REPUBLIC OF THE PHILIPPINES

DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

REGIONAL OFFICE NO. IV-A

CAVITE 3RD DISTRICT ENGINEERING OFFICE

CARMONA CITY, CAVITE

C.Y. 2024 PROJECT

DETAILED ENGINEERING DESIGN PLAN FOR

REHABILITATION/ REPAIR OF ZAGALA BR. EAST (B02991LZ) ALONG BACOOR-DASMARIÑAS NATIONAL RD., DASMARIÑAS CITY, CAVITE

ROAD SECTION	:	BACOOR-DASMARIÑAS NATIONAL RD.
LOCATION	:	DASMARIÑAS CITY, CAVITE
STATION LIMITS	:	K0030 + 1018 - K0030 + 1029.70
NET LENGTH	:	11.70 L.M.
BRIDGE ID	:	B02991LZ

SUBMITTED:

REIMART REGIN P. BAUTISTA

CHIEF, PLANNING AND DESIGN SECTION

DATE: 7/11/25

RECOMMENDED:

JENNIFER F. ALMANZOR

ASSISTANT DISTRICT ENGINEER

DATE: 7/14/25

APPROVED:

DONNIE D. CUNA

DISTRICT ENGINEER

DATE: 7/15/25

INDEX OF DRAWING

PAGE TITLE	SET NO.	SHEET NO.
COVER PAGE	A-1	1
INDEX OF DRAWING	B-1	2
LOCATION MAP, VICINITY MAP, AND KEY MAP	C-1	3
GENERAL NOTES	D-1	4
SUMMARY OF QUANTITIES	E-1	5
SCHEDULE OF QUANTITIES	F-1	6
THERMOPLASTIC PAVEMENT MARKING LAYOUT FOR ZAGALA BRIDGE EAST	G-1	7
GENERAL PLAN SHOWING BRIDGE REPAIR SCOPE OF WORKS	H-1	8
GENERAL ELEVATION	H-2	9
TYPICAL SECTION, CARBON FIBER SHEET DETAILS, CARBON FIBER PLATE DETAILS	H-3	10
TRAFFIC MANAGEMENT PLAN	I-1	11
DETAILS OF TEMPORARY ROAD WORK SIGNAGES, CONCRETE BARRIER , TRAFFIC CONE AND SAFETY VEST DETAILS	I-2	12
DPWH AND COA PROJECT BILLBOARD PLAN AND DETAILS	J-1	13
DETAILED ACCESS FACILITIES FOR PERSONS WITH DISABILITY AND DPWH FIELD OFFICE	K-1	14

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REGIONAL OFFICE IV-A
CAVITE 3RD DISTRICT ENGINEERING OFFICE
CARMONA CITY, CAVITE

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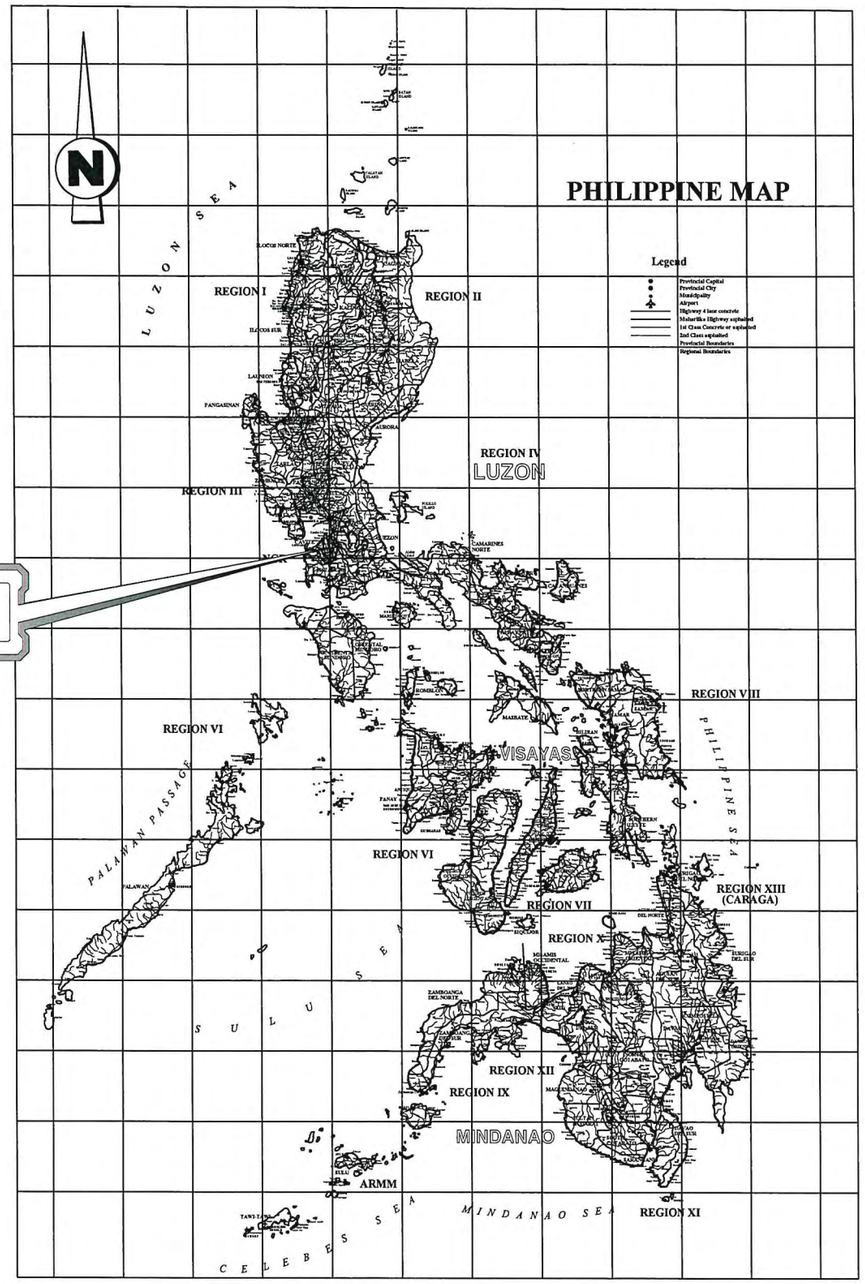
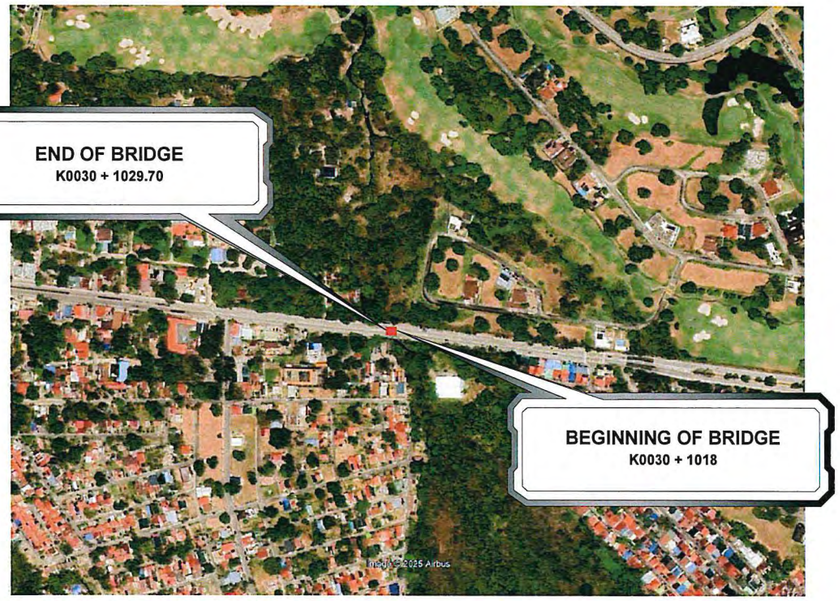
DASMARIÑAS CITY, CAVITE

C-1 / 1 LOCATION MAP
SCALE: NOT TO SCALE

PROJECT LOCATION



C-1 / 3 KEY MAP (PHILIPPINE MAP)
SCALE: NOT TO SCALE



C-1 / 2 VICINITY MAP
SCALE: NOT TO SCALE

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GENERAL NOTES

FOR RETROFITTING / STRENGTHENING OF BRIDGE:

1. GENERAL

ALL DIMENSIONS OF EXISTING STRUCTURE SHALL BE VERIFIED BY THE CONTRACTOR BEFORE CONSTRUCTION START. THE CONTRACTOR SHALL SUBMIT SHOP DRAWING FOR ALL REPAIR METHOD AND APPROVED BY THE ENGINEER.

2. SETTING OUT

THE SETTING OUT AND THE ELEVATION OF THE DIFFERENT COMPONENTS OF THE STRUCTURES SHALL BE APPROVED BY THE ENGINEER PRIOR TO THE START OF ANY CONSTRUCTION WORK.

3. CONSTRUCTION LIMITS

THE CONTRACTOR SHALL VERIFY AND WORK WITHIN THE CONSTRUCTION LIMITS OR EASEMENT OF THE BRIDGE STRUCTURE. THEY WILL BE HOWEVER PROVIDE FOR AREAS THAT REQUIRES FOR THERE OWN USE. IT IS THE INTENT OF THE PLAN TO LEAVE UNDISTURBED EVERYTHING WHICH DOES NOT ADVERSELY AFFECT THE FINISHED WORK. ALL AREAS DISTURBED BY CONSTRUCTION WILL BE RESTORED TO ITS ORIGINAL CONDITION AS DIRECTED BY THE ENGINEER.

4. SITE PREPARATION

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

5. TRAFFIC MANAGEMENT

THE CONTRACTOR SHALL BE RESPONSIBLE FOR DEVELOPING AND MAINTAINING AN EFFECTIVE TRAFFIC CONTROL IN ACCORDANCE WITH THE SPECIAL PROVISIONS SUBJECT TO THE APPROVAL OF THE ENGINEER AND CORRESPONDING LOCAL AUTHORITIES.

6. FALSEWORK

ALL FALSEWORK SHALL BE DESIGNED BY THE CONTRACTOR SUBJECT TO THE APPROVAL BY THE ENGINEER.

6. SURFACE PREPARATION

ALL EXISTING FINISHES ON MEMBERS SUCH AS COLUMNS, BEAMS, SLABS AND WALLS WITH PAINT AND PLASTER SHALL BE REMOVED TO EXPOSE THE BARE CONCRETE SURFACE.DAMAGED CONCRETE SHALL BE REMOVED BY HACKING TO A DEPTH SPECIFIED BY THE ENGINEER AND ADDITIONAL STEELREINFORCEMENT IS TO BE PROVIDED TO REPLACE THE CORRODED STEEL. THE SURFACE OF THE REINFORCED CONCRETE ELEMENT WILL RECEIVE THE FIBER REINFORCED POLYMER SHALL BE CLEANED AND KEPT FREE FROM FINS, SHARP EDGES AND PROTRUSIONS WHICH CAN CAUSE VOIDS BETWEEN THE COMPOSITE WRAP AND THE CONCRETE SURFACE OR WHICH IN THE OPINION OF THE ENGINEER WILL BE DETRIMENTAL TO THE FIBERS.

EXISTING UNEVEN SURFACE AND HACKED OUT DAMAGED PORTIONS IN THE REINFORCED CONCRETE ELEMENT TO BE WRAPPED WITH THE FRP SHALL BE REINSTATED WITH POLYMER MODIFIED MORTAR, EPOXY MORTAR OR OTHER SUITABLE MATERIALS APPROVED BY THE ENGINEER. ALL CRACKS WIDER THAN 0.30 mm SHALL BE EPOXY INJECTED PRIOR TO FRP STRENGTHENING. SHARP BENDS OF FRP COMPOSITE AROUND CORNERS SHALL BE AVOIDED. BENDING AROUND CORNERS SHALL ONLY BE PERMITTED WHEN THE CORNERS ARE ROUNDED BY MECHANICAL MEANS TO A MINIMUM RADIUS OF CURVATURE OF 16mm - 30mm.

7. MIXING OF EPOXY AND FIBER SATURATION

THE AMBIENT TEMPERATURE AND TEMPERATURE OF THE EPOXY COMPONENTS SHALL RANGE 10°C AND 38°C AT THE TIME OF MIXING.
EPOXY A AND B SHALL BE MIXED IN A STIPULATED PROPORTION WITH A LOW SHEAR MECHANICAL MIXER FOR 3 TO 5 MINUTES. EPOXY COMPONENT THAT HAVE EXCEED THEIR SHELF LIFE SHALL NOT BE USED. BOTH THE EPOXY RESIN AND THE FABRIC SHALL BE MEASURED ACCURATELY AND FABRIC IMPREGNATED IN THE MANNER SPECIFIED ON THE PACKING.

8. FRP SYSTEM APPLICATION

ALL BARE SURFACES TO BE STRENGTHENED SHALL BE PRIMED WITH MIXED EPOXY USING A ROLLER BRUSH OR PAINT BRUSH PRIOR TO RECEIVING THE COMPOSITE. ON SOFFIT AND SOME VERTICAL APPLICATIONS, THE BARE CONCRETE SURFACE MUST BE PRIMED WITH A MIXED EPOXY PRIOR TO APPLICATION OF THE COMPOSITE AND ALLOWED TO BECOME TACKY.

THE FULLY IMPREGNATED FIBER SHALL BE APPLIED TO THE SURFACE OF THE REINFORCED CONCRETE ELEMENT BY WRAPPING IT TO A UNIFORM TENSILE FORCE ALONG THE PRIMARY FIBER DIRECTION. APPLICATION OF THE FRP SHALL FOLLOW THE APPROPRIATE DRAWINGS. THE COMPOSITE SHALL BE LAPPED 150 mm AND 75 mm IN THE PRIMARY AND SECONDARY FIBER DIRECTION RESPECTIVELY. AFTER APPLICATION OF EACH LAYER, ALL ENTRAP AIR VOIDS SHALL BE SMOOTHENED OUT BY A ROLLER OR BY HAND ASSURING A UNIFORM, SMOOTH APPEARANCE.

9. CURING OF FIBER REINFORCED POLYMER

THE CURING TIME FOR THE COMPOSITE IS USUALLY 24 TO 72 HOURS DEPENDING ON THE AMBIENT TEMPERATURE CONDITIONS. THE CURED COMPOSITE SHALL BE IN UNIFORM THICKNESS AND DENSITY AND SHALL BE BONDED BETWEEN LAYERS SHOWING NO SIGNS OF HOLLOWNESS.

10. FINISHING

AFTER APPLICATION, FRP SURFACE MAY BE PLASTERED, PAINTED OR TILED OVER. IF THIS IS DESIRED A LIGHT SPRINKLING OF SAND MUST BE DONE ON THE WET COMPOSITE 2 - 4 HOURS AFTER THE FINAL COMPOSITE LAYER HAS BEEN PLACED AND ALLOWED TO CURE FOR AT LEAST 24 HOURS PRIOR TO APPLICATION OF THE PLASTER.

FOR ASPHALT OVERLAY:

1. BITUMINOUS MATERIAL SHALL BE EMULSIFIED ASPHALT. IT SHALL CONFORM TO THE REQUIREMENTS OF THE FOLLOWING SPECIFICATION
EMULSIFIED ASPHALT (ANIONIC) - AASHTO M140
(ASTM D 997)
EMULSIFIED ASPHALT (CATIONIC) - AASHTO M140

2. TACK COAT SHALL BE APPLIED ONLY THE THE SURFACES WHICH ARE DRY OF SLIGHTLY MOIST, NO TACK COAT SHALL BE APPLIED WHEN THE WEATHER IS FOGGY OR RAINY.

3. THE FULL WIDTH OF THE SURFACE TO BE TREATED SHALL BE CLEANED OF LOOSE AND FOREIGN MATERIALS.

4. THE LIQUID BITUMINOUS MATERIAL SHALL BE SPRAYED BY MEANS OF A PRESSURE DISTRIBUTOR OF NOT LESS THAN 1000 LITERS CAPACITY, MOUNTED ON PNEUMATIC TIRES OF SUCH WIDTH AND NUMBER THAT THE LOAD PRODUCED ON THE ROAD SURFACE WILL NOT EXCEED 1KN (KGF) PER CM. WIDTH OF TIRE.

5. THE TANK SHALL HAVE A HEATING DEVICE ABLE TO HEAT A COMPLETE CHANGE OF BITUMINOUS LIQUID TO 180°C.

6. THE DISTRIBUTOR SHALL BE ABLE TO VARY THE SPARY WIDTH OF THE BITUMINOUS LIQUID IN MAXIMUM STEPS OF 100MM OF A TOTAL WIDTH OF 4M.

7. THE RATE OF APPLICATION OF THE EMULSIFIED ASPHALT SHALL BE WITHIN THE RANGE OF 0.20 TO 0.70 LITER/M²

8. THE TACK COAT SHALL BE SPRAYED ONLY SO FAR IN ADVANCE ON THE SURFACE COURSE AS WILL PERMIT IT TO DRY TO A "TACKY: CONDITION UNTIL THE NEXT COURSE HAS BEEN APPLIED.

9. APPLICATION TEMPERATURES

Type and Grade Material	Application Spray (Min./Max.)	Temperature Range (°C) Mix (Min./Max.)
RT 1-2-2	15.5 - 54	15.5 - 54
RT 4-5-6	29 - 65.6	29 - 65.5
RT 7-8-9	65.5 - 107	65.6 - 107
RT 10-11-12	70 - 121	79 - 121
RTCB 5-6 . . . 30	15.5 - 48.9	15.5 - 48.9
MC 30	21 - 62.8	15.5 - 40.5
RC-MC 70	40.5 - 85	32 - 68
RC-MC 250	60 - 107	51.7 - 93
RC-MC 800	79 - 129	71 - 107
RC-MC 3000	106.7 - 143	93 - 126.7
All Emulsions	10 - 71	10 - 71
Asphalt Cement (All Grades)	204 Max.	As required to achieve viscosity of 75 - 150 seconds to achieve a Kinematic Viscosity of 150-300 mm²/s (150-300) centi stokes

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DRAFTED:	REVIEWED:	SUBMITTED:	RECOMMENDED:	APPROVED:	SET NO.	SHEET NO.
AARON JOY F. FABELLA ENGINEERING ASSISTANT SUBMITTED BY: **JAN ARIES B. MONTOYA** ENGINEER II	**ISAAC EMANUEL C. MOJICA** ENGINEER II DATE: 7/11/25	**REIMART REGINE BAUTISTA** CHIEF, PLANNING AND DESIGN SECTION DATE: 7/11/25	**JENNIFER F. ALMANZOR** ASSISTANT DISTRICT ENGINEER DATE: 7/11/25	**DONNIE D. CUNA** DISTRICT ENGINEER DATE: 7/15/25	D 1 1	4 14

SUMMARY OF QUANTITIES

ITEM NO.	DESCRIPTION	UNIT	QUANTITY K0030 + 1018 - K0030 +1029.70 NET LENGTH = 11.70 L.M.	REMARKS
PART A	**FACILITIES FOR THE ENGINEER**			
A.1.1 (3)	Construction of Field Office for the Engineer	l.s.	1.00	- See Detailed Drawing -
A.1.4 (1)	Provision of Progress Photographs	mos.	3.50	
PART B	**OTHER GENERAL REQUIREMENTS**			
B.5	Project Billboard/ Signboard	ea.	3.00	- See Detailed Drawing -
B.7 (2)	Occupational Safety and Health Program	l.s.	1.00	
B.8 (2)	Traffic Management	l.s.	1.00	- See Detailed Drawing -
B.9	Mobilization/Demobilization	l.s.	1.00	
PART E	**SURFACE COURSES**			
302 (2)	Emulsified Asphalt	sq.m.	280.86	-See Schedule of Quantities and Drawing Details-
310 (1)c	Bituminous Concrete Surface Wearing Course, Hot-Laid, 50mm	sq.m.	280.86	-do-
PART F	**BRIDGE CONSTRUCTION**			
414 (1)	Forms and Falsework	l.s.	1.00	-See Schedule of Quantities and Drawing Details-
416 (1)b	Carbon Fiber Sheet, 2 layers	sq.m.	107.98	-do-
416 (2)	Carbon Fiber Plate	sq.m.	9.36	-do-
628 (1)a	Waterproofing on Deck Slab, Torch Applied	sq.m.	94.77	-do-
425 (3)	Epoxy Injection on Crack	l.m.	18.86	-do-
425 (10)	Protective Coating for Concrete Structures	sq.m.	94.77	-do-
PART H	**MISCELLANEOUS STRUCTURES**			
612 (1)	Reflectorized Thermoplastic Pavement Markings White	sq.m.	19.88	- See Schedule of Quantities and Drawing Details -

NOTE:

1. THE STAKE-OUT SURVEY BETWEEN THE CONTRACTOR AND THE GOVERNMENT SHALL BE CONSIDERED AS THE FINAL PLAN.
2. THE ITEMS OF WORK IDENTIFIED WITH THE CORRESPONDING COMPUTED QUANTITIES IN THE APPROVED JOINT AS - STAKE SURVEY PLANS WILL BE THE BASIS OF PAYMENT.

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SHEET CONTENTS:
SUMMARY OF QUANTITIES

DRAFTED:
AARON JAY F. FABELLA
ENGINEERING ASSISTANT
SUBMITTED BY:
JAN-ARIES B. MONTOYA
ENGINEER II

REVIEWED:
ISAAC EMANUEL C. MOJICA
ENGINEER II
DATE: 7/11/25

SUBMITTED:
REIMART REGINO P. BAUTISTA
CHIEF, PLANNING AND DESIGN SECTION
DATE: 7/14/25

RECOMMENDED:
JENNIFER F. ALMANZOR
ASSISTANT DISTRICT ENGINEER
DATE: 7/14/25

APPROVED:
DONNIE D. CUNA
DISTRICT ENGINEER
DATE: 7/15/25

SET NO. E 1 1
SHEET NO. 5 14

SCHEDULE OF QUANTITIES

302 (2) **Emulsified Asphalt** — **280.86 sq.m**

Material	Area
Bituminous Concrete Surface Wearing Course, Hot-Laid, 50mm	280.86
Bituminous Concrete Surface Binder Course, Hot-Laid, 50 mm	-
Total	280.86

say : 280.86 sq.m

310 (1)c **Bituminous Concrete Surface Wearing Course, Hot-Laid, 50mm** — **280.86 sq.m.**

KM				Location		Length (m)	Width (m)	Area (sq.m)
Bridge Length	K00 31+018.00	-	K00 31+029.70	L/S	R/S	11.70	5.80	67.86
Additional Length	K00 31+003.00		K00 31+018.00	L/S	R/S	15.00	7.10	106.50
Additional Length	K00 31+029.70		K00 31+044.70	L/S	R/S	15.00	7.10	106.50
							Total:	280.86

say : 280.86 sq.m

416 (1)b **Carbon Fiber Sheet, 2 layers** — **107.98 sq.m.**

KM			Location		Length (m)	Perimeter	Number	Area (sq.m)
Girders			L/S	R/S	5.86	2.61	4.00	61.18
Slab Gaps			L/S	R/S	11.70	4.00	1.00	46.80
Sidewalk			L/S	R/S	11.70	0.95	0.00	-
backwall			L/S	R/S	9.10	4.00	0.00	-
							Total:	107.98

say : 107.98 sq.m

416 (1)e **Carbon Fiber Plate** — **9.36 sq.m.**

KM			Location		Length (m)	Perimeter	Number	Area (sq.m)
Girders			L/S	R/S	9.36	0.05	20.00	9.36
							Total:	9.36

say : 9.36 sq.m

612 (1) **Reflectorized Thermoplastic Pavement Markings White** — **19.88 sq.m**

EDGE LINE (White)			Strips	Length (m)	Width (m)	Area (sq.m)
K00 31+018.00	-	K00 31+029.70	2	11.70	0.10	2.34
K00 31+003.00	-	K00 31+018.00	2	15.00	0.10	3.00
K00 31+029.70	-	K00 31+044.70	2	15.00	0.10	3.00
					subtotal :	8.34

BROKEN LINES (White)			Strips	Qty	Length (m)	Width (m)	Area (sq.m)
K00 31+018.00	-	K00 31+044.70	1	2	3.00	0.15	0.90
K00 31+003.00	-	K00 31+018.00	1	3	3.00	0.15	1.35
K00 31+029.70	-	K00 31+044.70	1	3	3.00	0.15	1.35
						subtotal :	3.60
						Median Separator :	7.94
						Total :	19.88

*** Note: Quantity varies depending on the number of lanes*

say : 19.88 sq.m

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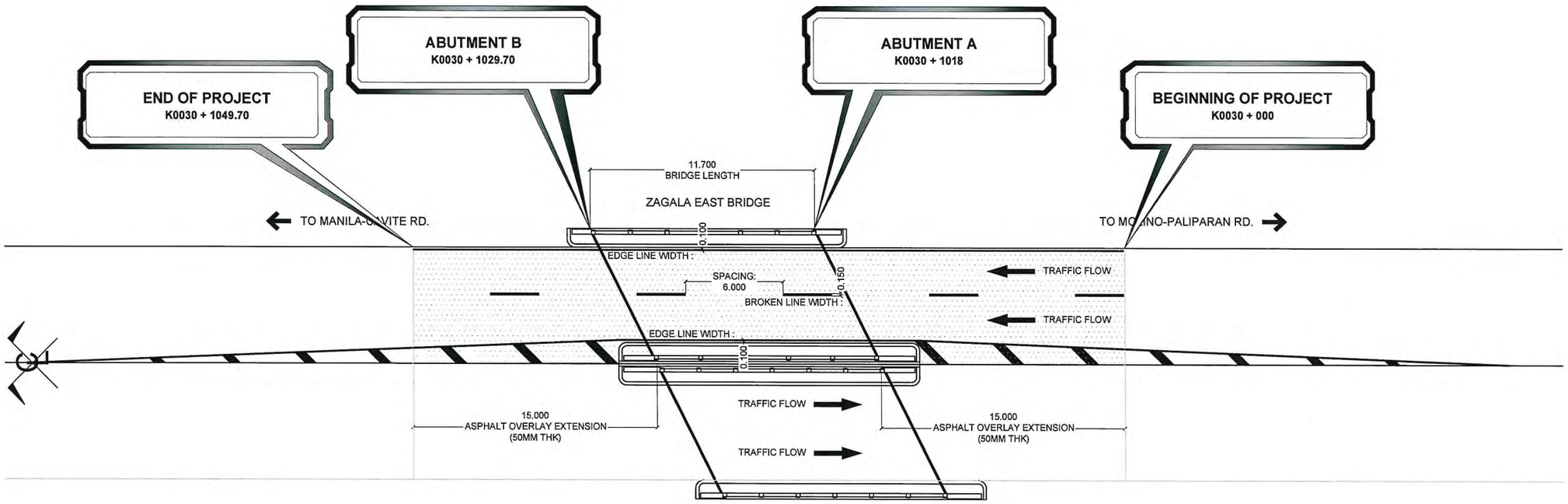
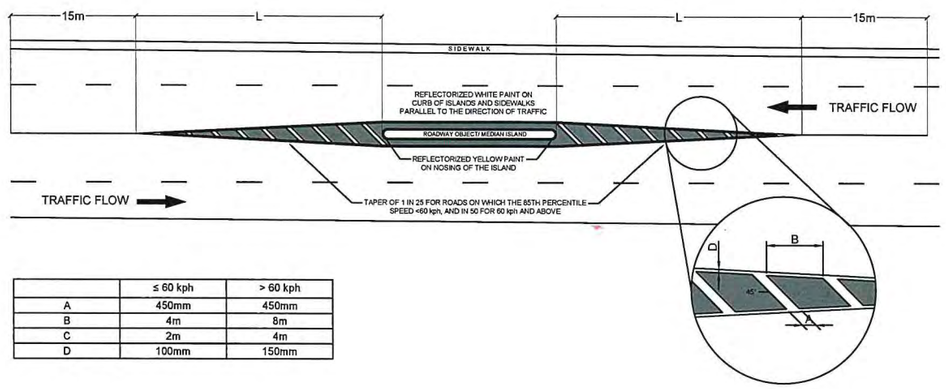
PROPOSED ASPHALT OVERLAY AND THERMOPLASTIC PAVEMENT MARKING LAYOUT FOR ZABALA BRIDGE EAST

SCALE: **1:200 MTS.**





	≤ 60 kph	> 60 kph
A	450mm	450mm
B	4m	8m
C	2m	4m
D	100mm	150mm

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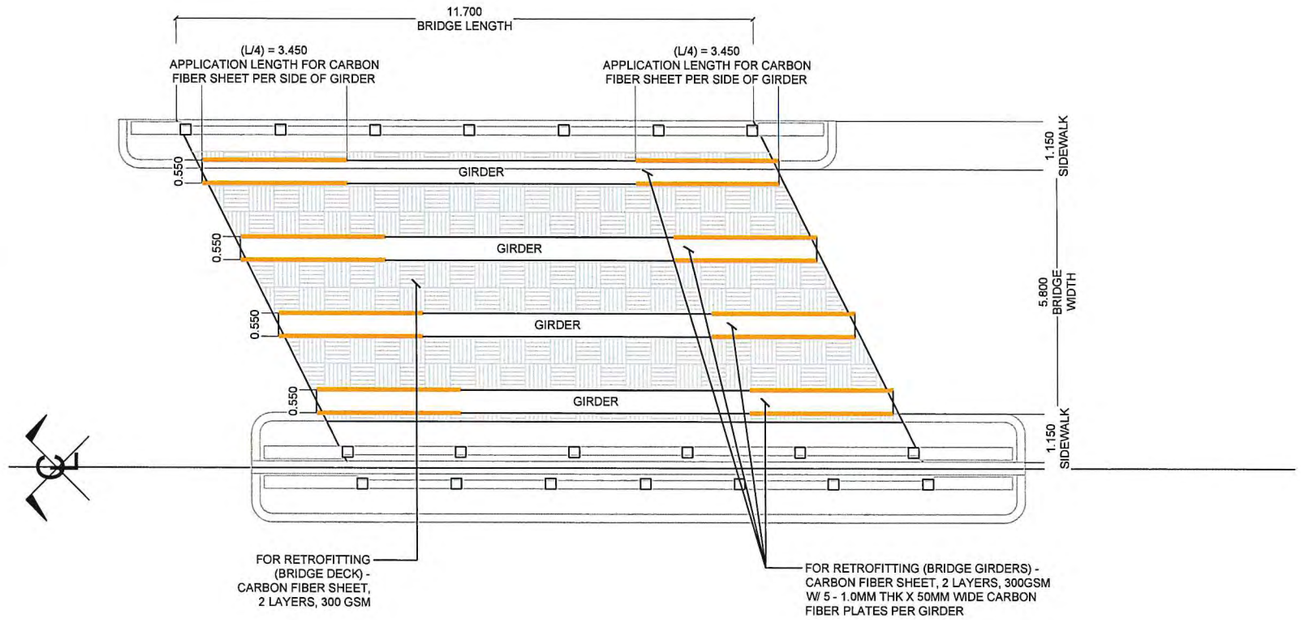
GENERAL PLAN

SCALE: 1:100 MTS.



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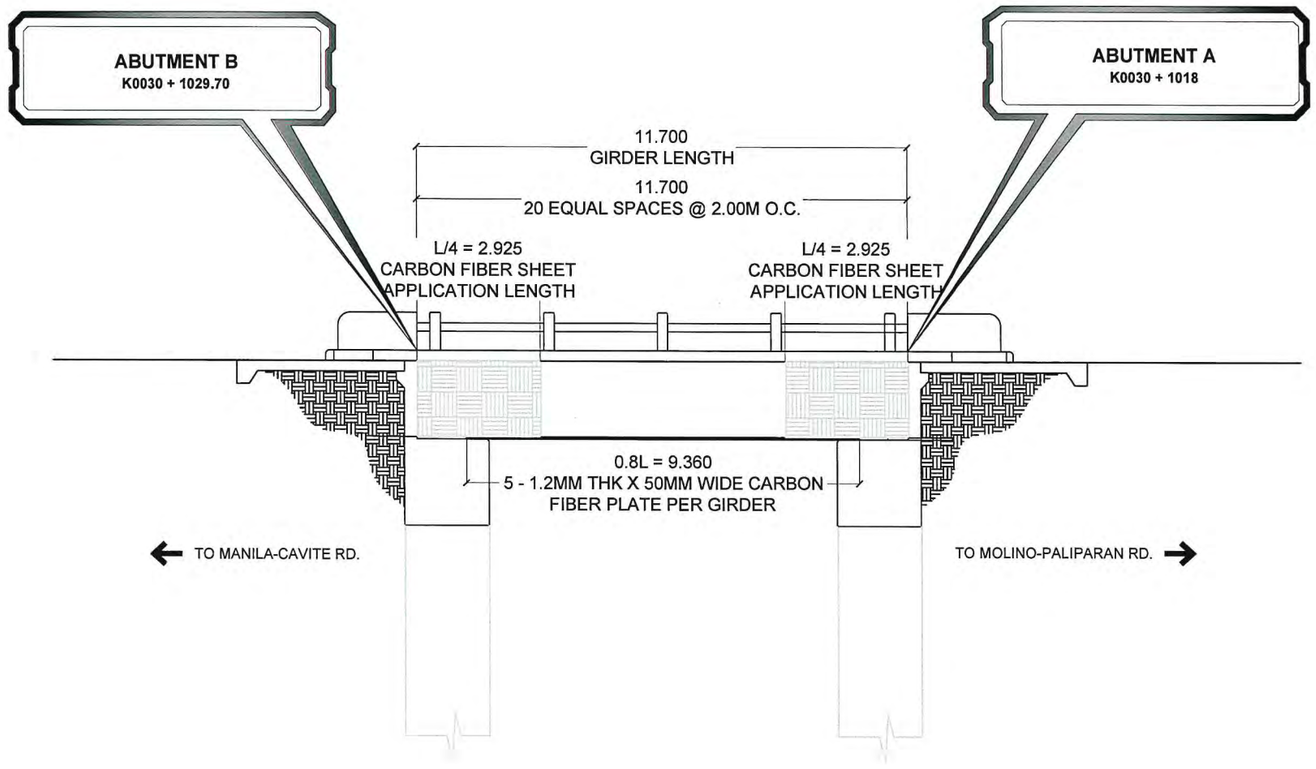
GENERAL ELEVATION

SCALE: 1:100 MTS.

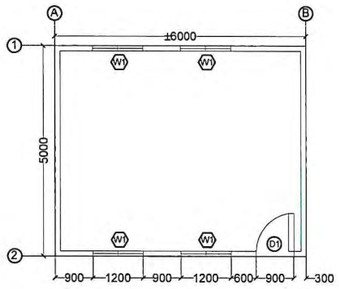


REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGIONAL OFFICE IV-A
CAVITE 3RD DISTRICT ENGINEERING OFFICE
CARMONA CITY, CAVITE

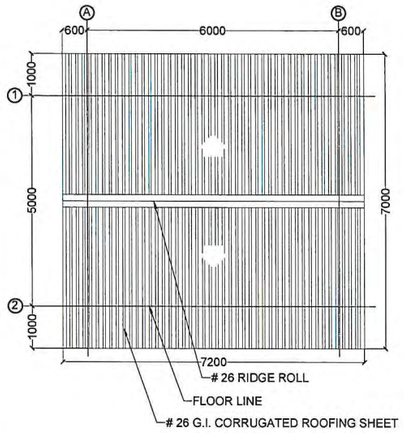
PROJECT NAME AND LOCATION:	SHEET CONTENTS:
DETAILED ENGINEERING DESIGN PLAN FOR REHABILITATION/ REPAIR OF ZAGALA BR. EAST, (B02991LZ) ALONG BACOOR- DASMARIÑAS NATIONAL RD., DASMARIÑAS CITY, CAVITE	**GENERAL ELEVATION**

DRAFTED:	REVIEWED:	SUBMITTED:	RECOMMENDED:	APPROVED:	SET NO.	SHEET NO.
AARON JAY R. FABELLA, ENGINEERING ASSISTANT SUBMITTED BY: JAN ARIES B. MONTOYA, ENGINEER II	ISAAC EMANUEL C. MOJICA, ENGINEER II DATE: 7/11/25	REIMART REGIN P. BAUTISTA, CHIEF, PLANNING AND DESIGN SECTION DATE: 7/11/25	JENNIFER F. ALMANZOR, ASSISTANT DISTRICT ENGINEER DATE: 7/14/25	DONNIE D. CUNA, DISTRICT ENGINEER DATE: 7/15/25	H 2 3	9 14

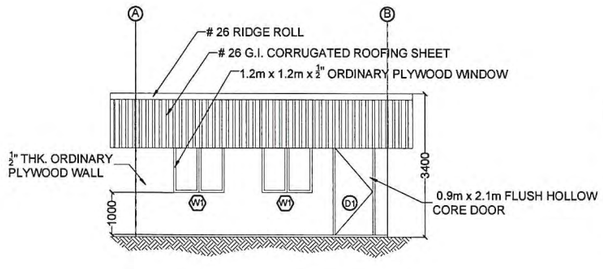
K-1 / 1 — DPWH STANDARD OFFICE PERSPECTIVE VIEW
SCALE: NOT TO SCALE



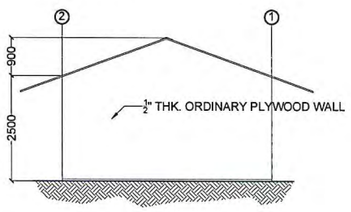
K-1 / 2 — FLOOR PLAN
SCALE: 1:100 MTS.



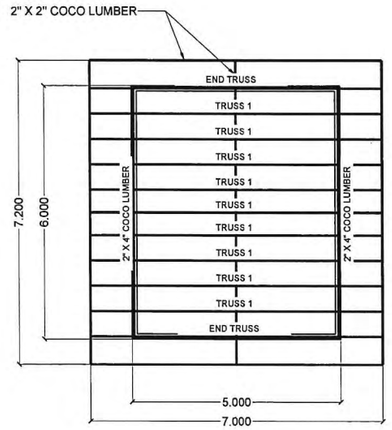
K-1 / 3 — ROOF PLAN
SCALE: 1:100 MTS.



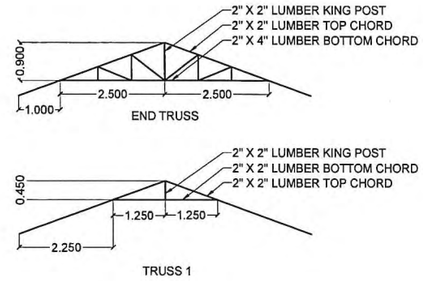
K-1 / 4 — FRONT ELEVATION
SCALE: 1:100 MTS.



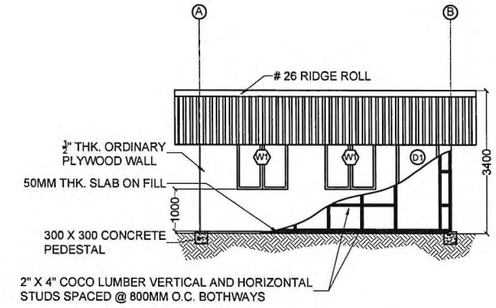
K-1 / 5 — SIDE ELEVATION
SCALE: 1:100 MTS.



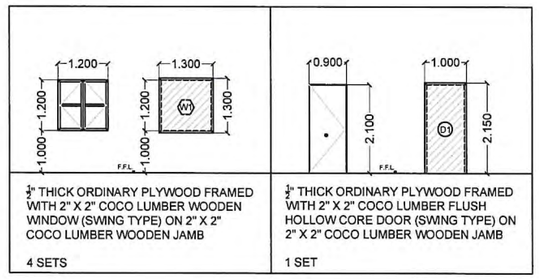
K-1 / 6 — ROOF FRAMING PLAN
SCALE: 1:100 MTS.



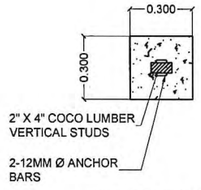
K-1 / 7 — TRUSS DETAILS
SCALE: 1:100 MTS.



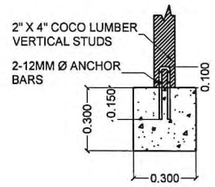
K-1 / 8 — SECTION VIEW
SCALE: 1:100 MTS.



K-1 / 10 — SCHEDULE OF DOORS AND WINDOWS
SCALE: NTS



PEDESTAL PLAN VIEW



PEDESTAL SECTION VIEW

K-1 / 9 — PEDESTAL DETAILS
SCALE: 1:100 MTS.

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SHEET CONTENTS:
DETAILED ACCESS FACILITIES FOR PERSONS WITH DISABILITY AND DPWH FIELD OFFICE

DRAFTED:
AARON JAYR. FABELLA
ENGINEERING ASSISTANT
SUBMITTED BY:
JAN ARIES B. MONTOYA
ENGINEER II
DATE:

REVIEWED:
ISAAC EMANUEL O. MOJICA
ENGINEER II
DATE: 7/11/25

SUBMITTED:
REIMART REGIN P. BAUTISTA
CHIEF, PLANNING AND DESIGN SECTION
DATE: 7/11/25

RECOMMENDED:
JENNIFER F. ALMANZOR
ASSISTANT DISTRICT ENGINEER
DATE: 7/14/25

APPROVED:
DONNIE D. CUNA
DISTRICT ENGINEER
DATE: 7/15/25

SET NO.: K 1 1
SHEET NO.: 14 / 14