REPUBLIC OF THE PHILIPPINES

DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

REGIONAL OFFICE No. XI

GOV. CHAVEZ COR. R. MAGSAYSAY ST. DAVAO CITY

C.Y. 2025 PROJECT

DETAILED ENGINEERING DESIGN PLAN FOR

CONSTRUCTION OF ROAD SLOPE PROTECTION STRUCTURE - MARAGUSAN-PANTUKAN ROAD (PANTUKAN SECTION), PACKAGE Q, DAVAO DE ORO

SECTION	:	BRGY. NAPNAPAN
LOCATION	:	DAVAO DE ORO
STATION LIMITS	:	STA. 28+740.000 - STA. 29+220.000
NET LENGTH	:	0.481 KM / 0.962 LANE-KM
SLOPE PROTECTION	:	50.000 LN M / 889.025 SQ M
ROAD SECTION ID	:	(LOCAL ROAD)

SUBMITTED:

JUDY ANN T. BERNARDINO
CHIEF, PLANNING AND DESIGN DIVISION

DATE:

RECOMMENDED:

JOSELITO B. CABALLERO
ASSISTANT REGIONAL DIRECTOR

DATE:

APPROVED:

JUBY B. CORDON
REGIONAL DIRECTOR

DATE:

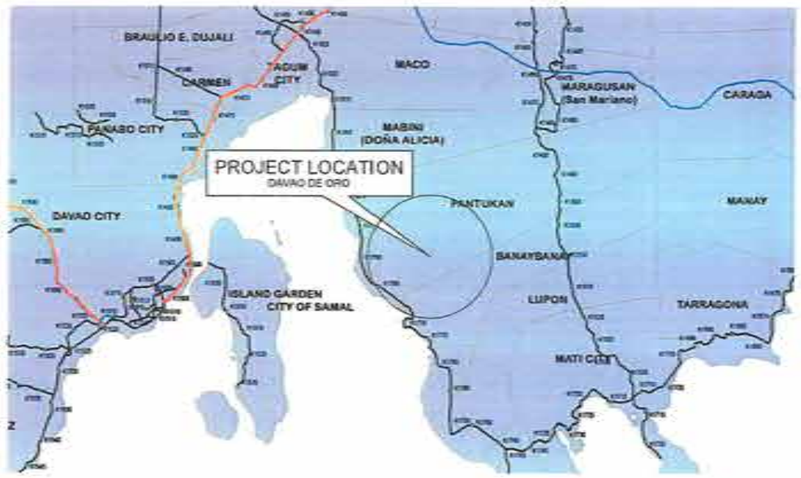
INDEX OF SHEETS

PROJECT LIMITS

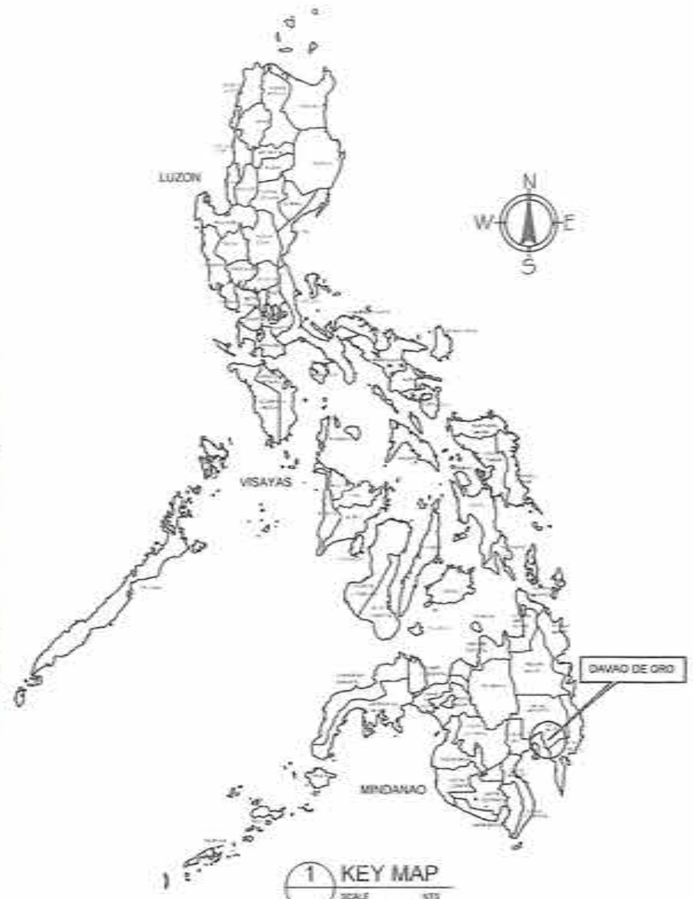
BEGINNING OF PROJECT		STA. 28+740.000
END OF PROJECT		STA. 29+220.000
STA. EQN.	STA. AHEAD =	STA. 29+220.000
	STA. BACK =	STA. 29+220.883
NET LENGTH	=	480.883 LN.M.

STEEL SHEET PILE SLOPE PROTECTION W/ MACHORE AND EROSION CONTROL MAT, TYPE V

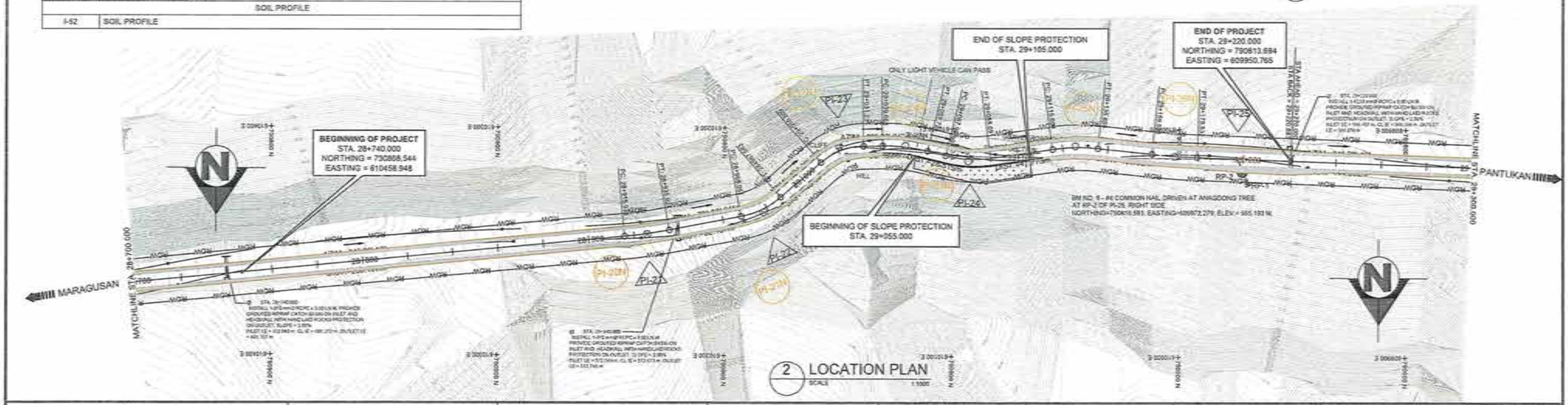
BEGINNING OF PROJECT:		STA. 29+055.000
END OF PROJECT:		STA. 29+105.000
NET LENGTH	=	50.000 LN.M.



3 VICINITY MAP
SCALE 1:1000



1 KEY MAP
SCALE NTS



2 LOCATION PLAN
SCALE 1:1000

REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS REGIONAL OFFICE NO. XI GOV. CHAVEZ COR. R. MAGSAYSAY AVENUE, DAVAO CITY	PROJECT NAME AND LOCATION: CONSTRUCTION OF ROAD SLOPE PROTECTION STRUCTURE - I'MARAGUSAN-PANTUKAN ROAD (PANTUKAN SECTION), PACKAGE Q, DAVAO DE ORO	SHEET CONTENTS: INDEX OF SHEETS, VICINITY MAP, KEY MAP, AND PROJECT LIMITS	PREPARED: LESTER E. [illegible] ENGINEER II DATE:	REVIEWED: ALGIN A. GINEZ ENGINEER III, SECTION CHIEF DATE:	SUBMITTED: JUDY ANN T. BERNARDINO CHIEF, PLANNING AND DESIGN DIVISION DATE:	RECOMMENDING: JOSELITO B. CABALLERO ASSISTANT REGIONAL DIRECTOR DATE:	APPROVED: JUBY B. CORDON REGIONAL DIRECTOR DATE:	SET NO. A 01 10	SHEET NO. 01 52

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SUMMARY OF QUANTITIES

ITEM NO.	DESCRIPTION	UNIT	ROADWAY / DRAINAGE	SLOPE PROTECTION	TOTAL QUANTITY	REMARKS
PART A. FACILITIES FOR ENGINEER						
A.1.1(3)	CONSTRUCTION OF FIELD OFFICE FOR THE ENGINEER	LS	-	-	1.00	
A.1.1(16)	OPERATION AND MAINTENANCE OF FIELD OFFICE FOR THE ENGINEER	MONTH	-	-	8.00	
PART B. OTHER GENERAL REQUIREMENT						
B.3	PERMITS AND CLEARANCES	LS	-	-	1.00	BRGY. NAPNAPAN
B.4(1)	CONSTRUCTION SURVEY AND STAKING	KM	-	-	0.39	
B.5	PROJECT BILLBOARD / SIGNBOARD (2 DPWH)	EACH	-	-	2.00	
B.5	PROJECT BILLBOARD / SIGNBOARD (2 DENR-EMB)	EACH	-	-	2.00	
B.5	PROJECT BILLBOARD / SIGNBOARD (2 COA)	EACH	-	-	2.00	
B.7(2)	OCCUPATIONAL SAFETY AND HEALTH PROGRAM	LS	-	-	1.00	
B.8(1)	TRAFFIC MANAGEMENT	MONTH	-	-	8.00	THE CONTRACTOR SHALL PREPARE A SEPARATE TRAFFIC OPERATIONAL PLAN (TOP) TO BE SUBMITTED AND APPROVED BY THE CONCERED LGU TRAFFIC BOARD
B.9	MOBILIZATION / DEMOBILIZATION	LS	-	-	1.00	
PART C. EARTHWORKS						
100(1)	CLEARING AND GRUBBING	HA	0.02	-	0.02	
100(3)a2	INDIVIDUAL REMOVAL OF TREES, 301 - 500mm DIA., SMALL	EACH	15.00	-	15.00	
102(2)	SURPLUS COMMON EXCAVATION	CU M	1,245.00	-	1,245.00	
103(1)a	STRUCTURE EXCAVATION, COMMON SOIL	CU M	301.00	447.45	748.45	FOR RCPC
103(3)	FOUNDATION FILL	CU M	2.00	-	2.00	
103(6)a	PIPE CULVERTS AND DRAIN EXCAVATION, COMMON SOIL	CU M	213.00	-	213.00	
104(1)a	EMBANKMENT FROM ROADWAY / STRUCTURE EXCAVATION, COMMON SOIL	CU M	1.00	-	1.00	
105(1)a	SUBGRADE PREPARATION, COMMON MATERIAL	SQ M	2,946.34	-	2,946.34	
PART D. SUBBASE AND BASE COURSE						
200(1)	AGGREGATE SUBBASE COURSE	CU M	594.00	-	594.00	
201(1)	AGGREGATE BASE COURSE	CU M	-	577.88	577.88	
PART F. DRAINAGE CONSTRUCTION						
404(1)a	REINFORCING STEEL, GRADE 40	KG	-	2,572.00	2,572.00	FOR STEEL SHEET PILES
404(1)b	REINFORCING STEEL, GRADE 60	KG	-	7,770.00	7,770.00	
405(1)b2	STRUCTURAL CONCRETE, 27.58 MPa, CLASS A, 14 DAYS	CU M	-	64.00	64.00	
405(4)a2	STRUCTURAL CONCRETE, 34.47 MPa, CLASS P, 14 DAYS	CU M	-	16.00	16.00	NON-SHRINK GROUT FOR STEEL SHEET PILE
PART G. DRAINAGE AND SLOPE PROTECTION STRUCTURES						
500(1)b3	PIPE CULVERTS, 910mm DIA., CLASS IV, RCPC	LN M	18.00	-	18.00	FOR CROSS DRAIN
500(1)b5	PIPE CULVERTS, 1220mm DIA., CLASS IV, RCPC	LN M	9.00	-	9.00	
505(2)a	GROUTED RIPRAP, CLASS "A"	CU M	51.00	-	51.00	FOR CATCH BASIN
506(1)	STONE MASONRY	CU M	16.00	-	16.00	FOR HEADWALL
508(1)	HAND-LAID ROCK EMBANKMENT	CU M	4.00	-	4.00	FOR DUMPED STONE PROTECTION (BOULDERS 250mmØ-300mmØ)
512(1)e	EROSION CONTROL MAT, TYPE 5	SQ M	-	568.53	568.53	WITH SEEDS AND FERTILIZER
513(1)	PERMANENT GROUND ANCHOR	LN M	-	6,960.00	6,960.00	
735(2)	SEPARATION GEOTEXTILE	SQ M	-	399.80	399.80	
1717(4)b	FURNISHED AND DRIVEN OF STEEL SHEET PILE, Z-TYPE, GRADE 50 (HOT ROLLED)	M	-	421.00	421.00	SECTION MODULUS = 1,304 cm^3/m; WIDTH = 770mm; WEIGHT = 76.20kg/m
PART H. MISCELLANEOUS STRUCTURES						
603(3)a1	METAL GUARDRAIL (METAL BEAM) INCLUDING POST, SINGLE, W-BEAM	LN M	180.00	-	180.00	SUBSIDIARY DELINEATOR = 74 PCS
603(4)b	METAL BEAM END PIECE, BULL NOSE	EACH	4.00	-	4.00	
611(1)	TREES (FURNISHING AND TRANSPLANTING)	EACH	1,500.00	-	1,500.00	

DISPOSAL AREA WITHIN 5.00 KM
QUARRY SITE : TAGBALADBAO RIVER

A. SPEED RESTRICTION (R4-1)	EACH	4.00
B. ROADWORK AHEAD (T1-1)	EACH	4.00
C. END ROADWORK (T2-16)	EACH	4.00
D. END SPEED RESTRICTION (R4-2)	EACH	4.00
E. WORKMEN AHEAD (T1-5)	EACH	4.00
F. ROADWORK MACHINERY AHEAD (T1-3)	EACH	2.00
G. PREPARE TO STOP (T1-18)	EACH	2.00
H. TEMPORARY HAZARD MARKER (T5-5)	EACH	1.00
I. SLIPPERY (T3-3)	EACH	4.00
J. LOOSE STONES (T3-9)	EACH	4.00
BOLLARDS	EACH	20.00
PLASTIC SAFETY BARRIER	EACH	136.00

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PROJECT NAME AND LOCATION: CONSTRUCTION OF ROAD SLOPE PROTECTION STRUCTURE - MARAGUSAN-PANTUKAN ROAD (PANTUKAN SECTION), PACKAGE Q, DAVAO DE ORO

SHEET CONTENTS: INDEX OF SHEETS AND SUMMARY OF QUANTITIES

PREPARED: JESSICA B. APOSTOL, ENGINEER II — DATE:

REVIEWED: ALGIN A. GINGOYON, ENGINEER III, SECTION CHIEF — DATE:

SUBMITTED: JUDE ANN T. BERNARDINO, CHIEF, PLANNING AND DESIGN SECTION — DATE:

RECOMMENDED: JOSELITO B. CABALLERO, ASSISTANT REGIONAL DIRECTOR — DATE:

APPROVED: JUBY B. CORDON, REGIONAL DIRECTOR — DATE:

SET NO. A 02 10 | SHEET NO. 02 52

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GENERAL NOTES

(ROADS, DRAINAGE AND STRUCTURES)

SPECIFICATIONS

1. ALL WORKS SHALL COMPLY WITH THE "DPWH STANDARD SPECIFICATIONS VOLUME II, HIGHWAYS, BRIDGES AND AIRPORTS 2013", SPECIAL PROVISIONS AND SUPPLEMENTAL SPECIFICATIONS PERTAINING TO THIS PROJECT.

DIMENSIONS

1. DISTANCES BETWEEN THE HORIZONTAL CONTROL POINTS INCLUDING REFERENCE POINTS ARE MEASURED AND EXPRESSED IN METERS.
2. UNLESS OTHERWISE SPECIFIED, DIMENSIONS OF PIPES, BOX CULVERTS, BRIDGES AND OTHER STRUCTURES ARE MEASURED AND EXPRESSED IN MILLIMETERS.
3. ALL OTHER DIMENSIONS ARE EXPRESSED IN METERS.

ELEVATIONS AND GRADES

1. FINISHED GRADE ELEVATION SHOWN ON PLAN AND PROFILE SHEETS REFERS TO FINISHED PAVEMENT LEVEL AS INDICATED IN THE TYPICAL ROADWAY SECTION.
2. GROUND GRADE SHOWN ON THE PLAN AND PROFILE SHEETS REFERS TO THE ELEVATION OF THE ORIGINAL GROUND ALONG THE CENTERLINE OF THE PROJECT ROAD.

GRADING AND OTHER GENERAL REQUIREMENTS

1. ALIGNMENT AND GRADES ARE SUBJECT TO ADJUSTMENT TO SUIT ACTUAL FIELD CONDITION.
2. DISTANCES AND ELEVATIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.
3. GRADE SHOWN ARE TOP OF FINISHED PAVEMENT.
4. ALL WORKS SHALL COMPLY WITH THE STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES, REVISED 2013 AND "A POLICY ON GEOMETRIC DESIGN", AASHTO 2011.
5. WHERE NO DETOURS ARE AVAILABLE, TRAFFIC SHALL BE HANDLED IN ACCORDANCE TO PROVISIONS OF CLAUSE 75 OF THE DPWH STANDARD SPECIFICATIONS, VOLUME 1, REQUIREMENTS AND CONDITIONS OF CONTRACT (2013).
6. THE APPARENT SILENCE OF SPECIFICATIONS, PLANS, SPECIAL PROVISIONS AND SUPPLEMENTARY SPECIFICATIONS, AS TO ANY DETAIL OR THE APPARENT OMISSION FROM THEM OF DETAILED DESCRIPTION CONCERNING ANY POINT SHALL BE REGARD AS MEANING THAT ONLY THE BEST GENERAL PRACTICE IS TO PREVAIL AND THAT ONLY MATERIAL AND WORKMANSHIP OF FIRST CLASS QUALITY ARE TO BE USED.
7. ROADS CLOSED TO TRAFFIC SHALL BE PROTECTED BY EFFECTIVE BARRICADES, AND OBSTRUCTIONS SHALL BE ILLUMINATED AT NIGHT, SUITABLE WARNING SIGNS, ILLUMINATED AT NIGHT BY LANTERNS OR FLARES, SHALL BE PROVIDED, ALL LIGHTS FOR THIS PURPOSE SHALL BE KEPT BURNING FROM SUNSET TO SUNRISE.
8. THE CONTRACTOR WILL BE REQUIRED TO ERECT WARNING SIGNS OUTSIDE OF, AND 150M FROM, EACH END OF THE PROJECT, AND 150M IN ADVANCE AT ANY PLACE ON THE PROJECT WHERE OPERATIONS INTERFERE WITH THE USE OF THE ROAD BY TRAFFIC, AND AT ALL INTERMEDIATE POINTS WHERE THE NEW WORK CROSSES OR COINCIDES WITH AN EXISTING ROAD.
9. 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.
10. THE IMPLEMENTING OFFICE SHALL IDENTIFY THE LOCATIONS OF AND PROVIDE ACCESSIBILITY FACILITIES FOR PERSONS WITH DISABILITIES IN ACCORDANCE WITH DO NO. 37, S. 2009.
11. QUARRY SITE IS LOCATED AT TAGBALACBAO RIVER. DISPOSAL SITE IS WITHIN FIVE (5) KM RADIUS FROM PROJECT LIMITS.
12. DESIGN WAS BASED ON SURVEY DATA SUBMITTED BY THE SURVEY AND INVESTIGATION SECTION OF PLANNING AND DESIGN DIVISION OF THE DPWH-REGIONAL OFFICE XI.

EARTHWORKS

1. CLEARING SHALL EXTEND ONE (1) METER BEYOND THE TOE OF THE FILL SLOPES OR BEYOND ROUNDING OF CUT SLOPES AS THE CASE MAY BE FOR THE ENTIRE LENGTH OF THE PROJECT UNLESS OTHERWISE SHOWN ON THE PLANS OR AS DIRECTED BY THE ENGINEER AND PROVIDED IT IS WITHIN THE RIGHT OF WAY LIMITS OF THE PROJECT.
2. ALL CONCRETE PAVEMENT, BASE COURSE, SIDEWALKS, CURBS, GUTTERS, ETC., DESIGNATED FOR REMOVAL SHALL BE BROKEN INTO PIECES, THE SIZE OF WHICH SHALL NOT EXCEED 300mm (12in) IN ANY DIMENSION AND STOCKPILED AT DESIGNATED LOCATIONS ON THE PROJECT OR AS DIRECTED BY THE ENGINEER.
3. ALL EXCAVATIONS SHALL BE FINISHED TO REASONABLY SMOOTH AND UNIFORM SURFACES. NO MATERIALS SHALL BE WASTED WITHOUT AUTHORITY OF THE ENGINEER. EXCAVATION OPERATIONS SHALL BE CONDUCTED SO THAT MATERIAL OUTSIDE OF THE LIMIT OF SLOPES WILL NOT BE DISTURBED.
4. SPOILS FROM DEMOLISHED/EXCAVATED MATERIALS SHALL NOT BE ALLOWED TO BE STOCKPILED AT THE SHOULDER OR PART OF THE TRAVELED ROADWAY AND SHALL BE REMOVED IMMEDIATELY TO PREVENT OBSTRUCTION. SPOILS REMOVED SHALL BE DISPOSED OFF IN DESIGNATED AREAS APPROVED BY THE ENGINEER.
5. ALL EMBANKMENTS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE REQUIREMENTS OF ITEM 104 EMBANKMENT. IT SHALL BE COMPACTED IN HORIZONTAL LAYERS NOT EXCEEDING 200mm (LOOSE MEASUREMENT), AFTER FIVE SUCCESSIVE LAYERS, THE FILL/EMBANKMENT SHALL BE FULLY SATURATED WITH WATER THEN DRIED BEFORE PLACING THE SUCCEEDING LAYERS. THE PROCEDURE SHALL BE REPEATED UNTIL THE DESIRED ELEVATION IS ATTAINED.
6. WATERING AND COMPACTING OF ALL EMBANKMENTS SHALL BE CONSIDERED AS SUBSIDIARY WORK PERTAINING TO OTHER CONTRACT ITEMS. THE COST OF PERFORMANCE THEREOF SHALL BE CONSIDERED TO BE INCLUDED IN THE CONTRACT UNIT BID PRICE FOR OTHER ITEMS.
7. CUT SLOPES, EXCEPT IN ROCKS AND FILL SLOPES SHALL BE ADJUSTED AND WARPED FLOW INTO EACH OTHER OR INTO NATURAL GROUND SURFACE WITHOUT NOTICEABLE BREAK.
8. APPROACHES AND ROAD CONNECTIONS SHALL BE CONSTRUCTED AS SHOWN ON THE PLANS OR AS DIRECTED BY THE ENGINEER IN SUCH MANNER AS TO ENSURE PROPER CONNECTIONS TO THE RIDING SURFACES.
9. PRIOR TO COMMENCING PREPARATION OF THE SUBGRADE, ALL CULVERTS, CROSS DRAINS, DUCTS AND THE LIKE (INCLUDING THEIR FULLY COMPLETED BACKFILL), DITCHES, DRAINS AND DRAINAGE OUTLETS SHALL BE COMPLETED. ANY WORK ON THE PREPARATION OF THE SUBGRADE SHALL NOT BE STARTED UNLESS PRIOR WORK HEREIN DESCRIBED SHALL HAVE BEEN APPROVED BY THE ENGINEER.

SUBBASE AND BASE COURSES

1. RE-PREPARATION AND COMPACTION OF THE EXISTING BASE/SUBBASE TO THE REQUIRED DENSITY SHALL BE DONE PRIOR TO GRAVEL RESURFACING IN ACCORDANCE WITH DPWH STANDARD SPECIFICATIONS, VOLUME II, 2013, USING VIBRATING ROLLERS AND PNEUMATIC TIRE ROLLERS. IN AREAS WHERE THE SAID EQUIPMENT CANNOT BE USED, A PORTABLE MECHANICAL COMPACTOR SHALL BE USED.

REMOVAL OF EXISTING STRUCTURES AND OBSTRUCTIONS

1. NO PAYMENT SHALL BE MADE FOR REMOVAL OF OTHER MISCELLANEOUS STRUCTURES THAT MAY BE REQUIRED AS SUBSIDIARY WORK PERTAINING TO OTHER CONTRACT ITEMS EXCEPT FOR SPECIFIC ITEMS EXPRESSLY IDENTIFIED FOR PAYMENT.
2. IMPROVEMENTS AND OTHER SIMILAR STRUCTURES THAT WILL BE AFFECTED DURING THE IMPLEMENTATION OF THIS PROJECT SHALL BE PAID FOR UNDER THE ROAD RIGHT-OF-WAY IMPROVEMENT.

MISCELLANEOUS STRUCTURES

1. OBSTRUCTIONS WITHIN THE ROADWAY, IF NOT ILLUMINATED, SHALL BE MARKED WITH REFLECTORIZED HAZARD MARKERS (REFER TO SECTION 7 OF THE HIGHWAY SAFETY DESIGN STANDARDS PART 2 MAY 2012 EDITION). FOR ADDITIONAL EMPHASIS, IT IS ADVISABLE TO MARK OBSTRUCTIONS WITH NO LESS THAN FIVE ALTERNATING REFLECTORIZED BLACK AND WHITE STRIPES.
2. MATERIALS WHICH ARE DEFECTIVE OR HAVE BEEN APPLIED IN AN UNSATISFACTORY MANNER OR TO INCORRECT DIMENSIONS OR IN A WRONG LOCATION SHALL BE REMOVED. THE ROAD PAVEMENT SHALL BE MADE GOOD AND MATERIALS REPLACED, RECONSTRUCTED AND/OR PROPERLY LOCATED, ALL AT THE CONTRACTOR'S EXPENSE AND TO THE SATISFACTION OF THE ENGINEER.
3. **THE PROJECT ENGINEER AND THE CONTRACTOR SHALL COORDINATE WITH THE CONCERNED/ IMPLEMENTING COMMUNITY ENVIRONMENT AND NATURAL RESOURCES OFFICES (CENRO) OF THE DENR REGARDING THE TURNOVER OF THE TIMBER AND OTHER DERIVABLE WOOD MATERIALS RECOVERED FROM THE TREES CUT/ REMOVED.**

FACILITIES FOR THE ENGINEER

1. THE CONTRACTOR SHALL CONSTRUCT FIELD OFFICES, LABORATORIES AND LIVING QUARTERS, INCLUDING ALL THE NECESSARY AIR CONDITIONING, ELECTRICITY, WATER, DRAINAGE AND SECURITY SERVICES FOR THE USE OF THE ENGINEER AND HIS STAFF FOR 24 HOURS A DAY OR PROVIDE THE SAME ON RENTAL BASIS UNTIL END OF CONTRACT. ON COMPLETION OF CONTRACT, THE FACILITIES INCLUDING UTILITIES SHALL REVERT TO THE GOVERNMENT UNLESS OTHERWISE SPECIFIED IN THE CONTRACT DOCUMENTS.
2. THE CONTRACTOR SHALL AT ALL TIMES DURING THE DURATION OF THE CONTACT PROVIDE FOR THE USE OF ENGINEER ALL EQUIPMENT, INSTRUMENTS AND APPARATUS, ALL INFORMATION AND RECORDS AND QUALIFIED CHAINMEN AND LABORERS REQUIRED BY THE ENGINEER FOR INSPECTING AND MEASURING THE WORKS. SUCH EQUIPMENT, INSTRUMENTS AND APPARATUS SHALL INCLUDE THOSE LISTED IN THE SPECIAL PROVISIONS.
3. 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 PROVIDED BY THE CONTRACTOR SHALL BE TO THE SATISFACTION OF THE ENGINEER. **ALL VEHICLES SHALL COMPLY IN ALL RESPECTS WITH ALL RELEVANT PHILIPPINE NATIONAL OR LOCAL LAWS STATUTES AND REGULATIONS.** ALL VEHICLES SHALL CARRY OR BE FITTED WITH THE ACCESSORIES AS MAY BE PRESCRIBED BY LAWS AND HAVE COMPREHENSIVE INSURANCE. THE VEHICLES ON DELIVERY SHALL BE NEW AND SHALL BE DRIVEN BY A COMPETENT, QUALIFIED AND EXPERIENCED DRIVER WHO SHALL BE UNDER DIRECT ORDER OF THE ENGINEER. THE CONTRACTOR SHALL MAINTAIN THE VEHICLE IN FIRST CLASS CONDITION AND SHALL BE SUPPLIED WITH APPROPRIATE FUEL AND LUBRICANTS AT ALL TIMES. HE SHALL PROVIDE EQUIVALENT SUBSTITUTE VEHICLES DURING ANY PERIOD WHEN THE SPECIFIED VEHICLES ARE TAKEN OUT OF SERVICE FOR MAINTENANCE, REPAIR OR ANY OTHER REASON. **UNLESS OTHERWISE SPECIFIED, THE VEHICLE SHALL AT THE END OF THE CONTRACT BECOME THE PROPERTY OF THE GOVERNMENT."**

REFERENCES

1. REVISED DPWH MANUAL ON HIGHWAY SAFETY DESIGN STANDARDS, MAY 2013 EDITION
   1.1. FOR ROAD SAFETY PLANNING AND DESIGN ACTIVITIES AS WELL AS ROAD SAFETY MAINTENANCE ACTIVITIES SUCH AS THE PROPER WAY OF INSTALLING/APPLYING ROAD SIGNS, ROAD SAFETY DEVICES AND PAVEMENT MARKINGS -DO 41, s.2012
2. 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
   2.1. FOR MONITORING, ENFORCEMENT AND IMPLEMENTATION OF CONSTRUCTION SAFETY AND HEALTH - DO 56, s.2005
3. DESIGN REFERENCES
   3.1. DPWH DESIGN GUIDELINES, CRITERIA, AND STANDARDS (DGCS), VOLUME 4, 2015 EDITION
   3.2. GUIDELINES FOR THE PREPARATION OF COST ESTIMATES FOR TRAFFIC MANAGEMENT AND SAFETY & HEALTH REQUIREMENTS FOR THE CONSTRUCTION AND MAINTENANCE OF ROADS, BRIDGES AND SAFETY & HEALTH REQUIREMENTS FOR SCHOOL BUILDINGS, 2018
   3.3. AASHTO A POLICY ON GEOMETRIC DESIGN STANDARD OF HIGHWAYS AND STREETS, 2018 7TH EDITION
   3.4. AASHTO GUIDE ON PAVEMENT DESIGN, 1993 EDITION
   3.5. HIGHWAY SAFETY DESIGN STANDARDS: PART 1 - ROAD SAFETY DESIGN, AND PART 2 - ROAD SIGNS AND PAVEMENT MARKINGS, 2012 EDITION

SURVEY SPECIFICATION

1. ALL PROJECT CONTROL POINTS ARE PROJECTED IN PRS '92 GRID COORDINATE SYSTEM (ZONE 5)
2. SURVEY INSTRUMENT USED, T.S - GEOMAX ZOOM50 SN 2837396, RTK BASE: 1049127 (I70+), ROVER: 1049126 (I70+)
3. DATE SURVEYED: NOVEMBER 26-27, 2024
4. PROJECT CONTROL POINTS, REFER TO PLAN AND PROFILE.

BENCHMARKS AND DESCRIPTION

BM NO.	NORTHING	EASTING	ELEVATION (METERS)	DESCRIPTION
6	790618.583	609972.279	565.193	NO. 4" COMMON NAIL DRIVEN AT ANAGDONG TREE AT RP-2 OF PI-25, RIGHT SIDE
7	790838.553	609734.874	592.789	NO. 4" COMMON NAIL DRIVEN AT MANSANITAS TREE AT RP-4 OF PI-25, RIGHT SIDE

DESIGN SPECIFICATION

1. GEOMETRIC DESIGN CRITERIA
   1.1. NORMAL CROWN SHALL BE - 1.50%, MAXIMUM SUPERELEVATION SHALL BE 8%.
   1.2. MINIMUM RADIUS OF HORIZONTAL CURVES SHALL BE 30 METERS.
   1.3. MINIMUM LENGTH OF PARABOLIC VERTICAL CURVES SHALL BE 60 METERS WITHOUT CONSIDERING K-VALUES

CONSTRUCTION REQUIREMENTS

ACCESSIBILITY LAW

1. PROVISION OF BATAS PAMBANSA BILANG 344 (ACCESSIBILITY LAW) AND ITS IMPLEMENTING RULES AND REGULATIONS. THE IMPLEMENTING OFFICE SHALL IDENTIFY THE LOCATIONS OF AND PROVIDE ACCESSIBILITY FACILITIES FOR PERSONS WITH DISABILITY IN ACCORDANCE WITH D.O. 37 SERIES OF 2009.

TREE PLANTING

2. RATIO OF TREES REMOVED VS TREES PLANTED, 1:100

EMBANKMENT

3. EMBANKMENT PLACED ON EXISTING SLOPES THAT ARE STEEPER THAN 3:1 WHEN MEASURED AT RIGHT ANGLES TO THE ROADWAY SHALL BE CONTINUOUSLY BENCHED IN LAYERS SUBJECT TO THE ENGINEER'S APPROVAL. PLEASE REFER TO STANDARD SPECIFICATIONS FOR HIGHWAYS ON METHOD OF CONSTRUCTION FOR EMBANKMENT.
4. ROADWAY EMBANKMENT OF EARTH MATERIALS SHALL BE PLACED IN HORIZONTAL LAYERS NOT EXCEEDING 200MM, LOOSE MEASUREMENT, AND SHALL BE COMPACTED AS SPECIFIED BEFORE THE NEXT LAYER IS PLACED. AS COMPACTION OF EACH LAYER PROGRESSES, CONTINUOUS LEVELING AND MANIPULATING WILL BE REQUIRED TO ASSURE UNIFORM DENSITY.

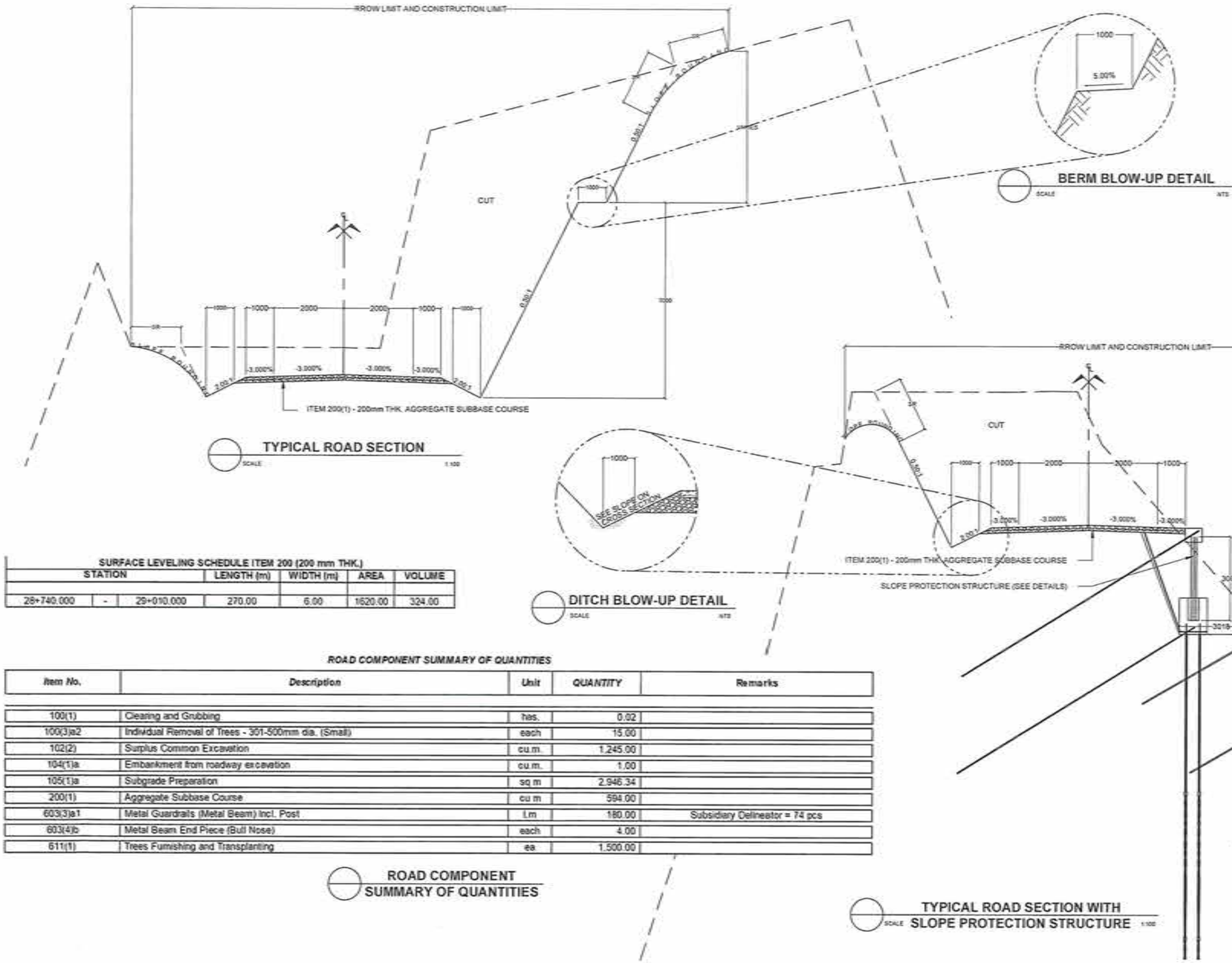
DRAINAGE

5. EXACT LOCATIONS, GRADIENTS, LENGTHS, SLOPES, OUTFALLS & INVERT ELEVATIONS OF ALL DRAINAGE STRUCTURES SHALL BE CHECKED IN THE FIELD BY THE ENGINEER, MINOR ADJUSTMENTS MAY BE MADE WITH THE APPROVAL OF THE ENGINEER SUIT FIELD CONDITIONS
6. EXTENSIONS AND OTHER IMPROVEMENTS OF EXISTING DRAINAGE STRUCTURES ARE SUBJECT TO CHANGE AND SHALL BE DETERMINED IN THE FIELD BY THE ENGINEER IN-CHARGE.
7. DURING CONSTRUCTION, ANY EXISTING PIPES FOUND DAMAGED OR DEFECTIVE SHALL BE REMOVED AND REPLACED AS DIRECTED BY THE ENGINEER. THE REMOVAL OF EXISTING STRUCTURES SHALL BE PAID FOR UNDER ITEM 101(4) - REMOVAL OF EXISTING PIPE CULVERT.
8. ANY MISCELLANEOUS REMOVAL NOT SHOWN ON THE PLANS INCLUDING REMOVAL OF HEADWALLS AND WINGWALLS OF EXISTING DRAINAGE STRUCTURES THAT ARE TO BE EXTENDED OR IMPROVED AND DISPOSAL OF RESULTING MATERIALS SHALL BE CONSIDERED SUBSIDIARY WORK PERTAINING TO OTHER CONTRACT ITEMS. THE COST OF PERFORMANCE THEREOF SHALL BE CONSIDERED TO BE INCLUDED IN THE UNIT PRICE BID FOR THOSE ITEMS.
9. ANY REVISIONS, REMOVAL AND/ OR RELAYING DRAINAGE STRUCTURES AS DIRECTED BY THE ENGINEER TO SUIT EXISTING FIELD CONDITIONS SHALL BE CONSIDERED AS SUBSIDIARY WORK PERTAINING TO OTHER CONTRACT ITEMS. NO DIRECT PAYMENT SHALL BE MADE FOR THIS WORK UNLESS OTHERWISE SPECIFICALLY IDENTIFIED FOR PAYMENT IN THE SCHEDULE.
10. EXISTING DRAINAGE STRUCTURES OR PART THEREOF REMOVED BY THE CONTRACTOR THAT ARE STILL SERVICEABLE SHALL BE TURNED OVER TO THE GOVERNMENT & SHALL BE DEPOSITED AT A PLACE WITHIN THE PROJECT SITE DESIGNATED WITHOUT ANY EXTRA COMPENSATION. EXTREME PRECAUTION SHALL BE THE EXERCISED BY THE CONTRACTOR NOT TO DAMAGE THESE MATERIALS DURING THE REMOVAL & HANDLING.
11. TEST REQUIREMENTS FOR DRAINAGE
    FOR CROSS DRAINAGE PIPES (CLASS IV)
    D-LOAD TO PRODUCE A 0.30MM CRACK OF 100N/M/MM OF DIAMETER
    D-LOAD TO PRODUCE THE ULTIMATE LOAD OF 150 100N/M/MM OF DIAMETER
    FOR LATERAL PIPE (CLASS III)
    D-LOAD TO PRODUCE A 0.30MM CRACK OF 50N/M/MM OF DIAMETER
    D-LOAD TO PRODUCE THE ULTIMATE LOAD OF 75 100N/M/MM OF DIAMETER

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGIONAL OFFICE NO. XI
GOV. CHAVEZ COR. R. MAGSAYSAY AVENUE, DAVAO CITY

PROJECT NAME AND LOCATION:	SHEET CONTENTS:	DRAFTED AND PREPARED:	REVIEWED:	SUBMITTED:	RECOMMENDED:	APPROVED:	SET NO.	SHEET NO.
CONSTRUCTION OF ROAD SLOPE PROTECTION STRUCTURE - MARAGUSAN-PANTUKAN ROAD (PANTUKAN SECTION), PACKAGE Q, DAVAO DE ORO	GENERAL NOTES	EDWARD JOSEPH M. SARTIGA, ENGINEER II, DATE:	DENVER ALDRIN A. SEMPIO, ENGINEER II, OIC / SECTION CHIEF, DATE:	JUDY ANN T. BERNARDINO, CHIEF, PLANNING AND DESIGN DIVISION, DATE:	JOSELITO B. CABALLERO, ASSISTANT REGIONAL DIRECTOR, DATE:	JUBY B. CORDON, REGIONAL DIRECTOR, DATE:	A 3 | 10	3 52

D:\INFRA\2025 INFRA\CONST. OF MARAGUSAN-PANTUKAN ROAD, CDO (12-5-2024)\DESIGN\TYPICAL DRAWINGS\3 GEN NOTES.DWG



SCHEDULE FOR SHOULDER

+ n%	<	5%	=	-3%
+ n%	≥	5%	=	-2%
+ n%	≥	6%	=	-1%
+ n%	≥	7%	=	+2%
+ n%	≥	8%	=	+1%

WARPING AND ROUND SCHEDULE

HEIGHT OF CUT SLOPE (H)	SLOPE ROUNDING (SR)
H<4.50M	1.50M
H>4.50M	2.50M

CUT/FILL SLOPE SCHEDULE

NATURE OF MATERIAL	CUT SLOPE	FILL SLOPE
COMMON EARTH	1:1 - 1:2:1	1.5:1
RIPPABLE ROCK	1:2:1-1:4:1	--
SOLID ROCK	1:4:1	--

SURFACE LEVELING SCHEDULE ITEM 200 (200 mm THK.)

STATION			LENGTH (m)	WIDTH (m)	AREA	VOLUME
28+740.000	-	29+010.000	270.00	6.00	1620.00	324.00

ROAD COMPONENT SUMMARY OF QUANTITIES

Item No.	*Description*	*Unit*	*QUANTITY*	*Remarks*
100(1)	Clearing and Grubbing	hes.	0.02	
100(3)a2	Individual Removal of Trees - 301-500mm dia. (Small)	each	15.00	
102(2)	Surplus Common Excavation	cu.m.	1,245.00	
104(1)a	Embankment from roadway excavation	cu.m.	1.00	
105(1)a	Subgrade Preparation	sq.m	2,946.34	
200(1)	Aggregate Subbase Course	cu.m	594.00	
603(3)a1	Metal Guardrails (Metal Beam) Incl. Post	l.m	180.00	Subsidiary Delineator = 74 pcs
603(4)b	Metal Beam End Piece (Bull Nose)	each	4.00	
611(1)	Trees Furnishing and Transplanting	ea	1,500.00	

ROAD COMPONENT SUMMARY OF QUANTITIES

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DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
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GOV. CHAVEZ COR. R. MAGSAYSAY AVENUE, DAVAO CITY

PROJECT NAME AND LOCATION: CONSTRUCTION OF ROAD SLOPE PROTECTION STRUCTURE - MARAGUSAN-PANTUKAN ROAD (PANTUKAN SECTION), PACKAGE Q, DAVAO DE ORO

SHEET CONTENTS: TYPICAL ROADWAY CROSS SECTIONS ROADWAY SUMMARY OF QUANTITIES

DRAFTED AND PREPARED: EDWARD JOSEPH M. SARTIGA, ENGINEER II — DATE:

REVIEWED: DENVIR ALDRIN A. SEMPIO, ENGINEER III, OIC - SECTION CHIEF — DATE:

SUBMITTED: JUDY ANN T. BERNARDINO, CHIEF, PLANNING AND DESIGN DIVISION — DATE:

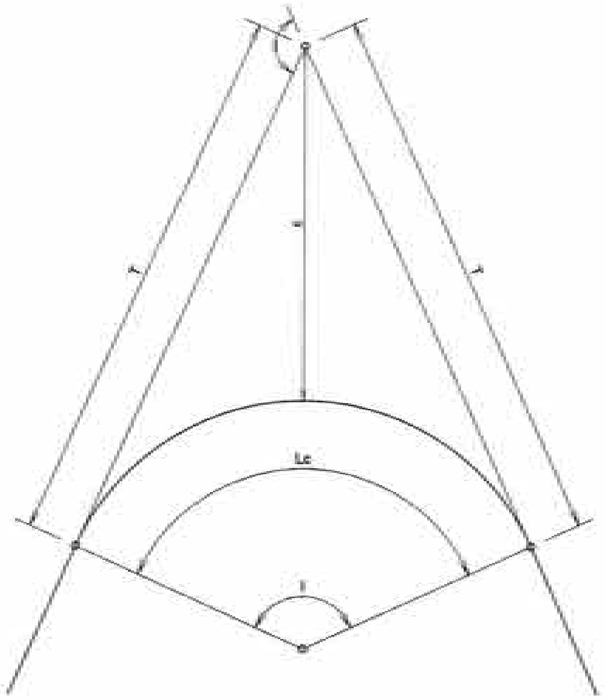
RECOMMENDED: JOSECITO B. CABALLERO, ASSISTANT REGIONAL DIRECTOR — DATE:

APPROVED: JUBY B. CORDON, REGIONAL DIRECTOR — DATE:

SET NO.: A 4 10

SHEET NO.: 4 52

D:\INFRA\DPS INFRA\DIST. OF MARAGUSAN-PANTUKAN ROAD, DDO (12-5-2024)\DESIGN\TYPICAL DRAWINGS\4-5 XSECTION, PAVEMENT, DESIGN CRITERIA.NEW.DWG



HORIZONTAL CURVE (CIRCULAR)

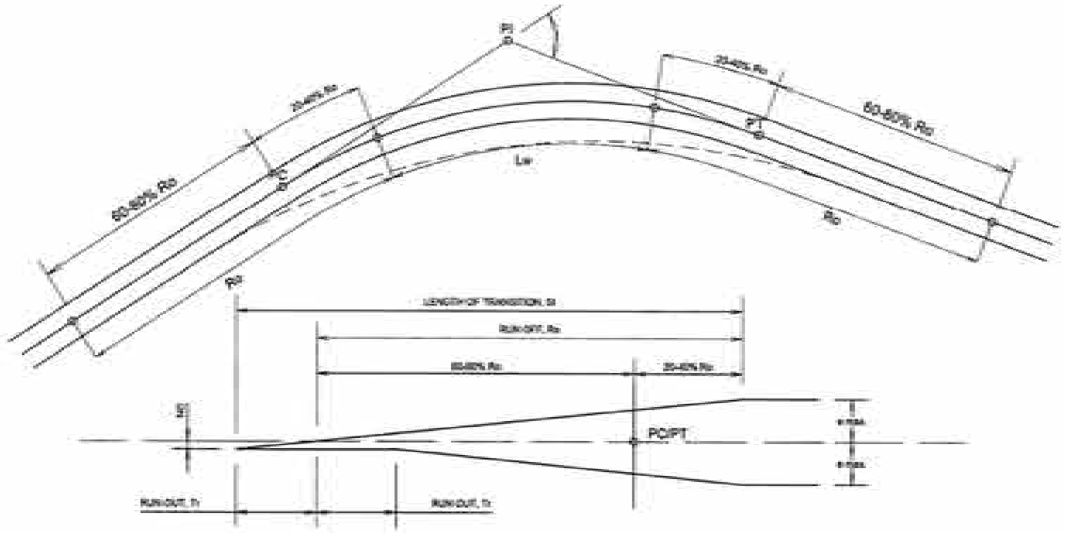
LEGEND: (HORIZONTAL CIRCULAR CURVE)

PI	=	POINT OF INTERSECTION
I	=	INTERSECTION ANGLE (CENTRAL ANGLE)
T	=	TANGENT DISTANCE
R	=	RADIUS
Lc	=	LENGTH OF CURVE
E	=	TOTAL EXTERNAL DISTANCE
PC	=	POINT OF CURVATURE
PT	=	POINT OF TANGENCY

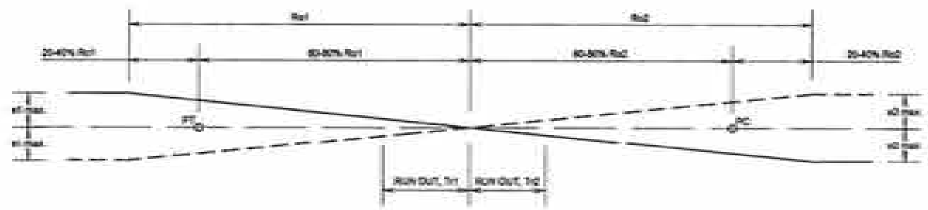
NOTE:

1. NO HORIZONTAL CURVE IS REQUIRED WHEN THE INTERSECTION (CENTRAL ANGLE) I IS LESS THAN ONE DEGREE (1°00').

2. LENGTH OF CIRCULAR CURVE, Lc = (pi)RI/180.



SHOWING HALF OF TRANSITION/EASEMENT - HORIZONTAL CURVATURE AND SUPERELEVATION
(DIAGRAMMATIC PROFILE - PAVEMENT REVOLVED ABOUT CENTERLINE)



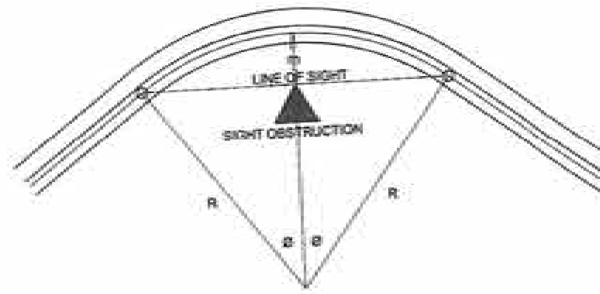
SHOWING HALF OF TRANSITION/EASEMENT - REVERSED HORIZONTAL CURVATURE AND SUPERELEVATION
(DIAGRAMMATIC PROFILE - PAVEMENT REVOLVED ABOUT CENTERLINE)

$m = R \text{ vers } Ø$

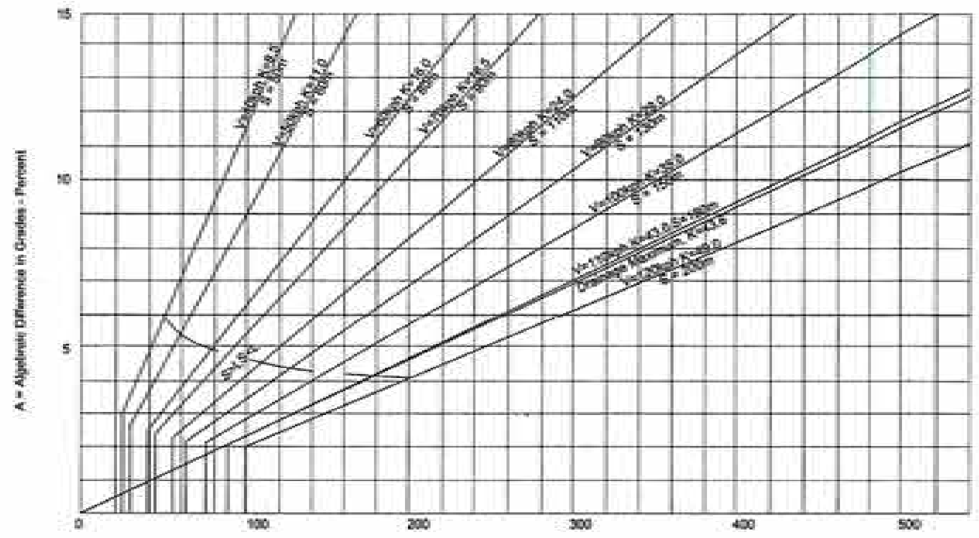
$m = \frac{1145.92}{D} \text{ vers } \frac{SD}{40}$

$m = R \text{ vers } \frac{28.65\, S}{R}$

$S = \frac{R}{28.65} \cos^{-1} \frac{R-m}{R}$



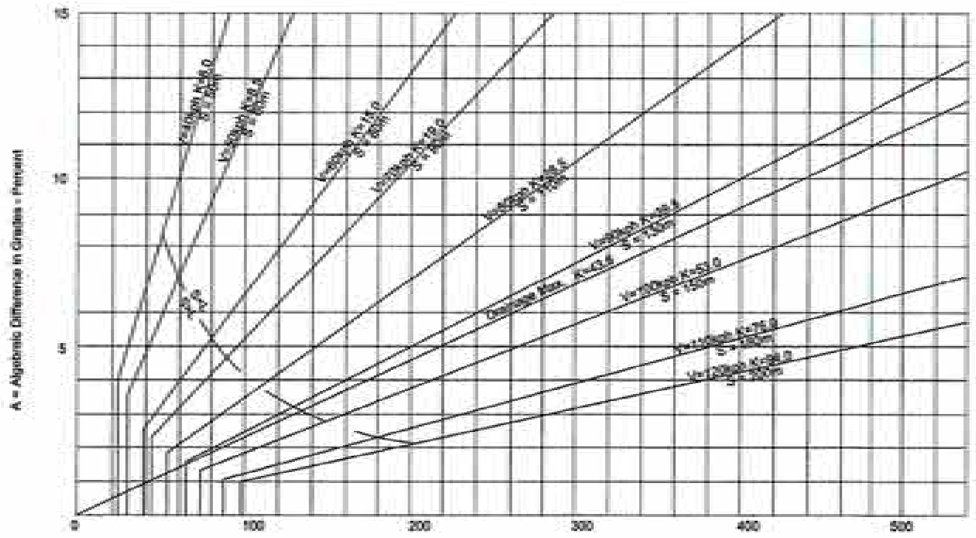
D	=	DEGREE OF CURVE
R	=	RADIUS OF CURVE
V	=	ASSUMED DESIGN SPEED
S	=	STOPPING SIGHT DISTANCE
m	=	MIDDLE ORDINATE
Ø	=	1/2 OF INTERSECTION ANGLE



L=MINIMUM LENGTH OF VERTICAL CURVES - METERS

DESIGN CONTROLS FOR SAG VERTICAL CURVE

BASED ON MINIMUM STOPPING SIGHT DISTANCE, (HEADLIGHT DISTANCE)



L=MINIMUM LENGTH OF VERTICAL CURVES - METERS

$L = KA$

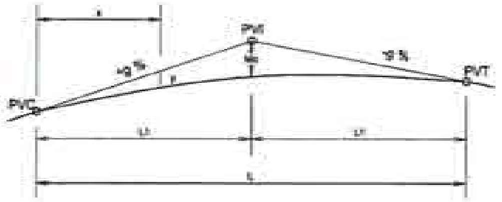
$K = \frac{S^2}{426}$ (K ROUNDED)

DESIGN CONTROLS FOR CREST VERTICAL CURVE

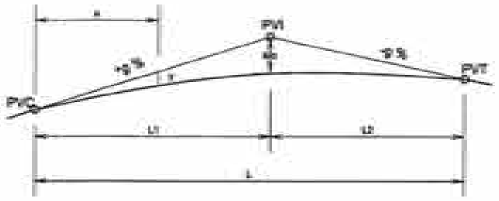
BASED ON MINIMUM STOPPING SIGHT DISTANCE, (S)

WIDENING WHEN TRANSITIONS NOT USED

RADIUS OF CURVE	ROADWAY WIDTH = 6.00 MTS.					
	DESIGN SPEED (KPH)					
	50	60	70	80	90	100
3000	0.5	0.5	0.6	0.6	0.6	0.6
2500	0.5	0.6	0.6	0.6	0.6	0.6
2000	0.6	0.6	0.6	0.6	0.6	0.7
1500	0.6	0.6	0.7	0.7	0.7	0.7
1000	0.7	0.7	0.7	0.8	0.8	0.8
900	0.7	0.7	0.8	0.8	0.8	0.9
800	0.7	0.8	0.8	0.8	0.9	0.9
700	0.8	0.8	0.8	0.9	0.9	1.0
600	0.8	0.8	0.9	0.9	1.0	1.0
500	0.9	0.9	1.0	1.0	1.1	1.1
400	1.0	1.0	1.1	1.1	1.2	1.2
300	1.1	1.2	1.2	1.3	1.4	1.4
250	1.2	1.3	1.4	1.4	1.5	
200	1.4	1.5	1.6	1.6		
150	1.7	1.8	1.9	1.9		
140	1.8	1.9				
130	1.9	2.0				
120	2.0	2.1				
110	2.1	2.2				
100	2.2	2.3				
90	2.4					
80	2.6					
70	2.9					



SYMMETRICAL



UNSYMMETRICAL

VERTICAL PARABOLIC CURVE

LEGEND: (HORIZONTAL CIRCULAR CURVE)

PVI	=	POINT OF VERTICAL INTERSECTION
PVC	=	POINT OF VERTICAL CURVATURE
PVT	=	POINT OF VERTICAL TANGENCY
L	=	LENGTH OF VERTICAL CURVE
g	=	GRADE IN PERCENT
Mo	=	MIDDLE ORDINATE
x	=	DISTANCE FROM PVC OR PVT TO ANY POINT OF CURVE
y	=	VERTICAL OFFSET IN METERS
A	=	ALGEBRAIC DIFFERENCE OF GRADES

NOTE:

1. NO VERTICAL CURVE IS REQUIRED WHEN THE ALGEBRAIC DIFFERENCE IN GRADES IS LESS THAN 0.50% IN ANY VERTICAL PARABOLIC CURVE.

SYMMETRICAL

$Mo = \frac{AL}{800}$ $\quad y = \frac{x^2(Mo)}{(L/2)^2}$

UNSYMMETRICAL

$Mo = \frac{A L_1 L_2}{200L}$ $\quad y = \frac{x^2(Mo)}{(L_1)^2 \text{ or } (L_2)^2}$

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CONSTRUCTION OF ROAD SLOPE PROTECTION STRUCTURE - MARAGUSAN-PANTUKAN ROAD (PANTUKAN SECTION), PACKAGE Q, DAVAO DE ORO	DESIGN CRITERIA	EDWARD JOSEPH M. SARTIGA ENGINEER II DATE:	DENVER ALDRIN A. SEMPIO ENGINEER II, OIC - SECTION CHIEF DATE:	JUDY ANN T. BERNARDINO CHIEF, PLANNING AND DESIGN DIVISION DATE:	JOSELITO B. CABALLERO ASSISTANT REGIONAL DIRECTOR DATE:	JUBY B. CORDON REGIONAL DIRECTOR DATE:	A 5 10	5 52

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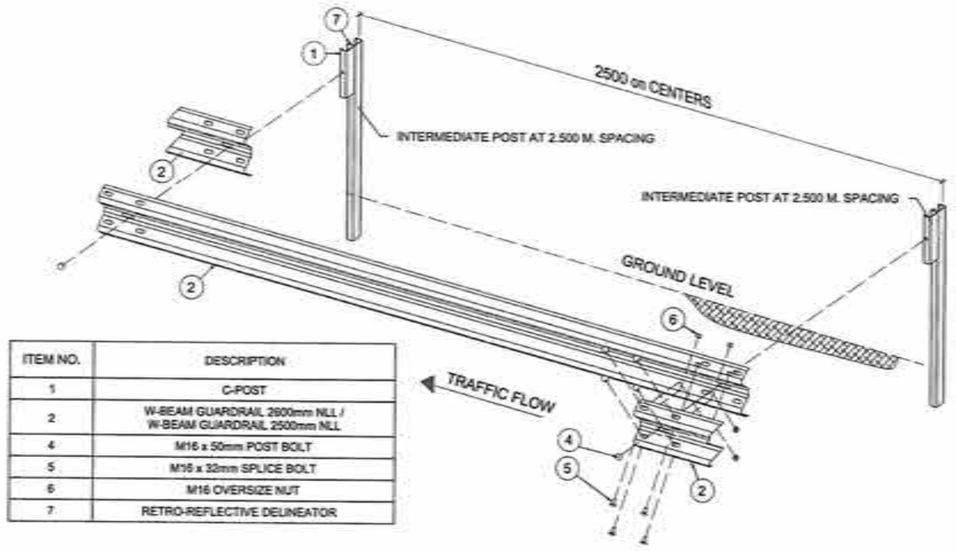
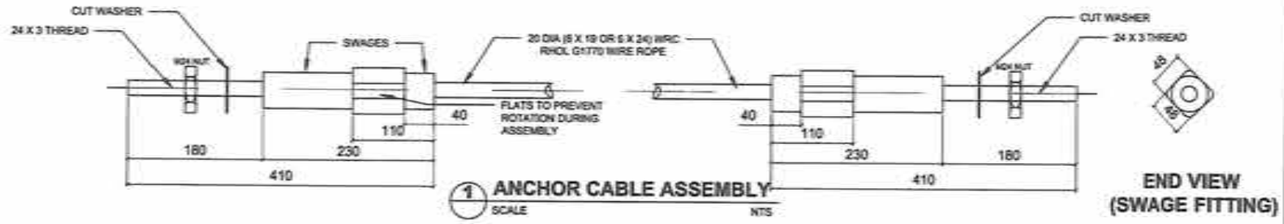


ITEM NO.	DESCRIPTION
1	C-POST
2	W-BEAM GUARDRAIL 2900mm NLL / W-BEAM GUARDRAIL 2500mm NLL
4	M16 x 50mm POST BOLT
5	M16 x 32mm SPLICE BOLT
6	M16 OVERSIZE NUT
7	RETRO-REFLECTIVE DELINEATOR

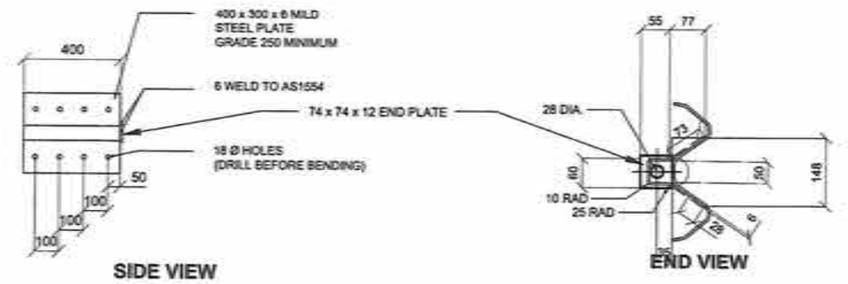
2 W-BEAM GUARDRAIL ASSEMBLY
SCALE NTS



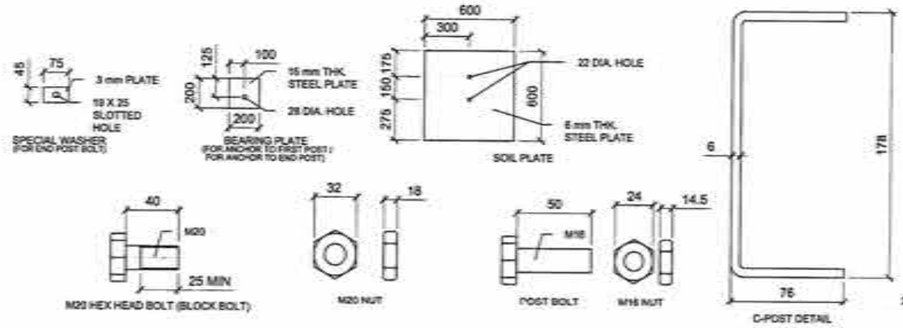
1 ANCHOR CABLE ASSEMBLY
SCALE NTS

NOTES:

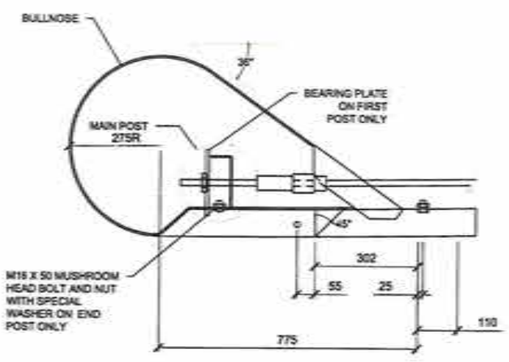
1.) COMPLETE ASSEMBLY SHALL BE ABLE TO DEVELOP BREAKING STRENGTH OF 200kN
2.) ANCHOR CABLE ASSEMBLY ARRANGEMENT CAN BE INSTALLED AS AN ACCEPTABLE ALTERNATIVE ARRANGEMENT AND ONLY IN CONJUNCTION WITH ANCHOR PLATE



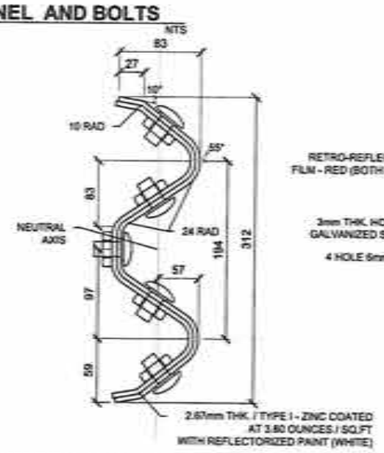
3 ANCHOR PLATE DETAIL
SCALE NTS



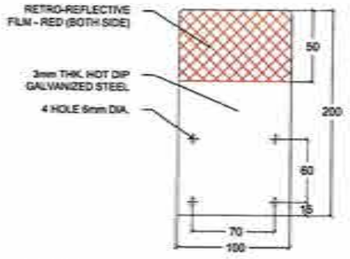
4 PLATES , C - CHANNEL AND BOLTS
SCALE NTS



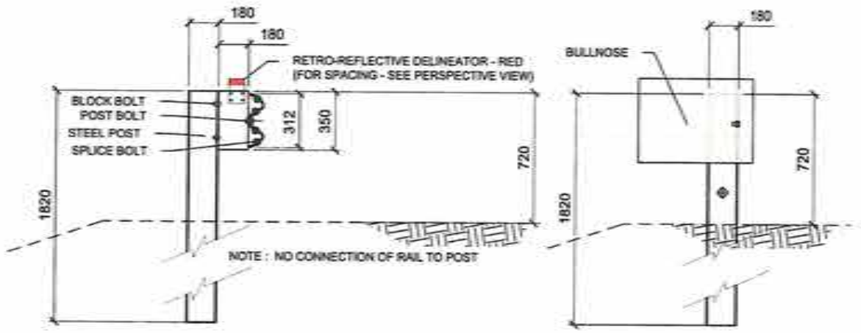
5 DETAIL OF FLEX - BEAM END SECTION
SCALE NTS



6 W-BEAM WITH SPLICE BOLTS
SCALE NTS



7 DELINEATOR DETAIL
SCALE NTS



8 RIGHT BACK VIEW (C-POST AND MAIN POST)
SCALE 1:40

NOTES:

1.) THE AGREEMENT OF THE PRINCIPAL ROAD DESIGN ENGINEER SHOULD BE SOUGHT BEFORE MODIFICATIONS ARE MADE TO ANY PART OF THE DESIGN.
2.) IN REMOTE AREAS WHERE CONCRETE IS NOT READILY AVAILABLE, THE CONCRETE FOOTING CAN BE REPLACED BY A 600 X 600 X 6mm STEEL PLATE BOLTED TO THE FACE OF THE FIRST POST ON THE UPSTREAM SIDE OF POST.
3.) B.C.T ASSEMBLY TO BE HOT DIP GALVANIZED (INC. NUTS, BOLTS AND WASHERS) TO AS1650/1989. HOLES TO BE DRILLED BEFORE GALVANIZING.
4.) SHALL BE PAINTED FIRST WITH EPOXY PRIMER THEN APPLY REFLECTORIZED WHITE PAINT.
5.) ALL STEEL POSTS AND BLOCKS SHALL BE 178 x 76 x 6mm STEEL BLOCKS CHANNEL SECTION GRADE 250 MINIMUM.
6.) BOLTS TO BE SNUG TIGHTENED TO AS4100/1990 AND SPOT WELD.
7.) DEPARTURE TERMINALS (BCT&TS) MUST NOT BE LOCATED WITHIN THE CLEAR ZONE OF OPPOSING TRAFFIC. (USE A BCTA).
8.) WHERE THE FACE OF GUARD FENCE IS ERECTED WITHIN 0 TO 1m BEHIND THE BACK OF KERB, THE MOUNTING HEIGHT SHALL BE MEASURED FROM THE ADJACENT ROAD PAVEMENT SURFACE. HOWEVER, FOR DISTANCES BEYOND THIS, THE MOUNTING HEIGHT SHALL BE MEASURED FROM THE GROUND SURFACE DIRECTLY BELOW W-BEAM RAIL.

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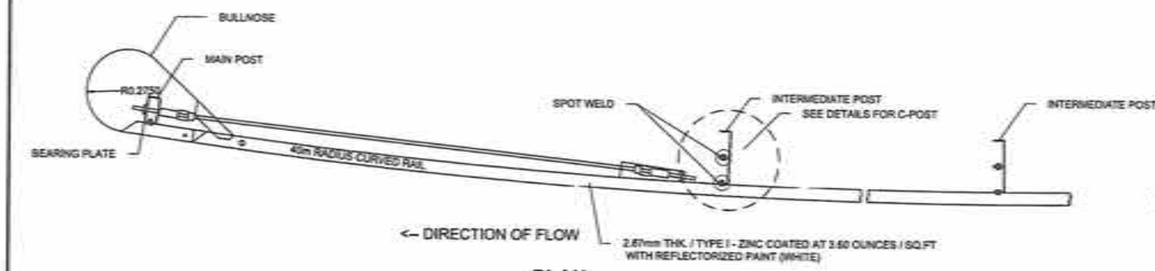
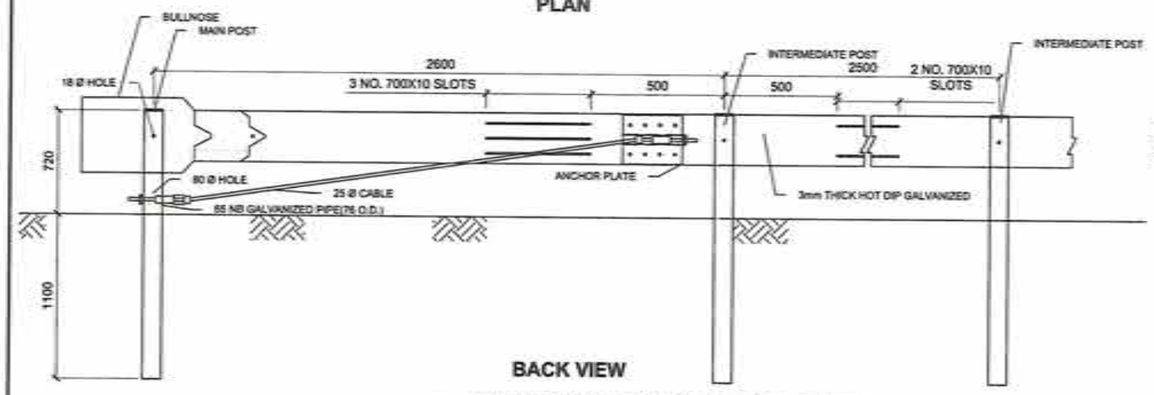
CONSTRUCTION OF ROAD SLOPE PROTECTION STRUCTURE - MARAGUSAN-PANTUKAN ROAD (PANTUKAN SECTION), PACKAGE Q, DAVAO DE ORO	ANCHOR CABLE ASSEMBLY W-BEAM GUARDRAIL ASSEMBLY ANCHOR PLATE DETAIL PLATES , C - CHANNEL AND BOLTS, DETAIL OF FLEX - BEAM END SECTION, W-BEAM WITH SPLICE BOLTS RIGHT BACK VIEW (C-POST AND MAIN POST)	EDWARD JOSEPH M. SARTIGA ENGINEER II DATE:	DENVIR ALDRIN A. SEMPIO ENGINEER II, DIC - SECTION CHIEF DATE:	JUDY ANN T. BERNARDINO CHIEF, PLANNING AND DESIGN DIVISION DATE:	JOSELITO B. CABALLERO ASSISTANT REGIONAL DIRECTOR DATE:	JUBY B. CORDON REGIONAL DIRECTOR DATE:	A 6 | 10	6 52

D:\INFRA\2025 INFRA\CONST. OF MARAGUSAN-PANTUKAN ROAD, DOO (12-5-2024)\DESIGN\TYPICAL DRAWINGS\6-7 GUARDRAILS UPDATED 2025.DWG

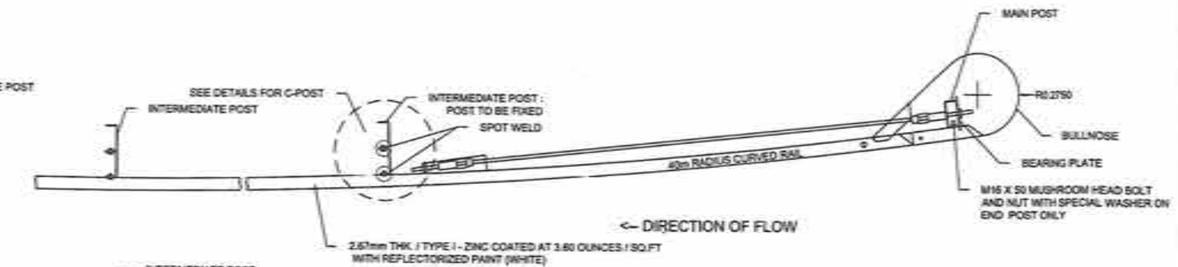


PLAN

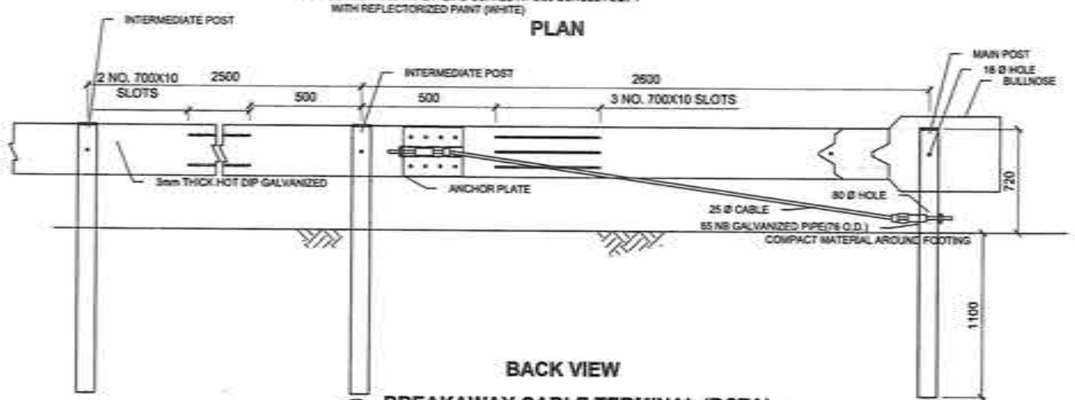


BACK VIEW

1a BREAKAWAY CABLE TERMINAL (BCTB)
SCALE 1:40

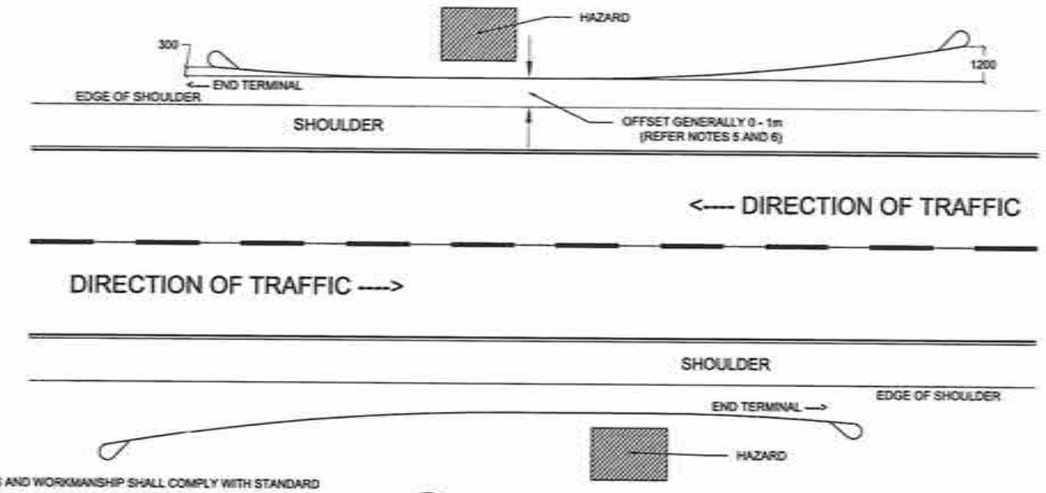


PLAN

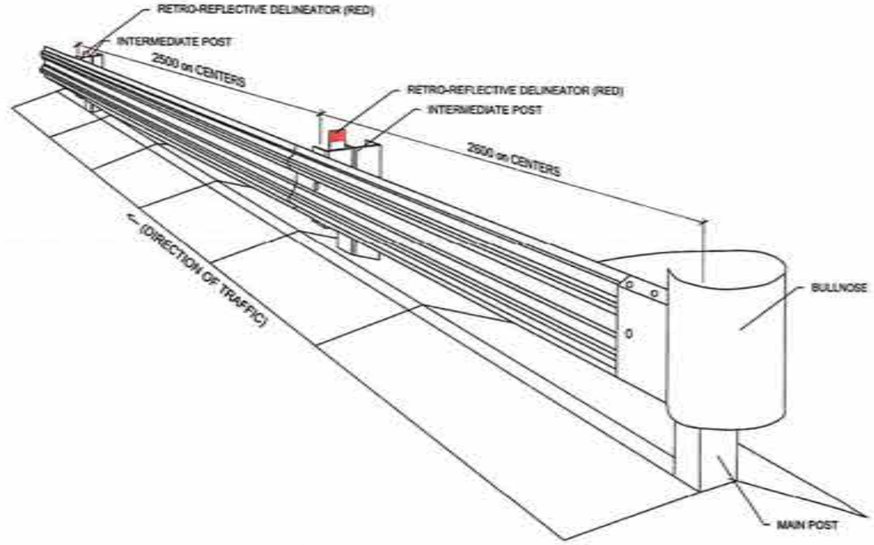


BACK VIEW

1b BREAKAWAY CABLE TERMINAL (BCTA)
SCALE 1:40



2 OFFSET AND SHOULDER PLAN
SCALE NTS



3 PERSPECTIVE VIEW
SCALE NTS

NOTES:

1.) MATERIALS AND WORKMANSHIP SHALL COMPLY WITH STANDARD SPECIFICATION FOR HIGHWAYS BRIDGES AND AIRPORTS, SERIES OF 2013.
2.) ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
3.) GAUGE OF FLEX - BEAM GUARDRAIL SHALL BE AS INDICATED IN PLAN & SPECIFICATIONS.
4.) ALL NUTS SHALL BE WELDED TO THE BOLTS AFTER TIGHTENING.
5.) OFFSET ON FILL DEPEND ON THE SHOULDER WIDTH WITH 3m WIDE SHOULDERS NO OFFSET IS REQUIRED
6.) WHERE PART OF THE TERRAIN IS DRIVABLE BETWEEN THE SHOULDER AND THE HAZARD THE GUARD FENCE IS LOCATED AT THE LIMIT OF THE DRIVABLE TERRAIN
7.) POST TO BE FIXED WITH FULL FACE OF CHANNEL SECTION FACING DIRECTION OF ADJACENT TRAFFIC

GUARDRAILS SCHEDULE

STATION LIMITS		EQUATIONS		SIDE	LENGTH (m)	DELINEATOR
START	END	BACK	AHEAD			
29+030.000	29+125.000			LEFT	95.000	38.000
29+035.000	29+120.000			RIGHT	85.000	35.000

4 GUARDRAILS SCHEDULE
SCALE NTS

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGIONAL OFFICE NO. XI
GOV. CHAVEZ COR. R. MAGSAYSAY AVENUE, DAVAO CITY

PROJECT NAME AND LOCATION:	SHEET CONTENTS:	DRAFTED AND PREPARED:	REVIEWED:	SUBMITTED:	RECOMMENDED:	APPROVED:	SET NO.	SHEET NO.
CONSTRUCTION OF ROAD SLOPE PROTECTION STRUCTURE - MARAGUSAN-PANTUKAN ROAD (PANTUKAN SECTION), PACKAGE Q, DAVAO DE ORO	BREAKAWAY CABLE TERMINAL (BCTA & BCTB) OFFSET AND SHOULDER PLAN PERSPECTIVE VIEW	EDWARD JOSEPH M. SARTIGA, ENGINEER II, DATE:	DENVIR ALDRIN A. SEMPIO, ENGINEER II, OIC - SECTION CHIEF, DATE:	JUDY ANN T. BERNARDINO, CHIEF, PLANNING AND DESIGN DIVISION, DATE:	JOSELITO B. CABALLERO, ASSISTANT REGIONAL DIRECTOR, DATE:	JUBY B. CORDON, REGIONAL DIRECTOR, DATE:	A 7 10	7 52

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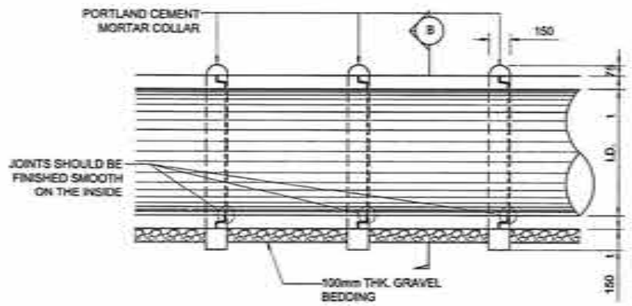
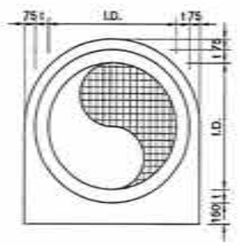
NOTES:

JOINTS SHALL BE MADE WITH
(A) PORTLAND CEMENT MORTAR ,
AS MAY BE SPECIFIED. MORTAR JOINTS SHALL BE MADE WITH AN EXCESS OF MORTAR TO FORM A CONTINUOUS BEAD AROUND THE OUTSIDE OF THE CONDUIT AND FINISHED SMOOTH ON THE INSIDE. FOR GROUTED JOINTS, MOLDS AND RUNNERS SHALL BE USED TO RETAIN THE POURED GROUT.

I.D. (mm)	t (mm) MACHINE MADE	t (mm) HAND MADE	C
910	85	-	150
1220	110	-	150
1520	127	-	150



DETAIL OF RCPC JOINT



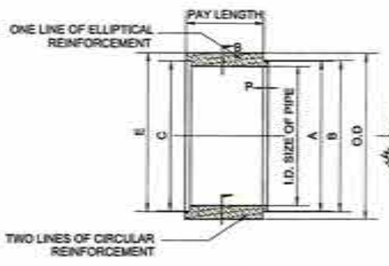
SECTION B-B

2 REINFORCED CONCRETE PIPE CULVERT DETAILS
SCALE 1:30

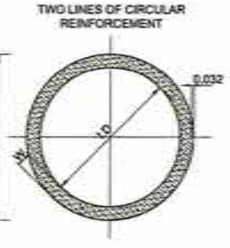
SIZE OF PIPE		CONCRETE 317 KG./SQ. CM. (4,500 LB/SQ.IN.)						
IN.	M.	WALL THICKNESS (M)	TONGUE (M)		GROOVE (M)		DEPTH (M)	MINIMUM REINFORCEMENT SQ.CM./M. OF PIPE *
		W	A	B	C	E	P	CIRCULAR REINFORCEMENT
24"	0.61	0.064	0.660	0.660	0.667	0.686	0.044	1 LINE EACH 4.23
36"	0.91	0.086	0.988	1.007	1.994	1.013	0.064	2 LINE EACH 4.66
48"	1.22	0.108	1.315	1.334	1.321	1.340	0.064	2 LINE EACH 6.56
60"	1.52	0.127	1.639	1.658	1.645	1.664	0.064	2 LINE EACH 8.66

* - THE DISTANCE FORM CENTERLINE OF THE REINFORCEMENT TO THE NEAREST SURFACE OF THE CONCRETE HAS BEEN ASSUMED AS 0.032 M. FOR PIPES WITH A SHELL THICKNESS OF 0.064 M. OR MORE.

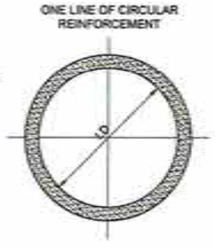
NOTE: DESIGN REQUIREMENTS ARE BASED ON THE SPECIFICATIONS FOR MATERIALS OF AASHTO M-170



LONGITUDINAL SECTION



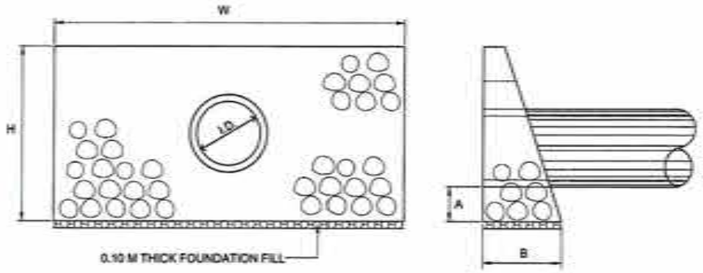
SECTION A



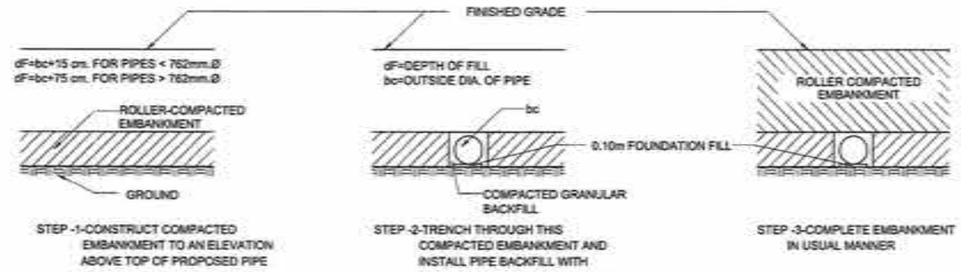
SECTION B

1 DESIGN REQUIREMENTS OF REINFORCED CONRETE PIPE CULVERT
SCALE 1:15

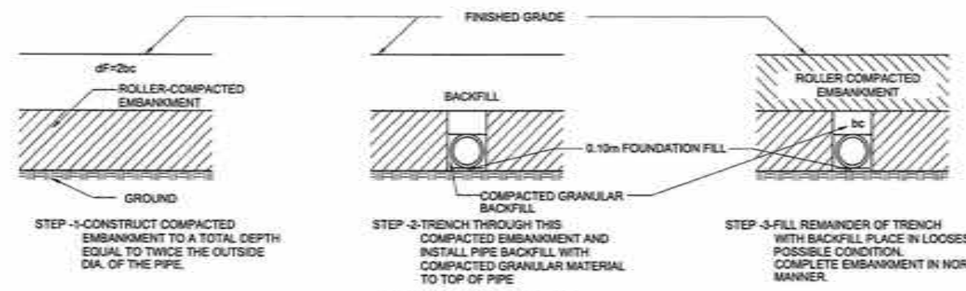
TABLE FOR SRAIGHT "S" TYPE HEADWALL										
DIA. & THK. OF PIPE		DIMENSIONS (mm)			SINGLE PIPE			DOUBLE PIPE		
I.D. (mm)	t (mm)	A	B	H	W	AREA OF WATERWAY	VOL. (cu.m.)	W	AREA OF WATERWAY	VOL. (cu.m.)
910	110	610	1080	1830	3660	0.51	3.98	-	-	-
1220	110	810	1180	2340	4880	0.910	7.25	6910	1.82	6.70
1520	130	1010	1280	2830	6050	1.410	11.62	-	-	-
1830	130	1210	1540	3400	7260	1.700	19.75	-	-	-



4 TYPICAL SECTION FOR STRAIGHT S-TYPE HEADWALL
SCALE 1:50



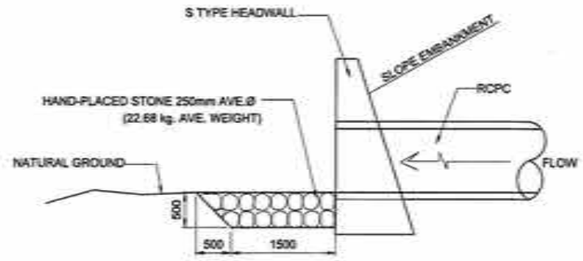
CALIFORNIA METHOD A



CALIFORNIA METHOD B

3 METHODS OF PIPE INSTALLATION
SCALE 1:15

PIPE DIAMETER (mm.)	LENGTH (mm.) SINGLE F	LENGTH (mm.) DOUBLE F
910	1300	2990
1220	1600	3800
1520	1900	4900
1830	2280	-



5 DUMPED STONE PROTECTION
SCALE 1:50

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGIONAL OFFICE NO. XI
GOV. CHAVEZ COR. R. MAGSAYSAY AVENUE, DAVAO CITY

PROJECT NAME AND LOCATION:	SHEET CONTENTS:	DRAFTED AND PREPARED:	REVIEWED:	SUBMITTED:	RECOMMENDED:	APPROVED:	SET NO.	SHEET NO.
CONSTRUCTION OF ROAD SLOPE PROTECTION STRUCTURE - MARAGUSAN-PANTUKAN ROAD (PANTUKAN SECTION), PACKAGE Q, DAVAO DE ORO	DESIGN REQUIREMENTS FPR RCPC REINFORCED CONCRETE PIPE CULVERT DETAILS METHODS OF PIPE INSTALLATION TYPICAL SECTION STRAIGHT S-TYPE HEADWALL DUMPED STONE PROTECTION	JAMAICA A. MANONG ENGINEER II DATE:	ALAIN JOHN P. SOTTO ENGINEER III DATE:	JUDY ANN T. BERNARDINO CHIEF, PLANNING AND DESIGN DIVISION DATE:	JOSELITO B. CABALLERO ASSISTANT REGIONAL DIRECTOR DATE:	JUBY B. CORDON REGIONAL DIRECTOR DATE:	A 8 10	8 52

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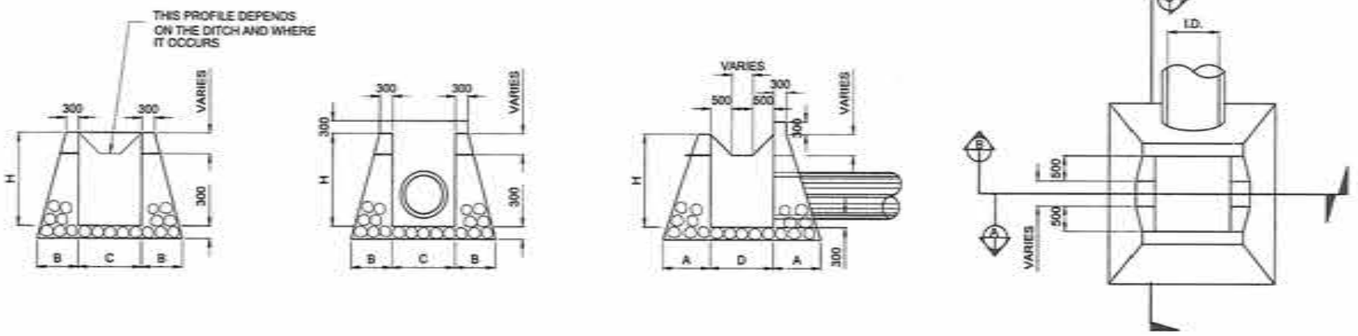


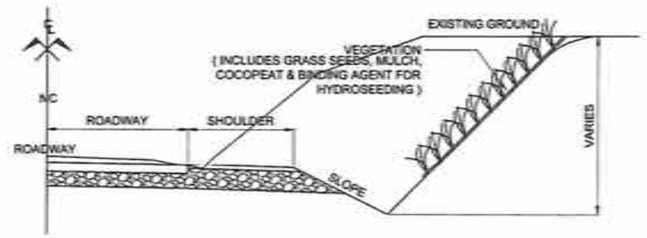
PIPE DIAMETER (mm)		910	1220	1520	1830
COMMON TO ALL NUMBER OF BARREL	H	2210	2580	2920	3280
	A	1130	1250	1360	1495
	B	970	1060	1140	1475
	D	1500	1800	2100	2580
SINGLE	C	1500	1800	2100	2580
DOUBLE	C	3320	4240	5140	

NOTES:

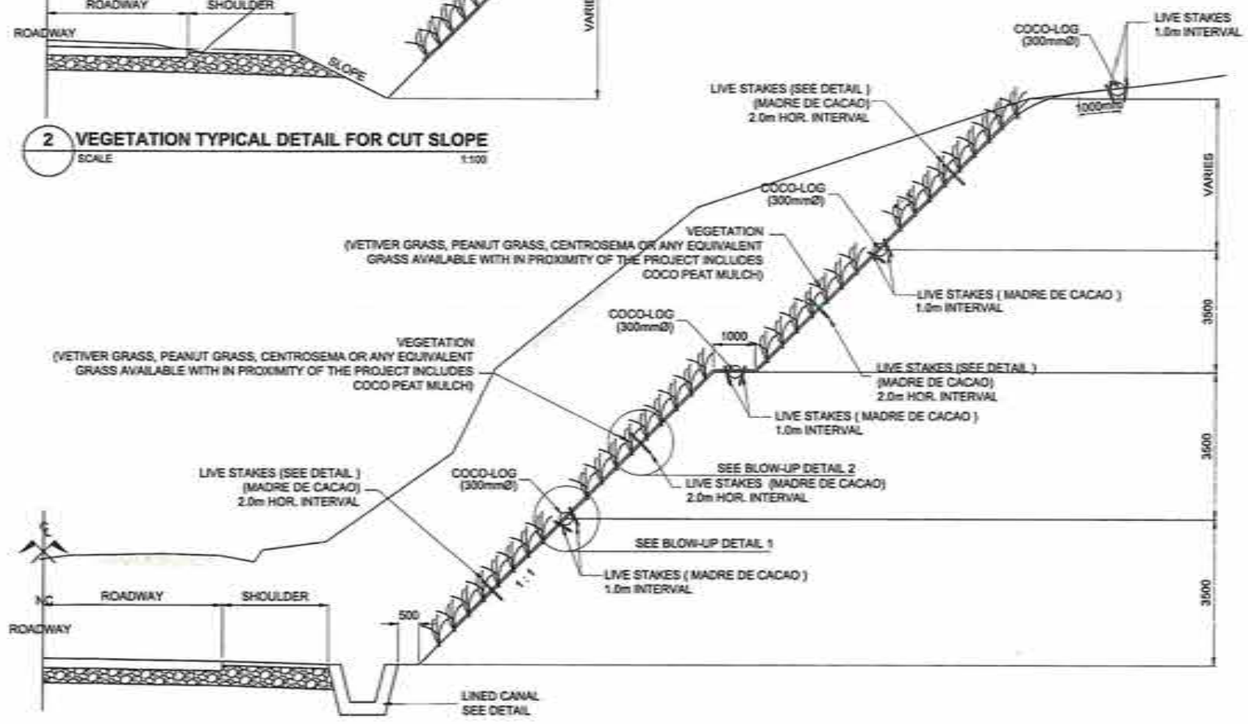
ITEM 505(2)a
GROUTED RIPRAP PLACING OF STONES
- FOR GROUTED RIPRAP, STONES SHALL BE LAID WITH CLOSE, BROKEN JOINTS AND SHALL BE FIRMLY BEDDED INTO SLOPE AND AGAINST THE ADJOINING STONES. EACH STONE SHALL BE LAID WITH ITS LONGEST AXIS PERPENDICULAR TO THE SLOPE.

GROUTING
- THE SPACES BETWEEN STONES SHALL BE FILLED WITH CEMENT MORTAR THROUGHOUT THE THICKNESS OF THE RIPRAP. SUFFICIENT MORTAR SHALL BE USED TO COMPLETELY FILL THE VOIDS, EXCEPT THAT THE SURFACE OF THE STONES SHALL BE EXPOSED.

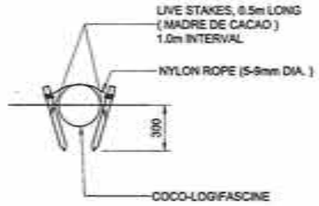
3 DETAIL OF GROUTED RIPRAP CATCH BASIN TYPE C1 (SQUARE)
SCALE 1:100



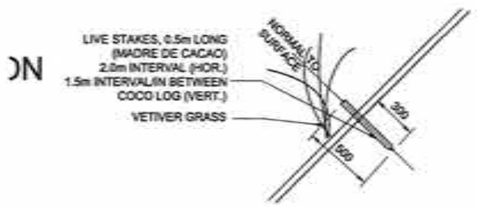
2 VEGETATION TYPICAL DETAIL FOR CUT SLOPE
SCALE 1:100



1 COCO LOG TYPICAL DETAIL FOR CUT SLOPE
SCALE 1:100



DETAIL 1
SCALE 1:30



DETAIL 2
SCALE 1:30

COCO-LOG
THE HAND-SPUN COCO COIR TWINE THAT IS TO BE WOVEN INTO COCONUT GEONETS SHALL HAVE A DIAMETER OF 5MM.

BACKFILL SHALL BE OF THE CLASS INDICATED ON THE PLANS AND SHALL CONFORM TO THE REQUIREMENTS OF ITEM 104.

THE COCONUT GEONETS MANUFACTURER SHALL BE RESPONSIBLE FOR ESTABLISHING AND MAINTAINING A QUALITY CONTROL PROGRAM TO ASSURE COMPLIANCE WITH THE REQUIREMENTS OF THIS SPECIFICATION.

EQUIPMENT AND TOOLS NECESSARY FOR HANDLING MATERIALS AND PERFORMING ALL PARTS OF THE WORKS SHALL BE APPROVED BY THE ENGINEER AS TO DESIGN, CAPACITY AND MECHANICAL CONDITION.

SITE FOR NET INSTALLATION SHALL BE GRADED AND SLOPED TO THE APPROVED DESIGN AND ANY RUNOFF CONTROL SUCH AS DIVERSIONS, DIKES AND BERMS SHALL BE COMPLETED PRIOR TO INSTALLATION. THE FACE OF THE SLOPE SHALL BE SMOOTHENED. ROCKS, CLODS, VEGETATION AND OTHER OBSTRUCTIONS SHALL BE REMOVED FROM TIP TO TOE OF THE SLOPE TO ENSURE COMPLETE CONTACT OF THE COCO-NETS WITH THE SOIL.

THE COCONUT GEONETS SHALL BE SECURED TO THE GROUND USING BAMBOO PEGS. AN AVERAGE OF 3 LIVE STAKES PER SQUARE METER SHALL BE USED TO ENSURE UNIFORM CONTACT OF COCO-NET TO THE GROUND SURFACE. ANCHORING SHALL BE AT RIGHT ANGLE TO THE GROUND SURFACE.

WHEN NECESSARY, COCO-LOGS SHALL BE PLACED ACROSS THE SLOPE ON CONTOUR AND SHALL BE PEGGED WITH LIVE STAKES TO THE GROUND AT 1M INTERVALS. FOR SLOPES WITH LOOSE SOIL, THE COCO-LOGS SHALL BE INSTALLED ON TRENCHES.THE TRENCH SHALL BE DEEP ENOUGH TO ACCOMMODATE HALF THE DIAMETER OF THE COCO-LOGS.

POST PROJECT MONITORING SHALL INCLUDE CHECKING ON ANY BREAKS OF THE INSTALLED COCONUT GEONETS ESPECIALLY AT THE POINT OF JUNCTIONS, THE GROWTH OF GRASSES AND THE MANIFESTATION OF ANY FAILURE OF GERMINATION OF PLANTS AND THE SUDDEN OUTBURST OF RAIN THAT MIGHT HAVE INFLUICTED DAMAGED TO SOME SECTIONS. REPAIR SHALL BE DONE ON DAMAGED SECTIONS OF THE SLOPE AND REPLACEMENT SHALL BE BE DONE IN THE CASE OF PLANT MORTALITY.

WATERING, WEEDING AND FERTILIZATION MAY BE DONE SUBJECT TO THE DISCRETION OF THE CONTRACTOR'S BIOENGINEER OR PLANT SPECIALIST. MAINTENANCE ACTIVITIES SHALL BE TERMINATED UPON THE RECOMMENDATION OF THE BIOENGINEER AND THE APPROVAL OF THE OWNER.

NOTE:
COCO-LOGS, MADRE CACAO, LIVE STAKES, VEGETATION SHALL BE INSTALLED/PLANTED IMMEDIATELY AFTER BACK SLOPES AND EMBANKMENT SLOPES ARE GRADED AND SLOPED TO THE APPROVED DESIGN.

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGIONAL OFFICE NO. XI
GOV. CHAVEZ COR. R. MAGSAYSAY AVENUE, DAVAO CITY

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CONSTRUCTION OF ROAD SLOPE PROTECTION STRUCTURE - MARAGUSAN-PANTUKAN ROAD (PANTUKAN SECTION), PACKAGE Q, DAVAO DE ORO	COCO LOG TYPICAL DETAIL FOR CUT SLOPE VEGETATION TYPICAL DETAIL FOR CUT SLOPE DETAIL 1 & DETAIL2 DETAIL OF GROUTED RIPRAP CATCH BASIN TYPE C1 (SQUARED)	JAMAICA A. MANDING, ENGINEER II, DATE:	ALAIN JOHN R. SOTTO, ENGINEER III, DATE:	JUDY ANN V. BERNARDINO, CHIEF, PLANNING AND DESIGN DIVISION, DATE:	JOSELITO B. CABALLERO, ASSISTANT REGIONAL DIRECTOR, DATE:	JUBY B. CORDON, REGIONAL DIRECTOR, DATE:	A 9 10	9 52

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D R A I N A G E S C H E D U L E

STATION	DESCRIPTION	103(1)a	103(3)	103(6)a	500(1)b3	500(1)b5	505(2)a	506(1)	508(1)	REMARKS	DESIGN PARAMETERS		
		cu.m.	cu.m.	cu.m.	ln.m.	ln.m.	cu.m.	cu.m.	cu.m.		Q(cu.m./s.)	A(has.)	v(m/s)
28+740.000	@ STA. 28+740.000 INSTALL 1-910 mmØ RCPC x 9.00 LN.M. PROVIDE GROUTED RIPRAP CATCH BASIN ON INLET AND HEADWALL WITH HAND LAID ROCKS PROTECTION ON OUTLET. SLOPE = 2.00% INLET I.E = 602.983 m, CL IE = 601.252 m ,OUTLET I.E = 601.357 m	62.90	0.40	32.68	9.00	-	14.90	3.98	1.14	CROSSDRAIN	2.285	1.747	3.514
28+940.000	@ STA. 28+940.000 INSTALL 1-910 mmØ RCPC x 9.00 LN.M. PROVIDE GROUTED RIPRAP CATCH BASIN ON INLET AND HEADWALL WITH HAND LAID ROCKS PROTECTION ON OUTLET. SLOPE = 2.00% INLET I.E = 572.569 m, CL IE = 572.673 m ,OUTLET I.E = 572.749 m	120.41	0.40	54.34	9.00	-	14.90	3.98	1.14	CROSSDRAIN	2.285	1.747	3.514
29+220.000	@ STA. 29+220.000 INSTALL 1-1220 mmØ RCPC x 9.00 LN.M. PROVIDE GROUTED RIPRAP CATCH BASIN ON INLET AND HEADWALL WITH HAND LAID ROCKS PROTECTION ON OUTLET. SLOPE = 2.00% INLET I.E = 566.457 m, CL IE = 566.388 m ,OUTLET I.E = 566.274 m	117.49	0.58	125.85	-	9.00	21.00	7.25	1.40	CROSSDRAIN	4.839	0.482	8.960
TOTAL		300.80	1.37	212.87	18.00	9.00	50.80	15.21	3.68				
SAY,		301.00	2.00	213.00	18.00	9.00	51.00	16.00	4.00				

SUMMARY OF QUANTITIES

ITEM #	DESCRIPTION	UNIT	QUANTITY	REMARKS
103(1)a	STRUCTURE EXCAVATION (COMMON SOIL)	cu.m.	301.00	FOR RCPC
103(3)	FOUNDATION FILL	cu.m.	2.00	FOR RCPC
103(6)a	PIPE CULVERTS AND DRAIN EXCAVATION (COMMON SOIL)	cu.m.	213.00	FOR RCPC
500(1)b3	PIPE CULVERTS, 910mmØ CLASS IV	ln.m.	18.00	FOR CROSS DRAIN
500(1)b5	PIPE CULVERTS, 1220mmØ CLASS IV	ln.m.	9.00	FOR CROSS DRAIN
505(2)a	GROUTED RIPRAP, CLASS "A"	cu.m.	51.00	FOR CATCH BASIN
506(1)	STONE MASONRY	cu.m.	16.00	FOR HEADWALL
508(1)	HAND-LAID ROCK EMBANKMENT	cu.m.	4.00	FOR DUMPED STONE PROTECTION (BOULDERS 250mmØ-300mmØ)

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGIONAL OFFICE NO. XI
GOV. CHAVEZ COR. R. MAGSAYSAY AVENUE, DAVAO CITY

PROJECT NAME AND LOCATION:
CONSTRUCTION OF ROAD SLOPE PROTECTION STRUCTURE - MARAGUSAN-PANTUKAN ROAD (PANTUKAN SECTION), PACKAGE Q, DAVAO DE ORO

SHEET CONTENTS:
DRAINAGE SCHEDULE
SUMMARY OF QUANTITIES

DRAFTED AND PREPARED:
JAMAICA A. MATONG
ENGINEER II
DATE:

REVIEWED:
ALAIN JOHN S. SOTTO
ENGINEER III
DATE:

SUBMITTED:
JUDY ANN V. BERNARDINO
CHIEF, PLANNING AND DESIGN DIVISION
DATE:

RECOMMENDED:
JOSELITO B. CABALLERO
ASSISTANT REGIONAL DIRECTOR
DATE:

APPROVED:
JUBY B. CORDON
REGIONAL DIRECTOR
DATE:

SET NO.: A 10/10

SHEET NO.: 10 / 52

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GENERAL NOTES

SITE PREPARATION

ALL EXISTING PERMANENT WORKS (SUCH AS PAVEMENT CURBS, GUTTERS, RIPRAP, SLOPE PROTECTION WORKS AND ALL OTHER SIMILAR WORKS) WHICH WILL INTERFERE WITH THE WORK SHALL BE COMPLETELY REMOVED AND DISPOSED OFF SITE BY THE CONTRACTOR. ALL SALVAGEABLE MATERIALS SHALL BE PROPERLY AND CAREFULLY DISMANTLED AND DEPOSITED ON A CONVENIENT SITE AS INSTRUCTED BY THE ENGINEER. HOWEVER, IF SUCH PERMANENT WORKS ARE DESIGNATED TO REMAIN BUT IT WILL DEMOLISHED BY THE CONTRACTOR FOR THE NECESSARY PROSECUTION OF THE WORKS, THESE DEMOLISHED PERMANENT WORKS SHALL BE RESTORED BY THE CONTRACTOR TO THEIR ORIGINAL CONDITION.

CONSTRUCTION LIMITS

THE CONTRACTOR SHALL VERIFY AND WORK WITHIN THE CONSTRUCTION LIMITS OF THE PROJECT. HE SHALL HOWEVER PROVIDE FOR ALL OTHER AREAS HE MAY REQUIRE FOR HIS OWN USE. IT IS THE INTENT OF THE PLANS TO LEAVE UNDISTURBED EVERYTHING WHICH DOES NOT ADVERSELY AFFECT THE FINISHED WORK. ALL ARSAS DISTURBED BY CONSTRUCTION SHALL BE RESTORED TO ITS ORIGINAL CONDITION AS DIRECTED BY THE ENGINEER.

RECONSTRUCTION

IF EXISTING PERMANENT WORKS OR PORTIONS THEREOF ARE DESIGNATED TO REMAIN, THE CONTRACTOR SHALL TAKE PRECAUTION NOT TO DAMAGE OR INJURE THESE WORKS. DAMAGE OR INJURY TO THESE WORKS CAUSED BY THE CONTRACTOR SHALL BE REPAIRED AT HIS OWN EXPENSE.

PREPARATION OF SUBGRADE

UNSUITABLE MATERIALS SHALL BE REMOVED FROM THE AREA TO BE OCCUPIED BY THE RETAINING STRUCTURE. ALL ORGANIC MATTER, VEGETATION, SLIDE DEBRIS AND OTHER UNSTABLE MATERIALS SHOULD BE STRIPPED OFF AND THE SUBGRADE COMPACTED.

IN UNSTABLE FOUNDATION AREAS; GROUND IMPROVEMENT METHODS, SUCH AS DYNAMIC COMPACTION, STONE COLUMNS, WICK DRAINS, OR OTHER FOUNDATION STABILIZATION/IMPROVEMENT METHODS WOULD BE CONSTRUCTED PRIOR TO WALL ERECTION.

PLACEMENT AND COMPACTION OF BACKFILL ON THE SUBGRADE TO THE LEVEL OF THE FIRST LAYER OF REINFORCEMENT AND ITS COMPACTION

THE FILL SHALL BE COMPACTED TO THE SPECIFIED DENSITY, 100 PERCENT OF MAXIMUM DRY DENSITY AND WITHIN THE SPECIFIED RANGE OF OPTIMUM MOISTURE CONTENT. COMPACTION MOISTURE CONTENTS DRY OF OPTIMUM ARE RECOMMENDED. A KEY TO GOOD PERFORMANCE IS CONSISTENT PLACEMENT AND COMPACTION. WALL FILL LIFT THICKNESS MUST BE CONTROLLED BASED ON SPECIFICATION REQUIREMENTS AND VERTICAL DISTRIBUTION OF REINFORCEMENT ELEMENTS. THE UNIFORM LOOSE LIFT THICKNESS OF THE REINFORCED BACKFILL SHOULD NOT EXCEED 200 MM (8 INCHES). REINFORCED BACKFILL SHALL BE DUMPED INTO OR PARALLEL TO THE REAR AND MIDDLE OF THE REINFORCEMENT AND BLADED TOWARD THE FRONT FACE. RANDOM FILL PLACEMENT BEHIND THE REINFORCED VOLUME SHOULD PROCEED SIMULTANEOUSLY.

PLACEMENT OF THE FIRST LAYER OF REINFORCING ELEMENTS ON THE BACKFILL

THE REINFORCEMENTS SHALL BE PLACED AND CONNECTED TO THE FACING PANELS, WHEN THE COMPACTED FILL HAS BEEN BROUGHT UP TO THE LEVEL OF THE CONNECTION, THEY SHALL BE GENERALLY PLACED PERPENDICULAR TO BACK OF THE FACING PANELS.

PLACEMENT OF THE BACKFILL OVER THE REINFORCING ELEMENTS TO THE LEVEL OF THE NEXT REINFORCEMENT LAYER AND COMPACTION OF THE BACKFILL

THE PREVIOUSLY OUTLINED STEPS SHALL BE REPEATED FOR EACH SUCCESSIVE LAYER.

MATERIALS

GEOTEXTILE

WOVEN OR NONWOVEN GEOTEXTILES SHALL CONSIST ONLY OF LONG CHAIN POLYMERIC FILAMENTS OR YARNS FORMED INTO A STABLE NETWORK SUCH THAT THE FILAMENTS OR YARNS RETAIN THEIR POSITION RELATIVE TO EACH OTHER DURING HANDLING, PLACEMENT, AND DESIGN SERVICE LIFE. AT LEAST 95 PERCENT BY WEIGHT OF THE LONG CHAIN POLYMER SHALL BE A POLYOLEFIN OR POLYESTER. THE MATERIAL SHALL BE FREE OF DEFECTS AND TEARS. THE GEOTEXTILE SHALL CONFORM AS A MINIMUM TO THE PROPERTIES INDICATED FOR CLASS 1 UNDER AASHTO M-288, GEOTEXTILE SPECIFICATION FOR HIGHWAY APPLICATIONS.

PROPERTIES OF FM GEOTEXTILES		TEST STANDARD	UNIT	FM 2000
INITIAL MECHANICAL PROPERTIES				
WIDE WIDTH TENSILE STRENGTH	MD	ISO 10319	kN/m	125
WIDE WIDTH TENSILE STRENGTH	CD	ISO 10319	kN/m	125
STRAIN AT NOMINAL TENSILE STRENGTH	MD	ISO 10319	%	15
STRAIN AT NOMINAL TENSILE STRENGTH	CD	ISO 10319	%	10
CBR PUNCTURE STRENGTH		ISO 12236	kN	14
DROP CONE PERFORATION DIAMETER		ISO 13433	mm	12
ABRASION RESISTANCE		ASTM D4886	% retained	75
UV RESISTANCE (AT 500 HOURS)		ASTM D4355	% retained	90
HYDRAULIC				
PORE SIZE O 90		ISO 12956	mm	0.35
WATER PERMEABILITY Q 50		ISO 11058	l/m/s	15
IN-WOVEN LOOP PROPERTIES				
LOOP SPACING	MD		m	0.25
LOOP SPACING	CD		m	1.0
LOOP TENSILE STRENGTH	MD		kN	2.0
FORM OF SUPPLY				
WIDTH			m	5.2
LENGTH			m	100

GEOSYNTHETIC PLACEMENT

THE GEOSYNTHETIC REINFORCEMENT SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS, UNLESS OTHERWISE MODIFIED BY THESE SPECIFICATIONS. THE GEOSYNTHETIC REINFORCEMENT SHALL BE PLACED WITHIN THE LAYERS OF THE COMPACTED SOIL AS SHOWN ON THE PLANS OR AS DIRECTED.

THE GEOSYNTHETIC REINFORCEMENT SHALL BE PLACED IN CONTINUOUS LONGITUDINAL STRIPS IN THE DIRECTION OF MAIN REINFORCEMENT. JOINTS IN THE DESIGN STRENGTH DIRECTION (PERPENDICULAR TO THE SLOPE) SHALL NOT BE PERMITTED WITH GEOTEXTILE OR GEOGRID, EXCEPT AS INDICATED ON THE DRAWINGS.

HORIZONTAL COVERAGE OF LESS THAN 100 PERCENT SHALL NOT BE ALLOWED UNLESS SPECIFICALLY DETAILED IN THE CONSTRUCTION DRAWINGS. IN THE CASE OF 100% COVERAGE IN PLAN VIEW ADJACENT STRIPS NEED NOT BE OVERLAPPED.

ADJACENT ROLLS OF GEOSYNTHETIC REINFORCEMENT SHALL BE OVERLAPPED OR MECHANICALLY CONNECTED WHERE EXPOSED IN A WRAP-AROUND FACE SYSTEM, AS APPLICABLE.

PLACE ONLY THAT AMOUNT OF GEOSYNTHETIC REINFORCEMENT REQUIRED FOR IMMEDIATELY PENDING WORK TO PREVENT UNDUE DAMAGE. AFTER A LAYER OF GEOSYNTHETIC REINFORCEMENT HAS BEEN PLACED, THE NEXT SUCCEEDING LAYER OF SOIL SHALL BE PLACED AND COMPACTED AS APPROPRIATE. AFTER THE SPECIFIED SOIL LAYER HAS BEEN PLACED, THE NEXT GEOSYNTHETIC REINFORCEMENT LAYER SHALL BE INSTALLED. THE PROCESS SHALL BE REPEATED FOR EACH SUBSEQUENT LAYER OF GEOSYNTHETIC REINFORCEMENT AND SOIL.

GEOSYNTHETIC REINFORCEMENT SHALL BE PLACED TO LAY FLAT AND PULLED TIGHT PRIOR TO BACKFILLING. AFTER A LAYER OF GEOSYNTHETIC REINFORCEMENT HAS BEEN PLACED, SUITABLE MEANS, SUCH AS PINS OR SMALL PILES OF SOIL, SHALL BE USED TO HOLD THE GEOSYNTHETIC REINFORCEMENT IN POSITION UNTIL THE SUBSEQUENT SOIL LAYER CAN BE PLACED. UNDER NO CIRCUMSTANCES SHALL A TRACK-TYPE VEHICLE BE ALLOWED ON THE GEOSYNTHETIC REINFORCEMENT BEFORE AT LEAST 150 MM OF SOIL HAS BEEN SUDDEN BRAKING AND SHARP TURNING – SUFFICIENT TO DISPLACE FILL – SHALL BE AVOIDED.

DURING CONSTRUCTION, THE SURFACE OF THE FILL SHOULD BE KEPT APPROXIMATELY HORIZONTAL. GEOSYNTHETIC REINFORCEMENT SHALL BE PLACED DIRECTLY ON THE COMPACTED HORIZONTAL FILL SURFACE. GEOSYNTHETIC REINFORCEMENTS ARE TO BE PLACED WITHIN 75 MM OF THE DESIGN ELEVATIONS AND EXTEND THE LENGTH AS SHOWN ON THE ELEVATION VIEW UNLESS OTHERWISE DIRECTED BY THE OWNER'S ENGINEER. CORRECT ORIENTATION OF THE GEOSYNTHETIC REINFORCEMENT SHALL BE VERIFIED BY THE CONTRACTOR.

FILL PLACEMENT

FILL SHALL BE COMPACTED AS SPECIFIED BY PROJECT SPECIFICATIONS OR TO 100 PERCENT OF THE MAXIMUM DRY DENSITY.

DENSITY TESTING SHALL BE MADE EVERY 500 CU M SOIL PLACEMENT OR AS OTHERWISE SPECIFIED BY THE ENGINEER FROM THIS OFFICE OR CONTRACT DOCUMENTS.

BACKFILL SHALL BE PLACED, SPREAD, AND COMPACTED IN SUCH A MANNER TO MINIMIZE THE DEVELOPMENT OF WRINKLES AND/OR DISPLACEMENT OF THE GEOSYNTHETIC REINFORCEMENT.

FILL SHALL BE PLACED IN 200 MM MAXIMUM LIFT THICKNESS WHERE HEAVY COMPACTION EQUIPMENT IS TO BE USED, AND 150 MM MAXIMUM UNCOMPACTED LIFT THICKNESS WHERE HAND OPERATED EQUIPMENT IS USED.

BACKFILL SHALL BE GRADED AWAY FROM THE SLOPE CREST AND ROLLED AT THE END OF EACH WORK DAY TO PREVENT PONDING OF WATER ON SURFACE OF THE REINFORCED SOIL MASS.

TRACKED CONSTRUCTION EQUIPMENT SHALL NOT BE OPERATED DIRECTLY UPON THE GEOSYNTHETIC REINFORCEMENT. A MINIMUM FILL THICKNESS OF 150 MM IS REQUIRED PRIOR TO OPERATION OF TRACKED VEHICLES OVER THE GEOSYNTHETIC REINFORCEMENT. TURNING OF TRACKED VEHICLES SHOULD BE KEPT TO A MINIMUM TO PREVENT TRACKS FROM DISPLACING THE FILL AND THE GEOSYNTHETIC REINFORCEMENT.

IF APPROVED BY THE ENGINEER, RUBBER-TIRED EQUIPMENT MAY PASS OVER THE GEOSYNTHETIC REINFORCEMENT AT SPEEDS OF LESS THAN 16 KM/H, SUDDEN BRAKING AND SHARP TURNING SHALL BE AVOIDED.

CONCRETE

CONCRETE STRENGTH BY CLASS.

STRUCTURAL MEMBER	CLASS	14-DAY CYLINDER STRENGTH		MAX SIZE OF COARSE AGGREGATE, mm(in.)
		MPa	PSI	
PILE CAP	A	27.58	4000	20
FOUNDATION	A	27.58	4000	20

THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER FOR APPROVAL THE PLACING SEQUENCES FOR ALL TYPES OF CONCRETING WORK.

DESIGN FOR CONCRETE STRENGTH SHALL BE AS SET FORTH UNDER ITEM NO. 1 OF MATERIALS.

CONCRETE SHALL BE DEPOSITED, VIBRATED AND CURED IN ACCORDANCE WITH THE GENERAL SPECIFICATIONS.

REINFORCING STEEL

REINFORCING STEEL SHALL CONFORM TO AASHTO M31 (ASTM A615), GRADE 40, DEFORMED WITH MINIMUM YIELD STRENGTH, fy=276 MPa (40,000 PSI) FOR BARS 16mm Ø OR SMALLER AND GRADE 60 WITH MINIMUM YIELD STRENGTH, fy=414 MPa (60,000 PSI) FOR LARGER THAN 16mm Ø.

REINFORCING STEEL SHALL BE FREE OF MILL SCALES, OIL OR ANY SUBSTANCES WHICH WILL WEAKEN THE BOND WITH CONCRETE.

BAR BENDING, SPLICING AND PLACING

(1) THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER FOR APPROVAL OF SHOP DRAWINGS INDICATING THE BENDING, CUTTING, SPLICING AND INSTALLATION OF ALL REINFORCING BARS.

(2) BARS SHALL BE BENT COLD. BARS PARTIALLY EMBEDDED IN CONCRETE SHALL NOT BE FIELD BENT UNLESS PERMITTED BY THE ENGINEER.

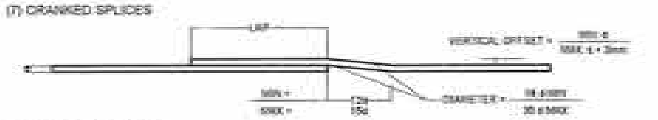
(3) BAR SPLICING NOT INDICATED ON DRAWINGS SHALL BE SUBJECT TO THE APROVAL OF THE ENGINEER.

(4) WELDED SPLICES, IF APPROVED BY THE ENGINEER , SHALL DEVELOP IN TENSION AT LEAST 125% OF THE SPECIFIED YIELD STRENGTH OF BARS.

(5) NOT MORE THAN 50% OF THE BARS AT ANY ONE SECTION SHALL BE SPLICED.

(6) UNLESS OTHERWISE SHOWN ON DRAWINGS, THE CLEAR DISTANCE BETWEEN PARALLEL BARS IN A LAYER SHALL NOT BE LESS THAN 1.5 TIMES THE NOMINAL DIAMETER OF THE BAR NOR LESS THAN 1.5 TIMES THE MAXIMUM SIZE OF COARSE AGGREGATE. THE CLEAR DISTANCE BETWEEN LAYERS SHALL NOT BE LESS THAN 25mm NOT ONE BAR DIAMETER. THE BARS IN THE UPPER LAYER SHALL BE PLACED DIRECTLY ABOVE THOSE IN THE BOTTOM LAYER.

(7) CRANKED SPLICES



(8) HOOKS AND BENDS

SURVEY SPECIFICATION

SURVEY INSTRUMENT USED	DATE SURVEYED	PROJECT CONTROL POINTS	REMARKS
T.S - GEOMAX ZOOM50 SN 2837596, RTK BASE: 1049127 (70+), ROVER: 1049126 (70+)	NOVEMBER 26-27, 2024	REFER TO PLAN AND PROFILE	ALL PROJECT CONTROL POINTS ARE PROJECTED IN PRS '92 GRID COORDINATE SYSTEM (ZONE 5)

BENCHMARK AND DESCRIPTION

BENCHMARK	NORTHING	EASTING	ELEVATION (METERS)	DESCRIPTION
BM NO. 6	790618.583	609972.279	565.193	#4 COMMON NAIL DRIVEN AT ANAGDONG TREE AT RP-2 OF PI-25, RIGHT SIDE

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGIONAL OFFICE NO. XI
GOV. CHAVEZ COR. R. MAGSAYSAY AVENUE, DAVAO CITY

PROJECT NAME AND LOCATION	SHEET CONTENTS	PREPARED	REVIEWED	SUBMITTED	RECOMMENDED	APPROVED	SET NO.	SHEET NO.
CONSTRUCTION OF ROAD SLOPE PROTECTION STRUCTURE - MARAGUSAN-PANTUKAN ROAD (PANTUKAN SECTION), PACKAGE Q, DAVAO DE ORO	GENERAL NOTES FOR SLOPE PROTECTION	LESTER [illegible] ENGINEER II DATE:	ALGIN A. GINSAYAN ENGINEER III, SECTION CHIEF DATE:	JUDY ANN T. BERNARDINO CHIEF, PLANNING AND DESIGN DIVISION DATE:	JOSELITO B. CABALLERO ASSISTANT REGIONAL DIRECTOR DATE:	JUBY B. CORDON REGIONAL DIRECTOR DATE:	B 01 07	11 52

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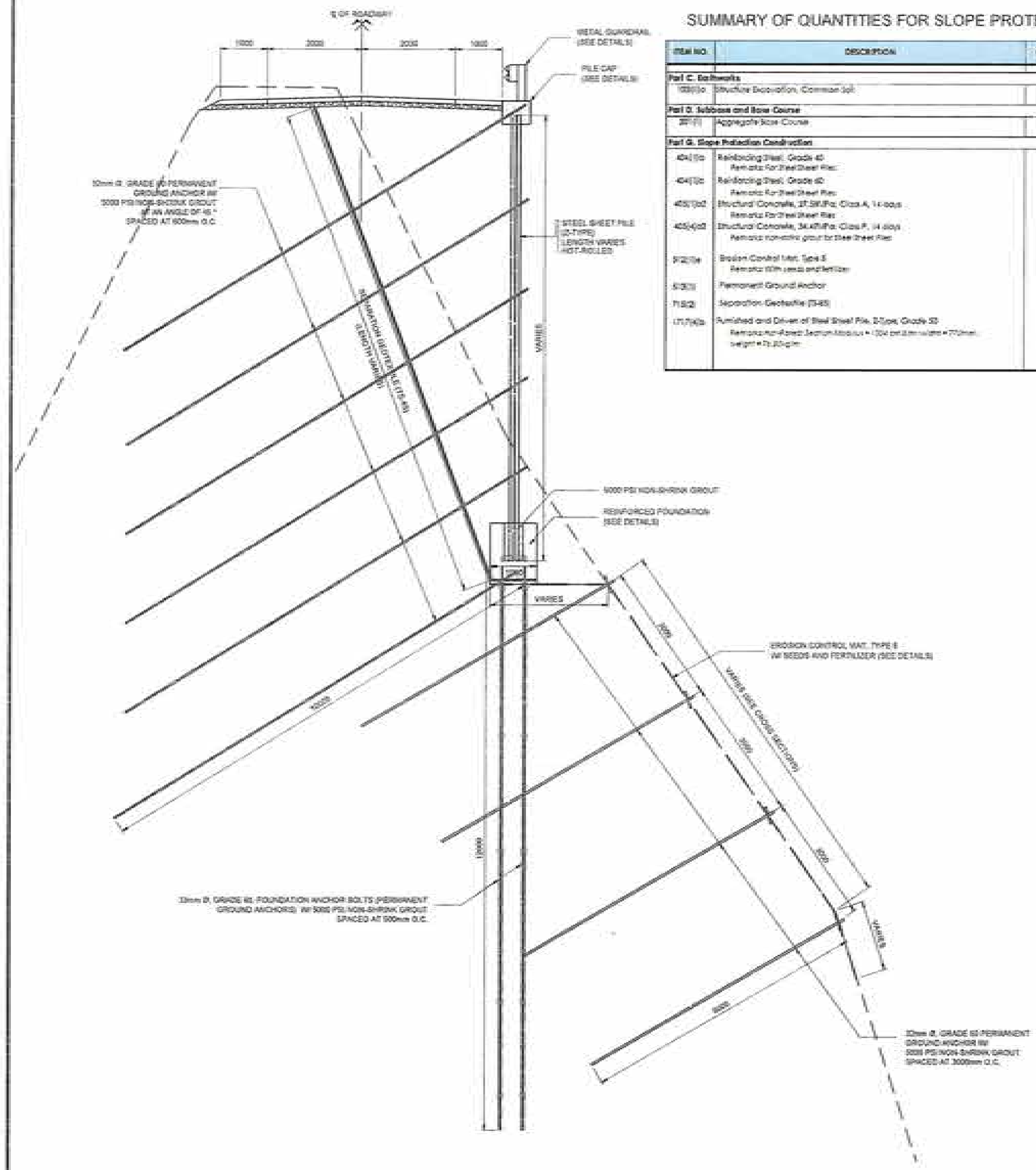
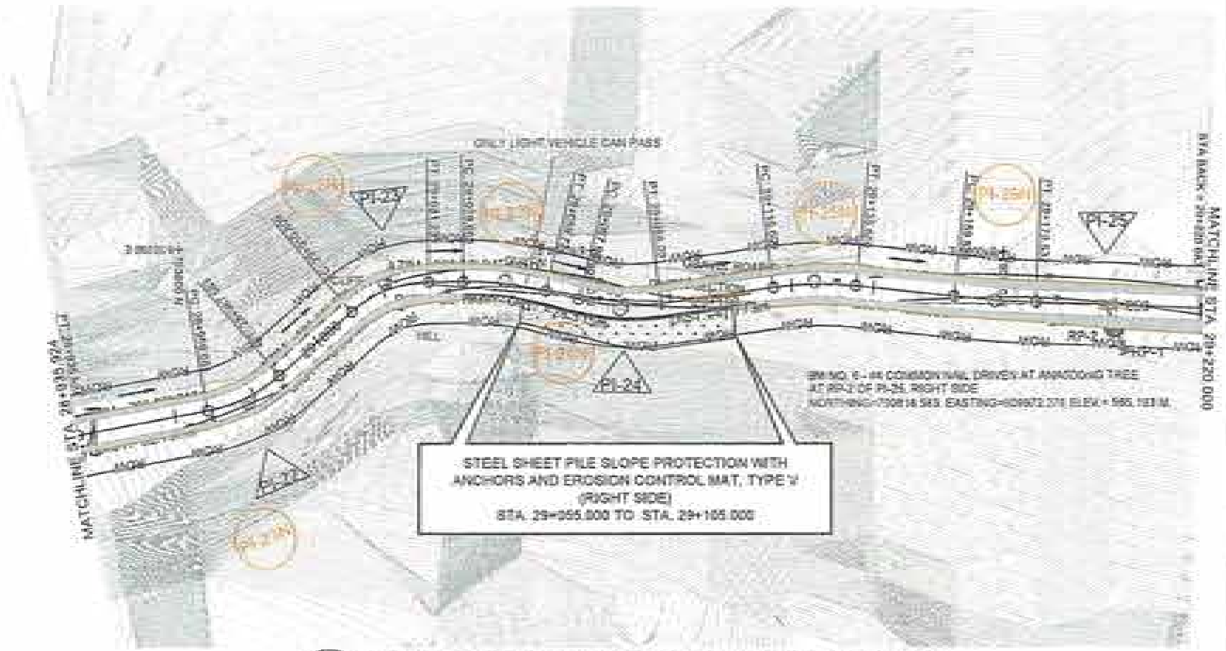


2 TYPICAL CROSS SECTION FOR SLOPE PROTECTION
SCALE 1:80

SUMMARY OF QUANTITIES FOR SLOPE PROTECTION

ITEM NO.	DESCRIPTION	QUANTITY	UNIT
Part C. Earthworks			
103(1)a	Structure Excavation, Common Soil	477.45	m³
Part D. Subbase and Base Course			
201(1)	Aggregate Base Course	577.88	m³
Part G. Slope Protection Construction			
404(1)a	Reinforcing Steel, Grade 40 Remarks: For Steel Sheet Piles	3,572.00	kg
404(1)c	Reinforcing Steel, Grade 60 Remarks: For Steel Sheet Piles	7,770.00	kg
405(1)a2	Structural Concrete, 27.58MPa, Class A, 14 days Remarks: For Steel Sheet Piles	44.00	m³
405(4)a2	Structural Concrete, 34.47MPa, Class P, 14 days Remarks: non-shrink grout for Steel Sheet Piles	14.00	m³
512(1)e	Erosion Control Mat, Type 5 Remarks: With seeds and fertilizer	588.55	m²
513(1)	Permanent Ground Anchor	4,960.00	lm
715(2)	Separation Geotextile (TS-65)	399.80	m²
1717(4)a	Furnished and Driven of Steel Sheet Pile, Z-type, Grade 50 Remarks: Hot-Rolled: Section Modulus = 1304 cm³/m; width = 770mm; weight = 73.20 kg/m	421.00	lin.m



1 LOCATION PLAN FOR SLOPE PROTECTION
SCALE 1:1000

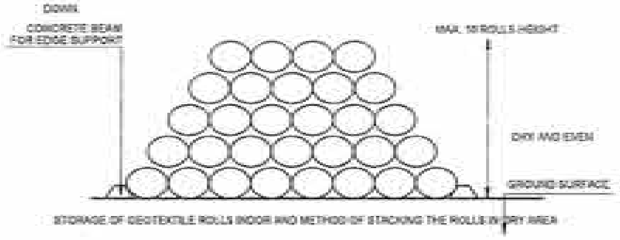
NOTES ON GEOTEXTILE

METHODS OF STORAGE:

THE GEOTEXTILES DELIVERED TO SITE SHALL BE STORED IN COVERED AREA ON A FIRM AND LEVEL FOUNDATION.THE GEOTEXTILE SHALL BE PREFERABLY BE PLACED ON WOODEN BEAM SUPPORT (ELEVATED SAY 100mm ABOVE GROUND LEVEL) TO AVOID DIRECT CONTACT WITH THE GROUND LEVEL. THIS IS TO PREVENT THE GEOTEXTILE FROM GETTING SOAK OR WET DURING RAIN FLOODING.

THE GEOTEXTILE SHALL BE STACKED IN TRIANGULAR MANNER NOT MORE THAN 10 ROLLS IN HEIGHT AND SUFFICIENT LATERAL RESTRAINT MUST BE PROVIDED TO PREVENT COLLAPSE OF THE STACKED ROLLS. LATERAL RESTRAINT CAN BE PROVIDED THROUGH HEAVY CONCRETE BLOCKS PLACED ON BOTH ENDS OF THE STACK.

WHERE PROPER COVERED STORAGE AREA IS NOT AVAILABLE THE ENTIRE STACKED ROLLS OF GEOTEXTILES SHALL BE COVERED WITH TARPAULIN OR PLASTIC SHEET AND FIRMLY WEIGHTED DOWN.



STORAGE OF GEOTEXTILE ROLLS INDOOR AND METHOD OF STACKING THE ROLLS IN DRY AREA

PROPERTIES OF GEOTEXTILE:

SEPARATION GEOTEXTILE

GEOTEXTILE OF NON-WOVEN SHEET

POSSIBL AK-150

PRODUCT DESCRIPTION: SPUNBOND CONTINUOUS FILAMENT YARN, NEEDLE PUNCHED

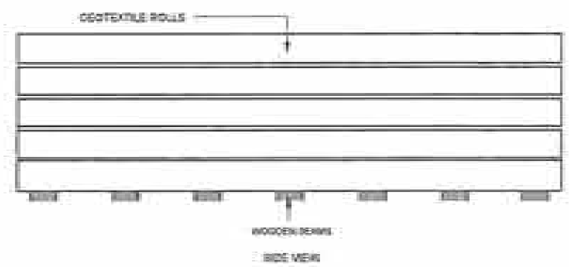
TECHNICAL DATA	TEST METHOD (BASED ON)	UNIT	VALUE
RAW MATERIAL	--	--	100% POLYESTER
THICKNESS	JIS L-1908	mm	1.5 OR GREATER
WEIGHT	JIS L-1908	g / m²	150 OR GREATER
TENSILE STRENGTH	JIS L-1908	N / 5cm	WARP X WEFT 360 X 340 OR GREATER
ELONGATION	JIS L-1908	%	WARP X WEFT 55 X 55 OR GREATER
PERMEABILITY	JIS A-1218	cm / sec	1 X 10⁻¹ OR GREATER

SEPARATION GEOTEXTILE

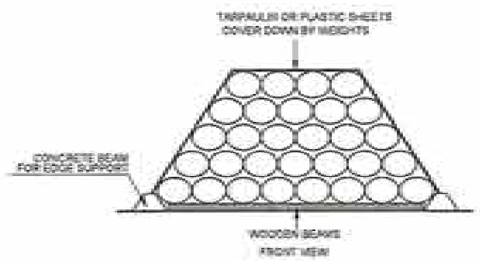
THE GEOTEXTILE SHALL BE UNROLLED AS SMOOTHLY AS POSSIBLE ON THE PREPARED SUBGRADE IN THE DIRECTION OF CONSTRUCTION TRAFFIC. ADJACENT GEOTEXTILE ROLLS SHALL BE OVERLAPPED IN THE DIRECTION OF SUBBASE PLACEMENT USING THE GUIDELINES TABLE 3. SEWING IS RECOMMENDED WHRE SUBGRADE SOILS HAVE A C.B.R. VALUES LESS THAN 1. THE GEOTEXTILE MAY BE HELD IN PLACE PRIOR TO SUBBASE PLACEMENT BY PINS, STAPLES, OR PILES OF FILL OR ROCK. ON CURVES, THE GEOTEXTILE MAYBE FOLDED OR CUT TO CONFORM TO THE CURVE. THE FOLD OR OVERLAP SHALL BE IN THE DIRECTION OF CONSTRUCTION AND HELD IN PLACE AS PRESCRIBED ABOVE.

TABLE 3 RECOMMENDED OVERLAPS

SOIL STRENGTH (CBR)	UNSEWN OVERLAP (mm)	OVERLAP (mm)
LESS THAN 1	-	229
1 - 2	350	203
2 - 3	152	78
3 AND ABOVE	610	-



SIDE VIEW



FRONT VIEW

REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS REGIONAL OFFICE NO. XI GOV. CHAVEZ COR. R. MAGSAYSAY AVENUE, DAVAO CITY	PROJECT NAME AND LOCATION: CONSTRUCTION OF ROAD SLOPE PROTECTION STRUCTURE - MARAGUSAN-PANTUKAN ROAD (PANTUKAN SECTION), PACKAGE Q, DAVAO DE ORO	SHEET CONTENTS: SUMMARY OF QUANTITIES, TYPICAL CROSS SECTION AND LOCATION PLAN FOR SLOPE PROTECTION NOTES ON GEOTEXTILE	PREPARED: LESTER G. PADILLA ENGINEER II DATE:	REVIEWED: ALGIN A. GINGA ENGINEER III, SECTION DATE:	SUBMITTED: JUDY T. BERNARDINO CHIEF, PLANNING AND DESIGN DIVISION DATE:	RECOMMENDED: JOSELITO B. CABALLERO ASSISTANT REGIONAL DIRECTOR DATE:	APPROVED: JUBY B. CORDON REGIONAL DIRECTOR DATE:	SET NO. B 02 07	SHEET NO. 12 52

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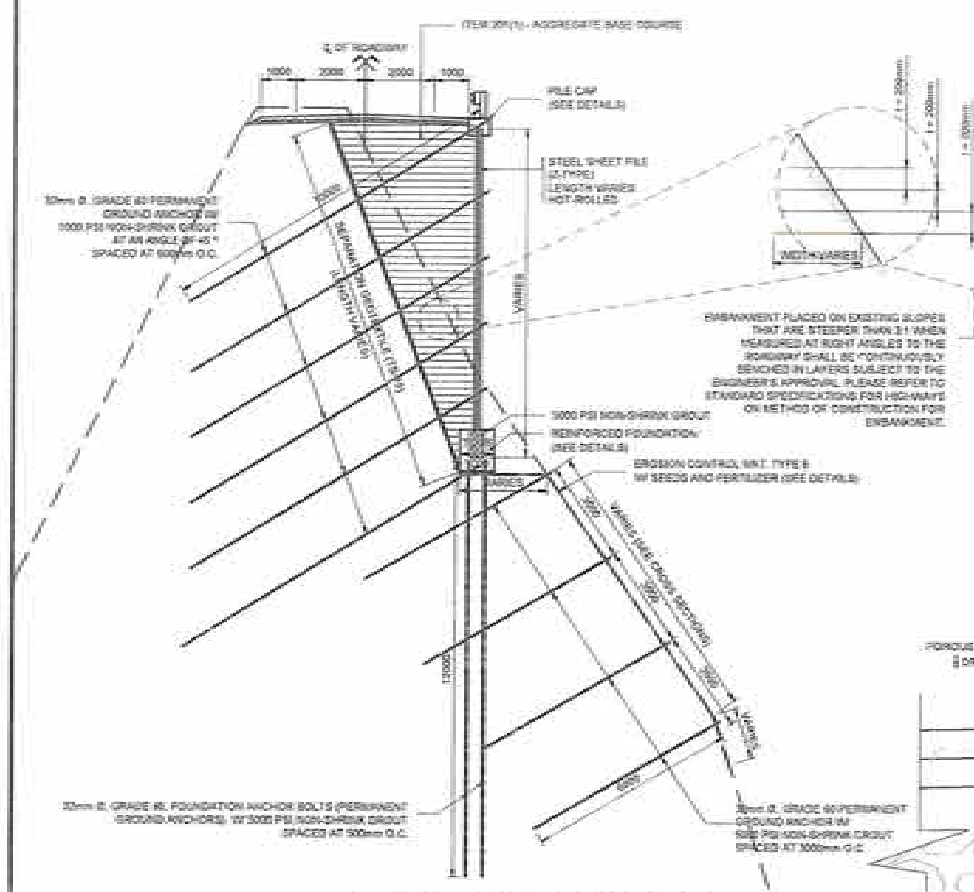
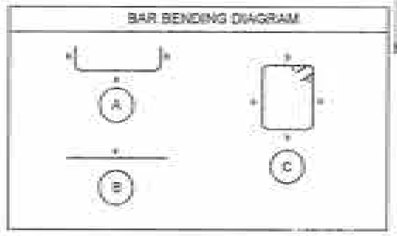
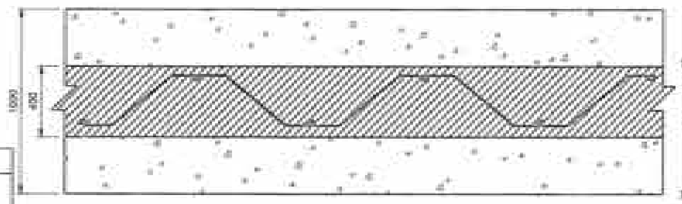
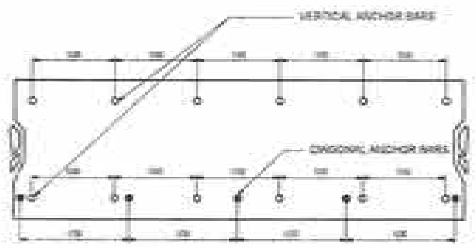


1 TYPICAL SECTION OF ROAD SLIP PROTECTION SYSTEM
SCALE NTS

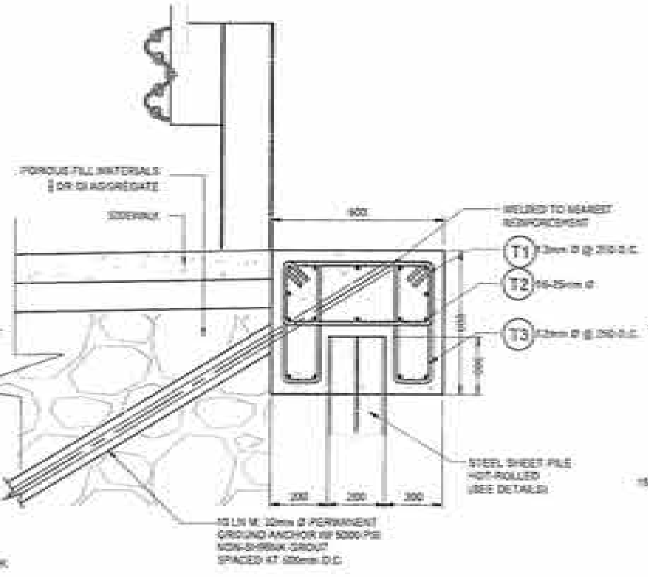




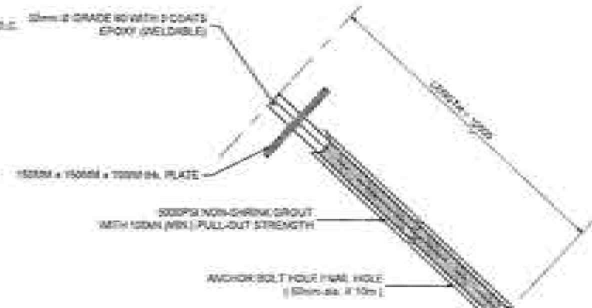
3 PLAN OF DETAIL B
SCALE NTS



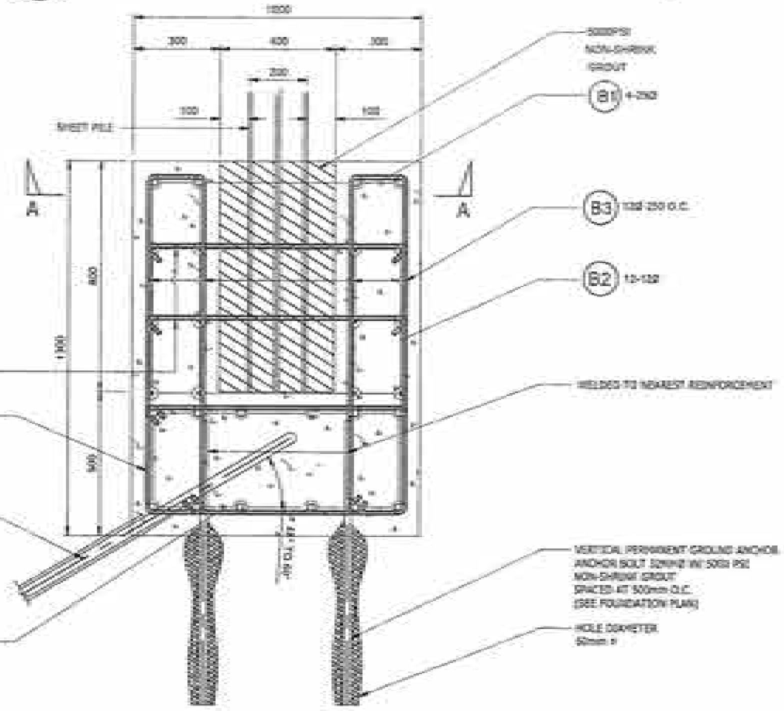
4 FOUNDATION PLAN
SCALE NTS



2 DETAIL A
SCALE NTS



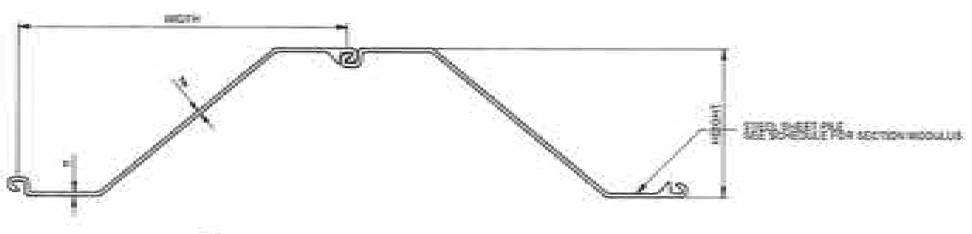
6 ANCHOR BOLT DETAIL
SCALE NTS



5 DETAIL B
SCALE NTS

REINFORCING STEEL BAR SCHEDULE FOR PILE CAP AND FOUNDATION

MARK	SIZE (mmØ)	QTY	SHAPE	SPACING	DIMENSIONS (mm) a	b	c	CUT LENGTH: LENGTH PER BAR (m)	LAP LENGTH	TOTAL LENGTH PER BAR (m)	TOTAL LENGTH (m)	UNIT WEIGHT (kg/m)	TOTAL WT. (ADJUSTED)
T1	12	200	C	250	800	400	200	2.600	0.00	2.600	520.00	0.888	462
T2	25	20	A	AS SHOWN	50,000			50.000	6.00	56.000	1,120.00	3.854	4317
T3	12	200	C	250	150	400		1.100	0.00	1.100	220.00	0.888	195
B1	25	4	A	AS SHOWN	50,000			50.000	6.00	56.000	224.00	3.854	863
B2	12	12	A	AS SHOWN	50,000			50.000	2.88	52.880	634.56	0.888	564
B3	12	200	C	250	200	1125		2.650	0.00	2.650	530.00	0.888	471
B4	12	200	C	250	900	375	200	2.750	0.00	2.750	550.00	0.888	489
B5	25	12	A	AS SHOWN	50,000			50.000	6.00	56.000	672.00	3.854	2590
B6	12	400	B	250	400	100		1.100	0.00	1.100	440.00	0.888	391
												TOTAL	10,242.000
												GRADE 40	2,572.000
												GRADE 60	7,770.000



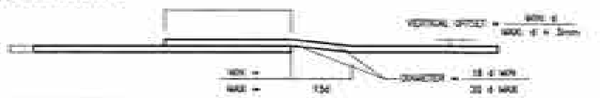
7 SHEET PILE DETAIL
SCALE NTS

GENERAL NOTES

1. STEEL SHEET PILE
   - (a) STEEL SHEET PILES SHALL BE OF TYPE, WEIGHT AND SECTION MODULUS INDICATED ON THE PLANS OR SPECIAL PROVISIONS, AND SHALL CONFORM TO THE REQUIREMENT OF ITEM 400 PILING, SUBSECTION 400.2.7 SHEET PILES.
   - (b) PAINTING SHALL CONFORM TO THE REQUIREMENTS FOR ITEM 411, PAINT, SUBSECTION 411.3.6.2, PAINTING STRUCTURAL STEEL.
2. CONSTRUCTION REQUIREMENTS
   - (a) SHEET PILES SHALL BE DRIVEN TO ELEVATION SHOWN ON 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.
   - (b) THE TOP OF THE PILING SHALL BE DRIVEN OR CUT-OFF TO A STRAIGHT LINE AT THE ELEVATION INDICATED ON THE PLANS.
   - (c) THE REQUIREMENTS GOVERNING THE INSTALLATION OF SHEET PILING SHALL CONFORM IN GENERAL TO THOSE GOVERNING BEARING PILES AS SET FORTH UNDER ITEM 400, PILING.
3. METHOD OF MEASUREMENT
   - (a) SHEET PILING WILL BE MEASURED BY THE LINEAR METER OF SHEET PILING AS SHOWN ON THE PLANS OR AS DIRECTED IN WRITING BY THE ENGINEER, COMPLETE IN PLACE AND ACCEPTED. HOWEVER, MEASUREMENT OF PILING WHICH HAS BEEN DELIVERED TO PLAN LENGTH AND CANNOT BE DRIVEN ACCORDING TO PLAN OR DIRECTED ELEVATION BECAUSE OF SUBSURFACE CONDITION SHALL BE MEASURED AS IF DRIVEN TO THAT ELEVATIONS.
4. CONCRETE
   - a. CONCRETE STRENGTH BY CLASS

STRUCTURAL MEMBER	CLASS	28-DAY CYLINDER STRENGTH MPa	PSI	MAX SIZE OF COARSE AGGREGATE, mm(in.)
PILE CAP	A	27.58	4000	20
FOUNDATION	A	27.58	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 STRENGTH 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.
5. REINFORCING STEEL
   - (a) REINFORCING STEEL SHALL CONFORM TO AASHTO M31 (ASTM A615), GRADE 40, DEFORMED WITH MINIMUM YIELD STRENGTH, fy=276 MPa (40,000 PSI) FOR BARS 16mm Ø OR SMALLER AND GRADE 60 WITH MINIMUM YIELD STRENGTH, fy=414MPa (60,000 PSI) FOR LARGER THAN 16mm Ø.
   - (b) REINFORCING STEEL SHALL BE FREE OF MILL SCALES OIL OR ANY SUBSTANCES WHICH WILL WEAKEN THE BOND WITH CONCRETE.
6. BAR BENDING, SPLICING AND PLACING
   - (1) THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER FOR APPROVAL OF SHOP DRAWINGS INDICATING THE BENDING, CUTTING, SPLICING AND INSTALLATION OF ALL REINFORCING BARS.
   - (2) BARS SHALL BE BENT COLD. BARS PARTIALLY EMBEDDED IN CONCRETE SHALL NOT BE FIELD BENT UNLESS PERMITTED BY THE ENGINEER.
   - (3) BAR SPLICING NOT INDICATED ON DRAWINGS SHALL BE SUBJECT TO THE APPROVAL OF THE ENGINEER.
   - (4) WELDED SPLICES, IF APPROVED BY THE ENGINEER, SHALL DEVELOP IN TENSION AT LEAST 125% OF THE SPECIFIED YIELD STRENGTH OF BARS.
   - (5) NOT MORE THAN 50% OF THE BARS AT ANY ONE SECTION SHALL BE SPLICED.
   - (6) UNLESS OTHERWISE SHOWN ON DRAWINGS, THE CLEAR DISTANCE BETWEEN PARALLEL BARS IN A LAYER SHALL NOT BE LESS THAN 1.5 TIMES THE NOMINAL DIAMETER OF THE BAR NOR LESS THAN 1.5 TIMES THE MAXIMUM SIZE OF COARSE AGGREGATE. THE CLEAR DISTANCE BETWEEN LAYERS SHALL NOT BE LESS THAN 25mm NOR ONE BAR DIAMETER. THE BARS IN THE UPPER LAYER SHALL BE PLACED DIRECTLY ABOVE THOSE IN THE BOTTOM LAYER.
   - (7) CRANKED SPLICES

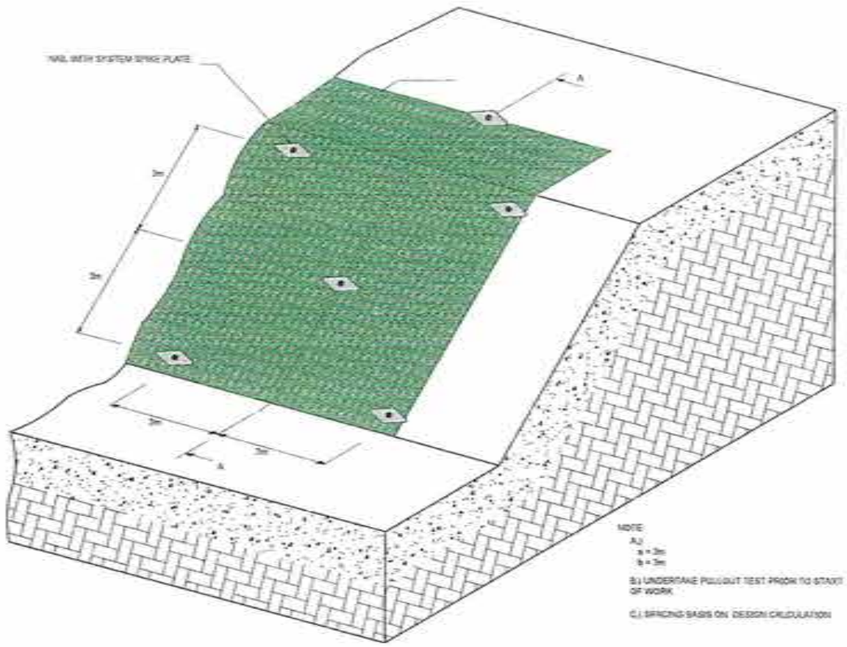


   - (8) HOOKS AND BENDS
     DIMENSIONS OF 90° AND 180° HOOKS

PROPERTIES OF STEEL SHEET PILES			
STEEL GRADE	WIDTH (mm)	SECTION MODULUS cm³/m	LENGTH (mm)
355	770	1,304	VARIES (SEE SHEET PILE SCHEDULE)

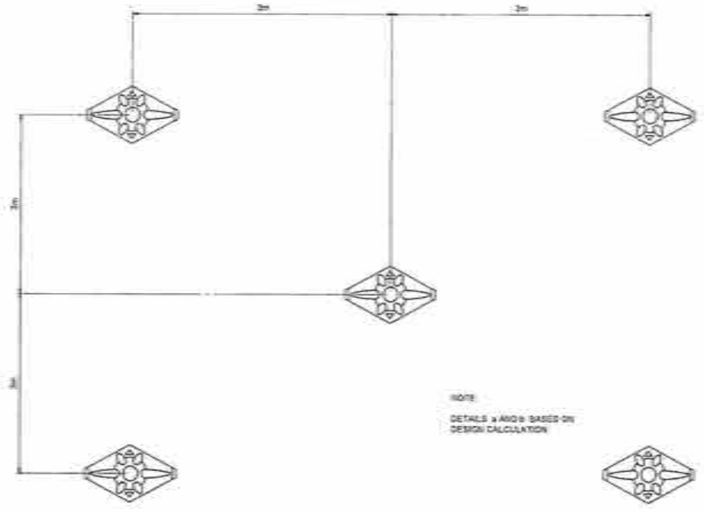
REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS REGIONAL OFFICE NO. XI GOV. CHAVEZ COR. R. SINGSAYSAY AVENUE, DAVAO CITY	PROJECT NAME AND LOCATION: CONSTRUCTION OF ROAD SLOPE PROTECTION STRUCTURE - MARAGUSAN-PANTUKAN ROAD (PANTUKAN SECTION), PACKAGE Q, DAVAO DE ORO	SHEET CONTENTS: TYPICAL SECTION OF SLOPE PROTECITON SYSTEM FOUNDATION DETAIL DETAIL OF ANCHOR BOLT STEEL SHEET PILE DETAIL	PREPARED: LESTER ... PADILLA ENGINEER II DATE:	REVIEWED: ALGIN A. GINGOYAN ENGINEER III, SECTION ... DATE:	SUBMITTED: JUDY ANN T. BERNARDINO CHIEF, PLANNING AND DESIGN DIVISION DATE:	RECOMMENDED: JOSELITO B. CABALLERO ASSISTANT REGIONAL DIRECTOR DATE:	APPROVED: JUBY B. CORDON REGIONAL DIRECTOR DATE:	SET NO. B 03/07	SHEET NO. 13 52

D:\DPWH XI_BRIDGES AND OTHER PUBLIC WORKS_SLOPE PROTECTION\2025 INFRA PROJECTS\MARAGUSAN-PANTUKAN\TYPICAL AND BACKUP\TYPICAL HIGH TENSILE MESH FINAL_SCHEME 5.DWG

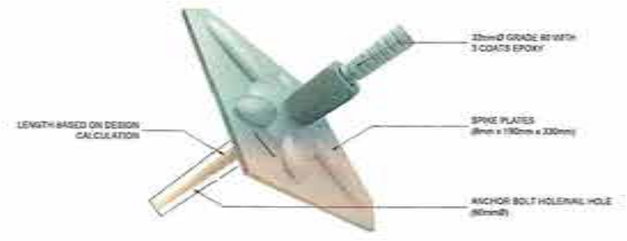


1 ISOMETRIC VIEW
AS SHOWN

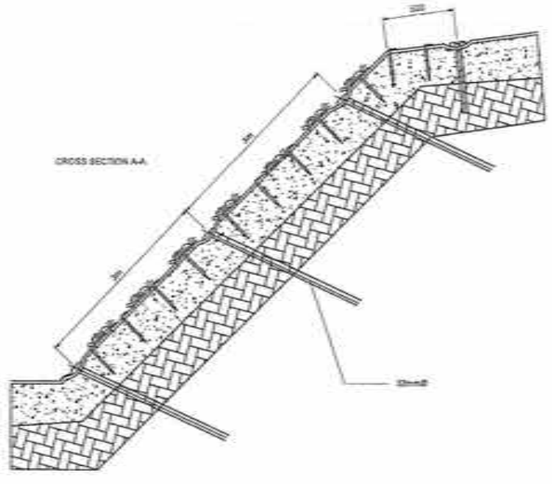
GENERAL SPECIFICATION		
I. MATERIAL	PROPERTIES	SPECIFICATION
1. ACCELERATED WEATHERING	1000 HRS, UNITL 5% DBP	ASTM B117
2. ANCHOR BOLTS	32mm DIA, GRADE 60 WELDABLE DEFORMED BAR W/ 3 COATS EPOXY COATING THICKNESS: 175 µm TO 300 µm	PNS 49, 2002 COATING: ASTM A934M
3. ANCHOR / SPIKE PLATE	8mm (THICK) x 150mm (WIDTH) x 330mm (LENGTH) ZINC COATED (HOT-DIP GALVANIZED) MIN. COAT WEIGHT: 530 g/m² MIN. YIELD STRENGTH: 245 MPa TENSILE STRENGTH: 400-550 MPa	THICKNESS: ASTM A6M YIELD AND TENSILE STRENGTH: ASTM A36M / JIS G 3101 COATING: ASTM A123M / JIS H 8641
4. CEMENT GROUT	NON SHRINK GROUT, 5,000 PSI AT 14 DAYS	ASTM C 109 AND ASTM 1107
II. MATERIAL TESTING	PROPERTIES	TEST METHOD
DPWH REPRESENTATIVE SHALL WITNESS ACTUAL TESTING AS PER SPECIFICATION	1. STEEL PLATES	YIELD AND TENSILE STRENGTH: ASTM 370M/ BENDING MOMENT RESISTANCE: EAD 330005-00-0318, ANNEX A
	2. ANCHOR BOLTS	COATING: ASTM A90M/ISO 1461 ASTM A370M
	3. GROUT	ASTM C109M AND AASHTO T 106
III. EQUIPMENTS	SPECIFICATION	
1. PNEUMATIC ROTARY HAMMER DRILL DRY TYPE	A. DRILLED HOLES SHALL BE FROM 83-90 mm Ø B. NO WATER WILL BE ALLOWED TO BE INTRODUCED DURING THE DRILLING PROCESS	
2. AIR COMPRESSOR	10 BAR (MIN)	
3. HYDROSEEDING MACHINE	A. MACHINE CAN SPRAY MINIMUM OF 40 METERS B. THE MATERIALS TO BE SPRAYED SHALL BE A MIXTURE OF PULP, FERTILIZER, CENTROCEMA SEED 50%, CALOPOGONIUM 50%, AND TRACKIFIER. THE HYDROSEEDING MACHINE USED FOR THE CONSTRUCTION SHALL BE ABLE TO SPRAY A MINIMUM OF 40 METERS. C. WATERING OF HYDROSEEDED MATERIALS SHALL BE MAINTAINED FOR SIXTY (60) DAYS	
4. BOOM TRUCK	MINIMUM LENGTH OF BOOM TRUCK SHALL BE 20 METERS	
5. GROUT PUMP	SCREW TYPE UR PNEUMATIC	
6. PULLOUT TESTING EQUIPMENT	PULLOUT EQUIPMENT SHALL HAVE A CAPACITY OF 200Kn (MINIMUM), LOADING REQUIREMENT OF ANCHOR BOLTS SHALL BE BASED ON THE DESIGN CALCULATION WHICH SHALL UNDERTAKEN ONE (1) WEEK FROM DATE OF GROUTING. TWO (2) ANCHOR BOLTS SHALL BE TESTED AND VERIFIED IF IN ACCORDANCE TO DESIGN CALCULATION.	
IV. WARRANTY ON INSTALLATION	CONTRACTOR OR INSTALLER SHALL PROVIDE A TEN (10) YEARS WARRANTY FOR LABOR AND SHALL REPLACE ANY DEFECTIVE WORKS AT NO COST TO DPWH.	
V. PATENT & MATERIALS WARRANTY	1. MANUFACTURER SHALL PROVIDE A TEN(10) YEARS WARRANTY FOR MATERIALS AND COMPONENTS AND SHALL REPLACE DEFECTIVE MATERIALS. FURTHER MORE, WARRANTY SHALL BE DULY COVERED BY A REPUTABLE INSURANCE COMPANY.	
	2. CONTRACTOR / MANUFACTURER SHALL FULLY RESPECT INTERNATIONAL PATENT RIGHTS. IT SHALL SUBMIT CERTIFICATION THAT MATERIAL TO BE SUPPLIED THE PROJECT ARE NOT COUNTERFEIT PRODUCTS	



2 NAIL ARRANGEMENT ALONG EROSION MAT
SCALE NTS



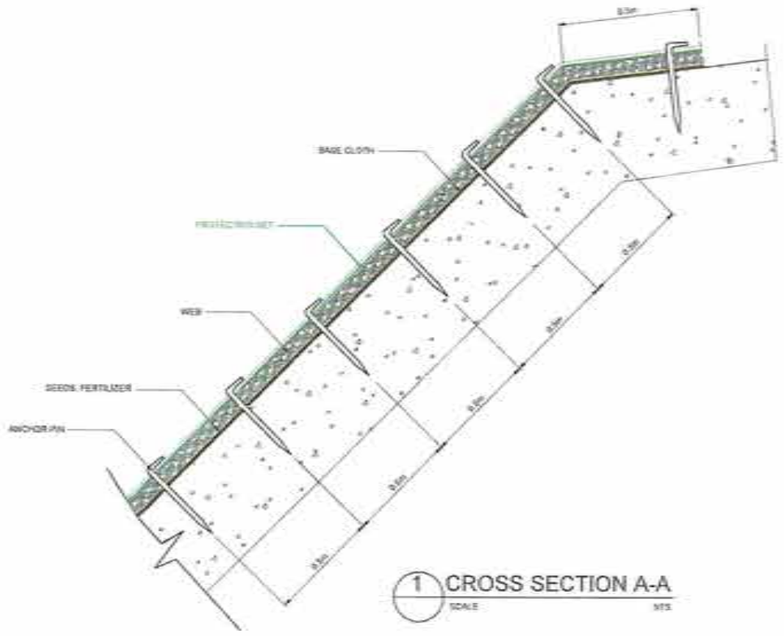
3 DETAIL OF ANCHOR BOLT & SPIKE
SCALE AS SHOWN



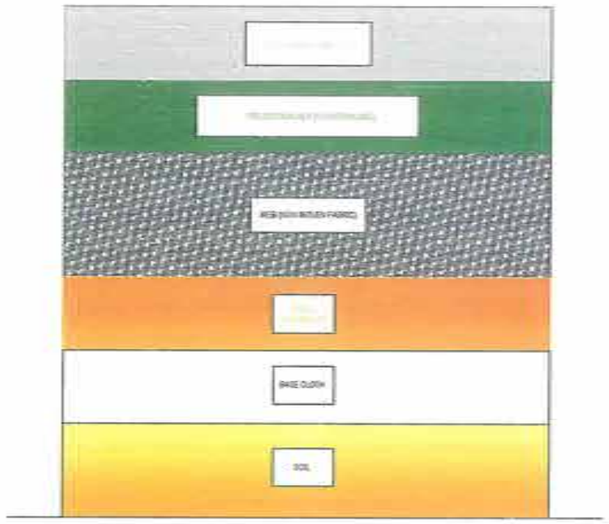
3 SECTION A-A
SCALE 1:20

REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS REGIONAL OFFICE NO. XI GOV. CHAVEZ COR. R. MAGSAYSAY AVENUE, DAVAO CITY	PROJECT NAME AND LOCATION: CONSTRUCTION OF ROAD SLOPE PROTECTION STRUCTURE – PARAGUSAN-PANTUKAN ROAD (PANTUKAN SECTION), PACKAGE Q, DAVAO DE ORO	SHEET CONTENTS: ISOMETRIC VIEW OF ANCHOR ARRANGEMENT ALONG EROSION CONTROL MAT DETAIL OF ANCHOR BOLT & SPIKE SPECIFICATIONS FOR ANCHOR BOLT & SPIKE	PREPARED: LESTER B. PADILLA ENGINEER II DATE:	REVIEWED: ALGIN A. GINOTA ENGINEER III, SECTION CHIEF DATE:	SUBMITTED: JUDY ANN T. BERNARDINO CHIEF, PLANNING AND DESIGN DIVISION DATE:	RECOMMENDED: JOSELITO B. CABALLERO ASSISTANT REGIONAL DIRECTOR DATE:	APPROVED: JUBY B. CORDON REGIONAL DIRECTOR DATE:	SET NO. B 04 07	SHEET NO. 14 52

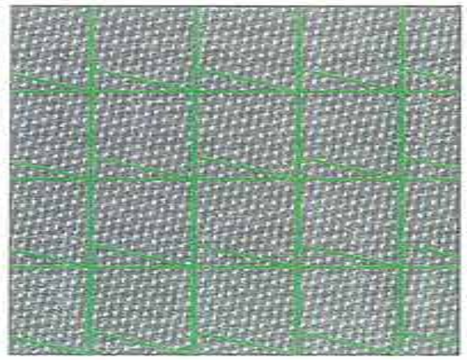
D:\DPWH XI_BRIDGES AND OTHER PUBLIC WORKS_SLOPE PROTECTION\2025 INFRA PROJECTS\PARAGUSAN-PANTUKAN\TYPICAL AND BACKUP\TYPICAL HIGH TENSILE MESH FINAL_SCHEME 5.DWG



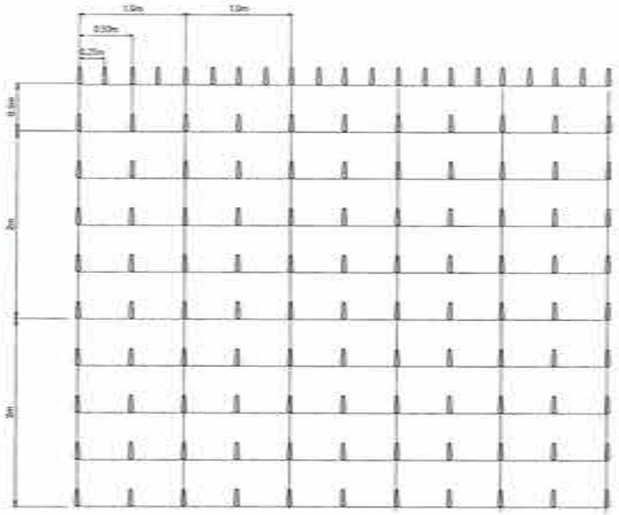
1 CROSS SECTION A-A
SCALE NTS



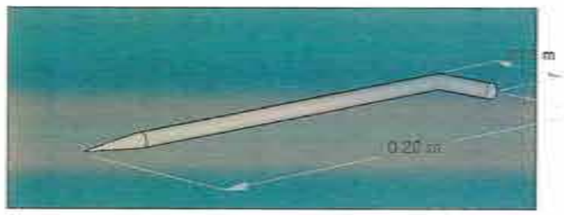
2 BLOW UP SECTION DETAILS
SCALE NTS



3 BLOW UP OF PROTECTION NET AND WEB
SCALE NTS



4 PIN/NAIL ARRANGEMENT
SCALE NTS



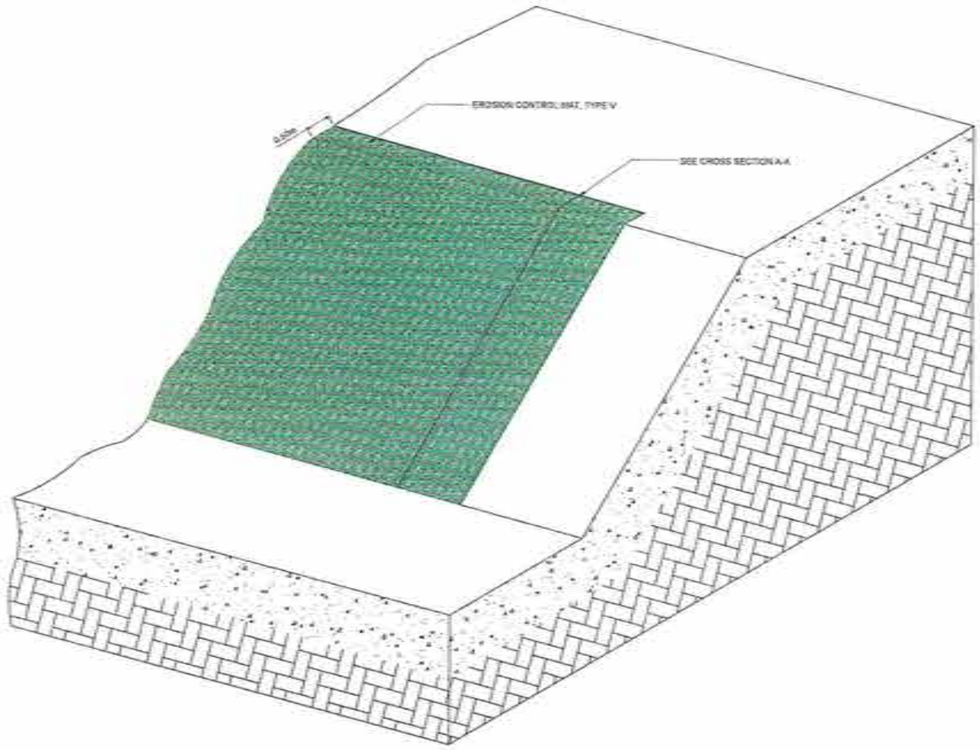
5 ANCHOR PIN ELEVATION
SCALE NTS

FERTILIZER

6 LOCAL AND CHEMICAL FERTILIZER CONTAINING N, P AND K
SCALE NTS

REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS REGIONAL OFFICE NO. XI GOV. CHAVEZ COR. R. MAGSAYSAY AVENUE, DAVAO CITY	PROJECT NAME AND LOCATION: CONSTRUCTION OF ROAD SLOPE PROTECTION STRUCTURE – PARAGUSAN-PANTUKAN ROAD (PANTUKAN SECTION), PACKAGE Q, DAVAO DE ORO	SHEET CONTENTS: EROSION CONTROL MAT, TYPE V DETAILS	PREPARED: LESTER O. ARELLA ENGINEER II DATE:	REVIEWED: ALGIN A. GINOCO ENGINEER III, SECTION CHIEF DATE:	SUBMITTED: JUDY ANN L. BERNARDINO CHIEF, PLANNING AND DESIGN DIVISION DATE:	RECOMMENDED: JOSRITO B. CABALLERO ASSISTANT REGIONAL DIRECTOR DATE:	APPROVED: JUBY B. CORDON REGIONAL DIRECTOR DATE:	SET NO. B 06 07	SHEET NO. 16 52

D:\DPWH XI_BRIDGES AND OTHER PUBLIC WORKS_SLOPE PROTECTION\2025 INFRA PROJECTS\MARAGUSAN-PANTUKAN\TYPICAL AND BACKUP\TYPICAL HIGH TENSILE MESH FINAL_SCHEME 5.DWG



1 ISOMETRIC VIEW OF EROSION CONTROL MAT, TYPE V
SCALE NTS

GENERAL SPECIFICATION		
I. MATERIAL	PROPERTIES	SPECIFICATION
1. PROTECTION NET	POLYETHYLENE (DARK GREEN)	
2. WEB	NON WOVEN FABRIC (DARK GRAY) MADE OF CHARASTERISTICS FIBERS	APPROX. 98% POROSITY POLYESTER
3. ANCHOR PIN	SIZE 20CM X 5CM	GALVANIZED STEEL
4. WIREMESH	SILVERY METALLIC COLOR 0.5 – 0.99IM (THICK)	GALVANIZED STEEL WIRE
5. BASE CLOTH		
6. SEEDS	SEED PUT IN THE MF MAT LEGUMINEOUS PLANTS: CENTROCERNA PUBESCENS CALOPOGONIUM MUCUNOIDS GRAMINEOUS PLANTS: PARAGIS (ELEUSINE INDICA)	THE PLANT SEEDS AND THE FERTILIZER ARE PROCURED IN THE PH
7. FERTILIZER	FOR THE FERTILIZER THE LOCAL CHEMICAL FERTILIZER CONTAINING NITROGEN, POSPHORUS AND POTASSIUM IS USED.	THE PLANT SEEDS AND THE FERTILIZER ARE PROCURED IN THE PH
II. MATERIAL TESTING:	PROPERTIES	SPECIFICATION
	1. LABORATORY ANALYSIS OF THICKNESS	ASTM D1777-96 (2015)
	2. LABORATORY ANALYSIS OF TENSILE STRENGTH	ASTM D4595-17 Wide-Width Method
	3. LABORATORY ANALYSIS OF MASS PEP UNIT AREA	ASTM D5261-10
	4. LABORATORY ANALYSIS OF UV STABILITY	ASTM D4355 (2014)
	5. LABORATORY ANALYSIS OF WATER HOLDING CAPACITY	ASTM D7367
	6. LABORATORY ANALYSIS OF LIGHT PENETRATION	ASTM D6567
	7. LABORATORY ANALYSIS OF C FACTOR	ASTM D6459

GENERAL NOTES FOR MATERIALS REQUIRING A MILL CERTIFICATE:

1. THE CONTRACTOR SHALL SECURE AND SUBMIT A MILL CERTIFICATE FOR ALL PROCURED MATERIALS REQUIRING THE SAID CERTIFICATE. THIS CERTIFICATE MUST CONFIRM THAT THE MATERIAL MEETS THE SPECIFIED STANDARDS AND QUALITY REQUIREMENTS.
2. THE MILL CERTIFICATE SHOULD PROVIDE DETAILS ON THE MATERIAL'S CHEMICAL COMPOSITION, MECHANICAL PROPERTIES, SPECIFICATIONS, AND COMPLIANCE WITH APPLICABLE CODES (E.G., ASTM, EN OR AS SPECIFIED ON THE PLAN).
3. EACH MILL CERTIFICATE MUST INCLUDE TRACEABILITY DETAILS, INCLUDING THE QUANTITY PROCURED, THE PROJECT NAME, AND ANY UNIQUE CODE IDENTIFYING THE SPECIFIC PRODUCTION BATCH FOR EASY TRACKING AND VERIFICATION.
4. ALL MILL CERTIFICATES MUST BE SUBMITTED FOR REVIEW AND APPROVAL BY THE QUALITY ASSURANCE AND HYDROLOGY DIVISION. MATERIALS WITHOUT AN APPROVED CERTIFICATE SHALL NOT BE USED IN THE PROJECT.
5. CERTIFIED COPIES OF THE MILL CERTIFICATE SHALL ALSO BE PROVIDED TO THE CONSTRUCTION DIVISION AND THE PLANNING AND DESIGN DIVISION FOR THEIR INFORMATION AND REFERENCE.
6. THE MANUFACTURER SHALL INCLUDE IN THE CERTIFICATE A GUARANTEE STATING THAT THE MATERIAL THAT IS FURNISHED MEETS THE REQUIREMENTS OF THE SPECIFICATION. EITHER MISMARKING OR MISINTERPRETATION BY THE MANUFACTURER SHALL BE REASON TO DISCONTINUE ACCEPTANCE UNDER THESE SPECIFICATIONS. NOTICE SENT TO THE MANUFACTURER BY THE PURCHASER REGARDING THE DISCONTINUANCE OF ACCEPTANCE WILL BE CONSIDERED TO BE NOTICE TO ALL WHOLESALERS, JOBBERS, DISTRIBUTORS, AGENTS, AND OTHER INTERMEDIARIES HANDLING THE MANUFACTURER'S PRODUCT.

EROSION CONTROL MAT INSTALLATION

1. INSTALL EROSION CONTROL MATS AS SPECIFIED IN THE PLAN.
2. INSTALL EROSIONS CONTROL MATS TO SOIL SURFACES WHICH ARE FINAL GRADE, STABLE, FIRM AND FREE FROM ROCKS OR OTHER OBSTRUCTIONS. SPREAD EROSION CONTROL MATS EVENLY AND SMOOTHLY, WITHOUT STRETCHING, TO ENSURE DIRECT CONTACT WITH THE SOIL AT ALL POINTS. UNROLL EROSION CONTROL MATS PARALLEL TO THE DRAINAGE FLOW DIRECTION. WHEN STARTING INSTALLING THE MATS, THE MATS SHALL COVER 30CM TO 50CM LONG OF THE SLOPE SHOULDER, DO NOT START INSTALLING THE MATS AT THE EDGE OF THE TOP OF THE SLOPE.LAP EDGES AS RECOMMENDED BY THE MANUFACTURER. PLACE THE UPSLOPE END IN A 150mm VERTICAL SLOT, BACKFILL THE SLOT AND COMPACT.
3. ANCHORING SHALL START FROM THE SLOPE SHOULDER ACCORDING TO THE ANCHORS/PEGS/PINS PATTERNS DESIGNATED FOR EITHER EMBANKMENTS OR CUT-SOIL. THE INSTALLMENT OF MATS SHALL BE CAREFULLY PROCEEDED BY AVOIDING THE MATS FROM BEING STAMPED BY WORKERS. WHEN DRIVING ANCHORS/PINS/STAPLES, IT IS RECOMMENDED TO CONTROL THE ROLLED MATS BY WORKER'S FEET TO AVOID EXCESSIVE MAT'S ROLLING-OUT.
4. WHEN CONNECTING THE MATS ALONG A SLOPE, OVERLAP THE MATS SO THAT THE UPPER MATS CAN BE ON TOP OF THE LOWER MATS BEFORE DRIVING ANCHORS/PEGS/PINS. SPECIFICALLY, TAKE A 8CM WIDTH OVERLAP TRANSVERSELY WHEN OVERLAPPING THE MATS LATERALLY, AND TAKE A 12CM WIDTH OVERLAP LONGITUDINALLY WHEN OVERLAPPING THE UPPER MAT ON THE LOWER ONE.
5. FOR SWALE OR DITCH INSTALLATIONS, PLACE UP THE SIDE SLOPES TO EXTEND ABOVE ANTICIPATED FLOW LINE AND CONSTRUCT INTERMEDIATE 150mm VERTICAL CHECK SLOTS AT 8m INTERVALS. CONSTRUCT CHECK SLOTS PERPENDICULAR TO FLOW DIRECTION. STAPLE EROSION MATS AS RECOMMENDED BY MANUFACTURER. DRIVE ALL STAPLES FLUSH WITH THE SOIL SURFACE.
6. REPAIR DAMAGED AREAS IMMEDIATELY. RESTORE THE SOIL IN DAMAGED AREAS TO FINISHED GRADE, REFERTILIZE AND RESEED.
7. SYNTHETIC EROSION CONTROL MATS (TYPE 5) AND MESHES SHALL BE INSTALLED AFTER TURF ESTABLISHMENT IS IN PLACE.
8. TURF ESTABLISHMENT MATS (TYPE5) SHALL BE INSTALLED BEFORE TURF ESTABLISHMENT IS IN PLACE. AFTER SEEDING, LIGHTLY BRUSH OR RAKE 15-5mm OF TOPSOIL INTO THE MAT VOIDS TO FILL THE MAT THICKNESS.

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGIONAL OFFICE NO. XI
GOV. CHAVEZ COR. R. WAGSAYSAY AVENUE, DAVAO CITY

PROJECT NAME AND LOCATION:	SHEET CONTENTS:	PREPARED:	REVIEWED:	SUBMITTED:	RECOMMENDED:	APPROVED:	SET NO:	SHEET NO:
CONSTRUCTION OF ROAD SLOPE PROTECTION STRUCTURE - INARAGUSAN-PANTUKAN ROAD (PANTUKAN SECTION), PACKAGE Q, DAVAO DE ORO	ISOMETRIC VIEW OF EROSION CONTROL MAT, TYPE V NOTES FOR EROSION CONTROL MAT, TYPE V	LESTER C. PADILLA ENGINEER II DATE:	ALGIN A. GINGOYON ENGINEER III, SECTION CHIEF DATE:	JUDY A. BERNARDINO CHIEF, PLANNING AND DESIGN DIVISION DATE:	JUANITO B. CABALLERO ASSISTANT REGIONAL DIRECTOR DATE:	JUBY B. CORDON REGIONAL DIRECTOR DATE:	B 05 07	15 52

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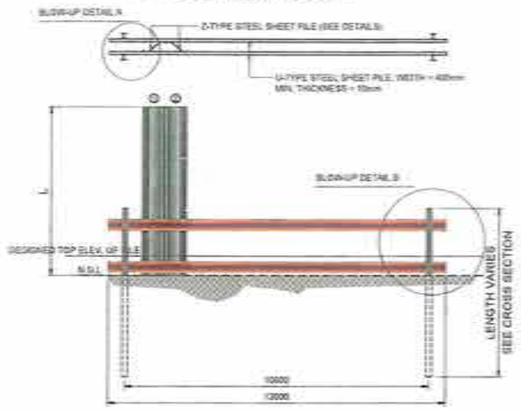
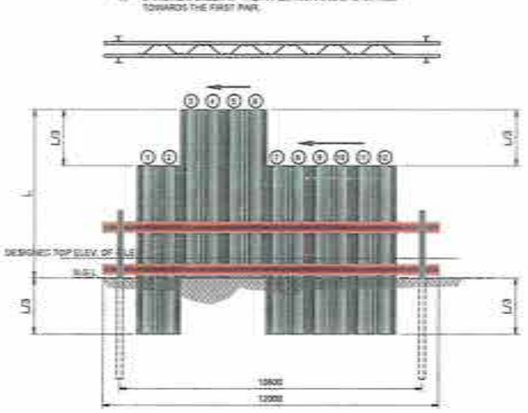
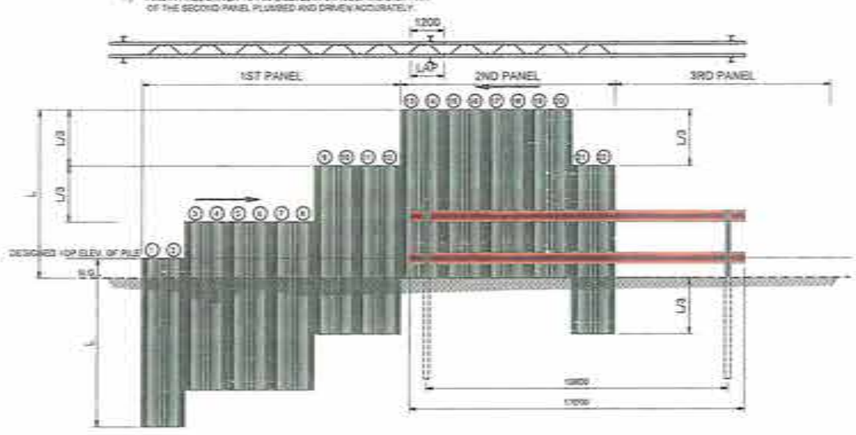
1.) PITCH, PLUMB AND PLUMB THE FIRST PAIR



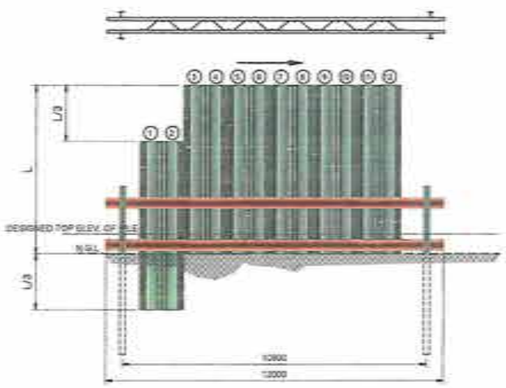
4.) DRIVE REMAINDER OF THE PANEL WORKING BACKWARDS TOWARDS THE FIRST PAIR.



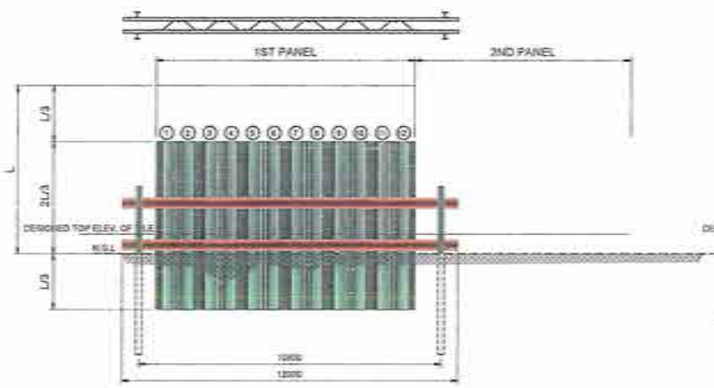
7.) FIRST PANEL DRIVEN TO FINAL LEVEL IN STAGES. THE LAST PAIR OF THE SECOND PANEL PLUMBED AND DRIVEN ACCURATELY.



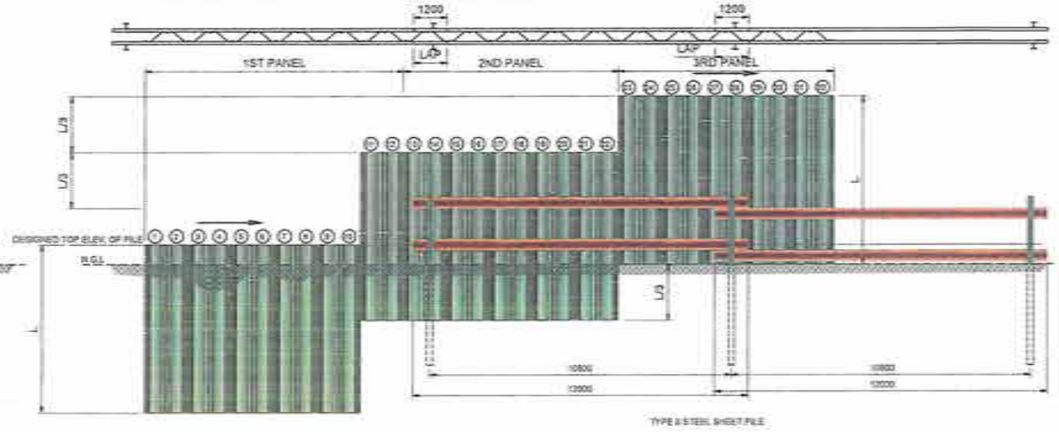
2.) DRIVE THE FIRST PAIR CAREFULLY AND ACCURATELY. PITCH THE REST OF THE PANEL.



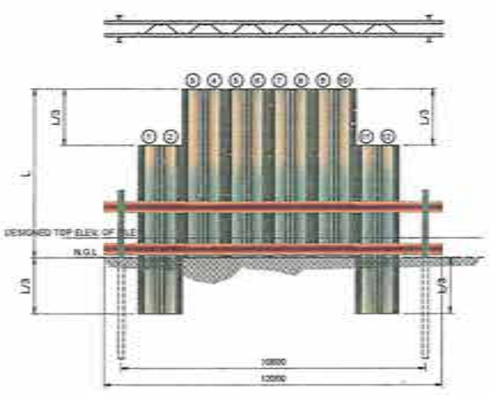
5.) FIRST PANEL PART DRIVEN



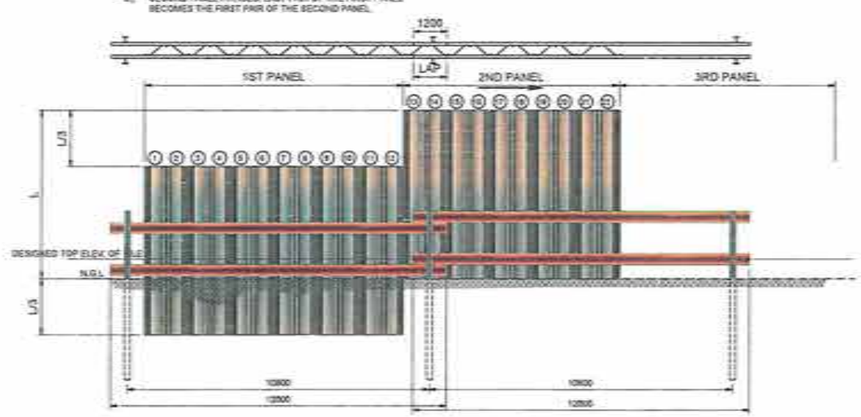
8.) FIRST PANEL COMPLETED, SECOND PANEL PART DRIVEN, THIRD PANEL PITCHED. THE LAST PAIR OF THE SECOND PANEL BECOMES THE FIRST PAIR OF THE THIRD PANEL



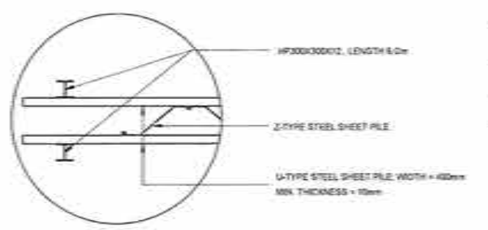
3.) ENSURE LAST PAIR IS ACCURATELY POSITION AND PLUMBED. DRIVE THE LAST PAIR.



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

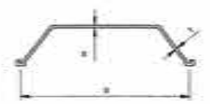


1 SHEET PILE PANEL DRIVING METHOD
SCALE 1:150

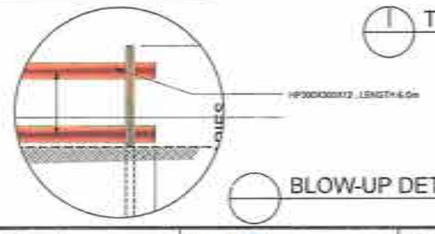


BLOW-UP DETAIL A

PROPERTIES OF TYPE II STEEL SHEET PILES		
WIDTH (mm)	SECTION MODULUS cm³/m	LENGTH (m)
400	874	12.00



TYPE II STEEL SHEET PILE



BLOW-UP DETAIL B

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGIONAL OFFICE NO. XI
GOV. CHAVEZ COR. R. MAGSAYSAY AVENUE, DAVAO CITY

PROJECT NAME AND LOCATION	SHEET CONTENTS	PREPARED	REVIEWED	SUBMITTED	RECOMMENDING	APPROVED	SET NO.	SHEET NO.
CONSTRUCTION OF ROAD SLOPE PROTECTION STRUCTURE - MARAGUSAN-PANTUKAN ROAD (PANTUKAN SECTION), PACKAGE Q, DAVAO DE ORO	SHEET PILE DRIVING METHOD	LESTER [illegible] ENGINEER II DATE:	ALGIN A. GINGATAN ENGINEER III, SECTION CHIEF DATE	JUDY ANN T. BERNARDINO CHIEF, PLANNING AND DESIGN DIVISION DATE	JOSECITO B. CABALLERO ASSISTANT REGIONAL DIRECTOR DATE	JUBY B. CORDON REGIONAL DIRECTOR DATE	B 07 07	17 52

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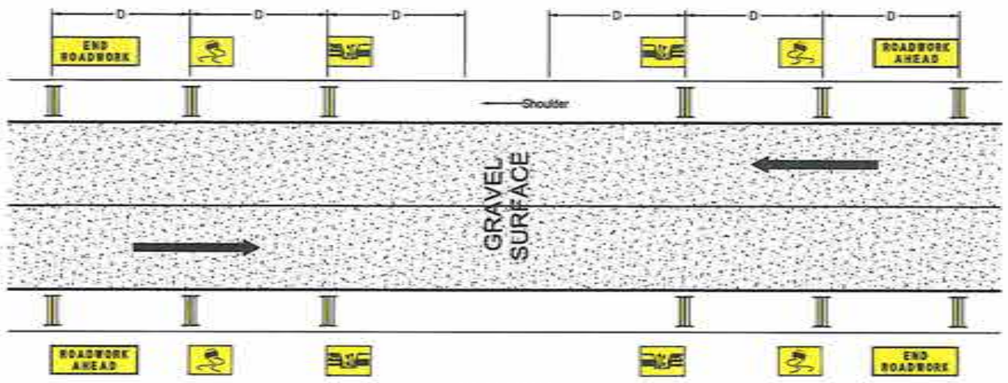
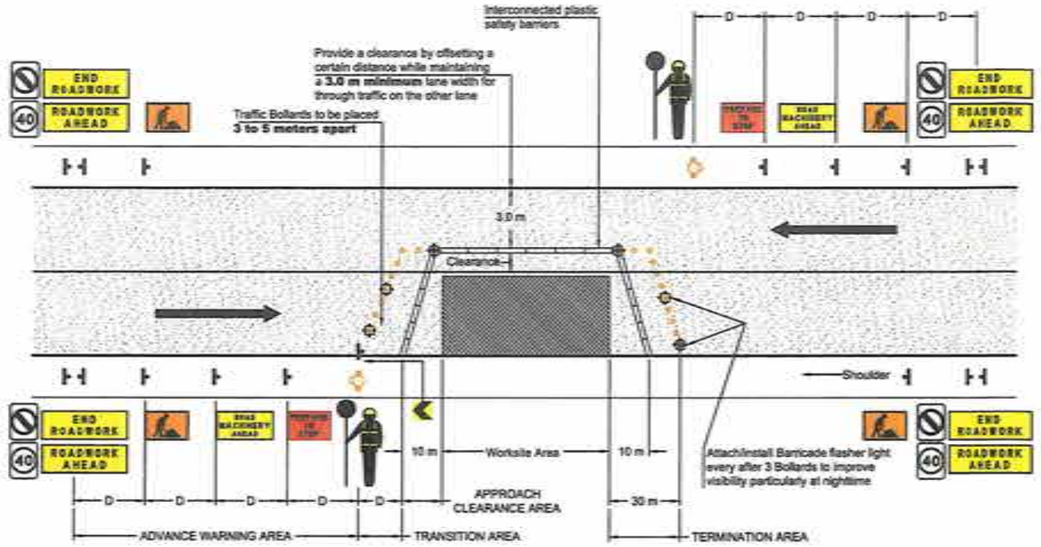


SCHEME 1
GRAVELLING

TRAFFIC MANAGEMENT STAGES	DESCRIPTION		QUANTITY
SCHEME 1: GRAVELLING	ROADWORK AHEAD	ROADWORK AHEAD (T1-1)	2
	END ROADWORK	END ROADWORK (T2-16)	2
		SLIPPERY (T3-3)	4
		LOOSE STONES (T3-9)	4

NOTE:
1. QUANTITY IS BASED ON THE ASSUMED 200-METER LENGTH ROADWORK IF THE PROGRAMMED LENGTH IS INCREASED/DECREASED, CORRESPONDING ADJUSTMENT OF QUANTITIES SHALL BE MADE.
2. FOR ESTIMATION PURPOSES, APPROACH SPEED (EQUAL TO "D" IN METERS) IS 40 KPH.
3. THE CONTRACTOR SHALL PREPARE A SEPARATE TRAFFIC OPERATIONAL PROGRAM (TOP) WHICH SHALL BE IMPLEMENTED DURING THE ENTIRE CONSTRUCTION DURATION



SCHEME 2
SLOPE PROTECTION

TRAFFIC MANAGEMENT STAGES	DESCRIPTION		QUANTITY
SCHEME 2: SLOPE PROTECTION	ROADWORK AHEAD	ROADWORK AHEAD (T1-1)	4
		END SPEED RESTRICTION (R4-12)	4
		PREPARE TO STOP (T1-18)	2
	40	SPEED RESTRICTION (R4-1)	4
		WORKMEN AHEAD (SYMBOLIC) (T1-5)	4
	ROAD MACHINERY AHEAD	ROADWORK MACHINERY AHEAD (T1-3)	2
		TEMPORARY HAZARD MARKER (T5-5)	1
	END ROADWORK	END ROADWORK (T2-16)	4
		BOLLARDS (200 meters - Working Area Considered)	20
		BARRICADE FLASHER LIGHT	7
		PLASTIC SAFETY BARRIER (200 meters - Working Area Considered)	136

NOTE:
1. QUANTITY IS BASED ON THE ASSUMED 200-METER LENGTH ROADWORK IF THE PROGRAMMED LENGTH IS INCREASED/DECREASED, CORRESPONDING ADJUSTMENT OF QUANTITIES SHALL BE MADE.
2. FOR ESTIMATION PURPOSES, APPROACH SPEED (EQUAL TO "D" IN METERS) IS 40 KPH.
3. THE CONTRACTOR SHALL PREPARE A SEPARATE TRAFFIC OPERATIONAL PROGRAM (TOP) WHICH SHALL BE IMPLEMENTED DURING THE ENTIRE CONSTRUCTION DURATION

1 TRAFFIC MANAGEMENT LAYOUT
SCALE NTS

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGIONAL OFFICE NO. XI
GOV. CHAVEZ COR. R. MAGSAYSAY AVENUE, DAVAO CITY

PROJECT NAME AND LOCATION	SHEET CONTENTS	DRAFTED AND PREPARED	REVIEWED	SUBMITTED	RECOMMENDED	APPROVED	SET NO.	SHEET NO.
CONSTRUCTION OF ROAD SLOPE PROTECTION STRUCTURE - MARAGUSAN-PANTUKAN ROAD (PANTUKAN SECTION), PACKAGE Q, DAVAO DE ORO	TRAFFIC MANAGEMENT LAYOUT	LESTER G. PANILA, ENGINEER II, DATE:	ALGIN A. GINGAPEN, ENGINEER III, DATE:	JUDY ANN T. BERNARDINO, CHIEF, PLANNING AND DESIGN DIVISION, DATE:	JOSELITO B. CABALLERO, ASSISTANT REGIONAL DIRECTOR, DATE:	JUBY B. CORDON, REGIONAL DIRECTOR, DATE:	D 1 7	18 52

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GENERAL NOTES FOR TRAFFIC MANAGEMENT PLAN:

A. GENERAL NOTES:

1. BEFORE THE START OF ACTUAL CONSTRUCTION, THE CONTRACTOR SHALL SUBMIT A TRAFFIC OPERATION PLAN TO THE REGIONAL OFFICE. THE CONTRACTOR MAY ADOPT THE TRAFFIC MANAGEMENT PLAN PREPARED DURING THE DETAILED ENGINEERING DESIGN (DED) PLAN OR FORMULATE THEIR OWN TRAFFIC OPERATION PLAN TO PROPERLY SUIT THE EXISTING WORKSITE CONDITIONS AND THE PROPOSED CONSTRUCTION METHODS TO BE USED BY THE CONTRACTOR.
2. THE PROJECT ENGINEER SHALL IDENTIFY ALL DIMENSIONS "D" BASED ON SITE CONDITIONS.
3. THE PROJECT ENGINEER SHALL IDENTIFY THE PROPER LOCATION AND PLACEMENT OF ALL "SPEED RESTRICTION" SIGNS BASED ON SITE CONDITIONS.
4. SIGNS SHALL BE MOUNTED SO THAT THEY ARE AT OR ABOUT THE DRIVER'S EYE LEVEL, APPROXIMATELY 1 METER, WITH A MINIMUM MOUNTING HEIGHT OF 200 mm FROM THE GROUND.
5. "ROADWORK AHEAD" THE FIRST ADVANCE WARNING SIGN SEEN BY DRIVERS, SHALL BE LOCATED AT A MINIMUM DISTANCE "2D"METERS (D IS THE APPROACHED SPEED OF TRAFFIC) BEFORE THE START OF THE WORKS, OR IF THERE IS A TRANSITION AREA, THE START OF THE TAPER.
6. OTHER SIGNS IN THE ADVANCE WARNING AREA SHALL BE SPACED "D" METERS APART.
7. LONGITUDINAL BUFFER SPACE SHALL BE 20 TO 30 METERS LONG BUT CAN BE EXTENDED IF THE WORK AREA IS HIDDEN FROM APPROACHING ROAD USER, e.g. BY A CURVE OR CREST.
8. LATERAL BUFFER SPACE SHALL BE A MINIMUM OF 1.2 METERS IN SLOW SPEED AREAS, OR IN HIGH SPEED AND HIGH VOLUME AREAS, A LARGE ADJACENT CLEARANCE IN DESIRABLE WITH SAFETY BARRIERS ADJACENT TO THE WORK AREA.
9. LOCATION OF TRAFFIC CONTROLLER SHALL BE 30 METERS IN ADVANCE OF WORK AREA, WITH GOOD SITE DISTANCE OF ONCOMING TRAFFIC, WITH AN ESCAPE PATH IN AN EMERGENCY, WHERE THE OTHER TRAFFIC CONTROLLER IS VISIBLE, AND CAN BE SEEN BY THE ROAD USER.
10. A MINIMUM LANE WIDTH OF 2.75 m FOR CARS AND 3.25 m FOR TRUCKS IS RECOMMENDED AND EXCESSIVELY WIDE LANES SHALL BE AVOIDED TO NOT INDUCE SPEEDING IN TIMES OF LOWER TRAFFIC VOLUMES.
11. THE CONTRACTOR SHALL PREPARE A SEPARATE TRAFFIC OPERATIONAL PROGRAM (TOP) WHICH SHALL BE IMPLEMENTED DURING THE ENTIRE CONSTRUCTION DURATION.

USE OF TRAFFIC CONTROLLERS (FLAGMEN)

1. THE TRAFFIC CONTROLLER USES A POTABLE STOP/SLOW HAND HELD SIGN OR RED AND GREEN STOP/GO FLAG TO CONTROL THE TRAFFIC.
2. WHEN CONTROLLING TRAFFIC, A TRAFFIC CONTROLLER SHOULD ENSURE THAT A SYMBOLIC WORKMAN SIGN AND PREPARE TO STOP SIGN AND ADDITIONAL SIGNS AND DEVICES REQUIRED FOR THE OVERALL WORKSITE TRAFFIC MANAGEMENT SCHEME, ARE IN PLACE TO PROVIDE ADVANCE WARNING AND INFORMATION TO ROAD USERS.
3. THE TRAFFIC CONTROLLER SHOULD STAND APPROXIMATELY 30 METERS IN ADVANCE OF WORK AREA.
4. THE TRAFFIC CONTROLLER SHOULD BE VISIBLE TO THE APPROACHING ROAD USER AND STAND ON THE CURB SIDE OR SHOULDER CLEAR OF THE TRAVELLED PATH TO VIEW BOTH THE WORKSITE AND ONCOMING TRAFFIC.
5. TRAFFIC CONTROLLER WILL NEED TO USE TWO-WAY RADIOS TO ENSURE ADEQUATE COMMUNICATION OVER LONG DISTANCE OR WHERE THERE IS LIMITED VISIBILITY.

NOTE:

1. ROADWORK AHEAD - THE FIRST ADVANCE WARNING SIGN SEEN BY DRIVERS, SHOULD BE LOCATED AT MINIMUM DISTANCE "2D"METERS (D IS THE APPROACHED SPEED OF TRAFFIC) BEFORE THE START OF THE WORKS, OR IF THERE IS A TRANSITION AREA, THE START OF THE TAPER.
2. OTHER SIGN IN ADVANCE WARNING AREA SHOULD BE SPACE "D"METERS APART.
3. LONGITUDINAL BUFFER SPACE SHOULD BE 20 TO 30 METERS LONG BUT CAN BE EXTENDED IF THE WORK AREA IS HIDDEN FROM APPROACHING ROAD USER, e.g. BY A CURVE OR CREST.
4. LATERAL BUFFER SPACE SHOULD BE A MINIMUM OF 1.2 METERS IN SLOW SPEED AREAS, OR IN HIGH SPEED AND HIGH VOLUME AREAS, A LARGE ADJACENT CLEARANCE IN DESIRABLE WITH SAFETY BARRIERS ADJACENT TO THE WORK AREA.
5. LOCATION OF TRAFFIC CONTROLLER SHOULD BE 30 METERS IN ADVANCE OF WORK AREA, WITH GOOD SITE DISTANCE OF ONCOMING TRAFFIC, WITH AN ESCAPE PATH IN AN EMERGENCY, WHERE THE OTHER TRAFFIC CONTROLLER IS VISIBLE, AND CAN BE SEEN BY THE ROAD USER.

REFERENCES:

- D.O. NO.13, SERIES 2018 - GUIDELINE FOR THE PREPARATION OF COST ESTIMATES FOR THE TRAFFIC MANAGEMENT AND SAFETY AND HEALTH REQUIREMENTS FOR THE CONSTRUCTION AN D MAINTENANCE OF ROADS, BRIDGES AND SAFETY AND HEALTH.
- ROAD SAFETY MANUAL 2004
- PART 2: ROAD SAFETY AND PAVEMENT DESIGN MANUAL 2012

	COMMENTS
1. ROAD LAYOUT	
2. ROAD GEOMETRY	
3. SIGHT DISTANCE	
4. VULNERABLE ROAD USER FACILITIES	
5. PAVEMENT CONDITION	
6. EXISTING SIGNS	
7. LIGHTING FACILITIES	
8. ABUTTING ACCESSES	
9. ADJOINING ROAD NETWORKS	
10. OTHER POSSIBLE CONSTRAINTS	

TERMINATION AREA			
SPEED OF TRAFFIC (KPH)	LENGTH OF DIVERGE/LATERAL SHIFT TAPER (m)	LENGTH OF MERGE TAPER (m)	LENGTH OF STRAIGHT SECTION BETWEEN MULTI-LANE CLOSURES (m)
≤ 40	40	80	½ OF LEAD TAPER LENGTH
50	50	100	
60	60	120	
70	70	140	
80	80	160	
90	90	180	
100	100	200	
110	110	220	

APPROACH CLEARANCE AREA	
SPEED OF TRAFFIC (KPH)	BUFFER LENGTH (m)
≤ 40	0
50	0
60	20 - 30
70	20 - 30
80	20 - 30
90	20 - 30
100	20 - 30
110	20 - 30

ADVANCE WARNING AREA	
SPEED OF TRAFFIC (KPH)	SIGNAGE SPACING ("D" VALUE) (m)
≤ 40	0 - 5
50	15
60	45
70	70
80	80
90	90
100	100
110	110

TRANSITION AREA			
SPEED OF TRAFFIC (KPH)	LENGTH OF DIVERGE/LATERAL SHIFT TAPER (m)	LENGTH OF MERGE TAPER (m)	LENGTH OF STRAIGHT SECTION BETWEEN MULTI-LANE CLOSURES (m)
≤ 40	40	80	60
50	50	100	75
60	60	120	90
70	70	140	105
80	80	160	120
90	90	180	135
100	100	200	150
110	110	220	165

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PROJECT NAME AND LOCATION: CONSTRUCTION OF ROAD SLOPE PROTECTION STRUCTURE - MARAGUSAN-PANTUKAN ROAD (PANTUKAN SECTION), PACKAGE C, DAVAO DE ORO

SHEET CONTENTS: TRAFFIC MANAGEMENT LAYOUT GENERAL NOTES

DRAFTED AND PREPARED: LESTERIO MADELA, ENGINEER II, DATE:

REVIEWED: ALGIN A. GINGATAN, ENGINEER III, DATE:

SUBMITTED: JUDY ANN T. BERNARDINO, CHIEF, PLANNING AND DESIGN DIVISION, DATE:

RECOMMENDED: JOSELITO B. CABALLERO, ASSISTANT REGIONAL DIRECTOR, DATE:

APPROVED: JUBY B. CORDON, REGIONAL DIRECTOR, DATE:

SET NO. D 2 7

SHEET NO. 19 52

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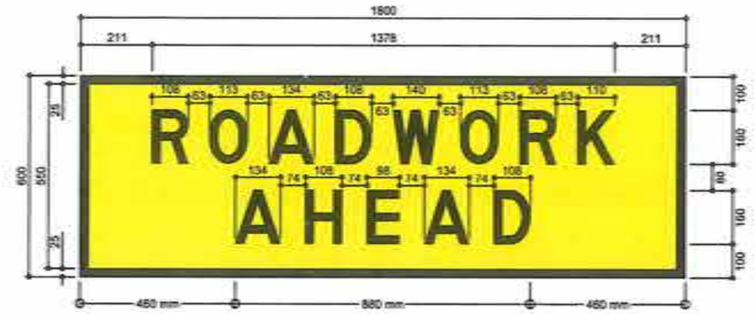
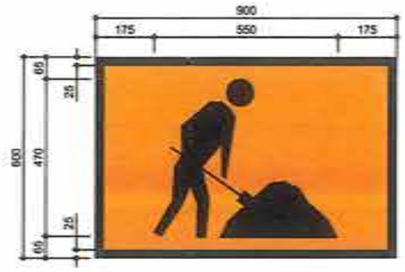


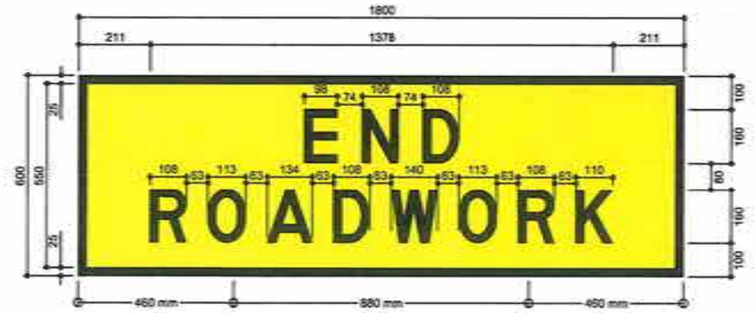
ROADWORK AHEAD DETAILS

SIGN NO.	SIZE (mm)	LETTERS/SYMBOLS	BACKGROUND	TYPE OF SIGNS
T1-1	1800 X 600	LINE 1 - BLACK 200 DM LINE 2 - BLACK 160 DM	YELLOW REFLECTORIZED	ADVANCE WARNING SIGNS



WORKMEN AHEAD (SYMBOLIC) DETAILS

SIGN NO.	SIZE (mm)	LETTERS/SYMBOLS	BACKGROUND	TYPE OF SIGNS
T1-5	900 X 600	BLACK	REDIORANGE - FLUORESCENT FOR DAY USE - REFLECTORIZED FOR NIGHT	ADVANCE WARNING SIGNS



END ROADWORK DETAILS

SIGN NO.	SIZE (mm)	LETTERS/SYMBOLS	BACKGROUND	TYPE OF SIGNS
T2-16	1800 X 600	LINE 1 - BLACK 200 DM LINE 2 - BLACK 160 DM	YELLOW REFLECTORIZED	ADVANCE WARNING SIGNS

PREPARED TO STOP DETAILS

SIGN NO.	SIZE (mm)	LETTERS/SYMBOLS	BACKGROUND	TYPE OF SIGNS
T1-18	900 X 600	LINE 1 - WHITE 120 DM LINE 2 - WHITE 120 DM LINE 3 - WHITE 120 EM REFLECTORIZED	RED REFLECTORIZED	REGULATORY SIGNS

ROAD MACHINERY AHEAD DETAILS

SIGN NO.	SIZE (mm)	LETTERS/SYMBOLS	BACKGROUND	TYPE OF SIGNS
T1-3	1200 X 600	LINE 1 - BLACK 100 EM LINE 2 - BLACK 120 EM LINE 3 - BLACK 100 EM	YELLOW REFLECTORIZED	ADVANCE WARNING SIGNS

SPEED RESTRICTION DETAILS

SIGN NO.	SIZE (mm)	LETTERS/SYMBOLS	BACKGROUND	TYPE OF SIGNS
R4-1	600 X 600 (SIZE B)	BLACK 240 DN CIRCLE - 600 DIA. RED	WHITE REFLECTORIZED RED CIRCLE - REFLECTORIZED	REGULATORY SIGNS

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CONSTRUCTION OF ROAD SLOPE PROTECTION STRUCTURE - MARAGUSAN-PANTUKAN ROAD (PANTUKAN SECTION), PACKAGE Q, DAVAO DE ORO	TRAFFIC MANAGEMENT PROGRAM SIGNAGE	LESTER G. PADILLA ENGINEER II DATE:	ALGIN A. GINGATAN ENGINEER III DATE:	JUDY ANN T. BERNARDINO CHIEF, PLANNING AND DESIGN DIVISION DATE:	JOSELITO B. CABALLERO ASSISTANT REGIONAL DIRECTOR DATE:	JUBY B. CORDON REGIONAL DIRECTOR DATE:	D 3 | 7	20 52

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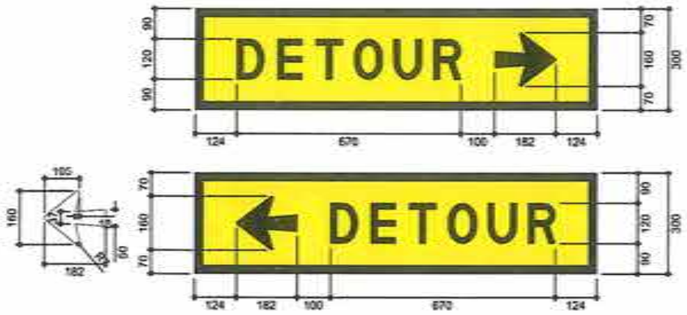
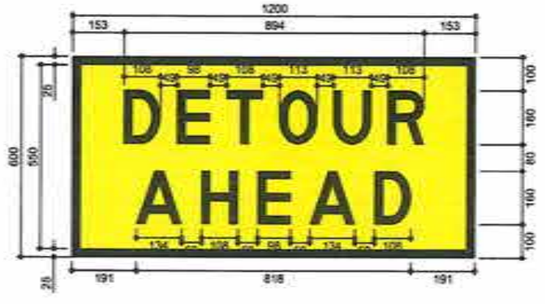
END SPEED RESTRICTION DETAILS

SIGN NO.	SIZE (mm)	LETTERS/SYMBOLS	BACKGROUND	TYPE OF SIGNS
R4-12	600 X 600 (SIZE B)	SYMBOL - 600 DIA. BLACK	WHITE REFLECTORIZED	REGULATORY SIGNS



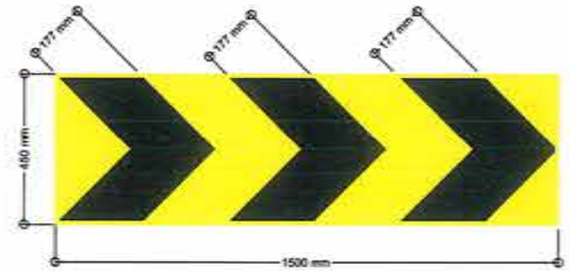
DETOUR (LEFT OR RIGHT) DETAILS

SIGN NO.	SIZE (mm)	LETTERS/SYMBOLS	BACKGROUND	TYPE OF SIGNS
T5-1	1200 X 300	BLACK 120 EN	YELLOW REFLECTORIZED	DETOUR SIGNS



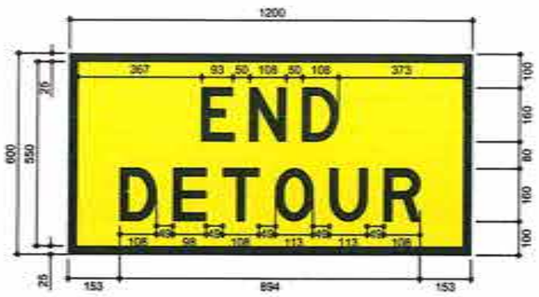
DETOUR AHEAD DETAILS

SIGN NO.	SIZE (mm)	LETTERS/SYMBOLS	BACKGROUND	TYPE OF SIGNS
T1-6	1200 X 600	LINE 1 - BLACK 160 EN LINE 2 - BLACK 160 EM	YELLOW REFLECTORIZED	DETOUR SIGNS



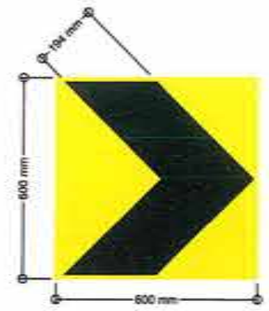
TEMPORARY HAZARD MARKER DETAILS

SIGN NO.	SIZE (mm)	LETTERS/SYMBOLS	BACKGROUND	TYPE OF SIGNS
T5-4	1500 X 450 TYPE B-1	BLACK 177 WIDE AT 45°	YELLOW REFLECTORIZED	TEMPORARY HAZARD MARKER



END DETOUR DETAILS

SIGN NO.	SIZE (mm)	LETTERS/SYMBOLS	BACKGROUND	TYPE OF SIGNS
T2-23	1200 X 600	LINE 1 - BLACK 160 DM LINE 2 - BLACK 160 DM	YELLOW REFLECTORIZED	DETOUR SIGNS



SPEED RESTRICTION DETAILS

SIGN NO.	SIZE (mm)	LETTERS/SYMBOLS	BACKGROUND	TYPE OF SIGNS
T5-5	600 X 600 TYPE B-1	BLACK 194 WIDE AT 45°	YELLOW REFLECTORIZED	TEMPORARY HAZARD MARKER

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CONSTRUCTION OF ROAD SLOPE PROTECTION STRUCTURE - MARAGUSAN-PANTUKAN ROAD (PANTUKAN SECTION), PACKAGE Q, DAVAO DE ORO	TRAFFIC MANAGEMENT PROGRAM SIGNAGE	LESTER A. PADILLA, ENGINEER II, DATE:	ALGIN A. GINGATAN, ENGINEER III, DATE:	JUDY ANN T. BERNARDINO, CHIEF, PLANNING AND DESIGN DIVISION, DATE:	JOSELITO B. CABALLERO, ASSISTANT REGIONAL DIRECTOR, DATE:	JUBY B. CORDON, REGIONAL DIRECTOR, DATE:	D 4 7	21 52

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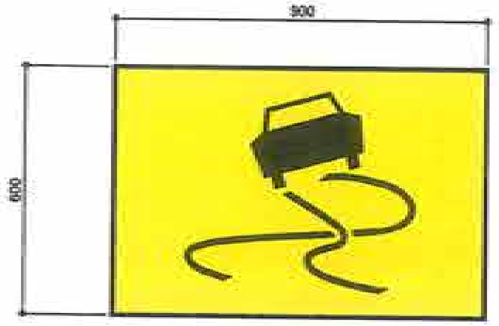
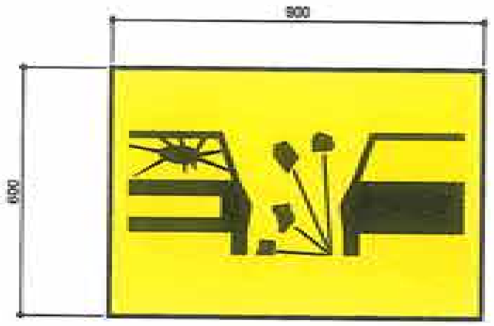


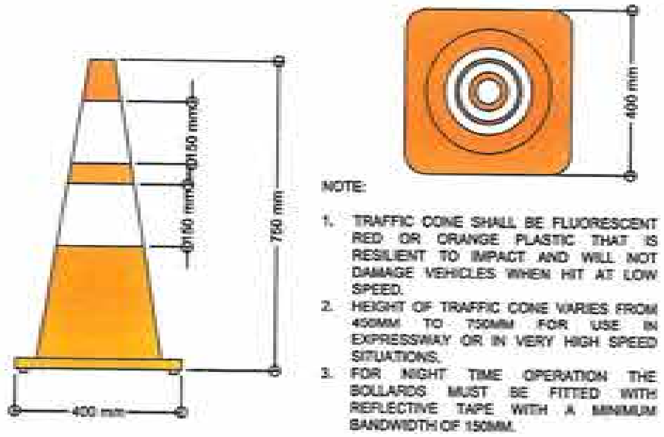
SLIPPERY

SIGN NO.	SIZE (mm)	LETTERS/SYMBOLS	BACKGROUND	TYPE OF SIGNS
T3-3	900 X 600	SYMBOL - BLACK	YELLOW REFLECTORIZED	SIGNS FOR ROAD CONDITIONS AND HAZARDS



LOOSE STONES

SIGN NO.	SIZE (mm)	LETTERS/SYMBOLS	BACKGROUND	TYPE OF SIGNS
T3-9	900 X 600	SYMBOL - BLACK	YELLOW REFLECTORIZED	SIGNS FOR ROAD CONDITIONS AND HAZARDS

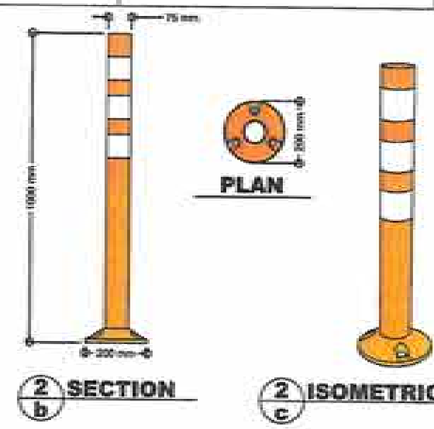


NOTE:

1. TRAFFIC CONE SHALL BE FLUORESCENT RED OR ORANGE PLASTIC THAT IS RESILIENT TO IMPACT AND WILL NOT DAMAGE VEHICLES WHEN HIT AT LOW SPEED.
2. HEIGHT OF TRAFFIC CONE VARIES FROM 450MM TO 750MM FOR USE IN EXPRESSWAY OR IN VERY HIGH SPEED SITUATIONS.
3. FOR NIGHT TIME OPERATION THE BOLLARDS MUST BE FITTED WITH REFLECTIVE TAPE WITH A MINIMUM BANDWIDTH OF 150MM.

SPACING	CONDITION
5 - 10 METERS	ON TAPER
	WHEN USED AROUND SMALL WORK SITES
	(MAY BE REDUCED TO 3m TO GUIDE PEDESTRIANS OR TO PREVENT TRAFFIC TAKING A WRONG TURN THOUGH A GAP IN THE LINE OF BOLLARDS)
10 - 20 METERS	WHEN USED AS LONGITUDINAL SEPARATION BETWEEN OPPOSING TRAFFIC FLOWS
	WHEN USED AS LONGITUDINAL SEPARATION OF TRAFFIC FROM THE WORKSITE OR CLOSED LANE
	(MAY BE INCREASED TO 50m WHERE THE LENGTH OF BOLLARDS EXCEEDS 1KM)

1 **TRAFFIC CONE**
SCALE NTS



SPECIFICATION	
REFLECTIVE:	ROAD SAFETY POLE
COLOR:	ORANGE
MATERIAL:	PU MATERIAL, ELASTIC, FLEXIBLE
REFLECTIVE FILM:	CRYSTAL LATTICE

NOTE:

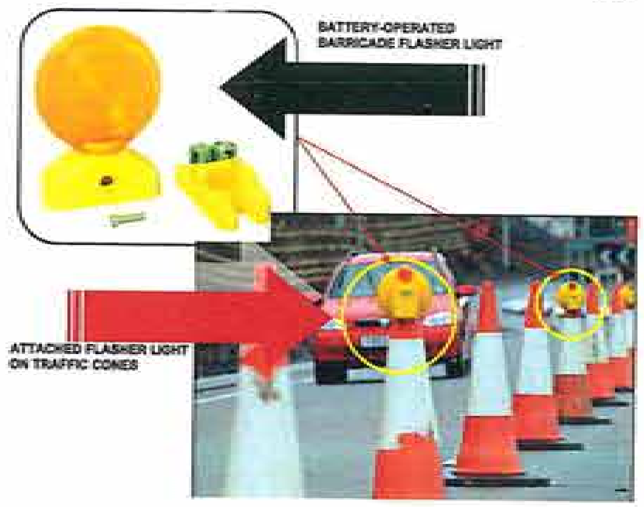
1. BOLLARDS SHALL BE FLUORESCENT RED OR ORANGE PLASTIC THAT IS RESILIENT TO IMPACT AND WILL NOT DAMAGE VEHICLES WHEN HIT AT LOW SPEED.
2. HEIGHT OF BOLLARDS MUST BE UP TO 1 METER.
3. FOR NIGHT TIME OPERATION THE BOLLARDS MUST BE FITTED WITH REFLECTIVE TAPE WITH A MINIMUM BANDWIDTH OF 250MM.
4. SPACING @ 0.80 M. O.C.

SPACING	CONDITION
5 - 10 METERS	ON TAPER
	WHEN USED AROUND SMALL WORK SITES
	(MAY BE REDUCED TO 3m TO GUIDE PEDESTRIANS OR TO PREVENT TRAFFIC TAKING A WRONG TURN THOUGH A GAP IN THE LINE OF BOLLARDS)
10 - 20 METERS	WHEN USED AS LONGITUDINAL SEPARATION BETWEEN OPPOSING TRAFFIC FLOWS
	WHEN USED AS LONGITUDINAL SEPARATION OF TRAFFIC FROM THE WORKSITE OR CLOSED LANE
	(MAY BE INCREASED TO 50m WHERE THE LENGTH OF BOLLARDS EXCEEDS 1KM)

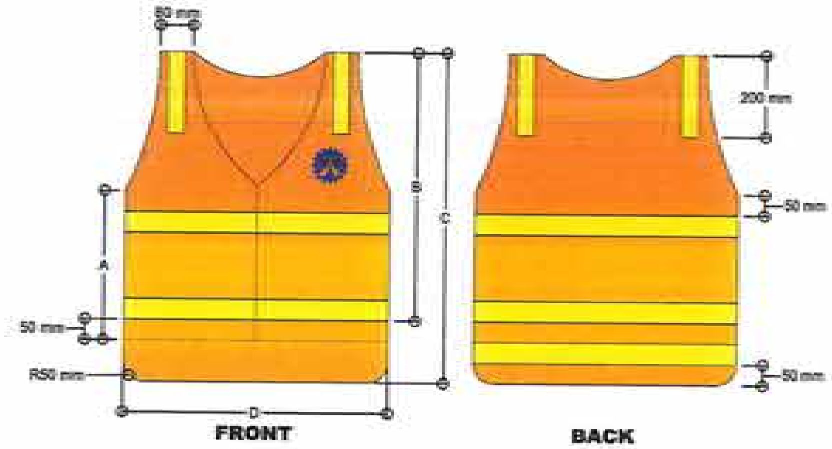
2 **FLEXIBLE BOLLARD DETAIL**
SCALE NTS

NOTE:

1. ALL PERSONNEL WORKING ON OR ADJACENT TO A ROADWORK SITE SHALL WEAR APPROPRIATE ROAD SAFETY MATERIALS SUCH AS HIGH VISIBILITY VEST (MADE FROM FLUORESCENT RED/ORANGE MATERIAL), HARD HAT AND SAFETY SHOES.
2. THE VEST SHALL BE WORN OVER NORMAL CLOTHING AND PROPERLY FASTENED SO THAT THE ENTIRE AVAILABLE AREA OF HIGH VISIBILITY MATERIAL CAN BE SEEN IN ANY DIRECTION. TO MAXIMIZE EFFECTIVENESS THE VEST SHOULD BE KEPT CLEAN AND IN GOOD CONDITION.
3. THE TRAFFIC SAFETY VEST SHALL BE MADE FROM FLUORESCENT RED OR ORANGE MATERIAL. HE VEST SHALL ALSO HAVE TWO (2) STRIPS OF YELLOW RETRO-REFLECTIVE MATERIAL AT THE FRONT AND THREE (3) STRIPS AT THE BACK. REFLECTIVE MATERIALS SHALL BE 50mm WIDE. DPWH LOGO SHALL BE 80mm DIAMETER. THE SAFETY VEST SHOULD HAVE A SECURE FASTENING PREFFRABLY A ZIP.
4. THE JACKET MAY BE WORN OVER WET WEATHER CLOTHING. ALTERNATIVELY, WET WEATHER HIGH VISIBILITY CLOTHING SHALL BE MADE FROM WATER PROOF MATERIAL MATCHING THOSE PROPERTIES ABOVE FOR COLOR AND RETRO REFLECTIVITY.



4 **BARRICADE FLASHER LIGHT**
SCALE NTS



SIZE	A (mm)	B (mm)	C (mm)	D (mm)
MEDIUM	280	600	750	580
LARGE	295	625	775	610
EXTRA LARGE	310	650	800	640

3 **TRAFFIC SAFETY VEST DETAILS**
SCALE NTS

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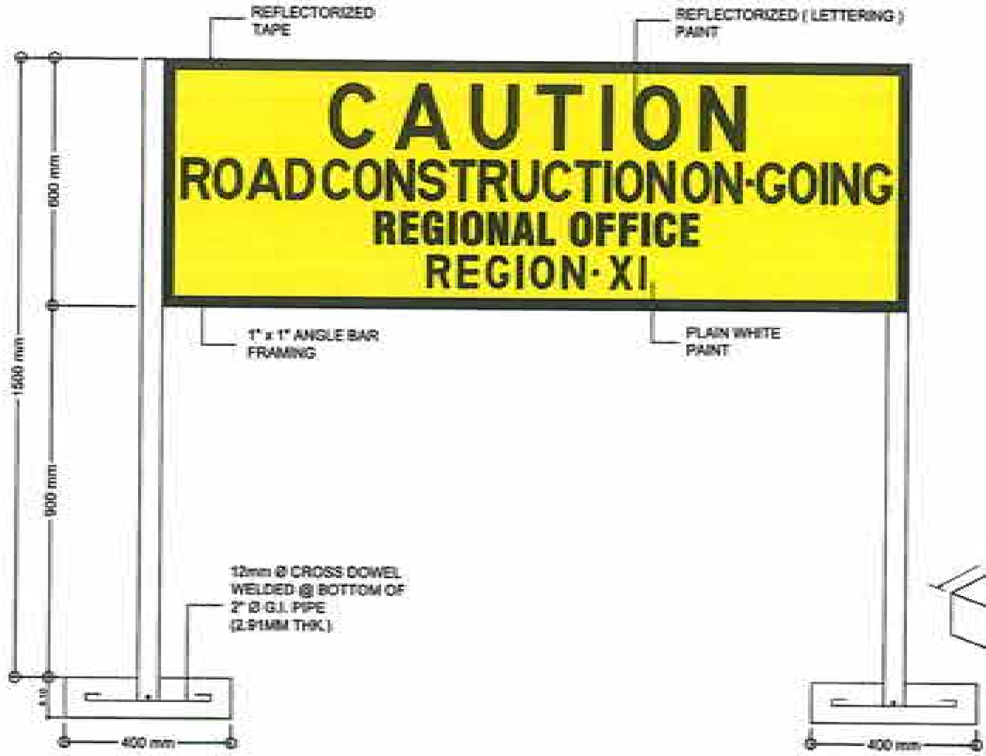
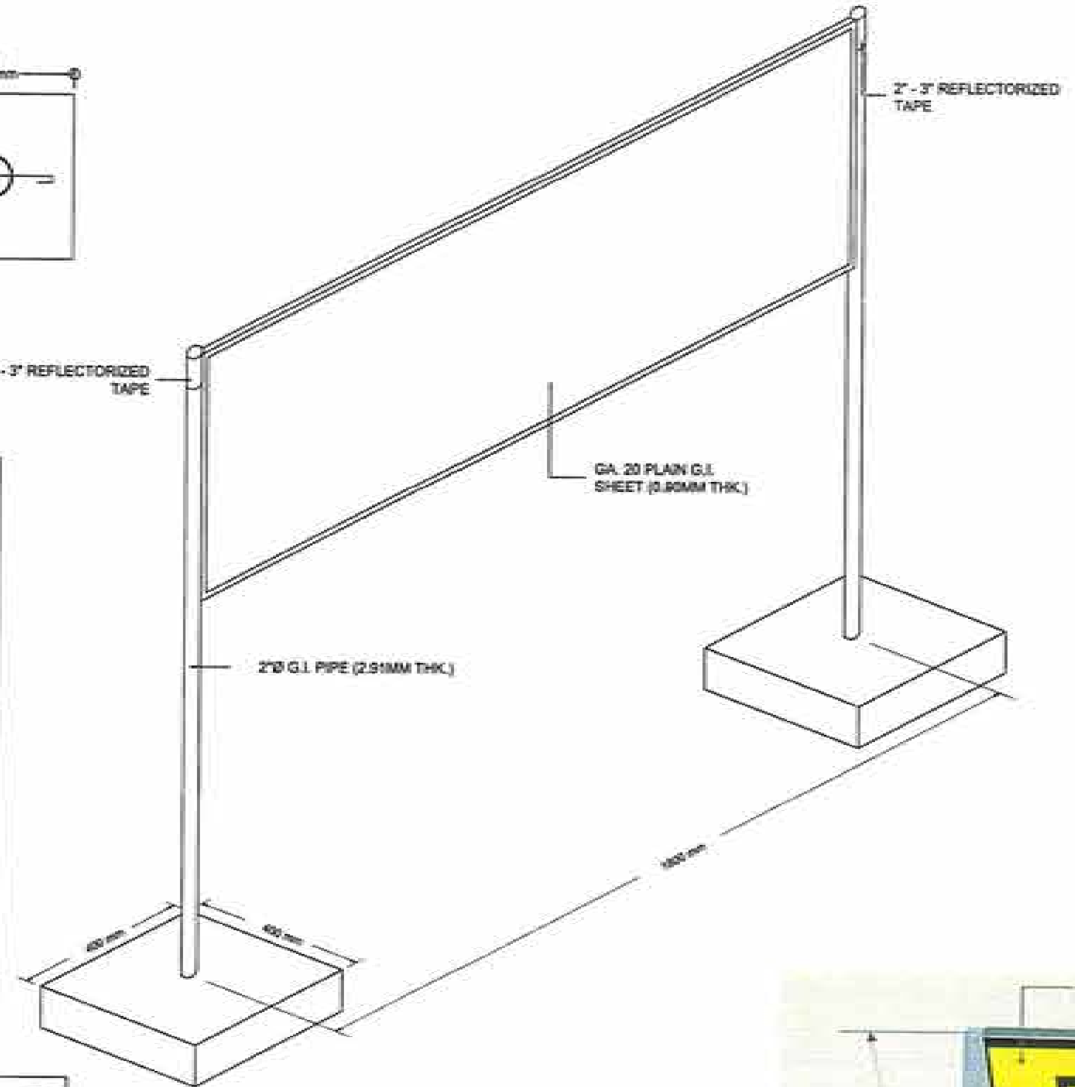
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGIONAL OFFICE NO. XI
GOV. CHAVEZ COR. R. MAGSAYSAY AVENUE, DAVAO CITY

PROJECT NAME AND LOCATION:	SHEET CONTENTS:	DRAFTED AND PREPARED:	REVIEWED:	SUBMITTED:	RECOMMENDED:	APPROVED:	SET NO.	SHEET NO.
CONSTRUCTION OF ROAD SLOPE PROTECTION STRUCTURE - MARAGUSAN-PANTUKAN ROAD (PANTUKAN SECTION), PACKAGE Q, DAVAO DE ORO	TRAFFIC MANAGEMENT PROGRAM SIGNAGE TRAFFIC CONE FLEXIBLE BOLLARD DETAIL BARRICADE FLASHER LIGHT TRAFFIC VEST DETAILS	LESTER [illegible] PADILLA ENGINEER II DATE:	ALGIN A. GING[illegible] ENGINEER III DATE:	JUDY ANN T. BERNARDINO CHIEF, PLANNING AND DESIGN DIVISION DATE:	JOSELITO B. CABALLERO ASSISTANT REGIONAL DIRECTOR DATE:	JUBY B. CORDON REGIONAL DIRECTOR DATE:	D 5 7	22 52

D:\INFRA\2025 INFRA\CONST. OF MARAGUSAN-PANTUKAN ROAD, DDO (12-5-2024)\DESIGN\TYPICAL DRAWINGS\18-24 TRAFFIC MANAGEMENT PROGRAM.DWG

PLAN

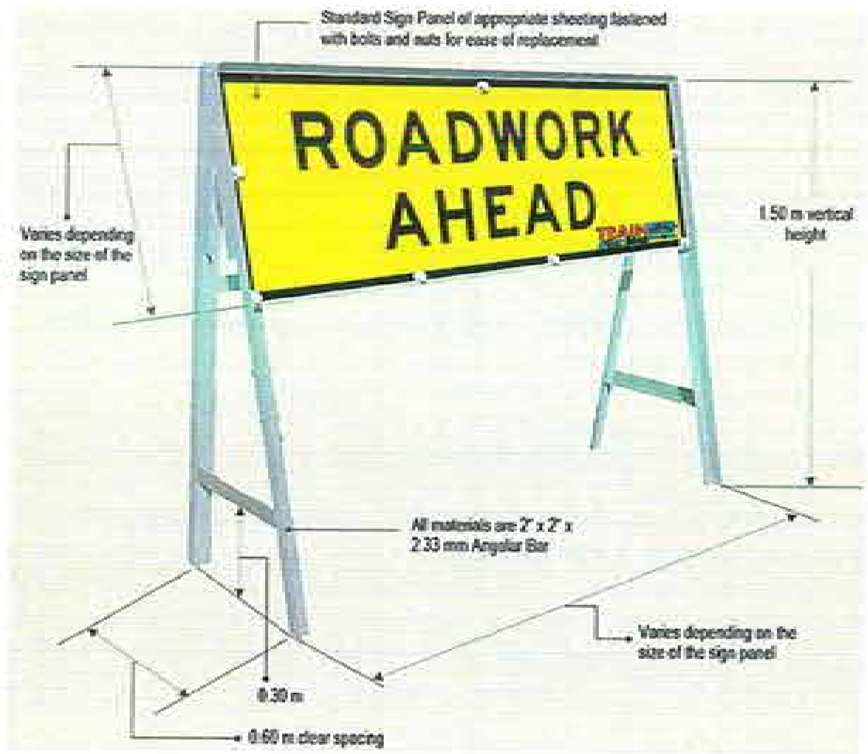




(1) INFORMATORY BILLBOARD DETAIL
SCALE 1:20

(2) PLASTIC BARRIER DETAILS
SCALE NTS

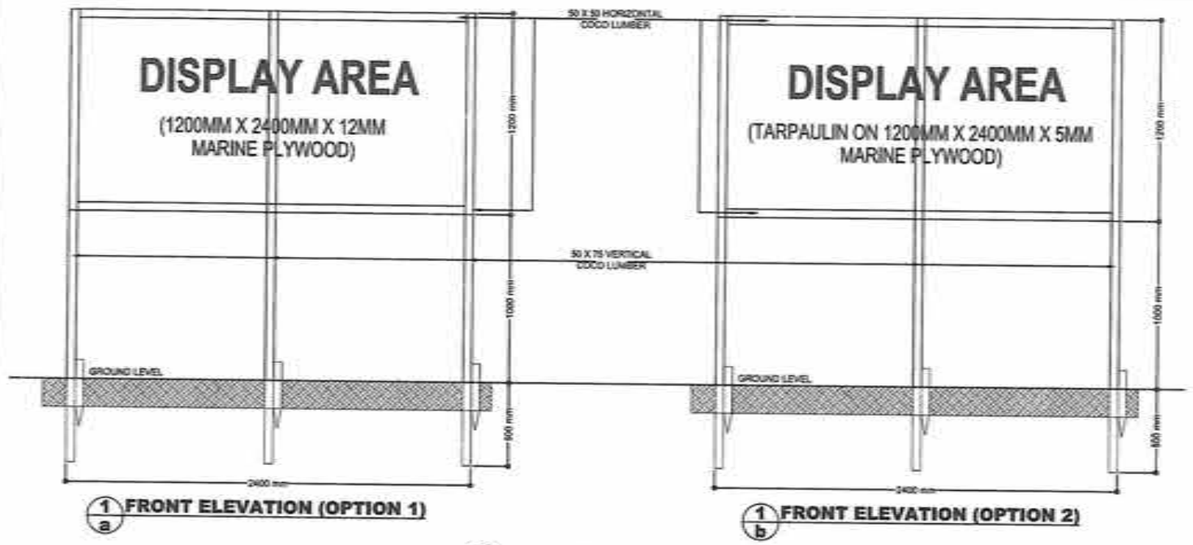
ADVANCE WARNING SIGN



(3) ROAD SIGN DETAILS
SCALE NTS

REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS REGIONAL OFFICE NO. XI GOV. CHAVEZ COR. R. MAGSAYSAY AVENUE, DAVAO CITY	PROJECT NAME AND LOCATION: CONSTRUCTION OF ROAD SLOPE PROTECTION STRUCTURE - MARAGUSAN-PANTUKAN ROAD (PANTUKAN SECTION), PACKAGE Q, DAVAO DE ORO	SHEET CONTENTS: INFORMATORY BILLBOARD DETAIL ROAD SIGN DETAILS	DRAFTED AND PREPARED: PADILLA ENGINEER II DATE:	REVIEWED: ALGIN A. GING ENGINEER DATE:	SUBMITTED: JUDY T. BERNARDINO CHIEF, PLANNING AND DESIGN DIVISION DATE:	RECOMMENDED: JOSELITO B. CABALLERO ASSISTANT REGIONAL DIRECTOR DATE:	APPROVED: JUBY B. CORDON REGIONAL DIRECTOR DATE:	SET NO. D 6 7	SHEET NO. 23 52

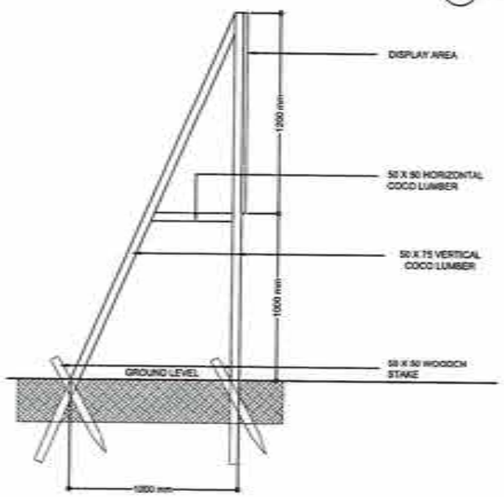
INFRA 2025 INFRACONST. OF MARAGUSAN-PANTUKAN ROAD, DDO (12-5-2024)\DESIGN\TYPICAL DRAWINGS\18-24 TRAFFIC MANAGEMENT PROGRAM.DWG



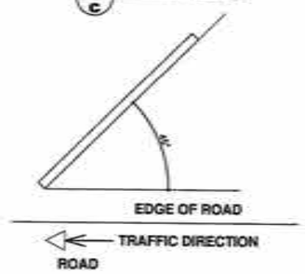
1a FRONT ELEVATION (OPTION 1)

1b FRONT ELEVATION (OPTION 2)

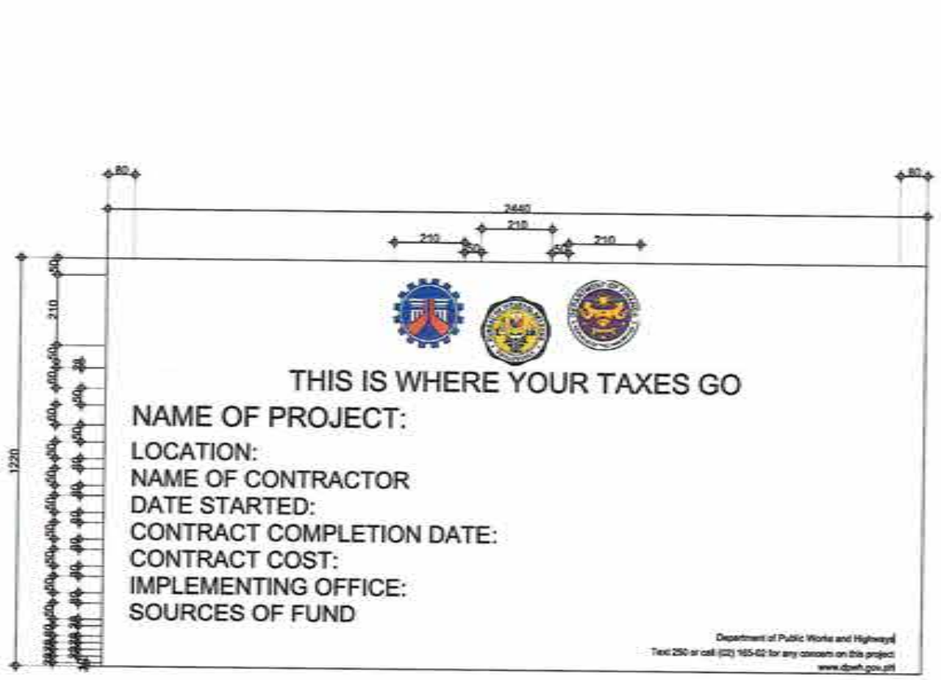
1 BILLBOARD DETAILS
SCALE 1:40



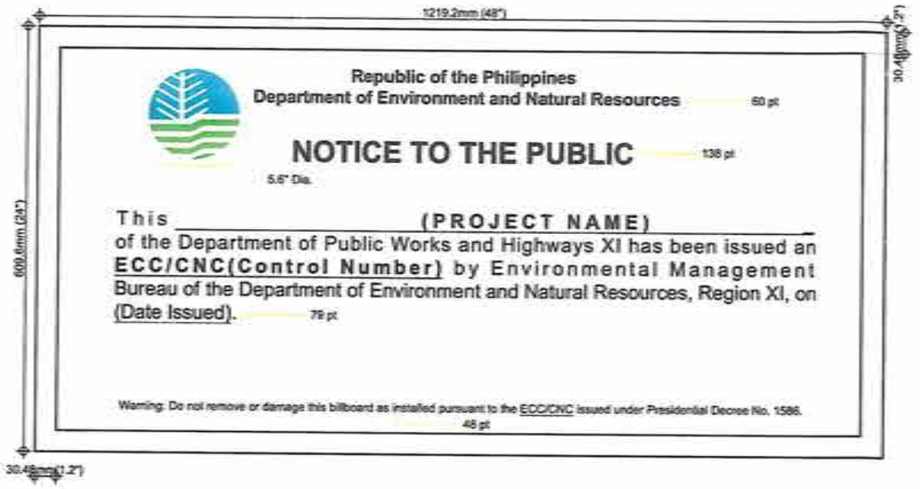
1c ELEVATION

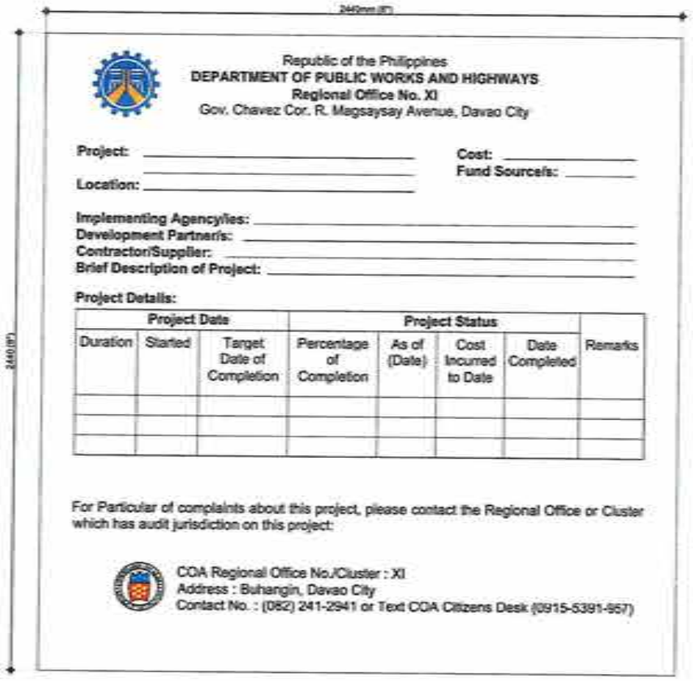


1d ORIENTATION



NOTE:
For source of Fund, state if DPWH Regular Budget, Priority Development Assistance Fund, DepEd/DA/DAR Budget, Calamity Fund, MVUC Fund etc.





NOTES FOR COA BILLBOARD:
- TARPAULIN, WHITE, 8FT x 8 FT
- RESOLUTION: 70DPI
- FONT: HELVETICA
- FONT SIZE : MAIN INFORMATION - 3"
  : SUB-INFORMATION - 1"
- FONT COLOR: BLACK

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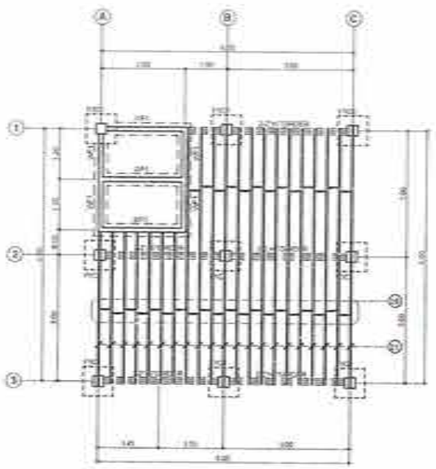
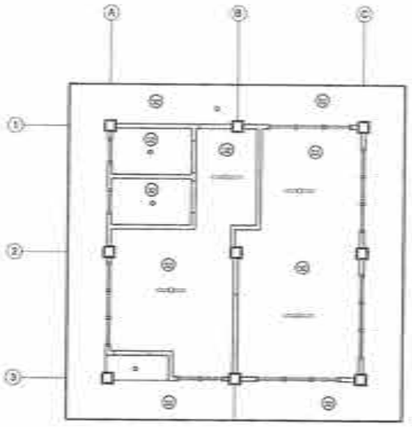
D:\INFRA\2025 INFRACONST. OF MARAGUSAN-PANTUKAN ROAD, DDO (12-5-2024)\DESIGN\TYPICAL DRAWINGS\1-8-24 TRAFFIC MANANGEMENT PROGRAM.DWG

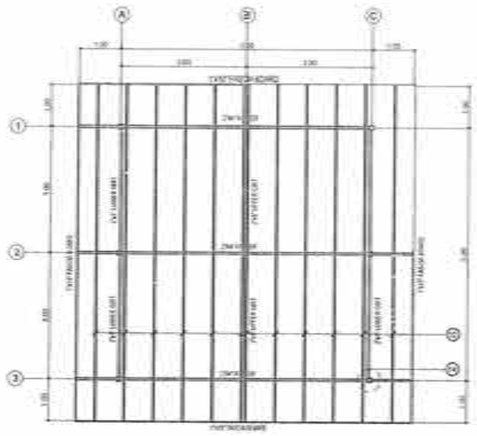
1 FLOOR PLAN
A-1 SCALE 1:100



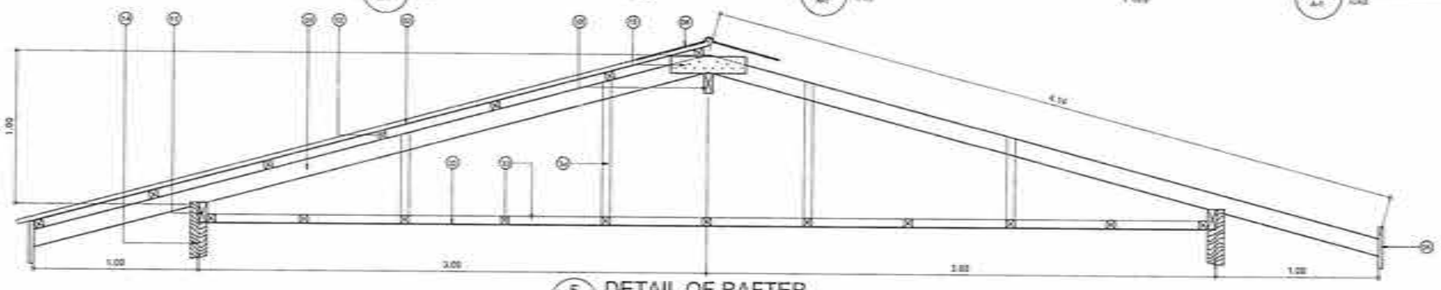
2 FLOOR FRAMING PLAN
A-1 SCALE 1:100



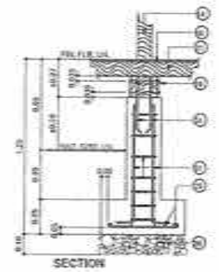
3 REFELECTED CEILING PLAN
A-1 SCALE 1:100



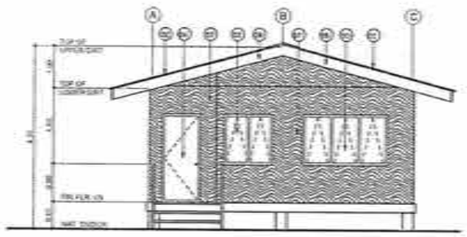
4 ROOF FRAMING PLAN
A-1 SCALE 1:100



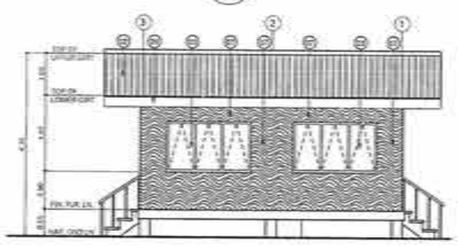
5 DETAIL OF RAFTER
A-1 SCALE 1:20



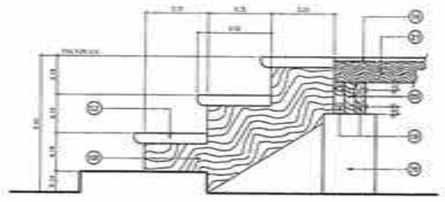
SECTION



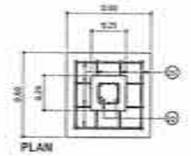
6 FRONT ELEVATION
A-1 SCALE 1:100



7 RIGHT SIDE ELEVATION
A-1 SCALE 1:100

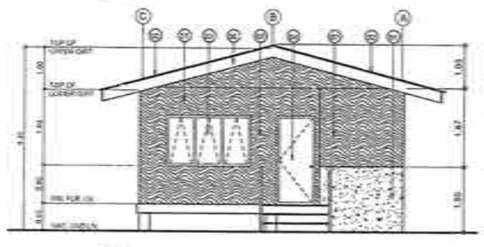


8 DETAIL OF WOODEN STAIR
A-1 SCALE 1:50

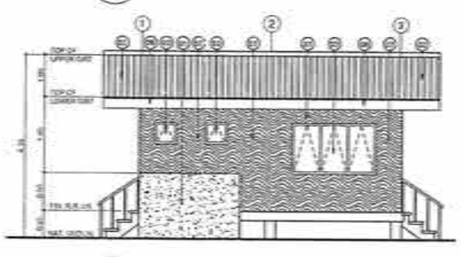


PLAN

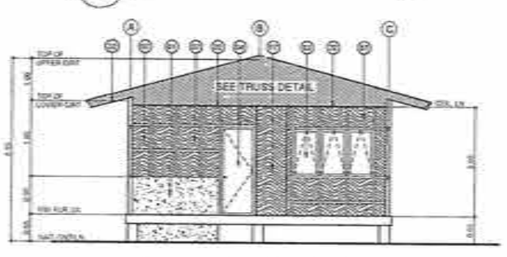
9 COLUMN/FOOTING (F1C1) DETAIL
A-1 SCALE 1:50



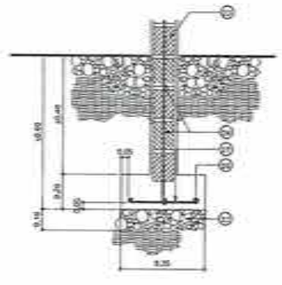
10 REAR ELEVATION
A-1 SCALE 1:100



11 RIGHT SIDE ELEVATION
A-1 SCALE 1:100



12 CROSS SECTION
A-1 SCALE 1:100



13 WALL FOOTING (WF) DETAIL
A-1 SCALE 1:50

ROOM DESIGNATION

100	ENTRANCE PORCH
101	KITCHEN/DINING/RECEIVING AREA
102	MEN'S TOILET PLAIN CEMENT FINISH COLOR TO BE APPROVED BY THE OWNER AND THE ARCHITECT
103	WOMEN'S TOILET PLAIN CEMENT FINISH COLOR TO BE APPROVED BY THE OWNER AND THE ARCHITECT
104	SLEEPING QUARTERS

I N D E X

01	4" THK. CONCRETE HOLLOW BLOCKS, PLAIN CEMENT PLASTER FINISH
02	NIPA ROOFING SHEETS
03	AWNING PLYWOOD WINDOW
04	40MM THK HOLLOW CORE FLUSH DOOR
05	2" X 4" WOOD BLOCK SPACER
06	1" X 10" FASCIA BOARD (COCO LUMBER)
07	4MM THK. ORDINARY PLYWOOD SINGLE PARTITION WALL ON 2"x2" COCO LUM. NAILERS SP @ 0.60M O.C.B.W.
08	G.A. 26 RIDGE ROLL
09	2" X 4" RAFTER (COCO LUMBER)
10	2" X 6" UPPER GIRT (COCO LUMBER)
11	2" X 6" LOWER GIRT (COCO LUMBER)
12	2" X 2" WOODEN PURLINS SP @ 0.75M ON CENTER
13	P.E. FOAM ROOF THERMAL INSULATOR (OPTIONAL)
14	4" X 4" COCO WOODEN POST
15	2-2" X 4" X 0.50M COLLAR PLATE (COCO LUMBER)
16	¾" THK. X 6" COCO BOARD FLOORING
17	2"x12" THREAD
18	2-2"x12" STRINGER
19	2-2"x8" GIRDER W/2-16MMØ MACHINE BOLT W/ NUT & WASHER
20	CONCRETE PEDESTAL
21	2"x4" FLOOR JOIST
22	4-12MMØ VERT. BARS W/ 10MMØ TIES SP @ 0.20M ON CENTER
23	4" THK CONCRETE HOLLOW BLOCKS
24	10MMØ REINFORCING BARS SP. @ 0.60M HORIZONTALLLY & VERTICALLY ON CENTER
25	8-10MMØ BEDBARS SP AS SHOWN ON CENTER BOTHWAYS
26	3-10MMØ CONTINUOUS BEDBARS SP AS SHOWN
27	10MMØ TIES SP @ 0.40M O.C.
28	100MM COMPACTED GRAVEL BASE
29	2"x4" WOODEN FLOOR BLOCKS
30	CONCRETE PEDESTAL
31	¼" X 2" X 12" ANCHOR STRAP
32	¼" THK. ORDINARY PLYWOOD ON 2"x2" COCO LUMBER FRAMING SP. @ 0.60M O.C.B.W. W/2"x6" COCO LUMBER HANGER SP @1.20M O.C.B.W.
33	2" x 2" COCO LUMBER FRAMING SP @ 0.60M O.C.B.W.
34	2" x 2" COCO LUMBER HANGER SP @ 1.20M O.C.B.W.

L E G E N D

- 20W T/D FLUORESCENT LAMP (DAYLIGHT)
- 18W COMPACT FLUORESCENT LAMP ON 3"Ø uPVC RECEPTACLE

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SHEET CONTENTS	ARCHITECTURAL DETAILS STRUCTURAL DETAILS
DRAFTED AND PREPARED	FERDINAND M. PAÑOSA ARCHITECT II DATE
REVIEWED	ALGIN A. GINGO ENGINEER II DATE
SUBMITTED	JUDY ANN T. BERNARDINO CHIEF, PLANNING AND DESIGN DIVISION DATE
RECOMMENDED	JOSELITO B. CABALLERO ASSISTANT REGIONAL DIRECTOR DATE
APPROVED	JUBY B. CORDON REGIONAL DIRECTOR DATE
SET NO.	E 01|03
SHEET NO.	25 52

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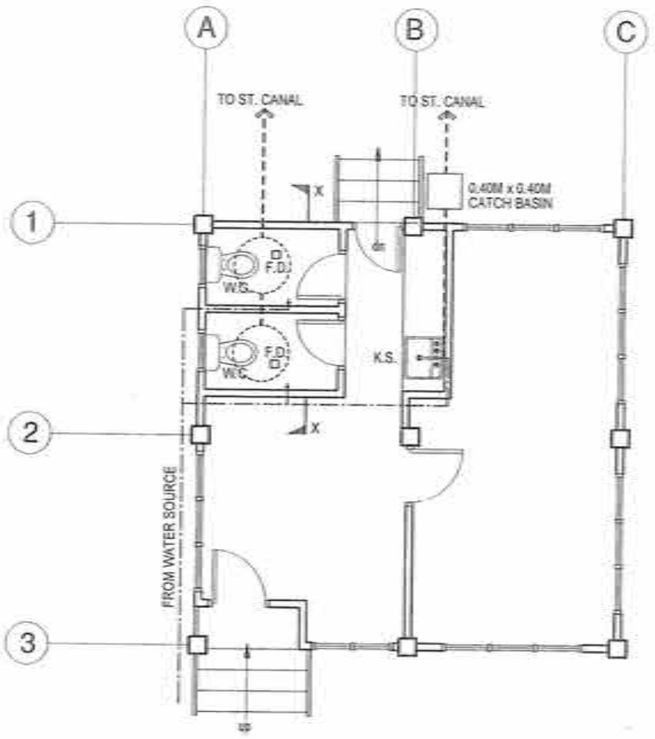
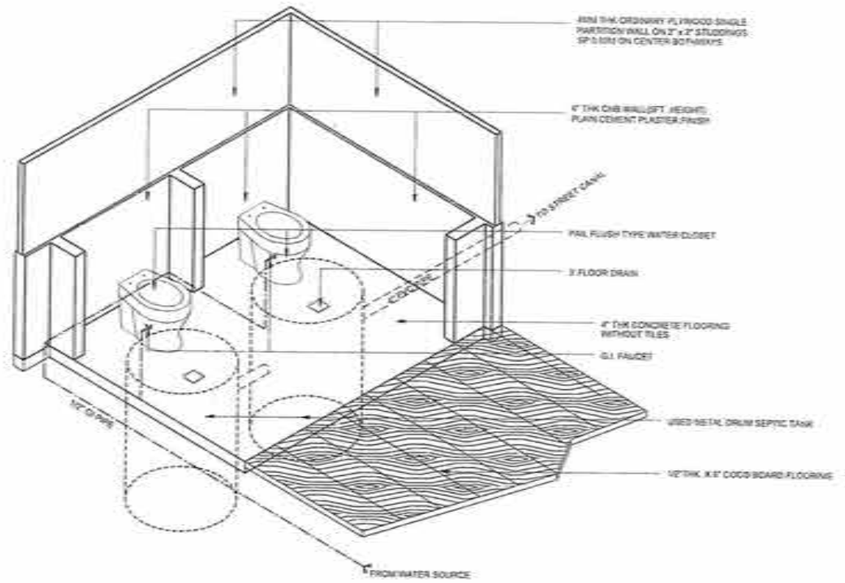


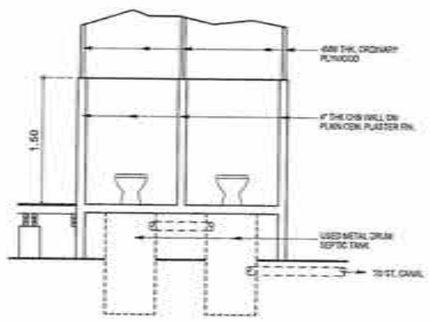
1 PLUMBING LAYOUT
SP-1

L E G E N D

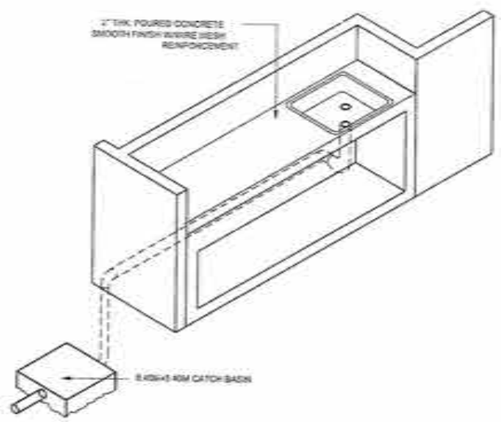
CO	CLEAN OUT
LAV	LAVATORY
—·—	WATER LINE
DST	DRUM SEPTIC TAN
F	FAUCET
WC	WATER CLOSET
FD	FLOOR DRAIN
CB	CATCH BASIN
KS	KITCHEN SINK

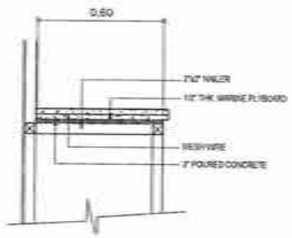


2 ISOMETRIC LAYOUT
SP-1



3 SECTION X-X
SP-1





4 COUNTER SINK DETAIL
SP-1

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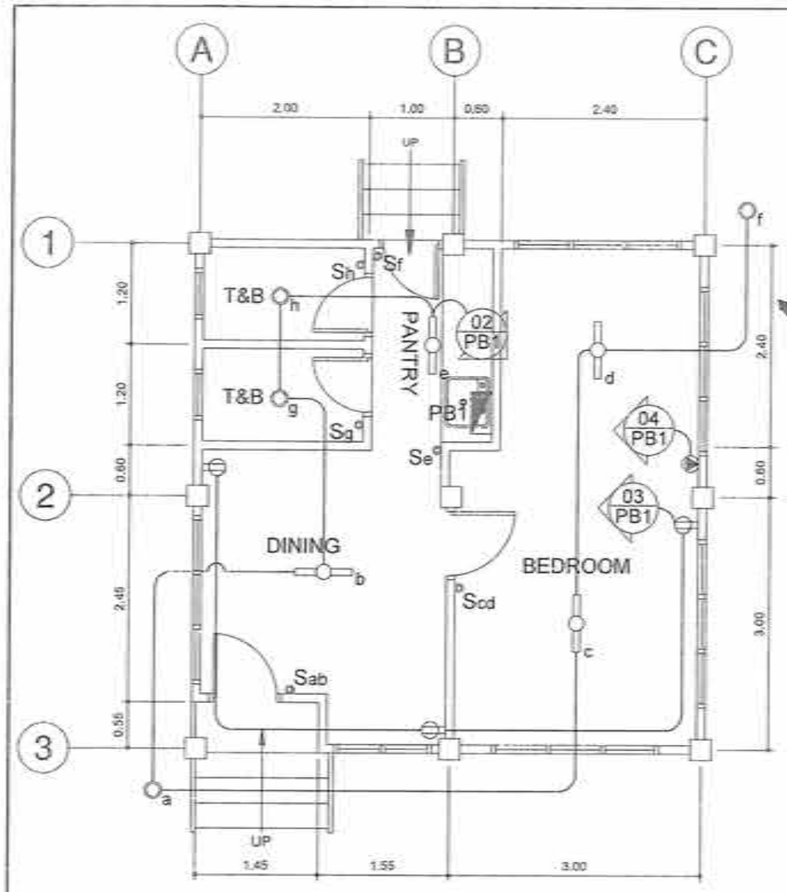
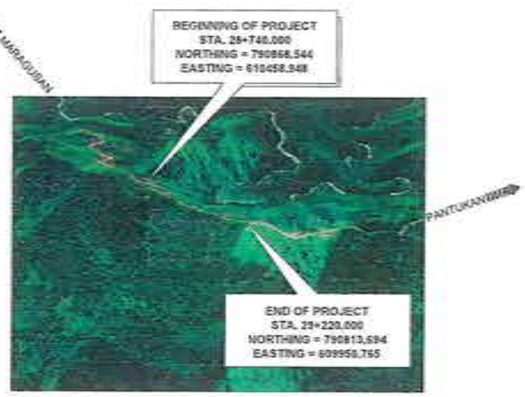


GROUND FLOOR LIGHTING & POWER PLAN
NOT TO SCALE



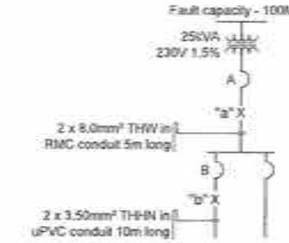
VICINITY MAP
NOT TO SCALE

LOAD SCHEDULE & COMPUTATION

PANEL	CKT	DESCRIPTION	VOLT	POWER	AMPERE	PROTECTION				CONDUCTOR & CONDUIT
						AT	AF	POLE	kAIC	
PB1	1	SERVICE/ FEEDER LINE	230	2 760	12.09	40	100	2	10	2 - 8.0mm² THW Cu. + 1 - 8.0mm² THW Cu. (G) IN 20mmØ RMC PIPE
	2	LIGHTING LOADS	230	400	1.74	20	100	2	10	2 - 3.5mm² THHN Cu. + 1 - 2.0mm² THHN Cu. (G) IN 20mmØ uPVC PIPE
	3	ALL PURPOSED LOADS	230	540	2.35	20	100	2	10	2 - 3.5mm² THHN Cu. + 1 - 2.0mm² THHN Cu. (G) IN 20mmØ uPVC PIPE
	4	AIR-CONDITION UNIT 1.0Hp	230	1 840	8.00	20	100	2	10	2 - 3.5mm² THHN Cu. + 1 - 3.5mm² THHN Cu. (G) IN 20mmØ uPVC PIPE

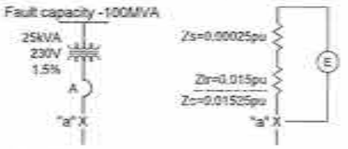
LOAD COMPUTATION
(AREA CALCULATION)
GENERAL LIGHTING & RECEPTACLE LOAD
35.10 m² x 24 VOLT-AMPERES / m² = 842 VA
PROVIDE ONE 20-AMPERE LIGHTING & RECEPTACLE CIRCUIT
SMALL APPLIANCE LOAD = 1 500 VA
PROVIDE ONE 20-AMPERE SMALL APPLIANCE LOAD CIRCUIT
SUB-TOTAL = 2 342 VA
APPLICATION OF DEMAND FACTOR
FIRST 3 000 VOLT-AMPERES @ 100% DF = 3 000 VA
REMINDER @ 35% DF = 0 VA
OTHER LOADS
ONE AIR-CONDITION UNIT 1.0Hp @ 100% DF = 1 840 VA
TOTAL NET COMPUTED LOAD = 4 840 VA
SERVICE FEEDER CONDUCTORS
TOTAL FULL LOAD CURRENT
I = 1.25 x 1 840 + 4 840 / 230 = 31.04 AMPERES
USE: 2 - 8.0mm² THW Cu. WIRE
1 - 8.0mm² THW Cu. WIRE (G)
INSIDE 1- 20mmØ RMC PIPE
SERVICE EQUIPMENT PROTECTION
TOTAL FULL LOAD CURRENT
I = 2.50 x 1 840 + 4 840 / 230 = 41.04 AMPERES
USE: 1- 40AT ACB 240V 2P 50Hz 10kAIC

FAULT CURRENT CALCULATION

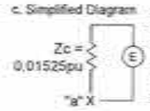


PU value of utility source, pu Zs = 0.00025 pu
PU for transformer, pu Ztr = 0.015 pu
PU value for feeder lines,
[For 2-3.5mm² cable in uPVC conduit, 10m, Zw=0.06560Ω]
pu Zw = 0.03100 pu
Fault at "a" (The fault current to be cleared by breaker A comes only from the transformer)

a. Single Line Diagram b. Impedance Diagram



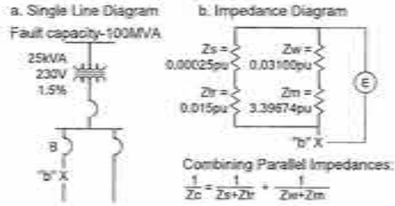
c. Simplified Diagram d. Fault Current at "a"



Isc(sym)= (1.0/0.01525)(25000/230)
Isc(sym)= 7 127.58 Amperes RMS
Say 10000Amperes RMS symmetrical
Circuit Breaker "A" should be rated not less than 10000 AIC symmetrical

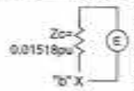
Fault at "b" (The fault current comes from the transformer plus from the contribution from the motors. The total current to be cleared by breaker B)

a. Single Line Diagram b. Impedance Diagram



Combining Parallel Impedances:
$\frac{1}{Zc} = \frac{1}{Zs+Ztr} + \frac{1}{Zw+Zm}$
Zc = 0.01518pu

c. Simplified Diagram d. Fault Current at "b"



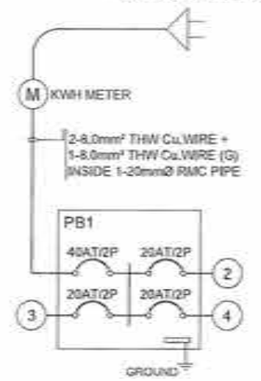
Isc(sym)= (1.0/0.01518)(25000/230)
Isc(sym)= 7 159.29 Amperes RMS
Say 10000Amperes RMS symmetrical Circuit Breaker "B" should be rated not less than 10000 AIC symmetrical

VOLTAGE DROP CALCULATION

FROM TRANSFORMER TO PB1
2 x 8.0mm² THW COPPER WIRE
WHERE:
R = 0.78Ω L = 5.0m
X = 0.064Ω I = 41.04A
VD = 1.05V
PERCENT VOLTAGE DROP
%VD = 0.46%

FROM PB1 TO A.C.U. LOAD CIRCUIT 4
FOR 3.50mm² THHN COOPER WIRE
WHERE:
R = 2.0Ω L = 10.0m
X = 0.064Ω I = 8.0A
VD = 1.05V
PERCENT VOLTAGE DROP
%VD = 0.46%
TOTAL PERCENT VOLTAGE DROP
%VDt = 0.91%

SINGLE LINE DIAGRAM



DRAWING LEGENDS

MARK	DESCRIPTIONS
	SERVICE ENTRANCE
M	KILO-WATT-HOUR METER
20AT/2P	AIR CIRCUIT BREAKER
	PANEL BOARD
	EARTH GROUND
12 PB1	CIRCUIT HOMERUN
	CIRCUIT LINE
	FLUORESCENT LAMP 36W LED (RECESSED)
	LED LIGHT BULB E27 11W
	ALL PURPOSED OUTLET 2GANG 3PRONGE
	AIR-CONDITION OUTLET 1GANG 3PRONGE

NOTES & SPECIFICATIONS

1. ALL ELECTRICAL INSTALLATIONS MADE HEREIN SHALL CONFORM WITH THE RULES AND REGULATIONS OF THE LATEST EDITION OF THE PHILIPPINE ELECTRICAL CODE (PEC), THE EXISTING LOCAL ORDINANCES, RULES AND REGULATIONS OF THE LOCAL ENFORCING AUTHORITY AND THE REQUIREMENT OF THE LOCAL UTILITY COMPANY
2. THE TYPE OF POWER SERVICE TO BE USED SHALL BE SINGLE PHASE, 1 WIRES, 230V 60HERTZ ALTERNATING CURRENT
3. ALL MATERIALS AND DEVICES TO BE USED AND INSTALLED HEREIN SHALL BE NEW, GOOD WORKMANSHIP AND OF APPROVED TYPE BY THE BUREAU OF STANDARDS
4. ELECTRICAL WIRING INSTALLATION SHALL BE DONE IN LOCATION AS FOLLOWS: (a) RIGID METALLIC CONDUIT (RMC) TO BE USED, IN SERVICE ENTRANCE AND FEEDERS, (b) ELECTRICAL METALLIC TUBING (EMT) TO BE USED ABOVE CEILING AND BETWEEN DOUBLE WALL PARTITION MADE OF COMBUSTIBLE MATERIALS (c) UNPLASTICIZED POLYVINYL CHLORINE CONDUIT (uPVC) TO BE USED IF EMBEDDED IN CONCRETE OR UNDERGROUND
5. ALL WIRES SHALL BE COPPER AND THERMOPLASTIC INSULATED TYPE "THW" UNLESS OTHERWISE INDICATED. THE MINIMUM SIZE OF WIRE AND CONDUIT TO BE USED SHALL BE 3.5mm² THW AND 15mm NOMINAL DIAMETER RESPECTIVELY
6. ALL NON-CURRENT CARRYING METAL PARTS OF ELECTRICAL EQUIPMENT SHALL BE PROPERLY GROUNDED IN ACCORDANCE WITH THE PROVISIONS OF PEC PART 1, LATEST EDITION
7. ANY DISCREPANCY IN THE LOCATION AND RATINGS OF EQUIPMENTS AND APPARATUS SHALL BE VERIFIED WITH THE OWNER OR ANY OF HIS REPRESENTATIVES AND CHANGES SHALL BE MADE ACCORDINGLY
8. ALL PIPE SLEEVES SHALL BE PROVIDE WITH PROPER SUPPORT OR ANCHORAGE NECESSARY FOR PERMANENT CONNECTION TO CONCRETE WALLING OR BEAM
9. WHEREVER REQUIRED AND NECESSARY, PULL BOXES OR JUNCTION BOXES OF PROPER SIZES SHALL BE INSTALLED AT CONVENIENT AND INCONSPICUOUS LOCATIONS, ALTHOUGH SUCH BOXES ARE NOT SHOWN AND MENTIONED IN THE PLANS OR IN THE SPECIFICATIONS
10. ALL FEEDERS LOCATED OUTSIDE THE BUILDING SHALL BE ENCASED IN ALL AROUND CONCRETE WATER PROOFED ENVELOP, AND SHALL BE BURIED WITH NOT LESS THAN 600MM BELOW THE GROUND SURFACE
11. STANDARD TYPE OF ACCESSORIES, SPLICING DEVICES, TERMINATIONS, AND OTHER APPURTENANCES FOR THE ENTIRE ELECTRICAL INSTALLATIONS SHALL BE USED
12. MOUNTING HEIGHT OF PANEL AND DEVICES WERE AS FOLLOWS: (FROM THE FLOOR FINISH TO CENTER OF UNIT)
    A. WALL SWITCHES I 400mm
    B. WALL CONVENIENCE OUTLETS 300mm
    C. kWH METER I 650mm
    D. PANELBOARD I 800mm
13. THE CONTRACTOR SHALL VERIFY AND ORIENT THE ACTUAL LOCATIONS OF SERVICE ENTRANCE FOR CONNECTIONS TO POWER SERVICE POINT
14. ALL ELECTRICAL WORKS SHALL BE DONE UNDER THE STRICT SUPERVISIONS OF A DULY REGISTERED ELECTRICAL ENGINEER

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGIONAL OFFICE NO. XI
GOV. DAVIEZ COR. R. MAGSAYSAY AVENUE, DAVAO CITY

PROJECT NAME AND LOCATION	SHEET CONTENTS	DRAFTED AND PREPARED	REVIEWED	SUBMITTED	RECOMMENDED	APPROVED	SET NO.	SHEET NO.
CONSTRUCTION OF ROAD SLOPE PROTECTION STRUCTURE - MARAGUSAN-PANTUKAN ROAD (PANTUKAN SECTION), PACKAGE Q, DAVAO DE ORO	GROUND FLOOR LIGHTING & POWER PLAN; LOAD SCHEDULE & COMPUTATION; FAULT CURRENT CALCULATION; VOLTAGE DROP CALCULATION; SINGLE LINE DIAGRAM; ELECTRICAL DRAWING LEGENDS; ELECTRICAL NOTES AND SPECIFICATIONS	JOHN PHILIP S. ORDENES, ENGINEER II, DATE	ALGIN A. GINGO, ENGINEER III, DATE	JUDY ANN P. BERNARDINO, CHIEF, PLANNING AND DESIGN DIVISION, DATE	JOSELITO B. CABALLERO, ASSISTANT REGIONAL DIRECTOR, DATE	JUBY B. CORDON, REGIONAL DIRECTOR, DATE	E 03 03	27 52

M:\11-PCO-2023_SLOPE PROTECTION\2025 INFRA PROJECTS\MARAGUSAN-PANTUKAN\TYPICAL AND BACKUP\CAMPHOUSE\25-01 CAMPHOUSE DETAILS CLEAN.DWG

LEGEND:

- — — GRAVEL ROAD (RE)
- WH WOODEN HOUSE
- CENTERLINE
- ROW RROW LIMIT
- CUT
- FILL
- RCPC

ELEMENTS OF CURVE

PI-No.	PI STATION	NORTHING	EASTING	I	D	R	T	E	Lc	Pc	Pt	e	w	V (kph)
PI-21	28+925.938	790846.760	610234.062	05°18'20"	05°18'52"	215.623	10.000	0.232	19.986	28+915.938	28+935.924			
PI-22	28+978.061	790835.952	610182.856	30°36'30"	31°21'32"	36.542	10.000	1.344	19.522	28+968.061	28+987.583			
PI-23	29+022.367	790807.316	610149.260	45°16'16"	48°57'45"	23.404	10.000	2.047	18.991	29+012.367	29+031.258			
PI-24	29+078.715	790812.143	610092.045	04°27'40"	04°27'55"	256.620	9.999	0.195	19.989	29+068.715	29+088.704			
PI-25	29+196.572	790812.676	609974.160	01°38'10"	01°38'20"	659.293	9.999	0.071	19.998	29+186.573	29+206.573			

TRAVERSE LINE

PI-#	AZIMUTH	DISTANCE
PI-20 TO PI-21	84°28'10"	258.137 M.
PI-21 TO PI-22	79°09'01"	52.137 M.
PI-22 TO PI-23	40°32'50"	44.704 M.
PI-23 TO PI-24	84°49'13"	57.447 M.
PI-24 TO PI-25	90°21'07"	117.858 M.
PI-25 TO PI-26	91°05'46"	116.965 M.

ELEMENTS OF CURVE (NEW)

PI NUMBER	STATION	NORTHING	EASTING	I	D	R	T	E	LC	PC	PT	e (%)	w (m)	V (kph)
PI-20N	28+925.938	790846.759	610234.062	5°18'40"	5°18'50"	215.623	10.000	0.232	19.986	28+915.938	28+935.924	-	-	30
PI-21N	28+978.061	790830.952	610182.856	30°36'30"	31°21'30"	36.542	10.000	1.344	19.522	28+968.061	28+987.583	-	-	30
PI-22N	29+021.467	790807.912	610149.863	40°29'10"	39°38'50"	28.862	10.658	1.903	20.422	29+010.809	29+031.231	-	-	30
PI-23N	29+049.752	790801.420	610120.768	14°45'30"	14°45'30"	77.640	10.064	0.652	20.000	29+039.688	29+059.724	-	-	30
PI-24N	29+078.155	790814.229	610095.100	22°03'50"	21°55'40"	52.250	10.188	0.984	20.124	29+067.967	29+088.091	-	-	30
PI-25N	29+123.875	790807.400	610045.819	14°05'50"	14°04'40"	81.404	10.075	0.621	20.051	29+113.800	29+133.850	-	-	30
PI-26N	29+169.534	790811.906	610002.090	3°53'10"	3°53'10"	294.800	10.006	0.170	20.004	29+159.528	29+179.532	-	-	30

TRAVERSE LINE (NEW)

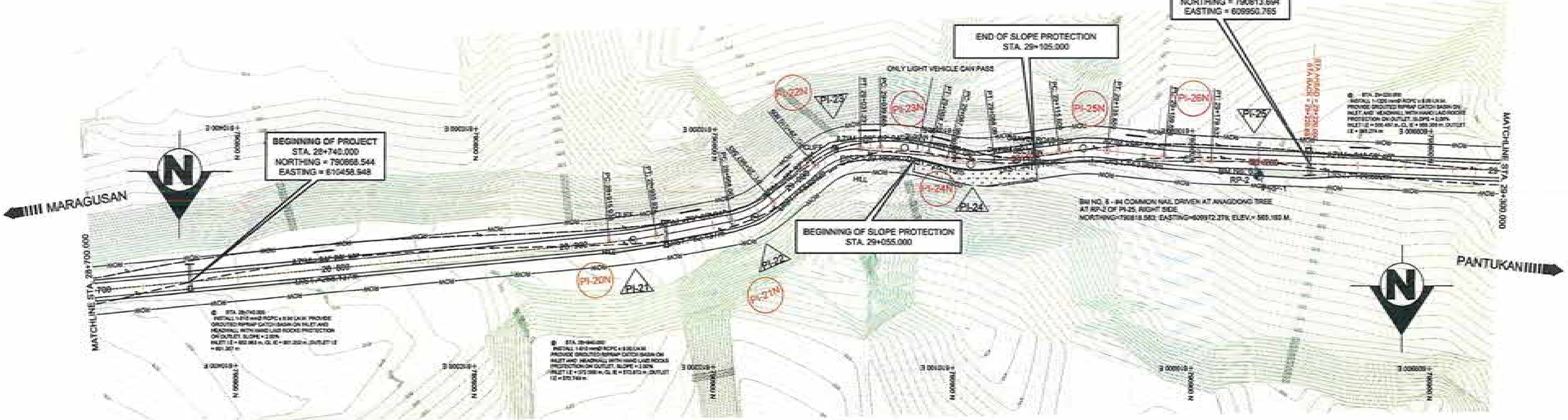
PI No.	DISTANCE	AZIMUTH
PI-20 TO PI-20N	258.137 M.	84° 28' 09.790"
PI-20N TO PI-21N	52.137 M.	79° 09' 31.104"
PI-21N TO PI-22N	43.864 M.	48° 32' 56.335"
PI-22N TO PI-23N	26.180 M.	88° 02' 04.140"
PI-23N TO PI-24N	28.618 M.	103° 50' 05.782"
PI-24N TO PI-25N	47.773 M.	81° 46' 12.110"
PI-25N TO PI-26N	43.960 M.	95° 52' 57.356"
PI-26N TO PI-26	144.892 M.	91° 59' 45.857"

REFERENCE POINT OF PI-25

	AZIMUTH	DISTANCE	NORTHING	EASTING
RP-1	157°4'19"	11.858 M.	790823.847	609968.578
RP-2	161°34'37"	8.013 M.	790818.583	609972.276

RP-1 - UMBRELLA NAIL WITH BOTTLE CAP AT HANAGDONG TREE

RP-2 - UMBRELLA NAIL WITH BOTTLE CAP AT HANAGDONG TREE



PLAN

SCALE 1:1250 m.

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGIONAL OFFICE NO. XI
GOV. CHAVEZ COR. R. MAGSAYSAY AVENUE, DAVAO CITY

PROJECT NAME AND LOCATION: CONSTRUCTION OF ROAD SLOPE PROTECTION STRUCTURE - MARAGUSAN-PANTUKAN ROAD (PANTUKAN SECTION), PACKAGE Q, DAVAO DE ORO

SHEET CONTENTS: PLAN AND PROFILE

SURVEYED: RUEL M. BACAY, ENGINEER II

REVIEWED: DANILO M. CARBADA, ENGINEER II

PREPARED: LESTER B. PADILLA, ENGINEER II

REVIEWED: ALGIN A. GINGATAN, ENGINEER III

SUBMITTED: JUDY ANN T. BERNARDINO, CHIEF, PLANNING AND DESIGN DIVISION

DATE:

RECOMMENDED: JOSELITO B. CABALLERO, ASSISTANT REGIONAL DIRECTOR

DATE:

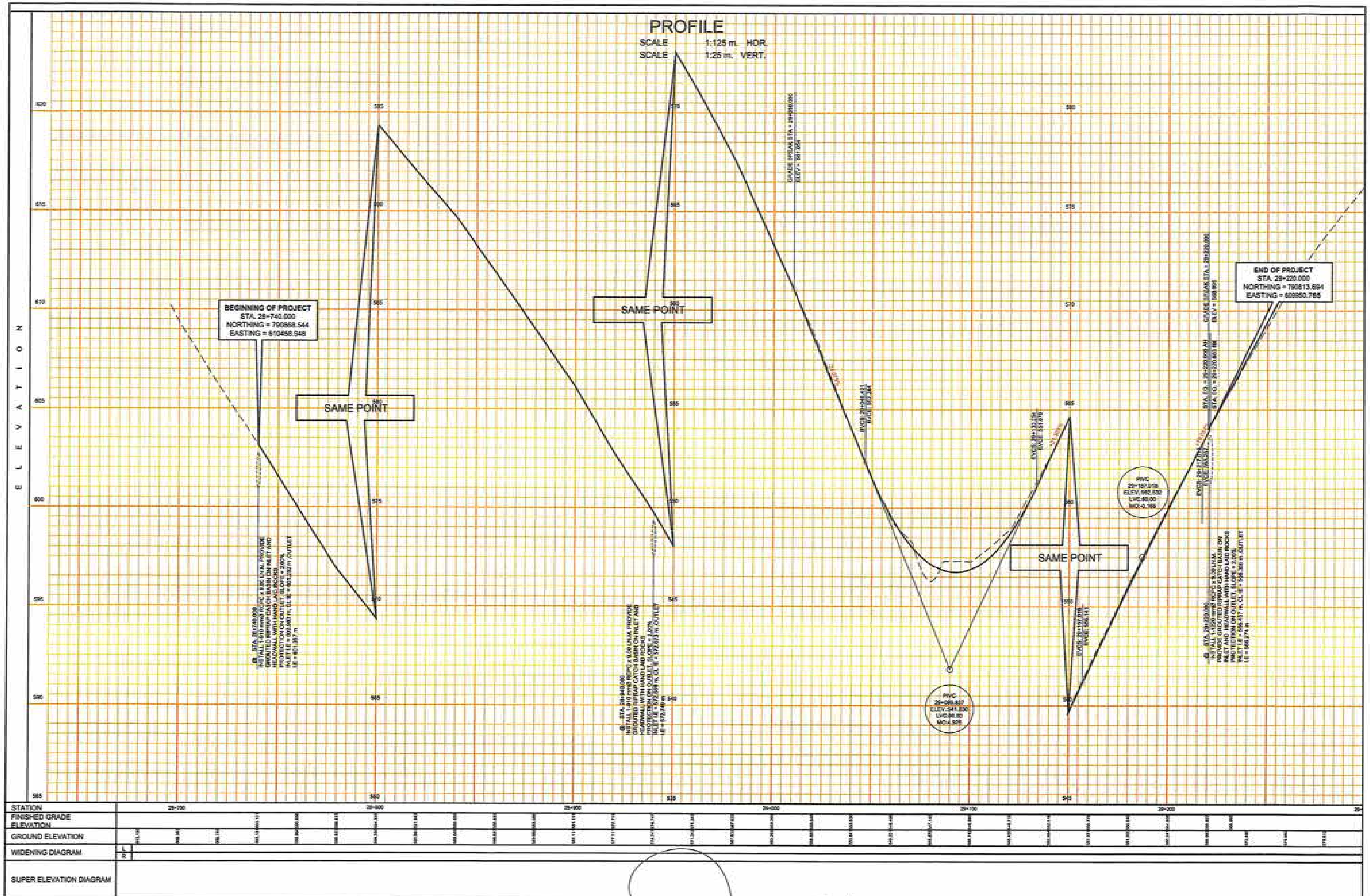
APPROVED: JUBY B. CORDON, REGIONAL DIRECTOR

DATE:

SET NO. F 1/2

SHEET NO. 28/52

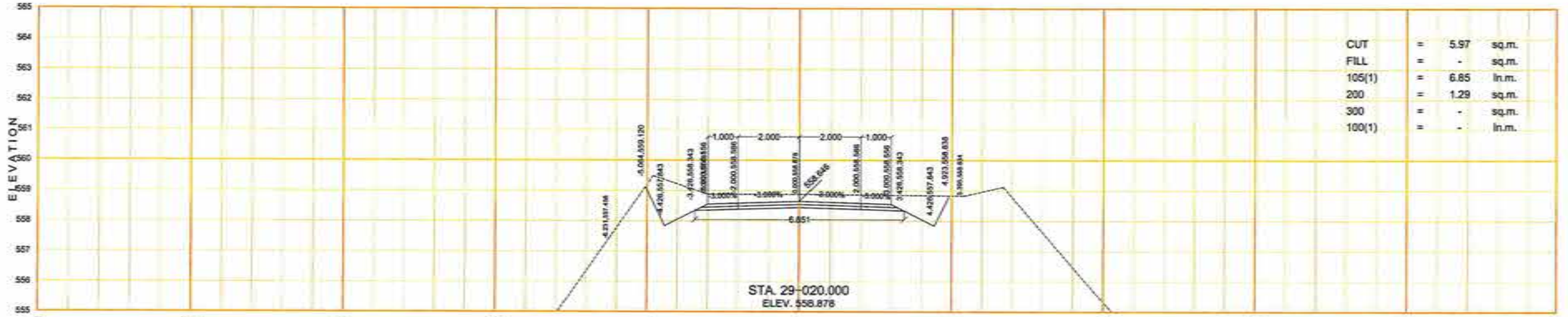
D:\INFRA\2025 INFRA\CONST. OF MARAGUSAN-PANTUKAN ROAD, DDO (12-5-2024)\DESIGN_SCHEME 3 5-8-25\A2\A2 PLAN AND PROFILE WITH CONTOUR.DWG

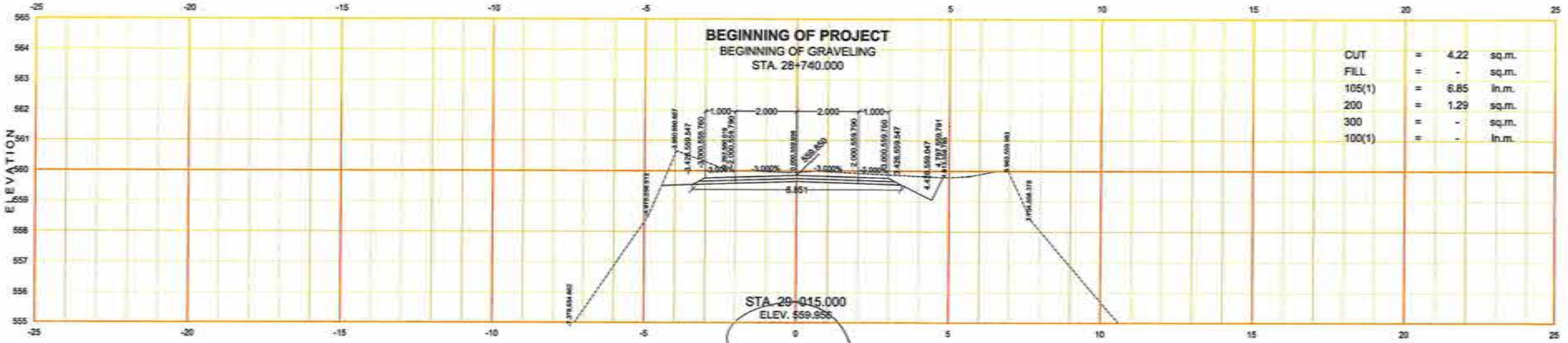


REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS REGIONAL OFFICE NO. XI GOV. CHAVEZ COR. R. MAGSAYSAY AVENUE, DAVAO CITY	PROJECT NAME AND LOCATION: CONSTRUCTION OF ROAD SLOPE PROTECTION STRUCTURE - MARAGUSAN-PANTUKAN ROAD (PANTUKAN SECTION), PACKAGE Q, DAVAO DE ORO	SHEET CONTENTS: PLAN AND PROFILE	SURVEYED: RUEL M. BACAY, ENGINEER III REVIEWED: DANILO M. CARIAGA, ENGINEER III	PREPARED: LESTER B. PADILLA, ENGINEER II REVIEWED: ALGIN A. GINGATA, ENGINEER III	SUBMITTED: JUDY ANN T. BERNARDINO, CHIEF, PLANNING AND DESIGN DIVISION DATE:	RECOMMENDED: JOSELITO B. CABALLERO, ASSISTANT REGIONAL DIRECTOR DATE:	APPROVED: JUBY B. CORDON, REGIONAL DIRECTOR DATE:

SET NO.: F 2 2 | SHEET NO.: 29 / 52

D:\INFRA\2025 INFRA\CONST. OF MARAGUSAN-PANTUKAN ROAD, DDO (12-6-2024)\DESIGN_SCHEME 3 5-8-25\A2\A2 PLAN AND PROFILE WITH CONTOUR.DWG





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SHEET CONTENTS:
CROSS SECTIONS

SURVEYED: RUEL M. BACAY, ENGINEER II
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PREPARED: LESTER O. RACELLA, ENGINEER I
REVIEWED: ALGIN A. GINGAYAN, ENGINEER III
SUBMITTED: JUDY ANN T. BERNARDINO, CHIEF, PLANNING AND DESIGN DIVISION, DATE:
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SET NO.: G 1 20
SHEET NO.: 30 52

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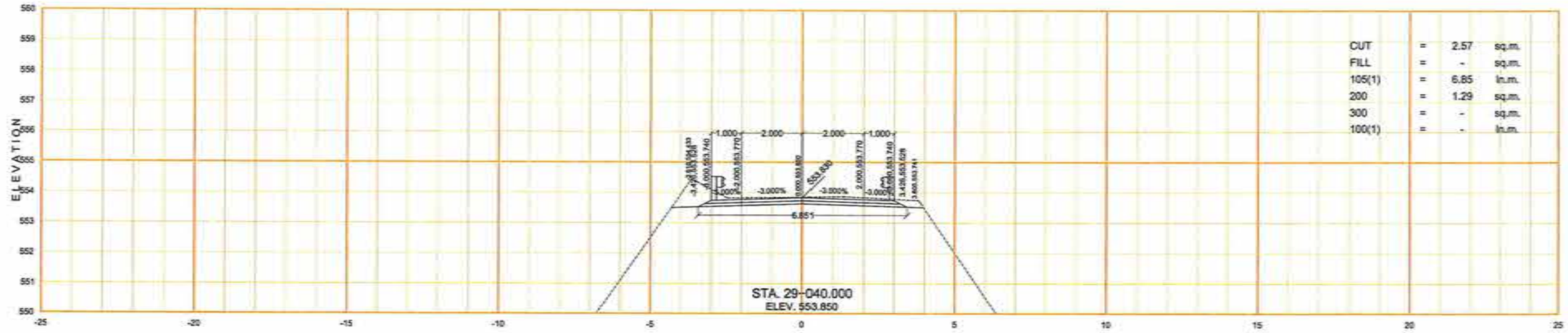

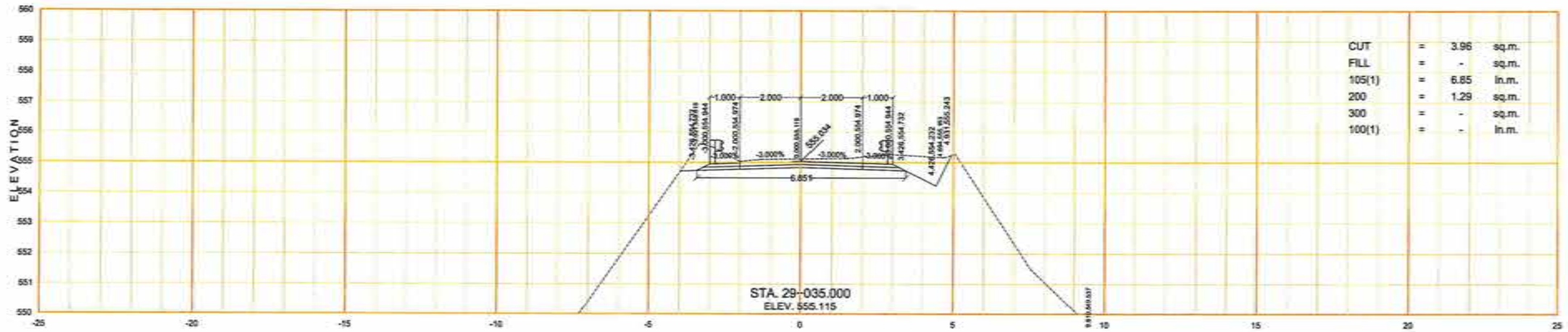

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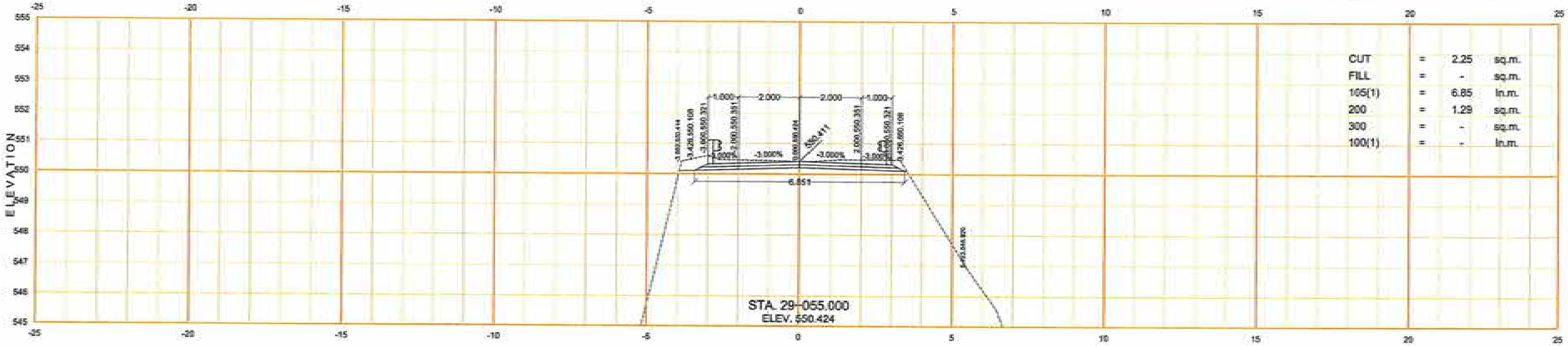
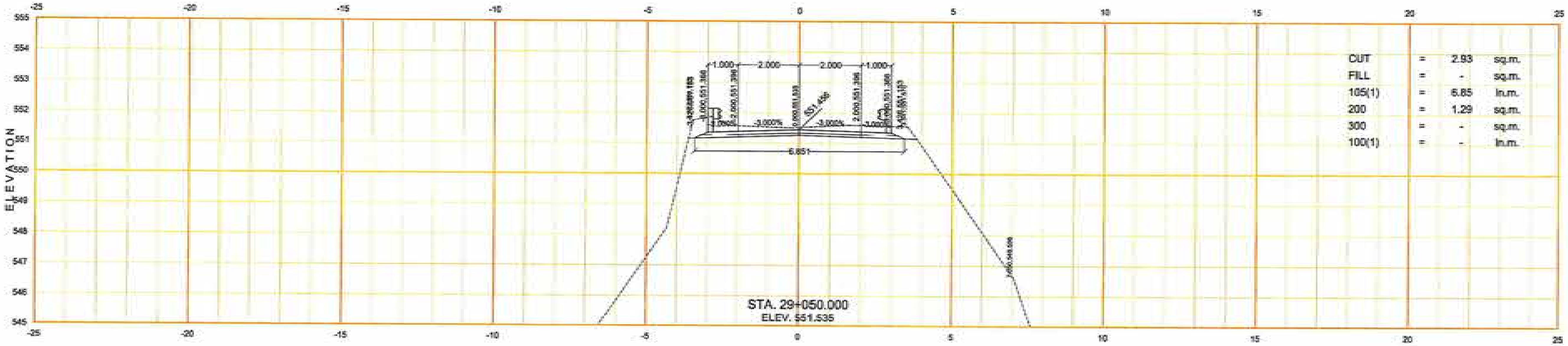
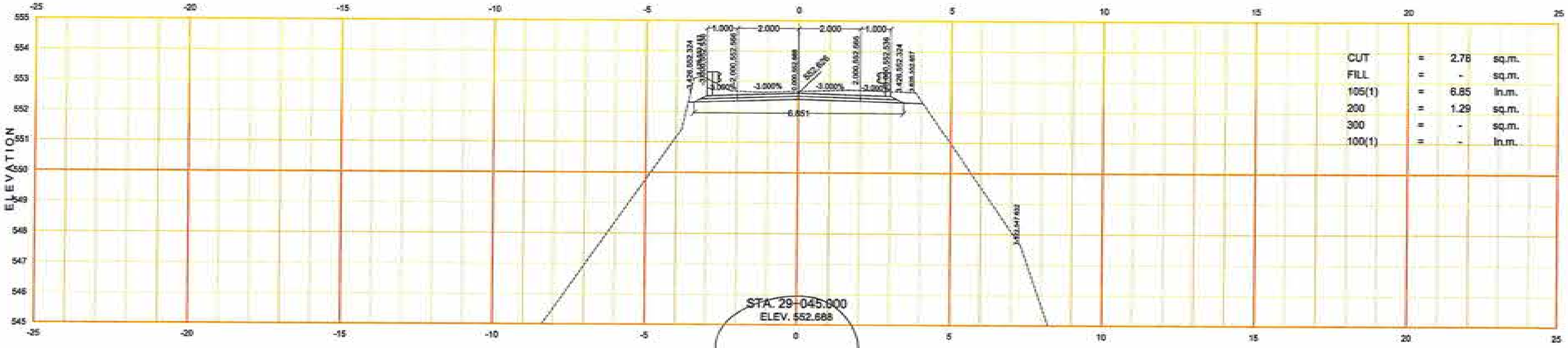
SHEET NO.: 31 52

G:\INFRA\2025 INFRA\CONST. OF MARAGUSAN-PANTUKAN ROAD, DDO (12-5-2024)\DESIGN_SCHEME 1-5-8-25\AZA2 XSECTION.DWG







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SHEET CONTENTS:
CROSS SECTIONS

SURVEYED: RUEL M. ALACAY, ENGINEER II
REVIEWED: DANILO M. CARSALIA, ENGINEER III
PREPARED: LESPETO G. FIGULLA, ENGINEER II
REVIEWED: ALGIN A. GINGATAO, ENGINEER II
SUBMITTED: JUDY ANN T. BERNARDINO, CHIEF, PLANNING AND DESIGN DIVISION
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DATE:

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SHEET NO. 32 52

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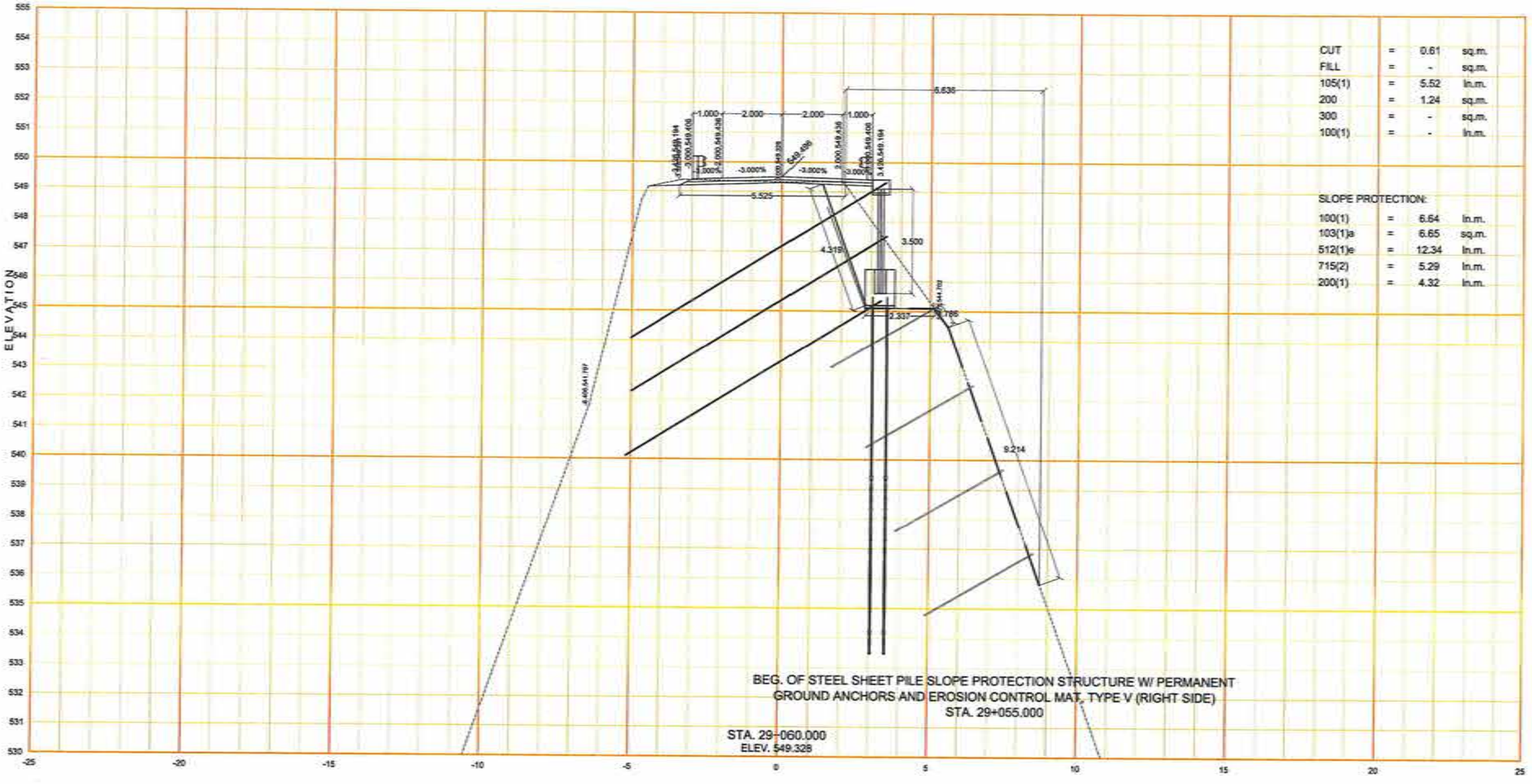

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SHEET CONTENTS:
CROSS SECTIONS

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PREPARED: LESTER S. PADILLA, ENGINEER I
REVIEWED: DANILO M. CARIAGA, ENGINEER III
REVIEWED: ALGIN A. GINGATAN, ENGINEER III
SUBMITTED: JUDY ANN T. BERNARDINO, CHIEF, PLANNING AND DESIGN DIVISION, DATE:
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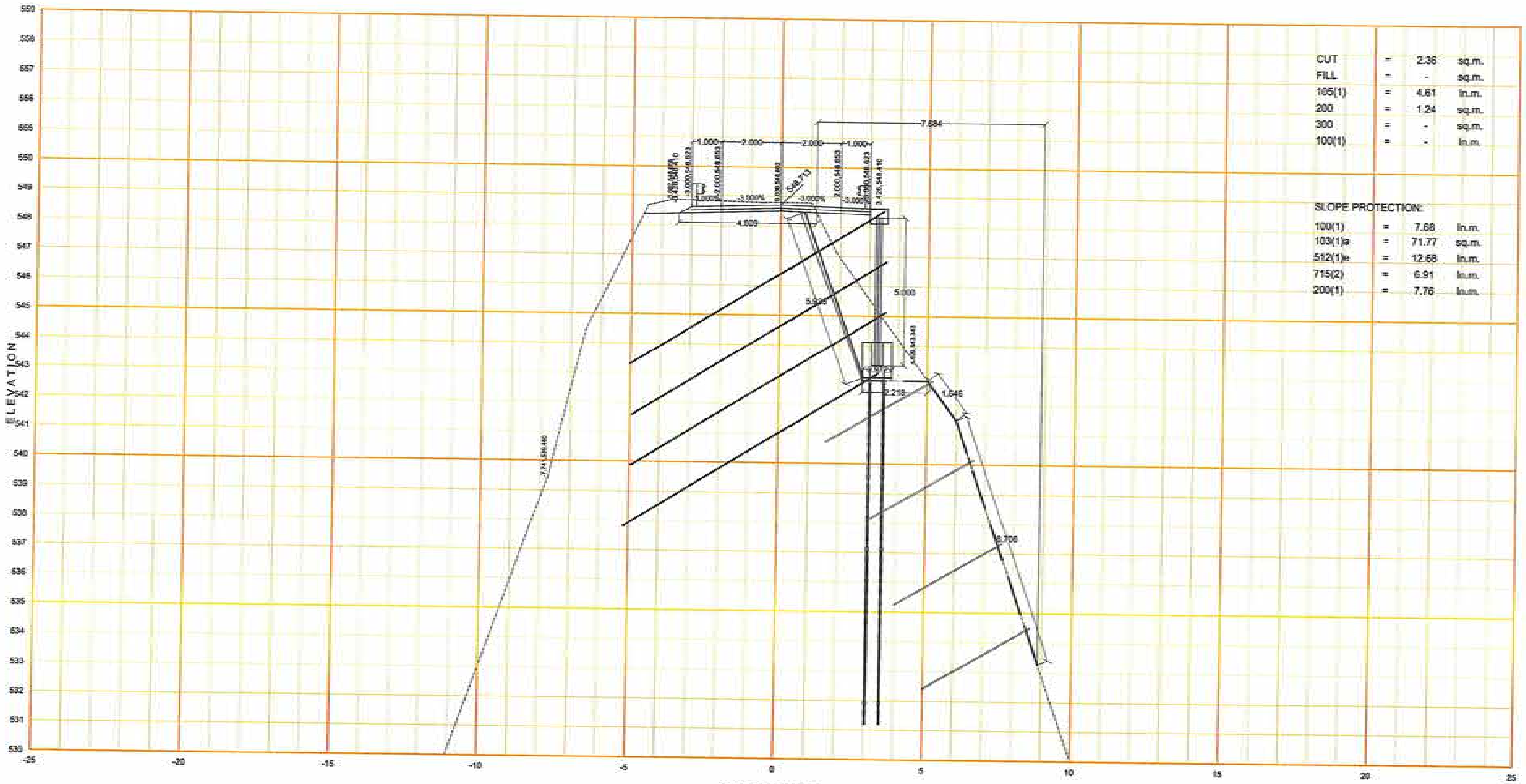
APPROVED: JUBY B. CORDON, REGIONAL DIRECTOR, DATE:

SET NO.: G 4 20
SHEET NO.: 33 52

D:\INFRA\2025 INFRA\CONST. OF MARAGUSAN-PANTUKAN ROAD, DDO (12-9-2024)\DESIGN_SCHEME 3 5-9-25\A2\A2 XSECTION.DWG



STA. 29+065.000
ELEV. 548.802

CUT	=	2.36	sq.m.
FILL	=	-	sq.m.
105(1)	=	4.61	ln.m.
200	=	1.24	sq.m.
300	=	-	sq.m.
100(1)	=	-	ln.m.

SLOPE PROTECTION:

100(1)	=	7.68	ln.m.
103(1)a	=	71.77	sq.m.
512(1)e	=	12.68	ln.m.
715(2)	=	6.91	ln.m.
200(1)	=	7.76	ln.m.

REPUBLIC OF THE PHILIPPINES
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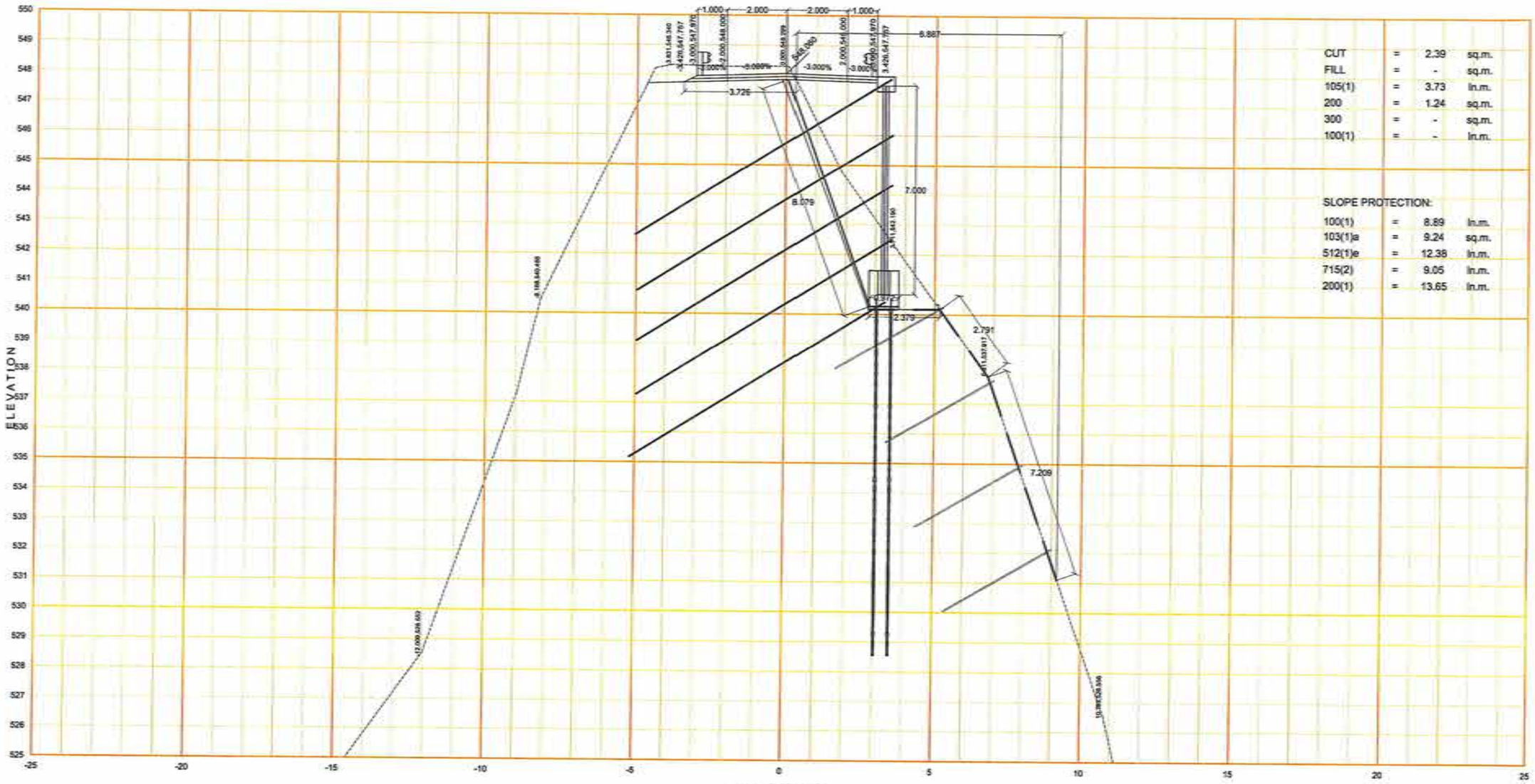
SHEET CONTENTS:
CROSS SECTIONS

SURVEYED: RUEL [illegible]ACAY, ENGINEER [illegible]
REVIEWED: DA[illegible]LO M. CA[illegible]GA, ENGINEER [illegible]
PREPARED: LES[illegible]G. [illegible]ILLA, ENGINEER II
REVIEWED: ALGIN A. GINGATA[illegible], ENGINEER [illegible]
SUBMITTED: JUDY A[illegible] T. BERNARDINO, CHIEF, PLANNING AND DESIGN DIVISION
DATE:
RECOMMENDED: JOSELITO B. CABALLERO, ASSISTANT REGIONAL DIRECTOR
DATE:
APPROVED: JUBY B. CORDON, REGIONAL DIRECTOR
DATE:

SET NO.: G 5 20
SHEET NO.: 34 / 52

D:\INFRA\2025 INFRA\CONST. OF MARAGUSAN-PANTUKAN ROAD, DDO (12-5-2024)\DESIGN_SCHEME 3 5-9-25\A2\A2 XSECTION.DWG



CUT	=	2.39	sq.m.
FILL	=	-	sq.m.
105(1)	=	3.73	ln.m.
200	=	1.24	sq.m.
300	=	-	sq.m.
100(1)	=	-	ln.m.

SLOPE PROTECTION:

100(1)	=	8.89	ln.m.
103(1)a	=	9.24	sq.m.
512(1)e	=	12.38	ln.m.
715(2)	=	9.05	ln.m.
200(1)	=	13.65	ln.m.

STA. 29+070.000
ELEV. 548.299

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGIONAL OFFICE NO. XI
GOV. CHAVEZ COR. R. MAGSAYSAY AVENUE, DAVAO CITY

PROJECT NAME AND LOCATION:
CONSTRUCTION OF ROAD SLOPE PROTECTION STRUCTURE - MARAGUSAN-PANTUKAN ROAD (PANTUKAN SECTION), PACKAGE Q, DAVAO DE ORO

SHEET CONTENTS:
CROSS SECTIONS

SURVEYED:
RUEL M. BACAY
ENGINEER II

REVIEWED:
DANILO M. CARRIGA
ENGINEER III

PREPARED:
LESTER B. PADILLA
ENGINEER I

REVIEWED:
ALGIN A. GINGATAN
ENGINEER II

SUBMITTED:
JUDY ANN T. BERNARDINO
CHIEF, PLANNING AND DESIGN DIVISION
DATE:

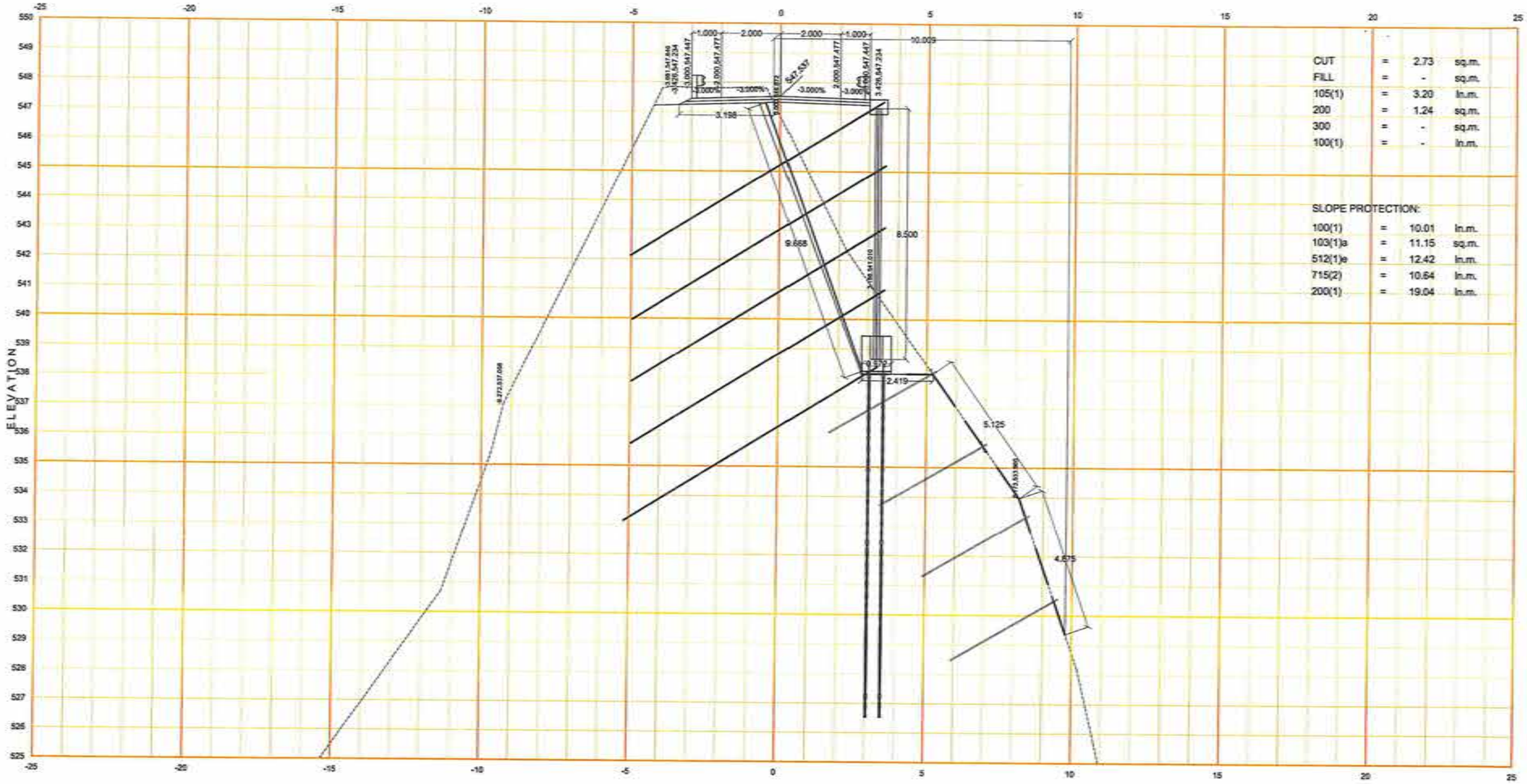
RECOMMENDED:
JOSELITO B. CABALLERO
ASSISTANT REGIONAL DIRECTOR
DATE:

APPROVED:
JUBY B. CORDON
REGIONAL DIRECTOR
DATE:

SET NO.: G 6 20

SHEET NO.: 35 52

D:\INFRA\2025 INFRA\CONST. OF MARAGUSAN-PANTUKAN ROAD, DDO (12-5-2024)\DESIGN_SCHEME 3 5-9-25\A2\A2 XSECTION.DWG



CUT	=	2.73	sq.m.
FILL	=	-	sq.m.
105(1)	=	3.20	ln.m.
200	=	1.24	sq.m.
300	=	-	sq.m.
100(1)	=	-	ln.m.

SLOPE PROTECTION:

100(1)	=	10.01	ln.m.
103(1)a	=	11.15	sq.m.
512(1)e	=	12.42	ln.m.
715(2)	=	10.64	ln.m.
200(1)	=	19.04	ln.m.

STA. 29+075.000
ELEV. 546.872

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGIONAL OFFICE NO. XI
GOV. CHAVEZ COR. R. MAGSAYSAY AVENUE, DAVAO CITY

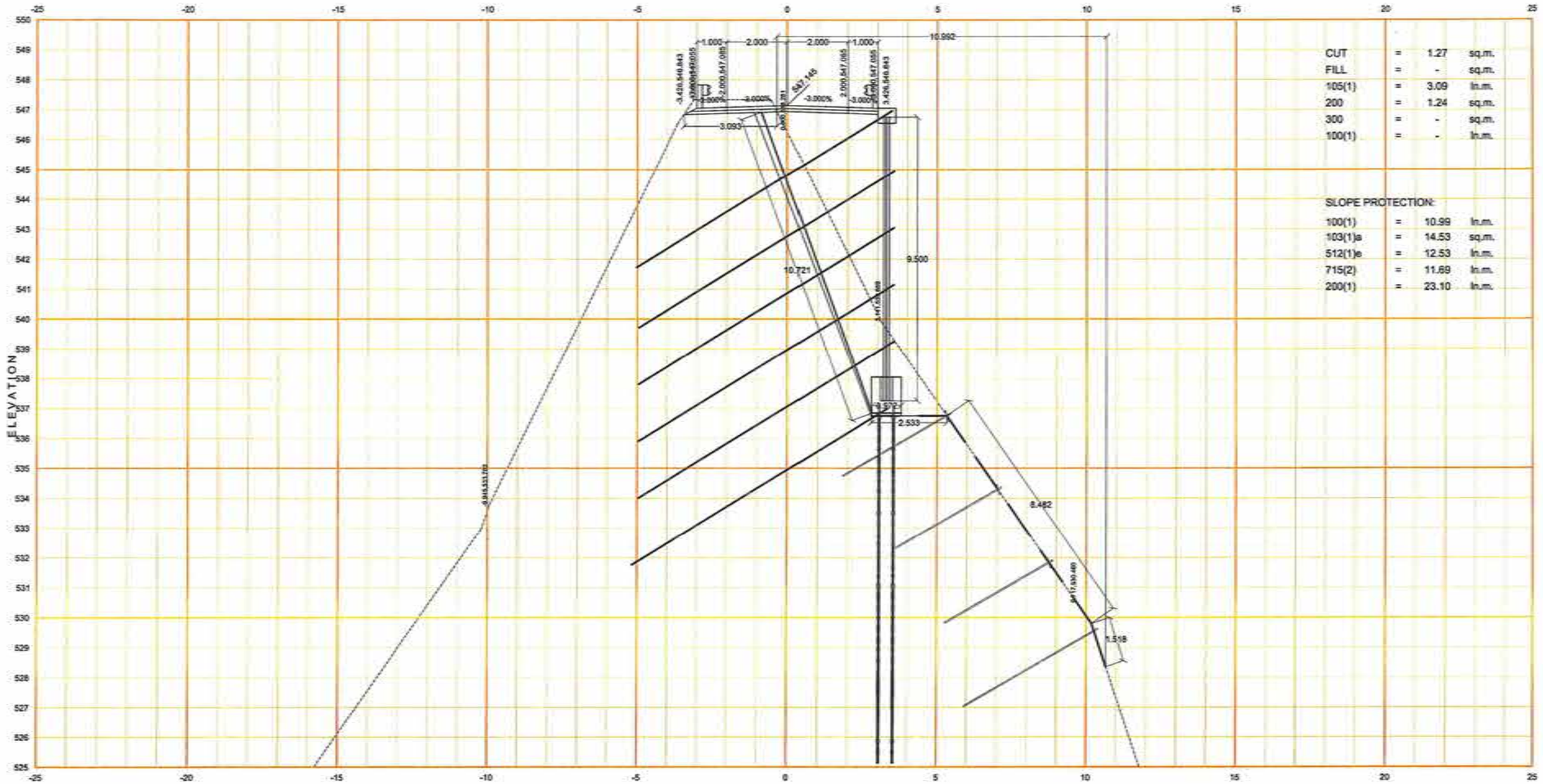
PROJECT NAME AND LOCATION:
CONSTRUCTION OF ROAD SLOPE PROTECTION STRUCTURE - MARAGUSAN-PANTUKAN ROAD (PANTUKAN SECTION), PACKAGE Q, DAVAO DE ORO

SHEET CONTENTS:
CROSS SECTIONS

SURVEYED: RUEL B. BACAY, ENGINEER II
PREPARED: LESTER D. PACHILA, ENGINEER II
REVIEWED: DANILO M. CARIAGA, ENGINEER III
REVIEWED: ALGIN A. GINGATAN, ENGINEER II
SUBMITTED: JUDY ANN T. BERNARDINO, CHIEF, PLANNING AND DESIGN DIVISION, DATE:
RECOMMENDED: JOSELITO B. CABALLERO, ASSISTANT REGIONAL DIRECTOR, DATE:
APPROVED: JUBY B. CORDON, REGIONAL DIRECTOR, DATE:

DET NO.: G / 7 | 20
SHEET NO.: 36 / 52

D:\INFRA\2025 INFRA\CONST. OF MARAGUSAN-PANTUKAN ROAD, DDO (12-5-2024)\DESIGN_SCHEME 5 5-8-25\A2\A2 XSECTION.DWG



CUT	=	1.27	sq.m.
FILL	=	-	sq.m.
105(1)	=	3.09	ln.m.
200	=	1.24	sq.m.
300	=	-	sq.m.
100(1)	=	-	ln.m.

SLOPE PROTECTION:

100(1)	=	10.99	ln.m.
103(1)a	=	14.53	sq.m.
512(1)e	=	12.53	ln.m.
715(2)	=	11.69	ln.m.
200(1)	=	23.10	ln.m.

STA. 29+080.000
ELEV. 546.261

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGIONAL OFFICE NO. XI
GOV. CHAVEZ COR. R. MAGSAYSAY AVENUE, DAVAO CITY

PROJECT NAME AND LOCATION:
CONSTRUCTION OF ROAD SLOPE PROTECTION STRUCTURE - MARAGUSAN-PANTUKAN ROAD (PANTUKAN SECTION), PACKAGE Q, DAVAO DE ORO

SHEET CONTENTS:
CROSS SECTIONS

SURVEYED:
RUEL M. CACAT
ENGINEER I

PREPARED:
LESTERG. PADILLA
ENGINEER I

REVIEWED:
DANILO M. CABIADA
ENGINEER III

REVIEWED:
ALGIN A. GINGATAN
ENGINEER III

SUBMITTED:
JUDY ANN T. BERNARDINO
CHIEF, PLANNING AND DESIGN DIVISION
DATE:

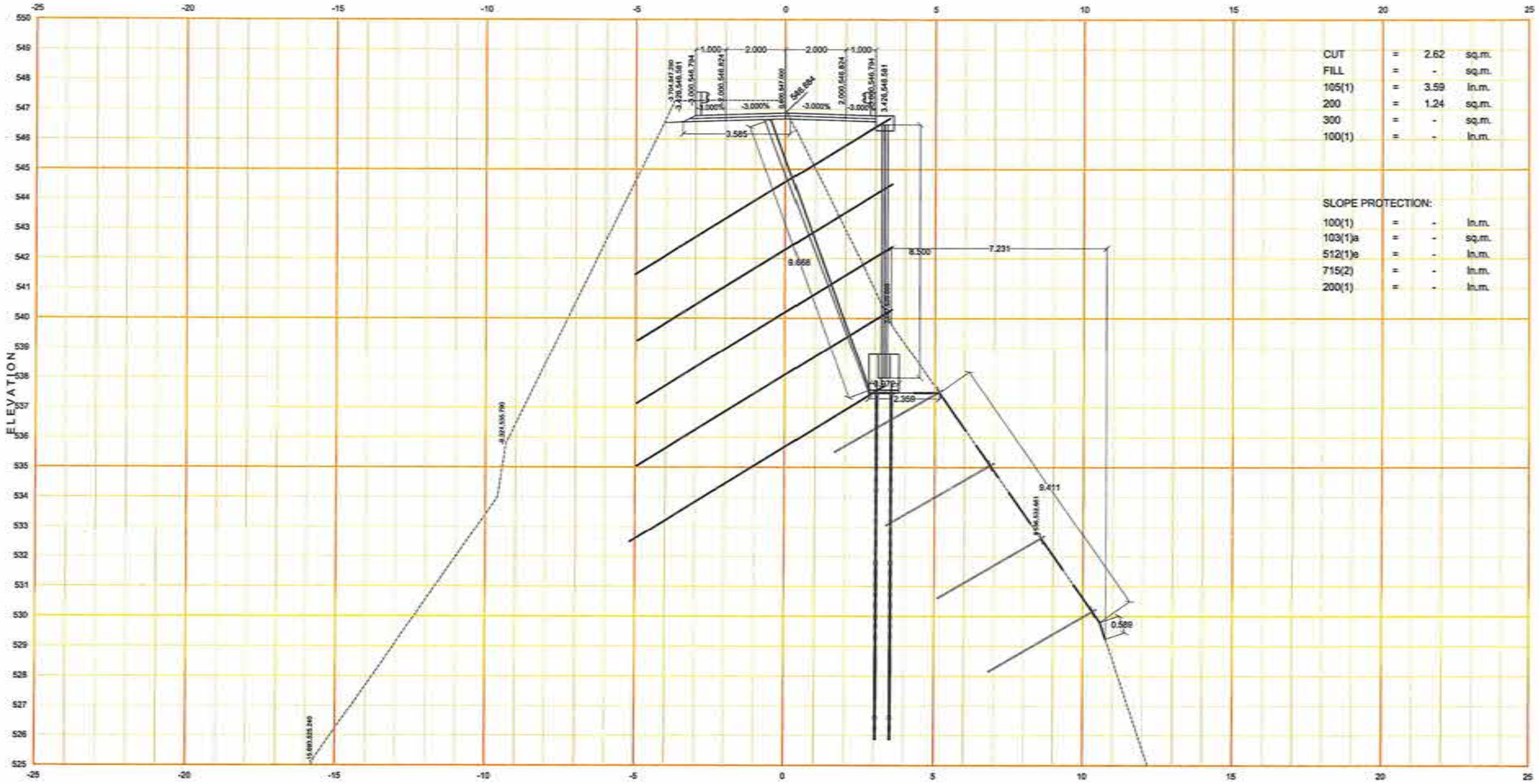
RECOMMENDED:
JOSELITO B. CABALLERO
ASSISTANT REGIONAL DIRECTOR
DATE:

APPROVED:
JUBY B. CORDON
REGIONAL DIRECTOR
DATE:

SET NO.: G 8 20

SHEET NO.: 37 52

D:\INFRA\2025 INFRA\CONST. OF MARAGUSAN-PANTUKAN ROAD, DDO (12-5-2024)\DESIGN_SCHEME 3 5-9-25\AZ\A2 XSECTION.DWG



CUT	=	2.62	sq.m.
FILL	=	-	sq.m.
105(1)	=	3.59	ln.m.
200	=	1.24	sq.m.
300	=	-	sq.m.
100(1)	=	-	ln.m.

SLOPE PROTECTION:

100(1)	=	-	ln.m.
103(1)a	=	-	sq.m.
512(1)e	=	-	ln.m.
715(2)	=	-	ln.m.
200(1)	=	-	ln.m.

STA. 29+085.000
ELEV. 547.000

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGIONAL OFFICE NO. XI
GOV. CHAVEZ COR. R. MAGSAYSAY AVENUE, DAVAO CITY

PROJECT NAME AND LOCATION:
CONSTRUCTION OF ROAD SLOPE PROTECTION STRUCTURE - MARAGUSAN-PANTUKAN ROAD (PANTUKAN SECTION), PACKAGE Q, DAVAO DE ORO

SHEET CONTENTS:
CROSS SECTIONS

SURVEYED:
RUEL M. BAZAR
ENGINEER II

REVIEWED:
DANILO M. CASORLA
ENGINEER

PREPARED:
LESTER D. PADILLA
ENGINEER II

REVIEWED:
ALGIN A. GINGATAN
ENGINEER II

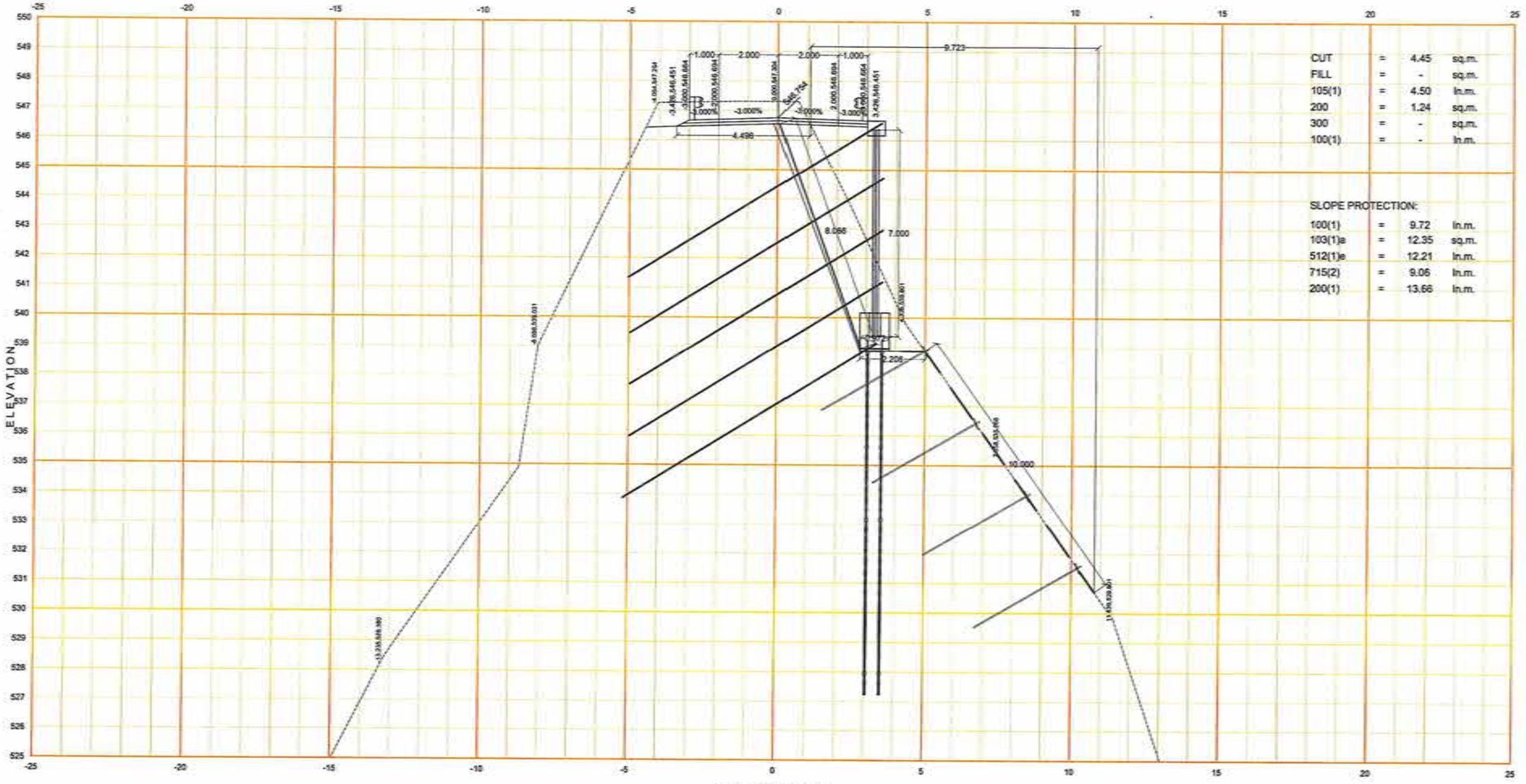
SUBMITTED:
JUDY ANN T. BERNARDINO
CHIEF, PLANNING AND DESIGN DIVISION
DATE:

RECOMMENDED:
JOSELITO B. CABALLERO
ASSISTANT REGIONAL DIRECTOR
DATE:

APPROVED:
JUBY B. CORDON
REGIONAL DIRECTOR
DATE:

SET NO.: G 9 | 20
SHEET NO.: 38 | 52

D:\INFRA\2025 INFRA\CONST. OF MARAGUSAN-PANTUKAN ROAD, DDO (12-5-2024)\DESIGN_SCHEME 3 5-9-25\AZ\AZ XSECTION.DWG



CUT	=	4.45	sq.m.
FILL	=	-	sq.m.
105(1)	=	4.50	ln.m.
200	=	1.24	sq.m.
300	=	-	sq.m.
100(1)	=	-	ln.m.

SLOPE PROTECTION:

100(1)	=	9.72	ln.m.
103(1)a	=	12.35	sq.m.
512(1)e	=	12.21	ln.m.
715(2)	=	9.06	ln.m.
200(1)	=	13.66	ln.m.

STA. 29+090.000
ELEV. 547.304

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGIONAL OFFICE NO. XI
GOV. CHAVEZ COR. R. MAGSAYSAY AVENUE, DAVAO CITY

PROJECT NAME AND LOCATION:
CONSTRUCTION OF ROAD SLOPE PROTECTION STRUCTURE - MARAGUSAN-PANTUKAN ROAD (PANTUKAN SECTION), PACKAGE Q, DAVAO DE ORO

SHEET CONTENTS:
CROSS SECTIONS

SURVEYED: RUEL M. BACAY, ENGINEER III

PREPARED: LESTHER B. [illegible], ENGINEER II

REVIEWED: DANILO M. CAMARA, ENGINEER III

REVIEWED: ALGIN A. GINGOYON, ENGINEER III

SUBMITTED: JUDY ANN T. BERNARDINO, CHIEF, PLANNING AND DESIGN DIVISION, DATE:

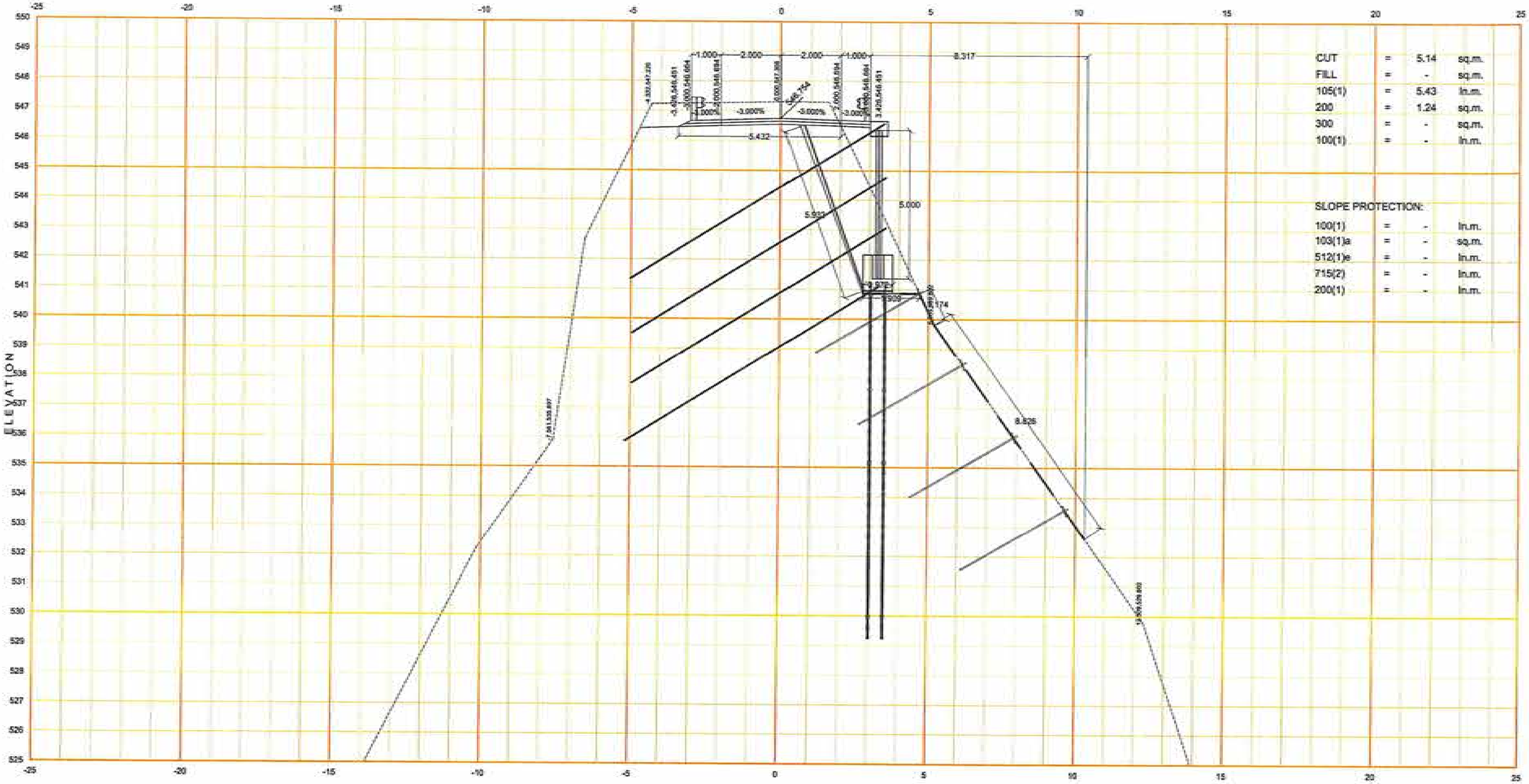
RECOMMENDED: JOSELITO B. CABALLERO, ASSISTANT REGIONAL DIRECTOR, DATE:

APPROVED: JUBY B. CORDON, REGIONAL DIRECTOR, DATE:

SET NO. G 10 20

SHEET NO. 39 52

D:\INFRA\2025 INFRA\CONST. OF MARAGUSAN-PANTUKAN ROAD, DDO (12-S-2024)\DESIGN_SCHEME 3 S-8-25\AZA2 XSECTION.DWG



CUT	=	5.14	sq.m.
FILL	=	-	sq.m.
105(1)	=	5.43	ln.m.
200	=	1.24	sq.m.
300	=	-	sq.m.
100(1)	=	-	ln.m.

SLOPE PROTECTION:

100(1)	=	-	ln.m.
103(1)a	=	-	sq.m.
512(1)e	=	-	ln.m.
715(2)	=	-	ln.m.
200(1)	=	-	ln.m.

STA. 29+095.000
ELEV. 547.308

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGIONAL OFFICE NO. XI
GOV. CHAVEZ COR. R. MAGSAYSAY AVENUE, DAVAO CITY

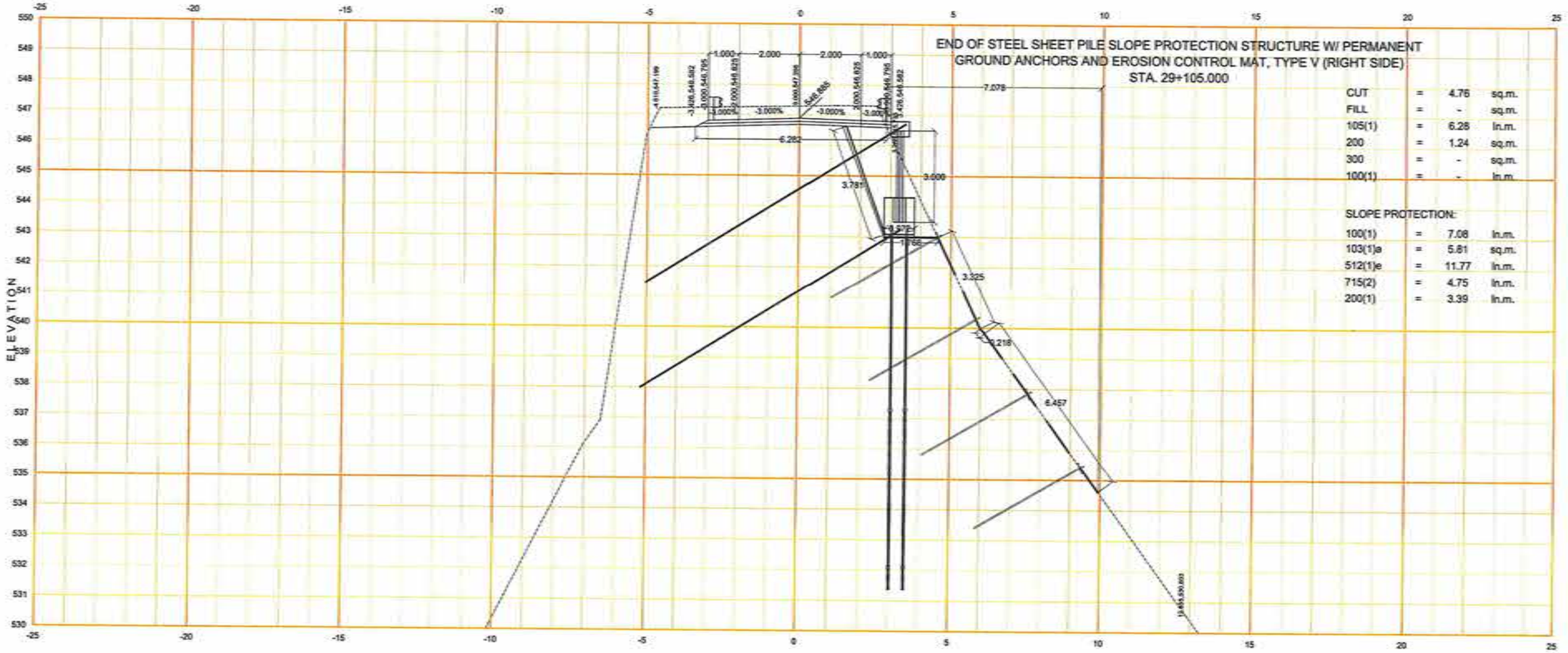
PROJECT NAME AND LOCATION: CONSTRUCTION OF ROAD SLOPE PROTECTION STRUCTURE - MARAGUSAN-PANTUKAN ROAD (PANTUKAN SECTION), PACKAGE Q, DAVAO DE ORO

SHEET CONTENTS: CROSS SECTIONS

SURVEYED: RUEL M. BACAY, ENGINEER II
REVIEWED: ORNELL M. CAPIAGA, ENGINEER III
PREPARED: LESTER B. PADILLA, ENGINEER II
REVIEWED: ALGIN A. GINGA, ENGINEER III
SUBMITTED: JUDY ANN T. BERNARDINO, CHIEF, PLANNING AND DESIGN DIVISION
DATE:
RECOMMENDED: JOSELITO B. CABALLERO, ASSISTANT REGIONAL DIRECTOR
DATE:
APPROVED: JUBY B. CORDON, REGIONAL DIRECTOR
DATE:

SET NO. G 11 20
SHEET NO. 40 52

D:\INFRA\2025 INFRA\CONST. OF MARAGUSAN-PANTUKAN ROAD, DDO (12-5-2024)\DESIGN_SCHEME 3 5-9-25\A2\A2 XSECTION.DWG



STA. 29+100.000
ELEV. 547.266

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGIONAL OFFICE NO. XI
GOV. CHAVEZ COR. R. MAGSAYSAY AVENUE, DAVAO CITY

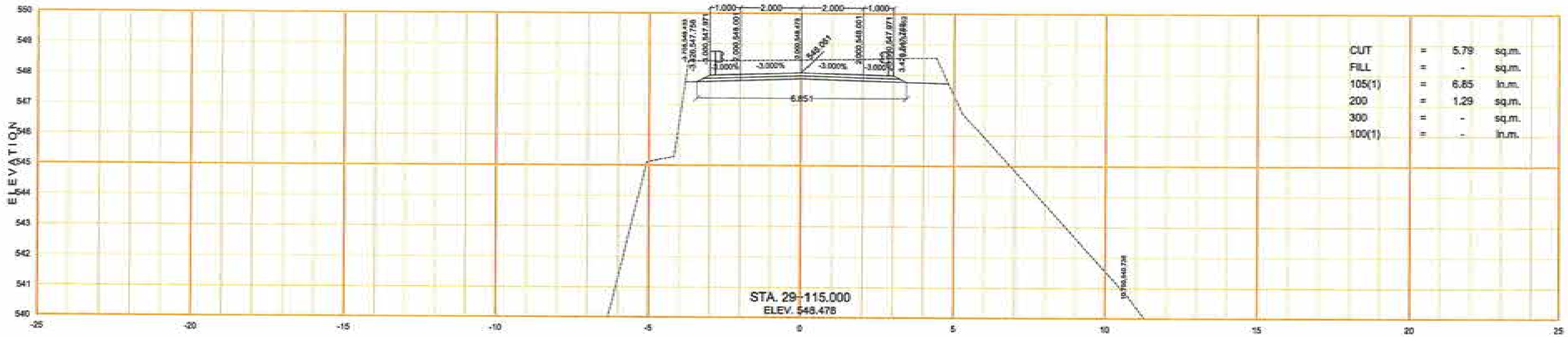
PROJECT NAME AND LOCATION:
CONSTRUCTION OF ROAD SLOPE PROTECTION STRUCTURE - MARAGUSAN-PANTUKAN ROAD (PANTUKAN SECTION), PACKAGE Q, DAVAO DE ORO

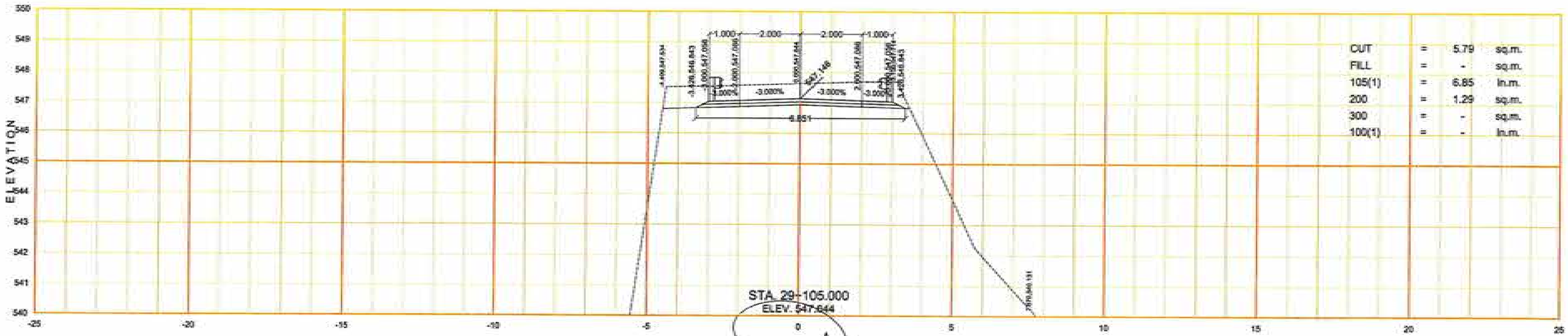
SHEET CONTENTS:
CROSS SECTIONS

SURVEYED: RUEL M. BACOY, ENGINEER III
REVIEWED: DANILO M. ZARAGA, ENGINEER III
PREPARED: LESTER Q. PADILLA, ENGINEER II
REVIEWED: ALGIN A. GINGATAN, ENGINEER II
SUBMITTED: JUDY ANN T. BERNARDINO, CHIEF, PLANNING AND DESIGN DIVISION, DATE:
RECOMMENDED: JOSELITO B. CABALLERO, ASSISTANT REGIONAL DIRECTOR, DATE:
APPROVED: JUBY B. CORDON, REGIONAL DIRECTOR, DATE:

SET NO. G 12/20
SHEET NO. 41/52

D:\INFRA\2025 INFRA\CONST. OF MARAGUSAN-PANTUKAN ROAD, DDO (10-5-2024)\DESIGN_SCHEME 3 5-9-25\SIA2\A2 XSECTION.DWG





REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGIONAL OFFICE NO. XI
GOV. CHAVEZ COR. R. MAGSAYSAY AVENUE, DAVAO CITY

PROJECT NAME AND LOCATION:
CONSTRUCTION OF ROAD SLOPE PROTECTION STRUCTURE - MARAGUSAN-PANTUKAN ROAD (PANTUKAN SECTION), PACKAGE Q, DAVAO DE ORO

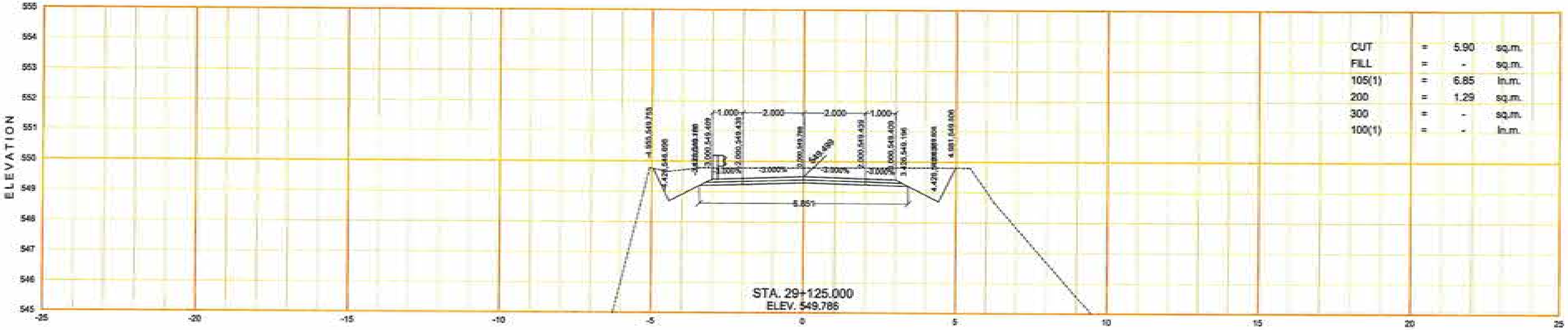
SHEET CONTENTS:
CROSS SECTIONS

SURVEYED: RUEL M. BACAY, ENGINEER II
REVIEWED: DANILO M. GARIAGA, ENGINEER II
PREPARED: LESTER G. PADILLA, ENGINEER II
REVIEWED: ALGIN A. GINGATAN, ENGINEER III
SUBMITTED: JUDY ANN T. BERNARDINO, CHIEF, PLANNING AND DESIGN DIVISION
DATE:
RECOMMENDED: JOSELITO B. CABALLERO, ASSISTANT REGIONAL DIRECTOR
DATE:
APPROVED: JUBY B. CORDON, REGIONAL DIRECTOR
DATE:

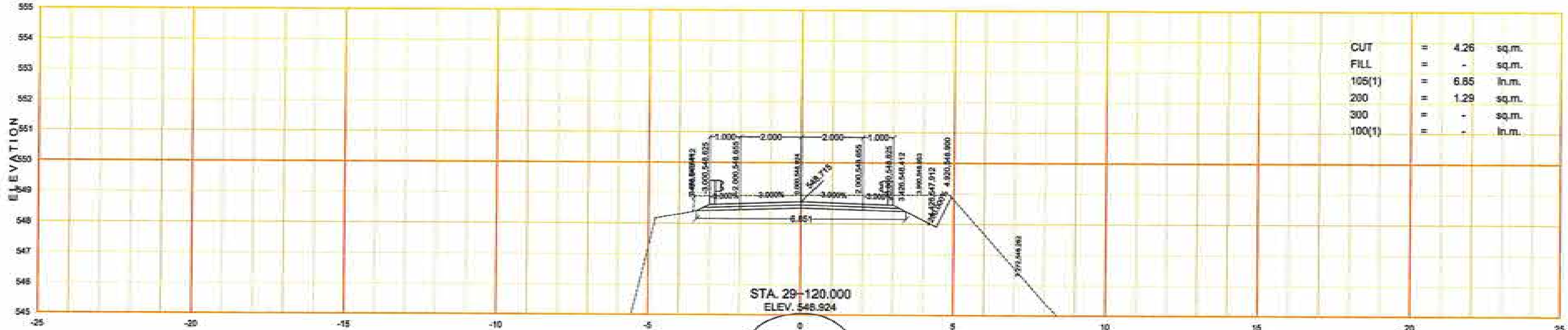
SET NO. G 13 20
SHEET NO. 42 52

D:\INFRA\2025 INFRACONST. OF MARAGUSAN-PANTUKAN ROAD, DDO (12-5-2024)\DESIGN_SCHEME 3 5-6-25\A2\A2 XSECTION.DWG

CUT	=	6.16	sq.m.
FILL	=	-	sq.m.
105(1)	=	6.85	ln.m.
200	=	1.29	sq.m.
300	=	-	sq.m.
100(1)	=	-	ln.m.



CUT	=	5.90	sq.m.
FILL	=	-	sq.m.
105(1)	=	6.85	ln.m.
200	=	1.29	sq.m.
300	=	-	sq.m.
100(1)	=	-	ln.m.



CUT	=	4.26	sq.m.
FILL	=	-	sq.m.
105(1)	=	6.85	ln.m.
200	=	1.29	sq.m.
300	=	-	sq.m.
100(1)	=	-	ln.m.

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGIONAL OFFICE NO. XI
GOV. CHAVEZ COR. R. MAGSAYSAY AVENUE, DAVAO CITY

PROJECT NAME AND LOCATION: CONSTRUCTION OF ROAD SLOPE PROTECTION STRUCTURE - MARAGUSAN-PANTUKAN ROAD (PANTUKAN SECTION), PACKAGE Q, DAVAO DE ORO

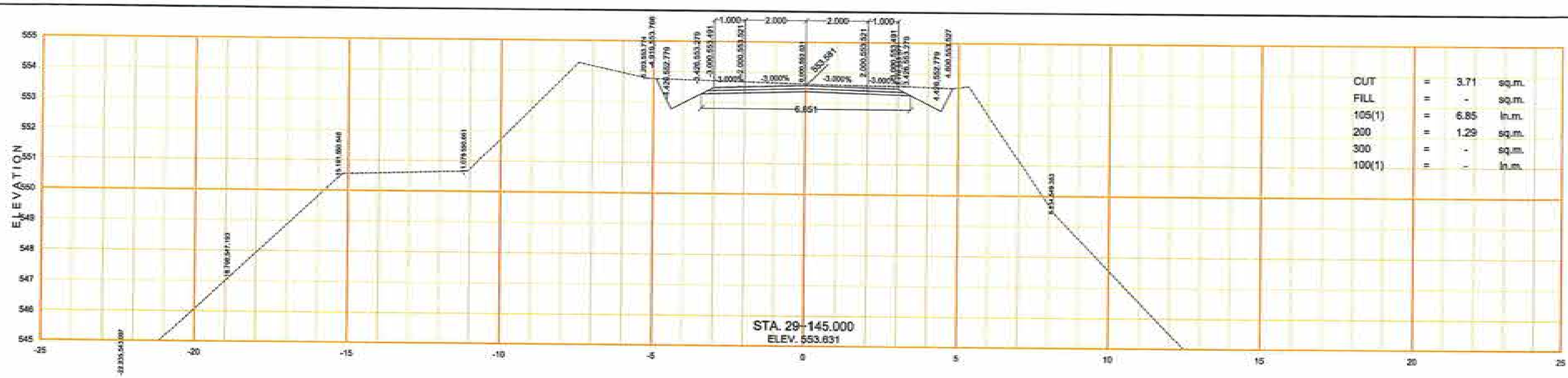
SHEET CONTENTS: CROSS SECTIONS

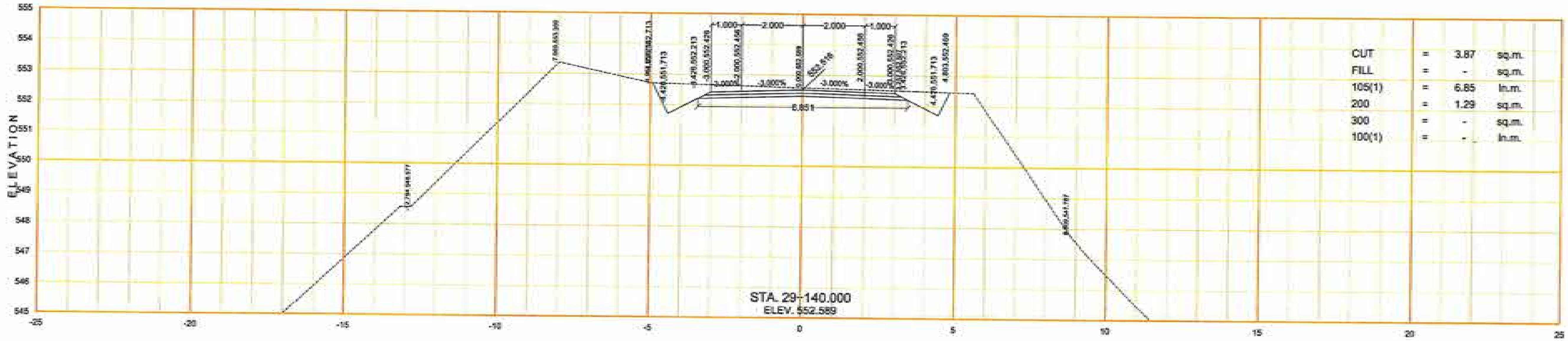
SURVEYED: RUEL M...CAY, ENGINEER III
PREPARED: LESTER ... PADILLA, ENGINEER II
REVIEWED: DANILO M. CABILGA, ENGINEER III
REVIEWED: ALGIN A. GINGATAN, ENGINEER III

SUBMITTED: JUDY ANN T. BERNARDINO, CHIEF, PLANNING AND DESIGN DIVISION — DATE:
RECOMMENDED: JOSELITO B. CABALLERO, ASSISTANT REGIONAL DIRECTOR — DATE:
APPROVED: JUBY B. CORDON, REGIONAL DIRECTOR — DATE:

SET NO. G 14 20 — SHEET NO. 43 / 52

D:\INFRA\2025 INFRA\CONST. OF MARAGUSAN-PANTUKAN ROAD, DDO (12-5-2024)\DESIGN_SCHEME 3-5-9-25\A2\A2 XSECTION.DWG





REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGIONAL OFFICE NO. XI
GOV. CHAVEZ COR. R. MAGSAYSAY AVENUE, DAVAO CITY

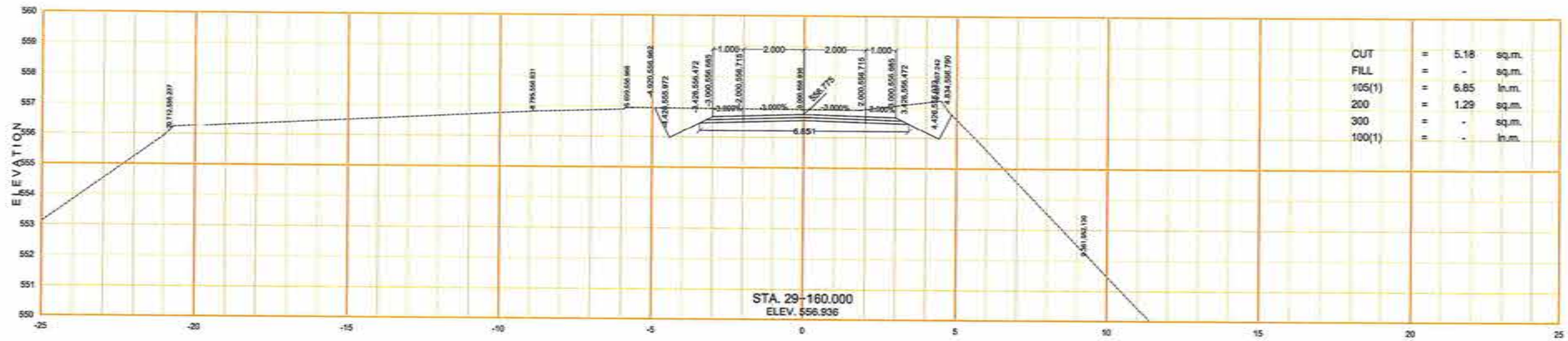
PROJECT NAME AND LOCATION:
CONSTRUCTION OF ROAD SLOPE PROTECTION STRUCTURE - MARAGUSAN-PANTUKAN ROAD (PANTUKAN SECTION), PACKAGE Q, DAVAO DE ORO

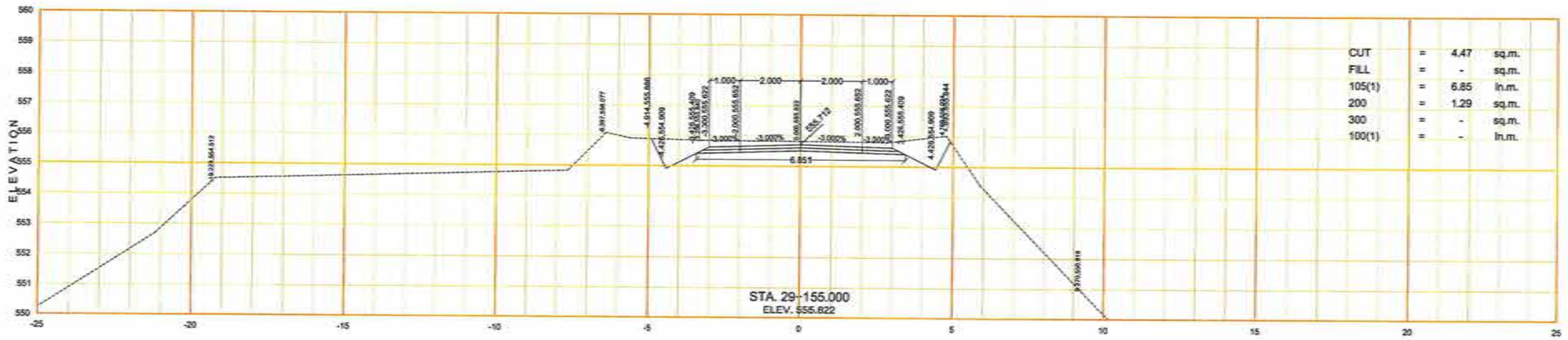
SHEET CONTENTS:
CROSS SECTIONS

SURVEYED: RUEL M. BA[illegible], ENGINEER
REVIEWED: DANILO M. CAR[illegible], ENGINEER
PREPARED: LESTER [illegible], ENGINEER
REVIEWED: ALGIN A. GING[illegible], ENGINEER
SUBMITTED: JUDY ANN T. BERNARDINO, CHIEF, PLANNING AND DESIGN DIVISION
DATE:
RECOMMENDED: JOSELITO B. CABALLERO, ASSISTANT REGIONAL DIRECTOR
DATE:
APPROVED: JUBY B. CORDON, REGIONAL DIRECTOR
DATE:

SET NO.: G 15 20
SHEET NO.: 44 52

D:\INFRA\2025 INFRA\CONST. OF MARAGUSAN-PANTUKAN ROAD, DDO (12-5-2024)\DESIGN_SCHEME 3 5-9-25\A2\A2 XSECTION.DWG





REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGIONAL OFFICE NO. XI
GOV. CHAVEZ COR. R. MAGSAYSAY AVENUE, DAVAO CITY

PROJECT NAME AND LOCATION:
CONSTRUCTION OF ROAD SLOPE PROTECTION STRUCTURE - MARAGUSAN-PANTUKAN ROAD (PANTUKAN SECTION), PACKAGE Q, DAVAO DE ORO

SHEET CONTENTS:
CROSS SECTIONS

SURVEYED:
RUEL M. BALAY
ENGINEER I

REVIEWED:
DANTE M. CARBAJA
ENGINEER III

PREPARED:
LESTERIE P. ADILLA
ENGINEER

REVIEWED:
ALGIN A. GINGATEN
ENGINEER II

SUBMITTED:
JUDY ANN T. BERNARDINO
CHIEF, PLANNING AND DESIGN DIVISION
DATE:

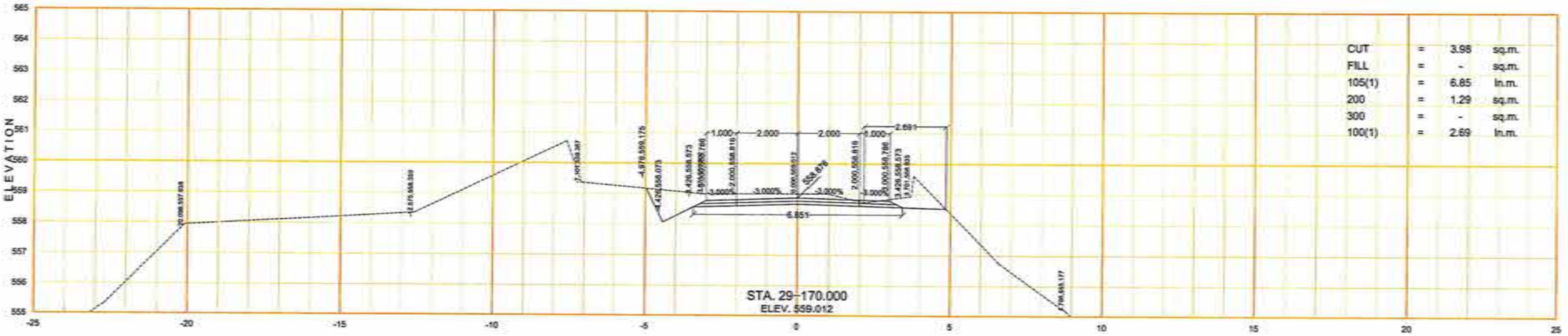
RECOMMENDED:
JOSELITO B. CABALLERO
ASSISTANT REGIONAL DIRECTOR
DATE:

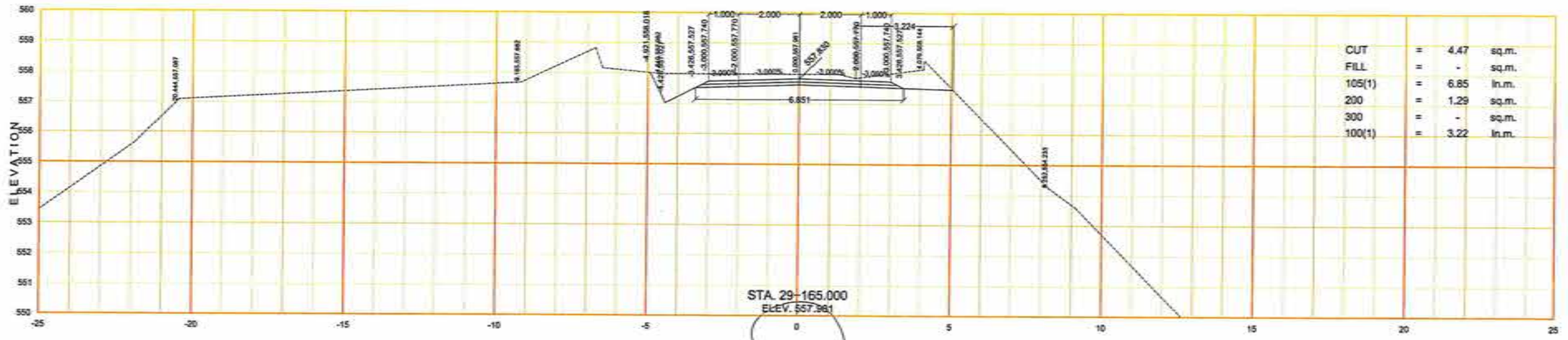
APPROVED:
JUBY B. CORDON
REGIONAL DIRECTOR
DATE:

SET NO.: G 16/20

SHEET NO.: 45/52

D:\INFRA\2025 INFRA\CONST. OF MARAGUSAN-PANTUKAN ROAD, CDO-(12-8-2024)\DESIGN_SCHEME 3 5-9-25\A2\A2 XSECTION.DWG





REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGIONAL OFFICE NO. XI
GOV. CHAVEZ COR. R. MAGSAYSAY AVENUE, DAVAO CITY

PROJECT NAME AND LOCATION: CONSTRUCTION OF ROAD SLOPE PROTECTION STRUCTURE - MARAGUSAN-PANTUKAN ROAD (PANTUKAN SECTION), PACKAGE Q, DAVAO DE ORO

SHEET CONTENTS: CROSS SECTIONS

SURVEYED: RUEL M. BACAY, ENGINEER II

PREPARED: LESTER G. PERILLA, ENGINEER II

REVIEWED: DANICO M. CARIAGA, ENGINEER III

REVIEWED: ALGIN A. GINGOYON, ENGINEER III

SUBMITTED: JUDY ANN T. BERNARDINO, CHIEF, PLANNING AND DESIGN DIVISION, DATE:

RECOMMENDED: JOSELITO B. CABALLERO, ASSISTANT REGIONAL DIRECTOR, DATE:

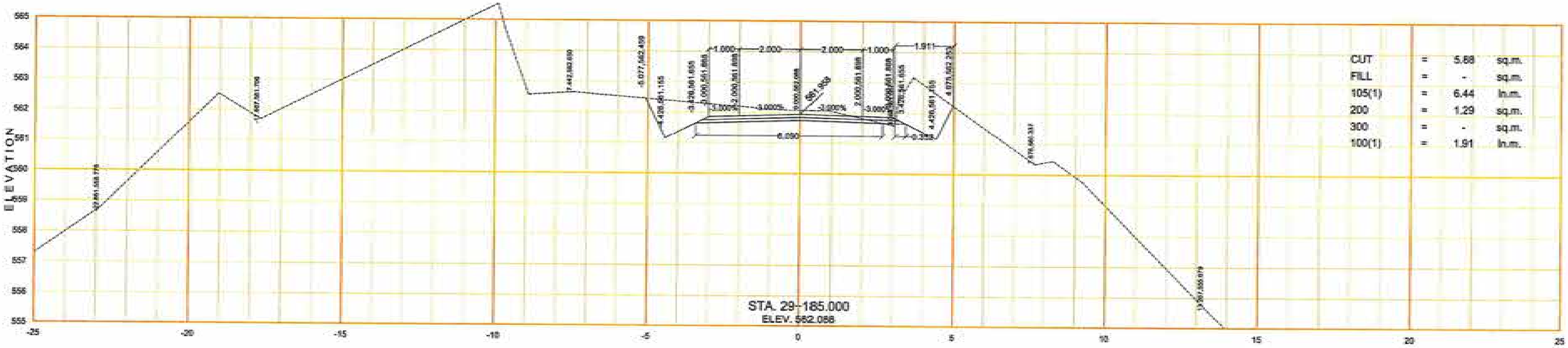
APPROVED: JUBY B. CORDON, REGIONAL DIRECTOR, DATE:

SET NO. G 17/20

SHEET NO. 46/52

D:\INFRA\2025 INFRACONST. OF MARAGUSAN-PANTUKAN ROAD, DDO (12-5-2024)\DESIGN_SCHEME 3 5-8-25\A2\A2 XSECTION.DWG

CUT	=	6.20	sq.m.
FILL	=	-	sq.m.
105(1)	=	6.85	ln.m.
200	=	1.29	sq.m.
300	=	-	sq.m.
100(1)	=	2.24	ln.m.



CUT	=	5.68	sq.m.
FILL	=	-	sq.m.
105(1)	=	6.44	ln.m.
200	=	1.29	sq.m.
300	=	-	sq.m.
100(1)	=	1.91	ln.m.

CUT	=	5.07	sq.m.
FILL	=	0.10	sq.m.
105(1)	=	5.92	ln.m.
200	=	1.29	sq.m.
300	=	-	sq.m.
100(1)	=	2.00	ln.m.

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGIONAL OFFICE NO. XI
GOV. CHAVEZ COR. R. MAGSAYSAY AVENUE, DAVAO CITY

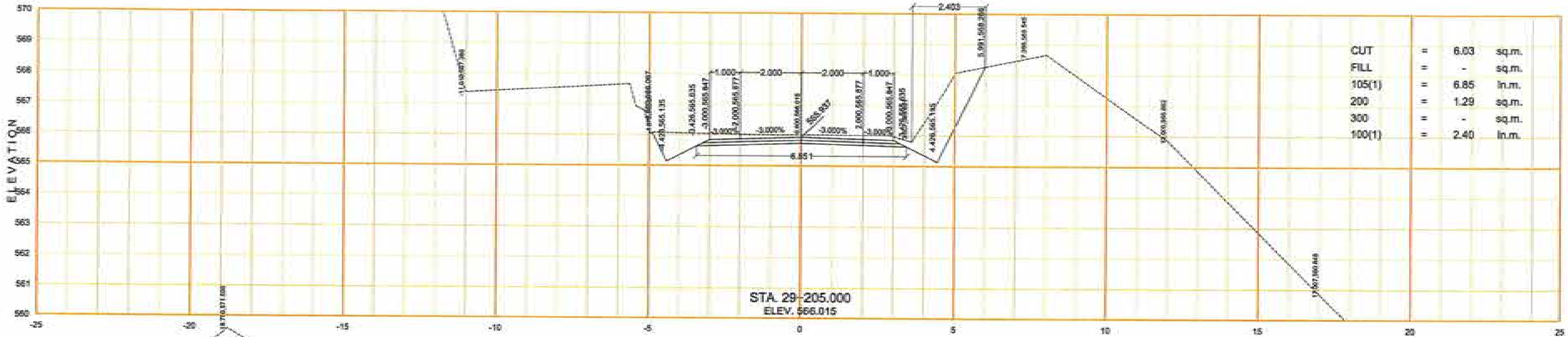
PROJECT NAME AND LOCATION:
CONSTRUCTION OF ROAD SLOPE PROTECTION STRUCTURE - MARAGUSAN-PANTUKAN ROAD (PANTUKAN SECTION), PACKAGE Q, DAVAO DE ORO

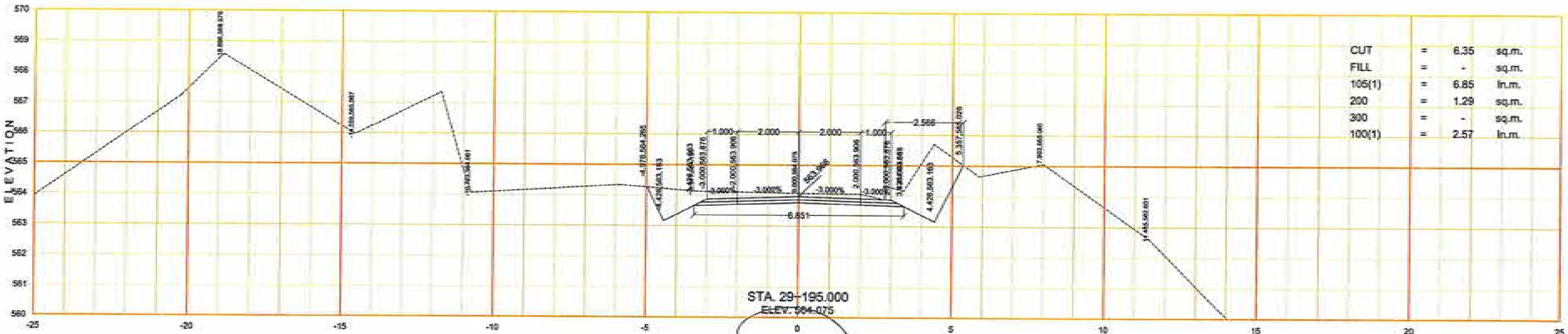
SHEET CONTENTS:
CROSS SECTIONS

SURVEYED: RUEL M. MACAY, ENGINEER II
REVIEWED: DANILO M. CABASA, ENGINEER
PREPARED: LESTER O. PADILLA, ENGINEER II
REVIEWED: ALGIN A. GINGATAN, ENGINEER III
SUBMITTED: JUDY ANN T. BERNARDINO, CHIEF, PLANNING AND DESIGN DIVISION
DATE:
RECOMMENDED: JOSELITO B. CABALLERO, ASSISTANT REGIONAL DIRECTOR
DATE:
APPROVED: JUBY B. CORDON, REGIONAL DIRECTOR
DATE:

SET NO.: G 18 20
SHEET NO.: 47 52

D:\INFRA\2025 INFRA\CONST. OF MARAGUSAN-PANTUKAN ROAD, DDO (12-5-2024)\DESIGN_SCHEME 3 5-6-25\A2\A2 XSECTION.DWG





REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGIONAL OFFICE NO. XI
GOV. CHAVEZ COR. R. MAGSAYSAY AVENUE, DAVAO CITY

PROJECT NAME AND LOCATION: CONSTRUCTION OF ROAD SLOPE PROTECTION STRUCTURE - MARAGUSAN-PANTUKAN ROAD (PANTUKAN SECTION), PACKAGE Q, DAVAO DE ORO

SHEET CONTENTS: CROSS SECTIONS

SURVEYED: RUEL M. DACAY, ENGINEER II

REVIEWED: DANILO M. DARIAGA, ENGINEER II

PREPARED: LESTER G. PADILLA, ENGINEER II

REVIEWED: ALGIN A. GINGATAN, ENGINEER III

SUBMITTED: JUDY ANN T. BERNARDINO, CHIEF, PLANNING AND DESIGN DIVISION

DATE:

RECOMMENDED: JOSELITO B. CABALLERO, ASSISTANT REGIONAL DIRECTOR

DATE:

APPROVED: JUBY B. CORDON, REGIONAL DIRECTOR

DATE:

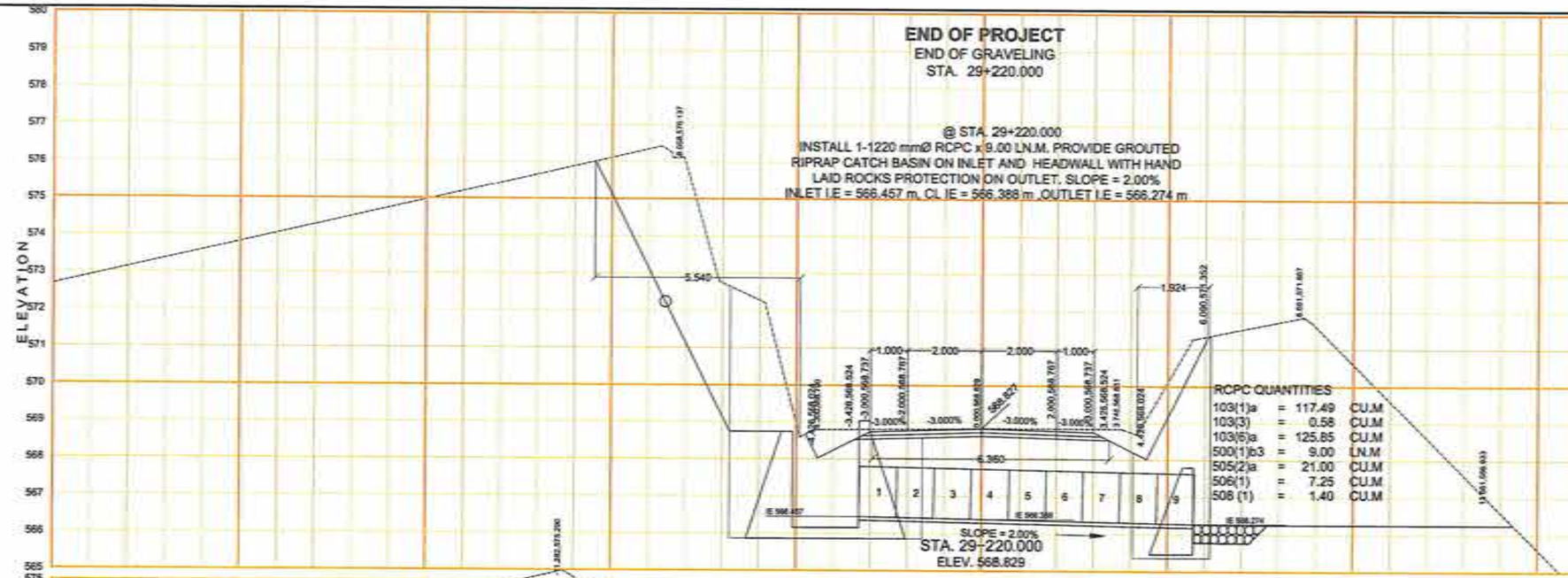
SET NO. G 19 20

SHEET NO. 48 52

D:\INFRA\2025 INFRA\CONST. OF MARAGUSAN-PANTUKAN ROAD, DDO (12-5-2024)\DESIGN_SCHEME 3 5-8-25\A2\A2 XSECTION.DWG

END OF PROJECT
END OF GRAVELING
STA. 29+220.000

@ STA. 29+220.000
INSTALL 1-1220 mmØ RCPC x 9.00 LN.M. PROVIDE GROUTED RIPRAP CATCH BASIN ON INLET AND HEADWALL WITH HAND LAID ROCKS PROTECTION ON OUTLET. SLOPE = 2.00%
INLET I.E = 566.457 m, CL IE = 566.388 m ,OUTLET I.E = 566.274 m

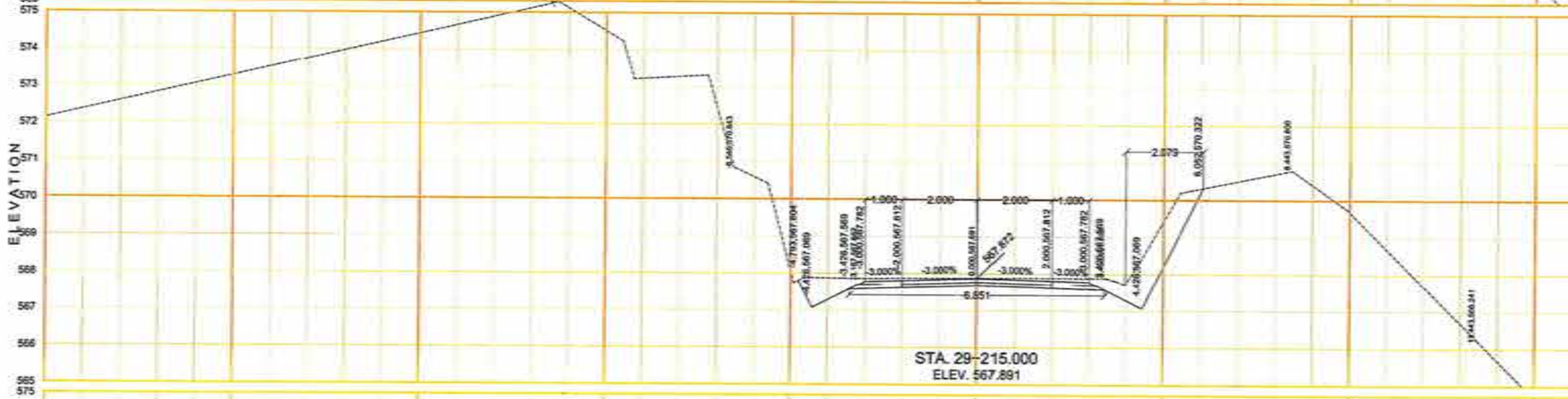


STA. 29+220.000
ELEV. 568.829

CUT	=	4.21	sq.m.
FILL	=	-	sq.m.
105(1)	=	6.36	ln.m.
200	=	1.24	sq.m.
300	=	-	sq.m.
100(1)	=	7.46	ln.m.

RCPC QUANTITIES

103(1)a	=	117.49	CU.M
103(3)	=	0.58	CU.M
103(6)a	=	125.85	CU.M
500(1)b3	=	9.00	LN.M
505(2)a	=	21.00	CU.M
506(1)	=	7.25	CU.M
508 (1)	=	1.40	CU.M



STA. 29+215.000
ELEV. 567.891

CUT	=	4.71	sq.m.
FILL	=	-	sq.m.
105(1)	=	6.85	ln.m.
200	=	1.29	sq.m.
300	=	-	sq.m.
100(1)	=	2.08	ln.m.

STA. 29+210.000
ELEV. 566.953

CUT	=	5.31	sq.m.
FILL	=	-	sq.m.
105(1)	=	6.85	ln.m.
200	=	1.29	sq.m.
300	=	-	sq.m.
100(1)	=	2.24	ln.m.

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGIONAL OFFICE NO. XI
GOV. CHAVEZ COR. R. MAGSAYSAY AVENUE, DAVAO CITY

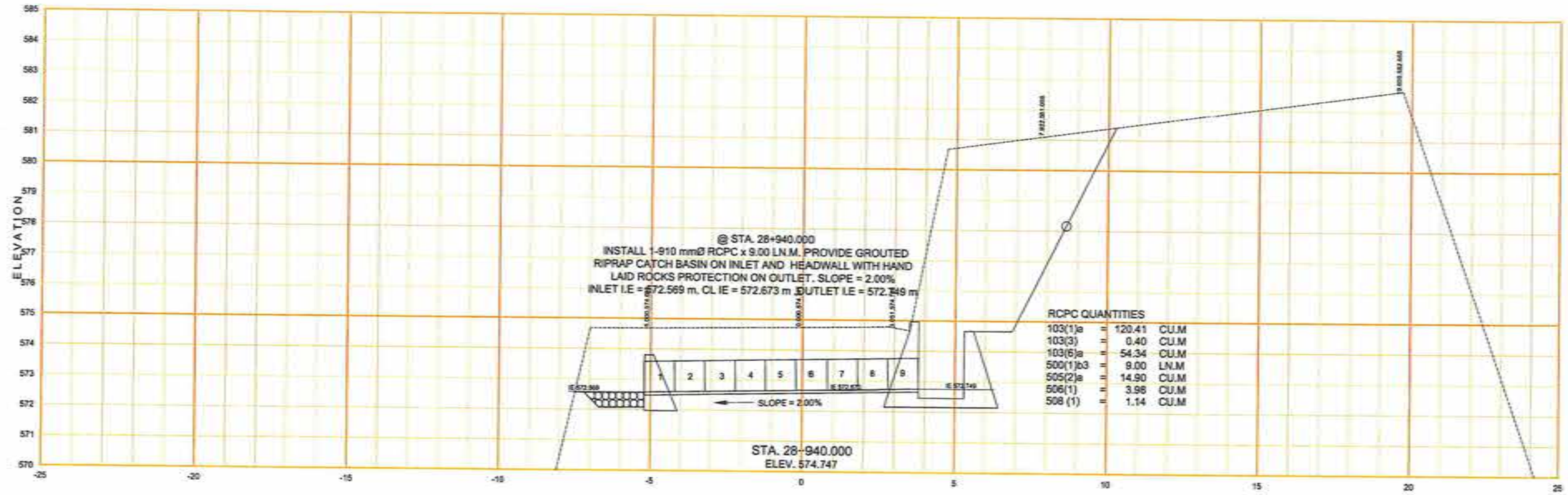
PROJECT NAME AND LOCATION: CONSTRUCTION OF ROAD SLOPE PROTECTION STRUCTURE - MARAGUSAN-PANTUKAN ROAD (PANTUKAN SECTION), PACKAGE Q, DAVAO DE ORO

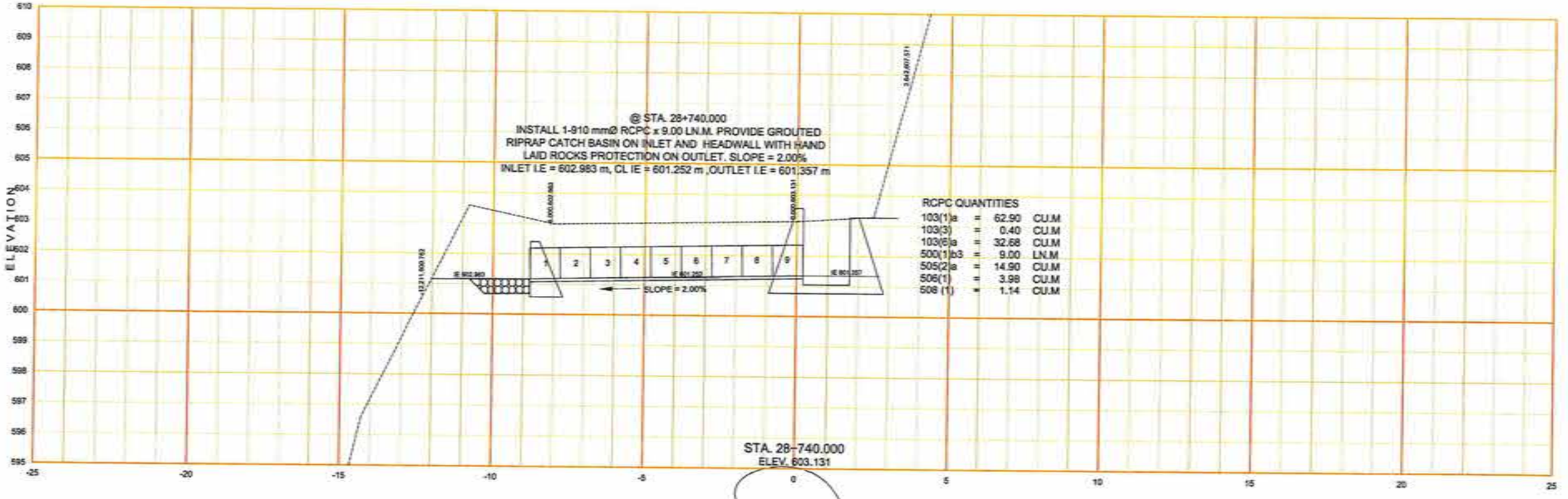
SHEET CONTENTS: CROSS SECTIONS

SURVEYED: RUEL M. BACAY, ENGINEER II
REVIEWED: DANILO M. CABALSA, ENGINEER III
PREPARED: CESTERO B. DELA CRUZ, ENGINEER II
REVIEWED: ALGIN A. GINGATAN, ENGINEER V
SUBMITTED: JUDY ANN T. BERNARDINO, CHIEF, PLANNING AND DESIGN DIVISION, DATE:
RECOMMENDED: JOSELITO B. CABALLERO, ASSISTANT REGIONAL DIRECTOR, DATE:
APPROVED: JUBY B. CORDON, REGIONAL DIRECTOR, DATE:

SET NO.: G 20 20
SHEET NO.: 49 52

D:\INFRA\2025 INFRA\CONST. OF MARAGUSAN-PANTUKAN ROAD, DDO-(12-5-2024)\DESIGN_SCHEME 3 5-9-25\AZ\A2 XSECTION.DWG





REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGIONAL OFFICE NO. XI
GOV. CHAVEZ COR. R. MAGSAYSAY AVENUE, DAVAO CITY

PROJECT NAME AND LOCATION: CONSTRUCTION OF ROAD SLOPE PROTECTION STRUCTURE - MARAGUSAN-PANTUKAN ROAD (PANTUKAN SECTION), PACKAGE Q, DAVAO DE ORO

SHEET CONTENTS: DRAINAGE CROSS SECTION

SURVEYED: RUEL R. BAGAY, ENGINEER III

REVIEWED: DANILO M. CRISTOBAL, ENGINEER III

PREPARED: JAMAICA A. MANDING, ENGINEER II

REVIEWED: ALAIN JOHN R. SOTTO, ENGINEER III

SUBMITTED: JUDY ANN T. BERNARDINO, CHIEF, PLANNING AND DESIGN DIVISION, DATE:

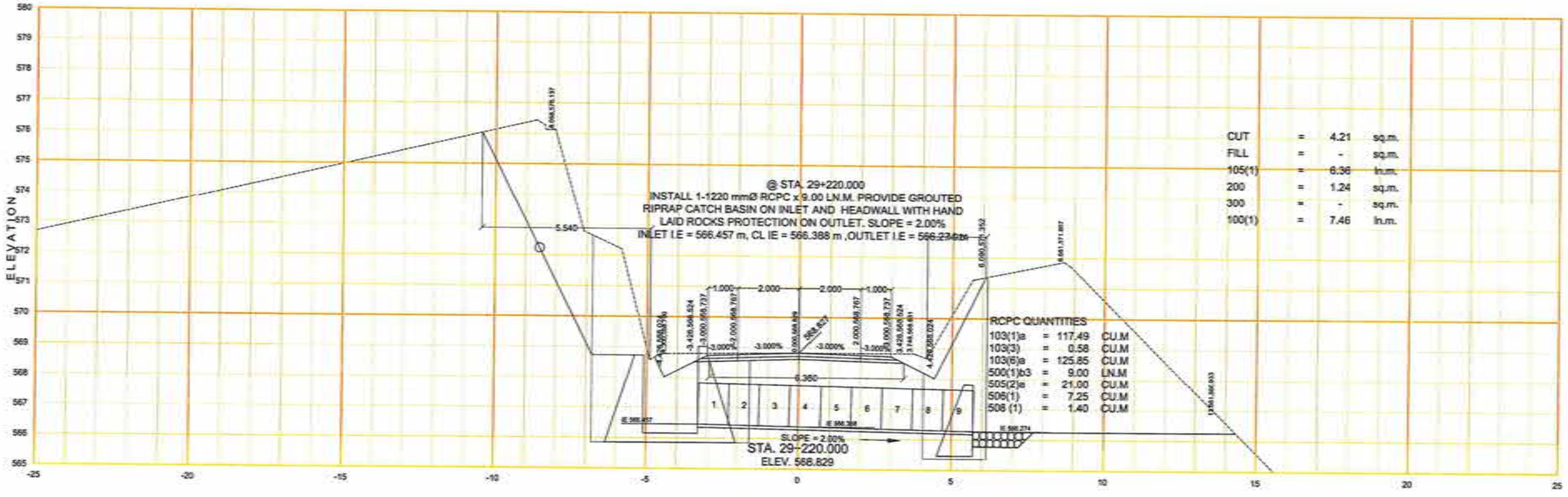
RECOMMENDED: JOSELITO B. CABALLERO, ASSISTANT REGIONAL DIRECTOR, DATE:

APPROVED: JUBY B. CORDON, REGIONAL DIRECTOR, DATE

SET NO. H 1 2

SHEET NO. 50 52

D:\INFRA\2025 INFRA\CONST. OF MARAGUSAN-PANTUKAN ROAD, DDO (12-5-2024)\DESIGN_SCHEME 3-5-9-25\AZA2 XSECTION.DWG



REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGIONAL OFFICE NO. XI
GOV. CHAVEZ COR. R. MAGSAYSAY AVENUE, DAVAO CITY

PROJECT NAME AND LOCATION:
CONSTRUCTION OF ROAD SLOPE PROTECTION STRUCTURE - MARAGUSAN-PANTUKAN ROAD (PANTUKAN SECTION), PACKAGE Q, DAVAO DE ORO

SHEET CONTENTS:
DRAINAGE CROSS SECTION

SURVEYED:
RUEL M. SACAY
ENGINEER II

REVIEWED:
DANILO M. CARIAGA
ENGINEER III

PREPARED:
JAMAICA A. MANDING
ENGINEER II

REVIEWED:
ALAIN JOHN B. SOTTO
ENGINEER III

SUBMITTED:
JUDY ANN T. BERNARDINO
CHIEF, PLANNING AND DESIGN DIVISION
DATE:

RECOMMENDED:
JOSELITO B. CABALLERO
ASSISTANT REGIONAL DIRECTOR
DATE:

APPROVED:
JUBY B. CORDON
REGIONAL DIRECTOR
DATE:

SET NO.: H 2 2

SHEET NO.: 51 52

D:\INFRA\2025 INFRA\CONST. OF MARAGUSAN-PANTUKAN ROAD, DDO (12-5-2024)\DESIGN_SCHEME 3 5-9-25\AZ\A2 XSECTION.DWG