REPUBLIC OF THE PHILIPPINES

DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

REGION XI

DAVAO DEL NORTE 2ND DISTRICT ENGINEERING OFFICE

TAGUM CITY

C.Y. 2025 PROJECT

DETAILED ENGINEERING DESIGN PLAN FOR

CONSTRUCTION OF BANK PROTECTION ALONG LASANG RIS, PANABO CITY, DAVAO DEL NORTE

SECTION : BRGY. MANAY

LOCATION : PANABO CITY, DAVAO DEL NORTE

STATION LIMITS: STA. 11+455.70 - STA. 12+000.00= 544.30 LN.M (CONCRETE REVETMENT)

NET LENGTH: 544.30 LN.M

SUBMITTED:

JEZABEL E. TULING, MPA

CHIEF, PLANNING AND DESIGN SECTION

DATE:

REVIEWED:

GARRY E. VERANO

OFFICER-IN-CHARGE

OFFICE OF THE ASSISTANT DISTRICT ENGINEER

DATE:

RECOMMENDED:

ARTURO P. LONGYAPON

DISTRICT ENGINEER

DATE:

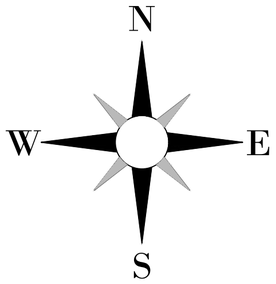
PROJECT LIMITS :

STA. 11+455.70 - STA. 12+000.00 = 544.30 Ln.m. Concrete Revetment (L/S)

11.55 LN.M CLOSURE (REINFORCED CONCRETE REVETMENT)

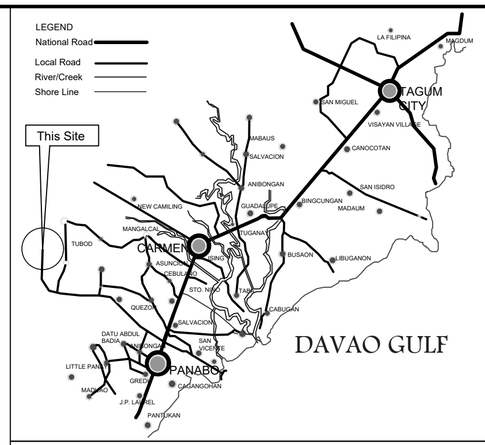
NET LENGTH = 544.30 Ln.m

PROVIDE 11.55 LN.M CLOSURE BEFORE THE BEGINNING OF THE PROJECT



SCALE LOCATION PLAN 1 : 2500 m

SHEET NO.	INDEX OF SHEETS
0	COVER PAGE
1	PROJECT LIMITS, INDEX OF SHEETS, VICINITY MAP & LOCATION PLAN
2	GENERAL NOTES & LEGEND
3	SUMMARY OF QUANTITIES
4	TYPICAL SECTION OF REINFORCED CONCRETE (TYPE II) DETAIL, CREST PROTECTION DETAIL, PILE CAP DETAIL, SHEET PILE DETAIL, & WHEEPHOLE DETAIL
5	COFFERDAM TYPICAL SECTION, COFFERDAM PLAN, DETAIL OF SANDBAG, CLOSURE DETAIL, STEP DETAIL, & STAIR DETAIL
6	SHEET PILE PANEL DRIVING METHOD
7-9	BOREHOLE DETAIL
10	STANDARD BILLBOARD DETAIL, BOLLARD DETAIL
11	ACCESS ROAD LOCATION PLAN, TYPICAL SECTION OF ACCESS ROAD, FLOOD CONTROL WORKS SITE TEMPORARY SIGNAGE & ROADSIGN DETAILS
12	PLAN AND PROFILE
13-26	CROSS SECTION



VICINITY MAP

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGION XI
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2ND DISTRICT ENGINEERING OFFICE
TAGUM CITY

PROJECT NAME AND LOCATION:
CONSTRUCTION OF BANK PROTECTION ALONG LASANG RIS, PANABO CITY, DAVAO DEL NORTE

SHEET CONTENTS:
INDEX OF SHEETS
LOCATION PLAN
VICINITY MAP

DRAFTED: **BENJIE T. PORTRIAS** ENGINEER II

PREPARED: **HERWIN EVAN J. BABABAG** ENGINEER II

REVIEWED: **BENILDA S. PACQUIAO** ENGINEER III

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

RECOMMENDED: **GARRY B. VERANO** OFFICER-IN-CHARGE OFFICE OF THE ASSISTANT DISTRICT ENGINEER
DATE:

APPROVED: **ARTURO P. LONGYAPON** DISTRICT ENGINEER
DATE:

SET NO. A 1 1

SHEET NO. 1 26

GENERAL NOTES

SPECIFICATION

1. STEEL SHEET PILES
   STEEL SHEET PILES SHALL BE OF THE TYPE, WEIGHT AND SECTION MODULUS INDICATED ON THEPLANS OR SPECIAL PROVISIONS, AND SHALL CONFORM TO THE REQUIREMENT OF ITEM 1717(2)a1.
2. PILE LENGTH
   THE DESIGNED PILE LENGTH IS BASED ON THE BORING TEST RESULT.
3. HEIGHT OF THE STRUCTURE
   THE DESIGNED HEIGHT OF THE STRUCTURE IS BASED ON THE DESIGN FLOOD LEVEL PLUS 1.0 M FREEBOARD.
4. DISCHARGE VOLUME
   THE DISCHARGE VOLUME OF FLOOD WATER WAS BASED ON 100 YEARS RETURN PERIOD.

CONSTRUCTION REQUIREMENTS

5. STEEL SHEET PILES
   SHEET PILES SHALL BE DRIVEN TO ELEVATION SHOWN ON THE PLANS OR AS DIRECTED BY THE ENGINEER. WHERE IMPRACTICAL TO DRIVE TO PLAN ELEVATION DUE TO SUBSURFACE CONDITIONS, THE DRIVING OF PILES MAY BE STOPPED AT A HIGHER ELEVATION WITH THE WRITTEN PERMISSION OF THE ENGINEER.

6. STRUCTURAL CONCRETE
   THIS ITEM SHALL CONSIST OF FURNISHING, PLACING AND FINISHING CONCRETE IN ALL STRUCTURES EXCEPT PAVEMENTS IN ACCORDANCE WITH THIS SPECIFICATION AND CONFORMING TO THE LINES, GRADES, AND DIMENSIONS SHOWN ON THE PLANS. CONCRETE SHALL CONSIST OF A MIXTURE OF PORTLAND CEMENT, FINE AGGREGATE, COARSE AGGREGATE, ADMIXTURE WHEN SPECIFIED, AND WATER MIXED IN THE PROPORTIONS SPECIFIED OR APPROVED BY THE ENGINEER.
7. ALL ELEVATION SHALL BASE ON PHILIPPINE REFERENCE SYSTEM OF 1992(PRS92).

8. PRE-CONSTRUCTION SURVEY SHALL BE CONDUCTED BY THE REPRESENTATIVE OF THE IMPLEMENTING OFFICE AND THE CONTRACTOR. CORRESPONDING "AS STAKED PLAN" SHALL BE PREPARED AND SUBJECT FOR APPROVAL BY THE DISTRICT ENGINEER.

9. OTHER ITEMS OF WORK SHALL CONFORM WITH THE DPWH STANDARD SPECIFICATIONS FOR PUBLIC WORKS AND HIGHWAYS, 2004 EDITION, VOLUME II AND DESIGN GUIDELINES CRITERIA AND STANDARD 2015 EDITION.

FACILITIES FOR THE ENGINEER

10. THE CONTRACTOR SHALL AT ALL TIMES DURING THE DURATION OF THE CONTRACT PROVIDE FOR THE USE OF THE ENGINEER ALL EQUIPMENT, INSTRUMENTS AND APPARATUS, ALL INFORMATION AND RECORDS AND QUALIFIED CHAINMEN AND LABOURERS REQUIRED BY THE ENGINEER FOR INSPECTING AND ASURING THE WORKS. SUCH EQUIPMENT, INSTRUMENTS AND APPARATUS SHALL INCLUDE THOSE LISTED IN THE SPECIAL PROVISIONS.

11. THE CONTRACTOR SHALL PROVIDE WITHIN THIRTY (30) CALENDAR DAYS AFTER NOTICE TO COMMENCE WORK, THE VEHICLE LISTED IN THE SPECIAL PROVISIONS FOR THE EXCLUSIVE USE OF THE ENGINEER. THE VEHICLES ON DELIVERY SHALL BE NEW AND SHALL BE DRIVEN BY A COMPETENT QUALIFIED AND EXPERIENCED DRIVER WHO SHALL BE UNDER THE DIRECT ORDER OF THE ENGINEER.

OTHER GENERAL REQUIREMENTS

12. ALIGNMENT AND GRADES ARE SUBJECT TO ADJUSTMENTS TO SUIT ACTUAL FIELD CONDITIONS.
13. DISTANCES AND ELEVATIONS ARE IN METER UNLESS OTHERWISE INDICATED.
14. BEFORE THE START OF ACTUAL CONSTRUCTION, THE AS-STAKED PLAN SHOULD BE SUBMITTED TO THE REGIONAL OFFICE IN ORDER THAT IMMEDIATE STEPS MAY BE TAKEN TO CORRECT OR ADJUST WHATEVER APPRECIABLE DEVIATION THERE MAY BE FROM THE ORIGINAL PLAN.
15. QUARRY SITE FOR AGGREGATES IS LOCATED AT BRGY. MABUHAY, CARMEN, 17.40 KM AWAY FROM PROJECT SITE.
17. DESIGN WAS BASED ON SURVEY DATA SUBMITTED BY THE SURVEY INVESTIGATION SECTION OF THE PLANNING AND DESIGN DIVISION OF THE DPWH-DISTRICT ENGINEERING OFFICE.

MATERIALS

1. CONCRETE
   a. CONCRETE STRENGTH BY CLASS

STRUCTURAL MEMBER	CLASS	28-DAY CYLINDER STRENGTH		MAX SIZE OF COARSE AGGREGATE, mm(in.)
		MPa	PSI	
CAST -IN-PLACE SLABS, DIAPHRAGMS, BACKWALLS, COPINGS,COLUMNS,SIDEWALK	A	27.59	4000	20

   b. THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER FOR APPROVAL THE PLACING SEQUENCES FOR ALL TYPES OF CONCRETING WORK.
   c. DESIGN OF CONCRETE SHALL BE AS SET FORTH UNDER ITEM NO. 1 OF MATERIALS.
   d. CONCRETE SHALL BE DEPOSITED, VIBRATED AND CURED IN ACCORDANCE WITH THE GENERAL SPECIFICATIONS.
   e. FOR CONCRETE DEPOSITED AGAINST THE GROUND, LEAN CONCRETE SHALL BE CONSIDERED IN MEASURING THE STRUCTURAL DEPTH OF THE CONCRETE SECTION.

2. REINFORCING STEEL
   a. REINFORCING STEEL NON WELDABLE SHALL CONFORM TO ASTM615/A615M & WELDABLE STEELBARS SHALL CONFORM TO ASTM A706/A706M. MINIMUM YIELD STRENGTH AS LISTED BELOW UNLESS OTHERWISE SPECIFIED IN THE DRAWING:
   Fy=414 MPa (Gr. 60) FOR 16mm Ø AND LARGER
   Fy=276 MPa (Gr. 40) FOR 12mm Ø AND SMALLER
   b. REINFORCING STEEL SHALL BE FREE OF MILL SCALES, OIL OR ANY SUBSTANCES WHICH WILL WEAKEN THE BOND WITH CONCRETE.

3. STEEL SHEET PILE
   a. ALL WORK SHALL BE DONE IN ACCORDANCE WITH ALL PROVISIONS IN ITEM 1717 - SHEET PILES OF DPWH STANDARD SPECIFICATIONS.
   b. STEEL SHEET PILES SHALL MEET THE REQUIREMENTS OF AASHTO M 202 (ASTM A328), OR AASHTO M 223. THE JOINTS SHALL BE PRACTICALLY WATER-TIGHT WHEN THE PILES ARE IN PLACE.

SURVEY SPECIFICATIONS

1. ALL PROJECT CONTROL POINTS ARE PROJECTED IN PRS'92 GRID COORDINATE SYSTEM (ZONE 5).
2. SURVEY INSTRUMENT USED. STONEX 800
3. DATE SURVEYED: JANUARY 27, 2025
4. PROJECT CONTROL POINTS, REFER TO 'PLAN AND PROFILE'

HYDRAULIC ANALYSIS		
	50 YRS.	100 YRS.
DRAINAGE AREA (DA)	425.823 sq.km	425.823 sq.km
DISCHARGE (Q)	605.00 cu.m/sec	667.00 cu.m/sec
FREE BOARD	1.00 m. (min)	1.00 m. (min)
ELEV. AT PT. OF ORIGIN	1100 m	1100 m
ELEV. AT PT. OF INTEREST	10 m	10 m

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 & 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
3. DPWH STANDARD SPECIFICATIONS FOR HIGHWAYS, BRIDGES AND AIRPORTS VOL II, 2013 EDITION.
4. DPWH STANDARD SPECIFICATIONS FOR PUBLIC WORKS STRUCTURES (BUILDING, PORTS AND HARBORS, FLOOD CONTROL & DRAINAGE STRUCTURES & WATER SUPPLY SYSTEMS) - VOL. III, 2019 EDITION

LEGEND

SYMBOLS	DESCRIPTION	SYMBOLS	DESCRIPTION
CH	CONCRETE HOUSE		BENCH MARK
P	PUROK		NATURAL GROUND
WH	WOODEN HOUSE	CEP	CONCRETE ELECTRIC POST
	EXISTING RCC PIPE	WEP	WOODEN ELECTRIC POST
	BRIDGE		EASEMENT
	SIDE SHOT REMARK		CONTOUR LINES
	JUNCTION RIVER		CYLINDRICAL MONUMENT
	VARIOUS TREES	PI	POINT OF INTERSECTION
RP-2	REFERENCE POINTS		BARBWIRE FENCE
	WATER FLOW DIRECTION	T-0	TURNING POINTS
	WATERWAY		WATER LEVEL
	RCC PIPE PROFILE		
	FENCE		

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
ENGINEER II

REPUBLIC OF THE PHILIPPINES
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SHEET CONTENTS:
GENERAL NOTES

DRAFTED:
BENJIE II PORTRIAS
ENGINEER II

PREPARED:
HERWIN EVAN J. RABABAG
ENGINEER II

REVIEWED:
BENILDA S. PACQUIAO
ENGINEER III

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

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

APPROVED:
ARTURO P. LONGYAPON
DISTRICT ENGINEER
DATE:

SET NO. B 1 1

SHEET NO. 2 26

SUMMARY OF QUANTITIES

ITEM NO.	DESCRIPTION	UNIT	QUANTITY	REMARKS
Part A	**Facilities for the Engineer**			
A.1.2(2)	Provision of 4x4 Pick Up Types Service Vehicle for the Engineer on Bare Rental Basis	Vehicle-Month	7.36	
A.1.2(3)	Construction of Field Office for the Engineer	ls	1.00	
A.1.1.1(11)	Provision of Furniture/Fixtures, Equipment & Appliances for the Field Office for the Engineer	ls	1.00	
A. 1.2 (5)	Operation and Maintenance of 4x4 Pick Up Types Service Vehicle for the Engineer	Vehicle-Month	7.36	
A. 1.3 (2)	Provision of Survey Equipment for the Assistance to the Engineer	ls	1.00	
Part B	**Other General Requirements**			
B.3(1)	Permits and Clearance	ls	1.00	
B.4(1)	Construction Survey and Staking	km	0.54	
B.5(1)	Project Billboard/Signboard	ea	4.00	COA Billboard and DPWH Billboard
B.7(1)	Occupational Safety and Health Program	ls	1.00	
B.9(1)	Mobilization and Demobilization	ls	1.00	
B.12(1)	Removal and Relocation of Utilities	ls	1.00	
B. 13	Additional Geotechnical Investigation	ls	1.00	
Part L-A	**Earthworks**			
1700(3)a2	Individual Removal of Trees (301-500 mm dia.)	ea	81.00	
1701(1)	Unsuitable Excavation	cu.m.	17,511.09	
1702(4)a	Shoring, Cribbing and Drain Excavation	ls	1.00	
1704(1)b	Embankment from Borrow (Common Soil)	cu.m.	29,856.01	
1707(1)	Aggregate Subbase Course	cu.m.	834.65	
Part D	**REINFORCED CONCRETE**			
900(1)d	Structural Concrete, Class "A"(4000 PSI), 28 days	cu.m.	170.22	
902(1)a1	Reinforcing Steel (Grade 40)	kg	1,924.00	
902(1)a2	Reinforcing Steel (Grade 60)	kg	5,374	
Part L-B	**BANK AND SLOPE PROTECTION WORKS**			
1712(1)	Concrete (Slope Protection)	cu.m.	2,445.28	
1717(2)a1	Sheet Piles (Steel), Slope Protection	l.m.	8,842.60	
Part G	**DRAINAGE AND SLOPE PROTECTION STRUCTURES**			
510(1)	BED COURSE GRANULAR MATERIAL (CONCRETE)	cu.m.	1,821.35	
Part H	**MISCELLANEOUS STRUCTURES**			
611(1)	Trees Furnishing and Transplating	ea	7,600.00	

NOTE: THE QUANTITIES OF ALL WORK ITEMS INVOLVED ARE SUBJECT TO INCREASE/ DECREASE AS PER ACTUAL FIELD REQUIREMENTS.

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ENGINEER II

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HERWIN EVAN J. BABABAG
ENGINEER II

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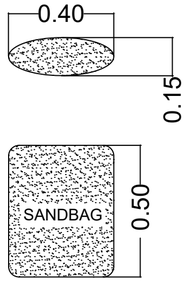
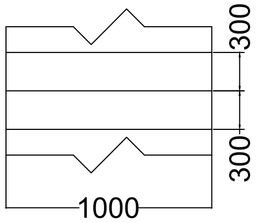
SHEET NO. 3 26



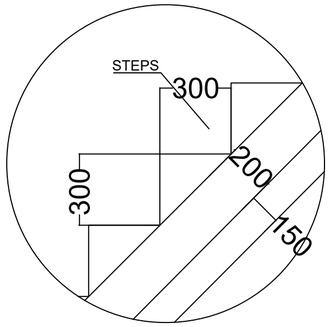
DETAIL OF SANDBAG

SCALE 1 : 20 mts.

SCHEDULE FOR CONSTRUCTION OF STAIRS	
STATION	REMARKS
11+940	PROVIDE STAIRS
11+880	PROVIDE STAIRS
11+820	PROVIDE STAIRS
11+760	PROVIDE STAIRS
11+700	PROVIDE STAIRS
11+640	PROVIDE STAIRS
11+580	PROVIDE STAIRS
11+520	PROVIDE STAIRS
11+460	PROVIDE STAIRS

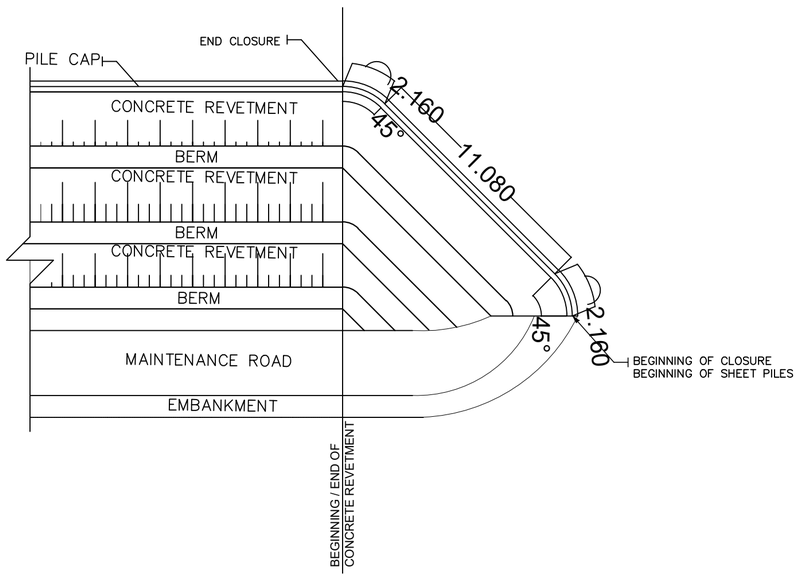


FRONT VIEW



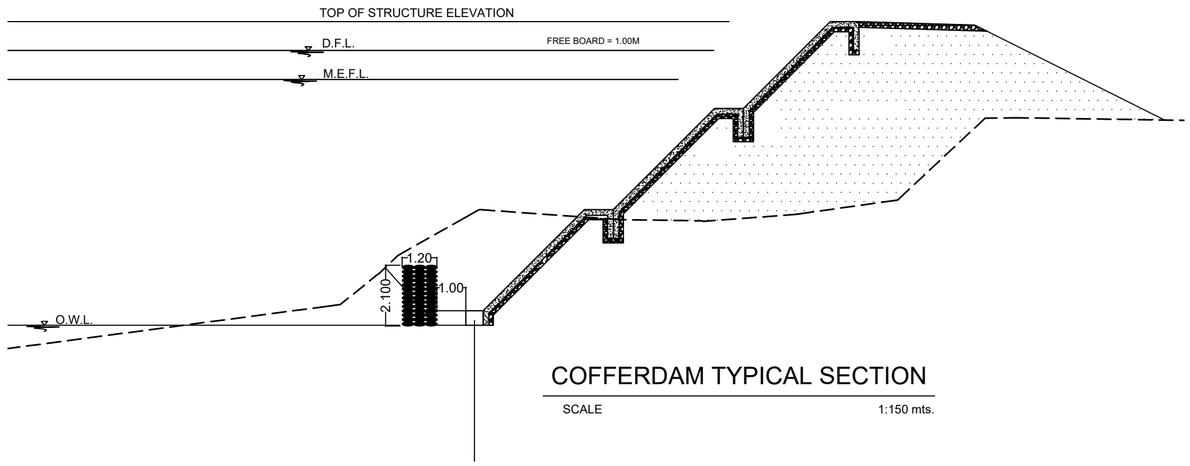
SECTION VEW

STEP DETAILS (REVETMENT)



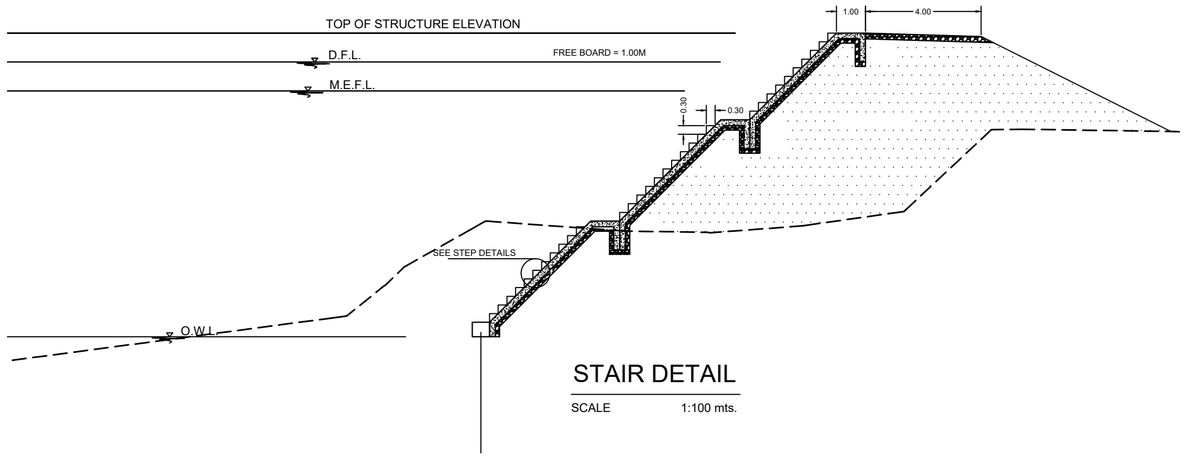
CLOSURE DETAIL

SCALE NTS



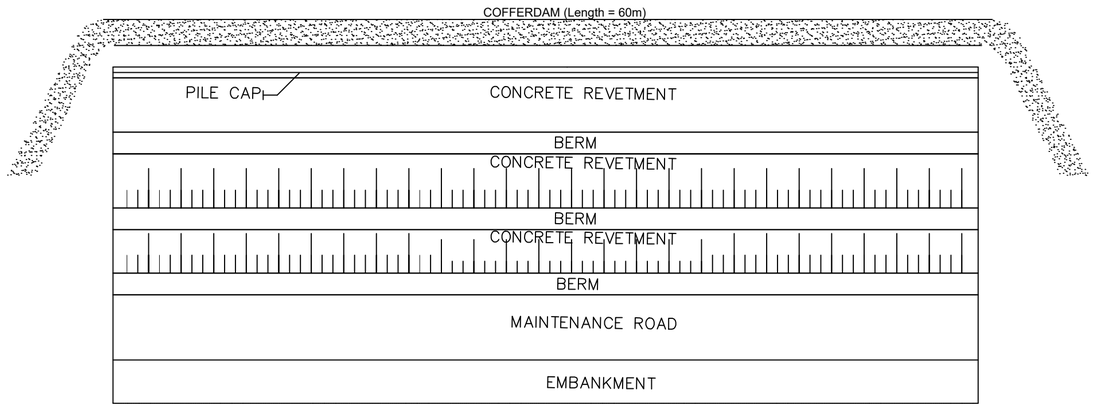
COFFERDAM TYPICAL SECTION

SCALE 1:150 mts.



STAIR DETAIL

SCALE 1:100 mts.



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SHEET CONTENTS:
COFFERDAM TYPICAL SECTION
DETAIL OF SANDBAG
STAIR DETAIL
STEP DETAILS
CLOSURE DETAIL

DRAFTED:
BENJIE U. PORTRIAS
ENGINEER III

PREPARED:
HERWIN EVAN J. BABABAG
ENGINEER II

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DATE:

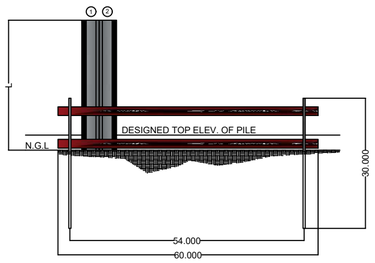
APPROVED:
ARTURO P. LONGYAPON
DISTRICT ENGINEER
DATE:

SET NO. E 1 1

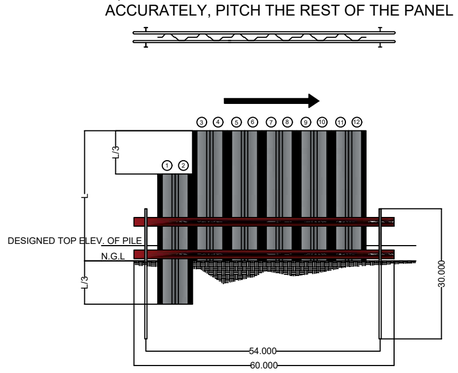
SHEET NO. 5 / 26

1.) PITCH, ALIGN AND PLUMB THE FIRST PAIR:

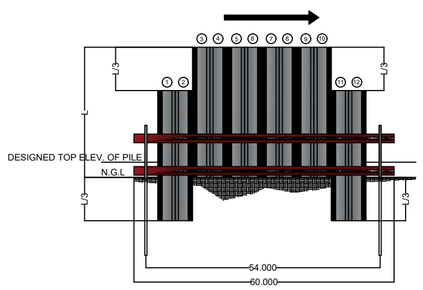
Z-TYPE STEEL SHEET PILE WIDTH = 770mm
MIN. THICKNESS = 9mm



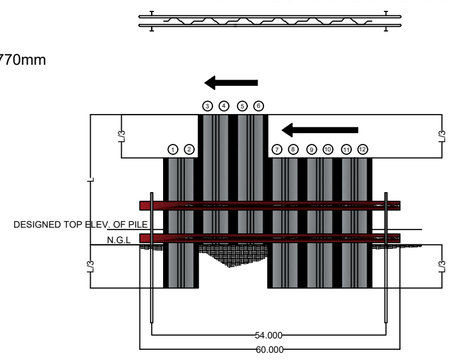
2.) DRIVE THE FIRST PAIR CAREFULLY AND ACCURATELY, PITCH THE REST OF THE PANEL



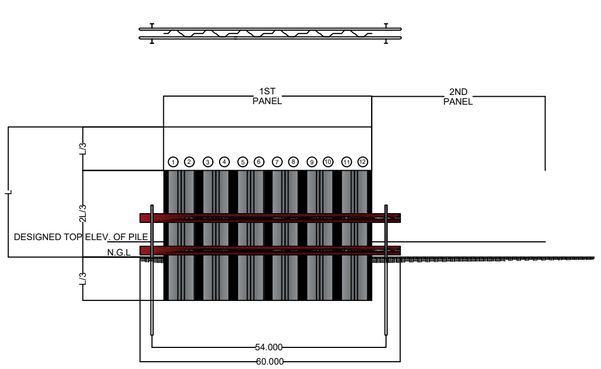
3.) ENSURE THE LAST PAIR IS ACCURATELY POSITION AND PLUMBER, DRIVE THE LAST PAIR.



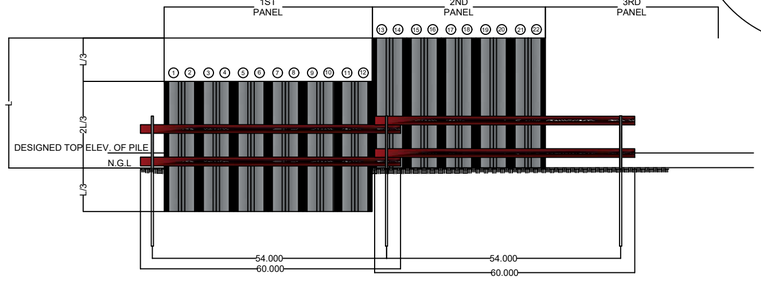
4.) DRIVE REMAINDER OF THE PANEL, WORKING BACKWARDS TOWARDS THE FIRST PAIR.



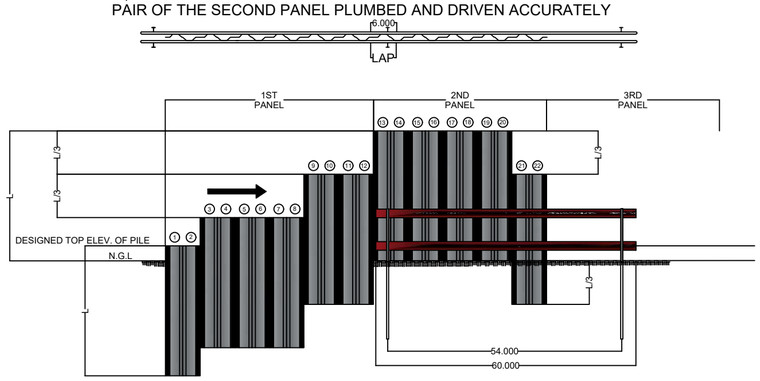
5.) FIRST PANEL PART DRIVEN



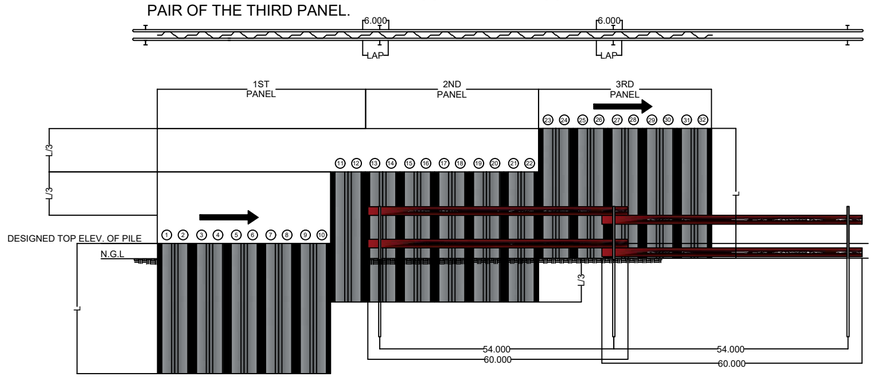
6.) SECOND PANEL PITCHED, LAST PAIR OF THE FIRST PANEL BECOMES THE FIRST PAIR OF THE SECOND PANEL



7.) FIRST PANEL DRIVEN TO FINAL LEVEL IN STAGES. THE LAST PAIR OF THE SECOND PANEL PLUMBED AND DRIVEN ACCURATELY

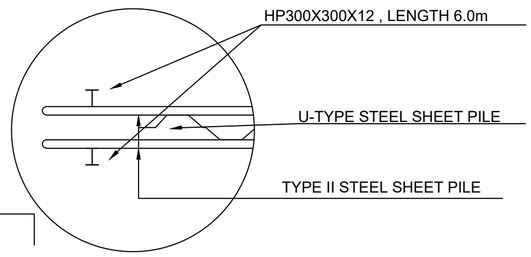


8.) FIRST PANEL COMPLETED, SECOND PANEL PART DRIVEN, THIRD PANEL PITCHED. THE LAST PAIR OF THE SECOND PANEL BECOMES THE FIRST PAIR OF THE THIRD PANEL.

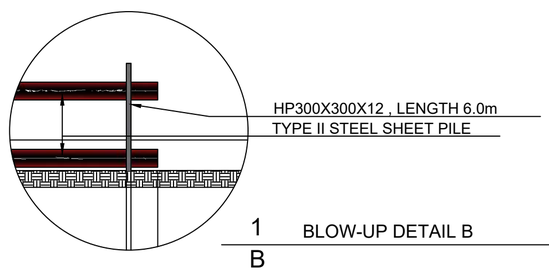


NOTES:

1.) 1 PAIR IS 2 Z-TYPE SHEET PILE

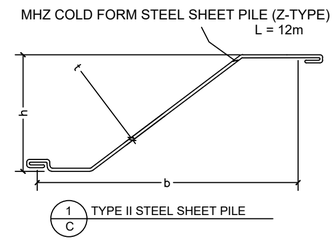


1/A BLOW-UP DETAIL A



1/B BLOW-UP DETAIL B

STEEL GRADE	SECTION MODULUS	b	h	t	wt
355	cm3/m	mm	mm	mm	kg/m
	1304	770	344	9.00	76.20



1/C TYPE II STEEL SHEET PILE

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGION XI
DAVAO DEL NORTE
2ND DISTRICT ENGINEERING OFFICE
TAGUM CITY

PROJECT NAME AND LOCATION:
CONSTRUCTION OF BANK PROTECTION ALONG LASANG RIS, PANABO CITY, DAVAO DEL NORTE

SHEET CONTENTS:
SHEET PILE DETAILS

DRAFTED:
BENJIE T. PORTRIAS
ENGINEER II

PREPARED:
HERWIN EVAN J. RABABAG
ENGINEER II

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GARRY B. VERANO
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DATE:

APPROVED:
ARTURO P. LONGYAPON
DISTRICT ENGINEER
DATE:

SET NO.: F 1 1

SHEET NO.: 6 / 26