CALCULATION OF INITIAL PRESSURE

Km 17+900 HE=3.5 m Top of Slope of Embankment

SOIL No.	SOIL	THICKNESS OF SOIL	WET UNIT WEIGHT	CALCULATION OF INITIAL PRESSURE	INITIAL PRESSURE
1	Ac1	2.000	1.660	0.000+0.5(0.000 * 0.000 + 2.000 * 1.660)	1.660
2	Ac2	2.000	0.660	1.660+0.5(2.000 * 1.660 + 2.000 * 0.660)	3.980

INTENSITY OF DISTRIBUTED LOAD q=H*rt= 3.50* 1.800 6.30

SOIL No.	SOIL	DEPTH FROM CENTRAL SOIL STRUTA	a/Z a= 5.250	b1/Z b1= 0.000	b2/Z b2= 5.800	I1	I2	DP	Po	Po+DP
1	Ac1	1.000	5.250	0.000	5.800	0.440	0.500	5.920	1.660	7.580
2	Ac2	3.000	1.750	0.000	1.933	0.335	0.490	5.198	3.980	9.178

SUBSIDED VALUE FOR CONSOLIDATION AND COEFFICIENT OF CONSOLIDATTION

SOIL No.	SOIL	THICKNESS OF SOIL	Po	DP	Po+DP	e0	ei	Sc	DP/2	Po+DP/2	Cv
1	Ac1	2.0000	1.6600	5.9199	7.5799	1.6370	1.5250	0.0849	2.9599	4.6199	405
2	Ac2	2.0000	3.9800	5.1975	9.1775	1.5860	1.4970	0.0688	2.5988	6.5788	390

TYPICAL COEFFICIENT OF CONSOLIDATION AND DISTANCE OF DRAINAGE

SOIL No	SOIL	THICKNESS OF SOIL	Cv	Cv'	H'	CONDITION OF DRAINAGE	DISTANCE OF DRAINAGE
1	Ac1	200.00	405.00	390.00	396.26	1Side	396.26
2	Ac2	200.00	390.00				

SUBSIDED TIME FOR CONSOLIDATION BY MOMENTARY EMBANKMENT

U (%)	10.00	20.00	30.00	40.00	50.00	60.00	70.00	80.00	90.00	95.00	100.00
Tv	0.008	0.031	0.071	0.126	0.196	0.287	0.403	0.567	0.848	1.130	infinite

EXPRESSION t=Tv.d^2/C'v=Tv. 396.26^2/ 390.00= 402.62

t (days)	3.22	12.48	28.59	50.73	78.91	115.55	162.26	228.20	341.42	454.96	
Sc.U (cm)	1.54	3.08	4.61	6.15	7.69	9.23	10.76	12.30	13.84	14.61	15.38

*APPENDIX

CALCULATION OF CONVERTIBLE SOIL THICKNESS

200.00 *SQR(390.00 / 405.00) + 200.00 *SQR(390.00 / 390.00)

CALCULATION OF INITIAL PRESSURE

SOIL No.	SOIL	THICKNESS OF SOIL	WET UNIT WEIGHT	CALCULATION OF INITIAL PRESSURE	INITIAL PRESSURE
1	Ac1	2.000	1.660	0.000+0.5(0.000 * 0.000 + 2.000 * 1.660)	1.660
2	Ac2	2.000	0.660	1.660+0.5(2.000 * 1.660 + 2.000 * 0.660)	3.980

INTENSITY OF DISTRIBUTED LOAD

SOIL No.	SOIL	DEPTH FROM CENTRAL SOIL STRUTA	a1+a2/Z	a1+b/Z	a1/Z a1= 5.250	a2/Z a2= 0.000	b/Z b= 5.800	I1	I2	I3	DP	Po	Po+DP
1	Ac1	1.000	5.250	11.050	5.250	0.000	0.000	0.500	0.440	0.000	0.378	1.660	2.038
2	Ac2	3.000	1.750	3.683	1.750	0.000	0.000	0.496	0.350	0.000	0.920	3.980	4.900

SUBSIDED VALUE FOR CONSOLIDATION AND COEFFICIENT OF CONSOLIDATTION

SOIL No.	SOIL	THICKNESS OF SOIL	Po	DP	Po+DP	e0	e1	Sc	DP/2	Po+DP/2	Cv
1	Ac1	2.0000	1.6600	0.3780	2.0380	1.6370	1.6300	0.0053	0.1890	1.8490	450
2	Ac2	2.0000	3.9800	0.9198	4.8998	1.5860	1.5700	0.0124	0.4599	4.4399	410

TYPICAL COEFFICIENT OF CONSOLIDATION AND DISTANCE OF DRAINAGE

SOIL No	SOIL	THICKNESS OF SOIL	Cv	Cv'	H'	CONDITION OF DRAINAGE	DISTANCE OF DRAINAGE
1	Ac1	200.00	450.00	410.00	390.90	1Side	390.90
2	Ac2	200.00	410.00				

SUBSIDED TIME FOR CONSOLIDATION BY MOMENTARY EMBANKMENT

U (%)	10.00	20.00	30.00	40.00	50.00	60.00	70.00	80.00	90.00	95.00	100.00
Tv	0.008	0.031	0.071	0.126	0.196	0.287	0.403	0.567	0.848	1.130	infinite

EXPRESSION t=Tv.d^2/C'v=Tv. 390.90^2/ 410.00= 372.70

t (days)	2.98	11.55	26.46	46.96	73.05	106.96	150.20	211.32	316.05	421.15	
Sc.U (cm)	0.18	0.35	0.53	0.71	0.88	1.06	1.24	1.41	1.59	1.68	1.77

*APPENDIX

CALCULATION OF CONVERTIBLE SOIL THICKNESS

200.00 *SQR(410.00 / 450.00) + 200.00 *SQR(410.00 / 410.00)

CALCULATION OF INITIAL PRESSURE

Km 17+900 HE=3.5 m 3.3m from Toe of Slope

SOIL No.	SOIL	THICKNESS OF SOIL	WET UNIT WEIGHT	CALCULATION OF INITIAL PRESSURE	INITIAL PRESSURE
1	Ac1	2.000	1.660	0.000+0.5(0.000 * 0.000 + 2.000 * 1.660)	1.660
2	Ac2	2.000	0.660	1.660+0.5(2.000 * 1.660 + 2.000 * 0.660)	3.980

INTENSITY OF DISTRIBUTED LOAD q=H*rt= 3.50* 1.800 6.30

SOIL No.	SOIL	DEPTH FROM CENTRAL SOIL STRUTA	a1/Z a1= 5.250	a1+a2+b/Z a2= 3.300	a2/Z b= 2.900	I1	I2	DP	Po	Po+DP
1	Ac1	1.000	5.250	14.350	3.300	0.001	0.000	0.009	1.660	1.669
2	Ac2	3.000	1.750	4.783	1.100	0.026	0.000	0.165	3.980	4.145

SUBSIDED VALUE FOR CONSOLIDATION AND COEFFICIENT OF CONSOLIDATTION

SOIL No.	SOIL	THICKNESS OF SOIL	Po	DP	Po+DP	e0	e1	Sc	DP/2	Po+DP/2	Cv
1	Ac1	2.0000	1.6600	0.0091	1.6691	1.6370	1.6360	0.0008	0.0045	1.6645	450
2	Ac2	2.0000	3.9800	0.1646	4.1446	1.5860	1.5840	0.0015	0.0823	4.0623	410

TYPICAL COEFFICIENT OF CONSOLIDATION AND DISTANCE OF DRAINAGE

SOIL No	SOIL	THICKNESS OF SOIL	Cv	Cv'	H'	CONDITION OF DRAINAGE	DISTANCE OF DRAINAGE
1	Ac1	200.00	450.00	410.00	390.90	1Side	390.90
2	Ac2	200.00	410.00				

SUBSIDED TIME FOR CONSOLIDATION BY MOMENTARY EMBANKMENT

U (%)	10.00	20.00	30.00	40.00	50.00	60.00	70.00	80.00	90.00	95.00	100.00
Tv	0.008	0.031	0.071	0.126	0.196	0.287	0.403	0.567	0.848	1.130	infinite

EXPRESSION t=Tv.d^2/C'v=Tv. 390.90^2/ 410.00= 372.70

t (days)	2.98	11.55	26.46	46.96	73.05	106.96	150.20	211.32	316.05	421.15	
Sc.U (cm)	0.02	0.05	0.07	0.09	0.12	0.14	0.16	0.18	0.21	0.22	0.23

*APPENDIX

CALCULATION OF CONVERTIBLE SOIL THICKNESS

200.00 *SQR(410.00 / 450.00) + 200.00 *SQR(410.00 / 410.00)

CALCULATION OF INITIAL PRESSURE

Km 17+900 HE=3.5m 7.3m from Toe of Slope

SOIL No.	SOIL	THICKNESS OF SOIL	WET UNIT WEIGHT	CALCULATION OF INITIAL PRESSURE	INITIAL PRESSURE
1	Ac1	2.000	1.660	0.000+0.5(0.000 * 0.000 + 2.000 * 1.660)	1.660
2	Ac2	2.000	0.660	1.660+0.5(2.000 * 1.660 + 2.000 * 0.660)	3.980

INTENSITY OF DISTRIBUTED LOAD q=H*rt= 3.50* 1.800 6.30

SOIL No.	SOIL	DEPTH FROM CENTRAL SOIL STRUTA	a1/Z a1= 5.250	a1+a2+b/Z a2= 7.300	a2/Z b= 2.900	I1	I2	DP	Po	Po+DP
1	Ac1	1.000	5.250	16.350	7.300	0.000	0.000	0.001	1.660	1.661
2	Ac2	3.000	1.750	6.117	2.433	0.005	0.000	0.034	3.980	4.014

SUBSIDED VALUE FOR CONSOLIDATION AND COEFFICIENT OF CONSOLIDATTION

SOIL No.	SOIL	THICKNESS OF SOIL	Po	DP	Po+DP	e0	e1	Sc	DP/2	Po+DP/2	Cv
1	Ac1	2.0000	1.6600	0.0014	1.6614	1.6370	1.6370	0.0000	0.0007	1.6607	450
2	Ac2	2.0000	3.9800	0.0336	4.0136	1.5860	1.5850	0.0008	0.0168	3.9968	410

TYPICAL COEFFICIENT OF CONSOLIDATION AND DISTANCE OF DRAINAGE

SOIL No	SOIL	THICKNESS OF SOIL	Cv	Cv'	H'	CONDITION OF DRAINAGE	DISTANCE OF DRAINAGE
1	Ac1	200.00	450.00	410.00	390.90	1Side	390.90
2	Ac2	200.00	410.00				

SUBSIDED TIME FOR CONSOLIDATION BY MOMENTARY EMBANKMENT

U (%)	10.00	20.00	30.00	40.00	50.00	60.00	70.00	80.00	90.00	95.00	100.00
Tv	0.008	0.031	0.071	0.126	0.196	0.287	0.403	0.567	0.848	1.130	infinite

EXPRESSION t=Tv.d^2/C'v=Tv. 390.90^2/ 410.00= 372.70

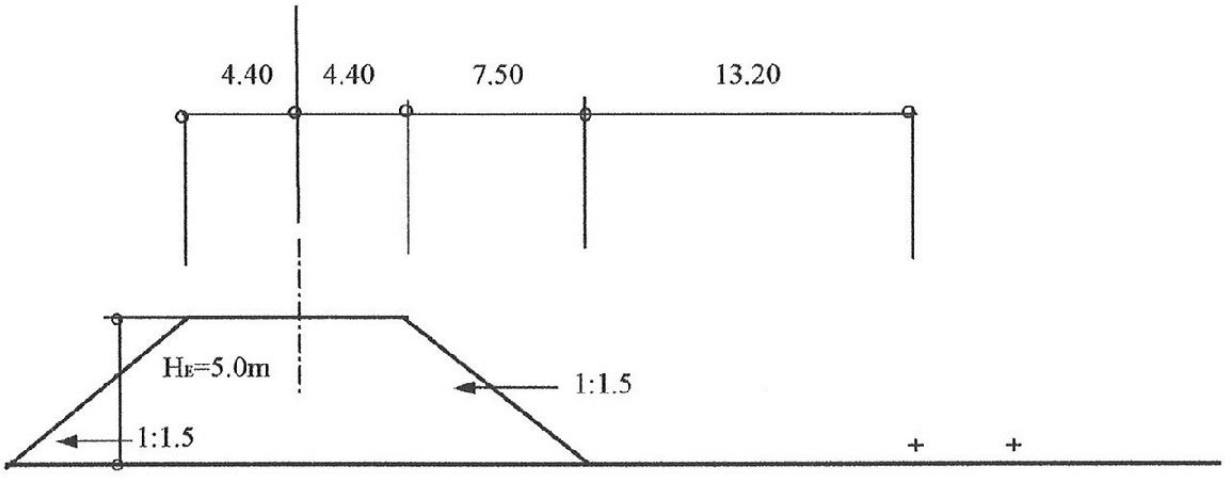
t (days)	2.98	11.55	26.46	46.96	73.05	106.96	150.20	211.32	316.05	421.15	
Sc.U (cm)	0.01	0.02	0.02	0.03	0.04	0.05	0.05	0.06	0.07	0.07	0.08

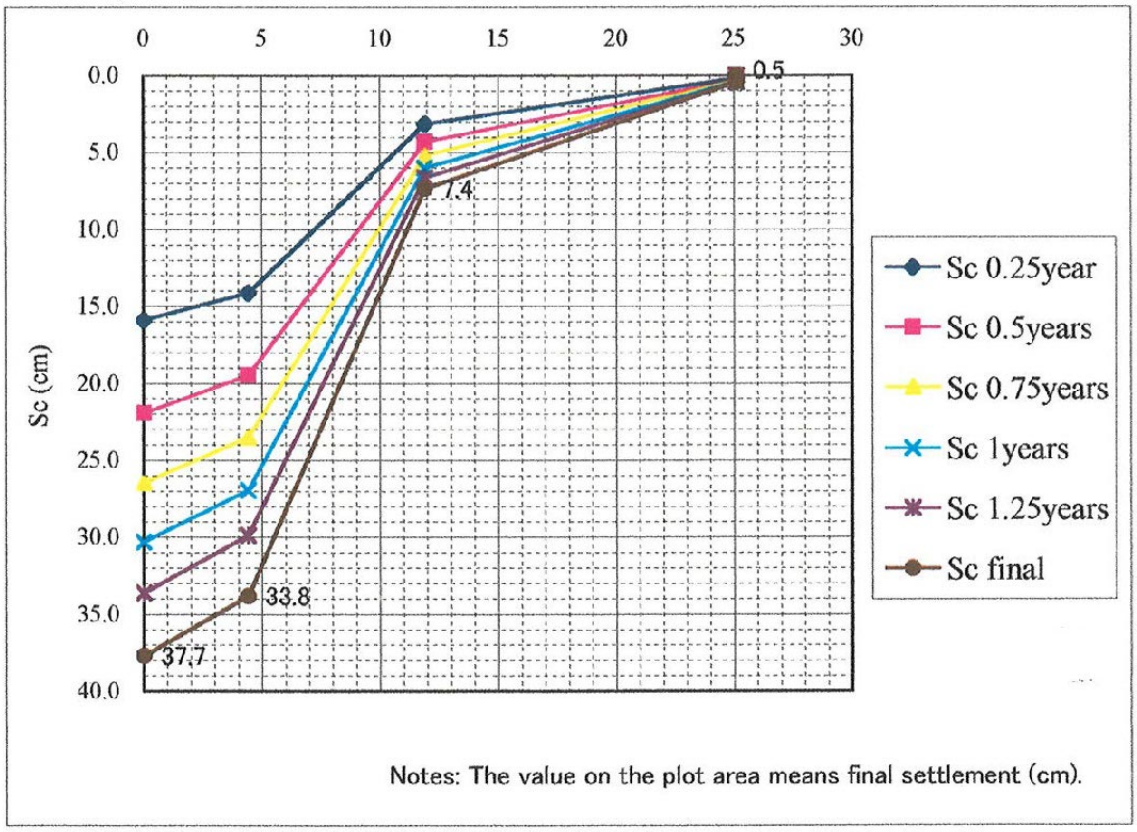
*APPENDIX

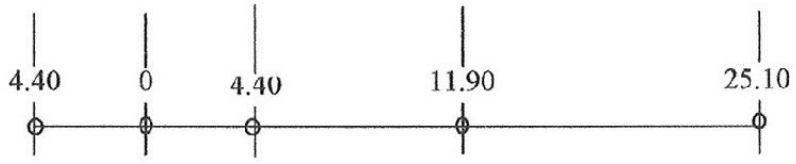
CALCULATION OF CONVERTIBLE SOIL THICKNESS

200.00 *SQR(410.00 / 450.00) + 200.00 *SQR(410.00 / 410.00)

Km.2+150 HE=5.0M







Final settlement (cm)				
Distance (m)	0	4.40	11.90	25.10
Settlement (cm)	37.7	33.8	7.4	0.5

Fig. Settlement and Distance Km.2+150 HE=5.0m

Table SOIL SECTION AND DESIGN SOIL VALUE

EXAMINED LOCATION:

Km Age 2+150

Location Jatinegara

Depth	Division of soil	Thickness of soil	Depth of central stratum	N Value	Wet unit weight	Cohesion of initial condition	Modulus of deformation	The rate of increase in strength	Yield stress	Remark
(m)		H (m)	(m)		γ (t/m^3)	Co (t/m^2)	E_{50}(t/m^2)		Py (t/m^2)	
7.50	Ac1	7.50	3.75	10	1.66	2.50	-	0.25	10.00	7.50 ▽
9.50	Ac2	2.00	8.50	15	0.66	3.00	-	0.25	12.00	
11.50	As1	2.00	10.50	30	0.70	-				

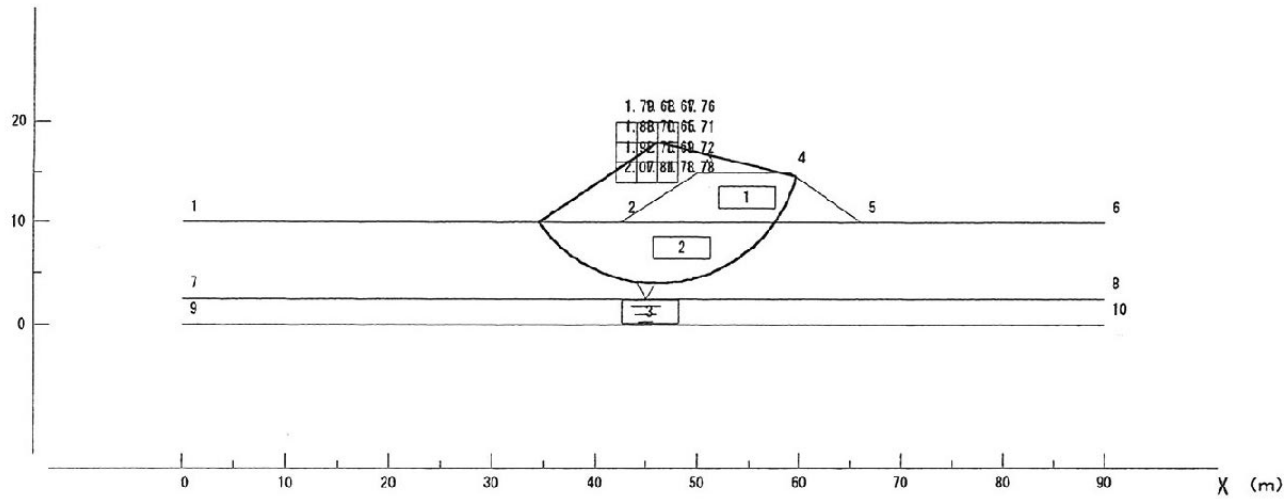
JKT Railway Km 2+150 HE=5.0m Normal Banking

Scale : 1 / 739

Safety Factor	Fs MIN	=	1.654
	X	=	46.00 (m)
	Y	=	18.00 (m)
Radius	R	=	14.00 (m)
Resistive Moment	Mr	=	1111.80 (tf - m)
Slipping Moment	Mo	=	672.10 (tf - m)

Layer	Unit Weight (t/m^3)	Saturated gravity(t/m^3)	Internal friction angle	Cohesion (t/m^2)	1st Coeff. of Cohesion	Horizontal Seismic Coeff	Vertical seismic Coeff
1	1.800	1700	10.00	2.20	0.00	0.00	0.00
2	1.760	1.660	0.00	2.50	0.00	0.00	0.00
3	1.760	1.660	0.00	3.00	0.00	0.00	0.00

Unit weight of water = 1.000 tf / m^3



Slope Stability Analysis

CALCULATION OF INITIAL PRESSURE

Km 2+150 HE=5.0m Center of Embankment

SOIL No.	SOIL	THICKNESS OF SOIL	WET UNIT WEIGHT	CALCULATION OF INITIAL PRESSURE	INITIAL PRESSURE
1	Ac1	7.500	1.660	0.000+0.5(0.000 * 0.000 + 7.500 * 1.660)	6.225
2	Ac2	2.000	0.660	6.225+0.5(7.500 * 1.660 + 2.000 * 0.660)	13.110
3	As1	2.000	0.700	13.110+0.5(2.000 * 0.660 + 2.000 * 0.700)	14.470

INTENSITY OF DISTRIBUTED LOAD q=H*rt= 5.00* 1.800 9.00

SOIL No.	SOIL	DEPTH FROM CENTRAL SOIL STRUTA	a/Z a= 7.500	b/Z b= 4.400	I	DP	Po	Po+DP
1	Ac1	3.750	2.000	1.173	0.478	8.597	6.225	14.822
2	Ac2	8.500	0.882	0.518	0.391	7.036	13.110	20.146
3	As1	10.500	0.714	0.419	0.354	6.374	14.470	20.844

SUBSIDED VALUE FOR CONSOLIDATION AND COEFFICIENT OF CONSOLIDATTION

SOIL No.	SOIL	THICKNESS OF SOIL	Po	DP	Po+DP	e0	e1	Sc	DP/2	Po+DP/2	Cv
1	Ac1	7.5000	6.2250	8.5973	14.8222	1.3450	1.2450	0.3198	4.2986	10.5236	380
2	Ac2	2.0000	13.1100	7.0358	20.1458	1.2620	1.1970	0.0575	3.5179	16.6279	355
3	As1	2.0000	14.4700	6.3736	20.8436	0.5460	0.5390	0.0091	3.1868	17.6568	0

0.3864

TYPICAL COEFFICIENT OF CONSOLIDATION AND DISTANCE OF DRAINAGE

SOIL No	SOIL	THICKNESS OF SOIL	Cv	Cv'	H'	CONDITION OF DRAINAGE	DISTANCE OF DRAINAGE
1	Aci	750.00	380.00	380.00	956.92	2Side	478.46
2	Ac2	200.00	355.00				
3	As1	200.00	0.00	0.00	0.00	2Side	0.00

SUBSIDED TIME FOR CONSOLIDATION BY MOMENTARY EMBANKMENT

U (%)	10.00	20.00	30.00	40.00	50.00	60.00	70.00	80.00	90.00	95.00	100.00
Tv	0.008	0.031	0.071	0.126	0.196	0.287	0.403	0.567	0.848	1.130	infinite
EXPRESSION t=Tv.d^2/C'v=Tv. 478.46²/ 380.00= 602.44											
t (days)	4.82	18.68	42.77	75.91	118.08	172.90	242.78	341.58	510.86	680.75	
Sc.U (cm)	3.77	7.55	11.32	15.09	18.87	22.64	26.41	30.18	33.96	35.84	37.73
EXPRESSION t=Tv.d^2/C'v=Tv. 0.00²/ 0.00= 0.00											
t (days)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Sc.U (cm)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

*APPENDIX

CALCULATION OF CONVERTIBLE SOIL THICKNESS

750.00 *SQR(380.00 / 380.00) + 200.00 *SQR(380.00 / 355.00)

200.00 *SQR(0.00 / 0.00)

CALCULATION OF INITIAL PRESSURE

Km 2+150 HE=5.0 m Top of Slope of Embankment

SOIL No.	SOIL	THICKNESS OF SOIL	WET UNIT WEIGHT	CALCULATION OF INITIAL PRESSURE	INITIAL PRESSURE
1	Ac1	7.500	1.660	0.000+0.5(0.000 * 0.000 + 7.500 * 1.660)	6.225
2	Ac2	2.000	0.660	6.225+0.5(7.500 * 1.660 + 2.000 * 0.660)	13.110
3	As1	2.000	0.700	13.110+0.5(2.000 * 0.660 + 2.000 * 0.700)	14.470

INTENSITY OF DISTRIBUTED LOAD q=H*rt= 5.00* 1.800 9.00

SOIL No.	SOIL	DEPTH FROM CENTRAL SOIL STRUTA	a/Z a= 7.500	b1/Z b1= 0.000	b2/Z b2= 3.800	I1	I2	DP	Po	Po+DP
1	Ac1	3.750	2.000	0.000	2.347	0.352	0.494	7.618	6.225	13.843
2	Ac2	8.500	0.882	0.000	1.035	0.230	0.454	6.160	13.110	19.270
3	As1	10.500	0.714	0.000	0.838	0.197	0.430	5.649	14.470	20.119

SUBSIDED VALUE FOR CONSOLIDATION AND COEFFICIENT OF CONSOLIDATTION

SOIL No.	SOIL	THICKNESS OF SOIL	Po	DP	Po+DP	e0	e1	Sc	DP/2	Po+DP/2	Cv
1	Ac1	7.5000	6.2250	7.6179	13.8429	1.3450	1.2550	0.2878	3.8090	10.0340	370
2	Ac2	2.0000	13.1100	6.1601	19.2701	1.2620	1.2050	0.0504	3.0801	16.1901	360
3	As1	2.0000	14.4700	5.6492	20.1192	0.5460	0.5400	0.0078	2.8246	17.2946	0

0.3460

TYPICAL COEFFICIENT OF CONSOLIDATION AND DISTANCE OF DRAINAGE

SOIL No	SOIL	THICKNESS OF SOIL	Cv	Cv'	H'	CONDITION OF DRAINAGE	DISTANCE OF DRAINAGE
1	Ac1	750.00	370.00	370.00	952.76	2Side	476.38
2	Ac2	200.00	360.00				
3	As1	200.00	0.00	0.00	0.00	2Side	0.00

SUBSIDED TIME FOR CONSOLIDATION BY MOMENTARY EMBANKMENT

U (%)	10.00	20.00	30.00	40.00	50.00	60.00	70.00	80.00	90.00	95.00	100.00
Tv	0.008	0.031	0.071	0.126	0.196	0.287	0.403	0.567	0.848	1.130	infinite
EXPRESSION	t=Tv.d^2/C'v=Tv. 476.38²/ 370.00= 613.34										
t (days)	4.91	19.01	43.55	77.28	120.22	176.03	247.18	347.77	520.12	693.08	
Sc.U (cm)	3.38	6.76	10.15	13.53	16.91	20.29	23.68	27.06	30.44	32.13	33.82
EXPRESSION	t=Tv.d^2/C'v=Tv. 0.00²/ 0.00= 0.00										
t (days)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Sc.U (cm)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

*APPENDIX

CALCULATION OF CONVERTIBLE SOIL THICKNESS

750.00 *SQR(370.00 / 370.00) + 200.00 *SQR(370.00 / 360.00)

200.00 *SQR(0.00 / 0.00)

CALCULATION OF INITIAL PRESSURE

Km 2+150 HE=5.0 m Toe of Slope of Embankment

SOIL No.	SOIL	THICKNESS OF SOIL	WET UNIT WEIGHT	CALCULATION OF INITIAL PRESSURE	INITIAL PRESSURE
1	Ac1	7.500	1.660	0.000+0.5(0.000 * 0.000 + 7.500 * 1.660)	6.225
2	Ac2	2.000	0.660	6.225+0.5(7.500 * 1.660 + 2.000 * 0.660)	13.110
3	As1	2.000	0.700	13.110+0.5(2.000 * 0.660 + 2.000 * 0.700)	14.470

INTENSITY OF DISTRIBUTED LOAD

SOIL No.	SOIL	DEPTH FROM CENTRAL SOIL STRUTA	a1+a2/Z a1= 7.500	a1+b/Z a2= 0.000	a1/Z	a2/Z	b/Z b= 8.800	I1	I2	I3	DP	Po	Po+DP
1	Ac1	3.750	2.000	4.347	2.000	0.000	0.000	0.499	0.350	0.000	1.341	6.225	7.566
2	Ac2	8.500	0.882	1.918	0.882	0.000	0.000	0.486	0.330	0.000	2.304	13.110	15.414
3	As1	10.500	0.714	1.552	0.714	0.000	0.000	0.430	0.180	0.000	2.250	14.470	16.720

SUBSIDED VALUE FOR CONSOLIDATION AND COEFFICIENT OF CONSOLIDATTION

SOIL No.	SOIL	THICKNESS OF SOIL	Po	DP	Po+DP	e0	e1	Sc	DP/2	Po+DP/2	Cv
1	Ac1	7.5000	6.2250	1.3410	7.5660	1.3450	1.3280	0.0544	0.6705	6.8955	390
2	Ac2	2.0000	13.1100	2.3040	15.4140	1.2620	1.2400	0.0195	1.1520	14.2620	360
3	As1	2.0000	14.4700	2.2500	16.7200	0.5460	0.5440	0.0026	1.1250	15.5950	0

0.0765

TYPICAL COEFFICIENT OF CONSOLIDATION AND DISTANCE OF DRAINAGE

SOIL No	SOIL	THICKNESS OF SOIL	Cv	Cv'	H'	CONDITION OF DRAINAGE	DISTANCE OF DRAINAGE
1	Ac1	750.00	390.00	390.00	958.17	2Side	479.08
2	Ac2	200.00	360.00				
3	As1	200.00	0.00	0.00	0.00	2Side	0.00

SUBSIDED TIME FOR CONSOLIDATION BY MOMENTARY EMBANKMENT

U (%)	10.00	20.00	30.00	40.00	50.00	60.00	70.00	80.00	90.00	95.00	100.00
Tv	0.008	0.031	0.071	0.126	0.196	0.287	0.403	0.567	0.848	1.130	infinite

EXPRESSION t=Tv.d^2/C'v=Tv. 479.08^2/ 390.00= 588.52

t (days)	4.71	18.24	41.78	74.15	115.35	168.90	237.17	333.69	499.06	665.02	
Sc.U (cm)	0.74	1.48	2.21	2.95	3.69	4.43	5.17	5.91	6.64	7.01	7.38

EXPRESSION t=Tv.d^2/C'v=Tv. 0.00^2/ 0.00= 0.00

t (days)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Sc.U (cm)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

*APPENDIX

CALCULATION OF CONVERTIBLE SOIL THICKNESS

750.00 *SQR(390.00 / 390.00) + 200.00 *SQR(390.00 / 360.00)