REPUBLIC OF THE PHILIPPINES

DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

REGION XI

DAVAO DEL NORTE 2ND DISTRICT ENGINEERING OFFICE

TAGUM CITY

C.Y. 2025 PROJECT

DETAILED ENGINEERING DESIGN PLAN FOR

CONCRETING OF ROAD IN BARANGAY BOBONGON, STO. TOMAS, DAVAO DEL NORTE

SECTION	:	BRGY. BOBONGON ROAD
LOCATION	:	STO. TOMAS, DAVAO DEL NORTE
STATION LIMITS	:	STA. 0+000.00 - STA. 0+597.00
NET LENGTH	:	594.00 LN.M CONCRETING/1.188 LANE-KM

SUBMITTED:

JEZABEL E. TULING, MPA
CHIEF,PLANNING & DESIGN SECTION
DATE:

RECOMMENDED:

GARRY E. VERANO
OFFICER-IN-CHARGE
OFFICE OF THE ASSISTANT DISTRICT ENGINEER
DATE:

APPROVED:

ARTURO P. LONGYAPON
DISTRICT ENGINEER
DATE:

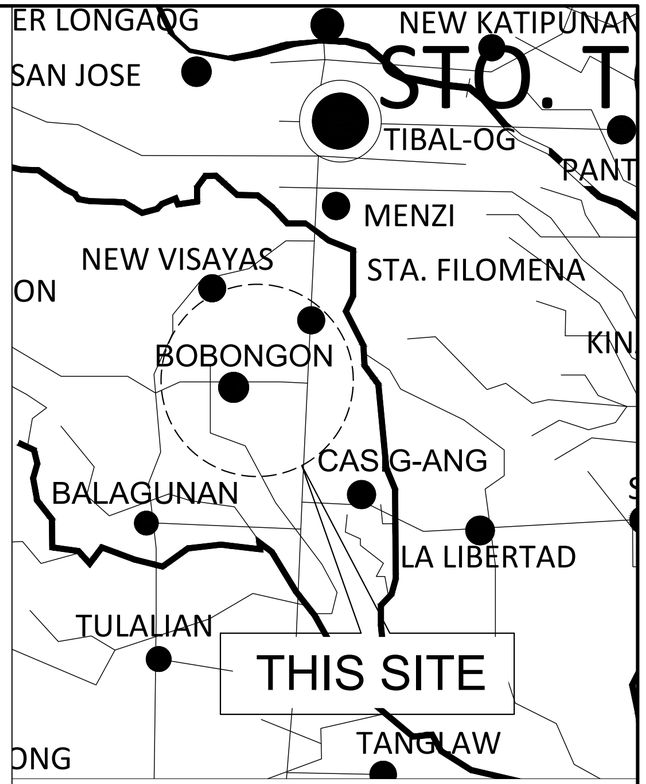
PROJECT LIMITS :

BEG. OF PROJECT/BEG. OF CONCRETING	=	STA. 0+000.00
END OF PROJECT/END OF CONCRETING	=	STA. 0+594.00
NET LENGTH	=	594.00 LN.M. CONCRETING (TWO LANES)

NOTE:

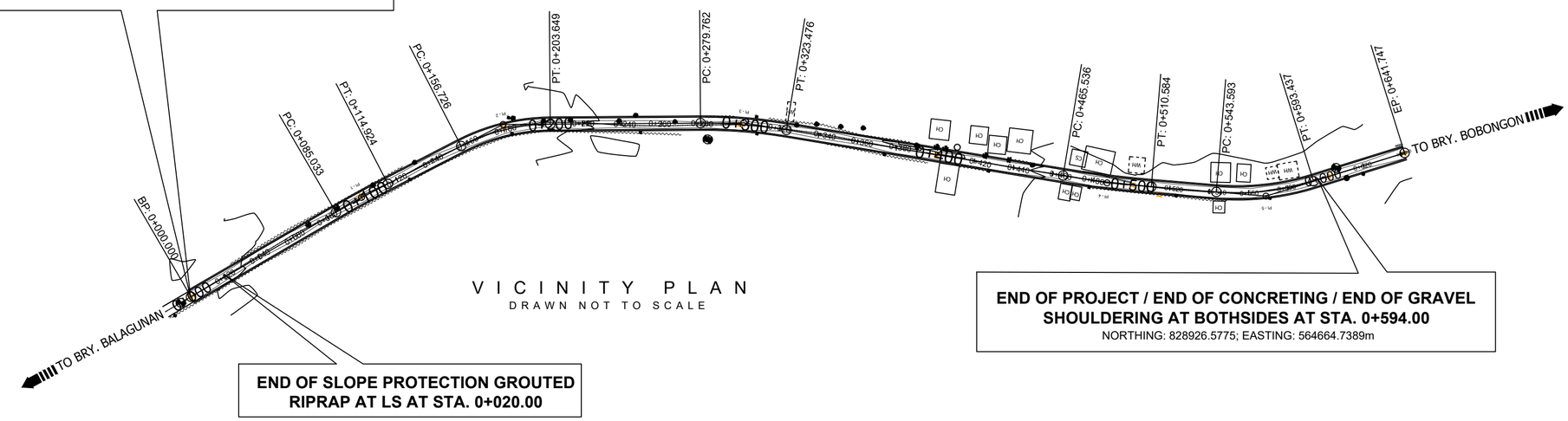
PROVIDE 10.00 MTS GRAVEL TRANSITION RAMP AT THE BEG. OF PROJECT STA. 0+000.00 (INCLUDED IN THE SCOPE OF WORKS)

INDEX OF DRAWINGS



LOCATION MAP
DRAWN NOT TO SCALE

BEG OF PROJECT / BEG OF CONCRETING / BEG. OF SLOPE PROTECTION GROUTED RIPRAP AT LS / BEG. OF GRAVEL SHOULDERING AT BOTHSIDES AT STA. 0+000.00
NORTHING: 828705.8951m; EASTING: 565211.0487m



V I C I N I T Y P L A N
DRAWN NOT TO SCALE

END OF SLOPE PROTECTION GROUTED RIPRAP AT LS AT STA. 0+020.00

END OF PROJECT / END OF CONCRETING / END OF GRAVEL SHOULDERING AT BOTHSIDES AT STA. 0+594.00
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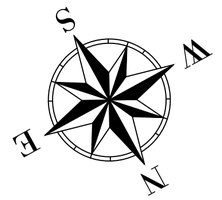

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGION XI
DAVAO DEL NORTE
2ND DISTRICT ENGINEERING OFFICE
TAGUM CITY

PROJECT NAME AND LOCATION:	CONCRETING OF ROAD IN BARANGAY BOBONGON, STO. TOMAS, DAVAO DEL NORTE
SHEET CONTENTS:	INDEX OF DRAWINGS, PROJECT LIMITS, LOCATION PLAN, VICINITY MAP
DRAFTED:	**HERWIN EVAN J. HABABAG** ENGINEER II
PREPARED:	**WARREN S. PIÑEZ** ENGINEER II
REVIEWED:	**BENILDA S. PACQUIAO** ENGINEER II DATE:
SUBMITTED:	**JEZABEL E. TULING, MPA** CHIEF, PLANNING AND DESIGN SECTION DATE:
RECOMMENDED:	**GARRY E. VERANO** OFFICER-IN-CHARGE OFFICE OF THE ASSISTANT DISTRICT ENGINEER DATE:
APPROVED:	**ARTURO P. LONGYAPON** DISTRICT ENGINEER DATE:
SET NO.	A 1 1
SHEET NO.	1 24

GENERAL NOTES

SPECIFICATIONS

1. ALL WORKS SHALL COMPLY WITH THE "DPWH STANDARD SPECIFICATION VOLUME II, HIGHWAYS, BRIDGES AND AIRPORTS 2013", SPECIAL PROVISION AND SUPPLEMENTAL SPECIFICATIONS PERTAINING TO THIS PROJECT.

DIMENSIONS

1. DISTANCE BETWEEN THE HORIZONTAL CONTROL POINTS INCLUDING REFERENCE POINTS ARE MEASURED AND EXPRESSED IN METERS.
2. UNLESS OTHERWISE SPECIFIED, DIMENSIONS OF PIPES, BOX CULVERTS, BRIDGES AND OTHER STRUCTURES ARE MEASURED AND EXPRESSED IN MILLIMETERS.
3. ALL OTHER DIMENSIONS ARE EXPRESSED IN METERS.

SURVEY SPECIFICATIONS

1. ALL PROJECT CONTROL POINTS ARE PROJECTED IN PRS '92 GRID COORDINATE SYSTEM (ZONE 5)
2. SURVEY INSTRUMENT USED, ROVER-CHC (I70+) SN1045456, BASE - CHC (I70+) SN1060962
3. DATE SURVEYED: DECEMBER 11, 2024
4. PROJECT CONTROL POINTS, REFER TO PLAN AND PROFILE

ELEVATIONS AND GRADES

1. FINISHED GRADE ELEVATION SHOWN ON PLAN AND PROFILE SHEETS REFERS TO FINISHED PAVEMENT LEVEL AS INDICATED IN THE TYPICAL ROADWAY SECTION.
2. GROUND GRADE SHOWN ON THE PLAN AND PROFILE SHEETS REFERS TO THE ELEVATION OF THE ORIGINAL GROUND ALONG THE CENTERLINE OF THE PROJECT ROAD.

OTHER GENERAL REQUIREMENTS

1. ALIGNMENT AND GRADES ARE SUBJECT TO ADJUSTMENTS TO SUIT ACTUAL FIELD CONDITIONS.
2. DISTANCES AND ELEVATIONS ARE IN METER UNLESS OTHERWISE INDICATED.
3. GRADES SHOWN ARE TOP OF FINISHED PAVEMENT.
4. ALL WORKS SHALL COMPLY WITH THE STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES, REVISED 2013 AND "A POLICY ON GEOMETRIC DESIGN", AASHTO 2011.
5. WHERE NO DETOURS ARE AVAILABLE, TRAFFIC SHALL BE HANDLED IN ACCORDANCE TO THE PROVISIONS OF CLAUSE 75 OF THE DPWH STANDARD SPECIFICATIONS, VOLUME 1, REQUIREMENTS AND CONDITIONS OF CONTRACT (2013).
6. THE CONTRACTOR SHALL CONTINUOUSLY KEEP THE ROAD UNDERGOING IMPROVEMENT AND THE SECTION DETOURS IN SUCH CONDITION SATISFACTORY TO THE ENGINEER THAT TRAFFIC WILL BE ACCOMMODATED DURING THE ENTIRE CONTRACT PERIOD WITHOUT ANY INCONVENIENCE TO THE TRAVELING PUBLIC IN ACCORDANCE TO CLAUSE 38 OF THE DPWH STANDARDS SPECIFICATIONS, VOLUME 1, REQUIREMENTS AND CONDITIONS OF CONTRACT (2013). THE CONTRACTOR SHALL BEAR ALL EXPENSES FOR CONSTRUCTING, RECONSTRUCTING IF NECESSARY AND MAINTAINING SUCH ROAD DETOURS, APPROACHES, INCLUDING RUN-AROUND TEMPORARY BRIDGES WITHOUT COMPENSATION.
7. THE APPARENT SILENCE OF SPECIFICATIONS, PLANS, SPECIAL PROVISIONS AND SUPPLEMENTARY SPECIFICATIONS, AS TO ANY DETAIL OR THE APPARENT OMISSION FROM THEM OF A DETAILED DESCRIPTION CONCERNING ANY POINT SHALL BE REGARDED AS MEANING THAT ONLY THE BEST GENERAL PRACTICE IS TO PREVAIL AND THAT ONLY MATERIAL AND WORKMANSHIP OF FIRST CLASS QUALITY ARE TO BE USED.
8. ROADS CLOSED TO TRAFFIC SHALL BE PROTECTED BY EFFECTIVE BARRICADES, AND OBSTRUCTIONS SHALL BE ILLUMINATED AT NIGHT. SUITABLE WARNING SIGNS, ILLUMINATED AT NIGHT BY LANTERNS OF FLARES, SHALL BE PROVIDED. ALL LIGHTS FOR THIS PURPOSE SHALL BE KEPT BURNING FROM SUNSET TO SUNRISE.
9. THE CONTRACTOR WILL BE REQUIRED TO ERECT WARNING SIGNS OUTSIDE OF, AND 150M FROM, EACH END OF THE PROJECT, AND 150M IN ADVANCE AT ANY PLACE ON THE PROJECT WHERE OPERATIONS INTERFERE WITH THE USE OF THE ROAD BY TRAFFIC, AND AT ALL INTERMEDIATE POINTS WHERE THE NEW WORK CROSSES OR COINCIDES WITH AN EXISTING ROAD.
10. BEFORE THE START OF ACTUAL CONSTRUCTION, THE AS-STAKED PLAN SHOULD BE SUBMITTED TO THE DAVAO DEL NORTE SUB-DISTRICT ENGINEERING OFFICE IN ORDER THAT IMMEDIATE STEPS MAY BE TAKEN TO CORRECT OR ADJUST WHATEVER APPRECIABLE DEVIATION THERE MAY BE FROM THE ORIGINAL PLAN.
11. THE IMPLEMENTING OFFICE SHALL IDENTIFY THE LOCATIONS OF AND PROVIDE ACCESSIBILITY FACILITIES FOR PERSONS WITH DISABILITIES IN ACCORDANCE WITH DO NO. 37, S. 2009.
12. QUARRY SITE FOR ITEM 200 AND ITEM 104 IS MABUHAY, CARMEN (30.27 KM. FROM THE PROJECT SITE), DISPOSAL SITE IS ONE (1) KMS. WITHIN PROJECT LIMIT.
13. DESIGN WAS BASED ON SURVEY DATA SUBMITTED BY THE SURVEY INVESTIGATION UNIT OF THE PLANNING AND DESIGN SECTION OF THE DPWH-DAVAO DEL NORTE ENGINEERING 2ND DISTRICT.

SUBBASE AND BASE COURSE

1. RE-PREPARATION AND COMPACTION OF THE EXISTING BASE/ SUBBASE TO THE REQUIRED DENSITY SHALL BE DONE PRIOR TO GRAVEL RESURFACING IN ACCORDANCE WITH DPWH STANDARD SPECIFICATIONS, VOLUME II, 2004, USING VIBRATING ROLLERS AND PNEUMATIC TIRE ROLLERS. IN AREAS WHERE THE SAID EQUIPMENT CANNOT BE USED, A PORTABLE MECHANICAL COMPACTOR SHALL BE USED.

SURFACE COURSE

1. USE STEEL FORMS FOR ITEM 311- PORTLAND CEMENT CONCRETE PAVEMENT
2. WHEN CONCRETE IS TO BE PLACED ADJOINING A PREVIOUSLY CONSTRUCTED LANE AND MECHANICAL EQUIPMENT WILL BE OPERATED UPON THE EXISTING LANE, THAT PREVIOUSLY CONSTRUCTED LANE SHALL HAVE ATTAINED THE STRENGTH OF FOURTEEN (14) DAY CONCRETE. IF ONLY FINISHING EQUIPMENT IS CARRIED ON THE EXISTING LANE, PAVING IN ADJOINING LANES MAY BE PERMITTED AFTER THREE (3) DAYS.
3. AT TRANSVERSE CONSTRUCTION JOINTS, HOLES OF 60MM DIA. AND SPACED AT 300MM (FOR 230MM AND 280MM THICK CONCRETE PAVEMENT) SHALL BE DRILLED AT ONE-HALF (1/2) OF THE EXISTING CONCRETE PAVEMENT THICKNESS SO AS TO PERMIT THE LOAD TRANSFER DEVICE (28MM DIA. PLAIN DOWEL BARS FOR 230MM THICK PCCP; 36MM DIA PLAIN DOWEL BARS FOR 280MM THICK PCCP; 36MM DIA. FOR 300MM THICK PCCP) TO BE INSERTED AT ONE-HALF (1/2) OF ITS LENGTH. THE SAID DEVICE SHALL BE INSTALLED FIRMLY AT THE HOLES AND SHALL BE HELD IN POSITION PARALLEL TO THE SURFACE OF THE SLAB. THE DOWEL BARS SHALL BE PAINTED WITH RED LEAD AND THE SURFACE OF ONE-HALF (1/2) OF THE LENGTH TO BE INSERTED SHALL BE COATED WITH CONCRETE EPOXY WHILE THE OTHER HALF SHALL BE COATED WITH APPROVED BITUMINOUS MATERIALS.
-DO 54, S.2012
4. TRANSVERSE CONTRACTION JOINT SHALL BE CUT USING A CONCRETE SAW TO THE REQUIRED DEPTH (ONE-FOURTH TO ONE-THIRD OF THE CONCRETE PAVEMENT THICKNESS) AND WIDTH AS SHOWN IN THE APPROVED PLANS.
5. ALL JOINTS SHALL BE SUFFICIENTLY SEALED WITH ASPHALT SEALANT PRIOR TO OPENING TO VEHICULAR TRAFFIC.
6. THE CONTRACTOR SHALL PREPARE THE DESIGN MIX BASED ON THE ABSOLUTE VOLUME METHOD AS OUTLINED IN THE AMERICAN CONCRETE INSTITUTE (ACI) STANDARD 211.1, "RECOMMENDED PRACTICE FOR SELECTING PROPORTIONS FOR NORMAL AND HEAVYWEIGHT CONCRETE". THE ENGINEER SHALL DETERMINE FROM LABORATORY TESTS OF THE MATERIALS TO BE USED, THE CEMENT CONTENT AND THE PROPORTIONS OF AGGREGATE AND WATER THAT WILL PRODUCE WORKABLE CONCRETE HAVING A SLUMP OF BETWEEN 40 AND 75 MM. IF NOT VIBRATED OR BETWEEN 10 AND 40 MM. IF VIBRATED, AND A FLEXURAL STRENGTH OF NOT LESS THAN 3.8 MPA WHEN TESTED BY THE THIRD-POINT METHOD OR 4.5 MPA WHEN TESTED BY THE MID-POINT METHOD AT FOURTEEN (14) DAYS IN ACCORDANCE WITH AASHTO T 97 AND T 177, RESPECTIVELY; OR A COMPRESSIVE STRENGTH OF 24.1 MPA FOR CORES TAKEN AT FOURTEEN (14) DAYS AND TESTED IN ACCORDANCE WITH AASHTO T 24.

EARTHWORK

1. CLEARING SHALL EXTEND ONE (1) METER BEYOND THE TOE OF THE FILL SLOPES OR BEYOND ROUNDING OF CUTS SLOPES AS THE CASE MAY BE FOR THE ENTIRE LENGTH OF THE PROJECT UNLESS OTHERWISE SHOWN ON THE PLANS OR AS DIRECTED BY THE ENGINEER AND PROVIDED IT IS WITHIN THE RIGHT OF WAY LIMITS OF THE PROJECT.
2. ALL CONCRETE PAVEMENT, BASE COURSE, SIDEWALKS, CURBS, GUTTERS, ETC., DESIGNATED FOR REMOVAL SHALL BE BROKEN INTO PIECES, THE SIZE OF WHICH SHALL NOT EXCEED 300MM (12IN) IN ANY DIMENSION AND STOCKPILED AT DESIGNATED LOCATIONS ON THE PROJECT OR AS DIRECTED BY THE ENGINEER.
3. ALL EXCAVATIONS SHALL BE FINISHED TO REASONABLY SMOOTH AND UNIFORM SURFACES. NO MATERIALS SHALL BE WASTED WITHOUT AUTHORITY OF THE ENGINEER. EXCAVATION OPERATIONS SHALL BE CONDUCTED SO THAT MATERIAL OUTSIDE OF THE LIMIT OF SLOPES WILL NOT BE DISTURBED.
4. SPOILS FROM DEMOLISHED/ EXCAVATED MATERIALS SHALL NOT BE ALLOWED TO BE STOCKPILED AT THE SHOULDER OR PART OF THE TRAVELED ROADWAY AND SHALL BE REMOVED IMMEDIATELY TO PREVENT OBSTRUCTION. SPOILS REMOVED SHALL BE DISPOSED OFF IN DESIGNATED AREAS APPROVED BY THE ENGINEER.
5. IN CASE OF USE, ALL EXPLOSIVES SHALL BE STORED IN A SECURE MANNER, IN COMPLIANCE WITH LOCAL LAWS AND ORDINANCES, AND ALL SUCH STORAGE PLACES SHALL BE MARKED CLEARLY "DANGEROUS EXPLOSIVES". WHERE NO LOCAL LAWS OR ORDINANCE APPLY, STORAGE SHALL BE PROVIDED IN A PLACE SATISFACTORY TO THE ENGINEER, AND IN GENERAL, NOT CLOSER THAN 300M FROM ANY BUILDING OR CAMPING AREA.
6. BORROW MATERIALS SHALL NOT BE PLACED UNTIL AFTER THE READILY ACCESSIBLE ROADWAY EXCAVATION HAS BEEN PLACED IN THE FILL, UNLESS OTHERWISE PERMITTED OR DIRECTED BY THE ENGINEER. IF THE CONTRACTOR PLACES MORE BORROW THAN IS REQUIRED AND THEREBY CAUSES A WASTE OF EXCAVATION, THE AMOUNT OF SUCH WASTE WILL BE DEDUCTED FROM THE BORROW VOLUME.
7. ALL EMBANKMENTS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE REQUIREMENTS OF ITEM 104-EMBANKMENT. IT SHALL BE COMPACTED IN HORIZONTAL LAYERS NOT EXCEEDING 200MM (LOOSE MEASUREMENT). AFTER FIVE SUCCESSIVE LAYERS, THE FILL/ EMBANKMENT SHALL BE SATURATED WITH WATER THEN DRIED BEFORE PLACING THE SUCCEEDING LAYERS. THE PROCEDURE SHALL BE REPEATED UNTIL THE DESIRED ELEVATION IS ATTAINED.
8. WATERING AND COMPACTING OF ALL EMBANKMENTS SHALL BE CONSIDERED AS SUBSIDIARY WORK PERTAINING TO OTHER CONTRACT ITEMS. THE COST OF PERFORMANCE THEREOF SHALL BE CONSIDERED TO BE INCLUDED IN THE CONTRACT UNIT BID PRICE FOR OTHER ITEMS.
9. CUT SLOPES, EXCEPT IN ROCKS AND FILL SLOPES SHALL BE ADJUSTED AND WARPED TO FLOW INTO EACH OTHER OR INTO NATURAL GROUND SURFACE WITHOUT NOTICEABLE BREAK.
10. APPROACHES AND ROAD CONNECTIONS SHALL BE CONSTRUCTED AS SHOWN ON THE PLANS OR AS DIRECTED BY THE ENGINEER IN SUCH MANNERS AS TO ENSURE PROPER CONNECTIONS TO THE RIDING SURFACES.
11. PRIOR TO COMMENCING PREPARATION OF THE SUBGRADE, ALL CULVERTS, CROSS DRAINS, DUCTS AND THE LIKE (INCLUDING THEIR FULLY COMPLETED BACKFILL), DITCHES, DRAINS AND DRAINAGE OUTLETS SHALL BE COMPLETED. ANY WORK ON THE PREPARATION OF THE SUBGRADE SHALL NOT BE STARTED UNLESS PRIOR WORK HEREIN DESCRIBED SHALL HAVE BEEN APPROVED BY THE ENGINEER.

DRAINAGE AND SLOPE PROTECTION STRUCTURES

1. EXACT LOCATIONS, GRADIENTS, LENGTHS, TOP AND INVERT ELEVATIONS OF ALL DRAINAGE STRUCTURES THAT ARE REQUIRED SHALL BE DETERMINED IN THE FIELD BY THE ENGINEER.
2. EXTENSIONS AND OTHER IMPROVEMENTS OF EXISTING DRAINAGE STRUCTURES ARE SUBJECT TO CHANGE AND SHALL BE DETERMINED IN THE FIELD BY THE ENGINEER IN-CHARGE.
3. DURING CONSTRUCTION, ANY EXISTING PIPES FOUND DAMAGED OR DEFECTIVES SHALL BE REMOVED AND REPLACED AS DIRECTED BY THE ENGINEER. THE REMOVAL OF EXISTING STRUCTURES SHALL BE PAID FOR UNDER ITEM 101(4)- REMOVAL OF EXISTING PIPE CULVERT.
4. ANY MISCELLANEOUS REMOVAL NOT SHOWN ON THE PLANS INCLUDING REMOVAL OF HEADWALLS AND WINGWALLS OF EXISTING DRAINAGE STRUCTURES THAT ARE TO BE EXTENDED OR IMPROVED AND DISPOSAL OF RESULTING MATERIALS SHALL BE CONSIDERED SUBSIDIARY WORK PERTAINING TO OTHER CONTRACT ITEMS. THE COST OF PERFORMANCE THEREOF SHALL BE CONSIDERED TO BE INCLUDED IN THE UNIT PRICE FOR THOSE ITEMS.

REMOVAL OF EXISTING STRUCTURES AND OBSTRUCTIONS

1. NO PAYMENT SHALL BE MADE FOR REMOVAL OF OTHER MISCELLANEOUS STRUCTURES THAT MAY BE REQUIRED AS SUBSIDIARY WORK PERTAINING TO OTHER CONTRACT ITEMS EXCEPT FOR SPECIFIC ITEMS EXPRESSLY IDENTIFIED FOR PAYMENT.
2. IMPROVEMENTS AND OTHER SIMILAR STRUCTURES THAT WILL BE AFFECTED DURING THE IMPLEMENTATION OF THIS PROJECT SHALL BE PAID FOR UNDER THE ROAD RIGHT-OF-WAY IMPROVEMENT.

MISCELLANEOUS STRUCTURES

1. OBSTRUCTIONS WITHIN THE ROADWAY, IF NOT ILLUMINATED SHALL BE MARKED WITH REFLECTORIZED HAZARD MARKERS (REFER TO SECTION 7 OF THE HIGHWAY SAFETY DESIGN STANDARDS PART 2 MAY 2012 EDITION). FOR ADDITIONAL EMPHASIS, IT IS ADVISABLE TO MARK OBSTRUCTIONS WITH NO LESS THAN FIVE ALTERNATING REFLECTORIZED BLACK AND WHITE STRIPES.
2. THE APPLICATION OF PAINT FOR PAVEMENT MARKINGS SHALL BE PREFERABLY CARRIED OUT BY A MACHINE SPECIALLY MADE FOR THIS PROPOSE BUT WHERE BRUSHED ARE USED, ONLY ROUND OR OVAL BRUSHES NOT EXCEEDING 100MM IN WIDTH WILL BE PERMITTED. THE PAINT SHALL BE SO APPLIED AS TO PRODUCE A UNIFORM, EVEN COATING IN CLOSE CONTACT WITH THE SURFACE BEING PAINTED.
3. THE APPLIED THERMOPLASTIC PAVEMENT MARKINGS SHALL HAVE A MINIMUM OF 2 YEARS OF LONGEVITY/DURABILITY.
4. MATERIALS WHICH ARE DEFECTIVE OR HAVE BEEN APPLIED IN AN UNSATISFACTORY MANNER OR TO INCORRECT DIMENSIONS OR IN A WRONG LOCATION SHALL BE REMOVED. THE ROAD PAVEMENT SHALL BE MADE GOOD AND MATERIALS REPLACED, RECONSTRUCTED AND/OR PROPERLY LOCATED, ALL AT THE CONTRACTOR'S EXPENSE AND TO THE SATISFACTION OF THE ENGINEER.

FACILITIES FOR THE ENGINEER

1. THE CONTRACTOR SHALL AT ALL TIMES DURING THE DURATION OF THE CONTRACT PROVIDE FOR THE USE OF THE ENGINEER ALL EQUIPMENT, INSTRUMENTS AND APPARATUS, ALL INFORMATION AND RECORDS AND QUALIFIED CHAINMEN AND LABOURERS REQUIRED BY THE ENGINEER FOR INSPECTING AND MEASURING THE WORKS. SUCH EQUIPMENT, INSTRUMENTS AND APPARATUS SHALL INCLUDE THOSE LISTED IN THE SPECIAL PROVISIONS.
2. THE CONTRACTOR SHALL PROVIDE WITHIN THIRTY (30) CALENDAR DAYS AFTER NOTICE TO COMMENCE WORK, THE VEHICLE LISTED IN THE SPECIAL PROVISIONS FOR THE EXCLUSIVE USE OF THE ENGINEER. THE VEHICLES ON DELIVERY SHALL BE NEW AND SHALL BE DRIVEN BY A COMPETENT QUALIFIED AND EXPERIENCED DRIVER WHO SHALL BE UNDER THE DIRECT ORDER OF THE ENGINEER.

CONSTRUCTION REQUIREMENTS

STAKING ACTIVITIES SHALL BE INCLUDED IN THE CONSTRUCTION SCHEDULE TO BE SUBMITTED BY THE CONTRACTOR. DATES AND SEQUENCE OF EACH STAKING ACTIVITY SHALL BE INCLUDED.

THE ENGINEER SHALL SET INITIAL REFERENCE LINES, HORIZONTAL AND VERTICAL CONTROL POINTS, AND SHALL FURNISH THE DATA FOR USE IN ESTABLISHING CONTROL FOR THE COMPLETION OF EACH ELEMENT OF THE WORK. DATA RELATING TO HORIZONTAL AND VERTICAL ALIGNMENTS, THEORETICAL SLOPE STAKE CATCH POINTS, AND OTHER DESIGN DATA SHALL BE FURNISHED.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE TRUE SETTLING OF THE WORKS OR IMPROVEMENTS AND FOR CORRECTNESS OF POSITIONS, LEVELS, DIMENSIONS AND ALIGNMENT OF ALL PARTS OF THE WORKS. HE SHALL PROVIDE ALL NECESSARY INSTRUMENTS, APPLIANCES, MATERIALS AND SUPPLIES, AND LABOR IN CONNECTION THEREWITH. THE CONTRACTOR SHALL PROVIDE A SURVEY CREW SUPERVISOR AT THE PROJECT SITE WHENEVER SURVEYING/STAKING ACTIVITY IS IN PROGRESS.

PRIOR TO CONSTRUCTION, THE ENGINEER SHALL BE NOTIFIED OF ANY MISSING INITIAL REFERENCE LINES, CONTROLS, POINTS, OR STAKES. THE ENGINEER SHALL REESTABLISH MISSING INITIAL REFERENCE LINES, CONTROLS, POINTS, OR STAKES.

THE CONTRACTOR FOR CONVENIENT USE OF GOVERNMENT-FURNISHED DATA SHALL PERFORM ADDITIONAL CALCULATIONS. IMMEDIATE NOTIFICATION OF APPARENT ERRORS IN THE INITIAL STAKING OR IN THE FURNISHED DATA SHALL BE PROVIDED.

ALL INITIAL REFERENCE AND CONTROL POINTS SHALL BE PRESERVED. AT THE START OF CONSTRUCTION, ALL DESTROYED OR DISTURBED INITIAL REFERENCE OR CONTROL POINTS NECESSARY TO THE WORK SHALL BE REPLACED.

BEFORE SURVEYING AND STAKING, THE CONTRACTOR SHALL DISCUSS AND COORDINATE THE FOLLOWING WITH THE ENGINEER:

1. SURVEYING AND STAKING METHODS
2. STAKE MARKING/CONCRETE MONUMENTS
3. GRADE CONTROL FOR COURSES OF MATERIAL
4. REFERENCING
5. STRUCTURE CONTROL
6. ANY OTHER PROCEDURES AND CONTROLS NECESSARY FOR THE WORK

REFERENCES:

1. REVISED DPWH MANUAL ON HIGHWAY SAFETY DESIGN STANDARDS,MAY 2012 EDITION
   - FOR ROAD SAFETY PLANNING AND DESIGN ACTIVITIES AS WELL AS ROAD SAFETY MAINTENANCE ACTIVITIES SUCH AS THE PROPER WAY OF INSTALLING ,APPLYING ROAD SIGNS,ROAD SAFETY DEVICES AND PAVEMENT MARKINGS - D.O. 41,S. 2012
2. LABOR CODE OF THE PHILIPPINES AND ITS IMPLEMENTING RULES AND REGULATIONS DOLE DO NO. 13,S. 1998, OCCUPATIONAL SAFETY AND HEALTH STANDARDS AND ITS PROCEDURAL GUIDELINES.
   - FOR MONITORING, ENFORCEMENT AND IMPLEMENTATION OF CONSTRUCTION SAFETY AND HEALTH - D.O. 56,S. 2005
3. DESIGN REFERENCES
   - DPWH DESIGN GUIDELINES, CRITERIA & STANDARDS (DGCS), 2015 EDITION
   - GUIDELINES FOR THE PREPARATION OF COST ESTIMATES FOR TRAFFIC MANAGEMENT AND SAFETY & HEALTH REQUIREMENTS FOR THE CONSTRUCTION AND MAINTENANCE OF ROADS, BRIDGES AND SAFETY & HEALTH REQUIREMENTS FOR SCHOOL BUILDINGS, 2018
   - AASHTO A POLICY ON GEOMETRIC DESIGN STANDARD OF HIGHWAYS AND STREETS, 2011 6TH EDITION
   - AASHTO GUIDE ON PAVEMENT DESIGN, 1993 EDITION
   - HIGHWAY SAFETY DESIGN STANDARDS: PART 1 - ROAD SAFETY DESIGN, AND PART 2 - ROAD SIGNS AND PAVEMENT MARKINGS, 2012 EDITION

LEGENDS

STEEL FENCE
CONCRETE FENCE
CYCLONE WIRE FENCE (CWF)
BAMBOO FENCE
WOODEN FENCE
BARBWIRE FENCE (BWF)
BANK
PROPERTY LINE
ROAD EDGE
GRAVEL ROAD
CLIFF
HILL
EARTH CANAL
LINED CANAL (COVERED)
LINED CANAL (OPEN)
PIPE CULVERT (RCPC)
BOX CULVERT (RCBC)
SLOPE PROTECTION
W.E.P. S.E.P. C.E.P. — ELECTRIC POSTS (WOODEN, STEEL, CONCRETE E-POSTS)
CONC. SLAB
RIPRAP
DAMAGED PCCP/RE-BLOCKING
REFERENCE POINTS (R.P.) TURNING POINTS (T-0)
WATERMETER, FIRE HYDRANT
BENCHMARK # 00 — BENCHMARK
CHEVRON
SB — SIGN BOARD
WP — WATER PUMP
CARDINAL DIRECTION
MH — MANHOLE
WATER EDGE
CH — CONCRETE HOUSE; CS — CONCRETE STORE
WH — WOODEN HOUSE; WS — WOODEN STORE
TYPICAL HOUSES & STORES
TO — DIRECTION
PI - 00; PI - 0 — ALIGNMENT POINT OF INTERSECTION MARKER (P.I.)
KM 1491 — KILOMETER POST
TRAFFIC LIGHT
STEET LIGHT

NARRA TREE, COCO TREE, UNKNOWN TREE, LEMON TREE, BAMBOO CLAN, DOL-DOL TREE, PALM TREE, TUGAS TREE, INDIAN TREE, LOMBOY TREE
RAMBUTAN TREE, GEMELINA TREE, TALISAY TREE, SAMBAG TREE, NANGKA TREE, BANANA, ACACIA TREE, ALOM TREE, MAGKUNO TREE, ANISLAG TREE
MAHOGANY TREE, MANGOSTEEN TREE, CACAO TREE, BINUNGA TREE, MADRE DE CACAO TREE, POMELO TREE, BOONGON TREE, SAMPALOK TREE, LAWAAN TREE, RESERVED
MISCELLANEOUS TREE, FALCATA TREE, LANSONES TREE, ANAHAW TREE, TUBA-TUBA TREE, MANGO TREE, SANTOL TREE, IBA TREE, PALMERA TREE
BALETE TREE, MANGROOVE TREE, ANTIPOLO TREE, DURIAN TREE, MACOPA TREE, MANSANITAS TREE, KAMANSI TREE, IPIL - IPIL TREE, TISA TREE
PINE TREE, CAMITO TREE, STAR - APPLE TREE, AVOCADO TREE, BULI TREE, MARANG TREE, HIBI TREE, BAGALNGA TREE, LABANA TREE

REPUBLIC OF THE PHILIPPINES
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PROJECT NAME AND LOCATION:
CONCRETING OF ROAD IN BARANGAY BOBONGON, STO. TOMAS, DAVAO DEL NORTE

SHEET CONTENTS:
GENERAL NOTES AND LEGENDS

DRAFTED:
HERWIN EVAN J. HABABAG
ENGINEER II

PREPARED:
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REVIEWED:
BENILDA S. PACQUIAO
ENGINEER II
DATE:

SUBMITTED:
JEZABEL E. TULING, MPA
CHIEF, PLANNING AND DESIGN SECTION
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GARRY E. VERANO
OFFICER-IN-CHARGE
OFFICE OF THE ASSISTANT DISTRICT ENGINEER
DATE:

APPROVED:
ARTURO P. LONGYAPON
DISTRICT ENGINEER
DATE:

SET NO. B (1 | 2)
SHEET NO. 2 / 24

GENERAL NOTES

1. DESIGN STANDARDS

A. ALL WORKS SHALL COMPLY WITH THE DPWH DESIGN GUIDLINES CRITERIA AND STANDARDS (DGCS), VOLUME IV - 2015 EDITION, AASHTO - A POLICY ON GEOMETRIC DESIGN STANDARD OF HIGHWAYS AND STREETS, 2011, 6TH EDITION AND AASHTO GUIDE ON PAVEMENT DESIHN, 1993 EDITION.

B. THE PROVISION FOR ROADWAY SAFETY SHALL COMPLY WITH THE HIGHWAY SAFETY DESIGN STANDARDS: PART 1 - ROAD SAFETY DESIGN, AND PART 2 - ROAD SIGNS AND PAVEMENT MARKINGS, 2012 EDITION

1. DESIGN SPECIFICATIONS:

- FOR GEOMETRIC DESIGN CRITERIA (IN GENERAL)

A. THE DESIGN MUST BE SUITABLE FOR THE TRAFFICE VOLUME, BOTH DAILY AND AT THE DESIGN PEAK HOUR, FOR THE DESIGN SPPED AND FOR THE CHARACTER OF THE VEHICLES TO USE THE FACILITY.

B. THE DESIGN MUST BE CONSISTENT AND MUST AVOID SURPRISE CHANGES IN ALIGNMENT, GRADE AND SIGHT DISTANCE, AND MUST BE PLEASING TO THE USER AND TO THOSE WHO LIVE ALONG IT.

C. THE DESIGN MUST BE COMPLETE HOWEVER, FOR THE DESIGNER TO BE ABLE TO ENSURE THE EFFECTIVENESS OF HIS DESIGN TO A LARGE DEGREE, THE NECESSARY ROADSIDE TREATMENT AND THE PROVISION OF CONTROL DEVICES, SUCH AS LANE MARKERS AND SPECIAL SIGNS, ARE TAKEN INTO ACCOUNT.

D. THE DESIGN SHALL BE AS SIMPLE AS POSSIBLE FROM THE STANDPOINT OF THE BUILDER. EXCESSIVE CHANGES IN CROSS SECTIONAL DESIGN OR THE USE OF VARIETY OF TYPES WITHIN A PROJECT WILL IN MANY CASES INCREASE THE COST AND DIFFICULTY OF CONSTRUCTION BEYOND THE COMMENSURATE VALUE OF SUCH "UNIQUENESS".

E. THE DESIGN SHOULD BE SUCH THAT THE FINISHED ROAD CAN BE MAINTAINED AT THE LEAST COST, AND MUST BE SAFE FOR DRIVING AND SHOULD ENSURE CONFIDENCE FOR MOTORIST.

- FOR GEOMETRIC DESIGN CRITERIA (HORIZONTAL ALIGNMENT AND CONTROLS)

A. FOR THE DESIGN SPEEDOF 30KPH, THE MINIMUM RADIUS IS 30M AND A SUPERELEVATION OF 6% - 8%.

B. THE RECOMMENDED MINIMUM LENGTH OF TANGENT BETWEEN REVERSED CURVES SHOULD BE 50M.

C. IN NO CASES SHALL THE TANGENT LENGTH BE LESS THAN 30M. THE TANGENT IS NECESSARY TO EFFECT THE TRANSITION FROM SUPERELEVATION IN ONE DIRECTION TO SUPERELEVTATION IN THE OPPOSITE DIRECTION

D. A SUPERELEVATED SECTION IS PROCEESED BY A TRANSITION SECTION. THE VALUES OD SUPERELEVATION ARE DETERMINED FROM THE AASHTO POLICY ON GEOMETRIC DESIGN AND ARE A FUNCTION OF THE RATE OF SUPERELEVATION AND THE CURVE RADIUS.

E. SUPERELEVATION IS USUALLY NOT PROVIDED ON LOCAL STREETS IN RESIDENTIAL AND COMMERCIAL AREAS WHERE WIDE PAVEMENTS, PROXIMITY OF ADJACENT DEVELOPMENT, CONTROL OF CROSS SLOPE, DRAINAGE PROFILES, FREQUENCY OF CROSS STREETS, AND OTHE URBAN FEATURES MAKE ITS USE IMPRACTICAL.

F. ON SIMPLE CURVES, WIDENING SHOULD BE APPLIED ON THE INSIDE EDGE ONLY WITH A RECOMMENDED MINIMUM WIDTH OF 0.60 METERS.

G. ON CURVE DESIGN WITH SPIRAL, WIDENING MAY BE PLACES ON THE INSIDE OR DIVIDED EQUALLY BETWEEN THE INSIDE AND OUTSIDE CURVE.

H. CURVE WIDENING SHOULD BE ATTAINED GRADUALLY OVER A LENGTH SUFFICIENT TO MAKE THE WHOLE OF THE TRAVELED WAY FULLY USABLE.

I. ALIGNMENT SHOULD BE AS DIRECTIONAL AS POSSIBLE BUT SHOULD BE CONSISTENT WITH THE TOPOGRAPHY AND WITH PRESERVING DEVELOPED PROPERTIES.

J. ALIGNMENT SHOULD BE CONSISTENT AND SHARP CURVES SHOULD NOT BE INTRODUCED AT THE LONG TANGENTS

K. FOR SMALL DEFLECTION ANGLE, CURVES SHOULD BE SUFFICIENTLY LONG TO AVOID THE APPEARANCE OF KINK.

L. TANGENTS OR FLAT CURVATURE SHOULD BE USED ON HIGH, LONG FILLS.

A. CAUTION SHOULD BE EXERCISED IN THE USE OF COMPOUND CURVE. WHERE TOPOGRAPHY OR RROW RESTRICTIONS MAKE THEIR USE NECESSARY, THE RADIUS OF THE FLATTER CURVE SHOULD NOT BE MORE THAN 50% GREATER THAN THE RADIUS OF THE SHARPER CURVE.

B. ANY ABRUPT REVERSAL IN ALIGNMENT SHOULD BE AVOIDED. THE REVERSION LENGTH OF TANGENT BETWEEN REVERSED CURVES SHOULD BE 50 METERS AND IN NO CASE SHOULD BE LESS THAN 30 METERS.

C. THE "BROKEN-BACK" OR "FLAT-BACK" ARRANGEMENT OF CURVE (HAVING A SHORT TANGENT BETWEEN TWO CURVES IN THE SAME DIRECTION) SHOULD BE AVOIDED EXCEPT WHEN VERY UNUSUAL TOPOGRAPHICAL OR R-O-W DICTATE OTHERWISE.

D. TO AVOID THE APPEARANCE OF INCONSISTENT DISTORTION, THE HORIZONTAL ALIGNMENT SHOULD BE COORDINATED CAREFULLY WITH THE PROFILE DESIGN.

E. ENDING A CURVE ON A BRIDGE IS UNDESIRABLE, UNSIGHTLY AND ADDS NEEDLESS COMPLICATIONS TO DESIGN AND CONSTRUCTION. LIKEWISE CURVES BEGINNING OR ENDING NEAR A BRIDGE SHOULD BE PLACED SUCH THAT NO PART OF THE SUPPERELEVATION TRANSITION EXTENDS ON TO THE BRIDGE. COMPOUND CURVES ON A BRIDGE ARE EQUALLY UNDESIRABLE. IF CURVATURE IS UNAVOIDABLE, THE BRIDGE SHOULD BE ENTIRELY ON A SIMPLE CURVE AS FLAT AS PHYSICAL CONDITIONS PERMIT.

- FOR GEOMETRIC DESIGN CRITERIA (VERTICAL ALIGNMENT AND CONTROLS)

A. IN AREAS SUBJECTED TO INUNDATION, GRADES SHOULD BE ESTABLISHED 0.50M. ABOVE WATER LEVEL.

B. GRADES OF BRIDGES SHOULD ALLOW 1.50M FREEBOARD ABOVE THE MAXIMUM FLOOD WATER ELEVATION.

C. MAXIMUM GRADES OF 5% ARE CONSIDERED APPROPRIATE FOR A DESIGN SPEED OF 110KPH. FOR A DESIGN OF 50KPH MAXIMUM GRADES ARE GENERALLY IN THE RANGE OF 7 TO 12%, DEPENDING ON TOPOGRAPHY. IN THE PHILIPPINES THE MAXIMUM GRADE WIDELY USED ID 6%.

D. ON THROUGH CUT SECTION, GRADES SHOULD AT LEAST BE 0.50% TO PROVIDE LONGITUDINAL DRAINAGE.

E. A MINIMUM OF 0.35% MAY BE USED ON HIGH TYPE PAVEMENTS AND ACCURATELY CROWNED TO FACILITATE DRAINAGE DISCHARGE.

F. THE FOLLOWING CRITICAL LENGTH OF UPGRADES WHEN APPROACHED BY A LEVEL SECTION SHOULD NOT BE USED A CONTROL BUT REFERRED TO AS A GUIDE:

CRITICAL LENGTH (m)	UPGRADE (%)
500	3
340	4
240	5
200	6
170	7
150	8

G. THE MINIMUM REQUIREMENT OF VERTICAL CURVE LENGTH IS 60M.

H. A SMOOTH GRADE LINE WITH GRADUAL CHANGES SHOULD BE SOUGHT FOR IN PREFERENCE TO A LINE WITH NUMEROUS BREAKS/SHORT LENGTH OF GRADES.

I. THE "ROLLER COASTER" OR THE HIDDEN-DIP TYPE OF PROFILE SHOULD BE AVOIDED.

J. A "BROKEN-BACK" GRADE LINE SHOULD BE AVOIDED.

K. ON LONG GRADES, IT MAY PREFERABLE TO PLACE THE STEEPEST GRADES AT THE BOTTOM AND FLATTER THE GRADES NEAR THE TOP OF THE ASCENT.

L. WHERE AT-GRADE INTERSECTIONS OCCUR ON ROADWAY SECTORS WITH MODERATE TO STEEP GRADES, IT IS DESIRABLE TO REDUCE THE GRADES THROUGH THE INTERSECTION.

M. SAG VERTICAL CURVES SHOULD BE AVOIDED IN CUTS UNLESS ADEQUATE DRAINAGE CAN BE PROVIDED.

- FOR GEOMETRIC DESIGN CRITERIA (CROSS SECTIONS)

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

SURFACE TYPE	CROSS SLOPE RATING
HIGH	1.50 - 2.0%
INTERMEDIATE	2.00 - 3.0%
LOW	3.00 - 4.0%

B. DESIRABLE LANE WIDTH IS 3.65M WHICH ALLOWS LARGE VEHICLES TO PASS WITHOUT EITHER VEHICLE HAVING TO MOVE SIDEWAYS TOWARDS THE EDGE OF PAVEMENT.

C. LANE WIDTH AS LOW AS 2.75M MAY BE USED ON GROUNDS OF ECONOMY.

D. ROADS WITH PAVEMENT WIDTHS LESS THAN 5.5M SHOULD REGARDED AS SINGLE LANE.

E. PAVEMENT WIDTH GREATER THAN 7.32M FOR 2-WAY MOVEMENT IS NOT RECOMMENDED FOR 2-LANE ROADS AS SOME DRIVERS WILL ATTEMPT TO TRAVEL THREE VEHICLES ABREAST ON WIDE PAVEMENT.

F. SHOULDERS ON FILL PREFERABLY SHOULD BE WIDER THAN IN CUTS ALTHOUGH THE PRESENT PRACTICE IS TO MAKE THEM EQUAL.

G. REGARDLESS OF THE WIDTH, SHOULDERS SHOULD BE CONTINUOUS.

H. ALTHOUGH, IT IS DESIRABLE THAT SHOULDER BE WIDE ENOUGH FOR A VEHICLE TO BE DRIVEN COMPLETELY OFF THE TRAVEL WAY, NARROWER SHOULDERS ARE BETTER THAN NONE AT ALL.

I. SHOULDER WIDTH OF 0.60M MAY BE CONSIDERED ON DIFFICULT TERRAIN AND ON LOW-VOLUME HIGHWAY.

J. PAVING OF SHOULDERS WITH A MINIMUM WIDTH OF 1.5M SHALL BE CONSIDERED WHEN AADT IS GREATER THAN 1,250 VEHICLES, WHEN CLOSELY SPACED DRIVEWAYS AND/OR FREQUENT TURNING MOVEMENTS AFFECT MAINTENANCE, ON HIGH EMBANKMENT SECTIONS, ON CURVED ALIGNMENT WITH MORE THAN 7% SUPERELEVATION, WHERE PEDESTRIANS ARE NORMALLY CONCENTRATED, AND IN AREAS WITH STEEP (>6%) AND LONG (>100M) GRADIENTS.

THIS IS TO CERTIFY THAT THE DETAILED ENGINEERING SURVEYS AND DESIGNS HAVE BEEN CONDUCTED ACCORDING TO THE PRESCRIBED AGENCY STANDARDS AND SPECIFICATIONS IN CONFORMANCE WITH THE PROVISIONS OF ANNEX"A" OF THE REVISED IMPLEMENTING RULES AND REGULATIONS OF RA 9184, AND THAT THE DETAILED ENGINEERING OUTPUTS ARE ADEQUATE FOR THE PROCUREMENT AT HAND.

WARREN S. PIÑEZ
HEAD, SURVEY & INVESTIGATION UNIT

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGION XI
DAVAO DEL NORTE
2ND DISTRICT ENGINEERING OFFICE
TAGUM CITY

PROJECT NAME AND LOCATION:
CONCRETING OF ROAD IN BARANGAY BOBONGON, STO. TOMAS, DAVAO DEL NORTE

SHEET CONTENTS:
GENERAL NOTES

DRAFTED: **HERWIN EVAN J. HABABAG** ENGINEER II
PREPARED: **WARREN S. PIÑEZ** ENGINEER II

REVIEWED: **BENILDA S. PACQUIAO** ENGINEER II DATE:

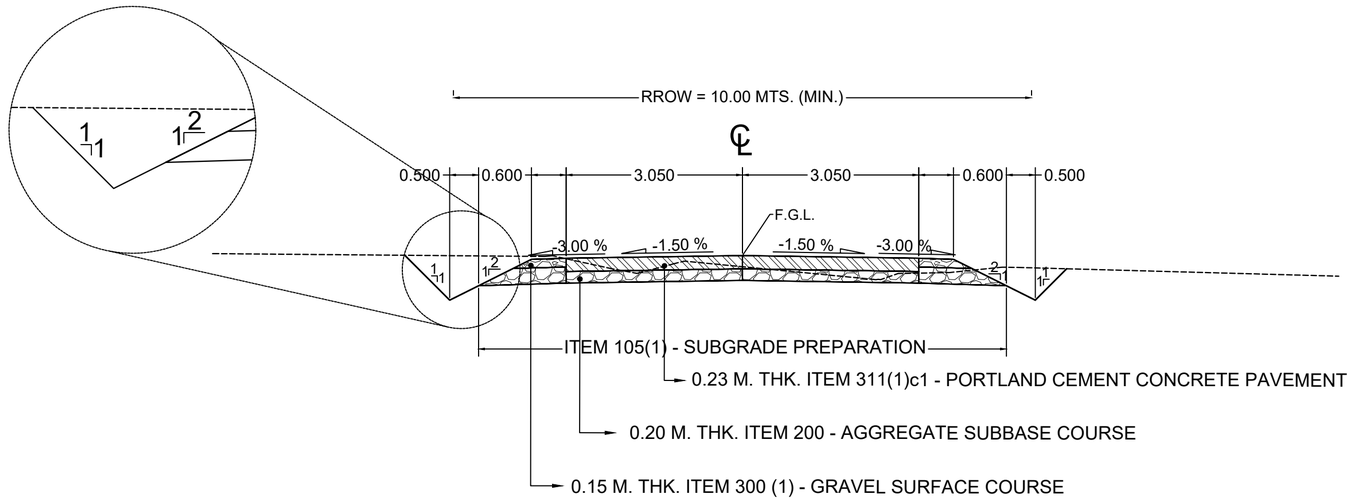
SUBMITTED: **JEZABEL E. TULING, MPA** CHIEF, PLANNING AND DESIGN SECTION DATE:

RECOMMENDED: **GARRY E. VERANO** OFFICER-IN-CHARGE OFFICE OF THE ASSISTANT DISTRICT ENGINEER DATE:

APPROVED: **ARTURO P. LONGYAPON** DISTRICT ENGINEER DATE:

SET NO. B 2 2

SHEET NO. 3 24



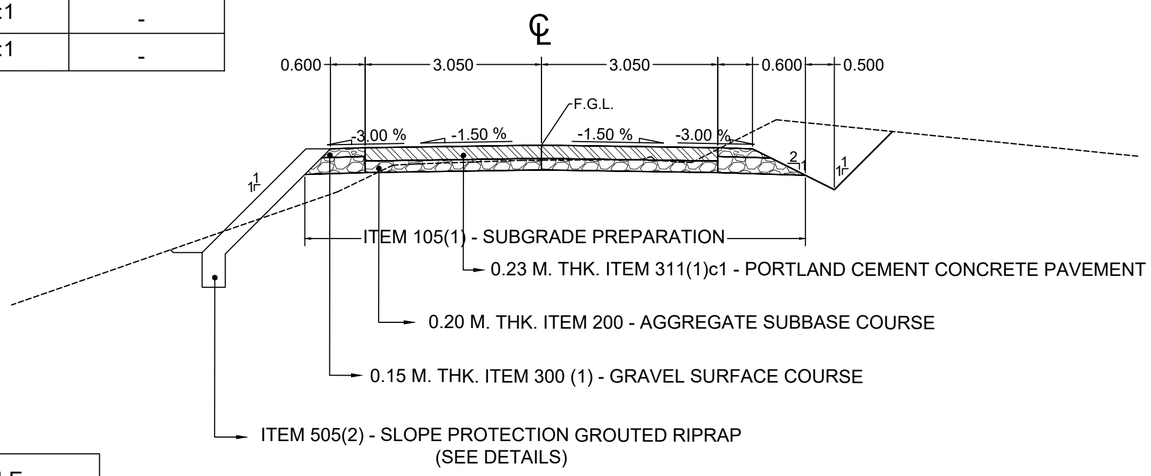
TYPICAL ROADWAY SECTION AT NORMAL CROWN SHOWING CUT AREA

CUT/FILL SLOPE SCHEDULE		
NATURE OF MATERIAL	CUT SLOPE	FILL SLOPE
COMMON EARTH	1:1	1.5:1
RIPPABLE ROCK	1/2:1	-
SOLID ROCK	1/4:1	-

SCHEDULE FOR RULE OF 7

+ e% < 5% = -3%
+ e% ≥ 5% = -2%
+ e% ≥ 6% = -1%
+ e% ≥ 7% = -0%
+ e% ≥ 8% = +1%

SLOPE ROUNDING SCHEDULE	
HEIGHT OF SLOPE	ROUNDING (X)
0 TO 4.50	1.5
OVER 4.50	2.5



TYPICAL ROADWAY SECTION AT NORMAL CROWN SHOWING CUT & FILL WITH GROUTED RIPRAP SLOPE PROTECTION AT LS

DESIGN PARAMETERS

DESIGN CONDITIONS :

Design Period	=	20	Years
Actual Loading	=	100%	(including overloaded trucks)
Design E SAL	=	993,771	One direction
Conc. Strength	=	650	psi @ 28 Days

Design CBR : = Mean CBR - ⅔S

where : $S = \sqrt{(x_i - \bar{x})^2/(n-1)}$

Mean CBR = 6.6667

$S = (281.6 / 8.00)^{0.5} = 5.9325$

CBR = 2.712

4,067.51

Resilient Modulus of Subgrade :

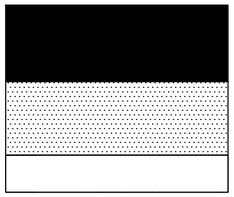
M_R = CBR X 1500 M_R = 4,068

Composite Modulus of Subgrade : k_α = 250

Corrected k, (from the graphs) : k_{cor} = 750

RIGID PAVEMENT ANALYSIS

PAVEMENT STRUCTURE



PCC Thickness , T_{PPC} = 230 mm

Subbase , item 200 = 200 mm

Subgrade CBR = 2.712

(MR, resilient modulus = 4,068

NOTE:

ALL EMBANKMENT SHALL BE COMPACTED IN HORIZONTAL LAYERS NOT EXCEEDING 200mm (LOOSE MEASUREMENT). AFTER FIVE SUCCESSIVE LAYERS , THE FILL/ EMBANKMENT SHALL BE SATURATED WITH WATER THEN DRIED BEFORE PLACING THE SUCCEEDING LAYERS. THE PROCEDURE SHALL BE REPEATED UNTIL THE DESIRED ELEVATION IS ATTAINED.

REFERENCE:

- DPWH DESIGN, GUIDELINES CRITERIA AND STANDARDS (DGCS) 2015 EDITION
- FOR THE MINIMUM REQUIREMENT OF ROAD RIGHT OF WAY (RROW) WIDTH D.O. 179, S. 2015

REPUBLIC OF THE PHILIPPINES
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TAGUM CITY

PROJECT NAME AND LOCATION: CONCRETING OF ROAD IN BARANGAY BOBONGON, STO. TOMAS, DAVAO DEL NORTE

SHEET CONTENTS: TYPICAL ROADWAY SECTION, DESIGN PARAMETERS, SHOULDER SCHEDULE, SLOPE SCHEDULE

DRAFTED: **HERWIN EVAN J. HABABAG** ENGINEER II
PREPARED: **WARREN S. PIÑEZ** ENGINEER II

REVIEWED: **BENILDA S. PACQUIAO** ENGINEER II DATE:

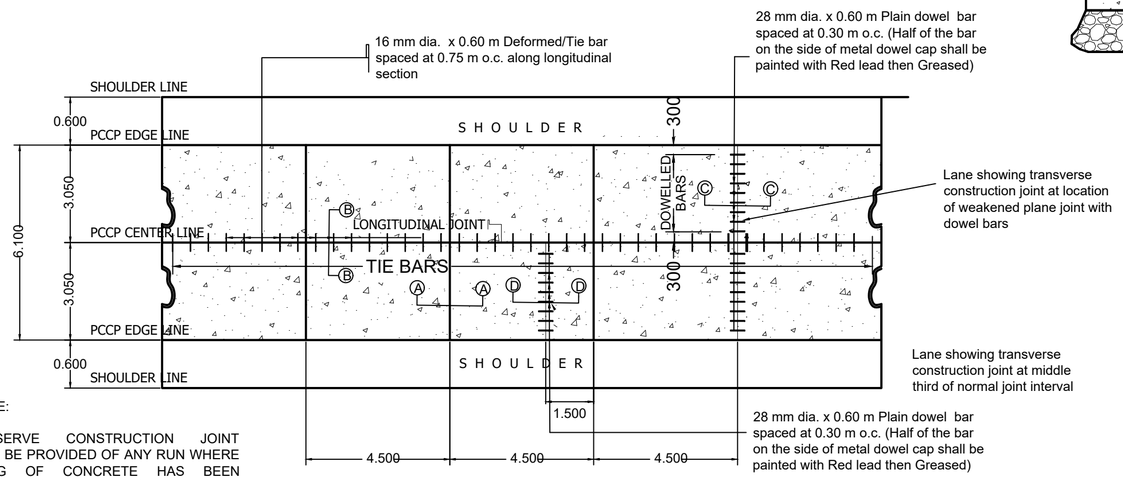
SUBMITTED: **JEZABEL E. TULING, MPA** CHIEF, PLANNING AND DESIGN SECTION DATE:

RECOMMENDED: **GARRY E. VERANO** OFFICER-IN-CHARGE OFFICE OF THE ASSISTANT DISTRICT ENGINEER DATE:

APPROVED: **ARTURO P. LONGYAPON** DISTRICT ENGINEER DATE:

SET NO. D 1 1

SHEET NO. 5 / 24



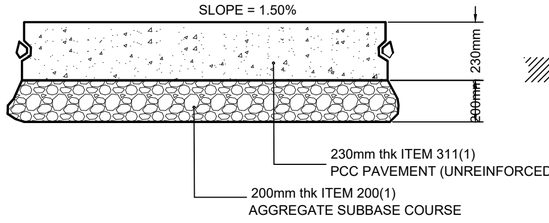
TYPICAL BAR LAYOUT "T" THICK PAVEMENT

TYPICAL PLAN OF TWO-LANE DOWELLED PAVEMENT
NOT TO SCALE

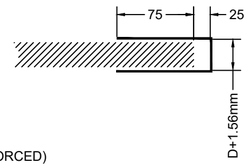
NOTE:

TRANSERVE CONSTRUCTION JOINT SHALL BE PROVIDED OF ANY RUN WHERE LAYING OF CONCRETE HAS BEEN STOPPED FOR THIRTY (30) MINUTES OR LONGER.

ALL TRANSVERSE CONSTRUCTION JOINTS SHOULD BE BUTT JOINTS WITH DOWEL.



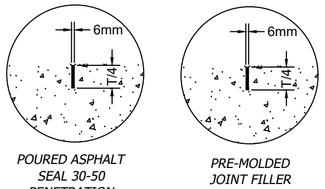
PAVEMENT SECTION
SCALE NTS



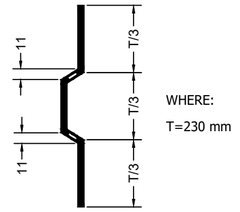
METAL CAP DOWEL DETAIL
SCALE NTS

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

BASED ON AASHTO GUIDE FOR DESIGN OF PAVEMENT STRUCTURES 1993



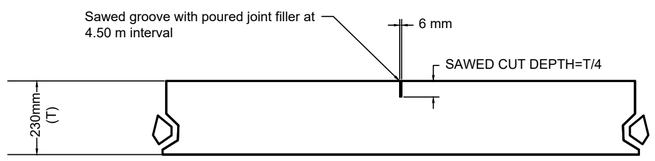
WEAKENED GROOVE DETAIL
SCALE NTS



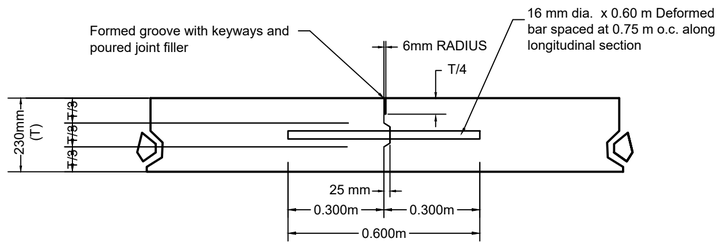
METAL SIDE FORM (KEYED JOINT)
DETAIL OF SIDE FORMS
SCALE NTS

TABLE SPACING OF PLAIN DOWEL BARS (L=600 mm)		
SLAB THICKNESS (mm)	DIAMETER,D (mm)	SPACING, S2(mm)
230	28	300
240	30	300
250	32	300
260	32	300
270	34	300
280	36	300

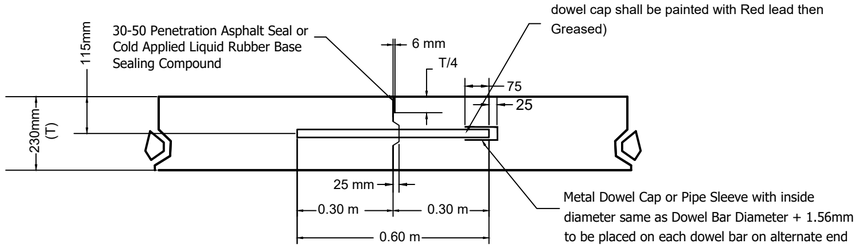
NOTE:
DIAMETER AND SPACING OF PLAIN DOWEL BARS MAY BE MODIFIED AS LONG AS THE EQUIVALENT STEEL AREA IS SUSTAINED.



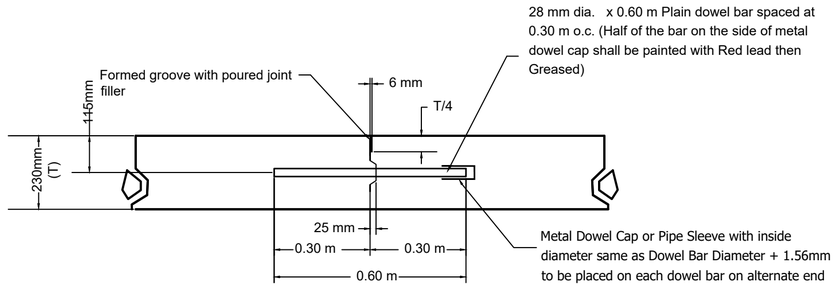
SECTION A - A
CONTRACTION JOINT SECTION
SCALE 1 : 20 M.



SECTION B - B
LONGITUDINAL CONSTRUCTION JOINT
SCALE 1 : 20 M.



SECTION C - C
DOWELLED EXPANSION JOINT DETAIL
SCALE 1 : 20 M.



SECTION D - D
BUTT TRANSVERSE CONSTRUCTION
OR CONTACT JOINT
SCALE 1 : 20 M.

1. Materials and workmanship shall conform with the DPWH Standard Specification for Highways, Bridges and Airport, 2013
2. Contraction joints are formed when concrete on one side of the joint is poured ahead and allowed to set before pouring on the other side, No construction joint shall be placed within 1.50 m. from the weakened plane joint.
3. At construction joint (longitudinal or transverse) care should be taken that no concrete from the last slab placed overhangs any portion of the first slab.
4. Tie bars should be deformed steel bars. 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 should be used for the whole project.
6. Material for the metal side form shall be brand new sheet metal Gauge no. 15 of black iron free from rust and links.
7. At least six (6) successive dowelled butt joints at normal joint spacing shall be provided before or after an expansion joint.
8. The groove or cracks above joints (longitudinal or transverse) shall be sealed with 30-50 penetration asphalt seal or cold applied liquid rubber compound after the concrete had been cured and before opening pavement to traffic. Asphalt sealed should be poured in such manner that spalling shall be prevented/ eliminated, thus, provide a smooth leveling/ riding surface.
9. All transverse joints except construction joint shall be continuous from edge to edge.
10. All longitudinal joints shall meet at intersections with no gaps or offset.
11. All dimensions are in millimeters unless otherwise specified.
12. Avoid stoppage of formworks along curves.
13. Construct expansion joint at every 90 meters and/or every adjacent existing structures.

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGION XI
DAVAO DEL NORTE
2ND DISTRICT ENGINEERING OFFICE
TAGUM CITY

PROJECT NAME AND LOCATION:
CONCRETING OF ROAD IN BARANGAY BOBONGON, STO. TOMAS, DAVAO DEL NORTE

SHEET CONTENTS:
STANDARD PORTLAND CEMENT CONCRETE PAVEMENT JOINTS

DRAFTED: **HERWIN EVAN J. HABABAG**, ENGINEER II
PREPARED: **WARREN S. PIÑEZ**, ENGINEER II

REVIEWED: **BENILDA S. PACQUIAO**, ENGINEER II, DATE:

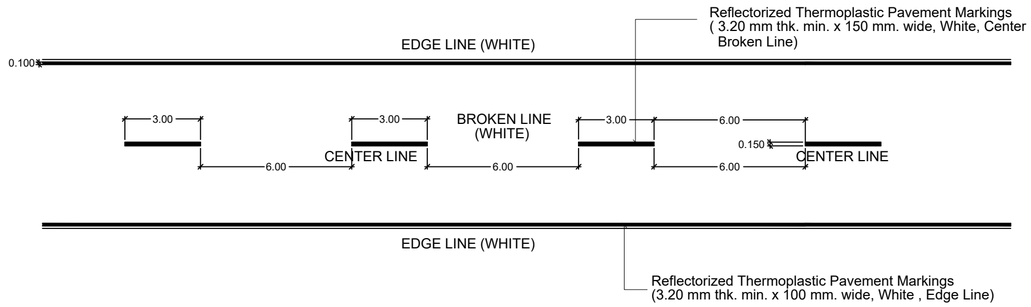
SUBMITTED: **JEZABEL E. TULING, MPA**, CHIEF, PLANNING AND DESIGN SECTION, DATE:

RECOMMENDED: **GARRY E. VERANO**, OFFICER-IN-CHARGE, OFFICE OF THE ASSISTANT DISTRICT ENGINEER, DATE:

APPROVED: **ARTURO P. LONGYAPON**, DISTRICT ENGINEER, DATE:

SET NO. E 1 1

SHEET NO. 6 / 24



REFLECTORIZED THERMOPLASTIC PAVEMENT MARKINGS

SCALE NTS

REFLECTORIZED THERMOPLASTIC PAVEMENT MARKINGS SCHEDULE

STATION	EDGE LINE (W=0.10m)	BROKEN LINES (W=0.15m, L=3.0 m)		DOUBLE CENTER LINE (W=0.15m)	AREA (SQ.M.) WHITE	AREA (SQ.M.) YELLOW	DESCRIPTION
		LENGTH	No. OF STRIPS				
STA. 0+000.00 - STA. 0+594.00	1,188.00				118.80		WHITE, EDGELINE (BOTHSIDES)
STA. 0+000.00 - STA. 0+594.00		594.00	66.00		29.70		WHITE, CENTER (BROKEN LINES)
				TOTAL	148.50		

REFLECTORIZED THERMOPLASTIC PAVEMENT MARKINGS DETAIL

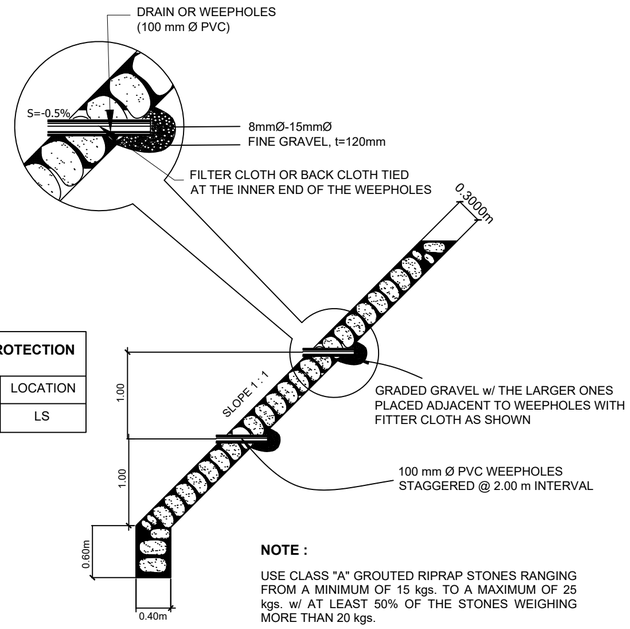
GENERAL NOTES:

1. THE MATERIALS, DIMENSIONS, SHAPE, COLOR, SIZE OF NUMERALS, LETTERS AND INSTALLATION SHALL CONFORM IN ACCORDANCE WITH SPECIFICATIONS OF DPWH MANUAL ON PAVEMENT MARKINGS.

2. REFLECTORIZED THERMOPLASTIC PAVEMENT STRIPPING MATERIAL SHALL CONFORM TO AASHTO M249 IN WHICH THE ROAD MUST BE APPLIED IN A MOLTEN STATE BY MECHANICAL MEANS W/ SURFACE APPLICATION OF GLASS BEADS AT A RATE OF NOT LESS THAN 350 G/L OF GLASS BEADS HAVING A SIZE RANGE OF DROP-IN TYPE AND WILL PRODUCE AN ADHERENT REFLECTORIZED STRIPE OF SPECIFIED THICKNESS AND WIDTH CAPABLE OF RESISTING DEFORMATION BY TRAFFIC.

SCHEDULE OF REMOVAL OF TREES		
SAMPLAOK TREE	1 LS	STA 0+331.00
PALMERA	1 LS	STA 0+333.00
MANGO TREE	1 LS	STA 0+392.00
IPIL-IPIL TREE	1 LS	STA 0+392.00

BLOW UP DETAIL OF WEEPHOLE



GROUTED RIPRAP SLOPE PROTECTION SCHEDULDE	
STATION	LOCATION
STA. 0+000.00 - STA. 0+020.00	LS

NOTE :

USE CLASS "A" GROUTED RIPRAP STONES RANGING FROM A MINIMUM OF 15 kgs. TO A MAXIMUM OF 25 kgs. w/ AT LEAST 50% OF THE STONES WEIGHING MORE THAN 20 kgs.

GROUTED RIPRAP SLOPE PROTECTION DETAIL

SCALE 1:20 MTS

GENERAL NOTES:

1. ALL DIMENSIONS AND DISTANCES ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
2. STONES FOR GROUTED RIPRAP SHALL BE SOUND, TOUGH, DURABLE, DENSE, RESISTANT TO THE ACTION OF AIR AND WATER, AND SUITABLE IN ALL RESPECTS FOR THE PURPOSE INTENDED.
3. MORTAR AND GROUTED RIPRAP SHALL CONSIST OF SAND, CEMENT, AND WATER CONFORMING TO THE REQUIREMENTS GIVEN UNDER ITEM 405-STRUCTURAL CONCRETE MIXED ON THE PROPORTION OF ONE PART CEMENT TO THREE PARTS SAND BY VOLUME, AND SUFFICIENT WATER TO OBTAIN THE REQUIRED CONSISTENCY.
4. THE HORIZONTAL AND VERTICAL CONTACT SURFACE BETWEEN STONES SHALL BE EMBEDDED BY CEMENT MORTAR HAVING A MINIMUM THICKNESS OF 20 mm.
5. WEEPHOLES SHALL HAVE SLOPES OF 0.50 % AND MUST BE PROVIDED WITH FILTER BAGS AS SPECIFIED IN THE SPECIAL PROVISION OR AS DIRECTED BY THE ENGINEER, AND SHALL BE INCIDENTAL TO PAY ITEM 505. ROCK BACKING OF NOT LESS THAN 0.06 cu.m. SHALL BE PROVIDED AT EACH WEEPHOLE AND SHALL EXTEND TO AT LEAST 300 mm ABOVE THE DRAIN.
6. THE STONES SHALL BE LAID IN A MANNER THAT THE VERTICAL AND HORIZONTAL ALIGNMENTS OF THE EXPOSED FACE SHALL BE MAINTAINED IN A STRAIGHT LINE.
7. ALL OTHER REQUIREMENTS SHALL CONFORM TO ITEM 505-RIPRAP AND GROUTED RIPRAP OF THE DPWH STANDARDS SPECIFICATIONS FOR HIGHWAYS, BRIDGES AND AIRPORTS, 2013 EDITION.

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REGION XI
DAVAO DEL NORTE
2ND DISTRICT ENGINEERING OFFICE
TAGUM CITY

PROJECT NAME AND LOCATION:
CONCRETING OF ROAD IN BARANGAY BOBONGON, STO. TOMAS, DAVAO DEL NORTE

SHEET CONTENTS:
REFLECTORIZED THERMOPLASTIC PAVEMENT MARKINGSDETAILS, GROUTED RIPRAP SLOPE PROTECTION DETAILS AND SCHEDULE, REMOVAL OF TREES SCHEDULE

DRAFTED: **HERWIN EVAN J. HABABAG** ENGINEER II
PREPARED: **WARREN S. PIÑEZ** ENGINEER II

REVIEWED: **BENILDA S. PACQUIAO** ENGINEER II DATE:

SUBMITTED: **JEZABEL E. TULING, MPA** CHIEF, PLANNING AND DESIGN SECTION DATE:

RECOMMENDED: **GARRY E. VERANO** OFFICER-IN-CHARGE OFFICE OF THE ASSISTANT DISTRICT ENGINEER DATE:

APPROVED: **ARTURO P. LONGYAPON** DISTRICT ENGINEER DATE:

SET NO. F 1 1

SHEET NO. 7 24