საქართველოს რეგიონული განვითარებისა და ინფრასტრუქტურის სამინისტრო
საავტომობილო გზების დეპარტამენტი

დეტალური საპროექტო დოკუმენტაციის მომზადება ქუთაისის შემოვლითი გზა-სამტრედიის მონაკვეთების 4-ზოლიან ავტომაგისტრალად მოდერნიზებისათვის

საგზაო ანგარიში

ლოტი 3.

მონაკვეთი: კმ 13+400 - კმ 30+000

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ხელშეკრულება: ე.ტ. No 51-17

შპს ჯეოინჟინერინგი

GEOENGINEERING

თბილისი, 2018 წელი

პროექტის შემადგენლობა

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ANNEX 1
Soils laboratory testing results

ANNEX 1 .9
Results of California Bearing Ratio (CBR) Tests

California Bearing Ratio Test (data for density)

Project Name:GC-1128		**Location**	Imereti Region, Georgia
Project: Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia		**TP no.**	TP-SE-1
Soil Description		**Sample no.**	
Rounded GRAVEL with low plastic sandy clay matrix, with rounded cobbles and boulders inclusions		**Depth**	1.0-2.0
		Date	27.06.2011
Sample preparation method BS 1377 : Part 4 : 1990			
Preparation procedure	Static, _____layer(s), with/ without tamping **2.5kg rammer**/4.5kg rammer/ vibrating hammer		
	Volume of mould $V cm^3$ **2313**	Specified effort **5** layers **62** blows per layer	

Calculated mass of soil required (m_1)		g	–
Mass of mould + baseplate + soil (m_3)		g	**10791.00**
Mass of mould + baseplate (m_2)		g	**5680.00**
Mass of soil ($m_3 – m_2$)		g	**5111.00**
Soaking time		days	**4**
Time for water to appear at top of sample			**–**
Final swell		mm	**0.07**
Mass of mould + baseplate + soil after soaking (m_4)		g	**10830.00**
*Mass of soil after soaking ($m_4 – m_2$)		g	**5150.00**
Maximum bearing ratio from plotting chart		%	**5.40**
Bulk density (unsoaked)	$\rho = \frac{m_1}{V}$	Mg/m^3	**–**
	$\rho = \frac{m_3 - m_2}{V}$	Mg/m^3	**2.21**
Moisture content (w)		%	**7.40**
Dry density (unsoaked)		Mg/m^3	**2.06**
Delete as appropriate			

sheet 1 of 3	Operator	Checked	Approved
	A. Lomidze	T. Jajanidze	R. Kavelashvili

California Bearing Ratio Test

Project Name:GC-1128	**Location**	Imereti Region, Georgia
Project: Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia	**TP no.**	TP-SE-1
Soil Description	**Sample no.**	
Rounded GRAVEL with low plastic sandy clay matrix, with rounded cobbles and boulders inclusions	**Depth**	1.0-2.0
	Date	27.06.2011
	Mean calibration	25.632 N/div

Test Method BS 1377 : Part 4 : 1990 **: 7.4**

Penetration of plunger mm	Force gauge reading div		Force on plunger kN		Penetration of plunger mm	Force gauge reading div		Force on plunger kN	
	Top	Bottom	Top	Bottom		Top	Bottom	Top	Bottom
0.00	0.0	0.0	0.0	0.0					
0.25	2.1	0.9	0.054	0.023	4.00	27.0	25.5	0.692	0.654
0.50	2.8	1.2	0.072	0.031	4.25	29.8	29.0	0.764	0.743
0.75	4.1	2.1	0.105	0.054	4.50	32.3	32.6	0.828	0.836
1.00	5.3	3.0	0.136	0.077	4.75	35.5	37.0	0.910	0.948
1.25	6.4	4.1	0.164	0.105	5.00	38.9	42.1	0.997	1.079
1.50	7.8	5.2	0.200	0.133	5.25	41.5	46.5	1.064	1.192
1.75	9.3	6.1	0.238	0.156	5.50	45.0	50.9	1.153	1.305
2.00	11.1	7.4	0.285	0.190	5.75	48.3	57.0	1.238	1.461
2.25	12.7	9.0	0.326	0.231	6.00	52.5	63.8	1.346	1.635
2.50	14.3	10.9	0.367	0.279	6.25	57.3	70.7	1.469	1.812
2.75	16.2	13.9	0.415	0.356	6.50	61.5	78.3	1.576	2.007
3.00	18.0	15.0	0.461	0.384	6.75	65.0	88.0	1.666	2.256
3.25	20.0	17.3	0.513	0.443	7.00	68.5	97.0	1.756	2.486
3.50	22.2	20.0	0.569	0.513	7.25	72.3	107.0	1.853	2.743
3.75	25.0	22.6	0.641	0.579	7.50	77.0	117.3	1.974	3.007

*Delete as appropriate

Moisture content after test		Top		Bottom	
Container No.		14	6	X	310
Mass of wet soil + container (m_2)	g	1739.0	1743.0	1861.5	1867.0
Mass of dry soil + container (m_3)	g	1629.0	1632.0	1732.0	1736.0
Mass of container (m_1)	g	393.0	398.0	355.9	359.0
Mass of moisture ($m_2 - m_3$)	g	110.0	111.0	129.5	131.0
Mass of dry soil ($m_3 - m_1$)	g	1236.0	1234.0	1376.1	1377.0
Moisture content $W = \left(\frac{m_2 - m_3}{m_3 - m_1}\right)100$	%	8.90	9.00	9.41	9.51
Average moisture content	%	**9.20**			

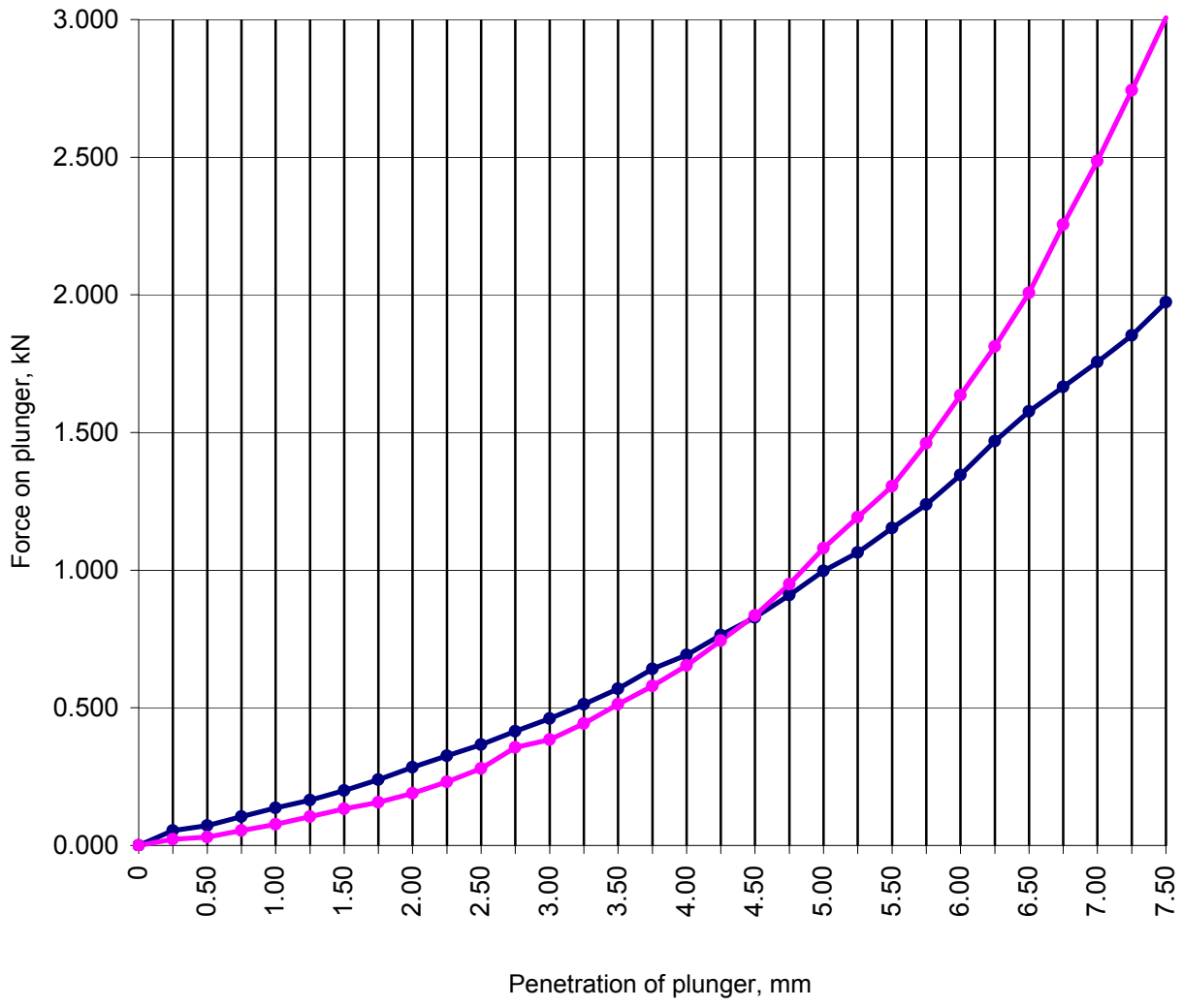
CBR value (%) at penetration of:	2.5mm	5.0mm
Top	**2.78**	**4.99**
Bottom	**2.12**	**5.40**
Accepted CBR %		**5.40**

sheet 2 of 3	Operator	Checked	Approved
	A. Lomidze	T. Jajanidze	R. Kavelashvili

California Bearing Ratio Test (graph)

Project Name:GC-1128	**Location**	Imereti Region, Georgia
Project: Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia	**TP no.**	TP-SE-1
Soil Description	**Sample no.**	
Rounded GRAVEL with low plastic sandy clay matrix, with rounded cobbles and boulders inclusions	**Depth**	1.0-2.0
Test Method BS 1377 : Part 4 : 1990 :	**Date**	27.06.2011

* Delete as appropriate	Test on top face soaked/unsoaked
	Test on bottom face soaked/unsoaked



		Top face	Bottom face
CBR % at penetration of	2.5mm	**2.78**	**2.12**
	5.0mm	**4.99**	**5.40**

sheet 3 of 3	Operator	Checked	Approved
	A. Lomidze	T. Jajanidze	R. Kavelashvili

California Bearing Ratio Test (data for density)

Project Name:GC-1128		**Location**	Imereti Region, Georgia
Project: Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia		**TP no.**	TP-SE-5
Soil Description		**Sample no.**	
Low plastic silty sandy CLAY		**Depth**	1,5-1,6
		Date	27.06.2011
Sample preparation method BS 1377 : Part 4 : 1990			
Preparation procedure	Static, _____layer(s), with/ without tamping **2.5kg rammer**/4.5kg rammer/ vibrating hammer		
		Volume of mould V_{cm^3} **2309**	Specified effort **5** layers **62** blows per layer

Calculated mass of soil required (m_1)		g	–
Mass of mould + baseplate + soil (m_3)		g	**10653.00**
Mass of mould + baseplate (m_2)		g	**5787.00**
Mass of soil ($m_3 – m_2$)		g	**4866.00**
Soaking time		days	**4**
Time for water to appear at top of sample			**–**
Final swell		mm	**0.01**
Mass of mould + baseplate + soil after soaking (m_4)		g	**10724.00**
*Mass of soil after soaking ($m_4 – m_2$)		g	**4937.00**
Maximum bearing ratio from plotting chart		%	**10.33**
Bulk density (unsoaked)	$\rho = \frac{m_1}{V}$	Mg/m^3	**–**
	$\rho = \frac{m_3 - m_2}{V}$	Mg/m^3	**2.11**
Moisture content (w)		%	**18.80**
Dry density (unsoaked)		Mg/m^3	**1.77**
Delete as appropriate			

sheet 1 of 3	Operator	Checked	Approved
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California Bearing Ratio Test

Project Name:GC-1128	**Location**	Imereti Region, Georgia
Project: Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia	**TP no.**	TP-SE-5
Soil Description	**Sample no.**	
Low plastic silty sandy CLAY	**Depth**	1,5-1,6
	Date	27.06.2011
	Mean calibration	25.632 N/div

Test Method BS 1377 : Part 4 : 1990 **: 7.4**

Penetration of plunger mm	Force gauge reading div		Force on plunger kN	
	Top	Bottom	Top	Bottom
0.00	0.0	0.0	0.0	0.0
0.25	4.5	5.0	0.115	0.128
0.50	7.5	9.0	0.192	0.231
0.75	9.0	14.2	0.231	0.364
1.00	11.2	20.5	0.287	0.525
1.25	12.5	23.8	0.320	0.610
1.50	16.3	30.5	0.418	0.782
1.75	17.6	35.4	0.451	0.907
2.00	19.8	40.2	0.508	1.030
2.25	22.5	46.0	0.577	1.179
2.50	24.3	48.2	0.623	1.235
2.75	27.6	53.2	0.707	1.364
3.00	29.2	57.0	0.748	1.461
3.25	32.3	60.8	0.828	1.558
3.50	34.5	63.8	0.884	1.635
3.75	36.5	66.7	0.936	1.710

Penetration of plunger mm	Force gauge reading div		Force on plunger kN	
	Top	Bottom	Top	Bottom
4.00	41.0	70.5	1.051	1.807
4.25	43.3	74.2	1.110	1.902
4.50	46.6	76.2	1.194	1.953
4.75	49.7	79.3	1.274	2.033
5.00	53.4	80.6	1.369	2.066
5.25	55.2	84.6	1.415	2.168
5.50	58.3	86.6	1.494	2.220
5.75	61.3	89.0	1.571	2.281
6.00	64.5	90.2	1.653	2.312
6.25	67.2	93.4	1.722	2.394
6.50	68.8	96.0	1.763	2.461
6.75	73.3	98.2	1.879	2.517
7.00	76.2	100.5	1.953	2.576
7.25	77.2	102.6	1.979	2.630
7.50	78.8	105.6	2.020	2.707

*Delete as appropriate

Moisture content after test		Top		Bottom	
Container No.		2	32	L	231
Mass of wet soil + container (m_2)	g	1368.0	1589.0	1389.0	1419.0
Mass of dry soil + container (m_3)	g	1210.0	1392.0	1161.0	1232.0
Mass of container (m_1)	g	392.0	387.0	158.0	353.0
Mass of moisture ($m_2 - m_3$)	g	158.0	197.0	228.0	187.0
Mass of dry soil ($m_3 - m_1$)	g	818.0	1005.0	1003.0	879.0
Moisture content $W = \left(\frac{m_2 - m_3}{m_3 - m_1}\right)100$	%	19.32	19.60	22.73	21.27
Average moisture content	%	**20.73**			

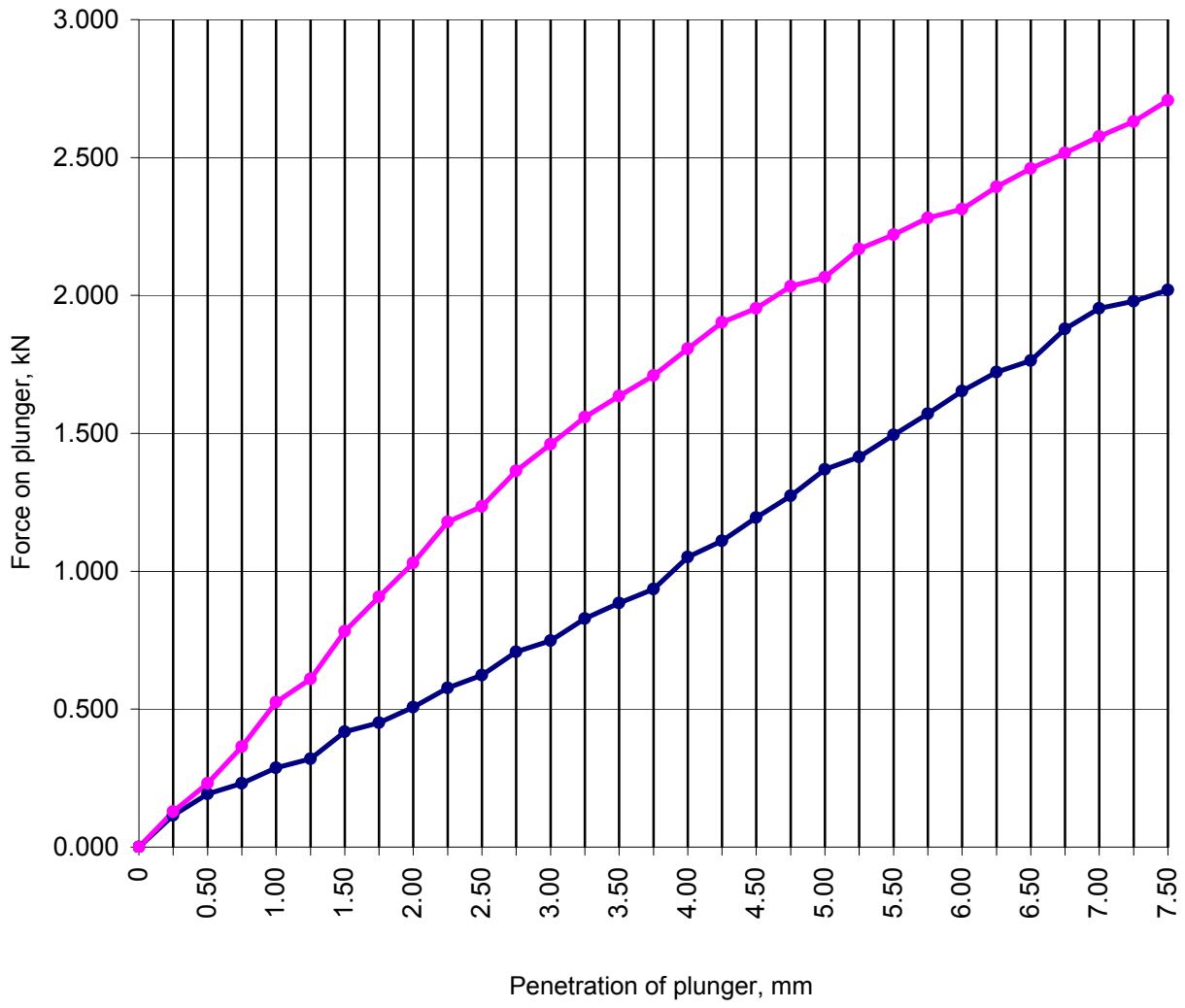
CBR value (%) at penetration of:	2.5mm	5.0mm
Top	**4.72**	**6.84**
Bottom	**9.36**	**10.33**
Accepted CBR %		**10.33**

sheet 2 of 3	Operator	Checked	Approved
	A. Lomidze	T. Jajanidze	R. Kavelashvili

California Bearing Ratio Test (graph)

Project Name:GC-1128	**Location**	Imereti Region, Georgia
Project: Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia	**TP no.**	TP-SE-5
Soil Description	**Sample no.**	
Low plastic silty sandy CLAY	**Depth**	1,5-1,6
Test Method BS 1377 : Part 4 : 1990 :	**Date**	27.06.2011

* Delete as appropriate	Test on top face soaked/unsoaked
	Test on bottom face soaked/unsoaked



		Top face	Bottom face
CBR % at penetration of	2.5mm	**4.72**	**9.36**
	5.0mm	**6.84**	**10.33**

sheet 3 of 3	Operator	Checked	Approved
	A. Lomidze	T. Jajanidze	R. Kavelashvili

California Bearing Ratio Test (data for density)

Project Name:GC-1128		**Location**	Imereti Region, Georgia
Project: Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia		**TP no.**	TP-SE-6
Soil Description		**Sample no.**	
Intermediately plastic silty sandy CLAY with little rounded gravel inclusions		**Depth**	1,5-1,7
		Date	27.06.2011
Sample preparation method BS 1377 : Part 4 : 1990			
Preparation procedure	Static, _____layer(s), with/ without tamping **2.5kg rammer**/4.5kg rammer/ vibrating hammer		
	Volume of mould V_{cm^3} **2309**	Specified effort **5** layers **62** blows per layer	

Calculated mass of soil required (m_1)		g	–
Mass of mould + baseplate + soil (m_3)		g	**10646.00**
Mass of mould + baseplate (m_2)		g	**5787.00**
Mass of soil ($m_3 – m_2$)		g	**4859.00**
Soaking time		days	**4**
Time for water to appear at top of sample			**–**
Final swell		mm	**0.01**
Mass of mould + baseplate + soil after soaking (m_4)		g	**10701.00**
*Mass of soil after soaking ($m_4 – m_2$)		g	**4914.00**
Maximum bearing ratio from plotting chart		%	**11.01**
Bulk density (unsoaked)	$\rho = \frac{m_1}{V}$	Mg/m^3	**–**
	$\rho = \frac{m_3 - m_2}{V}$	Mg/m^3	**2.10**
Moisture content (w)		%	**18.00**
Dry density (unsoaked)		Mg/m^3	**1.78**
Delete as appropriate			

sheet 1 of 3	Operator	Checked	Approved
	A. Lomidze	T. Jajanidze	R. Kavelashvili

California Bearing Ratio Test

Project Name:GC-1128	**Location**	Imereti Region, Georgia
Project: Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia	**TP no.**	TP-SE-6
Soil Description	**Sample no.**	
Intermediately plastic silty sandy CLAY with little rounded gravel inclusions	**Depth**	1,5-1,7
	Date	27.06.2011
	Mean calibration	25.632 N/div

Test Method BS 1377 : Part 4 : 1990 **: 7.4**

Penetration of plunger mm	Force gauge reading div		Force on plunger kN	
	Top	Bottom	Top	Bottom
0.00	0.0	0.0	0.0	0.0
0.25	4.2	5.2	0.108	0.133
0.50	6.7	8.8	0.172	0.226
0.75	8.7	11.2	0.223	0.287
1.00	10.6	13.9	0.272	0.356
1.25	11.9	18.5	0.305	0.474
1.50	15.4	22.0	0.395	0.564
1.75	17.0	26.5	0.436	0.679
2.00	21.2	32.0	0.543	0.820
2.25	24.2	36.2	0.620	0.928
2.50	25.4	41.7	0.651	1.069
2.75	27.9	46.3	0.715	1.187
3.00	31.1	51.3	0.797	1.315
3.25	33.2	55.6	0.851	1.425
3.50	36.4	60.6	0.933	1.553
3.75	40.5	64.0	1.038	1.640

Penetration of plunger mm	Force gauge reading div		Force on plunger kN	
	Top	Bottom	Top	Bottom
4.00	43.1	69.8	1.105	1.789
4.25	46.2	74.2	1.184	1.902
4.50	49.5	78.0	1.269	1.999
4.75	55.3	82.6	1.417	2.117
5.00	60.1	85.9	1.540	2.202
5.25	64.3	91.7	1.648	2.350
5.50	69.2	94.9	1.774	2.432
5.75	73.7	98.8	1.889	2.532
6.00	78.2	103.5	2.004	2.653
6.25	82.3	107.2	2.110	2.748
6.50	86.7	112.3	2.222	2.878
6.75	90.2	114.1	2.312	2.925
7.00	93.3	119.4	2.391	3.060
7.25	96.4	123.4	2.471	3.163
7.50	99.0	126.0	2.538	3.230

*Delete as appropriate

Moisture content after test		Top		Bottom	
Container No.		31	51	2X	413
Mass of wet soil + container (m_2)	g	1925.0	1545.0	1432.0	1419.0
Mass of dry soil + container (m_3)	g	1672.0	1342.0	1211.0	1222.0
Mass of container (m_1)	g	382.0	313.0	189.2	287.2
Mass of moisture ($m_2 - m_3$)	g	253.0	203.0	221.0	197.0
Mass of dry soil ($m_3 - m_1$)	g	1290.0	1029.0	1021.8	934.8
Moisture content $W = \left(\frac{m_2 - m_3}{m_3 - m_1}\right)100$	%	19.61	19.73	21.63	21.07
Average moisture content	%	**20.51**			

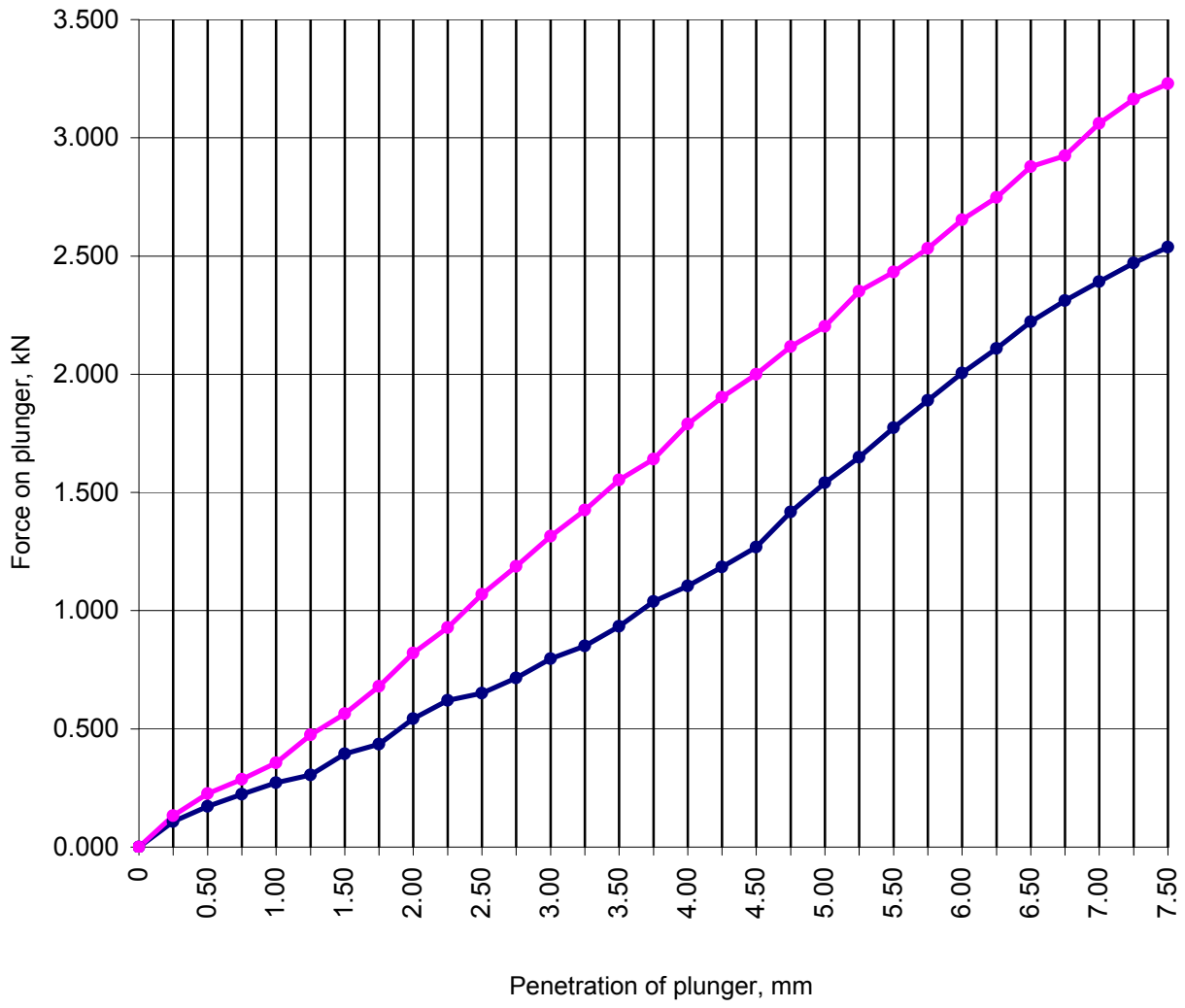
CBR value (%) at penetration of:		2.5mm	5.0mm
	Top	**4.93**	**7.70**
	Bottom	**8.10**	**11.01**
	Accepted CBR %		**11.01**

sheet 2 of 3	Operator	Checked	Approved
	A. Lomidze	T. Jajanidze	R. Kavelashvili

California Bearing Ratio Test (graph)

Project Name:GC-1128	**Location**	Imereti Region, Georgia
Project: Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia	**TP no.**	TP-SE-6
Soil Description	**Sample no.**	
Intermediately plastic silty sandy CLAY with little rounded gravel inclusions	**Depth**	1,5-1,7
Test Method BS 1377 : Part 4 : 1990 :	**Date**	27.06.2011

* Delete as appropriate	Test on top face soaked/unsoaked
	Test on bottom face soaked/unsoaked



		Top face	Bottom face
CBR % at penetration of	2.5mm	**4.93**	**8.10**
	5.0mm	**7.70**	**11.01**
sheet 3 of 3	Operator	Checked	Approved
	A. Lomidze	T. Jajanidze	R. Kavelashvili

California Bearing Ratio Test (data for density)

Project Name:GC-1128		**Location**	Imereti Region, Georgia
Project: Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia		**TP no.**	TP-SE-7
Soil Description		**Sample no.**	
Intermediately plastic silty sandy CLAY with little rounded gravel inclusions		**Depth**	1.3-2.0
		Date	27.06.2011
Sample preparation method BS 1377 : Part 4 : 1990			
Preparation procedure	Static, _____layer(s), with/ without tamping **2.5kg rammer**/4.5kg rammer/ vibrating hammer		
	Volume of mould $V cm^3$ **2309**	Specified effort **5** layers **62** blows per layer	

Calculated mass of soil required (m_1)		g	–
Mass of mould + baseplate + soil (m_3)		g	**10894.00**
Mass of mould + baseplate (m_2)		g	**5787.00**
Mass of soil ($m_3 – m_2$)		g	**5107.00**
Soaking time		days	**4**
Time for water to appear at top of sample			**–**
Final swell		mm	**0.01**
Mass of mould + baseplate + soil after soaking (m_4)		g	**10979.00**
Mass of soil after soaking ($m_4 – m_2$)		g	**5192.00**
Maximum bearing ratio from plotting chart		%	**18.25**
Bulk density (unsoaked)	$\rho = \frac{m_1}{V}$	Mg/m^3	**–**
	$\rho = \frac{m_3 - m_2}{V}$	Mg/m^3	**2.21**
Moisture content (w)		%	**8.30**
Dry density (unsoaked)		Mg/m^3	**2.04**
Delete as appropriate			

sheet 1 of 3	Operator	Checked	Approved
	A. Lomidze	T. Jajanidze	R. Kavelashvili

California Bearing Ratio Test

Project Name:GC-1128	**Location**	Imereti Region, Georgia
Project: Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia	**TP no.**	TP-SE-7
Soil Description	**Sample no.**	
Intermediately plastic silty sandy CLAY with little rounded gravel inclusions	**Depth**	1.3-2.0
	Date	27.06.2011
	Mean calibration	25.632 N/div

Test Method BS 1377 : Part 4 : 1990 **: 7.4**

Penetration of plunger mm	Force gauge reading div		Force on plunger kN	
	Top	Bottom	Top	Bottom
0.00	0.0	0.0	0.0	0.0
0.25	2.5	3.5	0.064	0.090
0.50	4.3	6.7	0.110	0.172
0.75	6.5	10.6	0.167	0.272
1.00	8.8	15.0	0.226	0.384
1.25	11.8	22.0	0.302	0.564
1.50	15.2	25.7	0.390	0.659
1.75	19.8	32.2	0.508	0.825
2.00	24.0	39.8	0.615	1.020
2.25	28.5	46.5	0.731	1.192
2.50	34.7	54.8	0.889	1.405
2.75	41.0	63.2	1.051	1.620
3.00	47.2	72.0	1.210	1.846
3.25	53.5	81.0	1.371	2.076
3.50	60.0	88.5	1.538	2.268
3.75	68.0	98.0	1.743	2.512

Penetration of plunger mm	Force gauge reading div		Force on plunger kN	
	Top	Bottom	Top	Bottom
4.00	73.2	107.8	1.876	2.763
4.25	79.7	117.0	2.043	2.999
4.50	87.2	125.5	2.235	3.217
4.75	93.0	134.0	2.384	3.435
5.00	100.0	142.4	2.563	3.650
5.25	105.8	151.4	2.712	3.881
5.50	114.7	160.0	2.940	4.101
5.75	126.4	168.5	3.240	4.319
6.00	131.0	177.0	3.358	4.537
6.25	139.0	184.4	3.563	4.727
6.50	146.2	192.5	3.747	4.934
6.75	153.4	201.1	3.932	5.155
7.00	161.2	208.8	4.132	5.352
7.25	166.0	216.5	4.255	5.549
7.50	171.5	222.3	4.396	5.698

*Delete as appropriate

Moisture content after test		Top		Bottom	
Container No.		37	33	35	45
Mass of wet soil + container (m_2)	g	1861.5	1465.0	1877.0	1885.0
Mass of dry soil + container (m_3)	g	1741.5	1373.0	1747.0	1740.0
Mass of container (m_1)	g	393.0	392.0	392.6	287.2
Mass of moisture ($m_2 - m_3$)	g	120.0	92.0	130.0	145.0
Mass of dry soil ($m_3 - m_1$)	g	1348.5	981.0	1354.4	1452.8
Moisture content $W = \left(\frac{m_2 - m_3}{m_3 - m_1}\right)100$	%	8.90	9.38	9.60	9.98
Average moisture content	%	**9.46**			

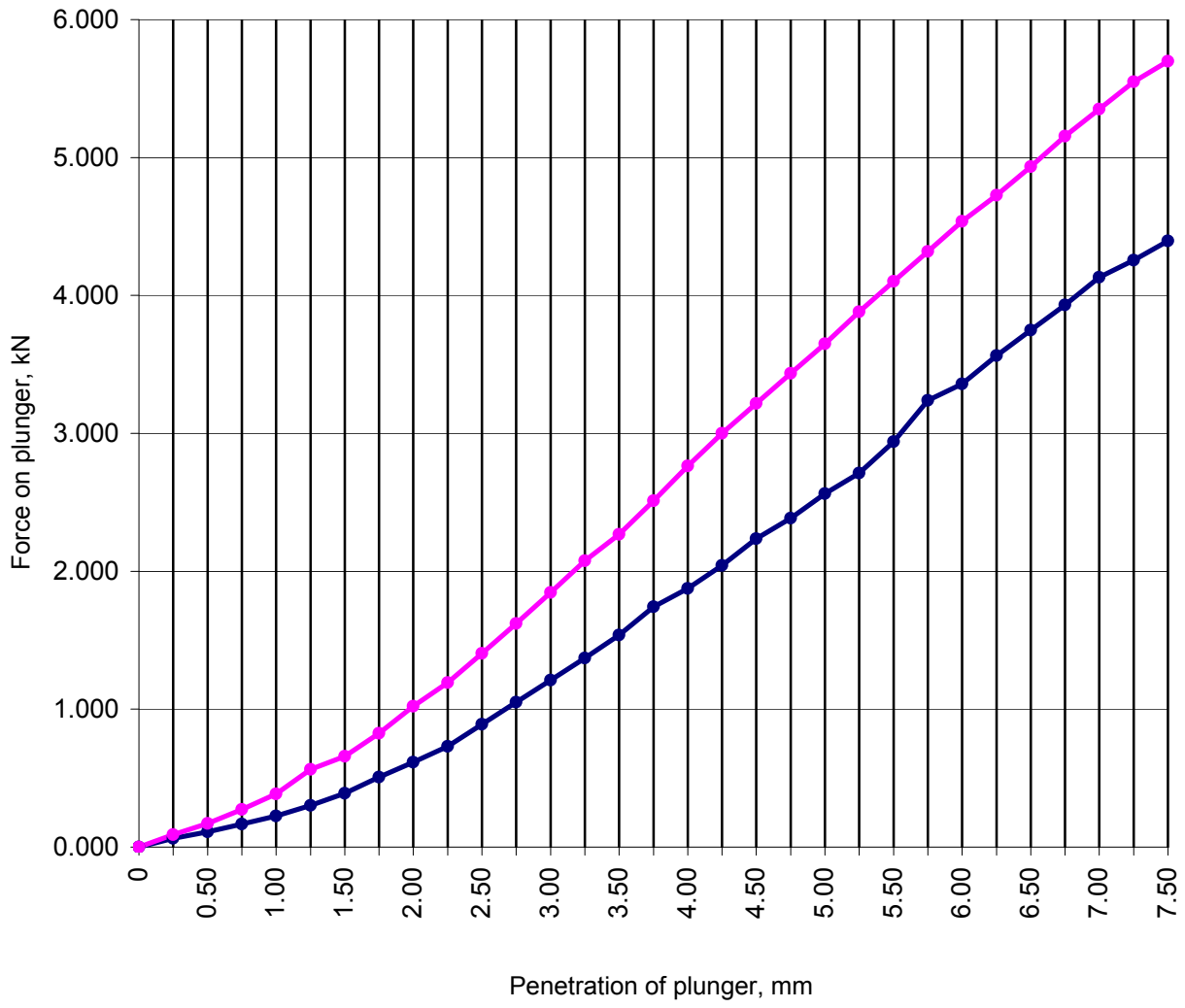
CBR value (%) at penetration of:	2.5mm	5.0mm
Top	**6.74**	**12.82**
Bottom	**10.64**	**18.25**
Accepted CBR %		**18.25**

sheet 2 of 3	Operator	Checked	Approved
	A. Lomidze	T. Jajanidze	R. Kavelashvili

California Bearing Ratio Test (graph)

Project Name:GC-1128	**Location**	Imereti Region, Georgia
Project: Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia	**TP no.**	TP-SE-7
Soil Description	**Sample no.**	
Intermediately plastic silty sandy CLAY with little rounded gravel inclusions	**Depth**	1.3-2.0
Test Method BS 1377 : Part 4 : 1990 :	**Date**	27.06.2011

* Delete as appropriate	Test on top face soaked/unsoaked
	Test on bottom face soaked/unsoaked



		Top face	Bottom face
CBR % at penetration of	2.5mm	**6.74**	**10.64**
	5.0mm	**12.82**	**18.25**

sheet 3 of 3	Operator	Checked	Approved
	A. Lomidze	T. Jajanidze	R. Kavelashvili

California Bearing Ratio Test (data for density)

Project Name:GC-1128		**Location**	Imereti Region, Georgia
Project: Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia		**TP no.**	TP-SE-8
Soil Description		**Sample no.**	
Intermediately plastic silty sandy CLAY with little rounded gravel inclusions		**Depth**	0.5-1.0
		Date	27.06.2011
Sample preparation method BS 1377 : Part 4 : 1990			
Preparation procedure	Static, _____layer(s), with/ without tamping **2.5kg rammer**/4.5kg rammer/ vibrating hammer		
	Volume of mould V_{cm^3} **2309**	Specified effort **5** layers **62** blows per layer	

Calculated mass of soil required (m_1)	g	–
Mass of mould + baseplate + soil (m_3)	g	**10625.00**
Mass of mould + baseplate (m_2)	g	**5845.00**
Mass of soil ($m_3 – m_2$)	g	**4780.00**
Soaking time	days	**4**
Time for water to appear at top of sample		**–**
Final swell	mm	**0.07**
Mass of mould + baseplate + soil after soaking (m_4)	g	**10665.00**
Mass of soil after soaking ($m_4 – m_2$)	g	**4820.00**
Maximum bearing ratio from plotting chart	%	**14.43**
Bulk density (unsoaked) $\rho = \frac{m_1}{V}$	Mg/m^3	**–**
Bulk density (unsoaked) $\rho = \frac{m_3 - m_2}{V}$	Mg/m^3	**2.07**
Moisture content (w)	%	**18.90**
density (unsoaked)	Mg/m^3	**1.74**

Delete as appropriate

sheet 1 of 3	Operator	Checked	Approved
	A. Lomidze	T. Jajanidze	R. Kavelashvili

California Bearing Ratio Test

Project Name:GC-1128	**Location**	Imereti Region, Georgia
Project: Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia	**TP no.**	TP-SE-8
Soil Description	**Sample no.**	
Intermediately plastic silty sandy CLAY with little rounded gravel inclusions	**Depth**	0.5-1.0
	Date	27.06.2011
	Mean calibration	25.632 N/div

Test Method BS 1377 : Part 4 : 1990 **: 7.4**

Penetration of plunger mm	Force gauge reading div		Force on plunger kN	
	Top	Bottom	Top	Bottom
0.00	0.0	0.0	0.0	0.0
0.25	9.8	20.0	0.251	0.513
0.50	22.8	32.0	0.584	0.820
0.75	33.8	40.5	0.866	1.038
1.00	43.2	47.5	1.107	1.218
1.25	51.2	51.5	1.312	1.320
1.50	55.0	57.3	1.410	1.469
1.75	62.5	61.9	1.602	1.587
2.00	66.7	65.0	1.710	1.666
2.25	70.5	68.5	1.807	1.756
2.50	74.3	71.5	1.904	1.833
2.75	77.2	73.5	1.979	1.884
3.00	79.8	75.4	2.045	1.933
3.25	82.3	77.5	2.110	1.986
3.50	84.7	79.5	2.171	2.038
3.75	86.7	82.0	2.222	2.102

Penetration of plunger mm	Force gauge reading div		Force on plunger kN	
	Top	Bottom	Top	Bottom
4.00	88.2	84.3	2.261	2.161
4.25	90.0	87.1	2.307	2.233
4.50	91.8	88.0	2.353	2.256
4.75	93.5	90.0	2.397	2.307
5.00	94.9	90.9	2.432	2.330
5.25	96.2	92.1	2.466	2.361
5.50	97.6	93.1	2.502	2.386
5.75	98.7	95.3	2.530	2.443
6.00	99.8	95.9	2.558	2.458
6.25	101.0	96.5	2.589	2.473
6.50	102.2	97.6	2.620	2.502
6.75	103.2	98.2	2.645	2.517
7.00	104.3	99.6	2.673	2.553
7.25	105.3	100.3	2.699	2.571
7.50	106.2	101.5	2.722	2.602

*Delete as appropriate

Moisture content after test		Top		Bottom	
Container No.		23	4	X	310
Mass of wet soil + container (m_2)	g	406.0	503.0	402.0	404.0
Mass of dry soil + container (m_3)	g	367.0	448.0	361.5	363.0
Mass of container (m_1)	g	167.0	171.2	159.0	161.0
Mass of moisture ($m_2 - m_3$)	g	39.0	55.0	40.5	41.0
Mass of dry soil ($m_3 - m_1$)	g	200.0	276.8	202.5	202.0
Moisture content $W = \left(\frac{m_2 - m_3}{m_3 - m_1}\right)100$	%	19.50	19.87	20.00	20.30
Average moisture content	%	**19.92**			

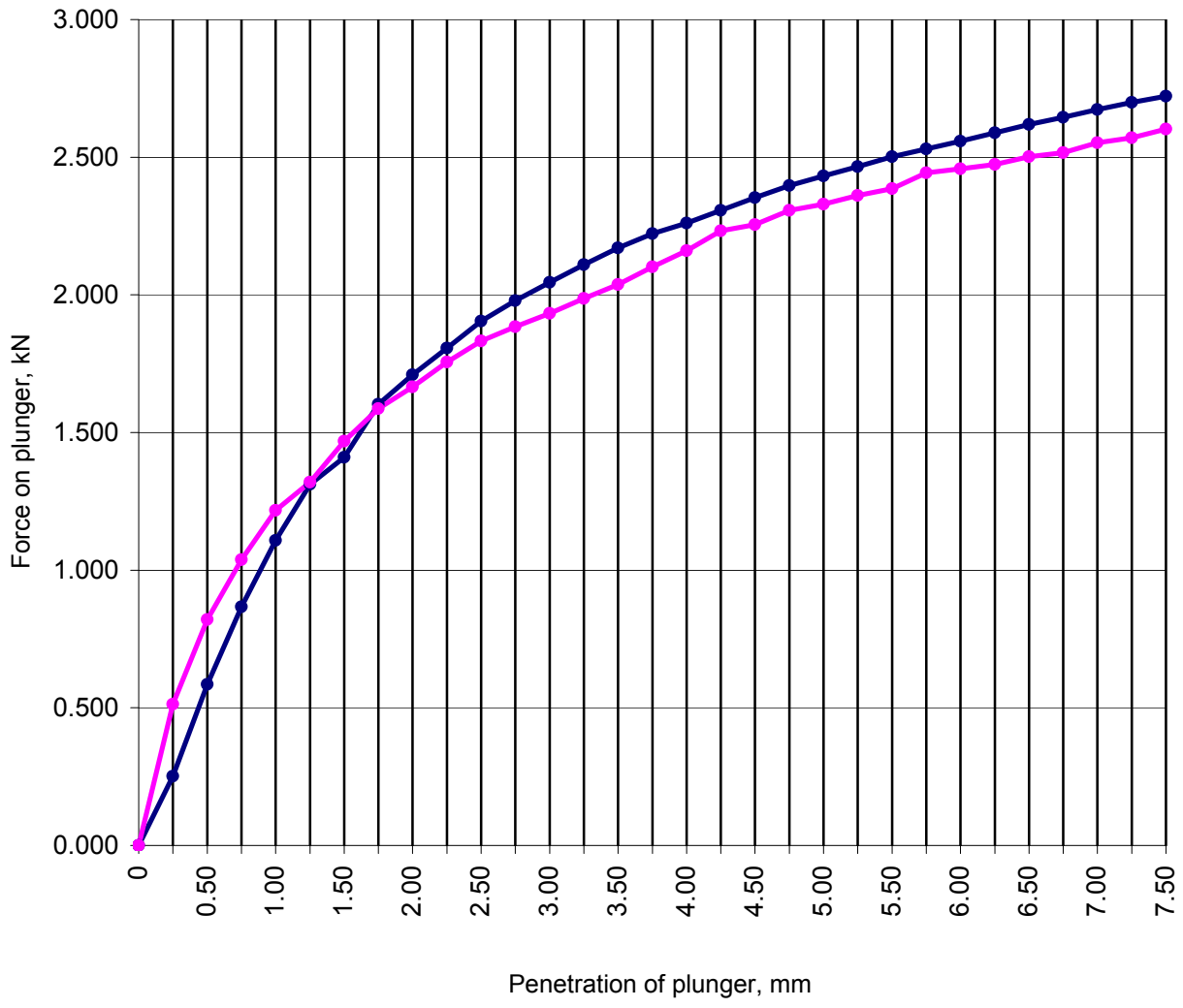
CBR value (%) at penetration of:	2.5mm	5.0mm
Top	**14.43**	**12.16**
Bottom	**13.88**	**11.65**
Accepted CBR %		**14.43**

sheet 2 of 3	Operator	Checked	Approved
	A. Lomidze	T. Jajanidze	R. Kavelashvili

California Bearing Ratio Test (graph)

Project Name:GC-1128	**Location**	Imereti Region, Georgia
Project: Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia	**TP no.**	TP-SE-8
Soil Description	**Sample no.**	
Intermediately plastic silty sandy CLAY with little rounded gravel inclusions	**Depth**	0.5-1.0
Test Method BS 1377 : Part 4 : 1990 :	**Date**	27.06.2011

* Delete as appropriate	Test on top face soaked/unsoaked
	Test on bottom face soaked/unsoaked



		Top face	Bottom face
CBR % at penetration of	2.5mm	**14.43**	**13.88**
	5.0mm	**12.16**	**11.65**

sheet 3 of 3	Operator	Checked	Approved
	A. Lomidze	T. Jajanidze	R. Kavelashvili

California Bearing Ratio Test (data for density)

Project Name:GC-1128		**Location**	Imereti Region, Georgia
Project: Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia		**Borehole no.**	BH-SE-12
Soil Description		**Sample no.**	
Intermediately plastic silty sandy CLAY		**Depth**	0.4-2.0
		Date	27.07.2011
Sample preparation method BS 1377 : Part 4 : 1990			
Preparation procedure	Static, _____layer(s), with/ without tamping **2.5kg rammer**/4.5kg rammer/ vibrating hammer		
	Volume of mould $V cm^3$ **2309**	Specified effort **5** layers **62** blows per layer	

Calculated mass of soil required (m_1)		g	–
Mass of mould + baseplate + soil (m_3)		g	**10734.00**
Mass of mould + baseplate (m_2)		g	**5845.00**
Mass of soil ($m_3 – m_2$)		g	**4889.00**
Soaking time		days	**4**
Time for water to appear at top of sample			**–**
Final swell		mm	**0.07**
Mass of mould + baseplate + soil after soaking (m_4)		g	**10750.00**
*Mass of soil after soaking ($m_4 – m_2$)		g	**4905.00**
Maximum bearing ratio from plotting chart		%	**10.49**
Bulk density (unsoaked)	$\rho = \frac{m_1}{V}$	Mg/m^3	**–**
	$\rho = \frac{m_3 - m_2}{V}$	Mg/m^3	**2.12**
Moisture content (w)		%	**18.30**
Dry density (unsoaked)		Mg/m^3	**1.79**
Delete as appropriate			

sheet 1 of 3	Operator	Checked	Approved
	A. Lomidze	T. Jajanidze	R. Kavelashvili

California Bearing Ratio Test

Project Name:GC-1128	**Location**	Imereti Region, Georgia
Project: Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia	**Borehole no.**	BH-SE-12
Soil Description	**Sample no.**	
Intermediately plastic silty sandy CLAY	**Depth**	0.4-2.0
	Date	27.07.2011
	Mean calibration	25.632 N/div

Test Method BS 1377 : Part 4 : 1990 **: 7.4**

Penetration of plunger mm	Force gauge reading div		Force on plunger kN	
	Top	Bottom	Top	Bottom
0.00	0.0	0.0	0.0	0.0
0.25	3.5	7.0	0.090	0.179
0.50	9.0	16.0	0.231	0.410
0.75	13.5	22.5	0.346	0.577
1.00	17.2	28.0	0.441	0.718
1.25	20.3	33.0	0.520	0.846
1.50	23.4	38.0	0.600	0.974
1.75	26.4	42.5	0.677	1.089
2.00	29.1	46.3	0.746	1.187
2.25	31.7	50.0	0.813	1.282
2.50	34.3	54.0	0.879	1.384
2.75	37.1	57.0	0.951	1.461
3.00	39.6	60.0	1.015	1.538
3.25	42.0	63.0	1.077	1.615
3.50	44.7	65.7	1.146	1.684
3.75	46.3	68.3	1.187	1.751

Penetration of plunger mm	Force gauge reading div		Force on plunger kN	
	Top	Bottom	Top	Bottom
4.00	49.5	70.5	1.269	1.807
4.25	52.0	73.0	1.333	1.871
4.50	54.2	75.0	1.389	1.922
4.75	56.5	77.0	1.448	1.974
5.00	58.3	79.3	1.494	2.033
5.25	60.2	81.0	1.543	2.076
5.50	62.2	83.0	1.594	2.127
5.75	64.2	85.0	1.646	2.179
6.00	66.0	86.7	1.692	2.222
6.25	68.7	88.4	1.761	2.266
6.50	70.5	90.1	1.807	2.309
6.75	71.3	92.3	1.828	2.366
7.00	73.0	94.0	1.871	2.409
7.25	74.7	96.0	1.915	2.461
7.50	76.4	97.7	1.958	2.504

*Delete as appropriate

Moisture content after test		Top		Bottom	
Container No.		15	5	IX	200
Mass of wet soil + container (m_2)	g	738.5	739.5	488.8	491.0
Mass of dry soil + container (m_3)	g	680.0	679.5	450.0	452.5
Mass of container (m_1)	g	355.5	357.5	245.5	250.5
Mass of moisture ($m_2 - m_3$)	g	58.5	60.0	38.8	38.5
Mass of dry soil ($m_3 - m_1$)	g	324.5	322.0	204.5	202.0
Moisture content $W = \left(\frac{m_2 - m_3}{m_3 - m_1}\right)100$	%	18.03	18.63	18.97	19.06
Average moisture content	%	**18.67**			

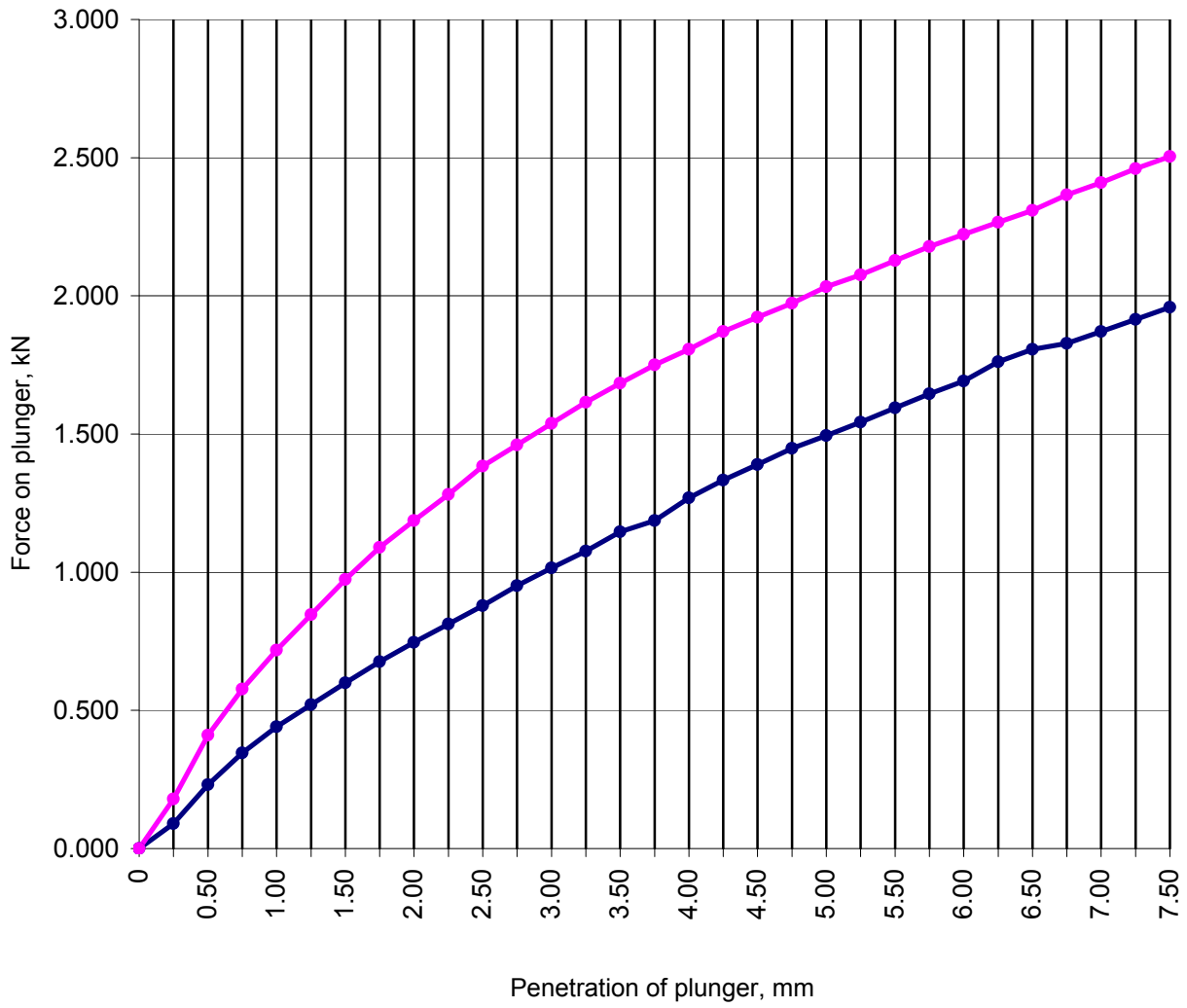
CBR value (%) at penetration of:	2.5mm	5.0mm
Top	**6.66**	**7.47**
Bottom	**10.49**	**10.16**
Accepted CBR %		**10.49**

sheet 2 of 3	Operator	Checked	Approved
	A. Lomidze	T. Jajanidze	R. Kavelashvili

California Bearing Ratio Test (graph)

Project Name:GC-1128	**Location**	Imereti Region, Georgia
Project: Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia	**Borehole no.**	BH-SE-12
Soil Description	**Sample no.**	
Intermediately plastic silty sandy CLAY	**Depth**	0.4-2.0
Test Method BS 1377 : Part 4 : 1990 :	**Date**	27.07.2011

* Delete as appropriate	Test on top face soaked/unsoaked
	Test on bottom face soaked/unsoaked



		Top face	Bottom face
CBR % at penetration of	2.5mm	**6.66**	**10.49**
	5.0mm	**7.47**	**10.16**

sheet 3 of 3	Operator	Checked	Approved
	A. Lomidze	T. Jajanidze	R. Kavelashvili

California Bearing Ratio Test (data for density)

Project Name:GC-1128		**Location**	Imereti Region, Georgia
Project: Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia		**Borehole no.**	BH-SE-14
Soil Description		**Sample no.**	
Silty SAND with a little rounded gravel content		**Depth**	1.2-2.3
		Date	26.07.2011
Sample preparation method BS 1377 : Part 4 : 1990			
Preparation procedure	Static, _____layer(s), with/ without tamping **2.5kg rammer**/4.5kg rammer/ vibrating hammer		
		Volume of mould Vcm^3 **2309**	Specified effort **5** layers **62** blows per layer

Calculated mass of soil required (m_1)		g	–
Mass of mould + baseplate + soil (m_3)		g	**10710.00**
Mass of mould + baseplate (m_2)		g	**5831.00**
Mass of soil (m_3– m_2)		g	**4879.00**
Soaking time		days	**4**
Time for water to appear at top of sample			**–**
Final swell		mm	**0.07**
Mass of mould + baseplate + soil after soaking (m_4)		g	**10775.00**
*Mass of soil after soaking (m_4– m_2)		g	**4944.00**
Maximum bearing ratio from plotting chart		%	**23.71**
Bulk density (unsoaked)	$\rho = \frac{m_1}{V}$	Mg/m^3	**–**
	$\rho = \frac{m_3 - m_2}{V}$	Mg/m^3	**2.11**
Moisture content (w)		%	**11.80**
Dry density (unsoaked)		Mg/m^3	**1.89**
Delete as appropriate			

sheet 1 of 3	Operator	Checked	Approved
	A. Lomidze	T. Jajanidze	R. Kavelashvili

California Bearing Ratio Test

Project Name:GC-1128	**Location**	Imereti Region, Georgia
Project: Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia	**Borehole no.**	BH-SE-14
Soil Description	**Sample no.**	
Silty SAND with a little rounded gravel content	**Depth**	1.2-2.3
	Date	26.07.2011
	Mean calibration	25.632 N/div

Test Method BS 1377 : Part 4 : 1990 **: 7.4**

Penetration of plunger mm	Force gauge reading div		Force on plunger kN	
	Top	Bottom	Top	Bottom
0.00	0.0	0.0	0.0	0.0
0.25	1.2	4.5	0.031	0.115
0.50	2.5	13.2	0.064	0.338
0.75	4.8	22.5	0.123	0.577
1.00	7.6	32.2	0.195	0.825
1.25	10.7	43.0	0.274	1.102
1.50	15.0	54.2	0.384	1.389
1.75	19.4	68.0	0.497	1.743
2.00	25.2	78.5	0.646	2.012
2.25	31.0	90.0	0.795	2.307
2.50	38.8	101.0	0.995	2.589
2.75	46.2	111.1	1.184	2.848
3.00	54.8	120.5	1.405	3.089
3.25	63.5	130.0	1.628	3.332
3.50	71.2	139.0	1.825	3.563
3.75	80.5	149.0	2.063	3.819

Penetration of plunger mm	Force gauge reading div		Force on plunger kN	
	Top	Bottom	Top	Bottom
4.00	90.0	155.0	2.307	3.973
4.25	98.0	163.8	2.512	4.199
4.50	108.5	171.7	2.781	4.401
4.75	117.2	178.5	3.004	4.575
5.00	127.1	185.0	3.258	4.742
5.25	136.2	193.0	3.491	4.947
5.50	144.0	200.0	3.691	5.126
5.75	153.8	207.2	3.942	5.311
6.00	162.6	213.8	4.168	5.480
6.25	172.1	220.0	4.411	5.639
6.50	181.0	226.6	4.639	5.808
6.75	191.7	233.1	4.914	5.975
7.00	200.0	238.9	5.126	6.123
7.25	208.1	244.0	5.334	6.254
7.50	218.0	250.1	5.588	6.411

*Delete as appropriate

Moisture content after test		Top		Bottom	
Container No.		22	4	X	310
Mass of wet soil + container (m_2)	g	1110.0	1114.0	1098.5	1100.0
Mass of dry soil + container (m_3)	g	1028.5	1030.0	1014.5	1015.0
Mass of container (m_1)	g	412.5	415.0	415.8	416.2
Mass of moisture ($m_2 - m_3$)	g	81.5	84.0	84.0	85.0
Mass of dry soil ($m_3 - m_1$)	g	616.0	615.0	598.7	598.8
Moisture content $W = \left(\frac{m_2 - m_3}{m_3 - m_1}\right)100$	%	13.23	13.66	14.03	14.20
Average moisture content	%	**13.78**			

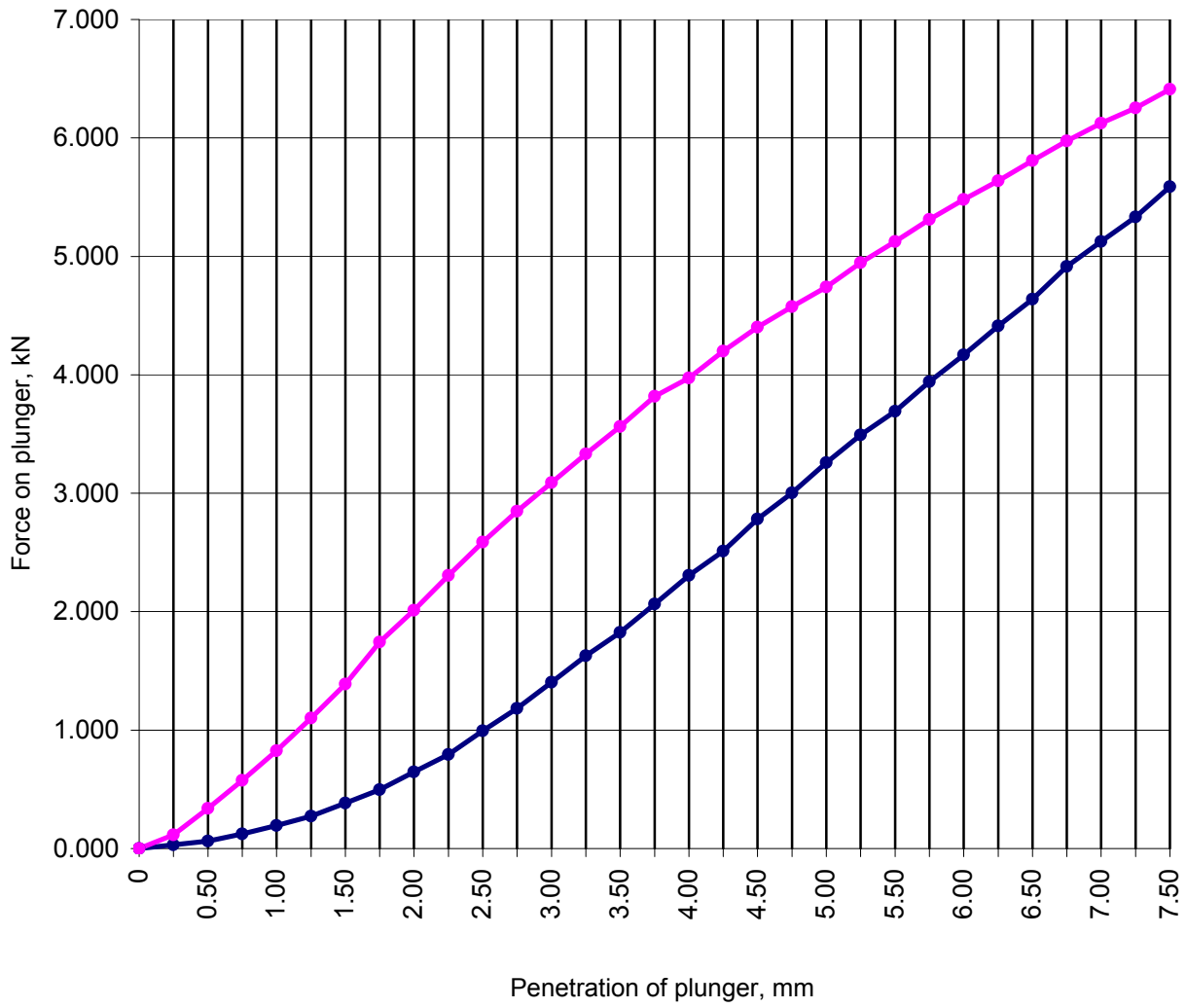
CBR value (%) at penetration of:	2.5mm	5.0mm
Top	**7.53**	**16.29**
Bottom	**19.61**	**23.71**
Accepted CBR %		**23.71**

sheet 2 of 3	Operator	Checked	Approved
	A. Lomidze	T. Jajanidze	R. Kavelashvili

California Bearing Ratio Test (graph)

Project Name:GC-1128	**Location**	Imereti Region, Georgia
Project: Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia	**Borehole no.**	BH-SE-14
Soil Description	**Sample no.**	
Silty SAND with a little rounded gravel content	**Depth**	1.2-2.3
Test Method BS 1377 : Part 4 : 1990 :	**Date**	26.07.2011

* Delete as appropriate	Test on top face soaked/unsoaked
	Test on bottom face soaked/unsoaked



		Top face	Bottom face
CBR % at penetration of	2.5mm	**7.53**	**19.61**
	5.0mm	**16.29**	**23.71**

sheet 3 of 3	Operator	Checked	Approved
	A. Lomidze	T. Jajanidze	R. Kavelashvili

California Bearing Ratio Test (data for density)

Project Name:GC-1128		**Location**	Imereti Region, Georgia
Project: Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia		**Borehole no.**	BH-SE-16
Soil Description		**Sample no.**	
Silty SAND with a little rounded gravel content		**Depth**	0.5-2.0
		Date	25.07.2011
Sample preparation method BS 1377 : Part 4 : 1990			
Preparation procedure	Static, _____layer(s), with/ without tamping **2.5kg rammer**/4.5kg rammer/ vibrating hammer		
	Volume of mould $V cm^3$ **2309**	Specified effort **5** layers **62** blows per layer	

Calculated mass of soil required (m_1)		g	–
Mass of mould + baseplate + soil (m_3)		g	**10553.00**
Mass of mould + baseplate (m_2)		g	**5845.00**
Mass of soil ($m_3 – m_2$)		g	**4708.00**
Soaking time		days	**4**
Time for water to appear at top of sample			**–**
Final swell		mm	**0.07**
Mass of mould + baseplate + soil after soaking (m_4)		g	**10583.00**
*Mass of soil after soaking ($m_4 – m_2$)		g	**4738.00**
Maximum bearing ratio from plotting chart		%	**26.14**
Bulk density (unsoaked)	$\rho = \frac{m_3 - m_2}{V}$	Mg/m^3	**–**
	$\rho = \frac{m_4}{V}$	Mg/m^3	**2.04**
Moisture content (w)		%	**15.20**
Dry density (unsoaked)		Mg/m^3	**1.77**
Delete as appropriate			

sheet 1 of 3	Operator	Checked	Approved
	A. Lomidze	T. Jajanidze	R. Kavelashvili

California Bearing Ratio Test

Project Name:GC-1128	**Location**	Imereti Region, Georgia
Project: Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia	**Borehole no.**	BH-SE-16
Soil Description	**Sample no.**	
Silty SAND with a little rounded gravel content	**Depth**	0.5-2.0
	Date	25.07.2011
	Mean calibration	25.632 N/div

Test Method BS 1377 : Part 4 : 1990 **: 7.4**

Penetration of plunger mm	Force gauge reading div		Force on plunger kN		Penetration of plunger mm	Force gauge reading div		Force on plunger kN	
	Top	Bottom	Top	Bottom		Top	Bottom	Top	Bottom
0.00	0.0	0.0	0.0	0.0					
0.25	7.0	7.5	0.179	0.192	4.00	124.0	179.0	3.178	4.588
0.50	16.0	23.3	0.410	0.597	4.25	129.5	185.7	3.319	4.760
0.75	25.5	40.0	0.654	1.025	4.50	134.5	192.0	3.448	4.921
1.00	35.0	57.5	0.897	1.474	4.75	139.5	198.0	3.576	5.075
1.25	46.0	72.8	1.179	1.866	5.00	144.0	204.0	3.691	5.229
1.50	56.0	87.6	1.435	2.245	5.25	149.0	209.5	3.819	5.370
1.75	64.5	100.5	1.653	2.576	5.50	153.0	215.0	3.922	5.511
2.00	73.0	112.4	1.871	2.881	5.75	157.3	222.0	4.032	5.690
2.25	80.5	124.2	2.063	3.183	6.00	161.3	225.8	4.134	5.788
2.50	88.0	132.9	2.256	3.406	6.25	165.3	231.0	4.237	5.921
2.75	94.8	142.0	2.430	3.640	6.50	169.0	235.7	4.332	6.041
3.00	100.1	150.3	2.566	3.852	6.75	173.0	240.5	4.434	6.164
3.25	107.0	157.4	2.743	4.034	7.00	176.3	245.5	4.519	6.293
3.50	113.5	166.0	2.909	4.255	7.25	179.5	250.0	4.601	6.408
3.75	119.0	174.0	3.050	4.460	7.50	182.5	255.0	4.678	6.536

*Delete as appropriate

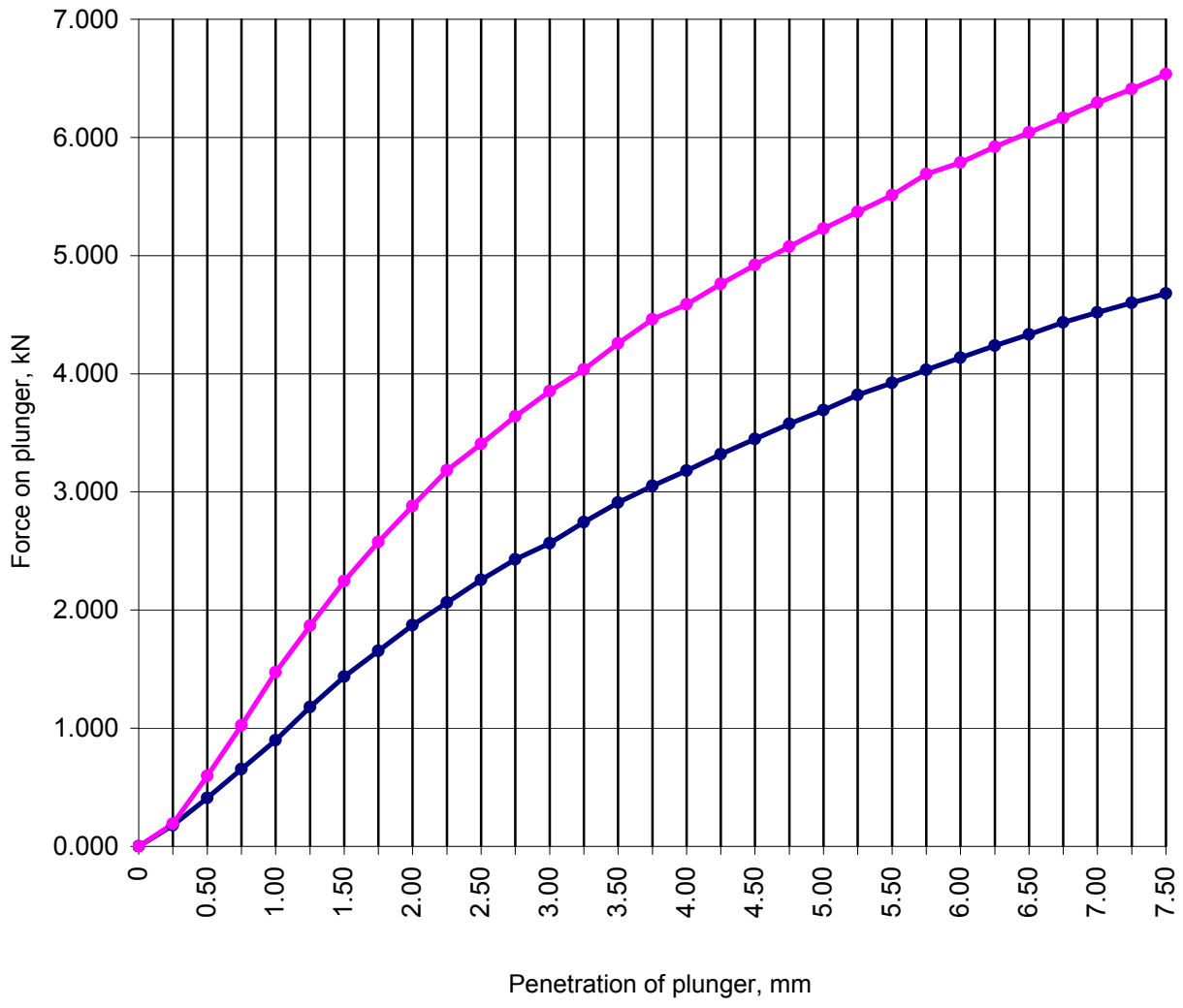
Moisture content after test		Top		Bottom				
Container No.		6	9	XX	250	CBR value (%) at penetration of:		
Mass of wet soil + container (m_2)	g	938.0	932.0	910.0	913.0		2.5mm	5.0mm
Mass of dry soil + container (m_3)	g	862.5	856.0	823.5	825.0	Top	**17.09**	**18.46**
Mass of container (m_1)	g	424.0	423.0	355.5	357.0			
Mass of moisture ($m_2 - m_3$)	g	75.5	76.0	86.5	88.0	Bottom	**25.81**	**26.14**
Mass of dry soil ($m_3 - m_1$)	g	438.5	433.0	468.0	468.0			
Moisture content $W = \left(\frac{m_2 - m_3}{m_3 - m_1}\right)100$	%	17.22	17.55	18.48	18.80	Accepted CBR %		**26.14**
Average moisture content	%	**18.01**						

sheet 2 of 3	Operator	Checked	Approved
	A. Lomidze	T. Jajanidze	R. Kavelashvili

California Bearing Ratio test (graph)

Project Name:GC-1128	**Location**	Imereti Region, Georgia
Project: Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia	**Borehole no.**	BH-SE-16
Soil Description	**Sample no.**	
Silty SAND with a little rounded gravel content	**Depth**	0.5-2.0
Test Method BS 1377 : Part 4 : 1990 :	**Date**	25.07.2011

* Delete as appropriate	Test on top face soaked/unsoaked
	Test on bottom face soaked/unsoaked



		Top face	Bottom face
CBR % at penetration of	2.5mm	**17.09**	**25.81**
	5.0mm	**18.46**	**26.14**

sheet 3 of 3	Operator	Checked	Approved
	A. Lomidze	T. Jajanidze	R. Kavelashvili

California Bearing Ratio Test (data for density)

Project Name:GC-1128		**Location**	Imereti Region, Georgia
Project: Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia		**Borehole no.**	BH-SE-18
Soil Description		**Sample no.**	
Low plastic sandy clayey SILT with a little rounded gravel inclusions		**Depth**	0.4-2.0
		Date	29.07.2011
Sample preparation method BS 1377 : Part 4 : 1990			
Preparation procedure	Static, _____layer(s), with/ without tamping **2.5kg rammer**/4.5kg rammer/ vibrating hammer		
	Volume of mould V_{cm^3} **2309**	Specified effort **5** layers **62** blows per layer	

Calculated mass of soil required (m_1)		g	–
Mass of mould + baseplate + soil (m_3)		g	**10653.00**
Mass of mould + baseplate (m_2)		g	**5873.00**
Mass of soil ($m_3 – m_2$)		g	**4780.00**
Soaking time		days	**4**
Time for water to appear at top of sample			**–**
Final swell		mm	**0.07**
Mass of mould + baseplate + soil after soaking (m_4)		g	**10687.00**
*Mass of soil after soaking ($m_4 – m_2$)		g	**4814.00**
Maximum bearing ratio from plotting chart		%	**24.48**
Bulk density (unsoaked)	$\rho = \frac{m_1}{V}$	Mg/m^3	**–**
	$\rho = \frac{m_3 - m_2}{V}$	Mg/m^3	**2.07**
Moisture content (w)		%	**16.30**
Dry density (unsoaked)		Mg/m^3	**1.78**
Delete as appropriate			

sheet 1 of 3	Operator	Checked	Approved
	A. Lomidze	T. Jajanidze	R. Kavelashvili

California Bearing Ratio Test

Project Name:GC-1128	**Location**	Imereti Region, Georgia
Project: Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia	**Borehole no.**	BH-SE-18
Soil Description	**Sample no.**	
Low plastic sandy clayey SILT with a little rounded gravel inclusions	**Depth**	0.4-2.0
	Date	29.07.2011
	Mean calibration	25.632 N/div

Test Method BS 1377 : Part 4 : 1990 **: 7.4**

Penetration of plunger mm	Force gauge reading div		Force on plunger kN	
	Top	Bottom	Top	Bottom
0.00	0.0	0.0	0.0	0.0
0.25	4.2	6.0	0.108	0.154
0.50	10.5	14.5	0.269	0.372
0.75	16.3	24.2	0.418	0.620
1.00	21.7	34.7	0.556	0.889
1.25	28.0	46.5	0.718	1.192
1.50	34.5	59.0	0.884	1.512
1.75	42.5	72.0	1.089	1.846
2.00	50.0	84.5	1.282	2.166
2.25	58.0	95.0	1.487	2.435
2.50	66.5	106.5	1.705	2.730
2.75	74.2	116.0	1.902	2.973
3.00	82.0	125.7	2.102	3.222
3.25	89.2	134.0	2.286	3.435
3.50	97.0	143.0	2.486	3.665
3.75	104.5	151.5	2.679	3.883

Penetration of plunger mm	Force gauge reading div		Force on plunger kN	
	Top	Bottom	Top	Bottom
4.00	111.5	159.7	2.858	4.093
4.25	118.2	168.0	3.030	4.306
4.50	125.0	175.7	3.204	4.504
4.75	132.8	183.0	3.404	4.691
5.00	138.2	191.0	3.542	4.896
5.25	144.0	198.2	3.691	5.080
5.50	150.2	205.7	3.850	5.273
5.75	156.1	211.8	4.001	5.429
6.00	162.2	218.0	4.158	5.588
6.25	167.5	224.2	4.293	5.747
6.50	173.5	231.0	4.447	5.921
6.75	179.0	236.7	4.588	6.067
7.00	184.2	242.5	4.721	6.216
7.25	190.0	249.0	4.870	6.382
7.50	196.0	254.8	5.024	6.531

*Delete as appropriate

Moisture content after test		Top		Bottom	
Container No.		23	4	X	310
Mass of wet soil + container (m_2)	g	491.5	493.5	363.5	362.0
Mass of dry soil + container (m_3)	g	436.5	438.0	326.0	324.5
Mass of container (m_1)	g	119.5	120.5	117.0	116.5
Mass of moisture ($m_2 - m_3$)	g	55.0	55.5	37.5	37.5
Mass of dry soil ($m_3 - m_1$)	g	317.0	317.5	209.0	208.0
Moisture content $W = \left(\frac{m_2 - m_3}{m_3 - m_1}\right)100$	%	17.35	17.48	17.94	18.03
Average moisture content	%	**17.70**			

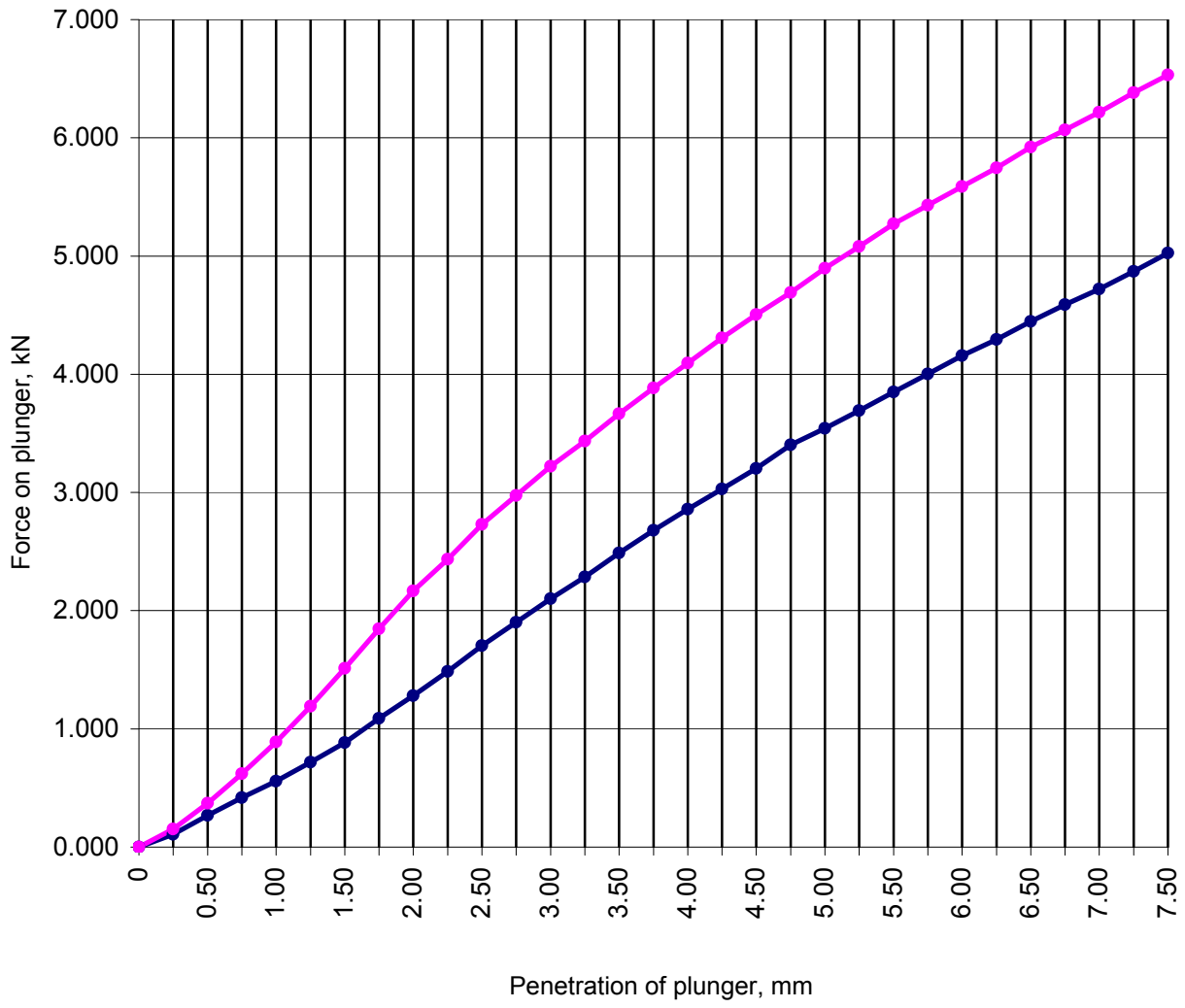
CBR value (%) at penetration of:		2.5mm	5.0mm
	Top	**12.91**	**17.71**
	Bottom	**20.68**	**24.48**
	Accepted CBR %		**24.48**

sheet 2 of 3	Operator	Checked	Approved
	A. Lomidze	T. Jajanidze	R. Kavelashvili

California Bearing Ratio Test (graph)

Project Name:GC-1128	**Location**	Imereti Region, Georgia
Project: Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia	**Borehole no.**	BH-SE-18
Soil Description	**Sample no.**	
Low plastic sandy clayey SILT with a little rounded gravel inclusions	**Depth**	0.4-2.0
Test Method BS 1377 : Part 4 : 1990 :	**Date**	29.07.2011

* Delete as appropriate	Test on top face soaked/unsoaked
	Test on bottom face soaked/unsoaked



		Top face	Bottom face
CBR % at penetration of	2.5mm	**12.91**	**20.68**
	5.0mm	**17.71**	**24.48**

sheet 3 of 3	Operator	Checked	Approved
	A. Lomidze	T. Jajanidze	R. Kavelashvili

California Bearing Ratio Test (data for density)

Project Name:GC-1128		**Location**	Imereti Region, Georgia
Project: Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia		**Borehole no.**	BH-SE-19
Soil Description		**Sample no.**	
Intermediately plastic silty CLAY		**Depth**	0.5-1.3
		Date	15.08.2011
Sample preparation method BS 1377 : Part 4 : 1990			
Preparation procedure	Static, _____layer(s), with/ without tamping **2.5kg rammer**/4.5kg rammer/ vibrating hammer		
	Volume of mould $V cm^3$ **2309**	Specified effort **5** layers **62** blows per layer	
Calculated mass of soil required (m_1)		g	–
Mass of mould + baseplate + soil (m_3)		g	**10149.00**
Mass of mould + baseplate (m_2)		g	**5831.00**
Mass of soil ($m_3 – m_2$)		g	**4318.00**
Soaking time		days	**4**
Time for water to appear at top of sample			**–**
Final swell		mm	**0.07**
Mass of mould + baseplate + soil after soaking (m_4)		g	**10250.00**
*Mass of soil after soaking ($m_4 – m_2$)		g	**4419.00**
Maximum bearing ratio from plotting chart		%	**12.52**
Bulk density (unsoaked)	$\rho = \frac{m_1}{V}$	Mg/m^3	**–**
	$\rho = \frac{m_3 - m_2}{V}$	Mg/m^3	**1.87**
Moisture content (w)		%	**26.10**
Dry density (unsoaked)		Mg/m^3	**1.48**
Delete as appropriate			

sheet 1 of 3	Operator	Checked	Approved
	A. Lomidze	T. Jajanidze	R. Kavelashvili

California Bearing Ratio Test

Project Name:GC-1128	**Location**	Imereti Region, Georgia
Project: Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia	**Borehole no.**	BH-SE-19
Soil Description	**Sample no.**	
Intermediately plastic silty CLAY	**Depth**	0.5-1.3
	Date	15.08.2011
	Mean calibration	25.632 N/div

Test Method BS 1377 : Part 4 : 1990 **: 7.4**

Penetration of plunger mm	Force gauge reading div		Force on plunger kN		Penetration of plunger mm	Force gauge reading div		Force on plunger kN	
	Top	Bottom	Top	Bottom		Top	Bottom	Top	Bottom
0.00	0.0	0.0	0.0	0.0					
0.25	7.0	5.0	0.179	0.128	4.00	85.0	84.5	2.179	2.166
0.50	14.0	13.0	0.359	0.333	4.25	87.5	87.5	2.243	2.243
0.75	20.5	23.0	0.525	0.590	4.50	90.5	90.0	2.320	2.307
1.00	26.0	31.0	0.666	0.795	4.75	92.3	93.7	2.366	2.402
1.25	31.5	38.0	0.807	0.974	5.00	93.8	95.7	2.404	2.453
1.50	37.5	44.5	0.961	1.141	5.25	95.3	97.8	2.443	2.507
1.75	43.5	50.5	1.115	1.294	5.50	96.8	100.2	2.481	2.568
2.00	50.0	55.5	1.282	1.423	5.75	98.3	102.2	2.520	2.620
2.25	55.5	60.5	1.423	1.551	6.00	100.0	104.3	2.563	2.673
2.50	61.0	64.5	1.564	1.653	6.25	101.3	106.5	2.597	2.730
2.75	66.0	68.5	1.692	1.756	6.50	103.2	108.7	2.645	2.786
3.00	71.0	72.0	1.820	1.846	6.75	104.7	110.6	2.684	2.835
3.25	75.0	75.3	1.922	1.930	7.00	106.1	112.5	2.720	2.884
3.50	78.5	78.5	2.012	2.012	7.25	107.5	114.2	2.755	2.927
3.75	82.0	81.8	2.102	2.097	7.50	109.3	116.0	2.802	2.973

*Delete as appropriate

Moisture content after test		Top		Bottom	
Container No.		17	6	X	8
Mass of wet soil + container (m_2)	g	727.0	737.8	644.0	655.0
Mass of dry soil + container (m_3)	g	656.5	663.0	590.0	597.5
Mass of container (m_1)	g	407.8	401.0	412.5	409.5
Mass of moisture ($m_2 - m_3$)	g	70.5	74.8	54.0	57.5
Mass of dry soil ($m_3 - m_1$)	g	248.7	262.0	177.5	188.0
Moisture content $W = \left(\frac{m_2 - m_3}{m_3 - m_1}\right)100$	%	28.35	28.55	30.42	30.59
Average moisture content	%	**29.48**			

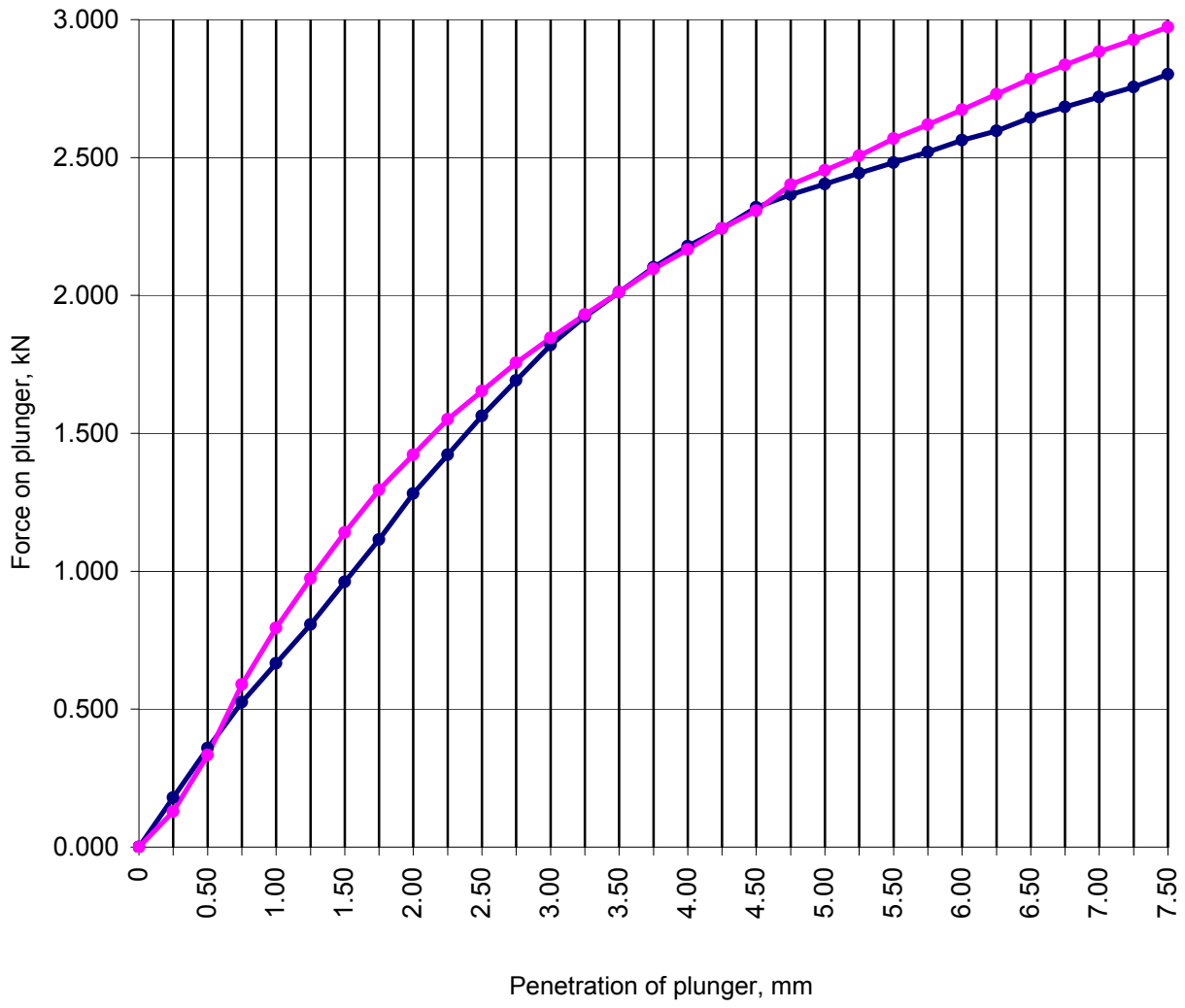
CBR value (%) at penetration of:	2.5mm	5.0mm
Top	**11.85**	**12.02**
Bottom	**12.52**	**12.26**
Accepted CBR %		**12.52**

sheet 2 of 3	Operator	Checked	Approved
	A. Lomidze	T. Jajanidze	R. Kavelashvili

California Bearing Ratio Test (graph)

Project Name:GC-1128	**Location**	Imereti Region, Georgia
Project: Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia	**Boehole no.**	BH-SE-19
Soil Description	**Sample no.**	
Intermediately plastic silty CLAY	**Depth**	0.5-1.3
Test Method BS 1377 : Part 4 : 1990 :	**Date**	15.08.2011

* Delete as appropriate	Test on top face soaked/unsoaked
	Test on bottom face soaked/unsoaked



		Top face	Bottom face
CBR % at penetration of	2.5mm	**11.85**	**12.52**
	5.0mm	**12.02**	**12.26**

sheet 3 of 3	Operator	Checked	Approved
	A. Lomidze	T. Jajanidze	R. Kavelashvili

California Bearing Ratio Test (data for density)

Project Name: GC-1128		**Location**	Imereti Region, Georgia
Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia		**Borehole no.**	BH-SB2-1
Soil Description		**Sample no.**	
Intermediately plastic sandy silty CLAY with a little rounded gravel content		**Depth**	0.5-2.0
		Date	26.07.2011
Sample preparation method BS 1377 : Part 4 : 1990			
Preparation procedure	Static, _____layer(s), with/ without tamping **2.5kg rammer**/4.5kg rammer/ vibrating hammer		
	Volume of mould Vcm^3 **2309**	Specified effort **5** layers **62** blows per layer	
Calculated mass of soil required (m_1)		g	–
Mass of mould + baseplate + soil (m_3)		g	**10401.00**
Mass of mould + baseplate (m_2)		g	**5831.00**
Mass of soil (m_3– m_2)		g	**4570.00**
Soaking time		days	**4**
Time for water to appear at top of sample			**–**
Final swell		mm	**0.07**
Mass of mould + baseplate + soil after soaking (m_4)		g	**10460.00**
*Mass of soil after soaking (m_4– m_2)		g	**4629.00**
Maximum bearing ratio from plotting chart		%	**3.46**
Bulk density (unsoaked)	$\rho = \frac{m_1}{V}$	Mg/m^3	**–**
	$\rho = \frac{m_3 - m_2}{V}$	Mg/m^3	**1.98**
Moisture content (w)		%	**20.50**
Dry density (unsoaked)		Mg/m^3	**1.64**
Delete as appropriate			

sheet 1 of 3	Operator	Checked	Approved
	A. Lomidze	T. Jajanidze	R. Kavelashvili

California Bearing Ratio Test

Project Name: GC-1128	**Location**	Imereti Region, Georgia
Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia	**Borehole no.**	BH-SB2-1
Soil Description	**Sample no.**	
Intermediately plastic sandy silty CLAY with a little rounded gravel content	**Depth**	0.5-2.0
	Date	26.07.2011
	Mean calibration	25.632 N/div

Test Method BS 1377 : Part 4 : 1990 **: 7.4**

Penetration of plunger mm	Force gauge reading div		Force on plunger kN		Penetration of plunger mm	Force gauge reading div		Force on plunger kN	
	Top	Bottom	Top	Bottom		Top	Bottom	Top	Bottom
0.00	0.0	0.0	0.0	0.0					
0.25	3.0	2.2	0.077	0.056	4.00	18.2	23.3	0.467	0.597
0.50	5.2	4.4	0.133	0.113	4.25	18.9	24.3	0.484	0.623
0.75	6.8	6.3	0.174	0.161	4.50	19.5	25.2	0.500	0.646
1.00	7.8	8.0	0.200	0.205	4.75	20.4	26.1	0.523	0.669
1.25	8.9	9.5	0.228	0.244	5.00	21.1	27.0	0.541	0.692
1.50	9.8	11.2	0.251	0.287	5.25	21.8	27.9	0.559	0.715
1.75	10.8	12.7	0.277	0.326	5.50	22.5	28.8	0.577	0.738
2.00	11.7	14.0	0.300	0.359	5.75	23.2	29.8	0.595	0.764
2.25	12.6	15.3	0.323	0.392	6.00	23.9	30.7	0.613	0.787
2.50	13.5	16.7	0.346	0.428	6.25	24.6	31.5	0.631	0.807
2.75	14.3	17.9	0.367	0.459	6.50	25.2	32.2	0.646	0.825
3.00	15.1	19.0	0.387	0.487	6.75	26.0	33.0	0.666	0.846
3.25	15.9	20.1	0.408	0.515	7.00	26.7	33.8	0.684	0.866
3.50	16.7	21.2	0.428	0.543	7.25	27.3	34.4	0.700	0.882
3.75	17.5	22.3	0.449	0.572	7.50	28.0	35.2	0.718	0.902

*Delete as appropriate

Moisture content after test		Top		Bottom	
Container No.		26	4	XX	56
Mass of wet soil + container (m_2)	g	544.6	545.8	234.0	236.0
Mass of dry soil + container (m_3)	g	517.0	518.0	213.0	214.9
Mass of container (m_1)	g	391.5	392.5	119.5	121.5
Mass of moisture ($m_2 - m_3$)	g	27.6	27.8	21.0	21.1
Mass of dry soil ($m_3 - m_1$)	g	125.5	125.5	93.5	93.4
Moisture content $W = \left(\frac{m_2 - m_3}{m_3 - m_1}\right)100$	%	21.99	22.15	22.46	22.59
Average moisture content	%	**22.30**			

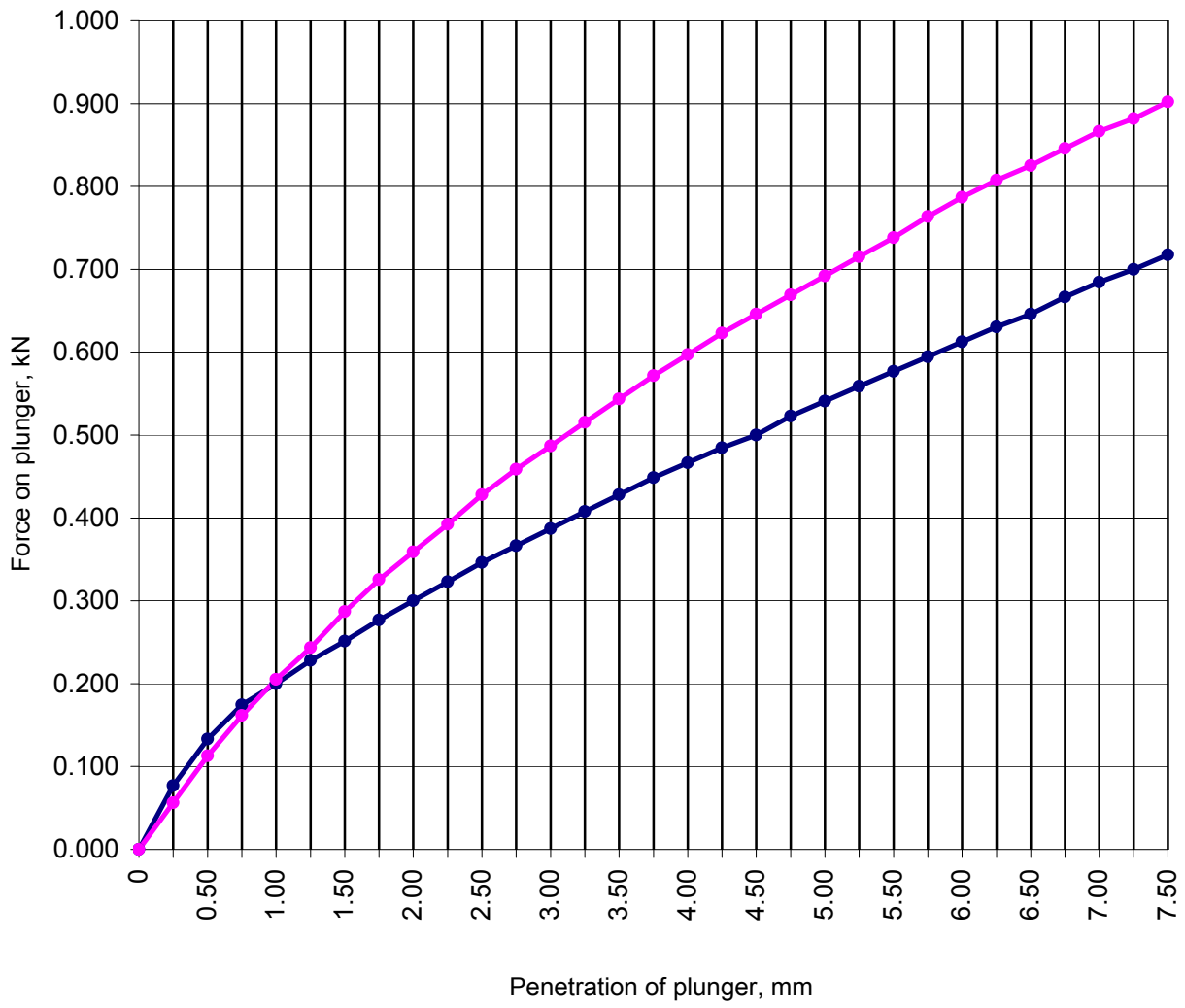
CBR value (%) at penetration of:	2.5mm	5.0mm
Top	**2.62**	**2.70**
Bottom	**3.24**	**3.46**
Accepted CBR %		**3.46**

sheet 2 of 3	Operator	Checked	Approved
	A. Lomidze	T. Jajanidze	R. Kavelashvili

California Bearing Ratio Test (graph)

Project Name: GC-1128	**Location**	Imereti Region, Georgia
Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia	**Borehole no.**	BH-SB2-1
Soil Description	**Sample no.**	
Intermediately plastic sandy silty CLAY with a little rounded gravel content	**Depth**	0.5-2.0
Test Method BS 1377 : Part 4 : 1990 :	**Date**	26.07.2011

* Delete as appropriate	Test on top face	soaked/unsoaked
	Test on bottom face	soaked/unsoaked



		Top face	Bottom face
CBR % at penetration of	2.5mm	**2.62**	**3.24**
	5.0mm	**2.70**	**3.46**

sheet 3 of 3	Operator	Checked	Approved
	A. Lomidze	T. Jajanidze	R. Kavelashvili

ANNEX 1 .10
Consolidation Tests

Consolidation Test

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SI1-2
	Sample no.	,
	Dept, m	21.0-21.3
	Date	14.07.2011
Test method BS1377 : Part 5 : 1990 : 3.5, 3.6		Saturated State

Cell no.	1	Particle density	
Ring no.	1	asumed	2.75 Mg/m^3

DIMENSIONS		Initial specimen	Overall change	Final specimen	Specimen preparation method
Diameter	D mm	87.40		87.40	
Area	A mm^2	5999.47		5999.47	
Height	H mm	H_o 24.90	2.626	22.274	
Volume	V cm^3	149.39	15.75	133.63	

WEIGHINGS		Initial specimen (a)	Initial specimen (b)	Final specimen (c)
Wet soil + ring + tray	g	482.23		482.00
Dry soil + ring + tray	g			430.50
Ring + tray	g	191.18		191.18
Wet soil	g	m_0 291.05	m_0 291.05	290.82
Dry soil	g		m_d 239.32	239.32
Water	g		51.73	51.50
Moisture content (measured)	%		21.62	21.52
Moisture content (from trimmings)	%	W_0 26.70		
Density	Mg/m^3	1.95	1.95	2.18
Dry density	Mg/m^3	1.54	1.60	1.79
Voids ratio		e_0 0.788	0.717	0.536
Degree of saturation	%	S_0 93.14	82.95	110.49
Height of soils	H_S mm	13.92	14.51	14.51

(a) Using moisture content from trimmings

(b) Using data from (a) and (c)

(c) Data from specimen after test

Sheet 1	**Operator**	**Checked**	**Approved**
Sheets 19	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SI1-2
	Sample no.	,
	Dept	21.0-21.3
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8				
Machine no.	1	Spec. diam.	87.40	Height	24.90 mm
Cell no.	1	Lever ratio	1:10	Area	5999.47 mm^2
Ring no.	1	**1kg** on hanger gives pressure of			21.60 kPa

LOADING/UNLOADING/RELOADING

Increment no.						1			2			3		
Date started						07.07.2011			08.07.2011			09.07.2011		
Load					kg	1.16			2.31			4.63		
Pressure					kPa	25.0			50.0			100.0		
Mean daily temperature 22 ^{0} C						LOADING			LOADING			LOADING		
Elapsed time														
h	m	s	t min	t^0		Clock time	Gauge reading	Cumulative compression mm ΔH	Clock time	Gauge reading	Cumulative compression mm ΔH	Clock time	Gauge reading	Cumulative compression mm ΔH
0	0	0	0	22		9:23	5.000	0.000	9:45	5.109	0.109	9:45	5.232	0.232
_	_	10	0.167	22		9:23	5.089	0.089	9:45	5.126	0.126	9:45	5.339	0.339
_	_	20	0.333	22		9:23	5.089	0.089	9:45	5.129	0.129	9:45	5.346	0.346
_	_	30	0.500	22		9:23	5.090	0.090	9:45	5.131	0.131	9:45	5.350	0.350
_	_	40	0.667	22		9:23	5.091	0.091	9:45	5.133	0.133	9:45	5.356	0.356
_	_	50	0.833	22		9:23	5.092	0.092	9:45	5.136	0.136	9:45	5.360	0.360
_	0:01	_	1	22		9:24	5.093	0.093	9:46	5.137	0.137	9:46	5.364	0.364
_	0:02	_	2	22		9:25	5.095	0.095	9:47	5.142	0.142	9:47	5.379	0.379
_	0:04	_	4	22		9:27	5.097	0.097	9:49	5.152	0.152	9:49	5.400	0.400
_	0:08	_	8	22		9:31	5.099	0.099	9:53	5.162	0.162	9:53	5.432	0.432
_	0:15	_	15	22		9:38	5.101	0.101	10:00	5.177	0.177	10:00	5.473	0.473
_	0:30	_	30	22		9:53	5.103	0.103	10:15	5.193	0.193	10:15	5.518	0.518
1:00	_	_	60	21		10:23	5.105	0.105	10:45	5.206	0.206	10:45	5.550	0.550
2:00	_	_	120	21		11:23	5.107	0.107	11:45	5.216	0.216	11:45	5.584	0.584
4:00	_	_	240	21		13:23	5.108	0.108	13:45	5.226	0.226	13:45	5.601	0.601
8:00	_	_	480	20		17:23	5.109	0.109	17:45	5.231	0.231	17:45	5.609	0.609
24:00	_	_	1440	21		9:23	5.109	0.109	9:45	5.232	0.232	9:45	5.611	0.611
36:00	_	_	2160			21:23			21:45			21:45		
48:00	_	_	**2880**			9:23			9:45			9:45		
Cumulative correction **y**						0.018			0.045			0.086		
Net cumulative compression (ΔH-y)						0.091			0.187			0.525		

Sheet 2	Operator	Checked	Approved
Sheets 19	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SI1-2
	Sample no.	,
	Dept	21.0-21.3
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8					
Machine no.	1	Spec. diam.	87.40	Height	24.90	mm
Cell no.	1	Lever ratio	1:10	Area	5999.47	mm^2
Ring no.	1	**1kg** on hanger gives pressure of			21.60	кPa

LOADING/UNLOADING/RELOADING

Increment no.					4			5			6		
Date started					10.07.2011			11.07.2011			12.07.2011		
Load kg					9.259			18.519			37.037		
Pressure kPa					200.0			400.0			800.0		
Mean daily temperature 22 ^{0} C					**LOADING**			**LOADING**			**UNLOADING**		
Elapsed time				t^0	Clock time	Gauge reading	Cumulative compression ΔH mm	Clock time	Gauge reading	Cumulative compression ΔH mm	Clock time	Gauge reading	Cumulative compression ΔH mm
h	m	s	t min										
0	0	0	0	22	9:45	5.611	0.611	9:45	6.182	1.182	9:45	6.940	1.940
_	_	10	0.167	22	9:45	5.710	0.710	9:45	6.315	1.315	9:45	7.055	2.055
_	_	20	0.333	22	9:45	5.725	0.725	9:45	6.333	1.333	9:45	7.075	2.075
_	_	30	0.500	22	9:45	5.736	0.736	9:45	6.346	1.346	9:45	7.085	2.085
_	_	40	0.667	22	9:45	5.749	0.749	9:45	6.360	1.360	9:45	7.095	2.095
_	_	50	0.833	22	9:45	5.760	0.760	9:45	6.370	1.370	9:45	7.105	2.105
_	0:01	_	1	22	9:46	5.764	0.764	9:46	6.379	1.379	9:46	7.115	2.115
_	0:02	_	2	22	9:47	5.800	0.800	9:47	6.420	1.420	9:47	7.170	2.170
_	0:04	_	4	22	9:49	5.845	0.845	9:49	6.482	1.482	9:49	7.238	2.238
_	0:08	_	8	22	9:53	5.928	0.928	9:53	6.554	1.554	9:53	7.334	2.334
_	0:15	_	15	22	10:00	5.974	0.974	10:00	6.653	1.653	10:00	7.442	2.442
_	0:30	_	30	22	10:15	6.055	1.055	10:15	6.758	1.758	10:15	7.584	2.584
1:00	_	_	60	21	10:45	6.121	1.121	10:45	6.840	1.840	10:45	7.686	2.686
2:00	_	_	120	21	11:45	6.159	1.159	11:45	6.890	1.890	11:45	7.745	2.745
4:00	_	_	240	21	13:45	6.172	1.172	13:45	6.920	1.920	13:45	7.781	2.781
8:00	_	_	480	20	17:45	6.180	1.180	17:45	6.941	1.941	17:45	7.812	2.812
24:00	_	_	1440	21	9:45	6.182	1.182	9:45	6.940	1.940	9:45	7.815	2.815
36:00	_	_	2160		21:45			21:45			21:45		
48:00	_	_	**2880**		9:45			9:45			9:45		
Cumulative correction **y**					0.131			0.162			0.200		
Net cumulative compression (ΔH-y)					1.051			1.778			2.615		

Sheet 3	Operator	Checked	Approved
Sheets 19	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SI1-2
	Sample no.	,
	Dept	21.0-21.3
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8					
Machine no.	1	Spec. diam.	87.40	Height	24.90	mm
Cell no.	1	Lever ratio	1:10	Area	5999.47	mm^2
Ring no.	1	**1kg** on hanger gives pressure of			21.60	кPa

LOADING/UNLOADING/RELOADING

Increment no.					7			8			9		
Date started					13.07.2011			14.07.2011			15.07.2011		
Load				kg	18.519			9.259			4.630		
Pressure				kPa	400.0			200.0			100.0		
Mean daily temperature 22 ^{0} C					UNLOADING			UNLOADING			RELOADING		
Elapsed time				t^0	Clock time	Gauge reading	Cumulative compression mm ΔH	Clock time	Gauge reading	Cumulative compression mm ΔH	Clock time	Gauge reading	Cumulative compression mm ΔH
h	m	s	t min										
0	0	0	0	22	9:45	7.815	2.815	10:15	7.787	2.787	10:15	7.640	2.640
_	_	10	0.167	22	9:45	7.845	2.845	10:15	7.759	2.759	10:15	7.599	2.599
_	_	20	0.333	22	9:45	7.845	2.845	10:15	7.755	2.755	10:15	7.596	2.596
_	_	30	0.500	22	9:45	7.845	2.845	10:15	7.753	2.753	10:15	7.595	2.595
_	_	40	0.667	22	9:45	7.844	2.844	10:15	7.751	2.751	10:15	7.595	2.595
_	_	50	0.833	22	9:45	7.840	2.840	10:15	7.749	2.749	10:15	7.594	2.594
_	0:01	_	1	22	9:46	7.838	2.838	10:16	7.746	2.746	10:16	7.593	2.593
_	0:02	_	2	22	9:47	7.832	2.832	10:17	7.737	2.737	10:17	7.589	2.589
_	0:04	_	4	22	9:49	7.823	2.823	10:19	7.728	2.728	10:19	7.583	2.583
_	0:08	_	8	22	9:53	7.814	2.814	10:23	7.706	2.706	10:23	7.574	2.574
_	0:15	_	15	22	10:00	7.805	2.805	10:30	7.695	2.695	10:30	7.567	2.567
_	0:30	_	30	22	10:15	7.798	2.798	10:45	7.678	2.678	10:45	7.558	2.558
1:00	_	_	60	21	10:45	7.792	2.792	11:15	7.656	2.656	11:15	7.549	2.549
2:00	_	_	120	21	11:45	7.790	2.790	12:15	7.652	2.652	12:15	7.538	2.538
4:00	_	_	240	21	13:45	7.788	2.788	14:15	7.650	2.650	14:15	7.526	2.526
8:00	_	_	480	20	17:45	7.787	2.787	18:15	7.650	2.650	18:15	7.524	2.524
24:00	_	_	1440	21	9:45	7.788	2.788	10:15	7.650	2.650	10:15	7.523	2.523
36:00	_	_	2160		21:45			22:15			22:15		
48:00	_	_	**2880**		9:45			10:15			10:15		
Cumulative correction **y**					0.162			0.131			0.086		
Net cumulative compression (ΔH-y)					2.626			2.519			2.437		

Sheet 4	Operator	Checked	Approved
Sheets 19	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SI1-2
	Sample no.	,
	Dept	21.0-21.3
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8					
Machine no.	1	Spec. diam.	87.40	Height	24.90	mm
Cell no.	1	Lever ratio	1:10	Area	5999.47	mm^2
Ring no.	1	**1kg** on hanger gives pressure of			21.60	кPa

LOADING/UNLOADING/RELOADING

Increment no.					10			11			12		
Date started					16.07.2011			17.07.2011			18.07.2011		
Load				kg	0.008			0.004			0.001		
Pressure				kPa	50.0			25.0			3.6		
Mean daily temperature 22 ^{0} C					RELOADING			RELOADING			RELOADING		
Elapsed time				t^0	Clock time	Gauge reading	Cumulative compression ΔH mm	Clock time	Gauge reading	Cumulative compression ΔH mm	Clock time	Gauge reading	Cumulative compression ΔH mm
h	m	s	t min										
0	0	0	0	22	10:15	7.512	2.512	10:15	7.446	2.446	10:15	7.381	2.381
_	_	10	0.167	22	10:15	7.483	2.483	10:15	7.428	2.428	10:15	7.365	2.365
_	_	20	0.333	22	10:15	7.482	2.482	10:15	7.426	2.426	10:15	7.363	2.363
_	_	30	0.500	22	10:15	7.481	2.481	10:15	7.425	2.425	10:15	7.362	2.362
_	_	40	0.667	22	10:15	7.479	2.479	10:15	7.424	2.424	10:15	7.360	2.360
_	_	50	0.833	22	10:15	7.478	2.478	10:15	7.423	2.423	10:15	7.358	2.358
_	0:01	_	1	22	10:16	7.477	2.477	10:16	7.422	2.422	10:16	7.358	2.358
_	0:02	_	2	22	10:17	7.475	2.475	10:17	7.420	2.420	10:17	7.353	2.353
_	0:04	_	4	22	10:19	7.474	2.474	10:19	7.416	2.416	10:19	7.349	2.349
_	0:08	_	8	22	10:23	7.471	2.471	10:23	7.411	2.411	10:23	7.345	2.345
_	0:15	_	15	22	10:30	7.468	2.468	10:30	7.407	2.407	10:30	7.341	2.341
_	0:30	_	30	22	10:45	7.464	2.464	10:45	7.404	2.404	10:45	7.337	2.337
1:00	_	_	60	21	11:15	7.460	2.460	11:15	7.399	2.399	11:15	7.332	2.332
2:00	_	_	120	21	12:15	7.456	2.456	12:15	7.395	2.395	12:15	7.328	2.328
4:00	_	_	240	21	14:15	7.452	2.452	14:15	7.391	2.391	14:15	7.324	2.324
8:00	_	_	480	20	18:15	7.451	2.451	18:15	7.390	2.390	18:15	7.321	2.321
24:00	_	_	1440	21	10:15	7.450	2.450	10:15	7.390	2.390	10:15	7.321	2.321
36:00	_	_	2160		22:15			22:15			22:15		
48:00	_	_	**2880**		10:15			10:15			10:15		
Cumulative correction **y**					0.045			0.018					
Net cumulative compression (ΔH-y)					2.405			2.372			2.321		

Sheet 5	Operator	Checked	Approved
Sheets 19	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SI1-2
	Sample no.	,
	Dept	21.0-21.3
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8				
Machine no.	1	Specimen diameter	87.40 mm	Height H_0,	24.9 mm
Cell no.	1	Height of solids Hs	13.92 mm		
Ring no.	1	Initial voids ratio e_1	0.788		

VOIDS RATIO					COMPRESSIBILITY			COEFFICIENT OF CONSOLIDATION			
					Incremental					c_v =	
Increment no.	Pressure P kPa	Cumulative compression (ΔH-y) mm	Consolidated height $H=H_0-(\Delta H-y)$ mm	Voids ratio $e=\frac{H-H_s}{H_s}$	height change, δH mm	pressure change δp kPa	$m_v=\frac{\delta H}{H_i}\cdot\frac{1000}{\delta p}$ m^2/MN	t_{50} min	$\bar{H}=\frac{1}{2}(H_1+H_2)$ mm	$\frac{0.026\bar{H}^2}{t_{50}}$ $m^2/year$	$\frac{0.111\bar{H}^2}{t_{90}}$ $m^2/year$
0	0	0.000	24.90	0.788	0.00	0	–	–	–	–	–
1	25.0	0.091	24.81	0.782	0.09	25.0	0.15	3.82	24.85	4.20	
2	50.0	0.187	24.71	0.775	0.10	25.0	0.15	12.70	24.76	1.26	
3	100.0	0.525	24.38	0.751	0.34	50.0	0.27	13.19	24.54	1.19	
4	200.0	1.051	23.85	0.713	0.53	100.0	0.22	8.85	24.11	1.71	
5	400.0	1.778	23.12	0.661	0.73	200.0	0.15	8.91	23.49	1.61	
6	800.0	2.615	22.29	0.601	0.84	400.0	0.09	11.64	22.70	1.15	
7	400.0	2.626	22.27	0.600	0.01	-400.0	0.00	6.97	22.28	1.85	
8	200.0	2.519	22.38	0.607	-0.11	-200.0	0.02	8.17	22.33	1.59	
9	100.0	2.437	22.46	0.613	-0.08	-100.0	0.04	18.94	22.42	0.69	
10	50.0	2.405	22.49	0.616	-0.03	-50.0	0.03	10.07	22.48	1.31	
11	25.0	2.372	22.53	0.618	-0.03	-25.0	0.06	8.87	22.51	1.49	
12	3.6	2.321	22.58	0.622	-0.05	-21.4	0.11	7.25	22.55	1.82	

Sheet	6	Operator	Checked	Approved
Sheets	19	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description:	**Borehole**	BH-SI1-2
Intermediately plastic silty CLAY	**Sample no.**	,
	Dept	21.0-21.3
	Date	14.07.2011

Test method BS 1377 : Part 7 : 1990 : 8

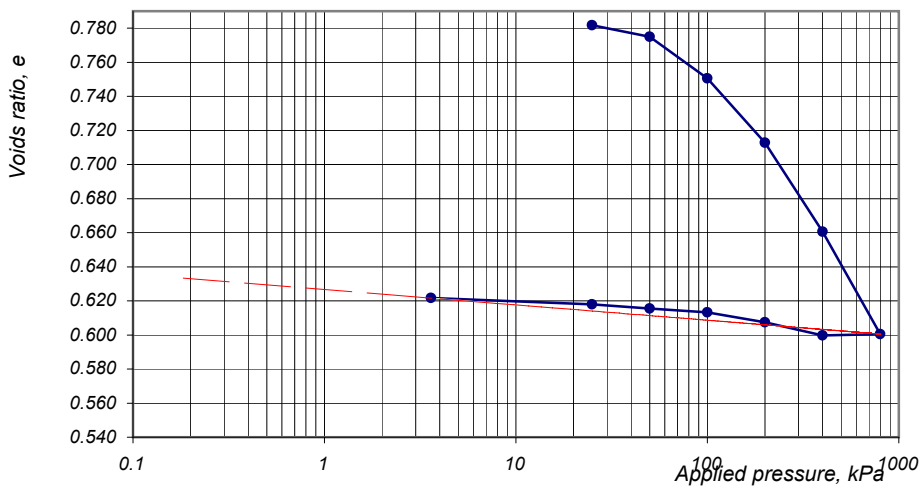
SPECIMEN INITIALLY

Diameter	87.40 mm	Density	1.95	Mg/m^3
Height	24.90 mm	Moisture content	26.7	%
Voids ratio	0.788	Dry density	1.54	Mg/m^3
Saturation	93.14 %	Particle density	2.75	Mg/m^3

Compression Index, C_c 0.009

Remarks:

Pressure stage kPa	Laboratory coefficients of: Compressibility, m_v m^2/MN	Consolidation, C_v $m^2/year$	Secondary Consolidation, C_α
0.0	-	-	-
25	0.15	4.20	4.3E-05
50	0.15	1.26	6.5E-18
100	0.27	1.19	6.4E-05
200	0.22	1.71	6.7E-05
400	0.15	1.61	7.7E-05
800	0.09	1.15	3.6E-05
400	0.00	1.85	0.00002
200	0.02	1.59	0.00000
100	0.04	0.69	0.00013
50	0.03	1.31	0.00012
25	0.06	1.49	1.5E-17
3.6	0.11	1.82	7.7E-05

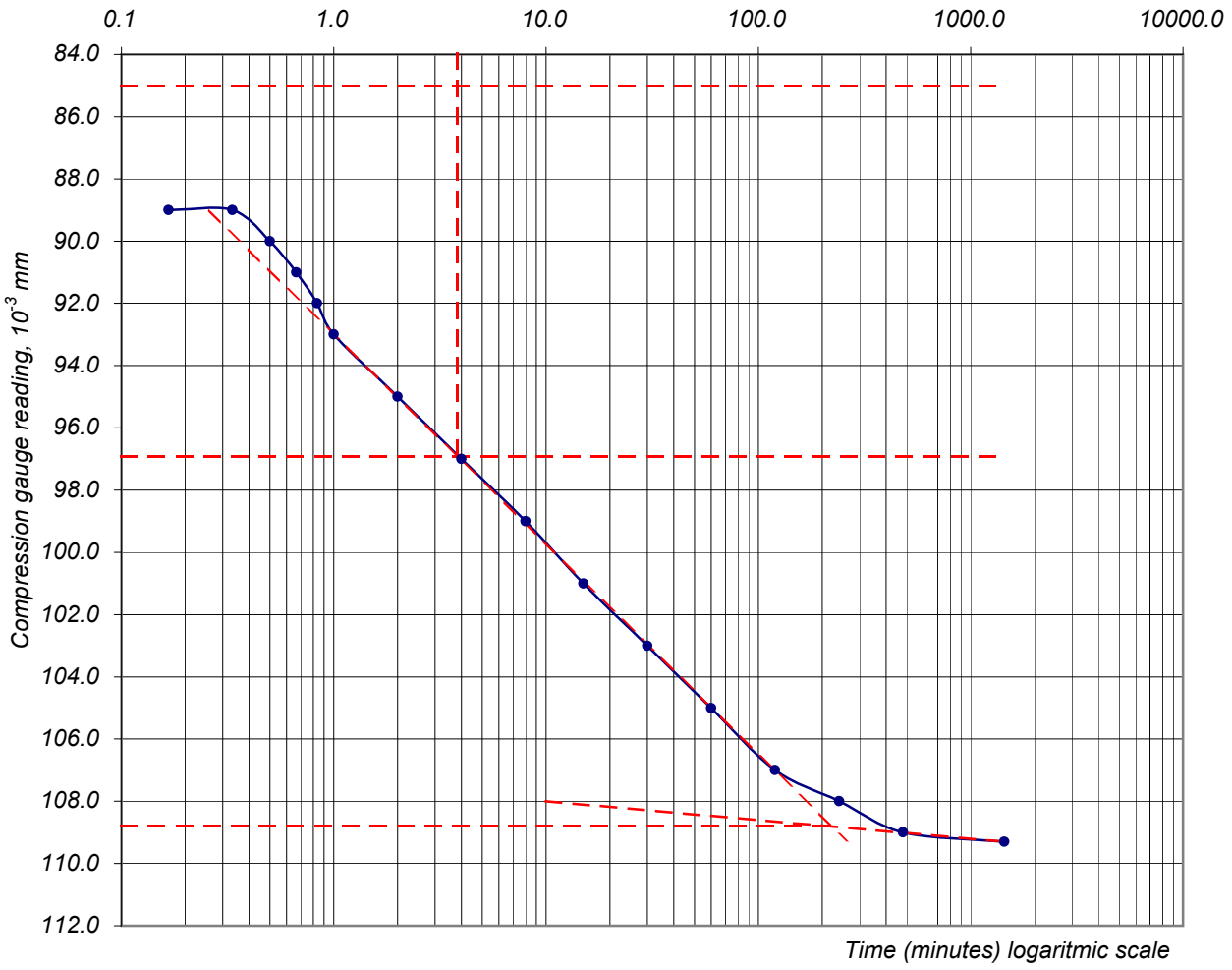


Sheet 7	Operator	Checked	Approved
Sheets 19	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Curve – Logarithm of Time Fitting Method

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SI1-2
	Sample no.	,
	Dept	21.0-21.3
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	25

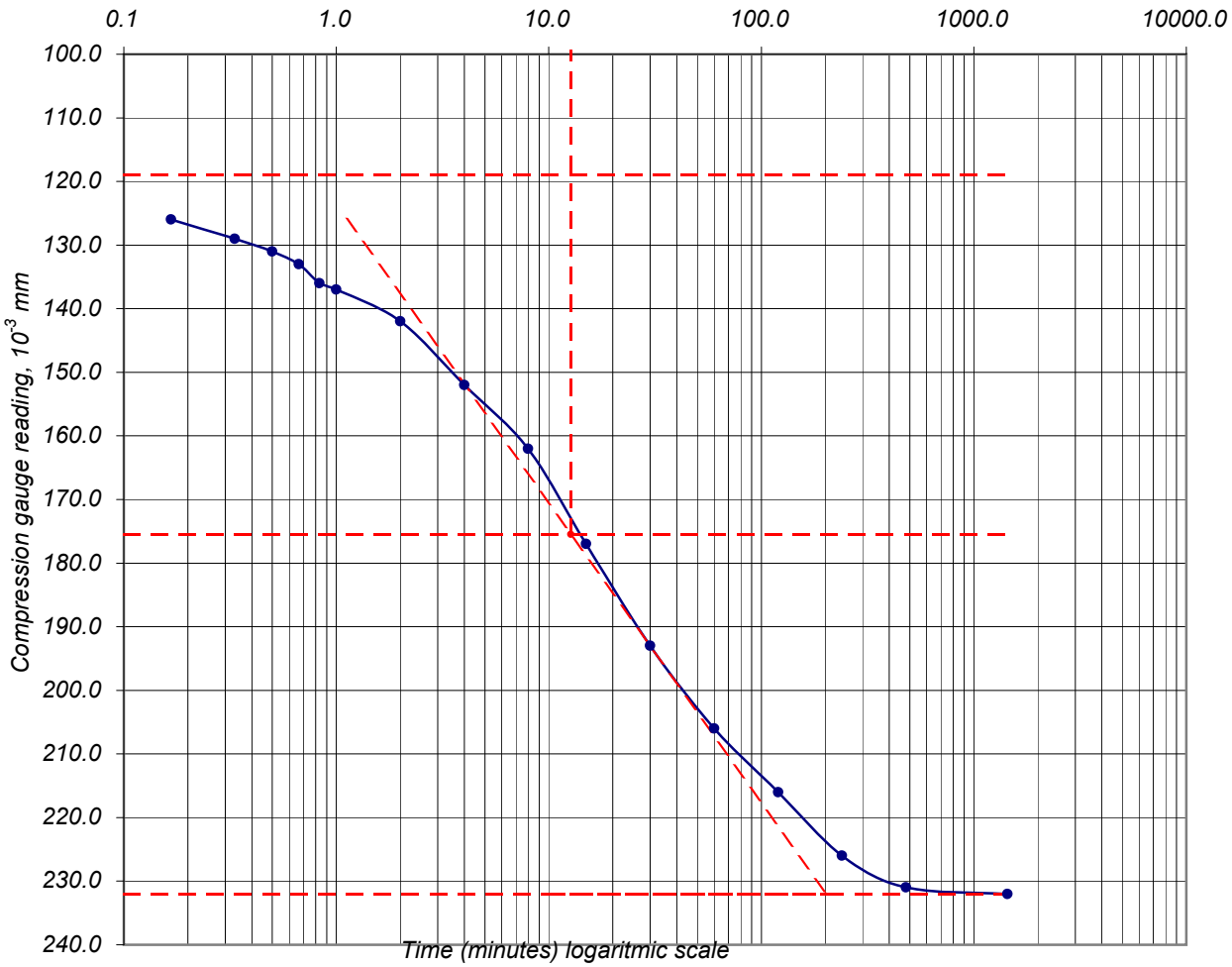


Sheet 8	Increment no. 1	Operator	Checked	Approved
Sheets 19	**LOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test (With Measurement of swelling pressure)

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SI1-2
	Sample no.	,
	Dept	21.0-21.3
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	50

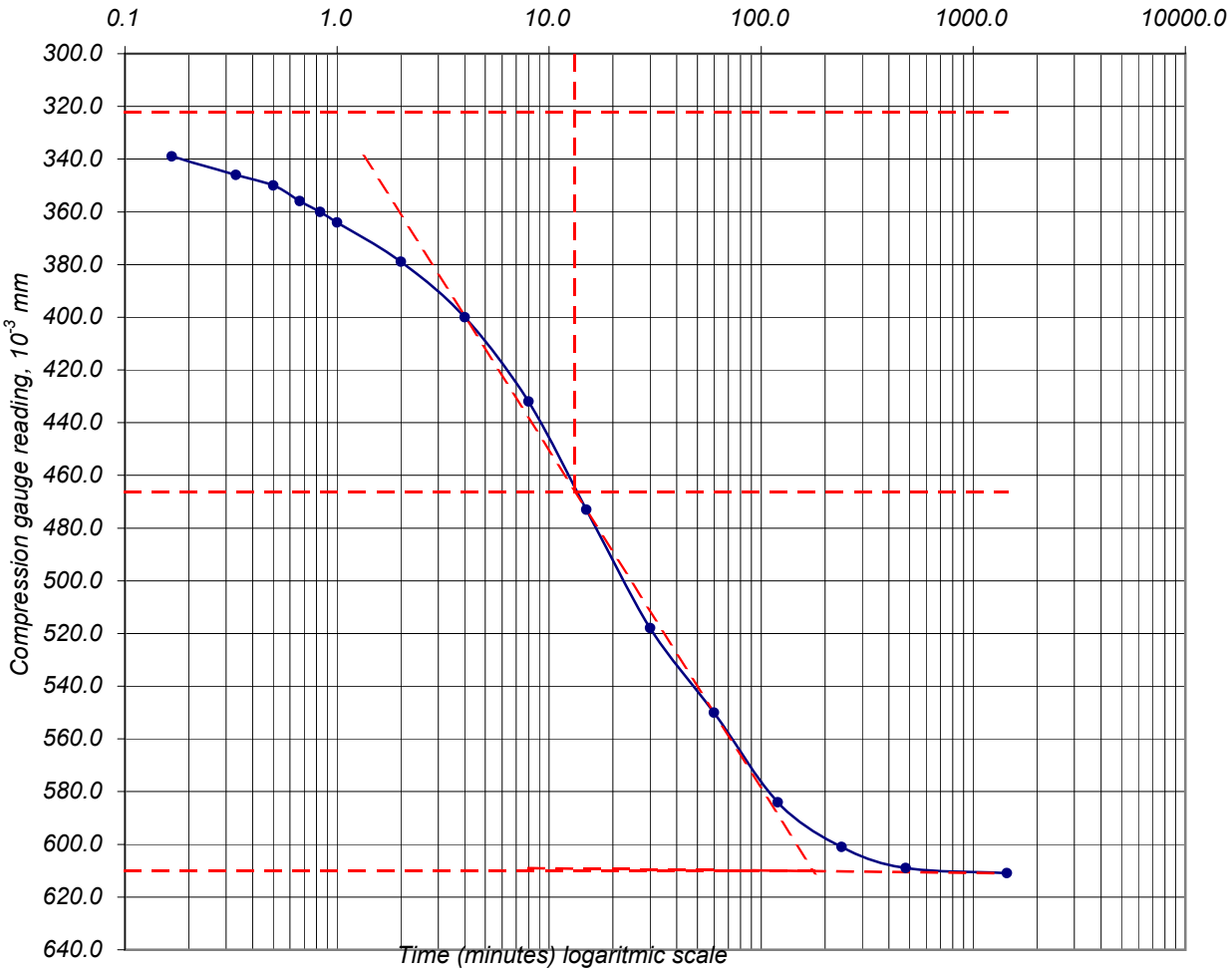


Sheet 9	Increment no. 2	Operator	Checked	Approved
Sheets 19	**LOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test (With Measurement of swelling pressure)

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SI1-2
	Sample no.	,
	Dept	21.0-21.3
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	100

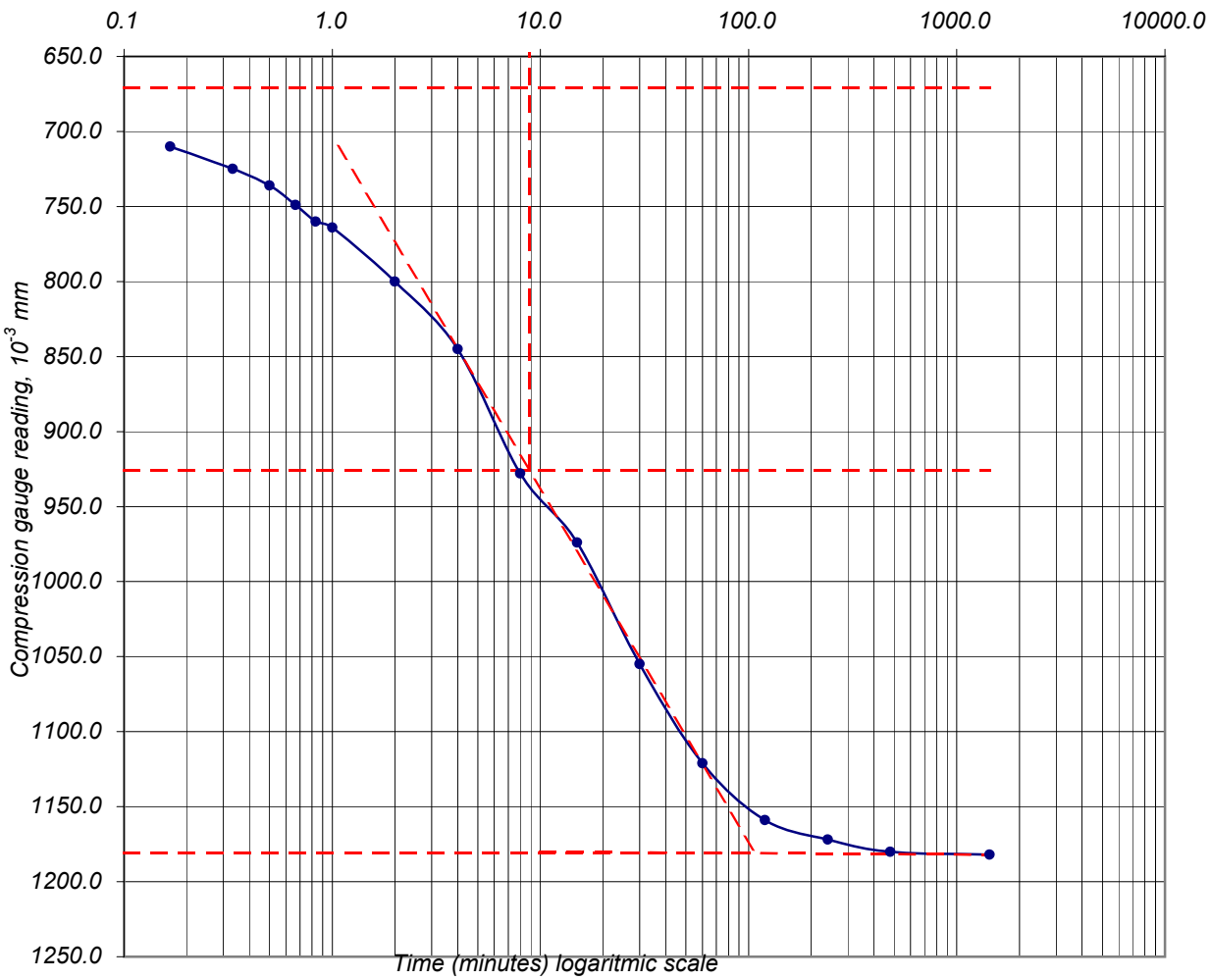


Sheet 10	Increment no. 3	Operator	Checked	Approved
Sheets 19	**LOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test (With Measurement of swelling pressure)

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SI1-2
	Sample no.	,
	Dept	21.0-21.3
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	200

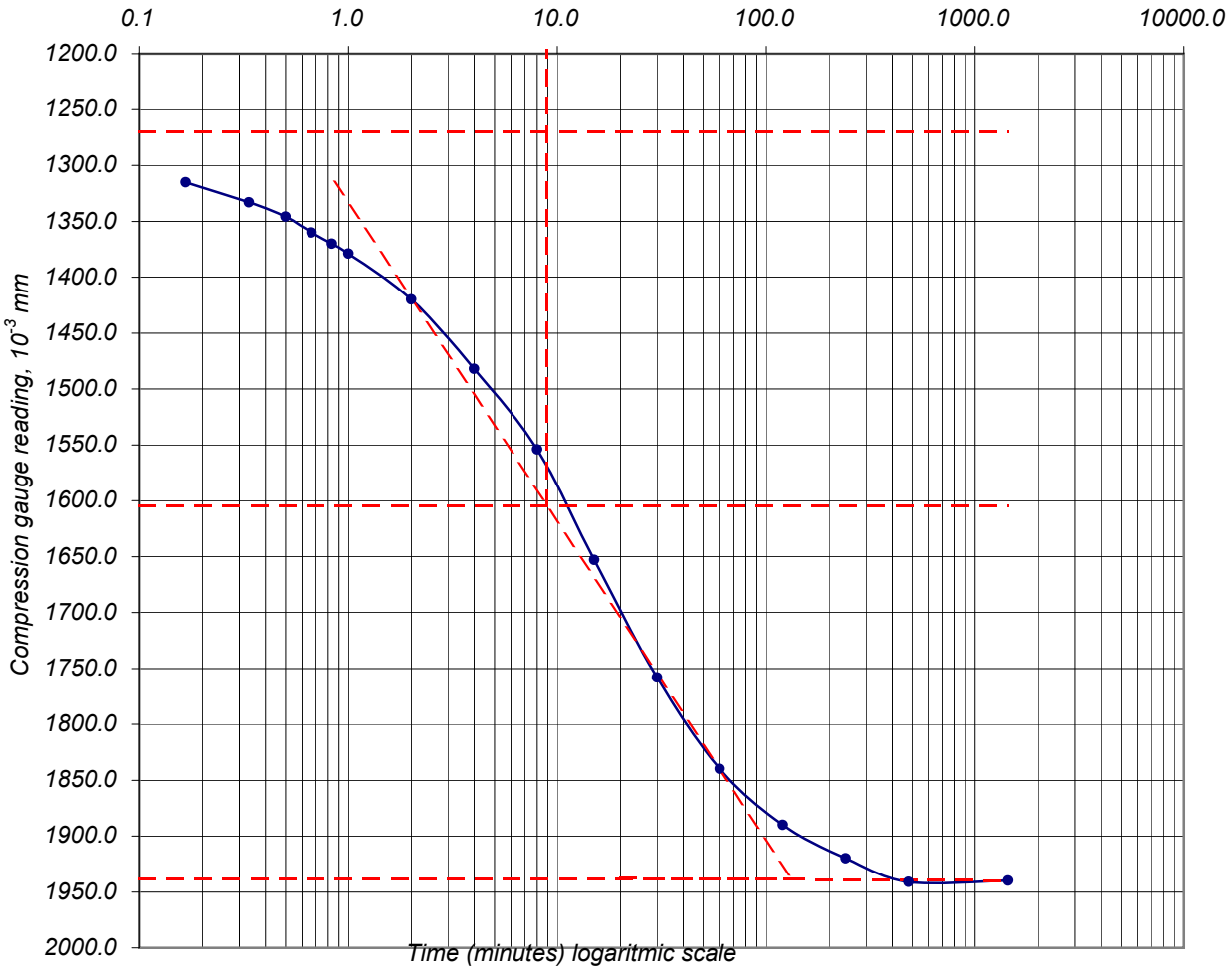


Sheet 11	Increment no. 4	Operator	Checked	Approved
Sheets 19	**LOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test (With Measurement of swelling pressure)

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SI1-2
	Sample no.	,
	Dept	21.0-21.3
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	400

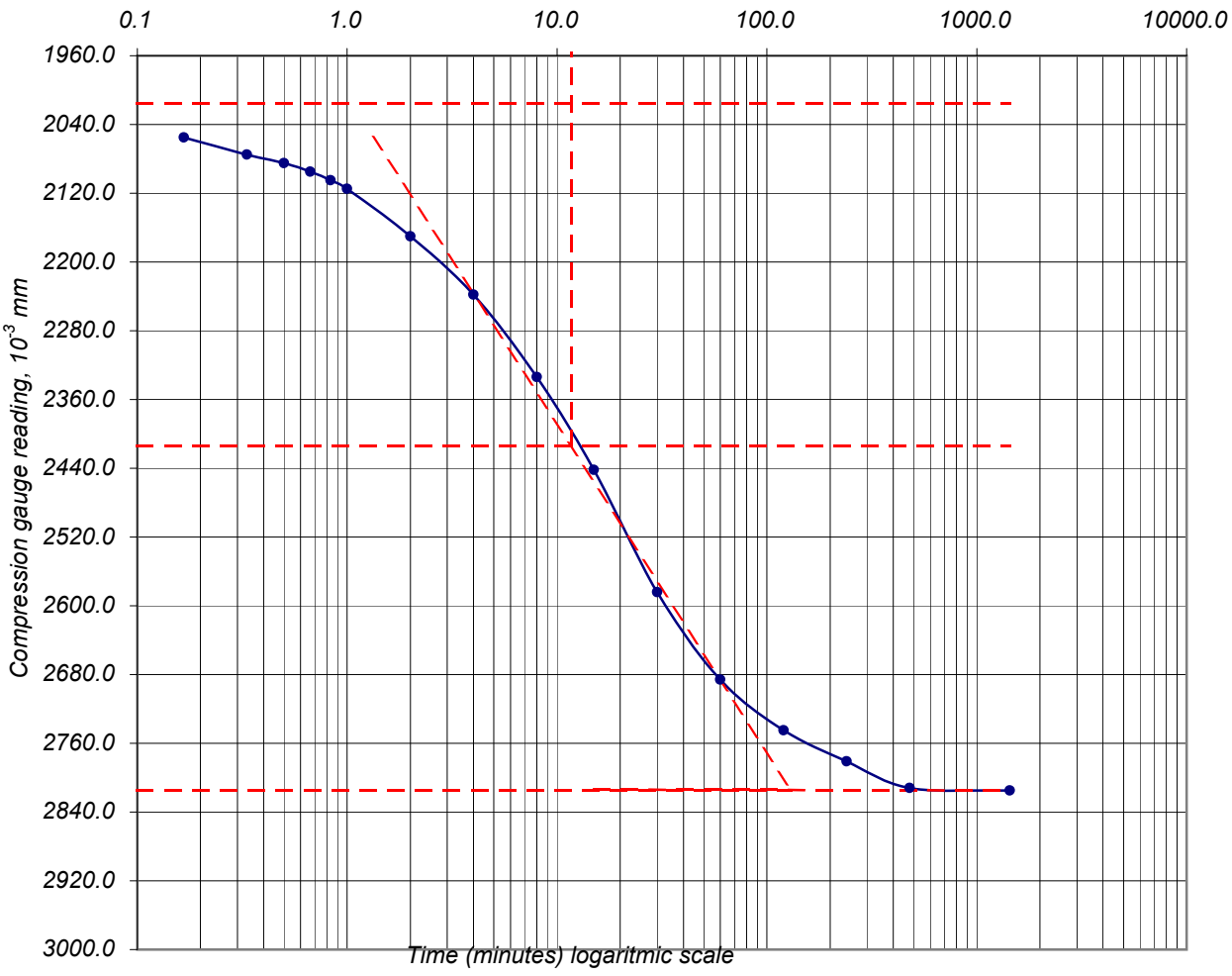


Sheet 12	Increment no. 5	Operator	Checked	Approved
Sheets 19	**LOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test (With Measurement of swelling pressure)

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SI1-2
	Sample no.	,
	Dept	21.0-21.3
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	800

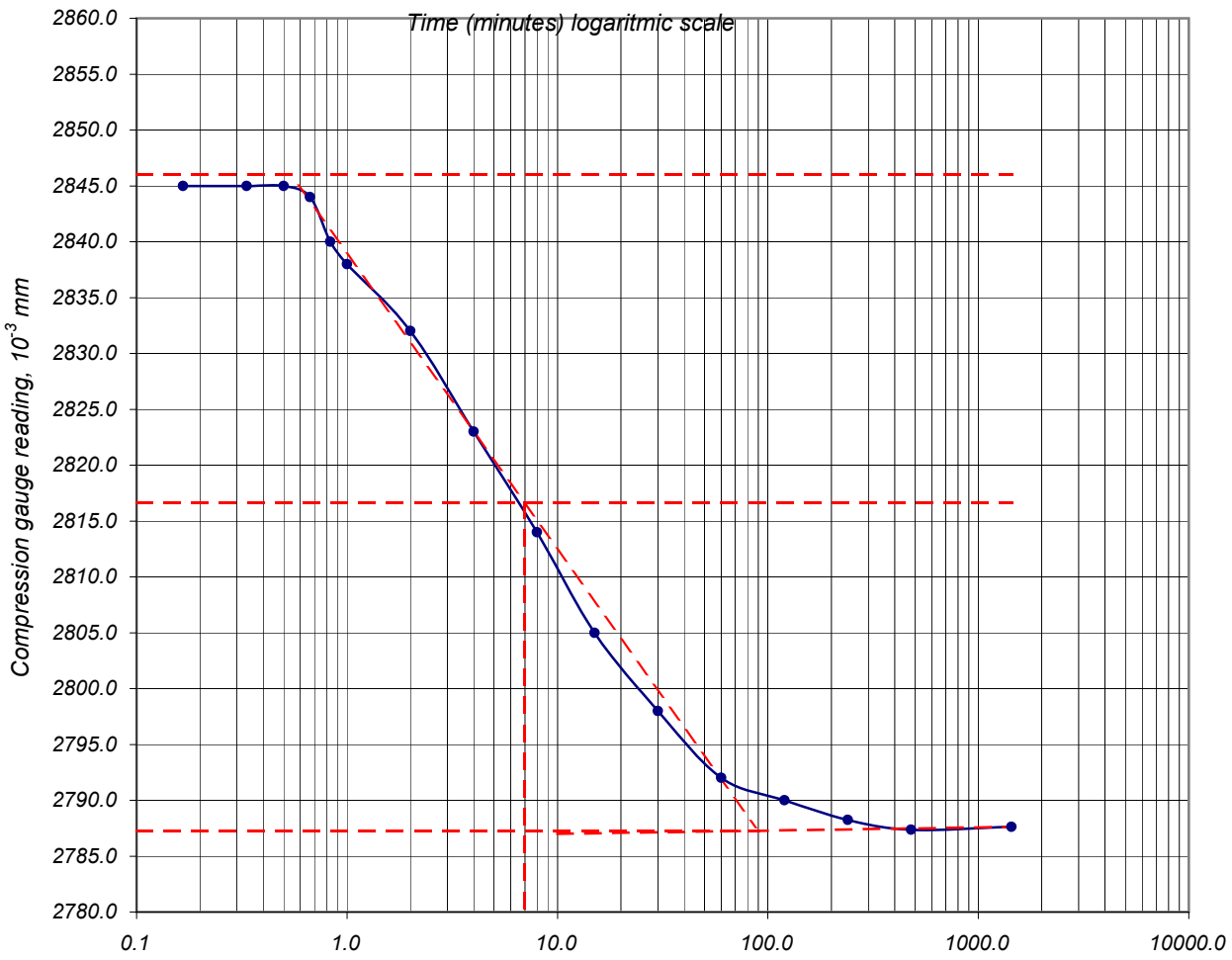


Sheet 13	Increment no. 6	Operator	Checked	Approved
Sheets 19	**UNLOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Curve – Logarithm of Time Fitting Method

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SI1-2
	Sample no.	,
	Dept	21.0-21.3
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	400

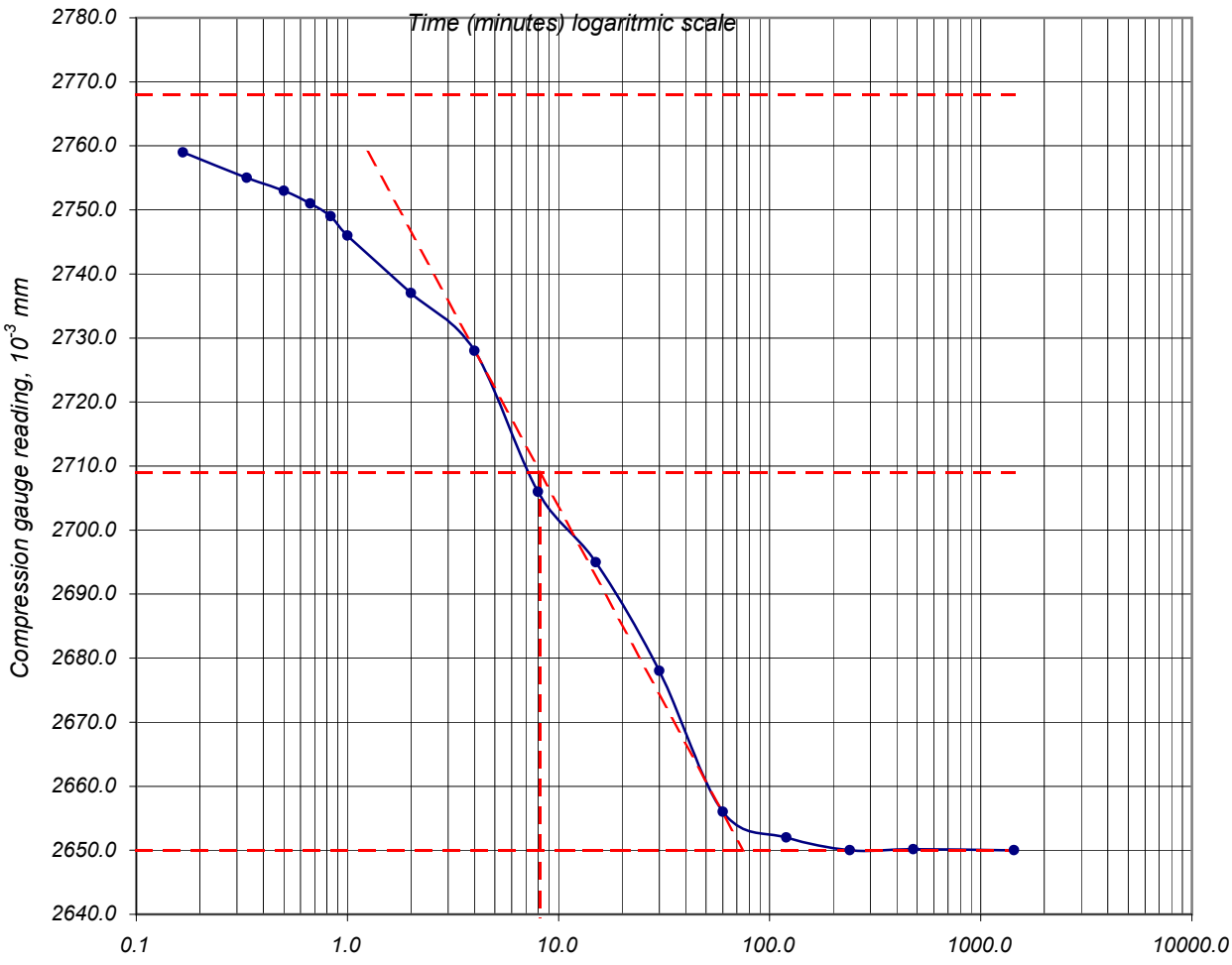


Sheet 14	Increment no. 7	Operator	Checked	Approved
Sheets 19	**UNLOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Curve – Logarithm of Time Fitting Method

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SI1-2
	Sample no.	,
	Dept	21.0-21.3
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	200

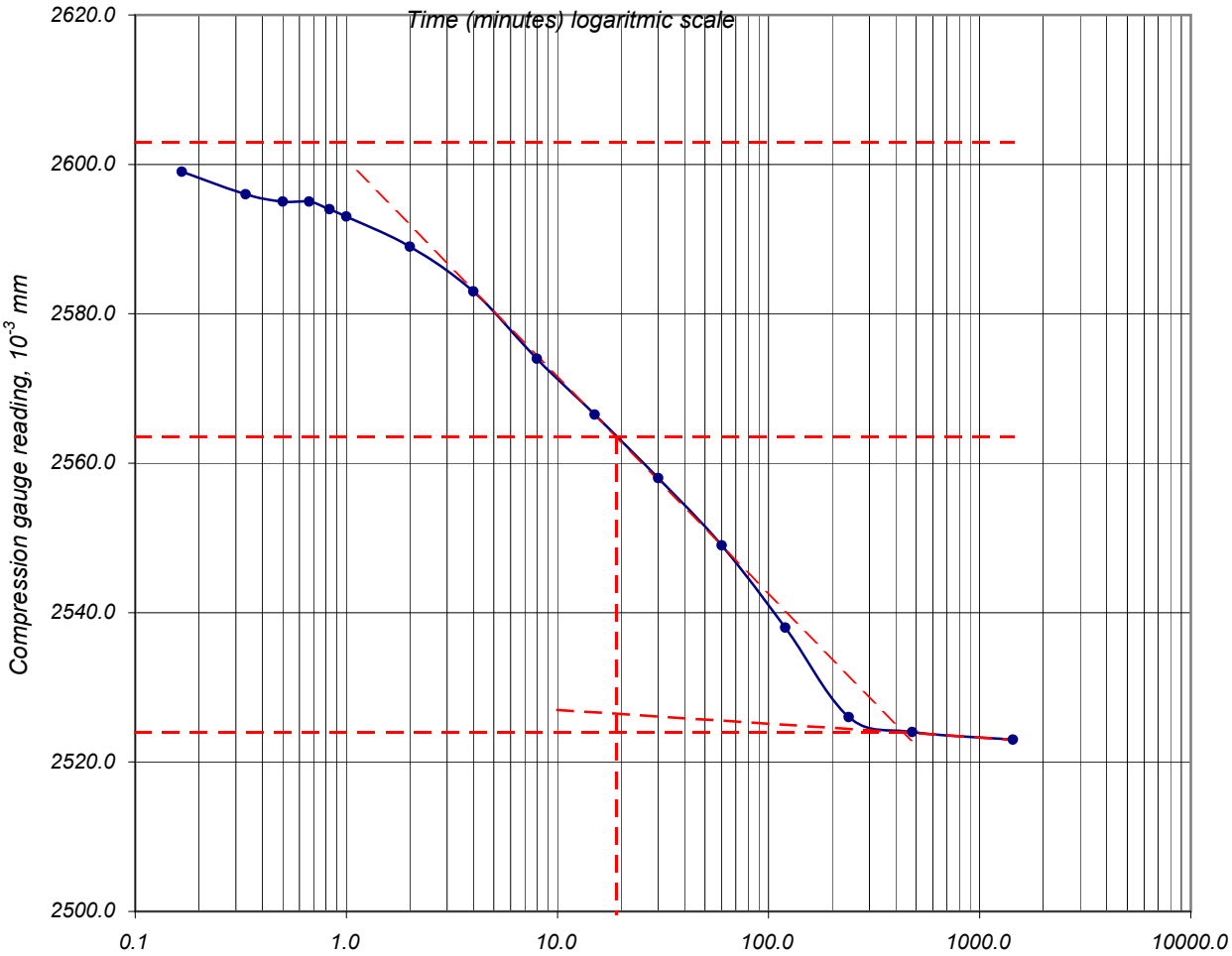


Sheet 15	Increment no. 8	Operator	Checked	Approved
Sheets 19	**UNLOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Curve – Logarithm of Time Fitting Method

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SI1-2
	Sample no.	,
	Dept	21.0-21.3
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	100

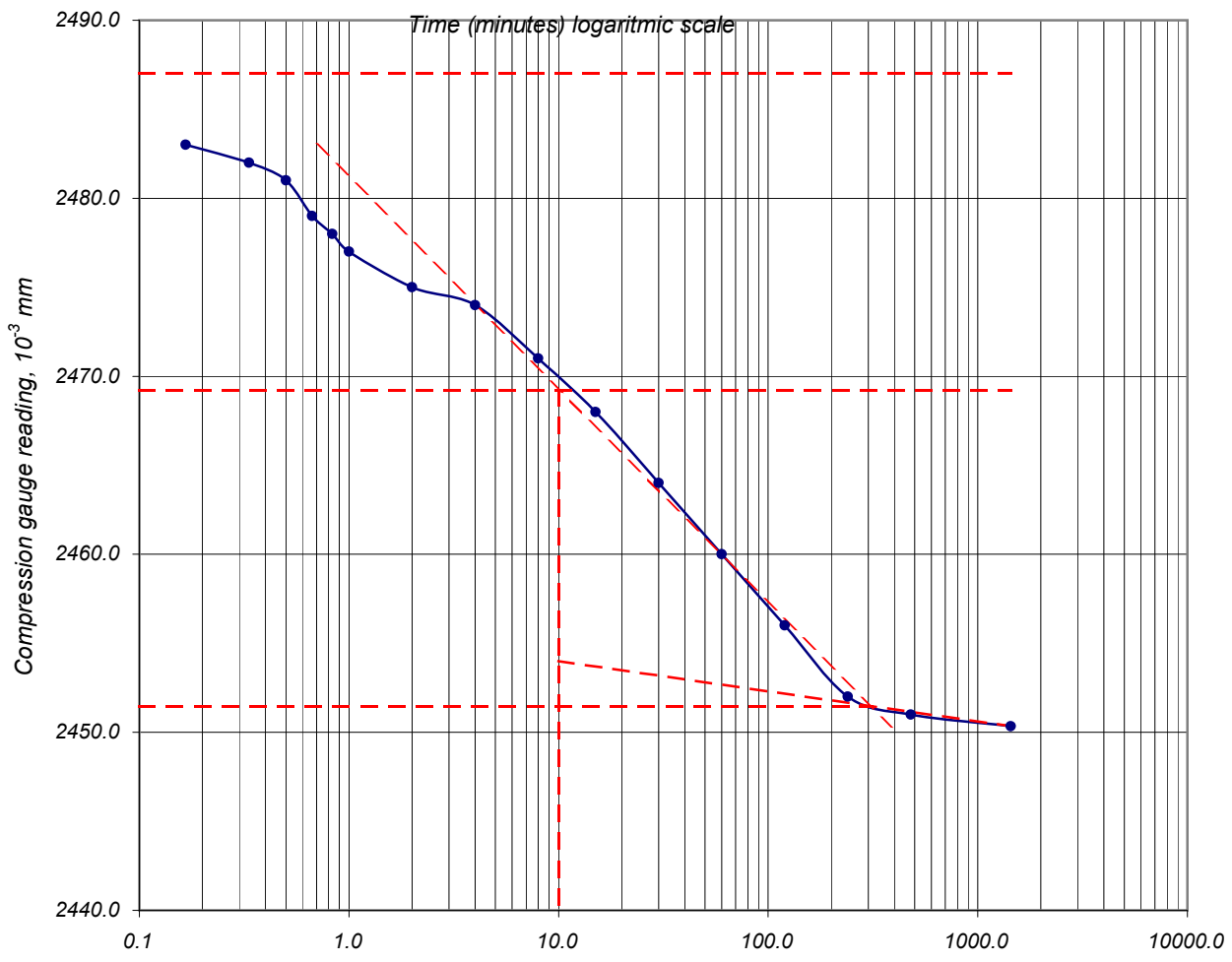


Sheet 16	Increment no. 9	Operator	Checked	Approved
Sheets 19	**RELOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Curve – Logarithm of Time Fitting Method

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SI1-2
	Sample no.	,
	Dept	21.0-21.3
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	50

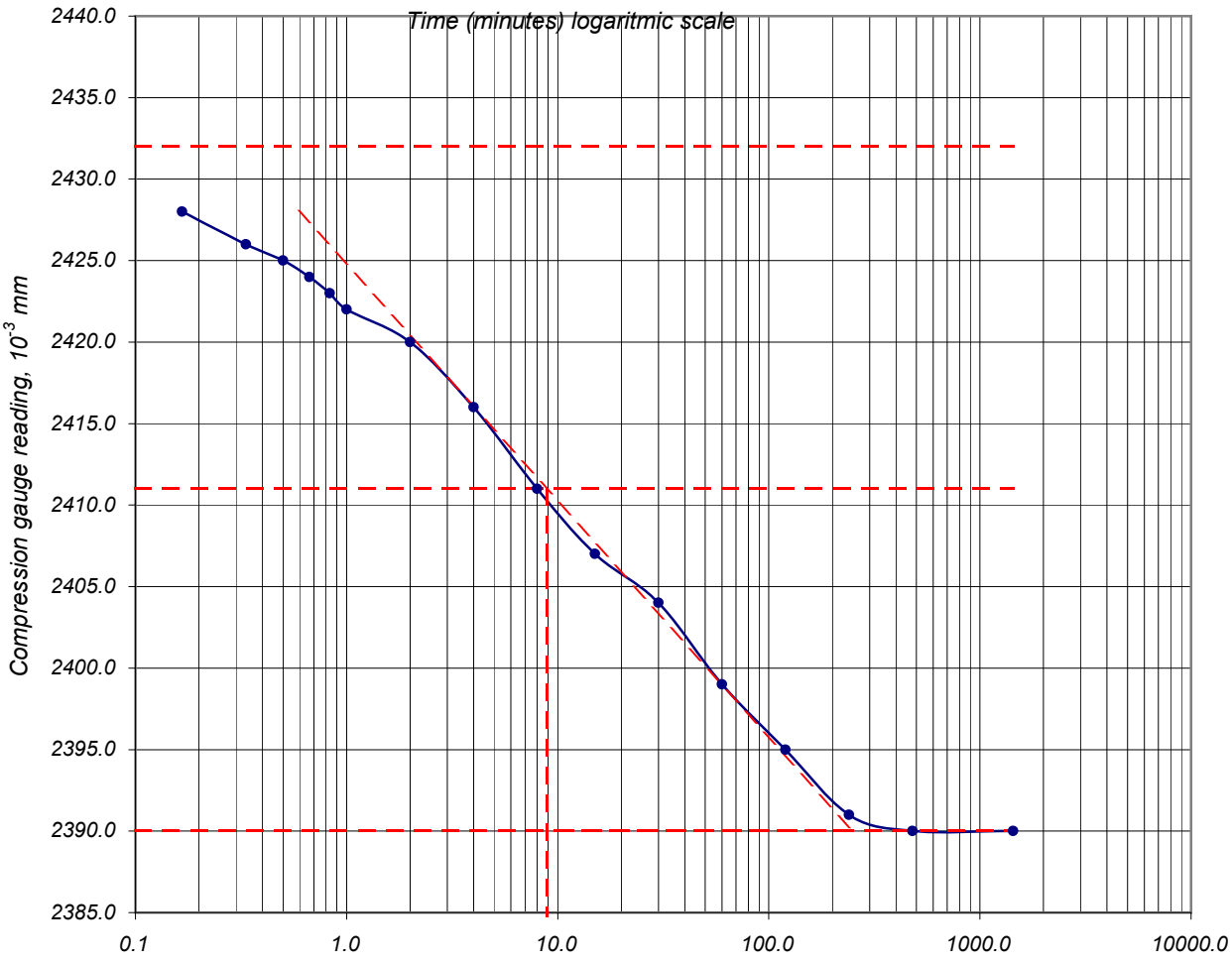


Sheet 17	Increment no. 10	Operator	Checked	Approved
Sheets 19	**RELOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Curve – Logarithm of Time Fitting Method

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SI1-2
	Sample no.	,
	Dept	21.0-21.3
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	25

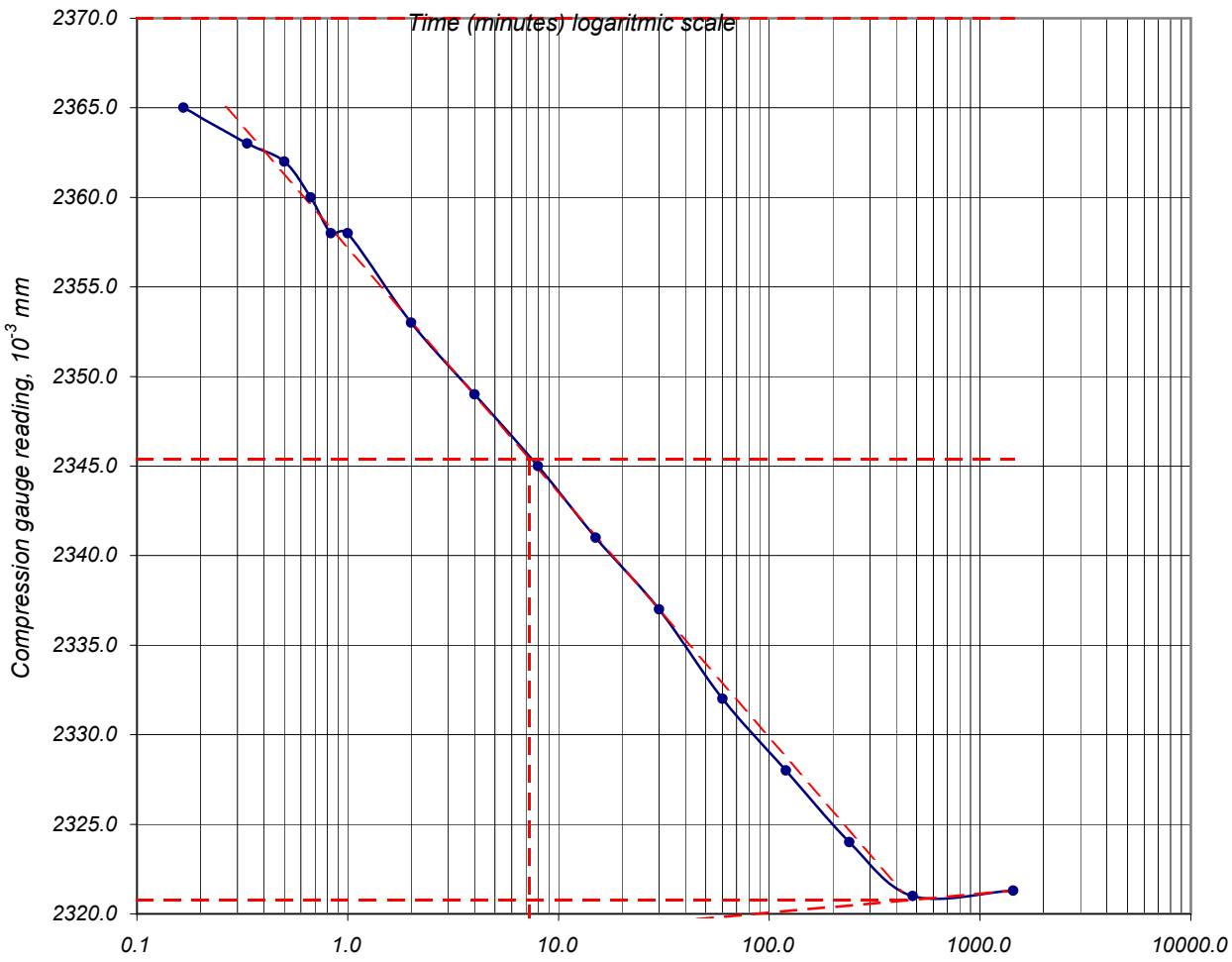


Sheet 18	Increment no. 11	Operator	Checked	Approved
Sheets 19	**RELOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Curve – Logarithm of Time Fitting Method

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SI1-2
	Sample no.	,
	Dept	21.0-21.3
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	3.6



Sheet 19	Increment no. 12	Operator	Checked	Approved
Sheets 19	**RELOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty sandy CLAY	**Borehole**	BH-SI1-1
	Sample no.	,
	Dept, m	21,2-21,5
	Date	14.07.2011
Test method BS1377 : Part 5 : 1990 : 3.5, 3.6		Saturated State

Cell no.	5	Particle density	
Ring no.	5	asumed	2.72 Mg/m^3

DIMENSIONS		Initial specimen	Overall change	Final specimen	Specimen preparation method
Diameter	D mm	87.30		87.30	
Area	A mm^2	5985.75		5985.75	
Height	H mm	H_o 25.00	2.218	22.782	
Volume	V cm^3	149.64	13.28	136.37	

WEIGHINGS		Initial specimen (a)	Initial specimen (b)	Final specimen (c)
Wet soil + ring + tray	g	490.50		484.50
Dry soil + ring + tray	g			433.00
Ring + tray	g	187.80		187.80
Wet soil	g	m_0 302.70	m_0 302.70	296.70
Dry soil	g		m_d 245.20	245.20
Water	g		57.50	51.50
Moisture content (measured)	%		23.45	21.00
Moisture content (from trimmings)	%	W_0 23.90		
Density	Mg/m^3	2.02	2.02	2.18
Dry density	Mg/m^3	1.63	1.64	1.80
Voids ratio		e_0 0.666	0.660	0.513
Degree of saturation	%	S_0 97.60	96.64	111.42
Height of soils	H_S mm	15.01	15.06	15.06

(a) Using moisture content from trimmings

(b) Using data from (a) and (c)

(c) Data from specimen after test

Sheet 1	**Operator**	**Checked**	**Approved**
Sheets 19	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty sandy CLAY	**Borehole**	BH-SI1-1
	Sample no.	,
	Dept	21,2-21,5
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8				
Machine no.	5	Spec. diam.	87.30	Height	25.00 mm
Cell no.	5	Lever ratio	1:10	Area	5985.75 mm^2
Ring no.	5	**1kg** on hanger gives pressure of			21.60 kPa

LOADING/UNLOADING/RELOADING

Increment no.					1			2			3		
Date started					07.07.2011			08.07.2011			09.07.2011		
Load				kg	1.16			2.31			4.63		
Pressure				kPa	25.0			50.0			100.0		
Mean daily temperature 22 ^{0} C					LOADING			LOADING			LOADING		
Elapsed time				t^0	Clock time	Gauge reading	Cumulative compression mm ΔH	Clock time	Gauge reading	Cumulative compression mm ΔH	Clock time	Gauge reading	Cumulative compression mm ΔH
h	m	s	t min										
0	0	0	0	22	9:23	5.000	0.000	9:45	5.273	0.273	9:45	5.485	0.485
_	_	10	0.167	22	9:23	5.054	0.054	9:45	5.309	0.309	9:45	5.550	0.550
_	_	20	0.333	22	9:23	5.059	0.058	9:45	5.314	0.314	9:45	5.558	0.558
_	_	30	0.500	22	9:23	5.060	0.060	9:45	5.316	0.316	9:45	5.565	0.565
_	_	40	0.667	22	9:23	5.064	0.064	9:45	5.319	0.319	9:45	5.568	0.568
_	_	50	0.833	22	9:23	5.067	0.067	9:45	5.323	0.323	9:45	5.571	0.571
_	0:01	_	1	22	9:24	5.070	0.070	9:46	5.325	0.325	9:46	5.575	0.575
_	0:02	_	2	22	9:25	5.080	0.080	9:47	5.336	0.336	9:47	5.592	0.592
_	0:04	_	4	22	9:27	5.110	0.110	9:49	5.353	0.353	9:49	5.617	0.617
_	0:08	_	8	22	9:31	5.135	0.135	9:53	5.374	0.374	9:53	5.645	0.645
_	0:15	_	15	22	9:38	5.165	0.165	10:00	5.399	0.399	10:00	5.683	0.683
_	0:30	_	30	22	9:53	5.199	0.199	10:15	5.428	0.428	10:15	5.716	0.716
1:00	_	_	60	21	10:23	5.232	0.232	10:45	5.450	0.450	10:45	5.741	0.741
2:00	_	_	120	21	11:23	5.253	0.253	11:45	5.465	0.465	11:45	5.770	0.770
4:00	_	_	240	21	13:23	5.262	0.262	13:45	5.478	0.478	13:45	5.793	0.793
8:00	_	_	480	20	17:23	5.270	0.270	17:45	5.482	0.482	17:45	5.800	0.800
24:00	_	_	1440	21	9:23	5.273	0.273	9:45	5.485	0.485	9:45	5.802	0.802
36:00	_	_	2160		21:23			21:45			21:45		
48:00	_	_	**2880**		9:23			9:45			9:45		
Cumulative correction **y**					0.045			0.077			0.120		
Net cumulative compression (ΔH-y)					0.228			0.408			0.682		

Sheet 2	Operator	Checked	Approved
Sheets 19	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty sandy CLAY	**Borehole**	BH-SI1-1
	Sample no.	,
	Dept	21,2-21,5
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8					
Machine no.	5	Spec. diam.	87.30	Height	25.00	mm
Cell no.	5	Lever ratio	1:10	Area	5985.75	mm^2
Ring no.	5	**1kg** on hanger gives pressure of			21.60	кPa

LOADING/UNLOADING/RELOADING

Increment no.					4			5			6		
Date started					10.07.2011			11.07.2011			12.07.2011		
Load kg					9.259			18.519			37.037		
Pressure kPa					200.0			400.0			800.0		
Mean daily temperature 22 ^{0} C					**LOADING**			**LOADING**			**UNLOADING**		
Elapsed time				t^0	Clock time	Gauge reading	Cumulative compression ΔH mm	Clock time	Gauge reading	Cumulative compression ΔH mm	Clock time	Gauge reading	Cumulative compression ΔH mm
h	m	s	t min										
0	0	0	0	22	9:45	5.797	0.797	9:45	6.202	1.202	9:45	6.700	1.700
_	_	10	0.167	22	9:45	5.875	0.875	9:45	6.320	1.320	9:45	6.845	1.845
_	_	20	0.333	22	9:45	5.894	0.894	9:45	6.335	1.335	9:45	6.861	1.861
_	_	30	0.500	22	9:45	5.905	0.905	9:45	6.348	1.348	9:45	6.875	1.875
_	_	40	0.667	22	9:45	5.914	0.914	9:45	6.360	1.360	9:45	6.892	1.892
_	_	50	0.833	22	9:45	5.921	0.921	9:45	6.375	1.375	9:45	6.905	1.905
_	0:01	_	1	22	9:46	5.928	0.928	9:46	6.380	1.380	9:46	6.920	1.920
_	0:02	_	2	22	9:47	5.960	0.960	9:47	6.430	1.430	9:47	6.984	1.984
_	0:04	_	4	22	9:49	6.002	1.002	9:49	6.485	1.485	9:49	7.040	2.040
_	0:08	_	8	22	9:53	6.052	1.052	9:53	6.543	1.543	9:53	7.114	2.114
_	0:15	_	15	22	10:00	6.088	1.088	10:00	6.599	1.599	10:00	7.170	2.170
_	0:30	_	30	22	10:15	6.132	1.132	10:15	6.639	1.639	10:15	7.219	2.219
1:00	_	_	60	21	10:45	6.163	1.163	10:45	6.658	1.658	10:45	7.275	2.275
2:00	_	_	120	21	11:45	6.206	1.206	11:45	6.676	1.676	11:45	7.343	2.343
4:00	_	_	240	21	13:45	6.226	1.226	13:45	6.688	1.688	13:45	7.408	2.408
8:00	_	_	480	20	17:45	6.236	1.236	17:45	6.696	1.696	17:45	7.440	2.440
24:00	_	_	1440	21	9:45	6.237	1.237	9:45	6.700	1.700	9:45	7.442	2.442
36:00	_	_	2160		21:45			21:45			21:45		
48:00	_	_	**2880**		9:45			9:45			9:45		
Cumulative correction **y**					0.156			0.193			0.224		
Net cumulative compression (ΔH-y)					1.081			1.507			2.218		

Sheet 3	Operator	Checked	Approved
Sheets 19	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty sandy CLAY	**Borehole**	BH-SI1-1
	Sample no.	,
	Dept	21,2-21,5
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8					
Machine no.	5	Spec. diam.	87.30	Height	25.00	mm
Cell no.	5	Lever ratio	1:10	Area	5985.75	mm^2
Ring no.	5	**1kg** on hanger gives pressure of			21.60	кPa

LOADING/UNLOADING/RELOADING

Increment no.					7			8			9		
Date started					13.07.2011			14.07.2011			15.07.2011		
Load				kg	18.519			9.259			4.630		
Pressure				kPa	400.0			200.0			100.0		
Mean daily temperature 22 ^{0} C					UNLOADING			UNLOADING			RELOADING		
Elapsed time				t^0	Clock time	Gauge reading	Cumulative compression mm ΔH	Clock time	Gauge reading	Cumulative compression mm ΔH	Clock time	Gauge reading	Cumulative compression mm ΔH
h	m	s	t min										
0	0	0	0	22	9:45	7.292	2.292	10:15	7.283	2.283	10:15	7.212	2.212
_	_	10	0.167	22	9:45	7.305	2.305	10:15	7.261	2.261	10:15	7.191	2.191
_	_	20	0.333	22	9:45	7.304	2.304	10:15	7.259	2.259	10:15	7.189	2.189
_	_	30	0.500	22	9:45	7.303	2.303	10:15	7.257	2.257	10:15	7.187	2.187
_	_	40	0.667	22	9:45	7.302	2.302	10:15	7.254	2.254	10:15	7.185	2.185
_	_	50	0.833	22	9:45	7.300	2.300	10:15	7.251	2.251	10:15	7.184	2.184
_	0:01	_	1	22	9:46	7.298	2.298	10:16	7.250	2.250	10:16	7.183	2.183
_	0:02	_	2	22	9:47	7.297	2.297	10:17	7.241	2.241	10:17	7.178	2.178
_	0:04	_	4	22	9:49	7.295	2.295	10:19	7.235	2.235	10:19	7.170	2.170
_	0:08	_	8	22	9:53	7.293	2.293	10:23	7.230	2.230	10:23	7.162	2.162
_	0:15	_	15	22	10:00	7.292	2.292	10:30	7.227	2.227	10:30	7.157	2.157
_	0:30	_	30	22	10:15	7.290	2.290	10:45	7.223	2.223	10:45	7.150	2.150
1:00	_	_	60	21	10:45	7.288	2.288	11:15	7.220	2.220	11:15	7.143	2.143
2:00	_	_	120	21	11:45	7.287	2.287	12:15	7.216	2.216	12:15	7.138	2.138
4:00	_	_	240	21	13:45	7.285	2.285	14:15	7.213	2.213	14:15	7.132	2.132
8:00	_	_	480	20	17:45	7.282	2.282	18:15	7.211	2.211	18:15	7.130	2.130
24:00	_	_	1440	21	9:45	7.282	2.282	10:15	7.211	2.211	10:15	7.129	2.129
36:00	_	_	2160		21:45			22:15			22:15		
48:00	_	_	**2880**		9:45			10:15			10:15		
Cumulative correction **y**					0.193			0.156			0.120		
Net cumulative compression (ΔH-y)					2.089			2.055			2.009		

Sheet 4	Operator	Checked	Approved
Sheets 19	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty sandy CLAY	**Borehole**	BH-SI1-1
	Sample no.	,
	Dept	21,2-21,5
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8					
Machine no.	5	Spec. diam.	87.30	Height	25.00	mm
Cell no.	5	Lever ratio	1:10	Area	5985.75	mm^2
Ring no.	5	**1kg** on hanger gives pressure of			21.60	кPa

LOADING/UNLOADING/RELOADING

Increment no.					10			11			12		
Date started					16.07.2011			17.07.2011			18.07.2011		
Load				kg	0.008			0.004			0.001		
Pressure				kPa	50.0			25.0			3.6		
Mean daily temperature 22 ^{0} C					RELOADING			RELOADING			RELOADING		
Elapsed time				t^0	Clock time	Gauge reading	Cumulative compression ΔH mm	Clock time	Gauge reading	Cumulative compression ΔH mm	Clock time	Gauge reading	Cumulative compression ΔH mm
h	m	s	t min										
0	0	0	0	22	10:15	7.129	2.129	10:15	7.049	2.049	10:15	6.966	1.966
_	_	10	0.167	22	10:15	7.110	2.110	10:15	7.030	2.030	10:15	6.952	1.952
_	_	20	0.333	22	10:15	7.109	2.109	10:15	7.028	2.028	10:15	6.950	1.950
_	_	30	0.500	22	10:15	7.108	2.108	10:15	7.026	2.026	10:15	6.947	1.947
_	_	40	0.667	22	10:15	7.107	2.107	10:15	7.025	2.025	10:15	6.945	1.945
_	_	50	0.833	22	10:15	7.106	2.106	10:15	7.024	2.024	10:15	6.942	1.942
_	0:01	_	1	22	10:16	7.105	2.105	10:16	7.023	2.023	10:16	6.939	1.939
_	0:02	_	2	22	10:17	7.102	2.102	10:17	7.020	2.020	10:17	6.933	1.933
_	0:04	_	4	22	10:19	7.093	2.093	10:19	7.015	2.015	10:19	6.928	1.928
_	0:08	_	8	22	10:23	7.086	2.086	10:23	7.010	2.010	10:23	6.920	1.920
_	0:15	_	15	22	10:30	7.078	2.078	10:30	7.003	2.003	10:30	6.914	1.914
_	0:30	_	30	22	10:45	7.071	2.071	10:45	6.995	1.995	10:45	6.909	1.909
1:00	_	_	60	21	11:15	7.065	2.065	11:15	6.990	1.990	11:15	6.903	1.903
2:00	_	_	120	21	12:15	7.058	2.058	12:15	6.983	1.983	12:15	6.895	1.895
4:00	_	_	240	21	14:15	7.049	2.049	14:15	6.977	1.977	14:15	6.889	1.889
8:00	_	_	480	20	18:15	7.043	2.043	18:15	6.969	1.969	18:15	6.884	1.884
24:00	_	_	1440	21	10:15	7.042	2.042	10:15	6.968	1.968	10:15	6.884	1.884
36:00	_	_	2160		22:15			22:15			22:15		
48:00	_	_	**2880**		10:15			10:15			10:15		
Cumulative correction **y**					0.077			0.045					
Net cumulative compression (ΔH-y)					1.965			1.923			1.884		

Sheet 5	Operator	Checked	Approved
Sheets 19	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description:	**Borehole**	BH-SI1-1
	Sample no.	,
Intermediately plastic silty sandy CLAY	**Dept**	21,2-21,5
	Date	14.07.2011

Test method		BS 1377 : Part 7 : 1990 : 8			
Machine no.	5	Specimen diameter	87.30 mm	Height H_0,	25.0 mm
Cell no.	5	Height of solids Hs	15.01 mm		
Ring no.	5	Initial voids ratio e_1	0.666		

VOIDS RATIO					COMPRESSIBILITY			COEFFICIENT OF CONSOLIDATION			
					Incremental					c_v =	
Increment no.	Pressure P kPa	Cumulative compression (ΔH-y) mm	Consolidated height $H=H_0-(\Delta H-y)$ mm	Voids ratio $e=\frac{H-H_s}{H_s}$	height change, δH mm	pressure change δp kPa	$m_v=\frac{\delta H}{H_i}\cdot\frac{100(}{\delta p}$ m^2/MN	t_{50} min	$\bar{H}=\frac{1}{2}(H_1+H_2)$ mm	$\frac{0.026\bar{H}^2}{t_{50}}$ $m^2/year$	$\frac{0.111\bar{H}^2}{t_{90}}$ $m^2/year$
0	0	0.000	25.00	0.666	0.00	0	–	–	–	–	–
1	25.0	0.228	24.77	0.651	0.23	25.0	0.36	10.98	24.89	1.47	
2	50.0	0.408	24.59	0.639	0.18	25.0	0.29	11.04	24.68	1.43	
3	100.0	0.682	24.32	0.621	0.27	50.0	0.22	11.83	24.46	1.31	
4	200.0	1.081	23.92	0.594	0.40	100.0	0.16	7.10	24.12	2.13	
5	400.0	1.507	23.49	0.566	0.43	200.0	0.09	4.67	23.71	3.13	
6	800.0	2.218	22.78	0.518	0.71	400.0	0.08	9.38	23.14	1.48	
7	400.0	2.089	22.91	0.527	-0.13	-400.0	0.01	4.29	22.85	3.16	
8	200.0	2.055	22.95	0.529	-0.03	-200.0	0.01	1.49	22.93	9.20	
9	100.0	2.009	22.99	0.532	-0.05	-100.0	0.02	7.62	22.97	1.80	
10	50.0	1.965	23.03	0.535	-0.04	-50.0	0.04	16.95	23.01	0.81	
11	25.0	1.923	23.08	0.538	-0.04	-25.0	0.07	17.27	23.06	0.80	
12	3.6	1.884	23.12	0.540	-0.04	-21.4	0.08	7.57	23.10	1.83	

Sheet	6	Operator	Checked	Approved
Sheets	19	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description:	**Borehole**	BH-SI1-1
Intermediately plastic silty sandy CLAY	**Sample no.**	,
	Dept	21,2-21,5
	Date	14.07.2011

Test method BS 1377 : Part 7 : 1990 : 8

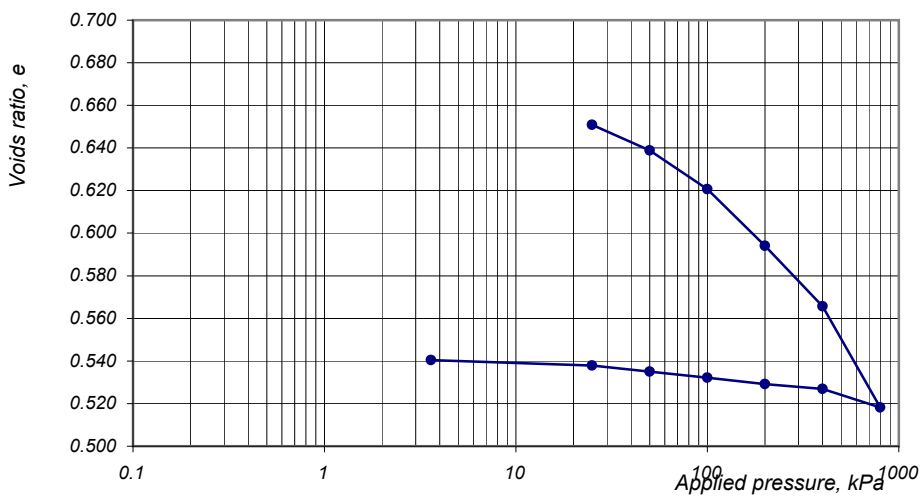
SPECIMEN INITIALLY

Diameter	87.30 mm	Density	2.02	Mg/m^3
Height	25.00 mm	Moisture content	23.9	%
Voids ratio	0.666	Dry density	1.63	Mg/m^3
Saturation	97.60 %	Particle density	2.72	Mg/m^3

Compression Index, C_c 0.009

Remarks:

Pressure stage kPa	Laboratory coefficients of: Compressibility, m_v m^2/MN	Consolidation, C_v $m^2/year$	Secondary Consolidation, C_α
0.0	-	-	-
25	0.36	1.47	0.00022
50	0.29	1.43	0.00015
100	0.22	1.31	5.9E-05
200	0.16	2.13	6.2E-05
400	0.09	3.13	0.00036
800	0.08	1.48	0.0000
400	0.01	3.16	0.00002
200	0.01	9.20	0.00005
100	0.02	1.80	9.3E-05
50	0.04	0.81	2.1E-05
25	0.07	0.80	0
3.6	0.08	1.83	9.3E-05

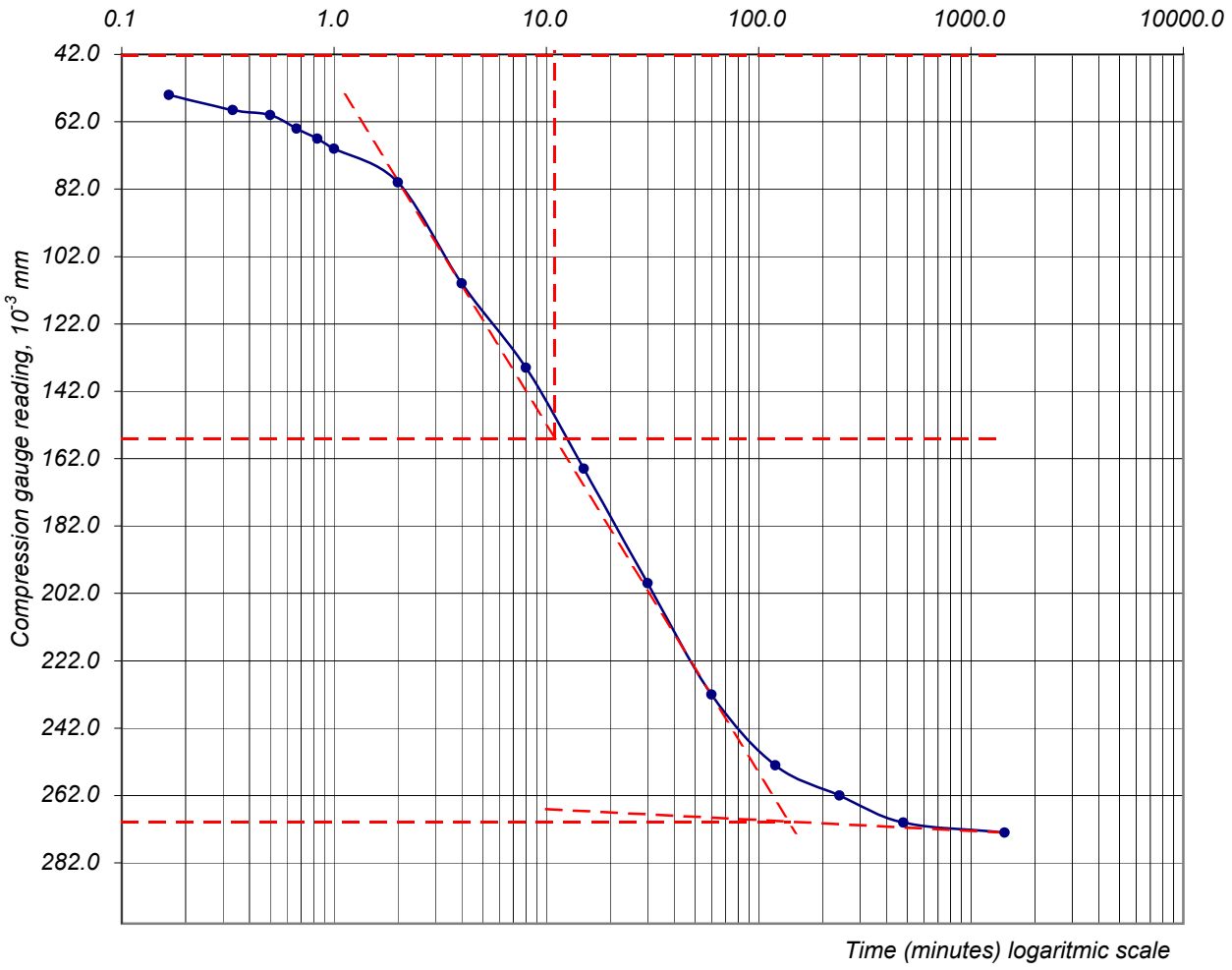


Sheet 7	Operator	Checked	Approved
Sheets 19	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Curve – Logarithm of Time Fitting Method

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty sandy CLAY	**Borehole**	BH-SI1-1
	Sample no.	,
	Dept	21,2-21,5
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	25

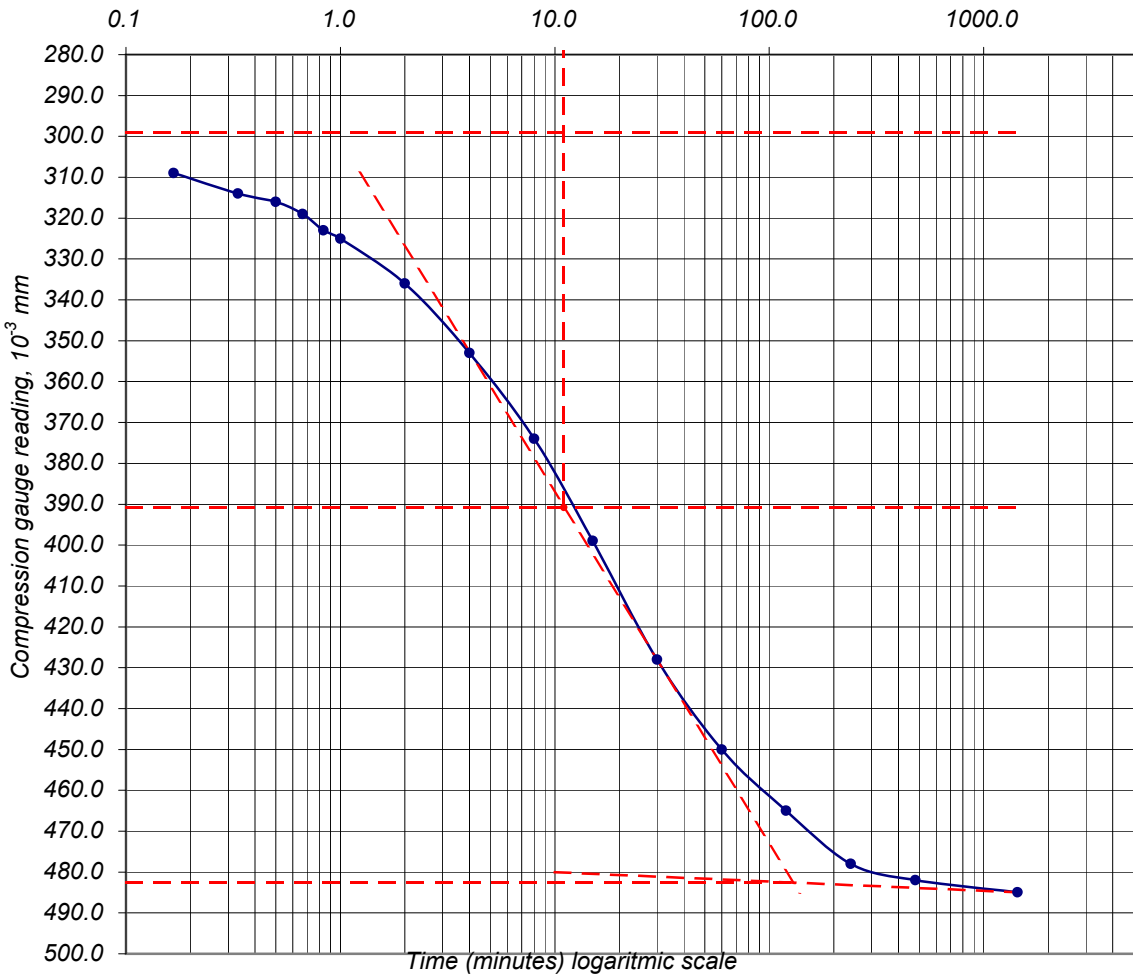


Sheet 8	Increment no. 1	Operator	Checked	Approved
Sheets 19	**LOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test (With Measurement of swelling pressure)

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty sandy CLAY	**Borehole**	BH-SI1-1
	Sample no.	,
	Dept	21,2-21,5
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	50

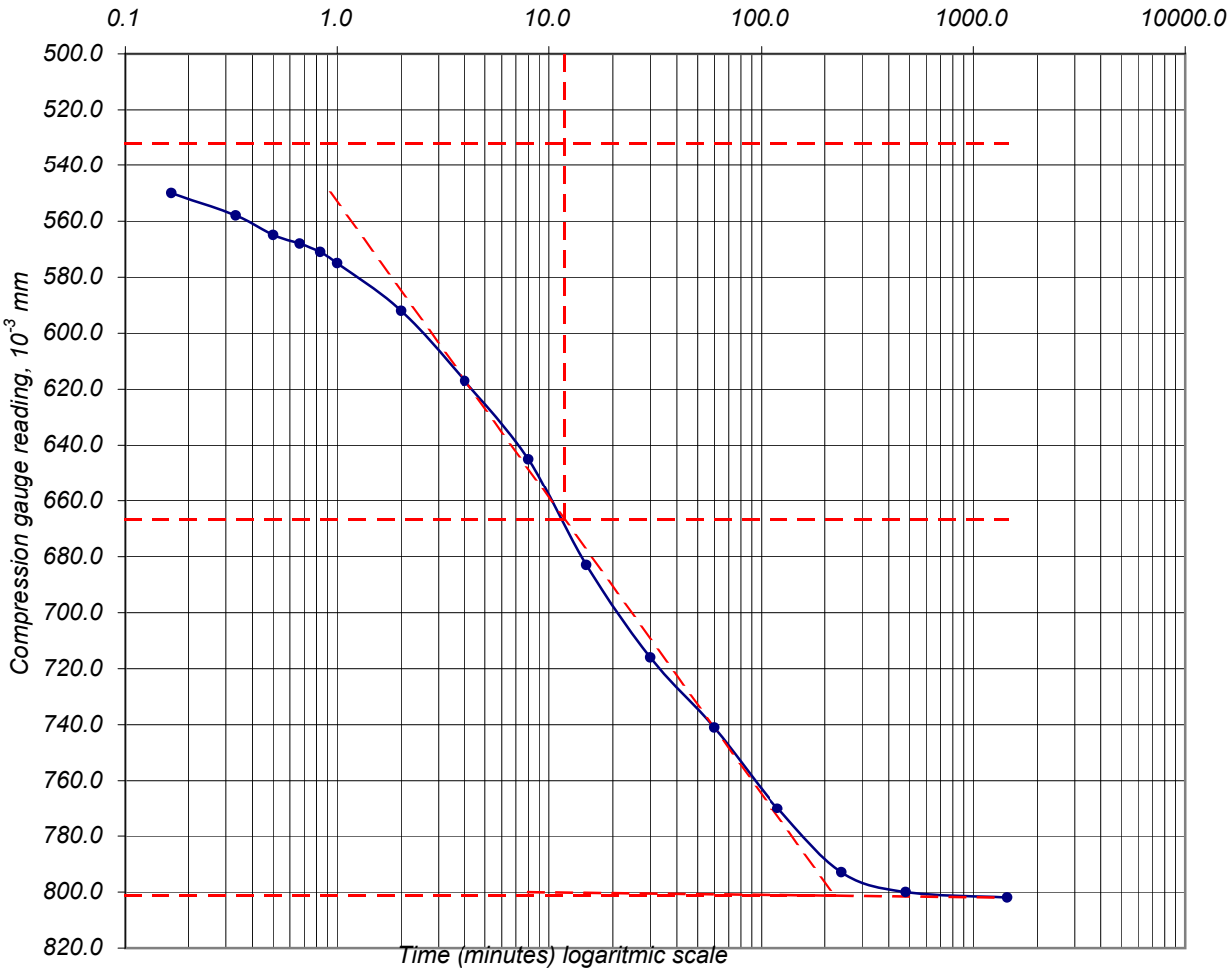


Sheet 9	Increment no. 2	Operator	Checked	Approved
Sheets 19	**LOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test (With Measurement of swelling pressure)

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty sandy CLAY	**Borehole**	BH-SI1-1
	Sample no.	,
	Dept	21,2-21,5
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	100

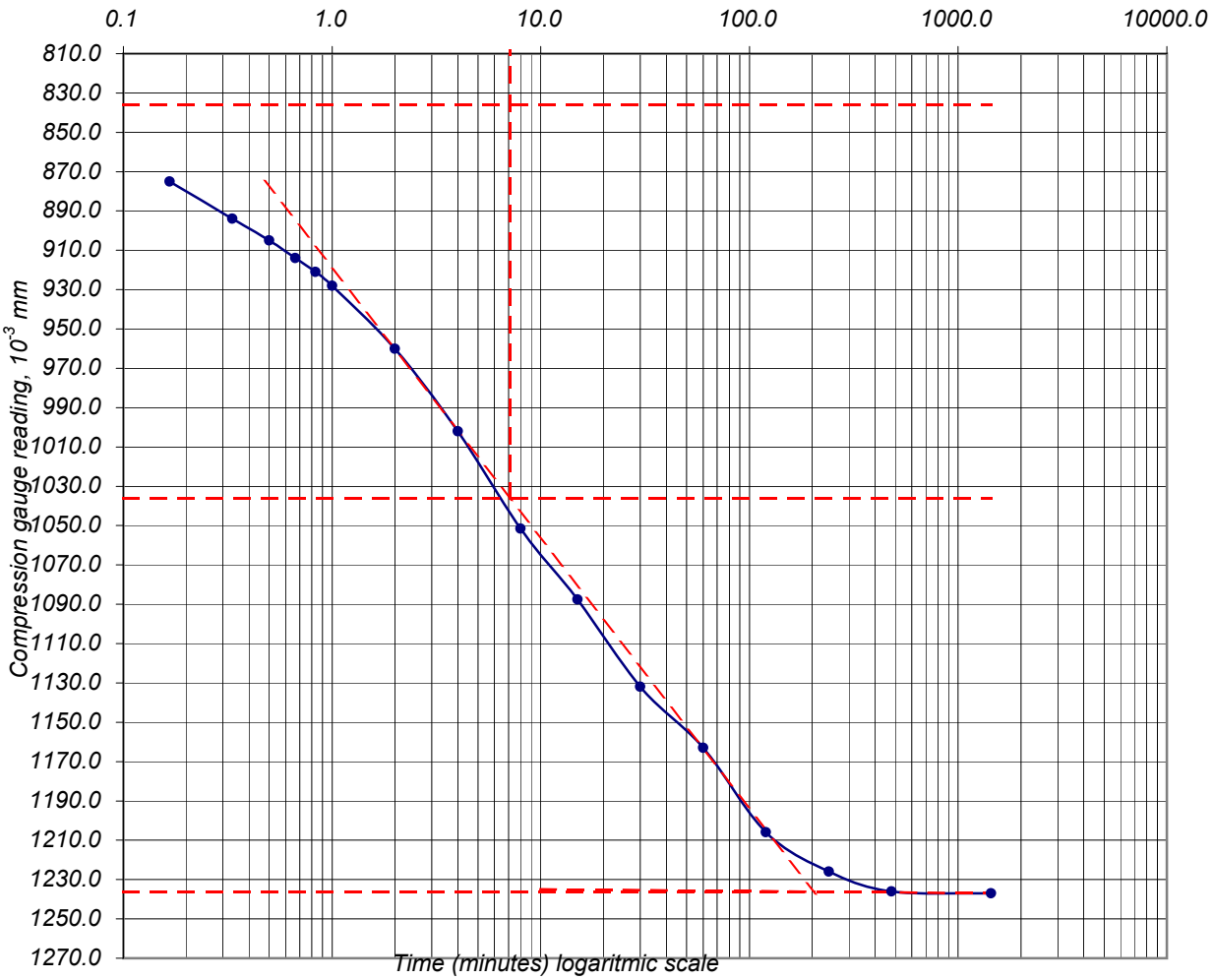


Sheet 10	Increment no. 3	Operator	Checked	Approved
Sheets 19	**LOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test (With Measurement of swelling pressure)

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty sandy CLAY	**Borehole**	BH-SI1-1
	Sample no.	,
	Dept	21,2-21,5
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	200

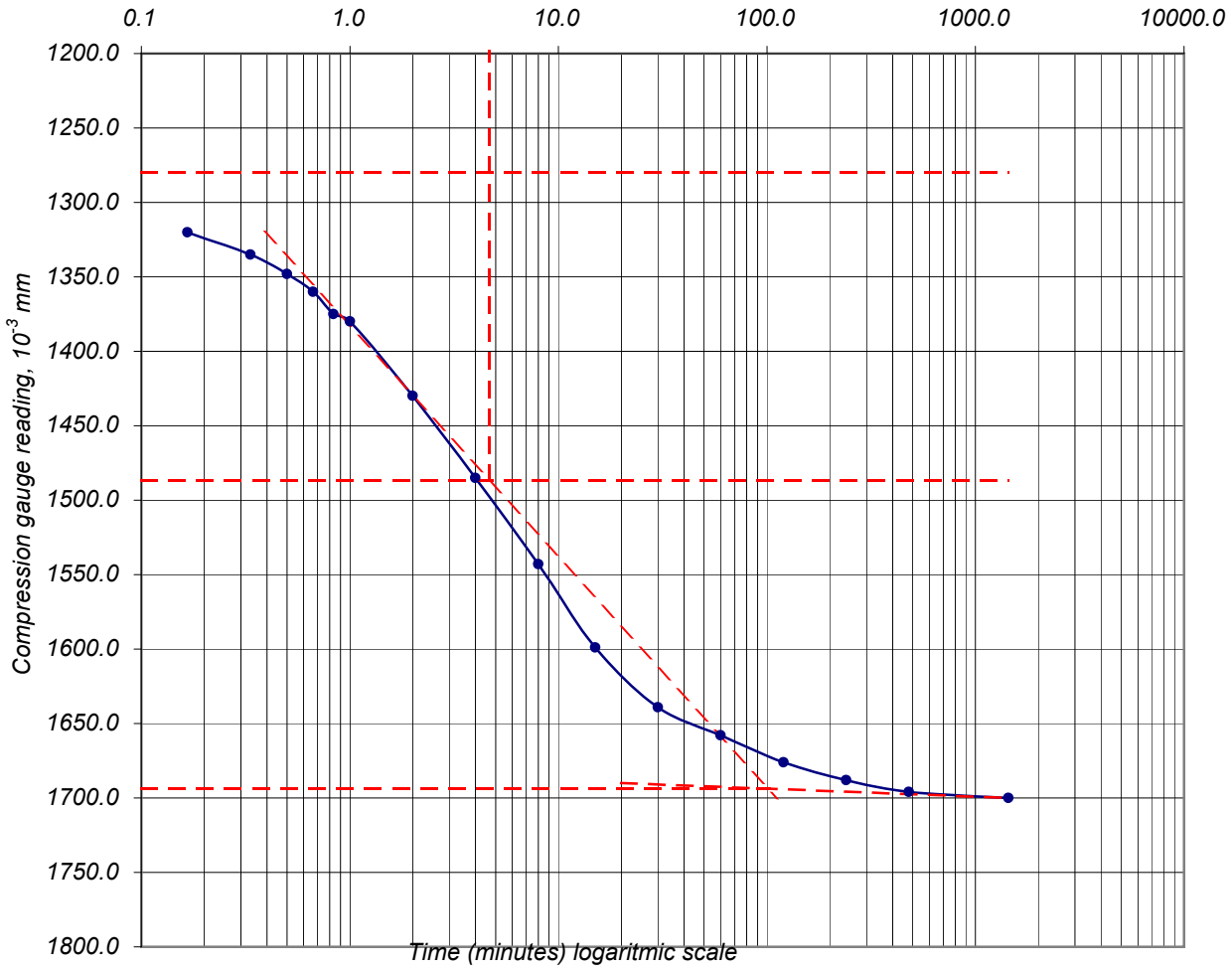


Sheet 11	Increment no. 4	Operator	Checked	Approved
Sheets 19	**LOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test (With Measurement of swelling pressure)

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty sandy CLAY	**Borehole**	BH-SI1-1
	Sample no.	,
	Dept	21,2-21,5
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	400

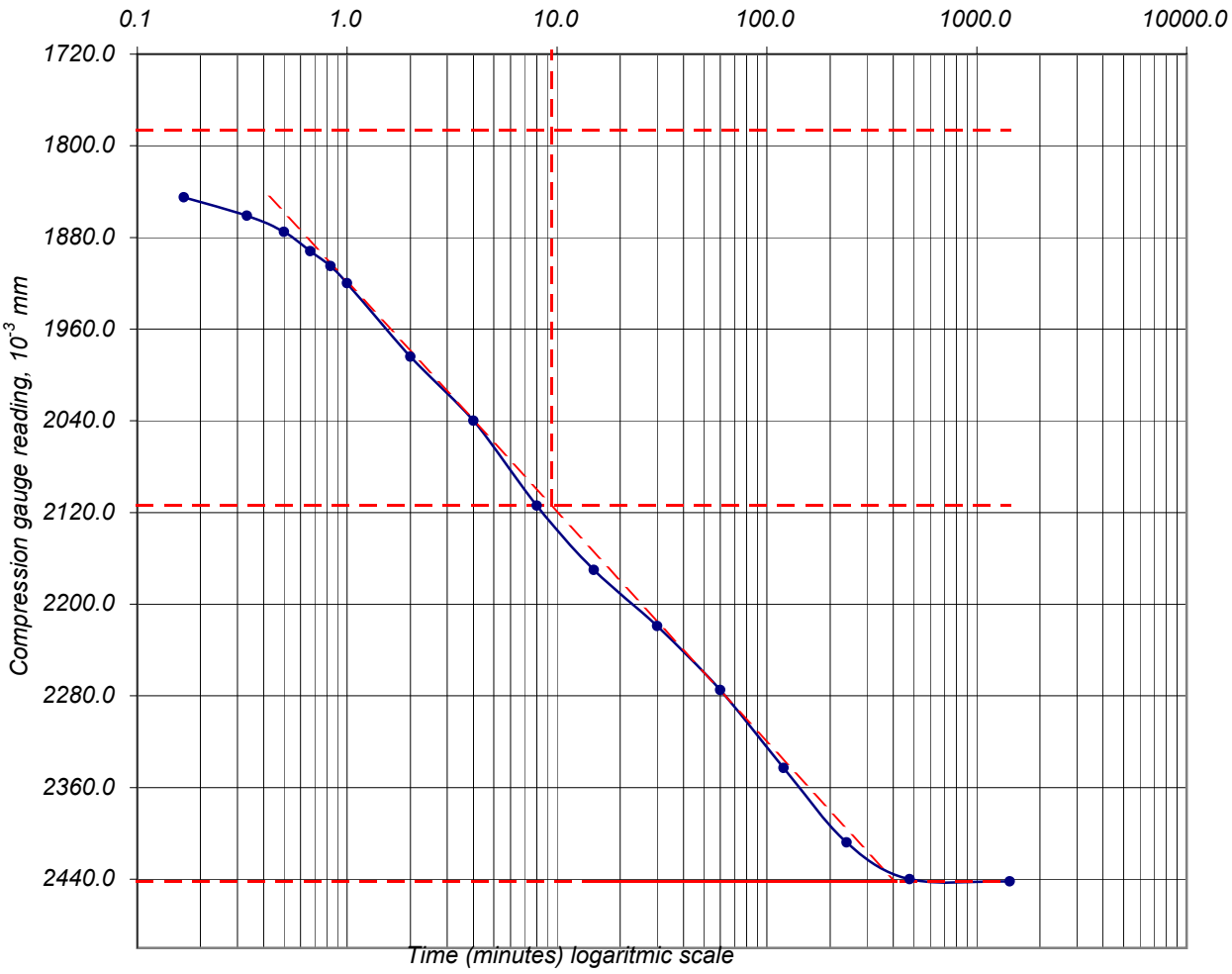


Sheet 12	Increment no. 5	Operator	Checked	Approved
Sheets 19	**LOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test (With Measurement of swelling pressure)

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty sandy CLAY	**Borehole**	BH-SI1-1
	Sample no.	,
	Dept	21,2-21,5
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	800

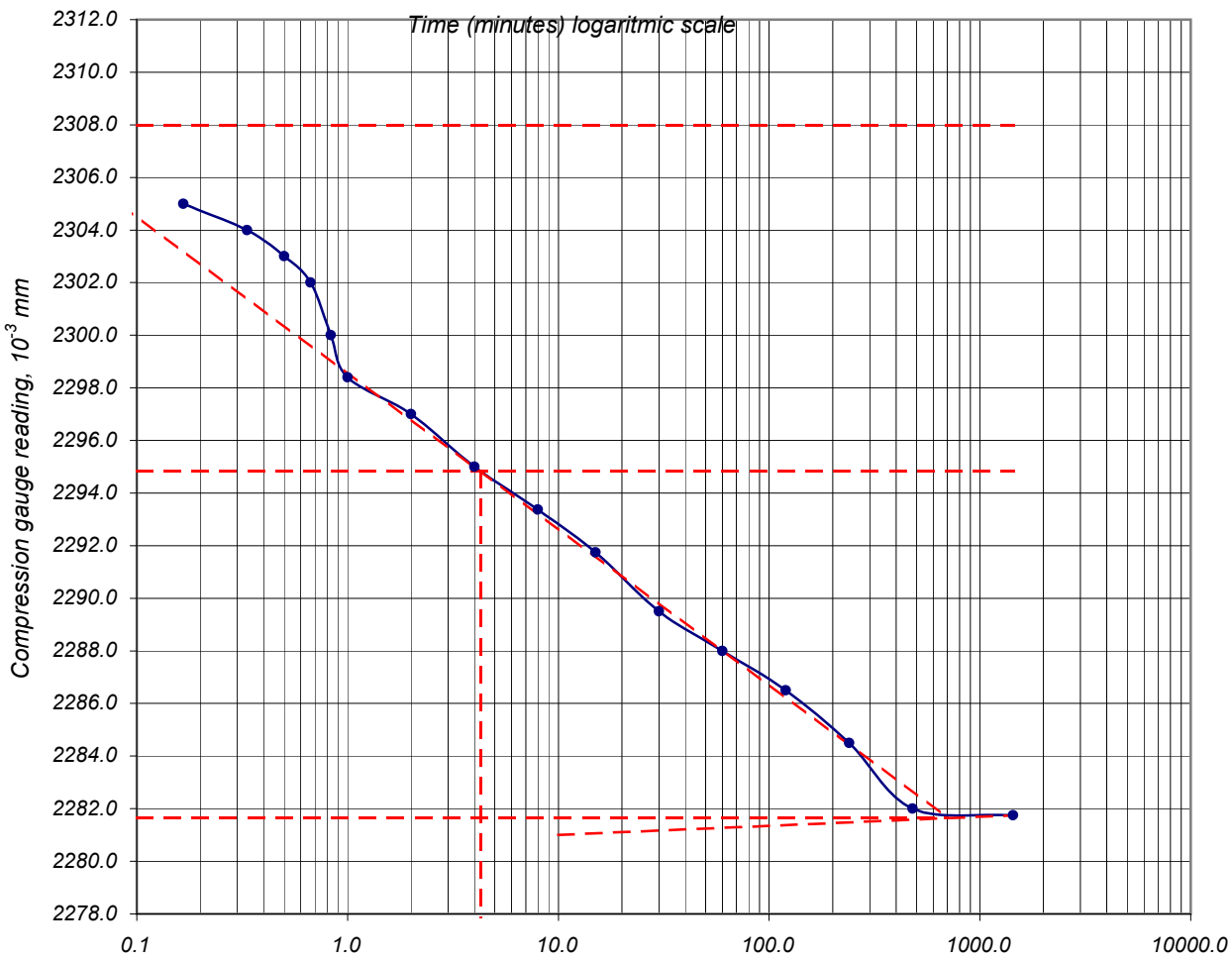


Sheet 13	Increment no. 6	Operator	Checked	Approved
Sheets 19	**UNLOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Curve – Logarithm of Time Fitting Method

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty sandy CLAY	**Borehole**	BH-SI1-1
	Sample no.	,
	Dept	21,2-21,5
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	400

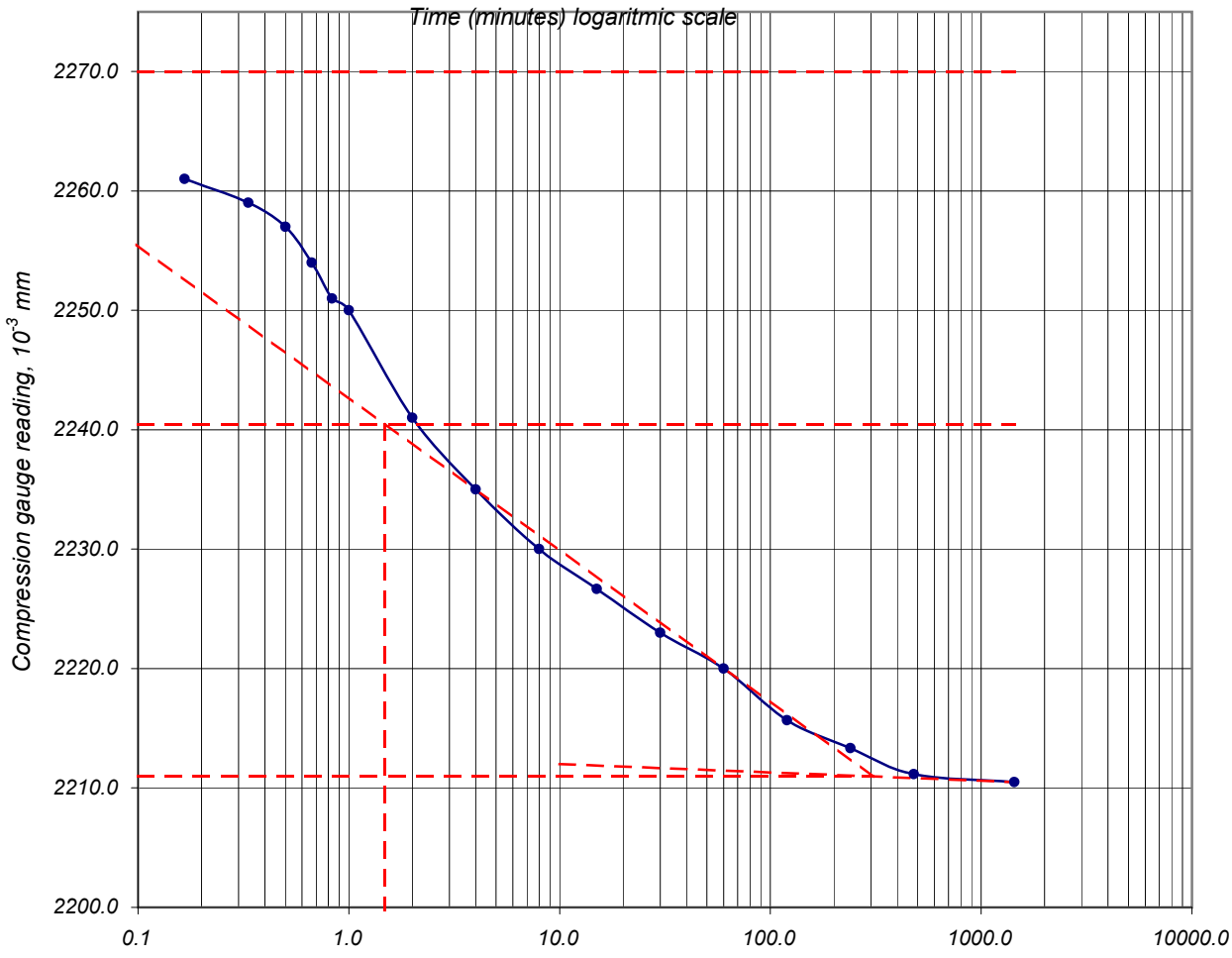


Sheet 14	Increment no. 7	Operator	Checked	Approved
Sheets 19	**UNLOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Curve – Logarithm of Time Fitting Method

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty sandy CLAY	**Borehole**	BH-SI1-1
	Sample no.	,
	Dept	21,2-21,5
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	200

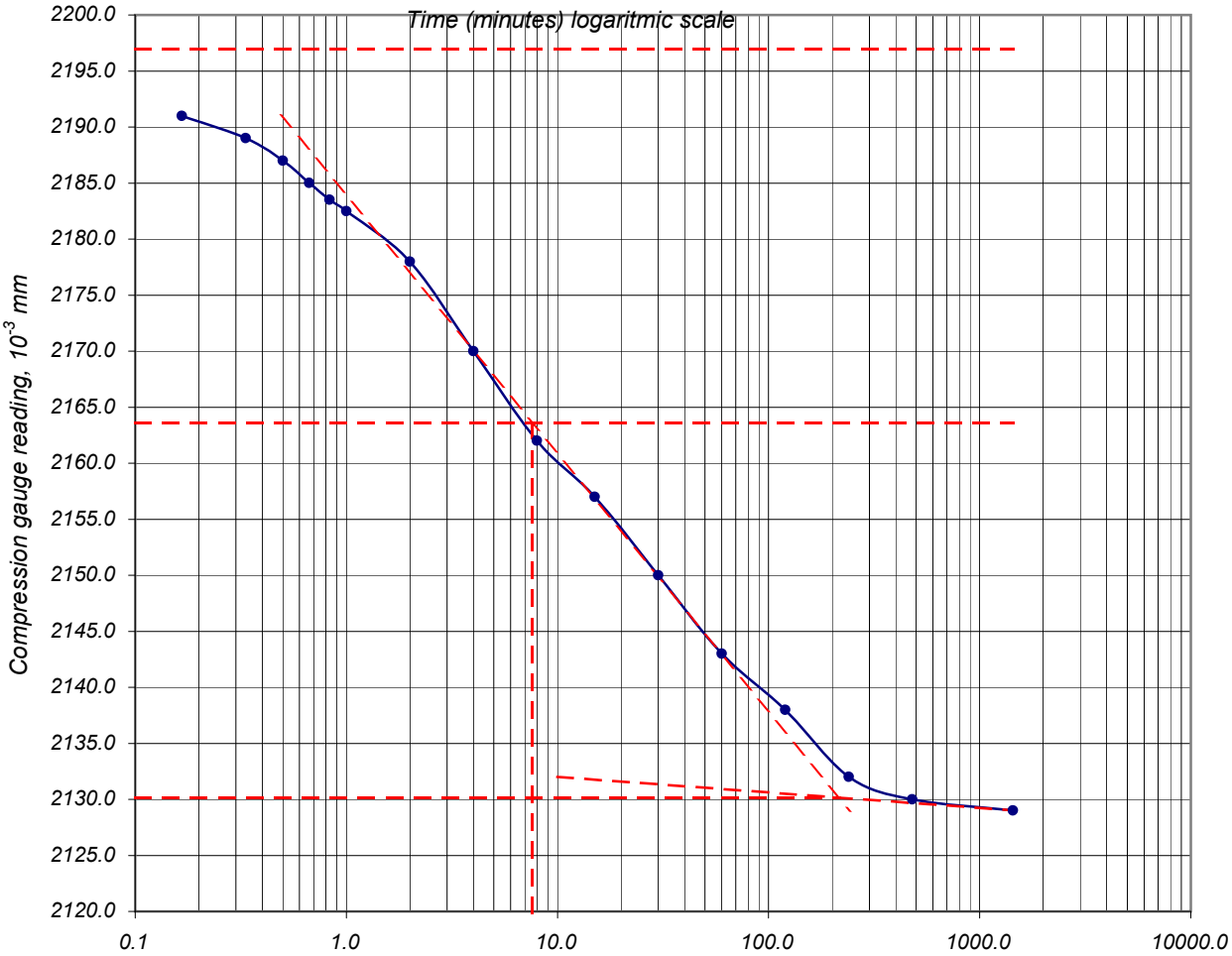


Sheet 15	Increment no. 8	Operator	Checked	Approved
Sheets 19	**UNLOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Curve – Logarithm of Time Fitting Method

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty sandy CLAY	**Borehole**	BH-SI1-1
	Sample no.	,
	Dept	21,2-21,5
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	100

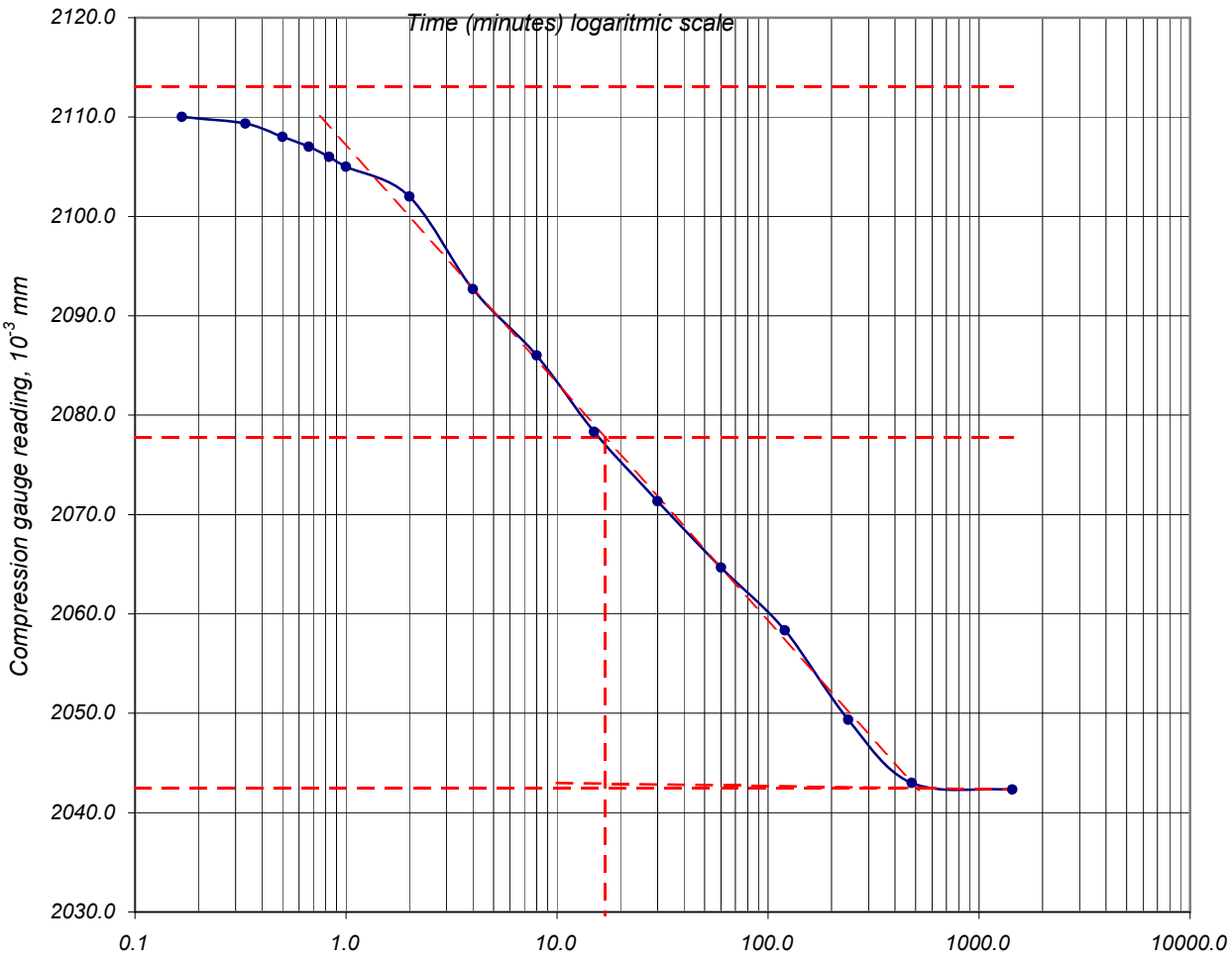


Sheet 16	Increment no. 9	Operator	Checked	Approved
Sheets 19	**RELOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Curve – Logarithm of Time Fitting Method

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty sandy CLAY	**Borehole**	BH-SI1-1
	Sample no.	,
	Dept	21,2-21,5
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	50

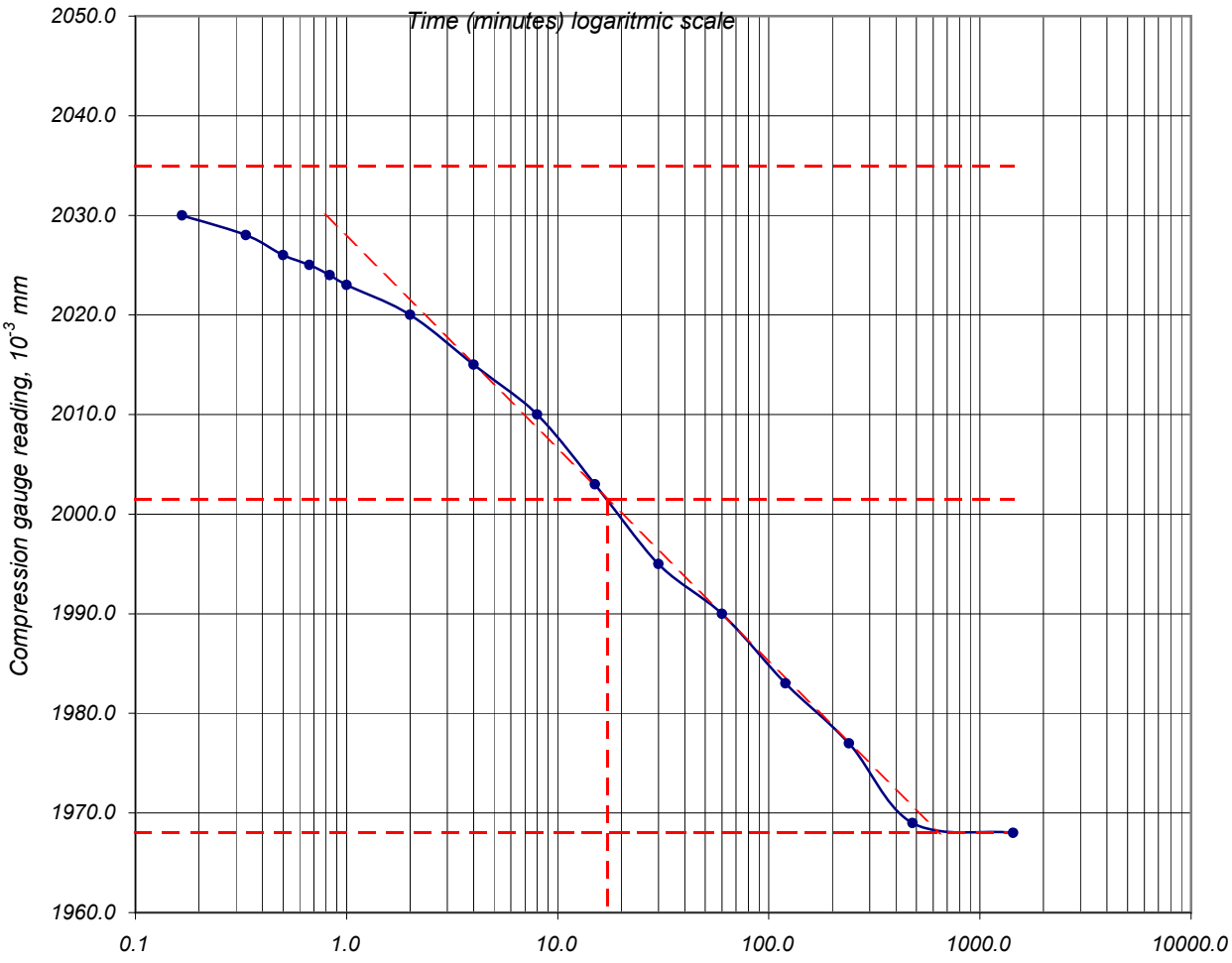


Sheet 17	Increment no. 10	Operator	Checked	Approved
Sheets 19	**RELOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Curve – Logarithm of Time Fitting Method

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty sandy CLAY	**Borehole**	BH-SI1-1
	Sample no.	,
	Dept	21,2-21,5
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	25

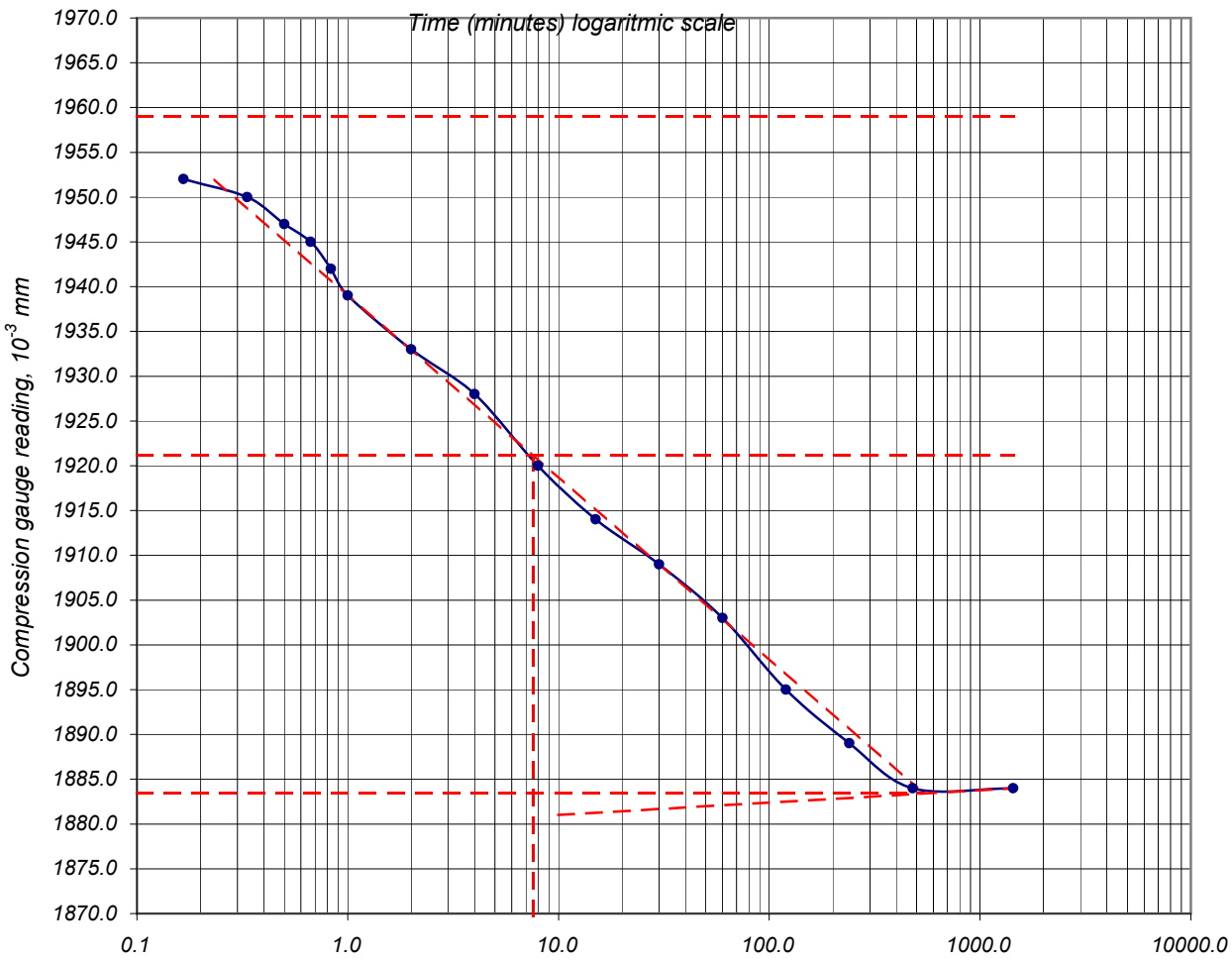


Sheet 18	Increment no. 11	Operator	Checked	Approved
Sheets 19	**RELOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Curve – Logarithm of Time Fitting Method

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty sandy CLAY	**Borehole**	BH-SI1-1
	Sample no.	,
	Dept	21,2-21,5
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	3.6



Sheet 19	Increment no. 12	Operator	Checked	Approved
Sheets 19	**RELOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty sandy CLAY with a little rounded gravel content	**Borehole**	BH-SI1-1
	Sample no.	,
	Dept, m	23,7-24,0
	Date	25.08.2011
Test method BS1377 : Part 5 : 1990 : 3.5, 3.6		Saturated State

Cell no.	2	Particle density	
Ring no.	2	asumed	2.73 Mg/m^3

DIMENSIONS		Initial specimen	Overall change	Final specimen	Specimen preparation method
Diameter	D mm	87.00		87.00	
Area	A mm^2	5944.68		5944.68	
Height	H mm	H_o 24.80	2.279	22.521	
Volume	V cm^3	147.43	13.55	133.88	

WEIGHINGS		Initial specimen (a)	Initial specimen (b)	Final specimen (c)
Wet soil + ring + tray	g	489.90		469.00
Dry soil + ring + tray	g			416.00
Ring + tray	g	190.93		190.93
Wet soil	g	m_0 298.97	m_0 298.97	278.07
Dry soil	g		m_d 225.07	225.07
Water	g		73.90	53.00
Moisture content (measured)	%		32.83	23.55
Moisture content (from trimmings)	%	W_0 27.10		
Density	Mg/m^3	2.03	2.03	2.08
Dry density	Mg/m^3	1.60	1.53	1.68
Voids ratio		e_0 0.711	0.788	0.624
Degree of saturation	%	S_0 104.05	113.72	103.04
Height of soils	H_S mm	14.49	13.87	13.87

(a) Using moisture content from trimmings

(b) Using data from (a) and (c)

(c) Data from specimen after test

Sheet 1	**Operator**	**Checked**	**Approved**
Sheets 19	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty sandy CLAY with a little rounded gravel content	**Borehole**	BH-SI1-1
	Sample no.	,
	Dept	23,7-24,0
	Date	25.08.2011

Test method	BS 1377 : Part 7 : 1990 : 8					
Machine no.	2	Spec. diam.	87.00	Height	24.80	mm
Cell no.	2	Lever ratio	1:10	Area	5944.68	mm^2
Ring no.	2	**1kg** on hanger gives pressure of			21.60	kPa

LOADING/UNLOADING/RELOADING

Increment no.					1			2			3		
Date started					18.08.2011			19.08.2011			20.08.2011		
Load				kg	1.16			2.31			4.63		
Pressure				kPa	25.0			50.0			100.0		
Mean daily temperature 22 ^{0} C					LOADING			LOADING			LOADING		
Elapsed time				t^0	Clock time	Gauge reading	Cumulative compression mm ΔH	Clock time	Gauge reading	Cumulative compression mm ΔH	Clock time	Gauge reading	Cumulative compression mm ΔH
h	m	s	t min										
0	0	0	0	22	9:23	5.000	0.000	9:45	5.195	0.195	9:45	5.423	0.423
_	_	10	0.167	22	9:23	5.079	0.079	9:45	5.234	0.234	9:45	5.502	0.502
_	_	20	0.333	22	9:23	5.086	0.086	9:45	5.243	0.243	9:45	5.515	0.515
_	_	30	0.500	22	9:23	5.091	0.091	9:45	5.254	0.254	9:45	5.523	0.523
_	_	40	0.667	22	9:23	5.096	0.096	9:45	5.263	0.263	9:45	5.535	0.535
_	_	50	0.833	22	9:23	5.098	0.098	9:45	5.267	0.267	9:45	5.542	0.542
_	0:01	_	1	22	9:24	5.101	0.101	9:46	5.275	0.275	9:46	5.547	0.547
_	0:02	_	2	22	9:25	5.119	0.119	9:47	5.291	0.291	9:47	5.575	0.575
_	0:04	_	4	22	9:27	5.132	0.132	9:49	5.314	0.314	9:49	5.603	0.603
_	0:08	_	8	22	9:31	5.146	0.146	9:53	5.333	0.333	9:53	5.627	0.627
_	0:15	_	15	22	9:38	5.156	0.156	10:00	5.348	0.348	10:00	5.645	0.645
_	0:30	_	30	22	9:53	5.165	0.165	10:15	5.370	0.370	10:15	5.670	0.670
1:00	_	_	60	21	10:23	5.174	0.174	10:45	5.394	0.394	10:45	5.694	0.694
2:00	_	_	120	21	11:23	5.184	0.184	11:45	5.407	0.407	11:45	5.712	0.712
4:00	_	_	240	21	13:23	5.188	0.188	13:45	5.416	0.416	13:45	5.719	0.719
8:00	_	_	480	20	17:23	5.192	0.192	17:45	5.419	0.419	17:45	5.721	0.721
24:00	_	_	1440	21	9:23	5.195	0.195	9:45	5.423	0.423	9:45	5.724	0.724
36:00	_	_	2160		21:23			21:45			21:45		
48:00	_	_	**2880**		9:23			9:45			9:45		
Cumulative correction **y**					0.032			0.070			0.110		
Net cumulative compression (ΔH-y)					0.163			0.353			0.614		

Sheet 2	Operator	Checked	Approved
Sheets 19	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty sandy CLAY with a little rounded gravel content	**Borehole**	BH-SI1-1
	Sample no.	,
	Dept	23,7-24,0
	Date	25.08.2011

Test method	BS 1377 : Part 7 : 1990 : 8					
Machine no.	2	Spec. diam.	87.00	Height	24.80	mm
Cell no.	2	Lever ratio	1:10	Area	5944.68	mm^2
Ring no.	2	**1kg** on hanger gives pressure of			21.60	кPa

LOADING/UNLOADING/RELOADING

Increment no.					4			5			6		
Date started					21.08.2011			22.08.2011			23.08.2011		
Load				kg	9.259			18.519			37.037		
Pressure				kPa	200.0			400.0			800.0		
Mean daily temperature 22 ^{0} C					LOADING			LOADING			LOADING		
Elapsed time				t^0	Clock time	Gauge reading	Cumulative compression ΔH mm	Clock time	Gauge reading	Cumulative compression ΔH mm	Clock time	Gauge reading	Cumulative compression ΔH mm
h	m	s	t min										
0	0	0	0	22	9:45	5.724	0.724	9:45	6.157	1.157	9:45	6.762	1.762
_	_	10	0.167	22	9:45	5.850	0.850	9:45	6.340	1.340	9:45	6.963	1.963
_	_	20	0.333	22	9:45	5.872	0.872	9:45	6.369	1.369	9:45	6.985	1.985
_	_	30	0.500	22	9:45	5.889	0.889	9:45	6.389	1.389	9:45	7.010	2.010
_	_	40	0.667	22	9:45	5.901	0.901	9:45	6.404	1.404	9:45	7.030	2.030
_	_	50	0.833	22	9:45	5.915	0.915	9:45	6.424	1.424	9:45	7.050	2.050
_	0:01	_	1	22	9:46	5.925	0.925	9:46	6.440	1.440	9:46	7.065	2.065
_	0:02	_	2	22	9:47	5.972	0.972	9:47	6.492	1.492	9:47	7.130	2.130
_	0:04	_	4	22	9:49	6.023	1.023	9:49	6.534	1.534	9:49	7.215	2.215
_	0:08	_	8	22	9:53	6.055	1.055	9:53	6.584	1.584	9:53	7.298	2.298
_	0:15	_	15	22	10:00	6.078	1.078	10:00	6.620	1.620	10:00	7.368	2.368
_	0:30	_	30	22	10:15	6.102	1.102	10:15	6.662	1.662	10:15	7.419	2.419
1:00	_	_	60	21	10:45	6.125	1.125	10:45	6.700	1.700	10:45	7.448	2.448
2:00	_	_	120	21	11:45	6.138	1.138	11:45	6.724	1.724	11:45	7.472	2.472
4:00	_	_	240	21	13:45	6.146	1.146	13:45	6.744	1.744	13:45	7.480	2.480
8:00	_	_	480	20	17:45	6.151	1.151	17:45	6.756	1.756	17:45	7.483	2.483
24:00	_	_	1440	21	9:45	6.157	1.157	9:45	6.762	1.762	9:45	7.487	2.487
36:00	_	_	2160		21:45			21:45			21:45		
48:00	_	_	**2880**		9:45			9:45			9:45		
Cumulative correction **y**					0.146			0.183			0.208		
Net cumulative compression (ΔH-y)					1.011			1.579			2.279		

Sheet 3	Operator	Checked	Approved
Sheets 19	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty sandy CLAY with a little rounded gravel content	**Borehole**	BH-SI1-1
	Sample no.	,
	Dept	23,7-24,0
	Date	25.08.2011

Test method	BS 1377 : Part 7 : 1990 : 8					
Machine no.	2	Spec. diam.	87.00	Height	24.80	mm
Cell no.	2	Lever ratio	1:10	Area	5944.68	mm^2
Ring no.	2	**1kg** on hanger gives pressure of			21.60	кPa

LOADING/UNLOADING/RELOADING

Increment no.					7			8			9		
Date started					24.08.2011			25.08.2011			26.08.2011		
Load				kg	18.519			9.259			4.630		
Pressure				kPa	400.0			200.0			100.0		
Mean daily temperature 22 ^{0} C					UNLOADING			UNLOADING			UNLOADING		
Elapsed time				t^0	Clock time	Gauge reading	Cumulative compression mm ΔH	Clock time	Gauge reading	Cumulative compression mm ΔH	Clock time	Gauge reading	Cumulative compression mm ΔH
h	m	s	t min										
0	0	0	0	22	9:45	7.487	2.487	10:15	7.430	2.430	10:15	7.351	2.351
_	_	10	0.167	22	9:45	7.481	2.481	10:15	7.407	2.407	10:15	7.323	2.323
_	_	20	0.333	22	9:45	7.478	2.478	10:15	7.405	2.405	10:15	7.320	2.320
_	_	30	0.500	22	9:45	7.476	2.476	10:15	7.403	2.403	10:15	7.316	2.316
_	_	40	0.667	22	9:45	7.471	2.471	10:15	7.398	2.398	10:15	7.314	2.314
_	_	50	0.833	22	9:45	7.465	2.465	10:15	7.393	2.393	10:15	7.313	2.313
_	0:01	_	1	22	9:46	7.462	2.462	10:16	7.387	2.387	10:16	7.310	2.310
_	0:02	_	2	22	9:47	7.456	2.456	10:17	7.382	2.382	10:17	7.305	2.305
_	0:04	_	4	22	9:49	7.451	2.451	10:19	7.378	2.378	10:19	7.300	2.300
_	0:08	_	8	22	9:53	7.447	2.447	10:23	7.373	2.373	10:23	7.294	2.294
_	0:15	_	15	22	10:00	7.444	2.444	10:30	7.369	2.369	10:30	7.290	2.290
_	0:30	_	30	22	10:15	7.441	2.441	10:45	7.365	2.365	10:45	7.286	2.286
1:00	_	_	60	21	10:45	7.438	2.438	11:15	7.362	2.362	11:15	7.280	2.280
2:00	_	_	120	21	11:45	7.435	2.435	12:15	7.359	2.359	12:15	7.275	2.275
4:00	_	_	240	21	13:45	7.432	2.432	14:15	7.356	2.356	14:15	7.272	2.272
8:00	_	_	480	20	17:45	7.430	2.430	18:15	7.353	2.353	18:15	7.270	2.270
24:00	_	_	1440	21	9:45	7.430	2.430	10:15	7.353	2.353	10:15	7.269	2.269
36:00	_	_	2160		21:45			22:15			22:15		
48:00	_	_	**2880**		9:45			10:15			10:15		
Cumulative correction **y**					0.183			0.146			0.110		
Net cumulative compression (ΔH-y)					2.247			2.207			2.159		

Sheet 4	Operator	Checked	Approved
Sheets 19	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty sandy CLAY with a little rounded gravel content	**Borehole**	BH-SI1-1
	Sample no.	,
	Dept	23,7-24,0
	Date	25.08.2011

Test method	BS 1377 : Part 7 : 1990 : 8					
Machine no.	2	Spec. diam.	87.00	Height	24.80	mm
Cell no.	2	Lever ratio	1:10	Area	5944.68	mm^2
Ring no.	2	**1kg** on hanger gives pressure of			21.60	кPa

LOADING/UNLOADING/RELOADING

Increment no.					10			11			12		
Date started					27.08.2011			28.08.2011			29.08.2011		
Load				kg	0.008			0.004			0.001		
Pressure				kPa	50.0			25.0			3.6		
Mean daily temperature 22 ^{0} C					UNLOADING			RELOADING			RELOADING		
Elapsed time				t^0	Clock time	Gauge reading	Cumulative compression ΔH mm	Clock time	Gauge reading	Cumulative compression ΔH mm	Clock time	Gauge reading	Cumulative compression ΔH mm
h	m	s	t min										
0	0	0	0	22	10:15	7.269	2.269	10:15	7.190	2.190	10:15	7.101	2.101
_	_	10	0.167	22	10:15	7.250	2.250	10:15	7.165	2.165	10:15	7.086	2.086
_	_	20	0.333	22	10:15	7.245	2.245	10:15	7.160	2.160	10:15	7.082	2.082
_	_	30	0.500	22	10:15	7.241	2.241	10:15	7.158	2.158	10:15	7.080	2.080
_	_	40	0.667	22	10:15	7.238	2.238	10:15	7.155	2.155	10:15	7.076	2.076
_	_	50	0.833	22	10:15	7.236	2.236	10:15	7.152	2.152	10:15	7.069	2.069
_	0:01	_	1	22	10:16	7.234	2.234	10:16	7.150	2.150	10:16	7.064	2.064
_	0:02	_	2	22	10:17	7.230	2.230	10:17	7.142	2.142	10:17	7.057	2.057
_	0:04	_	4	22	10:19	7.223	2.223	10:19	7.138	2.138	10:19	7.050	2.050
_	0:08	_	8	22	10:23	7.219	2.219	10:23	7.131	2.131	10:23	7.046	2.046
_	0:15	_	15	22	10:30	7.213	2.213	10:30	7.126	2.126	10:30	7.040	2.040
_	0:30	_	30	22	10:45	7.208	2.208	10:45	7.123	2.123	10:45	7.036	2.036
1:00	_	_	60	21	11:15	7.202	2.202	11:15	7.115	2.115	11:15	7.031	2.031
2:00	_	_	120	21	12:15	7.198	2.198	12:15	7.108	2.108	12:15	7.027	2.027
4:00	_	_	240	21	14:15	7.193	2.193	14:15	7.104	2.104	14:15	7.023	2.023
8:00	_	_	480	20	18:15	7.191	2.191	18:15	7.101	2.101	18:15	7.021	2.021
24:00	_	_	1440	21	10:15	7.190	2.190	10:15	7.101	2.101	10:15	7.020	2.020
36:00	_	_	2160		22:15			22:15			22:15		
48:00	_	_	**2880**		10:15			10:15			10:15		
Cumulative correction **y**					0.070			0.032					
Net cumulative compression (ΔH-y)					2.120			2.069			2.020		

Sheet 5	Operator	Checked	Approved
Sheets 19	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty sandy CLAY with a little rounded gravel content	**Borehole**	BH-SI1-1
	Sample no.	,
	Dept	23,7-24,0
	Date	25.08.2011

Test method		BS 1377 : Part 7 : 1990 : 8			
Machine no.	2	Specimen diameter	87.00 mm	Height H_0,	24.8 mm
Cell no.	2	Height of solids Hs	14.49 mm		
Ring no.	2	Initial voids ratio e_1	0.711		

VOIDS RATIO					COMPRESSIBILITY			COEFFICIENT OF CONSOLIDATION			
					Incremental					c_v =	
Increment no.	Pressure P kPa	Cumulative compression (ΔH-y) mm	Consolidated height $H=H_0-(\Delta H-y)$ mm	Voids ratio $e=\frac{H-H_s}{H_s}$	height change, δH mm	pressure change δp kPa	$m_v=\frac{\delta H}{H_i}\bullet\frac{100(}{\delta p}$ m^2/MN	t_{50} min	$\bar{H}=\frac{1}{2}(H_1+H_2)$ mm	$\frac{0.026\bar{H}^2}{t_{50}}$ $m^2/year$	$\frac{0.111\bar{H}^2}{t_{90}}$ $m^2/year$
0	0	0.000	24.80	0.711	0.00	0	–	–	–	–	–
1	25.0	0.163	24.64	0.700	0.16	25.0	0.26	3.45	24.72	4.60	
2	50.0	0.353	24.45	0.687	0.19	25.0	0.31	3.29	24.54	4.76	
3	100.0	0.614	24.19	0.669	0.26	50.0	0.21	3.08	24.32	5.00	
4	200.0	1.011	23.79	0.641	0.40	100.0	0.16	1.01	23.99	14.78	
5	400.0	1.579	23.22	0.602	0.57	200.0	0.12	2.87	23.51	5.00	
6	800.0	2.279	22.52	0.554	0.70	400.0	0.08	2.73	22.87	4.97	
7	400.0	2.247	22.55	0.556	-0.03	-400.0	0.00	0.56	22.54	23.52	
8	200.0	2.207	22.59	0.559	-0.04	-200.0	0.01	0.65	22.57	20.33	
9	100.0	2.159	22.64	0.562	-0.05	-100.0	0.02	3.56	22.62	3.73	
10	50.0	2.120	22.68	0.565	-0.04	-50.0	0.03	2.65	22.66	5.03	
11	25.0	2.069	22.73	0.568	-0.05	-25.0	0.09	4.11	22.71	3.26	
12	3.6	2.020	22.78	0.572	-0.05	-21.4	0.10	1.77	22.76	7.60	

Sheet	6	Operator	Checked	Approved
Sheets	19	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description:	**Borehole**	BH-SI1-1
Intermediately plastic silty sandy CLAY with a little rounded gravel content	**Sample no.**	,
	Dept	23,7-24,0
	Date	25.08.2011

Test method BS 1377 : Part 7 : 1990 : 8

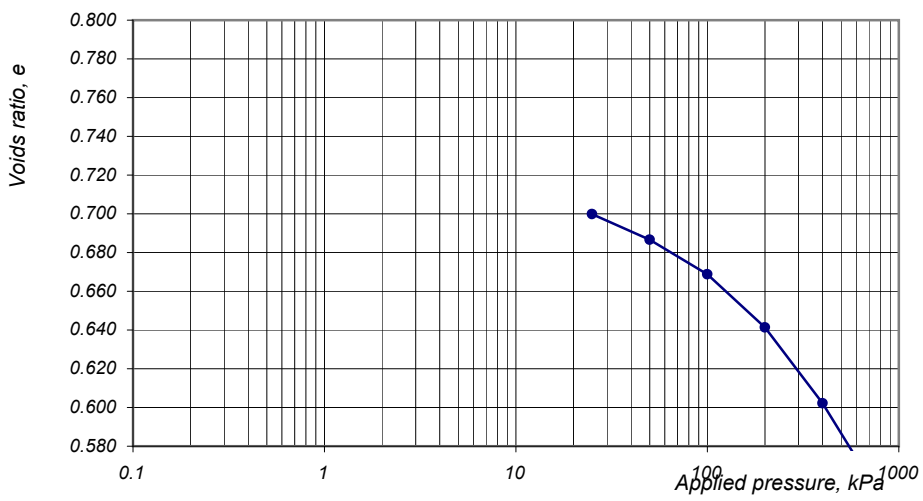
SPECIMEN INITIALLY

Diameter	87.00 mm	Density	2.03	Mg/m^3
Height	24.80 mm	Moisture content	27.1	%
Voids ratio	0.711	Dry density	1.60	Mg/m^3
Saturation	104.05 %	Particle density	2.73	Mg/m^3

Compression Index, C_c -0.020

Remarks:

Pressure stage kPa	Laboratory coefficients of: Compressibility, m_v m^2/MN	Consolidation, C_v $m^2/year$	Secondary Consolidation, C_α
0.0	-	-	-
25	0.26	4.60	0.00026
50	0.31	4.76	0.00074
100	0.21	5.00	0.00031
200	0.16	14.78	0.0008
400	0.12	5.00	0.00067
800	0.08	4.97	0.00031
400	0.00	23.52	0.00003
200	0.01	20.33	0.00001
100	0.02	3.73	6.4E-05
50	0.03	5.03	9.6E-05
25	0.09	3.26	2.6E-05
3.6	0.10	7.60	9.6E-06

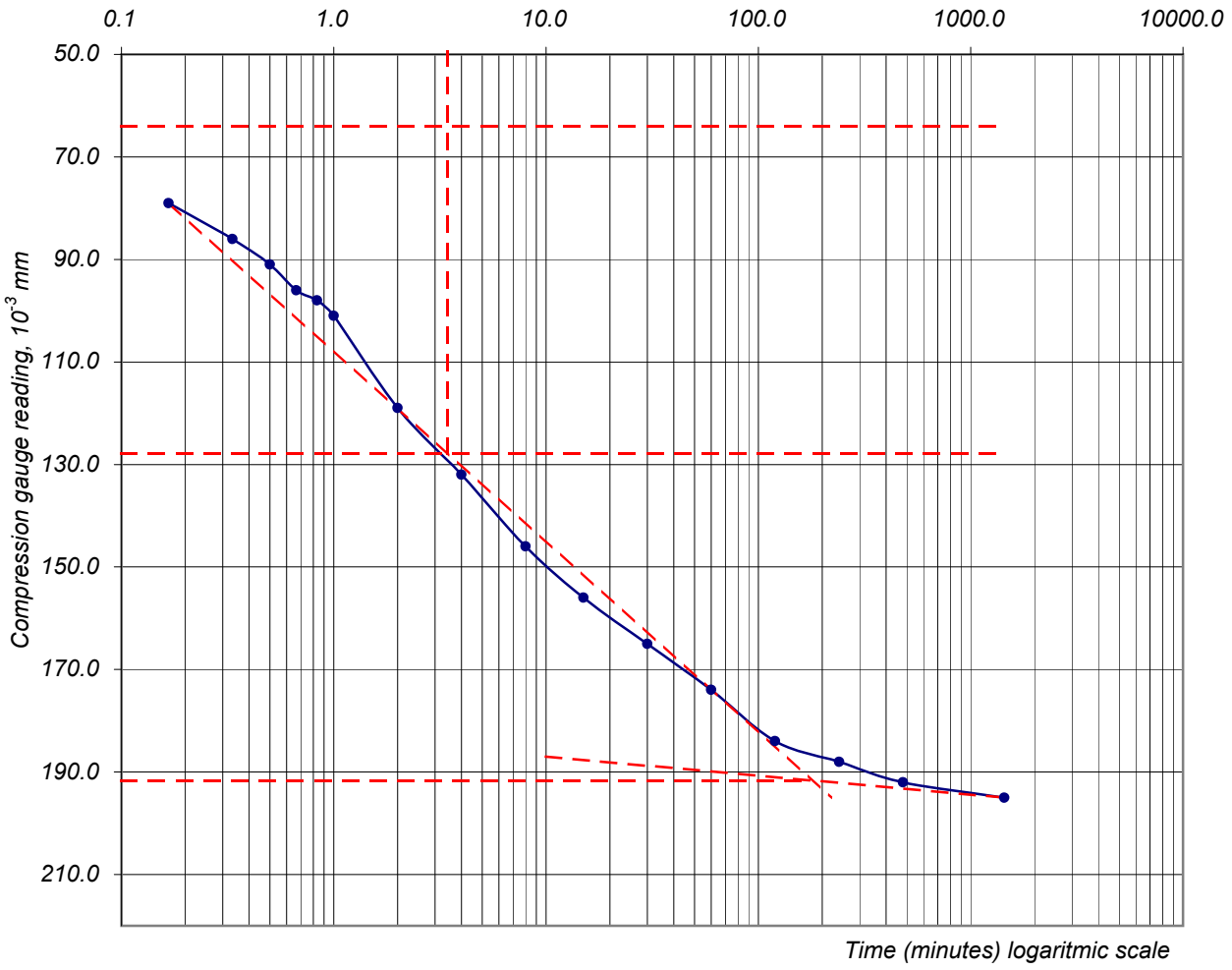


Sheet 7	Operator	Checked	Approved
Sheets 19	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Curve – Logarithm of Time Fitting Method

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty sandy CLAY with a little rounded gravel content	**Borehole**	BH-SI1-1
	Sample no.	,
	Dept	23,7-24,0
	Date	25.08.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	25

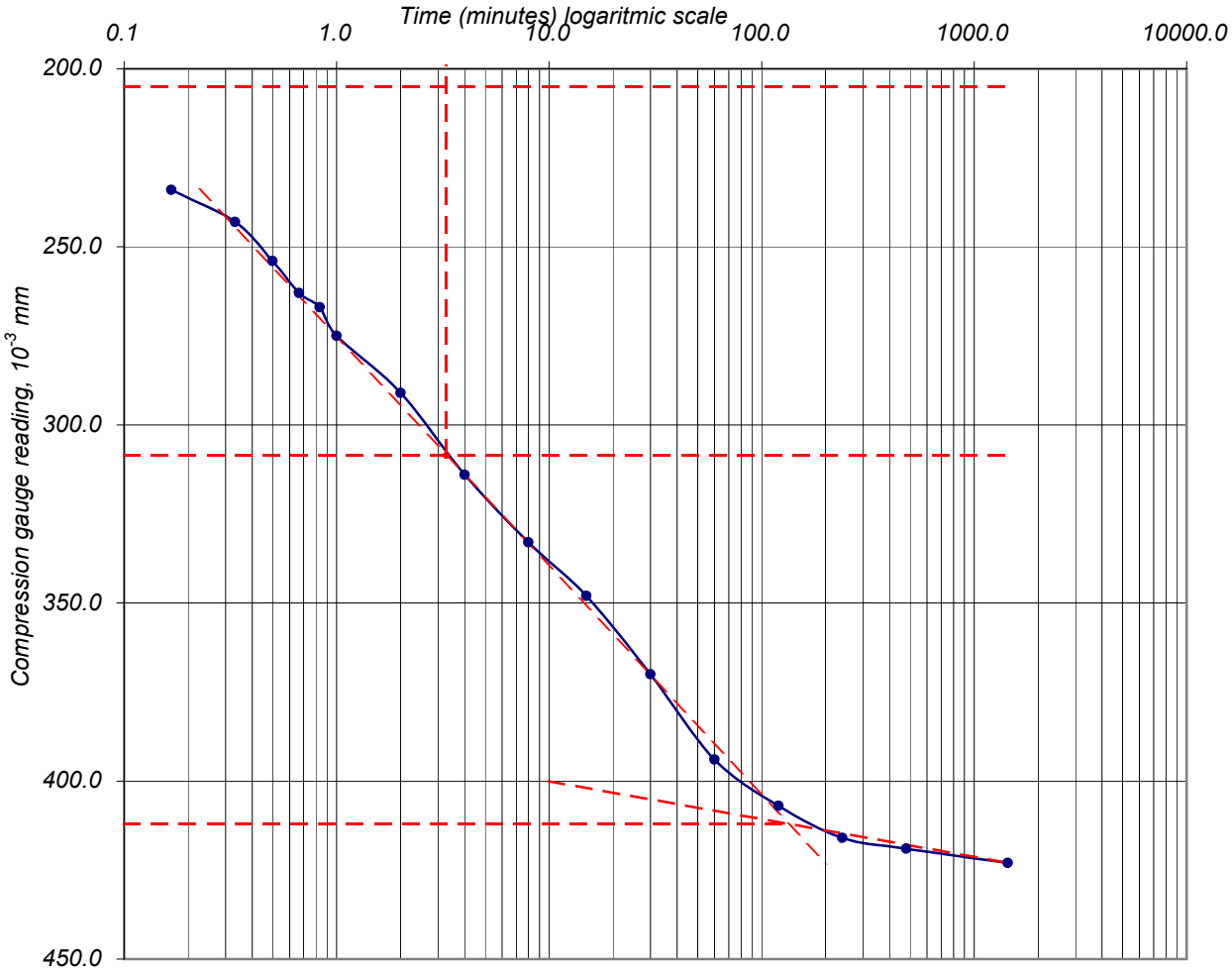


Sheet 8	Increment no. 1	Operator	Checked	Approved
Sheets 19	**LOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test (With Measurement of swelling pressure)

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty sandy CLAY with a little rounded gravel content	**Borehole**	BH-SI1-1
	Sample no.	,
	Dept	23,7-24,0
	Date	25.08.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	50

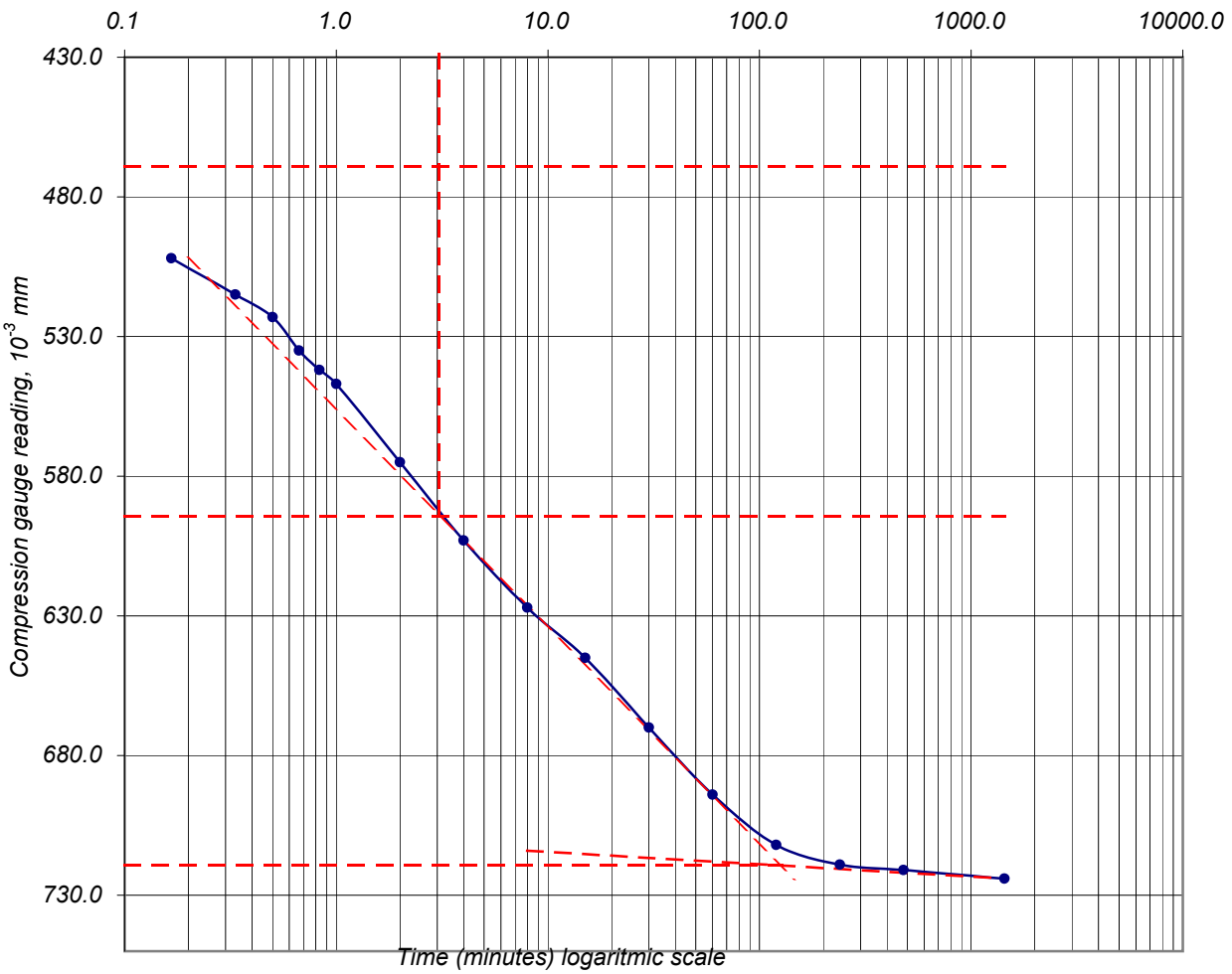


Sheet 9	Increment no. 2	Operator	Checked	Approved
Sheets 19	**LOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test (With Measurement of swelling pressure)

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty sandy CLAY with a little rounded gravel content	**Borehole**	BH-SI1-1
	Sample no.	,
	Dept	23,7-24,0
	Date	25.08.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	100

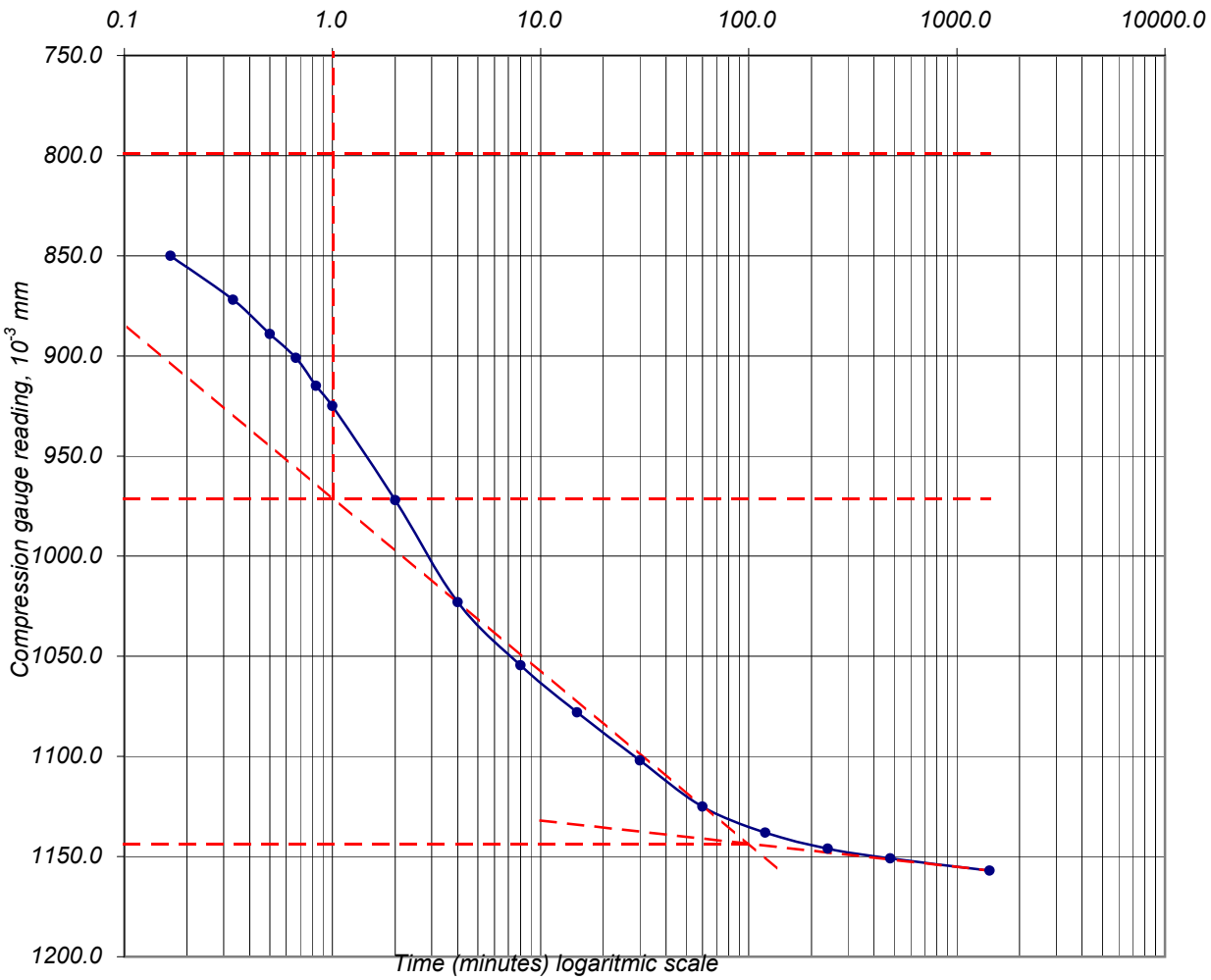


Sheet 10	Increment no. 3	Operator	Checked	Approved
Sheets 19	**LOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test (With Measurement of swelling pressure)

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty sandy CLAY with a little rounded gravel content	**Borehole**	BH-SI1-1
	Sample no.	,
	Dept	23,7-24,0
	Date	25.08.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	200

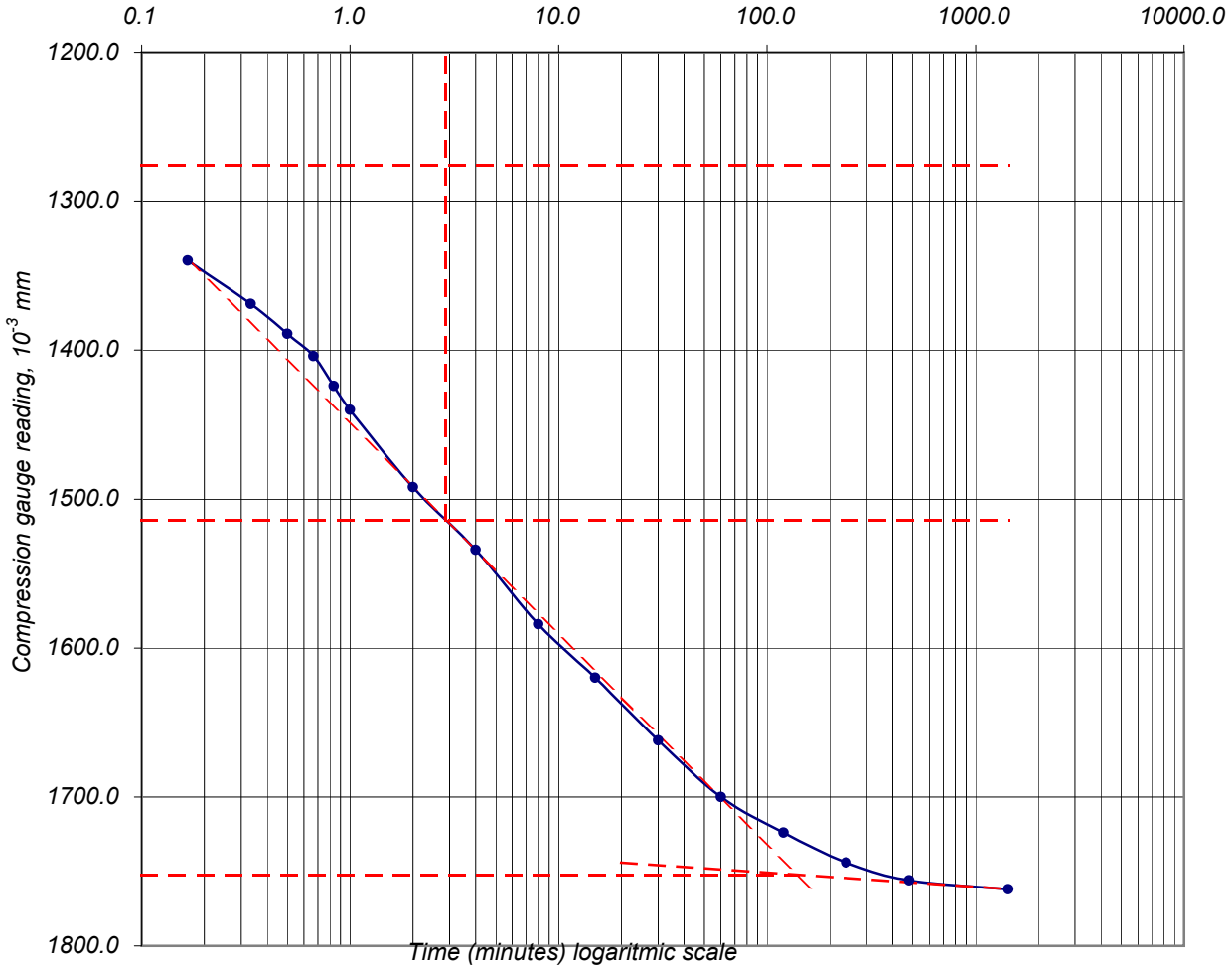


Sheet 11	Increment no. 4	Operator	Checked	Approved
Sheets 19	**LOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test (With Measurement of swelling pressure)

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty sandy CLAY with a little rounded gravel content	**Borehole**	BH-SI1-1
	Sample no.	,
	Dept	23,7-24,0
	Date	25.08.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	400

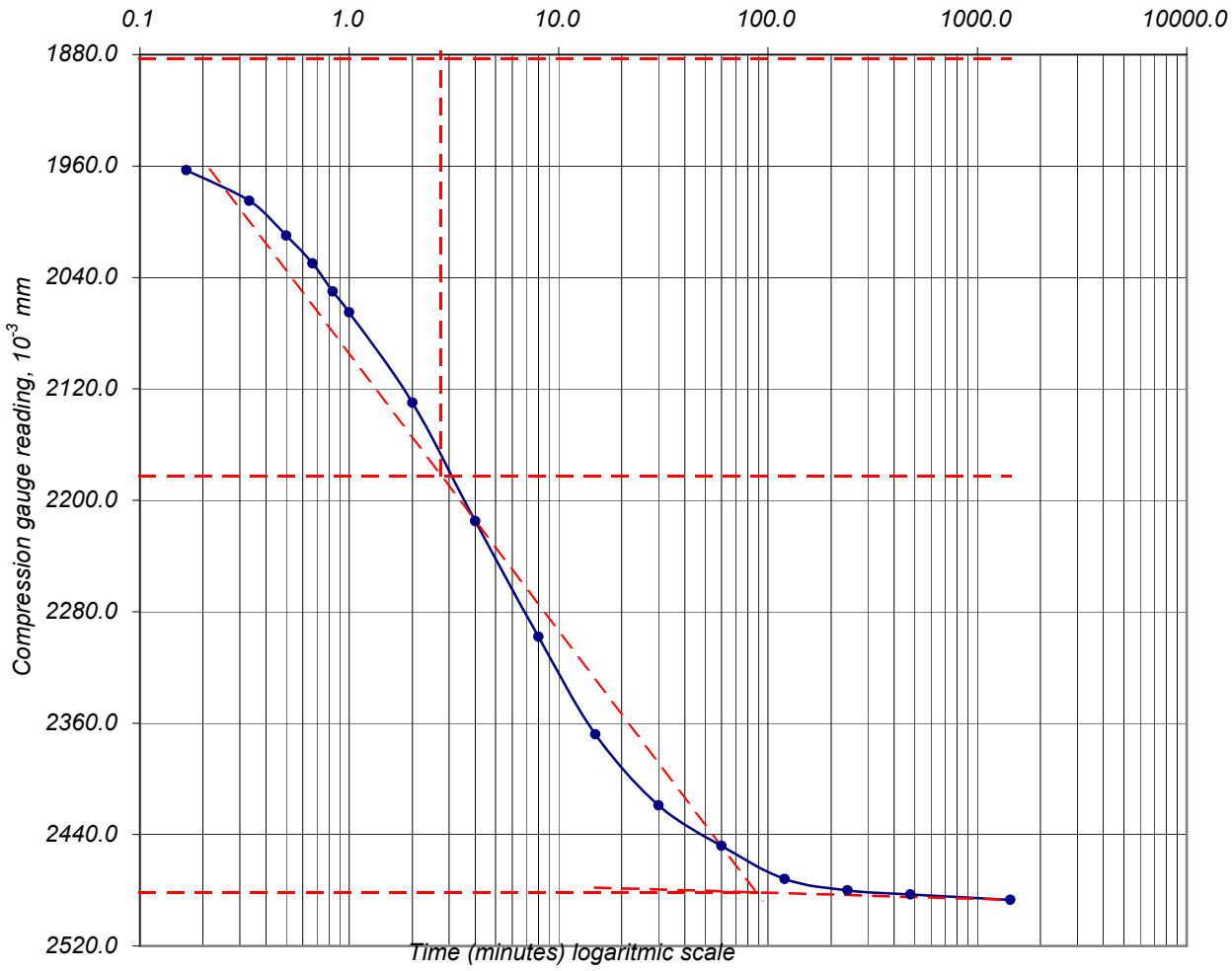


Sheet 12	Increment no. 5	Operator	Checked	Approved
Sheets 19	**LOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test (With Measurement of swelling pressure)

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty sandy CLAY with a little rounded gravel content	**Borehole**	BH-SI1-1
	Sample no.	,
	Dept	23,7-24,0
	Date	25.08.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	800



Sheet 13	Increment no. 6	Operator	Checked	Approved
Sheets 19	**LOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Curve – Logarithm of Time Fitting Method

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty sandy CLAY with a little rounded gravel content	**Borehole**	BH-SI1-1
	Sample no.	,
	Dept	23,7-24,0
	Date	25.08.2011

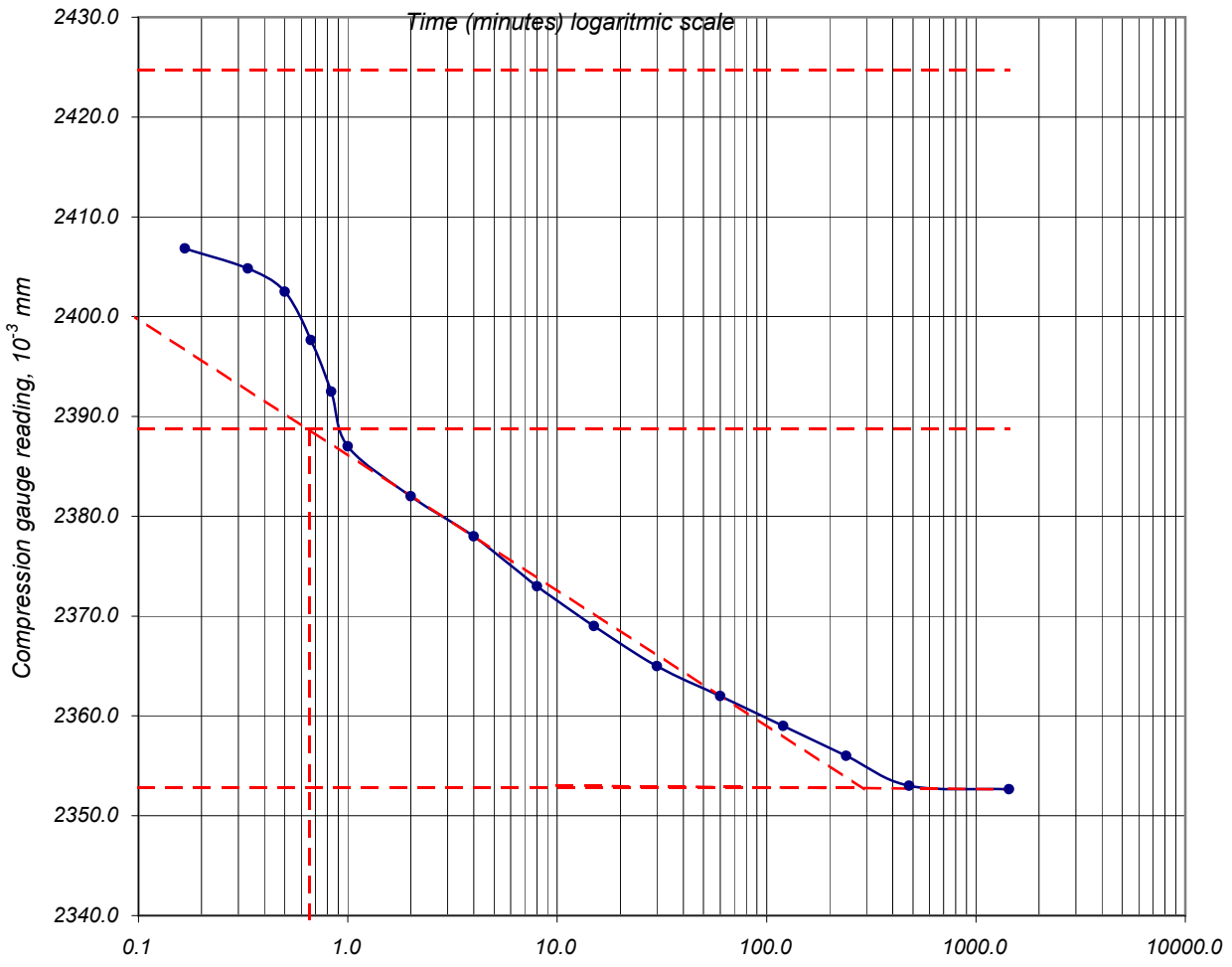
Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	400

Sheet 14	Increment no. 7	Operator	Checked	Approved
Sheets 19	**UNLOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Curve – Logarithm of Time Fitting Method

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty sandy CLAY with a little rounded gravel content	**Borehole**	BH-SI1-1
	Sample no.	,
	Dept	23,7-24,0
	Date	25.08.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	200

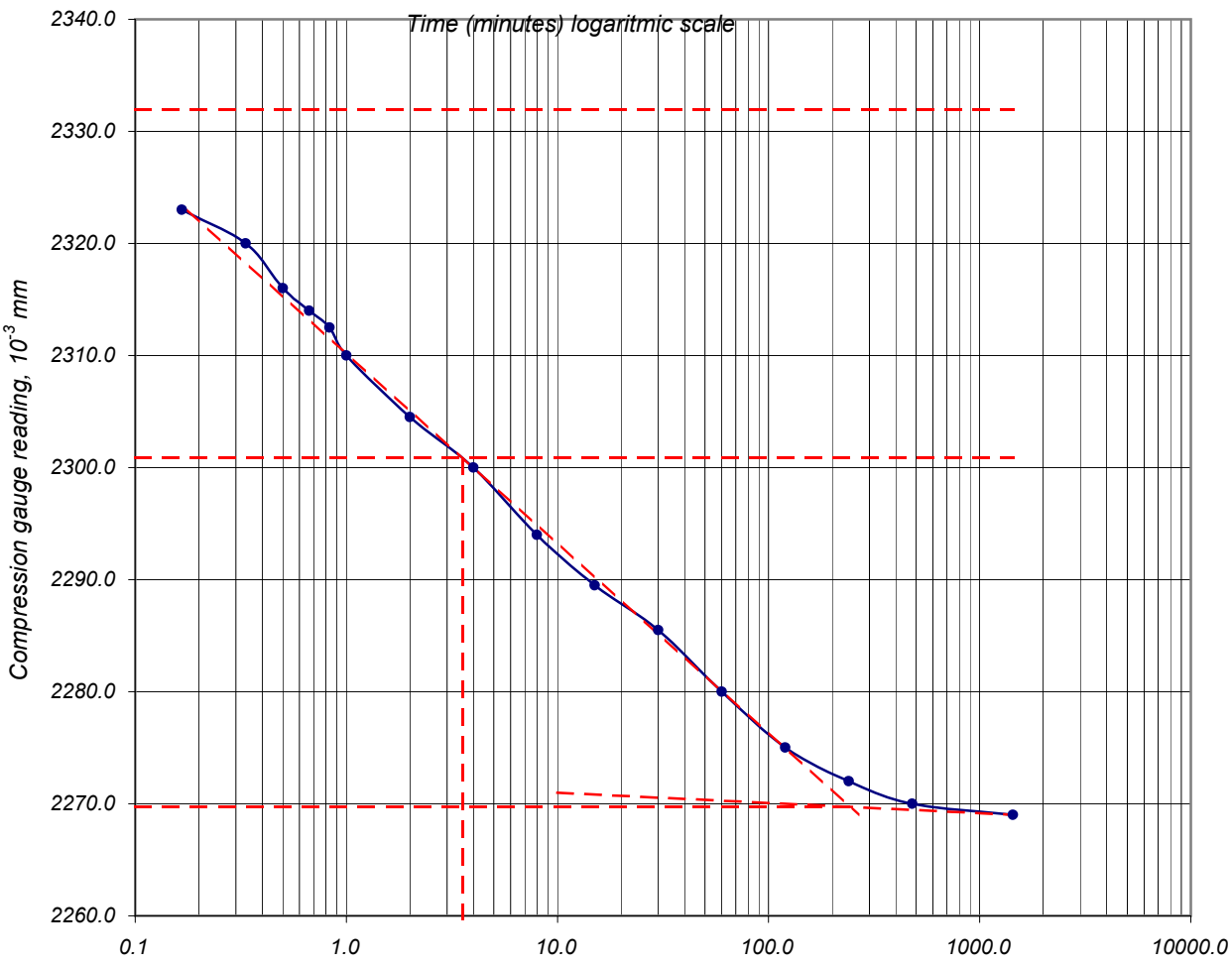


Sheet 15	Increment no. 8	Operator	Checked	Approved
Sheets 19	**UNLOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Curve – Logarithm of Time Fitting Method

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty sandy CLAY with a little rounded gravel content	**Borehole**	BH-SI1-1
	Sample no.	,
	Dept	23,7-24,0
	Date	25.08.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	100

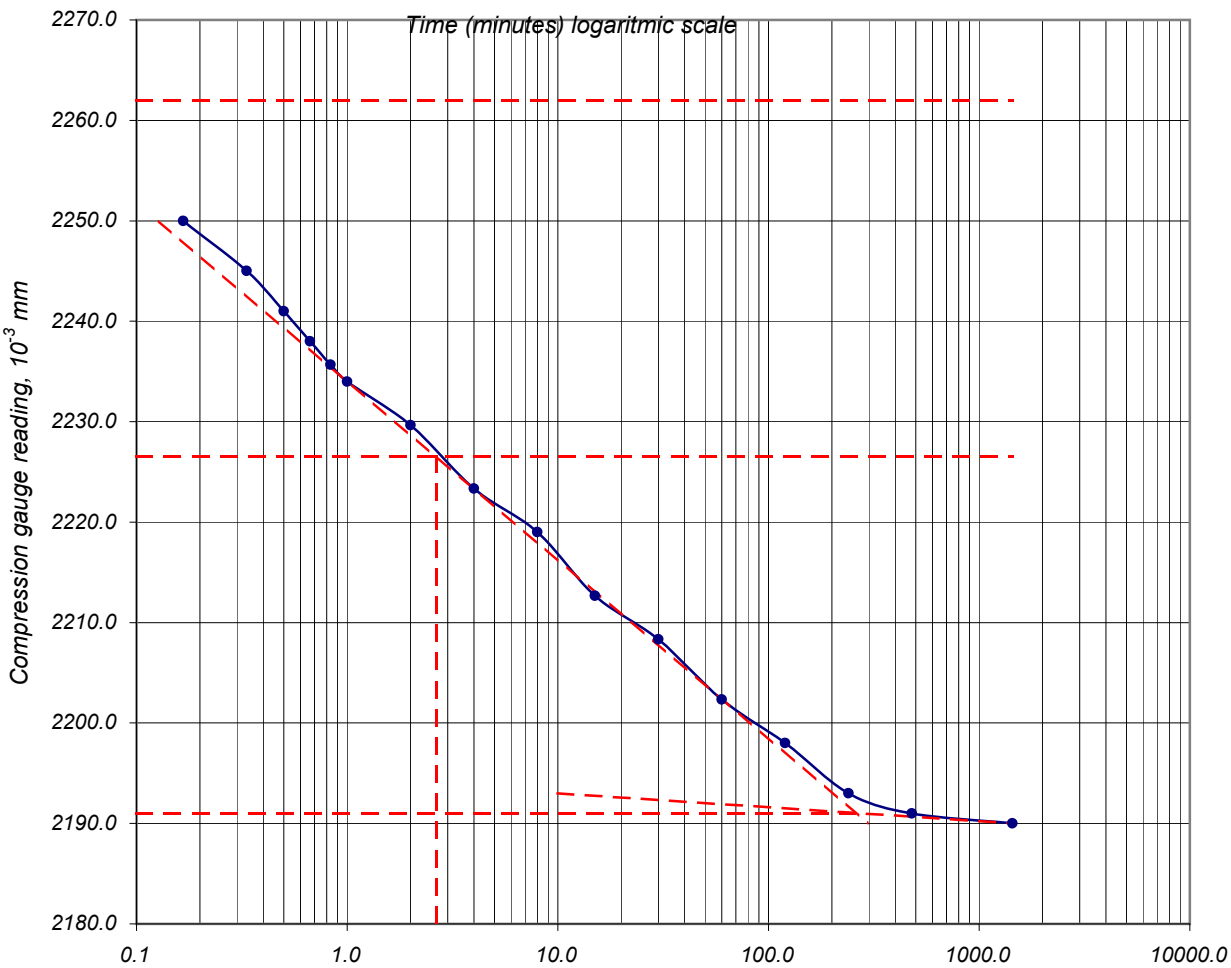


Sheet 16	Increment no. 9	Operator	Checked	Approved
Sheets 19	**UNLOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Curve – Logarithm of Time Fitting Method

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty sandy CLAY with a little rounded gravel content	**Borehole**	BH-SI1-1
	Sample no.	,
	Dept	23,7-24,0
	Date	25.08.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	50

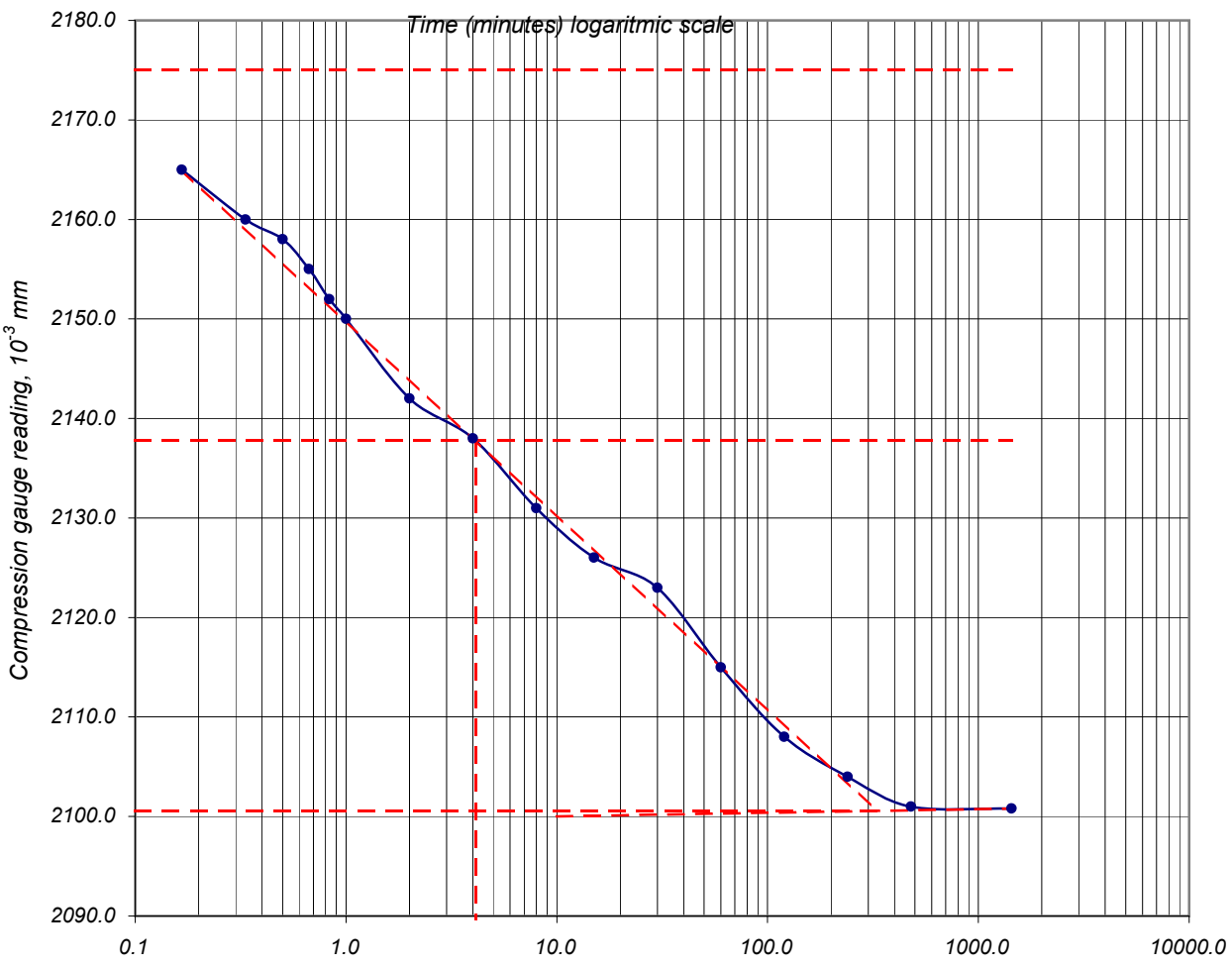


Sheet 17	Increment no. 10	Operator	Checked	Approved
Sheets 19	**UNLOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Curve – Logarithm of Time Fitting Method

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty sandy CLAY with a little rounded gravel content	**Borehole**	BH-SI1-1
	Sample no.	,
	Dept	23,7-24,0
	Date	25.08.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	25

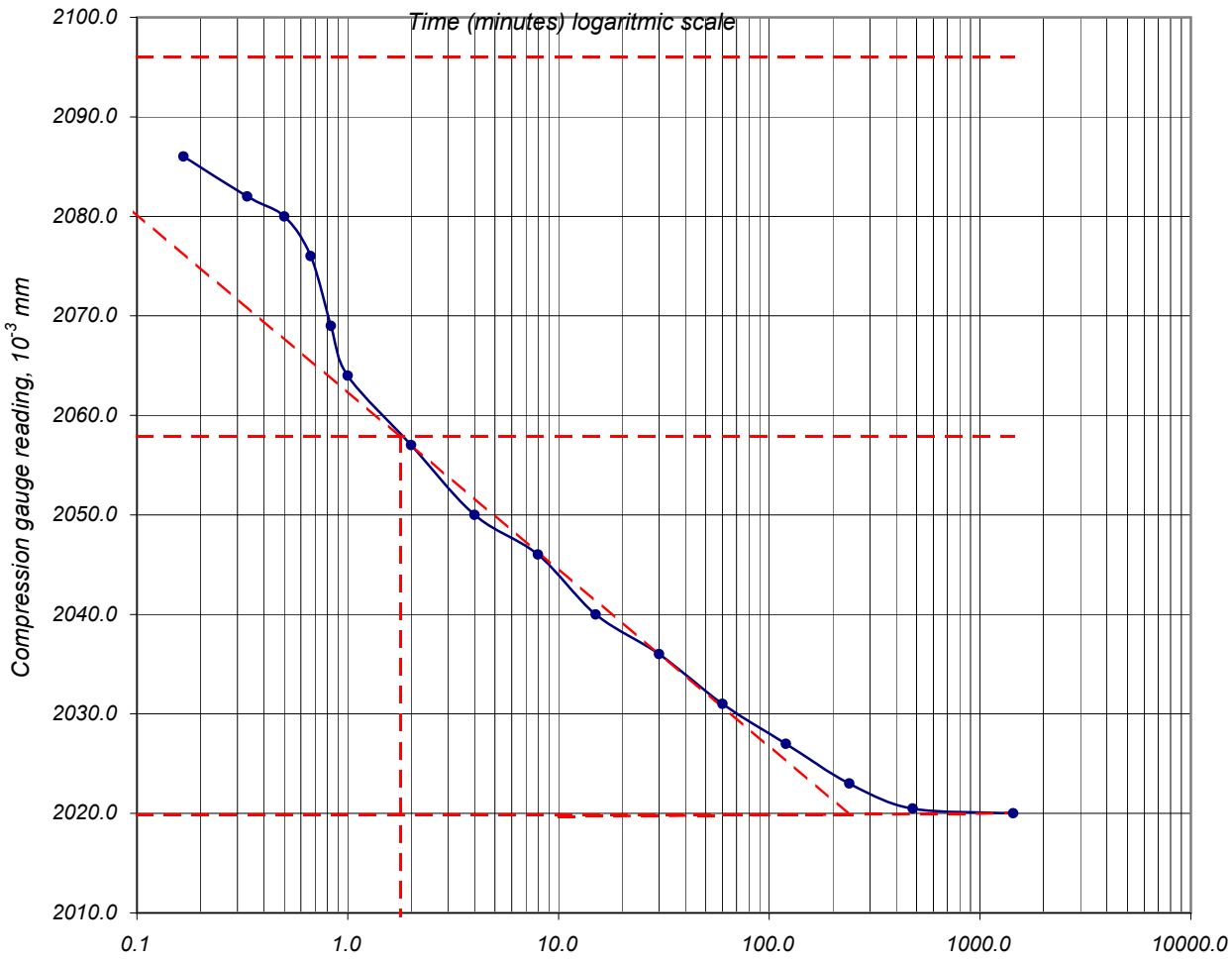


Sheet 18	Increment no. 11	Operator	Checked	Approved
Sheets 19	**RELOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Curve – Logarithm of Time Fitting Method

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty sandy CLAY with a little rounded gravel content	**Borehole**	BH-SI1-1
	Sample no.	,
	Dept	23,7-24,0
	Date	25.08.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	3.6



Sheet 19	Increment no. 12	Operator	Checked	Approved
Sheets 19	**RELOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SB1-2
	Sample no.	,
	Dept, m	25,2-25,4
	Date	14.07.2011
Test method BS1377 : Part 5 : 1990 : 3.5, 3.6		Saturated State

Cell no.	1	Particle density	
Ring no.	1	asumed	2.75 Mg/m^3

DIMENSIONS		Initial specimen	Overall change	Final specimen	Specimen preparation method
Diameter	D mm	87.40		87.40	
Area	A mm^2	5999.47		5999.47	
Height	H mm	H_o 24.90	2.353	22.547	
Volume	V cm^3	149.39	14.12	135.27	

WEIGHINGS		Initial specimen (a)	Initial specimen (b)	Final specimen (c)
Wet soil + ring + tray	g	491.42		482.00
Dry soil + ring + tray	g			430.50
Ring + tray	g	191.18		191.18
Wet soil	g	m_0 300.24	m_0 300.24	290.82
Dry soil	g		m_d 239.32	239.32
Water	g		60.92	51.50
Moisture content (measured)	%		25.46	21.52
Moisture content (from trimmings)	%	W_0 26.70		
Density	Mg/m^3	2.01	2.01	2.15
Dry density	Mg/m^3	1.59	1.60	1.77
Voids ratio		e_0 0.734	0.717	0.554
Degree of saturation	%	S_0 100.09	97.69	106.75
Height of soils	H_S mm	14.36	14.51	14.51

(a) Using moisture content from trimmings

(b) Using data from (a) and (c)

(c) Data from specimen after test

Sheet 1	**Operator**	**Checked**	**Approved**
Sheets 19	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SB1-2
	Sample no.	,
	Dept	25,2-25,4
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8					
Machine no.	1	Spec. diam.	87.40	Height	24.90	mm
Cell no.	1	Lever ratio	1:10	Area	5999.47	mm^2
Ring no.	1	**1kg** on hanger gives pressure of			21.60	kPa

LOADING/UNLOADING/RELOADING

Increment no.					1			2			3		
Date started					07.07.2011			08.07.2011			09.07.2011		
Load				kg	1.16			2.31			4.63		
Pressure				kPa	25.0			50.0			100.0		
Mean daily temperature 22 ^{0} C					LOADING			LOADING			LOADING		
Elapsed time				t^0	Clock time	Gauge reading	Cumulative compression mm ΔH	Clock time	Gauge reading	Cumulative compression mm ΔH	Clock time	Gauge reading	Cumulative compression mm ΔH
h	m	s	t min										
0	0	0	0	22	9:23	5.000	0.000	9:45	5.198	0.198	9:45	5.385	0.385
_	_	10	0.167	22	9:23	5.090	0.090	9:45	5.233	0.233	9:45	5.451	0.451
_	_	20	0.333	22	9:23	5.094	0.093	9:45	5.236	0.236	9:45	5.458	0.458
_	_	30	0.500	22	9:23	5.096	0.096	9:45	5.240	0.240	9:45	5.465	0.465
_	_	40	0.667	22	9:23	5.101	0.101	9:45	5.243	0.243	9:45	5.472	0.472
_	_	50	0.833	22	9:23	5.104	0.104	9:45	5.245	0.245	9:45	5.476	0.476
_	0:01	_	1	22	9:24	5.107	0.107	9:46	5.247	0.247	9:46	5.480	0.480
_	0:02	_	2	22	9:25	5.117	0.117	9:47	5.256	0.256	9:47	5.499	0.499
_	0:04	_	4	22	9:27	5.128	0.128	9:49	5.269	0.269	9:49	5.525	0.525
_	0:08	_	8	22	9:31	5.142	0.142	9:53	5.287	0.287	9:53	5.554	0.554
_	0:15	_	15	22	9:38	5.156	0.156	10:00	5.309	0.309	10:00	5.585	0.585
_	0:30	_	30	22	9:53	5.170	0.170	10:15	5.344	0.344	10:15	5.617	0.617
1:00	_	_	60	21	10:23	5.181	0.181	10:45	5.358	0.358	10:45	5.638	0.638
2:00	_	_	120	21	11:23	5.188	0.188	11:45	5.369	0.369	11:45	5.656	0.656
4:00	_	_	240	21	13:23	5.195	0.195	13:45	5.376	0.376	13:45	5.676	0.676
8:00	_	_	480	20	17:23	5.198	0.198	17:45	5.379	0.379	17:45	5.684	0.684
24:00	_	_	1440	21	9:23	5.198	0.198	9:45	5.381	0.381	9:45	5.690	0.690
36:00	_	_	2160		21:23			21:45			21:45		
48:00	_	_	**2880**		9:23			9:45			9:45		
Cumulative correction **y**					0.018			0.045			0.086		
Net cumulative compression (ΔH-y)					0.180			0.336			0.604		

Sheet 2	Operator	Checked	Approved
Sheets 19	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SB1-2
	Sample no.	,
	Dept	25,2-25,4
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8					
Machine no.	1	Spec. diam.	87.40	Height	24.90	mm
Cell no.	1	Lever ratio	1:10	Area	5999.47	mm^2
Ring no.	1	**1kg** on hanger gives pressure of			21.60	кPa

LOADING/UNLOADING/RELOADING

Increment no.					4			5			6		
Date started					10.07.2011			11.07.2011			12.07.2011		
Load kg					9.259			18.519			37.037		
Pressure kPa					200.0			400.0			800.0		
Mean daily temperature 22 ^{0} C					**LOADING**			**LOADING**			**UNLOADING**		
Elapsed time				t^0	Clock time	Gauge reading	Cumulative compression ΔH mm	Clock time	Gauge reading	Cumulative compression ΔH mm	Clock time	Gauge reading	Cumulative compression ΔH mm
h	m	s	t min										
0	0	0	0	22	9:45	5.685	0.685	9:45	5.987	0.987	9:45	6.639	1.639
_	_	10	0.167	22	9:45	5.765	0.765	9:45	6.035	1.035	9:45	6.770	1.770
_	_	20	0.333	22	9:45	5.773	0.773	9:45	6.045	1.045	9:45	6.780	1.780
_	_	30	0.500	22	9:45	5.779	0.779	9:45	6.053	1.053	9:45	6.795	1.795
_	_	40	0.667	22	9:45	5.783	0.783	9:45	6.063	1.063	9:45	6.800	1.800
_	_	50	0.833	22	9:45	5.789	0.789	9:45	6.069	1.069	9:45	6.814	1.814
_	0:01	_	1	22	9:46	5.793	0.793	9:46	6.073	1.073	9:46	6.820	1.820
_	0:02	_	2	22	9:47	5.815	0.815	9:47	6.095	1.095	9:47	6.870	1.870
_	0:04	_	4	22	9:49	5.840	0.840	9:49	6.210	1.210	9:49	6.936	1.936
_	0:08	_	8	22	9:53	5.875	0.875	9:53	6.282	1.282	9:53	7.024	2.024
_	0:15	_	15	22	10:00	5.907	0.907	10:00	6.358	1.358	10:00	7.115	2.115
_	0:30	_	30	22	10:15	5.939	0.939	10:15	6.440	1.440	10:15	7.217	2.217
1:00	_	_	60	21	10:45	5.963	0.963	10:45	6.539	1.539	10:45	7.326	2.326
2:00	_	_	120	21	11:45	5.978	0.978	11:45	6.585	1.585	11:45	7.400	2.400
4:00	_	_	240	21	13:45	5.982	0.982	13:45	6.615	1.615	13:45	7.505	2.505
8:00	_	_	480	20	17:45	5.985	0.985	17:45	6.639	1.639	17:45	7.545	2.545
24:00	_	_	1440	21	9:45	5.987	0.987	9:45	6.639	1.639	9:45	7.553	2.553
36:00	_	_	2160		21:45			21:45			21:45		
48:00	_	_	**2880**		9:45			9:45			9:45		
Cumulative correction **y**					0.131			0.162			0.200		
Net cumulative compression (ΔH-y)					0.856			1.477			2.353		

Sheet 3	Operator	Checked	Approved
Sheets 19	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SB1-2
	Sample no.	,
	Dept	25,2-25,4
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8					
Machine no.	1	Spec. diam.	87.40	Height	24.90	mm
Cell no.	1	Lever ratio	1:10	Area	5999.47	mm^2
Ring no.	1	**1kg** on hanger gives pressure of			21.60	кPa

LOADING/UNLOADING/RELOADING

Increment no.					7			8			9		
Date started					13.07.2011			14.07.2011			15.07.2011		
Load				kg	18.519			9.259			4.630		
Pressure				kPa	400.0			200.0			100.0		
Mean daily temperature 22 ^{0} C					UNLOADING			UNLOADING			RELOADING		
Elapsed time				t^0	Clock time	Gauge reading	Cumulative compression mm ΔH	Clock time	Gauge reading	Cumulative compression mm ΔH	Clock time	Gauge reading	Cumulative compression mm ΔH
h	m	s	t min										
0	0	0	0	22	9:45	7.403	2.403	10:15	7.349	2.349	10:15	7.220	2.220
_	_	10	0.167	22	9:45	7.397	2.397	10:15	7.323	2.323	10:15	7.208	2.208
_	_	20	0.333	22	9:45	7.394	2.394	10:15	7.320	2.320	10:15	7.206	2.206
_	_	30	0.500	22	9:45	7.391	2.391	10:15	7.319	2.319	10:15	7.204	2.204
_	_	40	0.667	22	9:45	7.388	2.388	10:15	7.317	2.317	10:15	7.204	2.204
_	_	50	0.833	22	9:45	7.384	2.384	10:15	7.315	2.315	10:15	7.203	2.203
_	0:01	_	1	22	9:46	7.381	2.381	10:16	7.314	2.314	10:16	7.202	2.202
_	0:02	_	2	22	9:47	7.376	2.376	10:17	7.305	2.305	10:17	7.197	2.197
_	0:04	_	4	22	9:49	7.369	2.369	10:19	7.294	2.294	10:19	7.189	2.189
_	0:08	_	8	22	9:53	7.364	2.364	10:23	7.285	2.285	10:23	7.177	2.177
_	0:15	_	15	22	10:00	7.360	2.360	10:30	7.272	2.272	10:30	7.164	2.164
_	0:30	_	30	22	10:15	7.357	2.357	10:45	7.259	2.259	10:45	7.152	2.152
1:00	_	_	60	21	10:45	7.352	2.352	11:15	7.243	2.243	11:15	7.139	2.139
2:00	_	_	120	21	11:45	7.347	2.347	12:15	7.234	2.234	12:15	7.125	2.125
4:00	_	_	240	21	13:45	7.344	2.344	14:15	7.227	2.227	14:15	7.110	2.110
8:00	_	_	480	20	17:45	7.342	2.342	18:15	7.223	2.223	18:15	7.105	2.105
24:00	_	_	1440	21	9:45	7.342	2.342	10:15	7.220	2.220	10:15	7.104	2.104
36:00	_	_	2160		21:45			22:15			22:15		
48:00	_	_	**2880**		9:45			10:15			10:15		
Cumulative correction **y**					0.162			0.131			0.086		
Net cumulative compression (ΔH-y)					2.180			2.089			2.018		

Sheet 4	Operator	Checked	Approved
Sheets 19	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SB1-2
	Sample no.	,
	Dept	25,2-25,4
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8					
Machine no.	1	Spec. diam.	87.40	Height	24.90	mm
Cell no.	1	Lever ratio	1:10	Area	5999.47	mm^2
Ring no.	1	**1kg** on hanger gives pressure of			21.60	кPa

LOADING/UNLOADING/RELOADING

Increment no.					10			11			12		
Date started					16.07.2011			17.07.2011			18.07.2011		
Load				kg	0.008			0.004			0.001		
Pressure				kPa	50.0			25.0			3.6		
Mean daily temperature 22 ^{0} C					RELOADING			RELOADING			RELOADING		
Elapsed time				t^0	Clock time	Gauge reading	Cumulative compression ΔH mm	Clock time	Gauge reading	Cumulative compression ΔH mm	Clock time	Gauge reading	Cumulative compression ΔH mm
h	m	s	t min										
0	0	0	0	22	10:15	7.094	2.094	10:15	6.994	1.994	10:15	6.968	1.968
_	_	10	0.167	22	10:15	7.084	2.084	10:15	6.987	1.987	10:15	6.964	1.964
_	_	20	0.333	22	10:15	7.084	2.084	10:15	6.987	1.987	10:15	6.963	1.963
_	_	30	0.500	22	10:15	7.082	2.082	10:15	6.987	1.987	10:15	6.962	1.962
_	_	40	0.667	22	10:15	7.081	2.081	10:15	6.987	1.987	10:15	6.961	1.961
_	_	50	0.833	22	10:15	7.080	2.080	10:15	6.986	1.986	10:15	6.960	1.960
_	0:01	_	1	22	10:16	7.080	2.080	10:16	6.985	1.985	10:16	6.959	1.959
_	0:02	_	2	22	10:17	7.076	2.076	10:17	6.984	1.984	10:17	6.957	1.957
_	0:04	_	4	22	10:19	7.070	2.070	10:19	6.982	1.982	10:19	6.954	1.954
_	0:08	_	8	22	10:23	7.056	2.056	10:23	6.980	1.980	10:23	6.951	1.951
_	0:15	_	15	22	10:30	7.045	2.045	10:30	6.979	1.979	10:30	6.948	1.948
_	0:30	_	30	22	10:45	7.033	2.033	10:45	6.978	1.978	10:45	6.945	1.945
1:00	_	_	60	21	11:15	7.023	2.023	11:15	6.976	1.976	11:15	6.942	1.942
2:00	_	_	120	21	12:15	7.010	2.010	12:15	6.975	1.975	12:15	6.939	1.939
4:00	_	_	240	21	14:15	6.996	1.996	14:15	6.973	1.973	14:15	6.937	1.937
8:00	_	_	480	20	18:15	6.989	1.989	18:15	6.972	1.972	18:15	6.933	1.933
24:00	_	_	1440	21	10:15	6.987	1.987	10:15	6.972	1.972	10:15	6.933	1.933
36:00	_	_	2160		22:15			22:15			22:15		
48:00	_	_	**2880**		10:15			10:15			10:15		
Cumulative correction **y**					0.045			0.018					
Net cumulative compression (ΔH-y)					1.942			1.954			1.933		

Sheet 5	Operator	Checked	Approved
Sheets 19	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SB1-2
	Sample no.	,
	Dept	25,2-25,4
	Date	14.07.2011

Test method		BS 1377 : Part 7 : 1990 : 8			
Machine no.	1	Specimen diameter	87.40 mm	Height H_0,	24.9 mm
Cell no.	1	Height of solids Hs	14.36 mm		
Ring no.	1	Initial voids ratio e_1	0.734		

VOIDS RATIO					COMPRESSIBILITY			COEFFICIENT OF CONSOLIDATION			
					Incremental					c_v =	
Increment no.	Pressure P kPa	Cumulative compression (ΔH-y) mm	Consolidated height $H=H_0-(\Delta H-y)$ mm	Voids ratio $e=\frac{H-H_s}{H_s}$	height change, δH mm	pressure change δp kPa	$m_v=\frac{\delta H}{H_i}\cdot\frac{100}{\delta p}$ m^2/MN	t_{50} min	$\bar{H}=\frac{1}{2}(H_1+H_2)$ mm	$\frac{0.026\bar{H}^2}{t_{50}}$ $m^2/year$	$\frac{0.111\bar{H}^2}{t_{90}}$ $m^2/year$
0	0	0.000	24.90	0.734	0.00	0	–	–	–	–	–
1	25.0	0.180	24.72	0.721	0.18	25.0	0.29	5.72	24.81	2.80	
2	50.0	0.336	24.56	0.710	0.16	25.0	0.25	9.63	24.64	1.64	
3	100.0	0.604	24.30	0.692	0.27	50.0	0.22	8.39	24.43	1.85	
4	200.0	0.856	24.04	0.674	0.25	100.0	0.10	7.16	24.17	2.12	
5	400.0	1.477	23.42	0.631	0.62	200.0	0.13	11.45	23.73	1.28	
6	800.0	2.353	22.55	0.570	0.88	400.0	0.09	16.60	22.99	0.83	
7	400.0	2.180	22.72	0.582	-0.17	-400.0	0.02	1.90	22.63	7.01	
8	200.0	2.089	22.81	0.588	-0.09	-200.0	0.02	9.48	22.77	1.42	
9	100.0	2.018	22.88	0.593	-0.07	-100.0	0.03	20.98	22.85	0.65	
10	50.0	1.942	22.96	0.598	-0.08	-50.0	0.07	26.41	22.92	0.52	
11	25.0	1.954	22.95	0.598	0.01	-25.0	-0.02	10.69	22.95	1.28	
12	3.6	1.933	22.97	0.599	-0.02	-21.4	0.04	17.02	22.96	0.81	

Sheet	6	Operator	Checked	Approved
Sheets	19	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description:	**Borehole**	BH-SB1-2
Intermediately plastic silty CLAY	**Sample no.**	,
	Dept	25,2-25,4
	Date	14.07.2011

Test method BS 1377 : Part 7 : 1990 : 8

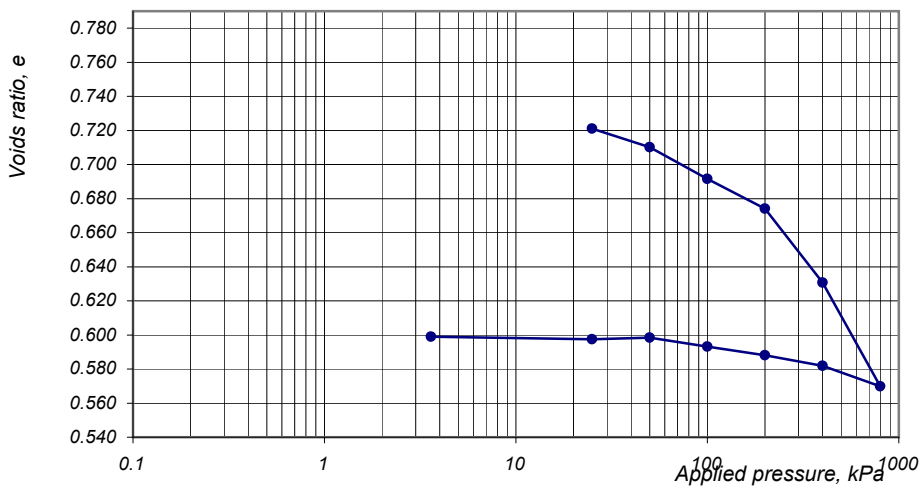
SPECIMEN INITIALLY

Diameter	87.40 mm	Density	2.01	Mg/m^3
Height	24.90 mm	Moisture content	26.7	%
Voids ratio	0.734	Dry density	1.59	Mg/m^3
Saturation	100.09 %	Particle density	2.75	Mg/m^3

Compression Index, C_c 0.012

Remarks:

Pressure stage kPa	Laboratory coefficients of: Compressibility, m_v m^2/MN	Consolidation, C_v $m^2/year$	Secondary Consolidation, C_α
0.0	-	-	-
25	0.29	2.80	6.5E-05
50	0.25	1.64	3.2E-05
100	0.22	1.85	0.00062
200	0.10	2.12	6.5E-05
400	0.13	1.28	3.7E-05
800	0.09	0.83	0.00011
400	0.02	7.01	0.00002
200	0.02	1.42	0.00045
100	0.03	0.65	9.7E-05
50	0.07	0.52	2.2E-05
25	-0.02	1.28	6.5E-06
3.6	0.04	0.81	0.01782

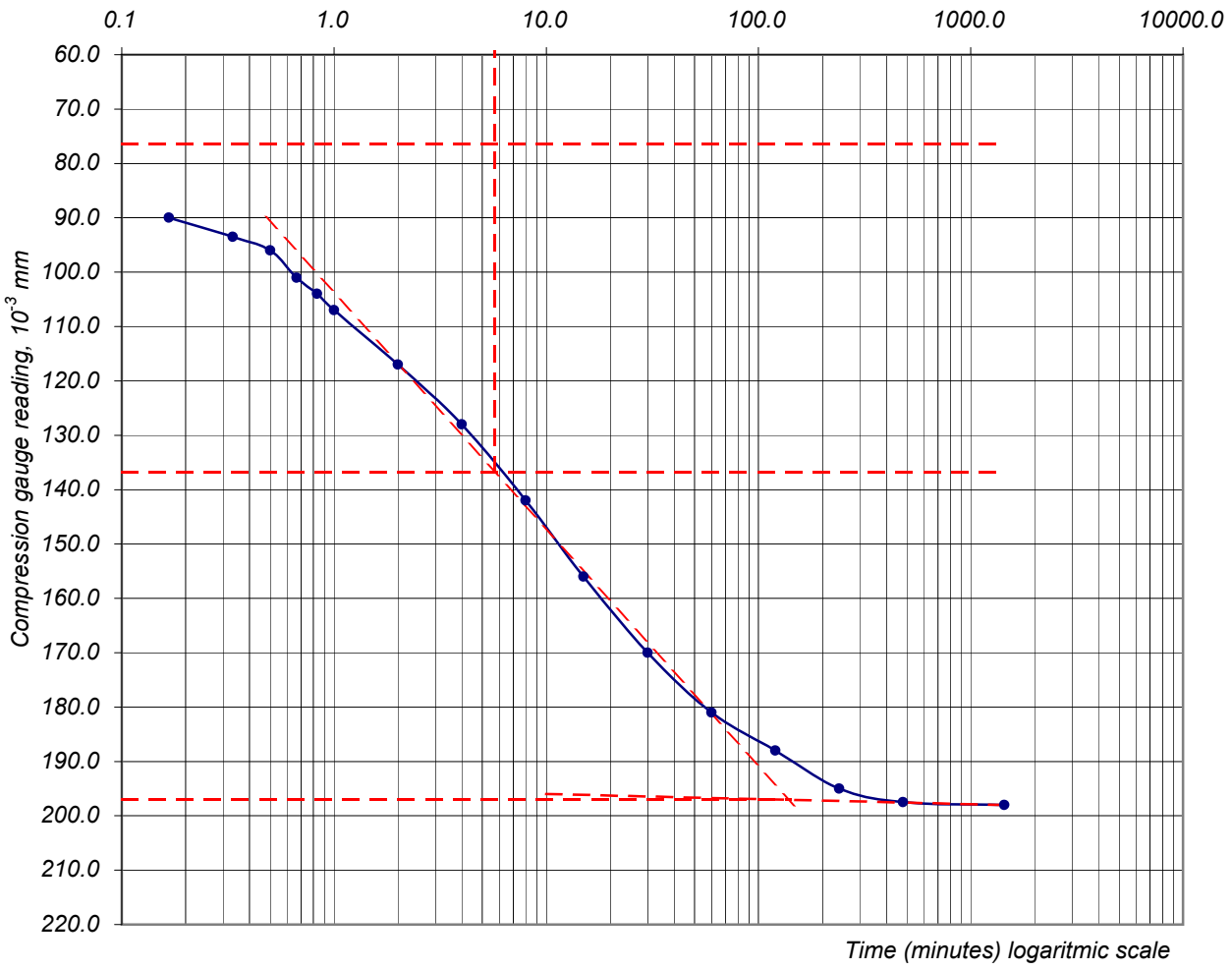


Sheet 7	Operator	Checked	Approved
Sheets 19	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Curve – Logarithm of Time Fitting Method

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SB1-2
	Sample no.	,
	Dept	25,2-25,4
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	25

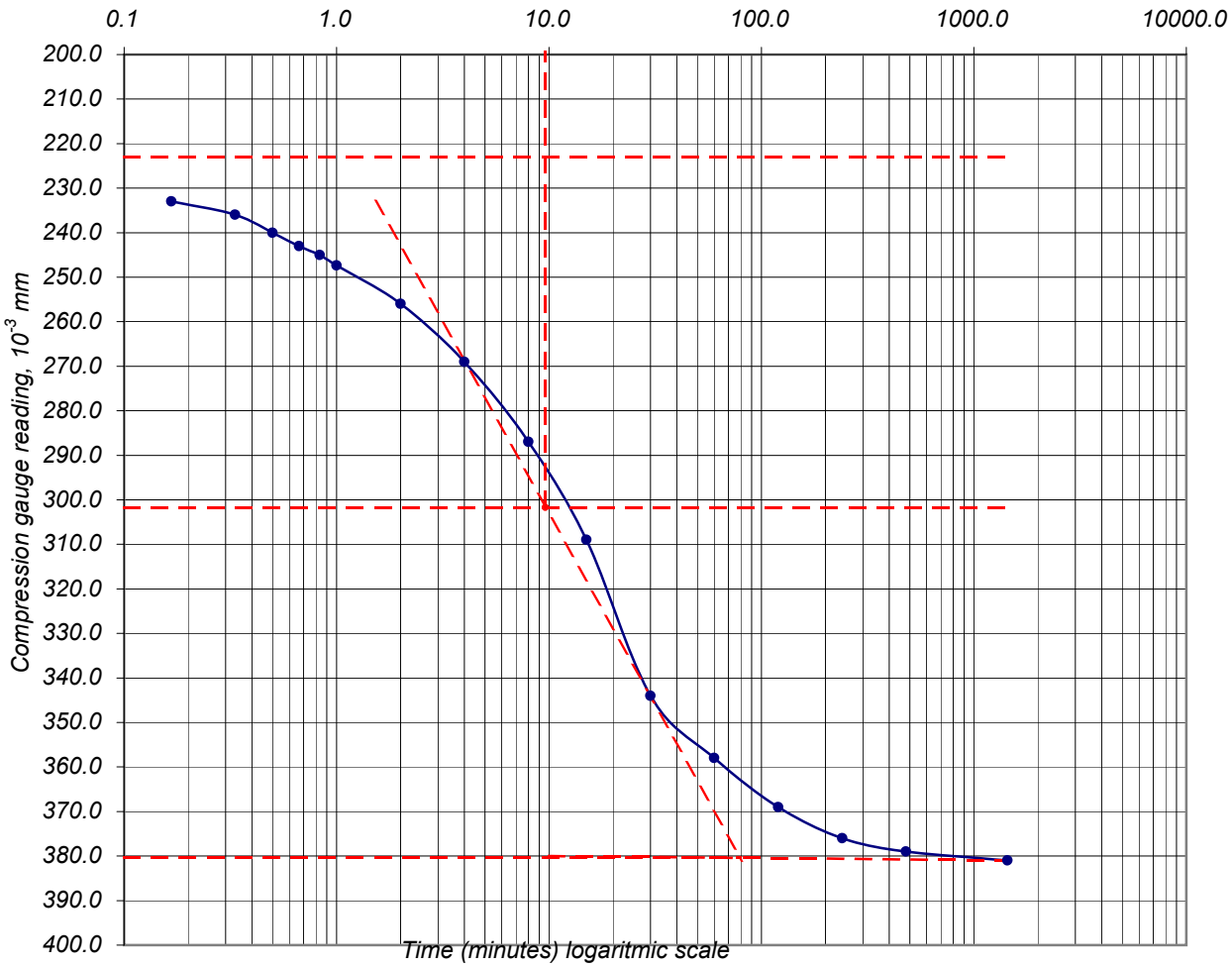


Sheet 8	Increment no. 1	Operator	Checked	Approved
Sheets 19	**LOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test (With Measurement of swelling pressure)

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SB1-2
	Sample no.	,
	Dept	25,2-25,4
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	50

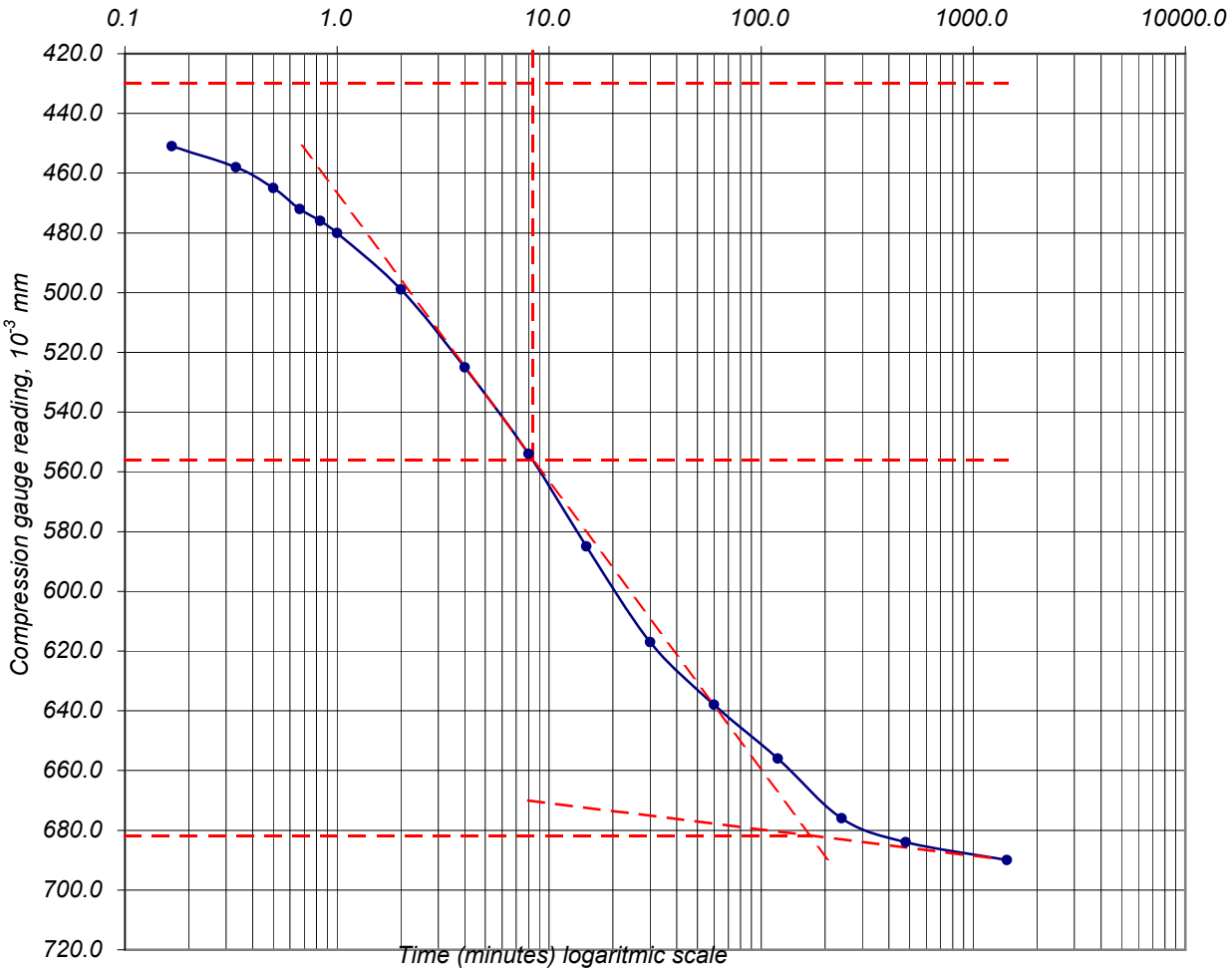


Sheet 9	Increment no. 2	Operator	Checked	Approved
Sheets 19	**LOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test (With Measurement of swelling pressure)

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SB1-2
	Sample no.	,
	Dept	25,2-25,4
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	100

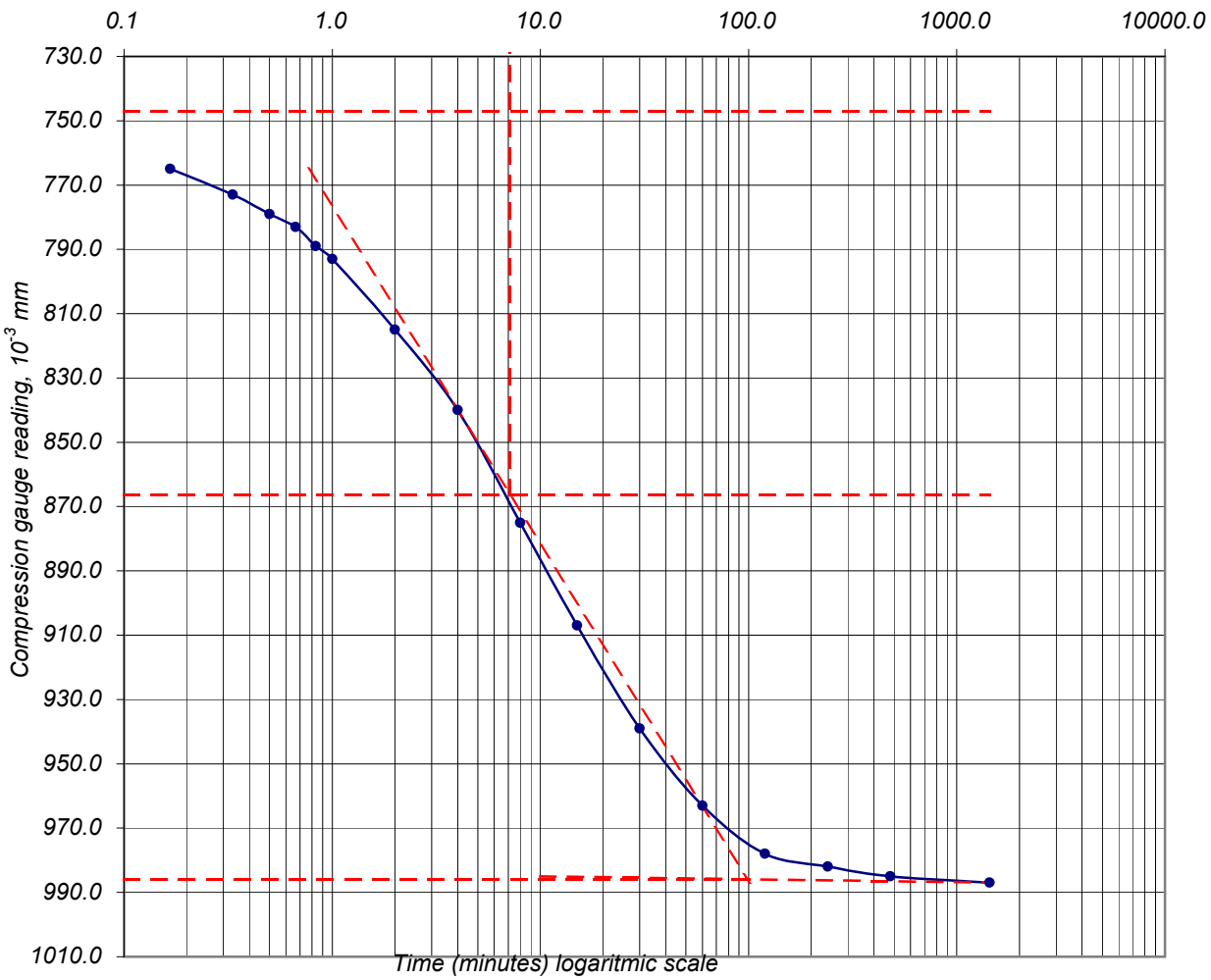


Sheet 10	Increment no. 3	Operator	Checked	Approved
Sheets 19	**LOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test (With Measurement of swelling pressure)

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SB1-2
	Sample no.	,
	Dept	25,2-25,4
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	200

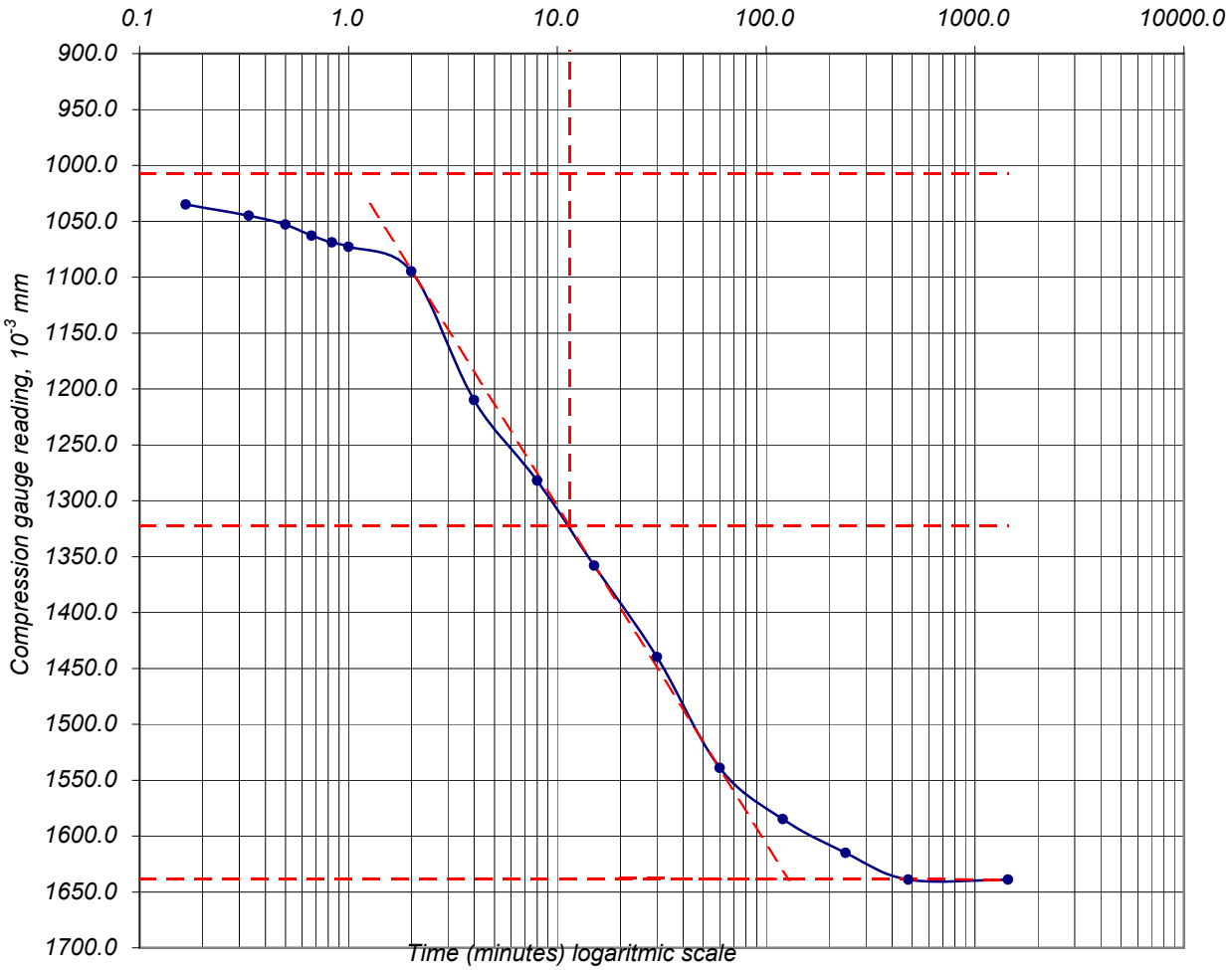


Sheet 11	Increment no. 4	Operator	Checked	Approved
Sheets 19	**LOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test (With Measurement of swelling pressure)

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SB1-2
	Sample no.	,
	Dept	25,2-25,4
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	400

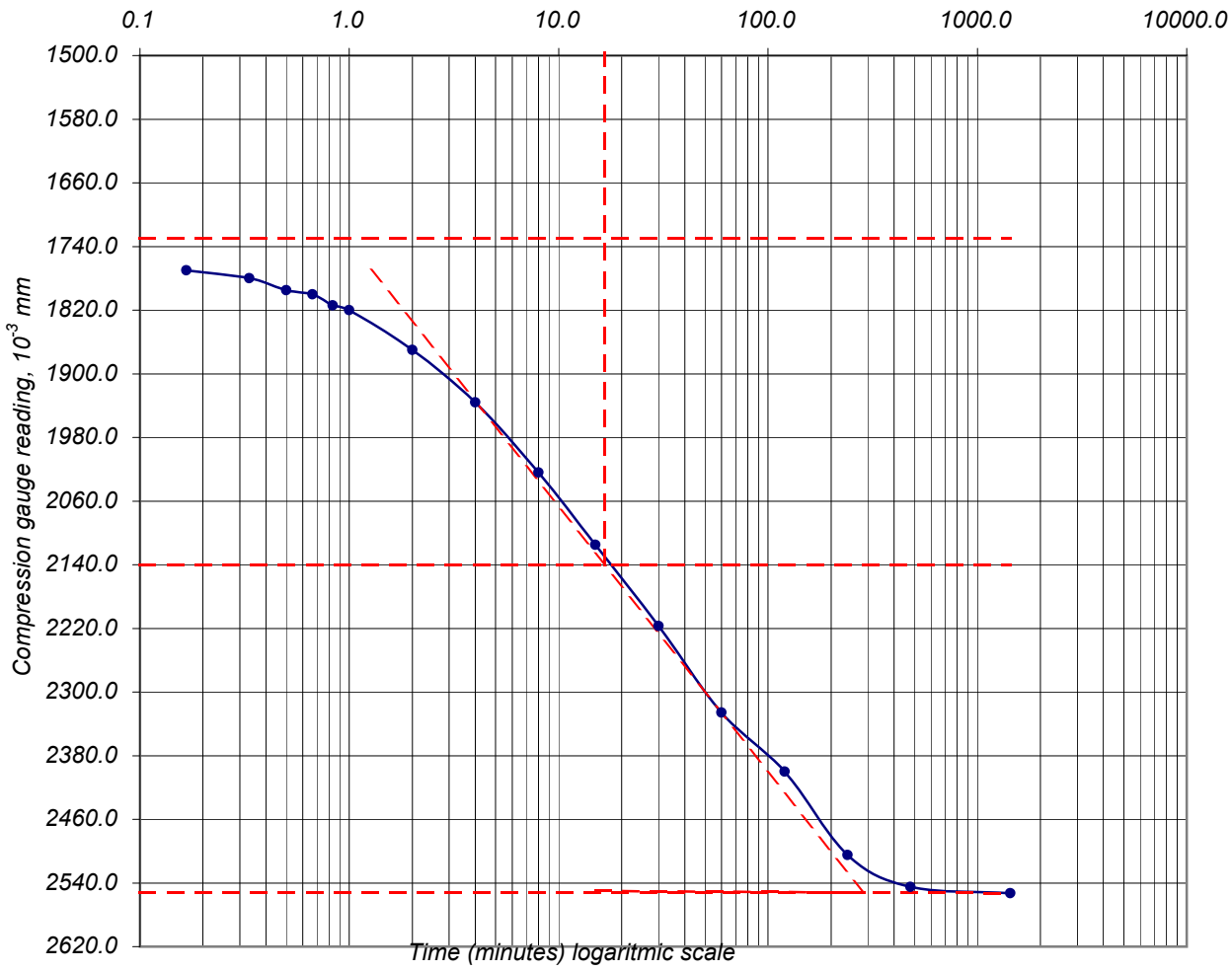


Sheet 12	Increment no. 5	Operator	Checked	Approved
Sheets 19	**LOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test (With Measurement of swelling pressure)

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SB1-2
	Sample no.	,
	Dept	25,2-25,4
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	800

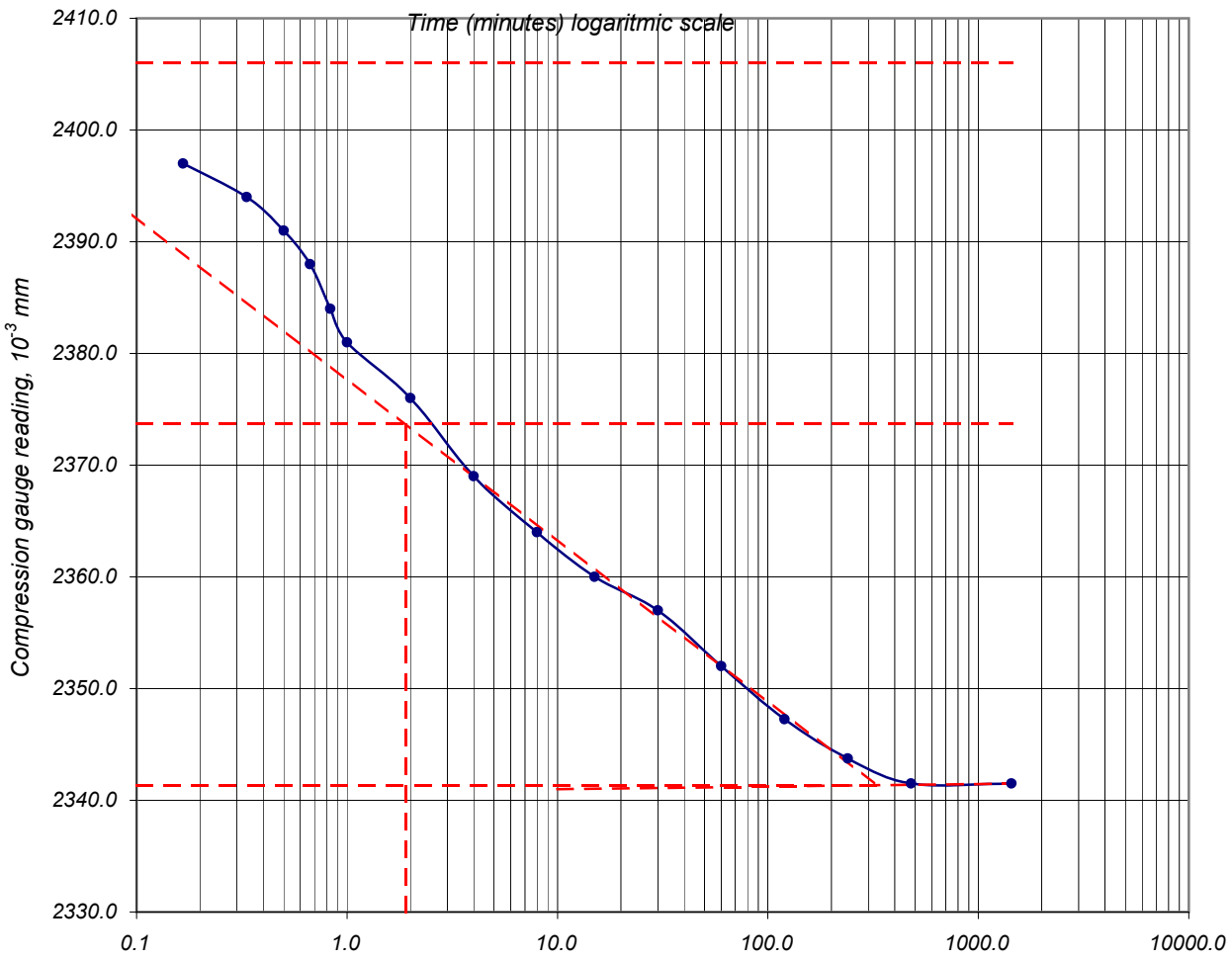


Sheet 13	Increment no. 6	Operator	Checked	Approved
Sheets 19	**UNLOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Curve – Logarithm of Time Fitting Method

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SB1-2
	Sample no.	,
	Dept	25,2-25,4
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	400

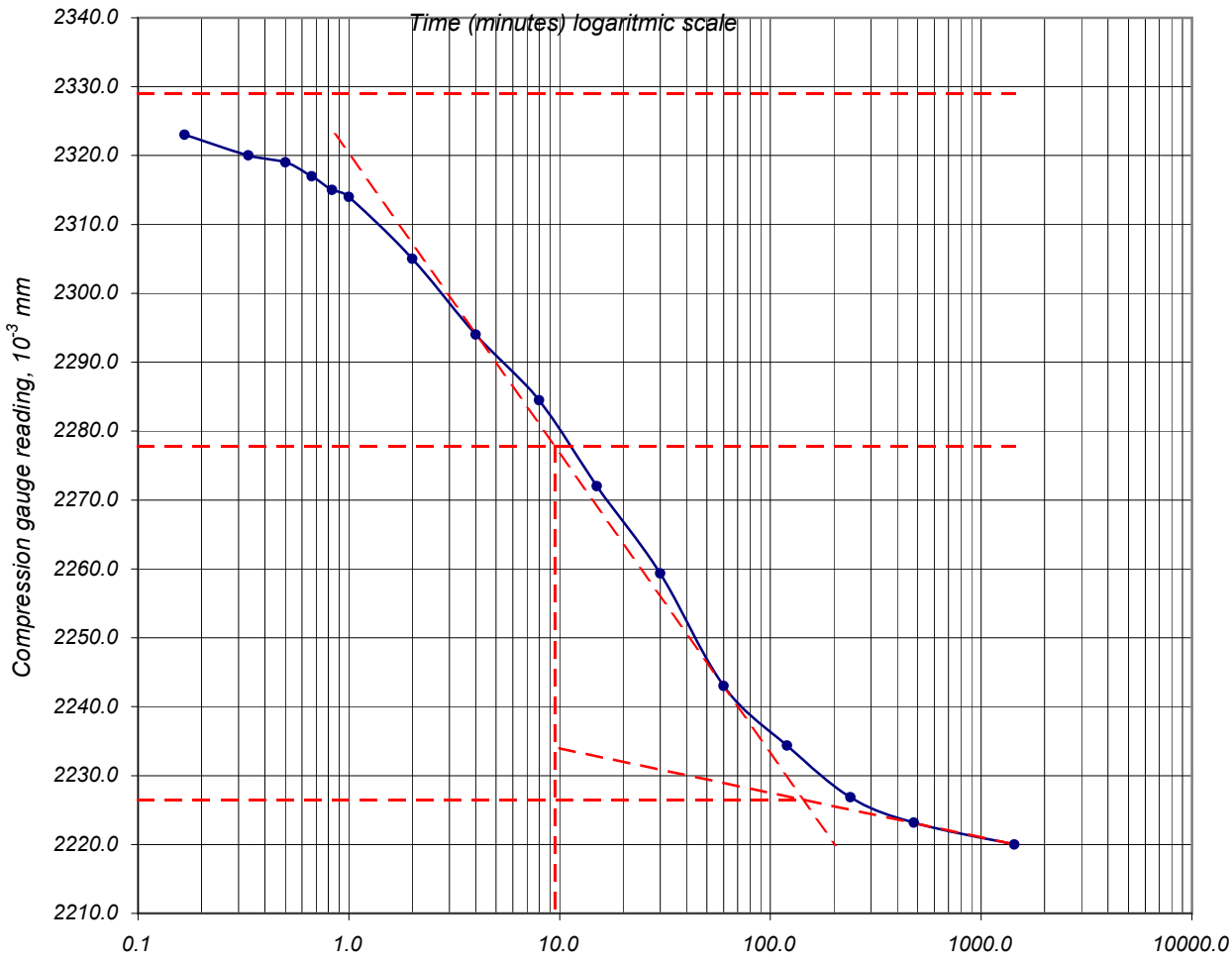


Sheet 14	Increment no. 7	Operator	Checked	Approved
Sheets 19	**UNLOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Curve – Logarithm of Time Fitting Method

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SB1-2
	Sample no.	,
	Dept	25,2-25,4
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	200

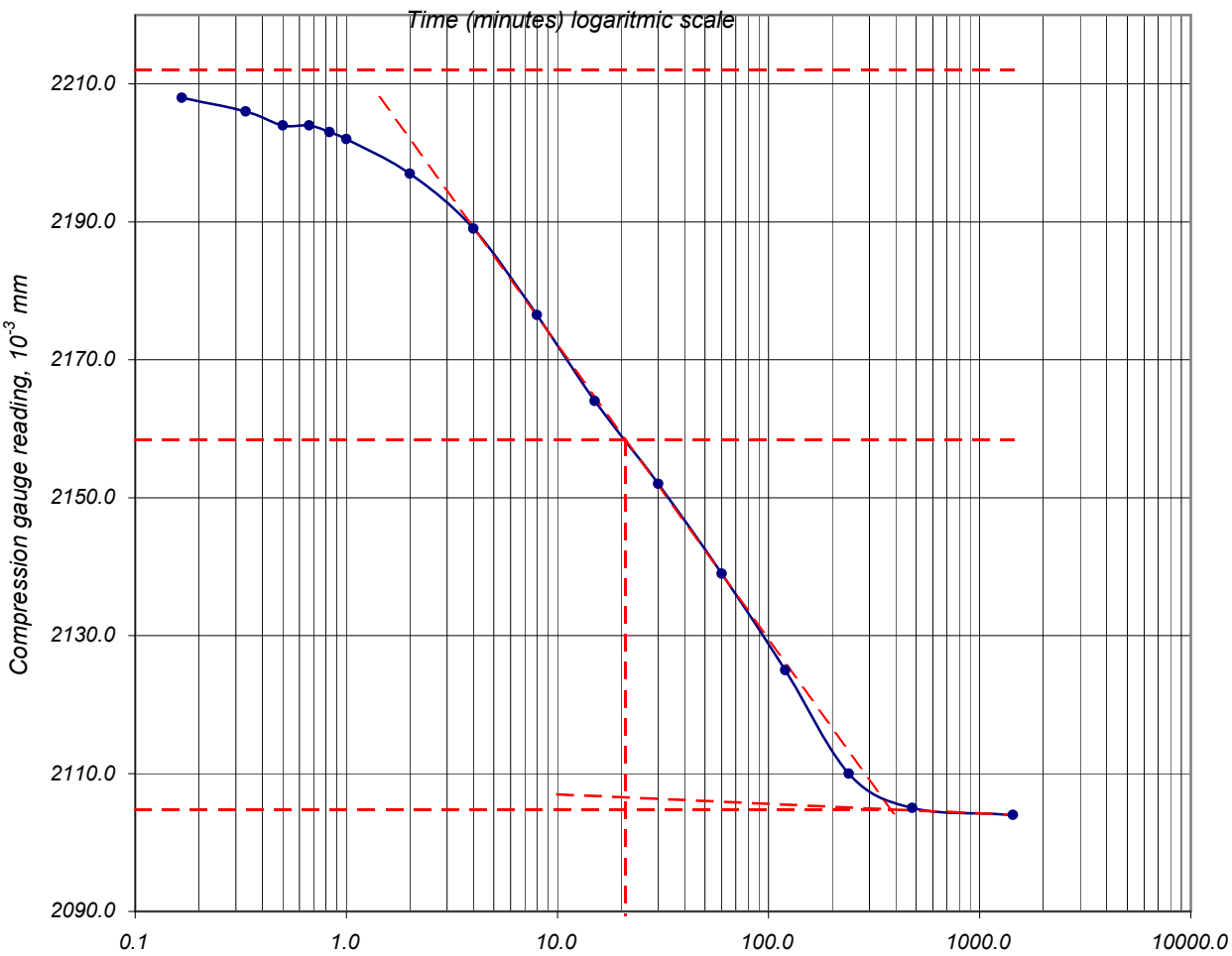


Sheet 15	Increment no. 8	Operator	Checked	Approved
Sheets 19	**UNLOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Curve – Logarithm of Time Fitting Method

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SB1-2
	Sample no.	,
	Dept	25,2-25,4
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	100

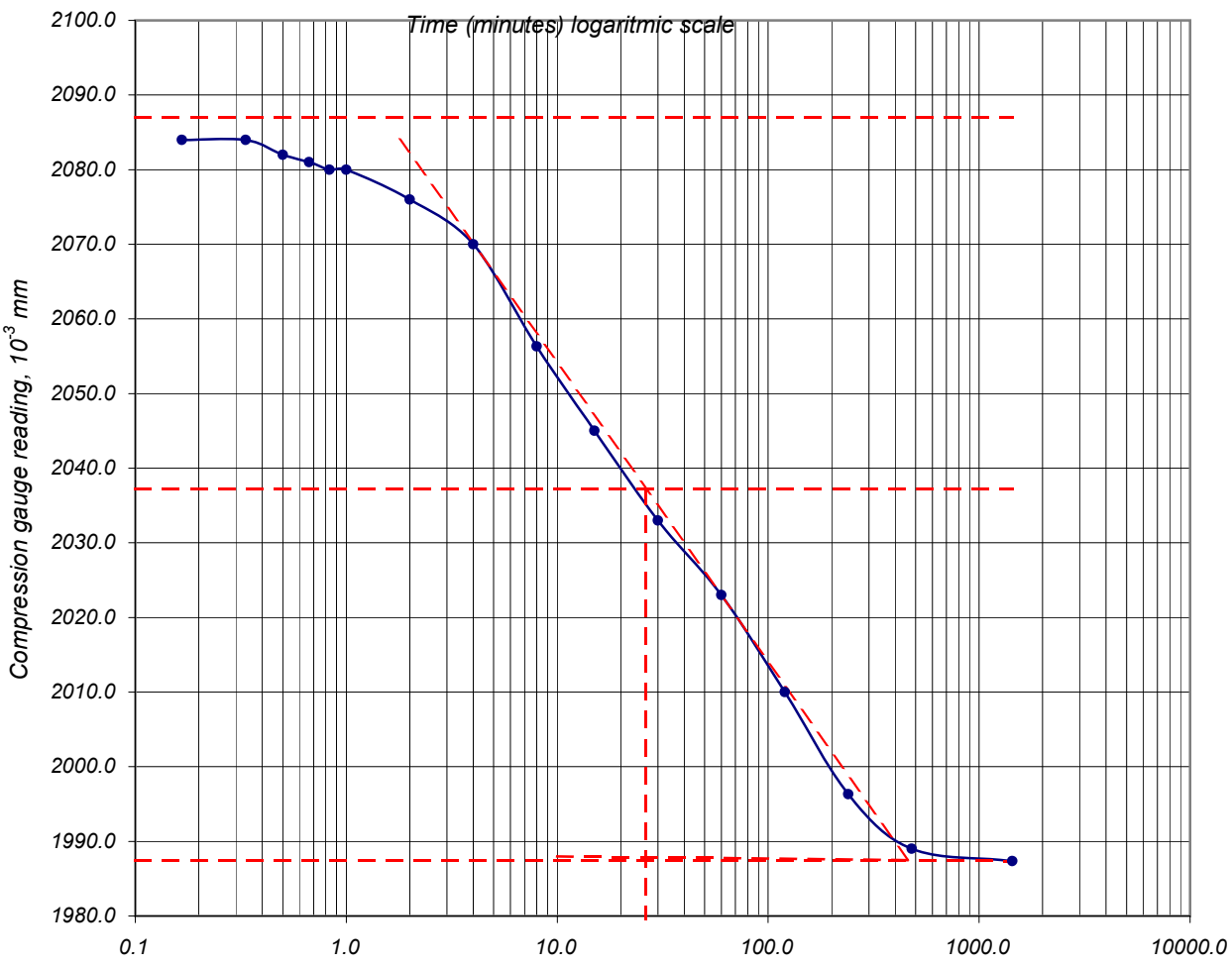


Sheet 16	Increment no. 9	Operator	Checked	Approved
Sheets 19	**RELOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Curve – Logarithm of Time Fitting Method

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SB1-2
	Sample no.	,
	Dept	25,2-25,4
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	50

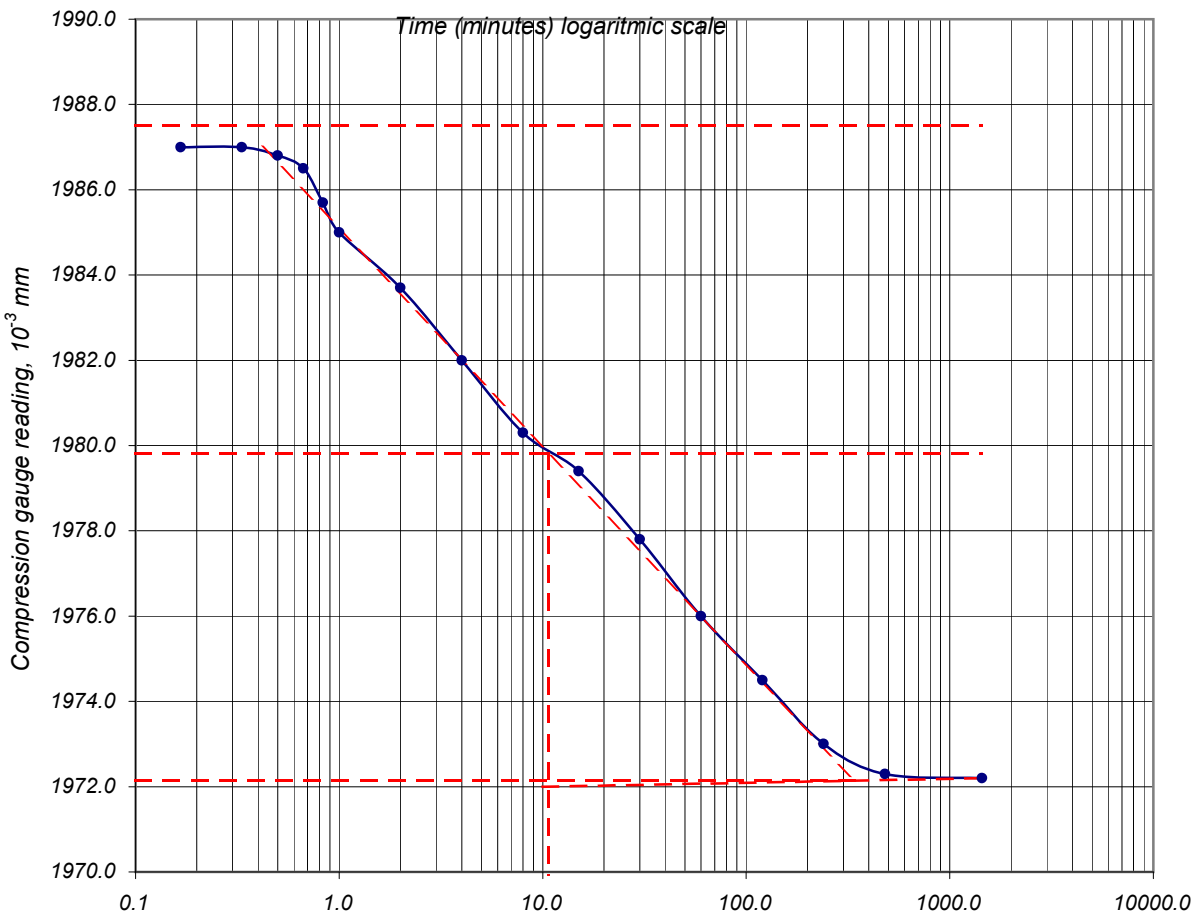


Sheet 17	Increment no. 10	Operator	Checked	Approved
Sheets 19	**RELOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Curve – Logarithm of Time Fitting Method

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SB1-2
	Sample no.	,
	Dept	25,2-25,4
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	25

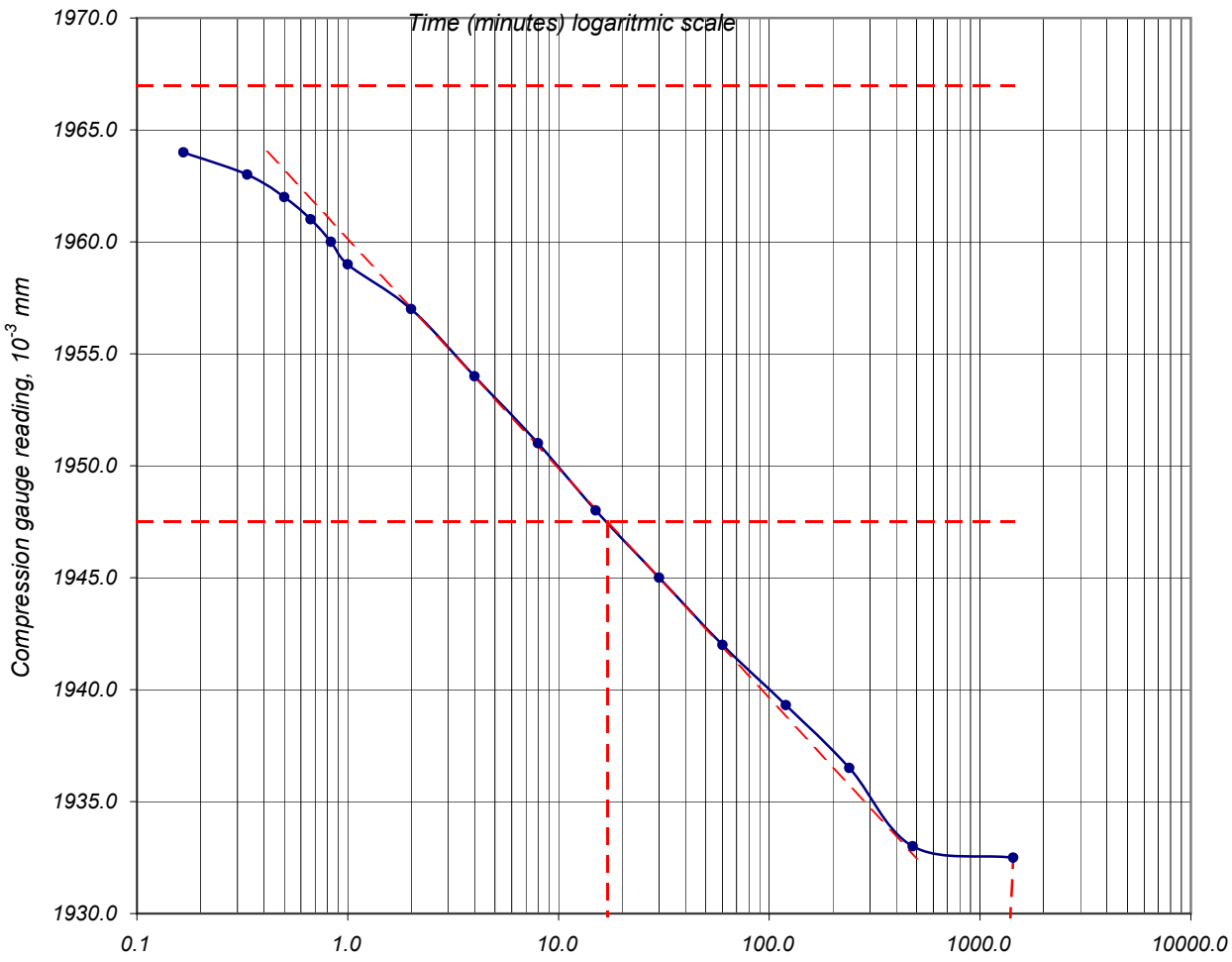


Sheet 18	Increment no. 11	Operator	Checked	Approved
Sheets 19	**RELOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Curve – Logarithm of Time Fitting Method

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SB1-2
	Sample no.	,
	Dept	25,2-25,4
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	3.6



Sheet 19	Increment no. 12	Operator	Checked	Approved
Sheets 19	**RELOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SB1-3
	Sample no.	,
	Dept, m	24,15-24,45
	Date	28.07.2011
Test method BS1377 : Part 5 : 1990 : 3.5, 3.6		Saturated State

Cell no.	3	Particle density	
Ring no.	3	asumed	2,73 Mg/m^3

DIMENSIONS		Initial specimen	Overall change	Final specimen	Specimen preparation method
Diameter	D mm	87,30		87,30	
Area	A mm^2	5985,75		5985,75	
Height	H mm	H_o 25,00	1,591	23,409	
Volume	V cm^3	149,64	9,52	140,12	

WEIGHINGS		Initial specimen (a)	Initial specimen (b)	Final specimen (c)
Wet soil + ring + tray	g	491,50		480,00
Dry soil + ring + tray	g			430,53
Ring + tray	g	193,35		193,35
Wet soil	g	m_0 298,15	m_0 298,15	286,65
Dry soil	g		m_d 237,18	237,18
Water	g		60,97	49,47
Moisture content (measured)	%		25,71	20,86
Moisture content (from trimmings)	%	W_0 20,00		
Density	Mg/m^3	1,99	1,99	2,05
Dry density	Mg/m^3	1,66	1,58	1,69
Voids ratio		e_0 0,644	0,722	0,613
Degree of saturation	%	S_0 84,75	97,14	92,92
Height of soils	H_S mm	15,20	14,51	14,51

(a) Using moisture content from trimmings

(b) Using data from (a) and (c)

(c) Data from specimen after test

Sheet 1	**Operator**	**Checked**	**Approved**
Sheets 19	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SB1-3
	Sample no.	,
	Dept	24,15-24,45
	Date	28.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8				
Machine no.	3	Spec. diam.	87,30	Height	25,00 mm
Cell no.	3	Lever ratio	1:10	Area	5985,75 mm^2
Ring no.	3	**1kg** on hanger gives pressure of			21,60 kPa

LOADING/UNLOADING/RELOADING

Increment no.					1			2			3		
Date started					21.07.2011			22.07.2011			23.07.2011		
Load				kg	1,16			2,31			4,63		
Pressure				kPa	25,0			50,0			100,0		
Mean daily temperature 22 ^{0} C					**LOADING**			**LOADING**			**LOADING**		
Elapsed time				t^0	Clock time	Gauge reading	Cumulative compression mm ΔH	Clock time	Gauge reading	Cumulative compression mm ΔH	Clock time	Gauge reading	Cumulative compression mm ΔH
h	m	s	t min										
0	0	0	0	22	9:23	5,000	0,000	9:45	5,038	0,038	9:45	5,111	0,111
_	_	10	0,167	22	9:23	5,018	0,018	9:45	5,059	0,059	9:45	5,170	0,170
_	_	20	0,333	22	9:23	5,018	0,018	9:45	5,060	0,060	9:45	5,179	0,179
_	_	30	0,500	22	9:23	5,020	0,020	9:45	5,062	0,062	9:45	5,183	0,183
_	_	40	0,667	22	9:23	5,020	0,020	9:45	5,064	0,064	9:45	5,189	0,189
_	_	50	0,833	22	9:23	5,020	0,020	9:45	5,066	0,066	9:45	5,192	0,192
_	0:01	_	1	22	9:24	5,020	0,020	9:46	5,068	0,068	9:46	5,196	0,196
_	0:02	_	2	22	9:25	5,022	0,022	9:47	5,072	0,072	9:47	5,211	0,211
_	0:04	_	4	22	9:27	5,024	0,024	9:49	5,076	0,076	9:49	5,230	0,230
_	0:08	_	8	22	9:31	5,027	0,026	9:53	5,081	0,081	9:53	5,250	0,250
_	0:15	_	15	22	9:38	5,029	0,029	10:00	5,086	0,086	10:00	5,273	0,273
_	0:30	_	30	22	9:53	5,031	0,031	10:15	5,091	0,091	10:15	5,293	0,293
1:00	_	_	60	21	10:23	5,033	0,033	10:45	5,096	0,096	10:45	5,313	0,313
2:00	_	_	120	21	11:23	5,036	0,036	11:45	5,102	0,102	11:45	5,334	0,334
4:00	_	_	240	21	13:23	5,038	0,038	13:45	5,107	0,107	13:45	5,356	0,356
8:00	_	_	480	20	17:23	5,039	0,039	17:45	5,110	0,110	17:45	5,375	0,375
24:00	_	_	1440	21	9:23	5,040	0,040	9:45	5,111	0,111	9:45	5,379	0,379
36:00	_	_	2160		21:23			21:45			21:45		
48:00	_	_	**2880**		9:23			9:45			9:45		
Cumulative correction **y**					0,050			0,071			0,090		
Net cumulative compression (ΔH-y)								0,040			0,289		

Sheet 2	Operator	Checked	Approved
Sheets 19	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SB1-3
	Sample no.	,
	Dept	24,15-24,45
	Date	28.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8					
Machine no.	3	Spec. diam.	87,30	Height	25,00	mm
Cell no.	3	Lever ratio	1:10	Area	5985,75	mm^2
Ring no.	3	**1kg** on hanger gives pressure of			21,60	кPa

LOADING/UNLOADING/RELOADING

Increment no.					4			5			6		
Date started					24.07.2011			25.07.2011			26.07.2011		
Load kg					9,259			18,519			37,037		
Pressure kPa					200,0			400,0			800,0		
Mean daily temperature 22 ^{0} C					**LOADING**			**LOADING**			**UNLOADING**		
Elapsed time				t^0	Clock time	Gauge reading	Cumulative compression mm ΔH	Clock time	Gauge reading	Cumulative compression mm ΔH	Clock time	Gauge reading	Cumulative compression mm ΔH
h	m	s	t min										
0	0	0	0	22	9:45	5,334	0,334	9:45	5,679	0,679	9:45	6,137	1,137
_	_	10	0,167	22	9:45	5,435	0,435	9:45	5,830	0,830	9:45	6,312	1,312
_	_	20	0,333	22	9:45	5,453	0,453	9:45	5,845	0,845	9:45	6,326	1,326
_	_	30	0,500	22	9:45	5,464	0,464	9:45	5,854	0,854	9:45	6,336	1,336
_	_	40	0,667	22	9:45	5,469	0,469	9:45	5,861	0,861	9:45	6,345	1,345
_	_	50	0,833	22	9:45	5,475	0,475	9:45	5,868	0,868	9:45	6,358	1,358
_	0:01	_	1	22	9:46	5,480	0,480	9:46	5,875	0,875	9:46	6,373	1,373
_	0:02	_	2	22	9:47	5,502	0,502	9:47	5,905	0,905	9:47	6,421	1,421
_	0:04	_	4	22	9:49	5,532	0,532	9:49	5,936	0,936	9:49	6,481	1,481
_	0:08	_	8	22	9:53	5,566	0,566	9:53	5,975	0,975	9:53	6,545	1,545
_	0:15	_	15	22	10:00	5,590	0,590	10:00	6,013	1,013	10:00	6,585	1,585
_	0:30	_	30	22	10:15	5,618	0,618	10:15	6,049	1,049	10:15	6,640	1,640
1:00	_	_	60	21	10:45	5,643	0,643	10:45	6,090	1,090	10:45	6,685	1,685
2:00	_	_	120	21	11:45	5,672	0,672	11:45	6,121	1,121	11:45	6,740	1,740
4:00	_	_	240	21	13:45	5,698	0,698	13:45	6,146	1,146	13:45	6,780	1,780
8:00	_	_	480	20	17:45	5,708	0,708	17:45	6,164	1,164	17:45	6,803	1,803
24:00	_	_	1440	21	9:45	5,714	0,714	9:45	6,167	1,167	9:45	6,806	1,806
36:00	_	_	2160		21:45			21:45			21:45		
48:00	_	_	**2880**		9:45			9:45			9:45		
Cumulative correction **y**					0,151			0,186			0,215		
Net cumulative compression (ΔH-y)					0,563			0,981			1,591		

Sheet 3	Operator	Checked	Approved
Sheets 19	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SB1-3
	Sample no.	,
	Dept	24,15-24,45
	Date	28.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8					
Machine no.	3	Spec. diam.	87,30	Height	25,00	mm
Cell no.	3	Lever ratio	1:10	Area	5985,75	mm^2
Ring no.	3	**1kg** on hanger gives pressure of			21,60	кPa

LOADING/UNLOADING/RELOADING

Increment no.					7			8			9		
Date started					27.07.2011			28.07.2011			29.07.2011		
Load				kg	18,519			9,259			4,630		
Pressure				kPa	400,0			200,0			100,0		
Mean daily temperature 22 ^{0} C					UNLOADING			UNLOADING			RELOADING		
Elapsed time				t^0	Clock time	Gauge reading	Cumulative compression mm ΔH	Clock time	Gauge reading	Cumulative compression mm ΔH	Clock time	Gauge reading	Cumulative compression mm ΔH
h	m	s	t min										
0	0	0	0	22	9:45	6,766	1,766	10:15	6,686	1,686	10:15	6,584	1,584
_	_	10	0,167	22	9:45	6,720	1,720	10:15	6,660	1,660	10:15	6,560	1,560
_	_	20	0,333	22	9:45	6,718	1,718	10:15	6,660	1,660	10:15	6,559	1,559
_	_	30	0,500	22	9:45	6,716	1,716	10:15	6,657	1,657	10:15	6,557	1,557
_	_	40	0,667	22	9:45	6,715	1,715	10:15	6,656	1,656	10:15	6,554	1,554
_	_	50	0,833	22	9:45	6,714	1,714	10:15	6,651	1,651	10:15	6,554	1,554
_	0:01	_	1	22	9:46	6,713	1,713	10:16	6,649	1,649	10:16	6,553	1,553
_	0:02	_	2	22	9:47	6,709	1,709	10:17	6,639	1,639	10:17	6,540	1,540
_	0:04	_	4	22	9:49	6,705	1,705	10:19	6,627	1,627	10:19	6,530	1,530
_	0:08	_	8	22	9:53	6,701	1,701	10:23	6,618	1,618	10:23	6,518	1,518
_	0:15	_	15	22	10:00	6,697	1,697	10:30	6,610	1,610	10:30	6,506	1,506
_	0:30	_	30	22	10:15	6,692	1,692	10:45	6,599	1,599	10:45	6,494	1,494
1:00	_	_	60	21	10:45	6,688	1,688	11:15	6,590	1,590	11:15	6,482	1,482
2:00	_	_	120	21	11:45	6,683	1,683	12:15	6,579	1,579	12:15	6,471	1,471
4:00	_	_	240	21	13:45	6,679	1,679	14:15	6,571	1,571	14:15	6,458	1,458
8:00	_	_	480	20	17:45	6,676	1,676	18:15	6,568	1,568	18:15	6,448	1,448
24:00	_	_	1440	21	9:45	6,676	1,676	10:15	6,566	1,566	10:15	6,446	1,446
36:00	_	_	2160		21:45			22:15			22:15		
48:00	_	_	**2880**		9:45			10:15			10:15		
Cumulative correction **y**					0,186			0,151			0,090		
Net cumulative compression (ΔH-y)					1,490			1,415			1,356		

Sheet 4	Operator	Checked	Approved
Sheets 19	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SB1-3
	Sample no.	,
	Dept	24,15-24,45
	Date	28.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8					
Machine no.	3	Spec. diam.	87,30	Height	25,00	mm
Cell no.	3	Lever ratio	1:10	Area	5985,75	mm^2
Ring no.	3	**1kg** on hanger gives pressure of			21,60	кPa

LOADING/UNLOADING/RELOADING

Increment no.					10			11			12		
Date started					30.07.2011			31.07.2011			01.08.2011		
Load kg					0,008			0,004			0,001		
Pressure kPa					50,0			25,0			3,6		
Mean daily temperature 22 ^{0} C					RELOADING			RELOADING			RELOADING		
Elapsed time				t^0	Clock time	Gauge reading	Cumulative compression mm ΔH	Clock time	Gauge reading	Cumulative compression mm ΔH	Clock time	Gauge reading	Cumulative compression mm ΔH
h	m	s	t min										
0	0	0	0	22	10:15	6,453	1,453	10:15	6,330	1,330	10:15	6,199	1,199
_	_	10	0,167	22	10:15	6,444	1,444	10:15	6,311	1,311	10:15	6,188	1,188
_	_	20	0,333	22	10:15	6,443	1,443	10:15	6,310	1,310	10:15	6,187	1,187
_	_	30	0,500	22	10:15	6,441	1,441	10:15	6,310	1,310	10:15	6,186	1,186
_	_	40	0,667	22	10:15	6,441	1,441	10:15	6,310	1,310	10:15	6,185	1,185
_	_	50	0,833	22	10:15	6,440	1,440	10:15	6,310	1,310	10:15	6,185	1,185
_	0:01	_	1	22	10:16	6,439	1,439	10:16	6,310	1,310	10:16	6,185	1,185
_	0:02	_	2	22	10:17	6,432	1,432	10:17	6,297	1,297	10:17	6,162	1,162
_	0:04	_	4	22	10:19	6,420	1,420	10:19	6,286	1,286	10:19	6,140	1,140
_	0:08	_	8	22	10:23	6,409	1,409	10:23	6,267	1,267	10:23	6,115	1,115
_	0:15	_	15	22	10:30	6,397	1,397	10:30	6,252	1,252	10:30	6,096	1,096
_	0:30	_	30	22	10:45	6,387	1,387	10:45	6,234	1,234	10:45	6,076	1,076
1:00	_	_	60	21	11:15	6,375	1,375	11:15	6,217	1,217	11:15	6,055	1,055
2:00	_	_	120	21	12:15	6,362	1,362	12:15	6,198	1,198	12:15	6,027	1,027
4:00	_	_	240	21	14:15	6,350	1,350	14:15	6,181	1,181	14:15	6,002	1,002
8:00	_	_	480	20	18:15	6,345	1,345	18:15	6,171	1,171	18:15	5,980	0,980
24:00	_	_	1440	21	10:15	6,343	1,343	10:15	6,171	1,171	10:15	5,980	0,980
36:00	_	_	2160		22:15			22:15			22:15		
48:00	_	_	**2880**		10:15			10:15			10:15		
Cumulative correction **y**					0,071			0,050					
Net cumulative compression (ΔH-y)					1,272			1,121			0,980		

Sheet 5	Operator	Checked	Approved
Sheets 19	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SB1-3
	Sample no.	,
	Dept	24,15-24,45
	Date	28.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8				
Machine no.	3	Specimen diameter	87,30 mm	Height H_0,	25,0 mm
Cell no.	3	Height of solids Hs	15,20 mm		
Ring no.	3	Initial voids ratio e_1	0,644		

VOIDS RATIO					COMPRESSIBILITY			COEFFICIENT OF CONSOLIDATION			
					Incremental					c_v =	
Increment no.	Pressure P kPa	Cumulative compression (ΔH-y) mm	Consolidated height H=H0-(ΔH-y) mm	Voids ratio $e = \frac{H - H_s}{H_s}$	height change, δH mm	pressure change δp kPa	$m_v = \frac{\delta H}{H_i} \cdot \frac{100(}{\delta p}$ m²/MN	t_{50} min	$\bar{H} = \frac{1}{2}(H_1 + H_2)$ mm	$\frac{0.026\bar{H}^2}{t_{50}}$ m²/year	$\frac{0.111\bar{H}^2}{t_{90}}$ m²/year
0	0	0,000	25,00	0,644	0,00	0	–	–	–	–	–
1	25,0	-0,010	25,01	0,645	-0,01	25,0	-0,02	11,14	25,01	1,46	
2	50,0	0,040	24,96	0,642	0,05	25,0	0,08	9,09	24,99	1,79	
3	100,0	0,289	24,71	0,625	0,25	50,0	0,20	12,15	24,84	1,32	
4	200,0	0,563	24,44	0,607	0,27	100,0	0,11	6,77	24,57	2,32	
5	400,0	0,981	24,02	0,580	0,42	200,0	0,09	8,17	24,23	1,87	
6	800,0	1,591	23,41	0,540	0,61	400,0	0,06	8,03	23,71	1,82	
7	400,0	1,490	23,51	0,546	-0,10	-400,0	0,01	8,64	23,46	1,66	
8	200,0	1,415	23,59	0,551	-0,08	-200,0	0,02	6,81	23,55	2,12	
9	100,0	1,356	23,64	0,555	-0,06	-100,0	0,03	15,03	23,61	0,96	
10	50,0	1,272	23,73	0,561	-0,08	-50,0	0,07	16,96	23,69	0,86	
11	25,0	1,121	23,88	0,571	-0,15	-25,0	0,26	23,19	23,80	0,64	
12	3,6	0,980	24,02	0,580	-0,14	-21,4	0,28	23,08	23,95	0,65	

Sheet	6	Operator	Checked	Approved
Sheets	19	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test

Location: Imereti Region, Georgia	**Project Name:** GC-1128	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description:	**Borehole**	BH-SB1-3
Intermediately plastic silty CLAY	**Sample no.**	,
	Dept	24,15-24,45
	Date	28.07.2011

Test method BS 1377 : Part 7 : 1990 : 8

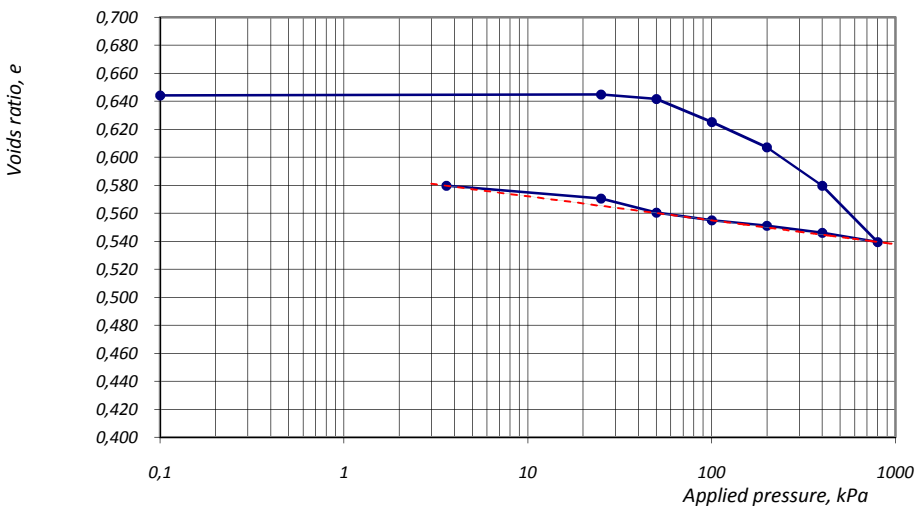
SPECIMEN INITIALLY

Diameter	87,30 mm	Density	1,99	Mg/m^3
Height	25,00 mm	Moisture content	20	%
Voids ratio	0,644	Dry density	1,66	Mg/m^3
Saturation	84,75 %	Particle density	2,73	Mg/m^3

Compression Index, C_c 0,017

Remarks:

Pressure stage kPa	Laboratory coefficients of: Compressibility, m_v m^2/MN	Consolidation, C_v $m^2/year$	Secondary Consolidation, C_α
0,0	-	-	-
25	-0,02	1,46	4,6E-05
50	0,08	1,79	9,1E-05
100	0,20	1,32	0,00026
200	0,11	2,32	0,00073
400	0,09	1,87	0,00025
800	0,06	1,82	0,00036
400	0,01	1,66	0,00003
200	0,02	2,12	0,00019
100	0,03	0,96	0,00020
50	0,07	0,86	0,00011
25	0,26	0,64	1,8E-05
3,6	0,28	0,65	0,00046

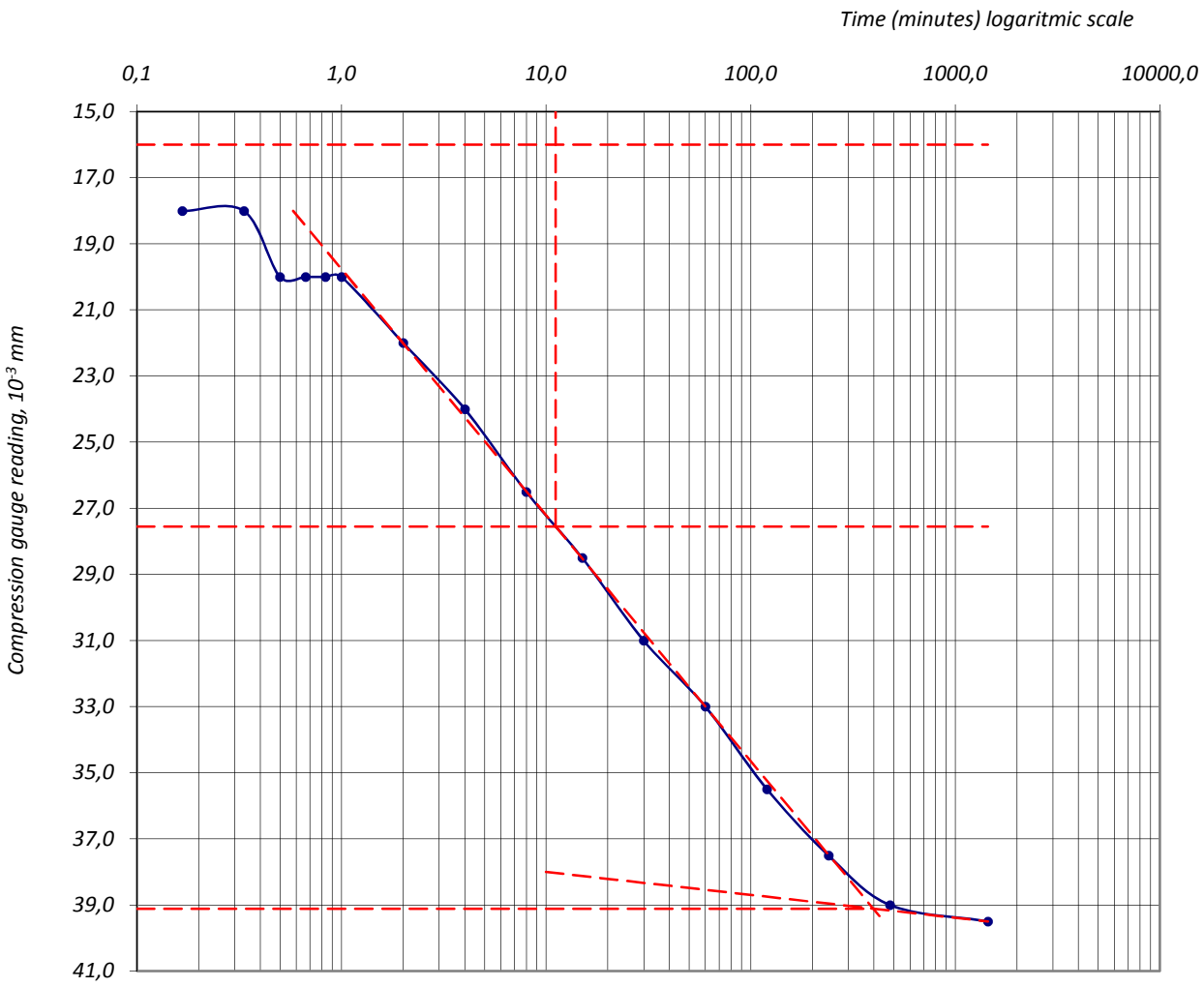


Sheet 7	Operator	Checked	Approved
Sheets 19	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Curve – Logarithm of Time Fitting Method

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SB1-3
	Sample no.	,
	Dept	24,15-24,45
	Date	28.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	25

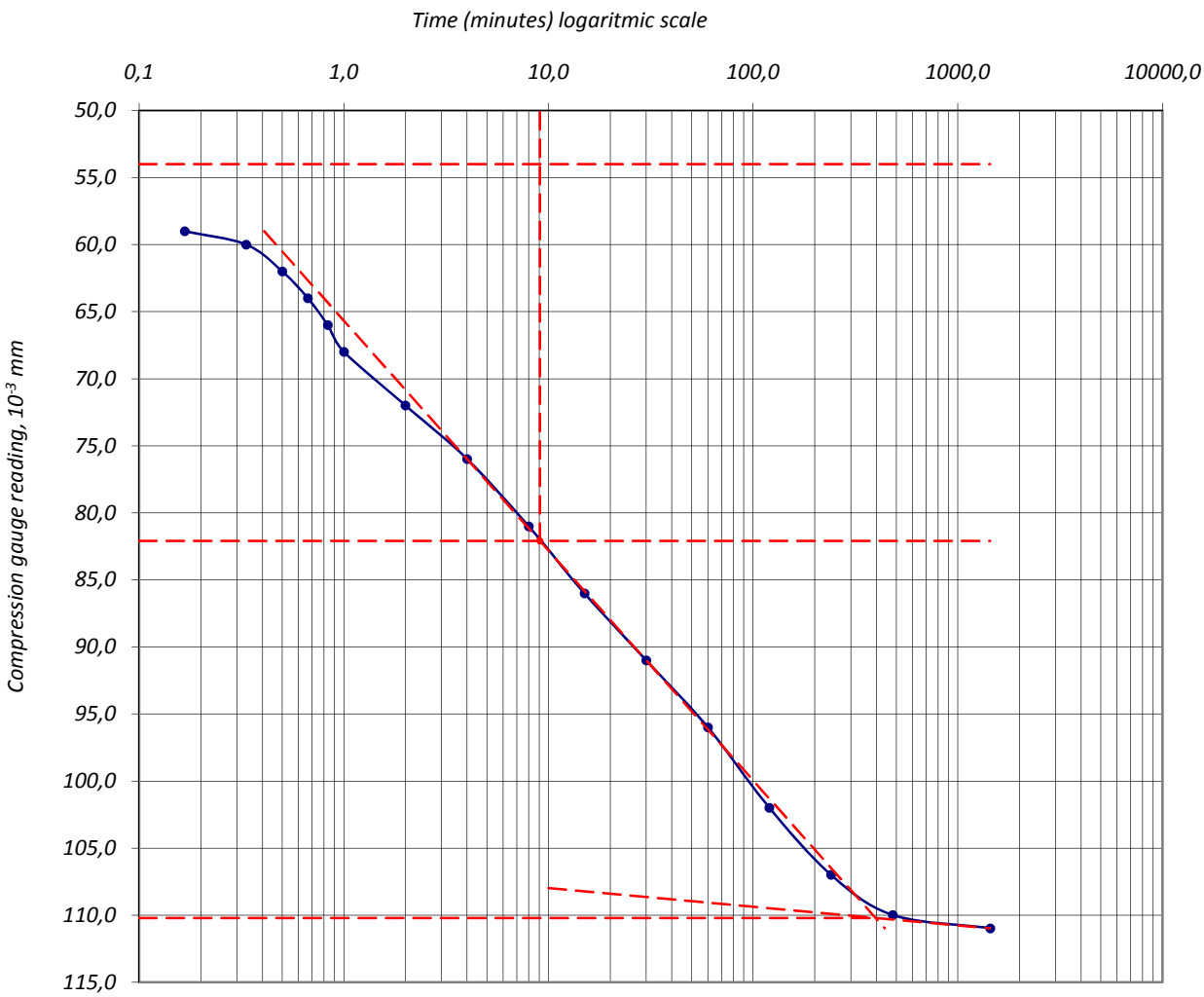


Sheet 8	Increment no. 1	Operator	Checked	Approved
Sheets 19	**LOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test (With Measurement of swelling pressure)

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description:	**Borehole**	BH-SB1-3
	Sample no.	,
Intermediately plastic silty CLAY	**Dept**	24,15-24,45
	Date	28.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	50

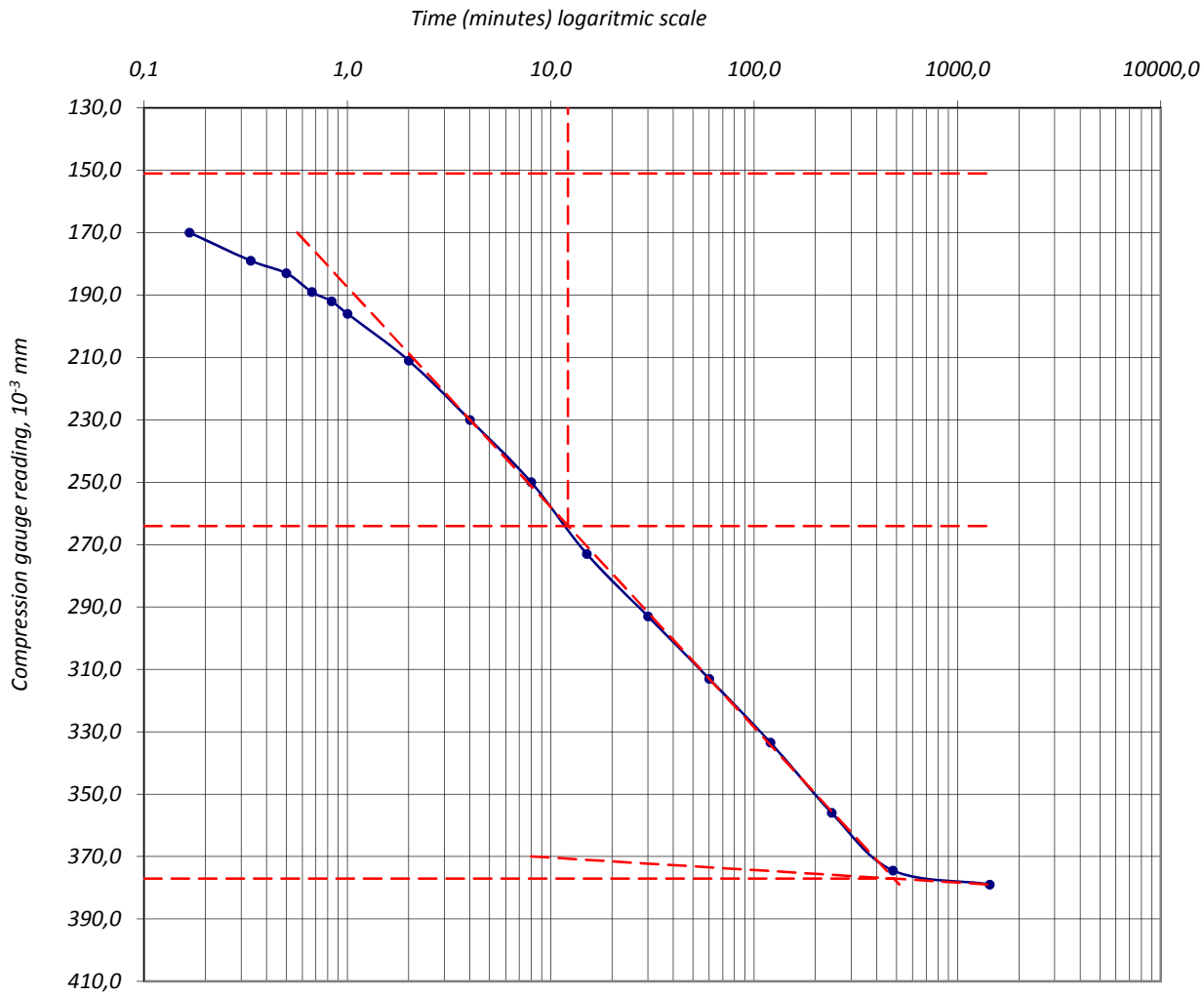


Sheet 9	Increment no. 2	Operator	Checked	Approved
Sheets 19	**LOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test (With Measurement of swelling pressure)

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SB1-3
	Sample no.	,
	Dept	24,15-24,45
	Date	28.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	100

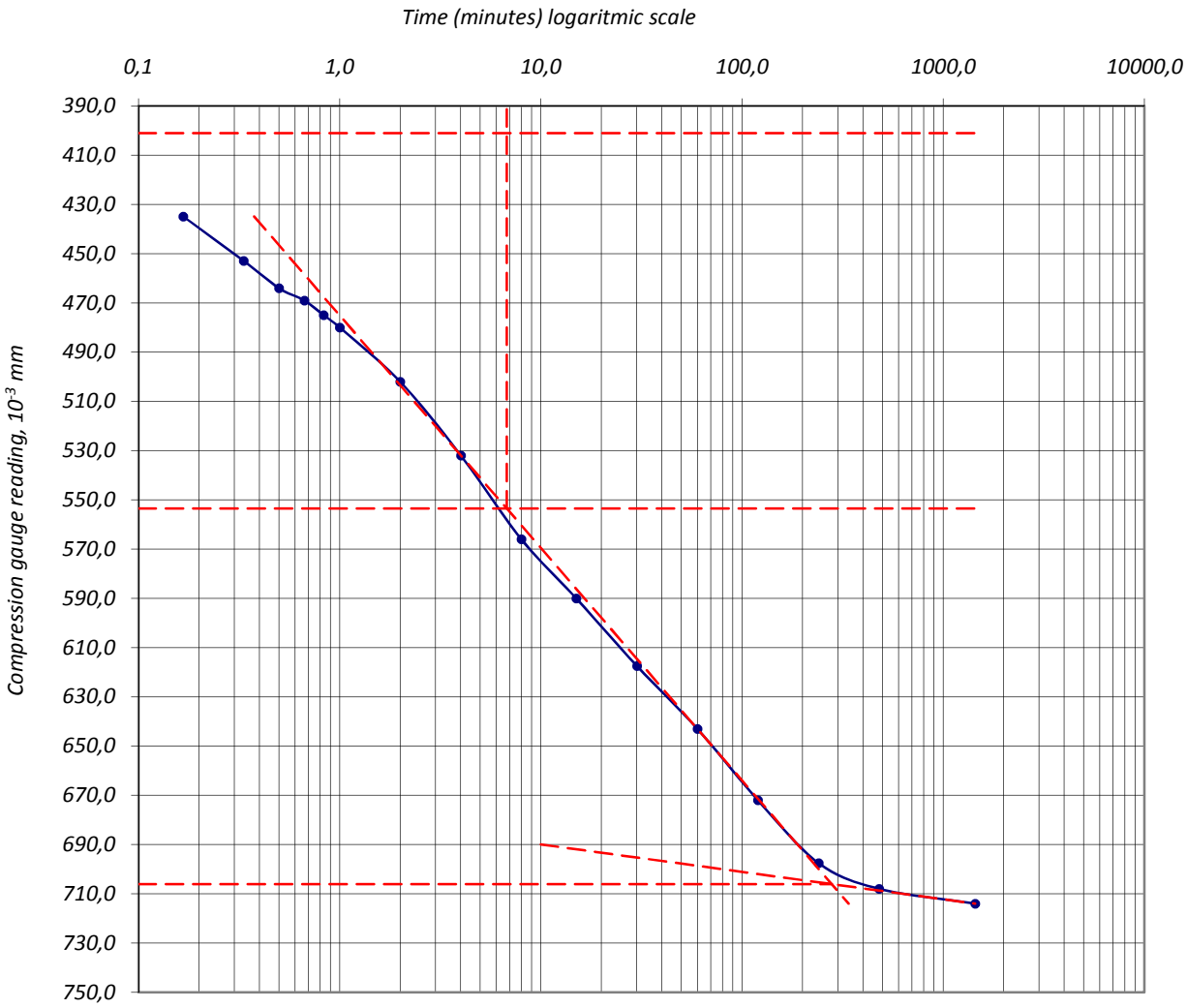


Sheet 10	Increment no. 3	Operator	Checked	Approved
Sheets 19	**LOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test (With Measurement of swelling pressure)

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SB1-3
	Sample no.	,
	Dept	24,15-24,45
	Date	28.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	200

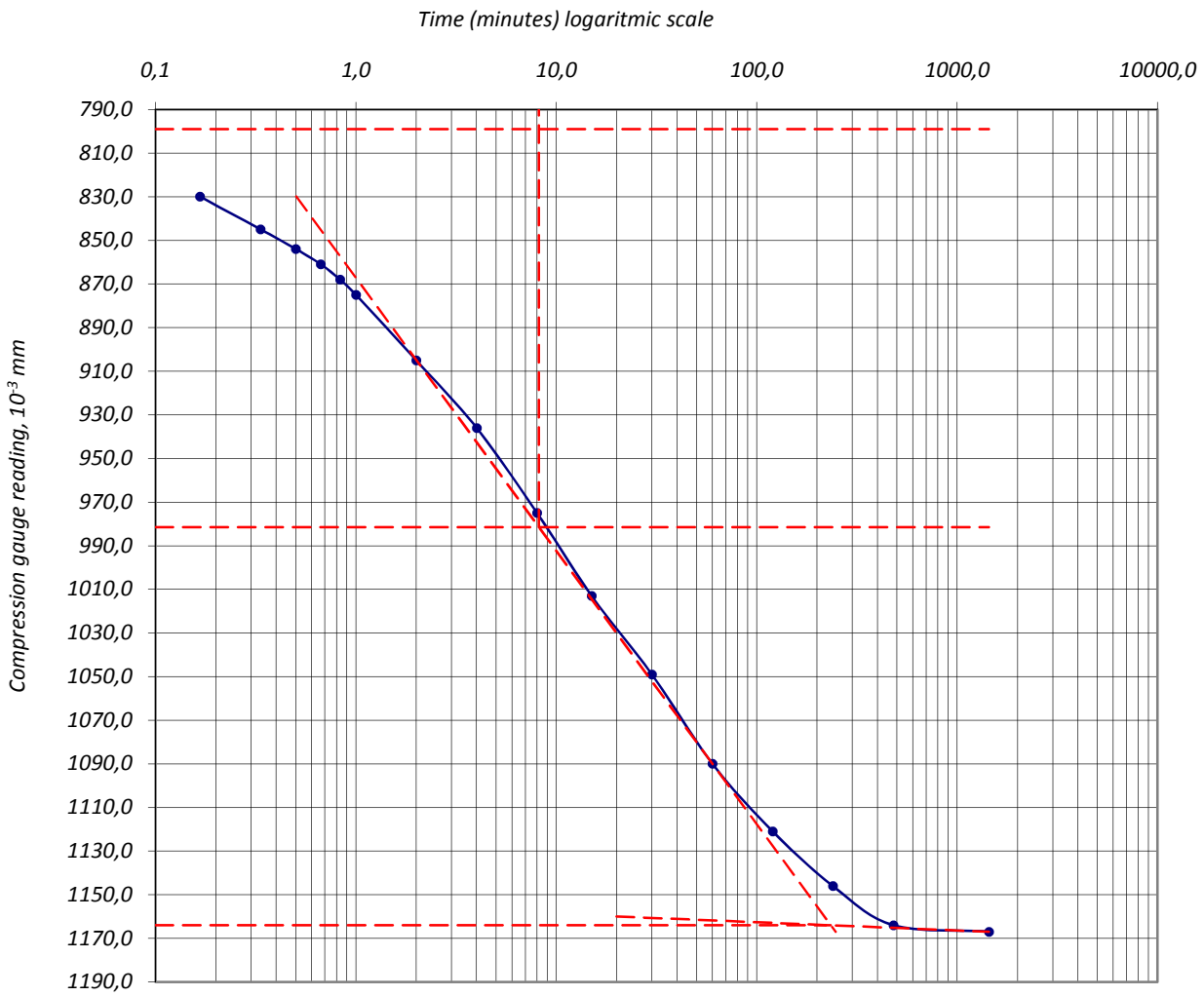


Sheet 11	Increment no. 4	Operator	Checked	Approved
Sheets 19	**LOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test (With Measurement of swelling pressure)

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SB1-3
	Sample no.	,
	Dept	24,15-24,45
	Date	28.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	400

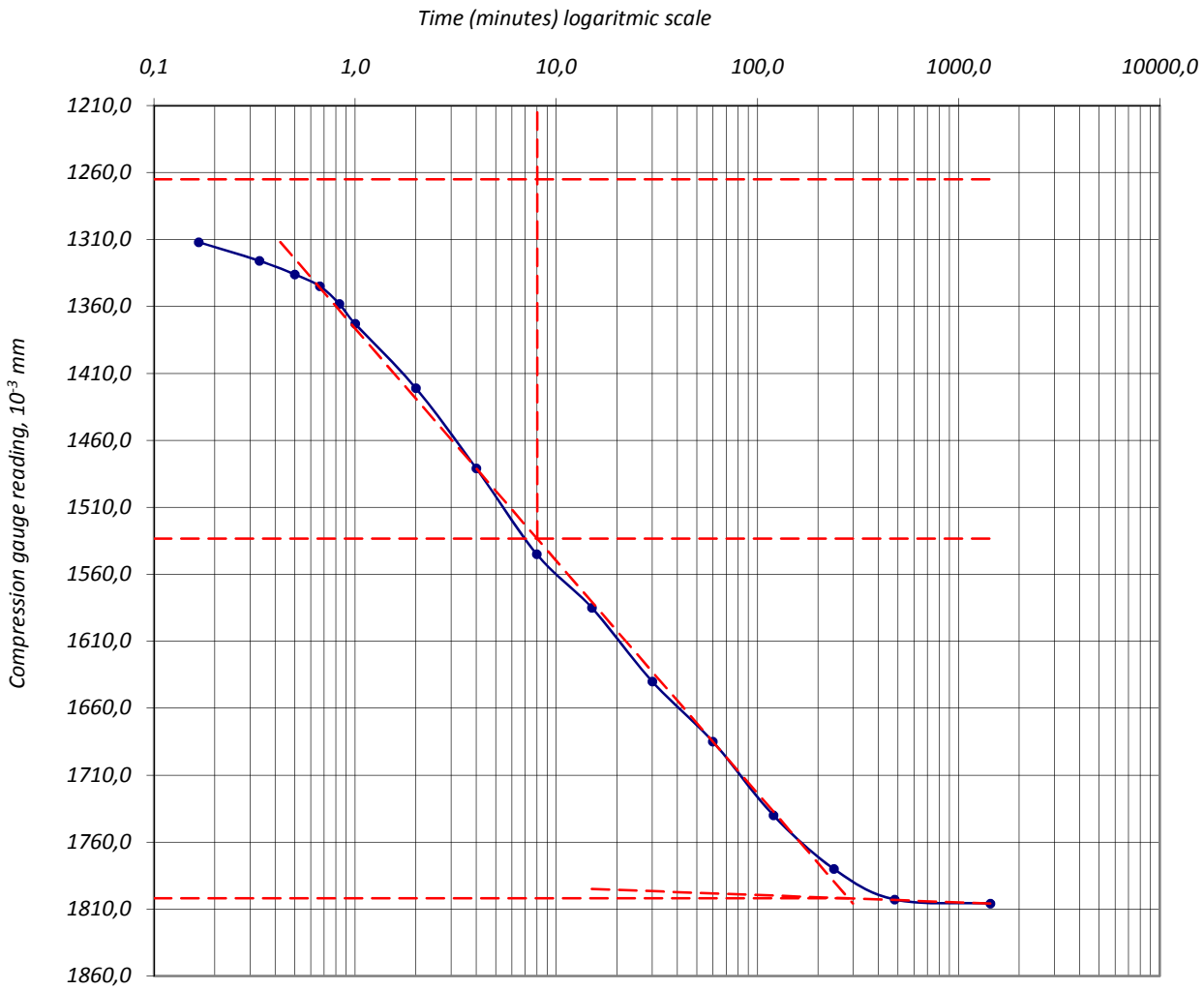


Sheet 12	Increment no. 5	Operator	Checked	Approved
Sheets 19	**LOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test (With Measurement of swelling pressure)

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SB1-3
	Sample no.	,
	Dept	24,15-24,45
	Date	28.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	800

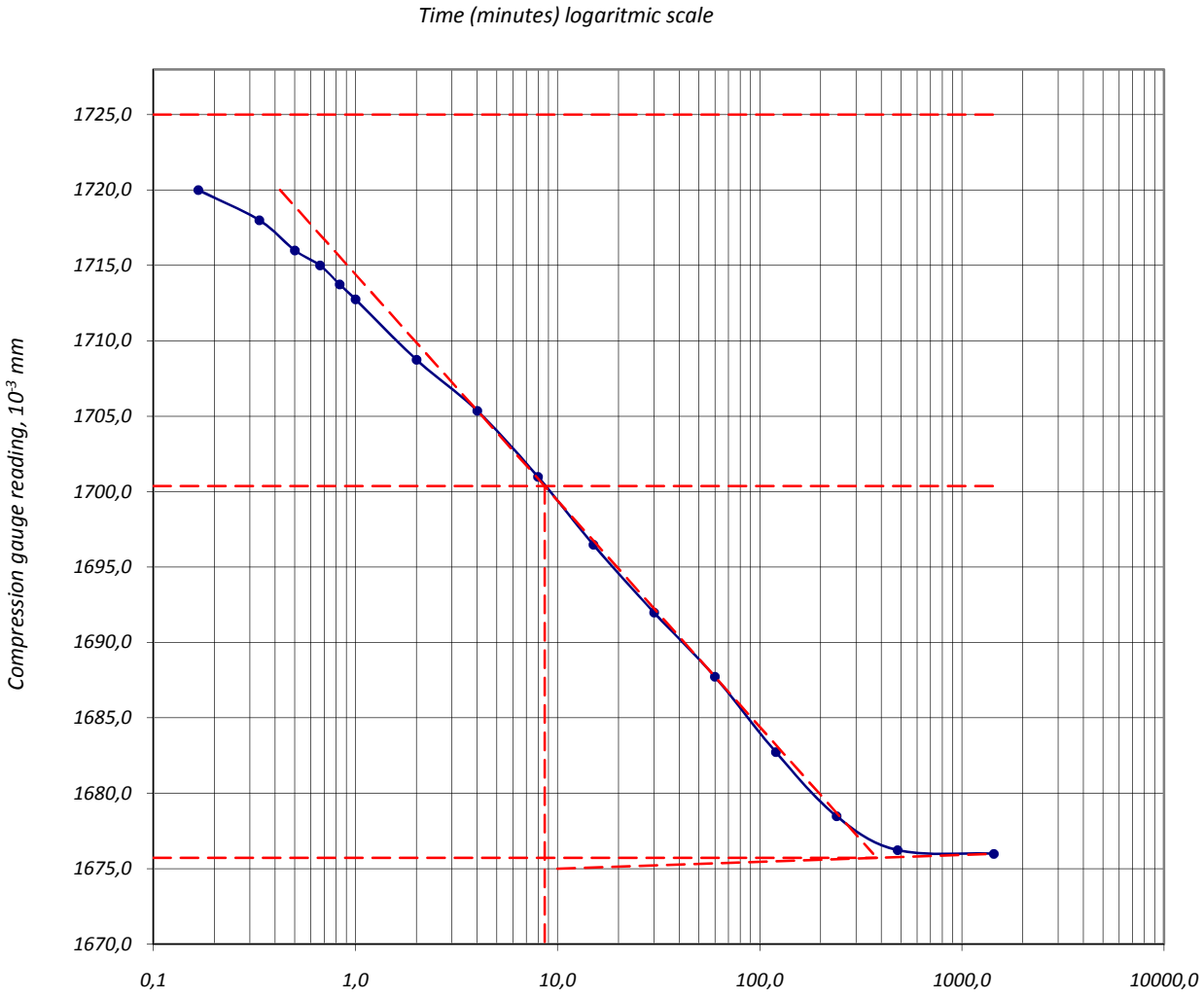


Sheet 13	Increment no. 6	Operator	Checked	Approved
Sheets 19	**UNLOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Curve – Logarithm of Time Fitting Method

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SB1-3
	Sample no.	,
	Dept	24,15-24,45
	Date	28.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	400

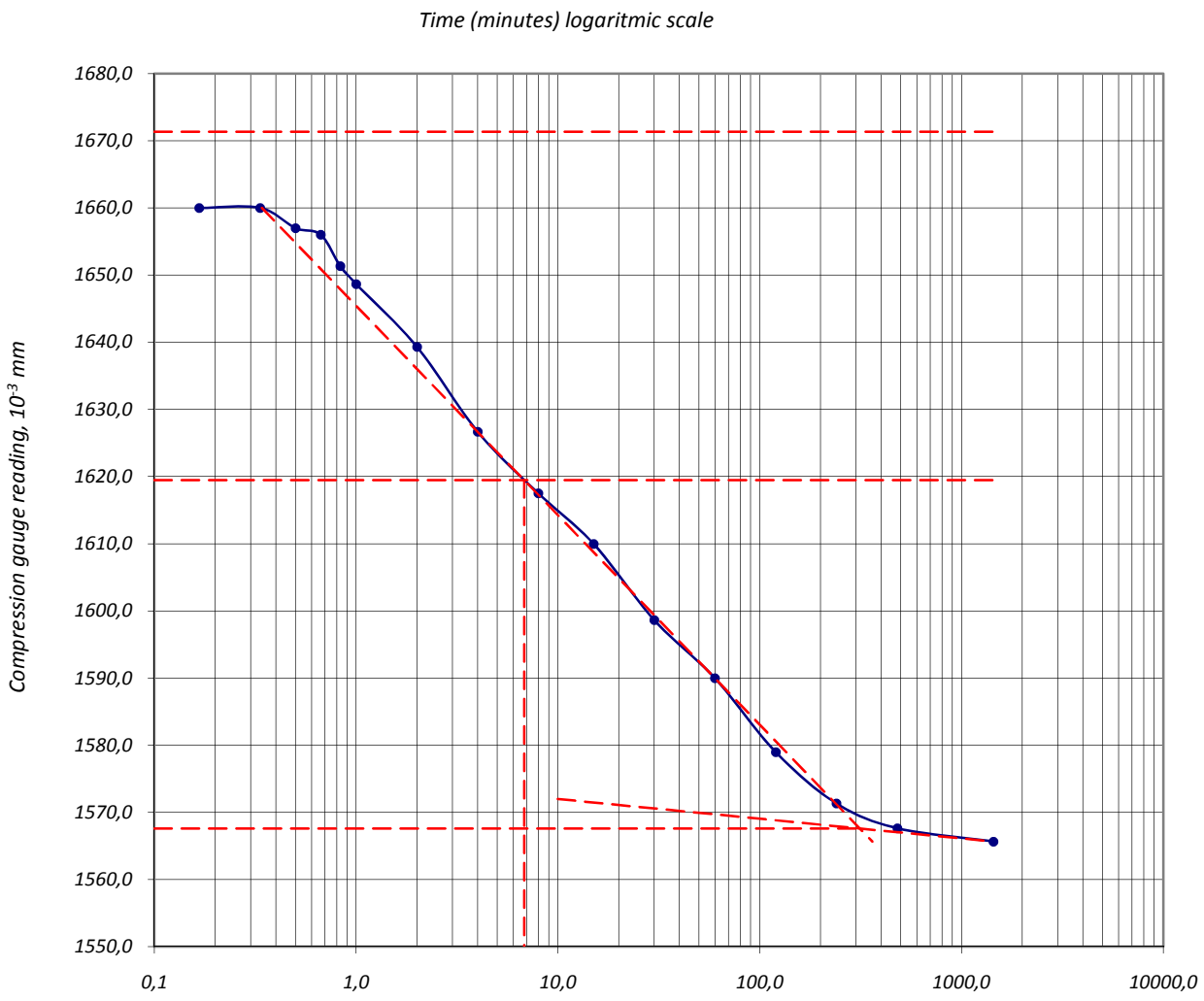


Sheet 14	Increment no. 7	Operator	Checked	Approved
Sheets 19	**UNLOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Curve – Logarithm of Time Fitting Method

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SB1-3
	Sample no.	,
	Dept	24,15-24,45
	Date	28.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	200

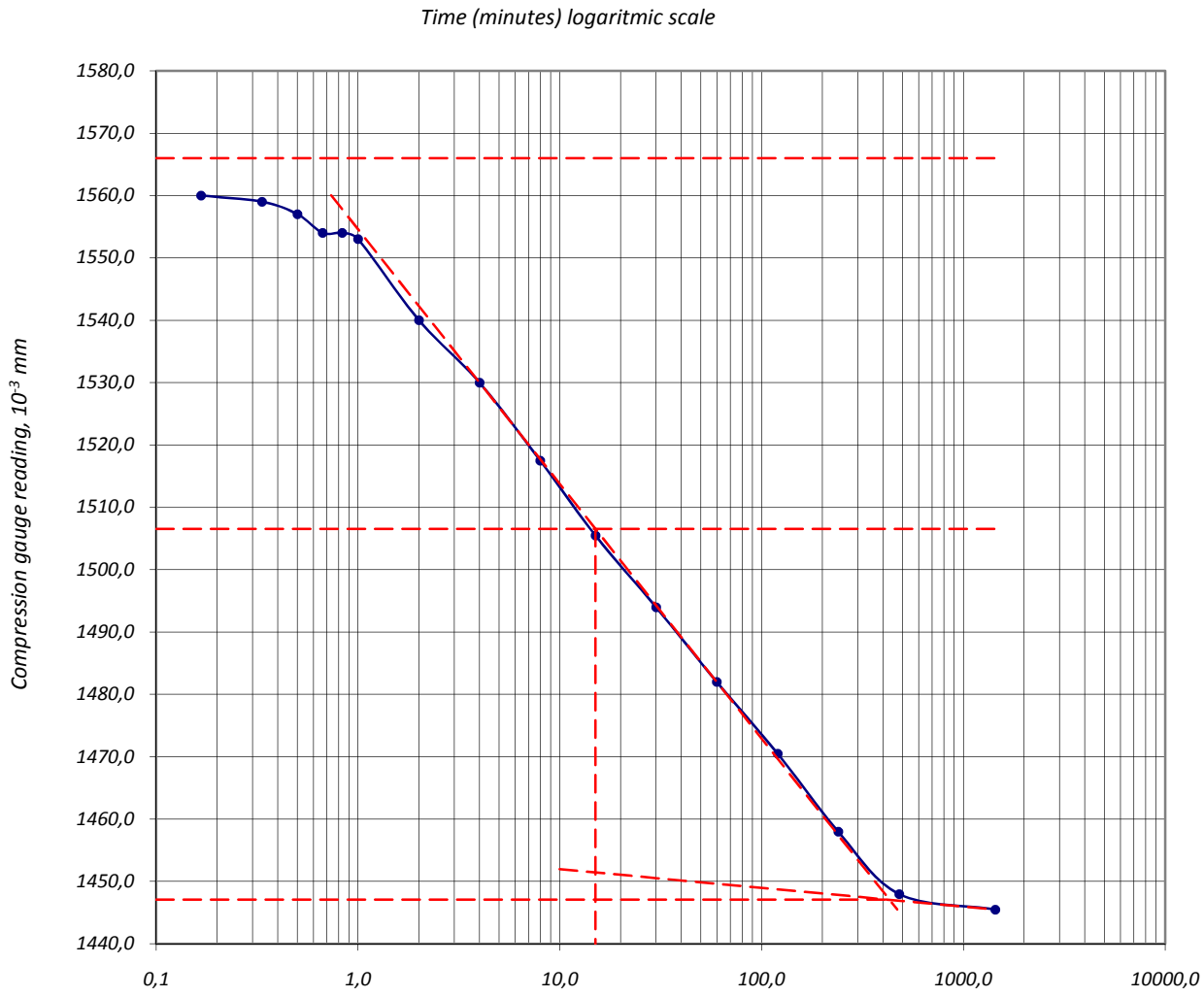


Sheet 15	Increment no. 8	Operator	Checked	Approved
Sheets 19	**UNLOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Curve – Logarithm of Time Fitting Method

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SB1-3
	Sample no.	,
	Dept	24,15-24,45
	Date	28.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	100

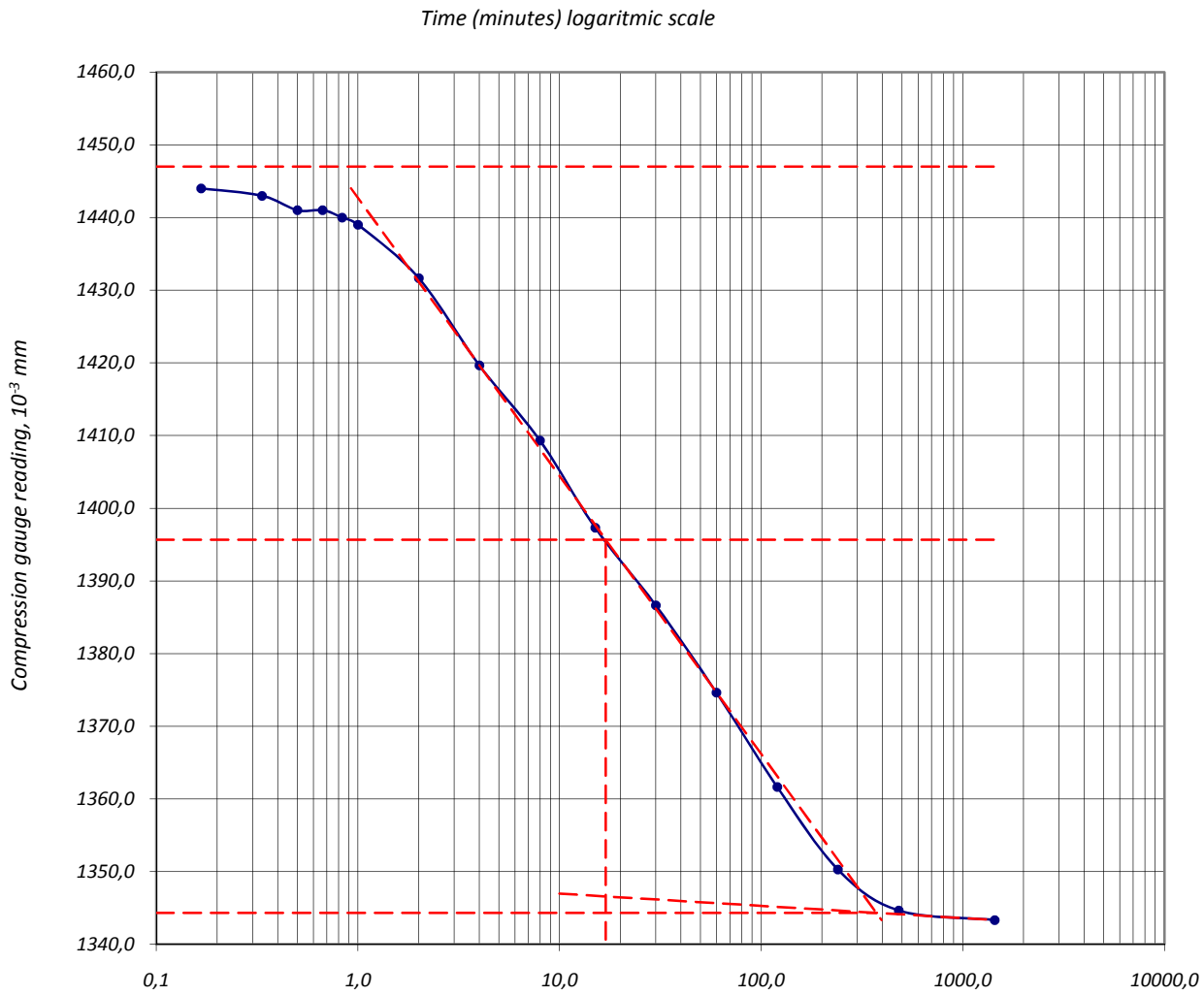


Sheet 16	Increment no. 9	Operator	Checked	Approved
Sheets 19	**RELOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Curve – Logarithm of Time Fitting Method

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SB1-3
	Sample no.	,
	Dept	24,15-24,45
	Date	28.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	50

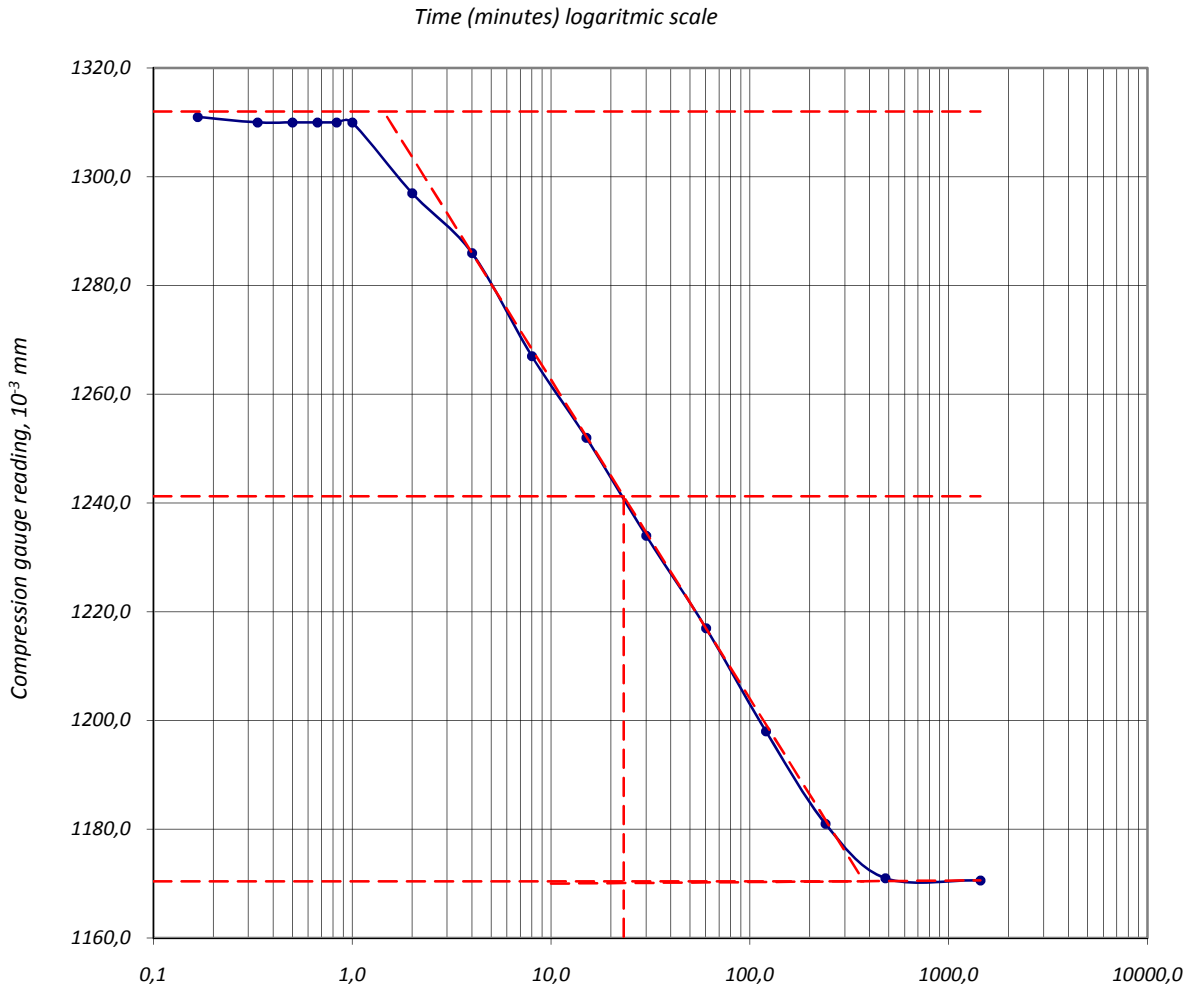


Sheet 17	Increment no. 10	Operator	Checked	Approved
Sheets 19	**RELOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Curve – Logarithm of Time Fitting Method

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SB1-3
	Sample no.	,
	Dept	24,15-24,45
	Date	28.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	25

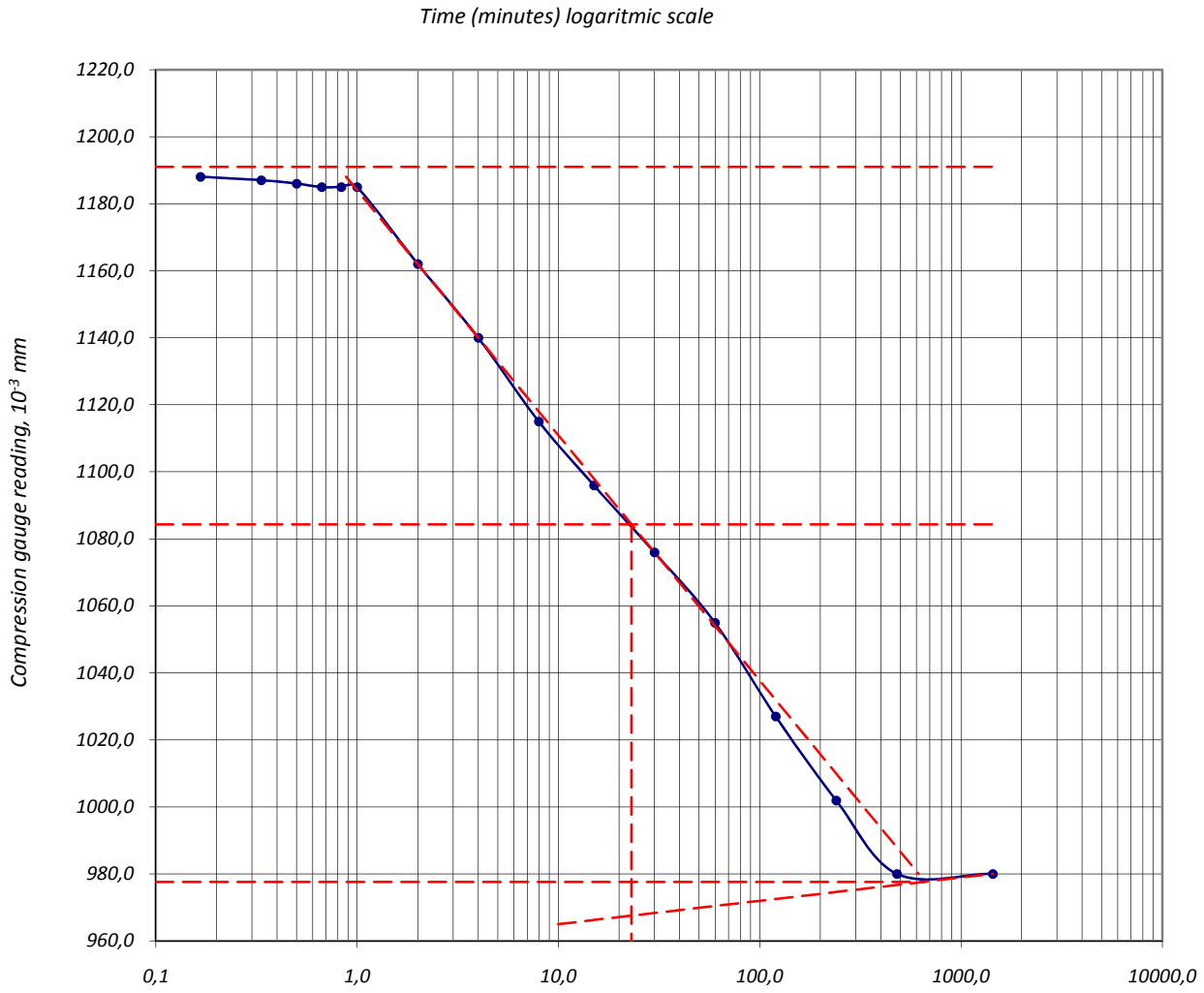


Sheet 18	Increment no. 11	Operator	Checked	Approved
Sheets 19	**RELOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Curve – Logarithm of Time Fitting Method

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SB1-3
	Sample no.	,
	Dept	24,15-24,45
	Date	28.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	3,6



Sheet 19	Increment no. 12	Operator	Checked	Approved
Sheets 19	**RELOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SB1-4
	Sample no.	,
	Dept, m	25,3-25,6
	Date	14.07.2011
Test method BS1377 : Part 5 : 1990 : 3.5, 3.6		Saturated State

Cell no.	1	Particle density	
Ring no.	1	asumed	2,75 Mg/m^3

DIMENSIONS		Initial specimen	Overall change	Final specimen	Specimen preparation method
Diameter	D mm	87,40		87,40	
Area	A mm^2	5999,47		5999,47	
Height	H mm	H_o 24,90	1,935	22,965	
Volume	V cm^3	149,39	11,61	137,78	

WEIGHINGS		Initial specimen (a)	Initial specimen (b)	Final specimen (c)
Wet soil + ring + tray	g	490,08		482,00
Dry soil + ring + tray	g			430,50
Ring + tray	g	191,18		191,18
Wet soil	g	m_0 298,90	m_0 298,90	290,82
Dry soil	g		m_d 239,32	239,32
Water	g		59,58	51,50
Moisture content (measured)	%		24,90	21,52
Moisture content (from trimmings)	%	W_0 26,70		
Density	Mg/m^3	2,00	2,00	2,11
Dry density	Mg/m^3	1,58	1,60	1,74
Voids ratio		e_0 0,741	0,717	0,583
Degree of saturation	%	S_0 99,04	95,54	101,47
Height of soils	H_S mm	14,30	14,51	14,51

(a) Using moisture content from trimmings

(b) Using data from (a) and (c)

(c) Data from specimen after test

Sheet 1	**Operator**	**Checked**	**Approved**
Sheets 19	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SB1-4
	Sample no.	,
	Dept	25,3-25,6
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8				
Machine no.	1	Spec. diam.	87,40	Height	24,90 mm
Cell no.	1	Lever ratio	1:10	Area	5999,47 mm^2
Ring no.	1	**1kg** on hanger gives pressure of			21,60 kPa

LOADING/UNLOADING/RELOADING

Increment no.					1			2			3		
Date started					07.07.2011			08.07.2011			09.07.2011		
Load				kg	1,16			2,31			4,63		
Pressure				kPa	25,0			50,0			100,0		
Mean daily temperature 22 ^{0} C					LOADING			LOADING			LOADING		
Elapsed time				t^0	Clock time	Gauge reading	Cumulative compression mm ΔH	Clock time	Gauge reading	Cumulative compression mm ΔH	Clock time	Gauge reading	Cumulative compression mm ΔH
h	m	s	t min										
0	0	0	0	22	9:23	5,000	0,000	9:45	5,103	0,103	9:45	5,289	0,289
_	_	10	0,167	22	9:23	5,053	0,053	9:45	5,142	0,142	9:45	5,350	0,350
_	_	20	0,333	22	9:23	5,057	0,056	9:45	5,150	0,150	9:45	5,363	0,363
_	_	30	0,500	22	9:23	5,059	0,059	9:45	5,153	0,153	9:45	5,367	0,367
_	_	40	0,667	22	9:23	5,061	0,061	9:45	5,155	0,155	9:45	5,375	0,375
_	_	50	0,833	22	9:23	5,063	0,063	9:45	5,157	0,157	9:45	5,380	0,380
_	0:01	_	1	22	9:24	5,065	0,065	9:46	5,160	0,160	9:46	5,385	0,385
_	0:02	_	2	22	9:25	5,070	0,070	9:47	5,174	0,174	9:47	5,408	0,408
_	0:04	_	4	22	9:27	5,075	0,075	9:49	5,190	0,190	9:49	5,439	0,439
_	0:08	_	8	22	9:31	5,079	0,079	9:53	5,207	0,207	9:53	5,476	0,476
_	0:15	_	15	22	9:38	5,084	0,084	10:00	5,222	0,222	10:00	5,514	0,514
_	0:30	_	30	22	9:53	5,088	0,088	10:15	5,239	0,239	10:15	5,548	0,548
1:00	_	_	60	21	10:23	5,093	0,093	10:45	5,253	0,253	10:45	5,576	0,576
2:00	_	_	120	21	11:23	5,098	0,098	11:45	5,264	0,264	11:45	5,597	0,597
4:00	_	_	240	21	13:23	5,101	0,101	13:45	5,272	0,272	13:45	5,610	0,610
8:00	_	_	480	20	17:23	5,103	0,103	17:45	5,279	0,279	17:45	5,617	0,617
24:00	_	_	1440	21	9:23	5,103	0,103	9:45	5,285	0,285	9:45	5,623	0,623
36:00	_	_	2160		21:23			21:45			21:45		
48:00	_	_	**2880**		9:23			9:45			9:45		
Cumulative correction **y**					0,018			0,045			0,086		
Net cumulative compression (ΔH-y)					0,085			0,240			0,537		

Sheet 2	Operator	Checked	Approved
Sheets 19	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SB1-4
	Sample no.	,
	Dept	25,3-25,6
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8					
Machine no.	1	Spec. diam.	87,40	Height	24,90	mm
Cell no.	1	Lever ratio	1:10	Area	5999,47	mm^2
Ring no.	1	**1kg** on hanger gives pressure of			21,60	кPa

LOADING/UNLOADING/RELOADING

Increment no.					4			5			6		
Date started					10.07.2011			11.07.2011			12.07.2011		
Load kg					9,259			18,519			37,037		
Pressure kPa					200,0			400,0			800,0		
Mean daily temperature 22 ^{0} C					**LOADING**			**LOADING**			**UNLOADING**		
Elapsed time				t^0	Clock time	Gauge reading	Cumulative compression mm ΔH	Clock time	Gauge reading	Cumulative compression mm ΔH	Clock time	Gauge reading	Cumulative compression mm ΔH
h	m	s	t min										
0	0	0	0	22	9:45	5,618	0,618	9:45	5,946	0,946	9:45	6,420	1,420
_	_	10	0,167	22	9:45	5,701	0,701	9:45	5,975	0,975	9:45	6,124	1,124
_	_	20	0,333	22	9:45	5,713	0,713	9:45	5,978	0,978	9:45	6,139	1,139
_	_	30	0,500	22	9:45	5,724	0,724	9:45	5,980	0,980	9:45	6,149	1,149
_	_	40	0,667	22	9:45	5,733	0,733	9:45	5,983	0,983	9:45	6,162	1,162
_	_	50	0,833	22	9:45	5,737	0,737	9:45	5,985	0,985	9:45	6,190	1,190
_	0:01	_	1	22	9:46	5,749	0,749	9:46	5,987	0,987	9:46	6,227	1,227
_	0:02	_	2	22	9:47	5,769	0,769	9:47	5,993	0,993	9:47	6,339	1,339
_	0:04	_	4	22	9:49	5,805	0,805	9:49	6,040	1,040	9:49	6,459	1,459
_	0:08	_	8	22	9:53	5,838	0,837	9:53	6,100	1,100	9:53	6,590	1,590
_	0:15	_	15	22	10:00	5,863	0,863	10:00	6,155	1,155	10:00	6,687	1,687
_	0:30	_	30	22	10:15	5,889	0,889	10:15	6,205	1,205	10:15	6,814	1,814
1:00	_	_	60	21	10:45	5,920	0,920	10:45	6,258	1,258	10:45	6,920	1,920
2:00	_	_	120	21	11:45	5,949	0,949	11:45	6,310	1,310	11:45	6,998	1,998
4:00	_	_	240	21	13:45	5,965	0,965	13:45	6,374	1,374	13:45	7,070	2,070
8:00	_	_	480	20	17:45	5,975	0,975	17:45	6,401	1,401	17:45	7,110	2,110
24:00	_	_	1440	21	9:45	5,981	0,981	9:45	6,420	1,420	9:45	7,135	2,135
36:00	_	_	2160		21:45			21:45			21:45		
48:00	_	_	**2880**		9:45			9:45			9:45		
Cumulative correction **y**					0,131			0,162			0,200		
Net cumulative compression (ΔH-y)					0,850			1,258			1,935		

Sheet 3	Operator	Checked	Approved
Sheets 19	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SB1-4
	Sample no.	,
	Dept	25,3-25,6
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8					
Machine no.	1	Spec. diam.	87,40	Height	24,90	mm
Cell no.	1	Lever ratio	1:10	Area	5999,47	mm^2
Ring no.	1	**1kg** on hanger gives pressure of			21,60	кPa

LOADING/UNLOADING/RELOADING

Increment no.					7			8			9		
Date started					13.07.2011			14.07.2011			15.07.2011		
Load				kg	18,519			9,259			4,630		
Pressure				kPa	400,0			200,0			100,0		
Mean daily temperature 22 ^{0} C					UNLOADING			UNLOADING			RELOADING		
Elapsed time				t^0	Clock time	Gauge reading	Cumulative compression mm ΔH	Clock time	Gauge reading	Cumulative compression mm ΔH	Clock time	Gauge reading	Cumulative compression mm ΔH
h	m	s	t min										
0	0	0	0	22	9:45	6,985	1,985	10:15	6,912	1,912	10:15	6,768	1,768
_	_	10	0,167	22	9:45	6,960	1,960	10:15	6,884	1,884	10:15	6,749	1,749
_	_	20	0,333	22	9:45	6,960	1,960	10:15	6,881	1,881	10:15	6,746	1,746
_	_	30	0,500	22	9:45	6,959	1,959	10:15	6,877	1,877	10:15	6,743	1,743
_	_	40	0,667	22	9:45	6,957	1,957	10:15	6,876	1,876	10:15	6,742	1,742
_	_	50	0,833	22	9:45	6,954	1,954	10:15	6,873	1,873	10:15	6,740	1,740
_	0:01	_	1	22	9:46	6,953	1,953	10:16	6,871	1,871	10:16	6,738	1,738
_	0:02	_	2	22	9:47	6,949	1,949	10:17	6,861	1,861	10:17	6,729	1,729
_	0:04	_	4	22	9:49	6,944	1,944	10:19	6,852	1,852	10:19	6,716	1,716
_	0:08	_	8	22	9:53	6,939	1,939	10:23	6,840	1,840	10:23	6,700	1,700
_	0:15	_	15	22	10:00	6,935	1,935	10:30	6,827	1,827	10:30	6,683	1,683
_	0:30	_	30	22	10:15	6,930	1,930	10:45	6,815	1,815	10:45	6,667	1,667
1:00	_	_	60	21	10:45	6,924	1,924	11:15	6,800	1,800	11:15	6,646	1,646
2:00	_	_	120	21	11:45	6,918	1,918	12:15	6,788	1,788	12:15	6,628	1,628
4:00	_	_	240	21	13:45	6,914	1,914	14:15	6,777	1,777	14:15	6,605	1,605
8:00	_	_	480	20	17:45	6,912	1,912	18:15	6,770	1,770	18:15	6,587	1,587
24:00	_	_	1440	21	9:45	6,912	1,912	10:15	6,768	1,768	10:15	6,576	1,576
36:00	_	_	2160		21:45			22:15			22:15		
48:00	_	_	**2880**		9:45			10:15			10:15		
Cumulative correction **y**					0,162			0,131			0,086		
Net cumulative compression (ΔH-y)					1,750			1,637			1,490		

Sheet 4	Operator	Checked	Approved
Sheets 19	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SB1-4
	Sample no.	,
	Dept	25,3-25,6
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8					
Machine no.	1	Spec. diam.	87,40	Height	24,90	mm
Cell no.	1	Lever ratio	1:10	Area	5999,47	mm^2
Ring no.	1	**1kg** on hanger gives pressure of			21,60	кPa

LOADING/UNLOADING/RELOADING

Increment no.					10			11			12		
Date started					16.07.2011			17.07.2011			18.07.2011		
Load kg					0,008			0,004			0,001		
Pressure kPa					50,0			25,0			3,6		
Mean daily temperature 22 ^{0} C					RELOADING			RELOADING			RELOADING		
Elapsed time				t^0	Clock time	Gauge reading	Cumulative compression mm ΔH	Clock time	Gauge reading	Cumulative compression mm ΔH	Clock time	Gauge reading	Cumulative compression mm ΔH
h	m	s	t min										
0	0	0	0	22	10:15	6,566	1,566	10:15	6,471	1,471	10:15	6,424	1,424
_	_	10	0,167	22	10:15	6,575	1,575	10:15	6,464	1,464	10:15	6,414	1,414
_	_	20	0,333	22	10:15	6,574	1,574	10:15	6,462	1,462	10:15	6,414	1,414
_	_	30	0,500	22	10:15	6,574	1,574	10:15	6,460	1,460	10:15	6,414	1,414
_	_	40	0,667	22	10:15	6,572	1,572	10:15	6,460	1,460	10:15	6,413	1,413
_	_	50	0,833	22	10:15	6,570	1,570	10:15	6,460	1,460	10:15	6,413	1,413
_	0:01	_	1	22	10:16	6,570	1,570	10:16	6,460	1,460	10:16	6,412	1,412
_	0:02	_	2	22	10:17	6,565	1,565	10:17	6,460	1,460	10:17	6,409	1,409
_	0:04	_	4	22	10:19	6,559	1,559	10:19	6,459	1,459	10:19	6,405	1,405
_	0:08	_	8	22	10:23	6,545	1,545	10:23	6,455	1,455	10:23	6,401	1,401
_	0:15	_	15	22	10:30	6,531	1,531	10:30	6,452	1,452	10:30	6,396	1,396
_	0:30	_	30	22	10:45	6,516	1,516	10:45	6,448	1,448	10:45	6,392	1,392
1:00	_	_	60	21	11:15	6,499	1,499	11:15	6,444	1,444	11:15	6,388	1,388
2:00	_	_	120	21	12:15	6,486	1,486	12:15	6,440	1,440	12:15	6,383	1,383
4:00	_	_	240	21	14:15	6,475	1,475	14:15	6,436	1,436	14:15	6,379	1,379
8:00	_	_	480	20	18:15	6,468	1,468	18:15	6,434	1,434	18:15	6,377	1,377
24:00	_	_	1440	21	10:15	6,464	1,464	10:15	6,434	1,434	10:15	6,377	1,377
36:00	_	_	2160		22:15			22:15			22:15		
48:00	_	_	**2880**		10:15			10:15			10:15		
Cumulative correction **y**					0,045			0,018					
Net cumulative compression (ΔH-y)					1,419			1,416			1,377		

Sheet 5	Operator	Checked	Approved
Sheets 19	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SB1-4
	Sample no.	,
	Dept	25,3-25,6
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8				
Machine no.	1	Specimen diameter	87,40 mm	Height H_0,	24,9 mm
Cell no.	1	Height of solids Hs	14,30 mm		
Ring no.	1	Initial voids ratio e_1	0,741		

VOIDS RATIO					COMPRESSIBILITY			COEFFICIENT OF CONSOLIDATION			
					Incremental					c_v =	
Increment no.	Pressure P kPa	Cumulative compression (ΔH-y) mm	Consolidated height H=H0-(ΔH-y) mm	Voids ratio $e = \frac{H - H_s}{H_s}$	height change, δH mm	pressure change δp kPa	$m_v = \frac{\delta H}{H_i} \cdot \frac{100(}{\delta p}$ m²/MN	t_{50} min	$\bar{H} = \frac{1}{2}(H_1 + H_2)$ mm	$\frac{0.026\bar{H}^2}{t_{50}}$ m²/year	$\frac{0.111\bar{H}^2}{t_{90}}$ m²/year
0	0	0,000	24,90	0,741	0,00	0	–	–	–	–	–
1	25,0	0,085	24,82	0,735	0,09	25,0	0,14	3,39	24,86	4,74	
2	50,0	0,240	24,66	0,725	0,15	25,0	0,25	6,22	24,74	2,56	
3	100,0	0,537	24,36	0,704	0,30	50,0	0,24	6,99	24,51	2,24	
4	200,0	0,850	24,05	0,682	0,31	100,0	0,13	5,58	24,21	2,73	
5	400,0	1,258	23,64	0,653	0,41	200,0	0,08	22,66	23,85	0,65	
6	800,0	1,935	22,97	0,606	0,68	400,0	0,07	7,24	23,30	1,95	
7	400,0	1,750	23,15	0,619	-0,19	-400,0	0,02	9,96	23,06	1,39	
8	200,0	1,637	23,26	0,627	-0,11	-200,0	0,02	11,25	23,21	1,24	
9	100,0	1,490	23,41	0,637	-0,15	-100,0	0,06	24,49	23,34	0,58	
10	50,0	1,419	23,48	0,642	-0,07	-50,0	0,06	19,30	23,45	0,74	
11	25,0	1,416	23,48	0,642	0,00	-25,0	0,01	17,53	23,48	0,82	
12	3,6	1,377	23,52	0,645	-0,04	-21,4	0,08	15,66	23,50	0,92	

Sheet	6	Operator	Checked	Approved
Sheets	19	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description:	**Borehole**	BH-SB1-4
Intermediately plastic silty CLAY	**Sample no.**	,
	Dept	25,3-25,6
	Date	14.07.2011

Test method BS 1377 : Part 7 : 1990 : 8

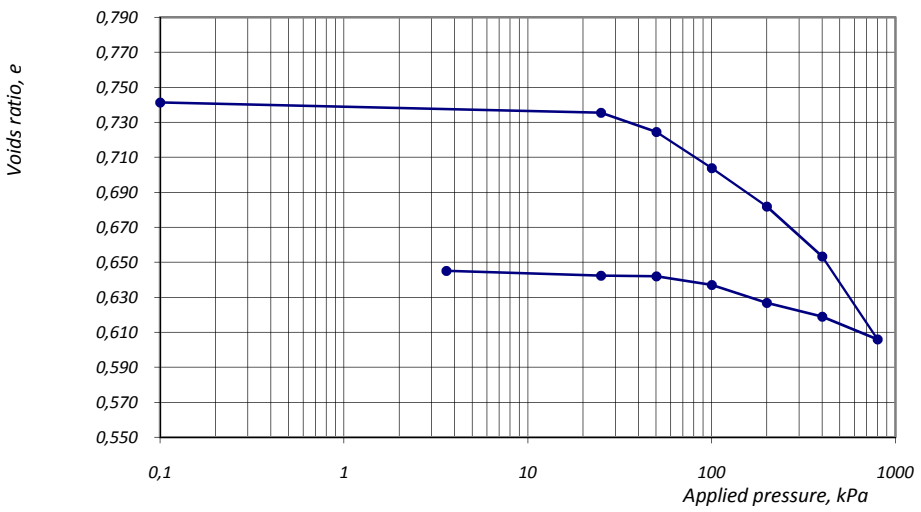
SPECIMEN INITIALLY

Diameter	87,40 mm	Density	2,00	Mg/m^3
Height	24,90 mm	Moisture content	26,7	%
Voids ratio	0,741	Dry density	1,58	Mg/m^3
Saturation	99,04 %	Particle density	2,75	Mg/m^3

Compression Index, C_c 0,017

Remarks:

Pressure stage kPa	Laboratory coefficients of: Compressibility, m_v m^2/MN	Consolidation, C_v $m^2/year$	Secondary Consolidation, C_α
0,0	-	-	-
25	0,14	4,74	3,2E-05
50	0,25	2,56	0,00081
100	0,24	2,24	0,00087
200	0,13	2,73	0,00094
400	0,08	0,65	0,00264
800	0,07	1,95	0,0037
400	0,02	1,39	0,00002
200	0,02	1,24	0,00023
100	0,06	0,58	0,00143
50	0,06	0,74	0,00051
25	0,01	0,82	0,00016
3,6	0,08	0,92	0,00039

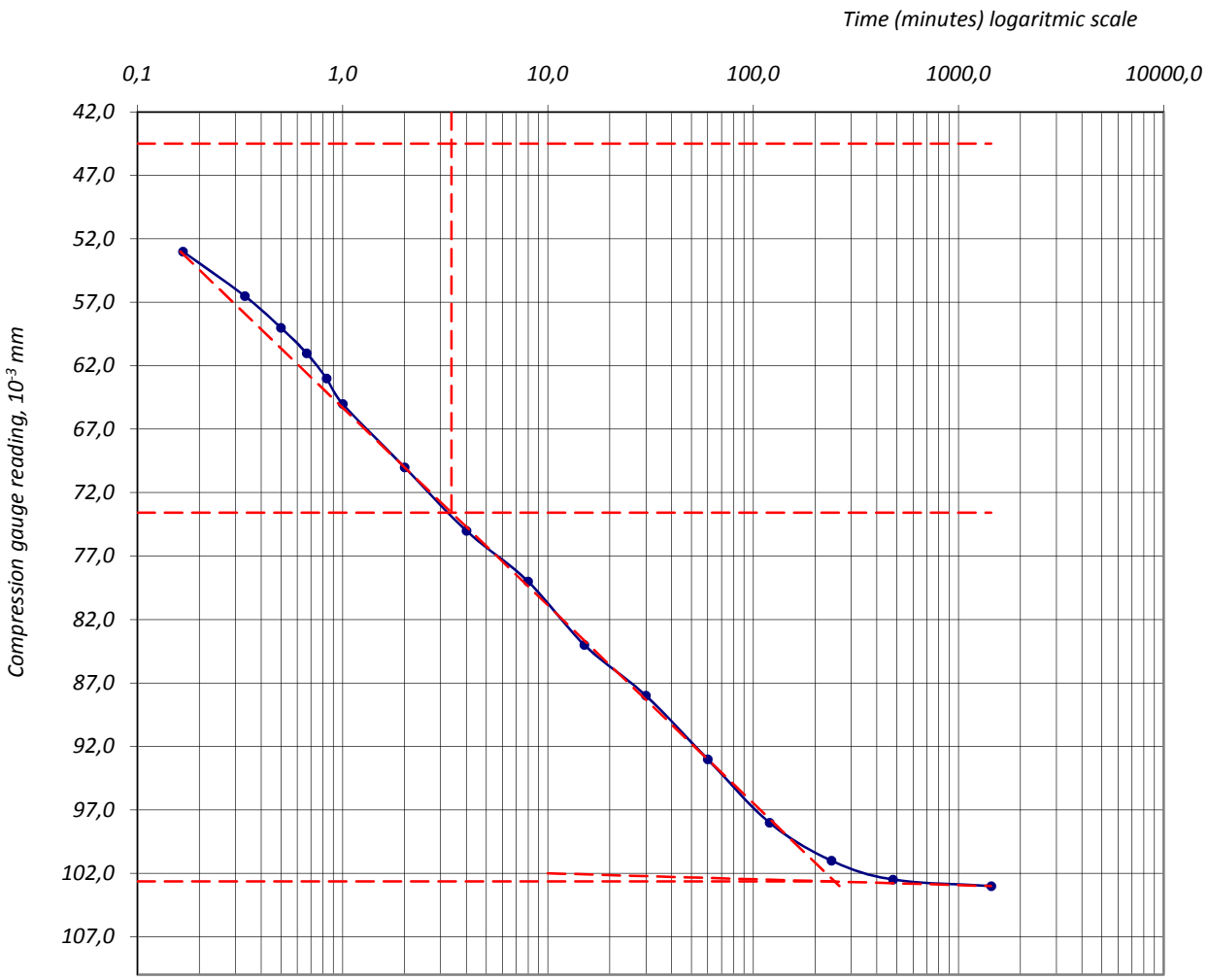


Sheet 7	Operator	Checked	Approved
Sheets 19	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Curve – Logarithm of Time Fitting Method

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SB1-4
	Sample no.	,
	Dept	25,3-25,6
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	25

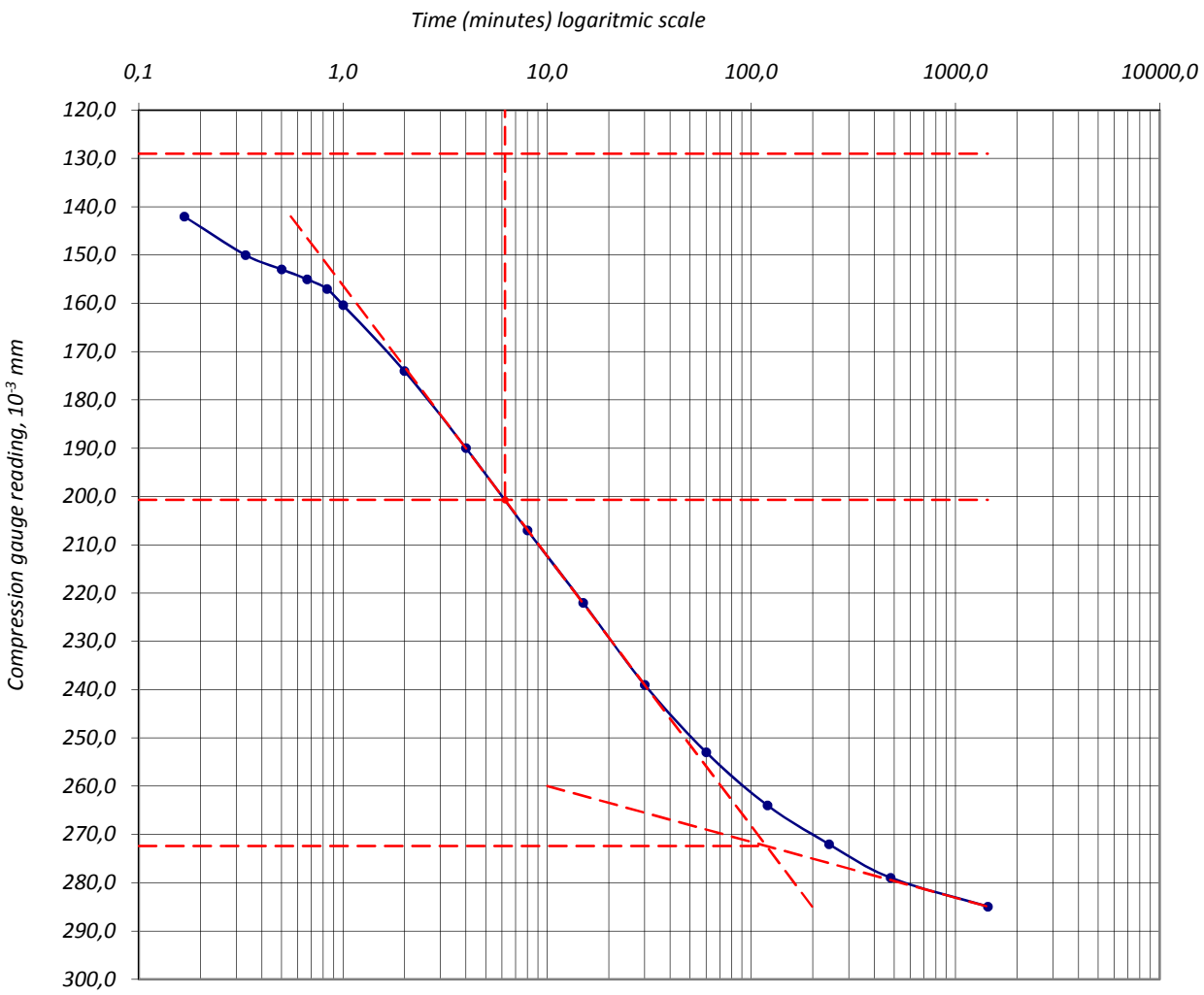


Sheet 8	Increment no. 1	Operator	Checked	Approved
Sheets 19	**LOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test (With Measurement of swelling pressure)

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description:	**Borehole**	BH-SB1-4
	Sample no.	,
Intermediately plastic silty CLAY	**Dept**	25,3-25,6
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	50

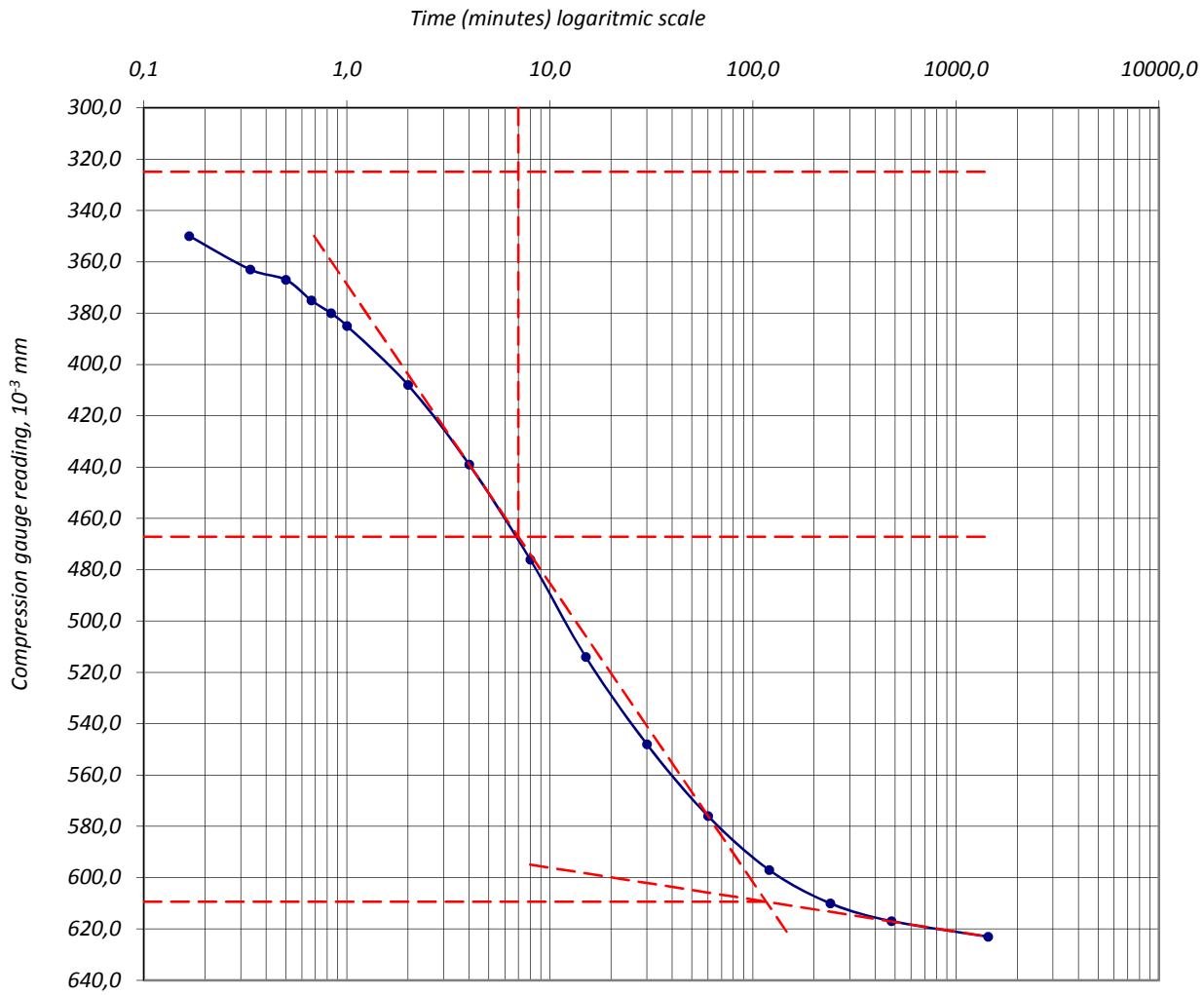


Sheet 9	Increment no. 2	Operator	Checked	Approved
Sheets 19	**LOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test (With Measurement of swelling pressure)

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SB1-4
	Sample no.	,
	Dept	25,3-25,6
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	100

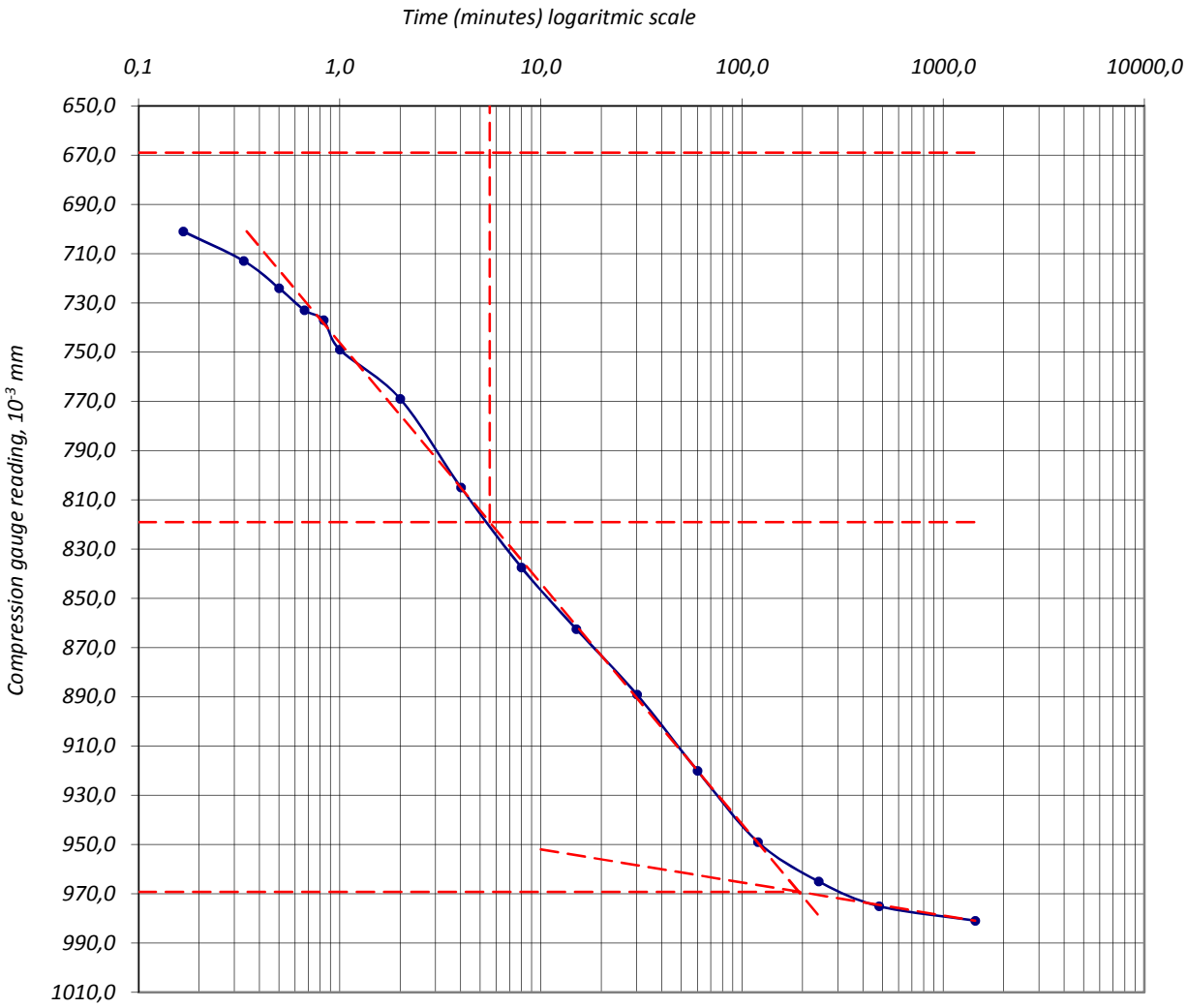


Sheet 10	Increment no. 3	Operator	Checked	Approved
Sheets 19	**LOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test (With Measurement of swelling pressure)

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SB1-4
	Sample no.	,
	Dept	25,3-25,6
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	200

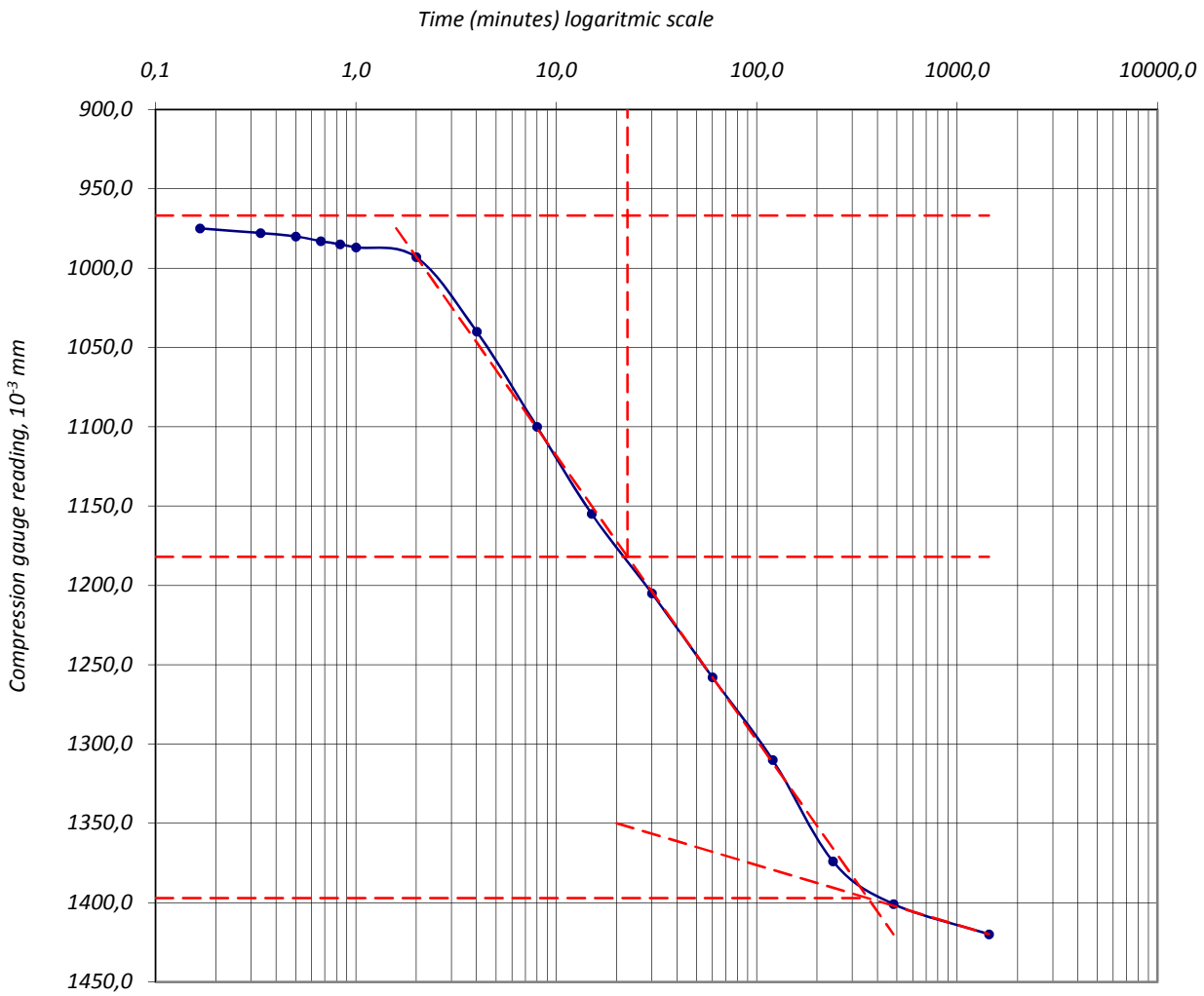


Sheet 11	Increment no. 4	Operator	Checked	Approved
Sheets 19	**LOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test (With Measurement of swelling pressure)

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SB1-4
	Sample no.	,
	Dept	25,3-25,6
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	400

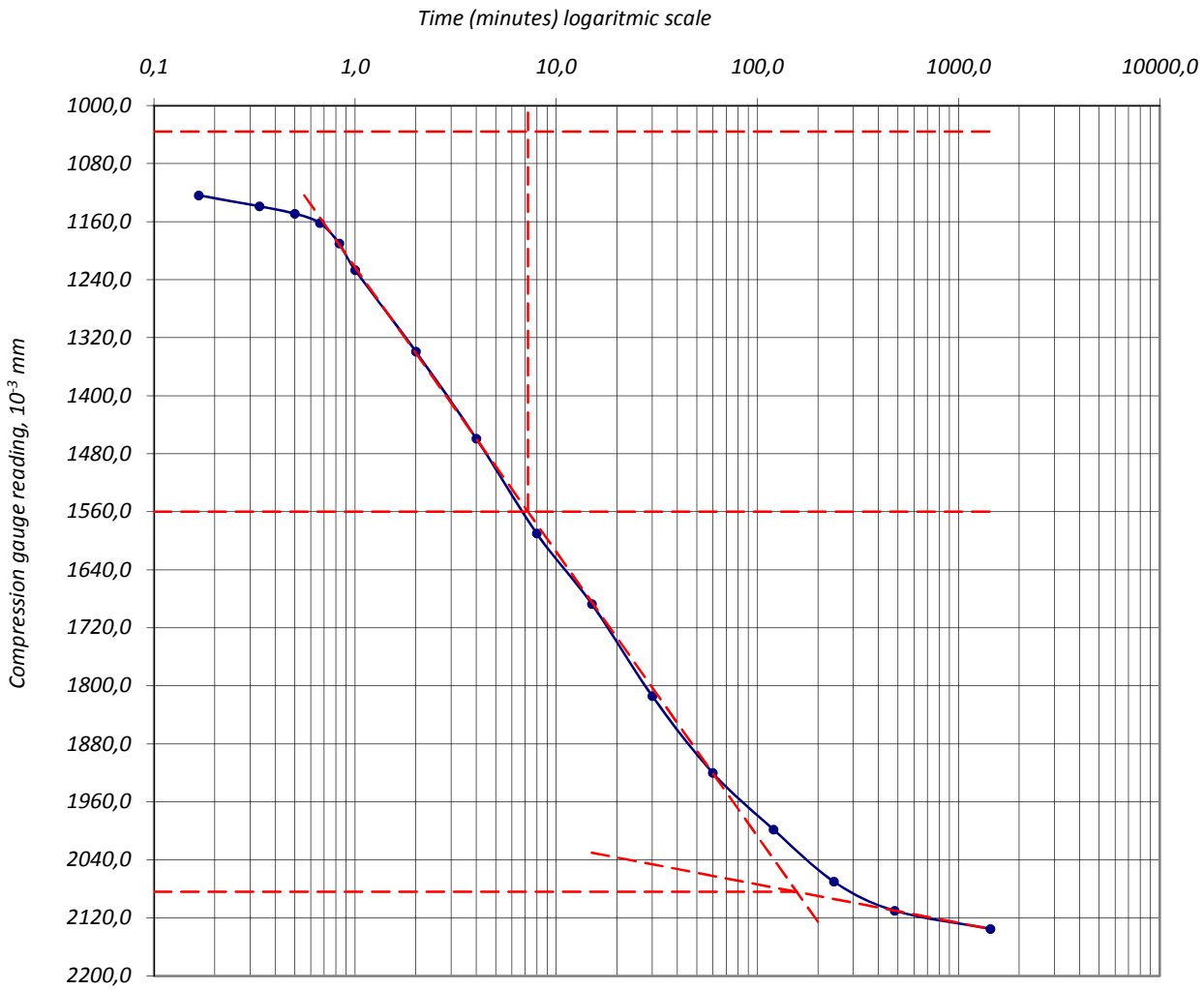


Sheet 12	Increment no. 5	Operator	Checked	Approved
Sheets 19	**LOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test (With Measurement of swelling pressure)

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SB1-4
	Sample no.	,
	Dept	25,3-25,6
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	800

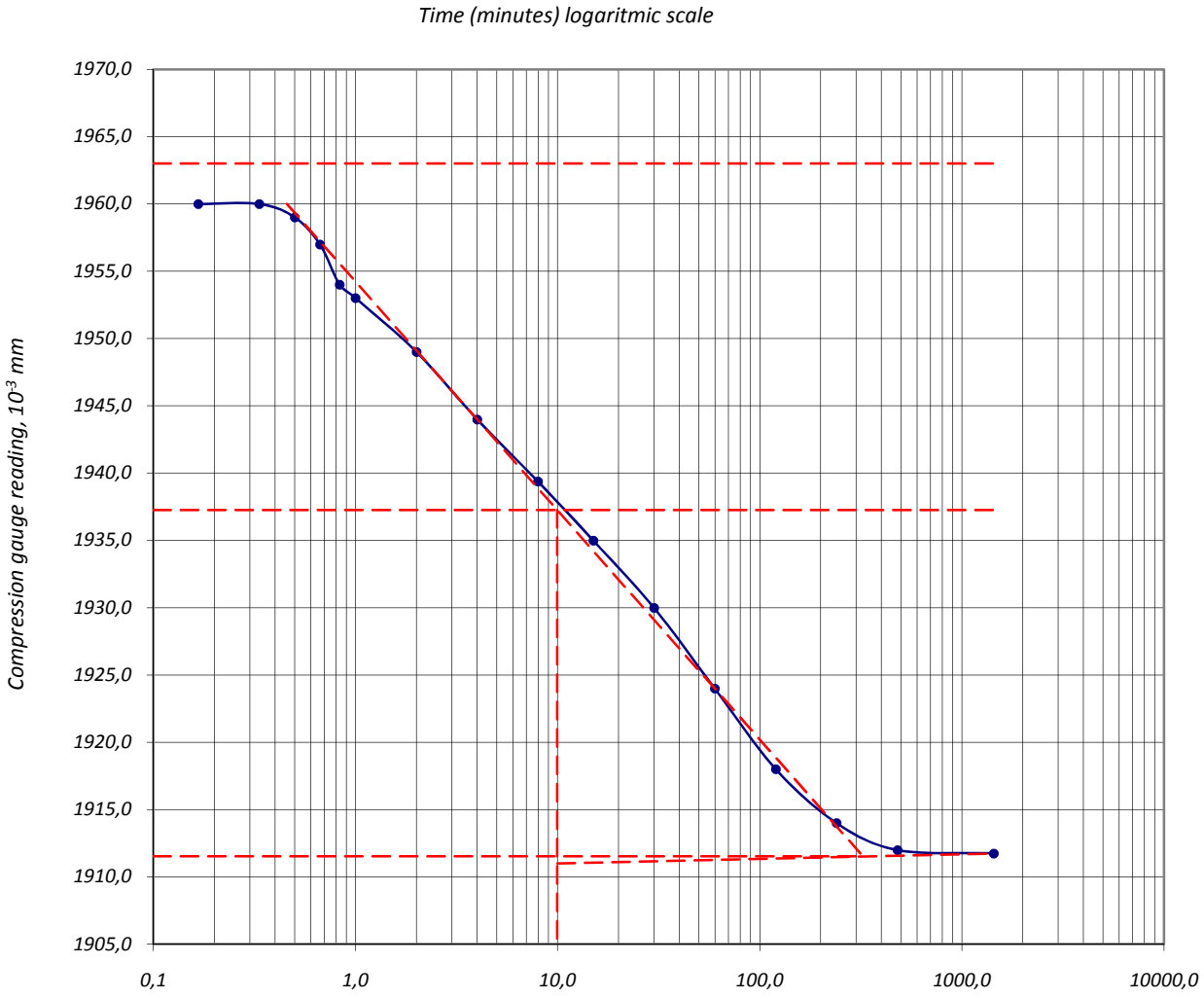


Sheet 13	Increment no. 6	Operator	Checked	Approved
Sheets 19	**UNLOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Curve – Logarithm of Time Fitting Method

Location: Imereti Region, Georgia	**Project Name:** GC-1128	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SB1-4
	Sample no.	,
	Dept	25,3-25,6
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	400

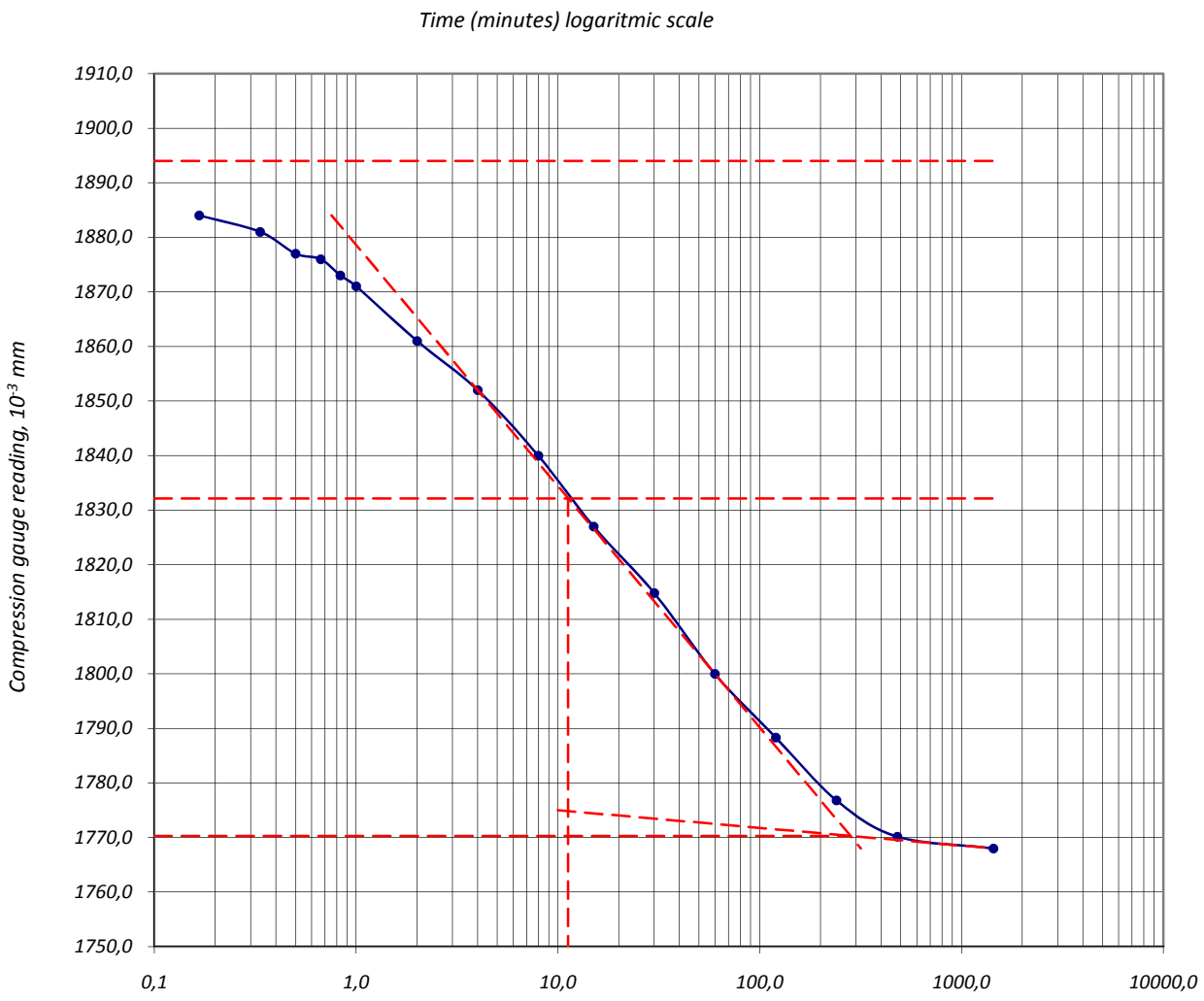


Sheet 14	Increment no. 7	Operator	Checked	Approved
Sheets 19	**UNLOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Curve – Logarithm of Time Fitting Method

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SB1-4
	Sample no.	,
	Dept	25,3-25,6
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	200

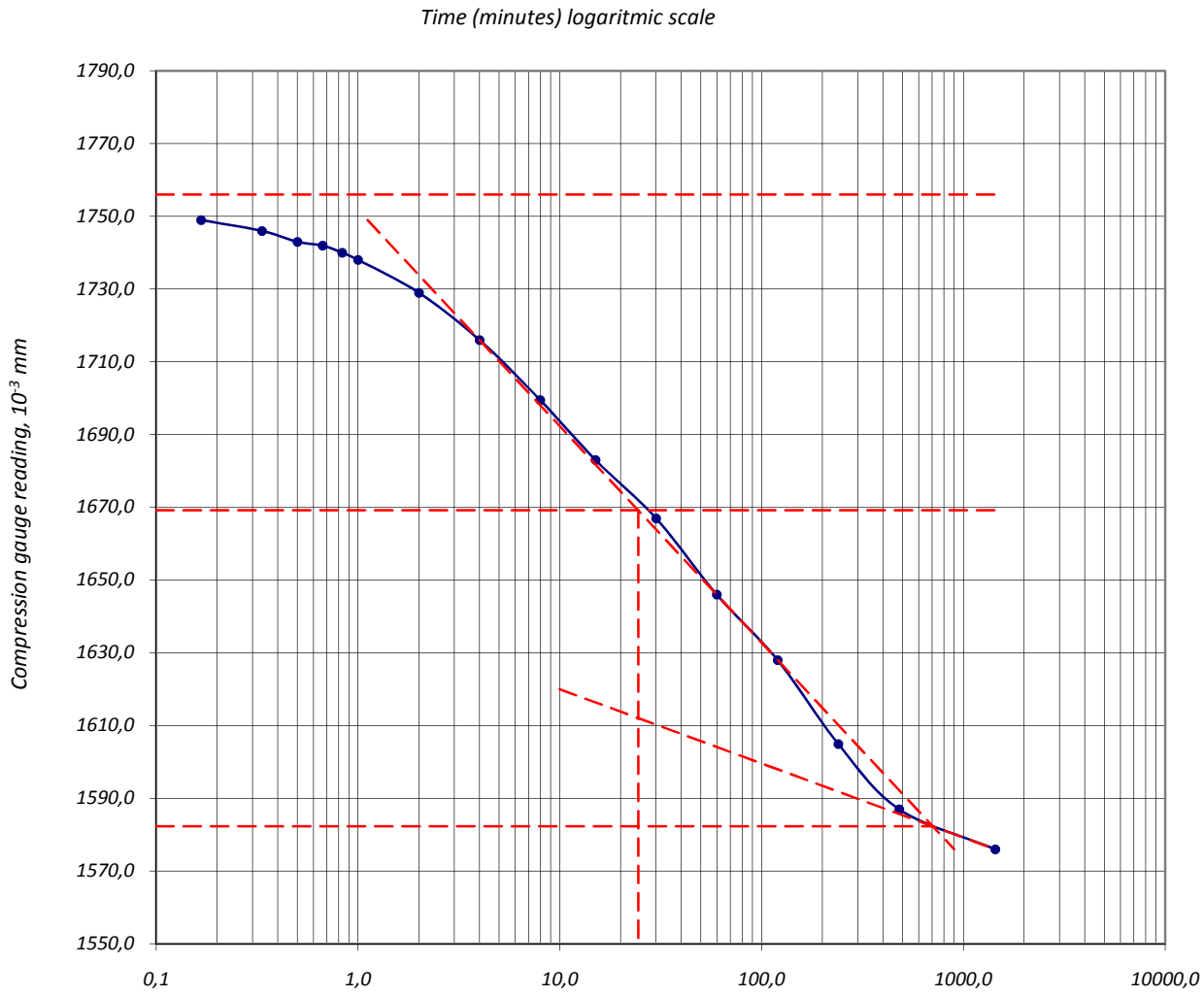


Sheet 15	Increment no. 8	Operator	Checked	Approved
Sheets 19	**UNLOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Curve – Logarithm of Time Fitting Method

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SB1-4
	Sample no.	,
	Dept	25,3-25,6
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	100

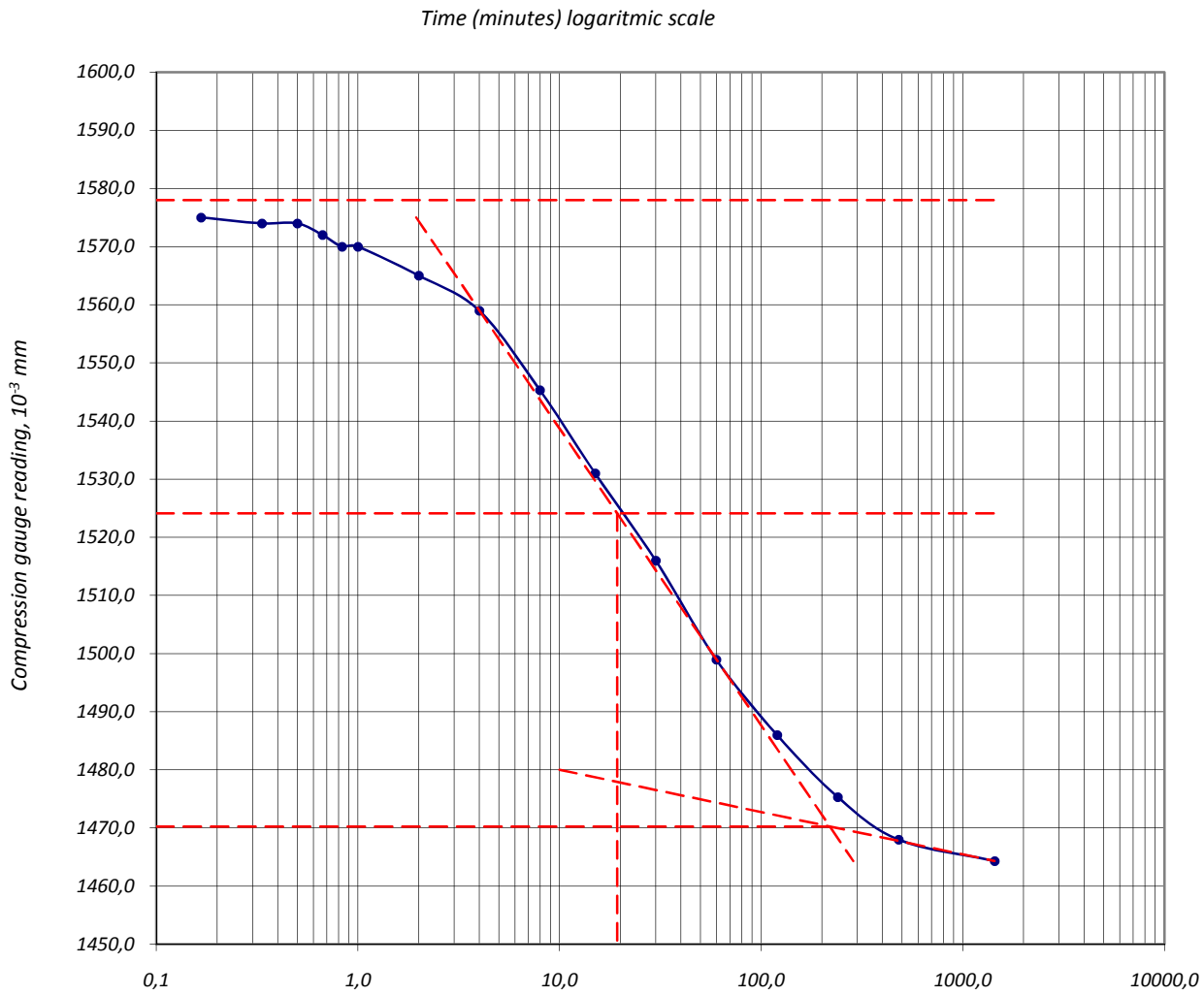


Sheet 16	Increment no. 9	Operator	Checked	Approved
Sheets 19	**RELOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Curve — Logarithm of Time Fitting Method

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SB1-4
	Sample no.	,
	Dept	25,3-25,6
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	50

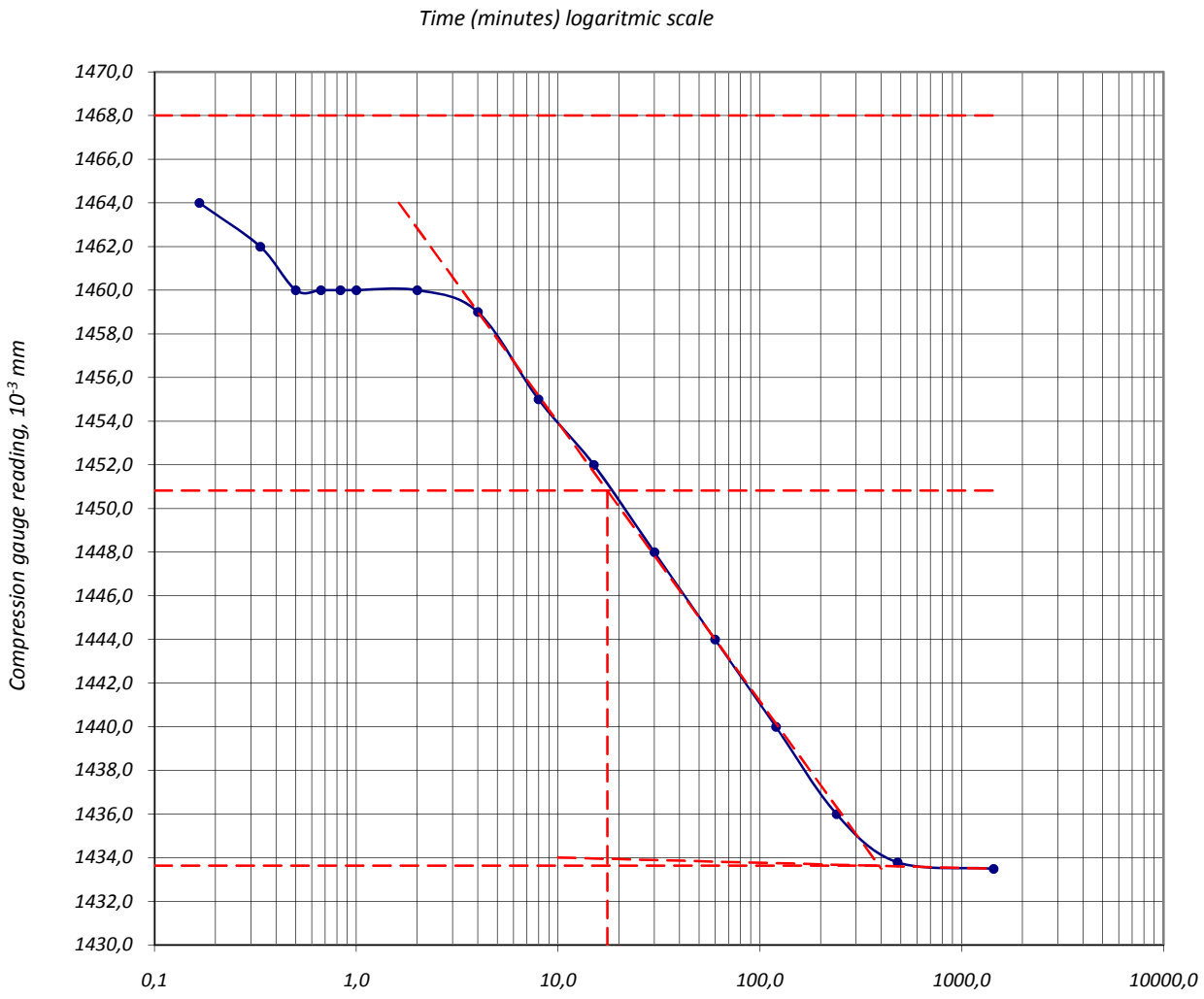


Sheet 17	Increment no. 10	Operator	Checked	Approved
Sheets 19	**RELOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Curve – Logarithm of Time Fitting Method

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SB1-4
	Sample no.	,
	Dept	25,3-25,6
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	25

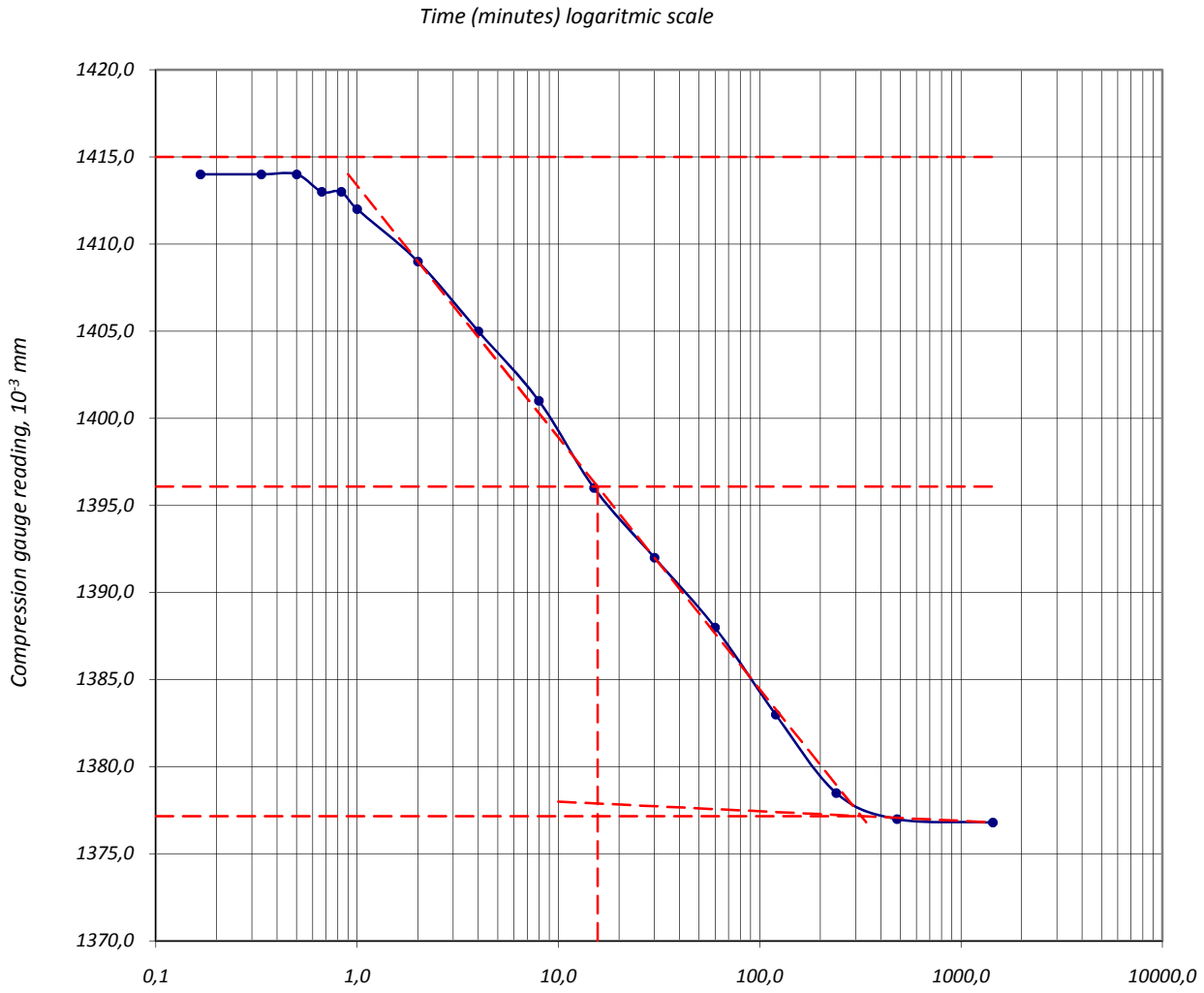


Sheet 18	Increment no. 11	Operator	Checked	Approved
Sheets 19	**RELOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Curve – Logarithm of Time Fitting Method

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty CLAY	**Borehole**	BH-SB1-4
	Sample no.	,
	Dept	25,3-25,6
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	3,6



Sheet 19	Increment no. 12	Operator	Checked	Approved
Sheets 19	**RELOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Low plastic silty sandy CLAY	**Borehole**	BH-SB3-1
	Sample no.	,
	Dept, m	27,0-27,7
	Date	25.08.2011
Test method BS1377 : Part 5 : 1990 : 3.5, 3.6		Saturated State

Cell no.	4	Particle density	
Ring no.	4	asumed	2.70 Mg/m^3

DIMENSIONS		Initial specimen	Overall change	Final specimen	Specimen preparation method
Diameter	D mm	87.10		87.10	
Area	A mm^2	5958.35		5958.35	
Height	H mm	H_o 24.90	1.666	23.234	
Volume	V cm^3	148.36	9.93	138.44	

WEIGHINGS		Initial specimen (a)	Initial specimen (b)	Final specimen (c)
Wet soil + ring + tray	g	494.00		502.00
Dry soil + ring + tray	g			450.00
Ring + tray	g	195.52		195.52
Wet soil	g	m_0 298.48	m_0 298.48	306.48
Dry soil	g		m_d 254.48	254.48
Water	g		44.00	52.00
Moisture content (measured)	%		17.29	20.43
Moisture content (from trimmings)	%	W_0 22.90		
Density	Mg/m^3	2.01	2.01	2.21
Dry density	Mg/m^3	1.64	1.72	1.84
Voids ratio		e_0 0.649	0.574	0.469
Degree of saturation	%	S_0 95.21	81.31	117.69
Height of soils	H_S mm	15.10	15.82	15.82

(a) Using moisture content from trimmings

(b) Using data from (a) and (c)

(c) Data from specimen after test

Sheet 1	**Operator**	**Checked**	**Approved**
Sheets 19	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Low plastic silty sandy CLAY	**Borehole**	BH-SB3-1
	Sample no.	,
	Dept	27,0-27,7
	Date	25.08.2011

Test method	BS 1377 : Part 7 : 1990 : 8					
Machine no.	4	Spec. diam.	87.10	Height	24.90	mm
Cell no.	4	Lever ratio	1:10	Area	5958.35	mm^2
Ring no.	4	**1kg** on hanger gives pressure of			21.60	kPa

LOADING/UNLOADING/RELOADING

Increment no.					1			2			3		
Date started					18.08.2011			19.08.2011			20.08.2011		
Load				kg	1.16			2.31			4.63		
Pressure				kPa	25.0			50.0			100.0		
Mean daily temperature 22 ^{0} C					LOADING			LOADING			LOADING		
Elapsed time				t^0	Clock time	Gauge reading	Cumulative compression mm ΔH	Clock time	Gauge reading	Cumulative compression mm ΔH	Clock time	Gauge reading	Cumulative compression mm ΔH
h	m	s	t min										
0	0	0	0	22	9:23	5.000	0.000	9:45	5.109	0.109	9:45	5.232	0.232
_	_	10	0.167	22	9:23	5.040	0.040	9:45	5.139	0.139	9:45	5.278	0.278
_	_	20	0.333	22	9:23	5.042	0.042	9:45	5.142	0.142	9:45	5.285	0.285
_	_	30	0.500	22	9:23	5.044	0.044	9:45	5.146	0.146	9:45	5.295	0.295
_	_	40	0.667	22	9:23	5.048	0.048	9:45	5.148	0.148	9:45	5.299	0.299
_	_	50	0.833	22	9:23	5.050	0.050	9:45	5.150	0.150	9:45	5.302	0.302
_	0:01	_	1	22	9:24	5.053	0.053	9:46	5.151	0.151	9:46	5.306	0.306
_	0:02	_	2	22	9:25	5.064	0.064	9:47	5.161	0.161	9:47	5.320	0.320
_	0:04	_	4	22	9:27	5.071	0.071	9:49	5.170	0.170	9:49	5.341	0.341
_	0:08	_	8	22	9:31	5.080	0.080	9:53	5.180	0.180	9:53	5.362	0.362
_	0:15	_	15	22	9:38	5.087	0.087	10:00	5.191	0.191	10:00	5.374	0.374
_	0:30	_	30	22	9:53	5.096	0.096	10:15	5.202	0.202	10:15	5.392	0.392
1:00	_	_	60	21	10:23	5.102	0.102	10:45	5.211	0.211	10:45	5.406	0.406
2:00	_	_	120	21	11:23	5.105	0.105	11:45	5.219	0.219	11:45	5.422	0.422
4:00	_	_	240	21	13:23	5.108	0.108	13:45	5.224	0.224	13:45	5.435	0.435
8:00	_	_	480	20	17:23	5.109	0.109	17:45	5.227	0.227	17:45	5.439	0.439
24:00	_	_	1440	21	9:23	5.109	0.109	9:45	5.228	0.228	9:45	5.439	0.439
36:00	_	_	2160		21:23			21:45			21:45		
48:00	_	_	**2880**		9:23			9:45			9:45		
Cumulative correction **y**					0.037			0.062			0.093		
Net cumulative compression (ΔH-y)					0.072			0.166			0.346		

Sheet 2	Operator	Checked	Approved
Sheets 19	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Low plastic silty sandy CLAY	**Borehole**	BH-SB3-1
	Sample no.	,
	Dept	27,0-27,7
	Date	25.08.2011

Test method	BS 1377 : Part 7 : 1990 : 8					
Machine no.	4	Spec. diam.	87.10	Height	24.90	mm
Cell no.	4	Lever ratio	1:10	Area	5958.35	mm^2
Ring no.	4	**1kg** on hanger gives pressure of			21.60	кPa

LOADING/UNLOADING/RELOADING

Increment no.					4			5			6		
Date started					21.08.2011			22.08.2011			23.08.2011		
Load				kg	9.259			18.519			37.037		
Pressure				kPa	200.0			400.0			800.0		
Mean daily temperature 22 ^{0} C					LOADING			LOADING			UNLOADING		
Elapsed time				t^0	Clock time	Gauge reading	Cumulative compression ΔH mm	Clock time	Gauge reading	Cumulative compression ΔH mm	Clock time	Gauge reading	Cumulative compression ΔH mm
h	m	s	t min										
0	0	0	0	22	9:45	5.434	0.434	9:45	5.755	0.755	9:45	6.183	1.183
_	_	10	0.167	22	9:45	5.514	0.514	9:45	5.880	0.880	9:45	6.340	1.340
_	_	20	0.333	22	9:45	5.525	0.525	9:45	5.895	0.895	9:45	6.370	1.370
_	_	30	0.500	22	9:45	5.534	0.534	9:45	5.915	0.915	9:45	6.390	1.390
_	_	40	0.667	22	9:45	5.545	0.545	9:45	5.925	0.925	9:45	6.400	1.400
_	_	50	0.833	22	9:45	5.555	0.555	9:45	5.940	0.940	9:45	6.415	1.415
_	0:01	_	1	22	9:46	5.560	0.560	9:46	5.955	0.955	9:46	6.425	1.425
_	0:02	_	2	22	9:47	5.595	0.595	9:47	6.000	1.000	9:47	6.475	1.475
_	0:04	_	4	22	9:49	5.631	0.631	9:49	6.024	1.024	9:49	6.521	1.521
_	0:08	_	8	22	9:53	5.658	0.658	9:53	6.046	1.046	9:53	6.568	1.568
_	0:15	_	15	22	10:00	5.682	0.682	10:00	6.080	1.080	10:00	6.606	1.606
_	0:30	_	30	22	10:15	5.702	0.702	10:15	6.101	1.101	10:15	6.654	1.654
1:00	_	_	60	21	10:45	5.720	0.720	10:45	6.123	1.123	10:45	6.694	1.694
2:00	_	_	120	21	11:45	5.749	0.749	11:45	6.144	1.144	11:45	6.748	1.748
4:00	_	_	240	21	13:45	5.770	0.770	13:45	6.158	1.158	13:45	6.780	1.780
8:00	_	_	480	20	17:45	5.787	0.787	17:45	6.176	1.176	17:45	6.818	1.818
24:00	_	_	1440	21	9:45	5.790	0.790	9:45	6.183	1.183	9:45	6.830	1.830
36:00	_	_	2160		21:45			21:45			21:45		
48:00	_	_	**2880**		9:45			9:45			9:45		
Cumulative correction **y**					0.122			0.145			0.164		
Net cumulative compression (ΔH-y)					0.668			1.038			1.666		

Sheet 3	Operator	Checked	Approved
Sheets 19	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Low plastic silty sandy CLAY	**Borehole**	BH-SB3-1
	Sample no.	,
	Dept	27,0-27,7
	Date	25.08.2011

Test method	BS 1377 : Part 7 : 1990 : 8					
Machine no.	4	Spec. diam.	87.10	Height	24.90	mm
Cell no.	4	Lever ratio	1:10	Area	5958.35	mm^2
Ring no.	4	**1kg** on hanger gives pressure of			21.60	кPa

LOADING/UNLOADING/RELOADING

Increment no.					7			8			9		
Date started					24.08.2011			25.08.2011			26.08.2011		
Load				kg	18.519			9.259			4.630		
Pressure				kPa	400.0			200.0			100.0		
Mean daily temperature 22 ^{0} C					UNLOADING			UNLOADING			UNLOADING		
Elapsed time				t^0	Clock time	Gauge reading	Cumulative compression mm ΔH	Clock time	Gauge reading	Cumulative compression mm ΔH	Clock time	Gauge reading	Cumulative compression mm ΔH
h	m	s	t min										
0	0	0	0	22	9:45	6.680	1.680	10:15	6.652	1.652	10:15	6.589	1.589
_	_	10	0.167	22	9:45	6.675	1.675	10:15	6.617	1.617	10:15	6.565	1.565
_	_	20	0.333	22	9:45	6.674	1.674	10:15	6.614	1.614	10:15	6.563	1.563
_	_	30	0.500	22	9:45	6.672	1.672	10:15	6.611	1.611	10:15	6.561	1.561
_	_	40	0.667	22	9:45	6.671	1.671	10:15	6.610	1.610	10:15	6.560	1.560
_	_	50	0.833	22	9:45	6.669	1.669	10:15	6.609	1.609	10:15	6.559	1.559
_	0:01	_	1	22	9:46	6.668	1.668	10:16	6.608	1.608	10:16	6.558	1.558
_	0:02	_	2	22	9:47	6.666	1.666	10:17	6.604	1.604	10:17	6.554	1.554
_	0:04	_	4	22	9:49	6.664	1.664	10:19	6.601	1.601	10:19	6.549	1.549
_	0:08	_	8	22	9:53	6.662	1.662	10:23	6.598	1.598	10:23	6.542	1.542
_	0:15	_	15	22	10:00	6.660	1.660	10:30	6.594	1.594	10:30	6.536	1.536
_	0:30	_	30	22	10:15	6.658	1.658	10:45	6.591	1.591	10:45	6.530	1.530
1:00	_	_	60	21	10:45	6.656	1.656	11:15	6.587	1.587	11:15	6.526	1.526
2:00	_	_	120	21	11:45	6.654	1.654	12:15	6.584	1.584	12:15	6.522	1.522
4:00	_	_	240	21	13:45	6.653	1.653	14:15	6.582	1.582	14:15	6.519	1.519
8:00	_	_	480	20	17:45	6.652	1.652	18:15	6.580	1.580	18:15	6.516	1.516
24:00	_	_	1440	21	9:45	6.652	1.652	10:15	6.579	1.579	10:15	6.515	1.515
36:00	_	_	2160		21:45			22:15			22:15		
48:00	_	_	**2880**		9:45			10:15			10:15		
Cumulative correction **y**					0.145			0.122			0.093		
Net cumulative compression (ΔH-y)					1.507			1.457			1.422		

Sheet 4	Operator	Checked	Approved
Sheets 19	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Low plastic silty sandy CLAY	**Borehole**	BH-SB3-1
	Sample no.	,
	Dept	27,0-27,7
	Date	25.08.2011

Test method	BS 1377 : Part 7 : 1990 : 8					
Machine no.	4	Spec. diam.	87.10	Height	24.90	mm
Cell no.	4	Lever ratio	1:10	Area	5958.35	mm^2
Ring no.	4	**1kg** on hanger gives pressure of			21.60	кPa

LOADING/UNLOADING/RELOADING

Increment no.					10			11			12		
Date started					27.08.2011			28.08.2011			29.08.2011		
Load kg					0.008			0.004			0.001		
Pressure kPa					50.0			25.0			3.6		
Mean daily temperature 22 ^{0} C					UNLOADING			RELOADING			RELOADING		
Elapsed time				t^0	Clock time	Gauge reading	Cumulative compression ΔH mm	Clock time	Gauge reading	Cumulative compression ΔH mm	Clock time	Gauge reading	Cumulative compression ΔH mm
h	m	s	t min										
0	0	0	0	22	10:15	6.515	1.515	10:15	6.467	1.467	10:15	6.412	1.412
_	_	10	0.167	22	10:15	6.503	1.503	10:15	6.454	1.454	10:15	6.400	1.400
_	_	20	0.333	22	10:15	6.501	1.501	10:15	6.453	1.453	10:15	6.398	1.398
_	_	30	0.500	22	10:15	6.500	1.500	10:15	6.450	1.450	10:15	6.390	1.390
_	_	40	0.667	22	10:15	6.500	1.500	10:15	6.448	1.448	10:15	6.386	1.386
_	_	50	0.833	22	10:15	6.499	1.499	10:15	6.445	1.445	10:15	6.383	1.383
_	0:01	_	1	22	10:16	6.498	1.498	10:16	6.443	1.443	10:16	6.381	1.381
_	0:02	_	2	22	10:17	6.492	1.492	10:17	6.440	1.440	10:17	6.377	1.377
_	0:04	_	4	22	10:19	6.487	1.487	10:19	6.436	1.436	10:19	6.374	1.374
_	0:08	_	8	22	10:23	6.485	1.485	10:23	6.432	1.432	10:23	6.370	1.370
_	0:15	_	15	22	10:30	6.482	1.482	10:30	6.429	1.429	10:30	6.368	1.368
_	0:30	_	30	22	10:45	6.480	1.480	10:45	6.425	1.425	10:45	6.364	1.364
1:00	_	_	60	21	11:15	6.477	1.477	11:15	6.422	1.422	11:15	6.361	1.361
2:00	_	_	120	21	12:15	6.474	1.474	12:15	6.418	1.418	12:15	6.357	1.357
4:00	_	_	240	21	14:15	6.471	1.471	14:15	6.413	1.413	14:15	6.352	1.352
8:00	_	_	480	20	18:15	6.468	1.468	18:15	6.410	1.410	18:15	6.349	1.349
24:00	_	_	1440	21	10:15	6.467	1.467	10:15	6.410	1.410	10:15	6.349	1.349
36:00	_	_	2160		22:15			22:15			22:15		
48:00	_	_	**2880**		10:15			10:15			10:15		
Cumulative correction **y**					0.062			0.037					
Net cumulative compression (ΔH-y)					1.405			1.373			1.349		

Sheet 5	Operator	Checked	Approved
Sheets 19	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description:	**Borehole**	BH-SB3-1
	Sample no.	,
Low plastic silty sandy CLAY	**Dept**	27,0-27,7
	Date	25.08.2011

Test method		BS 1377 : Part 7 : 1990 : 8			
Machine no.	4	Specimen diameter	87.10 mm	Height H_0,	24.9 mm
Cell no.	4	Height of solids Hs	15.10 mm		
Ring no.	4	Initial voids ratio e_1	0.649		

VOIDS RATIO					COMPRESSIBILITY			COEFFICIENT OF CONSOLIDATION			
					Incremental					c_v =	
Increment no.	Pressure P kPa	Cumulative compression (ΔH-y) mm	Consolidated height $H=H_0-(\Delta H-y)$ mm	Voids ratio $e=\frac{H-H_s}{H_s}$	height change, δH mm	pressure change δp kPa	$m_v=\frac{\delta H}{H_i}\cdot\frac{100}{\delta p}$ m^2/MN	t_{50} min	$\bar{H}=\frac{1}{2}(H_1+H_2)$ mm	$\frac{0.026\bar{H}^2}{t_{50}}$ $m^2/year$	$\frac{0.111\bar{H}^2}{t_{90}}$ $m^2/year$
0	0	0.000	24.90	0.649	0.00	0	–	–	–	–	–
1	25.0	0.072	24.83	0.645	0.07	25.0	0.12	2.99	24.86	5.38	
2	50.0	0.166	24.73	0.638	0.09	25.0	0.15	6.95	24.78	2.30	
3	100.0	0.346	24.55	0.626	0.18	50.0	0.15	5.36	24.64	2.95	
4	200.0	0.668	24.23	0.605	0.32	100.0	0.13	4.73	24.39	3.27	
5	400.0	1.038	23.86	0.581	0.37	200.0	0.08	2.35	24.05	6.40	
6	800.0	1.666	23.23	0.539	0.63	400.0	0.07	6.67	23.55	2.16	
7	400.0	1.507	23.39	0.550	-0.16	-400.0	0.02	2.41	23.31	5.87	
8	200.0	1.457	23.44	0.553	-0.05	-200.0	0.01	4.00	23.42	3.56	
9	100.0	1.422	23.48	0.555	-0.04	-100.0	0.01	8.00	23.46	1.79	
10	50.0	1.405	23.50	0.556	-0.02	-50.0	0.01	4.37	23.49	3.28	
11	25.0	1.373	23.53	0.558	-0.03	-25.0	0.05	4.78	23.51	3.00	
12	3.6	1.349	23.55	0.560	-0.02	-21.4	0.05	0.80	23.54	18.11	

Sheet	6	Operator	Checked	Approved
Sheets	19	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description:	**Borehole**	BH-SB3-1
Low plastic silty sandy CLAY	**Sample no.**	,
	Dept	27,0-27,7
	Date	25.08.2011

Test method BS 1377 : Part 7 : 1990 : 8

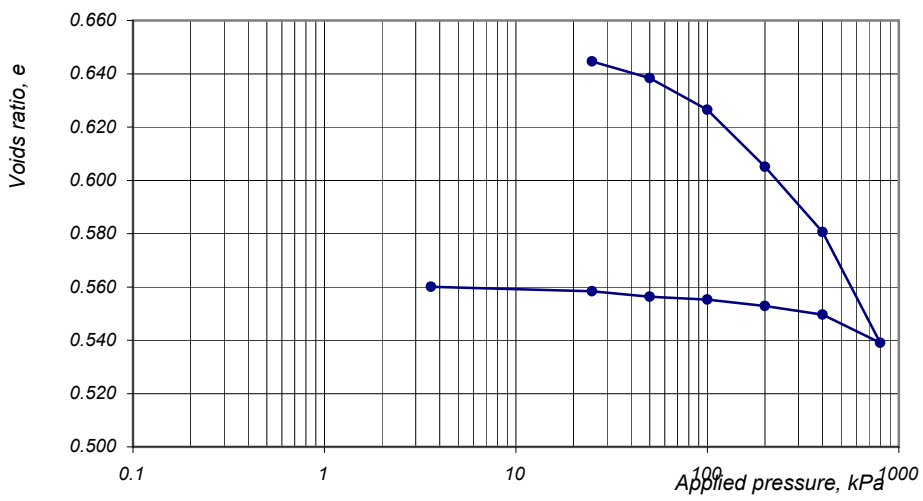
SPECIMEN INITIALLY

Diameter	87.10 mm	Density	2.01	Mg/m^3
Height	24.90 mm	Moisture content	22.9	%
Voids ratio	0.649	Dry density	1.64	Mg/m^3
Saturation	95.21 %	Particle density	2.70	Mg/m^3

Compression Index, C_c 0.009

Remarks:

Pressure stage kPa	Laboratory coefficients of: Compressibility, m_v m^2/MN	Consolidation, C_v $m^2/year$	Secondary Consolidation, C_α
0.0	-	-	-
25	0.12	5.38	3.1E-05
50	0.15	2.30	3.1E-05
100	0.15	2.95	1.6E-18
200	0.13	3.27	0.00000
400	0.08	6.40	0.00057
800	0.07	2.16	0.001
400	0.02	5.87	0.00000
200	0.01	3.56	0.00000
100	0.01	1.79	9.2E-05
50	0.01	3.28	1.4E-17
25	0.05	3.00	4.3E-05
3.6	0.05	18.11	3.1E-05

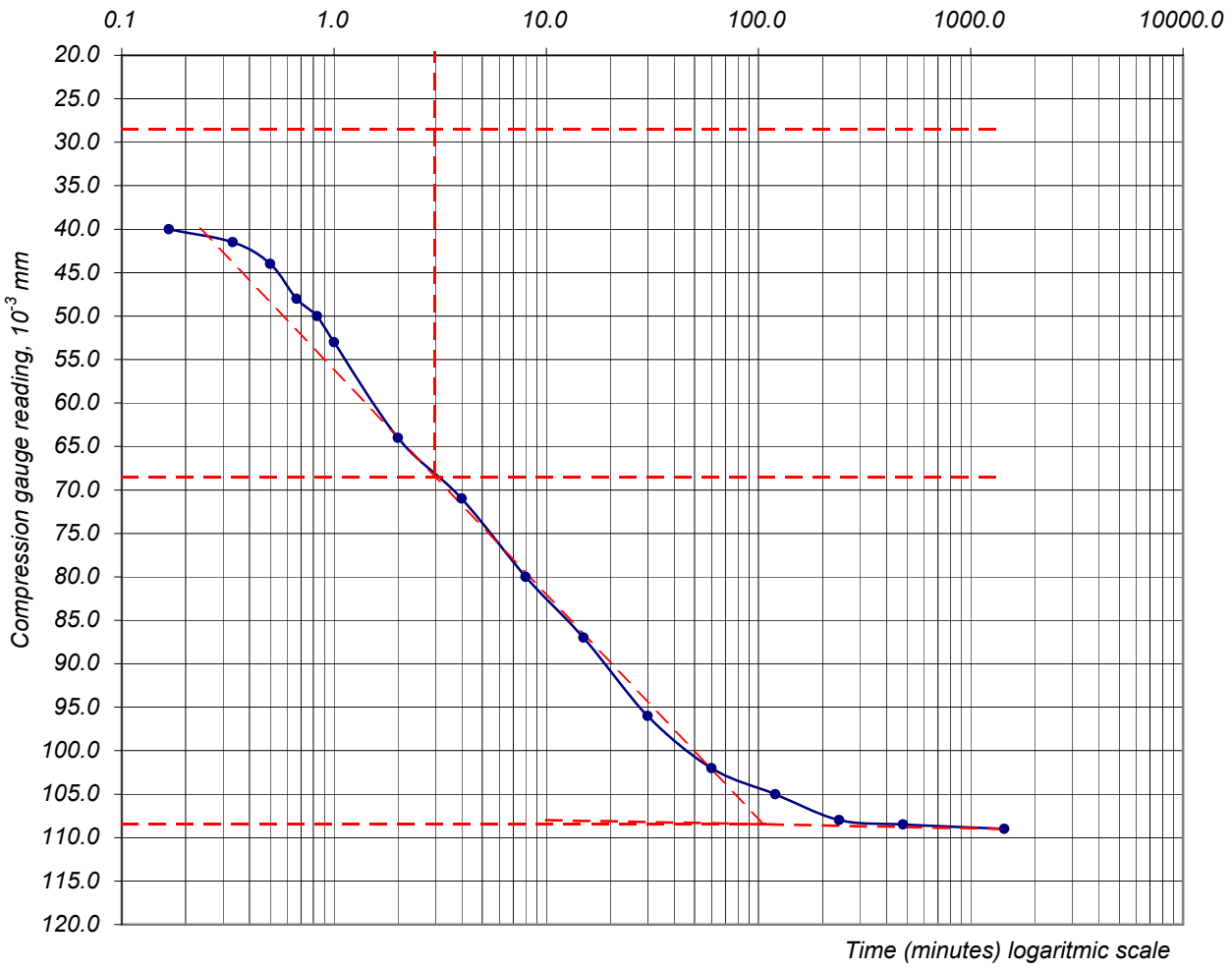


Sheet 7	Operator	Checked	Approved
Sheets 19	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Curve – Logarithm of Time Fitting Method

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Low plastic silty sandy CLAY	**Borehole**	BH-SB3-1
	Sample no.	,
	Dept	27,0-27,7
	Date	25.08.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	25

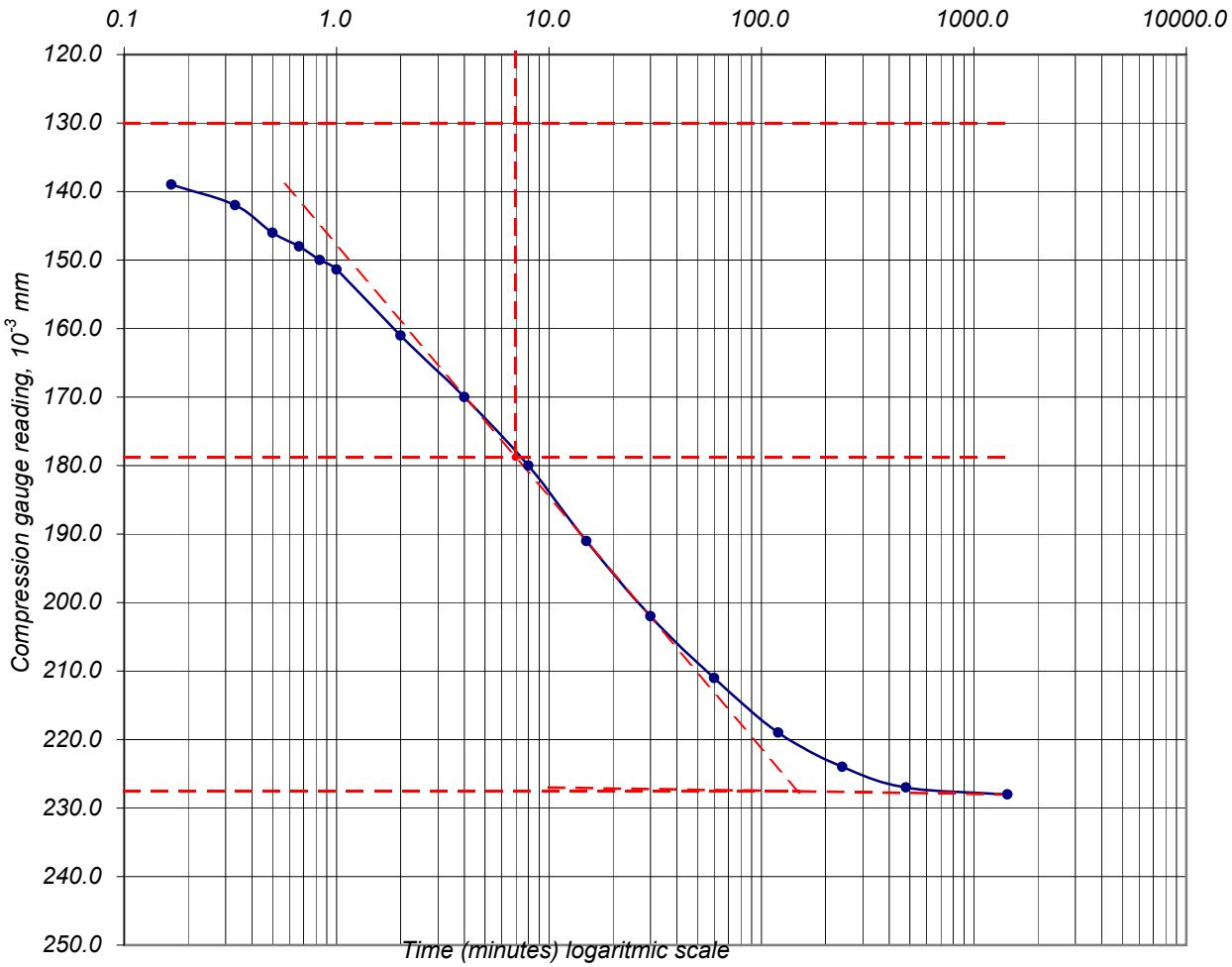


Sheet 8	Increment no. 1	Operator	Checked	Approved
Sheets 19	**LOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test (With Measurement of swelling pressure)

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Low plastic silty sandy CLAY	**Borehole**	BH-SB3-1
	Sample no.	,
	Dept	27,0-27,7
	Date	25.08.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	50

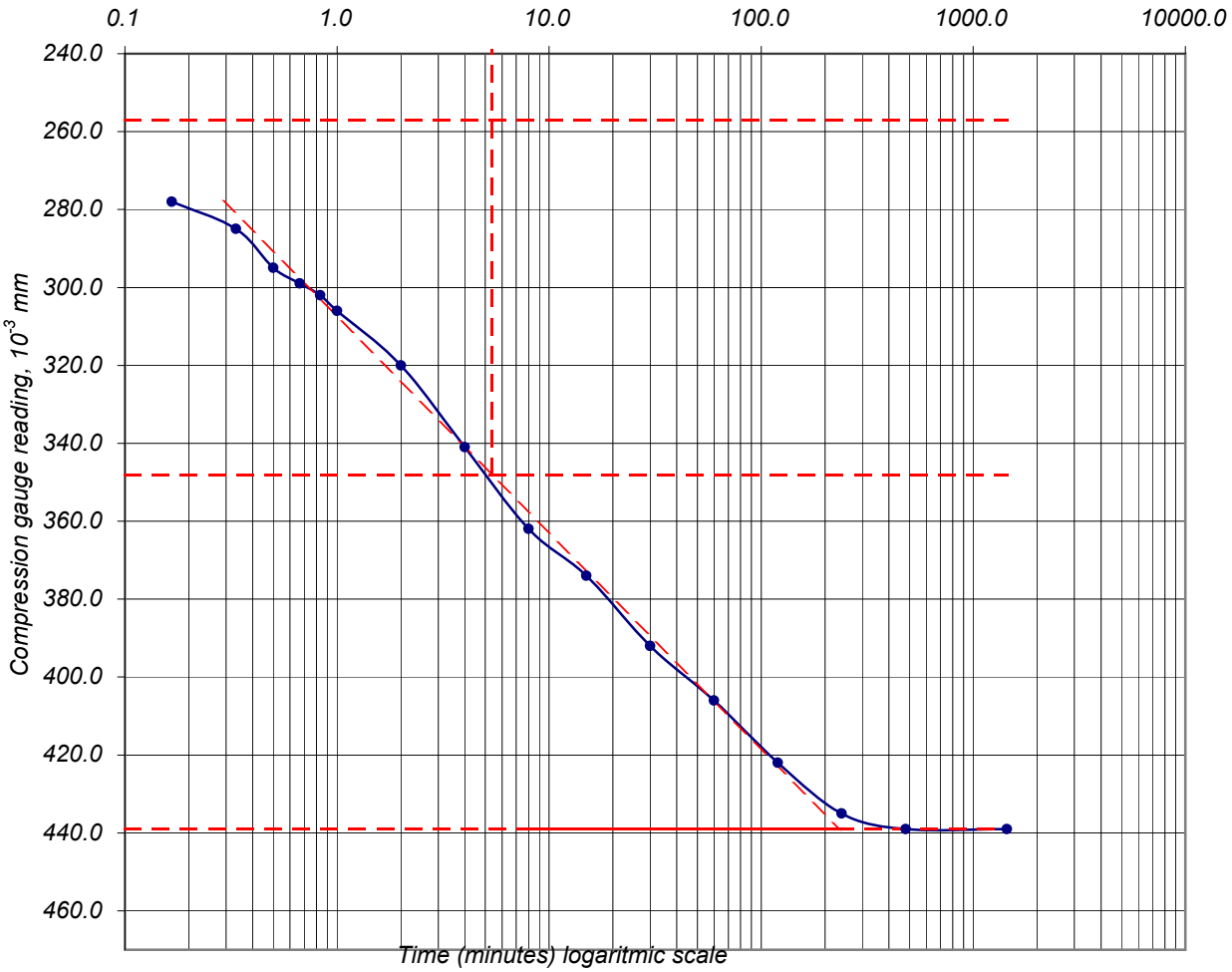


Sheet 9	Increment no. 2	Operator	Checked	Approved
Sheets 19	**LOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test (With Measurement of swelling pressure)

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Low plastic silty sandy CLAY	**Borehole**	BH-SB3-1
	Sample no.	,
	Dept	27,0-27,7
	Date	25.08.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	100

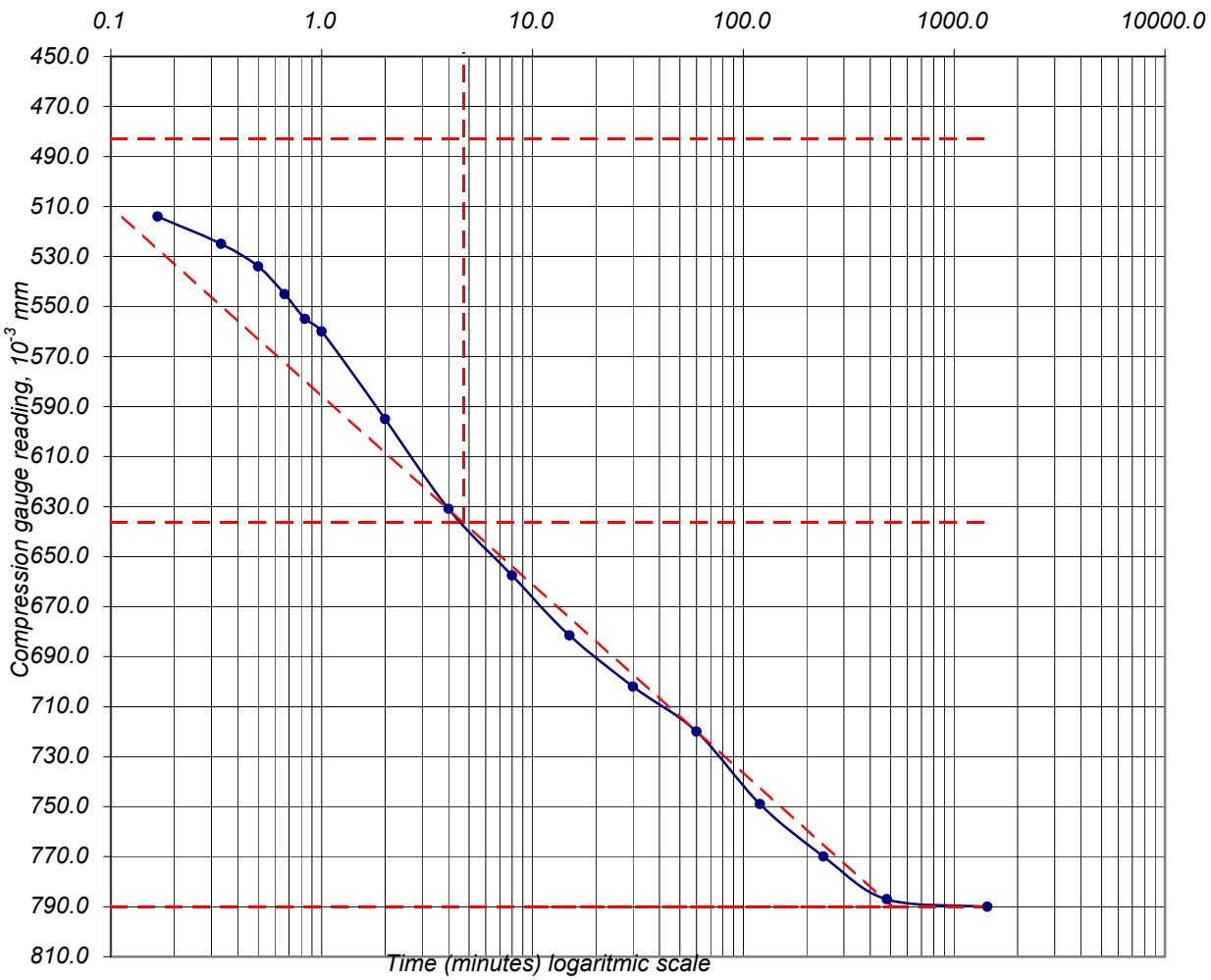


Sheet 10	Increment no. 3	Operator	Checked	Approved
Sheets 19	**LOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test (With Measurement of swelling pressure)

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Low plastic silty sandy CLAY	**Borehole**	BH-SB3-1
	Sample no.	,
	Dept	27,0-27,7
	Date	25.08.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	200

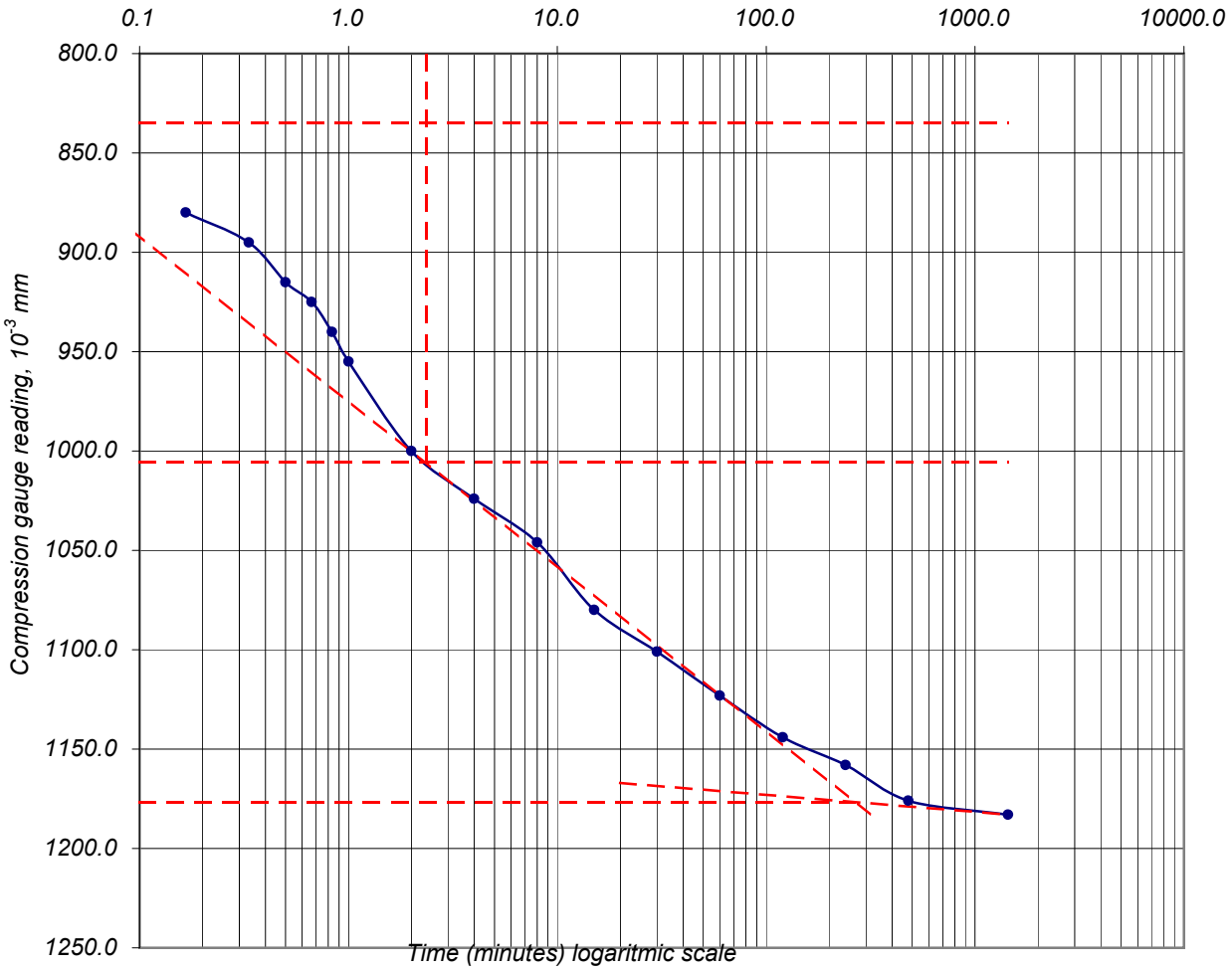


Sheet 11	Increment no. 4	Operator	Checked	Approved
Sheets 19	**LOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test (With Measurement of swelling pressure)

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Low plastic silty sandy CLAY	**Borehole**	BH-SB3-1
	Sample no.	,
	Dept	27,0-27,7
	Date	25.08.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	400

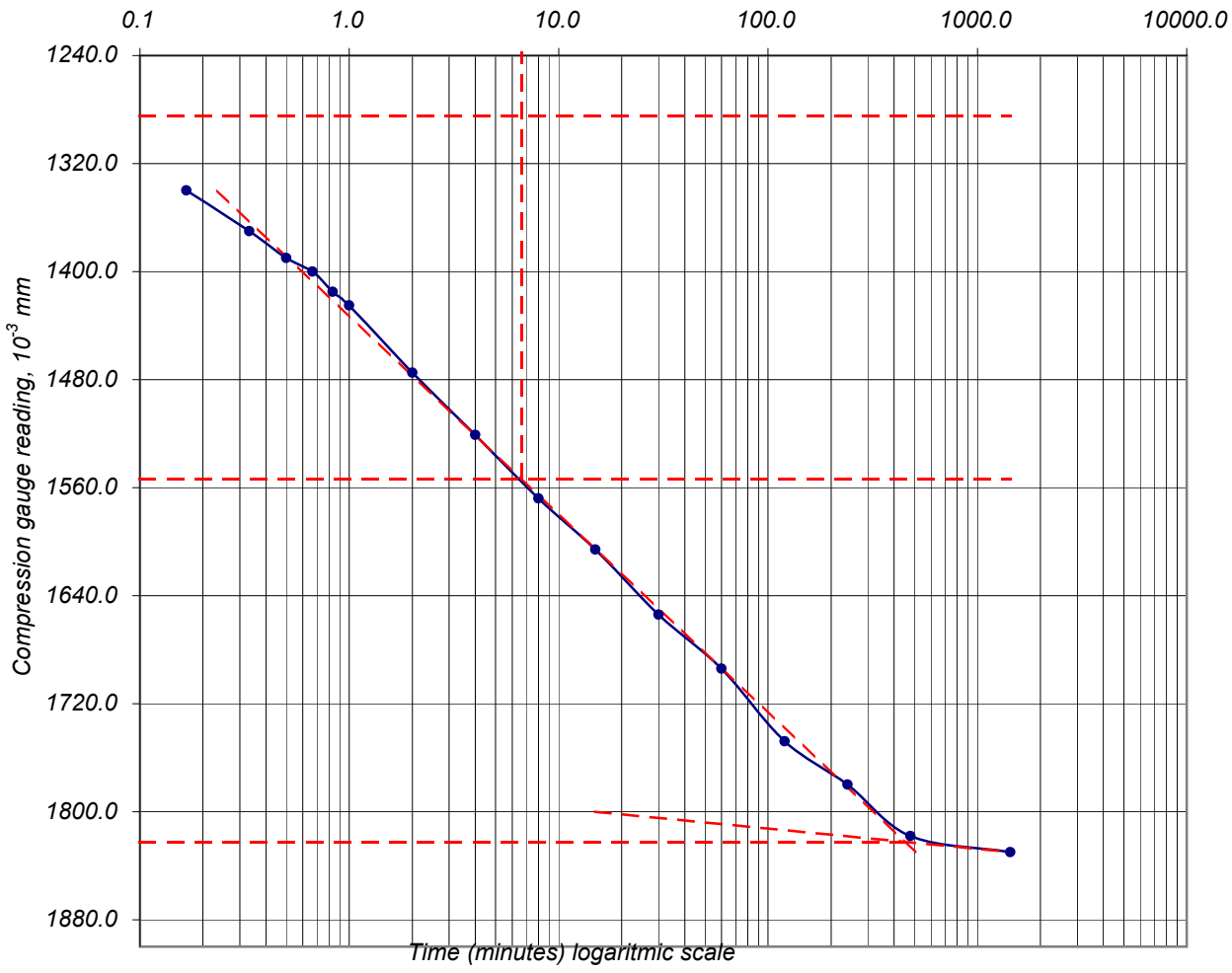


Sheet 12	Increment no. 5	Operator	Checked	Approved
Sheets 19	**LOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test (With Measurement of swelling pressure)

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Low plastic silty sandy CLAY	**Borehole**	BH-SB3-1
	Sample no.	,
	Dept	27,0-27,7
	Date	25.08.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	800

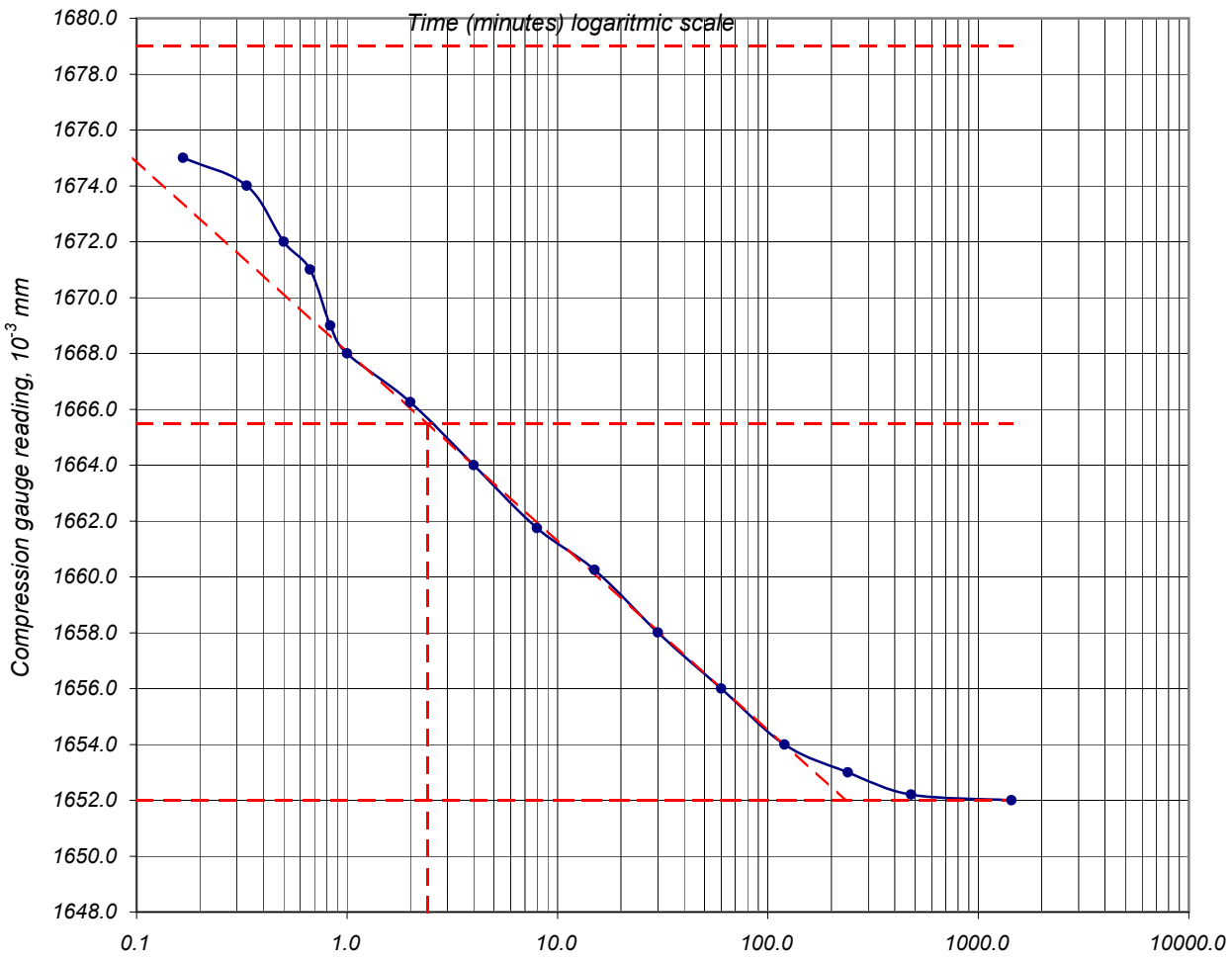


Sheet 13	Increment no. 6	Operator	Checked	Approved
Sheets 19	**UNLOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Curve – Logarithm of Time Fitting Method

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Low plastic silty sandy CLAY	**Borehole**	BH-SB3-1
	Sample no.	,
	Dept	27,0-27,7
	Date	25.08.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	400

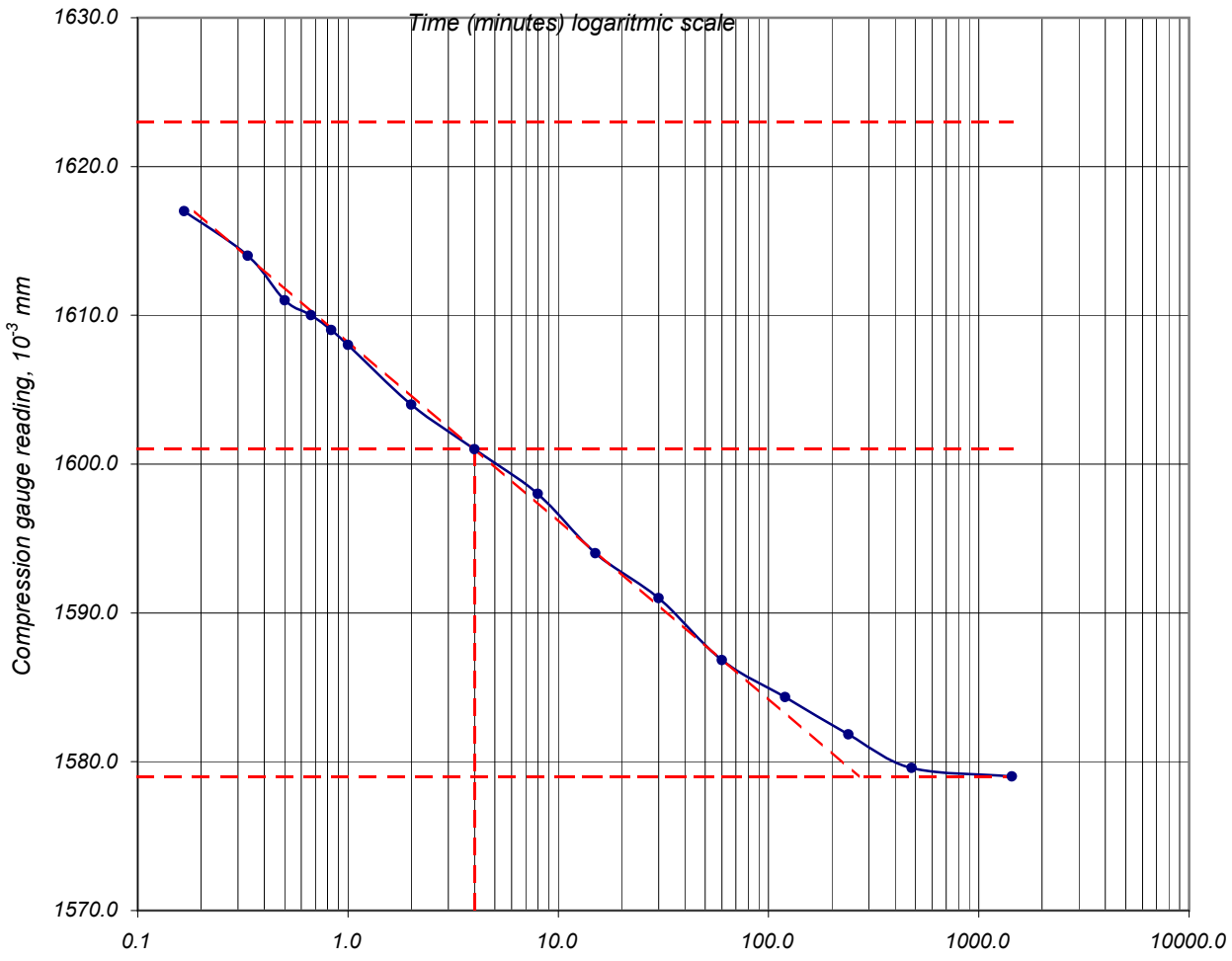


Sheet 14	Increment no. 7	Operator	Checked	Approved
Sheets 19	**UNLOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Curve – Logarithm of Time Fitting Method

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Low plastic silty sandy CLAY	**Borehole**	BH-SB3-1
	Sample no.	,
	Dept	27,0-27,7
	Date	25.08.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	200

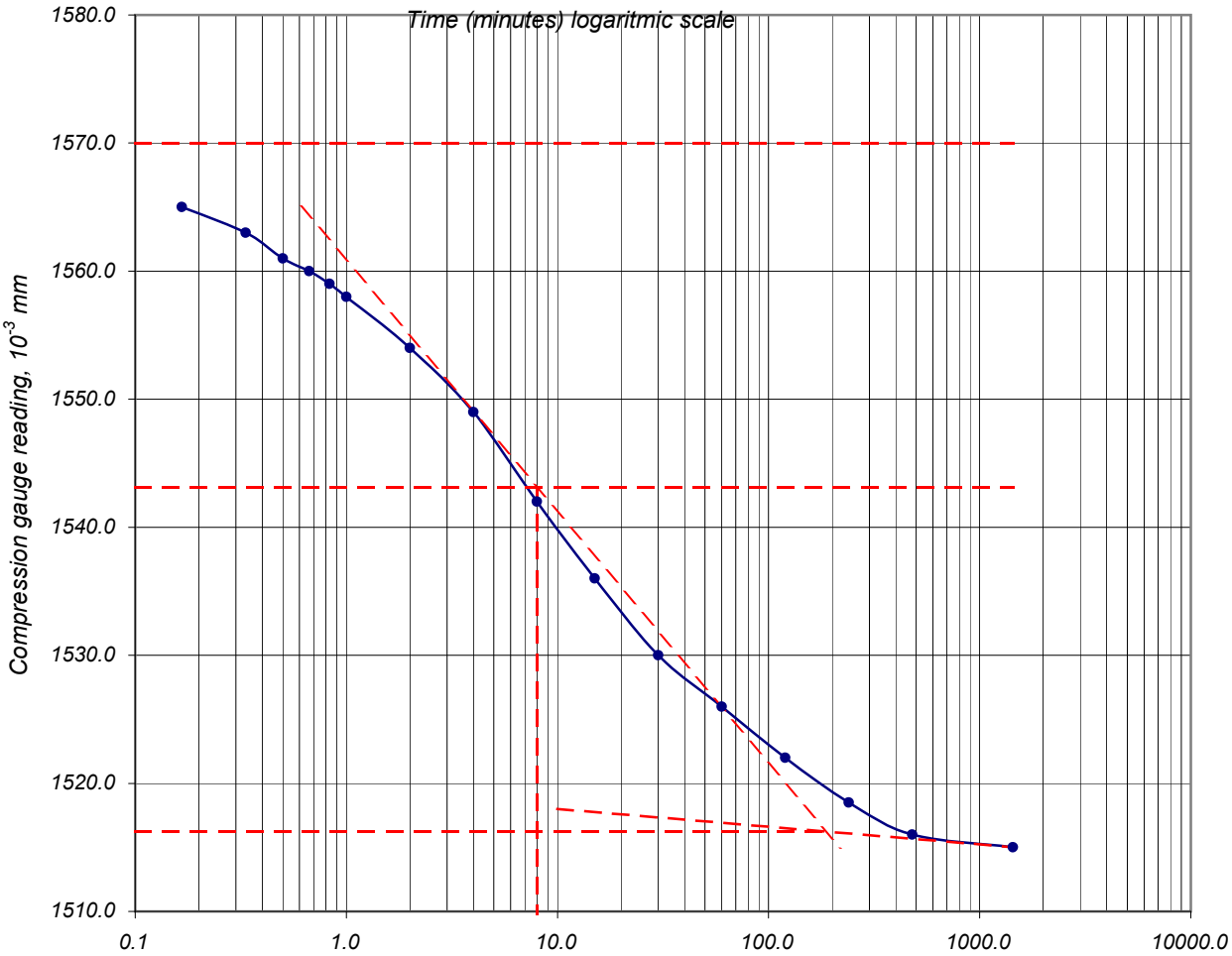


Sheet 15	Increment no. 8	Operator	Checked	Approved
Sheets 19	**UNLOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Curve – Logarithm of Time Fitting Method

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Low plastic silty sandy CLAY	**Borehole**	BH-SB3-1
	Sample no.	,
	Dept	27,0-27,7
	Date	25.08.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	100

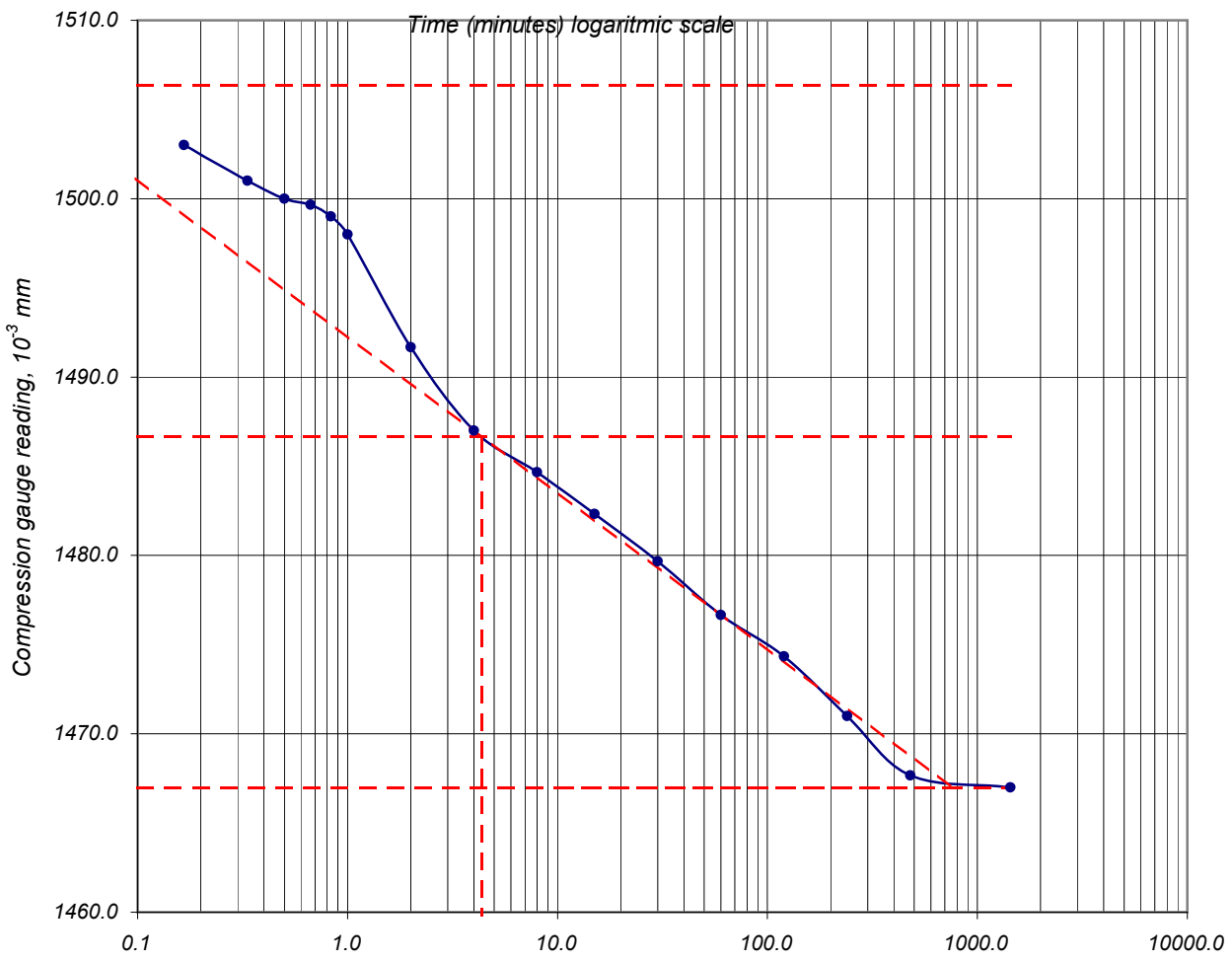


Sheet 16	Increment no. 9	Operator	Checked	Approved
Sheets 19	**UNLOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Curve – Logarithm of Time Fitting Method

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Low plastic silty sandy CLAY	**Borehole**	BH-SB3-1
	Sample no.	,
	Dept	27,0-27,7
	Date	25.08.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	50

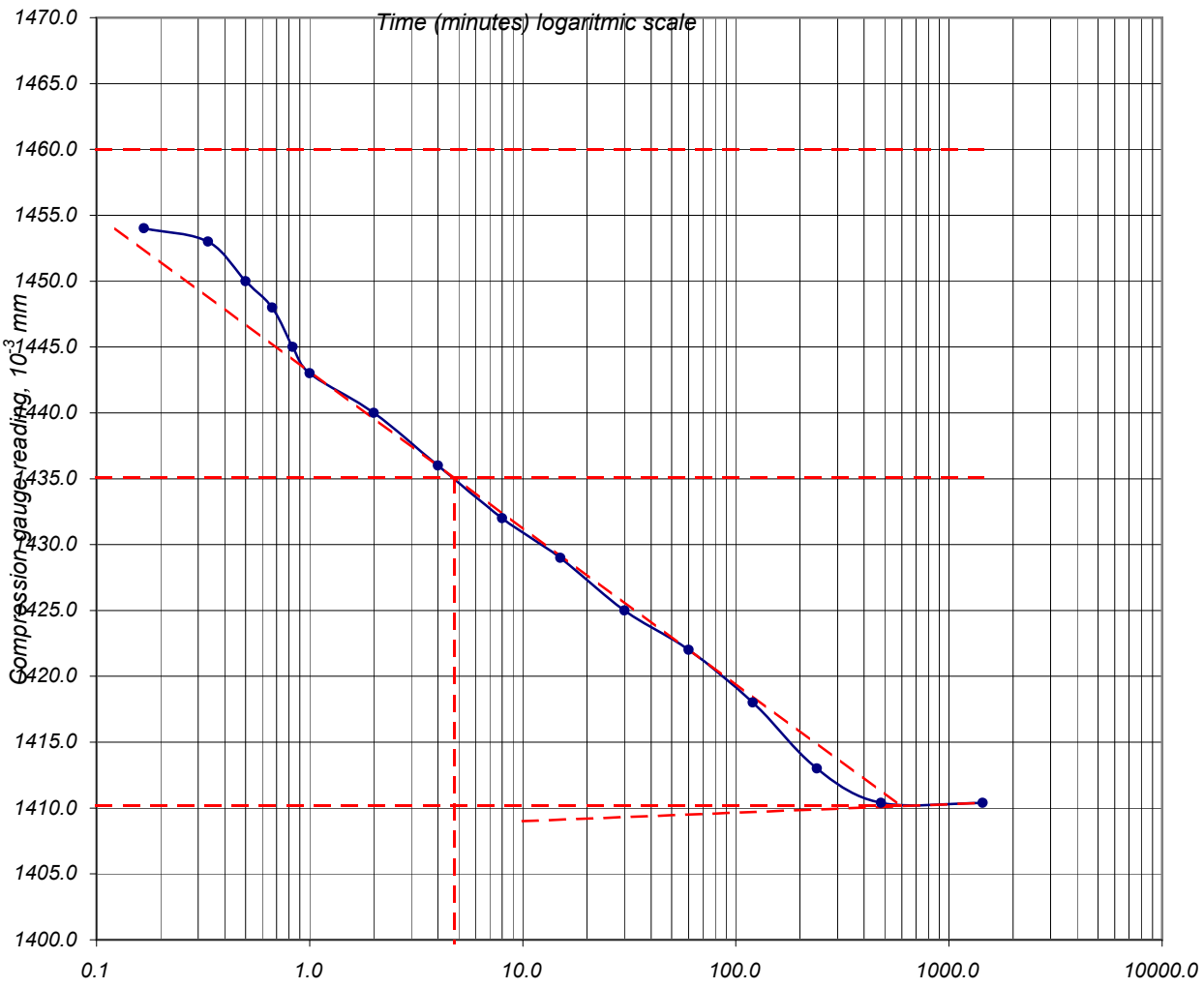


Sheet 17	Increment no. 10	Operator	Checked	Approved
Sheets 19	**UNLOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Curve – Logarithm of Time Fitting Method

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Low plastic silty sandy CLAY	**Borehole**	BH-SB3-1
	Sample no.	,
	Dept	27,0-27,7
	Date	25.08.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	25

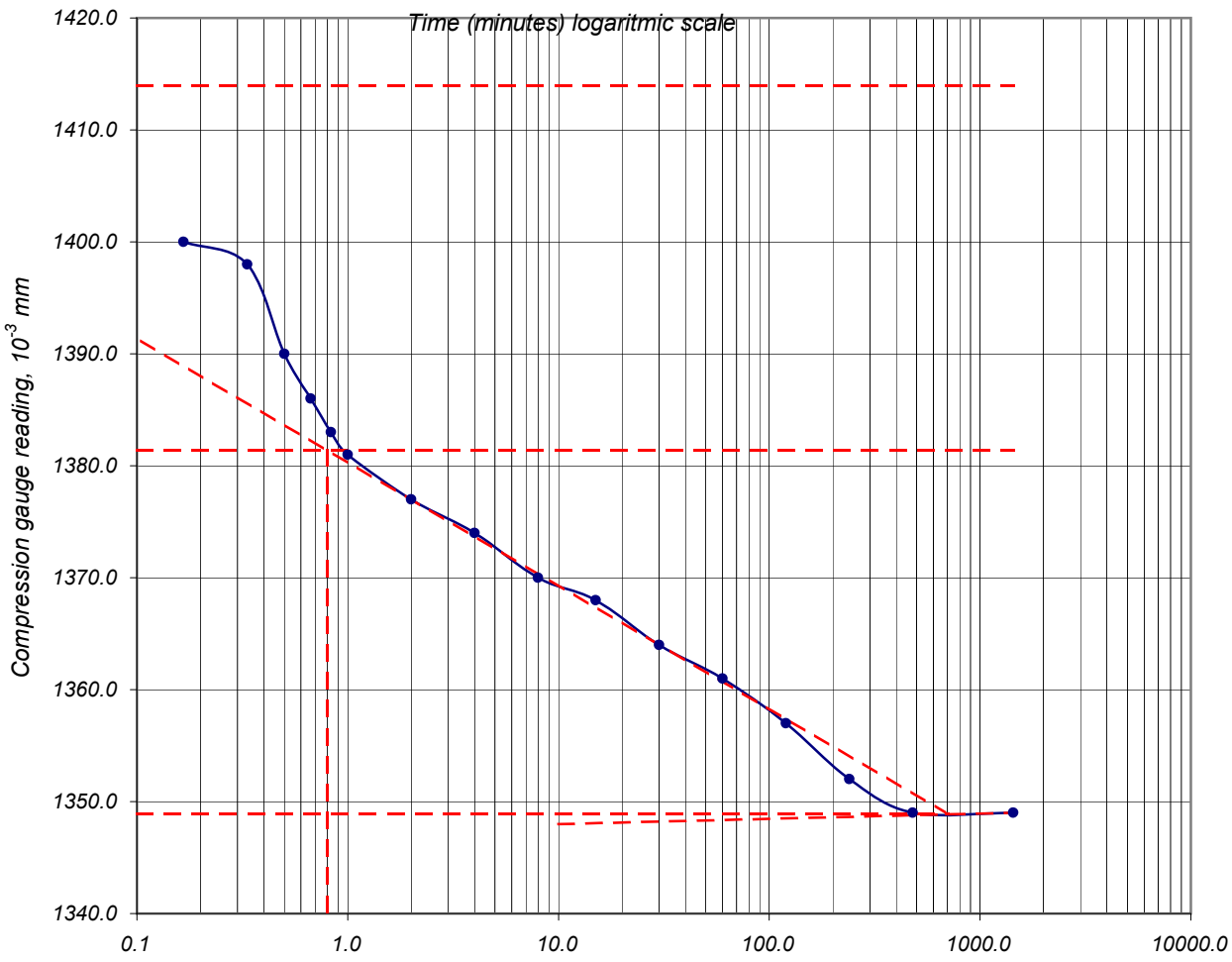


Sheet 18	Increment no. 11	Operator	Checked	Approved
Sheets 19	**RELOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Curve – Logarithm of Time Fitting Method

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Low plastic silty sandy CLAY	**Borehole**	BH-SB3-1
	Sample no.	,
	Dept	27,0-27,7
	Date	25.08.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	3.6



Sheet 19	Increment no. 12	Operator	Checked	Approved
Sheets 19	**RELOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty sandy CLAY	**Borehole**	BH-SI2-1
	Sample no.	,
	Dept, m	4,65-4,9
	Date	14.07.2011
Test method BS1377 : Part 5 : 1990 : 3.5, 3.6		Saturated State

Cell no.	1	Particle density	
Ring no.	1	asumed	2.75 Mg/m^3

DIMENSIONS		Initial specimen	Overall change	Final specimen	Specimen preparation method
Diameter	D mm	87.40		87.40	
Area	A mm^2	5999.47		5999.47	
Height	H mm	H_o 24.90	2.875	22.025	
Volume	V cm^3	149.39	17.25	132.14	

WEIGHINGS		Initial specimen (a)	Initial specimen (b)	Final specimen (c)
Wet soil + ring + tray	g	490.00		482.00
Dry soil + ring + tray	g			430.50
Ring + tray	g	191.18		191.18
Wet soil	g	m_0 298.82	m_0 298.82	290.82
Dry soil	g		m_d 239.32	239.32
Water	g		59.50	51.50
Moisture content (measured)	%		24.86	21.52
Moisture content (from trimmings)	%	W_0 26.70		
Density	Mg/m^3	2.00	2.00	2.20
Dry density	Mg/m^3	1.58	1.60	1.81
Voids ratio		e_0 0.742	0.717	0.518
Degree of saturation	%	S_0 98.98	95.41	114.16
Height of soils	H_S mm	14.30	14.51	14.51

(a) Using moisture content from trimmings

(b) Using data from (a) and (c)

(c) Data from specimen after test

Sheet 1	**Operator**	**Checked**	**Approved**
Sheets 19	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty sandy CLAY	**Borehole**	BH-SI2-1
	Sample no.	,
	Dept	4,65-4,9
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8				
Machine no.	1	Spec. diam.	87.40	Height	24.90 mm
Cell no.	1	Lever ratio	1:10	Area	5999.47 mm^2
Ring no.	1	**1kg** on hanger gives pressure of			21.60 kPa

LOADING/UNLOADING/RELOADING

Increment no.						1			2			3		
Date started						07.07.2011			08.07.2011			09.07.2011		
Load					kg	1.16			2.31			4.63		
Pressure					kPa	25.0			50.0			100.0		
Mean daily temperature 22 ^{0} C						LOADING			LOADING			LOADING		
Elapsed time					t^0	Clock time	Gauge reading	Cumulative compression mm ΔH	Clock time	Gauge reading	Cumulative compression mm ΔH	Clock time	Gauge reading	Cumulative compression mm ΔH
h	m	s	t min											
0	0	0	0	22		9:23	5.000	0.000	9:45	5.195	0.195	9:45	5.467	0.467
_	_	10	0.167	22		9:23	5.060	0.060	9:45	5.250	0.250	9:45	5.549	0.549
_	_	20	0.333	22		9:23	5.063	0.063	9:45	5.259	0.259	9:45	5.557	0.557
_	_	30	0.500	22		9:23	5.068	0.068	9:45	5.264	0.264	9:45	5.564	0.564
_	_	40	0.667	22		9:23	5.072	0.072	9:45	5.267	0.267	9:45	5.571	0.571
_	_	50	0.833	22		9:23	5.074	0.074	9:45	5.271	0.271	9:45	5.577	0.577
_	0:01	_	1	22		9:24	5.079	0.079	9:46	5.275	0.275	9:46	5.582	0.582
_	0:02	_	2	22		9:25	5.090	0.090	9:47	5.288	0.288	9:47	5.603	0.603
_	0:04	_	4	22		9:27	5.104	0.104	9:49	5.312	0.312	9:49	5.641	0.641
_	0:08	_	8	22		9:31	5.126	0.126	9:53	5.336	0.336	9:53	5.687	0.687
_	0:15	_	15	22		9:38	5.140	0.140	10:00	5.365	0.365	10:00	5.713	0.713
_	0:30	_	30	22		9:53	5.161	0.161	10:15	5.399	0.399	10:15	5.754	0.754
1:00	_	_	60	21		10:23	5.176	0.176	10:45	5.424	0.424	10:45	5.785	0.785
2:00	_	_	120	21		11:23	5.184	0.184	11:45	5.441	0.441	11:45	5.820	0.820
4:00	_	_	240	21		13:23	5.192	0.192	13:45	5.456	0.456	13:45	5.847	0.847
8:00	_	_	480	20		17:23	5.194	0.194	17:45	5.463	0.463	17:45	5.858	0.858
24:00	_	_	1440	21		9:23	5.195	0.195	9:45	5.467	0.467	9:45	5.860	0.860
36:00	_	_	2160			21:23			21:45			21:45		
48:00	_	_	**2880**			9:23			9:45			9:45		
Cumulative correction **y**						0.018			0.045			0.086		
Net cumulative compression (ΔH-y)						0.177			0.422			0.774		

Sheet 2	Operator	Checked	Approved
Sheets 19	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty sandy CLAY	**Borehole**	BH-SI2-1
	Sample no.	,
	Dept	4,65-4,9
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8					
Machine no.	1	Spec. diam.	87.40	Height	24.90	mm
Cell no.	1	Lever ratio	1:10	Area	5999.47	mm^2
Ring no.	1	**1kg** on hanger gives pressure of			21.60	кPa

LOADING/UNLOADING/RELOADING

Increment no.					4			5			6		
Date started					10.07.2011			11.07.2011			12.07.2011		
Load kg					9.259			18.519			37.037		
Pressure kPa					200.0			400.0			800.0		
Mean daily temperature 22 ^{0} C					**LOADING**			**LOADING**			**UNLOADING**		
Elapsed time				t^0	Clock time	Gauge reading	Cumulative compression ΔH mm	Clock time	Gauge reading	Cumulative compression ΔH mm	Clock time	Gauge reading	Cumulative compression ΔH mm
h	m	s	t min										
0	0	0	0	22	9:45	5.855	0.855	9:45	6.380	1.380	9:45	7.040	2.040
_	_	10	0.167	22	9:45	5.955	0.955	9:45	6.540	1.540	9:45	7.255	2.255
_	_	20	0.333	22	9:45	5.974	0.974	9:45	6.550	1.550	9:45	7.265	2.265
_	_	30	0.500	22	9:45	5.985	0.985	9:45	6.560	1.560	9:45	7.285	2.285
_	_	40	0.667	22	9:45	5.994	0.994	9:45	6.570	1.570	9:45	7.298	2.298
_	_	50	0.833	22	9:45	6.005	1.005	9:45	6.585	1.585	9:45	7.313	2.313
_	0:01	_	1	22	9:46	6.014	1.014	9:46	6.595	1.595	9:46	7.324	2.324
_	0:02	_	2	22	9:47	6.054	1.054	9:47	6.655	1.655	9:47	7.356	2.356
_	0:04	_	4	22	9:49	6.104	1.104	9:49	6.728	1.728	9:49	7.460	2.460
_	0:08	_	8	22	9:53	6.168	1.168	9:53	6.835	1.835	9:53	7.578	2.578
_	0:15	_	15	22	10:00	6.210	1.210	10:00	6.903	1.903	10:00	7.680	2.680
_	0:30	_	30	22	10:15	6.276	1.276	10:15	6.969	1.969	10:15	7.769	2.769
1:00	_	_	60	21	10:45	6.320	1.320	10:45	6.998	1.998	10:45	7.853	2.853
2:00	_	_	120	21	11:45	6.351	1.351	11:45	7.013	2.013	11:45	7.943	2.943
4:00	_	_	240	21	13:45	6.365	1.365	13:45	7.026	2.026	13:45	8.023	3.023
8:00	_	_	480	20	17:45	6.374	1.374	17:45	7.035	2.035	17:45	8.067	3.067
24:00	_	_	1440	21	9:45	6.380	1.380	9:45	7.040	2.040	9:45	8.075	3.075
36:00	_	_	2160		21:45			21:45			21:45		
48:00	_	_	**2880**		9:45			9:45			9:45		
Cumulative correction **y**					0.131			0.162			0.200		
Net cumulative compression (ΔH-y)					1.249			1.878			2.875		

Sheet 3	Operator	Checked	Approved
Sheets 19	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty sandy CLAY	**Borehole**	BH-SI2-1
	Sample no.	,
	Dept	4,65-4,9
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8					
Machine no.	1	Spec. diam.	87.40	Height	24.90	mm
Cell no.	1	Lever ratio	1:10	Area	5999.47	mm^2
Ring no.	1	**1kg** on hanger gives pressure of			21.60	кPa

LOADING/UNLOADING/RELOADING

Increment no.					7			8			9		
Date started					13.07.2011			14.07.2011			15.07.2011		
Load				kg	18.519			9.259			4.630		
Pressure				kPa	400.0			200.0			100.0		
Mean daily temperature 22 ^{0} C					UNLOADING			UNLOADING			RELOADING		
Elapsed time				t^0	Clock time	Gauge reading	Cumulative compression mm ΔH	Clock time	Gauge reading	Cumulative compression mm ΔH	Clock time	Gauge reading	Cumulative compression mm ΔH
h	m	s	t min										
0	0	0	0	22	9:45	7.925	2.925	10:15	7.904	2.904	10:15	7.755	2.755
_	_	10	0.167	22	9:45	7.959	2.959	10:15	7.872	2.872	10:15	7.733	2.733
_	_	20	0.333	22	9:45	7.957	2.957	10:15	7.870	2.870	10:15	7.730	2.730
_	_	30	0.500	22	9:45	7.953	2.953	10:15	7.867	2.867	10:15	7.729	2.729
_	_	40	0.667	22	9:45	7.948	2.948	10:15	7.862	2.862	10:15	7.726	2.726
_	_	50	0.833	22	9:45	7.946	2.946	10:15	7.860	2.860	10:15	7.723	2.723
_	0:01	_	1	22	9:46	7.944	2.944	10:16	7.859	2.859	10:16	7.721	2.721
_	0:02	_	2	22	9:47	7.936	2.936	10:17	7.849	2.849	10:17	7.713	2.713
_	0:04	_	4	22	9:49	7.930	2.930	10:19	7.830	2.830	10:19	7.702	2.702
_	0:08	_	8	22	9:53	7.925	2.925	10:23	7.816	2.816	10:23	7.684	2.684
_	0:15	_	15	22	10:00	7.920	2.920	10:30	7.800	2.800	10:30	7.668	2.668
_	0:30	_	30	22	10:15	7.916	2.916	10:45	7.781	2.781	10:45	7.651	2.651
1:00	_	_	60	21	10:45	7.911	2.911	11:15	7.768	2.768	11:15	7.629	2.629
2:00	_	_	120	21	11:45	7.905	2.905	12:15	7.763	2.763	12:15	7.608	2.608
4:00	_	_	240	21	13:45	7.904	2.904	14:15	7.758	2.758	14:15	7.595	2.595
8:00	_	_	480	20	17:45	7.904	2.904	18:15	7.755	2.755	18:15	7.590	2.590
24:00	_	_	1440	21	9:45	7.904	2.904	10:15	7.755	2.755	10:15	7.590	2.590
36:00	_	_	2160		21:45			22:15			22:15		
48:00	_	_	**2880**		9:45			10:15			10:15		
Cumulative correction **y**					0.162			0.131			0.086		
Net cumulative compression (ΔH-y)					2.742			2.624			2.504		

Sheet 4	Operator	Checked	Approved
Sheets 19	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty sandy CLAY	**Borehole**	BH-SI2-1
	Sample no.	,
	Dept	4,65-4,9
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8					
Machine no.	1	Spec. diam.	87.40	Height	24.90	mm
Cell no.	1	Lever ratio	1:10	Area	5999.47	mm^2
Ring no.	1	**1kg** on hanger gives pressure of			21.60	кPa

LOADING/UNLOADING/RELOADING

Increment no.					10			11			12		
Date started					16.07.2011			17.07.2011			18.07.2011		
Load				kg	0.008			0.004			0.001		
Pressure				kPa	50.0			25.0			3.6		
Mean daily temperature 22 ^{0} C					RELOADING			RELOADING			RELOADING		
Elapsed time				t^0	Clock time	Gauge reading	Cumulative compression ΔH mm	Clock time	Gauge reading	Cumulative compression ΔH mm	Clock time	Gauge reading	Cumulative compression ΔH mm
h	m	s	t min										
0	0	0	0	22	10:15	7.580	2.580	10:15	7.415	2.415	10:15	7.255	2.255
_	_	10	0.167	22	10:15	7.570	2.570	10:15	7.401	2.401	10:15	7.240	2.240
_	_	20	0.333	22	10:15	7.570	2.570	10:15	7.399	2.399	10:15	7.237	2.237
_	_	30	0.500	22	10:15	7.568	2.568	10:15	7.396	2.396	10:15	7.234	2.234
_	_	40	0.667	22	10:15	7.567	2.567	10:15	7.395	2.395	10:15	7.233	2.233
_	_	50	0.833	22	10:15	7.565	2.565	10:15	7.393	2.393	10:15	7.231	2.231
_	0:01	_	1	22	10:16	7.563	2.563	10:16	7.391	2.391	10:16	7.228	2.228
_	0:02	_	2	22	10:17	7.551	2.551	10:17	7.377	2.377	10:17	7.214	2.214
_	0:04	_	4	22	10:19	7.537	2.537	10:19	7.360	2.360	10:19	7.195	2.195
_	0:08	_	8	22	10:23	7.517	2.517	10:23	7.345	2.345	10:23	7.178	2.178
_	0:15	_	15	22	10:30	7.506	2.506	10:30	7.326	2.326	10:30	7.162	2.162
_	0:30	_	30	22	10:45	7.488	2.488	10:45	7.315	2.315	10:45	7.150	2.150
1:00	_	_	60	21	11:15	7.467	2.467	11:15	7.295	2.295	11:15	7.130	2.130
2:00	_	_	120	21	12:15	7.441	2.441	12:15	7.279	2.279	12:15	7.114	2.114
4:00	_	_	240	21	14:15	7.423	2.423	14:15	7.265	2.265	14:15	7.100	2.100
8:00	_	_	480	20	18:15	7.410	2.410	18:15	7.255	2.255	18:15	7.087	2.087
24:00	_	_	1440	21	10:15	7.408	2.408	10:15	7.255	2.255	10:15	7.086	2.086
36:00	_	_	2160		22:15			22:15			22:15		
48:00	_	_	**2880**		10:15			10:15			10:15		
Cumulative correction **y**					0.045			0.018					
Net cumulative compression (ΔH-y)					2.363			2.237			2.086		

Sheet 5	Operator	Checked	Approved
Sheets 19	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description:	**Borehole**	BH-SI2-1
	Sample no.	,
Intermediately plastic silty sandy CLAY	**Dept**	4,65-4,9
	Date	14.07.2011

Test method		BS 1377 : Part 7 : 1990 : 8			
Machine no.	1	Specimen diameter	87.40 mm	Height H_0,	24.9 mm
Cell no.	1	Height of solids Hs	14.30 mm		
Ring no.	1	Initial voids ratio e_1	0.742		

VOIDS RATIO					COMPRESSIBILITY			COEFFICIENT OF CONSOLIDATION			
					Incremental					c_v =	
Increment no.	Pressure P kPa	Cumulative compression (ΔH-y) mm	Consolidated height $H=H_0-(\Delta H-y)$ mm	Voids ratio $e=\frac{H-H_s}{H_s}$	height change, δH mm	pressure change δp kPa	$m_v=\frac{\delta H}{H_i}\bullet\frac{100}{\delta p}$ m^2/MN	t_{50} min	$\bar{H}=\frac{1}{2}(H_1+H_2)$ mm	$\frac{0.026\bar{H}^2}{t_{50}}$ $m^2/year$	$\frac{0.111\bar{H}^2}{t_{90}}$ $m^2/year$
0	0	0.000	24.90	0.742	0.00	0	–	–	–	–	–
1	25.0	0.177	24.72	0.729	0.18	25.0	0.28	6.36	24.81	2.52	
2	50.0	0.422	24.48	0.712	0.25	25.0	0.40	9.01	24.60	1.75	
3	100.0	0.774	24.13	0.688	0.35	50.0	0.29	10.74	24.30	1.43	
4	200.0	1.249	23.65	0.654	0.47	100.0	0.20	6.47	23.89	2.29	
5	400.0	1.878	23.02	0.610	0.63	200.0	0.13	6.45	23.34	2.20	
6	800.0	2.875	22.03	0.541	1.00	400.0	0.11	13.39	22.52	0.99	
7	400.0	2.742	22.16	0.550	-0.13	-400.0	0.02	1.54	22.09	8.26	
8	200.0	2.624	22.28	0.558	-0.12	-200.0	0.03	6.48	22.22	1.98	
9	100.0	2.504	22.40	0.567	-0.12	-100.0	0.05	15.58	22.34	0.83	
10	50.0	2.363	22.54	0.577	-0.14	-50.0	0.13	23.77	22.47	0.55	
11	25.0	2.237	22.66	0.585	-0.13	-25.0	0.22	13.56	22.60	0.98	
12	3.6	2.086	22.81	0.596	-0.15	-21.4	0.31	15.07	22.74	0.89	

Sheet	6	Operator	Checked	Approved
Sheets	19	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description:	**Borehole**	BH-SI2-1
Intermediately plastic silty sandy CLAY	**Sample no.**	,
	Dept	4,65-4,9
	Date	14.07.2011

Test method BS 1377 : Part 7 : 1990 : 8

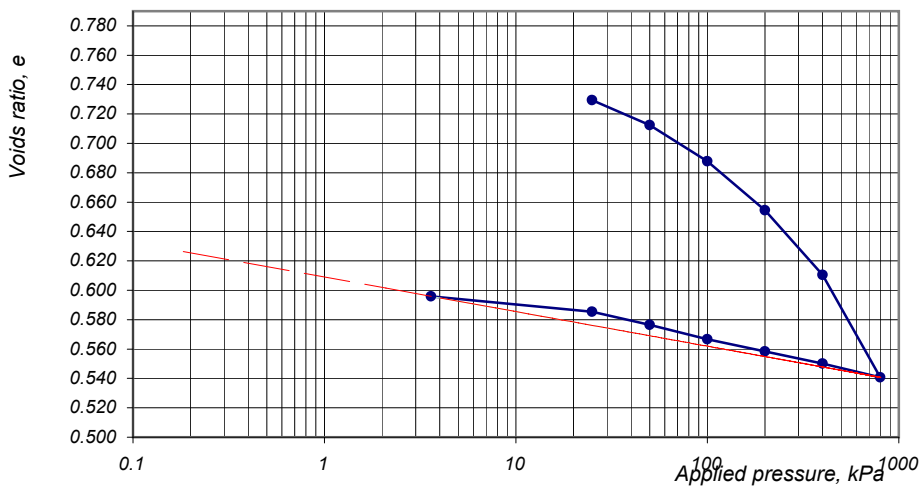
SPECIMEN INITIALLY

Diameter	87.40 mm	Density	2.00	Mg/m^3
Height	24.90 mm	Moisture content	26.7	%
Voids ratio	0.742	Dry density	1.58	Mg/m^3
Saturation	98.98 %	Particle density	2.75	Mg/m^3

Compression Index, C_c 0.024

Remarks:

Pressure stage kPa	Laboratory coefficients of: Compressibility, m_v m^2/MN	Consolidation, C_v $m^2/year$	Secondary Consolidation, C_α
0.0	-	-	-
25	0.28	2.52	3.2E-05
50	0.40	1.75	0.00039
100	0.29	1.43	1E-17
200	0.20	2.29	0.00071
400	0.13	2.20	0.00023
800	0.11	0.99	3.5E-05
400	0.02	8.26	0.00002
200	0.03	1.98	0.00000
100	0.05	0.83	6.5E-05
50	0.13	0.55	5.4E-05
25	0.22	0.98	6.5E-05
3.6	0.31	0.89	6.5E-05

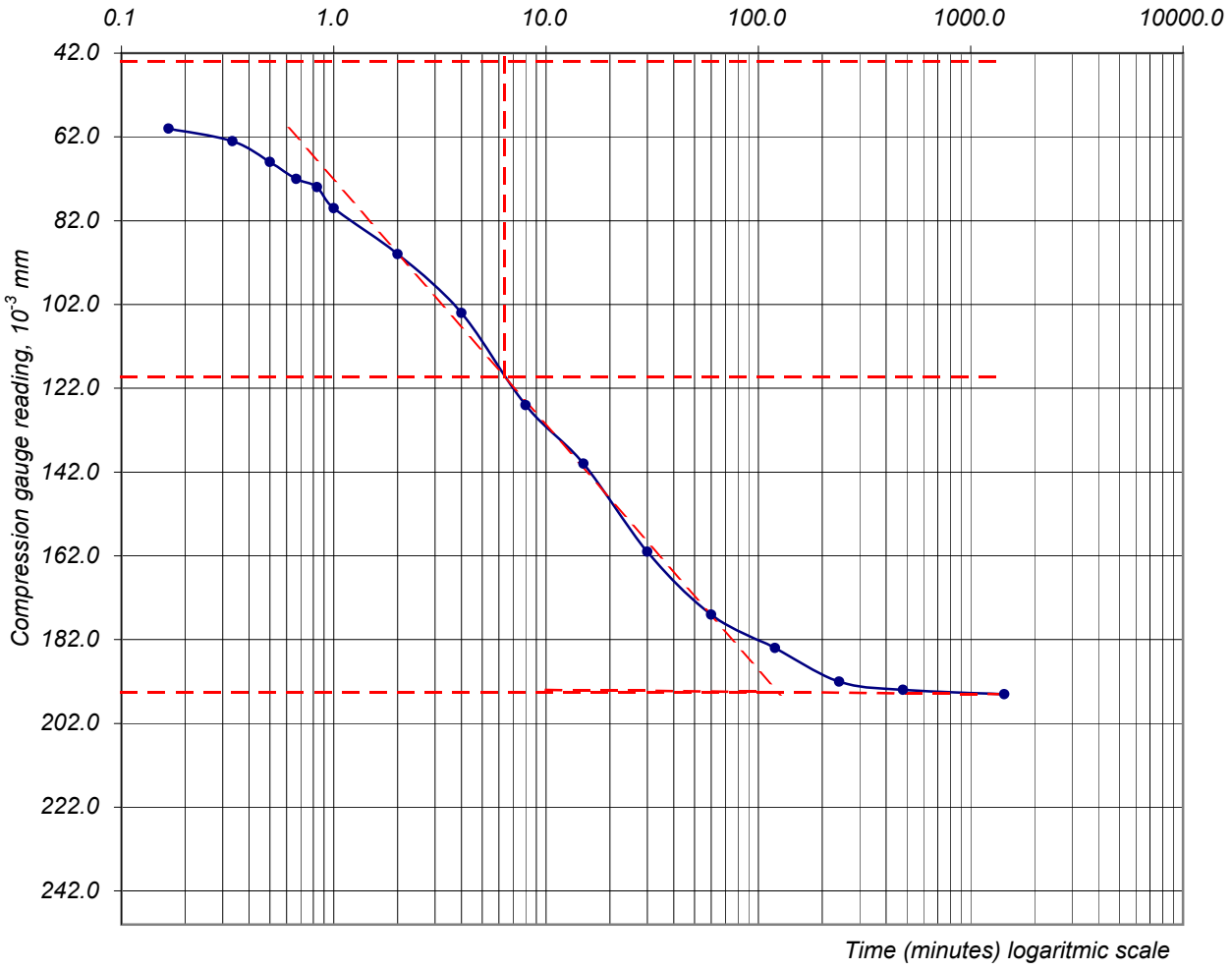


Sheet 7	Operator	Checked	Approved
Sheets 19	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Curve – Logarithm of Time Fitting Method

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty sandy CLAY	**Borehole**	BH-SI2-1
	Sample no.	,
	Dept	4,65-4,9
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	25

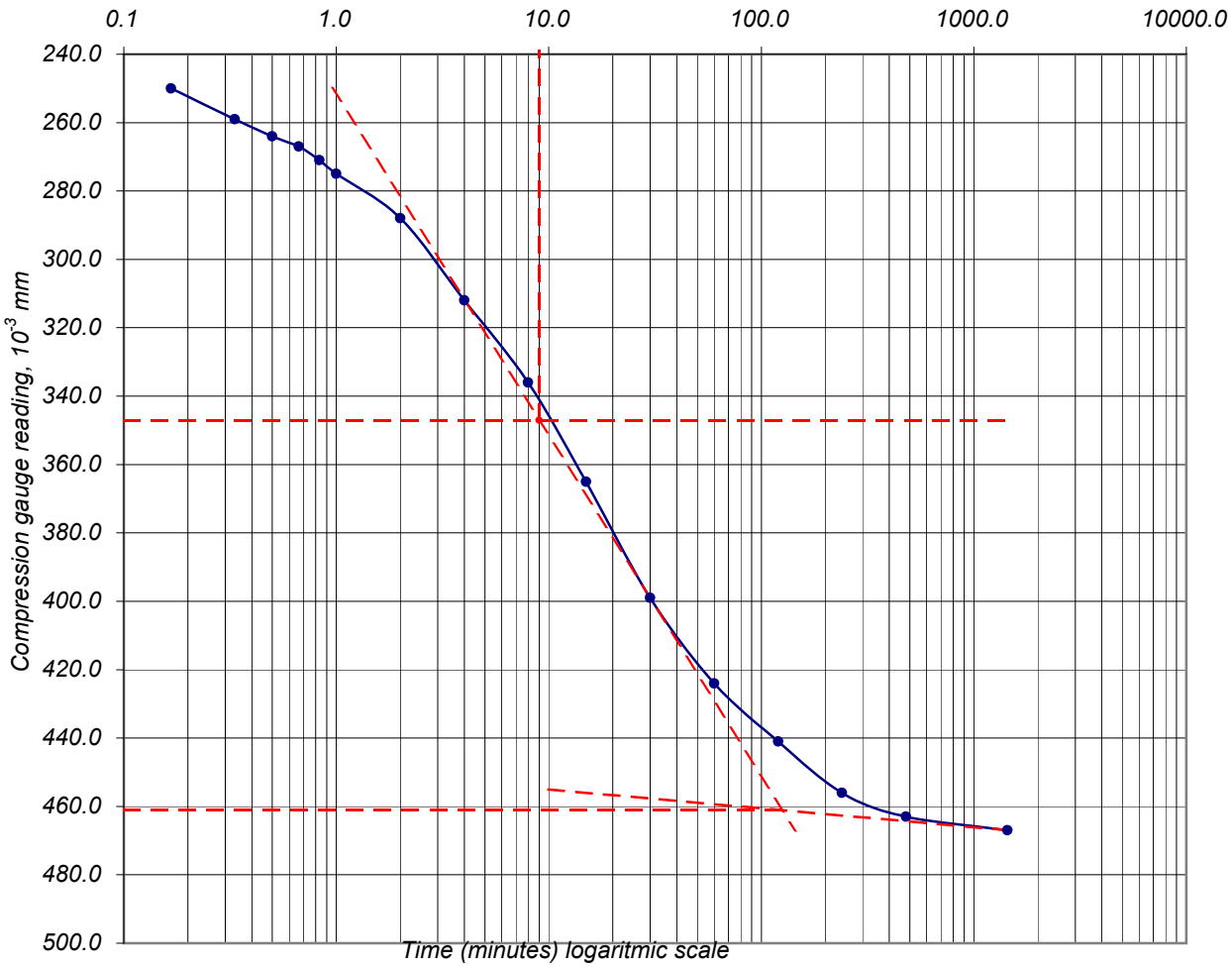


Sheet 8	Increment no. 1	Operator	Checked	Approved
Sheets 19	**LOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test (With Measurement of swelling pressure)

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty sandy CLAY	**Borehole**	BH-SI2-1
	Sample no.	,
	Dept	4,65-4,9
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	50

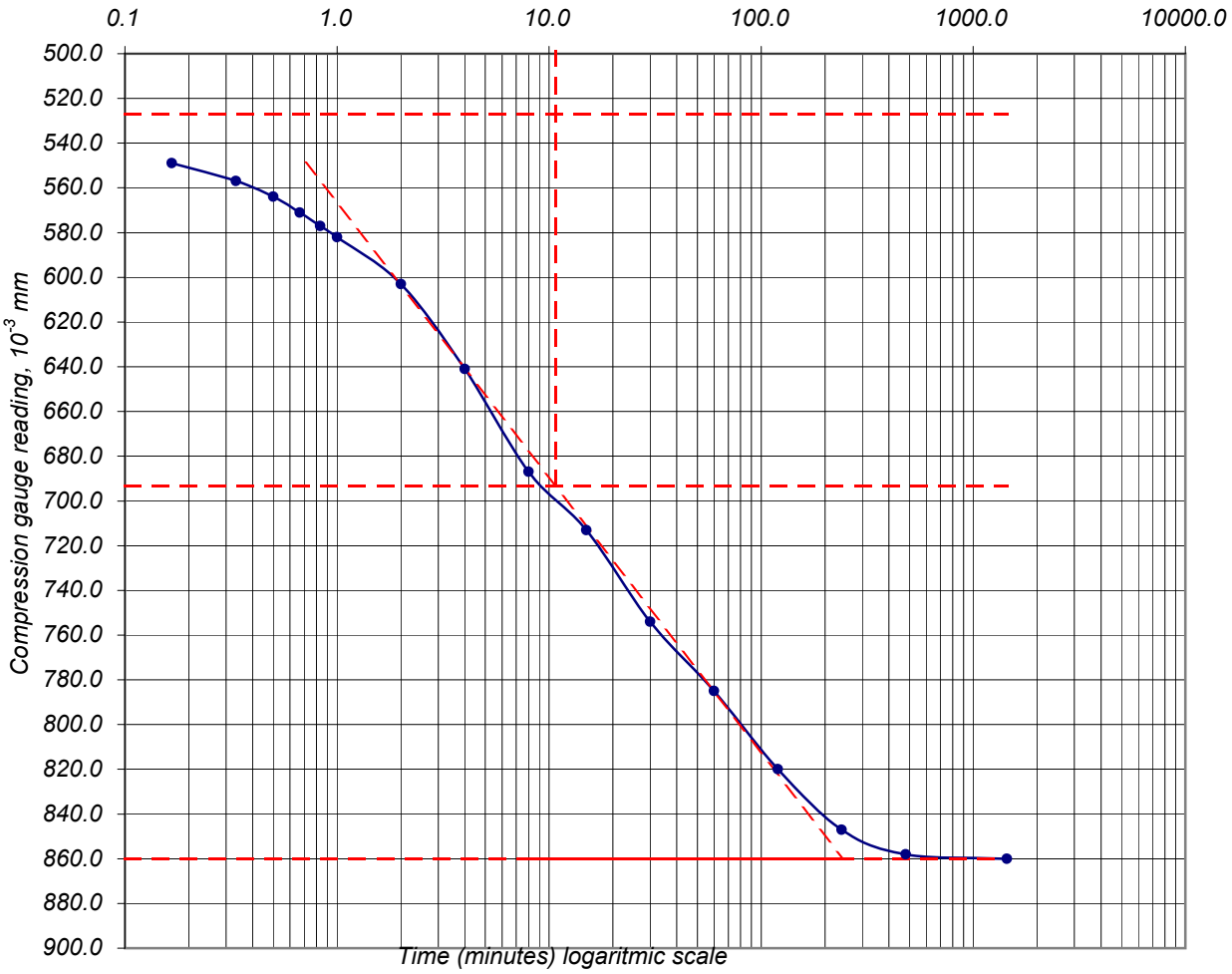


Sheet 9	Increment no. 2	Operator	Checked	Approved
Sheets 19	**LOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test (With Measurement of swelling pressure)

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty sandy CLAY	**Borehole**	BH-SI2-1
	Sample no.	,
	Dept	4,65-4,9
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	100

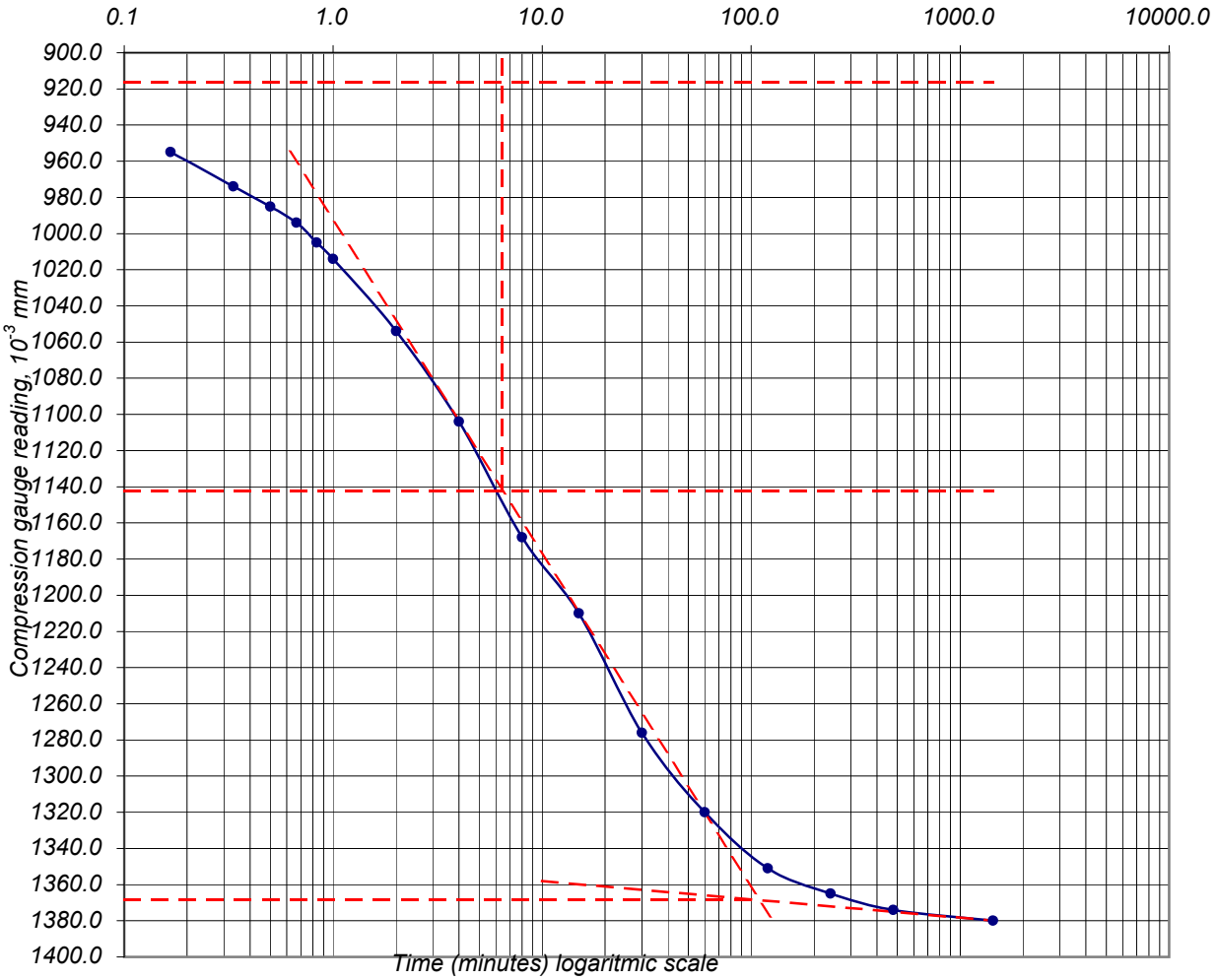


Sheet 10	Increment no. 3	Operator	Checked	Approved
Sheets 19	**LOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test (With Measurement of swelling pressure)

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty sandy CLAY	**Borehole**	BH-SI2-1
	Sample no.	,
	Dept	4,65-4,9
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	200

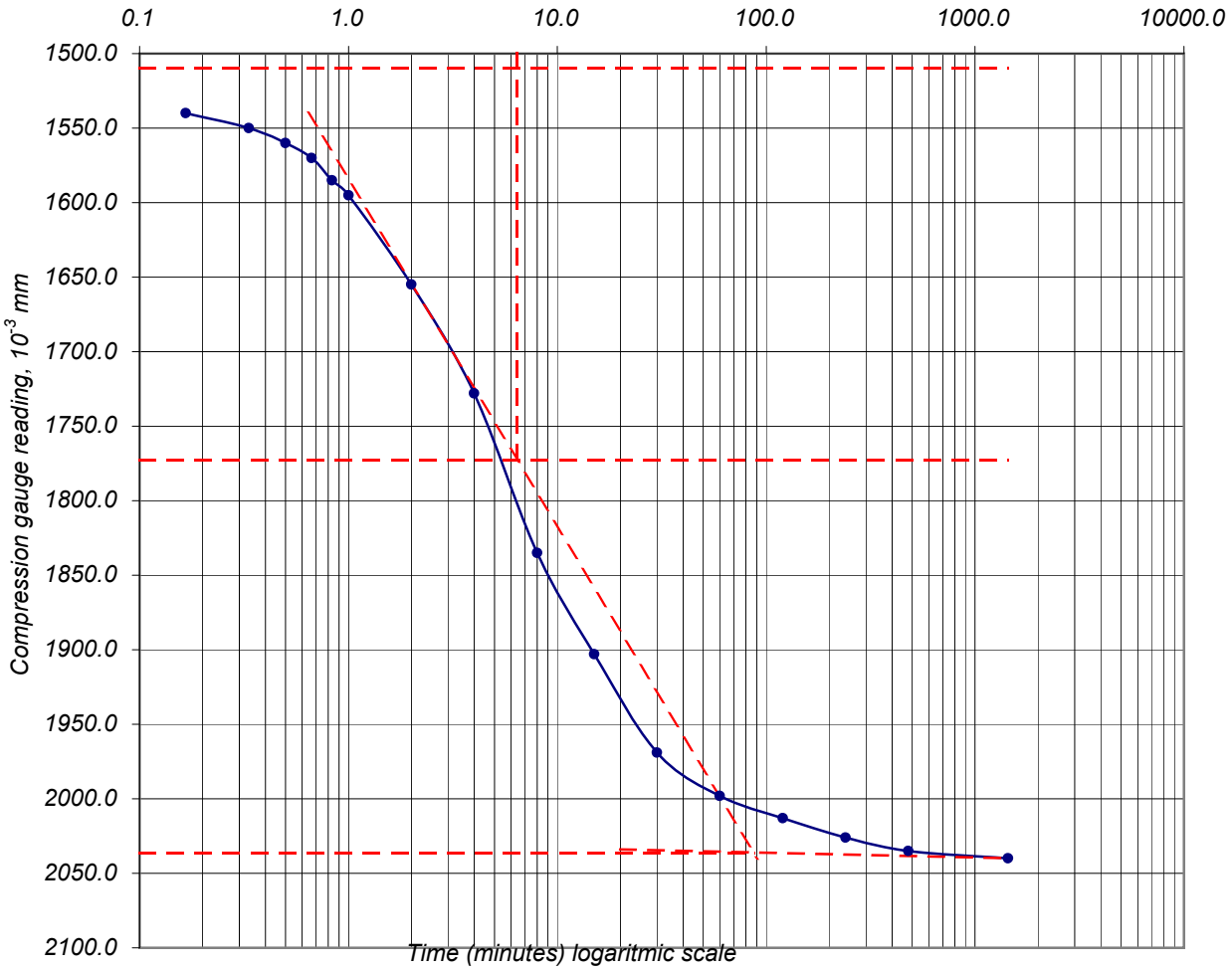


Sheet 11	Increment no. 4	Operator	Checked	Approved
Sheets 19	**LOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test (With Measurement of swelling pressure)

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty sandy CLAY	**Borehole**	BH-SI2-1
	Sample no.	,
	Dept	4,65-4,9
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	400

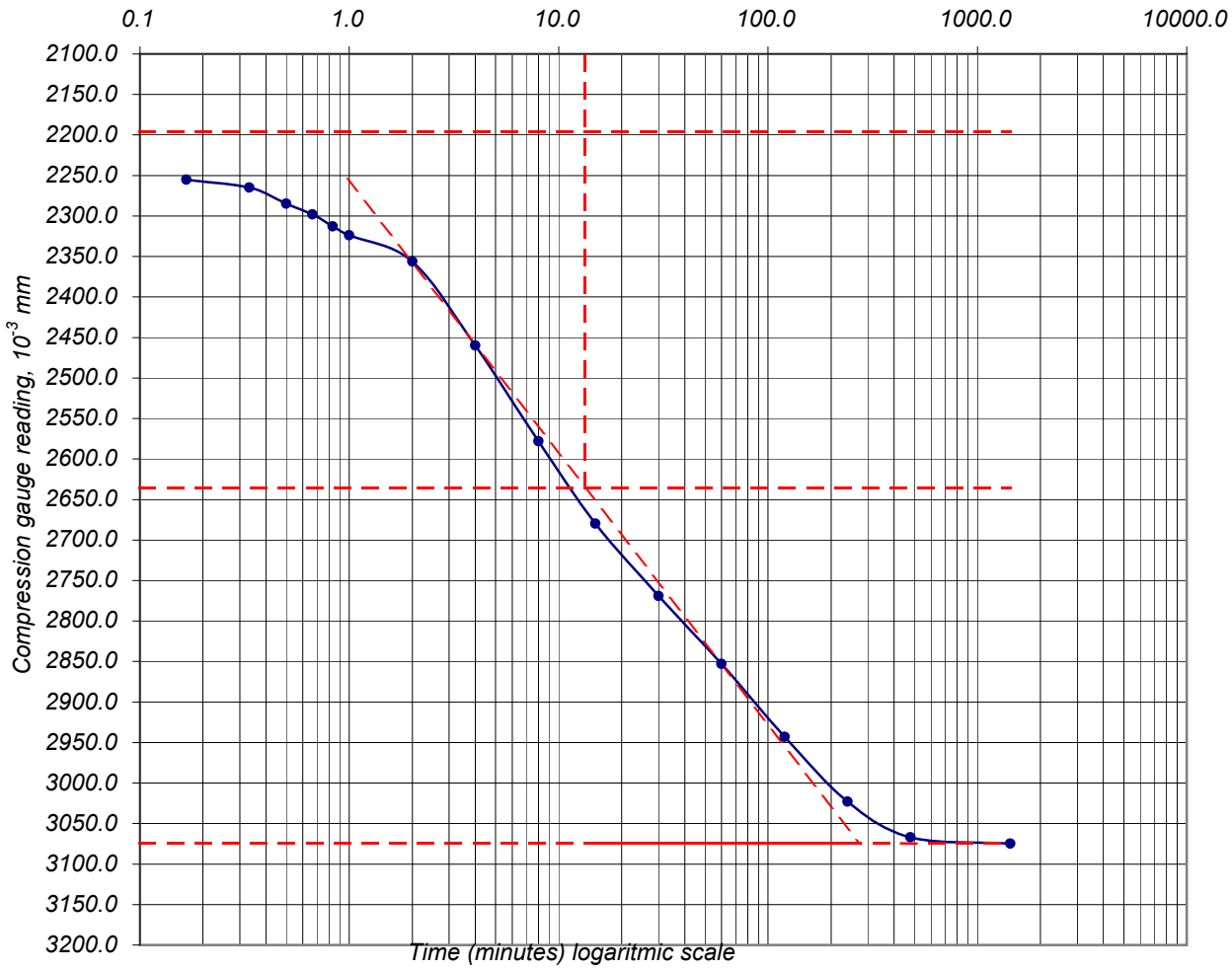


Sheet 12	Increment no. 5	Operator	Checked	Approved
Sheets 19	**LOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test (With Measurement of swelling pressure)

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty sandy CLAY	**Borehole**	BH-SI2-1
	Sample no.	,
	Dept	4,65-4,9
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	800

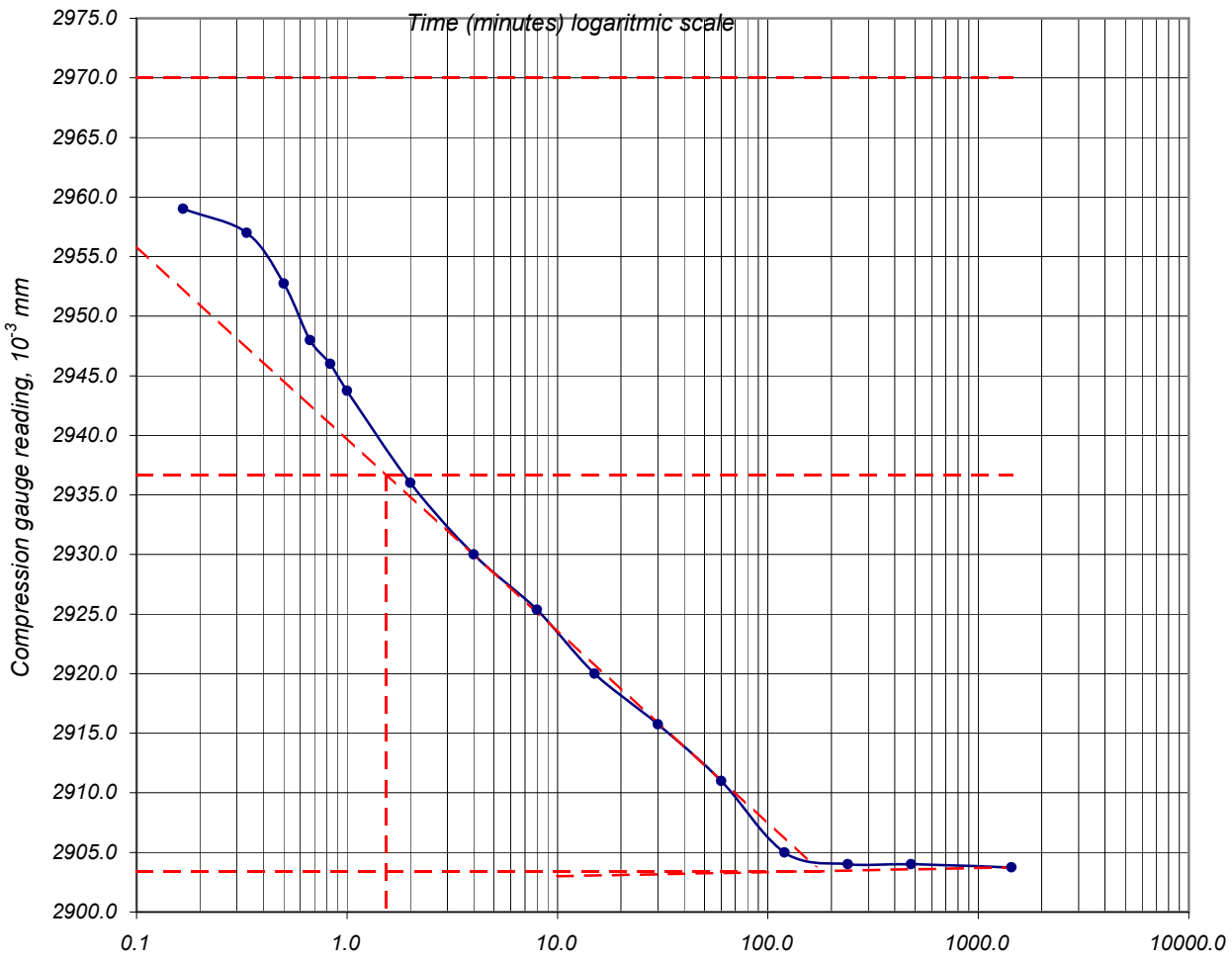


Sheet 13	Increment no. 6	Operator	Checked	Approved
Sheets 19	**UNLOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Curve – Logarithm of Time Fitting Method

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty sandy CLAY	**Borehole**	BH-SI2-1
	Sample no.	,
	Dept	4,65-4,9
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	400

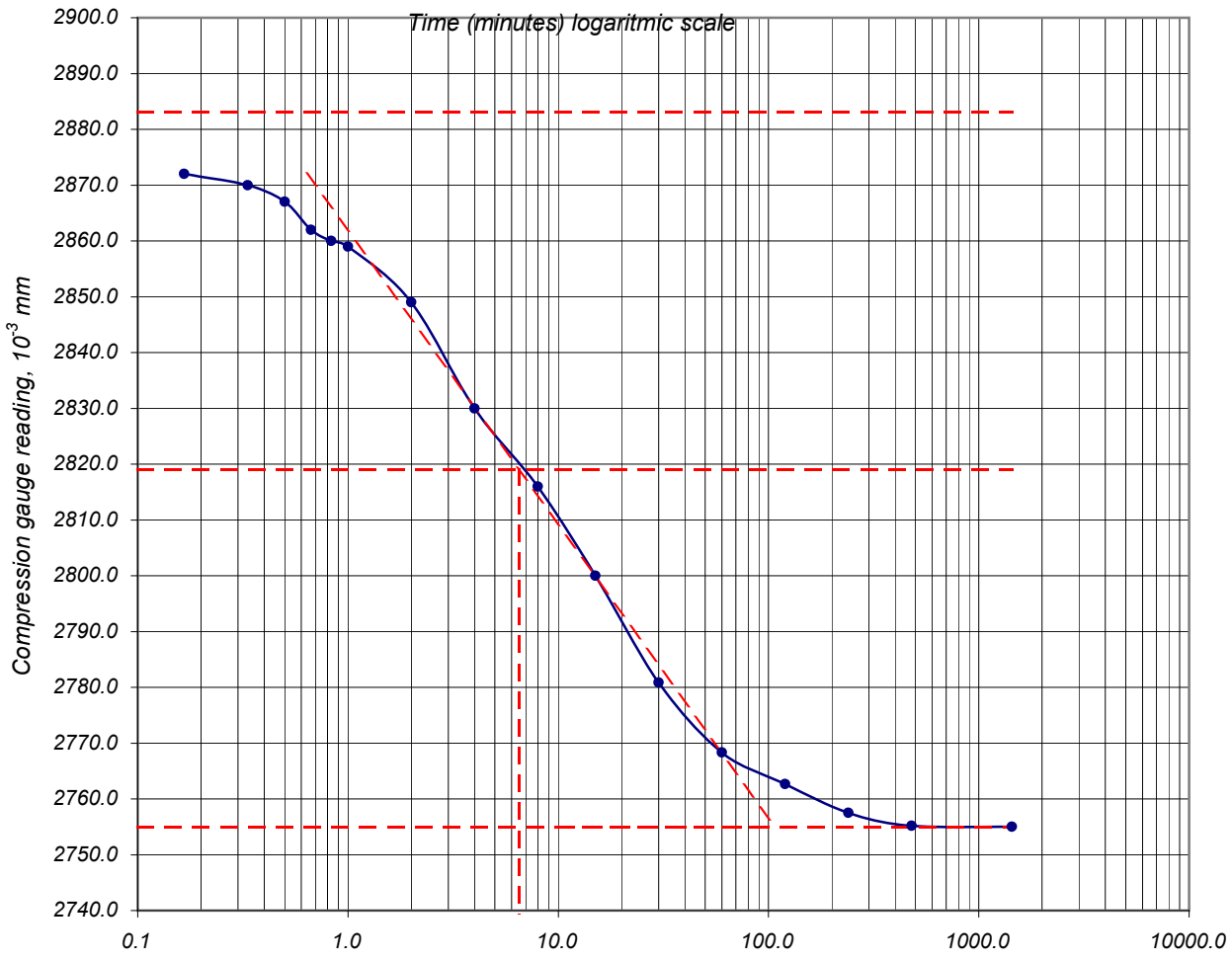


Sheet 14	Increment no. 7	Operator	Checked	Approved
Sheets 19	**UNLOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Curve – Logarithm of Time Fitting Method

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty sandy CLAY	**Borehole**	BH-SI2-1
	Sample no.	,
	Dept	4,65-4,9
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	200

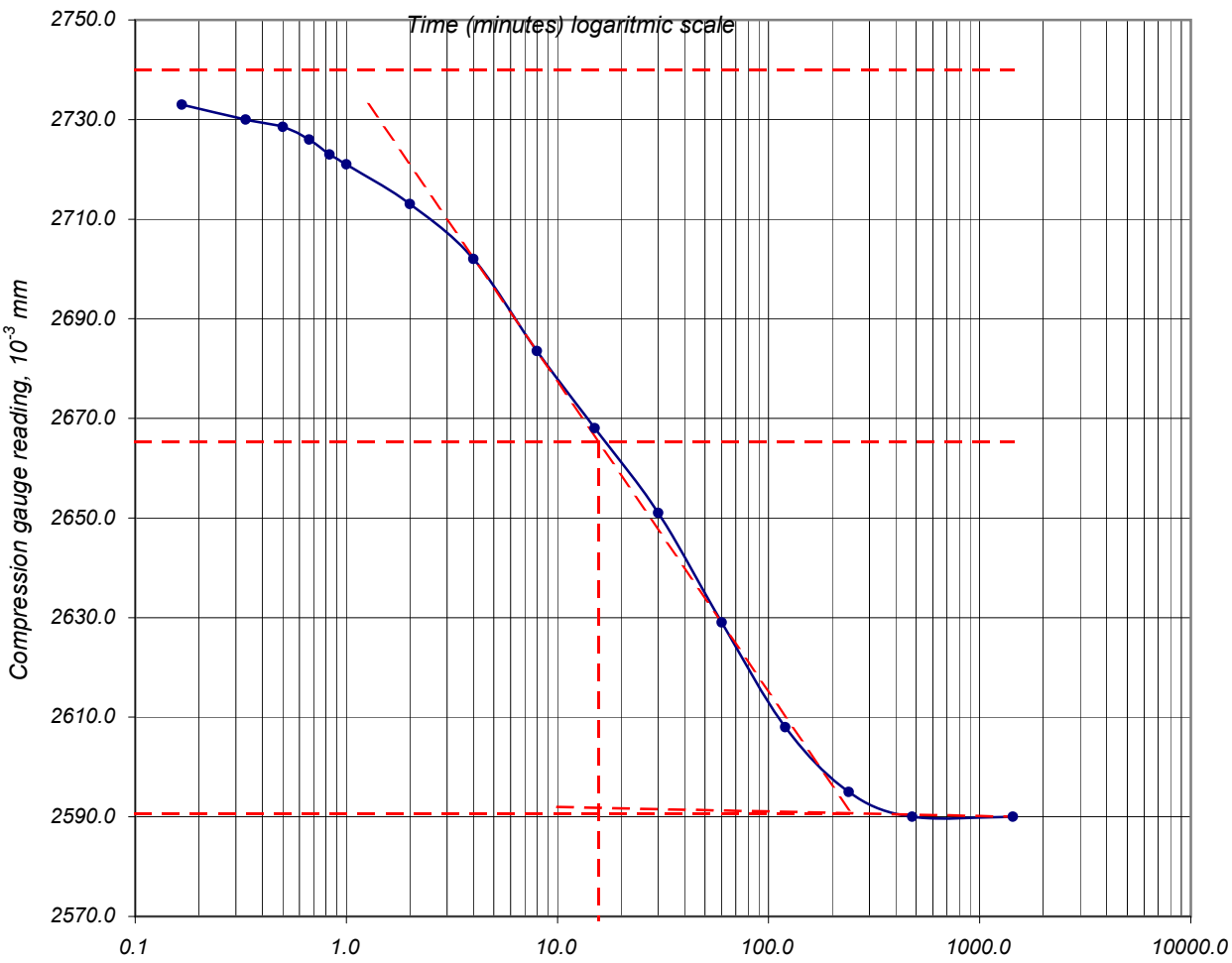


Sheet 15	Increment no. 8	Operator	Checked	Approved
Sheets 19	**UNLOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Curve – Logarithm of Time Fitting Method

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty sandy CLAY	**Borehole**	BH-SI2-1
	Sample no.	,
	Dept	4,65-4,9
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	100

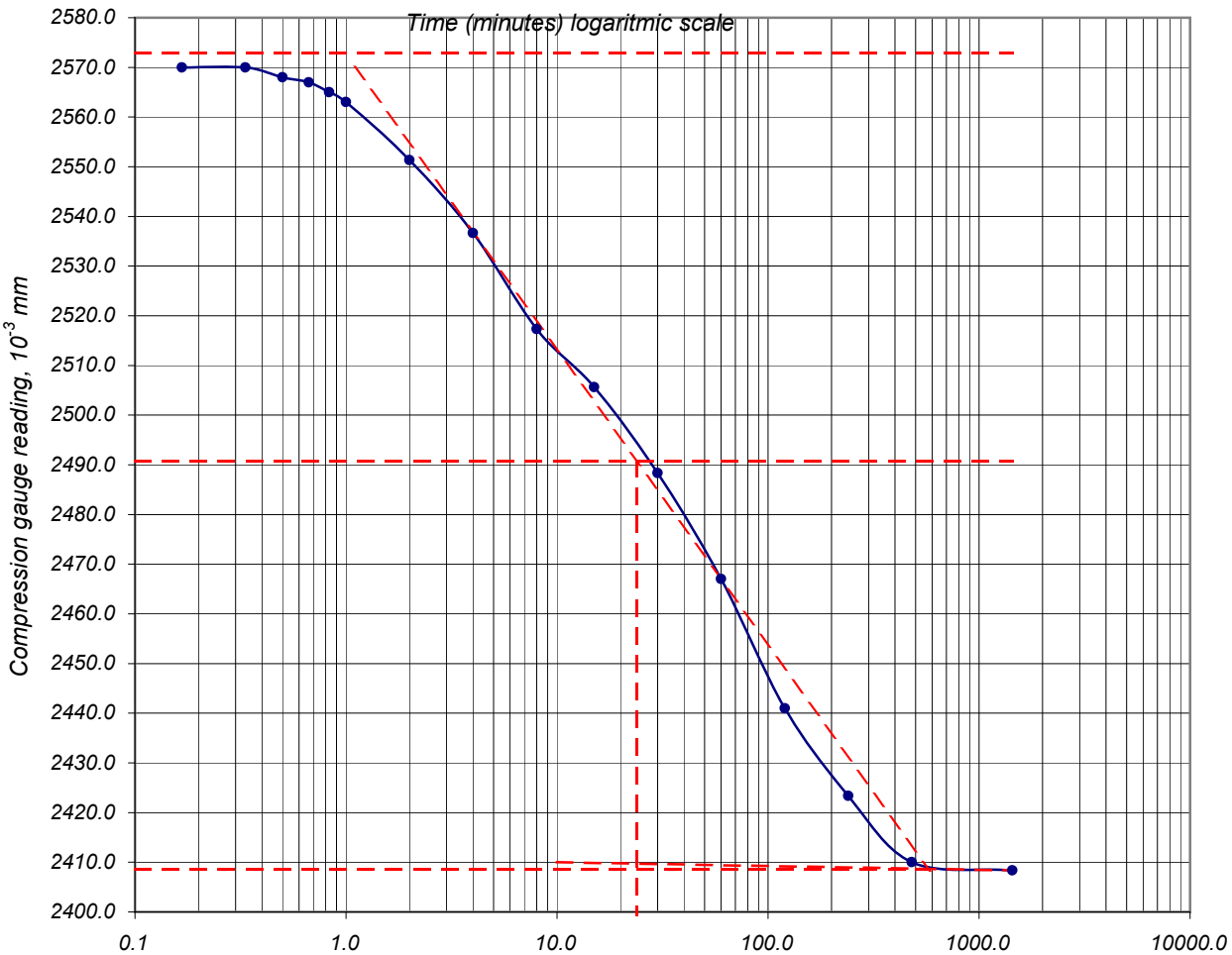


Sheet 16	Increment no. 9	Operator	Checked	Approved
Sheets 19	**RELOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Curve – Logarithm of Time Fitting Method

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty sandy CLAY	**Borehole**	BH-SI2-1
	Sample no.	,
	Dept	4,65-4,9
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	50

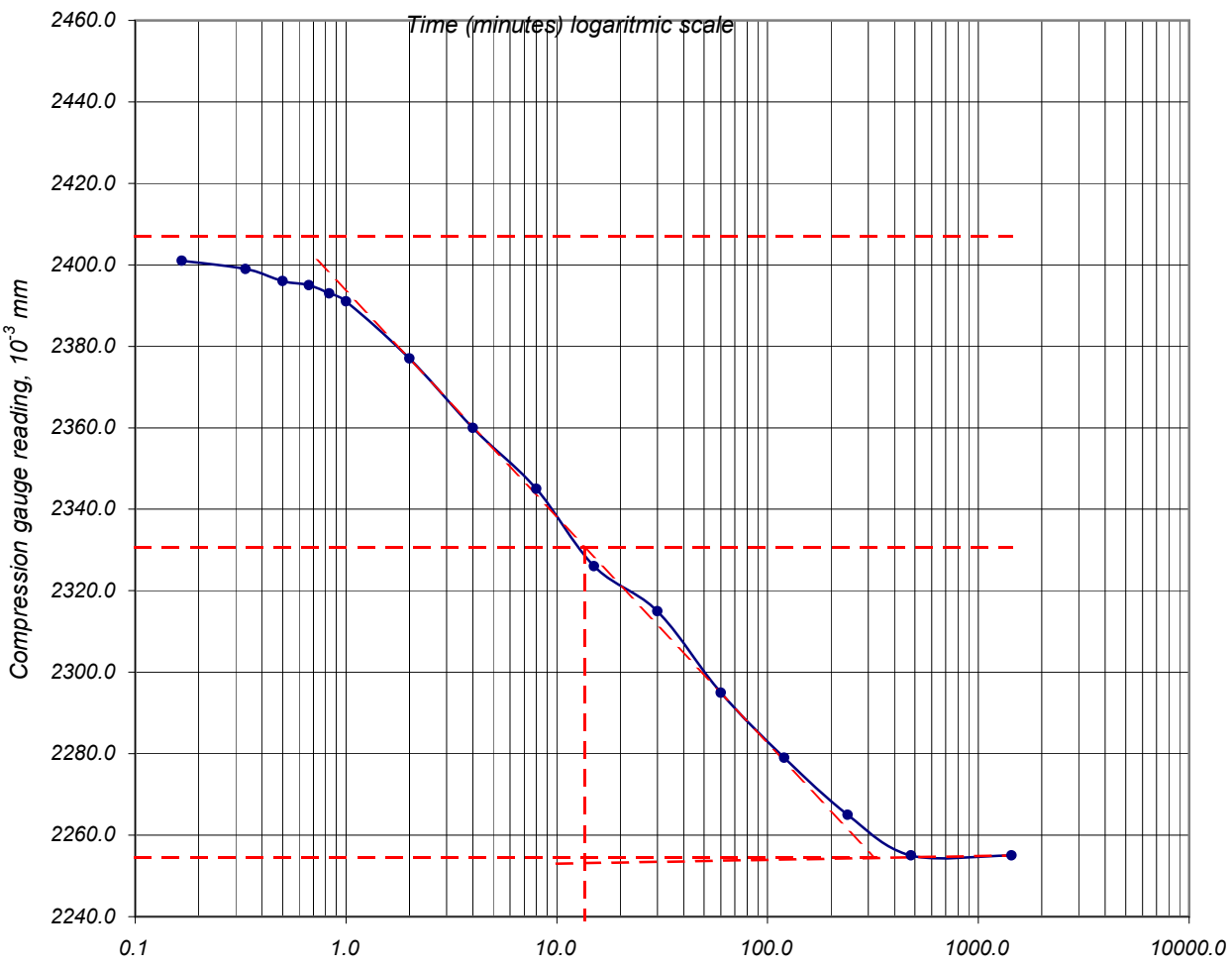


Sheet 17	Increment no. 10	Operator	Checked	Approved
Sheets 19	**RELOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Curve – Logarithm of Time Fitting Method

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty sandy CLAY	**Borehole**	BH-SI2-1
	Sample no.	,
	Dept	4,65-4,9
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	25

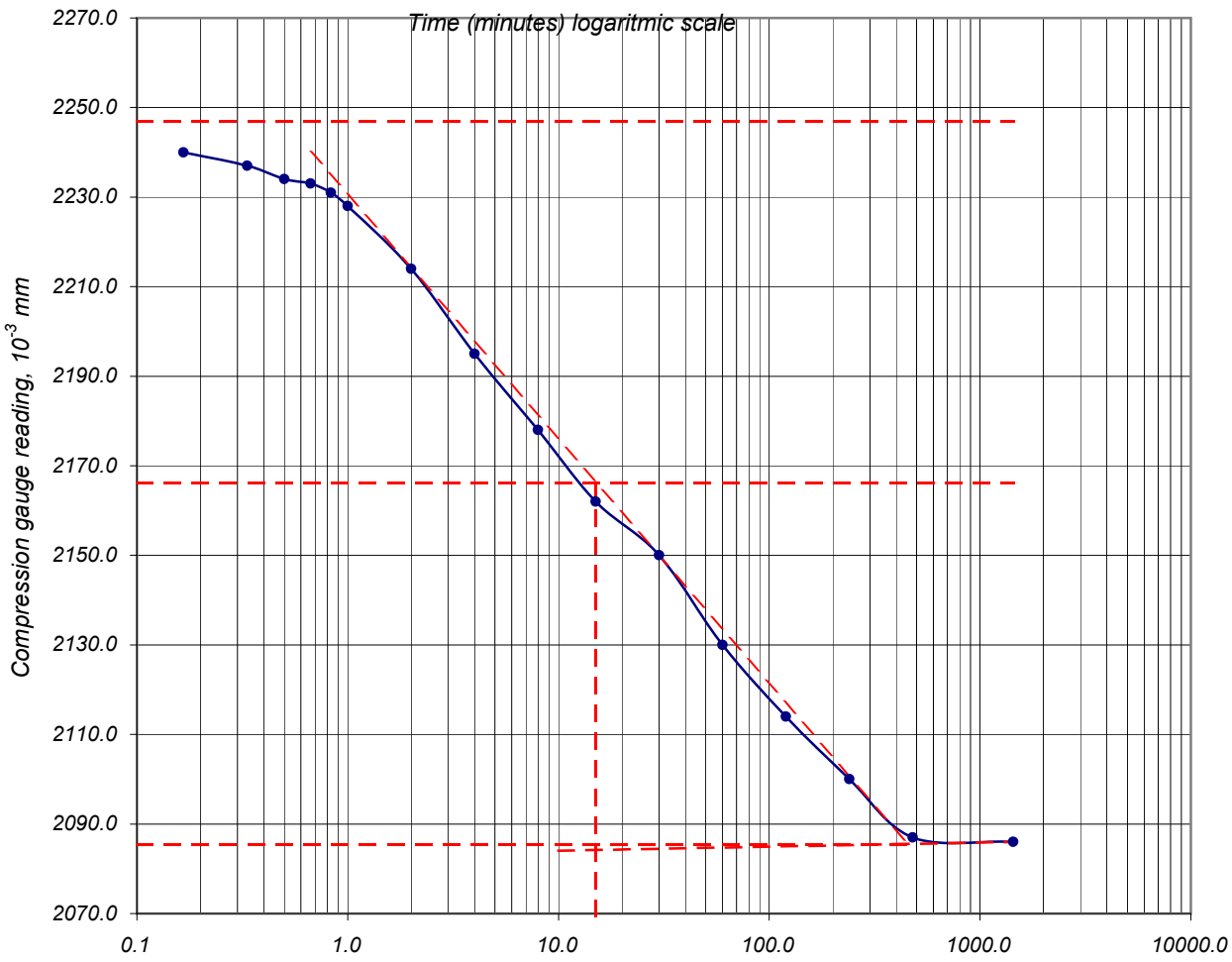


Sheet 18	Increment no. 11	Operator	Checked	Approved
Sheets 19	**RELOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Curve – Logarithm of Time Fitting Method

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Intermediately plastic silty sandy CLAY	**Borehole**	BH-SI2-1
	Sample no.	,
	Dept	4,65-4,9
	Date	14.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	3.6



Sheet 19	Increment no. 12	Operator	Checked	Approved
Sheets 19	**RELOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Low plastic silty sandy CLAY	**Borehole**	BH-SB2-1
	Sample no.	,
	Dept, m	21,1-22,5
	Date	20.07.2011
Test method BS1377 : Part 5 : 1990 : 3.5, 3.6		Saturated State

Cell no.	2	Particle density	
Ring no.	2	asumed	2,70 Mg/m^3

DIMENSIONS		Initial specimen	Overall change	Final specimen	Specimen preparation method
Diameter	D mm	87,00		87,00	
Area	A mm^2	5944,68		5944,68	
Height	H mm	H_o 24,80	2,330	22,470	
Volume	V cm^3	147,43	13,85	133,58	

WEIGHINGS		Initial specimen (a)	Initial specimen (b)	Final specimen (c)
Wet soil + ring + tray	g	489,00		475,00
Dry soil + ring + tray	g			438,42
Ring + tray	g	190,93		190,93
Wet soil	g	m_0 298,07	m_0 298,07	284,07
Dry soil	g		m_d 247,49	247,49
Water	g		50,58	36,58
Moisture content (measured)	%		20,44	14,78
Moisture content (from trimmings)	%	W_0 23,90		
Density	Mg/m^3	2,02	2,02	2,13
Dry density	Mg/m^3	1,63	1,68	1,85
Voids ratio		e_0 0,655	0,608	0,457
Degree of saturation	%	S_0 98,58	90,70	87,27
Height of soils	H_S mm	14,99	15,42	15,42

(a) Using moisture content from trimmings

(b) Using data from (a) and (c)

(c) Data from specimen after test

Sheet 1	**Operator**	**Checked**	**Approved**
Sheets 19	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Low plastic silty sandy CLAY	**Borehole**	BH-SB2-1
	Sample no.	,
	Dept	21,1-22,5
	Date	20.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8				
Machine no.	2	Spec. diam.	87,00	Height	24,80 mm
Cell no.	2	Lever ratio	1:10	Area	5944,68 mm^2
Ring no.	2	**1kg** on hanger gives pressure of			21,60 kPa

LOADING/UNLOADING/RELOADING

Increment no.						1			2			3		
Date started						13.07.2011			14.07.2011			15.07.2011		
Load					kg	1,16			2,31			4,63		
Pressure					kPa	25,0			50,0			100,0		
Mean daily temperature 22 ^{0} C						LOADING			LOADING			LOADING		
Elapsed time				t^0		Clock time	Gauge reading	Cumulative compression mm ΔH	Clock time	Gauge reading	Cumulative compression mm ΔH	Clock time	Gauge reading	Cumulative compression mm ΔH
h	m	s	t min											
0	0	0	0	22		9:23	5,000	0,000	9:45	5,261	0,261	9:45	5,342	0,342
_	_	10	0,167	22		9:23	5,045	0,045	9:45	5,290	0,290	9:45	5,409	0,409
_	_	20	0,333	22		9:23	5,060	0,060	9:45	5,294	0,294	9:45	5,416	0,416
_	_	30	0,500	22		9:23	5,067	0,067	9:45	5,297	0,297	9:45	5,422	0,422
_	_	40	0,667	22		9:23	5,070	0,070	9:45	5,299	0,299	9:45	5,426	0,426
_	_	50	0,833	22		9:23	5,074	0,074	9:45	5,300	0,300	9:45	5,430	0,430
_	0:01	_	1	22		9:24	5,075	0,075	9:46	5,301	0,301	9:46	5,434	0,434
_	0:02	_	2	22		9:25	5,090	0,090	9:47	5,308	0,308	9:47	5,451	0,451
_	0:04	_	4	22		9:27	5,115	0,115	9:49	5,315	0,315	9:49	5,465	0,465
_	0:08	_	8	22		9:31	5,150	0,150	9:53	5,322	0,322	9:53	5,478	0,478
_	0:15	_	15	22		9:38	5,183	0,183	10:00	5,329	0,329	10:00	5,490	0,490
_	0:30	_	30	22		9:53	5,216	0,216	10:15	5,335	0,335	10:15	5,501	0,501
1:00	_	_	60	21		10:23	5,236	0,236	10:45	5,339	0,339	10:45	5,514	0,514
2:00	_	_	120	21		11:23	5,247	0,247	11:45	5,341	0,341	11:45	5,522	0,522
4:00	_	_	240	21		13:23	5,252	0,252	13:45	5,342	0,342	13:45	5,528	0,528
8:00	_	_	480	20		17:23	5,256	0,256	17:45	5,342	0,342	17:45	5,530	0,530
24:00	_	_	1440	21		9:23	5,261	0,261	9:45	5,343	0,343	9:45	5,532	0,532
36:00	_	_	2160			21:23			21:45			21:45		
48:00	_	_	**2880**			9:23			9:45			9:45		
Cumulative correction **y**						0,032			0,070			0,110		
Net cumulative compression (ΔH-y)						0,229			0,273			0,422		

Sheet 2	Operator	Checked	Approved
Sheets 19	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Low plastic silty sandy CLAY	**Borehole**	BH-SB2-1
	Sample no.	,
	Dept	21,1-22,5
	Date	20.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8					
Machine no.	2	Spec. diam.	87,00	Height	24,80	mm
Cell no.	2	Lever ratio	1:10	Area	5944,68	mm^2
Ring no.	2	**1kg** on hanger gives pressure of			21,60	кPa

LOADING/UNLOADING/RELOADING

Increment no.					4			5			6		
Date started					16.07.2011			17.07.2011			18.07.2011		
Load kg					9,259			18,519			37,037		
Pressure kPa					200,0			400,0			800,0		
Mean daily temperature 22 ^{0} C					**LOADING**			**LOADING**			**UNLOADING**		
Elapsed time				t^0	Clock time	Gauge reading	Cumulative compression mm ΔH	Clock time	Gauge reading	Cumulative compression mm ΔH	Clock time	Gauge reading	Cumulative compression mm ΔH
h	m	s	t min										
0	0	0	0	22	9:45	5,527	0,527	9:45	6,364	1,364	9:45	6,885	1,885
_	_	10	0,167	22	9:45	5,720	0,720	9:45	6,465	1,465	9:45	7,050	2,050
_	_	20	0,333	22	9:45	5,741	0,741	9:45	6,509	1,509	9:45	7,064	2,064
_	_	30	0,500	22	9:45	5,769	0,769	9:45	6,520	1,520	9:45	7,070	2,070
_	_	40	0,667	22	9:45	5,789	0,789	9:45	6,530	1,530	9:45	7,082	2,082
_	_	50	0,833	22	9:45	5,802	0,802	9:45	6,545	1,545	9:45	7,094	2,094
_	0:01	_	1	22	9:46	5,820	0,820	9:46	6,560	1,560	9:46	7,105	2,105
_	0:02	_	2	22	9:47	5,893	0,893	9:47	6,595	1,595	9:47	7,160	2,160
_	0:04	_	4	22	9:49	5,980	0,980	9:49	6,650	1,650	9:49	7,220	2,220
_	0:08	_	8	22	9:53	6,075	1,075	9:53	6,701	1,701	9:53	7,280	2,280
_	0:15	_	15	22	10:00	6,161	1,161	10:00	6,749	1,749	10:00	7,335	2,335
_	0:30	_	30	22	10:15	6,245	1,245	10:15	6,793	1,793	10:15	7,388	2,388
1:00	_	_	60	21	10:45	6,323	1,323	10:45	6,840	1,840	10:45	7,443	2,443
2:00	_	_	120	21	11:45	6,365	1,365	11:45	6,869	1,869	11:45	7,486	2,486
4:00	_	_	240	21	13:45	6,382	1,382	13:45	6,894	1,894	13:45	7,515	2,515
8:00	_	_	480	20	17:45	6,393	1,393	17:45	6,913	1,913	17:45	7,530	2,530
24:00	_	_	1440	21	9:45	6,409	1,409	9:45	6,925	1,925	9:45	7,538	2,538
36:00	_	_	2160		21:45			21:45			21:45		
48:00	_	_	**2880**		9:45			9:45			9:45		
Cumulative correction **y**					0,146			0,183			0,208		
Net cumulative compression (ΔH-y)					1,263			1,742			2,330		

Sheet 3	Operator	Checked	Approved
Sheets 19	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Low plastic silty sandy CLAY	**Borehole**	BH-SB2-1
	Sample no.	,
	Dept	21,1-22,5
	Date	20.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8					
Machine no.	2	Spec. diam.	87,00	Height	24,80	mm
Cell no.	2	Lever ratio	1:10	Area	5944,68	mm^2
Ring no.	2	**1kg** on hanger gives pressure of			21,60	кPa

LOADING/UNLOADING/RELOADING

Increment no.					7			8			9		
Date started					19.07.2011			20.07.2011			21.07.2011		
Load kg					18,519			9,259			4,630		
Pressure kPa					400,0			200,0			100,0		
Mean daily temperature 22 ^{0} C					UNLOADING			UNLOADING			RELOADING		
Elapsed time				t^0	Clock time	Gauge reading	Cumulative compression mm ΔH	Clock time	Gauge reading	Cumulative compression mm ΔH	Clock time	Gauge reading	Cumulative compression mm ΔH
h	m	s	t min										
0	0	0	0	22	9:45	7,488	2,488	10:15	7,470	2,470	10:15	7,413	2,413
_	_	10	0,167	22	9:45	7,481	2,481	10:15	7,449	2,449	10:15	7,400	2,400
_	_	20	0,333	22	9:45	7,481	2,481	10:15	7,447	2,447	10:15	7,398	2,398
_	_	30	0,500	22	9:45	7,481	2,481	10:15	7,445	2,445	10:15	7,395	2,395
_	_	40	0,667	22	9:45	7,480	2,480	10:15	7,443	2,443	10:15	7,394	2,394
_	_	50	0,833	22	9:45	7,480	2,480	10:15	7,442	2,442	10:15	7,392	2,392
_	0:01	_	1	22	9:46	7,479	2,479	10:16	7,441	2,441	10:16	7,391	2,391
_	0:02	_	2	22	9:47	7,478	2,478	10:17	7,438	2,438	10:17	7,385	2,385
_	0:04	_	4	22	9:49	7,477	2,477	10:19	7,435	2,435	10:19	7,378	2,378
_	0:08	_	8	22	9:53	7,475	2,475	10:23	7,432	2,432	10:23	7,371	2,371
_	0:15	_	15	22	10:00	7,473	2,473	10:30	7,429	2,429	10:30	7,365	2,365
_	0:30	_	30	22	10:15	7,472	2,472	10:45	7,426	2,426	10:45	7,360	2,360
1:00	_	_	60	21	10:45	7,470	2,470	11:15	7,423	2,423	11:15	7,354	2,354
2:00	_	_	120	21	11:45	7,468	2,468	12:15	7,420	2,420	12:15	7,348	2,348
4:00	_	_	240	21	13:45	7,467	2,467	14:15	7,416	2,416	14:15	7,344	2,344
8:00	_	_	480	20	17:45	7,466	2,466	18:15	7,414	2,414	18:15	7,342	2,342
24:00	_	_	1440	21	9:45	7,466	2,466	10:15	7,413	2,413	10:15	7,340	2,340
36:00	_	_	2160		21:45			22:15			22:15		
48:00	_	_	**2880**		9:45			10:15			10:15		
Cumulative correction **y**					0,183			0,146			0,110		
Net cumulative compression (ΔH-y)					2,283			2,267			2,230		

Sheet 4	Operator	Checked	Approved
Sheets 19	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Low plastic silty sandy CLAY	**Borehole**	BH-SB2-1
	Sample no.	,
	Dept	21,1-22,5
	Date	20.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8					
Machine no.	2	Spec. diam.	87,00	Height	24,80	mm
Cell no.	2	Lever ratio	1:10	Area	5944,68	mm^2
Ring no.	2	**1kg** on hanger gives pressure of			21,60	кPa

LOADING/UNLOADING/RELOADING

Increment no.					10			11			12		
Date started					22.07.2011			23.07.2011			24.07.2011		
Load kg					0,008			0,004			0,001		
Pressure kPa					50,0			25,0			3,6		
Mean daily temperature 22 ^{0} C					RELOADING			RELOADING			RELOADING		
Elapsed time				t^0	Clock time	Gauge reading	Cumulative compression mm ΔH	Clock time	Gauge reading	Cumulative compression mm ΔH	Clock time	Gauge reading	Cumulative compression mm ΔH
h	m	s	t min										
0	0	0	0	22	10:15	7,344	2,344	10:15	7,260	2,260	10:15	7,197	2,197
_	_	10	0,167	22	10:15	7,333	2,333	10:15	7,255	2,255	10:15	7,188	2,188
_	_	20	0,333	22	10:15	7,331	2,331	10:15	7,254	2,254	10:15	7,188	2,188
_	_	30	0,500	22	10:15	7,329	2,329	10:15	7,252	2,252	10:15	7,186	2,186
_	_	40	0,667	22	10:15	7,327	2,327	10:15	7,251	2,251	10:15	7,186	2,186
_	_	50	0,833	22	10:15	7,326	2,326	10:15	7,250	2,250	10:15	7,185	2,185
_	0:01	_	1	22	10:16	7,321	2,321	10:16	7,249	2,249	10:16	7,184	2,184
_	0:02	_	2	22	10:17	7,313	2,313	10:17	7,247	2,247	10:17	7,176	2,176
_	0:04	_	4	22	10:19	7,306	2,306	10:19	7,242	2,242	10:19	7,165	2,165
_	0:08	_	8	22	10:23	7,299	2,299	10:23	7,234	2,234	10:23	7,151	2,151
_	0:15	_	15	22	10:30	7,291	2,291	10:30	7,227	2,227	10:30	7,139	2,139
_	0:30	_	30	22	10:45	7,285	2,285	10:45	7,219	2,219	10:45	7,125	2,125
1:00	_	_	60	21	11:15	7,277	2,277	11:15	7,211	2,211	11:15	7,111	2,111
2:00	_	_	120	21	12:15	7,269	2,269	12:15	7,204	2,204	12:15	7,096	2,096
4:00	_	_	240	21	14:15	7,260	2,260	14:15	7,200	2,200	14:15	7,082	2,082
8:00	_	_	480	20	18:15	7,256	2,256	18:15	7,198	2,198	18:15	7,072	2,072
24:00	_	_	1440	21	10:15	7,253	2,253	10:15	7,198	2,198	10:15	7,072	2,072
36:00	_	_	2160		22:15			22:15			22:15		
48:00	_	_	**2880**		10:15			10:15			10:15		
Cumulative correction **y**					0,070			0,032					
Net cumulative compression (ΔH-y)					2,183			2,166			2,072		

Sheet 5	Operator	Checked	Approved
Sheets 19	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Low plastic silty sandy CLAY	**Borehole**	BH-SB2-1
	Sample no.	,
	Dept	21,1-22,5
	Date	20.07.2011

Test method		BS 1377 : Part 7 : 1990 : 8			
Machine no.	2	Specimen diameter	87,00 mm	Height H_0,	24,8 mm
Cell no.	2	Height of solids Hs	14,99 mm		
Ring no.	2	Initial voids ratio e_1	0,655		

VOIDS RATIO					COMPRESSIBILITY			COEFFICIENT OF CONSOLIDATION			
					Incremental					c_v =	
Increment no.	Pressure P kPa	Cumulative compression (ΔH-y) mm	Consolidated height H=H0-(ΔH-y) mm	Voids ratio $e = \frac{H - H_s}{H_s}$	height change, δH mm	pressure change δp kPa	$m_v = \frac{\delta H}{H_i} \cdot \frac{100(}{\delta p}$ m²/MN	t_{50} min	$\bar{H} = \frac{1}{2}(H_1 + H_2)$ mm	$\frac{0.026\bar{H}^2}{t_{50}}$ m²/year	$\frac{0.111\bar{H}^2}{t_{90}}$ m²/year
0	0	0,000	24,80	0,655	0,00	0	–	–	–	–	–
1	25,0	0,229	24,57	0,639	0,23	25,0	0,37	6,32	24,69	2,51	
2	50,0	0,273	24,53	0,636	0,04	25,0	0,07	2,77	24,55	5,65	
3	100,0	0,422	24,38	0,626	0,15	50,0	0,12	3,10	24,45	5,01	
4	200,0	1,263	23,54	0,570	0,84	100,0	0,34	5,13	23,96	2,91	
5	400,0	1,742	23,06	0,538	0,48	200,0	0,10	4,30	23,30	3,28	
6	800,0	2,330	22,47	0,499	0,59	400,0	0,06	7,06	22,76	1,91	
7	400,0	2,283	22,52	0,502	-0,05	-400,0	0,01	11,24	22,49	1,17	
8	200,0	2,267	22,53	0,503	-0,02	-200,0	0,00	4,82	22,52	2,74	
9	100,0	2,230	22,57	0,506	-0,04	-100,0	0,02	5,56	22,55	2,38	
10	50,0	2,183	22,62	0,509	-0,05	-50,0	0,04	9,12	22,59	1,46	
11	25,0	2,166	22,63	0,510	-0,02	-25,0	0,03	13,41	22,63	0,99	
12	3,6	2,072	22,73	0,516	-0,09	-21,4	0,19	22,06	22,68	0,61	

Sheet	6	Operator	Checked	Approved
Sheets	19	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test

Location: Imereti Region, Georgia	**Project Name:** GC-1128	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description:	**Borehole**	BH-SB2-1
Low plastic silty sandy CLAY	**Sample no.**	,
	Dept	21,1-22,5
	Date	20.07.2011

Test method BS 1377 : Part 7 : 1990 : 8

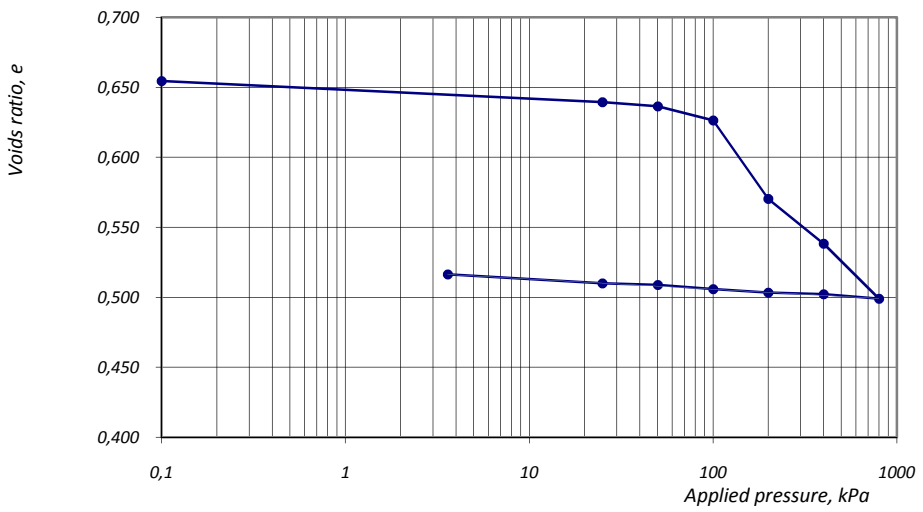
SPECIMEN INITIALLY

Diameter	87,00 mm	Density	2,02	Mg/m^3
Height	24,80 mm	Moisture content	23,9	%
Voids ratio	0,655	Dry density	1,63	Mg/m^3
Saturation	98,58 %	Particle density	2,70	Mg/m^3

Compression Index, C_c 0,007

Remarks:

Pressure stage kPa	Laboratory coefficients of: Compressibility, m_v m^2/MN	Consolidation, C_v $m^2/year$	Secondary Consolidation, C_α
0,0	-	-	-
25	0,37	2,51	0,0006
50	0,07	5,65	6,18E-05
100	0,12	5,01	0,00021
200	0,34	2,91	0,00204
400	0,10	3,28	0,00162
800	0,06	1,91	0,00094
400	0,01	1,17	0,00001
200	0,00	2,74	0,00006
100	0,02	2,38	0,00031
50	0,04	1,46	0,00027
25	0,03	0,99	0,00002
3,6	0,19	0,61	6,18E-05

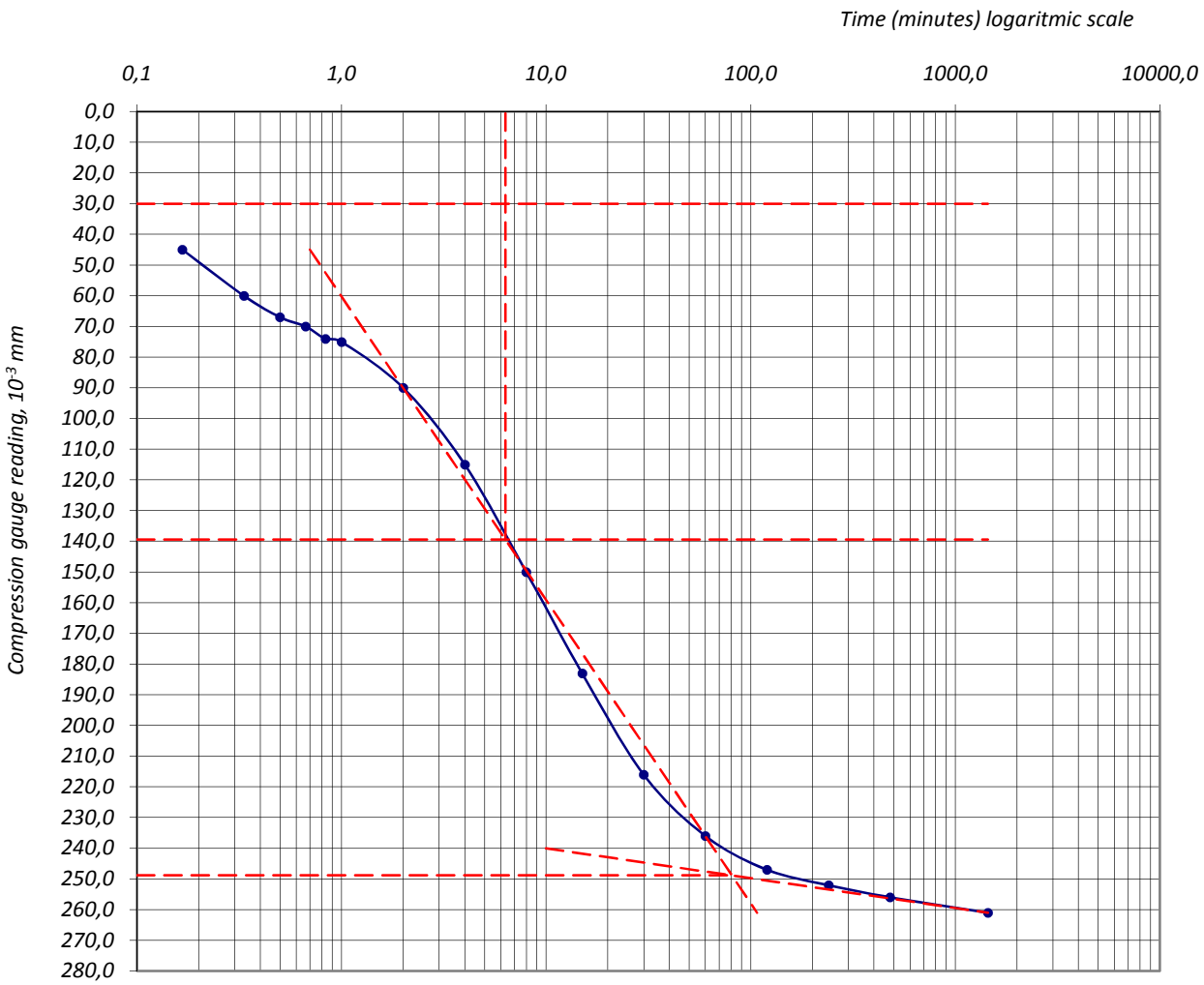


Sheet 7	Operator	Checked	Approved
Sheets 19	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Curve – Logarithm of Time Fitting Method

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Low plastic silty sandy CLAY	**Borehole**	BH-SB2-1
	Sample no.	,
	Dept	21,1-22,5
	Date	20.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	25

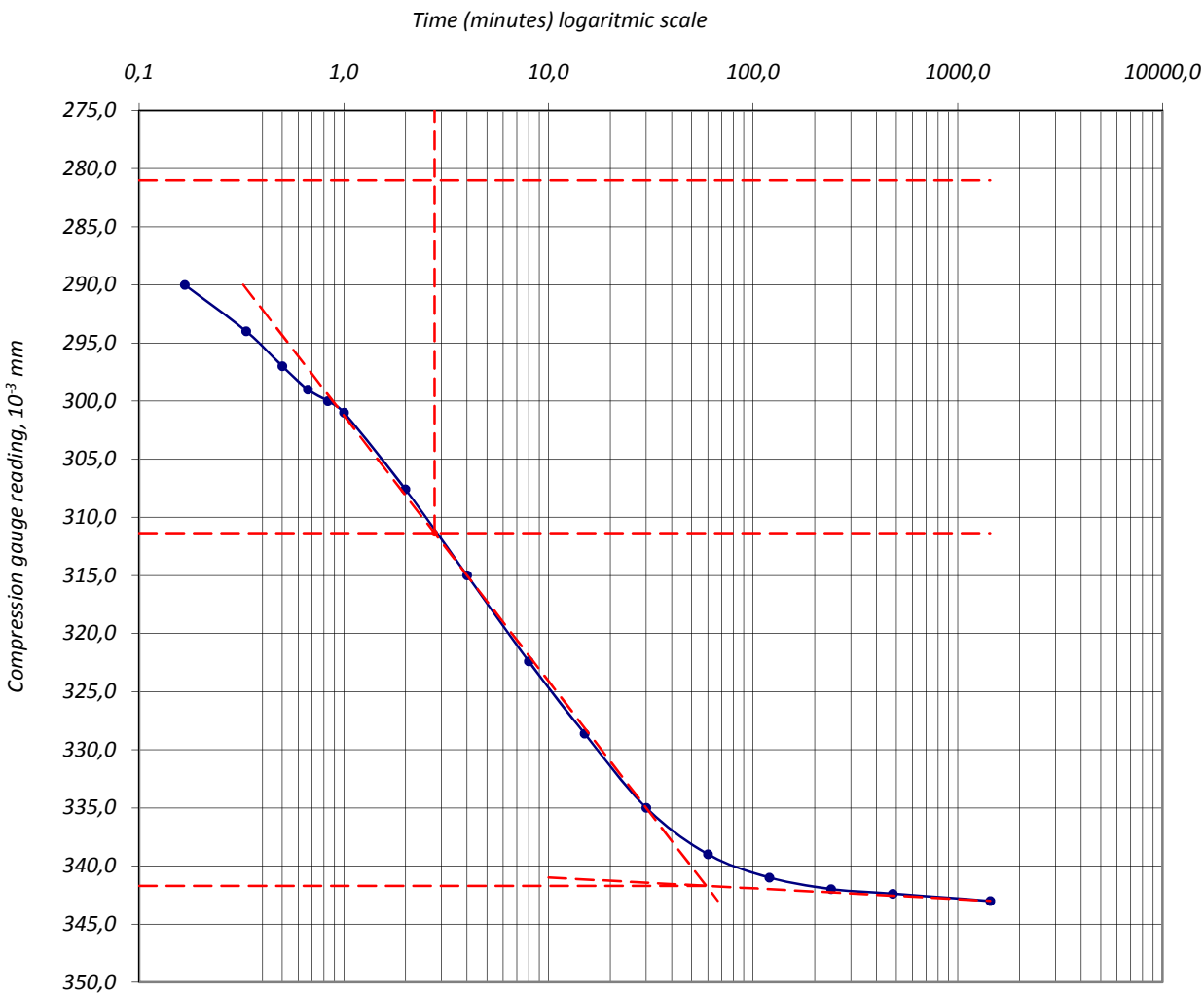


Sheet 8	Increment no. 1	Operator	Checked	Approved
Sheets 19	**LOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test (With Measurement of swelling pressure)

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description:	**Borehole**	BH-SB2-1
	Sample no.	,
Low plastic silty sandy CLAY	**Dept**	21,1-22,5
	Date	20.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	50

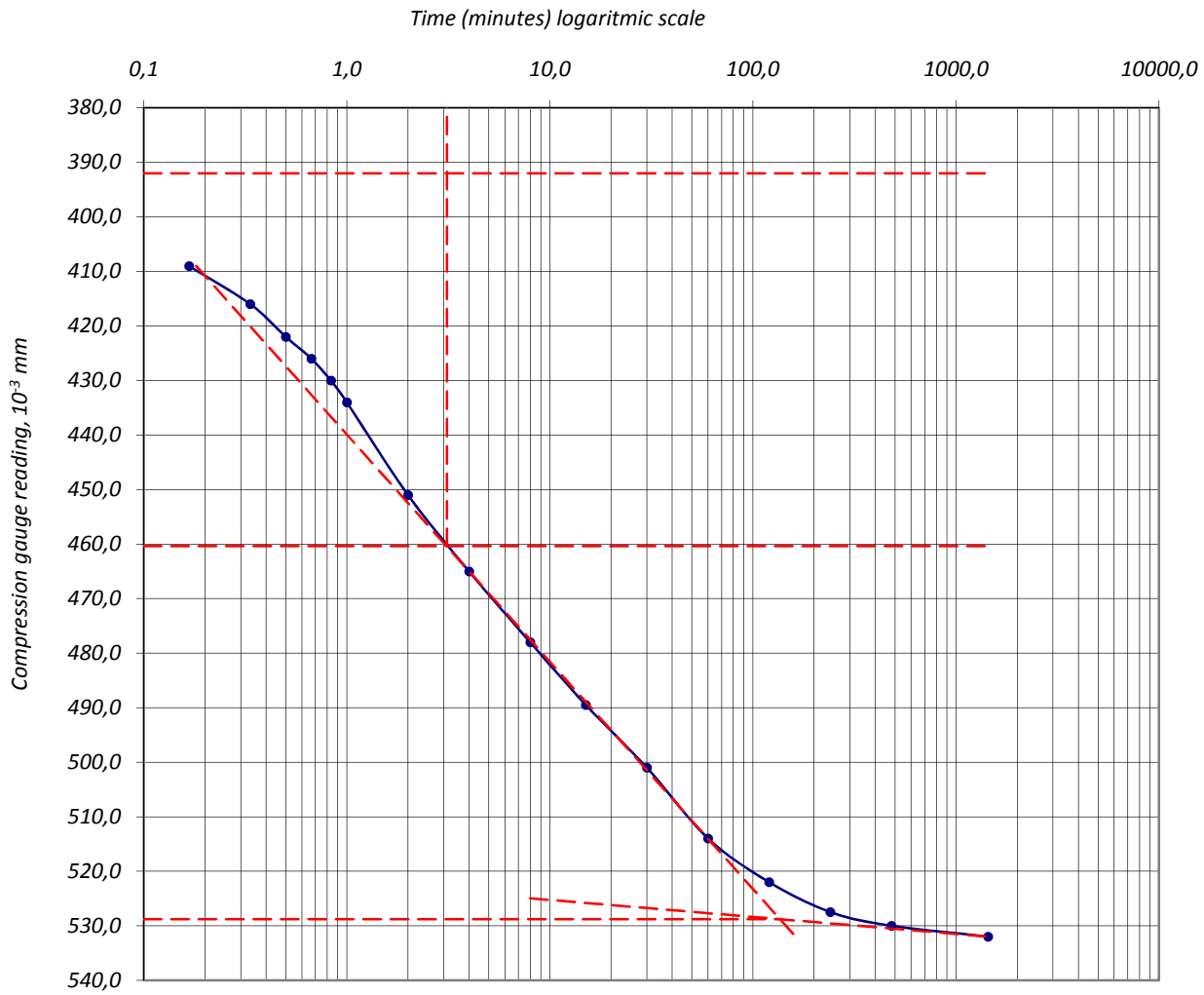


Sheet 9	Increment no. 2	Operator	Checked	Approved
Sheets 19	**LOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test (With Measurement of swelling pressure)

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Low plastic silty sandy CLAY	**Borehole**	BH-SB2-1
	Sample no.	,
	Dept	21,1-22,5
	Date	20.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	100

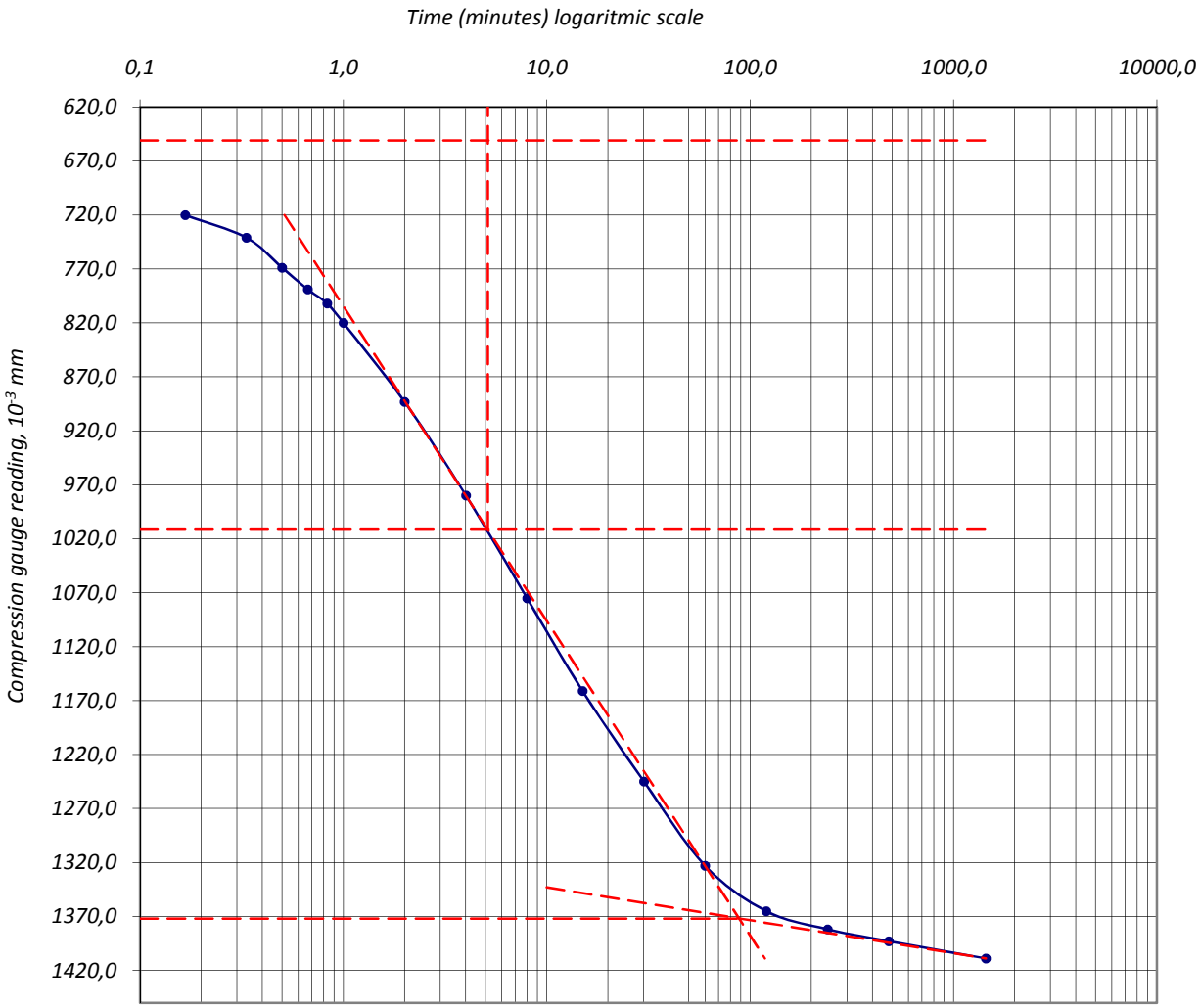


Sheet 10	Increment no. 3	Operator	Checked	Approved
Sheets 19	**LOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test (With Measurement of swelling pressure)

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Low plastic silty sandy CLAY	**Borehole**	BH-SB2-1
	Sample no.	,
	Dept	21,1-22,5
	Date	20.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	200

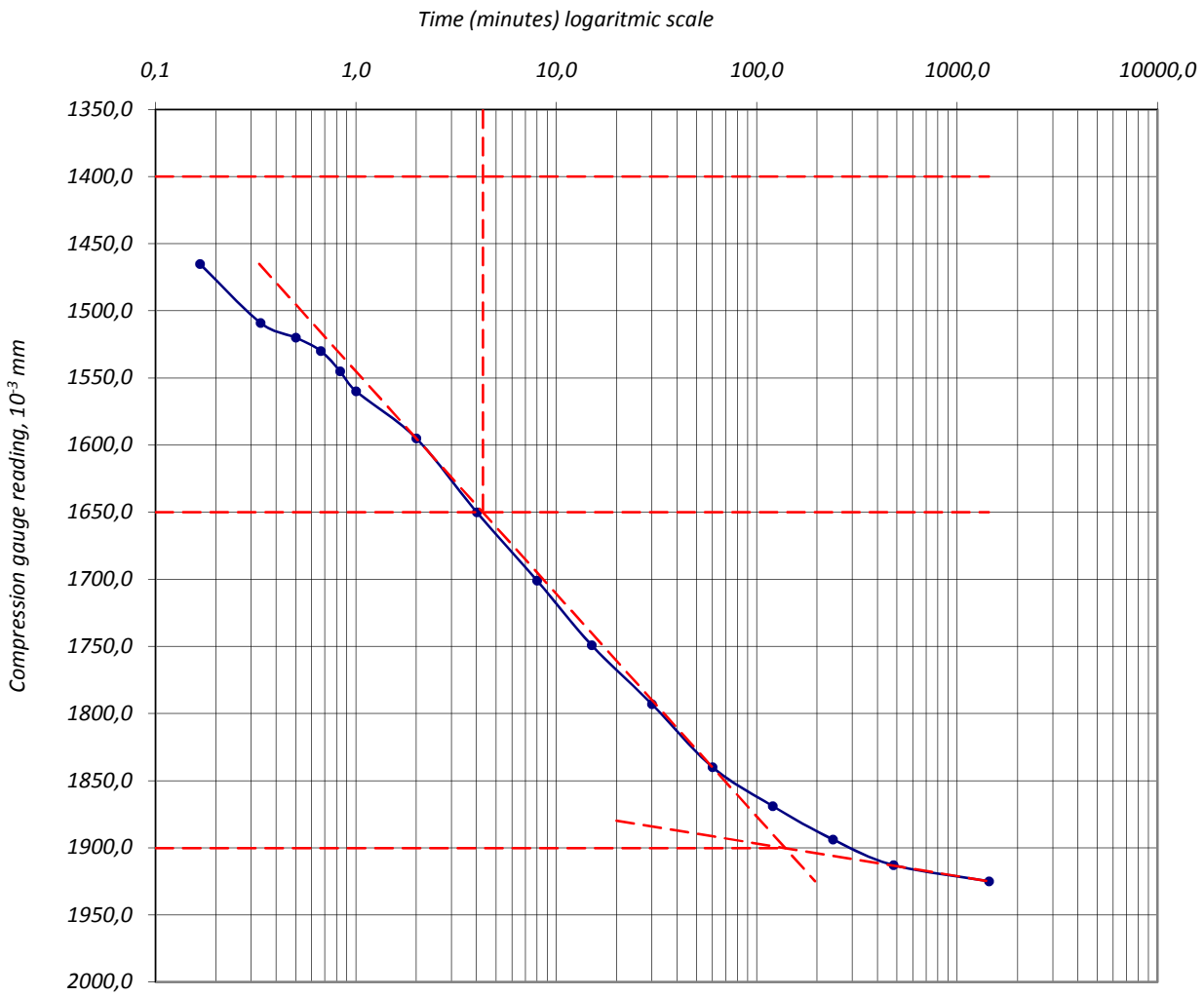


Sheet 11	Increment no. 4	Operator	Checked	Approved
Sheets 19	**LOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test (With Measurement of swelling pressure)

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Low plastic silty sandy CLAY	**Borehole**	BH-SB2-1
	Sample no.	,
	Dept	21,1-22,5
	Date	20.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	400

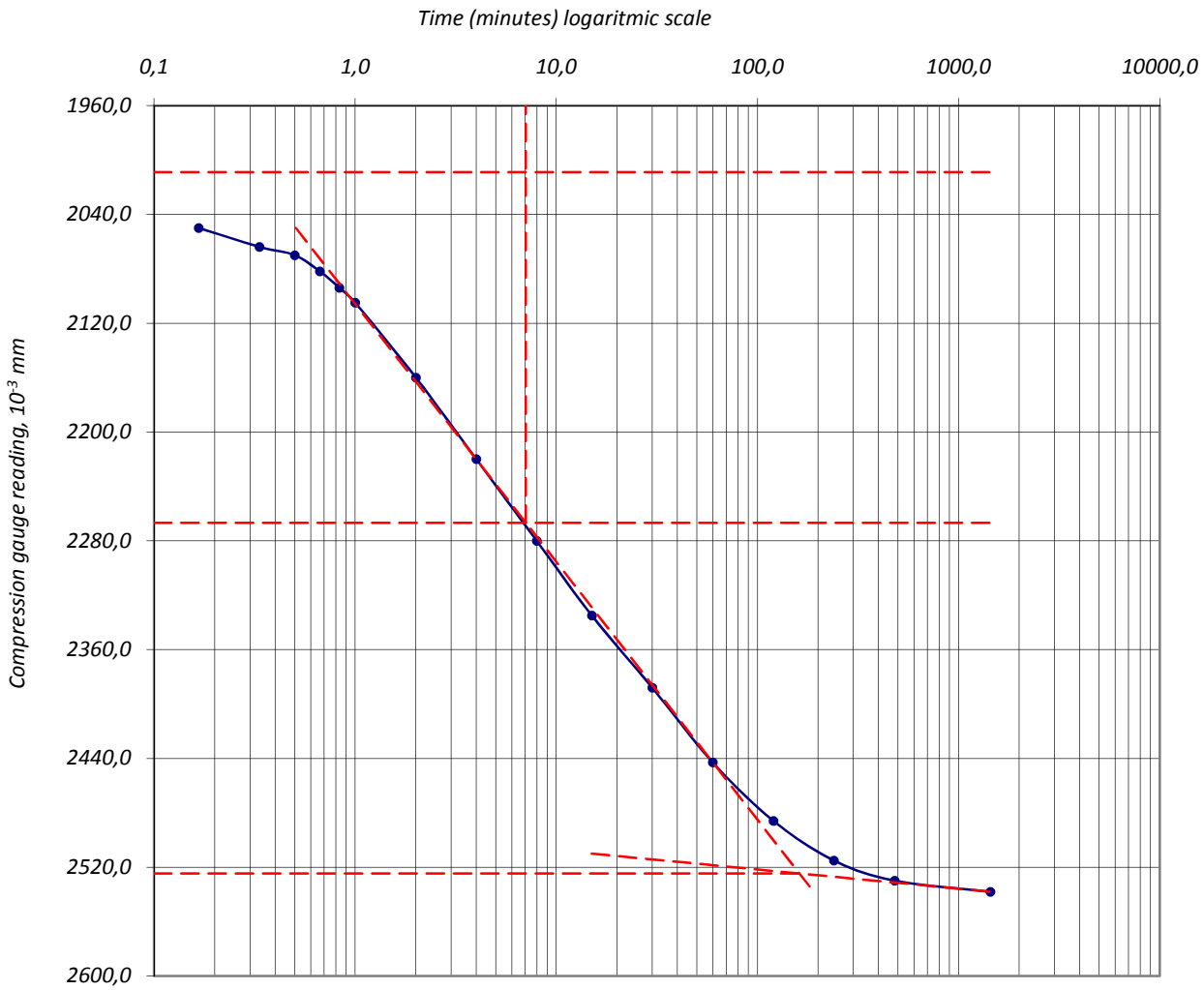


Sheet 12	Increment no. 5	Operator	Checked	Approved
Sheets 19	**LOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Test (With Measurement of swelling pressure)

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Low plastic silty sandy CLAY	**Borehole**	BH-SB2-1
	Sample no.	,
	Dept	21,1-22,5
	Date	20.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	800

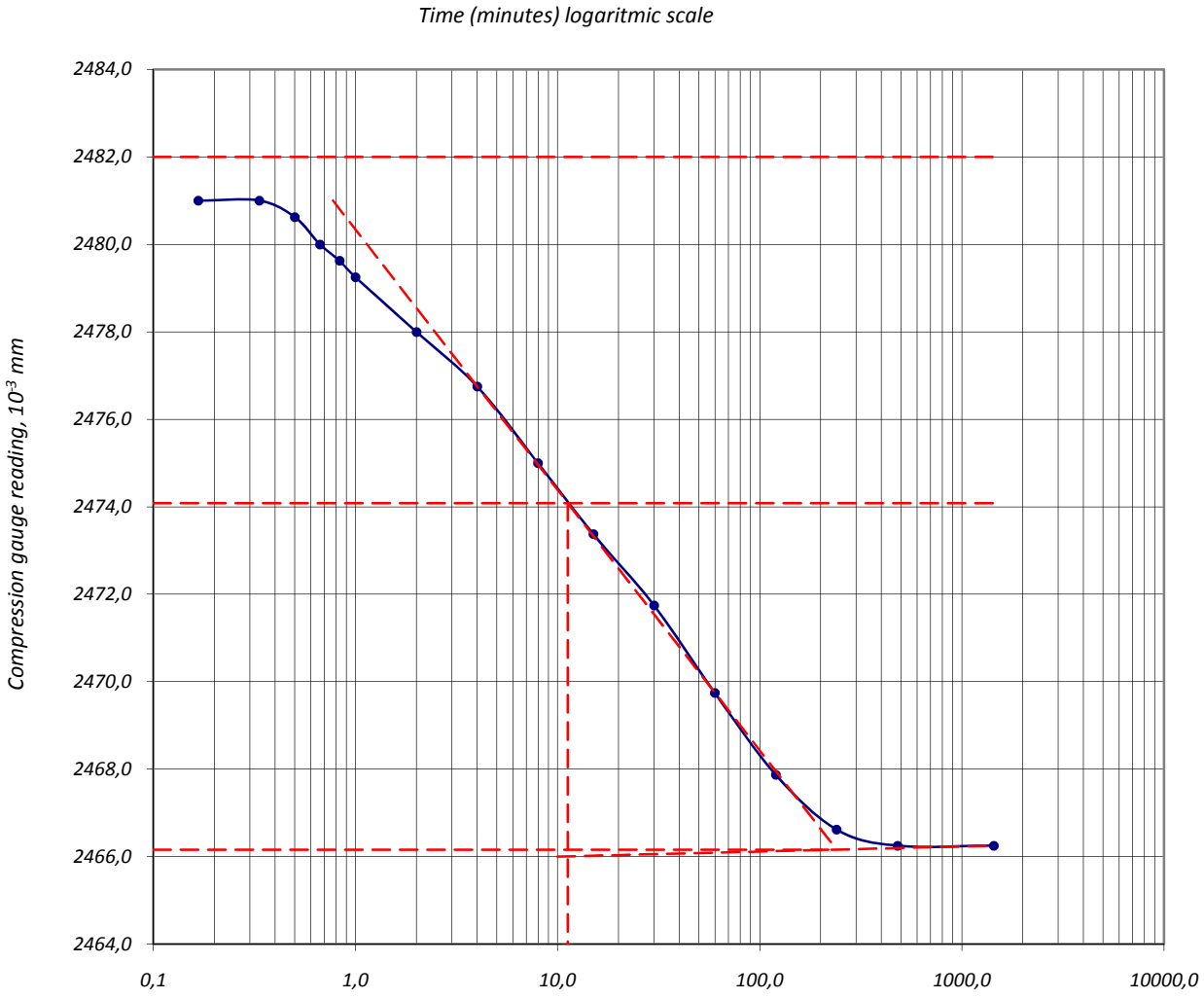


Sheet 13	Increment no. 6	Operator	Checked	Approved
Sheets 19	**UNLOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Curve – Logarithm of Time Fitting Method

Location: Imereti Region, Georgia	**Project Name:** GC-1128	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Low plastic silty sandy CLAY	**Borehole**	BH-SB2-1
	Sample no.	,
	Dept	21,1-22,5
	Date	20.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	400

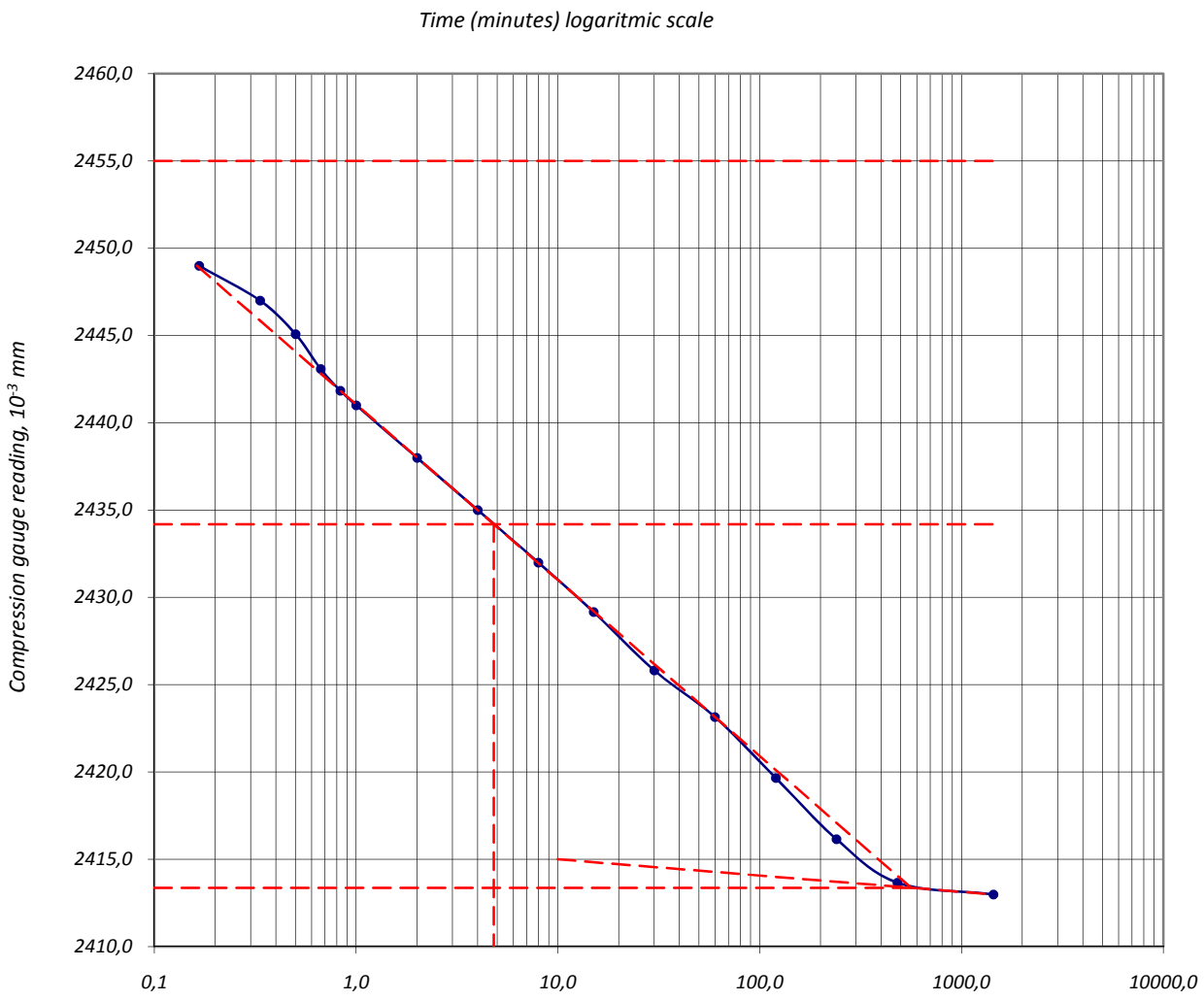


Sheet 14	Increment no. 7	Operator	Checked	Approved
Sheets 19	**UNLOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Curve – Logarithm of Time Fitting Method

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Low plastic silty sandy CLAY	**Borehole**	BH-SB2-1
	Sample no.	,
	Dept	21,1-22,5
	Date	20.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	200

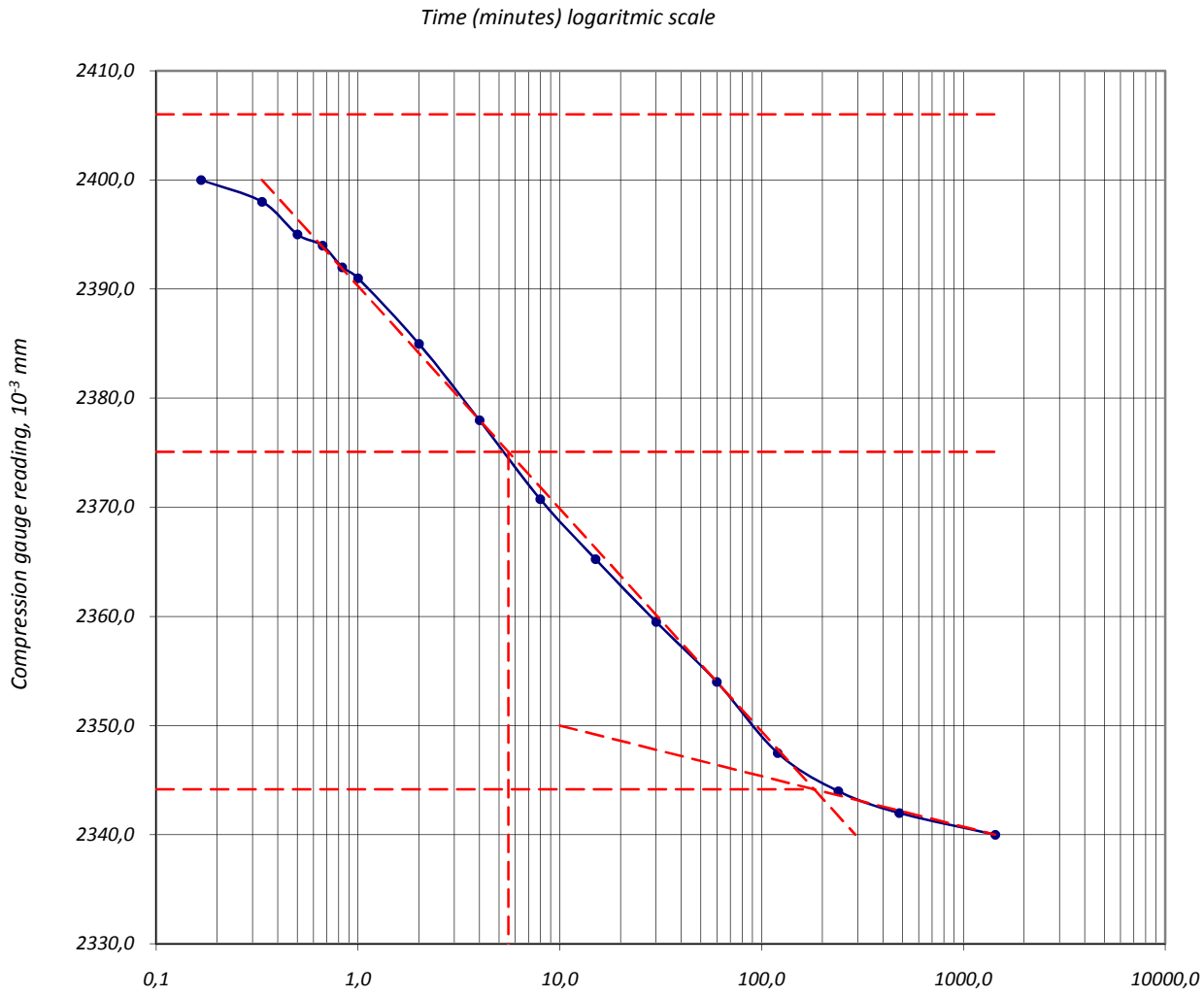


Sheet 15	Increment no. 8	Operator	Checked	Approved
Sheets 19	**UNLOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Curve – Logarithm of Time Fitting Method

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Low plastic silty sandy CLAY	**Borehole**	BH-SB2-1
	Sample no.	,
	Dept	21,1-22,5
	Date	20.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	100

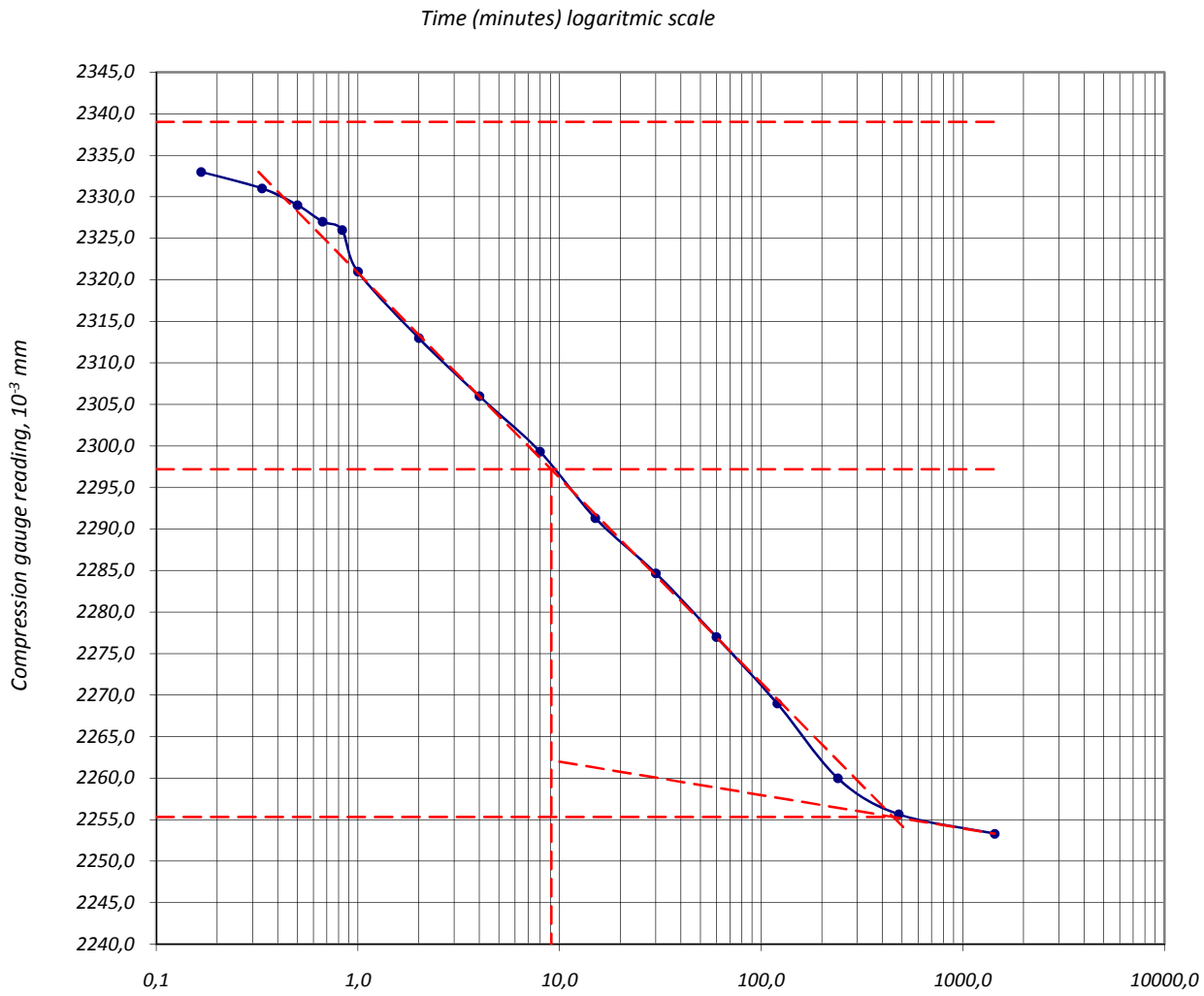


Sheet 16	Increment no. 9	Operator	Checked	Approved
Sheets 19	**RELOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Curve – Logarithm of Time Fitting Method

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Low plastic silty sandy CLAY	**Borehole**	BH-SB2-1
	Sample no.	,
	Dept	21,1-22,5
	Date	20.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	50

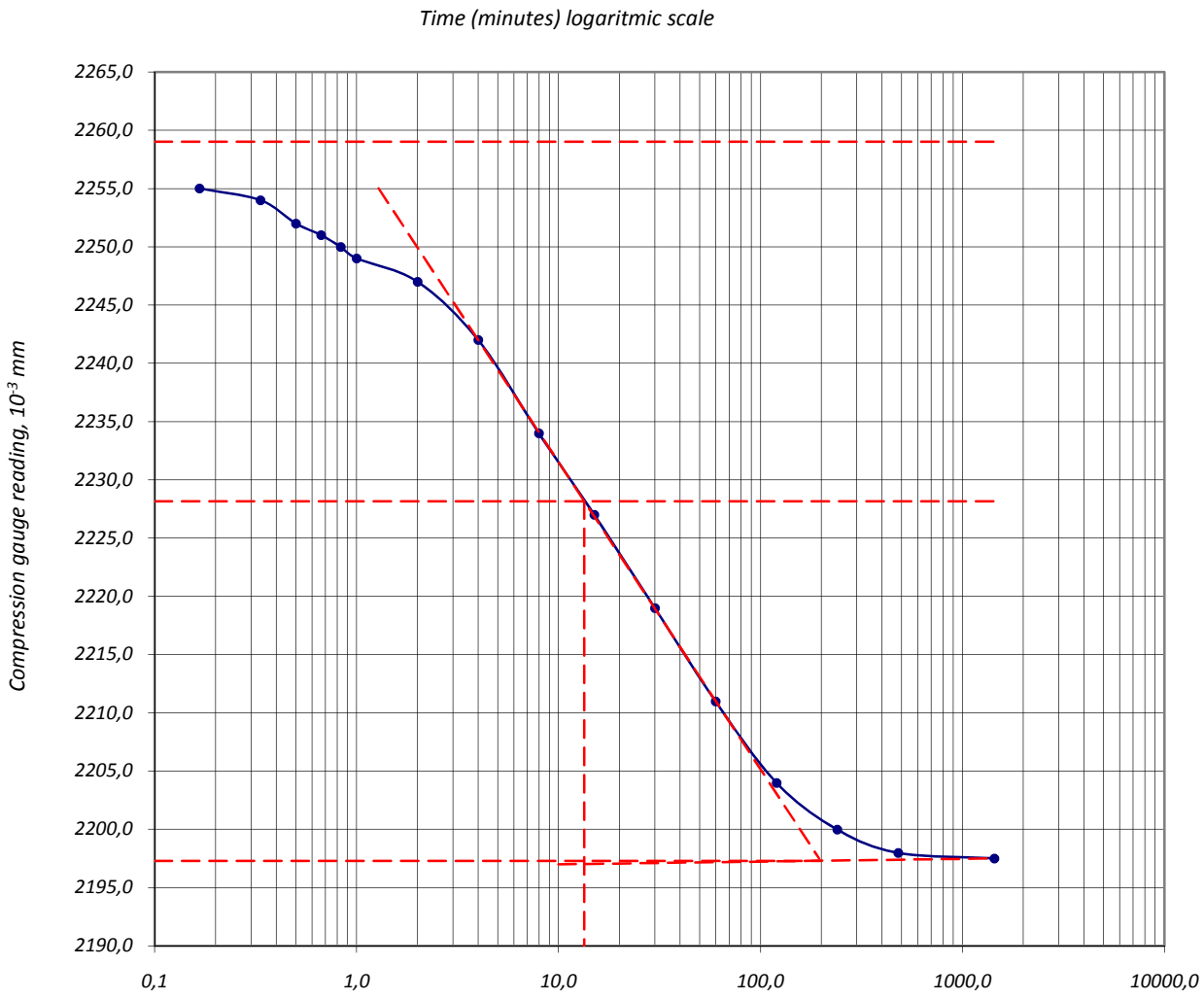


Sheet 17	Increment no. 10	Operator	Checked	Approved
Sheets 19	**RELOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Curve – Logarithm of Time Fitting Method

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Low plastic silty sandy CLAY	**Borehole**	BH-SB2-1
	Sample no.	,
	Dept	21,1-22,5
	Date	20.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	25

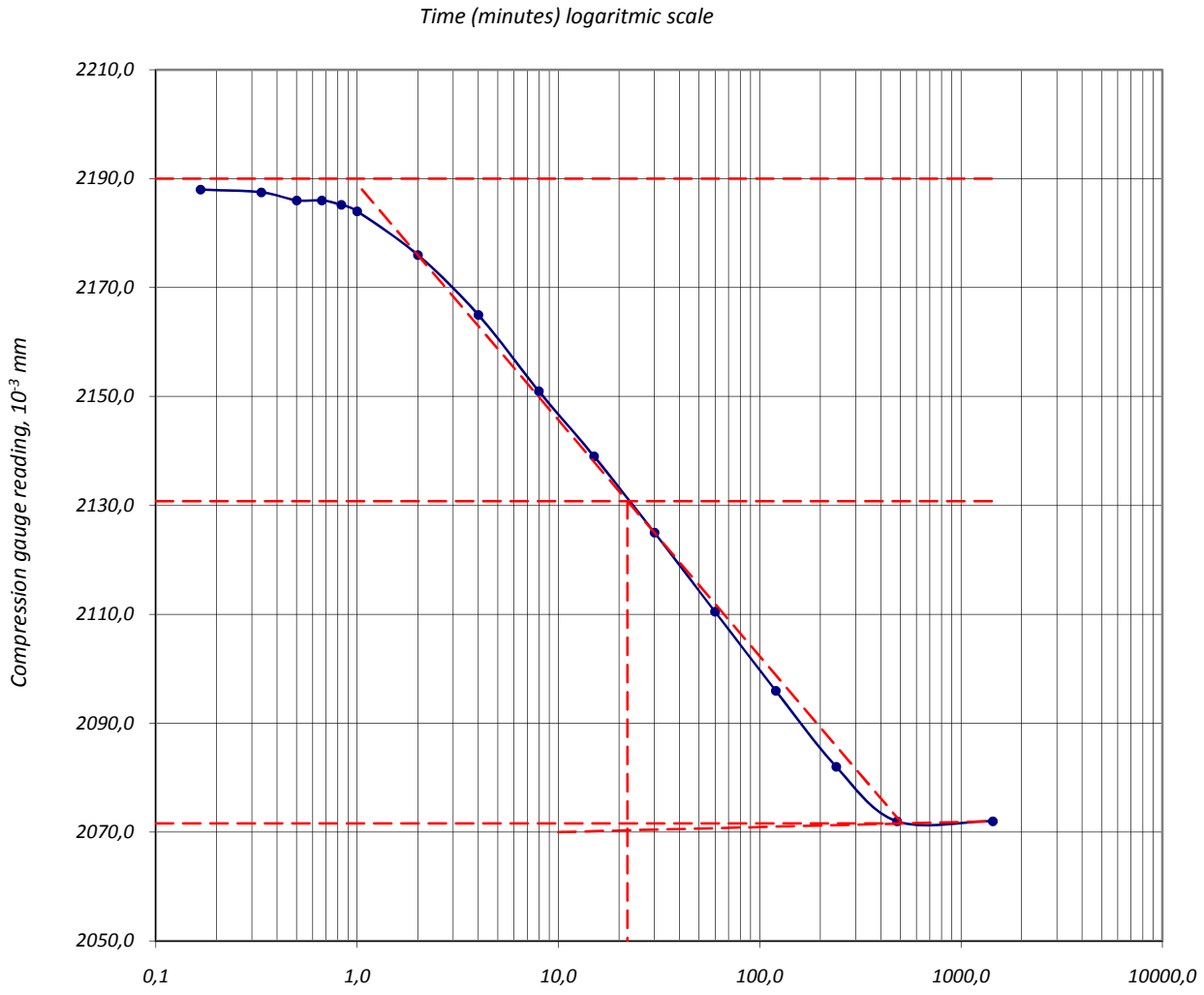


Sheet 18	Increment no. 11	Operator	Checked	Approved
Sheets 19	**RELOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

Consolidation Curve – Logarithm of Time Fitting Method

Location: Imereti Region, Georgia	**Project Name: GC-1128**	Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Soil description: Low plastic silty sandy CLAY	**Borehole**	BH-SB2-1
	Sample no.	,
	Dept	21,1-22,5
	Date	20.07.2011

Test method	BS 1377 : Part 7 : 1990 : 8	Pressure, kPa	3,6



Sheet 19	Increment no. 12	Operator	Checked	Approved
Sheets 19	**RELOADING**	T. Jajanidze	L. Gorgidze	R. Kavelashvili

ANNEX 2
Results of groundwater chemical analysis and assessment of agressivness

Project Name GC-1128 : Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi-Samtredia Road Section of the E-60 Highway in Georgia
Location: Imereti Region, Georgia

Groundwater Chemical Testing - Laboratory Data

#	BH #	Sampling Depth, m	Unit	Content per 1 liter		pH
				Anions		
				CL^-	SO_4^{2-}	
1	2	3	4	5	6	7
1	BH-SE-2	4.50	mg-l	68.08	No	6.15
2	BH-SE-3	2.95	mg-l	62.40	No	7.15
3	BH-SE-4	1.80	mg-l	56.74	No	7.07
4	BH-SE-5	1.40	mg-l	59.57	No	7.09
5	TP-SE-7	1.80	mg-l	60.57	No	6.95
6	BH-SE-6	2.30	mg-l	45.39	No	7.08
7	BH-SI1-2	1.30	mg-l	53.90	No	7.01
8	BH-SI1-1	1.80	mg-l	48.23	No	7.07
10	BH-SE-9	2.00	mg-l	59.57	No	6.95
11	BH-SE-10	2.00	mg-l	62.40	No	7.10
12	BH-SB1-1	4.30	mg-l	65.25	No	7.08
13	BH-SB1-3	2.00	mg-l	68.08	No	7.04
14	BH-SB1-4	0.52	mg-l	65.25	No	6.97
15	BH-SB1-4	26.0	mg-l	62.40	No	7.03
16	BH-SE-12	1.40	mg-l	59.57	No	7.06
17	BH-SB3-1	1.90	mg-l	59.57	No	7.14
18	BH-SE-14	1.00	mg-l	68.08	60.00	7.04
19	BH-SI2-1	3.20	mg-l	56.74	No	6.92
20	BH-SE-16	1.40	mg-l	62.40	No	6.99
21	BH-SE-17	1.20	mg-l	68.08	No	7.13
22	BH-SE-18	1.20	mg-l	65.25	No	7.06
23	BH-SE-19	2.00	mg-l	62.40	No	7.06
24	BH-SE-20	1.50	mg-l	42.55	No	6.87

ANNEX 3
Photo Documents

ფოტოგრაფიული დოკუმენტაცია	Photographic Documentation
ხელშეკრულება № GC-1128	Contract № GC-1128

პროექტის დასახელება: ქუთაისის ახალი შემოვლითი გზა-სამტრედიას საგზაო მონაკვეთის გეოტექნიკური კვლევა, საქართველოში E-60 ავტომაგისტრალის ზესტაფონი-ქუთაისი-სამტრედიას საგზაო მონაკვეთის დეტალური პროექტისა და მშენებლობის ზედამხედველობის მოსამზადებლად

Project Name: Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi- Samtredia Road Section of the E-60 Highway in Georgia

TP-SE-1

TP-SE-1

TP-SE-1

BH-SE-1
0-3 (მ, m)

BH-SE-1
3-6 (მ, m)

BH-SE-1
6-10 (მ, m)

ფოტოგრაფიული დოკუმენტაცია	Photographic Documentation
ხელშეკრულება № GC-1128	Contract № GC-1128

პროექტის დასახელება: ქუთაისის ახალი შემოვლითი გზა-სამტრედიას საგზაო მონაკვეთის გეოტექნიკური კვლევა, საქართველოში E-60 ავტომაგისტრალის ზესტაფონი-ქუთაისი-სამტრედიას საგზაო მონაკვეთის დეტალური პროექტისა და მშენებლობის ზედამხედველობის მოსამზადებლად

Project Name: Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi- Samtredia Road Section of the E-60 Highway in Georgia

TP-SE-2

TP-SE-2

TP-SE-2

TP-SE-2

TP-SE-3

TP-SE-3

ფოტოგრაფიული დოკუმენტაცია	Photographic Documentation
ხელშეკრულება № GC-1128	Contract № GC-1128

პროექტის დასახელება: ქუთაისის ახალი შემოვლითი გზა-სამტრედიას საგზაო მონაკვეთის გეოტექნიკური კვლევა, საქართველოში E-60 ავტომაგისტრალის ზესტაფონი-ქუთაისი-სამტრედიას საგზაო მონაკვეთის დეტალური პროექტისა და მშენებლობის ზედამხედველობის მოსამზადებლად

Project Name: Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi- Samtredia Road Section of the E-60 Highway in Georgia

TP-SE-3

TP-SE-3

BH-SB4-1
3-6 (მ, m)

BH-SB4-1
6-10 (მ, m)

BH-SB4-1
10-14 (მ, m)

BH-SB4-1
10-14 (მ, m) 14-17 (მ, m)

ფოტოგრაფიული დოკუმენტაცია	Photographic Documentation
ხელშეკრულება № GC-1128	Contract № GC-1128

პროექტის დასახელება: ქუთაისის ახალი შემოვლითი გზა-სამტრედიას საგზაო მონაკვეთის გეოტექნიკური კვლევა, საქართველოში E-60 ავტომაგისტრალის ზესტაფონი-ქუთაისი-სამტრედიას საგზაო მონაკვეთის დეტალური პროექტისა და მშენებლობის ზედამხედველობის მოსამზადებლად

Project Name: Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi- Samtredia Road Section of the E-60 Highway in Georgia

BH-SB4-1
17-21 (მ, m)

BH-SB4-1
21-26 (მ, m)

BH-SB4-1
26-30 (მ, m)

BH-SB4-1
0-21 (მ, m)

BH-SE-2

BH-SE-2
0-3 (მ, m)

ფოტოგრაფიული დოკუმენტაცია	Photographic Documentation
ხელშეკრულება № GC-1128	Contract № GC-1128

პროექტის დასახელება: ქუთაისის ახალი შემოვლითი გზა-სამტრედიას საგზაო მონაკვეთის გეოტექნიკური კვლევა, საქართველოში E-60 ავტომაგისტრალის ზესტაფონი-ქუთაისი-სამტრედიას საგზაო მონაკვეთის დეტალური პროექტისა და მშენებლობის ზედამხედველობის მოსამზადებლად

Project Name: Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi- Samtredia Road Section of the E-60 Highway in Georgia

BH-SE-2
0-3 (მ, m) 3-6 (მ, m)

TP-SE-4

TP-SE-4

TP-SE-4

TP-SE-5

TP-SE-5

ფოტოგრაფიული დოკუმენტაცია	Photographic Documentation
ხელშეკრულება № GC-1128	Contract № GC-1128

პროექტის დასახელება: ქუთაისის ახალი შემოვლითი გზა-სამტრედიას საგზაო მონაკვეთის გეოტექნიკური კვლევა, საქართველოში E-60 ავტომაგისტრალის ზესტაფონი-ქუთაისი-სამტრედიას საგზაო მონაკვეთის დეტალური პროექტისა და მშენებლობის ზედამხედველობის მოსამზადებლად

Project Name: Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi- Samtredia Road Section of the E-60 Highway in Georgia

TP-SE-5

TP-SE-5

BH-SE-3

BH-SE-3
0-3 (მ, m)

BH-SE-3
3-6 (მ, m) 6-10 (მ, m)

TP-SE-6

ფოტოგრაფიული დოკუმენტაცია	Photographic Documentation
ხელშეკრულება № GC-1128	Contract № GC-1128

პროექტის დასახელება: ქუთაისის ახალი შემოვლითი გზა-სამტრედიას საგზაო მონაკვეთის გეოტექნიკური კვლევა, საქართველოში E-60 ავტომაგისტრალის ზესტაფონი-ქუთაისი-სამტრედიას საგზაო მონაკვეთის დეტალური პროექტისა და მშენებლობის ზედამხედველობის მოსამზადებლად

Project Name: Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi- Samtredia Road Section of the E-60 Highway in Georgia

TP-SE-6

TP-SE-6

BH-SE-4
0-3 (მ, m)

BH-SE-4
3-6 (მ, m)

BH-SE-4
6-10 (მ, m)

BH-SE-5
0-3 (მ, m)

ფოტოგრაფიული დოკუმენტაცია	Photographic Documentation
ხელშეკრულება № GC-1128	Contract № GC-1128

პროექტის დასახელება: ქუთაისის ახალი შემოვლითი გზა-სამტრედიას საგზაო მონაკვეთის გეოტექნიკური კვლევა, საქართველოში E-60 ავტომაგისტრალის ზესტაფონი-ქუთაისი-სამტრედიას საგზაო მონაკვეთის დეტალური პროექტისა და მშენებლობის ზედამხედველობის მოსამზადებლად

Project Name: Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi- Samtredia Road Section of the E-60 Highway in Georgia

BH-SE-5
0-3 (მ, m) 3-6 (მ, m)

TP-SE-7

TP-SE-7

TP-SE-7

TP-SE-7

TP-SE-7

ფოტოგრაფიული დოკუმენტაცია	Photographic Documentation
ხელშეკრულება № GC-1128	Contract № GC-1128

პროექტის დასახელება: ქუთაისის ახალი შემოვლითი გზა-სამტრედიას საგზაო მონაკვეთის გეოტექნიკური კვლევა, საქართველოში E-60 ავტომაგისტრალის ზესტაფონი-ქუთაისი-სამტრედიას საგზაო მონაკვეთის დეტალური პროექტისა და მშენებლობის ზედამხედველობის მოსამზადებლად

Project Name: Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi- Samtredia Road Section of the E-60 Highway in Georgia

BH-SE-6
0-3 (მ, m)

BH-SE-6
3-6 (მ, m)

BH-SE-6
6-10 (მ, m)

BH-SB5-1
0-3 (მ, m)

BH-SB5-1
3-6 (მ, m)

BH-SB5-1
6-9 (მ, m)

ფოტოგრაფიული დოკუმენტაცია	Photographic Documentation
ხელშეკრულება № GC-1128	Contract № GC-1128

პროექტის დასახელება: ქუთაისის ახალი შემოვლითი გზა-სამტრედიას საგზაო მონაკვეთის გეოტექნიკური კვლევა, საქართველოში E-60 ავტომაგისტრალის ზესტაფონი-ქუთაისი-სამტრედიას საგზაო მონაკვეთის დეტალური პროექტისა და მშენებლობის ზედამხედველობის მოსამზადებლად

Project Name: Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi- Samtredia Road Section of the E-60 Highway in Georgia

BH-SB5-1
9-13 (მ, m)

BH-SB5-1
13-16 (მ, m)

BH-SI1-1
0-3 (მ, m)

BH-SI1-1
0-3 (მ, m) 3-6 (მ, m) 6-9 (მ, m)

BH-SI1-1
3-6 (მ, m) 6-9 (მ, m) 9-12 (მ, m) 12-15 (მ, m)

BH-SI1-1
9-12 (მ, m) 12-15 (მ, m) 15-19 (მ, m) 19-23 (მ, m)

ფოტოგრაფიული დოკუმენტაცია	Photographic Documentation
ხელშეკრულება № GC-1128	Contract № GC-1128

პროექტის დასახელება: ქუთაისის ახალი შემოვლითი გზა-სამტრედიას საგზაო მონაკვეთის გეოტექნიკური კვლევა, საქართველოში E-60 ავტომაგისტრალის ზესტაფონი-ქუთაისი-სამტრედიას საგზაო მონაკვეთის დეტალური პროექტისა და მშენებლობის ზედამხედველობის მოსამზადებლად

Project Name: Geotechnical Investigation for New Kutaisi Bypass-Samtredia Road Section of the Preparation of Detail Design and Construction Supervision of Zestafoni-Kutaisi- Samtredia Road Section of the E-60 Highway in Georgia

BH-SI1-1
15-19 (მ, m) 19-23 (მ, m) 23-27 (მ, m)

BH-SI1-2
0-3 (მ, m) 3-6 (მ, m)

BH-SI1-2
3-6 (მ, m) 6-9 (მ, m)

BH-SI1-2
6-9 (მ, m) 9-12 (მ, m)

BH-SI1-2
12-15 (მ, m)

BH-SI1-2
15-19 (მ, m)