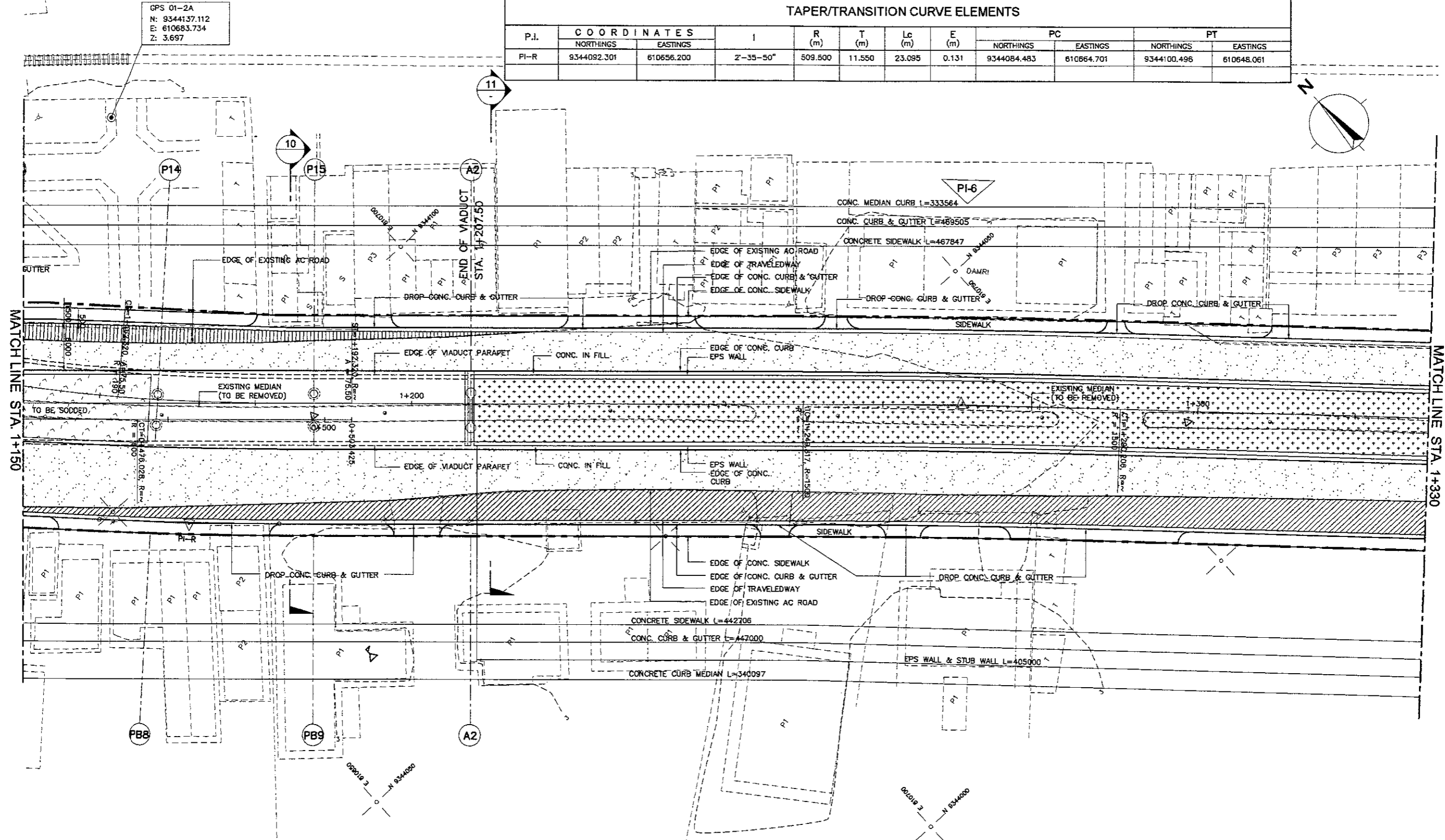


**TAPER/TRANSITION CURVE ELEMENTS**

P.I.	COORDINATES		I	R (m)	T (m)	Lc (m)	E (m)	PC		PT	
	NORTHINGS	EASTINGS						NORTHINGS	EASTINGS	NORTHINGS	EASTINGS
PI-R	9344092.301	610656.200	2'-35"-50"	509.500	11.550	23.095	0.131	9344084.483	610664.701	9344100.496	610648.061



MATCH LINE STA. 1+150

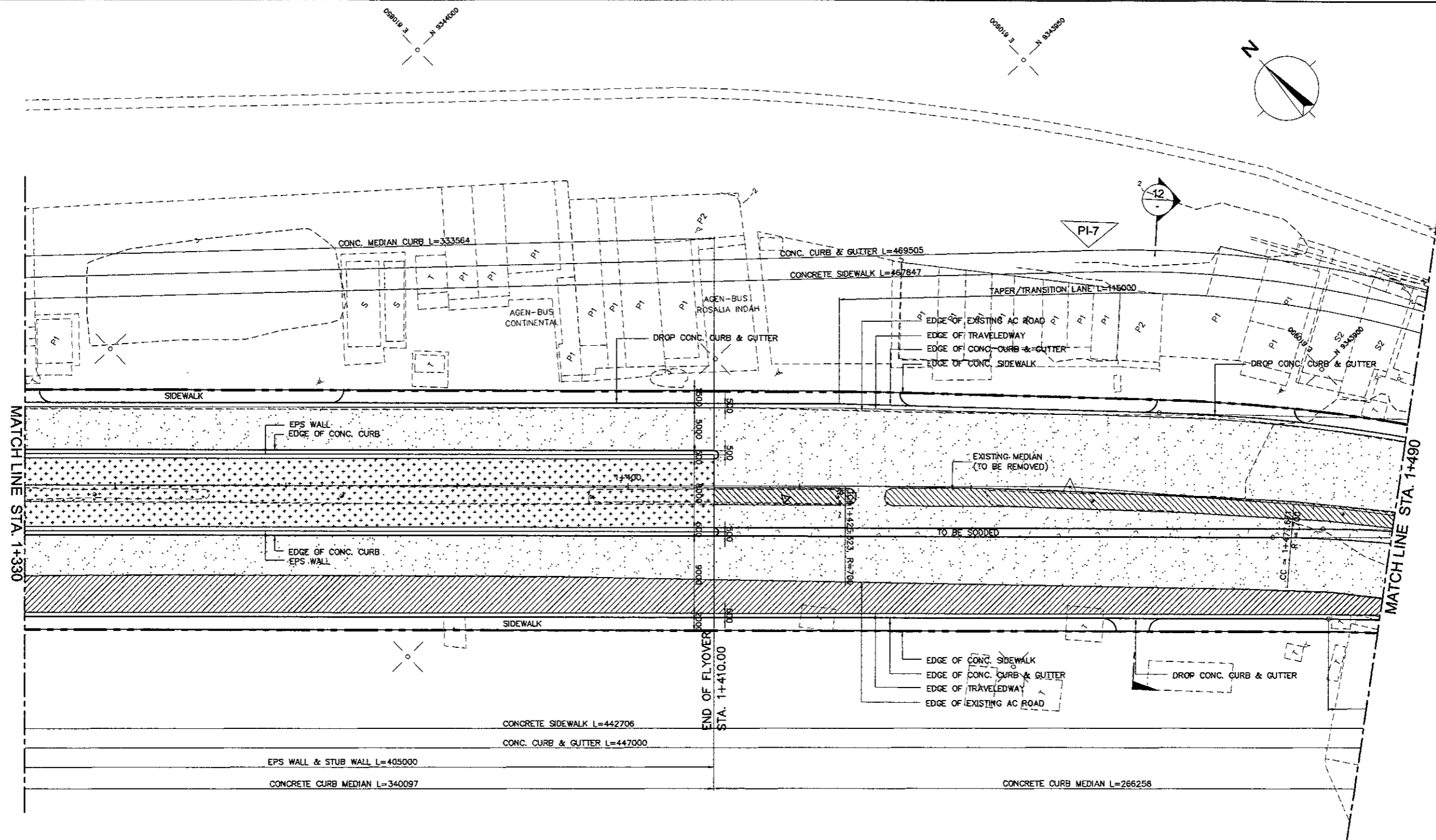
MATCH LINE STA. 1+330

- LEGEND:**
- PAVEMENT OVERLAY
  - PAVEMENT WIDENING - NEW PAVEMENT
  - PAVEMENT AT APPROACH RAMP

**1** DETAILED CONSTRUCTION LAYOUT PLAN  
 SCALE 1:500

**NOTE:**  
 1. FOR SPECIFIC NOTES, REFER TO DWG. MRD-025

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



LEGEND:



PAVEMENT OVERLAY



PAVEMENT WIDENING  
 -NEW PAVEMENT



PAVEMENT AT  
 APPROACH RAMP

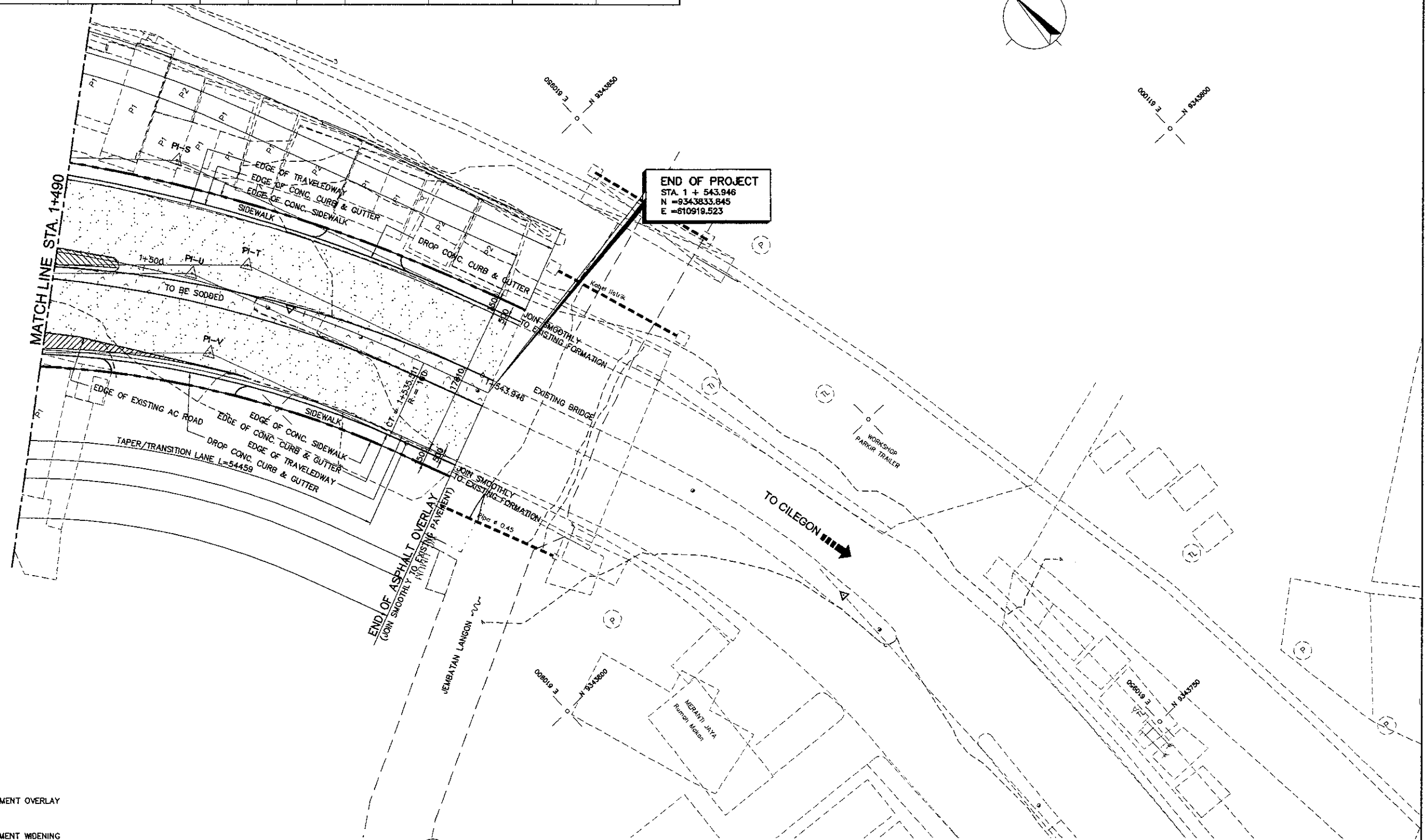
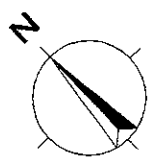
1 DETAILED CONSTRUCTION LAYOUT PLAN  
 SCALE 1:500

NOTE:

1. FOR SPECIFIC NOTES, REFER TO DWG. MRD-025

TAPER/TRANSITION CURVE ELEMENTS

P.I.	COORDINATES		I	R (m)	T (m)	Lc (m)	E (m)	PC		PT	
	NORTHINGS	EASTINGS						NORTHINGS	EASTINGS	NORTHINGS	EASTINGS
PI-S	9343879.686	610912.078	23°-34'-34"	200.00	41.739	82.296	4.309	9343909.504	610882.872	9343840.675	610926.919
PI-T	9343864.833	610909.437	25°-01'-34"	140.00	31.071	61.150	3.406	9343835.792	610920.485	9343886.473	610887.141
PI-U	9343868.759	610903.955	24°-24'-06"	140.00	30.271	59.625	3.235	9343840.586	610915.027	9343889.843	610882.233
PI-V	9343860.423	610898.904	24°-24'-06"	120.00	25.947	51.107	2.773	9343836.274	610908.394	9343878.494	610880.285



- LEGEND:
- PAVEMENT OVERLAY
  - PAVEMENT WIDENING -NEW PAVEMENT
  - PAVEMENT AT APPROACH RAMP

1 DETAILED CONSTRUCTION LAYOUT PLAN  
 SCALE 1:500

NOTE:  
 1. FOR SPECIFIC NOTES, REFER TO DWG. MRD-025

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

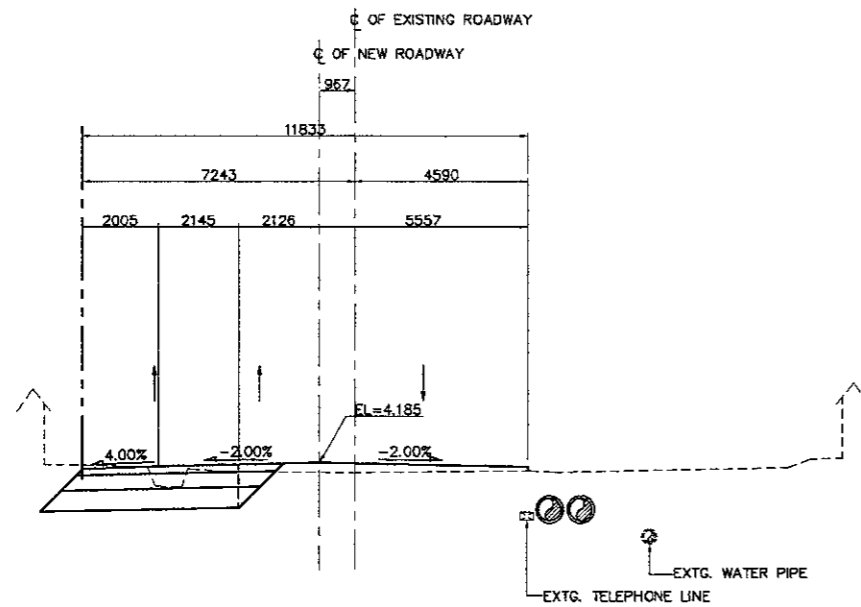
APPROVED BY	
Name	Ir. HERRY VAZA M.Eng.Sc
Date	

PROJECT AND LOCATION :
   
 DETAILED DESIGN STUDY OF
   
 NORTH JAVA CORRIDOR FLYOVER PROJECT
   
 MERAK FLYOVER - CONTRACT PACKAGE 1
   
 ( MERAK - BALARAJA )
   
 BANTEN PROVINCE

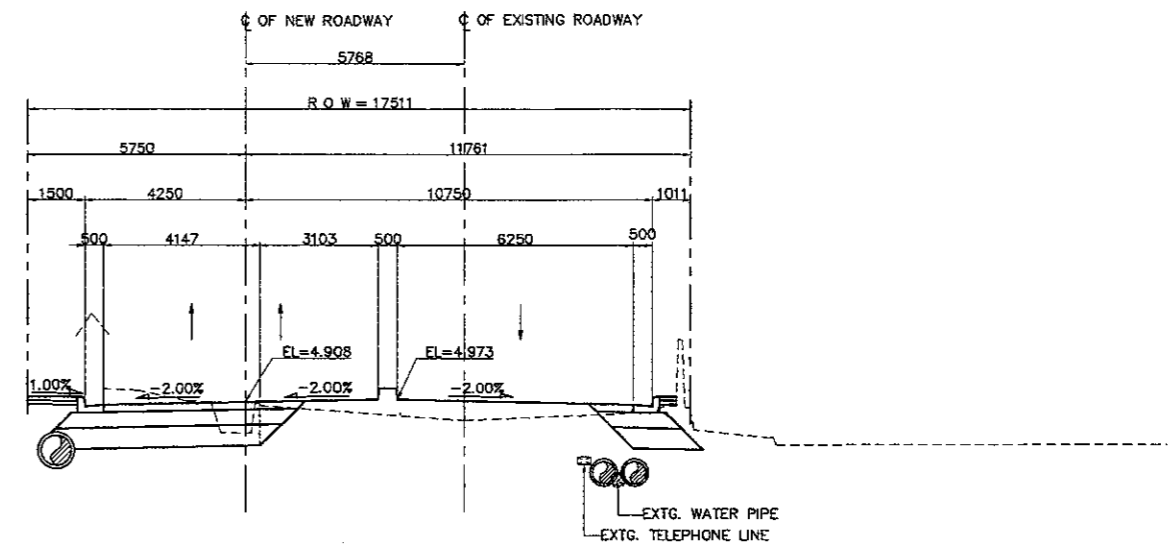
SCALE :
   
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 FULL SIZE A3

DRAWING TITLE :
   
 CROSS SECTION (MERAK-1)
   
 STA. 0 + 500.000 - 0 + 560.000
   
 (1 OF 14)

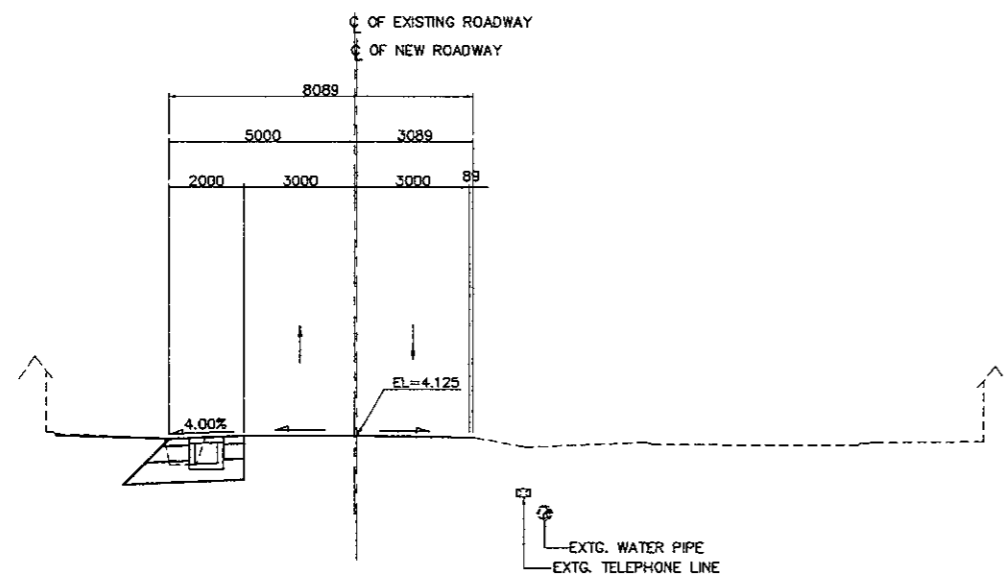
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 SHEET NO :
   
 34 / 84



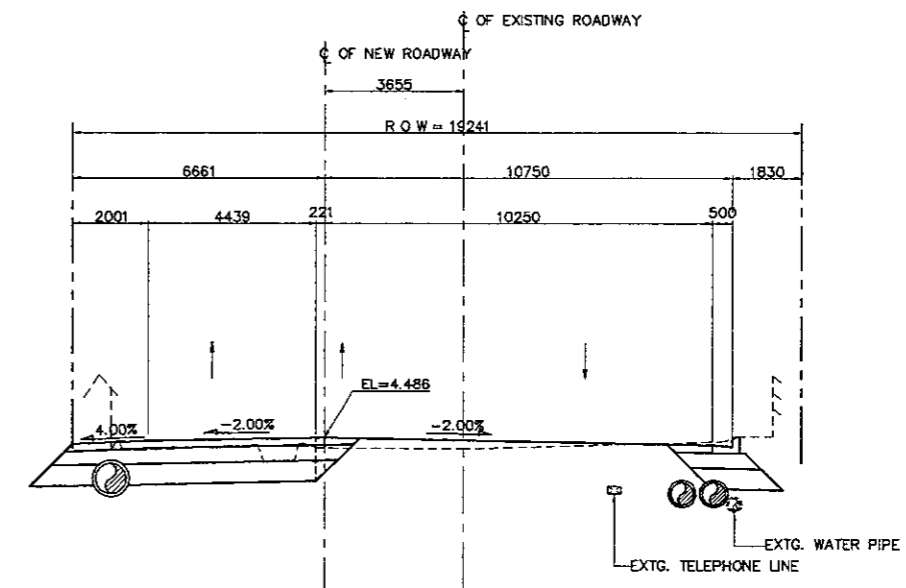
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 SCALE 1:200



4 SECTION (STA. 0 + 560.000)
   
 SCALE 1:200



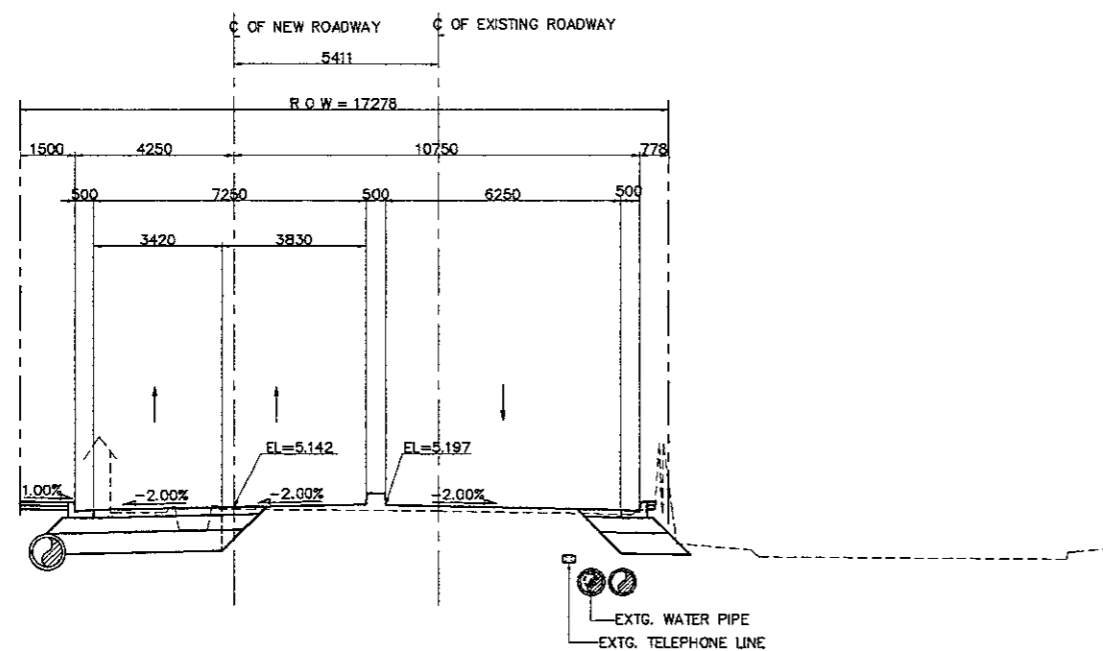
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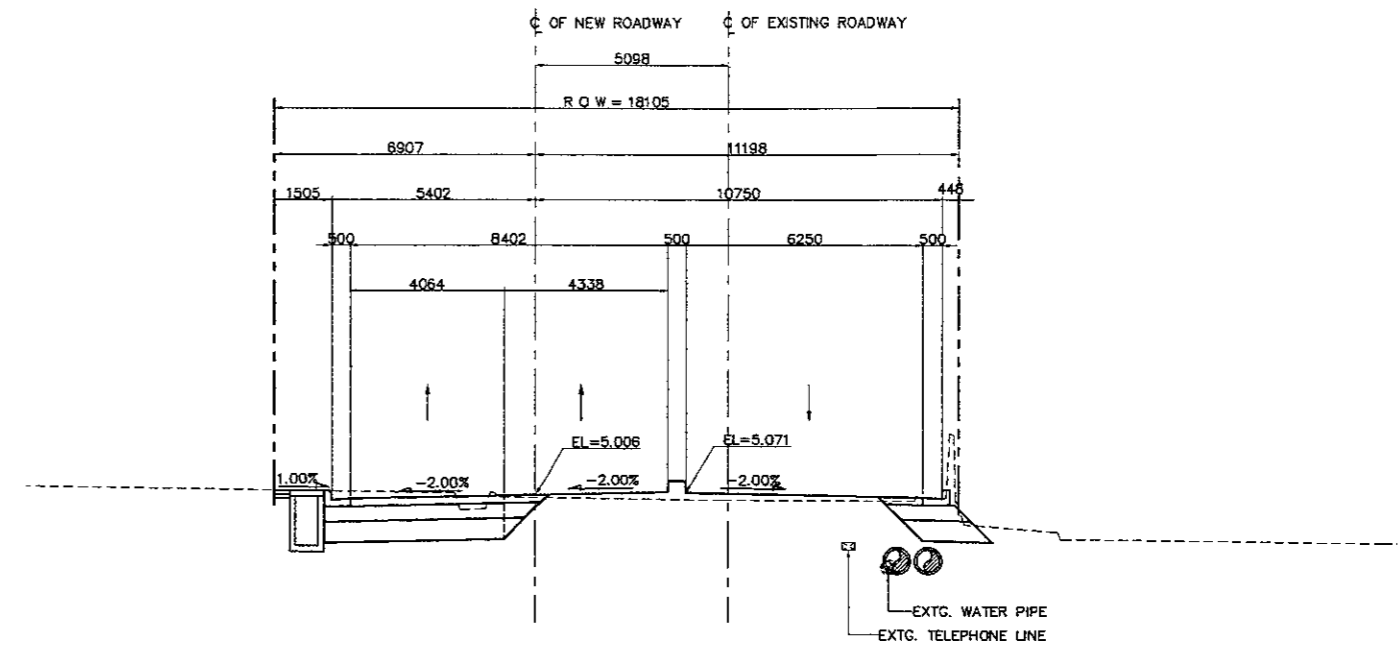
3 SECTION (STA. 0 + 540.000)
   
 SCALE 1:200

- NOTES:
1. ALL DIMENSIONS AND ELEVATIONS SHALL BE VERIFIED DURING CONSTRUCTION.
  2. LOCATION OF EXISTING UTILITIES SHALL BE VERIFIED PRIOR TO CONSTRUCTION.
  3. FOR LOCATION AND INVERT ELEVATIONS OF DRAINAGE SYSTEM (DITCH AND RCP) REFER TO DRAINAGE DRAWINGS.

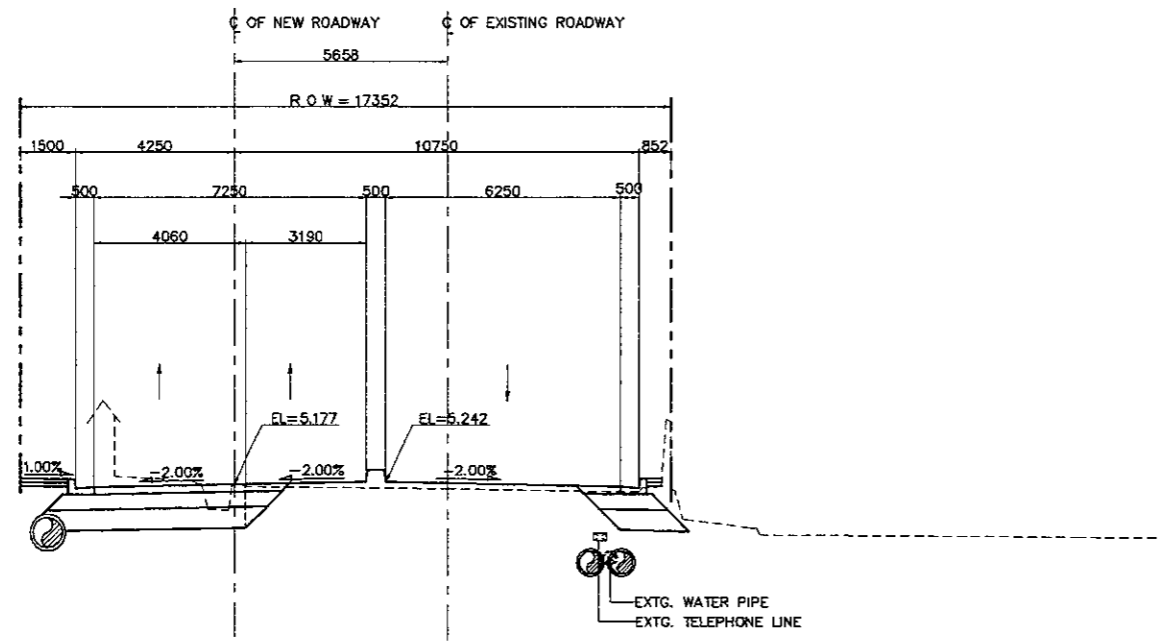
DESIGNED BY		CHECKED BY		SUBMITTED BY	
Name	R. UENO	Name	T. OKUMURA	Name	M. KIUCHI
Sign		Sign		Sign	
Date		Date		Date	



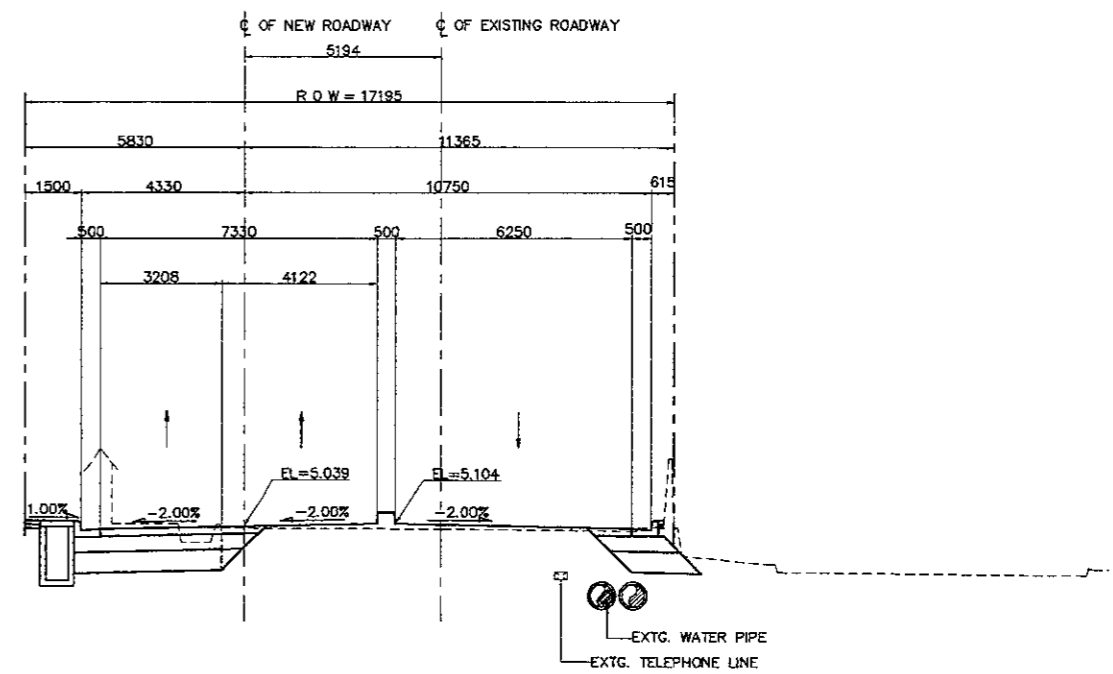
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4 SECTION (STA. 0 + 640.000)  
 SCALE 1:200



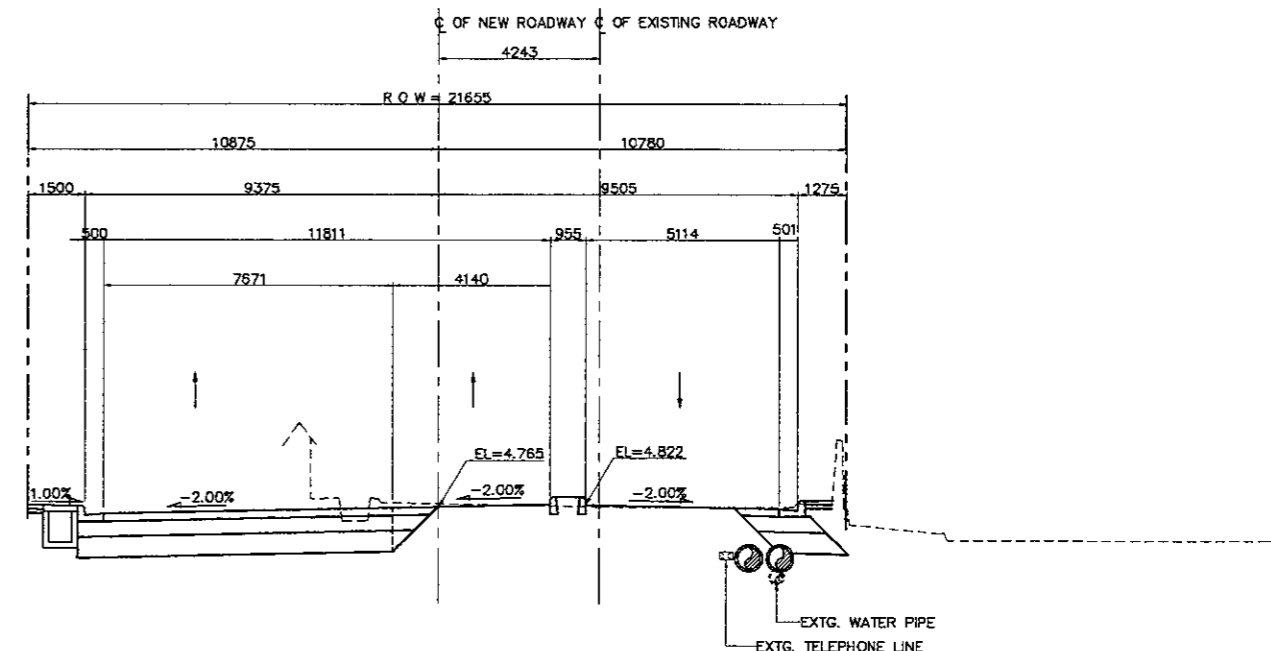
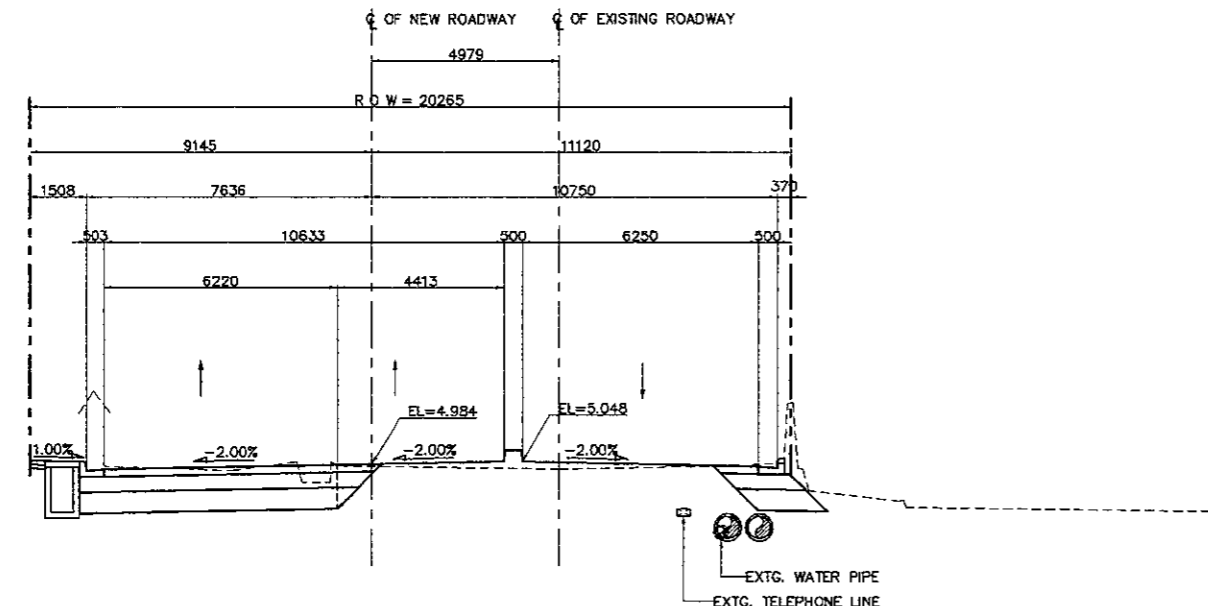
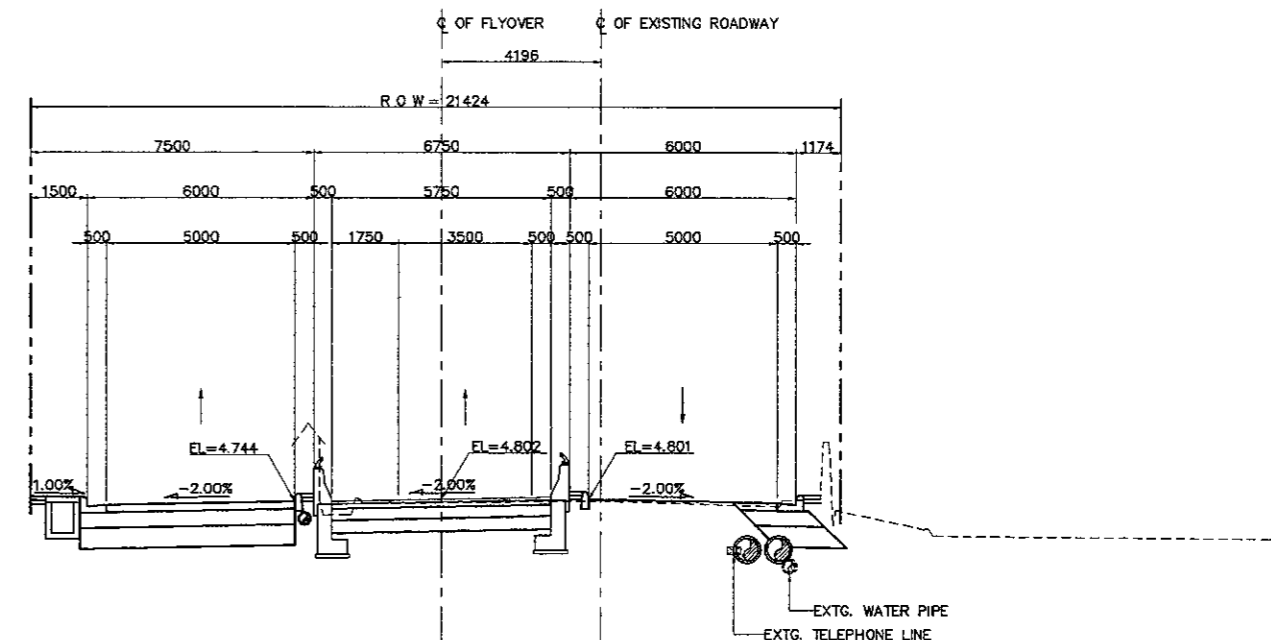
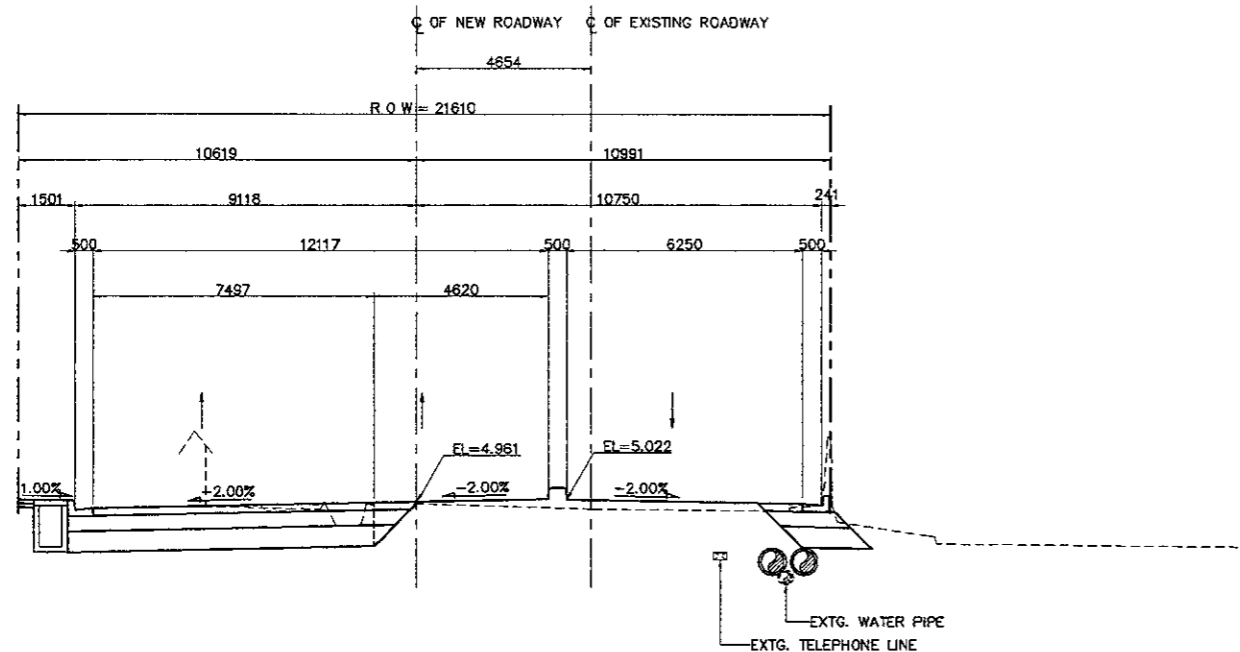
1 SECTION (STA. 0 + 580.000)  
 SCALE 1:200



3 SECTION (STA. 0 + 620.000)  
 SCALE 1:200

- NOTES:
1. ALL DIMENSIONS AND ELEVATIONS SHALL BE VERIFIED DURING CONSTRUCTION.
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DESIGNED BY	CHECKED BY	SUBMITTED BY
Name R. UENO	Name T. OKUMURA	Name M. KIUCHI
Sign	Sign	Sign
Date	Date	Date

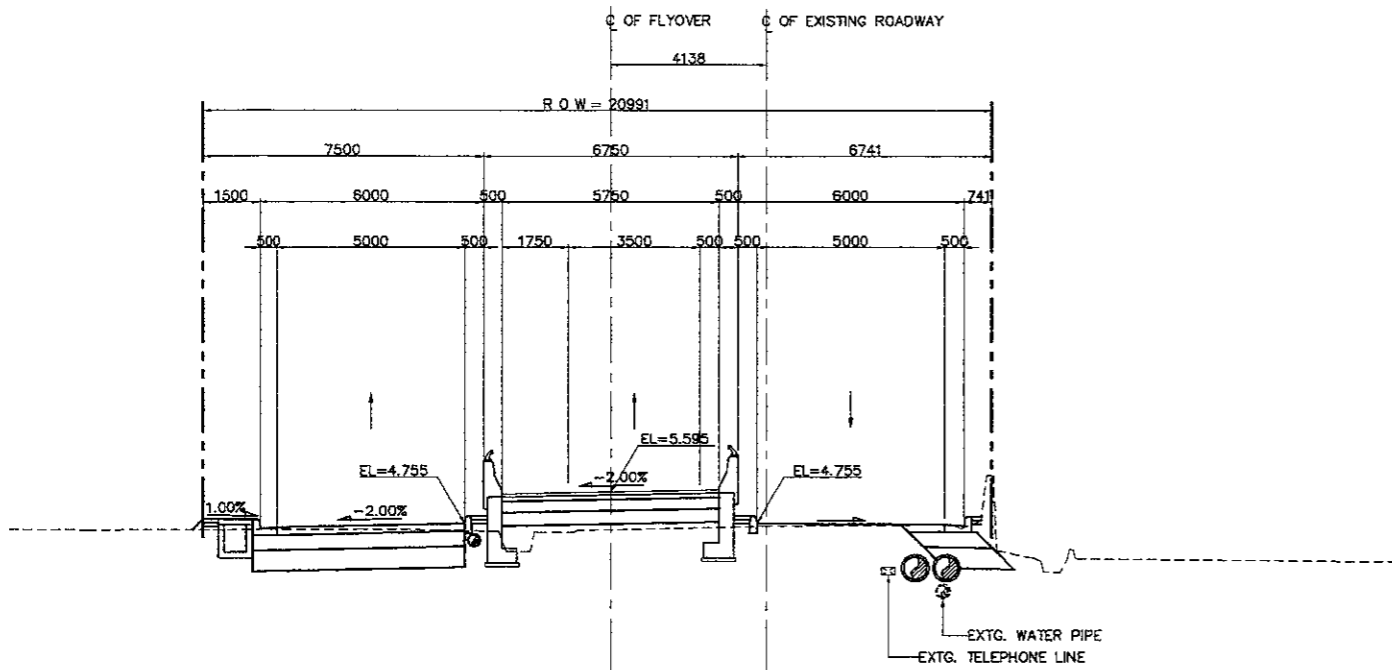


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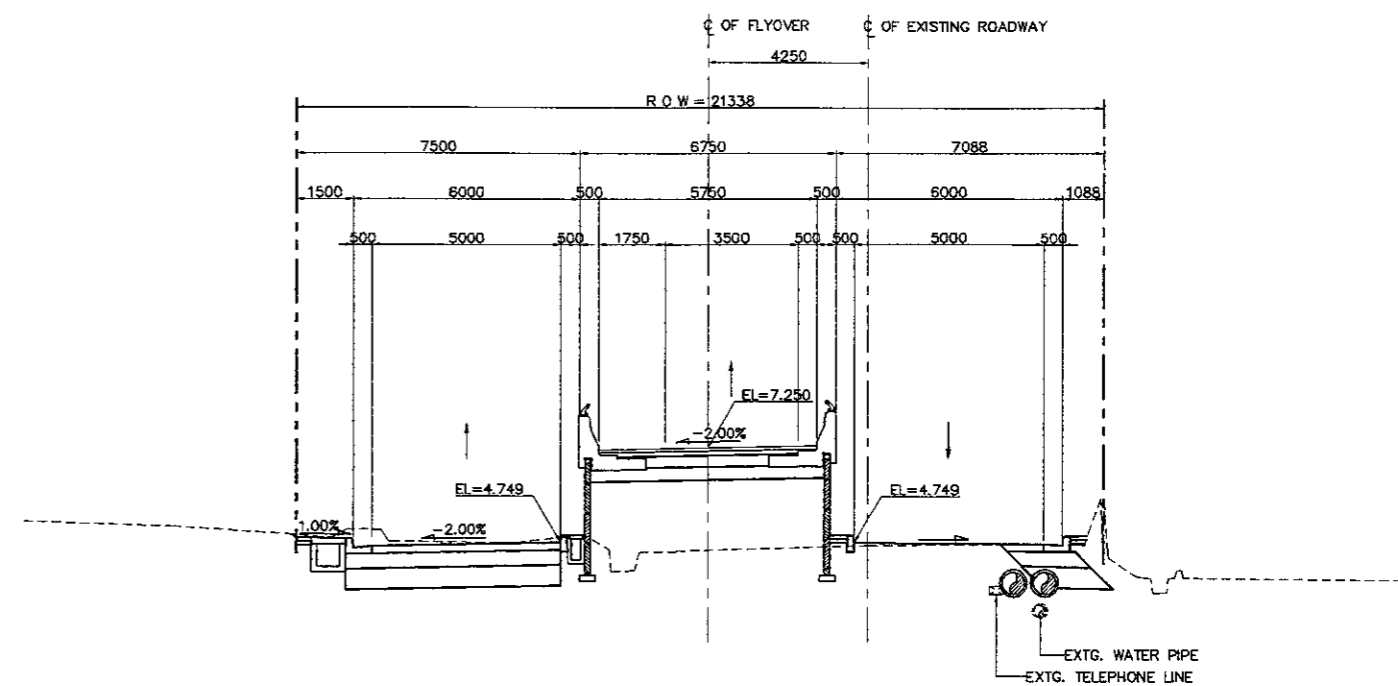
DESIGNED BY		CHECKED BY		SUBMITTED BY	
Name	R. UENO	Name	T. OKUMURA	Name	M. KIUCHI
Sign		Sign		Sign	
Date		Date		Date	

APPROVED BY

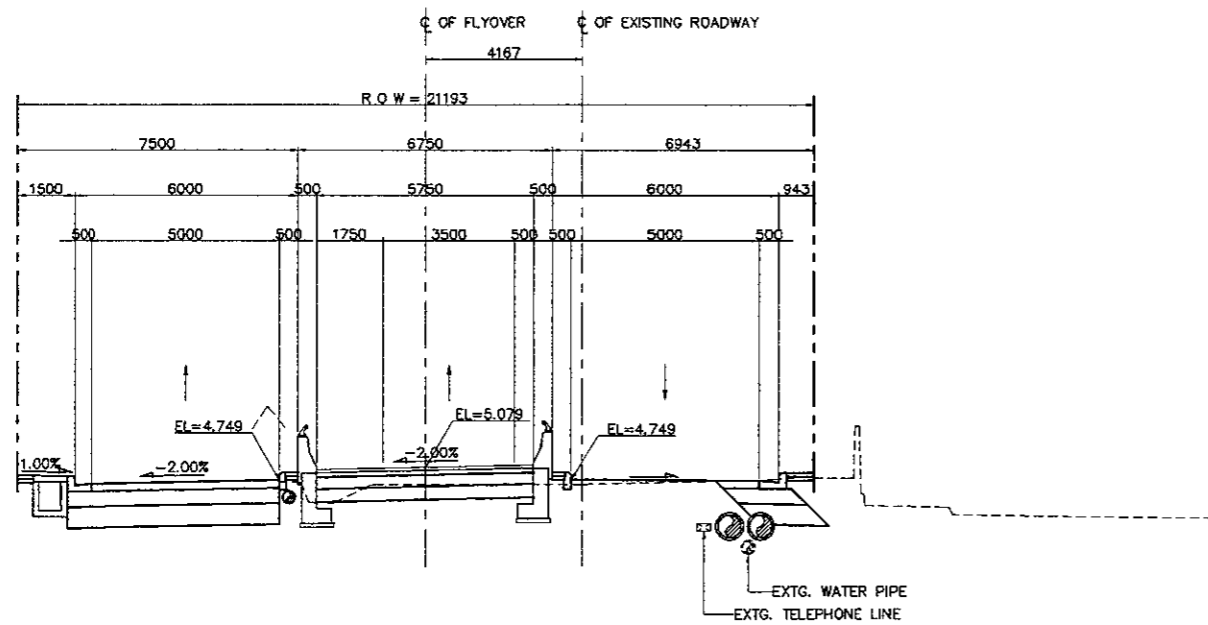
Ir. HERRY VAZA M.Eng.Sc	Sign
NIP. : 110038400	Date



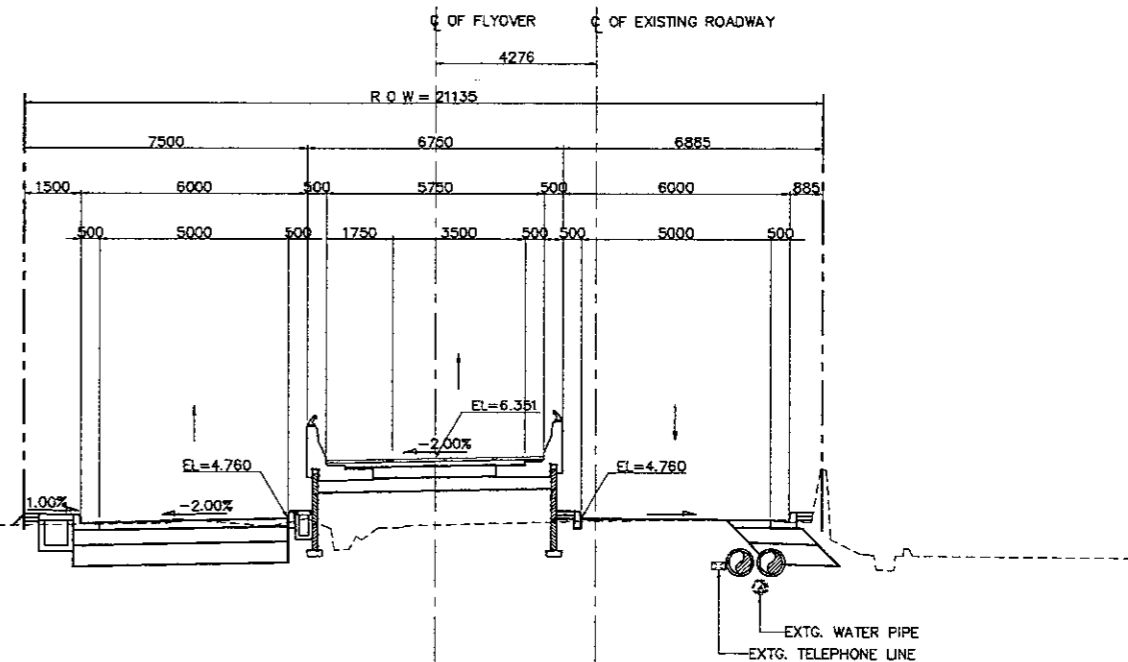
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4 SECTION (STA. 0 + 800.000)  
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1 SECTION (STA. 0 + 740.000)  
 SCALE 1:200

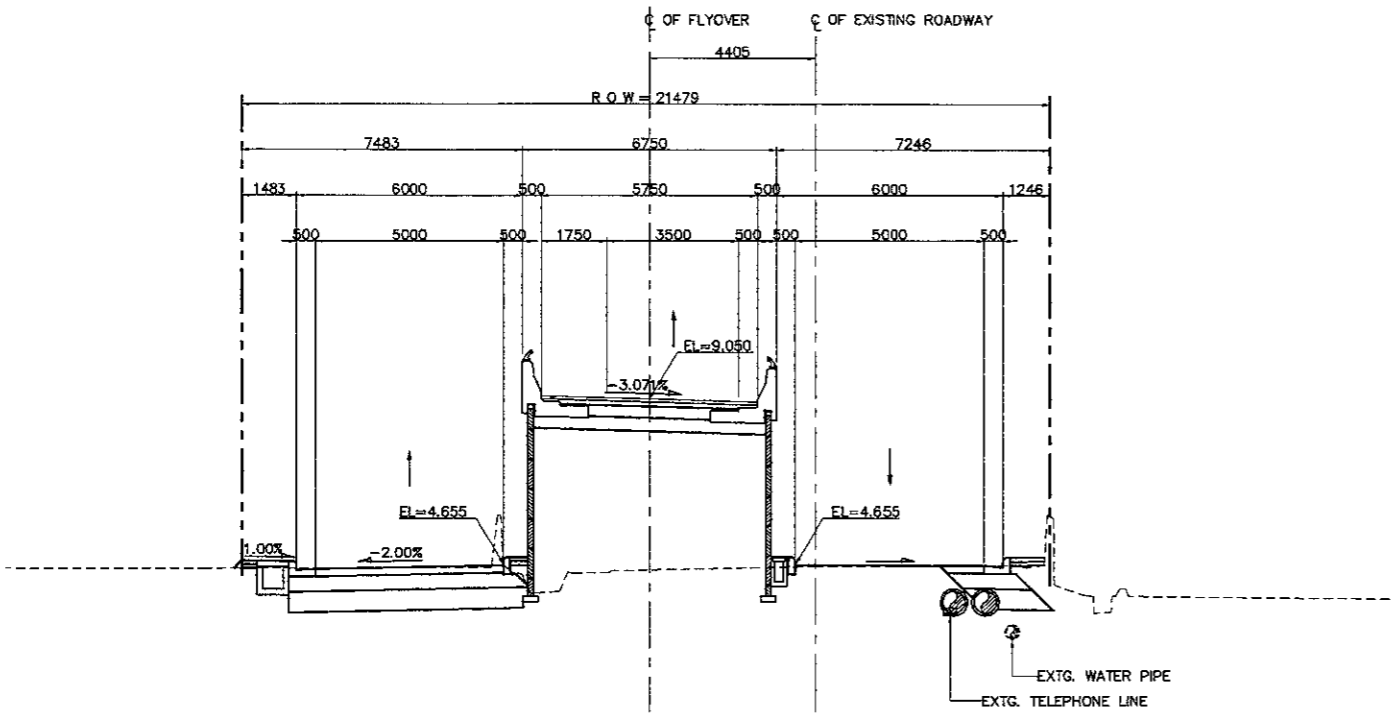


3 SECTION (STA. 0 + 780.000)  
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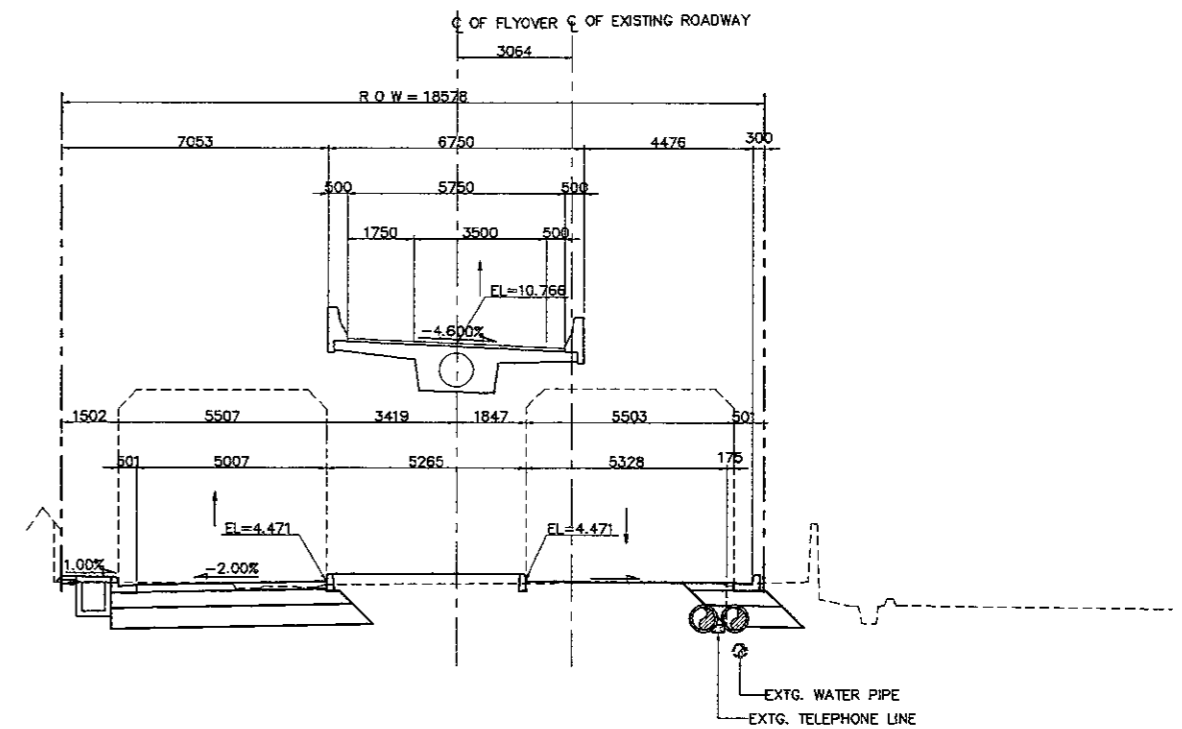
- NOTES:
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DESIGNED BY	CHECKED BY	SUBMITTED BY
Name R. UENO	Name T. OKUMURA	Name M. KIUCHI
Sign	Sign	Sign
Date	Date	Date

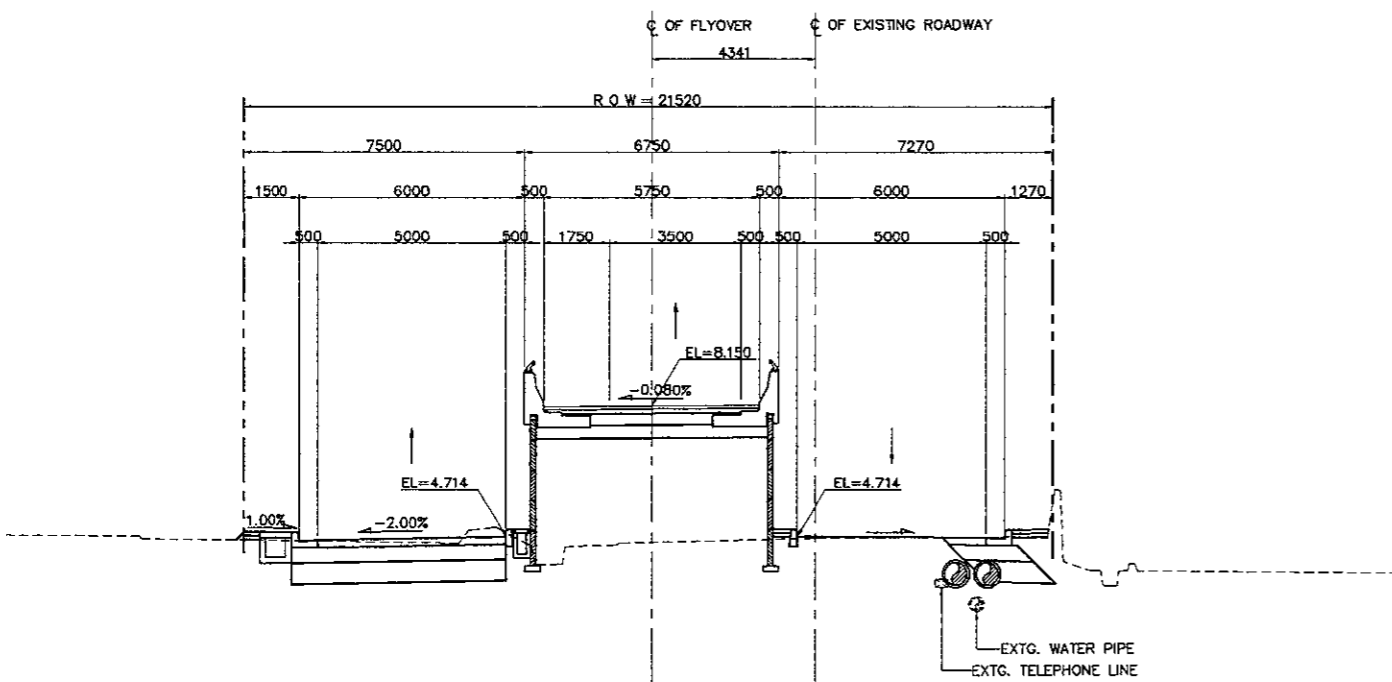
APPROVED BY	NAME	SIGNATURE	DATE
Ir. HERRY VAZA M.Eng.Sc			
NIP. : 110038400			



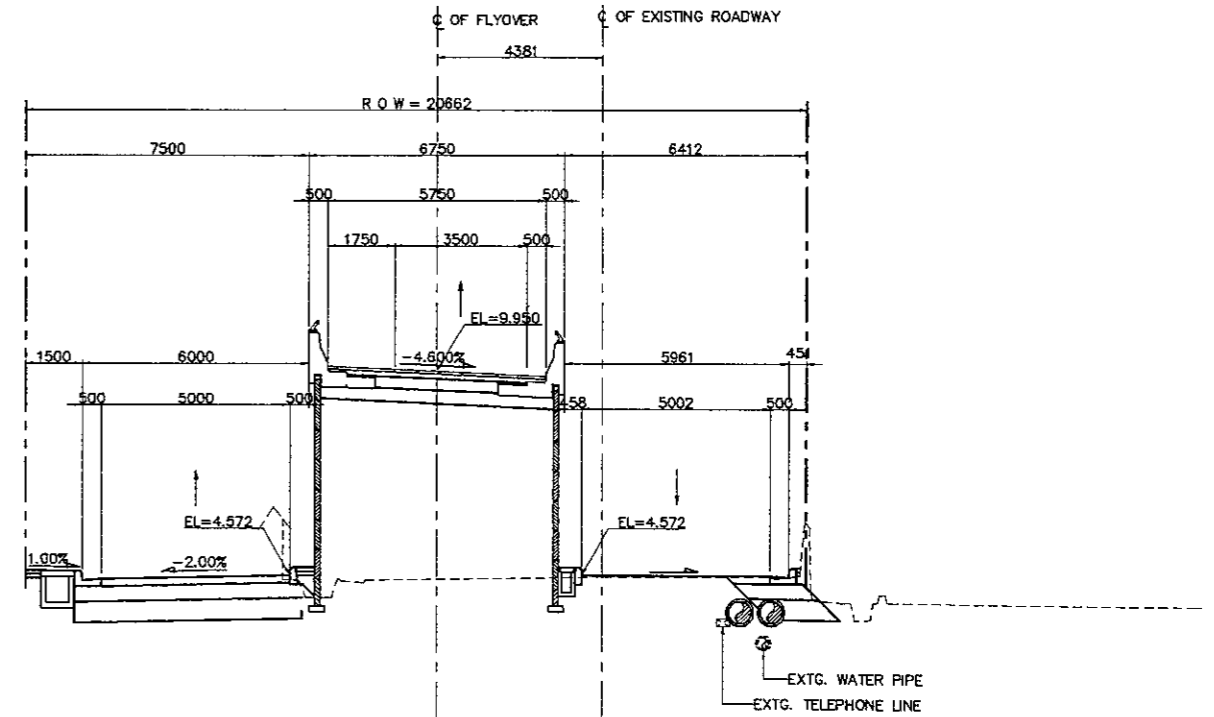
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**4 SECTION (STA. 0 + 880.000)**  
 SCALE 1:200



**1 SECTION (STA. 0 + 820.000)**  
 SCALE 1:200



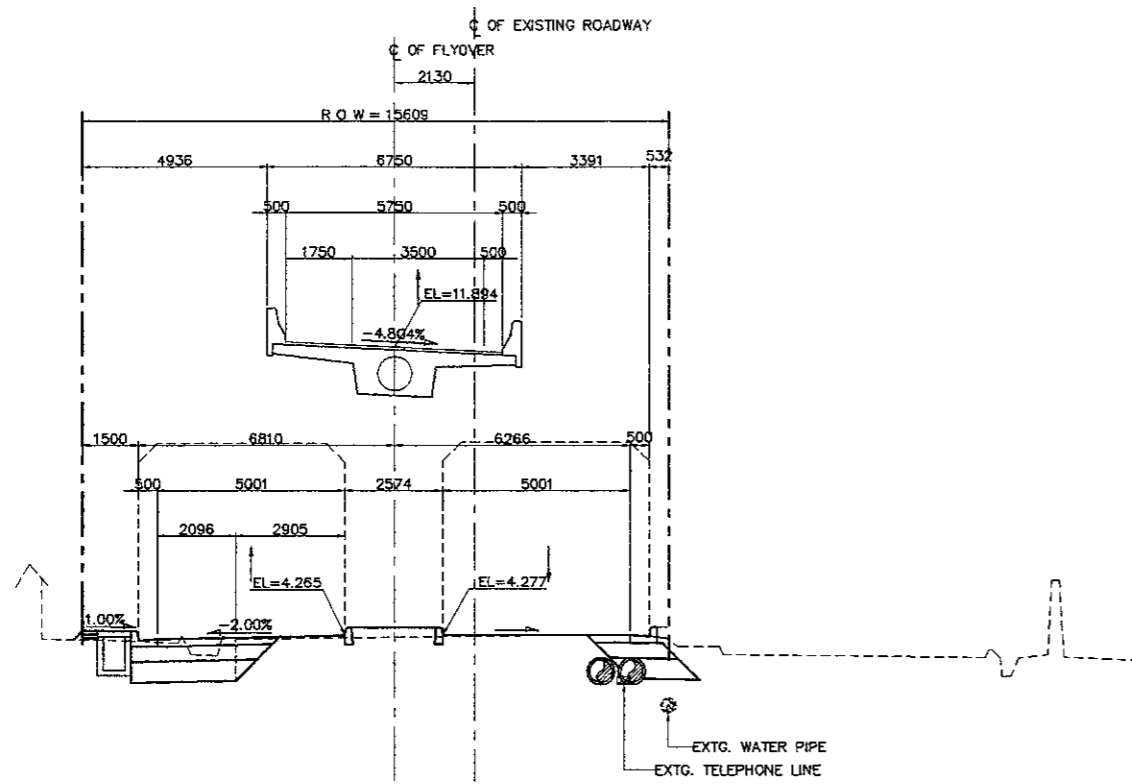
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**NOTES:**

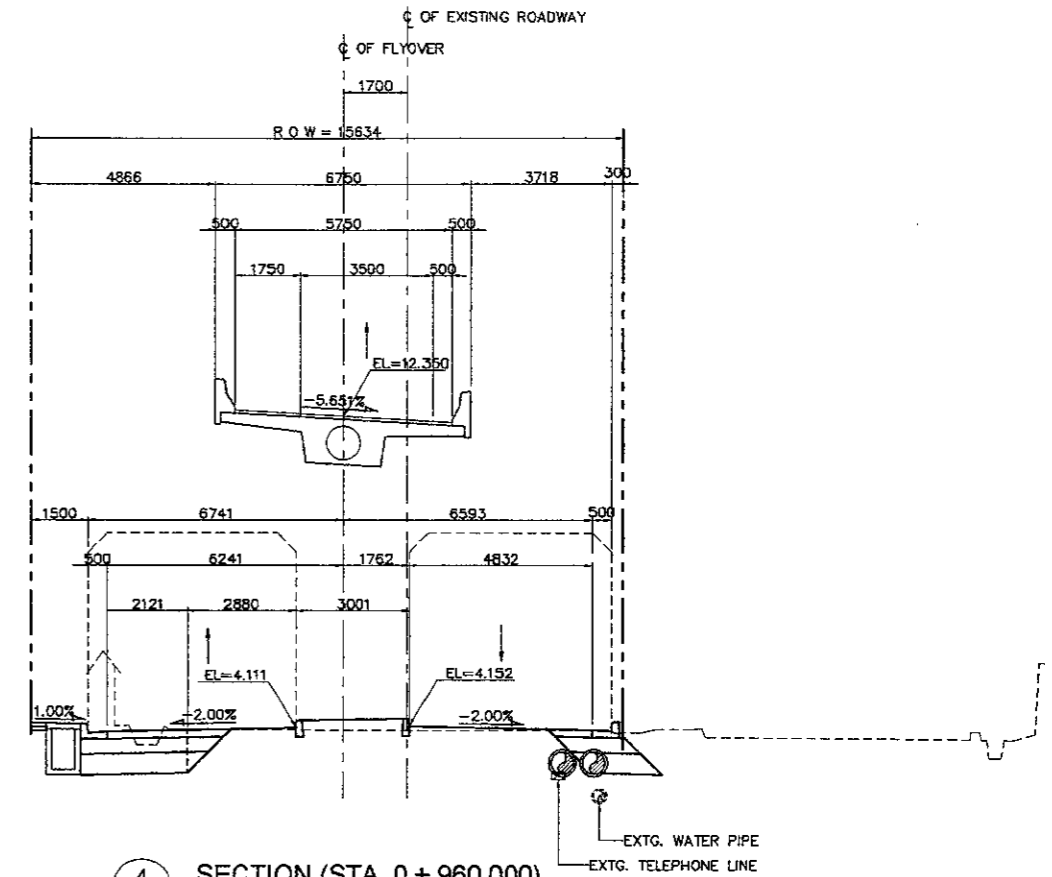
1. ALL DIMENSIONS AND ELEVATIONS SHALL BE VERIFIED DURING CONSTRUCTION.
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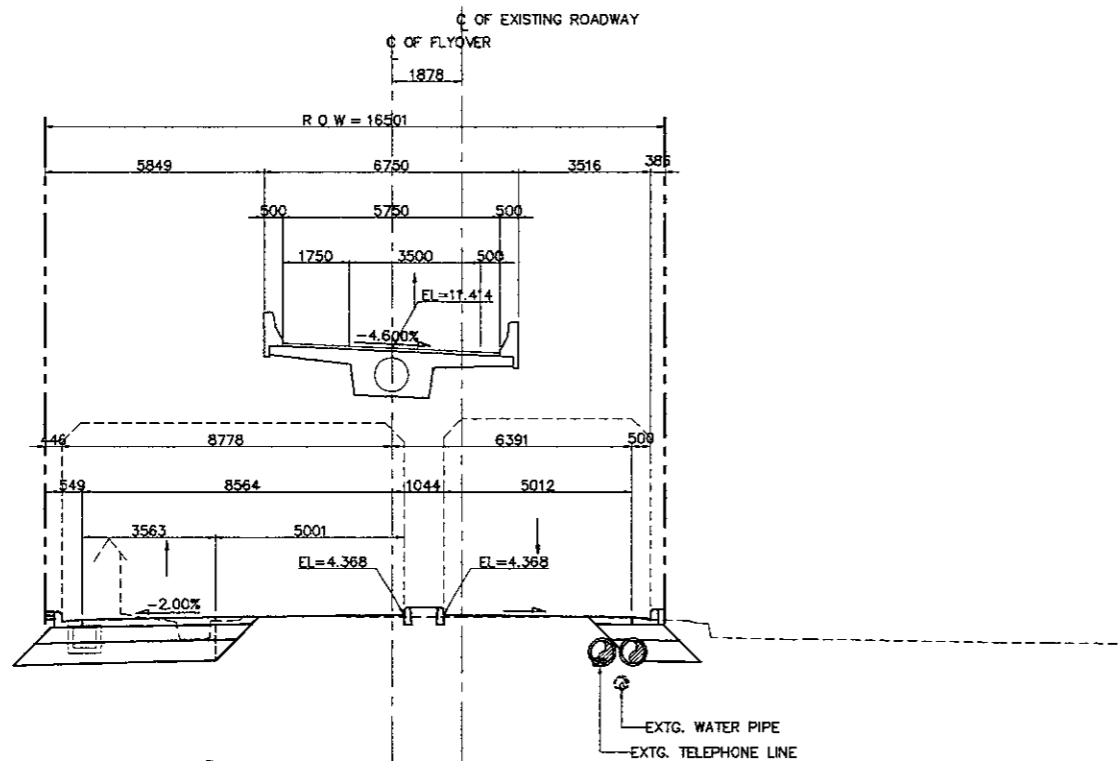
DESIGNED BY	CHECKED BY	SUBMITTED BY
Name: R. UENO	Name: T. OKUMURA	Name: M. KIUCHI
Sign:	Sign:	Sign:
Date:	Date:	Date:



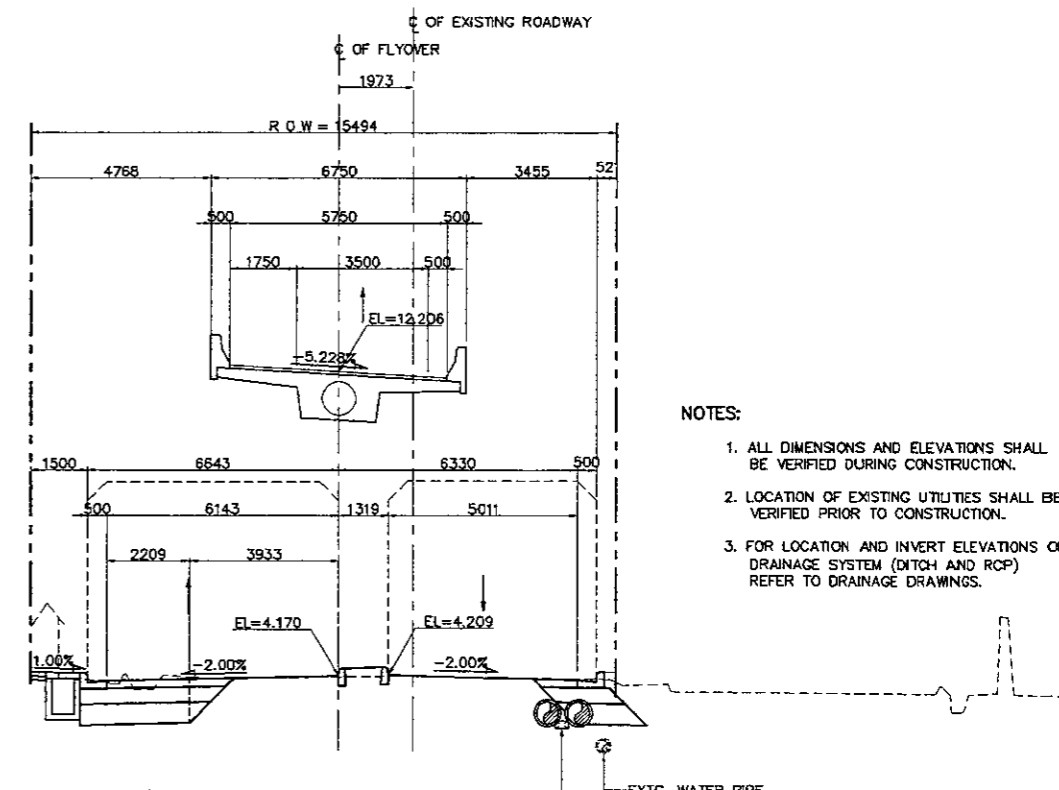
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**4 SECTION (STA. 0 + 960.000)**  
 SCALE 1:200



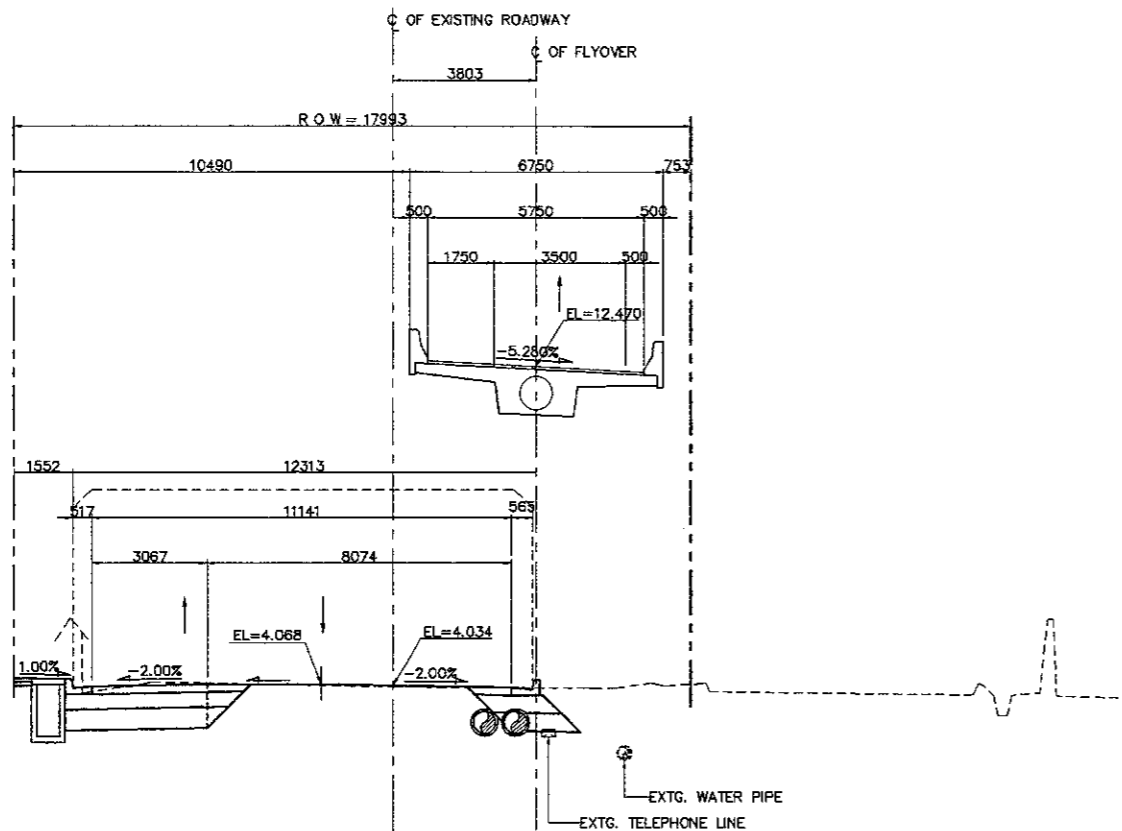
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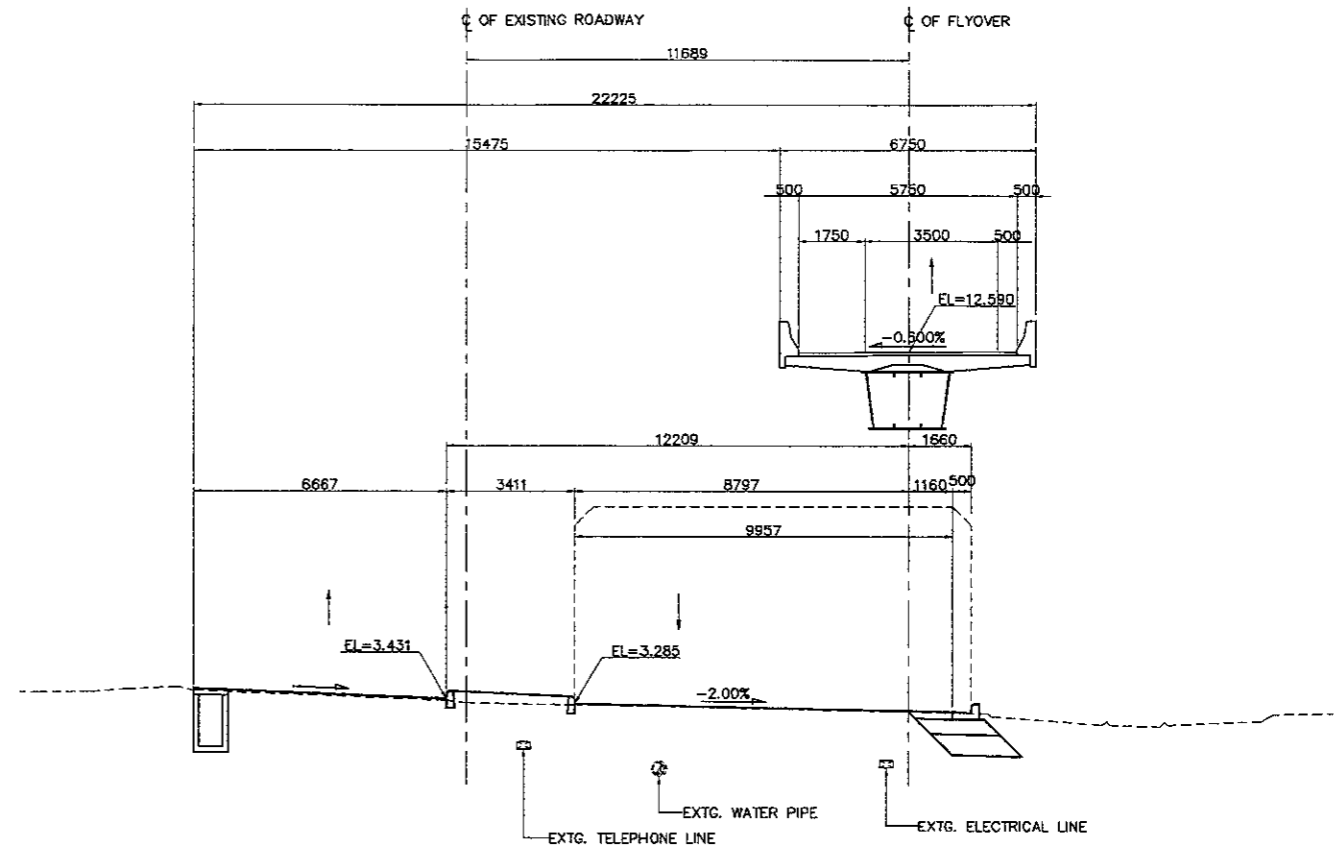
**3 SECTION (STA. 0 + 940.000)**  
 SCALE 1:200

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

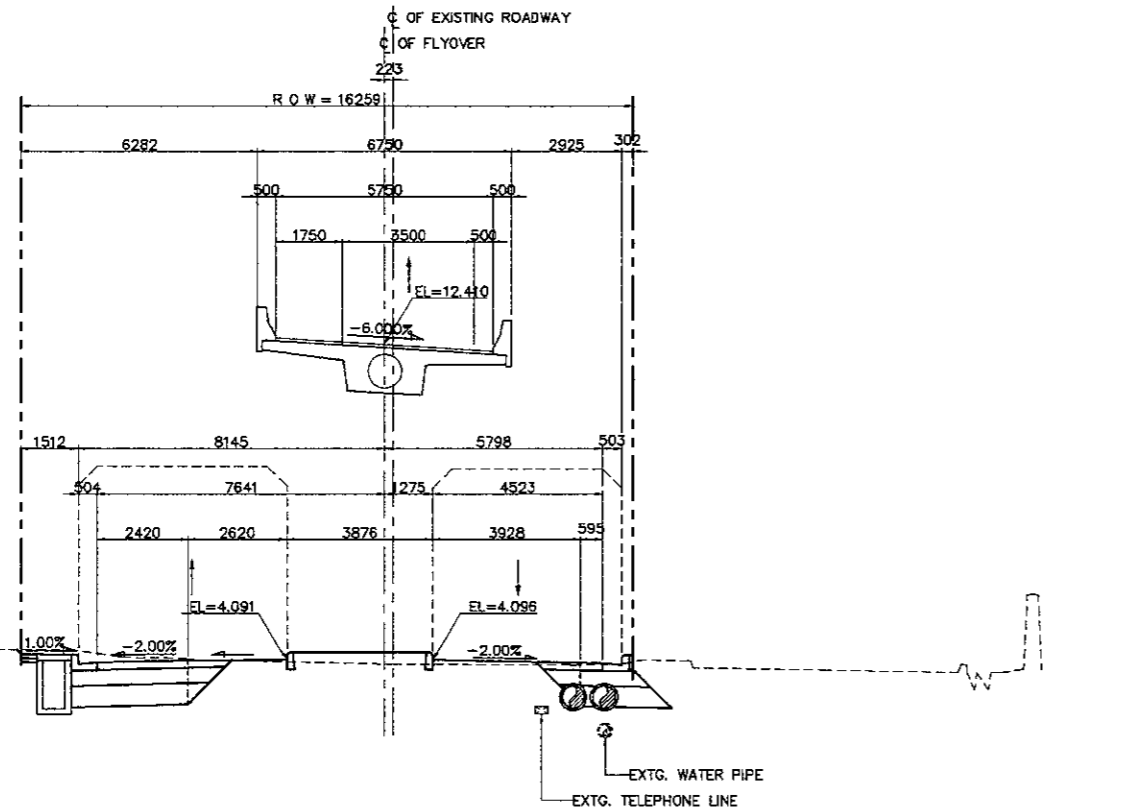


**2 SECTION (STA. 1 + 000.000)**  
 SCALE 1:200

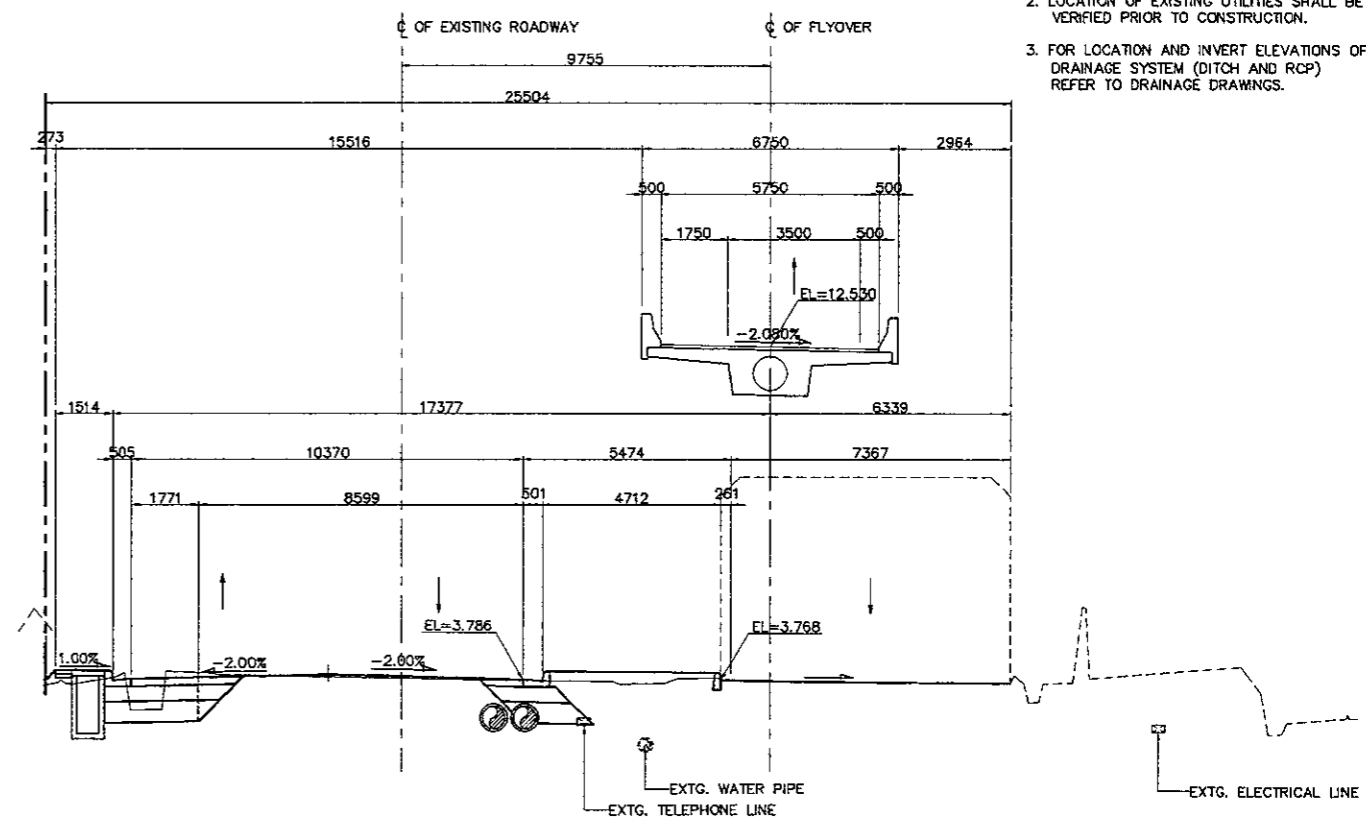


**4 SECTION (STA. 1 + 040.000)**  
 SCALE 1:200

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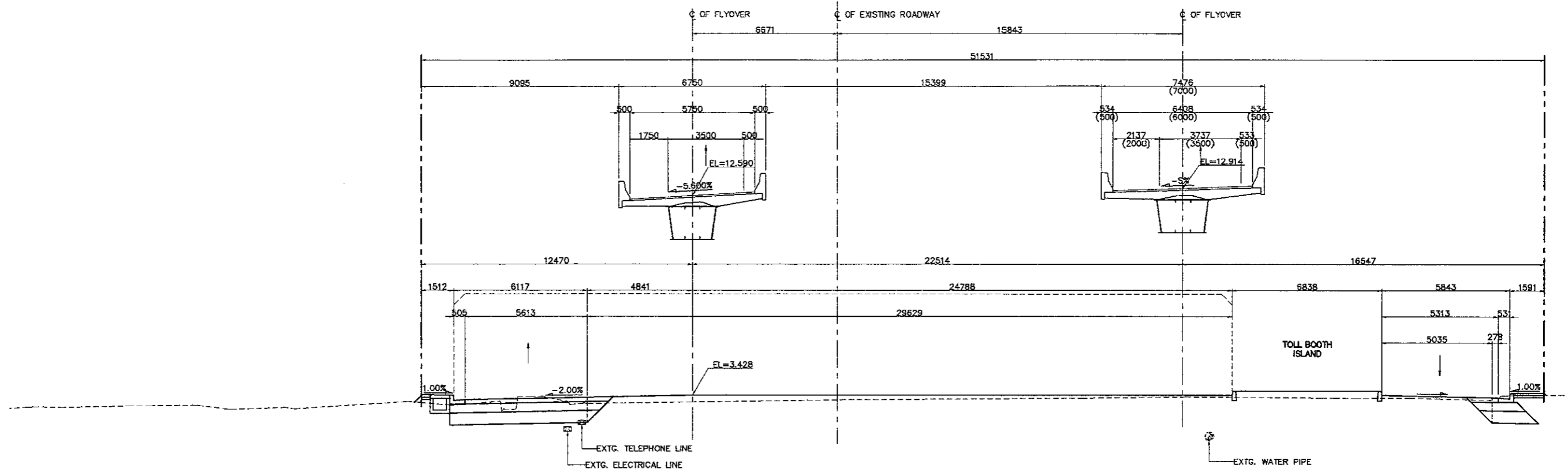


**1 SECTION (STA. 0 + 980.000)**  
 SCALE 1:200

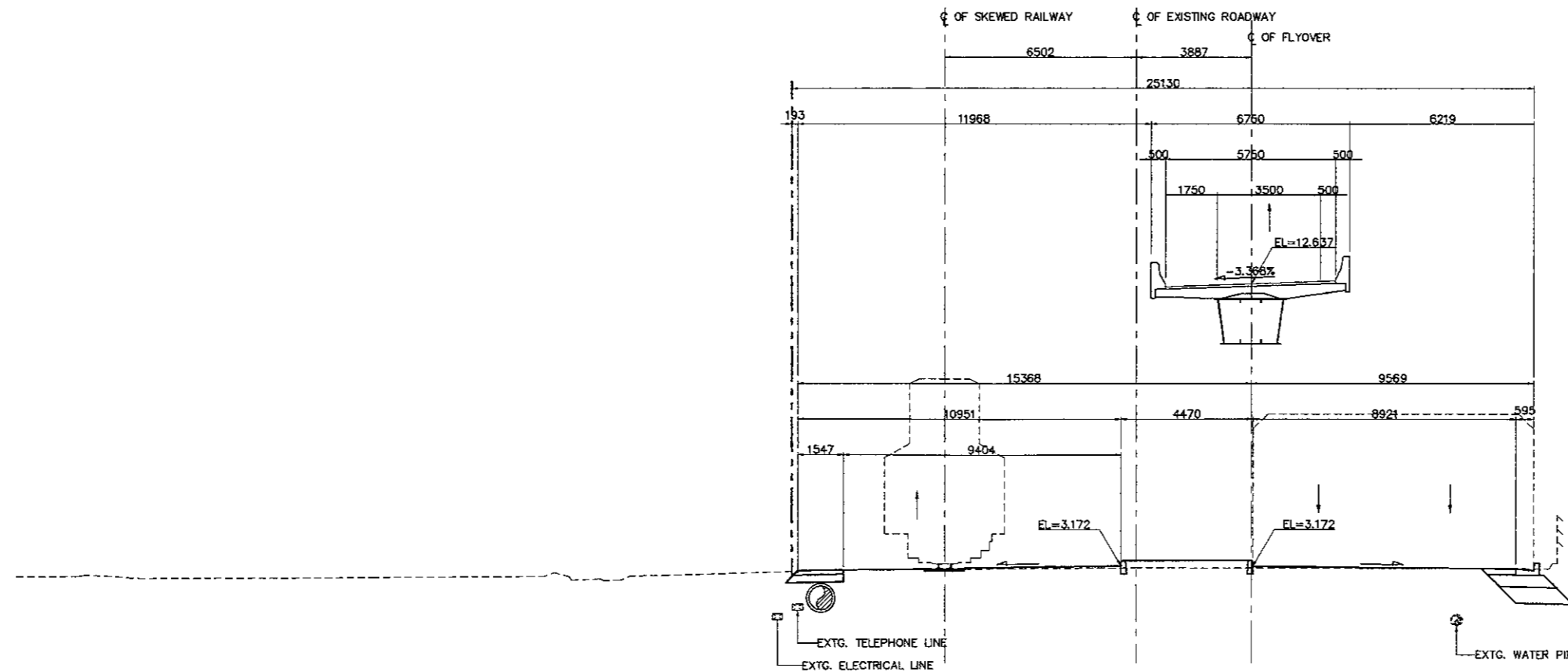


**3 SECTION (STA. 1 + 020.000)**  
 SCALE 1:200

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



2 SECTION (STA. 1 + 080.000)
   
 SCALE 1:200

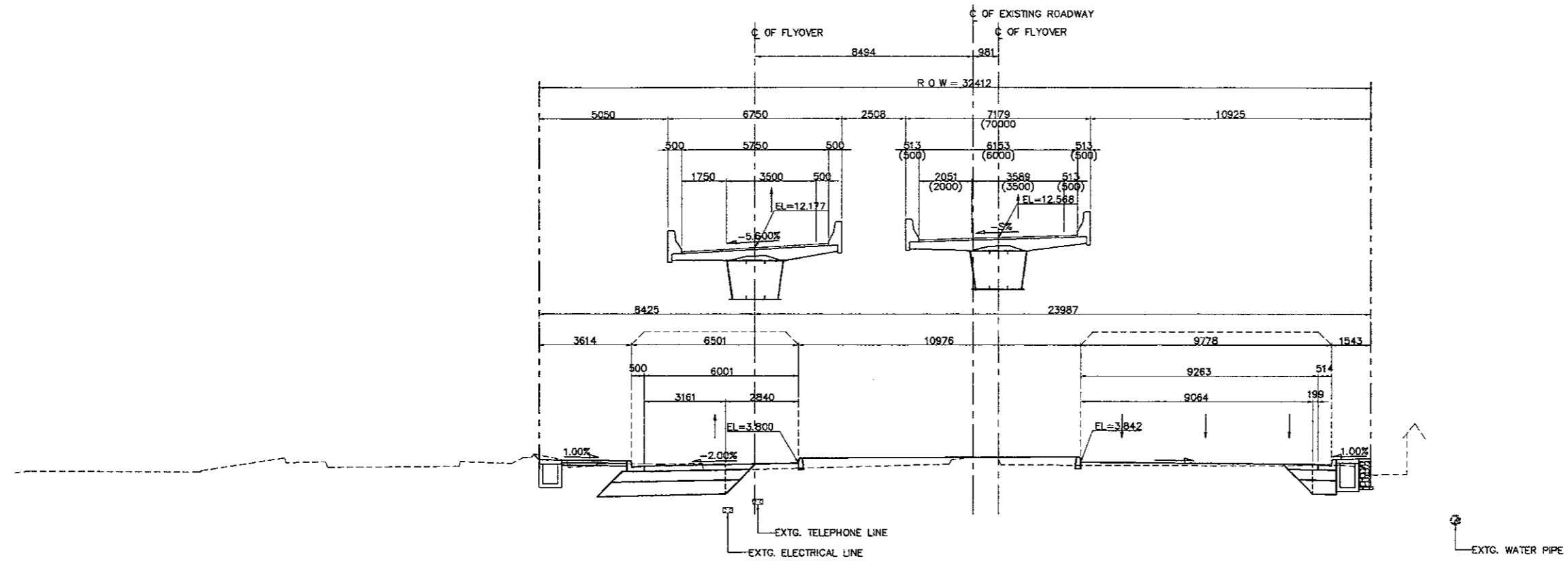


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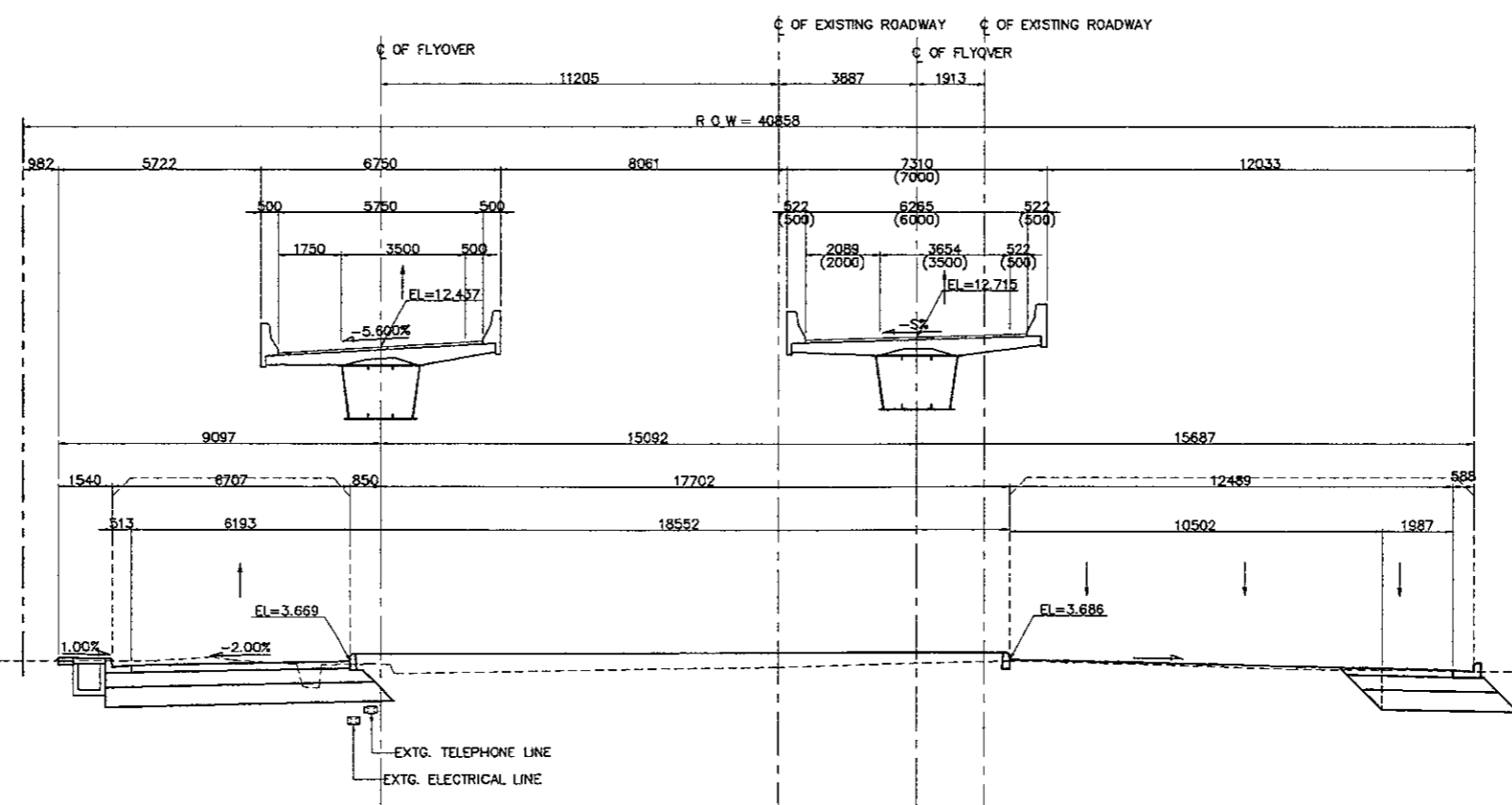
NOTES:

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



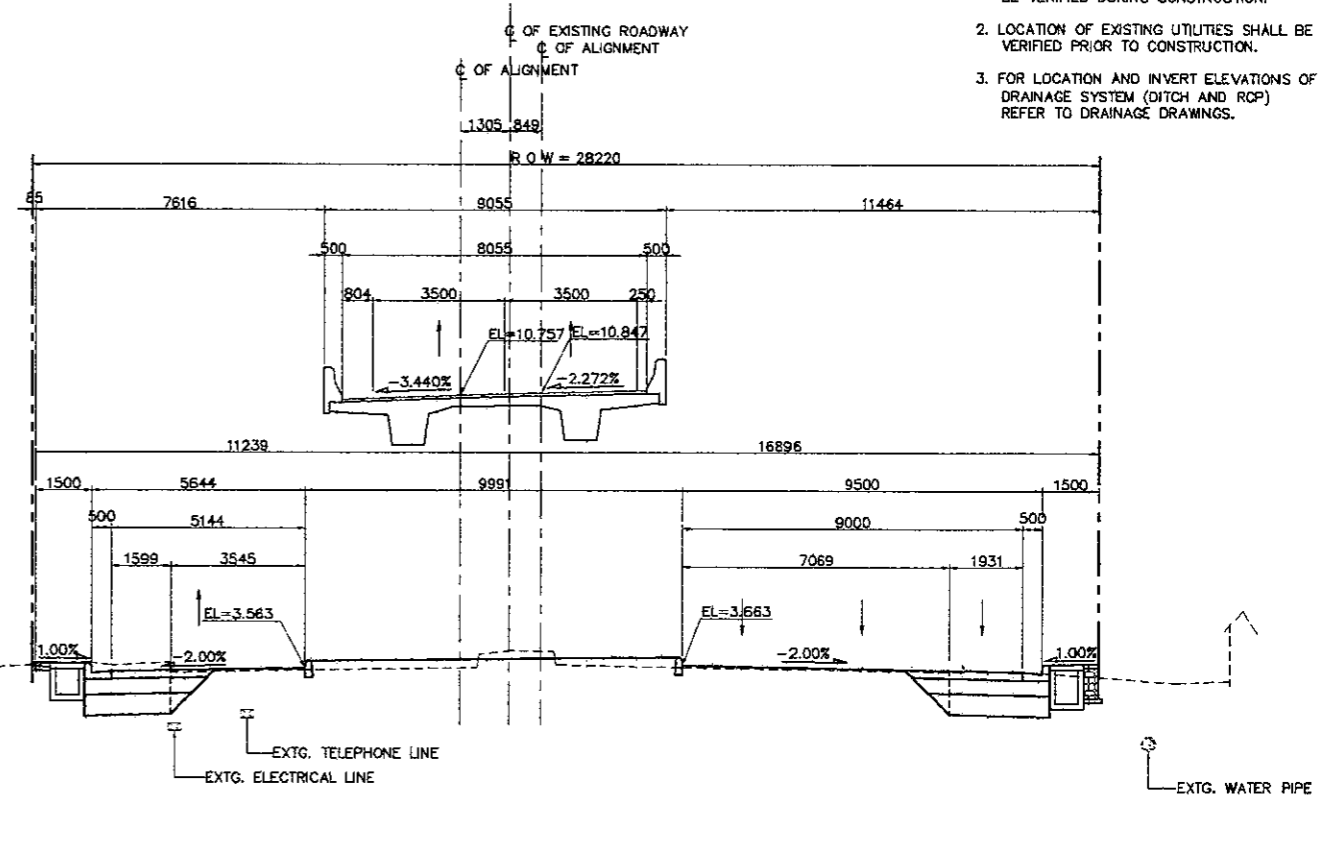
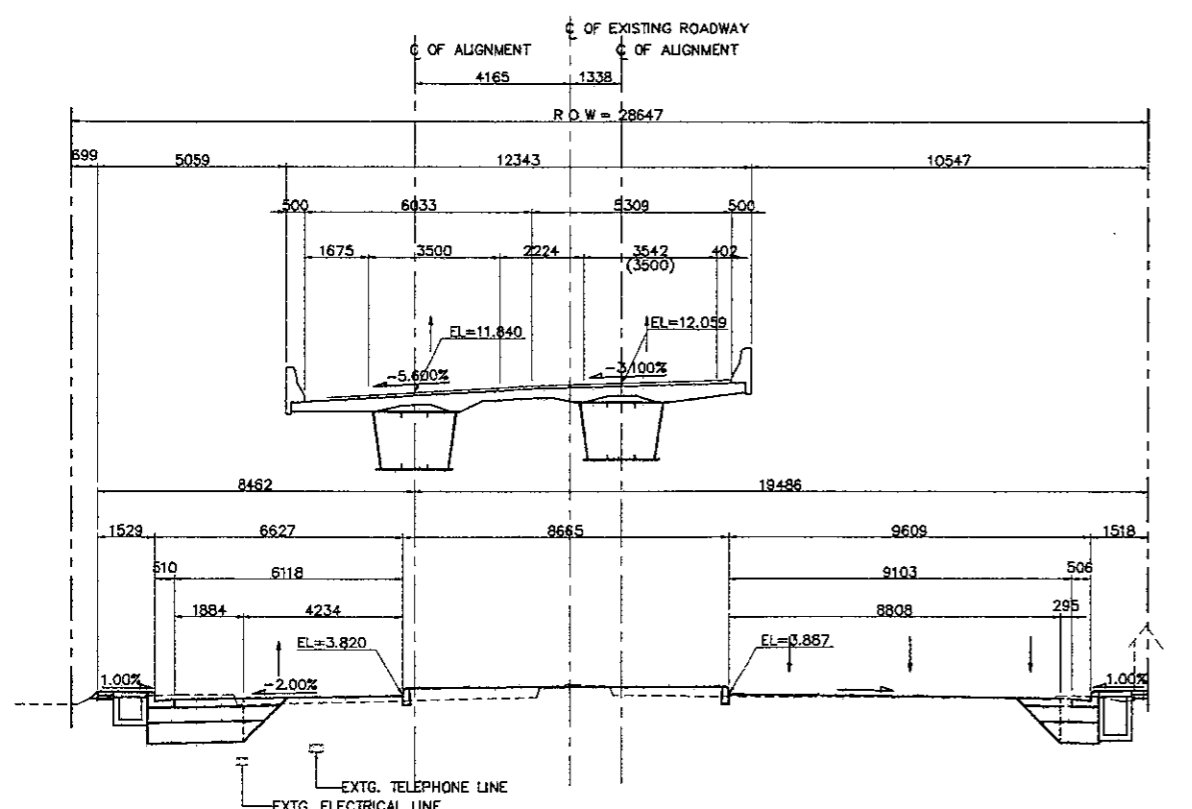
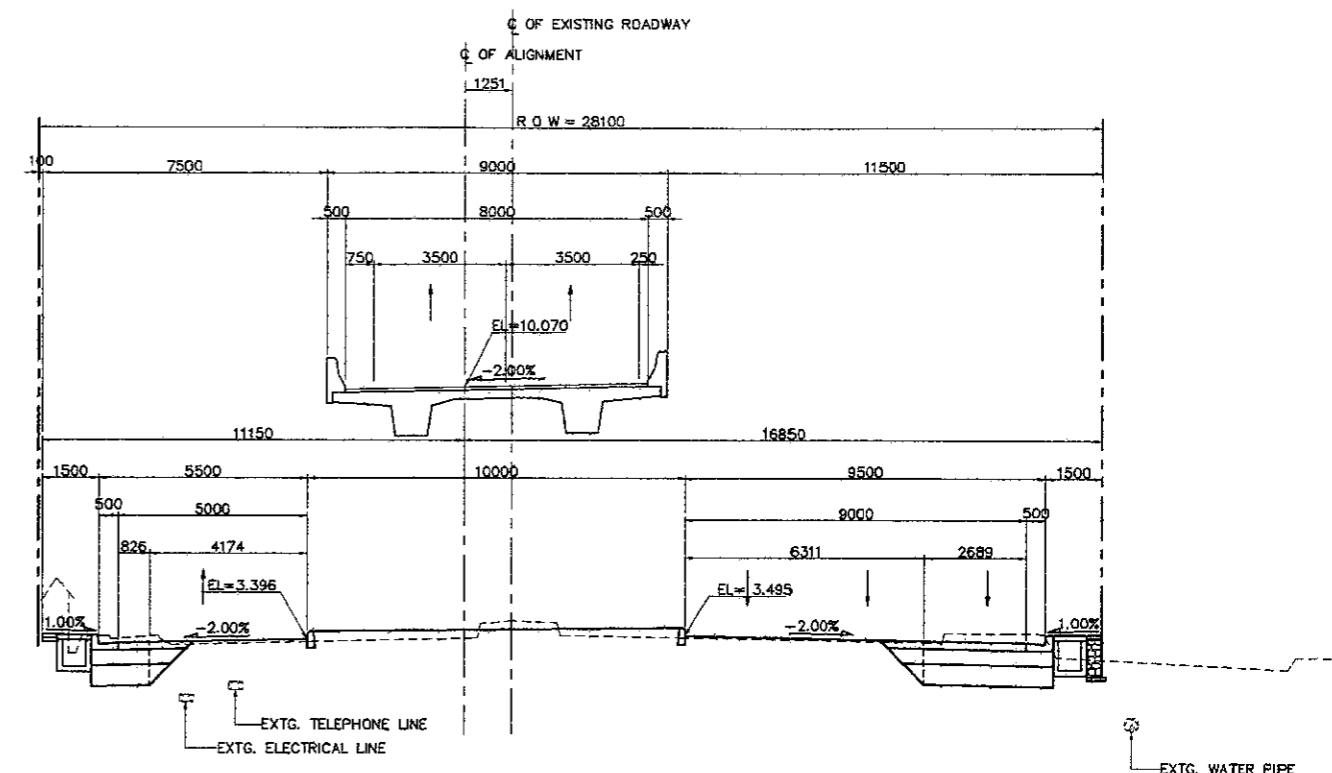
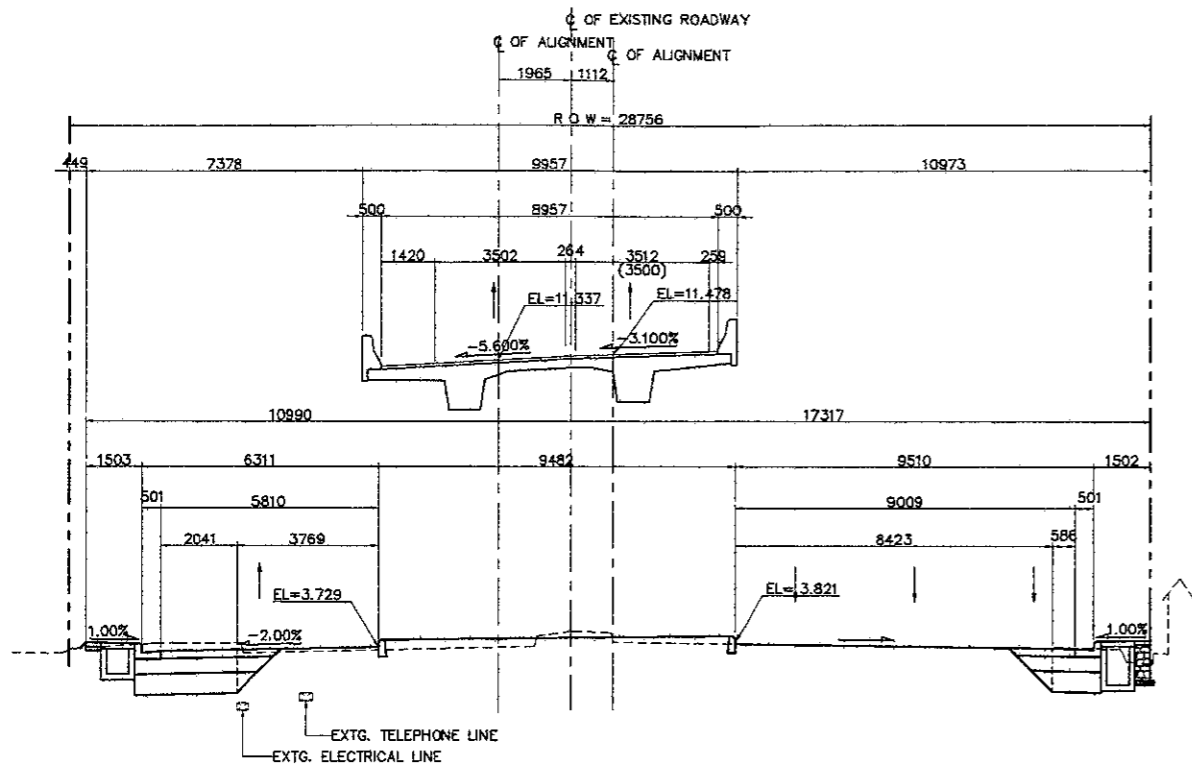
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**1 SECTION (STA. 1 + 100.000)**  
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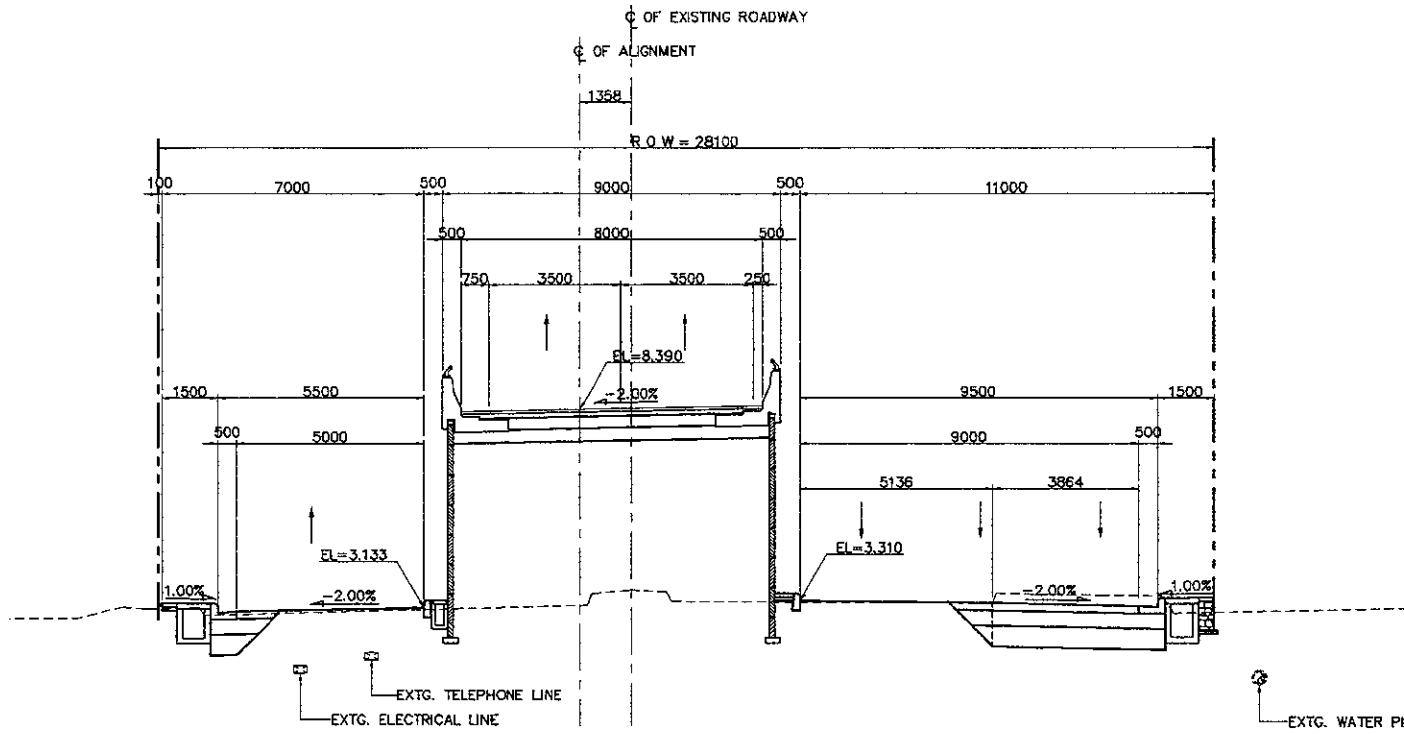
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DESIGNED BY	CHECKED BY	SUBMITTED BY
Name: R. UENO	Name: T. OKUMURA	Name: M. KIUCHI
Sign: _____	Sign: _____	Sign: _____
Date: _____	Date: _____	Date: _____

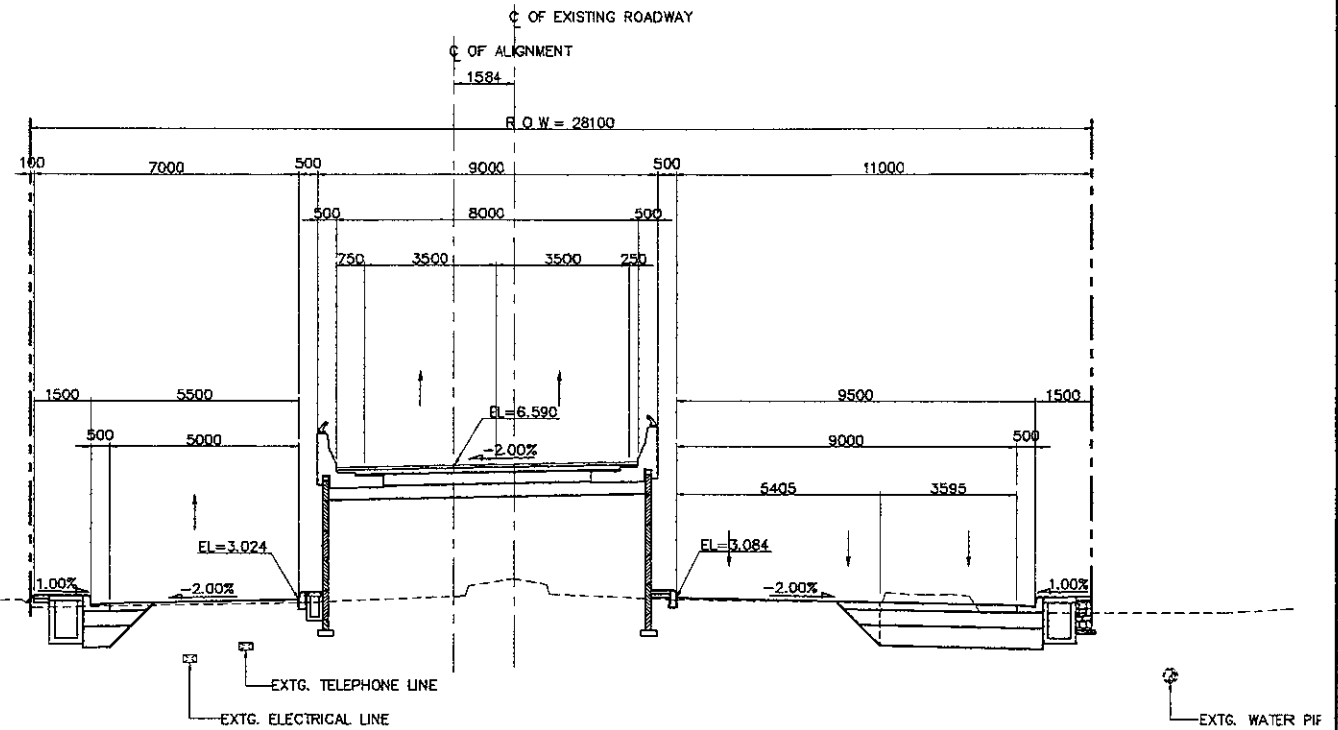


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DESIGNED BY	CHECKED BY	SUBMITTED BY
Name: R. UENO	Name: T. OKUMURA	Name: M. KIUCHI
Sign:	Sign:	Sign:
Date:	Date:	Date:



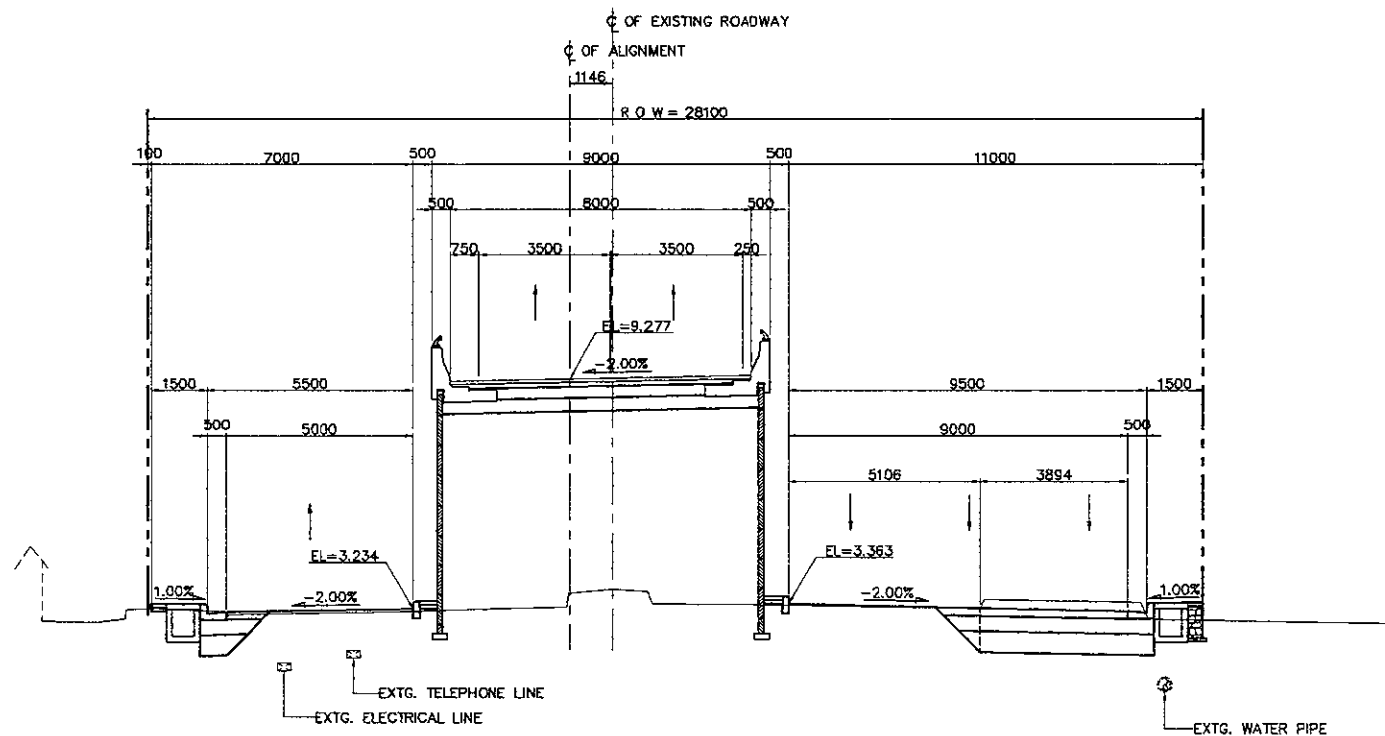
**2 SECTION (STA. 1 + 240.000)**  
 SCALE 1:200



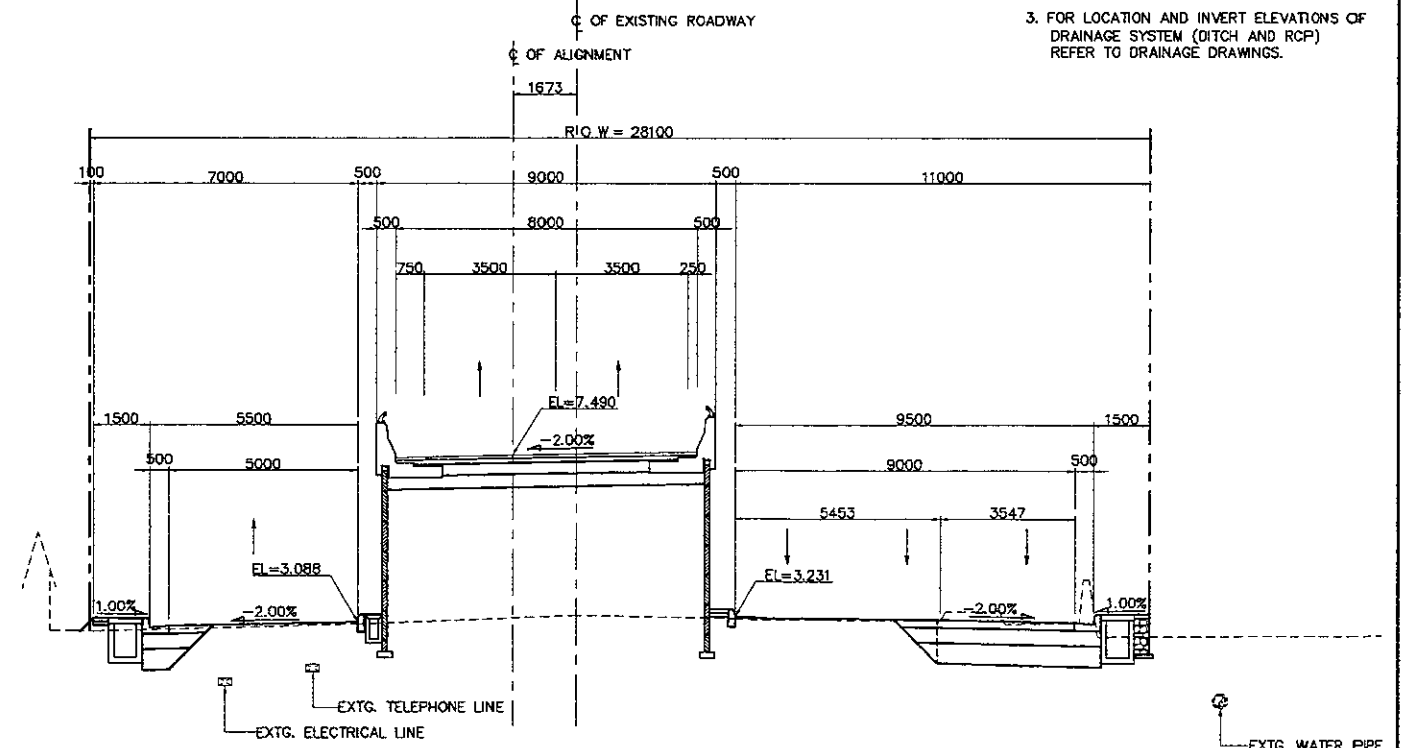
**4 SECTION (STA. 1 + 280.000)**  
 SCALE 1:200

**NOTES:**

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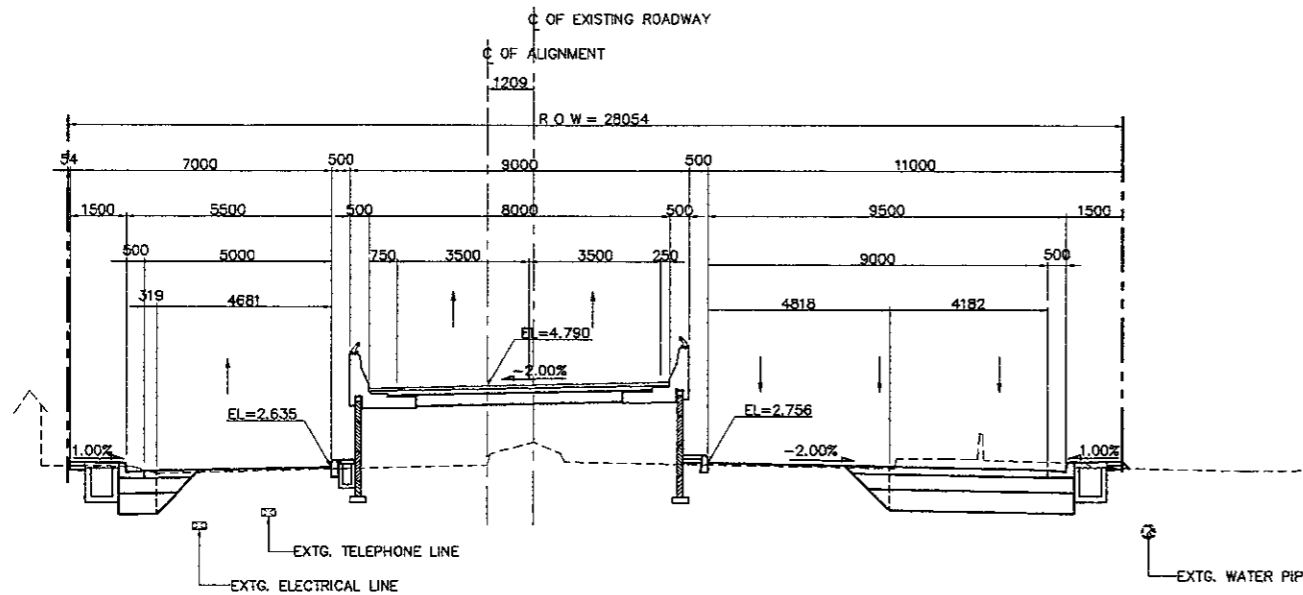


**1 SECTION (STA. 1 + 220.000)**  
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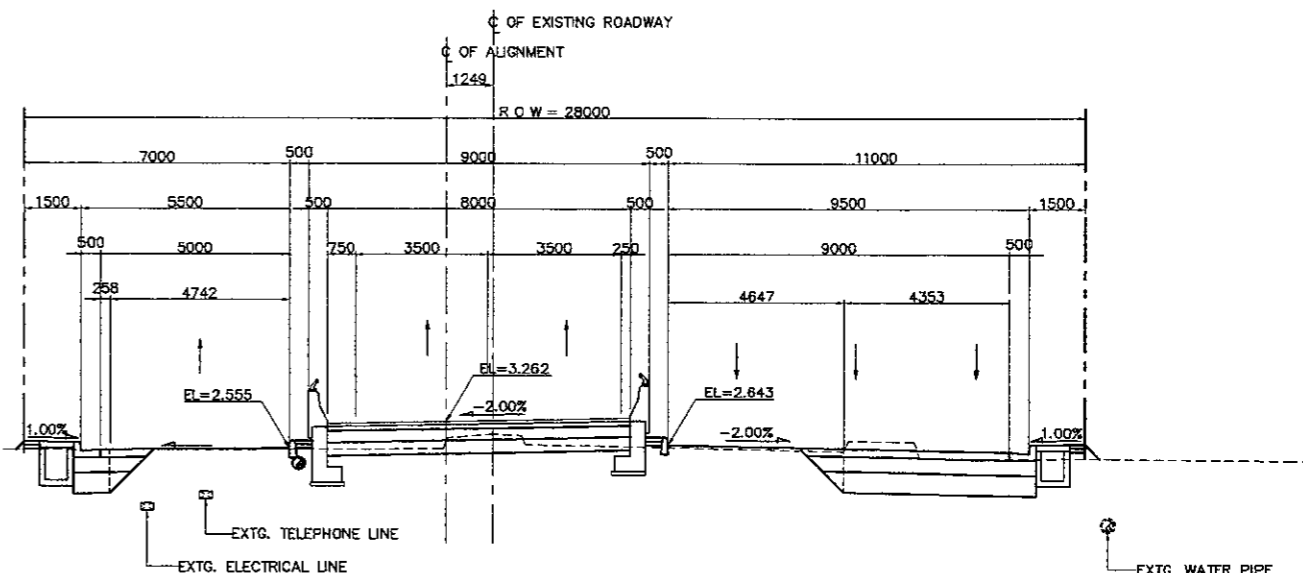


**3 SECTION (STA. 1 + 260.000)**  
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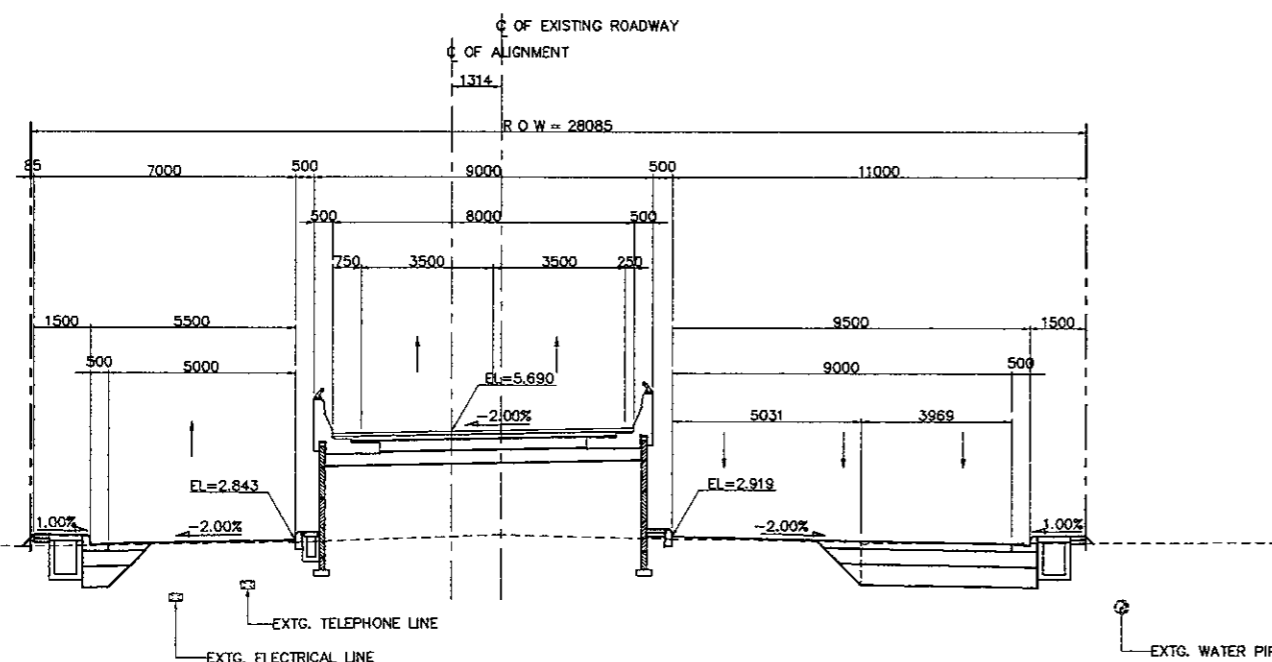
DESIGNED BY		CHECKED BY		SUBMITTED BY	
Name	R. UENO	Name	T. OKUMURA	Name	M. KIUCHI
Sign		Sign		Sign	
Date		Date		Date	



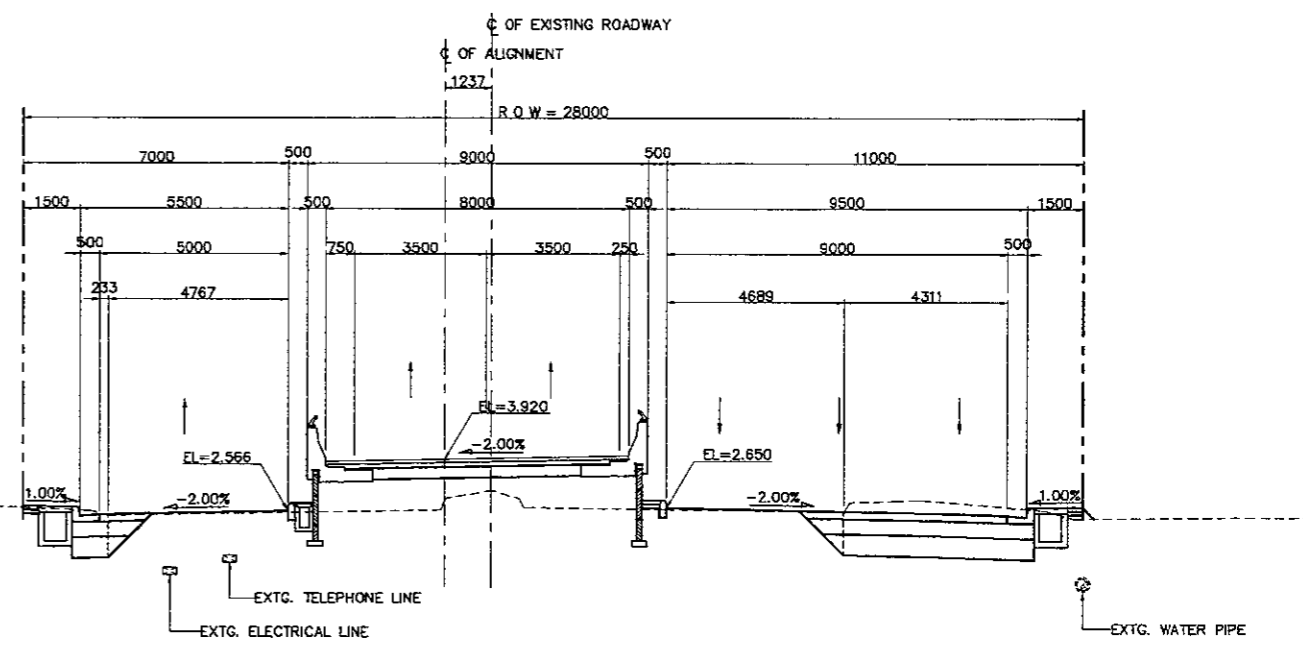
2 SECTION (STA. 1 + 320.000)
   
 SCALE 1:200



4 SECTION (STA. 1 + 360.000)
   
 SCALE 1:200



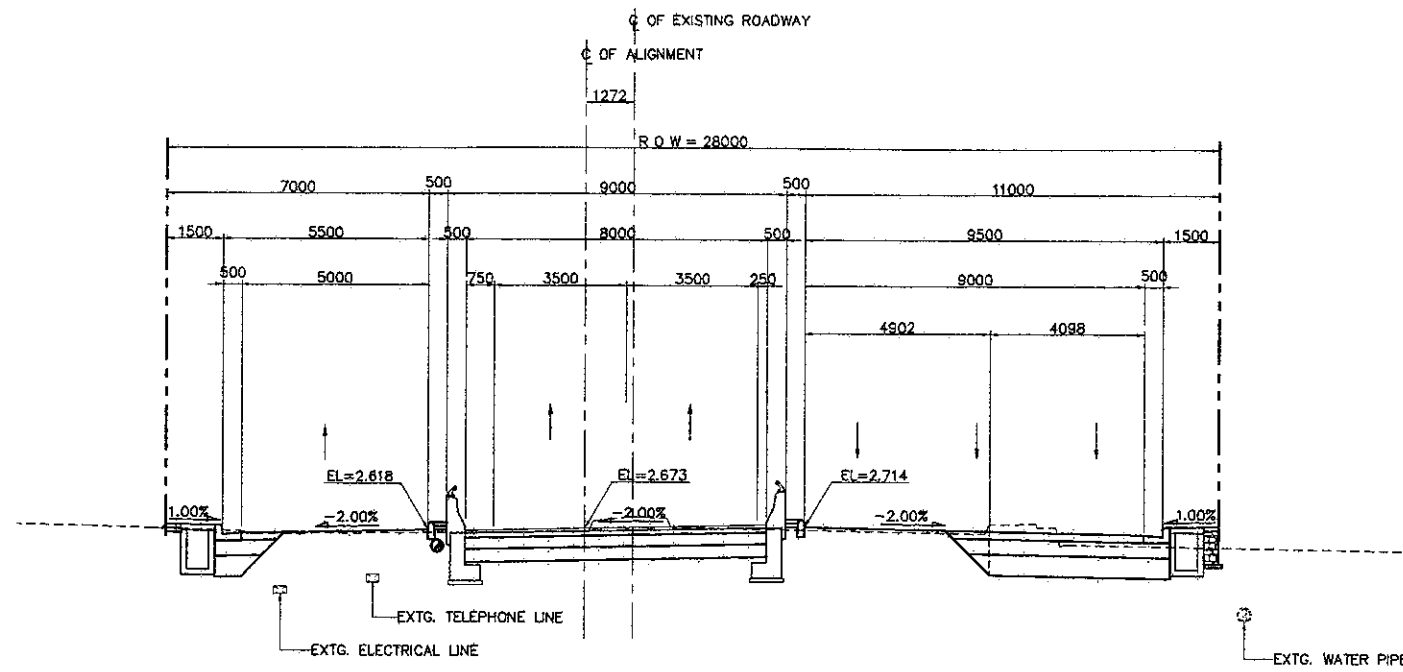
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 SCALE 1:200



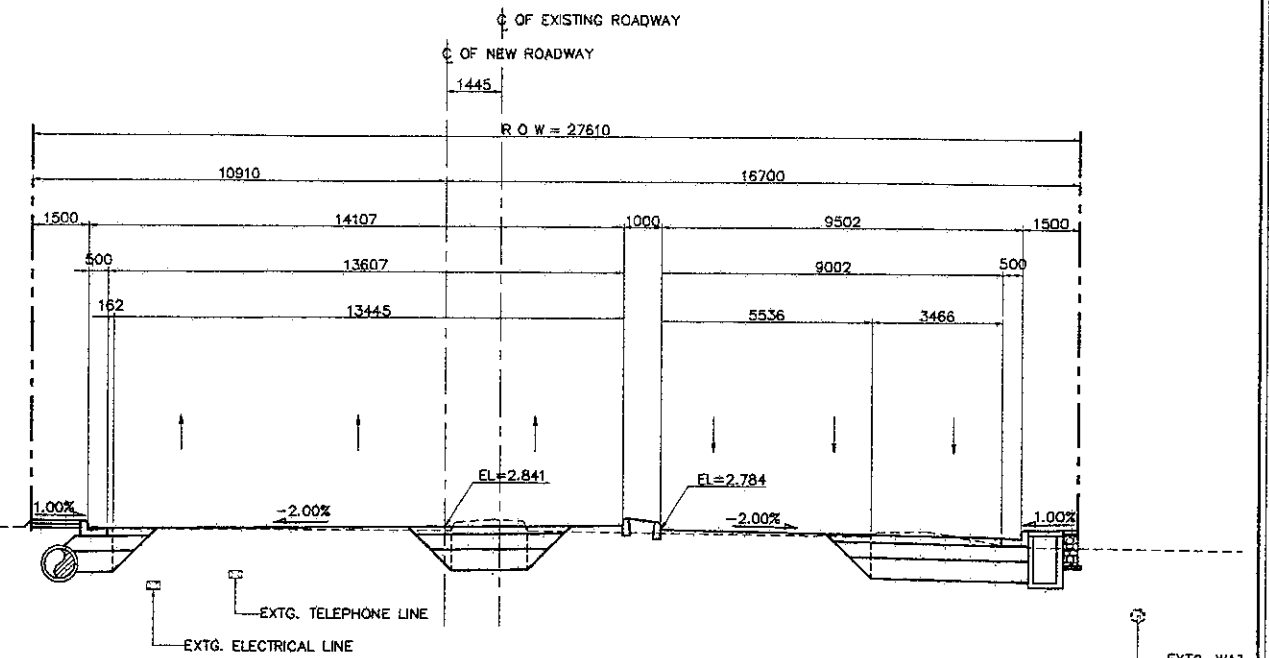
3 SECTION (STA. 1 + 340.000)
   
 SCALE 1:200

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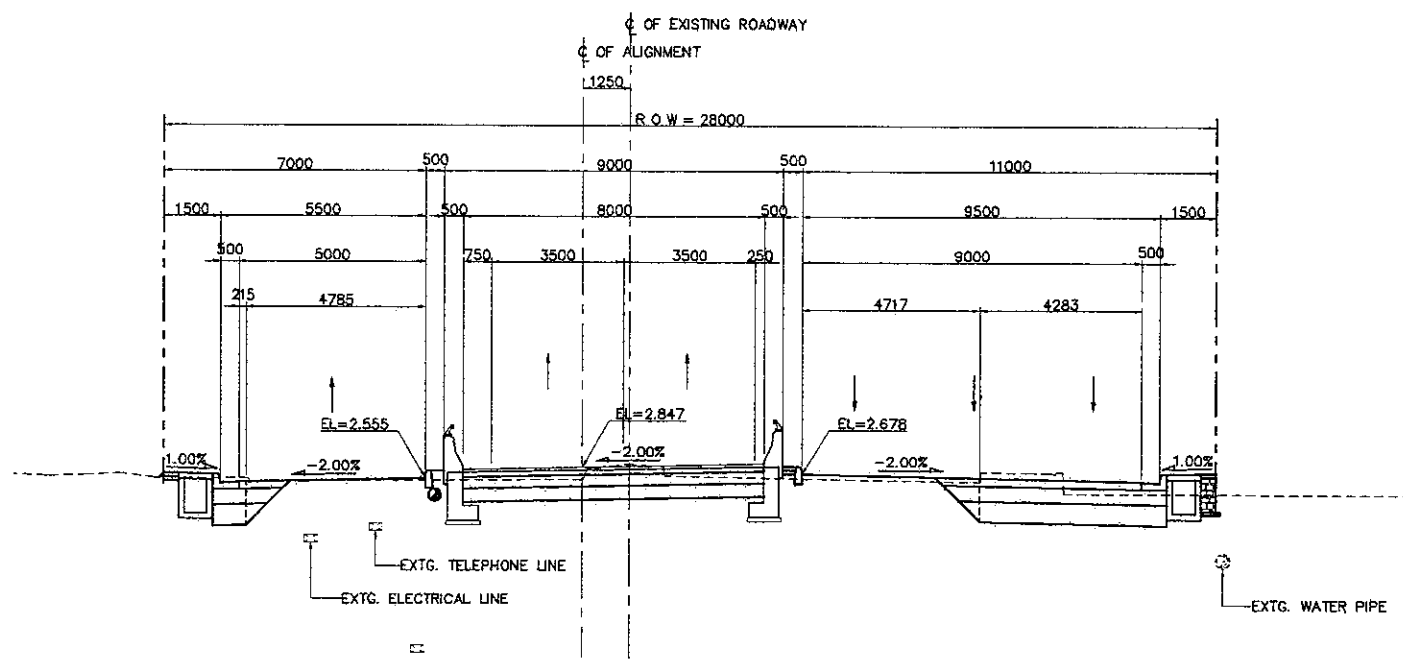
DESIGNED BY	CHECKED BY	SUBMITTED BY
Name: R. UENO	Name: T. OKUMURA	Name: M. KIUCHI
Sign: _____	Sign: _____	Sign: _____
Date: _____	Date: _____	Date: _____



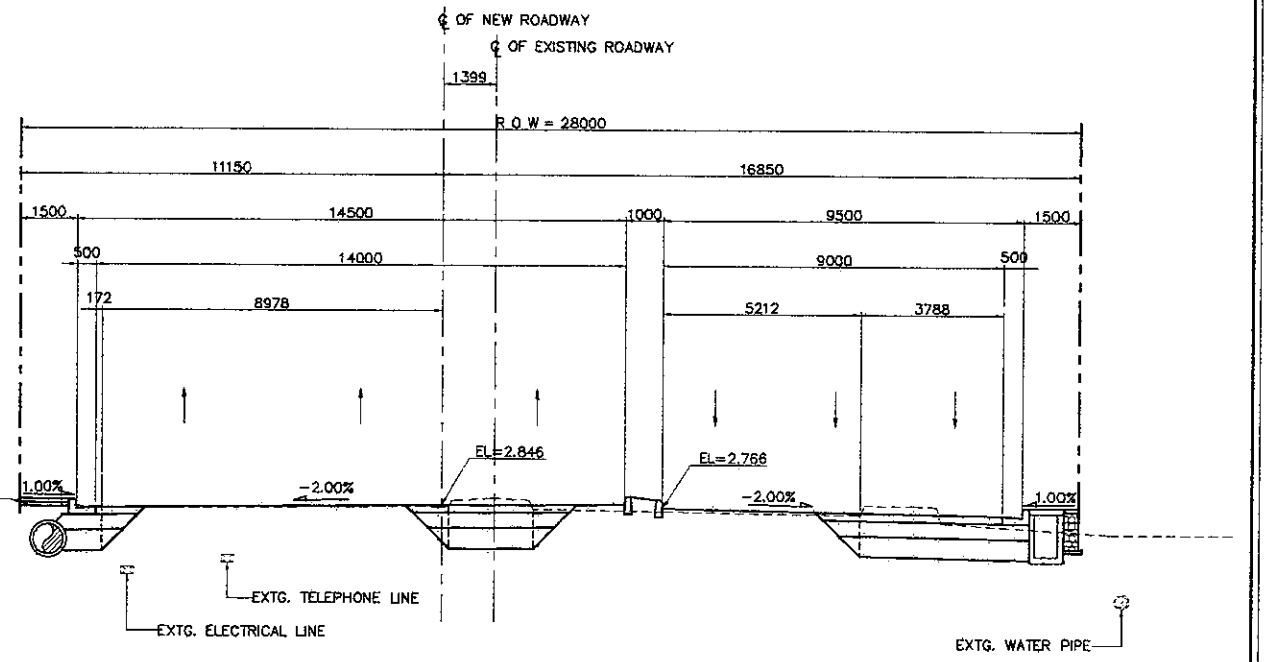
**2 SECTION (STA. 1 + 400.000)**  
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**4 SECTION (STA. 1 + 440.000)**  
 SCALE 1:200



**1 SECTION (STA. 1 + 380.000)**  
 SCALE 1:200

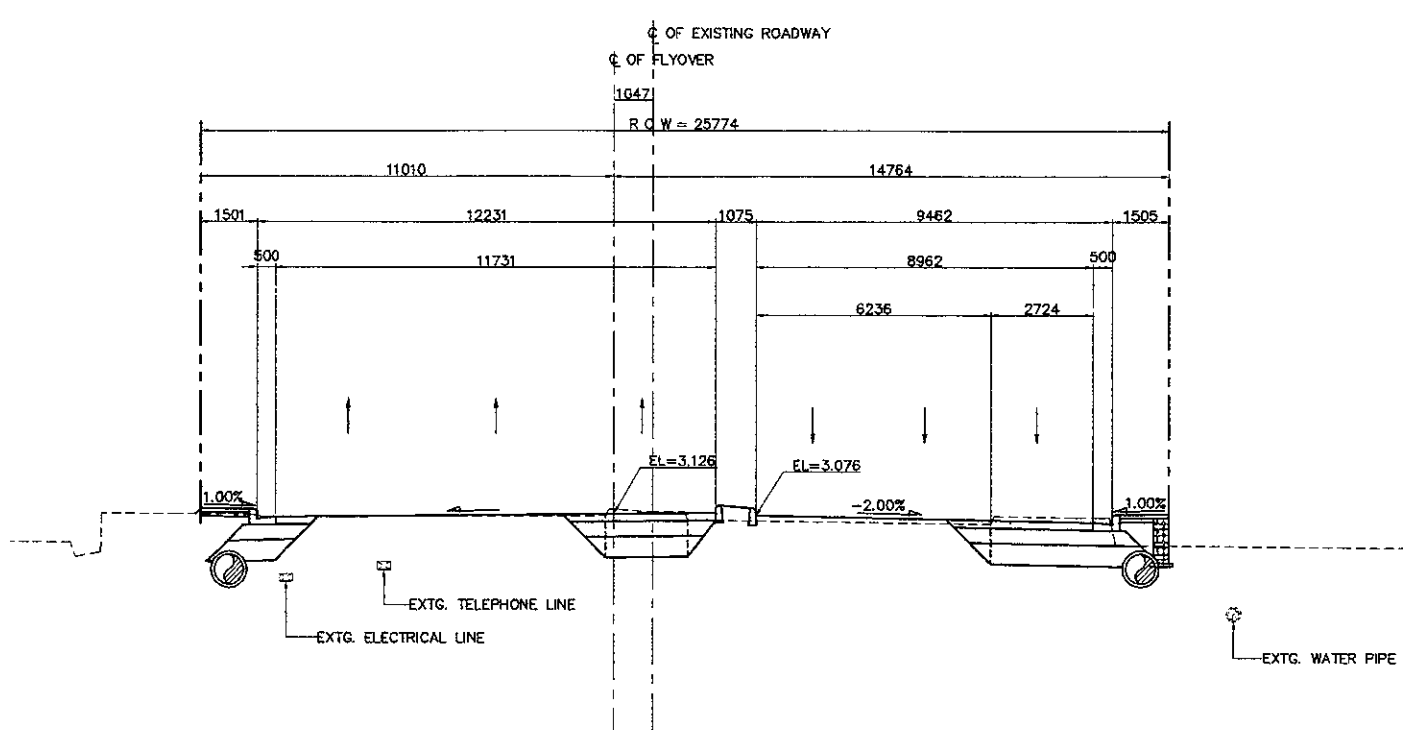


**3 SECTION (STA. 1 + 420.000)**  
 SCALE 1:200

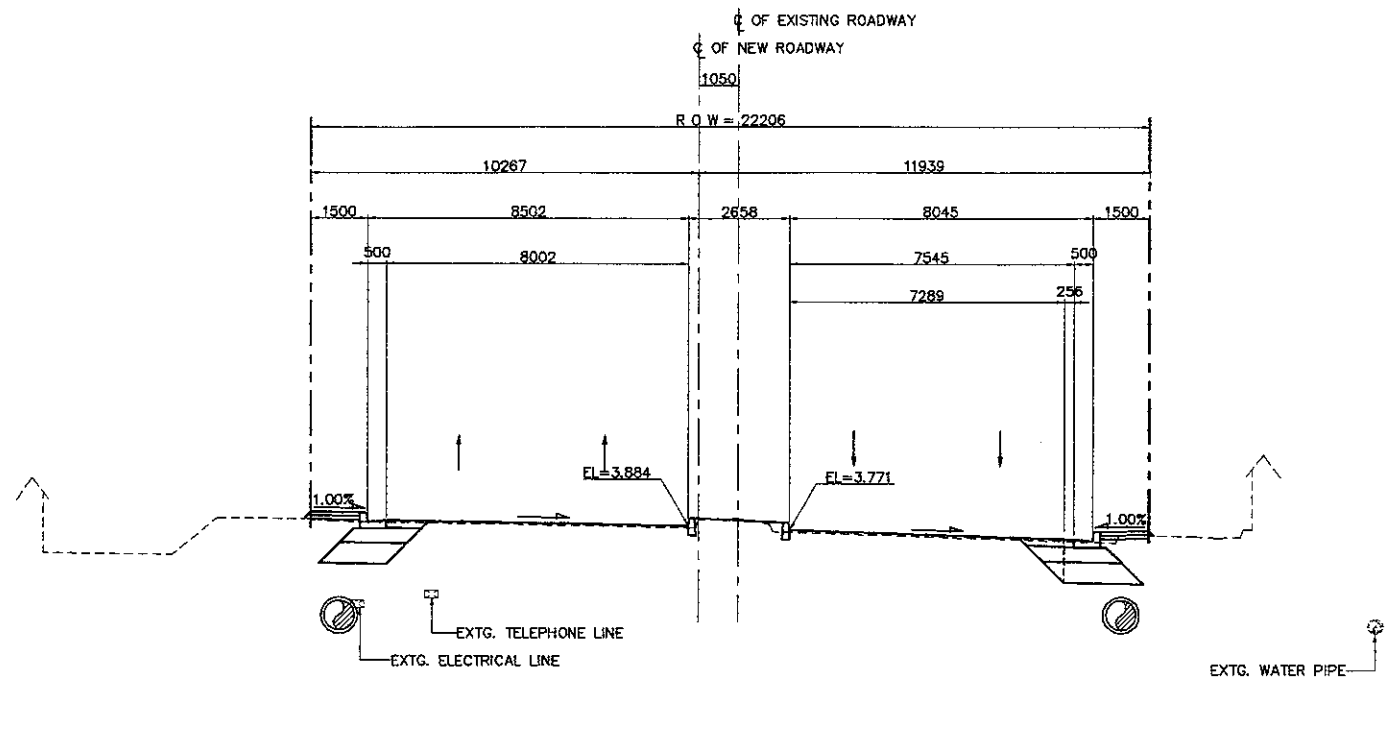
- NOTES:**
1. ALL DIMENSIONS AND ELEVATIONS SHALL BE VERIFIED DURING CONSTRUCTION.
  2. LOCATION OF EXISTING UTILITIES SHALL BE VERIFIED PRIOR TO CONSTRUCTION.
  3. FOR LOCATION AND INVERT ELEVATIONS OF DRAINAGE SYSTEM (DITCH AND RCP) REFER TO DRAINAGE DRAWINGS.



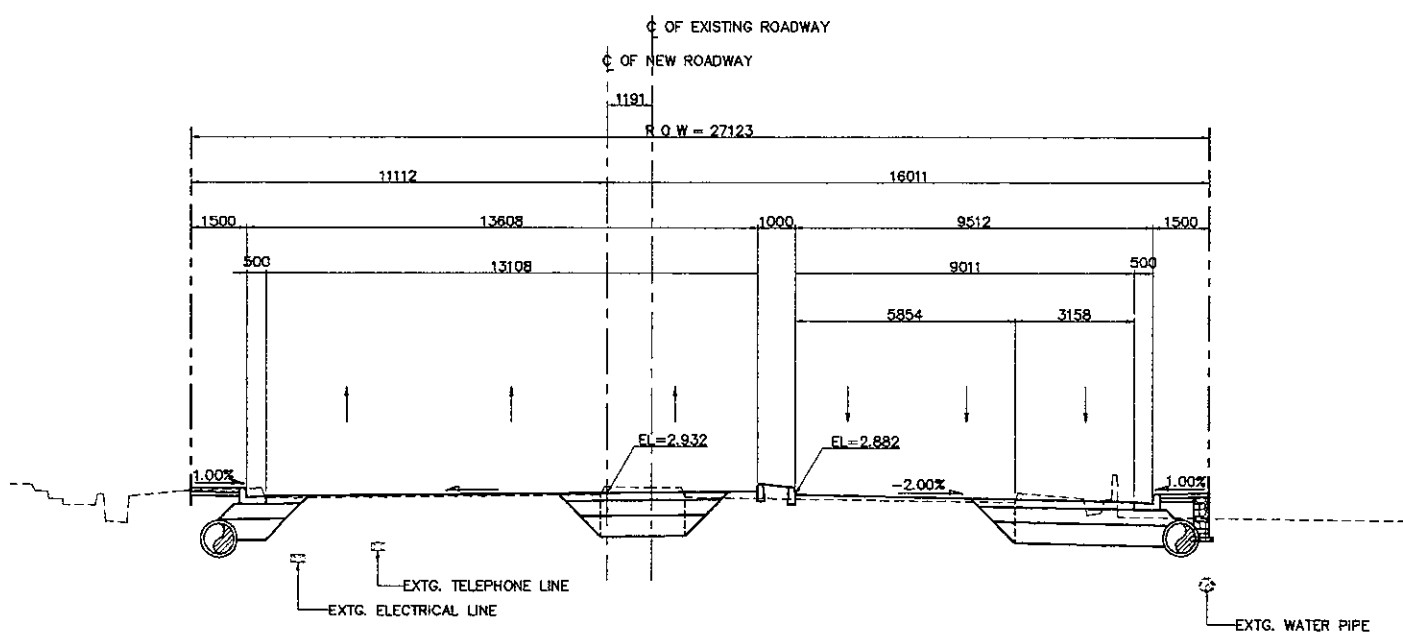
DESIGNED BY	CHECKED BY	SUBMITTED BY
Name: R. UENO	Name: T. OKUMURA	Name: M. KIUCHI
Sign: _____	Sign: _____	Sign: _____
Date: _____	Date: _____	Date: _____



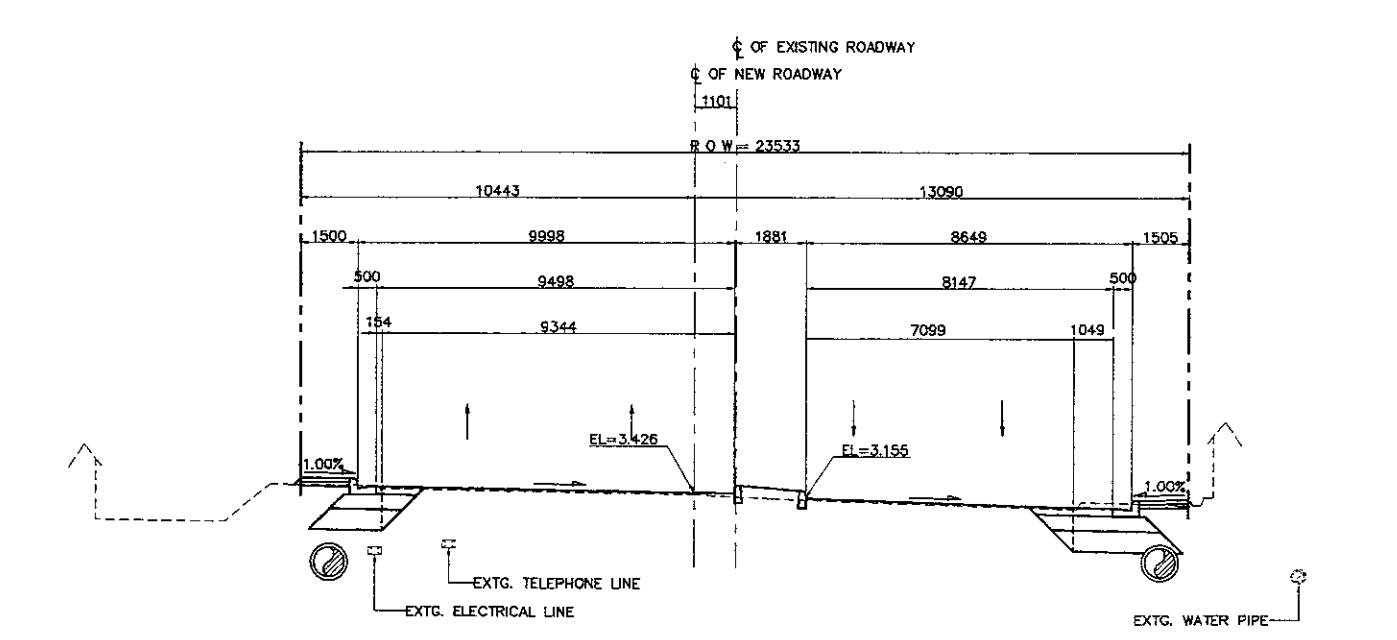
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**4 SECTION (STA. 1 + 520.000)**  
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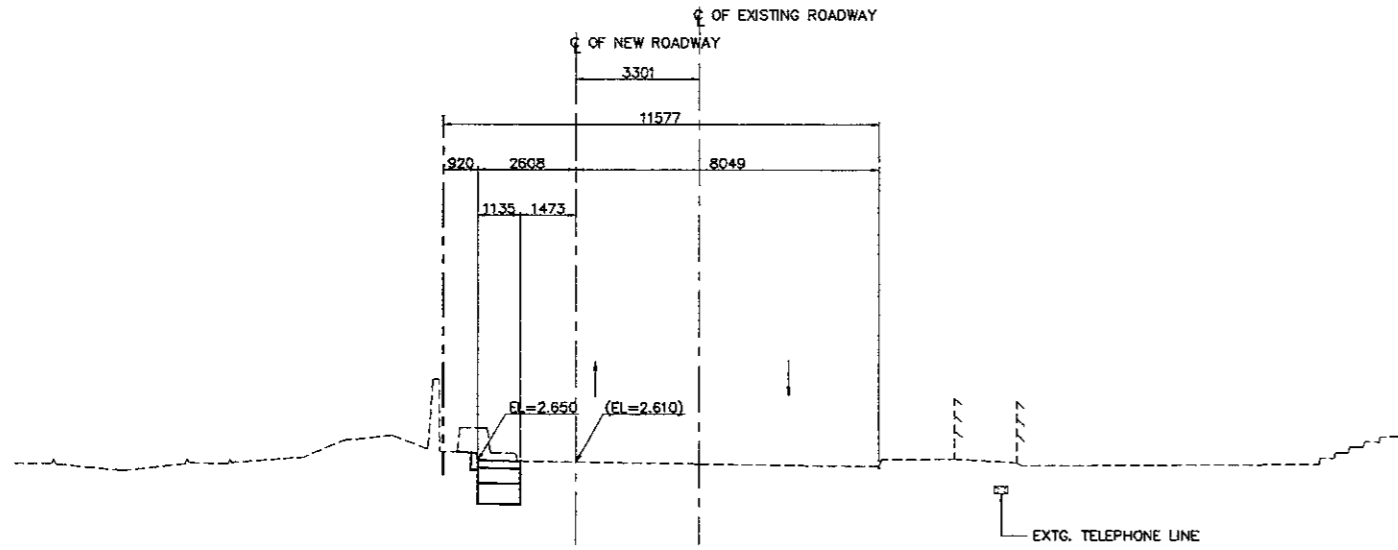
**1 SECTION (STA. 1 + 460.000)**  
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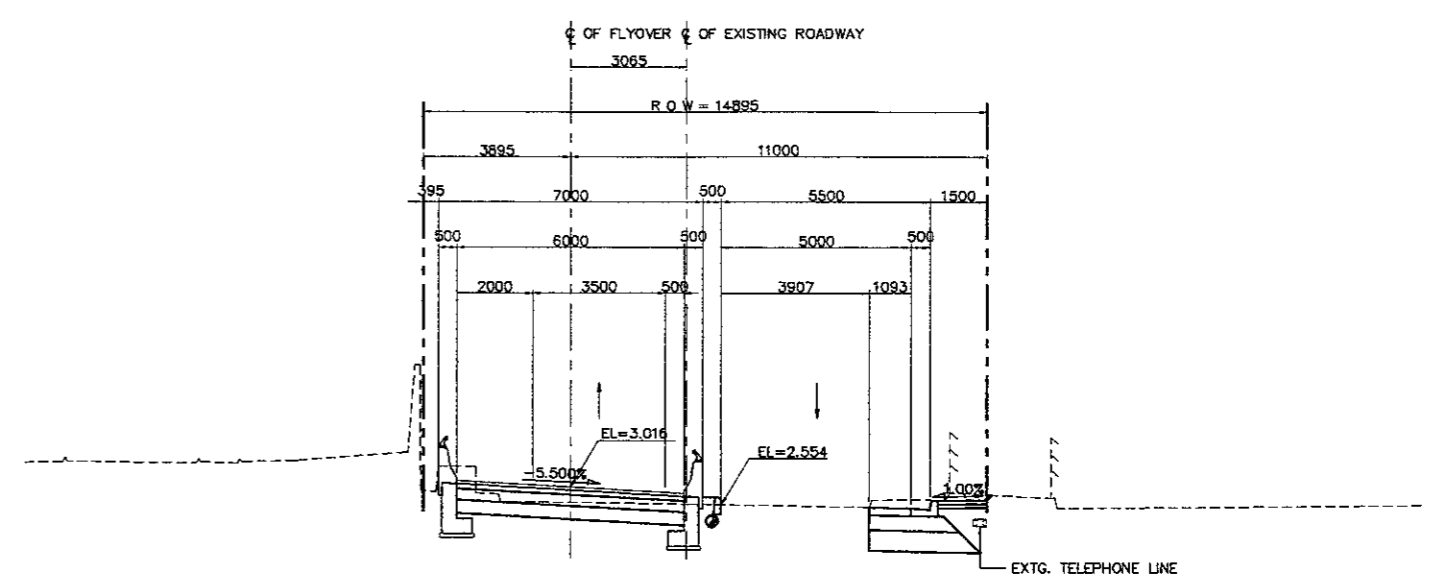
**3 SECTION (STA. 1 + 500.000)**  
 SCALE 1:200

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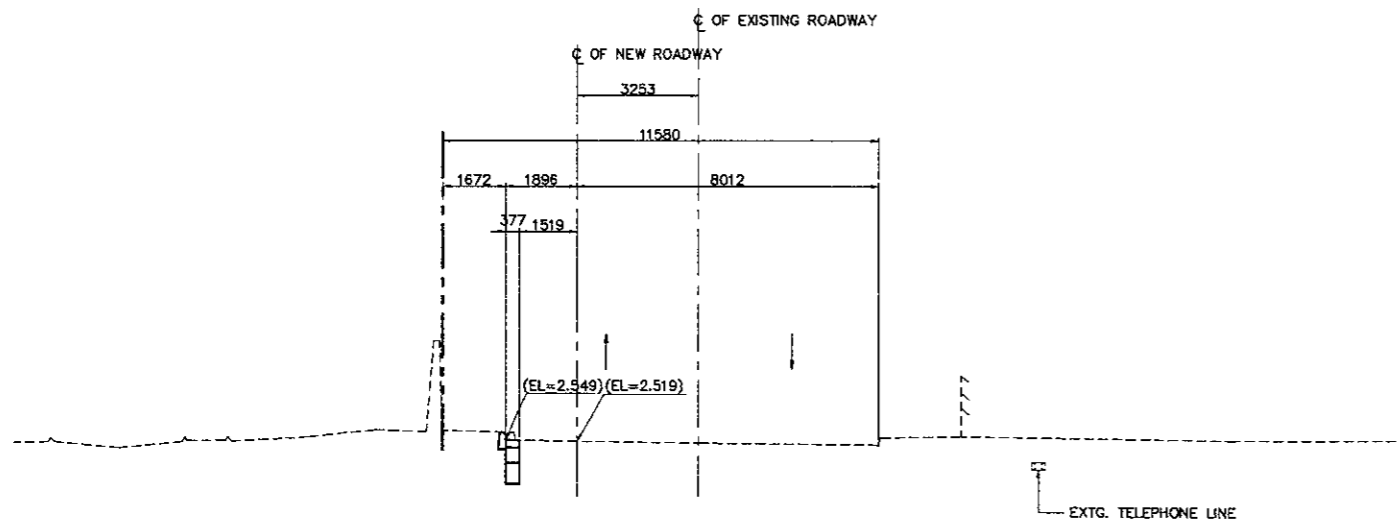
DESIGNED BY		CHECKED BY		SUBMITTED BY	
Name	R. UENO	Name	T. OKUMURA	Name	M. KIUCHI
Sign		Sign		Sign	
Date		Date		Date	



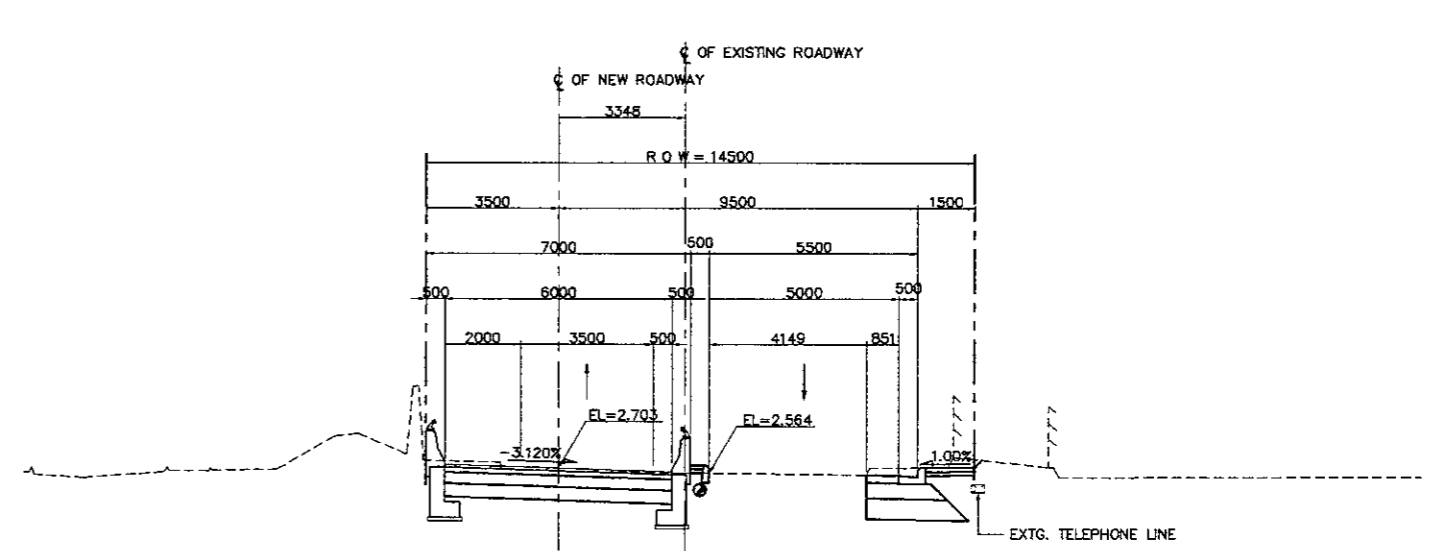
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**4 SECTION (STA. 0 + 140.000)**  
 SCALE 1:200



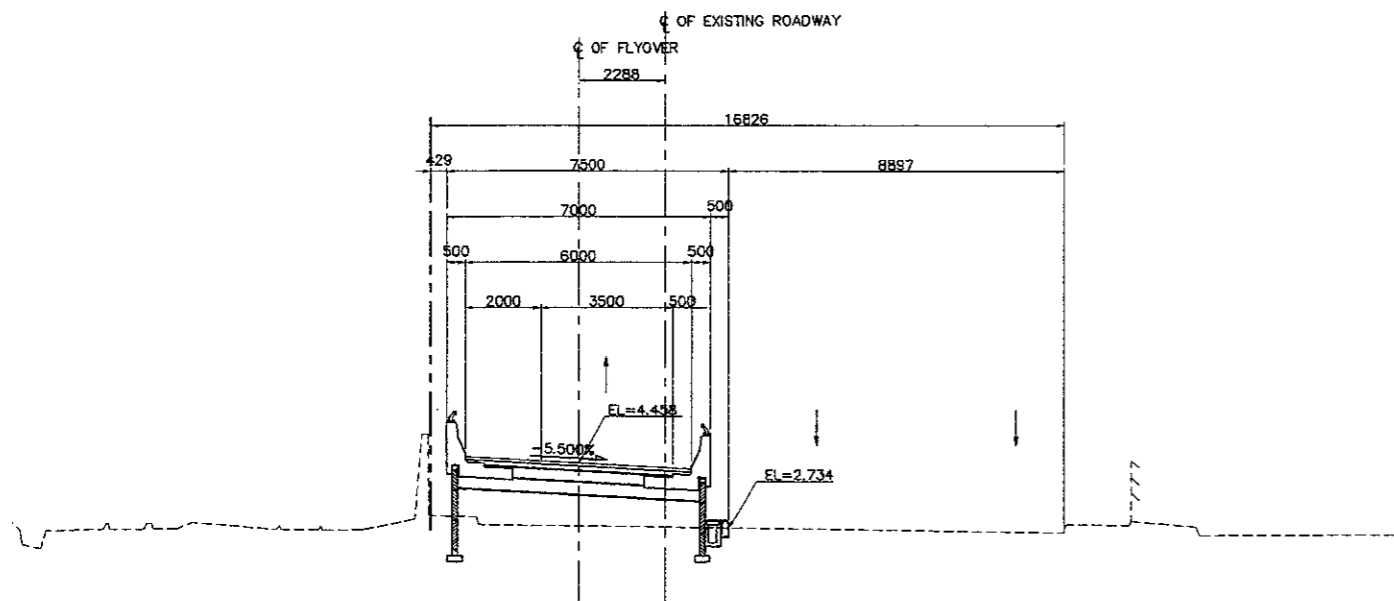
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 SCALE 1:200



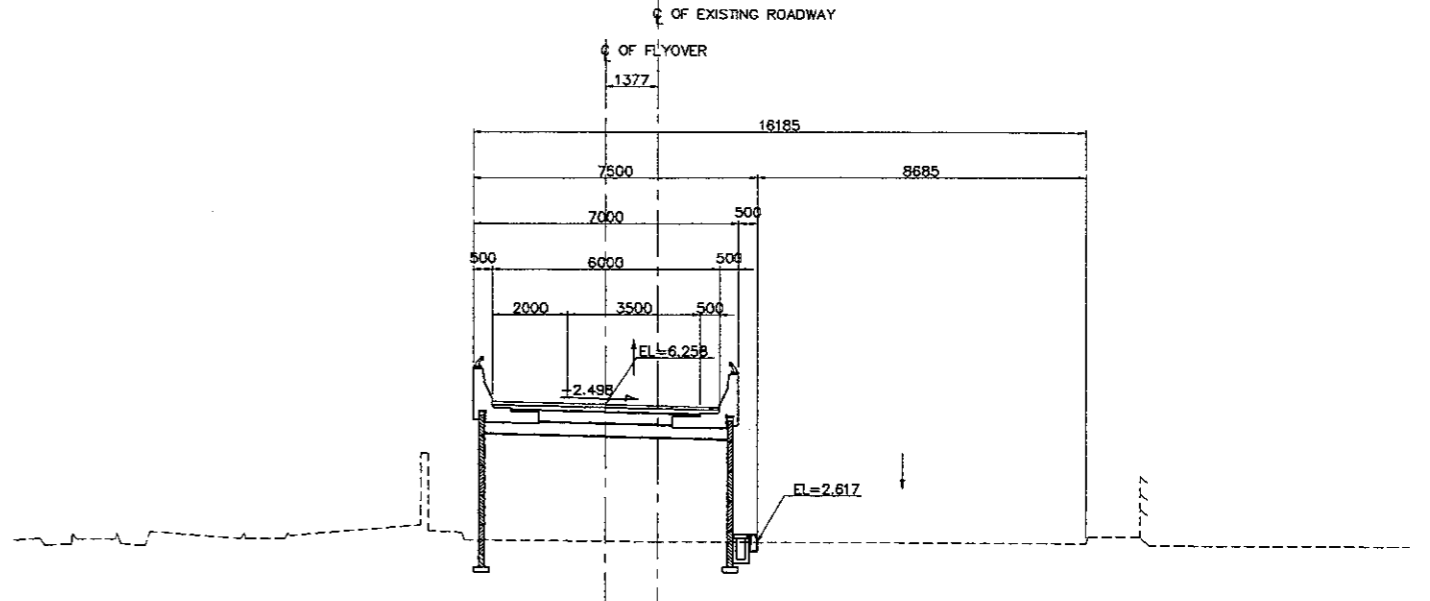
**3 SECTION (STA. 0 + 120.000)**  
 SCALE 1:200

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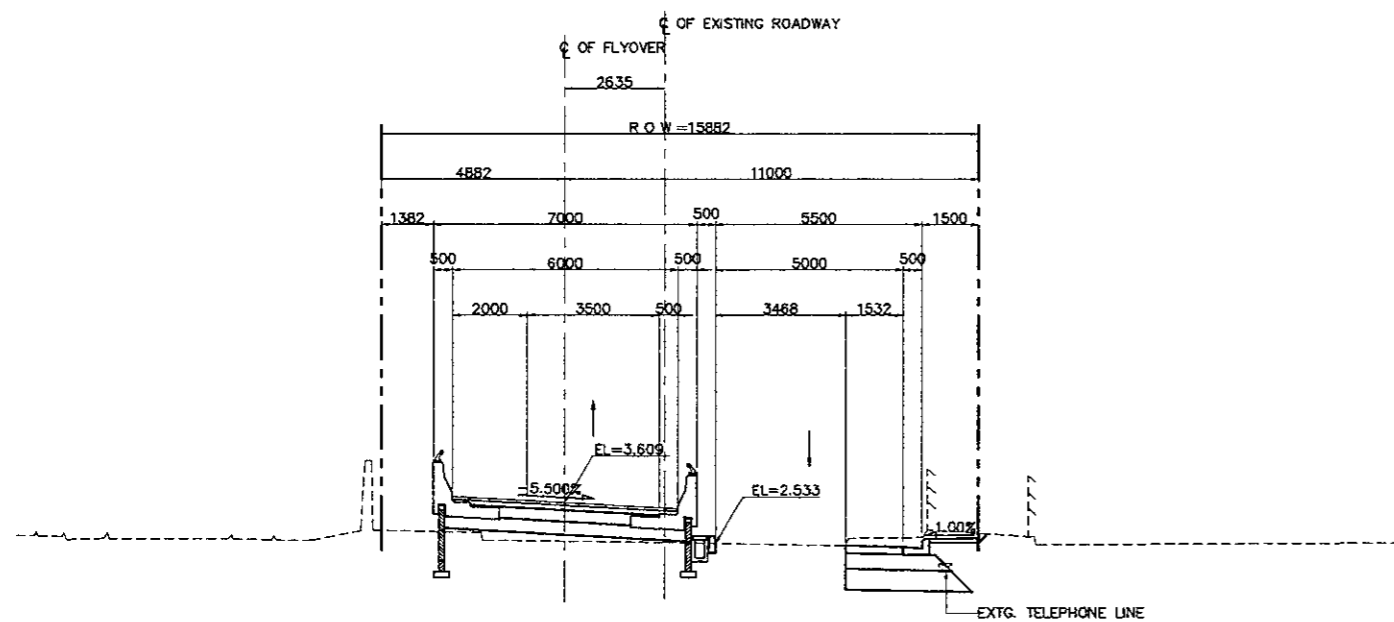
DESIGNED BY	CHECKED BY	SUBMITTED BY
Name: R. UENO	Name: T. OKUMURA	Name: M. KIUCHI
Sign:	Sign:	Sign:
Date:	Date:	Date:



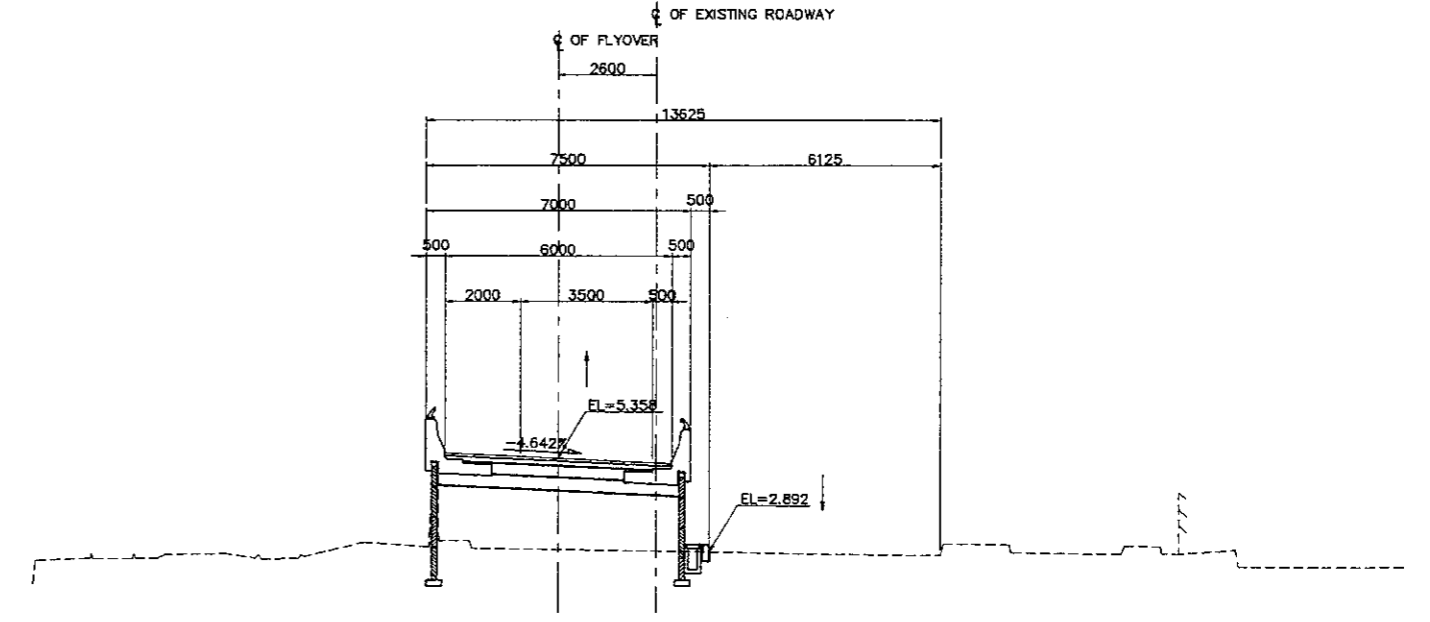
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**4 SECTION (STA. 0 + 220.000)**  
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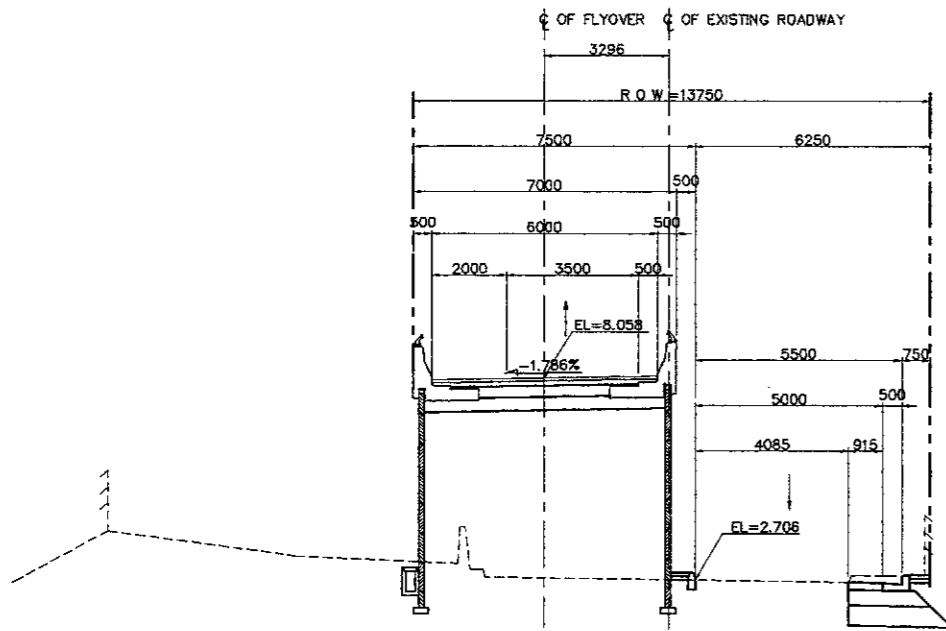
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 SCALE 1:200



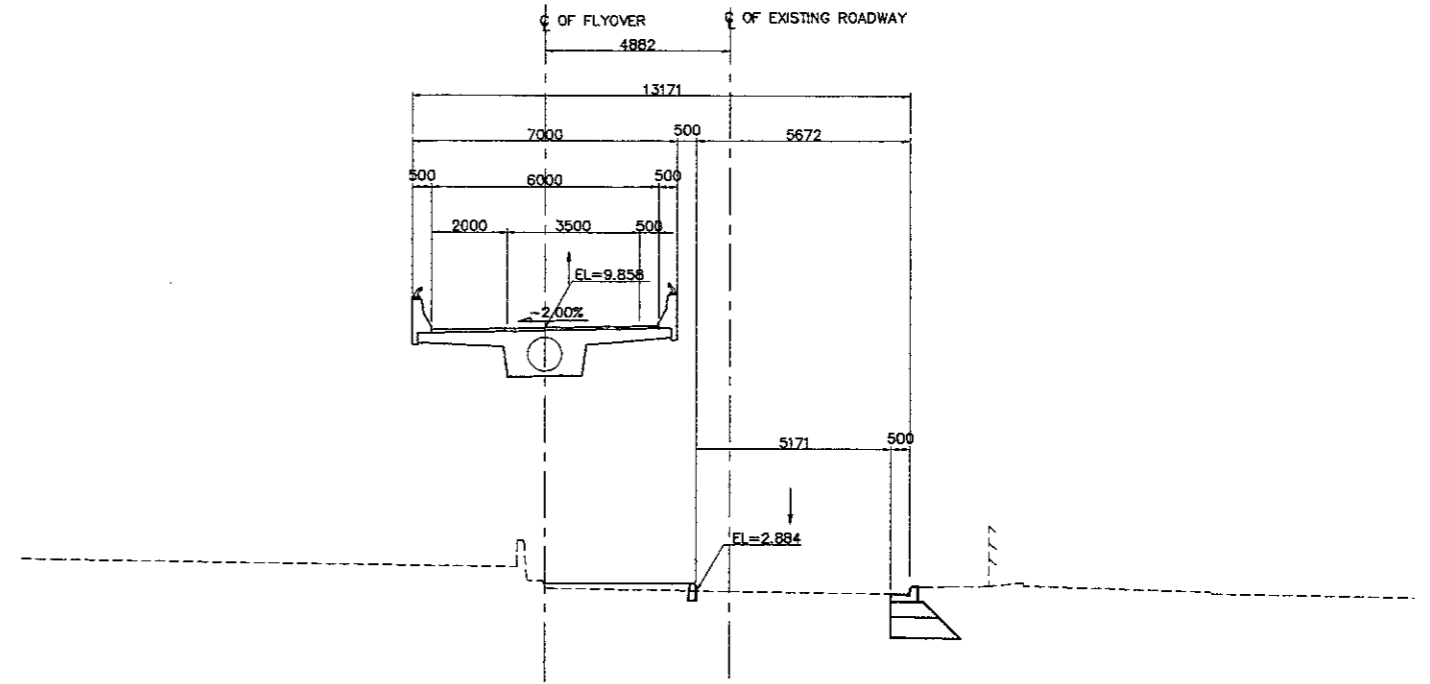
**3 SECTION (STA. 0 + 200.000)**  
 SCALE 1:200

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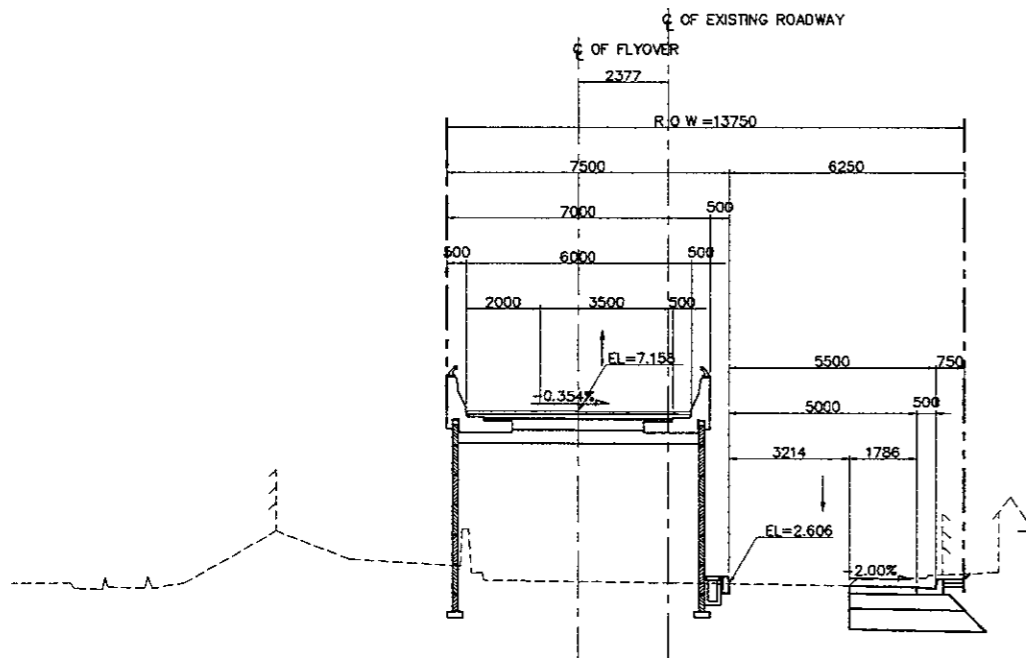
DESIGNED BY	CHECKED BY	SUBMITTED BY
Name R. UENO	Name T. OKUMURA	Name M. KIUCHI
Sign	Sign	Sign
Date	Date	Date



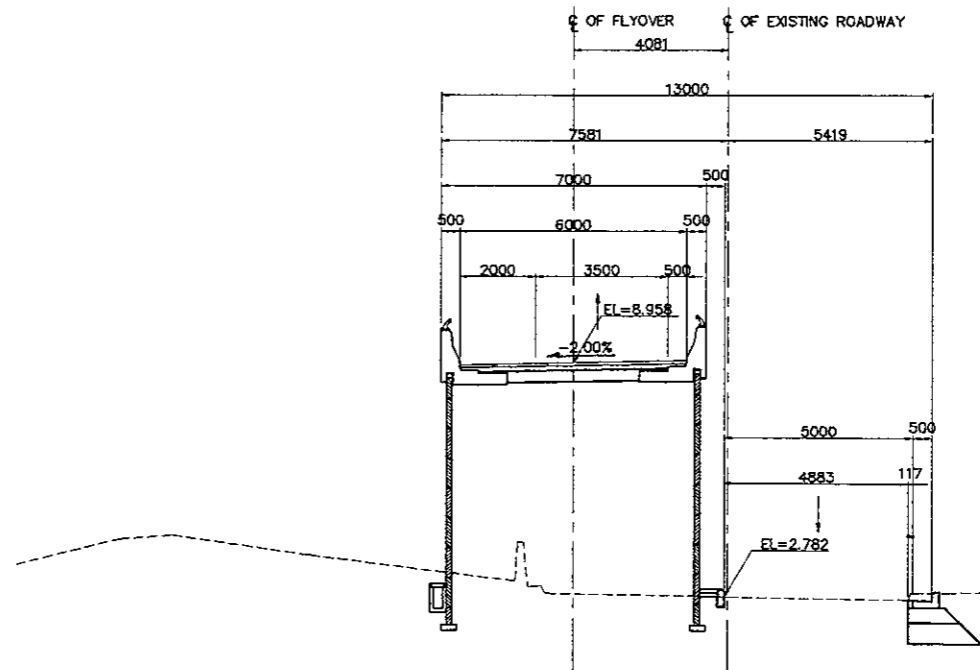
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**4 SECTION (STA. 0 + 300)**  
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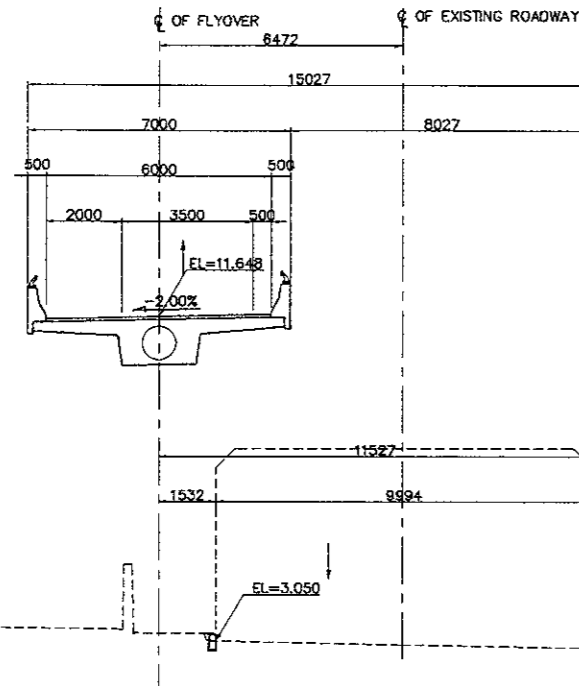
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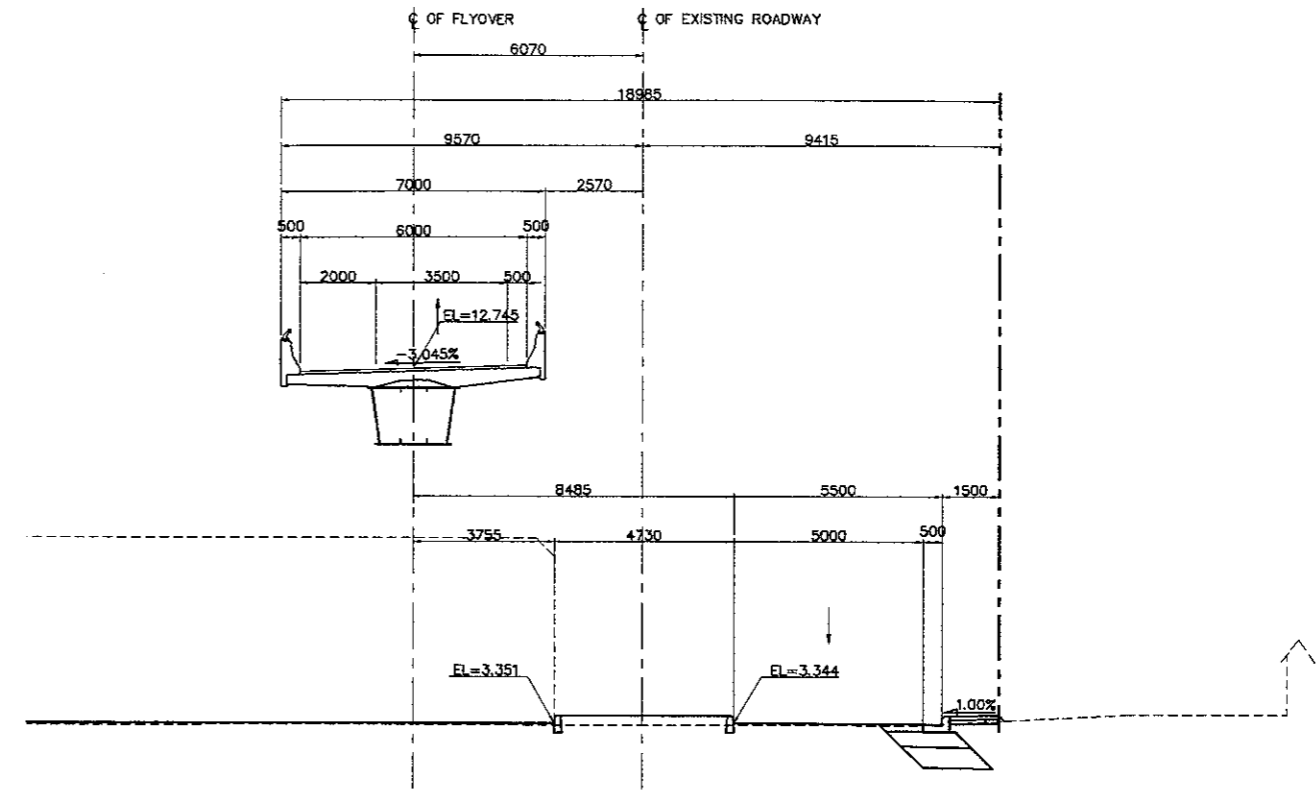
**3 SECTION (STA. 0 + 280)**  
 SCALE 1:200

- NOTES:
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  3. FOR LOCATION AND INVERT ELEVATIONS OF DRAINAGE SYSTEM (DITCH AND RCP) REFER TO DRAINAGE DRAWINGS.

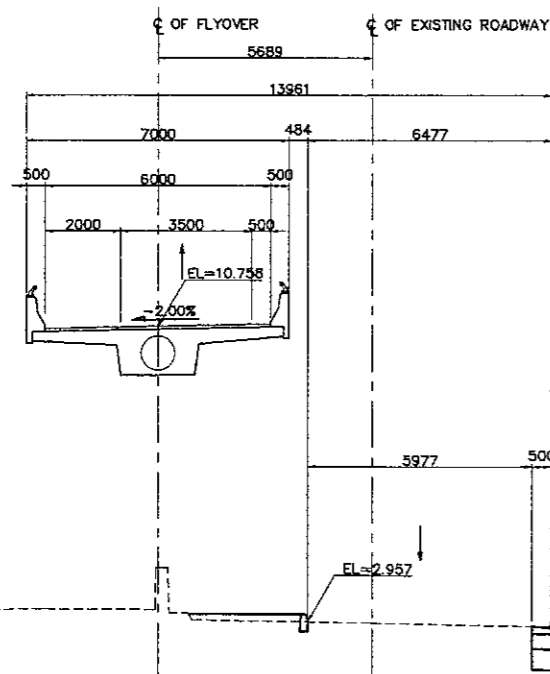
DESIGNED BY		CHECKED BY		SUBMITTED BY	
Name	R. UENO	Name	T. OKUMURA	Name	M. KIUCHI
Sign		Sign		Sign	
Date		Date		Date	



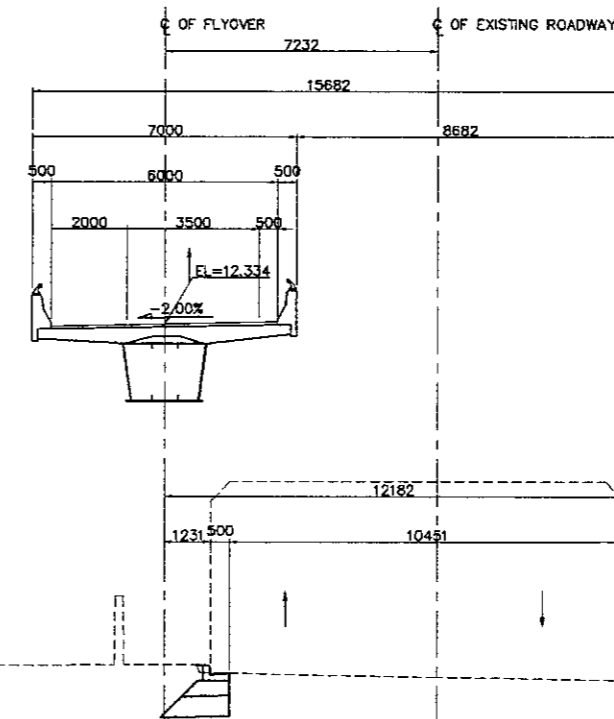
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**4 SECTION (STA. 0 + 380.000)**  
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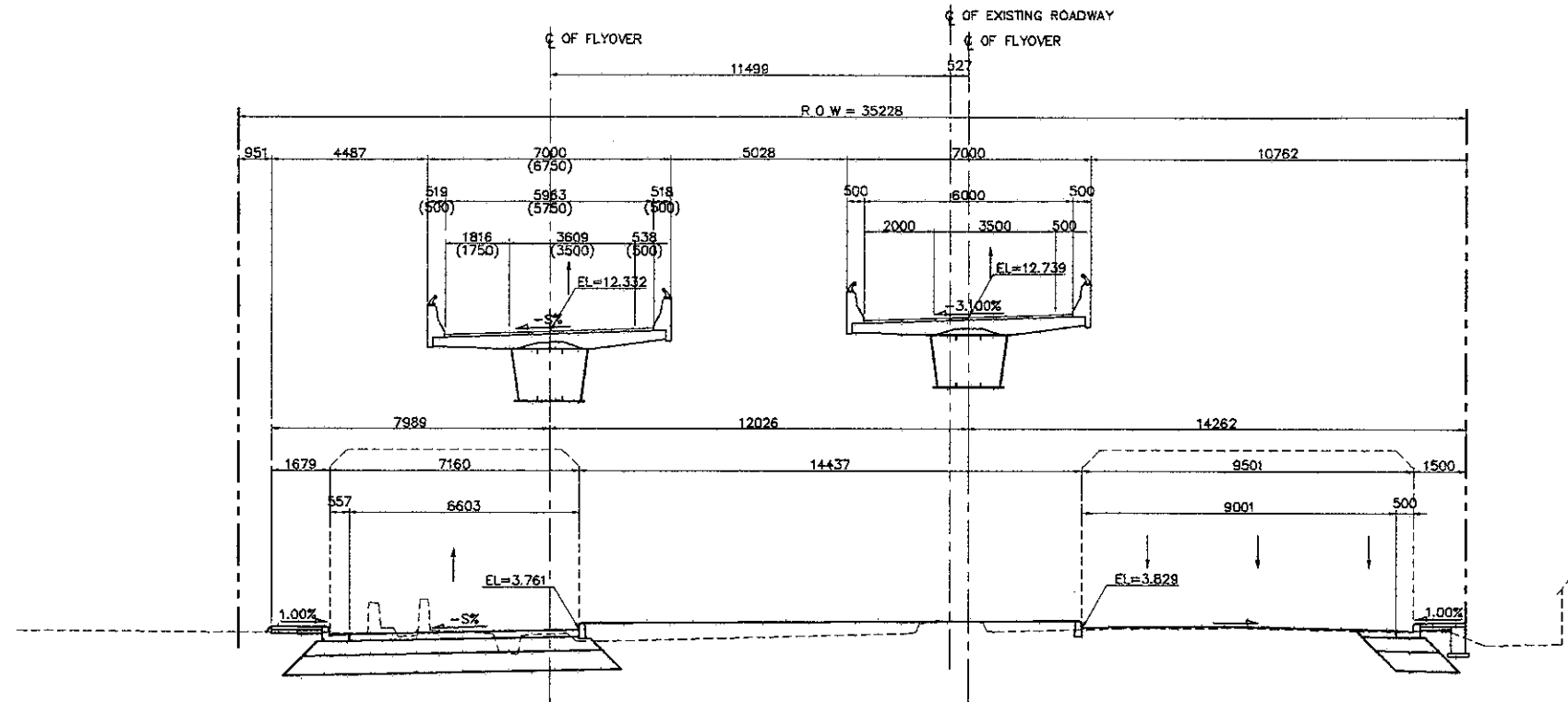
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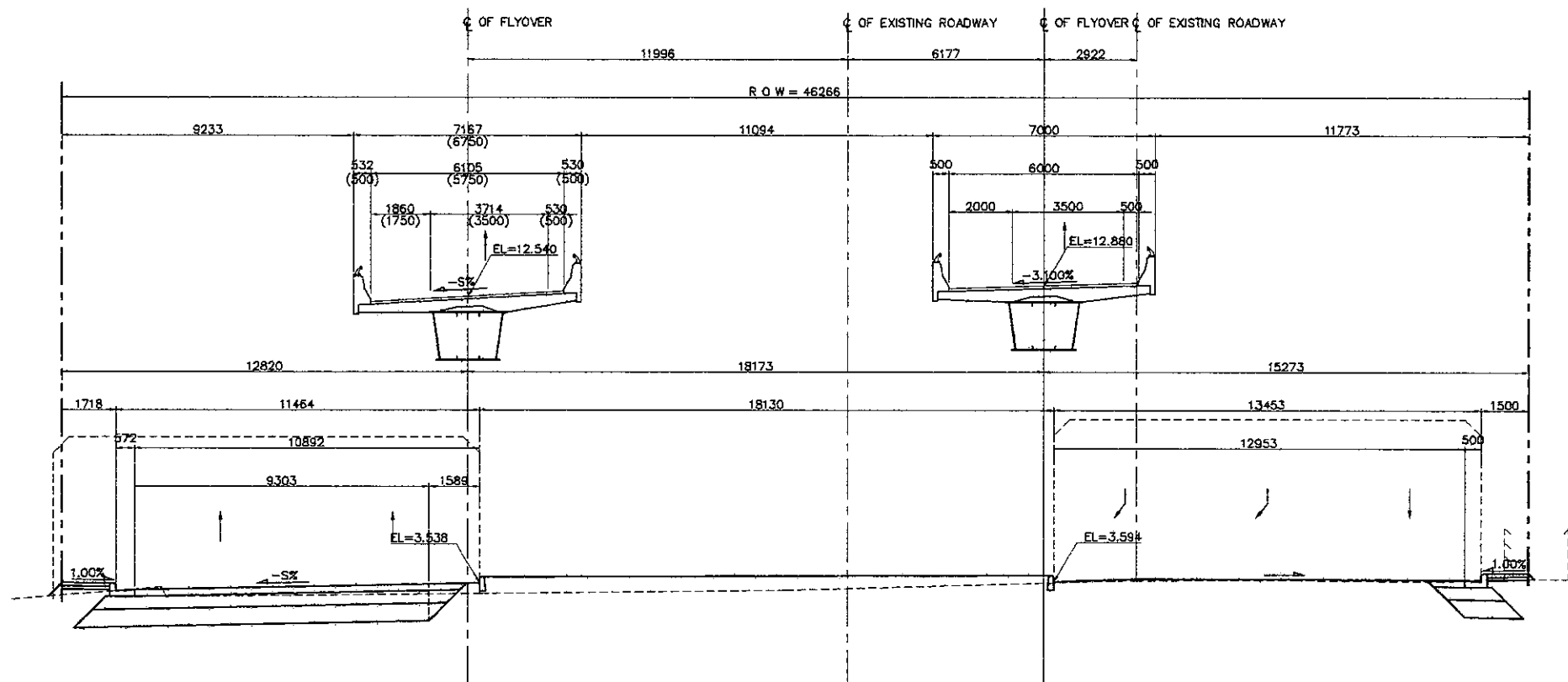
**3 SECTION (STA. 0 + 360.000)**  
 SCALE 1:200

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



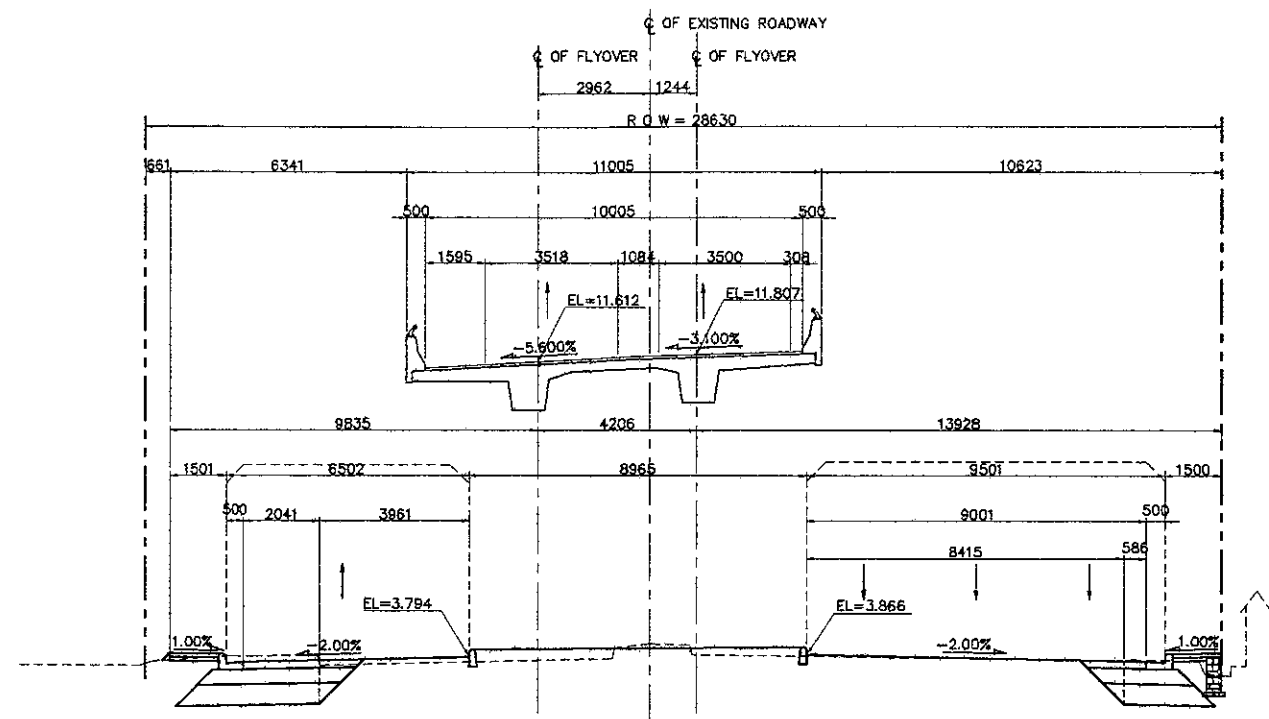
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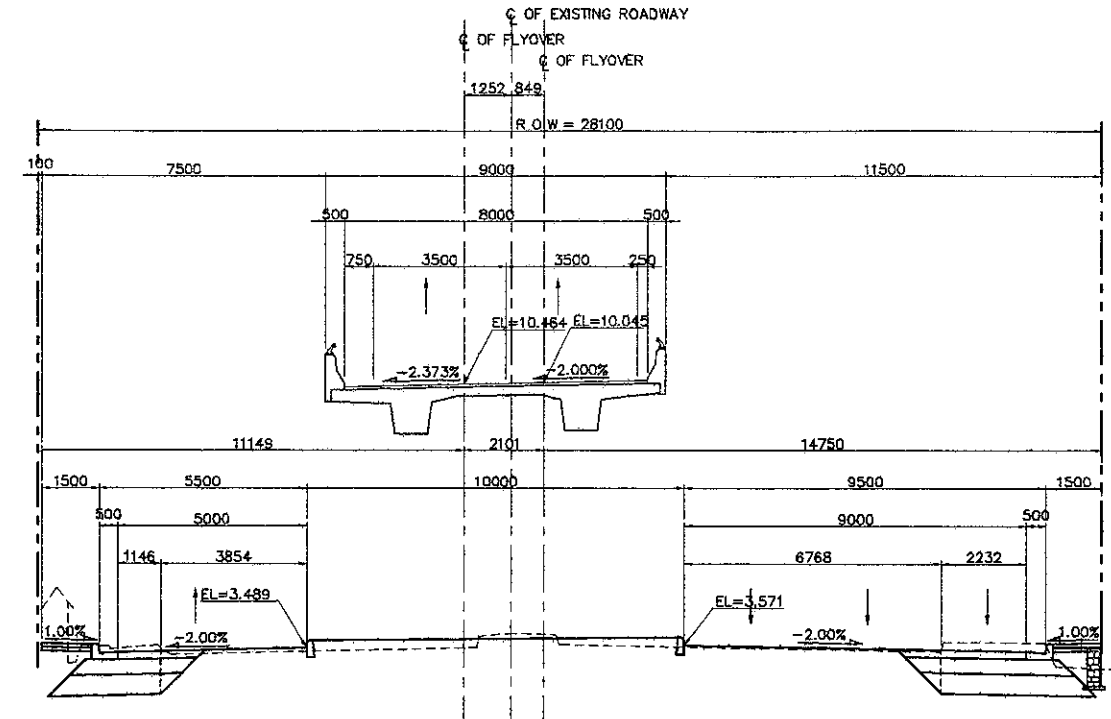
1 SECTION (STA. 0 + 400.000)  
 SCALE 1:200

NOTES:

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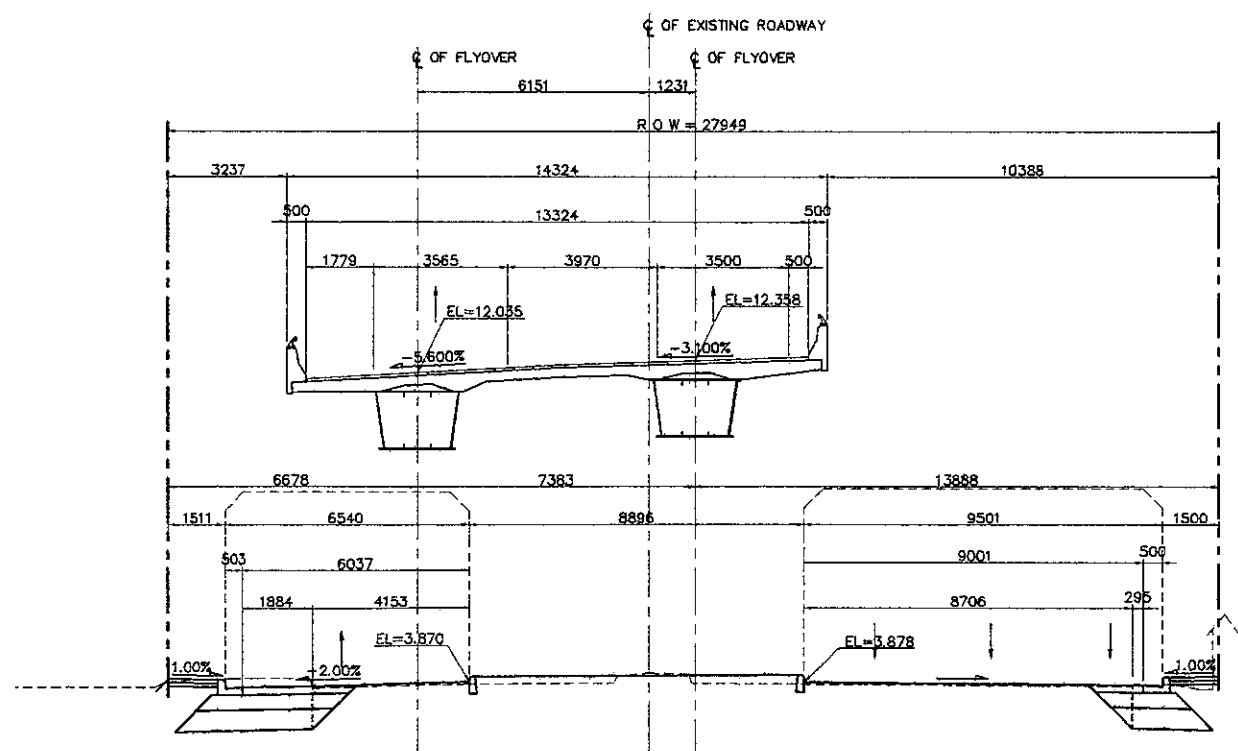


2 SECTION (STA. 0 + 460.000)  
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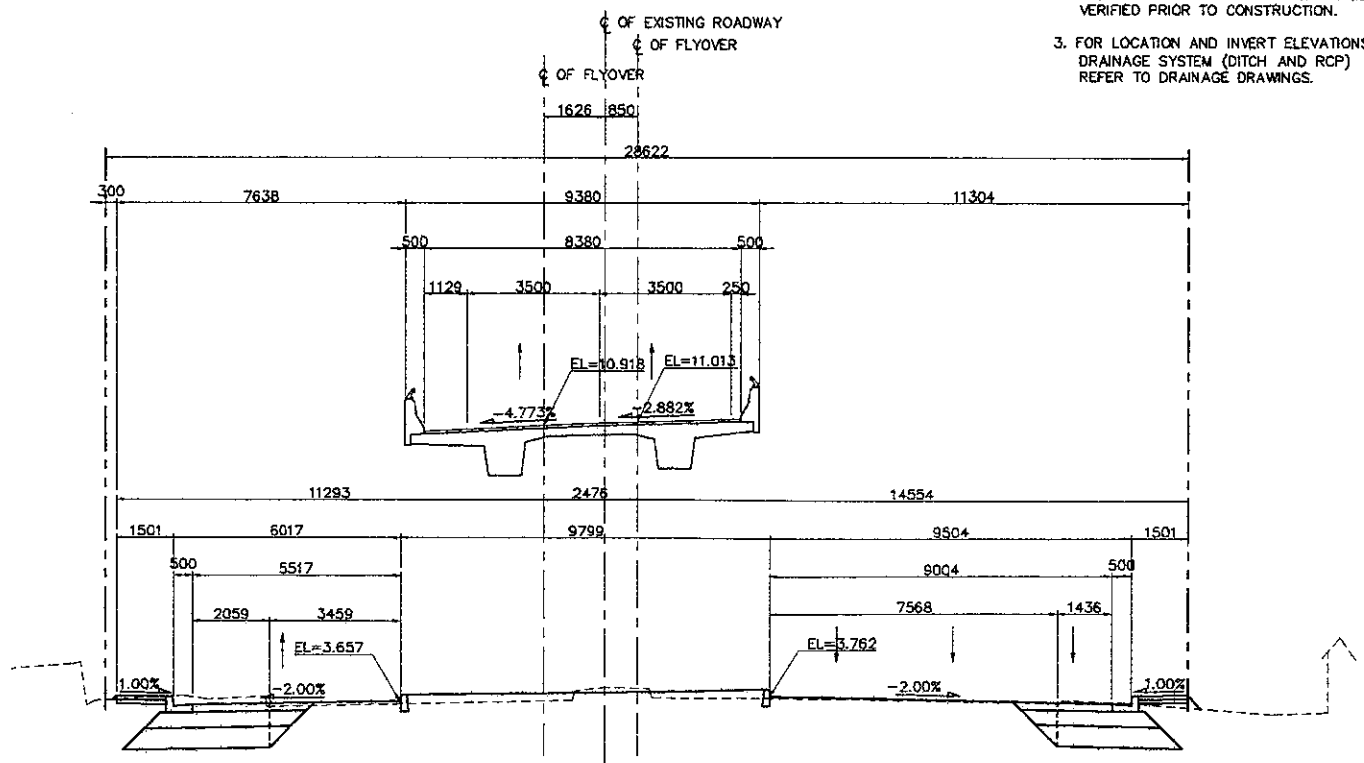


4 SECTION (STA. 0 + 500.000)  
 SCALE 1:200

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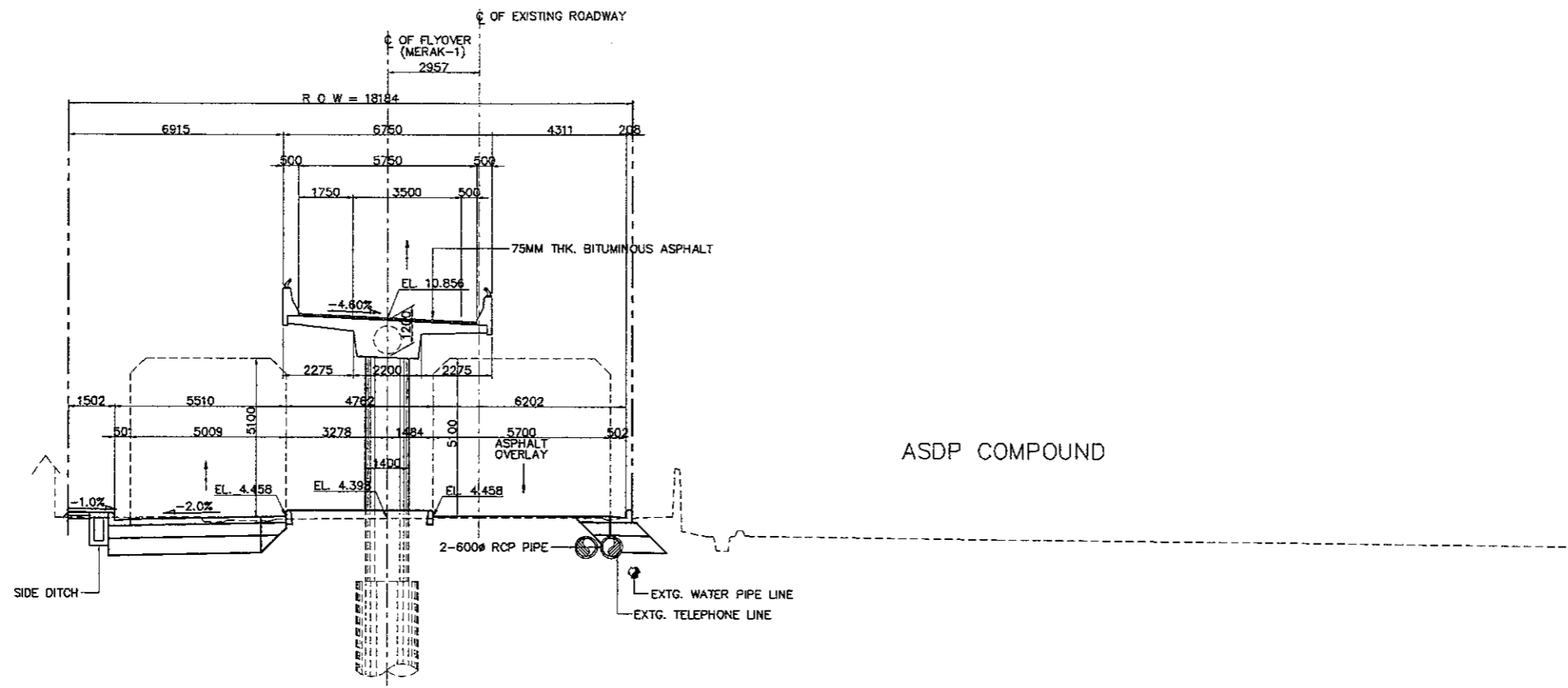


1 SECTION (STA. 0 + 440.000)  
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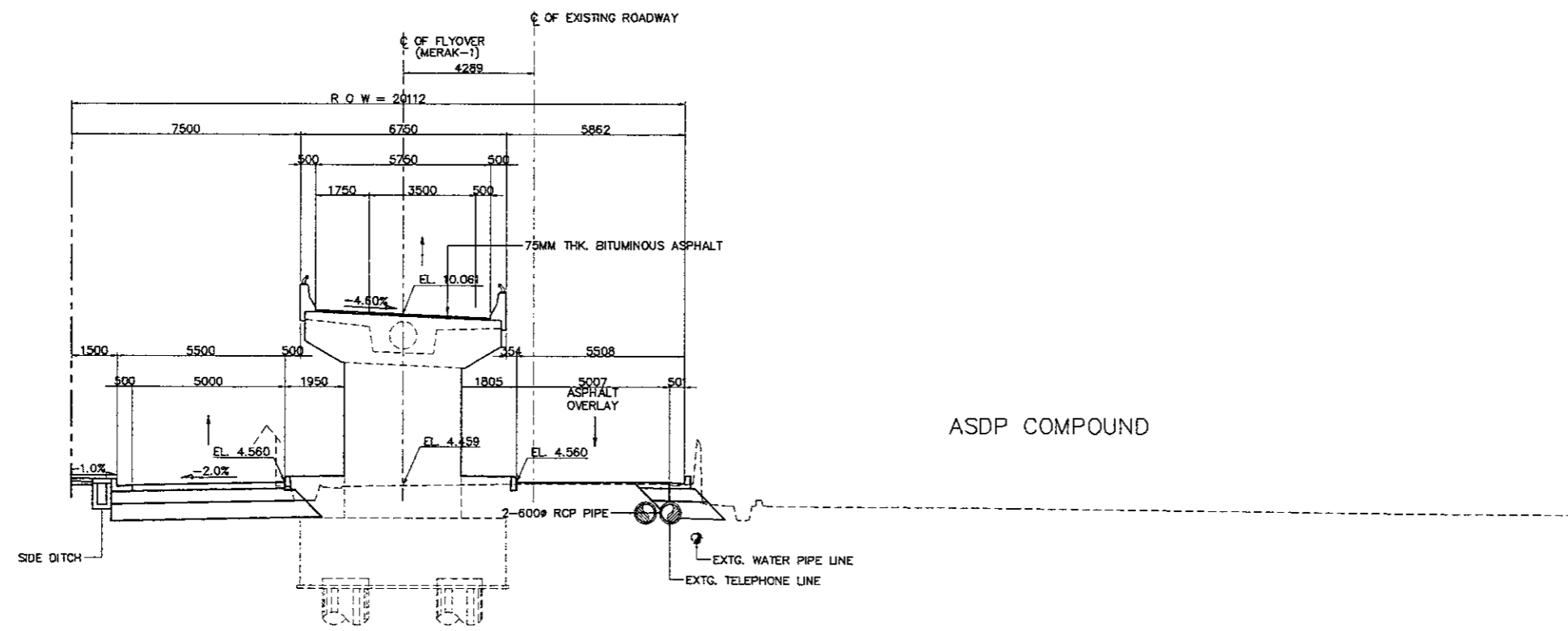


3 SECTION (STA. 0 + 480.000)  
 SCALE 1:200

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



**2 P1 SECTION (STA. 0 + 882.50)**  
 SCALE 1:200



**1 A1 SECTION (STA. 0 + 862.50)**  
 SCALE 1:200

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JAPAN INTERNATIONAL COOPERATION AGENCY  
**K** 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

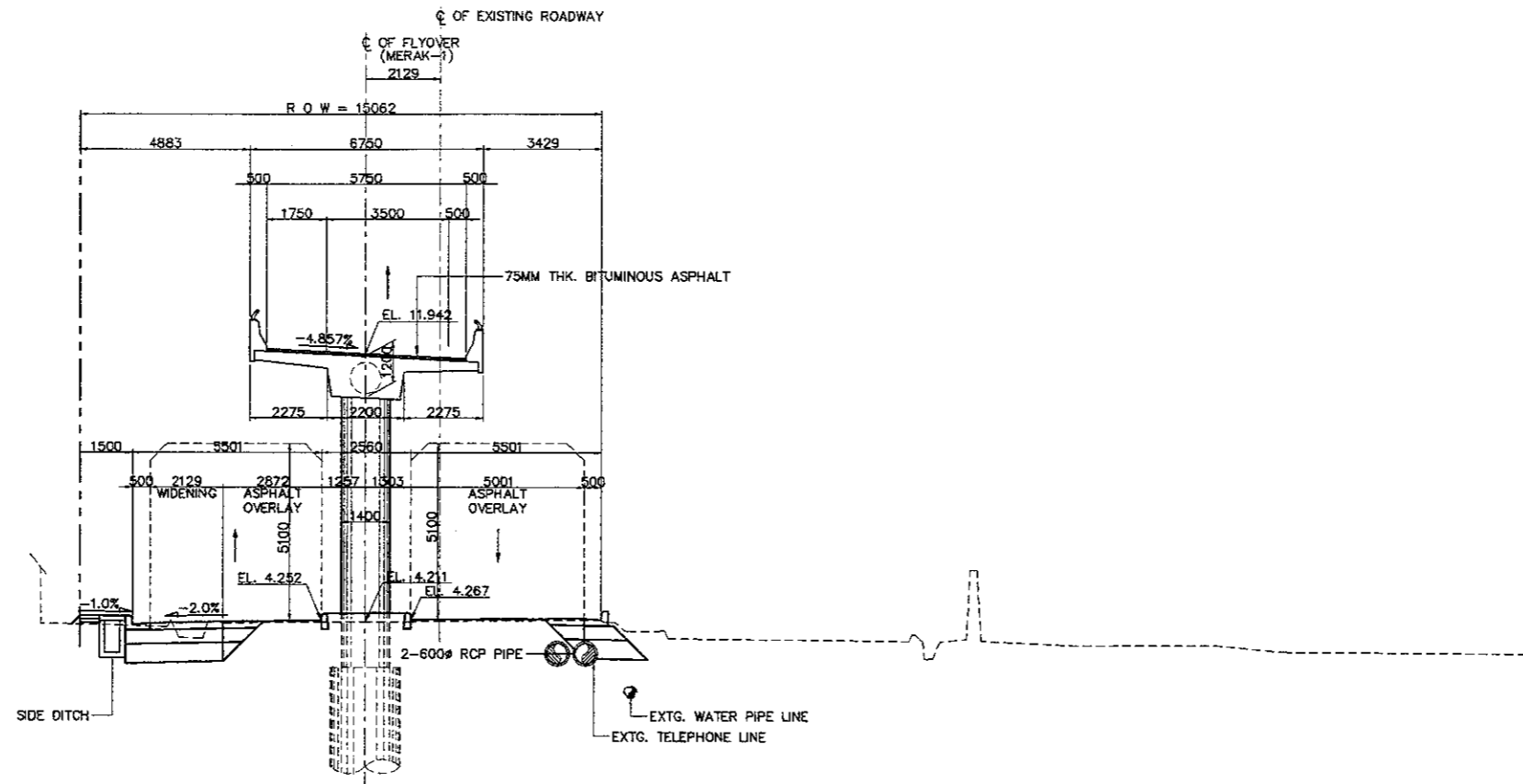
APPROVED BY	
Name	Ir. HERRY VAZA M.Eng.Sc
Date	

PROJECT AND LOCATION :
DETAILED DESIGN STUDY OF NORTH JAVA CORRIDOR FLYOVER PROJECT MERAK FLYOVER - CONTRACT PACKAGE 1 (MERAK - BALARAJA) BANTEN PROVINCE

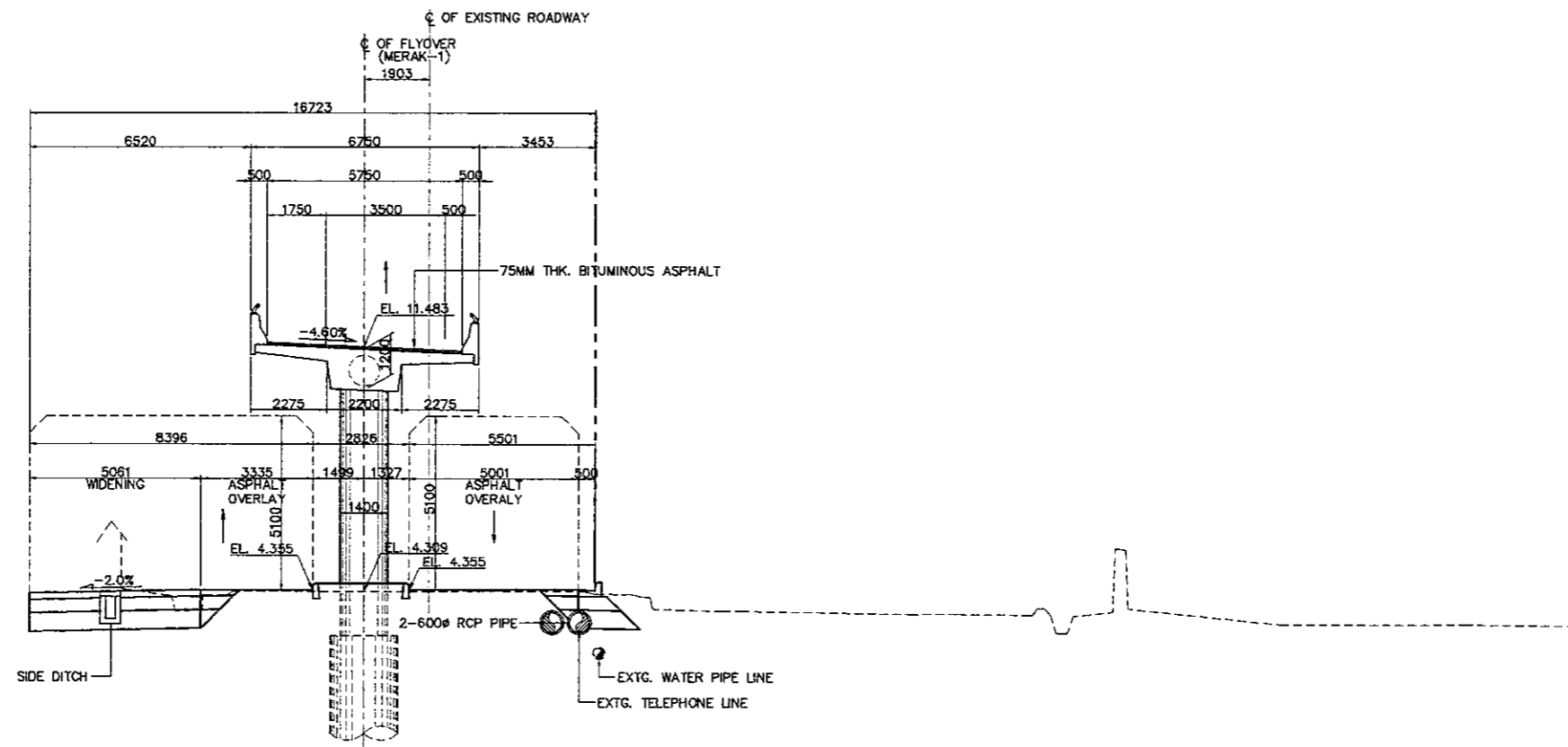
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FULL SIZE A3

DRAWING TITLE :
CROSS SECTION AT ABUTMENT AND PIER LOCATION (MERAK-1) (2 OF 9)

DRAWING NO. :
MRD-055
SHEET NO. :
55 / 84



2 P3 SECTION (STA. 0 + 922.50)  
 SCALE 1:200



1 P2 SECTION (STA. 0 + 902.50)  
 SCALE 1:200

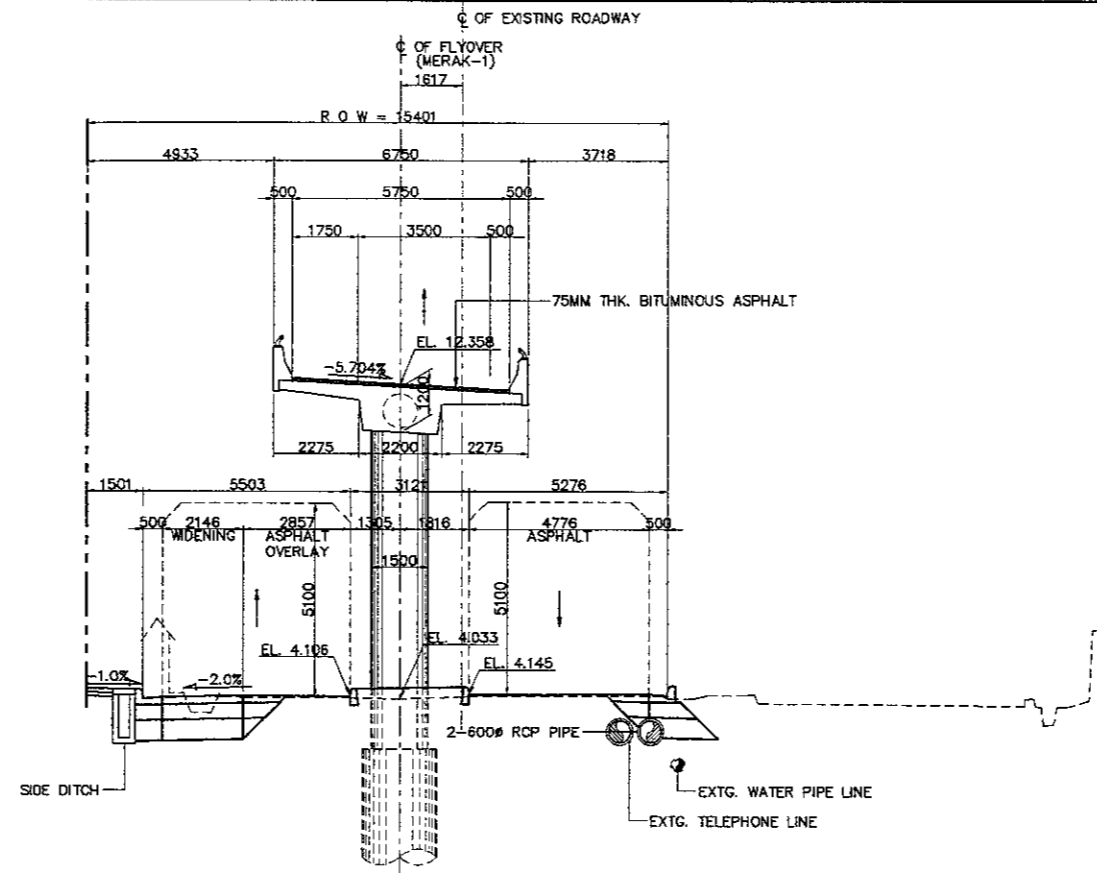
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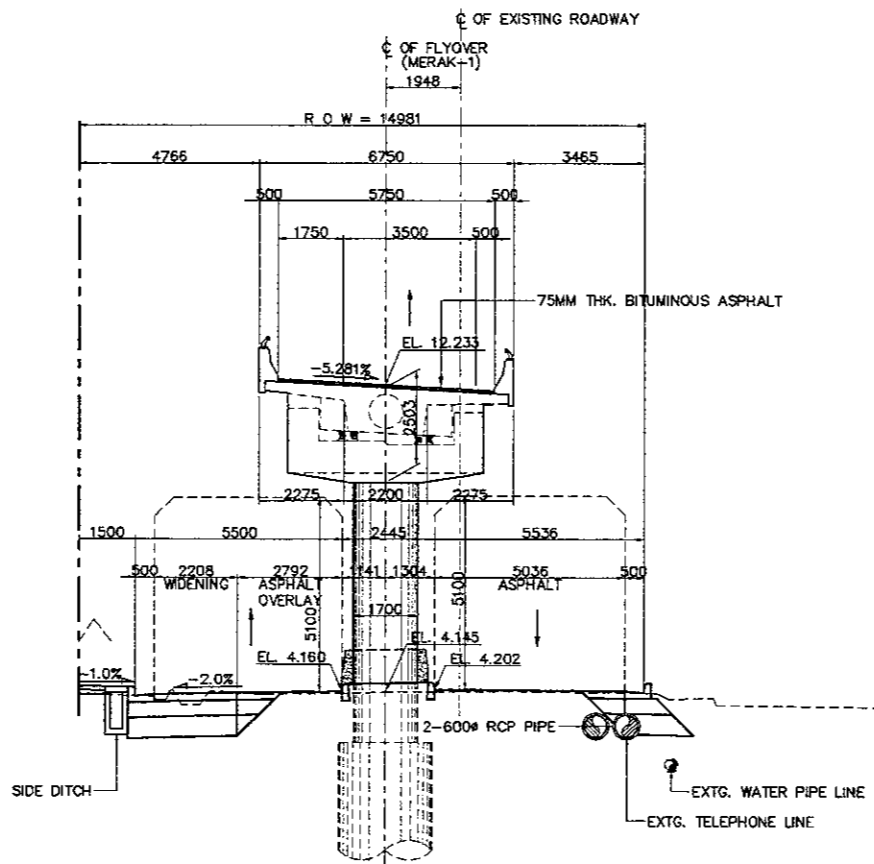
DESIGNED BY		CHECKED BY		SUBMITTED BY	
Name	R. UENO	Name	T. OKUMURA	Name	M. KIUCHI
Sign		Sign		Sign	
Date		Date		Date	

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

Sign	
Date	



2 P5 SECTION (STA. 0 + 962.50)
   
 SCALE 1:200

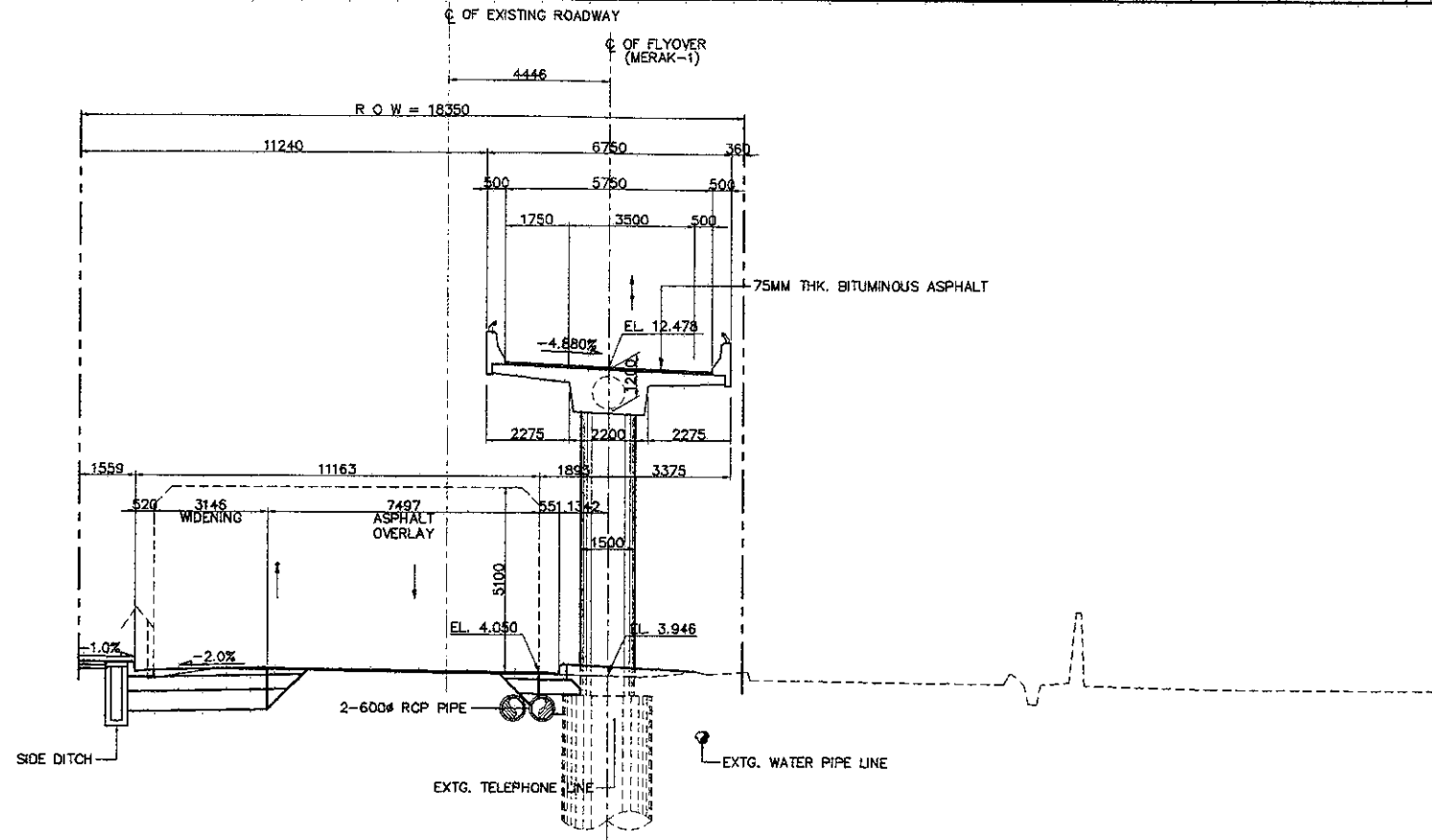


1 P4 SECTION (STA. 0 + 942.50)
   
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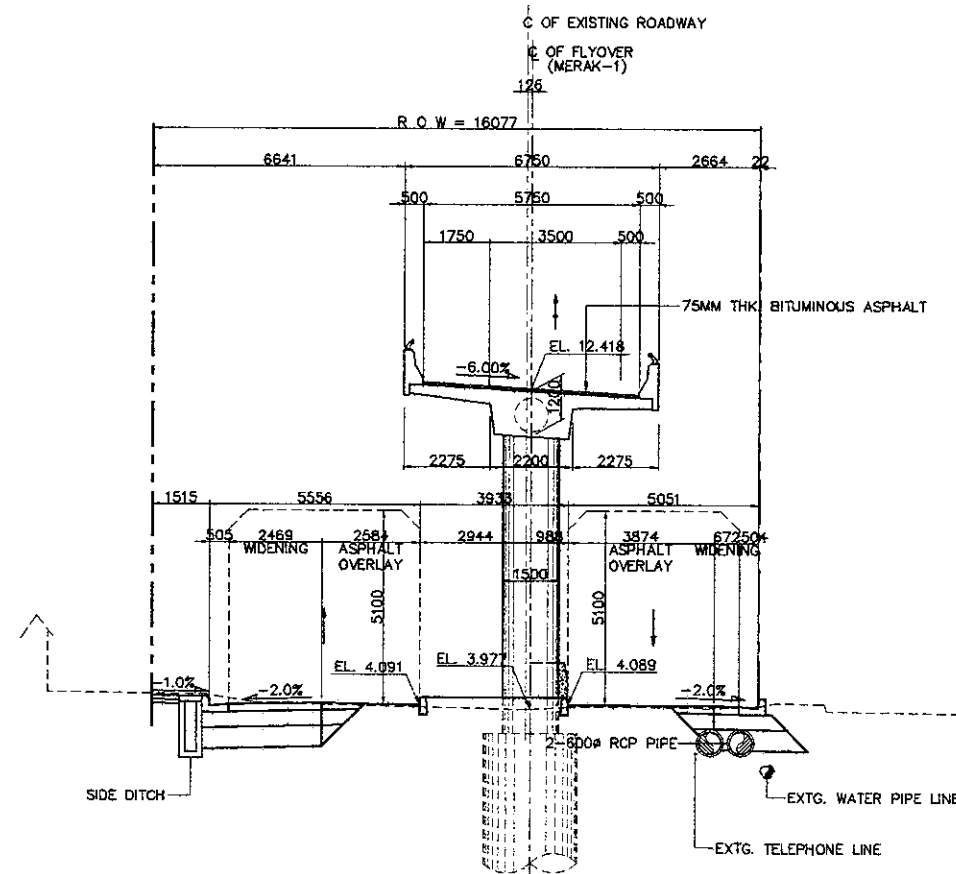
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Name	R. UENO	Name	T. OKUMURA	Name	M. KIUCHI
Sign		Sign		Sign	
Date		Date		Date	

APPROVED BY	
Ir. HERRY VAZA M,Eng.Sc	Sign
NIP. : 110038400	Date



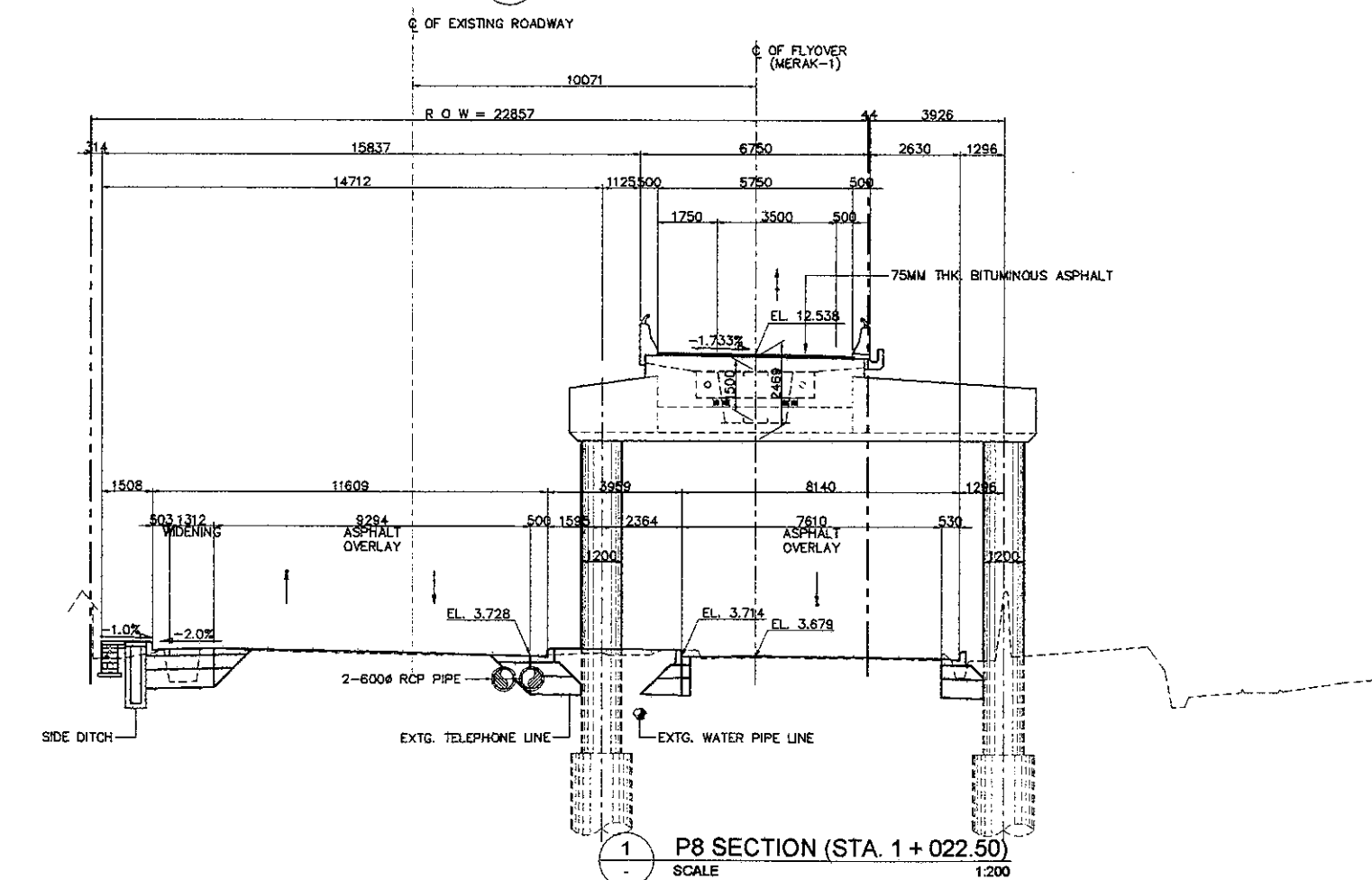
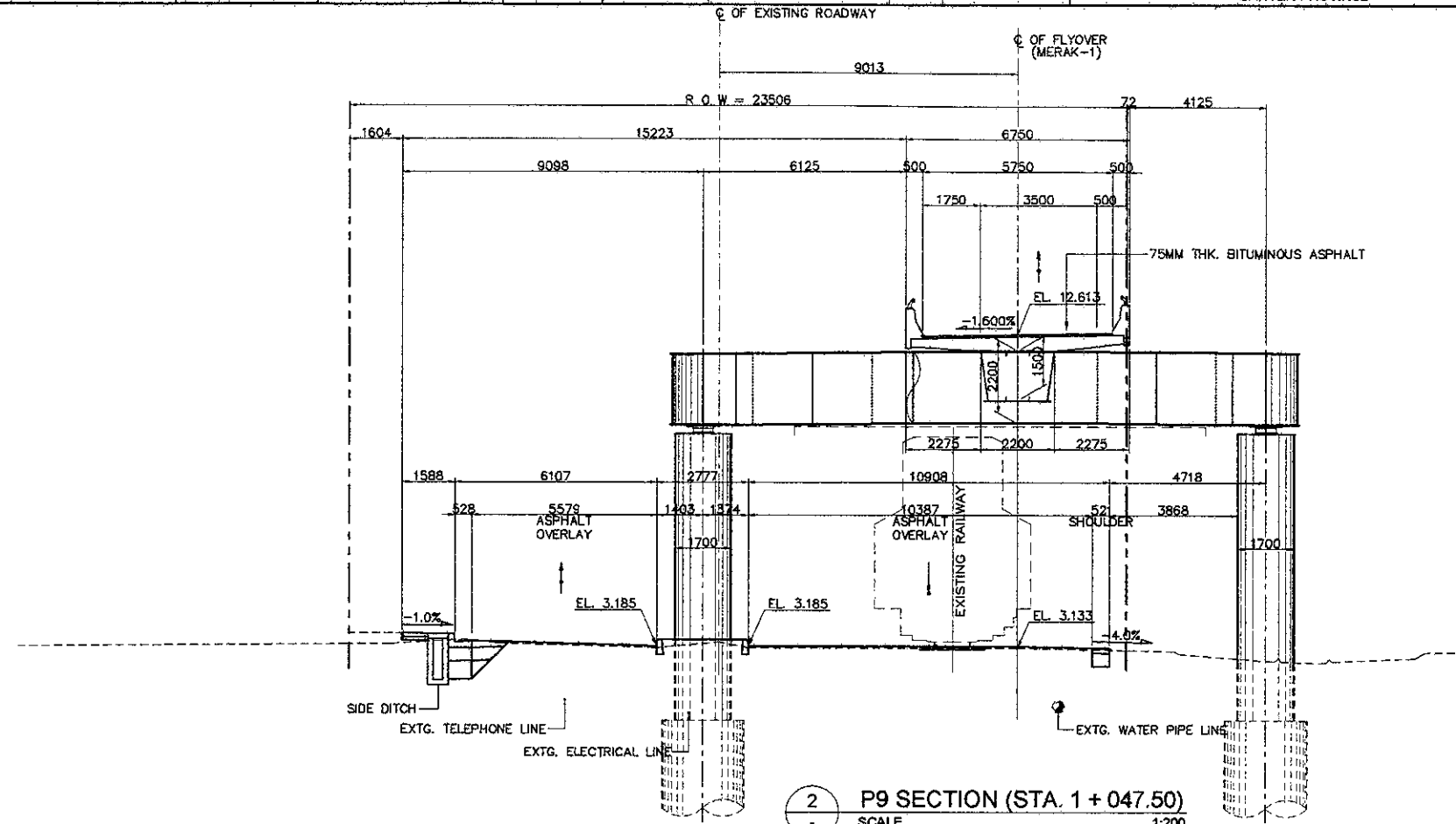
2 P7 SECTION (STA. 1 + 002.50)  
 SCALE 1:200



1 P6 SECTION (STA. 0 + 982.50)  
 SCALE 1:200

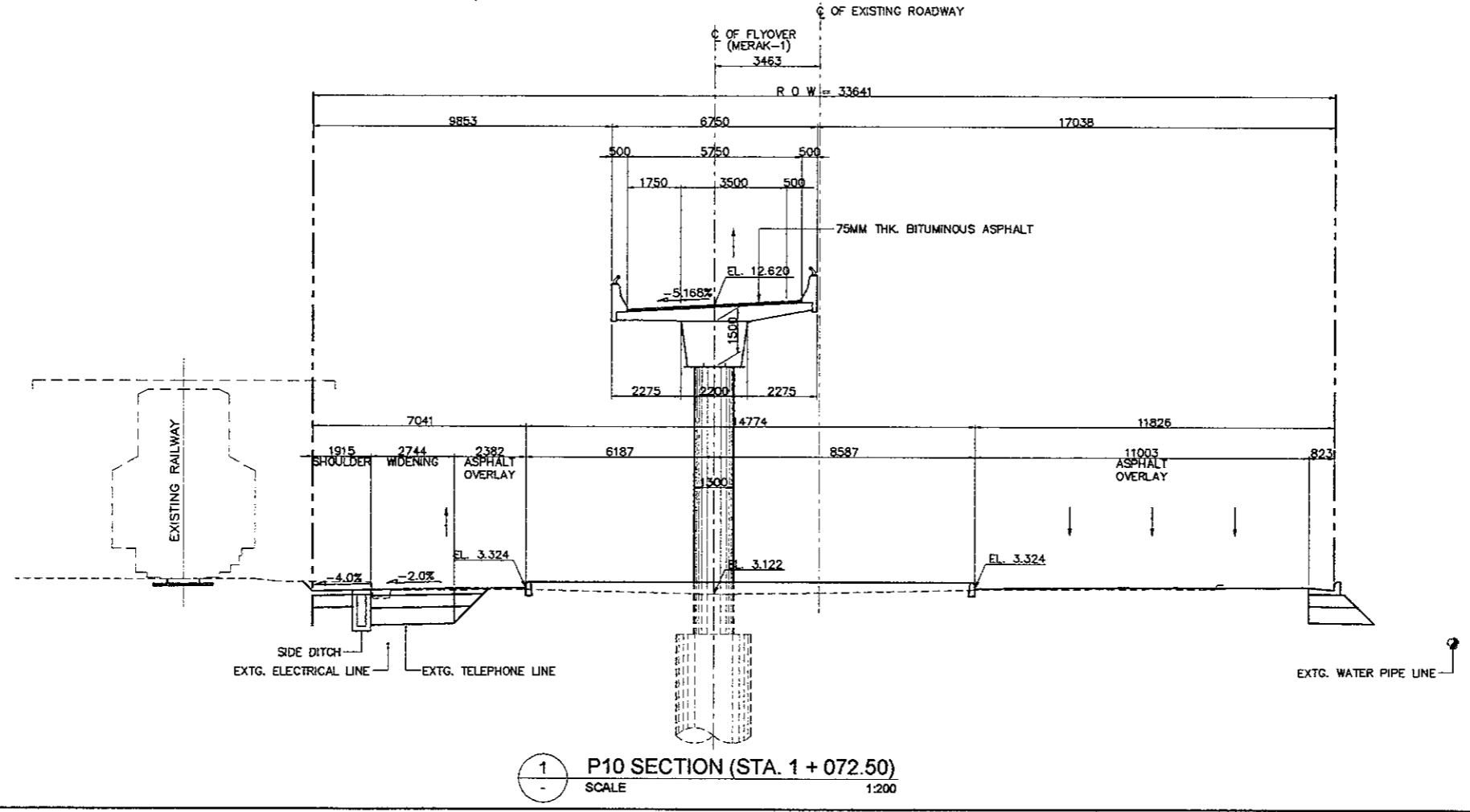
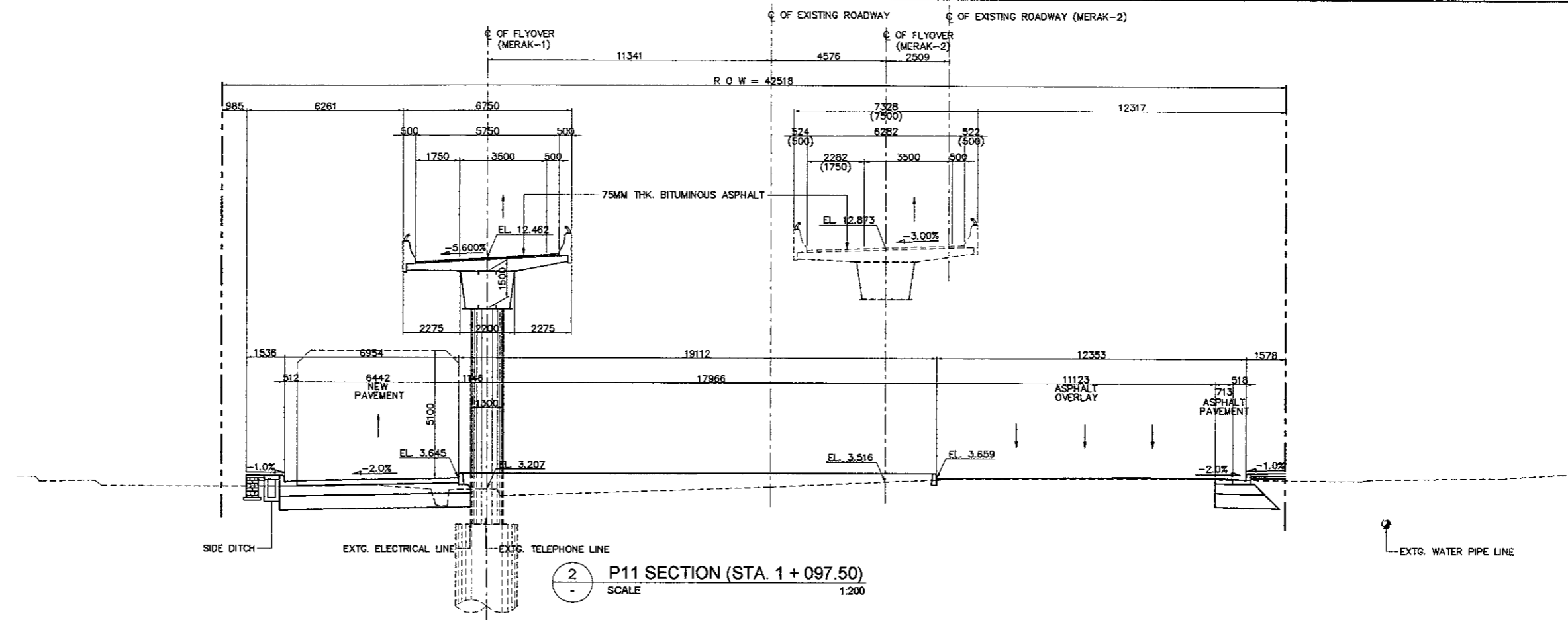
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Date		Date		Date	



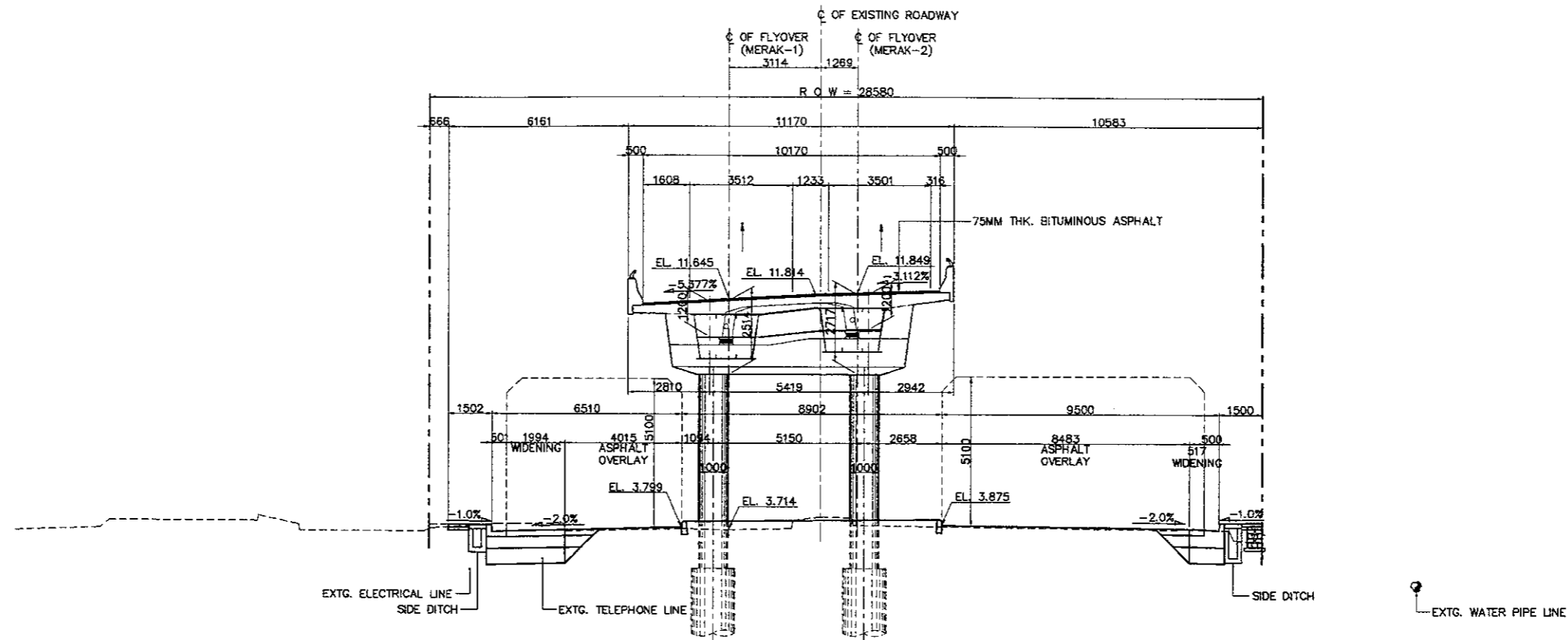
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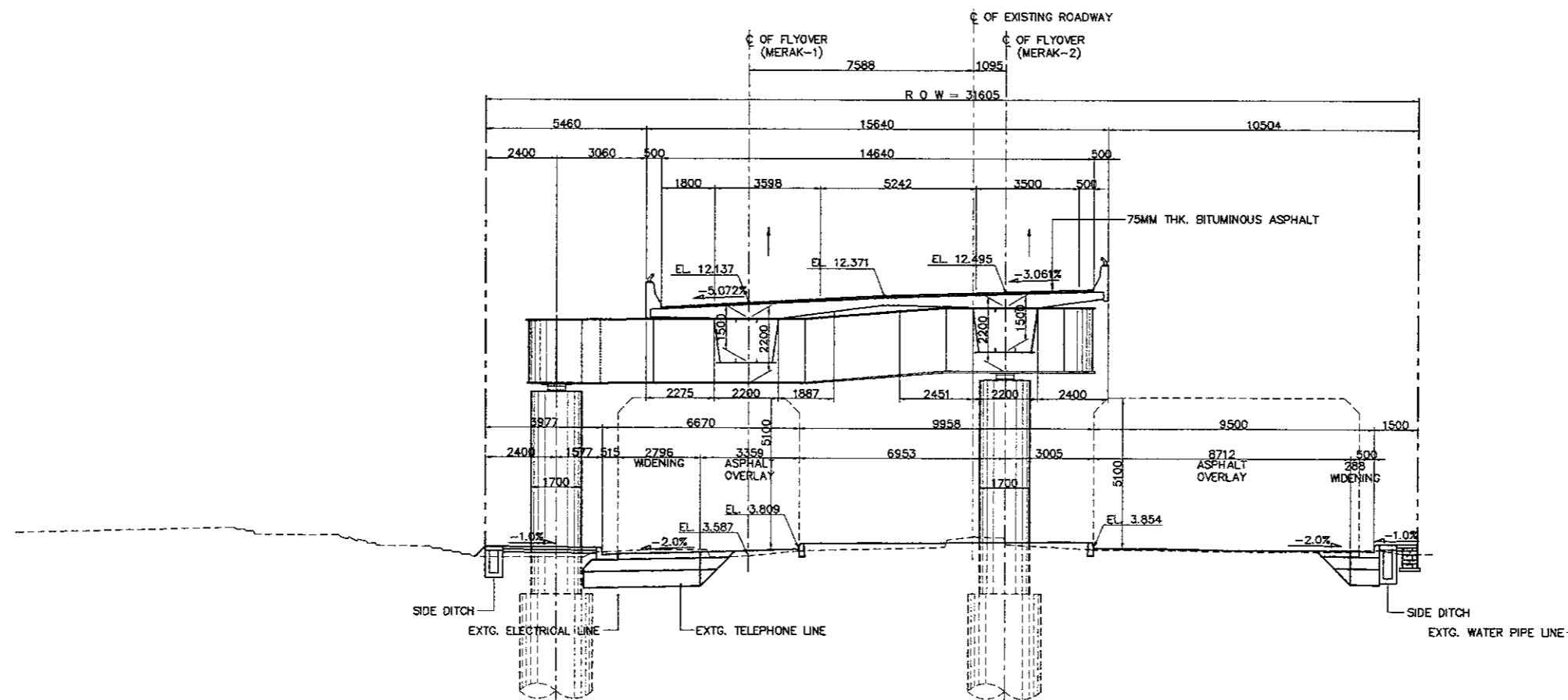


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Name	R. UENO	Name	T. OKUMURA	Name	M. KIUCHI
Sign		Sign		Sign	
Date		Date		Date	



2 P13-PB7 SECTION (STA. 1 + 147.50)-(STA. 0 + 458.490)  
 SCALE 1:200



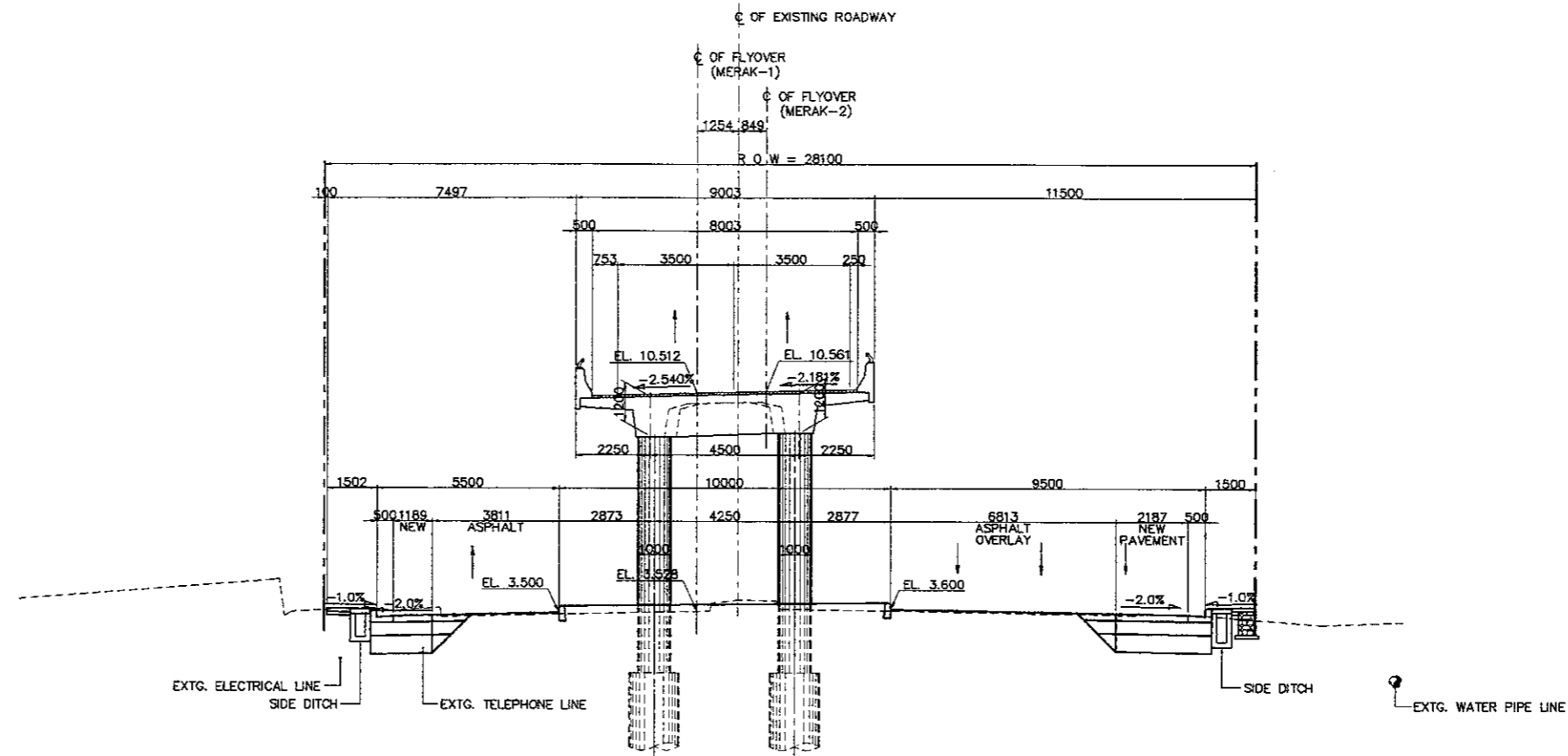
1 P12-PB6 SECTION (STA. 1 + 022.50)-(STA. 0 + 433.861)  
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NOTES:

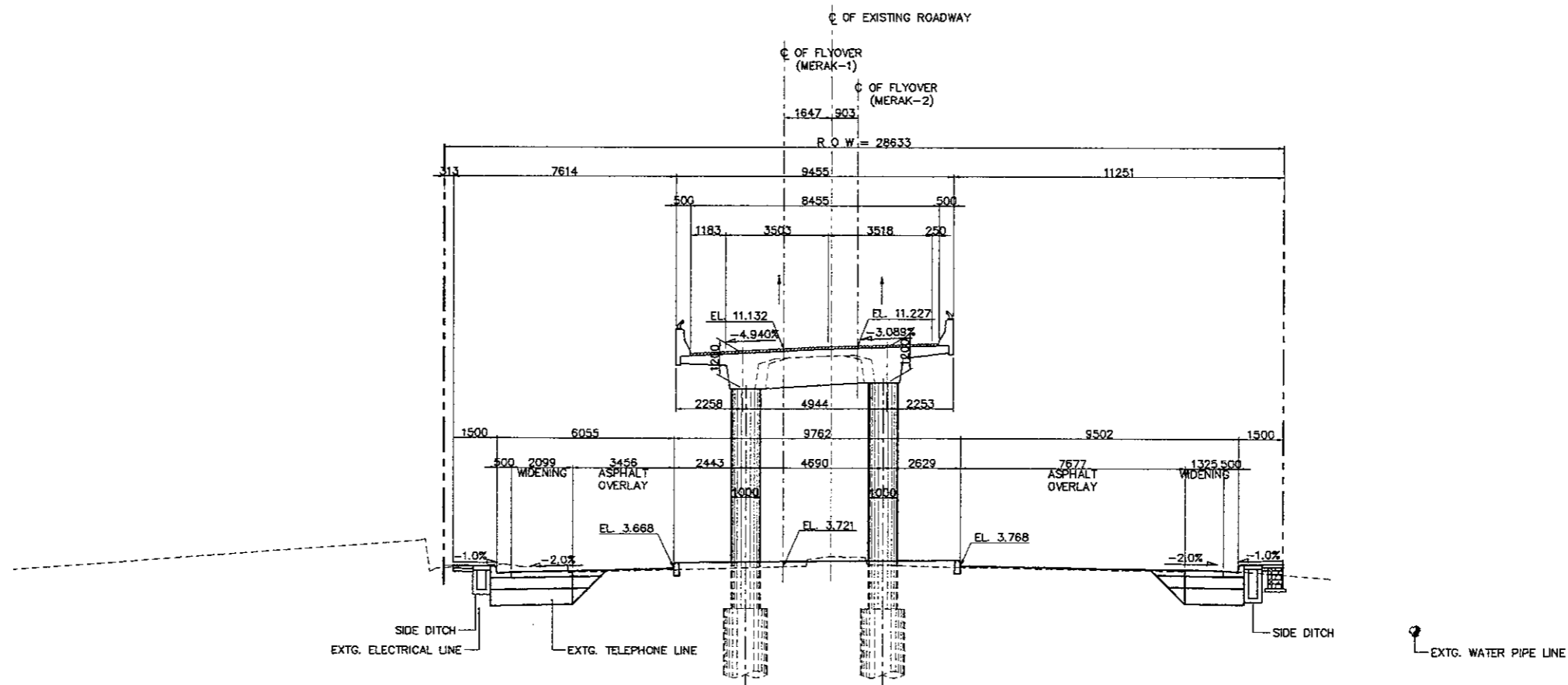
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Name	R. UENO	Name	T. OKUMURA	Name	M. KIUCHI
Sign		Sign		Sign	
Date		Date		Date	

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



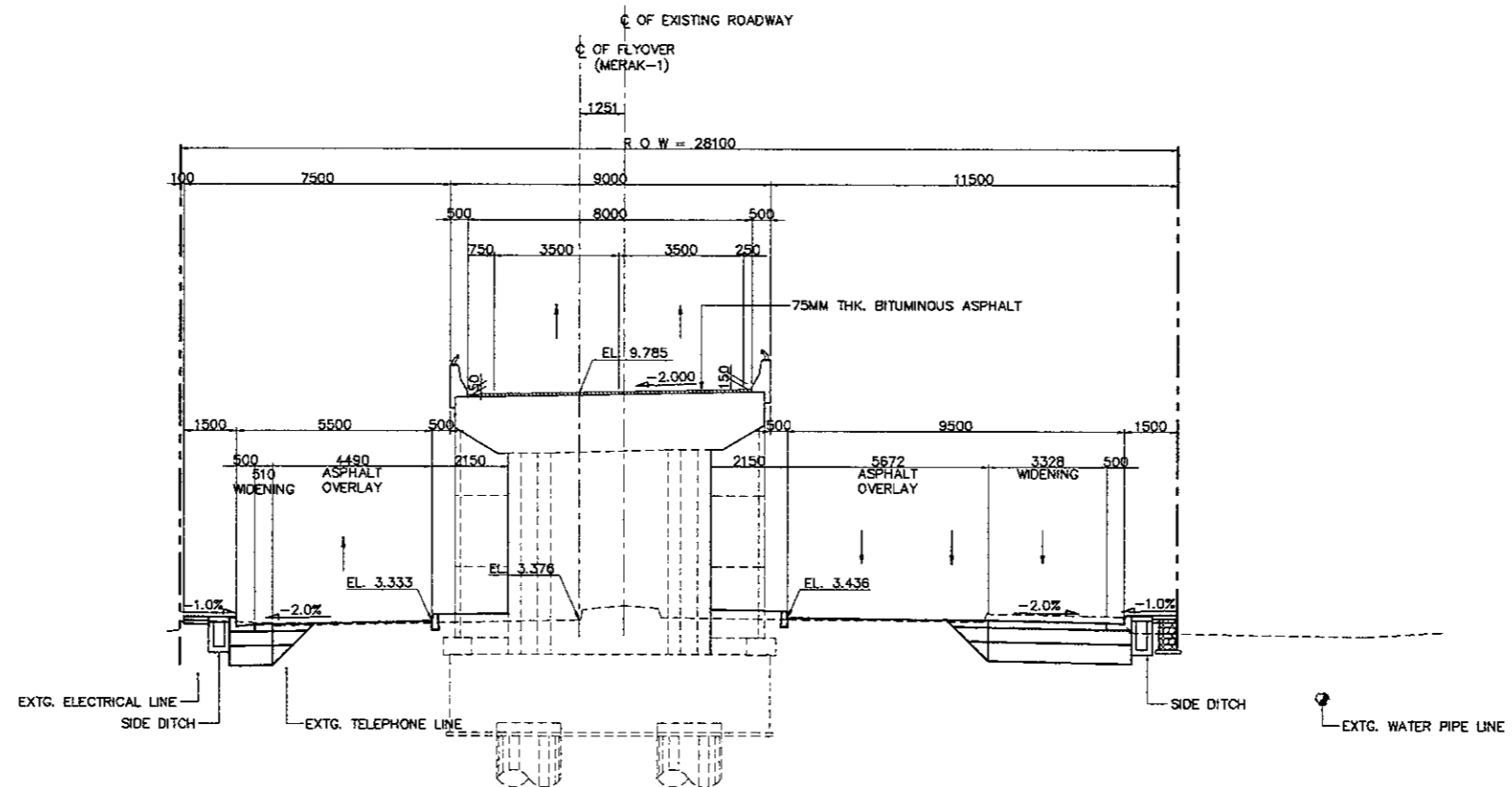
2 P15-PB9 SECTION (STA. 1 + 187.50)-(STA. 0 + 498.600)  
 SCALE 1:200



1 P14-PB8 SECTION (STA. 1 + 167.50)-(STA. 0 + 478.474)  
 SCALE 1:200

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Name	R. UENO	Name	T. OKUMURA	Name	M. KIUCHI
Sign		Sign		Sign	
Date		Date		Date	

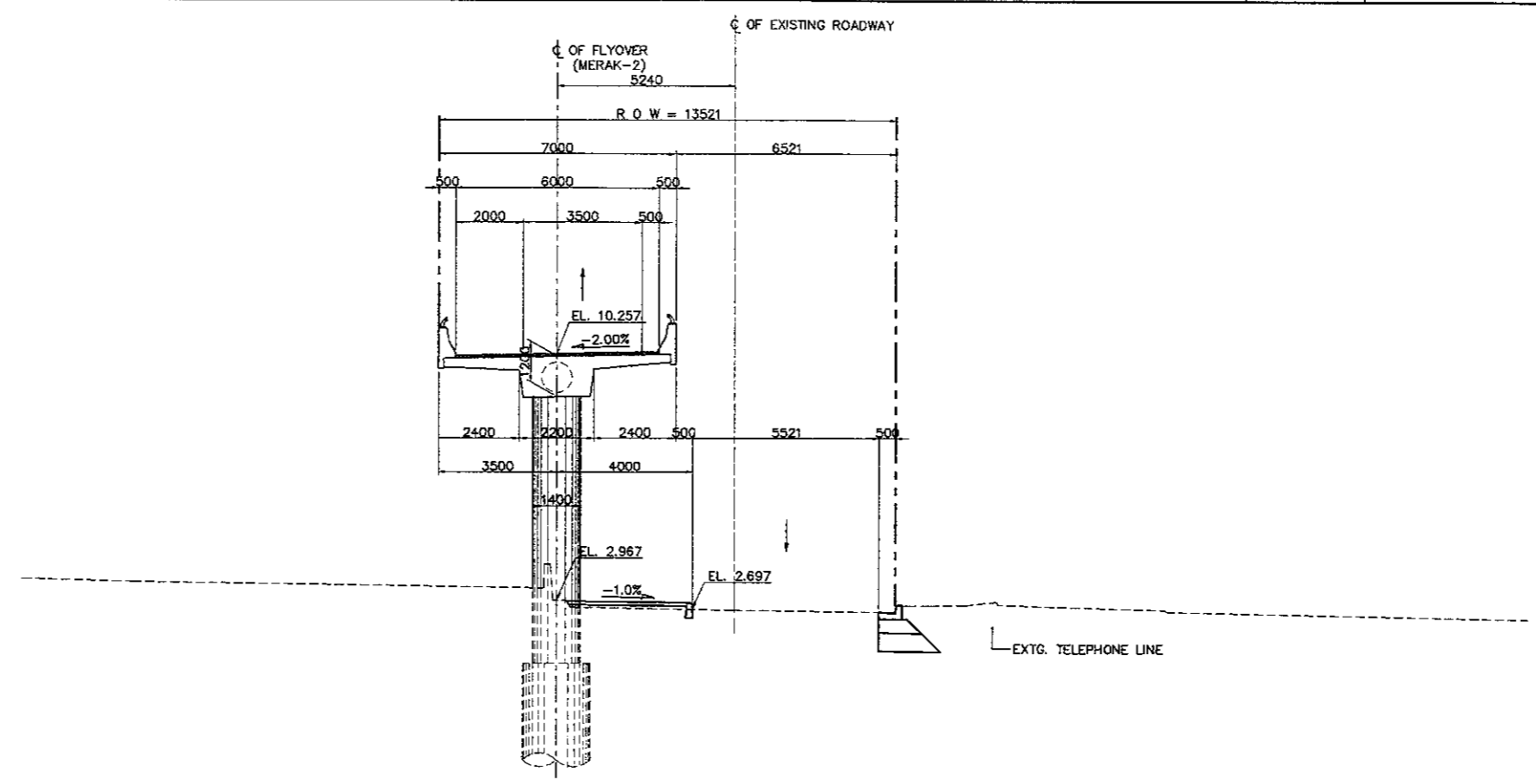


1 A2-AB2 SECTION (STA. 1 + 207.50)  
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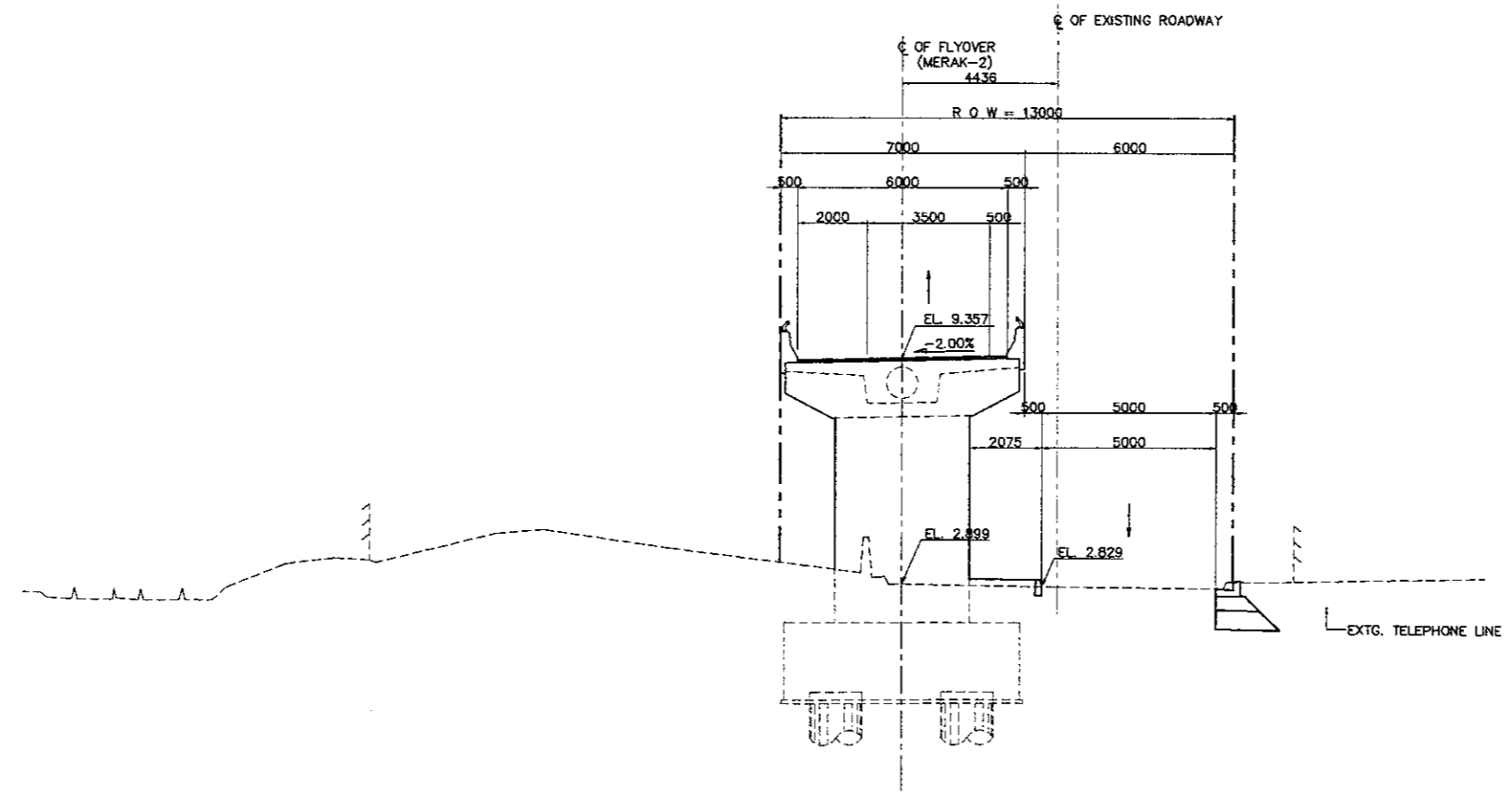
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Sign		Sign		Sign	
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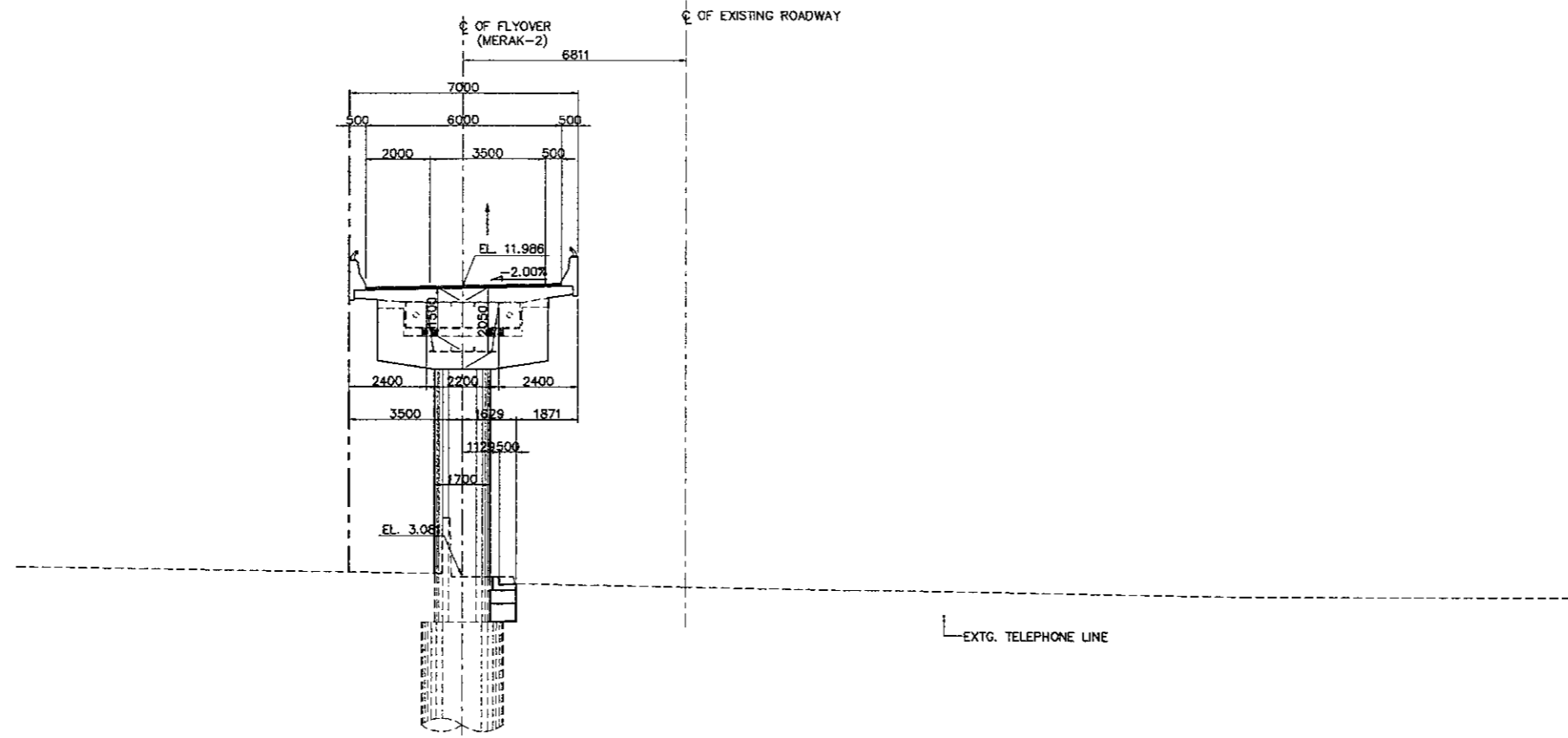
2 PB1 SECTION (STA. 0 + 308.861)  
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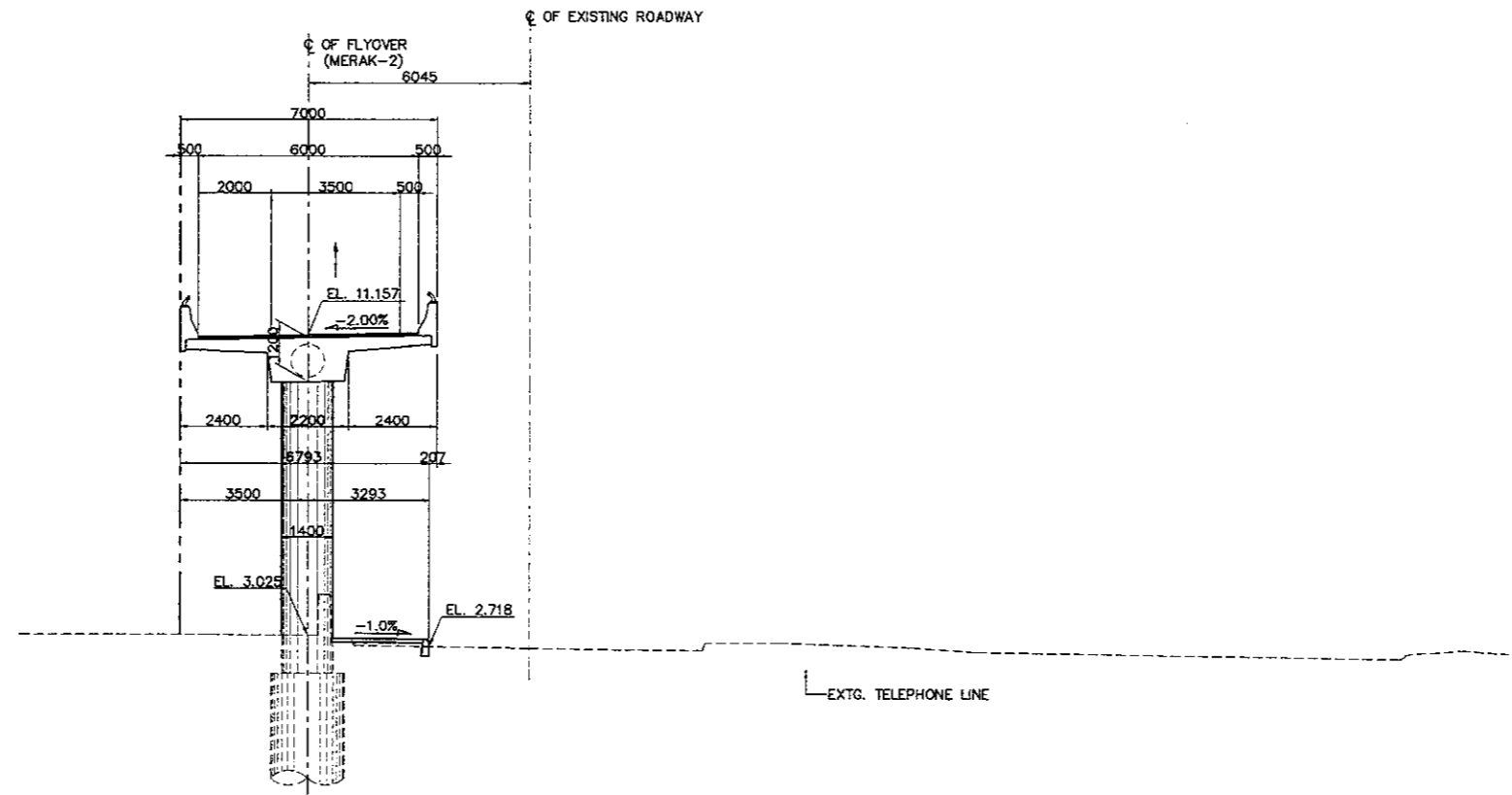
1 AB1 SECTION (STA. 0 + 288.861)  
 SCALE 1:200

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1. ALL DIMENSIONS AND ELEVATIONS SHALL BE VERIFIED DURING CONSTRUCTION.
  2. LOCATION OF EXISTING UTILITIES SHALL BE VERIFIED PRIOR TO CONSTRUCTION.
  3. FOR LOCATION AND INVERT ELEVATIONS OF DRAINAGE SYSTEM (DITCH AND RCP) REFER TO DRAINAGE DRAWINGS.

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



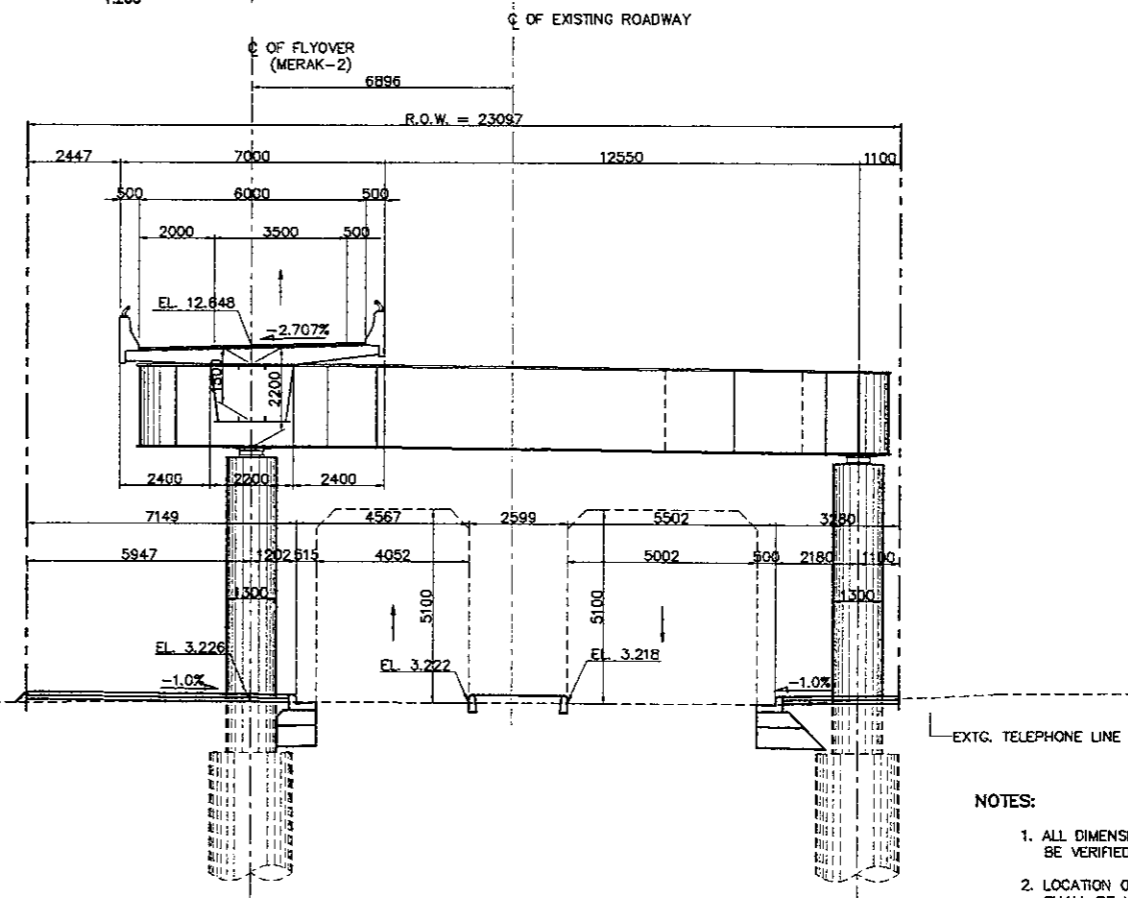
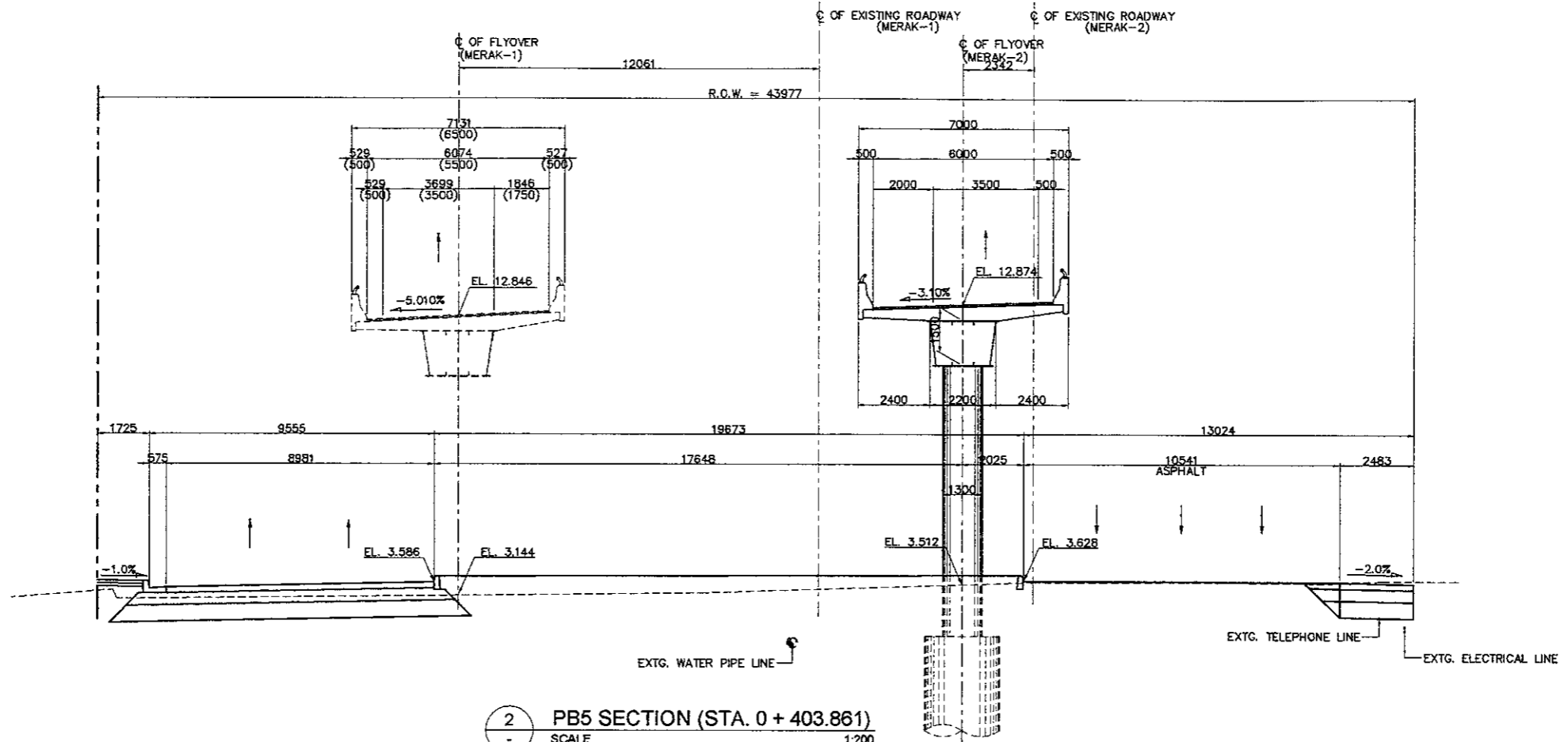
2 PB3 SECTION (STA. 0 + 348.861)  
 SCALE 1:200



1 PB2 SECTION (STA. 0 + 328.861)  
 SCALE 1:200

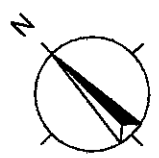
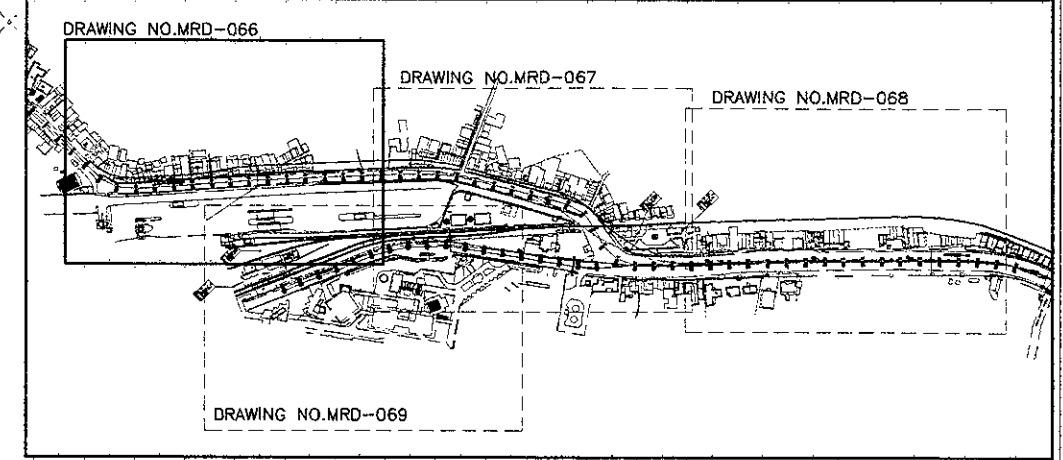
- NOTES:
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Name	R. UENO	Name	T. OKUMURA	Name	M. KIUCHI
Sign		Sign		Sign	
Date		Date		Date	

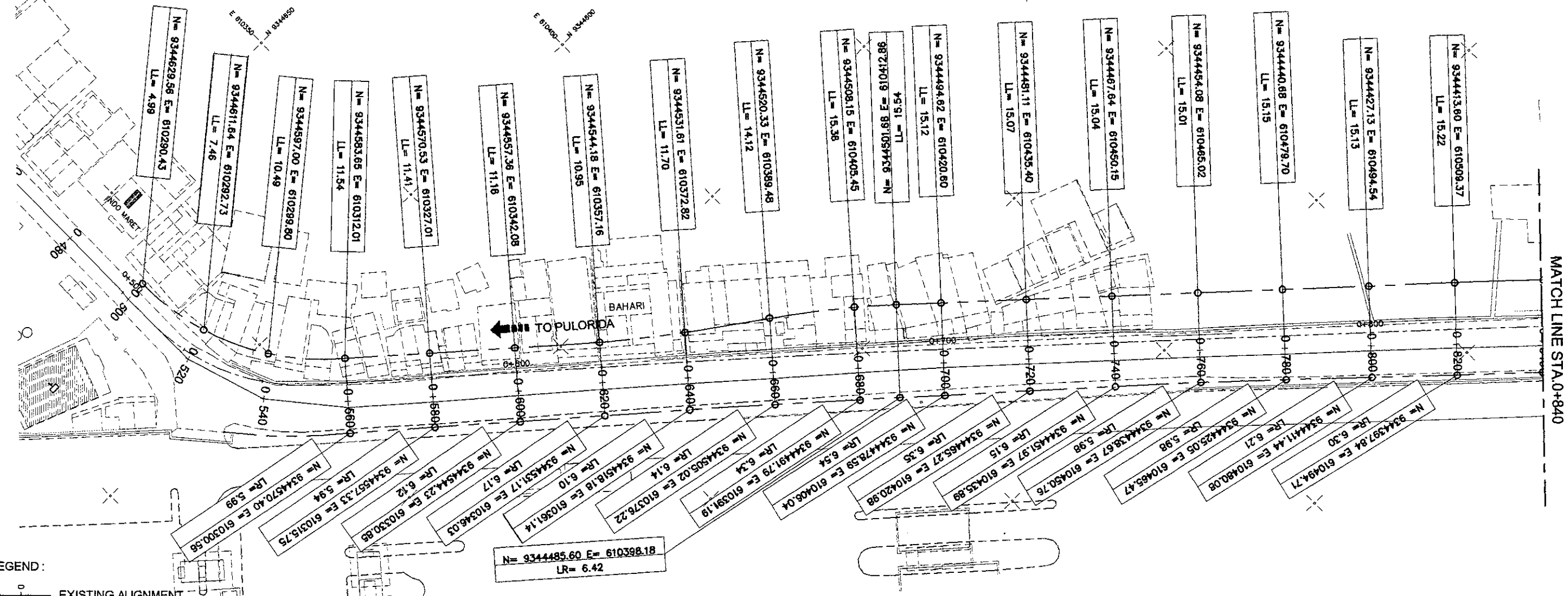


- NOTES:
1. ALL DIMENSIONS AND ELEVATIONS SHALL BE VERIFIED DURING CONSTRUCTION.
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Sign		Sign		Sign	
Date		Date		Date	



E 610500 N 9344350



LEGEND:  
 EXISTING ALIGNMENT  
 DESIGN ALIGNMENT

1 RIGHT-OF-WAY PLAN  
 SCALE 1:1000



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

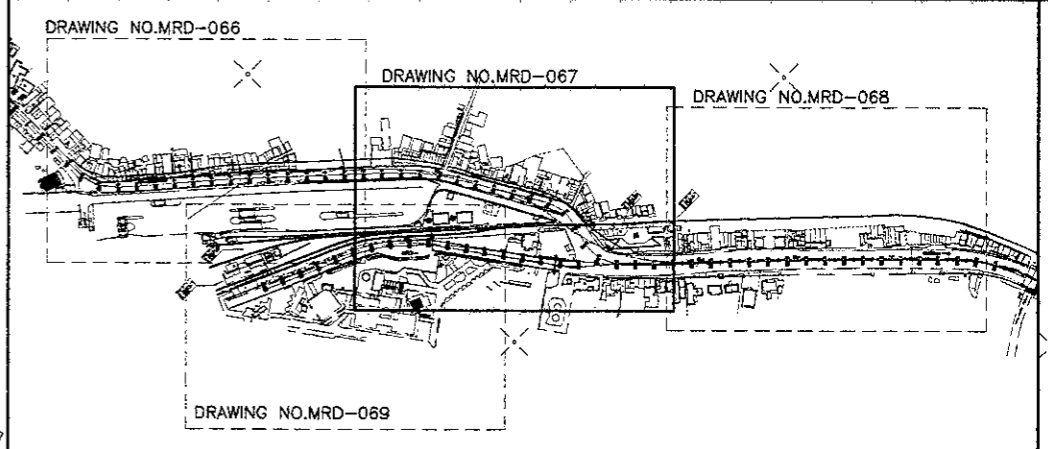
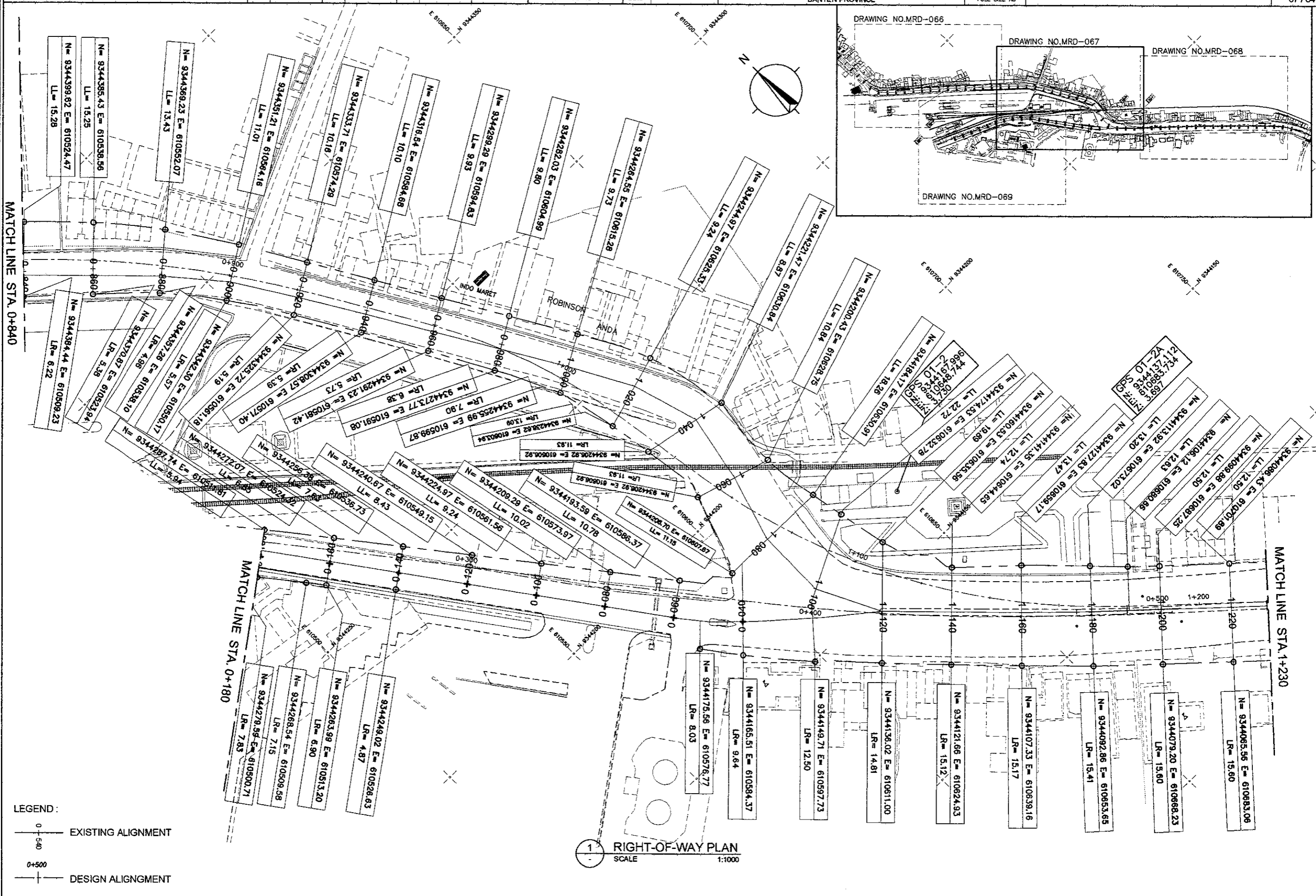
APPROVED BY  
Ir. HERRY VAZA M.Eng.Sc  
NIP. : 110038400

PROJECT AND LOCATION :  
DETAILED DESIGN STUDY OF  
NORTH JAVA CORRIDOR FLYOVER PROJECT  
MERAK FLYOVER - CONTRACT PACKAGE 1  
(MERAK - BALARAJA)  
BANTEN PROVINCE

SCALE :  
1 : 1000  
FULL SIZE A3

DRAWING TITLE :  
RIGHT-OF-WAY PLAN  
2 OF 4

DRAWING NO :  
MRD-067  
SHEET NO :  
67 / 84



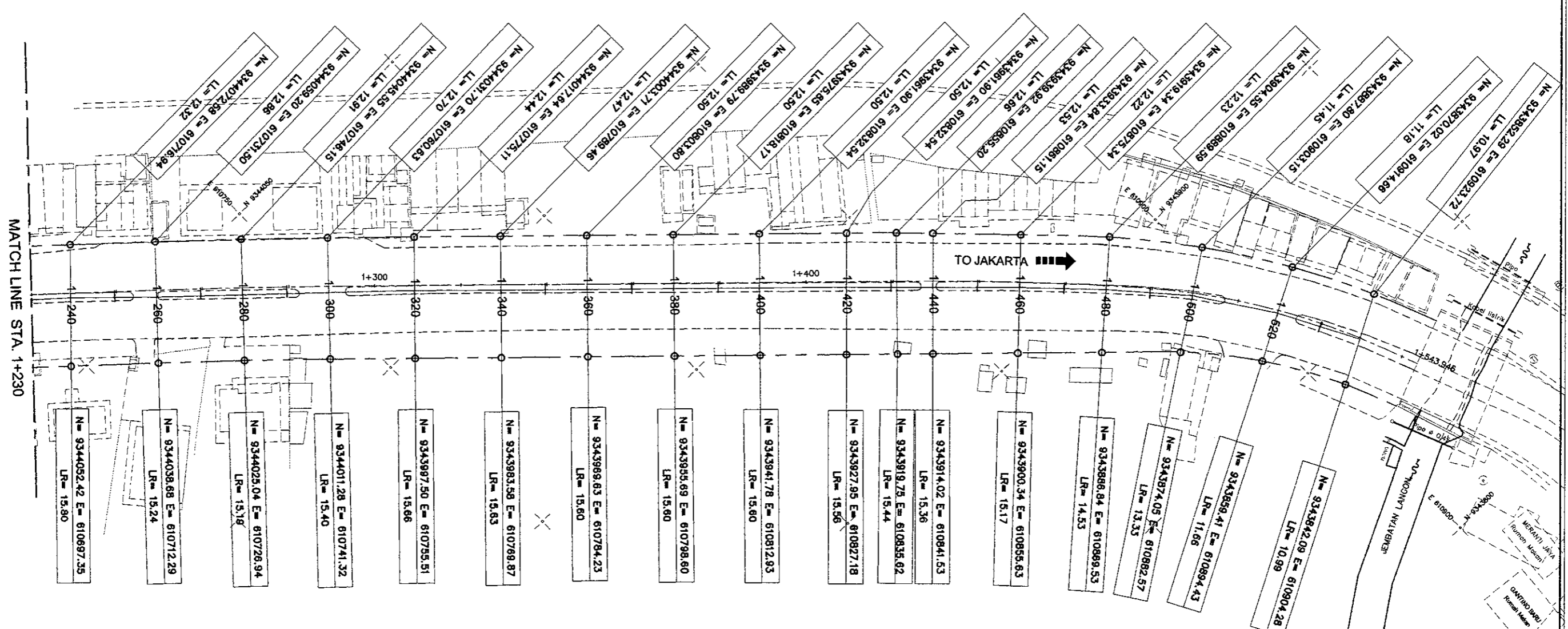
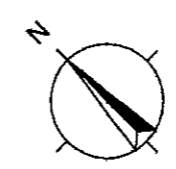
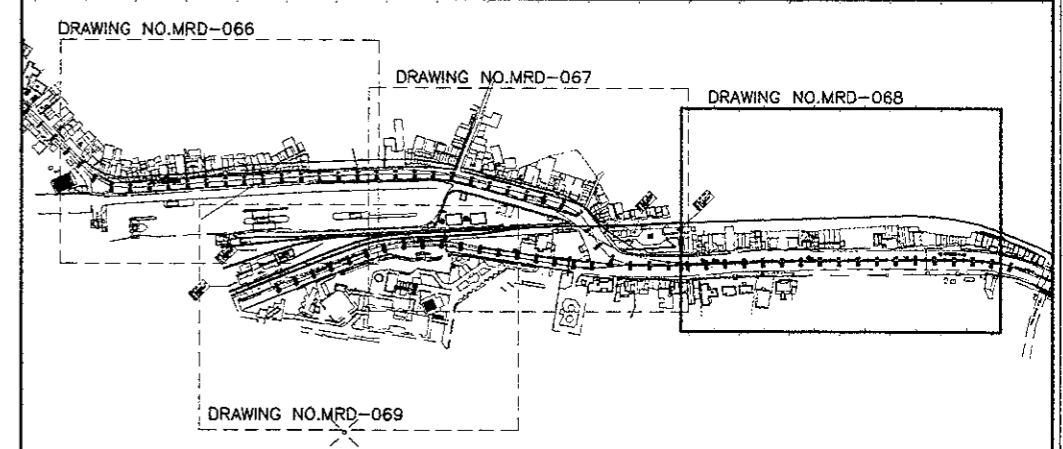
LEGEND :

0+540 ——— EXISTING ALIGNMENT

0+500 ——— DESIGN ALIGNMENT

RIGHT-OF-WAY 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: _____



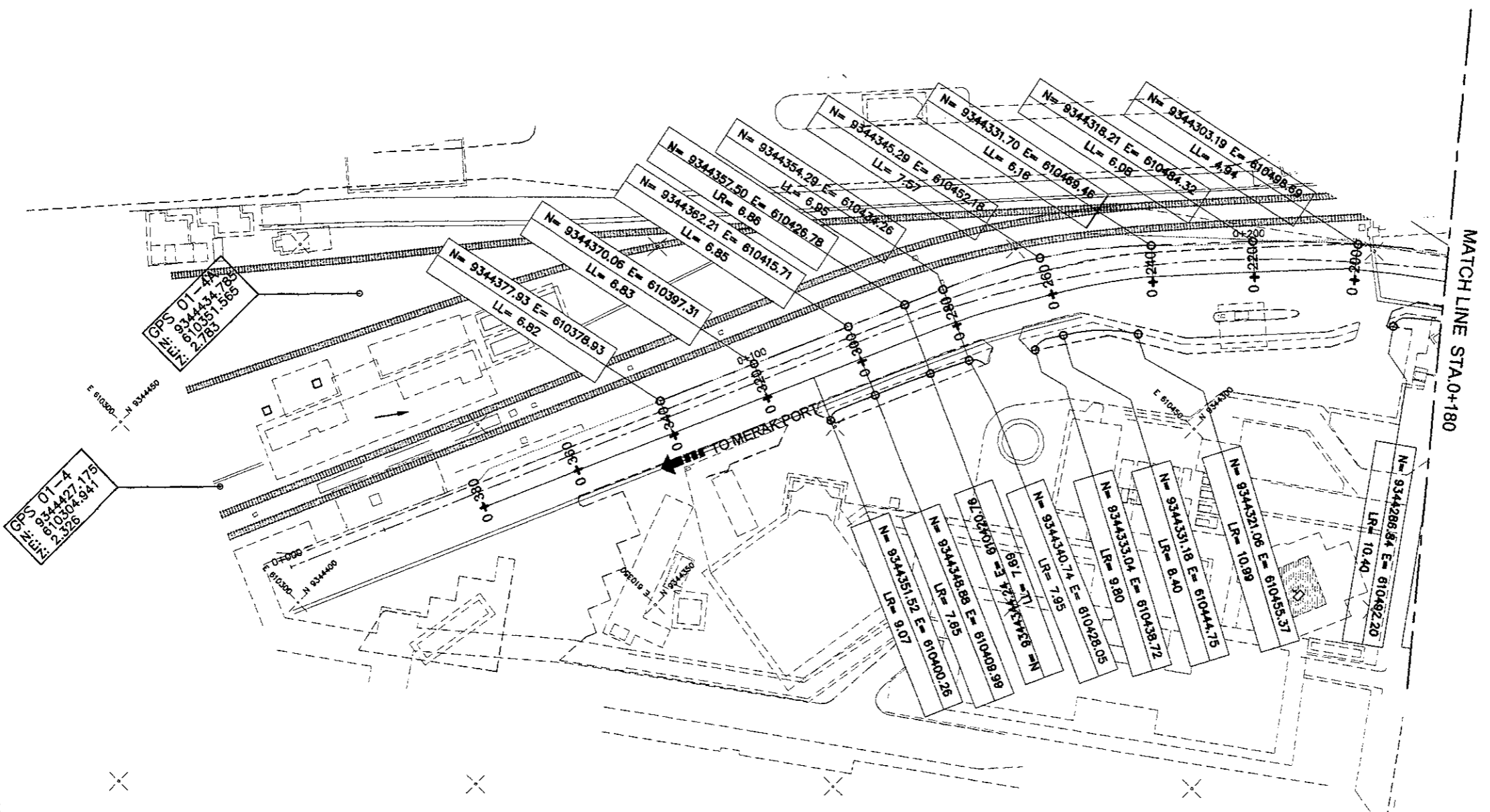
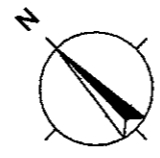
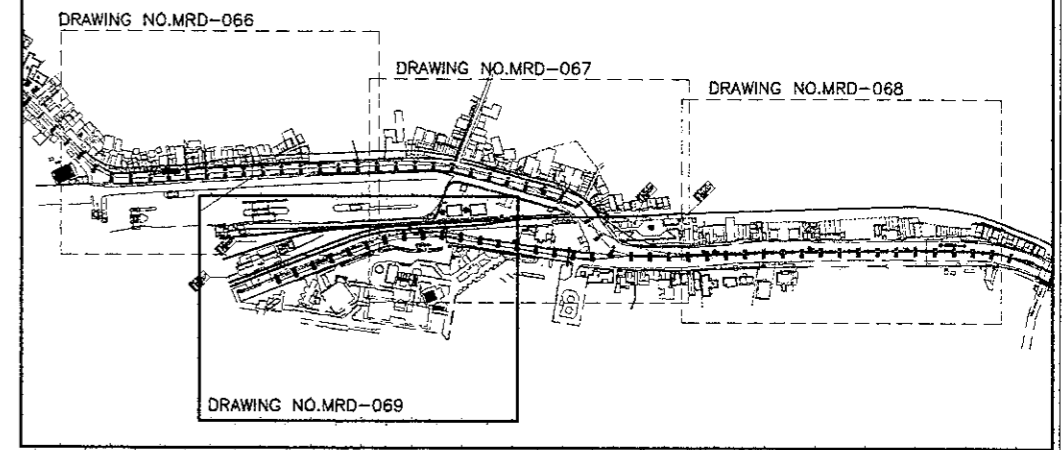
LEGEND :

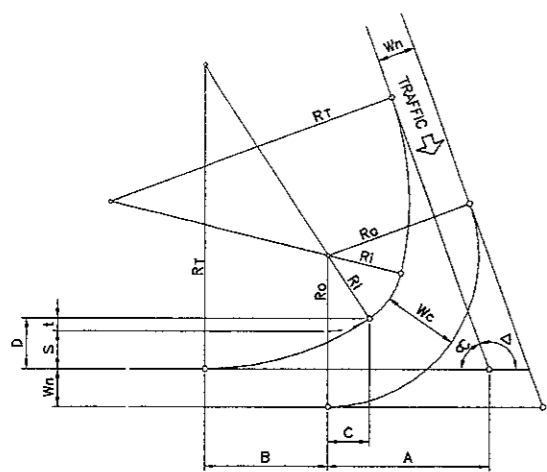
0+500 ——— EXISTING ALIGNMENT

0+500 ——— DESIGN ALIGNMENT

1 RIGHT-OF-WAY 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	





NOTES

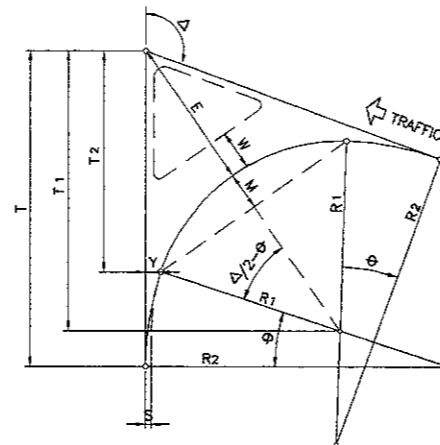
- RELATIVE PATHS OF RIGHT TURNING VEHICLES ARE IMAGINARY ONLY; OVERALL, THESE WILL DETERMINE THE CONFIGURATION OF CHANNELIZATION ISLANDS IN INTERSECTION DESIGN.
  - R<sub>0</sub> AS DEFINED BY CONDITION OBTAINING AND W<sub>c</sub> IN CONFORMANCE WITH DESIGN VEHICLES AND R<sub>0</sub>.
- ( ADOPTED FROM JAPANESE STANDARDS )  
 AND/OR "GEOMETRIC JALAN PERKOTAAN" RSN T-14-2004

WHERE

W<sub>n</sub> = LANE WIDTH (NORMAL)  
 W<sub>c</sub> = LANE WIDTH (TURNING)  
 Δ = INTERSECTION ANGLE  
 R<sub>0</sub> = OUTER RADIUS  
 R<sub>i</sub> = INNER RADIUS  
 R<sub>T</sub> = TRANSITION RADIUS  
 α = 180° - Δ

FORMULAS

R<sub>i</sub> = R<sub>0</sub> - W<sub>c</sub>  
 R<sub>T</sub> = nR<sub>i</sub> (n=3)  
 S = W<sub>c</sub> - W<sub>n</sub>  
 t = S / (n-1)  
 A = (R<sub>i</sub> + S) cot αC / 2  
 B = √[2 (R<sub>T</sub> - R<sub>i</sub>) S - S<sup>2</sup>]  
 C = B / (n-1)  
 D = S + t



NOTES

- FORMULAS DERIVED BELOW ARE FOR FIELD LAYOUT PURPOSE ( DRAWING LAYOUT BY GRAPHICAL SOLUTION ONLY. )
- DESIGN RADII ( R<sub>1</sub>, R<sub>2</sub> & R<sub>3</sub> ) AND OFFSET S AS WELL AS LANE WIDTH W ( WHERE CORNER ISLANDS ARE REQUIRED UNDER CONDITIONS OBTAINING )

WHERE

Δ = INTERSECTION ANGLE  
 R<sub>1</sub> = INNER RADIUS  
 R<sub>2</sub> = TRANSITION RADIUS  
 S = OFFSET OF INNER CIRCULAR CURVE FROM TANGENTS

FORMULAS

T<sub>1</sub> = (R<sub>1</sub> + S) TAN Δ/2  
 T = T<sub>1</sub> + (R<sub>2</sub> - R<sub>1</sub>) SIN θ  
 T<sub>2</sub> = T<sub>1</sub> - R<sub>1</sub> SIN θ  
 Y = (R<sub>1</sub> + S) - R<sub>1</sub> COS θ  
 E = (R<sub>1</sub> + S) / COS Δ/2 - R<sub>1</sub>  
 M = R<sub>1</sub> - R<sub>1</sub> COS (Δ/2 - θ)  
 θ = COS<sup>-1</sup> ( (R<sub>2</sub> - R<sub>1</sub> - S) / (R<sub>2</sub> - R<sub>1</sub>) )

WHERE

R<sub>i</sub> = RADIUS OF INTERMEDIATE CIRCULAR ARC  
 R<sub>2</sub> = RADIUS OF CIRCULAR ARC ON APPROACH LEG (1.5 x R<sub>i</sub>)  
 R<sub>3</sub> = RADIUS OF CIRCULAR ARC ON DEPARTURE LEG (3 x R<sub>i</sub>)  
 S = OFFSET OF INNER CIRCULAR CURVE FROM TANGENTS  
 Δ = INTERSECTION ANGLE

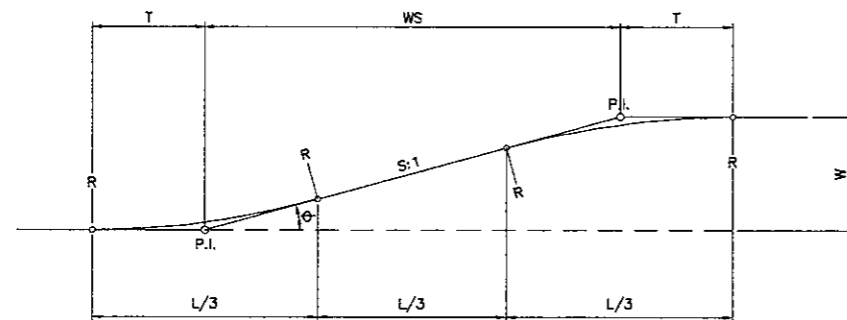
FORMULAS

θ<sub>A</sub> = COS<sup>-1</sup> [ (R<sub>2</sub> - (R<sub>1</sub> + S)) / (R<sub>2</sub> - R<sub>1</sub>) ]  
 θ<sub>B</sub> = COS<sup>-1</sup> [ (R<sub>3</sub> - (R<sub>1</sub> + S)) / (R<sub>3</sub> - R<sub>1</sub>) ]  
 T<sub>1</sub> = (R<sub>1</sub> + S) TAN Δ/2  
 T<sub>A</sub> = T<sub>1</sub> + (R<sub>2</sub> - R<sub>1</sub>) SIN θ<sub>A</sub>  
 T<sub>B</sub> = T<sub>1</sub> + (R<sub>3</sub> - R<sub>1</sub>) SIN θ<sub>B</sub>  
 t<sub>A</sub> = T<sub>1</sub> - R<sub>1</sub> SIN θ<sub>A</sub> = T<sub>A</sub> - R<sub>2</sub> SIN θ<sub>A</sub>  
 t<sub>B</sub> = T<sub>1</sub> - R<sub>1</sub> SIN θ<sub>B</sub> = T<sub>B</sub> - R<sub>3</sub> SIN θ<sub>B</sub>  
 Y<sub>A</sub> = (R<sub>1</sub> + S) - R<sub>1</sub> COS θ<sub>A</sub>  
 Y<sub>B</sub> = (R<sub>1</sub> + S) - R<sub>1</sub> COS θ<sub>B</sub>

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



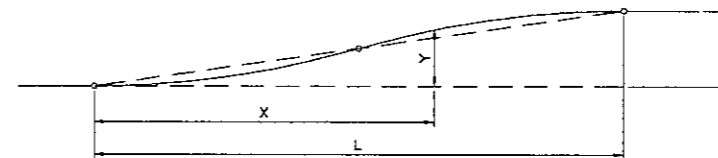
FORMULAS

θ = TAN<sup>-1</sup> 1/S (TAPER RATE S:1)  
 T = WS / (3 COS θ + 1)  
 L/3 = T (COS θ + 1)  
 R = T / TAN θ/2  
 APPROX.  
 T = L/6  
 θ = TAN<sup>-1</sup> 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

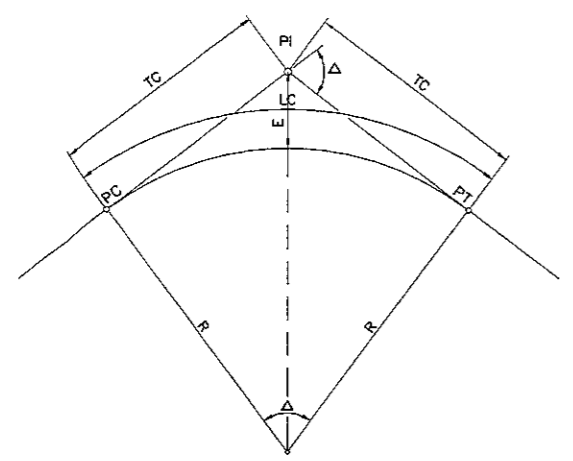
L = LENGTH OF FLARE  
 W = WIDENING (MAX. OFFSET)  
 S = TAPER RATE (HOR:VER)  
 X = DISTANCE ALONG BASELINE  
 Y = OFFSET FROM BASELINE

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

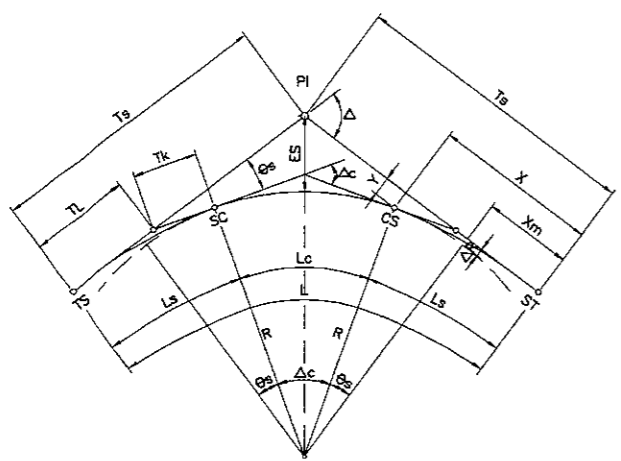
**FORMULAS**

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

**1 HORIZONTAL CURVE (CIRCULAR)**  
 NOT TO SCALE

**NOTE**

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

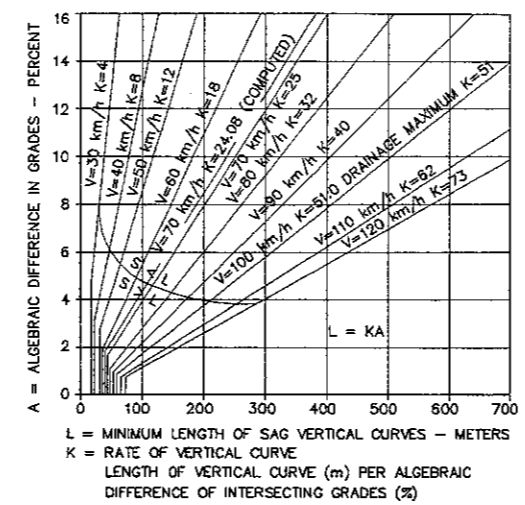


**WHERE**

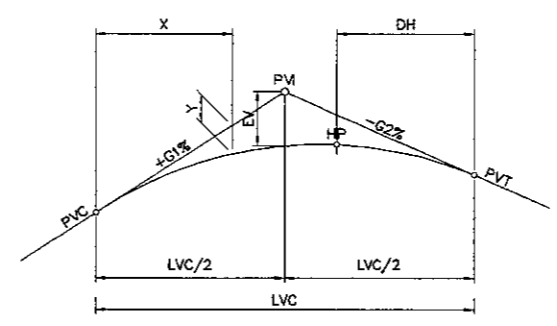
PI = POINT OF INTERSECTION  
 Δ = INTERSECTION ANGLE  
 R = CURVE RADIUS  
 Es = EXTERNAL DISTANCE  
 Ls = LENGTH OF SPIRAL  
 A = PARAMETER OF CLOTHOID  
 θs = SPIRAL ANGLE  
 X, Y = COORDINATES OF POINTS SC AND CS WITH RESPECT TO MAIN TANGENTS  
 ΔR = OFFSET BETWEEN CIRCULAR CURVE AND MAIN TANGENT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

Ts = TOTAL TANGENT DISTANCE  
 Ll = 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



**3 DESIGN CONTROLS FOR VERTICAL CURVES**  
 NOT TO SCALE



**WHERE**

PVI = 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  
 NO = 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

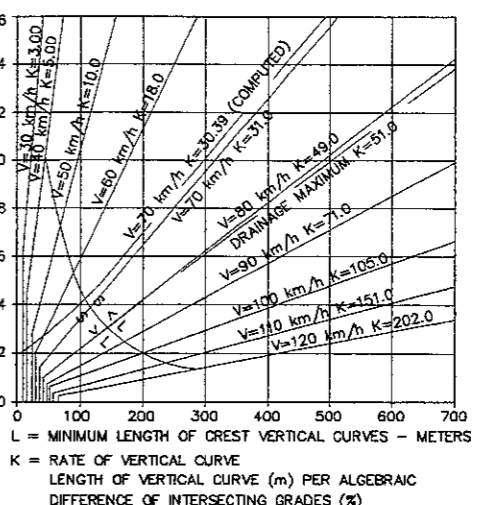
**FOR SYMMETRICAL VERTICAL PARABOLIC CURVES**

$EV = \frac{(G1-G2)}{100} \cdot \frac{L}{8}$

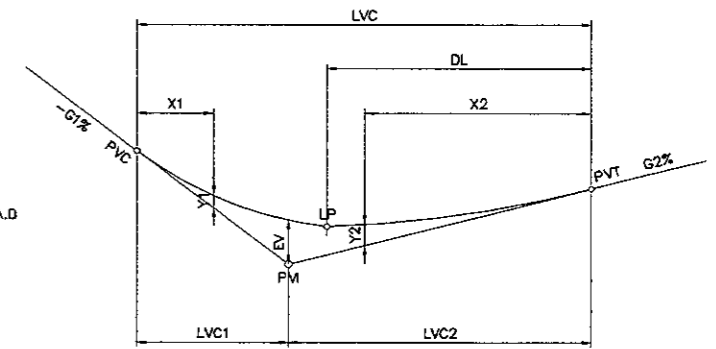
$Yx = \frac{(G1-G2)}{100} \cdot \frac{x^2}{2LVC}$

$DH = \frac{G \cdot VC}{(G1-G2)}$  (WHERE G IS THE LESSER GRADE)

**4 VERTICAL PARABOLIC CURVE (SYMMETRICAL)**  
 NOT TO SCALE



**5 VERTICAL PARABOLIC CURVE (ASYMMETRICAL)**  
 NOT TO SCALE



**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**

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

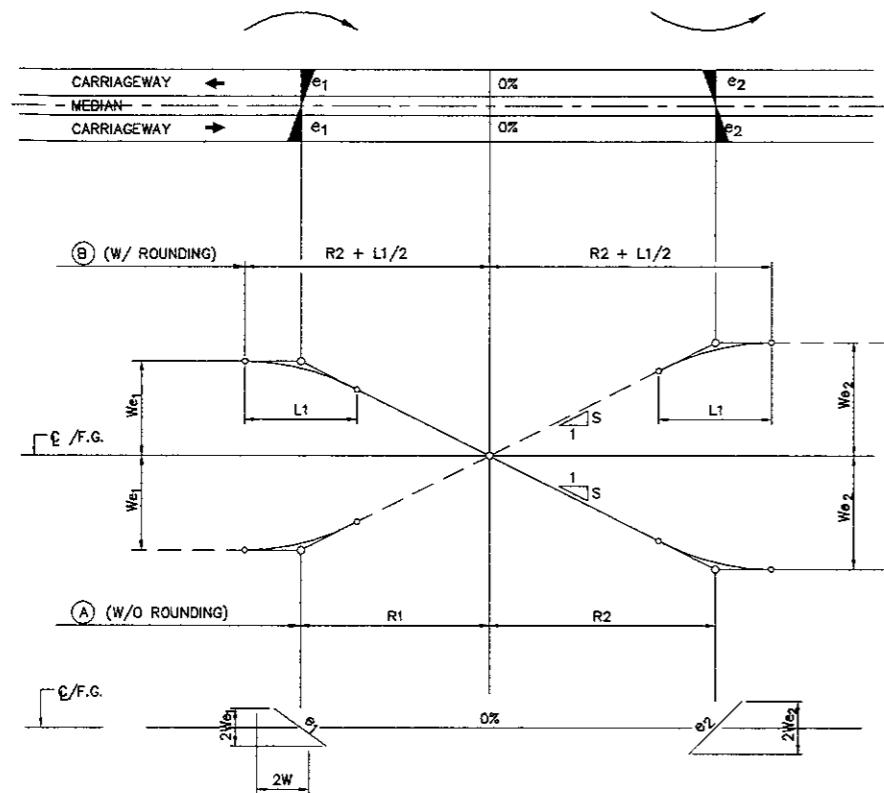
$Y1 = \frac{x1^2}{L1^2} \cdot EV$

$DL = \frac{G2 \cdot L2}{L1} \cdot K$

$K = \frac{L}{G1+G2}$

**NOTES :**

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



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

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

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

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

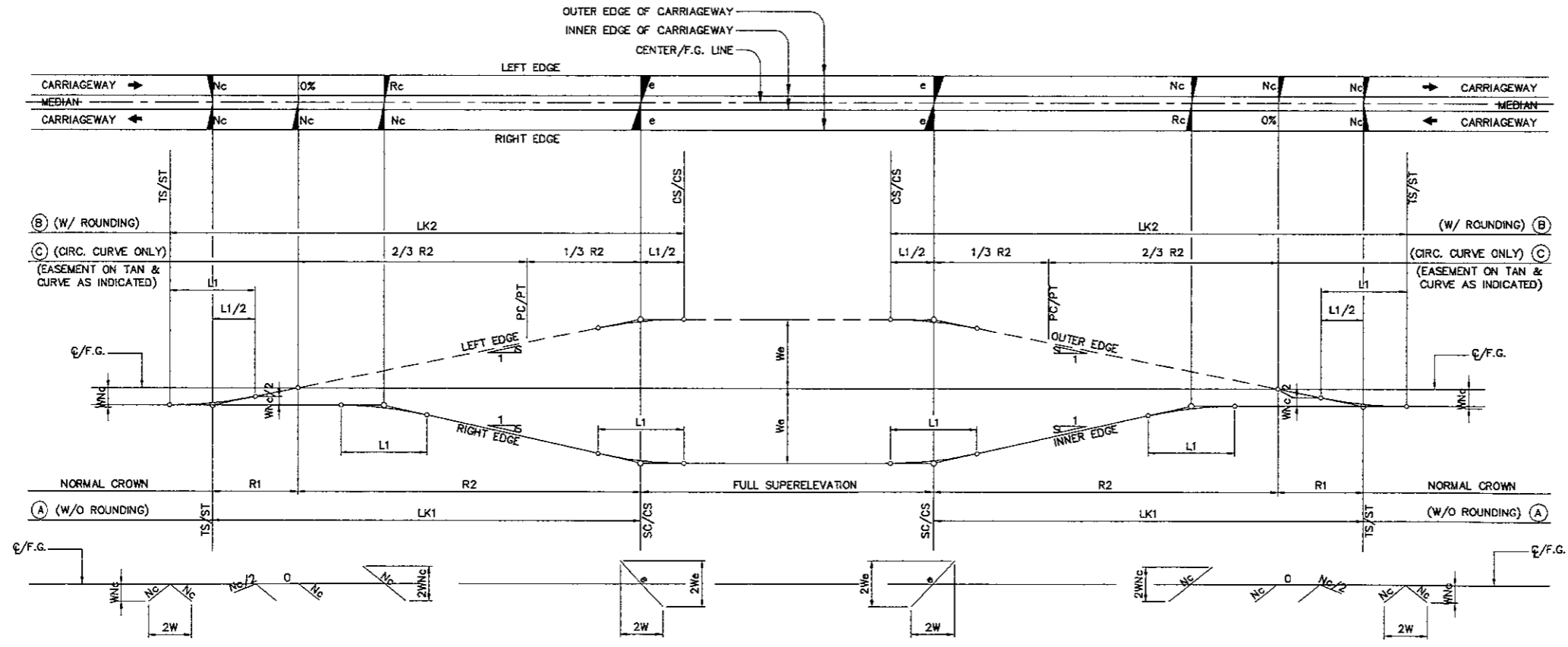
MERAK FLYOVER PIER			
STATION	SUPERELEVATION		
	LEFT	RIGHT	
AB-1	0+288.861	-2.000	-2.000
PB-1	0+308.861	-2.000	-2.000
PB-2	0+328.861	-2.000	-2.000
PB-3	0+348.861	-2.000	-2.000
PB-4	0+373.861	-2.707	2.707
PB-5	0+403.861	-3.100	3.100

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

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

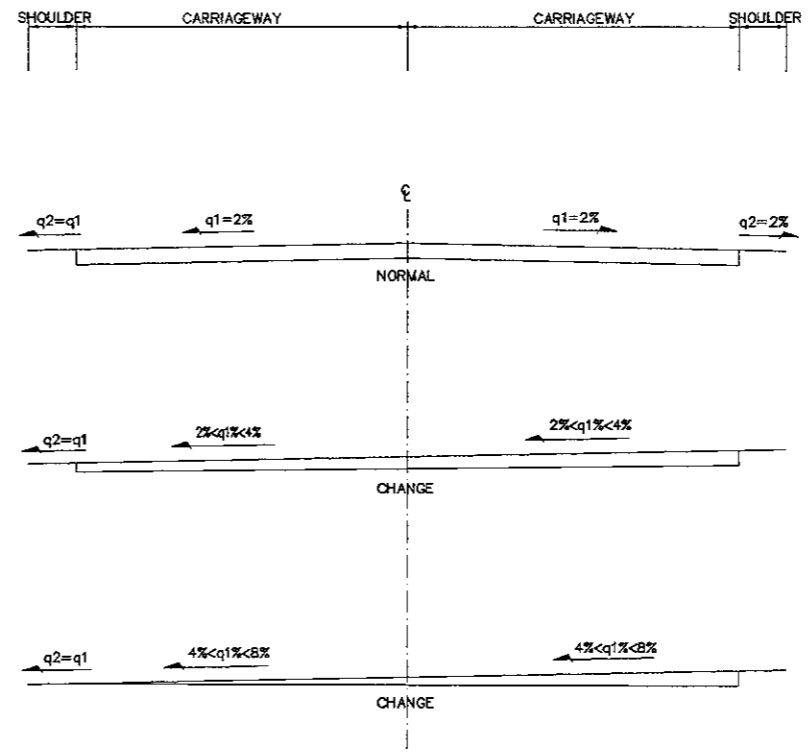
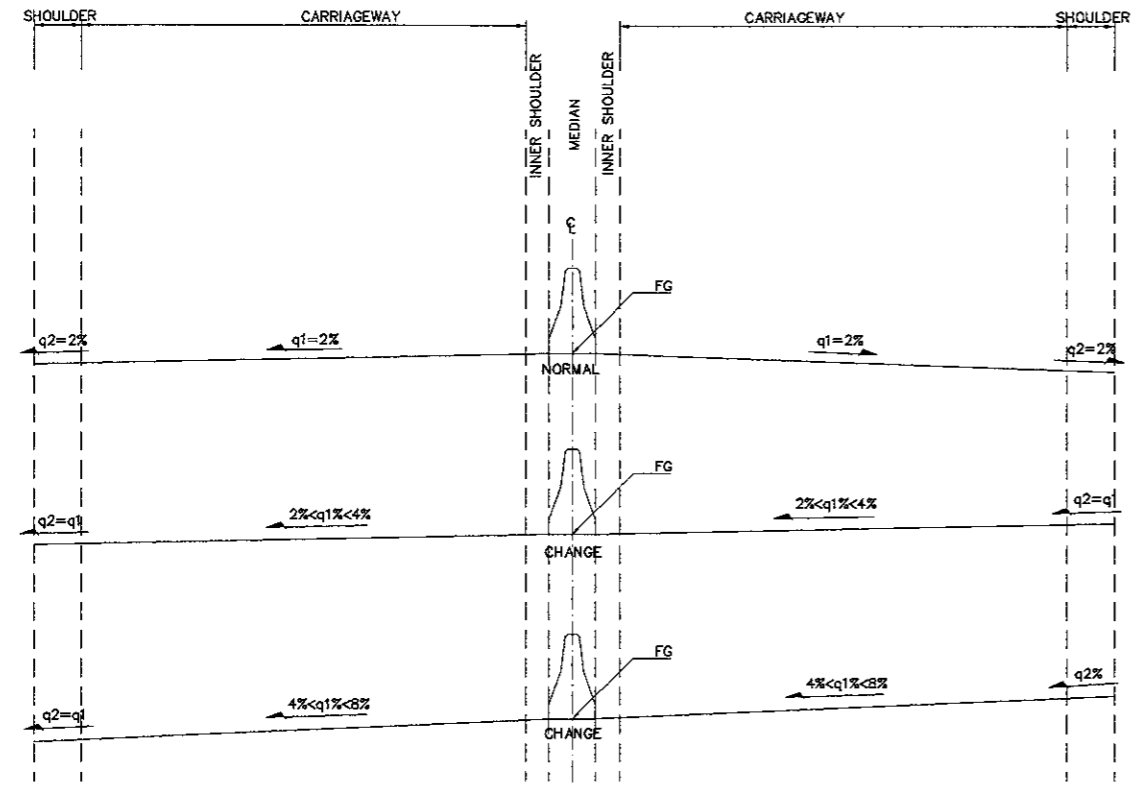
$$R2 = \frac{We}{S}$$

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

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

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

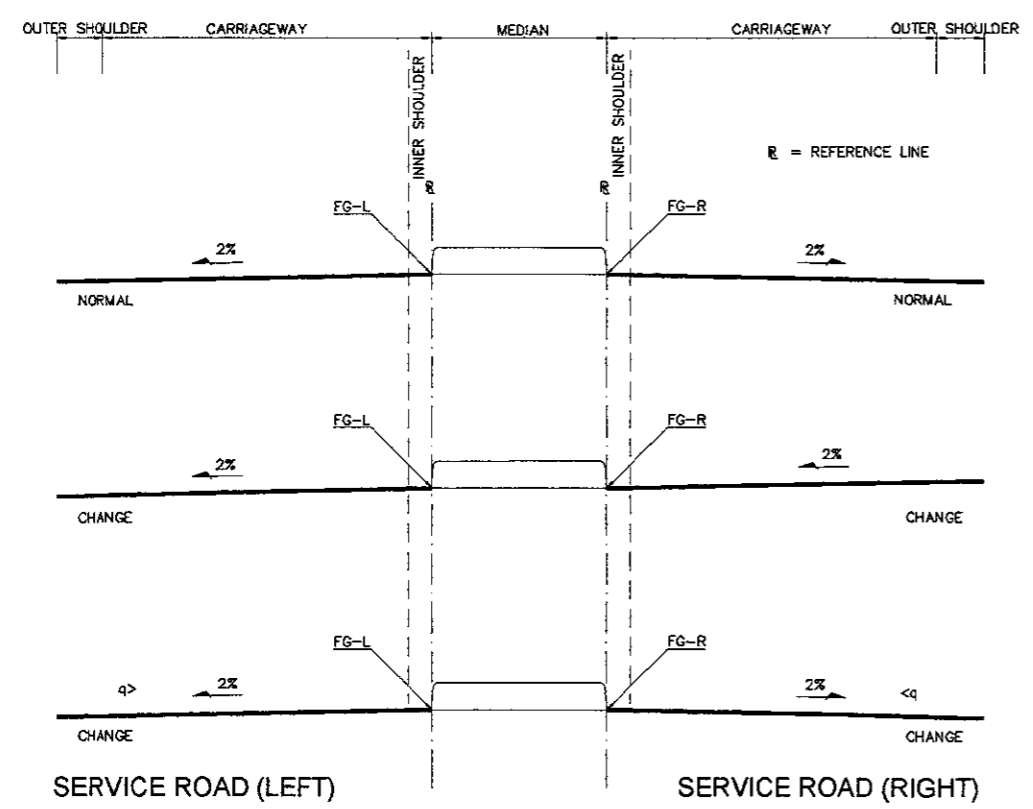
1  
 NOT TO SCALE  
 SUPERELEVATION TRANSITION FLYOVER



STATION	SUPER ELEVATION		
	FG	LEFT	RIGHT
0+700.00	4.765	-2.000	2.000
0+800.00	7.250	-2.000	2.000
0+840.00	9.050	3.071	-3.071
0+900.00	11.414	4.600	14.600
0+940.00	12.206	5.228	-5.228
1+000.00	12.470	5.280	-5.280
1+040.00	12.590	-0.600	0.600
1+080.00	12.590	-5.600	5.600
1+100.00	12.437	1.700	5.600
1+180.00	10.757	2.500	3.440
1+200.00	10.070	2.500	2.000
1+300.00	5.690	2.463	2.000
1+400.00	2.673	-2.000	2.000

1 MAIN ROAD / FLYOVER  
 NOT TO SCALE

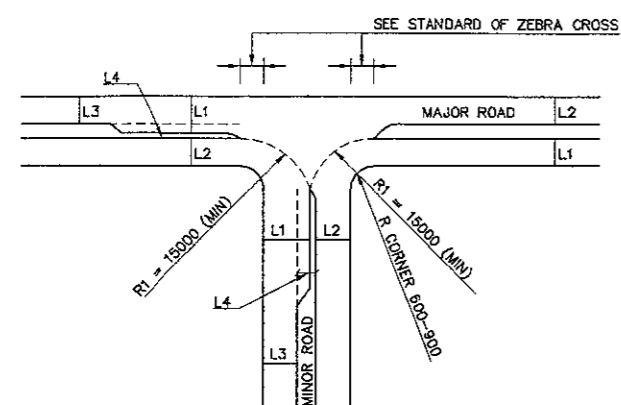
2 SUPERELEVATED ( EXISTING 2-LANE, 2-WAY )  
 NOT TO SCALE



R (m)	Vd = 40 km/hr			Vd = 50 km/hr			Vd = 60 km/hr				
	e (%)	L (m)		e (%)	L (m)		e (%)	L (m)			
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								

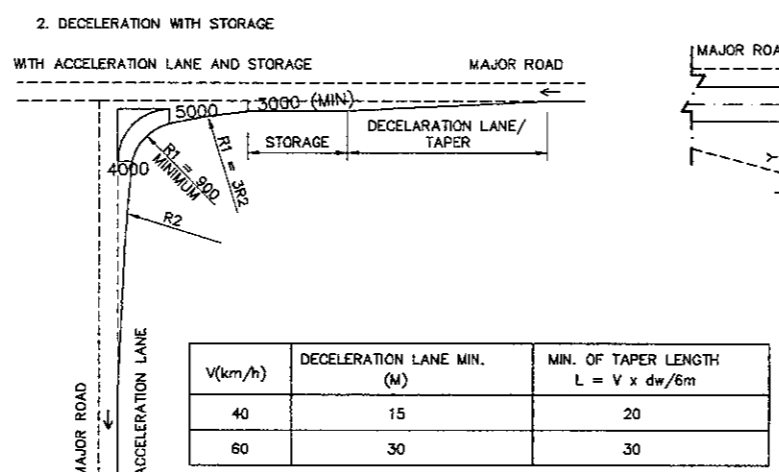
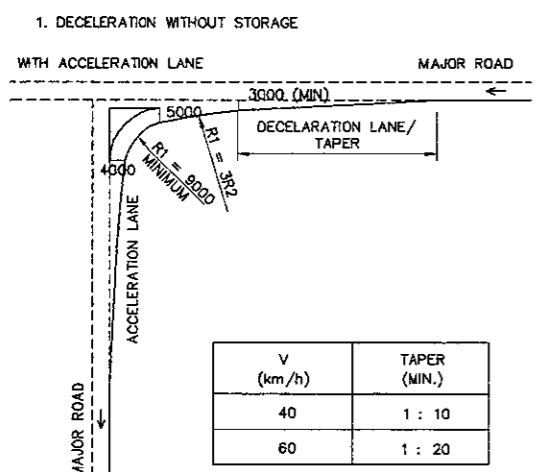
WHERE :

- $e_{max} = 6\%$
- 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

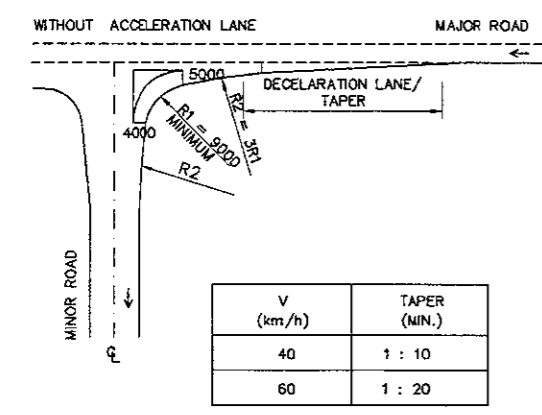


NOTES : - L1 (WITHOUT TRAFFIC LIGHT) BASED FROM CAPACITY OF INTERSECTION  
 L1 (WITH TRAFFIC LIGHT) BASED FROM CAPACITY OF TRAFFIC LIGHT ANALYSIS  
 - MINIMUM ABSOLUTE WIDTH L4 = 2.75 M  
 OR : L4 = L1 - L3 >= 2.75 M

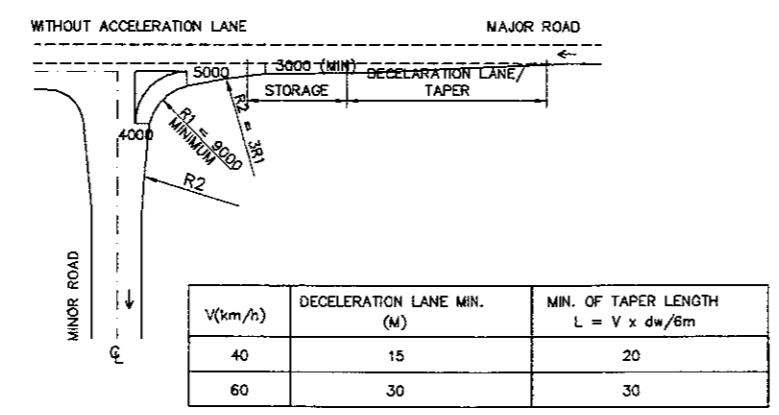
**A. TYPICAL OF THREE LEGS INTERSECTION**



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

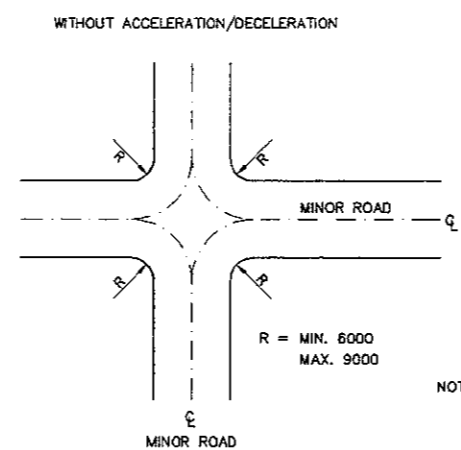


- R MIN. CALCULATED BASED ON SINGLE UNIT TRUCK  
 - FOR SPECIAL DESIGN, SEE STANDARD OF GEOMETRIC DESIGN

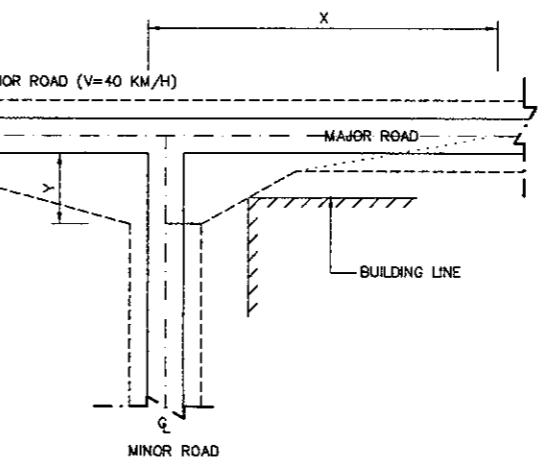
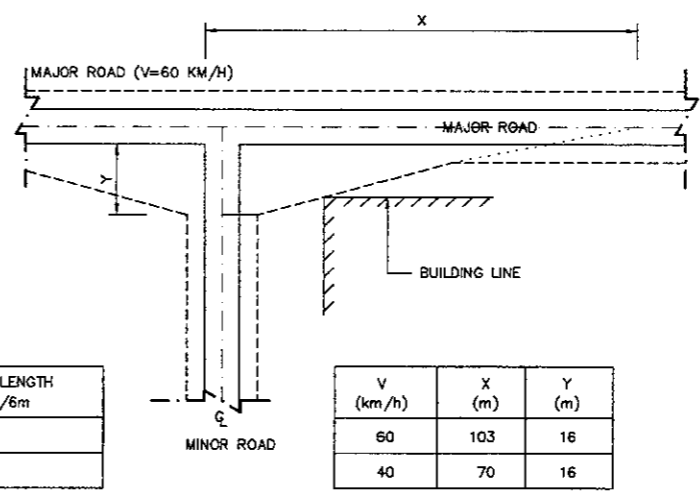


\* IF LENGTH OF TAPER > DECELERATION LANE  
 TAPER BE ASSUMED AS DECELERATION LANE

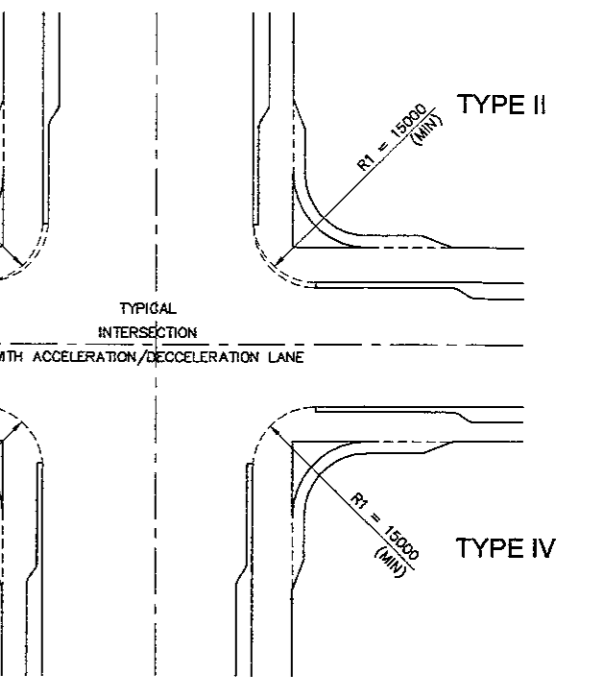
**E. LEFT TURN LINE**



**B. TYPICAL OF FOUR LEGS INTERSECTION**



**F. CLEARANCE SIGHT DISTANCE**



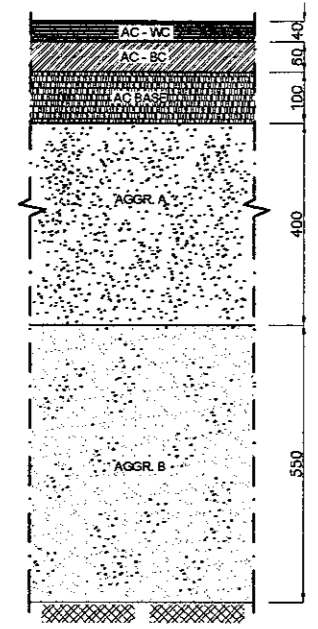
**D. TYPICAL RIGHT TURN FROM MAJOR ROAD TO MINOR / MAJOR ROAD**

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

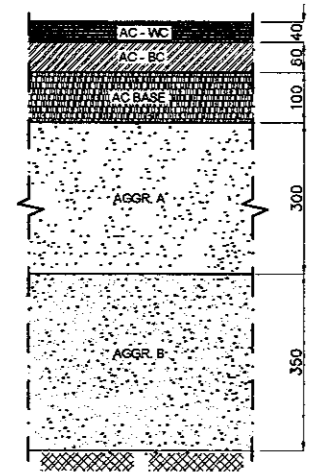
LENGTH OF STORAGE :  
 LS = 2 x M x S WITHOUT TRAFFIC LIGHT  
 LS = 15 x N x S WITH TRAFFIC LIGHT

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

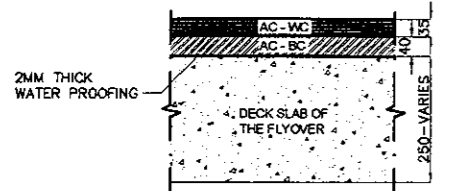
**FLEXIBLE PAVEMENT**



**1 SERVICE ROAD**  
 SCALE 1:150

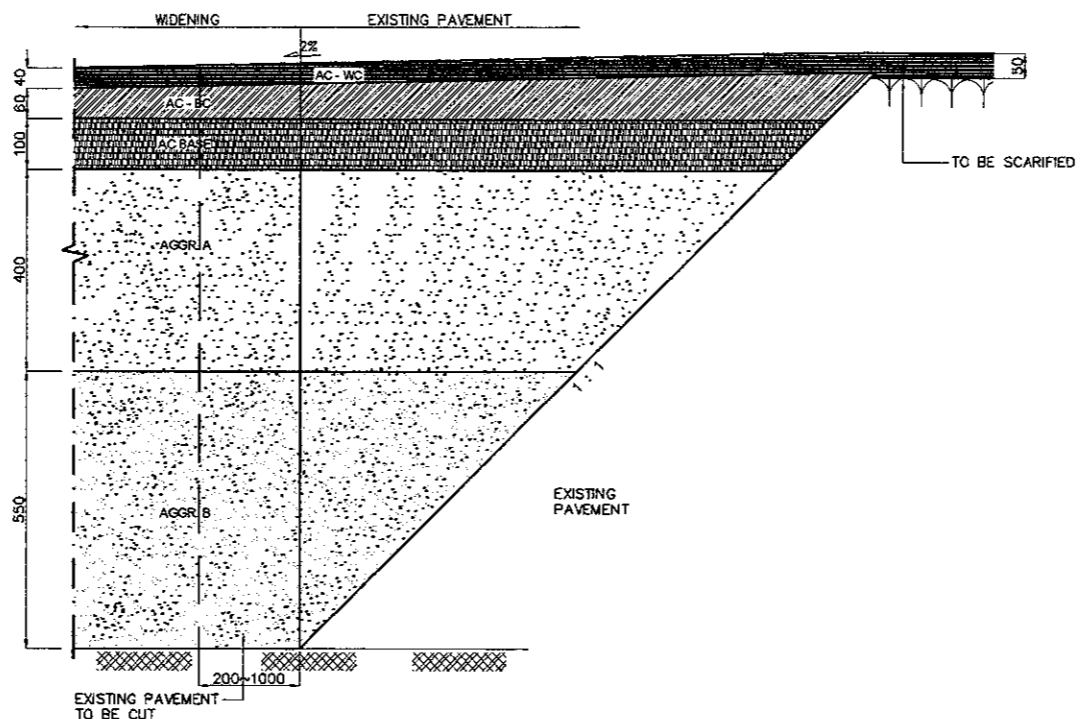


**2 ABUTMENT (APPROACH ROAD)**  
 SCALE 1:150

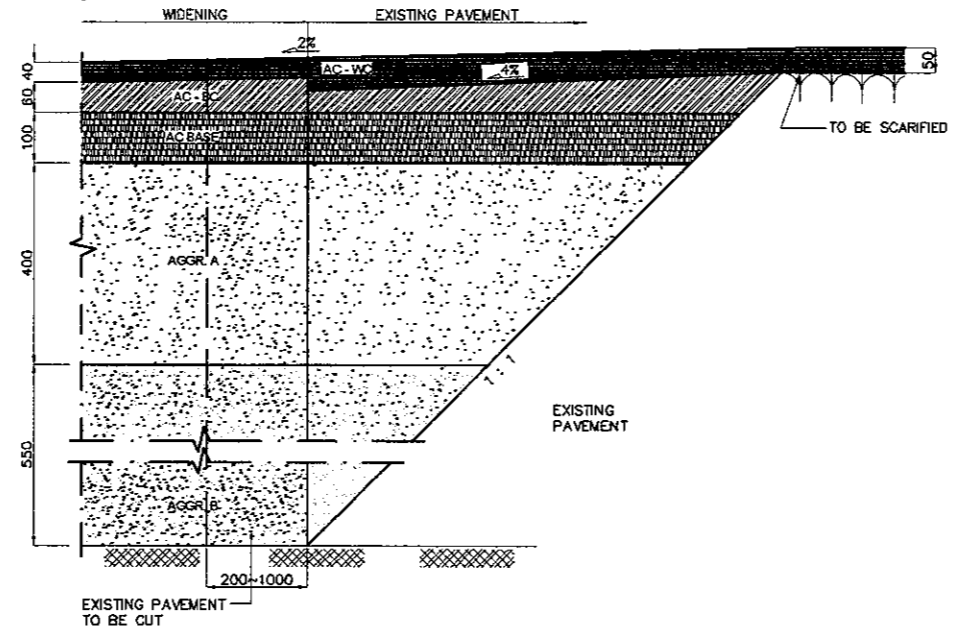


**3 VIADUCT**  
 SCALE 1:150

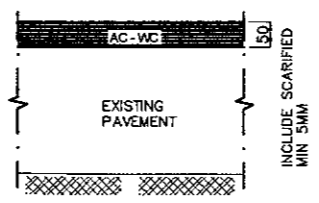
**EXISTING & NEW PAVEMENT CONNECTION**



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

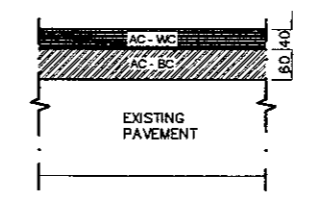


**5 WIDENING > 2000mm**  
 SCALE 1:150

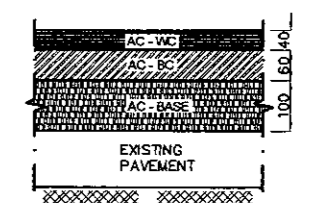


**8 NORMAL OVERLAY**  
 SCALE 1:150

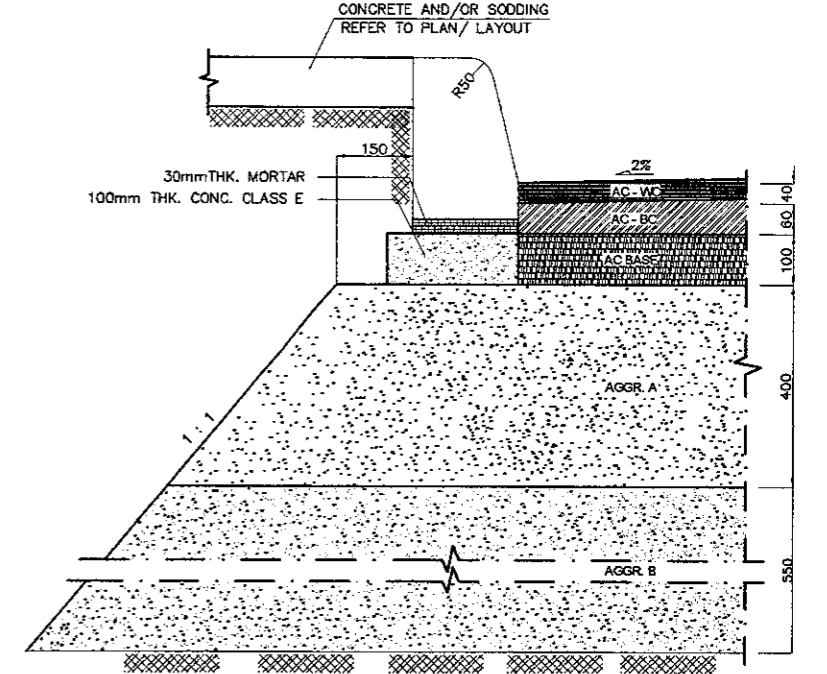
**OVERLAY THICKNESS**



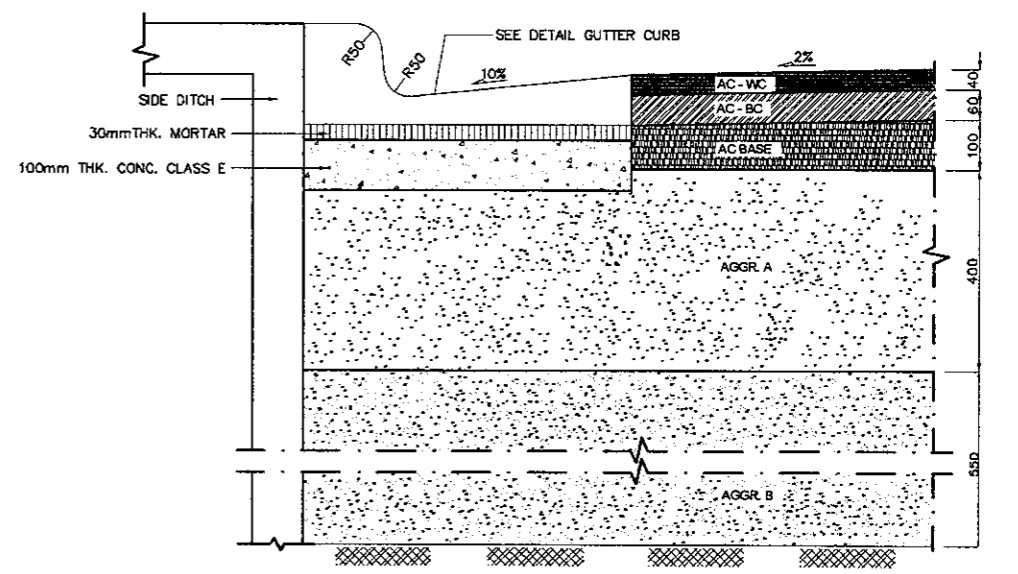
**9 OVERLAY THICKNESS < 50 > 100mm**  
 SCALE 1:150



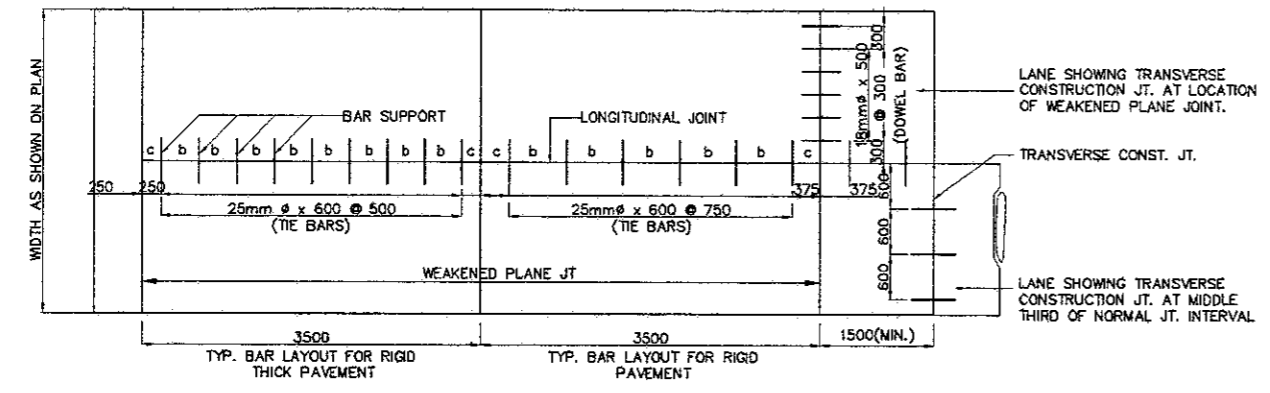
**10 OVERLAY THICKNESS > 100mm**  
 SCALE 1:150



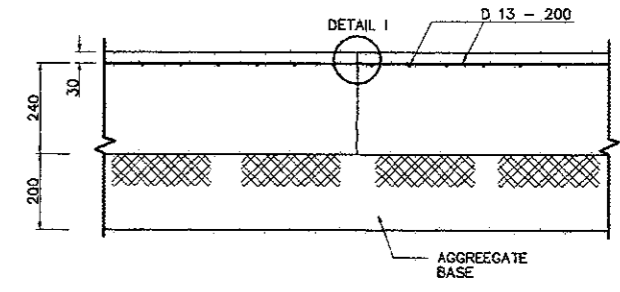
**6 MEDIAN CURB CONNECTION**  
 SCALE 1:150



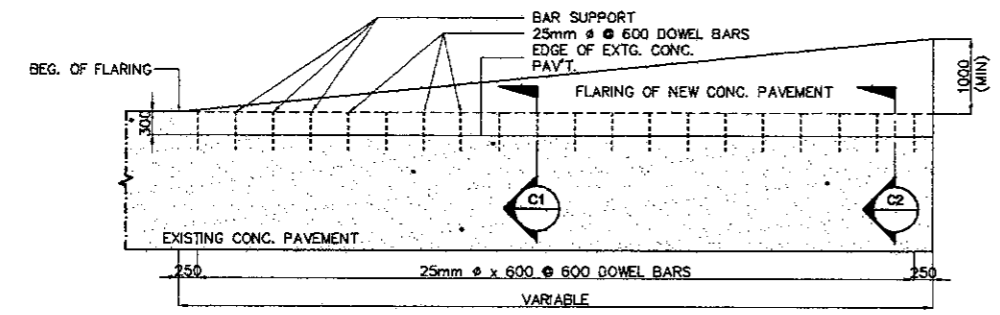
**7 CURB AND GUTTER CONNECTION**  
 SCALE 1:150



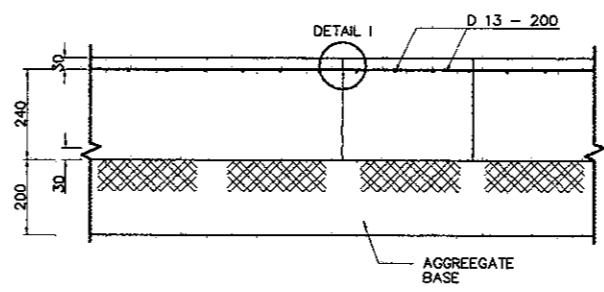
T	a	b	c
240	85	500	250
200	70	700	375



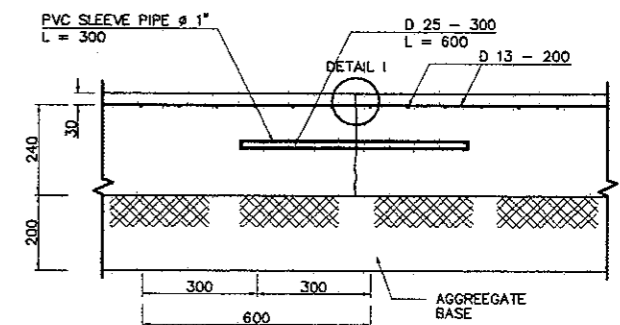
8 CONSTRUCTION JOINT  
 SCALE 1:20



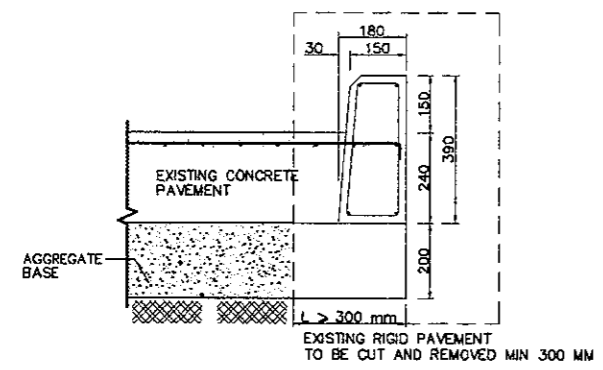
2 PLAN (SHOWING FLARING OF EXISTING CONC. PAVEMENT)  
 SCALE 1:20



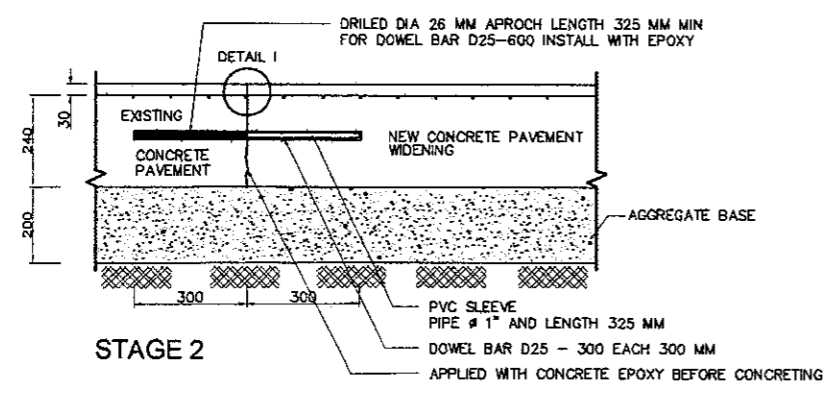
4 LONGITUDINAL JOINT  
 SCALE 1:20



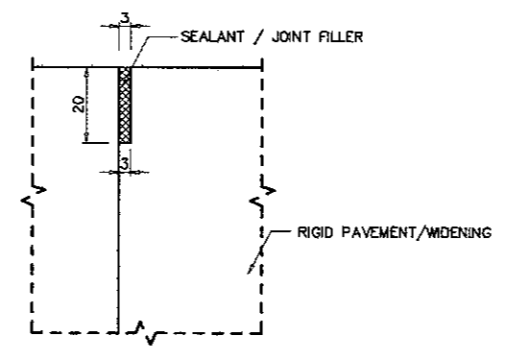
7 TRANSVERSE/EXPANSION JOINT  
 SCALE 1:20



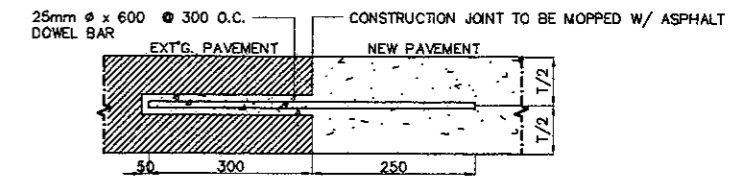
STAGE 1



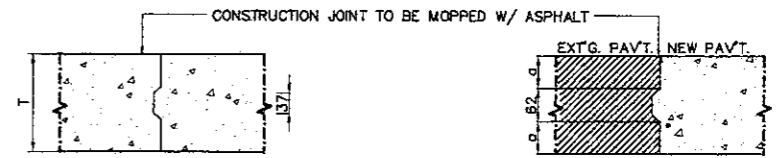
1 TYPICAL CONNECTION OF EXISTING CONCRETE AND NEW CONCRETE PAVEMENT  
 SCALE 1:20



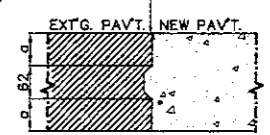
3 DETAIL 1  
 SCALE 1:20



6 SECTION C1  
 SCALE 1:20



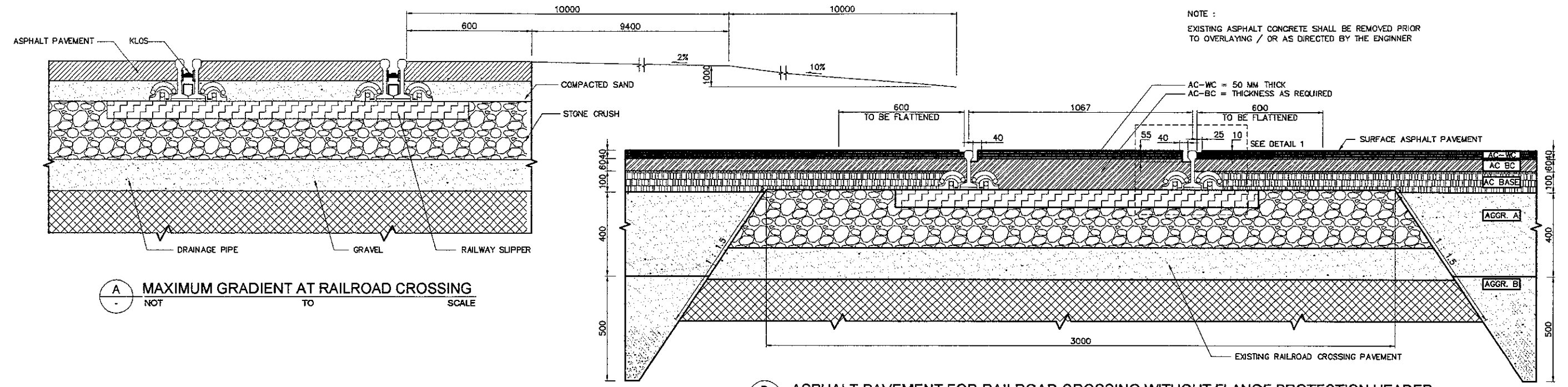
5 FREE LONGID. CONST. OR CONTACT JOINT  
 (TO BE PROVIDED IN PAVEMENT MORE THAN FOUR LANES IN WIDTH)



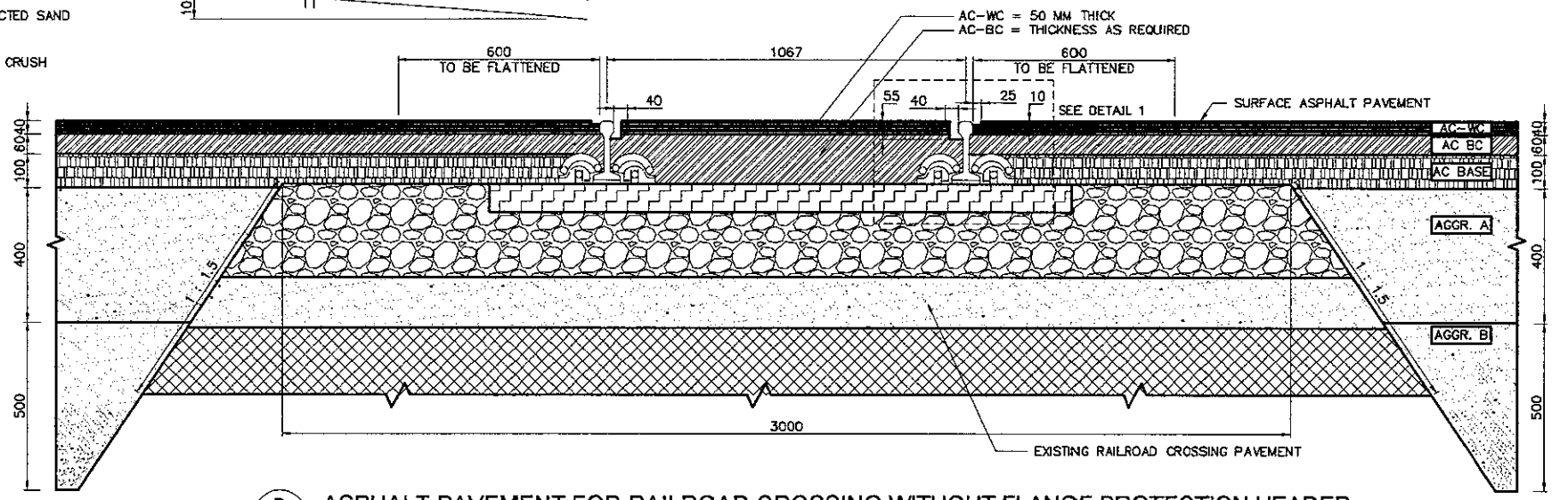
TRANSVERSE AND LONGID. CONST. JT.  
 (TO BE USED ONLY FOR CONNECTIONS W/ EXTG. CONCRETE PAVEMENT)

5 SECTION C2  
 SCALE 1:20

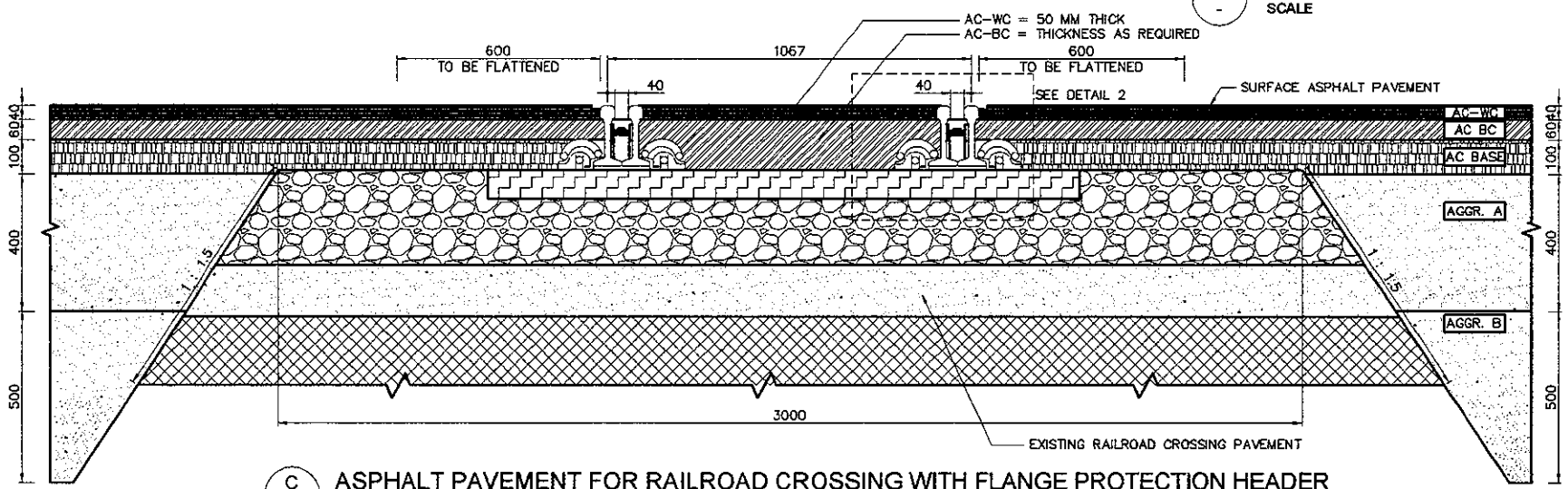
DESIGNED BY	CHECKED BY	SUBMITTED BY
Name: R. UENO	Name: T. OKUMURA	Name: M. KIUCHI
Sign: _____	Sign: _____	Sign: _____
Date: _____	Date: _____	Date: _____



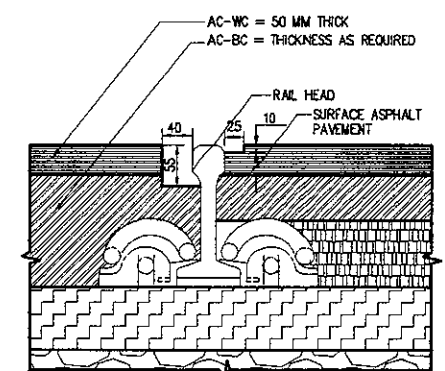
**A** MAXIMUM GRADIENT AT RAILROAD CROSSING  
 NOT TO SCALE



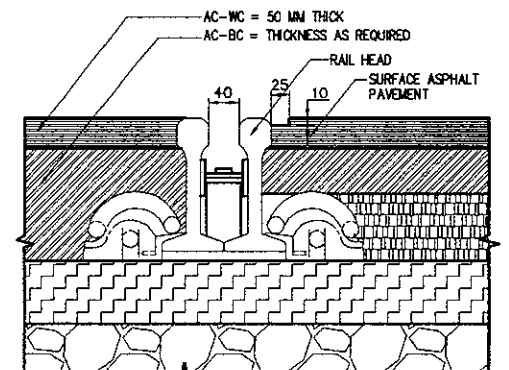
**B** ASPHALT PAVEMENT FOR RAILROAD CROSSING WITHOUT FLANGE PROTECTION HEADER  
 SCALE 1:20



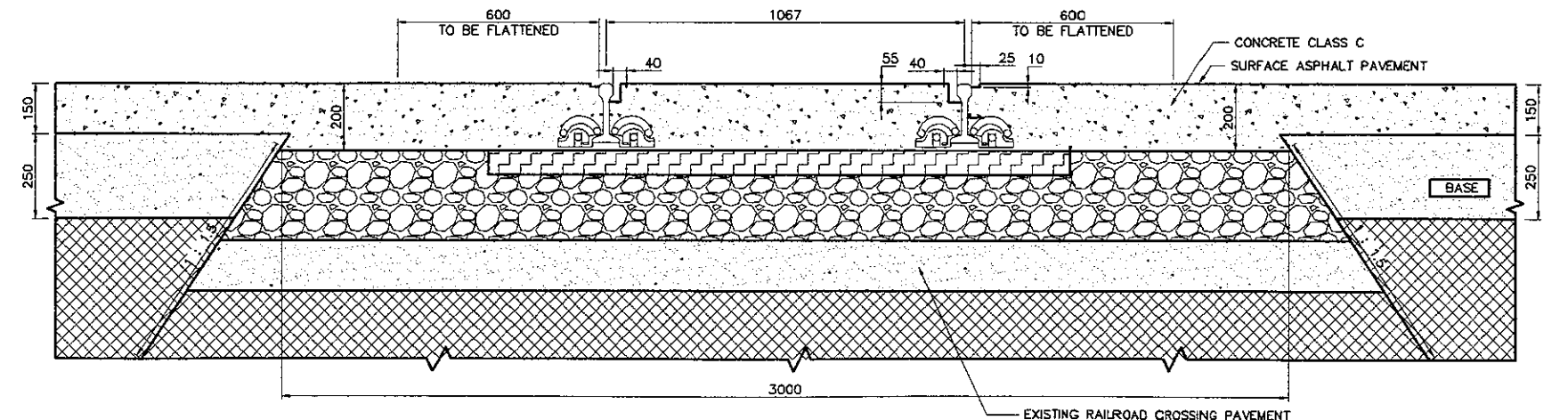
**C** ASPHALT PAVEMENT FOR RAILROAD CROSSING WITH FLANGE PROTECTION HEADER  
 SCALE 1:20



**1** DETAIL 1  
 SCALE 1:10

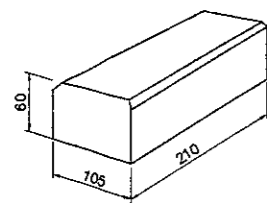


**2** DETAIL 2  
 SCALE 1:10

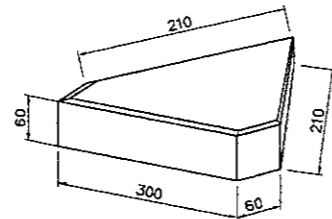


**D** CONCRETE SHOULDER AT RAILROAD CROSSING  
 SCALE 1:20

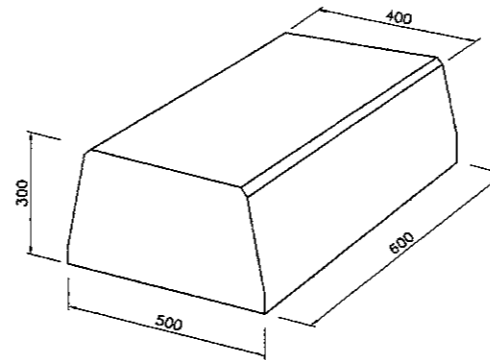
**CONCRETE BLOCK**



TYPE A

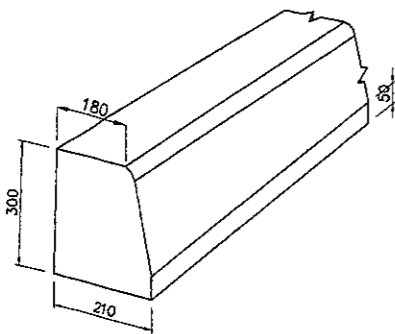


TYPE B

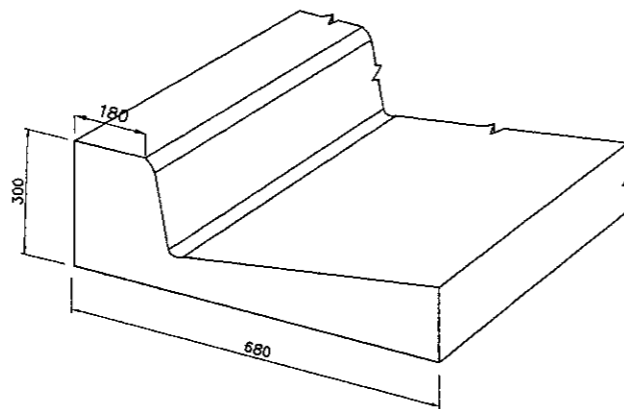


TYPE C

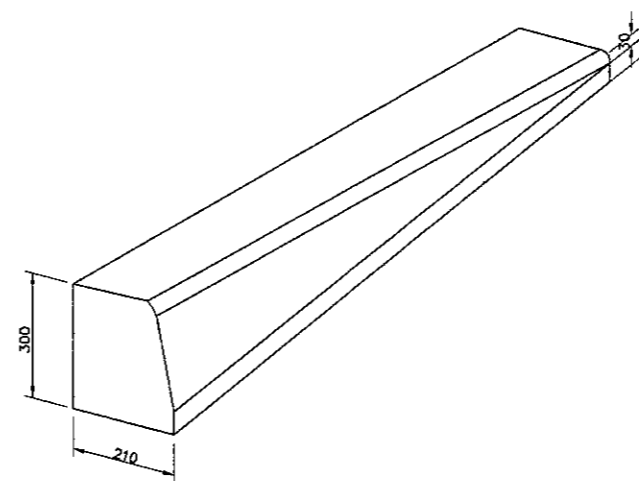
**CONCRETE CURB**



TYPE A



TYPE B



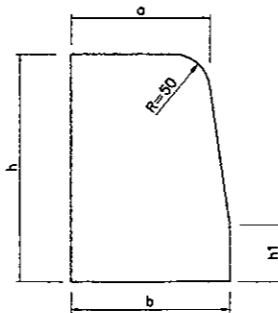
TYPE C

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

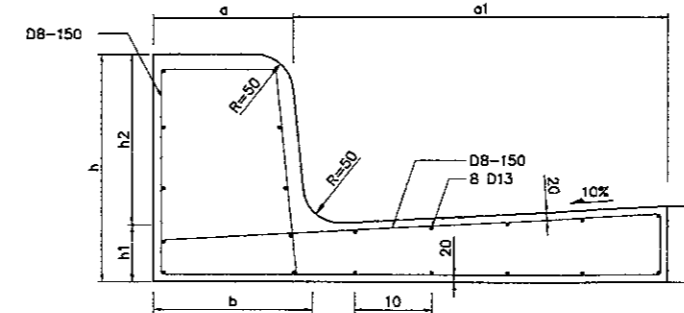
**SPECIFICATION :**

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

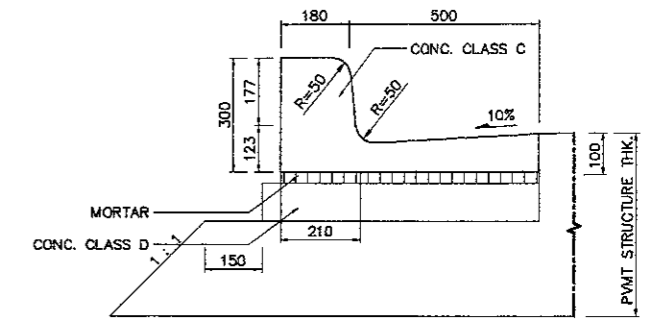
CONCRETE QUALITY K.150  
 - COST IN SITE  
 - NO REINFORCEMENT



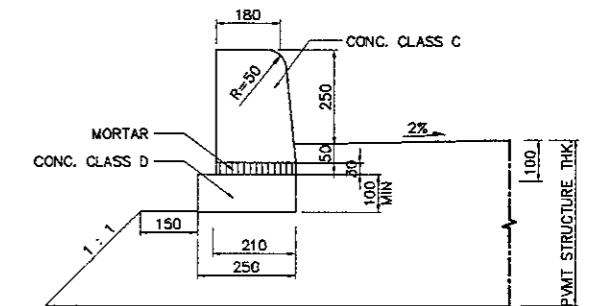
1 - NOT TO SCALE



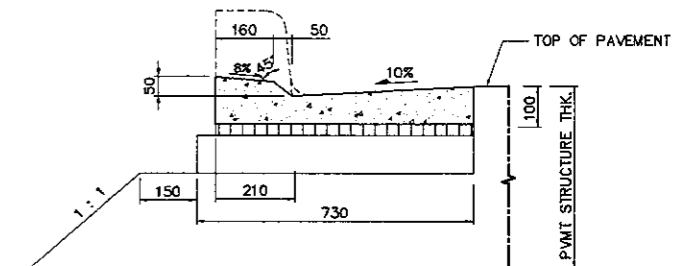
2 - NOT TO SCALE



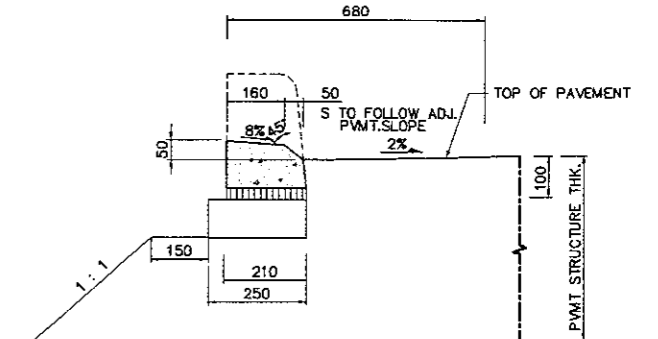
6 - NOT TO SCALE



5 - NOT TO SCALE

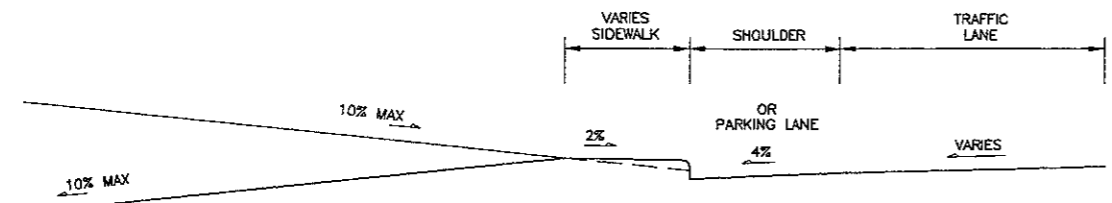


4 - NOT TO SCALE

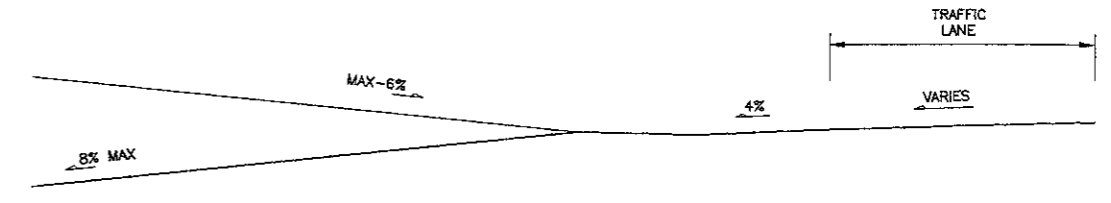


3 - NOT TO SCALE

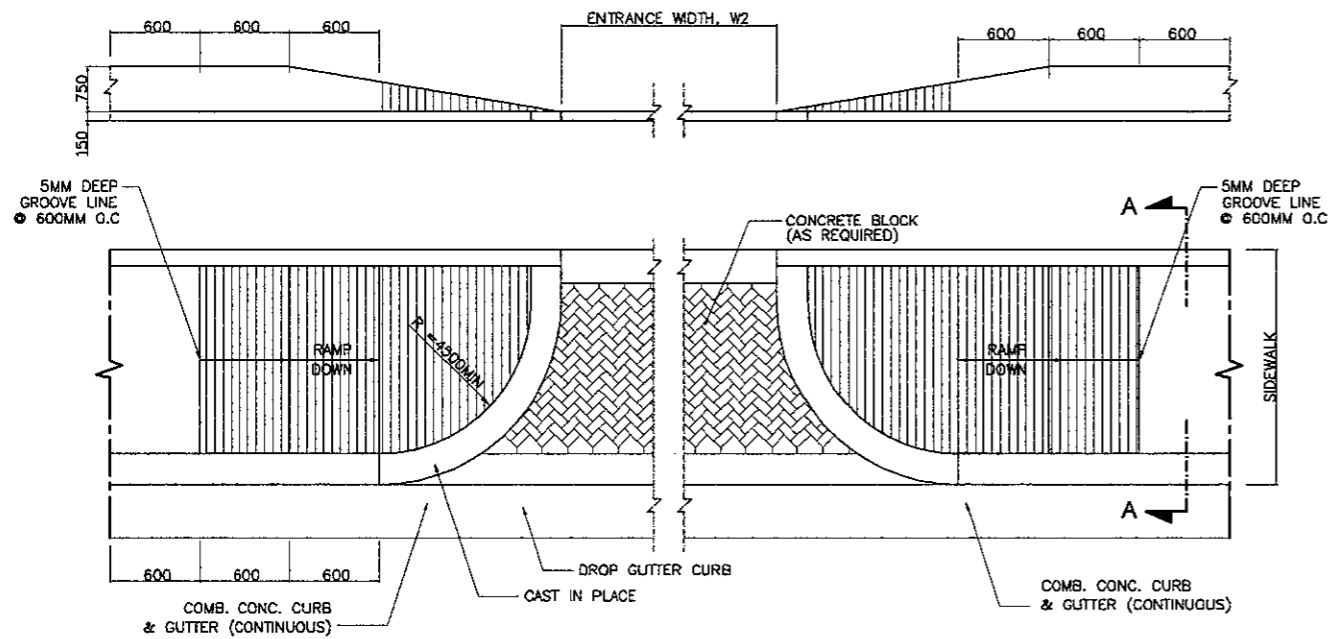




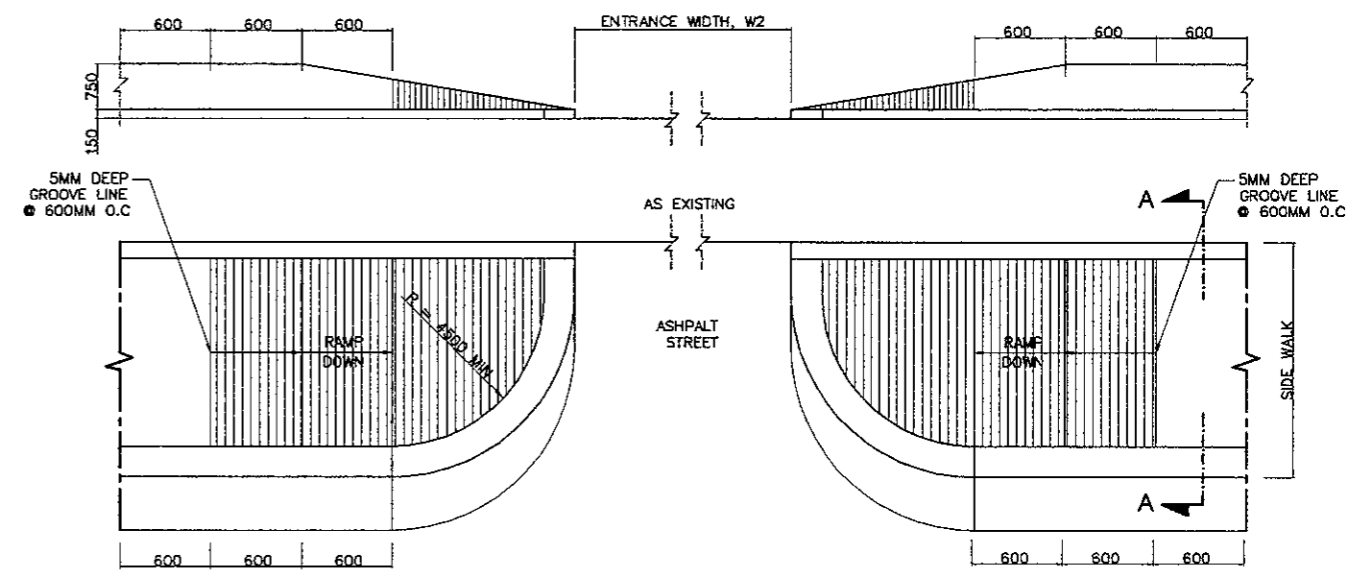
**(C) PRIVATE ENTRANCE PROFILE**  
 NOT TO SCALE



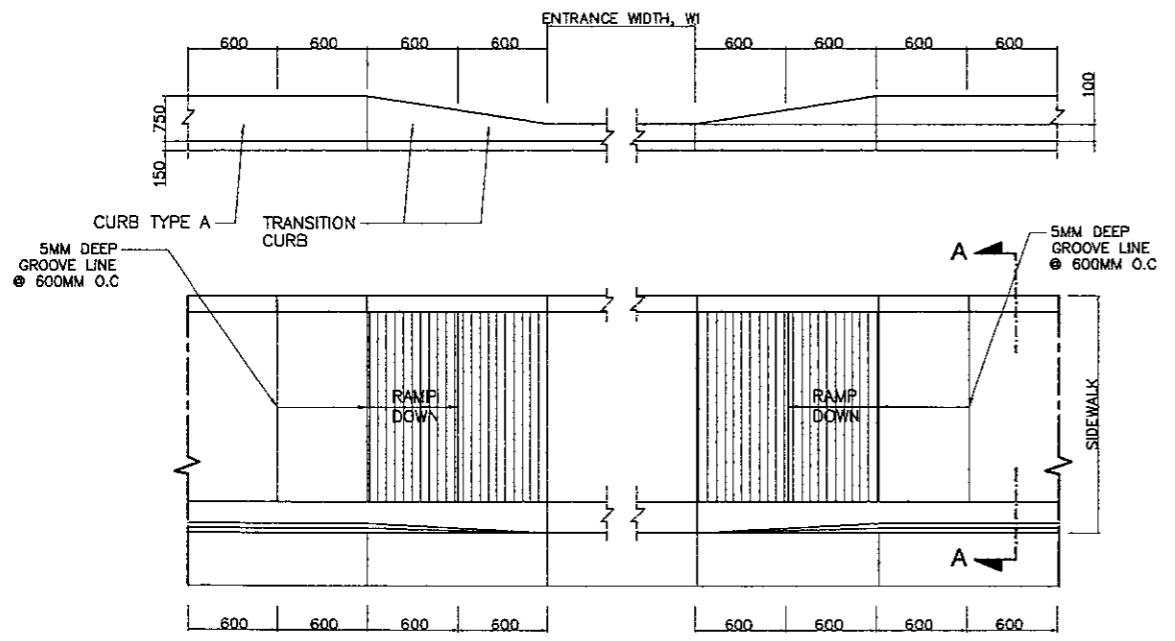
**(F) PUBLIC ENTRANCE PROFILE**  
 NOT TO SCALE



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

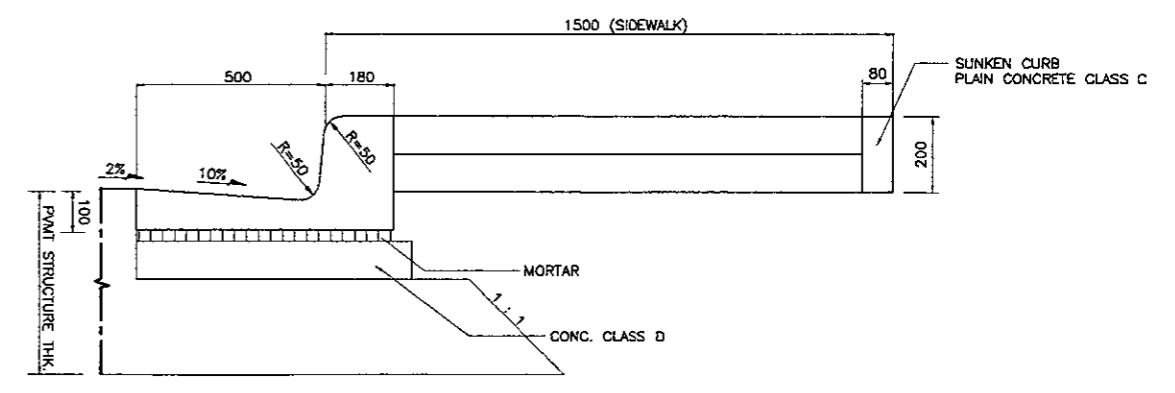


**(E) PUBLIC STREET / ALLEY ENTRANCE**  
 SCALE 1:50



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

	SINGLE	DOUBLE
$W_1$	< 1600	< 3000
$W_2$	< 3000	< 9000



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

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

