



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

C.Y. 2025 PROJECT
DETAILED ENGINEERING DESIGN PLAN FOR
**REHABILITATION / MAJOR REPAIR OF BRIDGE -
GOV. MIRANDA BRIDGE 2 (B01270MN) ALONG
MAHARLIKA HIGHWAY (MN), DAVAO DEL NORTE**

SECTION	:	DAANG MAHARLIKA (MN)
LOCATION	:	CARMEN, DAVAO DEL NORTE
STATION LIMITS	:	K 1468+(-508.000) - K 1468+(-1158.600)
LENGTH OF BRIDGE	:	650.600 LN.M. / 11,129.150 SQ. M.

SUBMITTED:


JUDY ANN T. BERNARDINO
CHIEF, PLANNING AND DESIGN DIVISION

DATE:

RECOMMENDED:

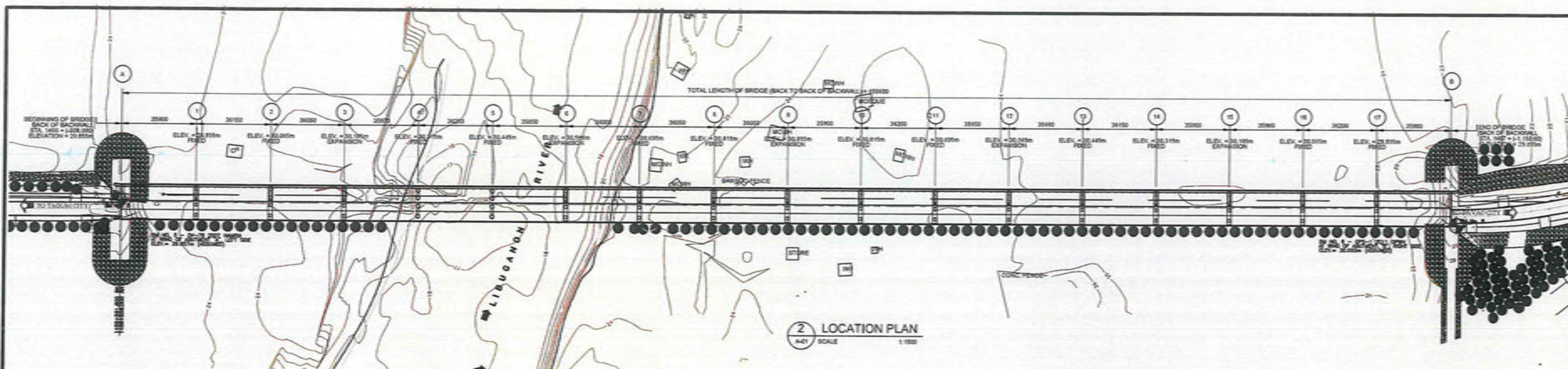

JOSELITO B. CABALLERO
ASSISTANT REGIONAL DIRECTOR

DATE:

APPROVED:


JUBY B. CORDON
REGIONAL DIRECTOR

DATE:



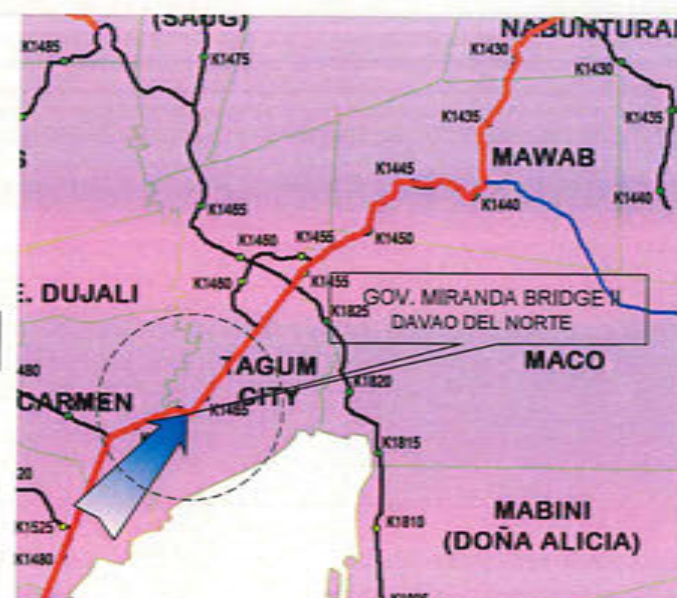
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SUMMARY OF QUANTITIES FOR REHABILITATION / MAJOR REPAIR OF GOV. MIRANDA BRIDGE 2

ITEM NO.	DESCRIPTION	UNIT	AMOUNT	SUBTOTAL	TOTAL QUANTITY	REMARKS
PART A. FACILITIES FOR ENGINEER						
A.1.1(10)	CONSTRUCTION OF FIELD OFFICE FOR THE ENGINEER	LS	-	-	1.00	
A.1.1(11)	OPERATION AND MAINTENANCE OF FIELD OFFICE FOR THE ENGINEER	MONTH	-	-	4.00	
PART B. OTHER GENERAL REQUIREMENT						
B.4(2)	BRIDGE SURVEY AND STAGING	LS	-	-	1.00	
B.5	PROJECT BILLBOARD / SIGNBOARD (2 DPM)	EACH	-	-	2.00	DPM BILLBOARD
B.5	PROJECT BILLBOARD / SIGNBOARD (2 CO)	EACH	-	-	2.00	COA AND DPM BILLBOARD
B.7(2)	OCCUPATIONAL SAFETY AND HEALTH PROGRAM	LS	-	-	1.00	
B.8(1)	TRAFFIC MANAGEMENT	MONTH	-	-	4.00	
B.9	WORKZONING / DEMARKATION	LS	-	-	1.00	
PART C. EARTHWORKS						
C.1(1)	REMOVAL OF EXISTING STRUCTURES/OBSTRUCTION, 0.05m THICK, ASP	CU M	-	-	2,232.84	2,232.84
C.1(2)	REMOVAL OF EXISTING STRUCTURES/OBSTRUCTION, CONCRETE	CU M	-	-	225.02	225.02
PART D. SURFACE COURSES						
D.1(1)	GRAVELLED ASPHALT	CU M	-	-	2,287.01	2,287.01
D.1(2)	STURDY CONCRETE SURFACE BROOK COURSE, HOT-LAY, 50mm THICK	CU M	-	-	2,287.01	2,287.01
PART E. BRIDGE CONSTRUCTION						
E.1(1)	REINFORCING STEEL, GRADE 40	KG	-	-	48,711.00	48,711.00
E.1(2)	STRUCTURAL CONCRETE, 27.5M MPa, CLASS A, 14 DAYS	CU M	-	-	241.27	241.27
PART F. MISCELLANEOUS						
F.1(1)	REFLECTORIZED THERMOPLASTIC PAINT MARKING (WHITE)	CU M	-	-	3.70	3.70
F.1(2)	REFLECTORIZED THERMOPLASTIC PAINT MARKING (YELLOW)	CU M	-	-	195.18	195.18

a. WORKMEN AHEAD (T1-5)	2.00
b. BRIDGEWORK AHEAD (T1-2)	2.00
c. SPEED RESTRICTION (R4-1)	2.00
d. ROAD MACHINERY AHEAD (T1-3)	2.00
e. LANE STATUS (T2-6-2.1.1)	2.00
f. TEMPORARY HAZARD MARKERS (T5-5)	2.00
g. TEMPORARY HAZARD MARKER (T5-4)	16.00
h. TRAFFIC BOLLARDS	60.00
i. END ROADWORK (T2-16)	2.00
j. END SPEED RESTRICTION (R4-2)	2.00



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REHABILITATION / MAJOR REPAIR OF BRIDGE -
GOV. MIRANDA BRIDGE 2 (B01270M)
ALONG MAHARLIKA HIGHWAY (MN),
DAVAO DEL NORTE

SHEET CONTENTS:

KEY MAP
LOCATION PLAN
VICINITY MAP
INDEX OF SHEETS
SUMMARY OF QUANTITIES

PREPARED:

DIANNE CARMELA L. CADANO
ENGINEER II
CHRISTINE M. SAYSON
ENGINEER II

REVIEWED:

ALGIN A. GINGA
ENGINEER III
DATE

SUBMITTED:

JUDY ANN T. BERNARDINO
CHIEF PLANNING AND DESIGN DIVISION
DATE

RECOMMENDED:

JOSELYN B. CABALLERO
ASSISTANT REGIONAL DIRECTOR
DATE

APPROVED:

JUDY B. CORDON
REGIONAL DIRECTOR
DATE

SET NO.

A
0119

SHEET NO.

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GENERAL NOTES

PARTIAL DECK SLAB REPLACEMENT (PORTLAND CEMENT MORTAR)

WORK SEQUENCE

- 1) SUPPORT OF EXISTING STRUCTURE
THE EXISTING STRUCTURE SHALL BE PROPERLY SUPPORTED TO SAFEGUARD AGAINST INSTABILITY AND DEFORMATION DURING THE REPAIR WORK.
- 2) REMOVAL OF DECK SLAB CONCRETE
ALL DETEIORATED OR DAMAGED CONCRETE SURFACE ARE CUT BY SAW, FORMING VERTICAL EDGES, AND THEN REMOVED USING BREAKER AND CHISEL. REBAR ARE EXAMINED FOR LOSS OF SECTION DUE TO CORROSION. IF CROSS SECTIONAL AREA OF THE REINFORCEMENT HAS REDUCED BY MORE THAN 20%, ADDITIONAL REINFORCEMENT IS REQUIRED AND NECESSARY.
- 3) PREPARATION OF OLD CONCRETE AND REBAR
A SUITABLE BONDING AGENT FOR CONCRETE AND REINFORCEMENT SHOULD BE SELECTED TAKING INTO CONSIDERATION THE LIMITED WORKING TIME AVAILABLE FOR FIXING THE FORMWORK AND PLACING THE NEW CONCRETE. CONCRETE SHOULD BE PLACED IMMEDIATELY AFTER APPLICATION OF THE BONDING COAT TO THE FACES OF THE OLD CONCRETE AND REBAR.
- 4) SETTING OF FORMWORKS
SOFFIT FORMWORK FOR RECASTING DECK SLAB MUST BE VERY RIGID AND WELL-SUPPORTED TO PREVENT THE NEW CONCRETE FROM SAGGING DUE TO ITS OWN WEIGHT.
- 5) CUTTING OF EXISTING REBAR AND ADDITIONAL OF NEW REBAR
DETERIORATED OLD REBAR ARE CUT UP TO THE REQUIRED LAP LENGTH. NEW BARS TO BE PROVIDED SHALL BE OF THE SAME OR BIGGER DIAMETER THAN THE EXISTING, CONSIDERING THE CURRENT LOADING CONDITION. THE LAP LENGTH IS CALCULATED AS 30 TIMES THE NEW REBAR DIAMETER. THE NEW REBAR SHALL BE TIED TO THE EXISTING BARS USING TIE WIRES OR BY WELDING.
- 6) PLACING OF CONCRETE
CONCRETE IS PLACED IN THE SOFFIT FORMWORKS THROUGH A SUITABLE METHOD AND COMPACTED WELL USING INTERNAL OR EXTERNAL VIBRATORS. FINISH UNIFORM SURFACES BY BROOM, WOOD FLOAT, OR STEEL TROWEL TO MATCH THE ADJACENT EXISTING CONCRETE.
- 7) CURING AND REMOVAL OF FORMWORKS
CONTINUOUS WATER CURING WITH WETTED COTTON MAT IS ALWAYS PREFERABLE TO SLOW DOWN DRYING. FORMWORKS FOR LOAD-BEARING STRUCTURAL MEMBERS SHALL REMAIN IN POSITION UNTIL AT LEAST 80% OF THE 28 DAY COMPRESSIVE STRENGTH OF THE NEW CONCRETE IS ACHIEVED.

REQUIRED MATERIALS AND TOOLS/EQUIPMENT

- REQUIRED MATERIALS**
- PORTLAND CEMENT
 - SILICA FUME
 - REBAR (REINFORCING BAR, USE GRADE 40 FOR 16mm DIAMETER)
 - EPOXY RESIN (BONDING COAT TO CONCRETE)
 - ZINC-RICH PRIMER (BONDING COAT TO REBAR)

- REQUIRED TOOLS/EQUIPMENT**
- SAWING EQUIPMENT
 - HIGH PRESSURE WATER BLASTING
 - HANDY CONCRETE BREAKER OR JACKHAMMER
 - HANDY POWER CHISEL
 - CONCRETE MIXER 30 LITERS
 - VIBRATOR
 - TROWELING TOOLS

SPECIFICATIONS

- 1) REMOVAL OF CONCRETE
CONCRETE AREAS SUBJECTED FOR FULL-DEPTH REPAIR SHALL BE REMOVED, AS DETERMINED BY THE ENGINEER. WHILE FOR PARTIAL DEPTH REPAIR IT SHOULD EXTEND BELOW HALF THE CONCRETE DECK THICKNESS. SAW CUTS SHALL BE MADE ON THE PERIMETER OF THE DECK TO BE REPLACED. CONCRETE SAW SHALL THEN BE USED TO FORM VERTICAL EDGES, WITH APPROXIMATELY 20mm DEEP, AROUND THE DEFINED PERIMETER. DECK SLAB CONCRETE IS REMOVED USING A BREAKER WHILE PORTABLE ELECTRIC CHISEL IS USED NEAR THE VERTICAL EDGES.

- 2) CONCRETE MIX
THE CONCRETE MIX USED FOR PARTIAL REPLACEMENT OF SLAB CONCRETE MUST BE CAPABLE OF PRODUCING HIGHLY IMPERMEABLE CONCRETE WITH ADEQUATE WORKABILITY AND LOW SHRINKAGE. THE REPAIR MIX SHOULD BE IDEALLY MADE WITH THE SAME TYPE OF AGGREGATE AS THE ORIGINAL CONCRETE TO MINIMIZE THERMAL STRESS. IT IS ALSO USUALLY NECESSARY TO USE A SMALLER (20mm) MAXIMUM AGGREGATE SIZE FOR REPAIR BECAUSE THE SPACE FOR PLACING CONCRETE IS OFTEN RESTRICTED. CARE SHOULD BE TAKEN TO ENSURE THAT AGGREGATE WILL NOT REACT WITH ALKALI FROM THE CEMENT PARTICULARLY AS RICH MIX WILL BE USED.

THE WATER CEMENT RATIO SHOULD NOT EXCEED 0.4 TO MINIMIZE STRESSES CAUSED BY DRYING SHRINKAGE. IN SOME SITUATIONS, IT MAY BE HELPFUL TO ADD SHRINKAGE-COMPENSATING ADMIXTURES TO THE MIX. THESE ADMIXTURES WORK BY CAUSING SLIGHT EXPANSION TO OFFSET SHRINKAGE AND THERMAL CONTRACTION.

THE FRESH CONCRETE SHOULD HAVE HIGH CEMENT-PASTE CONTENT FOR PROPER BONDING WITH THE OLD CONCRETE & REINFORCEMENT. IT SHOULD ALSO PROVIDE HIGH ALKALINITY FOR THE PROTECTION OF STEEL. THE MIX SHOULD HAVE A MINIMUM CEMENT CONTENT OF 410 KG PER CUBIC METER OF CONCRETE. THE GRADING OF AGGREGATE AND SAND MUST BE PROPERLY SELECTED TO PRODUCE A DENSE CONCRETE AND TO KEEP BLEEDING TO AN ABSOLUTE MINIMUM. ESPECIALLY FOR SOFFIT REPAIRS WHERE BLEEDING CAN LEAD TO COMPLETE SEPARATION BETWEEN OLD & NEW CONCRETE.

FOR SMALL REPAIR JOBS, CONCRETE MAY BE MIXED AT SITE USING A SMALL MIXER. ON SITE BATCHING SHOULD BE AVOIDED. IT IS PREFERABLE TO MAKE TRIAL MIXES AND THEN PRE-BATCH INTO CONVENIENT SIZED BAGS OFF SITE WITH ONLY SPECIFIED QUANTITIES OF WATER & SUPER PLASTICIZER TO BE ADDED AT SITE. ALL MATERIALS MUST BE WEIGHED BY BATCHES.

AN ASSUMED MIX DESIGN FOR SMALL SCALE REPAIRS IS GIVEN BELOW AS REFERENCE. THESE QUANTITIES WILL MAKE ABOUT 0.30 CUBIC METER OF CONCRETE & COULD BE ACCOMMODATED IN A SMALL MIX.

- 1) CEMENT
- PORTLAND CEMENT 13.0 KG
- SILICA FUME 3.50 KG (IF SILICA FUME UNAVAILABLE, USE 13.50 KG CEMENT)
- 2) 10mm CRUSHED AGGREGATE 36.5 KG
- 3) SAND (ASSUMED WITH 2% WATER CONTENT) 18.5 KG
- 4) WATER (MAXIMUM) 5.40 LITERS
- 5) SUPER PLASTICIZER (NOMINAL) 25ml

3) ADDING REBAR

ANY DAMAGE TO THE REBAR TO REMAIN IN PLACE SHALL BE REPAIRED OR REPLACED TO THE SATISFACTION OF THE ENGINEER AT THE CONTRACTOR'S EXPENSE. ALL EXISTING REBAR SHALL REMAIN IN PLACE EXCEPT THOSE WHICH ARE SIGNIFICANTLY CORRODED.

TYPING OF LOOSE BARS WILL BE REQUIRED. REBARS WHICH HAVE BEEN CUT OR HAVE LOST 20 PERCENT OR MORE OF THEIR ORIGINAL CROSS SECTIONAL AREA SHALL BE SUPPLEMENTED WITH NEW REINFORCING BARS. THE NEW BARS SHALL BE LAPPED A MINIMUM OF 30 TIMES THE NEW DIAMETER TO THE EXISTING BARS, WHICH SHALL BE COATED WITH ZINC-RICH PRIMER. AN APPROVED MECHANICAL BAR SPUCE CAPABLE OF DEVELOPING TENSION OF AT LEAST 125 PERCENT OF THE YIELD STRENGTH OF THE EXISTING BAR SHALL BE USED WHEN IT IS NOT FEASIBLE TO PROVIDE THE MINIMUM BAR LAP.

4) CONCRETE PLACEMENT

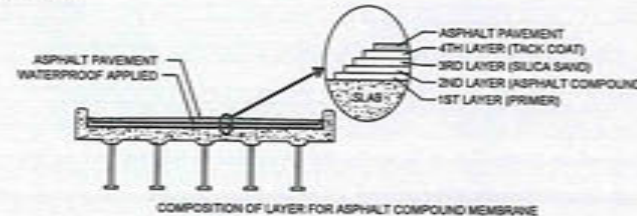
THE CONCRETE SHALL BE PLACED AND CONSOLIDATED ACCORDING TO ITEM 425.4.4 OF THE DPWH STANDARD SPECIFICATION.

WATERPROOFING ON DECK SLAB

WORK SEQUENCE

ASPHALT COMPOUND MEMBRANE (LIQUID TYPE)

ASPHALT COMPOUND MEMBRANE IS COMPOSED OF LAYERS AS SHOWN IN THE FIGURE



(1) PREPARATION OF SURFACE

EXISTING ASPHALT PAVEMENT IS STRIPPED OFF AND REMOVED TOTALLY. THE DECK SURFACE SHALL BE CLEANED USING A WIRE BRUSH, REMOVING OIL, ASPHALT AND CONCRETE CHIPS AND DUST THAT WILL AFFECT ADHESION TO THE SUBSTRATE. THE SUBSTRATE SHALL BE KEPT DRY DURING THE WATERPROOFING WORKS.

(2) PRIMER COATING

PRIMER COAT SHALL BE APPLIED ONCE OR TWICE ON THE CLEANED SUBSTRATE USING A ROLLER BRUSH. THE COATING IS APPROXIMATELY 0.2 kg/m² AND NATURAL DRIED FOR MORE THAN 30 MINUTES UNTIL TACK-FREE. (REFER ALSO TO MANUFACTURER'S INSTRUCTION).

(3) MELTING ASPHALT COMPOUND

ASPHALT MEMBRANE SHALL BE MELTED IN THE MECHANICALLY AGITATED HEATING PROCESS AND MIXED IN A KETTLE. THIS UNIT SHALL KEEP THE CONTENTS CONTINUOUSLY AGITATED UNTIL THE MATERIAL CAN BE DRAWN FREE FLOWING AND LUMP-FREE FROM THE MIXING UNIT, AT A TEMPERATURE RECOMMENDED BY THE MANUFACTURER.

(4) APPLICATION OF ASPHALT COMPOUND

THE ASPHALT MEMBRANE SHALL BE APPLIED USING A RUBBER BRUSH WITHIN THE TEMPERATURE RANGE RECOMMENDED BY THE MANUFACTURER. TO THE CLEAN, PRIMER-COATED CONCRETE DECK, FORMING A UNIFORM FILM WITH EQUAL THICKNESS (APPROXIMATELY 1.2kg/m²). THE LAYING OPERATION SHALL ELIMINATE DISCONTINUITIES IN THE MEMBRANE.

(5) APPLICATION OF SILICA SAND FOR PROTECTION

SILICA SAND SHALL BE SCATTERED ON THE WATERPROOFING LAYER WHILE THE MEMBRANE IS STILL HOT. THE SILICA SAND TO BE USED SHALL BE APPROXIMATELY 0.7 kg/m². (REFER TO THE MANUFACTURER'S INSTRUCTION).

(6) CURING/ASPHALT PAVEMENT

CURING MUST BE CARRIED OUT UNTIL WATERPROOFING MEMBRANE IS COOLED DOWN TO NORMAL TEMPERATURE. EXCESS SILICA SAND SHALL THEN BE REMOVED USING A BROOM. ASPHALT OVERLAY IS THEN FINALLY APPLIED.

REQUIRED MATERIALS AND TOOLS/EQUIPMENT

REQUIRED MATERIAL

- ASPHALT COMPOUND MEMBRANE**
- PRIMER
 - ASPHALT COMPOUND MEMBRANE
 - SILICA SAND NO. 4

REQUIRED EQUIPMENT/TOOLS

- ASPHALT COMPOUND MEMBRANE**
- KETTLE WITH HEATER
 - ROLLER BRUSH OR HAIR BRUSH
 - RUBBER BRUSH

SPECIFICATIONS

MATERIAL REQUIREMENT

(1) ASPHALT COMPOUND MEMBRANE

PRIMER

PRIMER SPECIFICATIONS SHALL BE SIMILAR TO THAT REQUIRED FOR RUBBERIZED MEMBRANE

WATERPROOFING BY ASPHALT COMPOUND MEMBRANE SHALL CONFORM TO THE REQUIREMENTS OF THE SPECIFICATIONS SHOWN IN THE TABLE 4-15, OR EQUIVALENT ASTM SPECIFICATION.

TABLE 4-15 SPECIFICATIONS OF ASPHALT COMPOUND FOR WATERPROOFING

PROPERTY	TEST METHOD	UNIT	SPECIFICATION
PENETRATION WITH CONIC NEEDLE	JIS K 5400/ASTM D217	mm	2 ~ 5
MELTING TEMPERATURE	JIS K 6621/ASTM D2462	°C	80
ELONGATION	JIS K 6621/ASTM D 438	%	1.5
TENSILE STRENGTH	JIS K 6621/ASTM D 438	kgf/cm²	300

The material shall be approved by the Engineer through mill certificate of the supplier. Primer, tack coat and silica sand shall be in accordance with DPWH Standard Specifications.

CONSTRUCTION REQUIREMENT

THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS FOR THE WATERPROOFING APPLICATION, SLAB DRAW AND SPRAY MESH TO THE ENGINEER FOR HIS REVIEW AND APPROVAL.

THE PERFORMANCE TEST FOR WATERPROOFING SHALL BE APPLIED BY THE CONTRACTOR TO BE APPROVED BY THE ENGINEER.

ASPHALT COMPOUND MEMBRANE

SURFACE PREPARATION

THE DECK CONCRETE, INCLUDING CURBS, AND SIDEWALKS MUST BE COMPLETELY DRY AND CURED AT LEAST 14 DAYS BEFORE APPLICATION OF PRIMER OR MEMBRANE. THE EXISTING SURFACE OF THE CONCRETE SHALL BE COMPLETELY SANDBLASTED OR SHOT WIRE BRUSH TO EXPOSE SOUND, LAY-UP-FREE CONCRETE. ALL DIRT AND DEBRIS SHALL BE REMOVED AND DISPOSED OF, LEAVING A PREPARED SURFACE SATISFACTORY FOR PRIMER COATING. PRIMER COATING AND WATERPROOFING SHALL NOT COMMENCE UNTIL THE ENGINEER HAS ACCEPTED ALL PREPARATION WORKS. IF THE EXISTING ASPHALT PAVEMENT IS COVERED ON THE DECK SLAB, THE PAVEMENT SHALL BE STRIPPED-OFF TOTALLY USING PAVEMENT SCRAPER. IMMEDIATELY PRIOR TO THE APPLICATION OF THE PRIMER COAT, THE CONCRETE SURFACE SHALL BE AIR BLASTED TO REMOVE ALL DUST AND ANY OTHER FOREIGN MATERIALS. PRIMER COAT MATERIAL SHALL BE APPLIED WITH APPROVED EQUIPMENT WHICH WILL PROVIDE UNIFORM APPLICATION AT THE REQUIRED RATE. THE PRIMER COAT SHALL BE APPLIED ONLY WHEN THE CONCRETE IS DRY AND CLEAN, AND WHEN THE AIR AND CONCRETE SURFACE TEMPERATURES ARE ABOVE 10°C. WATERPROOFING EQUIPMENT OR MATERIAL SHALL NOT BE PERMITTED ON THE PRIMER COAT UNTIL IT HAS FULLY CURED AND IS COMPLETELY TACK-FREE.

MELTING ASPHALT COMPOUND

ASPHALT MEMBRANE SHALL BE MELTED IN THE MECHANICALLY AGITATED HEATING AND MIXED IN A KETTLE. THIS UNIT SHALL KEEP THE CONTENTS CONTINUOUSLY AGITATED UNTIL THE MATERIAL CAN BE DRAWN FREE FLOWING AND LUMP-FREE FROM THE MIXING UNIT AT A TEMPERATURE RECOMMENDED BY THE MANUFACTURER.

AN APPROVED HEATING AND MIXING KETTLE BE USED TO HEAT THE HOT-APPLIED RUBBERIZED ASPHALT MEMBRANE. THE KETTLE SHALL BE OF A DOUBLE BOILER OIL TRANSFER TYPE WITH A BUILT-IN AGITATOR. IT SHALL BE EQUIPPED WITH PERMANENTLY INSTALLED DIAL TYPE THERMOMETERS TO MEASURE THE TEMPERATURE OF THE MELTED COMPOUND AND THE OIL.

APPLICATION OF ASPHALT COMPOUND

ASPHALT MEMBRANE SHALL NOT BE APPLIED UNTIL THE PRIMER HAS CURED COMPLETELY. THE ASPHALT MEMBRANE SHALL BE APPLIED WITHIN THE TEMPERATURE RANGE RECOMMENDED BY THE MANUFACTURER. TO THE CLEAN, PRIMER-COATED CONCRETE DECK, TO FORM A UNIFORM FILM HAVING A MINIMUM THICKNESS OF 4 mm ~ 5 mm (APPROXIMATELY 1.2kg/m²). THE LAYING OPERATION SHALL BE SUCH THAT DISCONTINUITIES IN THE MEMBRANE ARE AVOIDED AND ANY JOINTS LAPPED 150 mm. THE MEMBRANE SHALL BE APPLIED OVER ALL THE WATERPROOFED JOINTS AND CRACKS, AND SHALL EXTEND UP TO THE FACE OF CURBS, MEDIAN, BARRIER WALLS, AND DECK DRAINS, TO THE HEIGHT OF THE TOP OF THE HOT MIX SURFACE COURSE. DECK DRAINS AND DRAINAGE TUBES SHALL BE COVERED.

APPLICATION OF SILICA SAND FOR PROTECTION

SILICA SAND SHALL BE SCATTERED AS PROTECTION TO THE WATERPROOFING LAYER, WHILE THE MEMBRANE ON THE DECK IS STILL HOT. EXCESS SILICA SAND SHALL BE REMOVED BY BROOM. THE SILICA SAND SHALL BE REMOVED BY BROOM. THE SILICA SAND TO BE USED SHALL BE APPROXIMATELY 0.7kg/m². (REFER TO THE MANUFACTURER'S INSTRUCTIONS).

CURING/ASPHALT PAVEMENT

CURING MUST BE CARRIED OUT UNTIL WATERPROOFING MEMBRANE IS COOLED DOWN TO NORMAL TEMPERATURE. EXCESS SILICA SAND SHALL THEN BE REMOVED USING A BROOM. ASPHALT OVERLAY IS THEN FINALLY APPLIED.

REFERENCES

1. DPWH Manual on Highway Safety Design Standards, May 2012 Edition
- For road safety planning & design activities as well as road safety maintenance activities such as the proper way of installing/applying road signs, road safety devices and pavements markings
- DO 41, s.2012
2. Labor Code of the Philippines and its Implementing Rules and Regulations DO No. 13 s. 1998, Occupational Safety and Health Standards and its Procedural Guidelines.
- For monitoring, enforcement and implementation of construction safety and health
- DO 58, s.2005
3. DPWH Design Guidelines, Criteria & Standards (DGCS), 2015 Edition
- For the design of highways, bridges, buildings and flood control projects covering the minimum requirements, specifications and procedures.
- DO. 179, s.2015
4. DPWH-JICA, Bridge Repair Manual, 2014 2nd Edition
- For the improvement of quality management for highway and bridge construction and maintenance

This is to certify that the detailed engineering surveys and designs have been conducted according to the prescribed agency standards and specifications in conformance with the provisions of Annex "A" of the Revised Implementing Rules and Regulations of RA 9154, and that the detailed engineering outputs are adequate for the procurement at hand.



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SHEET CONTENTS:
GENERAL NOTES (1 / 2)

PREPARED:
DIANNE CARMELA L. CADANO
ENGINEER II
DATE: _____

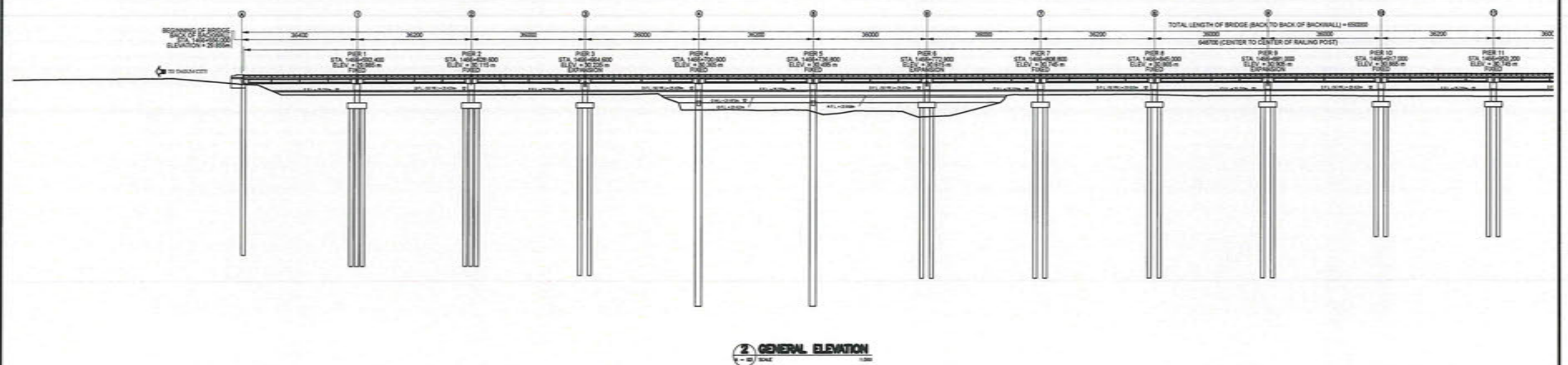
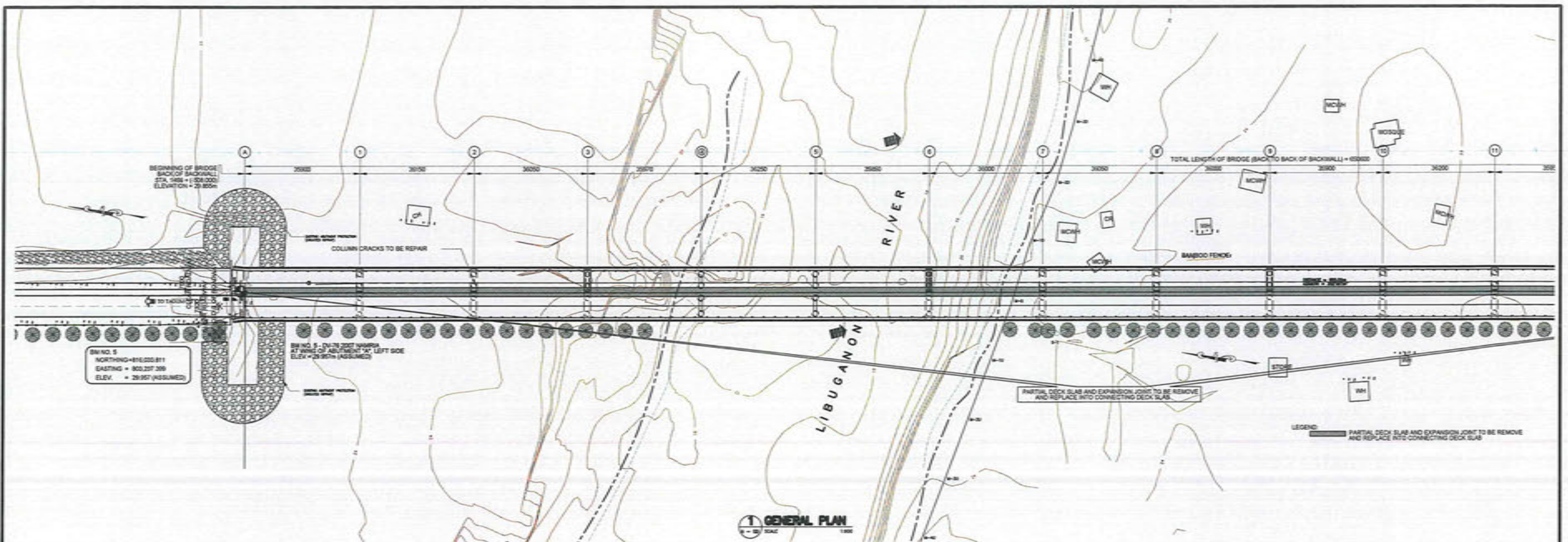
REVIEWED:
ALGIN A. GINGA
ENGINEER II, BRIDGE DIVISION
DATE: _____

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

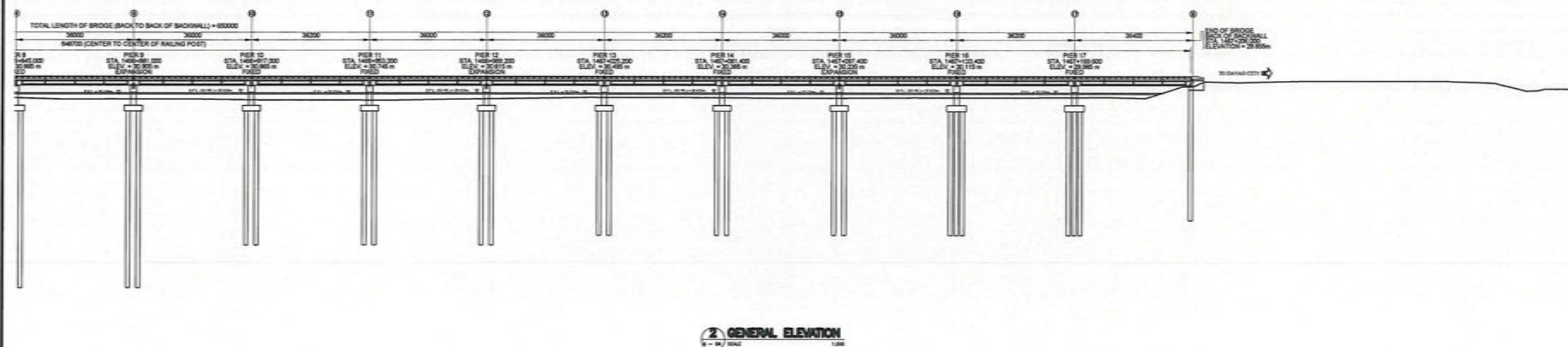
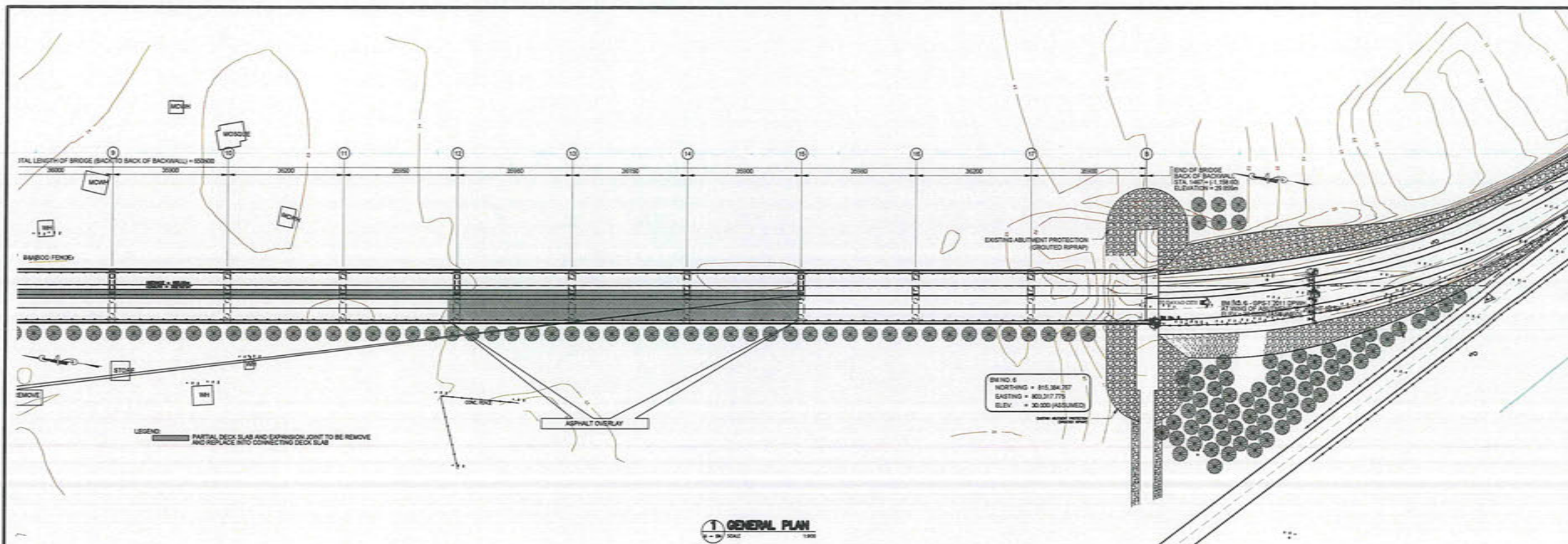
RECOMMENDED:
JOSE LITO S. CABALLERO
ASSISTANT REGIONAL DIRECTOR
DATE: _____

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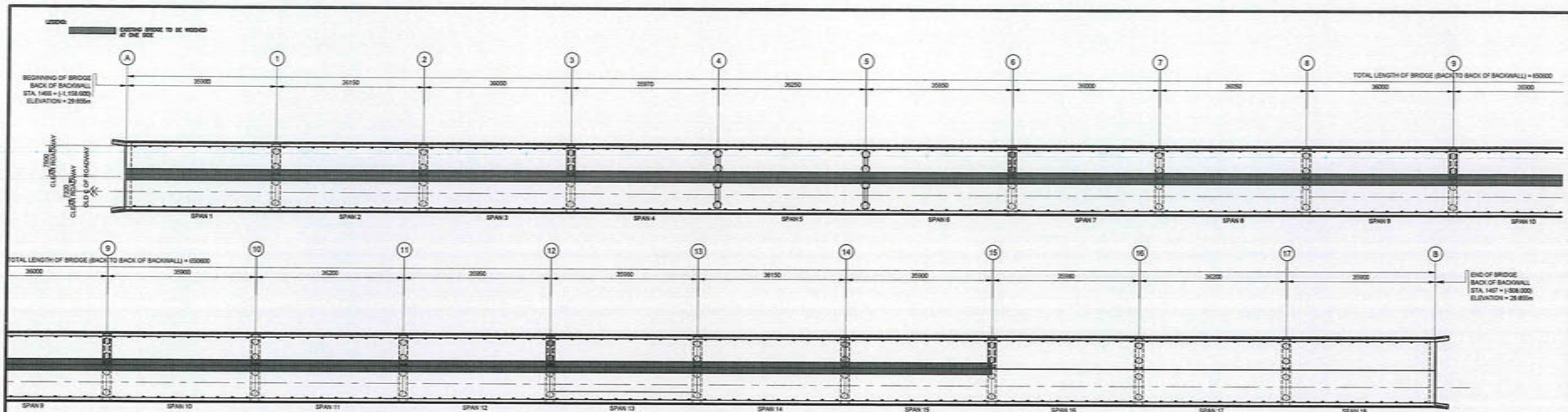
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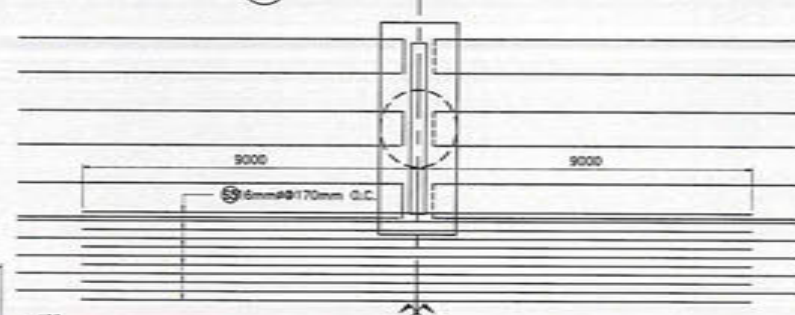
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REHABILITATION / MAJOR REPAIR OF BRIDGE - GOV. MIRANDA BRIDGE 2 (B01270MN) ALONG MAHARLIKA HIGHWAY (MN), DAVAO DEL NORTE	GENERAL PLAN GENERAL ELEVATION (1 / 2)	DIANNE CARWELA L. CADANO ENGINEER I	ALGIN A. GINGA ENGINEER II, BRIDGE	JUDY B. CORDON REGIONAL DIRECTOR	A 0319	03 19



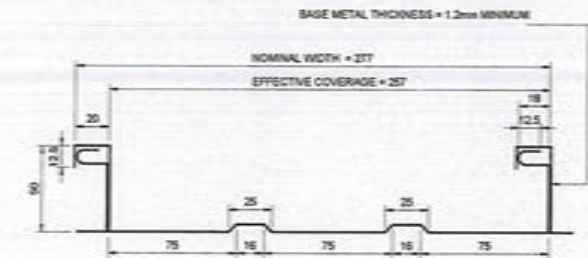
PROJECT NAME AND LOCATION	SHEET CONTENTS	PREPARED	REVIEWED	APPROVED	RECOMMENDED	APPROVED	SET NO.	SHEET NO.
REHABILITATION / MAJOR REPAIR OF BRIDGE - GOV. MIRANDA BRIDGE 2 (B01270MN) ALONG MAHARLIKA HIGHWAY (MN), DAVAO DEL NORTE	GENERAL PLAN GENERAL ELEVATION (2 / 2)	DIANNE CARMELA L. CADANO ENGINEER I	ALGIN A. GINGATA ENGINEER II, BRIDGE	JUDYAN T. BERNARDINO CHIEF PLANNING AND DESIGN DIVISION	JOSE LITO B. CABALLERO ASSISTANT REGIONAL DIRECTOR	JUBY B. CORDON REGIONAL DIRECTOR	A 0419	04 19



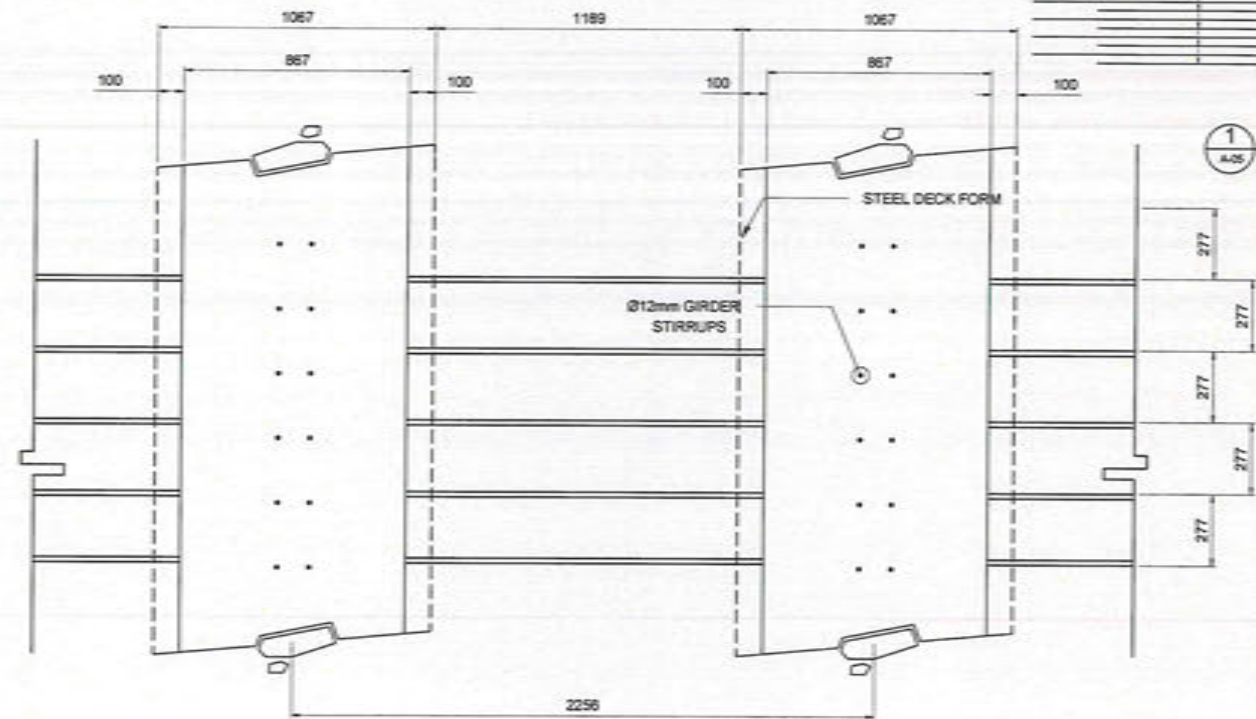
1 PLAN SHOWING SECTION OF SLAB TO BE REPLACED
A-05 SCALE 1:100



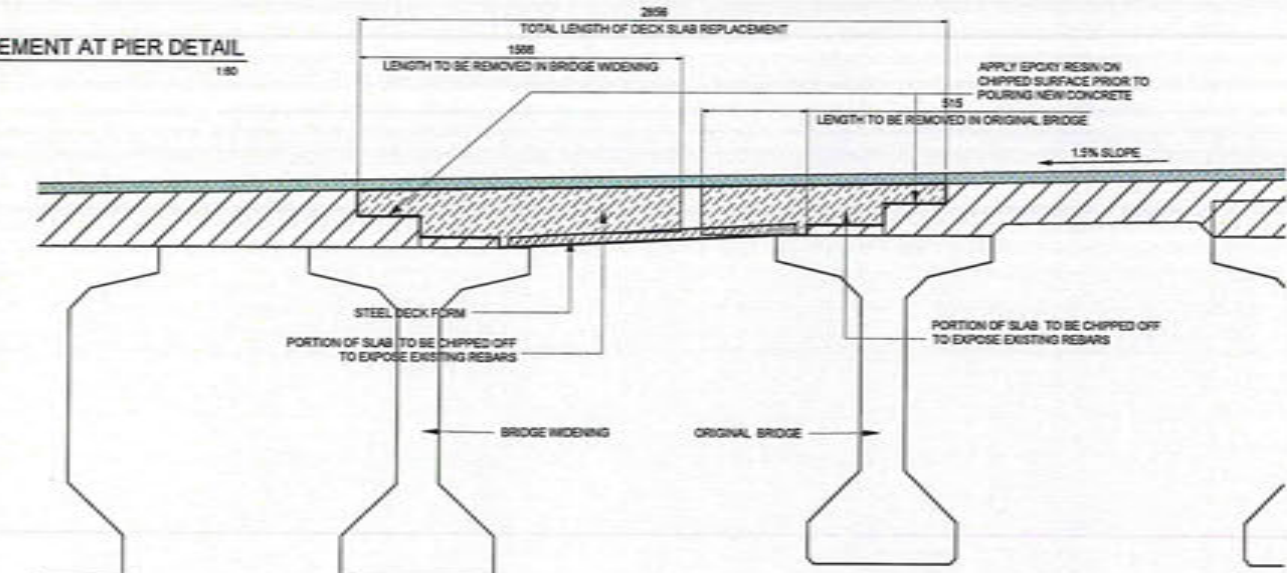
1 NEGATIVE REINFORCEMENT AT PIER DETAIL
A-05 SCALE 1:80



3 STEEL DECK CROSS SECTION
A-05 SCALE 1:25



1 STEEL DECK FORM PLAN
A-05 SCALE 1:25

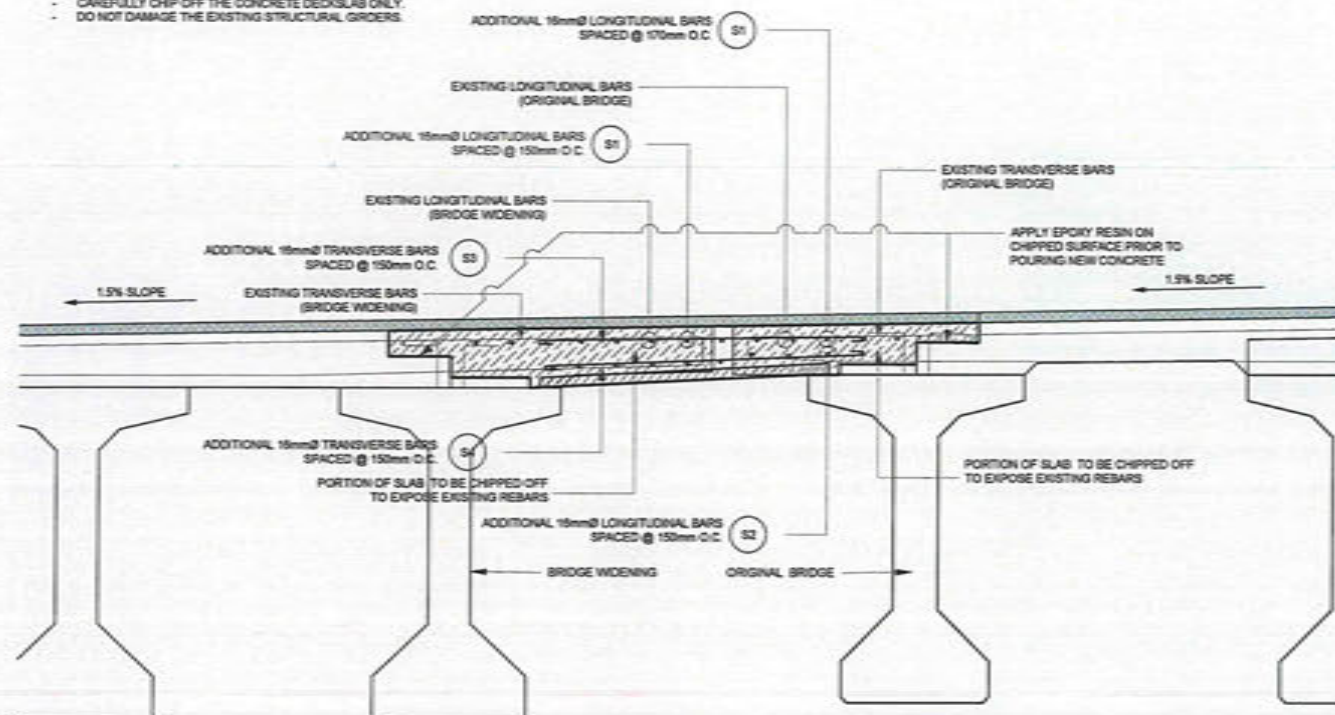


2 TYPICAL CROSS SECTION OF CONNECTING DECK SLAB
A-05 SCALE 1:25

- NOTE:
- REMOVE THE CONCRETE ONLY.
 - DO NOT REMOVE ANY EXISTING REINFORCEMENT.
 - USE EXISTING REINFORCING BARS AS DOVEL.
 - CAREFULLY CHIP OFF THE CONCRETE DECKSLAB ONLY.
 - DO NOT DAMAGE THE EXISTING STRUCTURAL GIRDERS.

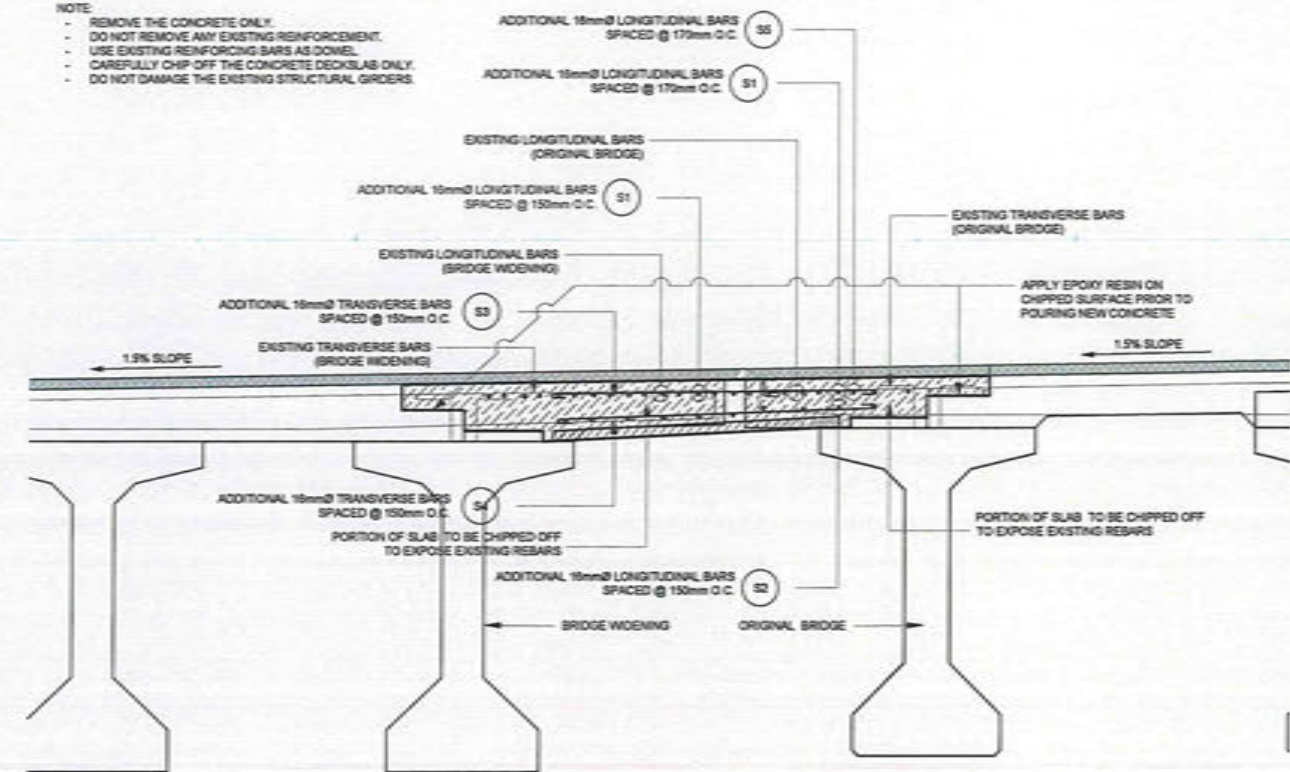
REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS REGIONAL OFFICE NO. XI GOV. CHAVEZ COR. R. MAGSAYSAY AVENUE, DAVAO CITY	PROJECT NAME AND LOCATION: REHABILITATION / MAJOR REPAIR OF BRIDGE - GOV. MIRANDA BRIDGE 2 (5012/20M) ALONG MAHARLIKA HIGHWAY (MN), DAVAO DEL NORTE	SHEET CONTENTS: STEEL DECK FORM PLAN TYPICAL CROSS SECTION OF CONNECTING DECK SLAB PLAN SHOWING SECTION OF SLAB TO BE REPLACED NEGATIVE REINFORCEMENT AT PIER CROSS SECTION	PREPARED: DIANNE CARMELA L. CADAÑO ENGINEER II DATE:	REVIEWED: ALGIN A. GINGATAN ENGINEER II, BRIDGE ENGINEER DATE:	SUBMITTED: JUDY A. T. BERNARDINO CHIEF, PLANNING AND DESIGN DIVISION DATE:	RECOMMENDED: JOSE LITO B. CABALLERO ASSISTANT REGIONAL DIRECTOR DATE:	APPROVED: JUDY B. CORDON REGIONAL DIRECTOR DATE:	SET NO. A 0519 SHEET NO. 05 19
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- NOTE:
- REMOVE THE CONCRETE ONLY.
 - DO NOT REMOVE ANY EXISTING REINFORCEMENT.
 - USE EXISTING REINFORCING BARS AS DOWEL.
 - CAREFULLY CHIP OFF THE CONCRETE DECKSLAB ONLY.
 - DO NOT DAMAGE THE EXISTING STRUCTURAL GRIDDERS.



4 TYPICAL TRANSVERSE SECTION
A-26 SCALE 1:25

- NOTE:
- REMOVE THE CONCRETE ONLY.
 - DO NOT REMOVE ANY EXISTING REINFORCEMENT.
 - USE EXISTING REINFORCING BARS AS DOWEL.
 - CAREFULLY CHIP OFF THE CONCRETE DECKSLAB ONLY.
 - DO NOT DAMAGE THE EXISTING STRUCTURAL GRIDDERS.



5 TYPICAL TRANSVERSE SECTION AT NEGATIVE REINFORCEMENT
A-26 SCALE 1:25

REINFORCEMENT SCHEDULE AND ESTIMATED QUANTITIES FOR PARTIAL DECK SLAB REPLACEMENT

BAR BENDING DIAGRAM	STRUCTURE COMPONENT	MARK	SIZE (mmØ)	QTY	SHAPE	BAR DIMENSIONS (mm)		LENGTH PER BAR (m)	LAP LENGTH (m)	TOTAL LENGTH PER BAR (m)	TOTAL LENGTH (m)	UNIT WEIGHT (kg/m)	TOTAL WEIGHT (kg)	REMARKS
						a	b							
	DECKSLAB (SPAN 15 TO 18 - CONNECTING SLAB)	S1	16	12	A	541,700	-	541.700	30.080	571.780	6,861.36	1.579	10,834	
		S2	16	10	A	541,700	-	541.700	30.080	571.780	5,717.80	1.579	9,029	
		S3	16	4,515	A	1,570	-	1.570	-	1.570	7,088.55	1.579	11,193	
		S4	16	4,515	A	1,560	-	1.560	-	1.560	7,043.40	1.579	11,122	
		S5	16	154	A	18,000	-	18.000	0.640	18.640	2,870.56	1.579	4,533	
	TOTAL	SUB-TOTAL											46,711	
		GRADE 40											46,711	
		GRADE 60											-	
		TOTAL											46,711	
		GRADE 40											46,711	
		GRADE 60											-	



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

PROJECT NAME AND LOCATION:
REHABILITATION / MAJOR REPAIR OF BRIDGE -
GOV. MIRANDA BRIDGE 2 (B01270MN)
ALONG MAHARLIKA HIGHWAY (MN),
DAVAO DEL NORTE

SHEET CONTENTS:
TYPICAL TRANSVERSE SECTION
TYPICAL TRANSVERSE SECTION AT NEGATIVE
REINFORCEMENT
REINFORCEMENT SCHEDULE AND ESTIMATED
QUANTITIES FOR PARTIAL DECK SLAB
REPLACEMENT

PREPARED:
DIANNE CARMELA L. CADANO
ENGINEER I
DATE:

REVIEWED:
ALVIN A. GINGGIAN
ENGINEER II
DATE:

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

RECOMMENDED:
JOSE LUIS S. CABALLERO
ASSISTANT REGIONAL DIRECTOR
DATE:

APPROVED:
JULY B. CORDON
REGIONAL DIRECTOR
DATE:

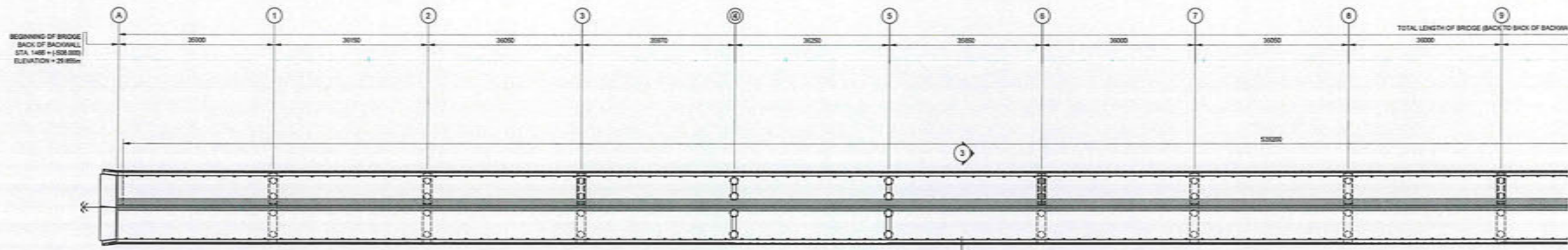
SET NO. SHEET NO.
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GENERAL NOTES

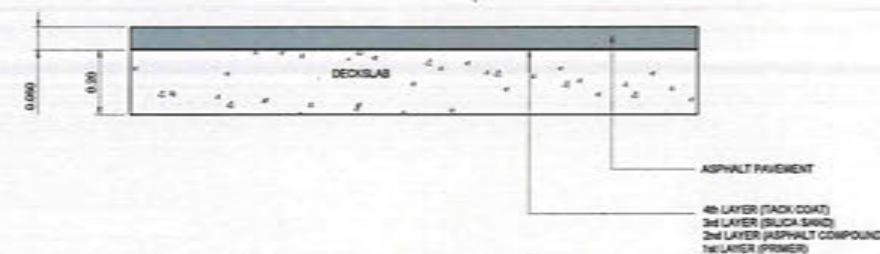
ASPHALT OVERLAY

1. ITEM 310 SHALL CONSIST OF CONSTRUCTING A BITUMINOUS CONCRETE SURFACE COURSE COMPOSED OF AGGREGATES, MINERAL FILLER, AND BITUMINOUS MATERIAL MIXED IN A CENTRAL PLANT, CONSTRUCTED AND LAID HOT ON THE PREPARED BASE IN ACCORDANCE WITH THIS SPECIFICATION AND IN CONFORMITY WITH LANES, GRADES, THICKNESS AND TYPICAL CROSS-SECTION SHOWN ON THE PLANS.
2. BITUMINOUS MATERIAL SHALL BE EITHER MEDIUM CURING (MC) CUT-BACK ASPHALT OR ASPHALT CEMENT, WHICHEVER IS CALLED FOR IN THE BILL OF QUANTITIES. IT SHALL CONFORM TO THE REQUIREMENTS OF ITEM 702 , BITUMINOUS MATERIALS. THE PENETRATION GRADE, TYPE AND GRADE OF BITUMINOUS MATERIAL SHALL BE SPECIFIED IN THE SPECIAL PROVISIONS.
3. AGGREGATES SHALL CONFORM TO THE REQUIREMENTS OF ITEM 307, BITUMINOUS PLANT MIX SURFACE COURSE-GENERAL.
4. THE PROPORTION OF BITUMINOUS MATERIAL ON THE BASIS OF TOTAL DRY AGGREGATE SHALL BE FROM 5.0 TO 8.0 MASS PERCENT. THE EXACT PERCENTAGE TO BE USED SHALL BE FIXED BY THE ENGINEER IN ACCORDANCE WITH THE JOB-MIX FORMULA AND THE OTHER QUALITY CONTROL REQUIREMENTS.
5. DURING THE MIXING OPERATION, ONE HALF TO ONE (0.5 TO 1.0) MASS PERCENT OF HYDRATED LIME, DRY AGGREGATE BASIS SHALL BE ADDED TO THE MIXTURE. THE LOWER PERCENTAGE LIMIT IS APPLICABLE TO AGGREGATE WHICH ARE PREDOMINANTLY CALCAREOUS.
6. THE CONSTRUCTION REQUIREMENTS SHALL BE IN ACCORDANCE WHENEVER APPLICABLE WITH SECTION 307.3.
7. ALL DETERIORATED TRANSVERSE & LONGITUDINAL JOINT SHALL BE SEALED WITH ASPHALT PRIOR TO APPLICATION OF TACK COAT ASPHALT & LAYING ASPHALT MIX.
8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE QUALITY CONTROL OF ALL THE MATERIALS DURING THE HANDLING, BLENDING, AND MIXING AND PLACEMENT OPERATIONS.
9. EQUIPMENT AND TOOLS NECESSARY FOR HANDLING MATERIALS AND PERFORMING ALL PARTS OF THE WORK SHALL BE APPROVED BY THE ENGINEER AS TO DESIGN, CAPACITY AND MECHANICAL CONDITION. THE EQUIPMENT SHALL BE AT THE JOBSITE SUFFICIENTLY AHEAD OF THE START OF CONSTRUCTION OPERATIONS TO BE EXAMINED THOROUGHLY AND APPROVED.
10. EXISTING PAVEMENTS WITH DEFECTS (OTHER THAN SHATTERED SLABS) & JOINTS SHALL BE SEALED REPAIRED BEFORE OVERLAYING THE ASPHALT.
11. CRACKS TO BE FILLED WITH ASPHALT SEALANT SHALL BE APPLIED WITH WASHED SAND. EXCESS SAND SHALL BE BROOMED AFTER 2-4 HOURS.
12. IN ASPHALT OVERLAYING AT CURVES, SUPERELEVATION OF THE EXISTING PAVEMENT SHALL BE MAINTAINED OR IMPROVED. APPROPRIATED CROSS SLOPES (NORMAL CROWN) SHALL BE APPLIED TO DRAIN THE PAVEMENT.

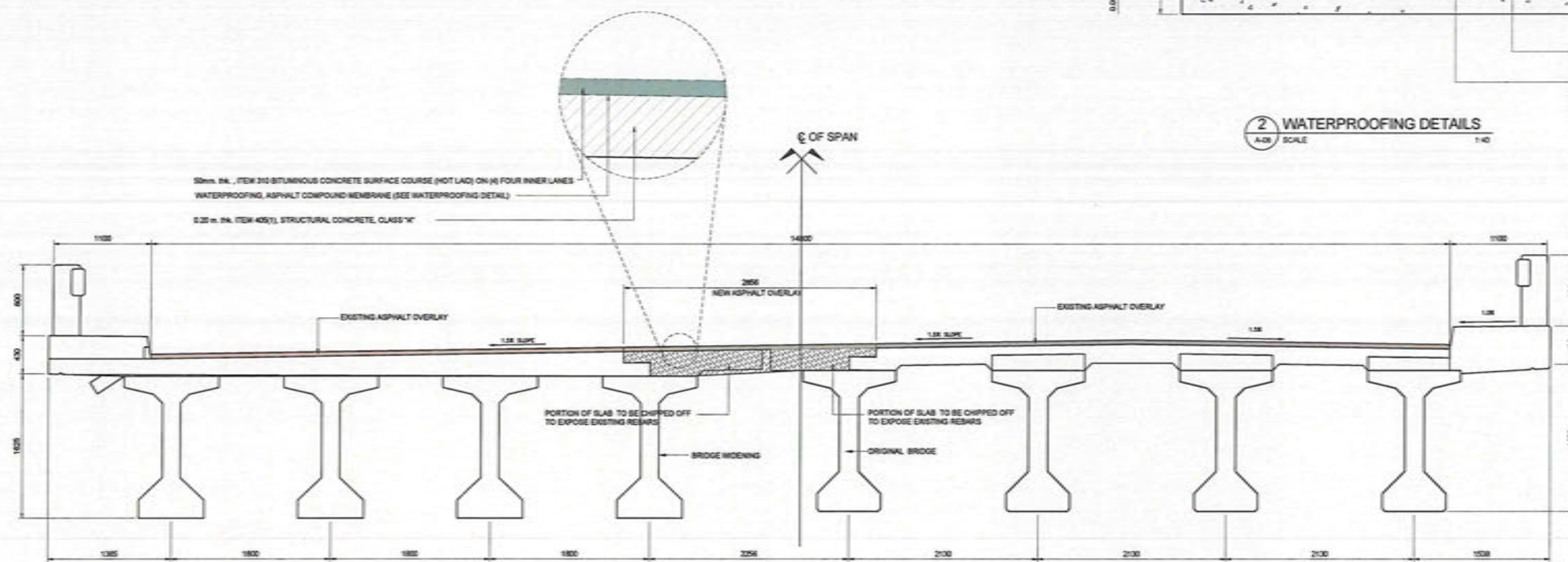
 REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS REGIONAL OFFICE NO. XI GOV. CHAVEZ COR. R. MAGSAYSAY AVENUE, DAVAO CITY	PROJECT NAME AND LOCATION: REHABILITATION / MAJOR REPAIR OF BRIDGE - GOV. MIRANDA BRIDGE 2 (801270MN) ALONG MAHARLIKA HIGHWAY (MN), DAVAO DEL NORTE	SHEET CONTENTS: GENERAL NOTES FOR ASPHALT OVERLAY	PREPARED:  DIANNE CARMELA L. CADANO ENGINEER I DATE: _____	REVIEWED:  ALGIN A. GINGATA ENGINEER II, BRIDGE DIVISION DATE: _____	SUBMITTED:  JUDY ANN T. BERNARDINO CHIEF, PLANNING AND DESIGN DIVISION DATE: _____	RECOMMENDED:  JOSEITO B. CABALLERO ASSISTANT REGIONAL DIRECTOR DATE: _____	APPROVED:  JUBY B. CORDON REGIONAL DIRECTOR DATE: _____	SET NO. SHEET NO. A 07 0719 19
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1 PLAN SHOWING ASPHALT OVERLAY
A-08 SCALE 1:700



2 WATERPROOFING DETAILS
A-08 SCALE 1:40



3 CROSS SECTION
A-08 SCALE 1:40



REPUBLIC OF THE PHILIPPINES
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REGIONAL OFFICE NO. XI
GOV. CHAVEZ COR. R. RINGSAY AVENUE, DAVAO CITY

PROJECT NAME AND LOCATION:
REHABILITATION / MAJOR REPAIR OF BRIDGE -
GOV. MIRANDA BRIDGE 2 (B01270MN)
ALONG MAHARLIKA HIGHWAY (MN),
DAVAO DEL NORTE

SHEET CONTENTS:
FRAMING PLAN
TYPICAL CROSS SECTION
TRANSVERSE SECTION

PREPARED:
DIANNE CARMELA L. CADANO
ENGINEER I
DATE:

REVIEWED:
ALGIN A. GINGARA
ENGINEER II, BRIDGE
DATE:

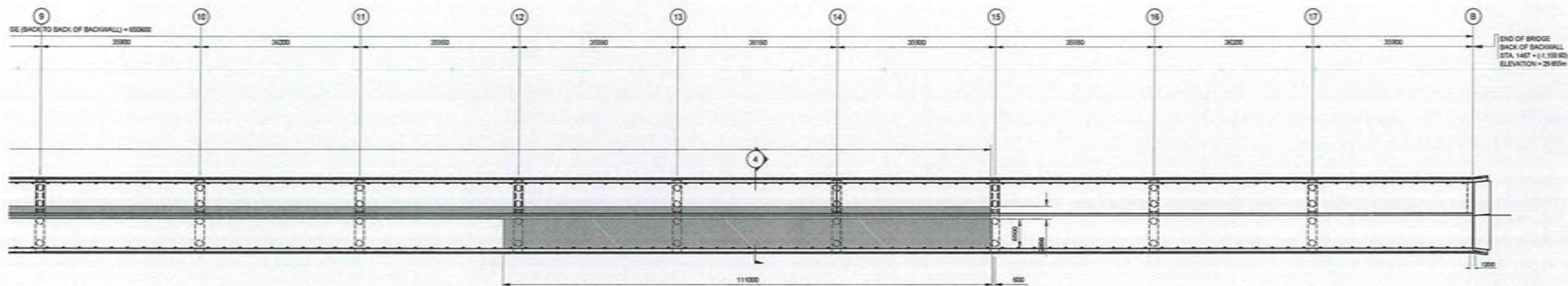
SUBMITTED:
JUDY B. BERNARDINO
CHIEF, PLANNING AND DESIGN DIVISION
DATE:

RECOMMENDED:
JOSE LITO B. CABALLERO
ASSISTANT REGIONAL DIRECTOR
DATE:

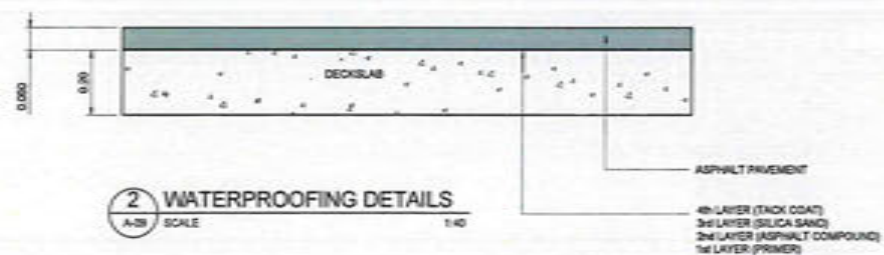
APPROVED:
JUDY B. CORDON
REGIONAL DIRECTOR
DATE:

SET NO.
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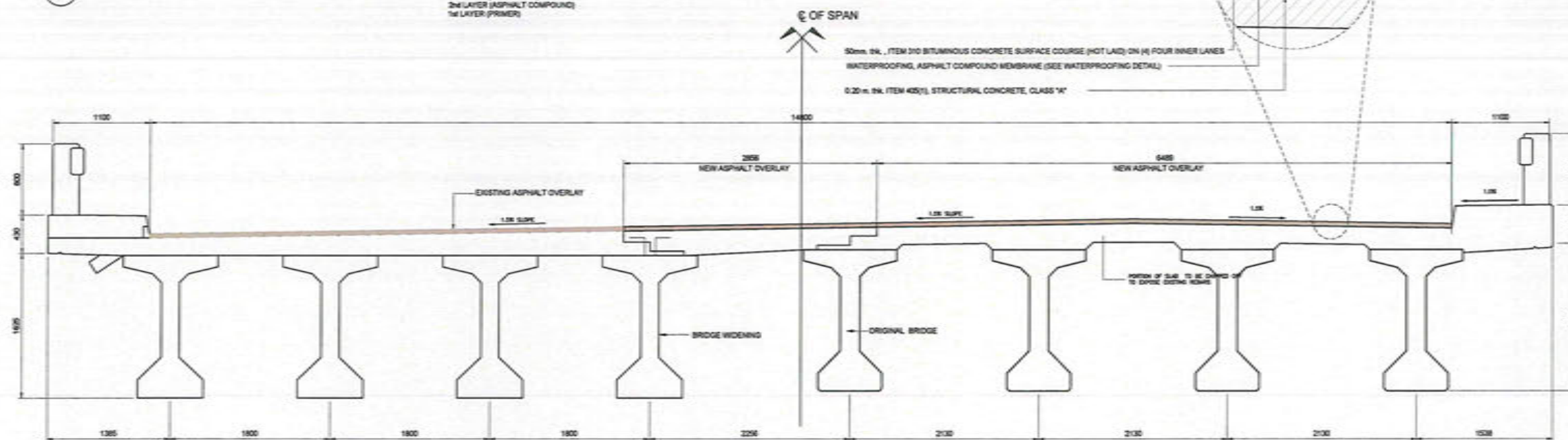
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1 PLAN SHOWING ASPHALT OVERLAY
A-09 SCALE 1:750



2 WATERPROOFING DETAILS
A-09 SCALE 1:40



3 CROSS SECTION
A-09 SCALE 1:50



REPUBLIC OF THE PHILIPPINES
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PROJECT NAME AND LOCATION:
REHABILITATION / MAJOR REPAIR OF BRIDGE -
GOV. MIRANDA BRIDGE 2 (B01270MN)
ALONG MAHARLIKA HIGHWAY (MN),
DAVAO DEL NORTE

SHEET CONTENTS:
FRAMING PLAN
TYPICAL CROSS SECTION
TRANSVERSE SECTION

PREPARED:
DIANNE CARIELA L. CADAVO
ENGINEER I
DATE

REVIEWED:
ALGIN A. GINGATA
ENGINEER II, BRIDGE DIV.
DATE

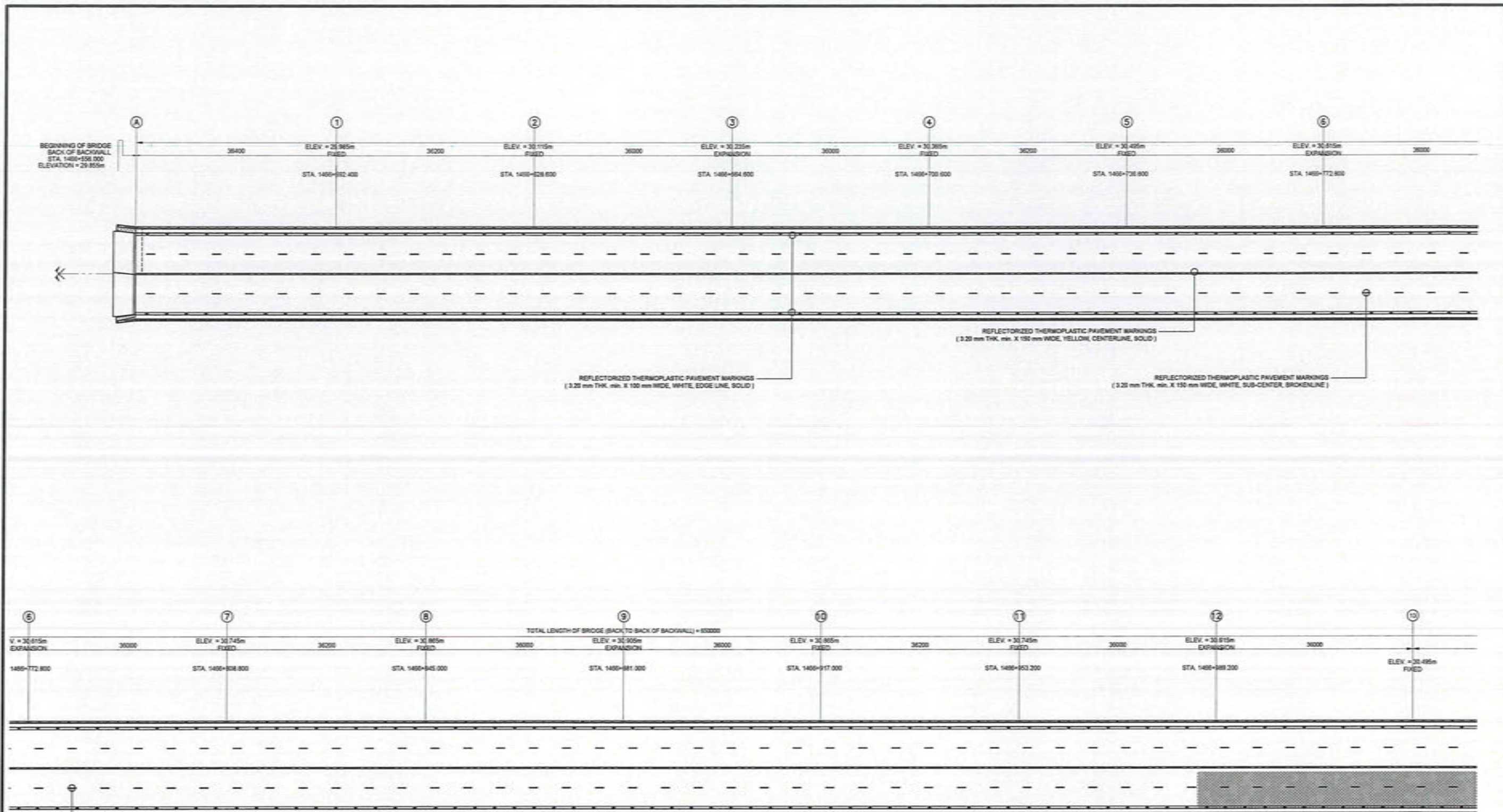
SUBMITTED:
JUDYAN T. BERNARDINO
CHIEF PLANNING AND DESIGN DIVISION
DATE

RECOMMENDED:
JOSELYN B. CABALLERO
ASSISTANT REGIONAL DIRECTOR
DATE

APPROVED:
JUBY B. CORDON
REGIONAL DIRECTOR
DATE

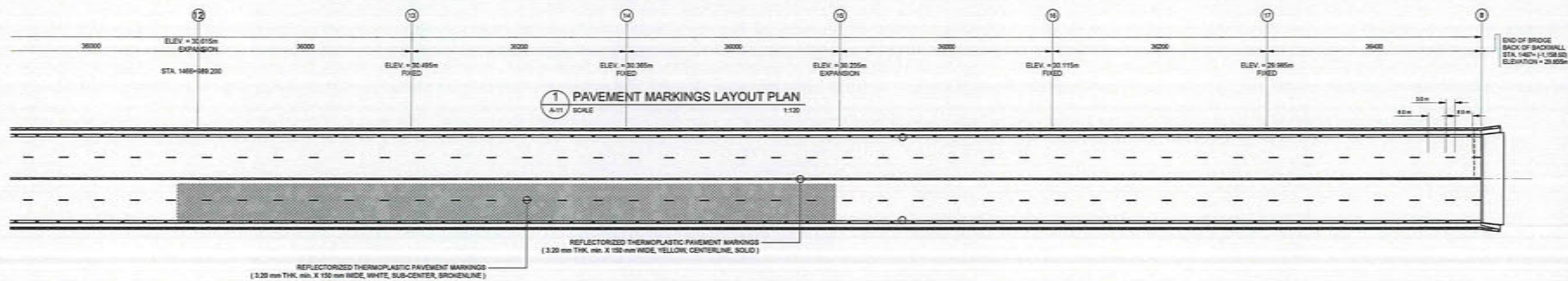
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SHEET NO.
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1 PAVEMENT MARKINGS LAYOUT PLAN
A-10 SCALE 1:125

REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS REGIONAL OFFICE NO. XI GOV. CHAVEZ COR. R. MAGSAYSAY AVENUE, DAVAO CITY	PROJECT NAME AND LOCATION:	SHEET CONTENTS:	PREPARED:	REVIEWED:	SUBMITTED:	RECOMMENDED:	APPROVED:	SET NO.	SHEET NO.
	REHABILITATION / MAJOR REPAIR OF BRIDGE - GOV. MIRANDA BRIDGE 2 (B01270MM) ALONG MAHARLIKA HIGHWAY (MN), DAVAO DEL NORTE	PAVEMENT MARKINGS LAYOUT PLAN	DIANNE CARMELA L. CADANO ENGINEER I	ALGIN A. GIVOCAN ENGINEER II	JUDY B. CORDON CHIEF PLANNING AND DESIGN DIVISION	JOSELYN B. CABALLERO ASSISTANT REGIONAL DIRECTOR	JUDY B. CORDON REGIONAL DIRECTOR	A 1019	10 19



REFLECTORIZED THERMOPLASTIC PAVEMENT MARKINGS SCHEDULE

STATION	SOLID (W = 0.15 m) DOUBLE	BROKEN LINES (W = 0.15 m L = 3.0 m)		AREA (SQ.M.)	DESCRIPTION
		LENGTH	No. OF STRIPS		
K 1450 + (500.00) - K 1450 + (1,150.00)	1,350.00 L.A.M.			195.00	YELLOW, CENTER LINE (SOLID)
K 1450 + (500.00) - K 1450 + (1,150.00)		111.00 L.A.M.	13	3.90	WHITE, SUB-CENTER (BROKEN LINE, L/S, R/S)



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REHABILITATION / MAJOR REPAIR OF BRIDGE -
GOV. MIRANDA BRIDGE 2 (B01270MN)
ALONG MAHARLIKA HIGHWAY (MN),
DAVAO DEL NORTE

SHEET CONTENTS:
PAVEMENT MARKINGS LAYOUT PLAN
PAVEMENT MARKINGS SCHEDULE

PREPARED:
DIANNE CARIELA L. CADANO
ENGINEER I
DATE

REVIEWED:
ALGIN A. GIVOTA
ENGINEER II, BRIDGE DIVISION
DATE

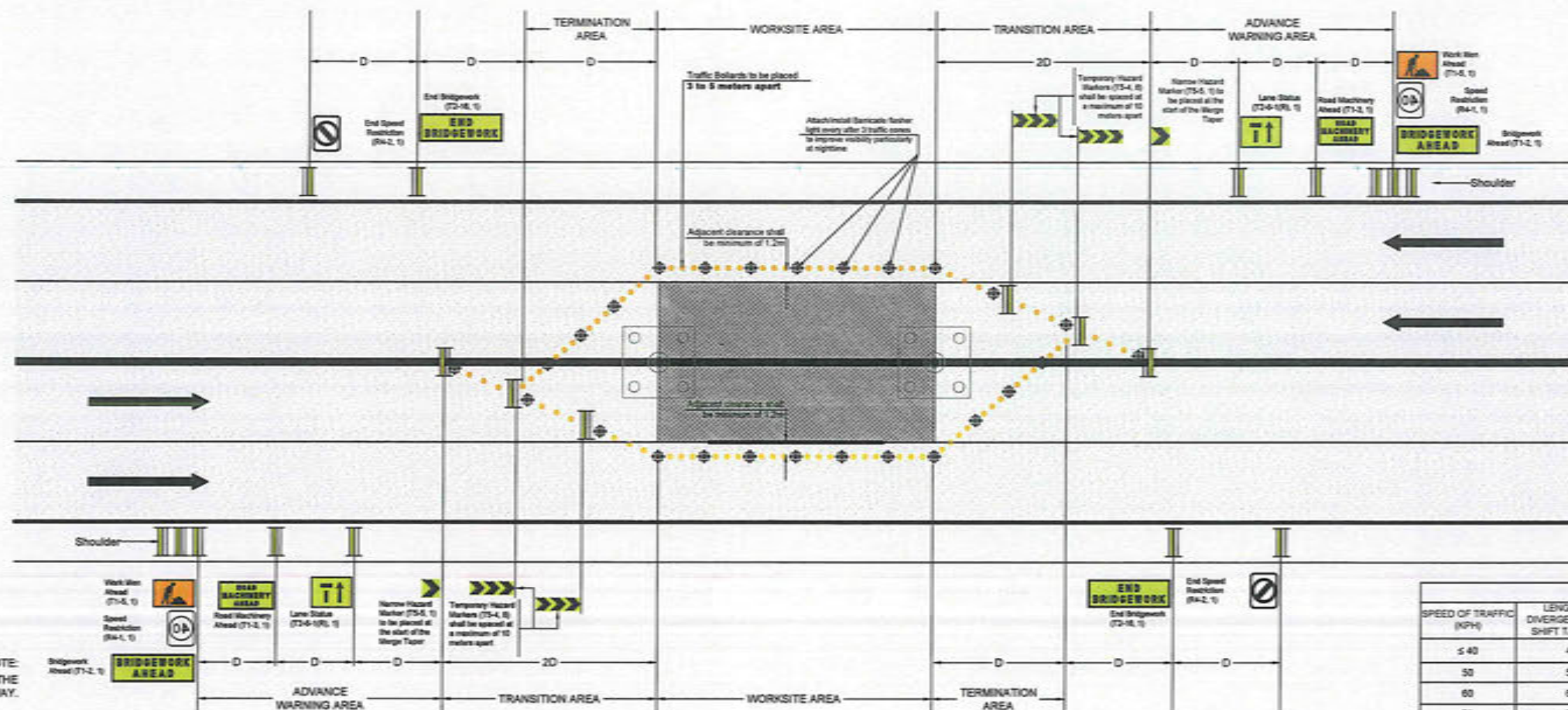
SUBMITTED:
JUDY B. BERNARDINO
CHIEF, PLANNING AND DESIGN DIVISION
DATE

RECOMMENDED:
JOSE LITO S. CABALLERO
ASSISTANT REGIONAL DIRECTOR
DATE

APPROVED:
JUBY B. CORDON
REGIONAL DIRECTOR
DATE

SET NO.
A
11/19

SHEET NO.
11
19



**SCHEME 1
REMOVAL OF EXISTING LONGITUDINAL EXPANSION JOINT**

USE OF TRAFFIC CONTROLLERS (FLAGMEN)

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

NOTE:

1. ROADWORK AHEAD - THE FIRST ADVANCE WARNING SIGN SEEN BY DRIVERS, SHOULD BE LOCATED AT MINIMUM DISTANCE 20 METERS (D) IS THE APPROACHED SPEED OF TRAFFIC) BEFORE THE START OF THE WORKS, OR IF THERE IS A TRANSITION AREA, THE START OF THE TAPER.
2. OTHER SIGN IN ADVANCE WARNING AREA SHOULD BE SPACE 10 METERS APART.
3. LONGITUDINAL BUFFER SPACE SHOULD BE 20 TO 30 METERS LONG BUT CAN BE EXTENDED IF THE WORK AREA IS HIDDEN FROM APPROACHING ROAD USER, e.g. BY A CURVE OR CREST.
4. LATERAL BUFFER SPACE SHOULD BE A MINIMUM OF 1.2 METERS IN SLOW SPEED AREAS, OR IN HIGH SPEED AND HIGH VOLUME AREAS, A LARGE ADJACENT CLEARANCE IN DESIRABLE WITH SAFETY BARRIERS ADJACENT TO THE WORK AREA.
5. LOCATION OF TRAFFIC CONTROLLER SHOULD BE 30 METERS IN ADVANCE OF WORK AREA, WITH GOOD SITE DISTANCE OF ONCOMING TRAFFIC, WITH AN ESCAPE PATH IN AN EMERGENCY, WHERE THE OTHER TRAFFIC CONTROLLER IS VISIBLE, AND CAN BE SEEN BY THE ROAD USER.

REFERENCES:

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

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

TERMINATION AREA			
SPEED OF TRAFFIC (KPH)	LENGTH OF DIVERGENCE/LATERAL SHIFT TAPER (m)	LENGTH OF MERGE TAPER (m)	LENGTH OF STRAIGHT SECTION BETWEEN MULTI-LANE CLOSURES (m)
≤ 40	40	80	1/3 OF LEAD TAPER LENGTH
50	50	100	
60	60	120	
70	70	140	
80	80	160	
90	90	180	
100	100	200	
110	110	220	

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

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

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

1 TRAFFIC MANAGEMENT LAYOUT
A-12 SCALE



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REHABILITATION / MAJOR REPAIR OF BRIDGE -
GOV. MIRANDA BRIDGE 2 (B01270MN)
ALONG MAHARLIKA HIGHWAY (MN),
DAVAO DEL NORTE

SHEET CONTENTS:
TRAFFIC MANAGEMENT LAYOUT

PREPARED:
DIANNE CARMELA L. CADANO
ENGINEER I
DATE:

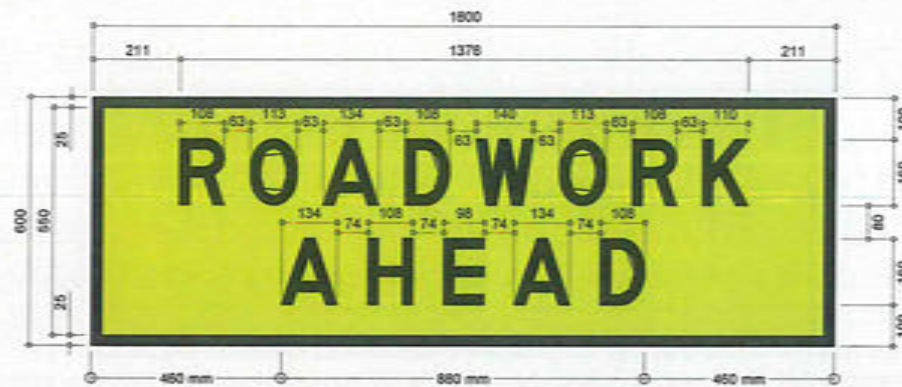
REVIEWED:
ALGIN A. GINGATA
ENGINEER II, BRIDGE
DATE:

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

RECOMMENDED:
JOSEPH B. CABALLERO
ASSISTANT REGIONAL DIRECTOR
DATE:

APPROVED:
JUBY S. CORDON
REGIONAL DIRECTOR
DATE:

SET NO. A
SHEET NO. 12
19



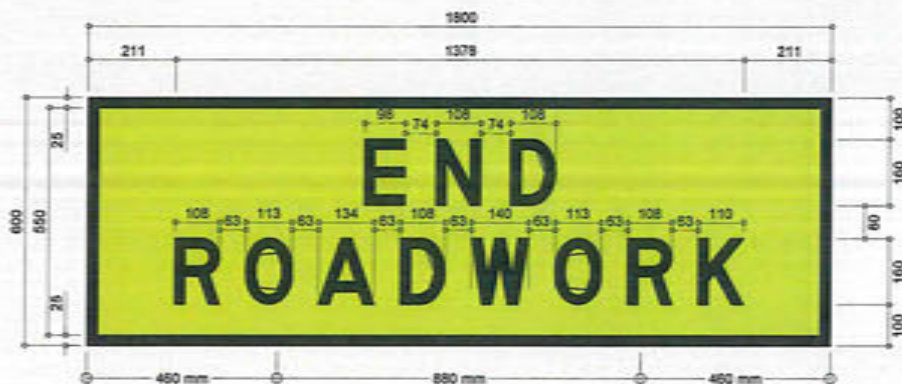
ROADWORK AHEAD DETAILS

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



WORKMEN AHEAD (SYMBOLIC) DETAILS

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



END ROADWORK DETAILS

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



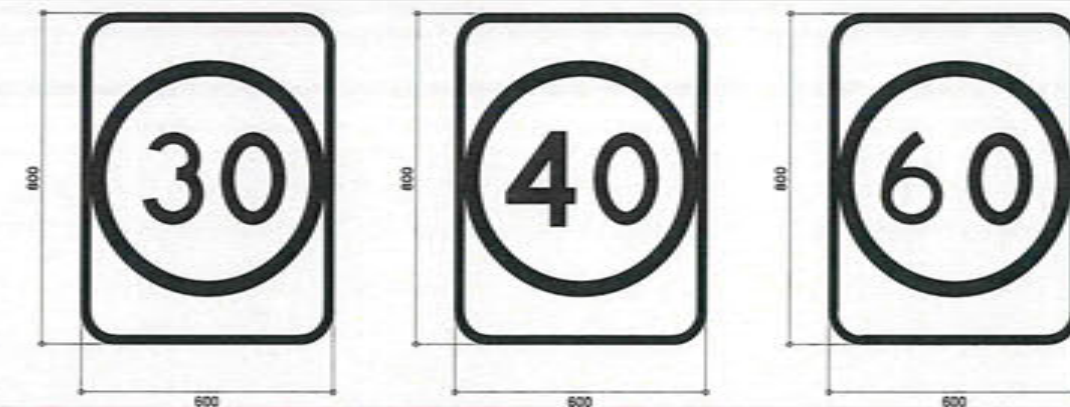
PREPARED TO STOP DETAILS

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



ROAD MACHINERY AHEAD DETAILS

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



SPEED RESTRICTION DETAILS

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



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

PROJECT NAME AND LOCATION:

REHABILITATION / MAJOR REPAIR OF BRIDGE -
GOV. MIRANDA BRIDGE 2 (B01270MN)
ALONG MAHARLIKA HIGHWAY (MN),
DAVAO DEL NORTE

SHEET CONTENTS:

TRAFFIC MANAGEMENT PROGRAM SIGNAGE

PREPARED:

DIANNE CARMELA L. CADANO
ENGINEER II

REVIEWED:

ALVIN A. GINGATA
ENGINEER II, BRIDGE DIV.

SUBMITTED:

JUDY B. BERNARDO
CHIEF, PLANNING AND DESIGN DIVISION

RECOMMENDED:

JOSE LITO S. CABALLERO
ASSISTANT REGIONAL DIRECTOR

APPROVED:

JUDY B. CORDON
REGIONAL DIRECTOR

SET NO.

A
1319

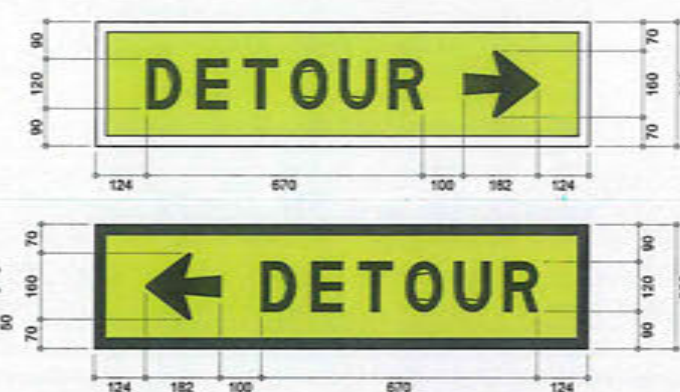
SHEET NO.

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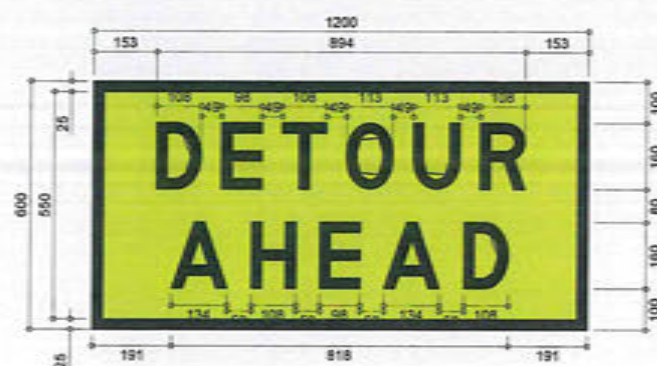
END SPEED RESTRICTION DETAILS

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



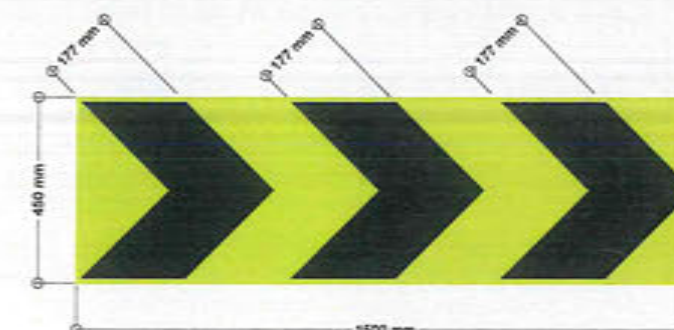
DETOUR (LEFT OR RIGHT) DETAILS

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



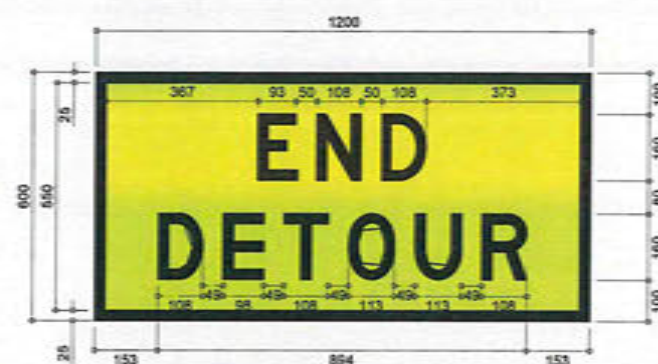
DETOUR AHEAD DETAILS

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



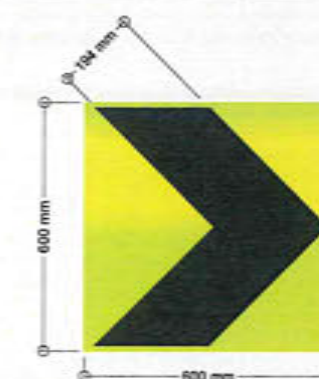
TEMPORARY HAZARD MARKER DETAILS

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



END DETOUR DETAILS

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



SPEED RESTRICTION DETAILS

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



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GOV. CHAVEZ COR. R. WAGSAYSAY AVENUE, DAVAO CITY

PROJECT NAME AND LOCATION:
REHABILITATION / MAJOR REPAIR OF BRIDGE -
GOV. MIRANDA BRIDGE 2 (B01270MN)
ALONG MAHARLIKA HIGHWAY (MN),
DAVAO DEL NORTE

SHEET CONTENTS:
TRAFFIC MANAGEMENT PROGRAM SIGNAGE

PREPARED:
DIANNE CARMELA L. CADAVO
ENGINEER II
DATE: _____

REVIEWED:
ALVIN A. GINGLATA
ENGINEER II, BRIDGE DIVISION
DATE: _____

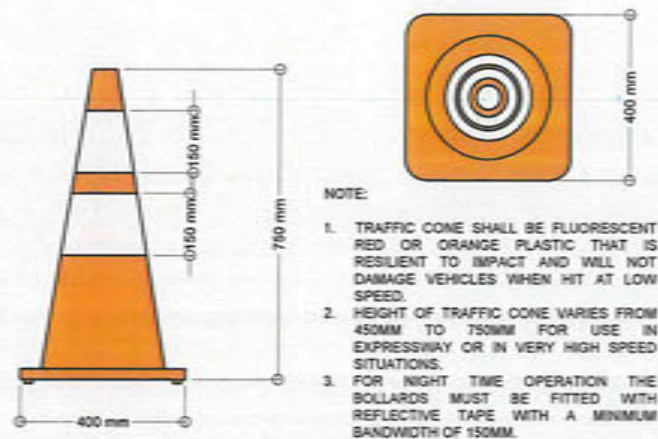
SUBMITTED:
JUDYAN T. BERNARDINO
CHIEF, PLANNING AND DESIGN DIVISION
DATE: _____

RECOMMENDED:
JOSELYN B. CABALLERO
ASSISTANT REGIONAL DIRECTOR
DATE: _____

APPROVED:
JUBY B. CORDON
REGIONAL DIRECTOR
DATE: _____

SET NO.
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1419

SHEET NO.
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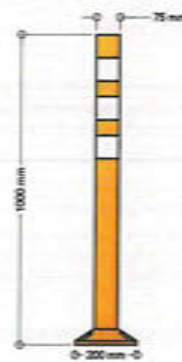


NOTE:

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

SPACING	CONDITION
5 - 10 METERS	ON TAPER WHEN USED AROUND SMALL WORK SITES (MAY BE REDUCED TO 3m TO GUIDE PEDESTRIANS OR TO PREVENT TRAFFIC TAKING A WRONG TURN THROUGH A GAP IN THE LINE OF BOLLARDS)
10 - 20 METERS	WHEN USED AS LONGITUDINAL SEPARATION BETWEEN OPPOSING TRAFFIC FLOWS WHEN USED AS LONGITUDINAL SEPARATION OF TRAFFIC FROM THE WORKSITE OR CLOSED LANE (MAY BE INCREASED TO 50m WHERE THE LENGTH OF BOLLARDS EXCEEDS 100M)

1 TRAFFIC CONE
A-10 SCALE
N75



PLAN



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

NOTE:

1. BOLLARDS SHALL BE FLUORESCENT RED OR ORANGE PLASTIC THAT IS RESILIENT TO IMPACT AND WILL NOT DAMAGE VEHICLES WHEN HIT AT LOW SPEED.
2. HEIGHT OF BOLLARDS MUST BE UP TO 1 METER.
3. FOR NIGHT TIME OPERATION THE BOLLARDS MUST BE FITTED WITH REFLECTIVE TAPE WITH A MINIMUM BANDWIDTH OF 250MM.
4. SPACING @ 0.50 M. O.C.

2 SECTION
A-10 SCALE
N75

2 ISOMETRIC VIEW
A-10 SCALE
N75

SPACING	CONDITION
5 - 10 METERS	ON TAPER WHEN USED AROUND SMALL WORK SITES (MAY BE REDUCED TO 3m TO GUIDE PEDESTRIANS OR TO PREVENT TRAFFIC TAKING A WRONG TURN THROUGH A GAP IN THE LINE OF BOLLARDS)
10 - 20 METERS	WHEN USED AS LONGITUDINAL SEPARATION BETWEEN OPPOSING TRAFFIC FLOWS WHEN USED AS LONGITUDINAL SEPARATION OF TRAFFIC FROM THE WORKSITE OR CLOSED LANE (MAY BE INCREASED TO 50m WHERE THE LENGTH OF BOLLARDS EXCEEDS 100M)

2 FLEXIBLE BOLLARD DETAIL
A-10 SCALE
N75

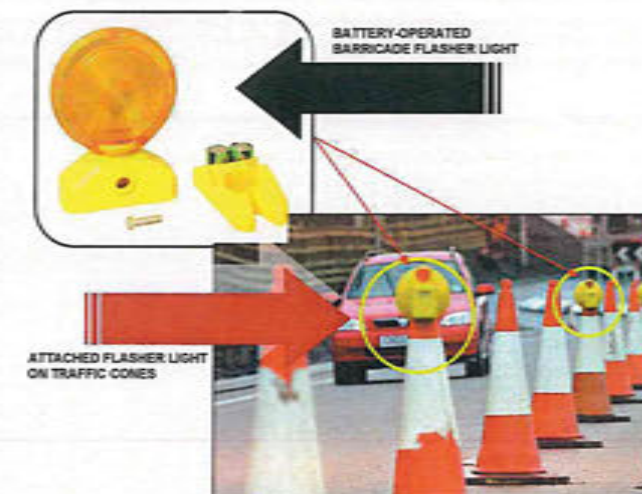
NOTE:

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



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

3 TRAFFIC SAFETY VEST DETAILS
A-10 SCALE
N75



4 BARRICADE FLASHER LIGHT
A-10 SCALE
N75



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REHABILITATION / MAJOR REPAIR OF BRIDGE -
GOV. MIRANDA BRIDGE 2 (B01270M)
ALONG MAHARLIKA HIGHWAY (MN),
DAVAO DEL NORTE

SHEET CONTENTS:
TRAFFIC CONE
FLEXIBLE BOLLARD DETAIL
TRAFFIC SAFETY VEST
BARRICADE FLASHER LIGHT

PREPARED:
DIANNE CARMELA L. CADANO
ENGINEER II
DATE:

REVIEWED:
ALGIN A. GINGITA
ENGINEER III, BRIDGE DIVISION
DATE:

SUBMITTED:
JUDY B. CORDON
CHIEF, PLANNING AND DESIGN DIVISION
DATE:

RECOMMENDED:
JOSELO B. CABALLERO
ASSISTANT REGIONAL DIRECTOR
DATE:

APPROVED:
JUDY B. CORDON
REGIONAL DIRECTOR
DATE:

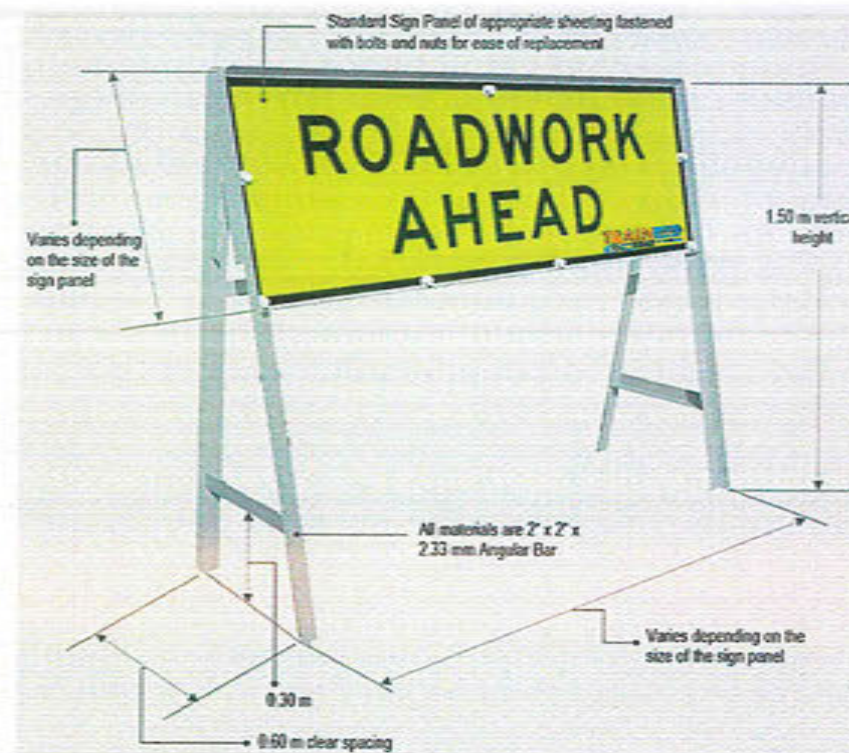
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SHEET NO. 19



NOTE:

1. BOARD DIMENSIONS: (4M X 0.15M X 0.20M) WITH DIAGONAL BLACK AND REFLECTIVE YELLOW STRIPES PREFERABLY TERMINATING IN YELLOW AT EACH END.
2. MOUNTING HEIGHT: APPROXIMATELY 1 METER USING TRESTLES (SHOULD BE ERECTED PERPENDICULAR TO THE DIRECTION OF TRAFFIC FLOW).
3. BARRIER BOARD SHALL NOT BE USED FOR DELINEATION PURPOSES OR INSTALLED PARALLEL TO VEHICULAR TRAFFIC UNLESS THERE IS AN OFFSET OF AT LEAST FOUR (4) METERS FROM THE TRAVELLED PATH.

1 BARRIER BOARD DETAIL



2 ROAD SIGN DETAILS



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REHABILITATION / MAJOR REPAIR OF BRIDGE -
GOV. MIRANDA BRIDGE 2 (B01270MN)
ALONG MAHARLIKA HIGHWAY (MN),
DAVAO DEL NORTE

SHEET CONTENTS:

ROAD SIGN DETAIL
BARRIER BOARD DETAIL

PREPARED:

DIANNE CARMELA L. CADANO
ENGINEER II

DATE:

REVIEWED:

ALGIN A. GINGATAN
ENGINEER III, BRIDGE DIVISION

DATE:

SUBMITTED:

JUDYLYN T. BERNARDINO
CHIEF, PLANNING AND DESIGN DIVISION

DATE:

RECOMMENDED:

JOSE LITO S. CABALLERO
ASSISTANT REGIONAL DIRECTOR

DATE:

APPROVED:

JUBY S. CORDON
REGIONAL DIRECTOR

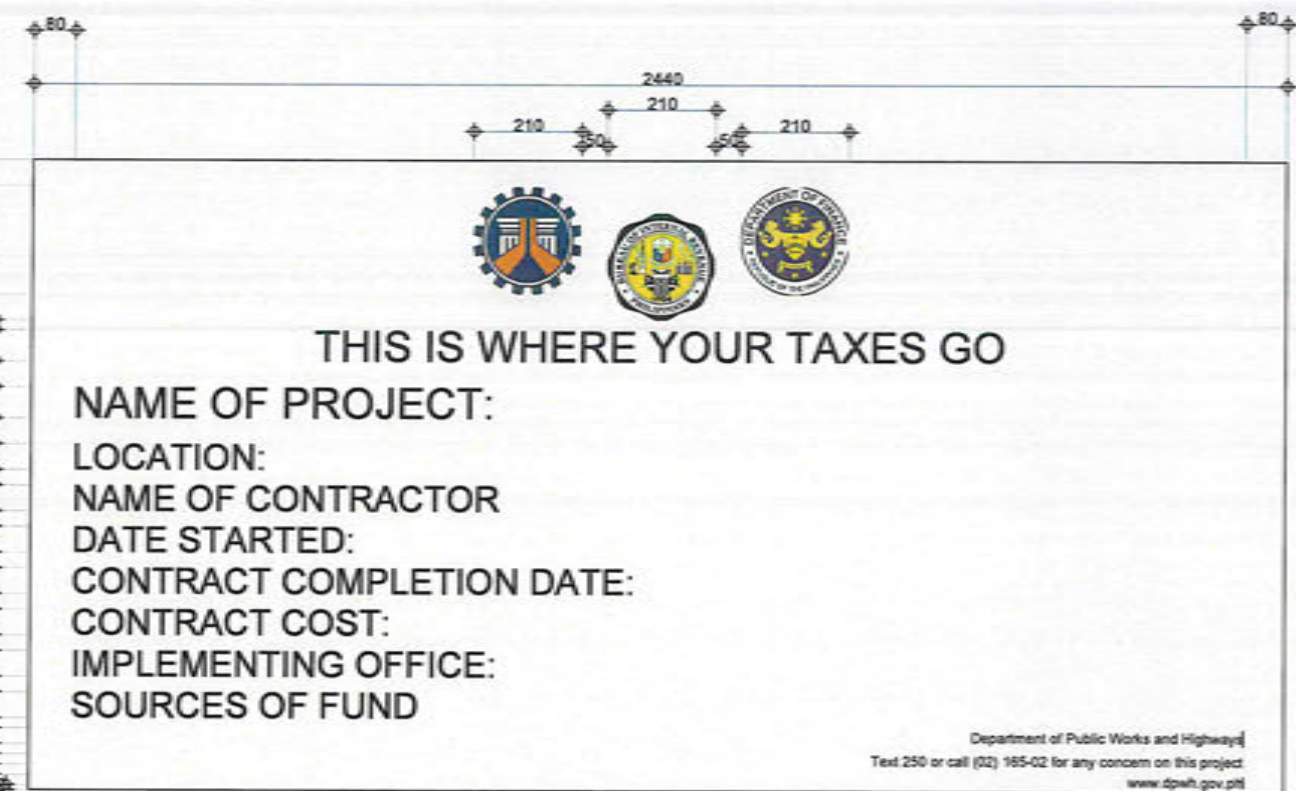
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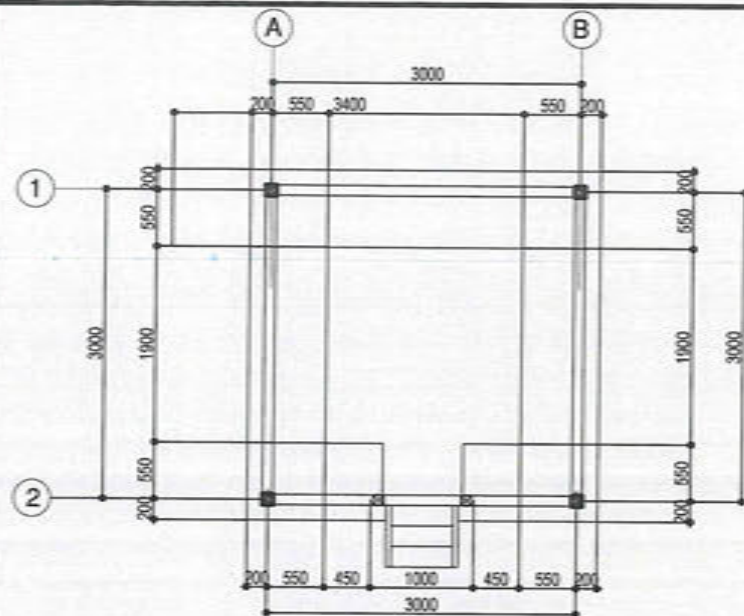
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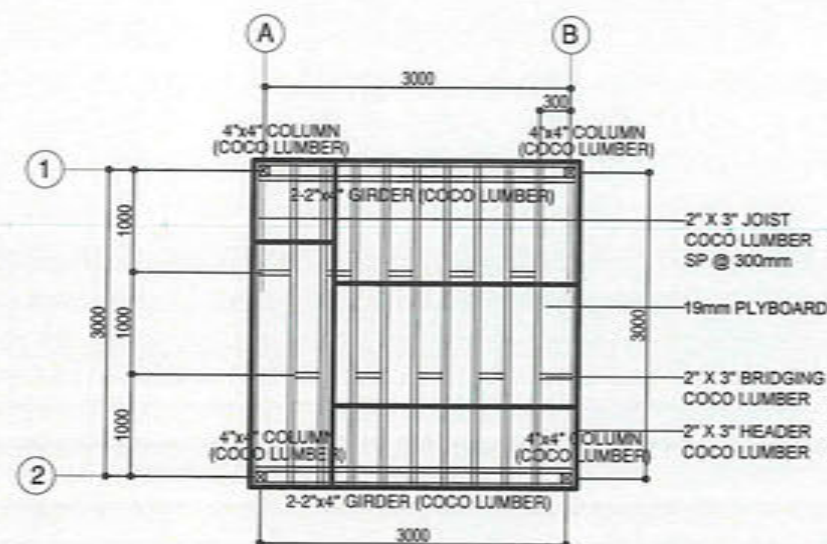
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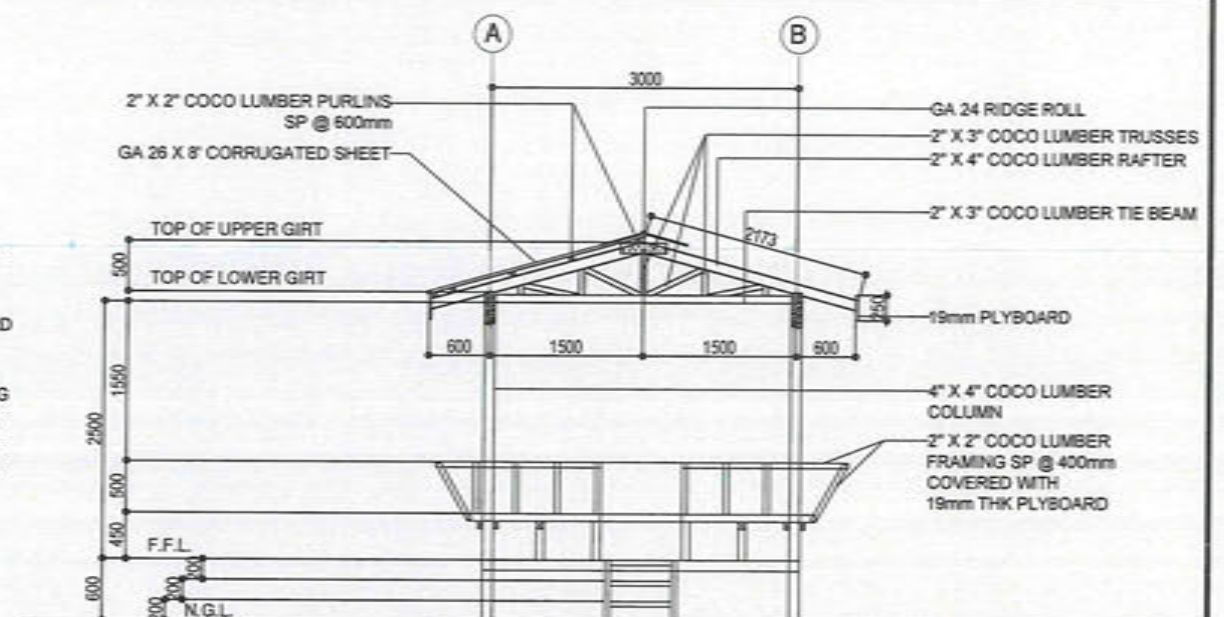
For source of Fund, state if DPWH Regular Budget, Priority Development Assistance Fund, DepEd/DA/DAR Budget, Calamity Fund, MVUC Fund etc.



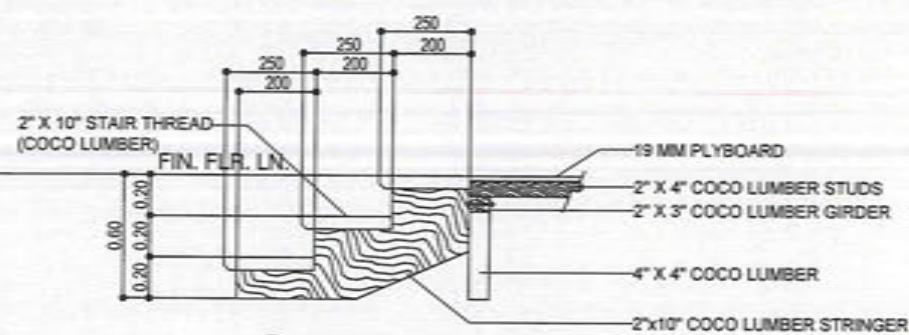
1 FLOOR PLAN



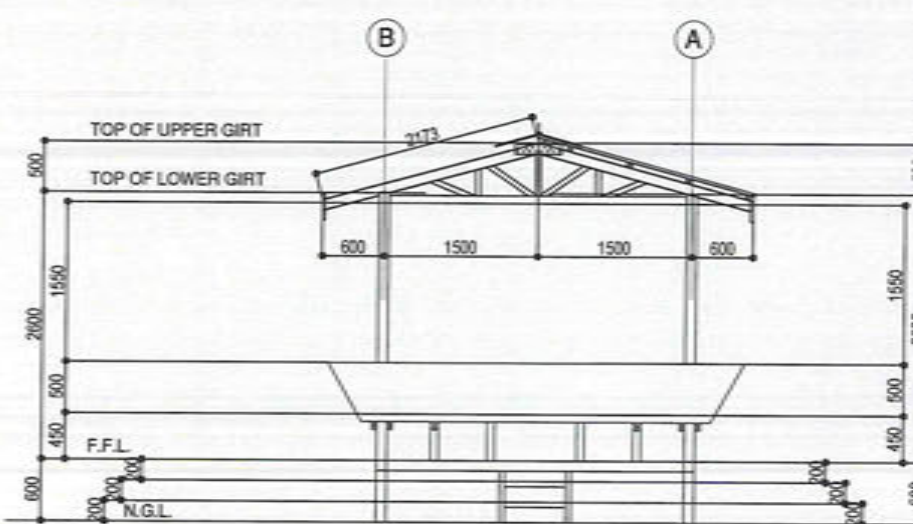
2 FLOOR FRAMING



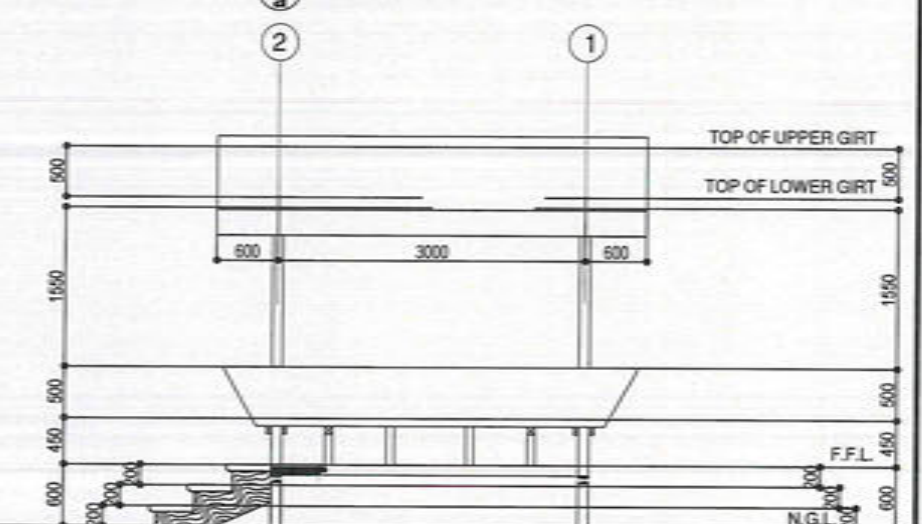
3 SECTION



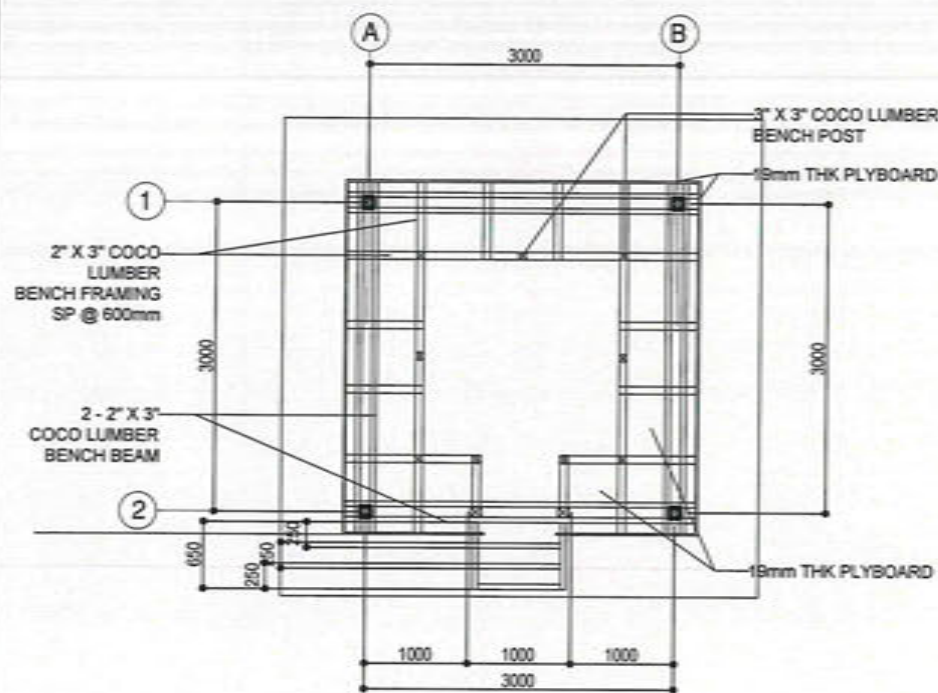
4 STAIR DETAIL



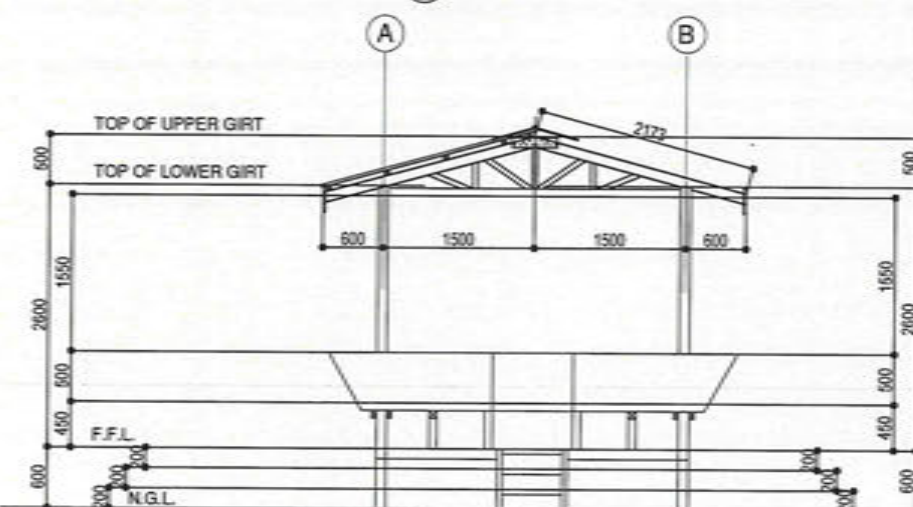
6 REAR ELEVATION



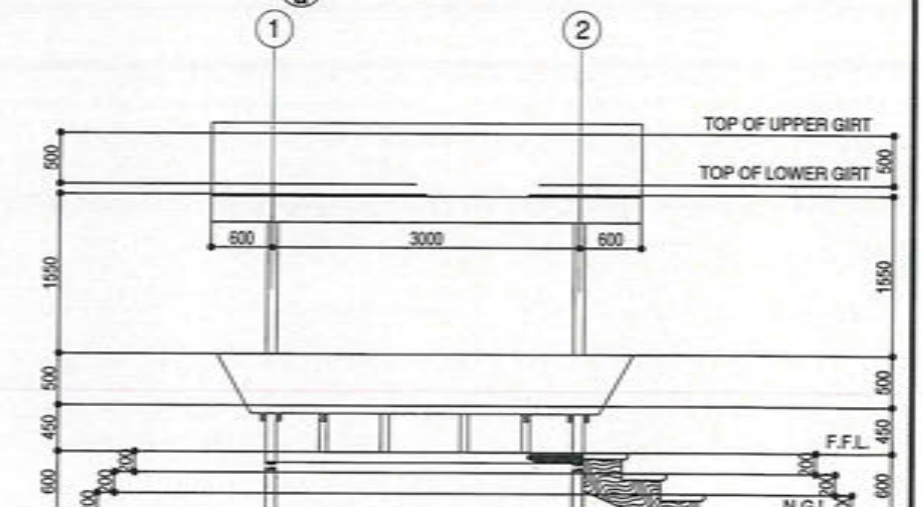
7 RIGHT SIDE ELEVATION



5 BENCH FRAMING



8 FRONT ELEVATION



9 LEFT SIDE ELEVATION

 REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS REGIONAL OFFICE NO. XI GOV. CHAVEZ COR. R. MAGSAYSAY AVENUE, DAVAO CITY	PROJECT NAME AND LOCATION: REHABILITATION / MAJOR REPAIR OF BRIDGE - GOV. MIRANDA BRIDGE 2 (B01270MN) ALONG MAHARLIKA HIGHWAY (MN), DAVAO DEL NORTE	SHEET CONTENTS: CAMPHOUSE TYPICAL DETAILS (BAHAY KUBO)	PREPARED: FERDINAND M. RAMOSA ARCHITECT I DATE: _____	REVIEWED: ALVIN A. GINGATAN ENGINEER II, BRIDGE DIVISION DATE: _____	SUBMITTED: JUDYANN T. BERNARDINO CHIEF, PLANNING AND DESIGN DIVISION DATE: _____	RECOMMENDED: JOSE LITO B. CABALLERO ASSISTANT REGIONAL DIRECTOR DATE: _____	APPROVED: JUBY S. CORDON REGIONAL DIRECTOR DATE: _____	SET NO. 19 SHEET NO. 19
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