



JAPAN INTERNATIONAL COOPERATION AGENCY  
KATAHIRA & ENGINEERS  
INTERNATIONAL

DESIGNED BY	CHECKED BY	SUBMITTED BY
Name: R. UENO	Name: T. OKUMURA	Name: M. KIUCHI
Sign: _____	Sign: _____	Sign: _____
Date: _____	Date: _____	Date: _____



REPUBLIC OF INDONESIA  
MINISTRY OF PUBLIC WORKS  
DIRECTORATE GENERAL OF HIGHWAYS

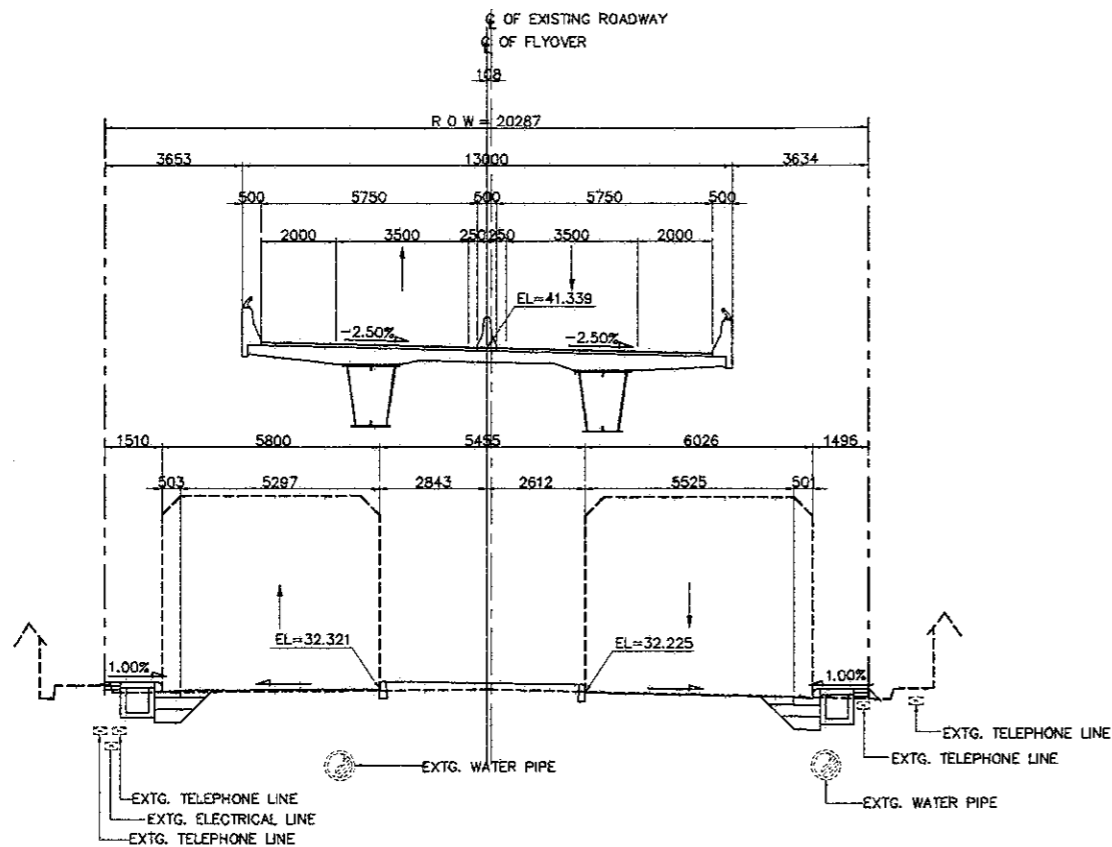
APPROVED BY	NAME	DATE
Ir. HERRY VAZA M,Eng.Sc		
NIP. : 110038400		

PROJECT AND LOCATION :  
DETAILED DESIGN STUDY OF  
NORTH JAVA CORRIDOR FLYOVER PROJECT  
PETERONGAN FLYOVER - CONTRACT PACKAGE 3  
(PETERONGAN - TANGGULANGIN)  
EAST JAVA PROVINCE

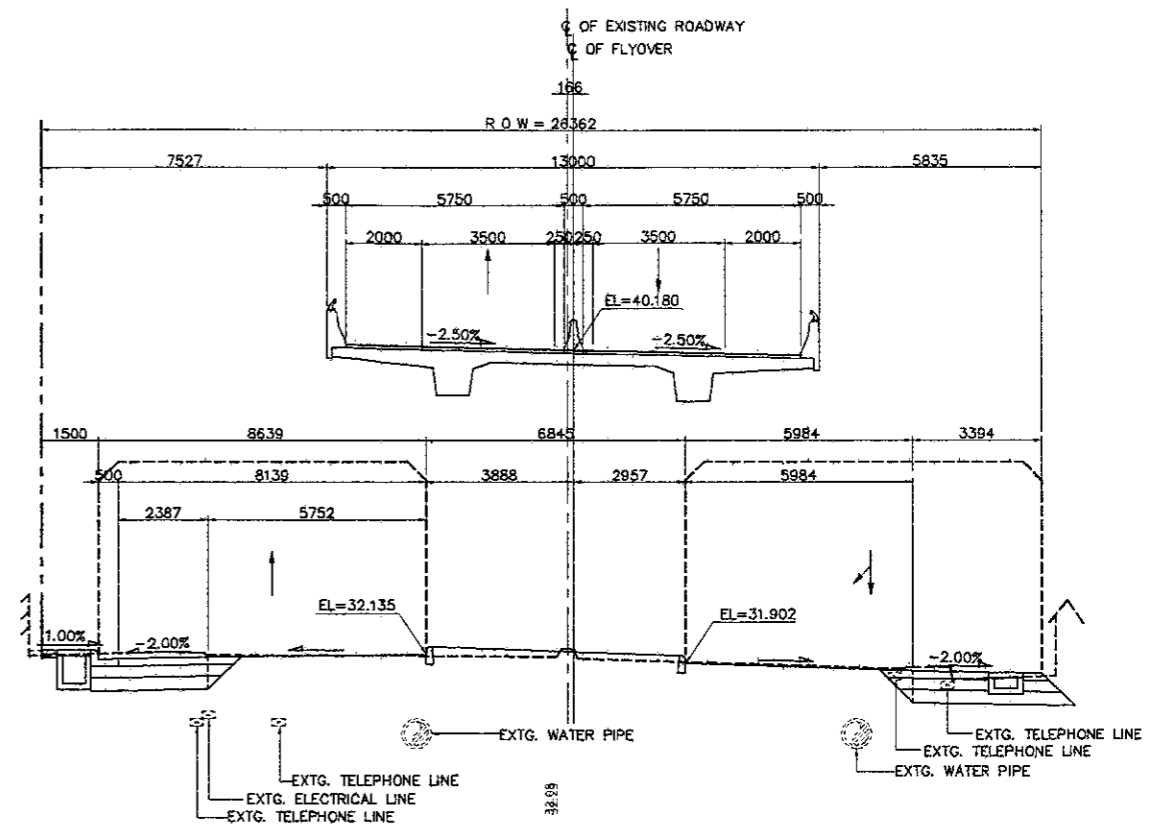
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DRAWING TITLE :  
CROSS SECTION  
STA. 0 + 480.000 - STA. 0 + 540.000  
(7 OF 12)

DRAWING NO :  
PRD-031  
SHEET NO :  
31 / 60

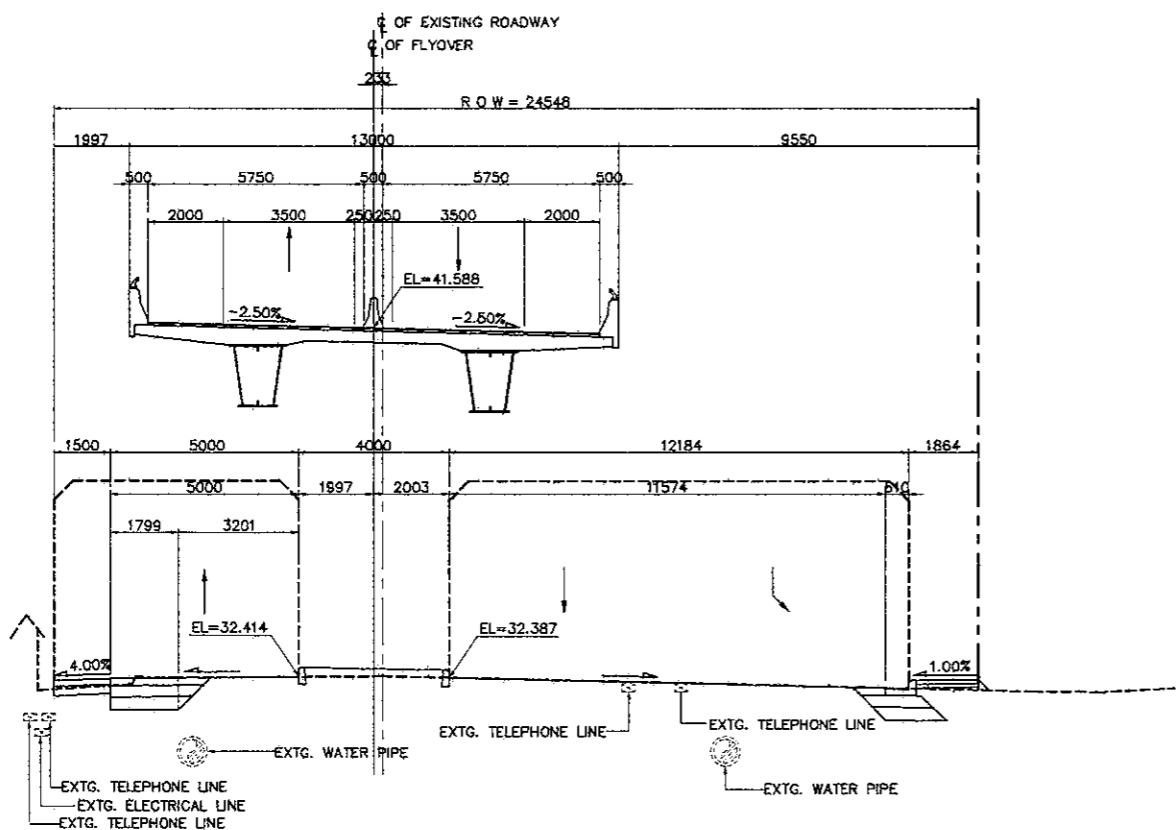


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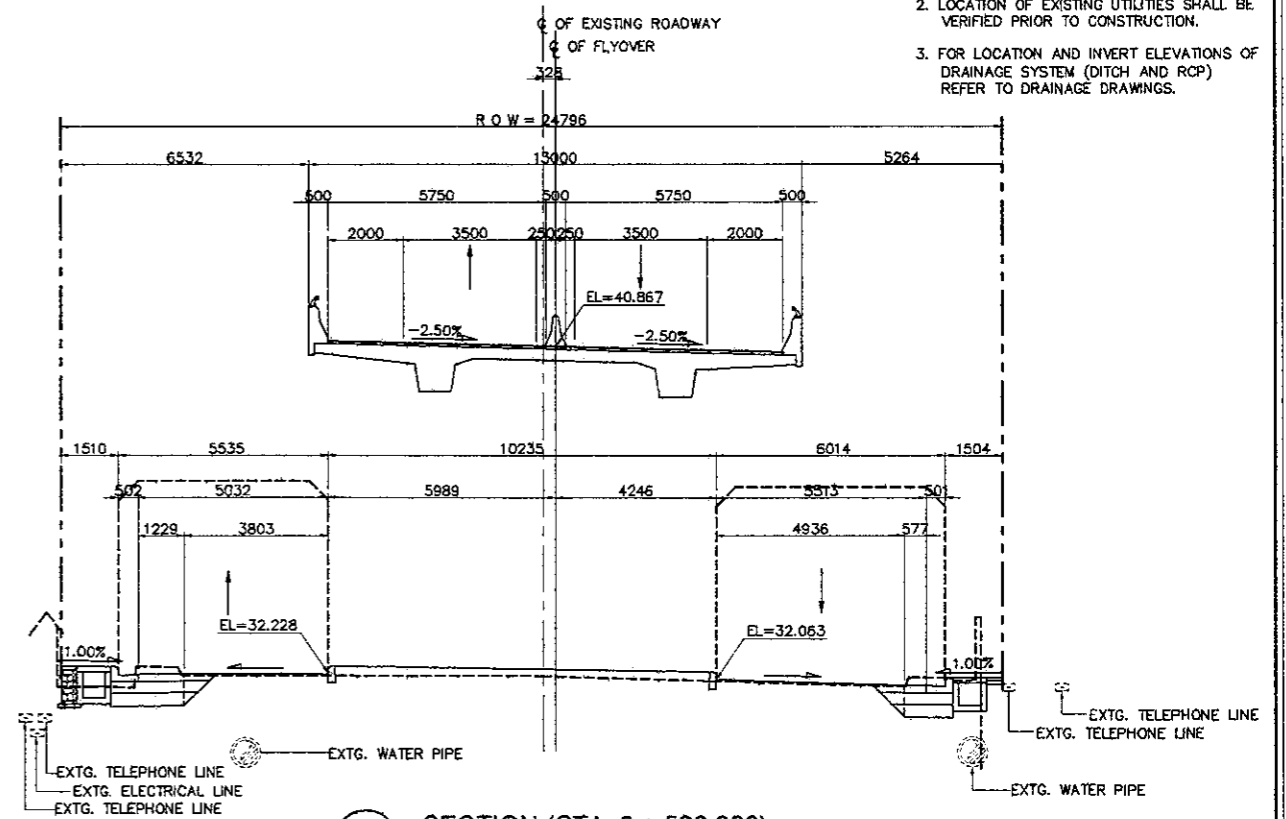


4 SECTION (STA. 0 + 540.000)  
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- NOTES:
1. ALL DIMENSIONS AND ELEVATIONS SHALL BE VERIFIED DURING CONSTRUCTION.
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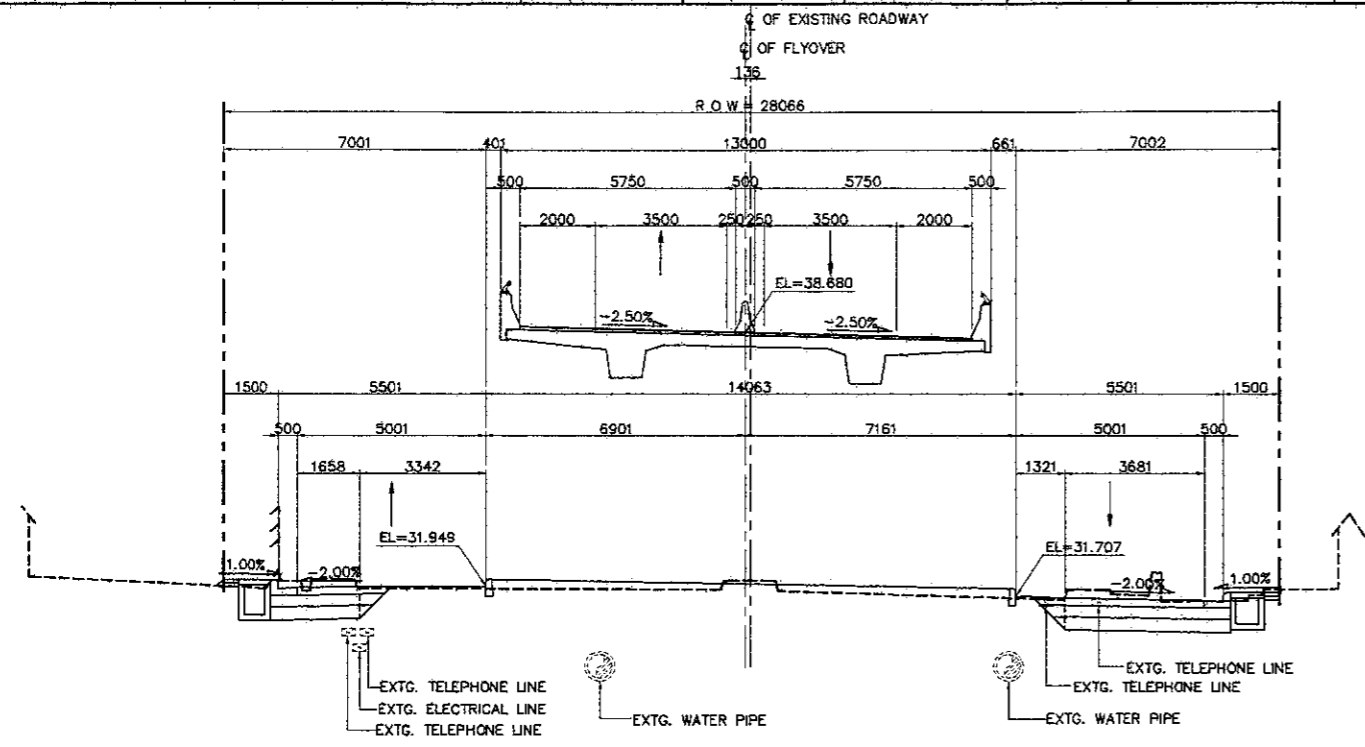


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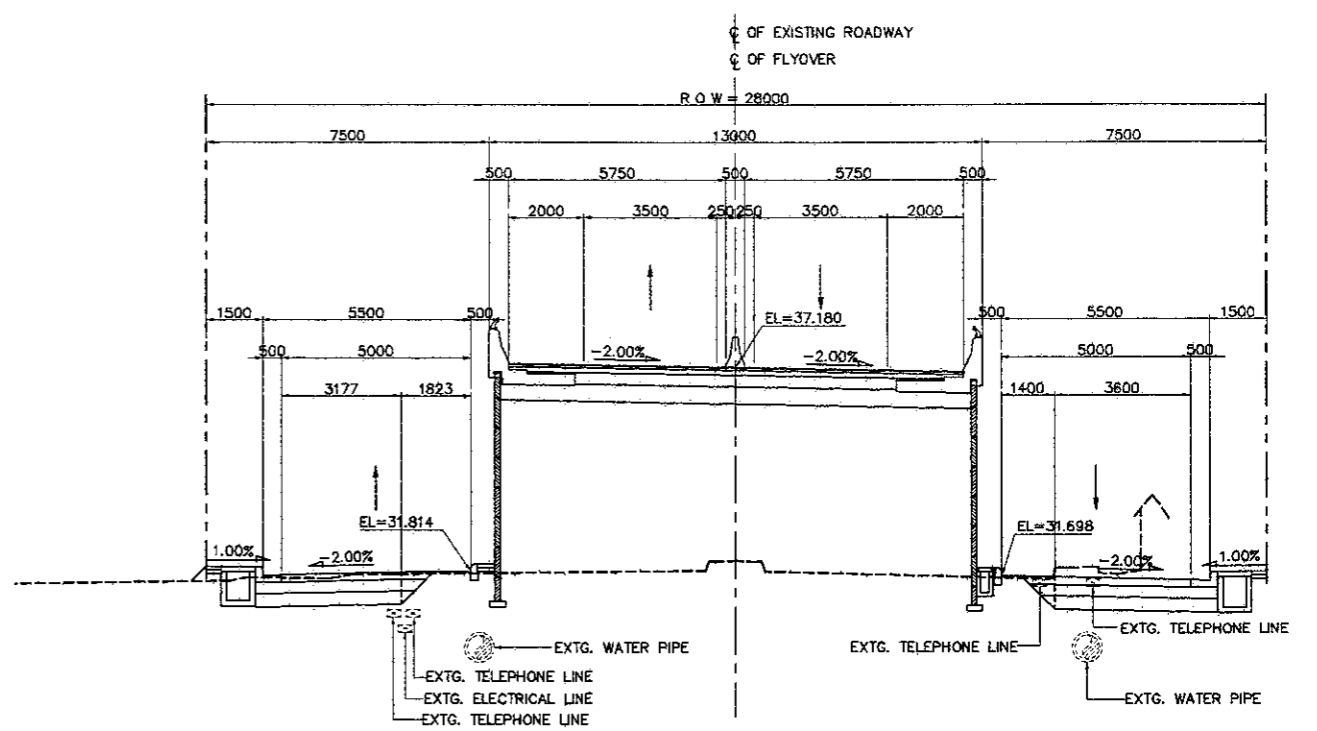


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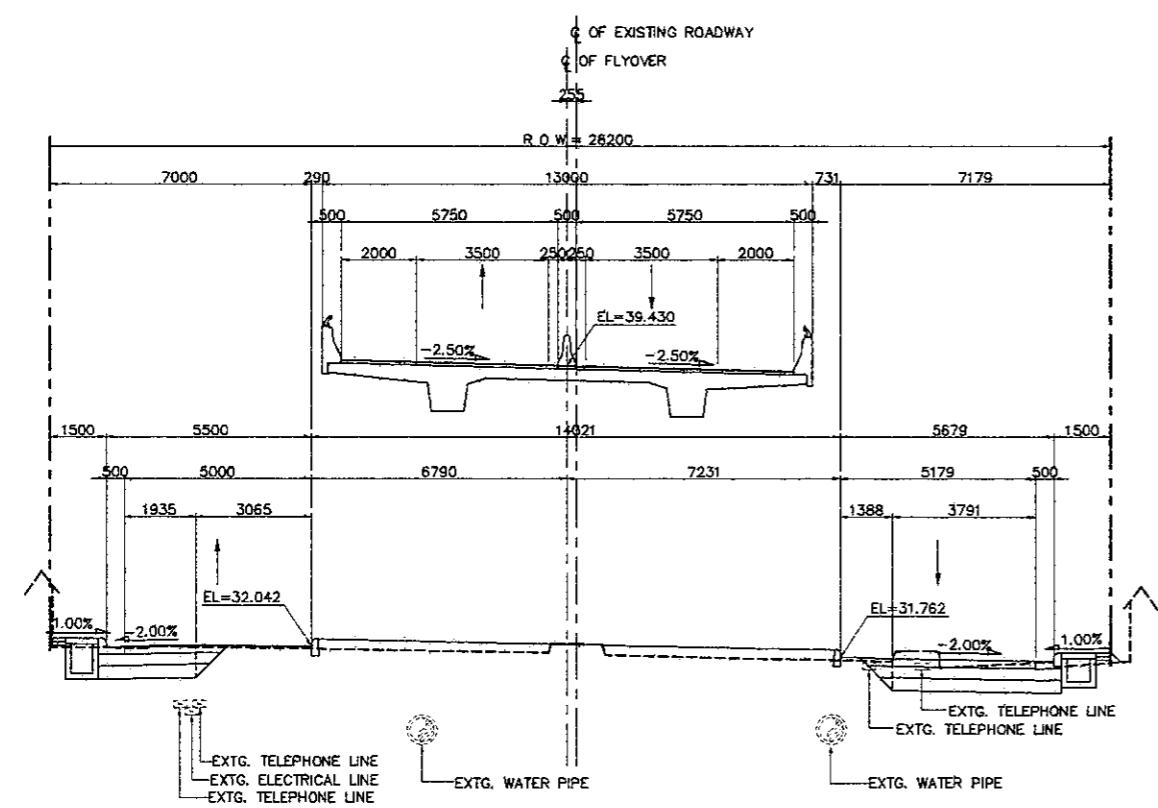
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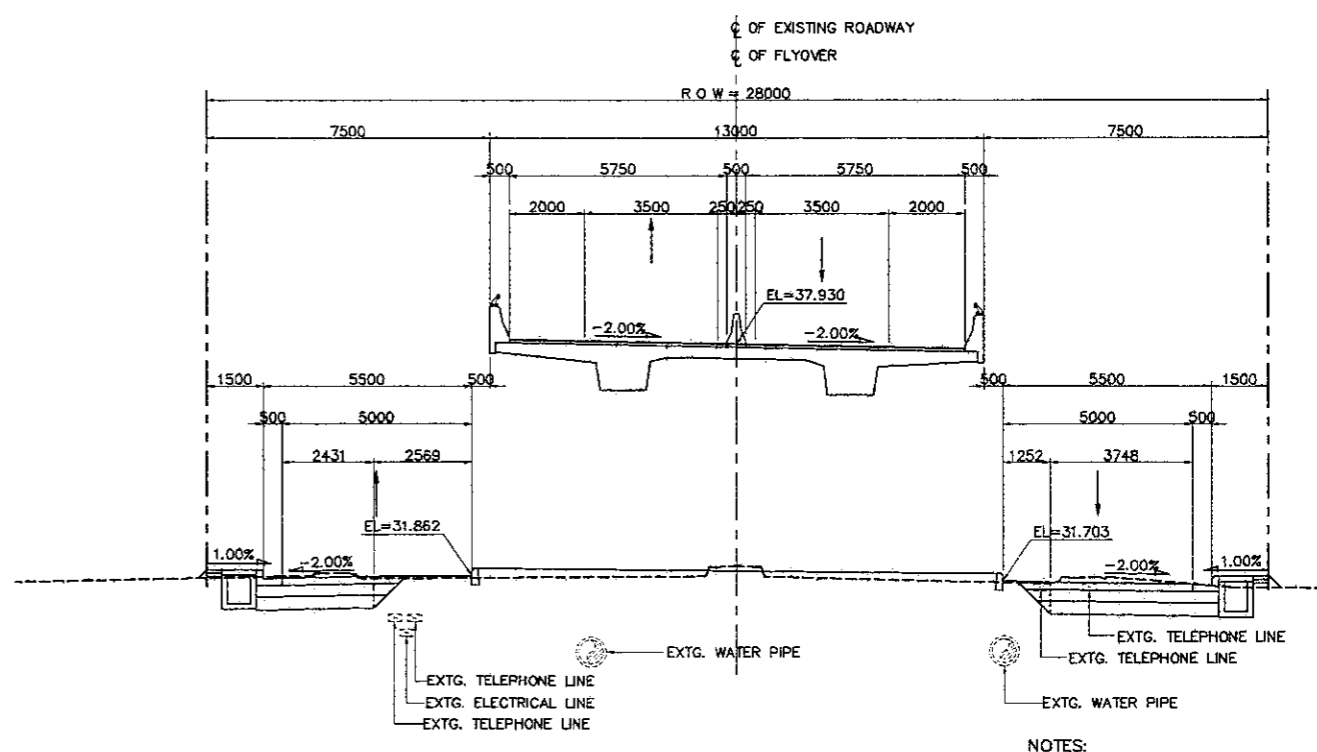
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**4 SECTION (STA. 0 + 620.000)**  
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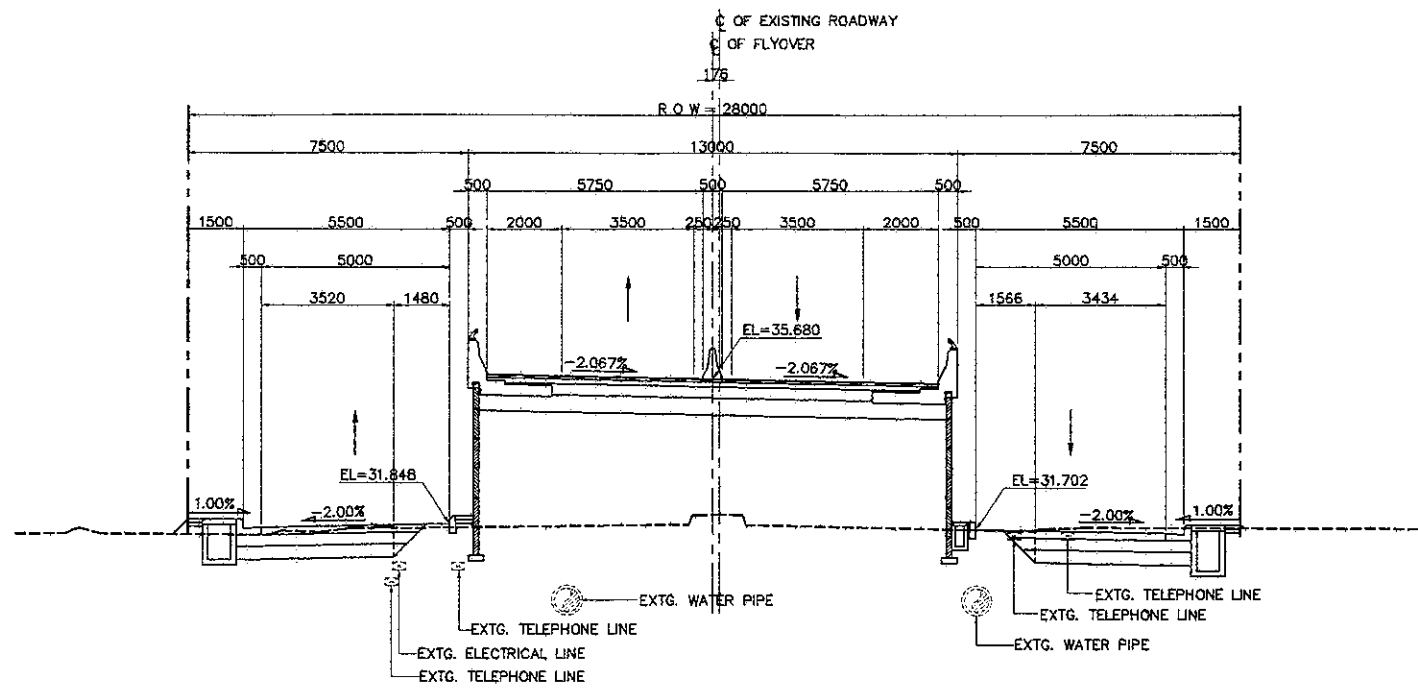
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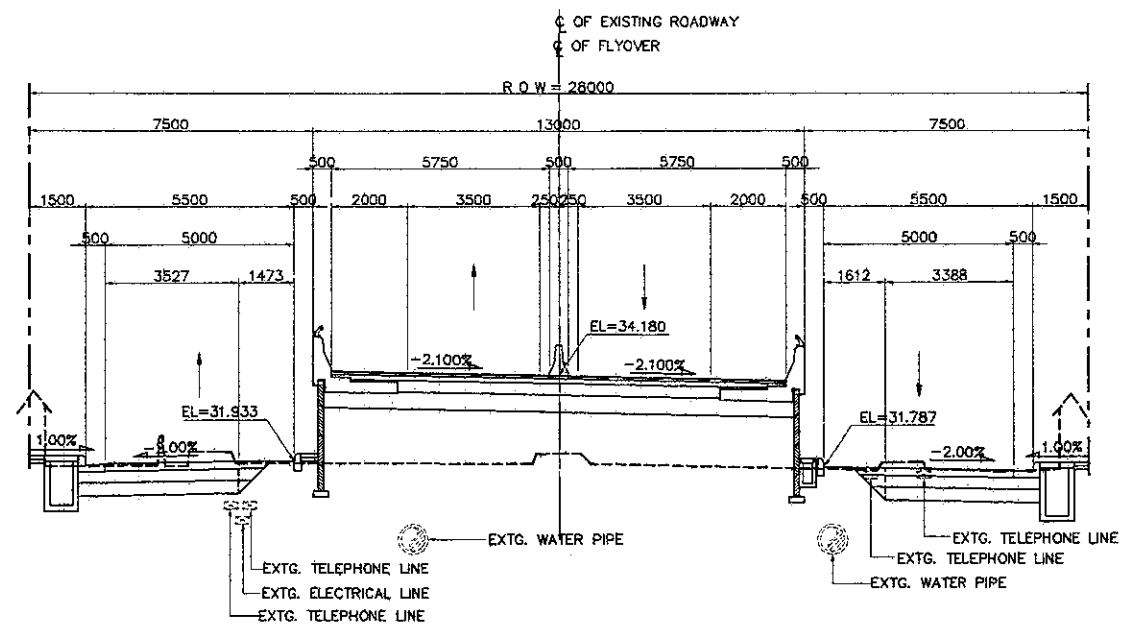
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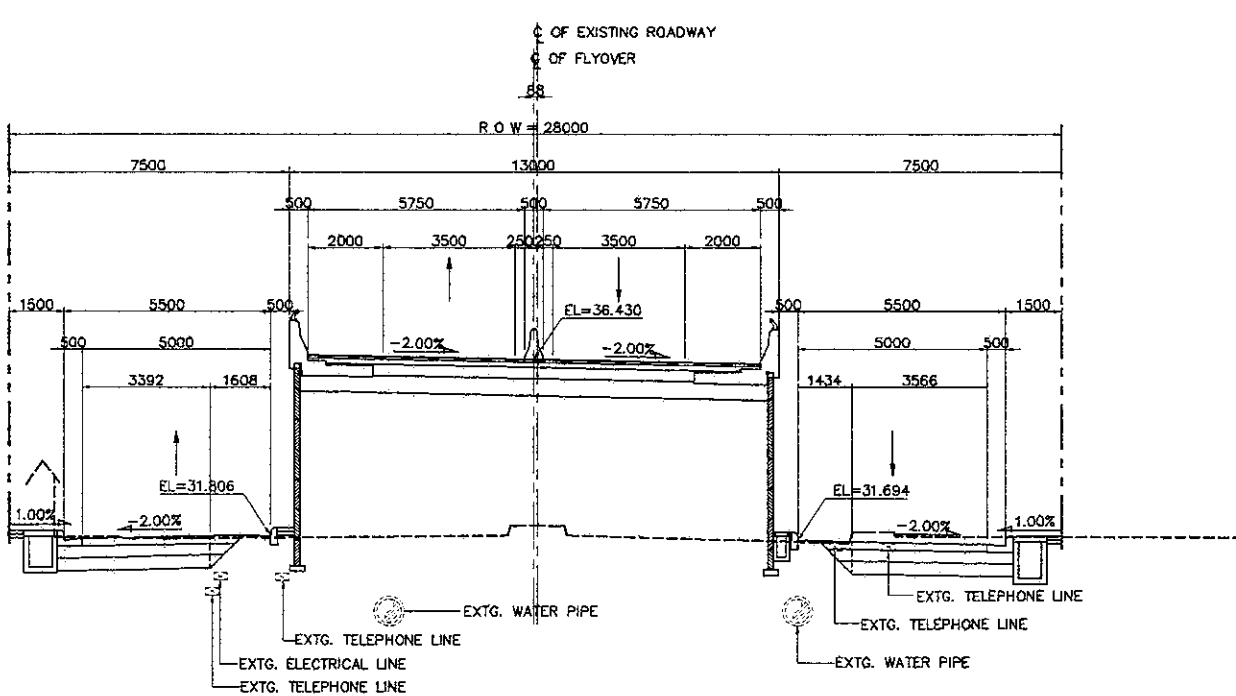
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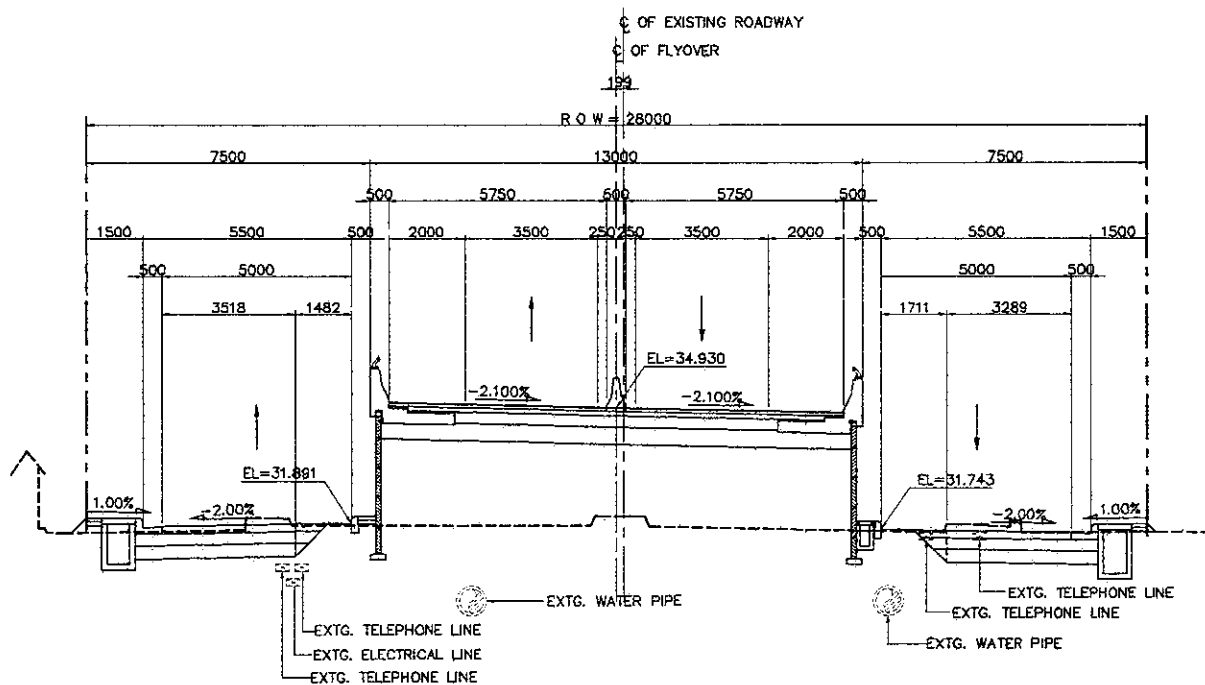
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**4 SECTION (STA. 0 + 700.000)**  
 SCALE 1:200



**1 SECTION (STA. 0 + 640.000)**  
 SCALE 1:200



**3 SECTION (STA. 0 + 680.000)**  
 SCALE 1:200

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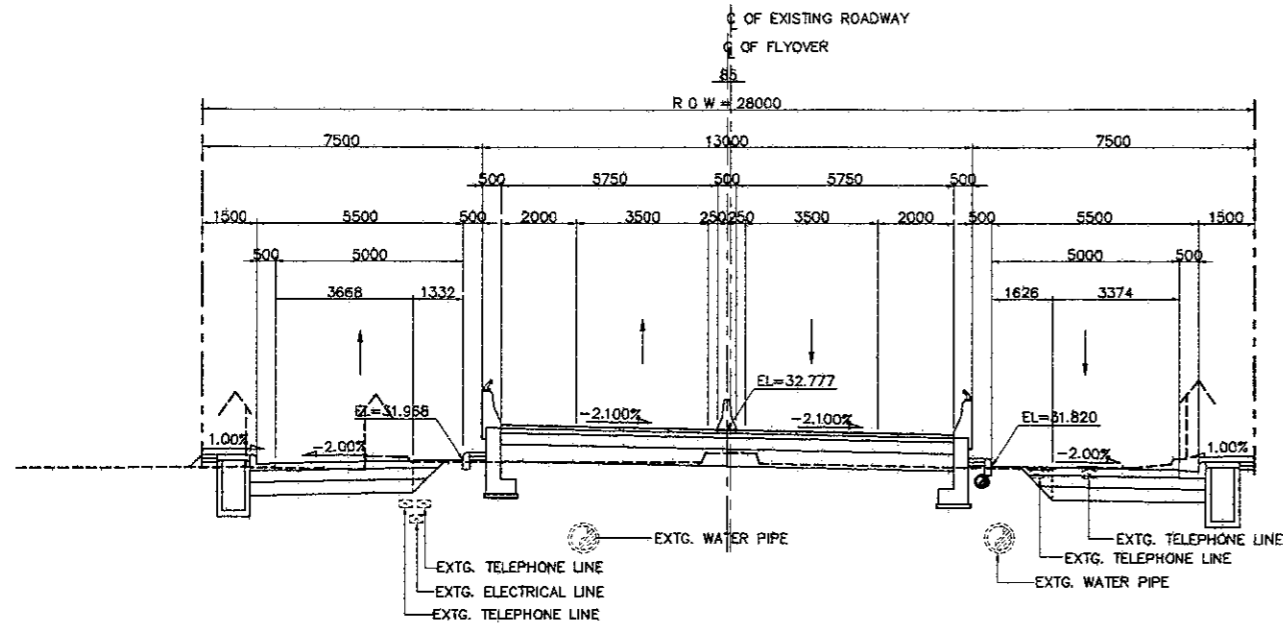
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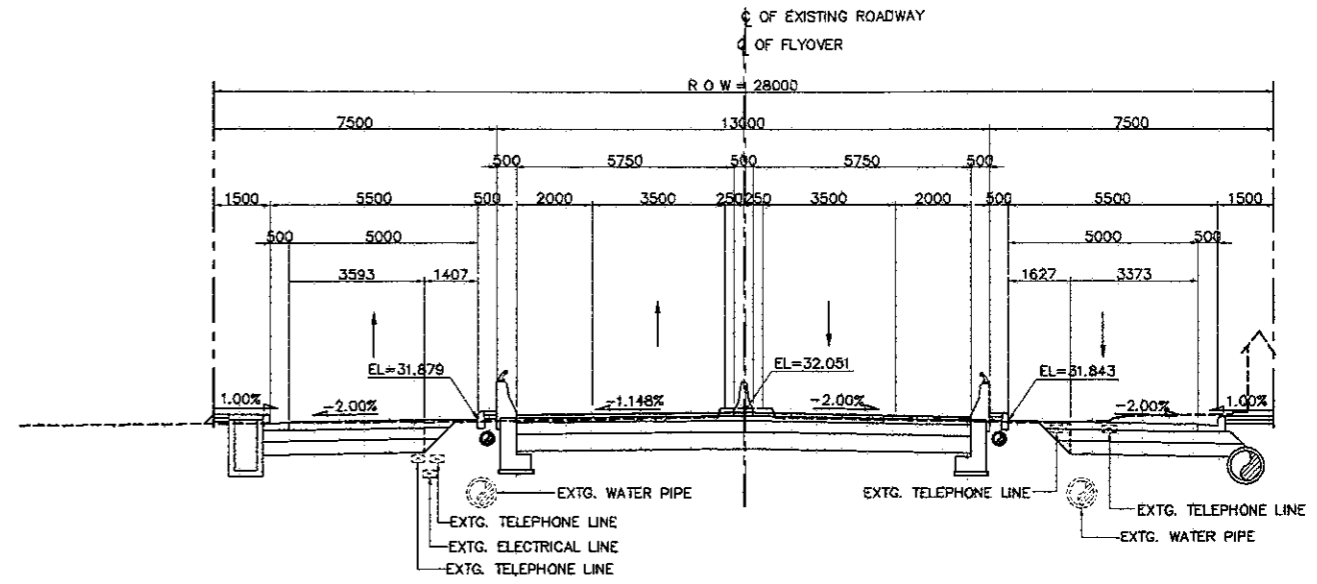
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DRAWING TITLE :  
CROSS SECTION  
STA. 0 + 720.000 - STA. 0 + 780.000  
(10 OF 12)

DRAWING NO :  
PRD-034  
SHEET NO :  
34 / 60

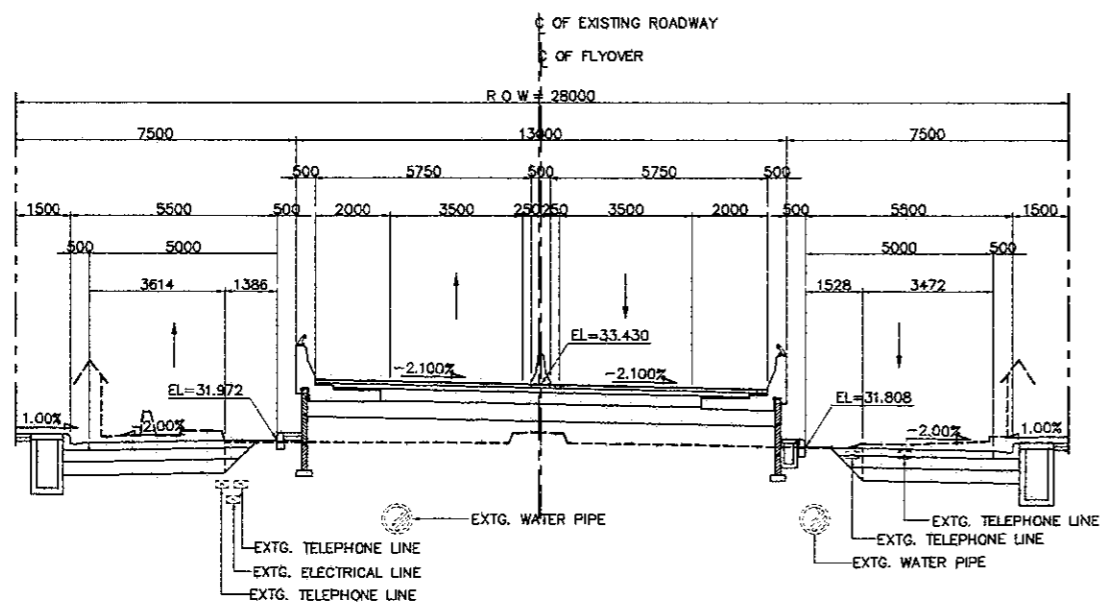


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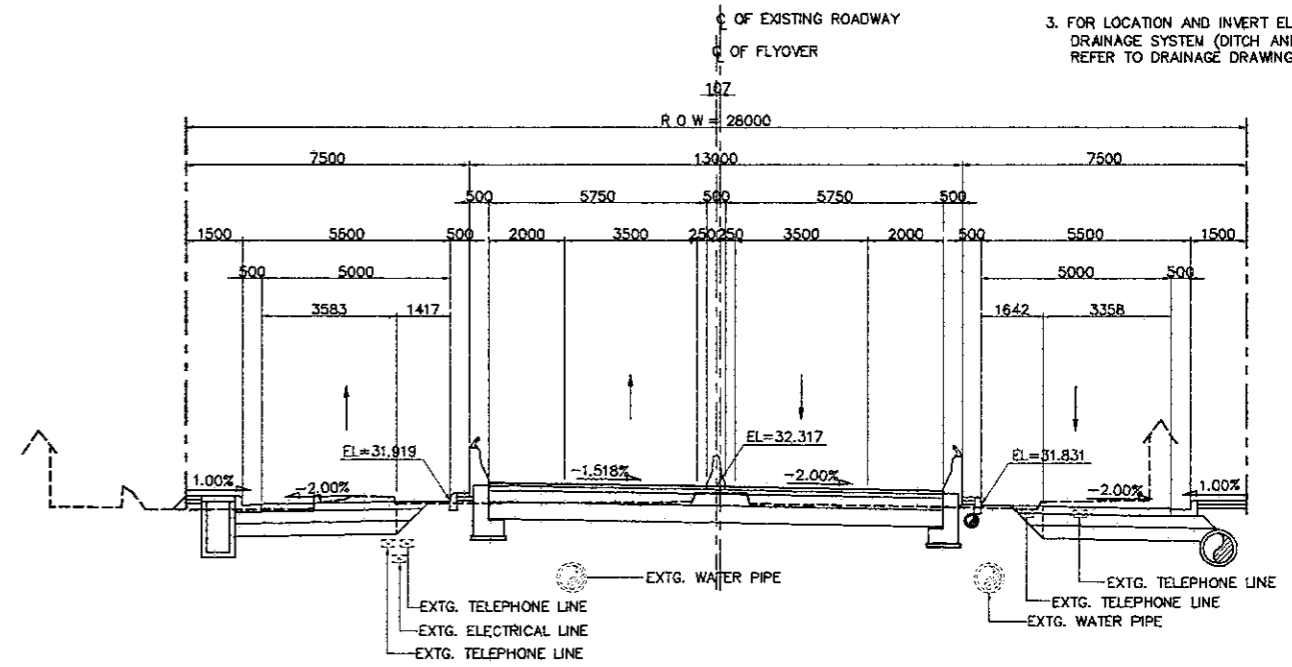


4 SECTION (STA. 0 + 780.000)  
SCALE 1:200

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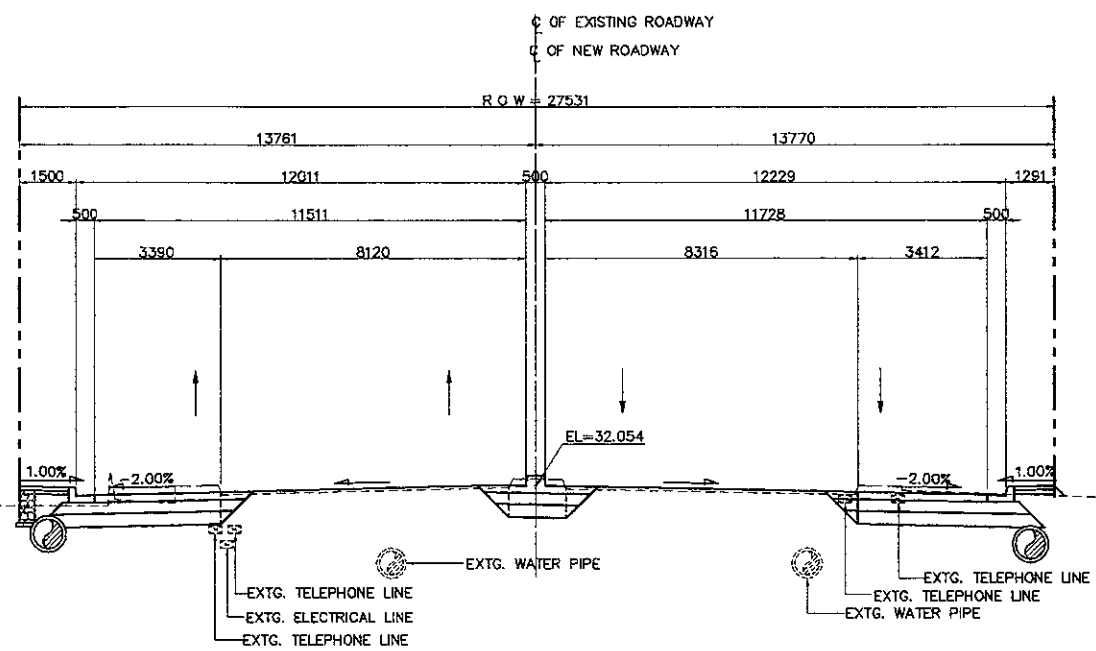


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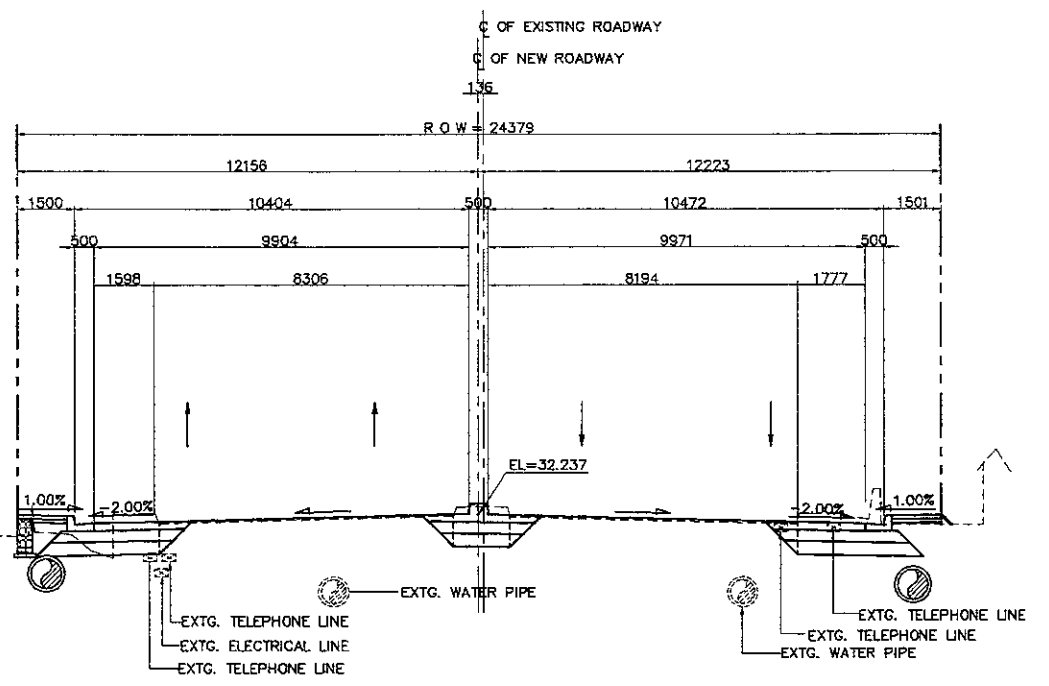


3 SECTION (STA. 0 + 760.000)  
SCALE 1:200

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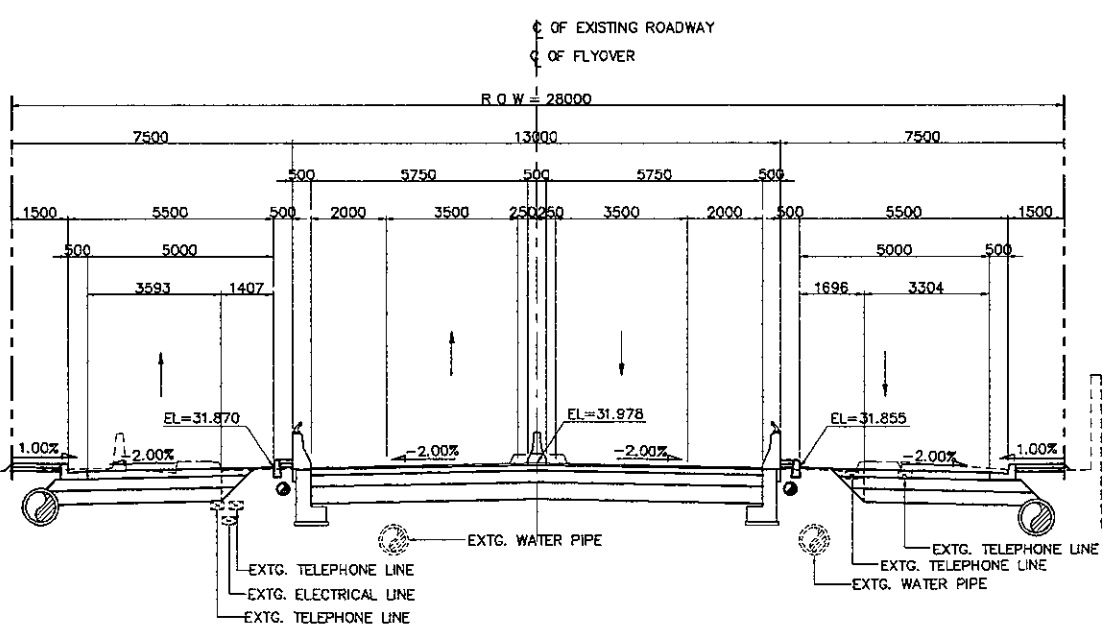


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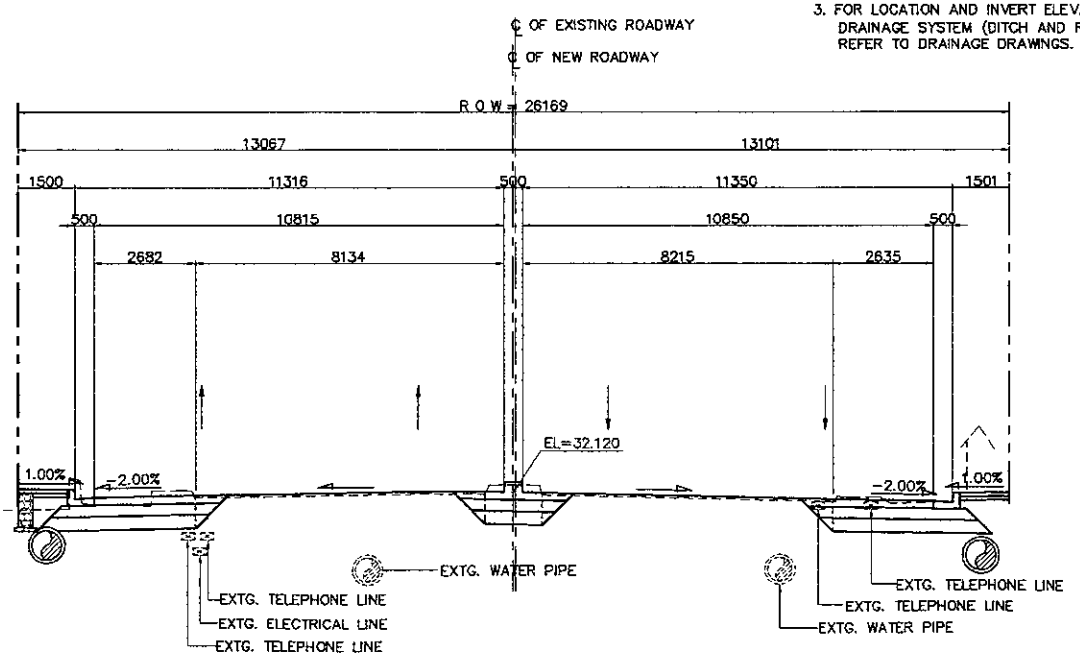


**4 SECTION (STA. 0 + 860.000)**  
 SCALE 1:200

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**1 SECTION (STA. 0 + 800.000)**  
 SCALE 1:200



**3 SECTION (STA. 0 + 840.000)**  
 SCALE 1:200

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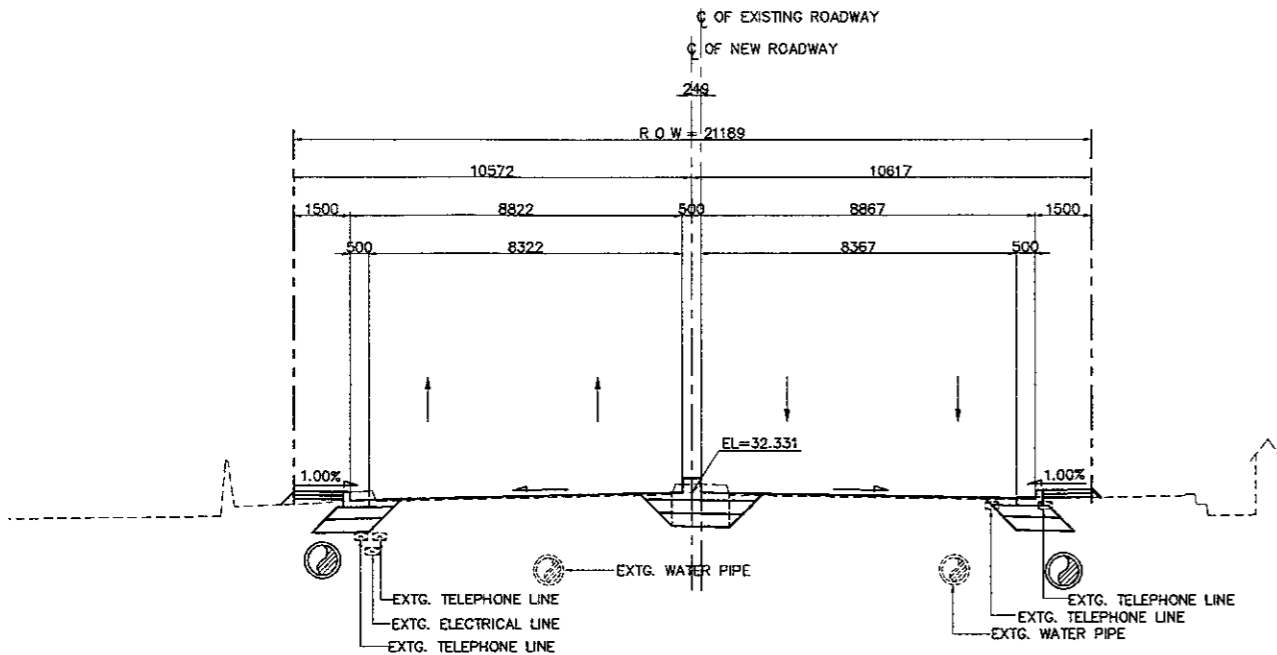
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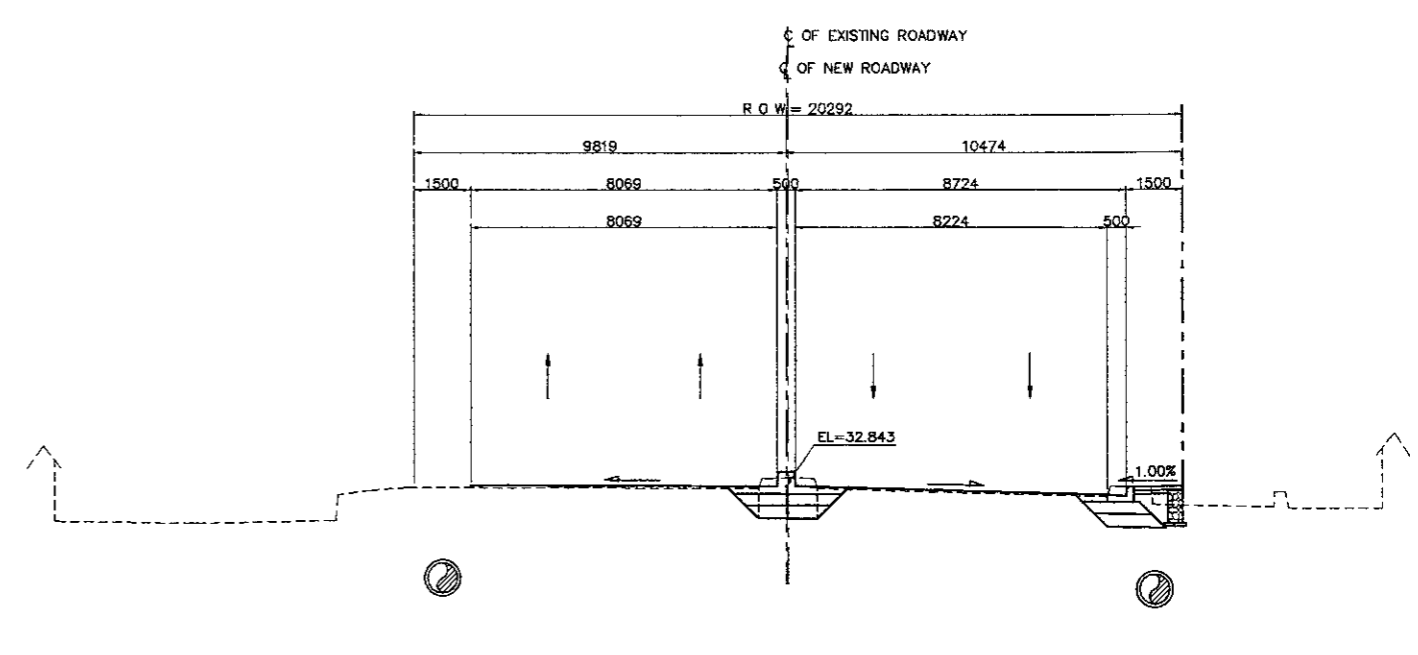
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 CROSS SECTION
   
 STA. 0 +880.000 - STA. 0 + 940.000
   
 (12 OF 12)

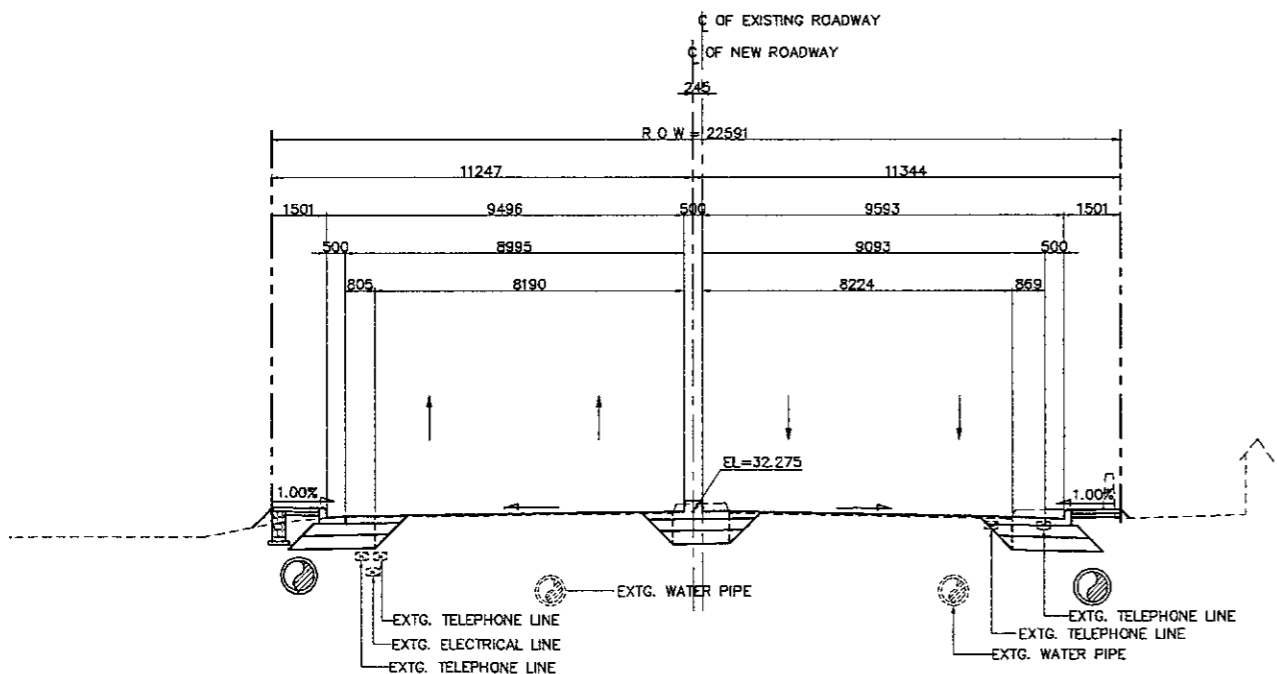
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 SHEET NO :
   
 36 / 60



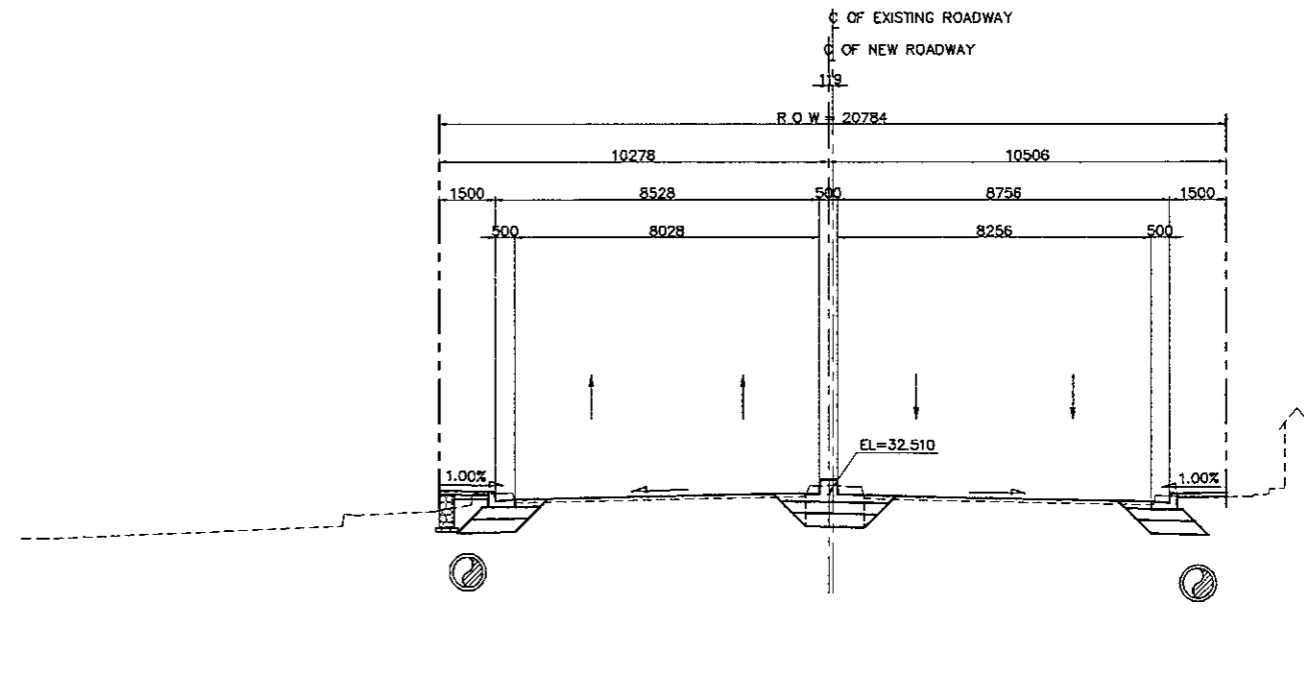
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4 SECTION (STA. 0 + 940.000)  
 SCALE 1:200



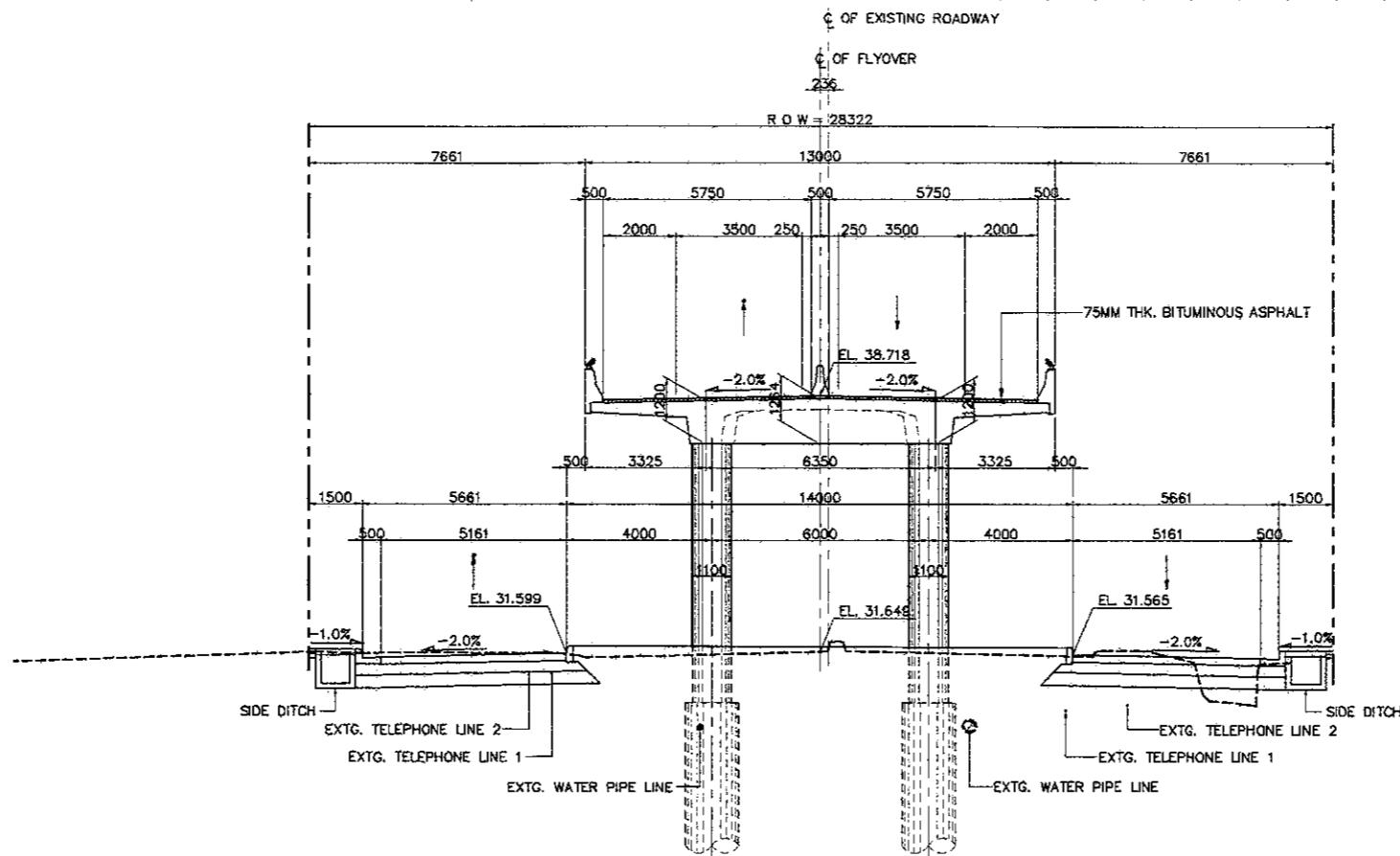
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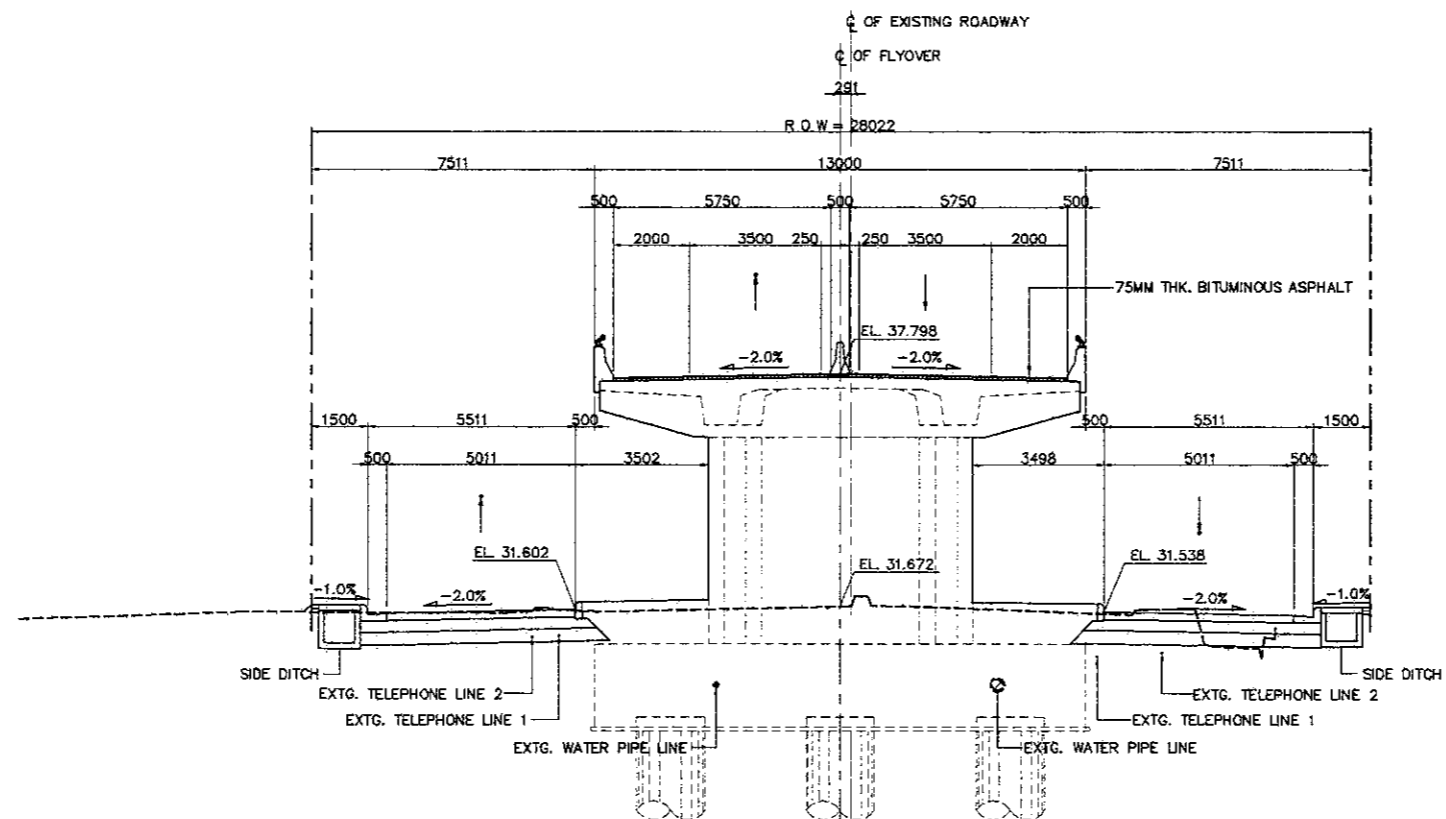
3 SECTION (STA. 0 + 920.000)  
 SCALE 1:200

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2 P1 SECTION (STA. 0 + 363.00)  
 SCALE 1:200

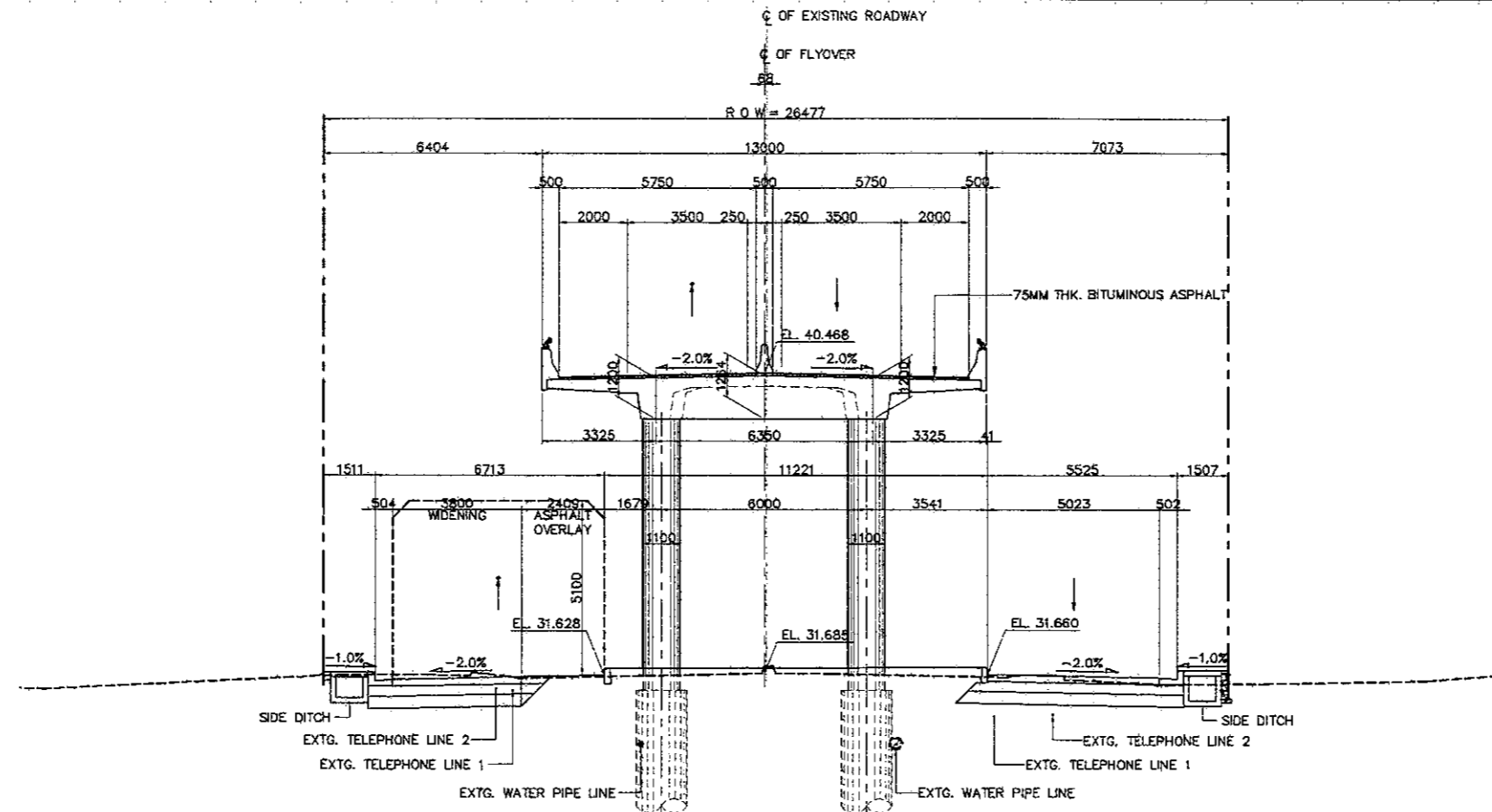


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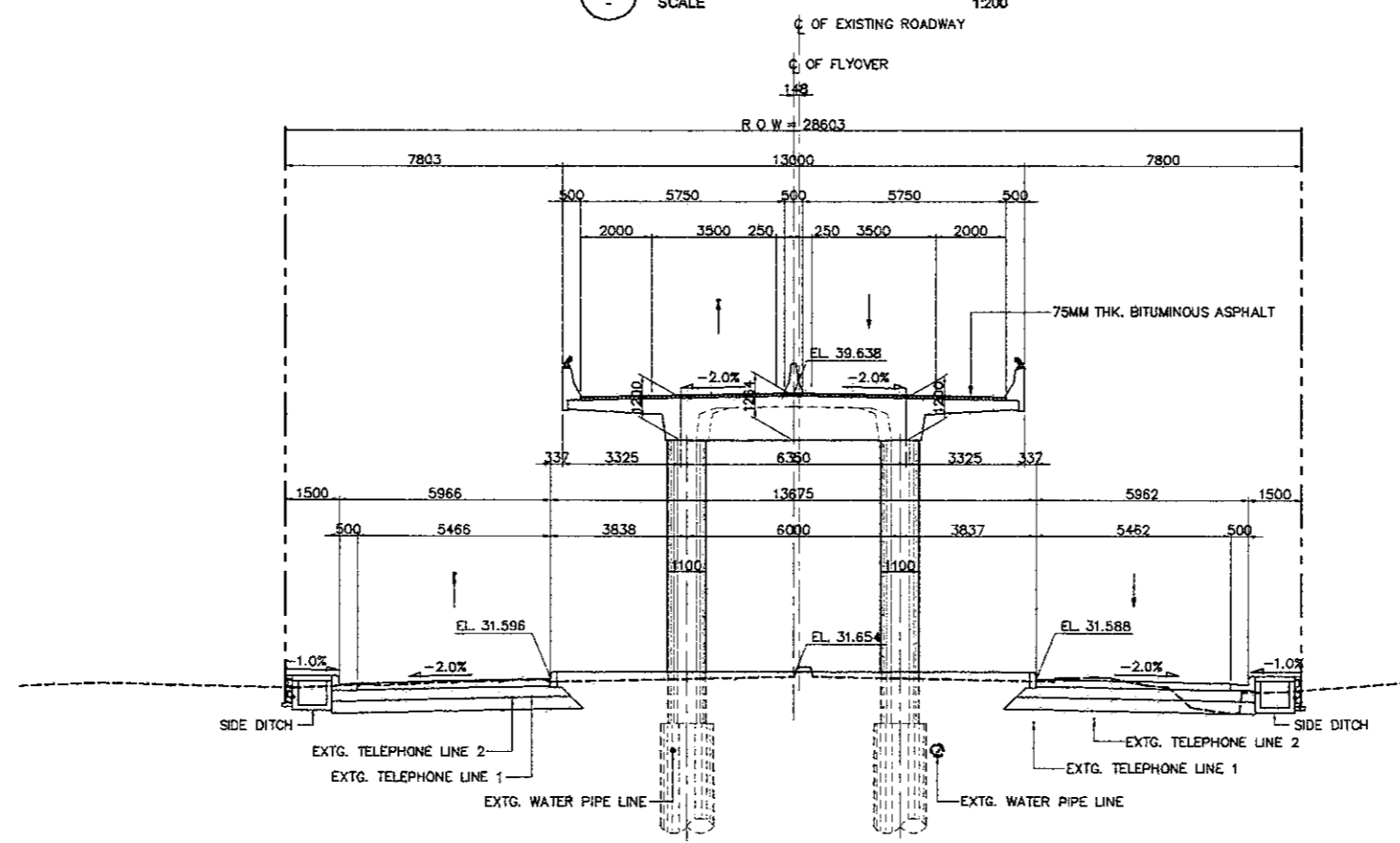
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2 P3 SECTION (STA. 0 + 403.00)  
 SCALE 1:200

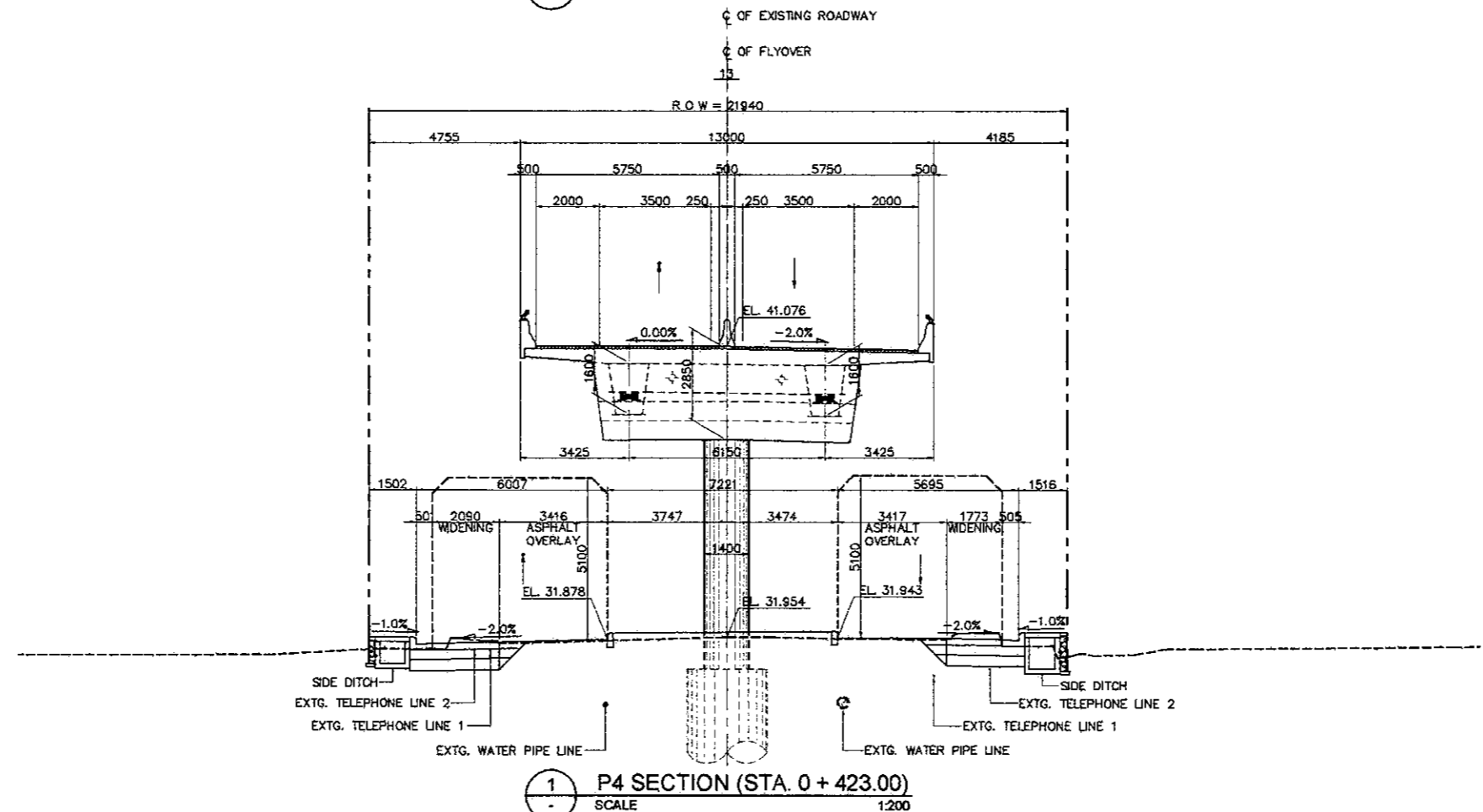
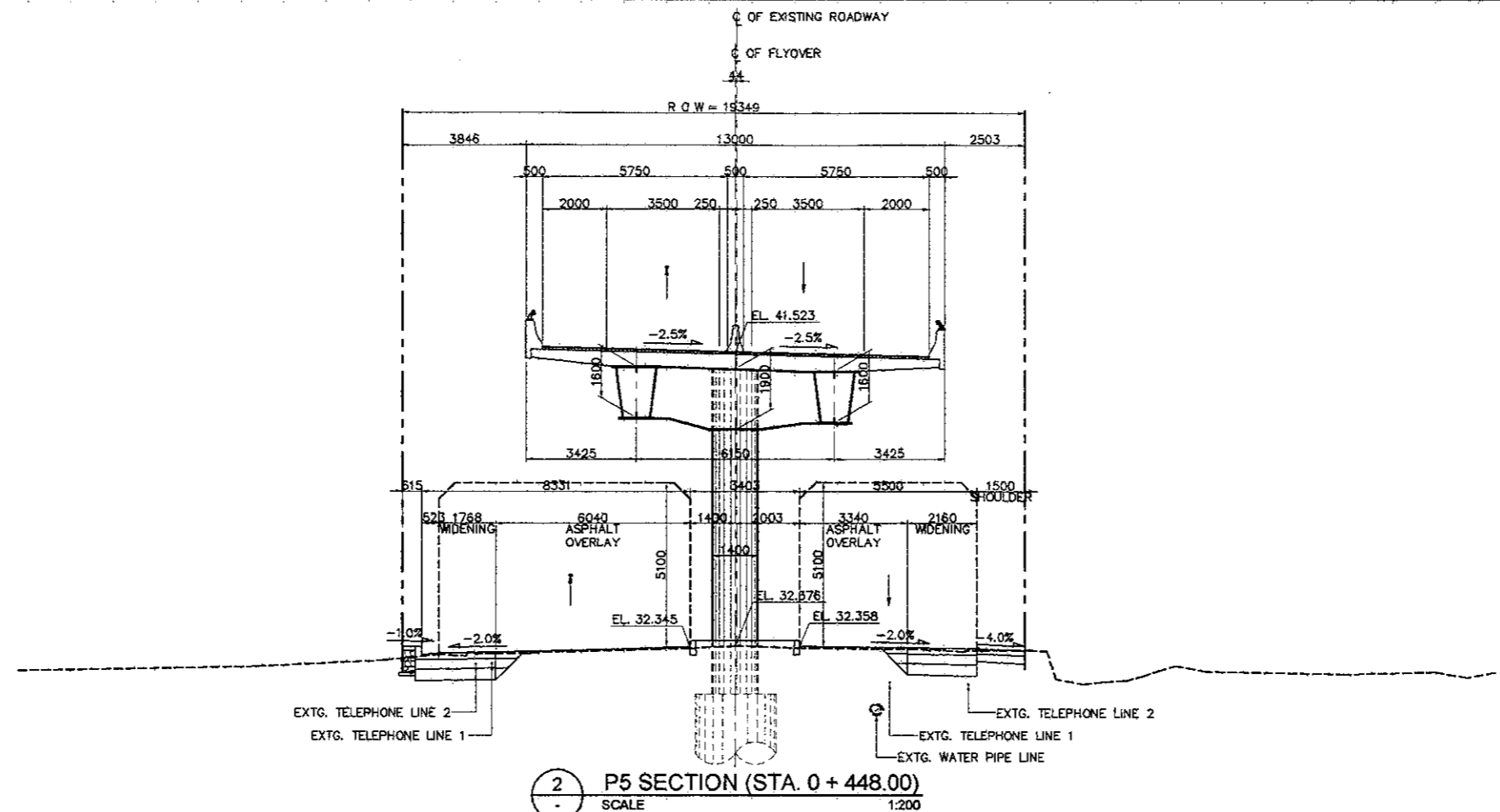


1 P2 SECTION (STA. 0 + 383.00)  
 SCALE 1:200

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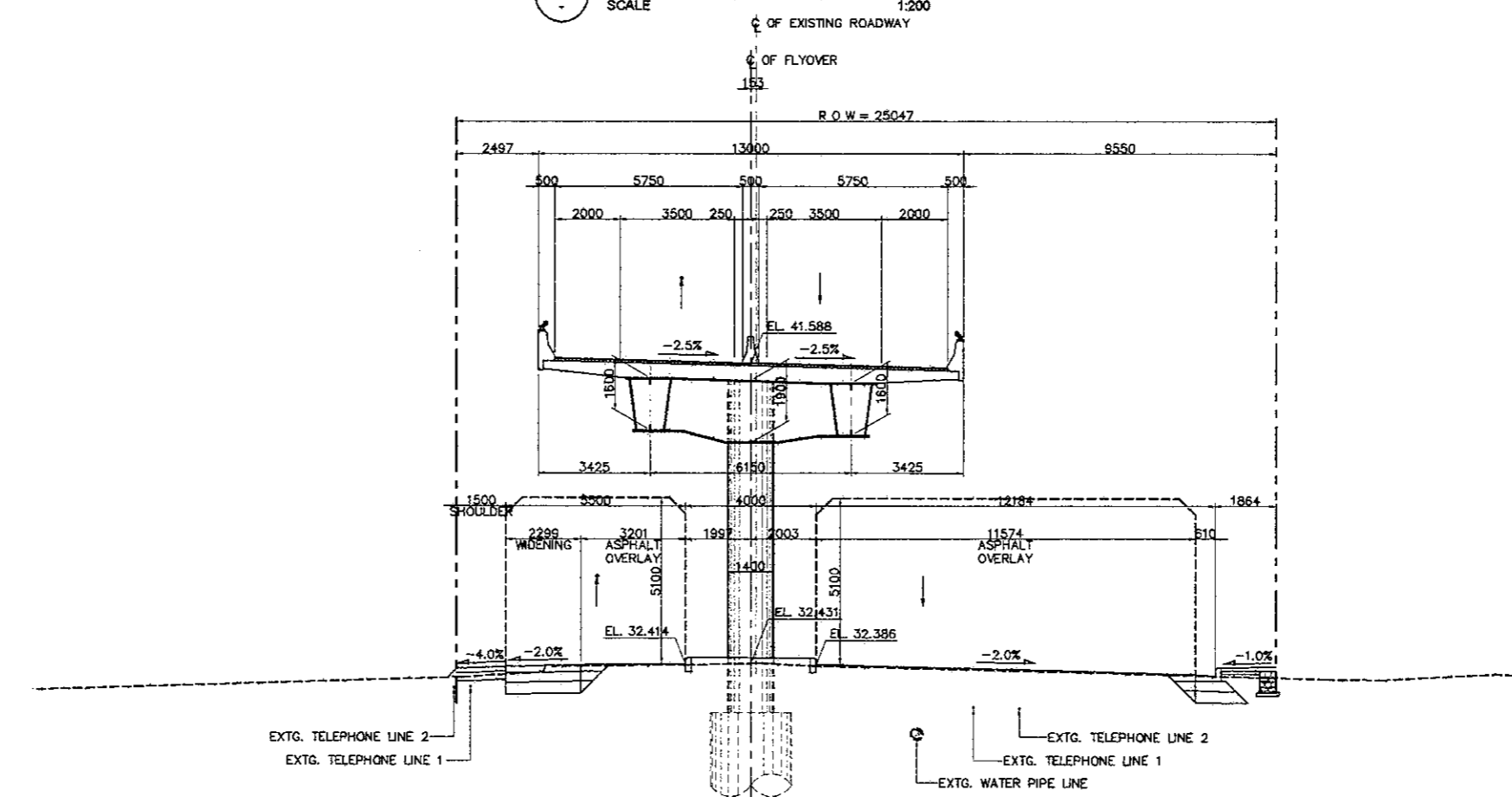
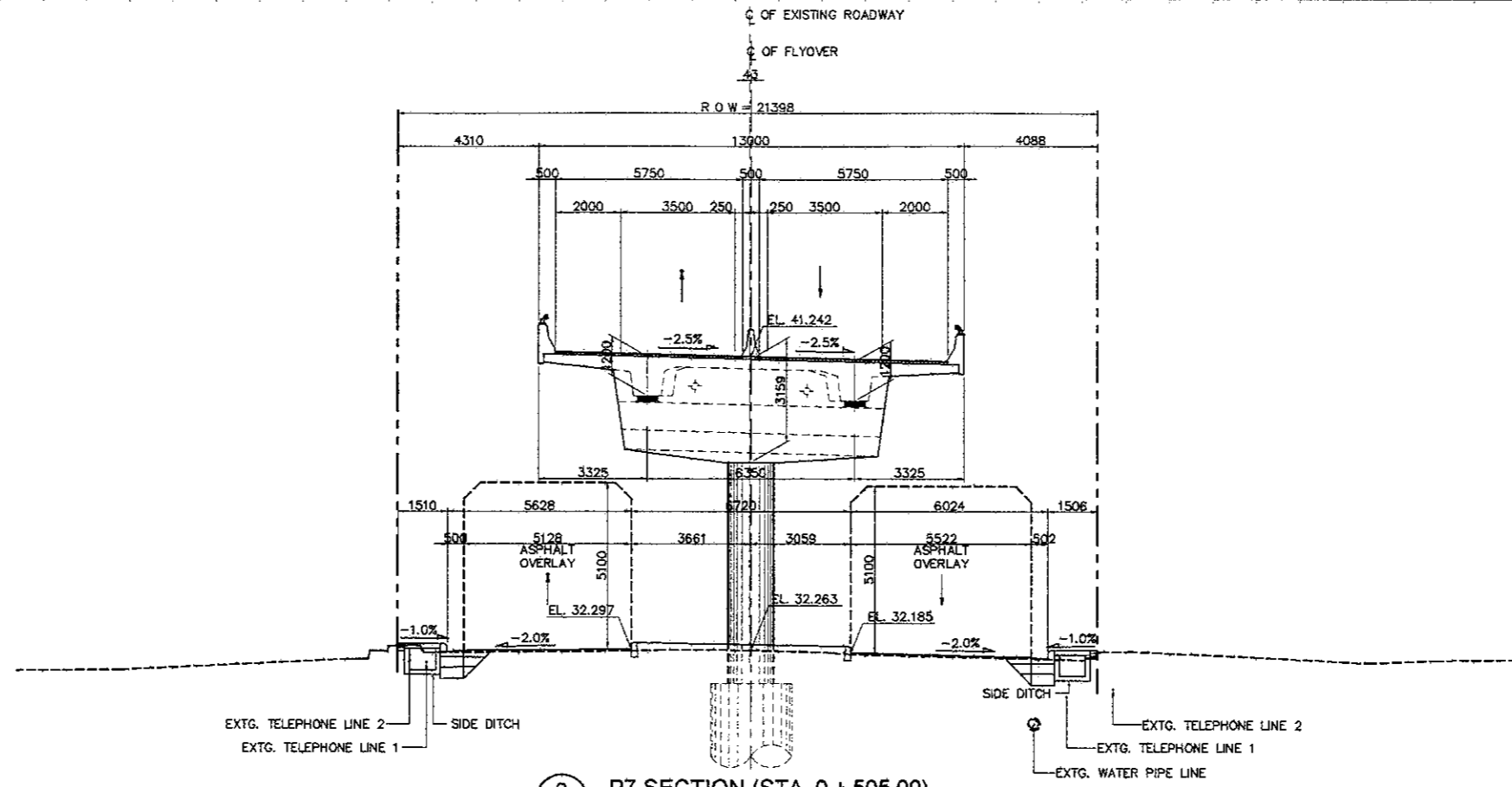


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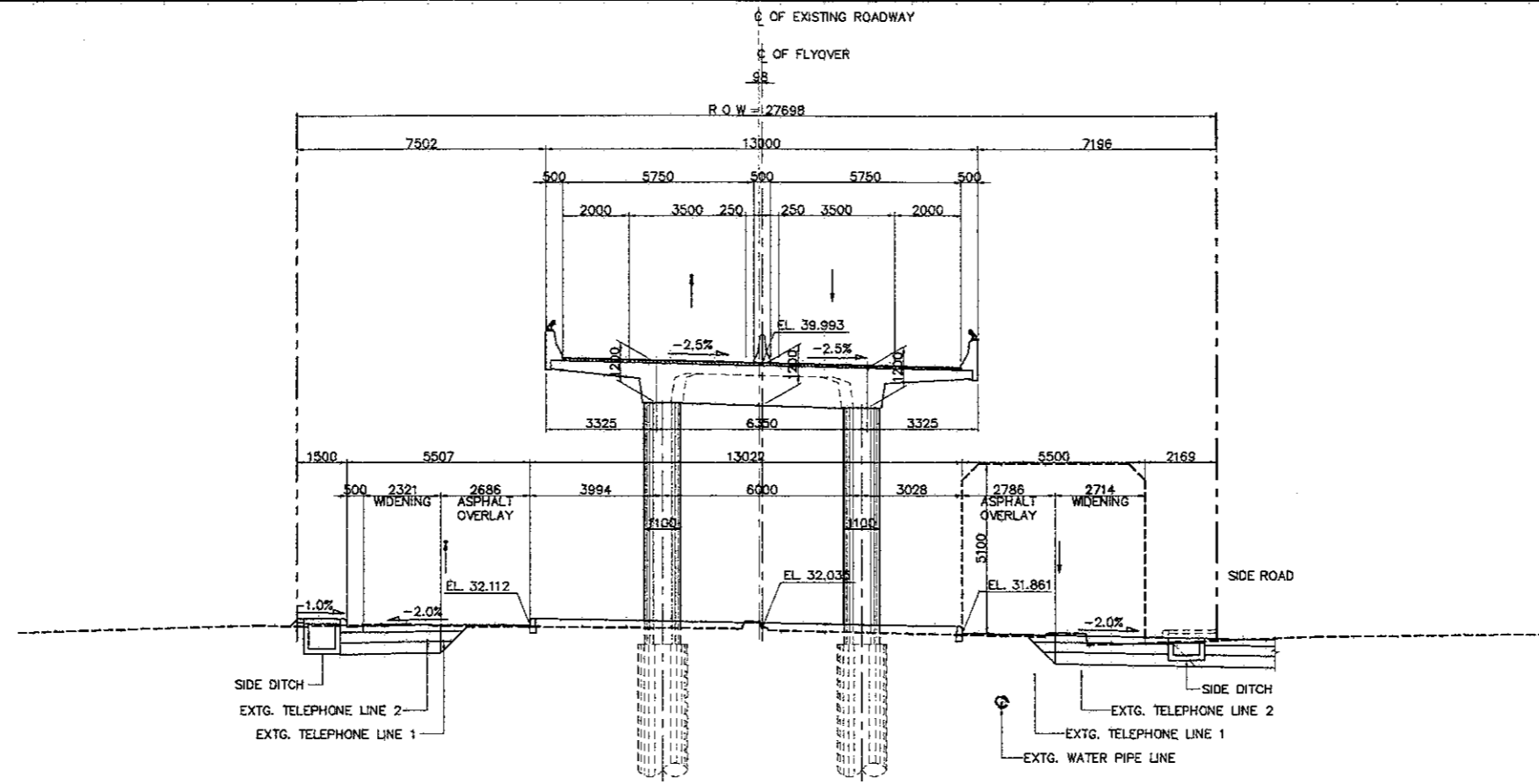
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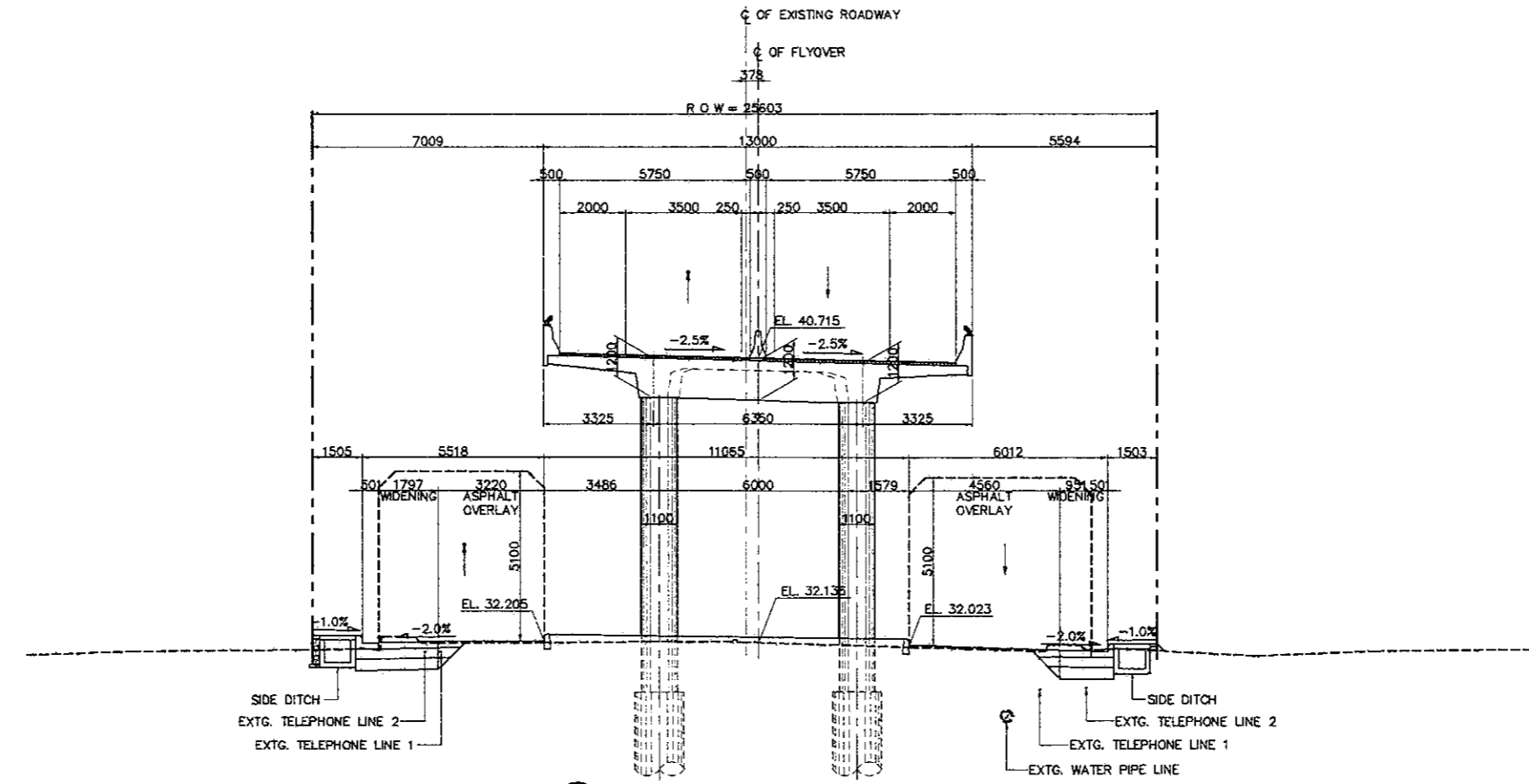


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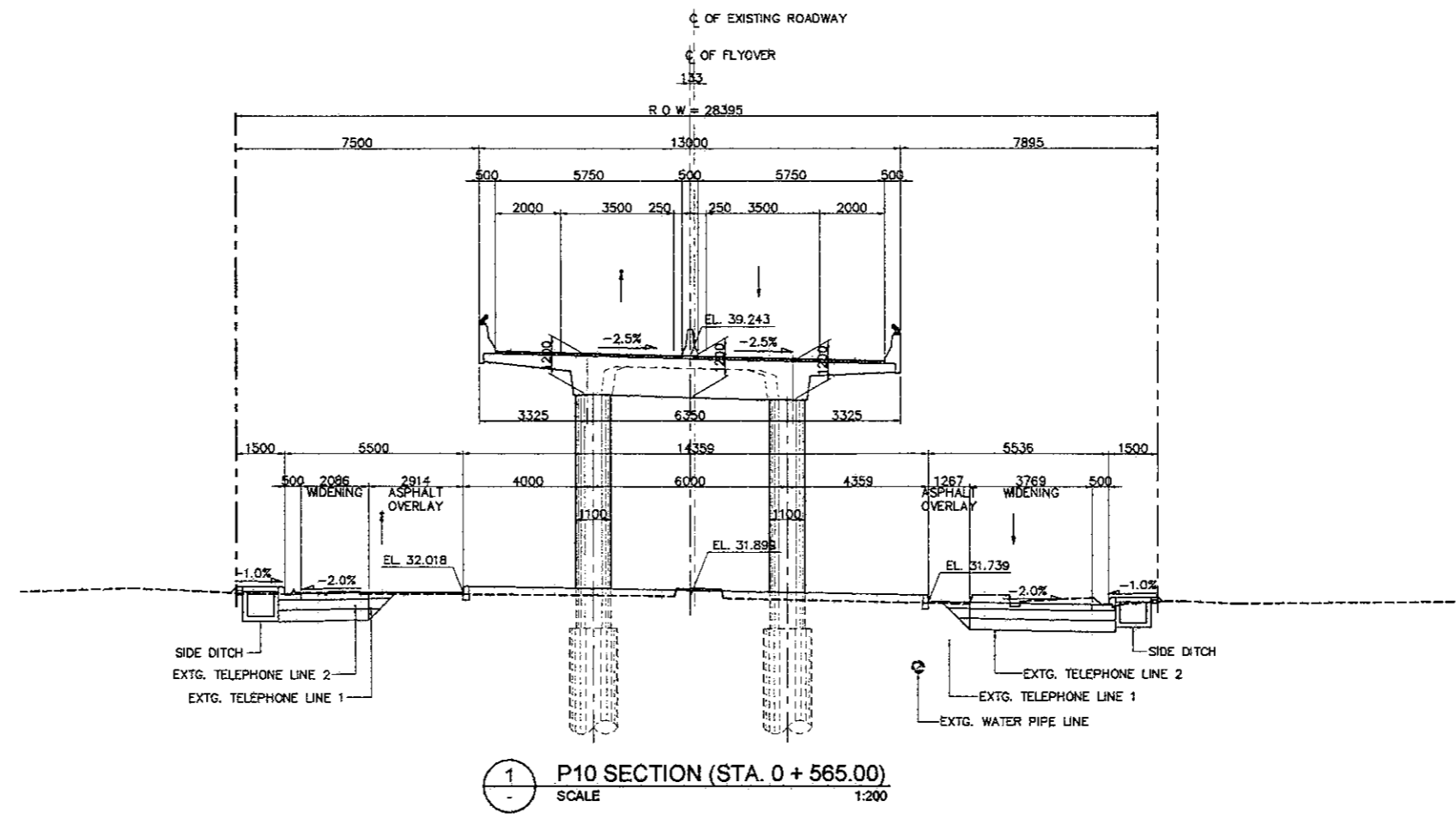
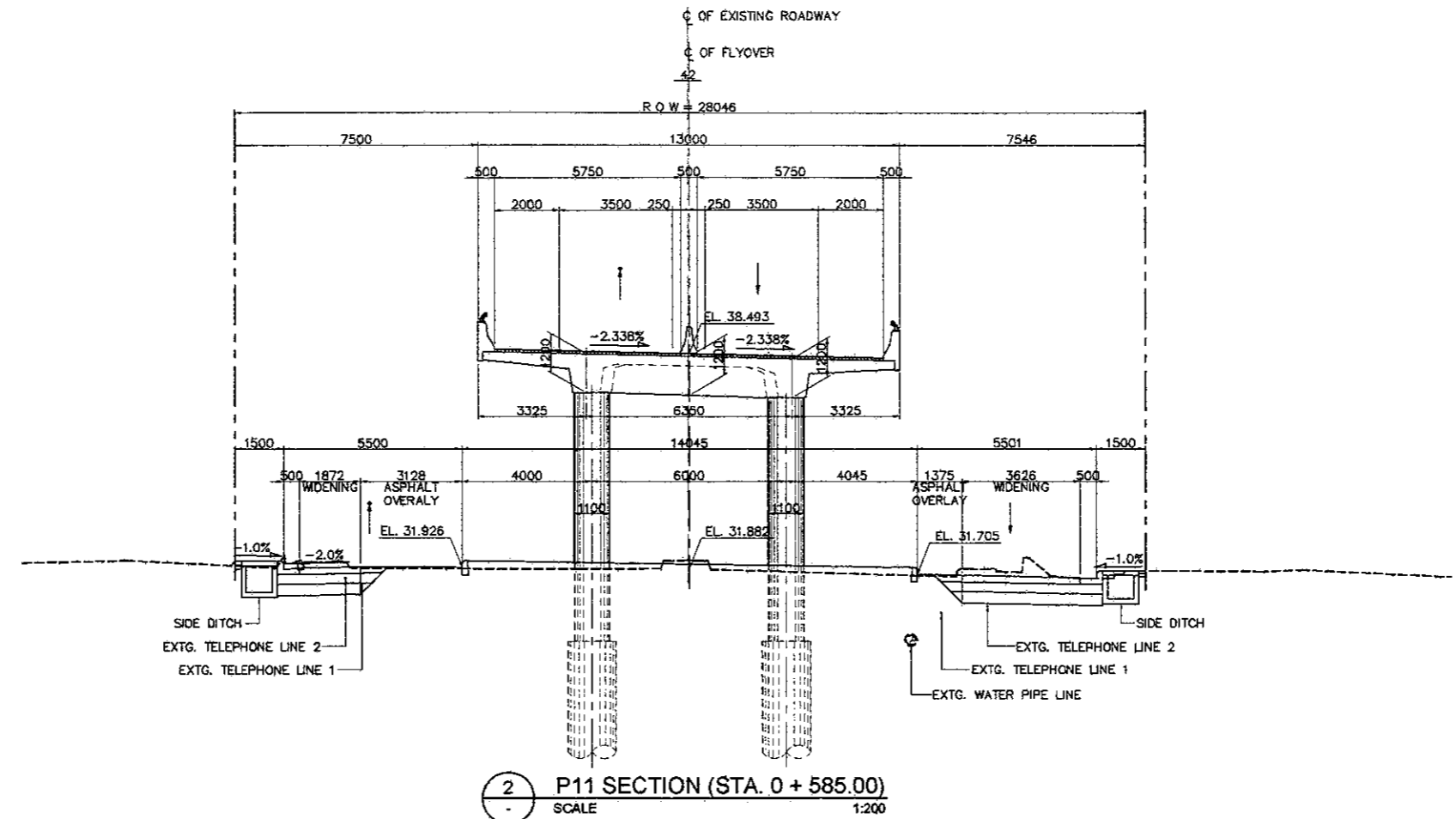
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 SCALE 1:200



**1** P8 SECTION (STA. 0 + 525.00)  
 SCALE 1:200

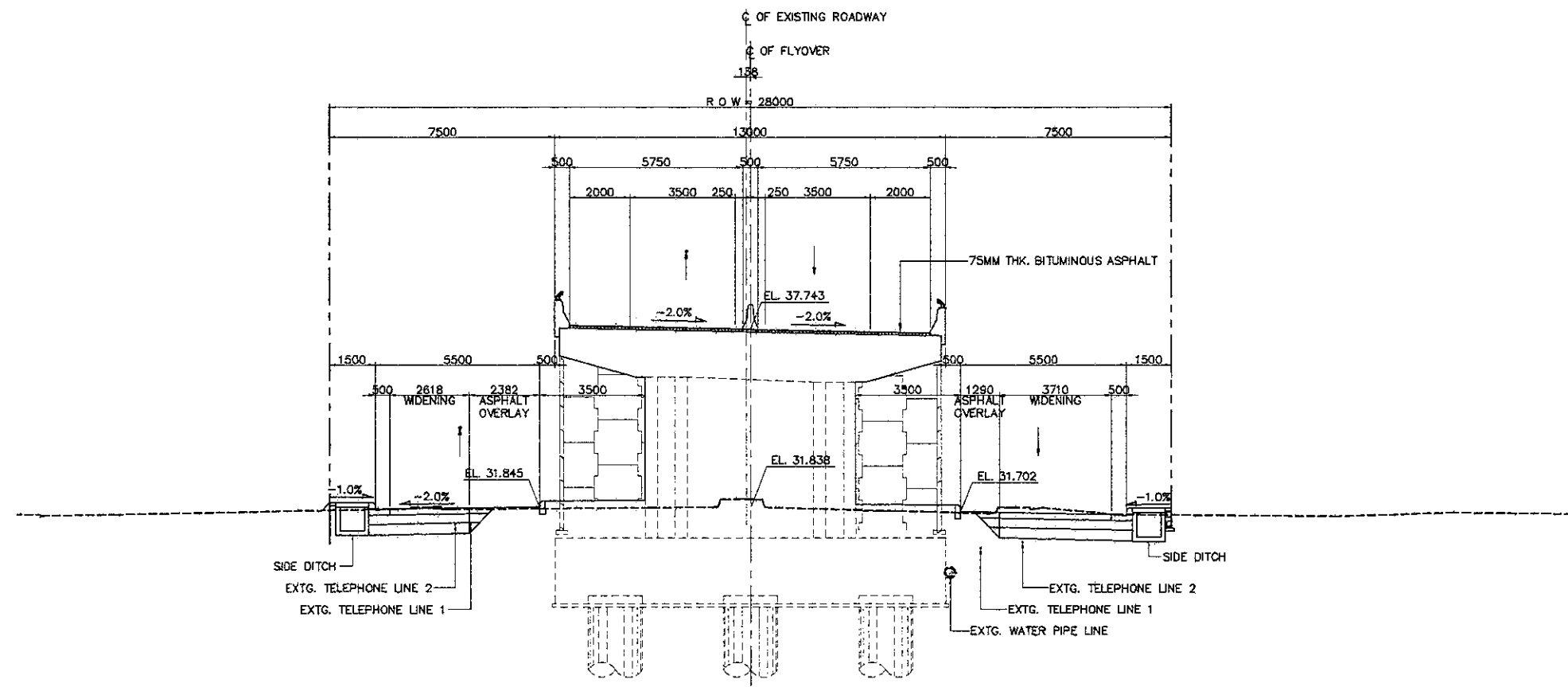
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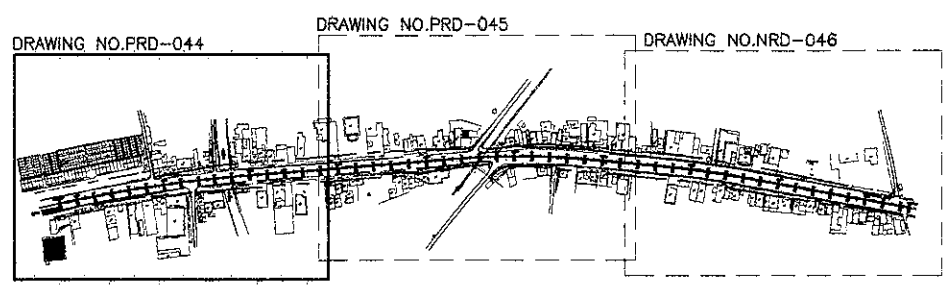
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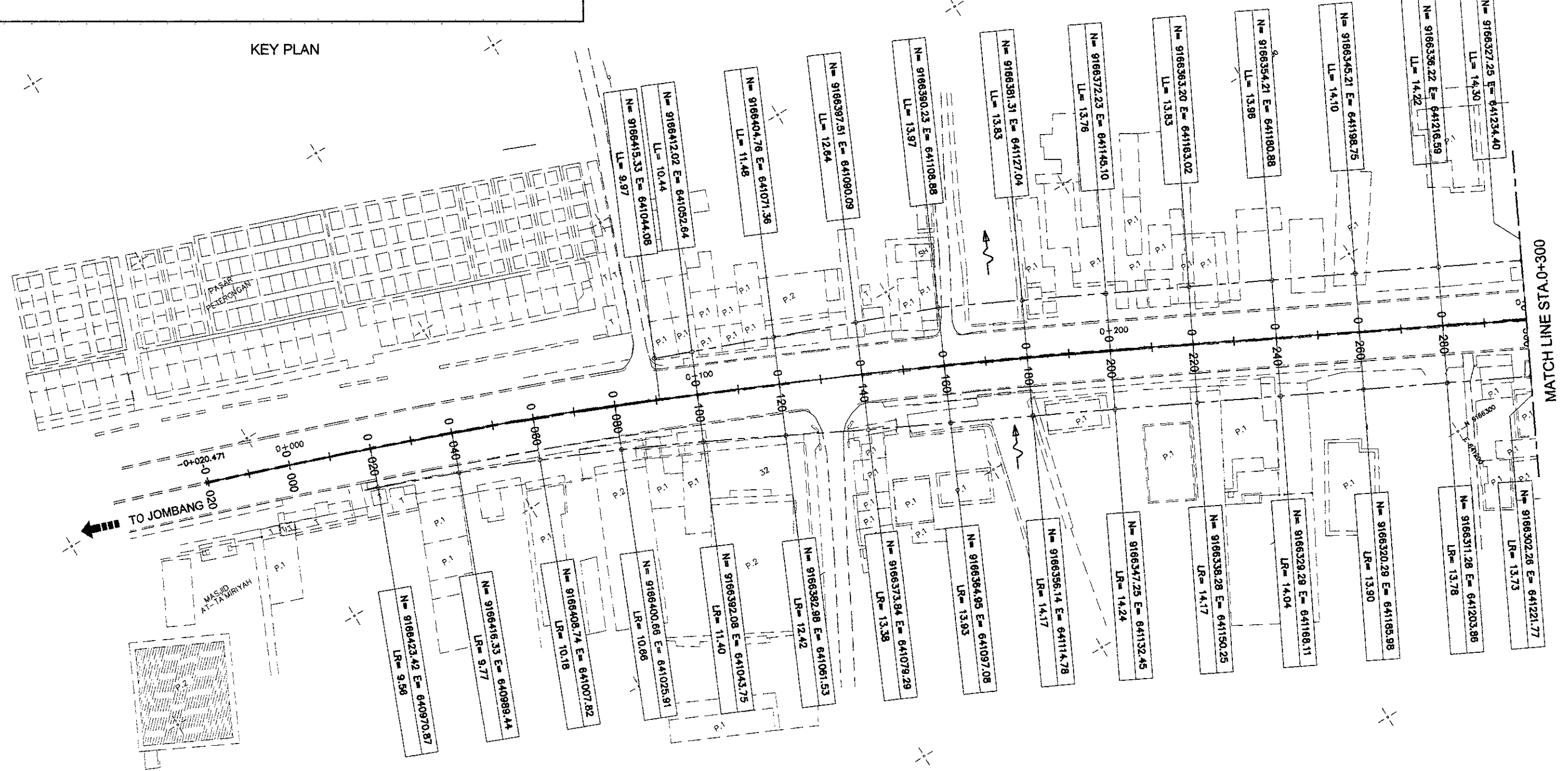
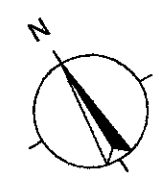
**1** A2 SECTION (STA. 0 + 605.00)  
 SCALE 1:200

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**KEY PLAN**

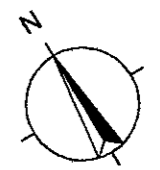
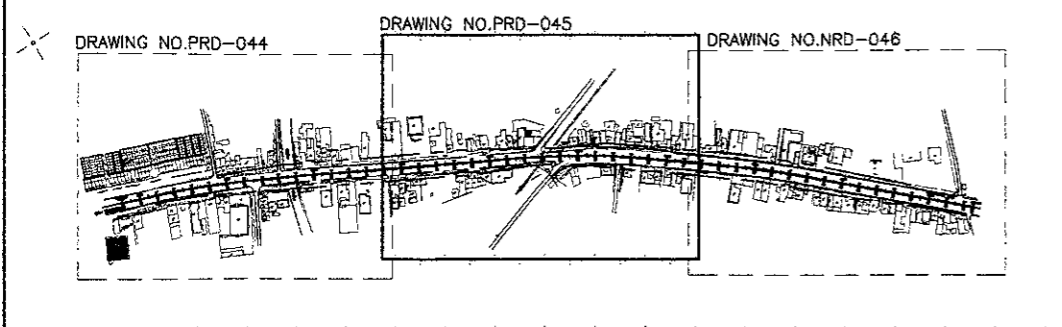


**LEGEND :**

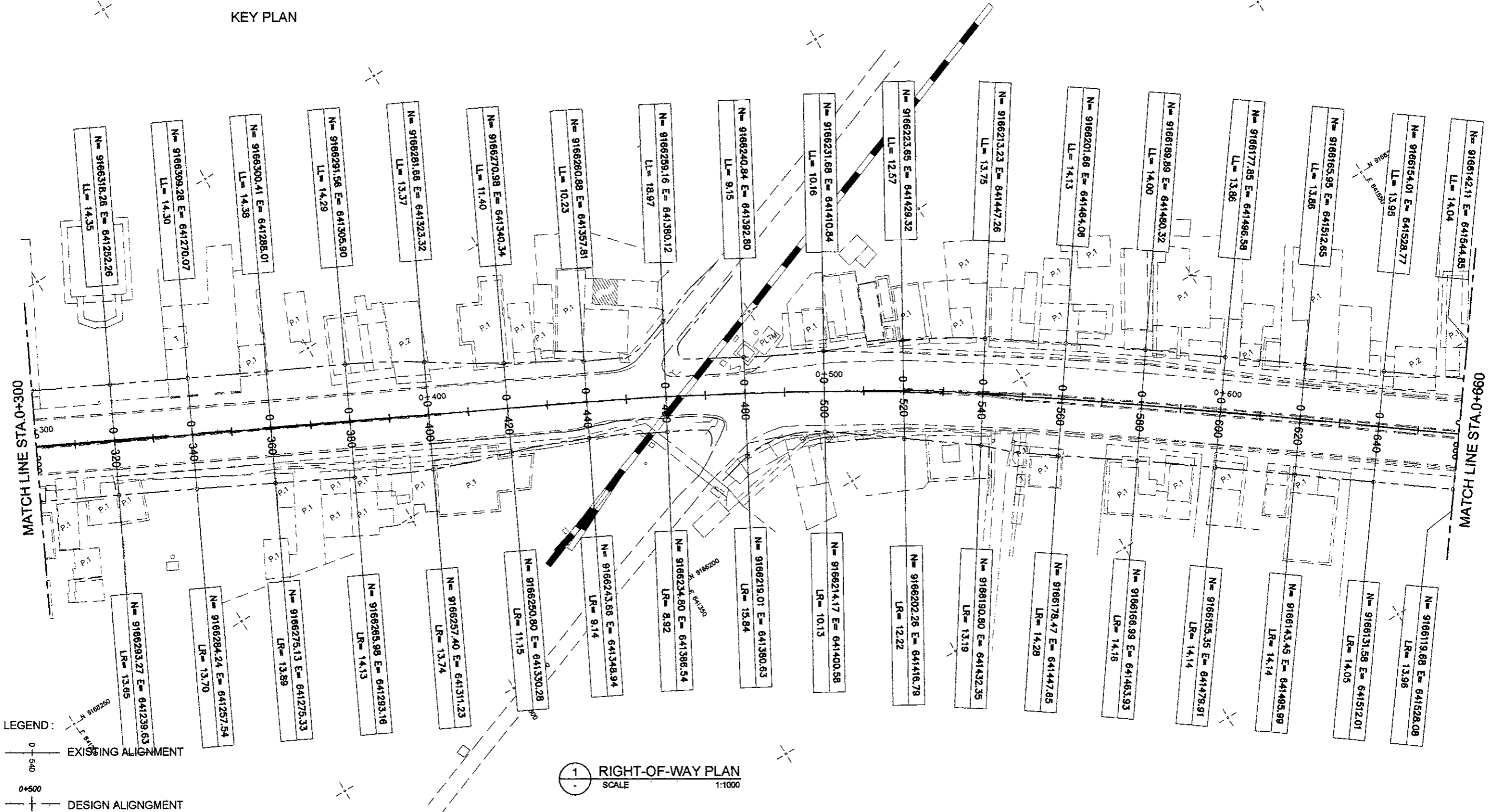
	EXISTING ALIGNMENT
	DESIGN ALIGNMENT

**RIGHT-OF-WAY PLAN**  
 SCALE 1:1000

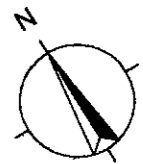
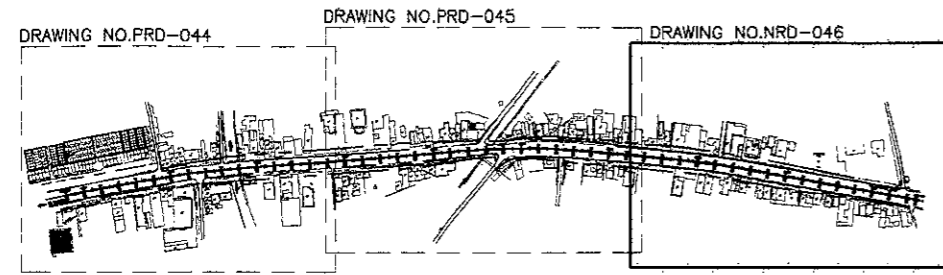
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**KEY PLAN**



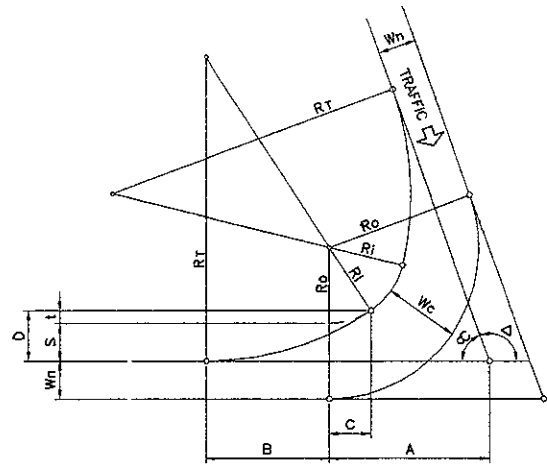
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Sign	Sign	Sign
Date	Date	Date



KEY PLAN







NOTES

- RELATIVE PATHS OF RIGHT TURNING VEHICLES ARE IMAGINARY ONLY; OVERALL, THESE WILL DETERMINE THE CONFIGURATION OF CHANNELIZATION ISLANDS IN INTERSECTION DESIGN.
  - Ro AS DEFINED BY CONDITION OBTAINING AND Wc IN CONFORMANCE WITH DESIGN VEHICLES AND Ro.
- ( ADOPTED FROM JAPANESE STANDARDS )  
 AND/OR "GEOMETRIC JALAN PERKOTAAN"  
 RSNI T-14-2004

WHERE

- Wn = LANE WIDTH (NORMAL)
- Wc = LANE WIDTH (TURNING)
- Δ = INTERSECTION ANGLE
- Ro = OUTER RADIUS
- Ri = INNER RADIUS
- RT = TRANSITION RADIUS
- α = 180° - Δ

FORMULAS

$$R_i = R_o - W_c$$

$$R_T = n R_i \quad (n=3)$$

$$S = W_c - W_n$$

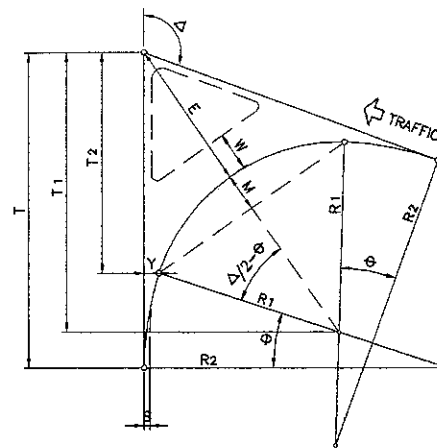
$$t = S / (n-1)$$

$$A = (R_i + S) \cot \alpha / 2$$

$$B = \sqrt{2(R_T - R_i) S - S^2}$$

$$C = B / (n-1)$$

$$D = S + t$$



NOTES

- FORMULAS DERIVED BELOW ARE FOR FIELD LAYOUT PURPOSE (DRAWING LAYOUT BY GRAPHICAL SOLUTION ONLY.)
- DESIGN RADII ( R1, R2 & R3 ) AND OFFSET S AS WELL AS LANE WIDTH W ( WHERE CORNER ISLANDS ARE REQUIRED UNDER CONDITIONS OBTAINING )

WHERE

- Δ = INTERSECTION ANGLE
- R1 = INNER RADIUS
- R2 = TRANSITION RADIUS
- S = OFFSET OF INNER CIRCULAR CURVE FROM TANGENTS

FORMULAS

$$T_1 = (R_1 + S) \tan \frac{\Delta}{2}$$

$$T = T_1 + (R_2 - R_1) \sin \theta$$

$$T_2 = T_1 - R_1 \sin \theta$$

$$Y = (R_1 + S) - R_1 \cos \theta$$

$$E = \frac{R_1 + S}{\cos \frac{\Delta}{2}} - R_1$$

$$M = R_1 - R_1 \cos (\frac{\Delta}{2} - \theta)$$

$$\theta = \cos^{-1} \left( \frac{R_2 - R_1 - S}{R_2 - R_1} \right)$$

WHERE

- R1 = RADIUS OF INTERMEDIATE CIRCULAR ARC
- R2 = RADIUS OF CIRCULAR ARC ON APPROACH LEG (1.5 x R1)
- R3 = RADIUS OF CIRCULAR ARC ON DEPARTURE LEG (3 x R1)
- S = OFFSET OF INNER CIRCULAR CURVE FROM TANGENTS
- Δ = INTERSECTION ANGLE

FORMULAS

$$\theta_A = \cos^{-1} \left[ \frac{R_2 - (R_1 + S)}{R_2 - R_1} \right]$$

$$\theta_B = \cos^{-1} \left[ \frac{R_3 - (R_1 + S)}{R_3 - R_1} \right]$$

$$T_1 = (R_1 + S) \tan \frac{\Delta}{2}$$

$$T_A = T_1 + (R_2 - R_1) \sin \theta_A$$

$$T_B = T_1 + (R_3 - R_1) \sin \theta_B$$

$$t_A = T_1 - R_1 \sin \theta_A$$

$$t_B = T_1 - R_1 \sin \theta_B$$

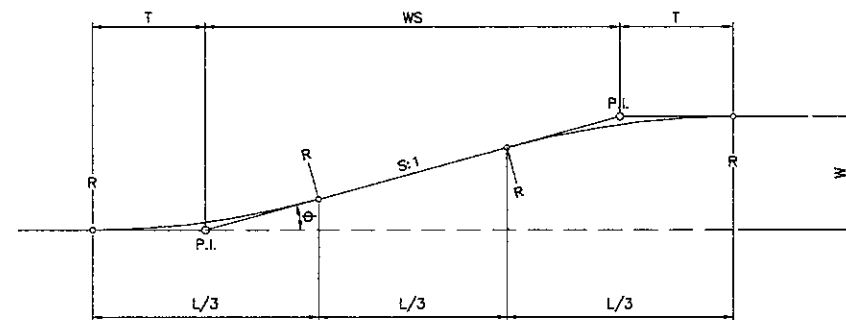
$$Y_A = (R_1 + S) - R_1 \cos \theta_A$$

$$Y_B = (R_1 + S) - R_1 \cos \theta_B$$

1 RIGHT TURN LANE/S ELEMENTS THREE CENTERED CURVE-SYMMETRICAL  
 NOT TO SCALE

2 LEFT TURN/S ELEMENTS THREE CENTERED CURVE-SYMMETRICAL  
 NOT TO SCALE

3 LEFT TURN/S ELEMENTS THREE CENTERED CURVE-ASYMMETRICAL  
 NOT TO SCALE



FORMULAS

$$\theta = \tan^{-1} 1/S \quad (\text{TAPER RATE } S:1)$$

$$T = \frac{WS}{3 \cos \theta + 1}$$

$$L/3 = T (\cos \theta + 1)$$

$$R = \frac{T}{\tan \theta / 2}$$

APPROX.

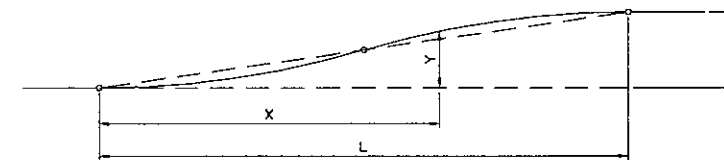
$$T = L/6$$

$$\theta = \tan^{-1} W/4T$$

OPERATING SPEED	S VALUE
40 KPH	8
50 KPH	(10)
60 KPH	(12.5)
PARKING TURNOUT (ENTRANCE / EXIT)	2
BUS TURNOUT (DESIRABLE MIN)	4

(S VALUE SHOWN IN PARENTHESIS WERE INTERPOLATED FROM AASHTO)

4 ROADWAY TAPERING - L/3 TAN SECTION (CIRCULAR CURVE ROUNDING)  
 NOT TO SCALE



FORMULAS

$$L = CWS$$

(C=1 MINIMUM)  
 (C=2 DESIRABLE)

$$Y = KW$$

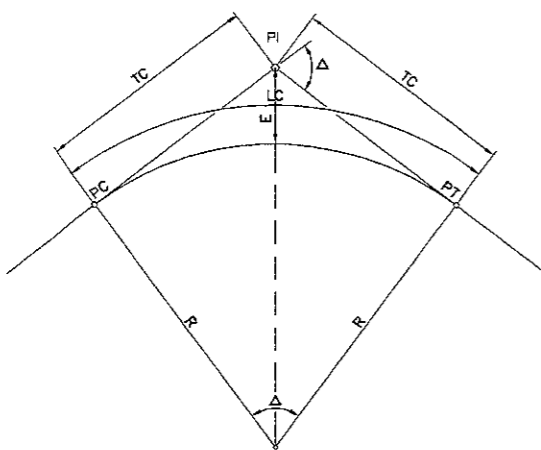
WHERE

- L = LENGTH OF FLARE
- W = WIDENING (MAX. OFFSET)
- S = TAPER RATE (HOR:VER)
- X = DISTANCE ALONG BASELINE
- Y = OFFSET FROM BASELINE

LAYOUT BY OFFSET

X/L	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00
K	0.000	0.005	0.020	0.045	0.080	0.125	0.180	0.245	0.320	0.405	0.500	0.595	0.680	0.755	0.820	0.875	0.920	0.955	0.980	0.995	1.000

5 ROADWAY TAPERING - REVERSED PARABOLIC CURVE FLARES - SYMMETRICAL  
 NOT TO SCALE



**WHERE**

PI = POINT OF INTERSECTION  
 Δ = INTERSECTION ANGLE  
 R = CURVE RADIUS  
 T = TANGENT LENGTH  
 LC = CURVE LENGTH  
 E = EXTERNAL DISTANCE  
 PC = BEGINNING OF CIRCULAR CURVE  
 PT = END OF CIRCULAR CURVE

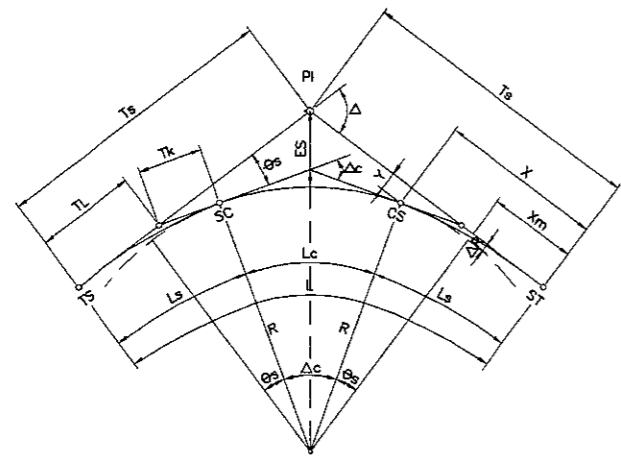
**FORMULAS**

$T = R (\tan \Delta/2)$   
 $LC = \frac{\pi R \Delta}{180}$   
 $E = T (\tan \Delta/4)$

1 HORIZONTAL CURVE (CIRCULAR)  
 NOT TO SCALE

**NOTE**

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

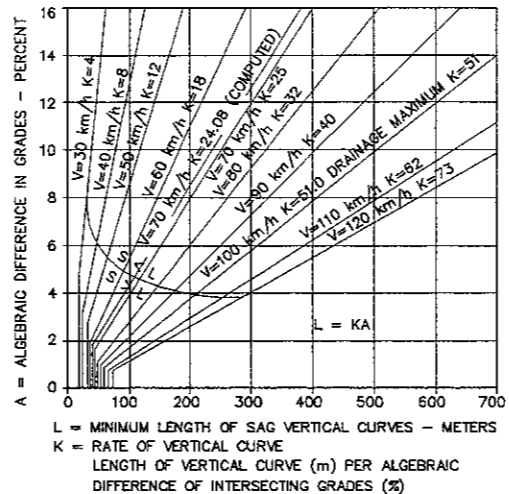


**WHERE**

PI = POINT OF INTERSECTION  
 Δ = INTERSECTION ANGLE  
 R = CURVE RADIUS  
 Es = EXTERNAL DISTANCE  
 Ls = LENGTH OF SPIRAL  
 A = PARAMETER OF CLOTHOID  
 Θs = SPIRAL ANGLE  
 X, Y = COORDINATES OF POINTS SC AND CS WITH RESPECT TO MAIN TANGENTS  
 ΔR = OFFSET BETWEEN CIRCULAR CURVE AND MAIN TANGENT ("THROW" OF SPIRAL)  
 Xm = DISTANCE FROM TS OR ST TO POINT OF "THROW"

Ts = TOTAL TANGENT DISTANCE  
 Tl = LONG TANGENT OF SPIRAL  
 Tk = SHORT TANGENT OF SPIRAL  
 L = TOTAL LENGTH OF CURVE  
 Δc = CENTRAL ANGLE OF CIRCULAR CURVE  
 Lc = LENGTH OF CIRCULAR CURVE  
 TS = BEGINNING OF TRANSITION CURVE  
 SC = BEGINNING OF CIRCULAR CURVE  
 CS = END OF CIRCULAR CURVE  
 ST = END OF TRANSITION CURVE

2 HORIZONTAL CURVE WITH TRANSITION (CLOTHOID SPIRAL)  
 NOT TO SCALE



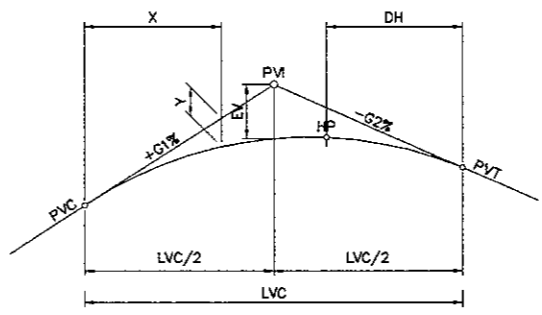
**FORMULA**

$L = \frac{AS^2}{120 + 3.5S}$        $L = 25 - \left( \frac{120 + 3.5S}{A} \right)$

**WHEN**  $S < L$       **WHEN**  $S > L$

S = STOPPING SIGN DISTANCE (m)  
 A = ALGEBRAIC DIFFERENCE IN GRADE (%)

3 DESIGN CONTROLS FOR VERTICAL CURVES  
 NOT TO SCALE



**WHERE**

PM = VERTICAL POINT OF INTERSECTION  
 AD = ALGEBRAIC DIFFERENCE OF INTERSECTING GRADES  
 K = RATE OF VERTICAL CURVE  
 LVC = LENGTH OF VERTICAL CURVE  
 EV = VERTICAL OFFSET  
 PVC = VERTICAL POINT OF CURVATURE  
 PVT = VERTICAL POINT OF TANGENCY  
 G1, G2 = TANGENT GRADES IN PERCENT  
 MO = MIDDLE ORDINATE  
 X = DISTANCE FROM PVC TO PVT TO ANY POINT OF CURVE  
 Y = VERTICAL OFFSET AT SAID DISTANCE "X"  
 HP = HIGH POINT OF CURVE  
 DH = DISTANCE OF "HP" FROM CURVE END RECKONED FROM FLATTER GRADE

**FOR SYMMETRICAL VERTICAL PARABOLIC CURVES**

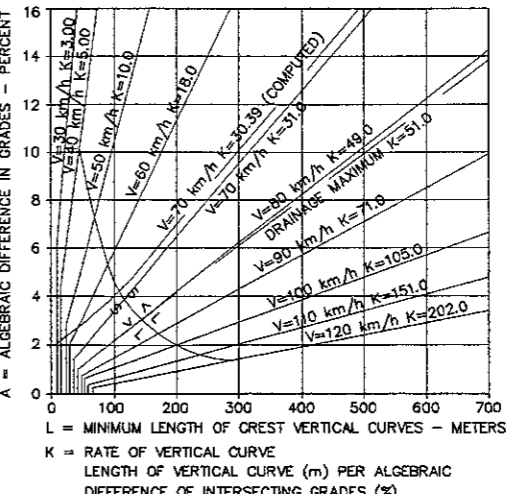
$EV = \frac{(G1-G2) \cdot L}{8}$   
 $Yx = \frac{(G1-G2) \cdot x^2}{2LVC}$   
 $DH = \frac{GLVC}{(G1-G2)}$

(WHERE G IS THE LESSER GRADE)

**NOTES**

1. SIMILARLY APPLIES TO LP (LOW POINT) OF SAG VERTICAL CURVES  
 2. NO VERTICAL CURVE IS REQUIRED WHERE THE ALGEBRAIC DIFFERENCE IN GRADE IS 0.50% OR LESS

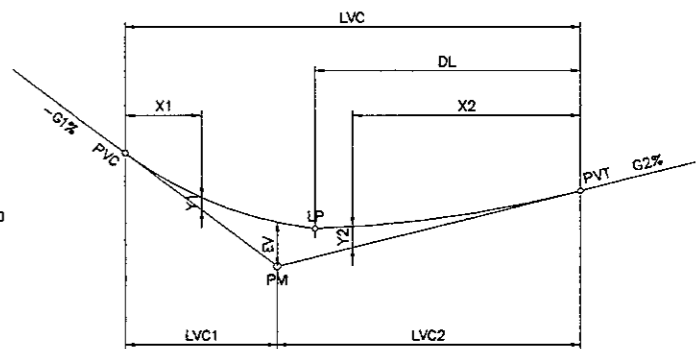
4 VERTICAL PARABOLIC CURVE (SYMMETRICAL)  
 NOT TO SCALE



**FORMULA**

$L = \frac{AS^2}{65S}$        $L = 25 - \frac{65S}{A}$

**WHEN**  $S < L$  :  $S > L$



**WHERE :**

LVC1 = SHORT SIDE OF VERTICAL CURVE LENGTH  
 LVC2 = LONG SIDE OF VERTICAL CURVE LENGTH  
 LP = LOW POINT OF CURVE  
 DL = DISTANCE OF LP FROM CURVE END RECKONED FROM FLATTER GRADE  
 ALL OTHER NOMENCLATURE SAME AS SYMMETRICAL PARABOLIC CURVE

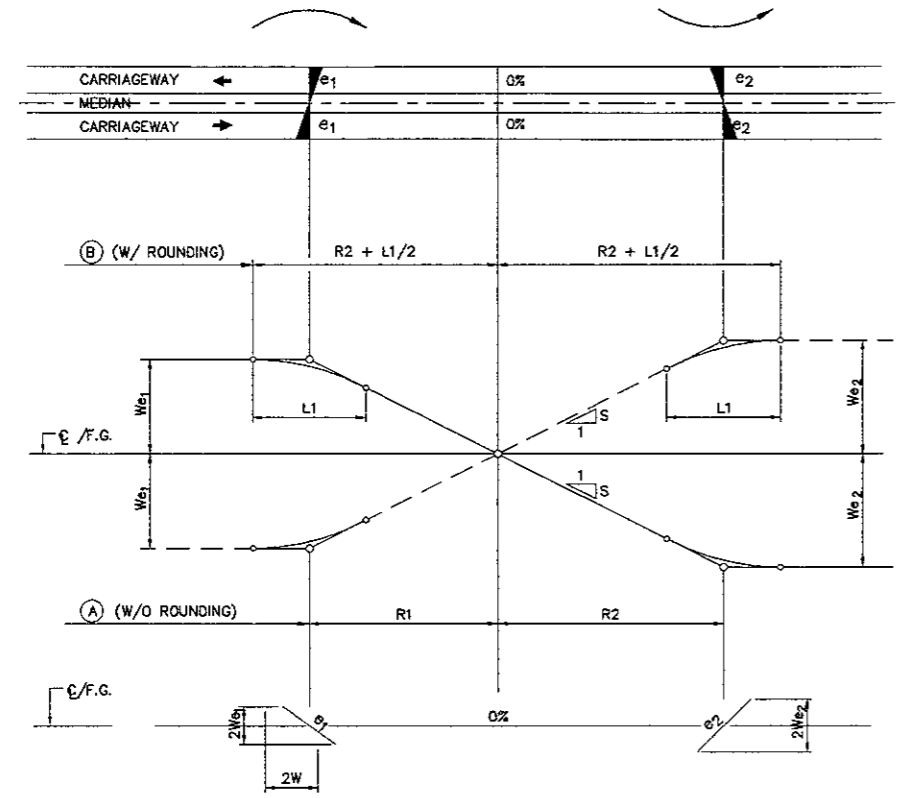
**FOR ASYMMETRICAL VERTICAL PARABOLIC CURVES**

$EV = \frac{(G1-G2) \cdot L1 \cdot L2}{100 \cdot 2L}$        $Y2 = \frac{x2^2}{L2^2} \cdot EV$   
 $Y1 = \frac{x1^2}{L1^2} \cdot EV$   
 $DL = \frac{G2 \cdot L2}{L1} \cdot K$   
 $K = \frac{L}{G1+G2}$

**NOTES :**

1. SIMILARLY APPLIES TO HP (HIGH POINT) OF CREST VERTICAL CURVES  
 2. NO VERTICAL CURVE IS REQUIRED WHERE THE ALGEBRAIC DIFFERENCE IN GRADE IS 0.50% OR LESS

5 VERTICAL PARABOLIC CURVE (ASYMMETRICAL)  
 NOT TO SCALE



$$R1 = \frac{We_1}{S}$$

$$R2 = \frac{We_2}{S}$$

$$L1 = \frac{Wnc}{S}$$

WHERE  
 R1 = LENGTH OF SUPERELEV. RUNOFF (1st CURVE)  
 R2 = LENGTH OF SUPERELEV. RUNOFF (2nd CURVE)  
 L1 = LENGTH OF ROUNDING  
 ALL OTHER NOMENCLATURE THE SAME

PETERONGAN FLYOVER PIER			
STATION	SUPERELEVATION		
	LEFT	RIGHT	
A1	0+343.00	-2.000	-2.000
P1	0+363.00	-2.000	-2.000
P2	0+383.00	-2.000	-2.000
P3	0+403.00	-2.000	-2.000
P4	0+423.00	0.000	-2.000
P5	0+448.00	2.500	2.500
P6	0+480.00	2.500	2.500
P7	0+505.00	2.500	2.500
P8	0+525.00	2.500	2.500
P9	0+545.00	2.500	2.500
P10	0+565.00	2.500	2.500
P11	0+585.00	2.338	-2.338
A2	0+605.00	2.000	-2.000

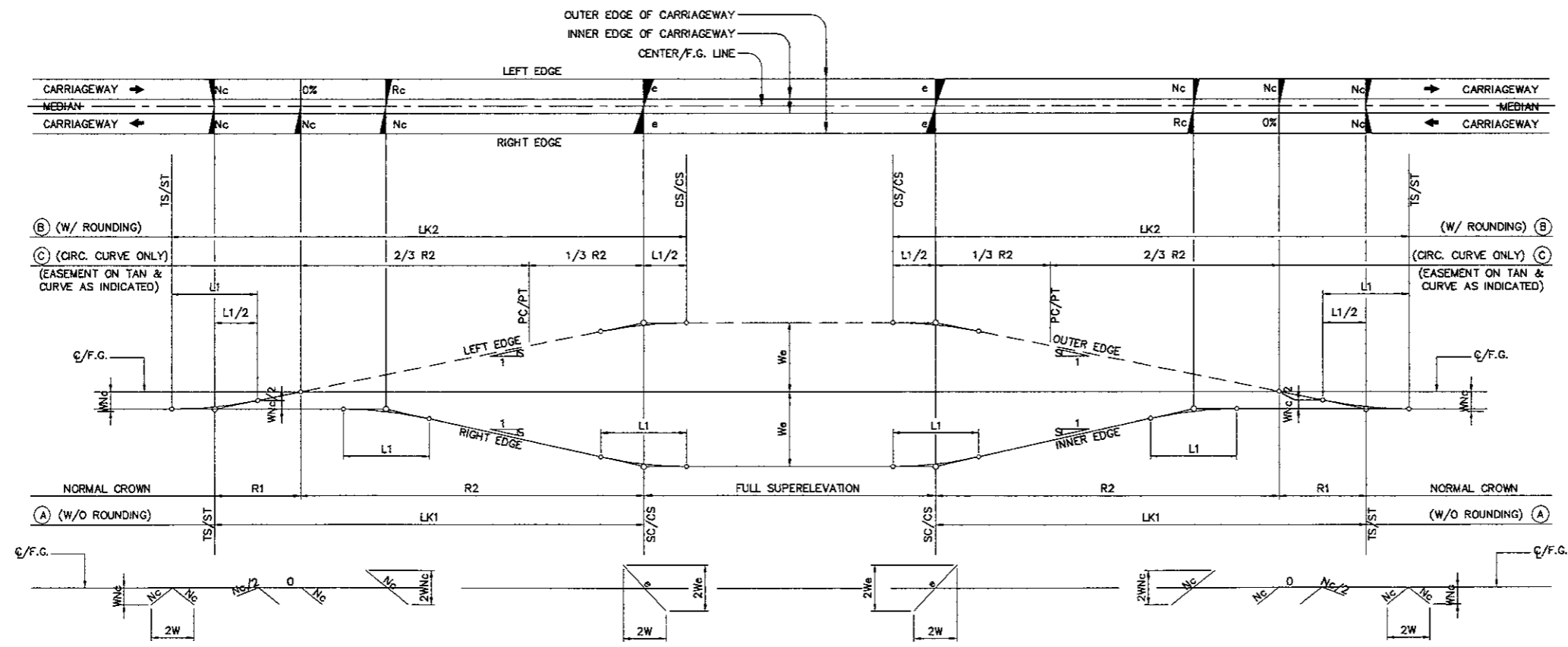
S VALUE (INTERPOLATED FROM AASHTO)									
DESIGN SPEED Km/h	40	50	60	70	80	90	100	110	120
100 S	0.70	0.65	0.60	0.55	0.50	0.48	0.45	0.42	0.40

- NOTES
- RATE OF SUPERELEVATION "e" IS AS SHOWN IN TABLE.
  - ROUNDING "L1" IS OPTIONAL AND NECESSARY ONLY IF "S" IS GREATER THAN THAT SHOWN IN TABLE FOR "S" VALUE.
  - SIDEWALKS SHALL ALWAYS SLOPE TOWARDS THE TRAVELWAY.
  - SHOULDERS OF THE MAIN ROADS ALWAYS SLOPE AWAY FROM THE TRAVELWAY IRRESPECTIVE OF THE RATE OF SUPERELEVATION, "e".

WHERE

LK1 = MIN. LENGTH OF EASEMENT/CLOTHOID (W/O ROUNDING)  
 LK2 = MIN. LENGTH OF EASEMENT/CLOTHOID (W/ ROUNDING, L1)  
 R1 = SUPERELEVATION RUNOUT LENGTH (WITHIN CLOTHOID) \*  
 R2 = SUPERELEVATION RUNOFF LENGTH  
 L1 = LENGTH OF ROUNDING  
 W = CARRIAGEWAY WIDTH = 7.00m (2 LANES EACH DIRECTION)  
 e = SUPERELEVATION  
 Nc = NORMAL CROWN SLOPE  
 S = RELATIVE SLOPE OF EDGES TO CENTERLINE

\* OTHER AUTHORITIES PLACE R1 WITHIN THE TANGENT



$$A^2 = R \times LK$$

A = CLOTHOID PARAMETER

$$R1 = \frac{WNc}{S}$$

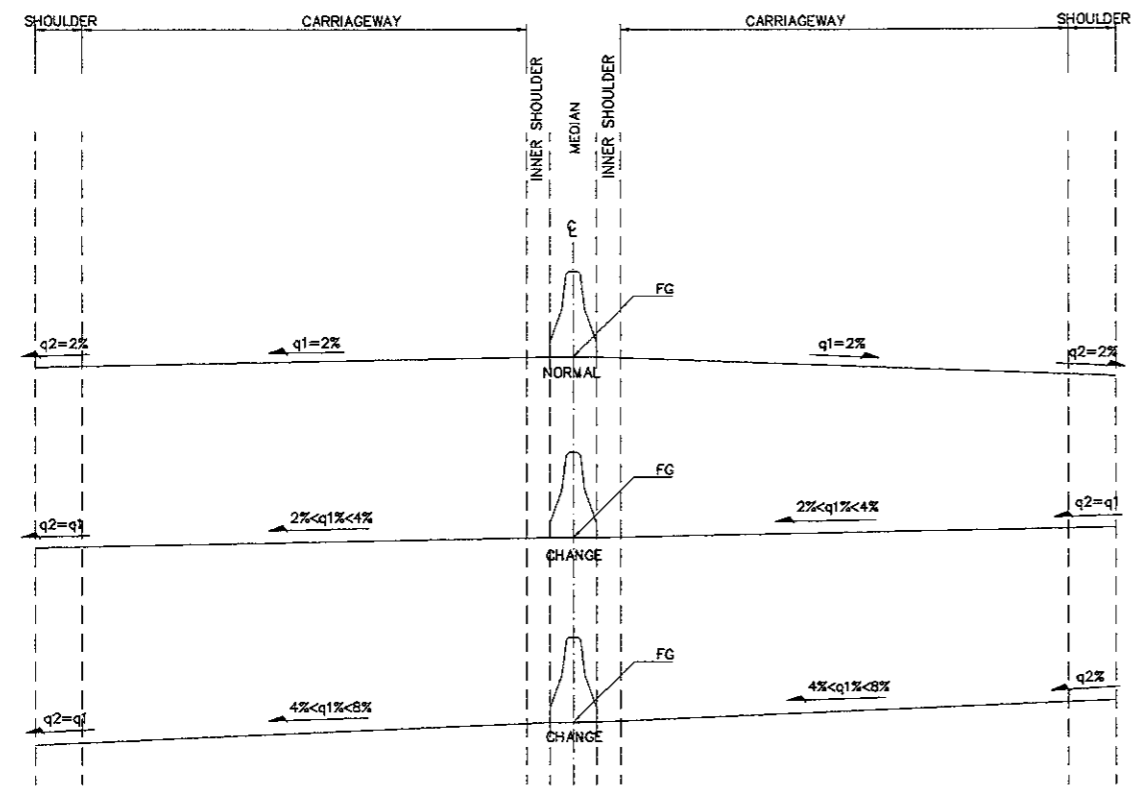
$$R2 = \frac{We}{S}$$

$$L1 = \frac{Wnc}{S}$$

$$LK1 = R1 + R2 = \frac{W}{S} (Nc + e) \quad (A)$$

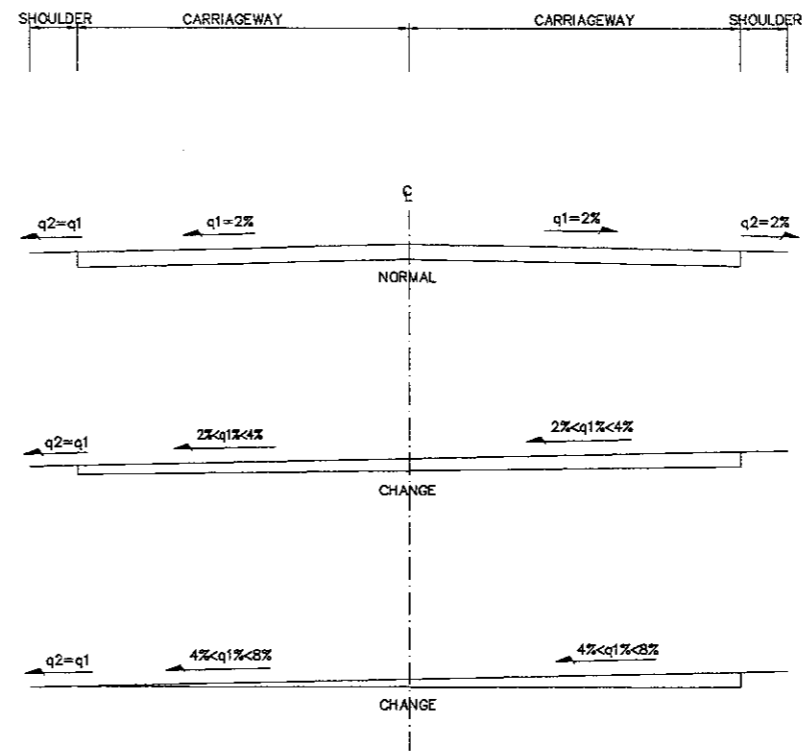
$$LK2 = L1 + LK1 = \frac{W}{S} (2Nc + e) \quad (B)$$

1 SUPERELEVATION TRANSITION FLYOVER  
 NOT TO SCALE



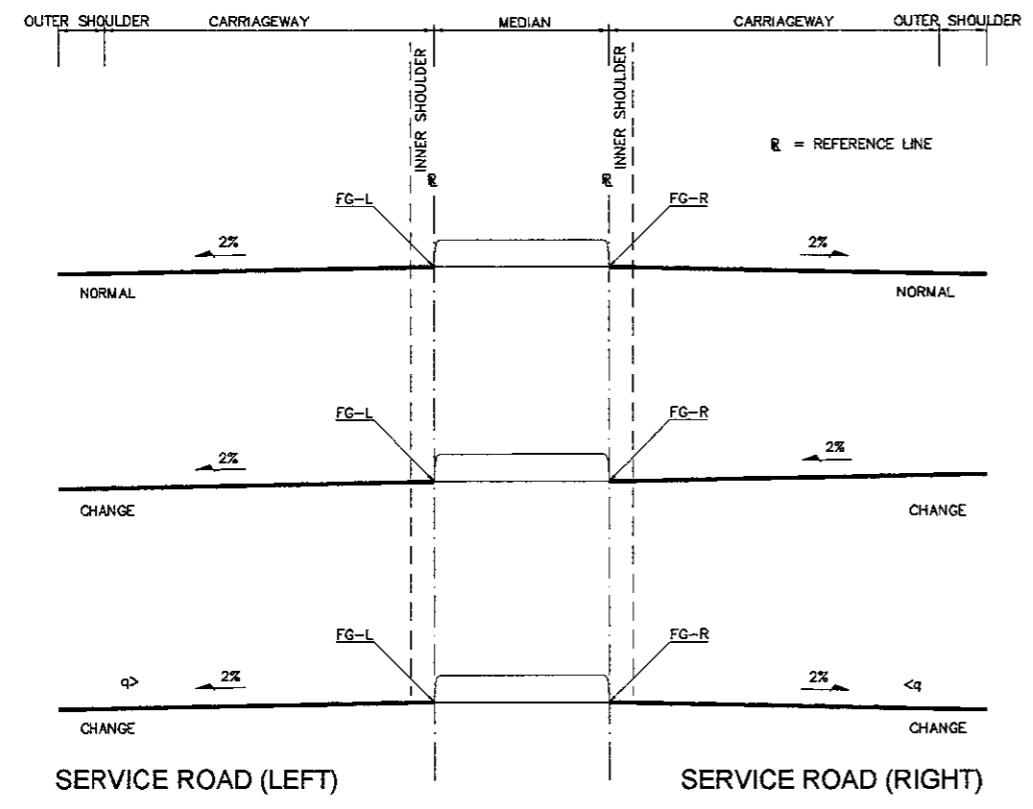
$|q1|+|q2|<8\%$

1 MAIN ROAD / FLYOVER  
 NOT TO SCALE



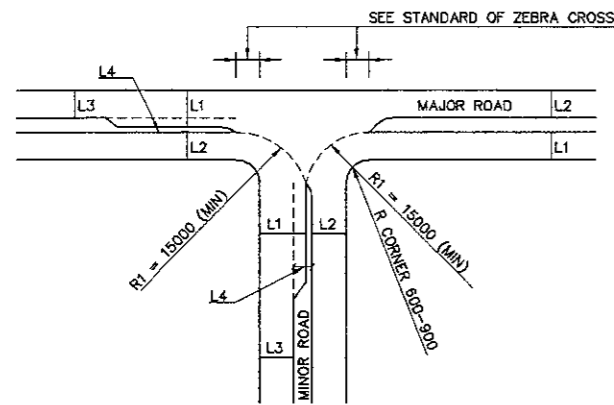
2 SUPERELEVATED ( EXISTING 2-LANE, 2-WAY )  
 NOT TO SCALE

STATION	SUPER ELEVATION		
	FG	LEFT	RIGHT
0+080.00	31.441	-2.000	-2.000
0+100.00	31.450	-2.000	-2.000
0+180.00	32.407	-2.000	-2.000
0+200.00	32.513	-2.000	-2.000
0+300.00	35.820	-2.000	-2.000
0+380.00	39.500	-2.000	-2.000
0+400.00	40.357	-2.000	-2.000
0+420.00	40.999	-0.300	-2.000
0+440.00	41.418	1.700	-2.000
0+460.00	41.614	2.500	-2.500
0+500.00	41.339	2.500	-2.500
0+580.00	38.680	2.463	-2.000
0+600.00	37.930	2.000	-2.000
0+660.00	35.680	2.067	-2.067
0+700.00	34.180	2.100	-2.100
0+760.00	32.317	1.518	-2.000
0+780.00	32.051	-1.148	-2.000
0+800.00	31.978	-2.000	-2.000



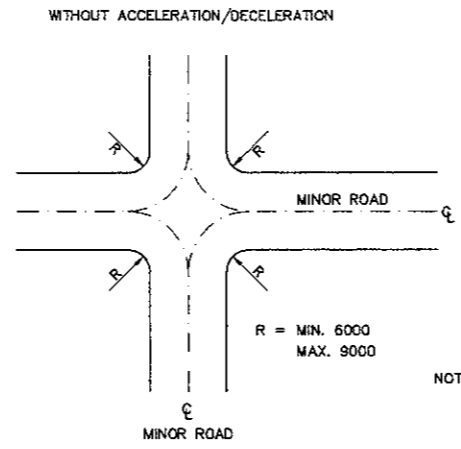
R (m)	Vd = 40 km/hr			Vd = 50 km/hr			Vd = 60 km/hr		
	e	L (m)		e	L (m)		e	L (m)	
	%	2 Lns	4 Lns	%	2 Lns	4 Lns	%	2 Lns	4 Lns
1000	NC	0	0	RC	11	17	2,1	13	19
900	NC	0	0	RC	11	17	2,3	14	21
800	NC	0	0	RC	11	17	2,5	15	23
700	RC	10	15	2,1	12	17	2,8	17	25
600	RC	10	15	2,4	13	22	3,1	19	28
500	2,1	11	16	2,8	15	20	3,5	21	32
400	2,5	13	19	3,3	18	23	4,0	24	36
300	3,1	16	24	3,9	22	27	4,6	28	41
250	3,5	18	27	4,2	23	32	5	30	45
200	3,9	20	30	4,7	26	39	5,5	33	50
175	4,1	21	32	5,0	28	42	5,8	35	52
150	4,4	23	34	5,3	29	44	6,0	36	54
140	4,5	23	35	5,4	30	45	6,0	36	54
130	4,6	24	35	5,6	31	47	Rmin = 135		
120	4,8	25	37	5,7	32	47			
110	5,0	26	39	5,8	32	48			
100	5,2	27	40	6,0	33	50			
90	5,4	28	42	6,0	33	50			
80	5,6	29	43	Rmin = 90					
70	5,8	30	45						
60	6,0	31	46						
			Rmin = 55						

WHERE:  
 $e_{max} = 6\%$   
 R = RADIUS OF CURVE  
 Vd = DESIGN SPEED  
 e = RATE OF SUPERELEVATION  
 L = MINIMUM LENGTH OF RUNOFF (DOES NOT INCLUDE TANGENT RUNOUT)  
 AS DISCUSSED IN TANGENT TO CURVE TRANSITION SECTION  
 NC = NORMAL CROWN SECTION  
 RC = REMOVE CROWN SECTION, SUPERELEVATED AT NORMAL CROWN SLOPE

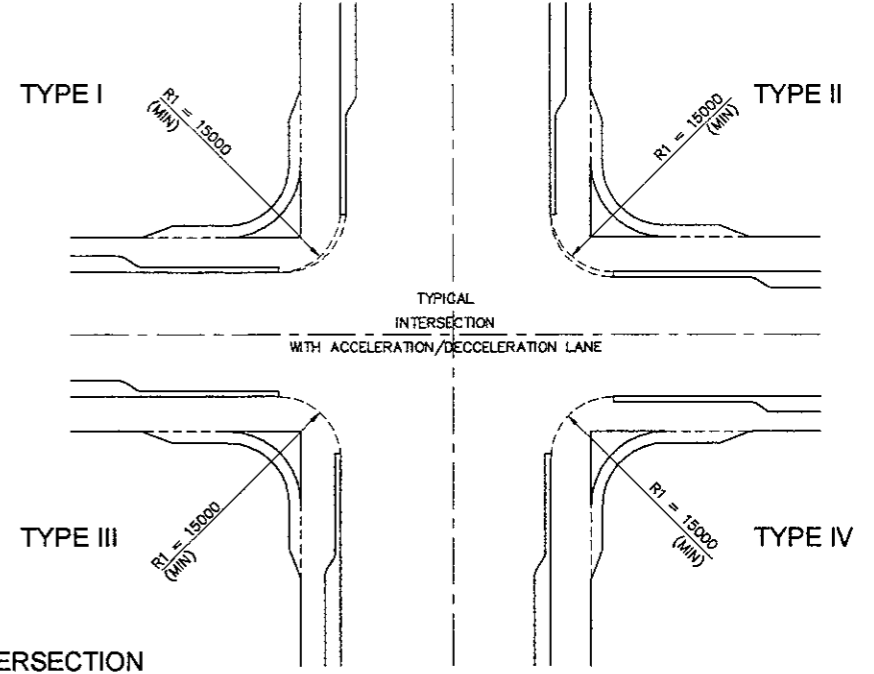


NOTES : - L1 (WITHOUT TRAFFIC LIGHT) BASED FROM CAPACITY OF INTERSECTION  
 L1 (WITH TRAFFIC LIGHT) BASED FROM CAPACITY OF TRAFFIC LIGHT ANALYSIS  
 - MINIMUM ABSOLUTE WIDTH L4 = 2.75 M  
 OR : L4 = L1 - L3 >= 2.75 M

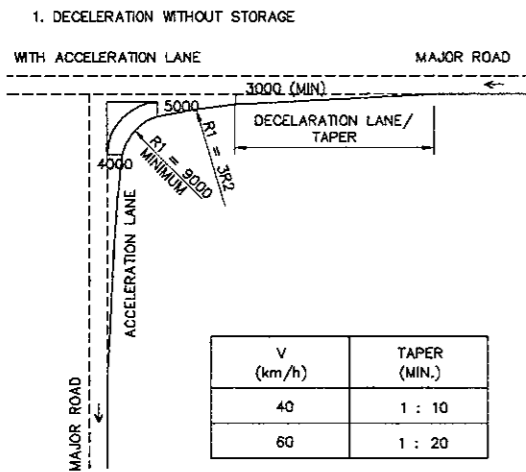
A. TYPICAL OF THREE LEGS INTERSECTION



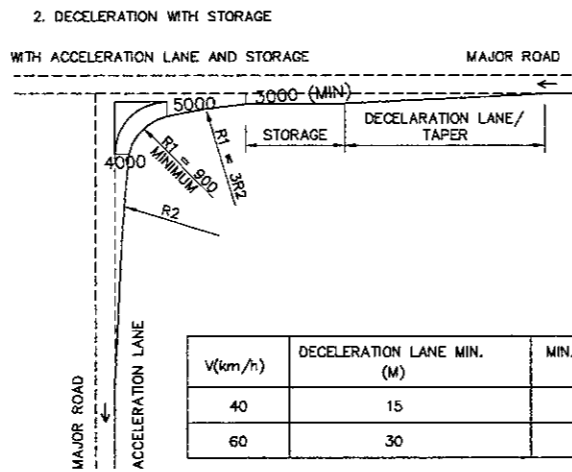
NOTES : - SEE STANDARD ROAD MARKING  
 - TAPER AND STORAGE NEEDED  
 BASED ON TRAFFIC ANALYSIS



B. TYPICAL OF FOUR LEGS INTERSECTION

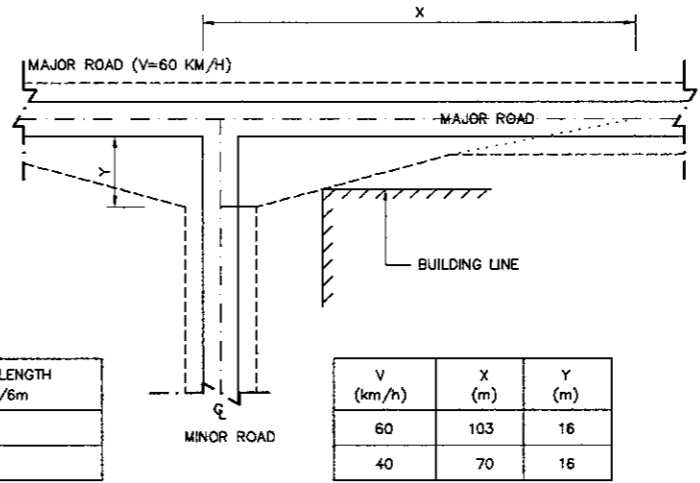


V (km/h)	TAPER (MIN.)
40	1 : 10
60	1 : 20



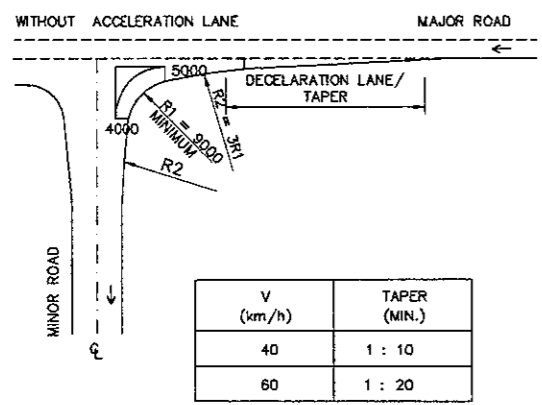
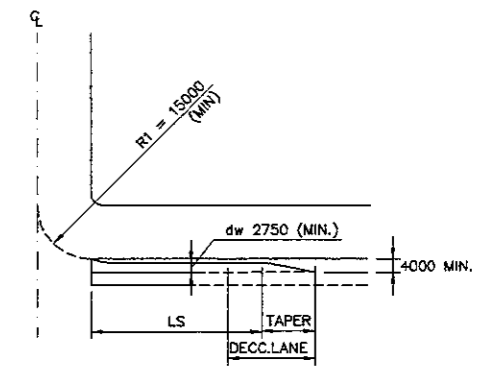
V(km/h)	DECELERATION LANE MIN. (M)	MIN. OF TAPER LENGTH L = V x dw/6m
40	15	20
60	30	30

\* IF LENGTH OF TAPER > DECELERATION LANE  
 TAPER ASSUMED AS DECELERATION LANE



V (km/h)	X (m)	Y (m)
60	103	16
40	70	16

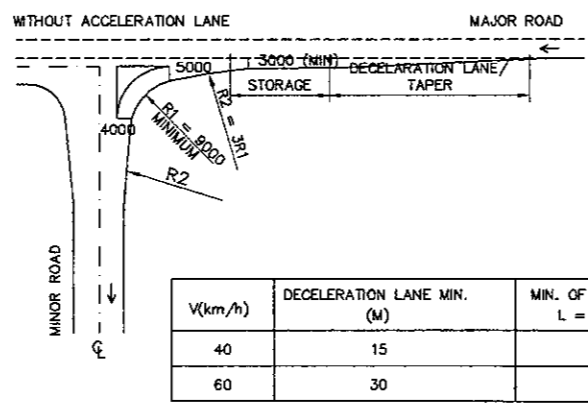
D. TYPICAL RIGHT TURN FROM MAJOR ROAD TO MINOR / MAJOR ROAD



V (km/h)	TAPER (MIN.)
40	1 : 10
60	1 : 20

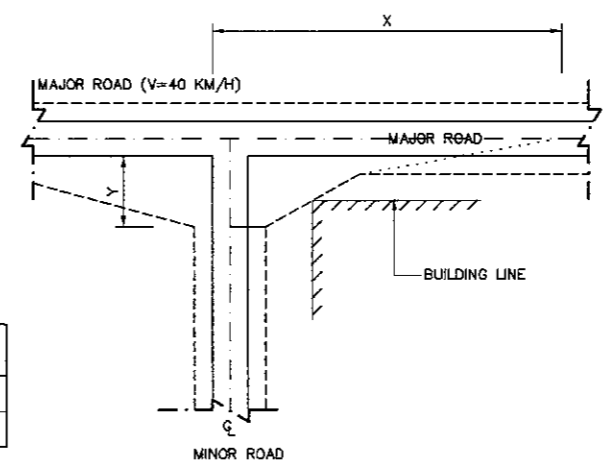
- R MIN. CALCULATED BASED ON SINGLE UNIT TRUCK  
 - FOR SPECIAL DESIGN, SEE STANDARD OF GEOMETRIC DESIGN

E. LEFT TURN LINE



V(km/h)	DECELERATION LANE MIN. (M)	MIN. OF TAPER LENGTH L = V x dw/6m
40	15	20
60	30	30

\* IF LENGTH OF TAPER > DECELERATION LANE  
 TAPER BE ASSUMED AS DECELERATION LANE



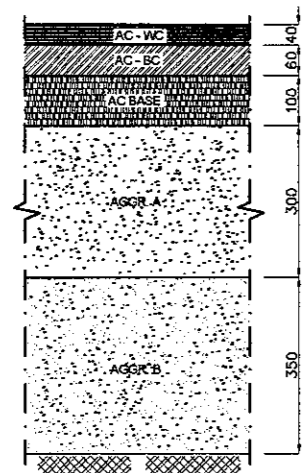
F. CLEARANCE SIGHT DISTANCE

V(km/h)	DECELERATION LANE MIN. (M)	MIN. OF TAPER LENGTH L = V x dw/6m
40	15	20
60	30	30

LENGTH OF STORAGE : LS = 2 x M x S WITHOUT TRAFFIC LIGHT  
 LS = 15 x N x S WITH TRAFFIC LIGHT

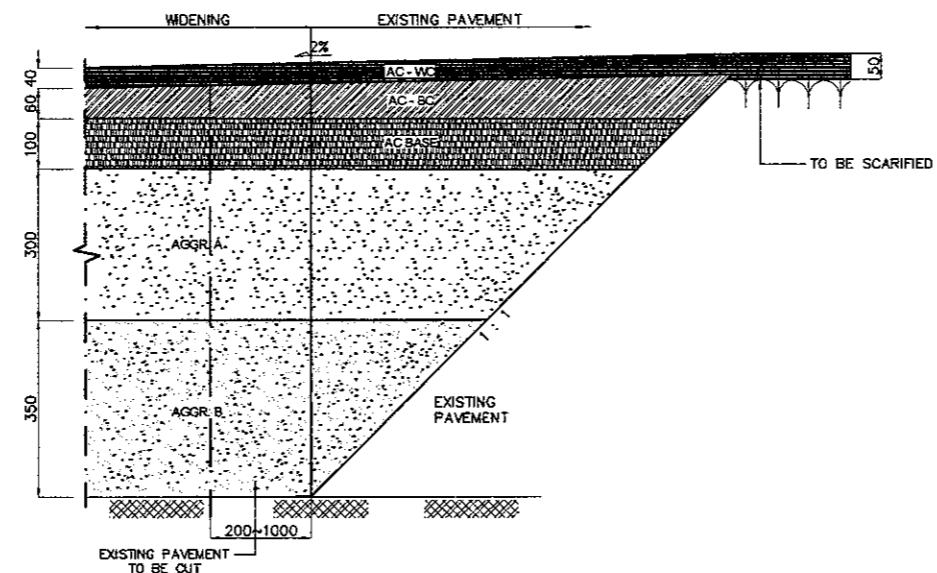
M - NUMBER OF MEANS OF RIGHT TURN VEHICLE/MINUTES  
 N - NUMBER OF MEANS OF LEFT TURN VEHICLE/CIRCLE  
 S - DISTANCE TWO VEHICLES (M)

**FLEXIBLE PAVEMENT**

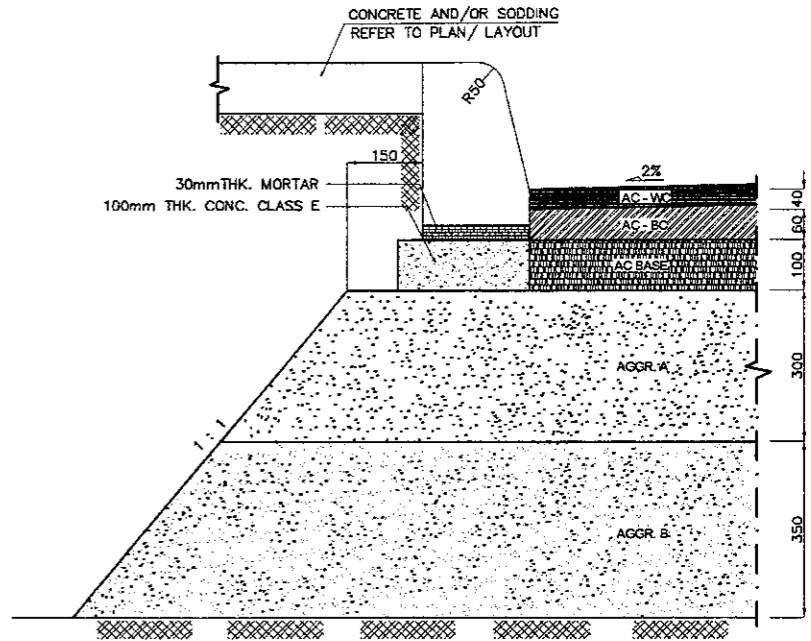


**1 SERVICE ROAD**  
 SCALE 1:150

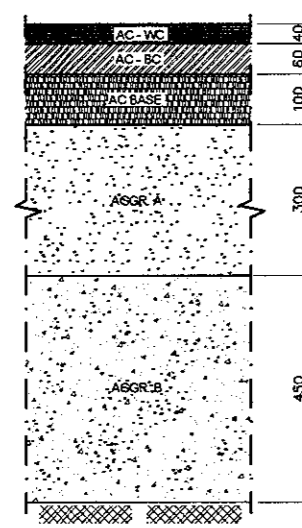
**EXISTING & NEW PAVEMENT CONNECTION**



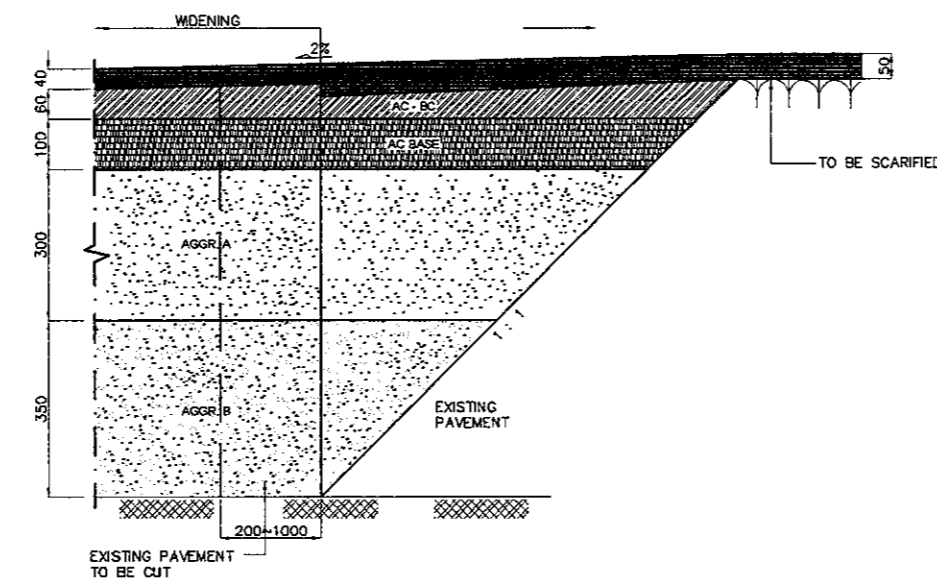
**4 WIDENING ≤ 2000mm**  
 SCALE 1:150



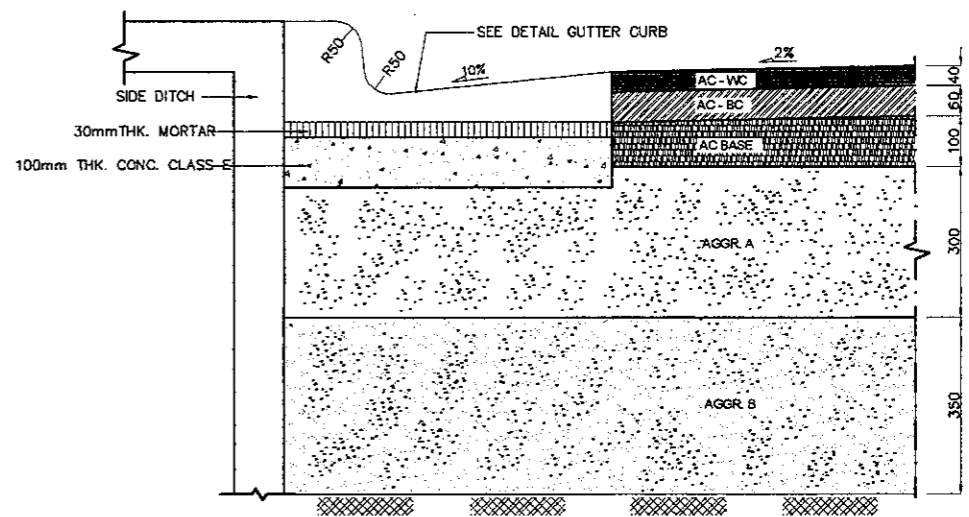
**6 MEDIAN CURB CONNECTION**  
 SCALE 1:150



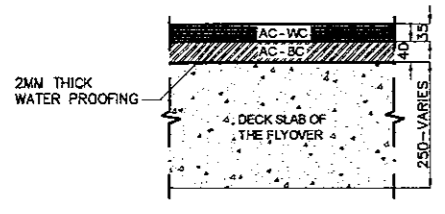
**2 ABUTMENT (APPROACH ROAD)**  
 SCALE 1:150



**5 WIDENING > 2000mm**  
 SCALE 1:150

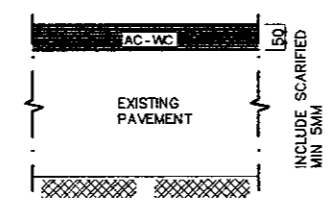


**7 CURB AND GUTTER CONNECTION**  
 SCALE 1:150

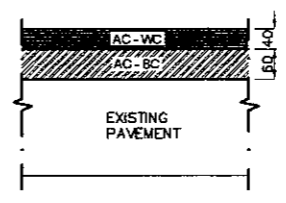


**3 VIADUCT**  
 SCALE 1:150

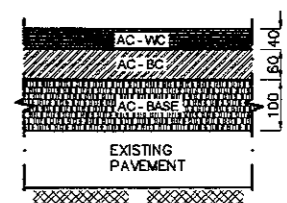
**OVERLAY THICKNESS**



**8 NORMAL OVERLAY**  
 SCALE 1:150

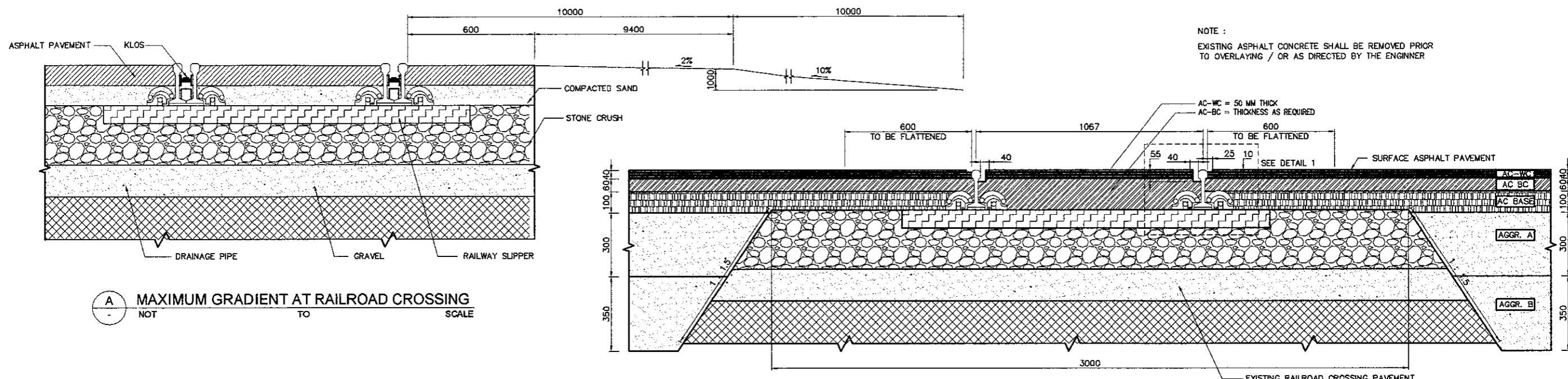


**9 OVERLAY THICKNESS < 50 > 100mm**  
 SCALE 1:150

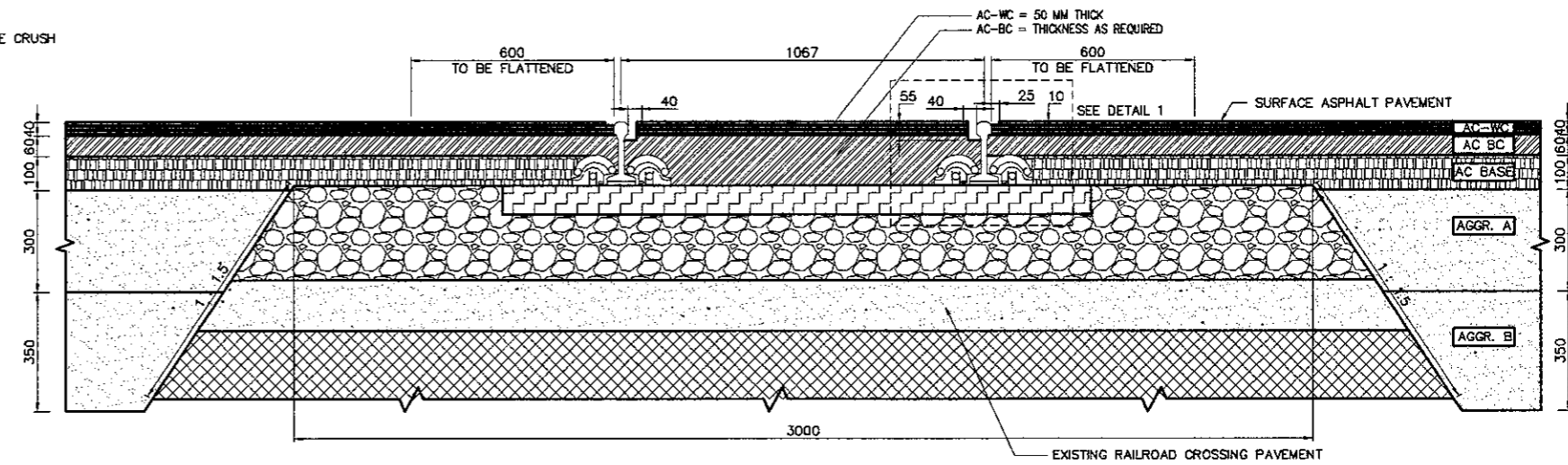


**10 OVERLAY THICKNESS > 100mm**  
 SCALE 1:150

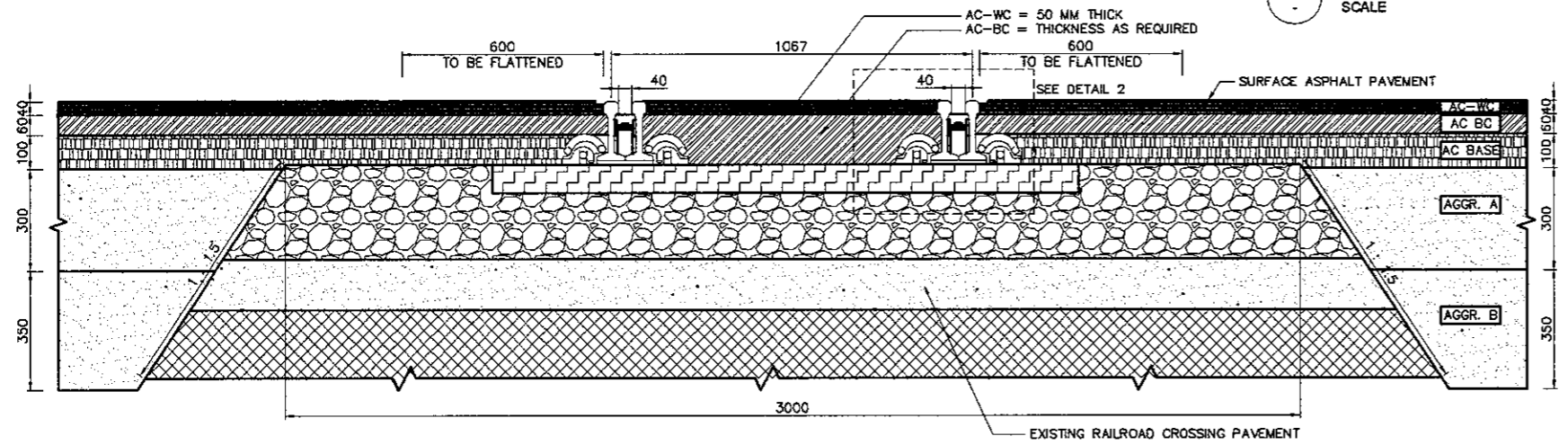
DESIGNED BY	CHECKED BY	SUBMITTED BY
Name R. UENO	Name T. OKUMURA	Name M. KIUCHI
Sign	Sign	Sign
Date	Date	Date



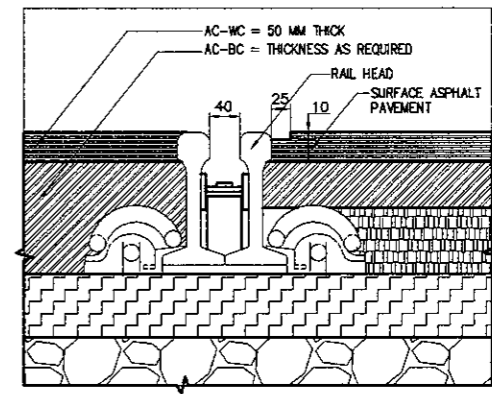
**A** MAXIMUM GRADIENT AT RAILROAD CROSSING  
 NOT TO SCALE



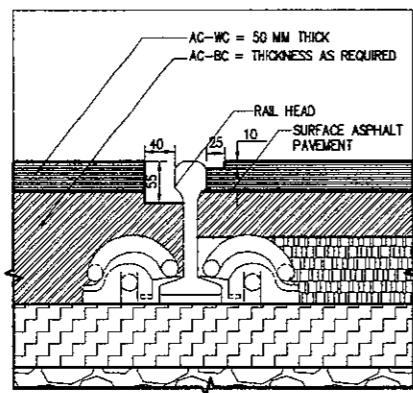
**B** ASPHALT ROAD CROSSING ON RAILWAY WITHOUT FLANGE PROTECTION HEADER  
 SCALE 1:20



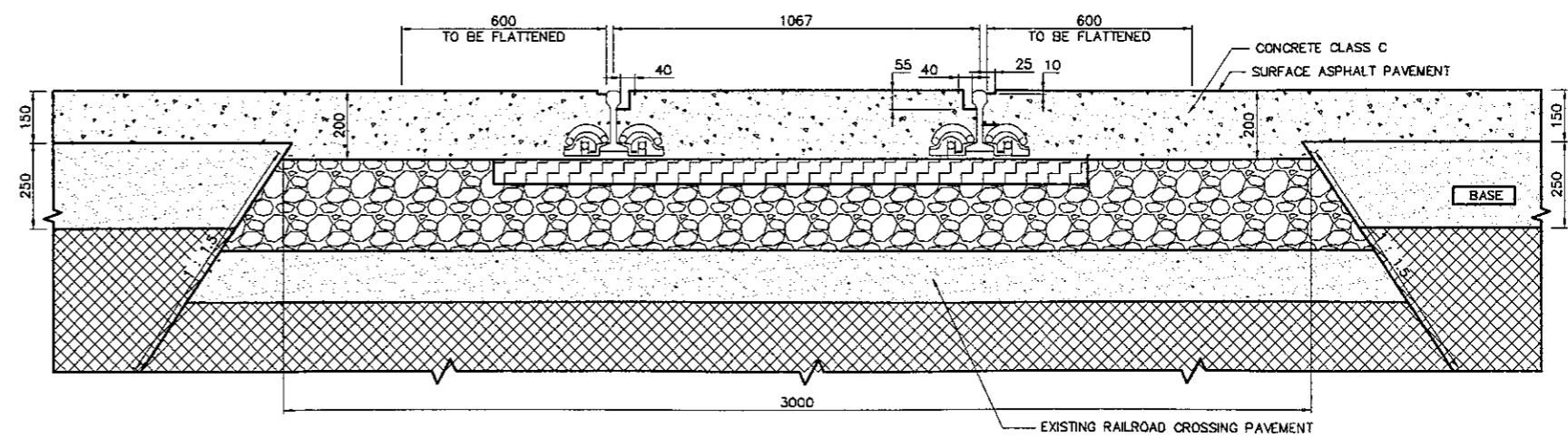
**B** ASPHALT ROAD CROSSING ON RAILWAY WITH FLANGE PROTECTION HEADER  
 SCALE 1:20



**2** DETAIL 2  
 SCALE 1:10

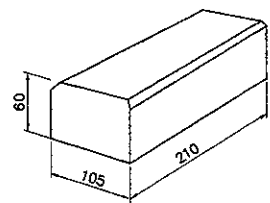


**1** DETAIL 1  
 SCALE 1:10

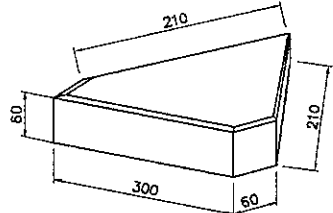


**D** CONCRETE SHOULDER AT RAILROAD CROSSING  
 SCALE 1:20

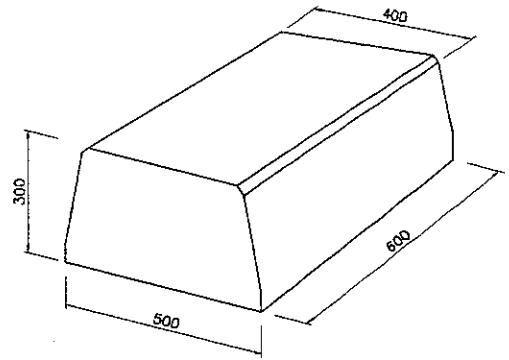
**CONCRETE BLOCK**



TYPE A

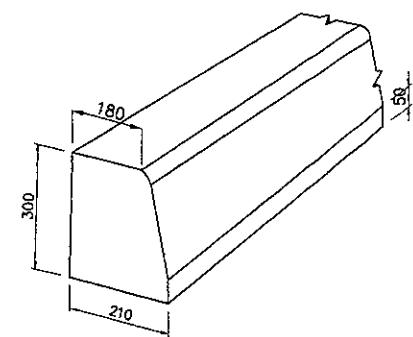


TYPE B

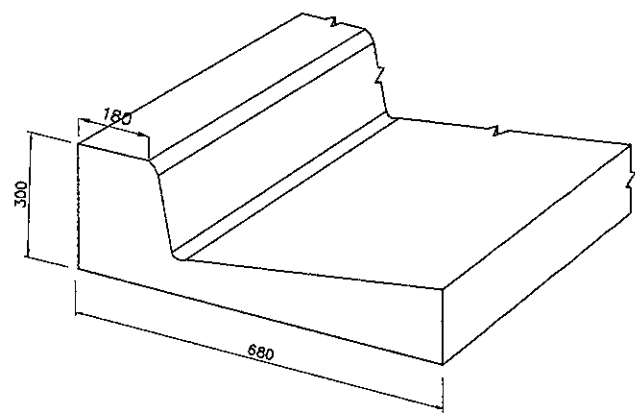


TYPE C

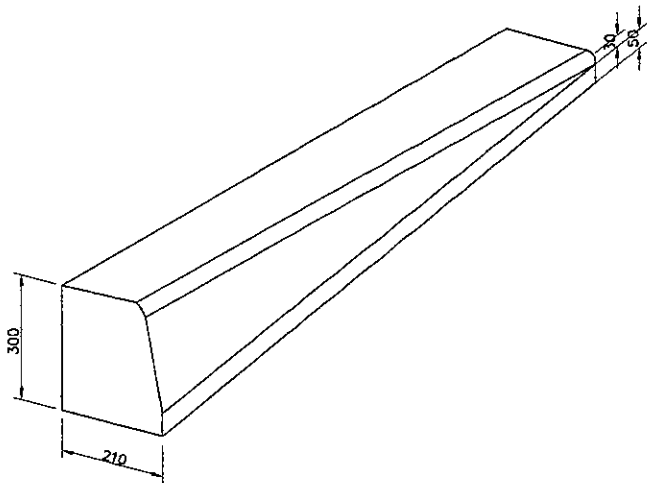
**CONCRETE CURB**



TYPE A



TYPE B



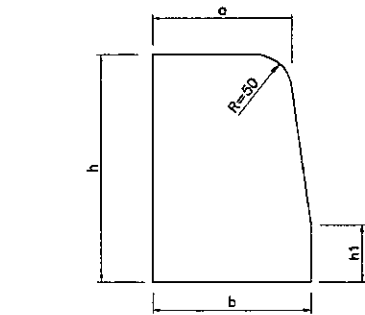
TYPE C

TYPE	DIMENSION (MM)								REMARK
	a	a1	b	b1	h1	h2	h3	h	
A	180	-	210	-	50	-	-	300	CURB
B	180	500	210	-	75	225	100	300	GUTTER CURB

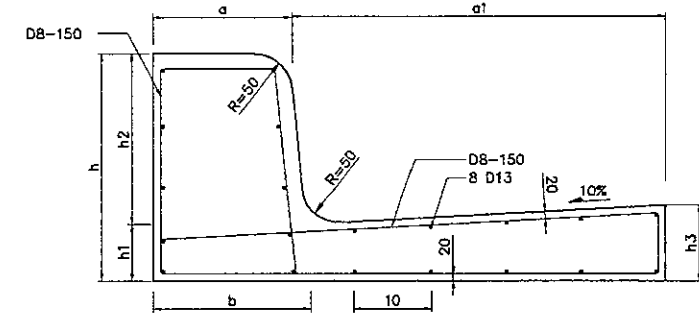
SPECIFICATION :

CONCRETE QUALITY K.300  
 - SHALL NOT BE PATCHED  
 - PERFORMED DAMAGED < 5%  
 - MINIMUM REINFORCED  $\phi$  6MM

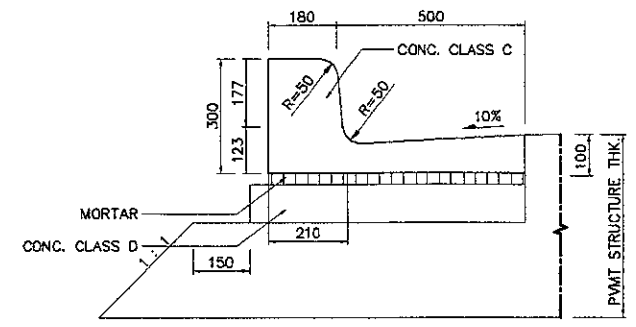
CONCRETE QUALITY K.150  
 - COST IN SITE  
 - NO REINFORCEMENT



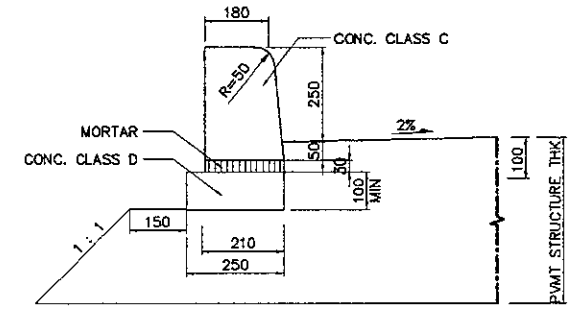
1 - CONCRETE CURB  
 NOT TO SCALE



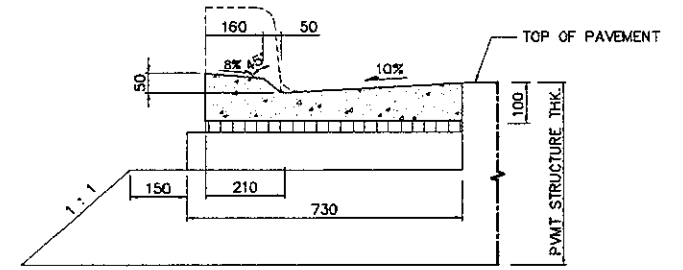
2 - REINFORCEMENT OF COMBINATION CONCRETE CURB AND GUTTER  
 NOT TO SCALE



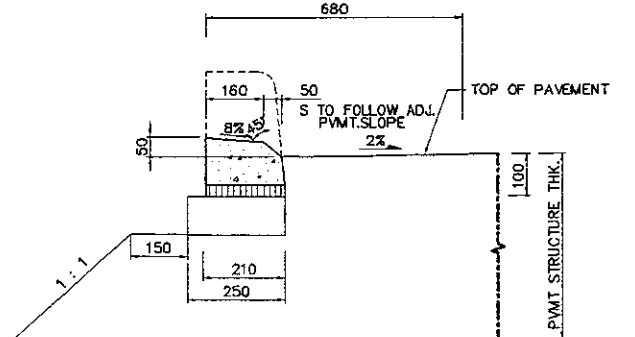
6 - COMBINATION CONCRETE CURB AND GUTTER  
 NOT TO SCALE



5 - CONCRETE CURB  
 NOT TO SCALE

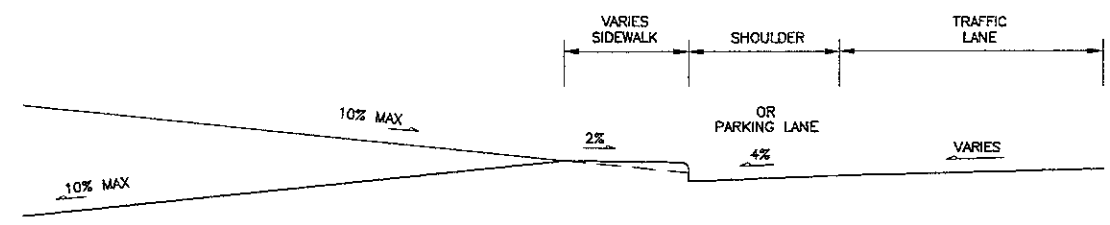


4 - CONCRETE DROP CURB AND GUTTER ( MODIFIED )  
 NOT TO SCALE

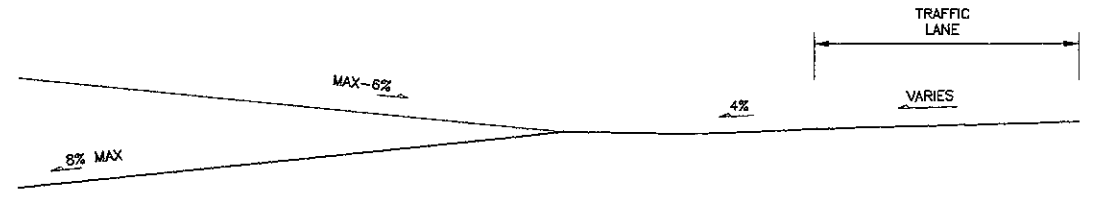


3 - CONCRETE DROP CURB (MEDIAN)  
 NOT TO SCALE

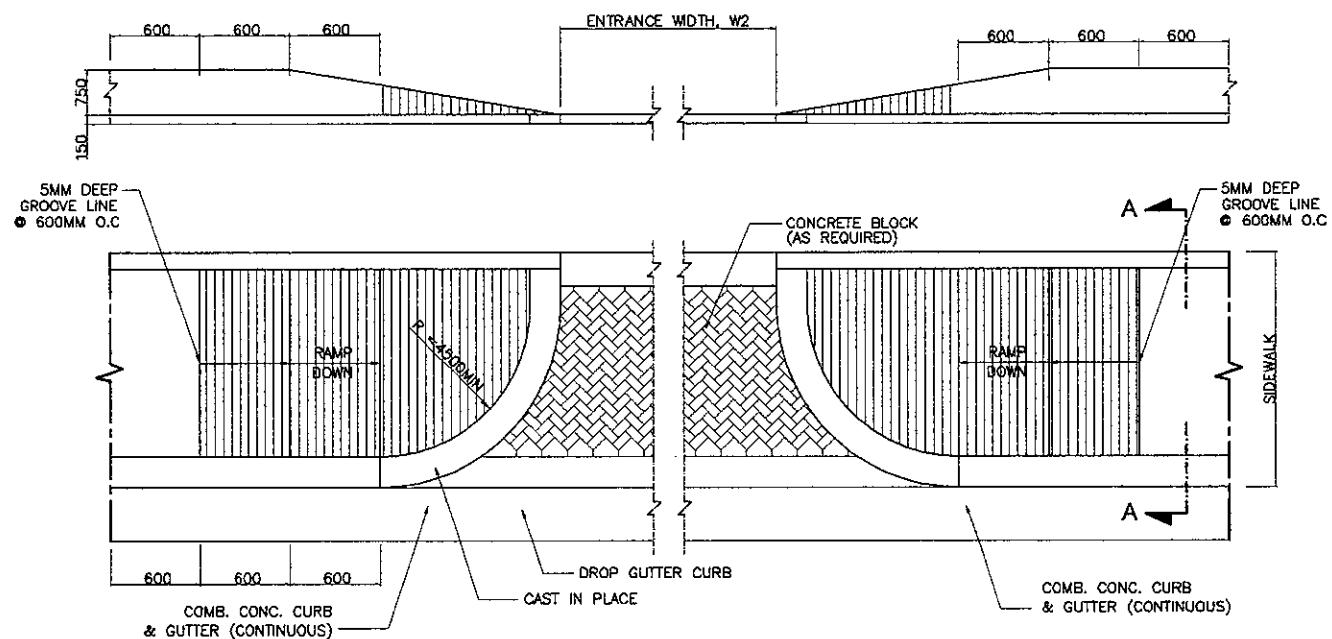




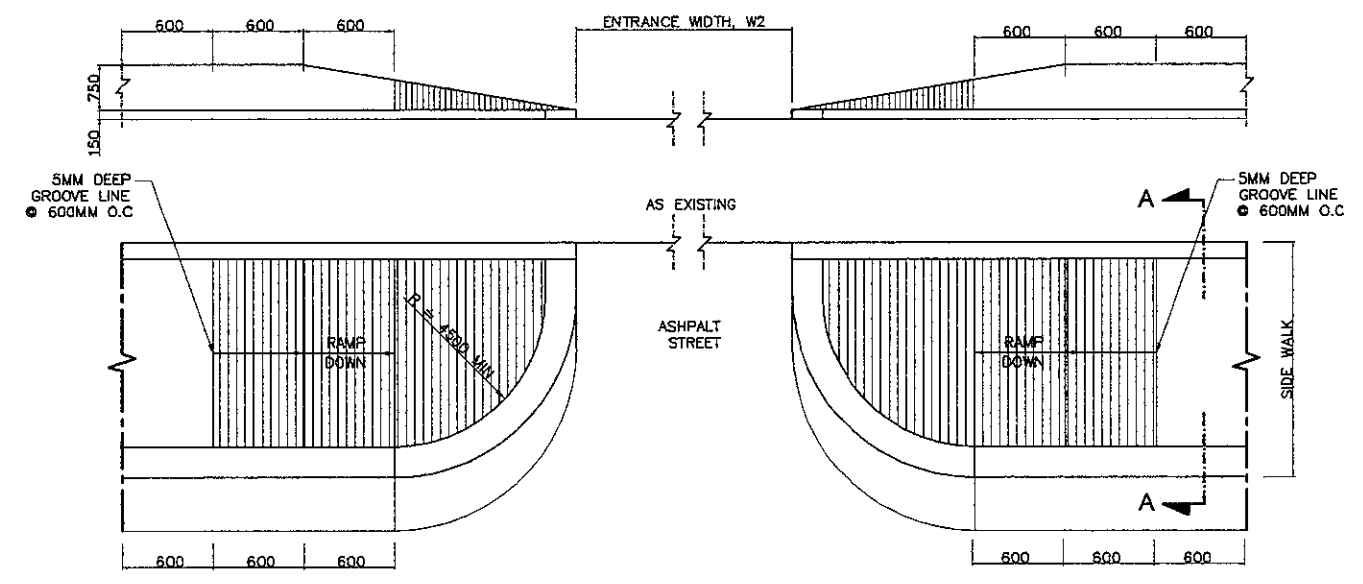
**(C) PRIVATE ENTRANCE PROFILE**  
 NOT TO SCALE



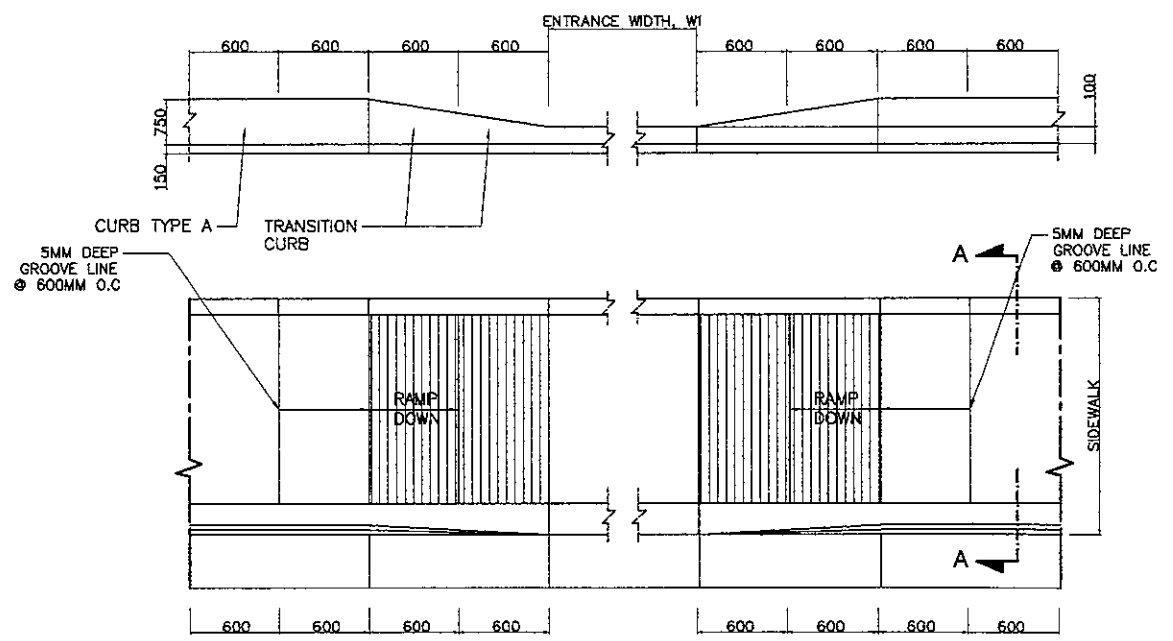
**(F) PUBLIC ENTRANCE PROFILE**  
 NOT TO SCALE



**(B) PRIVATE DRIVEWAY ENTRANCE - URBAN**  
 SCALE 1:50

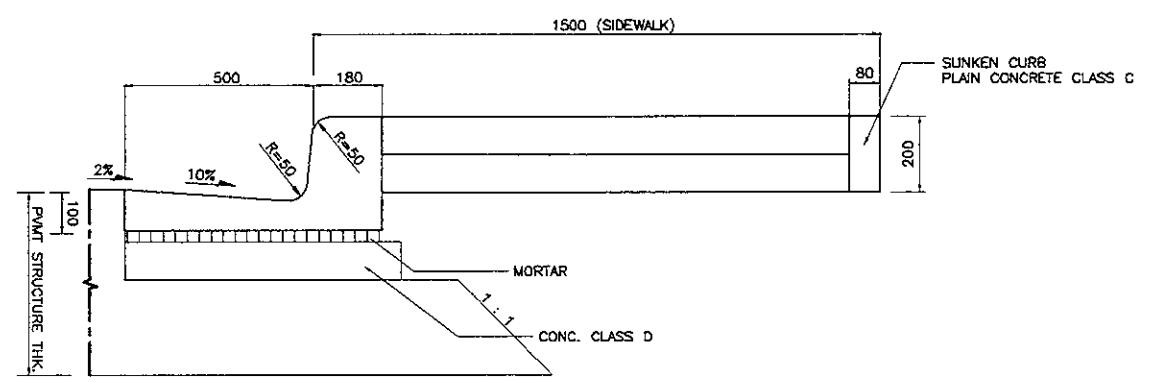


**(E) PUBLIC STREET / ALLEY ENTRANCE**  
 SCALE 1:50



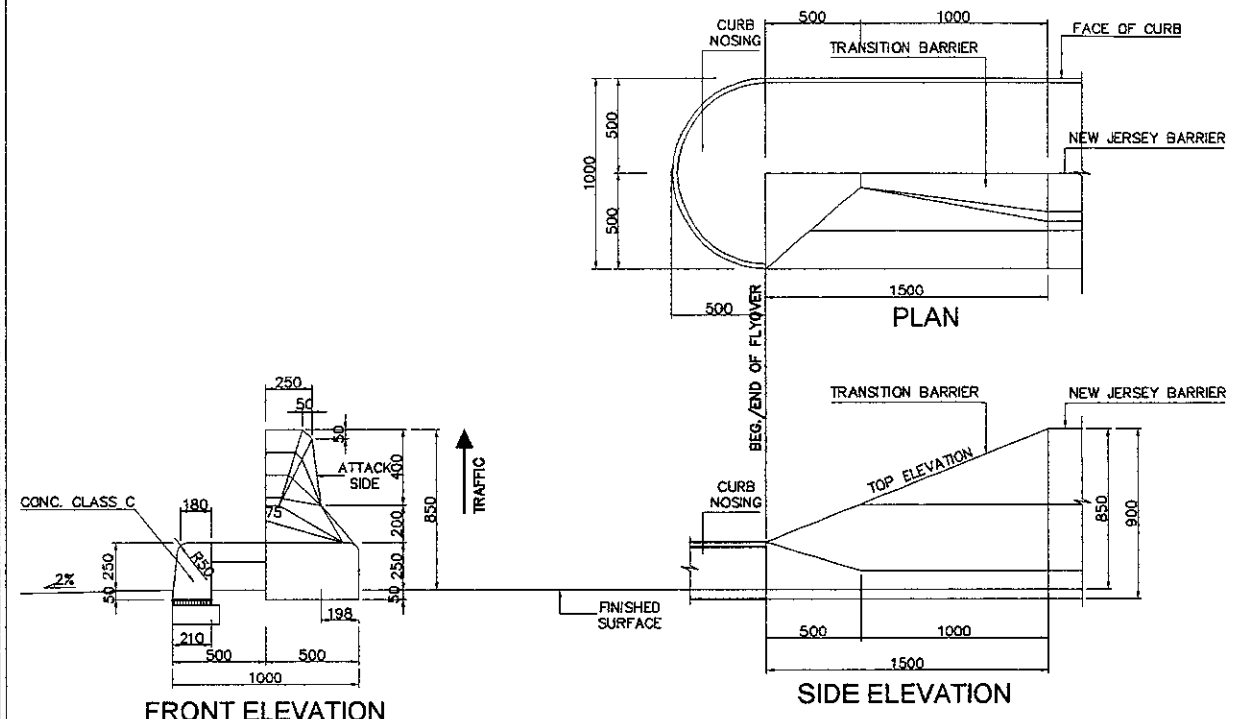
**(A) PRIVATE ENTRANCE - URBAN**  
 SCALE 1:50

	SINGLE	DOUBLE
W <sub>1</sub>	< 1600	< 3000
W <sub>2</sub>	< 3000	< 9000

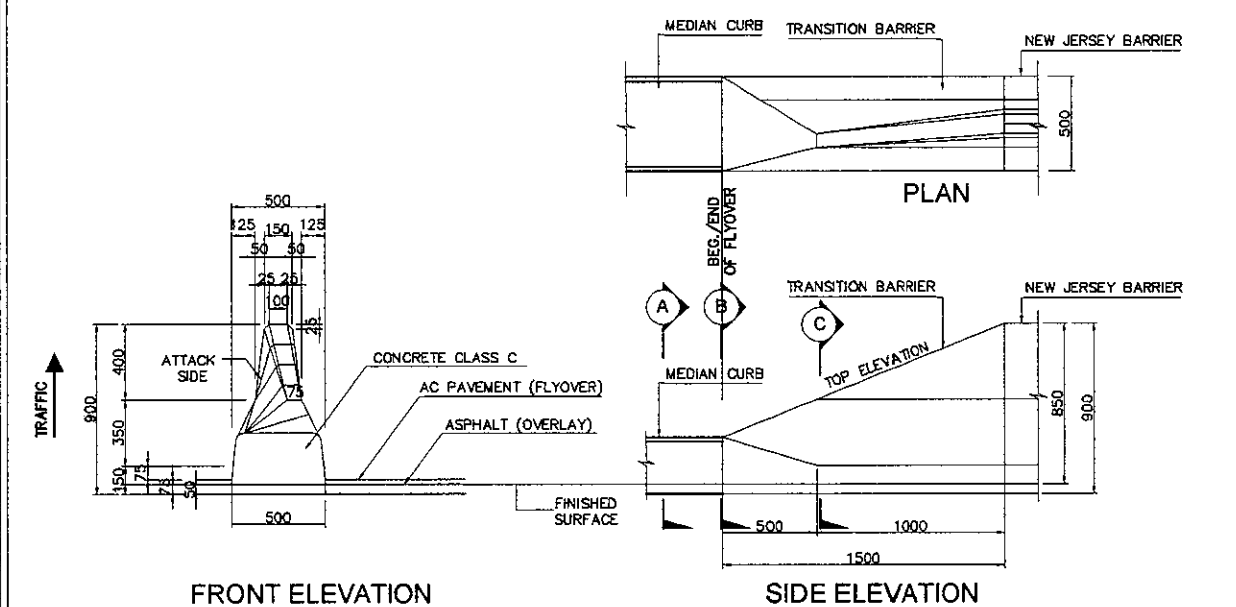


**(D) SECTION A-A**  
 SCALE 1:20

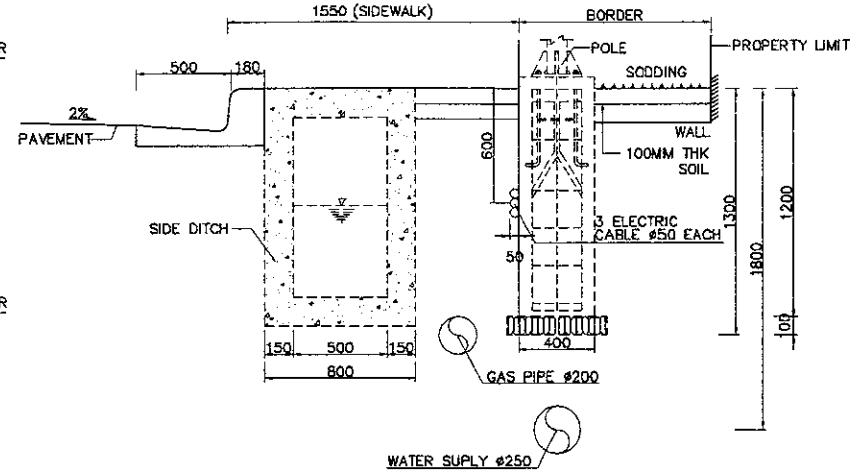
**(1) STANDARD PUBLIC AND PRIVATE ACCESS**  
 SCALE 1:100



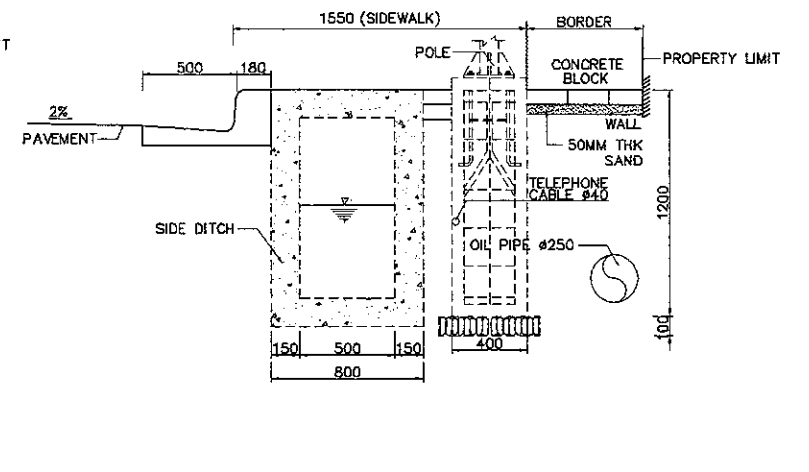
**1** TRANSITION PARAPET  
 SCALE 1:40



**2** TRANSITION BARRIER  
 SCALE 1:40

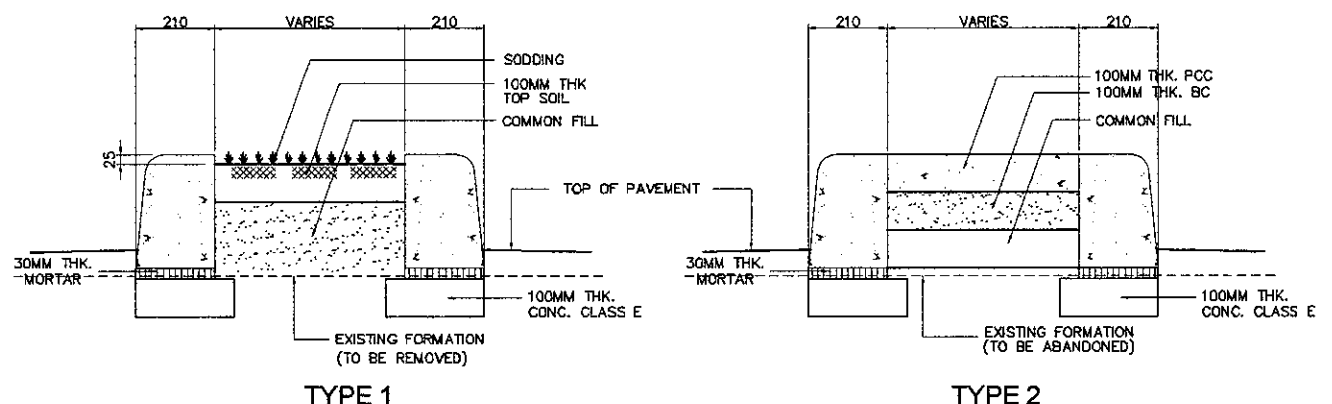


**TYPE 1**



**TYPE 2**

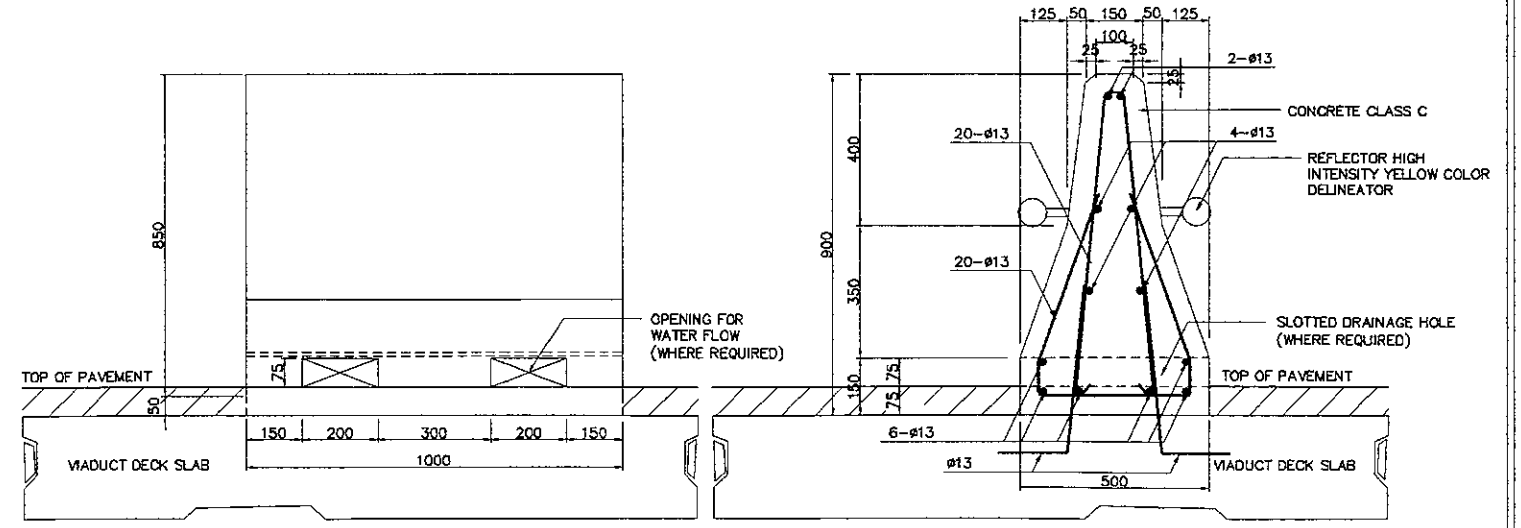
**3** SIDEWALK TO BORDER INFILL DETAILS  
 SCALE 1:40



**TYPE 1**

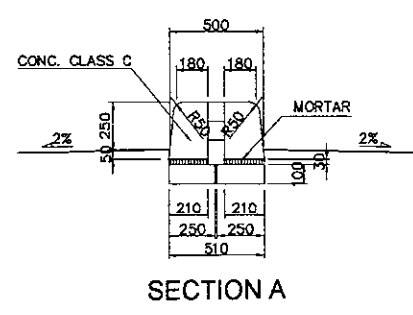
**TYPE 2**

**5** MEDIAN INFILL DETAILS  
 SCALE 1:20

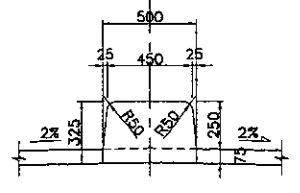


**SLOTTED NEW JERSEY BARRIER**

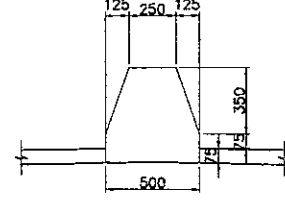
**4** NEW JERSEY BARRIER  
 SCALE 1:20



**SECTION A**



**SECTION B**



**SECTION C**

**TRANSITION MEDIAN**

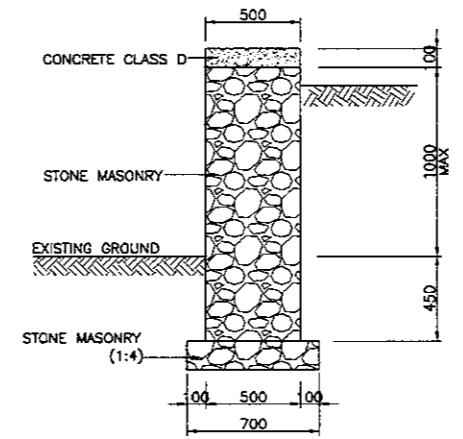
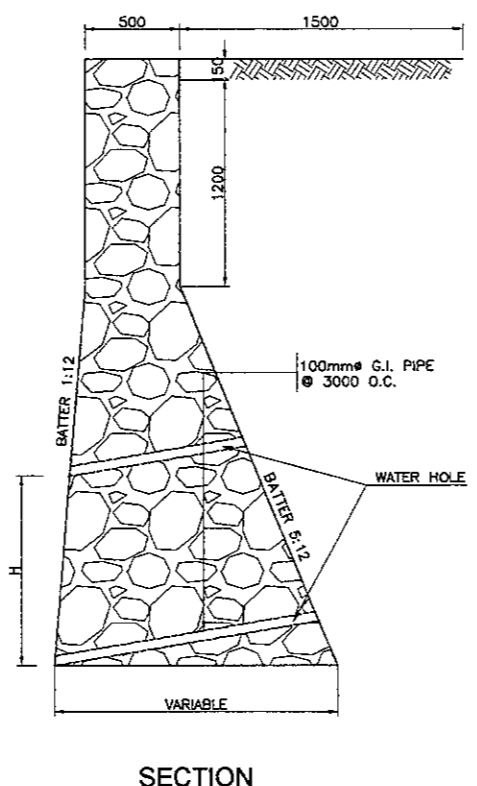
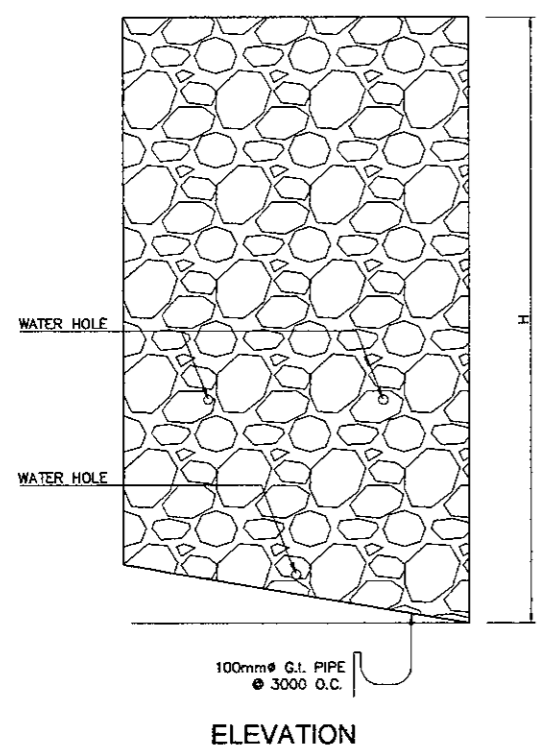
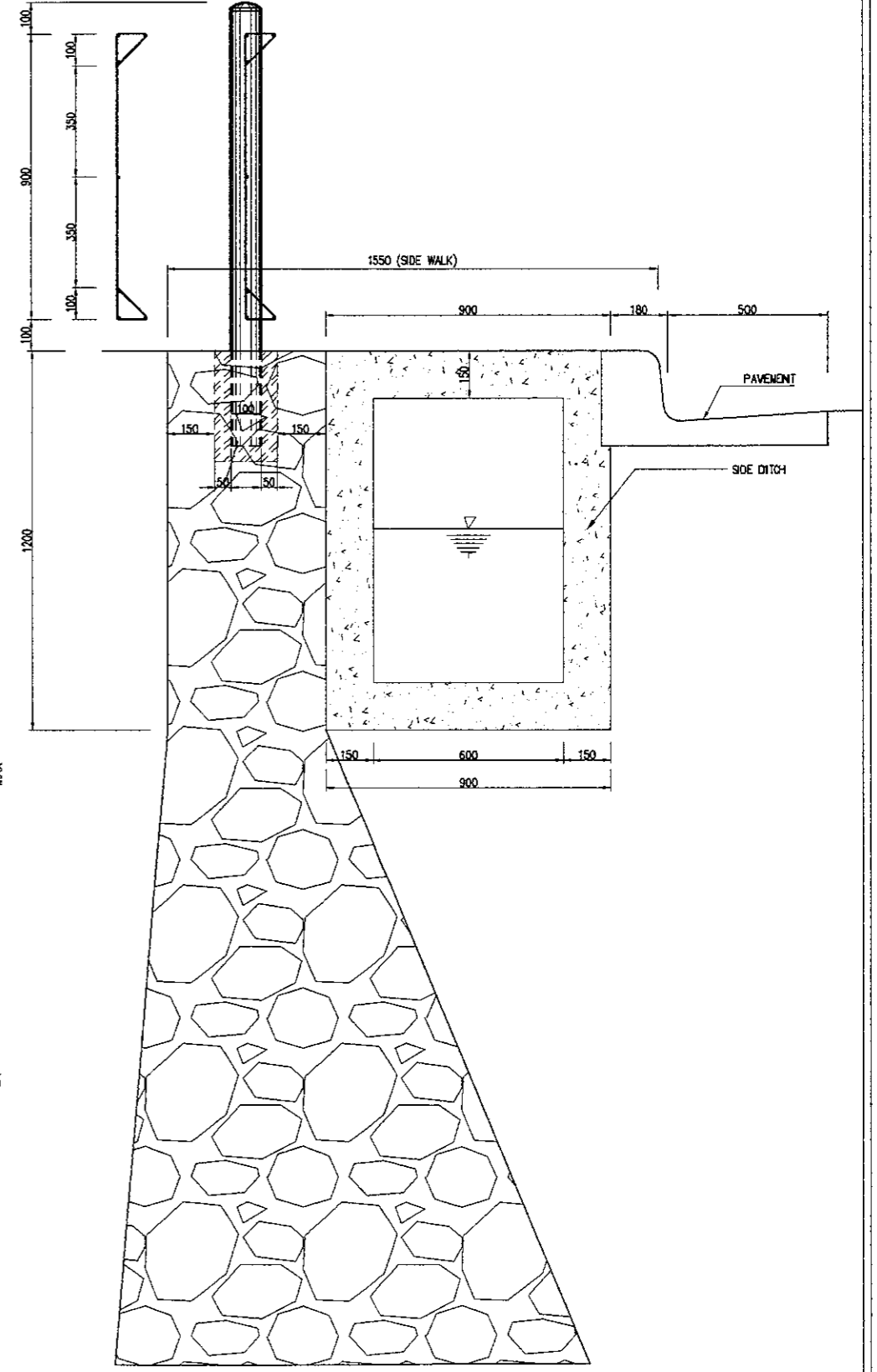
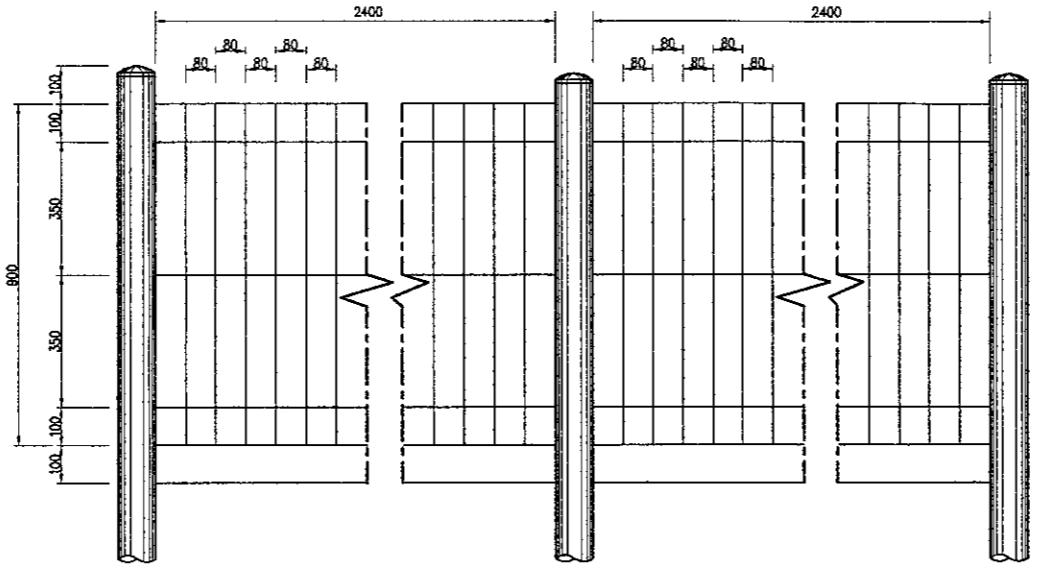
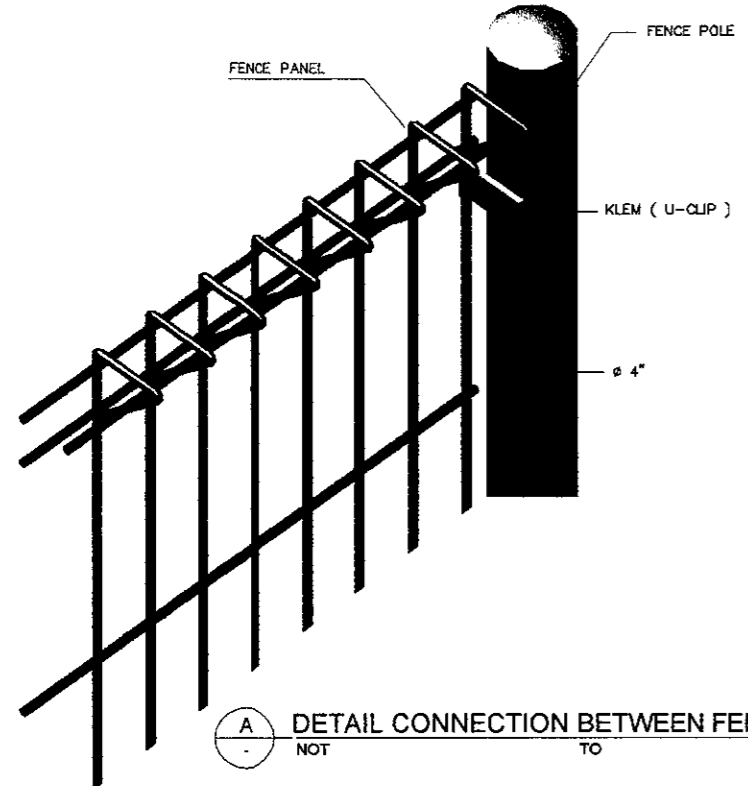
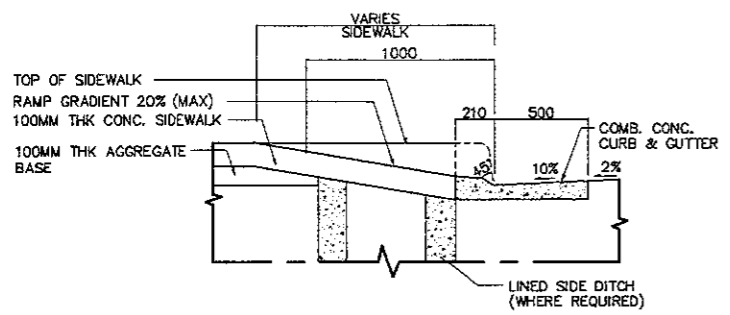


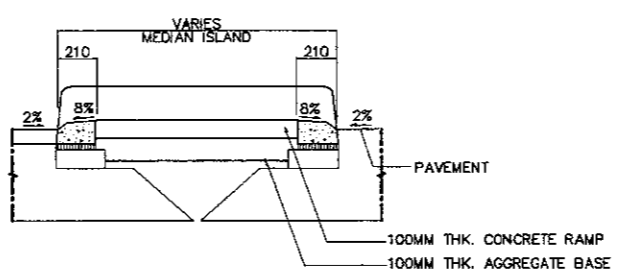
TABLE		TABLE	
HEIGHT IN METERS	QUANTITIES PER LINEAR M OF WALL IN CU. METER	HEIGHT IN METERS	QUANTITIES PER LINEAR M OF WALL IN CU. METER
0.90	0.15	3.60	1.15
1.20	0.23	3.90	1.30
1.50	0.31	4.20	1.45
1.90	0.38	4.50	1.68
2.10	0.46	4.80	1.91
2.40	0.54	5.10	2.14
2.70	0.69	5.40	2.37
3.00	0.77	5.60	2.68
3.30	0.92	6.00	2.91

MIN. BULGDE 2.50 CMS., MAX. BULGDE 10 CMS.  
 FEATHERED TO WORKING LINE AT JOINTS TO BE RAKED TO A DEPTH OF 2.50 TO 5 CMS.

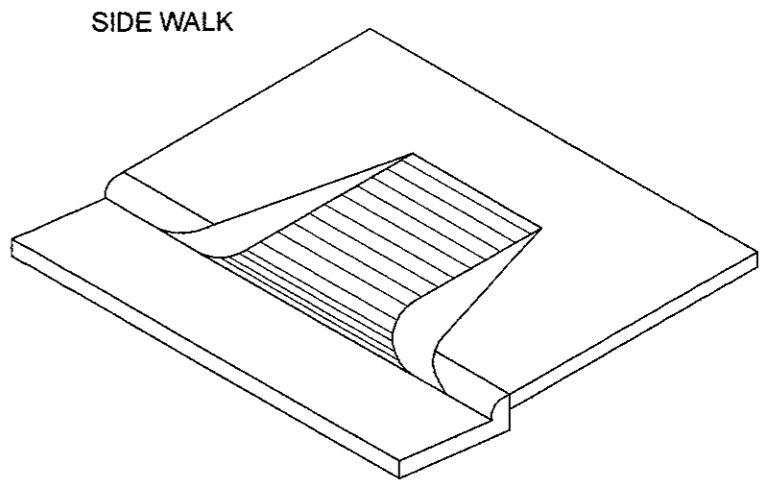
DESIGNED BY		CHECKED BY		SUBMITTED BY	
Name	R. UENO	Name	T. OKUMURA	Name	M. KIUCHI
Sign		Sign		Sign	
Date		Date		Date	



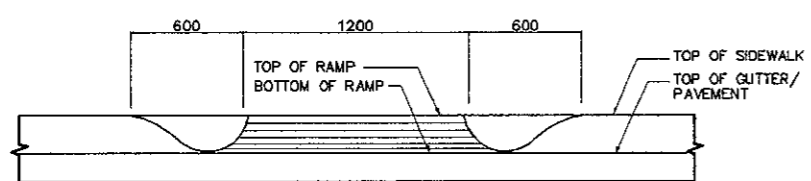
**3 SECTION 1-1**  
 SCALE 1:20



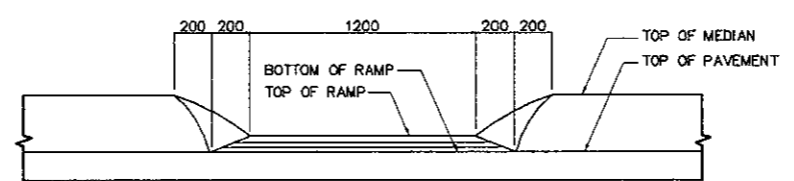
**6 SECTION 2-2**  
 SCALE 1:20



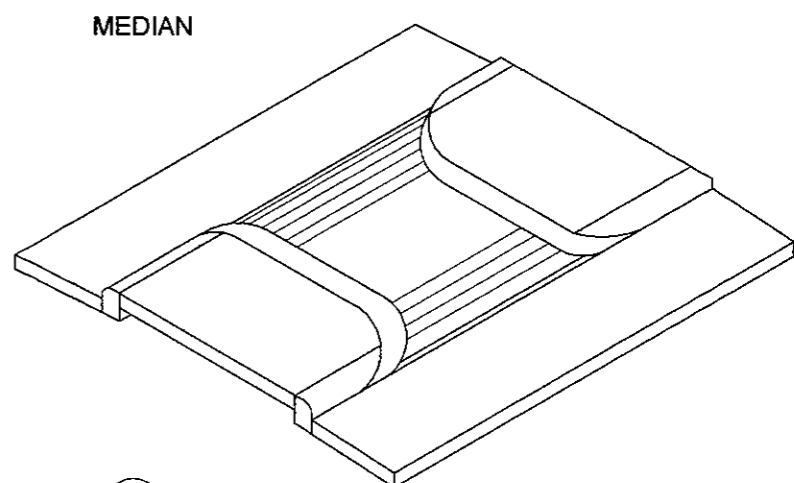
**8 ISOMETRIC**  
 NOT TO SCALE



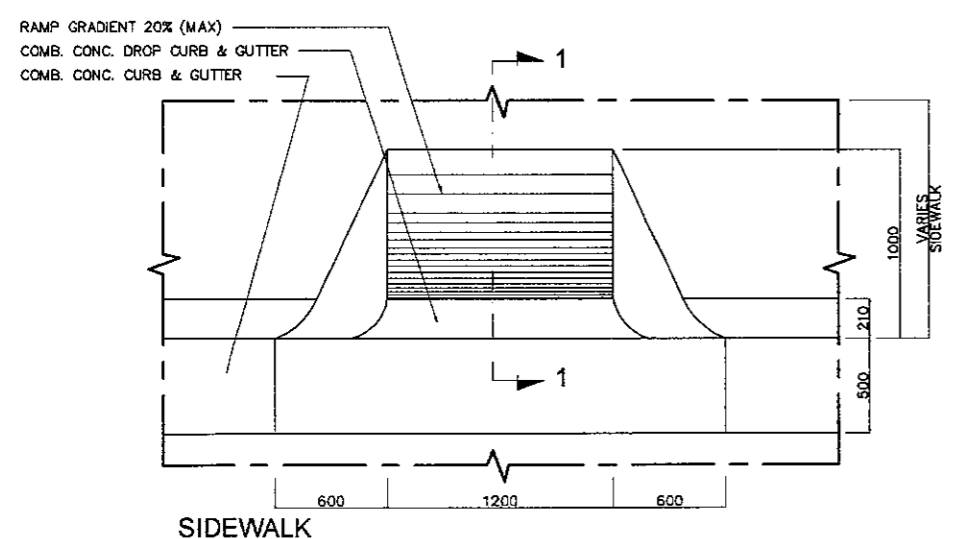
**2 ELEVATION**  
 SCALE 1:20



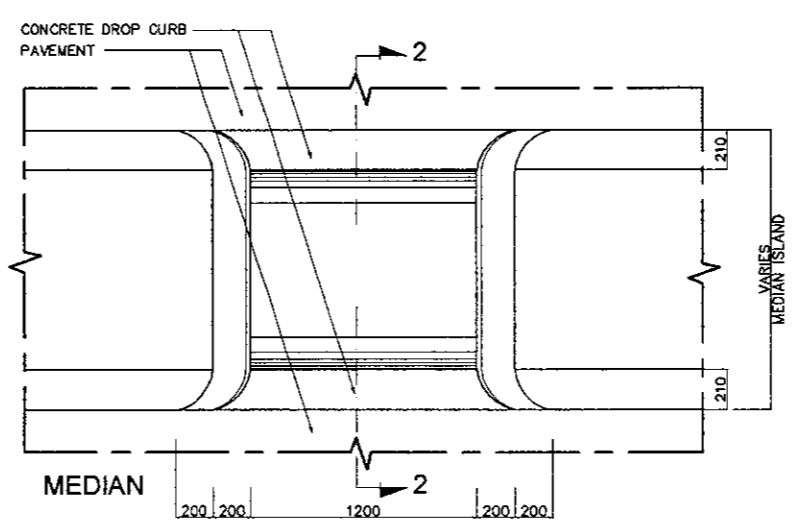
**5 ELEVATION**  
 SCALE 1:20



**7 ISOMETRIC**  
 NOT TO SCALE

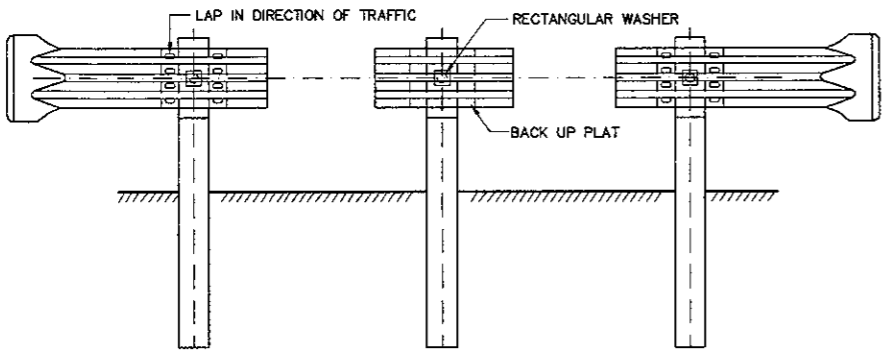
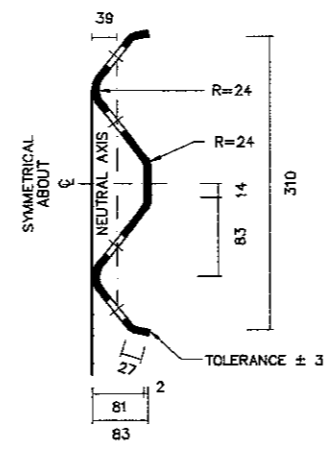
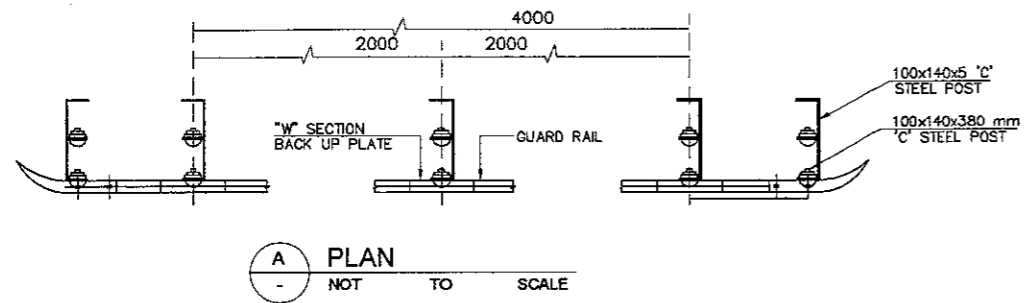


**1 PLAN**  
 SCALE 1:20

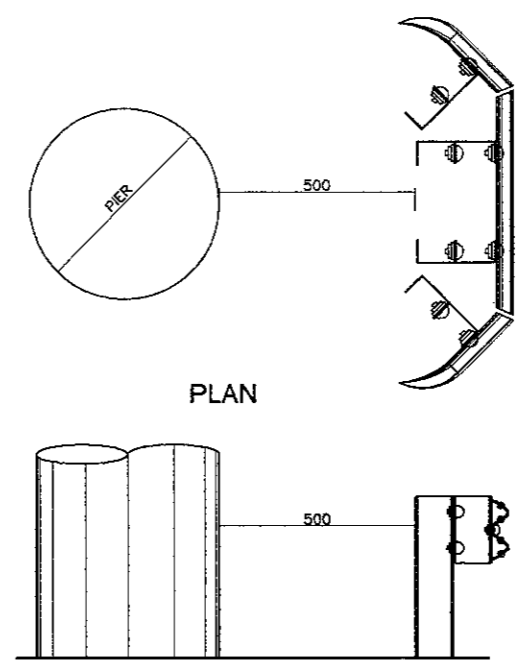


**4 PLAN**  
 SCALE 1:20

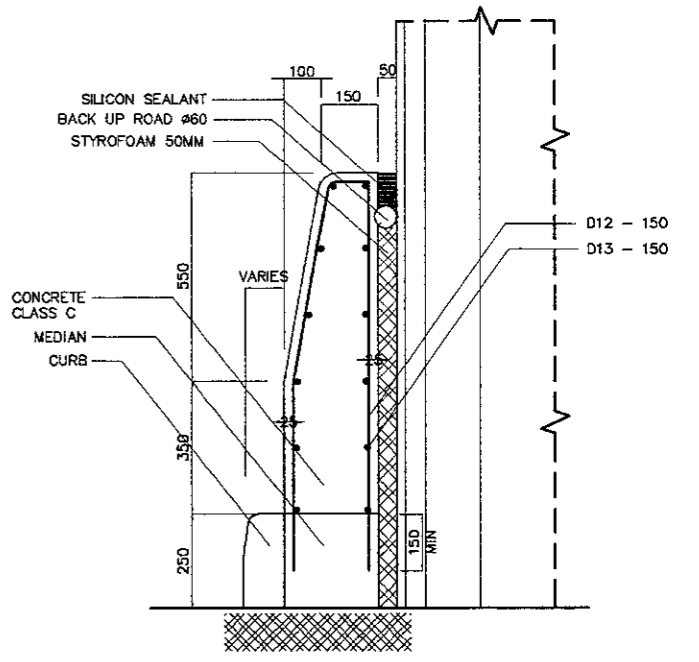
**A STANDARD CURB-CUT RAMP (FOR PHYSICALLY HANDICAPPED)**



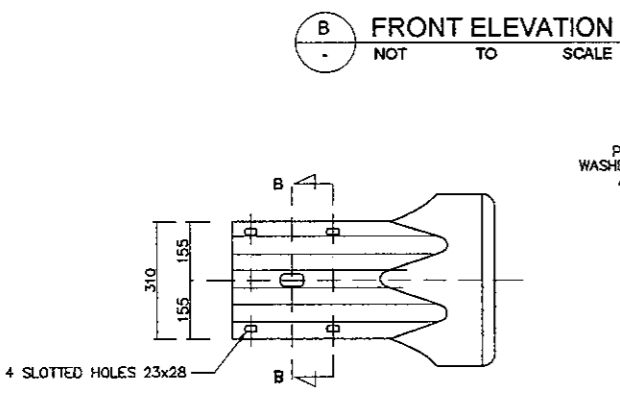
**F ENLARGED SECTION A-A**  
 (SECTION B-B, SIMILAR)  
 NOT TO SCALE



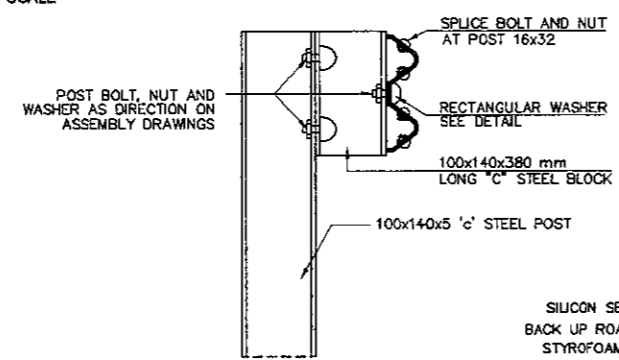
**ELEVATION**



**A DETAIL 1**  
 NOT TO SCALE 1:20

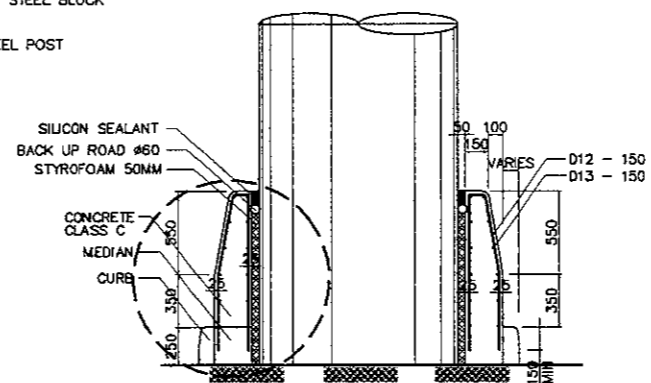


**E DOWN STREAM END TREATMENT**  
 NOT TO SCALE

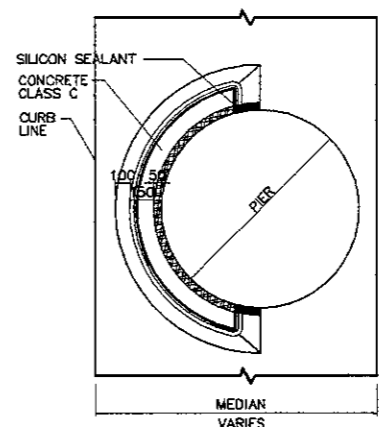


**D RAIL WASHER**  
 NOT TO SCALE

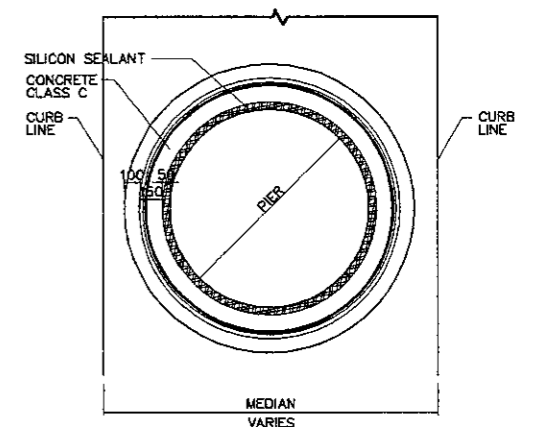
POST BOLTS AND HOLES		
HOLE DIA. (mm)	POST BOLTS AND NUTS (mm)	WASHER
18	16x45	RECT PLATE



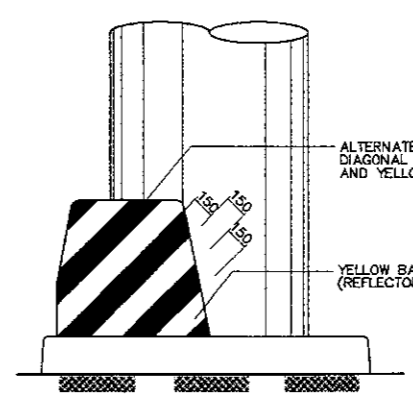
**SECTION**



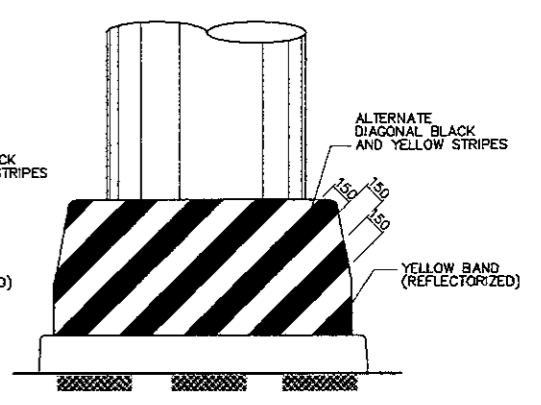
**PLAN**



**PLAN**



**ELEVATION**

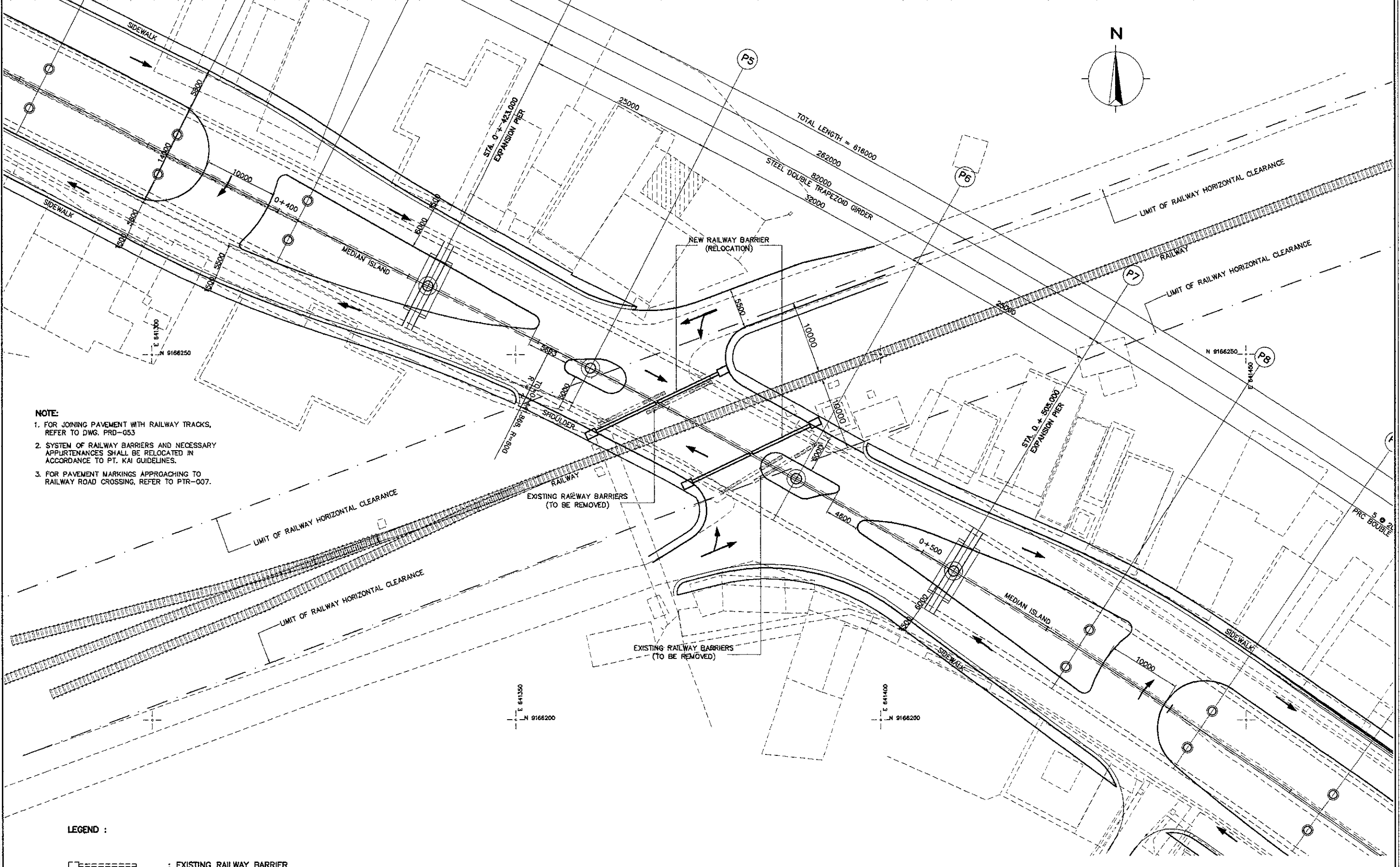


**ELEVATION**

**1 STEEL BEAM GUARD RAIL & RAIL DETAILS TYPE 2**  
 NOT TO SCALE

**2 CONCRETE COLUMN PROTECTION TYPE 1**  
 NOT TO SCALE 1:50

DESIGNED BY	CHECKED BY	SUBMITTED BY
Name: R. UENO	Name: T. OKUMURA	Name: M. KIUCHI
Sign:	Sign:	Sign:
Date:	Date:	Date:



**NOTE:**

1. FOR JOINING PAVEMENT WITH RAILWAY TRACKS, REFER TO DWG. PRD-053
2. SYSTEM OF RAILWAY BARRIERS AND NECESSARY APPURTENANCES SHALL BE RELOCATED IN ACCORDANCE TO PT. KAI GUIDELINES.
3. FOR PAVEMENT MARKINGS APPROACHING TO RAILWAY ROAD CROSSING, REFER TO PTR-007.

**LEGEND :**

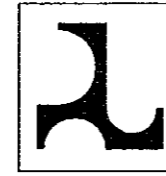
----- : EXISTING RAILWAY BARRIER

————— : RELOCATION RAILWAY BARRIER

**1** RAILWAY CROSSING DETAILS  
 SCALE 1:500



JAPAN INTERNATIONAL  
COOPERATION AGENCY



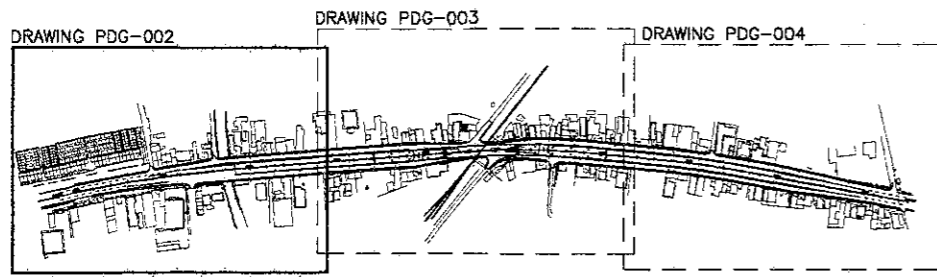
DIRECTORATE GENERAL OF HIGHWAY  
MINISTRY OF PUBLIC WORKS  
REPUBLIC OF INDONESIA

# DRAINAGE

 **KEI** KATAHIRA & ENGINEERS INTERNATIONAL



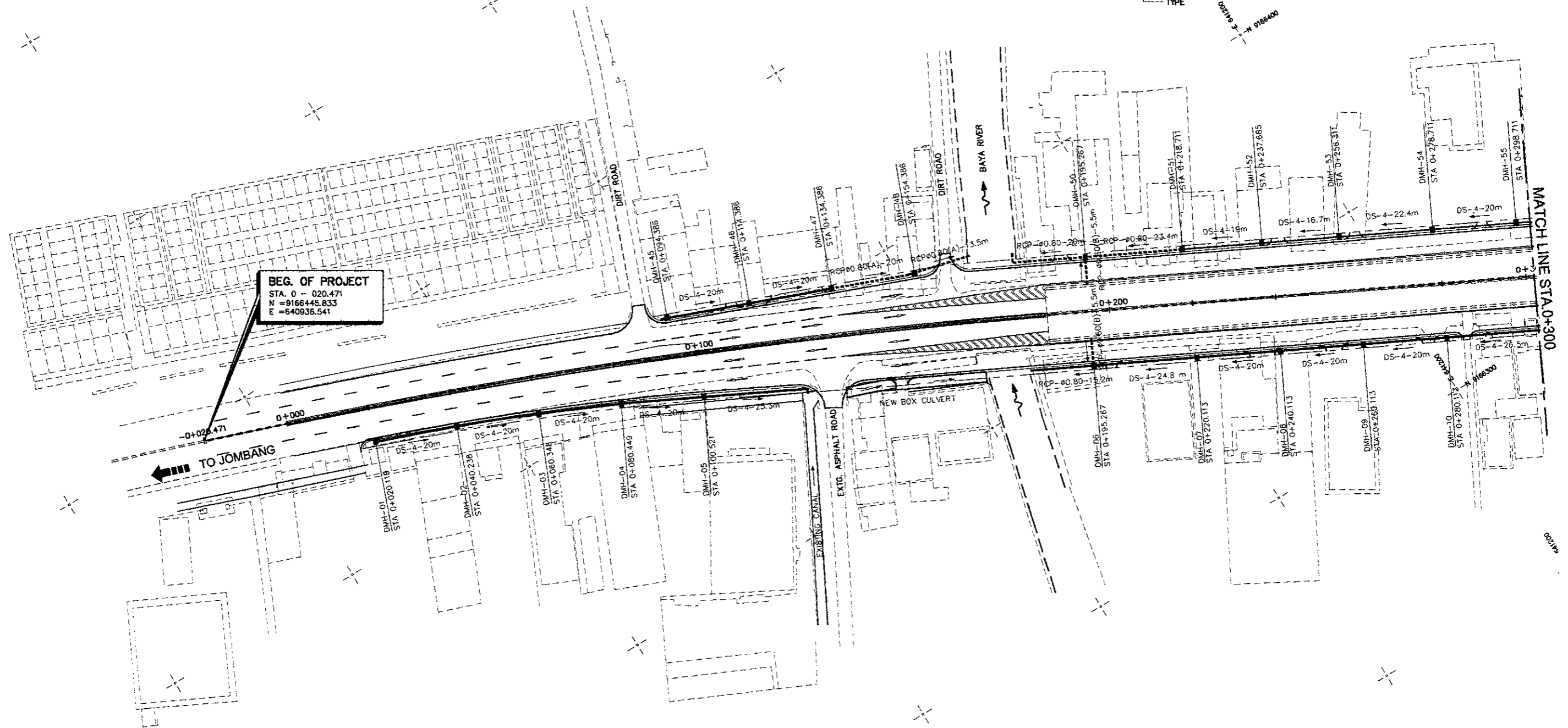
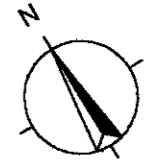




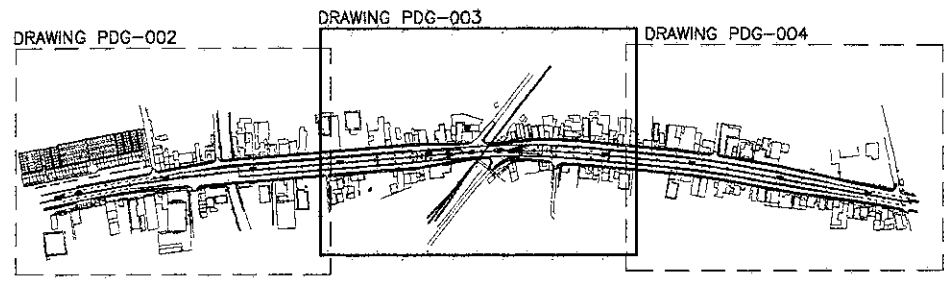
KEY PLAN

**LEGEND**

- : DRAINAGE MANHOLES
- : DRAINAGE LINE
- : NEW CULVERT
- : EXISTING DRAINAGE
- RCP : PIPE CULVERT, RCP- $\phi$ 0.60 (A)-15.0  
 DIAMETER — LENGTH  
 TYPE
- DS : SIDE DRAIN, DS-2-15.0  
 LENGTH  
 TYPE



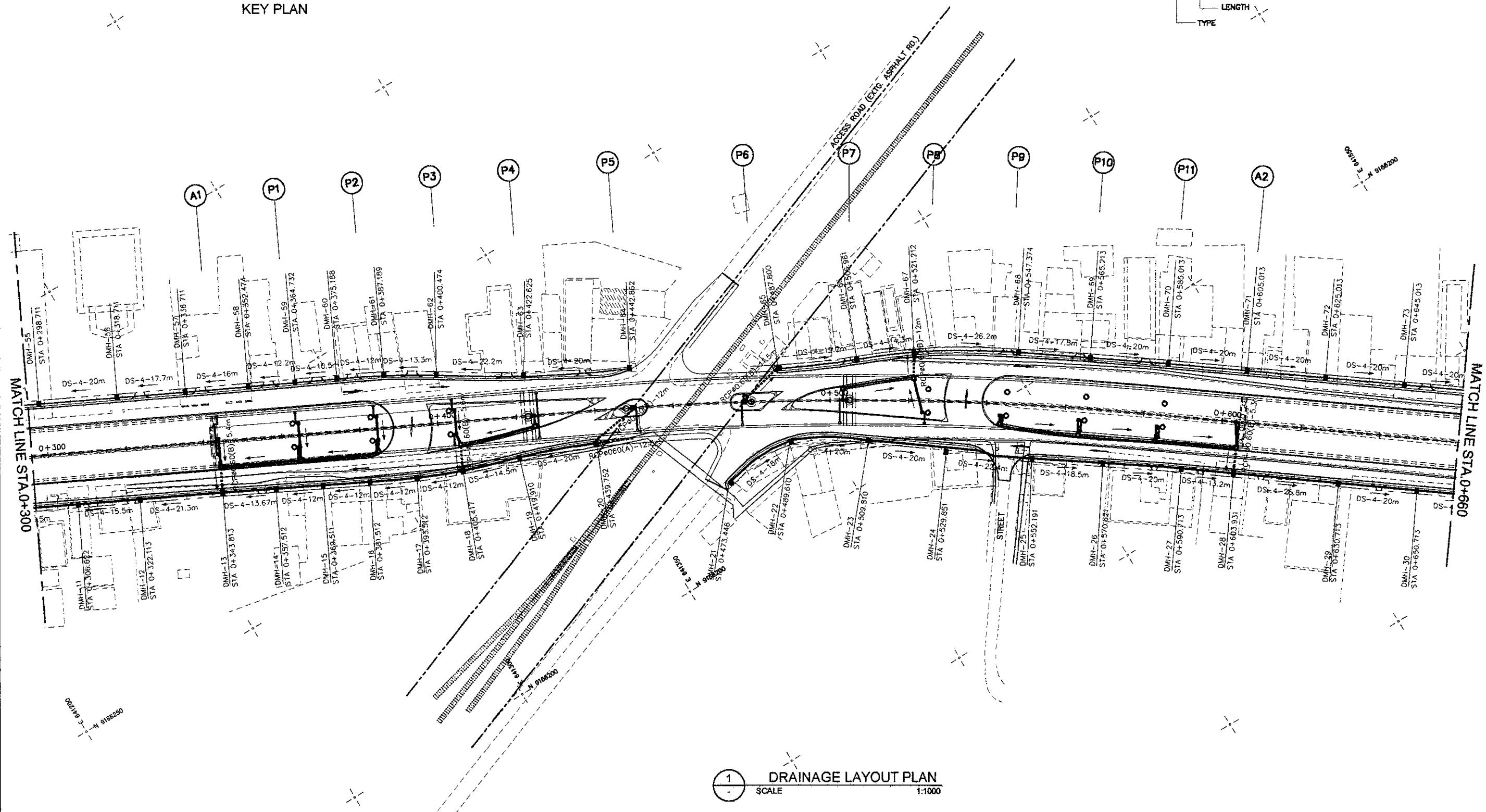
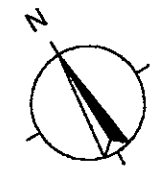
DESIGNED BY	CHECKED BY	SUBMITTED BY
Name: R. UENO	Name: T. OKUMURA	Name: M. KIUCHI
Sign:	Sign:	Sign:
Date:	Date:	Date:



KEY PLAN

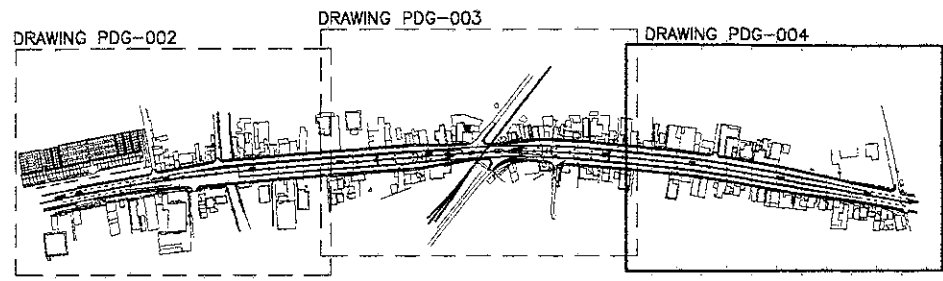
LEGEND

- : DRAINAGE MANHOLES
- : DRAINAGE LINE
- : NEW CULVERT
- : EXISTING DRAINAGE
- RCP : PIPE CULVERT, RCP- $\phi$ 0.60 (A)-15.0  
 DIAMETER — LENGTH  
 TYPE
- DS : SIDE DRAIN, DS-2-15.0  
 LENGTH — TYPE



1 DRAINAGE LAYOUT PLAN  
 SCALE 1:1000

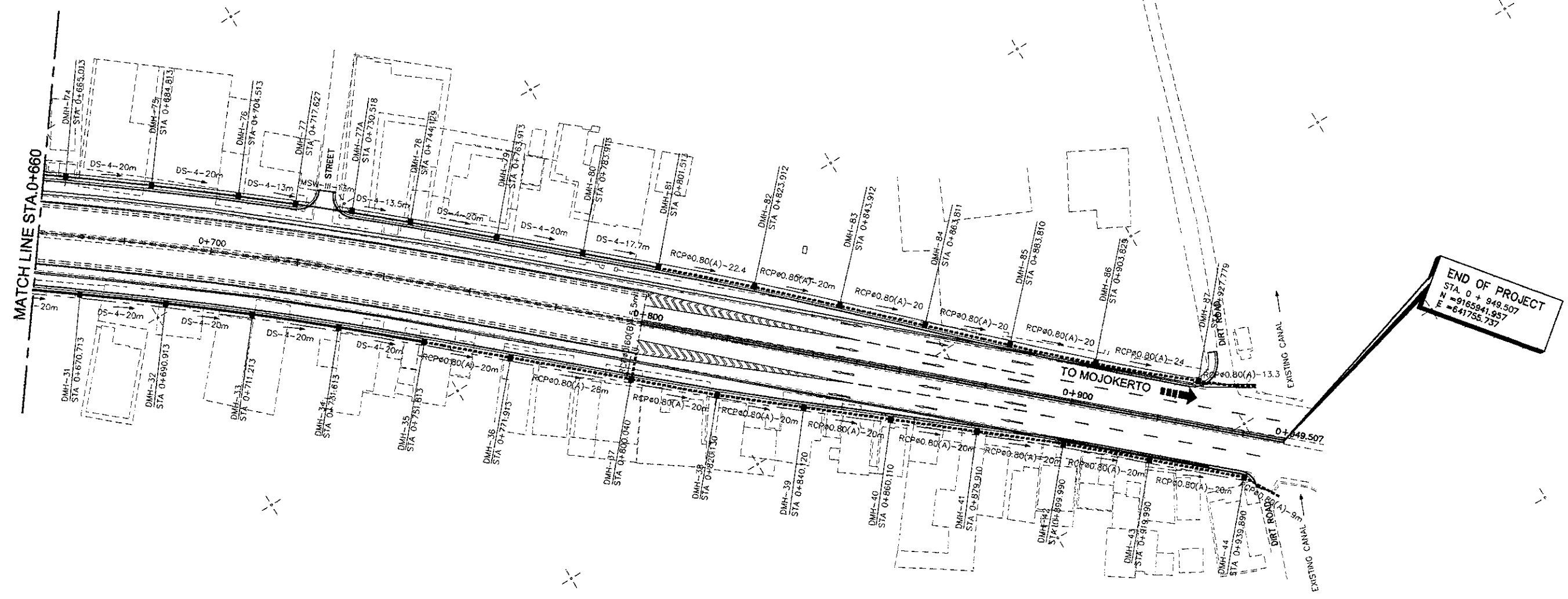
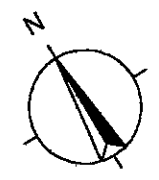
DESIGNED BY		CHECKED BY		SUBMITTED BY	
Name	R. UENO	Name	T. OKUMURA	Name	M. KIUCHI
Sign		Sign		Sign	
Date		Date		Date	



KEY PLAN

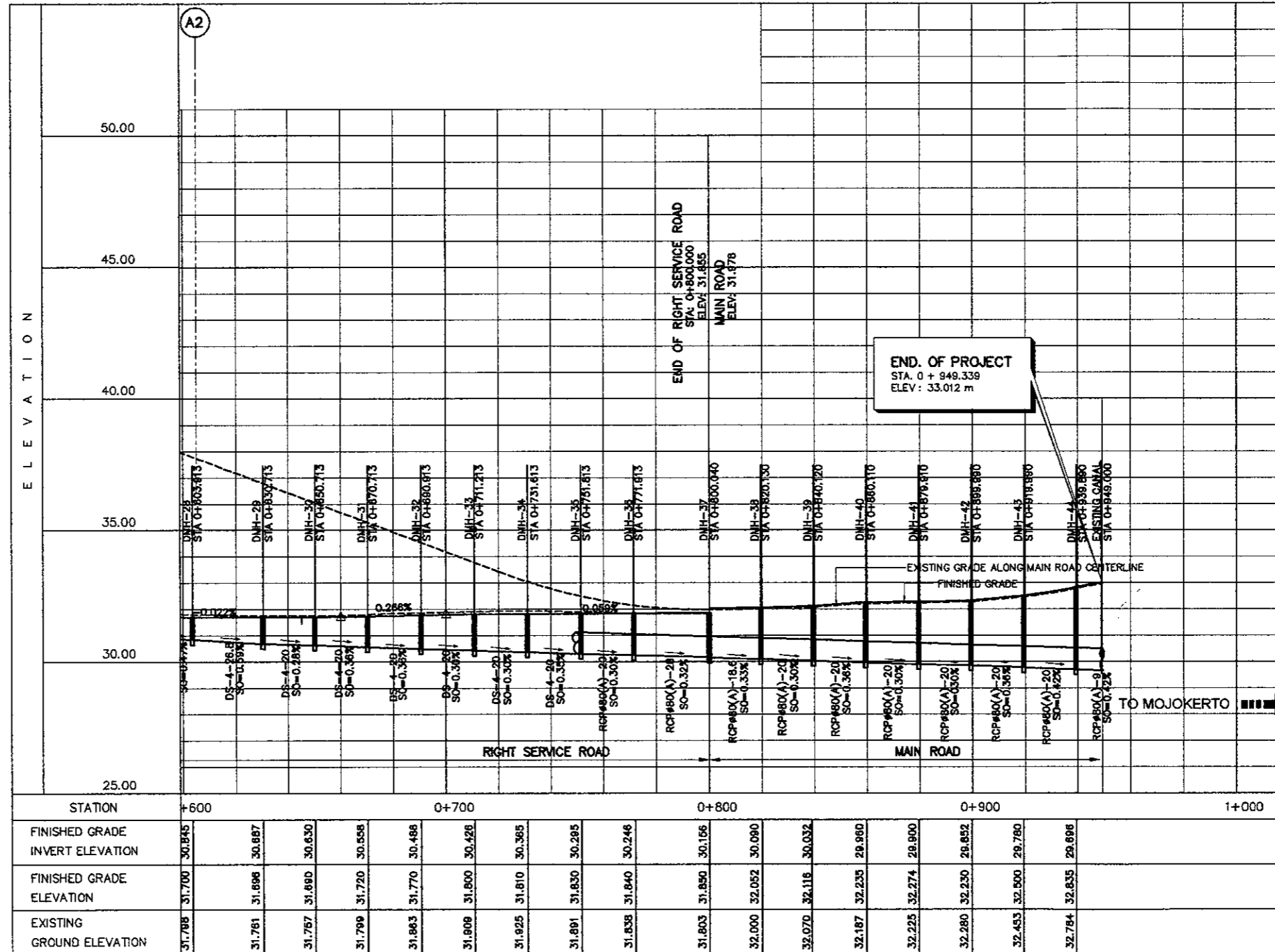
LEGEND

- : DRAINAGE MANHOLES
- : DRAINAGE LINE
- : NEW CULVERT
- : EXISTING DRAINAGE
- RCP : PIPE CULVERT, RCP-φ0.80 (A)-15.0  
 DIAMETER — LENGTH  
 TYPE
- DS : SIDE DRAIN, DS-2-15.0  
 LENGTH  
 TYPE

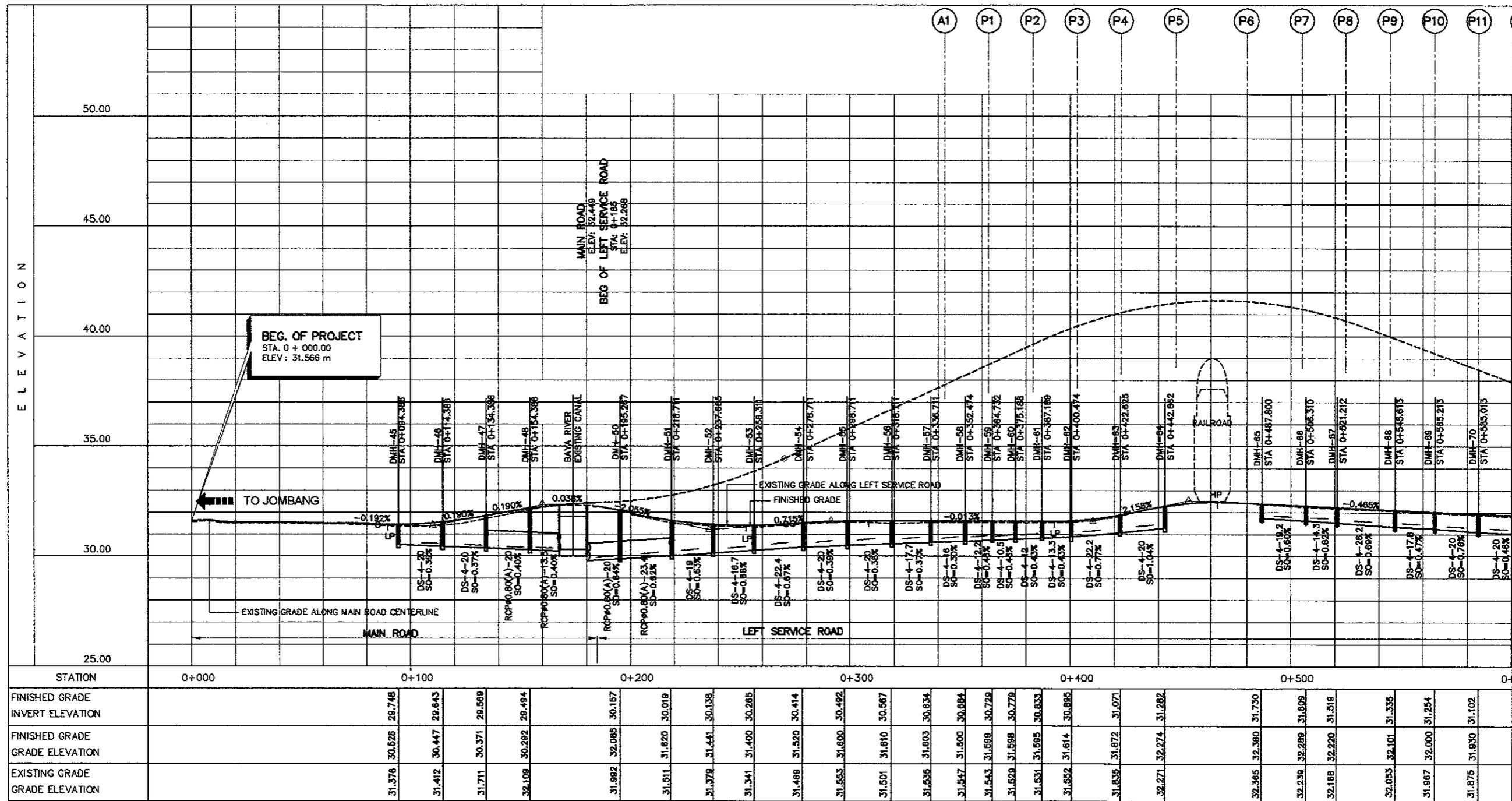




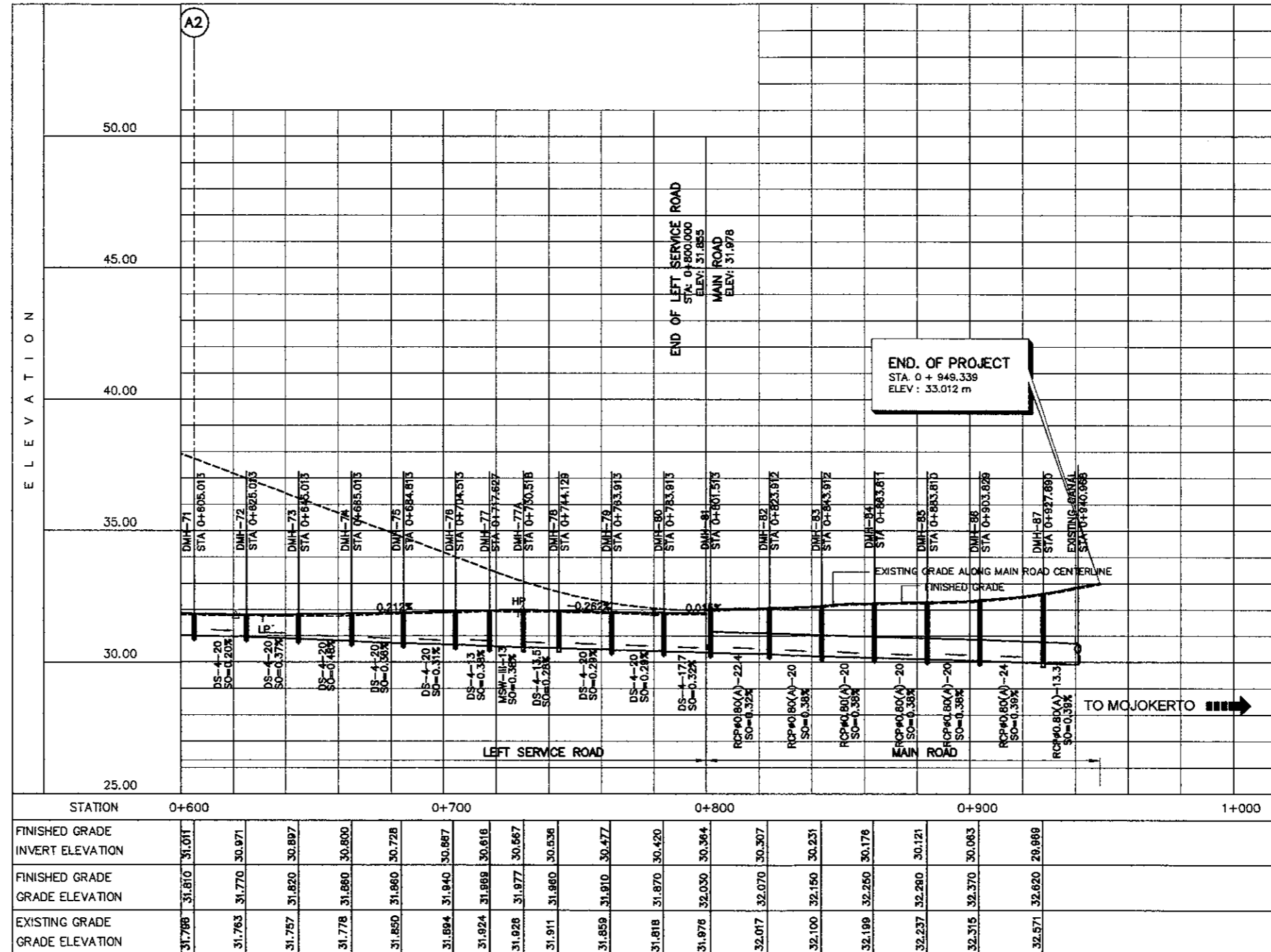
DESIGNED BY		CHECKED BY		SUBMITTED BY	
Name	R. UENO	Name	T. OKUMURA	Name	M. KIUCHI
Sign		Sign		Sign	
Date		Date		Date	



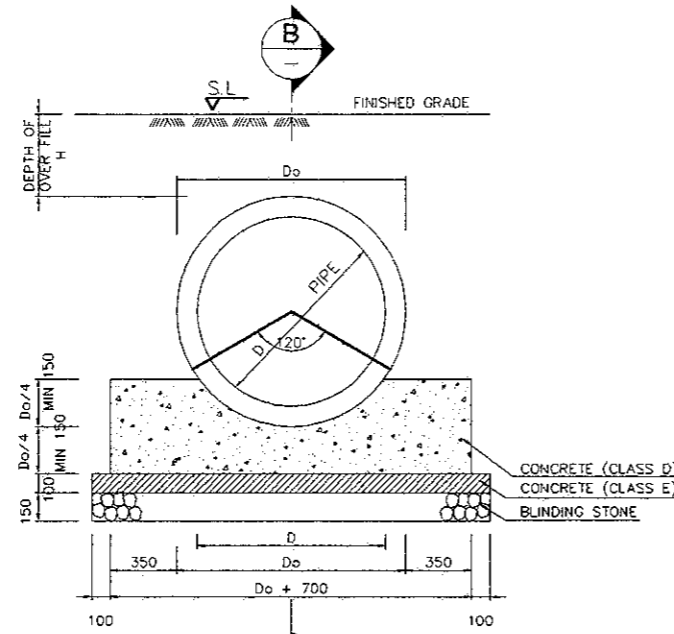
1 DRAINAGE PROFILE, RIGHT SERVICE ROAD (2 OF 2)  
 SCALE H:1:2000 V:1:200



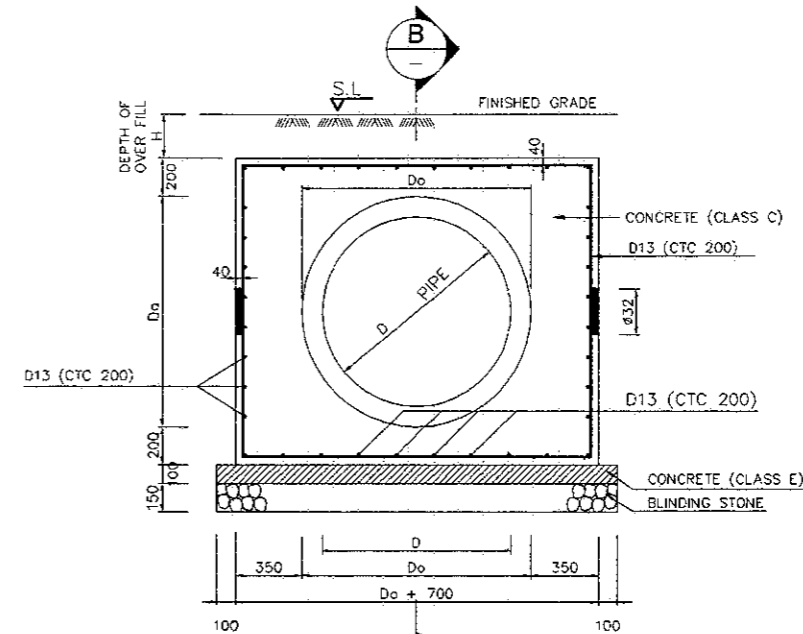
1 DRAINAGE PROFILE, LEFT SERVICE ROAD (1 OF 2)  
 SCALE  
 H:1:2000  
 V:1:200



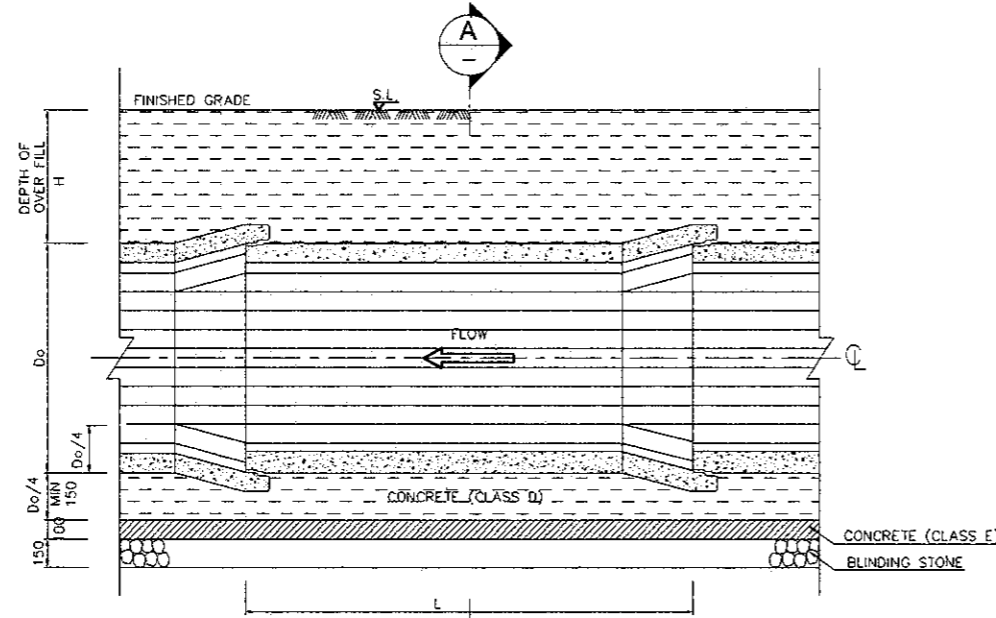
1 DRAINAGE PROFILE, LEFT SERVICE ROAD (1 OF 2)  
 SCALE  
 H:1:2000  
 V:1:200



1B SECTION A-A  
 SCALE 1:10

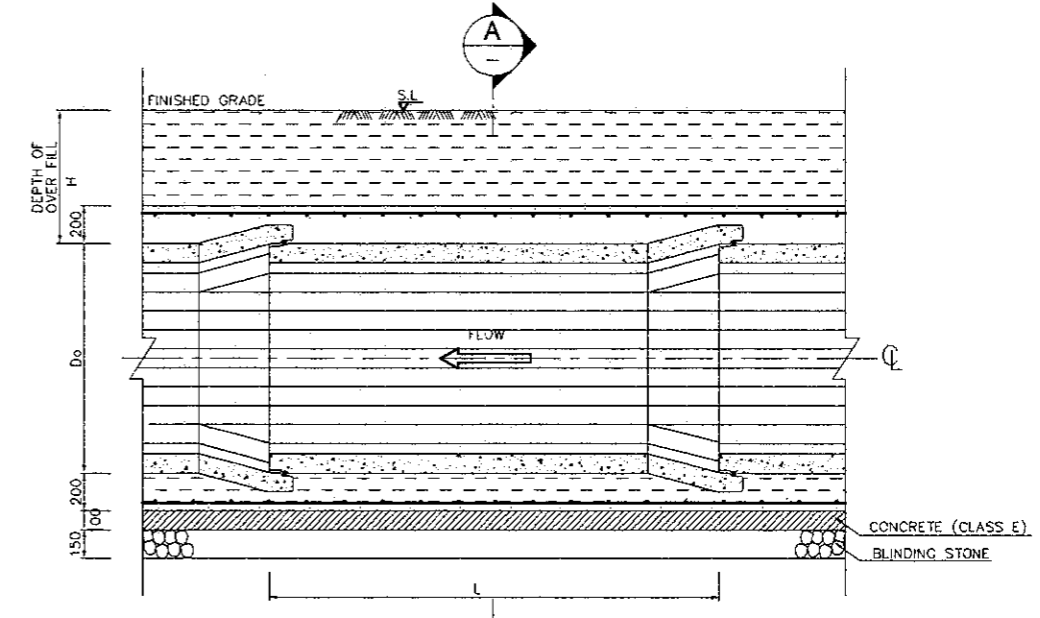


2B SECTION A-A  
 SCALE 1:10



1A SECTION B-B  
 SCALE 1:10

1 FOUNDATION (RCP TYPE - A)  
 SCALE 1:10



2A SECTION B-B  
 SCALE 1:10

2 FOUNDATION (RCP TYPE - B)  
 SCALE 1:10

PIPE DETAILS

DIA D	WALL THICKNESS T	Do	LENGTH L	WEIGHT W	RUBBER RING THICKNESS	REQUIRED STRENGTH	
						CRACKING	BREAKING
mm	mm	mm	mm	kg	mm	KN/m	KN/m
400	55	510	1250	281	12	35.19	58.65
600	70	740	1250/2500	519/965	12	43.07	73.00
800	84	988	2500	1690	15.5	58.40	102.50
1000	108	1216	2500	2638	15.5	75.00	138.00
1200	130	1460	2500	3805	16.5	80.00	160.00
1300	140	1580	2500	4444	18.5	94.20	171.25
1500	160	1820	2500	5858	20	102.20	175.00

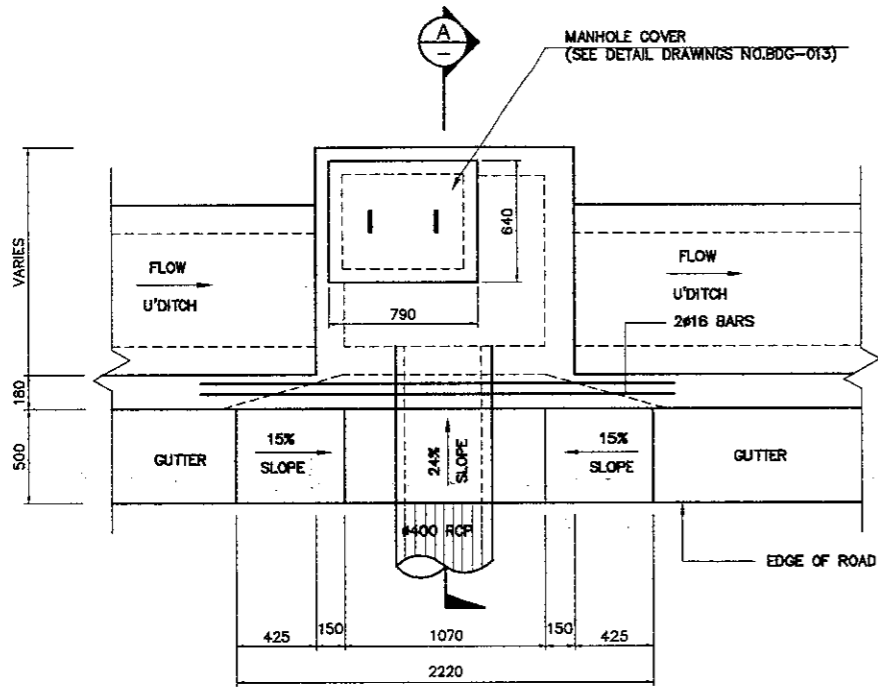
DEPTH OF OVER FILL : H

D	DIMENSION : mm	
	TYPE - A	TYPE - B
400	500 < H < 3000	300 < H < 500 OR 3000 < H
600	500 < H < 3000	300 < H < 500 OR 3000 < H
800	500 < H < 3000	300 < H < 500 OR 3000 < H
1000	500 < H < 3000	300 < H < 500 OR 3000 < H
1200	600 < H < 3000	300 < H < 600 OR 3000 < H
1300	600 < H < 3000	300 < H < 600 OR 3000 < H
1500	600 < H < 3000	300 < H < 600 OR 3000 < H

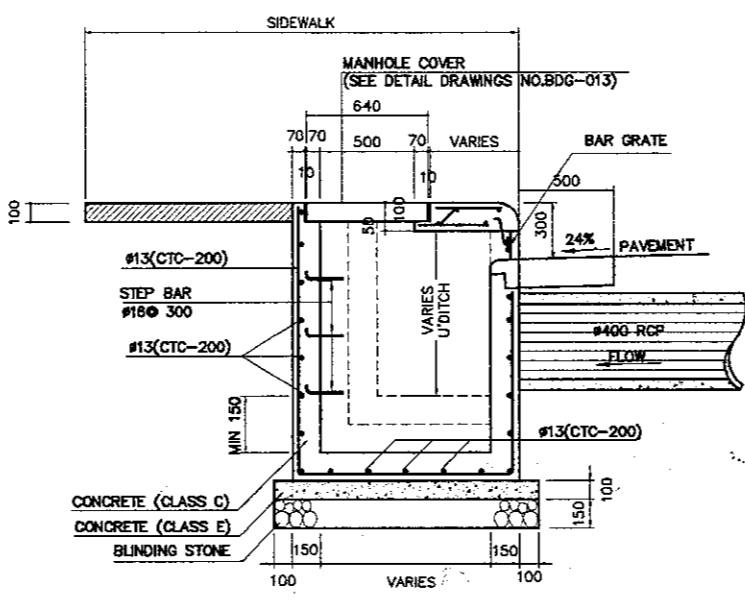
NOTES :

- ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN.
- TYPE OF FOUNDATION IS SHOWN ON THE DRAWING.
- THE FOUNDATIONS OF TRANSVERSE PIPE CULVERTS SHALL BE TYPE - B IRRESPECTIVE OF PIPE DEPTH.
- THE CRACKING LOAD MEANS THE LOAD AT WHICH A 0.05 mm WIDE CRACK DEVELOPES ON THE PIPE.
- BREAKING LOAD MEANS THE MAXIMUM LOAD INDICATED BY THE TESTING MACHINE.
- THE LOAD P DIVIDED BY THE EFFECTIVE LENGTH L OF PIPE IS GIVEN IN TERMS OF STRENGTH FOR EXTERNAL LOAD.

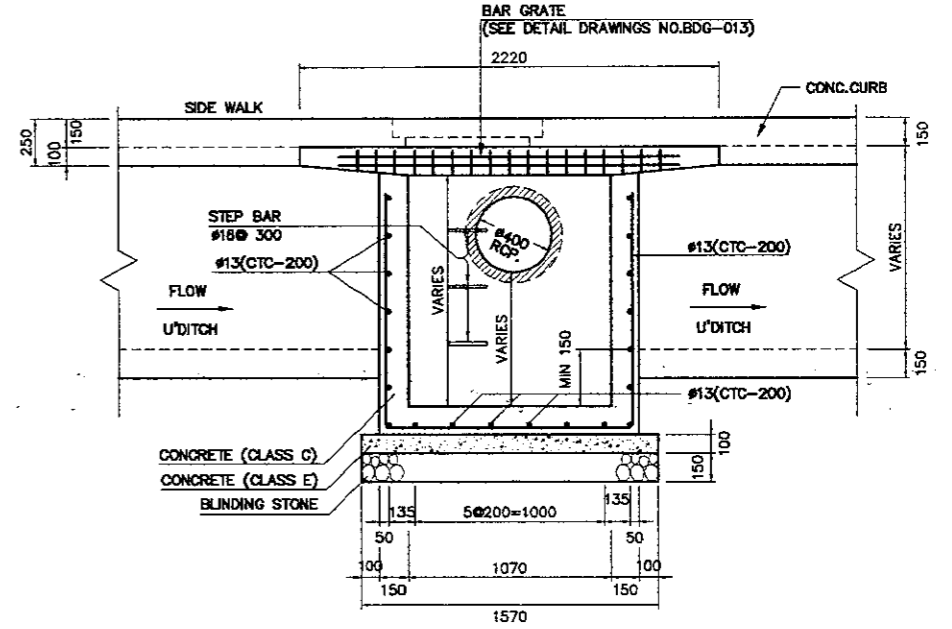




**2 PLAN**  
 SCALE 1:40

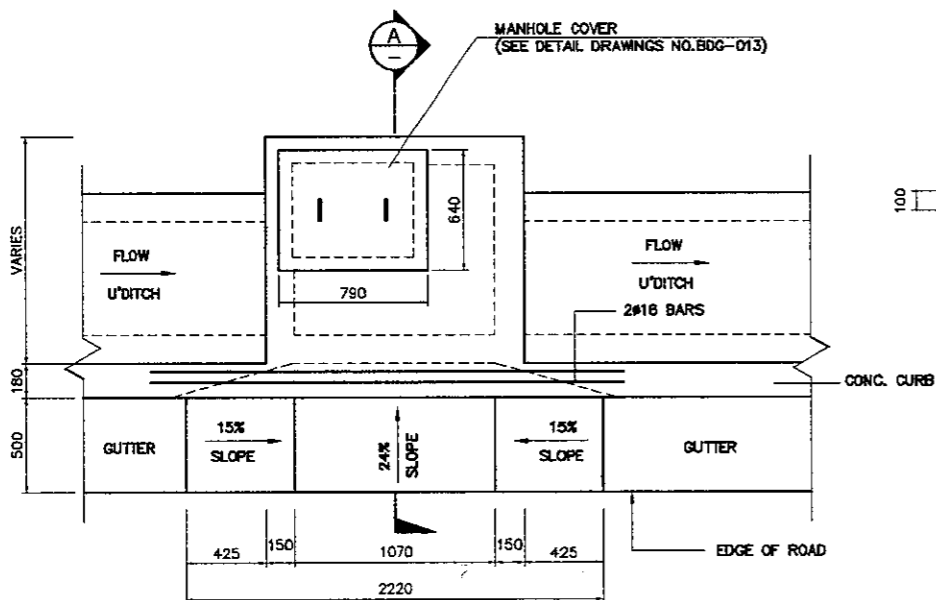


**2A SECTION**  
 SCALE 1:40

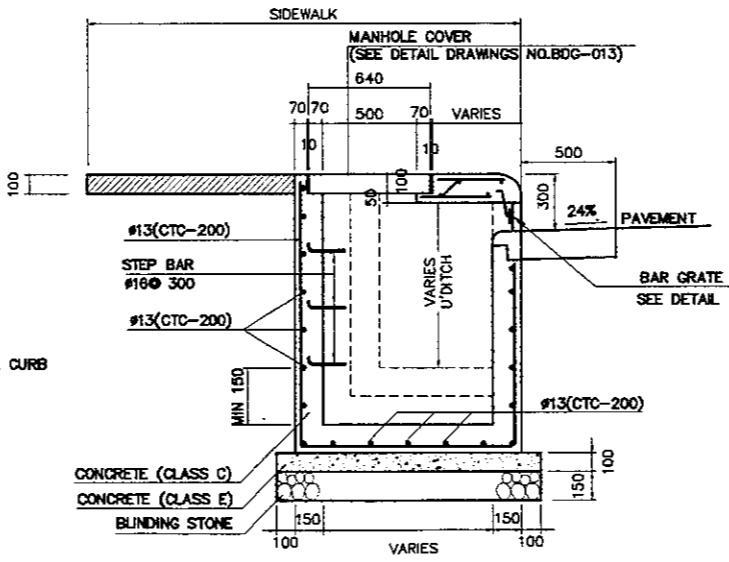


**2B FRONT ELEVATION**  
 SCALE 1:40

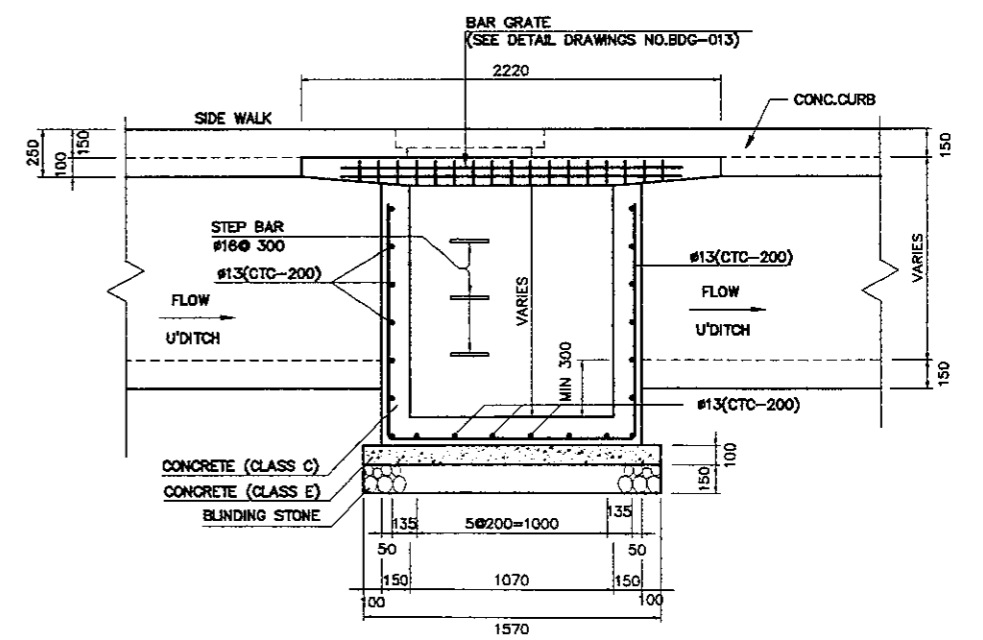
**II MANHOLE TYPE - II**



**1 PLAN**  
 SCALE 1:40



**1A SECTION**  
 SCALE 1:40



**1B FRONT ELEVATION**  
 SCALE 1:40

**I MANHOLE TYPE - I**