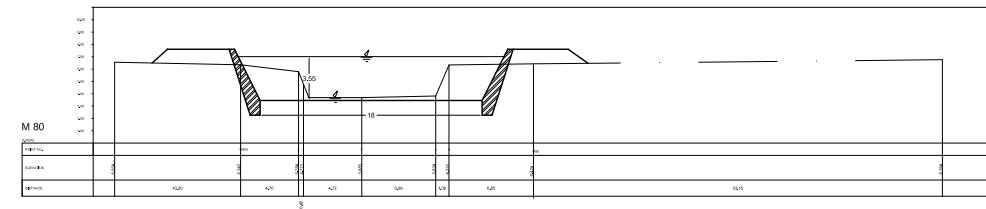
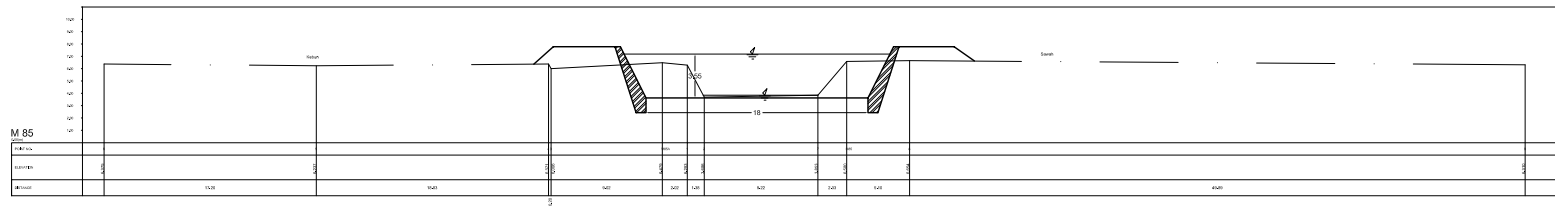
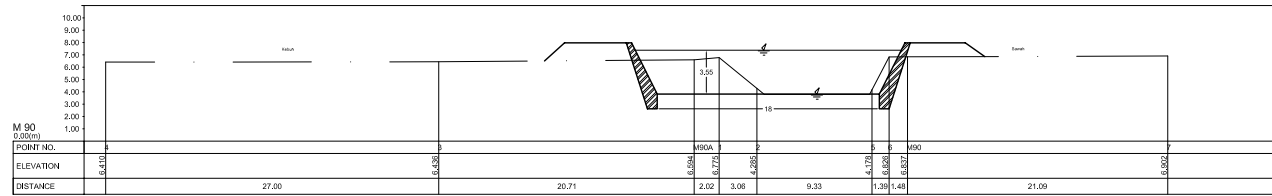
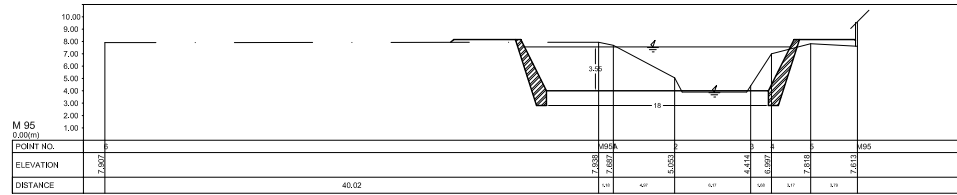
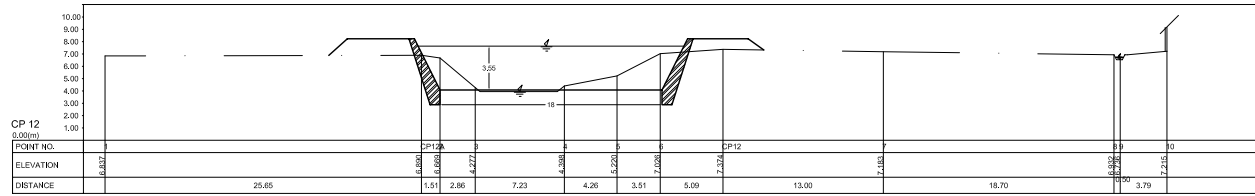
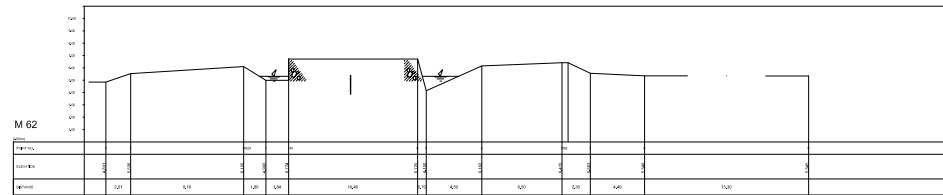
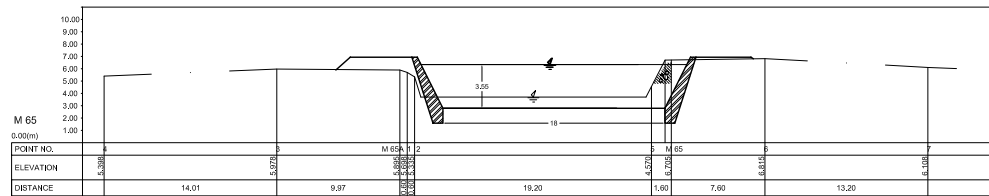
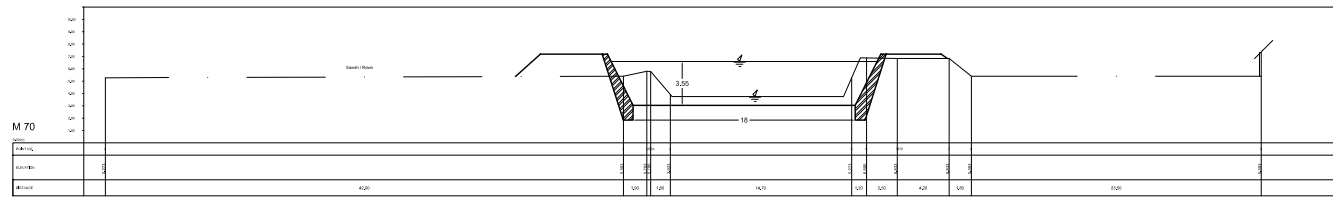
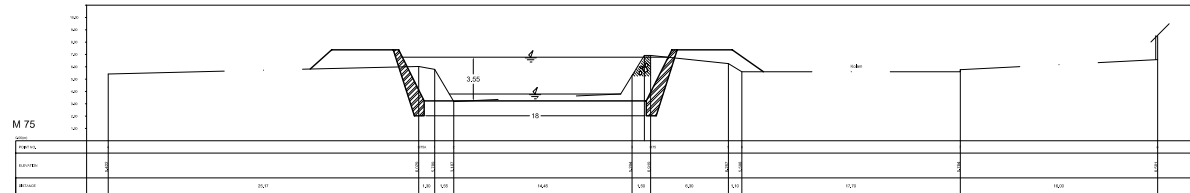
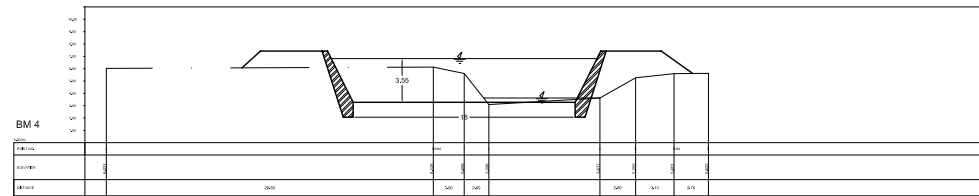


SCALE 1:400



SCALE 1:400



SCALE 1:400

## **B. GEOLOGY**

- B1 Drilling Logs DA-6~DA-10**
- B2 Photographs of Bore Cores DA-6~DA-10 and Drilling Works**
- B3 Daily Core Drilling and Field Test Data**
- B4 Permeability Tests DA-6~DA-10**
- B5 Friction Test for Water Pressure Test Analysis**
- B6 Laboratory Tests for Concrete Aggregates**
- B7 Laboratory Tests of Rock Core Samples**
- B8 Ground Water Level**
- B9 Topographic Survey**

## **B1 Drilling Logs DA-6~DA-10**

**DA - 6**

PROJECT		Detail Design Ayung Multipurpose Dam			DEPTH		100,00 M		ELEVATION		399,834																
LOCATION		Dam Site (Left Bank)			INCLINATION		VERTICAL		DRILLING MACHINE		Koken OP-1																
AVERAGE CORE RECOVER		88,60 %		DATE		FROM		December 14 - 2005 s/d January 25 - 2006		DRILLING MASTER		Triawan & Sjadj															
GEOLOGIST		Sgr		COORDINATE		X		Y																			
DATE	DEPTH (m)	ELEVATION (m)	ROCK TYPE OR FORMATION	ROCK CLASS	COLUMN SECTION	DESCRIPTION	BIT TYPE AND DIAMETER (mm)	GROUND WATER LEVEL (m)	CORE RECOVERY (%)				R Q D (%)	S P T N (Blows) per 30 cm	STANDARD PENETRATION TEST FIELD PERMEABILITY TEST PERMEABILITY COEF, K in Cm/Sec Nilai Lugeon, Lu					DEPTH (m)							
									25	50	75	100	25	50	75	100		10	20	30	40	50	60				
Dec 14 - 2005	1	399,08	TOP SOIL			Top Soil			50															1			
	2		Clayey SAND	Soil-like recovery		Brownish Grey-Greyish Brown Silty CLAY with some roots, highly plastic			50															2			
	2,5					Brownish grey - greyish brown clayey SAND minor silt, fine-medium sand, soft			50			40															3
	3					at ( 0.75 - 2 ) m , Greyish brown CLAY minor sand can be found			50			50															4
	4					Probably derived from highly WEATHERED TUFF			50			50															5
	4,5	395,26	LAPILLICEOUS TUFF	Soil-like recovery		Dark grey - grey brown Lapilliceous TUFF with andesitic and pumiceous fragment dia max 3 cm sandy scattered, highly weathered, firm			20															6			
	5					50						50															7
	6					50						50															8
	7					50						50															9
	8					50						50															10
	9					90						50															11
	10					50						50															12
	11					80						50															13
	12					50						50															14
	13					100						50															15
	14					50						50															16
	15					100						50															17
	16					50						50															18
	17					100						50															19
	18					50						50															20
	19					100						50															21
	20		50						50															22			
	21		100						50															23			
	22		50						50															24			
	23		80						50															25			
	24		50						50															26			
	25		100						50															27			
	26		40						50															28			
	27		80						50															29			
	28		50						50															30			
	29		100						50															30			
	30		50						50															30			

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DRILLLOG-GTS

PROJECT		Detail Design Ayung Multipurpose Dam				DEPTH	100,00 M <th>ELEVATION</th> <td colspan="2">399,8</td>		ELEVATION	399,8																	
LOCATION		Dam Site (Left Bank)		COORDINATE	X: .. Y: ..		INCLINATION	VERTICAL		DRILLING MACHINE	Koken OP-1																
AVERAGE CORE RECOVER		88,60 %		DATE	FROM December 14 - 2005 s/d January 25 - 2005		DRILLING MASTER	Triawan & Sjadj		GEOLOGIST	Sigz																
DATE	DEPTH (m)	ELEVATION (m)	ROCK TYPE OR FORMATION	ROCK CLASS	COLUMN SECTION	DESCRIPTION	BIT TYPE AND DIAMETER (mm)	GROUND WATER LEVEL (m)	CORE RECOVERY (%)				R Q D (%)	S P T N (Blows) per 30 cm	STANDARD PENETRATION TEST FIELD PERMEABILITY TEST PERMEABILITY COEF, K In Cm/Sec Nilai Lugeon, Lu						DEPTH (m)						
									25	50	75	100			25	50	75	100	10	20		30	40	50	60		
	31		ANDESITIC "TUFF LAVA"	CL - D	△	Brownish Dark Grey ANDESITIC "TUFF LAVA", with pumice and andesitic fragment, dia (0.30 - 1.00) cm, angular-subrounded, highly weathered, welded, Orientations of welded materials mostly inclined 45° LCA.	Double Core Barrel with Metal Core Bit dia 68 mm		100				0									31					
	32								100					0												32	
	33								80					10													33
	34								80					60													34
	35								100					60													35
	36	362,43							CM		△			15													36
	37		LAPILLICEOUS TUFF	D	▽	Greyish brown Lapilliceous TUFF with andesitic and pumiceous fragment dia max. 3 cm, sandy, scattered, highly weathered firm	Single Core Barrel with Metal Core Bit dia 68 mm		40				10									37					
	38								100					0													38
	39								100					0													39
	40								100					0													40
	41								100					0													41
	42								100					0													42
	43								50					0													43
	44								100					0													44
	45								50					0													45
	46								50					0													46
	47		50					0													47						
	48	351,83	Soil-like recovery		▽			0													48						
	49		50					0													49						
	50		50					0													50						
	51		50					0													51						
	52		100					0													52						
	53		30					0													53						
	54		50					0													54						
	55	344,83	Soil-like recovery		▽			0													55						
	56		Tuffaceous Silty CLAY	Soil-like recovery	▨	Greyish dark brown Tuffaceous Silty CLAY high plasticity, moist at ( 59,50 - 61,30 ) m depth	Single Core Barrel with Metal Core Bit dia 68 mm		100				0									56					
	57								50					0													57
	58	341,83							90					0													58
	59								40					0													59
	60								50					0													60

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DRILLLOG-GTS



PROJECT			Detail Design Ayung Multipurpose Dam			DEPTH		100,00 M		ELEVATION		399.8																	
LOCATION			Dam Site (Left Bank)			INCLINATION		VERTICAL		DRILLING MACHINE		Koken OP-1																	
AVERAGE CORE RECOVERY			88.60 %			DATE		FROM December 14 - 2005 s/d January 25 - 2006		DRILLING MASTER		Tnawan & Sjadi																	
COORDINATE			X - Y -			GEOLOGIST		Sigif		PERMEABILITY TEST		FIELD PERMEABILITY TEST																	
DATE	DEPTH (m)	ELEVATION (m)	ROCK TYPE OR FORMATION	ROCK CLASS OR SECTION	COLUMN DESCRIPTION	BIT TYPE AND DIAMETER (mm)	GROUND WATER LEVEL (m)	CORE RECOVERY (%)				RQD (%)		SPT N (Blows) per 30 cm	STANDARD PENETRATION TEST FIELD PERMEABILITY TEST PERMEABILITY COEF, K in Cm/Sec Nilai Lugeon, Lu						DEPTH (m)								
								25	50	75	100	25	50		75	100	10	20	30	40		50	60						
	61	338,53	Tuffaceous Silty CLAY	Soil-like recovery	at ( 59,50 - 61,30 ) m depth Brown highly plastic Tuffaceous CLAY			50	0	0	0	0	0	0	N = 39									61					
	62		LAPILLICEOUS TUFF	Soil-like recovery	Dark grey to Black Lapillaceous TUFF, very fine to medium tuff minor pumice and andesitic fragment, sandy ( D )			100	0	0	0	0	0	0											62				
	63							100	0	0	0	0	0	0	0	0	0												63
	64							100	0	0	0	0	0	0	0	0	0												64
	65							100	0	0	0	0	0	0	0	0	0												65
	66							80	0	0	0	0	0	0	0	0	0												66
	67							80	0	0	0	0	0	0	0	0	0												67
	68							80	0	0	0	0	0	0	0	0	0												68
	69							80	0	0	0	0	0	0	0	0	0												69
	70							70	0	0	0	0	0	0	0	0	0												70
	71							70	0	0	0	0	0	0	0	0	0												71
	72							70	0	0	0	0	0	0	0	0	0												72
	73	327,33	TUFFACEOUS CLAY	Soil-like recovery	Dark brown Tuffaceous CLAY, highly plastic, moist, soft At ( 73,00 - 74,30 ) m , Light grey SILT, non plastic, soft can be found			70	0	0	0	0	0												73				
	74	325,83						80	0	0	0	0	0	0	0	0												74	
	75							90	20	0	0	0	0	0	0	0													75
	76		100	25	0	0	0	0	0	0	0													76					
	77		80	0	0	0	0	0	0	0	0													77					
	78	321,83	100	100	0	0	0	0	0	0	0													78					
	79		TUFF BRECCIA WITH Tuffaceous CLAY intercalations	Soil-like recovery	Dark-brownish grey TUFF BRECCIA matrix consist of fine to coarse tuff with pumice - scoriaceous andesitic - basaltic fragment, angular - subrounded, diameter varies ( 0.5 - 5 ) cm, scattered highly weathered, weakly cemented ( CL - D )			100	30	0	0	0	0											79					
	80							70	0	0	0	0	0	0	0	0												80	
	81		80	0	0	0	0	0	0	0	0													81					
	82		80	0	0	0	0	0	0	0	0													82					
	83		80	0	0	0	0	0	0	0	0													83					
	84		70	0	0	0	0	0	0	0	0													84					
	85	295,50	70	0	0	0	0	0	0	0	0													85					
	86		100	0	0	0	0	0	0	0	0													86					
	87		100	0	0	0	0	0	0	0	0													87					
	88		90	0	0	0	0	0	0	0	0													88					
	89		80	0	0	0	0	0	0	0	0													89					
	90		100	0	0	0	0	0	0	0	0													90					

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DRILLLOG-GTS

DRILLING LOG

HOLE NO - DA-6

SHEET : 4 of 4

PROJECT		Detail Design Ayung Multipurpose Dam			DEPTH		100,00 M		ELEVATION		399,8																	
LOCATION		Dam Site (Left Bank)			INCLINATION		VERTICAL		DRILLING MACHINE		Koken OP-1																	
AVERAGE CORE RECOVER		88,60 %			DATE		FROM December 14 - 2005 s/d January 25 - 2006		DRILLING MASTER		Triawan & Sjadj																	
DATE	DEPTH (m)	ELEVATION (m)	ROCK TYPE OR FORMATION	ROCK CLASS	COLUMN SECTION	DESCRIPTION	BIT TYPE AND DIAMETER (mm)	GROUND WATER LEVEL (m)	CORE RECOVERY (%)				R Q D (%)		S P T N (Blows) per 30 cm	STANDARD PENETRATION TEST FIELD PERMEABILITY TEST						TEST NO	DEPTH (m)					
									25	50	75	100	25	50		75	100	10	20	30	40			50	60			
	91	289,00	TUFF BRECCIA WITH Tuffaceous CLAY intercalations	CL-D	Δ Δ Δ	Dark-brownish grey TUFF BRECCIA matrix consist of fine to coarse tuff with pumice - scorous, andesitic - basaltic fragment, angular - subrounded, diameter vases ( 0.5 - 5 ) cm, scattered, highly weathered weakly cemented ( CL - D )	Double core barrel with metal core bit dia 66 mm	up to 45,00 m depth	70	70	70	70	10	10										91				
	92				Δ Δ Δ								80	80	80	80	10	10										92
	93				Δ Δ Δ								70	70	70	70	0	0										93
	94				Δ Δ Δ								70	70	70	70	0	0										94
	95	285,00			Δ Δ Δ								80	80	80	80	0	0										95
	96				Δ Δ Δ								80	80	80	80	0	0										96
	97				Δ Δ Δ								60	60	60	60	0	0										97
	98				Δ Δ Δ								60	60	60	60	0	0										98
	99				Δ Δ Δ								60	60	60	60	0	0										99
	100	299,83			Δ Δ Δ						End of Hole at 100,00 m depth		60	60	60	60	0	0										100
	101																						101					
	102																						102					
	103																						103					
	104																						104					
	105																						105					
	106																						106					
	107																						107					
	108																						108					
	109																						109					
	110																						110					
	111																						111					
	112																						112					
	113																						113					
	114																						114					
	115																						115					
	116																						116					
	117																						117					
	118																						118					
	119																						119					
	120																						120					

DRILLLOG-GTS

**DA - 7**

PROJECT				Detail Design Ayung Multipurpose Dam				DEPTH		100.00 M		ELEVATION		281.015														
LOCATION				Dam Site ( River Bed )				INCLINATION		VERTICAL		DRILLING MACHINE		Koken KT - 1														
AVERAGE CORE RECOVER				73,19 %				DRILLING MASTER		Mugyono H S		GEOLOGIST		Sign														
DATE				FROM				January 08 - 2006		to		January 28 - 2006																
DATE	DEPTH (m)	ELEVATION (m)	ROCK TYPE OR FORMATION	ROCK CLASS	COLUMN SECTION	DESCRIPTION	BIT TYPE AND DIAMETER (mm)	GROUND WATER LEVEL (m)	CORE RECOVERY (%)			RQD (%)	SPT N (Blows) per 30 cm	STANDARD PENETRATION TEST FIELD PERMEABILITY TEST PERMEABILITY COEF, K In Cm/Sec Nilal Logeon, Lu						DEPTH (m)								
									25	50	75	100	25	50	75	100	10	20	30	40	50	60						
January 08 - 2006	1		RIVER DEPOSIT		V-V	RIVER DEPOSIT .	Single Core Barrel with Metal Core Bit dia 68 mm		50			0											1					
	2					Brownish Grey - Greyish Brown Gravelly SAND with Silty CLAY intercalations, firm to loose tuffaceous andesitic boulder up to 20 cm can be found - scattered			30			0																2
	2.5								40			20																3
	3								40			0																4
	4								30			15																5
	5								30			0																6
	6								50			0																7
January 08 - 2006	7			50			0																8					
	7.5	273.52		50			0																9					
	8		LITHIC TUFF	CM-CH	V-V	Dark grey to Black LITHIC TUFF fine to medium tuff, minor pumice and andesitic fragment dia ( 0.30 - 1.00 ) cm, angular to subrounded scattered mod weathered firm - hard	Double Core Barrel with Metal Core Bit dia 68 mm		50			30											8					
	9								100			60																9
	10								100			80																10
	11								100			30																11
	12								100			100																12
January 11 - 2006	13								100			90																13
	14								100			100																14
	15								100			50																15
	16								100			80																16
	17								100			100																17
	18								100			95																18
	19								100			80																19
	20			100			100																20					
January 12 - 2006	21			100			90																21					
	22			100			90																22					
	23	258.22		100			0																23					
	24			100			30																24					
	25			100			95																25					
	26			100			90																26					
	27			100			80																27					
January 13 2006	28	253.32		100			50																28					
	29			100			90																29					
	30			100			90																30					

continued to page 2

DRILLLOG-075

PROJECT				DEPTH				ELEVATION																
Detail Design Ayung Multipurpose Dam				100.00 M				281.016																
LOCATION				INCLINATION				VERTICAL																
Dam Site ( River Bed )				Y - - - - -				Koken KT - 1																
AVERAGE CORE RECOVER		DATE		FROM		DRILLING MASTER		GEOLOGIST		SIGN														
78,19 %		January 08 - 2006 s/d January 24 - 2006		January 08 - 2006 s/d January 24 - 2006		Magyono H S		Sigit																
DATE	DEPTH (m)	ELEVATION (m)	ROCK TYPE OR FORMATION	ROCK CLASS	COLUMN SECTION	DESCRIPTION	BIT TYPE AND DIAMETER (mm)	GROUND WATER LEVEL (m)	CORE RECOVERY (%)			R Q D (%)	S P T N (Blows) per 30 cm	STANDARD PENETRATION TEST FIELD PERMEABILITY TEST PERMEABILITY COEF, K in Cm/Sec					DEPTH (m)					
									25	50	75			100	25	50	75	100		10	20	30	40	50
Jan 13 - 2006	31	250,32	Lithic TUFF	CH-B	△ △ △	— the same as above —			100			50									31			
	32		ANDESITIC "TUFF LAVA"	CH-B	△ △ △	Light grey - grey ANDESITIC "TUFF LAVA", consist of quartz and volcanic glass with andesitic - basaltic rock, scorioid fragment, dia (0,30 - 100) cm angular - subrounded fresh to slightly weathered mostly welded			100			50									32			
	33					Orientations of welded materials inclined vanes (45° - 60°) LCA.			100			100			90									33
	34					* Irregular joint ( fracture ) rough fresh - limonitic, highly weathered surface can be found through the depth			100			100			75									34
	35								100			100			75									35
	36								100			100			40									36
	37								100			100			50									37
	38								100			100			40									38
	39								100			100			50									39
	40	241,82				Interbedded Lapillaceous TUFF and TUFF BRECCIA with Volcanic SAND and GRAVEL. Intercalation	D	▽ ▽ ▽	Grey to dark grey Interbedded Lapillaceous TUFF and TUFF BRECCIA with Volcanic SAND and GRAVEL. Intercalation, highly weathered, firm-loose			100			30									40
	41								Around 40,30 m.			80			80			0						
	42		Woods as fragment can be found charred						30			30			0									42
	43								50			50			25									43
	44								20			20			0									44
	45								30			30			0									45
	46								40			40			0									46
	47								50			50			0									47
	48								30			30			0									48
	49								40			40			0									49
	50					30			30			0									50			
	51					40			40			0									51			
	52					50			50			0									52			
	53					40			40			0									53			
	54					40			40			0									54			
	55					70			70			60									55			
	56					70			70			0									56			
	57					30			30			20									57			
	58					50			50			0									58			
	59					30			30			0									59			
	60					80			80			0									60			

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DRILLLOG-075

PROJECT				DEPTH				ELEVATION																	
Detail Design Ayung Multipurpose Dam				100.00 M				281.016																	
LOCATION				INCLINATION				DRILLING MACHINE																	
Dam Site (River Bed)				VERTICAL				Koken KT - 1																	
AVERAGE CORE RECOVER				DRILLING MASTER				GEOLOGIST																	
78,19 %				Mugyono H.S				Sigit																	
DATE				DATE				DATE																	
FROM				TO				TO																	
January 08 - 2006 s/d				January 28 - 2006																					
DATE	DEPTH (m)	ELEVATION (m)	ROCK TYPE OR FORMATION	ROCK CLASS	COLUMN SECTION	DESCRIPTION	BIT TYPE AND DIAMETER (mm)	GROUND WATER LEVEL (m)	CORE RECOVERY (%)				RQD (%)				SPT N (Blows) per 30 cm	STANDARD PENETRATION TEST						DEPTH (m)	
									25	50	75	100	25	50	75	100		FIELD PERMEABILITY TEST							
																	PERMEABILITY COEF, K in Cm/Sec								
																	Nilai Lugeon, Lu								
--- the same as the above ---																									
January 25 - 2006	61									30														61	
	62					Grey to dark grey Interbedded Lapilliceous TUFF and TUFF BRECCIA with Volcanic SAND and GRAVEL				30														62	
	63	218,02				Intercalation, highly weathered firm-loose				20														63	
	64									30															64
	65	216,02								70															65
	66									60															66
	67									30															67
	68	213,02								50															68
	69	212,02								30															69
	70	211,02								50			10												70
	71									20															71
	72									70															72
	73									30															73
	74									60			10												74
	75									50															75
	75,5	205,52								45															75
	76									60															76
	77									50															77
	78									50															78
	78,5									30															78
	79									30															79
	80	201,52								30															80
	80		Tuff BX			Greyish brown TUFF BRECCIA, firm																			80
End of Hole at 80,00 m Depth																									
	81																								81
	82																								82
	83																								83
	84																								84
	85																								85
	86																								86
	87																								87
	88																								88
	89																								89
	90																								90

**DA - 8**

PROJECT		Detail Design Ayung Multipurpose Dam				DEPTH	100.00 M	ELEVATION	406.294					
LOCATION		Dam Site (Right Bank)				INCLINATION	VERTICAL	DRILLING MACHINE	TAS					
AVERAGE CORE RECOVERY		85,40 %	COORDINATE	X --- --- Y --- ---	DATE	FROM November 19 - 2005 to February 11 - 2006	DRILLING MASTER	Sunardi	GEOLOGIST	Sigat				
DATE	DEPTH (m)	ELEVATION (m)	ROCK TYPE OR FORMATION	ROCK CLASS OR SECTION	DESCRIPTION	BIT TYPE AND DIAMETER (mm)	GROUND WATER LEVEL (m)	CORE RECOVERY (%)	RQD (%)	SPT N (Blows) per 30 cm	STANDARD PENETRATION TEST FIELD PERMEABILITY TEST PERMEABILITY COEF, K in Cm/Sec Nilai Logeori, Lu	DEPTH (m)		
November 19 - 2005	1		TOP SOIL		Top Soil			40	0			1		
	2		Lapillicaceous TUFF	Soil-like recovery	Brownish Grey-Greyish Brown SandyCLAY with some roots minor gravel, highly plastic, moist, highly weathered pumice and andesitic gravel ( 1.00 - 3.00 ) cm- scattered			50	0	N = 17	* Constant Head Test K = 6.55 x 10 <sup>-2</sup> Lu = 713.75	2		
	3						100	0						3
	4						50	0						4
	5						50	0						5
	6						50	0						6
	7					TUFF BRECCIA		Brownish - dark grey TUFF BRECCIA matrix consist of fine-coarse tuff, with andesitic to basaltic fragment, mostly pumiceous to scoriaceous dia ( 2 - 5 ) cm angular - subrounded, highly weathered			50	0	N = 15	* Constant Head Test K = 2.64 x 10 <sup>-2</sup> Lu = 192.0
	8			50	0									5
	9			50	0									6
	10			50	0									7
	11			50	0									8
	12			50	0									9
	13			50	0									10
	14			50	0									11
	15			50	0									12
	16			50	0									13
	17			50	0									14
	18			50	0									15
	19		Lapillicaceous TUFF	Soil-like recovery	Grey to dark grey Lapillicaceous TUFF with pumice and andesitic fragment, dia ( 0.30 - 1.00 ) cm angular to subrounded, moderately weathered massive, ( CH ) fine - coarse tuff, moderately - highly weathered soft - firm			50	0	N = 16	* Constant Head Test K = 3.06 x 10 <sup>-3</sup> Lu = 22.22	16		
	20						50	0						17
	21						50	0						18
	22						50	0						19
	23						50	0						20
	24						50	0						21
	25						50	0						22
	26						50	0						23
	27						50	0						24
	28						50	0						25
	29		TUFF BRECCIA		Brownish - dark grey TUFF BRECCIA matrix consist of fine-coarse tuff, with andesitic to basaltic fragment			50	0	N > 50	* Constant Head Test K = 1.67 x 10 <sup>-3</sup> Lu = 12.14	16		
	30						50	0						17
	31						50	0						18
	32			50	0						19			
	33			50	0						20			
	34			50	0						21			
	35			50	0						22			
	36			50	0						23			
	37			50	0						24			
	38			50	0						25			
	39			50	0						26			
	40			50	0						27			
	41			50	0						28			
	42			50	0						29			
	43			50	0						30			

Single Core Barrel with Metal Core Bit dia 66 mm  
 ---Up to 68.50 m depth --- . Water loss occurred around 24.00 m depth

Triple Core Barrel with Metal Core Bit dia 66 mm

continued to page 2

DRILLLOG-GTS



PROJECT		Detail Design Ayung Multipurpose Dam				DEPTH		100,00 M		ELEVATION		406,294															
LOCATION		Dam Site (Right Bank)				INCLINATION		VERTICAL		DRILLING MACHINE		TAS															
AVERAGE CORE RECOVER		85,40 %		DATE		FROM		November 19 - 2005 s/d February 11 - 2006		DRILLING MASTER		Sunari															
GEOLOGIST		Sgpt		ROCK TYPE OR FORMATION		ROCK CLASS OR SECTION		DESCRIPTION		BIT TYPE AND DIAMETER (mm)		GROUND WATER LEVEL (m)															
DATE	DEPTH (m)	ELEVATION (m)	ROCK TYPE OR FORMATION	ROCK CLASS OR SECTION	DESCRIPTION	BIT TYPE AND DIAMETER (mm)	GROUND WATER LEVEL (m)	CORE RECOVERY (%)				R Q D (%)				S P T N (Blows) per 30 cm	STANDARD PENETRATION TEST FIELD PERMEABILITY TEST PERMEABILITY COEF, $K$ in $\text{cm}^2/\text{Sec}$ Nilar Lugeon, $Lu$						I T R A W D (m)				
								25	50	75	100	25	50	75	100		10	20	30	40	50	60					
Nov 30 - 2005	31		TUFF BRECCIA	D - CL	Brownish - dark grey TUFF BRECCIA matrix consist of fine-coarse tuff, with andesitic to basaltic fragment, mostly pumiceous to scoriaceous dia (2 - 15) cm angular - subrounded highly weathered	Triple Core Barrel with Metal Core dia 66 mm	---	40	40	40	40	0	0	0	0								31				
	32	40			40			40	40	0	0	0	0													32	
	33											40	40	40	40	0	0	0	0								33
	33,5																										33
	34											80	80	80	80	0	0	0	0								34
	35											80	80	80	80	0	0	0	0								35
	36											50	50	50	50	0	0	0	0								36
	37											45	45	45	45	15	15	15	15								37
	38											50	50	50	50	0	0	0	0								38
	39											50	50	50	50	0	0	0	0								39
	40							90	90	90	90	10	10	10	10								40				
	41							80	80	80	80	0	0	0	0								41				
	42							50	50	50	50	0	0	0	0								42				
	43							50	50	50	50	0	0	0	0								43				
	44							100	100	100	100	30	30	30	30								44				
	45							100	100	100	100	40	40	40	40								45				
	46							100	100	100	100	0	0	0	0								46				
	47							100	100	100	100	35	35	35	35								47				
	48							100	100	100	100	50	50	50	50								48				
	49							100	100	100	100	40	40	40	40								49				
	50							80	80	80	80	30	30	30	30								50				
	51							100	100	100	100	50	50	50	50								51				
	52							90	90	90	90	25	25	25	25								52				
	53	353,29						80	80	80	80	40	40	40	40								53				
	54		LITHIC TUFF	CH	Light Grey to Grey LITHIC TUFF with pumice and andesitic fragment dia (0.30 - 1.00) cm angular to subrounded, moderately weathered, massive (CH)			80	80	80	80	50	50	50	50								54				
	55									90	90	90	90	30	30	30	30								55		
	56									50	50	50	50	20	20	20	20								56		
	57									100	100	100	100	90	90	90	90								57		
	58									90	90	90	90	30	30	30	30								58		
	59									100	100	100	100	20	20	20	20								59		
	60							100	100	100	100	50	50	50	50								60				

continued to page 3

DRILLING-GTS

PROJECT				Detail Design Ayung Multipurpose Dam				DEPTH				100,00 M				ELEVATION				406,294															
LOCATION				Dam Site (Right Bank)				COORDINATE				X . . . . . Y . . . . .				INCLINATION				VERTICAL				DRILLING MACHINE				TAS							
AVERAGE CORE RECOVERY				85,40 %				DATE				FROM				November 19 - 2005 s/d February 11 - 2006				DRILLING MASTER				Sunari				GEOLOGIST				Sigit			
DATE	DEPTH (m)	ELEVATION (m)	ROCK TYPE OR FORMATION	ROCK CLASS	COLUMN SECTION	DESCRIPTION	BIT TYPE AND DIAMETER (mm)	GROUND WATER LEVEL (m)	CORE RECOVERY (%)				R Q D (%)				S P T N (Blows) per 30 cm	STANDARD PENETRATION TEST FIELD PERMEABILITY TEST PERMEABILITY COEF, K In Cm/Sec Nilaj Lugeon, Lu				DEPTH (m)													
									25	50	75	100	25	50	75	100		10	20	30	40		50	60											
Dec 14 - 2005	61	344,04	ANDESITIC "TUFF LAVA"	CH - B	△ △	Dark grey to grey ANDESITIC "TUFF LAVA", consist of quartz and volcanic glass with andesitic - basaltic rock, sponous fragment, dia (0.30 - 1.00) cm angular - subrounded fresh to slightly weathered mostly welded ( B - A )	Double Core Barrel with Metal Core Bit Dia 66 MM		100	100	100	100	100	100	100	100								61											
	62								100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	62							
	62.25								100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	62.25							
	63								100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	63							
	64								100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	64							
	65								100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	65							
	66								100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	66							
	67								100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	67							
	68								100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	68							
	69								100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	69							
	70								50	0	0	0	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	70							
	71								100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	71							
	72								80	60	60	60	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	72							
	73								100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	73							
	74		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	74													
	75		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	75													
	76		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	76													
	77		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	77													
	78		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	78													
	78.5		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	78.5													
	79		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	79													
	79.3		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	79.3													
	80	326,39	Weathered TUFF BRECCIA	D	▽ ▽ ▽	Greyish brown TUFF BRECCIA clayey matrix consist of fine-coarse tuff, with andesitic to basaltic fragment, mostly pumiceous to sponous, dia ( 2 - 5 ) cm, angular - subrounded, highly weathered.	Triple Core Barrel with Metal Core Bit dia 66 mm		80	60	60	60	60	60	60	60	60	60	60	60	60	60	80												
	81								70	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	81							
	82		TUFF BRECCIA	D - CL	▽ ▽ ▽	Brownish - dark grey TUFF BRECCIA matrix consist of fine-coarse tuff with andesitic to basaltic fragment, mostly pumiceous to sponous, dia ( 2 - 10 ) cm, angular-subrounded mod-highly weathered	Single Core Barrel with Metal Core Bit dia 66 mm		82	70	70	70	70	70	70	70	70	70	70	70	70	70	82												
	82.50	323,79							50	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	82.50							
	83		50	0	0	0	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	83													
	84		50	0	0	0	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	84													
	84.5		75	0	0	0	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	84.5													
	85		60	0	0	0	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	85													
	86		60	0	0	0	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	86												
	87		60	0	0	0	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	87												
	88		60	0	0	0	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	88												
	89		60	0	0	0	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	89												
	90		60	0	0	0	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	90												

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DRILLLOG-673

PROJECT		Detail Design Ayung Multipurpose Dam				DEPTH		100.00 M		ELEVATION		406.294																				
LOCATION		Dam Site (Right Bank)				INCLINATION		VERTICAL		DRILLING MACHINE		TAS																				
AVERAGE CORE RECOVER		85.40 %		DATE		FROM		November 19 - 2005 s/d February 11 - 2006		DRILLING MASTER		Sunari																				
DATE	DEPTH (m)	ELEVATION (m)	ROCK TYPE OR FORMATION	ROCK CLASS	COLUMN SECTION	DESCRIPTION	BIT TYPE AND DIAMETER (mm)	GROUND WATER LEVEL (m)	CORE RECOVERY (%)			RQD (%)	SPT N (Blows) per 30 cm	STANDARD PENETRATION TEST FIELD PERMEABILITY TEST PERMEABILITY COEF, K in Cm/Sec Nilal Lugeon, Lu						DEPTH (m)												
									25	50	75			100	25	50	75	100	10		20	30	40	50	60							
February 10 - 2006	91	306.29	TUFF BRECCIA	CL	▽▽▽	Brownish - dark grey TUFF BRECCIA matrix consist of fine-coarse tuff with andesitic to basaltic fragment mostly pumiceous to scorous dia (2-10) cm angular - subrounded, mod-highly weathered	Single Core Barrel with Metal Core Bit dia 66 mm	---Up to 66.50 m depth - Water loss occurred around 24.00 m depth	60	60	60	60	0	* Water Pressure Test K = 2.59 x 10 <sup>-4</sup> Lu = 19.41							91											
	92								50	50	50	50	0															92				
	93								40	40	40	40	0																	93		
	94								50	50	50	50	0																		94	
	95								50	50	50	50	0																		95	
	96								70	70	70	70	0																			96
	97								45	45	45	45	0																			97
	98								50	50	50	50	0																			98
	99								70	70	70	70	0																			99
	100								70	70	70	70	20		End of Hole at 100.00 m depth																	100
101																							101									
102																							102									
103																							103									
104																							104									
105																							105									
106																							106									
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112																							112									
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116																							116									
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118																							118									
119																							119									
120																							120									

DRILLLOG-GTS

**DA - 9**

PROJECT				Detail Design Ayung Multipurpose Dam				DEPTH				100,00 M				ELEVATION				338,447															
LOCATION				Dam Site (Left Bank)				COORDINATE				X: . . . . . Y: . . . . .				INCLINATION				VERTICAL				DRILLING MACHINE				Koken T-1							
AVERAGE CORE RECOVER				83,35 %				DATE				FROM				February 15 - 2006 s/d February 27 - 2006				DRILLING MASTER				Mugyono & Triwan				GEOLOGIST				Sigil			
DATE	DEPTH (m)	ELEVATION (m)	ROCK TYPE OR FORMATION	ROCK CLASS	COLUMN SECTION	DESCRIPTION	BIT TYPE AND DIAMETER (mm)	GROUND WATER LEVEL (m)	CORE RECOVERY (%)				R Q D (%)				S P T N (Blows) per 30 cm	STANDARD PENETRATION TEST FIELD PERMEABILITY TEST PERMEABILITY COEF, K in Cm/Sec Nilal Lugeon, Lu				DEPTH (m)													
									25	50	75	100	25	50	75	100		10	20	30	40		50	60											
February 17 - 2006	31	346,50	ANDESITIC " TUFF LAVA "	CH-B		— the same as above —			100	100	100	100	100	100	100	100								31											
	32					Light grey - grey ANDESITIC "TUFF LAVA", consist of quartz and volcanic glass with andesitic - basaltic rock, scorous fragment dia ( 0.30 - 1.00 ) cm, angular - subrounded, fresh to slightly weathered mostly welded, hard - very hard			100	100	100	100	100	100	100	100	100	100	100	100	100	100							32						
	33																													33					
	34																													34					
	35																													35					
	36																														36				
	37																														37				
	38																														38				
	39																														39				
	40																														40				
February 18 - 2006	41	295,45	LITHIC TUFF	CH		Dark grey to black LITHIC TUFF with fine to medium tuff as matrix, minor pumice and andesitic fragment dia ( 0.30 - 1.00 ) cm, subangular to subrounded, scattered, mod weathered, firm			100	100	100	100	100	100	100	100									41										
	42																												42						
	43																													43					
	44																													44					
	45																													45					
	46																														46				
	47																														47				
	48																														48				
	49																														49				
	50																														50				
February 19 - 2006	51	293,45	ANDESITIC " TUFF LAVA "	CH-B		Light grey - grey ANDESITIC "TUFF LAVA", consist of quartz and volcanic glass with andesitic - basaltic rock, scorous fragment, dia ( 0.30 - 1.00 ) cm, angular - subrounded, fresh to slightly weathered, mostly welded,			100	100	100	100	100	100	100	100									51										
	52																												52						
	53																													53					
	54																													54					
	55																													55					
	56																													56					
	57																													57					
	58																													58					
	59																													59					
	60																													60					
February 20 - 2006	61	289,45	LITHIC TUFF	CH		Dark grey to black LITHIC TUFF fine to medium tuff, minor pumice and andesitic fragment, dia ( 0.30 - 1.00 ) cm, angular to subrounded, scattered, mod weathered, firm.			100	100	100	100	100	100	100	100									61										
	62																												62						
	63																													63					
	64																													64					
	65																													65					
	66																													66					
	67																													67					
	68																														68				
	69																														69				
	70																														70				

Double Core Barrel with metal Core Bit dia 68 mm

---Up to 25,00 m depth --- Water lost observed around ( 5,30 ) m depth

\* Ultra Sonic Velocity Test

\* Water Pressure Test  
K = 3,93 x 10<sup>-4</sup>  
Lu = 28,47

\* Water Pressure Test  
K = 2,33 x 10<sup>-4</sup>  
Lu = 17,48

\* Water Pressure Test  
K = 2,40 x 10<sup>-4</sup>  
Lu = 18,02

\* Water Pressure Test  
K = 1,03 x 10<sup>-4</sup>  
Lu = 7,71

...continued to page 3

PROJECT		Detail Design Ayung Multipurpose Dam				DEPTH		100,00 M		ELEVATION		338,447													
LOCATION		Dam Site (Left Bank)				INCLINATION		VERTICAL		DRILLING MACHINE		Koken T-1													
AVERAGE CORE RECOVER		88,35 %		COORDINATE		X. .... Y .....		DRILLING MASTER		Mugyono & Trawan		GEOLOGIST		Sigit											
DATE		ELEVATION		ROCK TYPE OR FORMATION		ROCK CLASS		COLUMN SECTION		DESCRIPTION		BIT TYPE AND DIAMETER (mm)		GROUND WATER LEVEL (m)		CORE RECOVERY (%)		RQD (%)		SPT N (Blows) per 30 cm		STANDARD PENETRATION TEST FIELD PERMEABILITY TEST PERMEABILITY COEF, K in Cm/Sec Nilal Logeon, Lu		DEPTH (m)	
DATE		ELEVATION		ROCK TYPE OR FORMATION		ROCK CLASS		COLUMN SECTION		DESCRIPTION		BIT TYPE AND DIAMETER (mm)		GROUND WATER LEVEL (m)		CORE RECOVERY (%)		RQD (%)		SPT N (Blows) per 30 cm		STANDARD PENETRATION TEST FIELD PERMEABILITY TEST PERMEABILITY COEF, K in Cm/Sec Nilal Logeon, Lu		DEPTH (m)	
February 26 - 2008		289,00		Lapillicaceous TEUFF		D - Cl		D - Cl		--- the same as the above --- Dark grey to Black Lapillicaceous TUFF, very fine to medium tuff as matrix, minor purple and andesitic fragment, mod. weathered, soft.		Double Core Barrel with metal Core Bit dia 66 mm		---Up to 25,00 m depth --- . Water lost observed around ( 6 30 ) m depth		75		0						91	
February 27 - 2008		238,75		TUFF BX						Brownish grey TUFF BRECCIA, matrix consist of fine to coarse tuff with purple to sponous & andesitic-basaltic fragment, angular to subrounded, up to 10 cm, broken core recovery, stiff, highly weathered, weakly cemented ( D ).						75		0		* Water Pressure Test K = 101 x 10 <sup>-4</sup> Lu = 7,58				92	
		238,45		TUFF BX						End of Hole at 100 00 m depth						75		0		* Water Pressure Test K = 593 x 10 <sup>-5</sup> Lu = 4,45				93	
																								94	
																								95	
																								96	
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DRILLLOG-GTS

PROJECT		Detail Design Ayung Multipurpose Dam				DEPTH		100.00 M		ELEVATION		338.447											
LOCATION		Dam Site (Left Bank)				INCLINATION		VERTICAL		DRILLING MACHINE		Koken T-1											
AVERAGE CORE RECOVER		88.35 %		DATE		FROM		February 15 - 2006 s/d February 27 - 2006		DRILLING MASTER		Mugyono & Thawan											
COORDINATE		X: .....		Y: .....		GEOLOGIST		Sigil		STANDARD PENETRATION TEST		FIELD PERMEABILITY TEST											
DATE	DEPTH (m)	ELEVATION (m)	ROCK TYPE OR FORMATION	ROCK CLASS	COLUMN SECTION	DESCRIPTION	BIT TYPE AND DIAMETER (mm)	GROUND WATER LEVEL (m)	CORE RECOVERY (%)				RQD (%)	SPT N (Blows) per 30 cm	PERMEABILITY COEF, K In Cm/Sec						DEPTH (E)		
									25	50	75	100			25	50	75	100	18	20		30	40
February 21 - 2006	61	275.95	LITHIC TUFF	CM	△	— the same as the above —			85				10										61
	62				△	Dark grey to Black LITHIC TUFF, fine to medium tuff as matrix, minor pumice and andesitic fragment, dia (0.30 - 1.00) cm, angular to subrounded, scattered, mod. weathered, firm.			75				0										62
	63				△				80				20										63
	64				△				100				0										64
	65				△	At (60.00 - 65.00) m depth, * Irregular joint ( fracture ) rough limonitic, highly weathered surface			100				0										65
	66				△				75				0										66
	67				△				80				15										67
	68				△				75				20										68
	69				△				80				40										69
	70				△				75				0										70
	71	263.45			△				75				15										71
	72				△				75				0										72
	73				△				75				25										73
	74				△				65				0										74
	75				△				65				0										75
	76				△	* Irregular joint ( fracture ), rough, limonitic, highly weathered surface			85				10										76
	77				△				75				0										77
	78				△				50				25										78
	79				△				65				0										79
	80				△				70				0										80
	81				△				50				15										81
	82				△				70				30										82
	83				△				75				15										83
	84				△				50				0										84
	85				△				50				0										85
	86				△				70				0										86
	87				△				60				9										87
	88				△				80				0										88
	89				△				90				0										89
	90		Lps TUFF	D	△	Dark grey to Black Lapilaceous TUFF			80				0										90

...continued to page 4

DRILLLOG-GTS

PROJECT			Detail Design Ayung Multipurpose Dam						DEPTH			100,00 M			ELEVATION			338.447														
LOCATION			Dam Site (Left Bank)			COORDINATE			X . . . . . Y . . . . .			INCLINATION			VERTICAL			DRILLING MACHINE			Koken T-1											
AVERAGE CORE RECOVER			88,35 %			DATE			FROM February 15 - 2008 to February 27 - 2008			DRILLING MASTER			Mugyono & Triawan			GEOLOGIST			Sgt											
DATE	DEPTH (m)	ELEVATION (m)	ROCK TYPE OR FORMATION	ROCK CLASS	COLUMN SECTION	DESCRIPTION	BIT TYPE AND DIAMETER (mm)	GROUND WATER LEVEL (m)	CORE RECOVERY (%)				R Q D (%)				S P T N (Blows) per 30 cm	STANDARD PENETRATION TEST FIELD PERMEABILITY TEST PERMEABILITY COEF, K in Cm/Sec Nilal Lugeon, Lu						TOTAL LOG D (m)								
									25	50	75	100	25	50	75	100		10	20	30	40	50	60									
February 15 - 2008	1	337,45	Top SOIL			Top Soil -			50	0														1								
	2	377,50	Weathered TUFF BRECCIA	D-CL	△▽△▽	Brownish Grey-Greysish Brown Silty CLAY with some roots minor gravel, highly plastic, moist, highly weathered	Single Core Barrel with Metal Core Bit dia 66 mm	-	50	0															2							
	2.5								100	0																			3			
	3								50	0																					4	
	4	330,45	TUFF BRECCIA	CM	△▽△▽	Brownish - yellowish grey TUFF BRECCIA, matrix consist of fine to coarse tuff with pumice to scoriae & andesitic-basaltic fragment, angular to subrounded, dia (0.5 - 4.0) cm, scattered, moderately - highly weathered, weakly cemented firm	-	-	100	0																5						
	5								100	20																				6		
	6								100	40																						7
	7								100	30																						8
	8								100	20																						9
9	328,65	LITHIC TUFF	CH	△▽△▽	Brownish - yellowish grey LITHIC TUFF with fine to medium tuff as matrix minor pumice and andesitic fragment, dia (0.3 - 1.0)cm, subangular to subrounded, scattered, mod weathered, mod cemented, firm	-	-	100	40																10							
10								100	50																				11			
11								100	90																						12	
12	February 16 - 2008	ANDESITIC "TUFF LAVA"	CH-B	△▽△▽	Light grey - grey ANDESITIC "TUFF LAVA", consist of quartz and volcanic glass with andesitic - basaltic rock, scoriaceous fragment, dia (0.30 - 1.00) cm, angular - subrounded, fresh to slightly weathered, mostly welded, hard - very hard	-	-	100	20																13							
13								100	30																					14		
14								100	50																						15	
15								100	70																						16	
16								100	50																						17	
17								100	0																						18	
18								100	90																							19
19								100	90																							20
20								100	25																							21
21	100	70																							22							
22	100	30																							23							
23	100	50																							24							
24	100	50																							25							
25	100	70																							26							
26	100	0																							27							
27	100	25																							28							
28	100	100																							29							
29	100	70																							30							



**DA - 10**

PROJECT		Detail Design Ayung Multipurpose Dam				DEPTH	100.00 M	ELEVATION	334.894																							
LOCATION		Dam Site (Right Bank)		COORDINATE		X : ... .. Y : ... ..	INCLINATION	VERTICAL	DRILLING MACHINE	TAS																						
AVERAGE CORE RECOVER		88,35 %	DATE	FROM January 09 - 2006 to February 02 - 2006		DRILLING MASTER	Sunari	GEOLOGIST	Sigit																							
DATE	DEPTH (m)	ELEVATION (m)	ROCK TYPE OR FORMATION	ROCK CLASS OR SECTION	DESCRIPTION	BIT TYPE AND DIAMETER (mm)	GROUND WATER LEVEL (m)	CORE RECOVERY (%)				R Q D (%)	S P T (Blows) per 30 cm	STANDARD PENETRATION TEST FIELD PERMEABILITY TEST PERMEABILITY COEF, K in Cm/Sec Nilaj Lugeon, Lu						DEPTH (m)												
								25	50	75	100			25	50	75	100	10	20		30	40	50	60								
January 09 - 2006	1	332.39	TUFF BRECCIA	CH	Dark grey - grey TUFF BRECCIA, matrix consist of fine to coarse tuff with pumice to scorioid & andesitic-basaltic fragment, angular to subrounded, dia. (0.5 - 6.0) cm, scattered, stiff, moderately - highly weathered, weakly - mod cemented (D) <u>At (0.00 - 0.80) m depth</u> Highly weathered - Dark brownish grey TUFF BRECCIA, can be found.  * Water lost start at 7,00 m	Single Core Barrel with Metal Core Bit dia 68 mm	15.00 m	50	0	0	0	0	0	* Constant Head Test K = 5,40 x 10 <sup>-2</sup> Lu = 490,62						1												
	2	45						0	0	0	0	0													2							
	3	40						0	0	0	0	0														3						
	4	40						0	0	0	0	0														4						
	5	30						0	0	0	0	0														5						
	6	30						0	0	0	0	0														6						
January 10 - 2006	7		LITHIC TUFF	CH	Grey LITHIC TUFF with scorioid and pumiceous to basaltic fragment, dia (0.50 - 2.00) cm, angular to subrounded massive, stiff, slightly to moderately weathered, (CH)  Jointed, vane (30 - 60)° LCA.	Double Core Barrel with Metal Core Bit dia 68 mm	15.00 m	90	0	0	0	0	* Constant Head Test K = 2,95 x 10 <sup>-2</sup> Lu = 107,08							7												
	8	50						0	0	0	0														8							
	9	40						0	0	0	0															9						
January 11 - 2006	10		ANDESITIC "LAVA TUFF"	CH-B	Dark - brownish grey ANDESITIC "TUFF LAVA", consist of quartz and volcanic glass with andesitic - basaltic rock, scorioid fragment, dia (0.30 - 1.00) cm, angular - subrounded, fresh to slightly weathered, mostly welded, Orientations of welded materials mostly inclined (45° - 60°) LCA. <u>At (14.00 - 20.00) m depth</u> : Dark grey - grey ANDESITIC "TUFF LAVA" can be found  <u>At (20.00 - 30.00) m depth</u> : Brownish Grey ANDESITIC "TUFF LAVA", consist of quartz and volcanic glass with andesitic - basaltic rock, scorioid fragment, dia (0.30 - 1.00) cm, angular - subrounded, fresh to slightly weathered, mostly welded, (B - A).	Double Core Barrel with Metal Core Bit dia 68 mm	15.00 m	90	0	0	0	0	* Water Pressure Test K = 5,90 x 10 <sup>-4</sup> Lu = 44,66									10										
	11	95						0	0	0	0															11						
	12	100						50	0	0	0																12					
	13	100						15	0	0	0																13					
January 12 - 2006	14		ANDESITIC "LAVA TUFF"	CH-B	Dark - brownish grey ANDESITIC "TUFF LAVA", consist of quartz and volcanic glass with andesitic - basaltic rock, scorioid fragment, dia (0.30 - 1.00) cm, angular - subrounded, fresh to slightly weathered, mostly welded, Orientations of welded materials mostly inclined (45° - 60°) LCA. <u>At (14.00 - 20.00) m depth</u> : Dark grey - grey ANDESITIC "TUFF LAVA" can be found  <u>At (20.00 - 30.00) m depth</u> : Brownish Grey ANDESITIC "TUFF LAVA", consist of quartz and volcanic glass with andesitic - basaltic rock, scorioid fragment, dia (0.30 - 1.00) cm, angular - subrounded, fresh to slightly weathered, mostly welded, (B - A).	Double Core Barrel with Metal Core Bit dia 68 mm	15.00 m	100	80	0	0	0	* Water Pressure Test K = 4,88 x 10 <sup>-4</sup> Lu = 36,62											14								
	15	100						80	0	0	0																15					
	16	90						50	0	0	0																	16				
	17	95						25	0	0	0																		17			
	18	90						70	0	0	0																		18			
	19	100						80	0	0	0																		19			
January 13 - 2006	20		ANDESITIC "LAVA TUFF"	CH-B	Dark - brownish grey ANDESITIC "TUFF LAVA", consist of quartz and volcanic glass with andesitic - basaltic rock, scorioid fragment, dia (0.30 - 1.00) cm, angular - subrounded, fresh to slightly weathered, mostly welded, (B - A).	Double Core Barrel with Metal Core Bit dia 68 mm	15.00 m	100	100	0	0	0	* Water Pressure Test K = 3,83 x 10 <sup>-4</sup> Lu = 28,75											20								
	21	90						85	0	0	0																		21			
	22	90						75	0	0	0																			22		
	23	100						25	0	0	0																			23		
	24	90						85	0	0	0																				24	
	25	100						50	0	0	0																				25	
January 14 - 2006	26		ANDESITIC "LAVA TUFF"	CH-B	Dark - brownish grey ANDESITIC "TUFF LAVA", consist of quartz and volcanic glass with andesitic - basaltic rock, scorioid fragment, dia (0.30 - 1.00) cm, angular - subrounded, fresh to slightly weathered, mostly welded, (B - A).	Double Core Barrel with Metal Core Bit dia 68 mm	15.00 m	100	40	0	0	0	* Water Pressure Test K = 3,44 x 10 <sup>-4</sup> Lu = 25,61											26								
	27	100						0	0	0	0																			27		
	28	100						10	0	0	0																				28	
	29	100						80	0	0	0																					29
	30	100						90	0	0	0																					30

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DRILLLOG-675

PROJECT		Detail Design Ayung Multipurpose Dam			DEPTH	100.00 M <th>ELEVATION</th> <td colspan="2">334,894</td>		ELEVATION	334,894						
LOCATION		Dam Site (Right Bank)			INCLINATION	VERTICAL		DRILLING MACHINE	TAS						
AVERAGE CORE RECOVERY		88,35 %			DRILLING MASTER	Suzarti		GEOLOGIST	Sigil						
DATE	DEPTH (m)	ELEVATION (m)	ROCK TYPE OR FORMATION	ROCK CLASS	COLUMN SECTION	DESCRIPTION	BIT TYPE AND DIAMETER (mm)	GROUND WATER LEVEL (m)	RECOVERY (%)	RQD (%)	SPT N (Blows) per 30 cm	STANDARD PENETRATION TEST FIELD PERMEABILITY TEST PERMEABILITY COEF, K in Cm/Sec Nilal Lugeon, Lu	DEPTH (m)		
FROM		DATE		FROM		DATE		FROM		DATE		FROM		DATE	
01/14/08	31		ANDESITIC "LAVA TUFF"	CH-B	△△△△	— the same as above — At ( 30.00 - 41.00 ) m depth. Light Grey ANDESITIC "TUFF LAVA", consist of quartz and volcanic glass with andesitic - basaltic rock, sponous fragment, dia ( 0.30 - 1.00 ) cm, angular - subrounded fresh to slightly weathered, mostly welded, ( CH - B )	Double Core Barrel with Metal Core Bit dia 66 mm		100	60			31		
	32	100			75	32									
	33	150			65	33									
	34	100			60	34									
	35	100			70	35									
	36	100			90	36									
	37	100			100	37									
	38	100			80	38									
	39	150			95	39									
	40	100			40	40									
	41	100	60	41											
	42	150	60	42											
	43	100	100	43											
	44	100	15	44											
	45	150	100	45											
	46	100	45	46											
	47	100	10	47											
	48	150	10	48											
	49	100	20	49											
	50	100	35	50											
	51	100	0	51											
	52	100	30	52											
	53	50	50	53											
	54	20	50	54											
	55	45	15	55											
	56	30	0	56											
	57	30	0	57											
	58	40	0	58											
	59	25	15	59											
	60	70	0	60											
		40	0												
		40	0												
		90	0												
		90	0												
		95	0												

Up to 22.80 m Depth, Water lost around 7.50 m

Single Core Barrel with Metal Core Bit dia 66 mm

\* Water Pressure Test  
K = 5,63 x 10<sup>-4</sup>  
Lu = 42,22

\* Water Pressure Test  
K = 3,44 x 10<sup>-4</sup>  
Lu = 25,84

\* Water Pressure Test  
K = 3 21 x 10<sup>-4</sup>  
Lu = 24 10

\* Water Pressure Test  
K = 4 00 x 10<sup>-4</sup>  
Lu = 30,00

\* Water Pressure Test  
K = 4,20 x 10<sup>-4</sup>  
Lu = 31,50

\* Water Pressure Test  
K = 1 40 x 10<sup>-4</sup>  
Lu = 10,48

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DRILL LOG-GTS

PROJECT				Detail Design Ayung Multipurpose Dam				DEPTH		100.00 M		ELEVATION		334.884												
LOCATION				Dam Site (Right Bank)				INCLINATION		VERTICAL		DRILLING MACHINE		TAS												
AVERAGE CORE RECOVER				88.35 %				DRILLING MASTER		Sunari		GEOLOGIST		Spt												
DATE				FROM January 09 - 2006 to February 02 - 2006				CORE RECOVERY		R Q D		S P T N		STANDARD PENETRATION TEST												
DATE	DEPTH (m)	ELEVATION (m)	ROCK TYPE OR FORMATION	COLUMN ROCK CLASS	DESCRIPTION	BIT TYPE AND DIAMETER (mm)	GROUND WATER LEVEL (m)	RECOVERY (%)				R Q D (%)				S P T N (Blows) per 30 cm				FIELD PERMEABILITY TEST PERMEABILITY COEF, K in Cm/Sec Nilaf Lugeon, Lu				DEPTH (E)		
								25	50	75	100	25	50	75	100	10	20	30	40	50	60					
					--- the same as the above ---																					
					<u>At ( 60.00 - 65.00 ) m depth</u>																					
	61	317.50			Brown Lapilliceous TUFF, with pumice and andesitic fragment dia ( 0.30 - 1.00 ) cm, angular to subrounded, moderately weathered, massive, fine - coarse tuff, moderately - highly weathered, soft - firm																					61
	62																									62
	62.5																									62.5
	63																									63
	64																									64
	65																									65
	66				<u>At ( 65.00 - 75.00 ) m depth</u>																					66
	67				Brownish Grey Lapilliceous TUFF, with pumice and andesitic fragment, dia ( 0.30 - 1.00 ) cm, angular to subrounded, moderately weathered, massive, fine - coarse tuff, moderately - highly weathered, soft - firm.																					67
	68																									68
	69																									69
	70																									70
	71																									71
	72																									72
	73																									73
	74																									74
	75	305.00																								75
	76				<u>At ( 75.00 - 85.50 ) m depth</u>																					76
	77				Brown Lapilliceous TUFF, with pumice and andesitic fragment, dia ( 0.30 - 1.00 ) cm, angular to subrounded moderately weathered, massive, fine - coarse tuff, moderately - highly weathered, soft - firm.																					77
	78																									78
	78.5																									78.5
	79	301.50																								79
	80																									80
	81																									81
	82																									82
	83																									83
	84																									84
	84.5																									84.5
	85	295.50																								85
	86				<u>At ( 90.00 - 95.00 ) m depth</u>																					86
	87				Brownish grey Lapilliceous TUFF, with pumice and andesitic fragment, dia ( 0.30 - 1.00 ) cm, angular to subrounded, moderately weathered massive, fine - coarse tuff, moderately - highly weathered, soft - firm																					87
	88																									88
	89																									89
	90																									90

...continued to page 4

PROJECT		Detail Design Ayung Multipurpose Dam				DEPTH	100,00 M	ELEVATION	334.894															
LOCATION		Dam Site (Right Bank)		COORDINATE	X: . . . . . Y: . . . . .	INCLINATION	VERTICAL	DRILLING MACHINE	TAS															
AVERAGE CORE RECOVER		88,35 %	DATE	FROM January 09 - 2006 to February 02 - 2006		DRILLING MASTER	Sunari	GEOLOGIST	SigZ															
DATE	DEPTH (m)	ELEVATION (m)	ROCK TYPE OR FORMATION	ROCK CLASS	COLUMN SECTION	DESCRIPTION	BIT TYPE AND DIAMETER (mm)	GROUND WATER LEVEL (m)	CORE RECOVERY (%)		R Q D (%)	S P T N (Blows) per 30 cm	STANDARD PENETRATION TEST FIELD PERMEABILITY TEST PERMEABILITY COEF, K in Cm/Sec Nilai Lugeon, Lu						DEPTH (m)					
									25	50			75	100	25	50	75	100		10	20	30	40	50
February 01 - 2008	91		LAPILLICEOUS TUFF	D - Soil-like recovery		--- the same as the above --- At ( 90.00 - 95.00 ) m depth	Single Core Barrel with Metal Core Bit dia 60 mm	Up to 22,80 m Depth. Water lost around 7.50 m	80		0								91					
	92					Brown Lapilliceous TUFF, fine to coarse tuff, minor pumice and andesitic fragment, dia ( 0.30 - 1.00 ) cm, angular to subrounded, scattered. Soft to firm			85		0											92		
	93					85				0													93	
	94					80				0													94	
	95					85				0														95
	96					At ( 95.00 - 100.00 ) m depth, Brownish grey Lapilliceous TUFF, fine to coarse tuff, minor pumice and andesitic fragment dia ( 0.30 - 1.00 ) cm, angular to subrounded, scattered. Soft to firm			80		0													96
	97					85				0														97
	98					80				0														98
	99					85				0														99
	100	234.89										End of Hole at 100.00 m depth												100
	101																		101					
	102																		102					
	103																		103					
	104																		104					
	105																		105					
	106																		106					
	107																		107					
	108																		108					
	109																		109					
	110																		110					
	111																		111					
	112																		112					
	113																		113					
	114																		114					
	115																		115					
	116																		116					
	117																		117					
	118																		118					
	119																		119					
	120																		120					

\* Water Pressure Test  
K = 1,30 x 10<sup>-4</sup>  
Lu = 9,75

\* Water Pressure Test  
K = 9,69 x 10<sup>-4</sup>  
Lu = 7,27