



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

C.Y. 2025 PROJECT
DETAILED ENGINEERING DESIGN PLAN FOR
**CONSTRUCTION OF ROAD
INCLUDING DRAINAGE STRUCTURE,
PUROK 4A, BARANGAY CANOCOTAN,
TAGUM CITY, DAVAO DEL NORTE**

BRGY. CANOCOTAN SECTION
TAGUM CITY, DAVAO DEL NORTE
914.50 Ln.M. CONCRETING (1.829 LANE KM)
(CY 2025 CONVERGENCE PROGRAM-SIPAG)
LOCAL ROAD

SUBMITTED:


CHIRWEN P. NAZARENO
CHIEF PLANNING & DESIGN SECTION
DATE:

RECOMMENDED:


LEO ALEX A. MABANGLO
OFFICER IN CHARGE
OFFICE OF THE ASSISTANT DISTRICT ENGINEER
DATE:

APPROVED:


EDITHA G. MONTILDE
DISTRICT ENGINEER
DATE:

LOCATION MAP

SCALE 1:10000mts

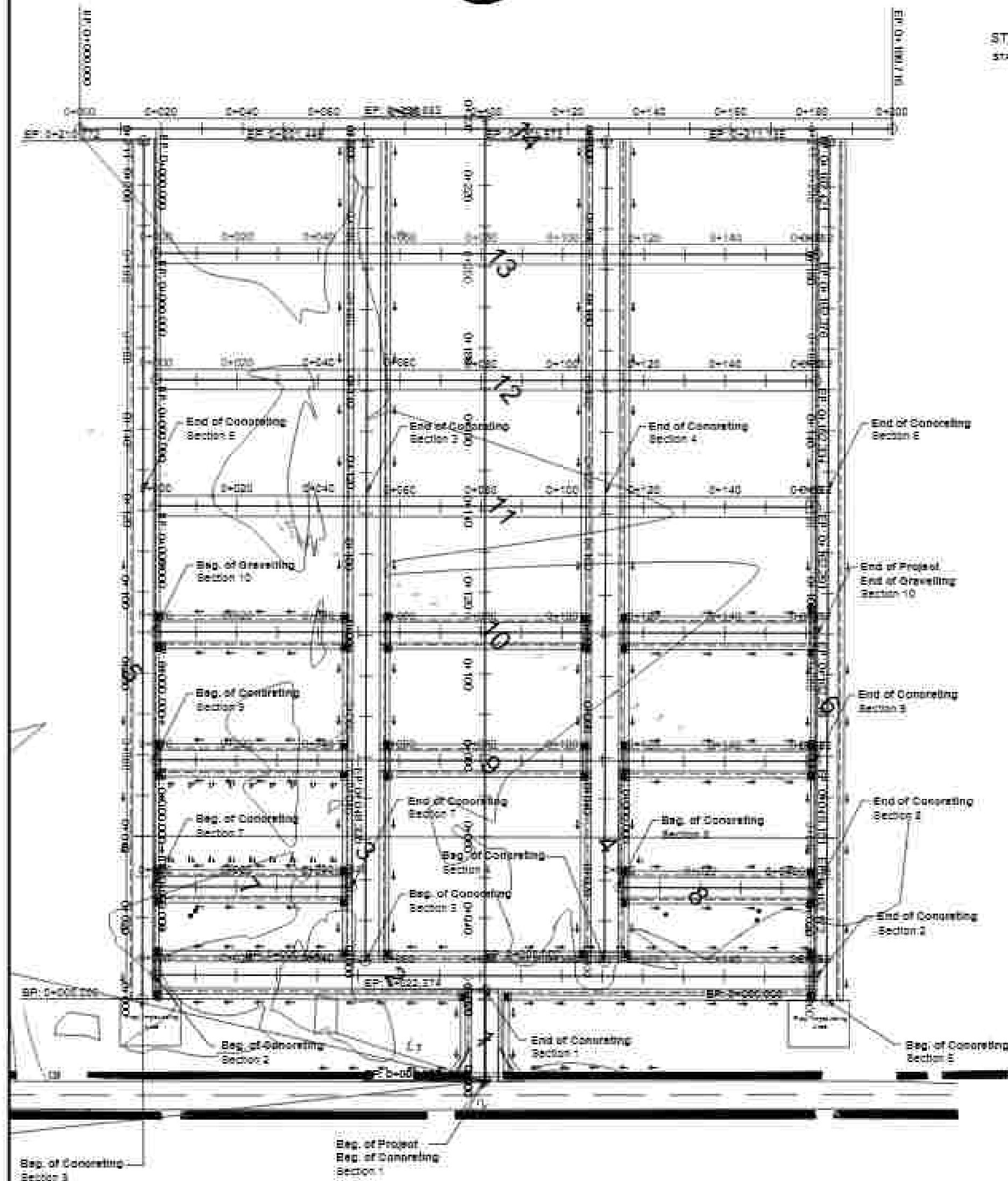


STATION LIMITS - CONCRETING

STA. 0+000.00 - STA. 0+025.00 • 25.00 LANE CONCRETING IN SECTION 1
 STA. 0+025.00 - STA. 0+100.00 • 75.00 LANE CONCRETING IN SECTION 2
 STA. 0+100.00 - STA. 0+125.00 • 25.00 LANE CONCRETING IN SECTION 3
 STA. 0+125.00 - STA. 0+150.00 • 25.00 LANE CONCRETING IN SECTION 4
 STA. 0+150.00 - STA. 0+175.00 • 25.00 LANE CONCRETING IN SECTION 5
 STA. 0+175.00 - STA. 0+200.00 • 25.00 LANE CONCRETING IN SECTION 6
 STA. 0+200.00 - STA. 0+225.00 • 25.00 LANE CONCRETING IN SECTION 7
 STA. 0+225.00 - STA. 0+250.00 • 25.00 LANE CONCRETING IN SECTION 8
 STA. 0+250.00 - STA. 0+275.00 • 25.00 LANE CONCRETING IN SECTION 9
 STA. 0+275.00 - STA. 0+300.00 • 25.00 LANE CONCRETING IN SECTION 10
 314.47 LHM

STATION LIMITS - GRAVELLING

STA. 0+000.00 - STA. 0+100.00 • 100.00 LANE GRAVELLING IN SECTION 10 - 100.00



VICINITY MAP



INDEX OF DRAWINGS

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3	GENERAL NOTES, LEGEND
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47	GENERAL & SPECIFICATIONS
48	GENERAL & SPECIFICATIONS
49	GENERAL & SPECIFICATIONS
50	GENERAL & SPECIFICATIONS



REPUBLIC OF THE PHILIPPINES
 DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
 REGION XI
 DAVAO DEL NORTE
 DISTRICT ENGINEERING OFFICE
 Tagum City

PROJECT NAME AND LOCATION
 CONSTRUCTION OF ROAD
 INCLUDING DRAINAGE STRUCTURE,
 Purok 4A, Barangay Canocotan,
 TAGUM CITY, DAVAO DEL NORTE

SHEET CONTENTS
 LOCATION MAP
 VICINITY MAP
 INDEX OF DRAWINGS
 PROJECT STATION LIMITS

DESIGNED BY
 JAMES G. MORADA
 DISTRICT ENGINEER
 PREPARED BY
 CHARME JANE E. CUNY
 DISTRICT ENGINEER

REVIEWED BY
 VOLAN M. MORADA
 DISTRICT ENGINEER
 DATE

SUBMITTED BY
 CHRISTEN F. MAZAREHO
 DISTRICT ENGINEER
 DATE

RECOMMENDED BY
 LEO A. E. VILLARDO
 DISTRICT ENGINEER
 DATE

APPROVED BY
 EDITH B. MONTILOS
 DISTRICT ENGINEER
 DATE

SHEET NO.
 1
 SHEET NO.
 55

15. LOCATION OF QUARRY SITES
AGGREGATE ITEM NO. 210(1) PANDAFAN QUARRY, 21.10 KMS. FROM PROJECT SITE
EQUILBERS. MASWANA QUARRY TO PROJECT SITE, 61.40 KMS.
17. DESIGN WAS BASED ON SURVEY DATA SUBMITTED BY THE SURVEY INVESTIGATION SECTION OF THE PLANNING AND DESIGN SECTION OF THE DISTRICT ENGINEERING OFFICE.

- SURVEY SPECIFICATIONS:**
1. ALL PROJECT CONTROL POINTS ARE PROJECTED IN PRYSO GRID COORDINATE SYSTEM (ZONE 5)
 2. SURVEY INSTRUMENT USED: GNSS STATION RECEIVER & CONTROLLER (RTK)
 3. DATE SURVEYED: DECEMBER 14, 2024
 4. PROJECT CONTROL POINTS REFER TO PLAN AND PROFILE
 5. BENCHMARK VALUES ON CL OF EXISTING PAVEMENT: ELEV. 255.49
 6. REFERENCE POINTS (SEE PLAN AND PROFILE)

- HORIZONTAL CONTROL**
1. BASIC TRANSVERSE STATIONS WERE ESTABLISHED BASED ON STATIONS EXISTING ON POST AND EXISTING PERMANENT STRUCTURES AT THE PROJECT SITE.
 2. BENCH MARKS WERE ESTABLISHED AT EXISTING UNOBTURBED STRUCTURES AT 500 METER INTERVALS ALONG THE PROJECT.

- | | |
|---|---|
|  <p>REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
(SECTION 30)</p> <p>DAVAO DEL NORTE
DISTRICT ENGINEERING OFFICE
(TAAGU CITY)</p> | <p>PROJECT NAME AND LOCATION</p> <p>CONSTRUCTION OF ROAD
INCLUDING DRAINAGE STRUCTURE
PUROK 4A, BARANGAY CANOCOTAN,
TAGUM CITY, DAVAO DEL NORTE</p> |
|---|---|

(ROADS, DRAINAGE AND STRUCTURES)

4. 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.
5. 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.
6. ADEQUATE DUST CONTROL MUST BE MAINTAINED BY THE CONTRACTOR AT ALL TIMES DURING EARTHMOVING OPERATIONS THROUGHOUT THE USE OF WRITER.
7. THE CONTRACTOR SHALL NOT PLACE STOCKPILES AT LOCATIONS WHERE THEY ARE SUBJECT TO EROSION. THE CONTRACTOR SHALL MAINTAIN EROSION AND DRAINAGE CONTROL NEAR ALL STOCKPILES AND SHALL ENSURE THAT SURFACE DRAINAGE DOES NOT ADVERSELY AFFECT ADJACENT LANDS, WATERCOURSES OR FUTURE RECLAMATION SITES.
8. STOCKPILES SHALL NOT BE SITUATED AT LOCATIONS THAT WILL INTERFERE OR CAUSE DAMAGE TO UTILITIES. IT SHALL NOT BE SITUATED WITHIN 30M OF A WATERCOURSE OR PERMANENT STRUCTURE OR WITHIN 1M OF ADJACENT PROPERTY BOUNDARY UNLESS OTHERWISE PERMITTED IN WRITING BY THE PROPERTY OWNER.
9. FINISHED SURFACES IN ALL CASES SHALL CONFORM WITH LINE, GRADE, DIMENSIONS AND ADJUSTMENTS SHOWN ON THE APPROVED PLANS, EXCEPT AS MODIFIED BY WRITTEN ORDER.

- This is to certify that the detailed engineering surveys and designs have been conducted according to the present agency standards and specifications in conformance with the provisions of Annex "A" of the Revised Implementing Rules and Regulations of RA 3184, and that the detailed engineering outputs are adequate for the procurement at hand.
- 
FRED ANGELO G. ARLEN
Head, Survey and Investigation
- | | | |
|---------------|---|--|
| REVISIONS | DRAWN

JANICE O. HONRADA
ENGINEERING ASSISTANT | REVISED |
| GENERAL NOTES | CHECKED

CHARNE GAY E. CURAY
ENGINEER | 
YOLANDE O. HONRADA
ENGINEER |

FRED ANGELO G. ARLEN
Head, Survey and Investigation

- OTHERS**
1. BEFORE FINAL ACCEPTANCE, THE RIGHT-OF-WAY, BORROW PITS AND ALL GROUND OCCUPIED BY THE CONTRACTOR SHALL BE CLEARED OF ALL RUBBISH, EXCESS MATERIALS, TEMPORARY STRUCTURES AND EQUIPMENT AND ALL PARTS OF THE WORK SHALL BE LEFT IN A NEAT AND PRESENTABLE CONDITION.
 2. ANY DEFECTIVE WORK WHETHER THE RESULT OF POOR WORKMANSHIP, USE OF DEFECTIVE MATERIALS, DAMAGE THROUGH CARELESSNESS, OR OF ANY OTHER CAUSE FOUND PRIOR TO ACCEPTANCE, SHALL BE REMOVED IMMEDIATELY AND REPLACED BY WORK AND MATERIALS WHICH SHALL CONFORM TO THE SPECIFICATIONS.
 3. DAMAGES TO ANY PORTION OF WORK BEFORE FINAL ACCEPTANCE EXCEPT DAMAGES DUE TO UNFORESEEABLE CAUSES BEYOND THE CONTROL OF AND WITHOUT FAULT OF NEGLIGENCE BY THE CONTRACTOR SHALL BE REBUILT, REPAIRED AND RESTORED.
 4. 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.

- | | | | |
|---|---|---|---|
| APPROVED: | RECOMMENDED: | APPROVED: | SET NO: |
| 
<u>CHIRWEN F. LAZARENO</u>
Chief Planning & Design Section
DATE: | 
<u>LEO ALEX M. MANALO</u>
Chief Engineer
OFFICE OF THE ASSISTANT CHIEF ENGINEER
DATE: | 
<u>EDITH B. MONTOLIO</u>
District Engineer
DATE: |  |

LEGENDS AND SYMBOLS

DRAWING SYMBOLS		
SYMBOL	ABBREVIATION	DESCRIPTION
	SH	SCORE HOLE
		CROSS SECTION HORIZONTAL
	SH	SECTION HOLE
	SH	HORIZONTAL SECTION HOLE
	PM	PERMANENT SECTION HOLE
	TS	TEST HOLE
	BP	BLIND POSITIONING HOLE
		THROUGH HOLE
		THROUGH SECTION HOLE

TOPOGRAPHIC FEATURES, INFRASTRUCTURE AND UTILITIES		
SYMBOL	ABBREVIATION	DESCRIPTION
		TREE
		COCONUT
		BANANA PLANTATION
		ASH-COL
		CHURCH
		GREEN WOODS
		CONCRETE WOODS
		WOODEN STORE
		STORE
	SB	SIGN BOARD
	SP	STEEL POST
	SEP	STEEL ELECTRIC POST
	CP	CONCRETE POST
	CEP	CONCRETE ELECTRIC POST
	WEP	WOODEN ELECTRIC POST
	LP	LAMP POST
	SL	STREET LIGHT
		UTILITY SHED

SUMMARY OF QUANTITIES				
ITEM No.	DESCRIPTION	UNIT	QUANTITY	REMARKS
CW1-ROADS				
PART A : FACILITIES FOR THE ENGINEER				
A.1.1(3)	Construction of Field Office for the Engineer	ls	1.00	
A.1.1(11)	Provision of Furnitures/ Fixtures, Equipment & Appliances for the Field Office for the Engineer	ls	1.00	
PART B : OTHER GENERAL REQUIREMENT				
B.4(1)	Construction Survey and Staking	km	1.07	
B.5	Project Billboard/ Signboard	ea	3.00	COA BILLBOARD, PROJECT BILLBOARD, ENV. BILLBOARD
B.7(2)	Occupational Safety and Health Program	ls	1.00	
B.8(2)	Traffic Management	ls	1.00	
B.8	Mobilization and Demobilization	ls	1.00	
PART C : EARTHWORK				
101(3)d	Removal of Actual Structures/ Obstruction (0.10m thk.), -Sidewalk	sq.m	14.18	See Schedule
101(4)a3	Removal of Actual Structures/ Obstruction (910mm dia. RCPC)	ea	4.00	See Schedule
102(1)	Unsuitable Excavation	cu.m	10,235.00	
103(1)a	Structure Excavation (Common Soil)	cu.m	3,888.00	
103(8)a	Pipe Culvert and Drain Excavation	cu.m	328.00	
104(1)a	Embankment from Roadway/ Structure Excavation (Common Soil)	cu.m	2,785.00	
104(2)a	Embankment from Borrow (Common Soil)	cu.m	32,473.00	
105(1)a	Subgrade Preparation	sq.m	8,590.00	
PART D : SUBBASE & BASE COURSE				
200(1)	Aggregate Subbase Course	cu.m	1,371.00	
PART E : SURFACE COURSES				
311(1)a	PCC Pavement (Unreinforced), 150mm thk., 14 Days	sq.m	582.08	Shoulder Bothsides
311(1)c1	PCC Pavement (Unreinforced), 230mm thk., 14 Days	sq.m	5,322.48	
PART H : MISCELLANEOUS STRUCTURES				
800(7)	Curb & Gutter (Precast)	pc	2,080.00	See Details & Schedule
805(1)g2	Warning Signs 800mm W2-B1, Intersection & Junction Signs Cross Road	ea	6.00	See Details & Schedule
805(1)g2	Warning Signs 800mm W2-4B, Intersection & Junction Signs T-Junction	ea	2.00	See Details & Schedule
805(1)k2	Warning Signs 800mm W2-5B, Intersection & Junction Signs Y-Junctions	ea	4.00	See Details & Schedule
812(1)	Reflectorized Thermoplastic Pavement Markings (White)	sq.m	228.79	See Details & Schedule
CW2-DRAINAGE				
PART G : DRAINAGE AND SLOPE PROTECTION STRUCTURES				
900(1)a	Structural Concrete, 3000psi/ 20.88 Mpa Class "A", 14 Days	cu.m	2.13	See Drainage Schedule
902(1)a1	Reinforcing Steel (Deformed), Grade 40	kg	151.07	See Drainage Schedule
1718(1)b3	Pipe Culverts, 910mm dia., Class IV RCPC	lm	182.00	See Drainage Schedule
1718(21)b1	Lined Canal, Rectangular, Concrete	lm	2,055.14	See Drainage Schedule
1720(1)a3	Manholes, 910mm dia. (Concrete)	ea	44.00	See Drainage Schedule

NOTE: ALL QUANTITIES FOR ALL ITEMS OF WORK INVOLVED ARE SUBJECT TO INCREASE/DECREASE TO SUIT ACTUAL SITE CONDITIONS.

 REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS REGION XI DAVAO DEL NORTE DISTRICT ENGINEERING OFFICE TAGUM CITY	PROJECT NAME AND LOCATION	SHEET CONTENTS	DESIGNED	REVIEWED	SUBMITTED	RECOMMENDED	APPROVED	BY: HD	SHEET NO.
	CONSTRUCTION OF ROAD INCLUDING DRAINAGE STRUCTURE, PUROK 4A, BARANGAY CANOC-DYAN, TAGUM CITY, DAVAO DEL NORTE	SUMMARY OF QUANTITIES	DESIGNED: JAMES O. MORADA ENGINEER PREPARED: CHARME JANE E. CURAY ENGINEER	REVIEWED: YOLAN MARIE S. MORADA ENGINEER DATE:	SUBMITTED: CHRISTEN F. MAZAREHO CHIEF ENGINEER/DESIGN SECTION DATE:	RECOMMENDED: LEO A. E. A. MANSALO CHIEF COURSE OFFICE OF THE ASSISTANT DISTRICT ENGINEER DATE:	APPROVED: EDITH M. MONTILOS DISTRICT ENGINEER DATE:	BY: HD 1/1	SHEET NO. 4/54

LEGEND:

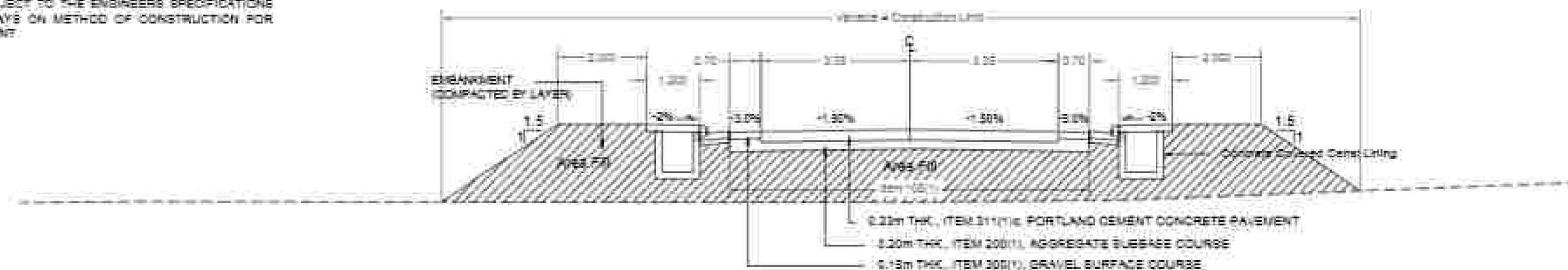
FGE- FINISHED GRADE ELEVATION
NGL- NATURAL GROUND LINE
W - WIDENING
RCPC - REINFORCED CONCRETE PIPE CULVERT
VAR - VARIABLE

REFERENCE:

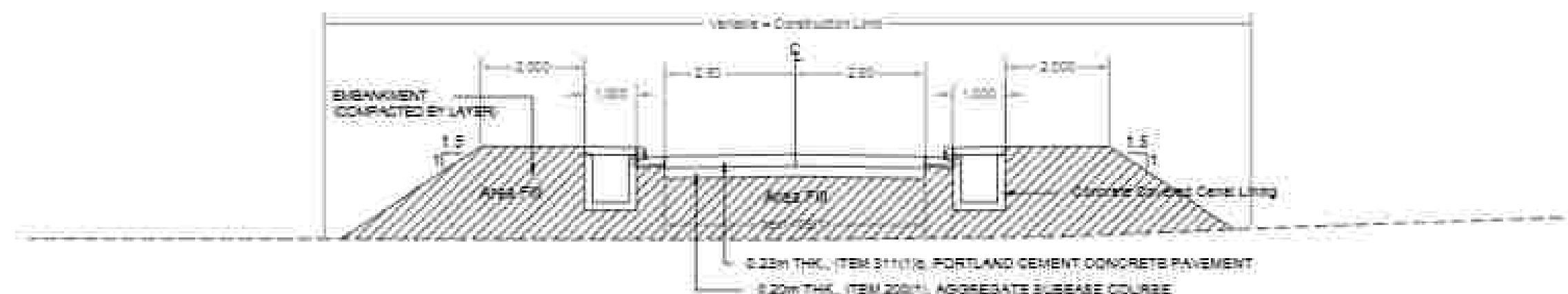
1. DRWH-DESIGN GUIDELINES, CRITERIA, AND STANDARDS (DGCS 2015 EDITION)
2. FOR THE MINIMUM REQUIREMENTS OF ROAD RIGHT-OF-WAY FOR NATIONAL AND LOCAL ROADS, DO 178, SERIES 2015

NOTE: ALL EMBANKMENT SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE REQUIREMENTS OF ITEM 104(1)-EMBANKMENT. IT SHALL BE COMPACTED IN HORIZONTAL LAYERS NOT EXCEEDING 200mm (LOOSE MEASUREMENT). AFTER FIVE SUCCESSIVE LAYERS, THE FILL EMBANKMENT SHALL BE SATURATED WITH WATER THEN DRIED, BEFORE PLACING THE SUCCEEDING LAYERS. THE PROCEDURE SHALL BE REPEATED UNTIL THE DESIRED ELEVATION IS ATTAINED.

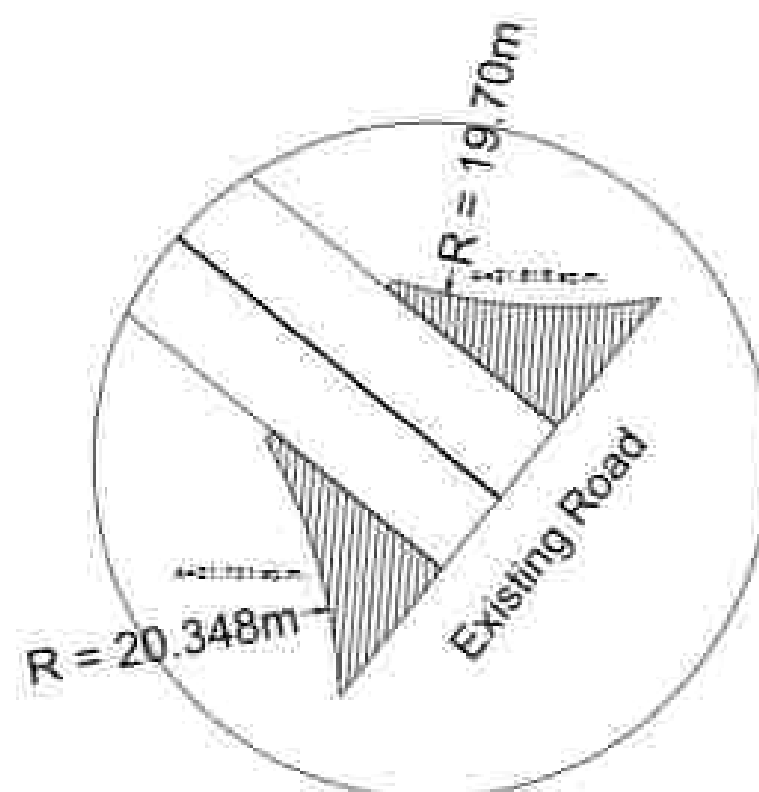
EMBANKMENT PLACED ON EXISTING SLOPES THAT ARE STEEPER THAN 3:1 WHEN MEASURED AT RIGHT TO THE ROADWAY SHALL BE CONTINUOUSLY BENCHED IN LAYERS SUBJECT TO THE ENGINEER'S SPECIFICATIONS FOR HIGHWAYS ON METHOD OF CONSTRUCTION FOR EMBANKMENT.



Typical Roadway Section
Showing Section @ 6.10m Width



Typical Roadway Section
Showing Section @ 5.00m Width



FLARE DETAIL
AT SECTION 1

DESIGN CONDITIONS:	
Design Period	= 20 Years
Actual Loading	= 100%
Design ESAL	= 995771
Comp. Strength	= 550 psi @ 28 Days
Design CBR	= Mean CBR - 1%
where $S = \sqrt{((x - \bar{x})^2 / (n - 1))}$	
Mean CBR	= 6.6667
$S = 1.2813 / 8.00 \sqrt{10} = 5.9325$	
Resilient Modulus of Subgrade	CBR = 5.713
$M_o = CBR \times 1500$	$M_o = 4.068$
Composite Modulus of Subgrade	$M_{oc} = 4.068$
Corrected k (from the graphs)	$k_{oc} = 4.068$
PAVEMENT STRUCTURE	
PCC Thickness T_{pcc}	= 230 mm
Subbase, Item 200	= 200 mm
Subgrade CBR	= 2.712
MR, resilient modulus	= 4.068

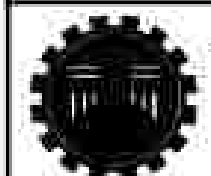
CUT/FILL SLOPE SCHEDULE

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

PAVING OF SHOULDER (0.70M WIDTH)

STATION	LENGTH	LANE	REMARKS
0+000 - 0+022.6	22.60	BOTH	AT SECTION 1
0+033 - 0+163.17	130.17	BOTH	AT SECTION 2
0+000 - 0+110.00	110.00	BOTH	AT SECTION 3
0+000 - 0+115.00	115.00	BOTH	AT SECTION 4

FLARE SCHEDULE			
STATION	LANE	AREA	REMARKS
AT BEG.	BOTH	43.319 SQ.M.	SECTION 1



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

PROJECT NAME AND LOCATION
CONSTRUCTION OF ROAD
INCLUDING DRAINAGE STRUCTURE,
PURUK 4A, BARANGAY CANOCOTAN,
TAGUM CITY, DAVAO DEL NORTE

SHEET CONTENTS
TYPICAL ROADWAY SECTION
DESIGN PARAMETERS
SHOULDER SCHEDULE
NOTES, LEGEND & REFERENCES

DRAWN BY
JANICE G. HONRADA
ENGINEER
CHECKED BY
CHARME JANE E. CURAY
ENGINEER

REVIEWED BY
YOLAN MARIE S. HONRADA
ENGINEER
DATE

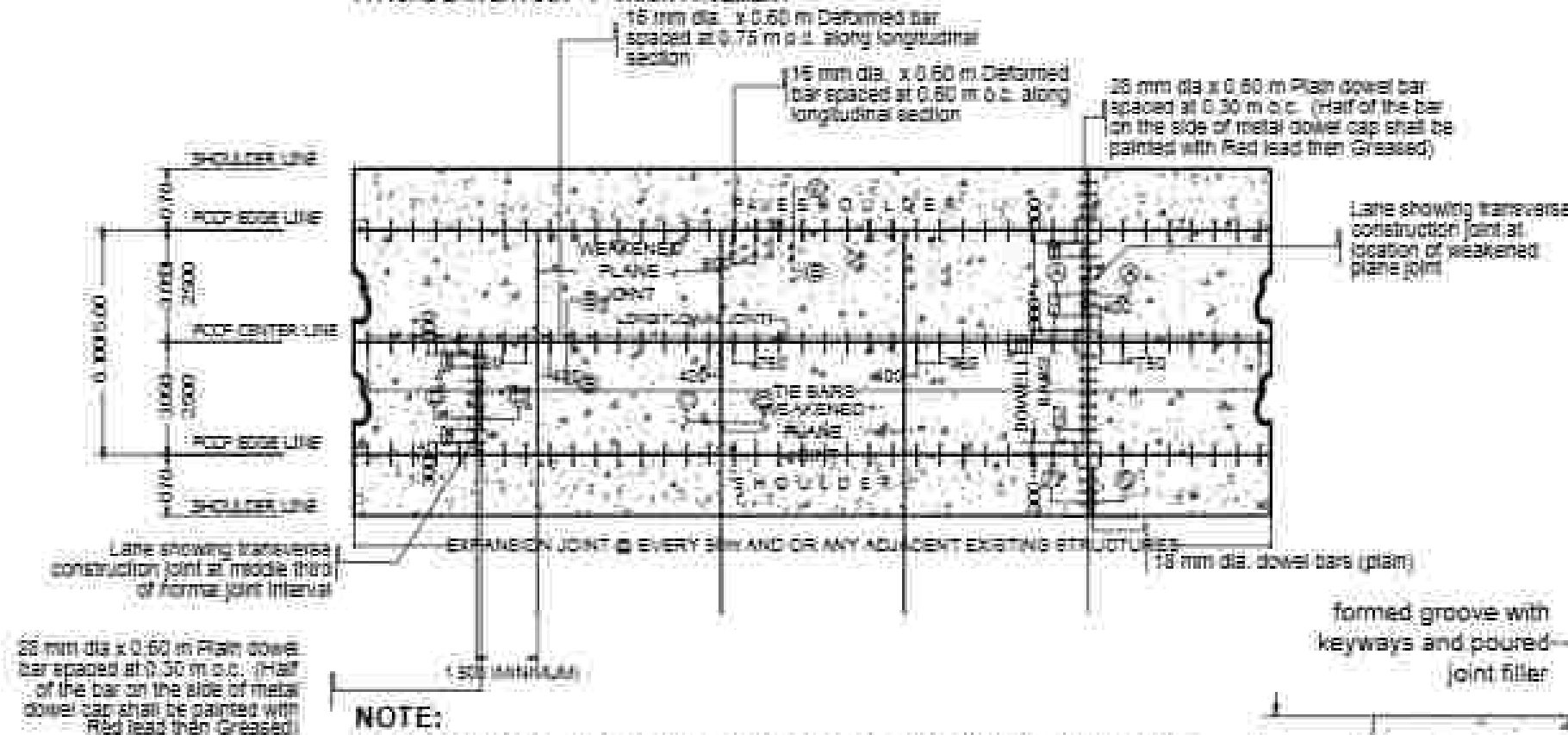
SUBMITTED BY
CHRISTEN F. MAZAREHO
CHIEF OF DESIGN SECTION
DATE

RECOMMENDED BY
LEO A. E. MANSALDO
CHIEF OF CONSTRUCTION
DATE

APPROVED BY
EDITH S. MONTILOS
DISTRICT ENGINEER
DATE

SHEET NO.
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1/1
SHEET NO.
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54

TYPICAL BAR LAYOUT "T" THICK PAVEMENT



TYPICAL PLAN FOR TWO-LANE PAVEMENT

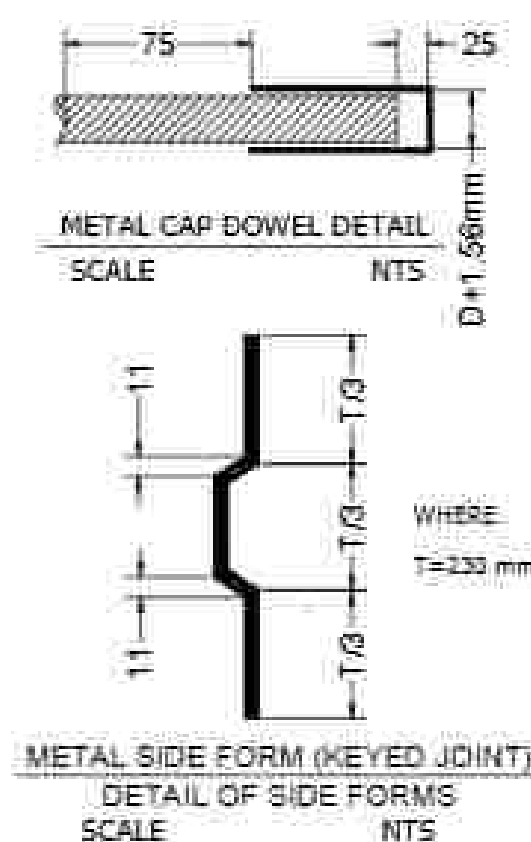
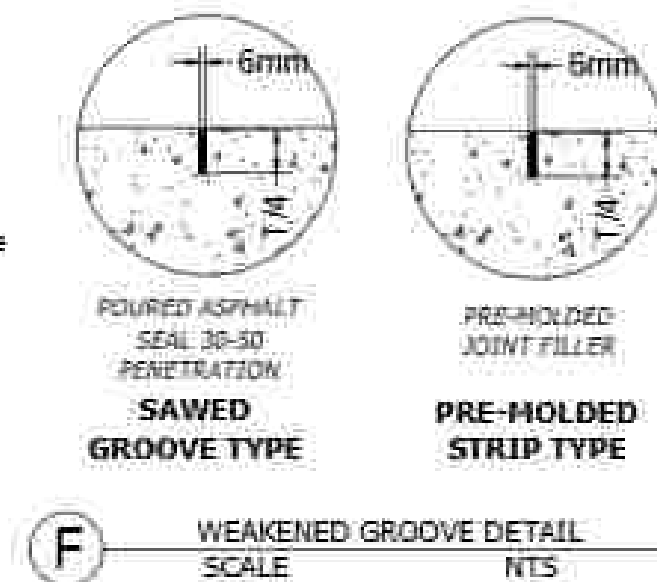
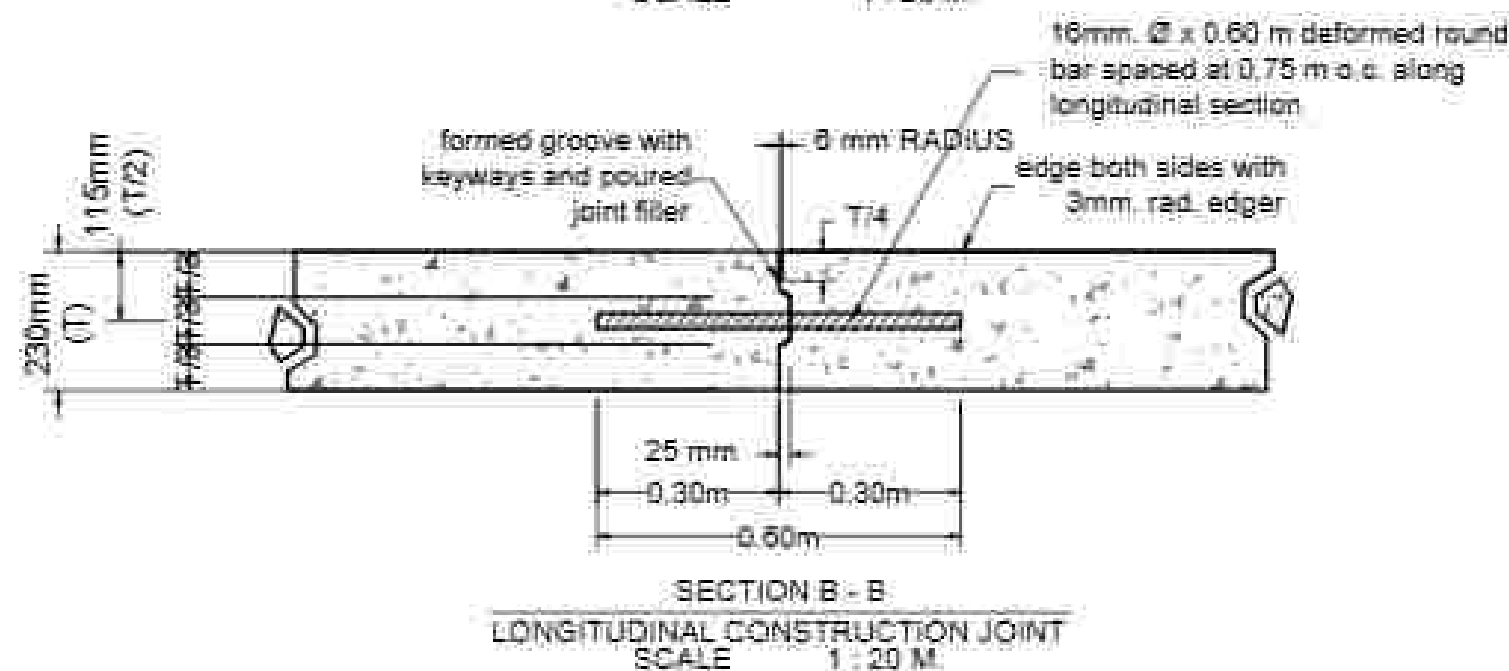
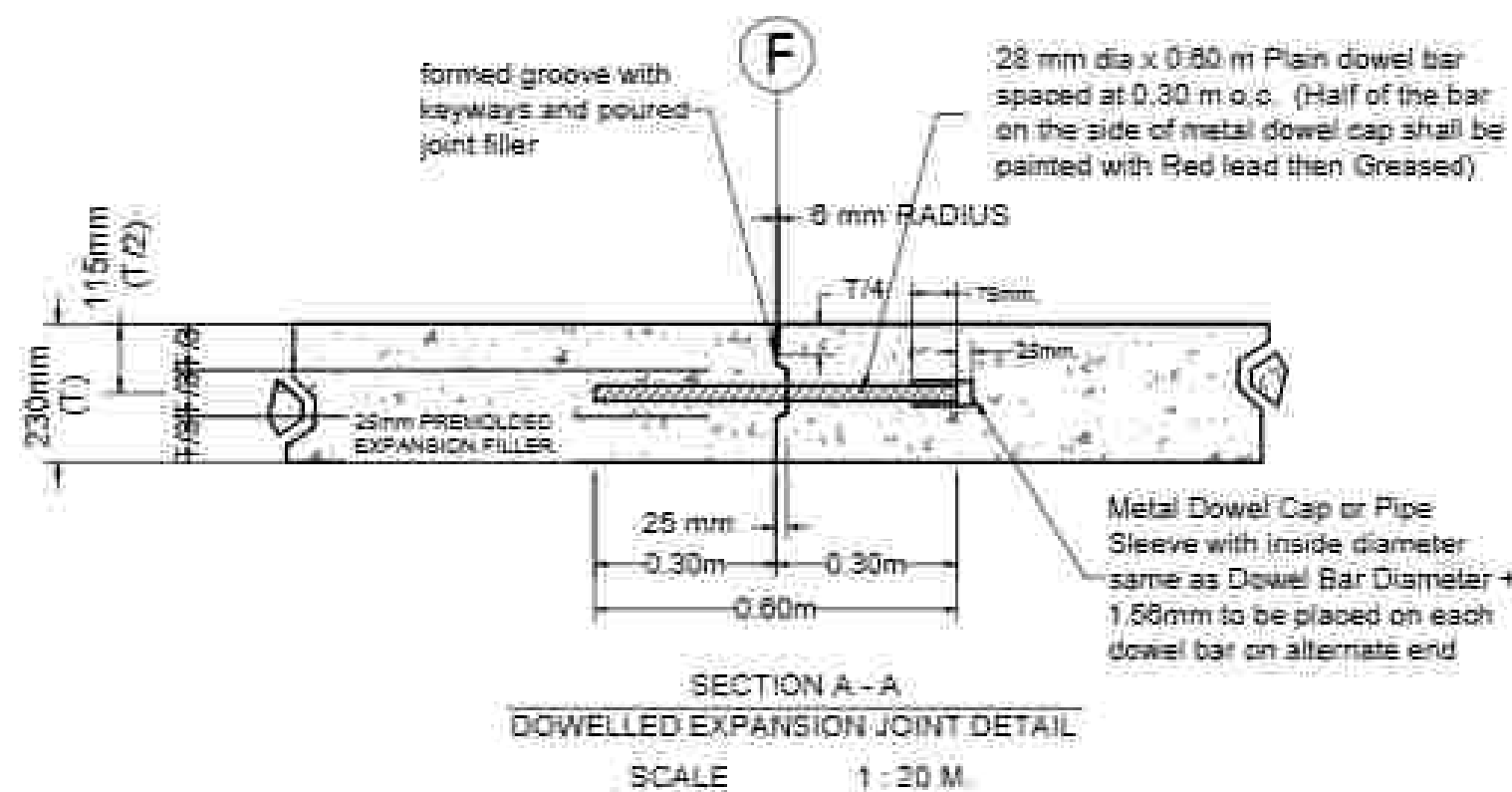


TABLE 1

SLAB THICKNESS (mm)	SPACING S1 (mm)	SPACING S2 (mm)
230	600	750
240	600	750
250	600	750
260	500	750
270	500	750
280	500	750
290	500	750
300	500	750
310	400	750
320	400	750
330	400	750
340	400	750

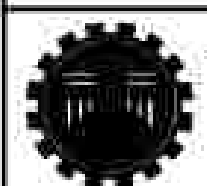
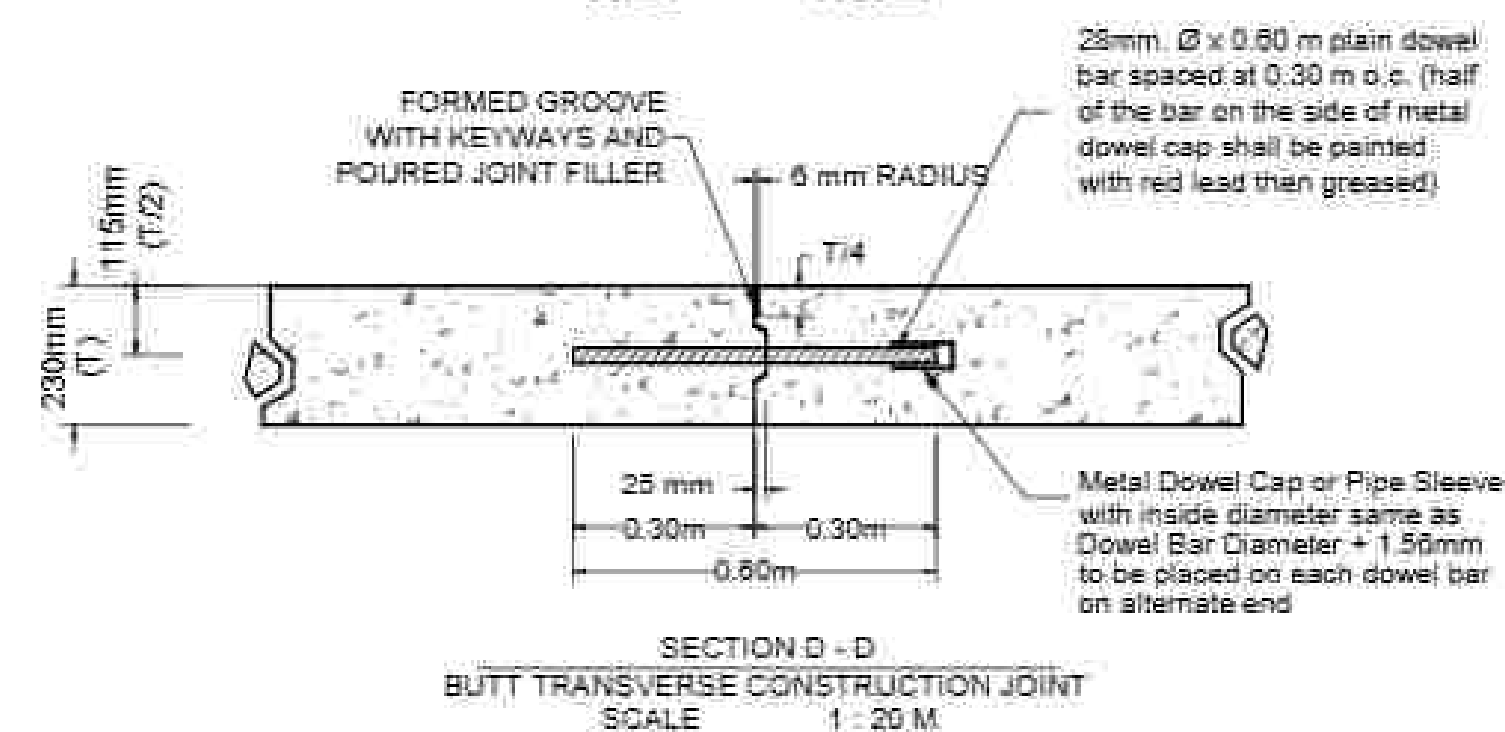
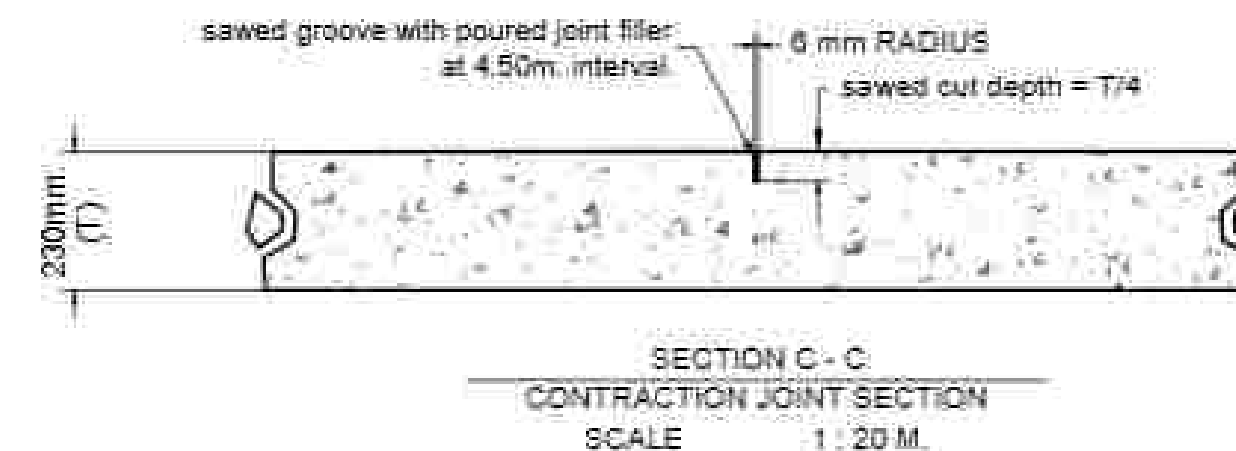
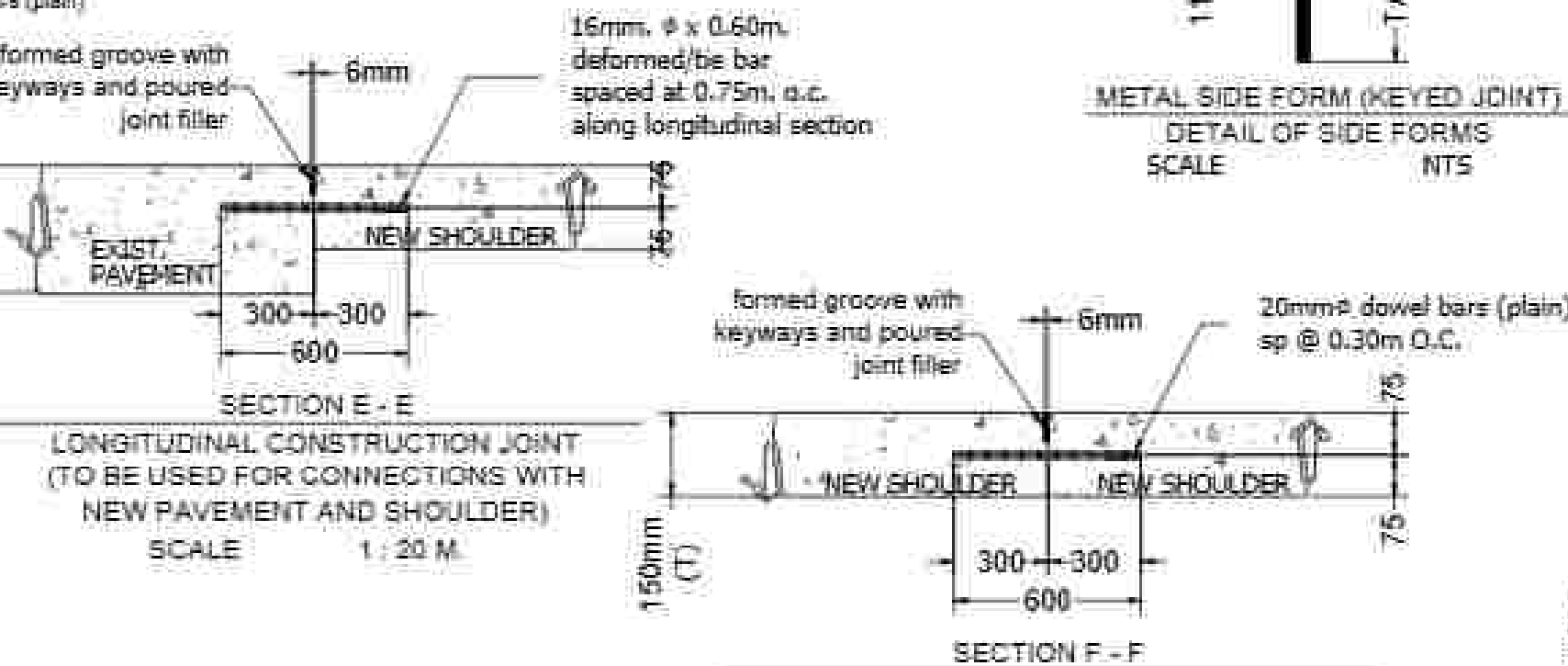
BASED ON AASHTO GUIDE FOR DESIGN OF PAVEMENT STRUCTURES 1993

TABLE 1

SLAB THICKNESS (mm)	DIAMETER, D (mm)	SPACING, S2 (mm)
230	28	300
240	30	300
250	32	300
260	32	300
270	34	300
280	36	300

NOTE: DIAMETER AND SPACING OF PLAIN DOWEL BARS MAY BE MODIFIED AS LONG AS THE EQUIVALENT STEEL AREA IS SUSTAINED.

- Materials and workmanship were conformed with the DPWH Standard Specification for Highways, Bridges and Airport, 2013
- Construction joints are formed when concrete on one side of the joint is poured ahead and allowed to set before pouring on the other side. No construction joint were placed within 1.50 m. from the weakened plane joint.
- At construction joint (longitudinal or transverse) care were taken that no concrete from the last slab placed overhangs any portion of the first slab.
- The bars were deformed steel bars. All dowel bars were smooth round steel bar free from rust and other defects which might restrict their movement.
- Type of weakened plane joint used was specified in the plans and only one type should be used for the whole project.
- Material for the metal side form was brand new sheet metal Gauge no. 15 of black iron free from rust and links.
- At least six (6) successive dowelled butt joints at normal joint spacing was provided before or after an expansion joint.
- The groove or cracks above joints (longitudinal or transverse) were sealed with 30-50 penetration asphalt seal or cold applied liquid rubber compound after the concrete had been cured and before opening pavement to traffic. Asphalt sealed was poured in such manner that spalling shall be prevented/ eliminated; thus, provide a smooth leveling riding surface.
- All transverse joints except construction joint was continuous from edge to edge.
- All longitudinal joints met at intersections with no gaps or offset.
- All dimensions was in millimeters unless otherwise specified.
- Avoided stoppage of formwork along curves.
- Constructed expansion joint at every 30 meters and/or every adjacent existing structures.



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

PROJECT NAME AND LOCATION
CONSTRUCTION OF ROAD INCLUDING DRAINAGE STRUCTURE, PURUK 4A, BARANGAY CANOCOTAN, TAGUM CITY, DAVAO DEL NORTE

SHEET CONTENTS
TYPICAL BAR LAYOUT
TYPICAL JOINT DETAILS
POCP NOTES & SCHEDULE

DESIGNED BY
JANES O. HORRADA
ENGINEER
CHECKED BY
CHARME JANE E. CUNY
ENGINEER

REVIEWED BY
YOLAN MARIE S. HORRADA
ENGINEER
DATE

SUBMITTED BY
CHRISTEN F. MAZAREHO
OFFICE ASSISTANT/DESIGN SECTION
DATE

RECOMMENDED BY
LEO ALBERTO M. BANGLO
CHIEF ENGINEER
OFFICE OF THE ASSISTANT DISTRICT ENGINEER
DATE

APPROVED BY
EDITH M. MONTILOS
DISTRICT ENGINEER
DATE

SHEET NO.
F
1
1
SHEET NO.
6
54

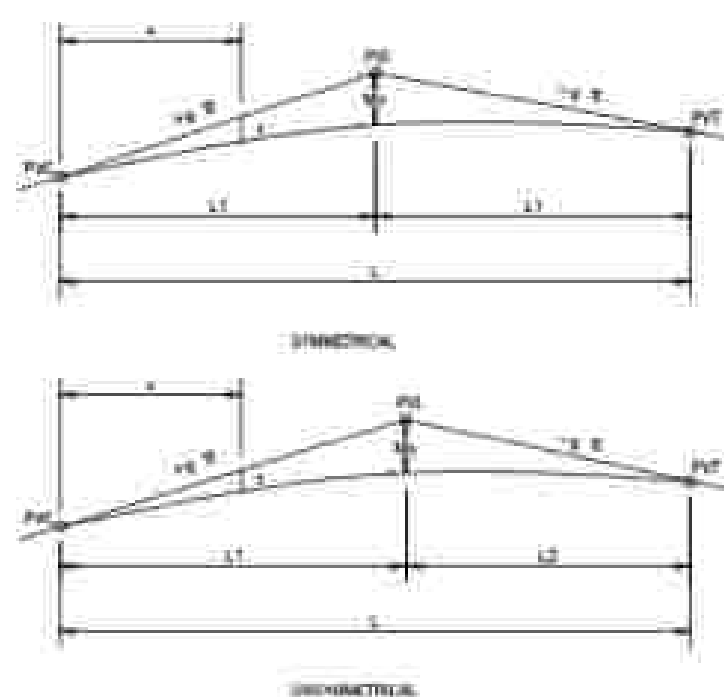
HORIZONTAL CURVE (CIRCULAR)

22220 *Pericoma*, circular, curved

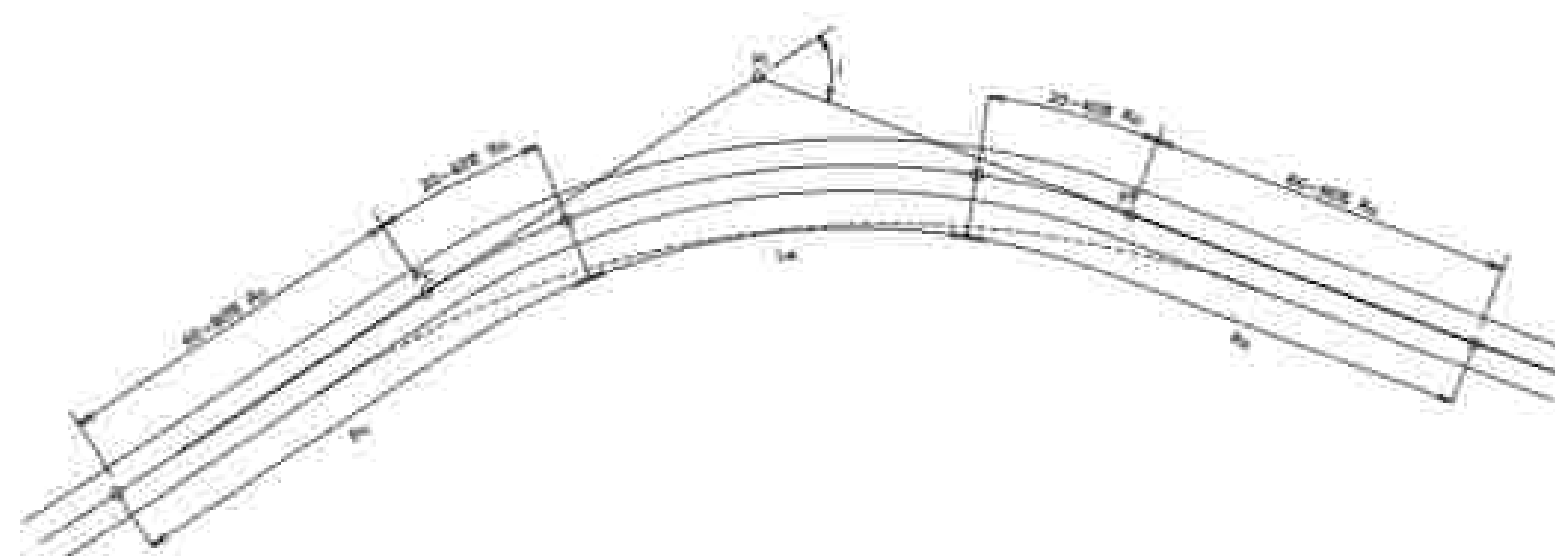
- | | | |
|----|---|-------------------------------------|
| P | = | POINT OF INTERSECTION |
| I | = | INTERSECTION SHAPE CORRECTING WHEEL |
| T | = | TANGENT DISTANCE |
| R | = | RADIUS |
| L | = | LENGTH OF CURVE |
| E | = | TOTAL EXTERNAL DISTANCE |
| PC | = | POINT OF CURVATURE |
| PT | = | POINT OF TANGENCY |

PLATE 1

1. NO PERIODIC CURVE IS REQUIRED WHEN THE INTERSECTION (CIRCUIT) ANGLE θ IS LESS THAN ONE DEGREE (1°00').
2. LENGTH OF CIRCULAR CURVE, $L = 1000/\text{PI}$



VERTICAL PARABOLIC CURVE



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)

WIDENING WHEN TRANSITIONS NOT USED

RADIUS OF CURVE	ROADWAY WIDTH = 10.00 MTS.					
	DESIGN SPEED (KPH)					
	50	60	70	80	90	100
5000	0.2	0.2	0.3	0.3	0.3	0.3
3500	0.3	0.3	0.3	0.3	0.3	0.3
3000	0.3	0.3	0.3	0.3	0.3	0.4
1500	0.3	0.3	0.4	0.4	0.4	0.4
1000	0.4	0.4	0.4	0.5	0.5	0.5
900	0.4	0.4	0.5	0.5	0.5	0.5
800	0.4	0.5	0.5	0.5	0.6	0.6
700	0.5	0.5	0.5	0.6	0.6	0.7
600	0.5	0.6	0.6	0.6	0.7	0.7
500	0.6	0.6	0.7	0.7	0.8	0.8
400	0.7	0.7	0.8	0.8	0.9	0.9
300	0.8	0.8	0.9	1.0	1.1	1.1
250	0.9	1.0	1.1	1.1	1.2	
200	1.1	1.2	1.3	1.3		
150	1.4	1.5	1.6	1.6		
140	1.5	1.6				
130	1.6	1.7				
120	1.7	1.8				
110	1.8	1.9				
100	1.9	2.0				
90	2.1					
80	2.3					
70	2.6					

² <http://www.fishbase.org> (Accessed 11 June 2008).

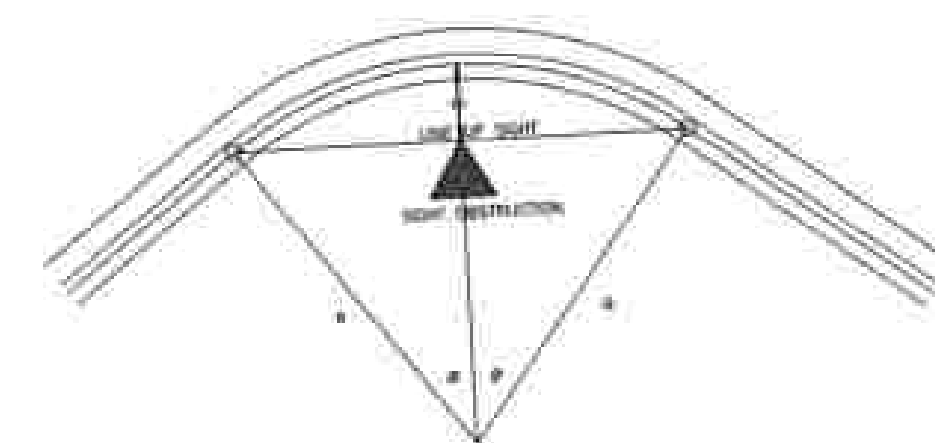
- | | | |
|-------|---|--|
| P_0 | = | POINT OF VERTICAL INTERSECTION |
| PVC | = | POINT OF VERTICAL CURVATURE |
| PVT | = | POINT OF VERTICAL TANGENCY |
| L | = | LENGTH OF VERTICAL CURVE |
| e | = | GRADE IN PERCENT |
| M_0 | = | WHEEL BASEWAVE |
| x | = | DISTANCE FROM PVC OR PVT TO ANY POINT OF CURVE |
| y | = | VERTICAL OFFSET IN METERS |
| A | = | ALGEBRAIC DIFFERENCE OF GRADES |

100

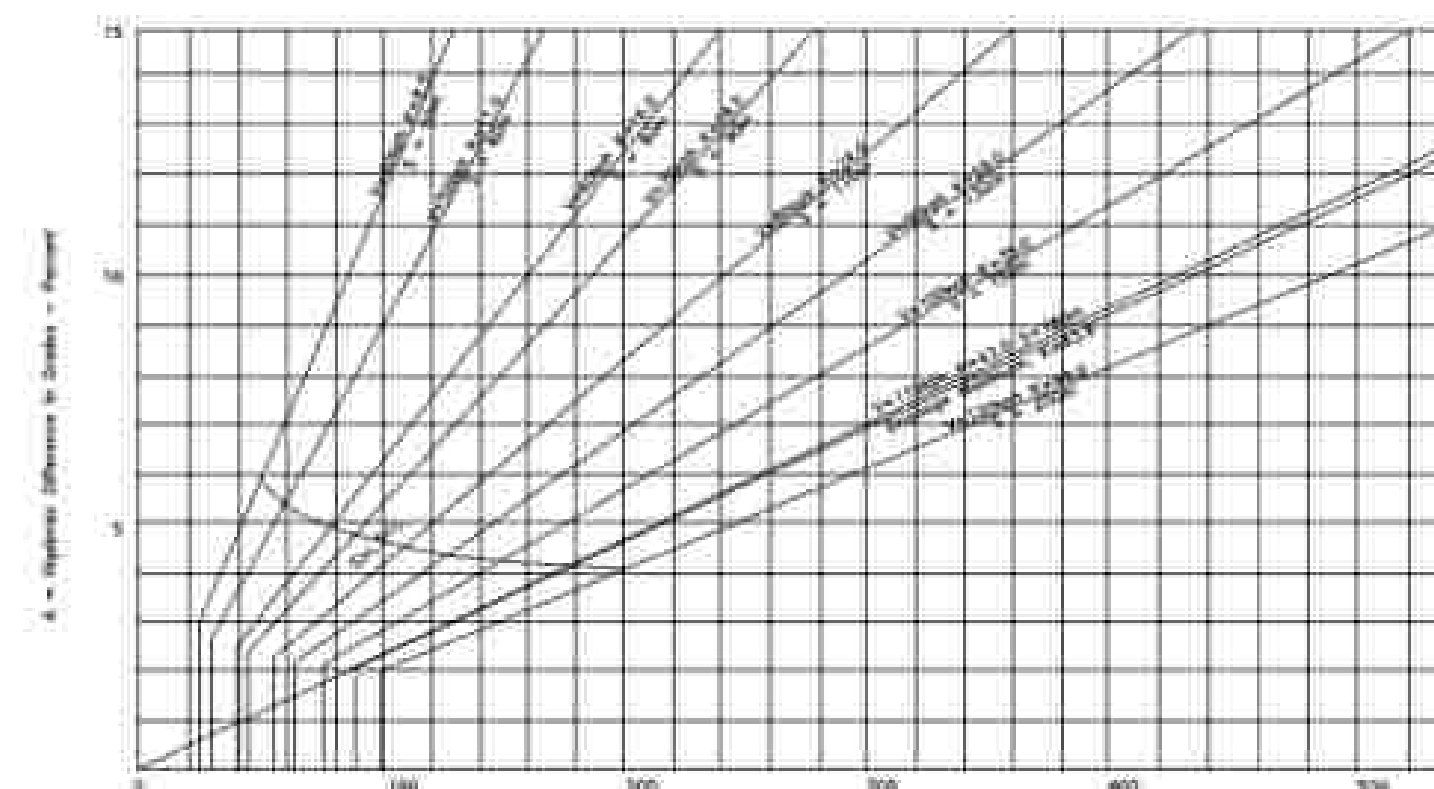
4. NO VERTICAL CURVE IS REQUIRED WHEN THE ALLEGED DIFFERENCE IN GRADES IS LESS THAN 0.4% IN ANY VERTICAL PARABOLIC CURVE.

$$\begin{array}{ll} \text{Find } \frac{dy}{dx} & \text{Use implicit differentiation} \\ \text{We have } \frac{dy}{dx} = \frac{1}{2x} & y = \frac{x^2 \ln x}{2x^2} \\ \text{We have } \frac{dy}{dx} = \frac{1}{2x} & y = \frac{x^2 \ln x}{2x^2} \end{array}$$

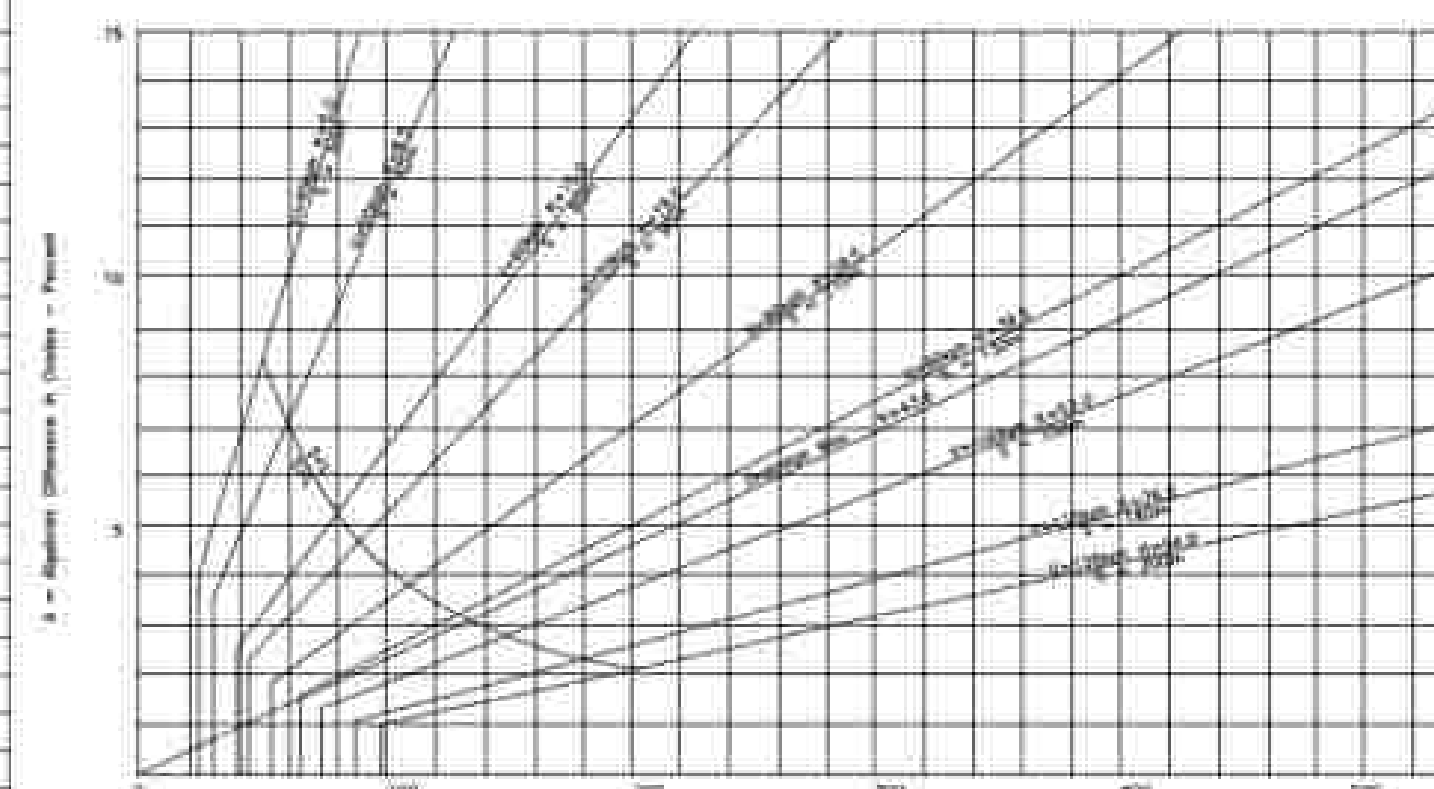
[illegible]



- | | | |
|---|---|---------------------------|
| D | = | DEGREE OF CURVE |
| H | = | HEAD OF CURVE |
| S | = | STANDARD TRAIL SPEED |
| T | = | STOPPING DISTANCE |
| M | = | MOBILE MESSAGE |
| R | = | 1/2 OF INTERSECTION WIDTH |



DESIGN CONTROLS FOR SAG VERTICAL CURVE
BASED ON MINIMUM STOPPING SIGHT DISTANCE (MSD) DISTANCE

DESIGN CONTROLS FOR CREST VERTICAL CURVE
BASED ON MINIMUM STOPPING SIGHT DISTANCE (3)

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
(REGION XI)
DAVAO DEL NORTE
DISTRICT ENGINEERING OFFICE
Tuguegarao

**CONSTRUCTION OF ROAD
INCLUDING DRAINAGE STRUCTURE,
PURUK 4A, BARANGAY CANOCOTAN,
TAGUM CITY, DAVAO DEL NORTE**

STD. CURVE DESIGN PARAMETERS

ORIGIN:	 JANCEE D. HONRADA ENROLLING SECRETARY
REMARKS:	 CHARMEE JANE E. CURA

YOLANNE E. HORRATA
20000221

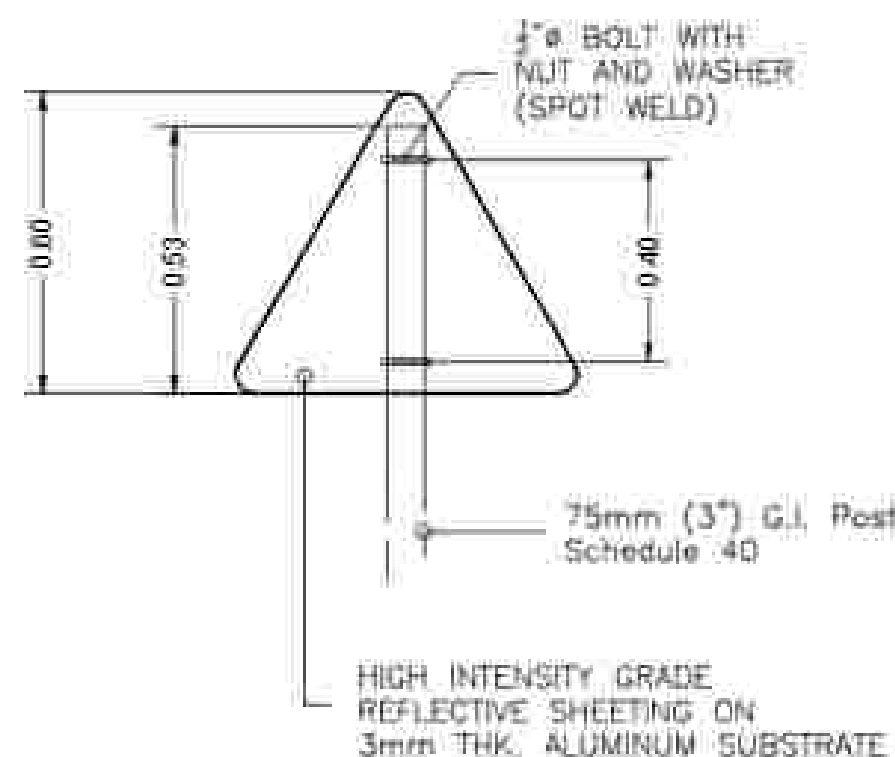
CHIRVEN F. MAZARENO
CHIRVEN F. MAZARENO

RECOMMENDED:

LT. ALBERT M. BANGLE
CHIEF OF POLICE
OFFICE OF THE ASSISTANT DISTRICT ATTORNEY

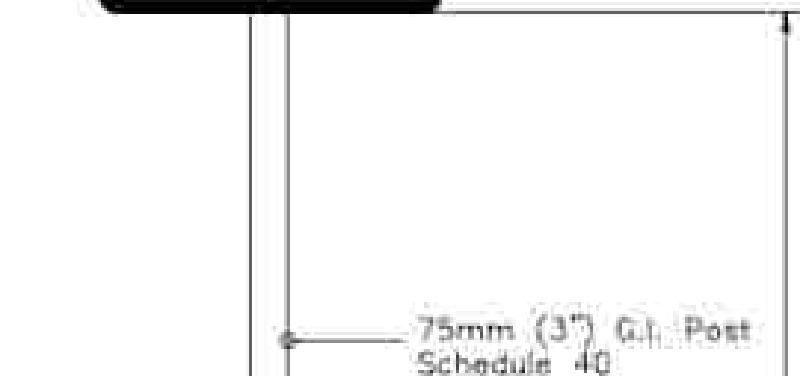
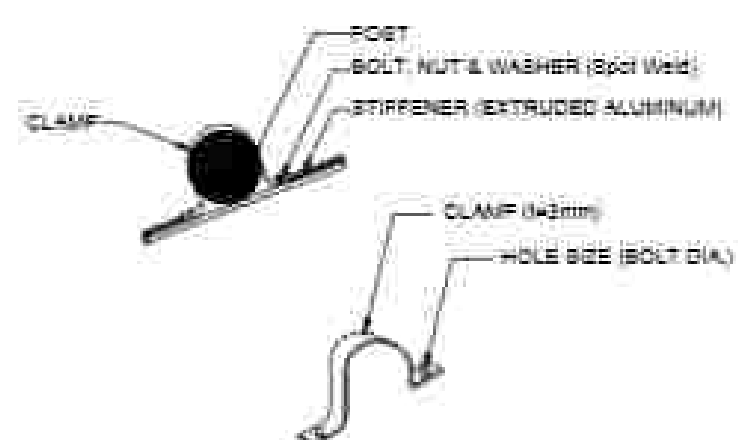
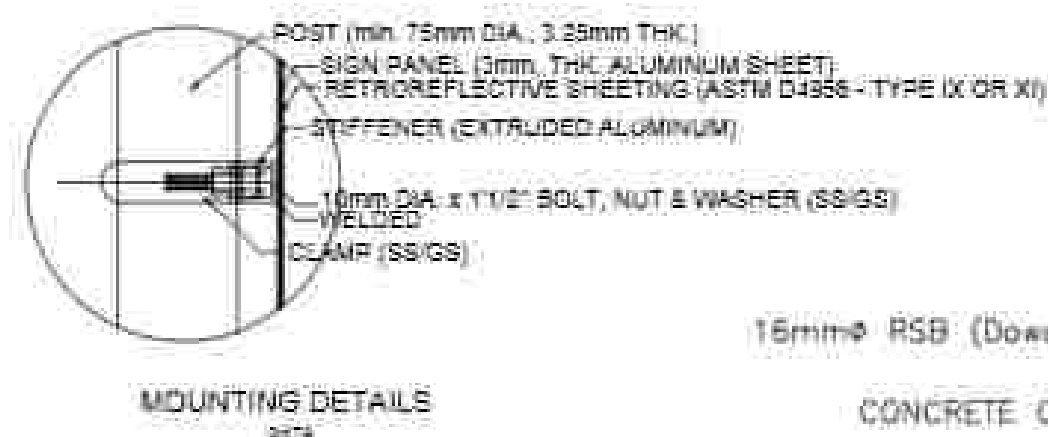
EDITH S. MONTLOE
DIRECTOR

	487 HD	2-487 HD
		



NOTE

THE NUMBER OF HAZARD MARKERS PER CURVE MAY BE CHANGED IF DEEMED NECESSARY. SPECIAL CARE SHOULD BE EXERCISED IN THE PLACEMENT OF SAID SIGNS TO ENSURE THEY ARE PROMINENTLY DISPLAYED TO APPROACHING DRIVERS.



GENERAL NOTES: WARNING SIGNS

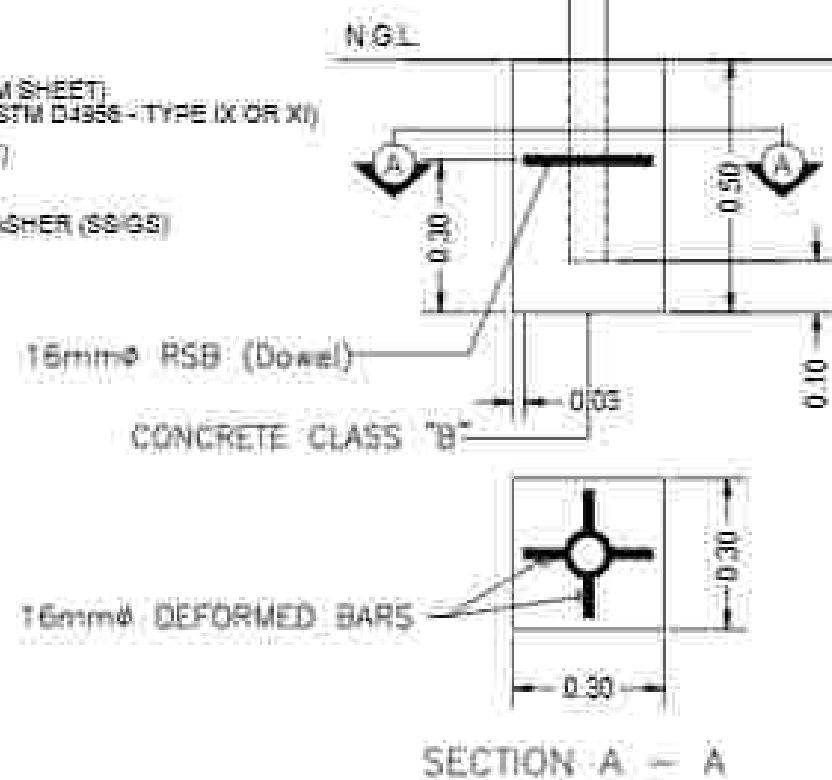
1. ALL POST SHALL BE THOROUGHLY CLEANED, FREE FROM GREASE, SCALE AND RUSTS BE GIVEN ONE COAT OF RUST-INHIBITING PRIMING PAINT AND TWO COATS OF INTERNATIONAL ORANGE IN ACCORDANCE WITH ITEM 411.
2. ALL DETAILS SHALL COMPLY WITH THE DPWH STANDARD SPECIFICATIONS FOR ROAD SIGN DO 158, S 2015.

DESIGN

3. IN GENERAL WARNING SIGNS ARE TRIANGULAR IN SHAPE (WITH ONE ANGLE VERTICAL), WITH A BLACK SYMBOL, REFLECTORIZED RED BORDER ON A RETRO-REFLECTIVE WHITE, FLOUORESCENT YELLOW-GREEN BACKGROUND.
4. THE SIDE OF ONE SIDE OF EQUILATERAL TRIANGULAR SHAPED SIGNS SHALL NOT BE LESS THAN 800mm FOR HIGH SPEED EXPRESSWAYS, LARGER SIGNS (UP TO 1200mm) ARE USUALLY ADOPTED.

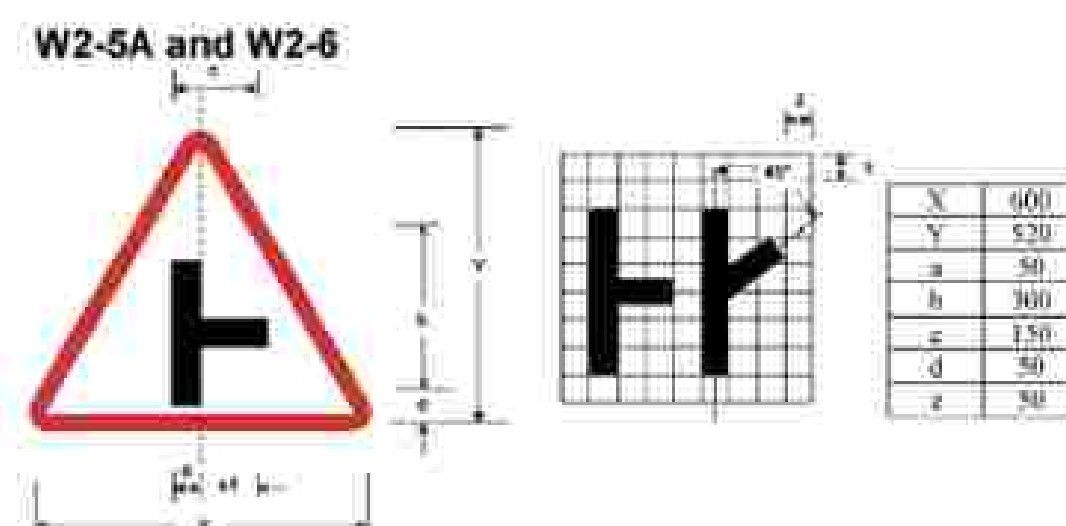
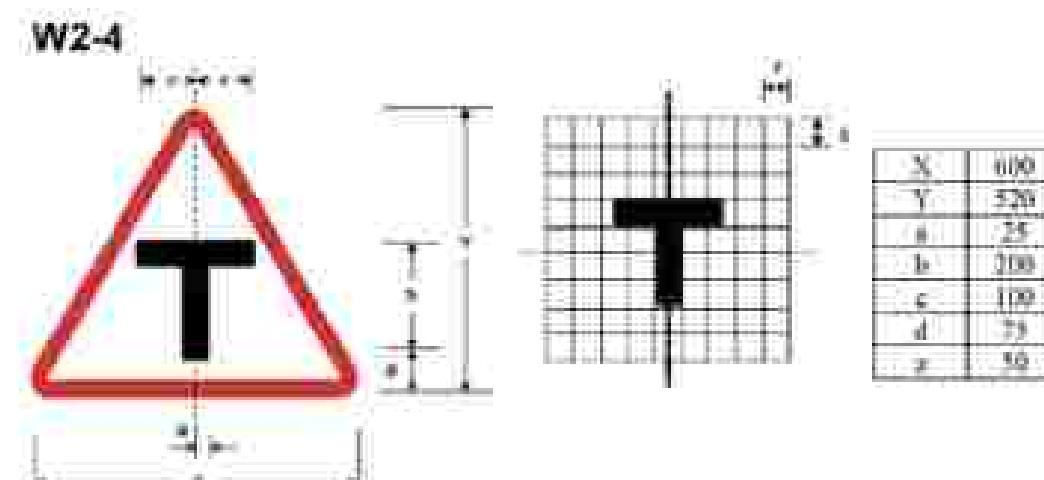
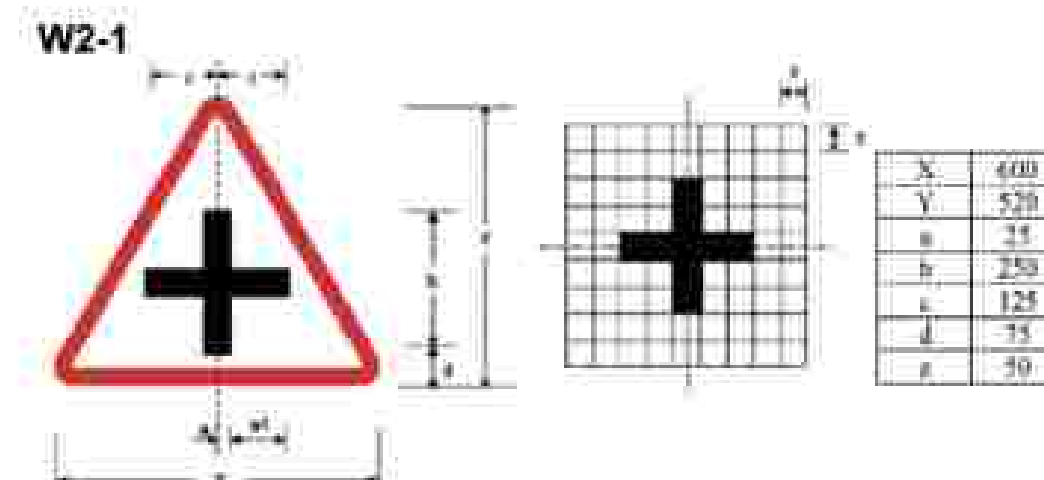
LOCATION

5. AS WARNING SIGNS ARE PLACED PRIMARILY FOR THE PROTECTION FOR THE DRIVER WHO IS NOT FAMILIAR WITH THE ROAD, IT IS VERY IMPORTANT THAT THE LOCATION AND INSTALLATION MUST BE UNDERTAKEN WITH CARE.
 - 5.1 TEST RUNS SHOULD BE MADE BY DAY AND BY NIGHT FROM BOTH DIRECTIONS TO CHECK THE LOCATION AND MOUNTING OF EACH INSTALLATION.
 - 5.2 A WARNING SIGN SHOULD BE GENERALLY INSTALLED ON THE RIGHT SIDE OF THE ROAD AND BE POSITIONED SO THAT IT WILL CONVEY ITS MESSAGE WITHOUT RESTRICTING LATERAL CLEARANCE OR SIGHT DISTANCE.
 - 5.3 IN URBAN AREAS, ADVANCE WARNING SIGN SHOULD BE PLACED AT NOT LESS THAN 30.00m IN ADVANCE OF THE HAZARDOUS AREA.
 - 5.4 EXACT LOCATION OF ALL WARNING SIGNS TO BE INSTALLED SHALL BE DETERMINED IN THE FIELD BY THE ENGINEER.

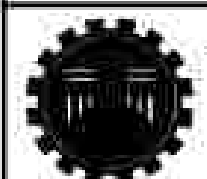


DETAIL OF POST (FOR WARNING SIGNS)

SCALE 1:20mts



INSTALLATION OF WARNING SIGNS			
STATION	LINE	REMARKS	DESCRIPTION
0+00.00	RIGHT	AT SECTION 1	W2-5A
0+140.00	LEFT	AT SECTION 2	W2-5A
0+080.00	LEFT	AT SECTION 3	W2-5A
0+000.00	RIGHT	AT SECTION 3	W2-5A
0+012.00	LEFT	AT SECTION 3	W2-4
0+000.00	LEFT	AT SECTION 4	W2-4
0+040.00	RIGHT	AT SECTION 3	W2-1
0+070.00	RIGHT	AT SECTION 3	W2-1
0+100.00	RIGHT	AT SECTION 3	W2-1
0+040.00	RIGHT	AT SECTION 4	W2-1
0+070.00	RIGHT	AT SECTION 4	W2-1
0+100.00	RIGHT	AT SECTION 4	W2-1



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

PROJECT NAME AND LOCATION
CONSTRUCTION OF ROAD
INCLUDING DRAINAGE STRUCTURE,
PURUK 4A, BARANGAY CANOCOTAN,
TAGUM CITY, DAVAO DEL NORTE

SHEET CONTENTS
WARNING SIGNS DETAIL
NOTES

DESIGNED BY
JANES O. MORADA
ENGINEER
CHECKED BY
CHARME J. E. CURAY
ENGINEER

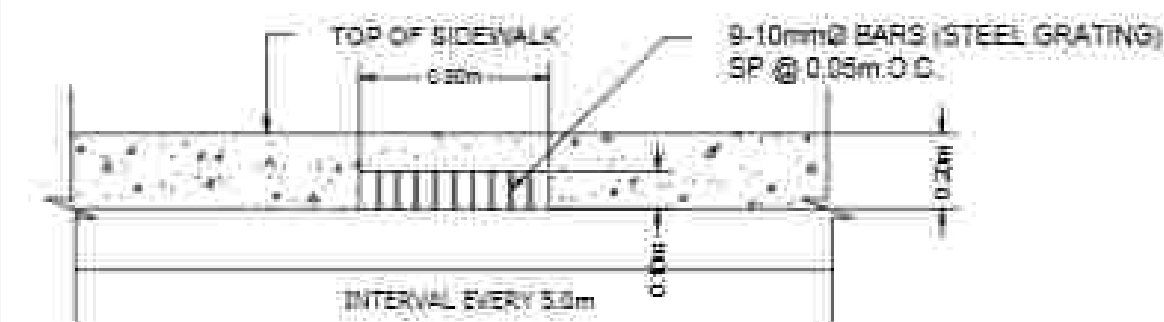
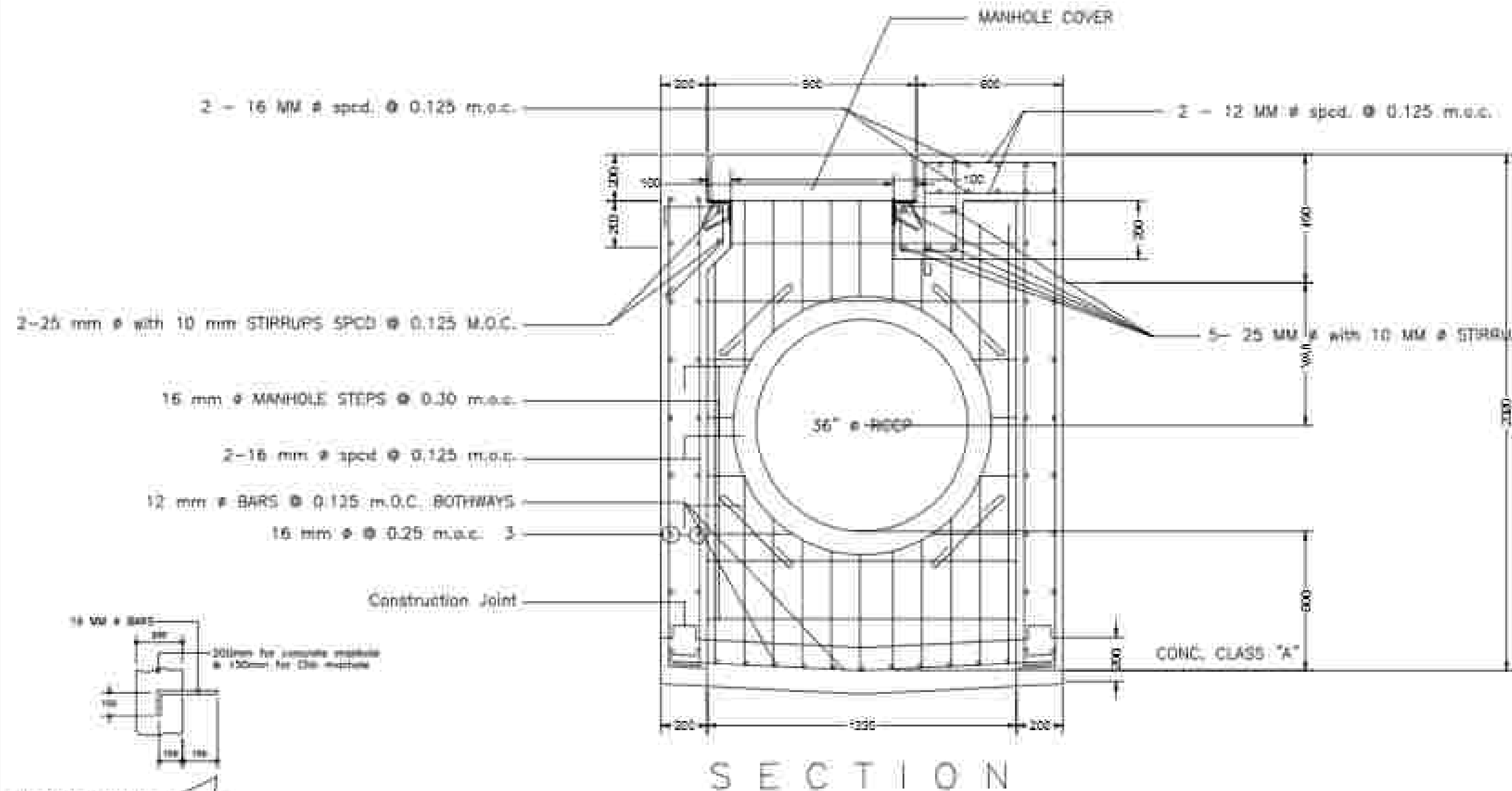
REVIEWED BY
YOLAN M. MORADA
ENGINEER
DATE

SUBMITTED BY
CHRISTEN F. MAZAREHO
CHIEF DESIGNER
DATE

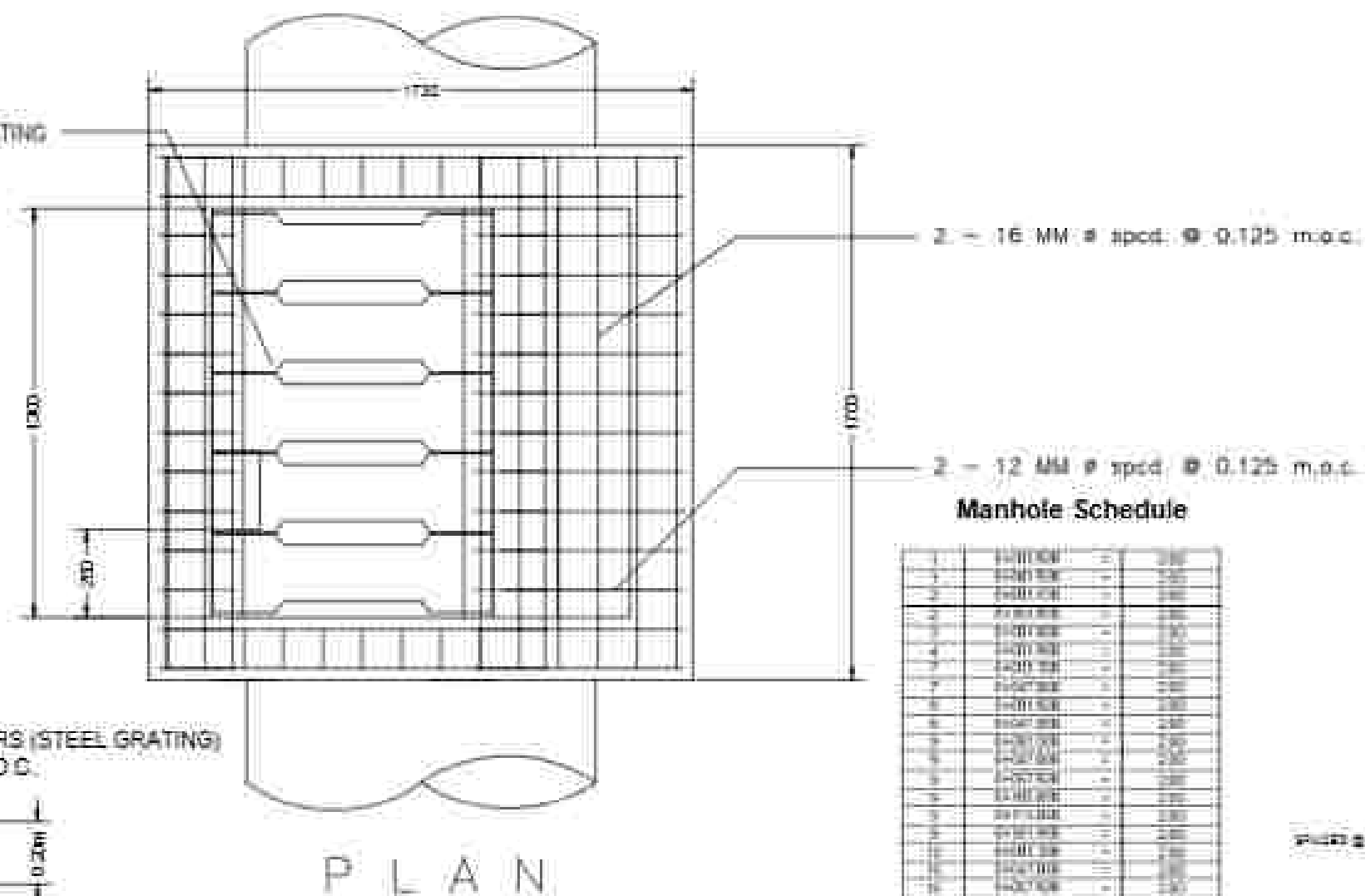
RECOMMENDED BY
LEO A. E. MANSALO
CHIEF ENGINEER
DATE

APPROVED BY
EDITH M. MONTILOS
DISTRICT ENGINEER
DATE

BY: 11
9
54

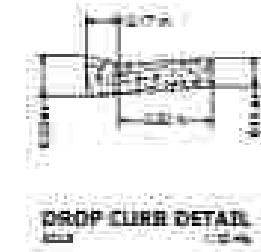
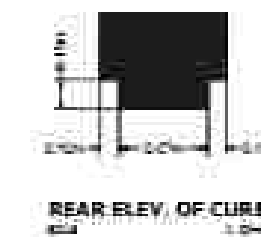
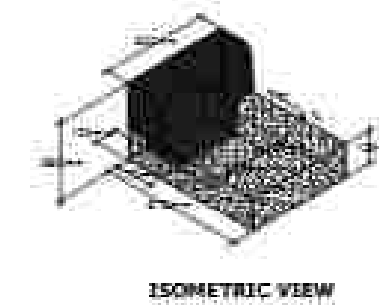


WATER INLET
SCALE 1:20mts.

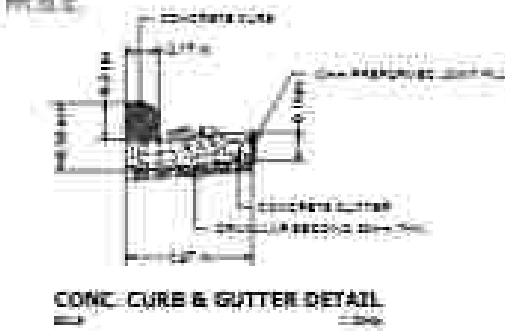


STATION	INVERT	LENGTH
1+000.00	2+121.00	121.00
2+000.00	2+121.00	121.00
3+000.00	2+121.00	121.00
4+000.00	2+121.00	121.00
5+000.00	2+121.00	121.00
6+000.00	2+121.00	121.00
7+000.00	2+121.00	121.00
8+000.00	2+121.00	121.00
9+000.00	2+121.00	121.00
10+000.00	2+121.00	121.00
11+000.00	2+121.00	121.00
12+000.00	2+121.00	121.00
13+000.00	2+121.00	121.00
14+000.00	2+121.00	121.00
15+000.00	2+121.00	121.00
16+000.00	2+121.00	121.00
17+000.00	2+121.00	121.00
18+000.00	2+121.00	121.00
19+000.00	2+121.00	121.00
20+000.00	2+121.00	121.00

1mm = 1/31.7m



DROP CURBS WILL BE LIKE @ CURBS OF SIDEWALK



NOTES:

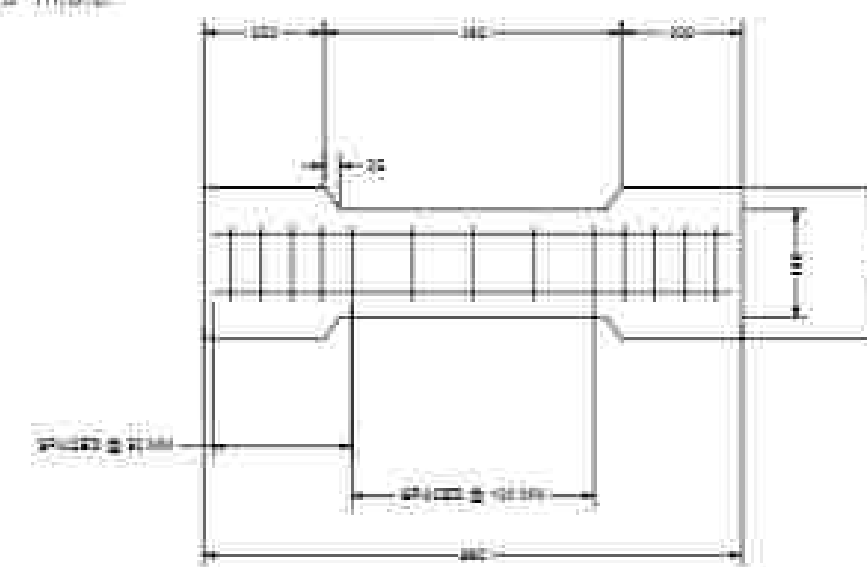
1. MATERIAL AND CONSTRUCTION REQUIREMENTS SHALL CONFORM TO THE STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION.
2. USE OF UNDER-PAVEMENT DRAINAGE SYSTEMS SHALL BE AS PER THE DESIGN OF THE PROJECT.
3. CONCRETE CURB AND GUTTER SHALL BE CONSIDERED THE DESIGN OF THE CURB AND GUTTER SHALL BE AS PER THE DESIGN OF THE PROJECT.
4. MANHOLE CURB SHALL BE 0.15m high.

TYPICAL PRECAST CURB & GUTTER

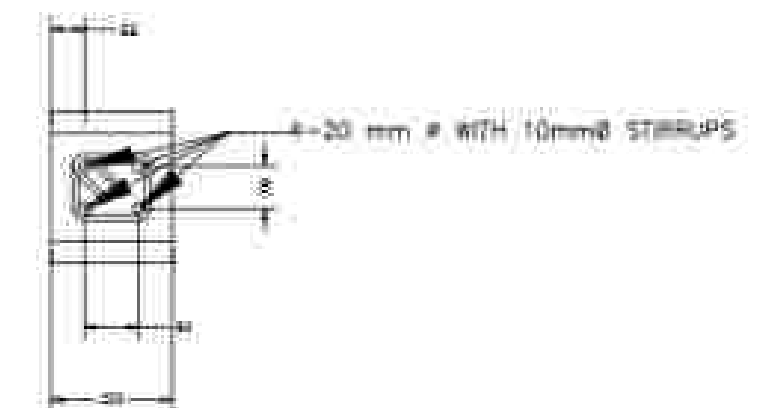
SECTION	LOCATION	LENGTH
1+000.00	2+121.00	121.00
2+000.00	2+121.00	121.00
3+000.00	2+121.00	121.00
4+000.00	2+121.00	121.00
5+000.00	2+121.00	121.00
6+000.00	2+121.00	121.00
7+000.00	2+121.00	121.00
8+000.00	2+121.00	121.00
9+000.00	2+121.00	121.00
10+000.00	2+121.00	121.00
11+000.00	2+121.00	121.00
12+000.00	2+121.00	121.00
13+000.00	2+121.00	121.00
14+000.00	2+121.00	121.00
15+000.00	2+121.00	121.00
16+000.00	2+121.00	121.00
17+000.00	2+121.00	121.00
18+000.00	2+121.00	121.00
19+000.00	2+121.00	121.00
20+000.00	2+121.00	121.00

DRAINAGE & SLOPE PROTECTION STRUCTURES:

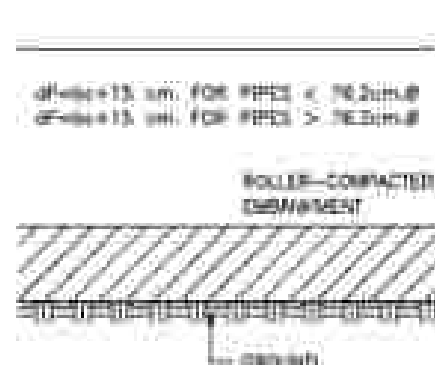
1. EXACT LOCATIONS, GRADIENTS, LENGTHS, TOP AND INVERT ELEVATIONS OF ALL DRAINAGE STRUCTURES THAT ARE REQUIRED SHALL BE DETERMINED IN THE FIELD BY THE ENGINEER.
2. EXTENSIONS AND OTHER IMPROVEMENTS OF EXISTING DRAINAGE STRUCTURES ARE SUBJECT TO CHANGE AND SHALL BE DETERMINED IN THE FIELD BY THE ENGINEER IN-CHARGE.
3. 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(A) - REMOVAL OF EXISTING PIPE CULVERT.
4. ANY MISCELLANEOUS REMOVAL NOT SHOWN ON THE PLANS INCLUDING REMOVAL OF ROADWAYS AND WALLS 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.



SCALE 1/16



REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS REGION XI DAVAO DEL NORTE DISTRICT ENGINEERING OFFICE TAGUM CITY	PROJECT NAME AND LOCATION CONSTRUCTION OF ROAD INCLUDING DRAINAGE STRUCTURE, PURUK 4A, BARANGAY CANOCOTAN, TAGUM CITY, DAVAO DEL NORTE	SHEET CONTENTS SERVICE HOLE DETAIL CURB & GUTTER DETAILS DRAINAGE NOTES	DESIGNED JANICE O. HONRADA DISTRICT ENGINEER	REVIEWED YOLAN M. HONRADA ENGINEER	SUBMITTED CHRISTEN F. MAZAREHO DISTRICT ENGINEER	RECOMMENDED LEO A. HONRADA DISTRICT ENGINEER	APPROVED EDITH M. MONTILOS DISTRICT ENGINEER	SET NO. 13	SHEET NO. 1054
			PREPARED CHARME J. E. CURAY ENGINEER	DATE 10/10/2023	DATE 10/10/2023	DATE 10/10/2023	DATE 10/10/2023		

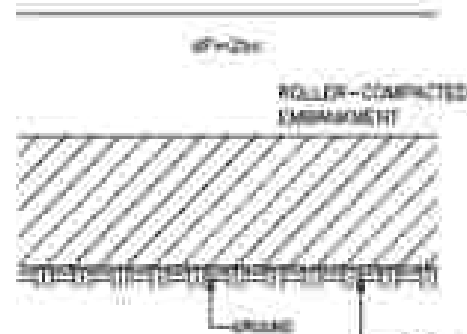


STEP -1-CONSTRUCT COMPACTED EMBANKMENT TO AN ELEVATION ABOVE TOP OF PROPOSED PIPE

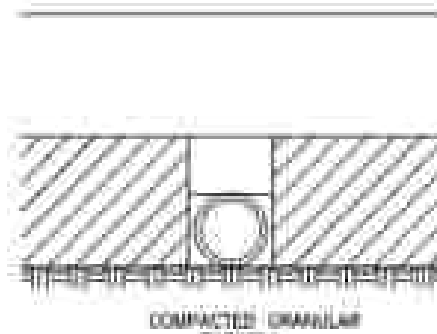


STEP -2-TRENCH THROUGH THE COMPACTED EMBANKMENT AND INSTALL PIPE BACKFILL WITH COMPACTED GRANULAR MATERIAL

CALIFORNIA METHOD A

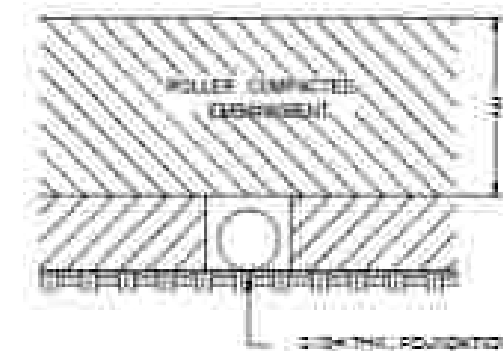


STEP -1-CONSTRUCT COMPACTED EMBANKMENT TO A TOTAL DEPTH EQUAL TO THREE TIMES THE OUTSIDE DIA. OF THE PIPE

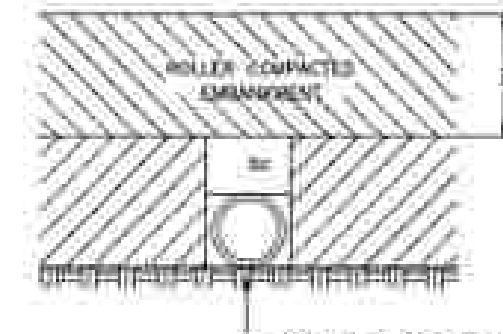


STEP -2-TRENCH THROUGH THE COMPACTED EMBANKMENT AND INSTALL PIPE BACKFILL WITH COMPACTED GRANULAR MATERIAL TO TOP OF PIPE

CALIFORNIA METHOD B



STEP -3-COMPLETE EMBANKMENT IN USUAL MANNER



STEP -3-FILL REMAINDER OF TRENCH WITH BACKFILL PLACE IN LOOSEST POSSIBLE CONDITION. COMPLETE EMBANKMENT IN NORMAL MANNER.

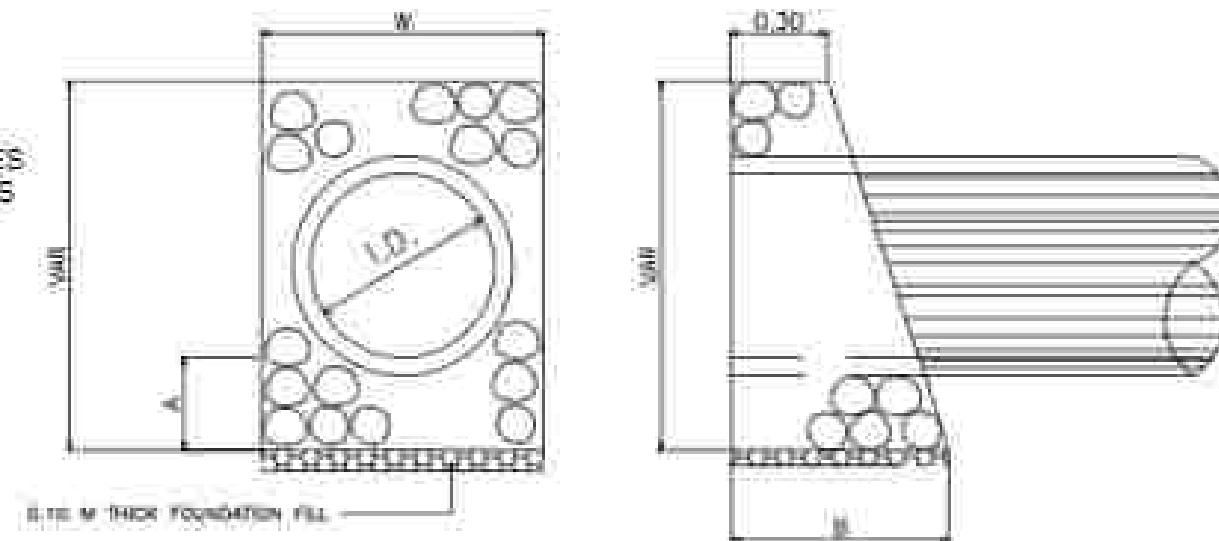
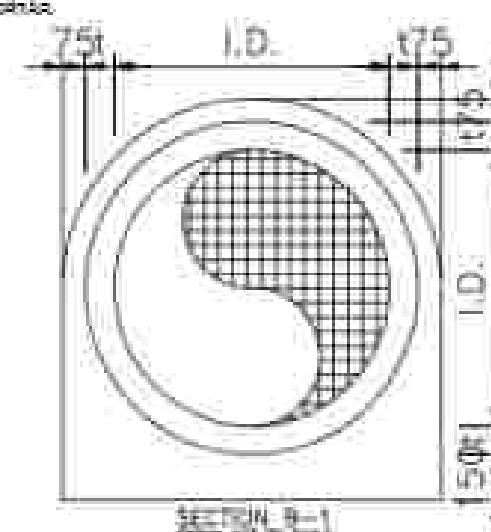
ITEM 506- STONE MASONRY

PLACING OF STONES SHALL BE LAID THEIR LONGEST FACES HORIZONTAL WITH THE BEDS OF MORTAR, AND THE JOINTS SHALL BE FLUSH WITH MORTAR.

TABLE FOR STRAIGHT "Y" TYPE HEADWALL										
DIA. & THK. OF PIPE		DIMENSIONS (mm)				SINGLE PIPE		DOUBLE PIPE		
I.D. (mm)	THK. (mm)	A	B	H	W	W w/o padding	VOL. (cu.m.)	W	W w/o padding	VOL. (cu.m.)
915	110	810	1080	1830	3660	10.515	3.36	4915	1.82	6.75
1220	150	810	1180	2340						

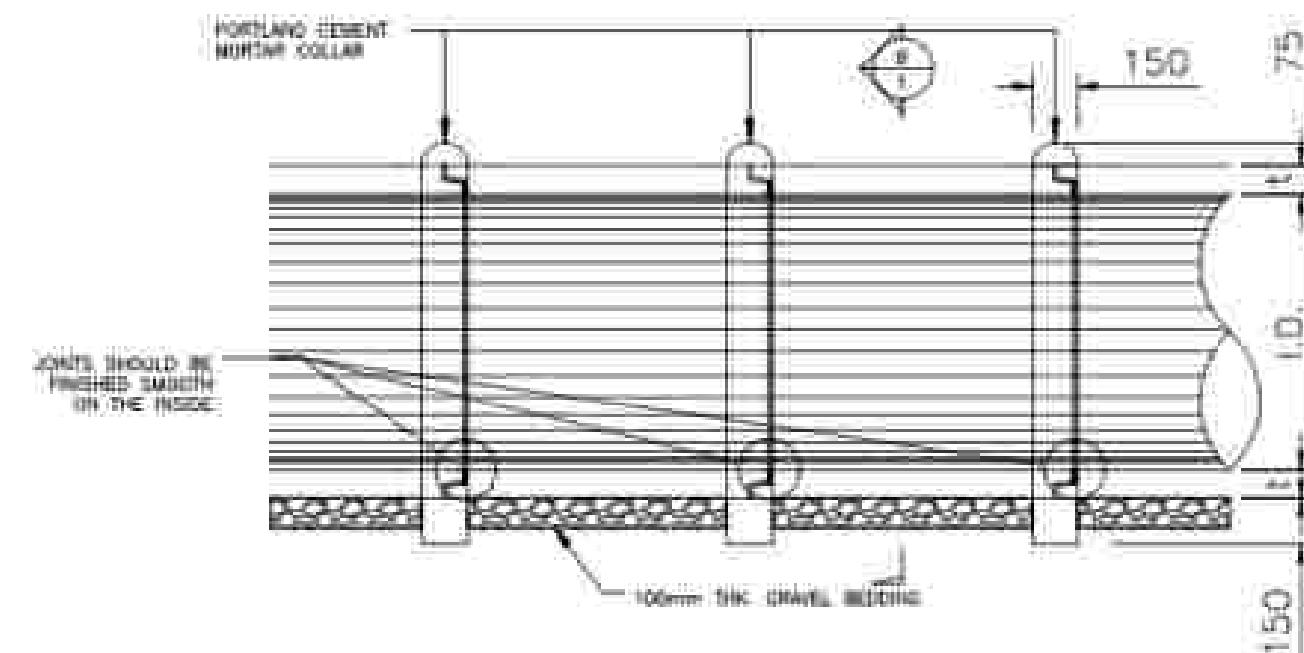
NOTES

ITEM 506- STONE MASONRY PLACING OF STONES
- STONES SHALL BE LAID THEIR LONGEST FACES HORIZONTAL WITH THE BEDS OF MORTAR, AND THE JOINTS SHALL BE FLUSH WITH MORTAR.

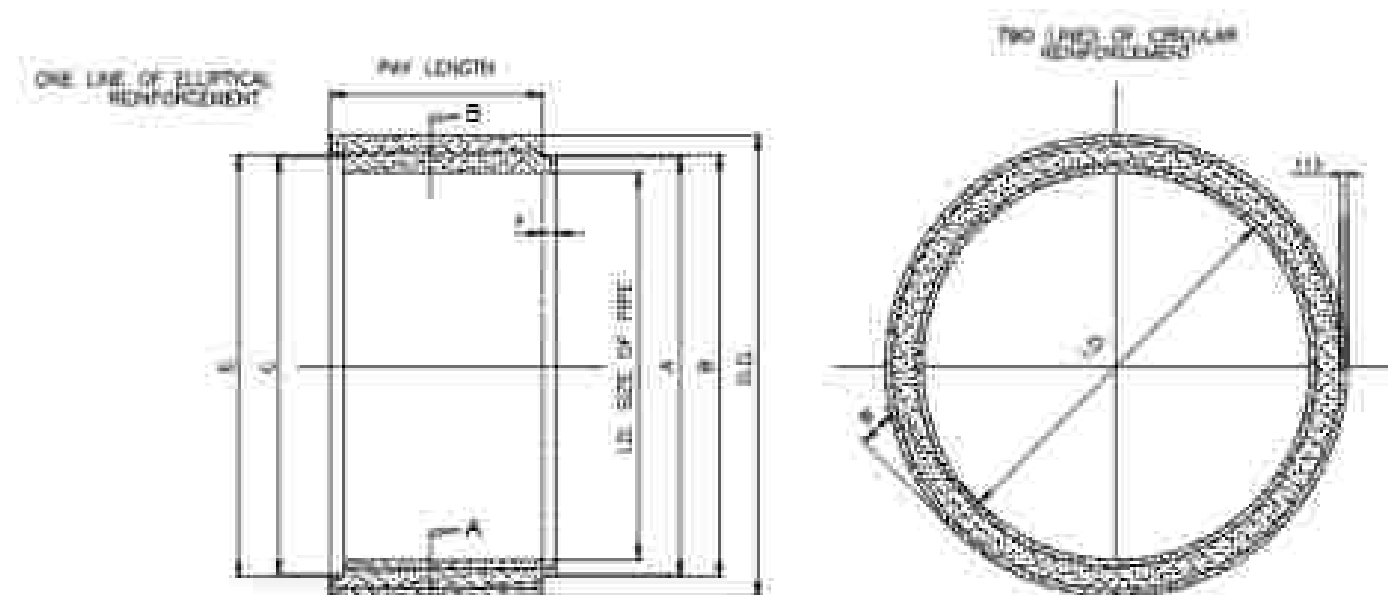


TYPICAL SECTION FOR STRAIGHT S-TYPE HEADWALL

SCALE: 1:20



DETAIL OF RCPC JOINT



LONGITUDINAL SECTION

SCALE: 1:20

SECTION A

SCALE: 1:20

SIZE OF PIPE		CONCRETE 317 KG/SG CM. (4,500 (A/SG/34)						
DIA.	M.	WALL THICKNESS (M)	TONGUE (M)		DRUDGE (M)		DEPTH (M)	MINIMUM REINFORCEMENT SQCM./M. OF PIPE *
		W.	A.	H.	C.	E.	F.	CIRCULAR REINFORCEMENT
30"	0.91	0.064	0.358	1.007	1.994	1.013	0.064	2 LINE EACH 4.35

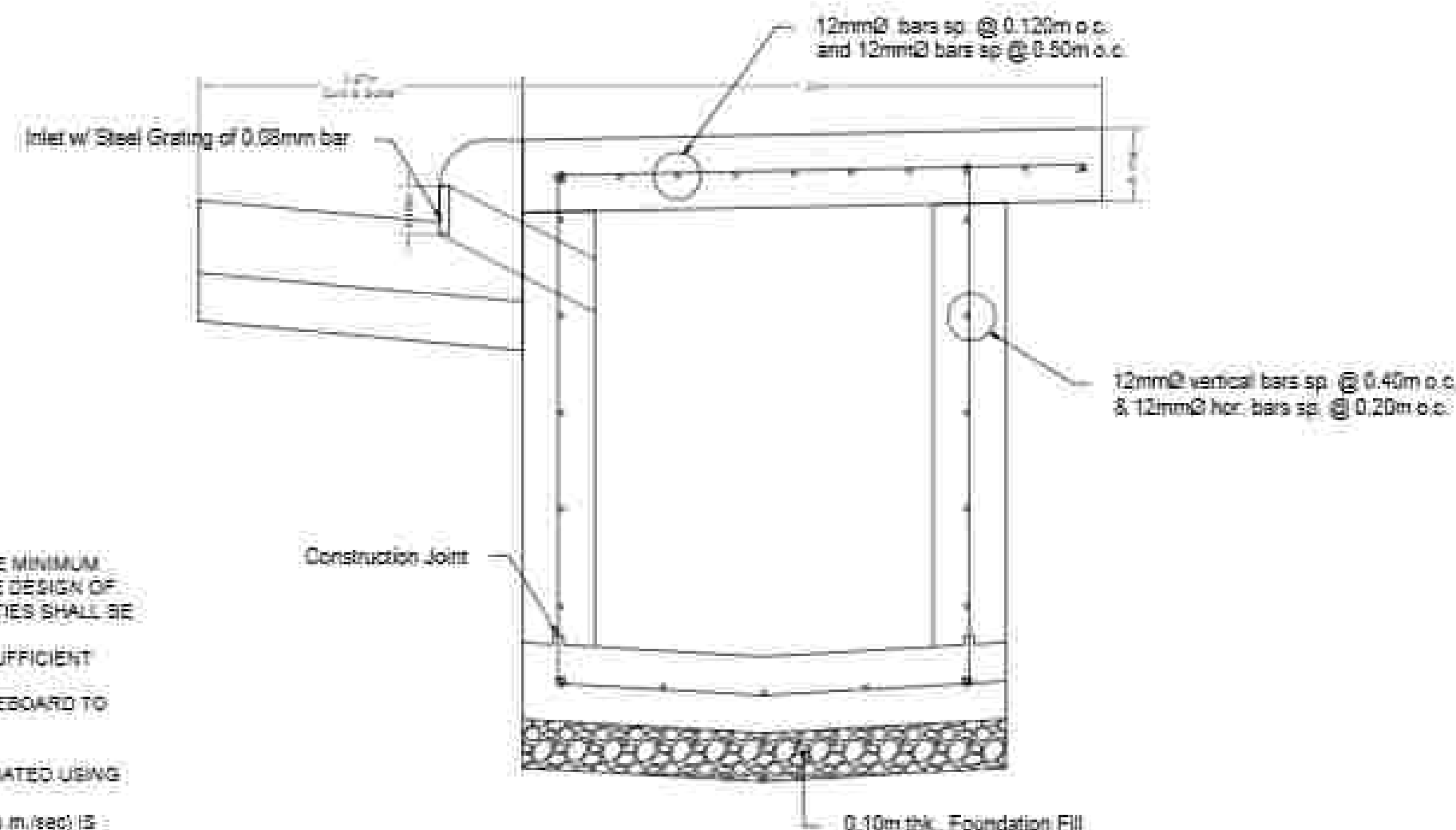
DESIGN REQUIREMENTS OF REINFORCED CONCRETE PIPES/CULVERTS

* - THE DISTANCE FROM CENTERLINE OF THE REINFORCEMENT TO THE HIGHEST SURFACE OF THE CONCRETE MAY BE REDUCED TO 100MM FOR PIPES WITH A WALL THICKNESS OF 0.064 M. OR MORE.

NOTE: DESIGN REQUIREMENTS ARE BASED ON THE ASSUMPTIONS FOR MATERIALS OF GRADE 40-175.

NOTE

- UNNUMBERED MEMO DATED JUNE 21, 2011, THE MINIMUM FLOOD RETURN PERIODS TO BE USED FOR THE DESIGN OF FLOOD CONTROL AND ROAD DRAINAGE FACILITIES SHALL BE AS FOLLOWS:
- FOR DRAINAGE PIPES, 15-YEAR FLOOD WITH SUFFICIENT FREEBOARD TO CONTAIN THE 25-YEAR FLOOD
- 1 PIPE - 15-YEAR FLOOD WITH SUFFICIENT FREEBOARD TO CONTAIN THE 25-YEAR FLOOD
- THE ACTUAL DISCHARGE IN (cu.m./sec) IS ESTIMATED USING THE RATIONAL FORMULA (Q=CIA/3.6)
- THE DISCHARGE CAPACITY OF DRAINAGE IN (cu.m./sec) IS DETERMINED USING THE MANNINGS FORMULA (Q=AV)
- THE MINIMUM SLOPE ON PIPES IS 0.20%, AND SHALL BE LAID AT SUCH GRADES THAT THERE WILL BE A CUSHION OF AT LEAST 0.40M OF FILL OVER THE TOP OF THE PIPE.



Concrete Covered Canal Lining Detail

SCALE

1:10 mts



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

PROJECT NAME AND LOCATION
CONSTRUCTION OF ROAD
INCLUDING DRAINAGE STRUCTURE,
PURUK 4A, BARANGAY CANOCOTAN,
TAGUM CITY, DAVAO DEL NORTE

SHEET CONTENTS
METHODS OF PIPE INSTALLATION
RCPC JOINT DETAIL, CANAL DETAIL,
HEADWALL DETAIL & SCHEDULE
DRAINAGE SCHEDULE
DRAINAGE QUANTITY

DESIGNED BY
JANES O. HORRADA
ENGINEER/REGISTERED
CHECKED BY
CHARME JANE E. CUNY
ENGINEER

REVIEWED BY
VOLAN MAE S. HORRADA
ENGINEER
DATE

SUBMITTED BY
CHRISTEN F. MAZAREHO
DIRECTOR/REGISTERED DESIGNER
DATE

RECOMMENDED BY
LEO A. E. MANSALDO
CHIEF ENGINEER
OFFICE OF THE ASSISTANT DISTRICT ENGINEER
DATE

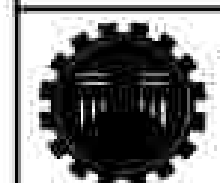
APPROVED BY
EDITH B. MONTILOS
DISTRICT ENGINEER
DATE

BY: 11
23 54

DRAINAGE SCHEDULE						
Section	Station	Description	103(6) cu.m.	1718(1)b3 lm	1718(21)b1 lm	1720(1)a3 ea
1	0+001.50	Manhole bothsides.				2.00
1	0+001.50	Installation of 1-910mm x 10.0 In.m. RCPC Crossdrain with Manhole bothsides.	20.64	10.00		2.00
2	0+001.40	Installation of 1-910mm x 10.0 In.m. RCPC Crossdrain with Manhole bothsides.	20.64	10.00		2.00
2	0+161.00	Installation of 1-910mm x 10.0 In.m. RCPC Crossdrain with Manhole bothsides.	20.64	10.00		2.00
3	0+001.85	Installation of 1-910mm x 10.0 In.m. RCPC Crossdrain with Manhole bothsides.	20.64	10.00		2.00
4	0+001.90	Installation of 1-910mm x 10.0 In.m. RCPC Crossdrain with Manhole bothsides.	20.64	10.00		2.00
7	0+001.50	Installation of 1-910mm x 7.0 In.m. RCPC Crossdrain with Manhole bothsides.	14.02	7.00		2.00
7	0+047.00	Installation of 1-910mm x 7.0 In.m. RCPC Crossdrain with Manhole bothsides.	14.02	7.00		2.00
8	0+001.60	Installation of 1-910mm x 7.0 In.m. RCPC Crossdrain with Manhole bothsides.	14.02	7.00		2.00
8	0+047.00	Installation of 1-910mm x 7.0 In.m. RCPC Crossdrain with Manhole bothsides.	14.02	7.00		2.00
9	0+001.30	Installation of 1-910mm x 7.0 In.m. RCPC Crossdrain with Manhole bothsides.	14.02	7.00		2.00
9	0+047.00	Installation of 1-910mm x 7.0 In.m. RCPC Crossdrain with Manhole bothsides.	14.02	7.00		2.00
9	0+057.50	Installation of 1-910mm x 7.0 In.m. RCPC Crossdrain with Manhole bothsides.	14.02	7.00		2.00
9	0+105.80	Installation of 1-910mm x 7.0 In.m. RCPC Crossdrain with Manhole bothsides.	14.02	7.00		2.00
9	0+116.00	Installation of 1-910mm x 7.0 In.m. RCPC Crossdrain with Manhole bothsides.	14.02	7.00		2.00
9	0+161.50	Installation of 1-910mm x 7.0 In.m. RCPC Crossdrain with Manhole bothsides.	14.02	7.00		2.00

Section	Station	Description	103(6) cu.m.	1718(1)b3 lm	1718(21)b1 lm	1720(1)a3 ea
10	0+001.30	Installation of 1-910mm x 7.0 In.m. RCPC Crossdrain with Manhole bothsides.	14.02	7.00		2.00
10	0+047.00	Installation of 1-910mm x 7.0 In.m. RCPC Crossdrain with Manhole bothsides.	14.02	7.00		2.00
10	0+067.50	Installation of 1-910mm x 7.0 In.m. RCPC Crossdrain with Manhole bothsides.	14.02	7.00		2.00
10	0+105.80	Installation of 1-910mm x 7.0 In.m. RCPC Crossdrain with Manhole bothsides.	14.02	7.00		2.00
10	0+116.00	Installation of 1-910mm x 7.0 In.m. RCPC Crossdrain with Manhole bothsides.	14.02	7.00		2.00
10	0+161.50	Installation of 1-910mm x 7.0 In.m. RCPC Crossdrain with Manhole bothsides.	14.02	7.00		2.00
1	0+000.00	0+022.60				
2	0+000.00	0+183.17				
3	0+000.00	0+115.00				
4	0+000.00	0+115.00				
5	0+000.00	0+125.00				
6	0+000.00	0+125.00				
7	0+000.00	0+048.90				
8	0+000.00	0+048.90				
9	0+000.00	0+151.00				
10	0+000.00	0+151.00				
Total			328.00	162.00	2,058.14	44.00
			103(6)	1718(1)b3	1718(21)b1	1720(1)a3

DRAINAGE SUMMARY OF QUANTITIES				
ITEM No.	DESCRIPTION	UNIT	QUANTITY	REMARKS
101(4)a3	Removal of Actual Structures/ Obstruction (910mm dia RCPC)	ea	4.00	See Drainage Schedule
103(6)a	Pipe Culvert and Drain Excavation	cu.m.	328.00	See Drainage Schedule
900(1)b	Structural Concrete, 3000psi/ 20.68 Mpa Class "A", 14 Days	cu.m.	2.13	See Drainage Schedule
902(1)a1	Reinforcing Steel (Deformed), Grade 40	kg	151.07	See Drainage Schedule
1718(1)b3	Pipe Culverts, 910mm dia., Class IV RCPC	lm	162.00	See Drainage Schedule
1718(21)b1	Lined Canal, Rectangular, Concrete	lm	2,058.14	See Drainage Schedule
1720(1)a3	Manholes, 910mm dia.: (Concrete)	ea	44.00	See Drainage Schedule



REPUBLIC OF THE PHILIPPINES
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REGION XI
DAVAO DEL NORTE
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TAGUM CITY

PROJECT NAME AND LOCATION
CONSTRUCTION OF ROAD
INCLUDING DRAINAGE STRUCTURE,
PURUK 4A, BARANGAY CANOCOTAN,
TAGUM CITY, DAVAO DEL NORTE

SHEET CONTENTS
DRAINAGE SCHEDULE

DESIGNED
JANICE G. HONRADA
ENGINEER
CHECKED
CHARME JANE E. CURAY
ENGINEER

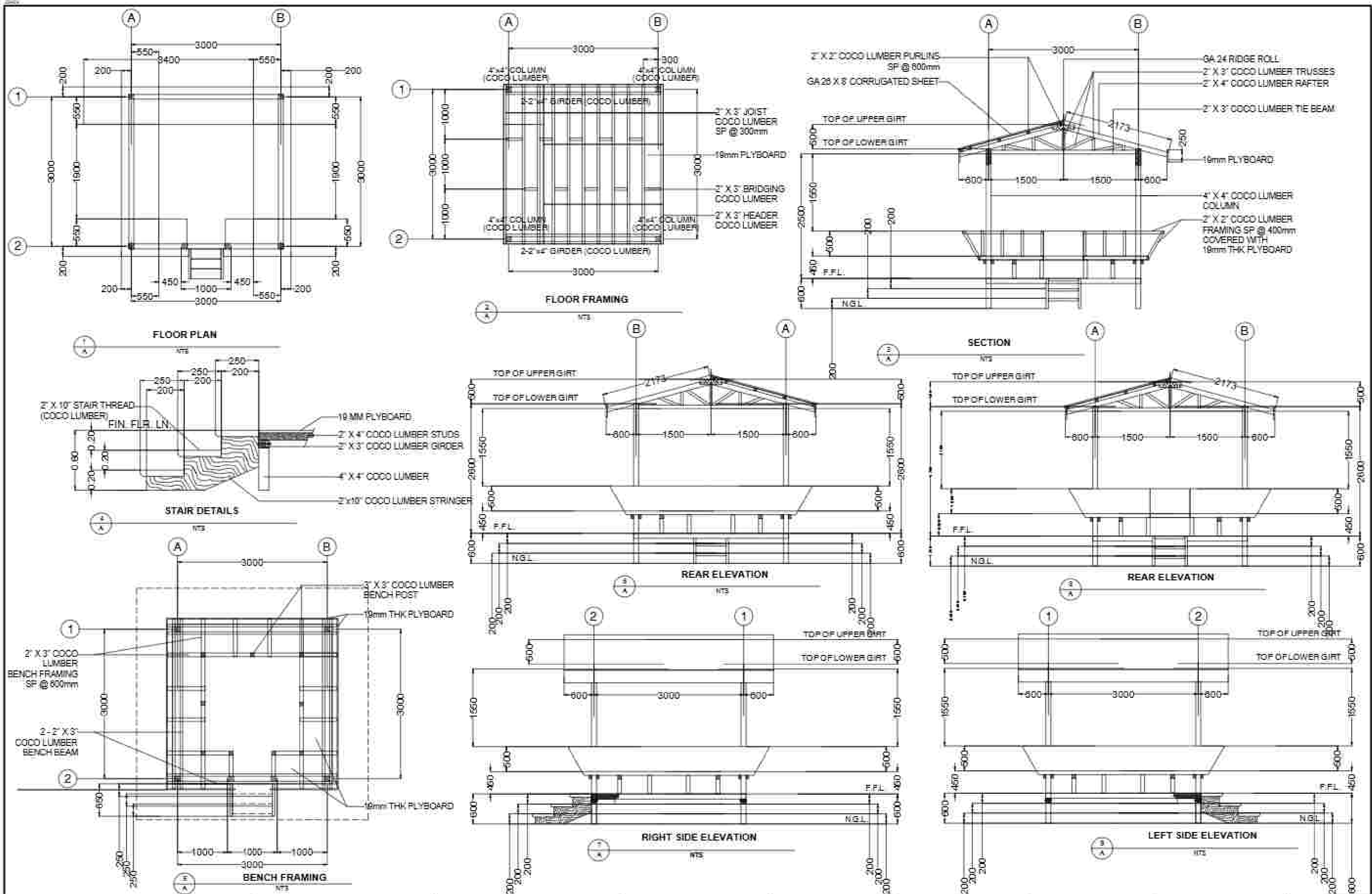
REVIEWED
YOLAN MARIE S. HONRADA
ENGINEER
DATE

SUBMITTED
CHRISTEN F. MAZAREHO
CHIEF ENGINEER
DATE

RECOMMENDED
LEO A. E. A. MANSALO
CHIEF ENGINEER
OFFICE OF THE ASSISTANT DISTRICT ENGINEER
DATE

APPROVED
EDITH M. MONTILOS
DISTRICT ENGINEER
DATE

BY: HD
3/3
SHEET NO.
12/55



 REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS REGION XI DAVAO DEL NORTE DISTRICT ENGINEERING OFFICE TAGUM CITY	PROJECT NAME AND LOCATION CONSTRUCTION OF ROAD INCLUDING DRAINAGE STRUCTURE, PURUK 4A, BARAMGAY CANOCOTAN, TAGUM CITY, DAVAO DEL NORTE	SHEET CONTENTS BAHAY KUBO DETAIL	DESIGNED JANER O. MORADA ENGINEER CHECKED CHARME JANE E. CUNY ENGINEER	REVIEWED YOLAN M. MORADA ENGINEER DATE	SUBMITTED CHRISTEN F. MAZAREHO CHIEF PLANNING / DESIGN SECTION DATE	RECOMMENDED LEO A. E. VIBANGLO CHIEF ENGINEER OFFICE OF THE ASSISTANT DISTRICT ENGINEER DATE	APPROVED EDITH M. MONTILOS DISTRICT ENGINEER DATE	SET NO. 1 SHEET NO. 14 55
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A. GENERAL NOTES:

- ### E. USE OF TRAFFIC CONTROLLERS (FLAGMEN)

- ### GENERAL NOTES FOR TRAFFIC MANAGEMENT PLAN

POSSIBLE RISK FACTORS AT WORKSITE

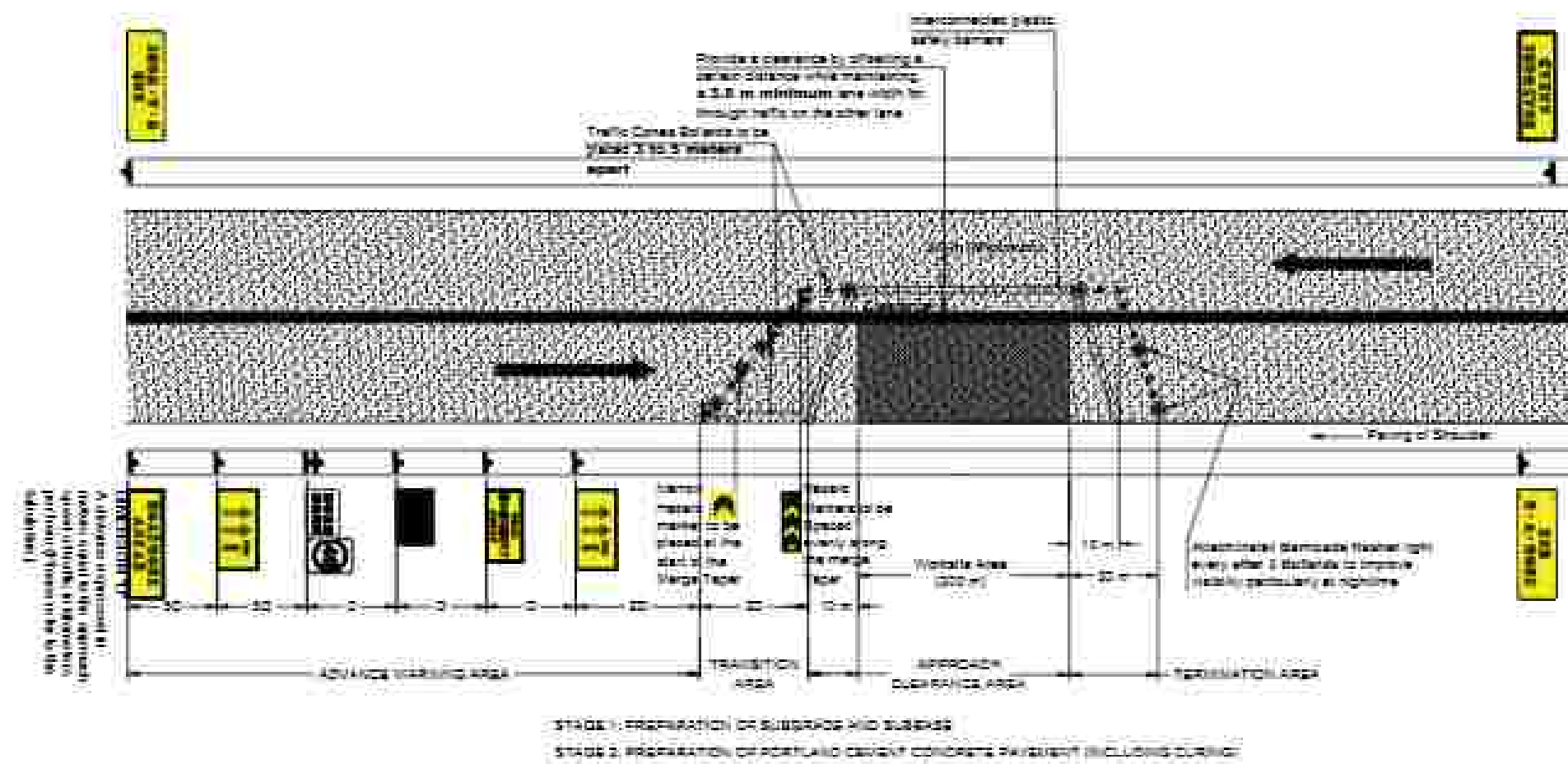
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PROJECT PARAMETERS

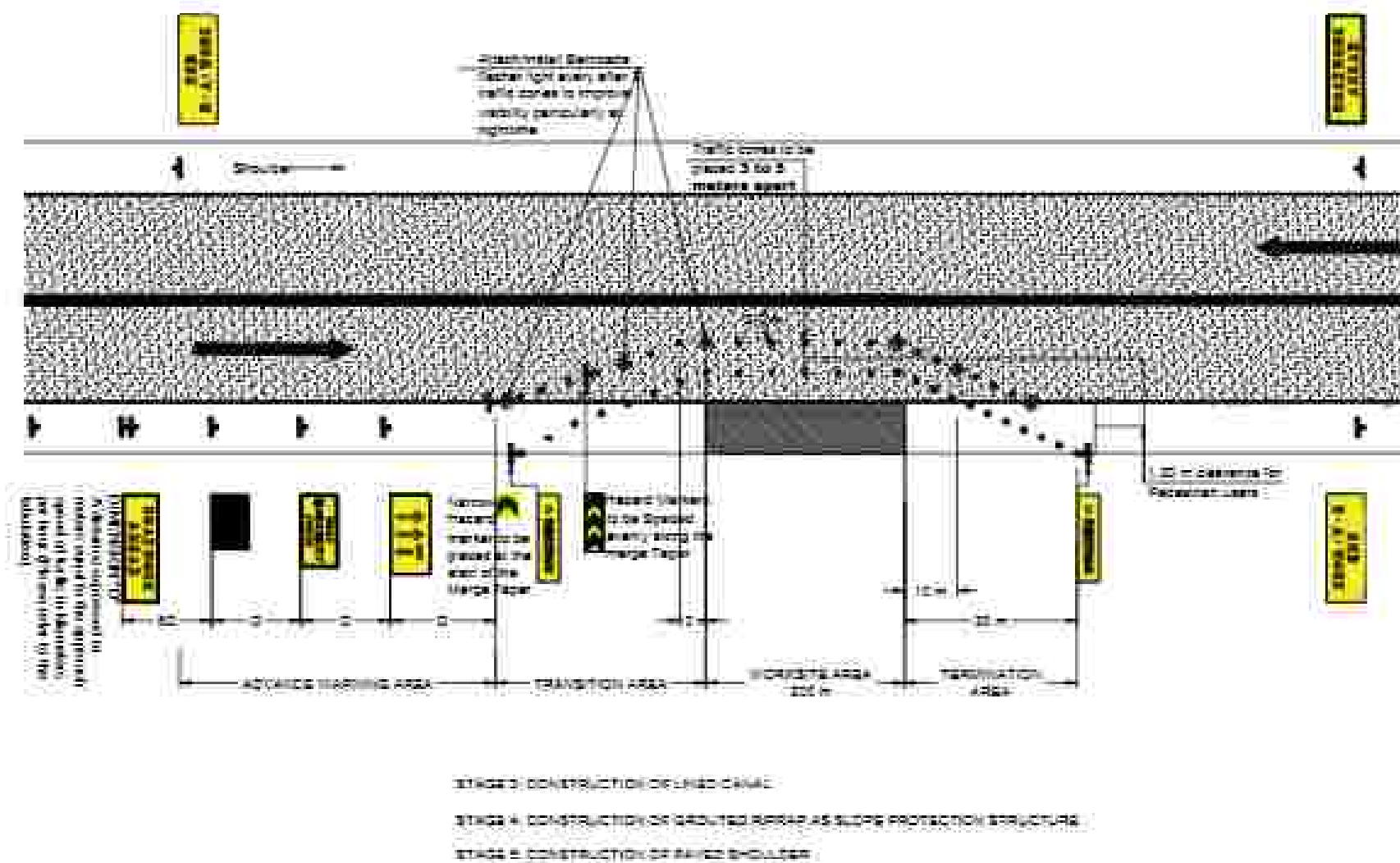
SPEED OF TRAFFIC (KPH)	TERMINATION AREA		LENGTH OF STRAIGHT SECTION BETWEEN MULTI-LANE CLOSURES
	LENGTH OF DIVERGENCE LATERAL SHIFT TAPER (m)	LENGTH OF MERGE TAPER (m)	
40	40	80	1/2 OF LEAD TAPER LENGTH
50	50	100	
60	60	120	
70	70	140	
80	80	160	
90	90	180	
100	100	200	
110	110	220	
120	120	240	

SPEED OF TRAFFIC (KPH)	TRANSITION AREA		
	LENGTH OF DIVERGE LATERAL SHIFT TAPER (m)	LENGTH OF MERGE TAPER (m)	LENGTH OF STRAIGHT SECTION BETWEEN MULTI-LANE CLOSURES
40	40	30	50
50	50	100	75
60	50	120	95
70	70	140	105
80	80	160	120
90	90	180	135
100	100	200	160
110	110	220	185

STANDARD DESIGN REQUIREMENTS FOR WORK ZONE AREAS



TRAFFIC MANAGEMENT STAGES	DESCRIPTION	QUANTITY
STAGE 1: PREPARATION OF SUBGRADE & SUBBASE	ROADWORK AHEAD (T1-1)	2
STAGE 2: PREPARATION OF PORTLAND CEMENT CONCRETE PAVEMENT (INCLUDING CURING)	LANE STATUS (T2-2)	2
	ROAD WORK (R-1)	1
	SPEED RESTRICTION (R-1)	1
	WORKING AHEAD (SYMBOLO) (T-1)	1
	ROADWORK (MACHINERY) AHEAD (T1-2)	1
	TEMPORARY HAZARD WARNING (T2-1)	1
	TEMPORARY HAZARD WARNING (T2-2)	3
	END ROADWORK (T2-1)	3
	TRAFFIC CONES (200 meters - Working Area Considered)	10
	BARRICADE FLASHER LIGHT	10
	PLASTIC SAFETY BARRIER (200 meters - Working Area Considered)	40



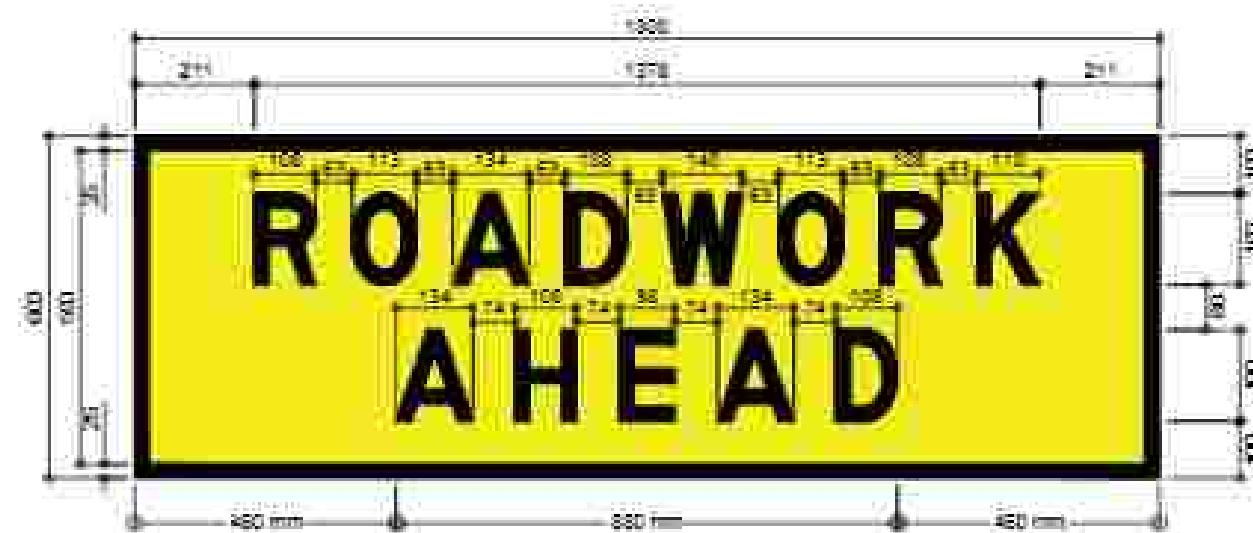
TRAFFIC MANAGEMENT STAGES	DESCRIPTION	QUANTITY
STAGE 3: CONSTRUCTION OF LINED CANAL	ROADWORK AHEAD (T1-1)	2
STAGE 4: CONSTRUCTION OF GRADED BARRIER AS SLOPE PROTECTION STRUCTURE	LANE STATUS (T2-2)	2
STAGE 5: CONSTRUCTION OF PAVED SHOULDER	WORKING AHEAD (SYMBOLO) (T-1)	1
	ROADWORK (MACHINERY) AHEAD (T1-2)	1
	TEMPORARY HAZARD WARNING (T2-1)	1
	TEMPORARY HAZARD WARNING (T2-2)	3
	END ROADWORK (T2-1)	3
	RESTRICTIONS (T2-1 & R)	3
	TRAFFIC CONES (200 meters - Working Area Considered)	10
	BARRICADE FLASHER LIGHT	10



TRAFFIC MANAGEMENT STAGES	DESCRIPTION	QUANTITY
STAGE 6: APPLICATION OF REFLECTORIZED THERMOPLASTIC PAVEMENT MARKINGS	 ROADWORK AHEAD (T1-10)	3
	 LANE STATUS (T2-60)	3
	 TEMPORARY HAZARD MARKER (T3-2)	16
	 TEMPORARY HAZARD MARKER (T3-2)	2
	 END ROADWORK (T3-18)	3
	 PEDESTRIAN (T3-14)	3
	 TRAFFIC CONES (DOT MARK - Closing Area Closed)	17
	 BARRICADE FLASHER LIGHT	10

TRAFFIC MANAGEMENT STAGES		DESCRIPTION	QUANTITY
SUMMARY			
STAGE 1: PREPARATION OF SUBBASE & SUBGRADE		ROADWORK AHEAD (T1-1)	2
STAGE 2: PREPARATION OF PORTLAND CEMENT CONCRETE PAVEMENT (INCLUDING CURING)		LANE STATUS (T2-2)	4
STAGE 3: CONSTRUCTION OF LINED CANAL		ROAD WORK (R4-3)	2
STAGE 4: CONSTRUCTION OF GROUTED RIPRAP AS SLOPE PROTECTION STRUCTURE		SPEED RESTRICTION (R4-1)	2
STAGE 5: CONSTRUCTION OF PAVED SHOULDER		WORKMEN AHEAD (SYMBOLIC) (T1-5)	2
STAGE 6: APPLICATION OF REFLECTORIZED THERMOPLASTIC PAVEMENT MARKINGS		ROADWORK MACHINERY AHEAD (T1-3)	2
		TEMPORARY HAZARD MARKER (T3-5)	2
		TEMPORARY HAZARD MARKER (T3-5)	6
		END ROADWORK (T2-15)	2
		TRAFFIC CONES (200 meters - Working Area Considered)	128
		BARRICADE FLASHER LIGHT	15
		PLASTIC SAFETY BARRIER (200 meters - Working Area Considered)	370

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.



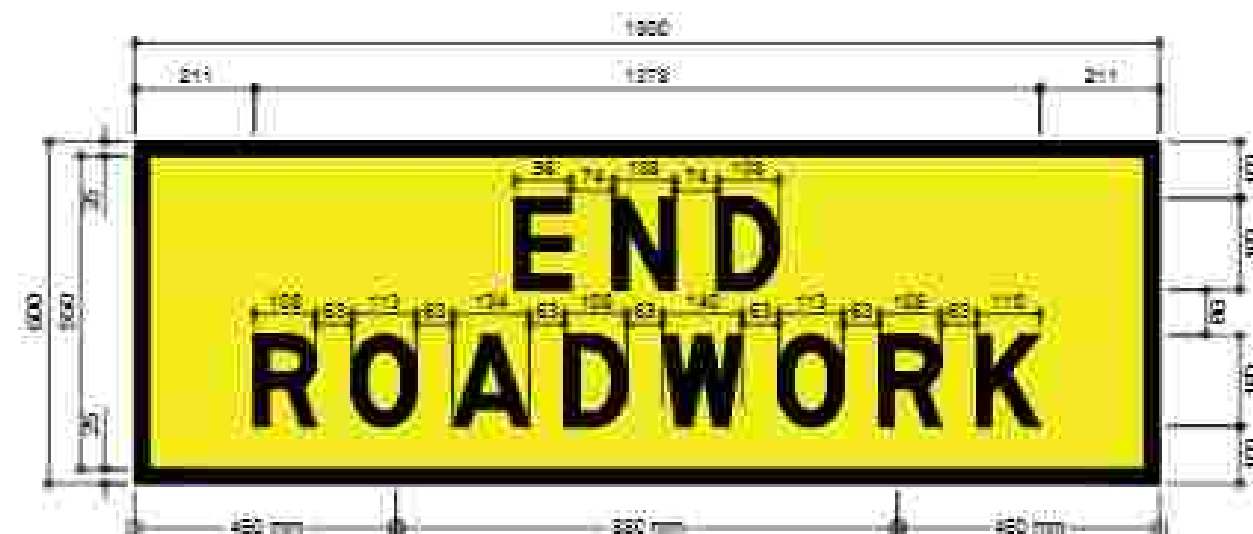
ROADWORK AHEAD DETAILS

SIGN NO.	SIZE (mm)	LETTERS/SYMBOLS	BACKGROUND	TYPE OF SIGN
T1-1	1000 X 800	LINE 1 - BLACK 200 DM LINE 2 - BLACK 160 DM	YELLOW REFLECTORIZED	ADVANCE WARNING SIGN



WORKMEN AHEAD (SYMBOLIC) DETAILS

SIGN NO.	SIZE (mm)	LETTERS/SYMBOLS	BACKGROUND	TYPE OF SIGN
T1-2	900 X 600	BLACK	RED/ORANGE - FLUORESCENT FOR DAY USE - REFLECTORIZED FOR NIGHT	ADVANCE WARNING SIGN



END ROADWORK DETAILS

SIGN NO.	SIZE (mm)	LETTERS/SYMBOLS	BACKGROUND	TYPE OF SIGN
T2-1B	1000 X 800	LINE 1 - BLACK 200 DM LINE 2 - BLACK 160 DM	YELLOW REFLECTORIZED	ADVANCE WARNING SIGN



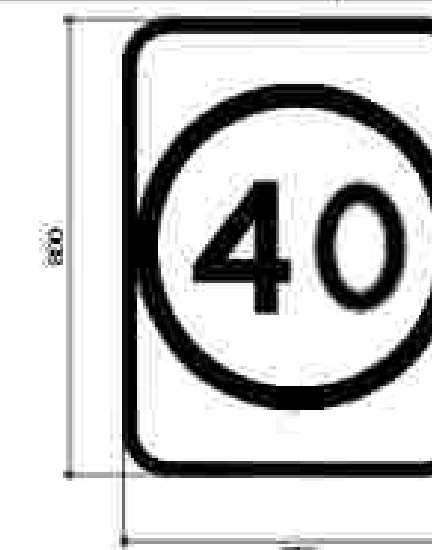
LANE STATUS DETAILS

SIGN NO.	SIZE (mm)	LETTERS/SYMBOLS	BACKGROUND	TYPE OF SIGN
T2-2	1000 X 800	BLACK 885 HIGH	YELLOW REFLECTORIZED	SIGN FOR LANE & ROAD CLOSURE



ROAD MACHINERY AHEAD DETAILS

SIGN NO.	SIZE (mm)	LETTERS/SYMBOLS	BACKGROUND	TYPE OF SIGN
T1-3	1000 X 800	LINE 1 - BLACK 100 DM LINE 2 - BLACK 120 DM LINE 3 - BLACK 100 DM	YELLOW REFLECTORIZED	ADVANCE WARNING SIGN



SPEED RESTRICTION DETAILS

SIGN NO.	SIZE (mm)	LETTERS/SYMBOLS	BACKGROUND	TYPE OF SIGN
R4-1	600 X 800 (SIZE B)	BLACK 240 DM CIRCLE - 600 DIA; RED	WHITE REFLECTORIZED RED CIRCLE - REFLECTORIZED	REGULATORY SIGN



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INCLUDING DRAINAGE STRUCTURE,
PUROK 4A, BARANGAY CANOCOTAN,
TAGUM CITY, DAVAO DEL NORTE

SHEET CONTENTS
TRAFFIC MANAGEMENT LAYOUTS AND DETAILS

DESIGNED
JANICE G. MONRADA
ENGINEER
PREPARED
CHARINE JANE B. CURAY
ENGINEER

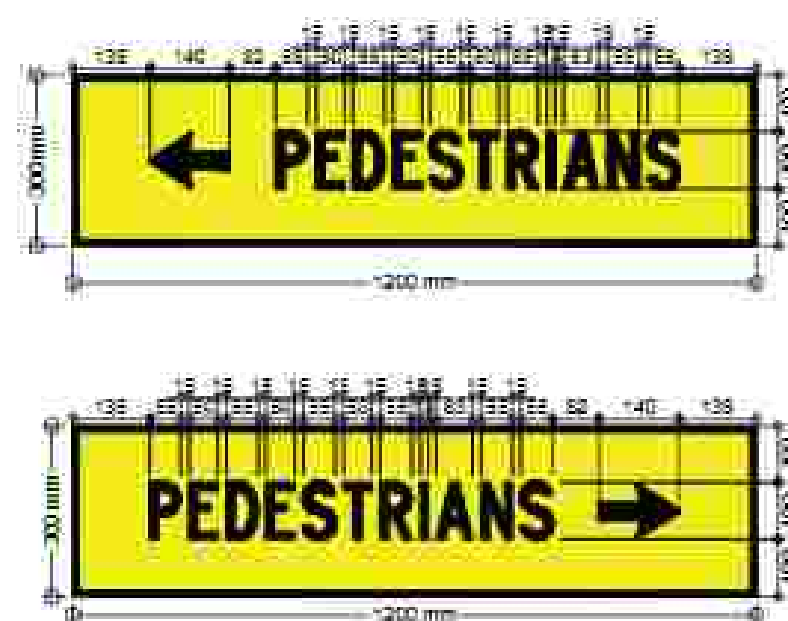
REVIEWED
YOLAN M. MONRADA
ENGINEER
DATE

APPROVED
CHRISTOPHER F. MAZARENO
CHIEF, PLANNING AND DESIGN SECTION
DATE

RECOMMENDED
LEO ALEX M. MANABLO
OFFICIAL ENGINEER
DIVISION OF THE ASSISTANT DISTRICT ENGINEER
DATE

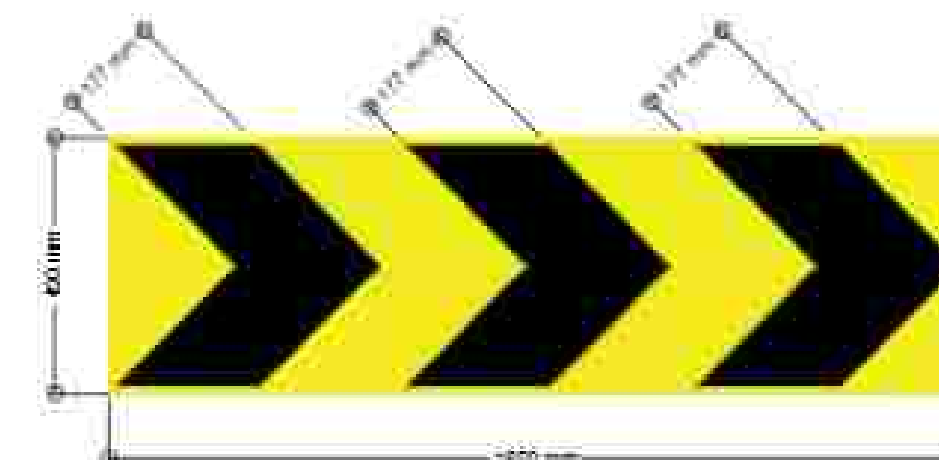
APPROVED
EDITHA S. MONTELOO
DISTRICT ENGINEER
DATE

SHEET NO.
M
47
SHEET NO.
18
55



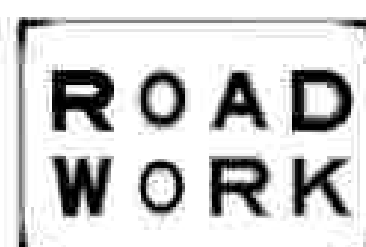
PEDESTRIANS DETAILS

SIGN NO.	SIZE (mm)	LETTERS/SYMBOLS	BACKGROUND	TYPE OF SIGN
TS-3L OR R	1200 X 600 (TYPE C-2)	BLACK 100 CM ARROW 140	YELLOW REFLECTORIZED	SIGN# FOR PEDESTRIAN CONTROL



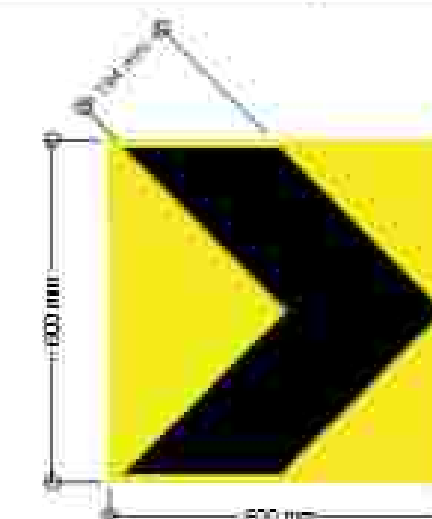
TEMPORARY HAZARD MARKER DETAILS

SIGN NO.	SIZE (mm)	LETTERS/SYMBOLS	BACKGROUND	TYPE OF SIGN
TS-4	1600 X 800 TYPE S-1	BLACK 177 WIDE AT 45°	YELLOW REFLECTORIZED	TEMPORARY HAZARD MARKER



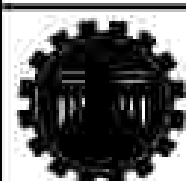
ROAD WORK DETAILS

SIGN NO.	SIZE (mm)	LETTERS/SYMBOLS	BACKGROUND	TYPE OF SIGN
R4-3	800 X 800 (SIZE B)	LINE 1 - BLACK 100 CM LINE 2 - BLACK 100 CM	WHITE REFLECTORIZED	REGULATORY SIGN



SPEED RESTRICTION DETAILS

SIGN NO.	SIZE (mm)	LETTERS/SYMBOLS	BACKGROUND	TYPE OF SIGN
TS-5	800 X 800 TYPE S-1	BLACK 184 WIDE AT 45°	YELLOW REFLECTORIZED	TEMPORARY HAZARD MARKER



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INCLUDING DRAINAGE STRUCTURE,
PUROK 4A, BARANGAY CANOCOTAN,
TAGUM CITY, DAVAO DEL NORTE

SHEET CONTENTS
TRAFFIC MANAGEMENT LAYOUTS AND DETAILS

DRAWN BY
JANICE G. MONRADA
ENGINEER
CHECKED BY
CHARINE JANE B. CURAY
ENGINEER

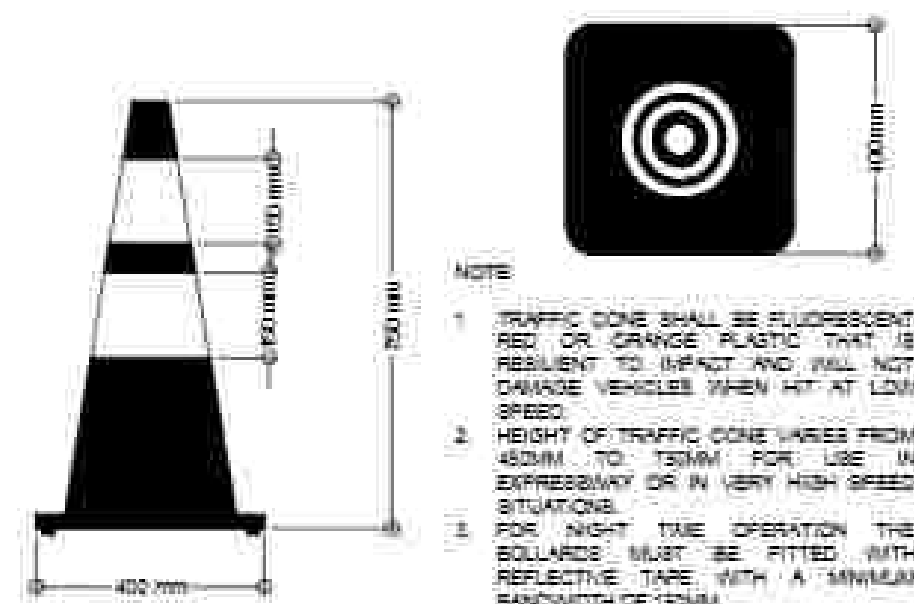
REVIEWED BY
YOLAN M. MONRADA
ENGINEER
DATE

APPROVED BY
CHRISTOPHER F. MAZARENO
DISTRICT ENGINEER
DATE

RECOMMENDED BY
LEO ALEX M. MANABLO
DISTRICT ENGINEER
DATE

APPROVED BY
EDITHA S. MONTELOO
DISTRICT ENGINEER
DATE

SHEET NO.
M
57
SHEET NO.
19
55

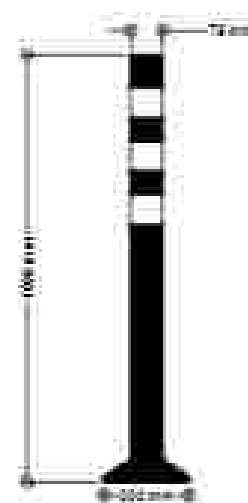


NOTE

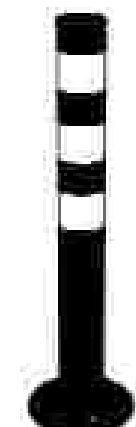
1. TRAFFIC CONE SHALL BE FLUORESCENT RED OR ORANGE PLASTIC THAT IS RESILIENT TO IMPACT AND WILL NOT DAMAGE VEHICLES WHEN HIT AT LOW SPEED.
2. HEIGHT OF TRAFFIC CONE VARIES FROM 450MM TO 750MM FOR USE IN EXPRESSWAY OR IN VERY HIGH SPEED SITUATIONS.
3. FOR NIGHT TIME OPERATION THE BOLLARDS MUST BE FITTED WITH REFLECTIVE TAPE WITH A MINIMUM BANDWIDTH OF 50MM.

SPACING	CONDITION
5 - 10 METERS	ON TAPE WHEN USED AROUND SMALL WORK SITES MAY BE REDUCED TO 3M TO GUIDE PEDESTRIANS OR TO PREVENT TRAFFIC TAKING A WEDGE TURN THROUGH A GAP IN THE LINE OF BOLLARDS
10 - 20 METERS	WHEN USED AS LONGITUDINAL SEPARATION BETWEEN CROSSING 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 100M)

1 TRAFFIC CONE
SCALE



2 SECTION
SCALE



2 ISOMETRIC VIEW
SCALE

SPECIFICATION	
REFLECTIVE	ROAD SAFETY POLD
COLOR	ORANGE
MATERIAL	POLYMER PLASTIC 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 50MM.
4. SPACING @ 200M O.C.

SPACING	CONDITION
5 - 10 METERS	ON TAPE WHEN USED AROUND SMALL WORK SITES MAY BE REDUCED TO 3M TO GUIDE PEDESTRIANS OR TO PREVENT TRAFFIC TAKING A WEDGE TURN THROUGH A GAP IN THE LINE OF BOLLARDS
10 - 20 METERS	WHEN USED AS LONGITUDINAL SEPARATION BETWEEN CROSSING 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 100M)

2 FLEXIBLE BOLLARD DETAIL
SCALE

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. THE VEST SHALL ALSO HAVE TWO (2) STRIPS OF YELLOW/RETROREFLECTIVE MATERIAL AT THE FRONT AND THREE (3) STRIPS AT THE BACK. REFLECTIVE MATERIALS SHALL BE 50MM WIDE. DPMH LOGO SHALL BE 50MM DIAMETER. THE SAFETY VEST SHOULD HAVE A SECURE FASTENING PREFERABLY 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.



SIZE	A (mm)	B (mm)	C (mm)	D (mm)
MEDIUM	280	600	750	500
LARGE	295	625	775	510
EXTRA LARGE	310	650	800	540

3 TRAFFIC SAFETY VEST DETAILS
SCALE

4 BARRICADE FLASHER LIGHT
SCALE

5 SAFETY BARRIERS
SCALE