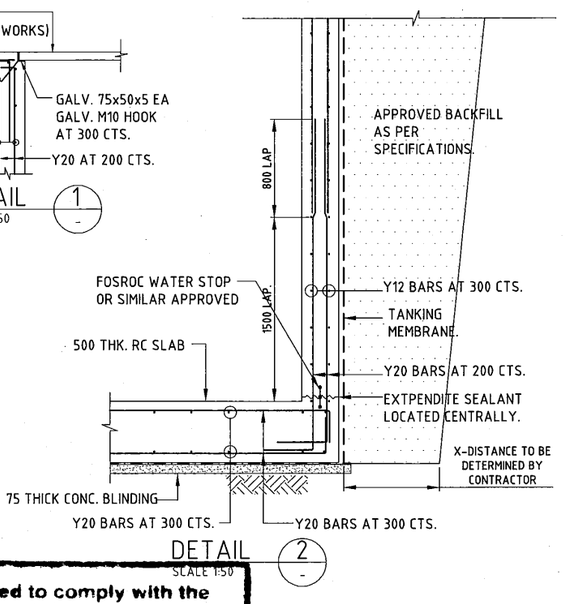

DETAIL 2
SCALE 1:50

This drawing is certified to comply with the Structural Engineering provisions of the Regulations under the Building Act Chapter 301 of the Revised Laws of Papua New Guinea

Name: Mr. L.J. Stocks
Registered Structural Engineer No: 0394152

TENDER ISSUE

PROJECT:
PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT (POMSSUP)

TITLE:
PS-16 Horsecamp Pumping Station - Layout, Pump Well Plan and Section

CLIENT:
INDEPENDENT PUBLIC BUSINESS CORPORATION
PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT
PROJECT MANAGEMENT UNIT (PMU)
JAPAN INTERNATIONAL COOPERATION AGENCY

CONSULTANTS :
NJS CONSULTANTS CO., LTD. - JAPAN

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Project Director
Lot G.Zauya

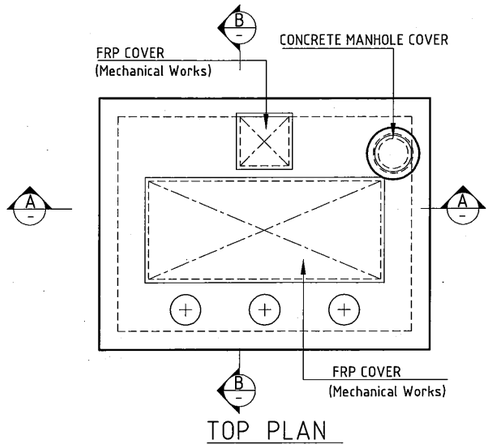
DATE: 1. Dec 2011

SCALE: 1/100

CHECKED by CONSULTANT
Project Manager
T.Fuji

DATE: 1. Dec 2011

DRAWING NO.: PS-HC-C02



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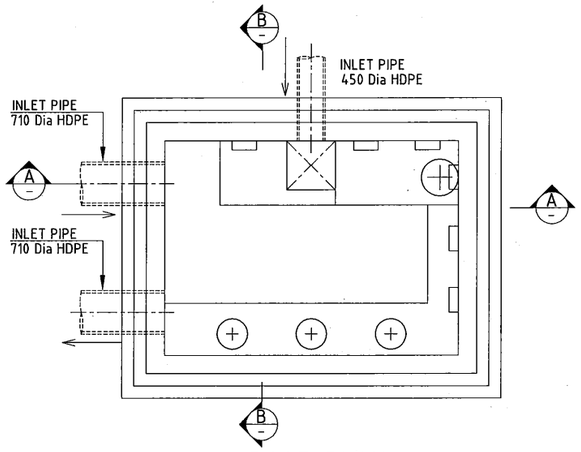

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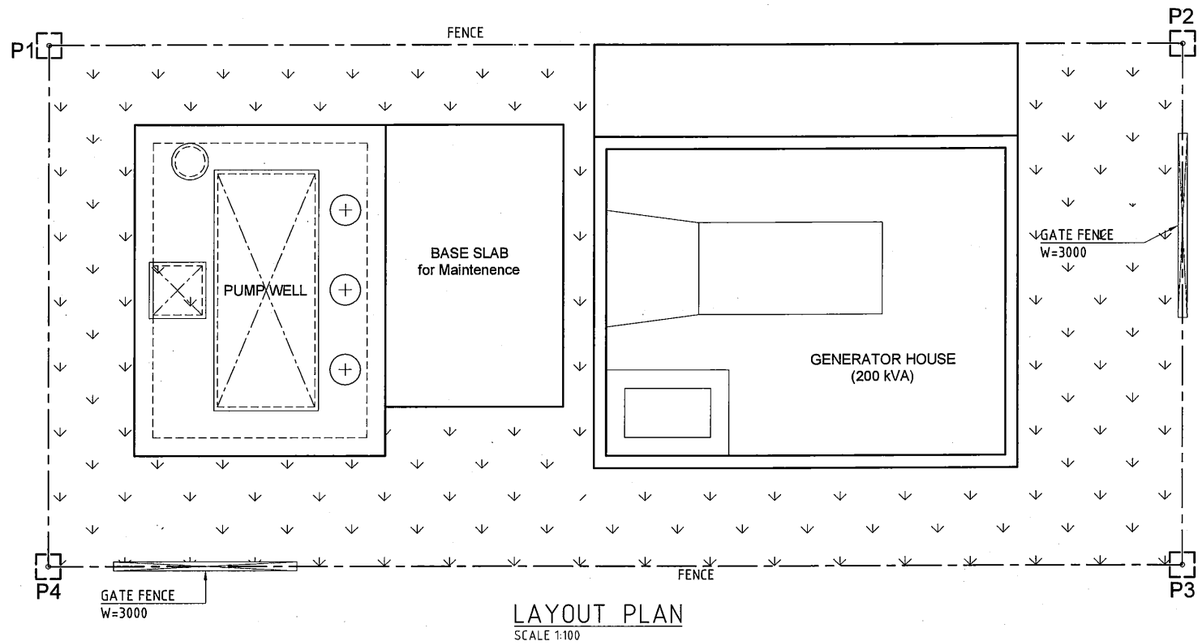

LAYOUT PLAN
SCALE 1:100

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This drawing is certified to comply with the Structural Engineering provisions of the Regulations under the Building Act Chapter 301 of the Revised Laws of Papua New Guinea

Name: Mr. L.J. Stocks
Registered Structural Engineer No: 0394152

TENDER ISSUE

PROJECT: PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT (POMSSUP)

TITLE: PS-17 Kaugere Pumping Station - Layout, Pump Well Plan and Section

CLIENT: INDEPENDENT PUBLIC BUSINESS CORPORATION
PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT
PROJECT MANAGEMENT UNIT (PMU)
JAPAN INTERNATIONAL COOPERATION AGENCY

CONSULTANTS: NJS CONSULTANTS CO., LTD. - JAPAN

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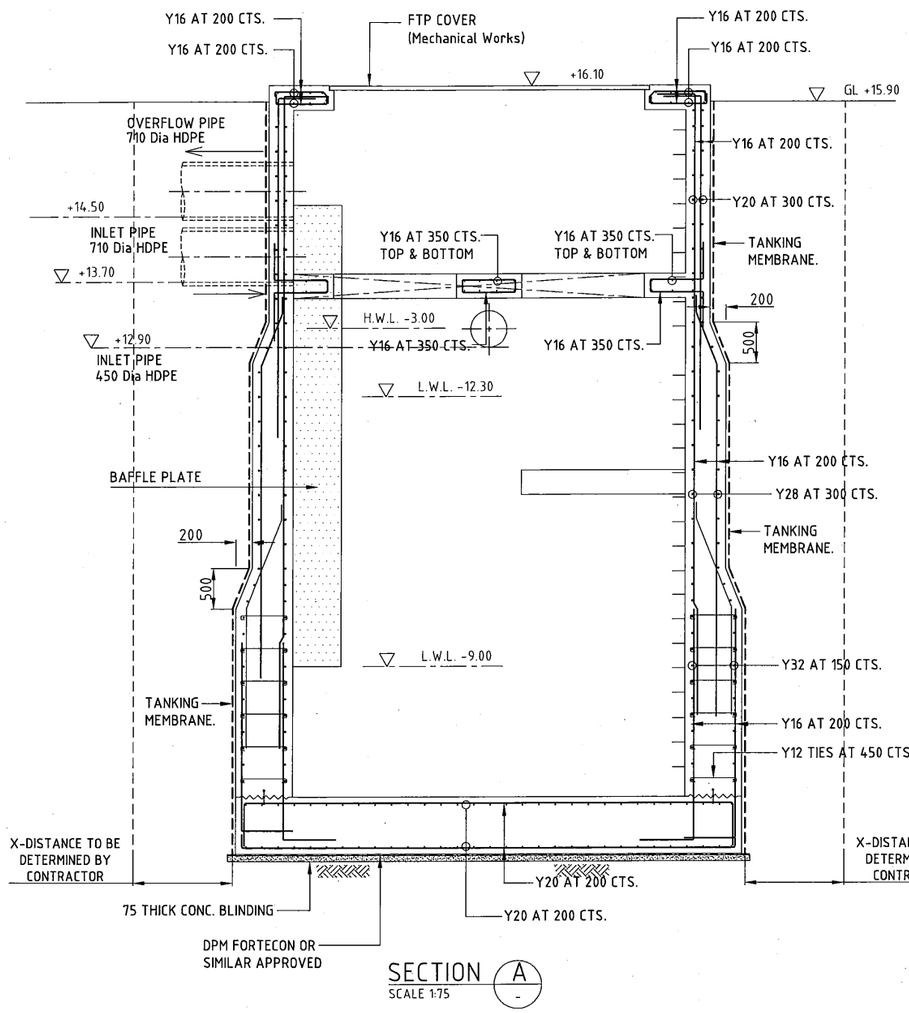
APPROVED by PMU: Project Director Lot G.Zauya — DATE: 1. Dec 2011 — SCALE: 1/100

CHECKED by CONSULTANT Project Manager T.Fuji — DATE: 1. Dec 2011 — DRAWING NO.: PS-KG-C02

17



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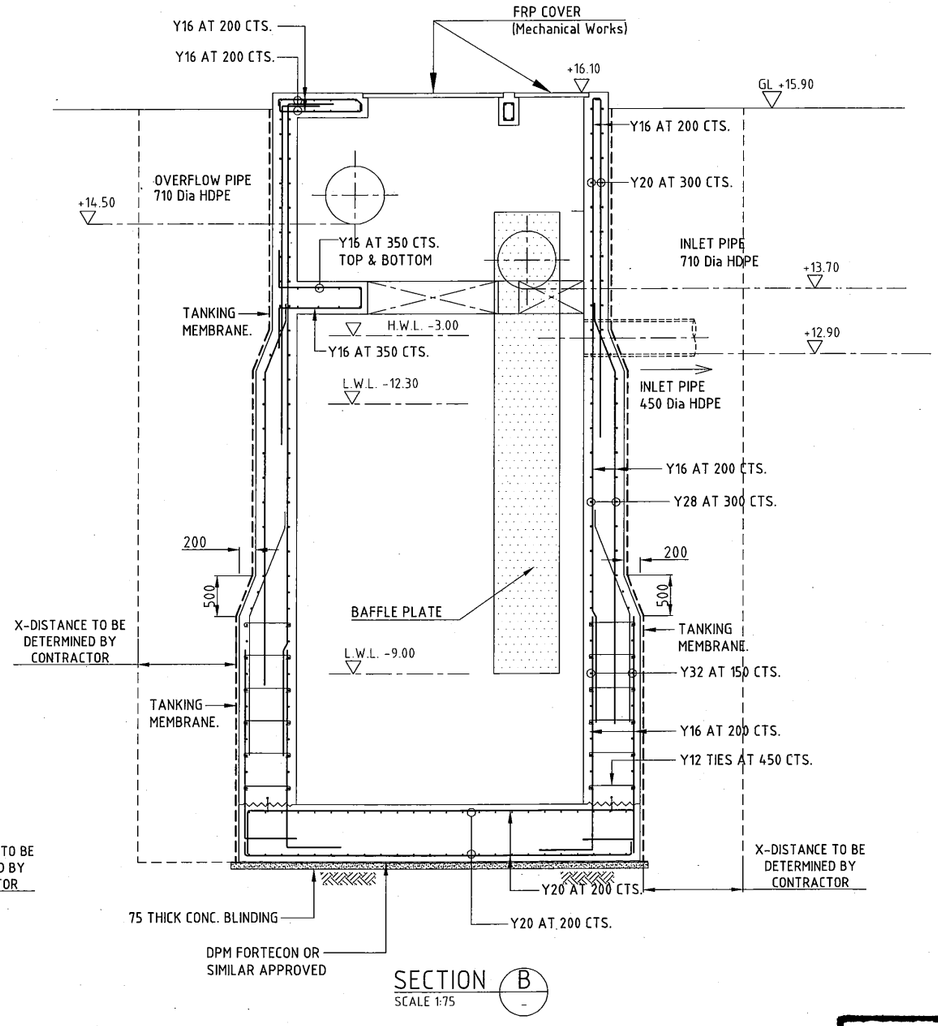

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NOTES:

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Name: Mr. L.J. Stocks
Registered Structural Engineer No: 0394152

TENDER ISSUE

PROJECT: PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT (POMSSUP)

TITLE: PS-17 Kaugere Pumping Station - Pump Well Section

CLIENT: INDEPENDENT PUBLIC BUSINESS CORPORATION
PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT
PROJECT MANAGEMENT UNIT (PMU)
JAPAN INTERNATIONAL COOPERATION AGENCY

CONSULTANTS : NJS CONSULTANTS CO., LTD. - JAPAN

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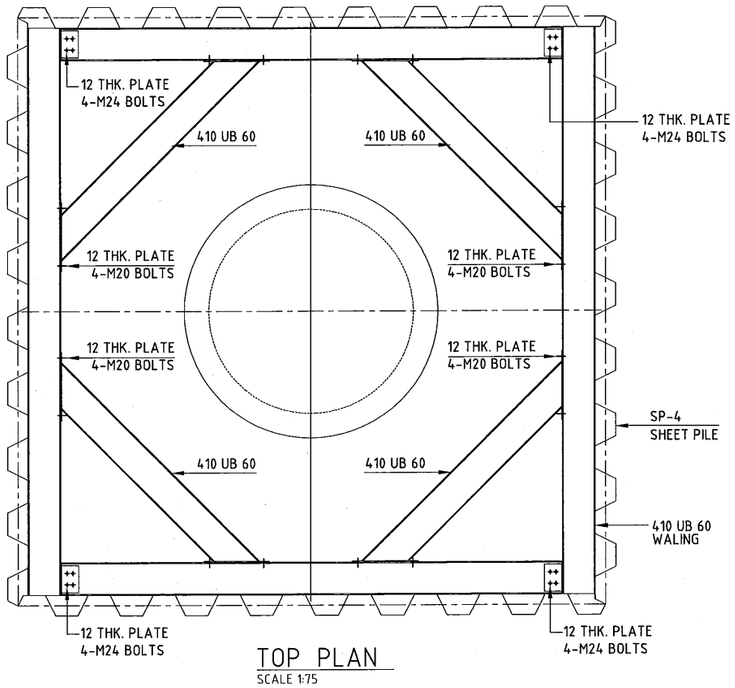

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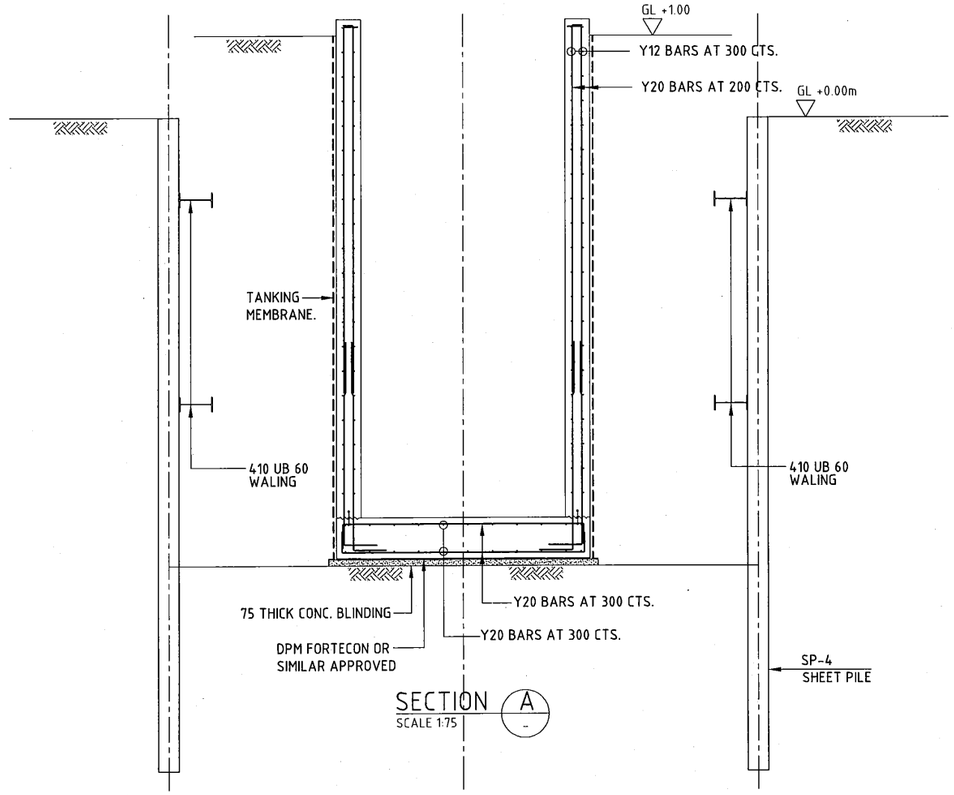

SECTION A
SCALE 1:75

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Name: Mr. L.J. Stocks
Registered Structural Engineer No: 0294152

TENDER ISSUE

PROJECT: PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT (POMSSUP)

TITLE: PS-16 Horsecamp Pumping Station - Temporary Works

CLIENT: INDEPENDENT PUBLIC BUSINESS CORPORATION
PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT
PROJECT MANAGEMENT UNIT (PMU)
JAPAN INTERNATIONAL COOPERATION AGENCY

CONSULTANTS : NJS CONSULTANTS CO., LTD. - JAPAN

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APPROVED by PMU: Project Director Lot G.Zauya — DATE: 1. Dec 2011 — SCALE: 1/100

CHECKED by CONSULTANT Project Manager T.Fuji — DATE: 1. Dec 2011 — DRAWING NO.: PS-HC-C03

GENERAL

G1 This building is situated in an earthquake zone and has been designed and detailed to resist seismic forces. Any variation to either structural or non-structural elements may significantly alter the eartquake response of the building and impair its safety.

ANY PROPOSED ALTERATIONS MUST BE REFERRED TO THE STRUCTURAL DESIGN ENGINEER.

G2 These drawings shall be read in conjunction with all Architectural and other consultants Drawings and Specifications and with such other written instructions as may be issued during the course of contract. All discrepancies shall be referred to Superintendant for decision before proceeding with the work.

G3 All dimensions relevant to setting out and off-site works shall be verified by the Contractor before construction and fabrication is commenced. The Engineers drawings shall not be scaled.

G4 During construction the contractor shall be responsible for maintaining the structure in a stable condition and ensuring no part shall be overstressed under construction activities.

G5 Workmanship and materials are to be in accordance with the relevant current PNGS and SAA standards including all amendments and the local statutory Authorities, except where varied by the the contract documents.

G6 Requirements to comply with a particular code or standard is deemed to refer to the latest edition with all relevant amendments and to include all other codes or standards associated with or referred to in the noted code or standard.

G7 No holes or chases other than those indicated on the structural drawings shall be made without the approval of the Superintendant.

G8 Prior to ordering materials or carrying out any work that may be affected, the Contractor shall submit the following information for approval in accordance with the drawings and specification. These proposals shall include all information neccessary for approval including the following:

1) Source and supplier of materials and products.

2) Cerificates and results of any tests already carried out.

3) Details of tests to be carried out both on and off site.

4) Location of any testing to be carried out off site.

5) Details of any seperate labratory, authority or other body to carry out tests.

The approval of substitution of materials shall be sought from the Superintendant.

All dimensions are in millimetres unless stated otherwise. All levels are expressed in metres.

G9 All props and formwork for beams and slabs shall be removed before construction of any masonry walls or partitions on the floor.

G10 All Non-Load Bearing Walls shall be kept clear of the underside of beams and slabs clearance shall not be less than 20mm unless otherwise shown.

G11 Where proprietary products are specified they shall be manufactured and used in accordance with the manufacturer's specifications and recommendations.

G12 Design loads to Papua New Guinea Standard 1001.

1) Wind - Basic Design Velocity 28m/sec
Terrain Category 3

2) Seismic - Zone 4

FOUNDATION

F1 Founding levels are provisional and are subject to the Superintendant's approval of the bearing strata.

F2 Anticipated bearing material: Undisturbed Natural Ground.

F3 Required allowable bearing strength of foundation material 550 kPa

F4 All water and loose material shall be removed from the base prior to pouring any concrete.

F5 Compacted fill under slabs and minor strip footings shall comply with the following:

a) Material shall be selected from an approved source, shall be free of vegetable matter and ball of clay, and shall comply with the following requirements.

(i) CBR value after 4 days soaking, not less than 25 when compacted to at least 95% maximum dry density as determined by AS1289 Test No. E1.1

(ii) Maximum linear shrinkage 6%

(iii) Grading

SIEVE SIZE (mm)	BY WEIGHT PASSING
37.5	100
19.0	60 - 100
9.5	40 - 80
4.75	30 - 60
2.36	20 - 45
0.425	15 - 30
0.075	3 - 15

(iv) The fraction passing the 75 micron sieve shall not exceed 2/3 that passing the 425 micron sieve.

(v) The fraction retained on the 2.36mm sieve shall consist of hard durable particles or fragments of stone, gravel or sand and shall not include any material that breaks up when alternately wetted and dried.

(vi) The fraction passing the 425 micron sieve shall have a liquid limit not greater than 30 and a plasticity index not greater than 10.

F6 Over excavating under footings shall be made good with 10 MPa mass concrete.

CONCRETE

C1 All workmanship and material shall be in accordance with PNG 1002.

C2 Minimum cover (mm) to all reinforcement unless otherwise shown shall be as follows:

REINFORCEMENT COVERS

Minimum reinforcement cover requirements to be in accordance with AS3600 - 1988 Exposure classification listed below:

Exterior faces of members (above ground) : B1
Interior faces of members : A1
Members below ground : A2

In addition reinforcement cover shall not be less than :

BASE SLAB : 75mm

BASE WALL : 75mm

COVER SLAB : 75mm

C3 Sizes of concrete elements do not include thickness of applied finishes.

C4 Reinforcement is represented diagrammatically and not neccessarily shown.

C5 Splices in reinforcement shall be made only in the positions shown or as otherwise approved by the Superintendant.

C6 Welding of reinforcement shall not be permitted.

C7 All reinforcement shall be securely supported in its correct position during concreting by approved bar chains, spacers or support bars.

C8 Reinforced symbols:
"Y" denotes hot rolled deformed bars grade 410Y to AS 1302
"S" denotes deformed bars grade 2305 to AS 1302.
"R" denotes plain round bars grade 230R to AS 1302.

C9 Laps, unless noted otherwise, shall be : 40 x bar diameter for rounds and 350mm for fabric.

C10 Bending radii, unless noted otherwise, shall be to PNGS 1002.

C11 Cover will be maintained during casting concrete by the use of plastic chairs and/or mortar blocks 1:2 mix at maximum 500mm centres in each directions. For work in contact with the ground chairs are to be supported on sheet plates.

C12 Reinforcement shall not be exposed for prolonged periods such as to permit the development of scale

C13 Reinforcement and formwork are to be checked by the Superintendant prior to pouring. The Superintendant is to be given 24 hours notice for a check and a futher 24 hours for any remedial work required prior to concrete placement.

C14 All conduits to be placed above bottom reinforcement and below top reinforcement - minimum spacing between conduits 25mm.

C15 Formwork shall be designed and constructed in accordance with AS 3610.

C16 Concrete components and quality shall be as follows, unless noted otherwise;

Element	F'c (MPa)	Water/Cement Ratio
BASE SLAB	40	0.55
BASE WALL	40	0.55
COVER SLAB	40	0.55

C17 Three test cylinders are to be taken from each sample (sampling in accordance with PNGS 1002.) One cylinder to be tested at seven days, the other two at 20 days. Where ready mix concrete is supplied each truck will constitute a batch in applying PNGS 1002.

C18 The Contractor shall submit for approval his proposals for curing of all insitu concrete work, at least 7 days prior to any pour taking place.

C19 Construction Joints to be cleaned of all loose and foreign materials, scabbled and wetted immediately before continuing the following concreting. Construction Joints other than those indicated on the drawing shall not be made without approval.

CONCRETE MASONRY

B1 All concrete block masonry is to be executed in accordance with the current edition of:

PNGS 1004 - Reinforced Masonry Structures Code.
AS 2733 - Concrete Masonry Units.

B2 Concrete masonry blocks shall have characteristics compressive strength of F'b = 12 MPa and 16 MPa at specific locations denoted as SW1 - SW39.

B3 All blocks shall be laid dry and wetting shall not be permitted during or after laying.

B4 Channel stretcher blocks and lintel blocks shall be used to form bond beams and lintels respectively. Top groove blocks shall be used elsewhere where horizontal reinforcement is required. Otherwise blocks shall conform to AS 2733.

B5 All blocks must be cured for minimum of 28 days before transportation to site.

B6 Clean out blocks are to be used for core filled cavities and all mortar droppings are to be removed from the bottom cavities before grouting.

B7 Mortar shall comply with AS 1475. Part 1, Appendix A. The mix proprtions of table A1 shall be adjusted to give an average compressive strength of 8 MPa.

B8 Mortar joints to be 10mm thick with blocks fully bedded and perpends filled.

B9 Grout for corefilling shall comply with AS 1475, Part 1, Section 2. Characteristic compressive strength F'c = 15 MPa Slump 225. Batching by volume is not permitted.

B10 Corefilling is to be placed for the full height in lifts of not more than 1200mm in height. A minimum delay period of one hour and max, three hours shall be observed between lifts. All cores are to be filled unless noted otherwise.

B11 Corefilling shall be thoroughly compacted into place with the aid of small immersion vibrators.

B12 The corefilling at the top of each lift shall be kept down at a distance of 25mm from the top of the blockwork and this surface shall be thoroughly scabbled before any further blocks are laid or concrete poured.

B13 Masonry walls shall be cured for at least three (3) days before corefilling is placed.

B14 All masonry must be approved by the Superintendant before corefilling takes place.

B15 Vertical reinforcement at any level shall be correctly positioned and securely tied to starters projecting from construction below prior to placing blocks.

B16 Reinforcement is to be left undisturbed for at least 12 hours after corefilling. Any reinforcement showing signs of seperation from the corefilling may render that section of the wall liable to rejection.

B17 Minimum cover to reinforcement : 12mm from inside face of block.

B18 Vertical bars shall be placed with laps at not less than 1600mm centres, unless noted otherwise.

B19 Laps, unless noted otherwise, shall be : 40 x bar diameter.

B20 All bars are to be cogged around openings and openings are to have a bond beam over them.

B21 At the completion of a day's work and during wet weather top and sides of all walls shall be covered to prevent rain penetration to cores or wetting of blocks.

B22 Control joints in blockwork to be at 4m maximum spacing.

STRUCTURAL STEELWORK

S1 All workmanship and materials shall be in accordance with PNGS 1003.

S2 Steel grade - 300 MPa.

S3 Plates, unless noted otherwise, shall be 8mm thick.

S4 Bolts, unless noted otherwise, shall be 16mm diameter, Grade 4.6/s, bolts 20mm diameter and greater shall be Grade 8.8/s.

S5 Welds, unless noted otherwise, shall be 6mm continuous fillet weld.

S6 Welding electrodes shall be class E 41XX.

S7 WElding shall be performed by an experienced qualified operator in accordance with PNGS 1016.

S8 The contractor shall verify that all members can be assembled and erected properly, prior to erection on site.

S9 Before fabrication is commenced the Contractor shall submit copies of the shop drawings to the Superintendant for review. Review does not include checking of dimensions.

S10 Reference shall be made to the Architect's drawings for additional drillings, cleats, fixings, etc.

S11 The contractor shall provide and leave in place until permanent bracing elements are constructed, such temporary bracing as is neccessary to stabilise the structure during erection.

S12 The ends of all tubular members are to be sealed with nominal thickness plates and continuous fillet weld unless otherwise shown.

S13 Unless otherwise specified all steelwork shall be sand blasted to remove all rust and scaled and painted one shop coat of inorganic zinc silicate primer min. 40 micron thickness. Members encased in concrete, fire spray or HSTF bolted connections must not be painted.

S14 All base plates shall be temporarily supported and dry pack grouted with 3:1 sand cement grout in a just wet condition.

S15 Cold formed steelwork shall comply with AS 1530, roll formed from hot-dipped zinc-rolled steel grade G450-Z200 to AS 1397.

S16 All steelwork exposed to the weather including bolts and fixings shall be hot dipped galvanised unless noted otherwise.

TIMBER

T1 Timber materials and workmanship shall comply with AS 1720.

T2 Timber shall be seasoned to moisture content not exceeding 15%, unless noted otherwise.

T3 Where unseasoned timber is specified, in no case shall timber be used having a moisture content exceeding 30% at the time of fabrication.

T3 Timber shall have strength properties not less than that shown below:

Stress Grade - F11
Strength Group - SD4
Joint Group - J3

In the absence of mechanical stress, grading timber shall be visually stress graded in accordance with AS 2082.

T4 The Contractor is required to submit details of the proposed species of timber for approval. If unidentified species are proposed, evidence must be provided from the Papua New Guinea Office of Forestry of identification and compliance with the specified properties.

T5 All sizes quoted are the final dressed sizes of finished timber unless noted otherwise.

T6 The Contractor shall verify that all members can be assembled and erected properly.

T7 Any variations shall be referred to the Superintendant for approval.

T8 Steel Components shall comply with PNGS 1003 Steel grade 250.

T9 Bolt holes are to be of same nominal diameter as bolts, drilled through assembled timber.

T10 Washers, unless noted otherwise, shall be provided under all bolt heads and nuts as follows:
Against timber, 65 x 65 x 5 square washers.
Against steel, standard round washers.

T11 All bolts, nuts and washers shall be galvanised in accordance with AS 1214.

T12 All bolts shall be retightened at completion of construction.

T13 Where neccessary timber shall be chamfered locally to just clean fillet welds connection plates, etc.

T14 Preservative treatment is to be provided as follows : dip diffused.

DESIGN LOADS

BASEMENT LEVEL

DEAD LOAD: 4.0 kPa

LIVE LOAD:
- STAIRS 4.0 kPa

- MECHANICAL LOADS FROM VARIOUS MECHANICAL FACILITIES
- HYDROSTATIC PRESSURE LOAD
- EARTH PRESSURE LOAD
- EARTHQUAKE PRESSURE LOAD
- HYDRODYNAMIC PRESSURE LOAD

This drawing is certified to comply with the Structural Engineering provisions of the Regulations under the Building Act Chapter 301 of the Revised Laws of Papua New Guinea

Name: Mr. L.J. Stocks
Registered Structural Engineer No: 0394152

TENDER ISSUE

PROJECT: PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT (POMSSUP)

TITLE: VALVE PIT - STRUCTURAL NOTES

CLIENT: INDEPENDENT PUBLIC BUSINESS CORPORATION
PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT
PROJECT MANAGEMENT UNIT (PMU)
JAPAN INTERNATIONAL COOPERATION AGENCY

CONSULTANTS : NJS CONSULTANTS CO., LTD. - JAPAN

NOTES :

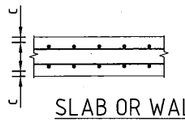
REVISIONS

ISSUE	REV.	DATE	CHKED	DESCRIPTION	BY
TENDER	-	14/11/2011	LJS	ISSUE FOR TENDER	GV

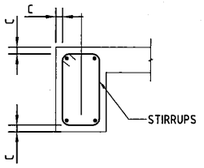
APPROVED by PMU: Project Director Lot G.Zauya — DATE: 1. Dec 2011 — SCALE: 1/100

CHECKED by CONSULTANT Project Manager T.Fuji — DATE: 1. Dec 2011 — DRAWING NO.: PS-GE-CC-S001

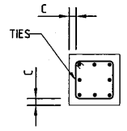
MINIMUM CONCRETE COVER



SLAB OR WALL

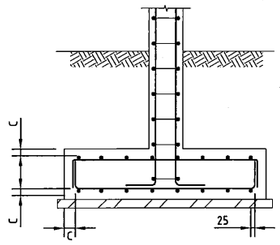


GIRDER OR BEAM

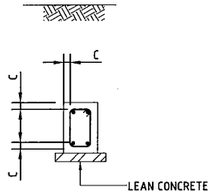


COLUMN OR PEDESTAL

ABOVE GRADE CONCRETE



FOOTING



GRADE BEAM

FOUNDATION

THE MINIMUM CONCRETE COVER OVER REINFORCING BARS SHALL BE AS INDICATED BELOW.

- ELEMENT EXPOSED TO WATER/SPILLAGE (CATCH BASIN/MANHOLE/SPILL BASIN etc	- 75mm
- OTHER STRUCTURE	- 65mm

THE REQUIREMENTS STIPULATED ABOVE SHALL NOT BE APPLIED TO THE FOLLOWING REINFORCED CONCRETE ITEMS :

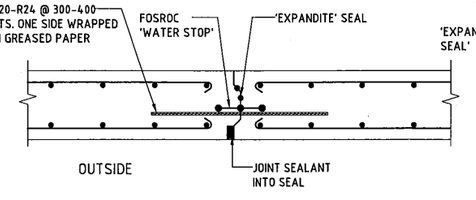
a) CONCRETE PIPES
- AS PER MANUFACTURER'S STANDARD.

b) FIREPROOFING (WITH GALVANISED WIRE MESH)

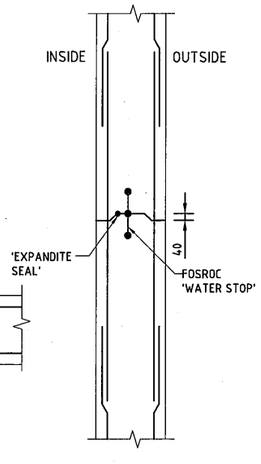
c) DITCH LINING/ SLOPE PROTECTION

d) CONCRETE PAVING

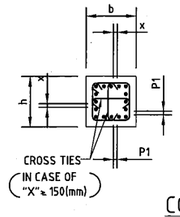
NOTE: FOR CONCRETE CAST AGAINST GROUND (WITHOUT FORMWORK) MINIMUM CONCRETE COVER (C) SHALL BE 75mm.



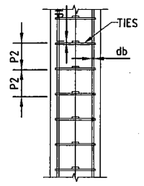
RECTANGULAR STRUCTURES



TYPICAL EXPANSION JOINT DETAIL FOR CIRCULAR LIQUID RETAINING STRUCTURE

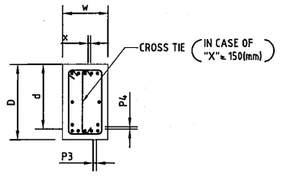


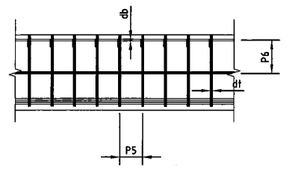
COLUMN



P1 ≥ hagg x 4/3 (mm)
1.5db,
40 (mm)
WHICHEVER IS GREATER

P2 ≤ 15 db or 300(mm) or SMALLEST CROSS SECTIONAL DIMENSION OF COLUMN WHICHEVER IS SMALLER





P3 ≥ hagg x 4/3 (mm)
db
WHICHEVER IS GREATER
hagg = 20(mm)

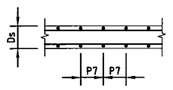
P4 ≥ 25(mm)

P5 ≤ D/2 or 300mm
WHICHEVER IS SMALLER

P6 ≤ 300(mm)

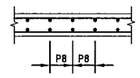
GIRDER AND BEAM

PRIMARY REINFORCEMENT



P7 ≤ 2Ds or 300 (mm)
WHICHEVER IS SMALLER

SECONDARY REINFORCEMENT



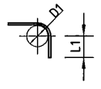
P8 ≤ 2Ds or 300 (mm)
WHICHEVER IS SMALLER

SLAB

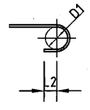
STANDARD HOOKS AND BENDS

FOR MAIN REINFORCEMENT

90° HOOK OR BEND

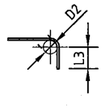


180° HOOK

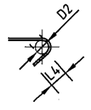


FOR TIES AND STIRRUPS REINFORCEMENT

90° HOOK



135° HOOK



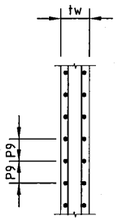
(mm)

BAR SIZE	MIN.BEND DIA. D1	MIN.EXTENSION L1	MIN.EXTENSION L2
N12	60	120	70
N16	80	135	70
N20	100	160	80
N24	120	195	100
N28	140	225	115
N32	160	260	130
N36	180	290	145
N40	200	320	160

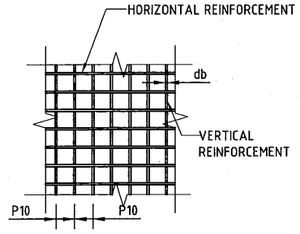
(mm)

BAR SIZE	MIN.BEND DIA. D2	MIN.EXTENSION L3	MIN.EXTENSION L4
N10	40	135	100
N12	50	160	120

SPACING LIMITS



P9 ≤ 350(mm)
≤ 2.5tw
≤ 4db



P10 ≤ 350(mm)
≤ 2.5tw
≤ 4db

WALL

NOTE : VERTICAL REINFORCEMENT NEED NOT BE ENCLOSED BY LATERAL TIES IF VERTICAL REINFORCEMENT AREA IS NOT GREATER THAN 0.01 TIMES GROSS CONCRETE AREA, OR WHERE VERTICAL REINFORCEMENT IS NOT REQUIRED AS COMPRESSION REINFORCEMENT.

FOR WALLS GREATER THAN 200mm THICK, THE VERTICAL AND HORIZONTAL REINFORCEMENT SHALL BE PROVIDED IN TWO GRIDS, ONE NEAR EACH FACE OF THE WALL.

NOTES:

1. FOR GENERAL NOTES, SEE DWG No. PGLN-YK-CSZZZ-900100.

2. LEGEND
- hagg : NOMINAL MAXIMUM SIZE OF AGGREGATE = 20mm
- d : EFFECTIVE DEPTH
- db : SIZE OF LONGITUDINAL BARS (mm)
- N : BAR SYMBOL
- dt : SIZE OF TIES
- s : SPACING
- D : BEAM HEIGHT
- w : BEAM WIDTH
- b,h : COLUMN SECTION
- tw : THICKNESS OF WALL

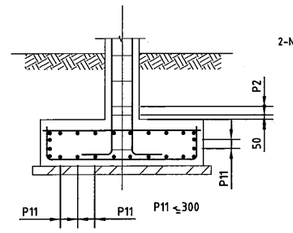
3. SPACING OF TIES AND STIRRUPS SHALL BE IN ACCORDANCE WITH AS 3600-2001

3-1 TIES SPACING (P2)
MAXIMUM TIE SPACING SHALL NOT EXCEED THE FOLLOWING VALUE
- -15db
- -SMALLEST CROSS SECTIONAL DIMENSION OF COLUMN
- -300mm

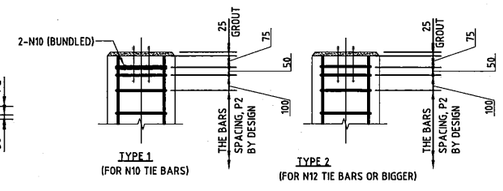
} WHICHEVER IS SMALLER

3-2 STIRRUP SPACING (P5)
MAXIMUM STIRRUP SPACING SHALL NOT EXCEED THE FOLLOWING VALUE:
- -D/2
- -15db
- -300mm

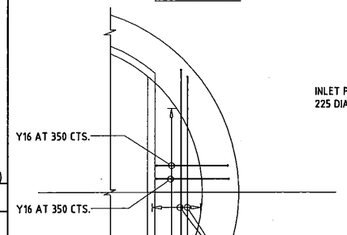
} WHICHEVER IS SMALLER



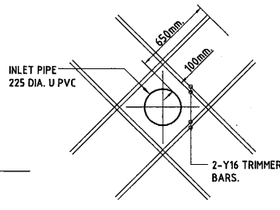
FOOTING



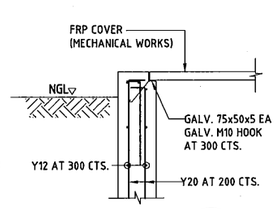
STIRRUP DETAIL FOR TOP OF PEDESTAL



DETAIL 1 / - SCALE 1:50



TYP. DETAIL
SCALE 1:50



DETAIL 2 / - SCALE 1:50

This drawing is certified to comply with the Structural Engineering provisions of the Regulations under the Building Act Chapter 301 of the Revised Laws of Papua New Guinea

Name: Mr. L.J. Stocks
Registered Structural Engineer No: 0394152

TENDER ISSUE

PROJECT: PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT (POMSSUP)

TITLE: VAVLE PIT - TYPICAL DETAILS & NOTES

CLIENT: INDEPENDENT PUBLIC BUSINESS CORPORATION
PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT
PROJECT MANAGEMENT UNIT (PMU)
JAPAN INTERNATIONAL COOPERATION AGENCY

CONSULTANTS : NJS CONSULTANTS CO., LTD. - JAPAN

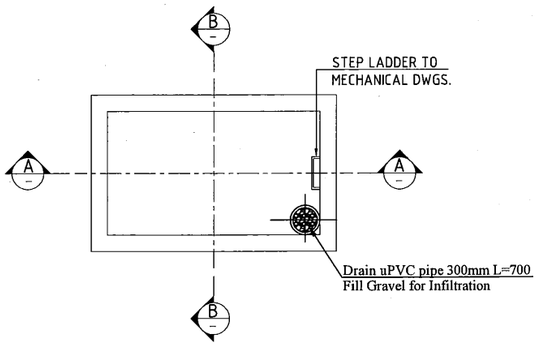
NOTES :

REVISIONS

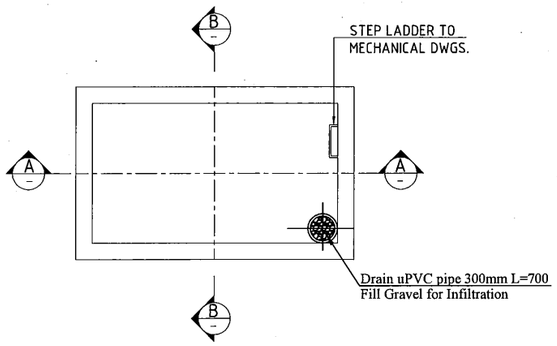
ISSUE	REV.	DATE	CHKED	DESCRIPTION	BY
TENDER	-	14/11/2011	LJS	ISSUE FOR TENDER	GV

APPROVED by PMU: Project Director Lot G.Zauya — DATE: 1. Dec 2011 — SCALE: 1/100

CHECKED by CONSULTANT Project Manager T.Fuji — DATE: 1. Dec 2011 — DRAWING NO.: PS-GE-CC-S001a



A TYPE TOP PLAN
SCALE 1:75



B TYPE TOP PLAN
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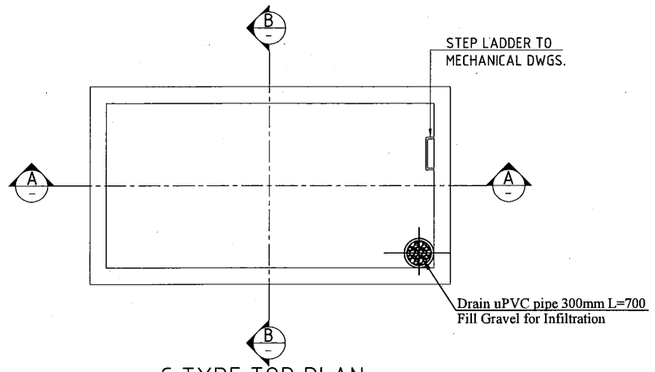

C TYPE TOP PLAN
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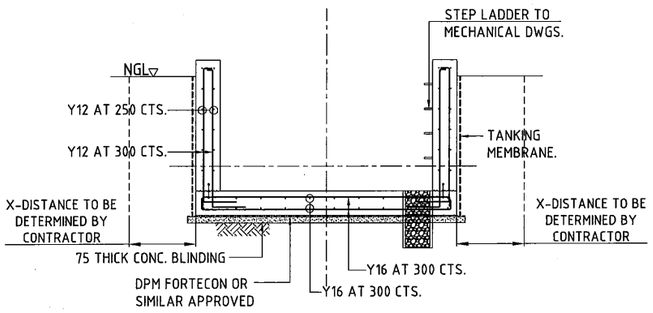
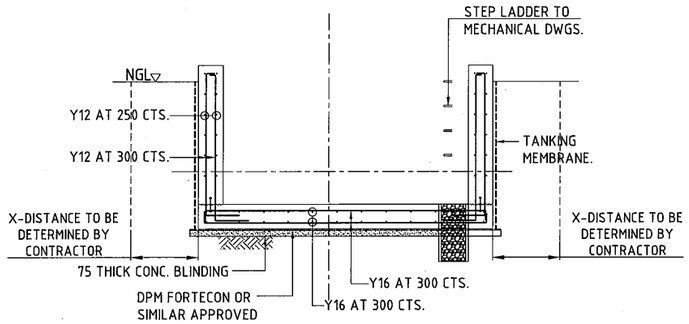


SECTION A
SCALE 1:75
TYPE A



SECTION A
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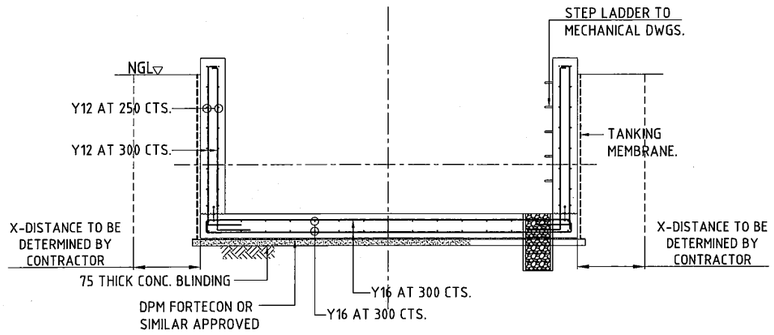

SECTION A
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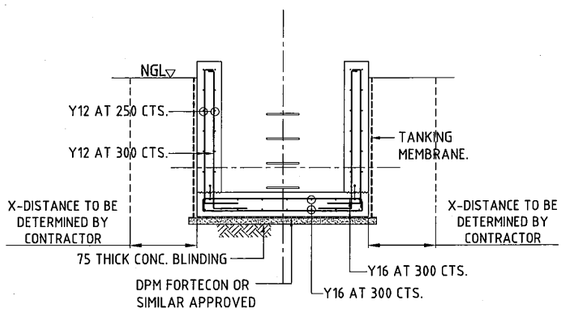
TYPE C



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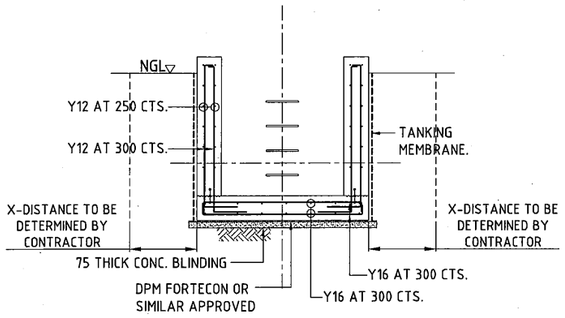

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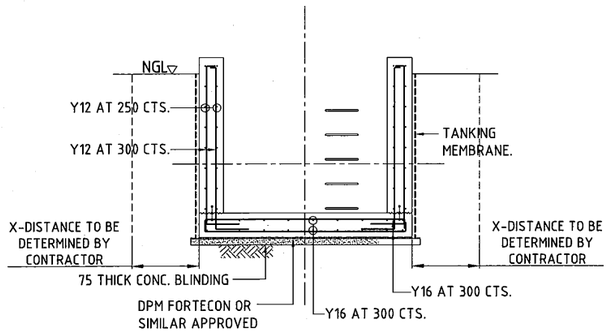


SECTION A
SCALE 1:75
TYPE C

NOTES:

1. REFER TO STD DRAWINGS FOR MISCELLANEOUS WORKS SUCH AS HANDRAILS, COVER, STEP LADDER, STAIR, STOP LOG AND EXPANSION JOINT.
2. EXTENT OF BULK EXCAVATION TO BE DETERMINED BY THE CONTRACTOR.
3. CONCRETE GRADE - F'c-40MPa
4. CONCRETE COVER AS FOLLOWS:
   RC WALL - 75mm
   BASE SLAB - 75mm
   SUSPENDED SLAB - 65mm
5. REFER TO SHEET STP-S001a FOR ALL THE TYPICAL DETAILS AND REBAR ARRANGEMENTS.

This drawing is certified to comply with the Structural Engineering provisions of the Regulations under the Building Act Chapter 30 of the Revised Laws of Papua New Guinea

Name: Mr. L.J. Stocks
Registered Structural Engineer No: 0294152

TENDER ISSUE

PROJECT:
PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT (POMSSUP)

TITLE:
VALVE PIT

CLIENT:
INDEPENDENT PUBLIC BUSINESS CORPORATION
PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT
PROJECT MANAGEMENT UNIT (PMU)
JAPAN INTERNATIONAL COOPERATION AGENCY

CONSULTANTS :
NJS CONSULTANTS CO., LTD. - JAPAN

NOTES :

REVISIONS

ISSUE	REV.	DATE	CHKED	DESCRIPTION	BY
TENDER	-	14/11/2011	LJS	ISSUE FOR TENDER	GV

APPROVED by PMU:
Project Director
Lot G.Zauya

DATE: 1. Dec 2011

SCALE: 1/100

CHECKED by CONSULTANT
Project Manager
T.Fuji

DATE: 1. Dec 2011

DRAWING NO.: PS-GE-CC-01

GENERAL

G1 This building is situated in an earthquake zone and has been designed and detailed to resist seismic forces. Any variation to either structural or non-structural elements may significantly alter the eartquake response of the building and impair its safety.

ANY PROPOSED ALTERATIONS MUST BE REFERRED TO THE STRUCTURAL DESIGN ENGINEER.

G2 These drawings shall be read in conjunction with all Architectural and other consultants Drawings and Specifications and with such other written instructions as may be issued during the course of contract. All discrepancies shall be referred to Superintendant for decision before proceeding with the work.

G3 All dimensions relevant to setting out and off-site works shall be verified by the Contractor before construction and fabrication is commenced. The Engineers drawings shall not be scaled.

G4 During construction the contractor shall be responsible for maintaining the structure in a stable condition and ensuring no part shall be overstressed under construction activities.

G5 Workmanship and materials are to be in accordance with the relevant current PNGS and SAA standards including all amendments and the local statutory Authorities, except where varied by the the contract documents.

G6 Requirements to comply with a particular code or standard is deemed to refer to the latest edition with all relevant amendments and to include all other codes or standards associated with or referred to in the noted code or standard.

G7 No holes or chases other than those indicated on the structural drawings shall be made without the approval of the Superintendant.

G8 Prior to ordering materials or carrying out any work that may be affected, the Contractor shall submit the following information for approval in accordance with the drawings and specification. These proposals shall include all information neccessary for approval including the following:

1) Source and supplier of materials and products.

2) Cerificates and results of any tests already carried out.

3) Details of tests to be carried out both on and off site.

4) Location of any testing to be carried out off site.

5) Details of any seperate labratory, authority or other body to carry out tests.

The approval of substitution of materials shall be sought from the Superintendant.

All dimensions are in millimetres unless stated otherwise. All levels are expressed in metres.

G9 All props and formwork for beams and slabs shall be removed before construction of any masonry walls or partitions on the floor.

G10 All Non-Load Bearing Walls shall be kept clear of the underside of beams and slabs clearance shall not be less than 20mm unless otherwise shown.

G11 Where proprietary products are specified they shall be manufactured and used in accordance with the manufacturer's specifications and recommendations.

G12 Design loads to Papua New Guinea Standard 1001.

1) Wind - Basic Design Velocity 25m/sec
Terrain Category 1

2) Seismic - Zone 4

FOUNDATION

F1 Founding levels are provisional and are subject to the Superintendant's approval of the bearing strata.

F2 Anticipated bearing material: Undisturbed Natural Ground.

F3 Required allowable bearing strength of foundation material 550 kPa

F4 All water and loose material shall be removed from the base prior to pouring any concrete.

F5 Compacted fill under slabs and minor strip footings shall comply with the following:

a) Material shall be selected from an approved source, shall be free of vegetable matter and ball of clay, and shall comply with the following requirements.

(i) CBR value after 4 days soaking, not less than 25 when compacted to at least 95% maximum dry density as determined by AS1289 Test No. E1.1

(ii) Maximum linear shrinkage 6%

(iii) Grading

SIEVE SIZE (mm)	BY WEIGHT PASSING
37.5	100
19.0	60 - 100
9.5	40 - 80
4.75	30 - 60
2.36	20 - 45
0.425	15 - 30
0.075	3 - 15

(iv) The fraction passing the 75 micron sieve shall not exceed 2/3 that passing the 425 micron sieve.

(v) The fraction retained on the 2.36mm sieve shall consist of hard durable particles or fragments of stone, gravel or sand and shall not include any material that breaks up when alternately wetted and dried.

(vi) The fraction passing the 425 micron sieve shall have a liquid limit not greater than 30 and a plasticity index not greater than 10.

F6 Over excavating under footings shall be made good with 10 MPa mass concrete.

CONCRETE

C1 All workmanship and material shall be in accordance with PNG 1002.

C2 Minimum cover (mm) to all reinforcement unless otherwise shown shall be as follows:

REINFORCEMENT COVERS

Minimum reinforcement cover requirements to be in accordance with PNG1002 - 1982 Exposure category listed below:

Exterior faces of members (above ground) : 3
Interior faces of members : 3
Members below ground : 3

In addition reinforcement cover shall not be less than :

FOOTINGS	: 65mm
PEDESTAL	: 65mm
GROUND SLABS	: 30mm TOP
SUSPENDED SLABS	: 30mm TOP
BEAMS	: 40mm EXPOSED FACE, INTERIOR FACE 25mm
COLUMNS	: 65mm IN GROUND, 40mm ABOVE GROUND
SHEARWALLS	: 65mm IN GROUND, 40mm ABOVE GROUND

C3 Sizes of concrete elements do not include thickness of applied finishes.

C4 Reinforcement is represented diagrammatically and not neccessarily shown.

C5 Splices in reinforcement shall be made only in the positions shown or as otherwise approved by the Superintendant.

C6 Welding of reinforcement shall not be permitted.

C7 All reinforcement shall be securely supported in its correct position during concreting by approved bar chains, spacers or support bars.

C8 Reinforced symbols:
"Y" denotes hot rolled deformed bars grade 410Y to AS 1302
"S" denotes deformed bars grade 2305 to AS 1302.
"R" denotes plain round bars grade 230R to AS 1302.

C9 Laps, unless noted otherwise, shall be : 40 x bar diameter for rounds and 350mm for fabric.

C10 Bending radii, unless noted otherwise, shall be to PNGS 1002.

C11 Cover will be maintained during casting concrete by the use of plastic chairs and/or mortar blocks 1:2 mix at maximum 500mm centres in each directions. For work in contact with the ground chairs are to be supported on sheet plates.

C12 Reinforcement shall not be exposed for prolonged periods such as to permit the development of scale

C13 Reinforcement and formwork are to be checked by the Superintendant prior to pouring. The Superintendant is to be given 24 hours notice for a check and a futher 24 hours for any remedial work required prior to concrete placement.

C14 All conduits to be placed above bottom reinforcement and below top reinforcement - minimum spacing between conduits 25mm.

C15 Formwork shall be designed and constructed in accordance with AS 3610.

C16 Concrete components and quality shall be as follows, unless noted otherwise;

Element	F'c (MPa)	Water/Cement Ratio
Foundations	40	0.55
Ground Slabs	32	0.55
Beams Concrete	32	0.55
RC Shear Walls	32	0.55
Columns	32	0.55
Mass Concrete	15	0.55

C17 Three test cylinders are to be taken from each sample (sampling in accordance with PNGS 1002.) One cylinder to be tested at seven days, the other two at 20 days. Where ready mix concrete is supplied each truck will constitute a batch in applying PNGS 1002.

C18 The Contractor shall submit for approval his proposals for curing of all insitu concrete work, at least 7 days prior to any pour taking place.

C19 Construction Joints to be cleaned of all loose and foreign materials, scabbled and wetted immediately before continuing the following concreting. Construction Joints other than those indicated on the drawing shall not be made without approval.

C20 Control Joints in the Ground Floor slab shall be provided by 6M centres UNO.

CONCRETE MASONRY

B1 All concrete block masonry is to be executed in accordance with the current edition of:

PNGS 1004 - Reinforced Masonry Structures Code.
AS 2733 - Concrete Masonry Units.

B2 Concrete masonry blocks shall have characteristics compressive strength of F'b = 12 MPa and 16 MPa at specific locations denoted as SW1 - SW39.

B3 All blocks shall be laid dry and wetting shall not be permitted during or after laying.

B4 Channel stretcher blocks and lintel blocks shall be used to form bond beams and lintels respectively. Top groove blocks shall be used elsewhere where horizontal reinforcement is required. Otherwise blocks shall conform to AS 2733.

B5 All blocks must be cured for minimum of 28 days before transportation to site.

B6 Clean out blocks are to be used for core filled cavities and all mortar droppings are to be removed from the bottom cavities before grouting.

B7 Mortar shall comply with AS 1475. Part 1, Appendix A. The mix proprtions of table A1 shall be adjusted to give an average compressive strength of 8 MPa.

B8 Mortar joints to be 10mm thick with blocks fully bedded and perpends filled.

B9 Grout for corefilling shall comply with AS 1475, Part 1, Section 2.
Characteristic compressive strength F'c = 15 MPa Slump 225. Batching by volume is not permitted.

B10 Corefilling is to be placed for the full height in lifts of not more than 1200mm in height. A minimum delay period of one hour and max, three hours shall be observed between lifts. All cores are to be filled unless noted otherwise.

B11 Corefilling shall be thoroughly compacted into place with the aid of small immersion vibrators.

B12 The corefilling at the top of each lift shall be kept down at a distance of 25mm from the top of the blockwork and this surface shall be thoroughly scabbled before any further blocks are laid or concrete poured.

B13 Masonry walls shall be cured for at least three (3) days before corefilling is placed.

B14 All masonry must be approved by the Superintendant before corefilling takes place.

B15 Vertical reinforcement at any level shall be correctly positioned and securely tied to starters projecting from construction below prior to placing blocks.

B16 Reinforcement is to be left undisturbed for at least 12 hours after corefilling. Any reinforcement showing signs of seperation from the corefilling may render that section of the wall liable to rejection.

B17 Minimum cover to reinforcement : 12mm from inside face of block.

B18 Vertical bars shall be placed with laps at not less than 1600mm centres, unless noted otherwise.

B19 Laps, unless noted otherwise, shall be : 40 x bar diameter.

B20 All bars are to be cogged around openings and openings are to have a bond beam over them.

B21 At the completion of a day's work and during wet weather top and sides of all walls shall be covered to prevent rain penetration to cores or wetting of blocks.

B22 Control joints in blockwork to be at 4m maximum spacing.

STRUCTURAL STEELWORK

S1 All workmanship and materials shall be in accordance with PNGS 1003.

S2 Steel grade - 300 MPa.

S3 Plates, unless noted otherwise, shall be 8mm thick.

S4 Bolts, unless noted otherwise, shall be 16mm diameter, Grade 4.6/s, bolts 20mm diameter and greater shall be Grade 8.8/s.

S5 Welds, unless noted otherwise, shall be 6mm continuous fillet weld.

S6 Welding electrodes shall be class E 41XX.

S7 WElding shall be performed by an experienced qualified operator in accordance with PNGS 1016.

S8 The contractor shall verify that all members can be assembled and erected properly, prior to erection on site.

S9 Before fabrication is commenced the Contractor shall submit copies of the shop drawings to the Superintendant for review. Review does not include checking of dimensions.

S10 Reference shall be made to the Architect's drawings for additional drillings, cleats, fixings, etc.

S11 The contractor shall provide and leave in place until permanent bracing elements are constructed, such temporary bracing as is neccessary to stabilise the structure during erection.

S12 The ends of all tubular members are to be sealed with nominal thickness plates and continuous fillet weld unless otherwise shown.

S13 Unless otherwise specified all steelwork shall be sand blasted to remove all rust and scaled and painted one shop coat of inorganic zinc silicate primer min. 40 micron thickness. Members encased in concrete, fire spray or HSTF bolted connections must not be painted.

S14 All base plates shall be temporarily supported and dry pack grouted with 3:1 sand cement grout in a just wet condition.

S15 Cold formed steelwork shall comply with AS 1530, roll formed from hot-dipped zinc-rolled steel grade G450-Z200 to AS 1397.

S16 All steelwork exposed to the weather including bolts and fixings shall be hot dipped galvanised unless noted otherwise.

TIMBER

T1 Timber materials and workmanship shall comply with AS 1720.

T2 Timber shall be seasoned to moisture content not exceeding 15%, unless noted otherwise.

T3 Where unseasoned timber is specified, in no case shall timber be used having a moisture content exceeding 30% at the time of fabrication.

T3 Timber shall have strength properties not less than that shown below:

Stress Grade - F11
Strength Group - SD4
Joint Group - J3

In the absence of mechanical stress, grading timber shall be visually stress graded in accordance with AS 2082.

T4 The Contractor is required to submit details of the proposed species of timber for approval. If unidentified species are proposed, evidence must be provided from the Papua New Guinea Office of Forestry of identification and compliance with the specified properties.

T5 All sizes quoted are the final dressed sizes of finished timber unless noted otherwise.

T6 The Contractor shall verify that all members can be assembled and erected properly.

T7 Any variations shall be referred to the Superintendant for approval.

T8 Steel Components shall comply with PNGS 1003 Steel grade 250.

T9 Bolt holes are to be of same nominal diameter as bolts, drilled through assembled timber.

T10 Washers, unless noted otherwise, shall be provided under all bolt heads and nuts as follows:
Against timber, 65 x 65 x 5 square washers.
Against steel, standard round washers.

T11 All bolts, nuts and washers shall be galvanised in accordance with AS 1214.

T12 All bolts shall be retightened at completion of construction.

T13 Where neccessary timber shall be chamfered locally to just clean fillet welds connection plates, etc.

T14 Preservative treatment is to be provided as follows : dip diffused.

DESIGN LOADS

ROOF LEVEL:

DEAD LOAD:	0.6 kPa
LIVE LOAD:	0.25 kPa

GROUND FLOOR LEVEL

DEAD LOAD:	4.7 kPa
LIVE LOAD:	
- GENERATOR	3.0 kPa

This drawing is certified to comply with the Structural Engineering provisions of the Regulations under the Building Act Chapter 301 of the Revised Laws of Papua New Guinea

Name: Mr. L.J. Stocks
Registered Structural Engineer No: 0394152

TENDER ISSUE

PROJECT: PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT (POMSSUP)

TITLE: KilaKila SPT. GENERATOR HOUSE - STRUCTURAL NOTES

CLIENT: INDEPENDENT PUBLIC BUSINESS CORPORATION
PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT
PROJECT MANAGEMENT UNIT (PMU)
JAPAN INTERNATIONAL COOPERATION AGENCY

CONSULTANTS : NJS CONSULTANTS CO., LTD. - JAPAN

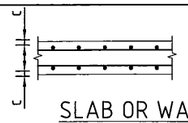
NOTES :

REVISIONS					
ISSUE	REV.	DATE	CHKED	DESCRIPTION	BY
TENDER	-	14/11/2011	FP	ISSUE FOR TENDER	LKT

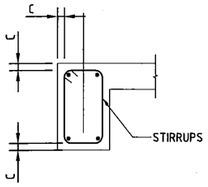
APPROVED by PMU: Project Director Lot G.Zauya — DATE: 1. Dec 2011 — SCALE: N.T.S.

CHECKED by CONSULTANT Project Manager T.Fuji — DATE: 1. Dec 2011 — DRAWING NO.: STP-S001

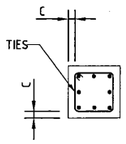
MINIMUM CONCRETE COVER



SLAB OR WALL

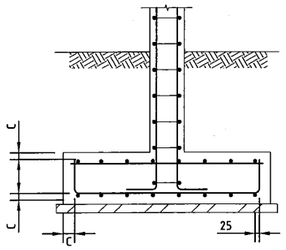


GIRDER OR BEAM

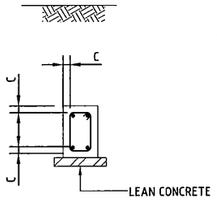


COLUMN OR PEDESTAL

ABOVE GRADE CONCRETE



FOOTING



GRADE BEAM

FOUNDATION

THE MINIMUM CONCRETE COVER OVER REINFORCING BARS SHALL BE AS INDICATED BELOW.

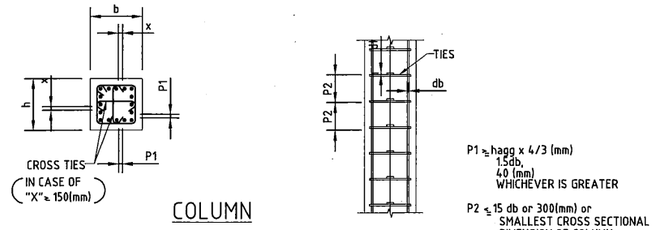
- ELEMENT EXPOSED TO WATER/SPILLAGE (CATCH BASIN/MANHOLE/SPILL BASIN etc - 75mm
- OTHER STRUCTURE - 65mm

REQUIREMENTS STIPULATED ABOVE SHALL NOT BE APPLIED TO THE FOLLOWING REINFORCED CONCRETE ITEMS :

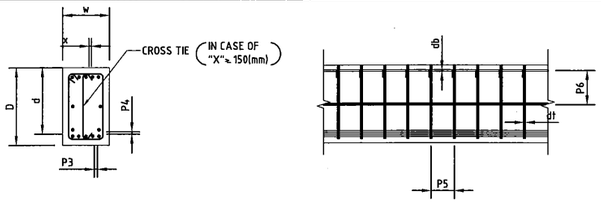
a) CONCRETE PIPES
 - AS PER MANUFACTURER'S STANDARD.
b) FIREPROOFING (WITH GALVANISED WIRE MESH)
c) DITCH LINING/ SLOPE PROTECTION
d) CONCRETE PAVING

NOTE: FOR CONCRETE CAST AGAINST GROUND (WITHOUT FORMWORK) MINIMUM CONCRETE COVER (C) SHALL BE 75mm.

SPACING LIMITS

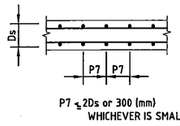


COLUMN

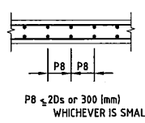


GIRDER AND BEAM

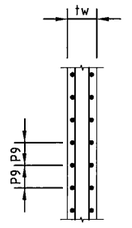
PRIMARY REINFORCEMENT

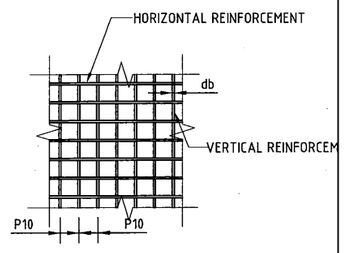


SECONDARY REINFORCEMENT



SLAB





WALL

NOTE : VERTICAL REINFORCEMENT NEED NOT BE ENCLOSED BY LATERAL TIES IF VERTICAL REINFORCEMENT AREA IS NOT GREATER THAN 0.01 TIMES GROSS CONCRETE AREA, OR WHERE VERTICAL REINFORCEMENT IS NOT REQUIRED AS COMPRESSION REINFORCEMENT.

FOR WALLS GREATER THAN 200mm THICK, THE VERTICAL AND HORIZONTAL REINFORCEMENT SHALL BE PROVIDED IN TWO GRIDS, ONE NEAR EACH FACE OF THE WALL.

NOTES:

1. FOR GENERAL NOTES, SEE DWG No. PGLN-YK-CSZZZ-900100.

2. LEGEND
 hagg : NOMINAL MAXIMUM SIZE OF AGGREGATE = 20mm
 d : EFFECTIVE DEPTH
 db : SIZE OF LONGITUDINAL BARS (mm)
 N : BAR SYMBOL
 dt : SIZE OF TIES
 s : SPACING
 D : BEAM HEIGHT
 w : BEAM WIDTH
 b,h : COLUMN SECTION
 tw : THICKNESS OF WALL

3. SPACING OF TIES AND STIRRUPS SHALL BE IN ACCORDANCE WITH AS 3600-2001

3-1 TIES SPACING (P2)
MAXIMUM TIE SPACING SHALL NOT EXCEED THE FOLLOWING VALUE
 -15db
 -SMALLEST CROSS SECTIONAL DIMENSION OF COLUMN
 -300mm
 } WHICHEVER IS SMALLER

3-2 STIRRUP SPACING (P5)
MAXIMUM STIRRUP SPACING SHALL NOT EXCEED THE FOLLOWING VALUE:
 -D/2
 -15db
 -300mm
 } WHICHEVER IS SMALLER

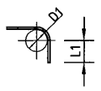
This drawing is certified to comply with the Structural Engineering provisions of the Regulations under the Building Act Chapter 301 of the Revised Laws of Papua New Guinea

Name: Mr. L.J. Stocks
Registered Structural Engineer No: 0394152

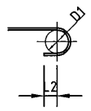
STANDARD HOOKS AND BENDS

FOR MAIN REINFORCEMENT

90° HOOK OR BEND



180° HOOK

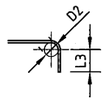


(mm)

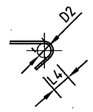
BAR SIZE	MIN.BEND DIA.	MIN.EXTENSION	
	D1	L1	L2
N12	60	120	70
N16	80	135	70
N20	100	160	80
N24	120	195	100
N28	140	225	115
N32	160	260	130
N36	180	290	145
N40	200	320	160

FOR TIES AND STIRRUPS REINFORCEMENT

90° HOOK

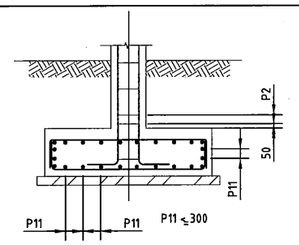


135° HOOK

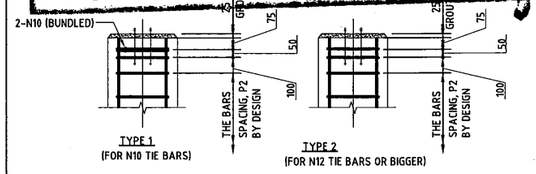


(mm)

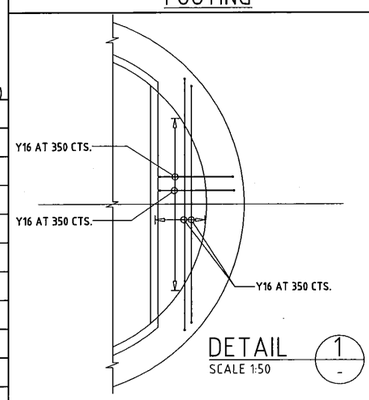
BAR SIZE	MIN.BEND DIA.	MIN.EXTENSION	
	D2	L3	L4
N10	40	135	100
N12	50	160	120



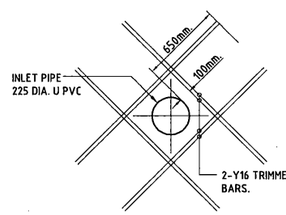
FOOTING



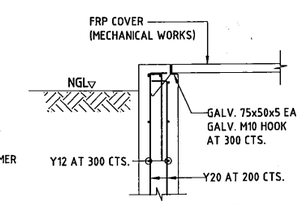
STIRRUP DETAIL FOR TOP OF PEDESTAL



DETAIL 1 SCALE 1:50



TYP. DETAIL SCALE 1:50



DETAIL 2 SCALE 1:50

TENDER ISSUE

PROJECT:	PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT (POMSSUP)
TITLE:	KilaKila STP. GENERATOR HOUSE - STRUCTURAL NOTES SHEETS 2 OF 2
CLIENT:	INDEPENDENT PUBLIC BUSINESS CORPORATION PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT PROJECT MANAGEMENT UNIT (PMU) JAPAN INTERNATIONAL COOPERATION AGENCY
CONSULTANTS :	NJS CONSULTANTS CO., LTD. - JAPAN
NOTES :	

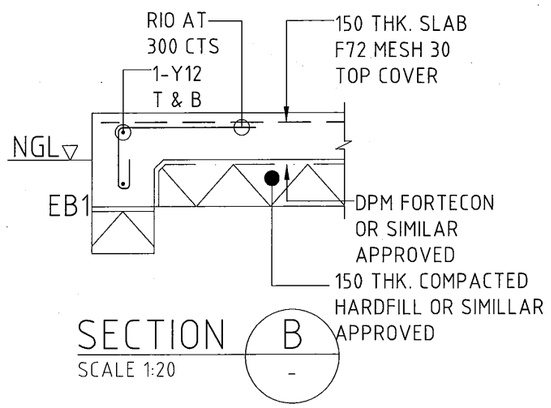
REVISIONS

ISSUE	REV.	DATE	CHKED	DESCRIPTION	BY
TENDER	-	14/11/2011	FP	ISSUE FOR TENDER	LKT

APPROVED by PMU: Project Director Lot G.Zauya	DATE: 1. Dec 2011	SCALE: N.T.S.
CHECKED by CONSULTANT Project Manager T.Fuji	DATE: 1. Dec 2011	DRAWING NO.: STP-S001a

FOOTING PLAN

SCALE 1:100



SECTION B

SCALE 1:20

MEMBER SCHEDULE

MARK	SIZE/DESCRIPTION	REINFORCEMENT		REMARK
		LENGTHWISE	WIDTHWISE	
SF1	400 DP x 600 WD	R10-300 CTS	4-Y16 T&B	RC STRIP FOOTING
PF1	600 DP x 400 SQR.	REFER DETAIL	D1, S003	RC PAD FOOTING
C1	65 x 5 SHS			STEEL COLUMN
EB1	300 DP x 200 WD	R10-300 CTS	1-Y12 T&B	RC EDGE BEAM
RB1	150 x 50 x 5 RHS			STEEL RAFTERS
RB2	150 x 50 HWD			TIMBER RAFTER
fr	50 x 50 x 5 SHS			STEEL FRAME

NOTES:

1. U.N.O. BLOCKWALL REINFORCEMENT
   LOAD BEARING:
   VERTICAL -Y16-400 CTS
   HORIZONTAL -Y12-400 CTS
2. U.N.O. ALL BLOCKWALL SHALL BE 200 min U.N.O.
3. U.N.O. LAP LENGTHS:
   Y12-500 min COG = 200 EMBEDMENT = 250
   Y16-650 min COG = 300 EMBEDMENT = 300
   WITH STD. HOOK
4. U.N.O. MINIMIUM DEPTH OF 1000mm TYP. FROM NGL. UNLESS HARD ROCK ENCOUNTED BEFORE THAT IN WHICH FOOTING TO BE FOUNDED ON HARD ROCK
5. ALL FOOTING FOUNDING LEVELS ARE TO BE VARIFIED ON SITE DURING EXCAVATION.
6. 300 THK MASS CONCRETE TO INCLUDE SERVICE CONDUITS AS PER MECHANICAL & ELECTRICAL DRAWINGS.

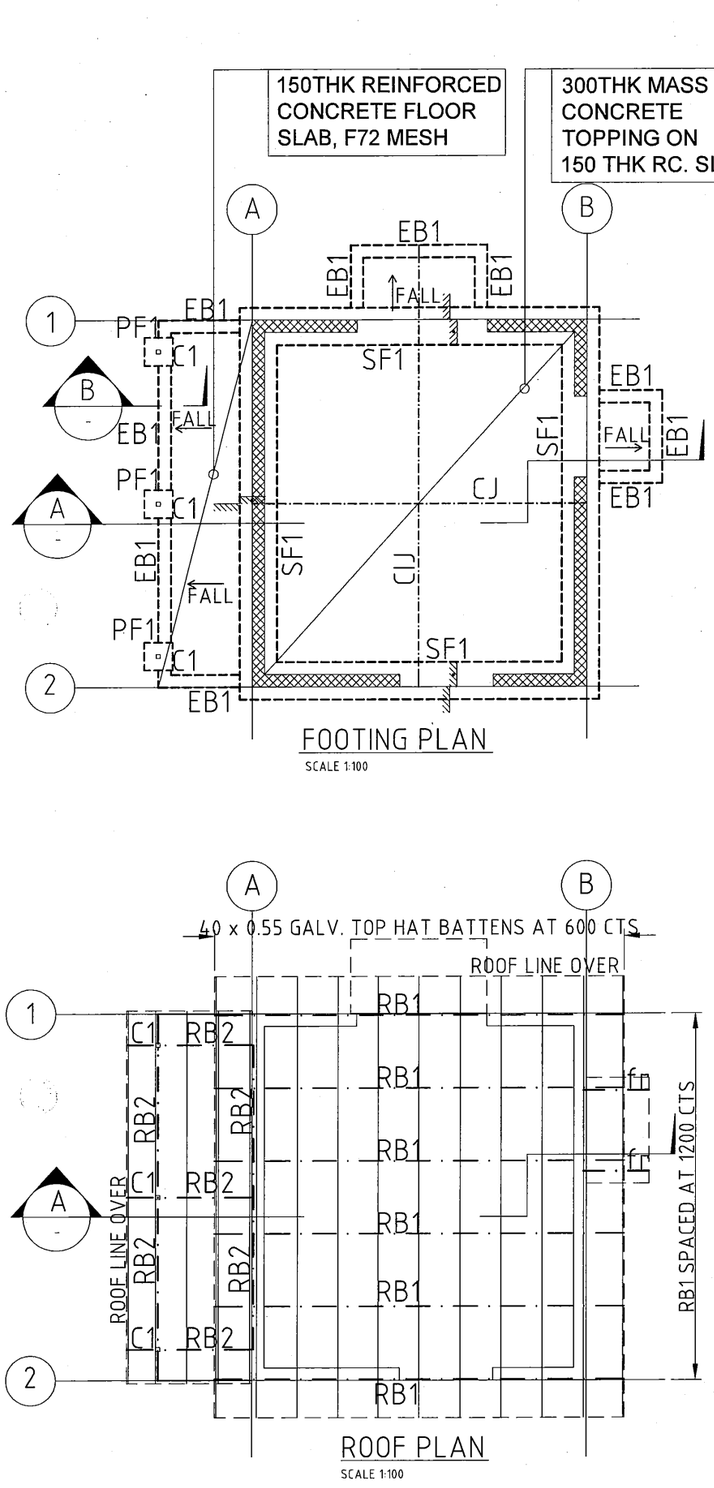
LEGEND:

- DENOTES LOAD BEARING BLOCKWALL
- DENOTES NON LOAD BEARING WALL
- DENOTES ARCHITECTURAL STUDWALL
- DENOTES STEP DOWN REFER ARCH. DWGS.

NGL - DENOTES NATURAL GROUND LEVEL
CIJ - DENOTES SAWCUT JOINT
CJ - DENOTES CONSTRUCTION JOINT
WJ - DENOTES WALL JOINT

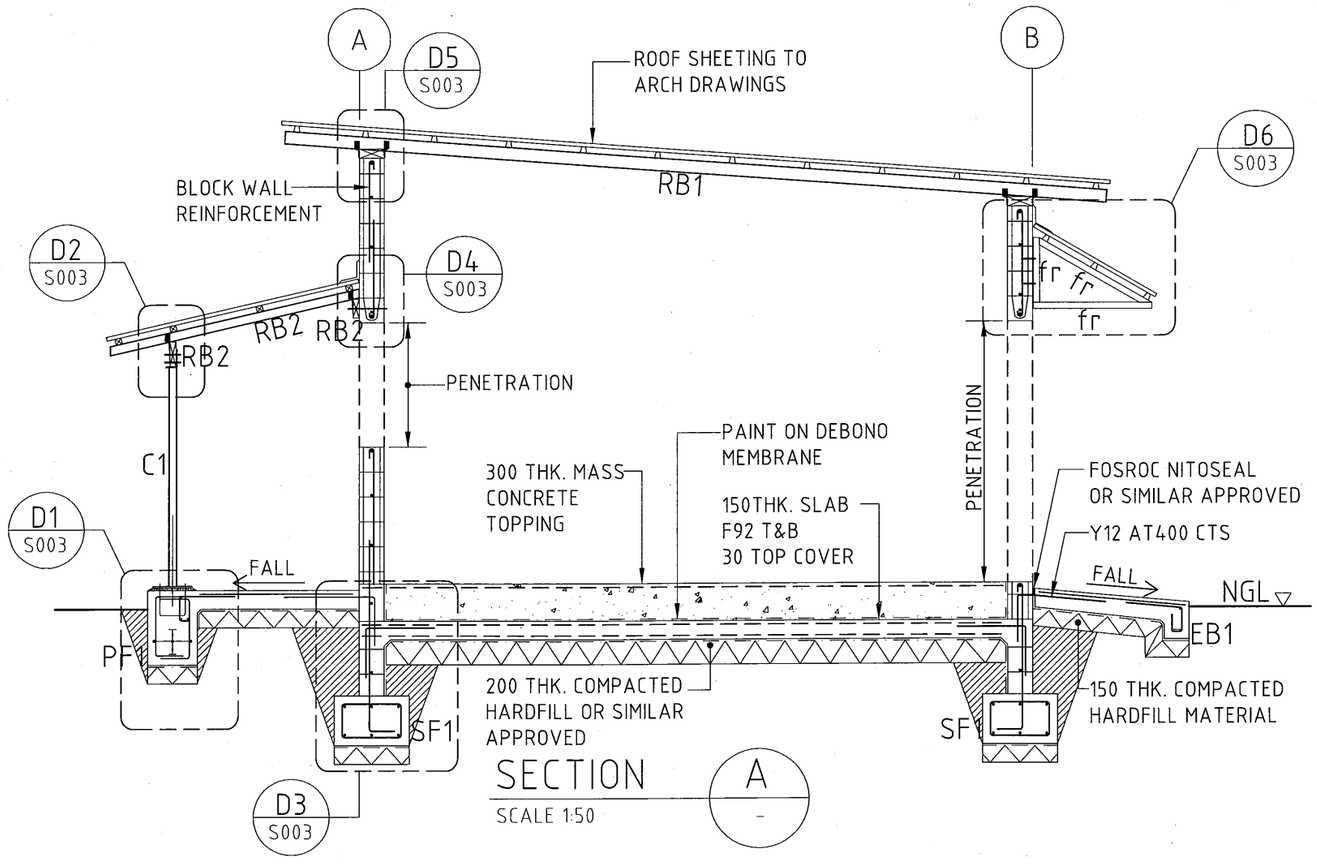
This drawing is certified to comply with the Structural Engineering provisions of the Regulations under the Building Act Chapter 301 of the Revised Laws of Papua New Guinea

Name: Mr. L.J. Stocks
Registered Structural Engineer No: 0394152



ROOF PLAN

SCALE 1:100



SECTION A

SCALE 1:50

TENDER ISSUE

PROJECT: PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT (POMSSUP)

TITLE: KilaKila SPT. GENERATOR HOUSE. PLANS AND CROSS SECTION

CLIENT: INDEPENDENT PUBLIC BUSINESS CORPORATION
PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT
PROJECT MANAGEMENT UNIT (PMU)
JAPAN INTERNATIONAL COOPERATION AGENCY

CONSULTANTS: NJS CONSULTANTS CO., LTD. - JAPAN

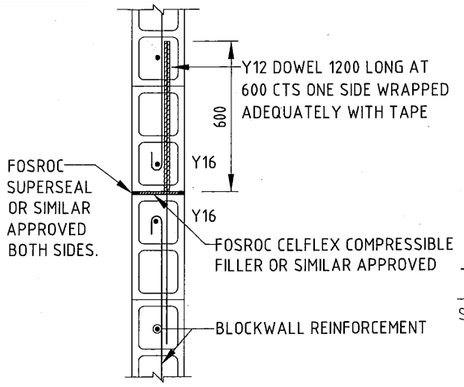
NOTES:

REVISIONS

ISSUE	REV.	DATE	CHKED	DESCRIPTION	BY
TENDER	-	14/11/2011	TT	ISSUE FOR TENDER	LKT

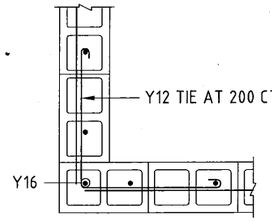
APPROVED by PMU: Project Director Lot G.Zauya — DATE: 1. Dec 2011 — SCALE: AS SHOWN

CHECKED by CONSULTANT Project Manager T.Fuji — DATE: 1. Dec 2011 — DRAWING NO.: STP-S002



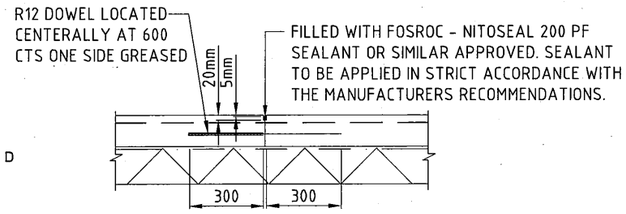
TYP. WALL JOINT DETAIL (WJ)

SCALE 1:20



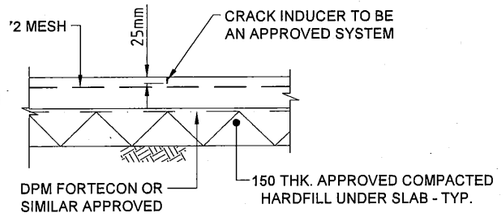
TYP. WALL CORNER DETAIL

SCALE 1:20



CONSTRUCTION JOINT (CJ)

SCALE 1:20



TYP. CRACK INDUCED JOINT (CIJ)

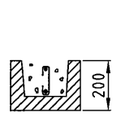
SCALE 1:25

MEMBER SCHEDULE

MARK	SIZE/DESCRIPTION	REINFORCEMENT		REMARK
		LENGTHWISE	WIDTHWISE	
SF1	400 DP x 600 WD	R10-300 CTS	4-Y16 T&B	RC STRIP FOOTING
PF1	600 DP x 400 SQR.	REFER DETAI	D1, S003	RC PAD FOOTING
C1	65 x 5 SHS			STEEL COLUMN
EB1	300 DP x 200 WD	R10-300 CTS	1-Y12 T&B	RC EDGE BEAM
RB1	150 x 50 x 5 RHS			STEEL RAFTERS
RB2	150 x 50 HWD			TIMBER RAFTER
fr	50 x 50 x 5 SHS			STEEL FRAME

MAX. ALLOWABLE SPANS FOR 200mm WIDE LINTELS

MAXIMUM LINTEL SPAN (mm)	LINTELS SUPPORTING		
	LIGHT ROOF OR WITHOUT CEILING	LIGHT ROOF, LIGHT TIMBER FRAMED WALL & TIMBER FLOOR	LIGHT FLOOR, MANSORY WALL & TIMBER FLOOR
1000	B1	B1	B2
1600	B1	B3	B3
2000	B2	B3	B4
2600	B3	B4	B5
3000	B3	B5	B5
3600	B3	B5	-

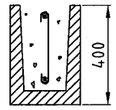


TYPE B1

2-Y12 WITH R10
@ 150 CTS FOR

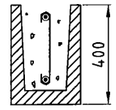
TYPE B2

2-Y16 WITH R10
@ 150 CTS FOR
LINTELS AND 300 CTS
FOR BOND BEAMS



TYPE B3

2-Y16 WITH R10
@ 150 CTS.



TYPE B4

2-Y20 WITH R10
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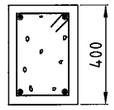
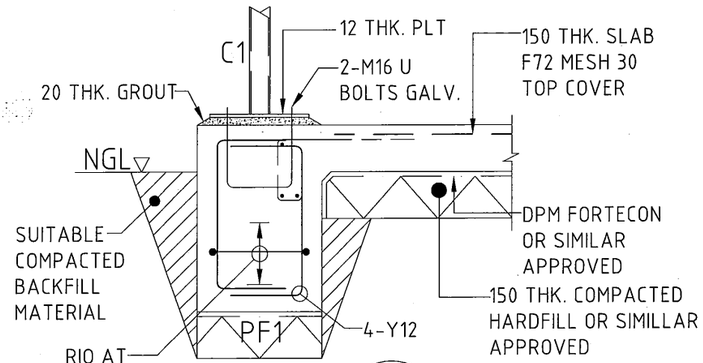


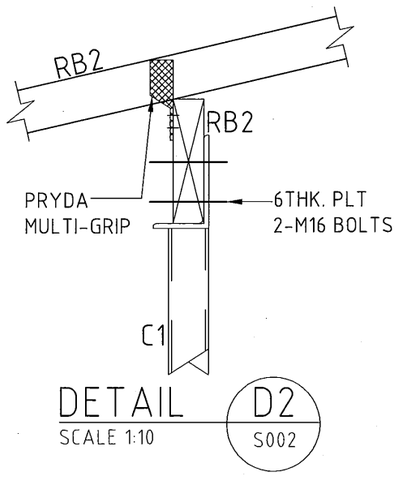
TYPE B5-RC

4-Y16 WITH R10
@ 150 CTS.



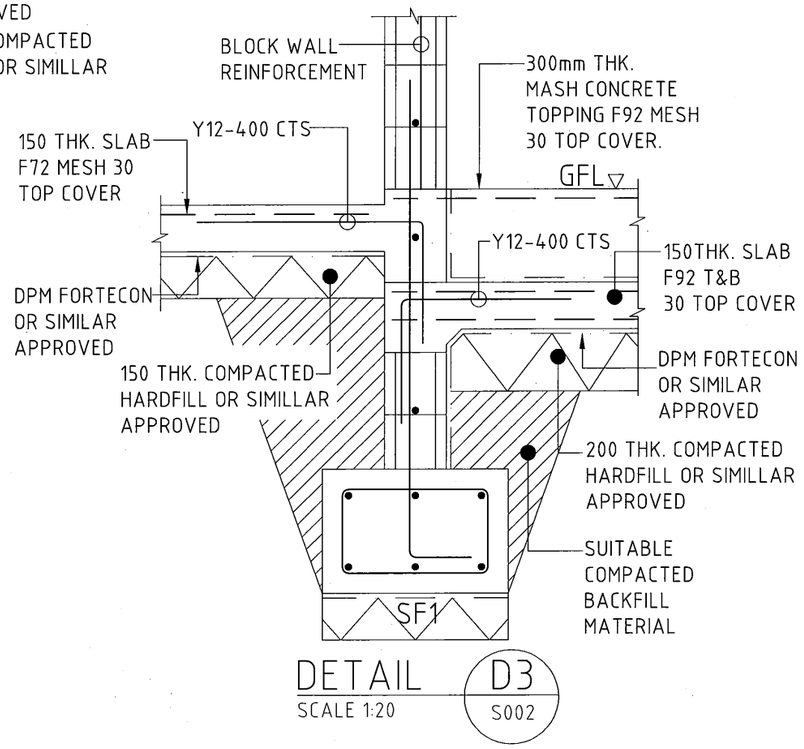
DETAIL D1

SCALE 1:20 — S002



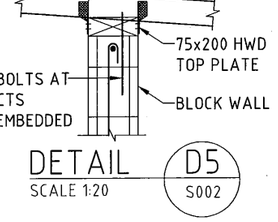
DETAIL D2

SCALE 1:10 — S002



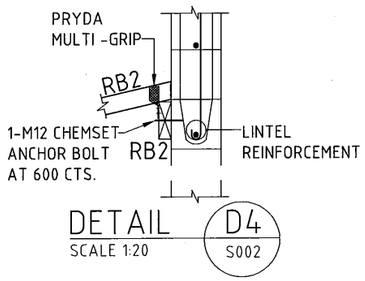
DETAIL D3

SCALE 1:20 — S002



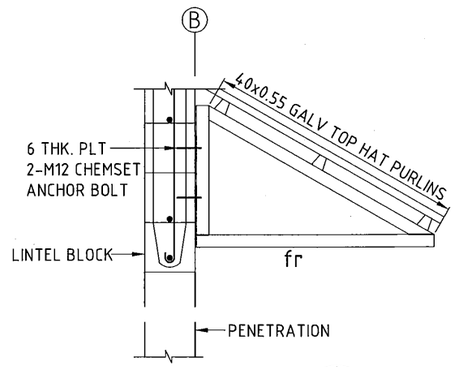
DETAIL D5

SCALE 1:20 — S002



DETAIL D4

SCALE 1:20 — S002



DETAIL D6

SCALE 1:20 — S002

This drawing is certified to comply with the Structural Engineering provisions of the Regulations under the Building Act Chapter 301 of the Revised Laws of Papua New Guinea

Name: Mr. L.J. Stocks
Registered Structural Engineer No: 029

TENDER ISSUE

PROJECT: PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT (POMSSUP)

TITLE: KilaKila SPT. GENERATOR HOUSE3 SECTION AND DETAILS

CLIENT: INDEPENDENT PUBLIC BUSINESS CORPORATION
PORT MORESBY SEWERAGE SYSTEM UPGRADING PROJECT
PROJECT MANAGEMENT UNIT (PMU)
JAPAN INTERNATIONAL COOPERATION AGENCY

CONSULTANTS : NJS CONSULTANTS CO., LTD. - JAPAN

NOTES :

REVISIONS					
ISSUE	REV.	DATE	CHKED	DESCRIPTION	BY
TENDER	-	14/11/2011	FP	ISSUE FOR TENDER	LKT

APPROVED by PMU: Project Director Lot G.Zauya — DATE: 1. Dec 2011 — SCALE: AS SHOWN

CHECKED by CONSULTANT Project Manager T.Fuji — DATE: 1. Dec 2011 — DRAWING NO.: STP-S003