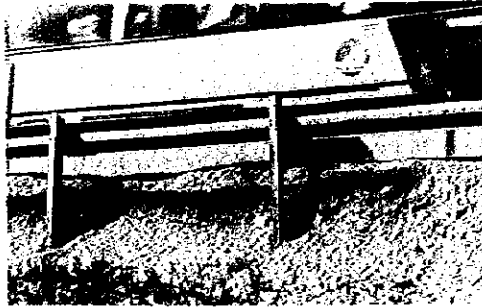




JAPAN INTERNATIONAL
COOPERATION AGENCY(JICA)



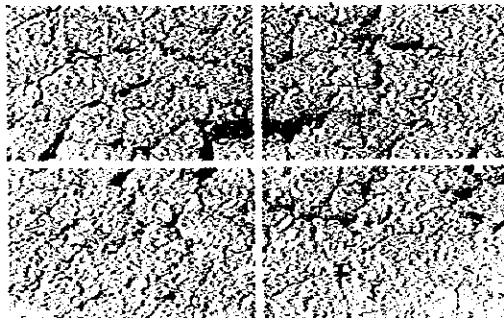
GENERAL DIRECTORATE OF HIGHWAYS
MINISTRY OF PUBLIC WORKS AND SETTLEMENT
THE REPUBLIC OF TURKEY(KGM)



THE STUDY ON ARTERIAL HIGHWAY MAINTENANCE IN THE REPUBLIC OF TURKEY

FINAL REPORT DRAWINGS

VOLUME ③



JULY 1998

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**JAPAN INTERNATIONAL
COOPERATION AGENCY(JICA)**



**GENERAL DIRECTORATE OF HIGHWAYS
MINISTRY OF PUBLIC WORKS AND SETTLEMENT
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I N D E X

Number	Route	Location	Sub-Div.	Repair work Items							Page
				Pavement	Slope	Embankment	Shoulder	Side ditch	Retaining wall	Culvert	
1	100-10	40-41	17	*						*	1-2
2	300-07	35-36	31		*		*				3-5
3	100-12	25-26	41		*						6-7
4	750-05	31-32	42	*	*		*			*	8-10
5	200-13	33-34	44		*			*			11-13
6	200-14	27-28	44	*							14-15
7	200-09	50-51	45	*							16
8	200-08	18-19	46	*	*		*				17-19
9	100-17	55-56	72			*	*				20-24
10	190-01	11-12	73	*							25-26
11	795-01	61-62	75	*							27-28
12	010-18	7-8	77	*	*				*		29-32
13	010-23	47-48	103		*						33-34
14	010-19	25-26	104	*					*		35-37
15	010-21	5-6	105	*					*		38-40
16	650-14	36-37	132	*							41-42
17	650-12	36-37	134	*							43-44
18	200-06	12-13	143	*							45-46
19	200-07	41-42	144	*	*		*				47-49
20	200-06	29-30	147	*							50-51



DESIGN OF REPAIR WORK

	Repair Method												
	Damage Type												
	Repair Method												
	Damage Type												
	Repair Method												
	Damage Type												
Slope	Repair Method												
	Damage Type												
Pavement (As. Con)	Repair Method												
	Damage Type												
Left Side		ISTANBUL											
Right Side			0	100	200	300	400	500	600	700	800	900	
Pavement	Damage Type												
	Repaire Method												
Slope	Damage Type												
	Repaire Method												
	Damage Type												
	Repaire Method												
	Damage Type												
	Repaire Method												
Culvert (Pipe)	Damage Type												
	Repaire Method												
Remarks													

DESIGN OF REPAIR WORK					
ROUTE		LOCATION	40-41	SUB -DIV	17
JICA STUDY TEAM			SCALE	1: -	SHEET NO
					1/51

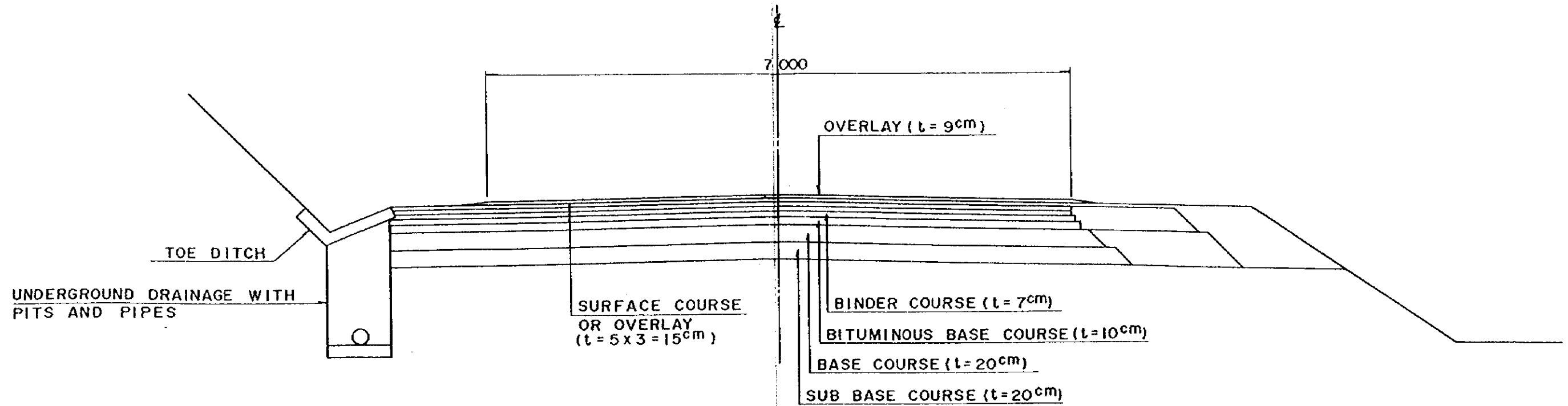
Overlay(t=9cm) + Toe ditch + Underground drainage with pits and pipes

C(A), R(C), W(C) P(2/10), PSI=1,9 CBR=3,3%, T=32cm, H=72cm

ANKARA
1000

Accumulation of debries ϕ 600 - 50%
High pressurized water washer

I. PAVEMENT



TRAFFIC VOLUME CLASSIFICATION : C
 DESIGN CBR VALUE OF SUBGRADE : 3 %
 TARGET VALUE OF TA (cm) : TA = 35cm
 $TA_0 = 15 \times 0.5 + 7 \times 0.5 + 10 \times 0.6 + 20 \times 0.25 + 20 \times 0.20 = 26 \text{ cm}$
 OVERLAY DEPTH REQUIRED = 35 - 26 = 9cm

2. PIPE CULVERT



DEBRIS IN THE PIPES IS REMOVED BY HIGH PRESSURE WATER JET

DESIGN OF REPAIR WORK					
ROUTE	100-10	LOCATION	40-41	SUB DIV	17
JICA STUDY TEAM			SCALE 1:50	SHEET NO	2/51

DESIGN OF REPAIR WORK

Left Side	ANTALYA											AFYON	
	Right Side	0	100	200	300	400	500	600	700	800	900		1000
Pavement	Damage Type												
	Repair Method												
Slope Embankment	Damage Type												
	Repair Method												
	Damage Type												
	Repair Method												
	Damage Type												
	Repair Method												
Remarks	Damage Type												
	Repair Method												

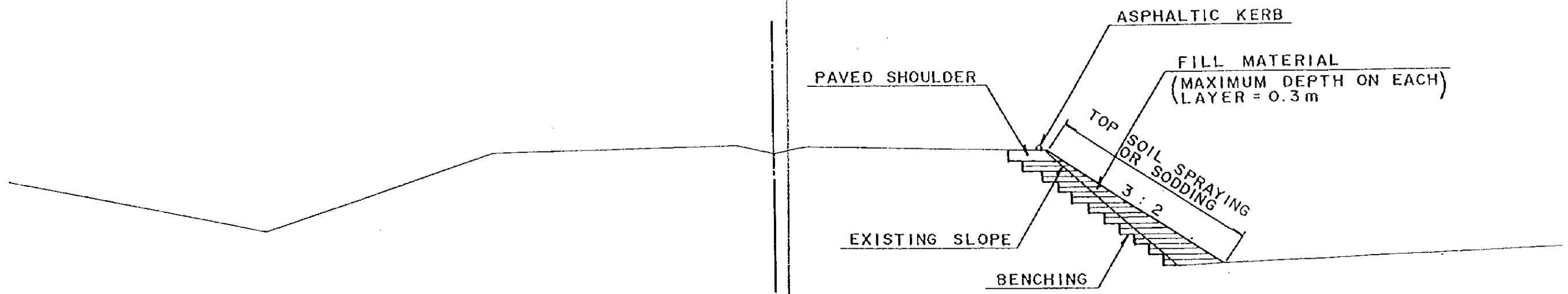
DESIGN OF REPAIR WORK					
ROUTE	300-07	LOCATION	35-36	SUB -DIV	31
JICA STUDY TEAM			SCALE	1: -	SHEET NO
					3/51



Filling asphalt curb, seed-mix spraying with a gun, paved shoulder

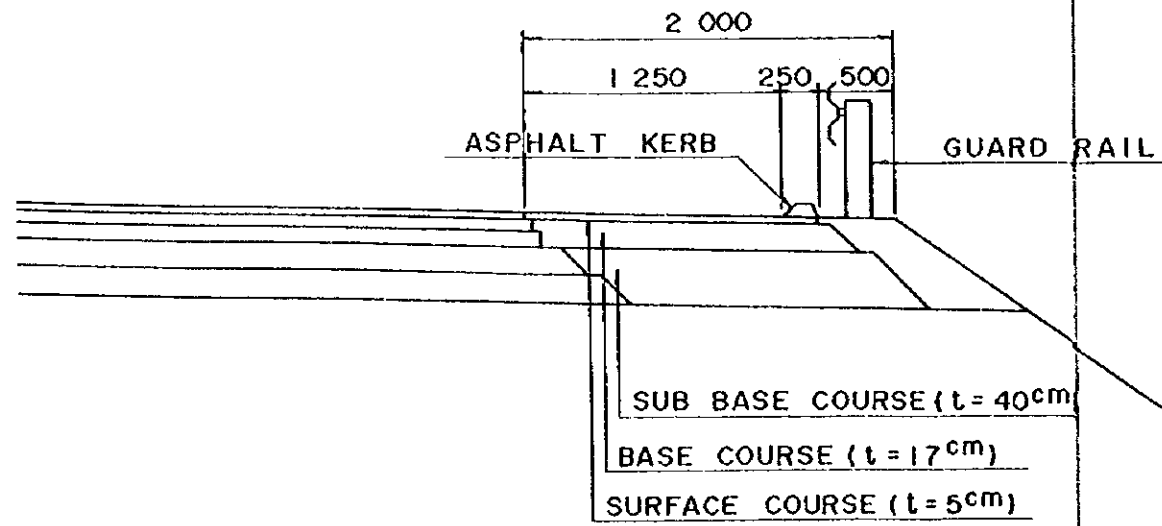
I. SLOPE (EROSION)

34 + 580



DESIGN OF REPAIR WORK					
ROUTE	300-07	LOCATION	35-36	SUB DIV	31
JICA STUDY TEAM			SCALE 1:200	SHEET NO	4/51

2. PAVED SHOULDER



DESIGN OF REPAIR WORK					
ROUTE	300-07	LOCATION	33-36	SUB DIV	31
JICA STUDY TEAM			SCALE 1:50	SHEET NO	5/51

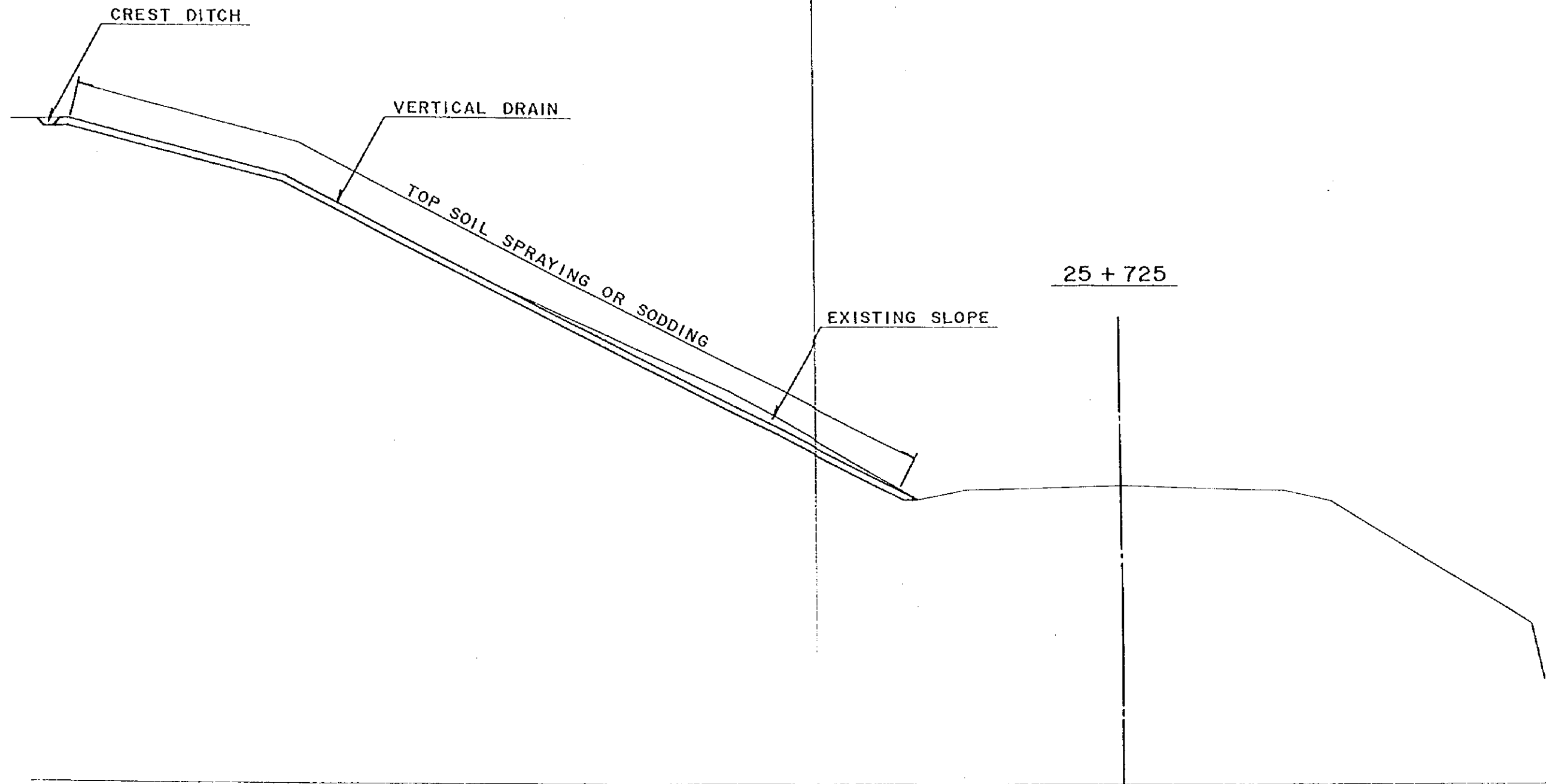
DESIGN OF REPAIR WORK

	Repair Method													
	Damage Type													
	Repair Method													
	Damage Type													
	Repair Method													
	Damage Type													
Slope (cut)	Repair Method													
	Damage Type													
	Repair Method													
	Damage Type													
Pavement	Repair Method													
	Damage Type													
Left Side		ISTANBUL												
Right Side			0	100	200	300	400	500	600	700	800	900		ANKARA 1000
Pavement	Damage Type													
	Repair Method													
Slope	Damage Type													
	Repair Method													
	Damage Type													
	Repair Method													
	Damage Type													
	Repair Method													
	Damage Type													
	Repair Method													
Remarks														

Crest ditch, vertical ditch, seed-mix spraying with a gun
 ←—————→
 washing out or erosion
 ←—————→

DESIGN OF REPAIR WORK					
ROUTE	100-12	LOCATION	25-26	SUB -DIV	41
JICA STUDY TEAM			SCALE	1: -	SHEET NO
					6/51

I. SLOPE (EROSION)

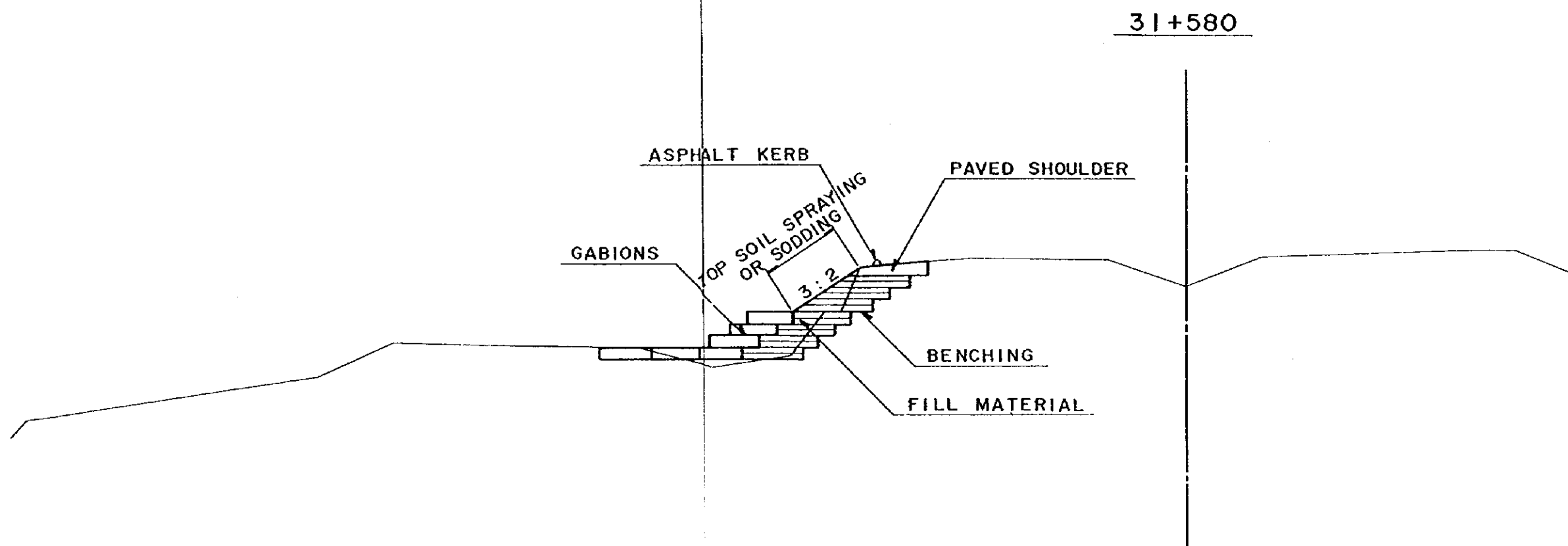


DESIGN OF REPAIR WORK					
ROUTE	100-12	LOCATION	25-26	SUB DIV	41
JICA STUDY TEAM			SCALE 1:200	SHEET NO	7/51

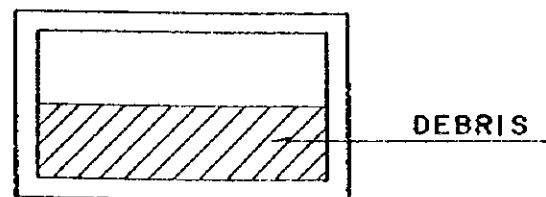
DESIGN OF REPAIR WORK

Category	Sub-Category	Repair Method	Damage Type	Distance (m)										Direction																									
				0	100	200	300	400	500	600	700	800	900		1000																								
	Repair Method																																						
	Damage Type																																						
	Repair Method																																						
	Damage Type																																						
Slope	Repair Method																																						
	Damage Type																																						
Pavement (As. Con.)	Repair Method				unnecessary to repair																																		
	Damage Type				C(-), R(-) W(B), P(-)																																		
Left Side	ISTANBUL																																						
Right Side				0	100	200	300	400	500	600	700	800	900			ANKARA																							
Pavement	Damage Type																																						
	Repair Method																																						
Slope Embankment	Damage Type																																						
	Repair Method																																						
	Damage Type																																						
	Repair Method																																						
	Damage Type																																						
	Repair Method																																						
Culvert (Pipe)	Damage Type																																						
	Repair Method																																						
Remarks	Damage Type																																						
	Repair Method																																						
<div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="width: 35%;"> <p style="text-align: center;">4.3x2.0 Accumulation of debries (50%)</p> <p style="text-align: center;">removal of debries by manpower</p> </div> <div style="width: 30%; text-align: center;"> <p>Erosion (River)</p> <p>Filling, Gabion wall, Gabion mat, Asphalt curb, Paved shoulder, seed-mix spraying with a gun</p> </div> </div>																																							
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="6">DESIGN OF REPAIR WORK</th> </tr> <tr> <td>ROUTE</td> <td>750-05</td> <td>LOCATION</td> <td>31-32</td> <td>SUB -DIV</td> <td>42</td> </tr> <tr> <td colspan="3">JICA STUDY TEAM</td> <td>SCALE</td> <td>1: -</td> <td>SHEET NO</td> </tr> <tr> <td colspan="5"></td> <td>8/51</td> </tr> </table>																DESIGN OF REPAIR WORK						ROUTE	750-05	LOCATION	31-32	SUB -DIV	42	JICA STUDY TEAM			SCALE	1: -	SHEET NO						8/51
DESIGN OF REPAIR WORK																																							
ROUTE	750-05	LOCATION	31-32	SUB -DIV	42																																		
JICA STUDY TEAM			SCALE	1: -	SHEET NO																																		
					8/51																																		

1. SLOPE (EROSION)



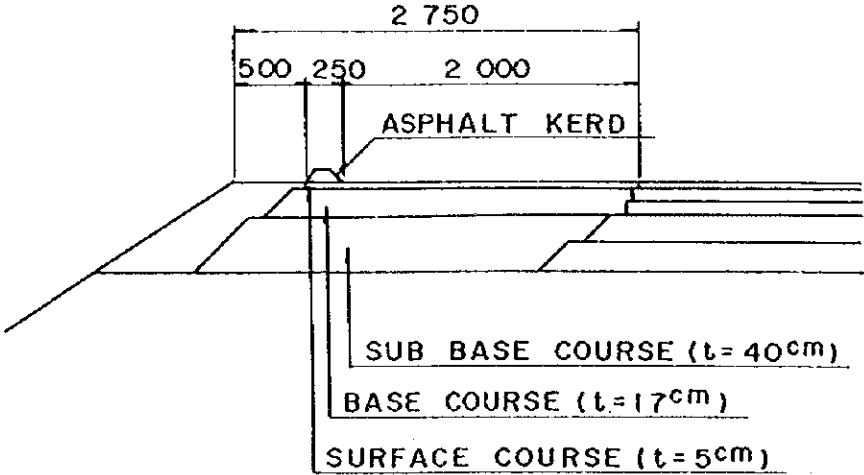
2. BOX CULVERT



DEBRIS IN THE BOX IS REMOVED BY MANPOWER

DESIGN OF REPAIR WORK					
ROUTE	750-05	LOCATION	31-32	SUB DIV	42
JICA STUDY TEAM			SCALE 1:200	SHEET NO	9/51

3. PAVED SHOULDER

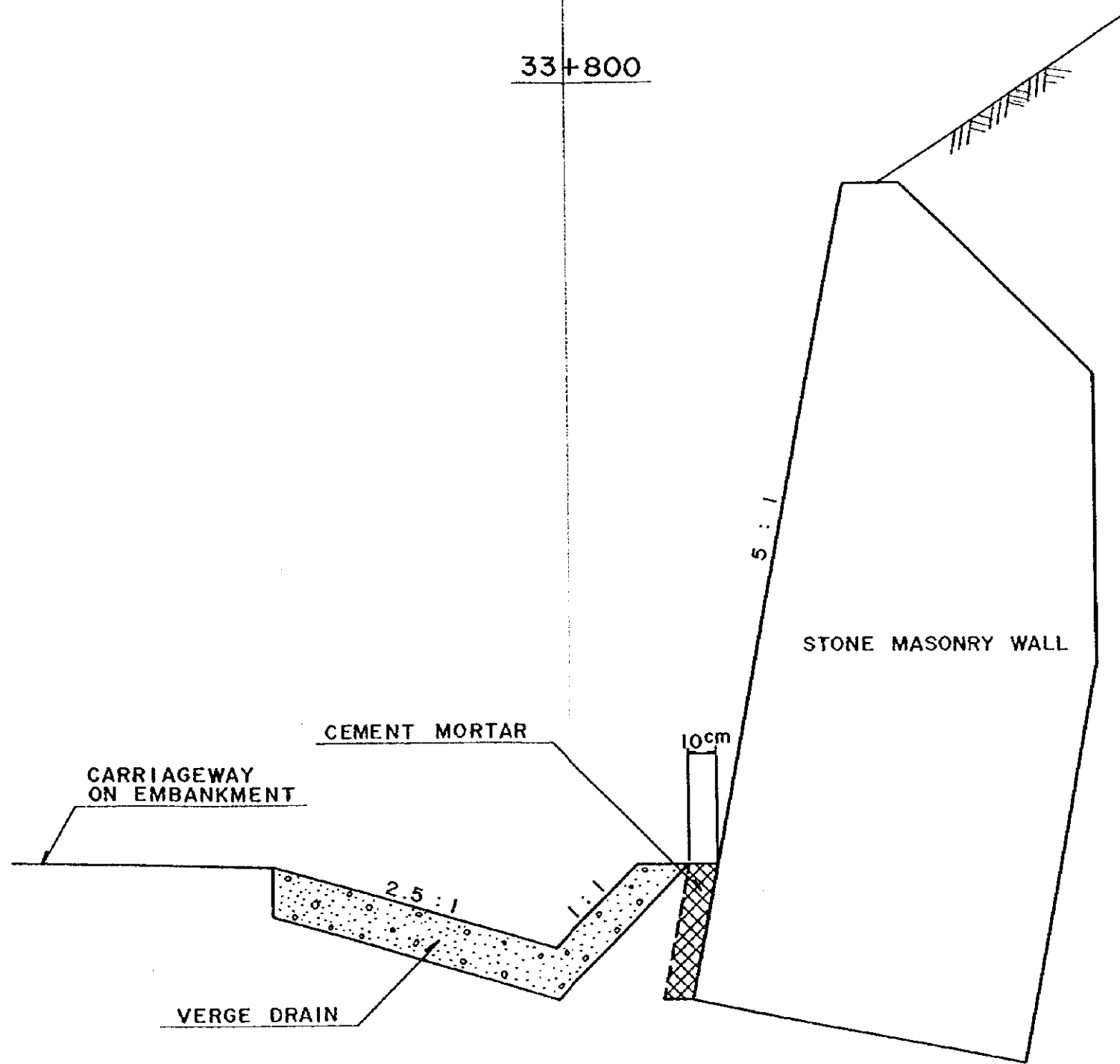


DESIGN OF REPAIR WORK					
ROUTE	750-05	LOCATION	31-32	SUB DIV	42
JICA STUDY TEAM			SCALE 1:50	SHEET NO	10/51

DESIGN OF REPAIR WORK

		0	100	200	300	400	500	600	700	800	900	1000																								
Side Ditch	Repair Method																																			
	Damage Type																																			
	Repair Method																																			
	Damage Type																																			
Slope Embankment	Repair Method																																			
	Damage Type																																			
	Repair Method																																			
	Damage Type																																			
Pavement	Repair Method																																			
	Damage Type																																			
	Repair Method																																			
	Damage Type																																			
Left Side	ANKARA																																			
Right Side		0	100	200	300	400	500	600	700	800	900	1000																								
Pavement	Damage Type																																			
	Repair Method																																			
Slope	Damage Type																																			
	Repair Method																																			
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	Repair Method																																			
	Damage Type																																			
	Repair Method																																			
Remarks	<table border="1" style="margin: auto; border-collapse: collapse;"> <tr> <th colspan="6">DESIGN OF REPAIR WORK</th> </tr> <tr> <td>ROUTE</td> <td>200-13</td> <td>LOCATION</td> <td>33-34</td> <td>SUB -DIV</td> <td>44</td> </tr> <tr> <td colspan="3">JICA STUDY TEAM</td> <td>SCALE</td> <td>1: -</td> <td>SHEET NO</td> </tr> <tr> <td colspan="3"></td> <td></td> <td></td> <td>11/51</td> </tr> </table>												DESIGN OF REPAIR WORK						ROUTE	200-13	LOCATION	33-34	SUB -DIV	44	JICA STUDY TEAM			SCALE	1: -	SHEET NO						11/51
DESIGN OF REPAIR WORK																																				
ROUTE	200-13	LOCATION	33-34	SUB -DIV	44																															
JICA STUDY TEAM			SCALE	1: -	SHEET NO																															
					11/51																															

I. SIDE DITCH



DESIGN OF REPAIR WORK					
ROUTE	200-13	LOCATION	33-34	SUB DIV	44
JICA STUDY TEAM			SCALE 1:50	SHEET NO	12/51

200-13 (Present Condition)

Minimum safety factor $Fs_{min} = 2.283$
 Center of circular arc $X = 70.00 (M)$
 $Y = 30.00 (M)$
 Radius $R = 45.00 (M)$
 Moment of resistance $MR = 12217.65 (T^*M)$
 Starting moment $Mo = 5351.12 (T^*M)$

Number of layers	Saturated weight (T/M3)	Wetting weight (T/M3)	External friction angle	Cohesion (T/M2)	Primary coefficient of cohesion	Lateral reismic coefficient	Vertical reismic coefficient
1	2.00	2.00	25.0	0.50	0.000	0.000	0.000
2	2.00	2.00	15.0		0.000	0.000	0.000
3			0.00	10.00	0.000	0.000	0.000
4	2.00	2.00	15.0	00.00	0.000	0.000	0.000
5	2.00	2.00	0.01	0.50	0.000	0.000	0.000

Weight per unit volume of water = 1.000 (T/M3)

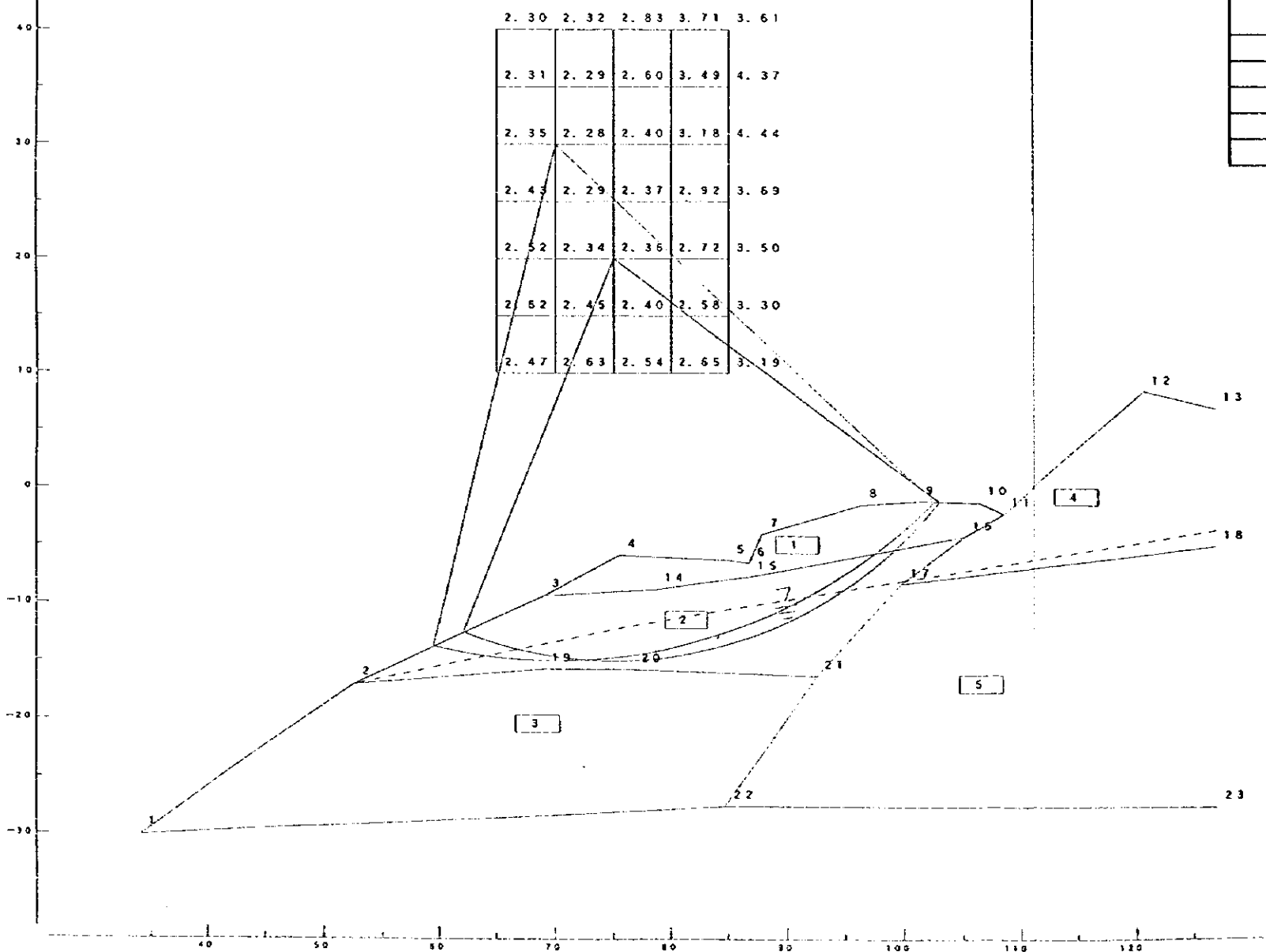


Figure of Safety Factor

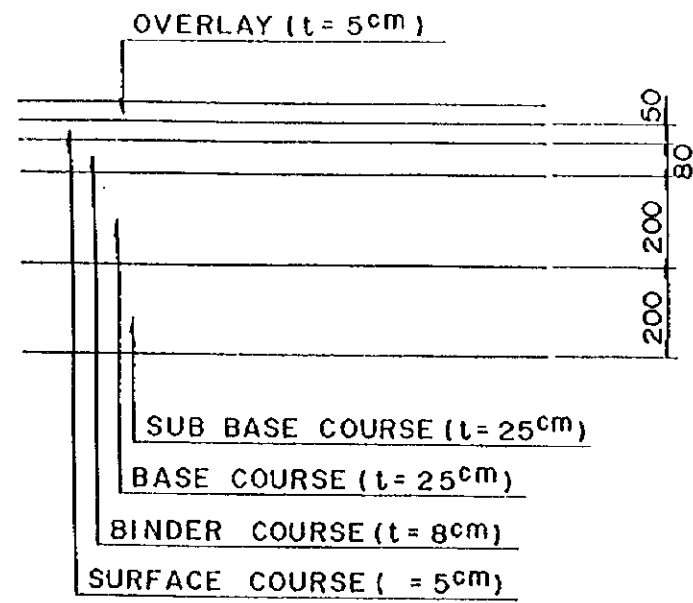
DESIGN OF REPAIR WORK					
ROUTE	200-13	LOCATION	33-34	SUB-DIV	44
JICA STUDY TEAM			SCALE 1:500	SHEET NO	13/51

DESIGN OF REPAIR WORK

	Repair Method																			
	Damage Type																			
	Repair Method																			
	Damage Type																			
	Repair Method																			
	Damage Type																			
Slope	Repair Method																			
	Damage Type																			
Pavement (As. Con)	Repair Method																			
	Damage Type																			
Left Side																				
Right Side		0	100	200	300	400	500	600	700	800	900	1000	CORUM							
Pavement	Damage Type																			
	Repair Method																			
Slope	Damage Type																			
	Repair Method																			
	Damage Type																			
	Repair Method																			
	Damage Type																			
	Repair Method																			
	Damage Type																			
	Repair Method																			
Remarks	Damage Type																			
	Repair Method																			

DESIGN OF REPAIR WORK					
ROUTE	200-14	LOCATION	27-28	SUB -DIV	44
JICA STUDY TEAM			SCALE	1: -	SHEET NO
					14/51

I. PAVEMENT



TRAFFIC VOLUME CLASSIFICATION : C
 DESIGN CBR VALUE OF SUBGRADE : 12 %
 TARGET VALUE OF T_a (cm) : 23 cm
 $T_{a0} = (5+8) \times 0.6 + 20 \times 0.3 + 20 \times 0.25 = 18.8 \text{ cm}$
 OVERLAY DEPTH REQUIRED = $23 - 18.8 \div 5 \text{ cm}$

DESIGN OF REPAIR WORK					
ROUTE	200-14	LOCATION	27-28	SUB DIV	44
JICA STUDY TEAM			SCALE	SHEET NO	15/51

DESIGN OF REPAIR WORK

	Repair Method												
	Damage Type												
	Repair Method												
	Damage Type												
	Repair Method												
	Damage Type												
Slope	Repair Method												
	Damage Type												
Pavement (As.Con.)	Repair Method												
	Damage Type												
Left Side	← ESKISEHIR												
Right Side		0	100	200	300	400	500	600	700	800	900	1000	→ ANKARA
Pavement (As.Con.)	Damage Type												
	Repair Method												
Slope	Damage Type												
	Repair Method												
	Damage Type												
	Repair Method												
	Damage Type												
	Repair Method												
	Damage Type												
	Repair Method												
Remarks	Damage Type												
	Repair Method												

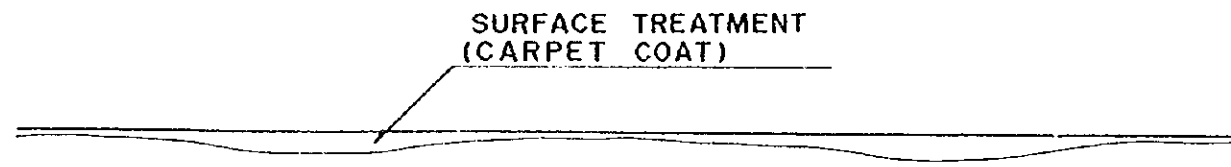
DESIGN OF REPAIR WORK					
ROUTE	200-09	LOCATION	50-51	SUB-DIV	45
JICA STUDY TEAM			SCALE	1: -	SHEET NO
					16/51

DESIGN OF REPAIR WORK

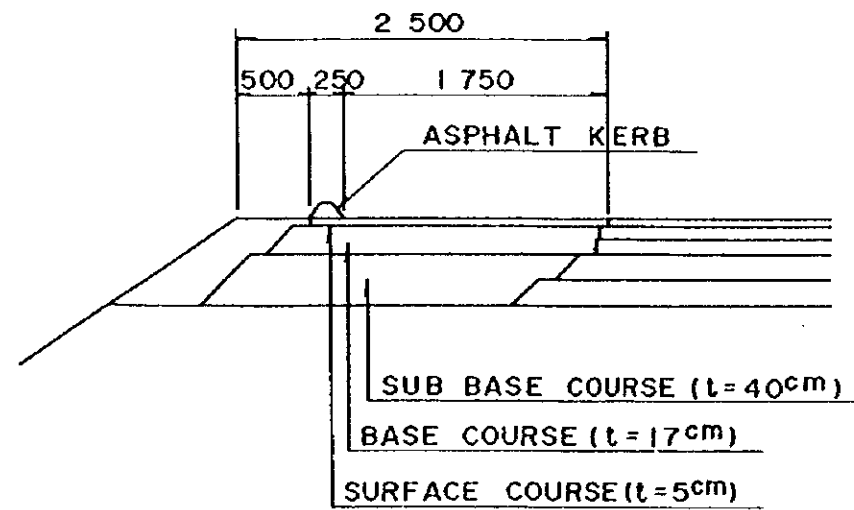
	Repair Method																			
	Damage Type																			
	Repair Method																			
	Damage Type																			
	Repair Method																			
	Damage Type																			
Slope Embankment	Repair Method																			
	Damage Type																			
Pavement (As. Con.)	Repair Method																			
	Damage Type																			
Left Side	BURSA																			
Right Side		0	100	200	300	400	500	600	700	800	900	1000	ESKISEHIR							
Pavement	Damage Type																			
	Repair Method																			
Slope	Damage Type																			
	Repair Method																			
	Damage Type																			
	Repair Method																			
	Damage Type																			
	Repair Method																			
	Damage Type																			
	Repair Method																			
Remarks																				

DESIGN OF REPAIR WORK					
ROUTE	200-08	LOCATION	18-19	SUB-DIV	46
JICA STUDY TEAM			SCALE	1: -	SHEET NO
					17/51

1. PAVEMENT

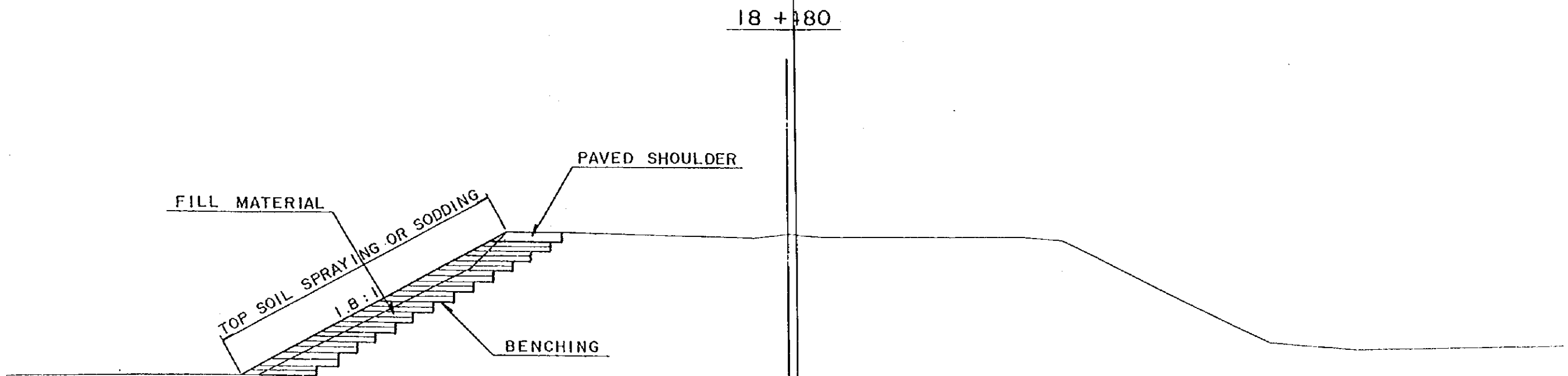


2. PAVED SHOULDER



DESIGN OF REPAIR WORK					
ROUTE	200-08	LOCATION	18-19	SUB DIV	46
JICA STUDY TEAM			SCALE 1:50	SHEET NO	18/51

3. SLOPE (EROSION)

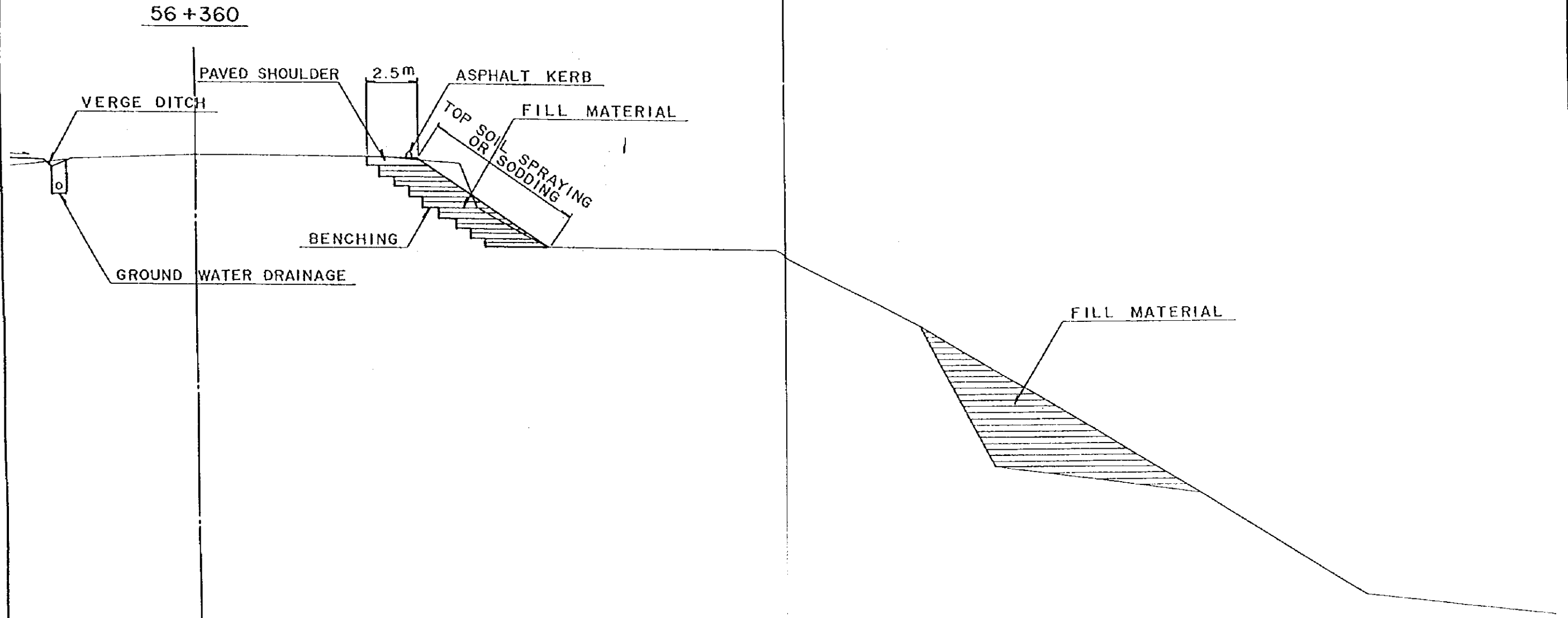


DESIGN OF REPAIR WORK					
ROUTE	200-08	LOCATION	18-19	SUB DIV	46
JICA STUDY TEAM			SCALE 1:200	SHEET NO	19/51

DESIGN OF REPAIR WORK

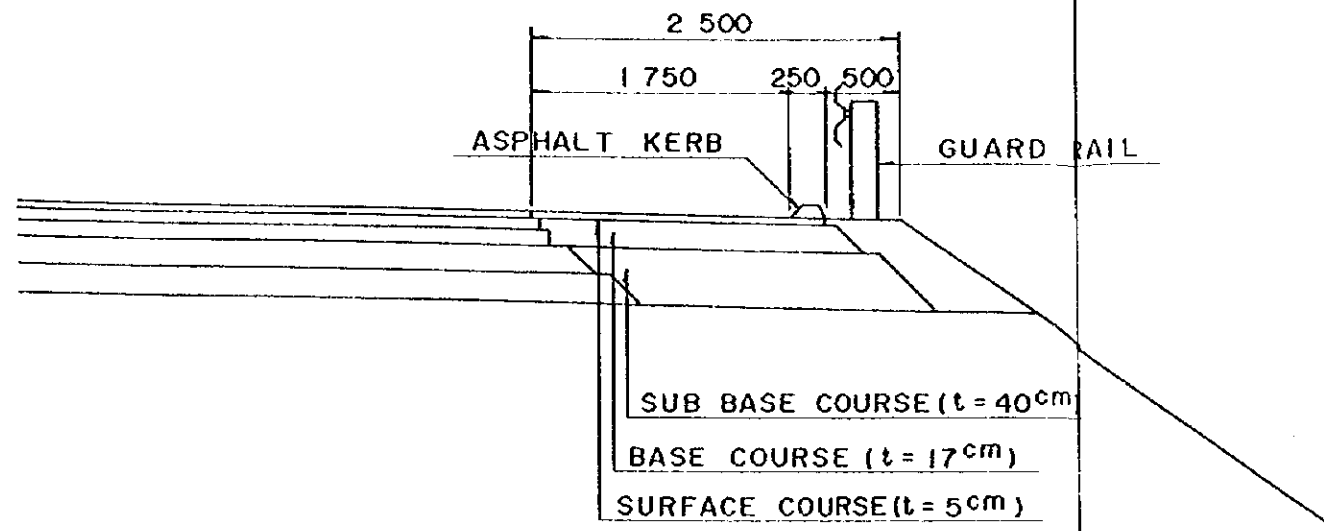
	Repair Method																																																						
	Damage Type																																																						
	Repair Method																																																						
	Damage Type																																																						
	Repair Method																																																						
	Damage Type																																																						
Slope	Repair Method																																																						
	Damage Type																																																						
Pavement	Repair Method																																																						
	Damage Type																																																						
Left Side		← CORUM																																																					
Right Side			0	100	200	300	400	500	600	700	800	900	1000 → SAMSUN																																										
Pavement	Damage Type																																																						
	Repair Method																																																						
Slope Embankment	Damage Type																																																						
	Repair Method																																																						
	Damage Type																																																						
	Repair Method																																																						
	Damage Type																																																						
	Repair Method																																																						
Embankment	Damage Type																																																						
	Repair Method																																																						
Remarks	<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: center;"> <p>← collapse Fs < 1.5 →</p> <p>← →</p> </div> <div style="text-align: center;"> <p>Filling, crest ditch, toe ditch, asphalt kerb, underground draniage with pits and pipes, seed-mix spraying with a gun</p> </div> </div>																																																						
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="14" style="text-align: center;">DESIGN OF REPAIR WORK</td> </tr> <tr> <td style="width: 15%;">ROUTE</td> <td style="width: 15%;">100-17</td> <td style="width: 15%;">LOCATION</td> <td style="width: 15%;">56-57</td> <td style="width: 15%;">SUB-DIV</td> <td style="width: 15%;">72</td> <td colspan="8"></td> </tr> <tr> <td colspan="4" style="text-align: center;">JICA STUDY TEAM</td> <td>SCALE</td> <td>1: -</td> <td>SHEET NO</td> <td colspan="7">20/51</td> </tr> </table>														DESIGN OF REPAIR WORK														ROUTE	100-17	LOCATION	56-57	SUB-DIV	72									JICA STUDY TEAM				SCALE	1: -	SHEET NO	20/51						
DESIGN OF REPAIR WORK																																																							
ROUTE	100-17	LOCATION	56-57	SUB-DIV	72																																																		
JICA STUDY TEAM				SCALE	1: -	SHEET NO	20/51																																																

I. EMBANKMENT



DESIGN OF REPAIR WORK					
ROUTE	100-17	LOCATION	56-57	SUB DIV	72
JICA STUDY TEAM			SCALE 1:200	SHEET NO	21/51

2. PAVED SHOULDER



DESIGN OF REPAIR WORK					
ROUTE	100-17	LOCATION	56-57	SUB DIV	72
JICA STUDY TEAM			SCALE 1:50	SHEET NO	22/51

100-17 (Present Condition)

Minimum safety factor $F_s \text{ min} = 1.189$
 Center of circular arc $X = 115.00 \text{ (M)}$
 $Y = 5.00 \text{ (M)}$
 Radius $R = 20.000 \text{ (M)}$
 Moment of resistance $MR = 1571.75 \text{ (T}^*\text{M)}$
 Starting moment $Mo = 1321.72 \text{ (T}^*\text{M)}$

Number of layers	Saturated weight (T/M3)	Wetting weight (T/M3)	External friction angle	Cohesion (T/M2)	Primary coefficient of cohesion	Lateral seismic coefficient	Vertical seismic coefficient
1	2.00	2.00	25.0	0.50	0.000	0.000	0.000
2			15.0		0.000	0.000	0.000
3	2.00	2.00	10.0	10.00	0.000	0.000	0.000
4			0.05	00.00	0.000	0.000	0.000

Weight per unit volume of water = 1.000 (T/M3)

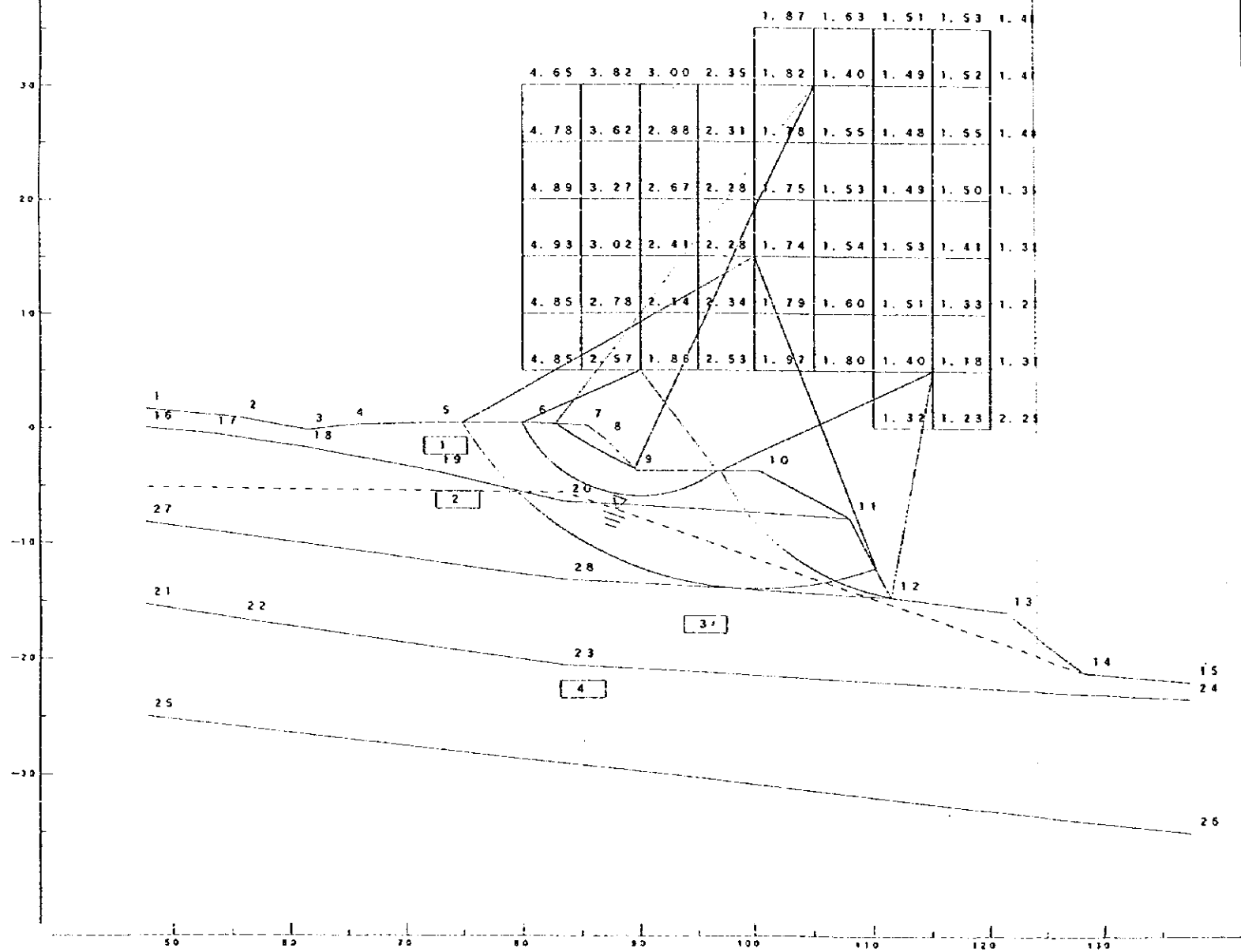


Figure of Safety Factor

DESIGN OF REPAIR WORK					
ROUTE	100-17	LOCATION	55-56	SUB-DIV	72
JICA STUDY TEAM			SCALE 1:500	SHEET NO	23/51

100-17 (Countermeasure)

Minimum safety factor $F_s \text{ min} = 1.468$
 Center of circular arc $X = 125.00 \text{ (M)}$
 $Y = 25.00 \text{ (M)}$
 Radius $R = 41.00 \text{ (M)}$
 Moment of resistance $MR = 3974.39 \text{ (T}^*\text{M)}$
 Starting moment $MO = 2706.35 \text{ (T}^*\text{M)}$

Number of layers	Saturated weight (T/M3)	Wetting weight (T/M3)	External friction angle	Cohesion (T/M2)	Primary coefficient of cohesion	Lateral seismic coefficient	Vertical seismic coefficient
1	2.00	2.00	25.0	0.50	0.000	0.000	0.000
2			15.0		0.000	0.000	0.000
3	2.00	2.00	10.0	10.00	0.000	0.000	0.000
4			0.00	00.00	0.000	0.000	0.000
5	2.00	2.00	25.0	0.50	0.000	0.000	0.000

Weight per unit volume of water = 1.000 (T/M3)

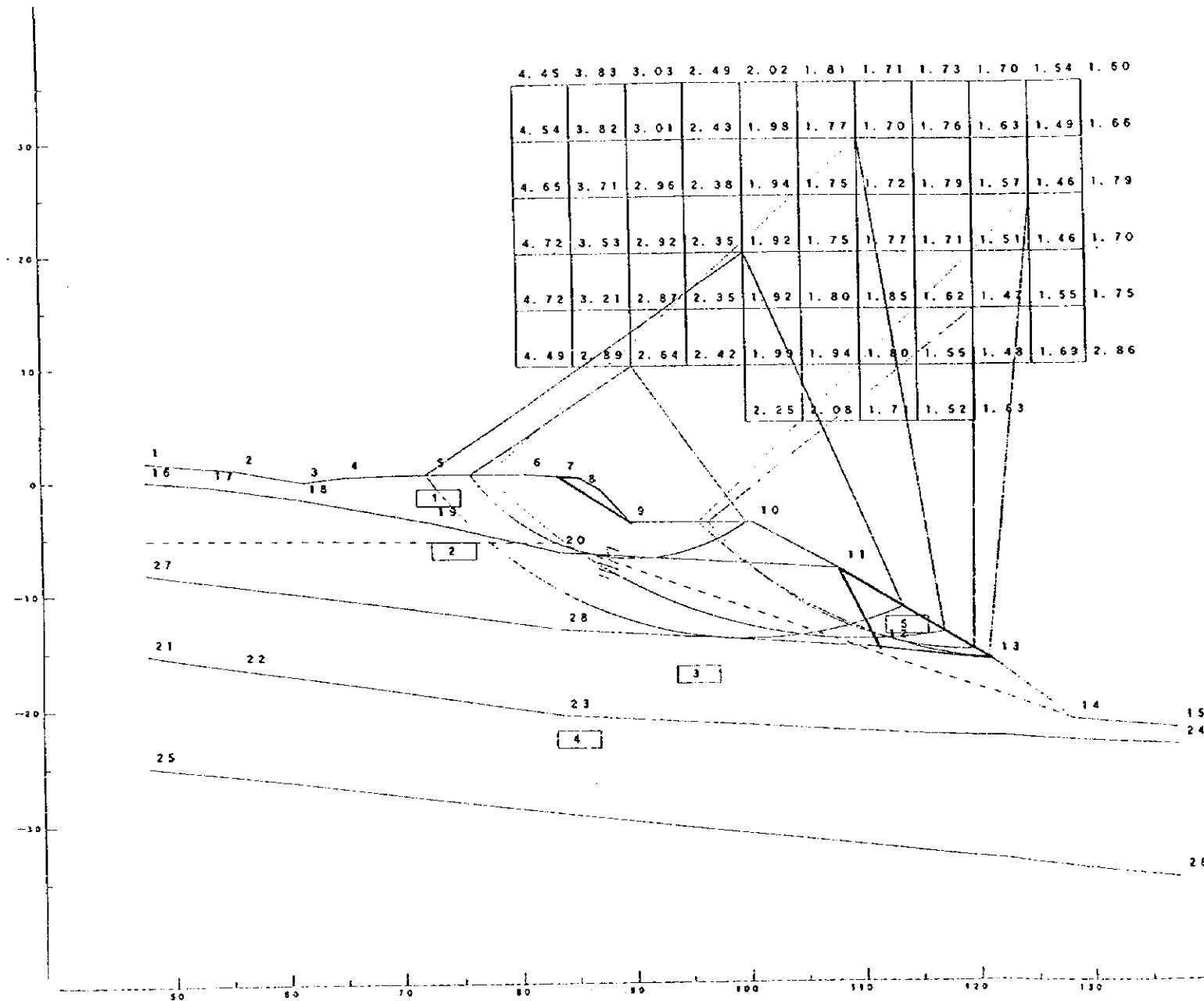


Figure of Safety Factor

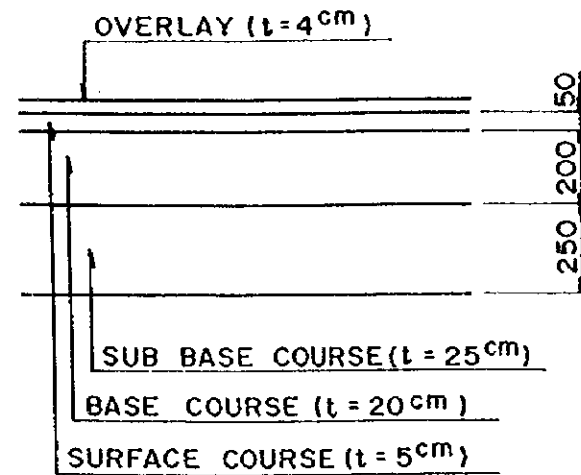
DESIGN OF REPAIR WORK					
ROUTE	100-17	LOCATION	55-56	SUB-DIV	72
JICA STUDY TEAM			SCALE	1:500	SHEET NO
					24/51

DESIGN OF REPAIR WORK

	Repair Method																		
	Damage Type																		
	Repair Method																		
	Damage Type																		
	Repair Method																		
	Damage Type																		
Slope	Repair Method																		
	Damage Type																		
Pavement (Sur. Tr)	Repair Method								overay(t=4cm)										
	Damage Type								C (C), R (C), W (B), PSI=2.8, CBR=34, T=5, H=50										
Left Side																			
Right Side																			
Pavement (Sur. Tr)	Damage Type																		
	Repaire Method								overay(t=4cm)										
Slope	Damage Type																		
	Repaire Method																		
	Damage Type																		
	Repaire Method																		
	Damage Type																		
	Repaire Method																		
Remarks																			

DESIGN OF REPAIR WORK					
ROUTE	190-01	LOCATION	11-12	SUB-DIV	73
JICA STUDY TEAM			SCALE	1: -	SHEET NO
					25/51

I. PAVEMENT



TRAFFIC VOLUME CLASSIFICATION : C

DESIGN CBR VALUE OF SUBGRADE : 20%

TARGET VALUE OF TA (cm) : 20 cm

$$TA_0 = 5 \times 0.6 + 20 \times 0.35 + 25 \times 0.25 = 16.3 \text{ cm}$$

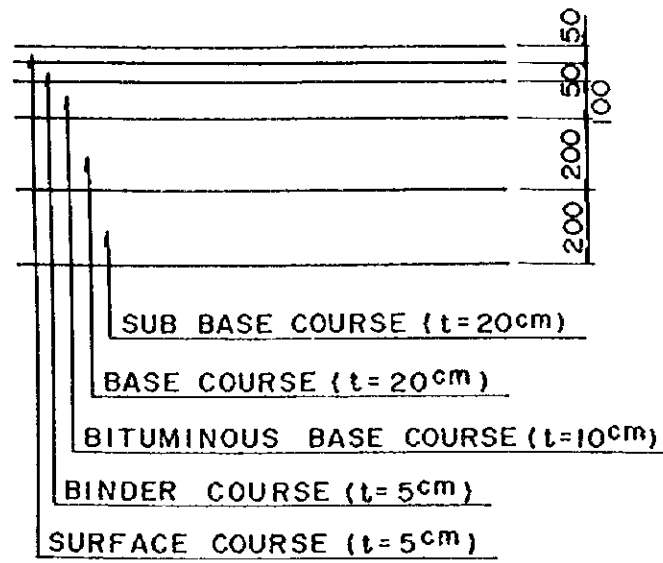
$$\text{OVERLAY DEPTH REQUIRED} = 20 - 16.3 \approx 4 \text{ cm}$$

DESIGN OF REPAIR WORK					
ROUTE	190-01	LOCATION	11-12	SUB DIV	73
JICA STUDY TEAM			SCALE 1:20	SHEET NO	26/51

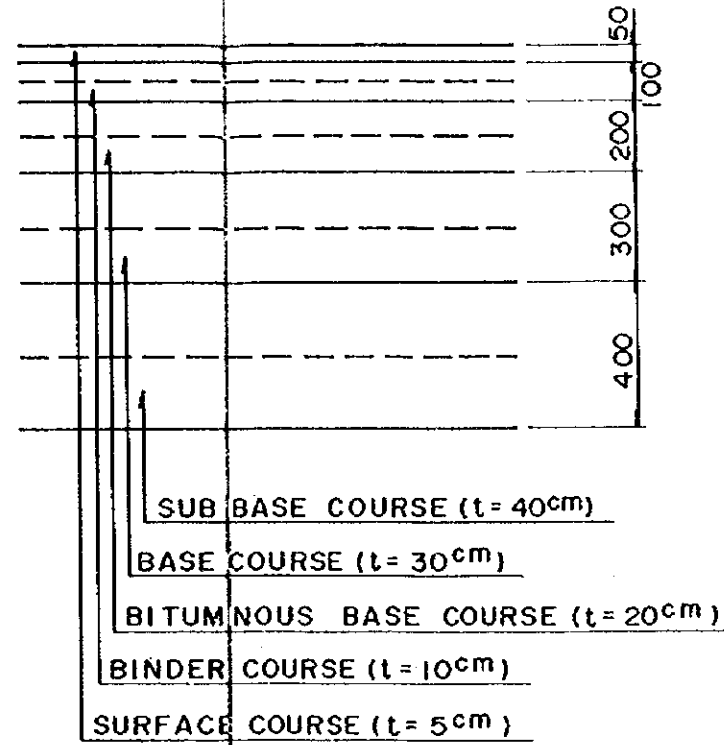
DESIGN OF REPAIR WORK

	Repair Method													
	Damage Type													
	Repair Method													
	Damage Type													
	Repair Method													
	Damage Type													
Slope	Repair Method													
	Damage Type													
Pavement (As. Con.)	Repair Method													
	Damage Type													
Left Side		← MERZIFON												
Right Side		0	100	200	300	400	500	600	700	800	900	1000	SAMSUN →	
Pavement (As. Con.)	Damage Type													
	Repair Method													
Slope	Damage Type													
	Repair Method													
	Damage Type													
	Repair Method													
	Damage Type													
	Repair Method													
Remarks	Damage Type													
	Repair Method													
DESIGN OF REPAIR WORK														
ROUTE		795-01		LOCATION		61-62		SUB-DIV		75				
		JICA STUDY TEAM		SCALE		1: -		SHEET NO		27/51				

I. PAVEMENT



RECONSTRUCTION



TRAFFIC VOLUME CLASSIFICATION : D
 DESIGN CBR VALUE OF SUBGRADE : 2 %
 TARGET VALUE OF T_a (cm) : 51^{cm}

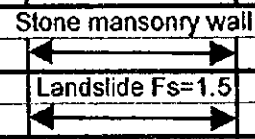
RECONSTRUCTION

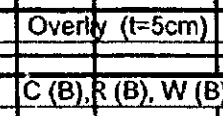
$$T_a = (5+10) \times 1.0 + 20 \times 0.8 + 30 \times 0.35 + 40 \times 0.25 = 51.5\text{cm} > 51\text{cm}$$

DESIGN OF REPAIR WORK					
ROUTE	795-01	LOCATION	61-62	SUB DIV	75
JICA STUDY TEAM			SCALE 1:20	SHEET NO	28/51

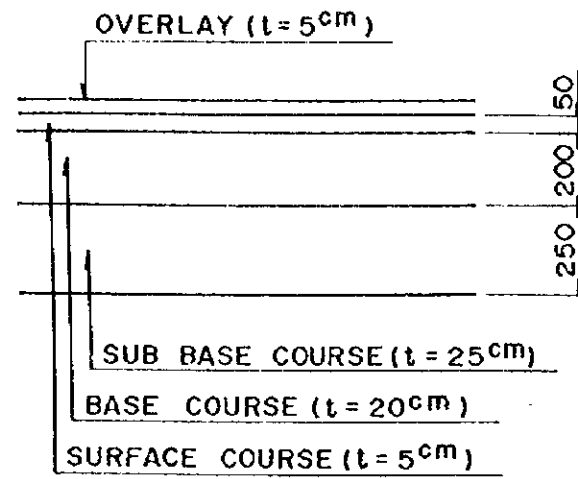
DESIGN OF REPAIR WORK

	Repair Method																						
	Damage Type																						
	Repair Method																						
	Damage Type																						
	Repair Method																						
	Damage Type																						
Slope	Repair Method																						
	Damage Type																						
	Repair Method																						
	Damage Type																						
Pavement (Sur. Tr.)	Repair Method																						
	Damage Type																						
Left Side		← SAMSUN																	→ ORDU				
Right Side			0	100	200	300	400	500	600	700	800	900	1000										
Pavement (Sur. Tr.)	Damage Type																						
	Repair Method																						
Slope	Damage Type																						
	Repair Method																						
	Damage Type																						
	Repair Method																						
	Damage Type																						
	Repair Method																						
	Damage Type																						
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	Repair Method																						
	Damage Type																						
	Repair Method																						
	Damage Type																						
	Repair Method																						
	Damage Type																						
Remarks																							
DESIGN OF REPAIR WORK																							
ROUTE				010-18				LOCATION				7-8				SUB-DIV				77			
JICA STUDY TEAM								SCALE				1: -				SHEET NO				29/51			

Stone masonry wall

 Landslide $F_s = 1.5$

Overly (t=5cm)

 C (B), R (B), W (B)

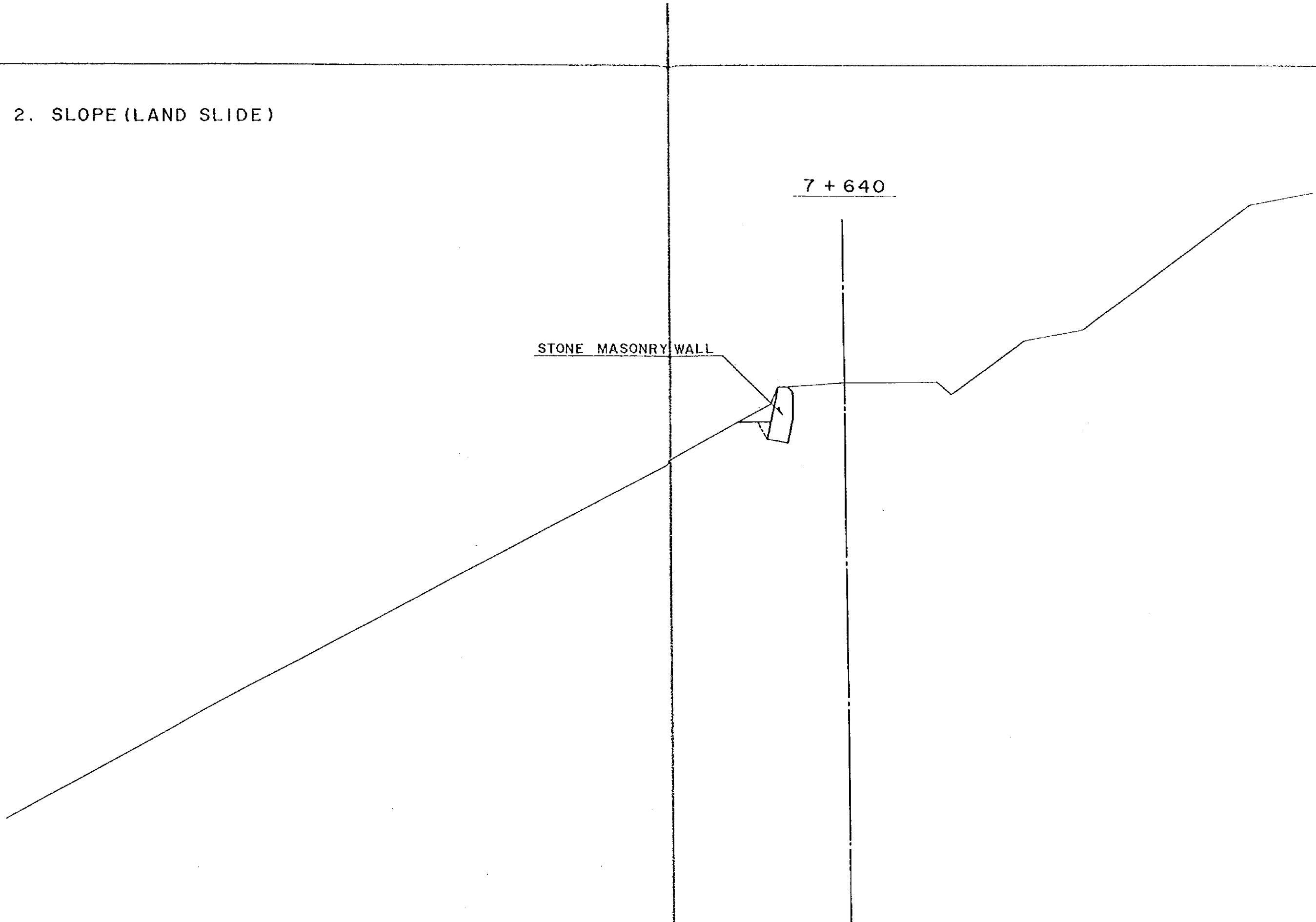
I. PAVEMENT



TRAFFIC VOLUME CLASSIFICATION : C
 DESIGN CBR VALUE OF SUBGRADE : 20% (ASSUMED)
 TARGET VALUE OF T_A (cm) : 20cm
 $T_{A0} = 5 \times 0.6 + 20 \times 0.30 + 25 \times 0.25 = 15.3 \text{ cm}$
 OVERLAY DEPTH REQUIRED = $20 - 15.3 \approx 5 \text{ cm}$

DESIGN OF REPAIR WORK					
ROUTE	010-18	LOCATION	7-8	SUB DIV	77
JICA STUDY TEAM			SCALE 1:20	SHEET NO	30 / 51

2. SLOPE (LAND SLIDE)



DESIGN OF REPAIR WORK					
ROUTE	OIO-18	LOCATION	7-8	SUB DIV	77
JICA STUDY TEAM			SCALE 1:200	SHEET NO	31/51

010-18 (Present Condition)

Minimum safety factor $F_s \text{ min} = 1.499$
 Center of circular arc $X = 160.00 \text{ (M)}$
 $Y = 25.00 \text{ (M)}$
 Radius $R = 48.00 \text{ (M)}$
 Moment of resistance $MR = 16671.71 \text{ (T}^*\text{M)}$
 Starting moment $Mo = 11121.63 \text{ (T}^*\text{M)}$

Number of layers	Saturated weight (T/M3)	Wetting weight (T/M3)	External piction angle	Cohesion (T/M2)	Primary coefficient of cohesion	Lateral reismic coefficient	Vertical reismic coefficient
1	2.00	2.00	25.0	0.50	0.000	0.000	0.000
2	2.00	2.00	15.0		0.000	0.000	0.000

Weight per unit volume of water = 1.000 (T/M3)

1.52	1.59	1.58	1.62	1.90	2.09	2.75	14.21
1.64	1.70	1.63	1.64	1.70	2.03	2.31	3.27
	1.57	1.55	1.58				
1.74	1.54	1.55	1.50	1.71	1.80	2.21	3.13
	1.71	1.64	1.61				
1.98	1.67	1.59	1.54	1.56	1.80	1.94	2.50
2.15	1.65	1.72	1.65	1.60	1.65	1.92	2.17
2.52	1.78	1.87	1.75	1.73	1.65	1.72	1.12

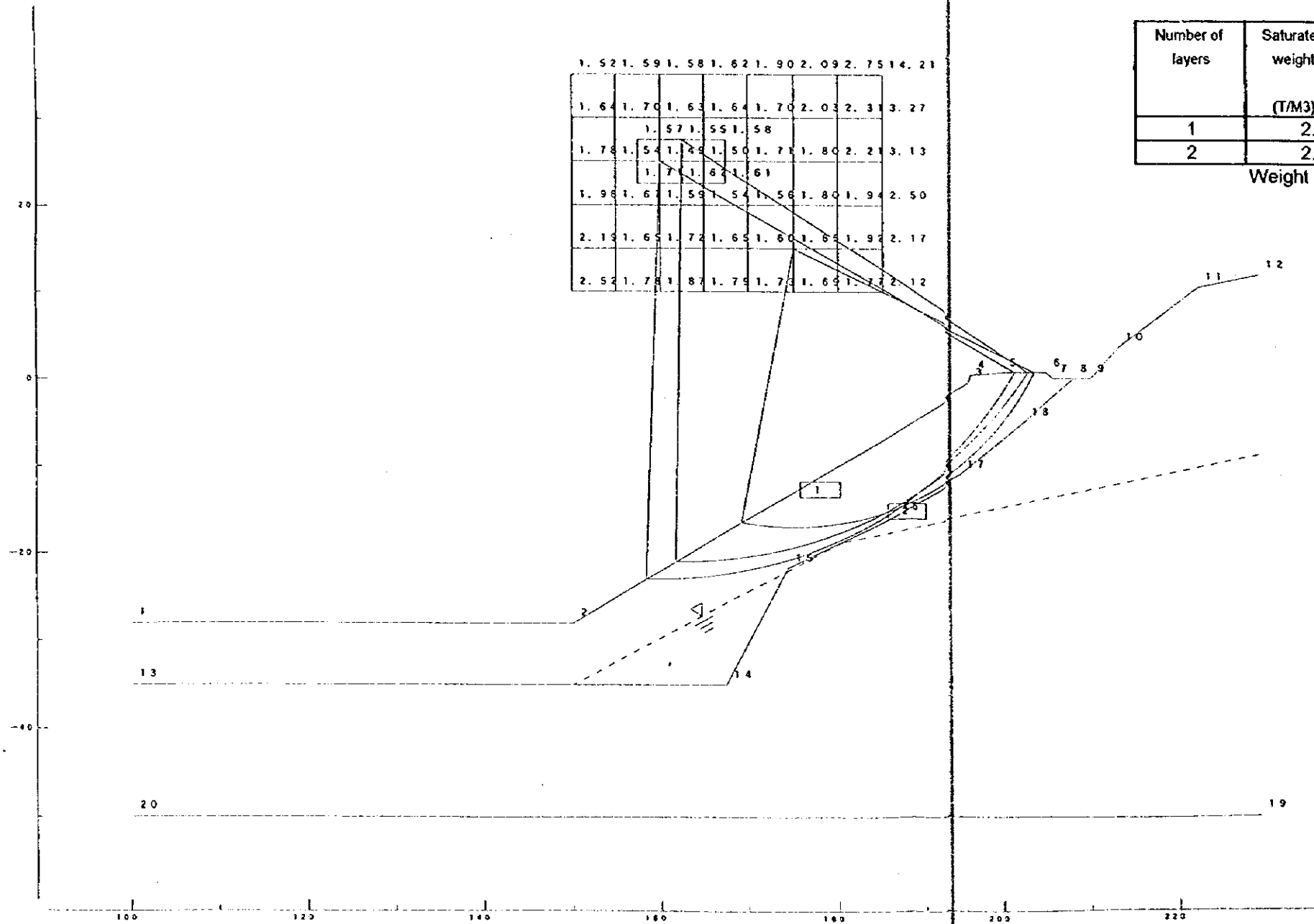


Figure of Safety Factor

DESIGN OF REPAIR WORK					
ROUTE	010-18	LOCATION	7-8	SUB-DIV	77
JICA STUDY TEAM			SCALE 1:600	SHEET NO	32/51

DESIGN OF REPAIR WORK

	Repair Method													
	Damage Type													
	Repair Method													
	Damage Type													
	Repair Method													
	Damage Type													
Slope	Repair Method													
	Damage Type													
Pavement	Repair Method													
	Damage Type													
Left Side	← RIZE													
Right Side		0	100	200	300	400	500	600	700	800	900			1000 →
Pavement	Damage Type													
	Repair Method													
Slope	Damage Type													
	Repair Method													
	Damage Type													
	Repair Method													
	Damage Type													
	Repair Method													
	Damage Type													
	Repair Method													
Remarks	Damage Type													
	Repair Method													
DESIGN OF REPAIR WORK														
ROUTE		010-23	LOCATION		47-48	SUB-DIV		103						
JICA STUDY TEAM				SCALE	1:-	SHEET NO		33/51						

Rock Fill, stone pitching, Wave Dissipation stone

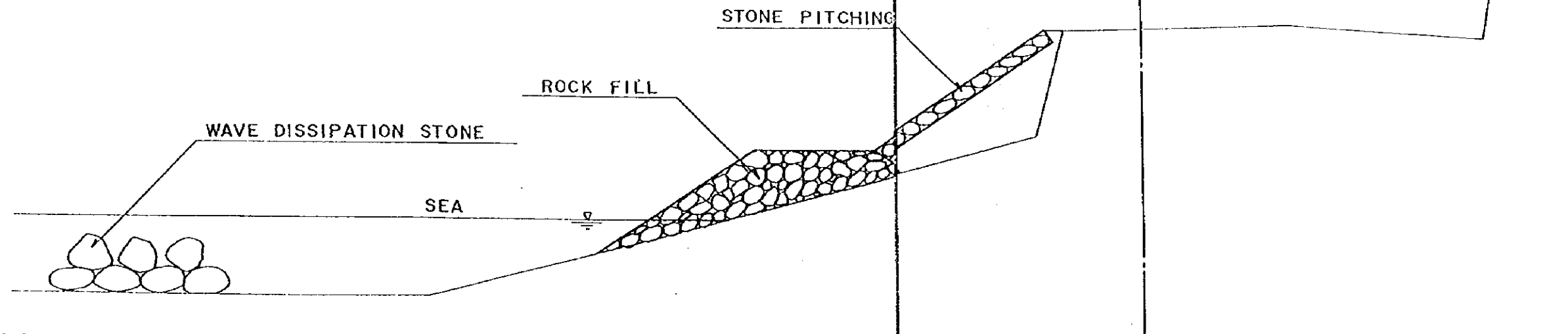
← Erosion (Sea) →

← RIZE

HOPA →

I. SLOPE (EROSION)

47 + 310



DESIGN OF REPAIR WORK					
ROUTE	010-23	LOCATION	47-48	SUB DIV	103
JICA STUDY TEAM			SCALE 1:200	SHEET NO	34/51

DESIGN OF REPAIR WORK

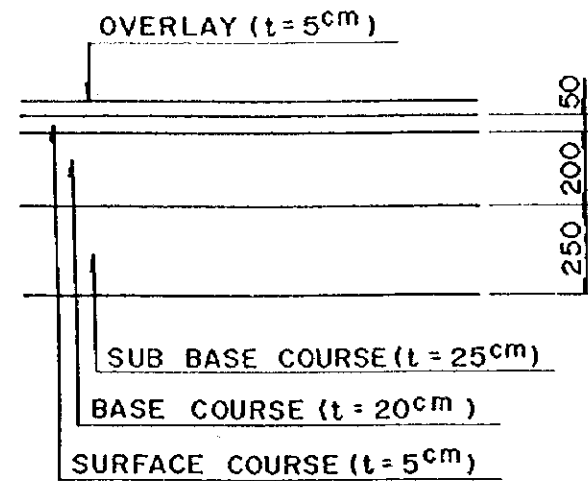
		0	100	200	300	400	500	600	700	800	900	1000
	Repair Method											
	Damage Type											
	Repair Method											
	Damage Type											
Retaining Wall (stone)	Repair Method											
	Damage Type											
Slope	Repair Method											
	Damage Type											
Pavement (Sur. Tr.)	Repair Method											
	Damage Type											
Left Side		← ORDU										
Right Side												→ GİRESUN
Pavement (Sur. Tr.)	Damage Type											
	Repair Method											
Slope	Damage Type											
	Repair Method											
	Damage Type											
	Repair Method											
	Damage Type											
	Repair Method											
Remarks	Damage Type											
	Repair Method											

Gravity Wall, Rock Fill
 ←→
 Settlement, collapse (sea)
 ←→

Overly (t=5cm)
 C (B), (B), W (-)

DESIGN OF REPAIR WORK					
ROUTE	010-19	LOCATION	25-26	SUB-DIV	104
JICA STUDY TEAM			SCALE	1: -	SHEET NO
					35/51

I. PAVEMENT



TRAFFIC VOLUME CLASSIFICATION : C

DESIGN CBR VALUE OF SUBGRADE : 20% (ASSUMED)

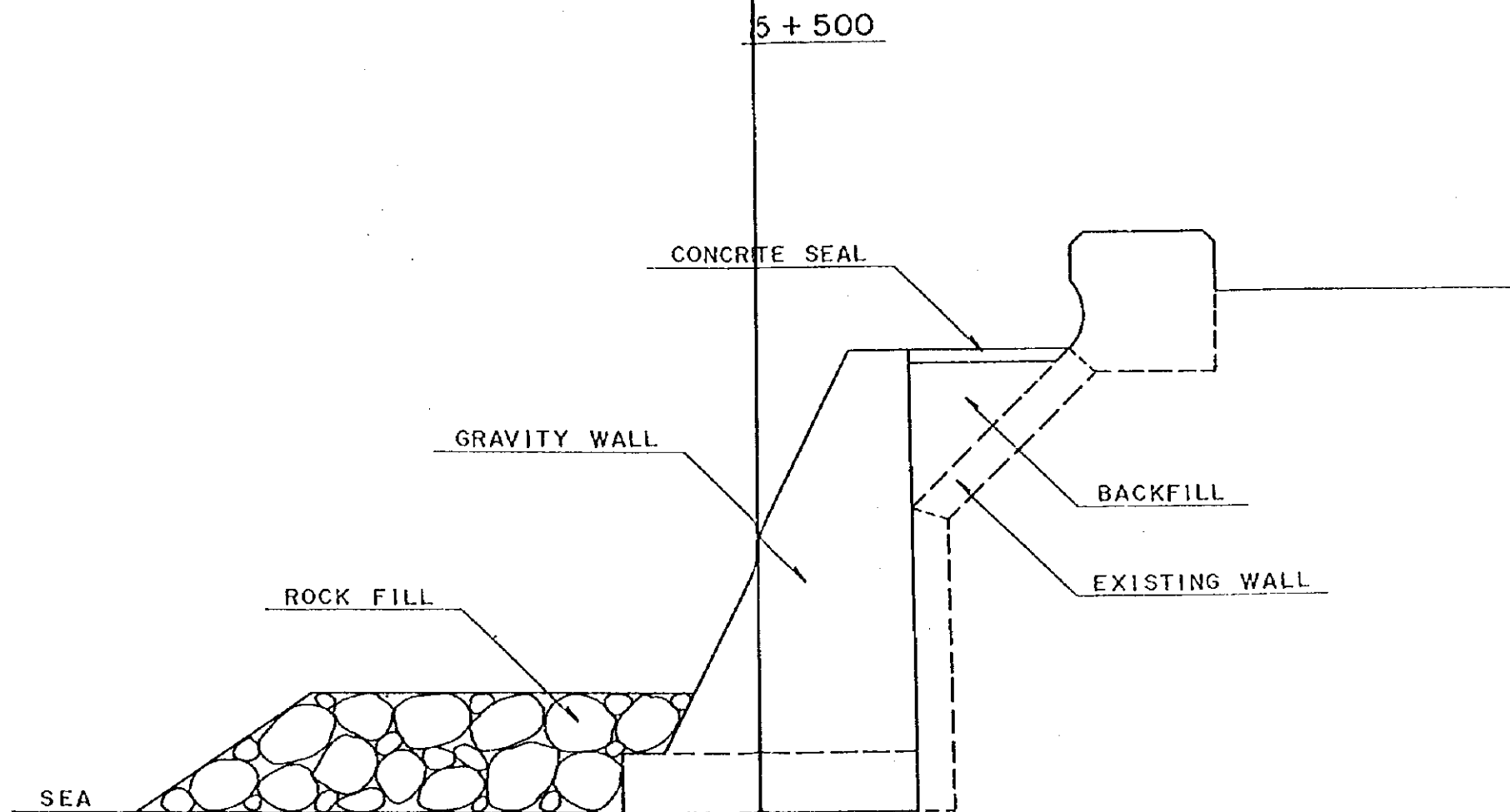
TARGET VALUE OF T_A (cm) : 20^{cm}

$$T_{A0} = 5 \times 0.6 + 20 \times 0.30 + 25 \times 0.25 = 15.3 \text{ cm}$$

$$\text{OVERLAY DEPTH REQUIRED} = 20 - 15.3 = 5 \text{ cm}$$

DESIGN OF REPAIR WORK					
ROUTE	010-19	LOCATION	25-26	SUB DIV	104
JICA STUDY TEAM			SCALE 1:20	SHEET NO	36/51

2. RETAINING WALL



DESIGN OF REPAIR WORK					
ROUTE	010-19	LOCATION	25-26	SUB DIV	104
JICA STUDY TEAM			SCALE 1:50	SHEET NO	37/51

DESIGN OF REPAIR WORK

	Repair Method														
	Damage Type														
	Repair Method														
	Damage Type														
Retaining Wall (con.)	Repair Method														
	Damage Type														
	Repair Method														
	Damage Type														
Slope	Repair Method														
	Damage Type														
	Repair Method														
	Damage Type														
Pavement (Sur. Tr.)	Repair Method														
	Damage Type														
	Repair Method														
	Damage Type														
Left Side	← GİRESUN														
Right Side	0	100	200	300	400	500	600	700	800	900	1000	→ TRABZON			
Pavement	Damage Type														
	Repair Method														
	Damage Type														
	Repair Method														
Slope	Damage Type														
	Repair Method														
	Damage Type														
	Repair Method														
	Damage Type														
	Repair Method														
	Damage Type														
	Repair Method														
	Damage Type														
	Repair Method														
	Damage Type														
	Repair Method														
Remarks															
DESIGN OF REPAIR WORK															
ROUTE			010-21			LOCATION			25-26			SUB-DIV			105
JICA STUDY TEAM								SCALE		1: -		SHEET NO		38/51	

Fill (cement mortar), rock fill

Settlement (sea)

Overly (t=5cm)

C (B), (B), W (-)

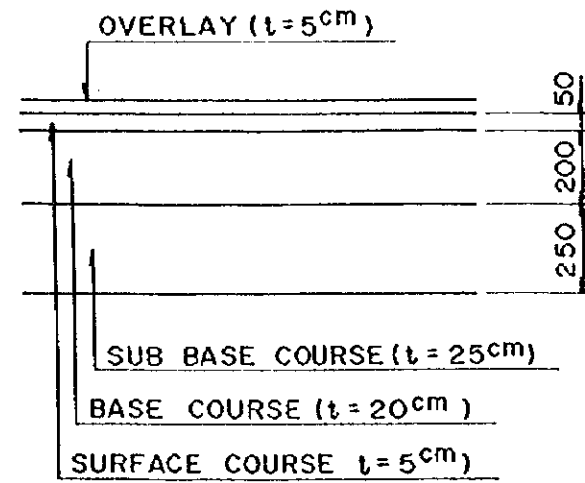
GİRESUN

TRABZON

DESIGN OF REPAIR WORK

ROUTE			010-21			LOCATION			25-26			SUB-DIV			105
JICA STUDY TEAM								SCALE		1: -		SHEET NO		38/51	

I. PAVEMENT

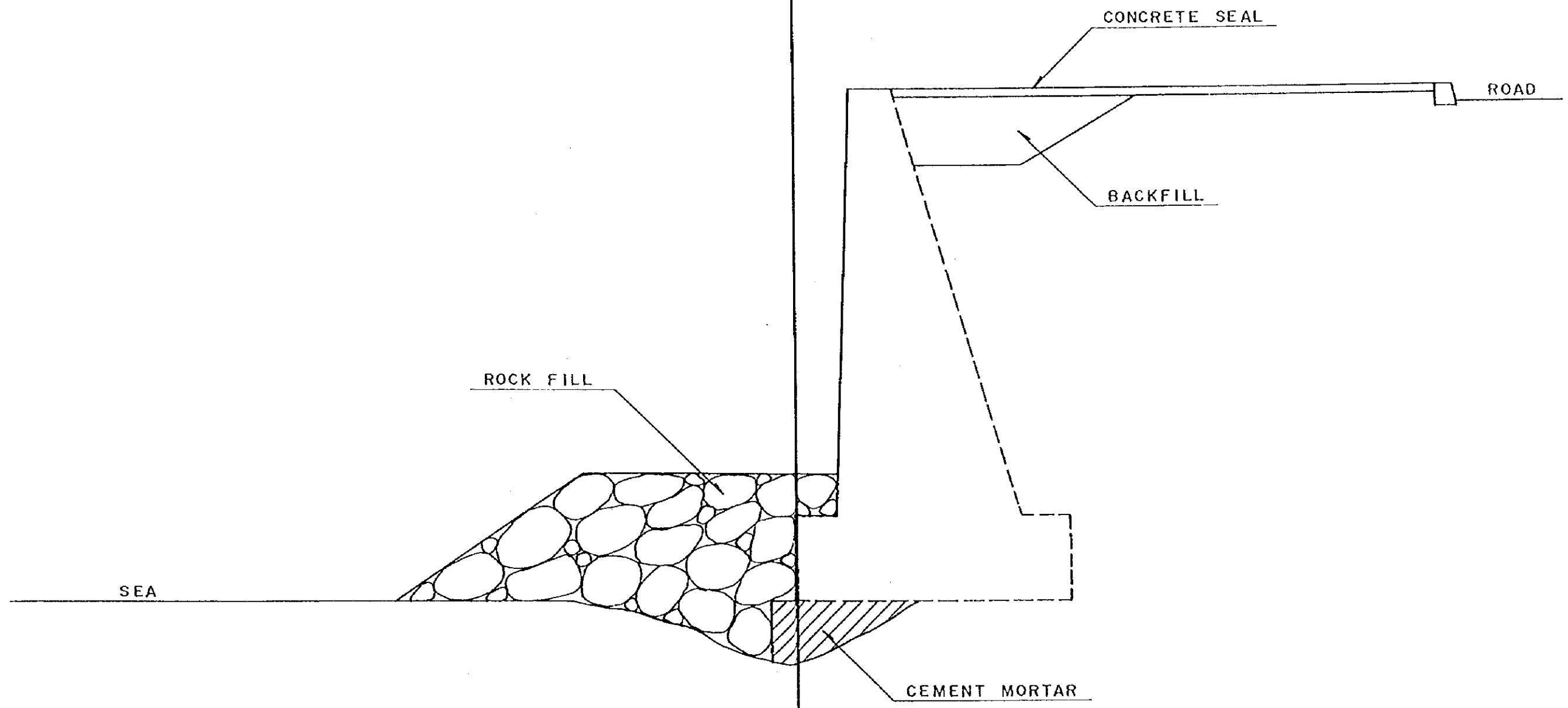


TRAFFIC VOLUME CLASSIFICATION : C
 DESIGN CBR VALUE OF SUBGRADE : 20% (ASSUMED)
 TARGET VALUE OF TA (cm) : 20^{cm}
 $TA_0 = 5 \times 0.6 + 20 \times 0.30 + 25 \times 0.25 = 15.3\text{cm}$
 OVERLAY DEPTH REQUIRED = $20 - 15.3 \approx 5\text{cm}$

DESIGN OF REPAIR WORK					
ROUTE	010-21	LOCATION	25-26	SUB DIV	105
JICA STUDY TEAM			SCALE 1:20	SHEET NO	39/51

2. RETAINING WALL

5 + 642

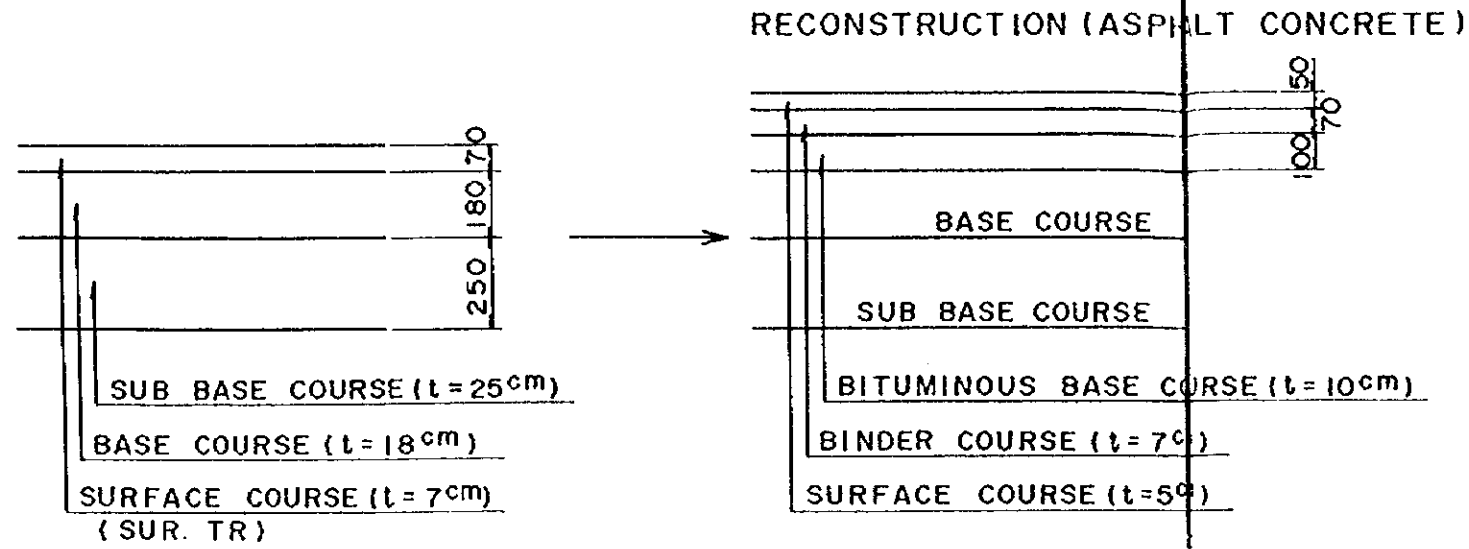


DESIGN OF REPAIR WORK					
ROUTE	010-21	LOCATION	5 - 6	SUB DIV	105
JICA STUDY TEAM			SCALE 1:50	SHEET NO	40 / 51

DESIGN OF REPAIR WORK

	Repair Method																					
	Damage Type																					
	Repair Method																					
	Damage Type																					
	Repair Method																					
	Damage Type																					
Slope	Repair Method																					
	Damage Type																					
Pavement (Sur. Tr.)	Repair Method																					
	Damage Type																					
Left Side		← BURDUR																				
Right Side			0	100	200	300	400	500	600	700	800	900	1000									→ ANTALYA
Pavement (Sur. Tr.)	Damage Type						←→	←→		←→												
	Repair Method						←→	←→		←→												
							C - R (C), W (B), PSI=3.9, CBR=4, T=7, H=50															
							reconstruction (As(t=12cm), Ast(t=10cm)), (Ashalt Concrete)															
Slope	Damage Type																					
	Repair Method																					
	Damage Type																					
	Repair Method																					
	Damage Type																					
	Repair Method																					
Remarks																						
DESIGN OF REPAIR WORK																						
ROUTE			650-14			LOCATION			36-37			SUB-DIV			132							
JICA STUDY TEAM																						
SCALE						1: -			SHEET NO			41/51										

I. PAVEMENT



TRAFFIC VOLUME CLASSIFICATION : C

DESIGN CBR VALUE OF SUBGRADE : 4 %

TARGET VALUE OF TA (cm) : 32 cm

$$TA_0 = 7 \times 0.6 + 18 \times 0.35 + 25 \times 0.25 = 16.8 \text{ cm}$$

$$\text{OVERLAY DEPTH REQUIRED} = (32 - 16.8) \times 1.08 = 19 \text{ cm}$$

IN THE CASE OF REPLACING THE SURFACE OF A SURFACE-TREATED ROAD WITH ASPHALT CONCRETE

$$TA = (5 + 7) \times 1.0 + 10 \times 0.8 + 18 \times 0.35 + 25 \times 0.25 = 32.5 \text{ cm} > 32 \text{ cm}$$

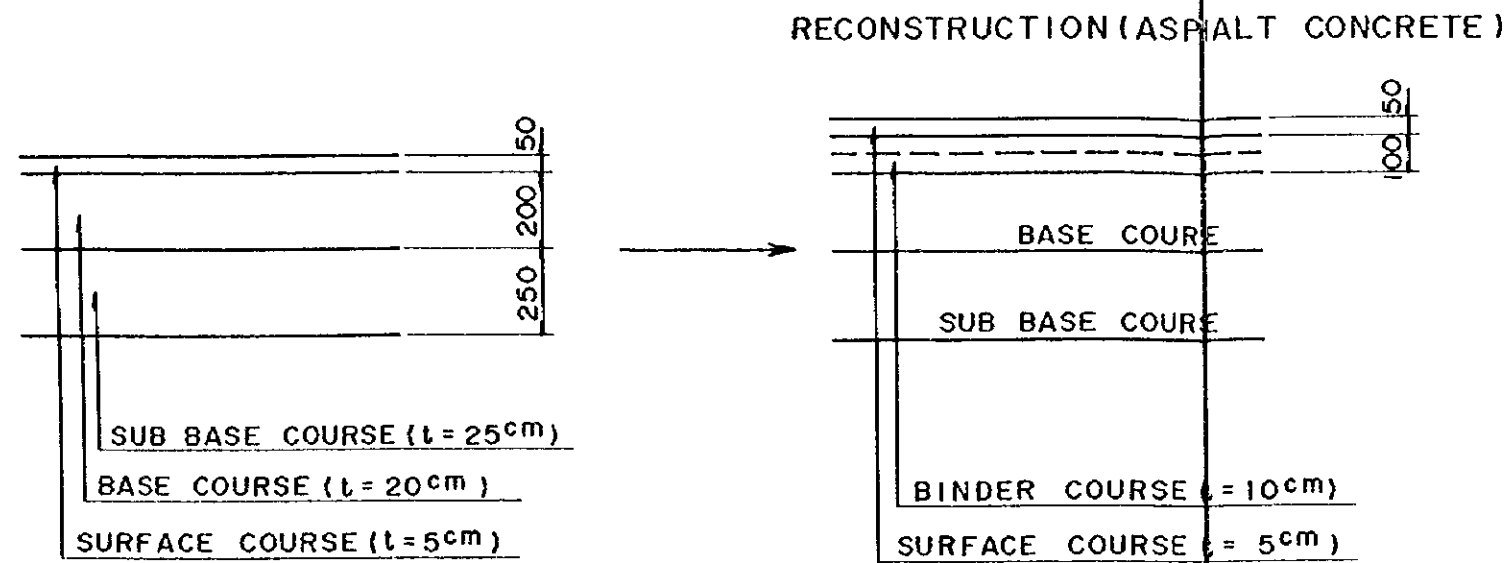
DESIGN OF REPAIR WORK					
ROUTE	650-14	LOCATION	36 - 37	SUB DIV	132
JICA STUDY TEAM			SCALE 1:20	SHEET NO	42 / 51

DESIGN OF REPAIR WORK

	Repair Method														
	Damage Type														
	Repair Method														
	Damage Type														
	Repair Method														
	Damage Type														
Slope	Repair Method														
	Damage Type														
Pavement (Sur. Tr.)	Repair Method														
	Damage Type														
Left Side	BURDUR														
Right Side		0	100	200	300	400	500	600	700	800	900				ANTALYA
Pavement (Sur. Tr.)	Damage Type				C(A), R (C), W (-), PSI=1.8										
	Repair Method				Reconstruction (As(t=15cm)), (Ashalt Cocrete)										
Slope	Damage Type														
	Repair Method														
	Damage Type														
	Repair Method														
	Damage Type														
	Repair Method														
Remarks															

DESIGN OF REPAIR WORK						
ROUTE	650-12	LOCATION	36-37	SUB-DIV	134	
JICA STUDY TEAM			SCALE	1: -	SHEET NO	43/51

I. PAVEMENT



TRAFFIC VOLUME CLASSIFICATION : C
 DESIGN CBR VALUE OF SUBGRADE : 10% (ASSUMED)
 TARGET VALUE OF T_A (cm) : 24.5cm
 $T_{A0} = 5 \times 0.5 + 20 \times 0.25 + 25 \times 0.20 = 12.5 \text{ cm}$
 OVERLAY DEPTH REQUIRED = $(24.5 - 12.5) \times 1.08 = 15 \text{ cm}$

RECONSTRUCTION

IN THE CASE OF REPLACING THE SURFACE OF A SURFACE-TREATED ROAD WITH ASPHALT CONCRETE

$T_A = (5 + 10) \times 1.0 + 20 \times 0.25 + 25 \times 0.20 = 25.0 \text{ cm} > 24.5 \text{ cm}$

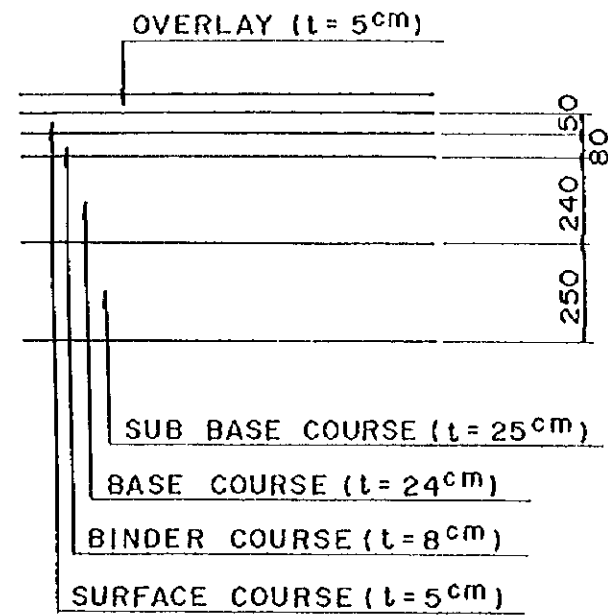
DESIGN OF REPAIR WORK					
ROUTE	650-12	LOCATION	36-37	SUB DIV	134
JICA STUDY TEAM			SCALE 1:20	SHEET NO	44/51

DESIGN OF REPAIR OF WORK

	Repair Method													
	Damage Type													
	Repair Method													
	Damage Type													
	Repair Method													
	Damage Type													
Slope	Repair Method													
	Damage Type													
Pavement	Repair Method													
	Damage Type													
Left Side		← BURSA												
Right Side			0	100	200	300	400	500	600	700	800	900	1000	→ ESKISEHIR
Pavement (As. Con.)	Damage Type													
	Repair Method													
Slope	Damage Type													
	Repair Method													
	Damage Type													
	Repair Method													
	Damage Type													
	Repair Method													
Remarks	Damage Type													
	Repair Method													

DESIGN OF REPAIR WORK					
ROUTE	200-06	LOCATION	12-13	SUB-DIV	143
JICA STUDY TEAM			SCALE	1: -	SHEET NO
					45/51

I. PAVEMENT



TRAFFIC VOLUME CLASSIFICATION : C

DESIGN CBR VALUE OF SUBGRADE : 10% (ASSUMED)

TARGET VALUE OF T_A (cm) : 24.5 cm

$$T_{A0} = (5+8) \times 0.6 + 24 \times 0.3 + 25 \times 0.20 = 20.0 \text{ cm}$$

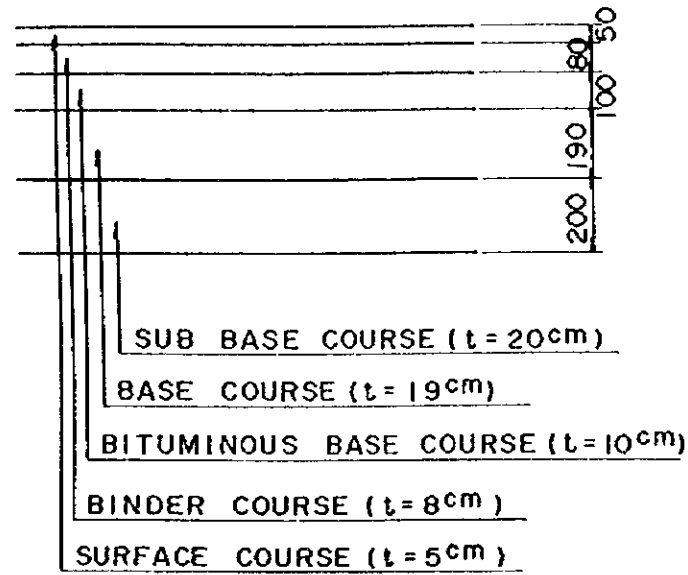
$$\text{OVERLAY DEPTH REQUIRED} = 24.5 - 20 \approx 5 \text{ cm}$$

DESIGN OF REPAIR WORK					
ROUTE	200-06	LOCATION	12-13	SUB DIV	143
JICA STUDY TEAM			SCALE 1:20	SHEET NO	46/51

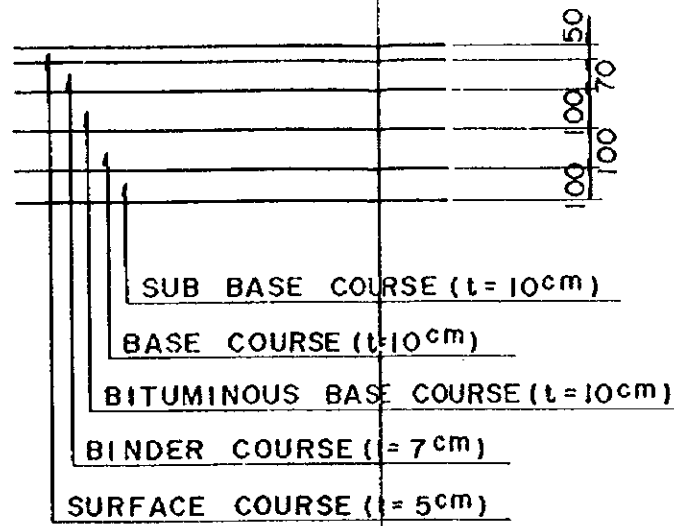
DESIGN OF REPAIR WORK

	Repair Method												
	Damage Type												
	Repair Method												
	Damage Type												
	Repair Method												
	Damage Type												
Slope	Repair Method												
	Damage Type												
Pavement	Repair Method												
	Damage Type												
Left Side		← BURSA											ESKISEHIR →
Right Side			0	100	200	300	400	500	600	700	800	900	1000
Pavement (As.Con.)	Damage Type		C (-), R (A), W (C), FSI=0, CBR=20, T=23, H=62										
	Repair Method		reconstruction (As (t=12cm), Ast (t=10cm), M(t=10cm), C(t=10cm))										
Slope Embankment	Damage Type											← Erosion →	
	Repair Method											← paved shoulder, asphalt kerb →	
	Damage Type												
	Repair Method												
	Damage Type												
	Repair Method												
	Damage Type												
	Repair Method												
Remarks													
		DESIGN OF REPAIR WORK											
		ROUTE	200-07	LOCATION	41-42			SUB-DIV	144				
		JICA STUDY TEAM				SCALE	1:1	SHEET NO		47/51			

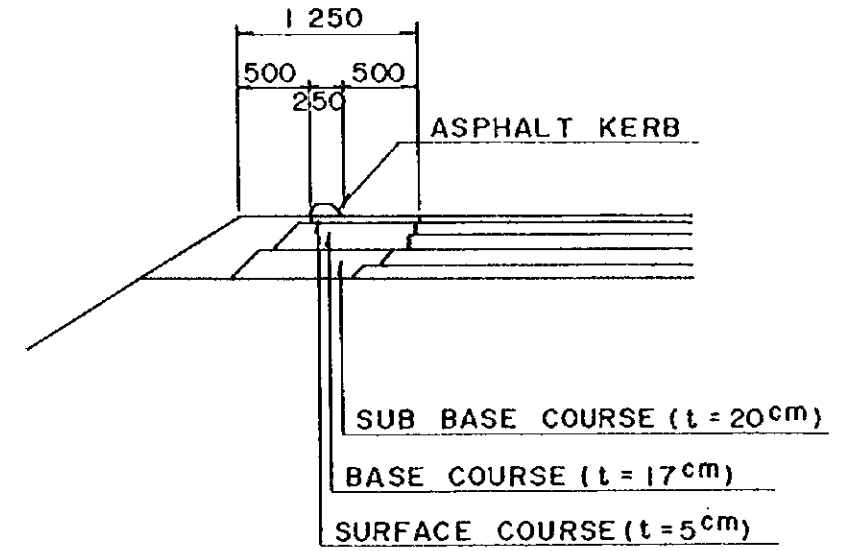
I. PAVEMENT



RECONSTRUCTION



2. PAVED SHOULDER



TRAFFIC VOLUME CLASSIFICATION : D

DESIGN CBR VALUE OF SUBGRADE : 20 %

TARGET VALUE OF T_A (cm) : 26 cm

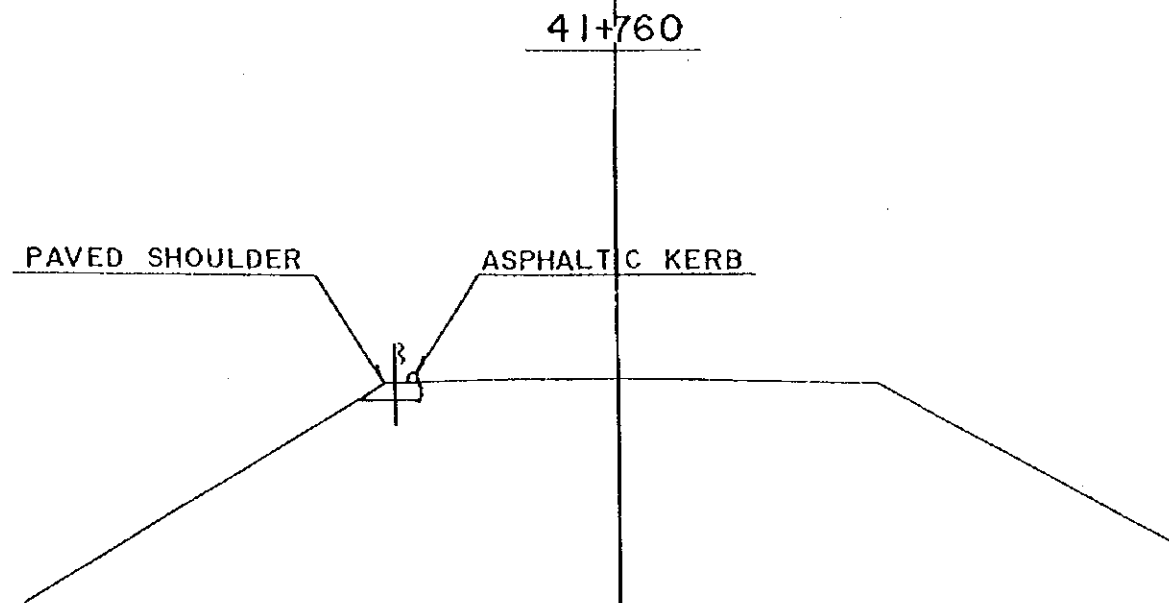
$$T_{A0} = (5 + 8) \times 0.5 + 10 \times 0.5 + 19 \times 0.25 + 20 \times 0.20 = 20.3 \text{ cm}$$

RECONSTRUCTION

$$T_A = (5 + 7) \times 1.0 + 10 \times 0.8 + 10 \times 0.35 + 10 \times 0.25 = 26 \text{ cm} \geq 26 \text{ cm}$$

DESIGN OF REPAIR WORK					
ROUTE	200-07	LOCATION	41-42	SUB DIV	144
JICA STUDY TEAM			SCALE 1:20	SHEET NO	48/51

3. SLOPE (EROSION)

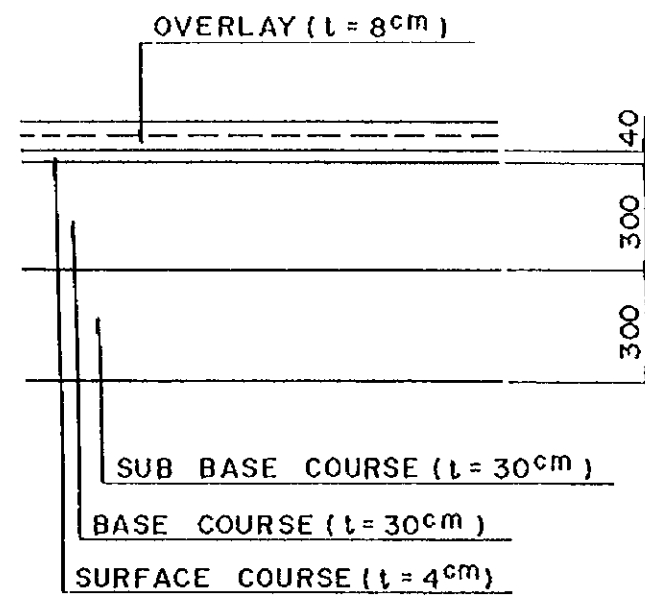


DESIGN OF REPAIR WORK					
ROUTE	200-07	LOCATION	41-42	SUB DIV	144
JICA STUDY TEAM			SCALE 1:200	SHEET NO	49/51

DESIGN OF REPAIR WORK

	Repair Method																																																																																										
	Damage Type																																																																																										
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Pavement (As.Con.)	Damage Type																																																																																										
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Slope Embankment	Damage Type																																																																																										
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ROUTE	200-06	LOCATION	29-30	SUB-DIV	147																																																																																						
JICA STUDY TEAM			SCALE	1: -	SHEET NO	50/51																																																																																					

I. PAVEMENT



TRAFFIC VOLUME CLASSIFICATION : C

DESIGN CBR VALUE OF SUBGRADE : 10%

TARGET VALUE OF T_A (cm) : 24.5 cm

$T_{A0} = 4 \times 0.5 + 30 \times 0.30 + 30 \times 0.20 = 17 \text{ cm}$

OVERLAY DEPTH REQUIRED = $24.5 - 17 = 8 \text{ cm}$

DESIGN OF REPAIR WORK					
ROUTE	200-06	LOCATION	29-30	SUB DIV	147
JICA STUDY TEAM			SCALE 1:20	SHEET NO	51/51



JICA