

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS & HIGHWAYS

Feasibility Study
on
The Rural Road Network Development Project

FINAL REPORT (Volume 28)

DRAWINGS FOR EXPERIMENTAL PAVEMENT CONSTRUCTION

OCTOBER, 1990

JAPAN INTERNATIONAL COOPERATION AGENCY

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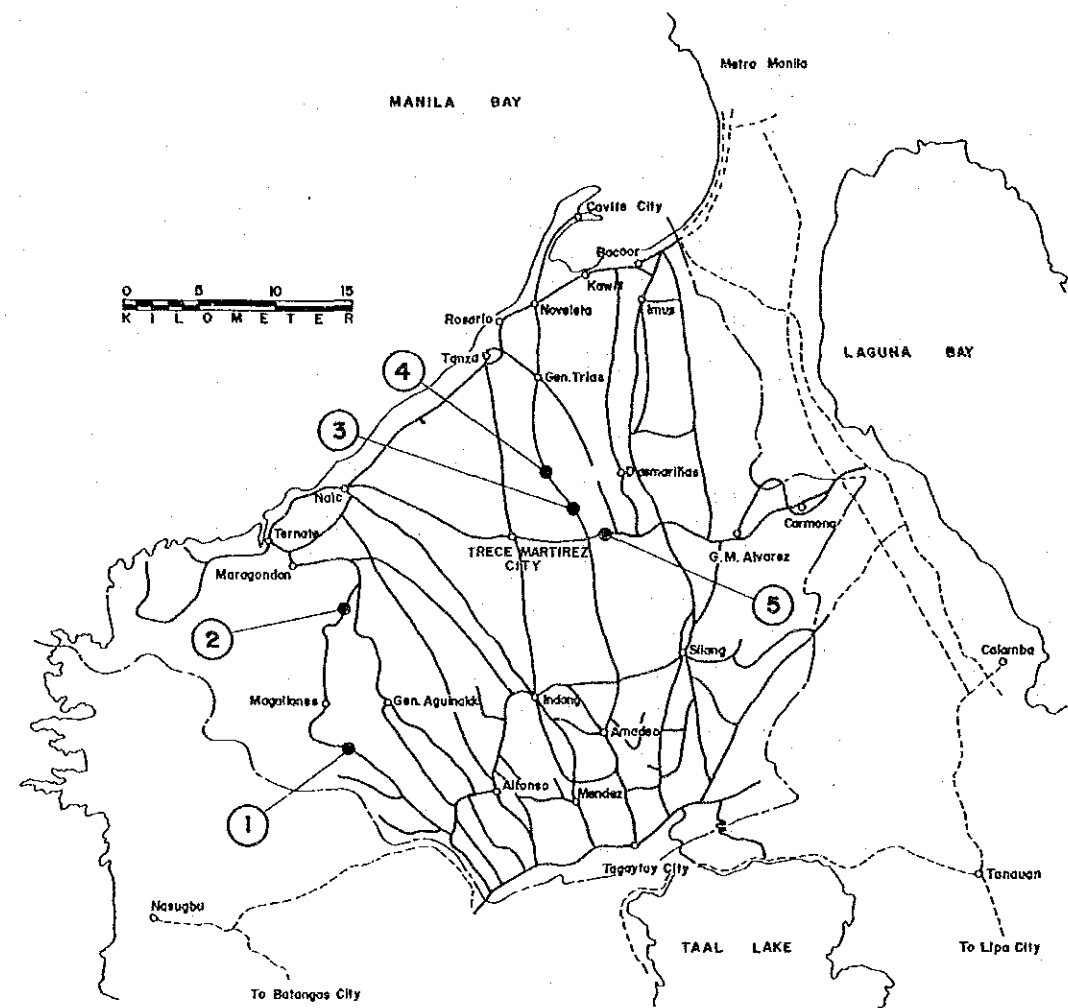
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FEASIBILITY STUDY ON THE RURAL ROAD NETWORK DEVELOPMENT PROJECT		
SCALE	INDEX OF DRAWINGS	DRAWING NO.
NONE		01

TITLE	DRAWING NO.
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FEASIBILITY STUDY ON THE RURAL ROAD NETWORK DEVELOPMENT PROJECT

SCALE	LOCATION & KEY MAP	DRAWING NO.
AS SHOWN		02

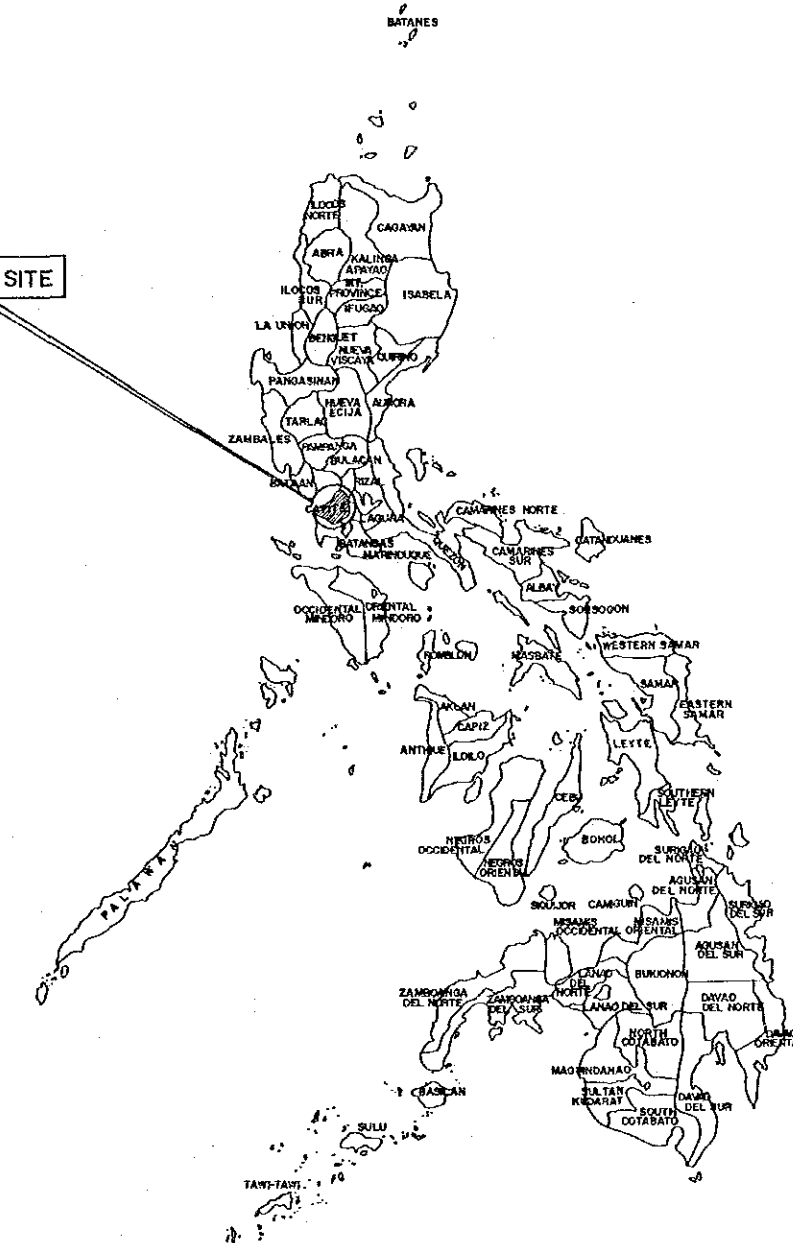


LOCATION MAP

EPC Section No.	Length (m.)	Type of Experimental Pavement
1	800	OR SBST DBST BMP
2	800	OR SBST DBST BMP
3	800	DBST BMP HAC (4cm) HAC (5cm)
4	800	DBST BMP HAC (4cm) HAC (5cm)
5	400	HAC (5cm) PCC (18cm)



PROJECT SITE



KEY MAP

FEASIBILITY STUDY ON THE RURAL ROAD NETWORK DEVELOPMENT PROJECT		
SCALE	GENERAL NOTES	DRAWING NO.
NONE		03

GENERAL NOTES

1. STATIONING

- (a) THE ROAD STATIONS AND ELEMENTS ARE RELATIVE TO THE CENTER LINE OF THE ROAD.
- (b) ALL MEASUREMENT SHALL BE HORIZONTAL DISTANCE.

2. ELEVATIONS AND GRADES

- (a) FINISHED GRADE ELEVATIONS INDICATED ON PLANS PROFILE REFER TO THE GRADE OF THE FINISHED ROAD AS SHOWN ON THE TYPICAL ROAD SECTION.
- (b) ELEVATIONS SHOWN ON GROUND LEVEL OF THE PLAN AND PROFILE DRAWINGS ARE THE ELEVATIONS OF THE EXISTING GROUND ALONG THE CENTER LINE OF THE PROJECT ROAD.
- (c) ALL ELEVATIONS AND DIMENSIONS ARE IN METERS EXCEPT OTHERWISE INDICATED.
- (d) GRADES SHOWN ARE TOP OF FINISHED PAVEMENT.

3. HORIZONTAL CONTROL

- (a) TRUE AZIMUTH WAS USED IN RUNNING THE TRAVERSE POINTS.
- (b) AZIMUTH OF LINE DERIVED FROM SOLAR OBSERVATIONS.
- (c) SIMPLE CURVES WERE USED IN THE TRANSITION OF THE HORIZONTAL CURVATURES.
- (d) ALL HORIZONTAL CURVE COMPUTATIONS WERE BASED ON THE 20.00m ARC DEFINITION.
- (e) SKEWED ANGLE IS DEFINED AS THE ANGLE BETWEEN THE LINE IN QUESTION AND A LINE NORMAL TO THE CENTER OF THE ROAD.
- (f) INTERSECTION POINTS (PI) ARE REFERED TO AT LEAST TWO REFERENCE POINTS WITH IN OR OUTSIDE THE ROAD RIGHT - OF - WAY.

4. VERTICAL CONTROL

- (a) VERTICAL DATUM BASED FROM 20 cm X 20 cm CONCRETE MONUMENT WITH ASSUMED ELEVATION.
- (b) BENCH MARKS WERE PROVIDED AS SHOWN ON THE PLAN PROFILE DRAWINGS.
- (c) PARABOLIC CURVES WERE INTRODUCED FOR VERTICAL ALIGNMENT.

5. CLEARING AND GRUBBING

- (a) THE EXTENT OF CLEARING AND GRUBBING SHALL BE 3.00m BEYOND THE TOES OF FILL SLOPE OR BEYOND ROUNDING SLOPE AS INDICATED IN THE TYPICAL ROADWAY SECTION.
- (b) ALL MEASUREMENT SHALL BE HORIZONTAL DISTANCE.

6. RIGHT - OF - WAY

- (a) THE PROPOSED RIGHT-OF-WAY LIMIT IS 30.00 m AS SHOWN ON THE PLAN FOR EPC SECTION NO. 5 AND 15m FOR EPC SECTION NO. 1 TO NO. 4.

7. SUPERELEVATION

- (a) THE MAXIMUM SUPERELEVATION USED WAS 6.5 %.

8. SPECIFICATIONS

- (a) SPECIFICATION FOR THIS PROJECT SHALL BE THE SPECIFICATIONS FOR EXPERIMENTAL PAVEMENT CONSTRUCTION.

SCALE

NONE

STANDARD SYMBOLS

DRAWING NO.

04

SYMBOLS

	PROJECTED ROAD
	EXISTING ROAD
	TRACK
	DIKE
	NEW BRIDGE
	EXISTING BRIDGE
	BAILEY BRIDGE
	RIGHT-OF-WAY LIMIT
	EXISTING IRRIGATION CANAL
	RIVER
	GULLY
	CONCRETE DITCH (EXISTING)
	FENCE (WOOD OR BARBED WIRE)
	FENCE MASONRY

	BUILDING (CONCRETE OR MASONRY)
	HOUSE (WOODEN OR MASONRY)
	WOODEN HOUSE
	CEMETERY
	MEMORIAL TOMB
	CHURCH-CHAPEL
	STATUE-PERSONNEL MONUMENT
	BARRIO/MUNICIPAL/PROVINCIAL BOUNDARY MONUMENT
	REFERENCE POINT (BCC OR ECC)
	POLYGON POINT
	TOWER
	BENCH MARK
	BM-RP BENCH MARK-REFERENCE POINT
	WATER TANK-DEEP WELL-ARTESIAN WELL-HYDRANT
	DRILL HOLE OR BORE HOLE
	VERT. CURVATURE
	GUARDRAIL (PROFILE)

	POINT OF INTERSECTION
	DISCHARGE DITCH
	MANHOLE
	EXTG. MANHOLE EXTG. WATER PIPE LINE EXTG. CATCH BASIN
	TELEGRAPH- TELEPHONE POST ELECTRIC POST
	OVERHEAD TRANSMISSION LINE
	CURB INLETS DROP INLETS (TYPE D-1, D-2, D-3)
	PIPE CULVERT (PROPOSED)
	PIPE CULVERT (EXISTING)
	BOX CULVERT
	BOX CULVERT (EXISTING)
	PIPE CULVERT INLET TYPE A
	PIPE CULVERT INLET TYPE B
	ROAD APPROACHES

	INLET TYPE OUTLET RETAINING WALL
	ANGLE OF SKEW
	RETAINING WALL (EXISTING)
	EMBANKMENT AND SLOPE PROTECTION TYPE
	RETAINING AND TOE WALLS
	GROUTED RIPRAP PROPOSED SLOPE PROTECTION
	WIRE MESH GABION
	PAVED WATERWAY TYPE
	DITCHES COMMON MEDIAN CONCRETE
	RICE FIELD
	CULTIVATED LAND
	BANANA LAND
	COCONUT LAND
	SWAMP OR MARSH LAND

SCALE

DRAWING NO.

NONE

STANDARD LEGEND

05

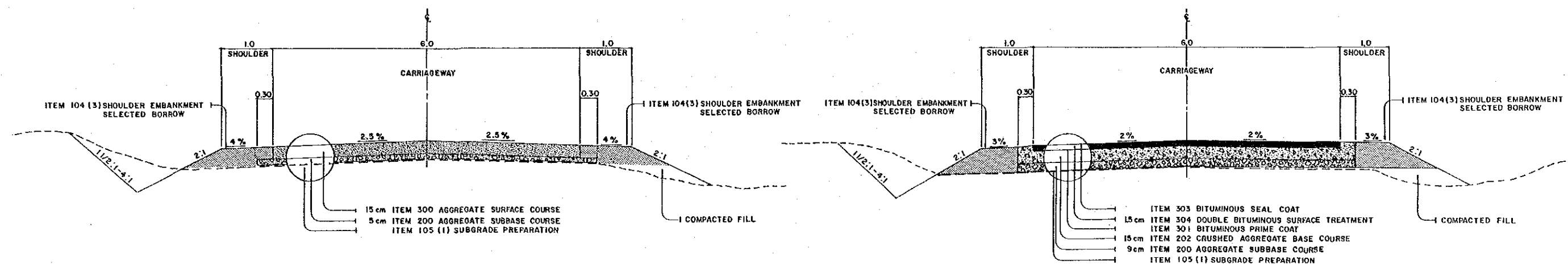
LEGEND

A	- PARAMETER	m	- METER
AC	- ASPHALT CONCRETE	MAX	- MAXIMUM
AH	- AHEAD STATIONING	MFL	- MAXIMUM FLOOD LEVEL
AZIM	- AZIMUTH	MIN	- MINIMUM
PC	- POINT OF CURVATURE (SIMPLE CURVE)	MM	- MILLIMETER
BEG.	- BEGINNING	MO	- MIDDLE ORDINATE
BH	- BORE HOLE	MOC	- METER ON CENTER
BIT.	- BITUMINOUS	DPWH	- DEPARTMENT OF PUBLIC WORKS & HIGHWAYS
BK	- BACK STATIONING	t	- METRIC TON
BM	- BENCH MARK	N	- NORTHINGS
BMP	- BITUMINOUS MACADAM PAVEMENT	NC	- NORMAL CROWN
BO	- BARRIO	NO	- NUMBER
BP	- BALANCE POINT	OH	- OVERHAUL
BST	- BITUMINOUS SURFACE TREATMENT	OFL	- ORDINARY FLOOD LEVEL
BTC	- BEGINNING OF SPIRAL	OWL	- ORDINARY WATER LEVEL
CB	- CATCHBASIN	P	- OFFSET BETWEEN CIRCULAR CURVE AND MAIN TANGENT NECESSARY FOR INSPECTION OF SPIRAL
m ³	- CUBIC METER	PCCP	- PORTLAND CEMENT CONCRETE PAVEMENT
D	- DEGREE OF CIRCULAR CURVE	PI	- HORIZONTAL POINT OF INTERSECTION
DBST	- DOUBLE BITUMINOUS SURFACE TREATMENT	PR	- PROJECT ROADS
DIA	- DIAMETER	PSC	- PRESTRESSED CONCRETE
DIST.	- DISTANCE	PVC	- BEGINNING OF VERTICAL CURVE
E	- EASTING	PVI	- VERTICAL POINT OF INTERSECTION
e	- SUPERELEVATION	PVT	- END OF VERTICAL CURVE
Eq.	- EACH	R	- RADIUS OF CIRCULAR CURVE
PT	- POINT OF TANGENCY (SIMPLE CURVE)	RCBC	- REINFORCED CONCRETE BOX CULVERT
ef	- FULL SUPERELEVATION	RCDG	- REINFORCED CONCRETE DECK GIRDER
ELEV.	- ELEVATION	RCPC	- REINFORCED CONCRETE PIPE CULVERT
EMB	- EMBANKMENT	ROW	- RIGHT OF WAY
EQ	- EQUATION	RP	- REFERENCE POINT
Es	- TOTAL EXTERNAL FROM MAIN PI TO CIRCULAR CURVE	RL	- RIGHT
ETC	- END OF SPIRAL	m ²	- SQUARE METER
EXC	- EXCAVATION	SL	- SLOPE
FH	- FREE HAUL	STA.	- STATION
G	- GRADE IN PERCENT	STD.	- STANDARD
K	- DISTANCE BTC OR ETC TO POINT OF "THROW"	TBM	- TEMPORARY BENCH MARK
kg	- KILOGRAM	Ts	- TOTAL TANGENT DISTANCE FROM BTC OR ETC TO MAIN PI
km	- KILOMETER	VAR	- VARIABLE
Lc	- LENGTH OF CIRCULAR CURVE	W	- WIDENING
LM	- LINEAR METER	WBH	- WATER BORE HOLE
LS	- LENGTH OF SPIRAL	X,Y	- COORDINATES OF BCC OR ECC WITH RESPECT TO MAIN TANGENT
LI.	- LEFT	Δ	- CENTRAL ANGLE
LT, ST	- LONG TANGENT AND SHORT TANGENT OF SPIRAL	∠s	- CENTRAL ANGLE OF SPIRAL, "SPIRAL ANGLE"
LVC	- LENGTH OF VERTICAL CURVE	CC	- CLOTHOID CURVE
IL	- INVERT LEVEL	SC	- SIMPLE CURVE

																		FEASIBILITY STUDY ON THE RURAL ROAD NETWORK DEVELOPMENT PROJECT			
																		SCALE	SUMMARY OF QUANTITIES		DRAWING NO.
																		NONE			06
I T E M		SECTION NO. 1 Carriageway Width = 6.00 m Length = 4 x 200 = 800 m				SECTION NO. 2 Carriageway Width = 6.00 m Length = 4 x 200 = 800 m				SECTION NO. 3 Carriageway Width = 6.00 m Length = 4 x 200 = 800 m				SECTION NO. 4 Carriageway Width = 6.00 m Length = 4 x 200 = 800 m				SECTION NO. 1-4	SECTION NO. 5 CW Width = 6.70m Length = 2 x 200 = 400 m	SECTION NO. 5	Grand Total
		GRAVEL	SBST	DBST	BMP	GRAVEL	SBST	DBST	BMP	DBST	BMP	HAC - 1	HAC - 2	DBST	BMP	HAC - 1	HAC - 2	TOTAL	HAC - 2	PCC	TOTAL
102 (2) Surplus Common Excavation	m ³	1,544.80				1,480.20												3,025.00			3,025.00
102 (5) Surplus Excavation of Existing Pavement for Section NO.3 and 4	m ³									1,081.80				737.00				1,818.80			1,818.80
102 (6) Surplus Excavation of Existing Pavement for Section NO. 5	m ³																		522.50		522.50
104 (3) Selected Borrow for Topping, Case 2	m ³	300.40				295.20												595.60			595.60
104 (5) Embankment for Shoulder with Materials obtained from Excavation of Existing Pavement	m ³									382.00				588.30				970.70	458.30		1,429.00
108 Re-shaping of Existing Shoulder	m ³									241.00				96.00				337.00			337.00
105 (1) Subgrade Preparation (Common Material)	m ²	1,320.00	1,348.83	1,348.83	1,320.00	1,341.91	1,375.65	1,394.29	1,320.00	1,320.00	1,320.00	1,361.76	1,361.76	1,320.00	1,320	1,320.00	1,429.02	21,522.05	1,460.00	1,460.00	24,442.05
200 Aggregate Subbase Course	m ³	66.00	108.51	121.39	66.00	107.35	165.08	195.20	132.00	396.00	343.20	108.94	81.71	171.60	211.20	303.60	300.09	2,877.87	277.40	292.00	3,447.27
202 Crushed Aggregate Base Course	m ³		202.92	204.12	204.00		206.95	210.94	204.00	198.60	204.00	168.21	169.41	199.80	204.00	202.80	220.35	2,800.10	225.00		3,025.10
300 (2) Crushed Aggregate Surface Course	m ³	180.00				183.28												363.28			363.28
301 (1) Bituminous Prime Coat, MC-70 Cut-back Asphalt	Tonne		1.23	1.23	1.20		1.26	1.27	1.20	1.20	1.20	1.24	1.24	1.20	1.20	1.20	1.31	17.18	1.34		18.52
303 (1) Bituminous Seal Coat, Cover Aggregate, Type 2	Tonne			7.37				7.65		7.20				7.20				29.42			29.42
303 (2) Bituminous Seal Coat, MC-800 Cut-back Asphalt	Tonne			0.98				1.02		0.96				0.96				3.92			3.92
304 (1) a Bituminous Surface Treatment Cover Aggregate Grading-A	Tonne			33.42				34.66		32.64				32.64				133.36			133.36
304 (1) b Bituminous Surface Treatment Cover Aggregate Grading-B	Tonne		16.71	13.37			17.08	13.86		13.06				13.06				87.14			87.14
304 (4) Bituminous Surface Treatment MC-800 Cut-back Asphalt	Tonne		1.67	3.61			1.71	3.75		3.53				3.53				17.80			17.80
305 (1) Bituminous Penetration Macadam Pavement, Aggregate	Tonne				146.40				146.40		146.40				146.40			585.60			585.60
305 (3) Bituminous Penetration Macadam Pavement, MC-800 Cut-back Asphalt	Tonne				8.64				8.64		8.64				8.64			34.56			34.56
310 Bituminous Concrete Surface Course, Hot-Laid	Tonne											124.18	155.22			120.00	163.63	563.03	167.50		730.53
311 (1) Portland Cement Concrete Pavement, Plain (t=18 cm)	m ²																		1,340.00	1,340.00	1,340.00
504 Grouted Riprap (Side Ditch)	m									1280.00								1280.00			1,280.00
SP-1 Laboratory Apparatus	Lump Sum																	1		1	
SP-3 Laboratory Staff	Lump Sum																	1		1	
SP-6 Vehicles for the Engineer's Staff	Lump Sum																	1		1	
SP-7 Informatory Signs	Each																	8		2	
SP-8 Photograph	Each																	684		60	

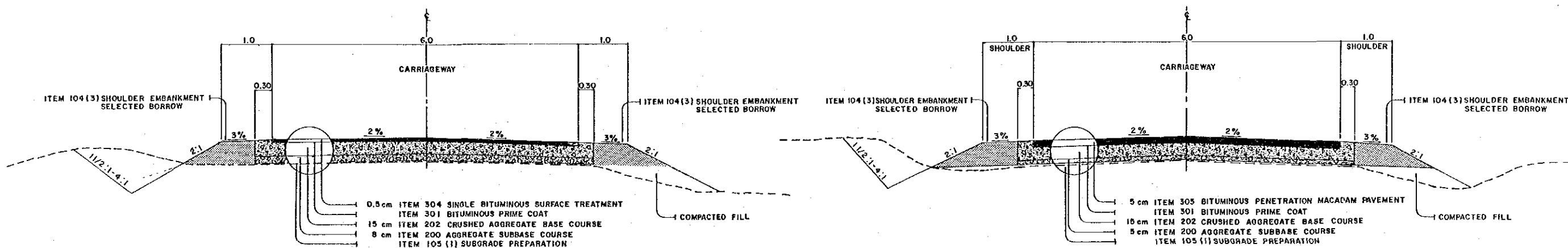
FEASIBILITY STUDY ON THE RURAL ROAD NETWORK
DEVELOPMENT PROJECT

SCALE	EXPERIMENTAL PAVEMENT CONSTRUCTION SECTION NO. I	DRAWING NO.
NOT TO SCALE	TYPICAL ROADWAY SECTION	07



MODEL No. 1 GRAVEL
STA. 0 + 600 - STA. 0 + 800

MODEL No. 3 DOUBLE BITUMINOUS SURFACE TREATMENT
STA. 0 + 200 - STA. 0 + 400

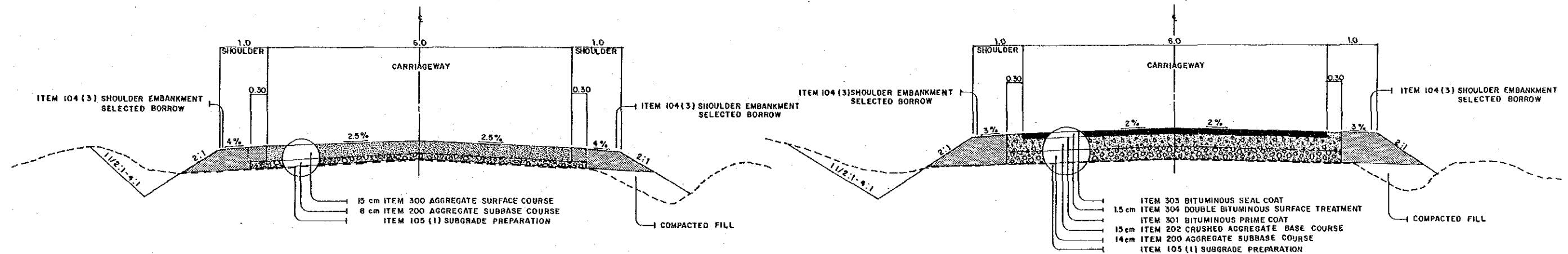


MODEL No. 2 SINGLE BITUMINOUS SURFACE TREATMENT
STA. 0 + 400 - STA. 0 + 600

MODEL No. 4 BITUMINOUS PENETRATION MACADAM
STA. 0 + 000 - STA. 0 + 200

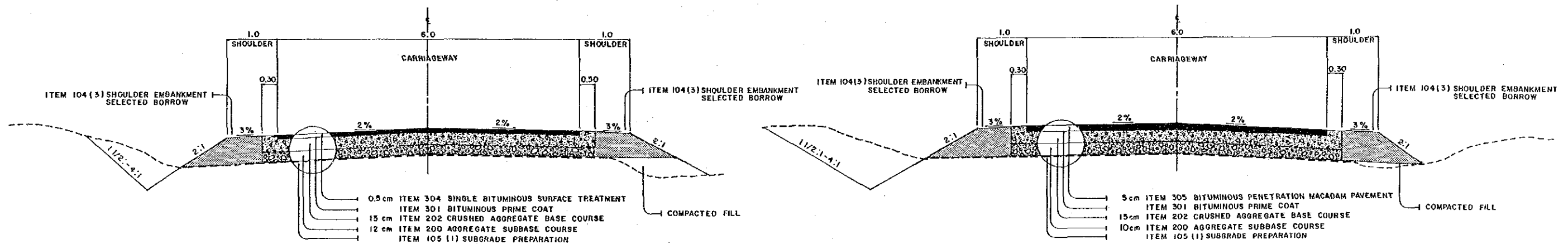
FEASIBILITY STUDY ON THE RURAL ROAD NETWORK
DEVELOPMENT PROJECT

SCALE	EXPERIMENTAL PAVEMENT CONSTRUCTION SECTION NO. 2	DRAWING NO.
NOT TO SCALE	TYPICAL ROADWAY SECTION	08



MODEL No. 5 GRAVEL
STA. 0 + 600 - STA. 0 + 800

MODEL No. 7 DOUBLE BITUMINOUS SURFACE TREATMENT
STA. 0 + 200 - STA. 0 + 400



MODEL No. 6 SINGLE BITUMINOUS SURFACE TREATMENT
STA. 0 + 400 - STA. 0 + 600

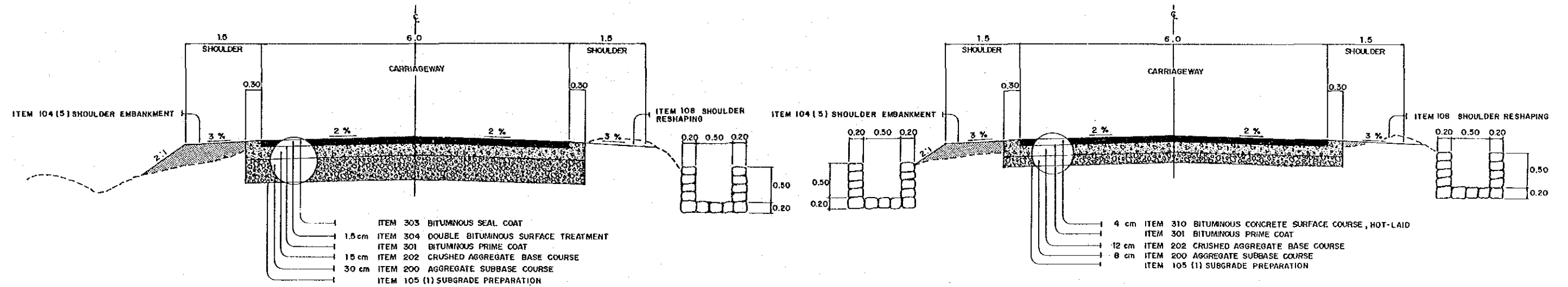
MODEL No. 8 BITUMINOUS PENETRATION MACADAM
STA. 0 + 000 - STA. 0 + 200

ITEM 108 SHOULDER RESHAPING

STATION LIMIT	Ave. Width (m)	Width (m)	
		Left	Right
STA. 0+110 - STA. 0+130	2.00	-	-
0+130 - 0+150	-	-	1.70
0+170 - 0+190	1.50	-	0.75
0+210 - 0+230	1.10	-	-
0+230 - 0+250	0.30	-	-
0+550 - 0+570	1.00	-	-
0+570 - 0+690	-	-	1.50
0+690 - 0+710	-	-	1.50
0+730 - 0+750	1.70	-	-

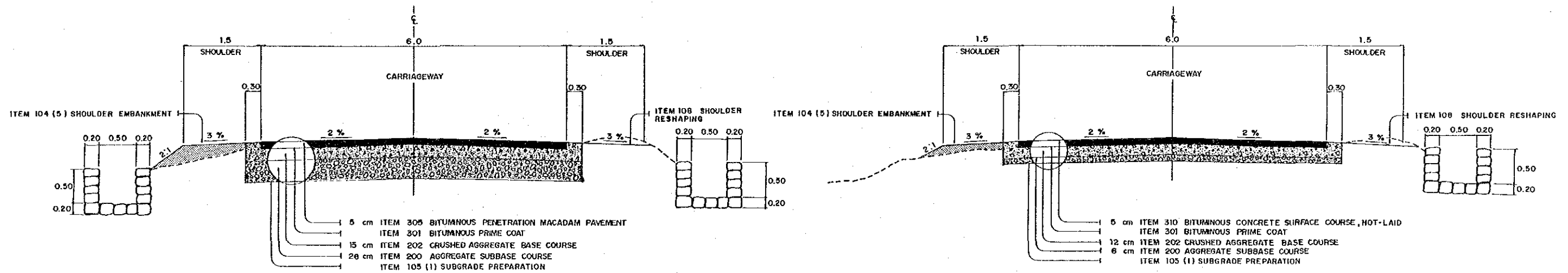
FEASIBILITY STUDY ON THE RURAL ROAD NETWORK
DEVELOPMENT PROJECT

SCALE	EXPERIMENTAL PAVEMENT CONSTRUCTION SECTION NO. 3	DRAWING NO.
NOT TO SCALE	TYPICAL ROADWAY SECTION	09



MODEL No. 9 DOUBLE BITUMINOUS SURFACE TREATMENT
STA. 0+000 - STA. 0+200

MODEL No. 11 ASPHALT CONCRETE (4 cm)
STA. 0+400 - STA. 0+600



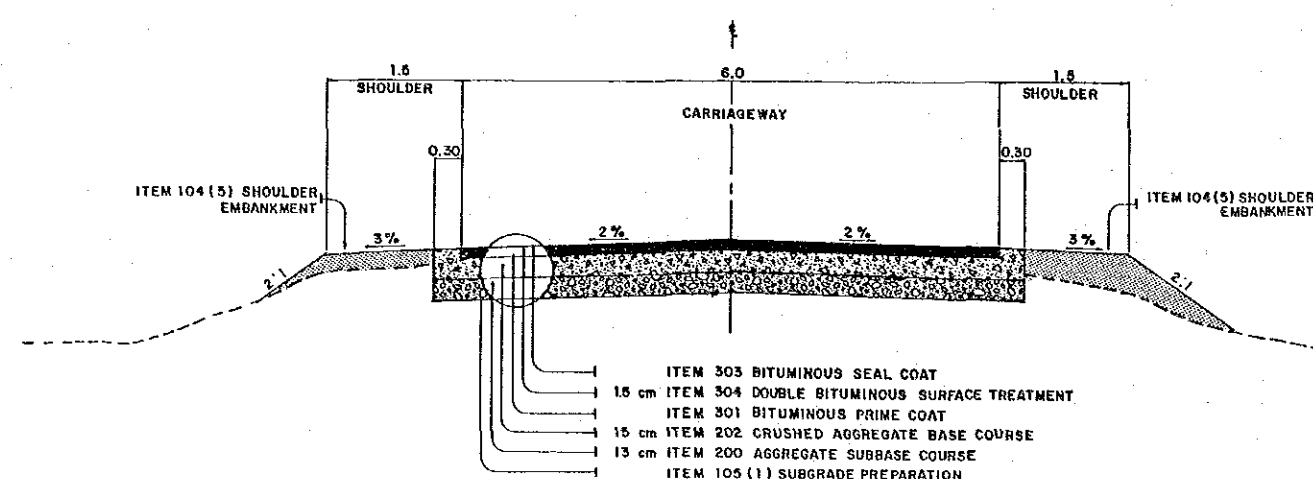
MODEL No. 10 BITUMINOUS PENETRATION MACADAM
STA. 0+200 - STA. 0+400

MODEL No. 12 ASPHALT CONCRETE (5 cm)
STA. 0+600 - STA. 0+800

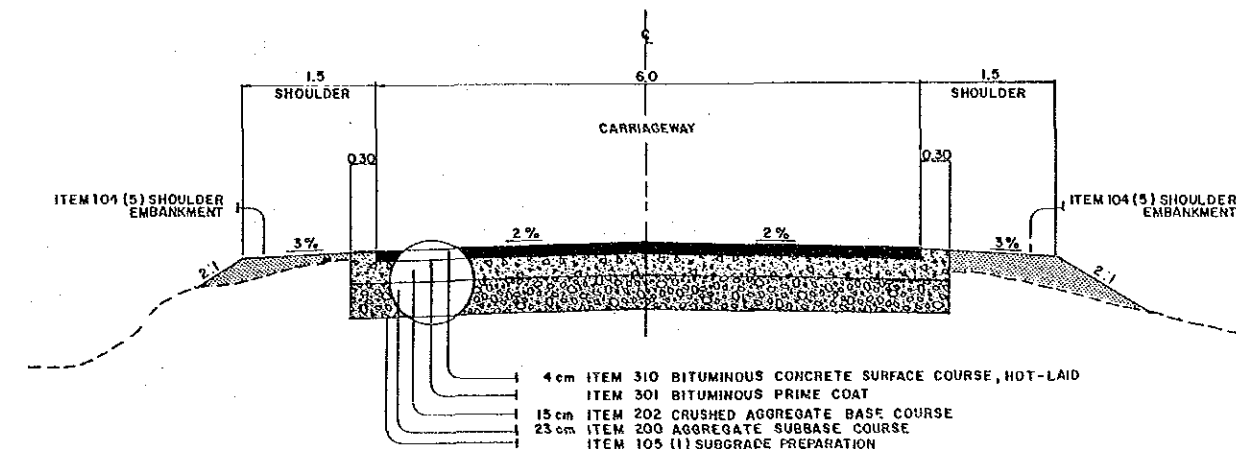
ITEM 108 SHOULDER RESHAPPING			
STATION LIMIT		Ave. Width (m)	
		Left	Right
STA. 0+230	- STA. 0+250	-	0.60
0+310	- 0+330	1.00	-
0+650	- 0+670	1.50	-
0+750	- 0+770	1.50	-
0+770	- 0+790	1.50	-

FEASIBILITY STUDY ON THE RURAL ROAD NETWORK
DEVELOPMENT PROJECT

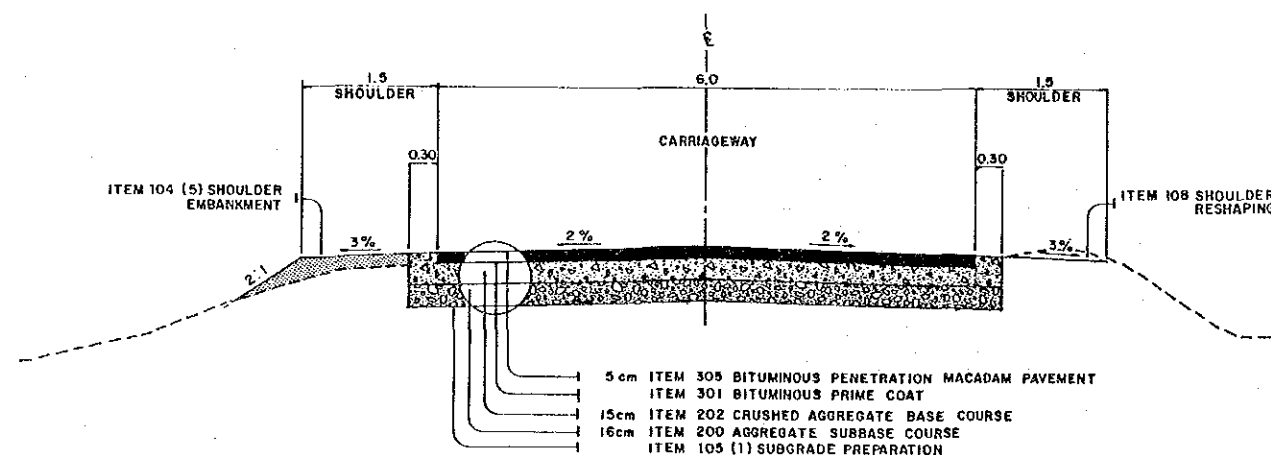
SCALE	EXPERIMENTAL PAVEMENT CONSTRUCTION SECTION NO. 4	DRAWING NO.
NOT TO SCALE	TYPICAL ROADWAY SECTION	10



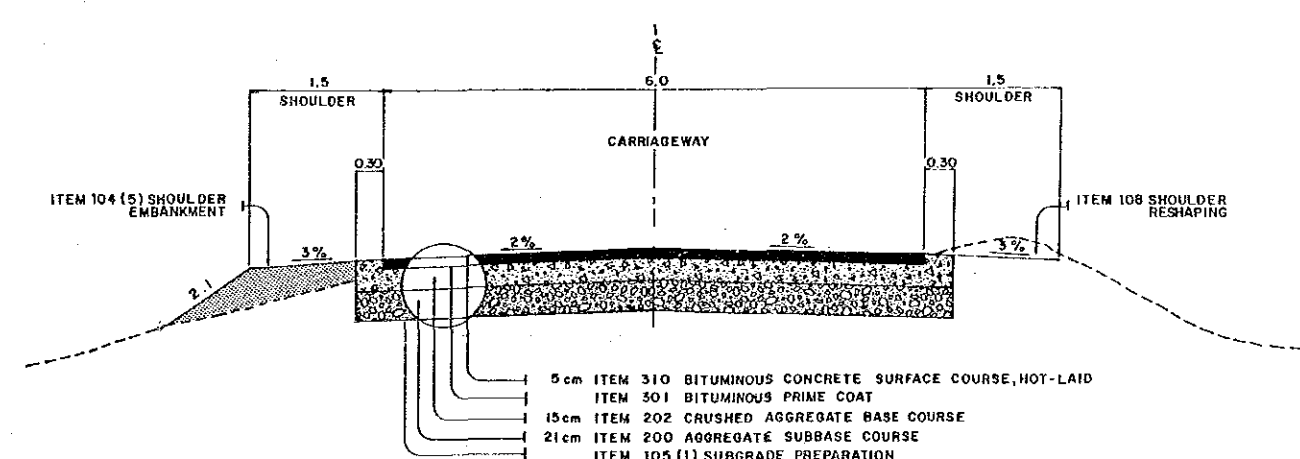
MODEL No. 13 DOUBLE BITUMINOUS SURFACE TREATMENT
STA. 0+000 - STA. 0+200



MODEL No. 15 ASPHALT CONCRETE (4 cm)
STA. 0+400 - STA. 0+600



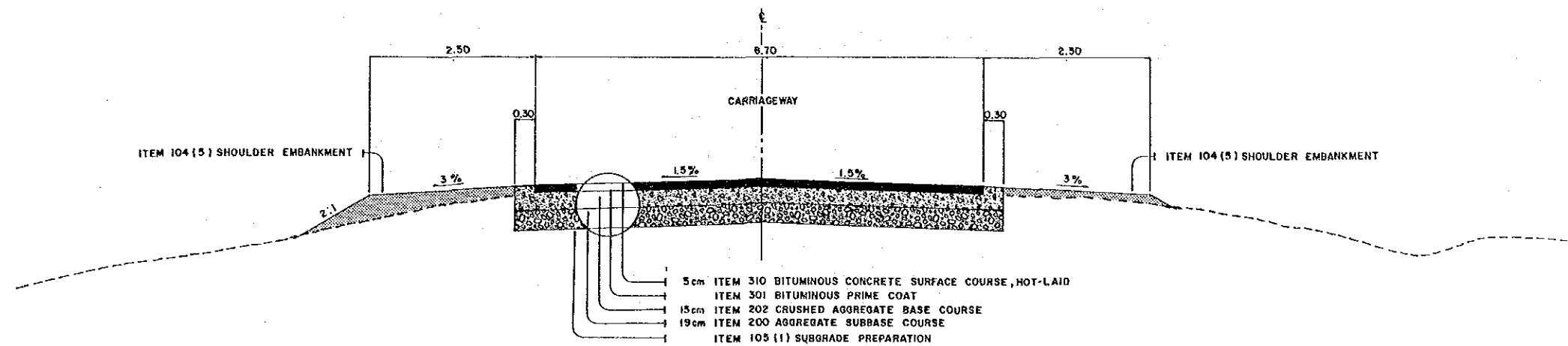
MODEL No. 14 BITUMINOUS PENETRATION MACADAM
STA. 0+200 - STA. 0+400



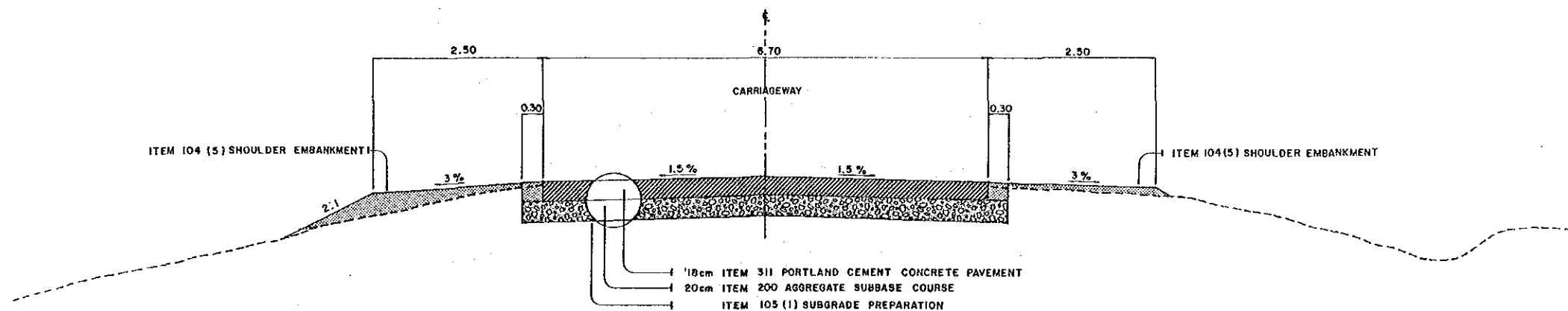
MODEL No. 16 ASPHALT CONCRETE (5 cm)
STA. 0+600 - STA. 0+800

FEASIBILITY STUDY ON THE RURAL ROAD NETWORK
DEVELOPMENT PROJECT

SCALE	EXPERIMENTAL PAVEMENT CONSTRUCTION SECTION NO. 5	DRAWING NO
NOT TO SCALE	TYPICAL ROADWAY SECTION	11



MODEL No. 17 ASPHALT CONCRETE
STA. 0 + 200 - STA. 0 + 400

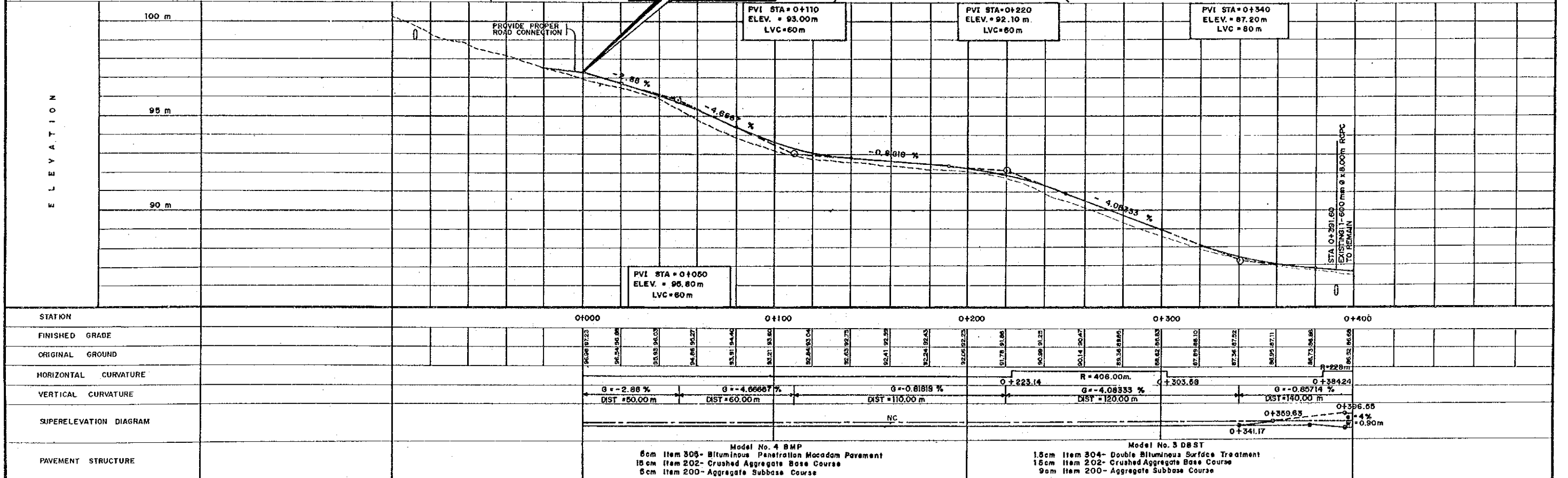
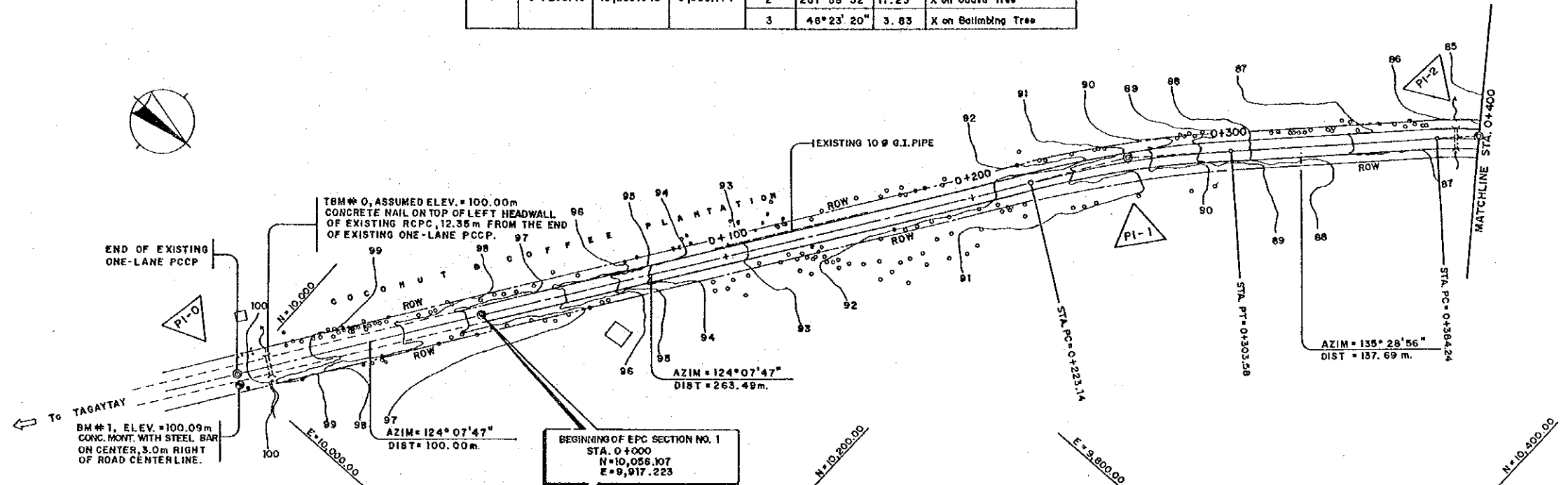


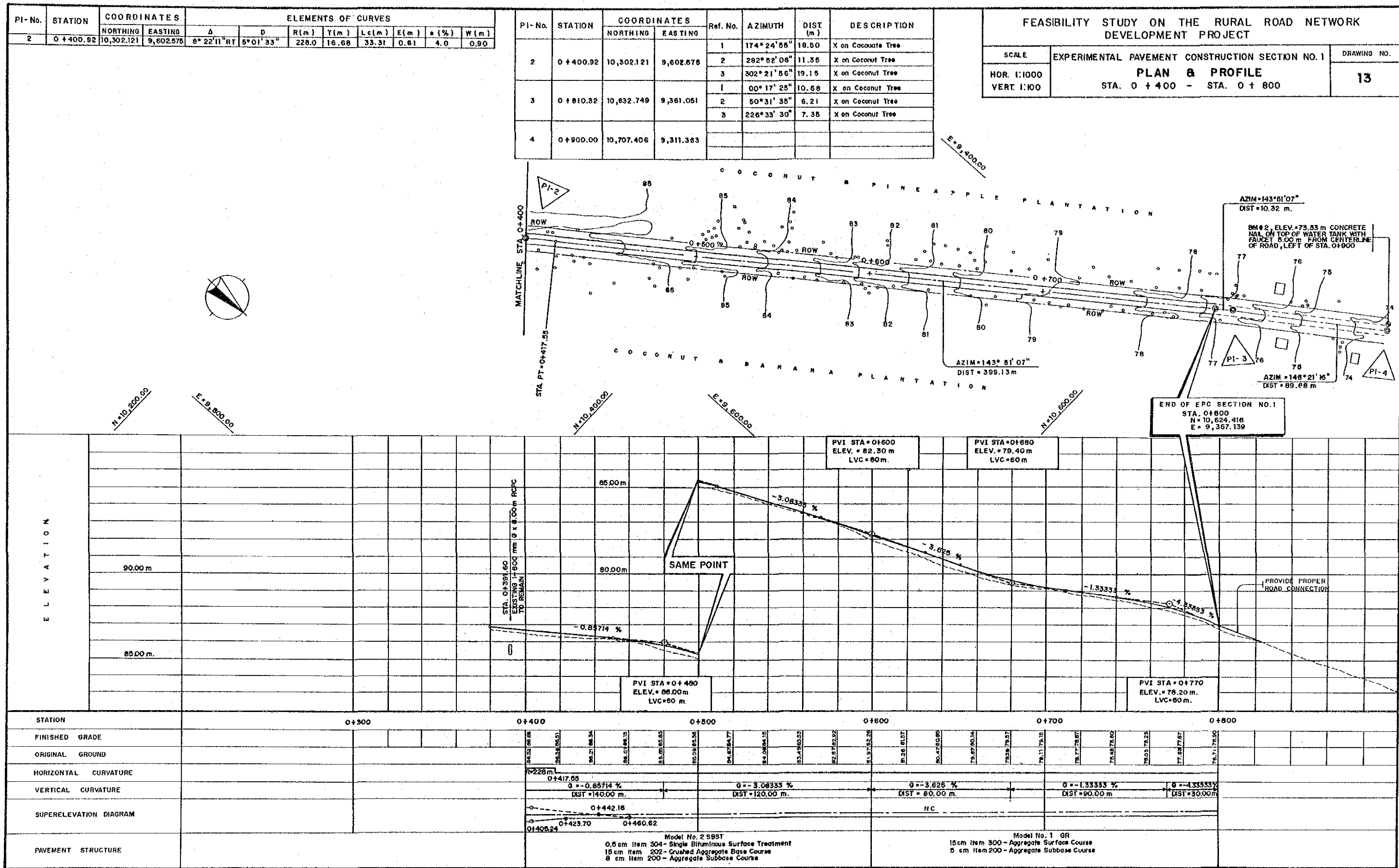
MODEL No. 18 PORTLAND CEMENT CONCRETE
STA. 0 + 000 - STA. 0 + 200

PI-No.	STATION	COORDINATES		ELEMENTS OF CURVES							
		NORTHING	EASTING	A	D	R(m)	T(m)	Lc(m)	E(m)	e(%)	W(m)
1	0+263.49	10,203.943	9,899.114	11°21'09" RT	2°49'21"	406.0	40.35	80.44	2.00	---	---

PI-No.	STATION	COORDINATES		Ref. No.	AZIMUTH	DIST. (m)	DESCRIPTION
		NORTHING	EASTING				
0		10,000.000	10,000.000	1	10°18'20"	6.83	X on Coconut Tree
				2	80°08'59"	9.49	X on Coconut Tree
				3	222°43'08"	14.40	X on Coconut Tree
1	0+263.49	10,203.943	9,899.114	1	212°28'40"	6.90	X on Annaple Tree
				2	267°58'32"	11.23	X on Guava Tree
				3	46°23'20"	3.83	X on Ballimbing Tree

FEASIBILITY STUDY ON THE RURAL ROAD NETWORK DEVELOPMENT PROJECT			
SCALE	EXPERIMENTAL PAVEMENT CONSTRUCTION SECTION NO. 1	DRAWING NO.	
HOR. 1:1000 VERT. 1:100	PLAN & PROFILE STA. 0+000 - STA. 0+400	12	





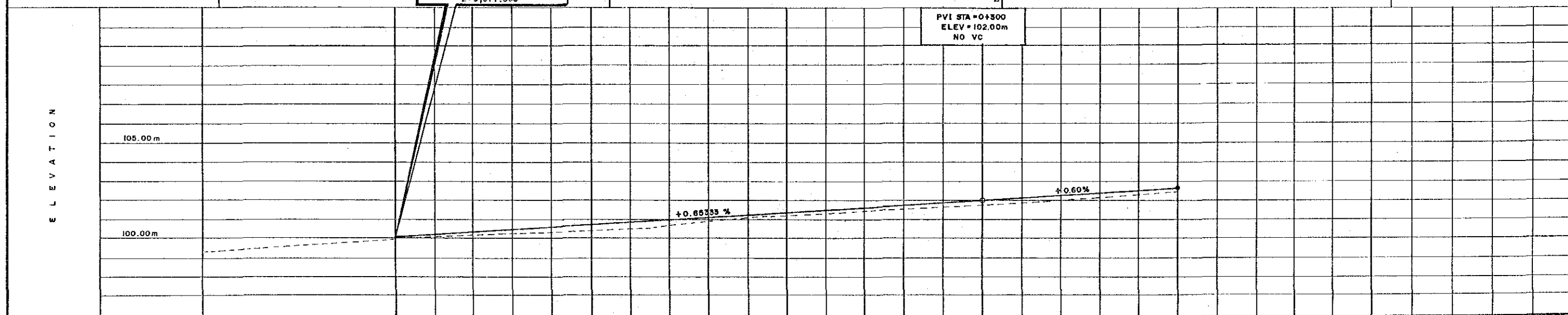
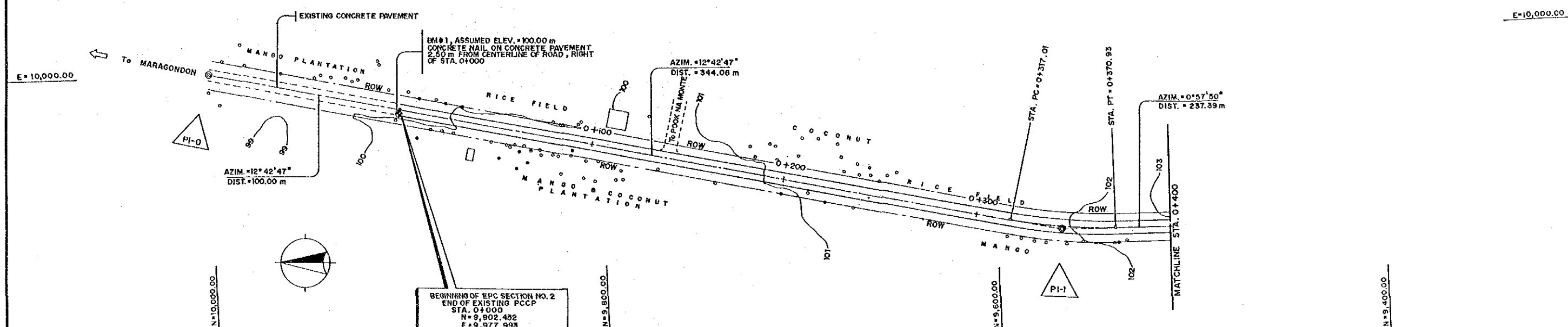
PI NO.	STATION	COORDINATES		ELEMENTS OF CURVE							
		NORTHING	EASTING	Δ	D	R (m)	T (m)	Lc (m)	E (m)	e (%)	W (m)

1	0+344.06	9,566.826	9,902.276	11°44'57"LT	4°21'26"	263.00	27.05	83.92	1.39	3.30	0.90
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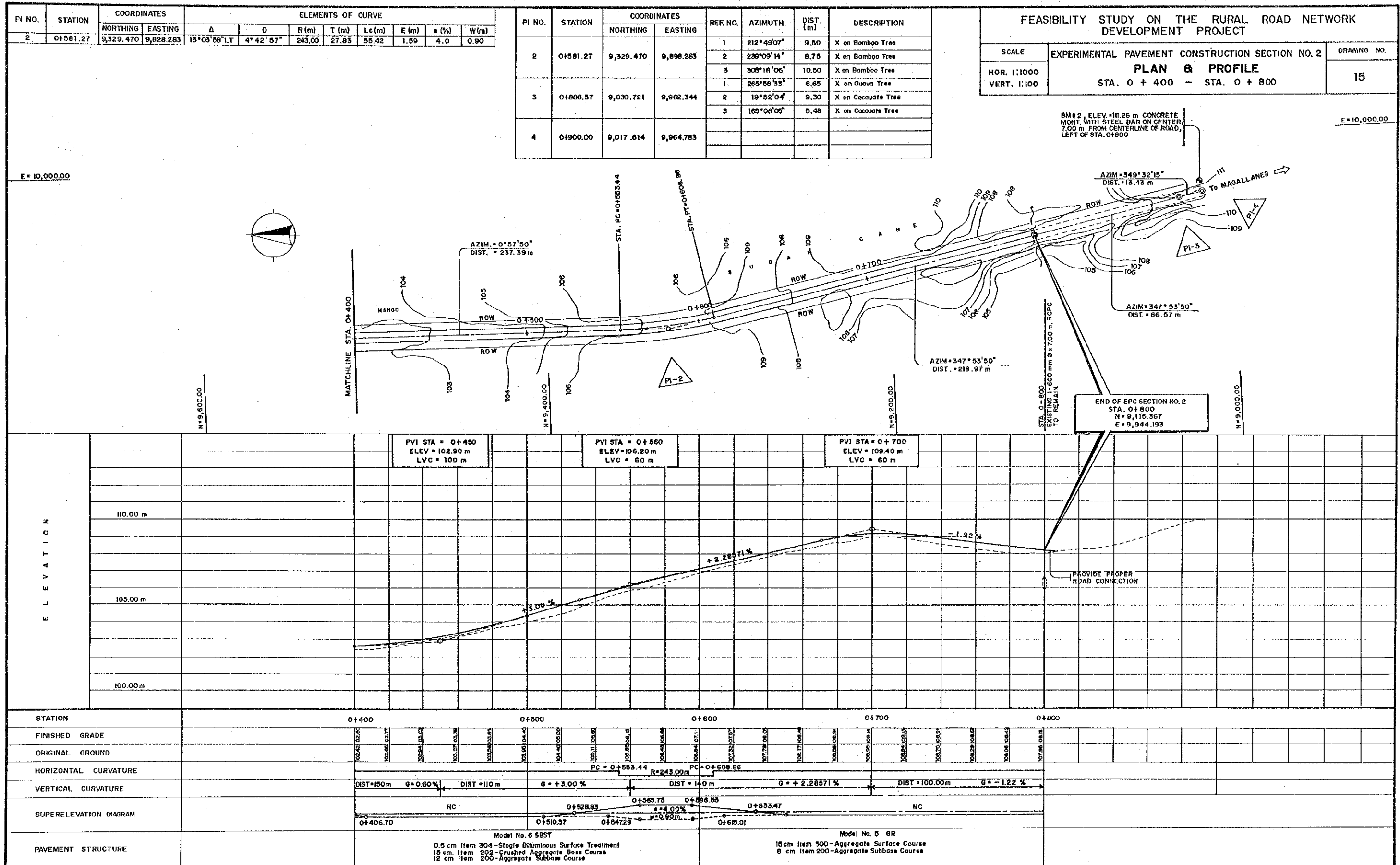
PI NO.	STATION	COORDINATES		REF NO.	AZIMUTH	DIST. (m)	DESCRIPTION
		NORTHING	EASTING				

0	-	10,000.00	10,000.00	1	88°54'38"	9.40	X on Santol Tree
				2	140°40'48"	6.80	X on Mabelo Tree
				3	308°59'54"	7.63	X on Mango Tree
1	0+344.06	9,566.826	9,902.276	1	27°29'06"	15.85	X on Mango Tree
				2	73°48'20"	6.85	X on Mango Tree
				3	155°04'20"	12.07	X on Duhol Tree

FEASIBILITY STUDY ON THE RURAL ROAD NETWORK DEVELOPMENT PROJECT		
SCALE	EXPERIMENTAL PAVEMENT CONSTRUCTION SECTION NO. 2	DRAWING NO.
HOR. 1:1000 VERT. 1:100	PLAN & PROFILE STA. 0 + 000 ~ STA. 0 + 400	14



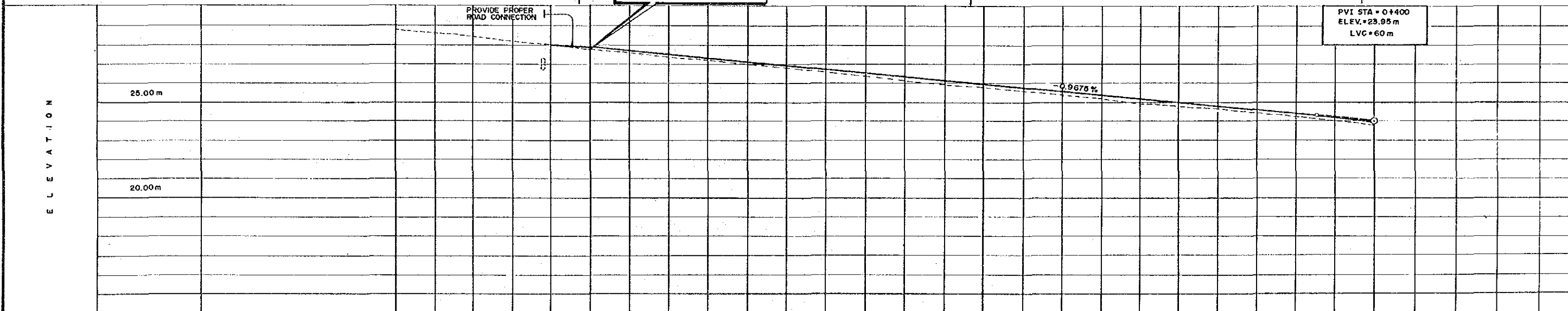
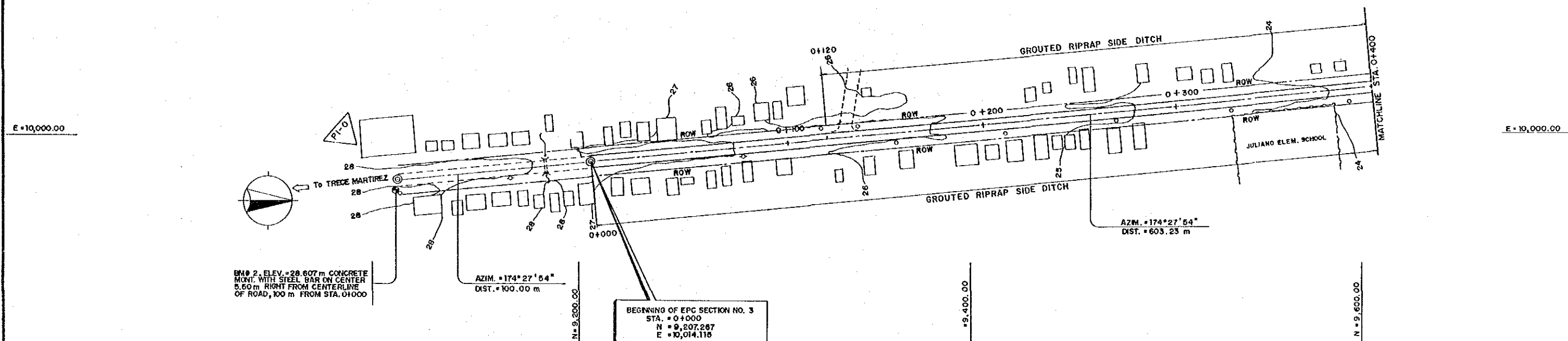
STATION	0+000	0+100	0+200	0+300	0+400
FINISHED GRADE	100.00	100.00	100.00	100.00	100.00
ORIGINAL GROUND	100.00	100.00	100.00	100.00	100.00
HORIZONTAL CURVATURE					
VERTICAL CURVATURE					
SUPERELEVATION DIAGRAM					
PAVEMENT STRUCTURE	Model No. 8 BMP 5 cm Item 305 - Bituminous Penetration Macadam Pavement 15 cm Item 202 - Crushed Aggregate Base Course 10 cm Item 200 - Aggregate Subbase Course		Model No. 7 DBST 1.5 cm Item 304 - Double Bituminous Surface Treatment 15 cm Item 202 - Crushed Aggregate Base Course 14 cm Item 200 - Aggregate Subbase Course		



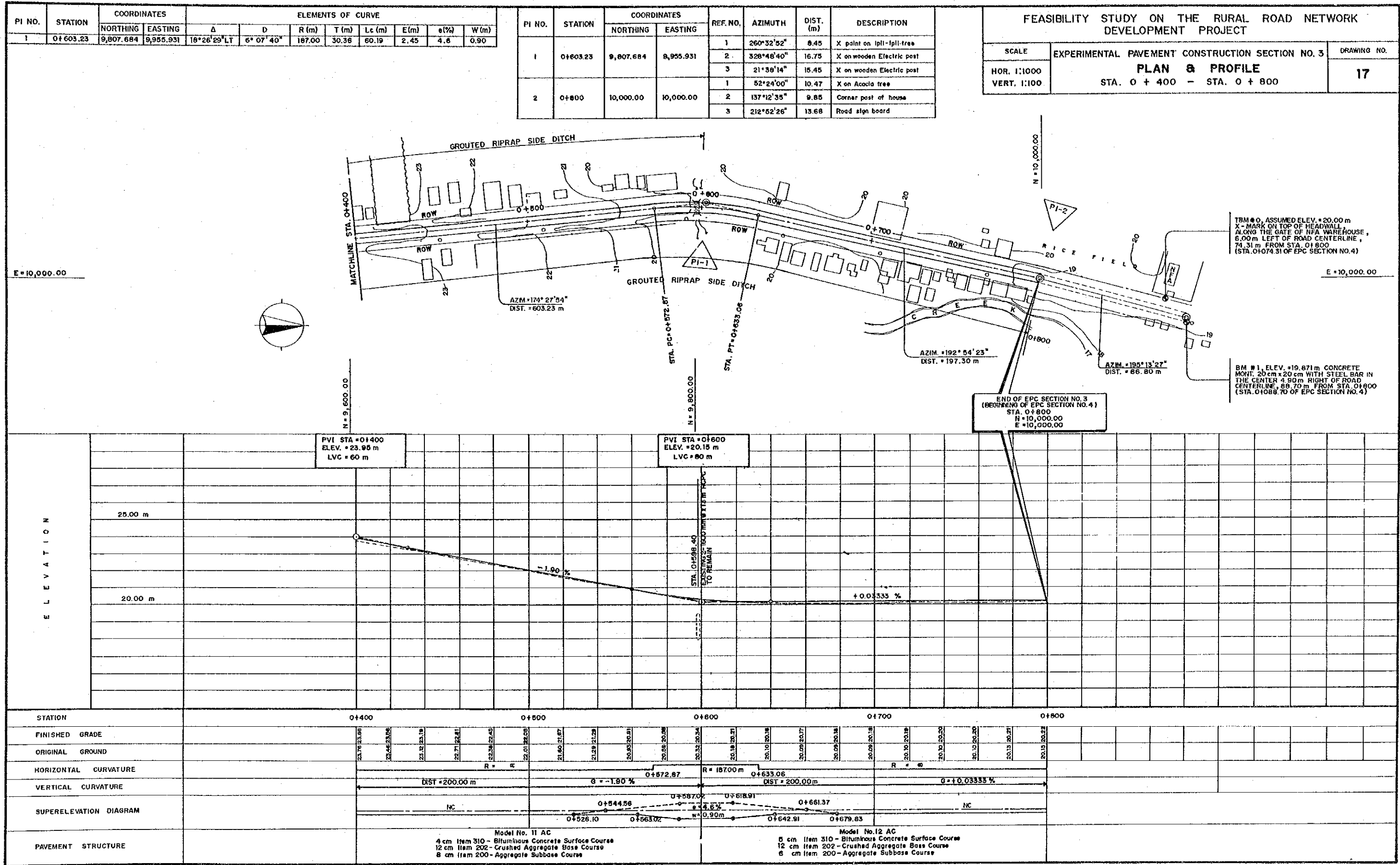
PI.NO.	STATION	COORDINATES		REF. NO.	AZIMUTH	DIST. (m)	DESCRIPTION
		NORTHING	EASTING				
0	-	9,107.733	10,023.780	1	283°30'45"	6.48	Center of BM#2
				2	301°57'30"	12.90	Corner post of store
				3	143°44'36"	8.95	Center of Tallay tree

FEASIBILITY STUDY ON THE RURAL ROAD NETWORK DEVELOPMENT PROJECT

SCALE	EXPERIMENTAL PAVEMENT CONSTRUCTION SECTION NO. 3	DRAWING NO.
HOR. 1:1000 VERT. 1:100	PLAN & PROFILE STA. 0 + 000 - STA. 0 + 400	16



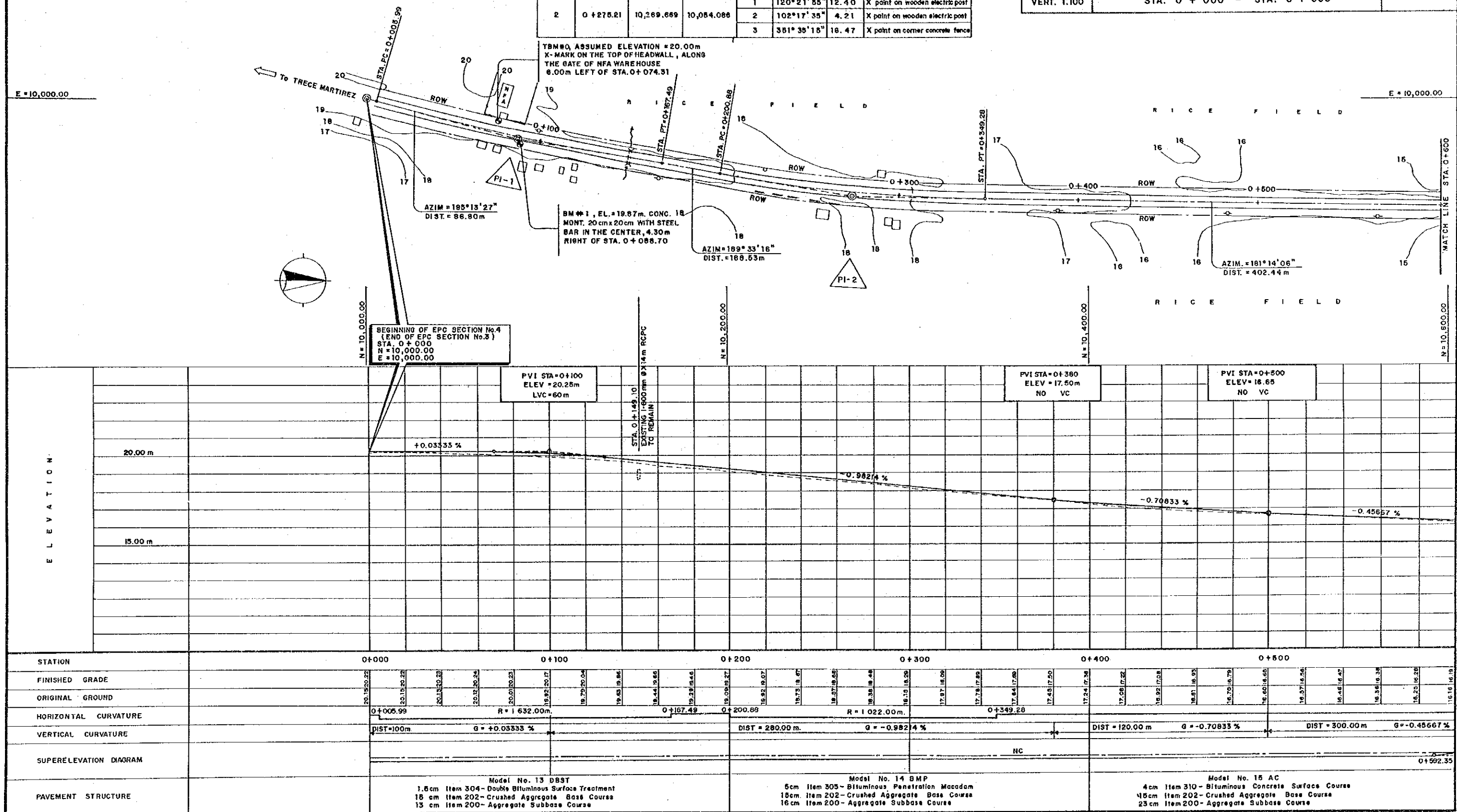
STATION	0+000	0+100	0+200	0+300	0+400
FINISHED GRADE	23.77	23.81	23.84	23.87	23.95
ORIGINAL GROUND	23.77	23.81	23.84	23.87	23.95
HORIZONTAL CURVATURE	DIST=400.00 m.				
VERTICAL CURVATURE	G = -0.9675 %				
SUPERELEVATION DIAGRAM	NC				
PAVEMENT STRUCTURE	<p>Model No. 9 DBST</p> <p>1.5 cm Item 304 - Double Bituminous Surface Treatment</p> <p>15 cm Item 202 - Crushed Aggregate Base Course</p> <p>30 cm Item 200 - Aggregate Subbase Course</p>				



PI-No.	STATION	COORDINATES		ELEMENTS OF CURVES							
		NORTHING	EASTING	Δ	D	R(m)	T(m)	Lc(m)	E(m)	e (%)	W(m)
1	0 + 086.80	10,083.784	10,022.793	5° 40' 11" LT	0° 42' 08"	1,632.0	80.81	161.50	2.0	---	---
2	0 + 275.21	10,269.669	10,084.086	6° 19' 10" LT	1° 07' 16"	1,022.0	74.33	146.40	2.7	---	---

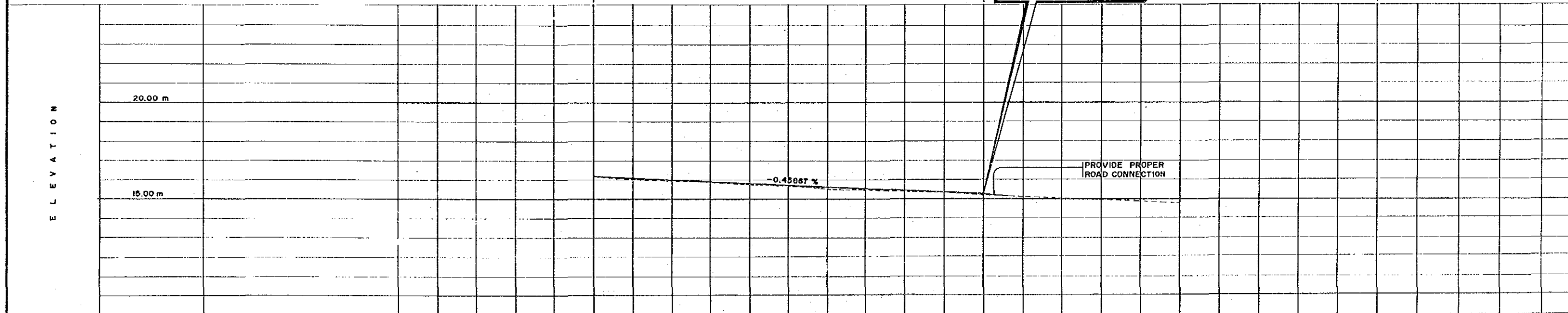
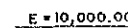
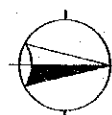
PI-No.	STATION	COORDINATES		Ref. No.	AZIMUTH	DIST. (m)	DESCRIPTION
		NORTHING	EASTING				
1	0 + 086.80	10,083.784	10,022.793	1	78° 43' 53"	11.00	Point on corner of gate post
				2	238° 36' 54"	2.75	Point on wooden electric post
				3	334° 34' 56"	12.15	Point on corner post of house
2	0 + 275.21	10,269.669	10,084.086	1	120° 21' 55"	12.40	X point on wooden electric post
				2	102° 17' 35"	4.21	X point on wooden electric post
				3	381° 35' 16"	16.47	X point on corner concrete fence

FEASIBILITY STUDY ON THE RURAL ROAD NETWORK DEVELOPMENT PROJECT			
SCALE	EXPERIMENTAL PAVEMENT CONSTRUCTION SECTION NO. 4	DRAWING NO.	
HOR. 1:1000 VERT. 1:100	PLAN & PROFILE STA. 0 + 000 - STA. 0 + 600	18	



PI-No.	STATION	COORDINATES		Ref. No.	AZIMUTH	DIST. (m)	DESCRIPTION
		NORTHING	EASTING				
3	O + 677.39	10,672.018	10,062.760	1	70° 56' 08"	7.80	Point on Camachile tree
				2	251° 42' 21"	10.60	Point on corner post of house
				3	325° 41' 28"	4.35	Point on Tallsay tree
4	O + 900.00	10,879.035	9,975.981	1	353° 35' 30"	18.48	Point on wooden electric post
				2	22° 04' 48"	7.15	Point on Ipil-Ipil tree
				3	60° 12' 35"	13.41	Point on post of house

E = 10,000.00



STATION		0+600	0+700	0+800
FINISHED GRADE				
ORIGINAL GROUND				
HORIZONTAL CURVATURE				
VERTICAL CURVATURE				
SUPERELEVATION DIAGRAM				
PAVEMENT STRUCTURE				

FEASIBILITY STUDY ON THE RURAL ROAD NETWORK DEVELOPMENT PROJECT

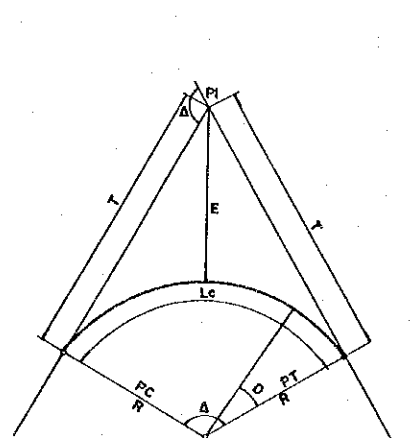
SCALE

NONE

STANDARD GEOMETRIC DESIGN

DRAWING NO.

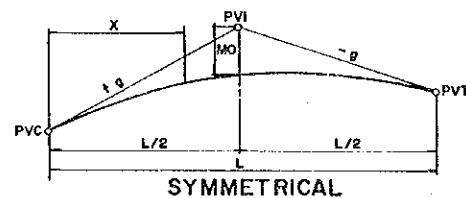
21



HORIZONTAL CURVE (CIRCULAR)

LEGEND :
 PI = POINT OF INTERSECTION
 Δ = INTERSECTION ANGLE (CENTRAL ANGLE)
 T = TANGENT DISTANCE
 R = HORIZONTAL RADIUS
 Lc = LENGTH OF CIRCULAR CURVE
 E = EXTERNAL DISTANCE
 Δ = DEGREE OF CURVE
 PC = POINT OF CURVATURE
 PT = POINT OF TANGENCY

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



SYMMETRICAL

VERTICAL PARABOLIC CURVE

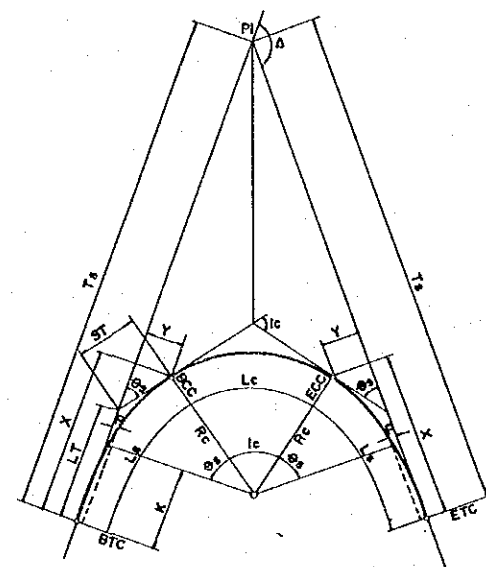
LEGEND :
 PVI = VERTICAL POINT OF INTERSECTION
 PVC = VERTICAL POINT OF CURVATURE
 PVT = VERTICAL POINT OF TANGENCY
 L = LENGTH OF VERTICAL CURVES IN METERS
 g = GRADE IN PERCENT
 MO = MIDDLE ORDINATE
 X = DISTANCE FROM PVC OR PVT TO ANY POINT OF CURVATURE
 Y = VERTICAL OFFSET IN METERS
 Δ = ALGEBRAIC DIFFERENCE OF GRADES

NOTE :
 1. NO VERTICAL CURVE IS REQUIRED WHEN THE ALGEBRAIC DIFFERENCE IS LESS THAN 0.50 %

IN ANY VERTICAL PARABOLIC CURVE SYMMETRICAL

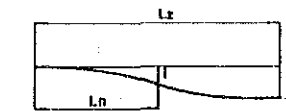
$$MO = \frac{AL}{800}$$

$$Y_x = \frac{4MOx^2}{L^2}$$



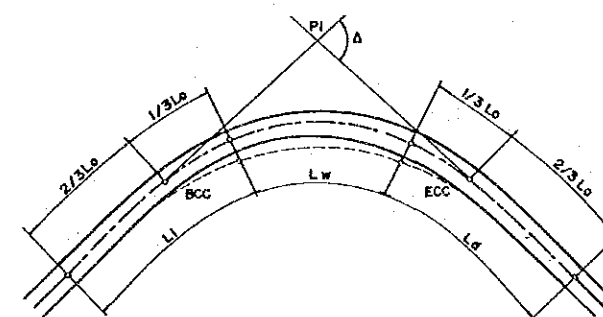
HORIZONTAL CURVE WITH TRANSITION

LEGEND :
 PI = POINT OF INTERSECTION
 Δ = INTERSECTION ANGLE
 Δs = SPIRAL ANGLE
 Ls = LENGTH OF SPIRAL
 X, Y = COORDINATES OF CS OR SC WITH RESPECT TO MAIN TANGENT
 K = LENGTHENING OF TANGENT DUE TO INTERSECTION OF SPIRAL
 P = OFFSET BETWEEN CIRCULAR CURVE AND MAIN TANGENT
 LT = LONG TANGENT OF SPIRAL
 ST = SHORT TANGENT OF SPIRAL
 Ts = TOTAL TANGENT DISTANCE
 BCC = BEGINNING OF SPIRAL CURVE
 ECC = POINT OF CHANGE FROM SPIRAL TO CIRCULAR CURVE
 ECC = POINT OF CHANGE FROM CIRCULAR CURVE TO SPIRAL
 ETC = END OF SPIRAL CURVE
 Rc = RADIUS OF CIRCULAR CURVE
 Lc = LENGTH OF CIRCULAR CURVE

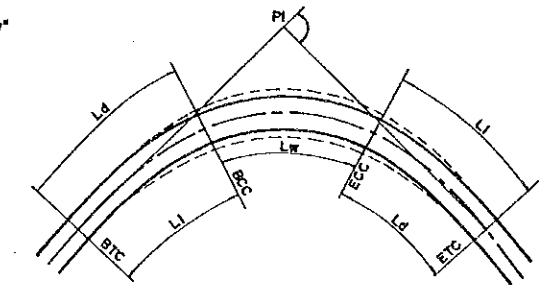


METHODS OF WIDENING

1 = KW
 FOR - SEE TABLE OR "KW"



WIDENING WHEN TRANSITIONS NOT USED



WIDENING WHEN TRANSITIONS ARE USED

L1 = TRANSITION LENGTH OF WIDENING (INCREASING SECTION)
 L2 = TRANSITION LENGTH OF WIDENING (DECREASING SECTION)
 Lw = LENGTH OF FULL WIDENING
 Lo = SUPERELEVATION RUN-OFF

WIDENING OF PAVEMENT ON CURVES

DESIGN SPEED (km/h)		50	60	70	80	90	100	50	60	70	80	90	100
D	R	NORMAL PAVEMENT WIDTH = 6.10 m						NORMAL PAVEMENT WIDTH = 6.70 m					
0.5	2291.83	0.45	0.45	0.50	0.50	0.50	0.55	0.10	0.15	0.15	0.20	0.20	0.25
1.0	1145.92	0.50	0.55	0.55	0.60	0.75	0.75	0.20	0.20	0.25	0.30	0.30	0.35
1.5	763.94	0.55	0.60	0.60	0.75	0.75	0.75	0.20	0.20	0.30	0.35	0.40	0.40
2.0	572.96	0.60	0.75	0.75	0.75	0.90	0.90	0.25	0.30	0.35	0.40	0.45	0.50
2.5	458.37	0.70	0.75	0.75	0.90	0.90	0.90	0.30	0.35	0.40	0.45	0.50	0.55
3.0	381.97	0.75	0.75	0.90	0.90	0.90	1.05	0.35	0.40	0.50	0.55	0.60	0.75
3.5	327.41	0.75	0.90	0.90	0.90	1.05	1.05	0.40	0.45	0.55	0.60	0.75	0.75
4.0	288.48	0.90	0.90	0.90	1.05	1.05		0.50	0.55	0.60	0.75		
4.5	254.65	0.90	0.90	1.05	1.05			0.55	0.60	0.75			
5.0	229.18	0.90	0.90	1.05	1.05			0.65	0.75				
6.0	190.99	0.90	1.05	1.05				0.75					
7.0	165.70	1.05	1.05	1.20				0.90					
8.0	143.24	1.05	1.20										
9.0	127.32	1.20	1.20										
10.0	114.59	1.20	1.50										
12.0	95.49	1.50	1.50										
13.0	88.15	1.50											
14.0	81.85	1.50											
15.0	76.39	1.50											
16.0	71.62	1.65											

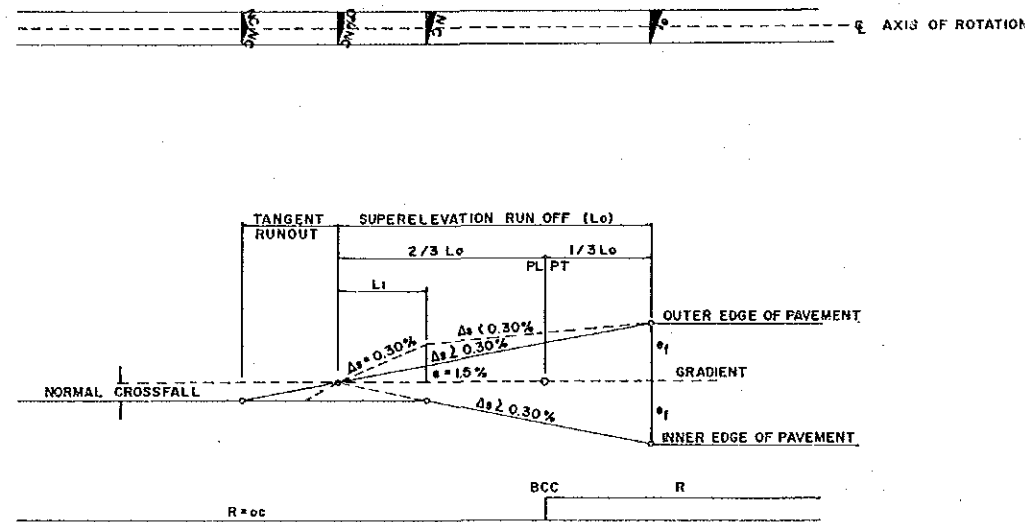
NOTES :

1. VALUES LESS THAN 0.60 m MAY BE DISREGARDED.
2. FOR 3-LANE PAVEMENTS, MULTIPLY VALUES DERIVED BY 1.6
3. FOR 4-LANE PAVEMENTS, MULTIPLY VALUES DERIVED BY 2.0
4. WHERE SEMI-TRAILERS ARE SIGNIFICANT, INCREASE TABULAR VALUES OF WIDENING BY 0.15 m FOR CURVES OF 7.0 TO 10.5 DEGREES AND BY 0.30 m FOR CURVES SHARPER THAN 10.5 DEGREES.

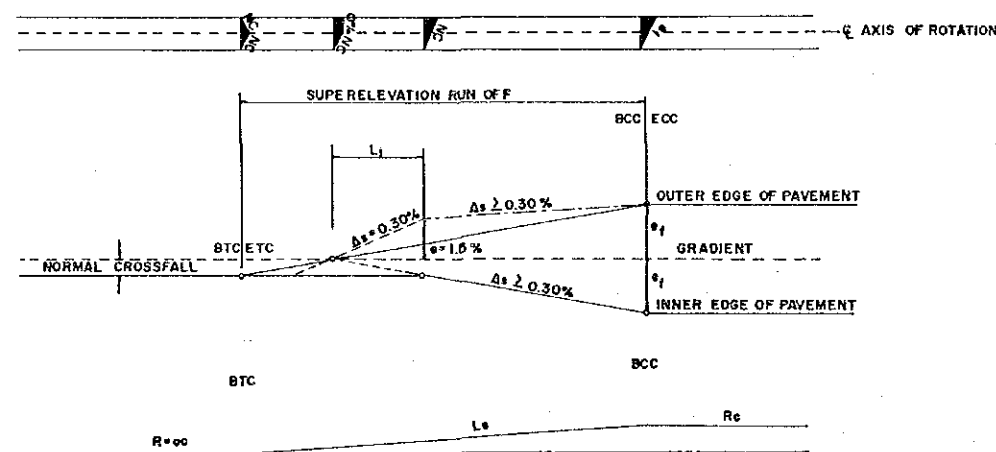
NOTES :
 1. VALUES LESS THAN 0.60m MAY BE DISREGARDED.
 2. FOR 3-LANE PAVEMENTS, MULTIPLY VALUES DERIVED BY 1.5
 3. FOR 4-LANE PAVEMENTS, MULTIPLY VALUES DERIVED BY 2.0
 4. WHERE SEM-TRAILERS ARE SIGNIFICANT, INCREASE TABULAR VALUES OF WIDENING BY 0.15m FOR CURVES OF 7.0 TO 10.5 DEGREES AND BY 0.30m FOR CURVES SHARPER THAN 10.5 DEGREES.

INCREASING			DECREASING		
Ln/Lz	K		Ln/Lz	K	
0.00	0.0000	5.0	0.00	1.0000	16.0
0.02	0.0010	5.0	0.02	0.9984	29.5
0.04	0.0020	13.5	0.04	0.9905	47.5
0.06	0.0047	15.0	0.06	0.9810	75.0
0.08	0.0077	16.0	0.08	0.9660	111.0
0.10	0.0114	21.0	0.10	0.9438	119.0
0.12	0.0158	30.0	0.12	0.9200	140.0
0.14	0.0217	41.5	0.14	0.8920	159.0
0.16	0.0300	45.0	0.16	0.8602	182.0
0.18	0.0390	54.5	0.18	0.8258	221.0
0.20	0.0499	56.5	0.20	0.7816	246.0
0.22	0.0612	74.0	0.22	0.7374	251.0
0.24	0.0760	74.0	0.24	0.6822	241.0
0.26	0.0908	101.0	0.26	0.6340	246.0
0.28	0.1110	102.5	0.28	0.5848	241.0
0.30	0.1315	129.5	0.30	0.5365	226.5
0.32	0.1574	137.5	0.32	0.4912	217.0
0.34	0.1849	156.0	0.34	0.4476	193.0
0.36	0.2161	167.5	0.36	0.4092	172.0
0.38	0.2496	179.0	0.38	0.3748	152.5
0.40	0.2846	184.5	0.40	0.3443	149.5
0.42	0.3215	185.5	0.42	0.3144	136.0
0.44	0.3586	189.5	0.44	0.2888	129.0
0.46	0.3985	189.5	0.46	0.2610	118.5
0.48	0.4344	190.0	0.48	0.2373	105.0
0.50	0.4724	189.5	0.50	0.2163	98.0
0.52	0.5103	183.5	0.52	0.1967	91.5
0.54	0.5470	183.0	0.54	0.1784	85.5
0.56	0.5836	179.0	0.56	0.1613	80.5
0.58	0.6194	177.0	0.58	0.1453	74.5
0.60	0.6548	170.0	0.60	0.1304	71.0
0.62	0.6888	164.5	0.62	0.1162	64.0
0.64	0.7217	162.8	0.64	0.1034	59.0
0.66	0.7522	133.5	0.66	0.0916	54.5
0.68	0.7789	130.5	0.68	0.0807	49.5
0.70	0.8050	118.0	0.70	0.0708	43.0
0.72	0.8286	117.5	0.72	0.6222	39.5
0.74	0.8521	110.0	0.74	0.0543	35.0
0.76	0.8741	103.0	0.76	0.0473	33.0
0.78	0.8947	90.5	0.78	0.0407	29.5
0.80	0.9128	82.5	0.80	0.0348	30.0
0.82	0.9293	75.5	0.82	0.0288	26.0
0.84	0.9440	70.0	0.84	0.0236	23.0
0.86	0.9560	55.0	0.86	0.0190	20.0
0.88	0.9691	42.0	0.88	0.0150	17.0
0.90	0.9776	37.0	0.90	0.0116	17.0
0.92	0.9849	27.0	0.92	0.0082	15.0
0.94	0.9903	24.0	0.94	0.0052	12.0
0.96	0.9952	15.0	0.96	0.0028	8.0
0.98	0.9982	9.0	0.98	0.0012	6.0
1.00	1.0000		1.00	0.0000	

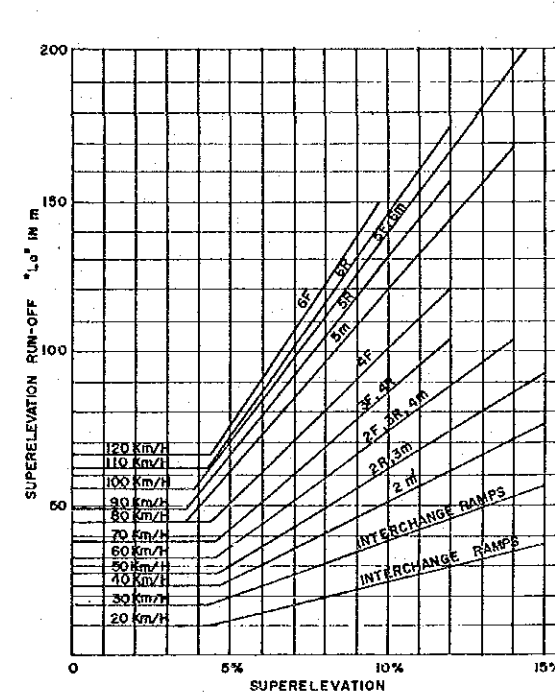
SCALE		DRAWING NO.
NONE	STANDARD GEOMETRIC DESIGN	22



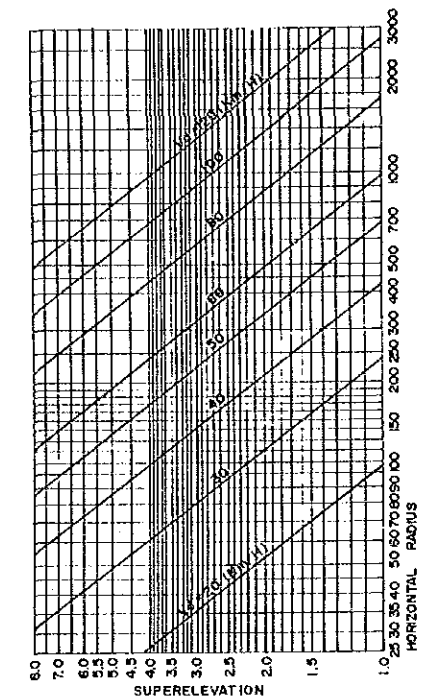
CASE-1
TRANSITION STRAIGHT CIRCULAR CURVE



CASE - 2
TRANSITION: STRAIGHT-SPIRAL CURVE-CIRCULAR CURVE



SUPERELEVATION RUN-OFF CHART (L_0)



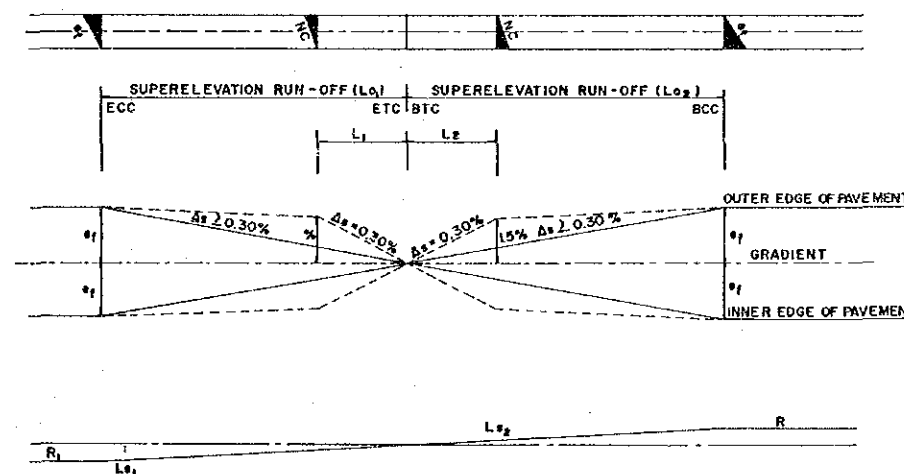
SUPERELEVATION RATES

LEGEND:
 Δs - SLOPE OF EDGE OF PAVEMENT IN %
 L_0 - SUPERELEVATION RUN-OFF
 L_1 - FULL SUPERELEVATION
 L_2 - LENGTH BETWEEN SUPERELEVATION 0% AND 2% WITH $\Delta s = 0.30\%$
 NC - NORMAL CROSSFALL

NOTES:
 1. FOR EFFECTIVE DRAINAGE Δs HAS TO BE 0.30% BETWEEN $\pm 2\%$
 2. WHERE $\Delta s < 0.30\%$, A SPECIAL METHOD OF SUPERELEVATION TRANSITION HAS TO BE ADOPTED AS INDICATED IN DOTTED LINE
 3. ROUNDED OFF ONLY NECESSARY IF $\Delta s > 0.60\%$

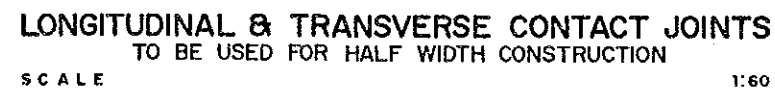
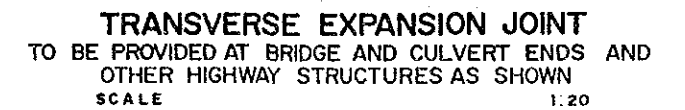
RADII FOR ROUNDING		
V_d	80 kph	60 kph
R	1000 m	2000 m

4. e_f MAX. CAN BE TAKEN FROM CHART FOR SUPERELEVATION ABOVE
 5. THE SLOPE OF SHOULDER SHALL ALWAYS FALL IN THE DIRECTION OF THE OUTSIDE EDGE OF THE TRAVELLED WAY
 6. WHEN THE SUPERELEVATION IS LARGER THAN 4% THEN THE SLOPE OF THE LOWER SHOULDER SHALL BE THE SAME AS FOR THE TRAVELLED WAY
 7. WHERE THE SUPERELEVATION IS LESS THAN 6% THEN THE HIGHER SHOULDER SHALL HAVE A SLOPE OF 4%
 8. IF THE SUPERELEVATION VARIES FROM 6% TO 8% THEN THE SUPERELEVATION OF THE SLOPE OF THE HIGH SHOULDER WILL VARY FROM 4% TO 1 1/2% L_2 . THE ALGEBRAIC SUM OF THE SLOPES OF THE TRAVELLED WAY AND THE SHOULDER SHOULD ALWAYS BE EQUAL TO 10%

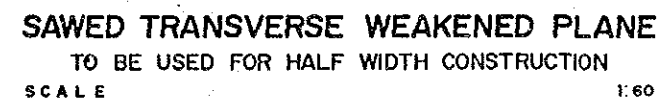


CASE - 3
TRANSITION CIRCULAR CURVE-REVERSED SPIRAL-CIRCULAR CURVE

SCALE	DETAIL OF PORTLAND CEMENT CONCRETE PAVEMENT (18 cm THICK)	DRAWING NO.
AS SHOWN		23



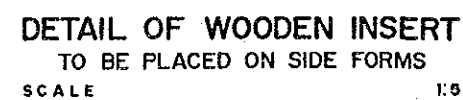
1:60



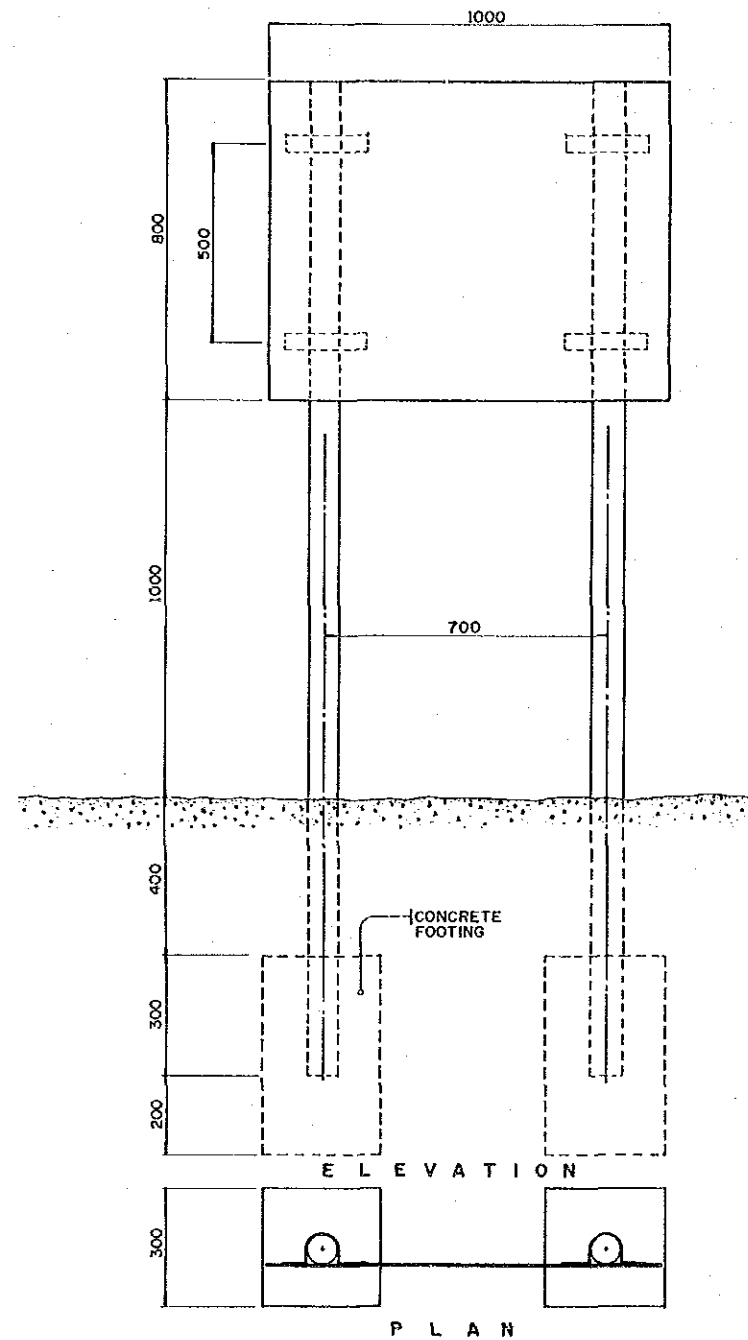
1:60



SCALE 1:50



TRANSVERSE CONTACT JOINT
MINIMUM DISTANCE 150 m
FROM WEAKENED PLANE TO
BE PROVIDED AT THE END OF
A DAYS RUN AND WHERE LAYING
OF CONCRETE HAS STOPPED
30 MINUTES OR LONGER.



INFORMATORY SIGN

FEASIBILITY STUDY ON THE RURAL ROAD NETWORK
DEVELOPMENT PROJECT

EXPERIMENTAL PAVEMENT

⇐ SECTION NO. 1

JAPAN INTERNATIONAL COOPERATION AGENCY
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

FEASIBILITY STUDY ON THE RURAL ROAD NETWORK
DEVELOPMENT PROJECT

EXPERIMENTAL PAVEMENT

⇐ SECTION NO. 2

JAPAN INTERNATIONAL COOPERATION AGENCY
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

FEASIBILITY STUDY ON THE RURAL ROAD NETWORK
DEVELOPMENT PROJECT

EXPERIMENTAL PAVEMENT

⇐ SECTION NO. 3

JAPAN INTERNATIONAL COOPERATION AGENCY
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

FEASIBILITY STUDY ON THE RURAL ROAD NETWORK
DEVELOPMENT PROJECT

EXPERIMENTAL PAVEMENT

⇐ SECTION NO. 4

JAPAN INTERNATIONAL COOPERATION AGENCY
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

FEASIBILITY STUDY ON THE RURAL ROAD NETWORK
DEVELOPMENT PROJECT

EXPERIMENTAL PAVEMENT

SECTION NO. 1 ⇐

JAPAN INTERNATIONAL COOPERATION AGENCY
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

FEASIBILITY STUDY ON THE RURAL ROAD NETWORK
DEVELOPMENT PROJECT

EXPERIMENTAL PAVEMENT

SECTION NO. 2 ⇐

JAPAN INTERNATIONAL COOPERATION AGENCY
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

FEASIBILITY STUDY ON THE RURAL ROAD NETWORK
DEVELOPMENT PROJECT

EXPERIMENTAL PAVEMENT

SECTION NO. 3 ⇐

JAPAN INTERNATIONAL COOPERATION AGENCY
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

FEASIBILITY STUDY ON THE RURAL ROAD NETWORK
DEVELOPMENT PROJECT

EXPERIMENTAL PAVEMENT

SECTION NO. 4 ⇐

JAPAN INTERNATIONAL COOPERATION AGENCY
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

NOTES:

1. ALL SIGN FACE SHALL BE PROCESSED WITH SUBSTRATE G.I. PLATE GAUGE #16.
2. THE SIGN MUST BE REFLECTORIZED "ENGINEER GRADE" OR ITS EQUIVALENT.
3. THE POST MUST BE 3"Ø G.I. PAINTED REFLECTORIZED SUNSHINE YELLOW - WITH RED LEAD BASE PAINT.
4. CONCRETE FOOTING SHOULD BE CLASS "B" CONCRETE.
5. INFORMATORY SIGNS SHALL BE INSTALLED AT THE LOCATIONS DIRECTED BY THE ENGINEER.

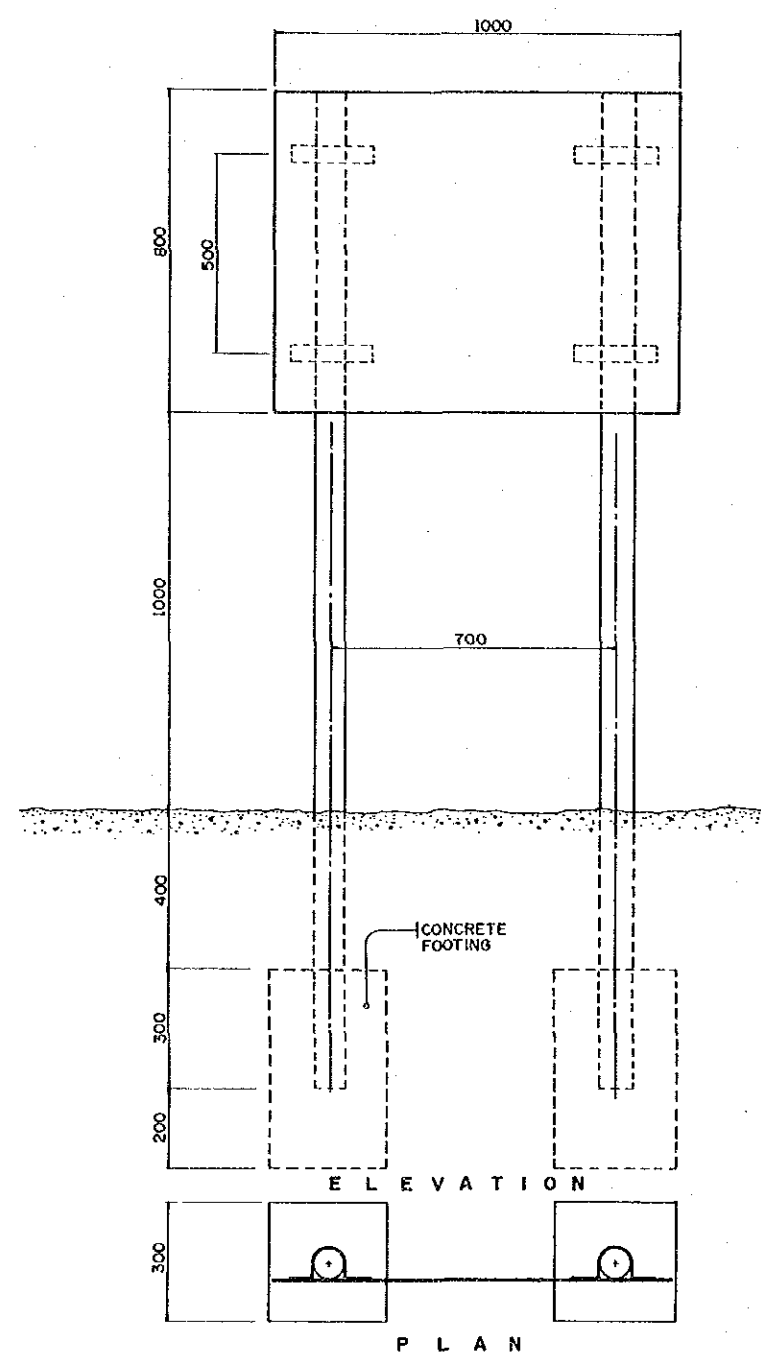
FEASIBILITY STUDY ON THE RURAL ROAD NETWORK
DEVELOPMENT PROJECT

SCALE

DETAIL OF INFORMATORY SIGNS

DRAWING NO.

25



INFORMATORY SIGN

FEASIBILITY STUDY ON THE RURAL ROAD NETWORK
DEVELOPMENT PROJECT

EXPERIMENTAL PAVEMENT

← SECTION NO. 5

JAPAN INTERNATIONAL COOPERATION AGENCY
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

FEASIBILITY STUDY ON THE RURAL ROAD NETWORK
DEVELOPMENT PROJECT

EXPERIMENTAL PAVEMENT

SECTION NO. 5 →

JAPAN INTERNATIONAL COOPERATION AGENCY
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

NOTES :

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