REPUBLIC OF THE PHILIPPINES

DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

REGION XI

DAVAO DEL NORTE

2ND DISTRICT ENGINEERING OFFICE

TAGUM CITY

FY 2025 BIP

DETAILED ENGINEERING DESIGN PLAN FOR

CONSTRUCTION OF WATER SYSTEM IN BARANGAY, MAGWAWA SANTO TOMAS, DAVAO DEL NORTE

PROJECT NAME

MAGWAWA, SANTO TOMAS, DAVAO DEL NORTE

LOCATION

SUBMITTED:

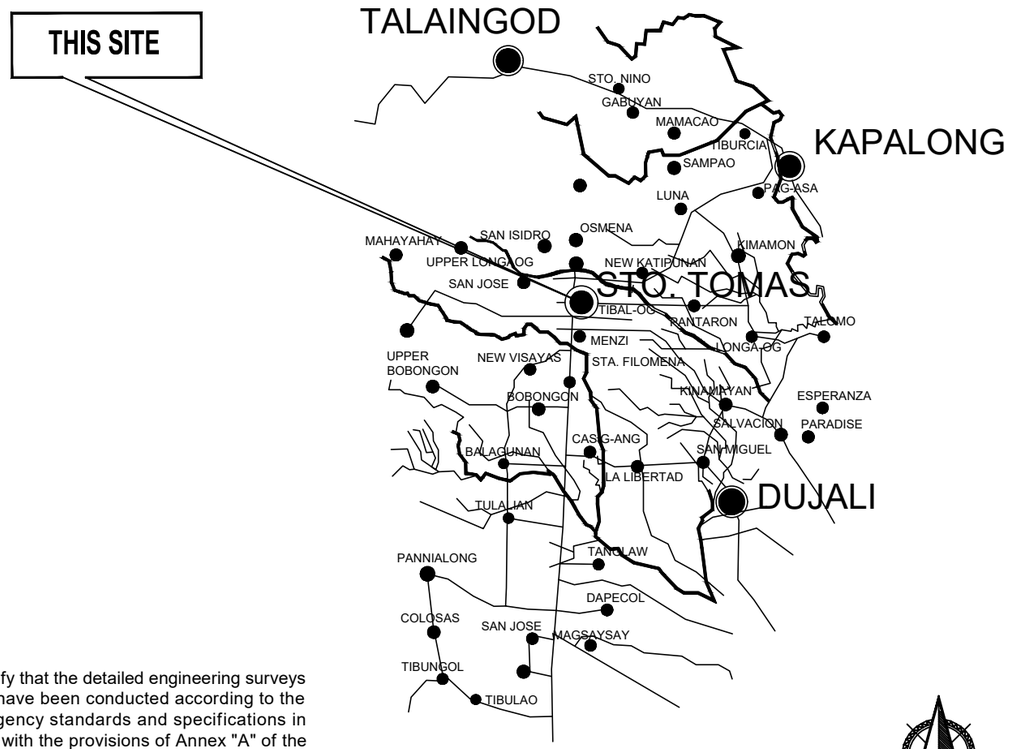
JEZABEL E. TULING, MPA
CHIEF, PLANNING AND DESIGN SECTION
DATE:

RECOMMENDED:

GARRY E. VERANO
OIC - OFFICE OF THE ASSISTANT DISTRICT ENGINEER
DATE:

APPROVED:

ARTURO P. LONGYAPON
DISTRICT ENGINEER
DATE:



VICINITY MAP

This is to certify that the detailed engineering surveys and designs have been conducted according to the prescribed agency standards and specifications in conformance with the provisions of Annex "A" of the Revised Implementing Rules and Regulations of RA 9184, and that the detailed engineering outputs are adequate for the procurement at hand.

WARREN S. PIÑEZ
Head, Survey and Investigation Unit
DATE:

LEGEND:

BM — BENCHMARK (Chapel, Day-Care Center, Existing Slab, Elev. 0.10 Mtrs.)

SITE AREA: 87,474 ± sq. m.

BUILDING AREA: 384 sq. m.

BUILDING OFFICIAL

MUNICIPALITY OF STO. TOMAS

LINE & GRADE

LAND USE & ZONING

ARCHITECTURAL

STRUCTURAL

SANITARY

ELECTRICAL

MECHANICAL

Republic of the Philippines
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

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2ND DISTRICT ENGINEERING OFFICE
TAGUM CITY, REGION XI

PROJECT & LOCATION:
CONSTRUCTION OF WATER SYSTEM IN BARANGAY MAGWAWA, SANTO TOMAS, DAVAO DEL NORTE

SHEET CONTENTS:
VICINITY MAP
LOCATION PLAN

DRAFTED:
WARREN S. PIÑEZ
ENGINEER II

PREPARED:
HERWIN EVAN J. HABABAG
ENGINEER II

SUBMITTED:
BENILDA S. PACQUIAO
ENGINEER III

REVIEWED:
JEZABEL E. TULING, MPA
CHIEF, PLANNING & DESIGN SECTION

RECOMMENDED:
GARRY E. VERANO
OFFICER IN CHARGE
OFFICE OF THE ASSISTANT DISTRICT ENGINEER

APPROVED:
ARTURO P. LONGYAPON
DISTRICT ENGINEER

SET NO: STD 0127

SHEET NO.: 01

SUMMARY OF QUANTITIES

ITEM NO.	DESCRIPTION	UNIT	QUANTITY	REMARKS
PART II	OTHER GENERAL REQUIREMENTS			
B.3 (1)	PERMITS AND CLEARANCES	lumpsum	1.00	
B.5 (1)	PROJECT BILLBOARD/SIGN BOARD	each	2.00	
B.7 (1)	OCCUPATIONAL SAFETY AND HEALTH	lumpsum	1.00	
B.9 (1)	MOBILIZATION/DEMOBILIZATION	lumpsum	1.00	
PART C	FINISHING WORKS			
900(1)c	Structural Concrete Class A 28 days (Suspended Slab)20 cu.m. Elevated Tank	cu.m.	11.95	
903(2)	Formworks and Falseworks	sq.m.	60.00	
1002(27)	Plumbing Works	lumpsum	1.00	
1046(2)a1	100mm CHB Non Bearing (including reinforcing steel)	sq.m.	15.60	
1027(1)	Cement Plaster Finish (Pump House with Solar Roof))	sq.m.	41.32	
900(4)c	Structural Concrete (Columns,Beam,footing and tie Beam)20 cu.m. Elevated Tank	cu.m.	10.17	
1032(1)a	Painting Works (Masonry Painting)- for Elevated Tank and Solar Roof with Pump House	cu.m.	123.38	
902(1)a1	Rainforcing Steel (Deformed Grade 40)- 20 cu.m Elevated Tank	kgs.	2,894.68	
1047(8)a	Structural Steel Roof Framing (Pump House with Solar Panel Roof)	kgs.	1,200.00	
1047(3)	Metal Structures Accessories	lumpsum	1.00	
PART E	ELECTRICAL WORKS			
1100(10)	CONDUIT, BOXES AND FITTINGS	lumpsum	1.00	
1101(33)	WIRES AND WIRING DEVICES	lumpsum	1.00	
1102(1)	PANELBOARD WITH MAIN & BRANCH BREAKERS	lumpsum	1.00	
1102(11)	POLE MOUNTED TRANSFORMER WITH COMPLETE ACCESSORIES	lumpsum	1.00	
1102(18)	SOLAR PANEL WITH INVERTER, BATTERY AND OTHER DEVICE	lumpsum	1.00	
1103(1)	LIGHTING FIXTURES AND LAMPS	lumpsum	1.00	
PART I	WATER SUPPLY			
1201(1)	WATER PUMPING SYSTEM	lumpsum	1.00	
1600(2)	PIPELINE TRENCH EXCAVATION	cu.m.	126.00	
1602(4)	POLYETHYLENE (PE) PLASTIC PIPE	lumpsum	1.00	
1603(1)	VALVE	lumpsum	1.00	

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ENGINEER II

PREPARED:
HERWIN EVAN J. HABABAG
ENGINEER II

SUBMITTED:
BENILDA S. PACQUIAO
ENGINEER III

REVIEWED:
JEZABEL E. TULING, MPA
CHIEF, PLANNING & DESIGN SECTION

RECOMMENDED:
GARRY E. VERANO
OFFICER IN CHARGE
OFFICE OF THE ASSISTANT DISTRICT ENGINEER

APPROVED:
ARTURO P. LONGYAPON
DISTRICT ENGINEER

SET NO: STD 0227

SHEET NO. : 02

I N D E X O F D R A W I N G

SHEET CONTENT	SET NO.	SHEET NO.
COVER PAGE		
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GENERAL NOTES	STD-6	06
GENERAL CONSTRUCTION NOTES	STD-7	07
GENERAL NOTES	STD-8	08
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SCHEDLE OF DIMENSION & REINFORCEMEN OF ELEVATED WATER TANK	STD-10	10
MINIMUM COVER OF REINFORCEMENT SCHEDULE OF REBARS SPLICES AND EMBEDMENT	STD-11	11
TYPICAL SECTION OF WATER TANK	STD-12	12
TYPICAL SECTION OF ELEV. WATER TANK OF BEAMS AT LEVEL 1 &2 TIE BEAM AND FOOTING FOUNDATION PLAN	STD-13	13
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INDEX OF DRAWING

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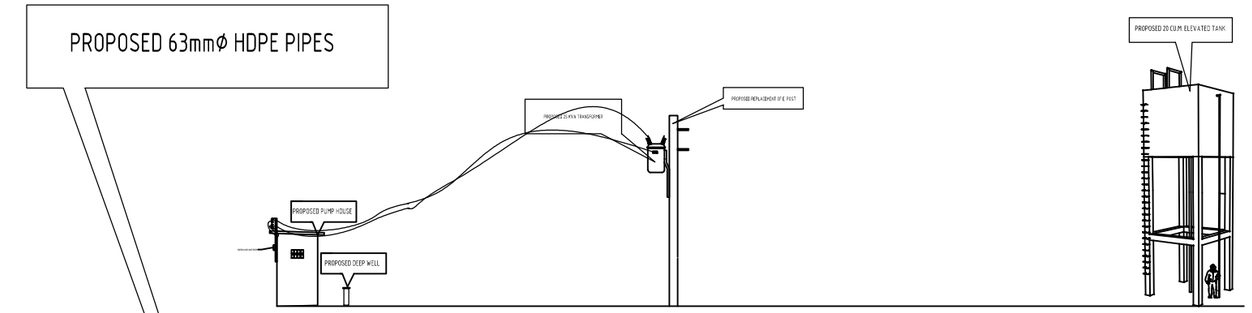
RECOMMENDED:
GARRY E. VERANO
OFFICER IN CHARGE
OFFICE OF THE ASSISTANT DISTRICT ENGINEER

APPROVED:
ARTURO P. LONGYAPON
DISTRICT ENGINEER

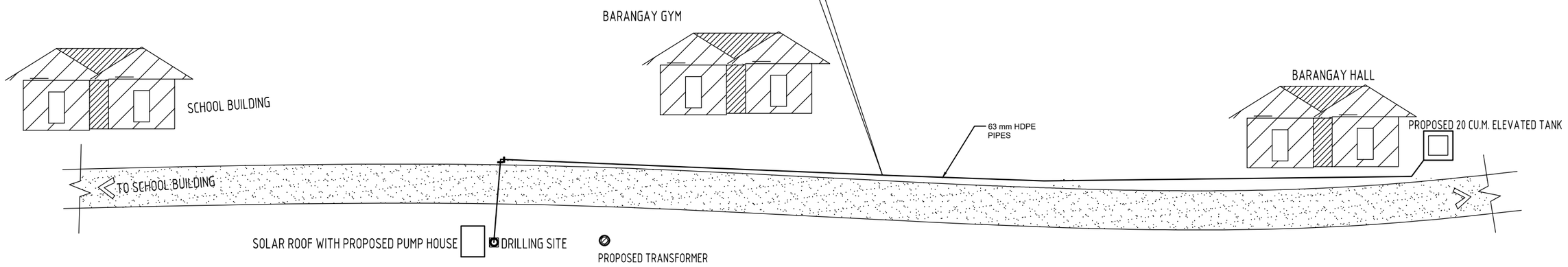
SET NO: STD 03|27

SHEET NO. : 03

SCOPE OF WORKS	
1	DRILLING OF WELL
2	20 CU.M. ELEVATED WATER TANK
3	PIPELINES
4	ELECTRICAL WORKS (SOLAR)



GENERAL PLAN
DNTS



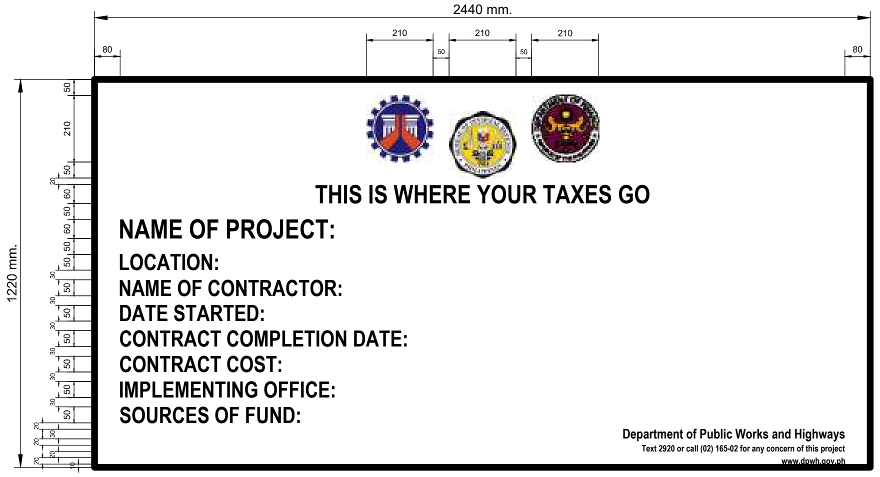
GENERAL PLAN

DNTS

Republic of the Philippines
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

DAVAO DEL NORTE
2ND DISTRICT ENGINEERING OFFICE
TAGUM CITY, REGION XI

PROJECT & LOCATION:	SHEET CONTENTS:	DRAFTED :	SUBMITTED:	REVIEWED:	RECOMMENDED:	APPROVED:	SET NO:	SHEET NO. :
CONSTRUCTION OF WATER SYSTEM IN BARANGAY MAGWAWA, SANTO TOMAS, DAVAO DEL NORTE	**GENERAL PLAN**	**WARREN S. PIÑEZ** ENGINEER II PREPARED: **HERWIN EVAN J. HABABAG** ENGINEER II	**BENILDA S. PACQUIAO** ENGINEER III	**JEZABEL E. TULING, MPA** CHIEF, PLANNING & DESIGN SECTION	**GARRY B. VERANO** OFFICER IN CHARGE OFFICE OF THE ASSISTANT DISTRICT ENGINEER	**ARTURO P. LONGYAPON** DISTRICT ENGINEER	STD 04 27	04



DPWH STANDARD PROJECT BILLBOARD

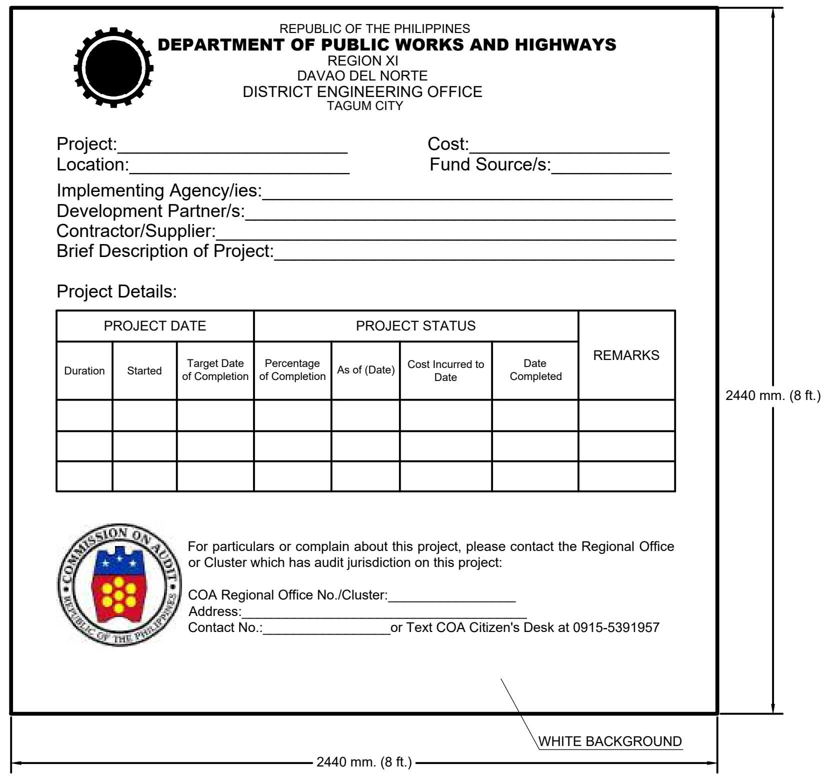
NOTE :

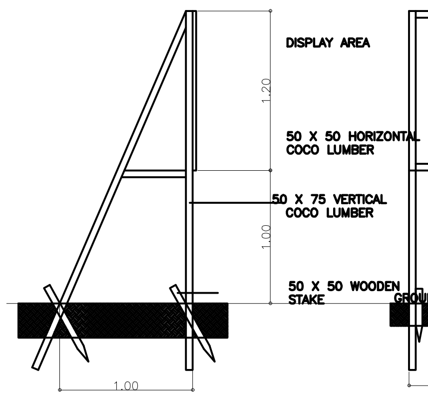
* INSTALLATION OF BILLBOARD SHALL BE ONE(1) AT THE BEGINNING & ONE(1) AT THE END OF THE PROJECT.

* NAMES OR PICTURES OF ANY PERSONAGES SHOULD NOT APPEAR IN THE BILLBOARD.

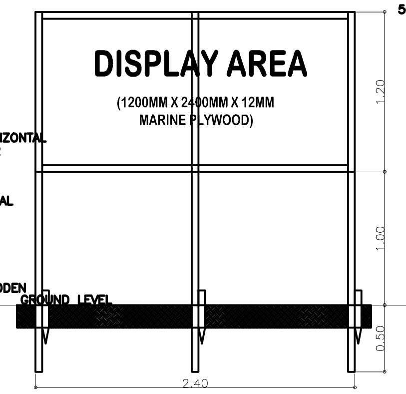
* NO POLITICAL BILLBOARD SHALL BE ALLOWED TO BE INSTALLED 100m BEFORE & 100m AFTER ALL DPWH PROJECTS & IN BETWEEN THE PROJECT LIMITS OR WITHIN THE ROAD-RIGHT-OF-WAY.

* DPWH CONTRACTORS SHALL NOT BE ALLOWED TO PLACE NAMES OF POLITICIANS ON THEIR EQUIPMENT OR CARRY POLITICAL BILLBOARD ON THEIR EQUIPMENT.

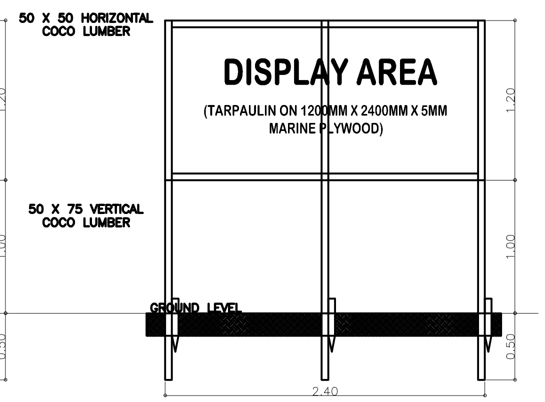




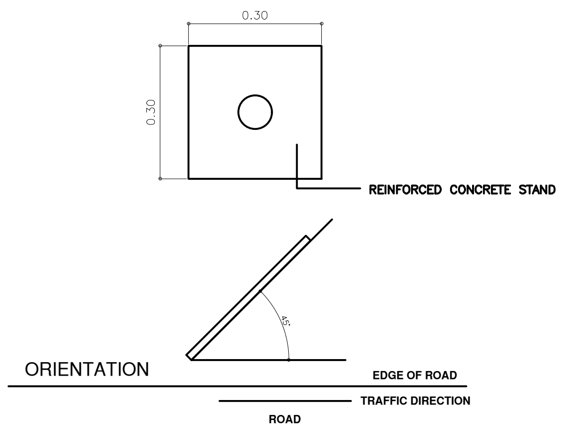
ELEVATION



FRONT ELEVATION (OPTION 1)



FRONT ELEVATION (OPTION 2)



BILLBOARD FRAME DETAIL

Republic of the Philippines DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS **DAVAO DEL NORTE** **2ND DISTRICT ENGINEERING OFFICE** TAGUM CITY, REGION XI	PROJECT & LOCATION: **CONSTRUCTION OF WATER SYSTEM IN BARANGAY MAGWAWA, SANTO TOMAS, DAVAO DEL NORTE**	SHEET CONTENTS: DPWH STANDARD / PROJECT BILLBOARD/ COA BILLBOARD / FRAMING DETAIL	DRAFTED : **WARREN S. PIÑEZ** ENGINEER II PREPARED: **HERWIN EVAN J. HABABAG** ENGINEER II	SUBMITTED: **BENILDA S. PACQUIAO** ENGINEER III	REVIEWED: **JEZABEL E. TULING, MPA** CHIEF, PLANNING & DESIGN SECTION	RECOMMENDED: **GARRY E. VERANO** OFFICER IN CHARGE OFFICE OF THE ASSISTANT DISTRICT ENGINEER	APPROVED: **ARTURO P. LONGYAPON** DISTRICT ENGINEER	SET NO: STD 05 27	SHEET NO. : 05

GENERAL NOTES:

1.0 STANDARD & REFERENCES

THE FOLLOWING SHALL GOVERN THE DESIGN, FABRICATION & CONSTRUCTION OF THE PROJECT

1.1 NATIONAL STRUCTURAL CODE OF THE PHILIPPINES (N.S.C.P.) VOL. 7TH. EDITION, 2015

2.0 DESIGN CRITERIA

2.1 LOADINGS

A. DEAD LOAD

CONCRETE - 23.56 Kn/m^3

STEEL - 76.93 Kn/m^3

B. LIVE LOAD

ROOF - 1.00 Kn/m^3

C. WIND LOAD (NSCP 2010)

BASIC WIND VELOCITY, V = 270 KPH

P=QH [9GCpf)] (DESIGN WIND PRESSURE)

where: qh = VELOCITY PRESSURE, Kpa

GCpf = EXTERNAL PRESSURE COEFFICIENT

GCpi = INTERNAL PRESSURE COEFFICIENT

D. SEISMIC LOAD (NSCP 2010)

$V=\frac{CVI}{RT}(W)$ (DESIGN BASE SHEAR)

$Vmax = \frac{2.50\ cal}{}(W)$ Vmin = 0.11 CaIW

Vmin = 0.80 $\frac{ZNvI}{R}$ W (ZONE 4)

WHERE: W = TOTAL DEAD LOAD

T = NATURAL PERIOD = Ct $(hn)^{3/4}$

WHERE: C = NUMERICAL COEFFICIENT

h = BUILDING HEIGHT

I = IMPORTANCE FACTOR = 8.50

SEISMIC COEFFICIENT Cv = 0.44 Nv

Ca = 0.64N

NEAR SOURCE FACTOR (10 Km) Nv = 1.2

Na = 1.0

Z = SEISMIC ZONE = 0.40 (ZONE 4)

S = SOIL TYPE = D

2.1 DESIGN STRESSES

A. CONCRETE

COMPRESSIVE STRENGTH (@ 28 DAYS fc' = 27 MPa (4,000 psi)

fc' = 21 MPa (3,000 psi)

B. REINFORCING BARS

a. FOR BARS 16 MM Ø & GREATER fy = 420 MPA (60,000 PSI)

b. FOR BARS LESS THAN 16 mm Ø fy = 275 MPA (40,000 PSI)

C. STRUCTURAL STEEL, ASTM-A36

3.0 FOUNDATION

3.1 FOUNDATIONS ARE DESIGNED USING AN ASSUMED ALLOWABLE SOIL BEARING CAPACITY OF _80_KPA AT DEPTHS INDICATED IN THE DRAWINGS.

3.1.1 IN CASE THE ACTUAL LOCATION OF THE STRUCTURE IS LESS THAN THE ASSUMED DISTANCE FROM THE SEISMIC SOURCE OF 40km; NOTIFY THE DIRECTOR, BUREAU OF DESIGN FOR PROPER REVISION OF THE DESIGN. REFER TO THE SEISMIC SOURCE MAP PROVIDED IN THE NATIONAL STRUCTURAL CODE OF THE PHILIPPINES OR PHIVOLCS SEISMIC SOURCE MAP.

3.1.2 SOIL TEST SHALL BE CONDUCTED PRIOR TO START OF CONSTRUCTION.

3.1.3 IN CASE THE ACTUAL SOIL BEARING CAPACITY IS FOUND LESS THAN THE ASSUMED, 96 kPa; NOTIFY THE DIRECTOR, BUREAU OF DESIGN FOR PROPER REVISION OF FOUNDATION.

3.1.4 NO FOOTING SHALL REST ON FILL.

3.1.5 BOTTOM OF FOOTING SHALL BE AT LEAST 1.00m. BELOW NATURAL GRADE LINE.

3.1.6 SOIL BEARING CAPACITY SHALL BE INCREASED BY 33% WHEN IN COMBINATION WITH SEISMIC OR WIND LOAD.

3.2 ALL COLUMN FOOTINGS & TIE BEAMS SHALL REST ON 100mm THK. WELL COMPACTED GRAVEL BASE COURSE.

3.3 BACK FILL SHALL BE PLACED IN LAYER AND EACH LAYER SHALL BE 200mm THK. AND SHALL BE COMPACTED TO 95% MAXIMUM DRY DENSITY.

3.4 WHERE LOOSE/SOFT MATERIAL IS ENCOUNTERED AT DEPTH OF EMBEDMENT INDICATED, EXCAVATE TO FIRM LAYER AND REPLACE LOOSE/MATERIALS UNDERNEATH THE FOOTING WITHIN THE FOOTING AREA PLUS 1/2 DEPTH OF SOFT MATERIAL ON ALL SIDES WITH SELECT GRANULAR BACKFILL. COMPACT SELECT GRANULAR BACKFILL TO 95% OF MAXIMUM DRY DENSITY.

4.0 MATERIALS

4.1 CONCRETE

4.1.1 CONCRETE COVER OVER REINFORCING BARS SHALL BE AS FOLLOWS:

A. FOOTINGS, FOOTING-TIE BEAMS (CAST AGAINST EARTH)	75mm
B. BEAMS AND COLUMNS (TO STIRRUPS AND TIES)	40mm
C. WALLS, SIDE OF FOOTING-TIE BEAMS (CAST AGAINST FORMS)	40mm
D. SUSPENDED SLAB	20mm

4.1.2 BEFORE CONCRETE IS POURED, CHECK WITH ALL TRADES TO ENSURE PROPER PLACEMENT OF ALL OPENINGS, SLEEVES, CURBS, CONDUITS, ETC. RELATING TO THE WORK.

4.2 REINFORCING BARS

4.2.1 ALL REINFORCING BARS SHALL BE CLEAN OF RUST, GREASE OR OTHER MATERIALS THAT WILL IMPAIR BOND.

4.2.2 ALL REINFORCING BARS SHALL BE ACCURATELY AND SECURELY PLACED BEFORE POURING CONCRETE OR APPLYING MORTAR OR GROUT.

4.2.3 LAPPED SPLICES SHALL BE STAGGERED WHERE POSSIBLE.

4.2.4 UNLESS OTHERWISE INDICATED, SPLICING OF REINFORCEMENT SHALL BE IN ACCORDANCE WITH ACI-318M, EXCEPT THAT THE MINIMUM LAP SPLICE SHALL BE 40 BAR DIAMETER BUT NOT LESS THAN 600mm.

4.2.5 UNLESS SHOWN OTHERWISE ON PLANS, SPLICES SHALL BE AS FOLLOWS:

A. INTERMEDIATE BEAMS: TOP BARS SHALL BE SPLICED AT MID-SPAN, AND BOTTOM BARS AT THE SUPPORT.

B. BEAMS FRAMING TO COLUMNS: TOP BARS SHALL BE SPLICED AT MID-SPAN AND BOTTOM BARS SHALL NOT BE SPLICED W/IN THE COLUMN OR W/IN A DISTANCE OF TWICE THE MEMBER DEPTH FROM THE FACE OF THE COLUMN. THE SPLICED LENGTH SHALL NOT BE LESS THAN 1.4 TIMES THE DEVELOPMENT LENGTH (Ld) IN 4.2.8 BELOW BUT NOT LESS THAN THAN 600mm.

C. COLUMNS: LAP SPLICES SHALL BE MADE WITHIN THE CENTER HALF OF HEIGHT AND THE SPLICE SHALL NOT BE LESS THAN 30 BAR DIAMETER. WELDING OR THE USE OF APPROVED MECHANICAL DEVICES MAY BE PERMITTED PROVIDED NOT MORE THAN ALTERNATE BARS ARE WELDED OR SPLICED AT ANY LEVEL AND THE MINIMUM VERTICAL DISTANCE BETWEEN TWO ADJACENT BAR SPLICES SHALL BE 600mm.

D. CHB WALLS: VERTICAL BARS SHALL BE SPLICED AT THE TOP OF WALL FOOTINGS OR FOOTING-TIE BEAMS AND AT THE BOTTOM OF REINFORCED CONCRETE LINTEL BEAMS OR BEAMS.

4.2.6 UNLESS OTHERWISE INDICATED: ALL BEAMS TERMINATING AT A COLUMN SHALL HAVE TOP AND BOTTOM BARS EXTENDING TO THE FAR FACE OF THE COLUMN, TERMINATING IN A STANDARD 90 HOOK LENGTH OF ANCHORAGE SHALL NOT BE LESS THAN 600mm.

4.2.7 SHOP DRAWING FOR REINFORCEMENT SHALL BE SUBMITTED FOR APPROVAL OF THE ENGINEER PRIOR TO FABRICATION & INSTALLATION.

4.2.8 DEVELOPMENT LENGTH (Ld) OF REINFORCING BARS SHALL BE AS FOLLOWS:

SIZE OF REBARS	DEVELOPMENT LENGTH
10 mm	170 mm
12 mm	220 mm
16 mm	270 mm
20 mm	360 mm
25 mm	600 mm

4.3 STRUCTURAL STEEL

4.3.1 ALL STRUCTURAL STEEL SHALL CONFORM TO ASTM A36 AND SHALL HAVE A MINIMUM YIELD STRESS, Fy = 248 MPa (36,000 psi)

4.3.2 ALL STRUCTURAL STEEL SHALL BE FABRICATED AND ERECTED IN ACCORDANCE WITH THE AISC SPECIFICATIONS AND CODE OF STANDARD PRACTICE AS AMMENDED TO DATE.

4.3.3 ALL BOLTS SHALL CONFORM TO ASTM A-307 UNLESS OTHERWISE INDICATED.

4.3.4 SHOP AND FIELD WELDING SHALL BE IN ACCORDANCE WITH AWS D1.1 AND PERFORMED BY QUALIFIED WELDERS.

4.3.5 UNLESS OTHERWISE INDICATED, WELDING ELECTRODES SHALL BE E60.

4.3.6 NO STEEL SHALL BE FABRICATED OR ERECTED UNTIL SHOP DRAWINGS HAVE BEEN APPROVED BY THE STRUCTURAL ENGINEER.

4.3.7 WELDS/(CONFORM WITH AMERICAN WELDING STANDARDS) USING E 60xx ELECTODES. fy = 93.77 MPa.

4.3.8 ANCHOR BOLTS (CONFORM WITH ASTM A-307) ft = 96.60 MPa. fv = 69 MPa.

4.4 CONCRETE HOLLOW BLOCKS (CHB):

4.4.1 UNLESS OTHERWISE INDICATED, CHB USED IN THIS WORK SHALL HAVE A MINIMUM ULTIMATE COMPRESSIVE STRENGTH f'm = 3.45 MPa (500 psi)

4.4.2 ALL CHB CELLS SHALL BE FILLED SOLIDLY WITH GROUT.

5.0 CONSTRUCTION JOINT

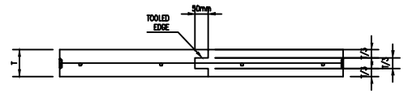
5.1 CONSTRUCTION JOINT NOT INDICATED ON THE PLANS SHALL BE MADE SO AS TO LEAST IMPAIR THE STRENGTH OF THE STRUCTURE AND SHALL BE SUBJECT TO THE APPROVAL OF THE ENGINEER EXCEPT SLAB ON GRADE.

5.2 UNLESS SHOWN OTHERWISE, SLAB ON GRADE SHALL HAVE CONTROL JOINTS SPACED AT 6000mm MAXIMUM CENTER TO CENTER.

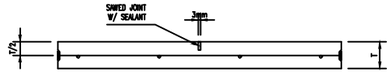
5.3 BEAMS CONSTRUCTION JOINT SHALL BE LOCATED W/ IN THE MIDDLE THIRD OF THE SPAN. IT SHALL BE PROVIDED WITH 3 EXTRA STIRRUPS @ 75mm O.C. ON EACH SIDE OF THE JOINT.

REFERENCES :

1. Labor Code of the Philippines and its Implementing Rules and Regulations
   DOLE DO No. 13, s. 1998, Occupational Safety and Health Standards and its Procedural Guidelines.
   - For monitoring, enforcement and implementation of construction safety and health
   - DO. 56, s. 2005
2. DPWH Design Guidelines, Criteria and Standards (DGCS), 2015 Edition
   - For the design of highways, bridges, buildings and flood control projects covering the minimum requirements, specifications and procedures.
   - DO. 179, s. 2015



CONSTRUCTION JOINT

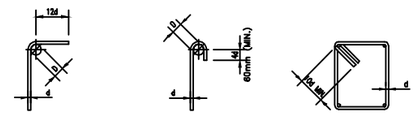


WEAKENED PLANE JOINT

NOTE: CONTROL JOINT CAN BE EITHER CONSTRUCTION JOINT OR WEAKENED PLANE JOINT.

3/A4 **CONTROL JOINTS FOR SLAB ON FILL**

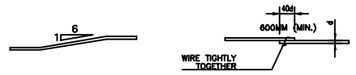
NTS



90° HOOK 180° HOOK TIE HOOK

BAR SIZE	D	
	90° HOOK	180° HOOK
10mm Ø THRU 25mm Ø	6d	4d
28mm Ø THRU 36mm Ø	8d	4d

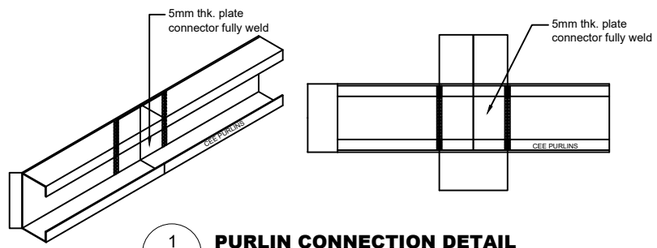
NOTE:
1. ALL BENDS SHOWN IN DETAILS/SCHEDULES SHALL BE STANDARD HOOK OTHERWISE NOTED.
2. 180° HOOKS MAY BE SUBSTITUTED FOR 90° HOOKS.



OFFSET LAP SPLICE

2/A4 **TYP. REINFORCEMENT DETAIL**

NTS



1/A4 **PURLIN CONNECTION DETAIL**

NTS

Republic of the Philippines
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

DAVAO DEL NORTE
2ND DISTRICT ENGINEERING OFFICE
TAGUM CITY, REGION XI

PROJECT & LOCATION:
CONSTRUCTION OF WATER SYSTEM IN BARANGAY MAGWAWA, SANTO TOMAS, DAVAO DEL NORTE

SHEET CONTENTS: GENERAL NOTES

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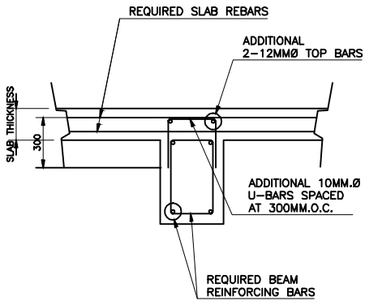
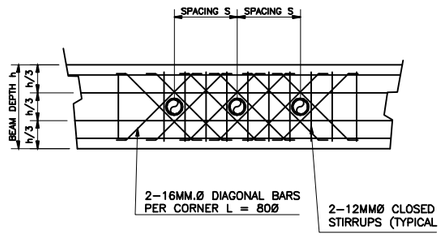


1H / S1 DETAILED SECTION
NOT TO SCALE



1I / S1 TYP. BEAM PENETRATION DETAIL
NOT TO SCALE

NOTE :

1. CENTER TO CENTER SPACING OF PIPE SLEEVES SHALL IN NO CASE BE LESS THAN 3 TIMES THE SLEEVE DIAMETER.
2. PIPE SLEEVES OF ALUMINUM SHALL NOT BE EMBEDDED IN STRUCTURAL CONCRETE.
3. PIPE SLEEVES SHALL NOT BE LARGER IN OUTSIDE DIMENSION THAN 1/3 THE OVERALL DEPTH OF THE BEAM.
4. PIPE SLEEVES SHALL BE LOCATED WITHIN THE MIDDLE THIRD OF THE BEAM DEPTH.
5. PIPE SLEEVES SHALL BE LOCATED WITHIN THE MIDDLE THIRD OF BEAM CLEAR SPAN.

SPLICING REQUIREMENT OF REINFORCING BARS "Ls" or "Ld"

BEAMS					COLUMNS			FLOOR SLABS	
BAR SIZE	SINGLE & 2 BAR BUNDLE		THREE BAR BUNDLE		BAR SIZE	VERTICAL REINFORCEMENT		BAR SIZE	SINGLE & 2 BAR BUNDLE
	BOTTOM BARS	TOP BARS	BOTTOM BARS	TOP BARS		SINGLE & 2 BAR BUNDLE	THREE BAR BUNDLE		
16Ø	600MM.	750MM.	800MM.	925MM.	20Ø	1000MM.		10Ø	400MM.
20Ø	750MM.	950MM.	900MM.	1200MM.	25Ø	1500MM.		12Ø	500MM.
25Ø	925MM.	1200MM.	1100MM.	1450MM.					

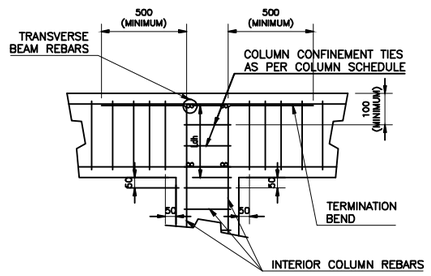
NOTE :
Ld = DEVELOPMENT LENGTH OF RE-BARS ABOVE VALUES SHALL BE THE MINIMUM SPLICE OR DEVELOPMENT LENGTH. ADDITIONAL MODIFICATION FACTORS OF ACI (CHAPTER 12) SHALL BE USED WHEREVER APPLICABLE. 36MM.Ø BARS FOR BEAMS SHALL NOT BE BUNDLED.

REMOVAL OF FORMS & SHORING

STRUCTURAL ELEMENTS	CLEAR SPAN BETWEEN SUPPORTS	MINIMUM TIME PERIOD (DAYS)
WALLS, COLUMNS, BEAMS, GIRDER SIDES & SLAB ON GRADE	-	1
JOIST, BEAMS & GIRDER SOFFIT	UNDER 3.00 M.	7
	3.00 M. TO 6.00 M.	14
	OVER 6.00 M.	21
ONE-WAY FLOOR SLABS	UNDER 3.00 M.	4
	3.00 M. TO 6.00 M.	7
	OVER 6.00 M.	10

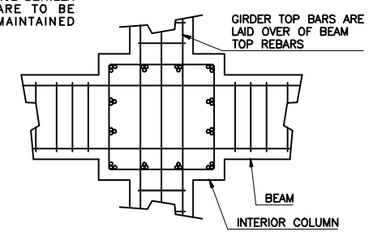
CAMBER REQUIREMENT

ELEMENT	MINIMUM CAMBER
R.C. BEAMS	6MM. FOR EVERY 4.50 M. SPAN
CANTILEVER R.C. BEAMS	18MM. FOR EVERY 3.00 M. SPAN
R.C. SLABS	3MM FOR EVERY 3.00 M. SHORTER SPAN

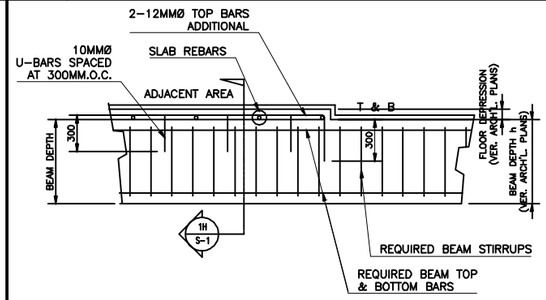


1D / S1 INTERIOR COLUMN TERMINATION BEND
NOT TO SCALE

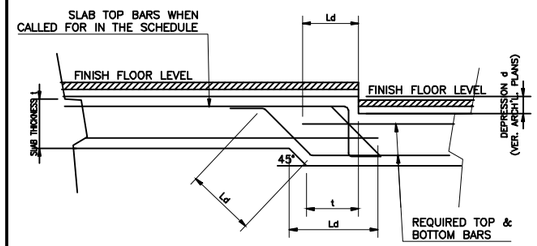
NOTE :
CLEAR DISTANCE BETWEEN RE-BARS ARE TO BE STRICTLY MAINTAINED



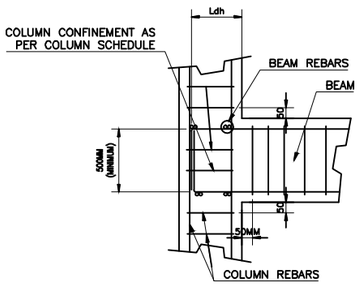
1E / S1 TYP. PLAN OF BEAM / GIRDER COL. JOINT
NOT TO SCALE



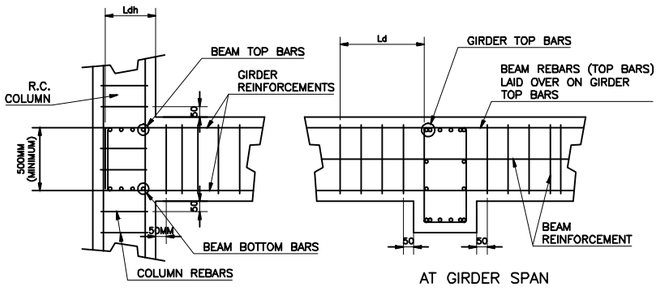
1F / S1 BEAM DET. FOR T & B DEPRESSION
NOT TO SCALE



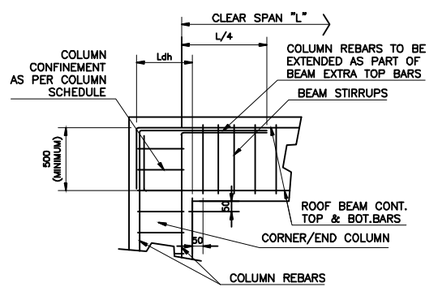
1G / S1 TYP. SLAB DEPRESSION DET.
NOT TO SCALE



1A / S1 BEAM RE-BAR TERMINATION BEND
NOT TO SCALE



1B / S1 TYPICAL BEAM & GIRDER RE-BAR LAYOUT
NOT TO SCALE



1C / S1 CORNER / EXTERIOR COL. TERMINATION BEND
NOT TO SCALE

Republic of the Philippines
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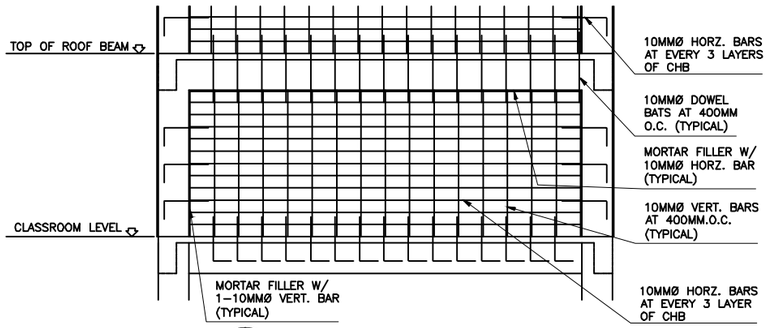
SHEET NO. : 07

SCHEDULE OF MASONRY WORKS

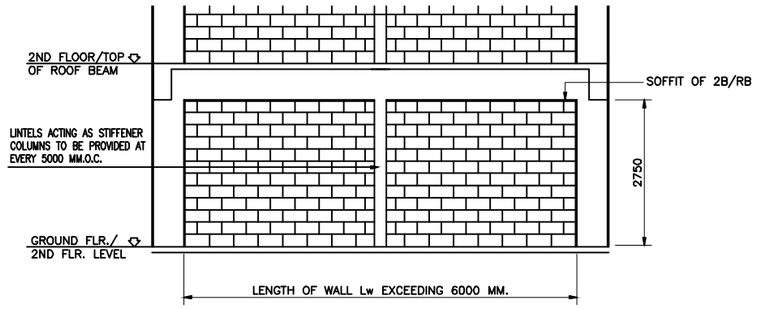
LINTEL BEAMS					MASONRY	
CHB WALL t (MM.)	B (MM.)	H (MM.)	HORZ. BARS	STIRRUPS	HORIZONTAL BARS	VERTICAL BARS
100	100	200	2–10MMØ	10MMØ @ 300	10MMØ @ 600 MM.O.C.	10MMØ @ 600 MM.O.C.
150	150	200	4–10MMØ	10MMØ @ 300	10MMØ @ 600 MM.O.C.	10MMØ @ 600 MM.O.C.
200	200	200	4–10MMØ	10MMØ @ 300	10MMØ @ 600 MM.O.C.	10MMØ @ 600 MM.O.C.

NOTE :

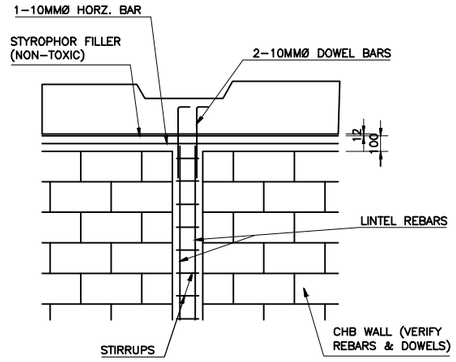
1. REFER TO ARCHITECTURAL PLANS TO VERIFY LOCATIONS OF ALL CHB WALLS.
2. REFER TO THICKNESS OF FINISHES TO ARCHITECTURAL PLANS.
3. 12MM. THICK GAP SHALL BE PROVIDED IN BETWEEN WALLS & COLUMNS, WALLS & BEAMS, WALLS & SLABS ON TOP.
4. SILICONE SEALANT SHALL BE PROVIDED FOR ALL EXTERNAL WALL (CHB). FOR INTERNAL WALLS SEALANTS NEED NOT BE PROVIDED.
5. STRUCTURAL R.C. WALLS (i.e. WATER TANK, ETC.) SHALL NOT BE PROVIDED W/ 12MM THK. GAPS ALL AROUND.
6. STRUCTURAL GAPS SHALL IN NO CASE BE COVERED W/ PLASTER.



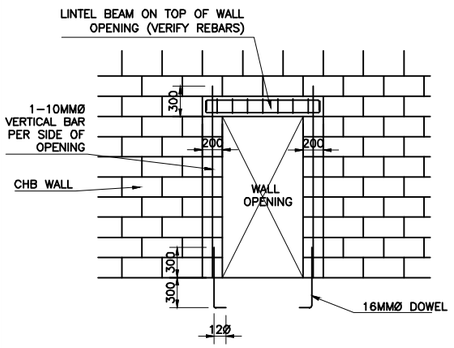
1B / S2 TYPICAL MASONRY ELEVATION
NOT TO SCALE



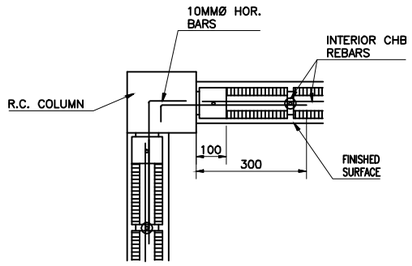
1A / S2 TYP. CHB ELEV. SHOWING LOCATION OF LINTEL BEAMS & STIFFENER COLUMNS
NOT TO SCALE



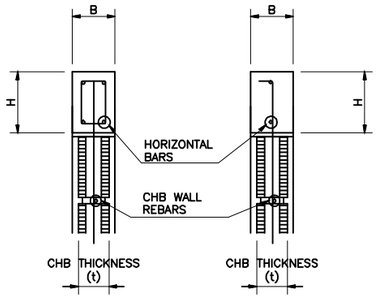
1D / S2 TOP ANCHORAGE OF LINTEL ACTING AS STIFFENER COLUMN
NOT TO SCALE



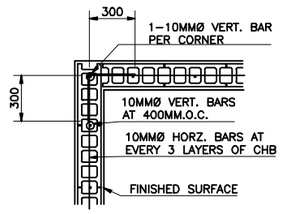
1C / S2 TYP. CHB WALL OPENING ELEV.
NOT TO SCALE



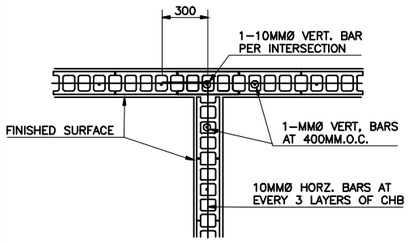
1F / S2 CHB EXTERIOR WALL SIDE ANCHORAGE DET.
NOT TO SCALE



1H / S2 TYPICAL LINTEL BEAM DET.
NOT TO SCALE



1E / S2 CORNER WALL DETAIL
NOT TO SCALE



1G / S2 WALL INTERSECTION
NOT TO SCALE

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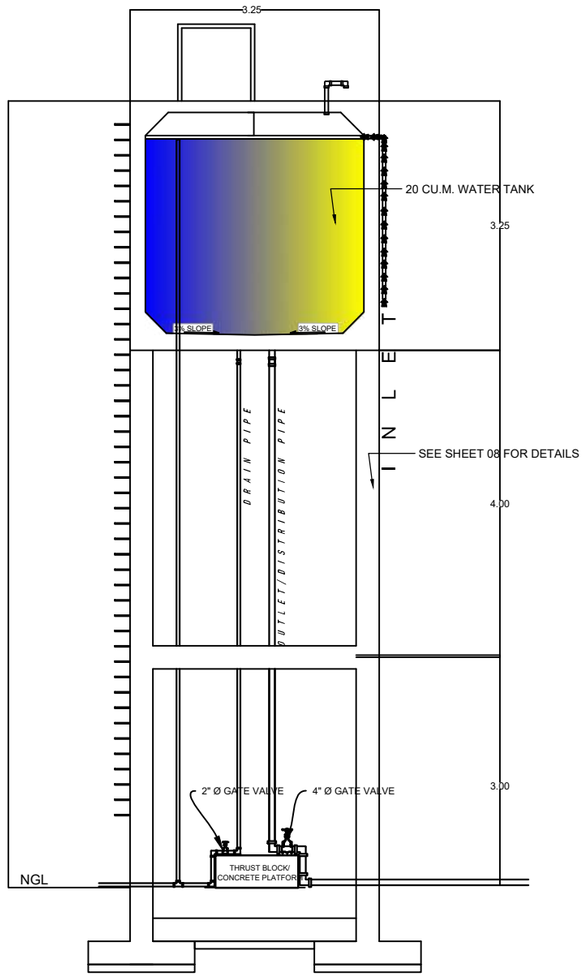
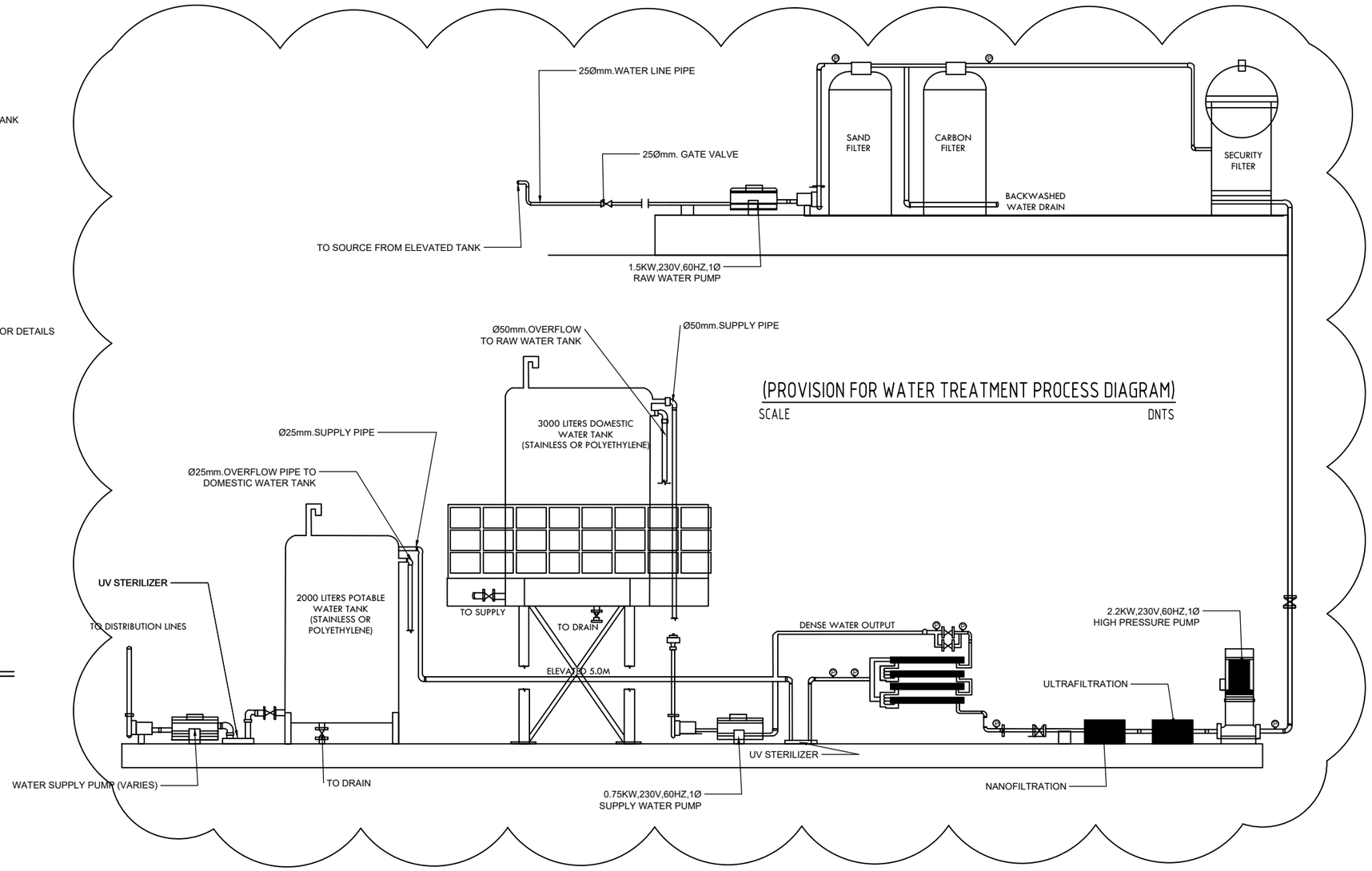


ELEVATED TANK TANK PLAN

DNTS



(PROVISION FOR WATER TREATMENT PROCESS DIAGRAM)

SCALE DNTS

Republic of the Philippines
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

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ELEVATED TANK
(PROVISION WATER TREATMENT PROCESS DIAGRAM)

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PIPE LAYOUT

SCHEDULE OF DIMENSION AND REINFORCEMENT OF ELEVATED WATER TANK

CAPACITY (m^3)	BEAMS LEVEL 1 & FOOTING TIE BEAMS								COLUMNS				FOOTINGS			REMARKS
	DIMENSIONS (mm)			REINFORCEMENT (mm)			SECTIONS		SIZE (mm)	REBARS (mm)	TIES (mm)	SECTION	SBP 120 KPa			
	C	D	E	TB	BB	STIRR.	SUPPORT	MIDSPAN					W (mm)	tf (mm)	REBARS (mm) BOTHWAYS	
20	300	300	3250	2-D16	2-D16	D10 1 50 fr ends rest 150			300x300	12-D16	D10 @ 250 2/SET		1520x1620	300	10-D12	h1 = 3000 h2 = 4000

CAPACITY (m^3)	WATER TANK													BEAMS @ LEVEL 2									SECTIONS (mm)			
	DIMENSIONS (mm)				REINFORCEMENT (mm)									DIMENSION (mm)												
	a	b1	b2	e	1 bw	2 bw	3 bw	4 bw	5	6	7	8 bw	9 bw	10 bw	c	d	e	1	2	3	4	5	6	stirrups	A	B	C	D
20	2850	200	150	3250	D12 @ 104	D12 @ 208	D12 @ 104	D12 @ 208	D12 @ 104	D12 @ 208	D12 @ 208	D12 @ 300	D12 @ 300	D12 @ 300	200	600	3250	2-D16	2-D16	2-D16	4-D20	2-D16	2-D20	D10 1@50 fr. ENDS REST @ 250				

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SCHEDULE OF REBAR SPLICES AND LENGTH OF EMBEDMENT

BAR SIZE	LENGTH OF LAPPED SPLICES FOR REINFORCING (mm)		LENGTH OF EMBEDMENT FOR END ANCHORAGE OF REINFORCING w/ STANDARD HOOKS (mm)	
	* TOP BARS	OTHERS	* TOP BARS	OTHERS
D 10	500	350	500	350
D 12	575	500	400	450
D 16	725	500	500	450
D 20	925	650	650	500
D 22	1250	900	900	550
D 25	1650	1175	1100	650
D 28	2075	1500	1375	800
D 32	2650	1900	1650	1025
D 36	3250	2325	1950	1300

MINIMUM CONCRETE COVER FOR REINFORCEMENT

LOCATION	MINIMUMCOVER
UNFORMED SURFACES ADJACENT TO EXCAVATION	75
FORMED OR TOP SURFACES EXPOSED TO WEATHER OR SATURATED AIR, SUBMEREGED OR IN CONTACT WITH EARTH	
D 20 or LARGER BARS	50
D 20 or LARGER BARS	40
OTHER LOCATION:	
BARS IN BEAM OR GIRDER, INCLUDING STIRRUPS AND COLUMN SPIRAL OR TIES	40
LARGER THAN D 36 BARS	40
D 36 AND SMALLER BARS	20

* TOP BARS ARE HORIZONTAL BAR SO PLACED THAT >300 OF CONCRETE IS CAST IN THE MEMBER BELOW THE BAR.
HORIZONTAL BARS IN WALLS ARE TO PROVIDED WITH AS REQUIRED FOR TOP BARS.
EXCEPT AS OTHERWISE INDICATED ON THE PLANS, EMBEDMENT LENGTHS FOR END ANCHORAGE AND LAPPED SPLICES SHALL NOT BE LESS THAN (NO MINUS TOLERANCE)SHOWN ABOVE.

LAPPED SPLICES SHALL NOT BE MADE AT POINT OF MAXIMUM STRESS DETERMINED BY THE ENGINEER, AND SHALL NOT BE SPACED CLOSER THAN 150 ON CENTERS. IF SPLICES ARE STAGGERED SO THAT NO MORE THAN ½ ARE SPLICED ON A LAP SPLICE LENGTH, THE SPLICE LENGTH CAN BE REDUCED TO 75 % OF THE LENGTH TABULATED ABOVE.

GENERAL NOTES:

1. ALL DIMENSION ARE IN MILLIMETER UNLESS OTHERWISE SPECIFIED.
2. ALL CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH, fc'=20.69 Mpa EXCEPT LEVELING CONCRETE WHICH SHALL BE 13.80 Mpa AT 28 DAYS BASED ON STANDARD CYLINDER.
3. REINFORCEMENT BARS SHALL BE DEFORMED BILLET STEEL BARS, INTERMEDIATE GRADE WITH MINIMUM YIELD STRENGTH, fy, OF 276 Mpa AND ALLOWABLE TENSILE STRENGTH OF 138 Mpa CONFORMING TO ASTM A-615.
4. ALLOWABLE SOIL BEARING PRESSURE=120 Kpa
5. ABBREVIATIONS:

TB -	TOP BARS
BB -	BOTTOM BARS
BW -	BOTHWAYS
a -	INSIDE DIMENSIONS OF TANK
b -	THICKNESS OF WALLS
c -	THICKNESS OF TOP SLAB
d -	THICKNESS OF BOTTOM SLAB
e -	OUTSIDE DIMENSION OF TANK
MAX -	MAXIMUM
H.W.L. -	HIGH WATER LEVEL
THK -	THICK
EF -	EACH FACE
	WELD

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SHEET CONTENTS:
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SCHEDULE OF REBAR
SPLICES AND EMBEDMENT

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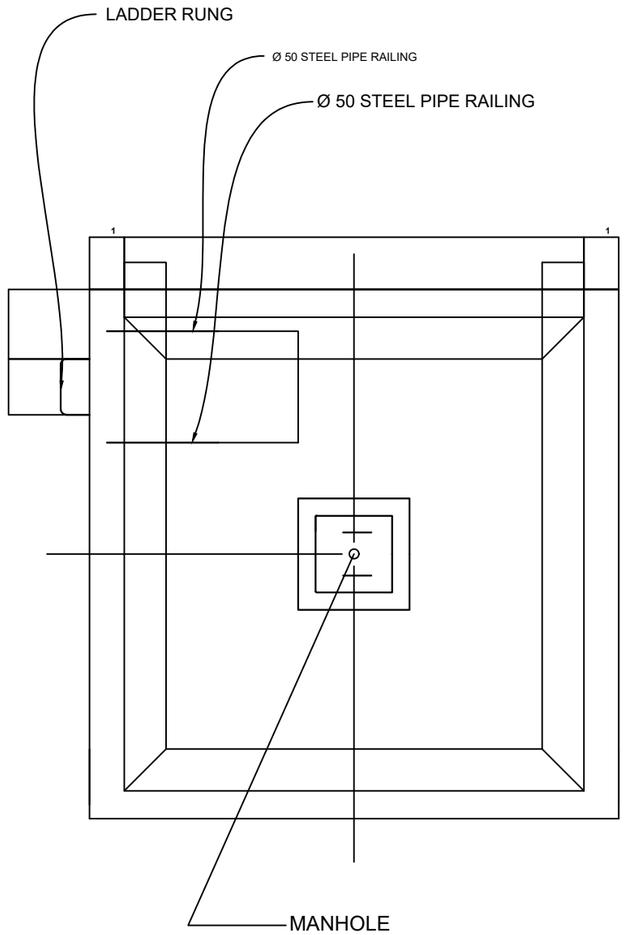
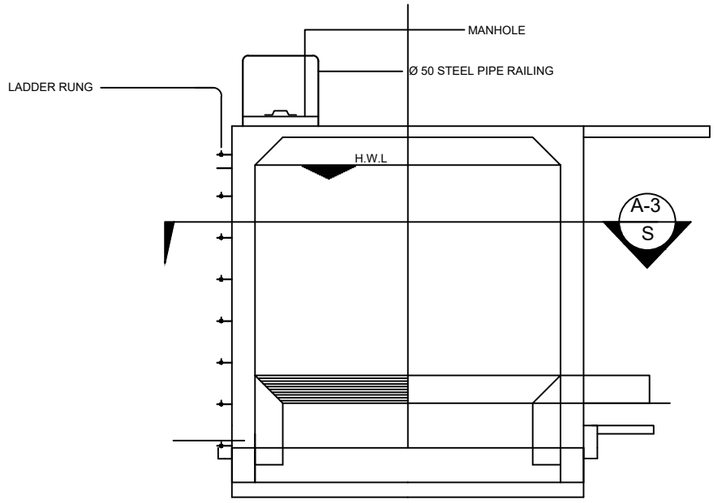


TYPICAL SECTION OF WATER TANK

NOT TO SCALE



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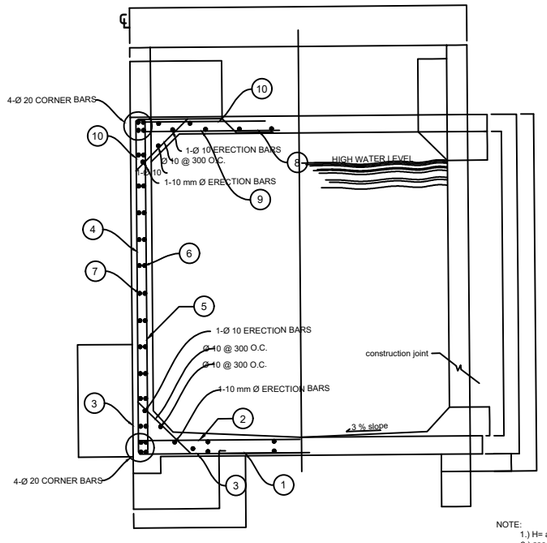
TAGUM CITY, REGION XI

PROJECT & LOCATION:	SHEET CONTENTS:	DRAFTED :	SUBMITTED:	REVIEWED:	RECOMMENDED:	APPROVED:	SET NO:	SHEET NO. :
CONSTRUCTION OF WATER SYSTEM IN BARANGAY MAGWAWA, SANTO TOMAS, DAVAO DEL NORTE	TYPICAL SECTION OF WATER TANK	**WARREN S. PIÑEZ** ENGINEER II PREPARED: **HERWIN EVAN J. BABABAG** ENGINEER II	**BENILDA S. PACQUIAO** ENGINEER III	**JEZABEL E. TULING, MPA** CHIEF, PLANNING & DESIGN SECTION	**GARRY E. VERANO** OFFICER IN CHARGE OFFICE OF THE ASSISTANT DISTRICT ENGINEER	**ARTURO P. LONGYAPON** DISTRICT ENGINEER	STD 12 27	12

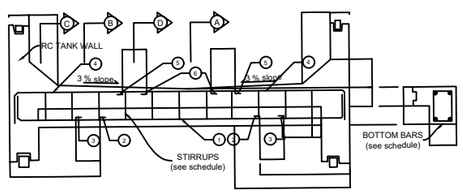


NOTE:
1.) H= a + b1 + b2
2.) see schedule @ dimensions & reinforcements on drwg No. S-12

A-3
S

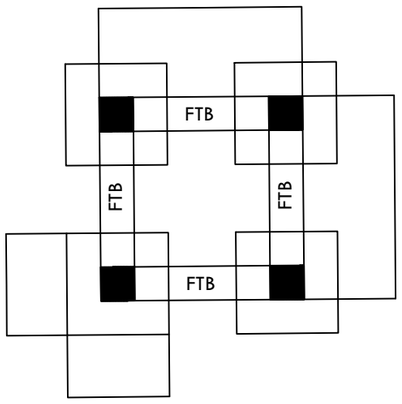
TYPICAL SECTION OF ELEVATED WATER TANK

NOT TO SCALE



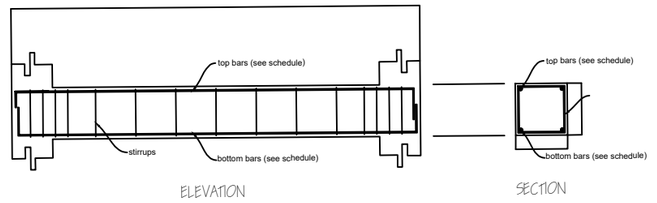
TYPICAL DET. OF BEAMS @ LEVEL 2

NOT TO SCALE



FOUNDATION PLAN

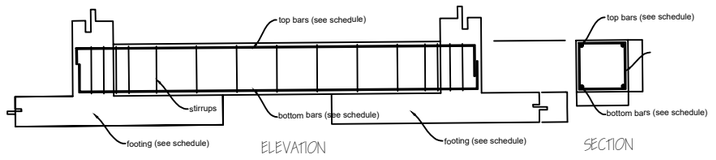
NOT TO SCALE



5
S1

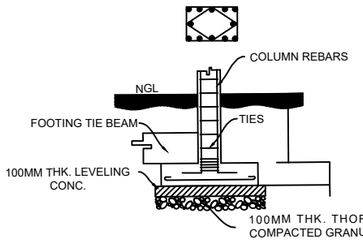
TYPICAL DETAIL OF BEAMS @ LEVEL 1

NOT TO SCALE



TYPICAL DETAIL OF FOOTING TIE BEAM

NOT TO SCALE



TYPICAL SECTION OF FOOTING

NOT TO SCALE

DESIGN CRITERIA

I. Live Load ..... 2000 Pa

II. Allowable Stresses

1. Concrete
a. for footing,beams and slabs
fc'= 21 MPa

2. Concrete Masonry Units
(Load Bearing CHB)
fm'=6.90 MPa,fm= 2.41 MPa
3.Reinf. Steel Bars for bars smaller than 16mmØ fy = 230 MPa

4. Assumed allowable soil bearing capacity = 100 Kpa

Republic of the Philippines
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DAVAO DEL NORTE
2ND DISTRICT ENGINEERING OFFICE
TAGUM CITY, REGION XI

PROJECT & LOCATION:

CONSTRUCTION OF WATER SYSTEM IN BARANGAY MAGWAWA, SANTO TOMAS, DAVAO DEL NORTE

SHEET CONTENTS:

TYPICAL SECTION OF ELEV. WATER TANK
TYPICAL DETAILS OF BEAMS AT LEVEL 1 & 2
TYPICAL DETAIL OF TIE BEAM
TYPICAL SECTION OF FOOTING
FOUNDATION PLAN

DRAFTED :
WARREN S. PIÑEZ
ENGINEER II

PREPARED:
HERWIN EVAN J. HABABAG
ENGINEER II

SUBMITTED:
BENILDA S. PACQUIAO
ENGINEER III

REVIEWED:
JEZABEL E. TULING, MPA
CHIEF, PLANNING & DESIGN SECTION

RECOMMENDED:
GARRY E. VERANO
OFFICER IN CHARGE
OFFICE OF THE ASSISTANT DISTRICT ENGINEER

APPROVED:
ARTURO P. LONGYAPON
DISTRICT ENGINEER

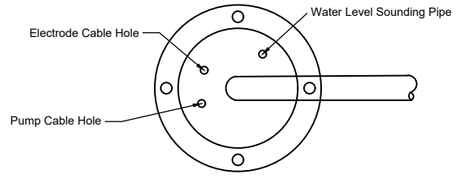
SET NO: STD 13 27

SHEET NO. : 13

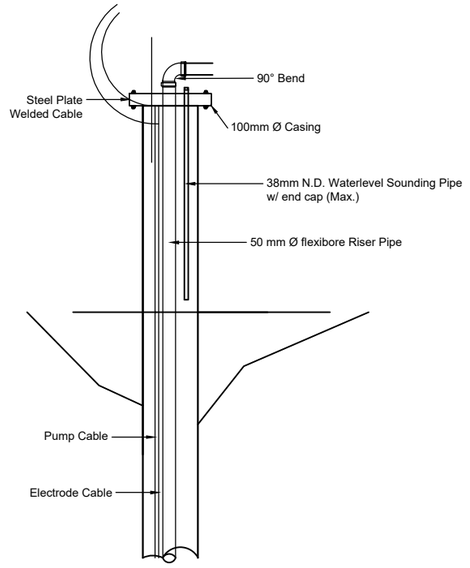
SCHEDULE OF EQUIPMENT

SCOPE OF WORK: REPLACE EXISTING 7.5HP PUMP INSTALL NEW 10HP PUMP

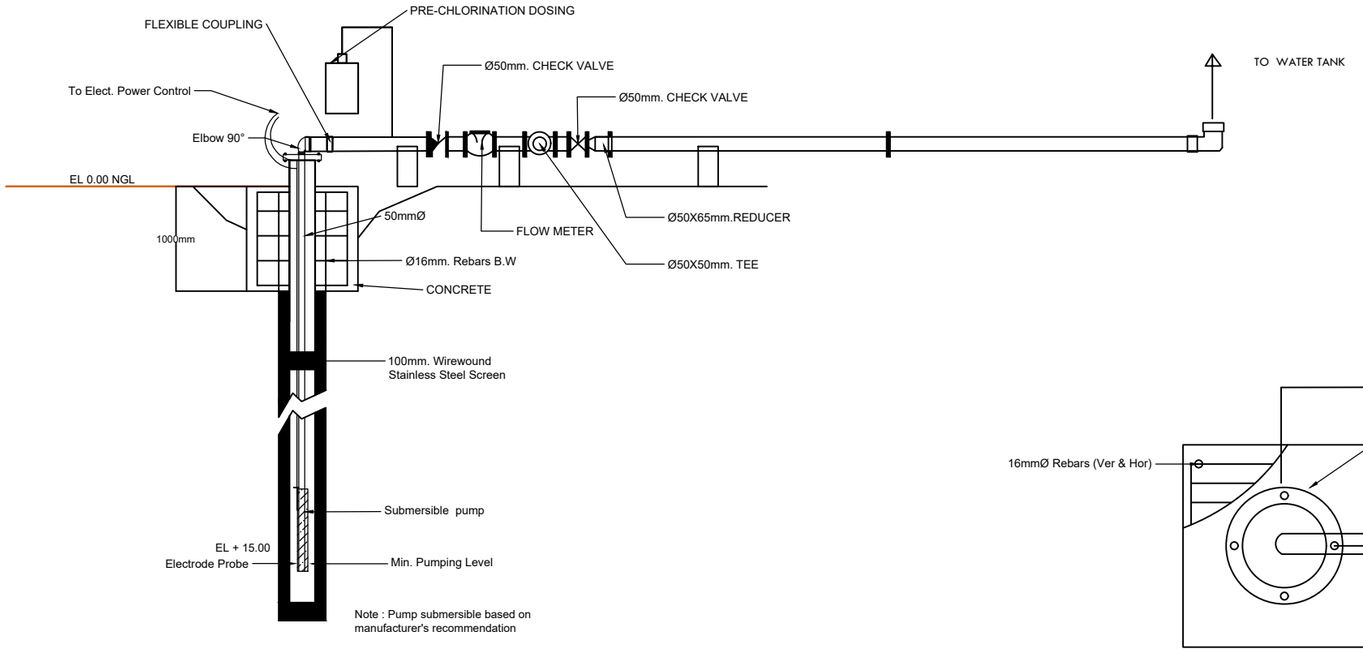
DESIGNATION	QTY	CAPACITY (GPM)	TYPE	TDH (M)	SPEED (RPM)	MOTOR RATING			
						POWER (HP)	VOLTS	PHASE	HERTZ
PUMP	1	95	SUBMERSIBLE	110	3450	5	230	SINGLE	60

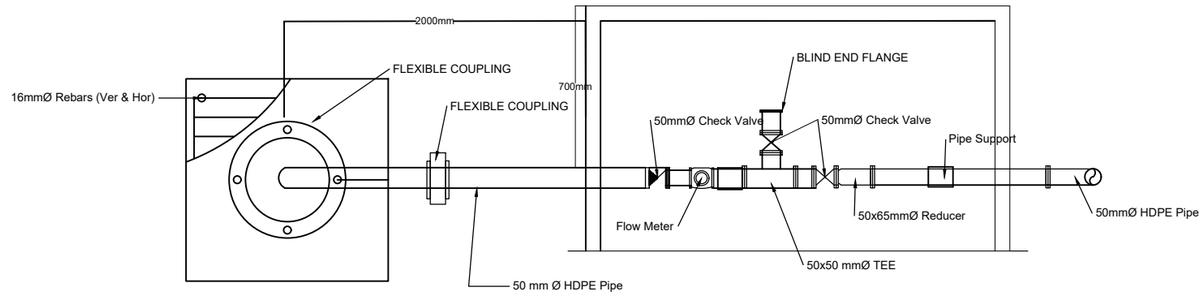


Details B



Details A





PLAN

SUBMERSIBLE PUMP DETAILS

Republic of the Philippines
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

DAVAO DEL NORTE
2ND DISTRICT ENGINEERING OFFICE
TAGUM CITY, REGION XI

PROJECT & LOCATION:
CONSTRUCTION OF WATER SYSTEM IN BARANGAY MAGWAWA, SANTO TOMAS, DAVAO DEL NORTE

SHEET CONTENTS:
SUBMERSIBLE PUMP DETAILS

DRAFTED :
WARREN S. PIÑEZ
ENGINEER II

PREPARED:
HERWIN EVAN J. HABABAG
ENGINEER II

SUBMITTED:
BENILDA S. PACQUIAO
ENGINEER III

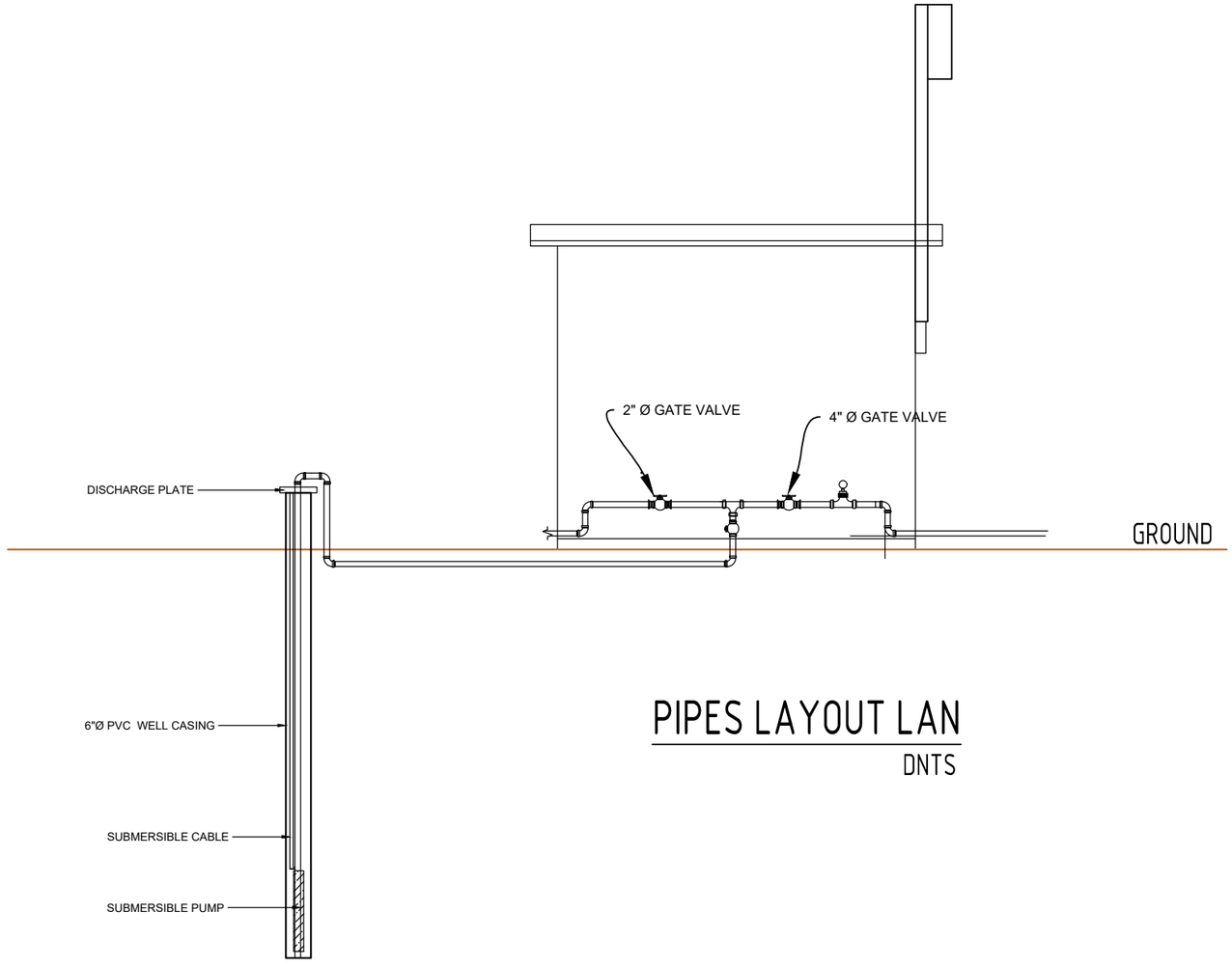
REVIEWED:
JEZABEL E. TULING, MPA
CHIEF, PLANNING & DESIGN SECTION

RECOMMENDED:
GARRY E. SERANO
OFFICER IN CHARGE
OFFICE OF THE ASSISTANT DISTRICT ENGINEER

APPROVED:
ARTURO P. LONGYAPON
DISTRICT ENGINEER

SET NO: STD 14|27

SHEET NO. : 14



PIPES LAYOUT LAN

DNTS

PLUMBING NOTES:

1. GRADES OF HORIZONTAL PIPINGS
RUN ALL HORIZONTAL PIPINGS IN PERPECT ALIGNMENT AND AT A FORM GRADE NOT LESS THAN TWO PERCENT (2%)

2. CHANGE IN DIRECTION
ALL CHANGE IN DIRECTION SHALL BE MADE BY APPROPRIATE USE OF FORTY-FIVE DEGREES (45°) WYES, LONG SWEEP QUARTER BEND, SIXTH-EIGHT OR SIXTEENTH BEND. WHEN THE CHANGE OF FLOW IS FROM HORIZONTAL TO VERTICAL A SINGLE 1/8 BEND COMBINATION MAYBE USED ON VERTICAL STACKS AND SHORT QUARTER BENDS MAYBE USED ON WASTE LINE, TEE AND CROSSES MAYBE USED IN BENT PIPES.

3. PROHIBITED FITTINGS
NO DOUBLE HUB OR TEE BRANCH SHALL BE USED ON HORIZONTAL SOIL AND WASTE LINES, THE DRILLINGS AND TAPPING OF HOUSE DRAIN, WASTE OR VENT PIPES AND USED OF SADDLE HUB AND BEND ARE PROHIBITED.

4. PIPE CLEAN-OUTS
CLEAN-OUTS ARE REQUIRED UNDER THE F0LLOWING CONDITIONS:
a) EVERY CHANGE OF HORIZONTAL DIRECTION EXCEEDING TWENTY TWO AND ONE-HALF DEGREES (22 1/2°).
b) ONE AND ONE-HALF METERS (1.50m.) INSIDE THE PROPERTY LINES BEFORE THE HOUSE DRAINAGE CONNECTION.
c) EVERY FIFTEEN METERS (15.00m) IN HORIZONTAL RUN OF PIPES.
d) AT THE END OF ANY HORIZONTAL PIPE LINES.

5. THE DIGESTION CHAMBER OF SEPTIC VAULT MUST BE WATERPROOFED.

6. NOT LESS THAN 0.30 METER OF AIR SPACE MUST BE LEFT BETWEEN THE TOP OF THE SEWAGE AND THE UNDER PART OF VAULT ROOF SLAB.

7. NO SEPTIC VAULT SHALL BE CONSTRUCTED UNDER THE BUILDING.

8. ALL PLUMBING WORKS SHALL BE UNDER THE SUPRVISION OF A LICENSED MASTER PLUMBER AND A LICENCED PLUMBING CONTRACTOR.

USE: 50MMΦ PVC PIPE FOR VENTS, VENT THRU ROOF & FOR WASTE WATER LINES (FLOOR DRAINS, LAVATORIES & URINALS)
100MMΦ PVC PIPE FOR SOIL STOCK PIPES, SOIL STOCK PIPE RISERS & FOR SANITARY LINES (WATER CLOSETS, CLEAN OUTS)

19MMΦ PPR (Polypropylene Random Copolymer plastic)
FOR SECONDARY POTABLE WATER LINES (RUNNING THRU FAUCETS/FLUSH LINES)

25MMΦ PPR (Polypropylene Random Copolymer plastic)
FOR MAIN POTABLE WATER LINES

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2ND DISTRICT ENGINEERING OFFICE
TAGUM CITY, REGION XI

PROJECT & LOCATION:
CONSTRUCTION OF WATER SYSTEM IN BARANGAY MAGWAWA, SANTO TOMAS, DAVAO DEL NORTE

SHEET CONTENTS:
PLUMBING LAYOUT PLAN

DRAFTED :
WARREN S. PIÑEZ
ENGINEER II
PREPARED:
HERWIN EVAN J. HABABAG
ENGINEER II

SUBMITTED:
BENILDA S. PACQUIAO
ENGINEER III

REVIEWED:
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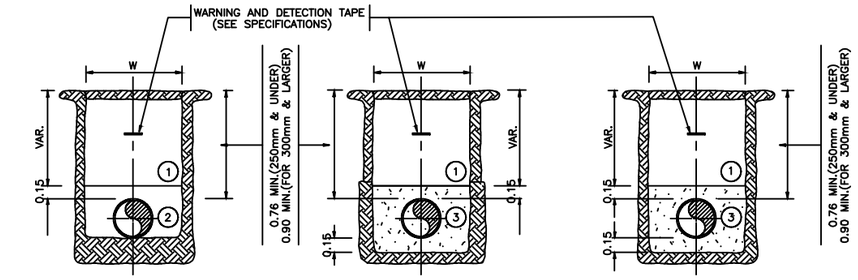
CHIEF, PLANNING & DESIGN SECTION

RECOMMENDED:
GARRY E. VERANO
OFFICER IN CHARGE
OFFICE OF THE ASSISTANT DISTRICT ENGINEER

APPROVED:
ARTURO P. LONGYAPON
DISTRICT ENGINEER

SET NO: STD 15|27

SHEET NO. : 15



NORMAL INSTALLATION WHERE SAND BEDDING/ BACKFILL NOT REQUIRED

IN ROCK OR WHEN ORDERED BY ENGINEER

PVC INSTALLATION IN NON–GRANULAR SOIL AS DETERMINED BY ENGINEER

LEGEND:

1. COMPACTED SELECTED NATIVE MATERIAL BACKFILL (SEE SPECIFICATION)
2. COMPACTED SELECTED NATIVE MATERIAL HAND PLACED AND COMPACTED IN 0.15M LAYER (SEE SPECIFICATION)
3. APPROVED SAND BEDDING AND BACKFILL HAND PLACED AND COMPACTED

TABLE OF TRENCH DIMENSION (IN METRES)

PIPE DIAMETER	mm	50	63	75	110	160	300	350	400	450	500	600	700	800	900	1000	1100
MINIMUM "W"	m	0.20	0.30	0.30	0.30	0.30	0.60	0.65	0.70	0.75	0.80	0.90	1.00	1.10	1.20	1.30	1.40
MAXIMUM "W"	m	0.30	0.40	0.50	0.60	0.60	0.90	0.95	1.00	1.05	1.10	1.20	1.30	1.40	1.50	1.60	1.70

TYPICAL TRENCH DETAILS

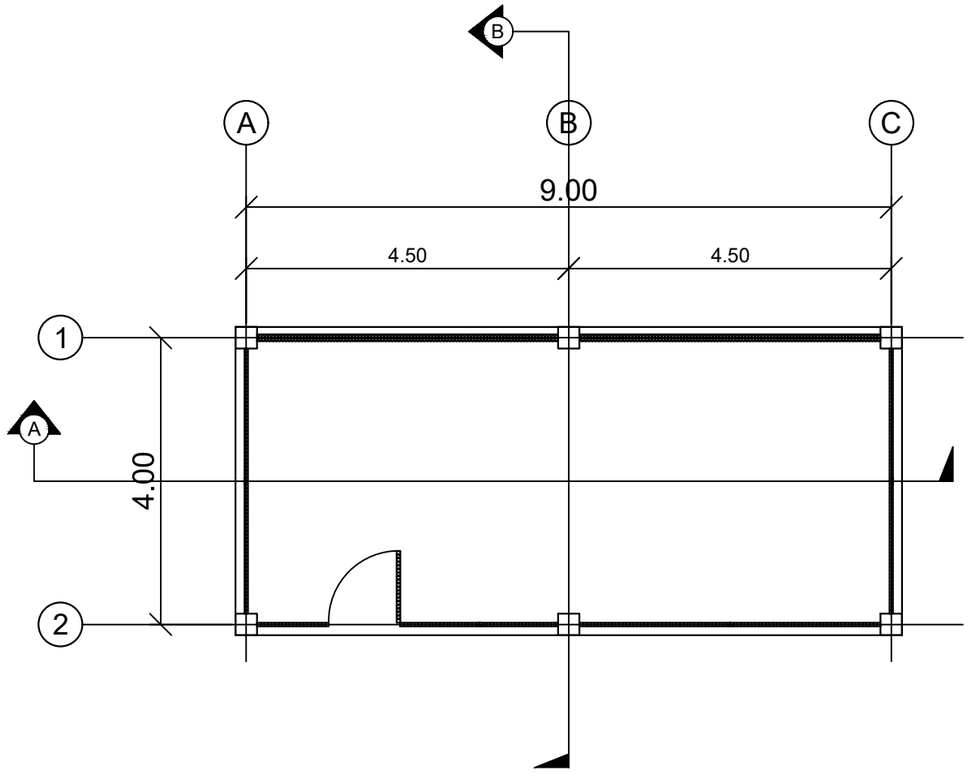
Republic of the Philippines
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

DAVAO DEL NORTE
2ND DISTRICT ENGINEERING OFFICE
TAGUM CITY, REGION XI

PROJECT & LOCATION:	SHEET CONTENTS:	DRAFTED :	SUBMITTED:	REVIEWED:	RECOMMENDED:	APPROVED:	SET NO:	SHEET NO. :
CONSTRUCTION OF WATER SYSTEM IN BARANGAY MAGWAWA, SANTO TOMAS, DAVAO DEL NORTE	TYPICAL TRENCH DETAILS	WARREN C. PINEZ, ENGINEER II PREPARED: HERWIN EVAN S. HABABAG, ENGINEER II	BENILDA S. PACQUIAO, ENGINEER III	JEZABEL E. TULING, MPA, CHIEF, PLANNING & DESIGN SECTION	GARRY B. VERANO, OFFICER IN CHARGE, OFFICE OF THE ASSISTANT DISTRICT ENGINEER	ARTURO P. LORONGYAPON, DISTRICT ENGINEER	STD 16 27	16

PUMP HOUSE PERSPECTIVE

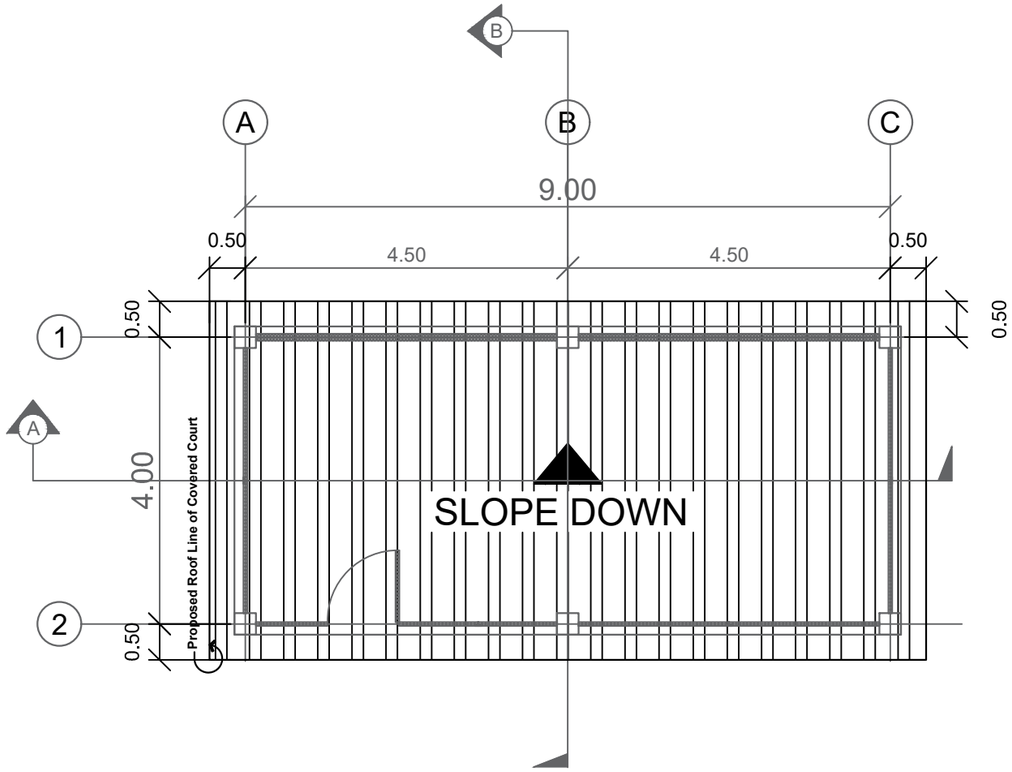
Republic of the Philippines DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS **DAVAO DEL NORTE** **2ND DISTRICT ENGINEERING OFFICE** TAGUM CITY, REGION XI	**PROJECT & LOCATION:** **CONSTRUCTION OF WATER SYSTEM IN BARANGAY MAGWAWA, SANTO TOMAS, DAVAO DEL NORTE**	SHEET CONTENTS: **PUMP HOUSE PERSPECTIVE**	DRAFTED : **WARREN S. PIÑEZ** ENGINEER II PREPARED: **HERWIN EVAN J. HABABAG** ENGINEER II	SUBMITTED: **BENILDA S. PACQUIAO** ENGINEER III	REVIEWED: **JEZABEL E. TULING, MPA** CHIEF, PLANNING & DESIGN SECTION	RECOMMENDED: **GARRY E. VERANO** OFFICER IN CHARGE OFFICE OF THE ASSISTANT DISTRICT ENGINEER	APPROVED: **ARTURO P. LONGYAPON** DISTRICT ENGINEER	SET NO: STD 17 27	SHEET NO. : 17



0 A 0

FLOOR PLAN

SCALE 1:50 MTRS.



ROOF PLAN

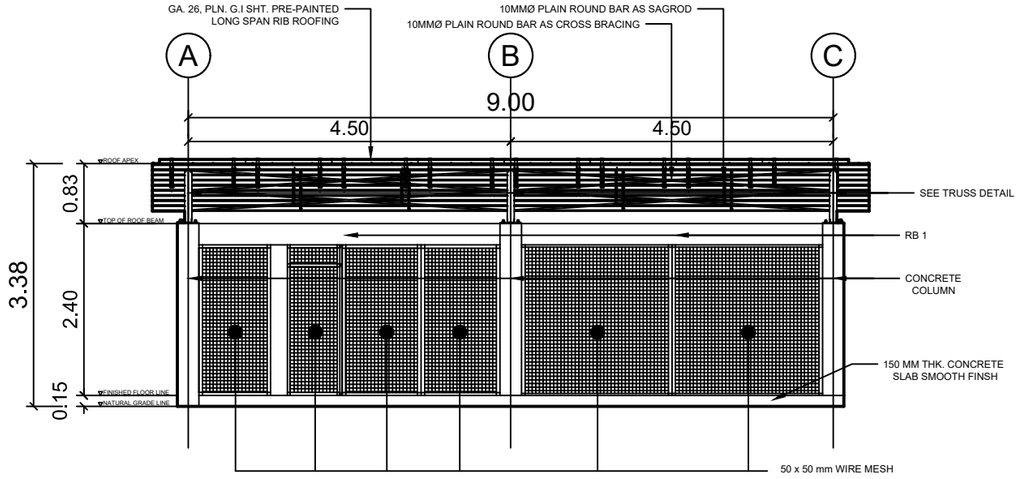
SCALE 1:50 MTRS.

0 A 0

Republic of the Philippines
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

DAVAO DEL NORTE
2ND DISTRICT ENGINEERING OFFICE
TAGUM CITY, REGION XI

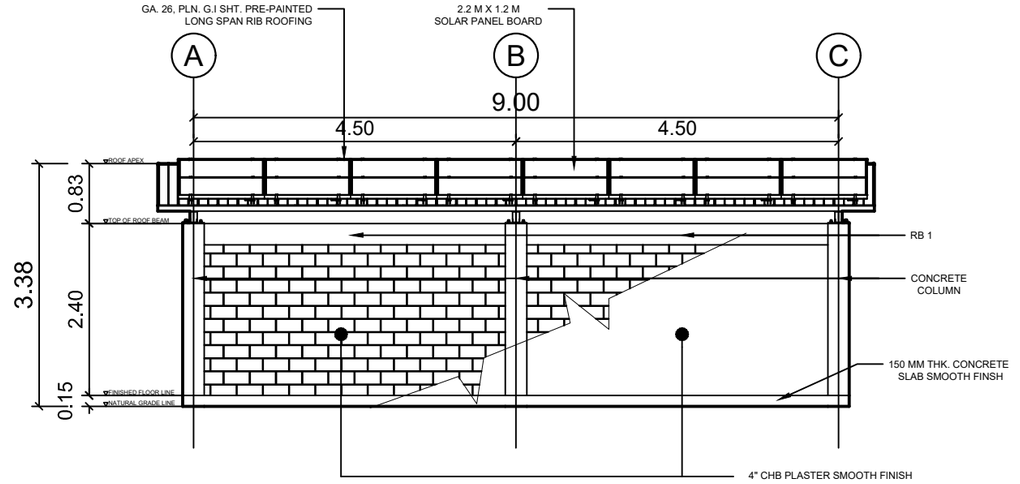
PROJECT & LOCATION:	SHEET CONTENTS:	DRAFTED :	SUBMITTED:	REVIEWED:	RECOMMENDED:	APPROVED:	SET NO:	SHEET NO. :
CONSTRUCTION OF WATER SYSTEM IN BARANGAY MAGWAWA, SANTO TOMAS, DAVAO DEL NORTE	FLOOR PLAN ROOF PLAN	WARREN S. PIÑEZ ENGINEER II PREPARED: HERWIN EVAN J. HABABAG ENGINEER II	BENILDA S. PACQUIAO ENGINEER III	JEZABEL E. TULING, MPA CHIEF, PLANNING & DESIGN SECTION	GARRY E. VERANO OFFICER IN CHARGE OFFICE OF THE ASSISTANT DISTRICT ENGINEER	ARTURO P. LONGYAPON DISTRICT ENGINEER	STD 18 28	18



0 / A 0

FRONT ELEVATION

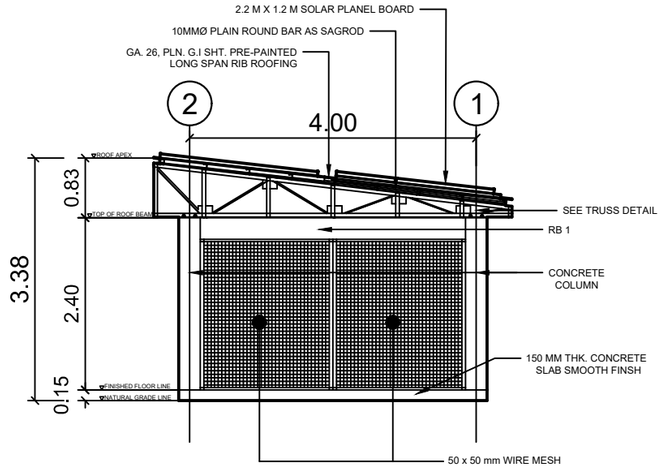
SCALE 1:50 MTRS.



0 / A 0

REAR ELEVATION

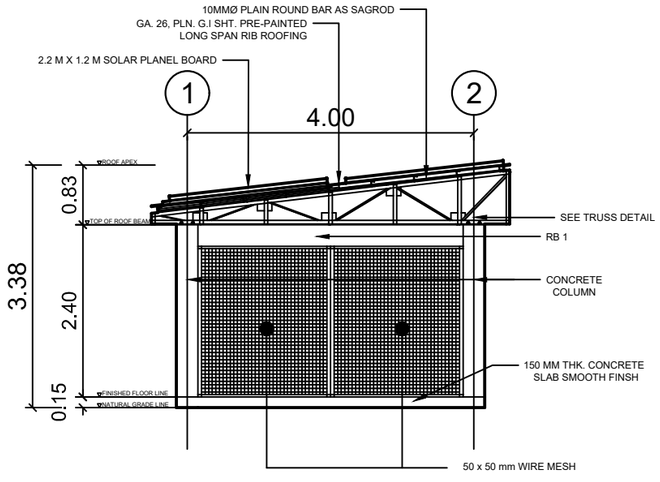
SCALE 1:50 MTRS.



0 / A 0

RIGHT ELEVATION

SCALE 1:50 MTRS.



0 / A 0

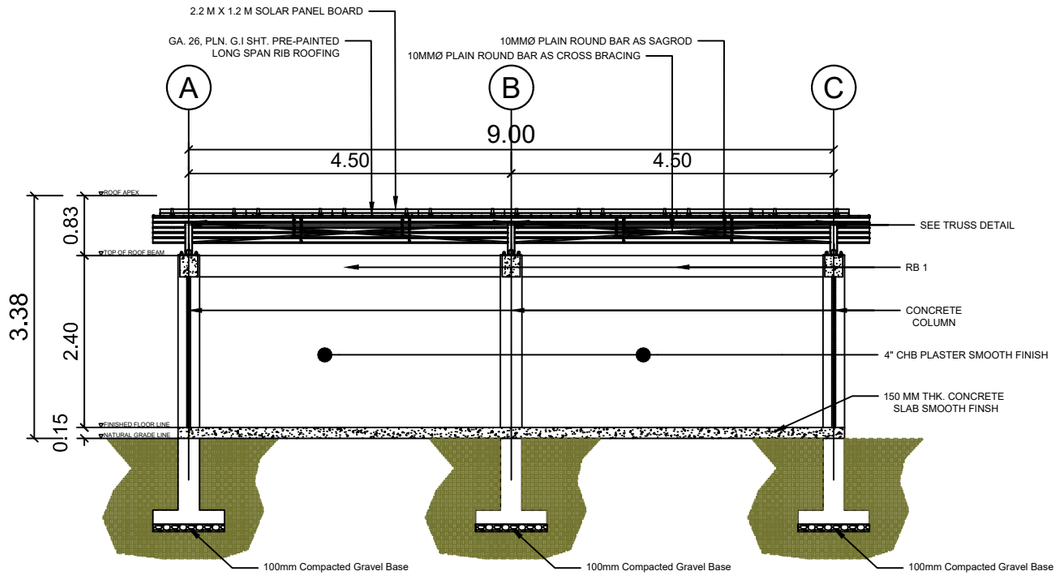
LEFT ELEVATION

SCALE 1:50 MTRS.

Republic of the Philippines
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

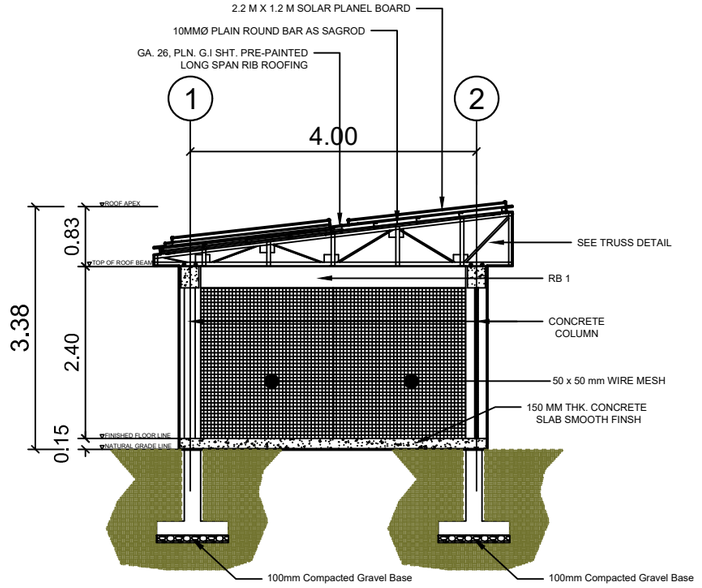
DAVAO DEL NORTE
2ND DISTRICT ENGINEERING OFFICE
TAGUM CITY, REGION XI

PROJECT & LOCATION:	SHEET CONTENTS:	DRAFTED :	SUBMITTED:	REVIEWED:	RECOMMENDED:	APPROVED:	SET NO:	SHEET NO. :
CONSTRUCTION OF WATER SYSTEM IN BARANGAY MAGWAWA, SANTO TOMAS, DAVAO DEL NORTE	FRONT ELEVATION REAR ELEVATION RIGHT ELEVATION LEFT ELEVATION	WARREN S. PIÑEZ ENGINEER II PREPARED: HERWIN EVAN J. HABABAG ENGINEER II	BENILDA S. PACQUIAO ENGINEER III	JEZABEL E. TULING, MPA CHIEF, PLANNING & DESIGN SECTION	GARY E. VERANO OFFICER IN CHARGE OFFICE OF THE ASSISTANT DISTRICT ENGINEER	ARTURO P. LONGYAPON DISTRICT ENGINEER	STD 19 27	19



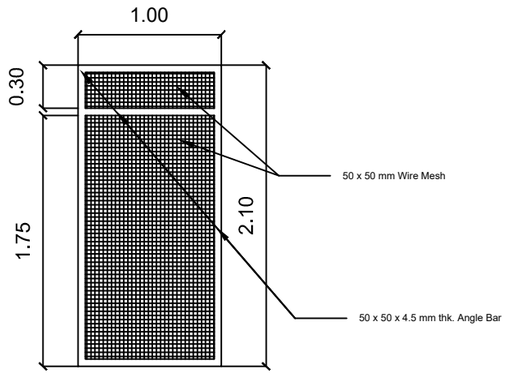
0 / A 0 **CROSS SECTION**

SCALE 1:50 MTRS.



0 / A 0 **LONGITUDINAL SECTION**

SCALE 1:50 MTRS.



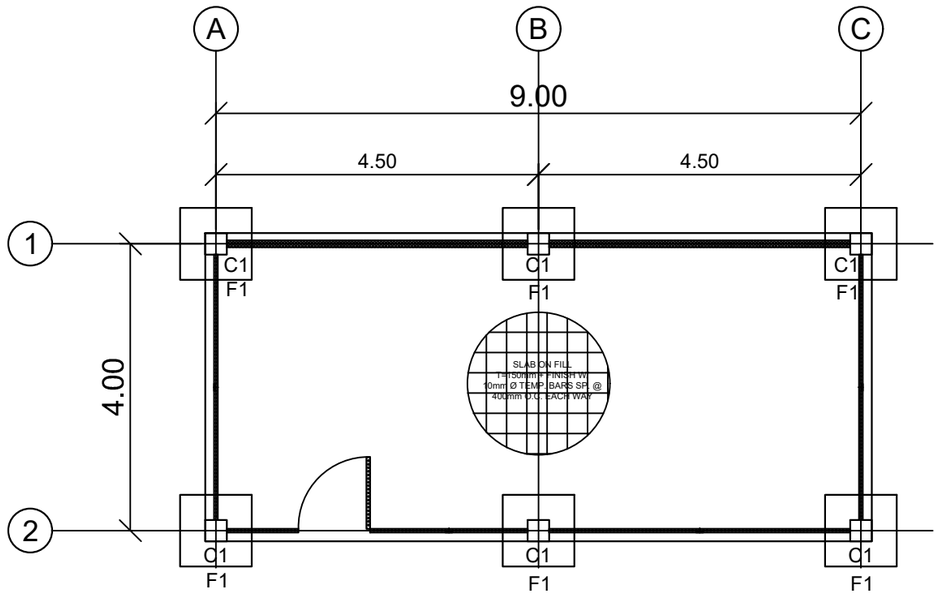
0 / A 0 **SCHEDULE OF DOOR**

SCALE 1:25 MTRS.

Republic of the Philippines
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

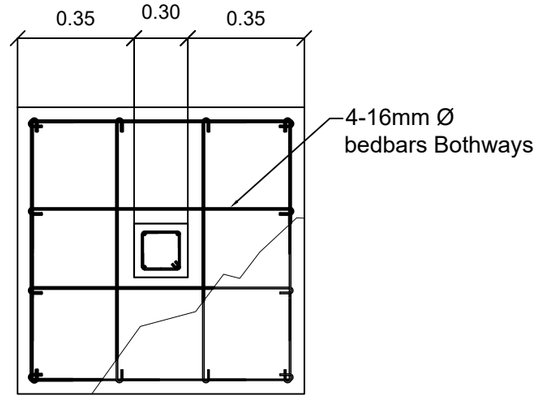
DAVAO DEL NORTE
2ND DISTRICT ENGINEERING OFFICE
TAGUM CITY, REGION XI

PROJECT & LOCATION:	SHEET CONTENTS:	DRAFTED :	SUBMITTED:	REVIEWED:	RECOMMENDED:	APPROVED:	SET NO:	SHEET NO. :
CONSTRUCTION OF WATER SYSTEM IN BARANGAY MAGWAWA, SANTO TOMAS, DAVAO DEL NORTE	**CROSS SECTION LONGITUDINAL SECTION SCHEDULE OF DOOR**	**WARREN S. PIÑEZ** ENGINEER II PREPARED: **HERWIN EVAN J. HABABAG** ENGINEER II	**BENILDA S. PACQUIAO** ENGINEER III	**JEZABEL E. TULING, MPA** CHIEF, PLANNING & DESIGN SECTION	**GARRY E. VERANO** OFFICER IN CHARGE OFFICE OF THE ASSISTANT DISTRICT ENGINEER	**ARTURO P. LONGYAPON** DISTRICT ENGINEER	STD 2027	20

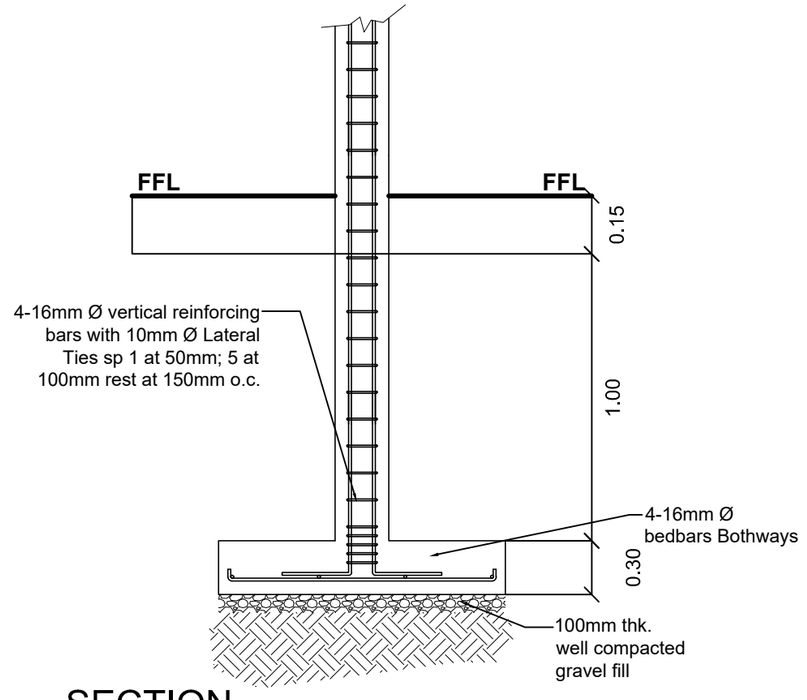


0 / A 0 **FOUNDATION PLAN**

SCALE 1:50 MTRS.



PLAN



SECTION

1 / S 8 **F1-P1 DETAIL**

SCALE 1:20 MTRS.

COLUMN SCHEDULE

LEVEL	C-1	
FRM. NAT. GRND. LEVEL TO FIN. FLR. LEVEL	0.30 M. x 0.30 M.	MAIN BAR: 4-16mm Ø TIES : Ø 10mm 1 at 50mm; 5 at 100mm rest at 150mm to center

2 / S 8 **PEDESTAL SCHEDULE**

DRAWN NOT SCALED

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2ND DISTRICT ENGINEERING OFFICE
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PROJECT & LOCATION:
CONSTRUCTION OF WATER SYSTEM IN BARANGAY MAGWAWA, SANTO TOMAS, DAVAO DEL NORTE

SHEET CONTENTS:
FOUNDATION PLAN
PEDESTAL SCHEDULE
F1-P1 DETAIL

DRAFTED : WARREN S. PIÑEZ, ENGINEER II
PREPARED: HERWIN EVAN J. HABABAG, ENGINEER II

SUBMITTED: BENILDA S. PACQUIAO, ENGINEER III

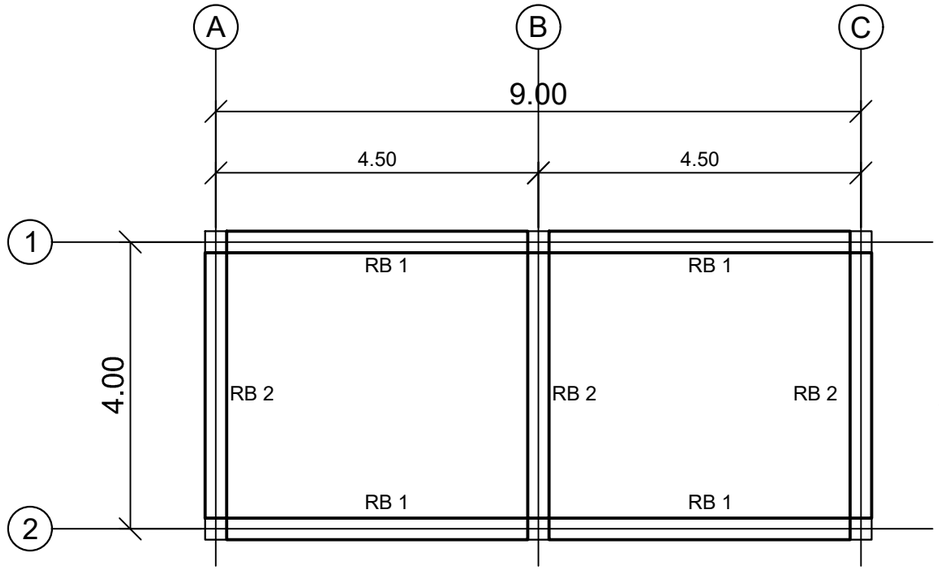
REVIEWED: S 8
JEZABEL E. TULING, MPA, CHIEF, PLANNING & DESIGN SECTION

RECOMMENDED: GARRY E. VERANO, OFFICER IN CHARGE, OFFICE OF THE ASSISTANT DISTRICT ENGINEER

APPROVED: ARTURO P. LONGYAPON, DISTRICT ENGINEER

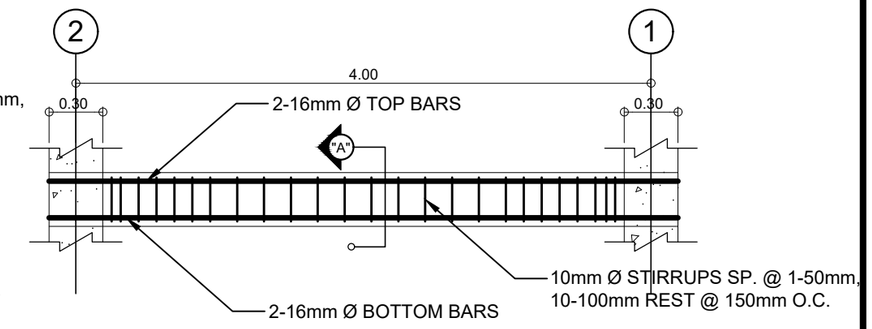
SET NO: STD 21|27

SHEET NO. : 21



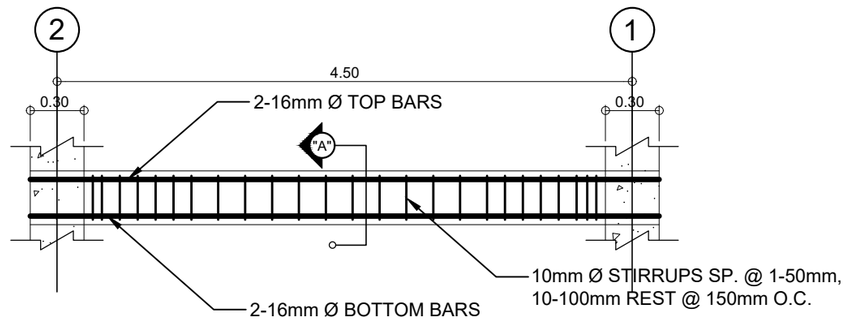
0 / A 0 **ROOF BEAM LAYOUT**
SCALE 1:50 MTRS.

4 / S 8 **RB-2 SECTION "A"**
SCALE 1:20 MTRS.



3 / S 8 **RB-2 DETAIL**
SCALE 1:20 MTRS.

4 / S 8 **RB-1 SECTION "A"**
SCALE 1:20 MTRS.



3 / S 8 **RB-1 DETAIL**
SCALE 1:20 MTRS.

Republic of the Philippines
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

DAVAO DEL NORTE
2ND DISTRICT ENGINEERING OFFICE
TAGUM CITY, REGION XI

PROJECT & LOCATION:
CONSTRUCTION OF WATER SYSTEM IN BARANGAY MAGWAWA, SANTO TOMAS, DAVAO DEL NORTE

SHEET CONTENTS:
ROOF BEAM LAYOUT
RB 1 & 2 DETAILS
RB 1& 2 SECTION A

DRAFTED :
WARREN S. PIÑEZ
ENGINEER II
PREPARED:
HERWIN EVAN J. HABABAG
ENGINEER II

SUBMITTED:
BENILDA S. PACQUIAO
ENGINEER III

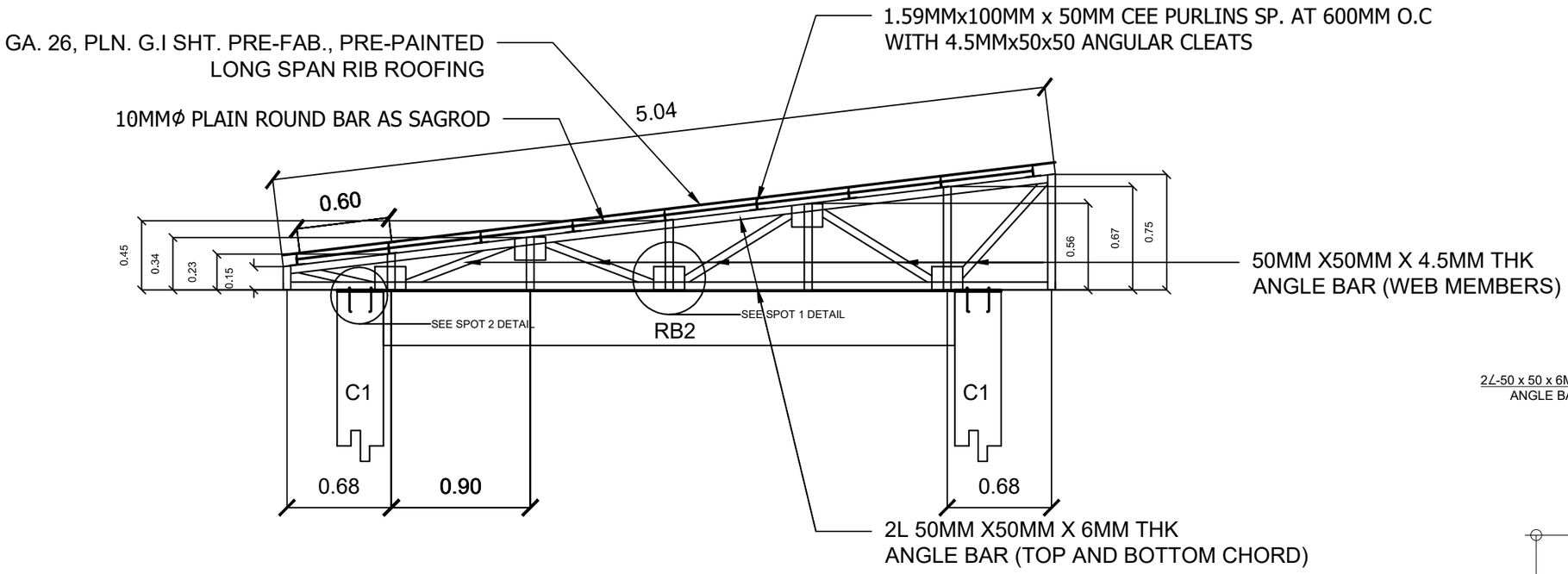
REVIEWED:
JEZABEL E. TULING, MPA
CHIEF, PLANNING & DESIGN SECTION

RECOMMENDED:
GARRY E. VERANO
OFFICER IN CHARGE
OFFICE OF THE ASSISTANT DISTRICT ENGINEER

APPROVED:
ARTURO P. LONGYAPON
DISTRICT ENGINEER

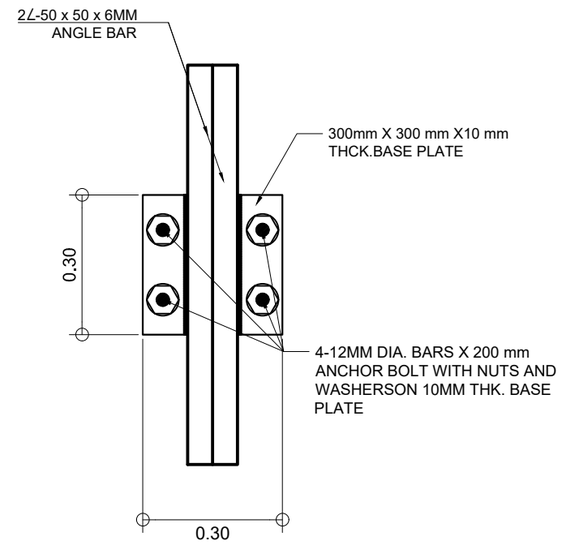
SET NO: STD 2227

SHEET NO. : 22



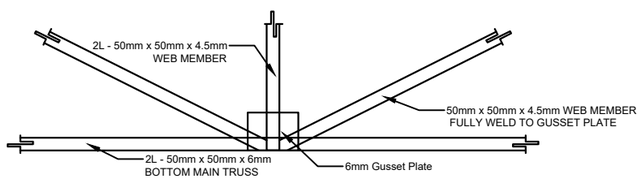
4 S 8 **TRUSS DETAIL**

SCALE 1:20 MTRS.



4 S 8 **SPOT 2 DETAIL**

N T S



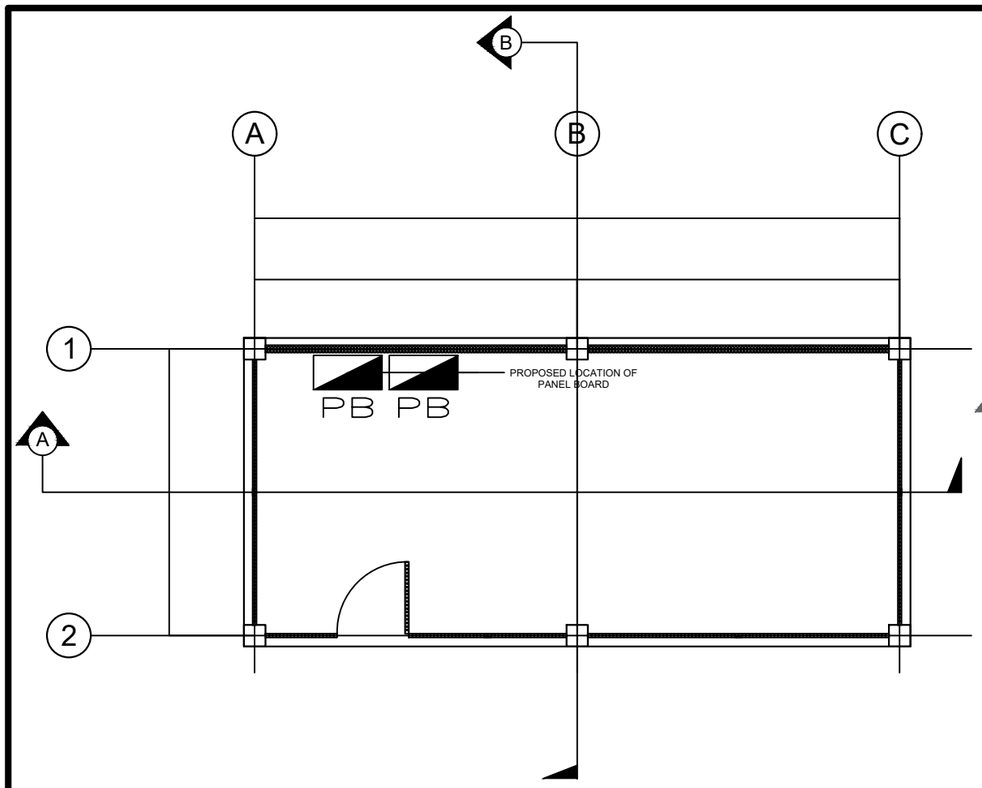
4 S 8 **SPOT 1 DETAIL**

N T S

Republic of the Philippines
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

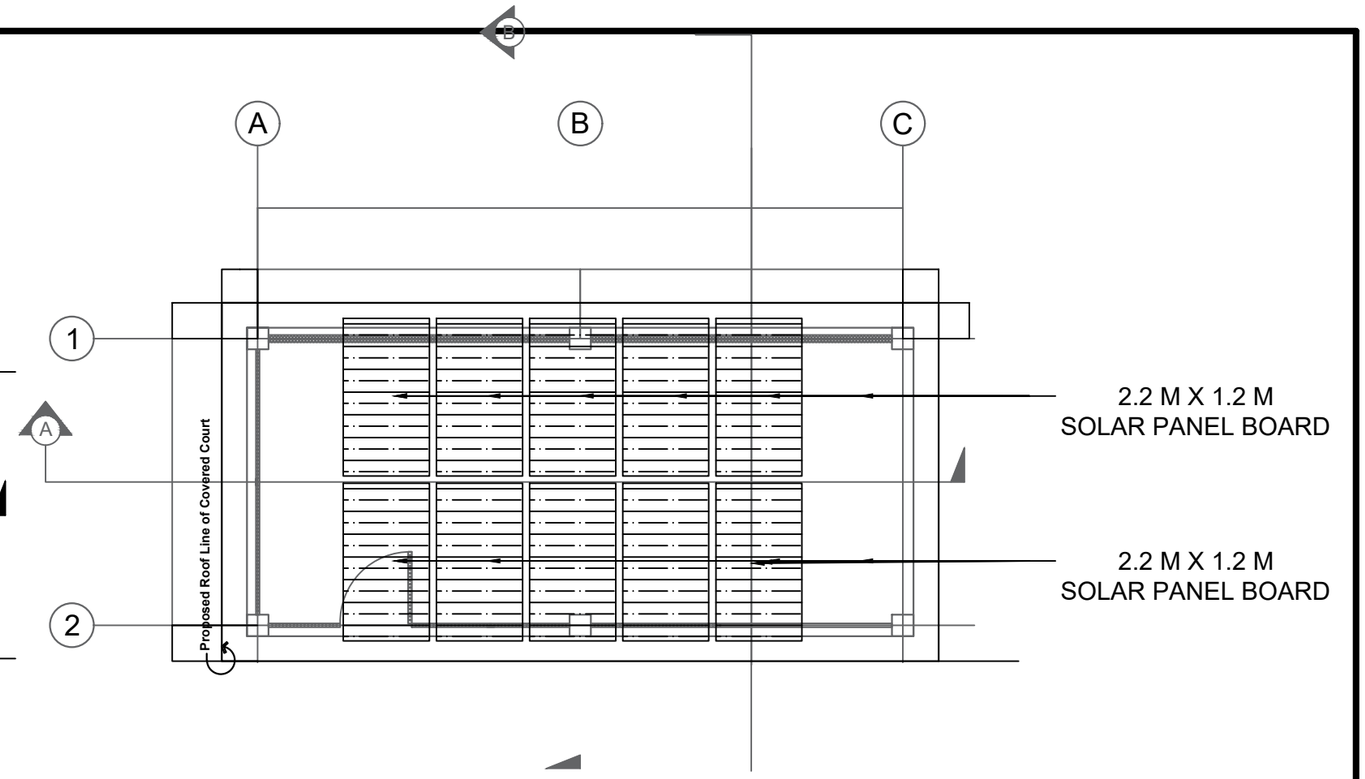
DAVAO DEL NORTE
2ND DISTRICT ENGINEERING OFFICE
TAGUM CITY, REGION XI

PROJECT & LOCATION:	SHEET CONTENTS:	DRAFTED :	SUBMITTED:	REVIEWED:	RECOMMENDED:	APPROVED:	SET NO:	SHEET NO. :
CONSTRUCTION OF WATER SYSTEM IN BARANGAY MAGWAWA, SANTO TOMAS, DAVAO DEL NORTE	**TRUSS DETAIL**	**WARREN S. PIÑEZ** ENGINEER II PREPARED: **HERWIN EVAN J. HABABAG** ENGINEER II	**BENILDA S. PACQUIAO** ENGINEER III	**JEZABEL E. TULING, MPA** CHIEF, PLANNING & DESIGN SECTION	**GARRY E. VERANO** OFFICER IN CHARGE OFFICE OF THE ASSISTANT DISTRICT ENGINEER	**ARTURO P. LONGYAPON** DISTRICT ENGINEER	STD 2327	23



0 A 0 **F L O O R P L A N**

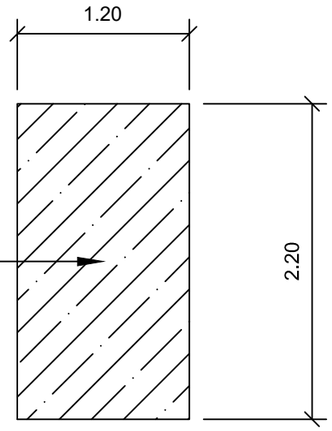
SCALE 1:50 MTRS.



SOLAR PANEL PLAN

SCALE 1:50 MTRS.

SOLAR PANEL
500 WATTS



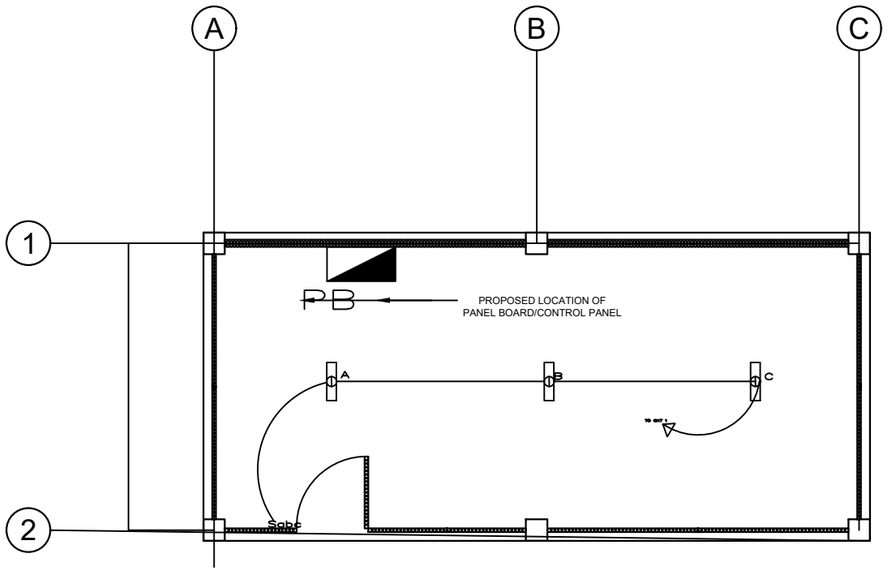
0 A 0 **SOLAR PANEL BOARD**

SCALE 1:25 MTRS.

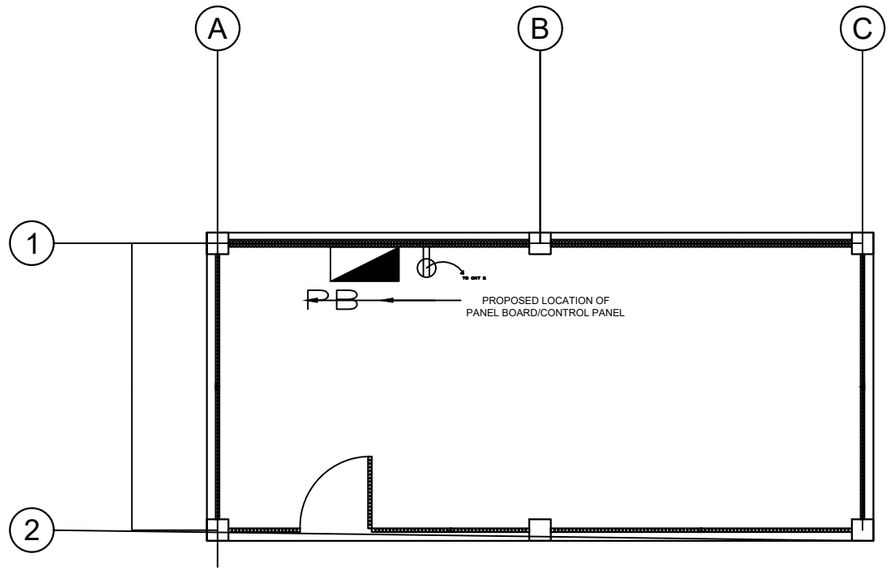
Republic of the Philippines
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

DAVAO DEL NORTE
2ND DISTRICT ENGINEERING OFFICE
TAGUM CITY, REGION XI

PROJECT & LOCATION:	SHEET CONTENTS:	DRAFTED :	SUBMITTED:	REVIEWED:	RECOMMENDED:	APPROVED:	SET NO:	SHEET NO. :
CONSTRUCTION OF WATER SYSTEM IN BARANGAY MAGWAWA, SANTO TOMAS, DAVAO DEL NORTE	FLOOR PLAN & SOLAR PANEL PLAN	WARREN S. PIÑEZ, ENGINEER II PREPARED: HERWIN EVAN J. HABABAG, ENGINEER II	BENILDA S. PACQUIAO, ENGINEER III	JEZABEL E. TULING, MPA, CHIEF, PLANNING & DESIGN SECTION	GARRY E. VERANO, OFFICER IN CHARGE, OFFICE OF THE ASSISTANT DISTRICT ENGINEER	ARTURO P. LONGYAPON, DISTRICT ENGINEER	STD 2427	24



0 A 0 **LIGHTING LAYOUT** SCALE 1:50 MTRS.



0 A 0 **POWER LAYOUT** SCALE 1:50 MTRS.

LOADS ANALYSIS

LOADS	WATTS	HR/DAY	QUANTITY	WHR/DAY
LIGHTING OUTLETS	20	8	3	480
CONVENIENCE OUTLETS	360	8	1	2880
5 HP SUBMERSIBLE PUMP	4663	5	1	23315
TOTAL DAILY ENERGY CONSUMPTION PER DAY				26675

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DAVAO DEL NORTE
2ND DISTRICT ENGINEERING OFFICE
TAGUM CITY, REGION XI

PROJECT & LOCATION:
CONSTRUCTION OF WATER SYSTEM IN BARANGAY MAGWAWA, SANTO TOMAS, DAVAO DEL NORTE

SHEET CONTENTS:
LIGHTING & POWER LAYOUT & LOAD ANALYSIS

DRAFTED :
WARREN S. PIÑEZ
ENGINEER II

PREPARED:
HERWIN EVAN J. HABABAG
ENGINEER II

SUBMITTED:
BENILDA S. PACQUIAO
ENGINEER III

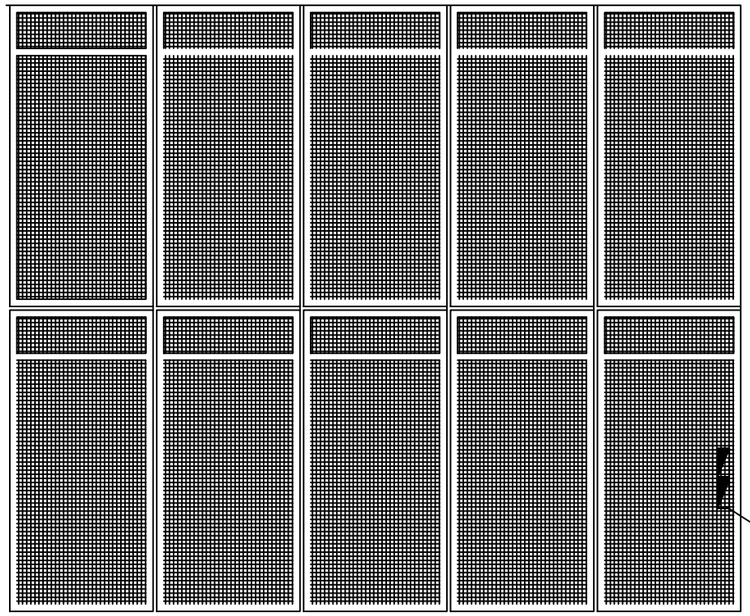
REVIEWED:
JEZABEL E. TULING, MPA
CHIEF, PLANNING & DESIGN SECTION

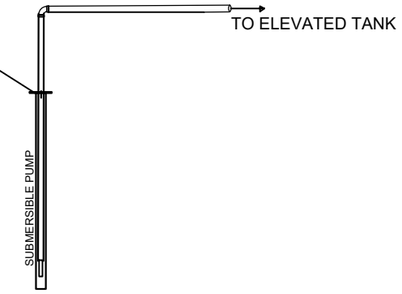
RECOMMENDED:
GIRLY E. VERANO
OFFICER IN CHARGE
OFFICE OF THE ASSISTANT DISTRICT ENGINEER

APPROVED:
ARTURO P. LONGYAPON
DISTRICT ENGINEER

SET NO: STD 25|27

SHEET NO. : 25





SOLAR PANEL LAYOUT PLAN

DNTS

Republic of the Philippines
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

DAVAO DEL NORTE
2ND DISTRICT ENGINEERING OFFICE
TAGUM CITY, REGION XI

PROJECT & LOCATION:
CONSTRUCTION OF WATER SYSTEM IN BARANGAY MAGWAWA, SANTO TOMAS, DAVAO DEL NORTE

SHEET CONTENTS:
SOLAR PANEL LAYOUT PLAN

DRAFTED :
WARREN S. PIÑEZ
ENGINEER II

PREPARED:
HERWIN EVAN J. BABABAG
ENGINEER II

SUBMITTED:
BENILDA S. PACQUIAO
ENGINEER III

REVIEWED:
JEZABEL E. TULING, MPA
CHIEF, PLANNING & DESIGN SECTION

RECOMMENDED:
GARRY E. VERANO
OFFICER IN CHARGE
OFFICE OF THE ASSISTANT DISTRICT ENGINEER

APPROVED:
ARTURO P. LONGYAPON
DISTRICT ENGINEER

SET NO: STD 26|27

SHEET NO. : 26

LEGEND

- A - AUTOMATIC AC CIRCUIT BREAKER 20AF, 2P, 240V, 15AT IN NAME 1 ENCLOSURE
- B - AUTOMATIC AC CIRCUIT BREAKER 225AF, 2P, 240V, 125AT IN NAME 1 ENCLOSURE
- C - AUTOMATIC DC CIRCUIT BREAKER 225AF, 2P, 240V, 150AT IN NAME 1 ENCLOSURE
- D - AUTOMATIC DC CIRCUIT BREAKER 400AF, 2P, 240V, 300AT IN NAME 1 ENCLOSURE

- (AC, DC) - Inverter
- CONTROL -CONTROL PANEL

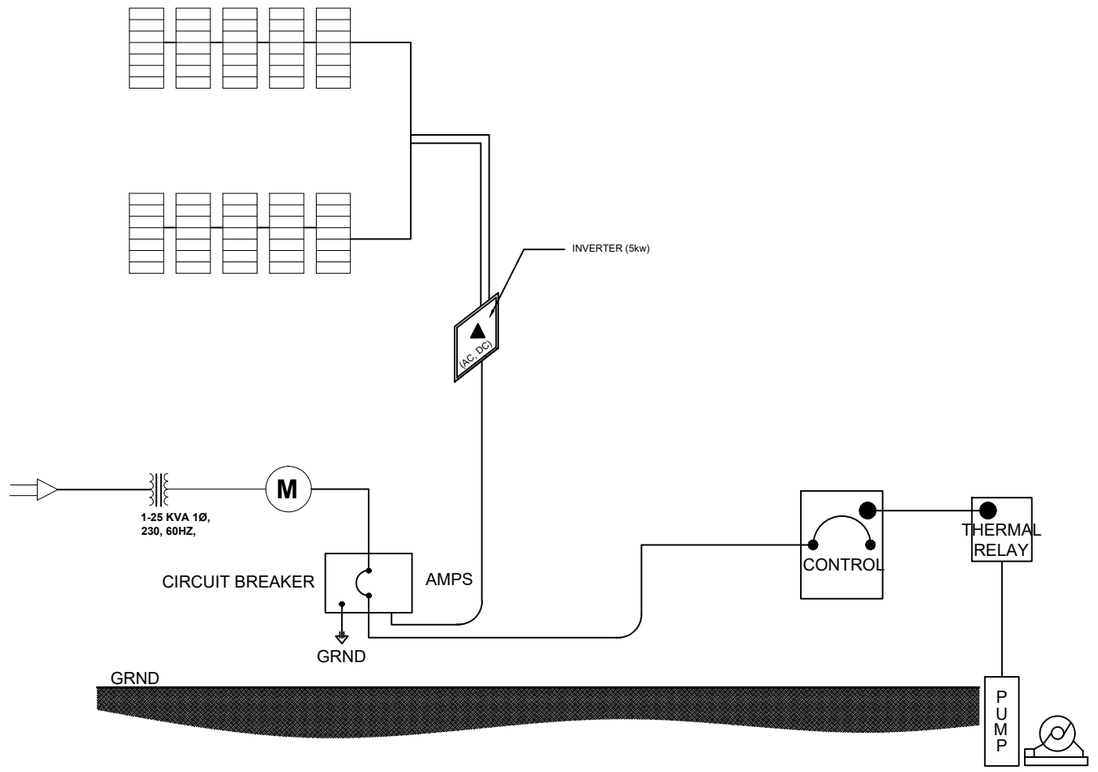
- - LITHIUM-ION BATTERY OR APPROVED EQUAL
- - MANUNAL TRANSFER SWITCH
- - 5 HP, 1Ø, 230, 60HZ, AC, SUBMERSIBLE PUMP MOTOR
- THERMAL RELAY - THERMAL RELAY

- SCHEDULES OF WIRES AND CONDUIT

- **X0** - 2-3.5mm² THHN in 15Ø PVC PNS 14
- **X1** - 1-50mm² PV CABLE
- **X2** - 1-60mm² PV CABLE
- **X3** - 2-30mm² THHN + 1-8.0 THHN (G) in 40mmØ RSC

- 450-500W SOLAR MONOCRYSTALLINE PANELS OR APPROVED EQUAL
- - SOLAR CHARGE CONTROLLER (MAXIMUM POWER POINT TRACKING) OR APPROVED EQUAL
- - PURE SINE WAVE INVERTER OR APPROVED EQUAL

- - ONE (1) -18W 230V, T5 LED TUBE & BOX TYPE SET
- - ONE (1) -20W 230V, LED FLOOD LIGHT
- Sabc - 3 SINGLE POLE WALL SWITCHES ON ONE PLATE (10A, 250V)
- - DUPLEX CONVENIENCE OUTLET, GROUNDING TYPE (20A, 250V)



SINGLE LINE DIAGRAM

SCALE: NTS

NOTES & SPECIFICATIONS

1. ALL ELECTRICAL WORKS SHALL COMPLY IN ACCORDANCE WITH THESE PLANS AND SPECIFICATIONS. THE APPLICABLE PROVISIONS OF THE LATEST EDITION OF THE PHILIPPINE ELECTRICAL CODE (PEC). THE RULES AND REGULATION OF THE LOCAL ENFORCING AUTHORITY AND THE REQUIREMENTS OF THE LOCAL POWER COMPANY. THE ELECTRICAL WORKS SHALL BE UNDER IMMEDIATE SUPERVISION OF A DULY REGISTERED ELECTRICAL ENGINEER.
2. THE ELECTRICAL SERVICE POWER IS 1–PHASE, 2–WIRE, 230 V AC, 60 Hz.
3. MINIMUM SIZE OF WIRE & ELECTRICAL CONDUIT TO BE USE SHALL BE 20 mm² TW & 15 mm Ø RESPECTIVELY.
4. MINIMUM SERVICE ENTRANCE SHALL BE 8.0 mm² THW COPPER WIRE & 20 mm Ø RIGID STEEL CONDUIT.
5. ALL MATERIALS TO BE USED SHALL BE NEW & OF APPROVED TYPE.

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CONSTRUCTION OF WATER SYSTEM IN BARANGAY MAGWAWA, SANTO TOMAS, DAVAO DEL NORTE	(SINGLE LINE DIAGRAM) LINE DIAGRAM LEGEND & SYMBOLS NOTES & SPECIFICATION	WARREN S. PIÑEZ ENGINEER II PREPARED: HERWIN EVAN J. BABABAG ENGINEER II	BENILDA S. PACQUIAO ENGINEER III	JEZABEL E. ULING, MPA CHIEF, PLANNING & DESIGN SECTION	GARRY B. PERANO OFFICER IN CHARGE OFFICE OF THE ASSISTANT DISTRICT ENGINEER	ARTURO P. LONGYAPON DISTRICT ENGINEER	STD 27|27	27