REPUBLIC OF THE PHILIPPINES

DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

REGIONAL OFFICE XI

DISTRICT ENGINEERING OFFICE

DIGOS CITY, DAVAO DEL SUR

C.Y. 2024 PROJECT

DETAILED ENGINEERING DESIGN PLAN FOR

INSTALLATION OF STREETLIGHTS WITH ROAD SAFETY FACILITIES ALONG DAVAO-COTABATO RD (JCT DIGOS-COTABATO SECT.), K1564+(-478) - K1581+000

LOCATION	: DIGOS CITY, MATANAO AND BANSALAN, DAVAO DEL SUR
STATION LIMIT	: K1564+(-478) - K1581+000 (As Per RBIA)
	: Sta 1563+522 - Sta 1581+000 (As Per Survey)

SUBMITTED:

VIRGENIA C. OÑEZ
CHIEF, PLANNING AND DESIGN SECTION

DATE:

RECOMMENDED:

MARIA TERESA R. LUCABERTE
ASSISTANT DISTRICT ENGINEER

DATE:

APPROVED

NICOMEDES D. PARILLA, JR.
DISTRICT ENGINEER

DATE:

INDEX OF DRAWINGS

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGIONAL OFFICE No XI
DAVAO DEL SUR DISTRICT ENGINEERING OFFICE
DIGOS CITY, DAVAO DEL SUR

PROJECT NAME AND LOCATION
INSTALLATION OF STREETLIGHTS WITH ROAD SAFETY FACILITIES ALONG DAVAO-COTABATO RD (JCT DIGOS-COTABATO SECT.), K1564+(-478) - K1581+800
DIGOS CITY / MATANAO / SANSALAN DAVAO DEL SUR

SHEET CONTENTS
INDEX OF DRAWINGS

ERATED:
MARK ANTHONY B. ALBERCA
ENGINEER II

PREPARED:
JOHN RONAFEB C. IGLESIAS
ENGINEER II

REVIEWED:
RANDY M. APITAN
ENGINEER II
DATE

SUBMITTED:
VIRGENIA C. OÑEZ
CHIEF, PLANNING & DESIGN SECTION
DATE

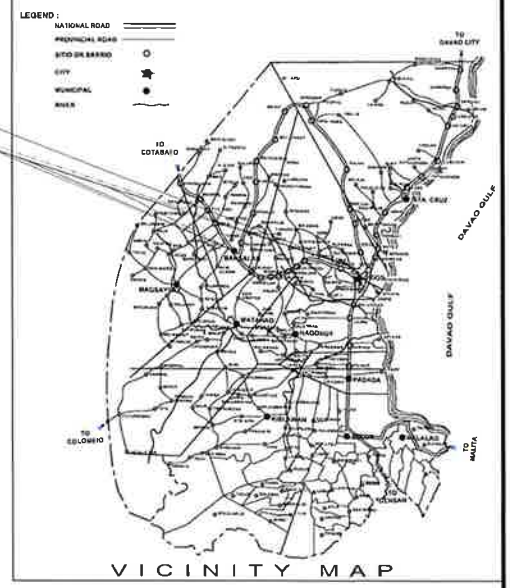
RECOMMENDED:
MARIA TERESA B. LUCABERTE
ASSISTANT DISTRICT ENGINEER
DATE

APPROVED:
NICOMEDES D. PARILLA, JR.
DISTRICT ENGINEER
DATE

SET NO: - - -

SHEET NO: 1 / 27

MAP OF DAVAO DEL SUR DISTRICT



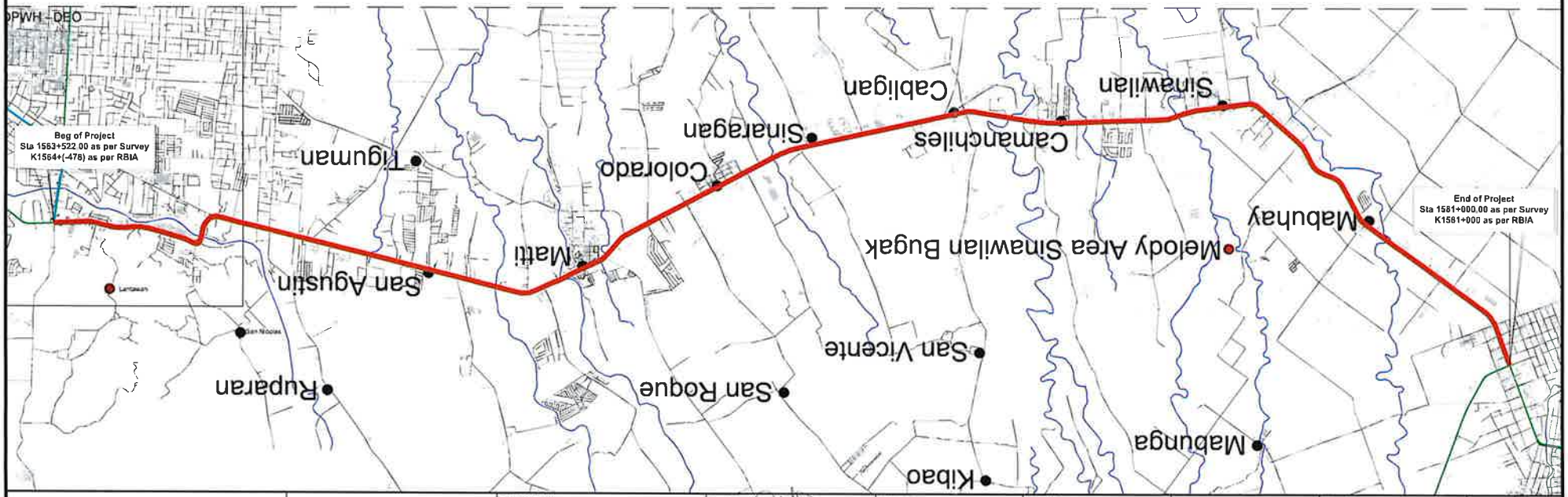
VICINITY MAP

PROJECT SITE

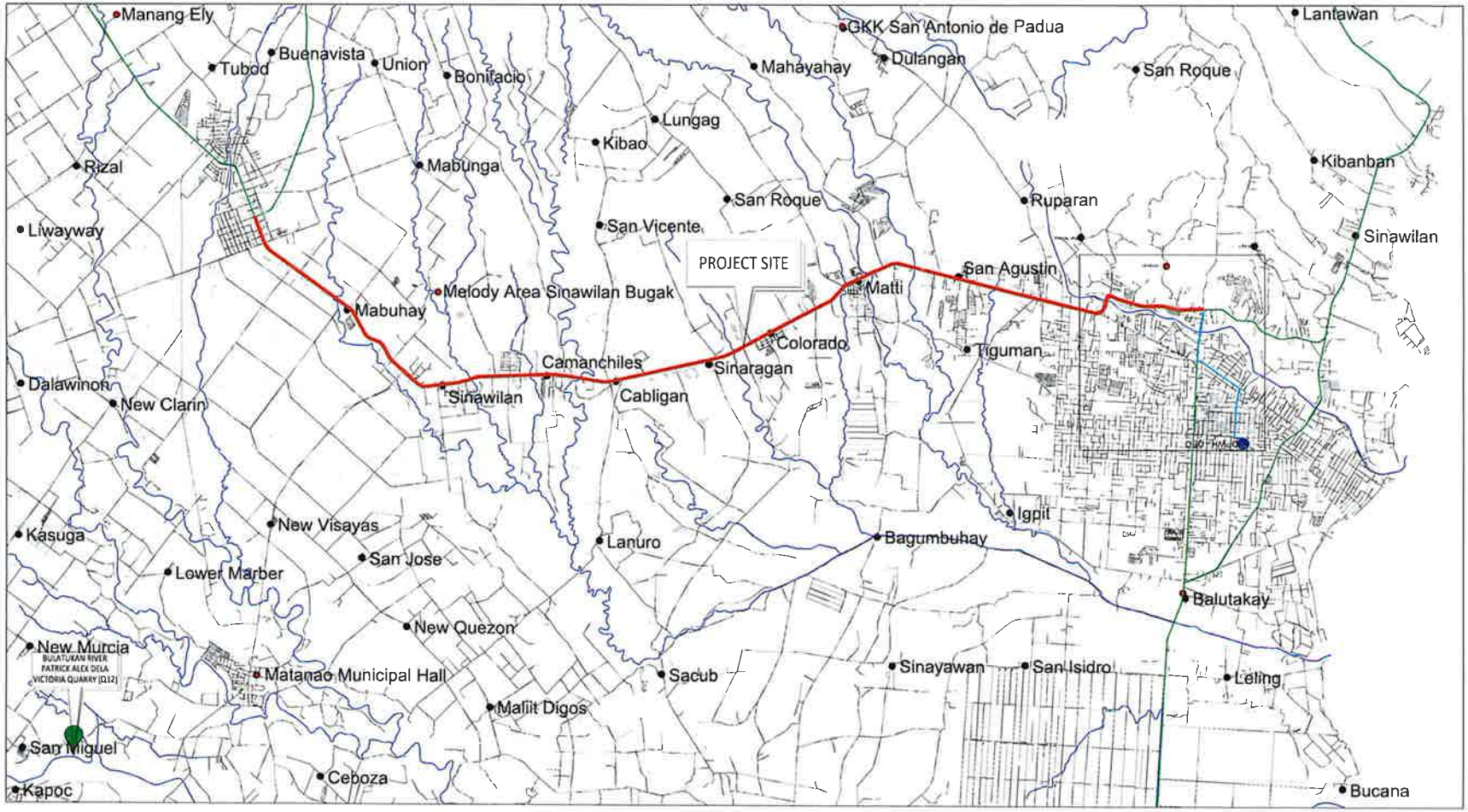
N

LOCATION MAP

SCALE 1 10000



REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS REGIONAL OFFICE No XI DAVAO DEL SUR DISTRICT ENGINEERING OFFICE DIGOS CITY, DAVAO DEL SUR	PROJECT NAME AND LOCATION INSTALLATION OF STREETLIGHTS WITH ROAD SAFETY FACILITIES ALONG DAVAO-COTABATO RD (JCT DIGOS-COTABATO SECT.), K1564+(-478) - K1581+000 DIGOS CITY / MATANAO / BANSALAN DAVAO DEL SUR	SHEET CONTENTS PROJECT LIMIT LOCATION MAP VICINITY MAP GENERAL PLAN	DRAFTED MARK ANTHONY B. ALBERCA ENGINEER II PREPARED JOHN RONAFEB C. IBLESIAS ENGINEER II	REVIEWED DARRYL M. APITAN ENGINEER II DATE	SUBMITTED VIRGENIA C. OÑEZ CHIEF, PLANNING & DESIGN SECTION DATE	RECOMMENDED MARIA TERESA B. LUCABERTE ASSISTANT DISTRICT ENGINEER DATE	APPROVED NICOMEDES D. PARILLA, JR. DISTRICT ENGINEER DATE	SET NO.	SHEET NO. 2 27



LEGEND :

- DPWH DEO XI TO PROJECT SITE — DISTANCE: 00.00 Km
- PROJECT SITE TO QUARRY SITE — DISTANCE: 00.00 Km
- PROJECT SITE AND QUARRY SITE
- LAND MARK/ PLACES
- RIVER
- NATIONAL ROAD
- DISPOSAL AREA

N

QUARRY AND DISPOSAL MAP

SCALE NTS

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGIONAL OFFICE No XI
DAVAO DEL SUR DISTRICT ENGINEERING OFFICE
DIGOS CITY, DAVAO DEL SUR

PROJECT NAME AND LOCATION: INSTALLATION OF STREETLIGHTS WITH ROAD SAFETY FACILITIES ALONG DAVAO-COTABATO RD (JCT DIGOS-COTABATO SECT.), K1564+(-478) - K1581+000
DIGOS CITY / MATANAO / BANSALAN DAVAO DEL SUR

SHEET CONTENTS: QUARRY MAP DISPOSAL MAP

DRAFTED: MARK ANTHONY B. ALBERCA, ENGINEER II	REVIEWED: DARYL M. APITAN, ENGINEER II, DATE	SUBMITTED: VIRGINIA C. OÑEZ, CHIEF, PLANNING & DESIGN SECTION, DATE	RECOMMENDED: MARIA TERESA R. LUCABERTE, ASSISTANT DISTRICT ENGINEER, DATE	APPROVED: NICOMEDES D. PARILLA, JR., DISTRICT ENGINEER, DATE
PREPARED: JOHN ROWAFEB C. IBLESIAS, ENGINEER II				

SET NO. SHEET NO. 3 27

ABBREVIATIONS:

ACut	AREA CUT
AFill	AREA FILL
AZI.	AZIMUTH
BM	BENCH MARK
℄	CENTER LINE
DIST.	DISTANCE
ELEV.	ELEVATION
EXTG.	EXISTING
FIN.	FINISHED
FGE	FINISHED GRADE ELEVATION
HOR.	HORIZONTAL
m	METER
PCCP	PORTLAND CEMENT CONCRETE PAVEMENT
PI	POINT OF INTERSECTION
PIVC #	POINT OF VERTICAL INTERSECTION CURVE #
R	RADIUS
RP #	REFERENCE POINT #
RROW	ROAD RIGHT OF WAY
STA.	STATION
TYP.	TYPICAL
EOP	EDGE OF PCCP
EOS	EDGE OF SHOULDER
SSD	SLOPE STAKE DISTANCE

LEGEND:

DESCRIPTION	PLAN	PROFILE
PROPOSED PCCP		
EXISTING PCCP		
SLOPE PROTECTION		
GRAVEL TRANSITION		
NORTH SIGN		
TREES		
BENCH MARK (BM #) REFERENCE POINTS (RP)		
POINT OF INTERSECTION (PI) BEG & END OF PROJECT		
DIRECTION	TO BAGY SITE	
SINGLE RCPC		
FENCES		
DITCH FLOW		
LINE CANAL		
CENTERLINE OF PCCP		
Edge of PCCP		
Edge of Shoulder		
CONSTRUCTION LIMIT		

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGIONAL OFFICE No XI
DAVAO DEL SUR DISTRICT ENGINEERING OFFICE
DIGOS CITY, DAVAO DEL SUR

PROJECT NAME AND LOCATION: INSTALLATION OF STREETLIGHTS WITH ROAD SAFETY FACILITIES ALONG DAVAO-COTABATO RD (JCT DIGOS-COTABATO SECT.), K1564+(-478) - K1581+000
DIGOS CITY / MATANAO / BANSALAN — DAVAO DEL SUR

SHEET CONTENTS: LEGENDS AND ABRIVATIONS

DRAFTED	REVIEWED	SUBMITTED	RECOMMENDED	APPROVED
MARK ANTHONY B. ALBERCA, ENGINEER II	ROBERT M. APITAN, ENGINEER II	VIRGENIA C. OÑEZ, CHIEF, PLANNING & DESIGN SECTION	MARIA TERESA B. LUCABERTE, ASSISTANT DISTRICT ENGINEER	NICOMEDES D. PARILLA, JR., DISTRICT ENGINEER
PREPARED: JOHN RONAFEB C. IGLESIAS, ENGINEER II	DATE	DATE	DATE	DATE

SET NO: - | SHEET NO: 4 / 27

SUMMARY OF QUANTITY

(In accordance with DPWH Standards Specification and D.O. 143 s.2017)

ITEM NO.	DESCRIPTION	UNIT	QTY			Remarks
			As per Plan	As per POW	VARRIANCE	
VOLUME II - DPWH STANDARD SPECIFICATIONS FOR HIGHWAYS, BRIDGES AND AIRPORTS						
Part B.	**OTHER GENERAL REQUIREMENTS**					
B.5	Project Billboard / Signboard	each	4.00	4.00	-	3 DPWH, 1 COA
B.7 (2)	Occupational Safety and Health Program	Lump sum	1.00	1.00	-	
B.8 (2)	Traffic Management	Lump Sum	1.00	1.00	-	
B.9	Mobilization/Demobilization	Lump Sum	1.00	1.00	-	
Part C.	**EARTHWORKS**					
101 (3) b6	Removal of Actual Structures/Obstruction, 0.30m thk, PCCP (Unreinforced)	sq.m.	31.68	31.68	-	Street Light Footing
103(1)a	Structure Excavation, Common Soil	cu.m.	914.09	914.09	-	Street Light Footing
103(3)	Foundation Fill	cu.m.	112.50	112.50	-	Street Light Footing
Part E.	**SURFACE COURSES**					
311 (1) f1	Portland Cement Concrete Pavement (Unreinforced) - 0.30m. thk., 14 days	sq.m.	31.68	31.68	-	PCCP Replacement for Street Light Footing
Part F.	**BRIDGE CONSTRUCTION (RCBC)**					
404(1)a	Reinforcing Steel, Grade 40	kgs	25,623.75	25,623.75	-	Street Light Pedestal and Median
404(1)b	Reinforcing Steel, Grade 60	kgs	50,725.00	50,725.00	-	Street Light Pedestal and Median
405(1)a3	Structural Concrete, Class A (20.68 MPa), 28 days	cu.m.	54.05	54.05	-	Street Light Pedestal and Median
405 (1)b3	Structural Concrete, Class A (27.58 Mpa), 28 days	cu.m.	755.00	755.00	-	Street Light Pedestal and Median
405(6)	Structural Concrete, painting works	sq.m.	1,148.07	1,148.07	-	Median
Part H.	**MISCELLANEOUS STRUCTURES**					
605 (1) b3	Warning Signs, 750mm-W1-1B Horizontal Alignment Sharp Turn L or R	each	2.00	2.00		
605 (1)g2	Warning Signs, 600mm-W2-1B Intersection and Junction Sign Cross Road	each	2.00	2.00	-	
605 (1)aj1	Warning Signs, 600mmx600mm-W6-2B Pedesrian and School Signs Children	each	6.00	6.00	-	
605 (2)al2	Regulatory Signs, 600mm R6-8B, Miscellaneous Signs Pedestrian Crossing	each	12.00	12.00	-	
605 (2)aj2	Regulatory Signs, 600mm R6-9B, Miscellaneous Signs School Children Crossir	each	6.00	6.00	-	
605 (6)e1	Hazard Markers (450x600mm), Chevron Signs	each	42.00	42.00	-	
608(1)	Furnishing and Placing Topsoil	cu.m.	164.50	164.50	-	Median
612(1)	Reflectorized Thermoplastic Pavement Markings, White	sq.m.	3,262.70	3,262.70	-	
612(2)	Reflectorized Thermoplastic Pavement Markings Yellow	sq.m	1,327.47	1,327.47	-	
624(9)e2	Single Arm Solar LED Roadway Lighting, 12m-Pole, 200W-300W	each	478.00	478.00	-	
624(15)c2	Double Arm Solar LED Roadway Lighting, 12m-Pole, 200W-300W	each	22.00	22.00	-	
VOLUME III - DPWH STANDARD SPECIFICATION FOR PUBLIC WORKS STRUCTURES						
Part E.	**FINISHINGS AND OTHER CIVIL WORKS**					
1046(2)a2	CHB Non-Load Bearing (including Reinforcing Steel), 150 mm thk.	sq.m.	753.76	753.76	-	Median
1027 (1)	Cement Plaster Finished	sq.m.	705.00	705.00	-	Median

NOTE: The quantities of various work items involved are subject to decrease or increase depending on the field conditions and as qualified and certified by the engineer based on the actual accomplishment.

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGIONAL OFFICE No. XI
DAVAO DEL SUR DISTRICT ENGINEERING OFFICE
DIGOS CITY, DAVAO DEL SUR

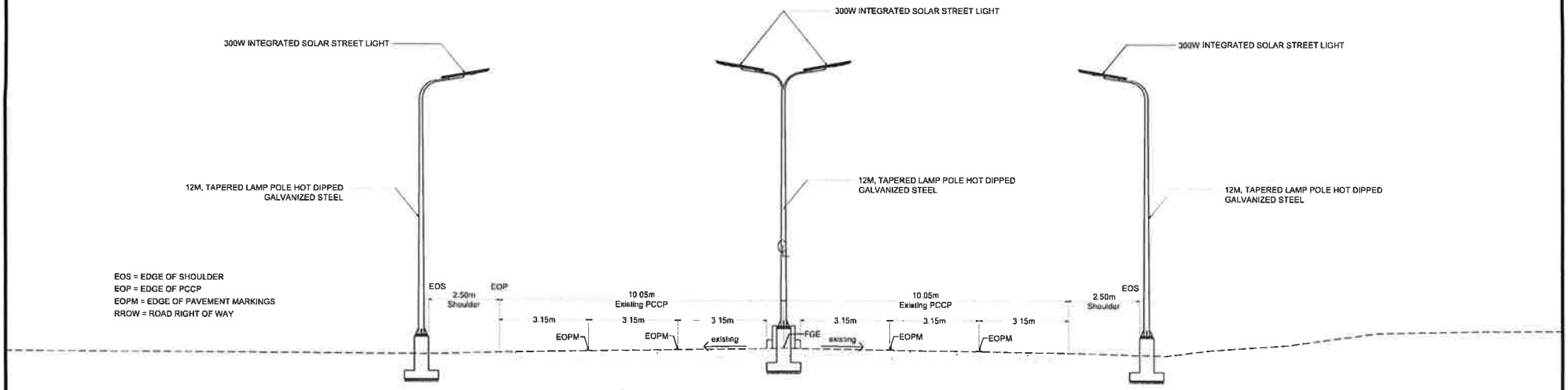
PROJECT NAME AND LOCATION: INSTALLATION OF STREETLIGHTS WITH ROAD SAFETY FACILITIES ALONG DAVAO-COTABATO RD (JCT DIGOS-COTABATO SECT.), K1564+(-478) - K1581+000
DIGOS CITY / MATANAO / BANSALAN DAVAO DEL SUR

SHEET CONTENTS: SUMMARY OF QUANTITY

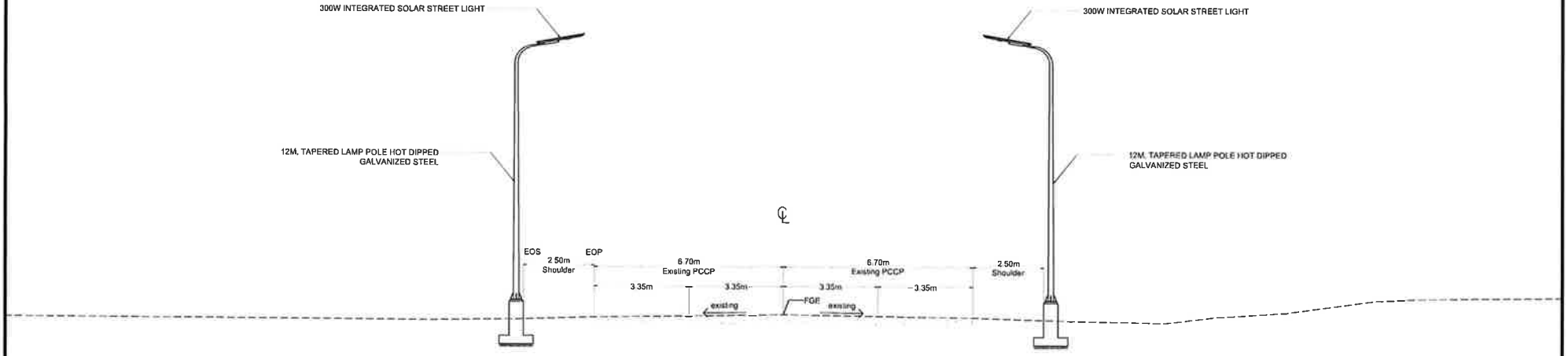
DRAFTED: MARK ANTHONY B. ALBERCA, ENGINEER II
PREPARED: JOHN RONAFEB C. IGLESIAS, ENGINEER II

REVIEWED: ROBERT M. APITAN, ENGINEER — DATE
SUBMITTED: VIRGENIA C. OÑEZ, CHIEF, PLANNING & DESIGN SECTION — DATE
RECOMMENDED: MARIA TERESA R. LUCABERTE, ASSISTANT DISTRICT ENGINEER — DATE
APPROVED: NICOMEDES D. PARILLA, JR., DISTRICT ENGINEER — DATE

SET NO. -
SHEET NO. 5 / 27



TYPICAL CROSS SECTION FOR 6 LANE CROSS SECTION



TYPICAL CROSS SECTION FOR 4 LANE CROSS SECTION

TYPICAL ROADWAY SECTIONS

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGIONAL OFFICE No XI
DAVAO DEL SUR DISTRICT ENGINEERING OFFICE
DIGOS CITY, DAVAO DEL SUR

PROJECT NAME AND LOCATION: INSTALLATION OF STREETLIGHTS WITH ROAD SAFETY FACILITIES ALONG DAVAO-COTABATO RD (JCT DIGOS-COTABATO SECT.), K1564+(-478) - K1581+000
DIGOS CITY / MATANAO / BANSALAN — DAVAO DEL SUR

SHEET CONTENTS: TYPICAL ROADWAY SECTIONS

DRAFTED: MARK ANTHONY S. ALBERCA, ENGINEER II
PREPARED: JOHN RONAFEB C. DELESIAS, ENGINEER II

REVIEWED: DARIOT M. APITAN, ENGINEER II — DATE

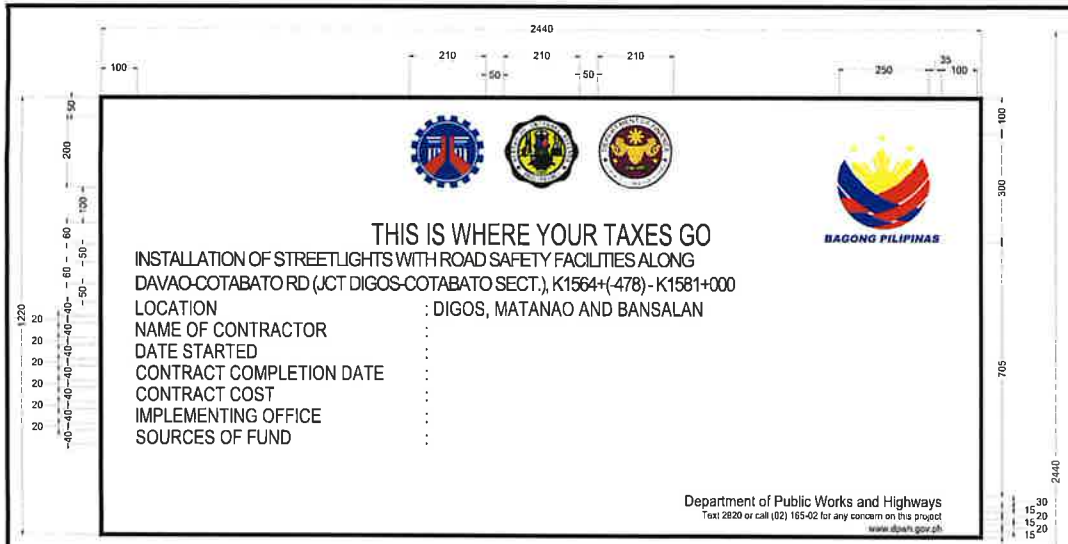
SUBMITTED: VIRGENIA C. OÑEZ, CHIEF PLANNING & DESIGN SECTION — DATE

RECOMMENDED: MARIA TERESA B. LUCABERTE, ASSISTANT DISTRICT ENGINEER — DATE

APPROVED: NICOMEDES D. PARILLA, JR., DISTRICT ENGINEER — DATE

SET NO: - - -

SHEET NO: 6 / 27



DPWH STANDARD PROJECT BILLBOARD

Republic of the Philippines
DEPARTMENT OF PUBLIC WORKS & HIGHWAYS
REGIONAL OFFICE NO. XI
DAVAO DEL SUR DISTRICT ENGINEERING OFFICE
DIGOS CITY, DAVAO DEL SUR

Project: INSTALLATION OF STREETLIGHTS WITH ROAD SAFETY FACILITIES ALONG DAVAO-COTABATO RD (JCT DIGOS-COTABATO SECT.), K1564+(-478) - K1581+000

Cost : P

Fund Source :

Location: DIGOS CITY, DAVAO DEL SUR

Implementing Agency/is : DPWH - DAVAO DEL SUR D.E.O.

Development Partner/s :

Contractor/Supplier :

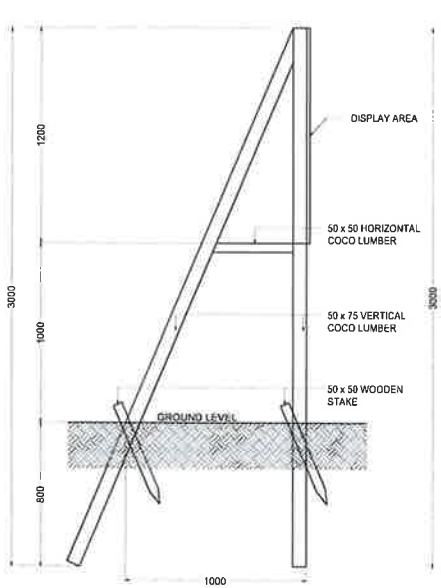
Brief Description of Project :

Project Details :

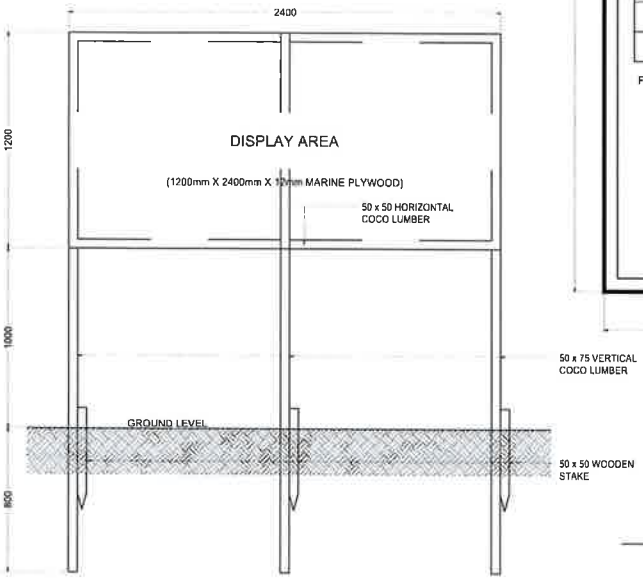
PROJECT DATE			PROJECT STATUS				Remarks
Duration	Started	Target Date Completion	Percentage of Completion	As of (Date)	Cost incurred to Date	Date Completed	

For particulars or complains this project, please contact the Regional Officer of cluster which has audit jurisdiction on this project

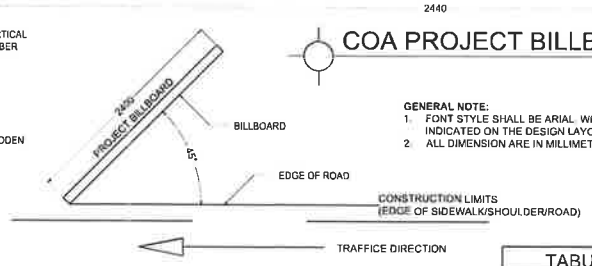
COA Regional Office No./ Cluster XI - Audit Group B
Address: City Hall Compound, Digos City
Contact No. or text COA Citizen's Desk at 0915-539-1957



TYPICAL FRAME ELEVATION



FRONT ELEVATION



COA PROJECT BILLBOARD

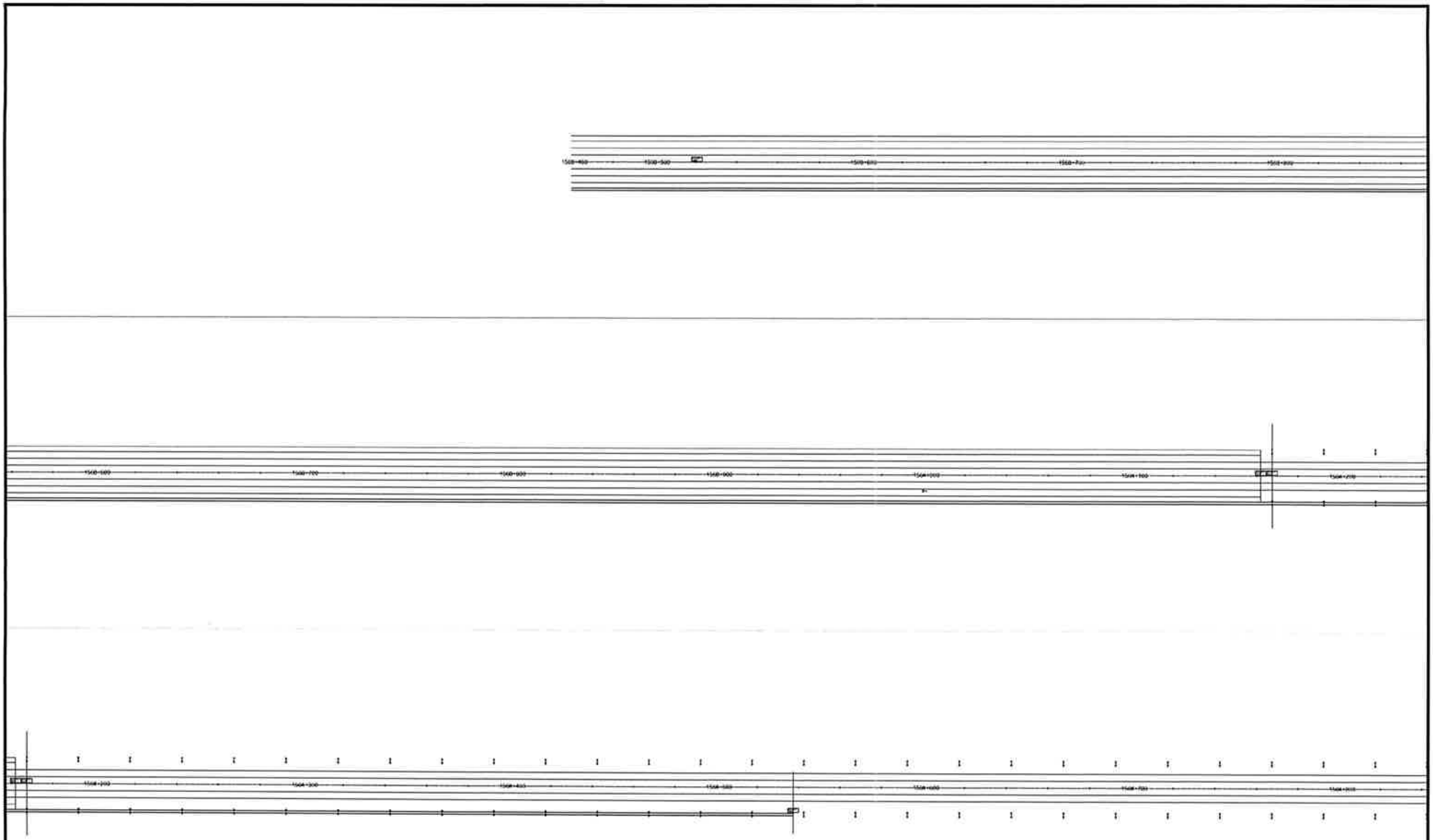
GENERAL NOTE:
1. FONT STYLE SHALL BE ARIAL. WHILE THE DIMENSION AND LETTER SIZES AS INDICATED ON THE DESIGN LAYOUT SHALL BE ON WHITE BACKGROUND
2. ALL DIMENSION ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.

TABULATION OF BILLBOARDS	
A.	DPWH BILLBOARD = 2.0 UNIT
B.	COA BILLBOARD = 1.0 UNIT

ORIENTATION

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGIONAL OFFICE No. XI
DAVAO DEL SUR DISTRICT ENGINEERING OFFICE
DIGOS CITY, DAVAO DEL SUR

PROJECT NAME AND LOCATION	SHEET CONTENTS	DRAFTED	REVIEWED	SUBMITTED	RECOMMENDED	APPROVED	SET NO	SHEET NO
INSTALLATION OF STREETLIGHTS WITH ROAD SAFETY FACILITIES ALONG DAVAO-COTABATO RD (JCT DIGOS-COTABATO SECT.), K1564+(-478) - K1581+000 DIGOS CITY / MATANAO / BANSALAN DAVAO DEL SUR	PROJECT BILLBOARD DETAILS	MARK ANTHONY S. ALBERCA ENGINEER II PREPARED: JOHN RONAFEB C. BLESIAS ENGINEER II	DANIEL M. APITAN ENGINEER II DATE	VIRGENIA C. OÑEZ CHIEF, PLANNING & DESIGN SECTION DATE	MARIA TERESA B. LUCABERTE ASSISTANT DISTRICT ENGINEER DATE	NICOMEDES D. PARILLA, JR. DISTRICT ENGINEER DATE	-	7



REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGIONAL OFFICE No. XI
DAVAO DEL SUR DISTRICT ENGINEERING OFFICE
DIGOS CITY, DAVAO DEL SUR

PROJECT NAME AND LOCATION:
INSTALLATION OF STREETLIGHTS WITH ROAD SAFETY FACILITIES ALONG DAVAO-COTABATO RD (JCT DIGOS-COTABATO SECT.), K1564+(-478) - K1581+000
DIGOS CITY / MATANAO / BANSALAN — DAVAO DEL SUR

SHEET CONTENTS:
STRAIGHT LINE
STA 1561+556.00 TO STA 1561+800.00

DRAFTED: MARK ANTHONY B. ALBERCA, ENGINEER II
PREPARED: JOHN RONAFEB C. IBLESIAS, ENGINEER II

REVIEWED: BARRY M. APITAN, ENGINEER II — DATE

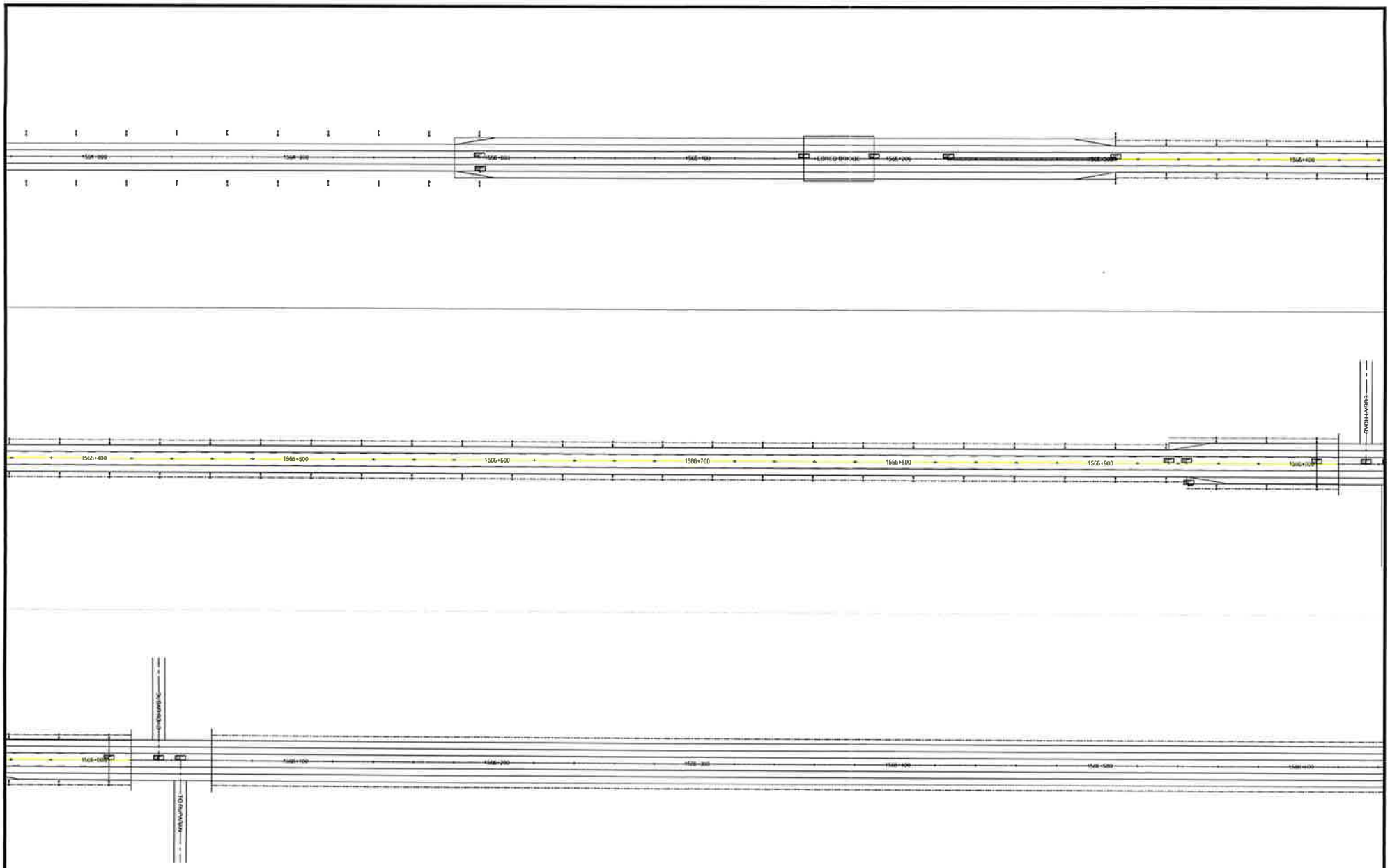
SUBMITTED: VIRGENIA C. OÑEZ, CHIEF, PLANNING & DESIGN SECTION — DATE

RECOMMENDED: MARIA TERESA B. LUCABERTE, ASSISTANT DISTRICT ENGINEER — DATE

APPROVED: NICOMEDES D. PARILLA, JR., DISTRICT ENGINEER — DATE

SET NO.

SHEET NO. 8 / 27



REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGIONAL OFFICE No. XI
DAVAO DEL SUR DISTRICT ENGINEERING OFFICE
DIGOS CITY, DAVAO DEL SUR

PROJECT NAME AND LOCATION
INSTALLATION OF STREETLIGHTS WITH ROAD SAFETY FACILITIES ALONG DAVAO-COTABATO RD (JCT DIGOS-COTABATO SECT.), K1584+(-476) - K1581+000
DIGOS CITY / MATANAO / BANSALAN DAVAO DEL SUR

SHEET CONTENTS
STRAIGHT LINE
STA 1561+556.00 TO STA 1561+800.00

DRAFTED: **MARK ANTHONY S. ALBERCA** ENGINEER II
PREPARED: **JOHN RONAFEB C. IBLESIAS** ENGINEER II

REVIEWED: **DAIROT M. APITAN** ENGINEER II DATE

SUBMITTED: **VIRGENIA C. OÑEZ** CHIEF, PLANNING & DESIGN SECTION DATE

RECOMMENDED: **MARIA TERESA B. LUCABERTE** ASSISTANT DISTRICT ENGINEER DATE

APPROVED: **NICOMEDES D. PARILLA, JR.** DISTRICT ENGINEER DATE

SET NO. -

SHEET NO. 9 of 27

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGIONAL OFFICE No XI
DAVAO DEL SUR DISTRICT ENGINEERING OFFICE
DIGOS CITY, DAVAO DEL SUR

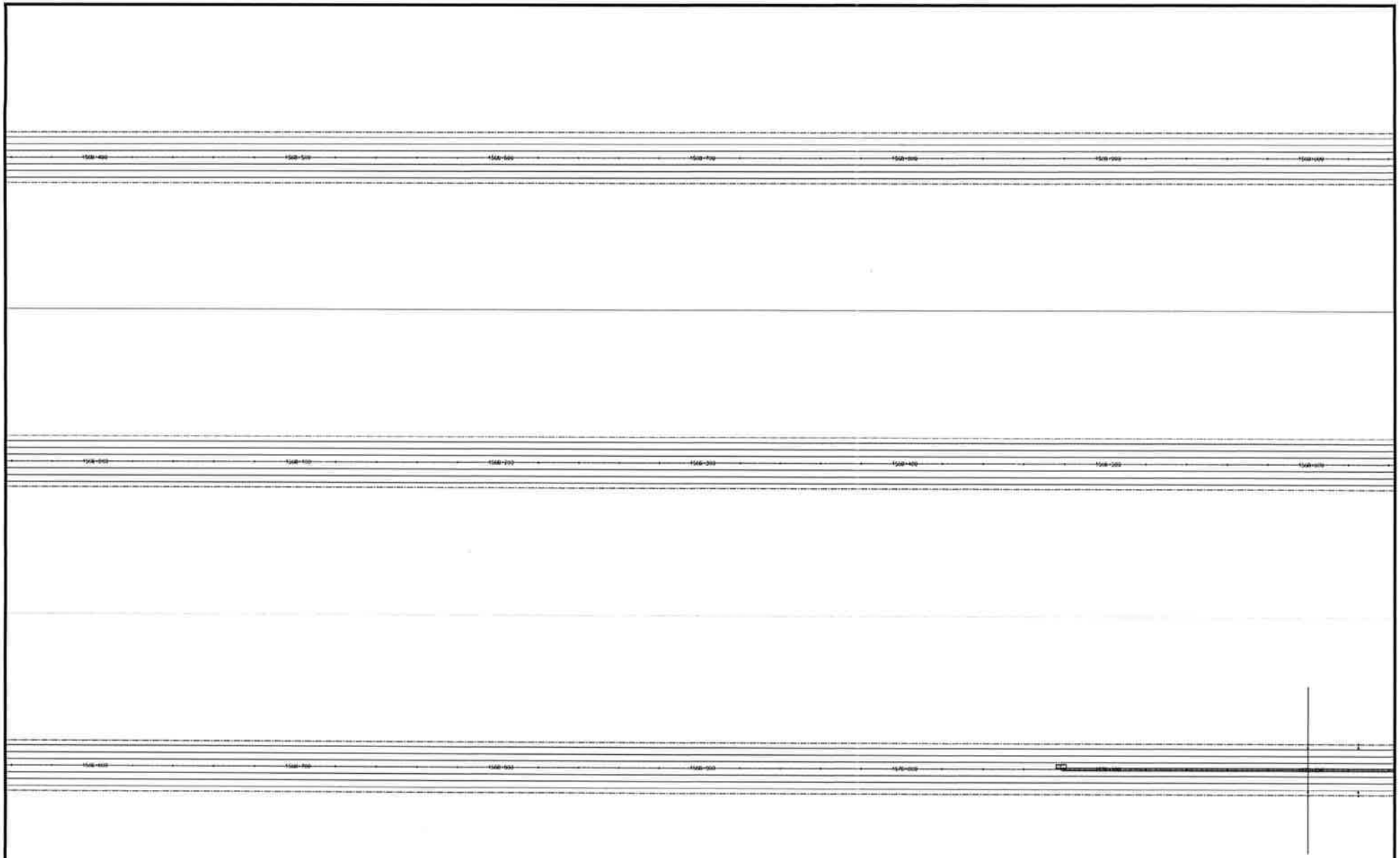
PROJECT NAME AND LOCATION:
INSTALLATION OF STREETLIGHTS WITH ROAD SAFETY FACILITIES ALONG DAVAO-COTABATO RD (JCT DIGOS-COTABATO SECT.), K1564+(-478) - K1581+000
DIGOS CITY / MATANAO / BANSALAN DAVAO DEL SUR

SHEET CONTENTS:
STRAIGHT LINE
STA 1561+556.00 TO STA 1561+800.00

DRAFTED: MARK ANTHONY B. ALBERCA, ENGINEER II
PREPARED: JOHN RONAFEB C. IGLESIAS, ENGINEER II

REVIEWED: DORIT M. APITAN, ENGINEER I, DATE:
SUBMITTED: VIRGENIA C. OÑEZ, CHIEF, PLANNING & DESIGN SECTION, DATE
RECOMMENDED: MARIA TERESA B. LUCABERTE, ASSISTANT DISTRICT ENGINEER, DATE:
APPROVED: NICOMEDES D. PARILLA, JR., DISTRICT ENGINEER, DATE:

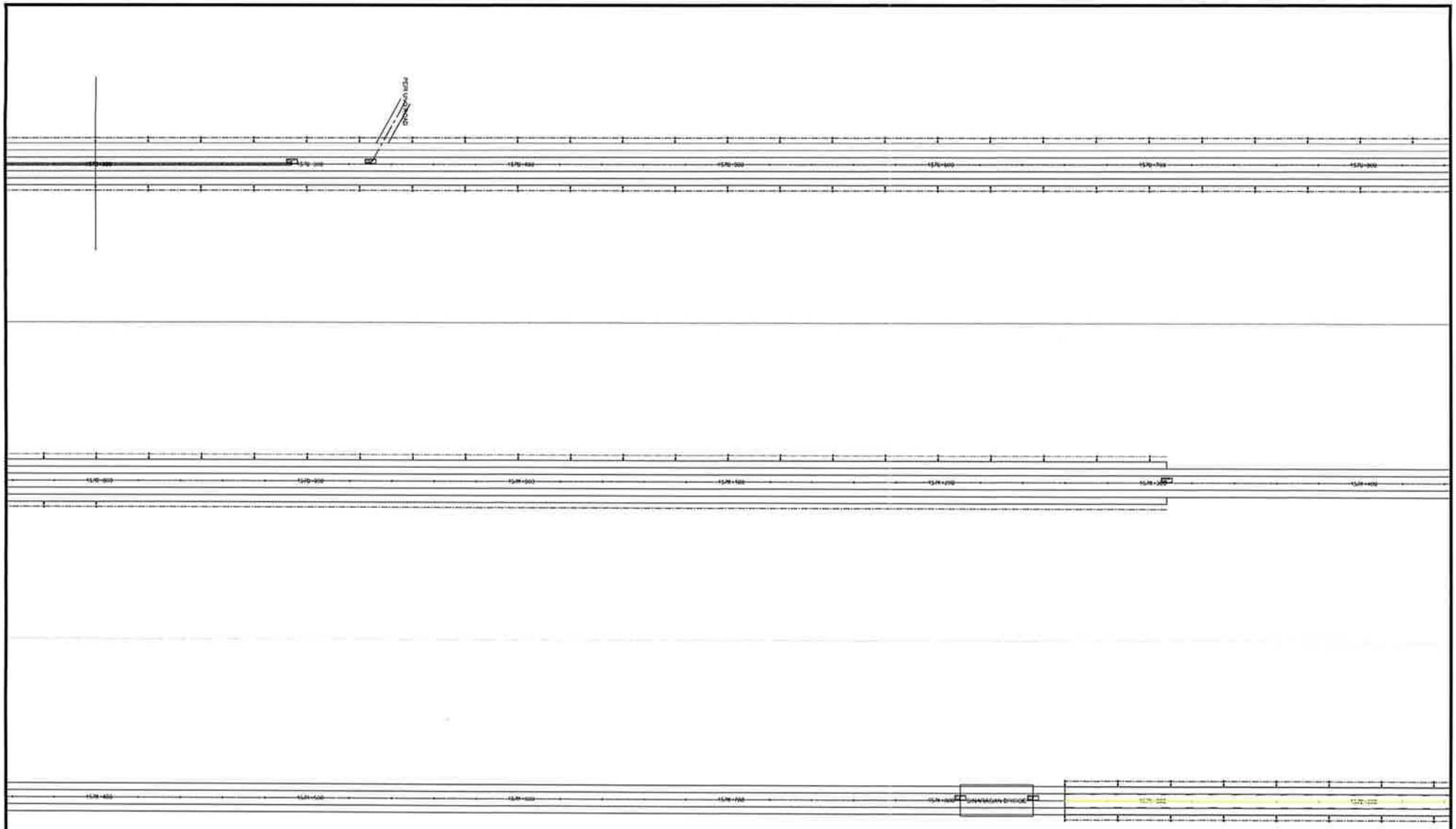
SET NO: - - -
SHEET NO: 19 / 27



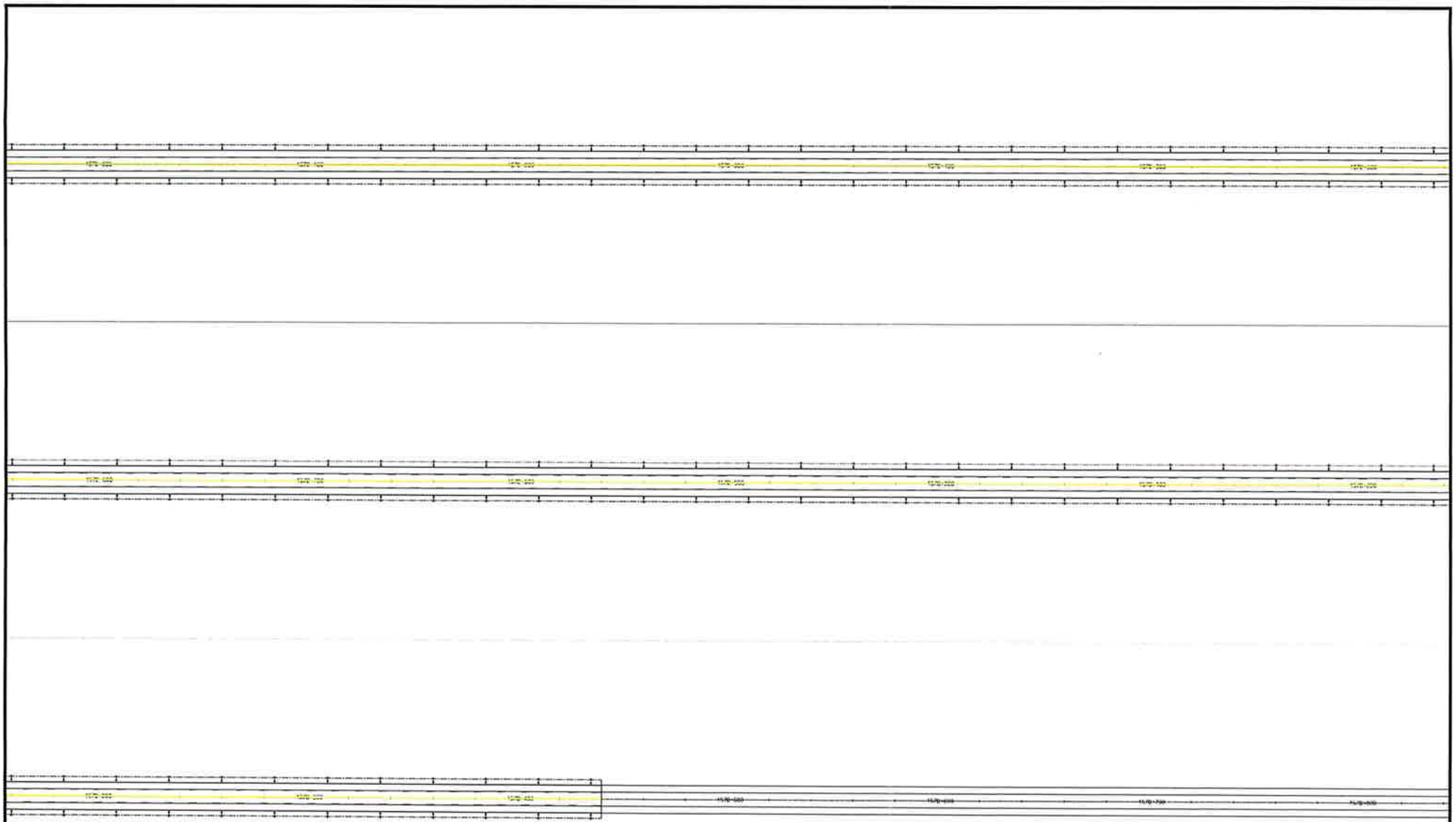
REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGIONAL OFFICE No. XI
DAVAO DEL SUR DISTRICT ENGINEERING OFFICE
DIGOS CITY, DAVAO DEL SUR

PROJECT NAME AND LOCATION	SHEET CONTENTS
INSTALLATION OF STREETLIGHTS WITH ROAD SAFETY FACILITIES ALONG DAVAO-COTABATO RD (JCT DIGOS-COTABATO SECT.), K1564+(-478) - K1581+000 DIGOS CITY / MATANAO / BANSALAN DAVAO DEL SUR	**STRAIGHT LINE** **STA 1561+556.00 TO STA 1561+800.00**

DRAFTED	REVIEWED	SUBMITTED	RECOMMENDED	APPROVED	SET NO.	SHEET NO.
MARK ANTHONY B. ALBERCA ENGINEER II	**DANIEL M. APITAN** ENGINEER II DATE	**VIRGENIA C. OÑEZ** CHIEF, PLANNING & DESIGN SECTION DATE	**MARIA TERESA B. LUCABERTE** ASSISTANT DISTRICT ENGINEER DATE	**NICOMEDES D. PARILLA, JR.** DISTRICT ENGINEER DATE	-	11
PREPARED **JOHN RONAFEB C. IGLESIAS** ENGINEER II					- -	27



REPUBLIC OF THE PHILIPPINES **DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS** REGIONAL OFFICE No. XI DAVAO DEL SUR DISTRICT ENGINEERING OFFICE DIGOS CITY, DAVAO DEL SUR	PROJECT NAME AND LOCATION **INSTALLATION OF STREETLIGHTS WITH ROAD SAFETY FACILITIES ALONG DAVAO-COTABATO RD (JCT DIGOS-COTABATO SECT.), K1564+(-478) - K1581+000** DIGOS CITY / MATANAO / BANSALAN DAVAO DEL SUR	SHEET CONTENTS **STRAIGHT LINE** **STA 1561+556.00 TO STA 1561+800.00**	DRAFTED **MARK ANTHONY B. ALBERCA** ENGINEER II PREPARED: **JOHN RONAFEB C. IBLESIAS** ENGINEER II	REVIEWED **BARRY M. APITAN** ENGINEER II DATE	SUBMITTED **VIRGENIA C. OÑEZ** CHIEF, PLANNING & DESIGN SECTION DATE	RECOMMENDED **MARIA TERESA B. LUCABERTE** ASSISTANT DISTRICT ENGINEER DATE	APPROVED **NICOMEDES D. PARILLA, JR.** DISTRICT ENGINEER DATE	SET NO.	SHEET NO. 12 27



REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGIONAL OFFICE No. XI
DAVAO DEL SUR DISTRICT ENGINEERING OFFICE
DIGOS CITY, DAVAO DEL SUR

PROJECT NAME AND LOCATION

INSTALLATION OF STREETLIGHTS WITH ROAD SAFETY FACILITIES ALONG DAVAO-COTABATO RD (JCT DIGOS-COTABATO SECT.), K1564+(-476) - K1581+000

DIGOS CITY / MATANAO / BANSALAN DAVAO DEL SUR

SHEET CONTENTS

STRAIGHT LINE
STA 1561+556.00 TO STA 1561+800.00

DRAFTED
MARK ANTHONY S. ALBERCA
ENGINEER II

PREPARED
JOHN RONAFEB C. IBLESIAS
ENGINEER II

REVIEWED
DARRYL M. APITAN
ENGINEER II
DATE

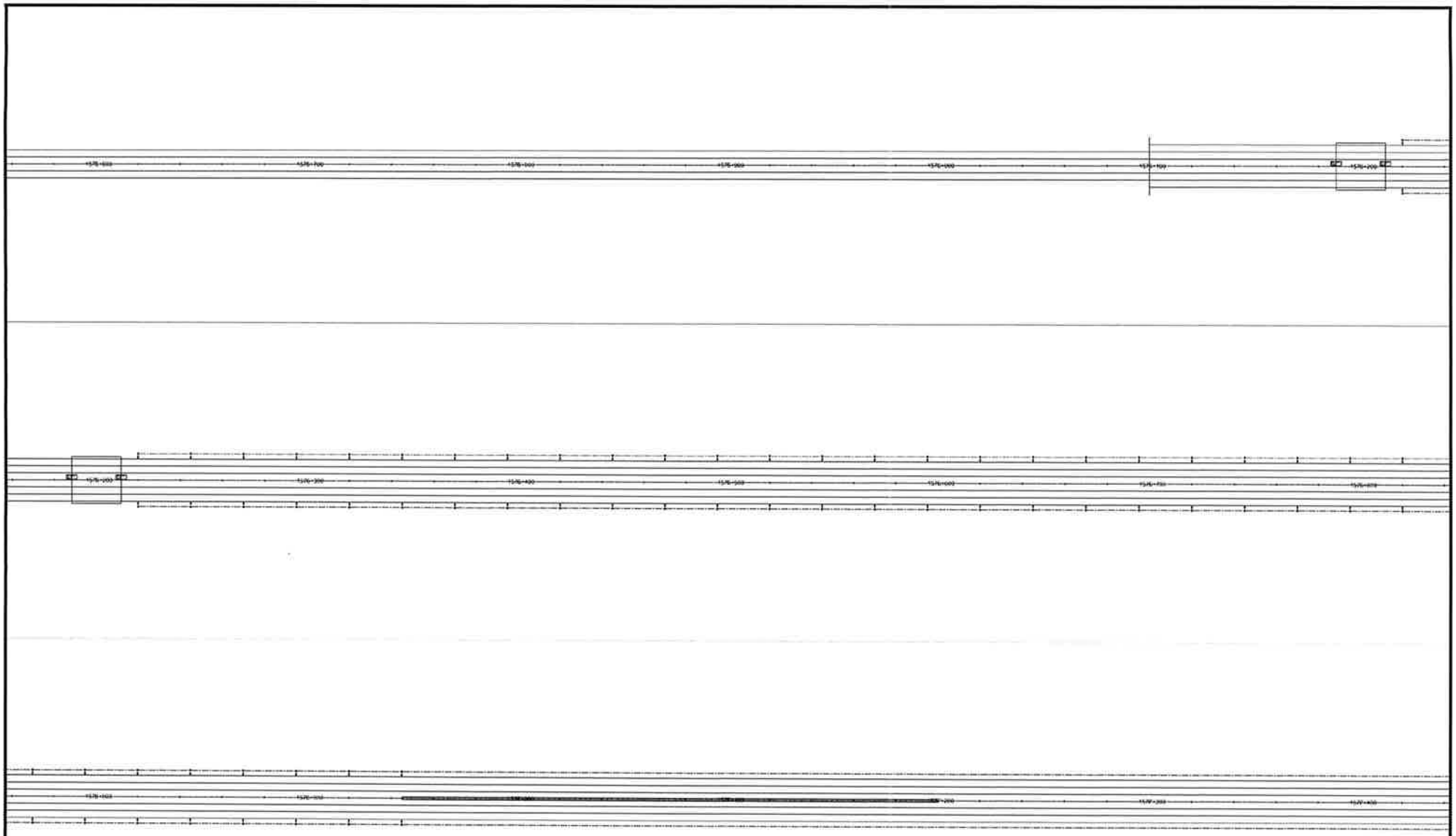
SUBMITTED
VIRGENIA C. OÑEZ
CHIEF, PLANNING & DESIGN SECTION
DATE

RECOMMENDED
MARIA TERESA B. LUCABERTE
ASSISTANT DISTRICT ENGINEER
DATE

APPROVED
NICOMEDES D. PARILLA, JR.
DISTRICT ENGINEER
DATE

SET NO. - - -

SHEET NO. 13 / 27



REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGIONAL OFFICE No. XI
DAVAO DEL SUR DISTRICT ENGINEERING OFFICE
DIGOS CITY, DAVAO DEL SUR

PROJECT NAME AND LOCATION

INSTALLATION OF STREETLIGHTS WITH ROAD SAFETY FACILITIES ALONG DAVAO-COTABATO RD (JCT DIGOS-COTABATO SECT.), K1564+(-478) - K1581+000

DIGOS CITY / MATANAO / BANSALAN DAVAO DEL SUR

SHEET CONTENTS

STRAIGHT LINE
STA 1561+558.00 TO STA 1561+800.00

DRAWN:
MARK ANTHONY B. ALBERCA
ENGINEER II

PREPARED:
JOHN RONAFEB C. IGLESIAS
ENGINEER III

REVIEWED
BARRY M. APITAN
ENGINEER II
DATE:

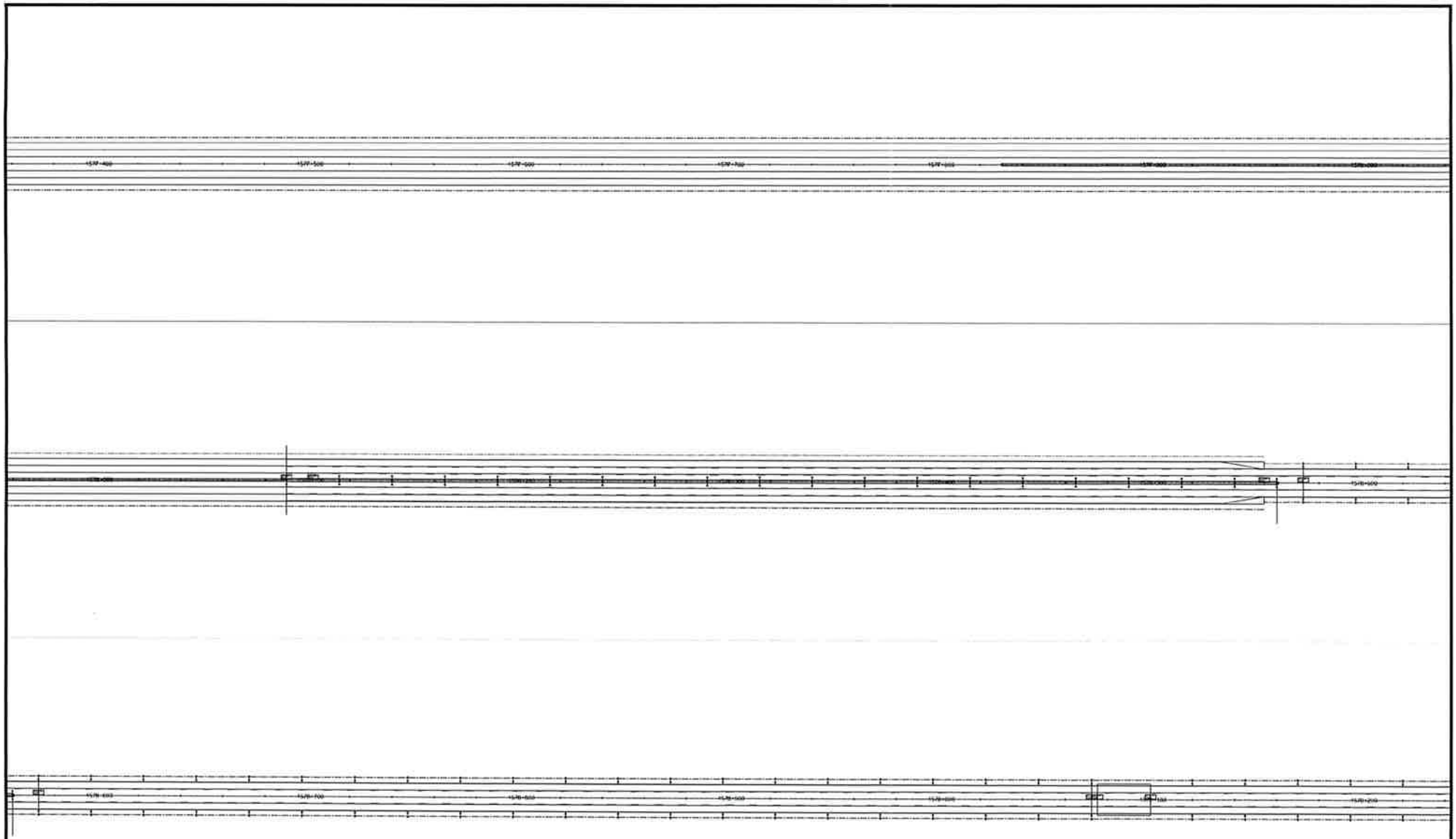
SUBMITTED:
VIRGENIA C. OÑEZ
CHIEF, PLANNING & DESIGN SECTION
DATE:

RECOMMENDED
MARIA TERESA R. LUCABERTE
ASSISTANT DISTRICT ENGINEER
DATE

APPROVED
NICOMEDES D. PARILLA, JR.
DISTRICT ENGINEER
DATE:

SET NO.

SHEET NO.
14
27



REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGIONAL OFFICE No. XI
DAVAO DEL SUR DISTRICT ENGINEERING OFFICE
DIGOS CITY, DAVAO DEL SUR

PROJECT NAME AND LOCATION:
INSTALLATION OF STREETLIGHTS WITH ROAD SAFETY FACILITIES ALONG DAVAO-COTABATO RD (JCT DIGOS-COTABATO SECT.), K1564+(-478) - K1581+000
DIGOS CITY / MATANAO / BANSALAN DAVAO DEL SUR

SHEET CONTENTS:
STRAIGHT LINE
STA 1561+556.00 TO STA 1561+800.00

DRAFTED:
MARK ANTHONY B. ALBERCA
ENGINEER II

PREPARED:
JOHN RONAFEB C. IGLESIAS
ENGINEER III

REVIEWED:
DARRYL M. APITAN
ENGINEER II
DATE:

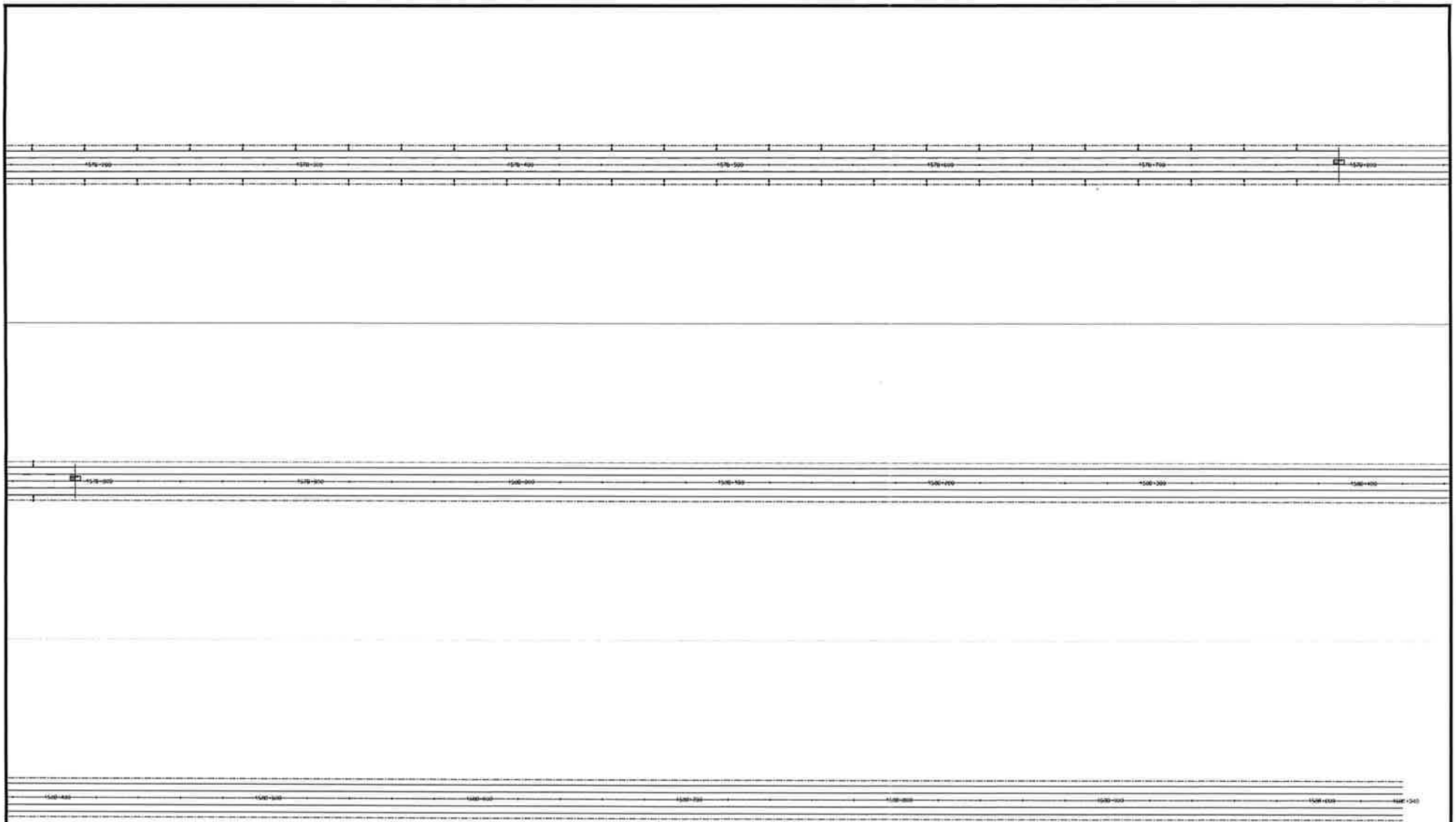
SUBMITTED:
VIRGENIA C. OÑEZ
CHIEF, PLANNING & DESIGN SECTION
DATE:

RECOMMENDED:
MARIA TERESA B. LUCABERTE
ASSISTANT DISTRICT ENGINEER
DATE:

APPROVED:
NICOMEDES D. PARILLA, JR.
DISTRICT ENGINEER
DATE:

SET NO.

SHEET NO.
15
27



REPUBLIC OF THE PHILIPPINES **DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS** REGIONAL OFFICE No. XI DAVAO DEL SUR DISTRICT ENGINEERING OFFICE DIGOS CITY, DAVAO DEL SUR	PROJECT NAME AND LOCATION **INSTALLATION OF STREETLIGHTS WITH ROAD SAFETY FACILITIES ALONG DAVAO-COTABATO RD (JCT DIGOB-COTABATO SECT.), K1564+(-478) - K1581+000** DIGOS CITY / MATANAO / SANGALAN DAVAO DEL SUR	SHEET CONTENTS **STRAIGHT LINE** **STA 1561+556.00 TO STA 1561+800.00**	DRAFTED: **MARK ANTHONY B. ALBERCA** ENGINEER II PREPARED: **JOHN RONAFEB C. IGLESIAS** ENGINEER II	REVIEWED: **DARIO M. APITAN** ENGINEER II DATE	SUBMITTED: **VIRGENIA C. OÑEZ** CHIEF, PLANNING & DESIGN SECTION DATE	RECOMMENDED: **MARIA TERESA R. LUCABERTE** ASSISTANT DISTRICT ENGINEER DATE	APPROVED: **NICOMEDES D. PARILLA, JR.** DISTRICT ENGINEER DATE	SET NO.	SHEET NO. 16 27

GENERAL NOTES

1. ELECTRICAL WORKS SHALL BE DONE IN ACCORDANCE WITH THE PROVISION OF THE LATEST EDITION OF THE PHILIPPINE ELECTRICAL CODE PART I AND II, THE LAWS AND ORDINANCES OF THE LOCAL CODE ENFORCING AUTHORITIES AND THE REQUIREMENTS OF THE LOCAL POWER COMPANY.
2. THE ELECTRICAL WORK SHALL BE DONE UNDER THE DIRECT AND IMMEDIATE SUPERVISION OF A DULY REGISTERED ELECTRICAL ENGINEER.
3. PERFORMANCE OF THE ROAD LIGHT SUCH AS ILLUMINANCE LEVEL SHALL COMPLY WITH THE REQUIREMENTS OF THE SPECIFICATION.
4. THE ELECTRICAL CONTRACTOR SHALL SECURE ALL PERMITS AND PAY ALL FEES REQUIRED FOR THE WORK AND FURNISH THE OWNER THROUGH THE ENGINEERS FINAL CERTIFICATE OF ELECTRICAL INSPECTION AND APPROVAL FROM PROPER GOVERNMENT AUTHORITIES FOR COMPLETE WORK.
5. THE ELECTRICAL MATERIALS TO BE USED AND EQUIPMENT TO BE INSTALLED SHALL BE BRAND NEW AND SHALL BE OF THE APPROVED TYPES FOR THE PARTICULAR LOCATION AND PURPOSE INTENDED.
6. ROAD LIGHTS AND WARNING LIGHTS SHALL BE POWERED FROM SOLAR PHOTOVOLTAIC (PV) SYSTEM WITH STORAGE BATTERY.
7. ALL BOXES SHALL BE OF STEEL AND ZINC CHROMATED PROTECTED.
8. UNDERGROUND CONDUIT PIPES AND CONDUIT RUN EMBEDDED IN CONCRETE SHALL BE UNPLASTICIZED POLYVINYL CHLORIDE CONDUIT (uPVC).
9. UNDERGROUND CONDUIT RUNS SHALL BE BURIED AT A MINIMUM OF 600mm BELOW GROUND LEVEL CONDUIT RUN CROSSING STREET SHALL BE ENCASED IN CONCRETE WITH STEEL BAR REINFORCED, 2500 psi CONCRETE WITH MINIMUM 75mm (3 INCHES) COVER ALL AROUND.
10. UNPROTECTED CONDUIT RISERS AND EXPOSED CONDUIT RUNS SHALL BE INTERMEDIATE METAL CONDUITS. (IMC)
11. STREET LUMINAIRE ASSEMBLY INCLUDES LED LUMINAIRE, PV POWER SUPPLY EQUIPMENT, CONTROL AND BATTERY PANEL, AND FOUNDATION SHALL WITHSTAND UP TO 340KPH PER HOUR GUSTING WINDS WITHOUT PERMANENT DEFORMATION.
12. ALL SPARE PIPES INCLUDING PULL BOXES EMBEDDED IN THE STRUCTURE WALL SHOWN ON THE STRUCTURE DRAWINGS WILL BE USED AS CONDUIT. IN CASE THAT THE ROAD LIGHT IS POWERED FROM ELECTRIC UTILITY COMPANY (EC) IN FUTURE OR EMERGENCY, THE SPARE PIPES, PULL WIRE AND PULL BOXES SHALL BE INSTALLED BY THE ELECTRICAL WORKS.
13. 13. EXISTING CABLE RUNS WHICH WILL BE REPLACED BEFORE REMOVING THE CABLE SHALL BE TESTED IF FREE FROM GROUND AND CAN STILL, BE RE-USED. IF FOUND GROUNDED, THESE CABLES SHALL BE REMOVED AND TURN-OVER TO THE CLIENT.

DESIGN GUIDELINES FOR ROADWAY LIGHTING

SECTION 1 OBJECTIVE

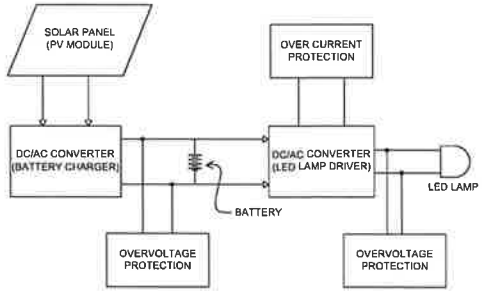
THESE GUIDELINES SET OUT FACTORS THAT NEED TO BE TAKEN INTO ACCOUNT IN DESIGNING ROADWAY LIGHTING SOLAR-POWERED SYSTEMS USED TO ILLUMINATE ROADWAYS SUCH AS PRIMARY, SECONDARY, AND TERTIARY ROADS AS WELL AS ROADS THAT IS MODIFIED, EXTENDED, EXPANDED, OR ADDED TO EXISTING ROADWAY INSTALLATIONS.

SECTION 2 MINIMUM TECHNICAL REQUIREMENTS

SECTION 2.1 ELECTRICAL SYSTEM (SOLAR-POWERED)

1. ILLUMINATION SHALL BE UNIFORM WITHOUT DARK BANDS OR ABRUPT VARIATIONS, AND SHOULD BE SOOTHING TO THE EYE. THE LIGHT OUTPUT FROM THE WHITE LIGHT-EMITTING DIODE (LED) LIGHT SOURCE SHOULD BE ALMOST CONSTANT AND HIGHER LIGHT OUTPUT WILL BE PREFERRED. THE ACCEPTABLE LEVELS OF LUMINANCE SHALL BE ACHIEVED UNDER NORMAL OPERATIONS.
2. COLOR TEMPERATURE FOR LED CAN VARY BETWEEN WARM WHITE' AND "WARM YELLOW" THE USE OF LEDS WHICH EMITS ULTRAVIOLET LIGHT SHALL NOT BE PERMITTED.
3. THE LAMPS SHALL BE HOUSED IN AN ASSEMBLY SUITABLE FOR OUTDOOR USE AND SHALL BE RATED AS IP 65 RATED PER IEC WITH A REFLECTOR ON ITS BACK. THE LED HOUSING SHALL BE MADE OF CORROSION-RESISTANT PRESSURE DIE-CAST ALUMINUM WITH A POWDER COATED FINISH OF A NEUTRAL COLOR HAVING A SUFFICIENT AREA FOR HEAT DISSIPATION AND HEAT RESISTANT TOUGHENED CLEAR GLASS/ HIGH-QUALITY POLYCARBONATE FITTED WITH PRESSURIZED DIE-CAST ALUMINUM FRAME WITH SCREWS. THE TEMPERATURE OF THE HEAT SINK SHOULD NOT INCREASE MORE THAN 30 °C ABOVE AMBIENT TEMPERATURE EVEN AFTER 48 HOURS OF CONTINUOUS OPERATION. THE DUTY CYCLE OF THE LED SHOULD COMPLY WITH THE DUSK TO DAWN OPERATION OF THE LAMPS WHILE THE BATTERY OPERATES AT ANY VOLTAGE BETWEEN THE LOAD DISCONNECT AND CHARGE REGULATION SET POINT.

   LEDS SHALL BE PROCURED FROM, A MANUFACTURER WHO HAS TEST REPORTS FROM IESNA LM80-08 AND TM-21-11 QUALIFIED FOR RELEVANT LED PRODUCT TESTING, PARTICULARLY FOR ROADWAY LIGHTING.
4. THE ELECTRIC CABLE SHALL BE TWIN CORE PVC INSULATED WATER AND UV RESISTANT COPPER CABLE OF 1.5 MM DIAMETER MINIMUM SIZE.
5. THE CHARGE CONTROLLER SHALL HAVE AN AUTOMATIC DUSK UNTIL DAWN CIRCUIT BASED ON A SOLAR PHOTOVOLTAIC MODULE AS A SENSOR FOR SWITCHING ON/OFF THE STREET LIGHT WITHOUT MANUAL INTERVENTION AND AS SPECIFIED OPERATION PROFILE DURING PROJECT ANALYSIS. ALL THIS CONTROL SHOULD KEEP THE SYSTEM OPERATING AT PEAK PERFORMANCE SHALL INCREASE THE SYSTEM'S LIFESPAN, AND SHOULD OPERATE AS ILLUSTRATED IN THE FIGURE BELOW.
6. THE PHOTOELECTRIC CONTROL'S OPERATING CONDITION SHALL TURN ON AT A NOMINAL LIGHT LEVEL SETTING OF 10.76 LUX WHICH IS WITHIN THE LIMITS OF 5.38LUX TO 21.52LUX AT RATED VOLTAGE OF 240VOLTS, 60HERTZ. THE RATIO OF THE TURN-OFF TO THE TURN-ON LIGHT LEVEL SHALL BE DESIGNED WITH A FAIL-ON FAILURE MODE AND SHALL BE INSTALLED AT EACH LIGHTING POST FOR INDIVIDUAL LAMP CONTROL. THE EYE OF THE CELL SHOULD BE ORIENTED TO FACE NORTH, CONTROL CONDUCTOR AND THE NECESSARY CONNECTION SHALL BE MADE FOR COMPLETE SATISFACTORY OPERATION OF THE STREET LUMINAIRE.



7. THE BATTERY SHALL BE LITHIUM-ION OR DEEP CYCLE, LEAD-ACID TYPE ELECTROLYTE PLATE LEAD ACID WITH LOW ANTIMONY LEAD ALLOY PLATES, AND CERAMIC VENT PLUGS AND SHALL BE CATEGORIZED BY LOW MAINTENANCE REQUIREMENTS, LONG SERVICE LIFE, AND EXCELLENT CAPACITY PERFORMANCE EVEN IN HIGH-TEMPERATURE.
8. THE SOLAR PHOTO VOLTAIC MODULE MUST BE MADE OF CRYSTALLINE HIGH POWER/EFFICIENCY CELLS AND SHALL BE USED AND MUST BE WARRANTED FOR OUTPUT WATTAGE, WHICH MUST BE GREATER THAN 90% AFTER 10 YEARS AND LESS THAN 80% AFTER 25 YEARS. THE PROJECT WILL ONLY USE INDIGENOUS MODULES FROM REPUTABLE BRANDS.THE TERMINAL BOX ON THE MODULE MUST BE DESIGNED FOR LONG-TERM OUTDOOR OPERATION IN HARSH ENVIRONMENTS, WITH AN OPENING FOR REPLACING THE CABLE IF NECESSARY. HENCE, PROTECTIVE DEVICES AGAINST SURGES AT THE PV MODULE SHALL BE PROVIDED.
9. THE GROUNDING SYSTEM SHALL HAVE LOW RESISTANCE AND LOW IMPEDANCE ATTRIBUTE TO PROTECT SOLAR STREET LIGHTS FROM EXTENSIVE LIGHTNING DAMAGE. AFTER ESTABLISHING THE STABLE GROUNDING SYSTEM, A SURGE PROTECTION DEVICE (SPD) SYSTEM SHOULD BE INSTALLED.
10. AUTOMATIC SELF-CLEANING MECHANISM SHALL HAVE A BRUSH WITH THICK AND SOFT BRISTLES IDEAL FOR CLEANING HEAVY DUST PARTICLES WITH FLAT FITTING ON THE SOLAR PANEL SHALL BE DESIGNED FOR AREAS WHERE SEA SPRAY, DUST, AND DIRT THAT MAY COVER THE PANEL PREVENTING THE BATTERY FROM BEING FULLY CHARGED. THE BRUSH SHOULD BE AUTOMATED TO ALLOW THOROUGH CLEANING EVERY FOUR HOURS AND SHALL ROUTINELY RETURN TO ITS INITIAL POSITION TO PREVENT FROM BEING JAMMED WHEN ENCOUNTERING LARGE OBSTACLES THAT MAY CAUSE MOTOR DAMAGE. THE CASING SHALL BE MADE OF AN ALUMINUM ALLOY FOR INCREASED DURABILITY.
11. MOTION SENSOR FEATURE SHALL HAVE DIFFERENT POWER CONTROL DEPENDING ON THE PERIOD WITH AN 8-METER RADIUS AND SHALL SET AND LOWER BRIGHTNESS IN A REDUCED PEDESTRIAN AFTER MIDNIGHT TO SAVE ENERGY AND IMPROVE PRACTICALITY.

SECTION 2.2 STRUCTURAL SYSTEM

1. THE POLE SHALL BE CONSTRUCTED OF ROUND TAPERED HOT-DIP GALVANIZED STEEL GI PIPE OF 3 MM MINIMUM THICKNESS, A MINIMUM LOWER AND UPPER DIAMETER OF 200 MM AND 75 MM DIAMETER AND ITS SURFACE MUST BE PAINTED WITH REFLECTORIZED WHITE ENAMEL COATING. THE POLE SHOULD HAVE THE PROVISIONS TO HOLD THE WEATHERPROOF LAMP HOUSING INDIVIDUALLY PER CASE, THE BATTERY BOX AT AN APPROPRIATE HEIGHT, AND THE SOLAR PHOTOVOLTAIC PANEL., THAT SHALL BE MOUNTED ON TOP OF THE POLE.

   STANDARD LIGHT POLES TO BE UTILIZED WITH SOLAR SHOULD HAVE LARGER BASES AND MORE SUBSTANTIAL FOUNDATIONS DUE TO THE WEIGHT OF THE SOLAR POWER ASSEMBLY AND SHOULD HAVE AN EFFECTIVE PROJECTED AREA (EPA) CAPACITY THAT COULD WITHSTAND SEVERAL WIND VELOCITIES UP TO 340 KPH IN ACCORDANCE WITH AASHTO LTS-6, AS STANDARD POLES ARE TOO WEAK TO HANDLE THE WEIGHT OF THE SYSTEM AND CAN QUICKLY FAIL. POLES SHOULD BE MANUFACTURED EXCLUSIVELY FOR THE PROJECT WITH APPROPRIATE HEIGHT AS IT INFLUENCES THE INTENSITY, UNIFORMITY, AND AREA OF ILLUMINATION.

   THE LOCATION OF STREET LIGHTING POSTS SHOWN ON THE DRAWINGS ARE APPROXIMATE AND THE EXACT LOCATION SHALL BE DETERMINED/ESTABLISHED BY THE ENGINEER IN THE FIELD.
2. SOLAR FIXTURE BRACKET SHOULD DIRECT THE PY SOLAR FACING SOUTH (OR TOWARDS THE EQUATOR) AND SHOULD ALLOW THE FIXTURE INSTALLATION TO FACE THE CORRECT DIRECTION IF IT IS ATTACHED TO THE PANEL, SHALL BE DESIGNED TO MEET THE STRENGTH REQUIREMENTS OF THE LATEST EDITION OF THE NATIONAL STRUCTURAL CODE OF THE PHILIPPINES (NSCP) AND SHOULD BE PROVIDED WITH A MOUNTING PLATE AND STIFFENER TO INCREASE ITS LOAD BEARING CAPACITY. HARDWARE SUCH AS HINGES, LATCHES, SPRINGS, NUTS, SCREWS, WASHERS, PINS, AMONG OTHERS, SHALL BE MADE OF MATERIALS COMPATIBLE TO THE HOUSING MATERIAL AND SHALL BE INHERENTLY CORROSION PROOF OR HAVE BEEN PROTECTED BY FINISHES APPROVED FOR CORROSION RESISTANCE. HOWEVER, THOSE EXPOSED TO THE ELEMENTS SHALL BE MADE OF HIGH-GRADE STAINLESS STEEL.
3. STREET LIGHTING POST CONCRETE FOOTING SHALL BE CLASS A AND SHALL CONFORM WITH SUBSECTION 405.2, MATERIAL REQUIREMENTS OF ITEM 405, STRUCTURAL CONCRETE.

   ALL ELECTRICAL LIGHTING POST FOOTINGS WITH DIMENSIONS INDICATED IN THE PLANS SHALL BE REINFORCED CONCRETE AND SHALL CONFORM WITH THE REQUIREMENTS FOR CONCRETE STRUCTURES OF THIS SPECIFICATION. EXCAVATION AND BACKFILL FOR FOUNDATION INCLUDING DISPOSAL OF SURPLUS MATERIAL SHALL BE PROVIDED. EXCAVATED HOLES FOR CONCRETE FOOTING SHALL BE NEAT OR PROPERLY FORMED AND FREE FROM LOOSE MATERIALS WHEN THE CONCRETE IS PLACED.

   CONCRETE FOUNDATION SHALL BE DESIGNED AND CONSTRUCTED IN ACCORDANCE WITH THE LATEST EDITION OF THE NATIONAL STRUCTURAL CODE OF THE PHILIPPINES (NSCP) TO RESIST WIND VELOCITY AND VIBRATIONS INHERENT IN THE AREA WHERE THE POLES WILL BE CONSTRUCTED AND LOCATED TO PROVIDE ADEQUATE SUPPORT FOR THE LUMINAIRE AND POLE STRUCTURE.

SECTION 3 ROADWAY LIGHTING SECTION CONFIGURATION

SECTION 3.1 LIGHTING ARRANGEMENT

IN SINGLE-SIDED POLE ARRANGEMENT, ALL LUMINAIRES ARE LOCATED ON ONE SIDE OF THE ROAD. THIS SHALL BE USED WHEN THE ROAD WIDTH IS LESS THAN OR EQUAL TO THE MOUNTING HEIGHT.

IN STAGGERED ARRANGEMENT, ALL LUMINAIRES ARE ALTERNATELY PLACED ON EACH SIDE OF THE ROAD. THIS SHALL BE USED WHEN THE ROAD WIDTH IS EQUAL TO 1 TO 1.5 TIMES THE MOUNTING HEIGHT.

IN AXIAL ARRANGEMENT, ALL LUMINAIRES ARE MOUNTED ON CENTRAL TWIN MASTS IN THE MIDDLE OF THE ISLAND. THIS SHALL BE USED WHEN THE ROAD WIDTH IS LESS THAN OR EQUAL TO THE MOUNTING HEIGHT.

IN OPPOSITE ARRANGEMENT, ALL LUMINAIRES ARE POSITIONED DIRECTLY OPPOSITE AND FACING EACH OTHER. THIS SHALL BE USED WHEN THE ROAD WIDTH IS GREATER THAN 1.5 TIMES THE MOUNTING HEIGHT.

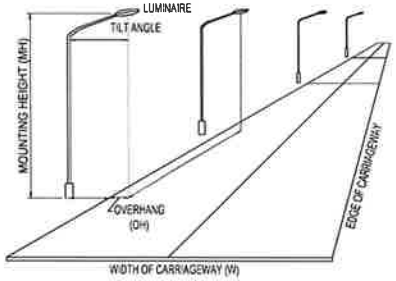
ARRANGEMENTS SUCH AS OPPOSITE, STAGGERED, AND ONE-SIDED ARE TYPICALLY INSTALLED 30 TO 40 METERS APART WHEN DESIGNING PRIMARY AND SECONDARY ROADS. IF AXIAL AND OPPOSITE ARRANGEMENTS LACK THE REQUIRED ILLUMINATION, THEY CAN BE COMBINED WITH SINGLE-SIDED ARRANGEMENTS.

REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS REGIONAL OFFICE No. XI DAVAO DEL SUR DISTRICT ENGINEERING OFFICE DIGOS CITY, DAVAO DEL SUR	PROJECT NAME AND LOCATION INSTALLATION OF STREETLIGHTS WITH ROAD SAFETY FACILITIES ALONG DAVAO-COTABATO RD.(JCT DIGOS-COTABATO SECT.); K1564+(-478) - K1581+000 DIGOS CITY / MATANAO / BANSALAN, DAVAO DEL SUR	SHEET CONTENTS DETAIL OF SINGLE AMDDOUBLE ARM POST WITH STREET LIGHT SCHEDULE OF STREET LIGHT	DRAFTED MARK ANTHONY B. ALBERCA ENGINEER II PREPARED JOHN RONAFEB C. IGLESIAS ENGINEER II	REVIEWED BARRY M. APITAN ENGINEER II DATE	SUBMITTED VIRGENIA C. OÑEZ CHIEF, PLANNING & DESIGN SECTION DATE	RECOMMENDED MARIA TERESA R. LUCABERTE ASSISTANT DISTRICT ENGINEER DATE	APPROVED NICOMEDES D. PARILLA, JR. DISTRICT ENGINEER DATE	SET NO. -	SHEET NO. 17 27

SECTION 3 ROADWAY LIGHTING SECTION CONFIGURATION

SECTION 3.2 MOUNTING HEIGHT, SPACING, MAST ARM, AND OVERHANG

THE STREET LIGHTING GEOMETRY IS SHOWN BELOW TO FURTHER ILLUSTRATE THE FOLLOWING DESIGN PARAMETERS:



MOUNTING HEIGHT

THE MOUNTING HEIGHT SHALL BE THE PERPENDICULAR DISTANCE FROM THE CENTER OF THE LAMP TO THE GROUND SURFACE. IN GENERAL, THE MINIMUM MOUNTING HEIGHT SHALL BE GENERALLY 8 METERS AND A LUMINAIRE THAT DOES NOT OVERHANG THE RAODWAY SHALL HAVE A MINIMUM MAST ARM LENGHT OF 1.5 METERS. PROVIDED THAT THE INSTALLED LUMINAIRE USED WOULD NOT RESULT INTO DISABILITY GLARE TO THE MOTORIST AND THE POLE IS INSTALLED IN ACCORDANCE WITH THE LATEST EDITION OF PHILIPPINE ELECTRICAL CODE (PEC)2. TABLE 2, ROADWAY LIGHTING STATIONING AND PARAMETERS SHOULD BE CONSIDERED AS IT SPECIFIES THE SUITABLE MOUNTING HEIGHT FOR THE ENTIRETY OF ROADWAY LIGHTING.

SPACING

SPACING SHALL BE DEFINED AS THE HORIZONTAL DISTANCE BETWEEN SUCCESSIVE LUMINAIRES IN AN INSTALLATION. TO PRESERVE LONGITUDINAL UNIFORMITY, THE SPACE-HEIGHT RATIO SHOULD GENERALLY BE GREATER THAN 3. MINIMUM AND MAXIMUM ALLOWABLE SPACING SHALL BE FOLLOWING THE VALUES ESTABLISHED IN TABLE 2, ROADWAY LIGHTING STATIONING AND PARAMETERS.

POLE SPACING IS ALSO SPECIFIED DEPENDING ON THE ILLUMINATION LEVEL OF THE AREA. INTERSECTIONS AND OTHER MERGING SECTION OF THE ROADWAY SHOULD HAVE A HIGHER LEVEL OF ILLUMINATION

OVERHANG

THE HORIZONTAL DISTANCE BETWEEN THE CENTER OF A LUMINAIRE MOUNTED ON A BRACKET AND THE ADJACENT EDGE OF A CARRIAGEWAY IS DEFINED AS OVERHANG. TO AVOID REDUCED VISIBILITY OF CURBS AND OBSTACLES, THE OVERHANG SHOULD NOT EXCEED ONE-FOURTH OF THE MOUNTING HEIGHT

POLE ARM

THE USE OF AN ARM BRINGS THE LIGHT SOURCE CLOSER TO THE TRAVELED PATH WHILE ALLOWING THE POLE TO BE PLACED FURTHER AWAY FROM THE EDGE OF THE PATH'S EDGE. DEPENDING ON THE APPLICATION, POLE ARMS CAN BE SINGLE AND/OR DOUBLE DAVIT OR ARMS AND LOCATED AT THE UPPER MOST PART OF THE POLE

THE POLE ARM'S ANGLE OF TILT SHALL BE KEPT FROM 15° TO 30°, OTHERWISE STRONG LIGHT SHALL AFFECT THE DRIVER'S EYES BY CAUSING DISCOMFORT GLARE. THE TILT GETS LARGER AS THE UNIFORMITY RATIO INCREASE.

SETBACK

THE SETBACK IS THE HORIZONTAL DISTANCE BETWEEN THE FACE OF A LIGHT POLE AND THE EDGE OF THE TRAVELED WAY. THE MINIMUM ALLOWED VALUE IS SET AT 0.80 TO 1.5 METERS SINCE EXTREMELY SHORT SETBACK GRAZES THE SURFACE AND ENHANCES ITS TEXTURE AND LONG SETBACKS CAUSE SHADOWS AT LOW LEVELS

THE TABLE BELOW SHALL BE CONSIDERED IN DESIGNING THE LUMINAIRE SETBACK BASED ON VEHICULAR SPEED ON A PARTICULAR ROADWAY AND EQUIVALENT.

DESIGN SPEED FOR THE ROADWAY (KPH)	POLE SETBACKS (M)
50	0.8
80	1.0
100	1.5
120	1.5

TABLE 1. DESIGNATED ALLOWABLE SETBACK VALUES WITH A ROADWAY DESIGNED SPEED EQUIVALENT.

OUTREACH

THE OUTREACH OR HORIZONTAL DISTANCE BETWEEN THE LUMINAIRE'S CENTER AND THE COLUMN'S CENTER IS TYPICALLY ESTABLISHED IN ACCORDANCE WITH THE ARCHITECTURAL AESTHETIC CONDITIONS

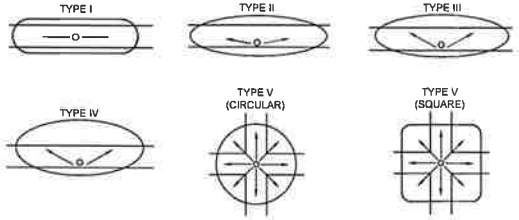
ROAD CLASSIFICATION	LIGHTING ARRANGEMENT	ROAD WIDTH (meter)	POLE PLACING (meter)	MOUNTING HEIGHT (meter)	LAMP WATTAGE (watt)		MAST ARM LENGTH (meter)
					HPS	LED	
PRIMARY	SINGLE	6.7	10-25	10	150-250	80-125	1.5
		13.4	15-35	12	150-250	80-125	3.0
	AXIAL	13.4	20-35	10	150-250	80-125	1.5
		20.1	20-40	12	150-250	80-125	3.0
		26.8	20-45	12	300-400	200-300	3.0
	OPPOSITE	6.7	20-35	10	70-120	50-80	1.5
		13.4	20-35	12	150-250	80-125	1.5
		20.1	20-40	12	300-400	200-300	1.5
		26.8	20-45	12	300-400	200-300	1.5
	STAGGERED	6.7	10-25	8	70-120	50-80	1.5
		13.4	10-25	10	150-250	80-125	1.5
		20.1	15-25	12	300-400	200-300	3.0
		26.8	15-25	12	300-400	200-300	3.0
SECONDARY	SINGLE	6.7	15-35	10	150-250	80-125	1.5
	OPPOSITE	6.7	20-40	8	150-250	80-125	1.5
	STAGGERED	6.7	15-35	8	150-250	80-125	1.5
TERTIARY	SINGLE	5.0	10-25	8	70-120	50-80	1.5
		6.1	10-25	8	70-120	50-80	1.5
	STAGGERED	5.0	10-25	8	70-120	50-80	1.5
		6.1	10-25	8	70-120	50-80	1.5

TABLE 2. ROADWAY LIGHTING STATIONING AND PARAMETERS

SECTION 3 ROADWAY LIGHTING SECTION CONFIGURATION

SECTION 3.3 PHOTOMETRIC REQUIREMENTS AND COMPUTATIONS

ONE OF THE MOST IMPORTANT ASPECTS OF OUTDOOR AREA LIGHTING IS THE PROPER DISTRIBUTION OF LIGHT FLUX FROM LUMINAIRES. THE LIGHT EMITTED BY THE LUMINAIRES IS DIRECTED AND PROPORTIONED ACCORDING TO THE REQUIREMENTS FOR SEEING AND VISIBILITY, LIGHT DISTRIBUTION IS TYPICALLY DESIGNED FOR A TYPICAL RANGE OF CONDITIONS SUCH AS LUMINAIRE MOUNTING HEIGHT, TRANSVERSE (OVERHANG) LOCATION OF THE LUMINAIRES, LONGITUDINAL SPACING, WIDTHS OF AREAS TO BE EFFECTIVELY LIGHTED, LUMINAIRE ARRANGEMENT, AND MAINTAINED SYSTEM EFFICIENCY.



LUMINAIRE'S TRANSVERSE (PROJECTION) CAN BE CONSIDERED AS TYPES I, II, III, IV, AND V, AS SHOWN IN THE FIGURE ABOVE. CHARACTERISTICS THAT SHOW THE MAXIMUM INTENSITY OF THE LIGHT IS ABOVE 180° AND 90° TO EVADE GLARE AND SPILL LIGHT. IT IS CLASSIFIED AS FULL CUTOFF, CUTOFF, SEMI-CUTOFF, AND NON-CUTOFF.

ON A TWO-LANE ROADWAY, ADDING LIGHT TO ONE SIDE AND USING A TYPE 2 WILL ALLOW THE LIGHT TO FOCUS ALONG THE ROADWAY. ALLOCATING A TYPE 5 OR TWO (2) TYPE 3 LIGHTS BACK-TO-BACK IS PREFERRED WHEN DESIGNING A FOUR-LANE HIGHWAY WITH A MEDIAN SHALL ENHANCE THE ILLUMINATION OF THE AREA. ADDITIONAL TYPE 2 OR 3 ON THE OUTSIDE EDGES OF THE ROADS COULD ALSO EVENLY ILLUMINATE THE AREA

GENERAL EQUATION

FOR ILLUMINANCE

$$E_{wp} = \frac{(\Theta TOTAL)\,(CU)\,(LLF)}{A_{wp}}$$

Ewp = Average Maintained Illuminance on the Work Plane

Θtotal = Total System Lamp Lumen Output
CU = Coefficient of Utilization
LLF = Light Loss Factor
Awp = Area of the Work Plane

$$S = \frac{(LL)\,(MF)\,(CU)}{(fc)\,(W)}$$

S = Spacing
LL = Lamp Lumen
MF = Maintenance Factor
CU = Coefficient of Utilization
fc = Foot Candle
W = Width of Road

NOTE: ILLUMINATION CALCULATION CAN ALSO BE ATTAINED USING DIGITAL SOFTWARE FOR THE LAMP WATTAGE RATING

EACH LUMINAIRE HAS ITS OWN COEFFICIENT OF UTILIZATION AND CAN BE OBTAINED FROM THE REPUTABLE MANUFACTORER'S DATA, SPECIFIC TO ITS LIGHT DISTRIBUTION AND EFFICIENCY.

THE TABLE BELOW ILLUSTRATES HOW THE DESIGN VARIES DEPENDING ON THE STANDARD VALUES LISTED FOR DIFFERENT SURFACE REFLECTANCE CONTINGENT ON THE PAVEMENT TYPE TO BE LIGHTED WHETHER CONCRETE OR ASPHALT

ILLUMINANCE METHOD - RECOMMENDED VALUES						
ROADWAY & PEDESTRIAN CONFLICT AREA		PAVEMENT CLASSIFICATION			UNIFORMITY RATIO EAVE/EMIN	VEILING LUMINANCE RATIO LMAX/LAVG
ROAD	PEDESTRIAN CONFLICT AREA	R1 LUX/ FC	R2 & R3 LUX/ FC	R4 LUX/ FC		
FREEWAY CLASS A		6.0/ 6.0	9.0/ 0.8	8.0/ 0.8	3	0.3
FREEWAY CLASS B		4.0/ 4.0	6.0/ 0.6	5.0/ 0.5	3	0.3
EXPRESSWAY	HIGH	10.0/ 1.0	14.0/ 1.4	13.0/ 1.3	3	0.3
	MEDIUM	8.0/ 0.8	12.0/ 1.2	10.0/ 1.0	3	0.3
	LOW	6.0/ 0.6	9.0/ 0.9	8.0/ 0.8	3	0.3
MAJOR PRIMARY	HIGH	12.0/ 1.2	17.0/ 1.7	15.0/ 1.5	3	0.3
	MEDIUM	9.0/ 0.9	13.0/ 1.3	11.0/ 1.1	3	0.3
	LOW	6.0/ 0.6	9.0/ 0.9	8.0/ 0.8	3	0.3
COLLECTOR SECONDARY	HIGH	8.0/ 0.8	12.0/ 1.2	10.0/ 1.0	4	0.4
	MEDIUM	6.0/ 0.6	9.0/ 0.9	8.0/ 0.8	4	0.4
	LOW	4.0/ 0.4	12.0/ 1.2	5.0/ 0.5	4	0.4
LOCAL TERTIARY	HIGH	6.0/ 0.6	9.0/ 0.9	8.0/ 0.8	6	0.4
	MEDIUM	5.0/ 0.5	7.0/ 0.7	6.0/ 0.6	6	0.4
	LOW	3.0/ 0.3	4.0/ 0.4	4.0/ 0.4	6	0.4

TABLE 3. IESNA RECOMMENDED MAINTAINED AVERAGE HORIZONTAL ILLUMINANCE LEVELS (LUX) FOR DIFFERENT TYPES OF ROADS, PAVEMENTS, AND PEDESTRIAN CONDITIONS (EXCEPT FROM IESA 2000)

- ACCORDING TO NATIONAL ROAD CLASSIFICATIONS

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGIONAL OFFICE No. XI
DAVAO DEL SUR DISTRICT ENGINEERING OFFICE
DIGOS CITY, DAVAO DEL SUR

PROJECT NAME AND LOCATION: INSTALLATION OF STREETLIGHTS WITH ROAD SAFETY FACILITIES ALONG DAVAO-COTABATO RD (JCT DIGOS-COTABATO SECT.), K1564+(-478) - K1581+000 — DIGOS CITY / MATANAO / BANSALAN — DAVAO DEL SUR

SHEET CONTENTS: DETAIL OF SINGLE AMDDOUBLE ARM POST WITH STREET LIGHT; SCHEDULE OF STREET LIGHT

DRAFTED: MARK ANTHONY B. ALBERCA, ENGINEER II
PREPARED: JOHN RONAFEB C. IBLESIAS, ENGINEER II
REVIEWED: DARRYL M. APITAN, ENGINEER II — DATE
SUBMITTED: VIRGENIA C. OÑEZ, CHIEF, PLANNING & DESIGN SECTION — DATE
RECOMMENDED: MARIA TERESA B. LUCABERTE, ASSISTANT DISTRICT ENGINEER — DATE
APPROVED: NICOMEDES D. PARILLA, JR., DISTRICT ENGINEER — DATE

SET NO.
SHEET NO. 18 of 27

SECTION 4 DESIGN CONSIDERATIONS

SURFACE LUMINANCE AND SOURCE LUMINANCE ARE THE TWO MOST IMPORTANT FACTORS TO BE CONSIDERED IN DESIGNING ROADWAY LIGHTING SYSTEMS. SURFACE LUMINANCE ADDS INTEREST AND DEPTH TO AN OUTDOOR SCENE AND CAN BE NECESSARY FOR GOOD VISIBILITY, ESPECIALLY FOR THE SAFETY OF THE DRIVERS.

FACTORS IN DESIGNING ROADWAY LIGHTING SYSTEM

THE EXPERTISE REQUIRED FOR LIGHTING DESIGNS INCLUDES:

- LAMP TYPES AND CHARACTERISTICS, INCLUDING DEPRECIATION FACTORS
- BALLAST AND DRIVER TYPES AND CHARACTERISTICS
- FIXTURE MECHANICAL CHARACTERISTICS
- LENS TYPES
- PHOTOMETRIC PERFORMANCE OF LUMINAIRES AND FACTORS IMPACTING SUCH PERFORMANCE
- FIXTURE MOUNTING TYPES
- POLE MECHANICAL AND ELECTRICAL CHARACTERISTICS
- BREAKAWAY DEVICE OPTIONS AND WHEN APPROPRIATE TO USE
- CLEAR ZONE CRITERIA
- POLE TYPES, MOUNTING OPTIONS, AND LOADING CONSIDERATIONS
- FOUNDATION AND SUPPORT DETAILS
- PAVEMENT REFLECTION FACTORS
- MOUNTING HEIGHT AND SPACING OPTIONS
- LIGHT TRESPASS AND SKY GLOW ISSUES INCLUDING LAWS AND ORDINANCES
- LIGHTING QUALITY REQUIREMENTS, SUCH AS ILLUMINANCE, VEILING LUMINANCE, VISIBILITY,
- ENERGY AND LIFE-CYCLE COSTS

MASTER LIGHTING PLAN

A MASTER LIGHTING PLAN IS A FORMAL ARRANGEMENT BETWEEN RELEVANT GOVERNMENT AGENCIES AND OTHER ENTITIES WITHIN A REGIONAL AREA TO COORDINATE AND STANDARDIZE THE DESIGN, OPERATION, MAINTENANCE OF PUBLIC LIGHTING, BASIC BENEFITS OF LIGHTING INCLUDE SAFETY, BEAUTIFICATION, AND SECURITY FOR PEOPLE AND PROPERTY.

ILLUMINANCE CONSIDERATIONS

ILLUMINANCE IN ROADWAY LIGHTING IS A MEASURE OF THE LIGHT INCIDENT ON THE PAVEMENT SURFACE MEASURED IN FOOT-CANDLES (LUX). THE ILLUMINANCE AT ANY CERTAIN POINT WILL BE THE SUM OF ILLUMINANCE FROM ONE OR SEVERAL CONTRIBUTING SOURCES.

LUMINANCE IN ROADWAY LIGHTING IS A MEASURE OF THE REFLECTED LIGHT FROM THE PAVEMENT SURFACE THAT IS VISIBLE TO THE MOTORIST'S EYE. DIFFERENT ROAD SURFACE MATERIALS, SUCH AS PORTLAND CEMENT CONCRETE OR ASPHALT HAVE DIFFERENT LUMINANCE COEFFICIENTS. FOR A SECTION OF ROADWAY, LUMINANCE UNIFORMITY IS CALCULATED BOTH AS THE RATIO OF AVERAGE LEVEL TO MINIMUM POINT, AND MAXIMUM POINT TO MINIMUM POINT. THE EVALUATION OF GLARE FROM THE FIXED LIGHTING SYSTEM IS ALSO RELEVANT AND INCLUDED WITH THE LUMINANCE CRITERIA.

PEDESTRIAN	VEHICULAR TRAFFIC CLASSIFICATION			
	VERY LIGHT	LIGHT	MEDIUM	HEAVY TO HEAVIEST
TRAFFIC	UNDER 150	150 - 500	500 - 1200	1200 AND UP
HEAVY	9.68	12.91	16.14	21.52
MEDIUM	6.46	8.61	10.26	12.91
LIGHT	2.15	4.30	6.46	9.68

TABLE 4. RECOMMENDED AVERAGE HORIZONTAL ILLUMINATION LEVEL, LUX (ELECTRICAL LAYOUT AND ESTIMATE, 2000)

POLE HEIGHT (M)						
ROAD CLASSIFICATION	PEDESTRIAN CONFLICT	1 LANE ONE SIDE	2 LANES ONE SIDE	3 LANES ONE SIDE	4 LANES OPPOSITE	5 LANES OPPOSITE
FREEWAY CLASS A		12 (40')	12 (40')	12 (40')	15 (49')	15 (49')
FREEWAY CLASS B		12 (40')	12 (40')	12 (40')	15 (49')	15 (49')
EXPRESSWAY	HIGH		12 (40')	12 (40')	12 (40')	12 (40')
	MEDIUM		12 (40')	12 (40')	12 (40')	12 (40')
	LOW		12 (40')	12 (40')	12 (40')	12 (40')
MAJOR PRIMARY	HIGH		12 (40')	12 (40')	12 (40')	12 (40')
	MEDIUM		12 (40')	12 (40')	12 (40')	12 (40')
	LOW		12 (40')	12 (40')	12 (40')	12 (40')
COLLECTOR SECONDARY	HIGH		10 (33')	10 (33')	10 (33')	12 (40')
	MEDIUM		10 (33')	10 (33')	10 (33')	12 (40')
	LOW		10 (33')	10 (33')	10 (33')	12 (40')
LOCAL TERTIARY	HIGH	7 (23')	7 (23')	10 (33')		
	MEDIUM	7 (23')	7 (23')	10 (33')		
	LOW	7 (23')	7 (23')	10 (33')		

TABLE 5. POLE HEIGHT BY ROADWAY CONFIGURATION (IESNA RP-8-05)

WARRANTING CONDITIONS

LIGHTING BENEFITS MOTORIST'S BY IMPROVING THEIR ABILITY TO SEE ROADWAY GEOMETRY AND OTHER VEHICLES AT EXTENDED DISTANCE AHEAD. THIS RESULTS IN GREATER DRIVER CONFIDENCE AND IMPROVED SAFETY, WHICH IN TURN IMPROVES HIGHWAY CAPACITY, PEDESTRIAN SAFETY, PUBLIC SAFETY, SECURITY AND CONVENIENCE.

WARRANTS FOR CONTINUOUS EXPRESSWAY LIGHTING, COMPLETE INTERCHANGE LIGHTING, AND PARTIAL INTERCHANGE LIGHTING ARE PROVIDED IN TABLE 4. COMPLETE INTERCHANGE LIGHTING IS DEFINED AS A LIGHTING SYSTEM THAT PROVIDES RELATIVELY UNIFORM LIGHTING WITHIN THE LIMITS OF THE INTERCHANGE, LANES, RAMP TERMINALS, CROSSROAD INTERSECTIONS.

CASE	WARRANTING CONDITIONS
CEL-1	SECTIONS IN AND NEAR CITIES WHERE THE CURRENT AVERAGE DAILY TRAFFIC (ADT) IS 30,000 OR GREATER
CEL-2	SECTIONS WHERE THREE OR MORE SUCCESSIVE INTERCHANGES ARE LOCATED WITH AN AVERAGE SPACING OF 2.3KM OR LESS, AND ADJACENT AREAS OUTSIDE THE RIGHT-OF-WAY ARE SUBSTANTIALLY URBAN IN CHARACTER.
CEL-3	SECTIONS OF 3 KM OR MORE PASSING THROUGH A SUBSTANTIALLY DEVELOPED URBAN OR SUBURBAN AREAS IN WHICH ONE OR MORE OF THE FOLLOWING CONDITIONS EXIST: LOCAL TRAFFIC OPERATES ON A COMPLETE STREET GRID HAVING SOME FORM OF STREET LIGHTING, PARTS OF WHICH ARE VISIBLE FROM THE EXPRESSWAY, THE EXPRESSWAY PASSES THROUGH A SERIES OF DEVELOPMENTS - SUCH AS RESIDENTIAL, COMMERCIAL, INDUSTRIAL, AND CIVIC AREAS, COLLEGES, PARKS, TERMINALS, ETC. THAT INCLUDE LIGHTED ROADS, STREETS, PARKING AREAS, YARDS, ETC., THAT ARE LIGHTED AS PART OF THE LOCAL STREET SYSTEM THE EXPRESSWAY CROSS SECTION ELEMENTS, SUCH AS MEDIAN AND BORDERS, ARE SUBSTANTIALLY REDUCED IN WIDTH BELOW DESIRABLE SECTIONS USED IN RELATIVELY OPEN COUNTRY.
CEL-4	SECTIONS WHERE THE RATIO OF NIGHT TO DAY CRASH RATE IS AT LEAST 2.0 TIMES THE REGION AVERAGE FOR ALL UNLIGHTED SIMILAR SECTIONS, AND A STUDY INDICATES THAT LIGHTING MAY BE EXPECTED TO RESULT IN A SIGNIFICANT REDUCTION IN THE NIGHT CRASH RATE, WHERE CRASH RATE DATA IS NOT AVAILABLE, RATE COMPARISON MAY BE USED AS A GENERAL GUIDELINE FOR CRASH SEVERITY.

TABLE 6. WARRANTING CONDITIONS FOR CONTINUOUS EXPRESSWAY LIGHTING *(AASHTO 2005, ROADWAY LIGHTING DESIGN GUIDE)*

CASE	WARRANTING CONDITIONS
CIL-1	WHERE THE TOTAL CURRENT ADT RAMP TRAFFIC ENTERING AND LEAVING EXPRESSWAY WITHIN THE INTERCHANGE AREAS EXCEEDS 10,000 FOR URBAN CONDITIONS, 8,000 FOR SUBURBAN CONDITIONS, OR 5,000 FOR RURAL CONDITIONS.
CIL-2	WHERE THE CURRENT ADT ON THE CROSSROAD EXCEEDS 10,000 FOR URBAN CONDITIONS, 8,000 FOR SUBURBAN CONDITIONS, OR 5,000 FOR RURAL CONDITIONS.
CIL-3	WHERE EXISTING SUBSTANTIAL COMMERCIAL OR INDUSTRIAL DEVELOPMENT THAT IT LIGHTED DURING HOURS OF DARKNESS IS LOCATED IN THE IMMEDIATE VICINITY OF THE INTERCHANGE, OR WHERE THE CROSSROAD APPROACH LEGS ARE LIGHTED FOR 0.75KM OR MORE ON EACH SIDE OF THE INTERCHANGE.
CIL-4	WHERE THE RATIO OF THE NIGHT TO DAY CRASH RATE WITHIN THE INTERCHANGE AREA IS AT LEAST 1.5 TIMES THE REGION AVERAGE FOR ALL UNLIGHTED SIMILAR SECTIONS, AND A STUDY INDICATES THAT LIGHTING MAY BE EXPECTED TO RESULT IN A SIGNIFICANT REDUCTION IN THE NIGHT CRASH RATE. WHERE CRASH DATA IS NOT AVAILABLE, RATE COMPARISON MAY BE USED AS A GENERAL GUIDELINE FOR CRASH SEVERITY.

TABLE 7. WARRANTING CONDITIONS FOR COMPLETE INTERCHANGE LIGHTING *(AASHTO 2005, ROADWAY LIGHTING DESIGN GUIDE)*

DESIGN CRITERIA

1. DPWH DESIGN GUIDELINES, CRITERIA, AND STANDARDS (DGCS) 2015 EDITION
2. NATIONAL STRUCTURAL CODE OF THE PHILIPPINES
3. PHILIPPINES ELECTRICAL CODE, PART 2, 2017
4. ROADWAY LIGHTING DESIGN GUIDE, 7TH EDITION, 2018
5. ILLUMINATING ENGINEERING SOCIETY OF NORTH AMERICA (IESNA) LIGHTING HANDBOOK, 9TH EDITION, 2000

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGIONAL OFFICE No XII
DAVAO DEL SUR DISTRICT ENGINEERING OFFICE
DIGOS CITY, DAVAO DEL SUR

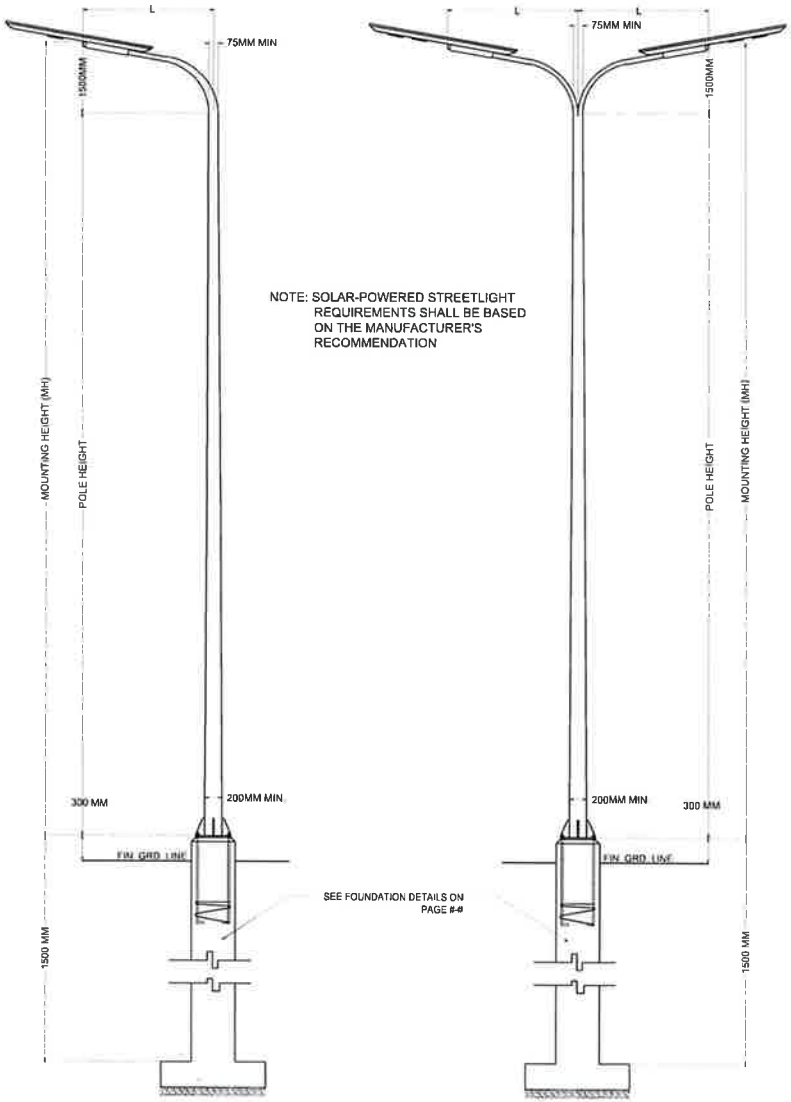
PROJECT NAME AND LOCATION: INSTALLATION OF STREETLIGHTS WITH ROAD SAFETY FACILITIES ALONG DAVAO-COTABATO RD (JCT DIGOS-COTABATO SECT.), K1554+(-478) - K1581+000
DIGOS CITY / MATANAO / BANSALAN — DAVAO DEL SUR

SHEET CONTENTS: DETAIL OF SINGLE AMDDOUBLE ARM POST WITH STREET LIGHT
SCHEDULE OF STREET LIGHT

DRAFTED: MARK ANTHONY B. ALBERCA, ENGINEER II
PREPARED: JOHN RONAFER C. IGLESIAS, ENGINEER II

REVIEWED: DANIEL M. APITAN, ENGINEER II — DATE
SUBMITTED: VIRGENIA C. OÑEZ, CHIEF, PLANNING & DESIGN SECTION — DATE
RECOMMENDED: MARIA TERESA B. LUCABERTE, ASSISTANT DISTRICT ENGINEER — DATE
APPROVED: NICOMEDES D. PARILLA, JR., DISTRICT ENGINEER — DATE

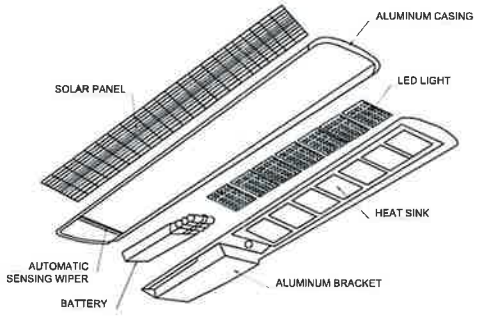
SET NO: - - -
SHEET NO: 19 / 27

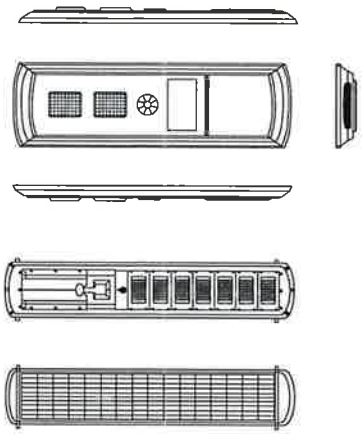


1 SINGLE ARM POST DETAILS
NOT TO SCALE

2 DOUBLE ARM POST DETAILS
NOT TO SCALE

NOTE: SOLAR-POWERED STREETLIGHT REQUIREMENTS SHALL BE BASED ON THE MANUFACTURER'S RECOMMENDATION





3 LED LUMINAIRE DETAILS
NOT TO SCALE

NOTE:
1. INCLUDE ADDITIONAL DETAIL FOR DESIRED LAMP POST TO BE USED AND REFER AND VERIFY TO DPWH STANDARDS
2. REFER TO DPWH ELECTRICAL TECHNICAL SPECS FOR LAMP POST WATTAGE RATING, MOUNTING HEIGHT, AND SPACING EQUIVALENT.

INTEGRATED SOLAR STREETLIGHT TECHNICAL PARAMETERS		
SOLAR PHOTOVOLTAIC PANEL	OPERATING VOLTAGE AND POWER	12V - 36V
		60 - 310W
		(SHOULD BE GREATER THAN 90% AFTER 10 YEARS AND LESS THAN 80% AFTER 25 YEARS)
	LIFETIME	>25 YEARS
	MATERIAL	MONOCRYSTALLINE/POLYCRYSTALLINE SILICON
	WEIGHT	<25 KG
	ALLOWABLE AMBIENT TEMPERATURE RANGE	-40°C TO +60°C
BATTERY	INPUT VOLTAGE	12.8V
	TYPE	LITHIUM-ION OR LEAD-ACID TYPE ELECTROLYTE PLATE LEAD ACID WITH LOW ANTIMONY LEAD ALLOY PLATES AND CERAMIC VENT PLUGS
	LIFETIME	6 - 8 YEARS
	CHARGING AND DISCHARGING CYCLES	2000
	CHARGING TIME	7 HOURS
	WORKING TIME UNDER RAINY DAYS	10 DAYS
CHARGE CONTROLLER	INTELLIGENT CONTROL FOR CIRCUIT PROTECTION	
	FEATURE	TIMING, DIMMING, AND SENSOR
LIGHT-EMITTING DIODE (LED) LAMP	LIGHT OUTPUT	50W TO 300W
	SYSTEM FLUX	8000 - 30,000 LM
	COLOR TEMPERATURE	2,500K - 3,500K (WARM WHITE) 3,000K - 4,500K (COOL WHITE) 5,500K - 6,500K (DAYLIGHT)
	OPTICAL COVER/ LENS TYPE	UV STABILIZED
		POLY CARBONATE COVER
	DRIVER	DIMMABLE AND DESIGNED TO OPERATE MAINTENANCE FREE FOR 50,000 HOURS WITH A COMPATIBILITY TO WIRELESS LIGHTING CONTROL PROTOCOLS
	LIFETIME	>50,000 HOURS
	PHOTO CONTROLLER	INDIVIDUAL OR GROUP
	HOUSING	HIGH PRESSURE DIE-CAST ALUMINUM WITH HEAT MANAGEMENT SYSTEM AND RUST RESISTANT
ALLOWABLE AMBIENT TEMPERATURE	RANGE	-40°C TO +80°C
	RANGE FOR CHARGING	0°C TO +45°C
	RANGE FOR DISCHARGING	-20°C TO +35°C
CHARGE TIME	7 HOURS UNDER DIRECT AND STRONG SUNLIGHT	
IP RATING	IP 65	
WARRANTY PERIOD	8 YEARS MINIMUM	

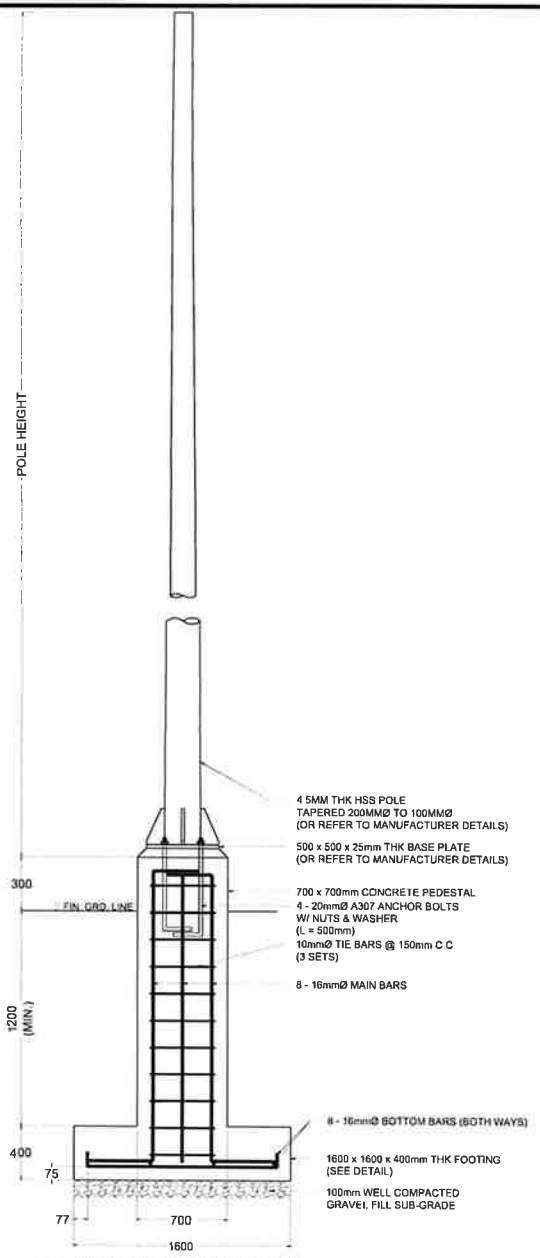
INITIAL LUMEN OF HIGH PRESSURE LAMPS		
TYPES OF LAMPS	WATTAGE	INITIAL LUMEN
HIGH PRESSURE SODIUM (HPS)	100	9500
	150	16000
	250	26000
	450	50000

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGIONAL OFFICE NO. XI
DAVAO DEL SUR DISTRICT ENGINEERING OFFICE
DIGOS CITY, DAVAO DEL SUR

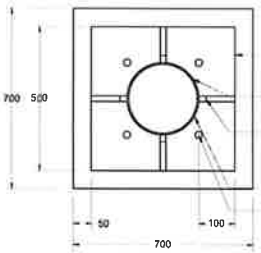
PROJECT NAME AND LOCATION: INSTALLATION OF STREETLIGHTS WITH ROAD SAFETY FACILITIES ALONG DAVAO-COTABATO RD (JCT DIGOS-COTABATO SECT.), K1564+(-478) - K1581+000
DIGOS CITY / MATANAO / BANSALAN — DAVAO DEL SUR

SHEET CONTENTS: DETAIL OF SINGLE AND DOUBLE ARM POST WITH STREET LIGHT

DRAFTED	REVIEWED	SUBMITTED	RECOMMENDED	APPROVED	SET NO	SHEET NO
MARK ANTHONY B. ALBERCA, ENGINEER II	DARIOT M. APITAN, ENGINEER II, DATE	VIRGENIA C. OÑEZ, CHIEF, PLANNING & DESIGN SECTION, DATE	MARIA TERESA B. LUCABERTE, ASSISTANT DISTRICT ENGINEER, DATE	NICOMEDES D. PARILLA, JR., DISTRICT ENGINEER, DATE	-	26 27
PREPARED: JOHN RONAFEB C. IGLESIAS, ENGINEER II						



1 FOUNDATION ELEVATION
SCALE 1:20 m



700 x 700mm CONCRETE PEDESTAL
(SEE DETAIL)

500 x 500 x 25mm THK BASE PLATE
(OR REFER TO MANUFACTURER DETAILS)

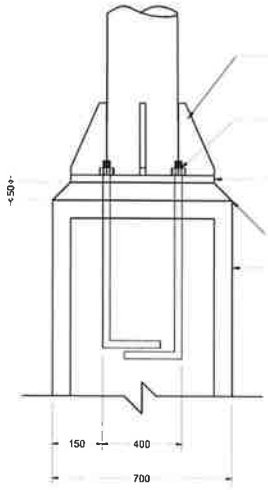
FULL WELD ALL STEEL
ELEMENTS (t = 5mm, E60xx)

4 - 16mm STIFFENER PLATES
(OR REFER TO MANUFACTURER
DETAILS)

TAPERED POLE

4 - 20mmØ A307 ANCHOR BOLTS
W/ NUTS & WASHER (L=500mm)

TOP VIEW



4 - 16mm STIFFENER PLATES
(OR REFER TO MANUFACTURER
DETAILS)

4 - 20mmØ A307 ANCHOR BOLTS
W/ NUTS & WASHER
(L = 500mm)

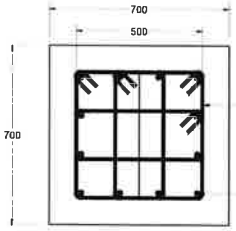
500 x 500 x 25mm THK BASE PLATE
(OR REFER TO MANUFACTURER DETAILS)

50mm LEVELING GROUT

500 x 500mm CONCRETE PEDESTAL
(SEE DETAIL)

FRONT VIEW

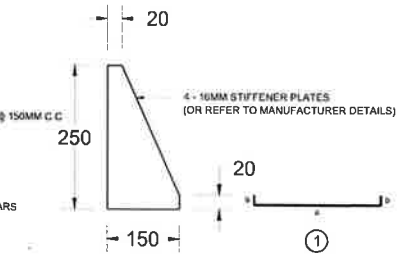
2 BASE PLATE DETAIL FOR 8M POLE
SCALE 1:10 m



10MMØ TIE BARS @ 150MM C.C
(3 SETS)

12 - 20MMØ MAIN BARS

3 PEDESTAL DETAIL
SCALE 1:10 m



4 STIFFENER DETAIL
SCALE 1:5 m

5 BAR BENDING DIAGRAM
SCALE 1:30 m

REINFORCEMENT BAR DIMENSIONS (mm)				
	SIZE (mm Ø)	a	b	c
1	16	1034	85	
2	16	1281	360	255
3	10	350	75	
4	10	350	75	

DESIGN CRITERIA

A. REFERENCES

a. NATIONAL STRUCTURAL CODE OF THE PHILIPPINES (NSCP), 7TH EDITION (2015)
b. AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE) 360
c. AMERICAN CONCRETE INSTITUTE (ACI) 318
d. AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC) 360

B. DESIGN LOADS

a. DEAD LOAD
   i. CONCRETE — 24 kN/m³
   ii. STEEL — 77 kN/m³
   iii. SOIL — 18 kN/m³
   iv. POLE ATTACHMENTS — 50 kg
b. WIND LOAD
   i. WIND SPEED — 250 kph
   ii. EXPOSURE CATEGORY — D
   iii. DIRECTIONALITY FACTOR — 0.85
   iv. OCCUPANCY CATEGORY — V (MISCELLANEOUS STRUCTURES)

C. MATERIALS

a. NORMAL WEIGHT CONCRETE — F'_c = 28 MPa (4000 psi)
b. REINFORCING STEEL
   i. 12mmØ AND BELOW — F_y = 276 MPa (Grade 40)
   ii. 16mmØ AND ABOVE — F_y = 414 MPa (Grade 60)
c. STRUCTURAL STEEL
   i. STEEL POLE — F_y = 240 MPa (A53 GRADE B); F_u = 415 MPa
   ii. BASE PLATE & STIFFENER — F_y = 276 MPa (A36); F_u = 400 MPa
d. STRUCTURAL BOLTS & FASTENER — F_{nt} = 310 MPa (A307); F_{nv} = 165 MPa
e. WELDS — E60xx ELECTRODE

D. DESIGN APPROACH

a. LOAD AND RESISTANCE FACTORED DESIGN (LRFD) IS USED TO DESIGN THE STEEL ELEMENTS.
b. ULTIMATE STRENGTH DESIGN (USD) IS USED TO DESIGN THE CONCRETE ELEMENTS.
c. WORKING STRESS DESIGN (WSD) IS USED TO PARTIALLY DESIGN THE FOUNDATION.
d. LOAD COMBINATIONS CORRESPONDING TO THE DESIGN PHILOSOPHIES MENTIONED ABOVE ARE UTILIZED WHICH ARE BASED ON THE NSCP 2015

E. NOTES ON DESIGN LOADS

a. IF THE ASSUMED DESIGN LOADS IS NOT APPLICABLE FOR THE REQUIRED DESIGN, THE DESIGN SHALL BE REVISED ACCORDINGLY.

F. NOTES ON FOUNDATION

a. THE FOUNDATION IS DESIGNED FOR AN ASSUMED ALLOWABLE SOIL BEARING CAPACITY (SBC) OF 96 kPa (2000 psf). IF THE LOCATION IS KNOWN OR FOUND OUT TO HAVE AN SBC OF LESS THAN THE ASSUMED, THE FOOTING DESIGN SHALL BE REVISED ACCORDINGLY.
b. NO FOOTING SHALL REST ON FILL. PROVIDE 100mm THICK PROPERLY WELL COMPACTED GRAVEL BED BEFORE CASTING

G. NOTES ON ASSEMBLY

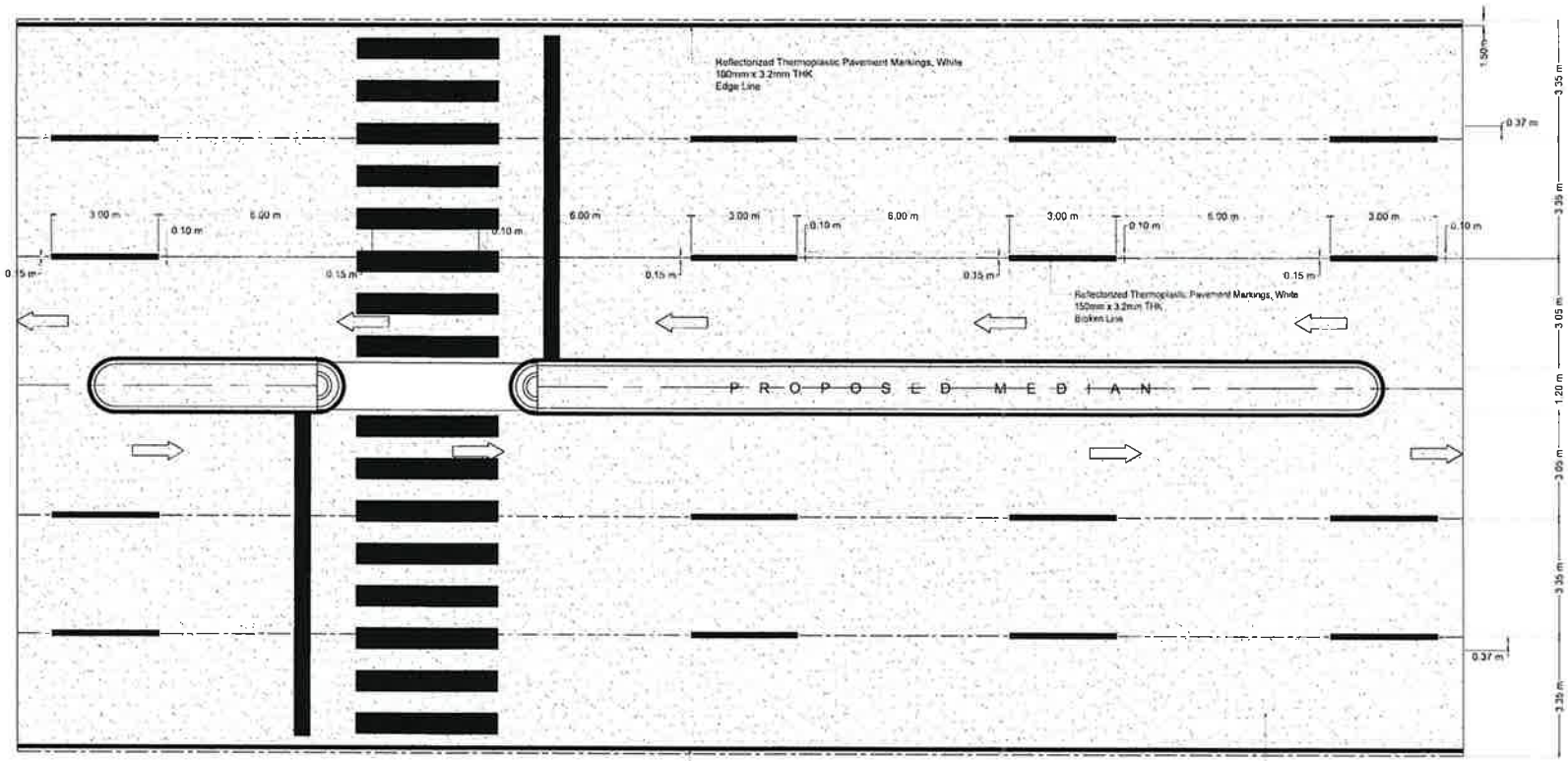
a. MANUFACTURER MAY SUPPLY A PRE-ASSEMBLED STEEL POST WITH ACCESSORIES (MAST ARM, STIFFENERS, AND/OR BASE PLATE) PROVIDED THAT ITS DESIGN IS SUFFICIENT FOR THE DESIGN LOADS AND MATERIAL STRENGTHS PROVIDED IN THE ITEMS ABOVE.
b. DESIGN CALCULATIONS/SPECIFICATIONS OF THE PRE-ASSEMBLED STEEL POST MUST BE SUBMITTED TO THE ENGINEER FOR APPROVAL PRIOR INSTALLATION

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGIONAL OFFICE No XI
DAVAO DEL SUR DISTRICT ENGINEERING OFFICE
DIGOS CITY, DAVAO DEL SUR

PROJECT NAME AND LOCATION: INSTALLATION OF STREETLIGHTS WITH ROAD SAFETY FACILITIES ALONG DAVAO-COTABATO RD (JCT DIGOS-COTABATO SECT.), K1564+(-478) - K1581+000
☐ DGS CITY ☐ MATANAO ☐ BANSALAN DAVAO DEL SUR

SHEET CONTENTS: DETAIL OF SINGLE AND DOUBLE ARM POST WITH STREET LIGHT
SCHEDULE OF STREET LIGHT

DRAFTED	REVIEWED	SUBMITTED	RECOMMENDED	APPROVED	SHEET NO.
MARK ANTHONY B. ALBERCA, ENGINEER II	DANIEL M. APITAN, ENGINEER II, DATE:	VIRGENIA C. OÑEZ, CHIEF, PLANNING & DESIGN SECTION, DATE	MARIA TERESA R. LUCABERTE, ASSISTANT DISTRICT ENGINEER, DATE	NICOMEDES D. PARILLA, JR., DISTRICT ENGINEER, DATE	21 / 27
PREPARED: JOHN RONAFEB C. IGLESIAS, ENGINEER III					



(1) TYPICAL REFLECTORIZED THERMOPLASTIC PAVEMENT MARKING (6 LANES WITH MEDIAN)

Scale: 1:100

SCHEDULE OF REFLECTORIZED THERMOPLASTIC PAVEMENT MARKING FOR PEDESTRIAN CROSSING AND STOP BAR

STATION	WIDTH	LENTGH	QUANTITY	AREA	REMARKS

SCHEDULE OF REFLECTORIZED THERMOPLASTIC PAVEMENT MARKING MEDIAN EDGE

EDGE OF MEDIAN				
STATION		SOLID LINES (w=0.10m)		
		LENGTH	AREA	

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGIONAL OFFICE No. XI
DAVAO DEL SUR DISTRICT ENGINEERING OFFICE
DIGOS CITY, DAVAO DEL SUR

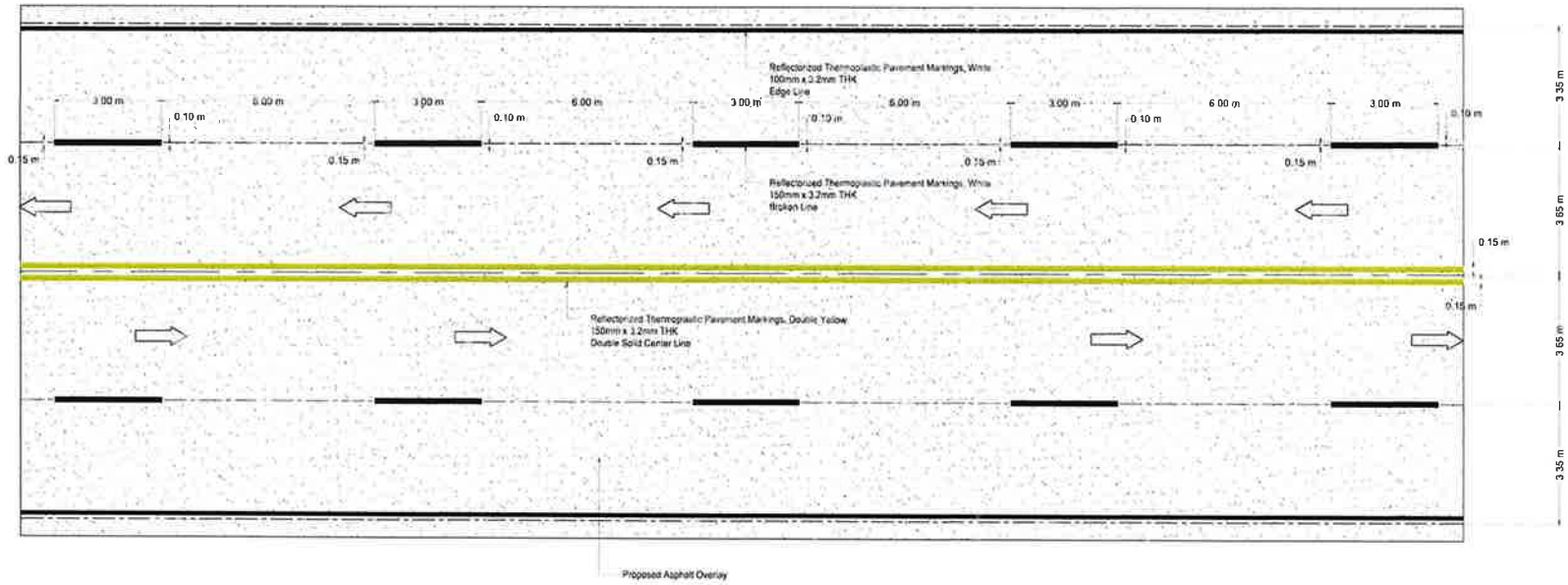
PROJECT NAME AND LOCATION: INSTALLATION OF STREETLIGHTS WITH ROAD SAFETY FACILITIES ALONG DAVAO-COTABATO RD (JCT DIGOS-COTABATO SECT.), K1564+(-478) - K1581+000
DIGOS CITY / MATANAO / BANSALAN — DAVAO DEL SUR

SHEET CONTENTS: REFLECTORIZED THEROMPLASTIC PAVEMENT MARKING DETAILS

DRAFTED: MARK ANTHONY B. ALBERCA, ENGINEER II
PREPARED: JOHN RONAFEB C. IGLESIAS, ENGINEER II

REVIEWED: DARIEL M. APITAN, ENGINEER II — DATE
SUBMITTED: VIRGENIA C. OÑEZ, CHIEF, PLANNING & DESIGN SECTION — DATE
RECOMMENDED: MARIA TERESA B. LUCABERTE, ASSISTANT DISTRICT ENGINEER — DATE
APPROVED: NICOMEDES D. PARILLA, JR., DISTRICT ENGINEER — DATE

SET NO.
SHEET NO. 22 / 27



1 TYPICAL REFLECTORIZED THERMOPLASTIC PAVEMENT MARKING (4 LANES)

Scale 1:100

SCHEDULE OF REFLECTORIZED THERMOPLASTIC PAVEMENT MARKING FOR BROKEN AND EDGE

STATION		SOLID LINES (w=0.10m)	BROKEN LINES (w=0.15/L=3.0m)			REMARKS
		LENGTH	LENGTH	NO. OF STRIPS	AREA	
SECTION A						
BEG	Sta. 1568+666.557	366.00 m			73.200 sq. m	Edge Line B/S
END	Sta. 1569+032.557					
BEG	Sta. 1568+666.557		366.00 m		73.200 sq. m	4L, Broke Line
END	Sta. 1569+032.557					
SECTION B						
BEG	Sta. 1569+371.446	306.00 m			61.200 sq. m	Edge Line B/S
END	Sta. 1569+677.446					
BEG	Sta. 1569+371.446		306.00 m		61.200 sq. m	4L, Broke Line
END	Sta. 1569+677.446					
SECTION C						
BEG	Sta. 1569+677.446	84.00 m			16.800 sq. m	Edge Line B/S
END	Sta. 1569+761.446					
BEG	Sta. 1569+677.446		84.00 m		16.800 sq. m	4L, Broke Line
END	Sta. 1569+761.446					
SECTION D						
BEG	Sta. 1578+929.00	170.00 m			34.00 sq. m	Edge Line B/S
END	Sta. 1579+099.00					
BEG	Sta. 1578+929.00		170.00 m		34.00 sq. m	4L, Broke Line
END	Sta. 1579+099.00					
					370.40 sq. m	Total Area

SUMMARY	
PEDESTRIAN CROSSING AND STOP BAR	280.620 sq.m
MEDIAN EDGE	95.489 sq. m
BROKEN AND EDGE	370.40 sq. m
GRAND TOTAL AREA =	746.509 sq. m

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGIONAL OFFICE No. XI
DAVAO DEL SUR DISTRICT ENGINEERING OFFICE
DIGOS CITY, DAVAO DEL SUR

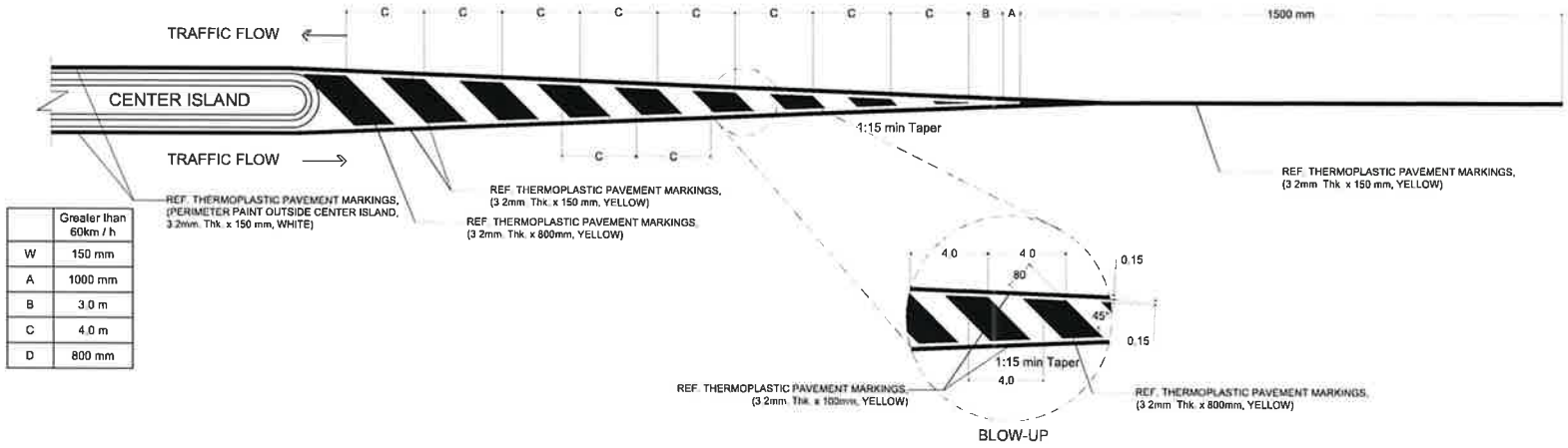
PROJECT NAME AND LOCATION: INSTALLATION OF STREETLIGHTS WITH ROAD SAFETY FACILITIES ALONG DAVAO-COTABATO RD (JCT DIGOS-COTABATO SECT.), K1554+(-478) - K1581+000 — DIGOS CITY / MATANAO / BANSALAN — DAVAO DEL SUR

SHEET CONTENTS: REFLECTORIZED THERMOPLASTIC PAVEMENT MARKING DETAILS

DRAFTED	REVIEWED	SUBMITTED	RECOMMENDED	APPROVED
MARK ANTHONY B. ALBERCA, ENGINEER II	DANIEL M. APITAN, ENGINEER II	VIRGENIA C. OÑEZ, CHIEF, PLANNING & DESIGN SECTION	MARIA TERESA B. LUCABERTE, ASSISTANT DISTRICT ENGINEER	NICOMEDES D. PARILLA, JR., DISTRICT ENGINEER
PREPARED: JOHN RONAFEB C. IGLESIAS, ENGINEER II	DATE	DATE	DATE	DATE

SET NO. -

SHEET NO. 23 / 27



	Greater than 60km / h
W	150 mm
A	1000 mm
B	3.0 m
C	4.0 m
D	800 mm

APPROACH MARKING TO CENTER ISLAND

SCHEDULE FOR REFLECTORIZED THERMOPLASTIC PAVEMENT MARKING (YELLOW)			
STATION	NO. OF APPROACH MARKING	TOTAL AREA	REMARKS
			TOTAL AREA

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGIONAL OFFICE No. XI
DAVAO DEL SUR DISTRICT ENGINEERING OFFICE
DIGOS CITY, DAVAO DEL SUR

PROJECT NAME AND LOCATION: INSTALLATION OF STREETLIGHTS WITH ROAD SAFETY FACILITIES ALONG DAVAO-COTABATO RD (JCT DIGOS-COTABATO SECT.), K1584+(-478) - K1581+000 DIGOS CITY / MATANAO / BANSALAN DAVAO DEL SUR

SHEET CONTENTS: REFLECTORIZED THEROMPLASTIC PAVEMENT MARKING DETAILS

DRAFTED: MARK ANTHONY B. ALBERCA, ENGINEER II
PREPARED: JOHN RONAFEB C. BLESIAS, ENGINEER II

REVIEWED: DANIEL M. APITAN, ENGINEER II, DATE

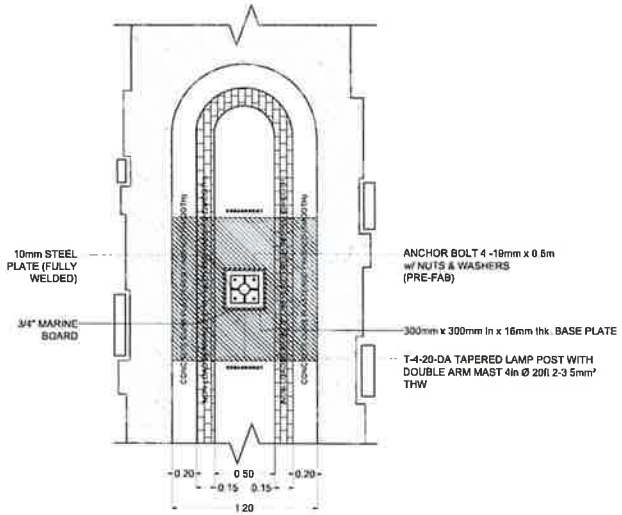
SUBMITTED: VIRGENIA C. OÑEZ, CHIEF, PLANNING & DESIGN SECTION, DATE

RECOMMENDED: MARIA TERESA B. LUCABERTE, ASSISTANT DISTRICT ENGINEER, DATE

APPROVED: NICOMEDES D. PARILLA, JR., DISTRICT ENGINEER, DATE

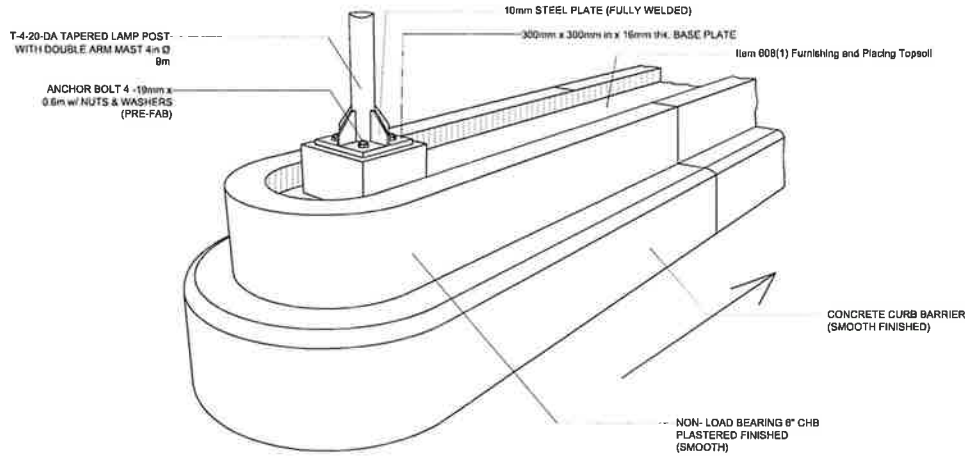
SET NO. -

SHEET NO. 24 / 27

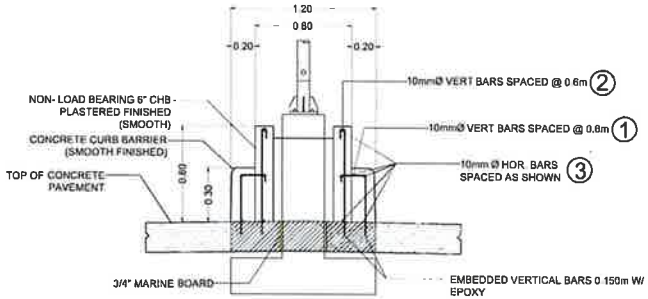


PLAN

scale 1:30



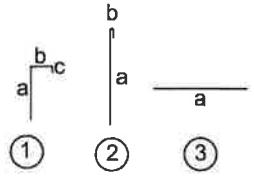
ISOMETRIC VIEW OF MEDIAN



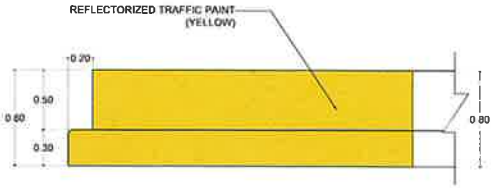
ELEVATION

scale 1:30

REINFORCEMENT BAR DIMENSIONS (mm)			
	a	b	c
①	500	225	120
②	850	75	
③	as shown		



BAR BENDING DIAGRAM MEDIAN



DETAILED PAINTING WORKS ON MEDIAN

Scale: 1:30 mm

Station	Length

SCHEDULE OF MEDIAN

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGIONAL OFFICE No XI
DAVAO DEL SUR DISTRICT ENGINEERING OFFICE
DIGOS CITY, DAVAO DEL SUR

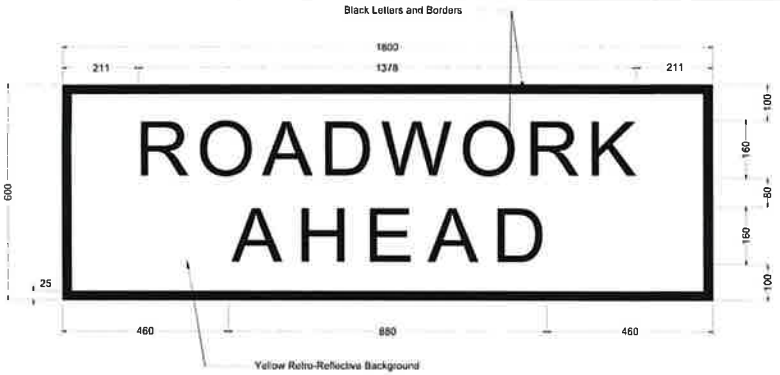
PROJECT NAME AND LOCATION: INSTALLATION OF STREETLIGHTS WITH ROAD SAFETY FACILITIES ALONG DAVAO-COTABATO RD.(JCT DIGOS-COTABATO SECT.), K1544+(-478) - K1581+000
DIGOS CITY / MATANAO / BANSALAN — DAVAO DEL SUR

SHEET CONTENTS: MEDIAN DETAILS

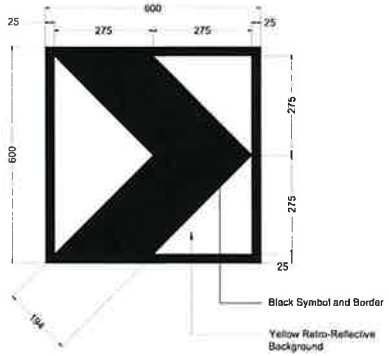
DRAFTED: MARK ANTHONY G. ALBERCA, ENGINEER II
PREPARED: JOHN RONAFEB C. IGLESIAS, ENGINEER II

REVIEWED: DARIOT M. APITAN, ENGINEER II — DATE
SUBMITTED: VIRGENIA C. OÑEZ, CHIEF, PLANNING & DESIGN SECTION — DATE
RECOMMENDED: MARIA TERESA B. LUCABERTE, ASSISTANT DISTRICT ENGINEER — DATE
APPROVED: NICOMEDES D. PARILLA, JR., DISTRICT ENGINEER — DATE

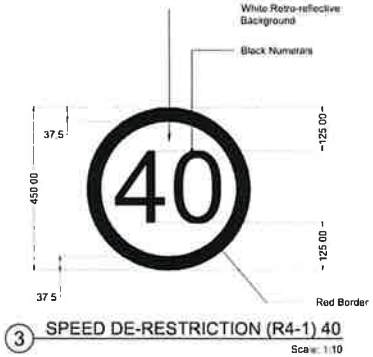
SET NO: - - -
SHEET NO: 25 / 27



1 ROADWORK AHEAD (T1-1)
Scale: 1:10

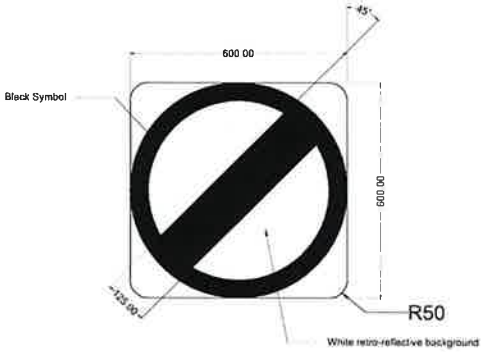


2 TEMPORARY HAZARD MARKERS (T5-5)
Scale: 1:10



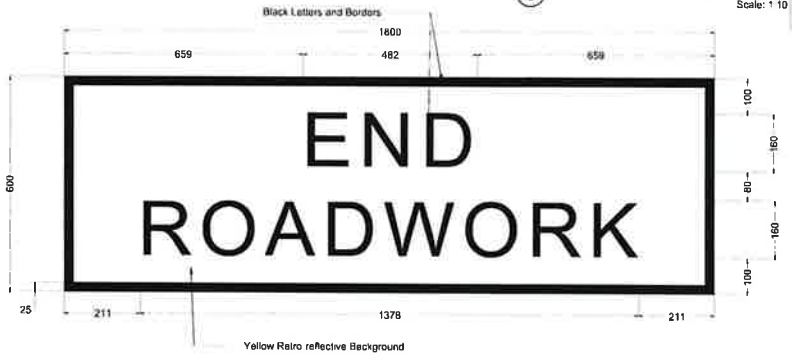
3 SPEED DE-RESTRICTION (R4-1) 40
Scale: 1:10

4 WORKMEN AHEAD (SYMBOLIC) (T1-5)
Scale: 1:10

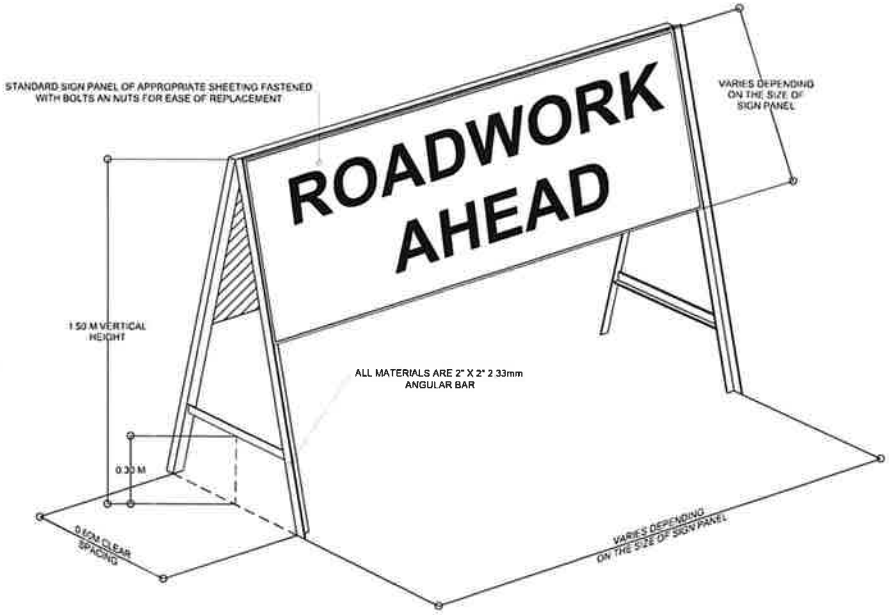


5 SPEED DE-RESTRICTION (R4-2)
Scale: 1:10

6 PREPARE TO STOP (T1-18)
Scale: 1:10



7 END ROADWORK
Scale: 1:10



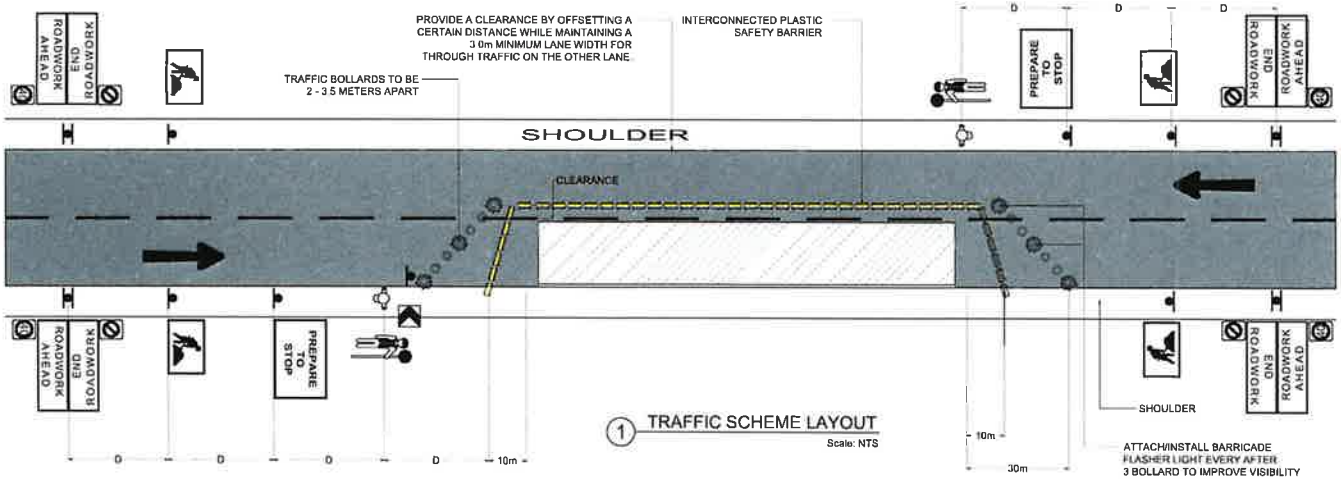
8 DETAILS OF TWO SIDED SIGN FRAME
Scale: NTS

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGIONAL OFFICE No XI
DAVAO DEL SUR DISTRICT ENGINEERING OFFICE
DIGOS CITY, DAVAO DEL SUR

PROJECT NAME AND LOCATION: INSTALLATION OF STREETLIGHTS WITH ROAD SAFETY FACILITIES ALONG DAVAO-COTABATO RD (JCT DIGOS-COTABATO SECT.), K1564+(-478) - K1581+000
DIGOS CITY / MATANAO / BANSALAN — DAVAO DEL SUR

SHEET CONTENTS: TRAFFIC MANAGEMENT PROGRAM SIGNAGE

DRAFTED	REVIEWED	SUBMITTED	RECOMMENDED	APPROVED	SET NO	SHEET NO
MARK ANTHONY B. ALBERCA, ENGINEER II PREPARED: JOHN RONAFEB C. IGLESIAS, ENGINEER II	BARRY M. APITAN, ENGINEER DATE	VIRGENIA C. OÑEZ, CHIEF, PLANNING & DESIGN SECTION DATE	MARIA TERESA R. LUCABERTE, ASSISTANT DISTRICT ENGINEER DATE	NICOMEDES D. PARILLA, JR., DISTRICT ENGINEER DATE	-	26 27



1 TRAFFIC SCHEME LAYOUT
Scale: NTS

NOTE:

ADVANCE WARNING AREA IS THE SECTION OF ROADWAY WHERE DRIVERS ARE INFORMED ABOUT THE APPROACHING WORK AREA AND WHAT TO EXPECT AHEAD

THE TYPE AND SPACING OF SIGNS TO BE USED IN THIS AREA DEPEND ON THE NATURE OF THE WORKS AND THE SPEED OF APPROACHING TRAFFIC

THE FIRST ADVANCE WARNING SIGN SEEN BY DRIVERS IS GENERALLY 'ROAD WORKS AHEAD'. THE SIGN SHOULD BE LOCATED A MINIMUM DISTANCE OF 2D METERS BEFORE THE START OF THE WORKS, OR IF THERE IS A TRANSITION AREA, THE START OF THE TAPER. FOR EXAMPLE IF THE APPROACH SPEED OF TRAFFIC IS 60 KPH THEN THE 'ROADWORKS AHEAD' SIGN SHOULD BE MINIMUM OF 120 METERS BEFORE THE TAPER OF WORK AREA.

OTHER SIGNS IN THE ADVANCE WARNING ARE PROVIDE ADDITIONAL WARNING FOR ROAD USERS OR INFORM DRIVERS OF SPECIFIC ACTION THAT MAY BE REQUIRED AHEAD IN THESE SITUATIONS THE SIGNS CLOSEST TO THE WORK SHOULD BE AT A DISTANCE OF 2D WITH OTHER SIGNS GENERALLY SPACED 'D' METERS APART. THEREFORE, IF TWO OR MORE SIGNS ARE PROVIDED IN THE ADVANCE WARNING AREA THE 'ROAD WORKERS AHEAD' SIGN MAY NEED TO BE A DISTANCE OF 3D OR MORE PRIOR TO THE WORKS. HOWEVER WHERE VISIBILITY IS GOOD AND THERE ARE MORE THAN TWO ADVANCE SIGNS THE SPACING OF SIGNS MAY BE REDUCED TO A MINIMUM OF 0.5D.

FOR SHORT TERMS PARTIAL ROAD CLOSURES IN LOW SPEED, LOW TRAFFIC VOLUME ROADS, OR WHERE THERE IS ROOM FOR TWO-WAY TRAFFIC ADJACENT TO THE WORK AREA, ADVANCE SIGNS MAY BE POSITIONED CLOSER TO THE WORK AREA NO TRAFFIC CONTROLLERS REQUIRED (D METERS WOULD GENERALLY BE SATISFACTORY) SIGNS MAY BE OMITTED THESE SITUATION IF THE VEHICLE MOUNTED WARNING DEVICE CAN BE SEEN BY APPROACHING DRIVERS FOR A DISTANCE OF 2D METERS

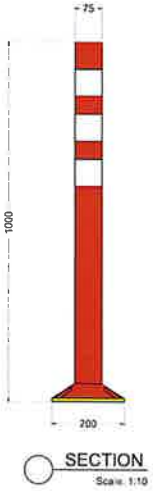
TABULATION OF TRAFFIC MANAGEMENT		
A.	1. Roadwork Ahead (T1 -1)	4.0 each
	2. End Roadwork Ahead (T2-16)	4.0 each
	3. Speed Restriction (R4-1)	4.0 each
	4. End Speed Restriction (R4-2)	4.0 each
	5. Workmen Ahead (T1-5)	4.0 each
	6. Prepare to Stop (T1-18)	2.0 each
	7. Temporary Hazard Marker (T5-5)	1.0 each
B.	1. Temporary Bollards (@ 5 meters apart)	160.0 each
	2. Plastic Safety barriers	160.0 each
C.	1. Safety Vest	2.0 each
	2. Hard Hat	2.0 each
	3. Safety Shoes	2.0 each

SPECIFICATION:

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

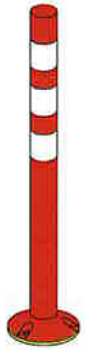
NOTE:

1. BOLLARD 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 REFLECTED TAPE WITH MINIMUM BANDWIDTH OF 250MM.
4. SPACING @ 0.60 M. O.C.



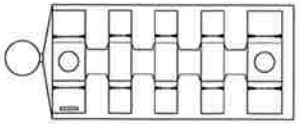
SECTION
Scale: 1:10

PLAN
Scale: 1:10

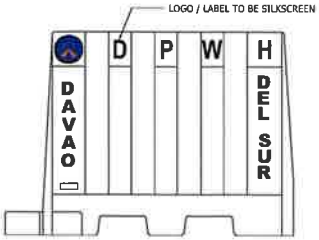


ISOMETRIC VIEW
Scale: 1:10

FLASHER DETAILS



TOP VIEW



FRONT VIEW

PERSPECTIVE

Orange (49"L x 19.50"W x 32"H), Virgin medium density polyethylene plastic, food grade, strong compact roto molding process, resistant to chemical heat, rot and compounded with uv stabilizer with DPWH Logo and Text label

2 FLEXIBLE BOLLARD DETAIL
Scale: 1:10

PLASTIC BARRIER DETAILS
Scale: NTS

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGIONAL OFFICE No. XI
DAVAO DEL SUR DISTRICT ENGINEERING OFFICE
DIGOS CITY, DAVAO DEL SUR

PROJECT NAME AND LOCATION: INSTALLATION OF STREETLIGHTS WITH ROAD SAFETY FACILITIES ALONG DAVAO-COTABATO RD (JCT DIGOS-COTABATO SECT.), K1564+(-478) - K1581+000
DIGOS CITY / MATANAO / BANSALAN — DAVAO DEL SUR

SHEET CONTENTS: TRAFFIC SCHEME (LAYOUT 7, CASE 1)

DRAFTED	REVIEWED	SUBMITTED	RECOMMENDED	APPROVED	SET NO.	SHEET NO.
MARK ANTHONY B. ALBERCA, ENGINEER II	BARRY M. APITAN, ENGINEER II, DATE	VIRGENIA C. OÑEZ, CHIEF, PLANNING & DESIGN SECTION, DATE	MARIA TERESA R. LUCABERTE, ASSISTANT DISTRICT ENGINEER, DATE	NICOMEDES D. PARILLA, JR., DISTRICT ENGINEER, DATE	-	27
PREPARED: JOHN RONAFEB C. BLESIAS, ENGINEER II					-	27