5.5.4 DRAINAGE

DRAINAGE OF THE BED COURSE OR BACKFILL SHALL BE PROVIDED AS SHOWN ON THE PLANS OR AS REQUIRED BY THE ENGINEER.

5.6 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. HOWEVER, BEFORE GRANTING SUCH PERMISSION, THE ENGINEER SHALL ASCERTAIN THAT THE CONTRACTOR HAS ADEQUATE EQUIPMENT FOR THE REQUIRED DRIVING AND THAT THE PILES CAN BE DRIVEN TO THE PLAN ELEVATION WITH THE PROPER USE OF THIS EQUIPMENT.

THE TOP OF THE PILING SHALL BE DRIVEN OR CUT-OFF TO A STRAIGHT LINE AT THE ELEVATION INDICATED ON THE PLANS. THE REQUIREMENTS GOVERNING THE INSTALLATION OF SHEET PILING SHALL CONFORM IN GENERAL TO THOSE GOVERNING BEARING PILES AS SET FORTH UNDER ITEM 400, PILING.

5.7 PILING

5.7.1 LOCATION AND SITE PREPARATION

PILES SHALL BE DRIVEN WHERE INDICATED ON THE PLANS OR AS DIRECTED BY THE ENGINEER. ALL EXCAVATIONS FOR THE FOUNDATION ON WHICH THE PILES ARE TO BE DRIVEN SHALL BE COMPLETED BEFORE THE PILE DRIVING, UNLESS OTHERWISE SPECIFIED OR APPROVED BY THE ENGINEER. AFTER DRIVING IS COMPLETED, ALL LOOSE AND DISPLACED MATERIALS SHALL BE REMOVED FROM AROUND THE PILES BY HAND EXCAVATION, LEAVING CLEAN SOLID SURFACE TO RECEIVE THE CONCRETE OF THE FOUNDATION.

5.7.2 DETERMINATION OF PILE LENGTH

PILE LENGTH AND BEARING CAPACITY SHALL BE DETERMINED BY THE ENGINEER FROM THE RESULTS OF THE TEST PILING AND LOAD TESTS. THE CRITERION FOR PILE LENGTH MAY BE ONE OF THE FOLLOWING:

(1) PILES IN SAND AND GRAVEL SHALL BE DRIVEN TO A BEARING POWER DETERMINED BY THE USE OF THE PILE DRIVING FORMULA OR AS DECIDED BY THE ENGINEER.
(2) PILES IN CLAY SHALL BE DRIVEN TO THE DEPTH ORDERED BY THE ENGINEER. HOWEVER, THE BEARING POWER SHALL BE CONTROLLED BY THE PILE DRIVING FORMULA IF CALLED FOR BY THE ENGINEER.
(3) PILES SHALL BE DRIVEN TO REFUSAL ON ROCK OR HARD LAYER WHEN SO ORDERED BY THE ENGINEER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING THE CORRECT PILE LENGTH AND BEARING CAPACITY ACCORDING TO THE CRITERIA GIVEN BY THE ENGINEER.

5.7.3 PILE DRIVING

ALL PILES SHALL BE DRIVEN AS SHOWN ON THE PLANS OR AS ORDERED IN WRITING BY THE ENGINEER. THEY SHALL BE DRIVEN WITHIN AN ALLOWED VARIATION OF 20MM PER METRE OF PILE LENGTH FROM THE VERTICAL OR BATTER AS SHOWN ON THE PLANS. THE MAXIMUM ALLOWABLE VARIATION AT THE BUTT END OF THE PILE SHALL BE 75MM IN ANY DIRECTION FROM THE LOCATION SHOWN ON THE PLANS OR AS DIRECTED BY THE ENGINEER. EACH PILE SHALL, AFTER DRIVING, BE WITHIN 150MM FROM THE THEORETICAL LOCATION UNDERNEATH THE PILE CAP OR UNDERNEATH THE SUPERSTRUCTURE IN CASE OF PILE BENTS. ALL PILES PUSHED UP BY THE DRIVING OF ADJACENT PILES OR ANY OTHER CAUSE SHALL BE REDRIVEN.

PILES SHALL BE USED ONLY IN PLACES WHERE THE MINIMUM PENETRATION OF 3M IN FIRM MATERIALS, OR 5M IN SOFT MATERIALS CAN BE OBTAINED. WHEREAS SOFT UPPER STRATUM OVERLIES A HARD STRATUM, THE PILES SHALL PENETRATE THE HARD MATERIALS AT SUFFICIENT DEPTHS TO FIX THE ENDS RIGIDLY.

ALL PILE DRIVING EQUIPMENT IS SUBJECT TO THE ENGINEER'S APPROVAL. THE CONTRACTOR IS RESPONSIBLE FOR SUFFICIENT WEIGHT AND EFFICIENCY OF THE HAMMERS TO DRIVE THE PILES DOWN TO THE REQUIRED DEPTH AND BEARING CAPACITY.

PILES SHALL BE SUPPORTED IN LINE AND POSITION WITH LEADS WHILE BEING DRIVEN. PILE DRIVING LEADS SHALL BE CONSTRUCTED IN SUCH A MANNER AS TO AFFORD FREEDOM OF MOVEMENT OF THE HAMMER, AND SHALL BE HELD IN POSITION BY GUYS OR STEEL BRACES TO INSURE RIGID LATERAL SUPPORT TO THE PILE DURING DRIVING. THE LEADS SHALL BE OF SUFFICIENT LENGTH TO MAKE THE USE OF A FOLLOWER UNNECESSARY AND SHALL BE SO DESIGNED AS TO PERMIT PROPER PLACING OF BATTER PILES. THE DRIVING OF THE PILES WITH FOLLOWERS SHALL BE AVOIDED IF PRACTICABLE AND SHALL BE DONE ONLY UNDER WRITTEN PERMISSION FROM THE ENGINEER.

THE PILE TOPS SHALL BE PROTECTED BY DRIVING HEADS, CAPS, OR CUSHIONS IN ACCORDANCE WITH THE RECOMMENDATION OF THE MANUFACTURER OF THE PILE HAMMER AND TO THE SATISFACTION OF THE ENGINEER. THE DRIVING HEAD SHALL BE PROVIDED TO MAINTAIN THE AXIS OF THE PILE WITH THE AXIS OF THE HAMMER AND PROVIDE A DRIVING SURFACE NORMAL TO THE PILE.

THE METHOD USED IN DRIVING PILES SHALL NOT SUBJECT THEM TO EXCESSIVE AND UNDUE ABUSE PRODUCING DEFORMATION OF THE STEEL. MANIPULATION OF PILES TO FORCE THEM INTO PROPER POSITION IF CONSIDERED BY THE ENGINEER TOO EXCESSIVE WILL NOT BE PERMITTED.

FULL LENGTH PILES SHALL BE USED WHERE PRACTICABLE. SPLICING OF PILES WHEN PERMITTED, SHALL BE IN ACCORDANCE WITH THE PROVISIONS OF SUBSECTION 400.3.7 AND 400.3.8. ALL PILES SHALL BE CONTINUOUSLY DRIVEN UNLESS OTHERWISE ALLOWED BY THE ENGINEER.

6.0 HYDROLOGIC DESIGN DATA

6.1 DESIGN HYETOGRAPH

DESIGN HYETOGRAPH (WITH CLIMATE CHANGE)			
HOUR	25-YR	50-YR	100-YR
1	1.32	1.50	1.77
2	1.44	1.64	1.92
3	1.59	1.81	2.12
4	1.77	2.01	2.35
5	2.00	2.28	2.65
6	2.30	2.62	3.05
7	2.72	3.10	3.59
8	3.33	3.80	4.39
9	4.31	4.91	5.64
10	6.08	6.94	7.92
11	10.20	11.66	13.18
12	26.97	30.88	34.50
13	82.28	93.93	105.21
14	15.06	17.23	19.36
15	7.64	8.73	9.92
16	5.04	5.76	6.59
17	3.76	4.28	4.93
18	3.00	3.41	3.95
19	2.50	2.84	3.30
20	2.14	2.44	2.84
21	1.88	2.14	2.49
22	1.67	1.90	2.23
23	1.51	1.72	2.01
24	1.38	1.57	1.84

6.2 WATERSHED PARAMETERS

BASIN											
Subbasin	Catchment Area (sq.km)	Length (km)	Slope S	Lca (km)	Ct	Lg		Baseflow Model	Initial Discharge per Area ($m^3/s/km^2$)	Recession Constant	Ratio to Peak
						(hr)	(min)				
S-1	8.281	7.91287	0.06596	4.18448	1.2	5.220946	313.257	Baseflow Recession	0.05	0.9	0.2
S-2	7.573	6.27243	0.06791	2.94698	1.2	4.160479	249.629	Baseflow Recession	0.05	0.9	0.2
S-3	3.660	5.36662	0.05413	2.59048	0.7	2.273820	136.429	Baseflow Recession	0.05	0.9	0.2
S-4	3.086	4.25814	0.04638	2.17105	0.7	2.005275	120.316	Baseflow Recession	0.05	0.9	0.2
S-5	5.574	6.04747	0.04051	3.46319	0.35	1.403689	84.2213	Baseflow Recession	0.05	0.9	0.2
TOTAL	**28.1736**										

REACH							
Reach	Length(m)	Slope	Mannning's n	Index Method: Celerity (m/s)	Shape	Bottom Width (m)	Side Slope
Reach-1	2935.84	0.00909	0.035	1.5	Rectangular	13	
Reach-2	665.09	0.01874	0.035	1.5	Rectangular	13	

6.3 RAINFALL INTENSITY - DURATION FREQUENCY ANALYSIS DATA

PAGASA DUMAGUETE STATION AWS: 9.335443N, 123.303342E

COMPUTED EXTREME VALUES (in mm) OF PRECIPITATION

T(yrs)	5mins	10mins	15mins	20mins	30 mins	45mins	60mins	80mins	100mins	120mins	150mins	3hrs	6hrs	12hrs	24hrs
2	5.8	12.1	17.7	22	28.7	35.4	39.9	45.3	49.4	52.7	56.1	59.1	71.7	81.4	89.4
5	9.7	18.1	26.6	32.5	42.6	53.2	60.2	68.1	75.2	81.3	87.7	92.7	110.8	125.7	137.1
10	12.3	22	32.5	39.5	51.8	65	73.6	83.2	92.3	100.1	108.7	115	136.6	155	168.7
20	14.8	25.9	38.1	46.3	60.6	76.3	86.5	97.7	108.7	118.3	128.7	136.3	161.4	183.1	199.1
25	15.6	27.1	39.9	48.4	63.4	79.9	90.6	102.3	113.9	124	135.1	143	169.3	192	208.7
50	18	30.8	45.4	54.9	72	90.9	103.2	116.4	129.9	141.7	154.7	163.9	193.6	219.5	238.3
100	20.4	34.5	50.9	61.5	80.5	101.9	115.7	130.4	145.8	159.3	174.2	184.6	217.6	246.8	267.7

EQUIVALENT AVERAGE INTENSITY (in mm) of COMPUTED EXTREME VALUES

T(yrs)	5mins	10mins	15mins	20mins	30 mins	45mins	60mins	80mins	100mins	120mins	150mins	3hrs	6hrs	12hrs	24hrs
2	69.6	72.6	70.8	66.0	57.4	47.2	39.9	34.0	29.6	26.4	22.4	19.7	12.0	6.8	3.7
5	116.4	108.6	106.4	97.5	85.2	70.9	60.2	51.1	45.1	40.7	35.1	30.9	18.5	10.5	5.7
10	147.6	132.0	130.0	118.5	103.6	86.7	73.6	62.4	55.4	50.1	43.5	38.3	22.8	12.9	7.0
20	177.6	155.4	152.4	138.9	121.2	101.7	86.5	73.3	65.2	59.2	51.5	45.4	26.9	15.3	8.3
25	187.2	162.6	159.6	145.2	126.8	106.5	90.6	76.7	68.3	62.0	54.0	47.7	28.2	16.0	8.7
50	216.0	184.8	181.6	164.7	144.0	121.2	103.2	87.3	77.9	70.9	61.9	54.6	32.3	18.3	9.9
100	244.8	207.0	203.6	184.5	161.0	135.9	115.7	97.8	87.5	79.7	69.7	61.5	36.3	20.6	11.2

7.0 CORROSION

7.1 IN SOIL CONDITION

Required design working life	5 years	25 years	50 years	75 years	100 years
Undisturbed natural soils (sand, silt clay, schist, ...)	0,00	0,30	0,60	0,90	1,20
Polluted natural soils and industrial grounds	0,15	0,75	1,50	2,25	3,00
Aggressive natural soils (swamp, marsh, peat, ...)	0,20	1,00	1,75	2,50	3,25
Non-compacted and non-aggressive fills (clay, schist, sand, silt, ...)	0,18	0,70	1,20	1,70	2,20
Non-compacted and aggressive fills (ashes, slag, ...)	0,50	2,00	3,25	4,50	5,75

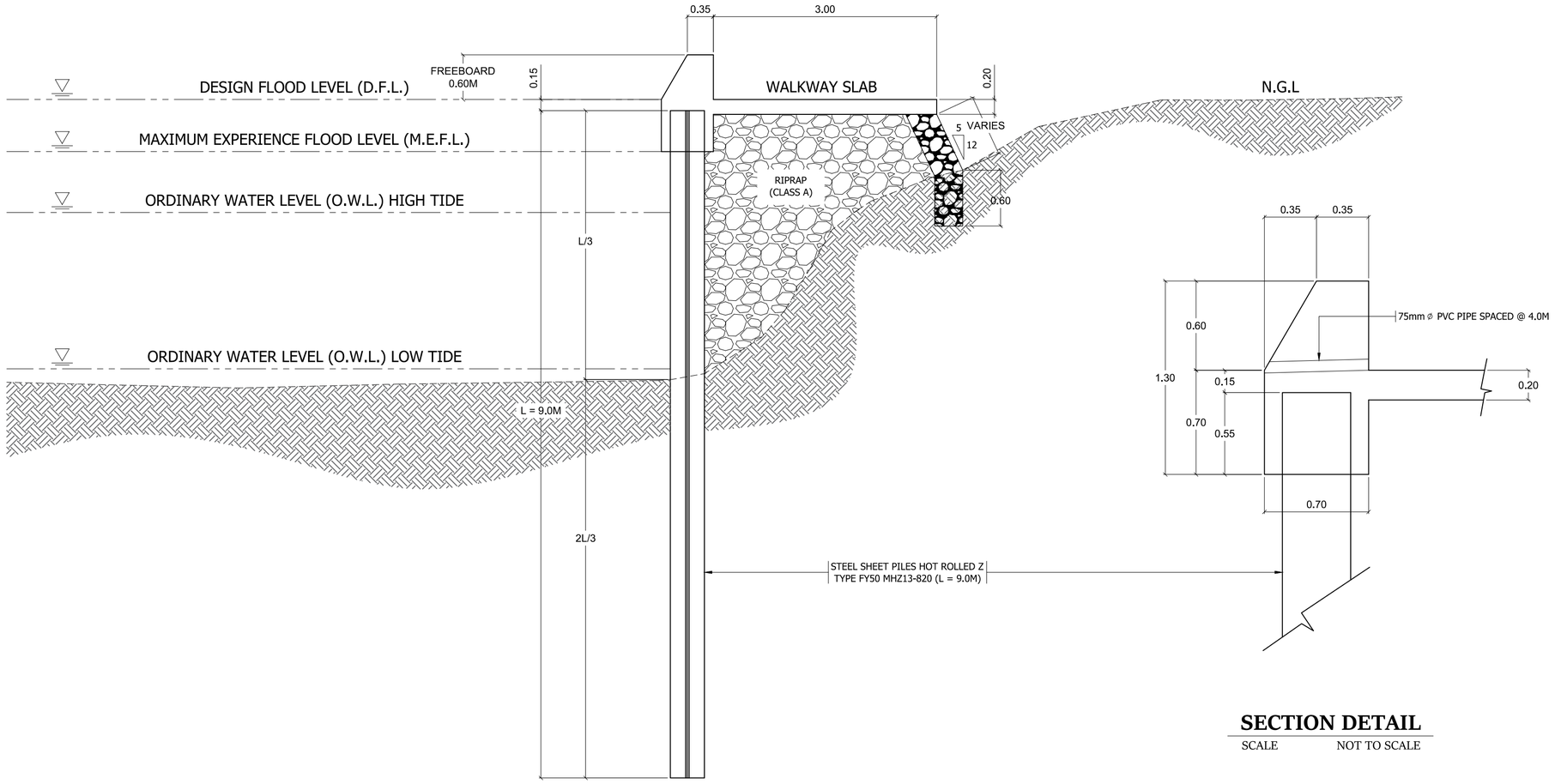
7.2 IN WATER CONDITION

Required design working life	5 years	25 years	50 years	75 years	100 years
Common fresh water (river, ship canal, ...) in the zone of high attack (water line)	0,15	0,55	0,90	1,15	1,40
Very polluted fresh water (sewage, industrial effluent, ...) in the zone of high attack (water line)	0,30	1,30	2,30	3,30	4,30
Sea water in temperate climate in the zone of high attack (low water and splash zones)	0,55	1,90	3,75	5,60	7,50
Sea water in temperate climate in the zone permanent immersion or in the intertidal zone	0,25	0,90	1,75	2,60	3,50

NOTES:

1) THE HIGHEST CORROSION RATE IS USUALLY FOUND IN THE SPLASH ZONE OR AT THE LOW WATER LEVEL IN TIDAL WATERS. HOWEVER, IN MOST CASES, THE HIGHEST BENDING STRESSES OCCUR IN THE PERMANENT IMMERSION ZONE.

2) THE VALUES GIVEN FOR 5 AND 25 YEARS ARE BASED ON MEASUREMENTS, WHEREAS THE OTHER VALUES ARE EXTRAPOLATED.



SECTION DETAIL

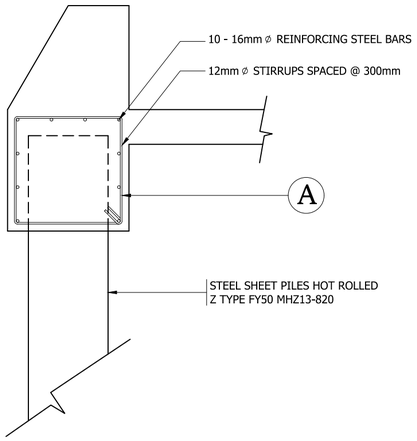
SCALE NOT TO SCALE

FLOOD CONTROL TYPICAL CROSS SECTION

SCALE NOT TO SCALE

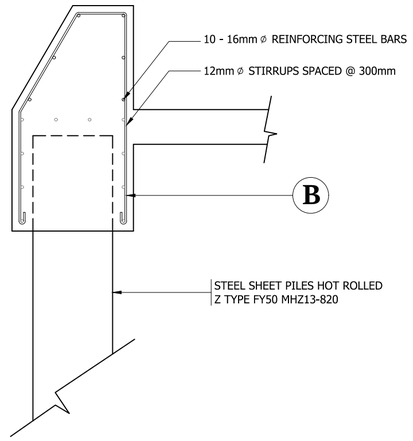
Republic of the Philippines
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGIONAL OFFICE VII
SIQUIJOR DISTRICT ENGINEERING OFFICE
Larena, Siquijor

PROJECT NAME AND LOCATION:	SHEET CONTENTS:	DRAFTED:	REVIEWED:	SUBMITTED:	RECOMMENDED:	APPROVED:	SET NO.	SHEET NO.
MOOE - MAINTENANCE, REPAIR AND REHABILITATION OF INFRASTRUCTURE FACILITIES AND OTHER RELATED ACTIVITIES - MAINTENANCE, REPAIR AND REHABILITATION OF INFRASTRUCTURE FACILITIES - FLOOD CONTROL AND DRAINAGE SYSTEMS, STRUCTURES AND RELATED FACILITIES, REPAIR/MAINTENANCE OF SEÑORA RIVER REVETMENT 1, TIGBAWAN, LAZI, SIQUIJOR	FLOOD CONTROL TYPICAL CROSS SECTION	XYRN A. DAVAL ENGINEER II PREPARED: ERNESTO S. REMOLLO, JR. ENGINEER II	BERNARD Z. DURAN ENGINEER II DATE:	JAY VINCENT C. PAL-ING CHIEF, MAINTENANCE SECTION DATE:	RAKIL-ALI S. RAKI-IN, AER ASSISTANT DISTRICT ENGINEER DATE:	YUSOPH D. RASUMAN DISTRICT ENGINEER DATE:	1 1	9 14



PILE CAP DETAIL

SCALE NOT TO SCALE



PARAPET DETAIL

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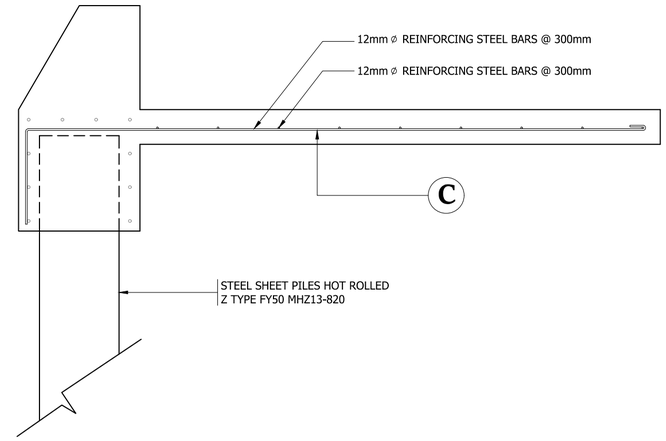
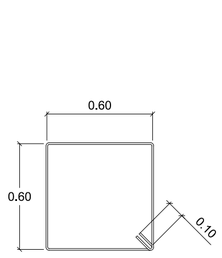
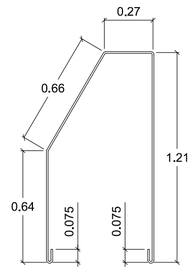
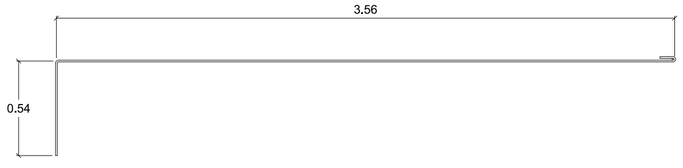


WALKWAY SLAB DETAIL

SCALE NOT TO SCALE







BAR BENDING DIAGRAM

SCALE NOT TO SCALE

Republic of the Philippines **DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS** REGIONAL OFFICE VII SIQUIJOR DISTRICT ENGINEERING OFFICE Larena, Siquijor	PROJECT NAME AND LOCATION: MOOE - MAINTENANCE, REPAIR AND REHABILITATION OF INFRASTRUCTURE FACILITIES AND OTHER RELATED ACTIVITIES - MAINTENANCE, REPAIR AND REHABILITATION OF INFRASTRUCTURE FACILITIES - FLOOD CONTROL AND DRAINAGE SYSTEMS, STRUCTURES AND RELATED FACILITIES, REPAIR/MAINTENANCE OF SEÑORA RIVER REVETMENT 1, TIGBAWAN, LAZI, SIQUIJOR	SHEET CONTENTS: FLOOD CONTROL PARAPET DETAIL STEEL SHEET PILES (MHZ14-1) BAR BENDING DIAGRAM	DRAFTED: XYRN A. DAVAL ENGINEER II PREPARED: ERNESTO S. REMOLLO, JR. ENGINEER II	REVIEWED: BERNARD Z. DURAN ENGINEER II DATE:	SUBMITTED: JAY VINCENT C. PAL-ING CHIEF, MAINTENANCE SECTION DATE:	RECOMMENDED: RAKIL-ALI S. RAKI-IN, AER ASSISTANT DISTRICT ENGINEER DATE:	APPROVED: YUSOPH D. RASUMAN DISTRICT ENGINEER DATE:	SET NO. 1 1	SHEET NO. 10 14

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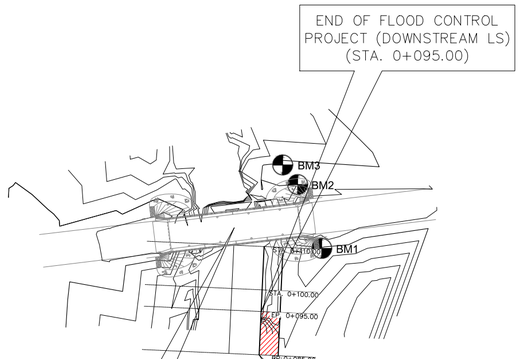


END OF FLOOD CONTROL PROJECT (DOWNSTREAM LS) (STA. 0+095.00)

SEÑORA BRIDGE (K0042+622.00)

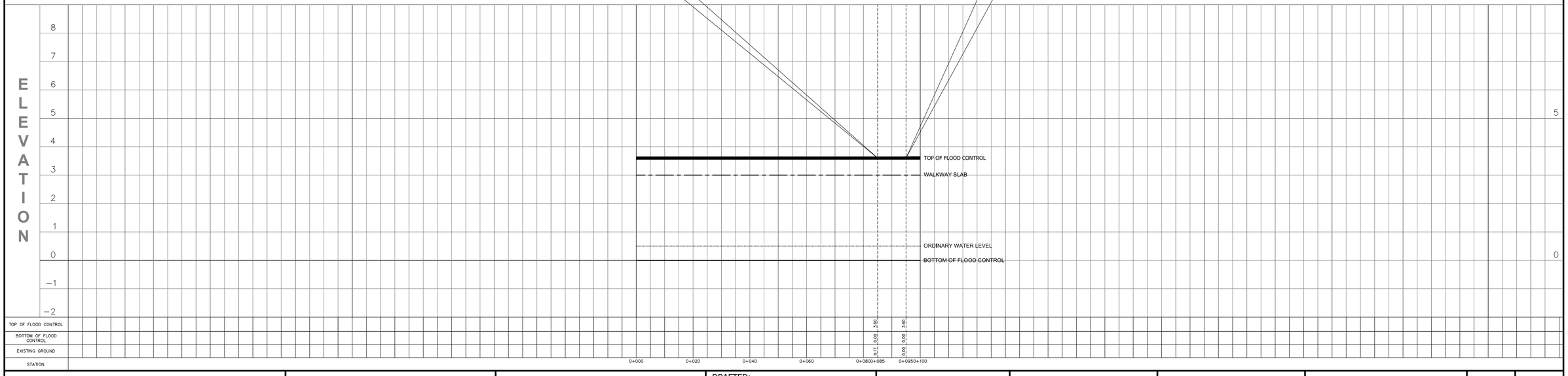
BEGINNING OF FLOOD CONTROL PROJECT (DOWNSTREAM LS) (STA. 0+085.00)

BEGINNING OF FLOOD CONTROL PROJECT (DOWNSTREAM LS) (STA. 0+085.00)

PLAN AND PROFILE

SCALE NOT TO SCALE

END OF FLOOD CONTROL PROJECT (DOWNSTREAM LS) (STA. 0+095.00)



Republic of the Philippines
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGIONAL OFFICE VII
SIQUIJOR DISTRICT ENGINEERING OFFICE
Larena, Siquijor

PROJECT NAME AND LOCATION:
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SHEET CONTENTS:
PLAN PROFILE

DRAFTED:
XYRN A. DAVAL
ENGINEER II

PREPARED:
ERNESTO S. REMOLLO, JR.
ENGINEER II

REVIEWED:
BERNARD Z. DURAN
ENGINEER II
DATE:

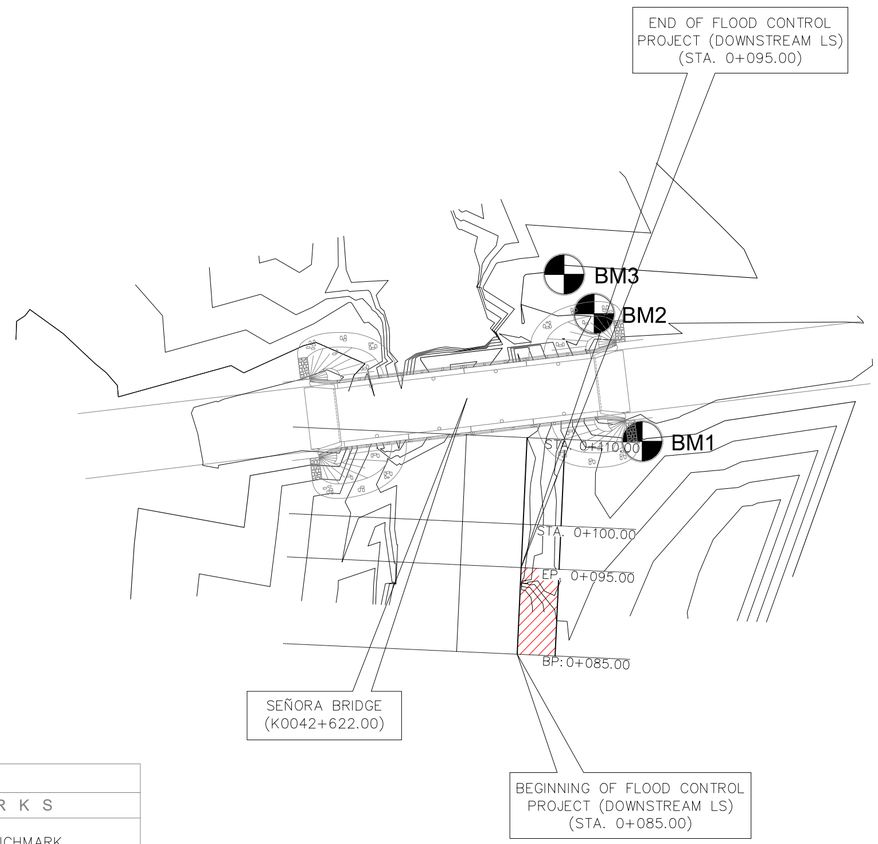
SUBMITTED:
JAY VINCENT C. PAL-ING
CHIEF, MAINTENANCE SECTION
DATE:

RECOMMENDED:
RAKIL-ALI S. RAKI-IN, AER
ASSISTANT DISTRICT ENGINEER
DATE:

APPROVED:
YUSOPH D. RASUMAN
DISTRICT ENGINEER
DATE:

SET NO. 1 / 1

SHEET NO. 11 / 14



BENCHMARK				
BM no.	NORTHING	EASTING	ELEVATION	REMARKS
1	999984.220	500013.972	4.875	BOUNDARY BENCHMARK
2	999998.921	500008.427	5.108	NAILED TANZAN AT MANGO TREE
3	1000003.464	500004.961	5.243	NAILED TANZAN AT BARANGAY ROAD PAVEMENT

TOPOGRAPHIC PLAN

SCALE NOT TO SCALE

Republic of the Philippines
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGIONAL OFFICE VII
SIQUIJOR DISTRICT ENGINEERING OFFICE
Larena, Siquijor

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DETAILED CROSS SECTIONS – FACING DOWNSTREAM

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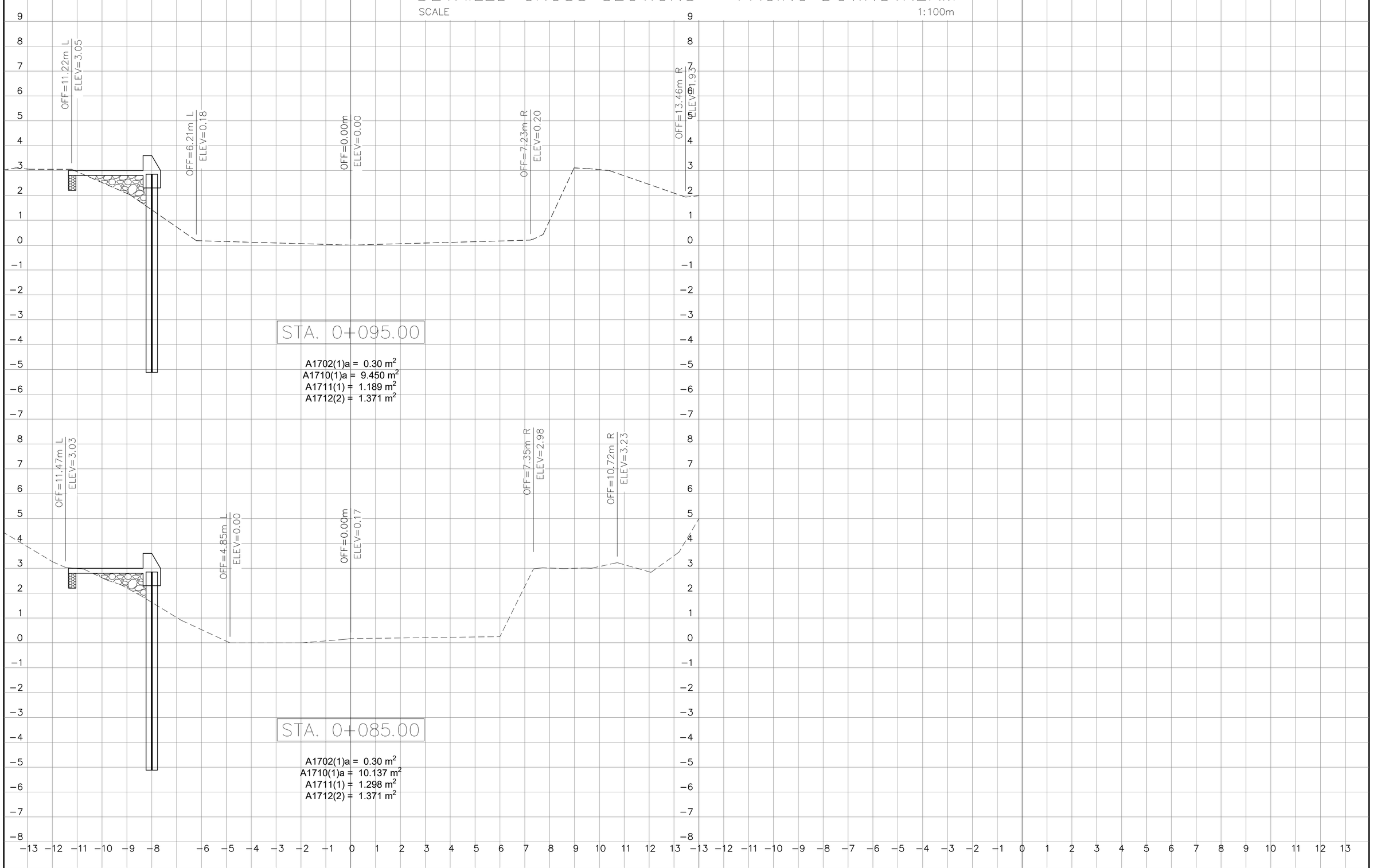

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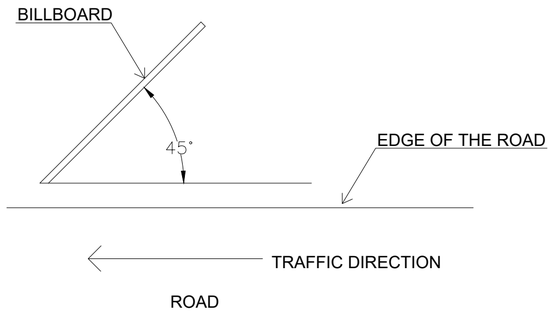
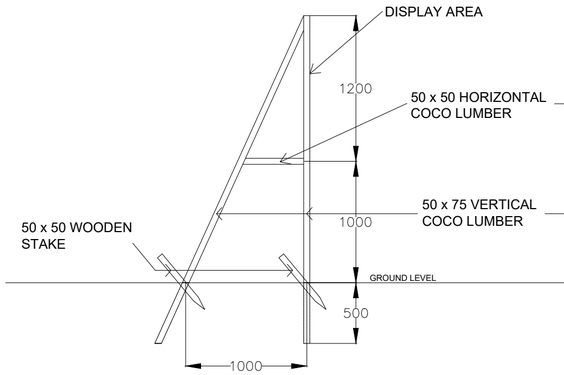
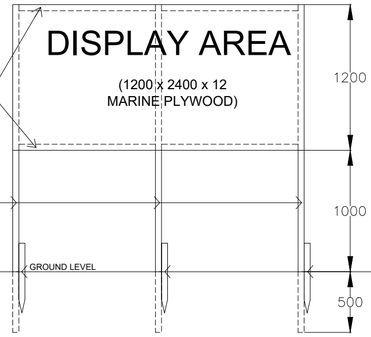


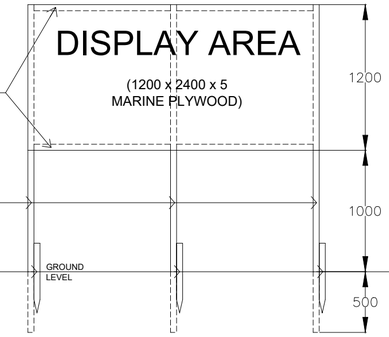
ORIENTATION



TYPICAL FRAME ELEVATION



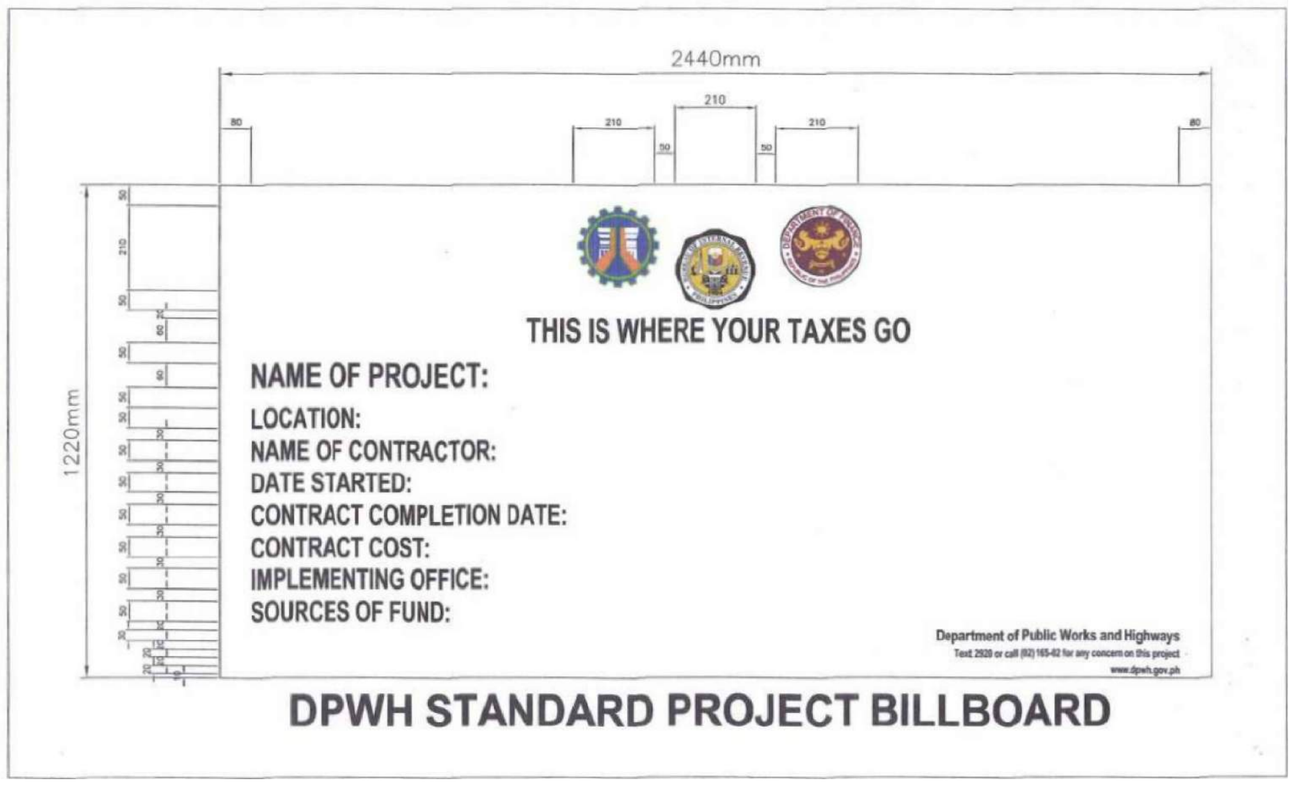
FRONT ELEVATION (OPTION 1)



FRONT ELEVATION (OPTION 2)

BILLBOARD FRAME

SCALE NOT TO SCALE



DPWH STANDARD PROJECT BILLBOARD

Republic of the Philippines **DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS** REGIONAL OFFICE VII SIQUIJOR DISTRICT ENGINEERING OFFICE Larena, Siquijor	PROJECT NAME AND LOCATION: MOOE - MAINTENANCE, REPAIR AND REHABILITATION OF INFRASTRUCTURE FACILITIES AND OTHER RELATED ACTIVITIES - MAINTENANCE, REPAIR AND REHABILITATION OF INFRASTRUCTURE FACILITIES - FLOOD CONTROL AND DRAINAGE SYSTEMS, STRUCTURES AND RELATED FACILITIES, REPAIR/MAINTENANCE OF SEÑORA RIVER REVETMENT 1, TIGBAWAN, LAZI, SIQUIJOR	SHEET CONTENTS: DPWH STANDARD PROJECT BILLBOARD	DRAFTED: XYRN A. DAVAL ENGINEER II PREPARED: ERNESTO S. REMOLLO, JR. ENGINEER II	REVIEWED: BERNARD Z. DURAN ENGINEER II DATE:	SUBMITTED: JAY VINCENT C. PAL-ING CHIEF, MAINTENANCE SECTION DATE:	RECOMMENDED: RAKIL-ALI S. RAKI-IN, AER ASSISTANT DISTRICT ENGINEER DATE:	APPROVED: YUSOPH D. RASUMAN DISTRICT ENGINEER DATE:	SET NO. 1 1	SHEET NO. 14 14