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. LIGAYA TO BRGY. BUENAVISTA FMR, BRGY. LIGAYA AND BRGY. BUENAVISTA, ROSARIO, NORTHERN SAMAR

ROSARIO, NORTHERN SAMAR

STA. 000+000.00 to 000 + 395

PCC PAVEMENT TARGET LENGTH = 0.790 in.km, w =2.50m, 230mm THK

SUBMITTED	RECOMMENDED	APPROVED
ANDY G. EREÑO	**VIVIAN G. BIACO**	**ALVIN A. IGNACIO**
CHIEF, PLANNING & DESIGN SECTION	ASST. DISTRICT ENGINEER	DISTRICT ENGINEER
Date	Date	Date

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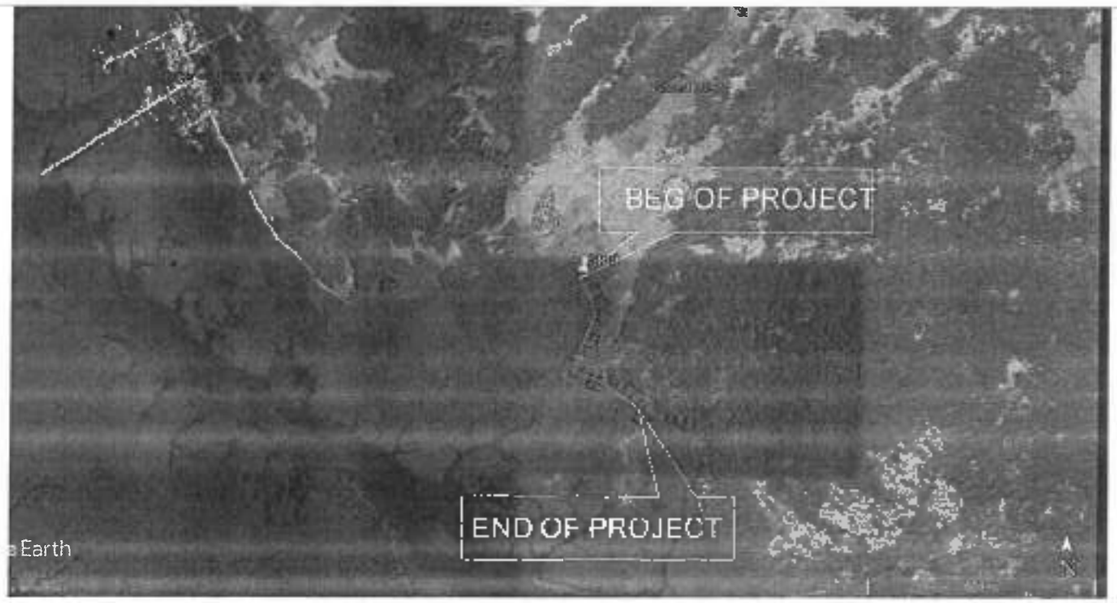
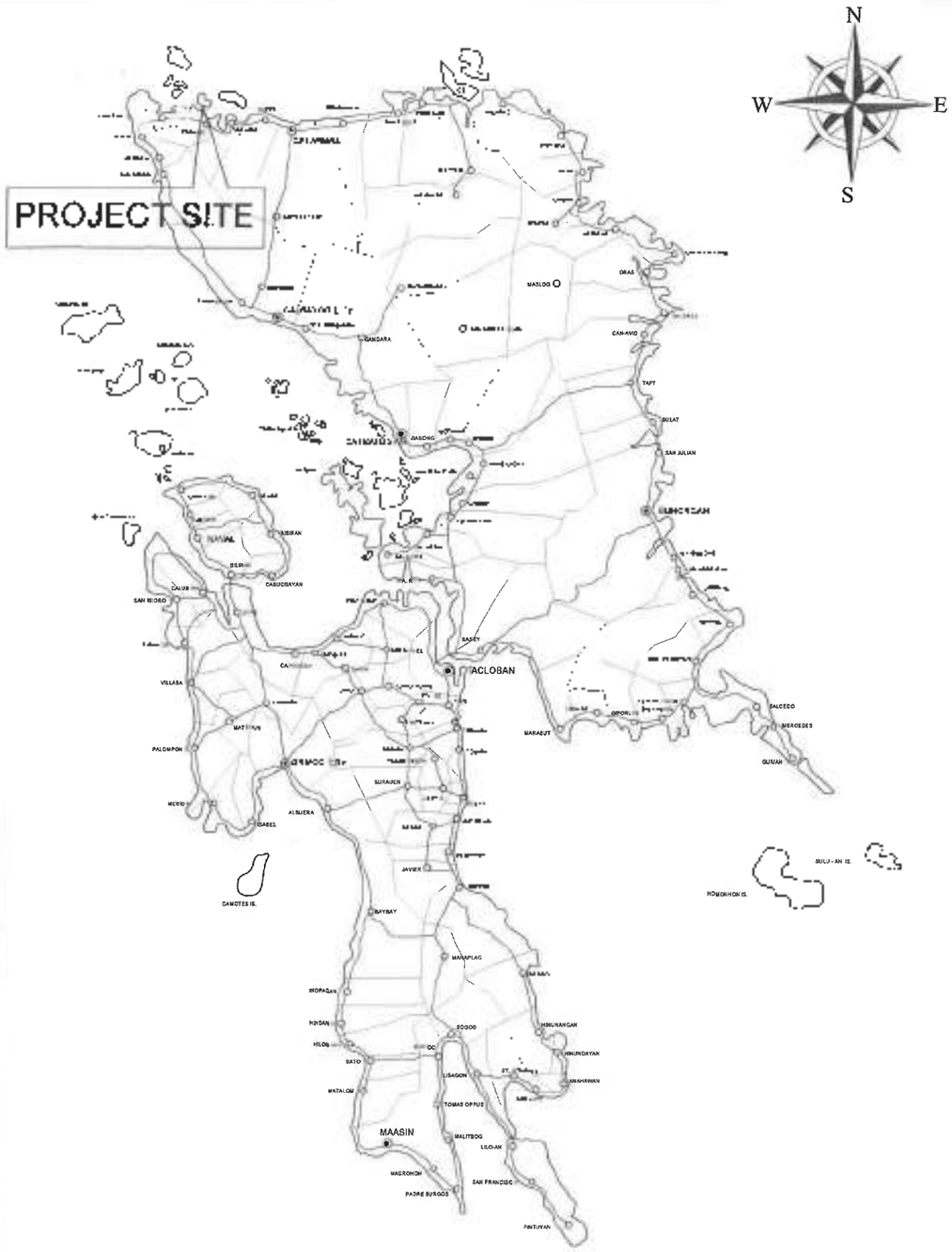


VICINITY MAP

NOT TO SCALE



LOCATION MAP

NOT TO SCALE

DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS WESTERN SAMAR FIRST DISTRICT ENGINEERING OFFICE	PROJECT TITLE AND LOCATION: [illegible]	SHEET CONTENTS: INDEX OF DRAWINGS, LOCATION MAP, VICINITY MAP	DRAFTED BY: JEFF [illegible] ENGINEER II	REVIEWED: MA. DONALD N. EMAN, ASST. DIST. ENGINEER FOR TECHNICAL, DATE 6/24/25	SUBMITTED: ANDY S. PEÑO, CHIEF Planning Section, DATE	RECOMMENDED: VIVIAN [illegible] BIAGO, ASSISTANT DISTRICT ENGINEER, DATE	APPROVED: ALVIN A. IGNACIO, DISTRICT ENGINEER, DATE	SHEET NO. G-1 / 1 9	SHEET NO. 02 / 36

SUMMARY OF QUANTITIES

	DESCRIPTION	UNIT	QUANTITY	REMARKS
PART B	OTHER GENERAL REQUIREMENTS			
B.3	Permits and Clearances	l.s	1.00	
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			
100(1)	Clearing and Grubbing	ha.	0.27	
100(3)a2	Individual Removal of Trees (301-500 dia) (small)	each	31.00	
102(1)	Unsuitable Excavation	cu.m	1,078.00	
102(2)	Surplus Common Excavation	cu.m	2,476.58	
104(1)a	Embankment from Roadway Excavation (Common Soil)	cu.m	1,480.50	
105(1)a	Subgrade Preparation (Common Material)	sq.m.	2,765.00	
PART D	SUBBASE AND BASE COURSE			
200(1)	Aggregate Subbase Course	cu.m	553.00	
PART E	SURFACE COURSE			
300(2)	Crushed Aggregate Surface Course	cu.m	118.50	
311(1)c1	Portland Cement Concrete Pavement (Unreinforced), 0.23m thk - 14 days	sq.m	1,975.00	
PART F	BRIDGE CONSTRUCTION			
404(1)a	Reinforcing Steel, Grade 40	kg	5,570.83	
405(1)a3	Structural Concrete (Class A, 28 days), 20.68 Mpa	cu.m	97.07	
PART G	DRAINAGE AND SLOPE PROTECTION STRUCTURES			
506(1)	Stone Masonry	cu.m.	357.95	
PART H	MISCELLANEOUS STRUCTURES			
602(2)a	Marker Post (Farm-to-Market Road Marker)	ea	2.00	
624(9)b2	Single Arm Solar LED Roadway Lighting (8m-Pole,100W)	each	24.00	

Republic of the Philippines
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGIONAL OFFICE
NUKTHERN SAMAR HIGH I
DISTRICT ENGINEERING OFFICE

PROJECT: [illegible]

PROJECT CONTRACT: SUMMARY OF QUANTITIES

PREPARED BY: JEFF R. PEDROLA, ENGINEER

REVIEWED: MAR DIONALD N. ERMAN, DATE:

SUBMITTED: ANDY S. CREÑO, DATE:

RECOMMENDED: IRWIN A. BIACO, DATE:

APPROVED: ALVIN A. IGNACIO, DISTRICT ENGINEER, DATE:

SHEET NO. C-2 | TOTAL SHEETS CU 36

GENERAL NOTES

SURVEY DATA:

DATE OF SURVEY: APRIL 15, 2023
EQUIPMENT USED (GEOMAX) BASE. Z36180101039
ROVER 1. Z35171102091, Z35180902035

CALIBRATION EXPIRY DATE: JUNE 2023

REFERENCE BENCHMARK DETAILS:

1.) THE POSITION OF PROJECT CONTROL POINTS SHALL BE DEFINED AND MARKED ON THE BY MONUMENTS OF PERMANENTS NATURE.

2.) CRITERIA FOR LOCATION OF MONUMENTS
- *ACCESSIBILITY*
- *GROUND STABILITY*
- *SECURITY FROM POSSIBLE ACTS OF DISTURBANCE*

3.) INTERNAL 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*

1.1 DIMENSIONS
a. STATIONS ARE GIVEN IN KILOMETERS WITH OR WITHOUT DECIMALS.
b. PIPE CULVERT DIAMETERS AND DIMENSIONS ARE GIVEN IN METERS
c. RADII, ELEVATIONS, FLOOD LEVELS, ETC. ARE GIVEN IN METERS WITH OR WITHOUT DECIMALS
d. UNLESS OTHERWISE SHOWN, ALL DISTANCES ARE IN METERS.

1.2 STATIONINGS
a. THE ROAD STATIONS AND ELEMENTS OF CURVES ARE RELATIVE TO THE CENTERLINE OF THE ROAD
b. ALL STATIONS ALONG ROAD CENTERLINE ARE RECKONED FROM NATIONAL ROAD.

1.3 ROADWAY EXCAVATION
a. EXCAVATION SHALL BE DONE IN ACCORDANCE TO THE LINES AND GRADES OF ELEVATION SHOWN ON THE PLANS OR AS STAKED BY THE ENGINEER

1.4 EMBANKMENT PROTECTION
a. EMBANKMENT SLOPE PROTECTION ARE GENERALLY PROVIDED AT SPECIFIED AREAS AND OTHER LOCATIONS SHOWN IN THE PLANS

1.5 ELEVATIONS AND GRADES
a. ELEVATIONS GIVEN IN THE ROW FINISHED GRADE ELEVATION REFER TO THE GRADE AS SHOWN IN THE TYPICAL ROADWAY SECTION
b. GROUND LEVEL AND FINISHED ROAD LEVEL OF THE ROAD REFER TO THE GROUND PROFILE ORIENTED FROM THE ROAD CENTERLINE

1.6 SUBGRADE PREPARATION
a. SUBGRADE PREPARATION SHALL EXTEND TO THE FULL WIDTH OF THE ROADWAY, UNLESS AUTHORIZED BY THE ENGINEER AND NOT BE DONE UNLESS THE CONTRACTOR IS READY TO START IMMEDIATELY THE CONSTRUCTION OF THE PAVEMENT STRUCTURE & SHALL MEET THE REQUIREMENTS OF ITEM 104-EMBANKMENT

1.7 AGGREGATE BASE COURSE
a. AGGREGATE BASE COURSE SHALL BE PLACED AFTER THE EXISTING SURFACE IS GRADED AND FINISHED AS PROVIDED UNDER ITEM 105 - SUBGRADE PREPARATION AND IT MUST BE IN UNIFORM MIXTURE ON A PREPARED SUB-GRADE IN A QUANTITY THAT WILL PROVIDE THE REQUIRED COMPACTED THICKNESS

1.8 PCCP
a. PCCP SHALL BE CONSTRUCTED ON A PREPARED BASE IN ACCORDANCE WITH THE SPECIFICATION AND IN CONFORMITY WITH LINES, GRADES, THICKNESS AND TYPICAL CROSS-SECTION SHOWN ON THE PLANS. ONLY TYPE 1 PORTLAND CEMENT SHALL BE USED UNLESS OTHERWISE PROVIDED FOR IN THE SPECIAL PROVISION. A MIXTURE OF CEMENT, FINE AGGREGATES, COURSE AGGREGATES AND WATER W/ OR W/OUT REINFORCEMENT AND SHALL BE CURED IN ACCORDANCE WITH THE SPECIFICATION PROVIDED BY THE IMPLEMENTING AGENCY

1.9 RCPC

THIS ITEM SHALL CONSIST OF THE CONSTRUCTION OR RECONSTRUCTION OF PIPE CULVERTS AND STORM DRAINS, HEREINAFTER REFERRED TO AS "CONDUIT" IN ACCORDANCE WITH THIS SPECIFICATION AND IN CONFORMITY WITH THE LINES AND GRADES SHOWN ON THE PLANS OR AS ESTABLISHED BY THE ENGINEER

THE CONDUIT LAYING SHALL BEGIN AT THE DOWNSTREAM END OF THE CONDUIT LINE. THE LOWER SEGMENT OF THE CONDUIT SHALL BE IN CONTACT WITH THE SHAPED BEDDING THROUGHOUT ITS FULL LENGTH. BELL OR GROOVE ENDS OF RIGID CONDUITS AND OUTSIDE CIRCUMFERENTIAL LAPS OF FLEXIBLE CONDUITS SHALL BE PLACED FACING UPSTREAM. FLEXIBLE CONDUIT SHALL BE PLACED WITH LONGITUDINAL LAPS OR SEAMS AT THE SIDES

PAVED OR PARTIALLY-LINED CONDUIT SHALL BE LAID SUCH THAT THE LONGITUDINAL CENTER LINE OF THE PAVED SEGMENT COINCIDES WITH THE FLOW LINE. ELLIPTICAL AND ELLIPTICALLY REINFORCED CONDUITS SHALL BE PLACED WITH THE MAJOR AXIS WITHIN 5 DEGREES OF A VERTICAL PLANE THROUGH THE LONGITUDINAL AXIS OF THE CONDUIT.

2.0 CONCRETE JOINT SEALANT
a. SHALL BE SEALED WITH ASPHALT SEALANT IMMEDIATELY AFTER COMPLETION OF THE CURING PERIOD AND BEFORE THE PAVEMENT IS OPENED TO TRAFFIC. JOINTS MUST BE THOROUGHLY CLEANED AND DRY BEFORE ASPHALT SEALANT IS APPLIED & WILL NOT BE SPILLED ON THE EXPOSED SURFACES OF THE CONCRETE. THE USE OF SAND OR SIMILAR MATERIAL AS A COVER FOR THE SEAL WILL NOT BE PERMITTED

404 - REINFORCING STEEL
1.11.1 ALL REINFORCEMENT STEEL BARS SHALL BE DEFORMED BARS WITH DEFORMATION CONFORMING TO ASTM A615 AND OF INTERMEDIATE ASTM A615 AND OF INTERMEDIATE (GRADE 40) WITH MINIMUM YIELD STRENGTH fy=275 MPa (40,000 psi)
1.11.2 REINFORCING BARS SHALL BE COLD BENT.
1.11.3 REINFORCING BARS SHALL HAVE 75mm COVERING

405 - STRUCTURAL CONCRETE
- Structural concrete shall consist of a mixture of Portland cement, fine aggregate, course aggregate, admixture when specified and water mix in the proportions specified and in accordance with the specification and conforming to the line grades and dimension shown on the plans

The classes of concrete will generally be used as follows:

Class A - All superstructures and heavily reinforced substructures. the important parts of the structure included are slabs, beams, girders, columns, arch ribs, box culverts, reinforced abutments, retaining walls, and reinforced footings

Class B - Footings, pedestals, massive pier shafts, pipe bedding cribbing and for filler in steel grid floors.

Class C - Thin reinforced sections, railings, precast R.C. piles and cribbing and for filler in steel grid floors.

Class P - Prestressed concrete structures and members.

Seal - Concrete deposited in water

505 - RIPRAP & GROUTED RIPRAP
STONES - SHALL CONSIST OF ROCKS, NEARLY RECTANGULAR IN SHAPE, EXCEPT FOR CLASS "A" RIPRAP WHICH MAY CONSIST OF ROUND NATURAL STONES. THEY SHALL BE SOUND, DURABLE, DENSE AND RESISTANT TO THE ACTION OF AIR AND WATER

CLASS OF RIPRAP	THICKNESS	WEIGHT OF STONES
Class A	300 mm	15-25kgs., w/ at least 50% of the stone weight more than 20 kgs

1.10 STONE MASONRY

1.10.1 Stone

1.10.1.1 THE STONE SHALL BE CLEAN, HARD, AND DURABLE AND SHALL BE SUBJECT TO THE ENGINEER'S APPROVAL. ADOBE STONE SHALL NOT BE USED UNLESS OTHERWISE SPECIFIED. SIZES AND SHAPES - UNLESS OTHER SIZES ARE SHOWN ON THE PLANS, STONES HAVE A THICKNESS OF NOT LESS THAN 150 MM AND WIDTHS OF NOT LESS THAN ONE AND ONE-HALF TIMES THEIR RESPECTIVE THICKNESS, AND LENGTHS OF NOT LESS THAN ONE AND ONE HALF TIMES THEIR RESPECTIVE WIDTHS. EACH STONE SHALL BE OF GOOD SHAPE AND BE FREE OF DEPRESSIONS AND PROJECTIONS THAT MIGHT WEAKEN OR PREVENT IT FROM BEING PROPERLY BEDDED.

1.10.1.2 THE FACE OF THE STONES FOR ABOUT 00 MM AND FROM THIS POINT MAY DEPART FROM DRESSING - THE STONE SHALL BE DRESSED TO REMOVE ANY THIN OR WEAK PORTIONS. FACE STONES SHALL BE DRESSED TO PROVIDE BED AND JOINT LINES THAT DO NOT VARY MORE THAN 20 MM FROM THE TRUE LINES AND TO ENSURE THE MEETING OF BED AND JOINT LINES WITHOUT THE ROUNDING OF CORNERS OF THE STONES IN EXCESS OF 30 MM IN RADIUS. BED SURFACES OF THE FACE STONES SHALL BE APPROXIMATELY NORMAL TO THE FACE OF THE STONES FOR ABOUT 00 MM AND FROM THIS POINT MAY DEPART FROM A NORMAL PLANE NOT TO EXCEED 50 MM IN 300 MM.

1.10.1.3 FINISH FOR EXPOSED FACES - FACE STONES SHALL BE PITCHED TO THE LINE ALONG THE BEDS AND JOINTS. THE MAXIMUM PROJECTION OF ROCK FACES BEYOND THE PITCH LINES SHALL NOT BE MORE THAN 50 MM

1.11.2.1 CEMENT, FINE AGGREGATE AND WATER SHALL CONFORM TO THE RESPECTIVE REQUIREMENTS FOR THOSE MATERIALS AS SPECIFIED UNDER ITEM 405, STRUCTURAL CONCRETE, EXCEPT AS TO THE GRADING OF FINE AGGREGATE WHICH SHALL ALL PASS THE 2.36MM (NO. 8) SIEVE. NOT LESS THAN 15 NOR MORE THAN 40 PERCENT SHALL PASS THE 0.3 MM (NO. 50) SIEVE AND NOT MORE THAN 10 PERCENT SHALL PASS THE 0.15MM (NO 100) SIEVE

1.11.2 Mortar

1.11.2.2 THE MORTAR FOR THE MASONRY SHALL BE COMPOSED OF ONE PART OF PORTLAND CEMENT AND TWO PARTS OF FINE AGGREGATE BY VOLUME AND SUFFICIENT WATER TO MAKE THE MORTAR OF SUCH CONSISTENCY THAT IT CAN BE HANDLED EASILY AND SPREAD WITH A TROWEL. MORTAR SHALL BE MIXED ONLY IN THOSE QUANTITIES REQUIRED FOR IMMEDIATE USE. UNLESS AN APPROVED MORTAR MIXING MACHINE IS USED, THE FINE AGGREGATE AND CEMENT CEMENT SHALL BE MIXED DRY IN A TIGHT BOX UNTIL THE MIXTURE ASSUMES A UNIFORM COLOR. AFTER WHICH, WATER SHALL BE ADDED AS THE MIXING CONTINUES UNTIL THE MORTAR ATTAINS THE PROPER CONSISTENCY. MORTAR THAT IS NOT USED WITHIN 90 MINUTES AFTER THE WATER HAS BEEN ADDED SHALL BE DISCARDED. RETEMPERING OF MORTAR WILL NOT BE PERMITTED

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

SPECIFICATIONS:
- DPWH STANDARD SPECIFICATIONS FOR HIGHWAYS, BRIDGES & AIRPORTS, REVISED EDITION 2014
- DESIGN GUIDELINES CRITERIA AND STANDARDS, 2015 EDITION
- DPWH HIGHWAY SAFETY DESIGN STANDARDS, 2012
- D.O. 13 S. 2018 - GUIDELINES FOR THE PREPARATION OF COST ESTIMATES FOR TRAFFIC
- D.O. 11 S. 2014 - DESIGN STANDARDS FOR TOURISM AND FARM TO MARKET ROAD
- D.O. 112 S. 2019 - REVISED DESIGN STANDARDS FOR TOURISM AND FARM TO MARKET ROADS

MANAGEMENT AND SAFETY & HEALTH REQUIREMENTS FOR THE CONSTRUCTION AND MAINTENANCE OF ROADS, BRIDGES AND SAFETY & HEALTH REQUIREMENTS FOR SCHOOL BUILDINGS.

CONTROL POINTS

Control Points	NORTHING	EASTING	ELEV	REMARKS
BM-1	1387406.299	438537.757	58.40	RCBC
BM-2	1387160.123	438635.812	61.49	COCONUT TREE
BM-3	1387040.351	438653.899	60.66	COCONUT TREE

GENERAL NOTES

1. ALL ELECTRICAL WORKS SHALL BE DONE IN ACCORDANCE WITH THE PROVISION OF THE LATEST EDITION OF THE PHILIPPINE ELECTRICAL CODE PART I AND II, THE LAWS AND ORDINANCES OF THE LOCAL CODE ENFORCING AUTHORITIES AND THE REQUIREMENTS OF THE LOCAL POWER COMPANY.
2. THE ELECTRICAL WORK SHALL BE DONE UNDER THE DIRECT AND IMMEDIATE SUPERVISION OF A DULY REGISTERED ELECTRICAL ENGINEER.
3. PERFORMANCE OF THE ROAD LIGHT SUCH AS ILLUMINANCE LEVEL SHALL COMPLY WITH THE REQUIREMENTS OF THE SPECIFICATION.
4. THE ELECTRICAL CONTRACTOR SHALL SECURE ALL PERMITS AND PAY ALL FEES REQUIRED FOR THE WORK AND FURNISH THE OWNER THROUGH THE ENGINEERS FINAL CERTIFICATE OF ELECTRICAL INSPECTION AND APPROVAL FROM PROPER GOVERNMENT AUTHORITIES FOR COMPLETE WORK.
5. THE ELECTRICAL MATERIALS TO BE USED AND EQUIPMENT TO BE INSTALLED SHALL BE BRAND NEW AND SHALL BE OF THE APPROVED TYPES FOR THE PARTICULAR LOCATION AND PURPOSE INTENDED.
6. ALL ROAD LIGHTS AND WARNING LIGHTS SHALL BE POWERED FROM SOLAR PHOTOVOLTAIC (PV) SYSTEM WITH STORAGE BATTERY.
7. ALL BOXES SHALL BE OF STEEL AND ZINC CHROMATED PROTECTED.
8. ALL UNDERGROUND CONDUIT PIPES AND CONDUIT RUN EMBEDDED IN CONCRETE SHALL BE UNPLASTICIZED POLYVINYL CHLORIDE CONDUIT (uPVC).
9. UNDERGROUND CONDUIT RUNS SHALL BE BURIED AT A MINIMUM OF 600mm BELOW GROUND LEVEL CONDUIT RUN CROSSING STREET BE ENCASED IN CONCRETE WITH STEEL BAR REINFORCED, 2500 psi CONCRETE WITH MINIMUM 75mm (3 INCHES) COVER ALL AROUND.
10. UNPROTECTED CONDUIT RISERS AND EXPOSED CONDUIT RUNS SHALL BE INTERMEDIATE METAL CONDUITS (IMC).
11. ALL STREET LUMINAIRE ASSEMBLY INCLUDES LED LUMINAIRE, PV POWER SUPPLY EQUIPMENT (CONTROL AND BATTERY PANEL), AND FOUNDATION SHALL WITHSTAND UP TO 240KPH FOR 1-HOUR GUSTING WINDS WITHOUT PERMANENT DEFORMATION.
12. ALL SPARE PIPES INCLUDING PULL BOXES EMBEDDED IN THE STRUCTURE WALL SHOWN ON THE STRUCTURE DRAWING WILL BE USED AS CONDUIT, IN CASE THAT THE ROAD LIGHT IS POWERED FROM ELECTRICAL UTILITY COMPANY (EC) IN FUTURE OR EMERGENCY. THE SPARE PIPES, PULL WIRE AND PULL BOXES SHALL BE INSTALLED BY THE ELECTRICAL WORKS.
13. FOR EXISTING CABLE RUNS WHICH WILL BE REPLACED BEFORE REMOVING THE CABLE SHALL BE TESTED IF FREE FROM GROUND AND CAN STILL BE RE-USED. IF FOUND GROUNDED, THESE CABLES SHALL BE REMOVED AND TURN OVER TO THE CLIENT.

DESIGN GUIDLINES FOR ROADWAY LIGHTING

SECTION 1 OBJECTIVE

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

SECTION 2 MINIMUM TECNICAL REQUIREMENT

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

SECTION 2.1 ELECTRICAL SYSTEM (SOLAR-POWERED)

1. THE ILLUMINATION SHALL BE UNIFORM WITHOUT DARK BANDS OR ABRUPT VARIATIONS AND SHOULD BE SOOTHING TO THE EYE. THE LIGHT OUTPUT FROM THE WHITE LIGHT EMITTING DIODE (LED) LIGHT SOURCE SHOULD BE ALMOST CONSTANT AND HIGHER LIGHT OUTPUT WILL BE PREFERRED. THE ACCEPTABLE LEVELS OF LUMINANCE SHALL BE ACHIEVED UNDER NORMAL OPERATIONS.
2. COLOR TEMPERATURE FOR LED CAN VARY BETWEEN "WARM WHITE" AND "WARM YELLOW" THE USE LEDS WHICH EMITS ULTRAVIOLET LIGHT SHALL NOT BE PERMITTED.
3. THE LAMPS SHALL BE HOUSED IN AN ASSEMBLY FOR OUTDOOR USE AND SHALL BE RATED ASSEMBLY RATED IP65 WITH A REFLECTOR ON ITS BACK. THE LED HOUSING SHALL BE MADE OF CORROSION RESISTANT PRESSURE DIE-CAST ALUMINUM WITH A POWDER COATED FINISH OF A NEUTRAL COLOR HAVING A SUFFICIENT AREA FOR HEAT DISSIPATION AND HEAT RESISTANT TOUGHENED CLEAR GLASS/ HIGH QUALITY POLYCARBONATE FITTED WITH PRESSURIZED DIE-CAST ALUMINUM FRAME WITH SCREWS. THE TEMPERATURE OF THE HEAT SINK SHOULD NOT INCREASED MORE 20% ABOVE AMBIENT TEMPERATURE EVEN AFTER 48 HOURS OF CONTINUOUS OPERATION. THE DUTY CYCLE OF THE LED SHOULD COMPLY WITH THE DUSK TO DAWN OPERATION OF THE LAMPS WHILE THE BATTERY OPERATES AT ANY VOLTAGE BETWEEN THE LOAD DISCONNECT AND CHARGE REGULATION SET POINT.

   LED SHALL BE PROCURED FROM A MANUFACTURER WHO HAS TEST REPORTS FROM IESNA LM80-08 AND TM-21-11 QUALIFIED FOR RELEVANT LED PRODUCT TESTING, PARTICULARLY FOR ROADWAY LIGHTING.
4. THE ELECTRICAL CABLE SHALL BE TWIN CORE PVC INSULATED WATER AND UV RESISTANT COPPER CABLE OF 1.5mm DIAMETER MINIMUM SIZE.
5. THE CHARGE CONTROLLER SHALL HAVE AN AUTOMATIC DUSK UNTIL DAWN CIRCUIT BASED ON A SOLAR PHOTOVOLTAIC MODULE AS A SENSOR FOR SWITCHING ON/OFF THE STREET LIGHT WITHOUT MANUAL INTERVENTION AND AN SPECIFIED OPERATION PROFILE DURING PROJECT ANALYSIS. ALL THIS CONTROL SHOULD KEEP THE SYSTEM OPERATING AT PEAK PERFORMANCE SHALL INCREASE THE SYSTEM'S LIFESPAN AND SHOULD OPERATE AS ILLUSTRATED IN THE FIGURE BELOW.
6. THE PHOTOELECTRIC CONTROL'S OPERATING CONDITION SHALL TURN ON AT A NOMINAL LIGHT LEVEL SETTING OF 10.76 LUX WHICH IS WITHIN THE LIMITS OF 5.38 LUX TO 21.53 LUX AT RATED VOLTAGE OF 240 VOLTS. BENEFITS THE RATIO OF THE TURN-OFF TO THE TURN-ON LIGHT LEVEL SHALL BE DESIGNED WITH A FAIL-ON FAILURE MODE AND SHALL BE INSTALLED AT EACH LIGHTING POST FOR INDIVIDUAL LAMP CONTROL. THE EYE OF THE CELL SHOULD BE ORIENTED TO FACE NORTH, CONTROL CONDUCTOR AND THE NECESSARY CONNECTION SHALL BE MADE FOR COMPLETE SATISFACTORY OPERATION OF THE STREET LUMINAIRE.
7. THE BATTERY SHALL BE LITHIUM ION OR DEEP CYCLE, LEAD-ACID TYPE ELECTROLYTE PLATE LEAD ACID WITH LOW ANTIMONY LEAD ALLOY PLATES AND CERAMIC VENT PLUGS AND SHALL BE CATEGORIZED BY LOW MAINTENANCE REQUIREMENTS, LONG SERVICE LIFE, AND EXCELLENT CAPACITY PERFORMANCE EVEN IN HIGH TEMPERATURE.
8. THE SOLAR PHOTOVOLTAIC MODULE MUST BE MADE OF CRYSTALLINE HIGH POWER EFFICIENCY CELLS AND SHALL BE USED AND MUST BE WARRANTED FOR OUTPUT WATTAGE WHICH MUST BE GREATER THAN 90% AFTER 10 YEARS AND LESS THAN 80% AFTER 25 YEARS. THE PROJECT WILL ONLY USE INDIGENOUS MODULES FROM REPUTABLE BRANDS.

   THE TERMINAL BOX ON THE MODULE MUST BE DESIGNED FOR LONG TERM OUTDOOR OPERATION IN HARSH ENVIRONMENTS, WITH AN OPENING FOR REPLACING THE CABLE IF NECESSARY. HENCE, PROTECTIVE DEVICES AGAINST SURGES AT THE PV MODULE SHALL BE PROVIDED.
9. THE GROUNDING SYSTEM SHALL HAVE LOW RESISTANCE AND LOW IMPEDANCE ATTRIBUTE TO PROTECT SOLAR STREET LIGHTS FROM EXTENSIVE LIGHTNING DAMAGE. AFTER ESTABLISHING THE STABLE GROUNDING SYSTEM, A SURGE PROTECTION DEVICE (SPD) SYSTEM SHOULD BE INSTALLED.
10. AUTOMATIC SELF CLEANING MECHANISM SHALL HAVE A BRUSH WITH THICK AND SOFT BRISTLES IDEAL FOR CLEANING HEAVY DUST PARTICLES WITH FLAT FITTING ON THE SOLAR PANEL SHALL BE DESIGNED FOR AREAS WHERE SEA SPRAY, DUST, AND DIRT THAT MAY COVER THE PANEL PREVENTING THE BATTERY FROM BEING FULLY CHARGED. THE BRUSH SHOULD BE AUTOMATED TO ALLOW THOROUGH CLEANING EVERY FOUR HOURS AND SHALL ROUTINELY RETURN TO ITS INITIAL POSITION TO PREVENT FROM BEING JAMMED WHEN ENCOUNTERING LARGE OBSTACLES THAT MAY CAUSE MOTOR DAMAGE. THE CASING SHALL BE MADE OF AN ALUMINUM ALLOY FOR INCREASED DURABILITY.
11. THE MOTION SENSOR FEATURE SHALL HAVE DIFFERENT POWER CONTROL DEPENDING ON THE PERIOD WITHIN 8-METER RADIUS AND SHALL SET AND LOWER BRIGHTNESS IN A REDUCED PEDESTRIAN AFTER MIDNIGHT TO SAVE ENERGY AND IMPROVE PRACTICALITY.

SECTION 2.2 STRUCTURAL SYSTEM

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

   STANDARD LIGHT POLES TO BE UTILIZED WITH SOLAR SHOULD HAVE LARGER BASES AND MORE SUBSTANTIAL FOUNDATIONS DUE TO THE WEIGHT OF THE SOLAR POWER ASSEMBLY AND SHOULD HAVE AN EFFECTIVE PROJECTED AREA (EPA) CAPACITY THAT COULD WITHSTAND SEVERAL WIND VELOCITIES UP TO 240KPH IN ACCORDANCE WITH AASHTO LTS-6, AS STANDARD POLES ARE TOO WEAK TO HANDLE THE WEIGHT OF THE SYSTEM AND CAN QUICKLY FAIL. POLES SHOULD BE MANUFACTURED EXCLUSIVELY FOR THE PROJECT WITH APPROPRIATE HEIGHT AS IT INFLUENCES THE INTENSITY, UNIFORMITY, AND AREA OF ILLUMINATION.
   THE LOCATION OF STREET LIGHTING POSTS SHOWN ON THE DRAWINGS ARE APPROXIMATE AND THE EXACT LOCATION SHALL BE DETERMINED/ESTABLISHED BY THE ENGINEER IN THE FIELD.
2. SOLAR FIXTURE BRACKET SHOULD DIRECT THE PV SOLAR FACING SOUTH (OR TOWARDS THE EQUATOR) AND SHOULD ALLOW THE FIXTURE INSTALLATION TO FACE THE CORRECT DIRECTION IF IT IS ATTACHED TO THE PANEL SHALL BE DESIGNED TO MEET THE STRENGTH REQUIREMENTS OF THE LATEST EDITION OF THE NATIONAL STRUCTURAL CODE OF THE PHILIPPINES (NSCP) AND SHOULD BE PROVIDED WITH A MOUNTING PLATE AND STIFFENER TO INCREASE ITS LOAD-BEARING CAPACITY.
   HARDWARE SUCH AS HINGES, LATCHES, SPRINGS, NUTS, SCREWS, WASHERS, PINS, AMONG OTHERS SHALL BE MADE OF MATERIALS COMPATIBLE TO THE HOUSING MATERIAL AND SHALL BE INHERENTLY CORROSION PROOF OR HAVE BEEN PROTECTED BY FINISHES APPROVED FOR CORROSION RESISTANCE. HOWEVER, THOSE EXPOSED TO THE ELEMENTS SHALL BE MADE OF HIGH GRADE STAINLESS STEEL.
3. STREET LIGHTING POST CONCRETE FOOTING SHALL BE CLASS A AND SHALL CONFORM WITH SUBSECTION 405.2 MATERIAL REQUIREMENTS OF ITEM 405 STRUCTURAL CONCRETE.
   ALL ELECTRICAL LIGHTING POST FOOTINGS WITH DIMENSIONS INDICATED IN THE PLANS SHALL BE REINFORCED CONCRETE AND SHALL CONFORM WITH THE REQUIREMENTS FOR CONCRETE STRUCTURES OF THIS SPECIFICATION. EXCAVATION AND BACKFILL FOR FOUNDATION INCLUDING DISPOSAL OF SURPLUS MATERIAL SHALL BE PROVIDED. EXCAVATED HOLES FOR CONCRETE FOOTINGS SHALL BE NEAT OR PROPERLY FORMED AND FREE FROM LOOSE MATERIALS WHEN THE CONCRETE IS PLACED.
   CONCRETE FOUNDATION SHALL BE DESIGNED AND CONSTRUCTED IN ACCORDANCE WITH THE LATEST EDITION OF THE NATIONAL STRUCTURAL CODE OF THE PHILIPPINES (NSCP) TO RESIST WIND VELOCITY AND VIBRATIONS INHERENT IN THE AREA WHERE THE POLES WILL BE CONSTRUCTED AND LOCATED TO PROVIDE ADEQUATE SUPPORT FOR THE LUMINAIRE AND POLE STRUCTURE.

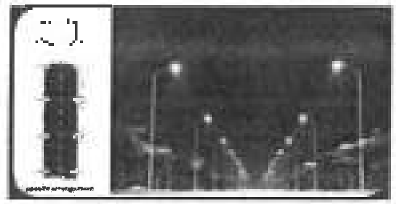
SECTION 3 ROADWAY LIGHTING SECTION AND CONFIGURATION

SECTION 3.1 LIGHTING ARRANGEMENT

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

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

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



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

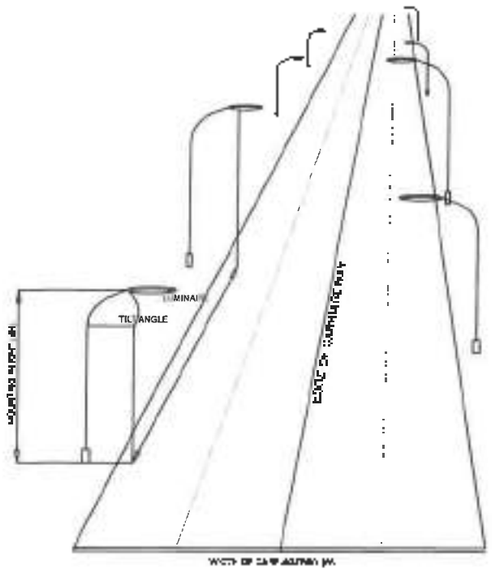
ARRANGEMENT SUCH AS OPPOSITE, STAGGERED, AND ONE SIDED ARE TYPICAL INSTALLED 30 TO 40 METERS APART WHEN DESIGNING PRIMARY AND SECONDARY ROADS IF AXIAL AND OPPOSITE ARRANGEMENTS LACK THE REQUIRED ILLUMINATION, THEY CAN BE COMBINED WITH SINGLE-SIDED COMBINED WITH THE SINGLE-SIDED ARRANGEMENTS.

Republic of the Philippines DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS REGIONAL OFFICE NO. VIII NORTHERN SAMAR FIRST DISTRICT ENGINEERING OFFICE	PROJECT NAME AND LOCATION: CONSTRUCTION OF ROAD LIGHTS ... SOLAR POWERED ... NORTHERN SAMAR	SHEET CONTENTS: GENERAL NOTES	DRAWN/DESIGNED: JEFF F. ... ENGINEER II	REVIEWED: MARK DONALD N. ERMAN ... PLANNING & DESIGN SECTION DATE:	SUBMITTED: ANDY S. ... CHIEF, PLANNING & DESIGN SECTION DATE:	RECOMMENDED: VIVIANO ... BIACO ASSISTANT DISTRICT ENGINEER DATE:	APPROVED: ALVIN A. IGNACIO DISTRICT ENGINEER DATE:	SET NO. / SHEET NO. 05 / 58

GENERAL NOTES

SECTION 3.2 MOUNTING HEIGHT, SPACING, MAST ARM, OVERHANG

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



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

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

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

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

POLE ARM
THE USE OF AN ARM SPACES THE LIGHT SOURCE CLOSER TO THE TRAVELED PATH WHILE ALLOWING THE POLE TO BE PLACED AWAY FROM THE EDGE OF THE RATING STRIP. DEPENDING ON THE APPLICATION, PULLARMS CAN BE SINGLE AND/OR DOUBLE OUTPUT OR MAST ARMS AND LOCATED AT THE UPPERMOST PART OF THE POLE.

THE POLE ARM LENGTH OF THE TILT SHALL BE KEPT PROMPTLY TO 30° OTHERWISE STRONG LIGHT SHALL AFFECT THE DRIVER'S EYES BY CAUSING DISCOMFORT GLARE. THE TILT GETS LARGER AS THE UNIFORMITY INTO INCREASE.

SETBACK
THE SETBACK IS THE HORIZONTAL DISTANCE BETWEEN THE FACE OF A LIGHT POLE AND THE EDGE OF THE TRAVELED WAY. THE MINIMUM ALLOWABLE VALUE IS 0.61 M (2 FT) TO 1.5 METERS. BRIDGE BATTERSLY SHORTER BACK GRAZES THE SURFACE AND ENHANCES THE FEATURE AND LONG SETBACKS CAUSE SHADOWS AT LOW LEVELS.

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

[illegible]	[illegible]
50	0.6
80	1.0
100	1.5
120	1.5

TABLE 1 DESIGNATED AND DRIVER SETBACK VALUES WITH ROADWAY DESIGN SPEED EQUIVALENT

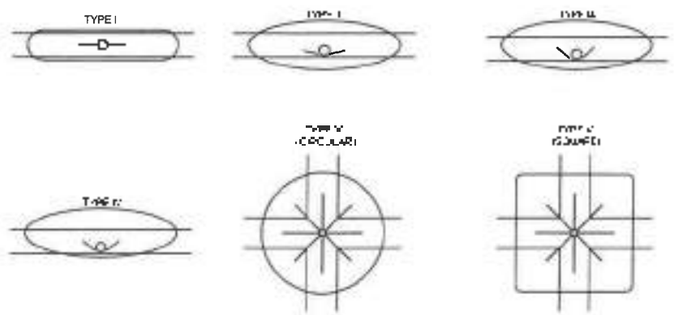
OUTREACH
THE OUTREACH OR HORIZONTAL DISTANCE BETWEEN THE LUMINAIRES CENTER AND THE COLUMNS CENTER IS TYPICALLY ESTABLISHED IN ACCORDANCE WITH THE ARCHITECTURAL AESTHETIC CONDITIONS.

ROAD CLASSIFICATION	LIGHTING ARRANGEMENT	ROAD WIDTH (meter)	POLE PLACING (meter)	MOUNTING HEIGHT (meter)	LAMP WATTAGE (watt) HPS	LED	MAST ARM LENGTH (meter)
PRIMARY	SINGLE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	DOUBLE	[illegible]	[illegible]	[illegible]	150-250	[illegible]	[illegible]
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	OPPOSITE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		[illegible]	[illegible]	[illegible]	300-400	[illegible]	[illegible]
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	STAGGERED	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		[illegible]	[illegible]	[illegible]	[illegible]	200-300	[illegible]
SECONDARY	SINGLE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	OPPOSITE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	STAGGERED	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
TERTIARY	SINGLE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	STAGGERED	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

TABLE 2 ROADWAY LIGHTING STATIONING AND PARAMETERS

SECTION 3.3 PHOTOMETRIC REQUIREMENTS AND COMPUTATION

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



LUMINAIRES TRANSVERSE PROJECTION CAN BE CONSIDERED AS TYPES I, II, III, IV, AND V, AS SHOWN IN THE FIGURE ABOVE. CHARACTERISTICS THAT SHOW THE MAXIMUM INTENSITY OF THE LIGHT IS ABOVE 80° AND 90° TO AVOID GLARE AND STILL LIGHT. IT IS CLASSIFIED AS FULL CUTOFF, SEMI-CUTOFF, AND NON-CUTOFF.

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

GENERAL EQUATION

FOR ILLUMINANCE

$$E_{avg} = \frac{\Phi_{lamp}(CU)(MF)}{A_{wp}}$$

E_{avg} = Average Maintained Illuminance on the Work Area
Φ_{lamp} = Total System Lamp Lumen Output
MF = Light Loss Factor
A_{wp} = Area of the Work Plane

FOR STREETLIGHT SPACING

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

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

[illegible]

EACH ILLUMINATE HAS ITS OWN COEFFICIENT OF UTILIZATION AND IS OBTAINED FROM THE REPUTABLE MANUFACTURER'S DATA, SPECIFIC TO ITS LIGHT DISTRIBUTION AND EFFICIENCY.

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

ILLUMINANCE LEVELS RECOMMENDED FOR ROADWAYS						
ROADWAY & PEDESTRIAN CONFLICT AREA		PAVEMENT CLASSIFICATION			UNIFORMITY RATIO (AVERAGE/MINIMUM)	VEILING LUMINANCE RATIO (MAXIMUM/AVERAGE)
ROAD	PEDESTRIAN CONFLICT AREA	R1 (lux)	R2/R3 (lux)	R4 (lux)		
PRIMARY CLASS A		[illegible]	[illegible]	[illegible]	3	0.3
PRIMARY CLASS B		[illegible]	[illegible]	[illegible]	3	0.3
EXPRESSWAY	HIGH	[illegible]	[illegible]	[illegible]	3	0.3
	MEDIUM	[illegible]	[illegible]	[illegible]	3	0.3
	LOW	[illegible]	[illegible]	[illegible]	3	0.3
MAJOR ROADWAY	HIGH	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	MEDIUM	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	LOW	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
COLLECTOR SECONDARY	HIGH	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	MEDIUM	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	LOW	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LOCAL TERTIARY	HIGH	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	MEDIUM	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	LOW	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

TABLE 3 [illegible] RECOMMENDED MAINTAINED AVERAGE HORIZONTAL ILLUMINANCE FOR ROADWAY [illegible] TYPES OF ROADS, PAVEMENTS, AND PEDESTRIAN CONDITIONS (REFER FROM [illegible])

* ACCORDING TO NATIONAL ROAD CLASSIFICATIONS

DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS NORTHERN SAMAR FIRST DISTRICT ENGINEERING OFFICE	PROJECT NAME AND LOCATION CONCRETING OF BRGY. LIBAS TO BRGY. BUENAVISTA (INCL. BRGY. LIBAS AND BRGY. BUENAVISTA), BOBON, NORTHERN SAMAR BOBON, NORTHERN SAMAR	SHEET CONTENTS GENERAL NOTES	DRAFTED BY JEFF [illegible] ENGINEER	REVIEWED MAR DONALD N. EMAN [illegible]	SUBMITTED ANDY B. [illegible] [illegible]	RECOMMENDED VIVIAN [illegible] [illegible]	APPROVED ALVIN A. IGNACIO DISTRICT ENGINEER	SHEET NO. GS 5 OF 10	DATE DG 5A

SECTION 4 DESIGN CONSIDERATIONS

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

FACTORS IN DESIGNING ROADWAY LIGHTING SYSTEM

THE EXPERTISE REQUIRED FOR LIGHTING DESIGNS INCLUDES

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

MASTER LIGHTING PLAN

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

ILLUMINANCE CONSIDERATIONS

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

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

PEDESTRIAN	VEHICULAR TRAFFIC CLASSIFICATION			
	[illegible]	LIGHT	MEDIUM	[illegible]
TRAFFIC	UNDER 150	150-500	500-1000	1000 AND UP
HEAVY	9.00	12.00	15.00	21.00
MEDIUM	6.00	9.00	10.00	12.00
LIGHT	2.00	4.00	6.00	9.00

TABLE 1 RECOMMENDED AVERAGE MAINTAINED ILLUMINATION FOR LEVEL 1 & 2 ROADWAY LIGHTING DESIGN GUIDE

POLE HEIGHT (M)						
ROAD CLASSIFICATION	PEDESTRIAN (NUMBER)	1 LANE ONE SIDE	2 LANES ONE SIDE	2 LANES ONE SIDE	4 LANES OPPOSITE	6 LANES OPPOSITE
FREEWAY CLASS II		10 (40)	12 (40)	12 (40)	15 (40)	15 (40)
FREEWAY CLASS I		10 (40)	12 (40)	12 (40)	15 (40)	15 (40)
EXPRESSWAY	HIGH		12 (40)	12 (40)	12 (40)	12 (40)
	MEDIUM		12 (40)	12 (40)	12 (40)	12 (40)
	LOW		12 (40)	12 (40)	12 (40)	12 (40)
MAJOR ARTERIAL	HIGH		12 (40)	12 (40)	12 (40)	12 (40)
	MEDIUM		12 (40)	12 (40)	12 (40)	12 (40)
	LOW		12 (40)	12 (40)	12 (40)	12 (40)
COLLECTOR SECONDARY	HIGH		10 (35)	10 (35)	10 (35)	12 (40)
	MEDIUM		10 (35)	10 (35)	10 (35)	12 (40)
	LOW		10 (35)	10 (35)	10 (35)	12 (40)
LOCAL TERTIARY	HIGH	10 (35)	10 (35)	10 (35)		
	MEDIUM	10 (35)	10 (35)	10 (35)		
	LOW	10 (35)	10 (35)	10 (35)		

TABLE 2 POLE HEIGHT BY ROADWAY CONFIGURATION (SEMI-ROADWAY)

WARRANTING CONDITIONS

LIGHTING BENEFITS MOTORISTS BY IMPROVING THEIR ABILITY TO SEE ROADWAY GEOMETRY AND OTHER VEHICLES AT EXTENDED DISTANCE AHEAD, THEREBY, IN GREATER DRIVER CONFIDENCE AND IMPROVED SAFETY, WHICH IN RETURN IMPROVES HIGHWAY CAPACITY, PEDESTRIAN SAFETY, PUBLIC SAFETY, SECURITY AND CONVENIENCE.

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

CASE	WARRANTING CONDITIONS
CASE 1	SECTIONS IN AN URBAN CITY WHERE THE CURRENT AVERAGE DAILY TRAFFIC (ADT) IS 30,000 OR GREATER
CASE 2	INTERCHANGE WHERE THREE OR MORE SINGLE LANE RAMPS ARE LOCATED WITHIN AN AVERAGE SPACING OF 1 KM OR LESS, AND AT LEAST TWO OF THE INTERCHANGE RAMPS ARE IN URBAN OR SUBURBAN AREAS
CASE 3	SECTIONS OF THE ROADWAY PASSING THROUGH ALREADY PARTIALLY DEVELOPED AREAS OF SUBURBAN NATURE WHERE ONE OR MORE OF THE FOLLOWING CONDITIONS EXIST LOCAL TRAFFIC OPERATES ON A COMMERCIAL STREET THAT HAS NO STREET LIGHTING, WHICH IS VISIBLE AND VISIBLE TO THE EXPRESSWAY THE EXPRESSWAY PASSES THROUGH A NATURAL BARRIER OR TERRAIN THAT SUCH AS RESERVATION, COMMERCIAL AREA, AND OTHER AREAS, COLLEGES, PARKS, FAIRGROUNDS, ETC. THAT INCLUDE INSTITUTIONS, STREETS, PARKING AREAS, TRAILS, ETC. THAT ARE LIGHTED IN THE LOCAL STREET SYSTEM THE EXPRESSWAY CROSS SECTION IS NARROW, WITH SHOULDERS AND BERMS ARE SUBSTANTIALLY REDUCED IN WIDTH OR CONSIDERABLE SECTIONS OFTEN IN RELATIVELY OPEN COUNTRY
CASE 4	SECTIONS WHERE THE RATIO OF NIGHT TO DAY CRASH RATE IS AT LEAST 3 TIMES THE REGIONAL AVERAGE FOR ALL UNLIMITED SIMILAR SECTIONS, AND A STUDY INDICATES THAT LIGHTING MAY BE EXPECTED TO RESULT IN A SIGNIFICANT REDUCTION IN THE NIGHT CRASH RATE, WHEN CHARACTERISTICS ARE NOT AVAILABLE, RATE COMPARISON MAY BE USED AS A GENERAL GUIDE FOR CRASH SEVERITY

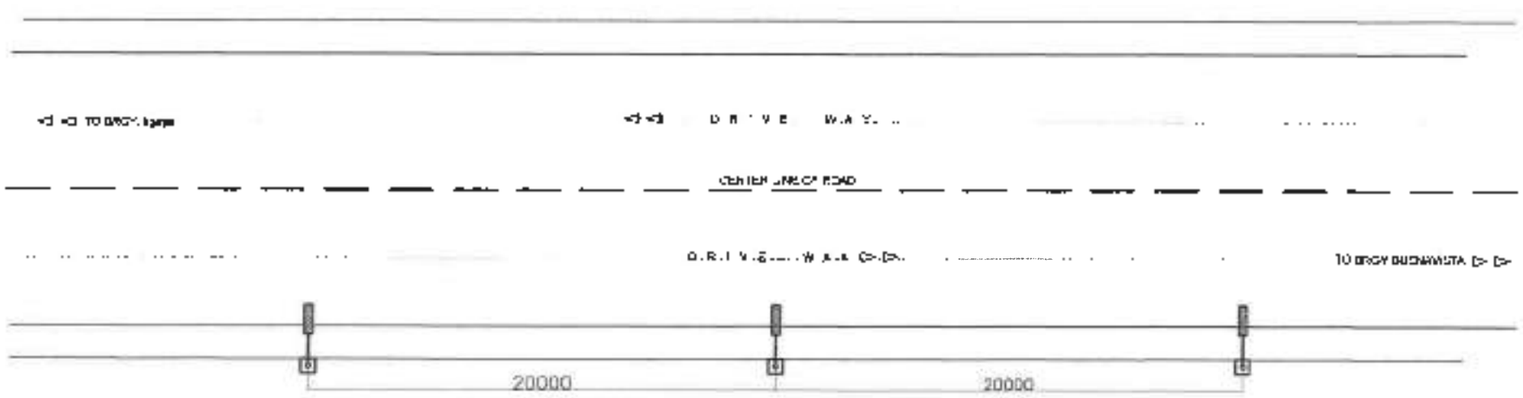
TABLE 4 WARRANTING CONDITIONS FOR CONTINUOUS EXPRESSWAY LIGHTING (NIGHT-OVER, NIGHTAM LIGHTING DESIGN GUIDE)

CASE	WARRANTING CONDITIONS
CASE 1	WHERE THE TOTAL CURRENT ADT RAMP ENTERING AND LEAVING EXPRESSWAY WITHIN THE ADJACENT AREAS EXCEEDS 10,000 FOR URBAN CONDITIONS, 5,000 FOR SUBURBAN CONDITIONS, OR 2,000 FOR RURAL CONDITIONS
CASE 2	WHERE THE CURRENT ADT ON THE CROSSROAD EXCEEDS 10,000 FOR URBAN CONDITIONS, 5,000 FOR SUBURBAN CONDITIONS, OR 2,000 FOR RURAL CONDITIONS
CASE 3	WHERE A STREET LIGHTING SYSTEM IS DEVELOPED THAT IT LIGHTS DURING HOURS OF DARKNESS IS LOCATED WITHIN THE MAGNIFICENCE OF THE INTERCHANGE OR WHERE THE CROSSROAD APPROACH SIGNALIZED ITEM HAS ONE OR MORE ON AND OFF SIDE OF THE INTERCHANGE
CASE 4	WHERE THE RATIO OF NIGHT TO DAY CRASH RATE WITHIN THE INTERCHANGE AREA IS AT LEAST 3 TIMES THE REGIONAL AVERAGE FOR ALL UNLIMITED SIMILAR SECTIONS, AND A STUDY INDICATES THAT LIGHTING MAY BE EXPECTED TO RESULT IN A SIGNIFICANT REDUCTION IN THE NIGHT CRASH RATE. WHERE CRASH DATA IS NOT AVAILABLE, RATE COMPARISON MAY BE USED AS A GENERAL GUIDE FOR CRASH SEVERITY

TABLE 7 WARRANTING CONDITIONS FOR CONTINUOUS INTERCHANGE LIGHTING (NIGHTAM LIGHTING DESIGN GUIDE)

DESIGN CRITERIA

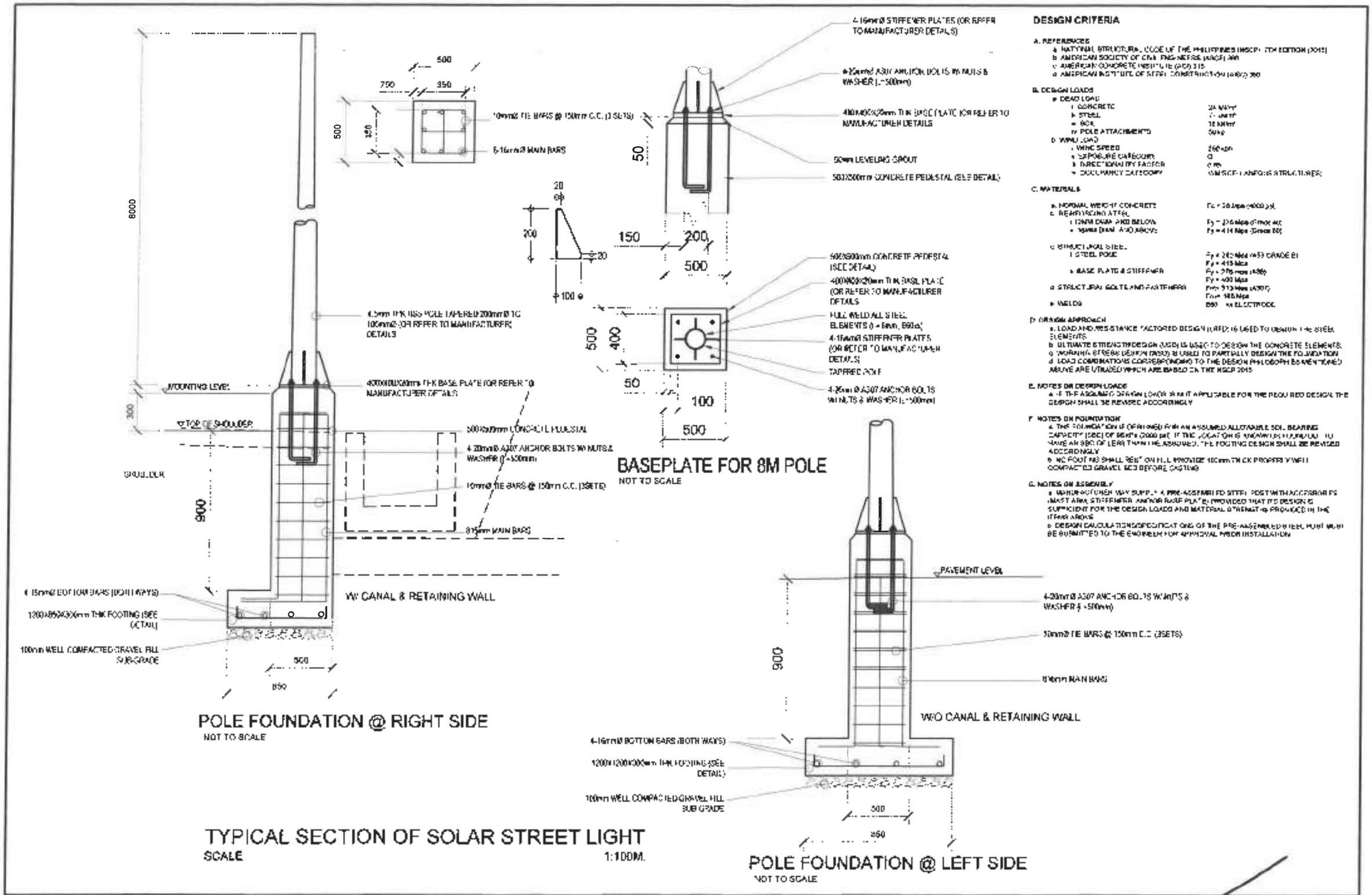
1. DPWH DESIGN GUIDELINES, CRITERIA, AND STANDARDS (DGCS) 2015 EDITION
2. NATIONAL STRUCTURE CODE OF THE PHILIPPINES
3. PHILIPPINE ELECTRICAL CODE, PART 2, 2017
4. ROADWAY LIGHTING DESIGN GUIDE, 7th EDITION, 2016
5. ILLUMINATING ENGINEERING SOCIETY OF NORTH AMERICA (IESNA) LIGHTING HANDBOOK, 9th EDITION, 2000

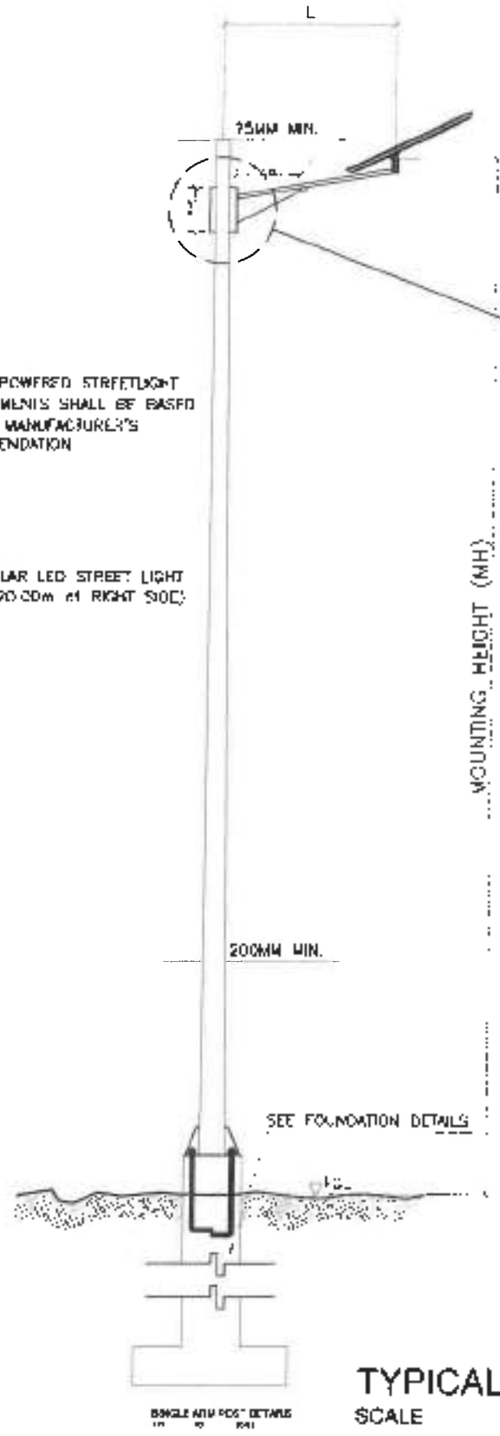


STRAIGHT LINE DIAGRAM OF STREET LIGHT

NTS

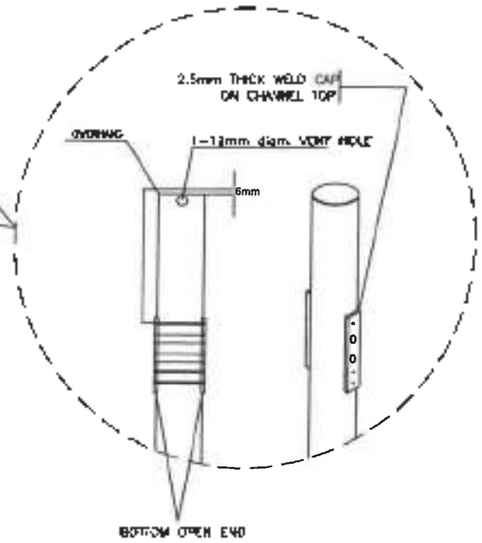
Republic of the Philippines DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS NORTHERN SAMAR FIRST DISTRICT ENGINEERING OFFICE	PROJECT NAME AND LOCATION: CONCRETING OF BRGY. LOAYA TO BRGY. BUENAVISTA FMR, BRGY. LOAYA AND BRGY. BUENAVISTA, CATARMAN, NORTHERN SAMAR	SHEET CONTENTS: STRAIGHT LINE DIAGRAM OF STREET LIGHT	DRAFTSMAN/DESIGNER: JEFF F. FERROLA, ENGINEER	REVIEWED: MARDONALD N. EMAN, ASST. DIST. ENGINEER	SUBMITTED: ANDY S. ERERO, DIST. ENGINEER	RECOMMENDED: ALVIN A. BLACO, ASST. DIST. ENGINEER	APPROVED: ALVIN A. IGNACIO, DISTRICT ENGINEER	SHEET 09 OF 50

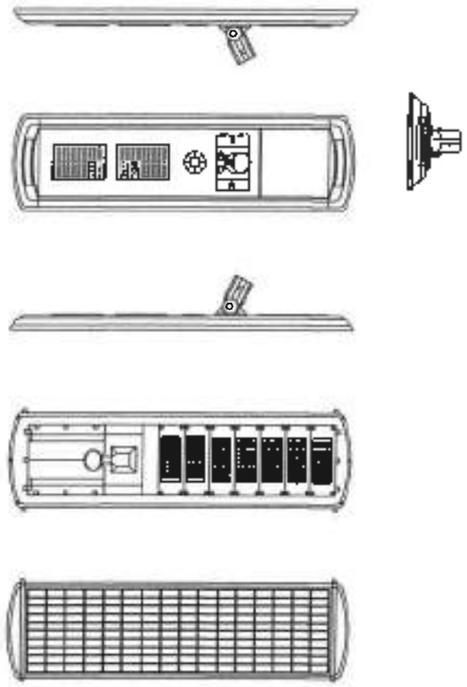

4-16mmØ STIFFENER PLATES (OR REFER TO MANUFACTURER DETAILS)
4-20mmØ A307 ANCHOR BOLTS W/ NUTS & WASHER (L=500mm)
400X400X20mm THK BASE PLATE (OR REFER TO MANUFACTURER DETAILS
50mm LEVELING GROUT
500X500mm CONCRETE PEDESTAL (SEE DETAIL)
500X500mm CONCRETE PEDESTAL (SEE DETAIL)
400X400X20mm THK BASE PLATE (OR REFER TO MANUFACTURER DETAILS
FULL WELD ALL STEEL ELEMENTS
4-16mmØ STIFFENER PLATES (OR REFER TO MANUFACTURER DETAILS)
TAPERED POLE
4-20mmØ A307 ANCHOR BOLTS W/ NUTS & WASHER (L=500mm)
10mmØ TIE BARS @ 150mm C.C. (3SETS)
6-16mmØ MAIN BARS
MOUNTING LEVEL
TOP OF SHOULDER
500X500mm CONCRETE PEDESTAL
4-20mmØ A307 ANCHOR BOLTS W/ NUTS & WASHER (L=500mm)
10mmØ TIE BARS @ 150mm C.C. (3SETS)
8-16mmØ MAIN BARS
SHOULDER
W/ CANAL & RETAINING WALL
4-16mmØ BOTTOM BARS (BOTH WAYS)
1200X850X300mm THK FOOTING (SEE DETAIL)
100mm WELL COMPACTED GRAVEL FILL SUB-GRADE
BASEPLATE FOR 8M POLE
NOT TO SCALE
POLE FOUNDATION @ RIGHT SIDE
NOT TO SCALE
PAVEMENT LEVEL
4-20mmØ A307 ANCHOR BOLTS W/ NUTS & WASHER (L=500mm)
10mmØ TIE BARS @ 150mm C.C. (3SETS)
8-16mmØ MAIN BARS
W/O CANAL & RETAINING WALL
4-16mmØ BOTTOM BARS (BOTH WAYS)
1200X1200X300mm THK FOOTING (SEE DETAIL)
100mm WELL COMPACTED GRAVEL FILL SUB GRADE
TYPICAL SECTION OF SOLAR STREET LIGHT
SCALE 1:100M.
POLE FOUNDATION @ LEFT SIDE
NOT TO SCALE
DESIGN CRITERIA
A. REFERENCES
a. NATIONAL STRUCTURAL CODE OF THE PHILIPPINES (NSCP) 7TH EDITION (2015)
b. AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE) 360
c. AMERICAN CONCRETE INSTITUTE (ACI) 318
d. AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC) 360
B. DESIGN LOADS
a. DEAD LOAD
i. CONCRETE 24 kN/m³
ii. STEEL 77 kN/m³
iii. SOIL 18 kN/m³
iv. POLE ATTACHMENTS 5kN
b. WIND LOAD
i. WIND SPEED 250 km/h
ii. EXPOSURE CATEGORY C
iii. DIRECTIONALITY FACTOR 0.85
iv. OCCUPANCY CATEGORY WIND SOLAR LANDSCAPE STRUCTURES
C. MATERIALS
a. NORMAL WEIGHT CONCRETE f'c = 28 Mpa (4000 psi)
b. REINFORCING STEEL
i. 12MM DIAM AND BELOW Fy = 276 Mpa (Grade 40)
ii. 16MM DIAM AND ABOVE Fy = 414 Mpa (Grade 60)
c. STRUCTURAL STEEL
i. STEEL POLE Fy = 240 Mpa (A53 GRADE B)
Fy = 415 Mpa
ii. BASE PLATE & STIFFENER Fy = 275 Mpa (A36)
Fy = 400 Mpa
d. STRUCTURAL BOLTS AND FASTENERS Fy = 310 Mpa (A307)
Fu = 415 Mpa
e. WELDS E60 xx ELECTRODE
D. DESIGN APPROACH
a. LOAD AND RESISTANCE FACTORED DESIGN (LRFD) IS USED TO DESIGN THE STEEL ELEMENTS.
b. ULTIMATE STRENGTH DESIGN (USD) IS USED TO DESIGN THE CONCRETE ELEMENTS.
c. WORKING STRESS DESIGN (WSD) IS USED TO PARTIALLY DESIGN THE FOUNDATION
d. LOAD COMBINATIONS CORRESPONDING TO THE DESIGN PHILOSOPHY MENTIONED ABOVE ARE UTILIZED WHICH ARE BASED ON THE NSCP 2015
E. NOTES ON DESIGN LOADS
a. IF THE ASSUMED DESIGN LOADS ARE NOT APPLICABLE FOR THE REQUIRED DESIGN, THE DESIGN SHALL BE REVISED ACCORDINGLY
F. NOTES ON FOUNDATION
a. THE FOUNDATION IS DESIGNED FOR AN ASSUMED ALLOWABLE SOIL BEARING CAPACITY (SBC) OF 96kPa (2000 psf). IF THE LOCATION IS KNOWN TO HAVE AN SBC OF LESS THAN THE ASSUMED, THE FOOTING DESIGN SHALL BE REVISED ACCORDINGLY
b. NO FOOTINGS SHALL REST ON FILL MINIMUM 100mm THICK PROPERLY WELL COMPACTED GRAVEL BED BEFORE CASTING
G. NOTES ON ASSEMBLY
a. MANUFACTURER MAY SUPPLY A PRE-ASSEMBLED STEEL POST WITH ACCESSORIES (MAST ARM, STIFFENERS, ANCHOR BASE PLATE) PROVIDED THAT ITS DESIGN IS SUFFICIENT FOR THE DESIGN LOADS AND MATERIAL STRENGTH PROVIDED IN THE ITEMS ABOVE
b. DESIGN CALCULATIONS/SPECIFICATIONS OF THE PRE-ASSEMBLED STEEL POST MUST BE SUBMITTED TO THE ENGINEER FOR APPROVAL PRIOR INSTALLATION
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGIONAL OFFICE 03
NORTHERN SAMAR FIRST DISTRICT ENGINEERING OFFICE
PROJECT NAME AND LOCATION
SHEET CONTENTS
TYPICAL SECTION OF SOLAR STREET LIGHT
DRAWN/DESIGNED:
JEFF P. ENGOLA
ENGINEER
REVIEWED:
MAR DONALD N. EIMAN
SUBMITTED:
ANDY S. ALCEÑO
RECOMMENDING:
VIVIAN B. BACO
APPROVED:
ALVIN A. IGNACIO
DISTRICT ENGINEER
SHEET NO.
08
58



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

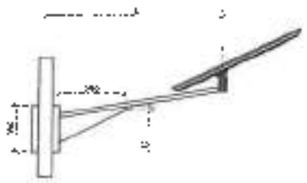
NEW 624(S) SOLAR LED STREET LIGHT (PLACED AT 20.00m at RIGHT SIDE)



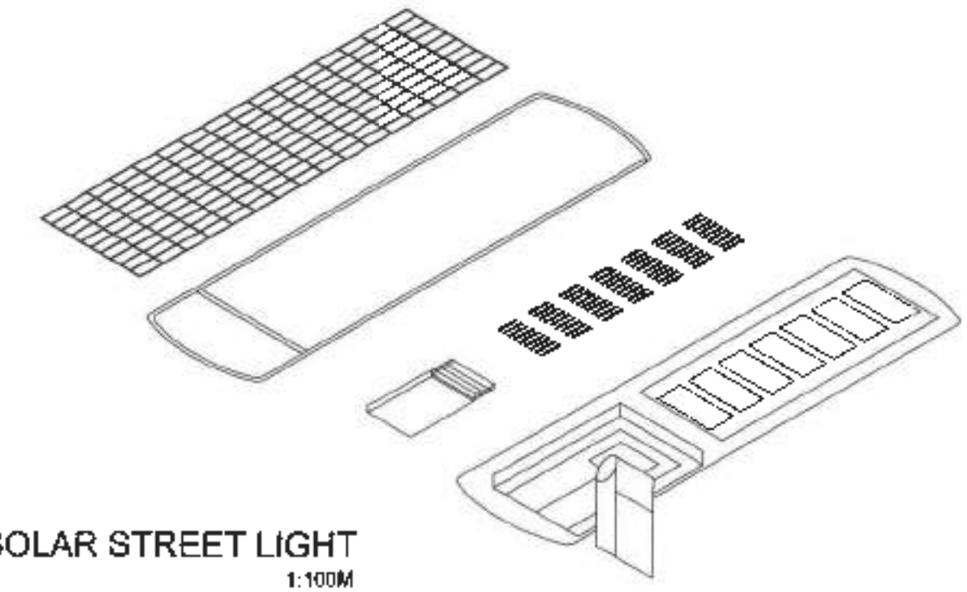


NOTE:

1. INCLUDE ADDITIONAL DETAIL FOR DESIRED LAMP POST TO BE USED AND REFER AND VERIFY TO METRO (C) STANDARD
2. REFER TO OTHER ELECTRICAL TECHNICAL SPECS FOR LAMP POST WATTAGE RATING MOUNTING HEIGHT, AND SHADING EQUIVALENT



E SECTION OF MAST ARM
NOT TO SCALE



TYPICAL SECTION OF SOLAR STREET LIGHT

SCALE 1:100M

Republic of the Philippines DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS NORTHERN SAMAR FIRST DISTRICT ENGINEERING OFFICE	PROJECT NAME AND LOCATION: CONSTRUCTION OF SOLAR STREET LIGHTS TO BRGY. BURAUEN, BRGY. LOQUILOQUIL, BRGY. SAN ROQUE, BURAUEN, BRGY. PAGSANGAN, BRGY. HUMAN BURAUEN, PROVINCE OF NORTHERN SAMAR	DRAWING TITLE: TYPICAL SECTION OF SOLAR STREET LIGHT	PREPARED BY: JEFF PATERNOLA ENGINEER II	REVIEWED: MAR DONALD N. EIMAN ASST. DIST. ENGINEER & DIST. ENGINEER DATE	SUBMITTED: ANDY S. LEANO ASST. DIST. ENGINEER & DIST. ENGINEER DATE	RECOMMENDED: VIVIANO BIACO ASSISTANT DISTRICT ENGINEER DATE	APPROVED: ALVIN A. IGNACIO DISTRICT ENGINEER DATE	SHEET NO. G 8 / 8	TOTAL SHEETS IN SB

L E G E N D

1.1 EXISTING TOPOGRAPHIC FEATURES		1.2 NEW DESIGN FEATURES	
EXISTING ROAD		A. PLAN	
PROJECT ROAD		PIPE CULVERT	
EXISTING PIPE CULVERT		POINT OF INTERSECTION	PI-1
ELECTRIC POST		ROAD CENTERLINE	
CONRETE HOUSE		CUT	
WOODEN HOUSE		EMBANKMENT	
BAMBOO NIPA HOUSE		LEVEL CUT OR FILL	
BENCH MARK & REFERENCE	BM REF	B. PROFILE	
RIVER / CREEK		PIPE CULVERTS	EXISTING NEW
NORTH ARROW		LENGTH OF VERTICAL CURVE	
CONTROL STATION		VERTICAL POINT OF INTERSECTION	
COCONUT TREES		WATER LEVEL	
FRUIT BEARING TREES		RCPC	PROFILE PLAN
CANAL		RCBC	PROFILE PLAN

ABBREVIATIONS

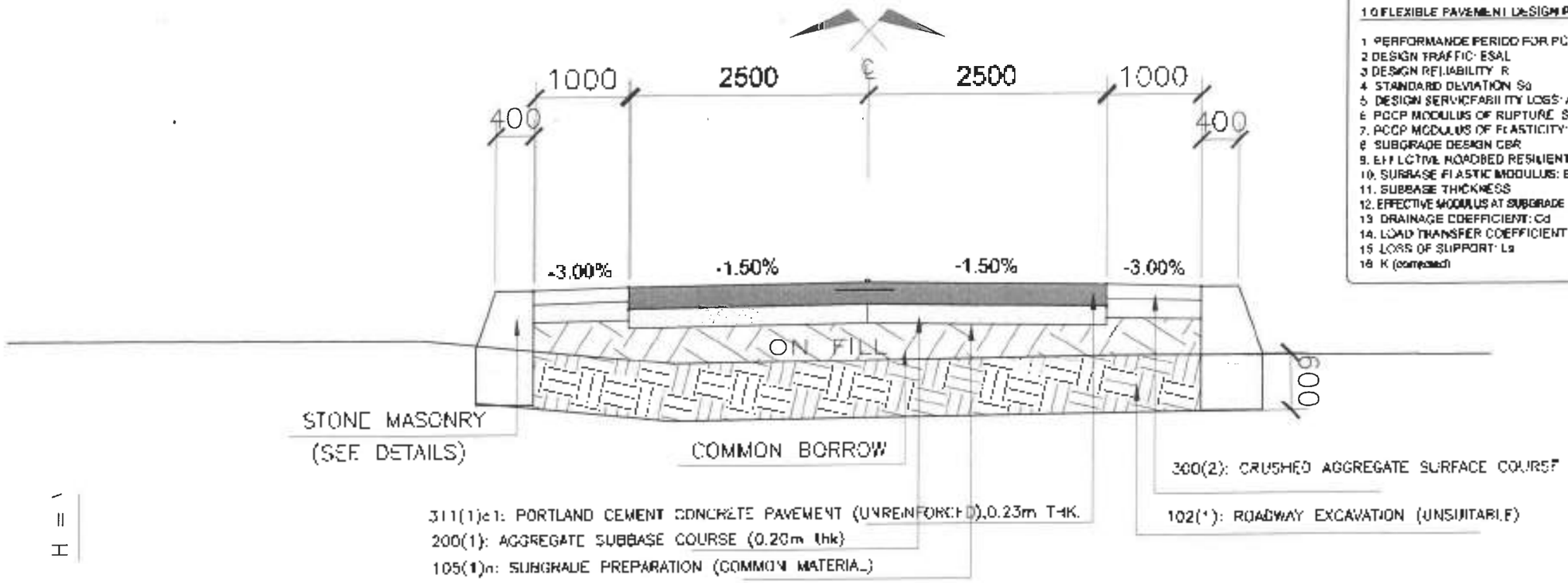
AH	- AHEAD STATIONING	EQ	- EQUATION	O.G	- ORIGINAL GROUND
AZIM	- AZIMUTH	g	GRADE IN PERCENT	OWL	- ORDINARY WATER LEVEL
BH	- BORE HOLE	Δ	- INTERSECTION ANGLE	PCCP	- PORTLAND CEMENT CONCRETE PAVEMENT
BK	- BACK STATIONING	KPH	- KILOMETER PER HOUR	PI	- HORIZONTAL POINT OF INTERSECTION
BM	- BENCH MARK	LC	- LENGTH OF HORIZONTAL CURVE	POT	- POINT OF TANGENT
℄	- CENTERLINE	MFL	- MAXIMUM FLOOD LEVEL	R	- RADIUS
cm	- CENTIMETER	M^3	- CUBIC METER	RCP	- REINFORCED CONCRETE PIPE
CS	- CONTROL STATION	M	- METER	STA	- STATION
DIST	- DISTANCE	mm	- MILLIMETER	T	- TANGENT
E	- EASTING/EXTERNAL DISTANCE	MO	- MIDDLE ORDINATE	VC	- LENGTH OF VERTICAL CURVE
ef	- FULL SUPERELEVATION	N	- NORTHING	VPI	- VERTICAL POINT OF INTERSECTION
EL/ELEV	- ELEVATION	NC	NORMAL CROWN	w	- WIDENING

REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS NORTHERN SAMAR FIRST DISTRICT ENGINEERING OFFICE	PROJECT NAME AND LOCATION [illegible] ROAD, [illegible] BRIDGE, [illegible], NORTHERN SAMAR [illegible], NORTHERN SAMAR	SHEET CONTENTS LEGEND AND ABBREVIATIONS	DRAWN BY: JEFF P. PATRICIA ENGINEER	REVIEWED: MAR DONALD N. EMAN DATE	SUBMITTED: ANDY S. BREÑO DATE	RECOMMENDING APPROVAL: VIVIAN S. BIACO DATE	APPROVED: ALVIN A. IGNACIO DISTRICT ENGINEER DATE	SHEET NO. G-9 / 9 TOTAL SHEETS 10 / 36

DESIGN SPECIFICATIONS:

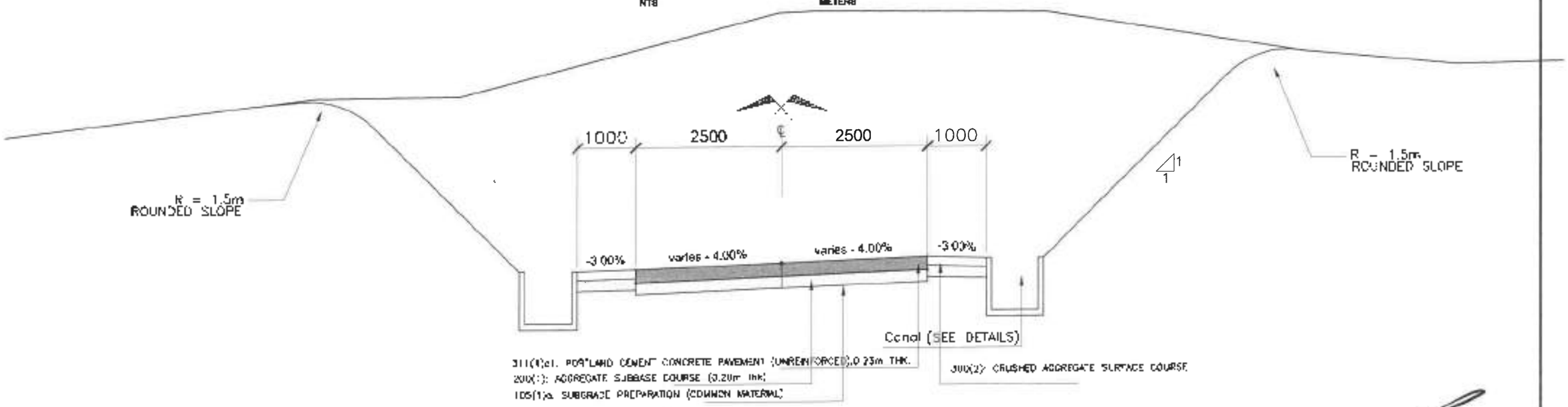
1.0 FLEXIBLE PAVEMENT DESIGN PARAMETERS

1. PERFORMANCE PERIOD FOR PCCP	-	20 years	
2. DESIGN TRAFFIC: ESAL	-	3.762 x 10	6
3. DESIGN RELIABILITY: R	-	85 %	
4. STANDARD DEVIATION: So	-	0.35	
5. DESIGN SERVICEABILITY LOSS: APSI	-	2.00	
6. PCCP MODULUS OF RUPTURE: Sc	-	550.00 psi	
7. PCCP MODULUS OF ELASTICITY: Ec	-	3.370 x 10	6
8. SUBGRADE DESIGN CBR	-	7.53	
9. EFFECTIVE ROADBED RESILIENT MODULUS: MR	-	1,297 psi	
10. SUBBASE ELASTIC MODULUS: ESB	-	15,000 psi	
11. SUBBASE THICKNESS	-	8" (200 mm)	
12. EFFECTIVE MODULUS AT SUBGRADE REACTION: K (pci)	-	400.00	
13. DRAINAGE COEFFICIENT: Cd	-	0.80	
14. LOAD TRANSFER COEFFICIENT: J	-	3.20	
15. LOSS OF SUPPORT: Ls	-	1.00	
16. K (corrected)		110.00	



TYPICAL ROADWAY SECTION

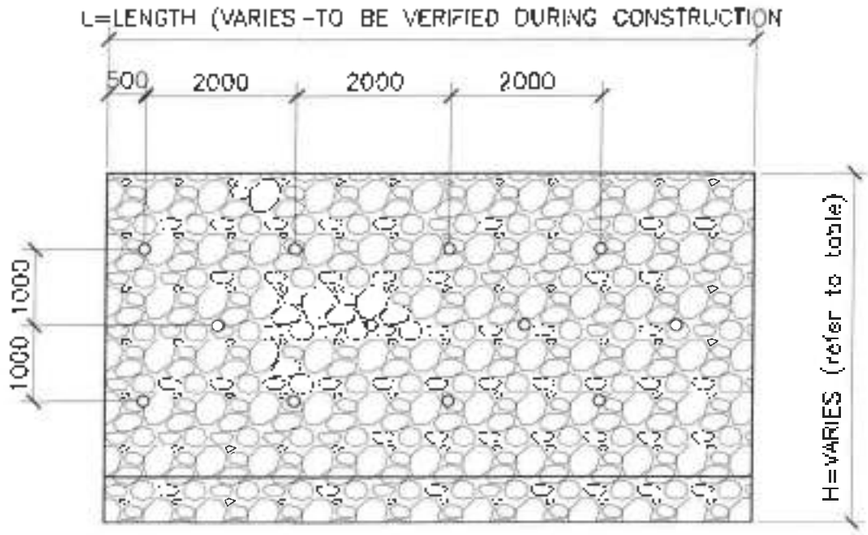
NTS METERS

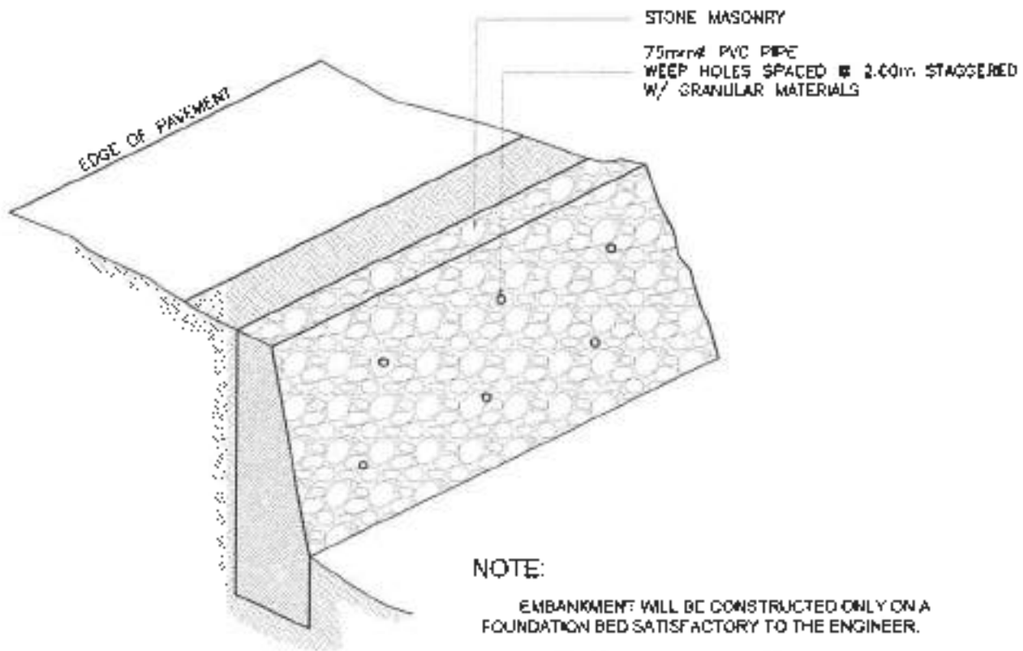


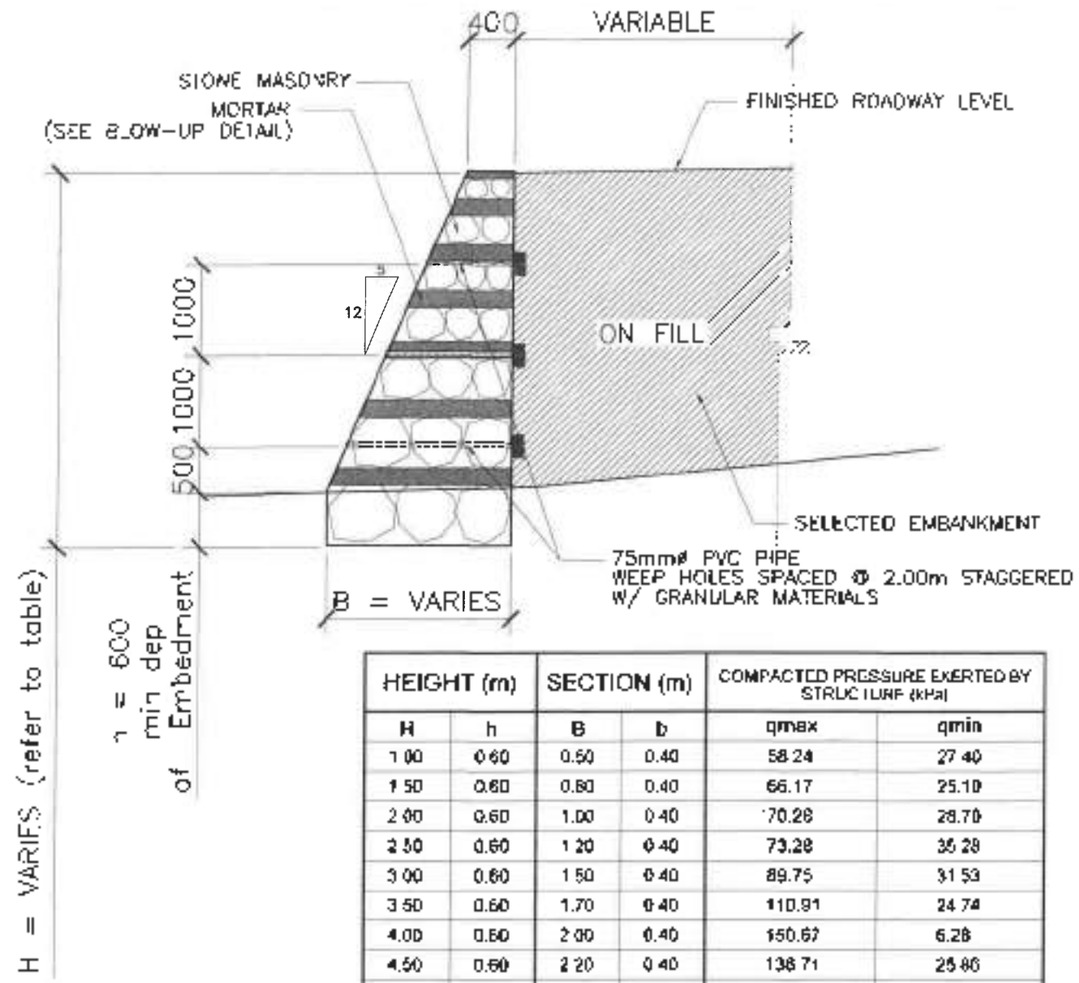
TYPICAL ROADWAY SECTION

NTS METERS

Republic of the Philippines DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS REGION OFFICE NO. 10 NORTHERN SAMAR FIRST DISTRICT ENGINEERING OFFICE Catarman, Northern Samar	PROJECT NAME AND LOCATION: CONSTRUCTION OF ABUT., UGDATA, RD SHOULDER WIDENING, BRGY. UBATA, ARTEMIO RIVERA, BOUNDARY, VICTORIA, NORTHERN SAMAR	SHEET CONTENTS: TYPICAL ROADWAY SECTION	PREPARED BY: JEFF F. PEDROLA ENGINEER	REVIEWED: MAR DONALD R. ERMAN ASST. CHIEF, PLANNING & DESIGN SECTION DATE	ENGINEER: ANDY S. BRERO CHIEF, PLANNING & DESIGN SECTION DATE	RECOMMENDED: VIVIAN C. BIACO ASSISTANT DISTRICT ENGINEER DATE	APPROVED: ALVIN A. IGNACIO DISTRICT ENGINEER DATE	SCALE: R-1 1 10	SHEET NO.: 1 3E







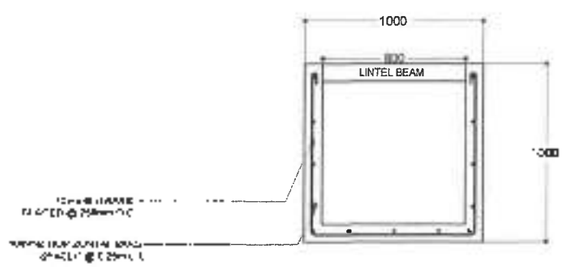
HEIGHT (m)		SECTION (m)		COMPACTED PRESSURE EXERTED BY STRUCTURE (KPa)	
H	h	B	b	qmax	qmin
1.00	0.60	0.50	0.40	58.24	27.40
1.50	0.60	0.80	0.40	66.17	25.10
2.00	0.60	1.00	0.40	70.26	28.70
2.50	0.60	1.20	0.40	73.28	35.28
3.00	0.60	1.50	0.40	89.75	31.53
3.50	0.60	1.70	0.40	110.91	24.74
4.00	0.60	2.00	0.40	150.67	6.28
4.50	0.60	2.20	0.40	138.71	25.86
5.00	0.60	2.50	0.40	142.50	32.99
5.50	0.60	2.80	0.40	148.77	39.72
6.00	0.60	3.00	0.40	153.95	38.46

NOTE:

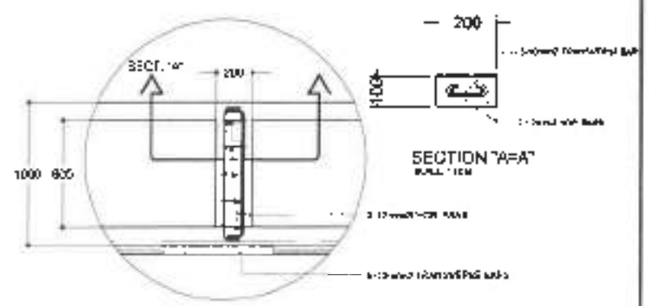
EMBANKMENT WILL BE CONSTRUCTED ONLY ON A FOUNDATION BED SATISFACTORY TO THE ENGINEER.

THE MINIMUM THICKNESS/DIAMETER OF BOULDERS SHALL NOT BE LESS THAN 150mm

THE ALLOWABLE SOIL BEARING CAPACITY SHALL NOT BE LESS THAN THE VALUES AS SHOWN ABOVE, WHICH IS A VERY FIRM CLAY FOUNDATION BED.



DETAIL SECTION OF OPEN LINED CANAL



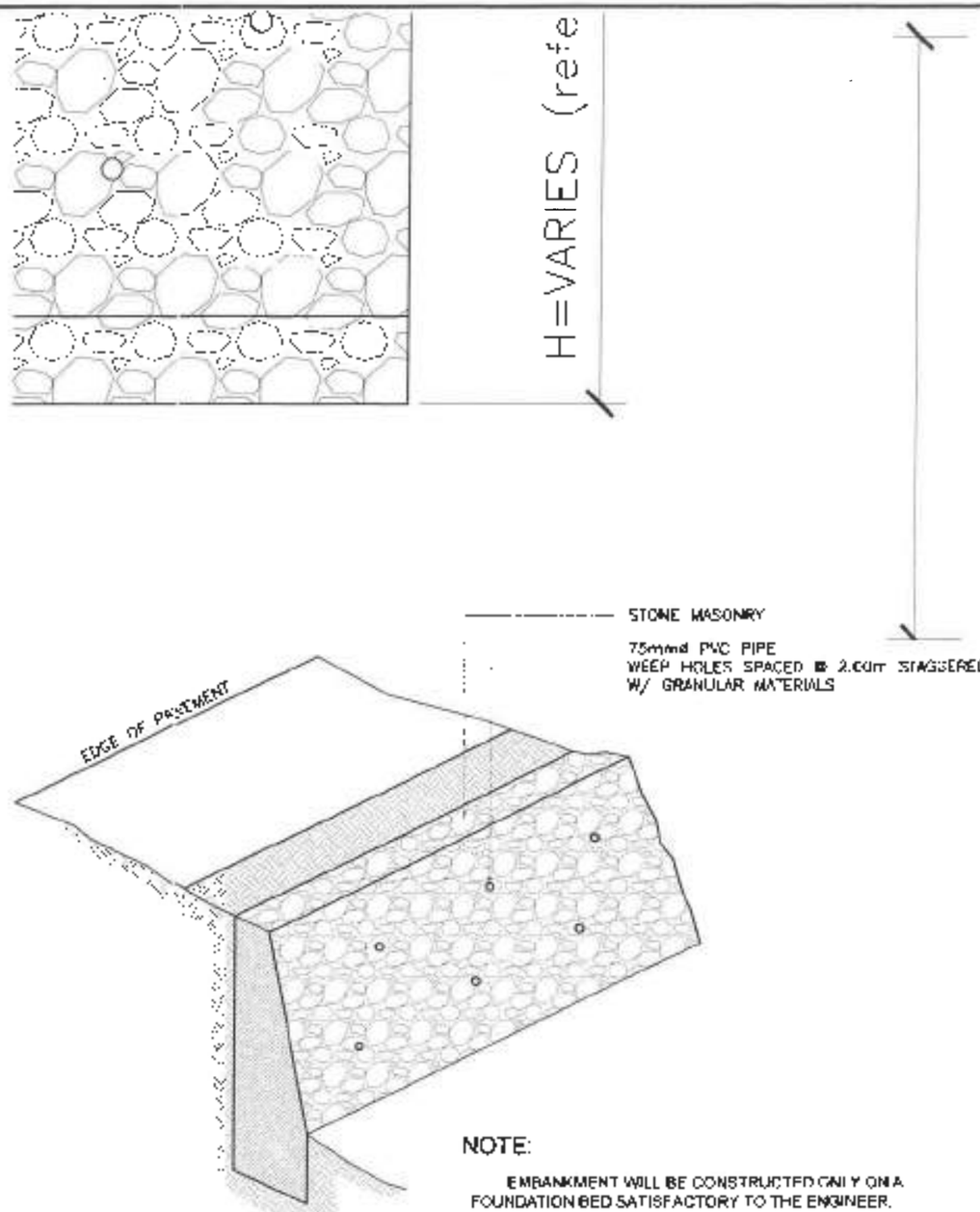
BLOW UP DETAILS OF LINTEL BEAM

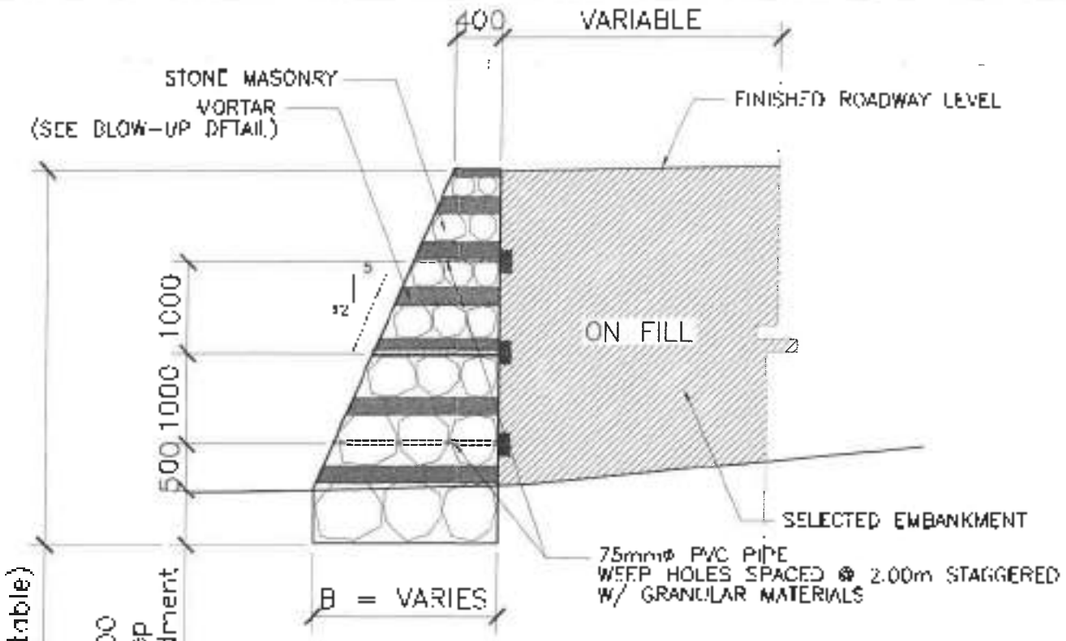
note : Lintel Beam with spacing of every 3m

DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS NORTHERN SAMAR FIRST DISTRICT ENGINEERING OFFICE	PROJECT NAME AND LOCATION: CONSTRUCTION OF FIRST DISTRICT ENGINEERING OFFICE BUILDING, NORTHERN SAMAR	SHEET CONTENTS: STONE MASONRY DETAILS OPEN LINED CANAL DETAILS	PREPARED BY: JEFF B. PEDROSA ENGINEER II	REVIEWED: MARDONALD N. EIMAN DATE	SUBMITTED: ANDY S. CERAÑO DATE	RECOMMENDED: DATE	APPROVED: ALVIN A. IGNACIO DATE

SHEET NO. N 2 10

DRAWING NO. 12 30





HEIGHT (m)		SECTION (m)		COMPACTED PRESSURE EXERTED BY STRUCTURE (kPa)	
H	h	B	b	qmax	qmin
1.00	0.60	0.50	0.40	58.24	27.40
1.50	0.60	0.80	0.40	66.17	25.10
2.00	0.60	1.00	0.40	70.26	28.70
2.50	0.60	1.20	0.40	73.28	35.26
3.00	0.60	1.50	0.40	88.75	31.53
3.50	0.60	1.70	0.40	110.91	24.74
4.00	0.60	2.00	0.40	150.67	6.28
4.50	0.60	2.20	0.40	136.71	25.86
5.00	0.60	2.50	0.40	142.50	32.99
5.50	0.60	2.80	0.40	148.77	39.72
6.00	0.60	3.00	0.40	163.95	38.46

NOTE:

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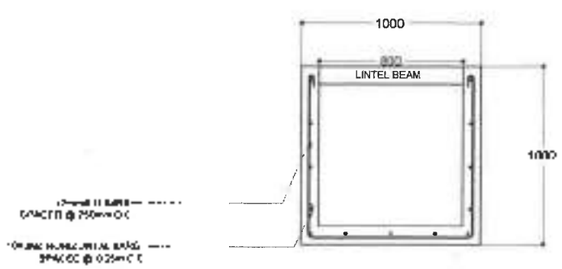
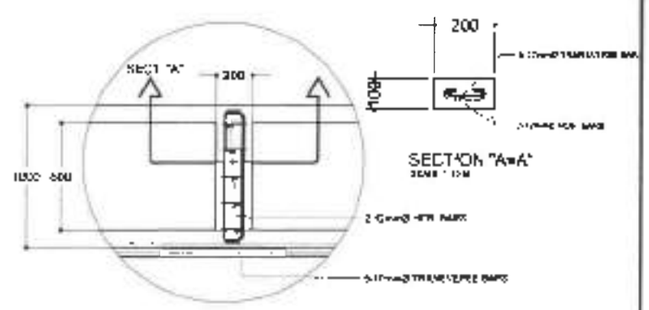


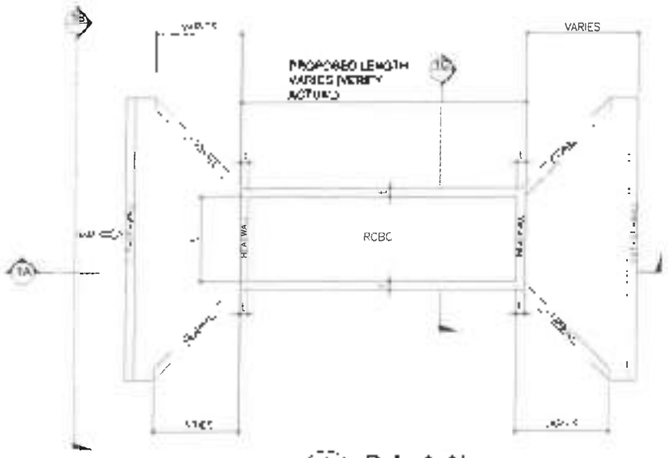
DETAIL SECTION OF OPEN LINED CANAL
SCALE 1:20 M



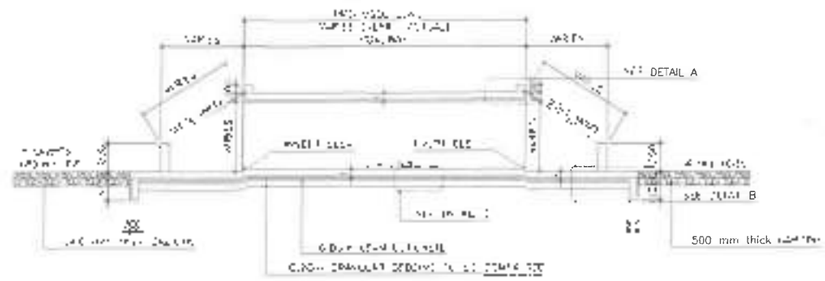
BLOW UP DETAILS OF LINTEL BEAM
SCALE 1:20 M

note Lintel Beam with spacing of every 3m

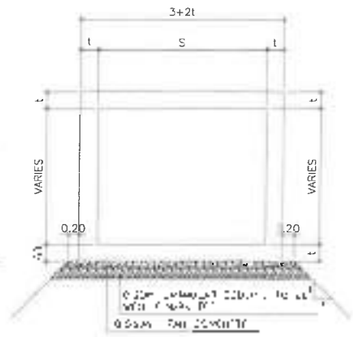
Republic of the Philippines DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS NORTHERN SAMAR FIRST DISTRICT ENGINEERING OFFICE		STONE MASONRY DETAILS OPEN LINED CANAL DETAILS		REVIEWED: MAR DONALD N. EMAN	SUBMITTED: ANDY S. BREÑO	RECOMMENDED: VIVIAN B. BIACO	APPROVED: ALVIN A. IGNACIO	SHEET No. A 2 of 10	SHEET No. 12 of 36



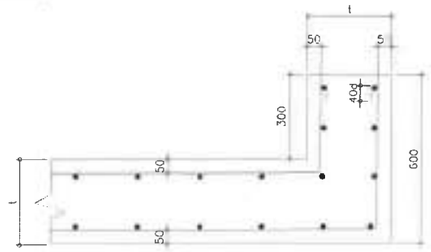
1 E- PLAN
SCALE 1:150



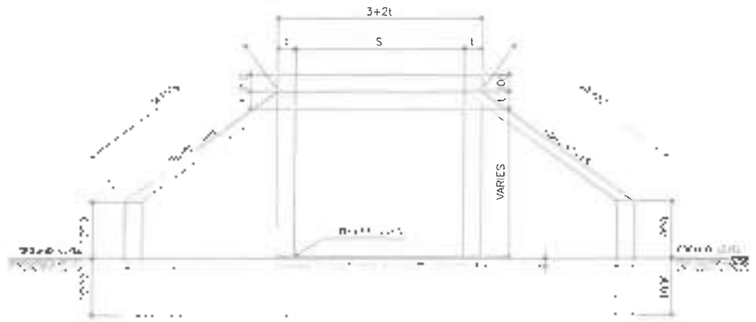
1A SECTION
SCALE 1:100



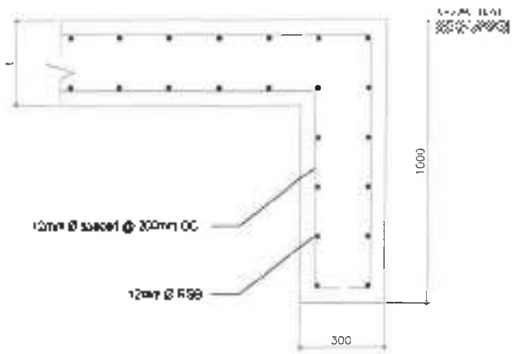
1C SECTION
SCALE 1:50



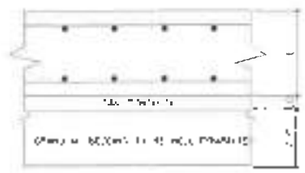
A DETAILS OF HEADWALL
SCALE 1:10



1B SECTION
SCALE 1:50



B DETAILS OF CUT-OFF-WALL
SCALE 1:10

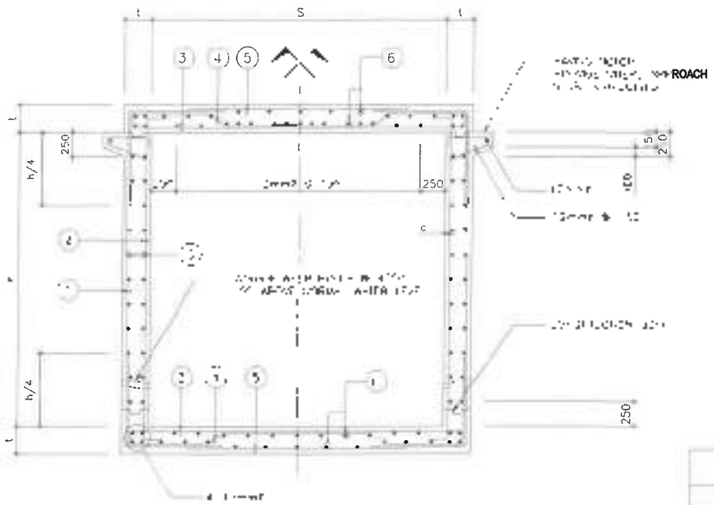


C DETAILS OF BEDDING
SCALE 1:10

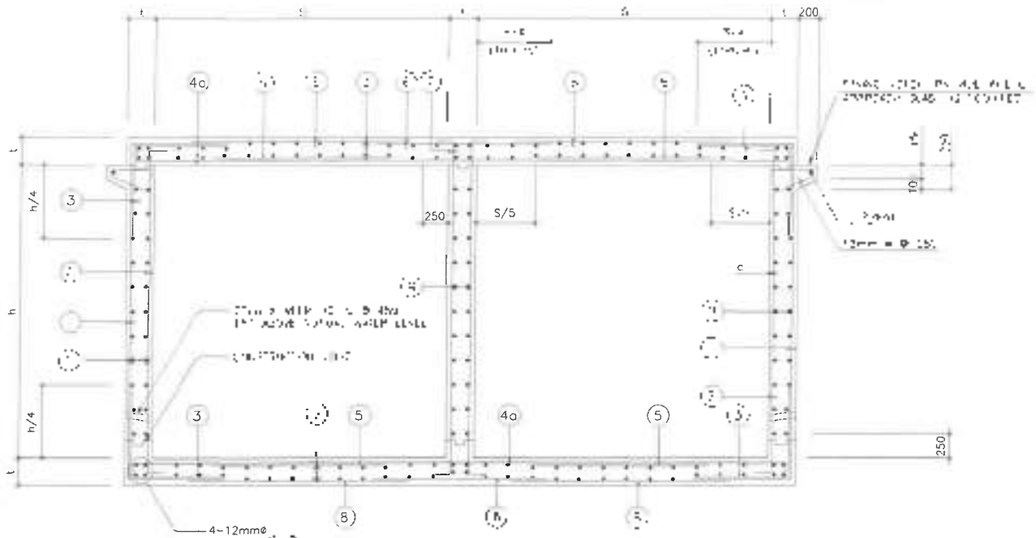
SCHEDULE OF RCBC

STATION	LENGTH	SKEW/DIMENSION	TYPE OF STRUCTURES	QUANTITY
000+057	600	SEE DETAILS	3mGx 2 BARREL (1.25m x 1.25m)	

Republic of the Philippines DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS NORTHERN SAMAR FIRST DISTRICT ENGINEERING OFFICE	PROJECT TITLE AND LOCATION: CONSTRUCTION OF RIPRAP, GABION, TO PROTECT BRIDGE, CULVERT AND DIKE EMBANKMENT, PUNTAPIRA, VILLA PASAGUAN, SAMAR	SHEET CONTENTS: STANDARD DETAILS OF RCBC	DRAWN BY: JEFF T. PAPAULA ENGINEER	REVIEWED: MA. DONALD N. EIMAN	SUBMITTED: ANDY S. ERIÑO	RECOMMENDED: VIVIA B. BIACO	APPROVED: ALVIN A. IGNACIO DISTRICT ENGINEER	SHEET NO. R 3/10	SHEET NO. 13 / 36



1A D-7 SINGLE BARREL SECTION
SCALE 1:20

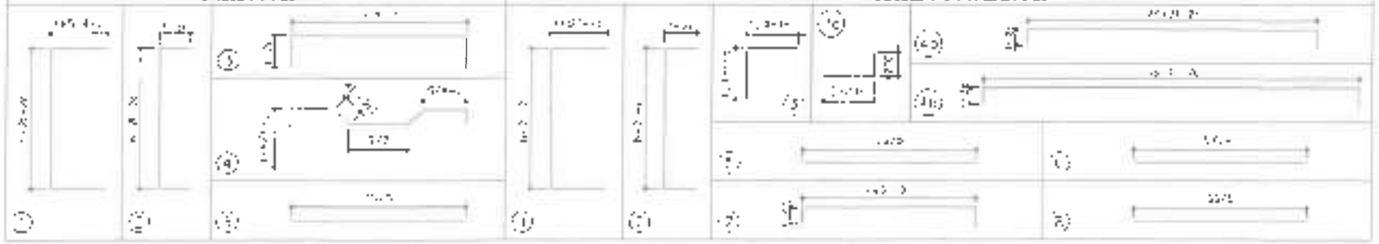


2A D-7 DOUBLE BARREL SECTION
SCALE 1:20

NOTE:

LEGEND:

BAR BENDING DIAGRAM

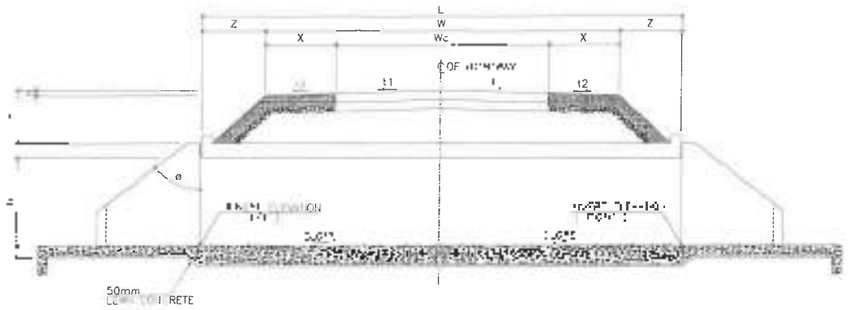


SINGLE BARREL BOX CULVERT / DOUBLE AND TRIPLE BARREL BOX CULVERT

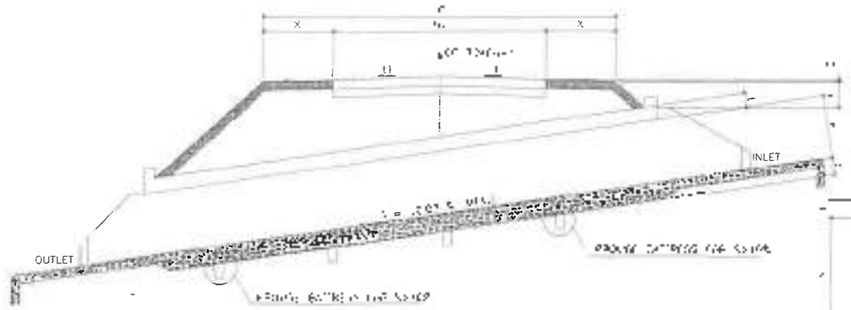
| CLEAR | | SINGLE BARREL BOX CULVERT | | |

QUANTITIES FOR STANDARD BOX CULVERTS

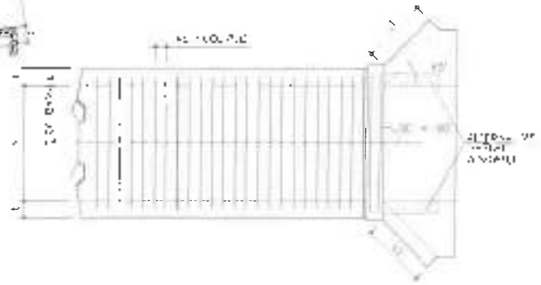
CLEAR		QUANTITY PER METER OF BARREL					



TYPICAL ROAD CROSS-SECTION
NOT TO SCALE



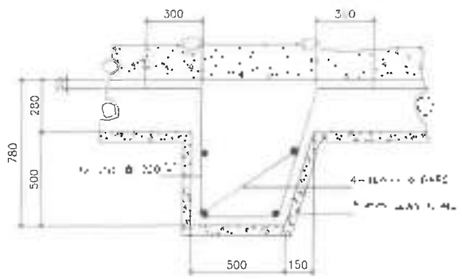
LONGITUDINAL SECTION
NOT TO SCALE



PART PLAN ∝ = 90°
NOT TO SCALE

NOTES:

LEGEND:



DETAIL "A"
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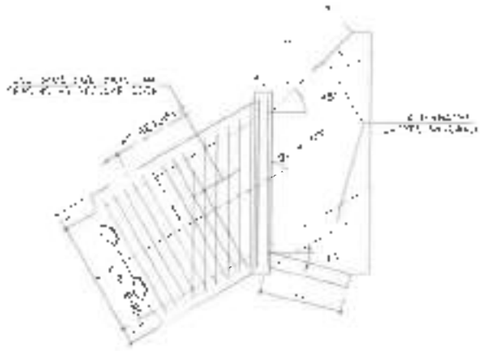
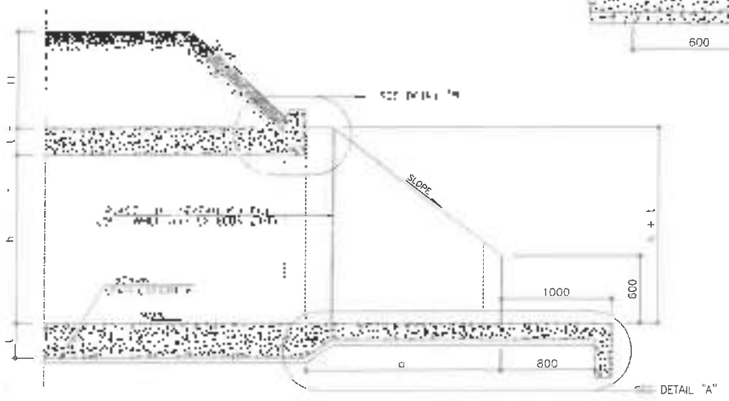
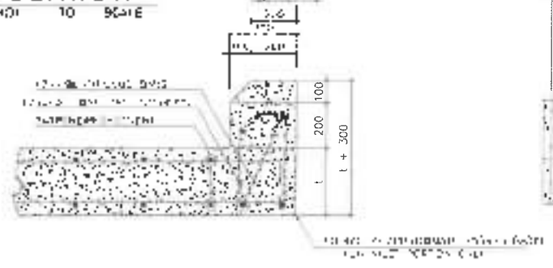


C
NOT TO SCALE

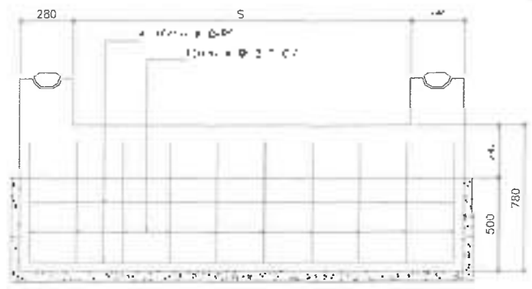
DETAIL "A"
NOT TO SCALE



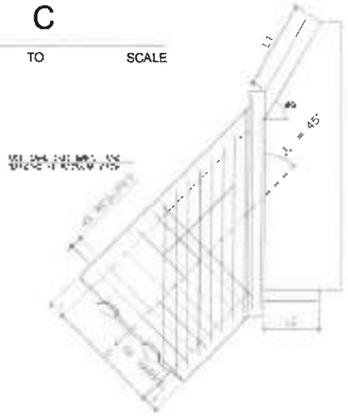
PART SECTION ALONG L OF CULVERT
NOT TO SCALE



DETAIL "B"
NOT TO SCALE



SECTION "B"
NOT TO SCALE



PART PLAN ∝ = 45°
NOT TO SCALE

Republic of the Philippines DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS NORTHERN SAMAR FIRST DISTRICT ENGINEERING OFFICE			CHECKED: JEFF [illegible] ENGINEER	REVIEWED: MAR DONALD N. EIMAN ASST. CHIEF ADMINISTRATIVE DIVISION	SUBMITTED: ANDY S. BRERO CHIEF PLANNING & PROJECTS	RECOMMENDED: VIVIAN [illegible] ASSISTANT DISTRICT ENGINEER	APPROVED: ALVIN A. IGNACIO DISTRICT ENGINEER	R 15	16 38
		STANDARD DETAILS OF HCSC							

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 LONGER

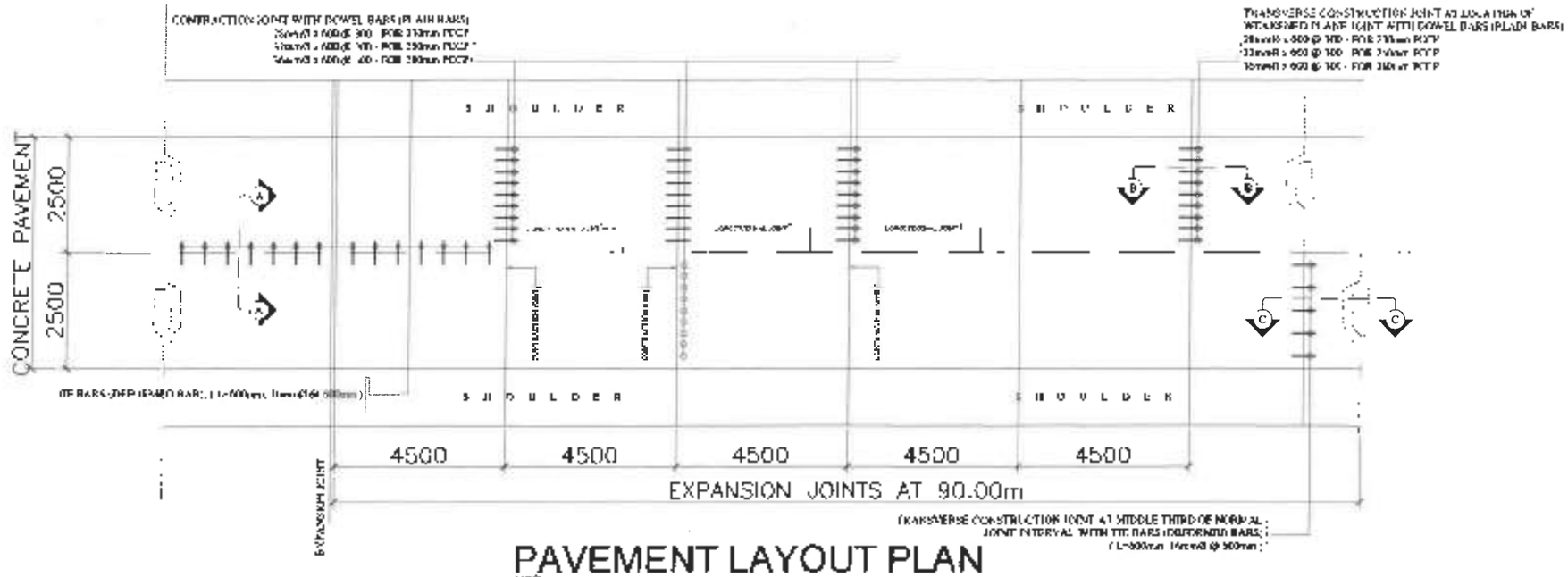
TRANSVERSE CONSTRUCTION JOINTS WHICH OCCUR AT LOCATION OF WEAKENED PLANE JOINTS SHOULD BE BUTT JOINTS WITH DOWELS. IF JOINT OCCURS IN THE MIDDLE THIRD OF THE WEAKENED JOINT INTERVAL (1500-3000mm) IT SHOULD BE KEYED JOINTS WITH TIE BARS.

FOR TRANSVERSE CONTRACTION JOINT (WEAKENED JOINT), THE DEPTH OF THE WEAKENED PLANE JOINT SHOULD AT ALL TIMES NOT BE LESS THAN 50mm WHILE THE WIDTH SHOULD NOT BE MORE THAN 5mm

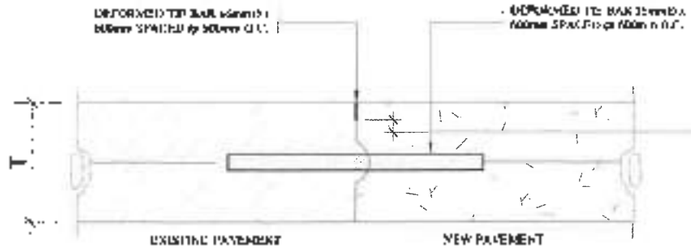
GENERAL NOTES

1. MATERIALS AND WORKMANSHIP SHALL CONFORM WITH THE DPWH STANDARD SPECIFICATIONS FOR HIGHWAYS, BRIDGES AND AIRPORT, 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 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 DENTS
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 ON CONCRETE JOINT SHOULD BE POURED IN SUCH A MANNER THAT SPALLING WILL BE ELIMINATED. THEY 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 WITHOUT GAPS OR OFFSET
11. ALL DIMENSION ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED
12. AVOID STORAGE OF FORMWORKS ALONG CURVES.
13. DRILLING OF HOLES ON EXISTING POLE AND OTHER STRUCTURES SHALL BE PERFORMED USING POWER TOOLS. THE HOLES SHALL BE PROPERLY CLEANED BEFORE GROUTED BY INJECTION AND INSTALLATION OF DOWELS OR TIE BARS
14. APPLICABLE PROVISIONS OF D.O. NO. 23, SERIES OF 1999 IS HEREBY ENFORCED

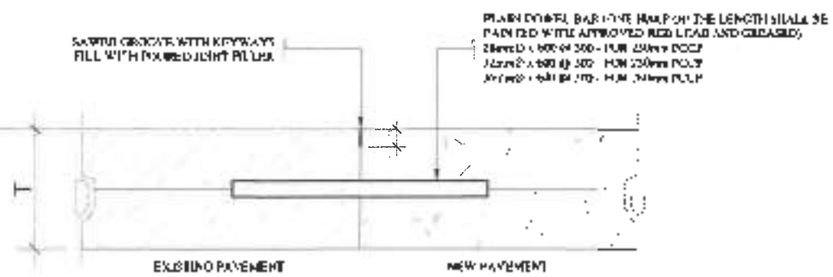
SPACING OF DOWEL BAR	
SLAB DEPTH (T) (mm)	SPACING (mm)
280	300
290	295
300	274
310	253
320	238
330	223
340	209



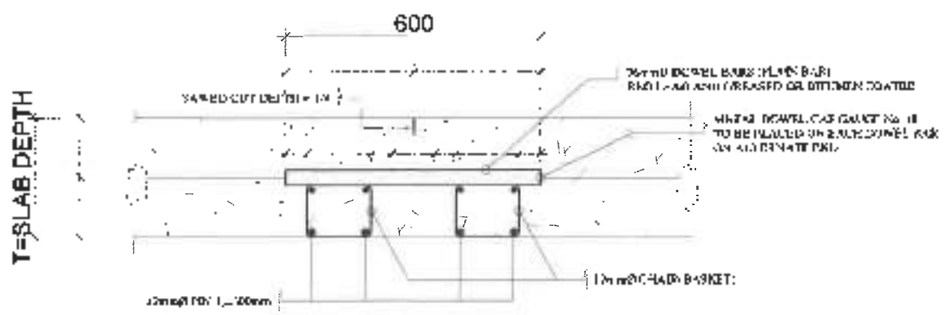
PAVEMENT LAYOUT PLAN
NTS



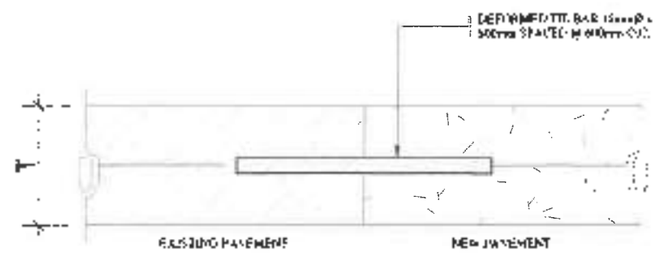
SECTION "A"
NTS



SECTION "B"
NTS

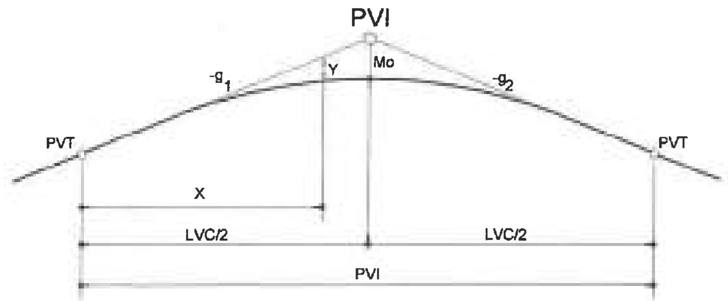


CONTRACTION JOINT SECTION
Steel Basket for Setting Dowels
NTS

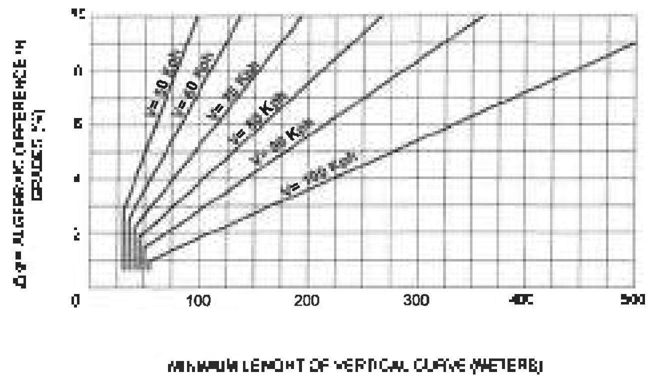


SECTION "C"
NTS

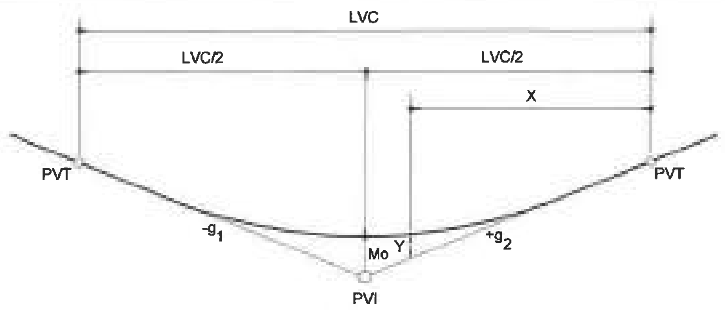
Republic of the Philippines DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS REGIONAL OFFICE VIII NORTHERN SAMAR (DEO) DISTRICT ENGINEERING OFFICE	PROJECT TITLE AND LOCATION	SHEET CONTENTS: PAVEMENT LAYOUT PLAN	DRAFTED BY: JEFF R. BERGOLA ENGINEER	REVIEWED: MAR DONALD M. ERMAN	SUBMITTED: ANDY S. ESENO	RECOMMENDED: VIVIANO G. BUCO	APPROVED: ALVIN A. IGNACIO	SHEET NO. R 7 10	SHEET NO. ST 3A



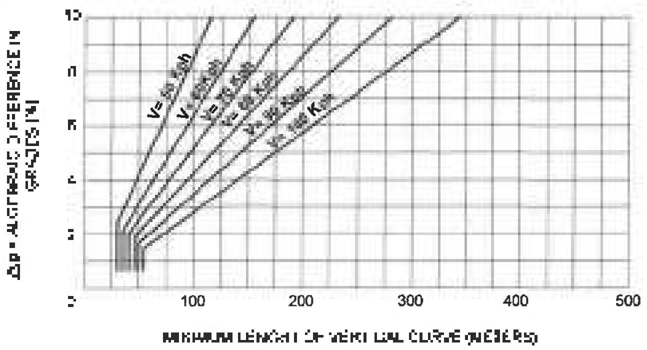
SYMMETRICAL VERTICAL PARABOLIC CURVES (CREST)



DESIGN CONTROL FOR VERTICAL CURVES (CREST)



SYMMETRICAL VERTICAL PARABOLIC CURVES (SAG)



DESIGN CONTROL FOR VERTICAL CURVES (SAG)

IN ANY VERTICAL PARABOLIC CURVE :

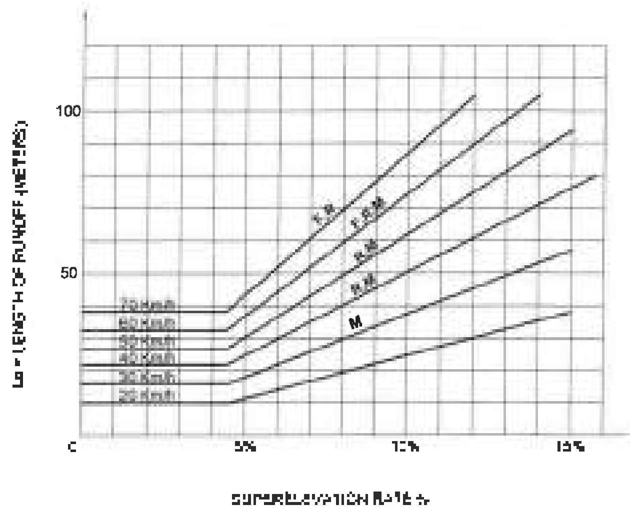
1. $Mo = \frac{(g_1 - g_2)(LVC)}{800}$
2. $Mo = \frac{1}{2}\left[\frac{ELEV\ PVC + ELEV\ PVT}{2} - ELEV\ PVI\right]$
3. Y = 4 Mo

LEGEND

PVI - POINT OF VERTICAL INTERSECTION
PVC - POINT OF VERTICAL CURVATURE
PVT - POINT OF VERTICAL TANGENCY
LVC - LENGTH OF VERTICAL CURVES - METER
Kph - 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

RATE OF SUPERELEVATION

DESIGN SPEED (Kph)	20	30	40	50	60	70	80
RADIUS OF CURVE	SUPERELEVATION (e%)						
[illegible]	NC	NC	NC	NC	NC	NC	NC
[illegible]	NC	NC	NC	NC	NC	NC	NC
[illegible]	NC	NC	NC	NC	NC	NC	NC
[illegible]	NC	NC	NC	NC	NC	[illegible]	[illegible]
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[illegible]	[illegible]						
[illegible]	[illegible]						
[illegible]	[illegible]						

DESIGN SUPERELEVATION RATES

Republic of the Philippines
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
NORTHERN SAMAR FIRST DISTRICT ENGINEERING OFFICE

DESIGN OF PAVEMENT

JEFF R. PERIOLA
ENGINEER II

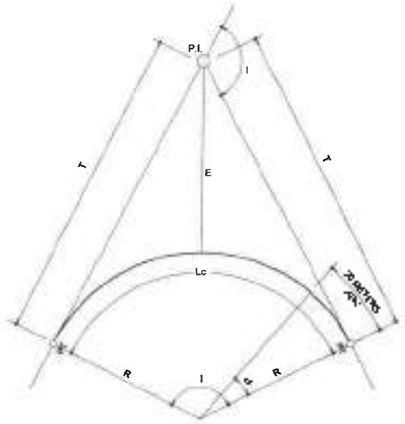
MAR DIONALD A. ERMAN

SUBMITTED:

ANDY S. ...EÑO

VIVIANA ... BIACO

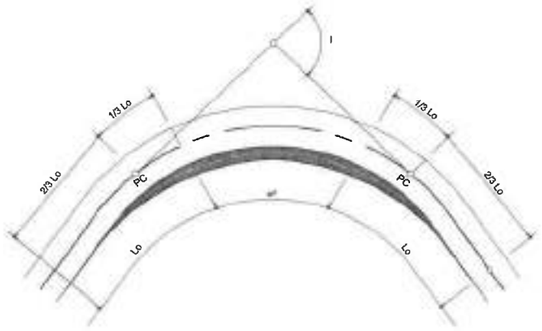
ALVIN A. IGNACIO



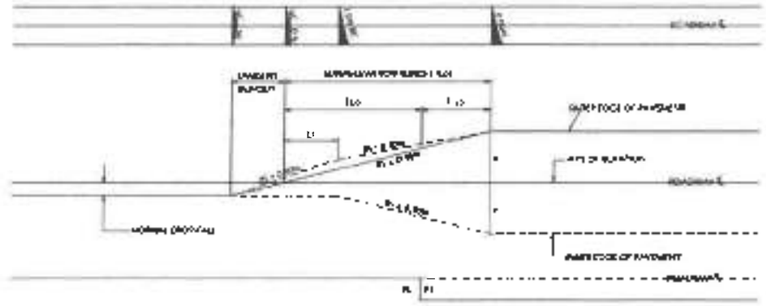
HORIZONTAL CURVE (CIRCULAR)

LEGEND:

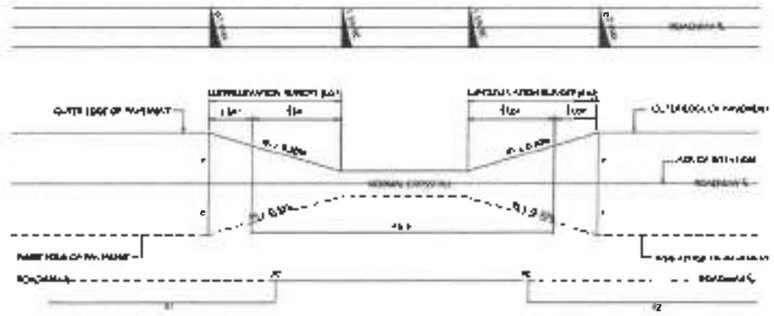
- W - FULL WIDENING
- M - POINT OF INTERSECTION
- I - INTERSECTION ANGLE (DEFLECTION ANGLE)
- T - TANGENT DISTANCE
- R - HORIZONTAL RADIUS
- E - HEIGHT OF CENTRAL CURVE
- L - SCP (Min. 100 M)
- D - DEGREE OF CURVE (PC TO PT)
- PC - POINT OF CURVATURE
- PT - POINT OF TANGENCY
- Lc - LENGTH OF SUPERELEVATION RUNOFF
- Lo - LENGTH OF SUPERELEVATION RUNOFF
- PI - POINT OF INTERSECTION
- X - LENGTH BETWEEN SUPERELEVATION POINT & P.C. OR P.T.
- Y - VERTICAL DISTANCE OF PAVEMENT EDGE FROM PI
- CL - CENTERLINE
- N - NORMAL CROSSFALL



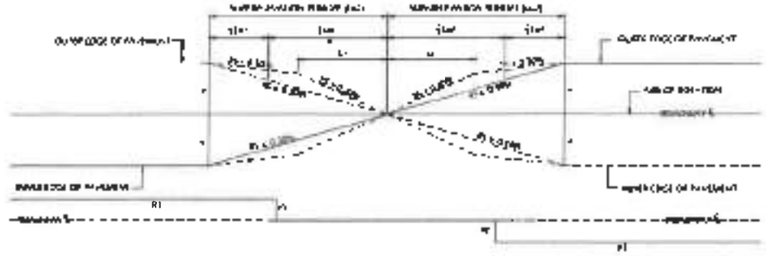
METHOD OF WIDENING



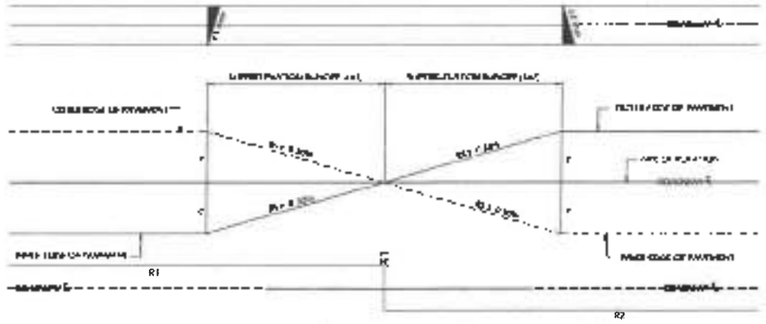
TRANSITION: STRAIGHT - CIRCULAR CURVE CASE 1



TRANSITION: CIRCULAR CURVE - STRAIGHT - CIRCULAR CURVE CASE 2



TRANSITION: CIRCULAR CURVE - MIN. STRAIGHT - CIRCULAR CURVE CASE 3



TRANSITION: CIRCULAR CURVE - CIRCULAR CURVE CASE 4

NOTES

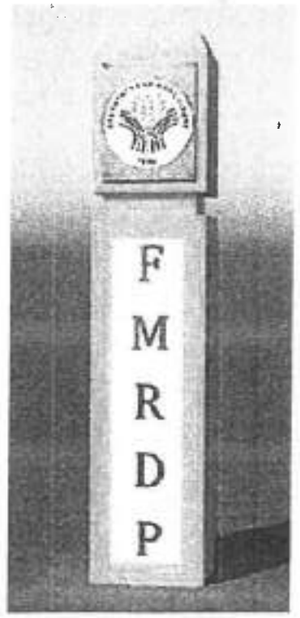
1. [illegible]
2. [illegible]
3. [illegible]

[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]

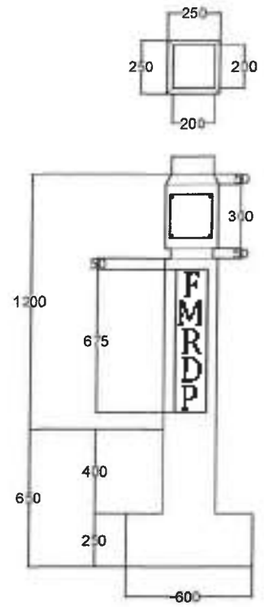
4. [illegible]
5. [illegible]
6. [illegible]
7. [illegible]
8. [illegible]
9. [illegible]
10. [illegible]

WIDENING OF PAVEMENT ON CURVES

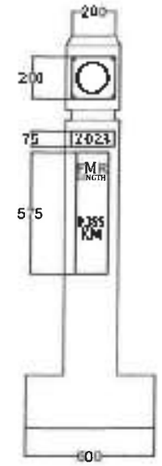
DESIGN SPEED (Kph)		20	30	40	50	60	70	80	90	100
D (degree)	R (m)	NORMAL PAVEMENT WIDTH = 6.10m								
0.5	4,071.50				0.06	0.07	0.10	0.14	0.18	0.23
1.0	2,145.92				0.14	0.16	0.21	0.29	0.38	0.49
1.5	1,432.39				0.23	0.30	0.40	0.54	0.71	0.91
2.0	1,074.78				0.33	0.43	0.57	0.77	1.00	1.28
2.5	859.93				0.43	0.57	0.75	1.01	1.31	1.68
3.0	716.62				0.54	0.71	0.94	1.26	1.64	2.10
3.5	614.27				0.65	0.86	1.13	1.52	1.97	2.52
4.0	537.46		0		0.77	1.01	1.33	1.79	2.32	2.97
4.5	477.75				0.89	1.17	1.54	2.07	2.68	3.43
5.0	429.97				1.02	1.34	1.76	2.37	3.07	3.93
5.5	390.88				1.15	1.51	1.99	2.67	3.46	4.43
6.0	358.31				1.28	1.68	2.21	2.97	3.85	4.92
6.5	330.75				1.42	1.86	2.44	3.28	4.25	5.43
7.0	307.14				1.56	2.05	2.69	3.61	4.68	5.98
8.0	268.73			0.50	1.85	2.43	3.19	4.28	5.55	7.09
9.0	238.87			0.56	2.09	2.74	3.60	4.83	6.26	8.00
10.0	214.98			0.62	2.32	3.04	4.00	5.37	6.96	8.89
12.0	179.15			0.75	2.79	3.65	4.80	6.44	8.35	10.67
15.0	143.32		0.56	0.94	3.49	4.56	6.00	8.05	10.43	13.33
17.0	126.50		0.63	1.06	3.95	5.17	6.80	9.12	11.82	15.10
20.0	107.49		0.74	1.25	4.65	6.08	8.00	10.73	13.91	17.77
25.0	85.99		0.93	1.56	5.81	7.60	10.00	13.41	17.38	22.21
30.0	71.66		1.12	1.87	6.97	9.12	12.00	16.09	20.86	26.65
35.0	61.42		1.30	2.18	8.13	10.64	14.00	18.77	24.33	31.09
40.0	53.74		1.49	2.49	9.29	12.16	16.00	21.45	27.81	35.53
50.0	42.99		1.86	3.12	11.61	15.20	20.00	26.81	34.76	44.42
60.0	35.83		2.23	3.74	13.93	18.24	24.00	32.18	41.71	53.30
70.0	30.71		2.60	4.37	16.25	21.28	28.00	37.54	48.66	62.18
80.0	26.87		2.97	4.99	18.57	24.32	32.00	42.90	55.61	71.06
90.0	23.89		3.34	5.62	20.89	27.36	36.00	48.26	62.56	79.94
100.0	21.50		3.71	6.24	23.21	30.40	40.00	53.63	69.51	88.82
125.0	17.20		4.64	7.80	29.01	38.00	50.00	67.04	86.89	111.03
150.0	14.33		5.57	9.36	34.81	45.60	60.00	80.45	104.27	133.23
175.0	12.28		6.50	10.92	40.61	53.20	70.00	93.86	121.65	155.44
200.0	10.75		7.42	12.48	46.41	60.80	80.00	107.27	139.03	177.65
250.0	8.60	0.50	9.28	15.60	58.01	76.00	100.00	134.09	173.79	222.06
300.0	7.17	0.60	11.14	18.72	69.61	91.20	120.00	160.91	208.55	266.47
350.0	6.14	0.69	13.00	21.84	81.21	106.40	140.00	187.73	243.31	310.88
400.0	5.37	0.79	14.86	24.96	92.81	121.60	160.00	214.54	278.06	355.29
450.0	4.77	0.89	16.72	28.08	104.41	136.80	180.00	241.36	312.82	399.71
500.0	4.30	0.99	18.58	31.20	116.01	152.00	200.00	268.18	347.58	444.12
600.0	3.58	1.19	22.30	37.44	139.21	182.40	240.00	321.82	417.09	532.94
700.0	3.07	1.39	26.02	43.68	162.41	212.80	280.00	375.45	486.61	621.76
800.0	2.69	1.59	29.74	49.92	185.61	243.20	320.00	429.09	556.12	710.59
900.0	2.39	1.79	33.46	56.16	208.81	273.60	360.00	482.73	625.64	799.41
1000.0	2.15	1.99	37.18	62.40	232.01	304.00	400.00	536.36	695.15	888.24
1250.0	1.72	2.48	46.48	78.00	290.01	380.00	500.00	670.45	868.94	1,110.30
1500.0	1.43	2.97	55.78	93.60	348.01	456.00	600.00	804.54	1,042.73	1,332.36
1750.0	1.23	3.47	65.08	109.20	406.01	532.00	700.00	938.63	1,216.52	1,554.42
2000.0	1.08	3.96	74.38	124.80	464.01	608.00	800.00	1,072.72	1,390.30	1,776.47
2500.0	0.86	4.95	92.97	156.00	580.01	760.00	1,000.00	1,340.90	1,737.88	2,220.59
3000.0	0.72	5.94	111.57	187.20	696.01	912.00	1,200.00	1,609.08	2,085.45	2,664.71
3500.0	0.61	6.93	130.16	218.40	812.01	1,064.00	1,400.00	1,877.26	2,433.03	3,108.83
4000.0	0.54	7.92	148.76	249.60	928.01	1,216.00	1,600.00	2,145.45	2,780.61	3,552.94
4500.0	0.48	8.91	167.36	280.80	1,044.01	1,368.00	1,800.00	2,413.63	3,128.18	3,997.06
5000.0	0.43	9.90	185.95	312.00	1,160.01	1,520.00	2,000.00	2,681.81	3,475.76	4,441.18
6000.0	0.36	11.88	223.15	374.40	1,392.01	1,824.00	2,400.00	3,218.18	4,170.91	5,329.41
7000.0	0.31	13.86	260.35	436.80	1,624.01	2,128.00	2,800.00	3,754.54	4,866.06	6,217.65
8000.0	0.27	15.84	297.54	499.20	1,856.01	2,432.00	3,200.00	4,290.90	5,561.21	7,105.88
9000.0	0.24	17.82	334.74	561.60	2,088.01	2,736.00	3,600.00	4,827.27	6,256.36	7,994.12
10000.0	0.21	19.80	371.94	624.00	2,320.01	3,040.00	4,000.00	5,363.63	6,951.52	8,882.35
12500.0	0.17	24.75	464.92	780.00	2,900.01	3,800.00	5,000.00	6,704.54	8,689.40	11,103.00
15000.0	0.14	29.70	557.91	936.00	3,480.01	4,560.00	6,000.00	8,045.45	10,427.28	13,323.59
17500.0	0.12	34.65	650.89	1,092.00	4,060.01	5,320.00	7,000.00	9,386.36	12,165.16	15,544.18
20000.0	0.11	39.60	743.87	1,248.00	4,640.01	6,080.00	8,000.00	10,727.27	13,903.03	17,764.71
25000.0	0.09	49.50	929.84	1,560.00	5,800.01	7,600.00	10,000.00	13,409.09	17,378.79	22,205.88
30000.0	0.07	59.40	1,115.81	1,872.00	6,960.01	9,120.00	12,000.00	16,090.90	20,854.55	26,647.06
35000.0	0.06	69.30	1,301.78	2,184.00	8,120.01	10,640.00	14,000.00	18,772.72	24,330.31	31,088.23
40000.0	0.05	79.20	1,487.75	2,496.00	9,280.01	12,160.00	16,000.00	21,454.54	27,806.06	35,529.41
45000.0	0.04	89.10	1,673.72	2,808.00	10,440.01	13,680.00	18,000.00	24,136.36	31,281.82	39,970.59
50000.0	0.04	99.00	1,859.69	3,120.00	11,600.01	15,200.00	20,000.00	26,818.18	34,757.58	44,411.76
60000.0	0.03	118.80	2,231.63	3,744.00	13,920.01	18,240.00	24,000.00	32,181.82	41,709.09	53,294.12
70000.0	0.03	138.60	2,603.56	4,368.00	16,240.01	21,280.00	28,000.00	37,545.45	48,660.61	62,176.47
80000.0	0.02	158.40	2,975.49	4,992.00	18,560.01	24,320.00	32,000.00	42,909.09	55,612.12	71,058.82
90000.0	0.02	178.20	3,347.42	5,616.00	20,880.01	27,360.00	36,000.00	48,272.72	62,563.64	79,941.18
100000.0	0.02	198.00	3,719.36	6,240.00	23,200.01	30,400.00	40,000.00	53,636.36	69,515.15	88,823.53
125000.0	0.01	247.50	4,649.20	7,800.00	29,000.01	38,000.00	50,000.00	67,045.45	86,893.94	111,029.41
150000.0	0.01	297.00	5,579.04	9,360.00	34,800.01	45,600.00	60,000.00	80,454.54	104,272.73	133,235.29
175000.0	0.01	346.50	6,508.88	10,920.00	40,600.01	53,200.00	70,000.00	93,863.63	121,651.52	155,441.18
200000.0	0.01	396.00	7,438.72	12,480.00	46,400.01	60,800.00	80,000.00	107,272.72	139,030.31	177,647.06
250000.0	0.01	495.00	9,298.40	15,600.00	58,000.01	76,000.00	100,000.00	134,090.90	173,787.88	222,058.82
300000.0	0.01	594.00	11,158.08	18,720.00	69,600.01	91,200.00	120,000.00	160,909.08	208,545.45	266,470.59
350000.0	0.01	693.00	13,017.76	21,840.00	81,200.01	106,400.00	140,000.00	187,727.26	243,303.03	310,882.35
400000.0	0.01	792.00	14,877.44	24,960.00	92,800.01	121,600.00	160,000.00	214,545.44	278,060.61	355,294.12
450000.0	0.01	891.00	16,737.12	28,080.00	104,400.01	136,800.00	180,000.00	241,363.62	312,818.18	399,705.88
500000.0	0.01	990.00	18,596.80	31,200.00	116,000.01	152,000.00	200,000.00	268,181.80	347,575.76	444,117.65
600000.0	0.01	1,188.00	22,316.16	37,440.00	139,200.01	182,400.00	240,000.00	321,818.18	417,090.91	532,941.18
700000.0	0.01	1,386.00	26,035.52	43,680.00	162,400.01	212,800.00	280,000.00	375,454.54	486,606.06	621,764.71
800000.0	0.01	1,584.00	29,754.88	49,920.00	185,600.01	243,200.00	320,000.00	429,090.90	556,121.21	710,588.23
900000.0	0.01	1,782.00	33,474.24	56,160.00	208,800.01	273,600.00	360,000.00	482,727.26	625,636.36	799,411.76
1000000.0	0.01	1,980.00	37,193.60	62,400.00	232,000.01	304,000.00	400,000.00	536,363.63	695,151.52	888,235.29
1250000.0	0.01	2,475.00	46,492.00	78,000.00	290,000.01	380,000.00	500,000.00	670,454.54	868,939.40	1,110,294.12
1500000.0	0.01	2,970.00	55,790.40	93,600.00	348,000.01	456,000.00	600,000.00	804,545.45	1,042,727.28	1,332,352.94
1750000.0	0.01	3,465.00	65,088.80	109,200.00	406,000.01	532,000.00	700,000.00	938,636.36	1,216,515.16	1,554,411.76
2000000.0	0.01	3,960.00	74,387.20	124,800.00	464,000.01	608,000.00	800,000.00	1,072,727.27	1,390,303.03	1,776,470.59
2500000.0	0.01	4,950.00	92,984.00	156,000.00	580,000.01	760,000.00	1,000,000.00	1,340,909.09	1,737,878.79	2,220,588.23
3000000.0	0.01	5,940.00	111,580.80	187,200.00	696,000.01	912,000.00	1,200,000.00	1,609,090.90	2,085,454.55	2,664,705.88
3500000.0	0.01	6,930.00	130,177.60	218,400.00	812,000.01	1,064,000.00	1,400,000.00	1,877,272.26	2,433,030.31	3,108,823.53
4000000.0	0.01	7,920.00	148,774.40	249,600.00	928,000.01	1,216,000.00	1,600,000.00	2,145,454.54	2,780,606.06	3,552,941.18
4500000.0	0.01	8,910.00	167,371.20	280,800.00	1,044,000.01	1,368,000.00	1,800,000.00	2,413,636.36	3,128,181.82	3,997,058.82
5000000.0	0.01	9,900.00	185,968.00	312,000.00	1,160,000.01	1,520,000.00	2,000,000.00	2,681,818.18	3,475,757.58	4,441,176.47
6000000.0	0.01	11,880.00	223,161.60	374,400.00	1,392,000.01	1,824,000.00	2,400,000.00	3,218,181.82	4,170,909.91	5,329,411.76
7000000.0	0.01	13,860.00	260,355.20	436,800.00	1,624,000.01	2,128,000.00	2,800,000.00	3,754,545.45	4,866,060.61	6,217,647.06
8000000.0	0.01	15,840.00	297,548.80	499,200.00	1,856,000.01	2,432,000.00	3,200,000.00	4,290,909.09	5,561,212.12	7,105,882.35
9000000.0	0.01	17,820.00	334,742.40	561,600.00	2,088,000.01	2,736,000.00	3,600,000.00	4,827,272.26	6,256,363.36	7,994,117.76
10000000.0	0.01	19,800.00	371,936.00	624,000.00	2,320,000.01	3,040,000.00	4,000,000.00	5,363,636.36	6,951,515.16	8,882,352.94
12500000.0	0.01	24,750.00	464,920.00	780,000.00	2,900,000.01	3,800,000.00	5,000,000.00	6,704,545.45	8,689,394.00	11,102,941.18
15000000.0	0.01	29,700.00	557,904.00	936,000.00	3,480,000.01	4,560,000.00	6,000,000.00	8,045,454.54	10,427,272.28	13,323,529.94
17500000.0	0.01	34,650.00	650,888.00	1,092,000.00	4,060,000.01	5,320,000.00	7,000,000.00	9,386,363.36	12,165,151.16	15,544,117.76
20000000.0	0.01	39,600.00	743,872.00	1,248,000.00	4,640,000.01	6,080,000.00	8,000,000.00	10,727,272.27	13,903,030.03	17,764,705.88
25000000.0	0.01	49,500.00	929,840.00	1,560,000.00	5,800,000.01	7,600,000.00	10,000,000.00	13,409,090.90	17,378,787.88	22,205,882.23
30000000.0	0.01	59,400.00	1,115,808.00	1,872,000.00	6,960,000.01	9,120,000.00	12,000,000.00	16,090,909.08	20,854,545.45	26,647,058.82
35000000.0	0.01	69,300.00	1,301,776.00	2,184,000.00	8,120,000.01	10,640,000.00	14,000,000.00	18,772,727.26	24,330,303.31	31,088,235.53
40000000.0	0.01	79,200.00	1,487,744.00	2,496,000.00	9,280,000.01	12,160,000.00	16,000,000.00	21,454,545.44	27,806,060.61	35,529,411.18
45000000.0	0.01	89,100.00	1,673,712.00	2,808,000.00	10,440,000.01	13,680,000.00	18,000,000.00	24,136,363.62	31,281,818.18	39,970,588.82
50000000.0	0.01	99,000.00	1,859,680.00	3,120,000.00	11,600,000.01	15,200,000.00	20,000,000.00	26,818,181.80	34,757,575.76	44,411,765.47
60000000.0	0.01	118,800.00	2,231,616.00	3,744,000.00	13,920,000.01	18,240,000.00	24,000,000.00	32,181,818.18	41,709,090.91	53,294,118.76
70000000.0	0.01	138,600.00	2,603,552.00	4,368,000.00	16,240,000.01	21,280,000.00	28,000,000.00	37,545,454.54	48,660,606.06	62,176,470.59
80000000.0	0.01	158,400.00	2,975,488.00	4,992,000.00	18,560,000.01	24,320,000.00	32,000,000.00	42,909,090.90	55,612,121.21	71,058,823.53
90000000.0	0.01	178,200.00	3,347,424.00	5,616,000.00	20,880,000.01	27,360,000.00	36,000,000.00	48,272,727.26	62,563,636.36	79,941,176.47
100000000.0	0.01	198,000.00	3,719,360.00	6,240,000.00	23,200,000.01	30,400,000.00	40,000,000.00	53,636,363.63	69,515,151.16	88,823,529.94
125000000.0	0.01	247,500.00	4,649,200.00	7,800,000.00	29,000,000.01	38,000,000.00	50,000,000.00	67,045,454.54	86,893,940.00	111,029,411.18
150000000.0	0.01	297,000.00	5,579,040.00	9,360,000.00	34,800,000.01	45,600,000.00	60,000,000.00	80,454,545.45	104,272,728.28	133,235,294.94
175000000.0	0.01	346,500.00	6,508,880.00	10,920,000.00	40,600,000.01	53,200,000.00	70,000,000.00	93,863,636.36	121,651,516.16	155,441,176.47
200000000.0	0.01	396,000.00	7,438,720.00	12,480,000.00	46,400,000.01	60,800,000.00	80,000,000.00	107,272,727.27	139,030,303.03	177,647,058.82
250000000.0	0.01	495,000.00	9,298,400.00	15,600,000.00	58,000,000.01	76,000,000.00	100,000,000.00	134,090,909.90	173,787,878.88	222,058,823.23
300000000.0	0.01	594,000.00	11,158,080.00	18,720,000.00	69,600,000.01	91,200,000.00	120,000,000.00	160,909,090.08	208,545,454.45	266,470,588.82
350000000.0	0.01	693,000.00	13,017,760.00	21,840,000.00	81,200,000.01	106,400,000.00	140,000,000.00	187,727,272.26	243,303,030.31	310,882,353.53
400000000.0	0.01	792,000.00	14,877,440.00	24,960,000.00	92,800,000.01	121,600,000.00	160,000,000.00	214,545,454.44	278,060,606.61	355,294,118.18
450000000.0	0.01	891,000.00	16,737,120.00	28,080,000.00	104,400,000.01	136,800,000.00	180,000,000.00	241,363,636.62	312,818,181.82	399,705,882.82
500000000.0	0.01	990,000.00	18,596,800.00	31,200,000.00	116,000,000.01	152,000,000.00	200,000,000.00	268,181,818.80	347,575,757.76	444,117,765.47
600000000.0	0.01	1,188,000.00	22,316,160.00	37,440,000.00	139,200,000.01	182,400,000.00	240,000,000.00	321,818,181.82	417,090,909.91	532,941,176.76
700000000.0	0.01	1,386,000.00	26,035,520.00	43,680,000.00	162,400,000.01	212,800,000.00	280,000,000.00	375,454,545.54	486,606,060.06	621,764,705.59
800000000.0	0.01	1,584,000.00	29,754,880.00	49,920,000.00	185,600,000.01	243,200,000.00	320,000,000.00	429,090,909.90	556,121,212.21	710,588,235.53
900000000.0	0.01	1,782,000.00	33,474,240.00	56,160,000.00	208,800,000.01	273,600,000.00	360,000,000.00	482,727,272.26	625,636,363.36	799,411,764.47
1000000000.0	0.01	1,980,000.00	37,193,600.00	62,400,000.00	232,000,000.01	304,000,000.00	400,000,000.00	536,363,636.36	695,151,516.16	888,235,294.94
1250000000.0	0.01	2,475,000.00	46,492,000.00	78,000,000.00	290,000,000.01	380,000,000.00	500,000,000.00	670,454,545.54	868,939,400.00	1,110,294,118.18
1500000000.0	0.01	2,970,000.00	55,790,400.00	93,600,000.00	348,000,000.01	456,000,000.00	600,000,000.00	804,545,454.45	1,042,727,282.28	1,332,352,941.94
1750000000.0	0.01	3,465,000.00	65,088,800.00	109,200,000.00	406,000,000.01	532,000,000.00	700,000,000.00	938,636,363.36	1,216,515,161.16	1,554,411,765.47
2000000000.0	0.01	3,960,000.00	74,387,200.00	124,800,000.00	464,000,000.01	608,000,000.00	800,000,000.00	1,072,727,272.27	1,390,303,030.03	1,776,470,588.82
2500000000.0	0.01	4,950,000.00	92,984,000.00	156,000,000.00	580,000,000.01	760,000,000.00	1,000,000,000.00	1,340,909,090.90	1,737,878,788.88	2,220,588,232.23
3000000000.0	0.01	5,940,000.00	111,580,800.00	187,200,000.00	696,000,000.01	912,000,000.00	1,200,000,000.00	1,609,090,909.08	2,085,454,545.45	2,664,705,882.82
3500000000.0	0.01	6,930,000.00	130,177,600.00	218,400,000.00	812,000,000.01	1,064,000,000.00	1,400,000,000.00	1,877,272,272.26	2,433,030,303.31	3,108,823,533.53
4000000000.0	0.01	7,920,000.00	148,774,400.00	249,600,000.00	928,000,000.01	1,216,000,000.00	1,600,000,000.00	2,145,454,544.44	2,780,606,060.61	3,552,941,181.18
4500000000.0	0.01	8,910,000.00	167,371,200.00	280,800,000.00	1,044,000,000.01	1,368,000,000.00	1,800,000,000.00	2,413,636,362.62	3,128,181,818.82	3,997,058,828.82
5000000000.0	0.01	9,900,000.00	185,968,000.00	312,000,000.00	1,160,000,000.01	1,520,000,000.00	2,000,000,000.00	2,681,818,180.80	3,475,757,576.76	4,441,176,474.47
6000000000.0	0.01	11,880,000.00	223,161,600.00	374,400,000.00	1,392,000,000.01	1,824,000,000.00	2,400,000,000.00	3,218,181,818.82	4,170,909,091.91	5,329,411,767.76
7000000000.0	0.01	13,860,000.00	260,355,200.00	436,800,000.00	1,624,000,000.01	2,128,000,000.00	2,800,000,000.00	3,754,545,454.54	4,866,060,606.06	6,217,647,065.59
8000000000.0	0.01	15,840,000.00	297,548,800.00	499,200,000.00	1,856,000,000.01	2,432,000,000.00	3,200,000,000.00	4,290,909,090.90	5,561,212,121.21	7,105,882,353.53
9000000000.0	0.01	17,820,000.00	334,742,400.00	561,600,000.00	2,088,000,000.01	2,736,000,000.00	3,600,000,000.00	4,827,272,272.26	6,256,363,363.36	7,994,117,764.47
10000000000.0	0.01	19,800,000.00	371,936,000.00	624,000,000.00	2,320,000,000.01	3,040,000,000.00	4,000,000,000.00	5,363,636,363.36	6,951,515,161.16	8,882,352,949.94
12500000000.0	0.01	24,750,000.00	464,920,000.00	780,000,000.00	2,900,000,000.01	3,800,000,000.00	5,000,000,000.00	6,704,545,454.54	8,689,394,000.00	11,102,941,181.18
15000000000.0	0.01	29,700,000.00	557,904,000.00	936,000,000.00	3,480,000,000.01	4,560,000,000.00	6,000,000,000.00	8,045,454,544.54	10,427,272,282.28	13,323,529,429.94
17500000000.0	0.01	34,650,000.00	650,888,000.00	1,092,000,000.00	4,060,000,000.01	5,320,000,000.00	7,000,000,000.00	9,386,363,363.36	12,165,151,161.16	15,544,117,764.47
20000000000.0	0.01	39,600,000.00	743,872,000.00	1,248,000,000.00	4,640,000,000.01	6,080,000,000.00	8,000,000,000.00	10,727,272,272.27	13,903,030,303.03	17,764,705,882.82
25000000000.0	0.01	49,500,000.00	929,840,000.00	1,560,000,000.00	5,800,000,000.01	7,600,000,000.00	10,000,000,000.00	13,409,090,909.90	17,378,787,888.88	22,205,882,232.23
30000000000.0	0.01	59,400,000.00	1,115,808,000.00	1,872,000,000.00	6,960,000,000.01	9,120,000,000.00	12,000,000,000.00	16,090,909,090.08	20,854,545,454.45	26,647,058,828.82
35000000000.0	0.01	69,300,000.00	1,301,776,000.00	2,184,000,000.00	8,120,000,000.01	10,640,000,000.00	14,000,000,000.00	18,772,727,272.26	24,330,303,303.31	31,088,235,533.53
40000000000.0	0.01	79,200,000.00	1,487,744,000.00	2,496,000,000.00	9,280,000,000.01	12,160,000,000.00	16,000,000,000.00	21,454,545,454.44	27,806,060,606.61	35,529,411,181.18
45000000000.0	0.01	89,100,000.00	1,673,712,000.00	2,808,000,000.00	10,440,000,000.01	13,680,000,000.00	18,000,000,000.00	24,136,363,362.62	31,281,818,182.82	39,970,588,282.82
50000000000.0	0.01	99,000,000.00	1,859,680,000.00	3,120,000,000.00	11,600,000,000.01	15,200,000,000.00	20,000,000,000.00	26,818,181,880.80	34,757,575,776.76	44,411,765,474.47
60000000000.0	0.01	118,800,000.00	2,231,616,000.00	3,744,000,000.00	13,920,000,000.01	18,240,000,000.00	24,000,000,000.00	32,181,818,182.82	41,709,090,911.91	53,294,118,767.76
70000000000.0	0.01	138,600,000.00	2,603,552,000.00	4,368,000,000.00	16,240,000,000.01	21,280,000,000.00	28,000,000,000.00	37,545,454,544.54	48,660,606,060.06	62,176,470,659.59
80000000000.0	0.01	158,400,000.00	2,975,488,000.00	4,992,000,000.00	18,560,000,000.01	24,320,000,000.00	32,000,000,000.00	42,909,090,909.90	55,612,121,211.21	71,058,823,533.53
90000000000.0	0.01	178,200,000.00	3,347,424,000.00	5,616,000,000.00	20,880,000,000.01	27,360,000,000.00	36,000,000,000.00	48,272,727,272.26	62,563,636,363.36	79,941,176,474.47
100000000000.0	0.01	198,000,000.00	3,719,360,000.00	6,240,000,000.00	23,200,000,000.01	30,400,000,000.00	40,000,000,000.00	53,636,363,636.36	69,515,151,616.16	88,823,529,494.94
125000000000.0	0.01	247,500,000.00	4,649,200,000.00	7,800,000,000.00	29,000,000,000.01	38,000,000,000.00	50,000,000,000.00	67,045,454,



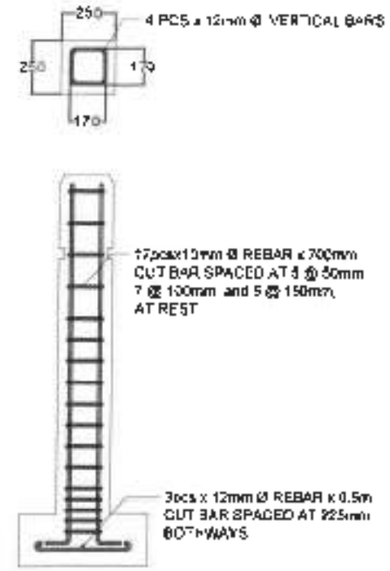
SAMPLE PERSPECTIVE



FRONT VIEW ELEVATION



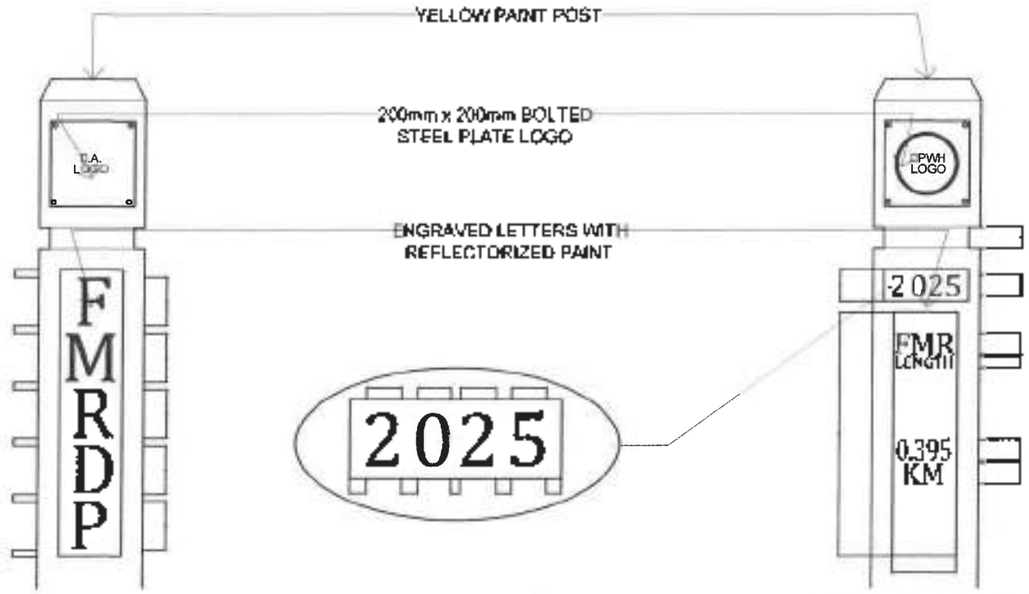
REAR VIEW ELEVATION



SECTION DETAILS

FARM - TO - MARKET - ROAD MARKER

SCALE 1:20 METERS



DETAILED OF FRONT VIEW OF MARKER

*NOTE: FONT FOR LETTERS AND NUMBERS SHALL BE CAMBRIA

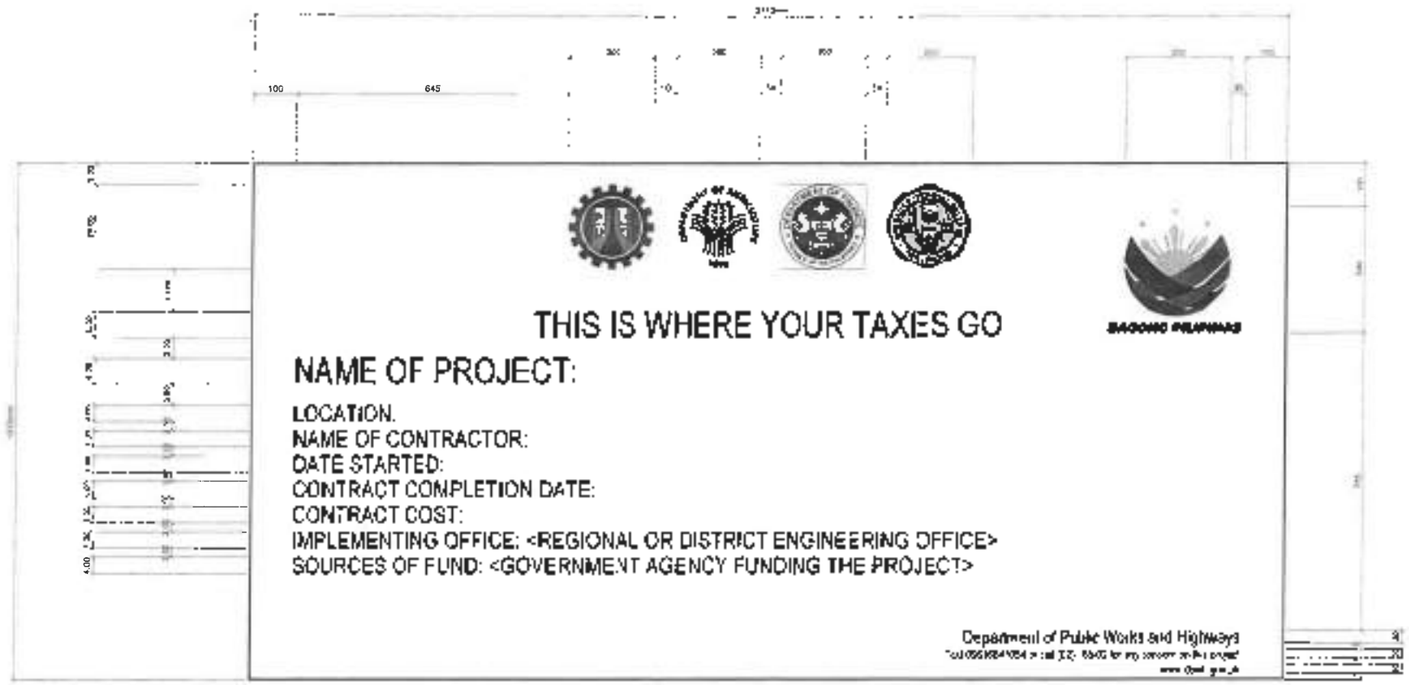
DETAILED OF REAR VIEW OF MARKER

SAMPLE PERSPECTIVE

FARM - TO - MARKET - ROAD MARKER

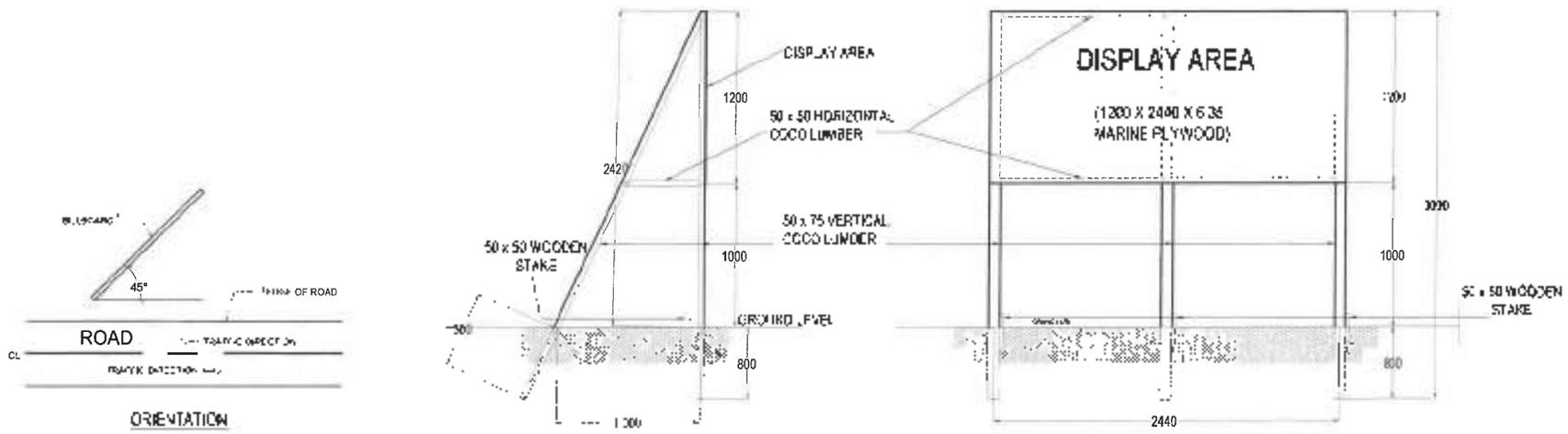
SCALE: 1:10 METERS

Republic of the Philippines DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS REGIONAL OFFICE No. 08 NORTHERN SAMAR FIRST DISTRICT ENGINEERING OFFICE	PROJECT NAME AND LOCATION: CONSTRUCTION OF FARM TO MARKET ROAD WITH RIGHT, LEFT AND RIGHT, RIGHT WITH WIDENING, PAN-ENGLEBAN, NORTHERN SAMAR	FMR ROAD MARKER	DRAWN BY: JEFF ENGINEER	REVIEWED: MARIONALD N. ENAM ASST. CHIEF PLANNING & DESIGN SECTION DATE:	SUBMITTED: MOY S. ERENO CHIEF PLANNING & DESIGN SECTION DATE:	RECOMMENDED: VIVIAN G. BIACO ASST. DISTRICT ENGINEER DATE:	APPROVED: ALVIN A. IGNACIO DISTRICT ENGINEER DATE:	SHEET NO. A 10/10	SHEET NO. 20/35



DPWH STANDARD PROJECT BILLBOARD

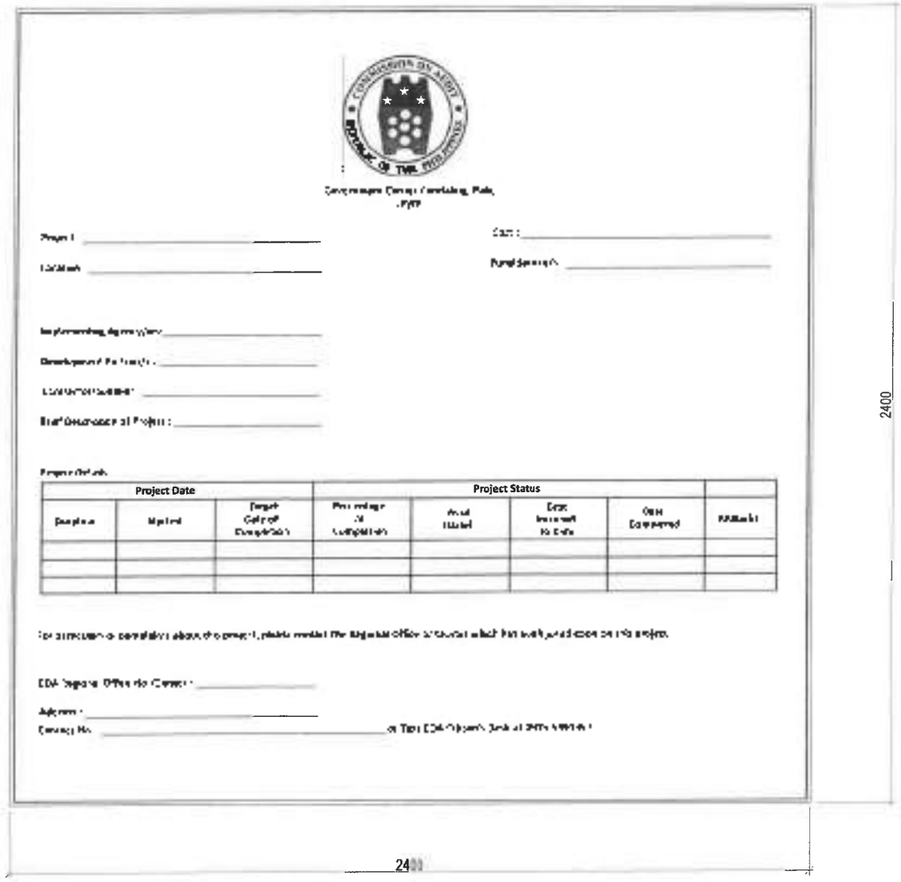
NOT TO SCALE

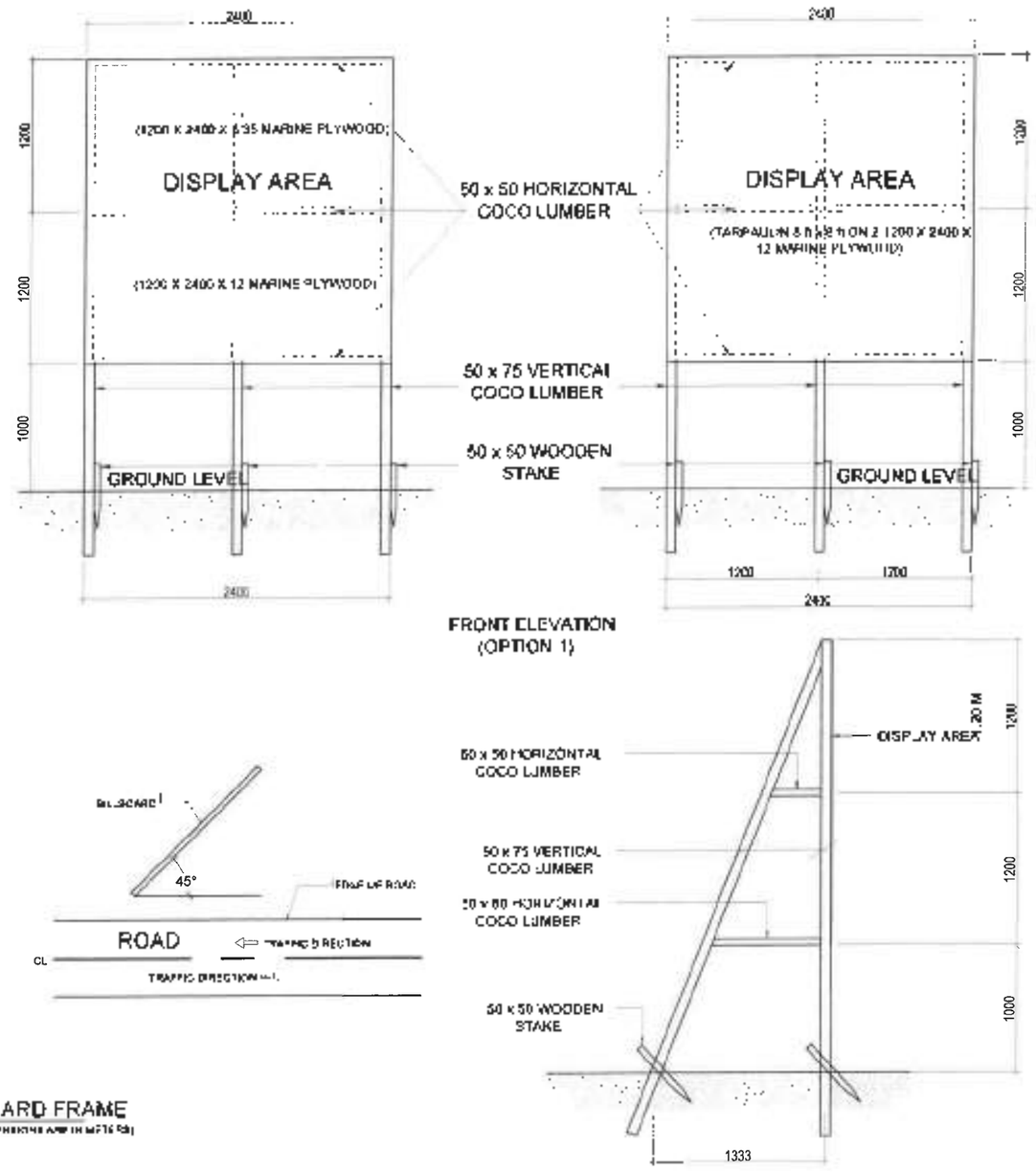


BILLBOARD FRAME

NOT TO SCALE. ALL DIMENSIONS ARE IN MILLIMETERS

DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS NORTHERN SAMAR FIRST DISTRICT ENGINEERING OFFICE			JEFF A. VERGARA ENGINEER	REVIEWED: MAR DIONALD N. DIMAN DATE	SUBMITTED: ANDY S. ERERO DATE	RECOMMENDED: VIVIAN C. BLACO DATE	APPROVED: ALVIN A. IGNACIO	SHEET NO. FBB 1 2	SHEET NO. 28 38





COA STANDARD PROJECT BILLBOARD

SPECIFICATIONS:

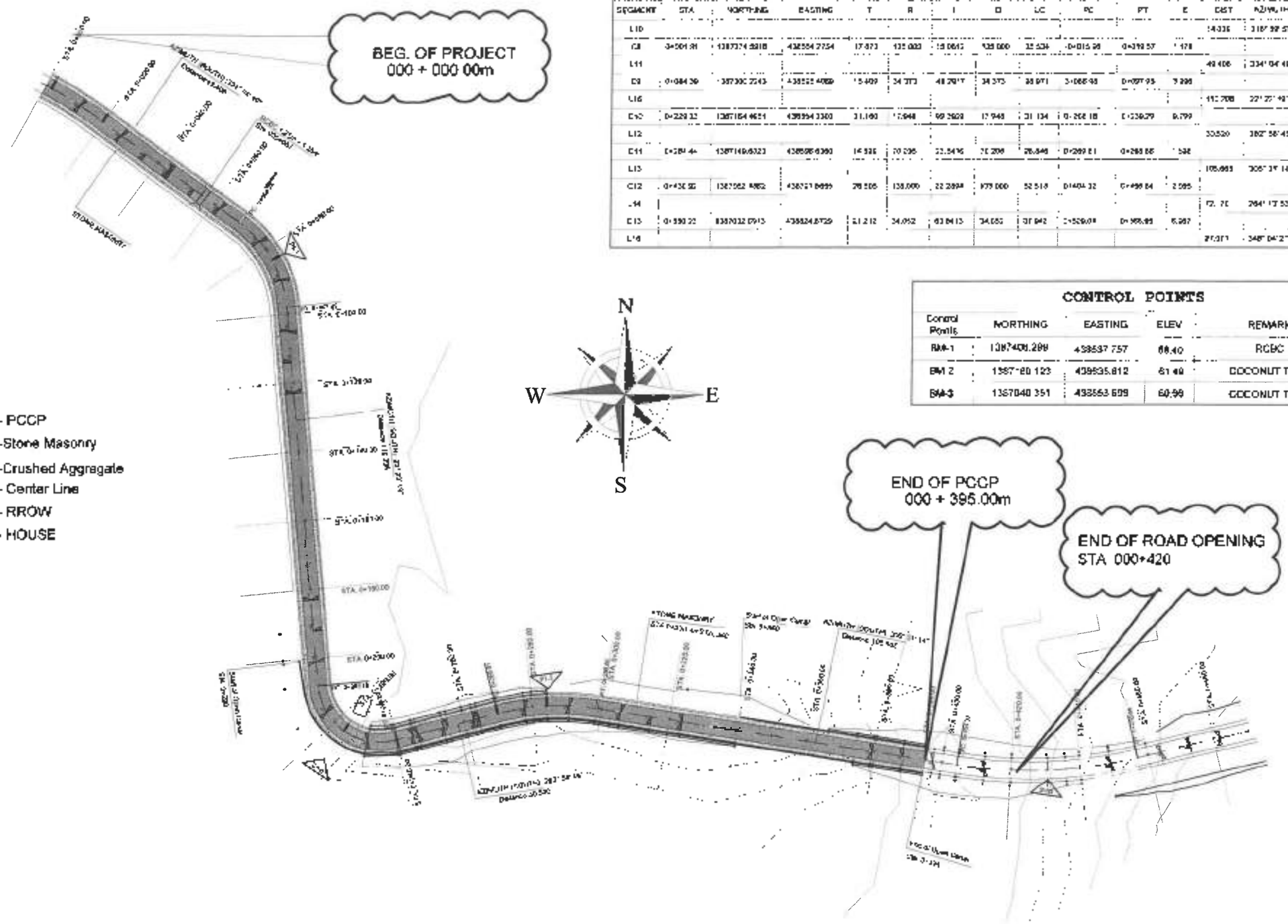
1. TARPAULIN, WHITE, 8 FT X 8 FT
2. RESOLUTION : 70 DPI
3. FONT : HELVETICA
4. FONT SIZE : MAIN INFORMATION - 3"
   SUB-INFORMATION - 1"
5. FONT COLOR: BLACK
6. BACKGROUND COLOR: WHITE

COA BILLBOARD FRAME
(NOT TO SCALE, ALL DIMENSIONS ARE IN METERS)

DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS NORTH SAMAR FIRST DISTRICT ENGINEERING OFFICE	DESIGN OF PROJECT BILLBOARD FOR DPWH LOCAL AND MAJOR BUILDINGS PROJECT, NORTHERN SAMAR	COA PROJECT BILLBOARD DETAILS	DRAFTED BY: JEFF P. ESTEBOLA, ENGINEER	REVIEWED: MAR DONALD N. EIMAN, ASST. CHIEF, PLANNING AND DESIGN SECTION, DATE	SUBMITTED: ANDY S. ERIÑO, CHIEF, PLANNING AND DESIGN SECTION, DATE	RECOMMENDED: VIMA M. BIACO, ASSISTANT DISTRICT ENGINEER, DATE	APPROVED: ALVIN A. IGNACIO, DISTRICT ENGINEER, DATE	SHEET NO. PBB 2 of 2	SHEET NO. 22 of 36

PLAN

SCALE 1:1250



ALIGNMENT PROPERTIES

SEGMENT	STA	NORTHING	EASTING	T	R	I	D	LC	PC	PT	E	DIST	AZIMUTH (DEGREE)
L10												14.035	318° 39' 57"
C8	0+001.91	1387374.5018	438554.7754	17.873	135.000	15.0613	135.000	35.534	0+015.98	0+019.57	1.478		
L11												49.406	334° 04' 45"
C9	0+084.39	1387300.2343	438555.4069	15.409	34.373	48.2917	34.373	38.971	0+066.93	0+097.95	9.996		
L12												152.708	321° 27' 41"
C10	0+229.32	1387154.4651	438554.3300	31.160	17.948	99.2923	17.948	31.134	0+208.18	0+239.29	9.799		
L13												30.520	302° 58' 45"
C11	0+284.44	1387149.6323	438556.6390	14.935	70.206	22.5476	70.206	28.846	0+269.51	0+298.35	5.585		
L14												105.663	305° 37' 14"
C12	0+430.92	1387052.4862	438621.8699	28.505	135.000	22.2894	979.000	52.518	0+404.42	0+456.94	2.085		
L15												72.70	264° 17' 53"
C13	0+530.22	1387032.0913	438624.8729	21.212	34.052	63.8413	34.052	37.842	0+509.01	0+566.85	6.987		
L16												27.013	348° 04' 27"

CONTROL POINTS

Control Points	NORTHING	EASTING	ELEV	REMARKS
BM-1	1387406.289	438537.757	68.40	RCBC
BM-2	1387180.123	438535.812	61.49	COCONUT TREE
BM-3	1387040.351	438553.609	60.99	COCONUT TREE

LEGENDS:
- PCCP
- Stone Masonry
- Crushed Aggregate
- Center Line
- RROW
- HOUSE

DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGION 7A (Cebu)
NORTHERN SAMAR FIRST DISTRICT ENGINEERING OFFICE
Catarman, Northern Samar

PROJECT NAME AND LOCATION: CONCRETING OF BRGY. LOAYS TO BRGY. N. NAMAYAN FMR, BRGY. LOAYA AND BRGY. REPUBLICA, INTAMAC MUNICIPALITY SAMAR
PROVINCE: NORTHERN SAMAR

SHEET CONTENTS: PLAN

PREPARED BY: JEFF P. PEDRONA, ENGINEER

REVIEWED: MAR DONALD N. EUMAN, ASST. DIST. PUBLIC WORKS & HIGHWAYS ENGINEER, DATE:

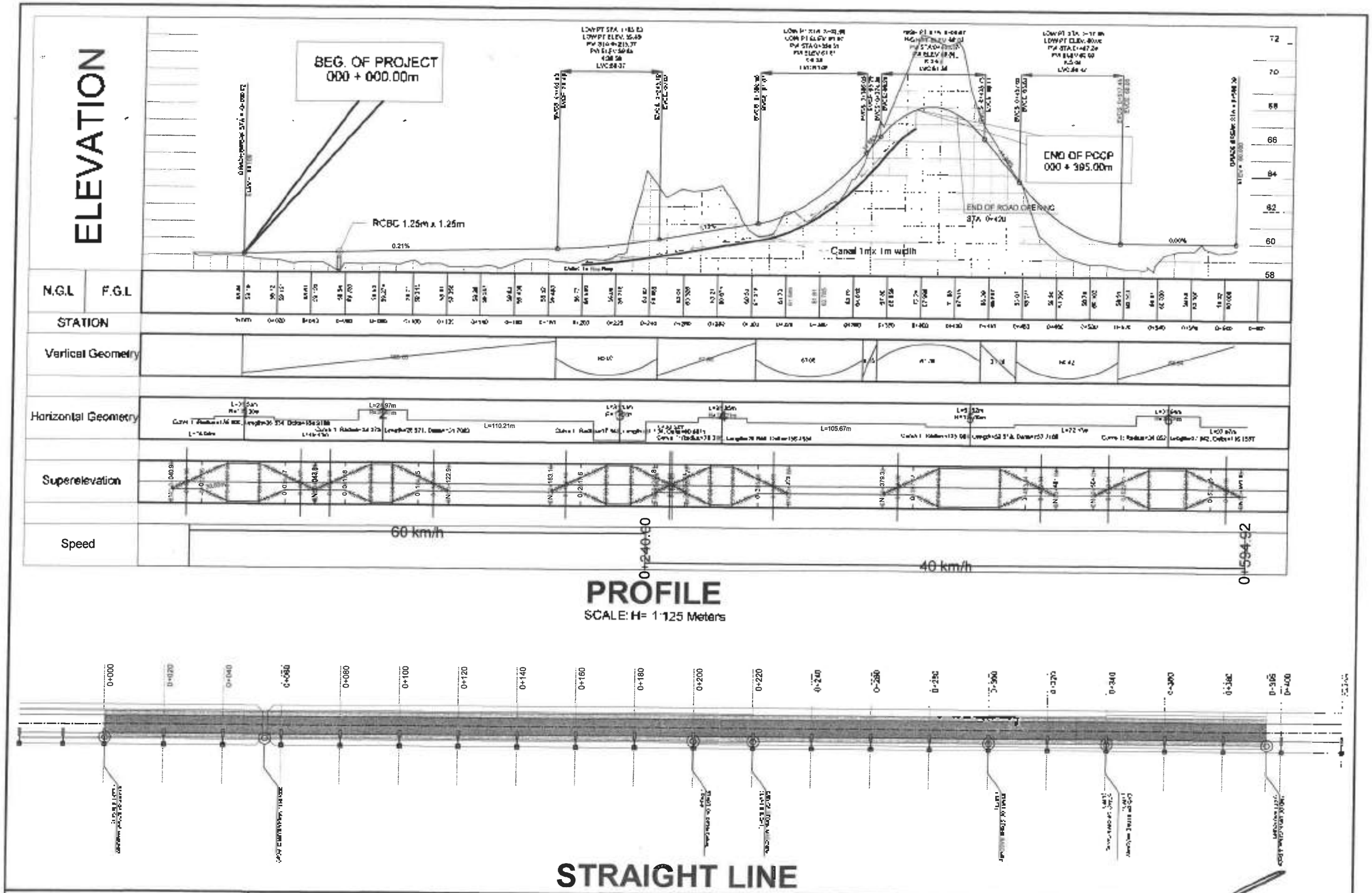
SUBMITTED: ANDY S. EFEÑO, CHIEF PUBLIC WORKS ADMINISTRATION, DATE:

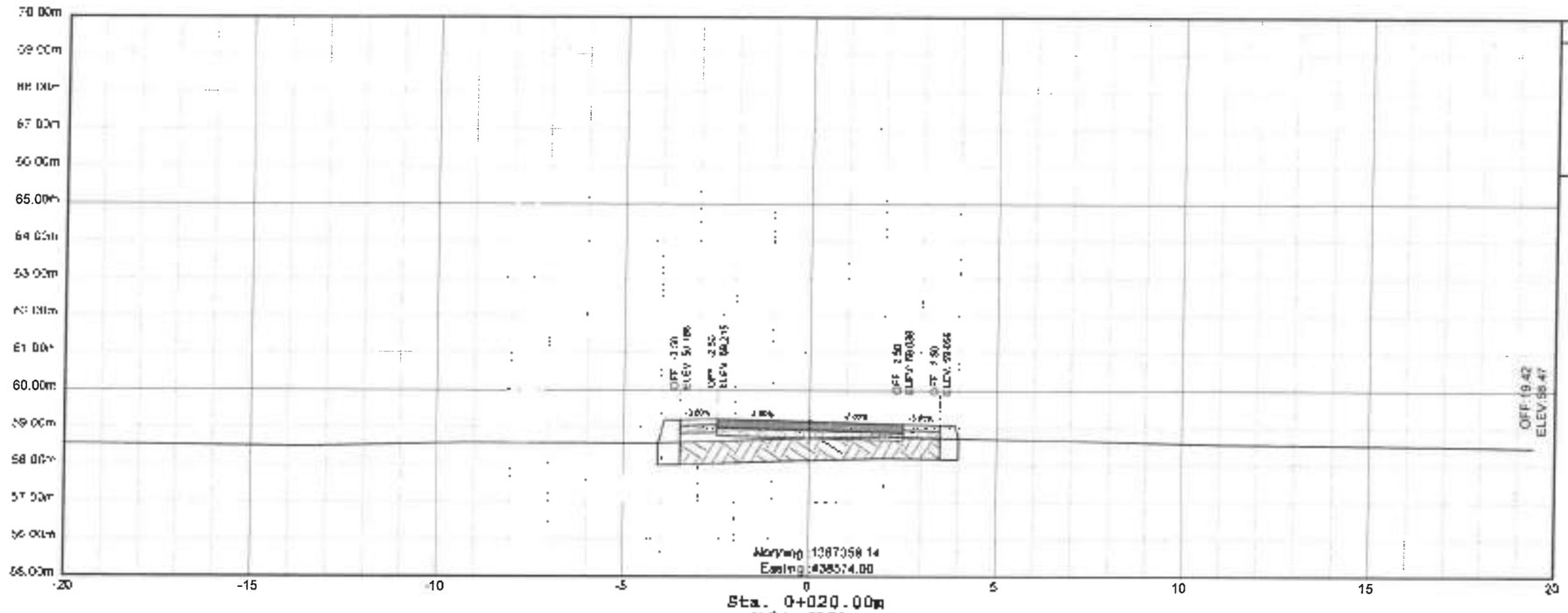
RECOMMENDED: VIVIAN A. BADCO, ASST. DIST. ENGINEER, DATE:

APPROVED: ALVIN A. IGNACIO, DISTRICT ENGINEER, DATE:

SHEET NO. P-1 (1 of 2)

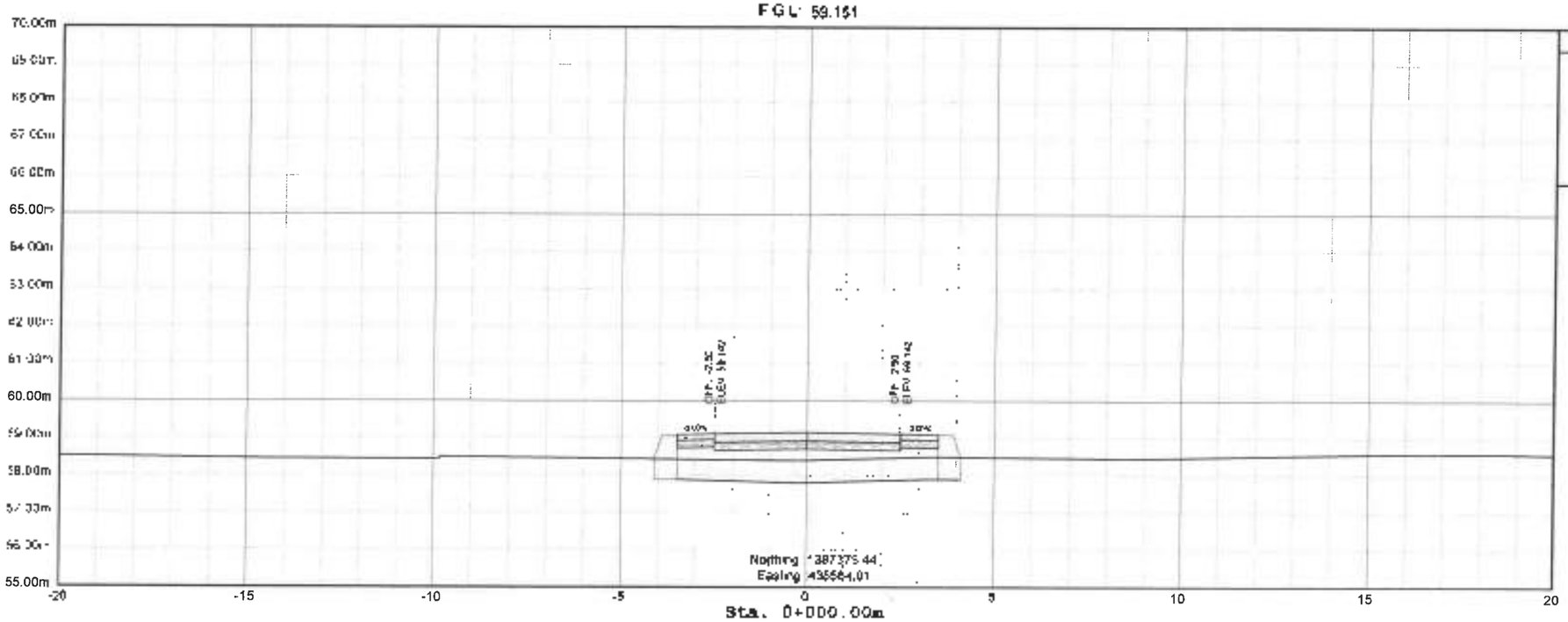
SHEET NO. 23 of 36


ELEVATION
BEG. OF PROJECT
000 + 000.00m
END OF PCCP
000 + 395.00m
RCBC 1.25m x 1.25m
0.21%
END OF ROAD OPENING
STA. 0+420
Canal 1m x 1m width
N.G.L
F.G.L
STATION
Vertical Geometry
Horizontal Geometry
Superelevation
Speed
60 km/h
40 km/h
0+240.00
0+594.92
PROFILE
SCALE: H= 1:125 Meters
STRAIGHT LINE
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
NORTHERN SAMAR FIRST DISTRICT ENGINEERING OFFICE
PROFILE
JEFFREY PEÑOLA
ENGINEER
REVIEWED:
MAY DONALD N. EIMAN
SUBMITTED:
ANDY S. ERAÑO
RECOMMENDED:
VIVIAN BUACO
APPROVED:
ALVIN A. IGNACIO
DISTRICT ENGINEER
DATE:
P-1
2 2
24
38



MATERIAL	AREA
CUT	0.00
FILL	4.39
ITEM 102(1)	4.03
[illegible]	0.00
ITEM R5	0.43
ITEM L9	0.66

Sta. 0+020.00m
N.G.L 58.73
F.G.L: 59.151



MATERIAL	AREA
CUT	0.00
FILL	5.00
ITEM 102(1)	4.35
[illegible]	0.00
ITEM R5	0.88
ITEM L9	0.66

Sta. 0+000.00m
N.G.L 58.44
F.G.L: 59.19
START OF PROJECT

Republic of the Philippines
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
NORTHERN SAMAR FIRST
DISTRICT ENGINEERING OFFICE

PROJECT NAME AND LOCATION: CONSTRUCTION OF NEW LEYTE-SAMAR BOUNDARY BRIDGE ALONG NAT'L SECONDARY ROAD, BRGY. DALAS AND BRGY. BURAUEN, REGION VIII, NORTHERN SAMAR, NORTHERN SAMAR

DRAFTSMAN: JEFFER [illegible]

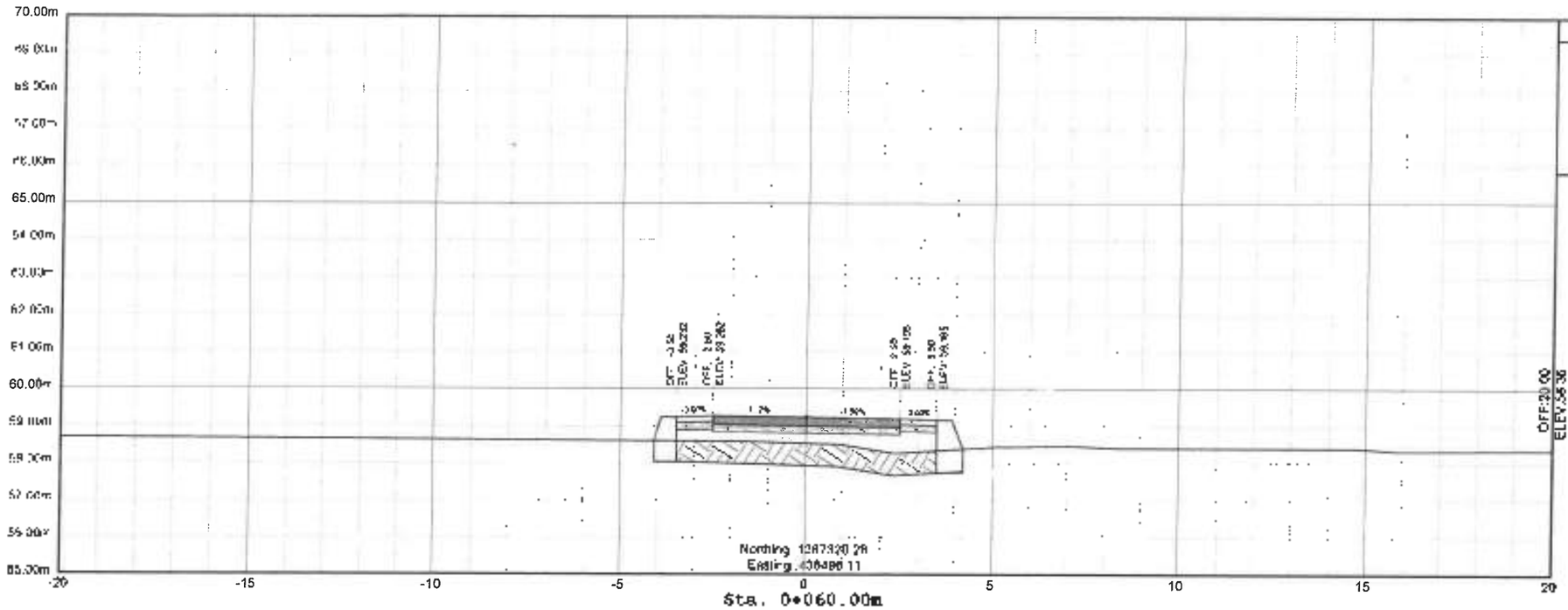
REVIEWED: MARIO DONALD N. EMAN — ASST. CHIEF PLANNING & DESIGN SECTION — DATE

SUPERVISED: ANDY S. LEÑO — CHIEF PLANNING & DESIGN SECTION — DATE

RECOMMENDED: VIVIAN A. BIACO — ASSISTANT DISTRICT ENGINEER — DATE

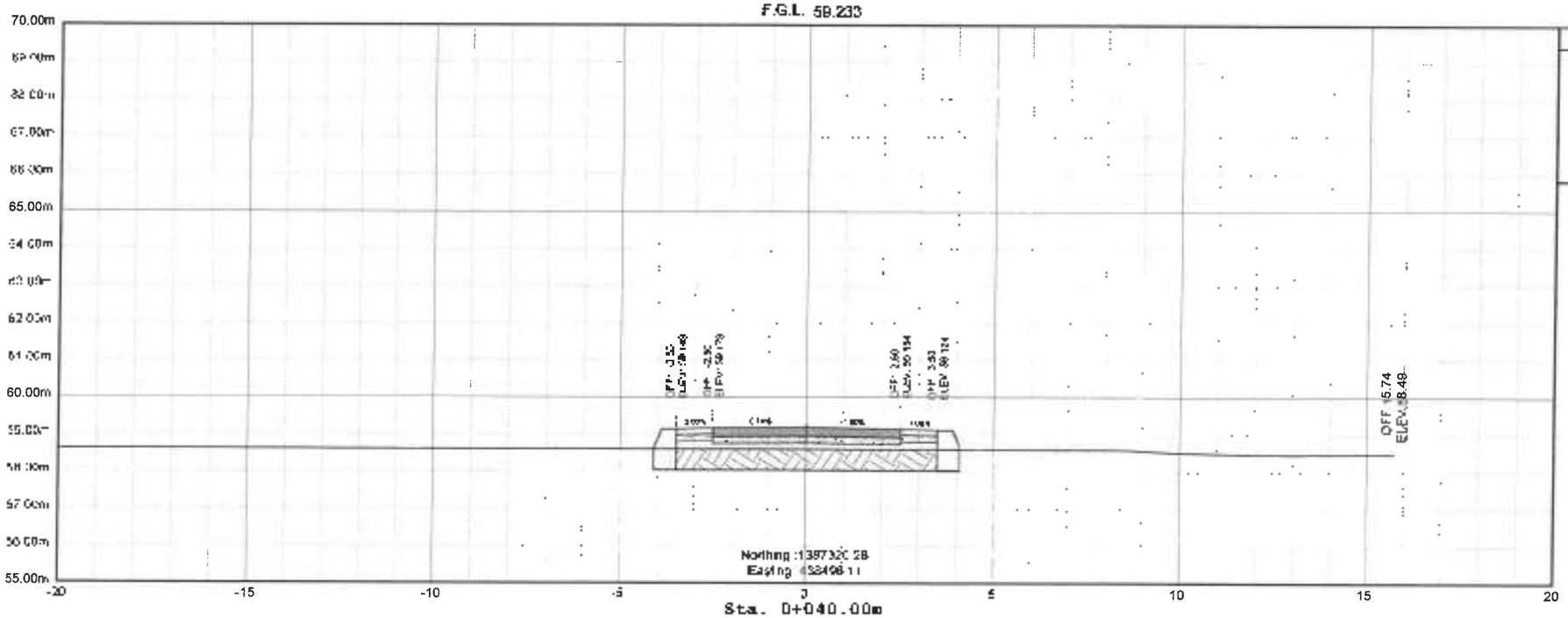
APPROVED: ALVIN A. IGNACIO — DISTRICT ENGINEER — DATE

SHEET NO. 25 / 38



MATERIAL	AREA
CUT	0.00
FILL	8.55
ITEM 102(1)	4.89
[illegible]	0.00
ITEM RS	0.86
ITEM LS	0.66

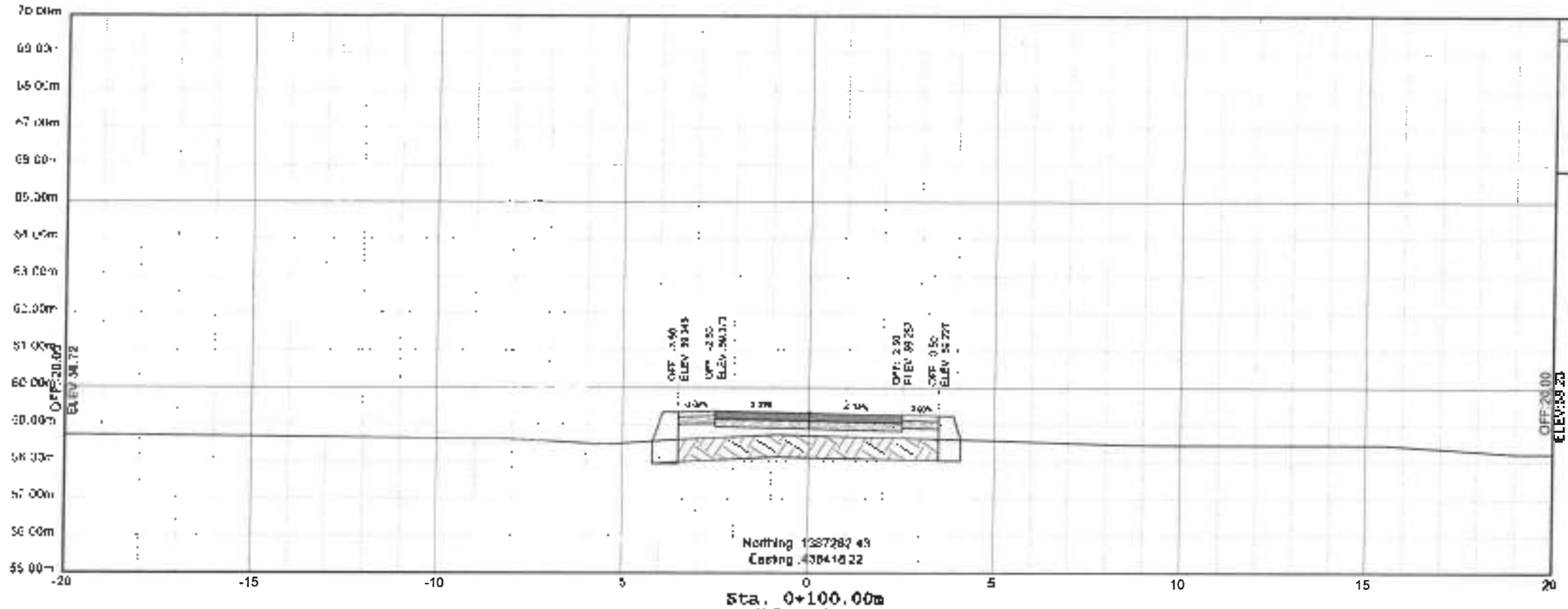
Sta. 0+060.00m
N.G.L. 58.54
F.G.L. 59.233



MATERIAL	AREA
CUT	0.00
FILL	5.30
ITEM 102(1)	4.47
[illegible]	0.00
ITEM RS	0.61
ITEM LS	0.67

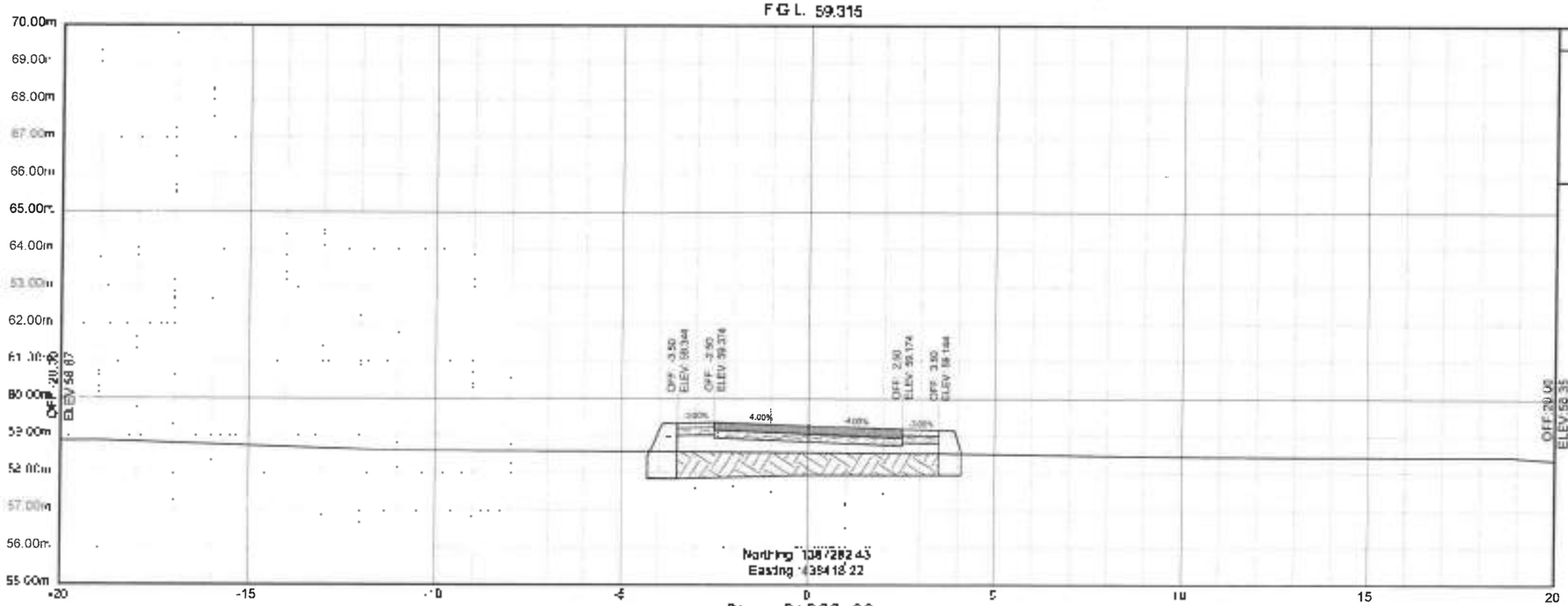
Sta. 0+040.00m
N.G.L. 58.61
F.G.L. 59.192

DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS NORTHERN SAMAR FIRST DISTRICT ENGINEERING OFFICE	CONSTRUCTION OF [illegible]		JEFF P. PEBROLA	MAR DONALD N. ELMAN DATE:	ANDY B. EBEÑO DATE	VIVIAN [illegible]NACO DATE	ALVIN A. IGNACIO DATE	26 38



MATERIAL	AREA
CUT	0.00
FILL	3.80
ITEM 102(1)	4.87
----	0.00
ITEM R3	0.66
ITEM L3	0.66

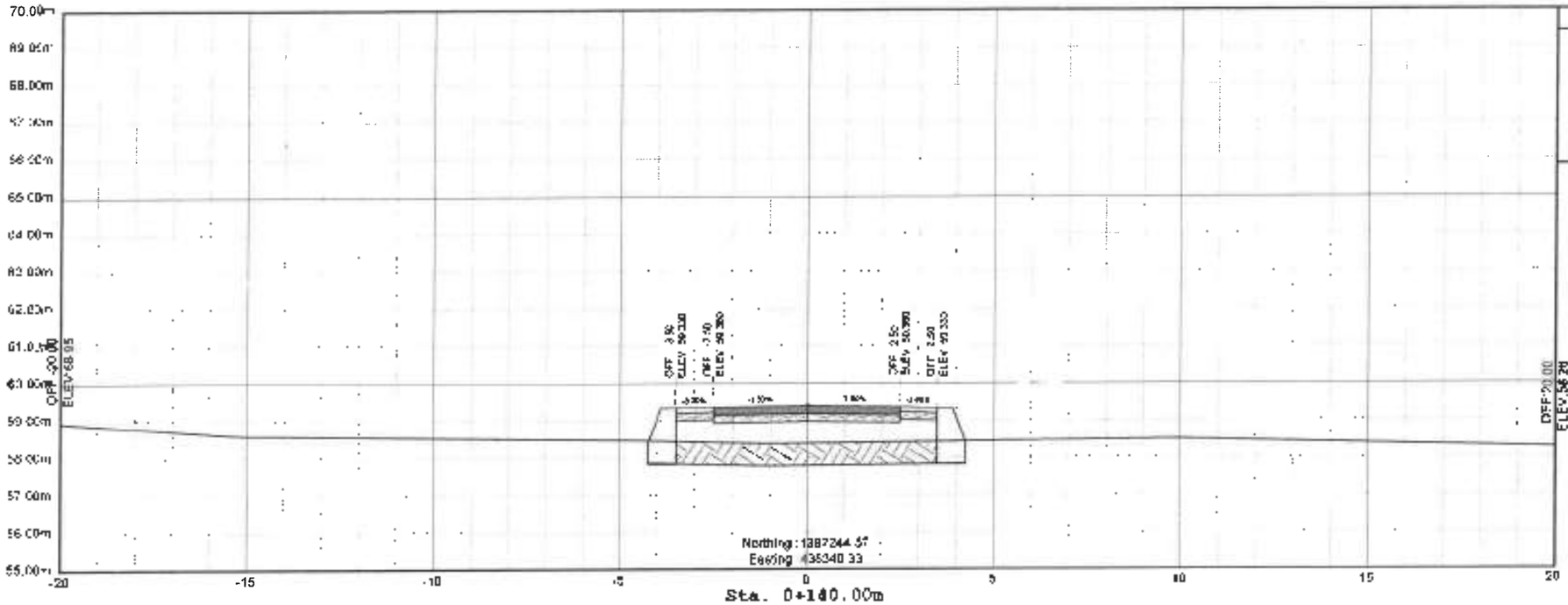
Sta. 0+100.00m
N.G.L: 58.71
F.G.L. 59.315



MATERIAL	AREA
CUT	0.00
FILL	8.63
ITEM 102(1)	5.32
----	0.00
ITEM R3	0.86
ITEM L3	0.84

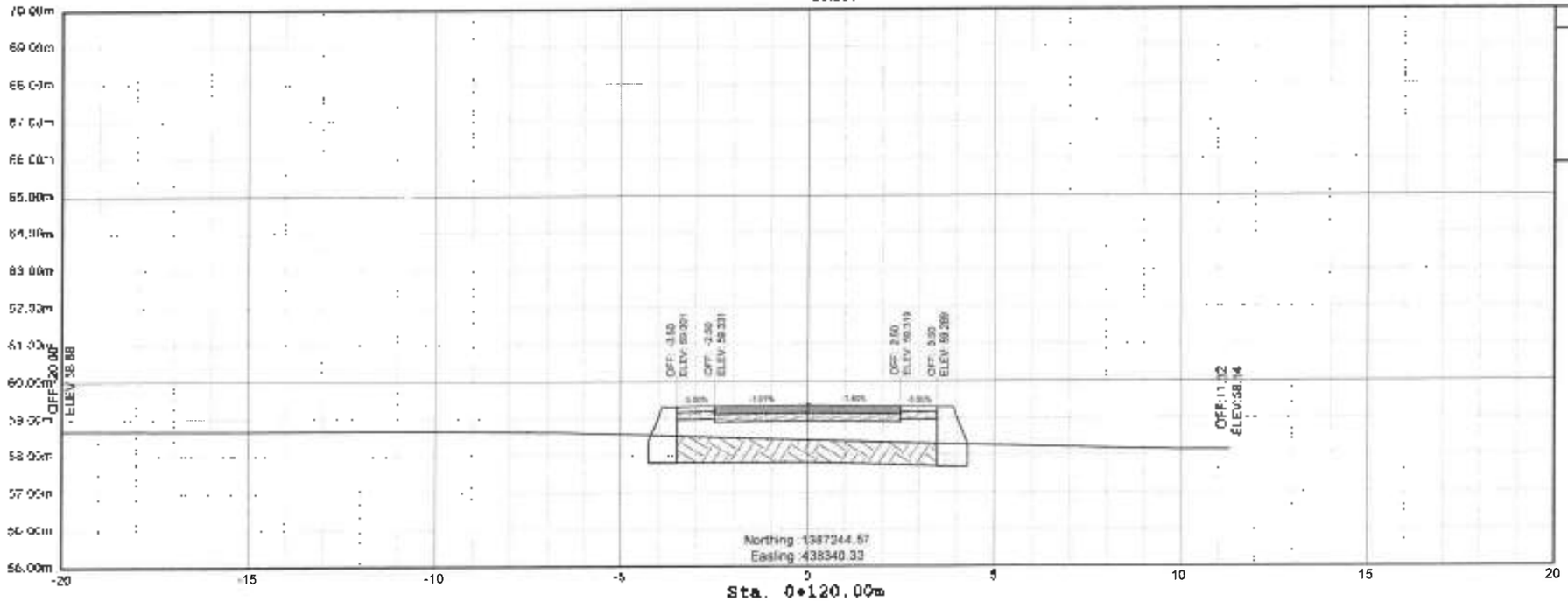
Sta. 0+080.00m
N.G.L: 58.54
F.G.L: 59.274

Republika ng Pilipinas DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS REGIONAL OFFICE NO. III NUEVA ECIJA - PAMPANGA DISTRICT ENGINEERING OFFICE	PROJECT NAME AND LOCATION CONSTRUCTION OF BRIDGE LIGHTS TO WEST BOUNDARY PARK BASE LIGHTS AND BRIDGE BOUNDARY WALL ALONG MAC ARTHUR HIGHWAY ACADIA, HIGHWAY RAMP	SHEET CONTENTS	DRAWN BY: JERFE TENIOLA	REVIEWED: MAR DONALD N. SIMAN DATE:	SUBMITTED: ANDY B. ENEÑO DATE	RECOMMENDED: VIVIANA B. BIACO DISTRICT ENGINEER DATE	APPROVED: ALVIN A. IGNACIO DISTRICT ENGINEER DATE:	SET NO.	SHEET NO. 27 38



MATERIAL	AREA
CUT	0.00
FILL	8.07
ITEM 102(1)	4.66
[illegible]	0.00
ITEM RS	0.87
ITEM LS	0.87

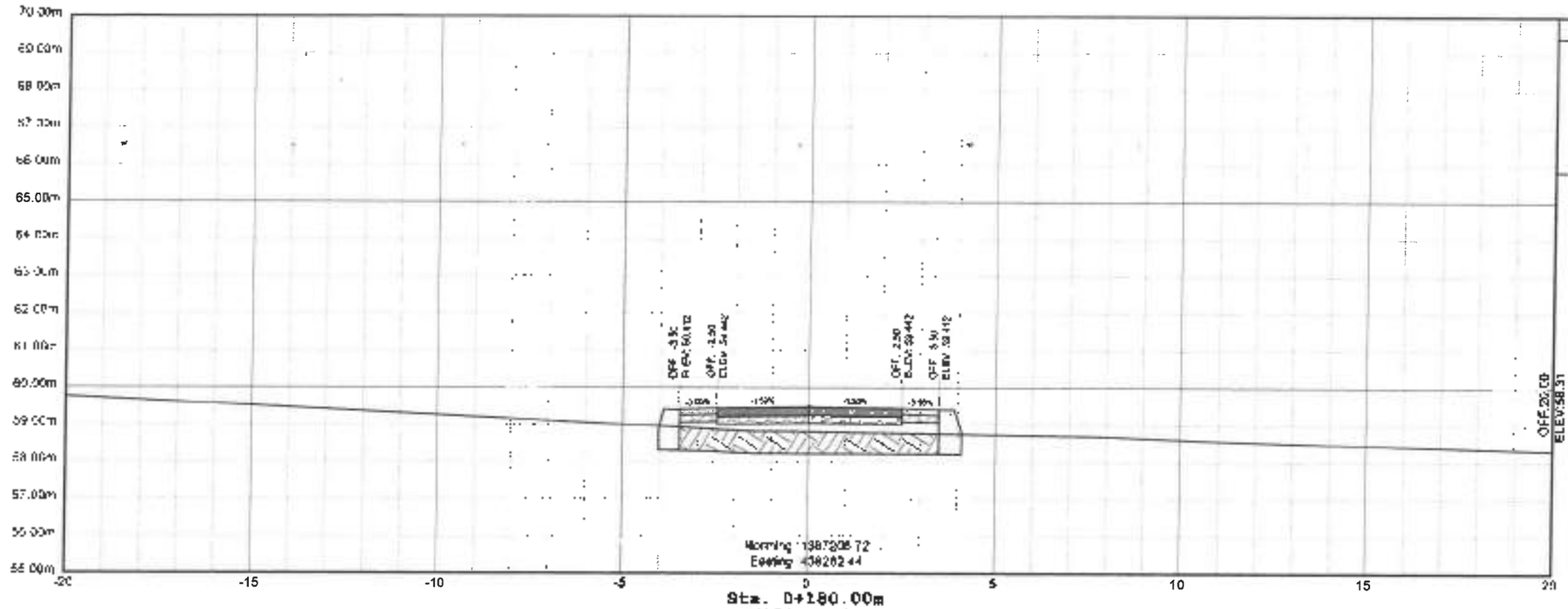
Sta. 0+180.00m
N.G.L: 58.39
F.G.L 58.337



MATERIAL	AREA
CUT	0.00
FILL	7.98
ITEM 102(1)	0.63
[illegible]	0.00
ITEM RS	1.08
ITEM LS	0.78

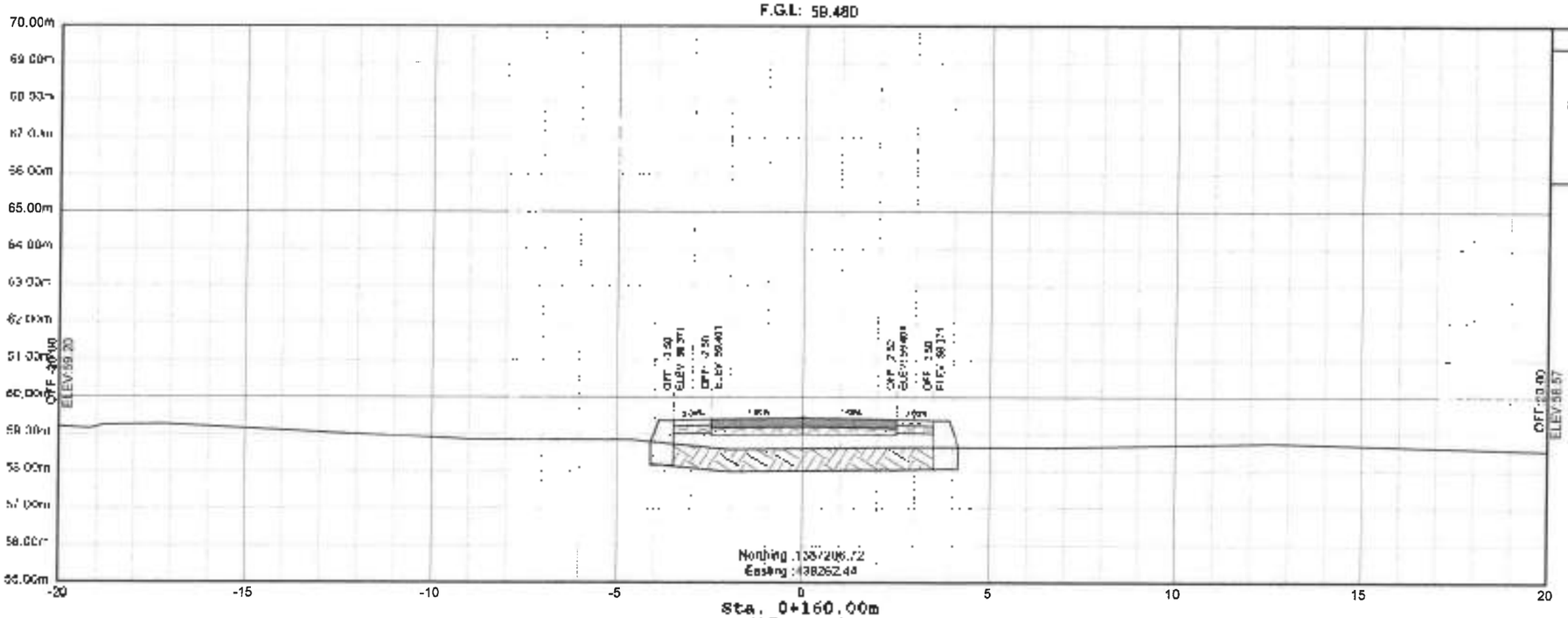
Sta. 0+120.00m
N.G.L: 58.41
F.G.L 58.356

Republic of the Philippines DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS REGIONAL OFFICE NO. 1 NORTH LUZON SUMMIT FIRST DISTRICT ENGINEERING OFFICE	PROJECT PLANTILLA LOCATION CONSTRUCTION OF BRGY. LOAN TO BRGY. BAYAMBANG, BRGY. LOAN AND BRGY. BAYAMBANG, BAYAMBANG NORTH DRAINAGE BAYAMBANG, NORTH LUZON SUMMIT	SHEET CONTENTS	DRAFTED BY: JEFF F. PEROLA ENGINEER I	REVIEWED: MARCIONALO N. EIMAN DATE:	SUBMITTED: ANDY S. BREÑO DATE:	RECOMMENDED: VIVIAN A. BIACO ASSISTANT DISTRICT ENGINEER DATE:	APPROVED: ALVIN A. IGNACIO DISTRICT ENGINEER DATE:	SHEET NO.	SHEET NO.
									28 36



MATERIAL	AREA
CUT	0.00
FILL	5.70
ITEM 102(1)	4.91
----	0.00
ITEM PS	0.68
ITEM LS	0.67

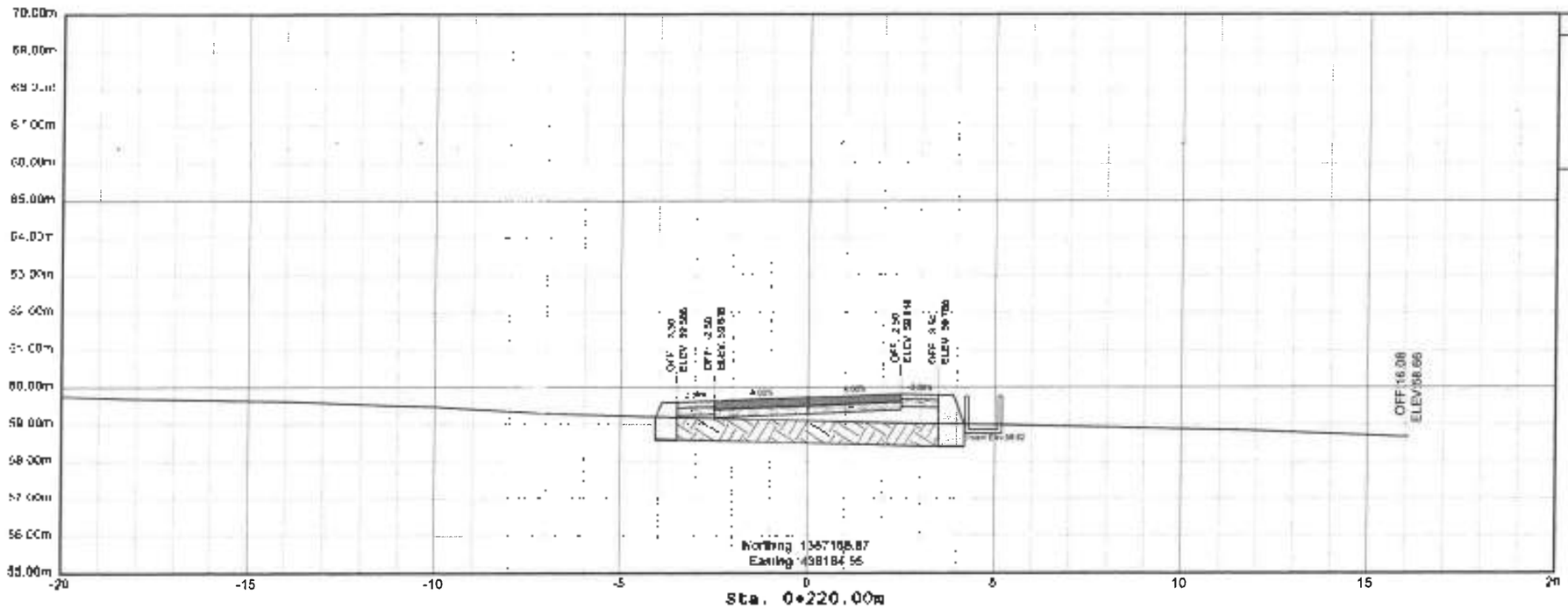
Sta. 0+180.00m
N.G.L: 58.82
F.G.L: 59.480



MATERIAL	AREA
CUT	0.00
FILL	6.72
ITEM 102(1)	4.87
----	0.00
ITEM PS	0.76
ITEM LS	0.56

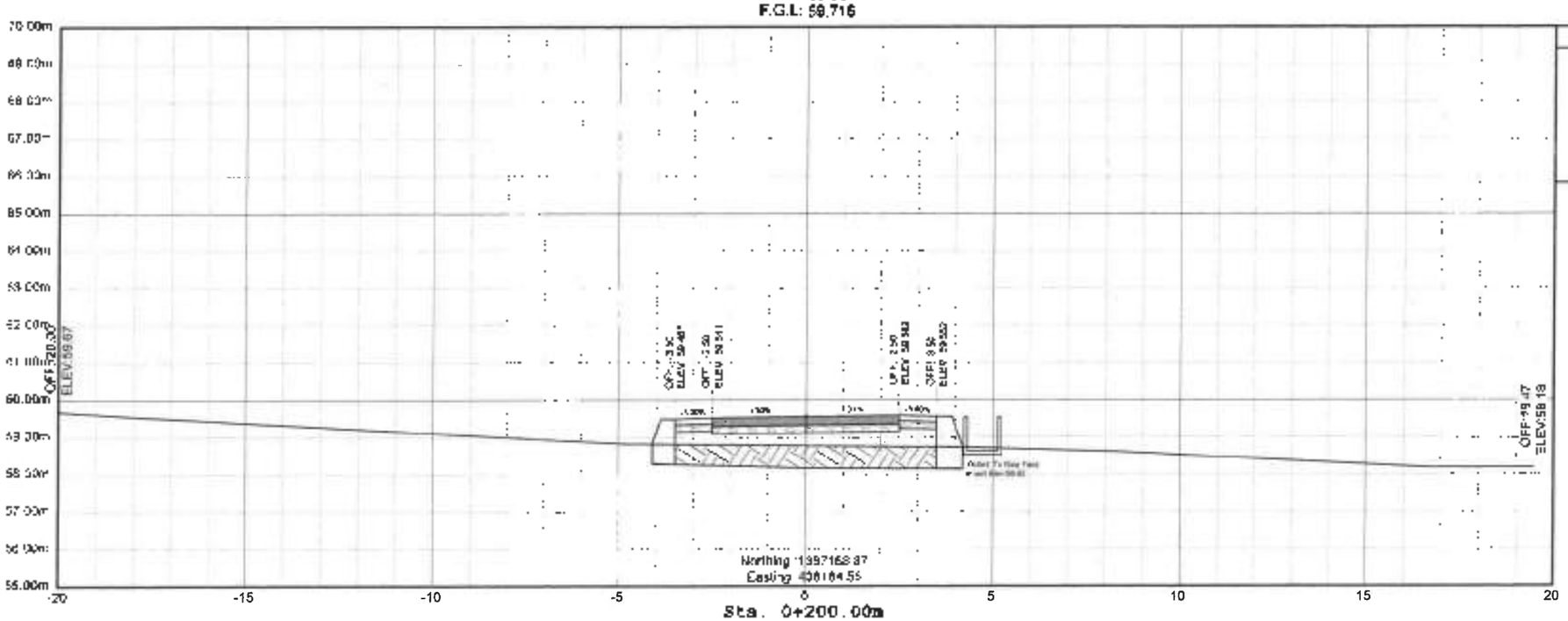
Sta. 0+160.00m
N.G.L: 58.62
F.G.L. 59.438

Republic of the Philippines DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS NORTHERN SAMAR FIRST DISTRICT ENGINEERING OFFICE	PROJECT AND LOCATION: CONCRETING OF FIRST LEGATE TO FIRST LAMANTE FRM FIRST LAMATE AND FIRST SUMAYDAYA, BOBON, NORTHERN SAMAR BOBON, NORTHERN SAMAR	SHEET CONTENTS:	DRAFTSMAN CHKD: JEFF TIPENDOLA	REVIEWED: MAR DONALD N. ERMAN ASST. CHIEF, PLANNING & DESIGN SECTION DATE	SUBMITTED: ANDY S. OSEÑO CHIEF, PLANNING & DESIGN SECTION DATE	RECOMMENDED: VIVIAN P. OBIACO ASSISTANT DISTRICT ENGINEER DATE	APPROVED: ALVIN A. IGNACIO DISTRICT ENGINEER DATE	SHEET NO.	SHEET NO.
									29 36



MATERIAL	AREA
CUT	0.00
FILL	6.50
ITEM 102(1)	4.87
----	0.00
ITEM RS	0.82
ITEM LS	0.53

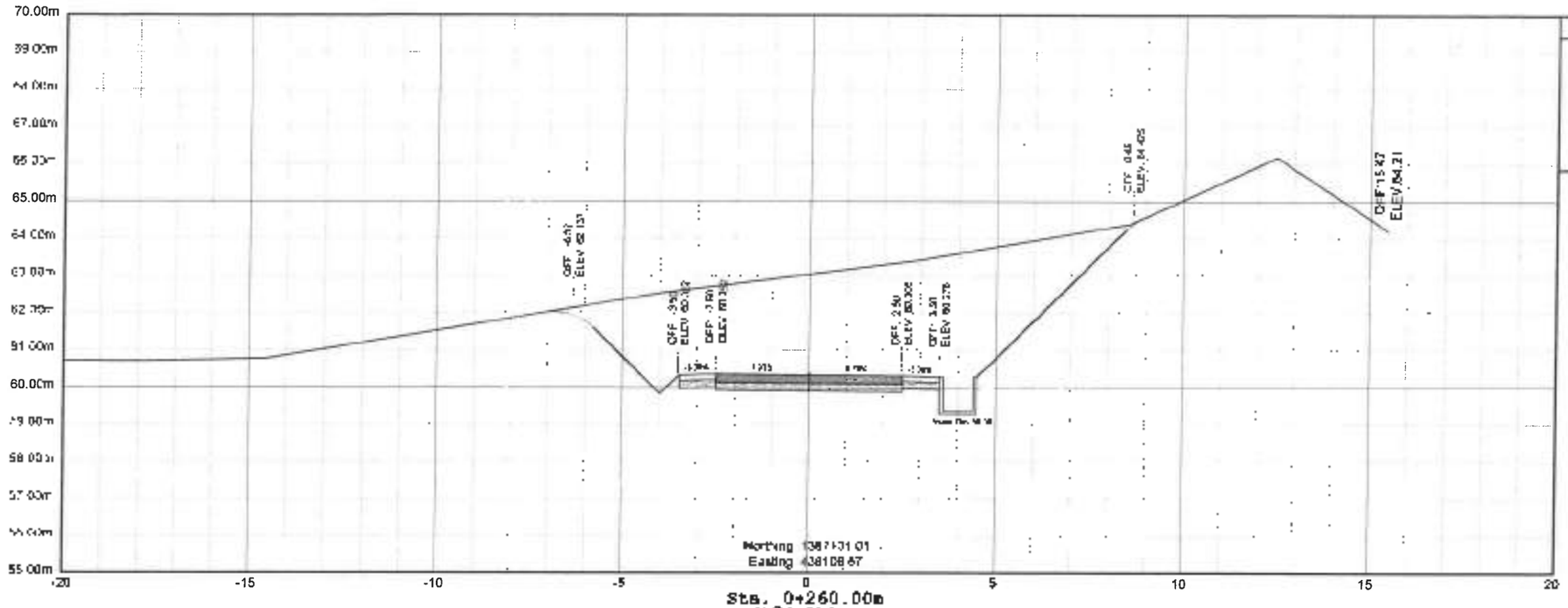
Sta. 0+220.00m
N.G.L: 59.09
F.G.L: 59.716



MATERIAL	AREA
CUT	0.00
FILL	6.61
ITEM 102(1)	4.72
----	0.00
ITEM RS	0.81
ITEM LS	0.52

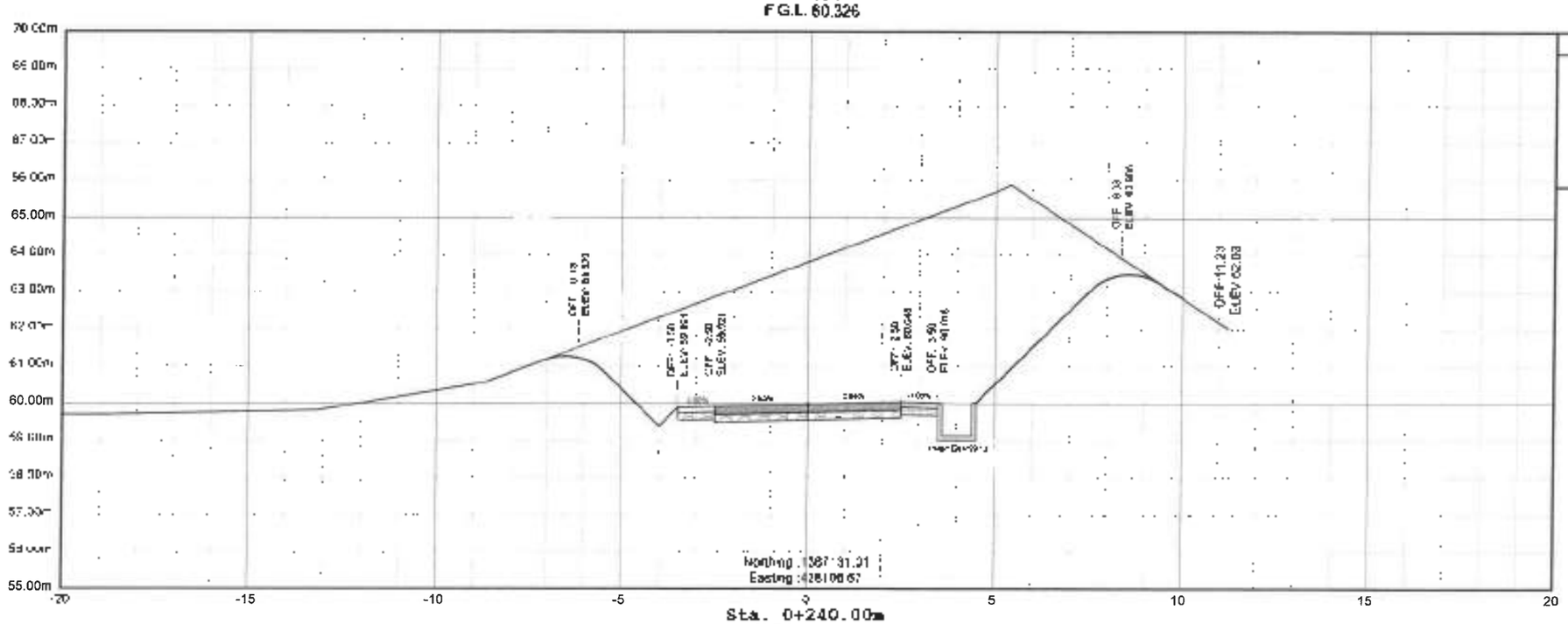
Sta. 0+200.00m
N.G.L. 58.77
F.G.L: 59.549

Republic of the Philippines DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS NORTHERN SAMAR FIRST DISTRICT ENGINEERING OFFICE	PROJECT NAME AND LOCATION: CONSTRUCTION OF MAIN LEVEE TO BRGY. BUENAVISTA, BRGY. URDAN AND BRGY. BURAGANA, ROSARIO, NORTHERN SAMAR ROSARIO, NORTHERN SAMAR	SHEET CONTENTS	PREPARED BY: JEFF FIREBOLA ENGINEER	REVIEWED: MARDONALD N. EIMAN ASST. CHIEF PLANNING & DESIGN SECTION DATE:	SUBMITTED: ANDY S. BRIEÑO CHIEF PLANNING & DESIGN SECTION DATE:	RECOMMENDED: VIVIAN S. IGNACIO ASSISTANT DISTRICT ENGINEER DATE:	APPROVED: ALVIN A. IGNACIO DISTRICT ENGINEER DATE:	SHT. NO.	SHEETS



MATERIAL	AREA
CUT	38.92
FILL	0.00
ITEM 102(1)	0.00
[illegible]	0.00
ITEM RS	0.00
ITEM LS	0.00

Sta. 0+260.00m
N.G.L. 63.04
F.G.L. 60.326



MATERIAL	AREA
CUT	51.86
FILL	0.00
ITEM 102(1)	0.00
[illegible]	0.00
ITEM RS	0.00
ITEM LS	0.00

Sta. 0+240.00m
N.G.L 63.82
F.G.L 59.985

Republic of the Philippines
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGION OFFICE VIII
NORTHERN SAMAR FIRST DISTRICT ENGINEERING OFFICE
Tacloban City, Northern Samar

PROJECT TITLE AND LOCATION: CONCRETING OF BRGY. [illegible] TO BRGY. [illegible] ASPHALTED PAVEMENT, BRGY. LIBAYA AND BRGY. SUMAGUTA, ROSARIO, NORTHERN SAMAR

PREPARED PLAN AND MAPS

DRAWN BY: JEFF P. [illegible]

CHECKED BY: MAR DONALD N. EMAN, CHIEF, PLANNING & DESIGN SECTION, DATE:

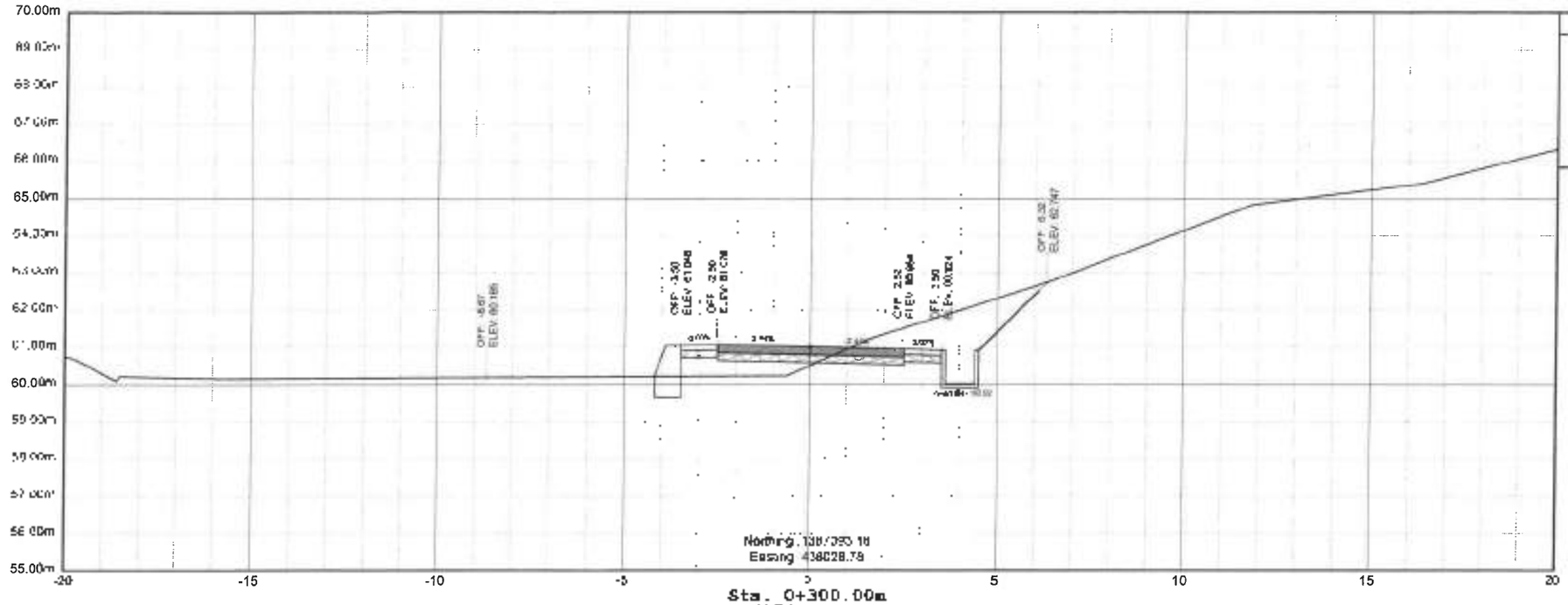
RECOMMENDED BY: ANDY S. [illegible], CHIEF, PLANNING & DESIGN SECTION, DATE

RECOMMENDED BY: VIVIAN [illegible] BIACO, ASST. DISTRICT ENGINEER, DATE

APPROVED BY: ALVIN A. IGNACIO, DISTRICT ENGINEER, DATE

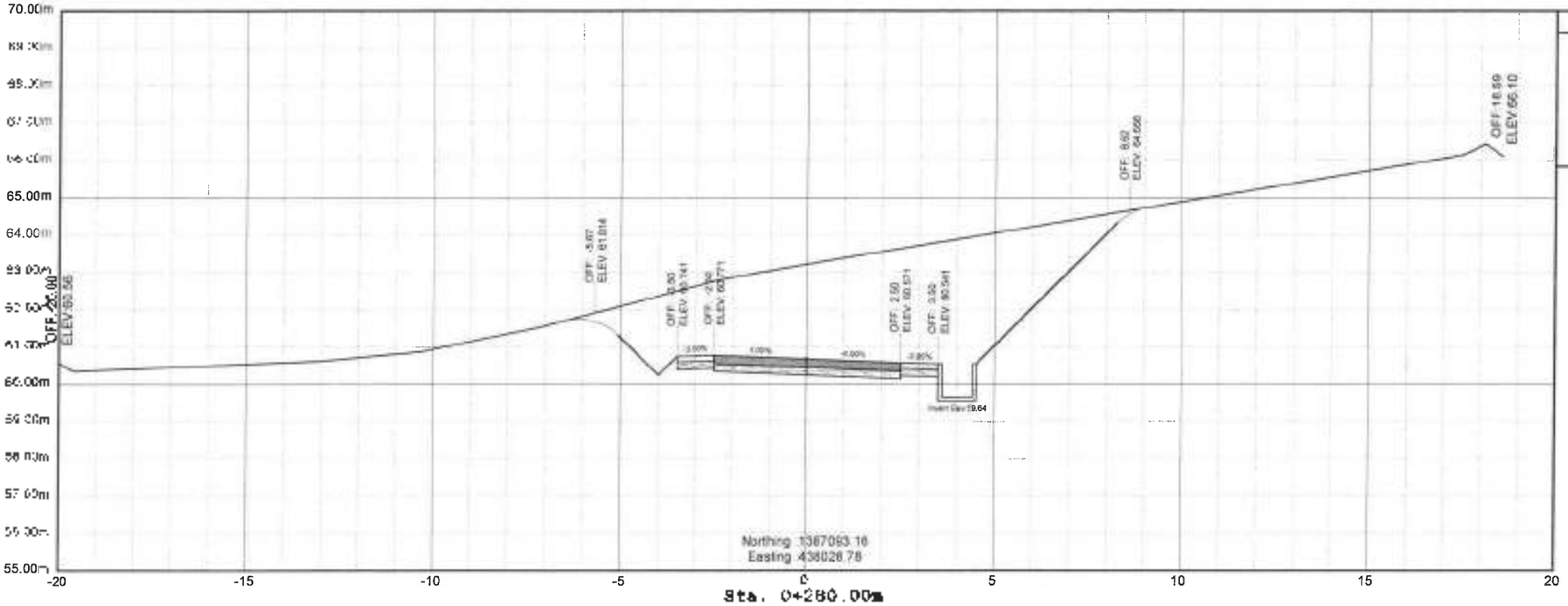
SET NO.

SHEET NO. 31 / 36



MATERIAL	AREA
CUT	4.85
FILL	1.40
ITEM 102(1)	0.00
.....	0.00
ITEM RS	0.00
ITEM LS	0.60

Sta. 0+300.00m
N.G.L: 60.50
F.G.L: 61.015



MATERIAL	AREA
CUT	35.79
FILL	0.00
ITEM 102(1)	0.00
.....	0.00
ITEM RS	0.00
ITEM LS	0.00

Sta. 0+280.00m
N.G.L: 63.21
F.G.L: 60.671

Republic of the Philippines
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
NORTHERN SAMAR FIRST DISTRICT ENGINEERING OFFICE

PROJECT NAME AND LOCATION

JEFF C. PEÑOLA

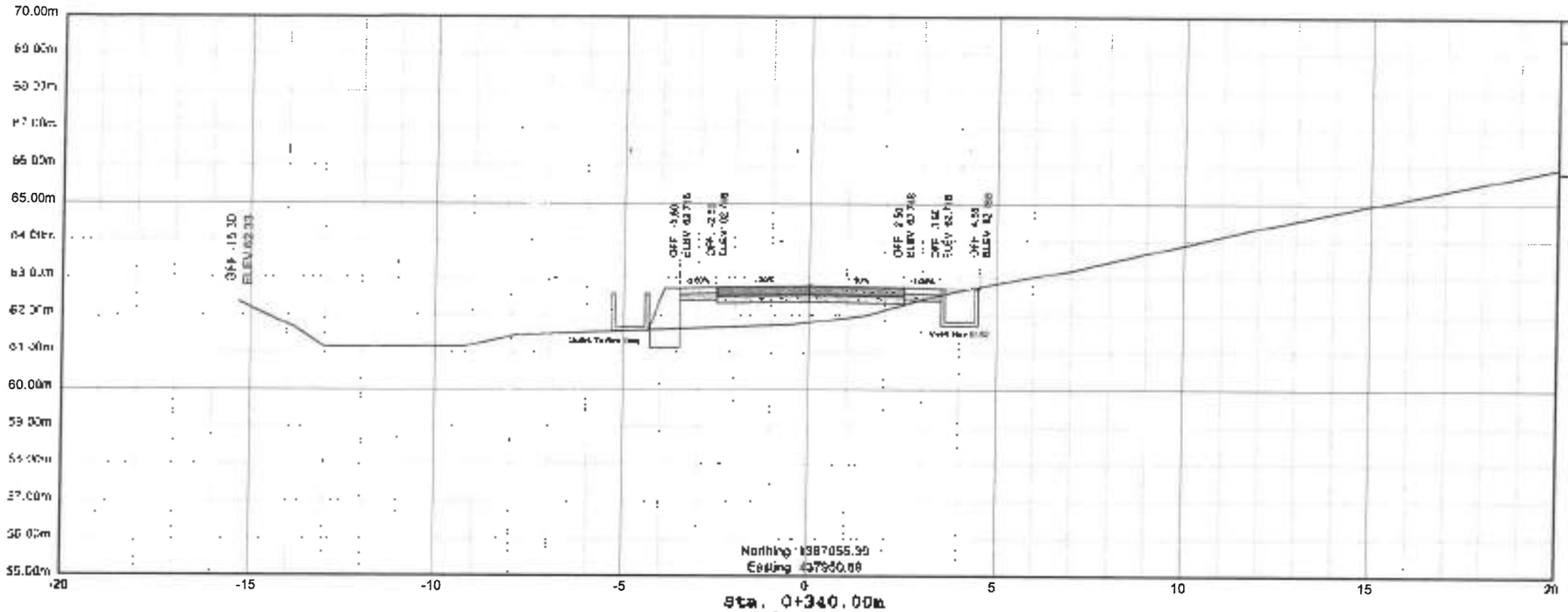
MARYDONALD N. EIMAR
DATE

ANDY S. EREÑO
DATE

VIVIAN S. BIACO
DATE

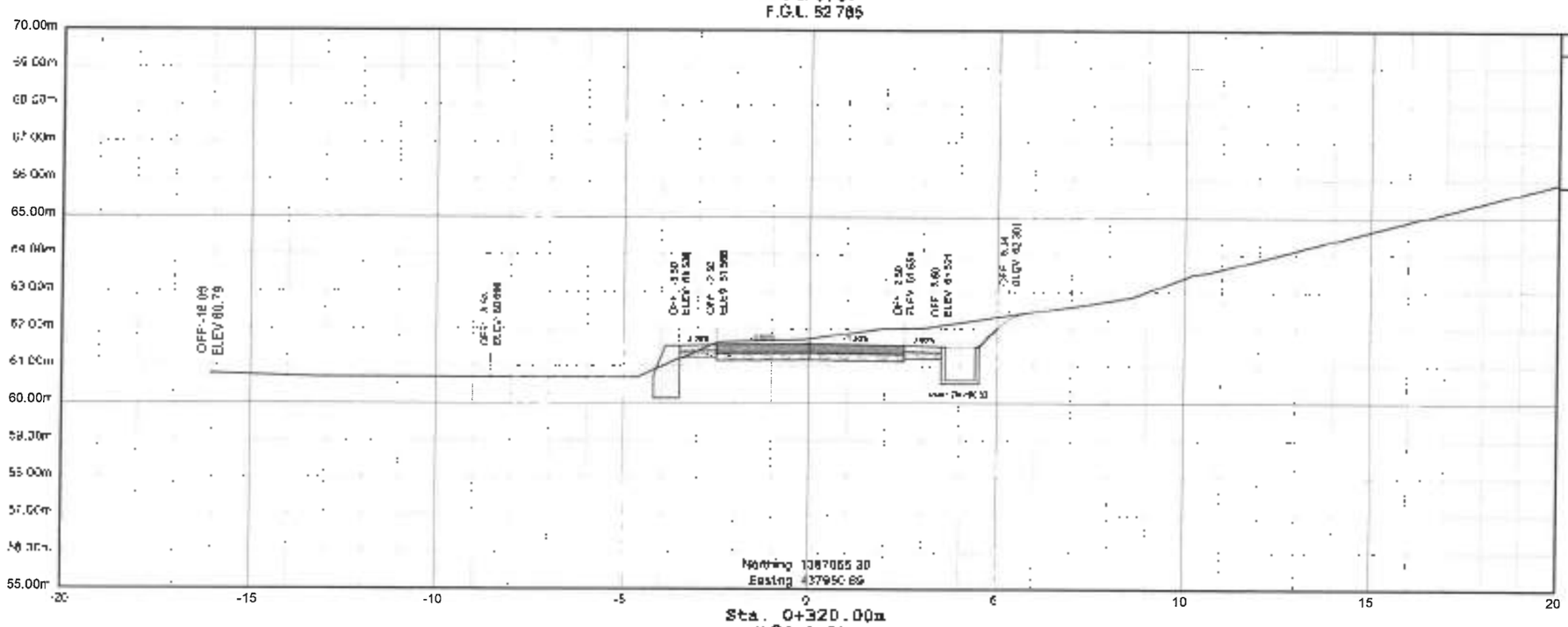
ALVIN A. IGNACIO
DATE:

32
36



MATERIAL	AREA
CUT	0.65
FILL	3.43
ITEM 102(1)	0.00
[illegible]	0.00
ITEM R5	0.00
ITEM L5	1.08

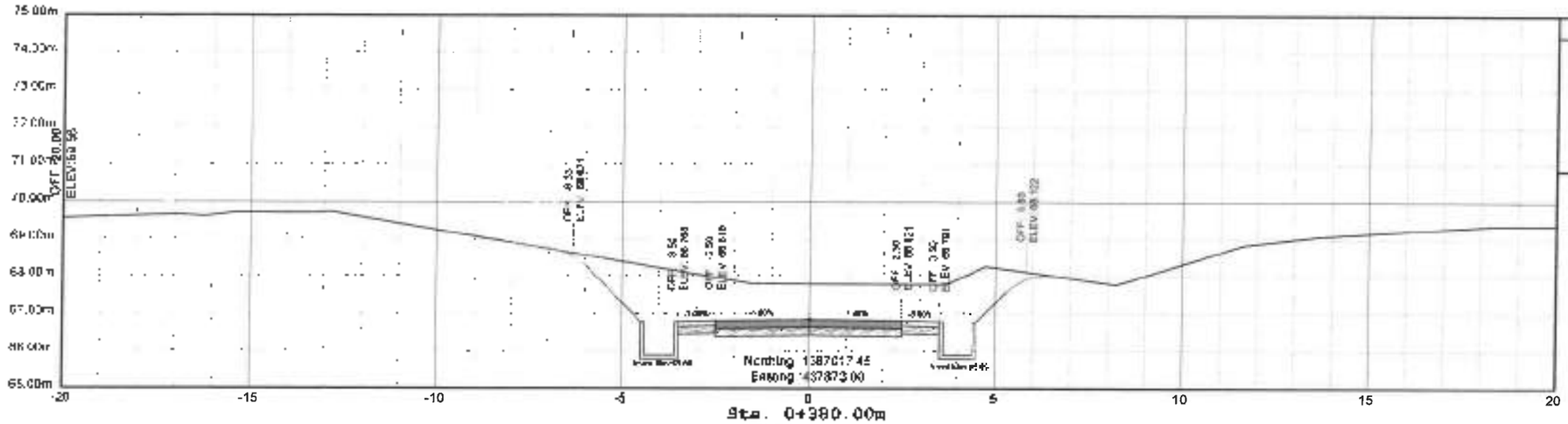
Sta. 0+340.00m
N.G.L: 61.91
F.G.L. 62.785



MATERIAL	AREA
CUT	5.62
FILL	0.00
ITEM 102(1)	0.00
[illegible]	0.00
ITEM R5	0.30
ITEM L5	0.80

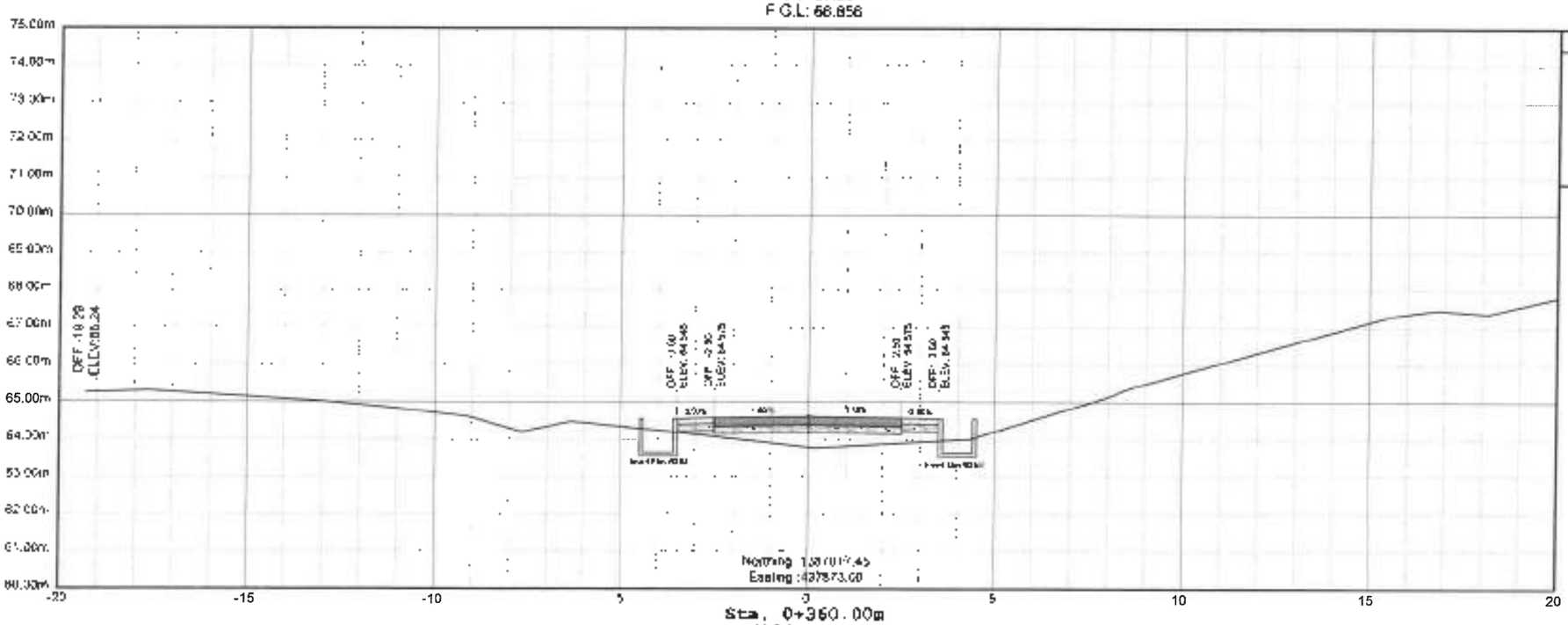
Sta. 0+320.00m
N.G.L: 61.73
F.G.L. 61.589

Republic of the Philippines DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS BFC Gen. Santos Ave NORTHERN SAMAR (PSO) DISTRICT ENGINEERING OFFICE Catarman, Northern Samar	CONTRACTING OF DIST. DATA COLLECTION [illegible] NORTHERN SAMAR	SHEET CONTENTS	DRAFTED BY JEFF [illegible]OLA	REVIEWED MAJ. DONALD N. EIMAN DIST. CHIEF PLANNING & DESIGN SECTION DATE	SUPERVISED ANDY S. CEREÑO CHIEF PLANNING & DESIGN SECTION DATE	RECOMMENDED VIVIANO G. BIRCO ASSISTANT DISTRICT ENGINEER DATE	APPROVED ALVIN A. IGNACIO DISTRICT ENGINEER DATE	SCALE	SHEET NO. 33 / 38



MATERIAL	AREA
CUT	16.64
FILL	0.00
ITEM 102(1)	0.00
----	0.00
ITEM RS	0.00
ITEM LS	0.00

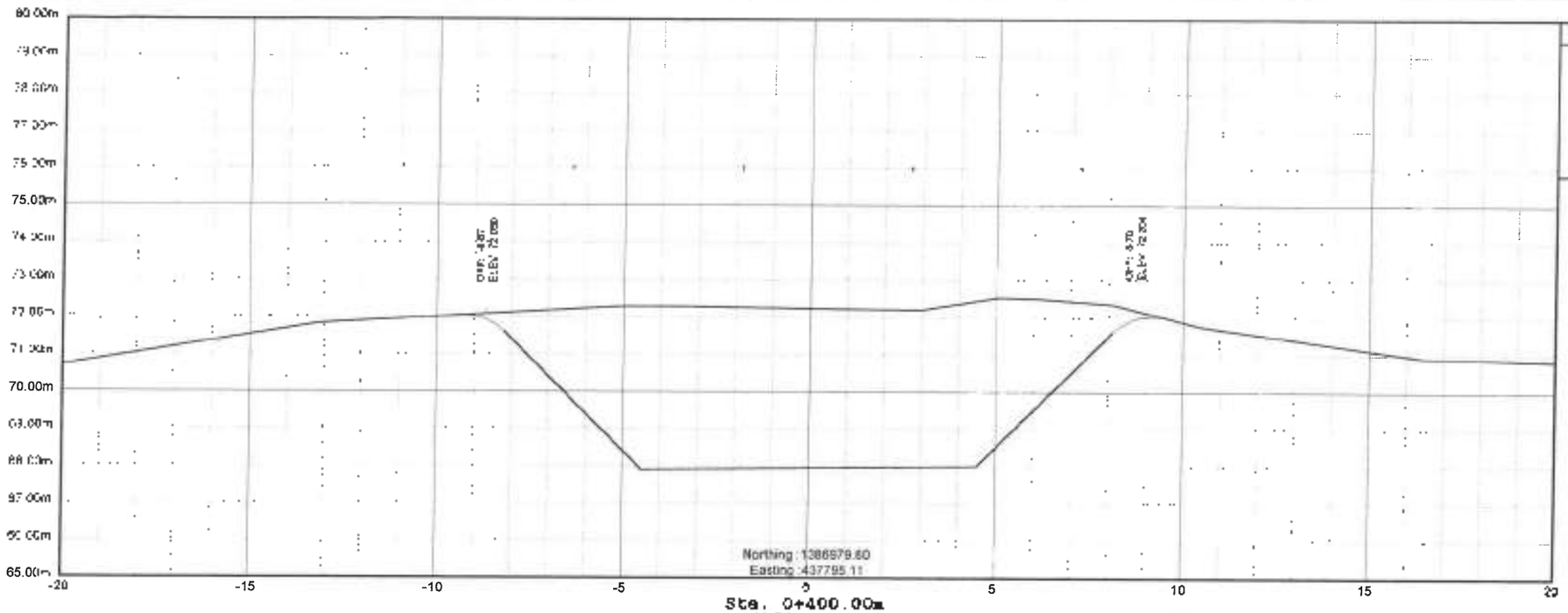
Sta. 0+380.00m
N.G.L: 67.80
F.G.L: 66.856



MATERIAL	AREA
CUT	1.01
FILL	1.78
ITEM 102(1)	0.00
----	0.00
ITEM RS	0.00
ITEM LS	0.00

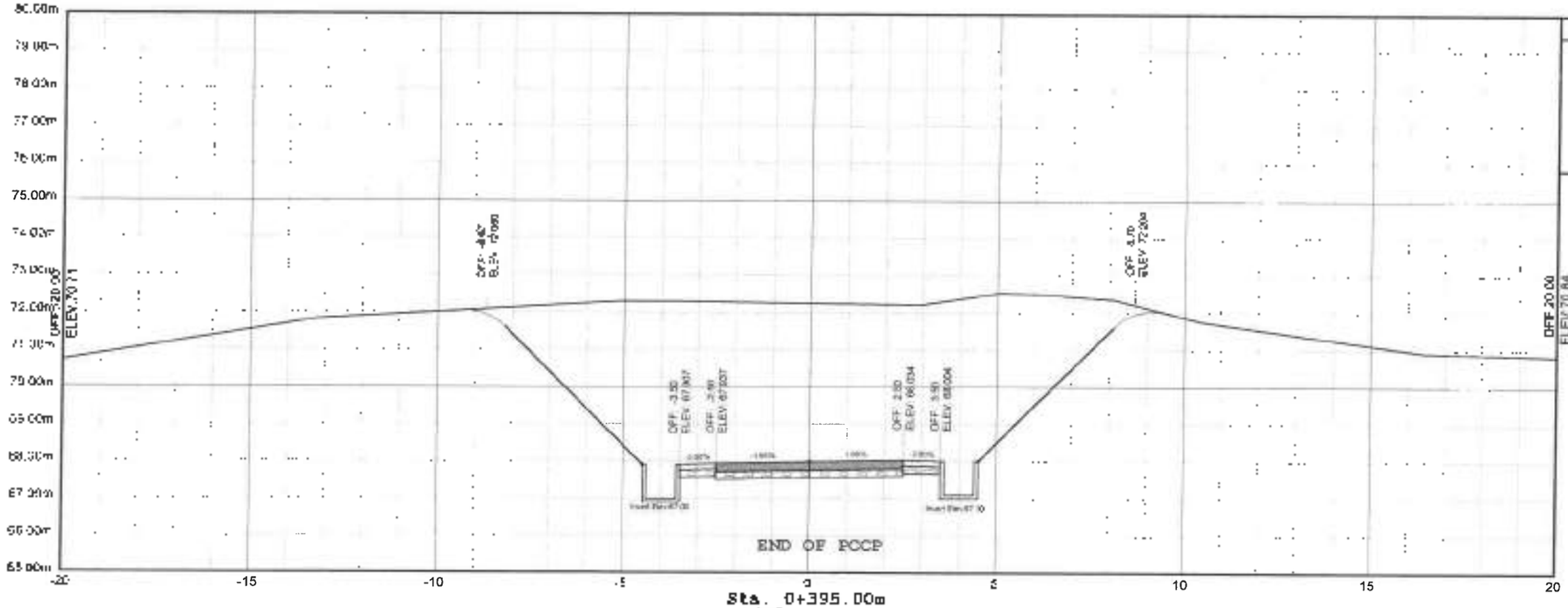
Sta. 0+360.00m
N.G.L: 63.79
F.G.L: 64.612

REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS NORTHERN SAMAR 1ST DISTRICT ENGINEERING OFFICE	PROJECT NAME AND LOCATION			PREPARED: JEFF F. PEROLA	REVIEWED: MARDIONALD N. EIMAN DATE:	TRANSITED: ANDY S. EMEÑO DATE:	RECOMMENDED: VIVIANO G. BIACO DATE:	APPROVED: ALVIN A. IGNACIO DATE:	SHEET NO.	SHEETS NO.
									34	38



MATERIAL	AREA
CUT	50.15
FILL	0.00
ITEM 102(1)	0.00
[illegible]	0.00
ITEM RS	0.00
ITEM LS	0.00

Sta. 0+400.00m
N.G.L: 72.24
F.G.L 67.986



MATERIAL	AREA
CUT	60.00
FILL	0.00
ITEM 102(1)	0.00
[illegible]	0.00
ITEM RS	0.00
ITEM LS	0.00

Sta. 0+395.00m
N.G.L: 72.24
F.G.L: 67.986

Republic of the Philippines
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
NORTHERN SAMAR FIRST DISTRICT ENGINEERING OFFICE

PROJECT MAP AND LOCATION

SHEET CONTENTS

DRAFTED BY: JEHI PADUHOLA

REVIEWED: MARDONALD N. EIMAN

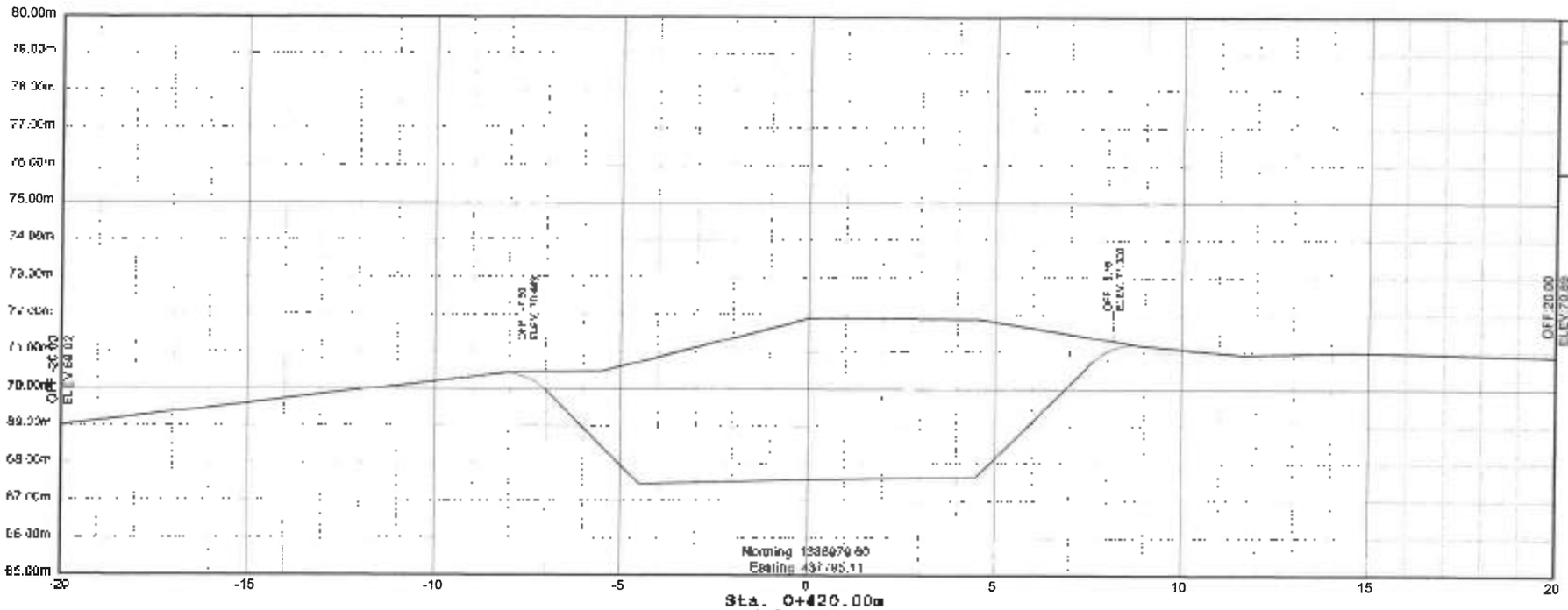
SUBMITTED: ANDY S. ENEÑO

RECOMMENDED: VIVIANA L. BIACO

APPROVED: ALVIN A. IGNACIO, DISTRICT ENGINEER

DATE:

SHEET NO. 35 / 35



MATERIAL	AREA
CUT	53.16
FILL	0.00
ITEM 102(1)	0.00
----	0.00
ITEM 105	0.00
ITEM 15	0.00

Sta. 0+420.00m
NGL: 71.88
F.G.L 67.575

END OF PROJECT

DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS REGIONAL OFFICE VI-B NORTH CENTRAL SAMAR FIRST DISTRICT ENGINEERING OFFICE	PROJECT NAME AND LOCATION	SHEET CONTENTS	DRAFTSMAN/ENGINEER JEFF M. PEÑOLA	REVIEWED: MAR DONALD N. EBMAN DATE	SUBMITTED: ANDY S. ENO DATE	RECOMMENDING: VIVIAN A. BUCO DATE	APPROVED: ALVIN A. IGNACIO DATE	SHEET NO. 36 / 36