REPUBLIC OF THE PHILIPPINES

# DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

REGIONAL OFFICE No. VIII
NORTHERN SAMAR FIRST
DISTRICT ENGINEERING OFFICE
Catarman, Northern Samar

C.Y. 2025 PROJECT

DETAILED ENGINEERING DESIGN PLAN FOR

## CONCRETING OF BRGY. POLANGI TO BRGY. PATICUA FMR, BRGY. POLANGI AND BRGY. PATICUA, CATARMAN, NORTHERN SAMAR

CATARMAN, NORTHERN SAMAR
001 + 707.00 - 001 + 907.00
Net Length = 0.200m (0.400 lane km)

BEG: 672290.178 E, 1370425.585 N
END: 672147.708 E, 1370296.846 N

SUBMITTED:

**ANDY S. EREÑO**
CHIEF, PLANNING & DESIGN SECTION
Date:

RECOMMENDED:

**VIVIAN G. BIACO**
ASST. DISTRICT ENGINEER
Date:

APPROVED:

**ALVIN A. IGNACIO**
DISTRICT ENGINEER
Date:

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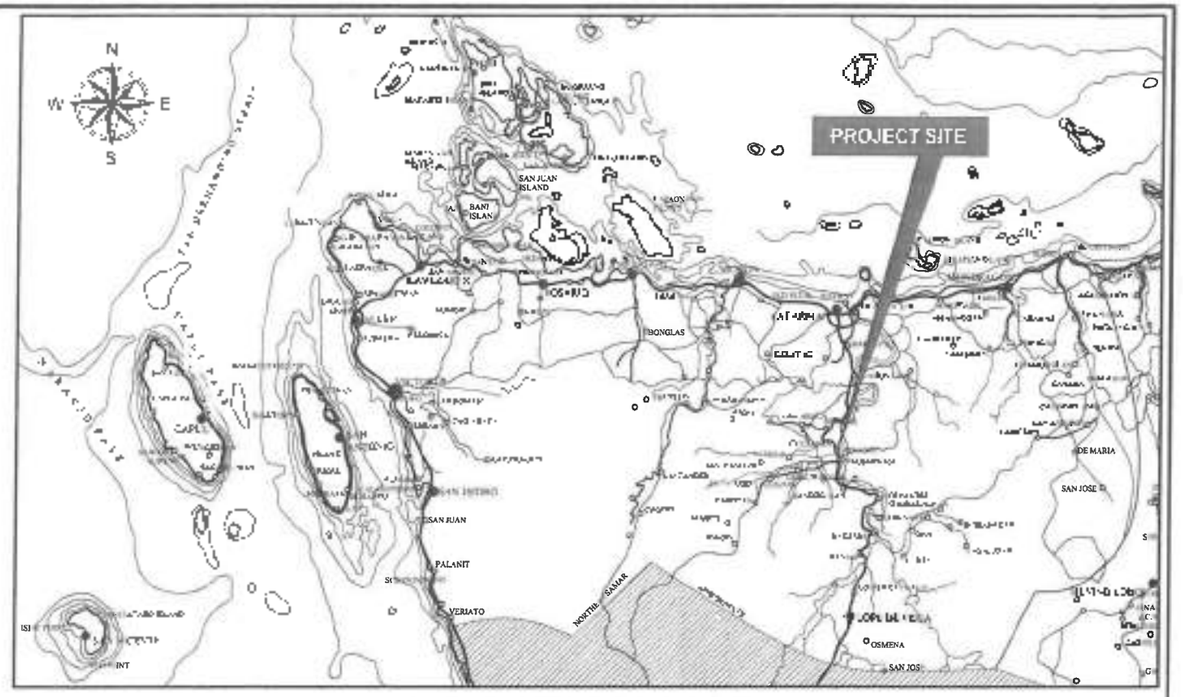
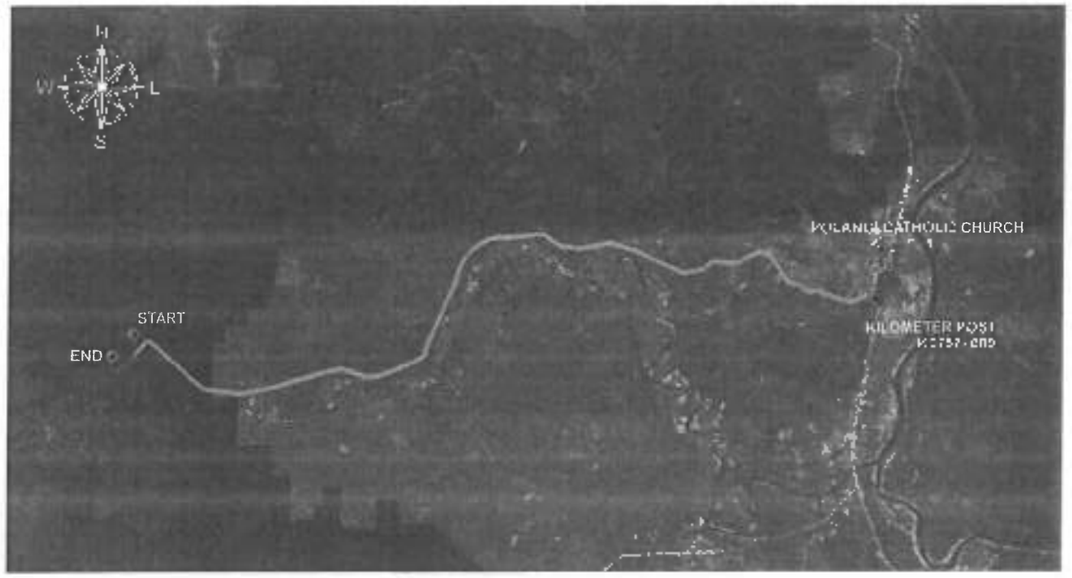


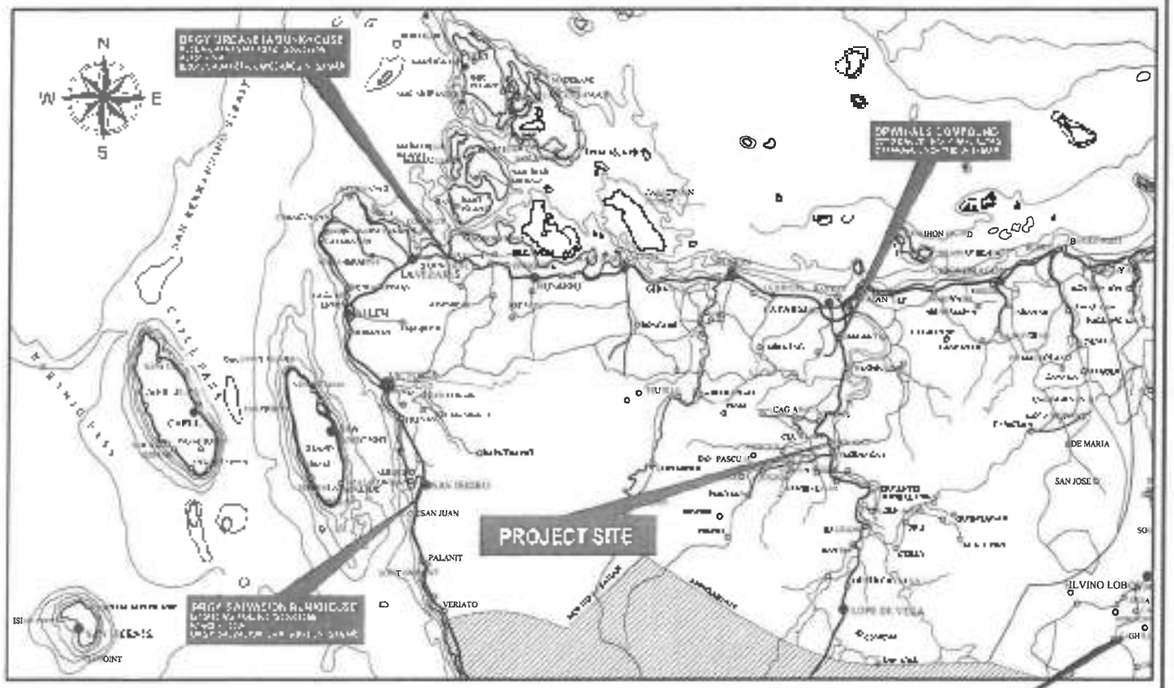

## LOCATION MAP

NOT TO SCALE




## VICINITY MAP

NOT TO SCALE




## DISPOSAL MAP

NOT TO SCALE

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Republic of the Philippines<br>DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS<br>NORTHERN SAMAR FIRST DISTRICT ENGINEERING OFFICE<br>Catarman, Northern Samar | PROJECT NAME AND LOCATION<br>CONSTRUCTION OF BRIDGE POLANGI TO BRIDGE PITO-PITO FARM, BRGY. POLANGI AND BRGY. NATIVIDAD, CATARMAN, NORTHERN SAMAR<br>Catarman, Northern Samar | SHEET CONTENTS<br>INDEX OF DRAWINGS<<br>LOCATION MAP<br>VICINITY MAP<br>DISPOSAL MAP | DRAFTED:<br>APRIL U. PAGHE<br>ENGINEER I<br>DESIGNED:<br>JEFF T. PEÑOLA<br>ENGINEER | REVIEWED:<br>MAR DONALD N. EIMAN<br>HEAD, DESIGN SECTION<br>DATE: May 25 | SUBMITTED:<br>ANDY S. ESERO<br>HEAD, PROJECT MANAGEMENT SECTION<br>DATE | RECOMMENDED:<br>VIVIAN S. BRAGO<br>ASSISTANT DISTRICT ENGINEER<br>DATE | APPROVED:<br>ALVIN A. IGNACIO<br>DISTRICT ENGINEER<br>DATE | SET NO<br>G<br>INFORM | SHEET NO<br>02<br>25 |

# GENERAL NOTES:

## SURVEY DATA:

DATE OF SURVEY : APRIL 16, 2025
EQUIPMENT USED : RTK-BASE(2351801010038) RTK-ROVER(2351804020351.
RTK-ROVER(2351711002046) GEOMAX REMOTE (ZXAC1990810038E).GEOMAX REMOTE (ZXAC1990810055E)
CALIBRATION EXPIRY DATE APRIL 22, 2025

## REFERENCE

| BM No | COORDINATES | | ELEVATION | REMARKS |
|---|---|---|---|---|
| | NORTHING | EASTING | | |
| 1 | 1271195.000 | 6119.[illegible] | 19.[illegible] | CONCRETE MON. [illegible] @ EXISTING PATHWAY |

| | |
|---|---|
| COORDINATE REFERENCE SYSTEM : | PRS92 (PHILIPPINE ZONE V |
| PROJECTION : | TRANSVERSE MERCATOR (TM) ZONE OF 3° NETWIDE |
| DATUM | PHILIPPINE REFERENCE SYSTEM 1992 |
| EPSG CODE : | 3123 |

REFERENCE BENCHMARK DETAILS

1.) THE POSITION OF PROJECT CONTROL POINTS SHALL BE DEFINED AND MARKED ON THE BY MONUMENTS OF PERMANENT NATURE.
2.) CRITERIA FOR LOCATION OF MONUMENTS:
-ACCESSIBILITY
-GROUND STABILITY
-SECURITY FROM POSSIBLE ACTS OF DISTURBANCE
3.) INTERVAL OF MONUMENTS
-PRIMARY GPS CONTROL (GPS) 3 KM INTERVAL
-PRIMARY PROJECT CONTROL (BM) 300 M INTERVAL
-INTERMEDIATE CONTROL (IBM) EVERY 250 M INTERVAL IN BETWEEN BMS

## STANDARDS AND REFERENCES:

- DESIGN GUIDELINES, CRITERIA AND STANDARDS, VOLUME 4, 2015
- AASHTO A POLICY ON GEOMETRIC DESIGN STANDARD OF HIGHWAYS AND STREETS, 2011, 6TH EDITION
- AASHTO GUIDE ON PAVEMENT DESIGN, 1993 EDITION
- HIGHWAY SAFETY DESIGN STANDARDS PART 1 - ROAD SAFETY DESIGN, AND PART 2 - ROAD SIGNS AND PAVEMENT MARKINGS, 2012 EDITION
- DPWH STANDARD SPECIFICATIONS FOR PUBLIC WORKS AND HIGHWAYS, 2014 EDITION VOLUME II, HIGHWAYS, BRIDGES AND AIRPORTS

# CONSTRUCTION REQUIREMENTS:

## i. DIMENSIONS

(1) STATIONS ARE GIVEN IN KILOMETERS WITH OR WITHOUT DECIMALS
(2) RADII, ELEVATIONS, FLOOD LEVELS, ETC, ARE GIVEN IN METERS WITH OR WITHOUT DECIMALS.
(3) UNLESS OTHERWISE SHOWN, ALL DISTANCES ARE IN METERS.

## ii. STATIONINGS

(1) THE ROAD STATIONS AND ELEMENTS OF CURVES ARE RELATIVE TO THE CENTERLINE OF THE ROAD
(2) ALL STATIONS ALONG ROAD CENTERLINE ARE REKONED FROM NATIONAL ROAD

## iii. ELEVATIONS AND GRADES

(1) ELEVATIONS GIVEN IN THE COLUMN "FINISHED GRADE ELEVATION" REFER TO THE GRADE AS SHOWN IN THE TYPICAL ROADWAY SECTION.
(2) GROUND LEVEL AND FINISHED ROAD LEVEL OF THE ROAD REFER TO THE GROUND PROFILE FOR THE ROAD CENTERLINE.

## ITEM 100 - CLEARING AND GRUBBING

THIS ITEM SHALL CONSIST OF CLEARING, GRUBBING, REMOVING AND DISPOSING ALL VEGETATION AND DEBRIS AS DESIGNATED IN THE CONTRACT, EXCEPT THOSE OBJECTS THAT ARE DESIGNATED TO REMAIN IN PLACE OR ARE TO BE REMOVED IN CONSONANCE WITH OTHER PROVISIONS OF THIS SPECIFICATION. THE WORK SHALL ALSO INCLUDE THE PRESERVATION FROM INJURY OR DEFACEMENT OF ALL OBJECTS DESIGNATED TO REMAIN.

100.2.2.1 THE ENGINEER WILL ESTABLISH THE LIMITS OF WORK AND DESIGNATE ALL TREES, SHRUBS, PLANTS AND OTHER THINGS TO REMAIN. THE CONTRACTOR SHALL PRESERVE ALL OBJECTS DESIGNATED TO REMAIN. PAINT REQUIRED FOR CUT OR SCARRED SURFACE OF TREES OR SHRUBS SELECTED FOR RETENTION SHALL BE AN APPROVED ASPHALTUM BASE PAINT PREPARED ESPECIALLY FOR TREE SURGERY

CLEARING SHALL EXTEND ONE (1) METER BEYOND THE TOE OF THE FILL SLOPES OR BEYOND ROUNDING OF CUT SLOPES AS THE CASE MAYBE FOR THE ENTIRE LENGTH OF THE PROJECT UNLESS OTHERWISE SHOWN ON THE PLANS OR AS DIRECTED BY THE ENGINEER AND PROVIDED IT IS WITHIN THE RIGHT OF WAY LIMITS OF THE PROJECT. WITH THE EXCEPTION OF TREES UNDER THE JURISDICTION OF THE FOREST MANAGEMENT BUREAU (FMB).

100.2.3 INDIVIDUAL TREES OR STUMPS DESIGNATED BY THE ENGINEER FOR REMOVAL AND LOCATED IN AREAS OTHER THAN THOSE ESTABLISHED FOR CLEARING AND GRUBBING AND ROADSIDE CLEANUP SHALL BE REMOVED AND DISPOSED OFF AS SPECIFIED UNDER SUBSECTION 100.2.2

100.2.4 EXCEPT TREES REMOVED SHALL BE CUT AS NEARLY FLUSH WITH THE GROUND AS PRACTICABLE WITHOUT REMOVING STUMPS.

## ITEM 102 - EXCAVATION

102.1.1 ROADWAY EXCAVATION WILL INCLUDE EXCAVATION AND GRADING FOR ROADWAYS, PARKING AREAS, INTERSECTIONS, APPROACHES, SLOPE ROUNDING, BENCHING, WATERWAYS AND DITCHES; REMOVAL OF UNSUITABLE MATERIAL FROM THE ROADBED AND BENEATH EMBANKMENT AREAS; AND EXCAVATING SELECTED MATERIAL FOUND IN THE ROADWAY AS DIRECTED BY THE ENGINEER FOR SPECIFIC USE IN THE IMPROVEMENT. ROADWAY EXCAVATION WILL BE CLASSIFIED AS "UNCLASSIFIED EXCAVATION", "ROCK EXCAVATION", "COMMON EXCAVATION", OR "MUCK EXCAVATION" AS INDICATED IN THE BILL OF QUANTITIES AND HEREINAFTER DESCRIBED

(1) UNCLASSIFIED EXCAVATION. UNCLASSIFIED EXCAVATION SHALL CONSIST OF THE EXCAVATION AND DISPOSAL OF ALL MATERIALS REGARDLESS OF ITS NATURE, NOT CLASSIFIED AND INCLUDED IN THE BILL OF QUANTITIES UNDER OTHER PAY ITEMS

(2) ROCK EXCAVATION. ROCK EXCAVATION SHALL CONSIST OF IGNEOUS, SEDIMENTARY AND METAMORPHIC ROCK WHICH CANNOT BE EXCAVATED WITHOUT BLASTING OR THE USE OF RIPPERS, AND ALL BOULDERS OR OTHER DETACHED STONES EACH HAVING A VOLUME OF 1 CUBIC METER OR MORE AS DETERMINED BY PHYSICAL MEASUREMENTS OR VISUALLY BY THE ENGINEER

(3) COMMON EXCAVATION. COMMON EXCAVATIONS SHALL CONSIST OF ALL EXCAVATION NOT INCLUDED IN THE BILL OF QUANTITIES UNDER "ROCK EXCAVATION" OR OTHER PAY ITEMS

(4) MUCK EXCAVATION. MUCK EXCAVATION SHALL CONSIST OF THE REMOVAL AND DISPOSAL OF DEPOSITS OF SATURATED OR UNSATURATED MIXTURES OF SOILS AND ORGANIC MATTER NOT SUITABLE FOR FOUNDATION MATERIAL REGARDLESS OF MOISTURE CONTENT.

WHEN THERE IS EVIDENCE OF DISCREPANCIES ON THE ACTUAL ELEVATIONS AND THAT SHOWN ON THE PLANS, A PRE-CONSTRUCTION SURVEY REFERRED TO THE DATUM PLANE USED IN THE APPROVED PLAN SHALL BE UNDERTAKEN BY THE CONTRACTOR UNDER THE CONTROL OF THE ENGINEER TO SERVE AS BASIS FOR THE COMPUTATION OF THE ACTUAL VOLUME OF THE EXCAVATED MATERIALS.

ALL EXCAVATIONS SHALL BE FINISHED TO REASONABLY SMOOTH AND UNIFORM SURFACES. NO MATERIALS SHALL BE WASTED WITHOUT AUTHORITY OF THE ENGINEER. EXCAVATION OPERATIONS SHALL BE CONDUCTED SO THAT MATERIAL OUTSIDE OF THE LIMITS OF SLOPES WILL NOT BE DISTURBED. PRIOR TO EXCAVATION, ALL NECESSARY CLEARING AND GRUBBING IN THAT AREA SHALL HAVE BEEN PERFORMED IN ACCORDANCE WITH ITEM 100, CLEARING AND GRUBBING

## ITEM 103 - STRUCTURE EXCAVATION

PRIOR TO STARTING EXCAVATION OPERATIONS IN ANY AREA, ALL NECESSARY CLEARING AND GRUBBING IN THAT AREA SHALL HAVE BEEN PERFORMED IN ACCORDANCE WITH ITEM 100, CLEARING AND GRUBBING

(1) GENERAL, ALL STRUCTURES. THE CONTRACTOR SHALL NOTIFY THE ENGINEER SUFFICIENTLY IN ADVANCE OF THE BEGINNING OF ANY EXCAVATION SO THAT CROSS-SECTIONAL ELEVATIONS AND MEASUREMENTS MAY BE TAKEN ON THE UNDISTURBED GROUND. THE NATURAL GROUND ADJACENT TO THE STRUCTURE SHALL NOT BE DISTURBED WITHOUT PERMISSION OF THE ENGINEER. TRENCHES OR FOUNDATION PITS FOR STRUCTURES OR STRUCTURE FOOTINGS SHALL BE EXCAVATED TO THE LINES AND GRADES OR ELEVATIONS SHOWN ON THE PLANS OR AS STAKED BY THE ENGINEER. THEY SHALL BE OF SUFFICIENT SIZE TO PERMIT THE PLACING OF STRUCTURES OR STRUCTURE FOOTINGS OF THE FULL WIDTH AND LENGTH SHOWN. THE ELEVATIONS OF THE BOTTOMS OF FOOTINGS, AS SHOWN ON THE PLANS, SHALL BE CONSIDERED AS APPROXIMATE ONLY AND THE ENGINEER MAY ORDER, IN WRITING, SUCH CHANGES IN DIMENSIONS OR ELEVATIONS OF FOOTINGS AS MAY BE DEEMED NECESSARY, TO SECURE A SATISFACTORY FOUNDATION. BOULDERS, LOGS, AND OTHER OBJECTIONABLE MATERIALS ENCOUNTERED IN EXCAVATION SHALL BE REMOVED. AFTER EACH EXCAVATION IS COMPLETED, THE CONTRACTOR SHALL NOTIFY THE ENGINEER TO THAT EFFECT AND NO FOOTING, BEDDING MATERIAL OR PIPE CULVERT SHALL BE PLACED UNTIL THE ENGINEER HAS APPROVED THE DEPTH OF EXCAVATION AND THE CHARACTER OF THE FOUNDATION MATERIAL.

(2) STRUCTURES OTHER THAN PIPE CULVERTS. ALL ROCK OR OTHER HARD FOUNDATION MATERIALS SHALL BE CLEANED ALL LOOSE MATERIALS, AND CUT TO A FIRM SURFACE, EITHER LEVEL, STEPPED, OR SERRATED AS DIRECTED BY THE ENGINEER. ALL SEAMS OR CREVICES SHALL BE CLEANED AND GROUTED. ALL LOOSE AND DISINTEGRATED ROCKS AND THIN STRATA SHALL BE REMOVED. WHEN THE FOOTING IS TO REST ON MATERIAL OTHER THAN ROCK, EXCAVATION TO FINAL GRADE SHALL NOT BE MADE UNTIL JUST BEFORE THE FOOTING IS TO BE PLACED. WHEN THE FOUNDATION MATERIAL IS SOFT OR MUCKY OR OTHERWISE UNSUITABLE, AS DETERMINED BY THE ENGINEER, THE CONTRACTOR SHALL REMOVE THE UNSUITABLE MATERIAL AND BACKFILL WITH APPROVED GRANULAR MATERIAL. THIS FOUNDATION FILL SHALL BE PLACED AND COMPACTED IN 150 MM (6 INCHES) LAYERS UP TO THE FOUNDATION ELEVATION. WHEN FOUNDATION PILES ARE USED, THE EXCAVATION OF EACH PIT SHALL BE COMPLETED BEFORE THE PILES ARE DRIVEN AND ANY PLACING OF FOUNDATION FILL SHALL BE DONE AFTER THE PILES ARE DRIVEN. AFTER THE DRIVING IS COMPLETED, ALL LOOSE AND DISPLACED MATERIALS SHALL BE REMOVED, LEAVING A SMOOTH, SOLIDIFIED FOUNDATION.

(3) PIPE CULVERTS. THE WIDTH OF THE PIPE TRENCH SHALL BE SUFFICIENT TO PERMIT SATISFACTORY JOINTING OF THE PIPE AND THOROUGH TAMPING OF THE BEDDING MATERIAL UNDER AND AROUND THE PIPE. WHERE ROCK, HARDPAN, OR OTHER UNYIELDING MATERIAL IS ENCOUNTERED, IT SHALL BE REMOVED BELOW THE FOUNDATION GRADE FOR A DEPTH OF AT LEAST 300 MM OR 4 MM FOR EACH 100 MM OF FILL OVER THE TOP OF PIPE, WHICHEVER IS GREATER, BUT NOT TO EXCEED THREE-QUARTERS OF THE VERTICAL INSIDE DIAMETER OF THE PIPE. THE WIDTH OF THE EXCAVATION SHALL BE AT LEAST 300 MM (12 INCHES) GREATER THAN THE HORIZONTAL OUTSIDE DIAMETER OF THE PIPE. THE EXCAVATION BELOW GRADE SHALL BE BACKFILLED WITH SELECTED FINE COMPRESSIBLE MATERIAL, SUCH AS SILTY CLAY OR LOAM, AND LIGHTLY COMPACTED IN LAYERS NOT OVER 150 MM (6 INCHES) IN UNCOMPACTED DEPTH TO FORM A UNIFORM BUT YIELDING FOUNDATION. WHERE A FIRM FOUNDATION IS NOT ENCOUNTERED AT THE GRADE ESTABLISHED, DUE TO SOFT, SPONGY, OR OTHER UNSTABLE SOIL, SUCH UNSTABLE SOIL UNDER THE PIPE AND FOR A WIDTH OF AT LEAST ONE DIAMETER ON EACH SIDE OF THE PIPE SHALL BE REMOVED TO THE DEPTH DIRECTED BY THE ENGINEER AND REPLACED WITH APPROVED GRANULAR FOUNDATION FILL MATERIAL PROPERLY COMPACTED TO PROVIDE ADEQUATE SUPPORT FOR THE PIPE, UNLESS OTHER SPECIAL CONSTRUCTION METHODS ARE CALLED FOR ON THE PLANS. THE FOUNDATION SURFACE SHALL PROVIDE A FIRM FOUNDATION OF UNIFORM DENSITY THROUGHOUT THE LENGTH OF THE CULVERT AND, IF DIRECTED BY THE ENGINEER, SHALL BE CAMBERED IN THE DIRECTION PARALLEL TO THE PIPE CENTERLINE. WHERE PIPE CULVERTS ARE TO BE PLACED IN TRENCHES EXCAVATED IN EMBANKMENTS, THE EXCAVATION OF EACH TRENCH SHALL BE PERFORMED AFTER THE EMBANKMENT HAS BEEN CONSTRUCTED TO A PLANE PARALLEL TO THE PROPOSED PROFILE GRADE AND TO SUCH HEIGHT ABOVE THE BOTTOM OF THE PIPE AS SHOWN ON THE PLANS OR DIRECTED BY THE ENGINEER.

## ITEM 104 - EMBANKMENT

PRIOR TO CONSTRUCTION OF EMBANKMENT, ALL NECESSARY CLEARING AND GRUBBING IN THAT AREA SHALL HAVE BEEN PERFORMED IN CONFORMITY WITH ITEM 100, CLEARING AND GRUBBING

EMBANKMENT CONSTRUCTION SHALL CONSIST OF CONSTRUCTING ROADWAY EMBANKMENTS, INCLUDING PREPARATION OF THE AREAS UPON WHICH THEY ARE TO BE PLACED; THE CONSTRUCTION OF DIKES WITHIN OR ADJACENT TO THE ROADWAY; THE PENCING AND COMPACTING OF APPROVED MATERIAL WITHIN ROADWAY AREAS WHERE UNSUITABLE MATERIAL HAS BEEN REMOVED; AND THE PLACING AND COMPACTING OF EMBANKMENT MATERIAL IN HOLES, PITS, AND OTHER DEPRESSIONS WITHIN THE ROADWAY AREA.

EMBANKMENTS AND BACKFILLS SHALL CONTAIN NO MUCK, PEAT, SOD, ROOTS OR OTHER DELETERIOUS MATTER. ROCKS, BROKEN CONCRETE OR OTHER SOLID, BULKY MATERIALS SHALL NOT BE PLACED IN EMBANKMENT AREAS WHERE PILINGS TO BE PLACED OR DRIVEN.

WHERE SHOWN ON THE PLANS OR DIRECTED BY THE ENGINEER, THE SURFACE OF THE EXISTING GROUND SHALL BE COMPACTED TO A DEPTH OF 150 MM (6 INCHES) AND TO THE SPECIFIED REQUIREMENTS OF THIS ITEM.

WHERE PROVIDED ON THE PLANS AND BILL OF QUANTITIES THE TOP PORTIONS OF THE ROADBED IN BOTH CUTS AND EMBANKMENTS, AS INDICATED, SHALL CONSIST OF SELECTED BORROW FOR TOPPING FROM EXCAVATIONS

104.3.3 THE CONTRACTOR SHALL COMPACT THE MATERIAL PLACED IN ALL EMBANKMENT LAYERS AND THE MATERIAL SCARIFIED TO THE DESIGNATED DEPTH BELOW SUBGRADE IN CUT SECTIONS, UNTIL A UNIFORM DENSITY OF NOT LESS THAN 95 MASS PERCENT OF THE MAXIMUM DRY DENSITY DETERMINED BY AASHTO T 99 METHOD C, IS ATTAINED, AT A MOISTURE CONTENT DETERMINED BY ENGINEER TO BE SUITABLE FOR SUCH DENSITY. ACCEPTANCE OF COMPACTION MAY BE BASED ON ADHERENCE TO AN APPROVED ROLLER PATTERN DEVELOPED AS SET FORTH IN ITEM 126, COMPACTION EQUIPMENT AND DENSITY CONTROL STRIPS.

THE ENGINEER SHALL DURING PROGRESS OF THE WORK, MAKE DENSITY TESTS OF COMPACTED MATERIAL IN ACCORDANCE WITH AASHTO T 191, T 205, OR OTHER APPROVED FIELD DENSITY TESTS, INCLUDING THE USE OF PROPERLY CALIBRATED NUCLEAR TESTING DEVICES. A CORRECTION FOR COARSE PARTICLES MAY BE MADE IN ACCORDANCE WITH AASHTO T 224, IF, BY SUCH TESTS, THE ENGINEER DETERMINES THAT THE SPECIFIED DENSITY AND MOISTURE CONDITIONS HAVE NOT BEEN ATTAINED, THE CONTRACTOR SHALL PERFORM ADDITIONAL WORK AS MAY BE NECESSARY TO ATTAIN THE SPECIFIED CONDITIONS.

AT LEAST ONE GROUP OF THREE IN-SITU DENSITY TESTS SHALL BE CARRIED OUT FOR EACH 500 M OF EACH LAYER OF COMPACTED FILL

## ITEM 105 - SUBGRADE PREPARATION

105.5.2 THE FINISHED COMPACTED SURFACE OF THE SUBGRADE SHALL CONFORM TO THE ALLOWABLE TOLERANCES AS SPECIFIED HEREUNDER.

| | | |
|---|---|---|
| Permitted variation from design LEVEL OF SURFACE | + | 20 mm |
| | - | 30 mm |
| Permitted SURFACE IRREGULARITY MEASURED BY 3-m STRAIGHT EDGE | | 30 mm |
| Permitted variation from design CROSSFALL OR CAMBER | ± | 0.5 % |
| Permitted variation from design LONGITUDINAL GRADE over 25 m length | ± | 0.1 % |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS NORTHERN SAMAR FIRST DISTRICT ENGINEERING OFFICE | PROJECT TITLE AND LOCATION: CONSTRUCTION OF [illegible] | TITLE OF DRAWING: GENERAL NOTES | DRAFTED: ANGELU POCHE ENGINEER I<br>DESIGNED: JEFF P. [illegible]OLA ENGINEER II | REVIEWED: MARIO DONALD M. ERMAN [illegible] DATE | SUBMITTED: ANDY S. [illegible] CHIEF, [illegible] DIVISION DATE | RECOMMENDED: [illegible] MANAGEMENT ENGINEER DATE | APPROVED: ALVIN A. IGNACIO DISTRICT ENGINEER DATE |

SHEET NO. G 03 OF 04
SHEET NO. D2 OF 22

105.3.3 UNLESS OTHERWISE SPECIFIED, ALL MATERIALS BELOW SUBGRADE LEVEL IN EARTH CUTS TO A DEPTH 150 MM OR OTHER DEPTH SHOWN ON THE PLANS OR AS DIRECTED BY THE ENGINEER SHALL BE EXCAVATED. THE MATERIAL, IF SUITABLE, SHALL BE SET SIDE FOR FUTURE USE OR, IF UNSUITABLE, SHALL BE DISPOSED OFF IN ACCORDANCE WITH THE REQUIREMENTS OF SUBSECTION 202.2.9

WHERE MATERIAL HAS BEEN REMOVED FROM BELOW SUBGRADE LEVEL, THE RESULTING SURFACE SHALL BE COMPACTED TO A DEPTH OF 150MM AND IN ACCORDANCE WITH OTHER REQUIREMENTS OF SUBSECTION 104.5.E

ALL MATERIALS IMMEDIATELY BELOW SUBGRADE LEVEL IN EARTH CUTS TO A DEPTH OF 150 MM, OR TO SUCH GREATER DEPTH AS MAY BE SPECIFIED, SHALL BE COMPACTED IN ACCORDANCE WITH THE REQUIREMENTS OF SUBSECTION 104.5.3.

## ITEM 200 - AGGREGATE SUBBASE COURSE

200.3.1 THE EXISTING SURFACE SHALL BE GRADED BY CONDUCTING PRE CONSTRUCTION SURVEY TO BE UNDERTAKEN BY THE CONTRACTOR UNDER THE CONTROL OF THE ENGINEER AS PROVIDED UNDER ITEM 105, SUBGRADE PREPARATION, TO PROPERLY IMPLEMENT THE DESIGNED ELEVATION AND THICKNESS OF THE ROAD FOUNDATION BEFORE PLACING THE SUBBASE MATERIAL.

200.3.2 THE AGGREGATE SUBBASE MATERIAL SHALL BE PLACED AT A UNIFORM MIXTURE ON A PREPARED SUBGRADE IN A QUANTITY WHICH WILL PROVIDE THE REQUIRED COMPACTED THICKNESS. WHEN MORE THAN ONE LAYER IS REQUIRED, EACH LAYER SHALL BE SHAPED AND COMPACTED BEFORE THE SUCCEEDING LAYER IS PLACED.

THE PLACING OF MATERIAL SHALL BEGIN AT THE POINT DESIGNATED BY THE ENGINEER PLACING SHALL BE FROM VEHICLES/EQUIPMENT ESPECIALLY EQUIPPED TO DISTRIBUTE THE MATERIAL IN A CONTINUOUS UNIFORM LAYER OR WINDROW. THE LAYER OR WINDROW SHALL BE OF SUCH SIZE THAT WHEN SPREAD OR COMPACTED, THE FINISHED LAYER SHALL BE IN REASONABLE CLOSE CONFORMITY TO THE NOMINAL THICKNESS SHOWN ON THE PLANS

WHEN HAULING IS DONE OVER PREVIOUSLY PLACED MATERIAL, HAULING EQUIPMENT SHALL BE DISTRIBUTED UNIFORMLY OVER THE ENTIRE SURFACE OF THE PREVIOUSLY CONSTRUCTED LAYER, TO MINIMIZE RUTTING OR UNEVEN COMPACTION

200.3.3 WHERE THE REQUIRED THICKNESS IS 200 MM OR LESS, THE MATERIAL SHALL BE SPREAD AND COMPACTED IN ONE (1) LAYER USING A VIBRATORY ROLLER EQUIPMENT WITH AT LEAST TEN (10) METRIC TONS CAPACITY. WHERE THE REQUIRED THICKNESS IS MORE THAN 200 MM, THE AGGREGATE SUBBASE SHALL BE SPREAD AND COMPACTED IN TWO OR MORE LAYERS OF APPROXIMATELY EQUAL THICKNESS, AND THE MAXIMUM COMPACTED THICKNESS OF ANY LAYER SHALL NOT EXCEED 200 MM. ALL SUBSEQUENT LAYERS SHALL BE SPREAD AND COMPACTED IN A SIMILAR MANNER.

THE MOISTURE CONTENT OF SUBBASE MATERIAL SHALL, IF NECESSARY, BE ADJUSTED PRIOR TO COMPACTION BY WATERING WITH APPROVED SPRINKLERS MOUNTED ON TRUCKS OR BY DRYING OUT, AS REQUIRED IN ORDER TO OBTAIN THE REQUIRED COMPACTION

IMMEDIATELY FOLLOWING FINAL SPREADING AND SMOOTHENING, EACH LAYER SHALL BE COMPACTED TO THE FULL WIDTH BY MEANS OF APPROVED COMPACTION EQUIPMENT. ROLLING SHALL PROCEED GRADUALLY FROM THE SIDES TO THE CENTER, PARALLEL TO THE CENTERLINE OF THE ROAD AND SHALL CONTINUE UNTIL THE WHOLE SURFACE HAS BEEN ROLLED. ANY IRREGULARITIES OR DEPRESSIONS THAT DEVELOP SHALL BE CORRECTED BY LOOSENING THE MATERIAL AT THESE PLACES AND ADDING OR REMOVING MATERIAL UNTIL SURFACE IS SMOOTH AND UNIFORM. ALONG CURBS, HEADERS AND WALLS, AND AT ALL PLACES NOT ACCESSIBLE TO THE ROLLER, THE SUBBASE MATERIAL SHALL BE COMPACTED THOROUGHLY WITH APPROVED TAMPERS OR COMPACTORS

IF THE LAYER OF SUBBASE MATERIAL, OR PART THEREOF, DOES NOT CONFORM TO THE REQUIRED FINISH, THE CONTRACTOR SHALL, AT HIS OWN EXPENSE, MAKE THE NECESSARY CORRECTIONS.

COMPACTION OF EACH LAYER SHALL CONTINUE UNTIL A FIELD DENSITY OF AT LEAST 100 PERCENT OF THE MAXIMUM DRY DENSITY DETERMINED IN ACCORDANCE WITH MSHTO T 180, METHOD D HAS BEEN ACHIEVED. IN PLACE DENSITY DETERMINATION SHALL BE MADE IN ACCORDANCE WITH MSHTO T 191.

## ITEM 311 - PORTLAND CEMENT CONCRETE PAVEMENT

THIS ITEM SHALL CONSIST OF PAVEMENT OF PORTLAND CEMENT CONCRETE, WITH OR WITHOUT REINFORCEMENT, CONSTRUCTED ON THE PREPARED BASE IN ACCORDANCE WITH THIS SPECIFICATION AND IN CONFORMITY WITH LINES, GRADES, THICKNESS AND TYPICAL CROSS SECTION SHOWN ON THE PLANS.

311.3.1 (1) THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE QUALITY CONTROL OF ALL MATERIALS DURING THE HANDLING, BLENDING, AND MIXING AND PLACEMENT OPERATIONS

(2) THE CONTRACTOR SHALL PURNISH THE ENGINEER A QUALITY CONTROL PLAN DETAILING HIS PRODUCTION CONTROL PROCEDURES AND THE TYPE AND FREQUENCY OF SAMPLING AND TESTING TO INSURE THAT THE CONCRETE PRODUCES COMPLIES WITH THE SPECIFICATIONS. THE ENGINEER SHALL BE PROVIDED FREE ACCESS TO RECENT PLANT PRODUCTION RECORDS, AND IF REQUESTED, INFORMATIONAL COPIES OF MIX DESIGN, MATERIALS CERTIFICATIONS AND SAMPLING AND TESTING REPORTS

(3) EXPERIENCED AND QUALIFIED PERSONNEL SHALL PERFORM ALL BATCHING OR MIXING OPERATION FOR THE CONCRETE MIX, AND SHALL BE PRESENT AT THE PLANT AND JOB SITE TO CONTROL THE CONCRETE PRODUCTIONS WHENEVER THE PLANT IS IN OPERATION. THEY SHALL BE IDENTIFIED AND DUTIES DEFINED AS FOLLOWS:

- CONCRETE BATCHER: THE PERSON PERFORMING THE BATCHING OR MIXING OPERATION SHALL BE CAPABLE OF ACCURATELY CONDUCTING AGGREGATE SURFACE MOISTURE DETERMINATION AND ESTABLISHING CORRECT SCALE WEIGHTS FOR CONCRETE MATERIALS. HE SHALL BE CAPABLE OF ASSURING THAT THE PROPORTIONED BATCH WEIGHTS OF MATERIALS ARE IN ACCORDANCE WITH THE MIX DESIGN.

- CONCRETE TECHNICIAN: THE PERSON RESPONSIBLE FOR CONCRETE PRODUCTION CONTROL AND SAMPLING AND TESTING FOR QUALITY CONTROL SHALL BE PROFICIENT IN CONCRETE TECHNOLOGY AND SHALL HAVE A SOUND KNOWLEDGE OF THE SPECIFICATIONS AS THEY RELATE TO CONCRETE PRODUCTION. HE SHALL BE CAPABLE OF CONDUCTING TESTS ON CONCRETE AND CONCRETE MATERIALS IN ACCORDANCE WITH THESE SPECIFICATIONS. HE SHALL BE CAPABLE OF ADJUSTING CONCRETE MIX DESIGNS FOR IMPROVING WORKABILITY AND SPECIFICATION COMPLIANCE AND PREPARING TRIAL MIX DESIGNS. HE SHALL BE QUALIFIED TO ACT AS THE CONCRETE BATCHER IN THE BATCHER'S ABSENCE

(4) THE CONTRACTOR SHALL PERFORM ALL SAMPLING, TESTING AND INSPECTION NECESSARY TO ASSURE QUALITY CONTROL OF THE COMPONENT MATERIALS AND THE CONCRETE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING THE GRADATION OF FINE AND COARSE AGGREGATES AND FOR TESTING THE CONCRETE MIXTURE FOR SLUMP, AIR CONTENT, WATER CEMENT RATIO AND TEMPERATURE. HE SHALL CONDUCT HIS OPERATIONS SO AS TO PRODUCE A MIX CONFORMING TO THE APPROVED MIX DESIGN.

(5) THE CONTRACTOR SHALL MAINTAIN ADEQUATE RECORDS OF ALL INSPECTIONS AND TESTS. THE RECORDS SHALL INDICATE THE NATURE AND NUMBER OF OBSERVATIONS MADE, THE NUMBER AND TYPE OF DEFICIENCIES FOUND, THE QUANTITIES APPROVED AND REJECTED, AND NATURE OF ANY CORRECTIVE ACTION TAKEN.

THE ENGINEER MAY TAKE INDEPENDENT ASSURANCE SAMPLES AT RANDOM LOCATION FOR ACCEPTANCE PURPOSES AS HE DEEMS NECESSARY.

## DESIGN OF PAVEMENT:

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.

TRANSVERSE CONSTRUCTION JOINTS WHICH OCCUR AT LOCATION OF WEAKENED PLANE JOINTS SHOULD BE BUTT JOINTS WITH DOWELS. IF JOINT OCCURS IN THE MIDDLE THIRD OF THE WEAKENED JOINT INTERVAL (1500 -2000mm) IT SHOULD BE KEYED JOINTS WITH TIE BARS.

GENERAL NOTES:

1. MATERIALS AND WORKMANSHIP SHALL CONFORM WITH THE "DPWH STANDARD SPECIFICATIONS FOR HIGHWAYS, BRIDGES AND AIRPORTS", 2014 EDITION
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.
3. AT THE CONSTRUCTION JOINTS (LONGITUDINAL OR TRANSVERSE) CARE SHOULD BE TAKEN THAT NO CONCRETE FROM THE LAST SLAB PLACED OVERHANGS ANY PORTION OF THE FIRST SLAB.
4. THE BARS SHOULD BE DEFORMED STEEL BAR. ALL DOWEL BARS SHALL BE SMOOTH ROUND STEEL BAR FREE FROM RUST AND OTHER DEFECTS WHICH MIGHT RESTRICT THEIR MOVEMENT.
5. 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
6. MATERIALS FOR METAL SIDE FORM SHALL BE BRAND NEW SHEET METAL GAUGE NO. 18 OF BLACK IRON FREE FROM DUST RUST AND LINKS.
7. AT LEAST SIX (6) SUCCESSIVE DOWELLED BUTT JOINTS AT NORMAL JOINT SPACING SHALL BE PROVIDED BEFORE OR AFTER AN EXPANSION JOINT
8. THE GROOVE OR CRACK ABOVE JOINTS (LONGITUDINAL OR TRANSVERSE) SHALL BE SEALED WITH 30-50 PENETRATION ASPHALT OR COLD APPLIED LIQUID RUBBER COMPOUND AFTER THE CONCRETE HAD BEEN CURED AND BEFORE OPENING PAVEMENT TO TRAFFIC. PENETRATION ASPHALT SEAL ON CONCRETE JOINT SHOULD BE POURED IN SUCH A MANNER THAT SPILLING WILL BE ELIMINATED. THUS, PROVIDE A SMOOTH RIDING SURFACE.
9. ALL TRANSVERSE JOINT, EXCEPT CONSTRUCTION JOINT, SHALL BE CONTINUOUS FROM EDGE TO EDGE
10. ALL LONGITUDINAL JOINT SHALL MEET AT INTERSECTIONS WITH NO GAPS OR OFFSET.
11. ALL DIMENSION ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED
12. AVOID STOPPAGE OF FORMWORKS ALONG CURVES
13. DRILLING OF HOLES ON EXISTING POCP AN OTHER STRUCTURES SHALL BE PERFORMED USING POWER TOOLS. THE HOLES SHALL BE PROPERLY CLEANED BEFORE GROUT/EPOXY INJECTION AND INSTALLATION OF DOWELS OR TIE BARS .

1.0 PAVEMENT DESIGN PARAMETERS

| | | |
|---|---|---|
| 1. PERFORMANCE PERIOD | | 20 YEARS (FOR PCCP) |
| 2. DESIGN TRAFFIC , ESAL | - | $3.086 \times 10^{6}$ |
| 3. DESIGN RELIABILITY R | - | 0.85 |
| 4. STANDARD DEVIATION So | - | 0.35 |
| 5. DESIGN SERVICEABILITY LOSS, APSI | - | 2.00 |
| 6. PCCP MODULUS OF RUPTURE: Sc | - | 636.00 |
| 7. PCCP MODULUS OF ELASTICITY Ec | - | $3.370 \times 10^{6}$ |
| 8. SUBGRADE DESIGN CBR | - | 6.06 |
| 9. EFFECTIVE ADJUSTED RESILIENT MODULUS MR | - | 9067.75 |
| 10. SUBBASE ELASTIC MODULUS ESB | - | 15000.00 |
| 11. SUBBASE THICKNESS | - | 200 mm |
| 12. EFFECTIVE MODULUS AT SUBGRADE REACTION, K (pci) | - | 500.00 |
| 13. DRAINAGE COEFFICIENT Cd | - | 1.00 |
| 14. LOAD TRANSFER COEFFICIENT J | - | 3.20 |
| 15. LOSS OF SUPPORT Ls | - | 1.00 |
| 16. K, CORRECTED | | 170.00 |

2.0 THIS PLAN WILL SERVE ONLY AS A GUIDE IN THE IMPLEMENTATION PARTICULARLY IN THE CONSTRUCTION STAGE. IT MUST ALSO BE SUBJECTED TO AN AS-STAKED SURVEY TO BE CONSTRUCTED JOINTLY BY THE OBJECT IMPLEMENTING OFFICE AND THE CONTRACTOR AND SUBSEQUENT PLANS WILL BE PREPARED AND SUBMITTED FOR APPROVAL.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Republic of the Philippines DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS REGIONAL OFFICE No. VIII NORTHERN SAMAR FIRST DISTRICT ENGINEERING OFFICE Catarman, Northern Samar | PROJECT TITLE AND LOCATION: CONSTRUCTION OF FIRST FLOOR TO SECOND FLOOR, BAGUIO REGIONAL HIGH SCHOOL, LAPINIGAN, NORTHERN SAMAR, Lapinigan, Northern Samar | SHEET CONTENTS: General Notes | DRAFTED: ARIEL R. POGOE ENGINEER II | REVIEWED: MAE DIONALD M. ENMAN ASST. DIST. ENGINEER (CIVIL) | SUBMITTED: ANDY S. BRIÑO DIST. PLANNING & DESIGN SECTION CHIEF | RECOMMENDED: VIVIANO G. BUACO DISTRICT ENGINEER DATE: | APPROVED: ALVIN A. IGNACIO DISTRICT ENGINEER DATE: | SHEET NO. G 04/06 | TOTAL SHEETS 04/23 |
| | | | DESIGNED: JEFF F. PEÑOLA ENGINEER II | | | | | | |

# LEGENDS AND ABBREVIATIONS

## EXISTING TOPOGRAPHICAL FEATURES

| | |
|---|---|
| NORTH ARROW | N W E S |
| EXISTING ROAD | |
| EXISTING ROAD WIDENED | |
| EXISTING CONTOUR | |
| KM POST | |
| EXISTING PIPE CULVERT | |
| EXISTING BOX CULVERT | |
| EXISTING CON. RAILINGS | |
| EXISTING RIPRAP | |
| EXISTING CANAL | |
| RIVER/CREEK | |
| HOUSES | |
| DIRECTION OF WATER FLOW | |
| TREES | |
| RICE FIELD | |
| SWAMP | |
| ELECTRICAL POST | |
| LIGHTING FIXTURES | |
| SOLAR BULBS | |

## DESIGN FEATURES ON PLAN

| | |
|---|---|
| PROPOSED ROAD WIDENING | |
| CENTER LINE | |
| EDGE OF PAVEMENT | |
| ROW LIMIT | |
| BENCH MARK | |
| REFERENCE POINT | |
| CONTROL STATION | |
| POINT OF CURVATURE | |
| POINT OF TANGENCY | |
| POINT OF INTERSECTION | |
| REINFORCED CONCRETE BOX CULVERT (RCBC) | |
| REINFORCED CONCRETE PIPE CULVERT (RCPC) | |
| GROUTED RIPRAP W/ HEAD WALL (SLOPE PROT.) | |
| STONE MASONRY LINED CANAL | |
| STONE MASONRY SLOPE PROTECTION | |
| CHEVRON SIGNS | |

## DESIGN FEATURES ON PROFILE

| | |
|---|---|
| SUPER ELEVATION INNER | |
| SUPER ELEVATION OUTER | |
| POINT OF VERTICAL INTERSECTION, STATION AND ELEVATION | |
| REINFORCED CONCRETE BOX CULVERT (RCBC) | |
| REINFORCED CONCRETE PIPE CULVERT (RCPC) | |

## ABBREVIATIONS

| | | |
|---|---|---|
| AZIM | = | AZIMUTH |
| DIST | = | DISTANCE |
| I | = | INTERSECTION ANGLE |
| T | = | TANGENT |
| R | = | RADIUS |
| D | = | DEGREE OF CURVE |
| Lc | = | LENGTH OF CURVE |
| PC | = | POINT OF CURVATURE |
| PT | = | POINT OF TANGENCY |
| E | = | EXTERNAL DISTANCE |
| M | = | MIDDLE ORDINATE |
| e | = | ELEVATION |
| v | = | VELOCITY |
| W | = | WIDENING |
| BM | = | BENCH MARK |
| RP | = | REFERENCE POINT |
| ELEV | = | ELEVATION |
| PVI | = | POINT OF VERTICAL INTERSECTION |
| STA | = | STATION |
| g | = | GRADE IN % |
| CL | = | CENTERLINE |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS<br>NORTHERN SAMAR (R8)<br>DISTRICT ENGINEERING OFFICE | PROJECT NAME AND LOCATION | PLAN TITLE | DRAFTED: ARI[illegible]CHE<br>DESIGNED: JEFF[illegible]ULA | REVIEWED: MAR DONALD M. EIMAN | SUBMITTED: ANDY S. BRIÑO | RECOMMENDED: VIVIANO C. BIAÇO | APPROVED: ALVIN A. IGNACIO | SHEET NO. 8 | SHEET NO. 05 |

# SUMMARY OF QUANTITIES

| ITEM NO. | DESCRIPTION | UNIT | QUANTITY | REMARKS |
|---|---|---|---|---|
| VOLUME II | HIGHWAYS, BRIDGES AND AIRPORTS | | | |
| PART B | OTHER GENERAL REQUIREMENTS | | | |
| B.5 | Project Billboard/Signboard (DPWH) | each | 2.00 | |
| B.5 | Project Billboard/Signboard (COA) | each | 1.00 | |
| B.7(2) | Occupational Safety and Health Program | l.s. | 1.00 | |
| B.9 | Mobilization/Demobilization | l.s. | 1.00 | |
| PART C | EARTHWORKS | | | |
| 102(2) | Surplus Common Excavation | m³ | 1,333.70 | |
| 104(1)a | Embankment from Roadway Excavation, Common Soil | m³ | 70.44 | |
| 105(1)a | Subgrade Preparation, Common Material | m² | 2,090.54 | |
| PART D | SUBBASE AND BASE COURSES | | | |
| 200(1) | Aggregate Subbase Course | m³ | 405.71 | |
| PART E | SURFACE COURSES | | | |
| 300(2) | Crushed Aggregate Surface Course | m³ | 90.00 | |
| 311(1)c1 | Portland Cement Concrete Pavement (Unreinforced), 0.23m thk - 14 days | m² | 1,270.54 | |
| PART H | MISCELLANEOUS STRUCTURES | | | |
| 602(2)a | Marker Post (Farm-to-Market Road Marker) | each | 2.00 | |

Republic of the Philippines
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
NORTHERN SAMAR (NS2)
DISTRICT ENGINEERING OFFICE

PROJECT IMPLEMENTATION: CONSTRUCTION OF NON-INCLUDED FARM-TO-MARKET ROADS AND AREA DEVELOPMENT NORTHERN SAMAR

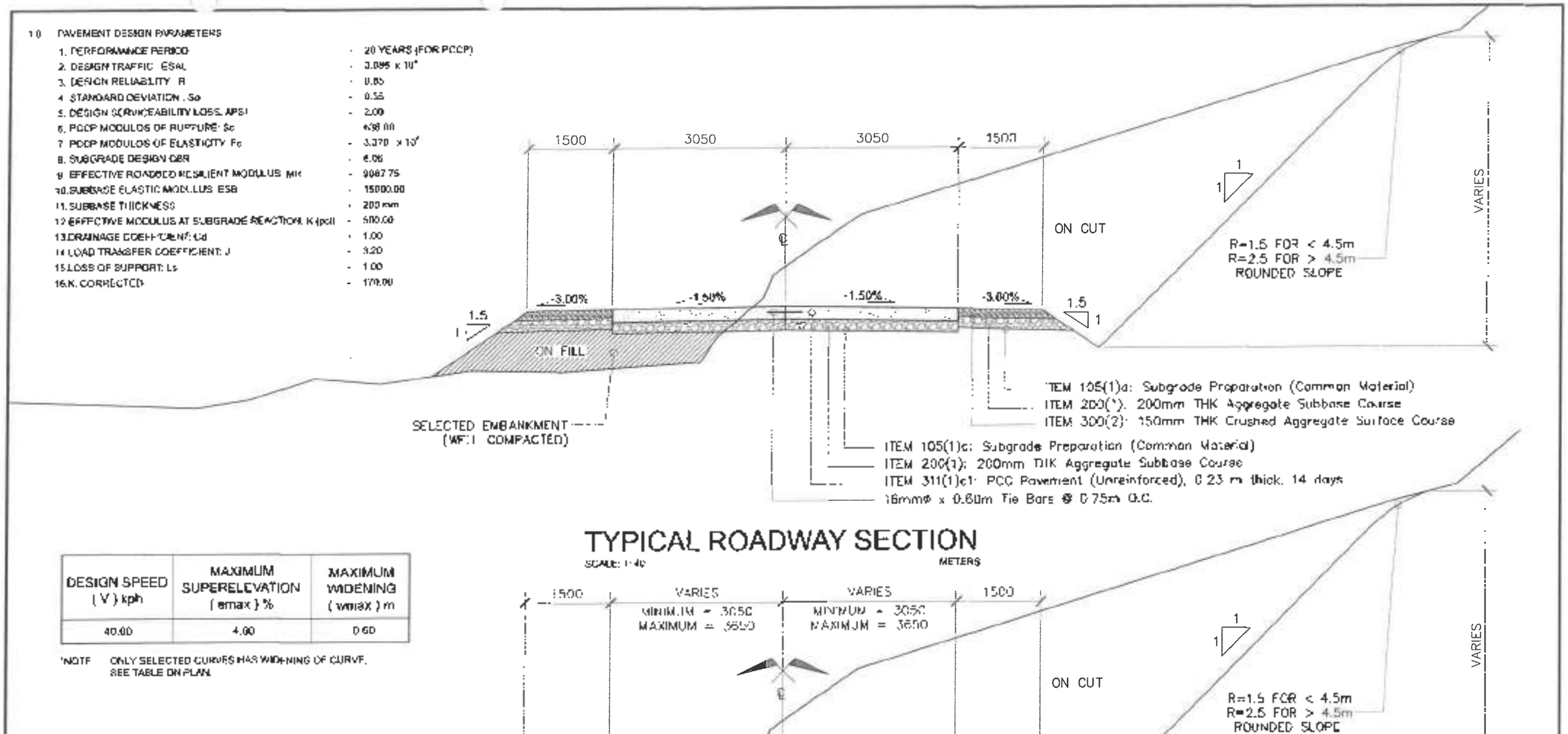
PART CONTAINS: SUMMARY OF QUANTITIES

DRAFTED: ANGEL U. POCHE, ENGINEER
DESIGNED: JEFF E. PEÑOLA, ENGINEER
REVIEWED: MAR DONALD N. EIMAN, ASST. CHIEF, ENGINEERING DESIGN SECTION, DATE:
SUBMITTED: ANDY S. ERERO, CHIEF, ENGINEERING DESIGN SECTION, DATE
RECOMMENDED: VIVIA [illegible] BIACO, ASST. DISTRICT ENGINEER, DATE
APPROVED: ALVIN A. IGNACIO, DISTRICT ENGINEER, DATE:

SHEET NO. G 05 06
TOTAL SHEETS 06 23

1.0 PAVEMENT DESIGN PARAMETERS

| | | |
|---|---|---|
| 1. PERFORMANCE PERIOD | - | 20 YEARS (FOR PCCP) |
| 2. DESIGN TRAFFIC ESAL | - | 3.095 x 10⁶ |
| 3. DESIGN RELIABILITY R | - | 0.85 |
| 4. STANDARD DEVIATION , So | - | 0.35 |
| 5. DESIGN SERVICEABILITY LOSS, APSI | - | 2.00 |
| 6. PCCP MODULOS OF RUPTURE: Sc | | 4.98.00 |
| 7. PCCP MODULOS OF ELASTICITY Ec | - | 3.370 x 10⁶ |
| 8. SUBGRADE DESIGN CBR | - | 6.06 |
| 9. EFFECTIVE ROADBED RESILIENT MODULUS MR | - | 9087.75 |
| 10. SUBBASE ELASTIC MODULUS ESB | - | 15000.00 |
| 11. SUBBASE THICKNESS | - | 200 mm |
| 12. EFFECTIVE MODULUS AT SUBGRADE REACTION, K (pci) | - | 500.00 |
| 13. DRAINAGE COEFFICIENT: Cd | - | 1.00 |
| 14. LOAD TRANSFER COEFFICIENT: J | - | 3.20 |
| 15. LOSS OF SUPPORT: Ls | - | 1.00 |
| 16. K, CORRECTED | - | 170.00 |

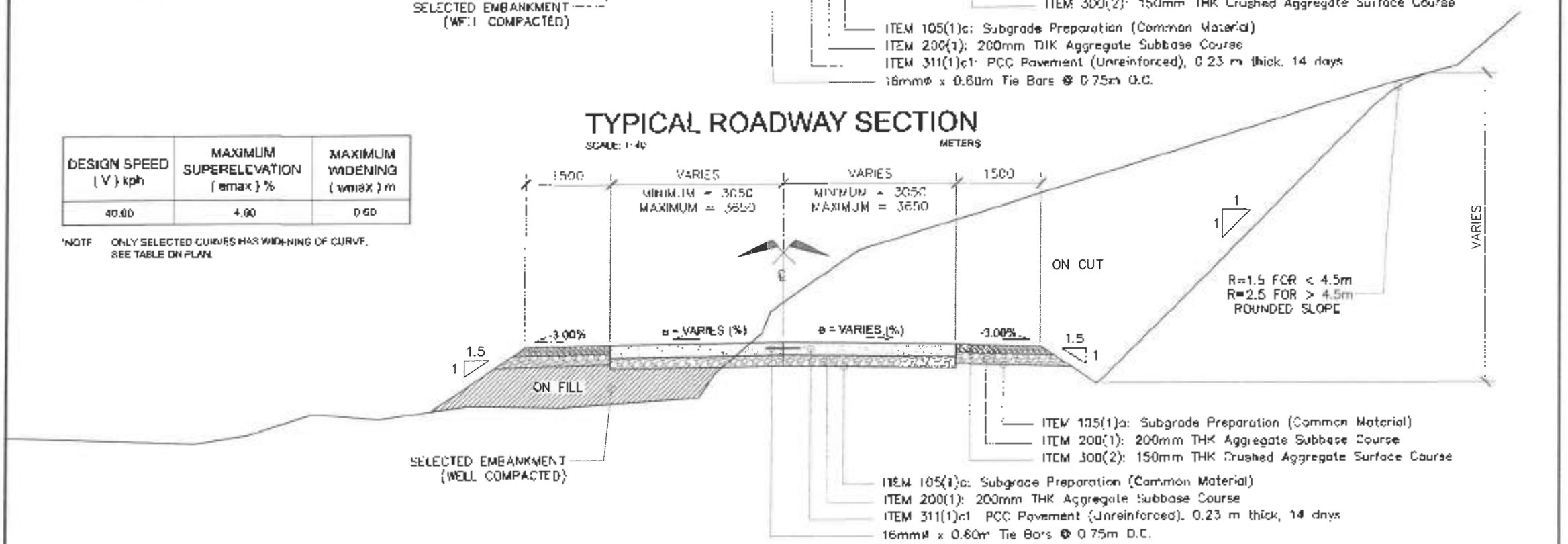



# TYPICAL ROADWAY SECTION

SCALE: 1:40 METERS

| DESIGN SPEED ( V ) kph | MAXIMUM SUPERELEVATION ( emax ) % | MAXIMUM WIDENING ( wmax ) m |
|---|---|---|
| 40.00 | 4.00 | 0.60 |

NOTE: ONLY SELECTED CURVES HAS WIDENING OF CURVE. SEE TABLE ON PLAN.




# TYPICAL ROADWAY SECTION ON CURVES

SCALE: 1:40 METERS

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Republic of the Philippines DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS NORTHERN SAMAR FIRST DISTRICT ENGINEERING OFFICE | PROJECT NAME AND LOCATION | SHEET CONTENTS | DRAFTED: ENGINEER I / ENGINEER II | REVIEWED: MAR DIONALD N. EMMAN | SUBMITTED: ANDY S. ERERO | RECOMMENDED: BIACO | APPROVED: ALVIN A. IGNACIO DISTRICT ENGINEER |
| | | | | | | | SHEET NO. R 01 06 / SHEET NO. 02 23 |

## DESIGN OF PAVEMENT

NOTE:

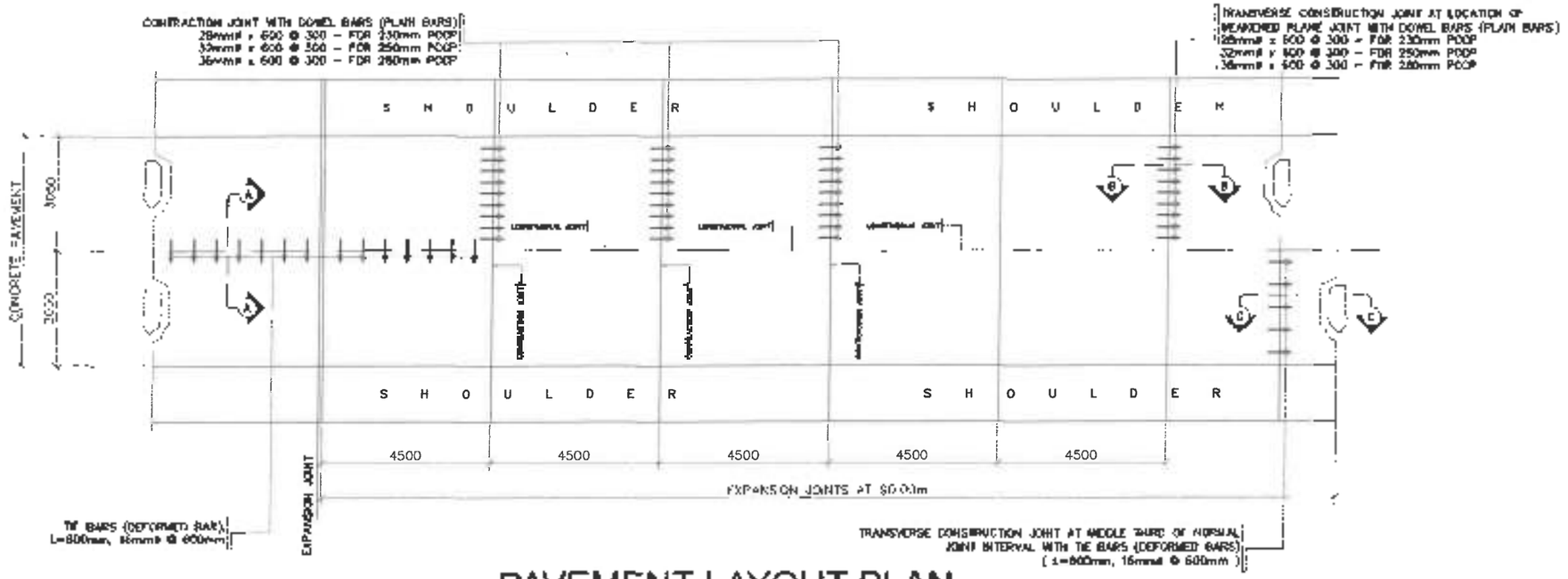
TRANSVERSE CONSTRUCTION (CONTACT) JOINT SHALL BE PROVIDED AT THE END OF ANY RUN WHERE LAYING OF CONCRETE HAS BEEN STOPPED FOR THIRTY (30) MINUTES OR LIKEWISE.

TRANSVERSE CONSTRUCTION JOINTS WHICH OCCUR AT LOCATION OF WEAKENED PLANE JOINTS SHOULD BE BUTT JOINTS WITH DOWELS. IF JOINT OCCURS IN THE MIDDLE THIRD OF THE WEAKENED JOINT INTERVAL (1500-3000mm) IT SHOULD BE KEYED JOINTS WITH TIE BARS.

FOR TRANSVERSE CONTRACTION JOINT (WEAKENED JOINT), THE DEPTH OF THE WEAKENED PLANE JOINT SHOULD AT ALL TIMES NOT BE LESS THAN 30mm, WHILE THE WIDTH SHOULD NOT BE MORE THAN 6mm.

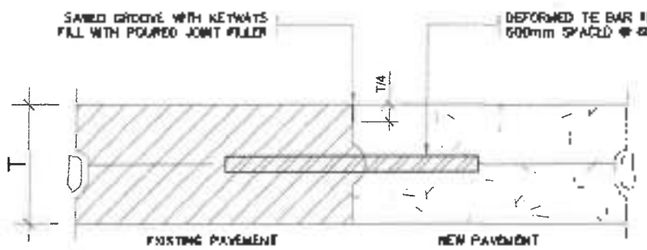
GENERAL NOTES:

1. MATERIALS AND WORKMANSHIP SHALL CONFORM WITH THE DPWH STANDARD SPECIFICATIONS FOR HIGHWAYS, BRIDGES AND AIRPORTS, 2013 EDITION.
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.
3. AT THE CONSTRUCTION JOINTS (LONGITUDINAL OR TRANSVERSE) CARE SHOULD BE TAKEN THAT NO CONCRETE FROM THE LAST SLAB PLACED OVERHANGS ANY PORTION OF THE FIRST SLAB.
4. THE BARS SHOULD BE DEFORMED STEEL BAR. ALL DOWEL BARS SHALL BE SMOOTH POLISHED STEEL BAR FREE FROM RUST AND OTHER DEFECTS WHICH MIGHT RESTRICT THEIR MOVEMENT.
5. 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.
6. MATERIALS FOR METAL SIDE FORM SHALL BE BRAND NEW SHEET METAL GAUGE NO. 16 OR BLACK IRON FREE FROM RUST AND DENT.
7. AT LEAST SIX (6) SUCCESSIVE DOWELLED BUTT JOINTS AT NORMAL JOINT SPACING SHALL BE PROVIDED BEFORE OR AFTER AN EXPANSION JOINT.
8. THE GROOVE OR CRACK ABOVE JOINTS (LONGITUDINAL OR TRANSVERSE) SHALL BE SEALED WITH 30-50 PENETRATION ASPHALT OR COLD APPLIED LIQUID RUBBER COMPOUND AFTER THE CONCRETE HAS BEEN CURED AND BEFORE OPENING PAVEMENT TO TRAFFIC. PENETRATION ASPHALT SEAL OR CONCRETE JOINT SHOULD BE POURED IN SUCH A MANNER THAT SPILLING WILL BE ELIMINATED THUS, PROVIDE A SMOOTH RIDING SURFACE.
9. ALL TRANSVERSE JOINT, EXCEPT CONSTRUCTION JOINT, SHALL BE CONTINUOUS FROM EDGE TO EDGE.
10. ALL LONGITUDINAL JOINT SHALL MEET AT INTERSECTIONS WITH NO GAPS OR OFFSET.
11. ALL DIMENSION ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
12. AVOID STOPPAGE OF FORMWORKS ALONG CURVES.
13. DRILLING OF HOLES ON EXISTING PCCP AND OTHER STRUCTURES SHALL BE PERFORMED USING POWER TOOLS. THE HOLES SHALL BE PROPERLY CLEANED BEFORE GROUT-EPOXY INJECTION AND INSTALLATION OF DOWELS OR TIE BARS.
14. APPLICABLE PROVISIONS OF D.O. NO. 20, SERIES OF 1999 IS HEREBY ENFORCED.



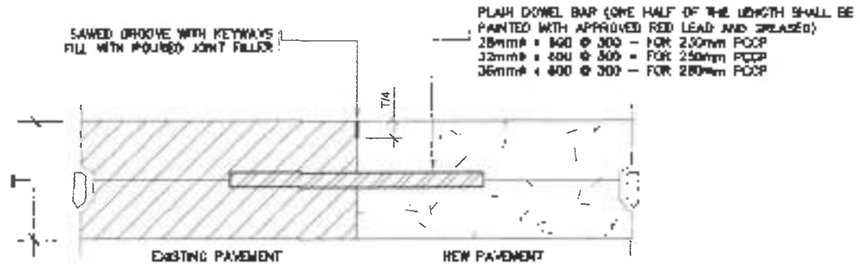

# PAVEMENT LAYOUT PLAN

NTS




# SECTION "A"

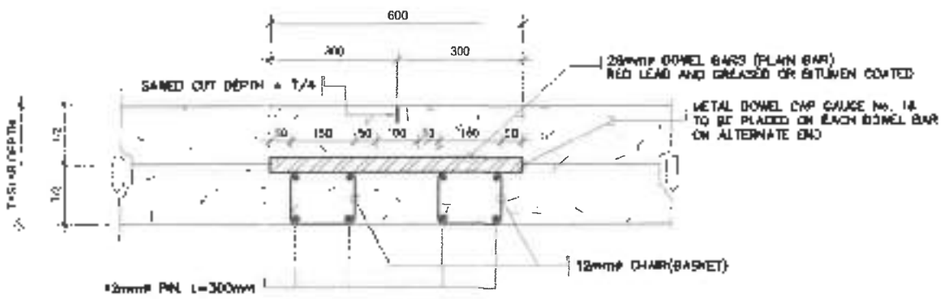
NTS




# SECTION "B"

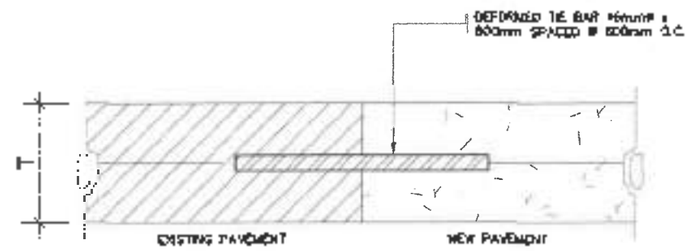
NTS

| SPACING OF DOWEL BAR | |
|---|---|
| SLAB DEPTH (T) (mm) | SPACING (mm) |
| 280 | 300 |
| 290 | 295 |
| 300 | 274 |
| 310 | 256 |
| 320 | 238 |
| 330 | 223 |
| 340 | 209 |




# CONTRACTION JOINT SECTION
## Steel Basket for Setting Dowels

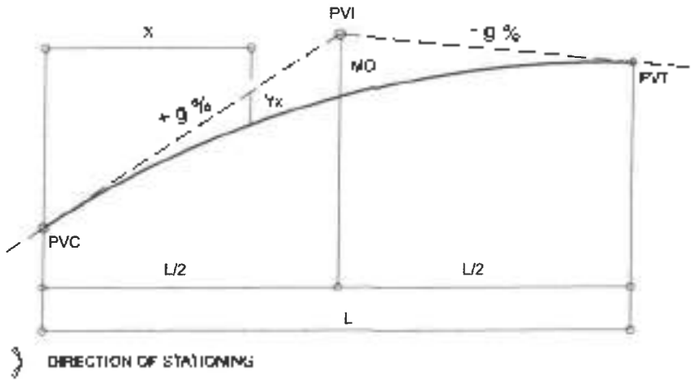
NTS




# SECTION "C"

NTS

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Republic of the Philippines<br>DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS<br>REGIONAL OFFICE NO. 02<br>NORTHERN SUNAR FIRST<br>DISTRICT ENGINEERING OFFICE<br>Carmen, Nueva Ecija | PROJECT TITLE AND LOCATION<br>CONSTRUCTION OF CONCRETE PAVEMENT (PCCP) ON NORTH SUNAR FIRST DISTRICT ENGINEERING OFFICE, Carmen, Nueva Ecija | DESCRIPTION<br>DESIGN OF PAVEMENT | DRAFTED:<br>ARIES L. POCHE<br>DESIGNED:<br>JEFF [illegible]<br>ENGINEER II | REVIEWED:<br>MARDONALD M. EIMAM<br>DATE: | SUBMITTED:<br>ANDY S. ENERO<br>DATE: | RECOMMENDED:<br>VIMAR A. BIACO<br>DATE: | APPROVED:<br>ALVIN A. IGNACIO<br>DISTRICT ENGINEER<br>DATE: | SHEET NO. R 02 06 | SHEET NO. 06 23 |




## VERTICAL PARABOLIC CURVE
( SYMMETRICAL )

LEGEND:

- PVI - VERTICAL POINT OF INTERSECTION
- PVC - VERTICAL POINT OF CURVATURE
- PVT - VERTICAL POINT OF TANGENCY
- L - LENGTH OF VERTICAL CURVE IN METERS
- g - GRADE IN PERCENT
- MO - MIDDLE ORDINATE
- X - DISTANCE FROM VPC OR VPT TO ANY POINT OF CURVATURE
- Yx - VERTICAL OFFSET IN METERS
- A - ALGEBRAIC DIFFERENCE OF GRADES

NOTE:

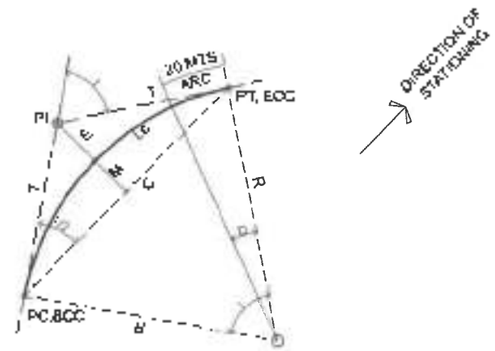
1 - NO VERTICAL CURVE IS REQUIRED WHEN THE ALGEBRAIC DIFFERENCE IS LESS THAN 0.50%

IN ANY VERTICAL PARABOLIC CURVE

SYMMETRICAL

$$MO = \frac{AL}{800} \qquad Yx = \frac{X^2\ MO}{(L/2)^2}$$

WHERE: $A = (g2 - g1)$




## HORIZONTAL CURVE ( CIRCULAR )

LEGEND

- PI - POINT OF INTERSECTION
- PC - POINT OF CURVATURE
- PT - POINT OF TANGENCY
- BCC - BEGINNING OF CIRCULAR CURVE
- ECC - END OF CIRCULAR CURVE
- I - INTERSECTION ANGLE
- Da - DEGREE OF CURVATURE (ARC DEFINITION)
- Dc - DEGREE OF CURVATURE (CHORD DEFINITION)
- T - TANGENT LENGTH
- R - HORIZONTAL RADIUS
- Lc - LENGTH OF CIRCULAR CURVE
- C - CHORD LENGTH
- E - EXTERNAL DISTANCE
- M - MIDDLE ORDINATE

NOTE:

FOR " Da " ASSUMED ARC = 100m

FOR " Dc " ASSUMED CHORD = 100m

NO HORIZONTAL CURVE IS REQUIRED WHEN THE INTERSECTION ( CENTRAL ) ANGLE Δ IS LESS THAN ONE DEGREE ( 1° 00' )

ALGEBRAIC DIFFERENCE IS 50% OR LESS

FORMULAS

$T = R \tan I/2$ $\qquad E = R(\sec I/2 - 1)$

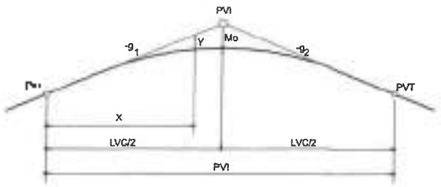
$C = 2R \sin I/2$ $\qquad D = 1145.916/R$

$M = R(1 - \cos I/2)$ $\qquad Lc = (20 \times I)/D$

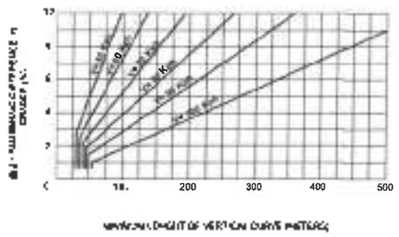
## LEGEND

- AZIM - AZIMUTH
- BCC - POINT OF CURVATURE (SIMPLE CURVE)
- BM - BENCH MARK
- BEG. - BEGINNING
- CU.M. - CUBIC METER ( $M^3$ )
- D - DEGREE OF CIRCULAR CURVE (ARC DEFINITION)
- DIA - DIAMETER
- DIST. - DISTANCE
- E - EXTERNAL DISTANCE (FROM PI TO CIRCULAR CURVE)
- e - SUPERELEVATION
- ECC - POINT OF TANGENCY ( SIMPLE CURVE )
- ELEV - ELEVATION
- EMB - EMBANKMENT
- EXC - EXCAVATION
- g - GRADE IN PERCENT
- KM - KILOMETER
- Lc - LENGTH OF CIRCULAR CURVE
- LM - LINEAR METER
- LVC - LENGTH OF VERTICAL CURVE
- M - METER
- MAX. - MAXIMUM
- MIN. - MINIMUM
- MM - MILLIMETER
- MO - MIDDLE ORDINATE
- N - NORTHINGS
- PCCP - PORTLAND CEMENT CONCRETE PAVEMENT
- PI - HORIZONTAL POINT OF INTERSECTION
- PVI - VERTICAL POINT OF INTERSECTION
- PVC - BEGINNING OF VERTICAL CURVE
- PVT - END OF VERTICAL CURVE
- R - RADIUS OF CIRCULAR CURVE
- RCBC - REINFORCED CONCRETE BOX CULVERT
- RCPC - REINFORCED CONCRETE PIPE CULVERT
- ROW - RIGHT OF WAY
- RP - REFERENCE POINT
- SQ.M. - SQUARE METER
- SL - SLOPE
- STA - STATION
- SC - SIMPLE CURVE
- VAR - VARIABLE
- W - WIDENING

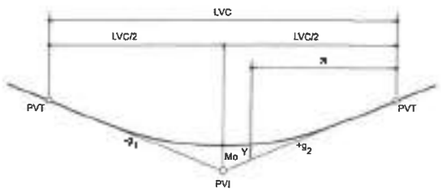
| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS<br>NORTHERN SAMAR (1ST)<br>DISTRICT ENGINEERING OFFICE | PROJECT NAME AND LOCATION | | DRAFTED: ANGEL U. POCHE<br>CHECKED: JEFF FUENTEBELLA | MAR DONALD N. ZIMAN<br>ASST. DIST. ENGINEER | ANDY S. LEPERO<br>DIST. ENGINEER | VIVIAN A. BLACO<br>ASST. DIST. ENGINEER | ALVIN A. IGNACIO<br>DISTRICT ENGINEER | R<br>03-06 | 39<br>22 |



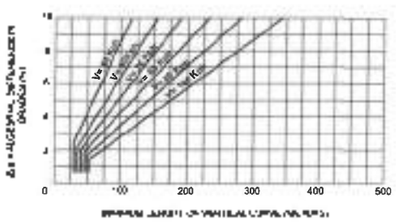

SYMMETRICAL VERTICAL PARABOLIC CURVES (CREST)



DESIGN CONTROL FOR VERTICAL CURVES (CREST)




SYMMETRICAL VERTICAL PARABOLIC CURVES (SAG)



DESIGN CONTROL FOR VERTICAL CURVES (SAG)

## IN ANY VERTICAL PARABOLIC CURVE :

1. $Mo = \frac{(g_1 - g_2)(LVC)}{800}$
2. $Mo = \frac{1}{2}\left[\left(\frac{ELEV\ PVC + ELEV\ PVT}{2}\right) - ELEV\ PVI\right]$
3. $Y = 4\ Mo$

## LEGEND:

PVI - POINT OF VERTICAL INTERSECTION

PVC - POINT OF VERTICAL CURVATURE

PVT - POINT OF VERTICAL TANGENCY

LVC - LENGTH OF VERTICAL CURVES METER

Mo - KILOMETER PER HOUR

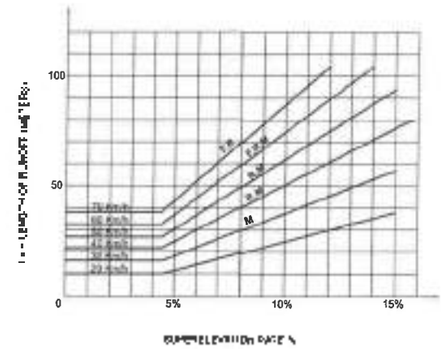
$g_1$ & $g_2$ - GRADE RATES PERCENT

X - DISTANCE FROM PVC OR PVT TO ANY POINT ON CURVE - METERS

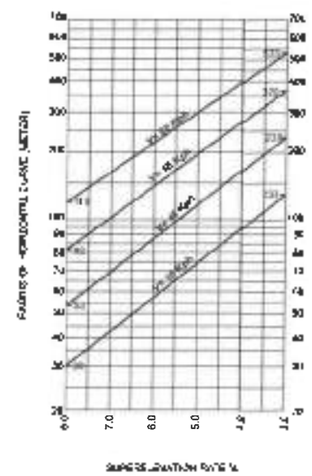
Y - VERTICAL OFFSET AT DISTANCE X - METERS

## NOTES:

1. GRADES ASCENDING FORWARD ARE POSITIVE, GRADES DESCENDING FORWARD ARE NEGATIVE.
2. NO VERTICAL CURVE IS REQUIRED WHEN THE ALGEBRAIC DIFFERENCE IN GRADE IS 0.5% OR LESS.



SUPERELEVATION RUNOFF CHART



LEGEND:

F - FLAT

R - RIDGE

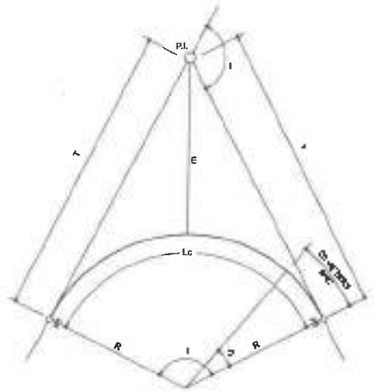
M - MOUNTAINOUS

V - DESIGN SPEED

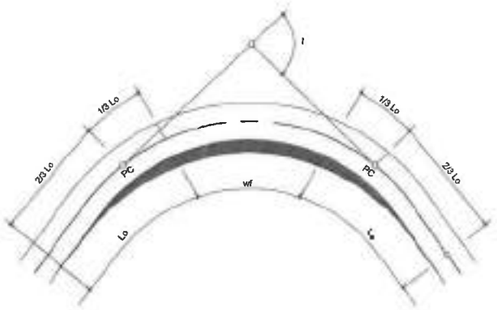
Vdn - KILOMETER PER HOUR

DESIGN SUPERELEVATION RATES

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS<br>BUREAU OF ROADS<br>NCR-NORTERN SAMAR - FIRST<br>DISTRICT ENGINEERING OFFICE | PROJECT NAME AND LOCATION<br>CONCRETING OF BRGY. POLANGAN TO BRGY. PALO-PALO, BRGY. POLANGAN AND BRGY. PATAG CARAMOAN, PARAMAN, SAMAR<br>Caramoan, Northern Samar | SHEET CONTENTS<br>GENERAL DESIGN CONSIDERATIONS, VERTICAL CURVES, FLAT VERTICAL CURVES | DRAFTED: ARIEL U. POCHE, ENGINEER III<br>DESIGNED: JEAN [illegible], ENGINEER II | REVIEWED: MARCHONALD M. ERMAN, ASST. DISTRICT ENGINEER (CONSTRUCTION), DATE | SUBMITTED: ANDY S. ERERO, CHIEF, DESIGN SECTION, DATE | RECOMMENDED: VIVIAN [illegible] BIACO, DISTRICT ENGINEER, DATE: | APPROVED: ALVIN A. IGNACIO, DISTRICT ENGINEER, DATE: | SHEET NO. R 04/06 | SHEETS NO. 10 / 23 |




HORIZONTAL CURVE (CIRCULAR)




METHOD OF WIDENING

## LEGEND

- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
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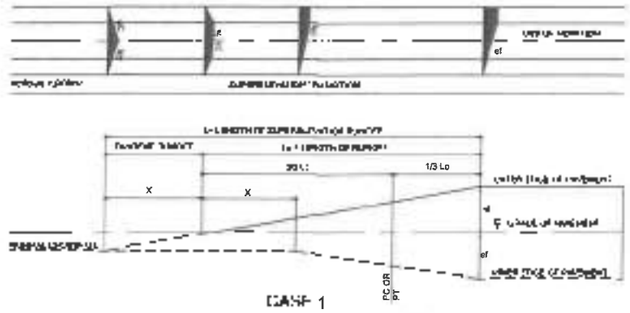
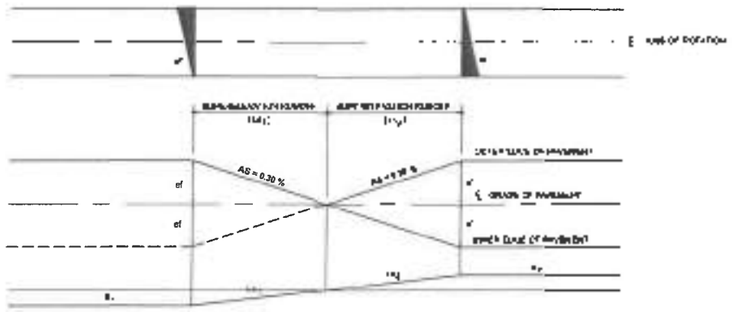
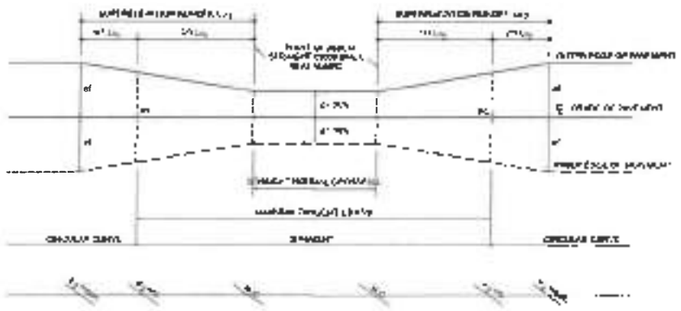
- [illegible]




CASE 1
SUPERELEVATION TRANSITION




CASE 2
TRANSITION : CIRCULAR CURVE - REVERSED CIRCULAR




CASE 3
TRANSITION : CIRCULAR CURVE - STRAIGHT- CIRCULAR CURVE

## NOTES

1. [illegible]
2. [illegible]
3. [illegible]

| [illegible] | [illegible] | [illegible] | [illegible] |
|---|---|---|---|
| [illegible] | [illegible] | [illegible] | [illegible] |

1. [illegible]
2. [illegible]
3. [illegible]
4. [illegible]
5. [illegible]
6. [illegible]
7. [illegible]
8. [illegible]
9. [illegible]
10. [illegible]
11. [illegible]
12. [illegible]
13. [illegible]
14. [illegible]

## WIDENING OF PAVEMENT ON CURVES

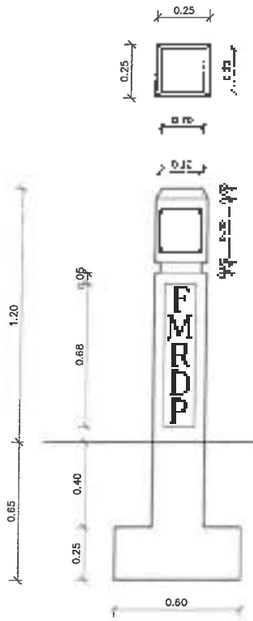
| DESIGN SPEED (Kph) | | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
|---|---|---|---|---|---|---|---|---|---|---|
| R (degree) | R (m) | NORMAL PAVEMENT WIDTH = 6.10m | | | | | | | | |
| 0.1 | 3,791.07 | | | | 0.05 | 0.15 | 0.50 | 0.90 | 0.95 | 0.95 |
| 0.2 | 1,146.49 | | | | 0.05 | 0.15 | 0.50 | 0.90 | 0.95 | 0.95 |
| 0.3 | 764.59 | | | | 0.05 | 0.20 | 0.50 | 0.95 | 0.95 | 0.95 |
| 0.4 | 573.56 | | | | 0.05 | 0.15 | 0.55 | 0.95 | 0.95 | 0.95 |
| 0.5 | 458.51 | | | | 0.05 | 0.15 | 0.55 | 0.90 | 0.90 | 0.90 |
| 0.6 | 381.81 | | | | 0.05 | 0.15 | 0.60 | 0.90 | 0.90 | 1.00 |
| 0.7 | 327.41 | | | | 0.05 | 0.20 | 0.60 | 0.95 | 0.95 | 1.00 |
| 0.8 | 286.48 | | | | 0.05 | 0.20 | 0.65 | 1.00 | 1.00 | |
| 0.9 | 254.65 | | | | 0.05 | 0.20 | 0.65 | 1.00 | 1.00 | |
| 1.0 | 229.18 | | | | 0.05 | 0.20 | 0.65 | 1.00 | 1.00 | |
| 1.1 | 208.29 | | | | 0.05 | 0.20 | 0.65 | 1.00 | | |
| 1.2 | 190.99 | | | | 0.05 | 0.20 | 0.65 | | | |
| 1.3 | 176.30 | | | | 0.05 | 0.20 | 0.65 | | | |
| 1.4 | 163.74 | | | | 0.05 | 0.20 | 0.65 | | | |
| 1.5 | 152.79 | | | | 0.05 | 0.20 | 0.65 | | | |
| 1.6 | 143.24 | | | | 0.05 | 0.20 | 0.65 | | | |
| 1.7 | 134.91 | | | | 0.05 | 0.20 | 0.65 | | | |
| 1.8 | 127.39 | | | | 0.05 | 0.20 | 0.65 | | | |
| 1.9 | 120.70 | | | | 0.05 | 0.20 | 0.65 | | | |
| 2.0 | 114.59 | | | | 0.05 | 0.20 | 0.65 | | | |
| 2.1 | 109.04 | | | | 0.05 | 0.20 | 0.65 | | | |
| 2.2 | 103.99 | | | | 0.05 | 0.20 | 0.65 | | | |
| 2.3 | 99.39 | | | | 0.05 | 0.20 | 0.65 | | | |
| 2.4 | 95.24 | | | | 0.05 | 0.20 | 0.65 | | | |
| 2.5 | 91.48 | | | | 0.05 | 0.20 | 0.65 | | | |
| 2.6 | 88.09 | | | | 0.05 | 0.20 | 0.65 | | | |
| 2.7 | 84.93 | | | | 0.05 | 0.20 | 0.65 | | | |
| 2.8 | 82.00 | | | | 0.05 | 0.20 | 0.65 | | | |
| 2.9 | 79.28 | | | | 0.05 | 0.20 | 0.65 | | | |
| 3.0 | 76.73 | | | | 0.05 | 0.20 | 0.65 | | | |
| 3.1 | 74.35 | | | | 0.05 | 0.20 | 0.65 | | | |
| 3.2 | 72.13 | | | | 0.05 | 0.20 | 0.65 | | | |
| 3.3 | 70.05 | | | | 0.05 | 0.20 | 0.65 | | | |
| 3.4 | 68.09 | | | | 0.05 | 0.20 | 0.65 | | | |
| 3.5 | 66.24 | | | | 0.05 | 0.20 | 0.65 | | | |
| 3.6 | 64.50 | | | | 0.05 | 0.20 | 0.65 | | | |
| 3.7 | 62.86 | | | | 0.05 | 0.20 | 0.65 | | | |
| 3.8 | 61.31 | | | | 0.05 | 0.20 | 0.65 | | | |
| 3.9 | 59.85 | | | | 0.05 | 0.20 | 0.65 | | | |
| 4.0 | 58.47 | | | | 0.05 | 0.20 | 0.65 | | | |
| 4.1 | 57.17 | | | | 0.05 | 0.20 | 0.65 | | | |
| 4.2 | 55.94 | | | | 0.05 | 0.20 | 0.65 | | | |
| 4.3 | 54.77 | | | | 0.05 | 0.20 | 0.65 | | | |
| 4.4 | 53.67 | | | | 0.05 | 0.20 | 0.65 | | | |
| 4.5 | 52.62 | | | | 0.05 | 0.20 | 0.65 | | | |
| 4.6 | 51.62 | | | | 0.05 | 0.20 | 0.65 | | | |
| 4.7 | 50.67 | | | | 0.05 | 0.20 | 0.65 | | | |
| 4.8 | 49.77 | | | | 0.05 | 0.20 | 0.65 | | | |
| 4.9 | 48.91 | | | | 0.05 | 0.20 | 0.65 | | | |
| 5.0 | 48.09 | | | | 0.05 | 0.20 | 0.65 | | | |
| 5.1 | 47.31 | | | | 0.05 | 0.20 | 0.65 | | | |
| 5.2 | 46.56 | | | | 0.05 | 0.20 | 0.65 | | | |
| 5.3 | 45.84 | | | | 0.05 | 0.20 | 0.65 | | | |
| 5.4 | 45.15 | | | | 0.05 | 0.20 | 0.65 | | | |
| 5.5 | 44.49 | | | | 0.05 | 0.20 | 0.65 | | | |
| 5.6 | 43.86 | | | | 0.05 | 0.20 | 0.65 | | | |
| 5.7 | 43.25 | | | | 0.05 | 0.20 | 0.65 | | | |
| 5.8 | 42.67 | | | | 0.05 | 0.20 | 0.65 | | | |
| 5.9 | 42.11 | | | | 0.05 | 0.20 | 0.65 | | | |
| 6.0 | 41.57 | | | | 0.05 | 0.20 | 0.65 | | | |
| 6.1 | 41.05 | | | | 0.05 | 0.20 | 0.65 | | | |
| 6.2 | 40.55 | | | | 0.05 | 0.20 | 0.65 | | | |
| 6.3 | 40.07 | | | | 0.05 | 0.20 | 0.65 | | | |
| 6.4 | 39.61 | | | | 0.05 | 0.20 | 0.65 | | | |
| 6.5 | 39.17 | | | | 0.05 | 0.20 | 0.65 | | | |
| 6.6 | 38.74 | | | | 0.05 | 0.20 | 0.65 | | | |
| 6.7 | 38.33 | | | | 0.05 | 0.20 | 0.65 | | | |
| 6.8 | 37.94 | | | | 0.05 | 0.20 | 0.65 | | | |
| 6.9 | 37.56 | | | | 0.05 | 0.20 | 0.65 | | | |
| 7.0 | 37.19 | | | | 0.05 | 0.20 | 0.65 | | | |
| 7.1 | 36.83 | | | | 0.05 | 0.20 | 0.65 | | | |
| 7.2 | 36.49 | | | | 0.05 | 0.20 | 0.65 | | | |
| 7.3 | 36.15 | | | | 0.05 | 0.20 | 0.65 | | | |
| 7.4 | 35.83 | | | | 0.05 | 0.20 | 0.65 | | | |
| 7.5 | 35.51 | | | | 0.05 | 0.20 | 0.65 | | | |
| 7.6 | 35.21 | | | | 0.05 | 0.20 | 0.65 | | | |
| 7.7 | 34.91 | | | | 0.05 | 0.20 | 0.65 | | | |
| 7.8 | 34.63 | | | | 0.05 | 0.20 | 0.65 | | | |
| 7.9 | 34.35 | | | | 0.05 | 0.20 | 0.65 | | | |
| 8.0 | 34.08 | | | | 0.05 | 0.20 | 0.65 | | | |
| 8.1 | 33.82 | | | | 0.05 | 0.20 | 0.65 | | | |
| 8.2 | 33.57 | | | | 0.05 | 0.20 | 0.65 | | | |
| 8.3 | 33.32 | | | | 0.05 | 0.20 | 0.65 | | | |
| 8.4 | 33.08 | | | | 0.05 | 0.20 | 0.65 | | | |
| 8.5 | 32.85 | | | | 0.05 | 0.20 | 0.65 | | | |
| 8.6 | 32.62 | | | | 0.05 | 0.20 | 0.65 | | | |
| 8.7 | 32.40 | | | | 0.05 | 0.20 | 0.65 | | | |
| 8.8 | 32.18 | | | | 0.05 | 0.20 | 0.65 | | | |
| 8.9 | 31.97 | | | | 0.05 | 0.20 | 0.65 | | | |
| 9.0 | 31.77 | | | | 0.05 | 0.20 | 0.65 | | | |
| 9.1 | 31.57 | | | | 0.05 | 0.20 | 0.65 | | | |
| 9.2 | 31.38 | | | | 0.05 | 0.20 | 0.65 | | | |
| 9.3 | 31.19 | | | | 0.05 | 0.20 | 0.65 | | | |
| 9.4 | 31.01 | | | | 0.05 | 0.20 | 0.65 | | | |
| 9.5 | 30.83 | | | | 0.05 | 0.20 | 0.65 | | | |
| 9.6 | 30.65 | | | | 0.05 | 0.20 | 0.65 | | | |
| 9.7 | 30.48 | | | | 0.05 | 0.20 | 0.65 | | | |
| 9.8 | 30.31 | | | | 0.05 | 0.20 | 0.65 | | | |
| 9.9 | 30.14 | | | | 0.05 | 0.20 | 0.65 | | | |
| 10.0 | 29.97 | | | | 0.05 | 0.20 | 0.65 | | | |
| 10.1 | 29.81 | | | | 0.05 | 0.20 | 0.65 | | | |
| 10.2 | 29.65 | | | | 0.05 | 0.20 | 0.65 | | | |
| 10.3 | 29.49 | | | | 0.05 | 0.20 | 0.65 | | | |
| 10.4 | 29.34 | | | | 0.05 | 0.20 | 0.65 | | | |
| 10.5 | 29.19 | | | | 0.05 | 0.20 | 0.65 | | | |
| 10.6 | 29.04 | | | | 0.05 | 0.20 | 0.65 | | | |
| 10.7 | 28.90 | | | | 0.05 | 0.20 | 0.65 | | | |
| 10.8 | 28.76 | | | | 0.05 | 0.20 | 0.65 | | | |
| 10.9 | 28.62 | | | | 0.05 | 0.20 | 0.65 | | | |
| 11.0 | 28.48 | | | | 0.05 | 0.20 | 0.65 | | | |
| 11.1 | 28.35 | | | | 0.05 | 0.20 | 0.65 | | | |
| 11.2 | 28.22 | | | | 0.05 | 0.20 | 0.65 | | | |
| 11.3 | 28.09 | | | | 0.05 | 0.20 | 0.65 | | | |
| 11.4 | 27.96 | | | | 0.05 | 0.20 | 0.65 | | | |
| 11.5 | 27.83 | | | | 0.05 | 0.20 | 0.65 | | | |
| 11.6 | 27.71 | | | | 0.05 | 0.20 | 0.65 | | | |
| 11.7 | 27.59 | | | | 0.05 | 0.20 | 0.65 | | | |
| 11.8 | 27.47 | | | | 0.05 | 0.20 | 0.65 | | | |
| 11.9 | 27.35 | | | | 0.05 | 0.20 | 0.65 | | | |
| 12.0 | 27.24 | | | | 0.05 | 0.20 | 0.65 | | | |
| 12.1 | 27.13 | | | | 0.05 | 0.20 | 0.65 | | | |
| 12.2 | 27.02 | | | | 0.05 | 0.20 | 0.65 | | | |
| 12.3 | 26.91 | | | | 0.05 | 0.20 | 0.65 | | | |
| 12.4 | 26.80 | | | | 0.05 | 0.20 | 0.65 | | | |
| 12.5 | 26.70 | | | | 0.05 | 0.20 | 0.65 | | | |
| 12.6 | 26.60 | | | | 0.05 | 0.20 | 0.65 | | | |
| 12.7 | 26.50 | | | | 0.05 | 0.20 | 0.65 | | | |
| 12.8 | 26.40 | | | | 0.05 | 0.20 | 0.65 | | | |
| 12.9 | 26.30 | | | | 0.05 | 0.20 | 0.65 | | | |
| 13.0 | 26.20 | | | | 0.05 | 0.20 | 0.65 | | | |
| 13.1 | 26.11 | | | | 0.05 | 0.20 | 0.65 | | | |
| 13.2 | 26.02 | | | | 0.05 | 0.20 | 0.65 | | | |
| 13.3 | 25.93 | | | | 0.05 | 0.20 | 0.65 | | | |
| 13.4 | 25.84 | | | | 0.05 | 0.20 | 0.65 | | | |
| 13.5 | 25.75 | | | | 0.05 | 0.20 | 0.65 | | | |
| 13.6 | 25.66 | | | | 0.05 | 0.20 | 0.65 | | | |
| 13.7 | 25.57 | | | | 0.05 | 0.20 | 0.65 | | | |
| 13.8 | 25.49 | | | | 0.05 | 0.20 | 0.65 | | | |
| 13.9 | 25.40 | | | | 0.05 | 0.20 | 0.65 | | | |
| 14.0 | 25.32 | | | | 0.05 | 0.20 | 0.65 | | | |
| 14.1 | 25.24 | | | | 0.05 | 0.20 | 0.65 | | | |
| 14.2 | 25.16 | | | | 0.05 | 0.20 | 0.65 | | | |
| 14.3 | 25.08 | | | | 0.05 | 0.20 | 0.65 | | | |
| 14.4 | 25.00 | | | | 0.05 | 0.20 | 0.65 | | | |
| 14.5 | 24.92 | | | | 0.05 | 0.20 | 0.65 | | | |
| 14.6 | 24.84 | | | | 0.05 | 0.20 | 0.65 | | | |
| 14.7 | 24.77 | | | | 0.05 | 0.20 | 0.65 | | | |
| 14.8 | 24.69 | | | | 0.05 | 0.20 | 0.65 | | | |
| 14.9 | 24.62 | | | | 0.05 | 0.20 | 0.65 | | | |
| 15.0 | 24.55 | | | | 0.05 | 0.20 | 0.65 | | | |
| 15.1 | 24.48 | | | | 0.05 | 0.20 | 0.65 | | | |
| 15.2 | 24.41 | | | | 0.05 | 0.20 | 0.65 | | | |
| 15.3 | 24.34 | | | | 0.05 | 0.20 | 0.65 | | | |
| 15.4 | 24.27 | | | | 0.05 | 0.20 | 0.65 | | | |
| 15.5 | 24.20 | | | | 0.05 | 0.20 | 0.65 | | | |
| 15.6 | 24.13 | | | | 0.05 | 0.20 | 0.65 | | | |
| 15.7 | 24.07 | | | | 0.05 | 0.20 | 0.65 | | | |
| 15.8 | 24.00 | | | | 0.05 | 0.20 | 0.65 | | | |
| 15.9 | 23.94 | | | | 0.05 | 0.20 | 0.65 | | | |
| 16.0 | 23.87 | | | | 0.05 | 0.20 | 0.65 | | | |

NOTE
- VALUES LESS THAN 0.50 M MAY BE DISREGARDED
- FOR SUPERELEVATED CURVES, USE THE VALUE IN PARENTHESIS
- FOR CURVE WIDENING, USE THE VALUE IN PARENTHESIS

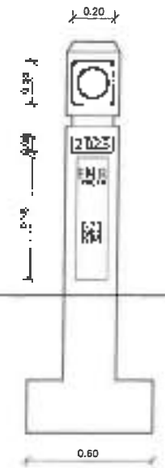
| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS<br>NORTHERN SAMAR (1ST)<br>DISTRICT ENGINEERING OFFICE | PROJECT NAME NO. LOCATION<br>CONCRETING OF [illegible] | SHEET CONTENTS<br>[illegible] | DRAFTED: ARI[illegible] U. [illegible]<br>DESIGNED: JEFF[illegible]BOLA | REVIEWED: MAR DONALD N. EMAN<br>ASS. CHIEF, PLANNING & DESIGN SECTION | SUBMITTED: ANDY B. [illegible]EÑO<br>CHIEF, PLANNING & DESIGN SECTION | RECOMMENDED: VIVIAN[illegible] BIACO<br>DATE: | APPROVED: ALVIN A. IGNACIO<br>DISTRICT ENGINEER | SET NO. R 09/05 | SHEET NO. 11 / 20 |

# FARM - TO - MARKET - ROAD MARKER

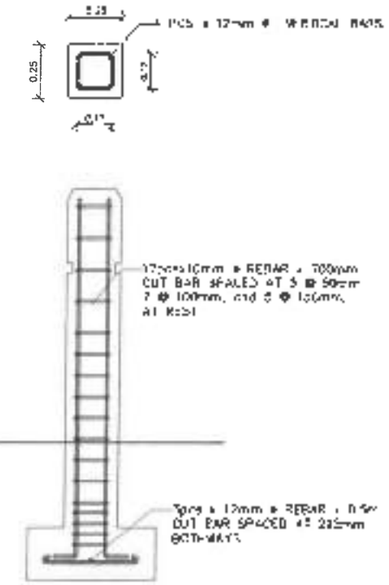
SCALE 1:10 METERS



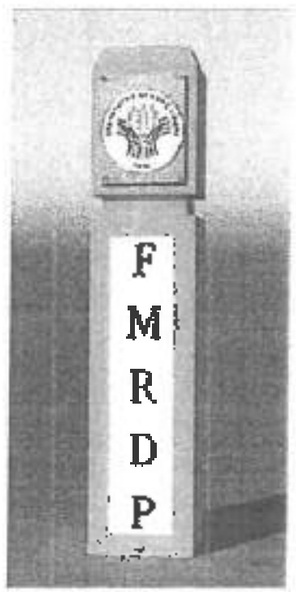

FRONT VIEW ELEVATION



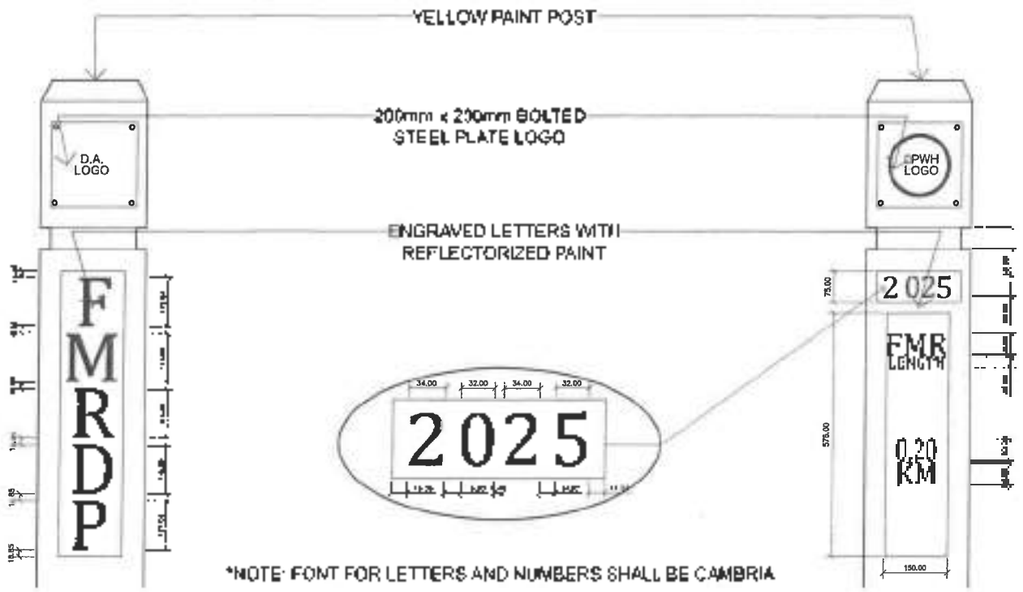

REAR VIEW ELEVATION




SECTION DETAILS

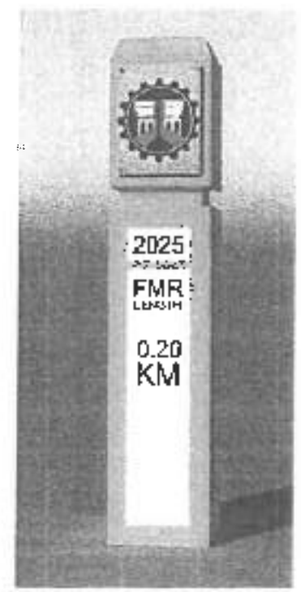



SAMPLE PERSPECTIVE




DETAILED OF FRONT VIEW OF MARKER

DETAILED OF REAR VIEW OF MARKER




SAMPLE PERSPECTIVE

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS<br>NORTHERN SAMAR FIRST DISTRICT ENGINEERING OFFICE | | | DRAFTED: ANGELU ROCHE<br>CHECKED: JEFF F. PEDROLA | REVIEWED: MAR DIONALD N. EMAN | SUBMITTED: ANDY S. EPEÑO | RECOMMENDED: VIVIAN A. BIACO | APPROVED: ALVIN A. IGNACIO | SHEET NO. 17 / 23 |

| BM No. | COORDINATES | | ELEVATION | REMARKS |
|---|---|---|---|---|
| | NORTHING | EASTING | | |
| 1 | [illegible] | [illegible] | [illegible] | CONCRETE NAIL STAKED @ EXISTING PATHWAY |

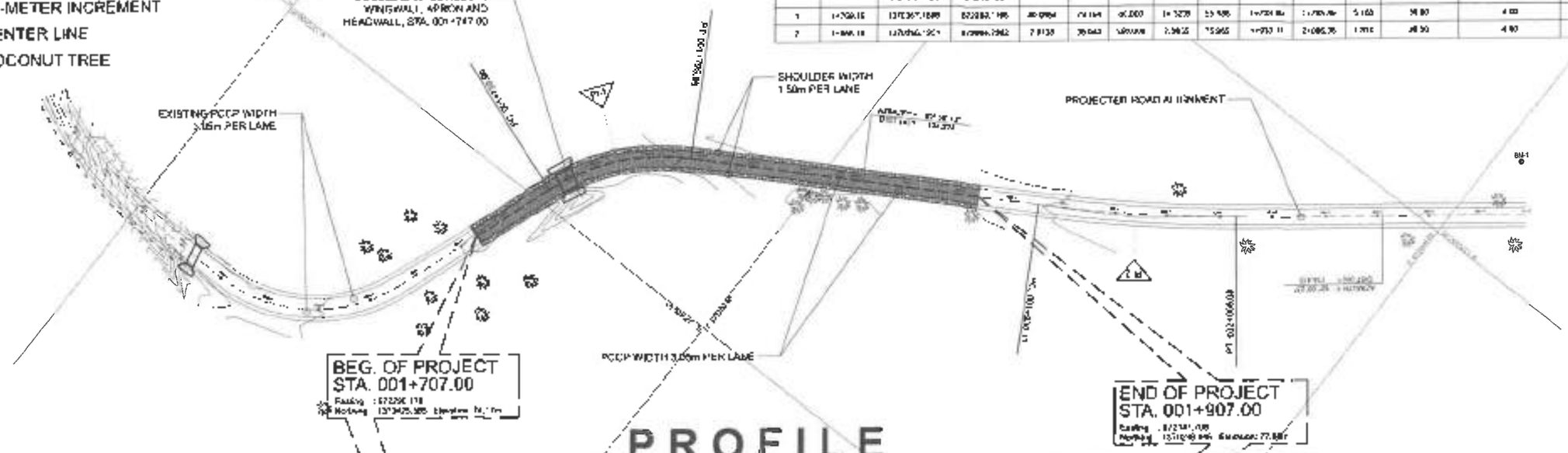
# PLAN

SCALE: 1:1250 METERS

LEGENDS:

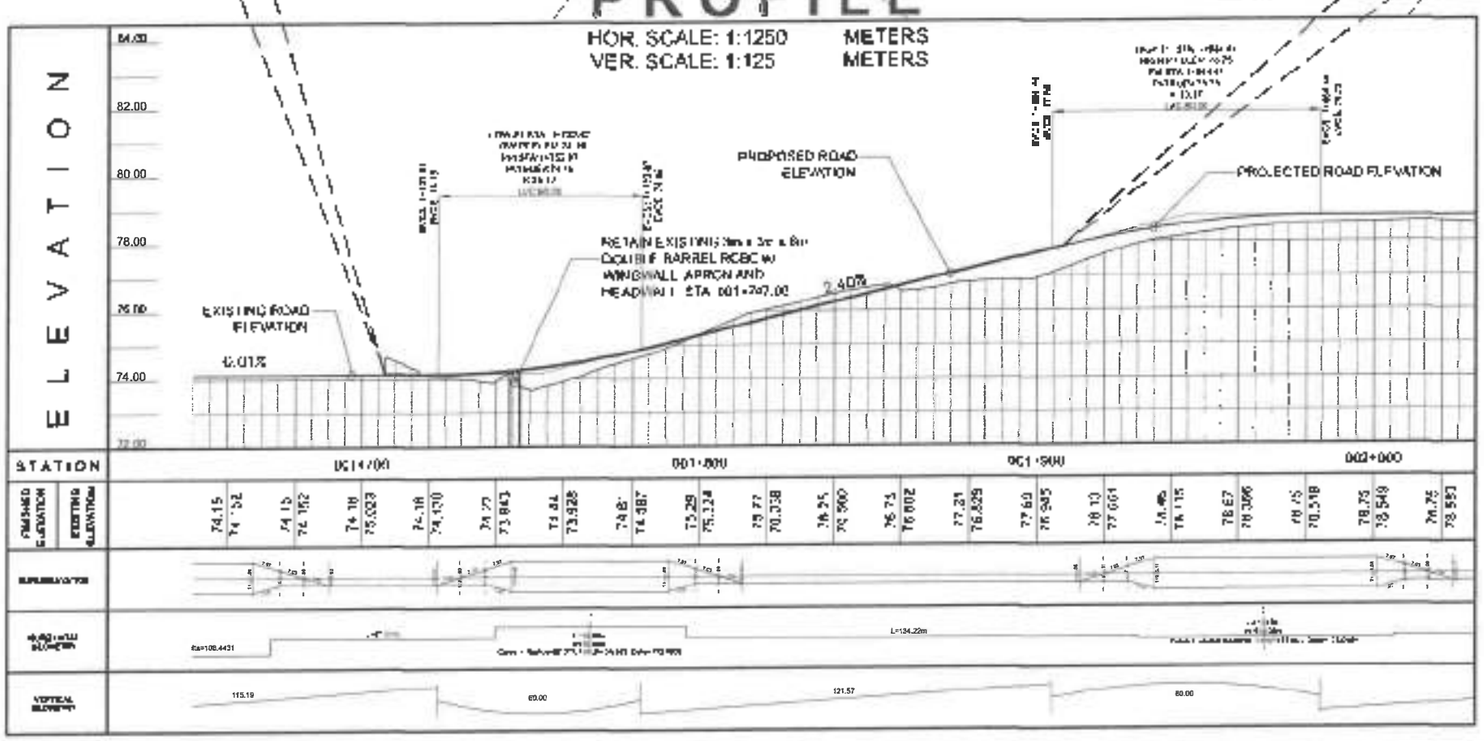
- PROPOSED PCCP
- 20-METER INCREMENT
- CENTER LINE
- COCONUT TREE

| POINT | STATION | COORDINATES | | ELEMENTS OF CURVE | | | | | | | | DESIGN SPEED (KPH) | MAXIMUM SUPERELEVATION (%) | MAXIMUM WIDENING (METER) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | NORTHINGS | EASTINGS | I | T | R | D | Lc | PC | PT | L | | | |
| 1 | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| 2 | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |

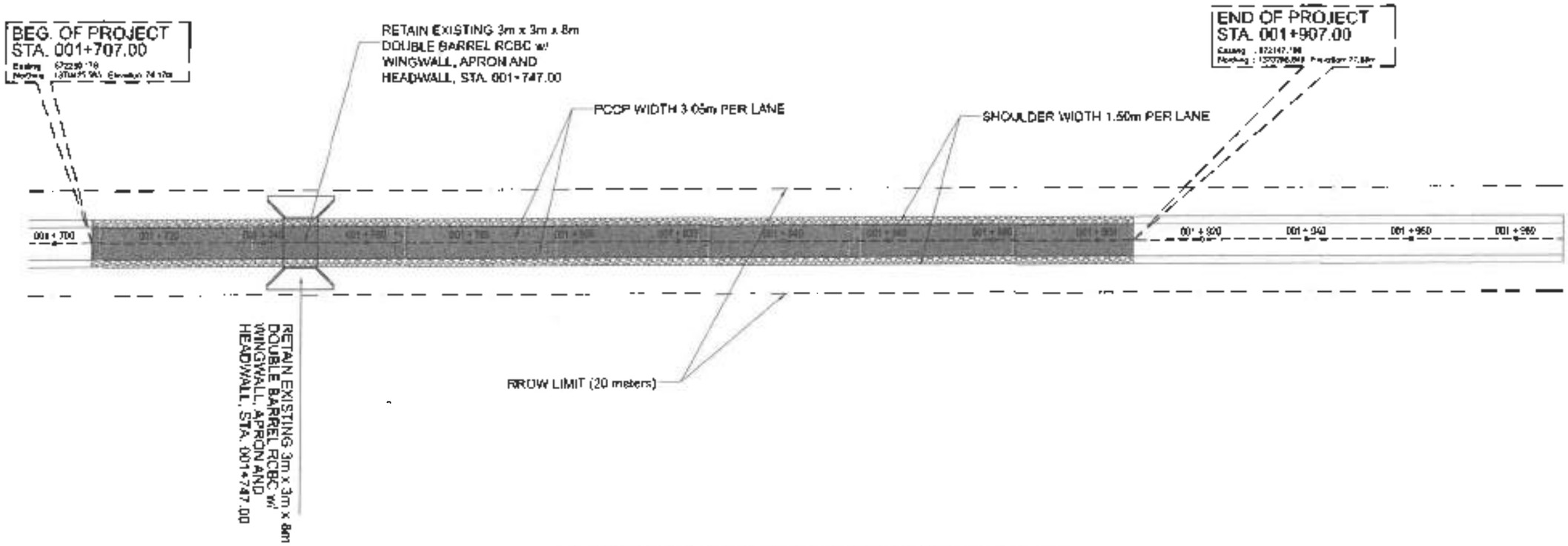



# PROFILE

HOR. SCALE: 1:1250 METERS
VER. SCALE: 1:125 METERS



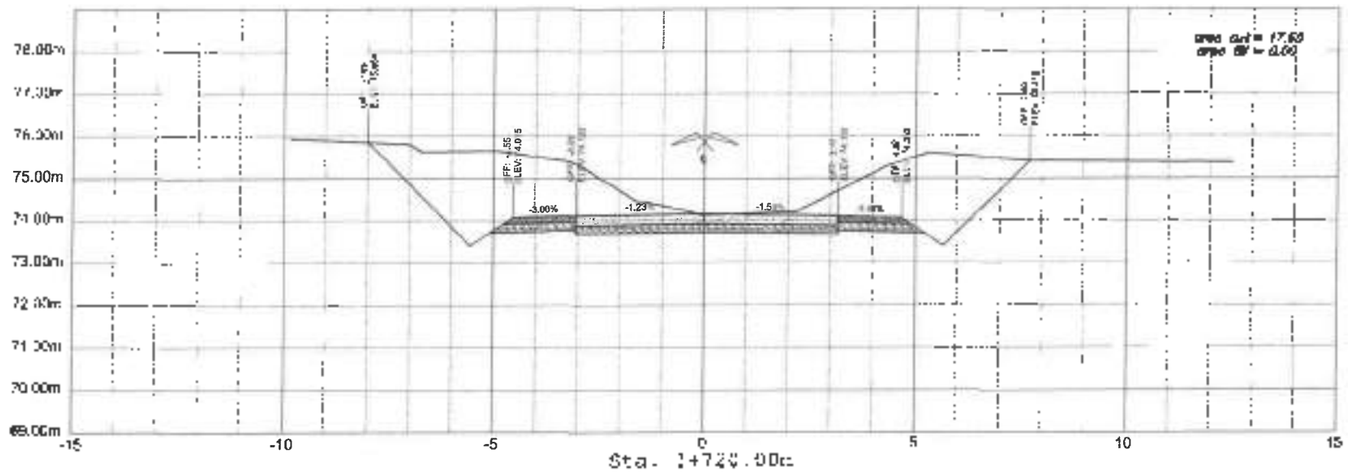

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Republic of the Philippines DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS REGIONAL OFFICE No. VIII NORTHERN SAMAR FIRST DISTRICT ENGINEERING OFFICE | PROJECT NAME AND LOCATION: [illegible] | SHEET DESCRIPTION: PLAN | DRAFTED: ANGEL L. POCHE ENGINEER I<br>DESIGNED: JEFF F. [illegible] | REVIEWED: MARIO DONALD N. EMAN CHIEF, PLANNING & DESIGN SECTION DATE | SUBMITTED: ANDY B. ENERO [illegible] DATE | RECOMMENDED: VIVIAN E. BIACO [illegible] DATE | APPROVED: ALVIN A. IGNACIO DISTRICT ENGINEER DATE: | SHEET NO. PP 01 02 SHEET NO. 13 23 |



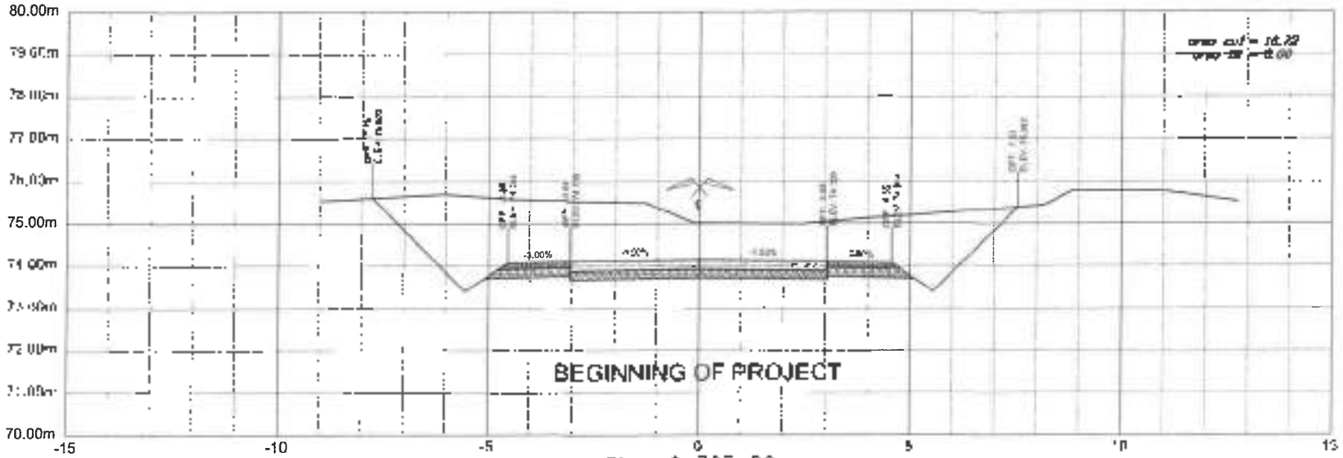

# STRAIGHT LINE DIAGRAM

SCALE: 1:600 METERS

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS<br>NORTHERN SAMAR 1ST<br>DISTRICT ENGINEERING OFFICE | PROJECT NAME AND LOCATION | SHEET CONTENTS<br>PLAN & PROFILE | DRAFTED:<br>ENGINEER I | REVIEWED:<br>MAY DIONALD N. EIMAN<br>DATE | SUBMITTED:<br>ANDY S. CHERO<br>DATE | RECOMMENDED:<br>VIVIAN B. BIACO<br>DATE | APPROVED:<br>ALVIN A. IGNACIO<br>DISTRICT ENGINEER<br>DATE | SHEET NO. 14 / 23 |
| | | | DESIGNED:<br>JEF[illegible]LA<br>ENGINEER II | | | | | |




Sta. 1+720.00m
FG = 74.16
EG = 74.13
NORTHING:1370413.3554, EASTING:672285.7893

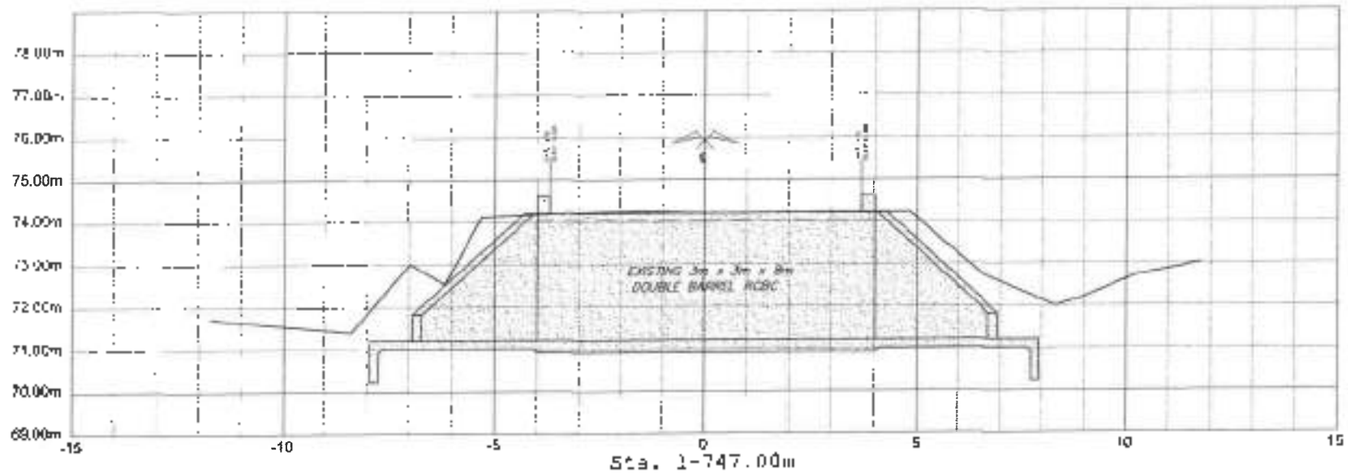



Sta. 1+707.00m
FG = 74.17
EG = 75.02
NORTHING:1370425.585, EASTING:672280.178

# DETAILED CROSS-SECTION

SCALE: 1:100m

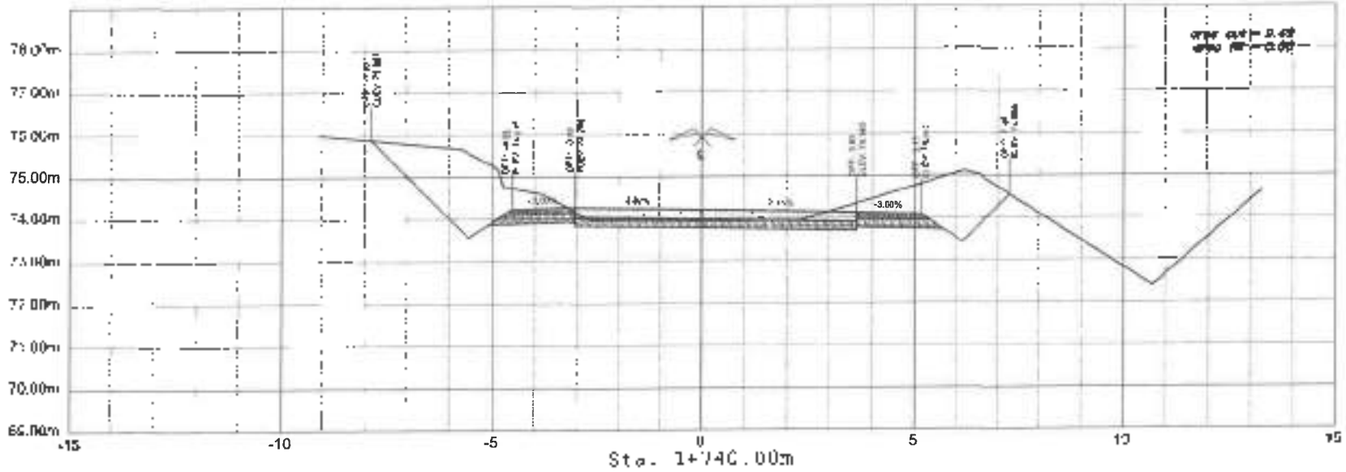
| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS<br>NORTHERN SAMAR FIRST<br>DISTRICT ENGINEERING OFFICE | PROJECT TITLE AND LOCATION | | DRAFTED: ARIEL U. POCHE<br>CHECKED: JEFFREY P. [illegible] ENGINEER | REVIEWED: MAR DIONALD N. ERMAN<br>CHIEF, PLANNING & DESIGN SECTION<br>DATE: | SUBMITTED: ANDY S. [illegible]<br>CHIEF, PLANNING & DESIGN SECTION<br>DATE: | RECOMMENDING: VIVIANO B. NACO<br>DISTRICT ENGINEER<br>DATE: | APPROVED: ALVIN A. IGNACIO<br>DISTRICT ENGINEER<br>DATE: | SHEET NO. CS 01 of 20 | SHEET NO. 16 / 20 |




Sta. 1+747.00m

FG = 74.22
EG = 74.22

NORTHING:1370388.063, EASTING:672278.316




Sta. 1+740.00m

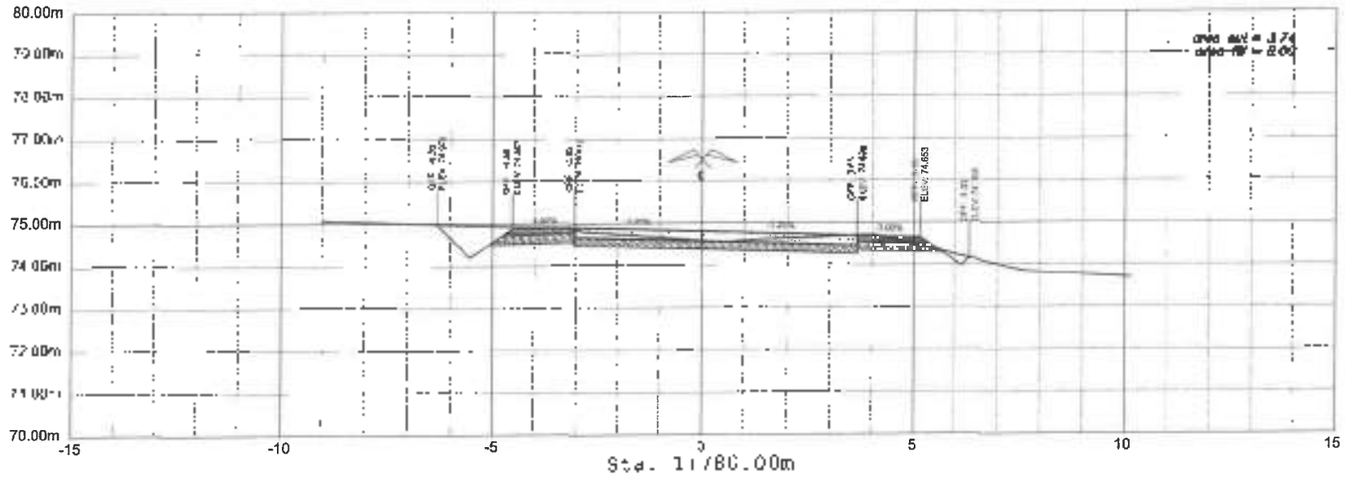
FG = 74.22
EG = 73.94

NORTHING 1370384.5406 EASTING 672278.0855

# DETAILED CROSS-SECTION

SCALE 1:100m

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Republic of the Philippines<br>DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS<br>REGIONAL OFFICE NO. VIII<br>NORTHERN SAMAR FIRST<br>DISTRICT ENGINEERING OFFICE<br>Catarman, Northern Samar | [illegible] | [illegible] | DRAFTED: [illegible] OCHE<br>ENGINEER<br>DESIGNED: JEFF T. PEÑOLA<br>ENGINEER II | REVIEWED: MARK DRONALD N. EMMAN<br>ASST. CHIEF, PLANNING & DESIGN SECTION<br>DATE: | SUBMITTED: ANDY B. ESEÑO<br>CHIEF, PLANNING & DESIGN SECTION<br>DATE: | RECOMMENDED: [illegible] BIACO<br>[illegible]<br>DATE: | APPROVED: ALVIN A. IGNACIO<br>DISTRICT ENGINEER<br>DATE: | SHEET NO. GS 02 of 07 | TOTAL SHEETS NO. 16 23 |

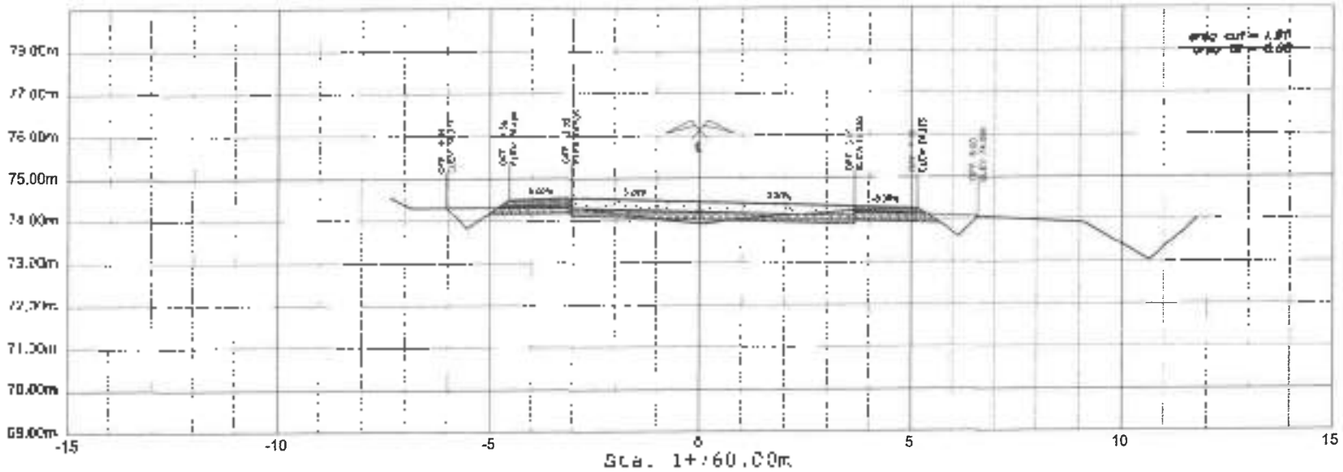



Sta. 1+80.00m

FG = 74.81

EG = 74.60

NORTHING 1370361.8078, EASTING:872256.7268




Sta. 1+160.00m

FG = 74.44

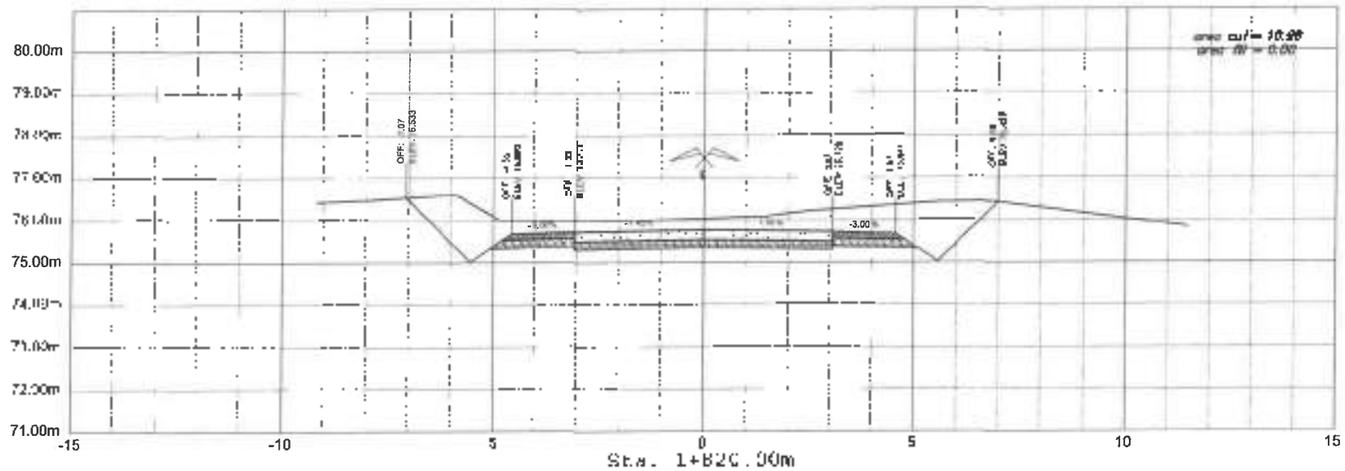
EG = 73.53

NORTHING 1370376.7757, EASTING:872260.9133

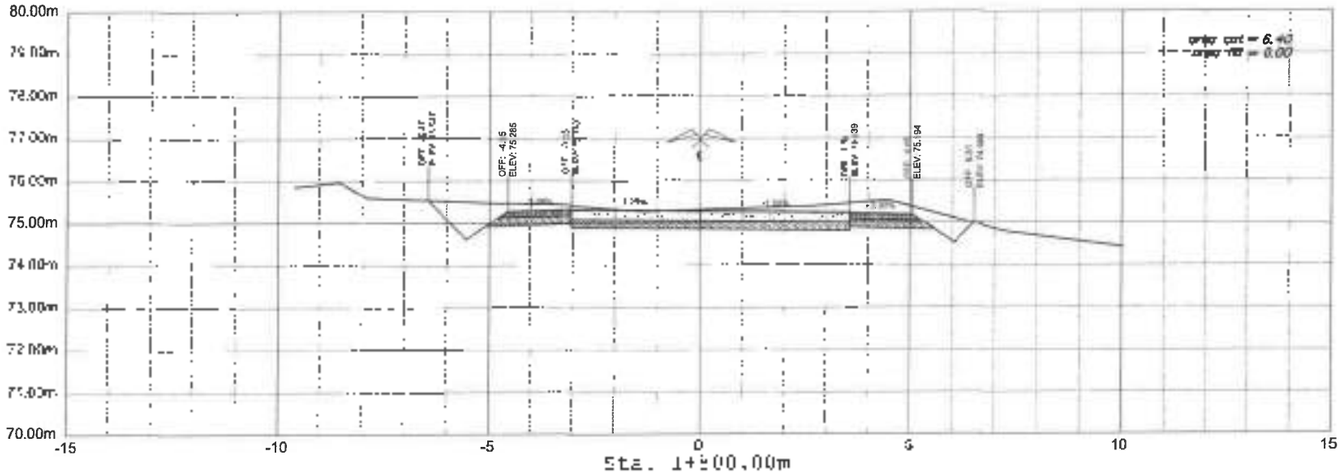
# DETAILED CROSS-SECTION

SCALE: 1:100m

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Republic of the Philippines DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS Regional Office No. VIII NORTHERN SAMAR FIRST DISTRICT ENGINEERING OFFICE Catarman, Northern Samar | PROJECT TITLE AND LOCATION: CONSTRUCTION OF BATO POLANGAN TO BRGY. JUSTICIA FARM, BRGY. POLANGAN AND BRGY. JUSTICIA, CALBIGAN, NORTHERN SAMAR (Upgrading Gravel to Paved) | CONTRACT NO.: DPWH-DISTRICT | DRAFTED: ANGELU. FOCHE Engineer | REVIEWED: MARC DONALD N. ERMAN Asst. Chief, Planning & Design Section DATE | SUBMITTED: ANDY S. ESEÑO Chief, Planning & Design Section DATE | RECOMMENDED: VIVIANO L. BIACO District Engineer DATE | APPROVED: ALVIN A. IGNACIO Regional Director, OIC DATE | SHEET NO. CS 03/07 | TOTAL SHEETS 17 23 |
| | | | DESIGNED: JEFF [illegible]OLA Engineer II | | | | | | |




Sta. 1+820.00m
FG = 75.77
EG = 76.04
NORTHING:1370340.4511 EASTING:672222.9020

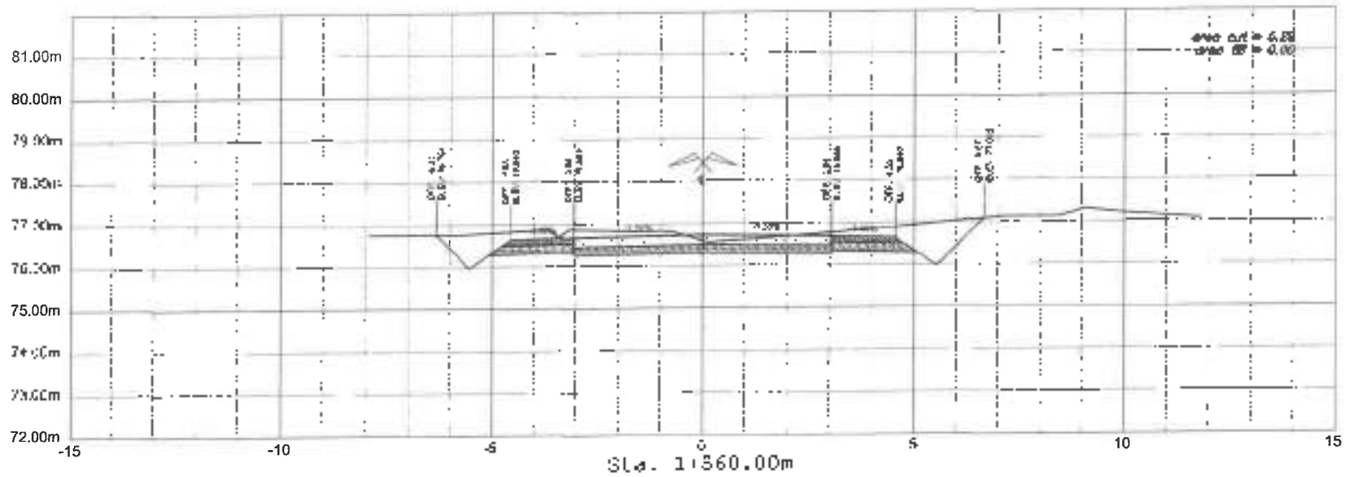



Sta. 1+900.00m
FG = 75.29
EG = 75.32
NORTHING:1370350.4753, EASTING:672240.2985

# DETAILED CROSS-SECTION

SCALE 1:100m

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Republic of the Philippines<br>DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS<br>REGIONAL OFFICE VIII<br>NORTHERN SAMAR FIRST DISTRICT ENGINEERING OFFICE<br>Catarman, Northern Samar | PROJECT DESCRIPTION<br>CONSTRUCTION OF [illegible] | PROJECT TITLE<br>CROSS SECTION | DRAFTED:<br>ANDRU. POCHE<br>ENGINEER<br>DESIGNED:<br>JEFF F. PEROLA<br>ENGINEER | REVIEWED:<br>MARDONALD N. ERMAN<br>[illegible]<br>DATE: | SUBMITTED:<br>ANDY S. CERRO<br>[illegible]<br>DATE: | RECOMMENDED:<br>VIVIANO GRACO<br>[illegible]<br>DATE: | APPROVED:<br>ALVIN A. IGNACIO<br>[illegible]<br>DATE: | SHT NO.<br>CS<br>04 / 07 | TOTAL NO.<br>08<br>23 |

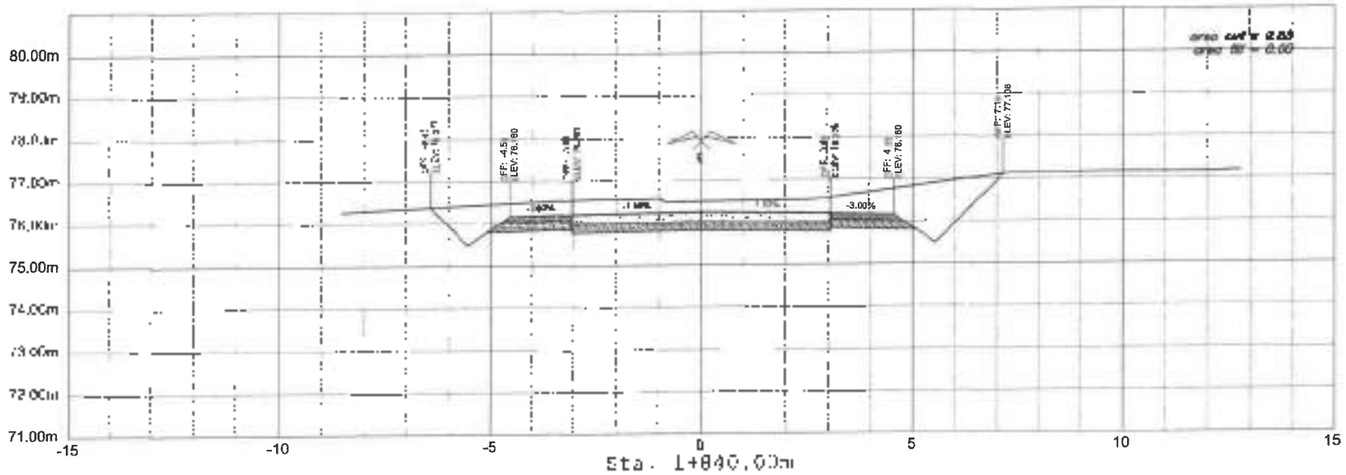



Sta. 1+860.00m

FG = 78.73

EG = 78.60

NORTHING:1370320.4026, EASTING:672188.3789




Sta. 1+840.00m

FG = 76.25

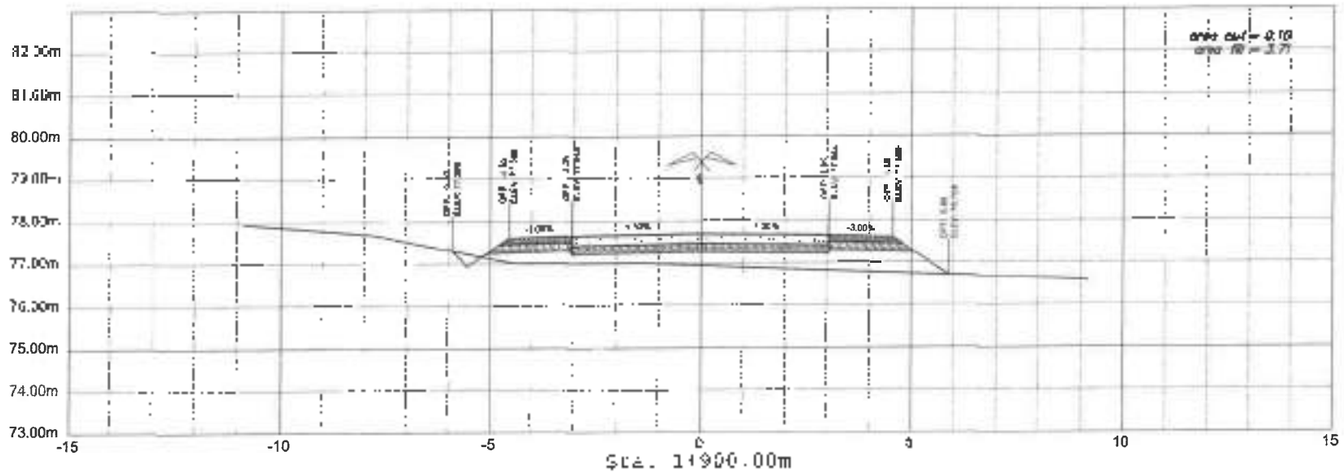
EG = 76.56

NORTHING:1370330.4270, EASTING:672205.6854

# DETAILED CROSS-SECTION

SCALE 1:100m

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Republic of the Philippines<br>DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS<br>HIGHWAY SECTOR VIII<br>NORTHERN SAMAR 1 DIST<br>DISTRICT ENGINEERING OFFICE<br>Catarman, Northern Samar | PROJECT NAME AND LOCATION<br>Construction of Bridge, Approaches and Slope Protection, Brgy. Polangi and Brgy. Patosan, Catarman, Northern Samar<br>Catarman, Northern Samar | SHEET CONTENTS<br>DETAILED SECTION | DRAFTED:<br>ARIEL U. FONTHE<br>ENGINEER II<br>DESIGNED:<br>JEFF [illegible]OLA<br>ENGINEER II | REVIEWED:<br>MARDIONALD N. EMAN<br>ASST. DISTRICT ENGINEER - BRIDGE SECTION<br>DATE: | SUBMITTED:<br>ANDY S. [illegible]EÑO<br>DISTRICT ENGINEER - BRIDGE SECTION<br>DATE | RECOMMENDED:<br>VIVIA [illegible]BIACO<br>ASSISTANT DISTRICT ENGINEER<br>DATE | APPROVED:<br>ALVIN A. IGNACIO<br>DISTRICT ENGINEER<br>DATE | SHEET NO.<br>05 / 07 | SHEET NO.<br>19 / 20 |

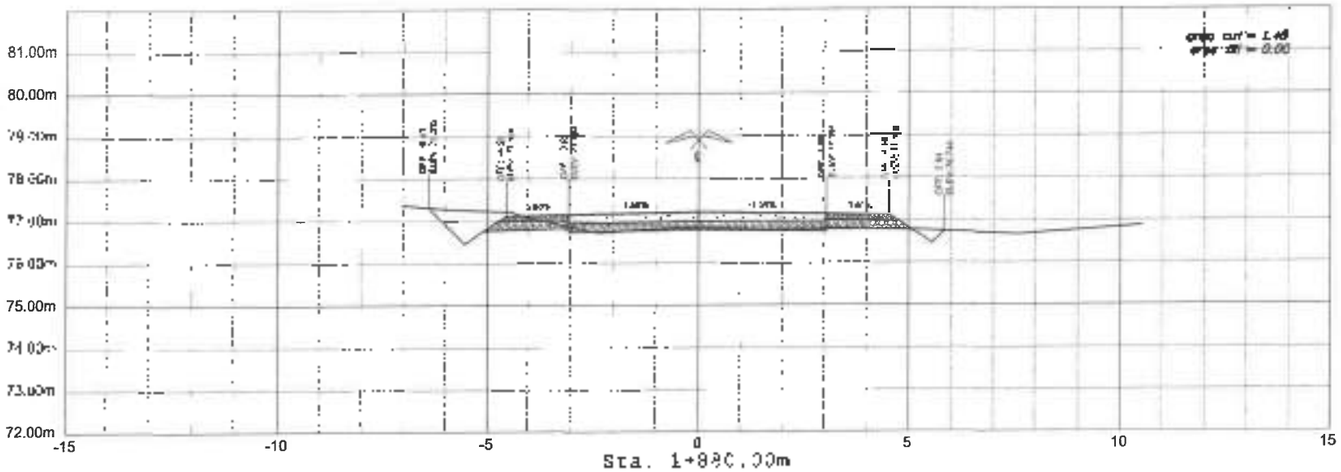



Sta. 1+900.00m

FG = 77.68

EG = 76.96

NORTHING:1270300.3645, EASTING 672153.7658




Sta. 1+880.00m

FG = 77.21

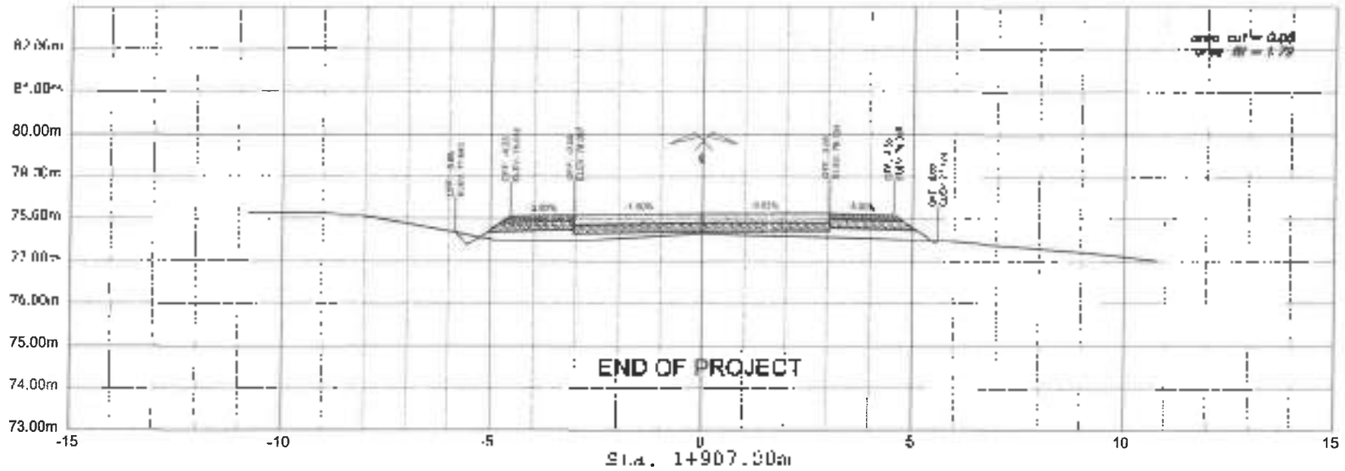
EG = 76.83

NORTHING:1270310.3787, EASTING 672171.0724

# DETAILED CROSS-SECTION

SCALE: 1:100m

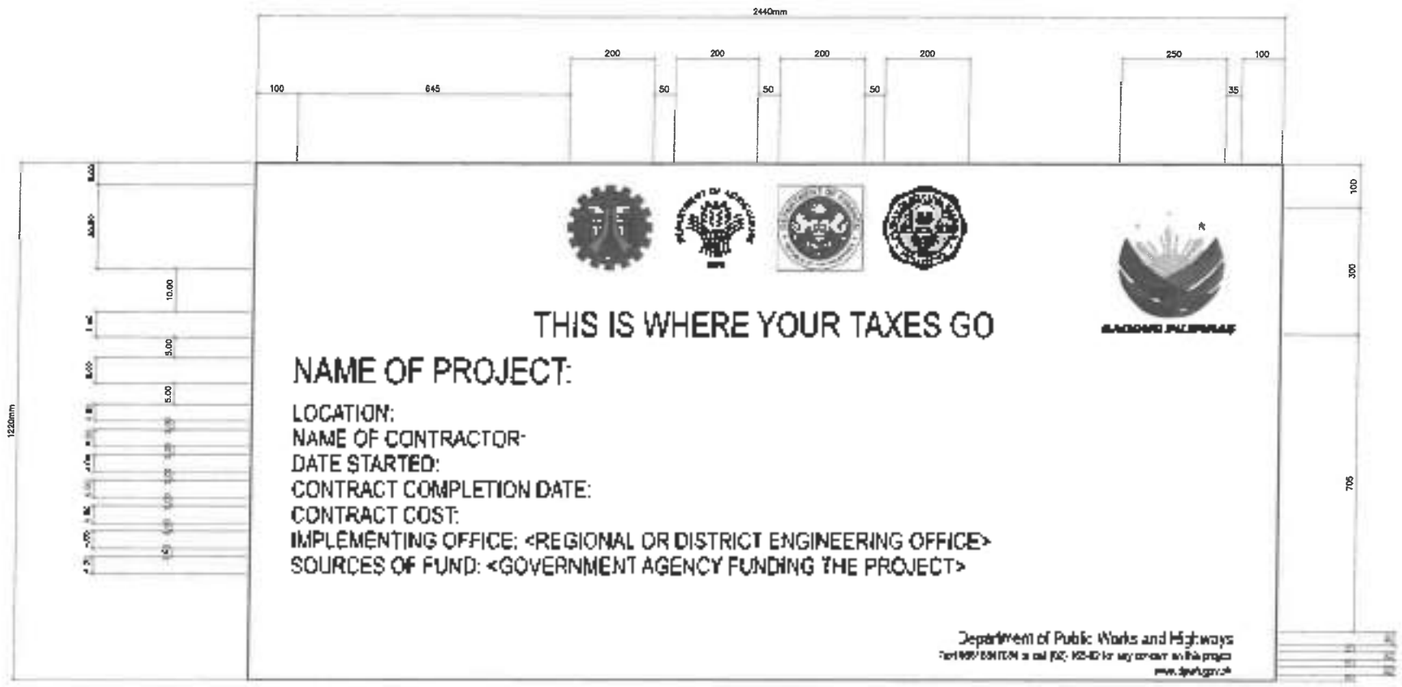
| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Republic of the Philippines DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS Region Office No. VIII NORTHERN SAMAR FIRST DISTRICT ENGINEERING OFFICE Catarman, Northern Samar | PROJECT: Upgrading of Road Section DESIGNING OF BRIDGE PILLARS 10 SPAN, VIGUELAS BRIDGE, BRGY. POLANGAN AND BRGY. PALOWAN, CAMARINES, NORTHERN SAMAR Catarman, Northern Samar | SHEET CONTENTS: CROSS SECTION | DRAFTED: ENGR. U. NOCHE ENGINEER I<br>DESIGNED: JEFF P. PANGOLA ENGINEER II | REVIEWED: MAR DIONALD N. EIMAN ASST. CHIEF, ENGINEERING DESIGN SECTION DATE: | SUBMITTED: ANDY T. ENERO CHIEF, ENGINEERING DESIGN SECTION DATE: | RECOMMENDED: VIVIANO B. BIADO DISTRICT ENGINEER DATE: | APPROVED: ALVIN A. IGNACIO DISTRICT ENGINEER DATE: | SHEET NO. CS CS 07 | SHEET TOTAL 26 23 |




# DETAILED CROSS-SECTION

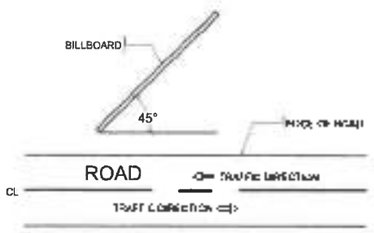
SCALE: 1:100m

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS<br>NORTHERN SAMAR FIRST<br>DISTRICT ENGINEERING OFFICE | PROJECT NAME AND LOCATION | SHEET CONTENTS<br>CROSS SECTION | DRAFTED: ANGELU TOCHE<br>DESIGNED: JEFF M. PEDOLA<br>ENGINEER | REVIEWED: MR. DIONALD N. EMAN<br>DATE | SUBMITTED: ANDY S. ESTERO<br>DATE | RECOMMENDED: WILIANO L. BIACO<br>DISTRICT ENGINEER<br>DATE: | APPROVED: ALVIN A. IGNACIO<br>DISTRICT ENGINEER<br>DATE | SHEET NO. CS 07 OF 07 | SHEET NO. 21 / 23 |

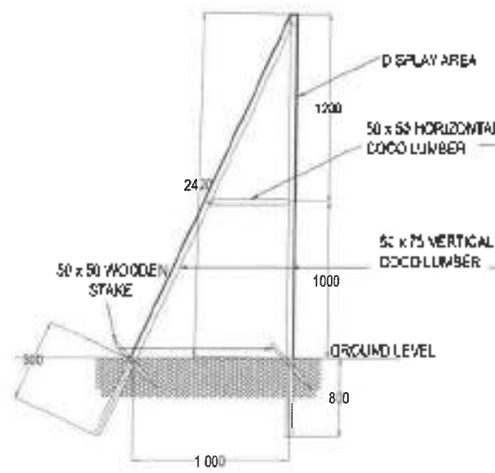



# DPWH STANDARD PROJECT BILLBOARD

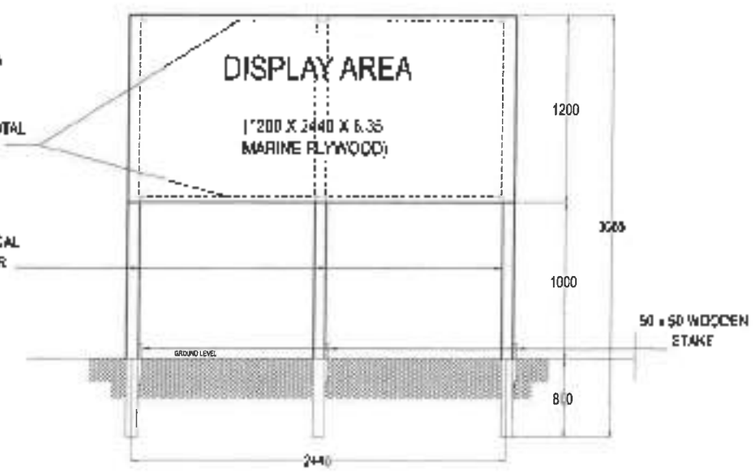
NOT TO SCALE




ORIENTATION




TYPICAL FRAME ELEVATION

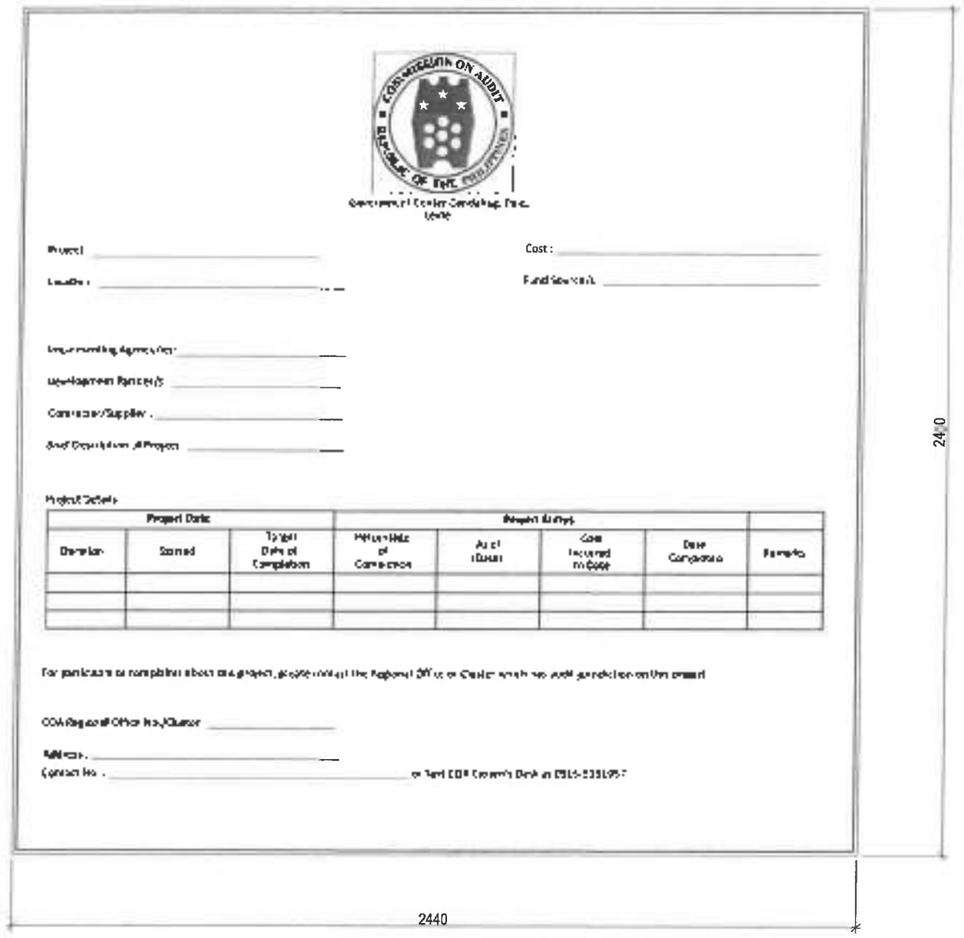



FRONT ELEVATION (OPTION 1)

# BILLBOARD FRAME

NOT TO SCALE, ALL DIMENSIONS ARE IN MILLIMETERS

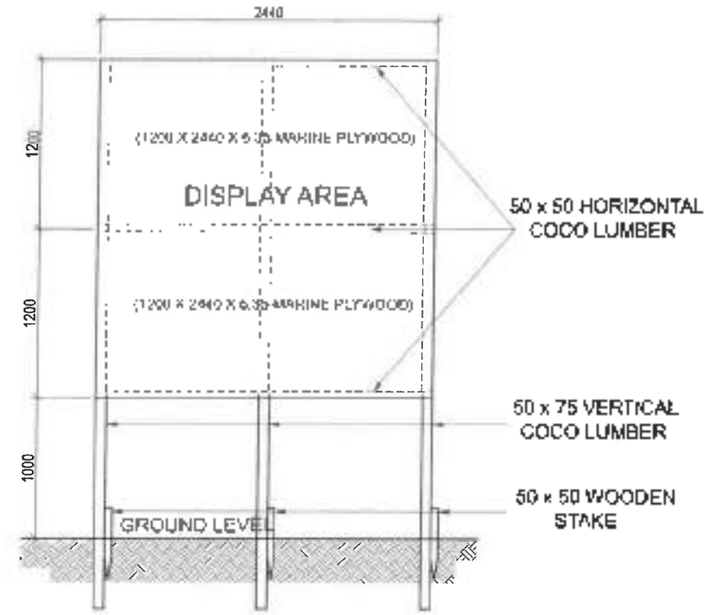
| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Republic of the Philippines DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS REGIONAL OFFICE NO. VIII NORTHERN SAMAR FIRST DISTRICT ENGINEERING OFFICE | PROJECT NAME AND LOCATION | PROJECT COST | DRAFTED: ANGELU. ROCHE; DESIGNED: JEFF R. [illegible] | REVIEWED: MAX DIONALD N. EBMAN, ASST. CHIEF PLANNING & DESIGN SECTION, DATE | SUBMITTED: ANDY S. LEREÑO, CHIEF PLANNING & DESIGN SECTION, DATE | RECOMMENDING: VIVIAN G. BIACO, ASSISTANT DISTRICT ENGINEER, DATE | APPROVED: ALVIN A. IGNACIO, (DISTRICT ENGINEER), DATE: | SHEET NO. PBB 01 02 | TOTAL SHEETS 22 23 |



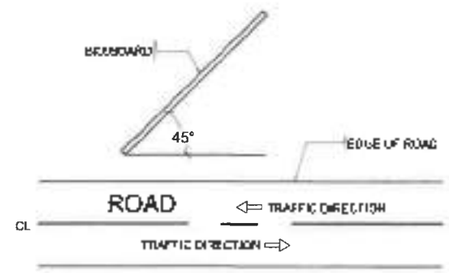

## COA STANDARD PROJECT BILLBOARD

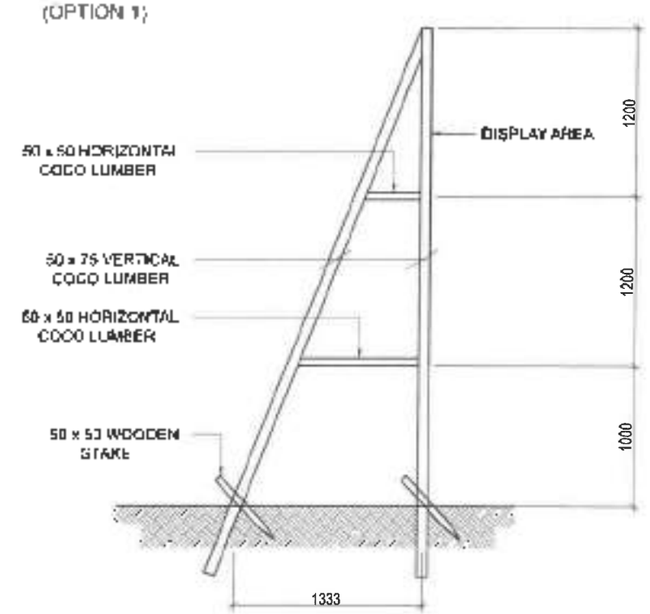
**SPECIFICATIONS:**

1. TARPAULIN, WHITE, 8 FT X 8 FT
2. RESOLUTION : 70 DPI
3. FONT : HELVETICA
4. FONT SIZE : MAIN INFORMATION - 3"
   SUB-INFORMATION - 1"
5. FONT COLOR: BLACK
6. BACKGROUND COLOR: WHITE




FRONT ELEVATION
(OPTION 1)




# COA BILLBOARD FRAME

(NOT TO SCALE, ALL DIMENSIONS ARE IN METERS)

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS<br>NORTH NUEVA ECIJA DIST<br>DISTRICT ENGINEERING OFFICE | PROJECT NAME AND LOCATION | SHEET CONTENTS | DRAFTED: ANGELA ROCHE<br>DESIGNED: JBR | REVIEWED: MAR DIONALD N. ERMAN | SUBMITTED: ANDY S. ERERO | RECOMMENDED: VIVIANO G. BIACO | APPROVED: ALVIN A. IGNACIO<br>DATE: | SHEET NO. PBB 02 02 | SHEETS 23 23 |