REPUBLIC OF THE PHILIPPINES

DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

REGION X

BUKIDNON 1ST DISTRICT ENGINEERING OFFICE

CAPITOL COMPOUND, MALAYBALAY CITY

C.Y. 2025 PROJECT

DETAILED ENGINEERING DESIGN PLAN FOR

REHABILITATION/ RECONSTRUCTION OF SCOURED PAVED ROADS ALONG SITIO SULOG, BARANGAY HALAPITAN, SAN FERNANDO, BUKIDNON

LOCATION	:BRGY. HALAPITAN, SAN FERNANDO, BUKIDNON 2ND LD
STATION LIMITS	:K1577 + 866 - K1577 + 902
LENGTH	:9.00l.m. (PCCP)
	:10.00m (GABIONS AT ROAD SIDE)

SUBMITTED:

EVELYN M. KIAMCO
CHIEF, MAINTENANCE SECTION
DATE:

RECOMMENDED:

SARAH JANE B. LAGRAMA
ASSISTANT DISTRICT ENGINEER
DATE:

APPROVED:

MARIA B. DAVID
DISTRICT ENGINEER
DATE:

2025

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ENGINEER II

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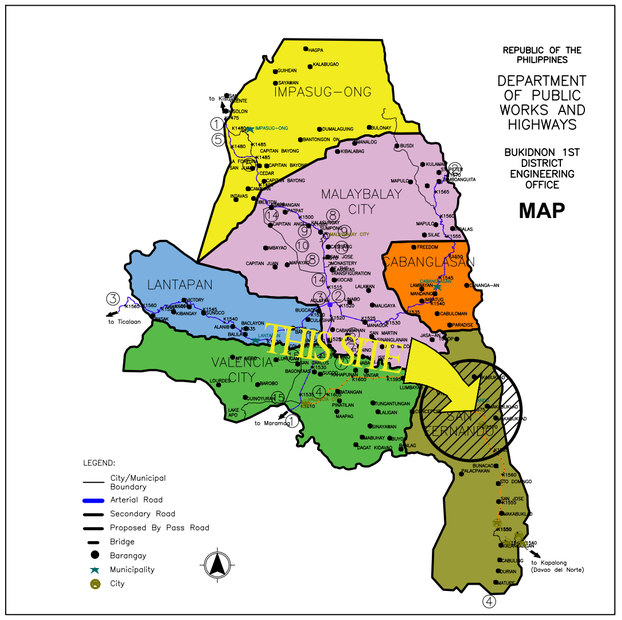
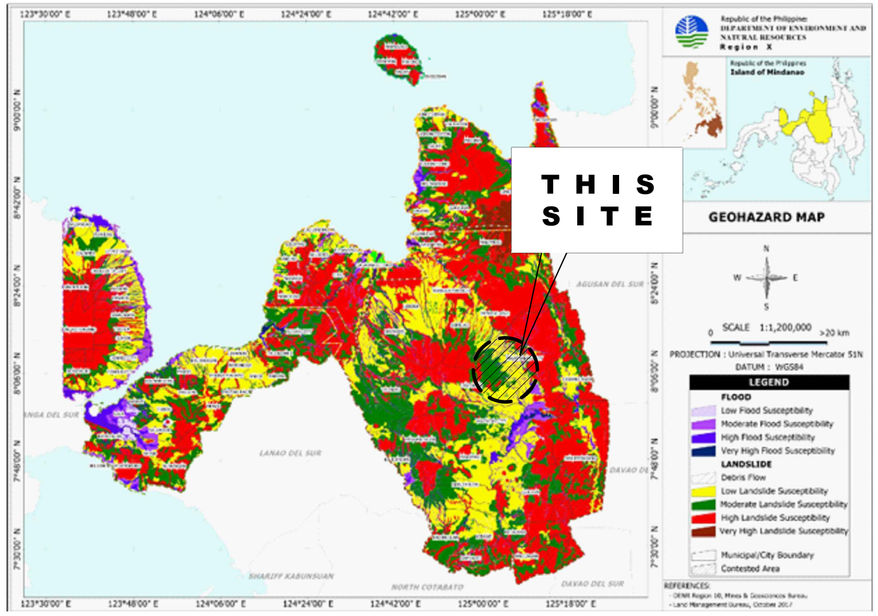


VICINITY MAP

NOT TO SCALE



GEO-HAZARD MAP

NOT TO SCALE

LOCATION PLAN

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GENERAL NOTES: DESIGN STANDARDS AND SPECIFICATIONS

DESIGN STANDARDS:

1. ALL WORKS SHALL COMPLY WITH THE DPWH DESIGN GUIDELINES CRITERIA AND STANDARDS (DGCS), VOLUME IV - 2015 EDITION,
AASHTO - A POLICY ON GEOMETRIC DESIGN STANDARD OF HIGHWAYS AND STREETS, 2018, 7TH EDITION AND AASHTO GUIDE ON PAVEMENT DESIGN, 1993 EDITION.
2. THE PROVISION FOR ROADWAY SAFETY SHALL COMPLY WITH THE HIGHWAY SAFETY DESIGN STANDARDS: PART 1 - ROAD
SAFETY DESIGN, AND PART 2 - ROAD SIGNS AND PAVEMENT MARKINGS, 2012 EDITION.

DESIGN SPECIFICATIONS:

- FOR GEOMETRIC DESIGN CRITERIA (IN GENERAL)

1. THE DESIGN MUST BE SUITABLE FOR THE TRAFFIC VOLUME, BOTH DAILY AND AT THE DESIGN PEAK HOUR, FOR THE DESIGN SPEED AND FOR THE CHARACTER OF THE VEHICLES TO USE THE FACILITY.
2. THE DESIGN MUST BE CONSISTENT AND MUST AVOID SURPRISE CHANGES IN ALIGNMENT, GRADE AND SIGHT DISTANCE, AND
MUST BE PLEASING TO THE USER AND TO THOSE WHO LIVE ALONG IT.
3. THE DESIGN MUST BE COMPLETE. HOWEVER, FOR THE DESIGNER TO BE ABLE TO ENSURE THE EFFECTIVENESS OF HIS DESIGN TO A LARGE DEGREE, THE NECESSARY ROADSIDE TREATMENT AND THE PROVISION OF CONTROL DEVICES, SUCH AS LANE MARKERS AND SPECIAL SIGNS, ARE TAKEN INTO ACCOUNT.
4. THE DESIGN SHALL BE AS SIMPLE AS POSSIBLE FROM THE STANDPOINT OF THE BUILDER. EXCESSIVE CHANGES IN CROSS SECTIONAL DESIGN OR THE USE OF A VARIETY OF TYPES WITHIN A PROJECT WILL IN MANY CASES INCREASE THE COST AND DIFFICULTY OF CONSTRUCTION BEYOND THE COMMENSURATE VALUE OF SUCH 'UNIQUENESS'.
5. THE DESIGN SHOULD BE SUCH THAT THE FINISHED ROAD CAN BE MAINTAINED AT THE LEAST COST, AND MUST BE SAFE FOR DRIVING AND SHOULD ENSURE CONFIDENCE FOR MOTORISTS.

- FOR GEOMETRIC DESIGN CRITERIA (HORIZONTAL ALIGNMENT AND CONTROLS)

1. FOR A DESIGN SPEED OF 30KPH, THE MINIMUM RADIUS IS 30M AND A SUPERELEVATION OF 6% - 8%.
2. THE RECOMMENDED MINIMUM LENGTH OF TANGENT BETWEEN REVERSED CURVES SHOULD BE 50 M.
3. IN NO CASES SHALL THE TANGENT LENGTH BE LESS THAN 30 M. THE TANGENT IS NECESSARY TO EFFECT THE TRANSITION FROM SUPERELEVATION IN ONE DIRECTION TO SUPERELEVATION IN THE OPPOSITE DIRECTION.
4. A SUPERELEVATED SECTION IS PROCEEDED BY A TRANSITION SECTION. THE VALUES OF SUPERELEVATION ARE DETERMINED FROM THE AASHTO POLICY ON GEOMETRIC DESIGN AND ARE A FUNCTION OF THE RATE OF SUPERELEVATION AND THE CURVE RADIUS.
5. SUPERELEVATION IS USUALLY NOT PROVIDED ON LOCAL STREETS IN RESIDENTIAL AND COMMERCIAL AREAS WHERE WIDE PAVEMENTS, PROXIMITY OF ADJACENT DEVELOPMENT, CONTROL OF CROSS SLOPE, DRAINAGE PROFILES, FREQUENCY OF CROSS STREETS, AND OTHER URBAN FEATURES MAKE ITS USE IMPRACTICAL.
6. ON SIMPLE CURVES, WIDENING SHOULD BE APPLIED ON THE INSIDE EDGE ONLY, WITH A RECOMMENDED MINIMUM WIDTH OF 0.60 METERS.
7. ON CURVE DESIGN WITH SPIRAL, WIDENING MAY BE PLACED ON THE INSIDE OR DIVIDED EQUALLY BETWEEN THE INSIDE AND OUTSIDE CURVE.
8. CURVE WIDENING SHOULD BE ATTAINED GRADUALLY OVER A LENGTH SUFFICIENT TO MAKE THE WHOLE OF THE TRAVELED WAY FULLY USABLE.
9. ALIGNMENT SHOULD BE AS DIRECTIONAL AS POSSIBLE BUT SHOULD BE CONSISTENT WITH THE TOPOGRAPHY AND WITH PRESERVING DEVELOPED PROPERTIES.
10. ALIGNMENT SHOULD BE CONSISTENT AND SHARP CURVES SHOULD NOT BE INTRODUCED AT THE END OF LONG TANGENTS.
11. FOR SMALL DEFLECTION ANGLE, CURVES SHOULD BE SUFFICIENTLY LONG TO AVOID THE APPEARANCE OF "KINK".
12. TANGENTS OR FLAT CURVATURE SHOULD BE USED ON HIGH, LONG FILLS.
13. CAUTION SHOULD BE EXERCISED IN THE USE OF COMPOUND CURVE. WHERE TOPOGRAPHY OR RROW RESTRICTIONS MAKE
14. THEIR USE NECESSARY, THE RADIUS OF THE FLATTER CURVE SHOULD NOT BE MORE THAN 50 % GREATER THAN THE RADIUS OF THE SHARPER CURVE.
15. ANY ABRUPT REVERSAL IN ALIGNMENT SHOULD BE AVOIDED. THE REVERSION LENGTH OF TANGENT BETWEEN REVERSED CURVES SHOULD BE 50 METERS AND IN NO CASE SHOULD BE LESS THAN 30 METERS.
16. THE "BROKEN-BACK" OR "FLAT-BACK" ARRANGEMENT OF CURVE (HAVING A SHORT TANGENT BETWEEN TWO CURVES IN THE SAME DIRECTION) SHOULD BE AVOIDED EXCEPT WHEN VERY UNUSUAL TOPOGRAPHICAL OR R-O-W DICTATE OTHERWISE.
17. TO AVOID THE APPEARANCE OF INCONSISTENT DISTORTION, THE HORIZONTAL ALIGNMENT SHOULD BE COORDINATED CAREFULLY WITH THE PROFILE DESIGN.
18. ENDING A CURVE ON A BRIDGE IS UNDESIRABLE, UNSIGHTLY AND ADDS NEEDLESS COMPLICATIONS TO DESIGN AND CONSTRUCTION. LIKEWISE CURVES BEGINNING OR ENDING NEAR A BRIDGE SHOULD BE PLACED SUCH THAT NO PART OF THE SUPERELEVATION TRANSITION EXTENDS ON TO THE BRIDGE. COMPOUND CURVES ON A BRIDGE ARE EQUALLY UNDESIRABLE. IF CURVATURE IS UNAVOIDABLE, THE BRIDGE SHOULD BE ENTIRELY ON A SIMPLE CURVE AS FLAT AS PHYSICAL CONDITIONS PERMIT.

- FOR GEOMETRIC DESIGN CRITERIA (VERTICAL ALIGNMENT AND CONTROLS)

1. IN AREAS SUBJECT TO INUNDATION, GRADES SHOULD BE ESTABLISHED 0.50M ABOVE WATER LEVEL.
2. GRADES OF BRIDGES SHOULD ALLOW 1.50M FREEBOARD ABOVE THE MAXIMUM FLOOD WATER ELEVATION.
3. MAXIMUM GRADES OF 5% ARE CONSIDERED APPROPRIATE FOR A DESIGN SPEED OF 110KPH. FOR A DESIGN SPEED OF 50 KPH MAXIMUM GRADES ARE GENERALLY IN THE RANGE OF 7 TO 12%, DEPENDING ON TOPOGRAPHY. IN THE PHILIPPINES THE MAXIMUM GRADE WIDELY USED IS 6%.
4. ON THROUGH CUT SECTIONS, GRADES SHOULD AT LEAST BE 0.50% TO PROVIDE LONGITUDINAL DRAINAGE.
5. A MINIMUM OF 0.35% MAY BE USED ON HIGH TYPE PAVEMENTS AND ACCURATELY CROWNED TO FACILITATE DRAINAGE DISCHARGE.
6. THE FOLLOWING CRITICAL LENGTH OF UPGRADES WHEN APPROACHED BY A LEVEL SECTION SHOULD NOT BE USED AS A CONTROL BUT SHOULD BE REFERRED TO AS A GUIDE:

Critical Length (m)	Upgrade (%)
500	3
340	4
240	5
200	6
170	7
150	8

7. THE MINIMUM REQUIREMENT OF VERTICAL CURVE LENGTH IS 60M.
8. A SMOOTH GRADE LINE WITH GRADUAL CHANGES SHOULD BE SOUGHT FOR IN PREFERENCE TO A LINE WITH NUMEROUS BREAKS /SHORT LENGTH OF GRADES.
9. THE 'ROLLER COASTER" OR THE HIDDEN-DIP TYPE OF PROFILE SHOULD BE AVOIDED.
10. A "BROKEN-BACK" GRADE LINE SHOULD BE AVOIDED.
11. ON LONG GRADES, IT MAY PREFERABLE TO PLACE THE STEEPEST GRADES AT THE BOTTOM AND FLATTER THE GRADES NEAR THE TOP OF THE ASCENT.
12. WHERE AT-GRADE INTERSECTIONS OCCUR ON ROADWAY SECTORS WITH MODERATE TO STEEP GRADES, IT IS DESIRABLE TO REDUCE THE GRADES THROUGH THE INTERSECTION.
13. SAG VERTICAL CURVES SHOULD BE AVOIDED IN CUTS UNLESS ADEQUATE DRAINAGE CAN BE PROVIDED.

- FOR GEOMETRIC DESIGN CRITERIA (CROSS SECTIONS)

1. FOR MULTILANE HIGHWAY, THE TWO LANES ADJACENT TO THE CROWN LINE SHOULD BE PITCHED AT THE NORMAL MINIMUM SLOPE, AND ON EACH SUCCESSIVE PAIR OF LANES OR PORTION THEREOF OUTWARD, THE RATE MAY BE INCREASED BY ABOUT 0.50 TO 1%. THE FOLLOWING CROSS-SLOPE RATING SHALL BE APPLIED FOR EACH SURFACE TYPE:

Surface Type	Cross Slope Rating
High	1.50-2.0%
Intermediate	2.0-3.0%
Low	3.0-4.0%

2. DESIRABLE LANE WIDTH IS 3.65M WHICH ALLOWS LARGE VEHICLES TO PASS WITHOUT EITHER VEHICLE HAVING TO MOVE SIDEWAYS TOWARDS THE EDGE OF PAVEMENT.
3. LANE WIDTH AS LOW AS 2.75M MAY BE USED ON GROUNDS OF ECONOMY.
4. ROADS WITH PAVEMENT WIDTHS LESS THAN 5.5M SHOULD BE REGARDED AS SINGLE LANE.
5. PAVEMENT WIDTH GREATER THAN 7.32M FOR 2-WAY MOVEMENT IS NOT RECOMMENDED FOR 2-LANE ROADS AS SOME DRIVERS WILL ATTEMPT TO TRAVEL THREE VEHICLES ABREAST ON WIDE PAVEMENT.

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MARIA B. DAVID
DISTRICT ENGINEER
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SHEET NO.: 03 / 16

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SURVEY GENERAL NOTES

1. SURVEY SPECIFICATIONS:

1.1 GENERAL PROVISIONS

ALL ENGINEERING SURVEY WORKS SHALL COMPLY WITH THE "DPWH DESIGN GUIDELINES, CRITERIA AND STANDARDS" VOLUME 2B - 2015 EDITION, "ENGINEERING SURVEYS". THIS MANUAL HAS BEEN REVISED TO PROVIDE UNIFORM GUIDELINES THAT WILL ASSURE APPROPRIATE EXECUTION OF PROJECTS AND QUALITY OF SURVEY DATA IN CONFORMITY WITH THE PLANNING AND DESIGN REQUIREMENTS OF THE DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS (DPWH). THE GUIDELINES CONFORM TO GENERALLY-ACCEPTED BEST PRACTICES IN THE SURVEYING PROFESSION AND APPLICABLE NATIONAL AND DEPARTMENT LAWS, POLICIES AND PROCEDURES.

1.2 GOVERNING LAWS, CODES AND DEPARTMENT ORDERS IN ORDER TO GUIDE USERS OF TOPOGRAPHIC SURVEY OUTPUTS THAT PROVIDE THE BASE MAPS NECESSARY IN PLANNING AND DESIGN OF INFRASTRUCTURE PROJECTS, SEVERAL LAWS, DEPARTMENT ORDERS AND MEMORANDUM CIRCULARS HAVE BEEN FORMULATED. THESE INCLUDE THE FOLLOWING:

- DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES (DENR) ADMINISTRATIVE ORDER (AO) NO. 2007-29, REVISED REGULATIONS FOR LAND SURVEYS
- DENR AO NO. 2005-13: REVISED GUIDELINES FOR THE IMPLEMENTATION OF THE PHILIPPINE REFERENCE SYSTEM OF 1992
- EXECUTIVE ORDER NO. 45, SERIES OF 1993, ADOPTING THE PHILIPPINE REFERENCE SYSTEM OF 1992 AS THE STANDARD REFERENCE FOR ALL SURVEYS IN THE PHILIPPINES
- DENR MEMORANDUM CIRCULAR NO. 2010-13: MANUAL ON LAND SURVEY PROCEDURES
- MINISTRY OF PUBLIC WORKS AND HIGHWAYS (1984), DESIGN GUIDELINES CRITERIA AND STANDARDS FOR PUBLIC WORKS AND HIGHWAYS, VOLUME I, PART 1
- PRESIDENTIAL DECREE NO. 399 DATED 28 FEBRUARY 1974
- PRESIDENTIAL DECREE NO. 748 DATED 16 JULY 1975
- BATAS PAMBANSA BILANG 8
- REPUBLIC ACT 8560, PHILIPPINE GEODETIC ENGINEERING ACT OF 1998, AS AMENDED BY REPUBLIC ACT 9200

1.3 THE PHILIPPINE REFERENCE SYSTEM OF 1992 (PRS92) SHALL BE THE STANDARD REFERENCE SYSTEM FOR ALL SURVEYS AND MAPPING IN THE PHILIPPINES, IN ACCORDANCE WITH EXECUTIVE ORDER NO. 45, SERIES OF 1993, AS AMENDED BY EO 321 AND EO 280, SERIES OF 200 AND 2004, RESPECTIVELY.

1.4 THE PHILIPPINE PLANE COORDINATE SYSTEM (PPCS) - PRS92 SHALL SERVE AS THE STANDARD COORDINATE SYSTEM FOR ALL SURVEYS IN THE PHILIPPINES.

2. SURVEY EQUIPMENT:

2.1 ALL PROJECT CONTROL SURVEYS SHALL BE CONDUCTED WITH THE PRS92 AS HORIZONTAL DATUM USING SURVEY-GRADE GLOBAL NAVIGATION SATELLITE SYSTEM (GNSS) RECEIVERS OR ELECTRONIC TOTAL STATIONS, OR A COMBINATION THEREOF, WHICHEVER IS MOST APPROPRIATE; AND THE MEAN SEA LEVEL AS VERTICAL DATUM USING PRECISE AUTOMATIC OR DIGITAL LEVELLING INSTRUMENTS. THESE SURVEYS SHALL BE CONDUCTED BY, OR UNDER THE DIRECT SUPERVISION OF A QUALIFIED PROFESSIONAL PURSUANT TO REPUBLIC ACT 8560, OTHERWISE KNOWN AS THE PHILIPPINE GEODETIC ENGINEERING ACT OF 1998, AS AMENDED.

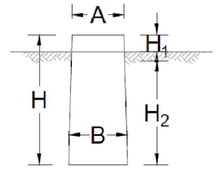
2.2 ALL SURVEY EQUIPMENT, SOFTWARE AND PROCEDURES SHOULD BE TESTED BEFORE GENERAL USAGE. THIS CAN BE ACHIEVED BY MAKING MEASUREMENTS AND PROCESSING DATA OVER KNOWN BASELINES OR A NETWORK OF POINTS.

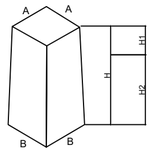
2.3. THE PROCESS OF SURVEY EQUIPMENT CALIBRATION SHALL COMPLY WITH THE REQUIREMENTS OF NATIONAL MAPPING AND RESOURCE INFORMATION AUTHORITY (NAMRIA) FOR GPS, GNSS-RTK, 3D SCANNER AND LEVELS (DIGITAL AND PRECISE) AND THE LAND MANAGEMENT BUREAU (LMB) OF THE DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES (DENR) FOR ELECTRONIC TOTAL STATIONS. CALIBRATION CERTIFICATES ISSUED BY THESE AGENCIES SHOULD ACCOMPANY THE SURVEY REQUIREMENTS TO BE SUBMITTED TO THE DPWH.

3. PRE-CONSTRUCTION SURVEY SHALL BE JOINTLY CONDUCTED BY THE CONTRACTOR & REPRESENTATIVES FROM THE IMPLEMENTING OFFICE. THE CORRESPONDING "AS-STAKED" PLAN SHALL BE PREPARED INCORPORATING THE CHANGES AS A RESULT OF THE PRE-CONSTRUCTION SURVEY & SHALL BE SUBJECT FOR APPROVAL BY THE DISTRICT ENGINEER, REGIONAL DIRECTOR &/OR UNDERSECRETARY FOR TECHNICAL SERVICES, WHICHEVER IS APPLICABLE, AS PER DEPARTMENT ORDER NO. 55, SERIES OF 2020, "REVISED GUIDELINES IN THE PREPARATION OF DETAILED ENGINEERING DESIGN, 'AS-STAKED', REVISED, AND 'AS-BUILT' PLANS FOR HIGHWAY, BRIDGE AND WATER PROJECTS".

3. ALL REFERENCE BENCHMARKS OR POSITIONS OF PROJECT CONTROL POINTS SHALL BE DEFINED AND MARKED ON THE GROUND BY MONUMENTS OF PERMANENT NATURE, IN ACCORDANCE WITH THE DGCS VOLUME 2B: "ENGINEERING SURVEYS", SECTION 2.7 "SURVEY MONUMENTS".

DIMENSIONS OF MONUMENTS					
CONTROL STATION	TOP CROSS-SECTION (A)	BOTTOM CROSS-SECTION (B)	LENGTH (H)	PROTRUDING ABOVE GROUND (H1)	EMBEDDED IN GROUND (H2)
PRIMARY GPS CONTROL	40 X 40 CM	45 X 45 CM	100 CM	20 CM	80 CM
PRIMARY PROJECT CONTROL	30 X 30 CM	35 X 35 CM	100 CM	20 CM	80 CM
INTERMEDIATE CONTROL	20 X 20 CM	30 X 30 CM	80 CM	20 CM	60 CM
LOT	15 CM DIA.	15 CM DIA.	40 CM	5 CM	35 CM





BENCHMARK						
TBM	NORTHING	EASTING	ELEVATION	LAT	LONG	REMARKS
	887317.4742	719592.8504	857.010	N8.022493	E124.992411	CONCRETE CYLINDER
	887307.2112	719579.9537	856.553	N8.022400	E124.992294	CONCRETE CYLINDER
	886714.2617	719923.3979	816.760	N8.017025	E124.995382	CONCRETE CYLINDER
	886697.9497	719938.5560	816.111	N8.016877	E124.995519	CONCRETE CYLINDER

3.1 CRITERIA FOR LOCATION OF MONUMENTS

THE CRITERIA TO BE CONSIDERED IN SELECTING THE LOCATION OF PROJECT CONTROL STATIONS:

- ACCESSIBILITY
- GROUND STABILITY; THESE SHOULD BE FAR FROM POSSIBLE CONSTRUCTION AREAS OR AREAS PRONE TO FLOODING AND LANDSLIDES
- SECURITY FROM POSSIBLE ACTS OF OF DESTRUCTION BY VANDALS
- PROXIMITY OF TOWERS, STRUCTURES AND TREES THAT MAY CAUSE SIGNAL INTERFERENCE (MULTIPATH), IN THE CASE OF GNSS/GPS STATIONS.

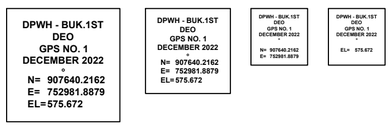
3.2 FABRICATION AND MARKING OF MONUMENTS

3.2.1 PROJECT CONTROL STATION CONCRETE MONUMENTS SHALL BE CAST IN PLACE WITH CLASS A CONCRETE MIX (RATIO 1:2:4 OF CEMENT, SAND AND GRAVEL) AND REINFORCED STEEL BAR (10 MM. VERTICAL BARS AND 8 MM. TIES).

3.2.2 THE STATION SHALL BE MARKED WITH EITHER A BRASS ROD (10 CM X 1.2 CM DIAMETER) HAVING A CROSS CU ON TOP OR A COPPER NAIL (10 CM) SET FLUSH ON THE TOP CENTER OF THE MONUMENT.

3.2.3 THE TOP SURFACE OF THE MONUMENTS SHALL BE ENGRAVED WITH THE FOLLOWING MARKINGS: DPWH, CONTROL POINT NUMBER, YEAR ESTABLISHED AND COORDINATES.

3.2.4 THE INSCRIPTIONS SHALL BE IN CAPITAL LETTERS, 2.5 CM. HIGH, 2 CM. WIDE AND 0.4 CM. THICK WITH MARGINS NOT LESS THAN 2 CM. ALONG THE EDGES OF THE MONUMENT.



MONUMENT	INTERVAL
PRIMARY GPS CONTROL (GPS)	EVERY THREE (3) KILOMETERS INTERVAL
PRIMARY PROJECT CONTROL (BM)	EVERY FIVE HUNDRED (500) METERS INTERVAL
INTERMEDIATE CONTROL (IBM)	EVERY TWO HUNDRED FIFTY (250) METERS INTERVAL IN BETWEEN BMs

DATE SURVEYED : SEPTEMBER 12, 2023
EQUIPMENT USED : (1) HI TARGET GNSS RTK IRTK4 (BASE: TE15839688; ROVER: TE15839730)
(2) LEICA TS07 5" R500 (3308110)
GEODETIC ENGINEER : CINDY S. SILDO

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DESIGN CRITERIA AND CONSTRUCTION REQUIREMENTS

AADT 2021 DATA :			ROAD DESIGN CRITERIA		
TRAFFIC STATION :			DESIGN LIFE	=	20 YEARS
ROAD SECTION ID :	**SAYRE HIGHWAY**		ASSUMED TRAFFIC GROTH,		
			TGR	=	4.00%
MOTOR-TRICYCLE	=	4,622	R	=	70.00%
PASSENGER CAR	=	1,582	ZR	=	-0.524
PASSENGER UTILITY	=	1,582	OVERALL STANDARD DEVIATION, S0	=	0.30
GOODS UTILITY	=	349	W18	=	11.151 x 10^6 (18 KIP ESAL)
SMALL BUS	=	10	pt	=	2.50
LARGE BUS	=	29	PRESENT SERVICEABILITY INDEX, ΔPSI	=	2.00
RIGID TRUCKS 2 AXLES	=	0	S'c	=	751 psi
RIGID TRUCKS 3AXLES	=	51	Cd	=	1.00
TRUCK SEMI-TRAILER 3&4 AXLES	=	142	J	=	3.60
TRUCK SEMI-TRAILER 5 AXLES	=	21	Ec	=	3.605 x 10^6 PSI
TRUCK TRAILER	=	14	k	=	140 pci
TRUCK TRAILER 5AXLES	=	8	DESIGN CBR	=	4.393793472
			DESIGN CESAL	=	11,150,995 (ONE DIRECTION)

NORMAL WEIGHT CONCRETE	Fc' = 28 MPa (4000 psi)
REINFORCING STEEL	
* 12mmØ AND BELOW	Fy = 276 MPa (Grade 40)
* 16mmØ AND ABOVE	Fy = 414 MPa (Grade 60)

REFERENCES

1. *DPWH CY 2021 ANNUAL AVERAGE DAILY TRAFFIC- REGION X (SURVEY SITE ID SV10103MN_AC)*
2. *DESIGN GUIDELINES, CRITERIA AND STANDARD (DGCS) VOLUME 4 - HIGHWAY DESIGN 2015, CHAPTER 6.1 PAVEMENT DESIGN*

CONSTRUCTION REQUIREMENTS :

1. MATERIALS AND WORKMANSHIP SHALL CONFORM WITH THE "DPWH STANDARD SPECIFICATIONS FOR HIGHWAYS, BRIDGES AND AIRPORTS, 2013".
2. CONCRETE MIXERS MAY BE OF THE REVOLVING DRUM OR THE REVOLVING BLADE AND THE MIXING DRUM OR BLADES SHALL BE OPERATED UNIFORMLY AT THE MIXING SPEED RECOMMENDED BY THE MANUFACTURER. THE PICK-UP AND THROW-OVER BLADES OF MIXERS SHALL BE RESTORED OR REPLACED WHEN ANY PART OR SECTION IS WORN 20 MM OR MORE BELOW THE ORIGINAL HEIGHT OF THE MANUFACTURER'S DESIGN. MIXERS AND AGITATORS WHICH HAVE AN ACCUMULATION OF HARD CONCRETE OR MORTAR SHALL NOT BE USED.
3. WHEN BULK CEMENT IS USED AND VOLUME OF THE BATCH IS 0.5 M3 OR MORE, THE SCALE AND WEIGH HOPPER FOR PORTLAND CEMENT SHALL BE SEPARATE AND DISTINCT FROM THE AGGREGATE HOPPER OR HOPPERS. THE DISCHARGE MECHANISM OF THE BULK CEMENT WEIGH HOPPER SHALL BE INTERLOCKED AGAINST OPENING BEFORE THE FULL AMOUNT OF CEMENT IS IN THE HOPPER. THE DISCHARGING MECHANISM SHALL ALSO BE INTERLOCKED AGAINST OPENING WHEN THE AMOUNT OF CEMENT IN THE HOPPER IS UNDERWEIGHT BY MORE THAN ONE (1) MASS PERCENT OR OVERWEIGHT BY MORE THAN THREE (3) MASS PERCENT OF THE AMOUNT SPECIFIED.
4. WHEN THE AGGREGATE CONTAINS MORE WATER THAN THE QUANTITY NECESSARY TO PRODUCE A SATURATED SURFACE DRY CONDITION, REPRESENTATIVE SAMPLES SHALL BE TAKEN AND THE MOISTURE CONTENT DETERMINED FOR EACH KIND OF AGGREGATE.
5. THE BATCH SHALL BE SO CHARGED INTO THE MIXER THAT SOME WATER WILL ENTER IN ADVANCE OF CEMENT AND AGGREGATE. ALL WATER SHALL BE IN DRUM BY THE END OF THE FIRST QUARTER OF THE SPECIFIED MIXING TIME.
6. CEMENT SHALL BE BATCHED AND CHARGE INTO THE MIXER SO THAT IT WILL NOT RESULT IN LOSS OF CEMENT DUE TO THE EFFECT OF WIND, OR IN ACCUMULATION OF CEMENT ON SURFACE OF CONVEYORS OR HOPPERS, OR IN OTHER CONDITIONS WHICH REDUCE OR VARY THE REQUIRED QUANTITY OF CEMENT IN THE CONCRETE MIXTURE.
7. THE ENTIRE CONTENT OF A BATCH MIXER SHALL BE REMOVED FROM THE DRUM BEFORE MATERIALS FOR A SUCCEEDING BATCH ARE PLACED THEREIN. THE MATERIALS COMPOSING A BATCH EXCEPT WATER SHALL BE DEPOSITED SIMULTANEOUSLY INTO THE MIXER.
8. ALL CONCRETE SHALL BE MIXED FOR A PERIOD OF NOT LESS THAN 1-1/2 MINUTES AFTER ALL MATERIALS, INCLUDING WATER, ARE IN THE MIXER. DURING THE PERIOD OF MIXING, THE MIXER SHALL OPERATE AT THE SPEED FOR WHICH IT HAS BEEN DESIGNED.
9. MIXERS SHALL BE OPERATED WITH AN AUTOMATIC TIMING DEVICE THAN CAN BE LOCKED BY THE ENGINEER. THE TIME DEVICE AND DISCHARGE MECHANICS SHALL BE SO INTERLOCKED THAT DURING NORMAL OPERATION NO PART OF THE BATCH WILL BE CHARGED UNTIL THE SPECIFIED MIXING TIME HAS ELAPSED.
10. THE FIRST BATCH OF CONCRETE MATERIALS PLACED IN THE MIXER SHALL CONTAIN A SUFFICIENT EXCESS OF CEMENT, SAND, AND WATER TO COAT INSIDE OF THE DRUM WITHOUT REDUCING THE REQUIRED MORTAR CONTENT OF THE MIX. WHEN MIXING IS TO CEASE FOR A PERIOD OF ONE HOUR OR MORE, THE MIXER SHALL BE THOROUGHLY CLEANED.

STRUCTURAL CONCRETE:

1. THIS ITEM SHALL CONSIST OF FURNISHING, BENDING, PLACING & FINISHING CONCRETE IN ALL STRUCTURE EXCEPT PAVEMENTS IN ACCORDANCE WITH THIS SPECIFICATIONS AND CONFORMING TO THE LINES, GRADES & DIMENSIONS SHOWN ON THE PLANS. CONCRETE SHALL CONSIST OF MIXTURE OF PORTLAND CEMENT, FINE AGGREGATES COURSE AGGREGATE ADMIXTURE WHEN SPECIFIED, AND WATER MIXED IN THE PROPORTIONS SPECIFIED OR APPROVED BY THE ENGINEER.
2. CLASS A - ALL SUPERSTRUCTURE AND HEAVILY REINFORCED SUBSTRUCTURE. THE IMPORTANT PARTS OF THE STRUCTURE INCLUDED ARE SLABS, BEAMS, GIRDERS, ARCH RIBS, BOX CULVERT,REINFORCED ABUTMENTS, RETAINING WALLS AND REINFORCED FOOTING.

REINFORCING STEEL:

1. THIS ITEM SHALL CONSIST OF FURNISHING, BENDING, FABRICATING AND OF PLACING OF STEEL REINFORCEMENT OF THE TYPE, SIZE & GRADE REQUIRED IN ACCORDANCE WITH THIS SPECIFICATION AND CONFORMITY WITH THE REQUIREMENTS SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER.

STONE MASONRY:

MATERIALS REQUIREMENTS:

STONE - SHALL BE CLEAN, HARD, AND DURABLE AND SHALL BE SUBJECT TO ENGINEER'S APPROVAL. SHALL HAVE A THICKNESS OF NOT LESS THAN 150MM, AND WIDTHS OF NOT LESS THAN ONE AND ONE-HALF TIMES THEIR THICKNESS, AND LENGTHS OF NOT LESS THAN ONE AND ONE HALF TIMES THEIR WIDTHS. SHALL BE OF GOOD SHAPE AND FREE OF DEPRESSIONS AND PROJECTIONS.
MORTAR - SHALL BE CLASS "B". SHALL BE COMPOSED OF ONE PART OF PORTLAND CEMENT AND TWO PARTS OF FINE AGGREGATES BY VOLUME AND SUFFICIENT WATER TO MAKE THE MORTAR OF SUCH CONSISTENCY THAT IT CAN BE HANDLED EASILY AND SPREAD WITH A TROWEL

CONSTRUCTION REQUIREMENTS:

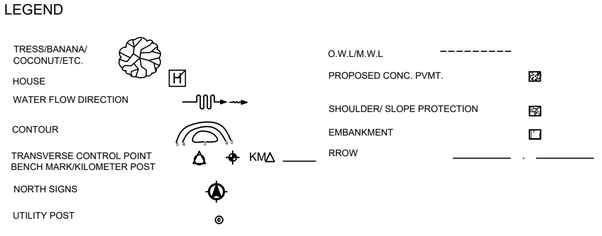
THE BED SHALL BE FIRM AND NORMAL TO THE FACE OF THE WALL, AND SHALL HAVE BEEN APPROVED BY THE ENGINEER BEFORE ANY STONE IS PLACED. ALL STONES SHALL BE CLEANED THOROUGHLY AND MOISTENED BEFORE THE MORTAR IS SPREAD. ALL JOINTS SHALL BE FLUSHED WITH MORTAR.
JOINTS MAY VARY FROM 20MM TO 50MM IN THICKNESS. THEY SHALL NOT EXTEND IN AN UNBROKEN LINE THROUGH MORE THAN TWO STONES. THEY MAY BE AT ANGLES WITH THE VERTICAL 0 TO 45 DEGREES. FACE STONE SHALL BOND AT LEAST 150MM LONGITUDINALLY AND 50MM VERTICALLY. AT NO PLACE SHALL CORNERS OF FOUR STONES BE ADJACENT TO EACH OTHER.
HEADERS SHALL BE DISTRIBUTED UNIFORMLY THROUGHOUT THE WALLS OF THE STRUCTURE SO AS TO FORM AT LEAST ONE-FIFTHE OF THE EXPOSED FACES. THEY SHALL BE OF SUCH LENGTHS AS TO EXTEND FROM THE WALL INTO THE BACKING OF AT LEAST 300MM.
BACKING SHALL BE BUILT MOSTLY OF LARGE STONES OR AS DIRECTED BY THE ENGINEER. ALL OPENINGS AND INTERSTICES IN THE BACKING SHALL BE FILLED COMPLETELY WITH MORTAR OR WITH SPALLS SURROUNDED COMPLETELY BY MORTAR.
BOTH BED AN D VERTICAL JOINTS SHALL BE FINISHED OR AS DIRECTED BY THE ENGINEER. THE MORTAR IN JOINTS ON TOP OF THE SURFACE OF MASONRY SHALL BE CROWNED SLIGHTLY AT THE CENTER OF THE MASONRY TO PROVIDE DRAINAGE.
IMMEDIATELY AFTER BEING LAID, ALL FACE STONES SHALL BE THOROUGHLY CLEANED OF MORTAR STAINS AND SHALL BE KEPT CLEAN UNTIL THE WORK IS COMPLETED.
IN HOT OR DRY WEATHER, THE MASONRY SHALL BE SATISFACTORY PROTECTED FROM THE SUN AND SHALL BE KEPT WET FOR A PERIOD OF AT LEAST THREE DAYS AFTER COMPLETION.

FILTER CLOTH :

1. POLYESTER OR POLYPROPYLENE --- 100%
2. MECHANICALLY HEAT BONDED
3. NON-WOVEN & COMPRISE OF CONTINUOUS FILAMENT
4. EFFECTIVE OPENING ZONE --- 110 MICRONS (max)
5. THICKNESS UNDER PRESSURE 200 KN/SQ.M. --- 0.60mm (min)
4. WEIGHT --- 200g/sqm
5. MULTIDIRECTIONAL TENSILE STRENGTH --- 13KN/m
6. CBR PUNCTURE STRENGTH

A B B R E V I A T I O N S A N D L E G E N D S

LEGEND



ABBREVIATIONS:

BEG.	BEGINNING
CHB.	CONCRETE HOLLOW BLOCKS
CON.	CONCRETE
ELEV.	ELEVATION
ENG.	ENGINEER
FGE	FINISH GRADE ELEVATION
OGE	ORIGINAL GROUND ELEVATION
H	HEIGHT
HOR.	HORIZONTAL
K	KILOMETER
L	LENGTH
LVC	LENGTH OF VERTICAL CURVE
BEG.	METER
MO	MIDDLE ORDINATE
MM.	MILLIMETER
PCCP	PORTLAND CEMENT CONCRETE PAVEMENT
PIVC	POINT OF INTERSECTION OF VERTICAL CURVE
RCBC	REINFORCEMENT CONCRETE BOX CULVERT
RSB	REINFORCEMENT STEEL BAR
S	SLOPE
THK.	THICK
VERT.	VERTICAL
&	AND
O.W.L	ORDINARY WATER LEVEL
M.W.L	MAXIMUM WATER LEVEL

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGION X

BUKIDNON 1ST
DISTRICT ENGINEERING OFFICE
CAPITOL COMPOUND, MALAYBALAY CITY

PROJECT NAME AND LOCATION:
REHABILITATION/ RECONSTRUCTION OF SCOURED PAVED ROADS ALONG SITIO SULOG, BARANGAY HALAPITAN, SAN FERNANDO, BUKIDNON
SAN FERNANDO, BUKIDNON 2ND LD

SHEET CONTENTS:
DESIGN CRITERIA
CONSTRUCTION REQUIREMENTS
ABBREVIATION
LEGENDS

DRAFTED:
BRYLLE ANTHONY O. DAYAO
ENGINEER II

PREPARED:
DAISY JOY G. TAGNIPES
ENGINEER II

REVIEWED:
RAUL G. MELIG
ENGINEER II
DATE:

SUBMITTED:
EVELYN M. KIAMCO
CHIEF, MAINTENANCE SECTION
DATE:

RECOMMENDED:
SARAH JANE B. LAGRAMA
ASSISTANT DISTRICT ENGINEER
DATE:

APPROVED:
MARIA B. DAVID
DISTRICT ENGINEER
DATE:

SET NO.: G 04 06

SHEET NO.: 05 16

2025

SUMMARY OF QUANTITIES

ITEM NO.	DESCRIPTION	UNIT	AS PLAN	AS-PROGRAMMED	REMARKS
OTHER GENERAL REQUIREMENTS					
B.5(1)	Project Billboards/Signboards	each	2.00	2.00	
B.7(1)	Occupational Safety and Health	ls	1.00	1.00	
B.8(2)	Traffic Management	ls	1.00	1.00	
B.9(1)	Mobilization / Demobilization	ls	1.00	1.00	
EARTHWORKS					
101(3)b5	Removal of Structures and Obstruction, 0.28m thick, PCCP (Unreinforced)	cu.m.	7.54	7.54	
102(2)	Surplus Common Excavation	cu.m.	27.56	27.56	
104(2)a	Embankment from borrow (Common Soil)	cu.m.	36.31	36.31	
104(5)	Boulder Fill	cu.m.	144.14	144.14	
105(1)b	Subgrade Preparation (Existing Pavement)	sq.m.	50.14	50.14	
SUBBASE & BASE COURSE					
200(1)	Aggregate Subbase Course	cu.m.	11.08	11.08	
SURFACE COURSES					
311(1)a	Portland Cement Concrete Pavement (Unreinforced) -0.15m thick 14 days	sq.m.	54.00	54.00	
311(1)e1	Portland Cement Concrete Pavement (Unreinforced) - 0.28m thick 14days	sq.m.	27.64	27.64	
BANK & SLOPE PROTECTION STRUCTURES					
511(1)a3	Gabions (1m x 1m 2m, metallic coated)	cu.m.	82.00	82.00	
511(1)b3	Stone Masonry	cu.m.	1.44	1.44	

NOTE :

- THE QUANTITIES OF ALL ITEMS OF WORK PRESENTED ARE SUBJECT TO INCREASE / DECREASE DEPENDING ON THE ACTUAL ACCOMPLISHMENT AS CERTIFIED BY THE ENGINEER.
- ITEM NO., DESCRIPTION OF ITEMS OF WORK INVOLVED, UNIT, AND REMARKS INDICATED IN ACCORDANCE WITH DPWH STANDARD SPECIFICATIONS AND 2022 REVISED STANDARD LIST OF PAY ITEMS ACQUIRED FROM BUREAU OF RESEARCH AND STANDARDS (BRS) IN ACCORDANCE TO D.O. 35 s. 2018.

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGION X
BUKIDNON 1ST
DISTRICT ENGINEERING OFFICE
CAPITOL COMPOUND, MALAYBALAY CITY

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REHABILITATION/ RECONSTRUCTION OF SCOURED PAVED ROADS ALONG SITIO SULOG, BARANGAY HALAPITAN, SAN FERNANDO, BUKIDNON
SAN FERNANDO, BUKIDNON 2ND LD

SHEET CONTENTS:
SUMMARY OF QUANTITIY

DRAFTED:
BRYLLE ANTHONY O. DAYAO
ENGINEER II

PREPARED:
DAISY JOY G. TAGNIPES
ENGINEER II

REVIEWED:
RAUL G. MELIG
ENGINEER II
DATE:

SUBMITTED:
EVELYN M. KIAMCO
CHIEF, MAINTENANCE SECTION
DATE:

RECOMMENDED:
SARAH JANE B. LAGRAMA
ASSISTANT DISTRICT ENGINEER
DATE:

APPROVED:
MARIA B. DAVID
DISTRICT ENGINEER
DATE:

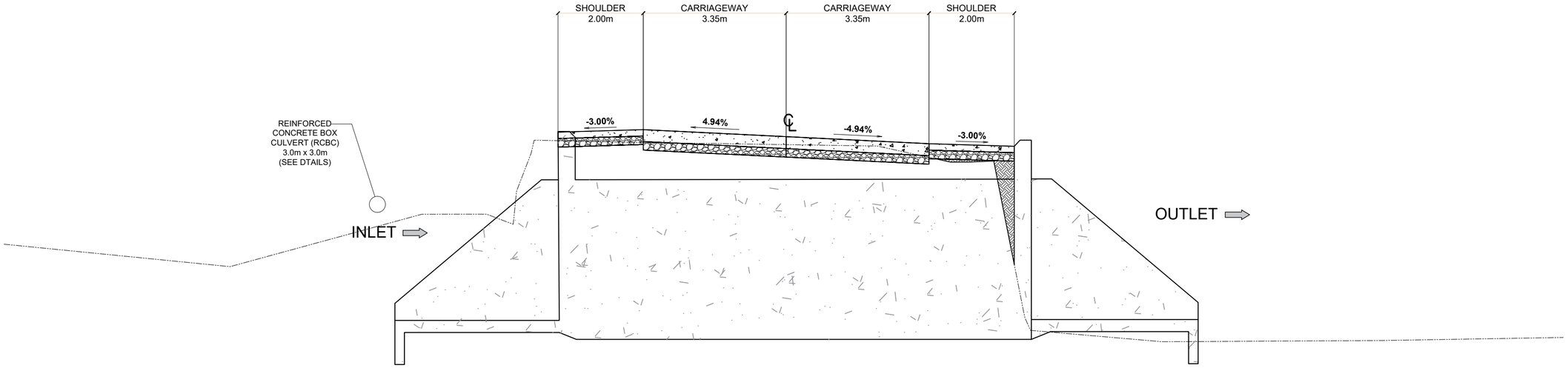
SET NO.: G 05 06

SHEET NO.: 06 16

2025

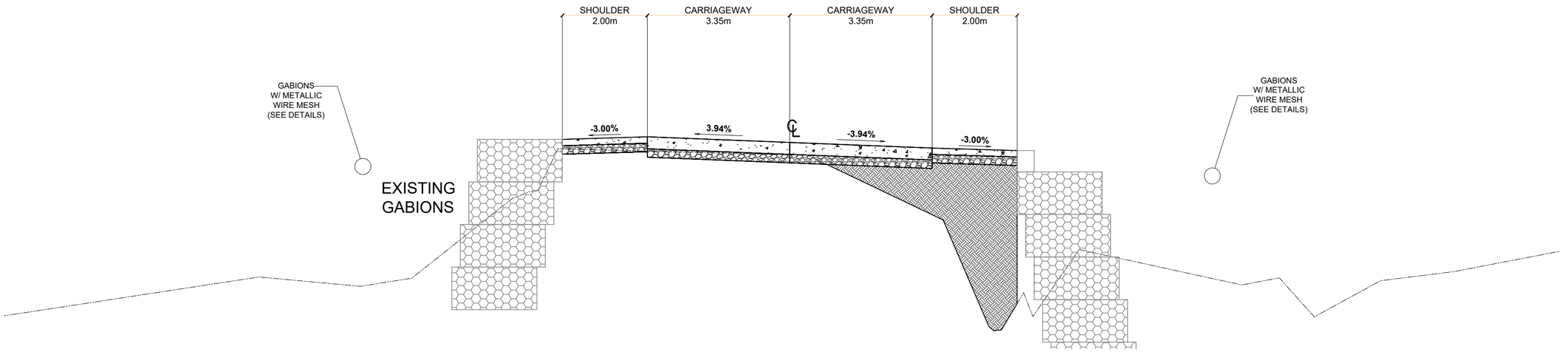
TYPICAL ROADWAY SECTION

REINFORCED CONCRETE BOX CULVERT (3.0m x 3.0m RCBC)



K1577 + 888

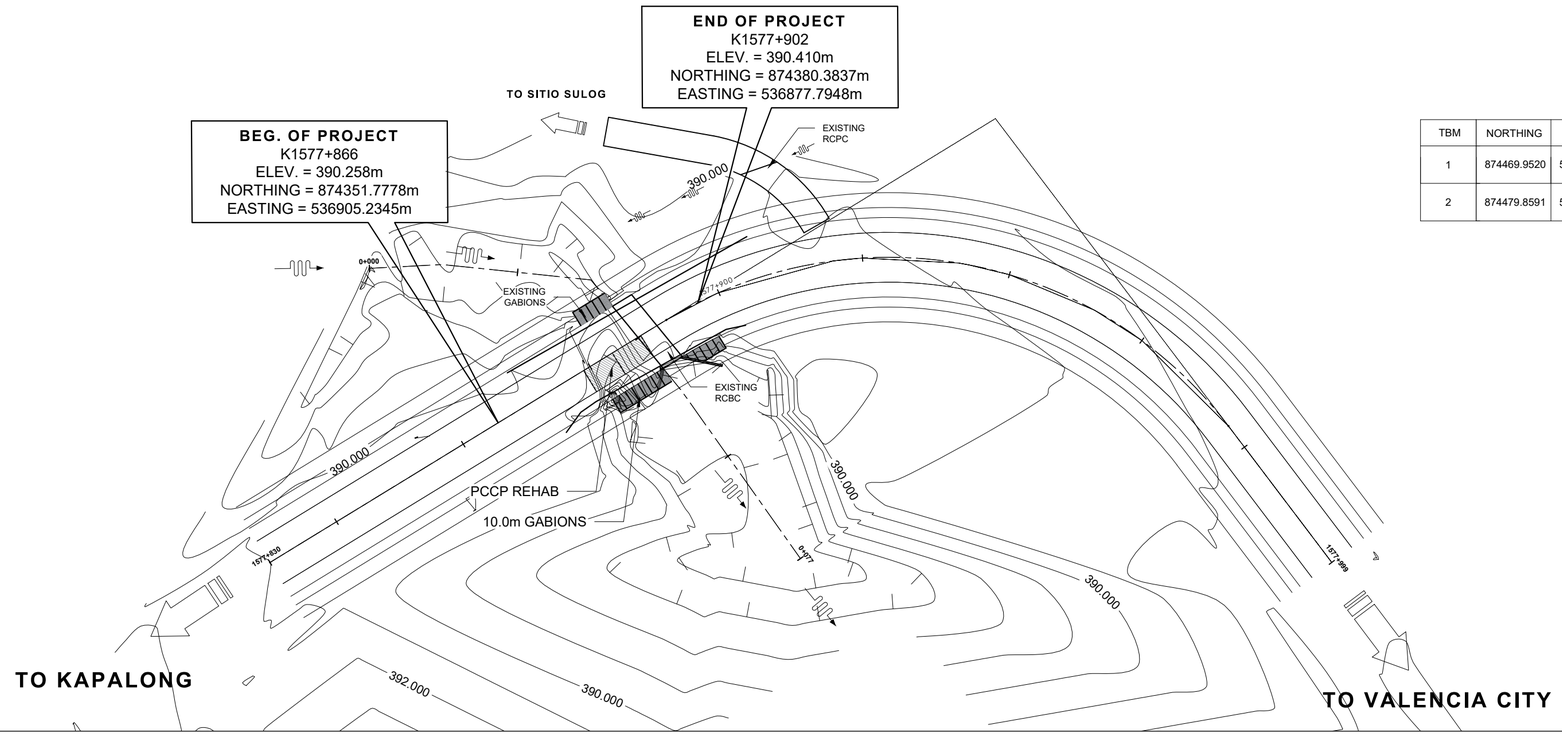
ROAD PROTECTION (GABIONS)



K1577 + 866 - K1577 + 902

REPUBLIC OF THE PHILIPPINES **DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS** REGION X BUKIDNON 1ST DISTRICT ENGINEERING OFFICE CAPITOL COMPOUND, MALAYBALAY CITY	PROJECT NAME AND LOCATION: **REHABILITATION/ RECONSTRUCTION OF SCOURED PAVED ROADS ALONG SITIO SULOG, BARANGAY HALAPITAN, SAN FERNANDO, BUKIDNON** **SAN FERNANDO, BUKIDNON 2ND LD**	SHEET CONTENTS: **TYPICAL ROADWAY SECTION**	DRAFTED: **BRYLLE ANTHONY O. DAYAO** ENGINEER II PREPARED: **DAISY JOY G. TAGNIPES** ENGINEER II	REVIEWED: **RAUL G. MELIG** ENGINEER II DATE:	SUBMITTED: **EVELYN M. KIAMCO** CHIEF, MAINTENANCE SECTION DATE:	RECOMMENDED: **SARAH JANE B. LAGRAMA** ASSISTANT DISTRICT ENGINEER DATE:	APPROVED: **MARIA B. DAVID** DISTRICT ENGINEER DATE:	SET NO. G 06 06	SHEET NO. 07 16

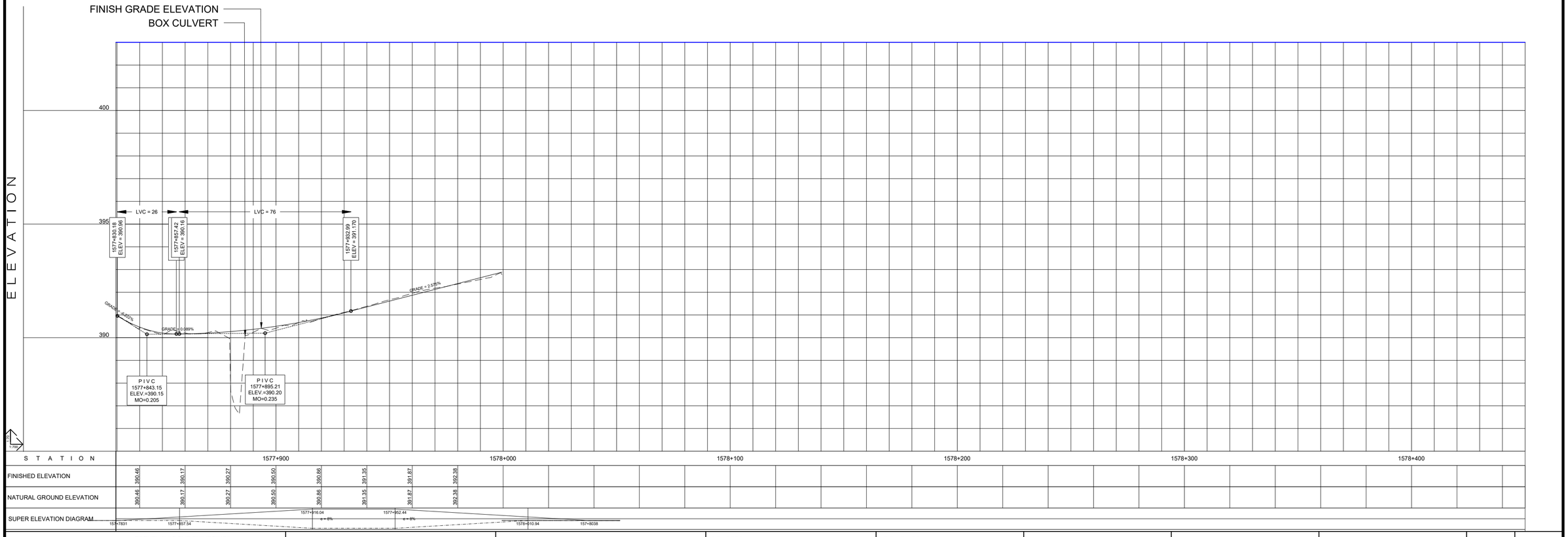
2025



TBM	NORTHING	EASTING	ELEVATION	REMARKS
1	874469.9520	536894.6735	392.601	CONCRETE NAIL
2	874479.8591	536889.2071	392.907	CONCRETE NAIL

SCALE 1:700 mts

LEGEND	SYMBOL
EXCAVATION	
EMBANKMENT	
PIPE CULVERT (EXISTING)	PLAN / PROFILE
PIPE CULVERT (PROPOSED)	PLAN / PROFILE
BOX CULVERT (EXISTING)	PLAN / PROFILE
BOX CULVERT (PROPOSED)	PLAN / PROFILE
WATER FLOW DIRECTION	
RETAINING WALL (MASONRY)	
RETAINING WALL (CONCRETE)	
DRAINAGE PROFILE	
DRAINAGE PLAN	
TREE	PLAN / PROFILE
TRAVERSE CONTROL POINT	



REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGION X

BUKIDNON 1ST
DISTRICT ENGINEERING OFFICE
CAPITOL COMPOUND, MALAYBALAY CITY

PROJECT NAME AND LOCATION:
REHABILITATION/ RECONSTRUCTION OF SCOURED PAVED ROADS ALONG SITIO SULOG, BARANGAY HALAPITAN, SAN FERNANDO, BUKIDNON
SAN FERNANDO, BUKIDNON 2ND LD

SHEET CONTENTS:
PLAN AND PROFILE

DRAFTED:
BRYLLE ANTHONY O. DAYAO
ENGINEER II

PREPARED:
DAISY JOY G. TAGNIPES
ENGINEER II

REVIEWED:
RAUL G. MELIG
ENGINEER II
DATE:

SUBMITTED:
EVELYN M. KIAMCO
CHIEF, MAINTENANCE SECTION
DATE:

RECOMMENDED:
SARAH JANE B. LAGRAMA
ASSISTANT DISTRICT ENGINEER
DATE:

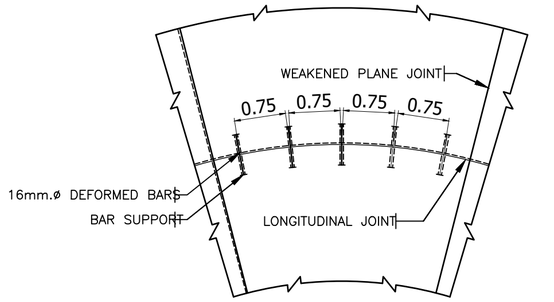
APPROVED:
MARIA B. DAVID
DISTRICT ENGINEER
DATE:

SET NO. P 01|01

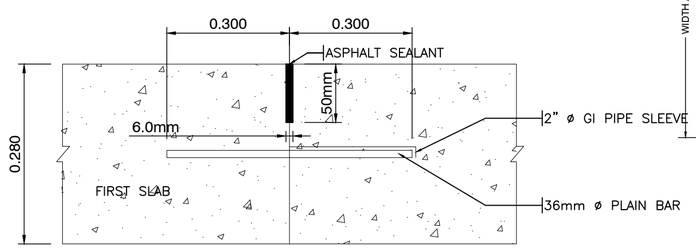
SHEET NO. 08/16

2025

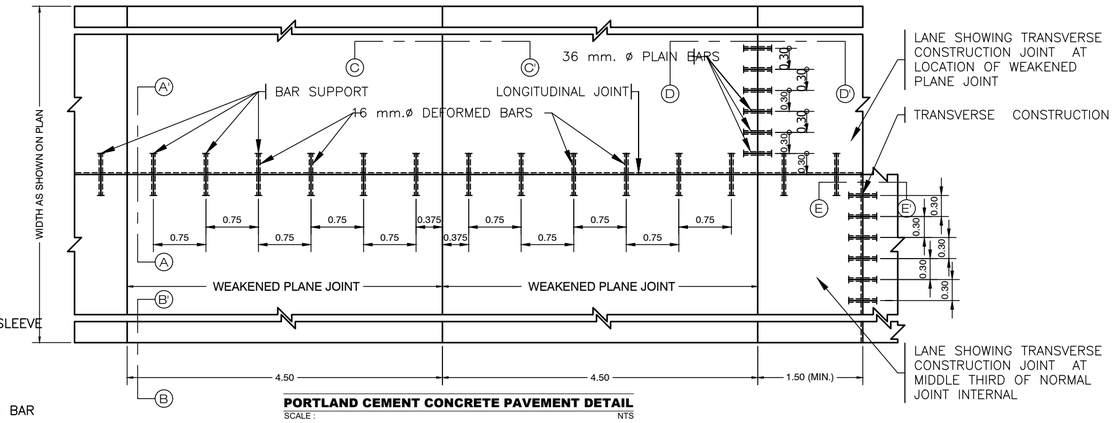
TYPICAL PAVEMENT DETAILS



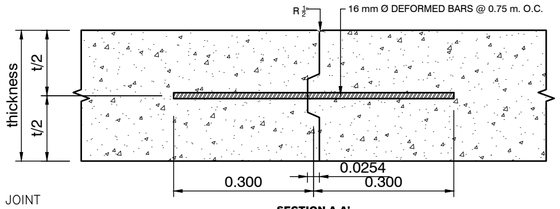
TRANSVERSE CONSTRUCTION JOINT / WEAKENED JOINT
SCALE : NTS



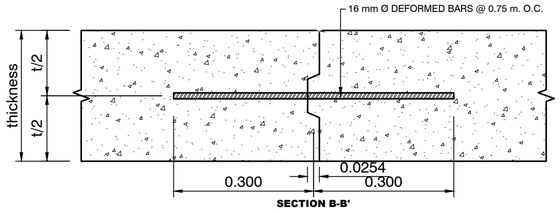
PIPE SLEEVES DETAIL
SCALE : NTS



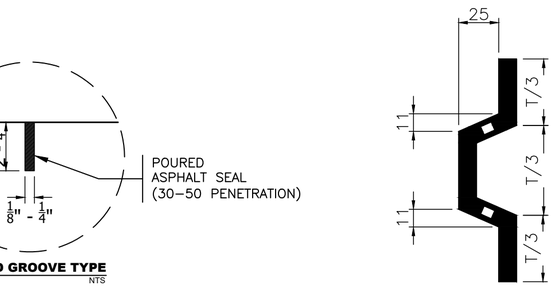
PORTLAND CEMENT CONCRETE PAVEMENT DETAIL
SCALE : NTS



SECTION A-A'
LONGITUDINAL CONSTRUCTION OR CONTACT JOINT
(TO BE USED FOR HALF WIDTH OR LANE AT A TIME CONSTRUCTION)
SCALE: NTS

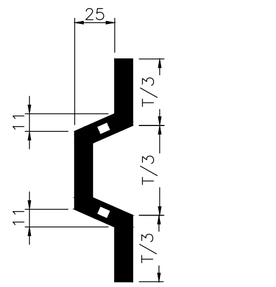


SECTION B-B'
LONGITUDINAL CENTER METAL PLATE JOINT
(TO BE USED FOR FULL WIDTH OR SIMULTANEOUS CONSTRUCTION OF TWO OR MORE LANES)
SCALE: NTS



PREMOLDED STRIP TYPE
SCALE : NTS

SAWED GROOVE TYPE
SCALE : NTS



METAL SIDE FORM (KEYED JOINT) DETAIL
SCALE : NTS

NOTE :

1. MATERIALS AND WORKMANSHIP SHALL CONFORM WITH THE "DPWH STANDARD SPECIFICATIONS FOR HIGHWAYS, BRIDGES AND AIRPORTS, 2013".
2. CONSTRUCTION (CONTACT) JOINTS ARE FORMED WHEN CONCRETE ON ONE SIDE OF THE JOINT IS POURED AHEAD AND ALLOWED TO SET BEFORE POURING ON THE OTHER SIDE. NO CONSTRUCTION JOINT SHALL BE PLACED WITHIN 1.50M. FROM THE WEAKENED PLANE JOINT.
3. TRANSVERSE CONSTRUCTION (CONTACT JOINT) SHALL BE PROVIDED AT THE END OF ANY RUN WHERE LAYING OF CONCRETE HAS BEEN STOPPED FOR THIRTY (30) MINUTES OR LONGER.
4. TRANSVERSE CONSTRUCTION JOINTS WHICH OCCUR AT LOCATION OF WEAKENED PLANE JOINTS SHOULD BE BUTT JOINTS WITH DOWELS IF THE JOINT OCCURS IN THE MIDDLE THIRD OF THE WEAKENED JOINT INTERVALS (1.50 TO 3.00 m.) IT SHOULD BE KEY - JOINT WITH TIE BARS.
5. AT CONSTRUCTION JOINTS (LONGITUDINAL OR TRANSVERSE), CARE SHOULD BE TAKEN SO THAT NO CONCRETE FROM THE LAST SLAB PLACED OVERHANGS ANY PORTION OF THE FIRST SLAB.
6. TIE BARS SHOULD BE DEFORMED STEEL BARS. ALL DOWEL BARS SHALL BE SMOOTH ROUND STEEL BAR FREE FROM RUST AND OTHER DEFECTS (REFER TO CLAUSE 3; 1,3,12. THE STANDARD SPECIFICATION FOR ROADS AND BRIDGES 2013.).
7. TYPE OF WEAKENED PLANE JOINT TO BE USED SHALL BE AS SPECIFIED IN THE PLANS AND ONLY ONE TYPE SHALL BE USED FOR THE WHOLE PROJECT.
8. MATERIAL FOR THE METAL SIDE FORM SHALL BE BRAND NEW SHEET METAL GAUGE No.18 OF BLACK IRON FREE FROM RUST AND LINKS.
9. AT LEAST SIX (6) SUCCESSIVE DOWELED BUTT JOINTS AT NORMAL JOINT SPACING SHALL BE PROVIDED BEFORE OR AFTER AN EXPANSION JOINT.
10. THE GROOVE OR CRACK ABOVE JOINTS (LONGITUDINAL OR TRANSVERSE) SHALL BE SEALED WITH 30-60 PENETRATION ASPHALT SEAL OR COLD APPLIED LIQUID RUBBER COMPOUND AFTER THE CONCRETE HARDENS AND BEFORE OPENING THE PAVEMENT TO TRAFFIC. PENETRATION ASPHALT SEAL ON CONCRETE PAVEMENT, JOINTS SHALL BE POURED IN SUCH MANNER THAT SPILLING WILL BE ELIMINATED / PREVENTED. THUS, PROVIDING A SMOOTH LEVELING / RIDING SURFACE.
11. ALL TRANSVERSE JOINTS, EXCEPT CONSTRUCTION JOINT SHALL BE CONTINUOUS FROM EDGE TO EDGE.
12. ALL LONGITUDINAL JOINTS SHALL MEET AT INTERSECTIONS WITH NO GAPS OR OFFSET.
13. AVOID STOPPAGE OF FORMWORKS ALONG CURVES.

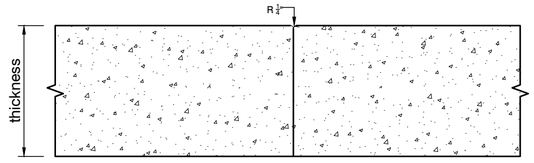
SPACING OF DOWEL BAR (Diameter 36mm/L=600mm)	
SLAB DEPTH, (T) (mm)	SPACING (mm)
280	300
290	295
300	270
310	255
320	235
330	220
340	205

NOTE :

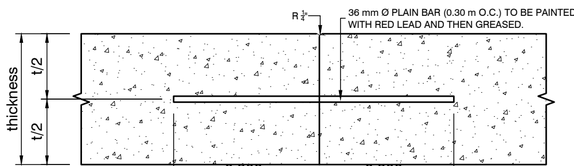
DIAMETER AND SPACING OF PLAIN DOWEL BARS MAY BE MODIFIED AS LONG AS THE EQUIVALENT STEEL AREA IS MAINTAINED/ INCREASED.

TABLE FOR SPACING OF TIE BARS (L=600mm)		
SLAB THICKNESS (mm)	SPACING, S1 (mm)	
	12mm Ø	16mm Ø
230	600	750
240	600	750
250	600	750
260	500	750
270	500	750
280	500	750
290	500	750
300	500	750
310	400	750
320	400	750
330	400	750
340	400	750

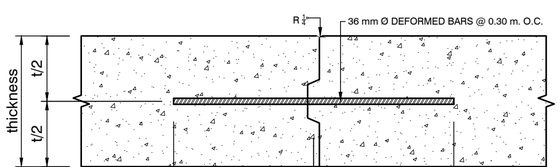
Based on AASHTO Pavement Design 1993



SECTION C-C'
SCALE: NTS



SECTION D-D'
TRANSVERSE CONTRACTION JOINT/ WEAKENED JOINT
(TO BE PLACED ONLY AT LOCATION WEAKENED PLANE JOINT)
SCALE: NTS



SECTION E-E'
KEYED TRANSVERSE CONSTRUCTION OR CONTACT JOINT
(TO BE PLACED ONLY IN MIDDLE THIRD OF NORMAL JOINT INTERVAL)
SCALE: NTS

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REGION X

BUKIDNON 1ST
DISTRICT ENGINEERING OFFICE
CAPITOL COMPOUND, MALAYBALAY CITY

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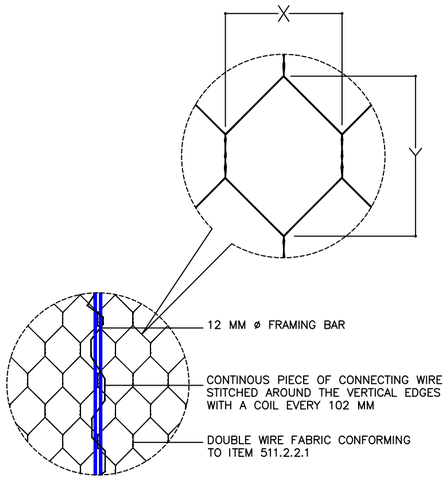
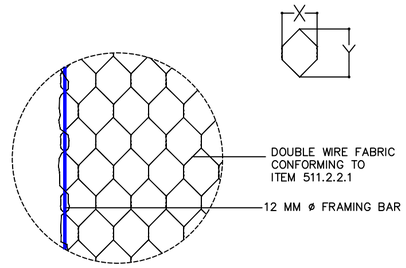
2025

G A B I O N S D E T A I L

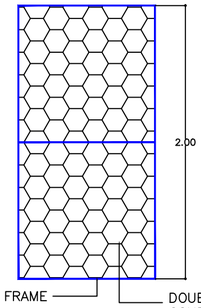


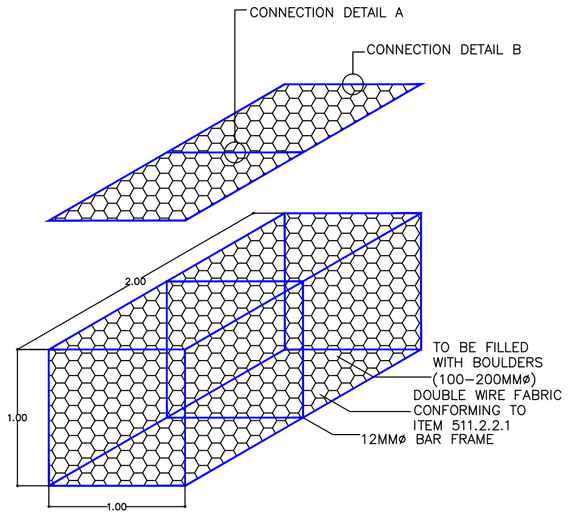
MESH TYPE	X (mm)	Y (mm)	TOLERANCE (%)
8 x 10	83	114	±10%

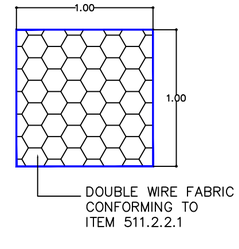


CONNECTION DETAIL B

CONNECTION DETAIL A







GENERAL NOTES :

A. GABIONS AND MATTRESSES NOTES

1. GABION MATERIALS AND CONSTRUCTION REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE ITEM 511 OF THE DPWH STANDARD SPECIFICATIONS.
2. GABIONS SHALL BE CONSTRUCTED OF WIRE MESH AND SHALL BE SUPPLIED IN VARIOUS LENGTHS AND HEIGHTS. A DOUBLE TWISTED WIRE MESH CONTAINER OF VARIABLE SIZES, UNITS, AND FILLED WITH STONES AT THE PROJECT SITE TO FORM FLEXIBLE, PERMEABLE, MONOLITHIC STRUCTURES SUCH AS RETAINNING WALL, SEA WALLS, CHANNEL LININGS, REVETMENT AND WEIRS FOR EROSION CONTROL. LENGTHS SHALL BE MULTIPLES OF 2, 3 OR 4 TIMES THE WIDTH OF THE GABION AND HEIGHT SHALL BE 0.50M TO 1.00M OR AS SHOWN ON THE PLANS. THE HORIZONTAL SHALL NOT BE LESS THAN ONE METER. GABION FURNISHED SHALL BE OF UNIFORM WIDTH.
3. THE WIDTH, HEIGHT AND LENGTH OF THE GABION AS MANUFACTURED SHALL NOT DIFFER MORE THAN ±5% FROM THE ORDERED SIZE PRIOR TO FILLING.
4. THE MATTRESSES ARE DOUBLE TWISTED WIRE MESH CONTAINER UNIFORMLY PARTITIONED INTO INTERNAL CELLS WITH RELATIVELY SMALL HEIGHT IN RELATION TO OTHER DIMENSIONS, HAVING SMALLER MESH OPENINGS THAN THE MESH USED FOR GABIONS.
5. THE MATTRESSES ARE GENERALLY USED FOR RIVERBANK PROTECTION AND CHANNEL LININGS. THE LENGTH SHALL BE 3.00M TO 6.00M, THE WIDTH SHALL BE 2.00M AND THE HEIGHT SHALL BE 0.17M, 0.23M OR 0.30M OR AS SHOWN ON THE PLANS.
6. THE WIDTH AND THE LENGTH OF THE REVET MATTRESS AS MANUFACTURED SHALL NOT DIFFER MORE THAN ±5%, AND THE HEIGHT SHALL NOT DIFFER MORE THAN ±10% FROM THE ORDERED SIZE PRIOR TO FILLING.
7. THE WIRE USED IN THE MANUFACTURED OF DOUBLE–TWISTED MESH FOR USE IN GABIONS AND MATTRESSE SHALL CONFORM TO ITEM 511.2.2.1 AS APPROPRIATE FOR STYLE ORDERED.
8. THE MINIMUM SIZE OF THE GALVANIZED AND PVC COATED WIRE TO BE USED IN THE FABRICATION OF THE GABION AND MATTRESSES SHALL BE AS FOLLOWS:

FOR GABION:
BODY WIRE = 3.05MMØ
SELVEDGE OR PERIMETER WIRE = 3.80MMØ
TYING AND CONNECTING = 2.20MMØ

FOR MATTRESSES:
BODY WIRE = 2.20MMØ
SELVEDGE OR PERIMETER WIRE = 2.70MMØ
TYING AND CONNECTING = 2.70MMØ

9. DIAMETER TOLERANCES FOR GALVANIZED WIRE TO BE USED IN THE FABRICATION OF GABION AND MATTRESS SHALL BE ±0.10.
10. ROCK USED IN THE GABIONS AND MATTRESSES SHALL CONSIST OF HARD, DURABLE ROCK PIECES THAT WILL NOT DETERIORATE WHEN SUBMERGED IN WATER OR EXPOSED TO SEVERE WEATHER CONDITIONS. ROCK PIECES SHALL BE GENERALLY UNIFORMLY GRADED IN SIZES RANGING FROM 100MMØ TO 200MMØ. FILLED GABIONS SHALL HAVE A MINIMUM DENSITY OF 1,400 KGS/M^3
11. NO ROCK SHALL EXCEED 2/3 THE MATTRESS DEPTH AND AT LEAST 85% BY WEIGHT OF THE STONE SHALL HAVE A SIZE GREATER THAN 80MM. NO STONES SHALL BE ABLE TO PASS THROUGH THE MESH.
12. THE ROCK SHALL MEET THE REQUIREMENTS OF AASHTO M 63 EXCEPT THAT THE SODIUM SULPHATE SOUNDNESS LOSS SHALL NOT EXCEED 9% AFTER 5 CYCLES.
13. FILTER CLOTH SHALL CONSIST OF 70% POLYPROPYLENE AND 30% POLYETHELYNE.
14. FABRICATION OF GABIONS AND MATTRESSES MUST BE BASED ON ITEM 511.3.1.1 IT SHALL BE IN THE FORM OF RECTANGULAR BASKETS OF THE REQUIRED DIMENSIONS AND SHALL BE MANUFACTURED FROM WIRE AS SPECIFIED IN ITEM 511.2.2. GABIONS SHALL BE MADE OF A STEEL WIRE DOUBBLE TWISTED FORMING A UNIFORM HEXAGONAL MESH TYPE 8 x 10 HAVING A NOMINAL MESH OPENINGS OF 83MM BY 114MM. TOLERANCES ON THE HEXAGONAL, DOUBLE–TWISTED WIRE MESH OPENING SHALL NOT EXCEED ±10% ON THE NOMINAL DIMENSION D VALUES, 83MM FOR GABIONS. THE EDGES SHALL BE FORMED INTO A SECURELY CONNECTED SELVEDGE ADEQUATE TO PREVENT RAVELING.
15. ASSEMBLY AND CONSTRUCTION OF GABIONS AND MATTRESSES MUST BE IN ACCORDANCE WITH ITEM 511.3.2

GABION DETAIL

SCALE: NTS

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REGION X
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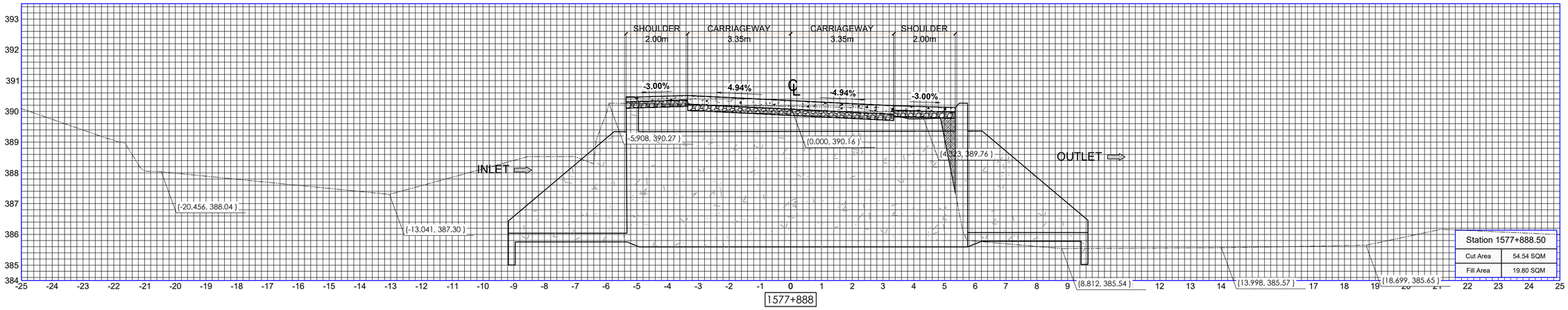
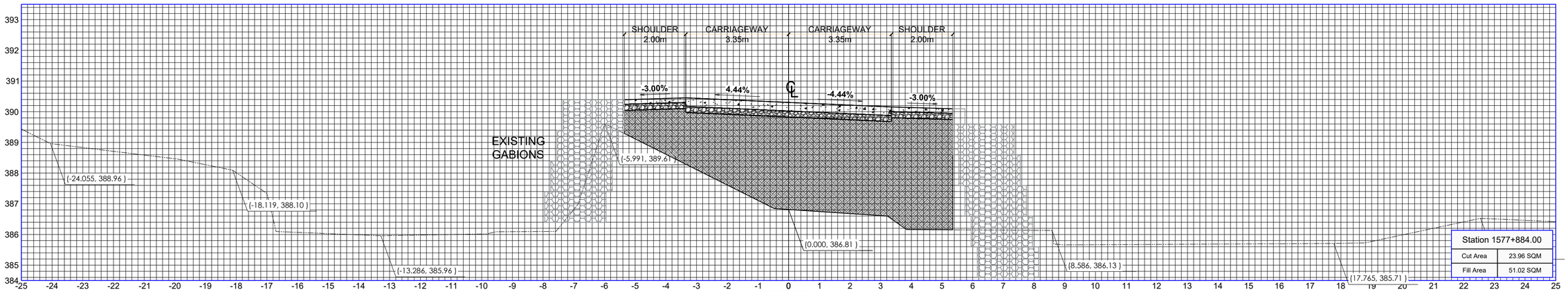


1577+888

FGE = 390.350

OGE = 390.163



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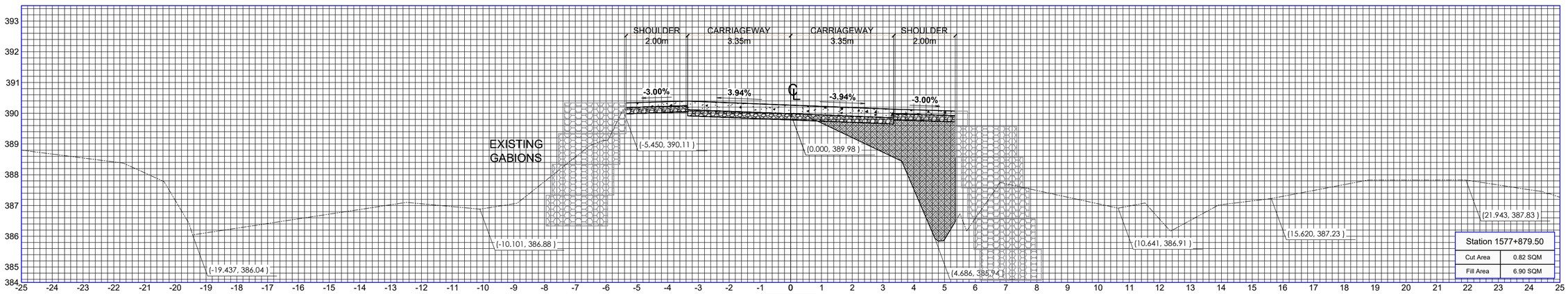

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REPUBLIC OF THE PHILIPPINES
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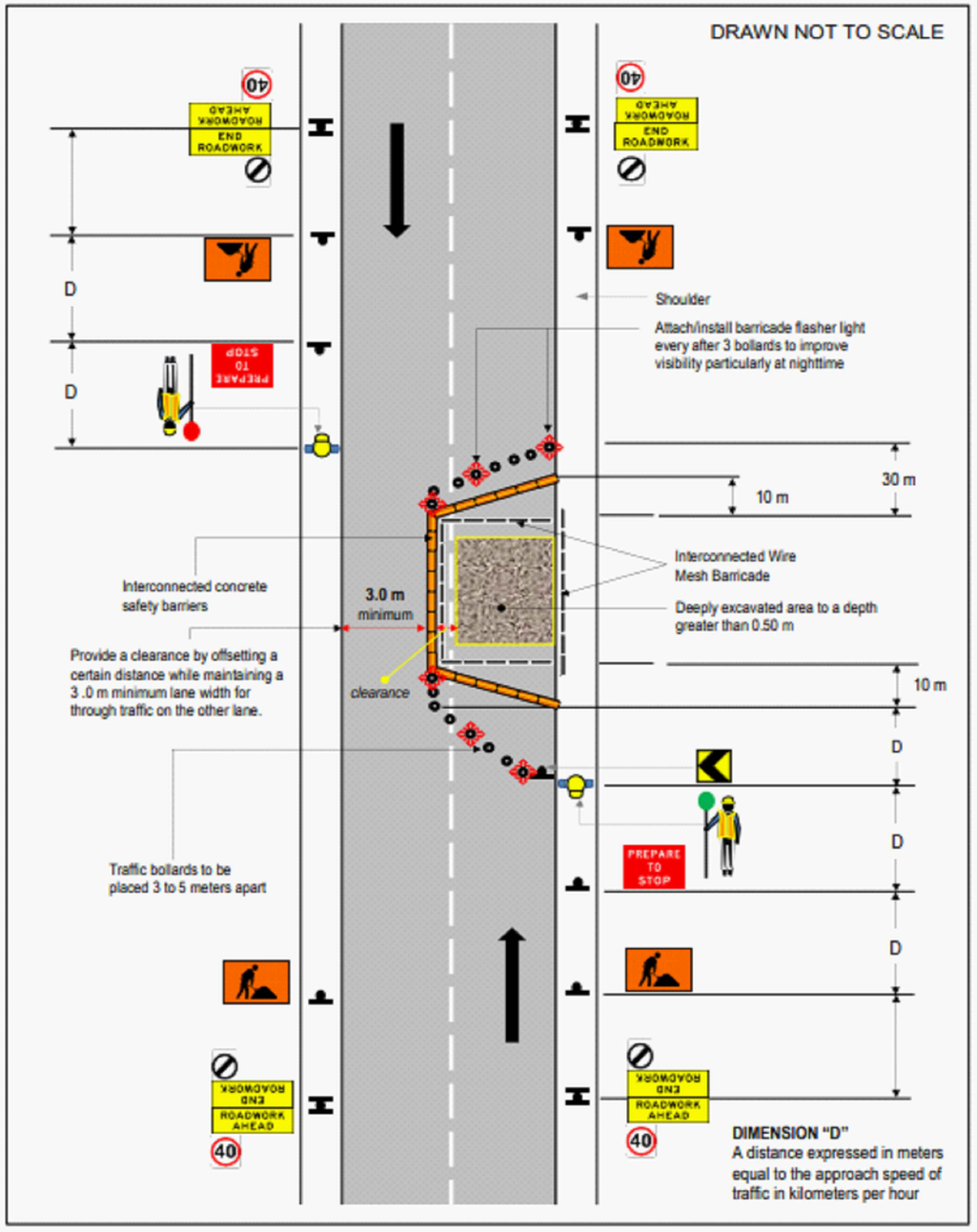
TRAFFIC MANAGEMENT PLAN

TRAFFIC MANAGEMENT			
Name and Specification		Unit	Quantity
a.	Speed Resitriction (R4-1)	each-day	4
b.	Roadwork Ahead (T1-1)	each-day	4
c.	End Roadwork (T2-16)	each-day	4
d.	End Speed Restriction (R4-2)	each-day	4
f.	Prepare to Stop (T1-18)	each-day	2
g.	Temporary Hazard Marker(Chevron, T5-5)	each-day	1
h.	Concrete Safety Barriers	each-day	47
i.	Construction Safety Fence	each-day	48
j.	Temporary Bollards (@5 meters apart)	each-day	16
k.	Safety Vest	each-day	2
l.	Safety Helmet	each-day	2
m.	Safety Shoes	each-day	2
Equipment			
a.	Two way Radio w lifespan consideration of 2 yrs	each-day	2
b.	Barricade Flasher Light (3-Volts, Battery Operated, Amber Color, w/ lifespan consideration of 6 months)	each-day	11

LAYOUT 7 (Case 2) – Part Lane Closure – 2 Lane, 2 Way Road, High Speed, Long Term (Works involving deep excavations)



REPUBLIC OF THE PHILIPPINES **DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS** REGION X BUKIDNON 1ST DISTRICT ENGINEERING OFFICE CAPITOL COMPOUND, MALAYBALAY CITY	PROJECT NAME AND LOCATION: **REHABILITATION/ RECONSTRUCTION OF SCOURED PAVED ROADS ALONG SITIO SULOG, BARANGAY HALAPITAN, SAN FERNANDO, BUKIDNON** **SAN FERNANDO, BUKIDNON 2ND LD**	SHEET CONTENTS: **TRAFFIC MANAGEMENT PLAN**	DRAFTED: **BRYLLE ANTHONY O. DAYAO** ENGINEER II PREPARED: **DAISY JOY G. TAGNIPES** ENGINEER II	REVIEWED: **RAUL G. MELIG** ENGINEER II DATE:	SUBMITTED: **EVELYN M. KIAMCO** CHIEF, MAINTENANCE SECTION DATE:	RECOMMENDED: **SARAH JANE B. LAGRAMA** ASSISTANT DISTRICT ENGINEER DATE:	APPROVED: **MARIA B. DAVID** DISTRICT ENGINEER DATE:	SET NO. R 01 05	SHEET NO. 12 16

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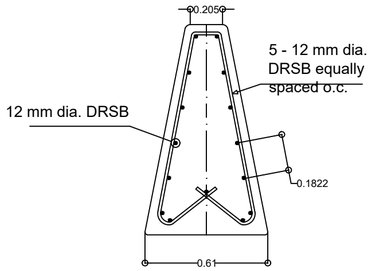
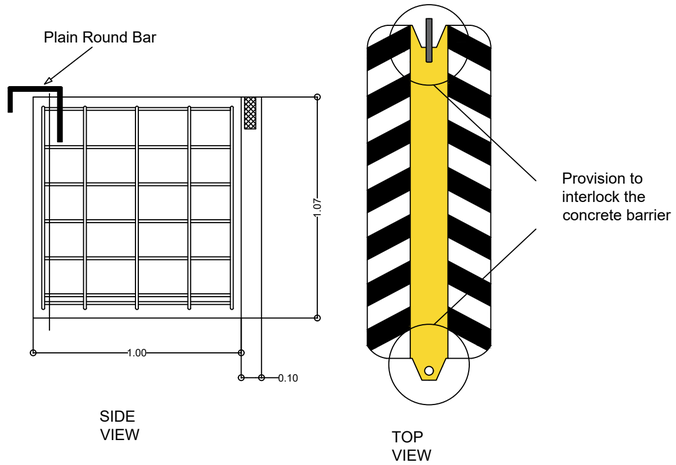
TRAFFIC SIGNS AND HAZARD MARKINGS



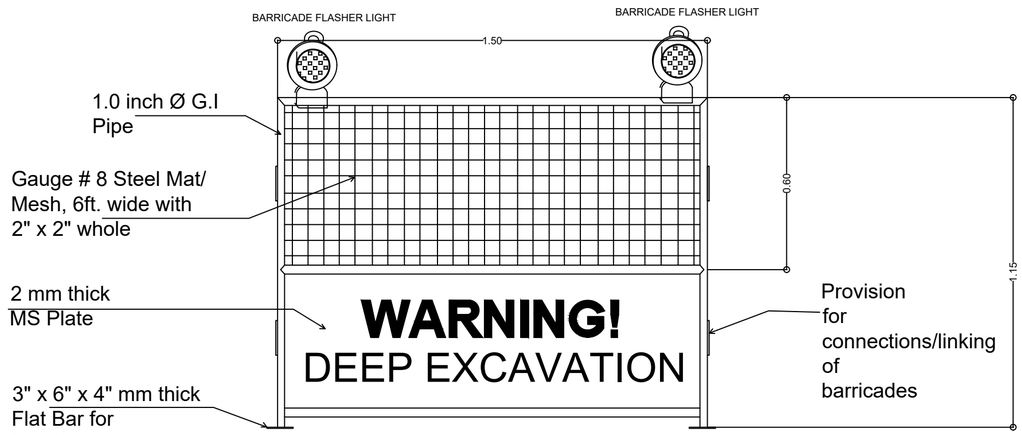
SECTION DETAILS



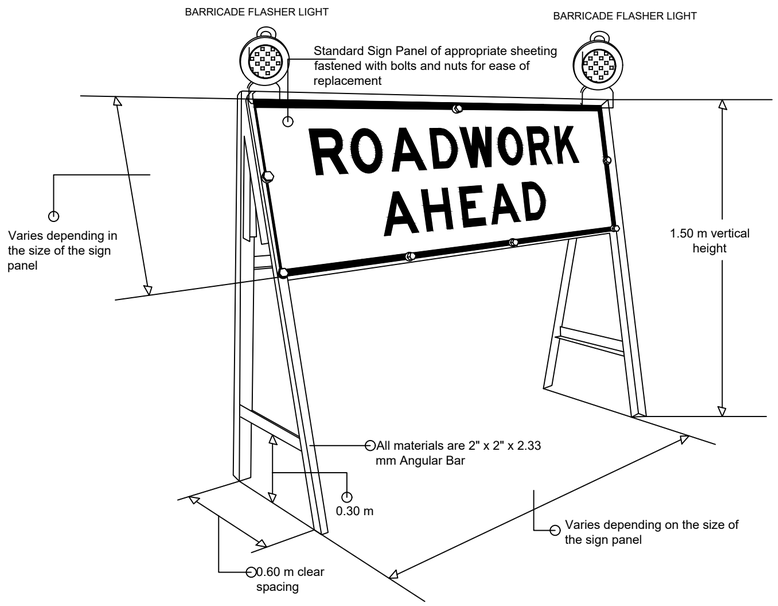
SIDE VIEW

TOP VIEW

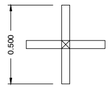
DETAILS OF CONCRETE BARRIER
SCALE: NTS



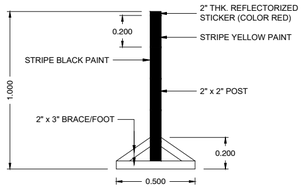
DETAILS OF CONSTRUCTION MESH FENCE/BARRICADE
SCALE: NTS



DETAILS OF TWO-SIDED SIGN FRAME
SCALE: NTS



TOP VIEW

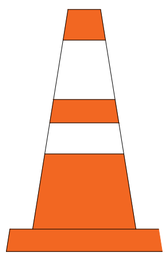


SIDE ELEV.

SPACING	CONDITION
5 - 10 M	ON TAPERS
	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)*
	WHEN USED AS LONGITUDINAL SEPARATION BETWEEN OPPOSING TRAFFIC FLOWS
10 - 20 M	WHEN USED AS LONGITUDINAL SEPARATION OF TRAFFIC FROM THE WORKSITE OR A CLOSED LANE *(MAY BE INCREASED TO 50m WHERE THE LENGTH OF BOLLARDS EXCEEDS 1 KM)*

NOTES :
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: UP TO 1 M.
3. AT NIGHT TIME OPERATION THE BOLLARDS MUST BE FITTED WITH REFLECTIVE TAPE WITH A MINIMUM BANDWIDTH OF 250mm.

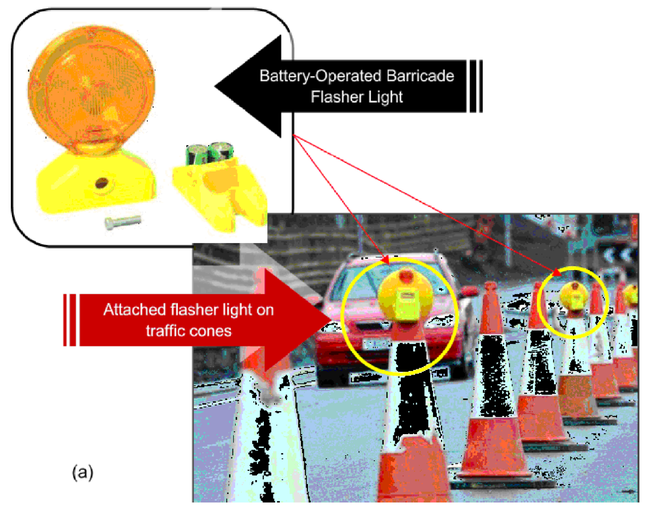
TEMPORARY BOLLARDS DETAIL
SCALE: NTS



SPACING	CONDITION
5 - 10 M	ON TAPERS
	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 CONES)*
	WHEN USED AS LONGITUDINAL SEPARATION BETWEEN OPPOSING TRAFFIC FLOWS
10 - 20 M	WHEN USED AS LONGITUDINAL SEPARATION OF TRAFFIC FROM THE WORKSITE OR A CLOSED LANE *(MAY BE INCREASED TO 50m WHERE THE LENGTH OF CONES EXCEEDS 1 KM)*

NOTES :
1. TRAFFIC CONES SHALL BE FLUORESCENT RED OR ORANGE PLASTIC. IT MUST BE RESILIENT TO IMPACT AND WILL NOT DAMAGE VEHICLES WHEN HIT AT LOW SPEED.
2. HEIGHT VARIES FROM 450mm UP TO 750mm FOR USE ON EXPRESSWAYS OR IN VERY HIGH SPEED SITUATIONS.
3. TRAFFIC CONES SHALL BE DESIGNED TO BE STABLE IN WIND AND THE AIR TURBULENCE FROM PASSING TRAFFIC.
4. AT NIGHT TIME OPERATION THE CONES MUST BE FITTED WITH REFLECTIVE TAPE WITH A MINIMUM BANDWIDTH OF 150mm.

TYPICAL TRAFFIC CONE DETAIL
SCALE: NTS



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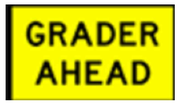
ADVANCE WARNING SIGNS

(T1-1, T1-31)

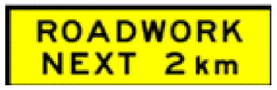
(T1-2)

(T1-3)



(T1-4)

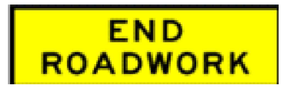

(T1-5)



(T1-24)

(T1-25)

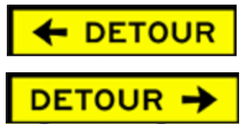
(T1-28)



(T2-16, T2-17)

DETOUR SIGNS

(T1-6)



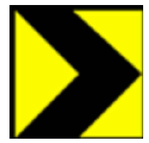
(T5-1)


(T5-6)

(G9-40-2)

(T2-23)

TEMPORARY HAZARD MARKERS


(T5-5)


(T5-4)

SIGNS FOR LANE AND ROAD CLOSURES

(T2-4)


(T2-6-1 and T2-6-2)

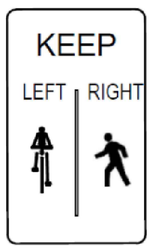

(T2-6-1 and T2-6-2)

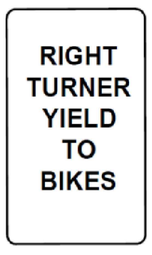
ROAD SIGNS FOR BICYCLE FACILITIES


(R6-10)

(W6-5)

(W6-5)





GENERAL NOTES:

1. W6-5 SIGN WITH A SUPPLEMENTARY WORD SIGN "AHEAD" SHOULD BE PLACED NOT LESS THAN 30M BEFORE THE BEGINNING OF A BIKE LANE.
2. W6-5 SIGN WITH A SUPPLEMENTARY WORD SIGN "ENDS" SHOULD BE PLACED AT THE END OF A BIKE LANE.
3. R6-10 SHOULD BE PLACED AT THE BEGINNING OF BIKE LANE, AT SIGNALIZED INTERSECTION AND AT PERIODIC INTERVAL SHOULD BE DETERMINED BY ENGINEERING JUDGEMENT BASED ON PREVAILING SPEED OF BICYCLE AND OTHER TRAFFIC, BLOCK LENGTH, DISTANCES FROM ADJACENT INTERSECTIONS AND OTHER CONSIDERATIONS. IF THERE ARE MULTIPLE SIDE ROADS/TURNS EXIST, IT IS NOT REQUIRED TO LOCATE SIGNS AT EVERY TURN. HOWEVER, SIGN SPACING SHOULD NOT EXCEED 500M.

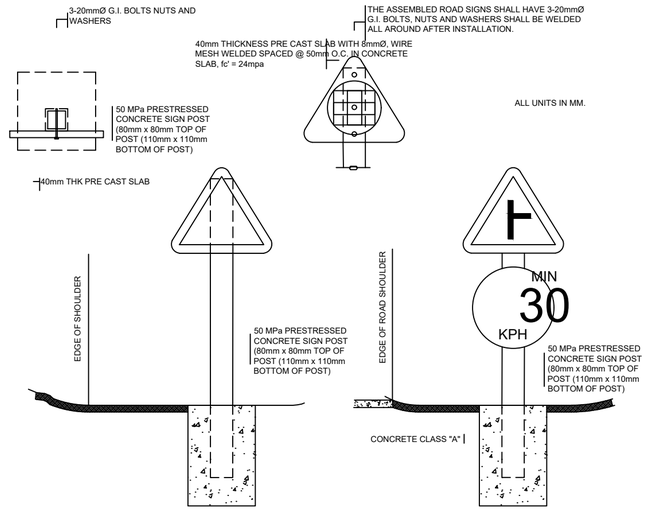
REGULATORY SIGNS

(T1-18)

(R4-1)

(R4-3)

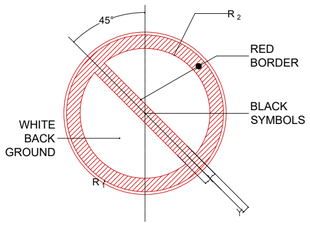
(R4-12, R4-2)



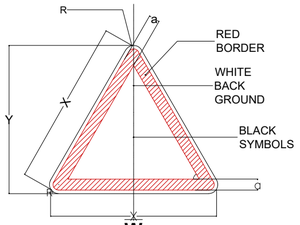
REPUBLIC OF THE PHILIPPINES **DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS** REGION X BUKIDNON 1ST DISTRICT ENGINEERING OFFICE CAPITOL COMPOUND, MALAYBALAY CITY	PROJECT NAME AND LOCATION: **REHABILITATION/ RECONSTRUCTION OF SCOURED PAVED ROADS ALONG SITIO SULOG, BARANGAY HALAPITAN, SAN FERNANDO, BUKIDNON** SAN FERNANDO, BUKIDNON 2ND LD	SHEET CONTENTS: **ADVANCE WARNING SIGNS**	DRAFTED: **BRYLLE ANTHONY O. DAYAO** ENGINEER II PREPARED: **DAISY JOY G. TAGNIPES** ENGINEER II	REVIEWED: **RAUL G. MELIG** ENGINEER II DATE:	SUBMITTED: **EVELYN M. KIAMCO** CHIEF, MAINTENANCE SECTION DATE:	RECOMMENDED: **SARAH JANE B. LAGRAMA** ASSISTANT DISTRICT ENGINEER DATE:	APPROVED: **MARIA B. DAVID** DISTRICT ENGINEER DATE:	SET NO. R 03 05	SHEET NO. 14 16

2025

WARNING SIGNS, REGULATORY SIGNS,
GUIDE AND INFORMATIVE SIGNS



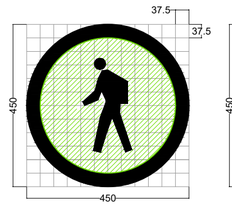
PROHIBITION SYMBOLS



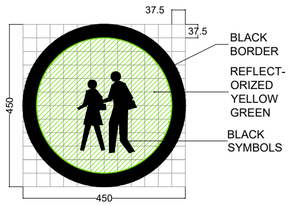
W SERIES SYMBOLS

W SERIES SYMBOLS			
SIZE	A	B	C
X	600	750	900
Y	519.5	649.5	779.5
a	30	37.5	45
R	30	35	45

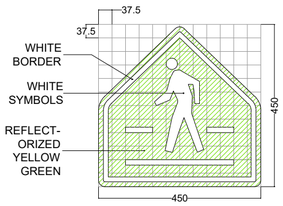
DISC-TYPE PROHIBITION			
SIZE	A 450	B 600	C 750
R_1	225	300	375
R_2	202.5	250	315
X	40	50	60
Y	20	25	30



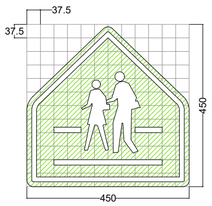
R6-8A



R6-9A



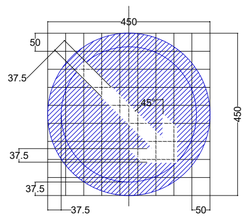
W6-1A



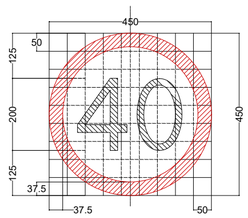
W6-2A

NOTE: PEDESTRIAN AND SCHOOL REGULATORY SIGN TO BE PLACED AT THE STOP LINES ON THE APPROACHES TO A ZEBRA PEDESTRIAN CROSSING OR A MARKED SCHOOL CHILDREN CROSSING.

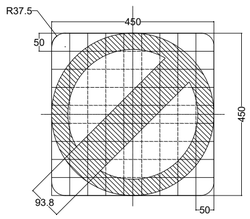
PEDESTRIAN AND SCHOOL SIGNS



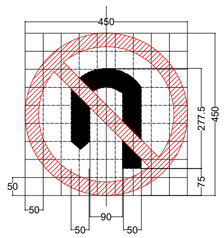
R2-3A



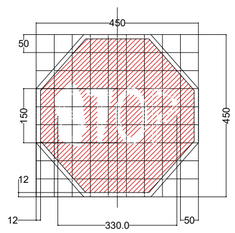
R4-1A



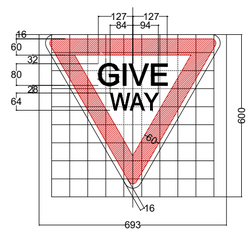
R4-2A



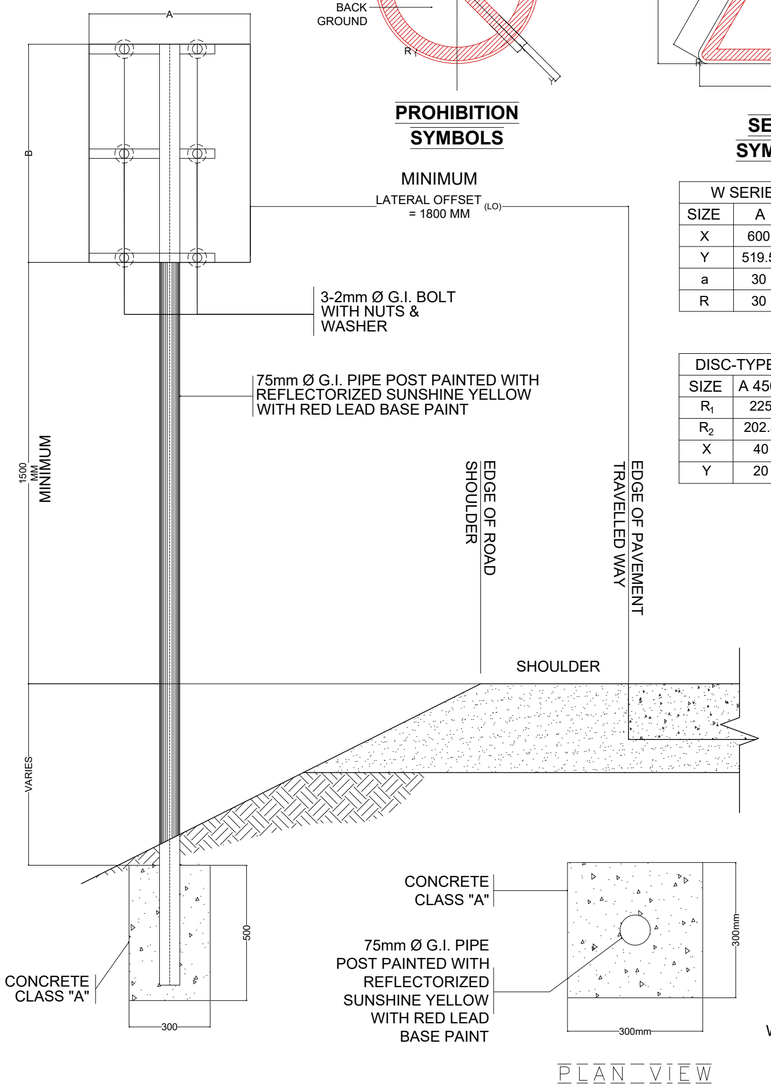
W3-15A



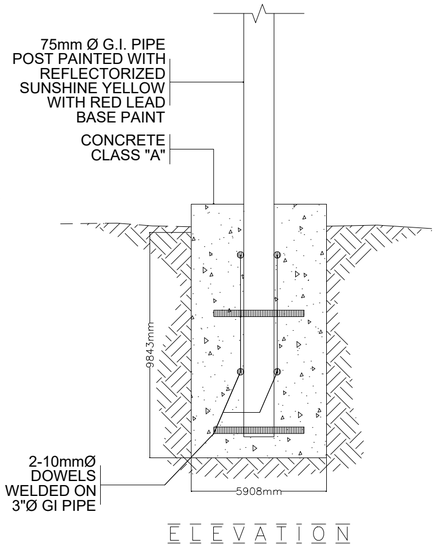
R1-1A



R1-2A



PLAN VIEW



ELEVATION

1 S-6 TYPICAL SIGN POST
SCALE NTS

2 S-6 SIGN POST FOOTING DETAIL
SCALE NTS

GENERAL CONSTRUCTION NOTES :

1. SIGN POST DIMENSION "A" AND "B" DEPENDS ON THE SIZE OF THE SIGN PLACED.
2. THE MATERIALS, DIMENSIONS, SHAPES, COLOR, SIZE OF NUMERALS, LETTERS AND INSTALLATION SHALL CONFORM WITH THE PHILIPPINE ROAD SIGNS MANUAL OF 1997 AND ALL SPECIFICATIONS REGARDING ROAD SIGNS MUST BE IN ACCORDANCE TO DPWH HIGHWAY SAFETY DESIGN STANDARDS, PART 2: ROAD SIGNS AND PAVEMENT MARKINGS MANUAL OF 2004.
3. WARNING SIGNS SHALL BE INSTALLED AT A DISTANCE NOT LESS THAN 0.6V m APART, WHERE V IS THE 85TH PERCENTILE SPEED IN KPH.
4. FINAL LOCATIONS OF ROAD SIGNS SHALL BE SUBJECT TO THE APPROVAL OF THE ENGINEER.

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGION X

BUKIDNON 1ST
DISTRICT ENGINEERING OFFICE
CAPITOL COMPOUND, MALAYBALAY CITY

PROJECT NAME AND LOCATION:
REHABILITATION/ RECONSTRUCTION OF SCOURED PAVED ROADS ALONG SITIO SULOG, BARANGAY HALAPITAN, SAN FERNANDO, BUKIDNON
SAN FERNANDO, BUKIDNON 2ND LD

SHEET CONTENTS:
WARNING SIGNS, REGULATORY SIGNS, GUIDE AND INFORMATIVE SIGNS

DRAFTED: **BRYLLE ANTHONY O. DAYAO**, ENGINEER II
PREPARED: **DAISY JOY G. TAGNIPES**, ENGINEER II

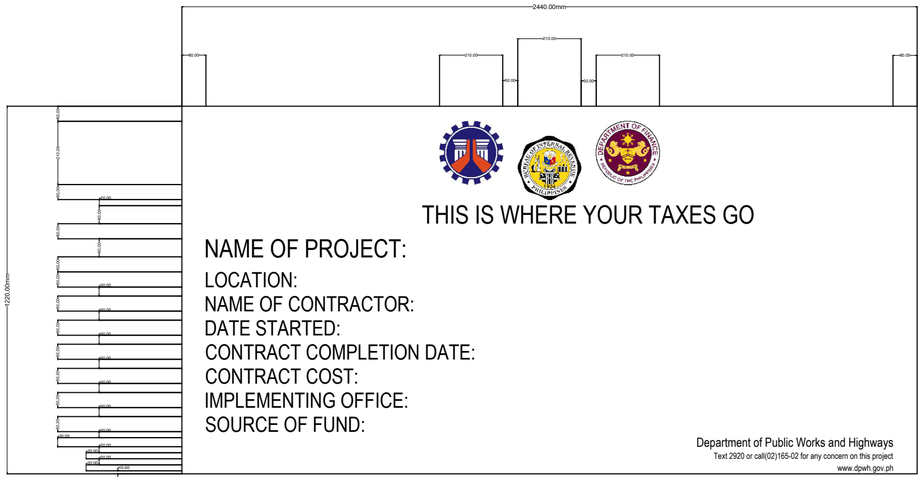
REVIEWED: **RAUL G. MELIG**, ENGINEER II, DATE:
SUBMITTED: **EVELYN M. KIAMCO**, CHIEF, MAINTENANCE SECTION, DATE:
RECOMMENDED: **SARAH JANE B. LAGRAMA**, ASSISTANT DISTRICT ENGINEER, DATE:
APPROVED: **MARIA B. DAVID**, DISTRICT ENGINEER, DATE:

SET NO. R 04 05
SHEET NO. 15 16

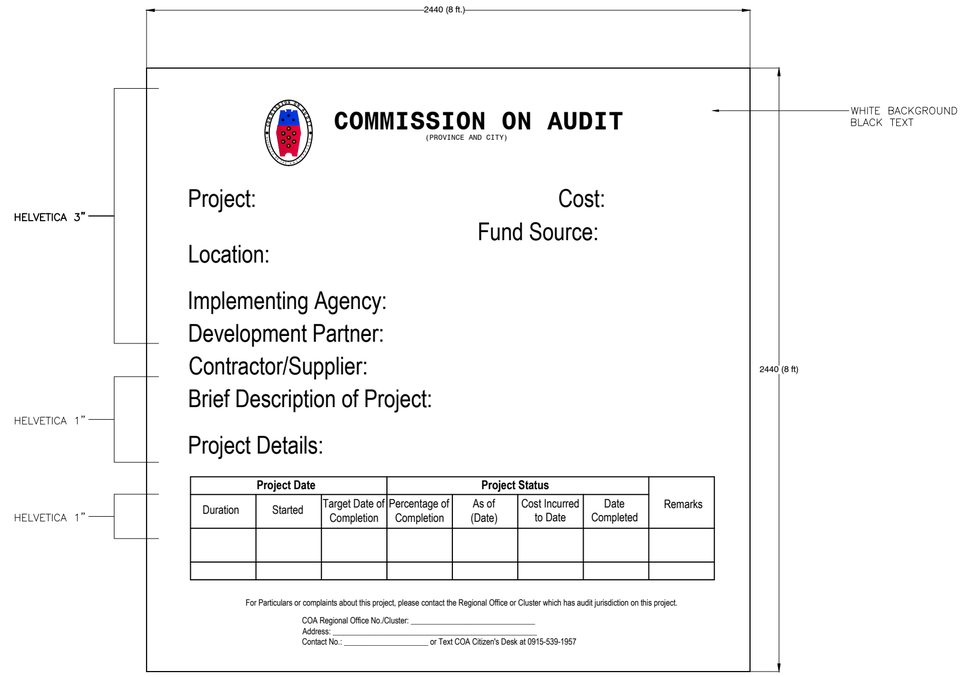
2025

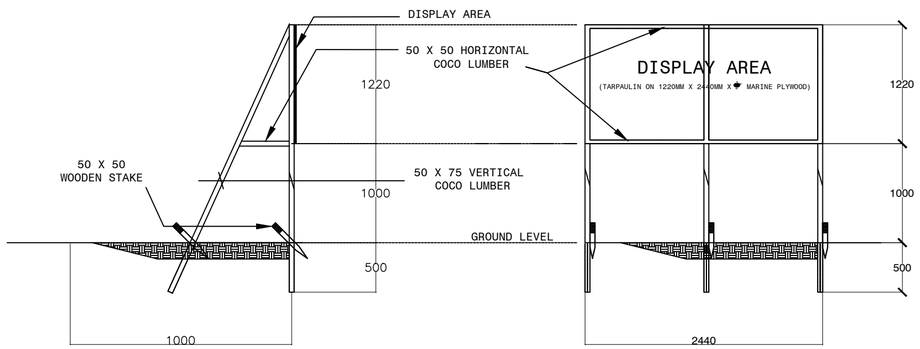
PROJECT BILLBOARD DETAILS

NOTE : IN COMPLIANCE TO DO. 11, SERIES 2022 - AN AMENDMENT TO DEPARTMENT ORDER NO. 21 SERIES OF 2017 "REVISED GUIDELINES ON THE INSTALLATION OF PROJECT BILLBOARDS "



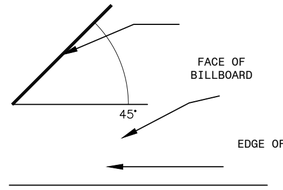
SCALE NTS

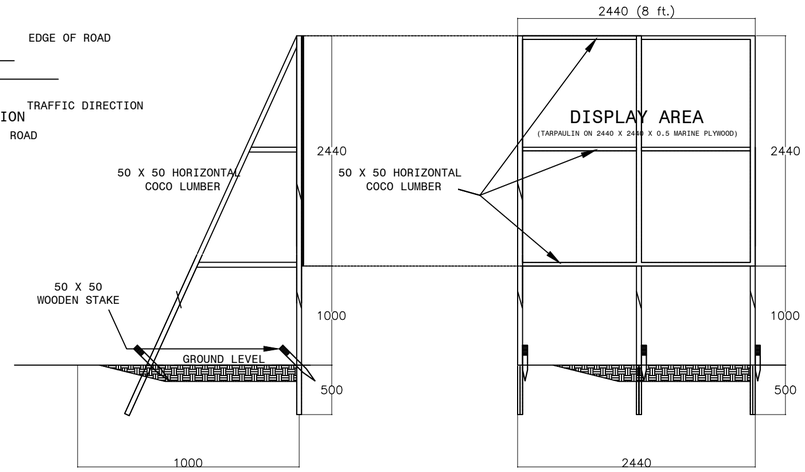




TYPICAL FRAME ELEVATION

FRONT ELEVATION
(OPTION 1)





SCALE NTS

TYPICAL FRAME ELEVATION

FRONT ELEVATION

STANDARD PROJECT BILLBOARD

(DPWH and COA)

REPUBLIC OF THE PHILIPPINES **DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS** REGION X BUKIDNON 1ST DISTRICT ENGINEERING OFFICE CAPITOL COMPOUND, MALAYBALAY CITY	PROJECT NAME AND LOCATION: **REHABILITATION/ RECONSTRUCTION OF SCOURED PAVED ROADS ALONG SITIO SULOG, BARANGAY HALAPITAN, SAN FERNANDO, BUKIDNON** **SAN FERNANDO, BUKIDNON 2ND LD**	SHEET CONTENTS: **PROJECT BILLBOARDS**	DRAFTED: **BRYLLE ANTHONY O. DAYAO** ENGINEER II PREPARED: **DAISY JOY G. TAGNIPES** ENGINEER II	REVIEWED: **RAUL G. MELIG** ENGINEER II DATE:	SUBMITTED: **EVELYN M. KIAMCO** CHIEF, MAINTENANCE SECTION DATE:	RECOMMENDED: **SARAH JANE B. LAGRAMA** ASSISTANT DISTRICT ENGINEER DATE:	APPROVED: **MARIA B. DAVID** DISTRICT ENGINEER DATE:	SET NO. R 05 05	SHEET NO. 16 16

2025