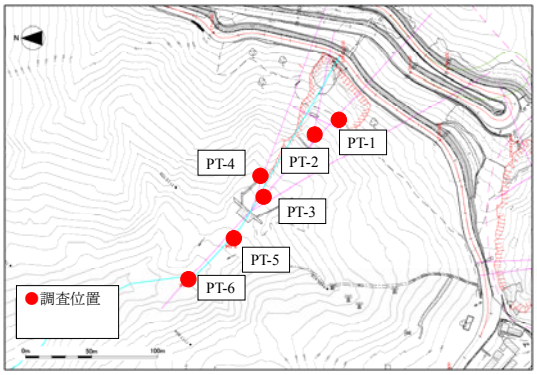
6.7
土質試験結果

土質試験結果一覧表（Pit1～Pit5）

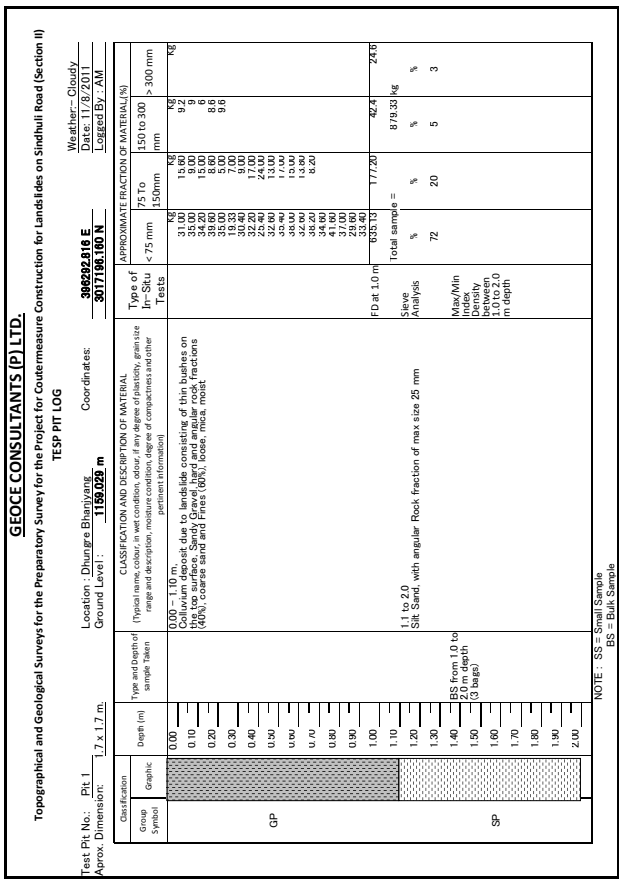
			試験項目	Pit1	Pit2	Pit3	Pit4	Pit5	Pit6	備考
土粒子の密度 ρ_s (g/cm³)			<粒径4.75mm	2.681	2.666	2.817	2.510	2.771	2.518	平均 2.661
絶乾比重 D_{ti} (g/cm³)			4.75～37.5mm	2.555	2.560	2.565	2.549	2.559	2.577	平均 2.561
			37.5～75mm	2.550	2.557	2.573	2.545	2.544	2.571	平均 2.557
			>75mm	2.615	2.610	2.620	2.635	2.676	2.614	平均 2.628
合成比重 $D_{ti}=1/\Sigma[(fi/100)/Di]$			<75mm	2.596	2.592	2.679	2.535	2.632	2.556	平均 2.598
			<Dmax	2.601	2.603	2.673	2.603	2.640	2.564	平均 2.614
吸水率 Q (%)			4.75～37.5mm	1.28	1.42	1.36	1.22	1.48	0.88	平均 1.27
			37.5～75mm	1.30	1.22	1.00	0.95	0.86	0.84	平均 1.03
			>75mm	0.56	0.83	0.72	0.49	0.23	0.94	平均 0.63
合成吸水率 $\Sigma fi \cdot Qi/100$			<75mm	1.3	1.4	1.3	1.1	1.4	0.9	平均 1.22
			<Dmax	1.1	1.0	1.3	0.7	1.1	0.9	fi：各粒度階における重量構成百分率（いわゆる残留率）
含水比 Wn (%)			<37.5mm	8.67	9.28	7.03	10.84	8.18	6.33	現場密度試験と現場粒度試験の含水比の平均を示す
			37.5～75mm	3.08	2.20	2.37	4.46	2.26	2.56	同上
			>75mm	1.76	1.45	1.25	1.67	1.51	1.50	現場密度試験の含水比
合成含水比 $\Sigma fi \cdot Wi/100$			<75mm	7.1	7.5	6.5	8.7	7.0	5.0	平均 7.0
			<Dmax	5.6	3.8	6.0	3.8	5.9	4.5	平均 4.9
粒度特性	最大粒径 Dmax (mm)			300	350	300	350	310	300	
	質量百分率 %	ボルダー(巨石) >300mm		3.0	24	8	17	2	0	粒径区分はASTMD653Iによる。
		コブル(粗石) 75mm～300mm		25.0	37	9	52	18	14	Pit2は120kgの巨石を含み、300mm以上の割合が多くなっている。
		礫 37.5mm～75mm		20.7	9.8	11.1	10.5	15.4	30.7	Pit4は300mm以上の礫が相対的に多かった。
		礫 4.75mm～37.5mm		26.5	16.7	37.1	10.4	34.5	28.7	
		砂 0.075mm～4.75mm		18.3	9.2	37.5	8.4	25.7	22.7	
		シルト・粘土 <0.075mm		6.5	3.3	5.3	1.7	4.4	3.9	
	通過粒径 Di (mm)	60%粒径		51	170	15	150	32	40	
		50%粒径		34	110	9.5	110	22	32	
		30%粒径		9.9	38	1	73	4.75	10	
		20%粒径		1.3	17	0.34	35	0.76	0.9	
		10%粒径		0.16	1.9	0.15	4.7	0.18	0.21	
	均等係数	$Uc=D_{60}/D_{10}$		318.8	89.5	100.0	31.9	177.8	190.5	JGS Uc≧10 粒径幅の広い
	勾配係数	$Uc'=D_{30}{}^2/(D_{10}\times D_{60})$		12.0	4.5	0.4	7.6	3.9	11.9	ASTM Uc≧4 and 1≦Uc'≦3:Well-graded Gravel
締固特性	最小密度 (g/cm^3)	湿潤密度 ρ_{tmin}	<75mm	1.755	1.621	1.765	1.679	1.759	1.735	
			<Dmax	1.933	2.108	1.818	2.245	1.887	1.821	乾燥密度と含水比から算出
		乾燥密度 ρ_{dmin}	<75mm	1.640	1.508	1.658	1.545	1.644	1.653	試験の湿潤密度(<75mm)と含水比から算出
			<Dmax	1.831	2.031	1.715	2.162	1.781	1.743	Walker-Holtzの締固え方法より算出、Pit2,4は75mm以上の含有率が30%以上と多く参考値。
	最大間隙比 e_{max}		<75mm	0.583	0.719	0.615	0.641	0.601	0.547	
			<Dmax	0.421	0.282	0.559	0.204	0.483	0.472	
	最大密度 (g/cm^3)	湿潤密度 ρ_{tmax}	<75mm	2.290	2.179	2.366	2.317	2.351	2.244	
			<Dmax	2.376	2.432	2.392	2.530	2.408	2.287	乾燥密度と含水比から算出
		乾燥密度 ρ_{dmax}	<75mm	2.139	2.027	2.223	2.132	2.196	2.138	試験の湿潤密度(<75mm)と含水比から算出
			<Dmax	2.251	2.343	2.257	2.436	2.273	2.189	Walker-Holtzの締固え方法より算出
	最小間隙比 e_{min}		<75mm	0.213	0.279	0.205	0.189	0.198	0.196	
			<Dmax	0.156	0.111	0.184	0.069	0.162	0.171	
	ρ dmax×95% の状態量	湿潤密度	ρ_{t95} ×95% (g/cm^3)	2.258	2.311	2.273	2.403	2.287	2.173	<Dmaxで評価
			γ_{t95} ×95% (kN/m^3)	22.1	22.7	22.3	23.6	22.4	21.3	Pit1,3,5,6平均 22.0
		乾燥密度	ρ_{d95} ×95% (g/cm^3)	2.138	2.226	2.144	2.314	2.159	2.079	
		間隙比	e	0.216	0.169	0.247	0.125	0.223	0.233	Pit1,3,5,6平均 0.230
		相対密度	$Dr=(e_{max}-e)/(e_{max}-e_{min})\times100\%$	77.1	85.7	83.4	58.5	80.9	79.5	Pit1,3,5,6平均 80.2
	ρ dmax×90% の状態量	湿潤密度	ρ_{t90} ×95% (g/cm^3)	2.139	2.189	2.153	2.277	2.167	2.058	<Dmaxで評価
			γ_{t90} ×95% (kN/m^3)	21.0	21.5	21.1	22.3	21.3	20.2	Pit1,3,5,6平均 20.9
		乾燥密度	ρ_{d90} ×90% (g/cm^3)	2.026	2.109	2.031	2.193	2.046	1.970	
		間隙比	e	0.284	0.234	0.316	0.187	0.291	0.302	Pit1,3,5,6平均 0.298
		相対密度	$Dr=(e_{max}-e)/(e_{max}-e_{min})\times100\%$	51.6	71.7	64.9	12.3	59.8	56.6	Pit1,3,5,6平均 59.2
現場密度	試験孔の最大粒径 (mm)			300	350	300	350	310	300	
	湿潤密度	ρ_t (g/cm^3)		2.058	1.927	2.046	2.076	2.546	2.128	Pit1,2,3,4,6平均 2.047
		$\gamma_t=9.81\times\rho_t$ (kN/m^3)		20.2	18.9	20.1	20.4	25.0	20.9	Pit1,2,3,4,6平均 20.1
	乾燥密度	ρ_d (g/cm^3)		1.948	1.856	1.931	1.999	2.404	2.037	
	間隙比	e		0.334	0.403	0.385	0.302	0.098	0.259	Pit1,2,3,4,6平均 0.337
	相対密度	$Dr=(e_{max}-e)/(e_{max}-e_{min})\times100\%$		32.6	-70.9	46.5	-72.6	119.7	70.8	Pit1,3,6平均 50.0

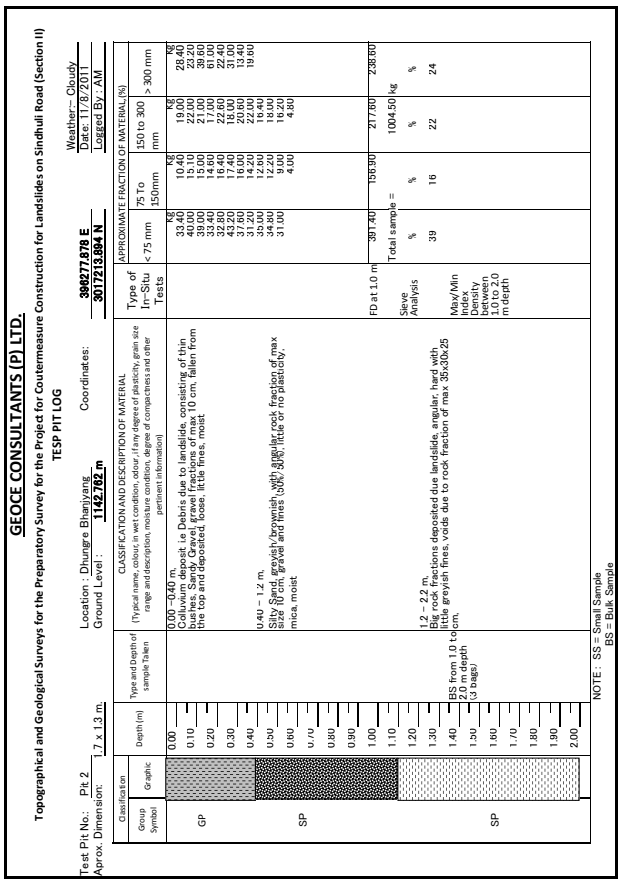


Sta.17+600 調査位置図

Pit1,2：表層に Dmax300 のコブル集積する Gabion2 より上位にを配置。
Pit3,4：Gabion2～3 の 3 個に配置。
Pit5,6：押え盛土効果に該当する Gabion3 より下位に配置

Sta.17+600 調査位置写真





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Topographical and Geological Surveys for the Preparatory Survey for the Project for Coutermeasure Construction for Landslides on Sindhuli Road (Section II)

TESP PIT LOG

Test Pit No.: Pit 5 | Location : | Coordinates: 396196.721 E | Weather:– Cloudy
Aprox. Dimension: 1.3 x 2.1 m. | Ground Level : 1096.871 m | 3017276.046 N | Date: 10/8/2011 | Logged By : AM

Classification: Group Symbol	Graphic	Depth (m)	Type and Depth of sample Taken	CLASSIFICATION AND DESCRIPTION OF MATERIAL (Typical name, colour, in wet condition, odour, if any degree of plasticity, grain size range and description, moisture condition, degree of compactness and other pertinent information)	Type of In–Situ Tests	APPROXIMATE FRACTION OF MATERIAL,(%) < 75 mm	75 To 150mm	150 to 300 mm	> 300 mm
GP		0.00		0.00 –0.40 m, Colluvium due to landslide, consisting of big Boulders of max size 42x30x25 cm		Kg 53.00 41.00 60.00 45.00 62.00 60.00 38.00 46.00 100.00	Kg 15.00 20.60 17.40 15.40	Kg 15.00 11.00 18.00	Kg 15.00
SM-ML		0.40		0.40 – 0.8 m, Silty Sand, greyish, small boulders/rock fractions, water seepage, high water content, loose, little or no plasticity, mica, wet					
		0.80		0.8 – 2.0 m, Silty Sand, with little anular Gravels, loose, ground water recorded at depth 1.3 m from the top					
		1.00			FD at 1.0 m (water replacement)	505.00	68.40	44.00	15.00
		1.10			Total sample =			632.40	kg
		1.20			Sieve Analysis	%	%	%	%
		1.30			GWt at 1.3 m	80	11	7	2
		1.40	BS from 1.0 to 2.0 m depth (3 bags)						
		1.50							
		1.60							
		1.70							
		1.80							
		1.90							
		2.00							

NOTE : SS = Small Sample
BS = Bulk Sample

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Topographical and Geological Surveys for the Preparatory Survey for the Project for Coutermeasure Construction for Landslides on Sindhuli Road (Section II)

TESP PIT LOG

Test Pit No.: Pit 3 | Location : Seismic Group (475 inslide) | Coordinates: 396231.480 E | Weather:– Cloudy
Aprox. Dimension: 2.0 x 1.5 m. | Ground Level : 1110.684 m | 3017253.296 N | Date: 11/8/2011 | Logged By : AM

Classification: Group Symbol	Graphic	Depth (m)	Type and Depth of sample Taken	CLASSIFICATION AND DESCRIPTION OF MATERIAL (Typical name, colour, in wet condition, odour, if any degree of plasticity, grain size range and description, moisture condition, degree of compactness and other pertinent information)	Type of In–Situ Tests	APPROXIMATE FRACTION OF MATERIAL,(%) < 75 mm	75 To 150mm	150 to 300 mm	> 300 mm
GP		0.00		0.00 –0.60 m, Colluvium materials i.e landslide debris consisting of Sandy Gravel, angular rock fractions fallen from the top and deposited during landslide, loose, little fines, moist		Kg 34.00 39.00 38.00 33.00 42.00 36.60 42.00 41.00 23.80 23.00	Kg 26.50 8.40	Kg	Kg
		0.60		0.6 – 1.9 m, Sand with Gravel and boulder/rock fraction, hard, angular of max size 11.5x15x10 cm fines, no plasticity, moist	FD by water replacement method at 1.0 m				
		1.00				353.40	34.90	0.00	0.00
		1.10				Total sample =		388.30	kg
SP		1.20			Sieve Analysis	%	%	%	%
		1.30				91	9	0	0
		1.40	BS from 1.0 to 2.0 m depth (3 bags)						
		1.50							
		1.60							
		1.70							
		1.80							
		1.90		1.9 – 2.0 Gravelly Sand, Coarse grained, gravel or boulder of max size 75 mm, water seepage, loose, wet					
		2.00							

NOTE : SS = Small Sample
BS = Bulk Sample

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Topographical and Geological Surveys for the Preparatory Survey for the Project for Coutermeasure Construction for Landslides on Sindhuli Road (Section II)

TESP PIT LOG

Test Pit No.: Pit 6 | Location : Dhungre Bas (136 of Seismic) | Coordinates: 396166.737 E | Weather:– Cloudy
Aprox. Dimension: 2.1 x 1.2 m. | Ground Level : 1084.491 m | 3017310.612 N | Date: 12/8/2011 | Logged By : AM

Classification: Group Symbol	Graphic	Depth (m)	Type and Depth of sample Taken	CLASSIFICATION AND DESCRIPTION OF MATERIAL (Typical name, colour, in wet condition, odour, if any degree of plasticity, grain size range and description, moisture condition, degree of compactness and other pertinent information)	Type of In–Situ Tests	APPROXIMATE FRACTION OF MATERIAL,(%) < 75 mm	75 To 150mm	150 to 300 mm	> 300 mm
GP		0.00		0.00 –0.30 m, Colluvium deposit or Debris due to landslide, consisting of big Rock fractions of max size 17x12x11 cm, with grass roots, little sand		Kg 27.00 29.20 29.00 33.00 29.00 26.60 29.00 30.40 36.20 15.80 29.80	Kg 10.20 20.00 14.60	Kg 8.00	Kg
		0.30		0.3 – 1.2 m, Sandy Gravel, litt l boulder/stone (10%), little fines, wet, ground water noticed at 1/2 m depth from the top					
		1.00			FD at 1.0 m (water replacement) Sieve Analysis	312.00	44.80	8.00	0.00
		1.10				Total sample =		364.80	kg
		1.20		1.2 – 1.5 m & down,	GWt at 1.2 m	%	%	%	%
		1.30		Sandy Gravel, with little boulder/rock fraction of max size 40x37x11 cm, water seepage, wet		86	12	2	0
		1.40	BS from 1.0 to 2.0 m depth (3 bags)						
		1.50							
		1.60							
		1.70							
		1.80							
		1.90							
		2.00							

NOTE : SS = Small Sample
BS = Bulk Sample

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Topographical and Geological Surveys for the Preparatory Survey for the Project for Coutermeasure Construction for Landslides on Sindhuli Road (Section II)

TESP PIT LOG

Test Pit No.: Pit 4 | Location : 30 for Seismic Group | Coordinates: 396246.103 E | Weather:– Cloudy
Aprox. Dimension: 1.7 x 1.4 m. | Ground Level : 1115.611 m | 3017254.555 N | Date: 10/8/2011 | Logged By : AM

Classification: Group Symbol	Graphic	Depth (m)	Type and Depth of sample Taken	CLASSIFICATION AND DESCRIPTION OF MATERIAL (Typical name, colour, in wet condition, odour, if any degree of plasticity, grain size range and description, moisture condition, degree of compactness and other pertinent information)	Type of In–Situ Tests	APPROXIMATE FRACTION OF MATERIAL,(%) < 75 mm	75 To 150mm		150 to 300 mm	> 300 mm
GP		0.00		0.00 – 2.1 m, Colluvium deposit due to landslide, consisting of mostly Boulder/Stone, angular, hard, max size of rock fraction is recorded as 46x28x15 cm, fallen from the top and deposited, loose, little mica, little fines, moist		Kg 26.60 35.00 31.20 26.80 34.00 25.40 32.00 38.40 33.00 43.00 35.10	Kg 5.00 4.60 4.20 6.20 6.20 7.20 9.80 8.00 2.00 4.20 4.80 10.40 6.00 4.00 3.80 18 17 18 22	18 26 22 19.4 21 12 14 15 13 19 19	Kg 25.00 8.80 8.20 15.00 5.00 19.00 8.00 15.00 23.00 22.00 10.00 14.00 8.2 11 12 7 12 14	Kg 40.00 30.80 21.00 19.20 22.40 31.00 13.40 19.60
		1.00			FD at 1.0 m (water replacement) Sieve Analysis	362.50	161.40 356.80	195.4	240.80	197.40
		1.10				Total sample =			1157.50	kg
		1.20				%	%		%	%
		1.30				31	31		21	17
		1.40	BS from 1.0 to 2.0 m depth (3 bags)		Max/Min Index Density between 1.0 to 2.0 m depth					
		1.50								
		1.60								
		1.70								
		1.80								
		1.90								
		2.00								

NOTE : SS = Small Sample
BS = Bulk Sample

資料6-7-2

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Topographical and Geological Surveys for the Preparatory Survey for the Project for Coutermeasure Construction for Landslides on Sindhuli Road (Section II)

FIELD DENSITY TEST
Water Replacment Method

Location : Dhungre Bhanjyang Test Pit: Pit 4 Test Dep 1 m Date 10-Sep-11

Field Density test				Weight of Water in Hole				Water Content Determination		<37.5 mm		37.5 - 75 mm		>75 mm	
F1	wt of wet soil	54200.00	gm		gm	gm	gm	F1	Wt of wet soil + Pan	1135	1127	836		1798.00	gm
F2	unit wt of water (γ_{water})	1.000	gm/cm3	1	5910	-272.00	5638.00	F2	Wt of dry soil + Pan	1030	1015	795		1770.00	gm
F3	Weight of water in Hole	28960.00	gm	2	6037	-272.00	5765.00	F3	Wt of can	69	87.4	79		93.50	gm
F4	Vol of hole (F2 / F3)	28960.00	cm3	3	6055	-272.00	5783.00	F4	wt of water (F1-F2)	105.00	112.00	41.00		28.00	gm
F5	Wet Field Density of Soil (F1/F8)	1.8715	gm/cc	4	6241	-272.00	5969.00	F5	wt. of dry soil (F2-F3)	961.00	927.60	716.00		1676.50	gm
F6	Dry ield Density of Soil			5	6077	-272.00	5805.00	F6	Water content (F4/F5*100)	10.93	12.07	5.73		1.67	%
F7				6					Average water content (%)	11.50		5.73		1.67	
F8							28960.00								
F9															
F10															

Location : Dhungre Bhanjyang Test Pit: Pit 4 Test Dep 1.1 m Date 11-Sep-11

Field Density test				Weight of Water in Hole				Water Content Determination		<37.5 mm		37.5 - 75 mm		>75 mm	
F1	wt of wet soil	115800.00	gm		gm	gm	gm	F1	Wt of wet soil + Pan	1135	1127	836		1798.00	gm
F2	unit wt of water (γ_{water})	1.000	gm/cm3	1	6040	-272.00	5768.00	F2	Wt of dry soil + Pan	1030	1015	795		1770.00	gm
F3	Weight of water in Hole	55791.00	gm	2	6070	-272.00	5798.00	F3	Wt of can	69	87.4	79		93.50	gm
F4	Vol of hole (F2 / F3)	55791.00	cm3	3	6062	-272.00	5790.00	F4	wt of water (F1-F2)	105.00	112.00	41.00		28.00	gm
F5	Wet Field Density of Soil (F1/F8)	2.0756	g m/cc	4	6050	-272.00	5778.00	F5	wt. of dry soil (F2-F3)	961.00	927.60	716.00		1676.50	gm
F6	Dry Field Density of Soil			5	6080	-272.00	5808.00	F6	Water content (F4/F5*100)	10.93	12.07	5.73		1.67	%
F7				6	6280	-272.00	6008.00		Average water content (%)	11.50		5.73		1.67	
F8					6562	-272.00	6290.00								
F9					6710	-272.00	6438.00								
F10					5010	-272.00	4738.00								
					7015	-3640	3375.00								
							55791.00								

資料6-7-3

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Topographical and Geological Surveys for the Preparatory Survey for the Project for Coutermeasure Construction for Landslides on Sindhuli Road (Section II)

FIELD DENSITY TEST
Water Replacment Method

Location : Dhungre Bhanjyang Test Pit: Pit 1 Test Dep 1.1 m Date 12-Sep-11

Field Density test				Weight of Water in Hole				Water Content Determination		<37.5 mm		37.5 - 75 mm		>75 mm	
F1	wt of wet soil	121600.00	gm		gm	gm	gm	F1	Wt of wet soil + Pan	1396	1374	1267	1392	1385.00	gm
F2	unit wt of water (γ_{water})	1.000	gm/cm3	1	6755	-272.00	6483.00	F2	Wt of dry soil + Pan	1290	1288	1240	1355	1362.00	gm
F3	Weight of water in Hole	59099.00	gm	2	6910	-272.00	6638.00	F3	Wt of can	86.8	78	84.9	83.7	55.70	gm
F4	Vol of hole (F2 / F3)	59099.00	cm3	3	7050	-272.00	6778.00	F4	wt of water (F1-F2)	106.00	86.00	27.00	37.00	23.00	gm
F5	Wet Field Density of Soil (F1/F8)	2.0576	gm/cc	4	7080	-272.00	6808.00	F5	wt. of dry soil (F2-F3)	1203.20	1210.00	1155.10	1271.30	1306.30	gm
F6	Dry Field Density of Soil			5	6830	-272.00	6558.00	F6	Water content (F4/F5*100)	8.81	7.11	2.34	2.91	1.76	%
F7				6	6880	-272.00	6608.00		Average water content (%)	7.96		2.62		1.76	
F8					6595	-272.00	6323.00								
F9					7005	-272.00	6733.00								
F10					6625	-455.00	6170.00								
							59099.00								

Location : Dhungre Bhanjyang Test Pit: Pit 2 Test Dep 1 m Date 11-Sep-11

Field Density test				Weight of Water in Hole				Water Content Determination		<37.5 mm		37.5 - 75 mm		>75 mm	
F1	wt of wet soil	116400.00	gm		gm	gm	gm	F1	Wt of wet soil + Pan	1330	1103	1240	1005	2960.00	gm
F2	unit wt of water (γ_{water})	1.000	gm/cm3	1	6737	-272.00	6465.00	F2	Wt of dry soil + Pan	1222	1015	1212	977	2920.00	gm
F3	Weight of water in Hole	60421.00	gm	2	6895	-272.00	6623.00	F3	Wt of can	83.4	71.3	84.9	68	158.10	gm
F4	Vol of hole (F2 / F3)	60421.00	cm3	3	8590	-272.00	8318.00	F4	wt of water (F1-F2)	108.00	88.00	28.00	28.00	40.00	gm
F5	Wet Field Density of Soil (F1/F8)	1.9265	gm/cc	4	6575	-272.00	6303.00	F5	wt. of dry soil (F2-F3)	1138.60	943.70	1127.10	909.00	2761.90	gm
F6	Dry Field Density of Soil			5	6900	-272.00	6628.00	F6	Water content (F4/F5*100)	9.49	9.32	2.48	3.08	1.45	%
F7				6	7060	-272.00	6788.00		Average water content (%)	9.41		2.78		1.45	
F8					6905	-272.00	6633.00								
F9					7054	-272.00	6782.00								
F10					6890	-1009.00	5881.00								
							60421.00								

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FIELD DENSITY TEST
Sand Cone Method

Location :Dhungre Bhanjyang Test Pit: Pit 5 Test Depth 1 m Date : 9-Sep-11

Field Density test				Water Content Determination		<37.5 mm		37.5 - 75 mm		>75 mm	
F1	wt of wet soil	7160.00	gm	F1	Wt of wet soil + Pan	1085	1042	568	629	1977.00	gm
F2	unit wt of sand (γ_{sand})	1.467	gm/cm3	F2	Wt of dry soil + Pan	1012	970	560	610	1950.00	g m
F3	Wt of jug+cone (before)	9700.00	gm	F3	Wt of can	93.5	83.4	68	77.5	157.50	gm
F4	Wt of jug+cone (after)	4095.00	gm	F4	wt of water (F1-F2)	73.00	72.00	8.00	19.00	27.00	g m
F5	Wt of sand (hole +cone) (F2-F3)	5605.00	gm	F5	wt. of dry soil (F2-F3)	918.50	886.60	492.00	532.50	1792.50	gm
F6	Wt of sand in cone(calibration)	1480.00	gm	F6	Water content (F4/F5*100	7.95	8.12	1.63	3.57	1.51	%
F7	Wt of sand in hole(W=F5-F6)	4125.00	gm		Average water content (%)	8.03		2.60		1.51	
F8	Vol of hole (F9 / F4)	2811.86	cm3								
F9	Wet Field Density of Soil (F1/F8)	2.5464	gm/cc								
F10	Dry Field Density of Soil										

FIELD DENSITY TEST
Water Replacement Method

Location :Dhungre Bhanjyang Test Pit: Pit 6 Test Depth 1 m Date 12-Sep-11

Field Density test				Weight of Water in Hole				Water Content Determination		<37.5 mm		37.5 - 75 mm		>75 mm	
F1	wt of wet soil	79000.00	gm		gm	gm	gm	F1	Wt of wet soil + Pan	1925	1265	1495	920	1413.00	gm
F2	unit wt of water (γ_{water})	1.000	gm/cm3	1	6420	-272.00	6148.00	F2	Wt of dry soil + Pan	1840	1172	1475	891	1393.00	gm
F3	Weight of water in Hole	37120.00	gm	2	5895	-272.00	5623.00	F3	Wt of can	101.2	76.5	80	63	56.80	gm
F4	Vol of hole (F2 / F3)	37120.00	cm3	3	5875	-272.00	5603.00	F4	wt of water (F1-F2)	85.00	93.00	20.00	29.00	20.00	gm
F5	Wet Field Density of Soil (F1/F8)	2.1282	gm/cc	4	5975	-272.00	5703.00	F5	wt. of dry soil (F2-F3)	1738.80	1095.50	1395.00	828.00	1336.20	gm
F6	Dry Field Density of Soil			5	5955	-272.00	5683.00	F6	Water content (F4/F5*100	4.89	8.49	1.43	3.50	1.50	%
F7				6	6025	-272.00	5753.00		Average water content (%)	6.69		2.47		1.50	
F8					6019	-3412.00	2607.00								
F9															
F10							37120.00								

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FIELD DENSITY TEST
Water Replacment Method

Location : Dhungre Bhanjyang Test Pit: Pit 3 Test Dep 1 m Date 10-Sep-11

Field Density test				Weight of Water in Hole				Water Content Determination		<37.5 mm		37.5 - 75 mm		>75 mm	
F1	wt of wet soil	70400.00	gm		gm	gm	gm	F1	Wt of wet soil + Pan	2680	1750	925	920	1315.00	gm
F2	unit wt of water (γ_{water})	1.000	gm/cm3	1	6960	-272.00	6688.00	F2	Wt of dry soil + Pan	2540	1635	900	900	1300.00	gm
F3	Weight of water in Hole	34405.00	gm	2	7080	-272.00	6808.00	F3	Wt of can	177.8	144	99.1	82.6	101.20	gm
F4	Vol of hole (F2 / F3)	34405.00	cm3	3	7290	-272.00	7018.00	F4	wt of water (F1-F2)	140.00	115.00	25.00	20.00	15.00	gm
F5	Wet Field Density of Soil (F1/F8)	2.0462	gm/cc	4	6965	-272.00	6693.00	F5	wt. of dry soil (F2-F3)	2362.20	1491.00	800.90	817.40	1198.80	gm
F6	Dry ield Density of Soil			5	4925	-272.00	4653.00	F6	Water content (F4/F5*100)	5.93	7.71	3.12	2.45	1.25	%
F7				6	5935	-3390.00	2545.00		Average water content (%)	6.82		2.78		1.25	
F8							34405.00								
F9															
F10															

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Topographical and Geological Surveys for the Preparatory Survey for the Project for Coutermeasure Construction for Landslides on Sindhuli Road (Section II)

Field Minimum and Maximum Index Density Tests

1 Details of Mould/Drum
Diameter, d= 0.57 m
Area, A = 0.255176 m2

2 Compaction by Monkey Jumper/Hammer

1 Location:- TP – 1

Minimum Index Density		Maximum Index density		
Total Weight of sample, W	314.8	Kg	Total Weight of sample, W	382.8	Kg
Height of sample, h	0.702778	m	Height of sample, h	0.655111	m
Volume of Mould, V	0.179332	m3	Volume of Mould, V	0.167169	m3
Minimum Index Denstiy, ρdmin	1755.404	kg/m3	Maximum Index Denstiy, ρdmax	2289.905	kg/m3

2 Location:- TP – 2

Minimum Index Density		Maximum Index density		
Total Weight of sample, W	297.6	Kg	Total Weight of sample, W	337.8	Kg
Height of sample, h	0.719444	m	Height of sample, h	0.607667	m
Volume of Mould, V	0.183585	m3	Volume of Mould, V	0.155062	m3
Minimum Index Denstiy, ρdmin	1621.049	kg/m3	Maximum Index Denstiy, ρdmax	2178.485	kg/m3

3 Location:- TP – 4

Minimum Index Density		Maximum Index density		
Total Weight of sample, W	299.9	Kg	Total Weight of sample, W	362.6	Kg
Height of sample, h	0.7	m	Height of sample, h	0.613333	m
Volume of Mould, V	0.178623	m3	Volume of Mould, V	0.156508	m3
Minimum Index Denstiy, ρdmin	1678.954	kg/m3	Maximum Index Denstiy, ρdmax	2316.817	kg/m3

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Lab Minimum and Maximum Index Density Tests

1 Details of Mould/Drum
Diameter, d= 0.35 m
Area, A = 0.095115 m2

2 Compaction by Manual Rammer

1 Location:- PIT – 3

Minimum Index Density			Maximum Index density		
Total Weight of sample+Mould, W1	48.0	Kg	Total Weight of sample, W	58.6	Kg
Weight of Empty Mould, W2	16.6	Kg	Weight of Empty Mould, W2	16.6	Kg
Weight of Soil, W = W1−W2	31.4	Kg	Weight of Soil, W = W1−W2	42	Kg
Height of sample, h	0.187	m	Height of sample, h	0.1866	m
Volume of Mould, V	0.017786	m3	Volume of Mould, V	0.017748	m3
Minimum Index Denstiy, ρdmin	1765.386	kg/m3	Maximum Index Denstiy, ρdmax	2366.406	kg/m3

Water Content Determination						
		<37.5 mm		37.5 - 75 mm		>75 mm
F1	Wt of wet soil + Pan, gm	750	845	684		
F2	Wt of dry soil + Pan, gm	710	790	675		
F3	Wt. of can, gm	79.3	71.3	65		
F4	wt of water (F1-F2), gm	40.00	55.00	9.00		
F5	wt. of dry soil (F2-F3), gm	630.70	718.70	610.00		
F6	Water content (F4/F5*100), %	6.34	7.65	1.48		
	Average water content (%)	7.00		1.48	0.00	

3 Location: – PIT – 5

Minimum Index Density			Maximum Index density		
Total Weight of sample+Mould, W1	50.2	Kg	Total Weight of sample, W	59.8	Kg
Weight of Empty Mould, W2	16.6	Kg	Weight of Empty Mould, W2	16.6	Kg
Weight of Soil, W = W1−W2	33.6	Kg	Weight of Soil, W = W1−W2	43.2	Kg
Height of sample, h	0.2008	m	Height of sample, h	0.1932	m
Volume of Mould, V	0.019099	m3	Volume of Mould, V	0.018376	m3
Minimum Index Denstiy, ρdmin	1759.249	kg/m3	Maximum Index Denstiy, ρdmax	2350.868	kg/m3

Water Content Determination						
		<37.5 mm		37.5 - 75 mm		>75 mm
F1	Wt of wet soil + Pan, gm	680	800	810	955	
F2	Wt of dry soil + Pan, gm	635	745	755	945	
F3	Wt. of can, gm	62.5	68.5	61.5	66.5	
F4	wt of water (F1-F2), gm	45.00	55.00	55.00	10.00	
F5	wt. of dry soil (F2-F3), gm	572.50	676.50	693.50	878.50	
F6	Water content (F4/F5*100), %	7.86	8.13	7.93	1.14	
	Average water content (%)	7.97		1.14	0.00	

2 Location: – PIT – 6

Minimum Index Density			Maximum Index density		
Total Weight of sample+Mould, W1	50.2	Kg	Total Weight of sample, W	61.6	Kg
Weight of Empty Mould, W2	16.6	Kg	Weight of Empty Mould, W2	16.6	Kg
Weight of Soil, W = W1−W2	33.6	Kg	Weight of Soil, W = W1−W2	45	Kg
Height of sample, h	0.2036	m	Height of sample, h	0.2108	m
Volume of Mould, V	0.019365	m3	Volume of Mould, V	0.02005	m3
Minimum Index Denstiy, ρdmin	1735.055	kg/m3	Maximum Index Denstiy, ρdmax	2244.365	kg/m3

Water Content Determination						
		<37.5 mm		37.5 - 75 mm		>75 mm
F1	Wt of wet soil + Pan, gm	1110	995	1015		
F2	Wt of dry soil + Pan, gm	1056	940	1004		
F3	Wt. of can, gm	90.7	94.8	64.1		
F4	wt of water (F1-F2), gm	54.00	55.00	11.00		
F5	wt. of dry soil (F2-F3), gm	965.30	845.20	939.90		
F6	Water content (F4/F5*100), %	5.59	6.51	1.17		
	Average water content (%)	6.05		1.17	0.00	

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Topographical and Geological Surveys for the Preparatory Survey for the Project for Coutermeasure Construction for Landslides on Sindhuli Road (Section II)

SPECIFIC GRAVITY TEST OF SOILS

Location: Dhungre Bhanjyang — Sample Size < 4.75 mm — Tested by: KB
Sample: Pit Sample — Date: September 2011

Sample No.	Pit 1			Pit 2			Pit 3		
Determination No	1	2	3	1	2	3	1	2	3
1 Temperature, °c	60	49	39	61	53	42	63	55	43
2 Wt. Of Flask + Water + Soil	757.5	760.0	762	764.5	766	768.7	748	750	752.5
3 Wt. Of Flask + Water (From Calib	726.9	729.4	731.7	733.6	735.4	738.0	713	715	718.2
4 Wt. Of Dry Soil + Container	206.3			202.8			196.7		
5 Wt. Of Container	158			154			143.2		
6 Wt. Of Dry Soil	48.3			48.8			53.5		
7 Sp. Gr. Of water at t 0 c	0.9832	0.9885	0.9926	0.9827	0.9867	0.9915	0.9817	0.9857	0.9911
8 Sp. Gr. Of soils = (6 x 7)/(3+6-2)	2.6830	2.6974	2.6635	2.6791	2.6457	2.6732	2.8390	2.8505	2.7617
9 Average Sp. Gr.		**2.681**			**2.666**			**2.817**	

Sample No.	Pit 4			Pit 5			Pit 6		
Determination No	1	2	3	1	2	3	1	2	3
1 Temperature, °c	60	55	43	60	50	39	62	46	39
2 Wt. Of Flask + Water + Soil	745.9	747.5	749	758.4	760.6	763.1	765.9	769.4	771.3
3 Wt. Of Flask + Water (From Calib	715.9	717.9	719.4	726.9	729.2	731.8	733.3	737.1	738.7
4 Wt. Of Dry Soil + Container	188			208.4			205.8		
5 Wt. Of Container	139			158			154.0		
6 Wt. Of Dry Soil	49.0			50.4			51.8		
7 Sp. Gr. Of water at t 0 c	0.9832	0.9857	0.9911	0.9832	0.9881	0.9926	0.9822	0.9898	0.9926
8 Sp. Gr. Of soils = (6 x 7)/(3+6-2)	2.5356	2.4897	2.5033	2.7734	2.7712	2.7679	2.5142	2.4978	2.5409
9 Average Sp. Gr.		**2.510**			**2.771**			**2.518**	

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Topographical and Geological Surveys for the Preparatory Survey for the Project for Countermeasure Construction for Landslides on Sindhuli Road (Section II)

SPECIFIC GRAVITY & WATER ABSORPTION TEST

Location: Dhungre Bhanjyang — Tested by: KB
Test Pit: Pit 1 — Date: September 2011
Sample Size:
1 >75 mm
2 75 - 37.5 mm
3 37.5 - 4.75 mm

Sample No. / Description	>75 mm 1 Weight (gm)	75-37.5 mm 2 Weight (gm)	37.5-4.75 mm 3
Mass of submerged density basket and saturated sample, M1	3,970.00	3,441.00	4,055.00
Mass of submerged empty density basket, M2	1,320.00	1,320.00	1,320.00
Mass of saturated surface dried test sample in air, B	4,275.00	3,460.00	4,457.00
Mass of oven dried test sample, A	4,250.00	3,415.00	4,400.00
Mass of saturated test sample in water, C (M1 - M2)	2,650.00	2,121.00	2,735.00

CALCULATIONS

		1	2	3
Specific Gravity:				
a)	Bulk Sp. Gr = A/(B-C)	2.615	2.550	2.555
b)	Bulk Sp Gr (saturated surface dry) = B/(B-C)	2.631	2.584	2.588
(c)	Apparent Sp Gr = A/(A-C)	2.656	2.639	2.643
(d)	(d) Water Absorption = (B-A)/A*100	0.58	1.30	1.28

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Topographical and Geological Surveys for the Preparatory Survey for the Project for Countermeasure Construction for Landslides on Sindhuli Road (Section II)

SPECIFIC GRAVITY & WATER ABSORPTION TEST

Location: Dhungre Bhanjyang | Tested by: KB
Test Pit: Pit 2 | Date: September 2011
Sample Size:
1 >75 mm
2 75 - 37.5 mm
3 37.5 - 4.75 mm

Sample No. / Description	>75 mm 1	75-37.5 mm 2	37.5-4.75 mm 3
	Weight (gm)	Weight (gm)	
Mass of submerged density basket and saturated sample, M1	4,690.00	3,830.00	5,075.00
Mass of submerged empty density basket, M2	1,320.00	1,320.00	1,320.00
Mass of saturated surface dried test sample in air, B	5,435.00	4,090.00	6,107.00
Mass of oven dried test sample, A	5,390.00	4,040.00	6,020.00
Mass of saturated test sample in water, C (M1 - M2)	3,370.00	2,510.00	3,755.00

CALCULATIONS

Specific Gravity:	1	2	3
a) Bulk Sp. Gr = A/(B-C)	2.610	2.557	2.560
b) Bulk Sp Gr (saturated surface dry) = B/(B-C)	2.632	2.589	2.597
(c) Apparent Sp Gr = A/(A-C)	2.668	2.641	2.658
(d) (d) Water Absorption = (B-A)/A*100	0.83	1.22	1.42

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Topographical and Geological Surveys for the Preparatory Survey for the Project for Countermeasure Construction for Landslides on Sindhuli Road (Section II)

SPECIFIC GRAVITY & WATER ABSORPTION TEST

Location: Dhungre Bhanjyang | Tested by: KB
Test Pit: Pit 3 | Date: September 2011
Sample Size:
1 >75 mm
2 75 - 37.5 mm
3 37.5 - 4.75 mm

Sample No. / Description	>75 mm 1	75-37.5 mm 2	37.5-4.75 mm 3
	Weight (gm)	Weight (gm)	
Mass of submerged density basket and saturated sample, M1	3,910.00	2,855.00	5,020.00
Mass of submerged empty density basket, M2	1,320.00	1,320.00	1,320.00
Mass of saturated surface dried test sample in air, B	4,170.00	2,495.00	6,012.00
Mass of oven dried test sample, A	4,140.00	2,470.00	5,930.00
Mass of saturated test sample in water, C (M1 - M2)	2,590.00	1,535.00	3,700.00

CALCULATIONS

Specific Gravity:	1	2	3
a) Bulk Sp. Gr = A/(B-C)	2.620	2.573	2.565
b) Bulk Sp Gr (saturated surface dry) = B/(B-C)	2.639	2.599	2.600
(c) Apparent Sp Gr = A/(A-C)	2.671	2.642	2.659
(d) (d) Water Absorption = (B-A)/A*100	0.72	1.00	1.36

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Topographical and Geological Surveys for the Preparatory Survey for the Project for Countermeasure Construction for Landslides on Sindhuli Road (Section II)

SPECIFIC GRAVITY & WATER ABSORPTION TEST

Location: Dhungre Bhanjyang | Tested by: KB
Test Pit: Pit 4 | Date: September 2011
Sample Size:
1 >75 mm
2 75 - 37.5 mm
3 37.5 - 4.75 mm

Sample No. / Description	>75 mm 1	75-37.5 mm 2	37.5-4.75 mm 3
	Weight (gm)	Weight (gm)	
Mass of submerged density basket and saturated sample, M1	2,960.00	2,800.00	3,825.00
Mass of submerged empty density basket, M2	1,320.00	1,320.00	1,320.00
Mass of saturated surface dried test sample in air, B	2,635.00	2,423.00	4,090.00
Mass of oven dried test sample, A	2,622.00	2,400.00	4,040.00
Mass of saturated test sample in water, C (M1 - M2)	1,640.00	1,480.00	2,505.00

CALCULATIONS

Specific Gravity:	1	2	3
a) Bulk Sp. Gr = A/(B-C)	2.635	2.545	2.549
b) Bulk Sp Gr (saturated surface dry) = B/(B-C)	2.648	2.569	2.580
(c) Apparent Sp Gr = A/(A-C)	2.670	2.609	2.632
(d) (d) Water Absorption = (B-A)/A*100	0.49	0.95	1.22

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Topographical and Geological Surveys for the Preparatory Survey for the Project for Countermeasure Construction for Landslides on Sindhuli Road (Section II)

SPECIFIC GRAVITY & WATER ABSORPTION TEST

Location: Dhungre Bhanjyang | Tested by: KB
Test Pit: Pit 5 | Date: September 2011
Sample Size:
1 >75 mm
2 75 - 37.5 mm
3 37.5 - 4.75 mm

Sample No. / Description	>75 mm 1	75-37.5 mm 2	37.5-4.75 mm 3
	Weight (gm)	Weight (gm)	
Mass of submerged density basket and saturated sample, M1	4,020.00	2,812.00	4,020.00
Mass of submerged empty density basket, M2	1,320.00	1,320.00	1,320.00
Mass of saturated surface dried test sample in air, B	4,305.00	2,445.00	4,390.00
Mass of oven dried test sample, A	4,295.00	2,424.00	4,325.00
Mass of saturated test sample in water, C (M1 - M2)	2,700.00	1,492.00	2,700.00

CALCULATIONS

Specific Gravity:	1	2	3
a) Bulk Sp. Gr = A/(B-C)	2.676	2.544	2.559
b) Bulk Sp Gr (saturated surface dry) = B/(B-C)	2.682	2.566	2.598
(c) Apparent Sp Gr = A/(A-C)	2.693	2.601	2.662
(d) (d) Water Absorption = (B-A)/A*100	0.23	0.86	1.48

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Topographical and Geological Surveys for the Preparatory Survey for the Project for Countermeasure Construction for Landslides on Sindhuli Road (Section II)

SPECIFIC GRAVITY & WATER ABSORPTION TEST

Location: Dhungre Bhanjyang — Tested by: KB
Test Pit: Pit 6 — Date: September 2011
Sample Size:
1 >75 mm
2 75 - 37.5 mm
3 37.5 - 4.75 mm

Description \ Sample No.	>75 mm 1 Weight (gm)	75-37.5 mm 2 Weight (gm)	37.5-4.75 mm 3
Mass of submerged density basket and saturated sample, M1	3,433.00	3,077.00	4,055.00
Mass of submerged empty density basket, M2	1,320.00	1,320.00	1,320.00
Mass of saturated surface dried test sample in air, B	3,402.00	2,860.00	4,445.00
Mass of oven dried test sample, A	3,370.00	2,836.00	4,406.00
Mass of saturated test sample in water, C (M1 - M2)	2,113.00	1,757.00	2,735.00

CALCULATIONS

		1	2	3
Specific Gravity:				
a)	Bulk Sp. Gr = A/(B-C)	2.614	2.571	2.577
b)	Bulk Sp Gr (saturated surface dry) = B/(B-C)	2.639	2.593	2.599
(c)	Apparent Sp Gr = A/(A-C)	2.681	2.628	2.637
(d)	(d) Water Absorption = (B-A)/A*100	0.94	0.84	0.88

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Topographical and Geological Surveys for the Preparatory Survey for the Project for Coutermeasure Construction for Landslides on Sindhuli Road (Section II)

Natural Moisture ContentTests

TP No: Pit 1

Water Content Determination		<37.5 mm		37.5 - 75 mm		>75 mm	
F1	Wt of wet soil + Pan, gm	1705	1405	1140	895		
F2	Wt of dry soil + Pan, gm	1560	1300	1107	865		
F3	Wt. of can, gm	98.5	110.2	69.4	92.5		
F4	wt of water (F1-F2), gm	145.00	105.00	33.00	30.00		
F5	wt. of dry soil (F2-F3), gm	1461.50	1189.80	1037.60	772.50		
F6	Water content (F4/F5*100), %	9.92	8.83	3.18	3.88		
	Average water content (%)	9.37		3.53		0.00	

TP No: Pit 2

Water Content Determination		<37.5 mm		37.5 - 75 mm		>75 mm	
F1	Wt of wet soil + Pan, gm	1075	1170	1402	1516		
F2	Wt of dry soil + Pan, gm	981	1090	1375	1500		
F3	Wt. of can, gm	74.3	80	82.1	74.4		
F4	wt of water (F1-F2), gm	94.00	80.00	27.00	16.00		
F5	wt. of dry soil (F2-F3), gm	906.70	1010.00	1292.90	1425.60		
F6	Water content (F4/F5*100), %	10.37	7.92	2.09	1.12		
	Average water content (%)	9.14		1.61		0.00	

TP No: Pit 3

Water Content Determination		<37.5 mm		37.5 - 75 mm		>75 mm	
F1	Wt of wet soil + Pan, gm	1780	1770	1160	985		
F2	Wt of dry soil + Pan, gm	1660	1670	1149	960		
F3	Wt. of can, gm	135	158.1	84.9	90.7		
F4	wt of water (F1-F2), gm	120.00	100.00	11.00	25.00		
F5	wt. of dry soil (F2-F3), gm	1525.00	1511.90	1064.10	869.30		
F6	Water content (F4/F5*100), %	7.87	6.61	1.03	2.88		
	Average water content (%)	7.24		1.95		0.00	

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Topographical and Geological Surveys for the Preparatory Survey for the Project for Coutermeasure Construction for Landslides on Sindhuli Road (Section II)

Natural Moisture ContentTests

TP No: Pit 4

Water Content Determination		<37.5 mm		37.5 - 75 mm		>75 mm	
F1	Wt of wet soil + Pan, gm	1140	1055	905	1172		
F2	Wt of dry soil + Pan, gm	1035	973	875	1144		
F3	Wt. of can, gm	99.9	74	70	79.3		
F4	wt of water (F1-F2), gm	105.00	82.00	30.00	28.00		
F5	wt. of dry soil (F2-F3), gm	935.10	899.00	805.00	1064.70		
F6	Water content (F4/F5*100), %	11.23	9.12	3.73	2.63		
	Average water content (%)	10.17		3.18		0.00	

TP No: Pit 5

Water Content Determination		<37.5 mm		37.5 - 75 mm		>75 mm	
F1	Wt of wet soil + Pan, gm	2000	2000	1465			
F2	Wt of dry soil + Pan, gm	1860	1855	1440			
F3	Wt. of can, gm	154.7	137	136.3			
F4	wt of water (F1-F2), gm	140.00	145.00	25.00			
F5	wt. of dry soil (F2-F3), gm	1705.30	1718.00	1303.70			
F6	Water content (F4/F5*100), %	8.21	8.44	1.92			
	Average water content (%)	8.32		1.92		0.00	

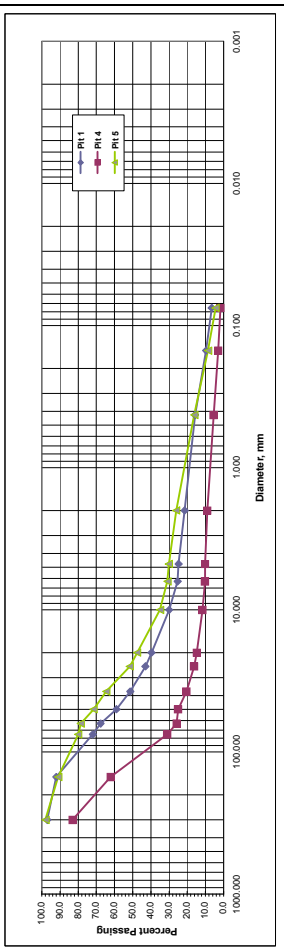
TP No: Pit 6

Water Content Determination		<37.5 mm		37.5 - 75 mm		>75 mm	
F1	Wt of wet soil + Pan, gm	915	837	965	618		
F2	Wt of dry soil + Pan, gm	872	790	943	603		
F3	Wt of can, gm	79.5	67	57.8	65.3		
F4	wt of water (F1-F2), gm	43.00	47.00	22.00	15.00		
F5	wt. of dry soil (F2-F3), gm	792.50	723.00	885.20	537.70		
F6	Water content (F4/F5*100), %	5.43	6.50	2.49	2.79		
	Average water content (%)	5.96		2.64		0.00	

GEOCE CONSULTANTS (P) LTD.
GRAIN SIZE DISTRIBUTION

Project : Topographical and Geological Surveys for the Preparatory Survey for the Project for Coutermeasure Construction for Landslides on Sindhuli Road (Section II)
Location : Dhungre Bhanjyang, Test Pits — Date : September 2011 — Tested By : KB

Sieve size, mm	300	150	75	63	50	37.5	25	20	10	6.3	4.75	2.00	0.425	0.15	0.075
Test Pit samples (oven dried)															
Pit 1	97.0	92.0	72.0	67.6	58.9	51.3	42.9	39.7	29.9	26.2	24.8	21.4	15.7	9.6	6.5
Pit 4	83.0	62.0	31.0	25.7	26.0	20.5	16.2	14.7	11.6	10.2	10.1	8.8	5.5	2.9	1.7
Pit 5	98.0	91.0	80.0	78.5	71.4	64.6	51.6	47.6	35.0	30.9	30.1	26.1	16.1	8.5	4.4

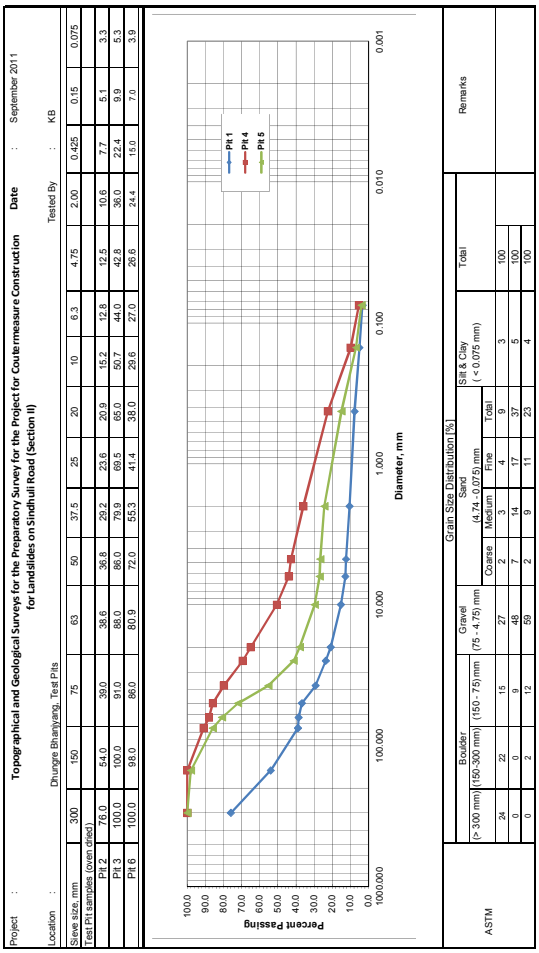


	Boulder		Gravel	Grain Size Distribution [%] Sand				Silt & Clay	Total	Remarks
	(> 300 mm)	(150-300 mm)	(75 - 4.75) mm	Coarse	Medium	Fine	Total	(< 0.075 mm)		
		(150 - 75) mm		(4.74 - 0.075) mm						
Pit 1	3	5	47	3	6	9	18	6	100	
Pit 4	17	21	21	4	3	4	8	2	100	
Pit 5	2	7	50	4	10	12	26	4	100	

ASTM

GEOCE CONSULTANTS (P) LTD.

GRAIN SIZE DISTRIBUTION



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Topographical and Geological Surveys for the Preparatory Survey for the Project for Countermeasure Construction for Landslides on Sindhuli Road (Section II)

SPECIFIC GRAVITY & WATER ABSORPTION TEST

(Rock Sample)

Location: Rock Sample — Tested by: AM

Date: September 2011

Sample Size:
1 75 mm down

Sample No. / Description	R 1 Weight (gm)	R 2 Weight (gm)	R 3 Weight (gm)	R 4 Weight (gm)
Mass of submerged density basket and saturated sample, M1	1,920.00	2,230.00	2,457.00	2,212.00
Mass of submerged empty density basket, M2	1,320.00	1,320.00	1,320.00	1,320.00
Mass of saturated surface dried test sample in air, B	958.00	1,449.00	1,822.00	1,447.00
Mass of oven dried test sample, A	953.00	1,443.00	1,803.00	1,427.00
Mass of saturated test sample in water, C (M1 - M2)	600.00	910.00	1,137.00	892.00

CALCULATIONS

Specific Gravity:	R 1	R 2	R 3	R 4
a) Bulk Sp. Gr = A/(B-C)	2.662	2.677	2.632	2.571
b) Bulk Sp Gr (saturated surface dry) = B/(B-C)	2.676	2.688	2.660	2.607
(c) Apparent Sp Gr = A/(A-C)	2.700	2.707	2.707	2.667
(d) (d) Water Absorption = (B-A)/A*100	0.52	0.41	1.04	1.38

GEOCE CONSULTANTS (P) LTD

Topographical and Geological Surveys for the Preparatory Survey for the Project for Countermeasure Construction for Landslides on Sindhuli Road (Section II)

POINT LOAD STRENGTH TESTS

Location: Dhungre Bhanjyang — Tested by: AM

Rock Sample: Rock Samples (R 1, R 2, R 3 & R 4) — Date: September 2011

Point Load Strength, $Is = P/De^2$ Where P = Failure Load, De = Equivalent Core Diameter

$Is(50) = F \times Is$ $= 4/\pi \times A$, A = Width X Height of rock lumps

where F = Size correction factor (from chart) = $(De/50)^{0.45}$

S. No.	Sample No.	Type of test	Test	Width mm	height mm	P KN	De^2	De	Is Mpa	F	IS (50) MPa
1	R-1	Vertical	Irregular	75.0	33.0	12.0	3,151.27	56.136	3.808	1.053	4.012
			Irregular	61.0	42.0	15.0	3,262.04	57.114	4.598	1.062	4.882
			Irregular	62.6	27.0	20.5	2,152.03	46.390	9.526	0.967	9.210
		Parallal	Irregular	55.0	41.5	2.5	2,906.17	53.909	0.860	1.034	0.890
			Irregular	55.0	42.0	8.0	2,941.18	54.233	2.720	1.037	2.821
			Irregular	50.5	31.0	4.5	1,993.26	44.646	2.258	0.950	2.145
2	R-2	Vertical	Irregular	80.0	47.0	18.5	4,787.38	69.191	3.864	1.157	4.473
			Irregular	69.0	24.5	26.0	2,152.41	46.394	12.079	0.967	11.679
			Irregular	63.5	39.0	25.5	3,153.18	56.153	8.087	1.054	8.521
		Parallal	Irregular	50.5	29.0	11.5	1,864.66	43.182	6.167	0.936	5.774
			Irregular	52.5	27.0	5.5	1,804.82	42.483	3.047	0.929	2.832
			Irregular	50.0	26.0	8.0	1,655.21	40.684	4.833	0.911	4.405
3	R-3	Vertical	Irregular	84.5	43.0	9.0	4,626.32	68.017	1.945	1.149	2.234
			Irregular	102.5	59.0	30.0	7,699.92	87.749	3.896	1.288	5.018
			Irregular	64.3	28.0	13.0	2,292.34	47.878	5.671	0.981	5.561
		Parallal	Irregular	97.5	55.0	12.5	6,827.75	82.630	1.831	1.254	2.295
			Irregular	65.5	59.0	8.5	4,920.43	70.146	1.727	1.165	2.012
			Irregular	50.0	37.0	5.5	2,355.49	48.533	2.335	0.987	2.304
4	R-4	Vertical	Irregular	66.5	46.0	12.0	3,894.84	62.409	3.081	1.105	3.404
			Irregular	93.5	46.0	25.0	5,476.20	74.001	4.565	1.193	5.446
			Irregular	84.0	48.0	22.0	5,133.70	71.650	4.285	1.176	5.039
		Parallal	Irregular	50.0	45.0	2.0	2,864.79	53.524	0.698	1.031	0.720
			Irregular	50.5	38.0	2.5	2,443.35	49.430	1.023	0.995	1.018
			Irregular	50.3	41.0	4.0	2,625.80	51.243	1.523	1.011	1.540

NOTE:-
Vertical = Axial
Parallel = Diametrical

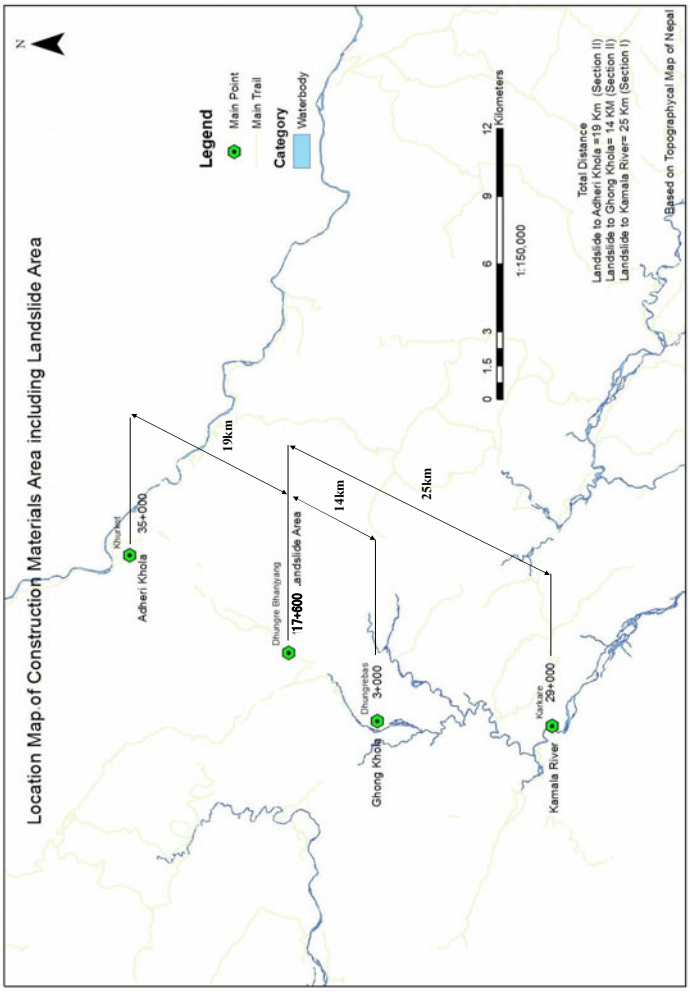
表 1　土取り場比較

	土取場名称※1	①アデリコラ Adheri Khola	②ゴンコラ Ghong Khola	③カマラ川 Kamala River	備考(供給等)
立地条件・環境	盛土場からの距離	19km	14km	25km	Sta.17+600 を起点とし、道路距離から算出
	所有者	私有地からの採取。 公用地は可床幅１５～２０ｍであるが、河床が変動するため境界不明。なお、下記のとおり河床低下のため河床からの採取は困難。	公用地からの採取。 (公用地は幅約 20m の河床。土量が不足する場合、私有地より採取。)	公用地からの採取。	現場踏査より
	進入路	既存道路から直接進入可能 1 点	同左 2 点	同左。 3 点	現場踏査より
	農業施設への影響	未農用地を利用	-	-	
	河床低下	現河床は周辺地盤より２ｍ程度低く、河床低下を伴う掘削は困難。 1 点	砂州は小さいため、大量採取の場合、広範囲の河床から浅く広く採取する必要がある。 2 点	砂州が大きく発達しており、影響はない。 3 点	
	その他	私有地よりハザマが採掘中	河床から現地会社が採掘中	河床から主に粒径 20cm の礫を公共工事で採掘中	
材質（仮）		最大粒径 30cm 以下の礫を主とするが、他に比べ 30cm 以上の大玉が多く、岩材との混合やジオテキの保護材としての利用では不利 1 点	最大粒径 30cm 以下の砂礫 2 点	最大粒径 30cm 以下の砂礫 3 点	土質試験より
賦存量		中 2 点	小 1 点	大 3 点	現場踏査より
工事費	購入費(DOR 負担)	167N R s/m³ の数倍 1 点	167 s/m³ の数倍 1 点	167NR 程度 3 点	ヨギ氏聞き取り
	運搬費(日本負担)	1,114NRs/m³ 2 点	926 NRs/m³ 3 点	1,270NRs/m³ 1 点	①,②の購入費は、167NRs の 3 倍 (501NRs) で試算。
	合計	1,615NRs 程度	1,427NRs 程度	1,437NRs 程度	
総合評価		6 点	11 点	16 点 採用	

※1：河川名で示す。コラ(Khola)は、ネパール語で乾季に枯れ川となる川を意味する。

土質試験結果一覧表（河床材 Adheri Khola:A1～A3, Ghong Khola:G1～G3, Kamala River:K1～K3）

		試験項目	A1	A2	A3	G1	G2	G3	K1	K2	K3	
土粒子の密度 ρ_s (g/cm³)		<粒径4.75mm	2.657	2.319	2.637	2.548	2.295	2.405	2.579	2.342	2.833	
絶乾比重 D_d (g/cm³)		4.75～37.5mm	2.649	2.649	2.649	2.655	2.655	2.655	2.595	2.595	2.995	比重は各河川の3箇所から採取した試料を混合して実施。
		37.5～75mm	2.634	2.634	2.634	2.675	2.675	2.675	2.589	2.589	2.589	
		>75mm	2.638	2.638	2.638	2.619	2.619	2.619	2.615	2.615	2.615	
合成比重 $D_d=1/\Sigma[(1-100)/Di]$		<75mm	2.649	2.495	2.639	2.610	2.462	2.519	2.589	2.492	2.676	
		<Dmax	2.648	2.525	2.639	2.611	2.466	2.525	2.595	2.511	2.664	
吸水率 Q (%)		4.75～37.5mm	0.71	0.71	0.71	1.10	1.10	1.10	0.52	0.52	0.52	吸水率は各河川の3箇所から採取した試料を混合して実施。
		37.5～75mm	0.68	0.68	0.68	0.63	0.63	0.63	0.56	0.56	0.56	
		>75mm	0.66	0.66	0.66	1.46	1.46	1.46	0.09	0.09	0.09	
合成吸水率 ΣSi･Qi/100		<75mm	0.7	0.7	0.7	1.0	1.1	1.0	0.5	0.5	0.5	
		<Dmax	0.7	0.7	0.7	1.0	1.1	1.1	0.4	0.5	0.4	Si:各粒度間における重量構成百分率(いわゆる残留率)
含水比 Wn (%)		<37.5mm	1.15	2.24	2.31	3.17	3.89	4.36	2.28	2.67	2.42	現場密度試験と現場粒度試験の含水比の平均を示す
		37.5～75mm	0.49	0.68	0.66	2.21	0.63	0.78	1.29	0.81	1.09	同上
		>75mm	0.48	0.46	0.43	1.46	1.46	1.46	0.67	0.72	0.25	現場密度試験の含水比
合成含水比 ΣSi･Wi/100		<75mm	1.0	1.9	2.0	3.0	3.6	3.9	2.1	2.1	2.2	
		<Dmax	0.9	1.6	1.7	2.9	3.5	3.8	1.8	1.9	1.8	
粒度特性	最大粒径 Dmax (mm)		200	300	300	150	150	300	300	200	300	
	質量百分率 %	ボルダー(巨石) >300mm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	粒径区分はASTMD653による。
		コブル(粗石) 75mm～300mm	13.0	22.0	20.0	7.1	4.0	6.0	23.0	16.0	20.0	
		礫 37.5mm～75mm	20.1	16.3	20.4	20.0	8.5	11.0	14.4	25.7	15.2	
		礫 4.75mm～37.5mm	27.5	28.5	19.2	31.5	39.1	33.4	38.0	26.6	35.5	
		砂 0.075mm～4.75mm	38.9	32.0	38.8	40.9	47.2	47.3	24.3	31.5	28.3	
		シルト・粘土 <0.075mm	0.5	1.2	1.6	0.5	1.2	2.3	0.3	0.2	1.0	
	通過粒径	60%粒径	28.0	36.0	37.0	18.0	9.0	10.5	32.0	40.0	31.0	
		30%粒径	14	20	15	9.1	6.4	4.8	22	25	21	
		20%粒径	1.8	2	1.5	1.8	1.8	1.6	8	4	5	
		10%粒径	0.88	0.95	0.71	0.95	0.85	0.65	2.5	1.8	1.7	
	Di (mm)		0.46	0.46	0.31	0.5	0.45	0.24	0.65	0.8	0.52	
	均等係数	$Uc=D_{60}/D_{10}$	60.9	78.3	119.4	36.0	20.0	43.8	49.2	66.7	59.6	JGS Uc≧10粒径幅の広い
	曲率係数	$Uc=D_{30}^2/(D_{10}\times D_{60})$	0.3	0.2	0.2	0.4	0.8	1.0	3.1	0.7	1.6	ASTM Uc≧4 and 1≦Uc'≦3Well-graded Gravel
締固特性	最小密度 ρ_{min} (g/cm³)	湿潤密度	<75mm	1.974	1.918	1.889	1.817	1.918	1.798	1.805	1.850	1.870	
			<Dmax	2.041	2.041	2.002	1.858	1.939	1.832	1.944	1.941	1.981	乾燥密度と含水比から算出
		乾燥密度 ρ_{dmin}	<75mm	1.954	1.882	1.852	1.784	1.851	1.729	1.768	1.812	1.830	試験の湿潤密度(<75mm)と含水比から算出
			<Dmax	2.023	2.009	1.970	1.806	1.873	1.765	1.910	1.906	1.947	Walker-Holtzの補正方法より算出
	最大間隙比 e_{max}		<75mm	0.355	0.326	0.425	0.480	0.330	0.457	0.464	0.375	0.462	
			<Dmax	0.309	0.257	0.340	0.446	0.317	0.430	0.358	0.318	0.368	
	最大密度 (g/cm³) ρ_{max}	湿潤密度	<75mm	2.224	2.227	2.225	2.247	2.262	2.225	2.224	2.124	2.236	
			<Dmax	2.272	2.286	2.298	2.271	2.271	2.242	2.302	2.179	2.310	乾燥密度と含水比から算出
		乾燥密度 ρ_{dmax}	<75mm	2.202	2.185	2.183	2.182	2.194	2.140	2.179	2.080	2.188	試験の湿潤密度(<75mm)と含水比から算出
			<Dmax	2.251	2.252	2.261	2.208	2.194	2.165	2.263	2.139	2.269	Walker-Holtzの補正方法より算出
	最小間隙比 e_{min}		<75mm	0.203	0.142	0.209	0.196	0.127	0.177	0.188	0.196	0.223	
			<Dmax	0.176	0.121	0.167	0.183	0.125	0.169	0.147	0.174	0.174	
	ρ dmax ×95%の状態量	湿潤密度 $\rho_{...}\times95\%$ (g/cm³)		2.159	2.173	2.183	2.157	2.157	2.130	2.187	2.070	2.194	<Dmaxで評価
		乾燥密度 $\rho_{dmax}\times95\%$ (g/cm³)		2.139	2.139	2.146	2.097	2.084	2.052	2.149	2.032	2.156	
		間隙比 e		0.238	0.180	0.229	0.245	0.194	0.230	0.207	0.236	0.236	
		相対密度 $Dr=(e_{max}-e)/(e_{max}-e_{min})\times100\%$		53.5	56.5	64.4	76.3	69.2	76.5	71.4	57.0	68.2	
	ρ dmax ×90%の状態量	湿潤密度 $\rho_{...}\times90\%$ (g/cm³)		2.045	2.059	2.068	2.044	2.044	2.018	2.072	1.961	2.079	<Dmaxで評価
		乾燥密度 $\rho_{dmax}\times90\%$ (g/cm³)		2.026	2.027	2.035	1.987	1.974	1.944	2.036	1.925	2.042	
		間隙比 e		0.307	0.248	0.297	0.314	0.250	0.299	0.274	0.304	0.304	
		相対密度 $Dr=(e_{max}-e)/(e_{max}-e_{min})\times100\%$		1.8	8.1	24.8	50.1	35.1	50.3	39.7	9.3	32.9	
現場密度	試験孔の最大粒径 (mm)			200		295			150	100	195	150	
	湿潤密度	ρ_t (g/cm³)		2.295		2.412			2.327	1.990	2.271	2.243	
		$\gamma_t=9.81\times\rho_t$ (kN/m³)		22.5		23.7			22.8	19.5	22.3	22.0	
	乾燥密度 ρ_d (g/cm³)			2.274		2.372			2.242	1.956	2.229	2.204	
	間隙比 e			0.164		0.112			0.126	0.327	0.126	0.208	
	相対密度 $Dr=(e_{max}-e)/(e_{max}-e_{min})\times100\%$			108.9		131.8			116.3	14.9	133.1	82.1	



Adheri Khola(アデリコラ)

場所：Sta.37+000　現土砂採取箇所

Ghong Khola(ゴンコラ)

GEOCE CONSULTANTS (P) LTD.

Topographical and Geological Surveys for the Preparatory Survey for the Project for Coutermeasure Construction for Landslides on Sindhuli Road (Section II)

TESP PIT LOG

Project : Sindhuli Road (Section II) | Test Pit No.: G-2 | Coordinates: N 27 0 13.476' E 85 0 54.822' | Date: 13/8/2011
Aprox. Dimension: 1.2 x 1.0 m. | Location : Ghong Khola | Ground Level : 1647.0 m | Logged By : AM

Classification: Group Symbol	Classification: Graphic	Depth (m)	Type and Depth of sample Taken	CLASSIFICATION AND DESCRIPTION OF MATERIAL (Typical name, colour, in wet condition, odour, if any degree of plasticity, grain size range and description, moisture condition, degree of compactness and other pertinent information)	Type of In-Situ Tests	APPROXIMATE FRACTION OF MATERIAL,(%) < 75 mm	75 To 150mm	150 to 300 mm	> 300 mm
		0.00				Kg	Kg	Kg	Kg
		0.10		Riverbed materials consisting of Alluvium with rounded hard and strong big Boulders of max size 15x12x8 cm, little Sand, wet	No FD	27.60	23.40		
		0.20				28.00			
		0.30		Groundwater was recorded at 0.25 m from the surface of river		40.50			
		0.40	BS		GWT at 0.25 m	41.80			
GP		0.50				37.80			
		0.60				49.40			
		0.70				34.40			
		0.80				36.60			
		0.90				47.00			
		1.00				49.40			
						46.00			
						30.00			
						39.00			
						31.40			
						538.90	23.40	0.00	0.00
						96.00	4.00	0.00	0.00

NOTE : SS = Small Sample
BS = Bulk Sample

Lower side of Kamala Bridge

Kamala River(カマラ川)
Upper side of Kamala Bridge
Sandbank Width 100m or more
Length 500m or more
Tributary stream

資料6-7-9

GEOCE CONSULTANTS (P) LTD.

Topographical and Geological Surveys for the Preparatory Survey for the Project for Coutermeasure Construction for Landslides on Sindhuli Road (Section II)

TESP PIT LOG

Project : Sindhuli Road (Section II) | Test Pit No.: G-3 | Coordinates: N 27 0 13.439' E 85 0 54.884' | Date: 13/8/2011
Aprox. Dimension: 1.0 x 1.0 m. | Location : Ghong Khola | Ground Level : 1631.0 m | Logged By : AM

Classification: Group Symbol	Classification: Graphic	Depth (m)	Type and Depth of sample Taken	CLASSIFICATION AND DESCRIPTION OF MATERIAL (Typical name, colour, in wet condition, odour, if any degree of plasticity, grain size range and description, moisture condition, degree of compactness and other pertinent information)	Type of In-Situ Tests	APPROXIMATE FRACTION OF MATERIAL,(%) < 75 mm	75 To 150mm	150 to 300 mm	> 300 mm
		0.00				Kg	Kg	Kg	Kg
		0.10		Riverbed materials consisting of Alluvium with rounded hard and strong big Boulders of max size 25x18x13 cm, little Sand	FD at 0.15m	29.00	12.60	11.2	
		0.20				30.40			
		0.30				31.60			
		0.40	BS			28.40			
GP		0.50				38.60			
		0.60				39.00			
		0.70				45.00			
		0.80				28.00			
		0.90				35.00			
		1.00				39.40			
						48.00			
						15.00			
						407.40	12.60	11.20	0.00
						94.00	3.00	3.00	0.00

NOTE : SS = Small Sample
BS = Bulk Sample

GEOCE CONSULTANTS (P) LTD.

Topographical and Geological Surveys for the Preparatory Survey for the Project for Coutermeasure Construction for Landslides on Sindhuli Road (Section II)

TESP PIT LOG

Project : Sindhuli Road (Section II) | Test Pit No.: G-1 | Coordinates: N 27 0 13.570' E 85 0 54.760' | Date: 13/8/2011
Aprox. Dimension: 1.0 x 1.0 m. | Location : Ghong Khola | Ground Level : 1669.0 m | Logged By : AM

Classification: Group Symbol	Classification: Graphic	Depth (m)	Type and Depth of sample Taken	CLASSIFICATION AND DESCRIPTION OF MATERIAL (Typical name, colour, in wet condition, odour, if any degree of plasticity, grain size range and description, moisture condition, degree of compactness and other pertinent information)	Type of In-Situ Tests	APPROXIMATE FRACTION OF MATERIAL,(%) < 75 mm	75 To 150mm	150 to 300 mm	> 300 mm
		0.00				Kg	Kg	Kg	Kg
		0.10		Riverbed materials consisting of Alluvium with rounded hard and strong big Boulders, little Sand		43.40	24.00		
		0.20				24.20			
		0.30				46.00			
		0.40	BS		No FD	29.40			
GP		0.50				28.60			
		0.60				26.00			
		0.70				22.20			
		0.80				22.00			
		0.90				22.20			
		1.00				22.60			
						21.30			
						7.00			
						314.90	24.00	0.00	0.00
						93.00	7.00	0.00	0.00

NOTE : SS = Small Sample
BS = Bulk Sample

GEOCE CONSULTANTS (P) LTD.

Topographical and Geological Surveys for the Preparatory Survey for the Project for Coutermeasure Construction for Landslides on Sindhuli Road (Section II)

TESP PIT LOG

Project : Sindhuli Road (Section II) | Test Pit No.: A – 3 | Coordinates: N 27 0 19.216' E 85 0 59.678' | Date: 14/8/2011
Aprox. Dimension: 1.2 x 1.0 m. | Location : Andheri Khola | Ground Level : 515.0 m | Logged By : AM

Classification: Group Symbol	Classification: Graphic	Depth (m)	Type and Depth of sample Taken	CLASSIFICATION AND DESCRIPTION OF MATERIAL (Typical name, colour, in wet condition, odour, if any degree of plasticity, grain size range and description, moisture condition, degree of compactness and other pertinent information)	Type of In-Situ Tests	APPROXIMATE FRACTION OF MATERIAL,(%) < 75 mm	75 To 150mm	150 to 300 mm	> 300 mm
		0.00				Kg	Kg	Kg	Kg
		0.10		Riverbed materials consisting of Alluvium with rounded hard and strong big Boulders of max size 20x25x8 cm, little Sand	FD at 0.1m	26.00	37.00	10	
		0.20				27.00	21.20	6	
		0.30		0–0.5 m, Gravel mixed with fine Sand, loose, dry		23.40	17.00		
		0.40				37.40	18.00		
		0.50		0.5 – 1.0 m, Fine Sand with big boulder at depth 0.9 m depth		40.80			
GP		0.60				35.20			
		0.70				27.80			
		0.80				36.10			
		0.90				32.00			
		1.00				27.40			
						22.00			
						25.00			
						30.40			
						28.00			
						26.00			
						444.50	93.20	16.00	0.00
						80.00	17.00	3.00	0.00

NOTE : SS = Small Sample
BS = Bulk Sample

GEOCE CONSULTANTS (P) LTD.

Topographical and Geological Surveys for the Preparatory Survey for the Project for Coutermeasure Construction for Landslides on Sindhuli Road (Section II)

TESP PIT LOG

Project : Sindhuli Road (Section II) | Test Pit No.: A – 1 | Coordinates: N 27 0 18.984' E 85 0 59.689' | Date: 14/8/2011
Aprox. Dimension: 0.9 x 0.8 m. | Location : Andheri Khola | Ground Level : 580.0 m | Logged By : AM

Classification: Group Symbol	Classification: Graphic	Depth (m)	Type and Depth of sample Taken	CLASSIFICATION AND DESCRIPTION OF MATERIAL (Typical name, colour, in wet condition, odour, if any degree of plasticity, grain size range and description, moisture condition, degree of compactness and other pertinent information)	Type of In-Situ Tests	APPROXIMATE FRACTION OF MATERIAL,(%) < 75 mm	75 To 150mm	150 to 300 mm	> 300 mm
		0.00				Kg	Kg	Kg	Kg
		0.10		Riverbed materials consisting of Alluvium with rounded hard and strong big Boulders of max size 16x16x26 cm, little Sand	FD at 0.1m	22.60	10.00	17.2	
		0.20				24.40	16.00		
		0.30		0 – 0.25 m Fine Sand, loose		23.00	13.00		
		0.40	BS			31.80	20.60		
		0.50		0.25 – 0.7 m Coarse Sand with Bolude of max size 10 cm		33.00	20.40		
GP		0.60				26.20			
		0.70				35.40			
		0.80		0.7 – 1.0 m Sand, with little Fines, mica, loose, wet		37.80			
		0.90				32.60			
		1.00				34.60			
						32.40			
						29.20			
						27.20			
						32.60			
						37.00			
						36.00			
						12.20			
						508.00	80.00	17.20	0.00
						84.00	13.00	3.00	0.00

NOTE : SS = Small Sample
BS = Bulk Sample

資料 6-7-10

GEOCE CONSULTANTS (P) LTD.

Topographical and Geological Surveys for the Preparatory Survey for the Project for Coutermeasure Construction for Landslides on Sindhuli Road (Section II)

TESP PIT LOG

Project : Sindhuli Road (Section II) | Test Pit No.: K – 1 | Coordinates: N 27 0 09.966' E 85 0 53.842' | Date: 15/8/2011
Aprox. Dimension: 1.2 x 0.9 m. | Location : Kamala River | Ground Level : 440.0 m | Logged By : AM

Classification: Group Symbol	Classification: Graphic	Depth (m)	Type and Depth of sample Taken	CLASSIFICATION AND DESCRIPTION OF MATERIAL (Typical name, colour, in wet condition, odour, if any degree of plasticity, grain size range and description, moisture condition, degree of compactness and other pertinent information)	Type of In-Situ Tests	APPROXIMATE FRACTION OF MATERIAL,(%) < 75 mm		75 To 150mm	150 to 300 mm	> 300 mm
		0.00				Kg		Kg	Kg	Kg
		0.10		Riverbed materials consisting of Alluvium, reddidh. with rounded hard and strong big Boulders of max size 26x20x15 cm, little Sand	FD at 0.1m	22.20	33.20	5.20	28	
		0.20				24.20	24.20	18.20	15	
		0.30		0–0.1 m, Fine Sand with Gravel, loose, dry		29.80	53.20	24.20	30	
		0.40		0.1 –0.6 m, Coarse Sand with few Boulder		45.00		25.00	5.2	
		0.50		0.6 – 1.1 m, Coarse Sand with big Boulders, loose and dry Groundwater seepage was recorded at 0.9 m depth		33.00		26.40		
GP		0.60				32.00		29.80		
		0.70				36.80				
		0.80				49.00				
		0.90				36.00				
		1.00				39.00				
						39.40				
						36.60				
						39.00				
						33.80				
						32.60				
						28.60				
						32.20				
						589.20	110.60	128.80	78.20	0.00
					GWT at 0.9 m	699.80				
						77.00		14.00	9.00	0.00

NOTE : SS = Small Sample
BS = Bulk Sample

GEOCE CONSULTANTS (P) LTD.

Topographical and Geological Surveys for the Preparatory Survey for the Project for Coutermeasure Construction for Landslides on Sindhuli Road (Section II)

TESP PIT LOG

Project : Sindhuli Road (Section II) | Test Pit No.: A – 2 | Coordinates: N 27 0 19.054' E 85 0 59.700' | Date: 14/8/2011
Aprox. Dimension: 1.2 x 0.85 m. | Location : Andheri Khola | Ground Level : 522.0 m | Logged By : AM

Classification: Group Symbol	Classification: Graphic	Depth (m)	Type and Depth of sample Taken	CLASSIFICATION AND DESCRIPTION OF MATERIAL (Typical name, colour, in wet condition, odour, if any degree of plasticity, grain size range and description, moisture condition, degree of compactness and other pertinent information)	Type of In-Situ Tests	APPROXIMATE FRACTION OF MATERIAL,(%) < 75 mm	75 To 150mm	150 to 300 mm	> 300 mm
		0.00				Kg	Kg	Kg	Kg
		0.10		Riverbed materials consisting of Alluvium with rounded hard and strong big Boulders of max size 18x23x30 cm, little Sand	No FD	37.00	56.40	23	
		0.20	BS			31.00	17.00	20.2	
		0.30				25.40		19.6	
		0.40				55.40		31	
		0.50				54.00			
GP		0.60				44.00			
		0.70				50.90			
		0.80				45.60			
		0.90				39.00			
		1.00				48.40			
						19.00			
						22.40			
						26.40			
						29.60			
						34.40			
						32.40			
						594.90	73.40	93.80	0.00
						78.00	10.00	12.00	0.00

NOTE : SS = Small Sample
BS = Bulk Sample

GEOCE CONSULTANTS (P) LTD.

Topographical and Geological Surveys for the Preparatory Survey for the Project for Coutermeasure Construction for Landslides on Sindhuli Road (Section II)

FIELD DENSITY TEST

Water Replacment Method

Location : Ghong Khola **Test Pit: G - 3** **Test Dep 0.15 m** **Date 13-Sep-11**

Field Density test				Weight of Water in Hole				Water Content Determination									
										<37.5 mm		37.5 - 75 mm				
F1	wt of wet soil	79800.00	gm		gm	gm	gm	F1	Wt of wet soil + Pan	1050	1050	1000	995		gm
F2	unit wt of water (γ_{water})	1.000	gm/cm3	1	6570	-272.00	6298.00	F2	Wt of dry soil + Pan	1017	1015	965	991		gm
F3	Weight of water in Hole	34294.00	gm	2	6730	-272.00	6458.00	F3	Wt of can	94.8	92.5	55	83.7		gm
F4	Vol of hole (F2 / F3)	34294.00	cm3	3	6815	-272.00	6543.00	F4	wt of water (F1-F2)	33.00	35.00	35.00	4.00		gm
F5	Wet Field Density of Soil (F1/F8)	2.3269	gm/cc	4	6742	-272.00	6470.00	F5	wt. of dry soil (F2-F3)	922.20	922.50	910.00	907.30		gm
F6	Dry Field Density of Soil			5	6830	-272.00	6558.00	F6	Water content (F4/F5*100)	3.58	3.79	3.85	0.44		%
F7				6	6827	-4860.00	1967.00		Average water content (%)		3.74		0.44		
F8															
F9															
F10															
							34294.00								

GEOCE CONSULTANTS (P) LTD.

Topographical and Geological Surveys for the Preparatory Survey for the Project for Coutermeasure Construction for Landslides on Sindhuli Road (Section II)

TESP PIT LOG

Project : Sindhuli Road (Section II) Test Pit No.: K – 2 Coordinates: **N 27 ° 09.974' E 85 ° 53.898'** Date: 15/8/2011
Aprox. Dimension: 1.3 x 1.0 m. Location : Kamala River Ground Level : **434/440.0 m** Logged By : AM

Classification		Depth (m)	Type and Depth of sample Taken	CLASSIFICATION AND DESCRIPTION OF MATERIAL (Typical name, colour, in wet condition, odour, if any degree of plasticity, grain size range and description, moisture condition, degree of compactness and other pertinent information)	Type of In-Situ Tests	APPROXIMATE FRACTION OF MATERIAL,(%)				
Group Symbol	Graphic					< 75 mm		75 To 150mm	150 to 300 mm	> 300 mm
		0.00		Riverbed materials consisting of Alluvium, reddidh. with rounded hard and strong big Boulders of max size 20x25x8 cm, little Sand		Kg		Kg	Kg	Kg
		0.10			FD at 0.1m	23.00	43.00	21.00	22	
		0.20		0–0.6 m, Fine Sand with Gravel, loose, dry and water seepage at 0.9 m		27.00	51.40	20.80		
		0.30				21.00	31.00	20.40		
		0.40		0.6 – 0.9 m, Coarse Sand with Gravels, loose and dry		39.00	37.00	18.00		
GP		0.50		0.6 – 0.9 m, Coarse Sand with big Boulders, loose and dry Groundwater seepage was recorded at 0.9 m depth		42.00		28.00		
		0.60				38.00		19.60		
		0.70				35.00				
		0.80				35.20				
		0.90				36.00				
						36.20				
						43.60				
						33.00				
						32.60				
						36.00				
						41.00				
						45.00				
						40.00				
						603.60	162.40	127.80	22.00	0.00
		1.00			GWT at 0.9 m	766.00				
						84.00		14.00	2.00	0.00

NOTE : SS = Small Sample
BS = Bulk Sample

資料6-7-11

GEOCE CONSULTANTS (P) LTD.

Topographical and Geological Surveys for the Preparatory Survey for the Project for Coutermeasure Construction for Landslides on Sindhuli Road (Section II)

FIELD DENSITY TEST

Water Replacment Method

Location : Andheri Khola **Test Pit: A - 1** **Test Dep 0.1 m** **Date 14-Sep-11**

Field Density test				Weight of Water in Hole				Water Content Determination									
										<37.5 mm		37.5 - 75 mm		>75 mm		
F1	wt of wet soil	81000.00	gm		gm	gm	gm	F1	Wt of wet soil + Pan	2155	2102	1248	980	1250.00	gm
F2	unit wt of water (γ_{water})	1.000	gm/cm3	1	6667	-272.00	6395.00	F2	Wt of dry soil + Pan	2135	2083	1242	974	1245.00	gm
F3	Weight of water in Hole	35288.00	gm	2	5940	-272.00	5668.00	F3	Wt of can	158.1	135	84.9	87.4	90.70	gm
F4	Vol of hole (F2 / F3)	35288.00	cm3	3	6670	-272.00	6398.00	F4	wt of water (F1-F2)	20.00	19.00	6.00	6.00	5.00	gm
F5	Wet Field Density of Soil (F1/F8)	2.2954	gm/cc	4	6675	-272.00	6403.00	F5	wt. of dry soil (F2-F3)	1976.90	1948.00	1157.10	886.60	1154.30	gm
F6	Dry Field Density of Soil			5	6718	-272.00	6446.00	F6	Water content (F4/F5*100)	1.01	0.98	0.52	0.68	0.43	%
F7				6	6690	-2712.00	3978.00		Average water content (%)	0.99		0.60		0.43	
F8															
F9															
F10															
							35288.00								

Location : Andheri Khola **Test Pit: A - 3** **Test Depth 0.1 m** **Date 14-Sep-11**

Field Density test				Weight of Water in Hole				Water Content Determination									
										<37.5 mm		37.5 - 75 mm		>75 mm		
F1	wt of wet soil	94000.00	gm		gm	gm	gm	F1	Wt of wet soil + Pan	1832	1850	1843	1632	705.00	gm
F2	unit wt of water (γ_{water})	1.000	gm/cm3	1	6960	-272.00	6688.00	F2	Wt of dry soil + Pan	1793	1815	1817	1617	700.00	gm
F3	Weight of water in Hole	38976.00	gm	2	5860	-272.00	5588.00	F3	Wt of can	82.6	93.5	83.4	68	77.50	gm
F4	Vol of hole (F2 / F3)	38976.00	cm3	3	5895	-272.00	5623.00	F4	wt of water (F1-F2)	39.00	35.00	26.00	15.00	5.00	gm
F5	Wet Field Density of Soil (F1/F8)	2.4117	gm/cc	4	6010	-272.00	5738.00	F5	wt. of dry soil (F2-F3)	1710.40	1721.50	1733.60	1549.00	622.50	gm
F6	Dry Field Density of Soil			5	5980	-272.00	5708.00	F6	Water content (F4/F5*100)	2.28	2.03	1.50	0.97	0.80	%
F7				6	6000	-272.00	5728.00		Average water content (%)	2.16		1.23		0.80	
F8					6000	-2097.00	3903.00								
F9															
F10															
							38976.00								

GEOCE CONSULTANTS (P) LTD.

Topographical and Geological Surveys for the Preparatory Survey for the Project for Coutermeasure Construction for Landslides on Sindhuli Road (Section II)

TESP PIT LOG

Project : Sindhuli Road (Section II) Test Pit No.: K – 3 Coordinates: **N 27 ° 09.990' E 85 ° 54.107'** Date: 15/8/2011
Aprox. Dimension: 1.3 x 1.0 m. Location : Kamala River Ground Level : **445.0 m** Logged By : AM

Classification		Depth (m)	Type and Depth of sample Taken	CLASSIFICATION AND DESCRIPTION OF MATERIAL (Typical name, colour, in wet condition, odour, if any degree of plasticity, grain size range and description, moisture condition, degree of compactness and other pertinent information)	Type of In-Situ Tests	APPROXIMATE FRACTION OF MATERIAL,(%)				
Group Symbol	Graphic					< 75 mm		75 To 150mm	150 to 300 mm	> 300 mm
		0.00		Riverbed materials consisting of Alluvium, reddidh. with rounded hard and strong big Boulders of max size 27x24x19 cm, little Sand		Kg		Kg	Kg	Kg
		0.10			FD at 0.1m	25.00	40.80	16.00	22	
		0.20		0–0.4 m, Coarse Sand with Gravels, loose and dry		23.00		18.80	8	
		0.30				24.20		16.80	5.4	
		0.40		0.4 – 1.0 M, Fine Sand with few big Boulders, loose and dry Groundwater seepage was recorded at 0.9 m depth		37.20		19.00		
GP		0.50				38.20		16.00		
		0.60				42.00		15.80		
		0.70				34.20		13.00		
		0.80				52.80		15.00		
		0.90				34.00				
						44.60				
						36.80				
						43.80				
						30.80				
						46.00				
						32.80				
						33.00				
						37.00				
						615.40	40.80	130.40	35.40	0.00
		1.00			GWT at 0.9 m	656.20				
						80.00		16.00	4.00	0.00

NOTE : SS = Small Sample
BS = Bulk Sample

GEOCE CONSULTANTS (P) LTD.

Topographical and Geological Surveys for the Preparatory Survey for the Project for Coutermeasure Construction for Landslides on Sindhuli Road (Section II)

FIELD DENSITY TEST

Water Replacement Method

Location Kamala River | Test Pit: K - 1 | Test Depth 0.1 m | Date 15-Sep-11

Field Density test					Weight of Water in Hole			Water Content Determination	<37.5 mm	37.5 - 75 mm	>75 mm
F1	wt. of wet soil	61400.00	gm	gm	gm	gm	F1	Wt of wet soil + Pan	1602	1640	1920	815.00	gm
F2	unit wt. of water (γ_{water})	1.000	gm/cm3	1	7220	-272.00	6948.00	F2	Wt of dry soil + Pan	1582	1610	1895	810.00	gm
F3	Weight of water in Hole	30855.00	gm	2	7275	-272.00	7003.00	F3	Wt of can	84.9	114.9	82.4	65.30	gm
F4	Vol.of hole (F2 / F3)	30855.00	cm3	3	7295	-272.00	7023.00	F4	wt of water (F1-F2)	38.00	30.00	25.00	5.00	gm
F5	Wet Field Density of Soil (F1/F3)	1.990	gm/cc	4	6000	-272.00	5728.00	F5	wt. of dry soil (F2-F3)	1497.10	1495.10	1812.60	744.70	gm
F6	Dry Field Density of Soil			5	6035	-1852.00	4153.00	F6	Water content (F4/F5*100)	2.54	2.01	1.38	0.67	%
F7				6					Average water content (%)	2.27		1.38	0.67	
							30855.00							

Location Kamala River | Test Pit: K - 2 | Test Depth 0.1 m | Date 15-Sep-11

Field Density test					Weight of Water in Hole			Water Content Determination	<37.5 mm	37.5 - 75 mm	>75 mm
F1	wt. of wet soil	74200.00	gm	gm	gm	gm	F1	Wt of wet soil + Pan	1890	1510	1649	2310.00	gm
F2	unit wt. of water (γ_{water})	1.000	gm/cm3	1	6985	-272.00	6713.00	F2	Wt of dry soil + Pan	1865	1475	1630	2296.00	gm
F3	Weight of water in Hole	32670.00	gm	2	7300	-272.00	7028.00	F3	Wt of can	101.4	74	70.9	78.00	gm
F4	Vol.of hole (F2 / F3)	32670.00	cm3	3	7230	-272.00	6958.00	F4	wt of water (F1-F2)	25.00	35.00	19.00	15.00	gm
F5	Wet Field Density of Soil (F1/F3)	2.271	gm/cc	4	7125	-272.00	6853.00	F5	wt. of dry soil (F2-F3)	1763.60	1401.00	1559.10	2217.00	gm
F6	Dry Field Density of Soil			5	7145	-2027.00	5118.00	F6	Water content (F4/F5*100)	1.42	2.50	1.22	0.68	%
F7				6					Average water content (%)	1.96		1.22	0.68	
							32670.00							

Location Kamala River | Test Pit: K - 3 | Test Depth 0.1 m | Date 15-Sep-11

Field Density test					Weight of Water in Hole			Water Content Determination	<37.5 mm	37.5 - 75 mm	>75 mm
F1	wt. of wet soil	81600.00	gm	gm	gm	gm	F1	Wt of wet soil + Pan	1350	1485	1357	1032.00	gm
F2	unit wt. of water (γ_{water})	1.000	gm/cm3	1	7155	-272.00	6883.00	F2	Wt of dry soil + Pan	1330	1457	1455	1015.00	gm
F3	Weight of water in Hole	36974.00	gm	2	7045	-272.00	6773.00	F3	Wt of can	97	76	80	47.80	gm
F4	Vol.of hole (F2 / F3)	36974.00	cm3	3	7045	-272.00	6773.00	F4	wt of water (F1-F2)	20.00	28.00	30.10	17.00	gm
F5	Wet Field Density of Soil (F1/F3)	2.249	gm/cc	4	7007	-272.00	6735.00	F5	wt. of dry soil (F2-F3)	1263.00	1276.00	1375.00	1269.30	gm
F6	Dry Field Density of Soil			5	7102	-272.00	6830.00	F6	Water content (F4/F5*100)	1.58	1.90	2.18	0.82	%
F7				6	2720	-340.00	2380.00		Average water content (%)	1.66		1.34		
							36974.00							

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Topographical and Geological Surveys for the Preparatory Survey for the Project for Coutermeasure Construction for Landslides on Sindhuli Road (Section II)

Lab Minimum and Maximum Index Density Tests

1 Details of Mould/Drum — 2 Compaction by Manual Rammer
Diameter, d= 0.35 m
Area, A = 0.095115 m2

1 Location:-Ghong Khola (G -1)

Minimum Index Density			Maximum Index density		
Total Weight of sample+Mould, W1	52.4	Kg	Total Weight of sample, W	64	Kg
Weight of Empty Mould, W2	16.6	Kg	Weight of Empty Mould, W2	16.6	Kg
Weight of Soil, W = W1-W2	35.8	Kg	Weight of Soil, W = W1-W2	47.4	Kg
Height of sample, h	0.2072	m	Height of sample, h	0.2218	m
Volume of Mould, V	0.019708	m3	Volume of Mould, V	0.021096	m3
Minimum Index Denstiy, ρdmin	1816.54	kg/m3	Maximum Index Denstiy, ρdmax	2246.821	kg/m3

Water Content Determination							
		<37.5 mm		37.5 - 75 mm		>75 mm	
F1	Wt of wet soil + Pan, gm	1640	1435	860	799		
F2	Wt of dry soil + Pan, gm	1595	1395	845	786		
F3	Wt of can, gm	86.7	82.4	68.6	70.9		
F4	wt of water (F1-F2), gm	45.00	40.00	15.00	13.00		
F5	wt. of dry soil (F2-F3), gm	1508.30	1312.60	776.40	715.10		
F6	Water content (F4/F5*100), %	2.98	3.05	1.93	1.82		
	Average water content (%)	3.02		1.87		0.00	

3 Location:-Ghong Khola (G - 2)

Minimum Index Density			Maximum Index density		
Total Weight of sample+Mould, W1	54.8	Kg	Total Weight of sample, W	64.2	Kg
Weight of Empty Mould, W2	16.6	Kg	Weight of Empty Mould, W2	16.6	Kg
Weight of Soil, W = W1-W2	38.2	Kg	Weight of Soil, W = W1-W2	47.6	Kg
Height of sample, h	0.2094	m	Height of sample, h	0.2212	m
Volume of Mould, V	0.019917	m3	Volume of Mould, V	0.021039	m3
Minimum Index Denstiy, ρdmin	1917.955	kg/m3	Maximum Index Denstiy, ρdmax	2262.421	kg/m3

Water Content Determination							
		<37.5 mm		37.5 - 75 mm		>75 mm	
F1	Wt of wet soil + Pan, gm	2300	1900	1410			
F2	Wt of dry soil + Pan, gm	2270	1880	1405			
F3	Wt of can, gm	177.8	135	83.5			
F4	wt of water (F1-F2), gm	30.00	20.00	5.00			
F5	wt. of dry soil (F2-F3), gm	2092.20	1745.00	1321.50			
F6	Water content (F4/F5*100), %	1.43	1.15	0.38			
	Average water content (%)	1.29		0.38		0.00	

2 Location:-Ghong Khola (G - 3)

Minimum Index Density			Maximum Index density		
Total Weight of sample+Mould, W1	59.2	Kg	Total Weight of sample, W	64	Kg
Weight of Empty Mould, W2	16.6	Kg	Weight of Empty Mould, W2	16.6	Kg
Weight of Soil, W = W1-W2	42.6	Kg	Weight of Soil, W = W1-W2	47.4	Kg
Height of sample, h	0.2534	m	Height of sample, h	0.224	m
Volume of Mould, V	0.024102	m3	Volume of Mould, V	0.021306	m3
Minimum Index Denstiy, ρdmin	1767.48	kg/m3	Maximum Index Denstiy, ρdmax	2224.754	kg/m3

Water Content Determination							
		<37.5 mm		37.5 - 75 mm		>75 mm	
F1	Wt of wet soil + Pan, gm	1750	1480	737	863		
F2	Wt of dry soil + Pan, gm	1700	1443	734	855		
F3	Wt of can, gm	136.3	99.1	63.5	64		
F4	wt of water (F1-F2), gm	50.00	37.00	3.00	8.00		
F5	wt. of dry soil (F2-F3), gm	1563.70	1343.90	670.50	791.00		
F6	Water content (F4/F5*100), %	3.20	2.75	0.45	1.01		
	Average water content (%)	2.98		0.73		0.00	

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Topographical and Geological Surveys for the Preparatory Survey for the Project for Coutermeasure Construction for Landslides on Sindhuli Road (Section II)

Lab Minimum and Maximum Index Density Tests

1 Details of Mould/Drum — 2 Compaction by Manual Rammer
Diameter, d= 0.35 m
Area, A = 0.095115 m2

1 Location:-Andheri Khola (A -1)

Minimum Index Density			Maximum Index density		
Total Weight of sample+Mould, W1	54.6	Kg	Total Weight of sample, W	60.6	Kg
Weight of Empty Mould, W2	16.6	Kg	Weight of Empty Mould, W2	16.6	Kg
Weight of Soil, W = W1-W2	38	Kg	Weight of Soil, W = W1-W2	44	Kg
Height of sample, h	0.2024	m	Height of sample, h	0.208	m
Volume of Mould, V	0.019251	m3	Volume of Mould, V	0.019784	m3
Minimum Index Denstiy, ρdmin	1973.898	kg/m3	Maximum Index Denstiy, ρdmax	2224.032	kg/m3

Water Content Determination							
		<37.5 mm		37.5 - 75 mm		>75 mm	
F1	Wt of wet soil + Pan, gm	2195	2240	835	1318		
F2	Wt of dry soil + Pan, gm	2170	2222	831	1309		
F3	Wt of can, gm	144	154.7	58.6	61.3		
F4	wt of water (F1-F2), gm	25.00	18.00	4.00	9.00		
F5	wt. of dry soil (F2-F3), gm	2026.00	2067.30	772.40	1247.70		
F6	Water content (F4/F5*100), %	1.23	0.87	0.52	0.72		
	Average water content (%)	1.05		0.62		0.00	

3 Location:-Andheri Khola (A -2)

Minimum Index Density			Maximum Index density		
Total Weight of sample+Mould, W1	54.0	Kg	Total Weight of sample, W	60.4	Kg
Weight of Empty Mould, W2	16.6	Kg	Weight of Empty Mould, W2	16.6	Kg
Weight of Soil, W = W1-W2	37.4	Kg	Weight of Soil, W = W1-W2	43.8	Kg
Height of sample, h	0.205	m	Height of sample, h	0.2068	m
Volume of Mould, V	0.019499	m3	Volume of Mould, V	0.01967	m3
Minimum Index Denstiy, ρdmin	1918.092	kg/m3	Maximum Index Denstiy, ρdmax	2226.769	kg/m3

Water Content Determination							
		<37.5 mm		37.5 - 75 mm		>75 mm	
F1	Wt of wet soil + Pan, gm	810	940	784	872		
F2	Wt of dry soil + Pan, gm	787	932	788	867		
F3	Wt of can, gm	47.8	69.7	61.6	68		
F4	wt of water (F1-F2), gm	23.00	8.00	6.00	5.00		
F5	wt. of dry soil (F2-F3), gm	739.20	862.30	726.40	799.00		
F6	Water content (F4/F5*100), %	3.11	0.93	0.83	0.63		
	Average water content (%)	2.02		0.73		0.00	

2 Location:-Andheri Khola (A - 3)

Minimum Index Density			Maximum Index density		
Total Weight of sample+Mould, W1	52.6	Kg	Total Weight of sample, W	59	Kg
Weight of Empty Mould, W2	16.6	Kg	Weight of Empty Mould, W2	16.6	Kg
Weight of Soil, W = W1-W2	36	Kg	Weight of Soil, W = W1-W2	42.4	Kg
Height of sample, h	0.2004	m	Height of sample, h	0.198	m
Volume of Mould, V	0.019061	m3	Volume of Mould, V	0.018833	m3
Minimum Index Denstiy, ρdmin	1888.671	kg/m3	Maximum Index Denstiy, ρdmax	2251.398	kg/m3

Water Content Determination							
		<37.5 mm		37.5 - 75 mm		>75 mm	
F1	Wt of wet soil + Pan, gm	1415	1207	1070	742		
F2	Wt of dry soil + Pan, gm	1392	1182	1064	738		
F3	Wt of can, gm	86.7	70.9	68.6	62.5		
F4	wt of water (F1-F2), gm	23.00	25.00	6.00	4.00		
F5	wt. of dry soil (F2-F3), gm	1305.30	1111.10	995.40	675.50		
F6	Water content (F4/F5*100), %	1.76	2.25	0.60	0.59		
	Average water content (%)	2.01		0.60		0.00	

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Topographical and Geological Surveys for the Preparatory Survey for the Project for Coutermeasure Construction for Landslides on Sindhuli Road (Section II)

Lab Minimum and Maximum Index Density Tests

1 Details of Mould/Drum — 2 Compaction by Manual Rammer
Diameter, d= 0.35 m
Area, A = 0.095115 m2

1 Location:-Kamala River (K - 1)

Minimum Index Density			Maximum Index density		
Total Weight of samplet+Mould, W1	55.5	Kg	Total Weight of sample, W	59	Kg
Weight of Empty Mould, W2	16.6	Kg	Weight of Empty Mould, W2	16.6	Kg
Weight of Soil, W = W1-W2	38.9	Kg	Weight of Soil, W = W1-W2	42.4	Kg
Height of sample, h	0.2266	m	Height of sample, h	0.2004	m
Volume of Mould, V	0.021553	m3	Volume of Mould, V	0.019061	m3
Minimum Index Denstiy, ρdmin	1804.851	kg/m3	Maximum Index Denstiy, ρdmax	2224.435	kg/m3

Water Content Determination							
		<37.5 mm		37.5 - 75 mm		>75 mm	
F1	Wt of wet soil + Pan, gm	1355	1062	1200	990		
F2	Wt of dry soil + Pan, gm	1328	1041	1195	980		
F3	Wt of can, gm	84.9	87.4	69	69.4		
F4	wt of water (F1-F2), gm	27.00	21.00	5.00	10.00		
F5	wt. of dry soil (F2-F3), gm	1243.10	953.60	1126.00	910.60		
F6	Water content (F4/F5*100), %	2.17	2.20	0.44	1.10		
	Average water content (%)	2.19		0.77		0.00	

3 Location:-Kamala River (K - 2)

Minimum Index Density			Maximum Index density		
Total Weight of samplet+Mould, W1	52.6	Kg	Total Weight of sample, W	56.8	Kg
Weight of Empty Mould, W2	16.6	Kg	Weight of Empty Mould, W2	16.6	Kg
Weight of Soil, W = W1-W2	36	Kg	Weight of Soil, W = W1-W2	40.2	Kg
Height of sample, h	0.2046	m	Height of sample, h	0.199	m
Volume of Mould, V	0.019461	m3	Volume of Mould, V	0.018928	m3
Minimum Index Denstiy, ρdmin	1849.901	kg/m3	Maximum Index Denstiy, ρdmax	2123.854	kg/m3

Water Content Determination							
		<37.5 mm		37.5 - 75 mm		>75 mm	
F1	Wt of wet soil + Pan, gm	1720	1785	1125	1124		
F2	Wt of dry soil + Pan, gm	1683	1743	1120	1120		
F3	Wt of can, gm	137	158.1	65	83.4		
F4	wt of water (F1-F2), gm	37.00	42.00	5.00	4.00		
F5	wt. of dry soil (F2-F3), gm	1546.00	1584.90	1055.00	1036.60		
F6	Water content (F4/F5*100), %	2.39	2.65	0.47	0.39		
	Average water content (%)	2.52		0.43		0.00	

2 Location:-Kamala River (K - 3)

Minimum Index Density			Maximum Index density		
Total Weight of samplet+Mould, W1	52.2	Kg	Total Weight of sample, W	61	Kg
Weight of Empty Mould, W2	16.6	Kg	Weight of Empty Mould, W2	16.6	Kg
Weight of Soil, W = W1-W2	35.6	Kg	Weight of Soil, W = W1-W2	44.4	Kg
Height of sample, h	0.2002	m	Height of sample, h	0.2088	m
Volume of Mould, V	0.019042	m3	Volume of Mould, V	0.01986	m3
Minimum Index Denstiy, ρdmin	1869.552	kg/m3	Maximum Index Denstiy, ρdmax	2235.652	kg/m3

Water Content Determination							
		<37.5 mm		37.5 - 75 mm		>75 mm	
F1	Wt of wet soil + Pan, gm	1185	1366	1128	983		
F2	Wt of dry soil + Pan, gm	1155	1335	1120	981		
F3	Wt of can, gm	114.9	83.7	80	55.7		
F4	wt of water (F1-F2), gm	30.00	31.00	8.00	2.00		
F5	wt. of dry soil (F2-F3), gm	1040.10	1251.30	1040.00	925.30		
F6	Water content (F4/F5*100), %	2.88	2.48	0.77	0.22		
	Average water content (%)	2.68		0.49		0.00	

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Topographical and Geological Surveys for the Preparatory Survey for the Project for Coutermeasure Construction for Landslides on Sindhuli Road (Section II)

SPECIFIC GRAVITY TEST OF SOILS

Location: Dhungre Bhanjyang — Sample Size < 4.75 mm — Tested by: KB
Sample: River Sample — Date: September 2011

Sample No.	G 1			G 2			G 3		
Determination No	1	2	3	1	2	3	1	2	3
1 Temperature, ^{0}c	61	48	38	60	50	41	63	50	41
2 Wt. Of Flask + Water + Soil	766.2	769.3	771.1	746.8	749	751.2	743.5	746.8	748.5
3 Wt. Of Flask + Water (From Calib	733.6	736.6	738.9	715.9	718	719.8	713	716.3	718.6
4 Wt. Of Dry Soil + Container	207.3			187.1			185.4		
5 Wt. Of Container	154.2			132.5			134.0		
6 Wt. Of Dry Soil	53.1			54.6			51.4		
7 Sp. Gr. Of water at t 0 c	0.9827	0.9890	0.9930	0.9832	0.9881	0.9919	0.9817	0.9881	0.9919
8 Sp. Gr. Of soils = (6 x 7)/(3+6-2)	2.5454	2.5743	2.5229	2.2651	2.2860	2.3344	2.4143	2.4301	2.3713
9 Average Sp. Gr.		**2.548**			**2.295**			**2.405**	

Sample No.	A 1			A 2			A 3		
Determination No	1	2	3	1	2	3	1	2	3
1 Temperature, ^{0}c	60	47	38	57	51	40	60	50	37
2 Wt. Of Flask + Water + Soil	749.4	751.9	754	746.2	747.3	750	759.2	761.1	764.5
3 Wt. Of Flask + Water (From Calib	715.9	718.6	720.4	714.5	716.1	718.9	726.9	729.2	732.3
4 Wt. Of Dry Soil + Container	196.5			188.7			205.3		
5 Wt. Of Container	143.2			139			158.0		
6 Wt. Of Dry Soil	53.3			49.7			47.3		
7 Sp. Gr. Of water at t 0 c	0.9832	0.9894	0.9930	0.9848	0.9876	0.9922	0.9832	0.9881	0.9934
8 Sp. Gr. Of soils = (6 x 7)/(3+6-2)	2.6467	2.6368	2.6866	2.3480	2.3044	2.3053	2.6459	2.6045	2.6594
9 Average Sp. Gr.		**2.657**			**2.319**			**2.637**	

Sample No.	K 1			K 2			K 3		
Determination No	1	2	3	1	2	3	1	2	3
1 Temperature, ^{0}c	59	50	38	60	50	40	63	53	42
2 Wt. Of Flask + Water + Soil	767.5	768.7	771.4	747.6	749.8	751.2	746.7	749	751.7
3 Wt. Of Flask + Water (From Calib	734	736.1	738.9	715.9	718	720.0	713	715.5	718.4
4 Wt. Of Dry Soil + Container	207			193			188.2		
5 Wt. Of Container	154			143.2			139.0		
6 Wt. Of Dry Soil	53.0			49.8			49.2		
7 Sp. Gr. Of water at t 0 c	0.9838	0.9881	0.9930	0.9832	0.9881	0.9922	0.9817	0.9867	0.9915
8 Sp. Gr. Of soils = (6 x 7)/(3+6-2)	2.6483	2.5442	2.5446	2.3442	2.3662	2.3151	2.8508	2.8333	2.8156
9 Average Sp. Gr.		**2.579**			**2.342**			**2.833**	

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Topographical and Geological Surveys for the Preparatory Survey for the Project for Countermeasure Construction for Landslides on Sindhuli Road (Section II)

SPECIFIC GRAVITY & WATER ABSORPTION TEST

Location: Ghong Khola — Tested by: KB
Test Pit: G 1, G 2 & G 3 — Date: September 2011
Sample Size:
1 >75 mm
2 75 - 37.5 mm
3 37.5 - 4.75 mm

Sample No. / Description	>75 mm 1	75-37.5 mm 2	37.5-4.75 mm 3
	Weight (gm)	Weight (gm)	
Mass of submerged density basket and saturated sample, M1	4,346.00	3,010.00	4,460.00
Mass of submerged empty density basket, M2	1,320.00	1,320.00	1,320.00
Mass of saturated surface dried test sample in air, B	4,851.00	2,689.00	5,004.00
Mass of oven dried test sample, A	4,780.00	2,672.00	4,949.00
Mass of saturated test sample in water, C (M1 - M2)	3,026.00	1,690.00	3,140.00

CALCULATIONS

Specific Gravity:		1	2	3
a)	Bulk Sp. Gr = A/(B-C)	2.619	2.675	2.655
b)	Bulk Sp Gr (saturated surface dry) = B/(B-C)	2.658	2.692	2.685
(c)	Apparent Sp Gr = A/(A-C)	2.725	2.721	2.736
(d)	(d) Water Absorption = (B-A)/A*100	1.46	0.63	1.10

GEOCE CONSULTANTS (P) LTD

Topographical and Geological Surveys for the Preparatory Survey for the Project for Countermeasure Construction for Landslides on Sindhuli Road (Section II)

SPECIFIC GRAVITY & WATER ABSORPTION TEST

Location: Andheri Khola — Tested by: KB
Test Pit: A 1, A 2 & A 3 — Date: September 2011
Sample Size:
1 >75 mm
2 75 - 37.5 mm
3 37.5 - 4.75 mm

Sample No. / Description	>75 mm 1	75-37.5 mm 2	37.5-4.75 mm 3
	Weight (gm)	Weight (gm)	
Mass of submerged density basket and saturated sample, M1	3,505.00	3,330.00	4,130.00
Mass of submerged empty density basket, M2	1,320.00	1,320.00	1,320.00
Mass of saturated surface dried test sample in air, B	3,505.00	3,227.00	4,495.00
Mass of oven dried test sample, A	3,482.00	3,205.00	4,463.00
Mass of saturated test sample in water, C (M1 - M2)	2,185.00	2,010.00	2,810.00

CALCULATIONS

Specific Gravity:		1	2	3
a)	Bulk Sp. Gr = A/(B-C)	2.638	2.634	2.649
b)	Bulk Sp Gr (saturated surface dry) = B/(B-C)	2.655	2.652	2.668
(c)	Apparent Sp Gr = A/(A-C)	2.685	2.682	2.700
(d)	(d) Water Absorption = (B-A)/A*100	0.66	0.68	0.71

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Topographical and Geological Surveys for the Preparatory Survey for the Project for Countermeasure Construction for Landslides on Sindhuli Road (Section II)

SPECIFIC GRAVITY & WATER ABSORPTION TEST

Location: Kamala River — Tested by: KB
Test Pit: K 1, K 2 & K 3 — Date: September 2011
Sample Size:
1 >75 mm
2 75 - 37.5 mm
3 37.5 - 4.75 mm

Sample No. / Description	>75 mm 1	75-37.5 mm 2	37.5-4.75 mm 3
	Weight (gm)	Weight (gm)	
Mass of submerged density basket and saturated sample, M1	3,385.00	3,180.00	3,825.00
Mass of submerged empty density basket, M2	1,320.00	1,320.00	1,320.00
Mass of saturated surface dried test sample in air, B	3,342.00	3,020.00	4,062.00
Mass of oven dried test sample, A	3,339.00	3,003.00	4,041.00
Mass of saturated test sample in water, C (M1 - M2)	2,065.00	1,860.00	2,505.00

CALCULATIONS

Specific Gravity:		1	2	3
a)	Bulk Sp. Gr = A/(B-C)	2.615	2.589	2.595
b)	Bulk Sp Gr (saturated surface dry) = B/(B-C)	2.617	2.603	2.609
(c)	Apparent Sp Gr = A/(A-C)	2.621	2.627	2.631
(d)	(d) Water Absorption = (B-A)/A*100	0.09	0.56	0.52

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Topographical and Geological Surveys for the Preparatory Survey for the Project for Coutermeasure Construction for Landslides on Sindhuli Road (Section II)

Natural Moisture Content Tests

TP No: G 1

Water Content Determination								
		<37.5 mm			37.5 - 75 mm		>75 mm	
F1	Wt of wet soil + Pan, gm	1300	1350	1500	835	835		
F2	Wt of dry soil + Pan, gm	1265	1307	1460	827	810		
F3	Wt. of can, gm	114.9	99.9	82.4	57.8	72.3		
F4	wt of water (F1-F2), gm	35.00	43.00	40.00	8.00	25.00		
F5	wt. of dry soil (F2-F3), gm	1150.10	1207.10	1377.60	769.20	737.70		
F6	Water content (F4/F5*100), %	3.04	3.56	2.90	1.04	3.39		
	Average water content (%)	3.17			2.21		0.00	

TP No: G 2

Water Content Determination								
		<37.5 mm			37.5 - 75 mm		>75 mm	
F1	Wt of wet soil + Pan, gm	1118	1530	1225	741	999		
F2	Wt of dry soil + Pan, gm	1080	1490	1170	737	993		
F3	Wt. of can, gm	69.4	98.5	76.5	82.1	64.1		
F4	wt of water (F1-F2), gm	38.00	40.00	55.00	4.00	6.00		
F5	wt. of dry soil (F2-F3), gm	1010.60	1391.50	1093.50	654.90	928.90		
F6	Water content (F4/F5*100), %	3.76	2.87	5.03	0.61	0.65		
	Average water content (%)	3.89			0.63		0.00	

TP No: G 3

Water Content Determination								
		<37.5 mm			37.5 - 75 mm		>75 mm	
F1	Wt of wet soil + Pan, gm	1200	1200	1300	1430			
F2	Wt of dry soil + Pan, gm	1137	1145	1255	1415			
F3	Wt. of can, gm	66	87.4	78	70.9			
F4	wt of water (F1-F2), gm	63.00	55.00	45.00	15.00			
F5	wt. of dry soil (F2-F3), gm	1071.00	1057.60	1177.00	1344.10			
F6	Water content (F4/F5*100), %	5.88	5.20	3.82	1.12			
	Average water content (%)	4.97			1.12		0.00	

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Topographical and Geological Surveys for the Preparatory Survey for the Project for Countermeasure Construction for Landslides on Sindhuli Road (Section II)

Natural Moisture Content Tests

TP No: A 1

Water Content Determination								
		<37.5 mm			37.5 - 75 mm		>75 mm	
F1	Wt of wet soil + Pan, gm	2150	2200	2315	1277	1030	620.00	
F2	Wt of dry soil + Pan, gm	2125	2170	2290	1272	1027	617.00	
F3	Wt. of can, gm	157.5	137	154.7	83.7	72.3	55.00	
F4	wt of water (F1-F2), gm	25.00	30.00	25.00	5.00	3.00	3.00	
F5	wt. of dry soil (F2-F3), gm	1967.50	2033.00	2135.30	1188.30	954.70	562.00	
F6	Water content (F4/F5*100), %	1.27	1.48	1.17	0.42	0.31	0.53	
	Average water content (%)	1.31			0.37		0.53	

TP No: A 2

Water Content Determination								
		<37.5 mm			37.5 - 75 mm		>75 mm	
F1	Wt of wet soil + Pan, gm	1800	1950		1435	1940		
F2	Wt of dry soil + Pan, gm	1750	1925		1420	1925		
F3	Wt. of can, gm	144	136.3		64.1	99.9		
F4	wt of water (F1-F2), gm	50.00	25.00		15.00	15.00		
F5	wt. of dry soil (F2-F3), gm	1606.00	1788.70		1355.90	1825.10		
F6	Water content (F4/F5*100), %	3.11	1.40		1.11	0.82		
	Average water content (%)	2.26			0.96		0.00	

TP No: A 2 (Repeat)

Water Content Determination								
		<37.5 mm			37.5 - 75 mm		>75 mm	
F1	Wt of wet soil + Pan, gm	2582	2036		1420	1305		
F2	Wt of dry soil + Pan, gm	2530	1995		1415	1300		
F3	Wt. of can, gm	177.8	98.5		94.8	82.1		
F4	wt of water (F1-F2), gm	52.00	41.00		5.00	5.00		
F5	wt. of dry soil (F2-F3), gm	2352.20	1896.50		1320.20	1217.90		
F6	Water content (F4/F5*100), %	2.21	2.16		0.38	0.41		
	Average water content (%)	2.19			0.39		0.00	

TP No: A 3

Water Content Determination								
		<37.5 mm			37.5 - 75 mm		>75 mm	
F1	Wt of wet soil + Pan, gm	1880	1830	1200	970	1135		
F2	Wt of dry soil + Pan, gm	1844	1795	1165	962	1130		
F3	Wt. of can, gm	101.2	99.1	76.5	92.5	57.8		
F4	wt of water (F1-F2), gm	36.00	35.00	35.00	8.00	5.00		
F5	wt. of dry soil (F2-F3), gm	1742.80	1695.90	1088.50	869.50	1072.20		
F6	Water content (F4/F5*100), %	2.07	2.06	3.22	0.92	0.47		
	Average water content (%)	2.45			0.69		0.00	

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Topographical and Geological Surveys for the Preparatory Survey for the Project for Coutermeasure Construction for Landslides on Sindhuli Road (Section II)

Natural Moisture Content Tests

TP No: K 1

Water Content Determination								
		<37.5 mm			37.5 - 75 mm		>75 mm	
F1	Wt of wet soil + Pan, gm	1475	1545	1525	1800			
F2	Wt of dry soil + Pan, gm	1445	1510	1495	1780			
F3	Wt. of can, gm	66	74.4	69.4	110.2			
F4	wt of water (F1-F2), gm	30.00	35.00	30.00	20.00			
F5	wt. of dry soil (F2-F3), gm	1379.00	1435.60	1425.60	1669.80			
F6	Water content (F4/F5*100), %	2.18	2.44	2.10	1.20			
	Average water content (%)	2.24			1.20		0.00	

TP No: K 2

Water Content Determination								
		<37.5 mm			37.5 - 75 mm		>75 mm	
F1	Wt of wet soil + Pan, gm	1500	1338		1450	1220	735.00	
F2	Wt of dry soil + Pan, gm	1458	1293		1445	1215	730.00	
F3	Wt. of can, gm	86.8	69		83.5	70	65.30	
F4	wt of water (F1-F2), gm	42.00	45.00		5.00	5.00	5.00	
F5	wt. of dry soil (F2-F3), gm	1371.20	1224.00		1361.50	1145.00	664.70	
F6	Water content (F4/F5*100), %	3.06	3.68		0.37	0.44	0.75	
	Average water content (%)	3.37			0.40		0.75	

TP No: K 3

Water Content Determination								
		<37.5 mm			37.5 - 75 mm		>75 mm	
F1	Wt of wet soil + Pan, gm	1180	1259	1130	660		2115	
F2	Wt of dry soil + Pan, gm	1150	1222	1100	655		2110	
F3	Wt. of can, gm	86.7	56.8	68.6	58.6		74.3	
F4	wt of water (F1-F2), gm	30.00	37.00	30.00	5.00		5.00	
F5	wt. of dry soil (F2-F3), gm	1063.30	1165.20	1031.40	596.40		2035.70	
F6	Water content (F4/F5*100), %	2.82	3.18	2.91	0.84		0.25	
	Average water content (%)	2.97			0.84		0.25	

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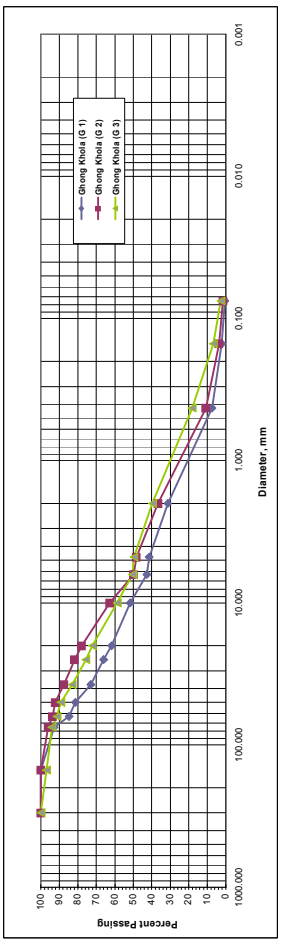
GRAIN SIZE DISTRIBUTION

Topographical and Geological Surveys for the Preparatory Survey for the Project for Coutermeasure Construction for Landslides on Sindhuli Road (Section II)

Project : Date : September 2011

Location : Tested By : KB

Sieve size, mm		300	150	75	63	50	37.5	25	20	10	6.3	4.75	2.00	0.425	0.15	0.075
River bed materials	G 1	100	100.0	92.9	84.7	81.3	72.9	66.1	61.7	51.7	42.8	41.4	31.2	7.5	2.1	0.5
	G 2	100	100.0	96.0	93.7	92.2	87.5	81.7	76.0	62.7	49.8	48.4	36.6	10.7	3.6	1.5
	G 3	100	97.0	94.0	91.4	89.2	83.0	75.7	72.2	58.8	50.5	49.6	39.7	18.2	6.8	2.7



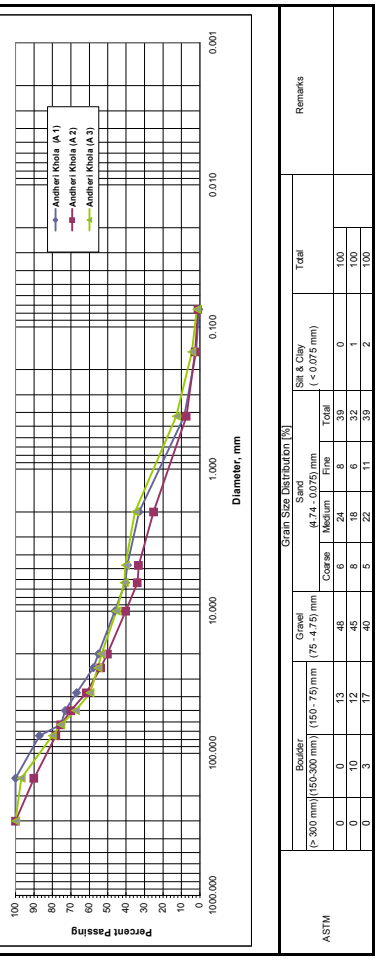
ASTM	Boulder (> 300 mm)	Boulder (150-300 mm)	Gravel (75 - 4.75) mm	Sand (4.74 - 0.075) mm Coarse	Sand (4.74 - 0.075) mm Medium	Sand (4.74 - 0.075) mm Fine	Sand (4.74 - 0.075) mm Total	Silt & Clay (< 0.075 mm)	Total	Remarks
G 1	0	0	7	10	24	7	41	1	100	
G 2	0	0	4	12	26	9	47	1	100	
G 3	0	3	3	10	22	15	47	3	100	

GEOCE CONSULTANTS (P) LTD.
GRAIN SIZE DISTRIBUTION

Project : Topographical and Geological Surveys for the Preparatory Survey for the Project for Coutermeasure Construction for Landslides on Sindhuli Road (Section II) Date : September 2011

Location : Andheri Khola Tested By : KB

Sieve size, mm		300	150	75	63	50	37.5	25	20	10	6.3	4.75	2.00	0.425	0.15	0.075
River bed materials																
	A 1	100	100.0	87.0	75.5	73.2	66.9	57.8	55.0	46.1	40.3	39.4	32.9	8.5	2.0	0.5
	A 2	100	90.0	78.0	75.3	69.9	61.7	53.8	50.1	40.2	34.0	33.2	25.1	7.4	2.5	1.0
	A 3	100	97.0	80.0	75.4	67.4	59.6	55.4	53.4	45.4	41.1	40.4	35.2	12.8	4.4	1.6



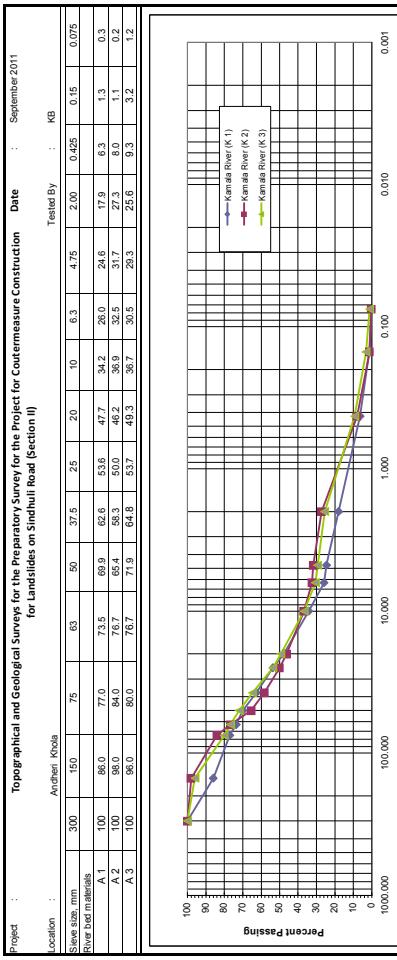
ASTM	Grain Size Distribution (%)									Remarks
	Boulder		Gravel	Sand				Silt & Clay	Total	
	(> 300 mm)	(150-300 mm)	(75 - 150) mm	(75 -4.75) mm	(4.74 - 0.075) mm			(< 0.075 mm)		
					Coarse	Medium	Fine	Total		
	0	0	13	48	6	24	8	39	100	
	0	10	12	45	8	46	6	32	100	
	0	3	17	40	5	22	11	39	100	

GEOCE CONSULTANTS (P) LTD.
GRAIN SIZE DISTRIBUTION

Project : Topographical and Geological Surveys for the Preparatory Survey for the Project for Coutermeasure Construction for Landslides on Sindhuli Road (Section II) Date : September 2011

Location : Andheri Khola Tested By : KB

Sieve size, mm		300	150	75	63	50	37.5	25	20	10	6.3	4.75	2.00	0.425	0.15	0.075
River bed materials																
	A 1	100	86.0	77.0	73.5	69.9	62.6	53.6	47.7	34.2	26.0	24.6	17.9	6.3	1.3	0.3
	A 2	100	98.0	84.0	76.7	65.4	58.3	50.0	46.2	36.8	32.5	31.7	27.3	8.0	1.1	0.2
	A 3	100	96.0	80.0	76.7	71.9	64.8	53.7	49.3	36.7	30.5	29.3	25.6	9.3	3.2	1.2



ASTM	Grain Size Distribution (%)									Remarks
	Boulder		Gravel	Sand				Silt & Clay	Total	
	(> 300 mm)	(150-300 mm)	(75 - 150) mm	(75 -4.75) mm	(4.74 - 0.075) mm			(< 0.075 mm)		
					Coarse	Medium	Fine	Total		
	0	14	9	52	7	12	6	24	100	
	0	2	14	52	4	19	8	31	100	
	0	4	16	51	4	16	8	28	100	

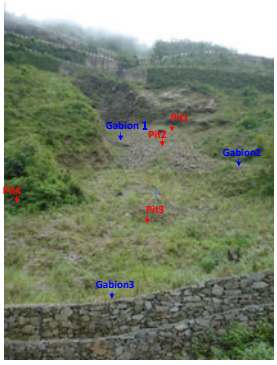
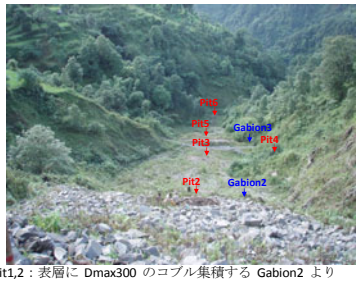


Photo 1: Location



Pit1,2：表層に Dmax300 のコブル集積する Gabion2 より上位にを配置。
Pite3,4：Gabion2～3 の 3 側に配置。
Pi5,6：押え盛土法尻に該当する Gabion3 より下位に配置

Photo 2: Location

最大粒径 Dmax200mm で他に比べて締りがよい。

Photo 3: Test Pit 1

Dmax300mm で空隙が多くゆるい。

Photo 4: Test Pit 2

Dmax30～50mm の礫が表層 0～0.6m に集積
下位は礫が少ない。全体的にはゆるい。

Photo 5: Test Pit 3

Dmax300mm のコブルが多く、他に比べ空隙が多く、ゆるい。

Photo 6: Test Pit 4

Dmax200mm のコブルが表層 0～0.1m に分布。
その下位は、Dmax150mm の礫混り土。

Photo 7: Test Pit 5

0～0.3m に Dmax300 のコブルが分布。その下位 1.3m まで概ね Dmax150mm の礫混り土。
1.3m より湧水を伴う砂礫。

Photo 8: Test Pit 6

IN-SITU INDEX DENSITY TESTS

Photo 9: Compaction Layers by Monkey Jumper

IN-SITU FILED DENSITY TESTS

hot o 10: In-situ De nsit y by San d Con e Me thod

Photo 11: IN-SITU DENSITY TESTS BY WATER REPLACEMENT METHOD

TEST PIT ON RIVER BED (Ghong Khola)

In-situ Density at G 3

TEST PIT ON RIVER BED (Andheri Khola)

TEST PIT ON RIVER BED (Kamala River)

IN-SITU DENSITY TESTS BY WATER REPLACEMENT METHOD

In-situ Density at Ghong Khola (G 3)

In-situ Density tests at Andheri Khola

In-situ Density tests at Kamala River

ROCK SAMPLE

FIELD SIEVE

6.8
観測データレビュー結果

1. レビュー結果（観測データ）

斜面対策準備調査（その１）で設置した観測計器について、観測機材を DOR に移管し、2010 年 10 月以降、DOR 側において自主的にモニタリングを継続している。
今回、DOR より観測データの提供を受け、2011 年 8 月までの観測結果について、レビューを行った。
なお、観測項目については、斜面対策準備調査(その 1)のデータとの整合（継続性）が良好と認められる地盤傾斜計を中心に行った。孔内傾斜計については、データの提供を受けたが、データの整合（継続性）が悪く、レビュー対象から除外した。

1.1 地盤傾斜計

地盤の安定度評価を主目的として、各崩壊地周辺に、地盤傾斜計が設置されている。STA.17+400 については、DOR 側が斜面対策工事を担当しており、参考データとして確認した。地盤傾斜計の設置･観測数量は、以下のとおりである。

表 1.1　地盤傾斜計設置数量一覧表

地　点	番号	数量	観　測　頻　度
STA.17+400(参考)	AK-1～AK-3	3 基	週 1～2回(2010 年 7 月～9月) 月1回(2010 年 10 月～2011 年 8 月)
STA.18+200	AK-4～AK-5	2 基	週 1～2回(2010 年 7 月～9月) 月1回(2010 年 10 月～2011 年 8 月)
STA17+600	BK-1～BK-8	8基	週2回(2010 年8月～9月) 月1回(2010 年 10 月～2011 年 8 月)
合　計		13 基	

地盤傾斜計の判定基準については、以下の基準に準拠する。

表 1.2　傾斜変動の程度（道路土工　法面工・斜面安定工指針；日本道路協会）

変動ランク	日平均変動量(秒)	累積変動量(秒/月)	傾斜量の累積傾向の有無	傾斜運動方向と地形との相関性	活動性等
変動 A	5 秒以上	100 秒以上	顕著	あり	活発に運動中
変動 B	1～5 秒	30～100 秒	やや顕著	あり	緩慢に運動中
変動 C	1 秒以下	30 秒以下	ややあり	あり	継続観測が必要
変動 D	3 秒以上	なし(断続変動)	なし (断続変動)	なし	局部的な地盤変動、その他

※　日変動量と累積変動量をあわせて変動ランクを考慮する

地盤傾斜計の変動状況は、以下のとおりである。

表 1.3　地盤傾斜計観測結果(2010 年 7 月～2011 年 8 月)

位置	計器番号	日平均変動量(秒)	累積変動量(秒/月)	傾斜量の累積傾向の有無	傾斜運動方向	判定
STA.17+400	AK-1	0.1	2.8	なし	N83W	変動なし
	AK-2	0.2	7.3	なし	N26W	変動なし
	AK-3	0.8	23.0	ややあり (斜面方向やや上方)	N57E	変動 C
STA.18+200	AK-4	1.9	57.0	雨期に顕著 (斜面方向に斜交)	N17E	変動 B

	AK-5	2.0	59.7	雨期に顕著 (斜面上方)	S86W	変動 B
STA17+600	BK-1	0.6	18.6	ややあり (斜面方向に直行)	N11W	変動 C
	BK-2	0.2	5.4	なし	N65W	変動なし
	BK-3	0	1.3	なし	N65W	変動なし
	BK-4 (擁壁上)	0.5	14.4	なし (回帰性あり)	N1W	変動 C (回帰変動)
	BK-5 (擁壁上)	0.7	21.6	ややあり (斜面方向に斜交)	S1W	変動 C
	BK-6 (擁壁上)	0.4	11.1	なし (回帰性あり)	N25W	変動 C (回帰変動)
	BK-7 (擁壁上)	1.1	34.1	ややあり (斜面下方、回帰性あり)	N62E	変動 B (回帰変動)
	BK-8	0.3	7.6	なし	N60W	変動なし

出典：調査団データ＋DoR データ

STA. 17+400 地点では、AK-1～AK-２には、観測期間中全く変動は認められない。AK-3 では、斜面やや上方への若干の累積性の認められる微小な変動(変動 C)が観測され、STA. 18+200 のモルタル剥離崩壊の進行による緩みの影響を受けている可能性もある。

STA. 18+200 地点では、AK-4 および AK-5 では、雨期を中心に顕著な累積性の認められる変動が観測され、両傾斜計とも変動 B と判定された。当該斜面については、シンズリ道路(第二工区)斜面対策準備調査（その１）における雨季状況調査結果(2010 年 8 月)からも、吹き付けモルタルの剥離崩壊など、降雨に伴い斜面の不安定化が進行しており、地盤傾斜計の観測結果からも裏付けられる。

STA17+600 地点では、崩壊地周辺に設置された傾斜計のうち、終点側隣接斜面の BK-１について、雨季に斜面方向に直交やや累積性のある変動が認められ、変動 C と判定する。その上方の BK-2 および BK-3 については、設置直後のなじみの期間を除けば、変動なしと判定する起点側地滑り地形上方の BK-8 については、変動は認められない。

崩壊地上方斜面(道路山側擁壁天端に設置)に位置する傾斜計のうち、BK-4 および BK-7 については、回帰性の変動が観測され、それぞれ変動 C および変動 B(累積性を伴う)と判定された。BK-7 については、道路下部の崩壊の影響が、徐々に擁壁にまで及んでいる可能性も考えられる。

一方、さらに上方斜面に設置した BK-5 および BK-6 については、回帰性の認められる変動が観測され、変動 C と判定する。これについては、安定した斜面と判断する。

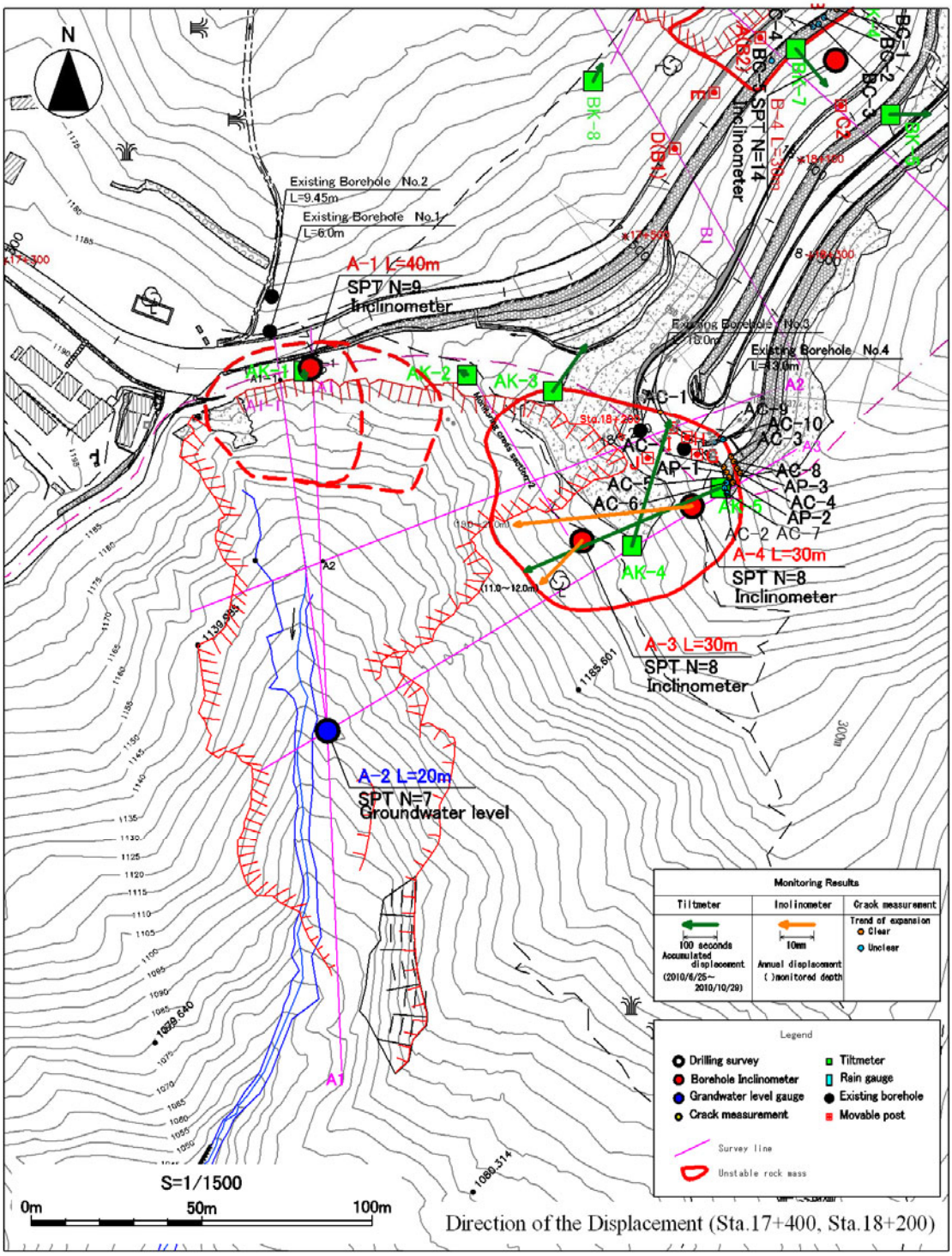


図 1.1 傾斜変動方向を記入した平面図　(出典：調査団)

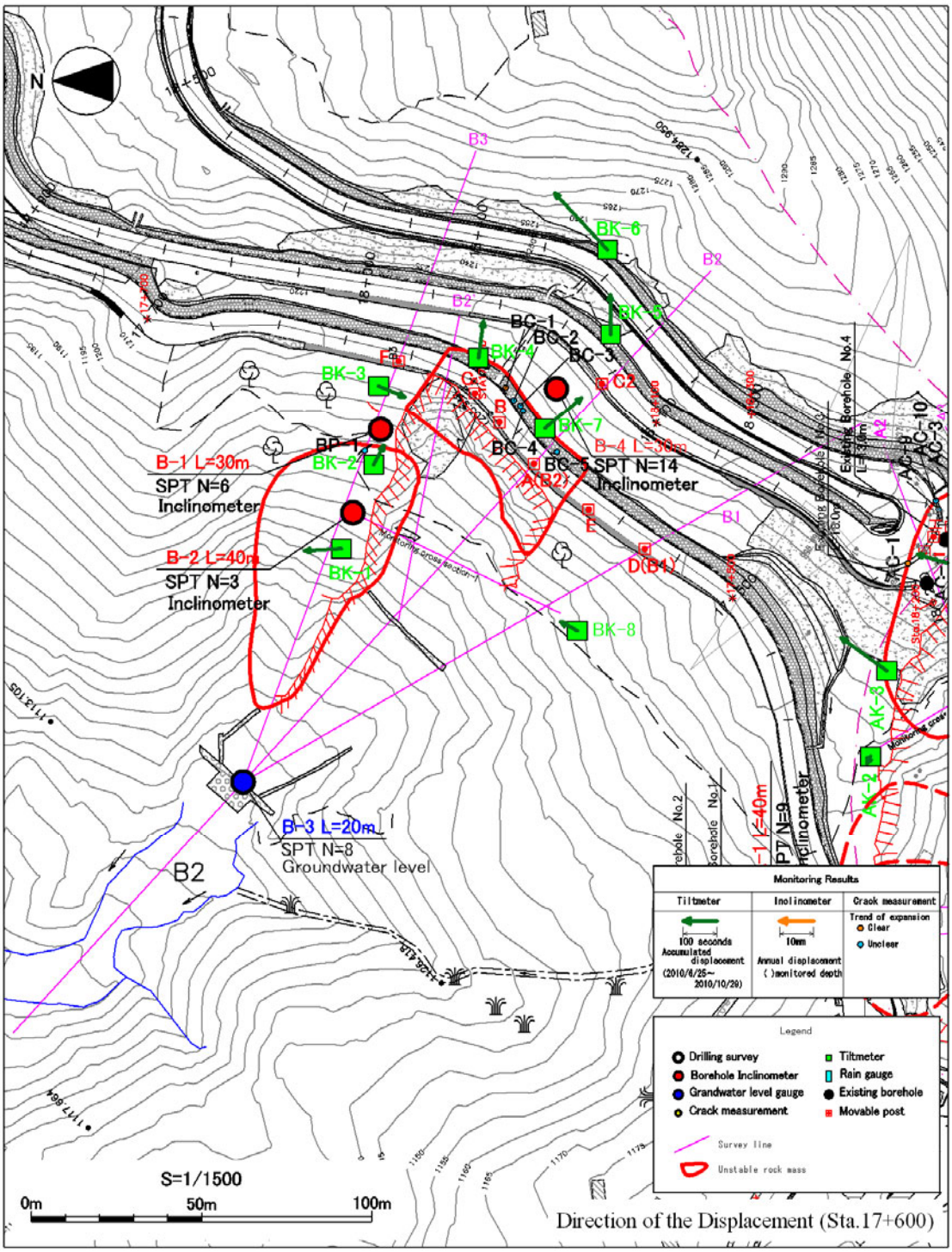


図 1.2 斜変動方向を記入した平面図 (出典：調査団)

1.2 亀裂計測

STA. 17+600 の崩壊地上部の道路擁壁と、STA. 18+200 の崩壊地上部の道路ヘアピン部の、過酷片状の発生した２箇所の擁壁について、亀裂の計測を行い、亀裂変位の進行状況の確認を行っている。2010 年 10 月以降 DOR に観測を移管しているが、それ以前のデータとの間に一部データの不整合が認められたため、今回調査団が再計測を行い、前回調査との差異を確認した。

亀裂計測数量は、以下のとおりである。

表 1.4　亀裂計測数量一覧表(手動観測)

地　点	位置	計測亀裂箇所数	計測期間	備考
STA.18+200	崩壊地上部の道路山側擁壁	14 箇所 AP-1～3、AC-1～11	2010 年 6 月 ～2011 年9月	AP-1～3、AC-5～8は、亀裂間隔と測定ピン間隔の 2 箇所計測
STA17+600	崩壊地上部の道路山側擁壁	6 箇所 BC-1～５、BP-1	2010 年 6 月 ～2011 年9月	BP-1(岩盤表面の亀裂を計測)は、内側亀裂と外側亀裂の 2 箇所測定
合　計	2 地点	20 箇所		

これまでの、亀裂計測の概略の変動状況は、以下のとおりである。

表 1.5　亀裂計測結果一覧表(累積)

地　点	計測点	C:亀裂間隔 P:ピン間隔	累積変位(mm)	変動状況
STA.18+200	AP-1	C	12.0	増大傾向顕著
		P	20.0	
	AP-2	C	41.0	増大傾向顕著
		P	48.0	
	AP-3	C	1.0	
		P	-1.0	
	AC-1	C	14.5	増大傾向顕著
	AC-2	C	(2.3)	
	AC-3	C	0.7	
	AC-4	C	(15.8)	(増大傾向顕著)
	AC-5	C	30.0	増大傾向顕著
		P	33.0	
	AC-6	C	0	
		P	1	
	AC-7	C	0.5	
		P	8.0	
	AC-8	C	4.0	
		P	-2.0	
	AC-9	C	3.1	
	AC-10	C	-0.1	
	AC-11	C	4.0	
STA.17+600	BC-1	C	1.2	
		P	-5.0	
	BC-2	C	-0.2	

		P	0.1	
	BC-3	C	0	
		P	0.7	
	BC-4	C	-0.2	
		P	0.1	
	BC-5	C	0	
		P	4.0	
	BP-1	P(外側)	0	
		P(外側)	6	

出典：調査団観測データを基に作成

STA.18+200 では、擁壁右端部の開口亀裂周辺の観測点の増大傾向が顕著で、AP-1,AP2,AC-1,AC-4,AC-5 の変位量は、2010 年 6 月～2011 年 9 月の累積で、最大 48mm である。

STA.17+600 では、若干の変位は認められるものの、観測全期間を通じて顕著な累積変位は認められない。

1.3 雨量計

雨量計の設置･観測数量は以下のとおりでありである。

表 1.6　雨量計設置観測数量一覧表

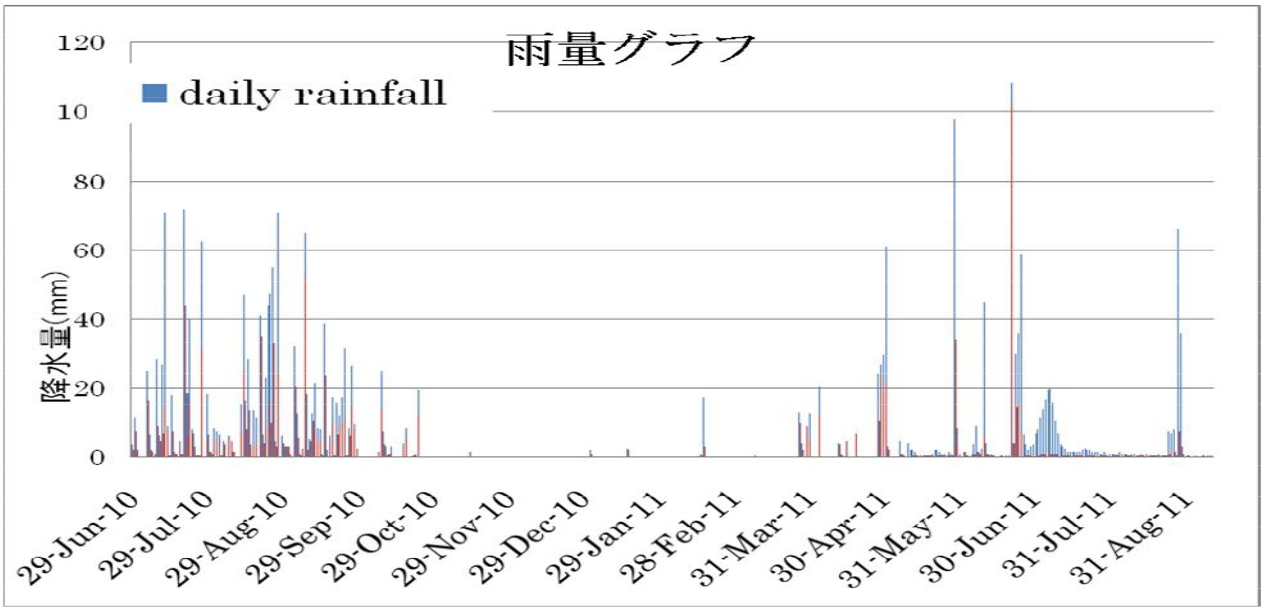
設置位置	設置機材	観測期間	備考
STA.17+200 付近 (人家屋根に設置)	転倒枡型雨量計 データロガー	2010 年 6 月 29 日～2011 年 9 月 12 日	同箇所に設置されていた旧間組計器と交換･設置(旧計器は同社に返却)

雨量記録によれば、2011 年雨季(6 月～9 月)の最大日雨量、最大連続雨量、最大時間雨量は、以下のとおりである。

表 1.7　2011 年雨季の降雨状況

項目	月日	雨量(mm)	備考
最大日雨量	6 月 21 日	108.5mm	
最大連続雨量	6 月 21 日～7 月 26 日	417mm	24 時間無降雨(時間 1mm 以下)でリセットとした場合
最大時間雨量	6 月 21 日	102mm	
日雨量 20mm 超の月日	6 月 21 日 6 月 25 日 7 月 7 日 8 月 28 日 8 月 29 日	108.5mm 58.5mm 20mm 66mm 36mm	

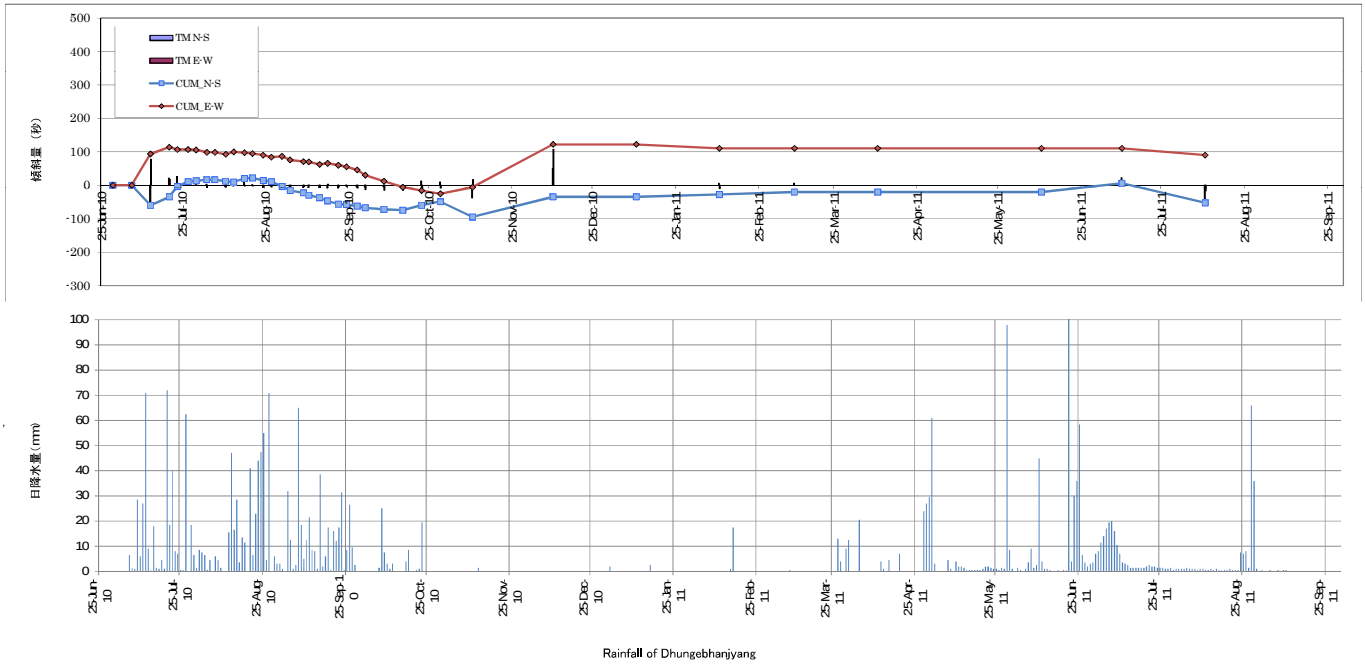
(DoR データ)



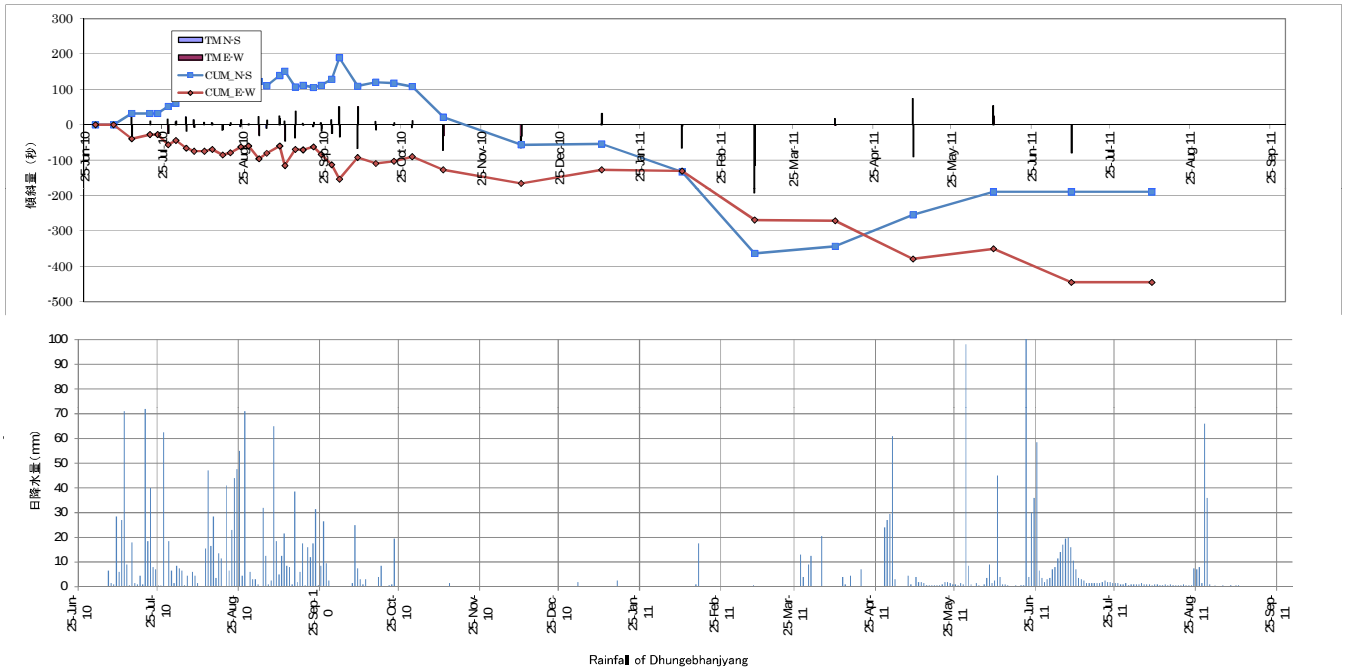
出典 DoR データを基に調査団で作成

図 1.3　雨量グラフ

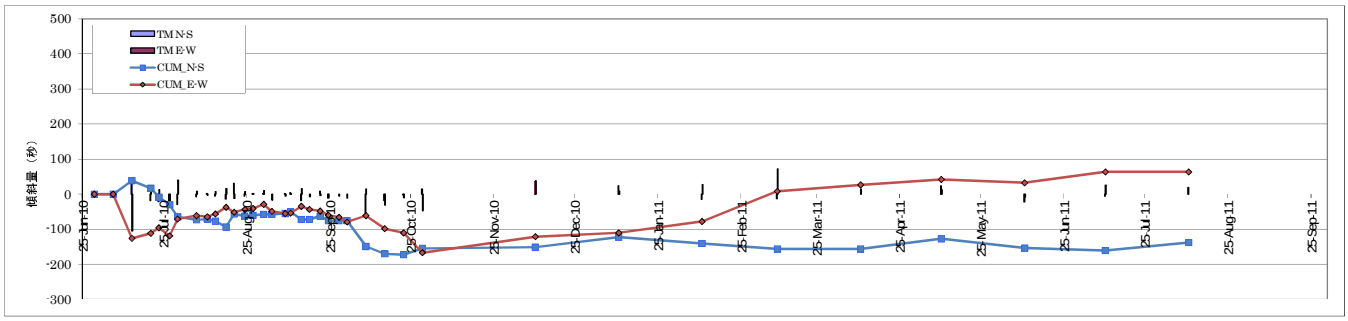
Tilt Meter BK8

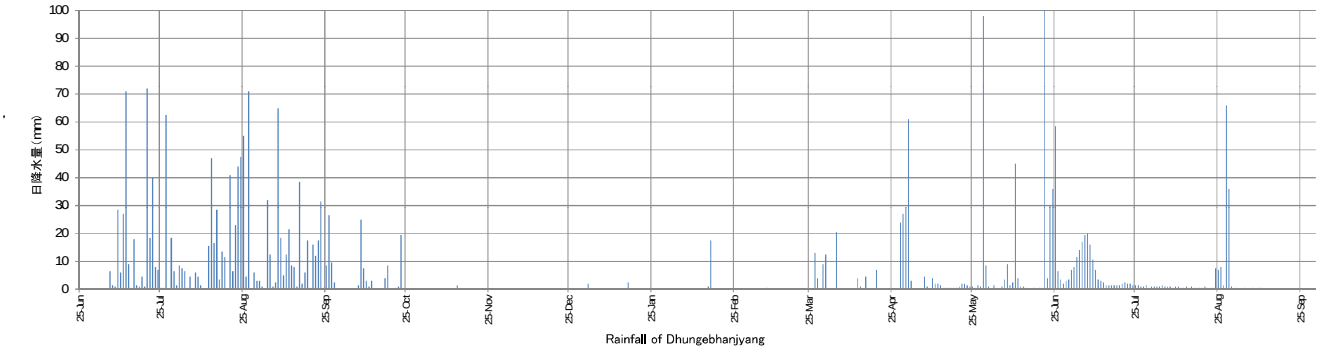


Tilt Meter BK7

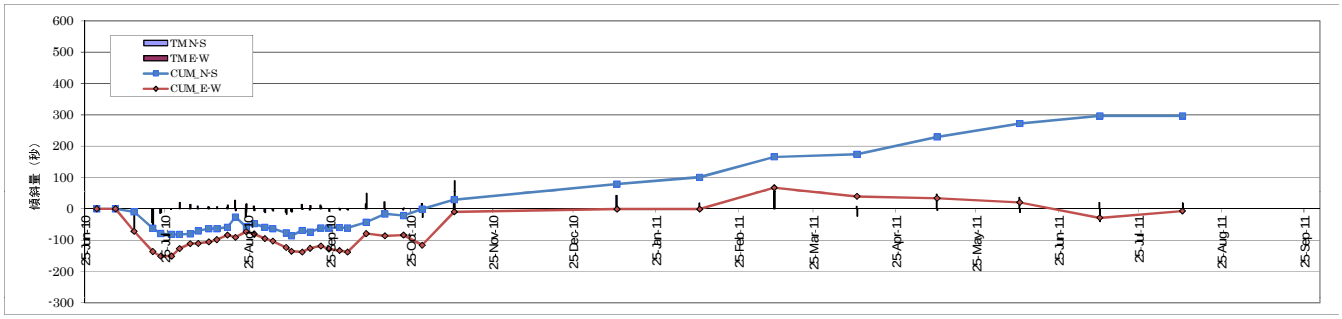


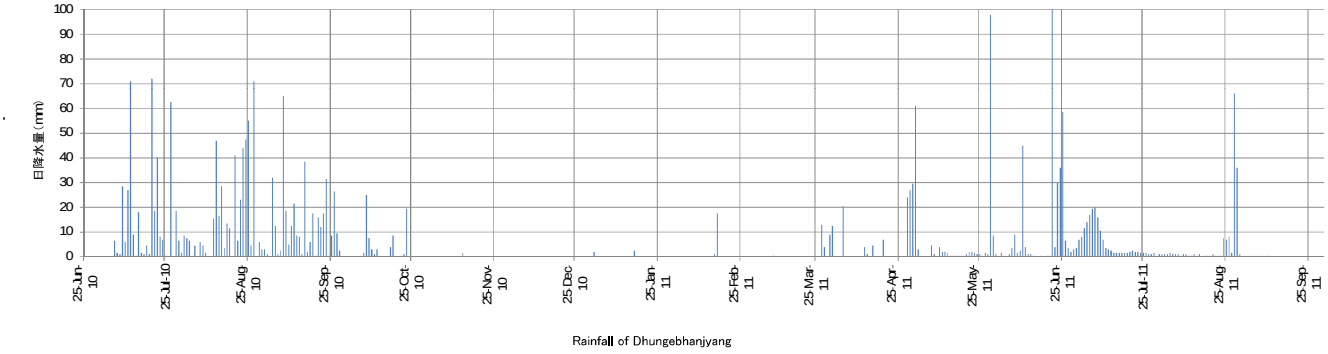
Tilt Meter BK6



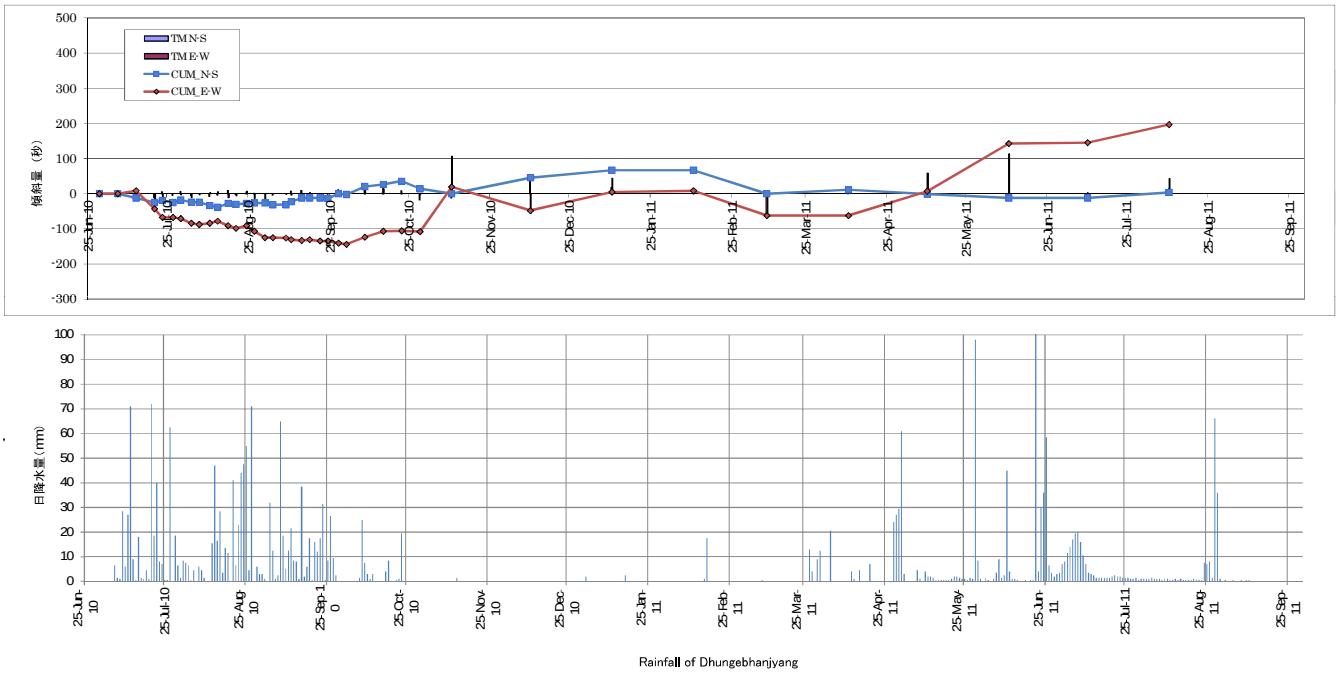


Tilt Meter BK5



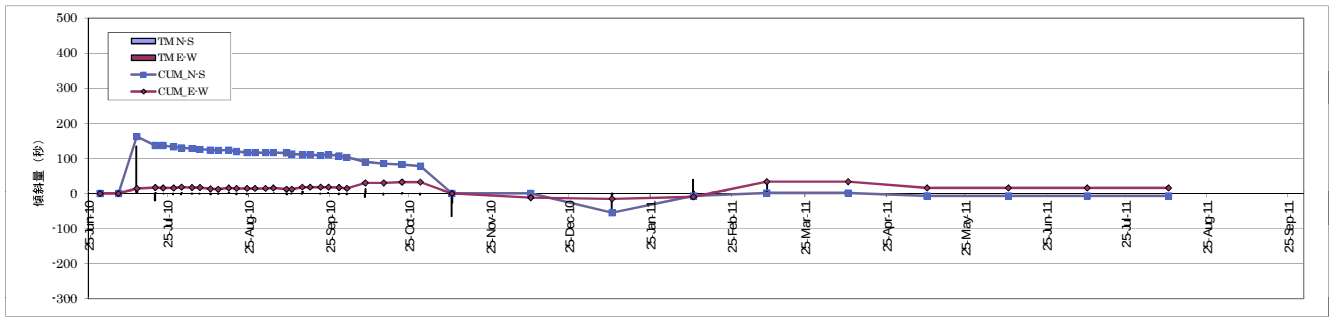


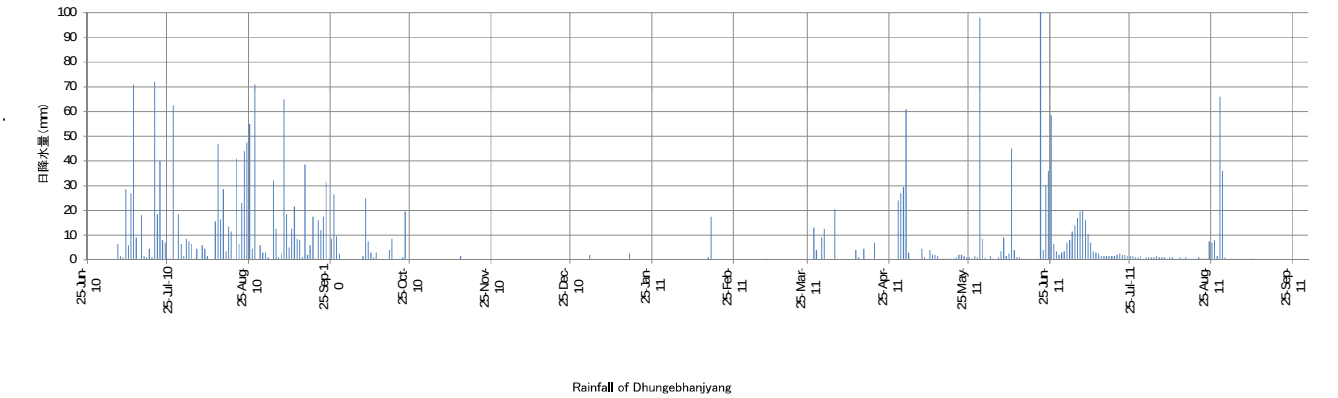
Tilt Meter BK4



Rainfall of Dhungebhanjyang

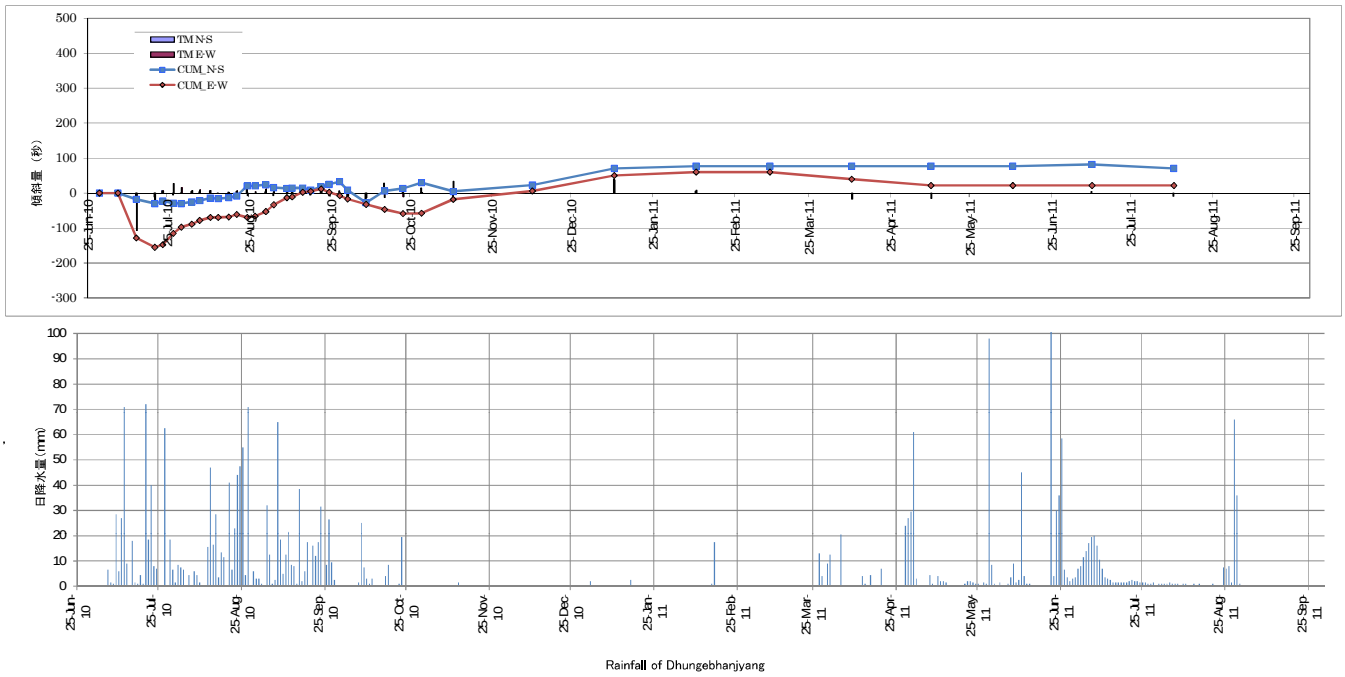
Tilt Meter BK3





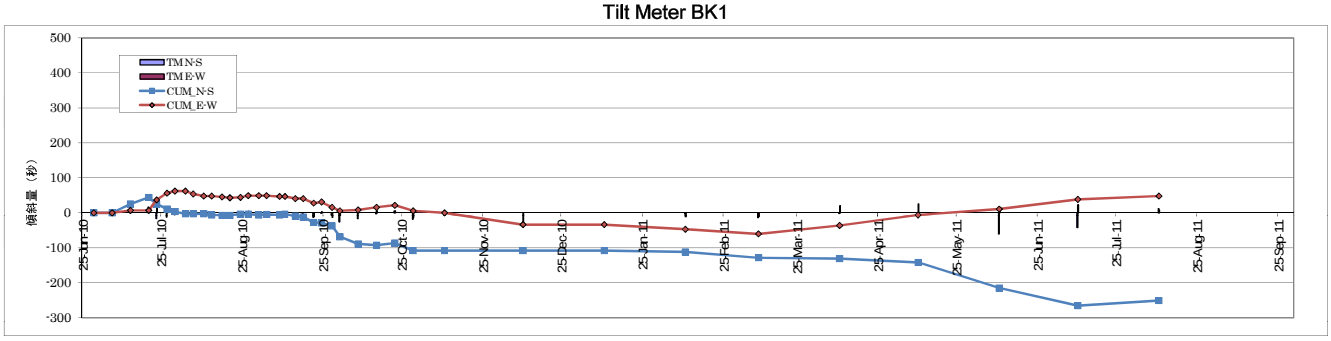
Rainfall of Dhungebhanjyang

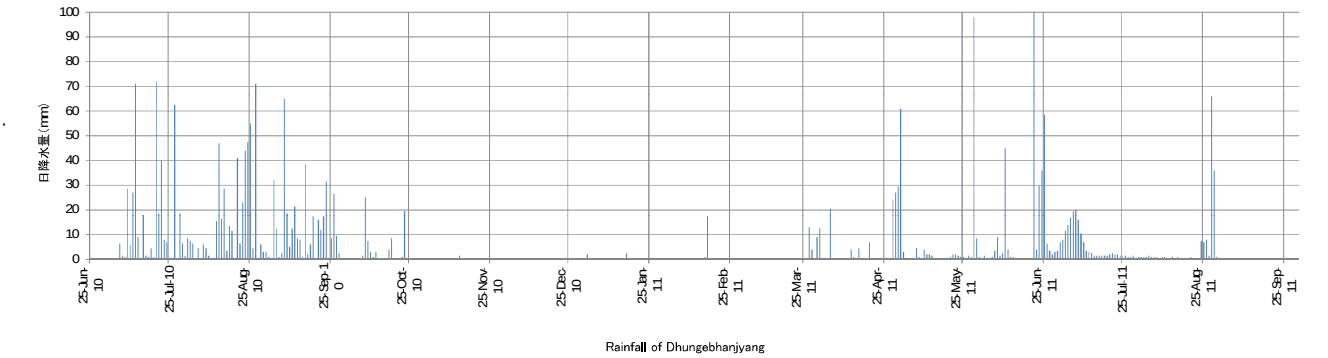
Tilt Meter BK2



Rainfall of Dhungebhanjyang

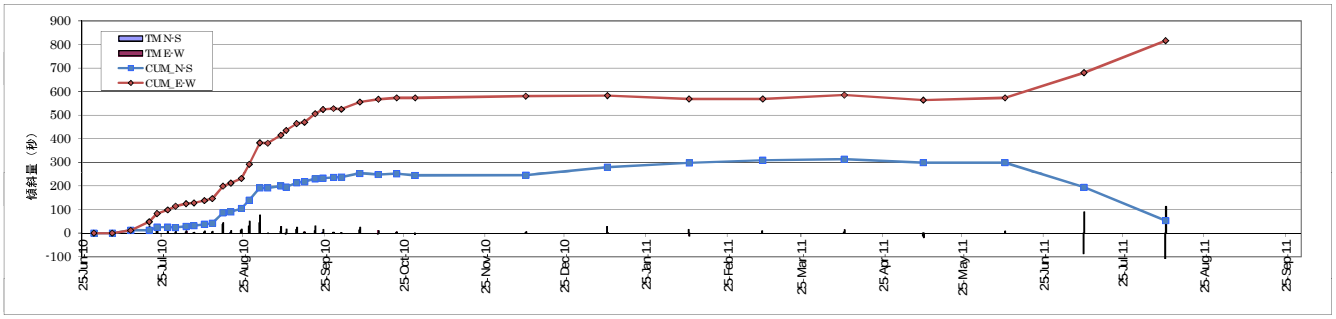
Tilt Meter BK1

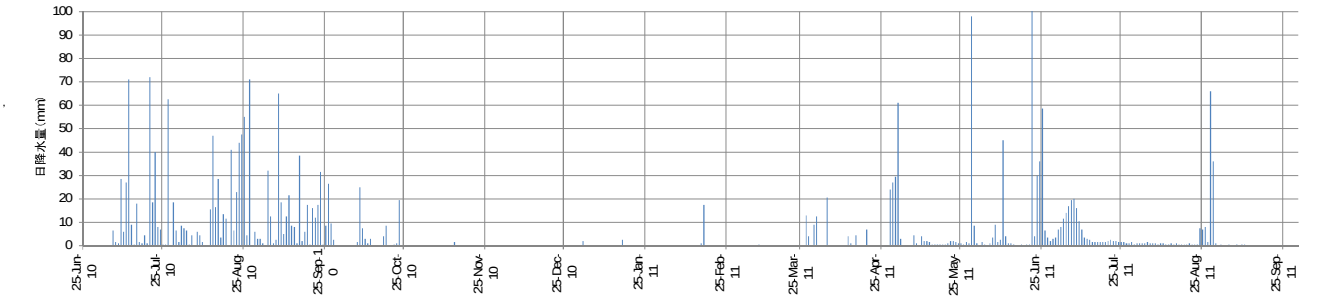




Rainfall of Dhungebhanjyang

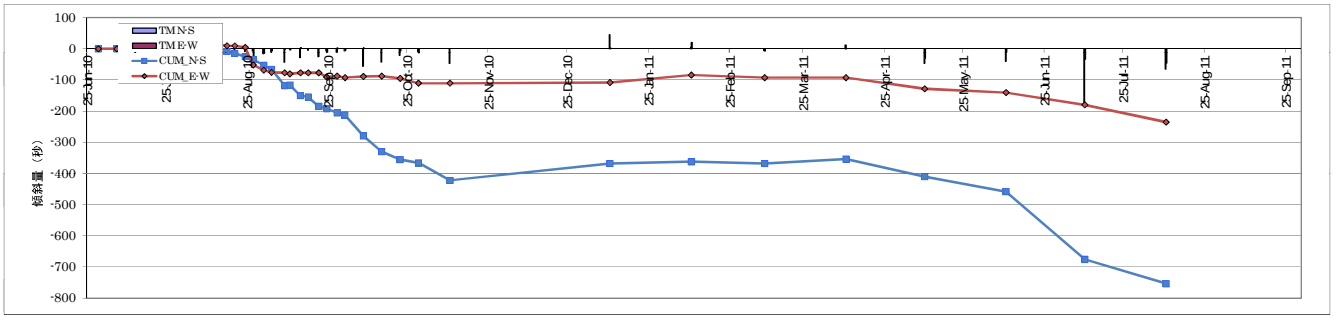
Tilt Meter AK5

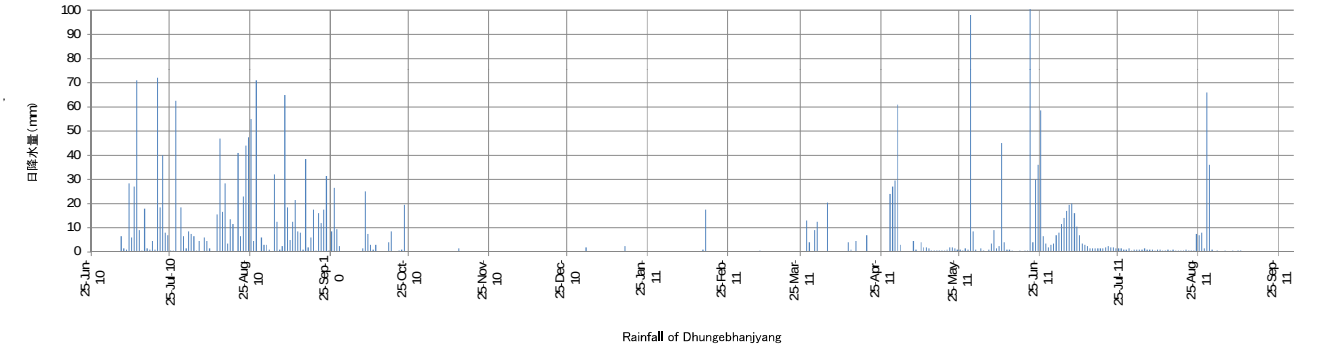




Rainfall of Dhungebhanjyang

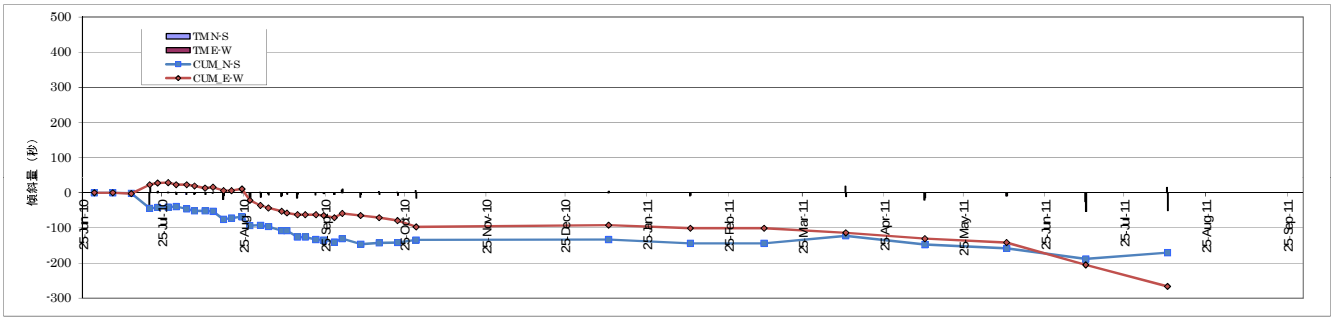
Tilt Meter AK4

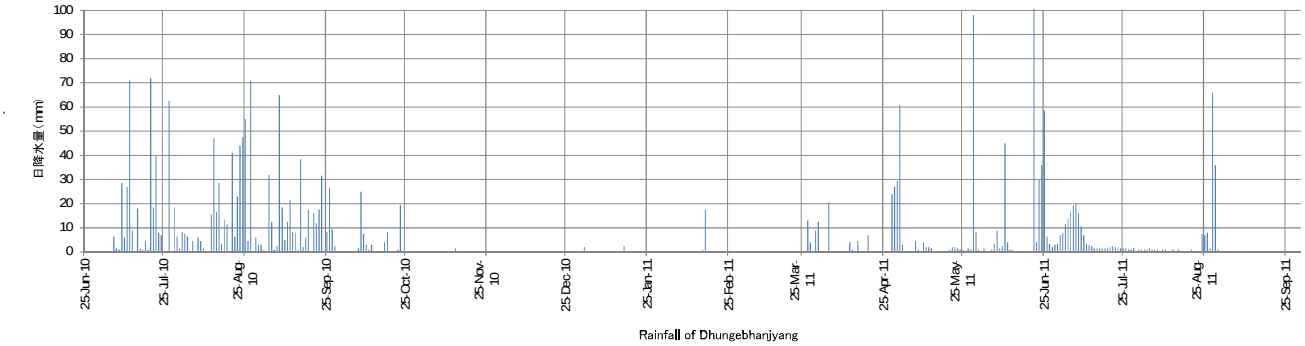




Rainfall of Dhungebhanjyang

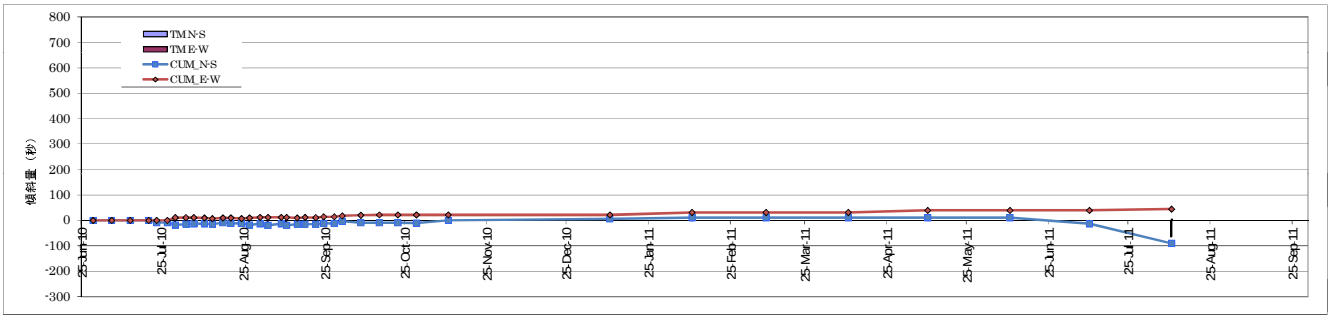
Tilt Meter AK3

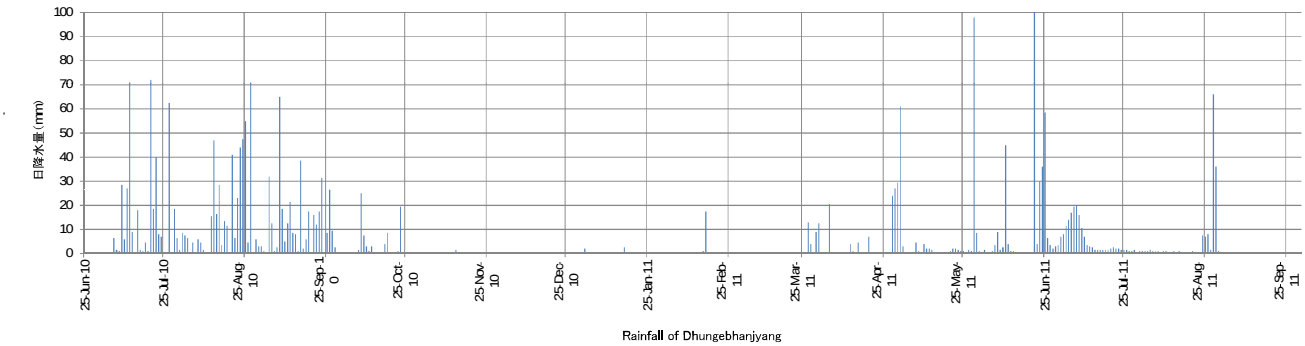




Rainfall of Dhungebhanjyang

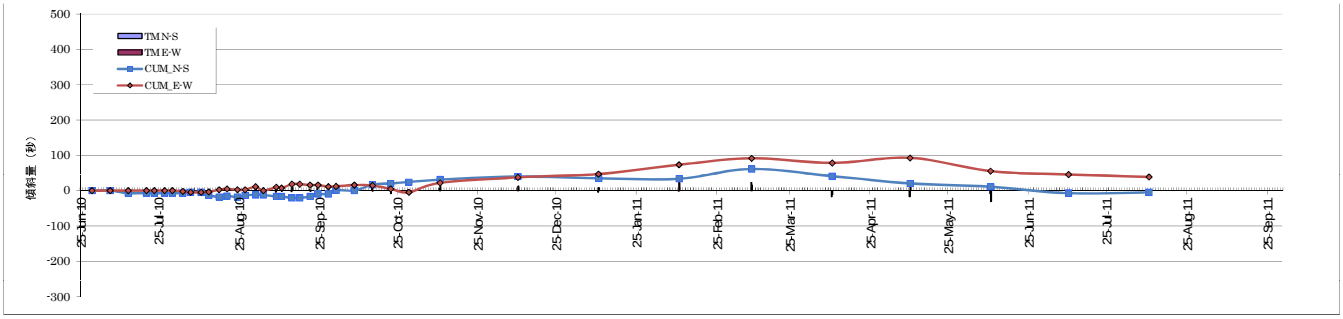
Tilt Meter AK2

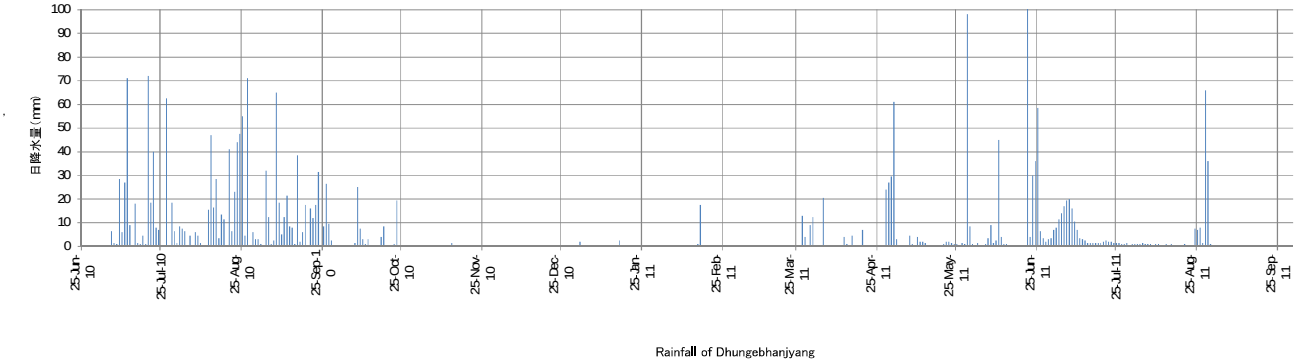




Rainfall of Dhungebhanjyang

Tilt Meter AK1





Rainfall of Dhungebhanjyang