Table 3.3.4 SUMMARY OF LABORATORY TEST FOR EARTH MATERIAL IN KEDUNGWARAK BORROW AREA IV

·		KTP 1	KTP. 2	KTP. 3	KTP.4	KTP. 5
Sampling Depth	(m)				. <u></u>	
Natural Moisture Content	W (%)	10.36	11.03	24,72	8.12	20.14
Specific Gravity Gs		2.85	2.79	2,68	2.75	2.64
Grain Size	•					
Maximum Particle Size (	mm)	20.0	40.0	2.0	2.0	2.0
Gravel (2 - 76.2 mm)	(%)	12	59	_	-	
Sand (0.074 - 2 mm)	(%)	80	33 ,	65	86	39
Silt (0.005 - 0.074 mm)	(%)	4	5	24	7	45
Clay (< 0.005 mm)	(%)	4 .	3	11	7	16
Unified Soil Classificati	on Sys	tem SP-SM	I GW-GM	SC	SM	СН
Consistency						
Liquid Limit $W_{ m L}$	(%)	NP	NP	34.70	NP	55.40
Plastic Limit Wp	(%)	<b>–</b> ,	-	23.13	-	24.71
Plasticity Index $I_{ m P}$	(%)		-	11.57	-	30.69
Optimum Moisture Conten		19.50	17.30	22.00	16.85	26.85
Maximum Dry Density $oldsymbol{\gamma}$ d	(g/cm <sup>3</sup>	) 1.657	1.794	1.549	1.659	1.398
Cohesion Intercept c'	(kg/cm	<sup>2</sup> ) 0.5	0.25	0.3	0.3	0.4
Angle of Internal Frict	ion 🏚	37 <sup>0</sup>	37 <sup>0</sup>	27 <sup>0</sup>	36°	15 <sup>0</sup>
Initial Void Ratio $e_0$		0.82	0.64	0.77		1.03
Compression Index c		0.11	0.10	0.13		0.29

Table 3.3.5 SUMMARY OF LABORATORY TEST FOR EARTH MATERIAL (WIDAS RIVER IMPROVEMENT SCHEME) (1/2)

			TW.1	TW. 2	TW.3	TW.4	TW.5	TW.6
Sampling Depth		(m)	0.25 - 1.60	0.30 - 3.00	0.30	0.30 - 3.00	0.30 - 3.00	0.30
Natural Moisture Content	M	(4)	46.51	47.81	41.06	36.78	40.53	41.36
Specific Gravity	Gs		2.71	2.66	2.69	2.65	2.77	2.65
Grain Size					:			
Maximum Particle Size		(mm)	2.0	2.0	2.0	2.0	2.0	2.0
Gravel (2 - 76.2 mm)		(%)	_ '		-	÷ '.	· <del>-</del>	· <del>-</del> ·
Sand (0.074 - 2 mm)		(%)	6	4	4	7	14 .	4 .
Silt (0.005 ~ 0.074 mm)		(%)	60	59	56	57	46	60
Clay ( 0.005 mm)	•	(%)	34	37	40	36	38	36
Unified Soil Classification	Syste	m				:		
Consistency					-			
Liquid Limit	$w_{\mathbf{L}}$	(%)	69.90	79.90	72.20	64.80	84.20	68.05
Plastic Limit	Wp	(%)	28.94	33.85	34.94	29.27	35.45	28.79
Plasticity Index	Ip	(3)	40.96	45.05	42.92	35.53	48.75	29.26
Optimum Moisture Content		(%)	32.70	36.43	35.60	33.20	35.00	34.20
Maximum Dry Density	₹d	(g/cm <sup>3</sup> )	1.334	1.267	1.282	1.312	1.129	1.308
Cohesion Intercept	C٢	(kg/cm²)	0.25			0.25	0.4	0.5
Angle of Internal Friction	' ⊈		20°		1 -	16°	5°	14°
Initial Void Ratio	e <sub>0</sub>		1.15	•		1.12	1.12	1.14
Compression Index	cc		0.31			0.37	0.41	0.36
Coefficient of Permeability	K	(cm/s)	1.9x10 <sup>-8</sup>	$4.2 \times 10^{-8}$	9.0x10 <sup>-9</sup>	3.6x10 <sup>-9</sup>	1.9x10 <sup>-9</sup>	7.5x10

Table 3.3.5 SUMMARY OF LABORATORY TEST FOR EARTH MATERIAL (WIDAS RIVER IMPROVEMENT SCHEME) (2/2)

			TW.7	TW.8	TW.9	TW.10	TW.11	TW.12
Sampling Depth		(m)	0.30 - 3.00	0.30 -3.00	0.30 -3.00	0.30 -1.90	0.30 -3.00	0.35 -2.75
Natural Moisture Content	W	(%)	33.32	46.32	42.15	43.22	42.45	47.33
Specific Gravity	Gs		2.78	2.69	2.78	2.72	2.74	2.64
Grain Size								
Maximum Particle Size		(mm)	2.0	2.0	2.0	2.0	2.0	2.0
Gravel (2 - 76.2 mm)		(2)	-	<del>.</del>	-		· -	-
Sand (0.074 - 2 mm)		(8)	70	2	13	4	7	10
Silt (0.005 - 0.074 mm)		(%)	10	43	43	35	32	43
Clay (< 0.005 mm)		(%)	20	55	44	61	61	47
Unified Soil Classification	Syste	m	sc	CH	CH	СН	Chi	CH
Consistency								
Liquid Limit	$R_{\mathbf{L}}$	(%)	30.40	97.55	84.05	97.80	96.65	79.90
Plastic Limit	$w_{\mathbf{p}}$	(%)	17.74	39.61	33.99	37.64	33.65	33.90
Plasticity Index	P	(₹)	12.66	57.94	50.51	63.1€	63.00	46.00
Optimum Moisture Content		(%)	20.00	37.80	34.80	37.10	36.90	40.05
Maximum Dry Density	₹d.	(g/cm <sup>3</sup> )	1.681	1.233	1.318	1.220	1.244	1.206
Cohesion Intercept	C'	(kg/cm <sup>2</sup> )	0.2	•	0.35			
Angle of Internal Friction		σ'	30°		90			
Initial Void Ratio		e0	0.74		1.35			
Compression Index		cc	0.23		0.26			
Coefficient of Permeability	ĸ	(cm/s)	1.1x10 <sup>-5</sup>	9.2x10 <sup>-9</sup>	2.2x10 <sup>-9</sup>	1.0x10 <sup>-8</sup>	5.7x10 <sup>-9</sup>	7.6x10

Table 3.3.6 GEOLOGICAL INVESTIGATION AND CONSTRUCTION MATERIAL SURVEY COMPONENTS FOR KETANDAN DAM

Test	Item			Wall	ty(sample) Test Pit (Borrow Area)
(I) Soil	Test	·			
(I-1) Phys	sical Properties				
(1)	Specific gravity test			2	6
(ii)	Particle size analysis	•			
(iii)	Moisture content test			2	6
(iv)	Unit weight test			2	_
(v)	Consistency test			2	6
(I-2) Mec	nanical Properties				•
(i)	Compaction test				6
(ii)	Permeability test			-	6
(iii)	Consolidation test		,		
	(Disturbed sample)			_	3
	(Undisturbed sample)			2	
(iv)	Triaxial compression test				
	(UU: Undisturbed sample)	•		2	-
	(CV : Disturbed sample)			-	. 3
(II) Rock	Test (from boring core)		Dam	site	Transbasi Tunnel
(1)					
(i)	Specific gravity and absorbtion test			12	4
(ii)	Compression strength test			2	2
	CONSTRUCTION MATERIAL AND SAM		T PIT	ring	
	Loaction	No of T	est P Samp		g and
	Earth Borrow Area	·		6	

Table 3.3.7 SUMMARY OF LABORATORY TEST FOR EARTH MATERIAL
IN KETANDAN BORROW AREA

-		KT.1	KT.2	KT.3	KT.4	KT.5	KT.6
Sampling Depth	(m)	2.0-3.0	2.0-3.0	2.0-3.0	2.0-3.0	•	-
Natural Moisture Content W	(%)	46.32	29.32	52.13	44.75		
Specific Gravity Gs	2.78	2.78	2.78	2.71	2.77		
Grain Size							
Maximum Particle Size	(mm)	100	100	100	100	100	38.1
Gravel (2 - 76.2 mm)	(%)	81	44	86	69	30	24
Sand (0.074 - 2 mm)	(%)	9	22	4	7	30	32
Silt (0.005 - 0.074 mm)	(%)	5	28	6	15	26	27
Clay (< 0.005 mm)	(%)	5	6	4	9	14	17
nified Soil Classification S	ystem	GC.	GC	GC	GC	GC-5C	SM
Onsistency							
Liquid Limit W <sub>L</sub>	(%)	65.00	57.45	79.80	70,60	62,15	67.75
Plastic Limit W <sub>p</sub>	(%)	47.46	33,67	45.91	40.87	31.00	35.90
Plasticity Index I <sub>P</sub>	(%)	15,54	23.78	33.89	29.73	31.15	31.85
Optimum Moisture Content	(%)	42.00	34.50	49,90	48.70	33.60	39.20
Maximum Dry Density	(g/cm <sup>3</sup> )	1.192	1,292	1.068	1.124	1,275	1,227
Cohesion Intercept c'	(kg/cm <sup>2</sup> )	0.6	0.9	0.4	0.4	0.1	0.3
Angle of Internal Friction	φ'	30°	20°	30°	30°	23°	20°
Initial Void Ratio e <sub>0</sub>							
Compression Index $\mathbf{c_c}$							
oefficient of Permeability K	(cm/s)						÷

Table 3.3.8 REQUIREMENT OF CONSTRUCTION MATERIAL FOR KEDUNGWARAK WEIR ( PROVISIONAL )

Material	Quantity (m <sup>3</sup> )
. Earth Material	6,300
. Rock riprap	250
. Masonry	600
. Coarse aggregate	9,000

Table 3.3.9 PROPOSED DESIGN VALUES OF EMBANKMENT MATERIALS FOR KEDUNGWARAK WEIR

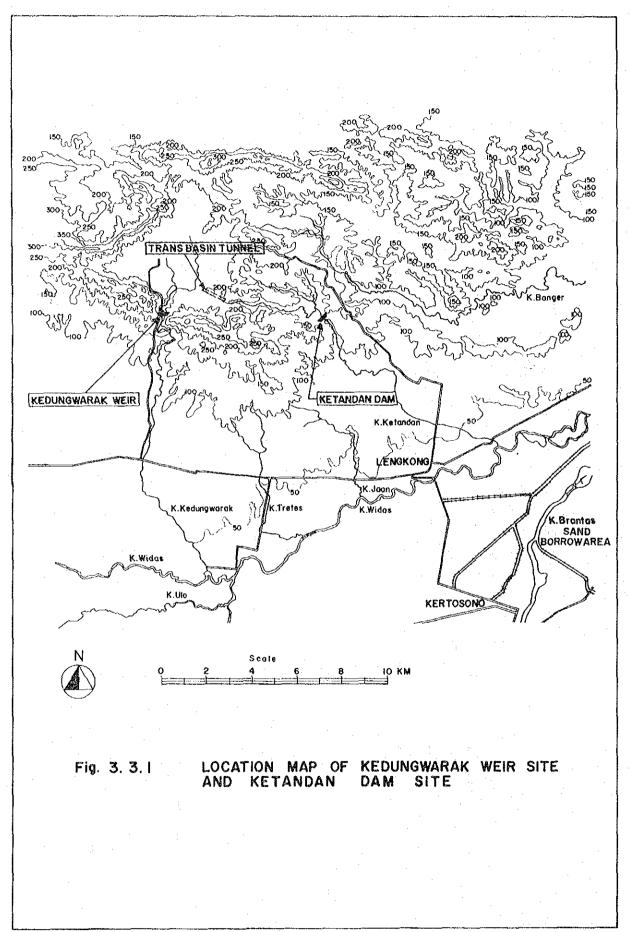
			· · · · · · · · · · · · · · · · · · ·	
		Earth Material	Filter and Drain Material	Rock Material
Specific gravity		2.75	2.85	2.60
Dry density	(t/m <sup>3</sup> )	1.55	1.70	1.80
Wet density	(t/m <sup>3</sup> )	1.85	1.80	1.84
Saturated density	(t/m <sup>3</sup> )	1.95	2.00	2.00
Cohesion	(t/m <sup>2</sup> )	2.0	0	. 0
Angle of internal friction	(°)	32	38	
Coefficient of Permeability	(cm/s)	5 x 10 <sup>-5</sup>	1 × 10 <sup>-3</sup>	1 x 10°
	1		4 - 1	

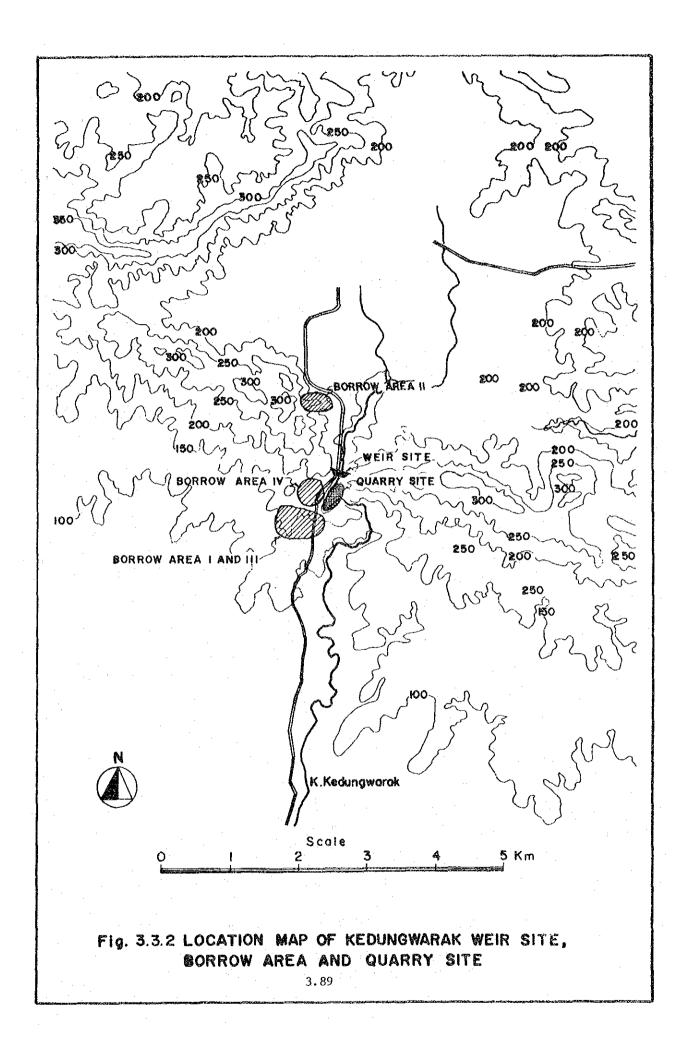
Table 3.3.10 REQUIREMENT OF CONSTRUCTION MATERIALS FOR KETANDAN DAM ( PROVISIONAL )

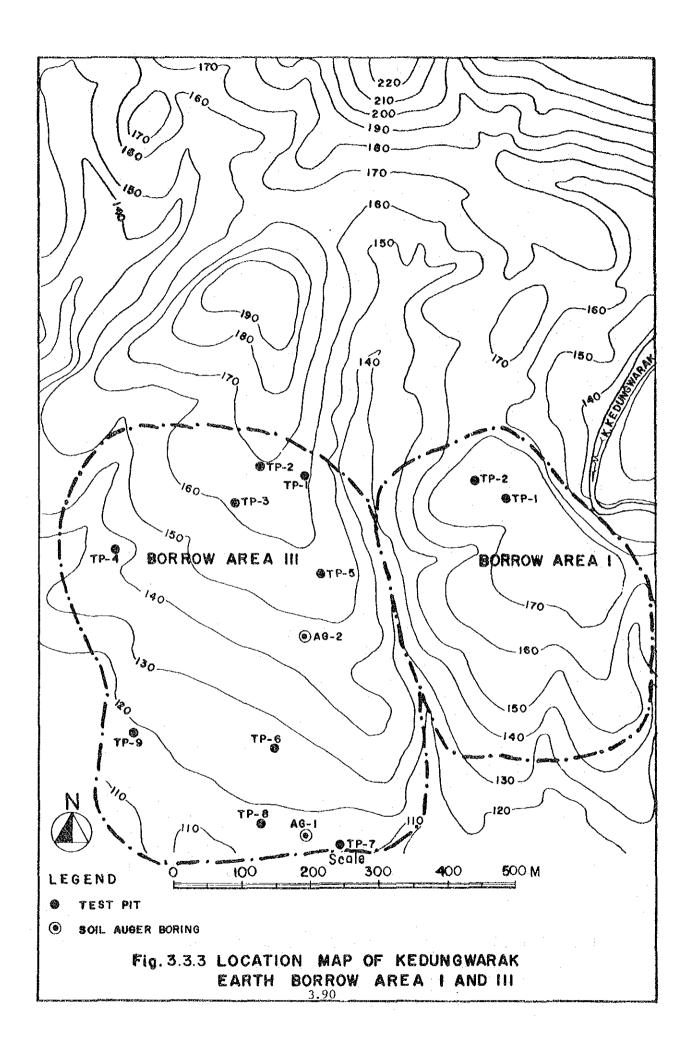
Ма	terial	Quantity (m <sup>3</sup> )
1.	Earth Material	423,000
2.	Filter and Drain Material	27,000
3.	Rock riprap	58,400
4.	Coarse aggregate	10,700
5.	Fine aggregate	1,000

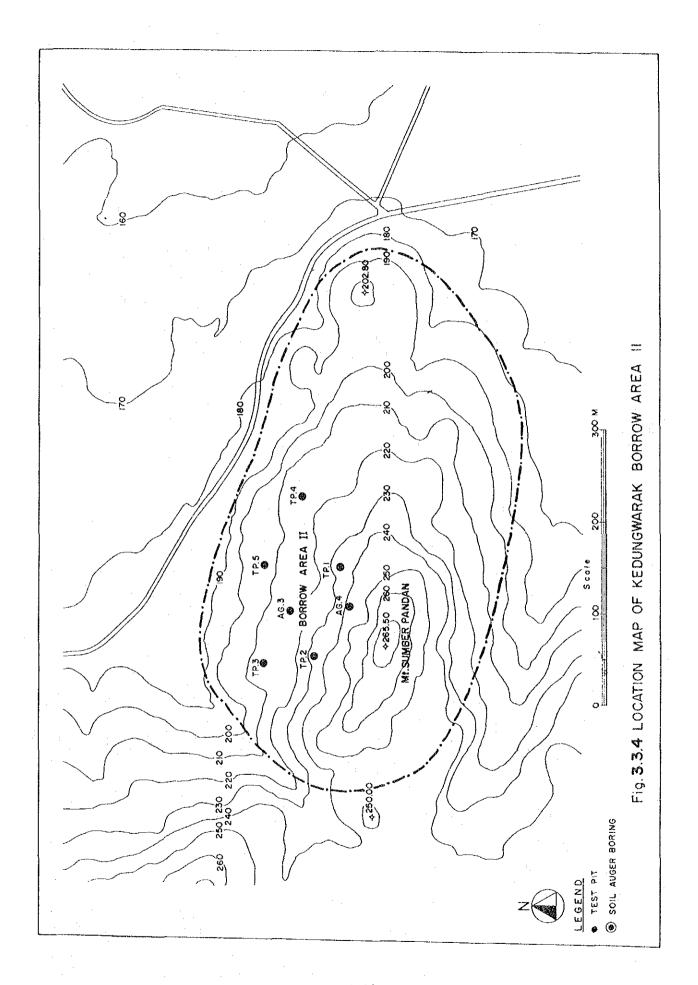
Table 3.3.11 PROPOSED DESIGN VALUES OF EMBANKMENT MATERIALS FOR KETANDAN DAM

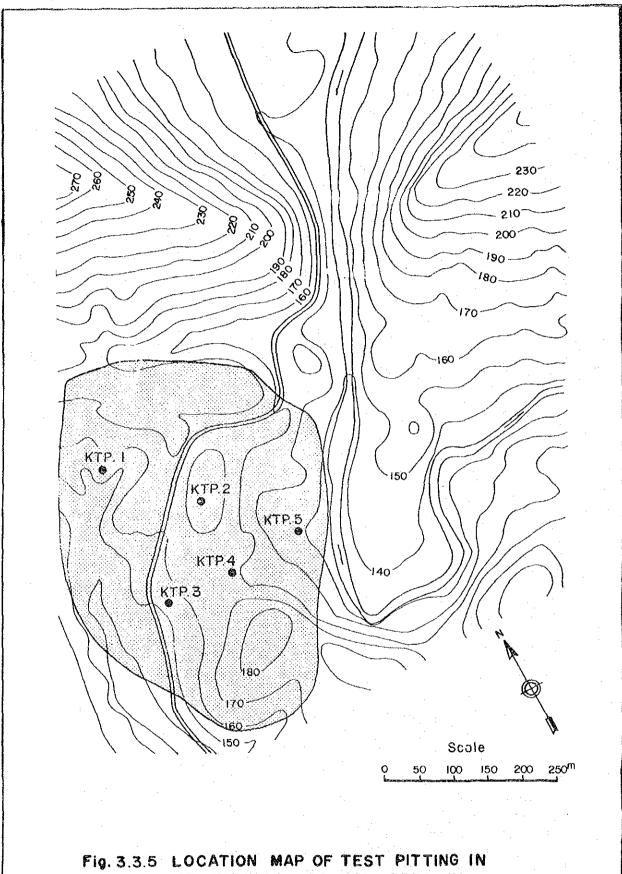
		Earth Material	Filter and Drain	Rock Material
Specific gravity			2.75	2.60
Dry density	(t/m <sup>3</sup> )	÷		1.75
Wet density	(t/m <sup>3</sup> )	1.60	1.80	1.80
Saturated density	(t/m <sup>3</sup> )	1.75	2.10	2.15
Cohesion Angle of internal	(t/m <sup>2</sup> )	4.0	0	<b>0</b>
Friction	( ° )	25	38	40
Coefficient of permeability	(cm/s)	5 x 10 <sup>-5</sup>	1 x 10 <sup>-3</sup>	1 x 10°
			•	



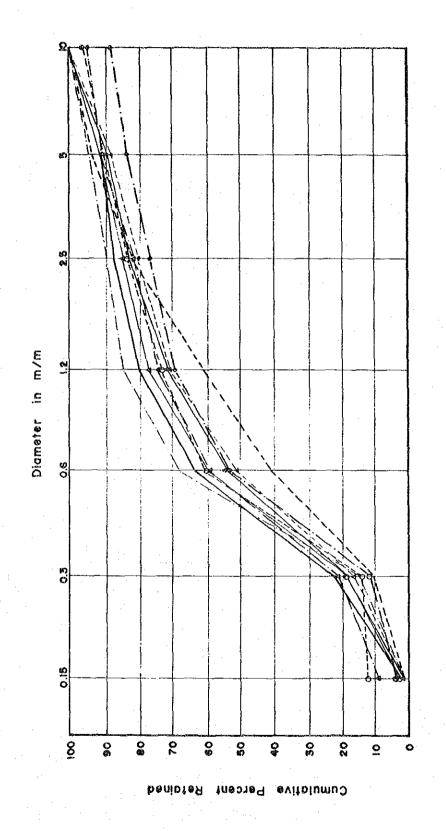




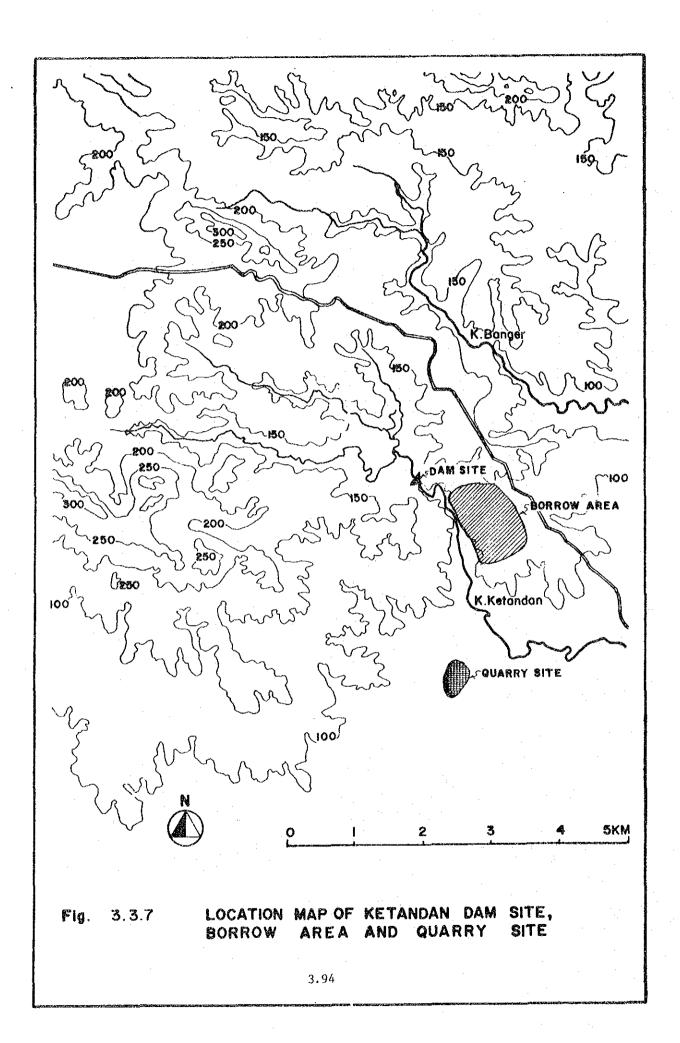


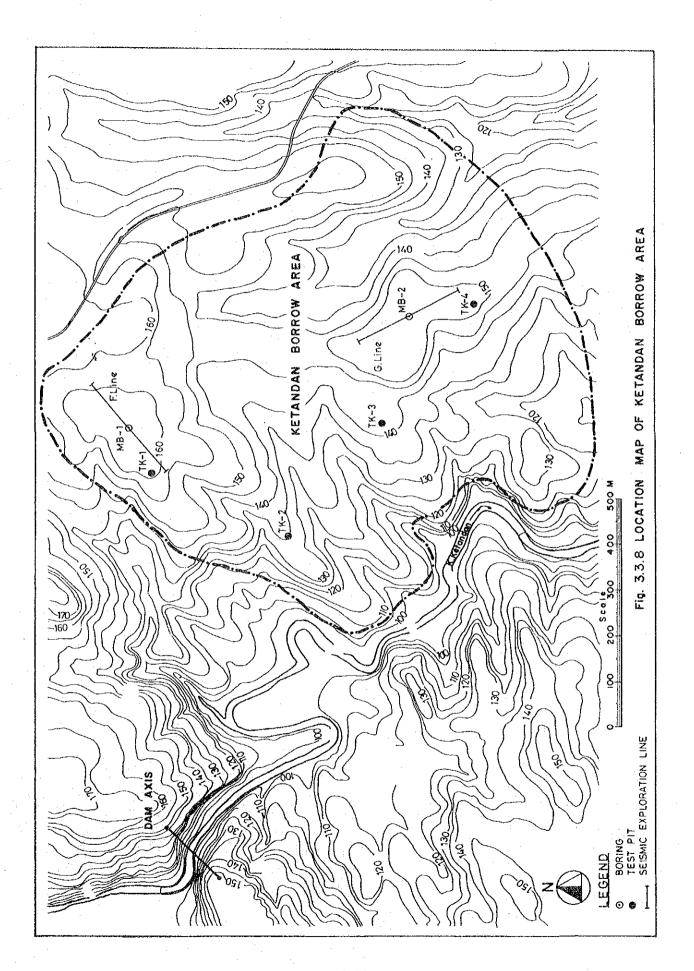


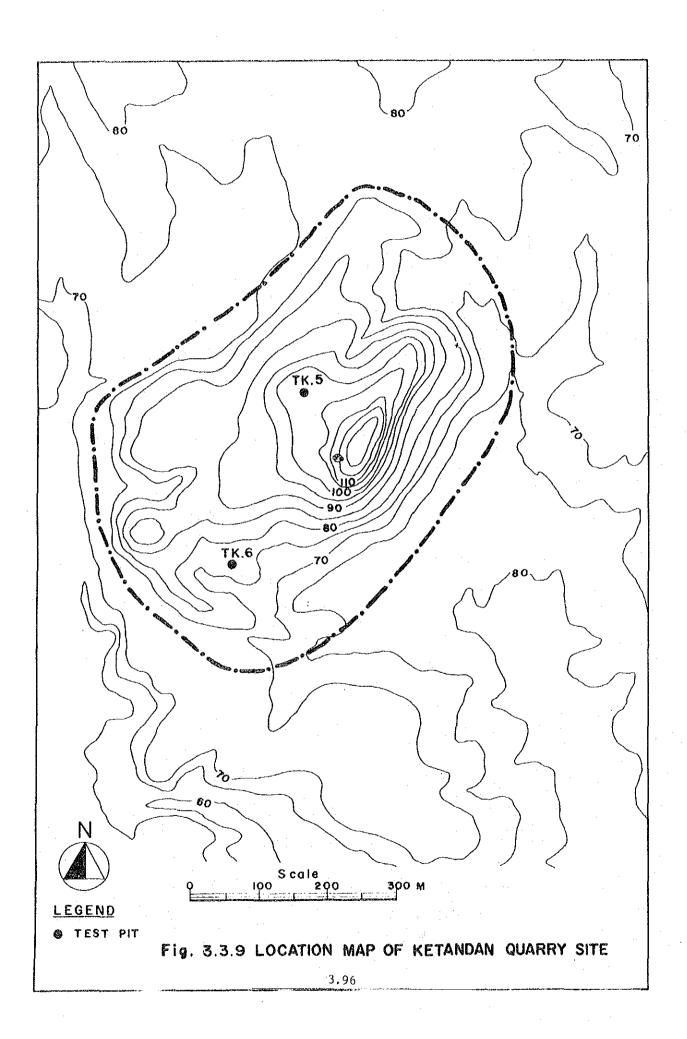
KEDUNGWARAK BORROW AREA IV

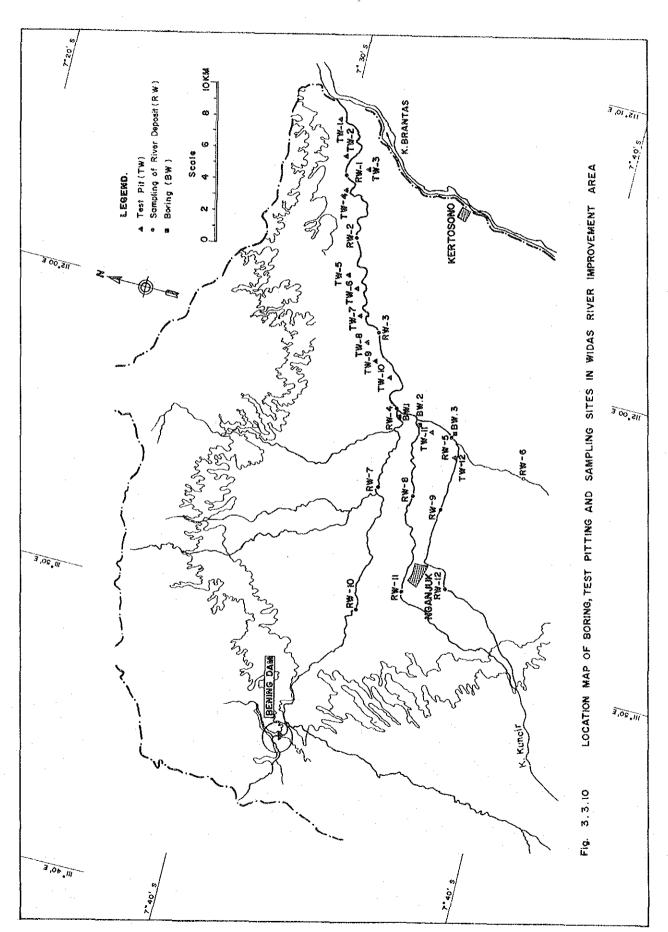


SIEVING ANALYSIS TEST RESULT OF FILTER, DRAIN AND FINE AGGREGATE FOR BENING DAM CONSTRUCTION 3. 3. 8.









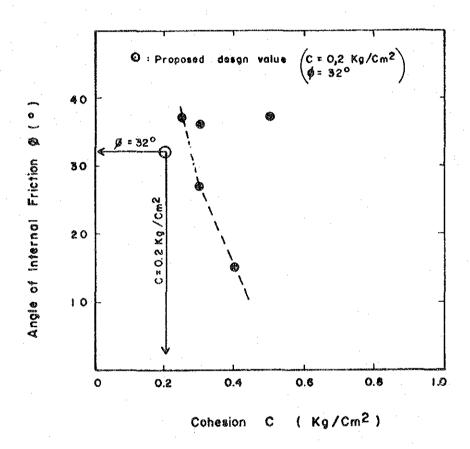


Fig. 3.3.11 RELATIONSHIP BETWEEN COHESION AND ANGLE OF INTERNAL FRICTION FOR EARTH MATERIAL IN KEDUNGWARAK EARTH BORROW AREA IV

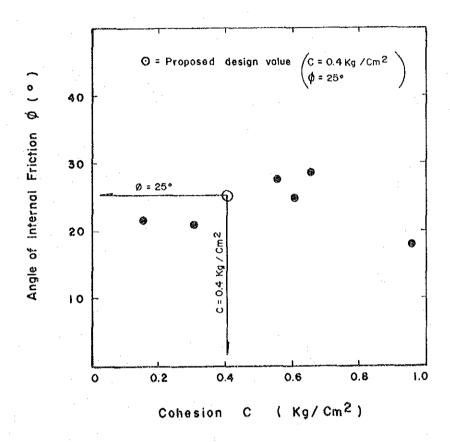
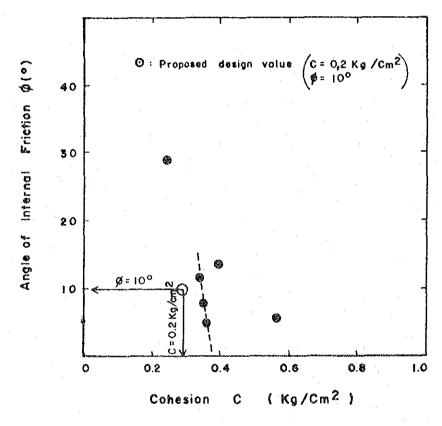


Fig. 3.3.12 RELATIONSHIP BETWEEN COHESION AND ANGLE OF INTERNAL FRICTION FOR EARTH MATERIAL IN KETANDAN EARTH BORROW AREA



Note : Borrow area is assumed to be along the river channel

Fig. 3.3.13 RELATION BETWEEN COMESION AND ANGLE OF INTERNAL FRICTION FOR EARTH MATERIAL IN WIDAS LOWER FOR LEVEE EMBANKMENT

	1916	OJEC	<del>г Т</del>	DRILL		ROL AND DRAIN			INO.	B. I DEPTH	SHEET 50 r		OF ELEVATION		
		21116		KETANDAN I			MOL I NOUE	101	<u> </u>	ENCLINATION		n	DRILL RIG	156.10 UD - 5	m
ĀΫ	Eñ.	AGE (	ORE		212111 211	DATE	FROM Sep. IO		24'85	DRILLE	<del></del>	s	LOGGED	M.F	
Į				ROCK TYPE						cons		T			7
DATE		ОЕРТН	ELEVATION	ÓR	COLUMN	DESCRIPT	ION	ÆT.	LEVEL	RECOVERY	R. Q. D	WAI	ER PRESS		
ч				FORMATION	SECTION			BIT & DIAMETER	SROUNDWATER LEVEL	92 cm	:		LUGEON A	ALUE	
82	-	0.1	156.0	lop soll	///	Dork brown, o	loy	1	_					Õuoin	
ω.	{			· .	11/1	Strongly weoth		1					Y Volue		
=[				Sandstone		light brown, tri		D						76	
3	-					rother soft							V Volue 9 \ 12		
Ň	-	<u>65</u>			12, 4								(2 6 7		
1				Sandstone	1/1	Weathered, fine crushed brown							16,/	62.7	
85	-	9.5		Odilostorio (				CL					7		
	-[	108		Sondstone		Weathered, fria fine groined, so	ibleie ried, brown	UL.				10	4		
2		120		Sandstone				-							
Sep	-			,	177	Weathered, Irla line grained, w								551	
S	_			Sandstone		grey		CM							
85		16.4		·	<i>[::/:::</i> ::	Slightly weathe	red crocky	1							
	- [				1/1/	rich joint with s	lickenside		1				37.9		
Sep	1	-		Sundstone		fine grained, gr	ey	CL					37.9		-
F	4	200			14,			1	1						2
8	-	1		Sandstone		Slightly to mode rich joint with ste	sined color	ם [	1	100					
2 €	_	223 230		Clayey sond		fine grained, cre friable fracture	acky and d	"					38.3		-
Seb	- 1	245		Sandstone	1	// /	<u> </u>	CH	1						
—Ē	-	250		Clayey sond	77777	Strongly weather	ered,	5	1						Ш
8	_	ļ				and fractured	ciayey						100		
8						Strongly weathe	red, sondstone		∇ 28.20 m				27.2		
Sep	-					altered into clay	, grey		28.20 m	1					
85	_			• .		rother soft		-							
o l	-}					Colcoreous, fine							7777		
Sep						gray	122146	1					22.8		
S	~-							١							-
85	4			Sandstone		ajtered into clay,	ered, sandsione , gray	СН			[1]				
ន្ត	- ]			Salidatollo		rather soft	Tarina Tarina				1		270		
Seb								1					) )		
	$\dashv$	:			1	Calcareous, fine	orologd						1 1		4
82	-					compact partial	ily jointed								
~	- [			•		moderately hard	i	1					262		
Sep	-														-
82		ļ				·		1							
22	-	47.5				Weathered, fria	Na		1 1						
Sep 2	_	488		Sandstone	77	joint offered into	clay	D					25.0		$\  \  \ $
Š	_	500	· .	Sandstone	<u> </u>	gray, weakly cen	nented	СН			11000				5
نبيلين	-	ļ		1		/ /		1							
	-					Calcareous, fine	grained								//////
1		4				compact grey	1,1								
	-							1							
	-	:	:			·		1							-
	~ I			l'	t ŧ	BIT DIAMETER	: 56 mm	1	l	tilllllitti	: ((11111111111111111111111111111111111	utititilli		880000018810EE	11111 <b>1</b>

<sup>#</sup>R.Q.D is Nock (Posity Designation, R.Q.D= (Total length of cylindric cures longer than 10 cm)/(Total core length) x 100% #LIGERN VALUE is Visial's under injection water pressure of 10% g/cm.
#DEFTIL and ELEVATION are in meter

LOC FORM-B

NIPPON KOEI CO., LTD. CONSULTING ENGINEERS, TOKYO.

	SITE		KETANDAN					INCURSIN		
WE R	RAGE ECOVE	FY			DATE FROM	TO 2	`` <del>`</del>		I SIYADI	LOGGED M.F
112	KL-12st	Set Ext 1	ROCK TYPE OR FORMATION	COLUMN SECTION	DESCRIPTION	MIT A DIAMETER	LEVEL	COLO SECONED	-R Q D	HATER PRESSURE TEXT
+	.0Б		Top 1941		Clay to sill, dark brown	-	-	), <u>"</u>		N - Value
<u>-</u>	-	•	Sond \$1008		Strongly weathered light brown fribble, portly altered	D				*11
3	-	ľ	3010 1141	1/1/	in to Gloy, rather soft					2606
2	33			//	Strongly to moderately	<u> </u>	Ì		_ '	67.2
2					weathered brown, crocky frioble, weakly committed fine					
<u>.</u>	_				to medium grained, rich joint well stained in color, rather soft					·
إ	1	ŀ	Sand stons		10lber 2011	CL				51.0
<u>, , , , , , , , , , , , , , , , , , , </u>	-	}	ļ	4		ļ			<b>A</b>	1
Š				1	Strongly weathered sand stone attered into clay, grey rather soft				i i	·
╁	17.0		Glayey sand			ь	1			41.0
4.85	19.5	ļ		ang	Cotoorsous slightly weathered rich joint, crocky, partially	-			70	
9	_	Į	Sond stone	//	fractured, grey	C₩ }				41.8
85	240	,		//	Calcoreous slightly	CL.				47.0
Sep.17	_				weathered compact, gray, partially weakly fractured	ŀ				
82	-		Send stone		joint attered into clayey at 28.2 - 26.4 m, 28.8 - 29.0 m	СМ				28.0
œ.			05.00 51010		•					
Sep	320				Moderately weathered,	ì			200	- Curry
2	]		Tuffaceous sand stone		colcoreous, rough surface, contain mass clay, medium					35.7
9.61	<u>-</u>		23.2	/	weight rather hard, withish grey with colcite	┢				
Sep	_				rein				<b>E</b> T	27.2
92	-}	١.		//	Colcareous, fine to medium	)				
0.20	-		Sand stone		grained partially strongly weathered jointed with	СН				40.00
SS			Said Sixie		cotate rein of 413 - 41.6 m, 440 - 45.0 m, 450 - 45.3 m,	i				23.2
9.2.8	-	l		//	490-492m,	СМ	45.00n			743
8	-	1	} .	/						. 19.9
22	50,	, x				1				
	7-							<b></b>		
	51		İ				İ			
	52		ļ						10	}K=2.71×10 <sup>4</sup> cm/se LU =19.7
1	53		1		m. The billion and a pinc	l		-60	SO	1 20-19.7
ŀ	54	]	ĺ		Greyish white colour fine sand size, medium com - paction, contained carbo-		1			
į	55		Sandstem.		nate, medium hard.			164	11	
Ė	56				:	}		103	49	
Ĺ	57		]		,	]	١.	83		K = 2.04 x 10 cm/sec
ŀ	- 58					ĺ	On 35.77π			LU≖14.8
L	59	79.52	<u> </u>		Grayish white colour, med	1	depth.	00	æ[	
	60		Sendstone.		sand size, med compaction, contained corbonate, me ~			iGO.	•	1
Ė	151	77.78	<u> </u>		dium hord. Greyish white, colour fine	1		100	63	K+3.I3xID cm/sec
1	62	76.12	Sandstone.		sand size med compaction contained carbonate med nard.			100		LU = 2.12
L	63					]		8.0	10	
عليسلند	64	Ì		-7.5.				<b>82</b>	[	
	65	}		-2-2-						
Ĺ	66	ļ	Mort.		Grayish white colour sitt cloy size compact med			100	25	
-	67				herd.			on		
	68				•					K=1.645×10 <sup>5</sup> cm/sec
E	69							100		LU = 1.153
	70				•			100	72	
-	71	67.82				-				
F					BIT DIAMETER: 56 mm					
	-{									
-	-	:								i .
$\vdash$	1									
Γ	L	L		L				L	L	

	PROJEC	T	WIDAS FLOO KETANDAN	DAM S	TROL	AND DRAI	NAGE PRO	ECT		DEPTH	60 r	n	ELEVATION	99.65	m
ŸĊ	RAGE LECOVE	CORE	IN IMITUALLY	VMIN 31	1 55	DATE	FROM Aug II	ΤΟ Διι	a 30'A5	INCLINATION DRILLED	90°		DAILL RIG	UD - 5 M. 1	
Ť		1	ROCK TYPE	1	<u> </u>		1	4	- <u>-</u> -	<del></del>	T HILDELINI	<del></del>	COOURD	M. I	
	рертн	ELEVATION	OR	COLUMN		(AFFCRIA)	7.534	BIT & DIAMETER	GROUNDWATER Q LEVEL	CORE	B 0 D	WAT	ER PRESS	ORE TEST	ī.
1	ÖEI	EV	FORMATION	SECTION		DESCRIPT	IUN	A ME	UNDWAT LEVEL	RECOVERY	R. Q. D		LUGEON	VALUE	à
1	0.6		L_	1,,,,	ļ	· · · · · · · · · · · · · · · · · · ·			ĝ∇	% cm	50 %	<u> </u>	0 20	39 (9	50
F	- 0.0 <sub>-</sub>		Sondstone	1.6.6.6.6	SI gr	rongly weather	ed, crushed	b	0 m						
1	-	l	1		<b>,</b> , , ,	,,							20m	8.00 m	THE .
F	1		1		ĺ								4 20 m · · · · · · · · · · · · · · · · · ·		
( -	-	!	1								444		JIZ 7		100
f		•	1		Τι	ffaceous and	calcareous,								13 -
1	1		ļ		fin	e grained com	pact, light						4 20 1	000 m	3
ľ	1					lghi, rich joint sclured, gray	party								30 -
	1			<b>/</b> ::::::	"`	sciorau, gray							86	2	3
		l	1 .					1							3.5
	]	!	Sandstone					СМ							
E.,	1														闘 -
!	.													ALA B	
1				1:::/::	l r										-
ŧ				7								111111111			∭-
F	-{			Y	/ / ~~	logranua urom	there d								ML
-	1		1		/ rai	lcareous, wea her soft, fria	ble								∭.
Ł.,	1				/ wa	ackly Joint will	slicken side,		'			97			_
			İ		/ gre	y					<b>N</b>	200			-
Ė	20,5			12612	ľ							3			11 20
E	22.7		Sandstons	11 11	_			CM CL				333			-
	22.3	}	<del></del>	-//-				-Ch							$\parallel \mid \vdash$
				~	Çic	yey to sandy,	compact, grey								-
	]		Mari	~~	1118	sole i bos trollà	compact, gray	CL				200			-
L	4			~~	_			] ""							₩ -
1	27.0			~ <u>~</u> ~											
	-		Sandstone	1	Co	lcareous, silgi athered, main	ntiy	CH				ijφ			∭ -
Ŀ	29.3		Sundayona	[::/:::	Cos	arnerea, main mpacted, grey	iy '	СМ							
ŧ.	-			\~ ~	<u> </u>			Γ			21 12	ЩЩ			3
1				_~~											<b>III</b> -
F	1			_~		ndy, friable rtially clayey,	orav -								<b>    -</b>
-	1		Mort	~~	"	,,6,,	4.37	CL							-
	٦ :			\		<del></del>	:	1			331				<b>    -</b> -
	36.0			~_	V	**						Hiiii			-
Ľ			Morly	アグ	Sti	onaly weather	ed								ii  -
			Clay	/~/~/	fre	iri, altered into ctured grey	clay, soft,	ם				1 6			- III
L	39.0	ļ		1-1	۱" <sup>۱</sup>	arered Algà									
F	4			~~	$\setminus$										a
F		:		~~											11
ŀ	-			]~~	_	<del></del>	**	1							1111
	1 - 1		1	1~ ~ l	İ				٠						₩ -
F	1		Mari	_ ~		*									<b>    -</b>
Ī			Mart	~~	So	ndy, fractured		CL				$\mathbb{H}$			₩.
ĺ	1			~~	gre		*-	₹ .							-
E				$ \sim\sim $			•	D							-
Ė			1	·~~											-
E	4			ائہ ~	ر	· 		1 1							برا ا
Ì		1.		~_~	/	.•									#II^
H	52.0		<del>- </del>	$ \sim,$	Str	ongly weather	ed	ļ							1111 -
				ブ~	mo	rl, altered into	clay					0%			-  -
	-		Mariy Clay	/ ~-/ l	801	l, grey		D.							
t-	56.0		""	ン~/											<b>    </b>   -
-	""			<u> </u> ~~					i						
			1	~~		dy, froctured		CL							∭.
	]		- Marl	~~	gre	у		D							-
	60.0		1	ı ~ ~		100		ויו					1916H (11111HH)		11111 -

<sup>\*</sup>R.Q.D is Bock Quality Designation. B.Q.Dm (Total length of cylindric cares longer than 10 cm)/(Total core length) x 100%
\*\*LUGEON VALUE, is Point's under injection mater pressure of 10kg/rm'
\*\*DEPTH and ELEVATION are in meter

BIT DIAMETER: 56 mm

CONSULTING ENGINEERS, TOKYO.

	DJECT	r l 16	VIDAS FLO	0D C0N	TROL AND DRAINAGE PRO	JJEC	Т	DEALH	50 m	ELEVATION 12	3,14 m
	SITE	H			ITE COORDINATE :	:		INCLINATION			JD-5
ER.	AGE C	ORE			DATE FROM AUG.15		<sub>3</sub> 30 85	DRILLES	SIYADI	LOGGED	u.F
	DELTH		ROCK TYPE OR FORMATION	COLUMN	DESCRIPTION	BIT & DIAMETER	JEVEL, LEVEL,	CORE RECOVERY	R.Q.D	WATER PRESSURE LUGEON VALUE	
	_85_		TOP SON	177	Cloy, dark brown		- <del></del>		<u>-</u>		
			Regival sail		Strongly weathered sandstone	D.					-
- }	-30			11/1	brown	-				137.1	
	_30		Soncatons		Strongly to moderately		ĺ		<b>3</b>		
-	- 1										
			Sondationa	11/11	wanthered fractured, rich	CL			<b>3</b>	81.4	3
-	94		Candadaa	11	jointed with stolned color	CM	•				
	10.4		SOMOTIONS	170	fine grained	- ···					
-			Turreleous		Silahtly weathered, compact,	CL					
	14.2		SQUOERNOS	11/11	cologrepus, contaîn coloife :	L	ļ ·			38.5	
-				· /	rather hard	ŀ			<u> </u>	1	_11
				/	Manhanad handly tenetured	СМ					
			Sendationa	:::/::	colcoragua, contain some	1				33.8	-
				/	towall fragments rather hard,	ÇL.					_ <b></b> _k
-				/	Oray		21350				
ŧ	220	<del></del>		ļ'	Slightly weathered, fine to		1			41.0	1 [
					medium grained partially		ļ				4
		WIDAS FLOOD CONTROL AND DRAINA   KETANDAN DAM SITE   COURSTATE   CONSISTE   COURSTATE   contain clayby sandstone									
-		ROCK TYPE   COLUMN   DESCRIPTION	\	}				30.0			
				/···							
					Calcareous, fine to medium		1				3
-			- E		and coarse grained, not		ĺ				
				/	sorted, light weight, rather	CH				25.3	
Н			Sondstone	/	hammering at lower portion.	l					
					Portigily exposed elicken	СМ					
					side joint, grey					35.0	
						İ					
	:				,		1		_	-	3 4
			,	/							1
1						l	]			37.1	
	450			1		L					
					Calcareous, fine grained,	СМ					∦.⊦
			Sondstone	/	bedding, rather soft dark	l			222333	44.9	
L				/:		CL				L.	
Н	500	<u></u>		11111	·		<del> </del>		12	48.40	
	5 F						ľ				
F					Greyish white colour, fine sond size, medium hard,		On				
П	52			::::::	contained carbonote.		15.32cm			19 19 1 P	×IQ da
Н	53		Sandstone		exposed joint, tight, in- terval more than 50cm.		depth.	co.			21.96
	54		Congaiona.	ļ: : : i i i	· · · · · · · · · · · · · · · · · · ·	ļ		COST N	333		
ŀ	.								0	84.30	
H	55			<b>.</b>				-	70		
Н	56				,				<b>P</b>	K=1.06xt0	cm/sec
	57			:::::				34	f I	LU = 0,81	
-	}	81,29	·					100	61		
	58									57.00<	"
Ц	59				Consider the 111	ľ					· ·  -
	۵				Greyish white colour, silt clay size compact, med	İ		100			
	60		Mort.						19		
$\dashv$	61							90		LU = 0.82	
	62									20-0.0	: <b>.  </b>
-1	- 1							ion			
	63		•						0		Γ
	64	74.82			· · · · · · · · · · · · · · · · · · ·			288888		84.00/	-
-	64	74.82		~ ~						5•.09/ 	

PARD in Rad Quity Dispersion. RQ.D = Tests length of cylindric cores to-per than 10 pm// Tests core length' + 1005-RLOGEN VALUE is I am' in order expersion water pressure of 10th pm'. GORPH of all ELEVATION are to water NIPPON KOEI CO., LTD.
CONSULTING ENGINEERS, TOXYO.

LUC FORM B

3.104

_1	ROJEC SITE	T	WIDAS FLO		NTROL AND DRAINAGE	PROJE	CT	DEPTH	50m	ELEVATION	139.06m	
νŒ	RAGE ( ECOVE	ÇORE	NE I MINUAN	DAM	· · · · · · · · · · · · · · · · · · ·	:	70'or	INCLINATION	90°	DRILL RIG	UD - 5	
T <sup>II</sup>			DANK MILE	7	DATE FROM Aug. !!		· .	DRILLED	MODIE	LOGGED	M.F	-T-
	ОЕРТН	) ATT	ROCK TYPE	COLUMN	DESCRIPTION	1313	UNDWATE	CORE RECOVERY	R. Q. D	WATER PRESS	URE TEST.	7
	30	ELEVATION	FORMATION	SECTION	· · · · · · · · · · · · · · · · · · ·	BIT &	ROUNDWATER		4. 0	LUGEON A	ALUE	à
	0.2		Top soli	11177	Sandy silt, brown		- S	% cn				ᆲ
-	30		Sand stone		Strongly weathered, light	d	1			ŅΗVelu	ė į	1
-	3.0 4.0		Sand stone		brown to whilish grey fractured					272	3	
	5.0		Sand stone	17.7	\ \	_	1			Υ⊤ Υου 12 476		╟
-	+				Strongly to moderately weathered, fractured whitist	СМ						1
					\\ grey				r e	56.0		-
F				1:/:	Weathered, cracky, rather					$\sim$		
	1			Viii ii	soft, grey, friable	CL,						<b>-</b>
	-	ļ			Frach to ellette	T	1					Ŀ
					Fresh to slightly weathered calcareous, rich jointed					3(4)	man.	∦.
Γ				:::::;	partially fractured with	. см						-
3	1		Sond stone	1::/:	calcite rein at 8.2m - 11.0r 18.2m - 19.8m , 20.5m - 21.6i	1 6 1					7.00	1
īĒ					23.9m - 24.7m <sub>1</sub> 27.0m - 27.4 m.					240		-
Ä				111111	fine to medium grained	CL.	1			35.e		1
F	1			:::::		CM						-
	-					CL						Ĺ
*				:::::		СМ				20.6		
				· /	·	CL				20.6		-
-	1			/:::		CM				No.		
}_						CL				15.0		1
	30.0				Calcareous, slightly	7				50		11.
1				:::/	weothered, fine to medium	СМ	V					1-
₽	-		Sand sione	//:	whitish grey, rather soft	1	30.80 m					
	33.5			V	Weathered, calcareous	CL				30.6		.
1			Tuffaceous Sand stone		rough surface, medium							
Ē	36.3		-	<del>  /: } : :</del>	weight rather hard whitish grey with colcite vein	-	-			30.8	1	
	- I									35,2	J. Janes	
				:: <i>:/</i> :	Colograph from	-					Transition in the last of the	-
	]			<i>:::::</i>	Calcareous, fresh to slightly weathered rich							#-
	1		Sand stone	:::::	joint at upper part rather	1 .						L
	] ]	:		· /	soft, fine grained grey	11	1			Z 1,3 11 11		-
1				/		СМ						<b>∐</b> -
3	1				70.11	4						-
	48.0	·	-		Colcoreous, slightly weathered, bedding dip					28,7		
i	50.0		Sand stone		about 30°, rather sofe							1.
					friable, fine grained grey partially stained color							1
E	4 1					7						-
					: ·		1					╢.
F-	1 1	Ì		i i	BIT DIAMETER:56mg	•		ammuun k			,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	

<sup>\*</sup>R.Q.D is Bork Quality Designation, R.Q.D = Crotal length of cylindric cores longer than 10 cm/cTotal core length) x 100% \*LUGEON VALUE is Uniform under injection water pressure of 10kg/cm' \*DEPTII and ELEVATION are in meter

LOC FORM-B

NIPPON KOEI CO., LTD. CONSULTING ENGINEERS, TOKYO.

		OJECT	<u> </u>			TROL AND DRA	NAGE PRO	JECT		DEPTH	50	n	ELEVATION	100.95 f	n
ĀŶĬ		ITE GE C COVEI	ORE.	KETANDAN	DAM SIT	E COORDINATE DATE	FROM Com. A	TOP	- 03 <sup>1</sup> 0#	INCLINATION	90*		DRILL RIG	UD - 5	
202					T	DATE	FROM Sep 4	8 E		DRILLED	MISEN	li T	Logged	M.F	· Y-
DATE	į	DEPTH	БІЕУАПОН	ROCK TYPE OR	COLUMN	DESCRIPT	ION	ETE	UNDWATE	CORE RECOVERY	R. Q. D	WA	TER PRESS	URE TEST	Ę
١		30	ELE	FORMATION	SECTION			BIT DIAMET	oroundrater   ≤evel	36 cm	ei 4		LUCEON	VALUE	DEF
8	- [	2.0		Mari	7/4	Strongly weather decomposed, so	ed	D	0 m						<u> </u>
4	_	30		Marly clay	11/2/	dacomposed, son	ii' Aieà	Ů						N - Válue	-
혉				1 .	~~	Weathered mari							12.4	35 %	
3					~Z	into clay, soft, b	rownish								1
` <b>!</b>	- [	•			Z~								Ų.	501	
	_	: '		Mari	~~]			CL							-
ŧ	$\dashv$	.			~~	Rather soft, from	ctured								ΙO
OF E					~	Whitish grey					ğ				-
읔	-	135	_		~~								3,4		
200	1		- ,		~~										
SE	-			Mori	~~	Compact, light w		CM )							
- 6		[			$\sim$	partly fractured, whitish grey	rother soff,	CL					48		-
ള	-  -	19.3			~~										
3	_				7/2										20
1	$\dashv$			Mart	~	Fractured, soft, partly altered into	n clay	CL.							
2	_				~~	gray to brownish	ātsā	Ď				11.00	4.6		-
£	-	25.0	• >		//~			ļ							∭-
21					~~	Coimpact, light w	relaht								-
_	4					friable, rather se	off,				***		No	63	-    _
8					~~	partly fractured Joint with slicker	side	CM							12/
2	- ]				~~	at 26.5m - 27.5 n 35.0m - 35.4m,		)							
20	1			Marl	\ \ \		• /	CL.				o:			
8	-				~~										
2					~~										-
20 E	-	38.0			~~	Fractured, claye	v								
Sep	-1-	39.0		Mari	7774	marl, soil, grey		D							-
1		ĺ			\ \ \						<b>3</b>				10
SE	_				~/										-
2	-	-			12~	Compact, light w	eighl,	CM				j j			-
炸	_				~~	friable, rather so portially fracture	i,	1							
3[	-			Mar)	~~>	rich joint, whitish		CL							
3					~/~	*		VL							-
ì	-  .	500		1.	\^_		1 * .								-
-[	-	50.0			~-										5.0
ŀ															
E						BIT DIAMETI	ER : 56 mm								-
į.	-														-
į	1					•								***************************************	
i i	$\dashv$														
1	_ _														-

\*H.Q.D is Rock Quality Designation, R.Q.Dn (Total length of cylindric cares longer than 10 cm)/(Total care length) × 100%
\*ELICEON VALUE is Umin/m under injection water pressure of 10kg/cm'
\*DEITH and ELEVATION are in meter

CONSULTING ENGINEERS, TOKYO.

: PI	ROJEC	r	WIDAS FLOO	D CONT	TROL AND DRAINAGE PRO	IOLE		DEPTH	SHEET 50 m		102.86 m
	SITE		KETANDAN I	DAM SIT	E COORDINATE :	:		ENCLINATION	90*	DRILL RIC	102.04 111
VER	AGE (	ORE			DATE FROM Sep 3	TO Sa	024'85	DRILLED	MASTU		~ <del></del>
			ROCK TYPE			-		<del>                                     </del>	1 1117010	<del></del>	<u> </u>
5	оертн	ELEVATION	OR	COLUMN	DESCRIPTION	BIT & DIAMETER	CROUNDWATER	CORE	R. Q. D	WATER PRES	1:
3	30	Ę	FORMATION	SECTION	DESCRIPTION	BIT	1 5 5		и. ч. р	LUGEON	VALUE
1-	10		Top soll	17777		m D	8	96 cm	10111111111111111111111111111111111111	unianiiniini	main conformit
3-	J.Q.			7777	Brown sili soft	<del>  "-</del>					
,	3.0		Sondstone	/ / :	Weathered colcareous	CL					
	43		Sandy mari	~~	fine grained fractured	CM					
_Ł.	5.0		Mari	アベ	brown						
			Mari	~~	<b>\</b>	CM	5.70 m				
<u> </u>	7.2		-	~	Compact, light weight friable, rather soft		3.10111				
			1		grey						
2				//~		-					
<u>,                                    </u>				[ ]	Fractured, grey	CL					
						7				35	
-[			Mari	1/1/	Compact, light weight friable rich joint	( )				99	
	•			$\angle$	with slicken side	D				33	
					rother soft grey	1					
3	17.0			~/	\						
	180		Mart	1111	Fractured, rather soft	D				3.8	
				1~ /	light weight, grey	}					
<u>,                                     </u>											
					Fractured, clayey	1					
	l .		:		mari, soft, grey to	١				44	
				1	prowu	CL	ļ				
1			1	1//		-{ <i>l</i>					
3			Mari		Mainly fractured,	D	İ				
				1	partly compact, light weight						
				2/	friable, rather soft,	1				4.3	
1				17	grey	1					
3				$\Gamma A$							
2	320			1//		L					
350			Mari	12//	Fractured, altered into clay, soft, grey to	١.				26	
	35.0		Mari	1//	brown	D	1				
-E- I							ĺ				
					Cracky and rich joint					in the second	
`			Mari	/	with slicken side	CL				22	
	400			r~ 1	grey						
F	400		<del>- </del>	177	<u></u>	<del> </del>	·				
2				17//	Fractured, altered						
			Mari	1/2/	into clay, strongly weathered, soft	D				27	
				1//	grey lo brown					Name of the last	
¥-1	45.0		1	1//4							
				~ <i> </i>		].					
			Mari	1/-	Cracky and rich joint	,,					
	.			V. 1	with slicken side, grey	CL					
	500		_ <u> </u>								
							,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,				
H			1			1					
					<b>5.5</b>		ł				
					BIT DIAMETER	]					
H							Ì				
H	.					1					
			1 .		4	1					
<u> </u>	·		<del>-1</del>		of cylindric cores longer than 10 cml/(Total co	J	ـــــــ	mannii L	IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	KOEL CO	tatini ke ka ka j

	ROJECT						DRAINAGE	PROJ	ÉĆT	DEPTH	50 n		ELEVATION	99.202	m
	SITE	ORE	KETANDAN	DAM S	SITE	COORDINAT	FROM Aug.16	**************************************	20/08	INCLINATION			DRILL RIG	UD-5	
Ř	AGE C		and the same of the same and the	<del>                                     </del>	-	DATE	I ROM AUG.16	400.00	- <del>-</del>	DRILLED	MASTU	'N .	LOGGED	M.F	-
:	Ĕ	ELEVATION	ROCK TYPE	соглин				BIT &	SROUNDWATER	CORE	R. Q. D	WAT	ER PRESS	SURE TEST	臣
2	ОЕРТН	EVA	OR FORMATION	SECTION		DESCRII	אטודי	BIT	XUNDWAT LEVEL	KECUVERT	K. Q. D	ı	LUGEON	VALUE	뱮
<u> </u>	F-0.5	tu		77777	<u> </u>	- 11		1 to 0	5 V	% (m)	minanenen	111111111	0 20 		×
	0.5		Top soil— Sand stone	77777	\ <u> </u>	own , silty		Į o	+1.00						
1-		~~		7.7.7	51	rongly wed	ilhered, grey	<u> </u>	1						-
	[ ]		Sand stone	11	C	alcoreous,	weathered	CF	1						
	5.0		·	<i>:::/</i> ::	Cr	acky, comp	oact, rather soft	ļ	ļ		1				
ŧ					Qr.	ey			ļ						-
1				<sub>/</sub>									272		
E	]				\		<del></del>	1	1						
F	.			Z::::		olcareous,	slightly compact partly	CM							₩
		1		/	3	-	yly sand slone	5	ļ						<del> </del>
	1		Sand stone	/:-			2.0m,16.8m ~	'				1			
	<u> </u>	!		Y:::::	ţ.		m = 10.3m,	CL							_
F				/	1	eli sorted,	,lominaled, arev.								-   -
	]			/:-		·- · - •		1							
_	4 .			<b>/</b> ::::								12			_
-			-			<del></del>		-	l .						-
المالية المالية	20.8				1/	roctured v in frioble	vilh calcite								-
E	_	l	Sand stone				, γιο).	CL							
4-	23.6		1		/ w	eathered,	calcareous,	b			1		NÖBAT	Δ	-
)  -	25.0		Sond stone	177.	ro	ther soft	дгву.		1		4				-
}			Tuff	7.7./	T	uffaceous,	rough surface	.							
	27.3		Sand stone	1/1	C	ontain grey	clay bowl,					200			- III
Ľ	1		Sand stone	::./		other heav hiteish gro	rey weight, av.					4	9		-
<u> </u>	30.0		Journal and the	/:			•		1			20	9		-
LE.			<u> </u>	:::::	∫ s	lightly we	othered, fine	СМ							
*	1			/		rained, cra off.	cky gray, rothar	1	1		<u> </u>		4.5		₩
3				/:::	\*	211.		'					Ĭ		-
ĬĘ.			)		\	<del></del>		CL	ì		1				
	-		Sand stone	/		lightly was alcoreous.	ithered, rather hard and	.				2.5			-
			1	<b>//</b>	, ce	ompact, fin	e to medium		1				5		-
			ĺ	/	1 *		well sorted,								
<u> </u>	1			//	) /	rey.		4	1			1			111-
	42.0			<u> </u>			calcareous,								-
	43.0		Sand stone	11:11			ned,weakly ather soft grey	CL			Dirini	3			
-			]						[			1			
F	]			12:1		liabilie ta n		СМ			1				<b>    </b>   -
-			Sand stone				noderately rich joint with	1				22.55.27			
ρĘ	}			<b> </b> /::://	si	iken side	rather hard and	CL				5	,e		_
-	50.0				C	ompact pa	irtly fractured.	"	l						-
-		u.u.k v = ===		ľ	Contraction (p. 4	4324) to approve here	and the state of t	1	<b> </b>						<b>##</b>
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	Q.D ie Re	ek Qualit	y Dealgnation, R.Q.D≪	(Total length	of cultede		also to sestimate	11	it - Inn%	NI	PPON	KOI	CO II	TTD	_

	70000			L L()				HOLE			SHEET		<u>OF</u>	
	SITE	;T	KETANDA	NOD CON	ITE I		NAGE PRO	DJECT		DEPTH	50			
ĀVĒ	RACE	CORE	NEIMADA	UN UAMI S	11.5	COORDINATE	FROM Aug 1	. TO C.	- 7 'or	INCLINATION	90°	DRILL		<u> </u>
7		1			T	OATS	Tr nom House			DRILLED	MURK	VNI FOCE	ED M. I	<del></del>
DATE	06273	ELEVATION	ROCK TYP OR FORMATIO	COLUMN		DESCRIPT	ION	BIT &	GROUNDWATER LEVEL	CORE. RECOVERY	R. Q. D	LUGEO	ESSURE TES IN VALUE	DEPT
8	0.9		Sandston	8 ////	Stro	ongly weathe	red brown	D	∇	% (cm)	w. Karani	hooding in the state of the sta		mňl
AUG (IS	5.0		Sandston		Fine well	grained, bed sorted, cons triable, grey	dded solidated		0.65 m				y 6	
8	_6.7		Sondston	e //	, Med	ium grained,	bedded	7						
RE	7.8	1	Sandston	8 :(\;;)\	com	pact, grey, s	off	_	1				8.2	-
21 65 AM			Sandston	•	grain mine	faceous, coo ned, mixed v arais, portly silly, grey	otcanic						96.2 40.8	0
3	- 187				Cole	arenue ciltu	,		l					
2	15.0 16.0	Ţ——.	Sandston	θ	lofi	areous, silty ne grained, solidated, rai	lbor	СМ					3	<b>    </b>   -
AUG 22 B					5011			- CL				9.5		-
Z3 23 A	-				\ cate	greous, rich ite nein tight kness 2~3 n	ioint				ij	97		2
one co oz			Sandston	•	grain rath	careous, fine ned, consolid er light weigh lighty fracture ble	oled, it,							
OS AUG	30.0					<del></del>	~~~~~	_				03		y
	330		Sandston	• /	<b>g</b> rair	areous, fine 1ed, bedded 11e nein, grey	contain					8.2		-
	35.0	<u> </u>	Sandaton	. 1/1/11		lhered, luffe					r			
			Sandston		cont	us, rough su lain volconic arols	·	CL O				8		
William I do	40.0		Sandston	• ///	soft cont	ngly to mode thered, calco , frioble , gre ain calcite no volcante mir	alu A Seona	 См				e).		4
	46.6				calco	nily weathere precus, part	ially	CL						
200	50.0		Sandstone	, //		ey, calcite ne 2.5 m	In .	Ct.				7		
manual comme					Wed fine soft	lhered, calco to medium g and friable	reous rained					£		
خاسيناسماسسا سالسا					віт	DIAMETER	: 56 mm							

WRQD is Hock Quality Bengontion, RQD-l'itel length of cylindric corea langer than 10 cml/l'Inial core length a 100% WLUGEON VALUE is Iminim under injection water pressure of 10ks/cm\*

\*\*DEPTH and ELEVATION are in mater

CONSULTING ENGINEERS, TORYO.

-	en en		~~~~	TITITI		al-emphasion described			140.19	-	SHEET		
		OJEC	T	WIDAS FLO			DRAINAGE PI	ROJEC	Υ	DEPTH	<b></b>	DAILL BIG	<del> </del>
Ϋ́		AGE COVE	ORE	Me I Milher	DAN		TE FROM	то		DRILLEC		LOGGED	<del> </del>
T	KE			ROCK TYPE		<del>,</del>		8 K	ដ		<u>. l</u>	<del></del>	<u> </u>
3140		DEPTH	ELEVATION	OR	COLUMN	DES	CHIPTION	BIT & DIAMETER	SROUNDWATER LEVEL	CORE RECOVERY	R. Q. D	WATER PRES	Į.
١		30	ELEV	FORMATION	SECTION	:		MAN	NOUN.			LUGEON	AVI'ne
1	7			N 1	~			- 111 - 1.7	- G	% cm	iminii iniii	homericaerii sa	
ŀ		1.8		Mort		Strongly	to moderately						
È	-				~~	Medinal	ed, stiff, white	0					- 1
				Mari	~	Strongly	weathered					36	9.0
Į		6.0	ļ	<u> </u>	_~	fracture	d , brown		ļ				
į	-				<b> </b> ~				∇				
					~				7.80m		E I	Ĭ	1)
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							dated but friable	CM				Contract of	
1	Н			Morl			y included slicke Infal 8.5 m,	'n C				3.8	
				,		16.3m-	16.4m ,17.3 m ~	)	ł				-
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						BIT	DIAMETER: 56 mm	. ]					
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#RQD is Ruch Quility Designation, RQD=(Total length of cylindric cores tonger than 10 cm)/(Total core length) × 100% \*\*ERITON VALUE is Minim under injection water pressure of 10kg/cm²\*

\*\*DEPTII and ELEVATION are in meter

NIPPON KOEI CO., LTD. CONSULTING ENGINEERS, TOKYO,

	-			DKILL				NO. B		SHEET		1 OF	. 5	
		OJEC	T	WIDAS FLO	OOD CO	NTROL AND DRAINAGE F		CT	DEPTH	701		ELEVATION	160.26	
χŪΊ	S ERA	AGE	CORE	KETANDAN	DAM		1.		INCLINATION	900		DRILL RIG	UD - 5	
-	RE	ÇQVE	CORE RY		-	DATE FROM	TO	eratutuu.	DRILLED			LOCGED	M.F	
.[	:	æ.	ELEVATION	ROCK TYPE	COLUMN		BIT & DIAMETER	ER ,	CORE		WATI	ER PRESS	OURE TES	1 7
3		1000	EVA1	on	1 .	DESCRIPTION	ME.	GROUNDWATER LEVEL	RECOVERY	R. Q. D		LUGEON		J }
1			Ξ	FORMATION	SECTION		PR PR	200	% cm			a.out.on	VALUE.	OEP
Ì	]	0.8	-	Top soil	1/4////	Brown, sandy silt	1			minmit	mmi		niimmin	mål-
I	4	2,0		Sond stone	14/4	Caranalu washarad Bata	D							
ŀ	-			Sand stone		Strongly weathered light brown, triable fractured	l					11111		
F	-	5,0					CL S					<b>0</b> 8	0	
		61		Sond stone	177		ď							-
į	_ }	7.0		Sand stone	11	Strongly to moderately weathered, friable and					ii ita u			
Ė	$\dashv$					fracture, stained joint,			IIIII ' [		7 7	Y 11 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	O E	
ŧ	-					// brown						38.7		_
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E	$\square$				l:::::	Weathered, fractured weakly comented, soft grey,	'						7.P.	-
Ę	-				:::::	\\ stained, sort gray,					) o	)Om 1(5)	Om	
E	-			į .	];;;;;		CM					39 O	Om .	
F	- [			Sond atone	1:::::	Weathered, clayey, rather	7 C#*							
Ē		:	·		1 ::::	soft gray						53.		
Ŀ	╝		,		1:::::	<u> </u>	]	}		177		<b>其</b> 東 7		-
į.	-	;			: : : : :	Colonianus flan outland								
Ē	-					Calcareous, fine grained, consolidated, partially								
Ŀ	-				1::::	fractured with stained		21.QQm						- 1
E	7			1	:::::	joint and calcite vein, from 19 to 20 m, bedded medium		21.QQ{				2 0		-
Ė	_	24.6			1	grained grained						35		-
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Ę	1			İ						1				
E	╛						-	<b>{</b>			Ġ	6		
Ē	-					Slightly to moderately	1							
ŀ	-			Sand stone	<b>//</b> ::	weathered, weakly cemented soft, friable soft, almostly	'CL							
E	-				Y: //	fractured, grey calcareous				***		77		-
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	-	<u>35.0</u>		· · · · · · · · · · · · · · · · · · ·			ــ							Ш-
E	-				1::::/	Colcareous, fine grained	1							
E					1::/:	laminated friable partially		ł						-
		1		.[	V: ::	fractured but almostly				THE PART OF THE PA				
T.	-				::::/	consolidated compact core fractured portion (at 43.8 ~								
F	-				1:/:	45.3m, 47.0-47.7m,								
F	$\dashv$			1	<b>/</b> ::::	48.7 - 49.0m, 51.8 - 52.0m	,							
E	_	:		1	1::/	53.3 - 55.0m, 55.0 - 57.0m) from 55 to 60m, water	СМ				<b>2</b> 0	2		-
I	-]				:/::	lost during drilling.	1,							
E	$\dashv$			Sand stone	<i>Y</i> :::	·	1							
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#RQD is flock Quality Bestanation, RQD > (Total length of calledric cores longer than 10 cm)/(Total core length) x 100% #LUGEON VALUE is Minimu under logication mater pressure of 10kg/cm' #BEPTH and ELEVATION see to meter

NIPPON KOEI CO., LTD.

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		LOG					SHEET	NO. 2 OF 2	-
DEPTH	ROCK TYPE OR FORMATION	COLUMN SECTION	DESCRIPTION	ROCK	GROUNDWATER LEVEL	CORE RECOVERY	R. (). ()	WATER PRESSURE TEST LUGEON VALUE	ж
	Sandstone		Colcareous, fine groined, consolidated, porticity fractured (at 64 - 65 m.). with rich calcite noin (60 - 61 m., 65 - 65 5n 68 - 70 m.)	CM CL				70 DATA	
			BIT DIAMETER: 56 mm						Indicates Section Control of the Indicates Ind

	OJEC	T	WIDAS FLO	OD CO	TROL	AND DI	RAINAG	E PRO	DJEC	T	DEPTH	30 m		
		CORE RY	KETANDAN	VAM SI	1 6,	COORDINATI		Sep 9	TO Set	9 A5	DRILLED	90*	LOGGED	UD - 5 M. F
			ROCK TYPE	]				ocp 5				1		L
	рерти	NOLTKY TION	on	COLUMN		DESCRIP	TION		BIT & DKAMETER	SROUNDWATER LEVEL	CORE RECOVERY	R. Q. D	WATER PRESS	Ι <i>ξ</i> -
	ä	ELE	FORMATION	SECTION					BIT	E 3			LUGEON 1	MADE E
	1.0		Top soll	11111	So	ndy silt, br	0Wη		щы	<u> </u>	% cm	milioni		
	2.7	į	Sandstone		18	rongly weat			Ö					-
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					co	mpact grey	4 \$(11:1		Cf.	₩.				-
-			Sandstone	J					,	14.30 m				
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	n t. n.	ack Outili	Pesignation, R.Q.D=	Class Janet	at auti-1-t						AIT	PPON	KOEL CO.,	

OF

PROJEC	r			TROL AND DRAINAGE PR	OJECT	рести	20	ELEVATION .
SITE ERAGE ( RECOVE	ORE	BANGLE H	EAD W		; TO	INCLINATION	<del></del>	LOGGED M.F
RECOVE	COLUMN TWO		1	DATE FROM	TO  a ⊯  ∄	DRILLE	' <u> </u>	
рертн	ELEVATION	ROCK TYPE OR FORMATION	COLUMN	DESCRIPTION	BIT & DIAMETER GROUNDWATER		R. Q. b	LUGEON VALUE
1.2		Coorse sand		Tuff, silly br	10	10002000		
2.0		Sand stone	1//	Weathered, clayey, br	] ]			_
5.0		Sand stone		Weathered, medium grain contain some fossil	od	Ü		27.3
10.0		Clay stone		Weathered, tuffaceous, Interlocated fine red SS at 6.4 – 6.5	CL			241
18.0		Sand stone		Weathered, tuffaceous, contain some fossit fine t medium grained partially some gravel, weakly cemented grey	D			58:4 59:4
20.0		Sand stone						
				Weathered, tuffoceous, weakly cemented, grey				
				Weathered tuffaceous contain some grovel weakly cemented				
				BIT DIAMETER:56mm				
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eR.Q.D is Hock (hally Designation, R.Q.D = (Total length of cylindric cores longer than 10 cm)/(Total core length) × 100% 
\*\*LUGEON VALUE is Unin/m under injection water pressure of tokyfon\*\*
\*\*DECTH and ELEVATION are in motes

	ROJEC		BANGL HE	OD CON	TROL AND DE		ROJECT	<u> </u>	DEPTH INCLINATION	20 n	DAILL RIG	UD · 5	
	AGE (	CORÉ RY	was the	11 (1)	DATE	FROM	то		DRILLED	30	LOGGED	M. F	
	ОЕРТИ	ELEVATION	ROCK TYPE OR FORMATION	COLUMN SECTION	DESCRI	TION	BIT & DIAMETER	CROUNDWATER LEVEL	CORE RECOVERY	R. Q. D	WATER PRESS	URE TEST	DEPTH
	-0.4		- Gravel -	1	River bed depo	oslis							-  -
	3,5		Sandy luff		Weathered, ro soft partially a gravel at 2.5	ontain 3.0 m		5.50 m				92	-
	8.0 10.5		Sandstone		Weathered, m grovel Weathered, we	al ly	\ CF					38	· ·
لسلسا	12.0		Tuff	1//	cemented grey but reddish cot 8.0 - 8.3 m, fi	or of	D						-
	14.0		Claystone		Weathered co	ntoin			Ē			265	-
_					gravel weakly	cemented							
			Sandstone		Compact dark	grey							-
	19.0				Tuffaceous, f	ine grained,						28	-
	20.0		Clay		Grey, rather s	oft							2
استئستاسلسانسا					BIT DIAMETE	IR : 56 mm							
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	PR	OJEC	ř		AS FLO	OD CON		AND DR	AINAGI			NO. II	DEPTH	SHEET 4 II		FLEVATION			-
	SITE VERAGE CORE RECOVERY					AD WORKS		ε ;		:		INCLINATION	90*		DRILL RIC		UD - 5		
V	ERA RES	COVE	CORE		and the state of t		_	DATE	FROM	-things - the	TO	vint debulkus	DRILLED		*******	LOGGEO	M.	F	es part
I				ROC	к түре	COLUMN					% 37:	#ATER	CORE		WAT	ER PRES	SURE	TEST	12
		DEPTH	ELEVATION	FOR	AR MATION	SECTION	DESCRIPTION		BIT & DIAMETER	ROUNDWATER	RECOVERY	R. Q. D	LUCEON		VALUE		930		
	-	2.0		-	Tuff	17/1	Semi compact, white weathered			CĹ	<u></u>	9.5 cm				Ň		#-	
	_			Sa	ndstone	13//		faceous, t			( D	1							-
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WRQD is Rock Quality Designations RQD= (Total beneth of cylindric cores longer than 19 cm1/cTatal case length) a 160%whiceon values is longer under injection water pressure of 10bg/cm'
whice the Values is a specific pressure of 10bg/cm'.

NIPPON KOEI CO., LTD. CONSULTING ENGINEERS, TORYO.

	ROJE		DANOLE	FLOOD CO	MINO	L AND U		PROJE	CT_		DEPTH	4 n	<u>.</u>	ELEVATION		
VE	RAGE	CORE	DANGLE	HEAD W	UKKS	COORDINATE	FROM	: : : : : : : : : : : : : : : : : : :		U D-5						
T			ROCK TY	DE T	*	1/4/17	THOM		] E	-	DRITTED	<u> </u>	······································	LOGGED	M.F	-1-
1	DEPTH	ELEVATION	OR	COLONI		DESCRIPT	non	3T3	CINDWATE	١,	CORE	R. Q. D	WAT	ER PRESS	URE TEST	EPTH
1	Ğ	313	FORMATE	ON SECTION				BIT & OKAMETER	ROUNDWATER LEVEL	1				LUGEON	PALUE	DEF
1	0.2		Top so		1	Grey, semi c	ompact	0	1.5	,	% (-					*
	5	-	Sandstor	111111	1 ~	Waathered, r				ease.						
Ĺ	4.0		Sundato	na	] _	<del></del>		CM CL	) ·	31400						11 -
L					1	Tuffaceous, groined well	bem of enif וע hebbed	llum (	<b></b>	-						5
F	1			į	11	calcite vein,										
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<sup>\*</sup>B.Q.D is Rock Quality Designation. B.Q.D - (Total trendth of cylindeic cores tonger than 10 cm)/(Total core length) v 100%

\*\*\*LIRGEON VALUE is trainfurunder injection water pressure of 10kg/cm'

\*\*\*DEPTH and ELEVATION are in motor

LOG FORM-B

NIPPON KOEI CO., L'TD. CONSULTING ENGINEERS, TOKYO.

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◆ H.Q.D is Rock Quality Designation, H.Q.D → (Total length of cylindric cores tonger than 10 em)/(Total core length) × 100% ■ LUGEON VALUE is 1/min/m under injection water pressure of 10kg/cm² 
■ DEPTH and ELEVATION are in mater.

NIPPON KOEL CO., LTD. CONSULTING ENGINEERS, TOKYO.

	PROJEC	r	WIDAS FLO				NAGE PR	OJECT		рерти	42 1	71	ELEVATION		
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\*RQD is Rock Quality Uniquation. II.Q D= (Fotal length of cylindric cores longer than 18 cm)/(Total core length) & 100% \*LUGEON VALUE is Italia'm under injection water pressure of 1884/cm.

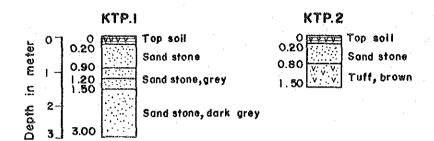
\*DEPTH and ELEVATION are in meter

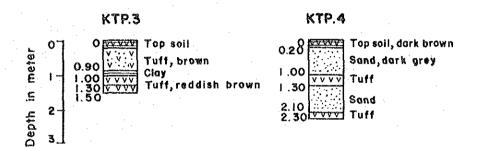
NIPPON KOEI CO., LTD. CONSULTING ENGINEERS, TOKYO.

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\*ILGD is North Quellity Designation. BAD-Cross length of cylindelic cores longer than 10 cml/(Total core length) x 100%
\*ILGEON VALUE is I/min/m under injection nater pressure of 10km/cml
\*DEPTH and ELEVATION are in meter

NIPPON KOEI CO., LTD. CONSULTING ENGINEERS, TORYO,





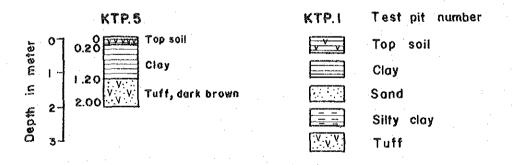
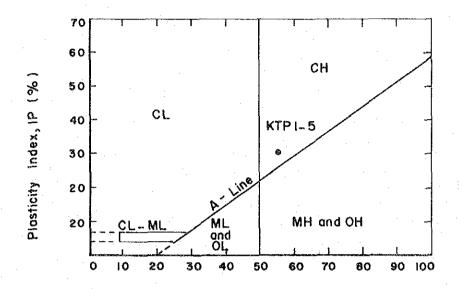


Fig. A 2.1 LOG OF TEST PITS IN KEDUNGWARAK BORROW AREA



Liquid Limit, WI (%)

Fig. A2.2

PLASTICITY CHART FOR UNIFIED SOIL CLASSIFICATION SYSTEM OF EARTH MATERIALS SAMPLED FROM KEDUNGWARAK BORROW AREA

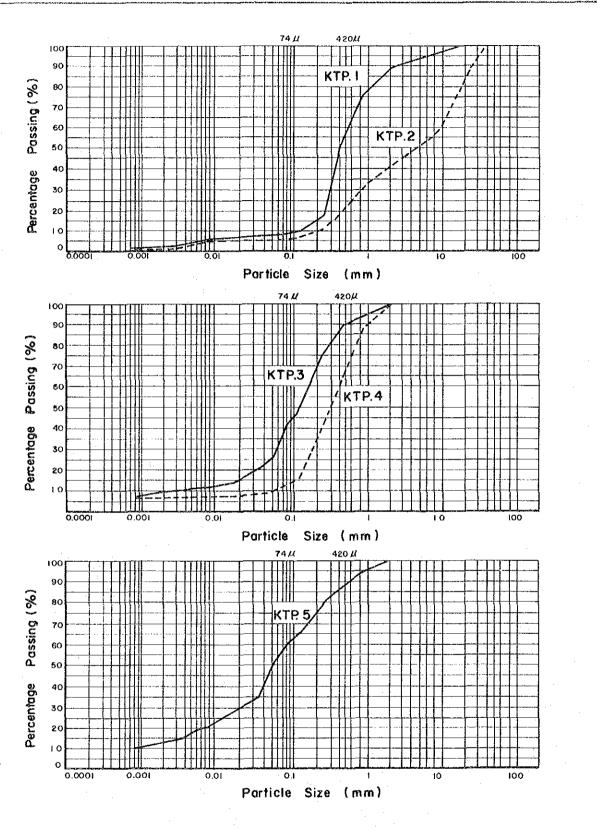


Fig. A 2.3 PARTICLE SIZE DISTRIBUTION OF EARTH MATERIAL IN KEDUNGWARAK BORROW AREA

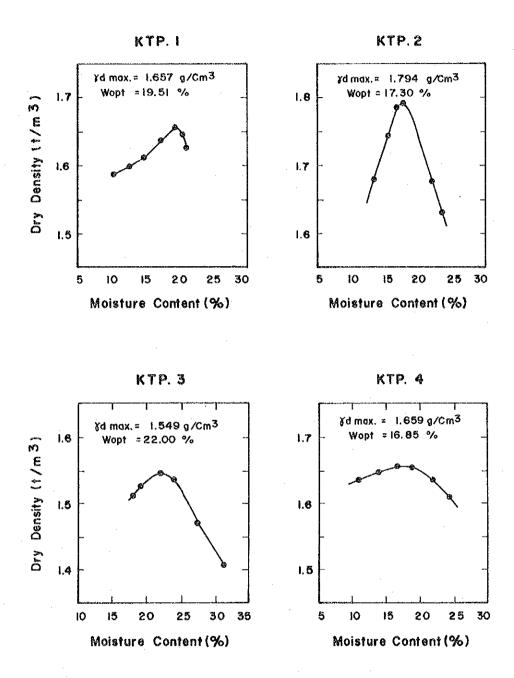


Fig. A2.4 MOISTURE-DRY DENSITY RELATIONSHIP OF EARTH MATERIAL FROM KEDUNG-WARAK BORROW AREA IV (1/2)

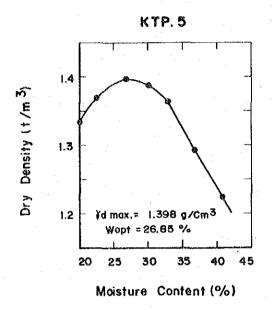


Fig. A2.4 MOISTURE - DRY DENSITY RELATION -SHIP OF EARTH MATERIAL FROM KEDUNGWARAK BORROW AREA IV (2/2)

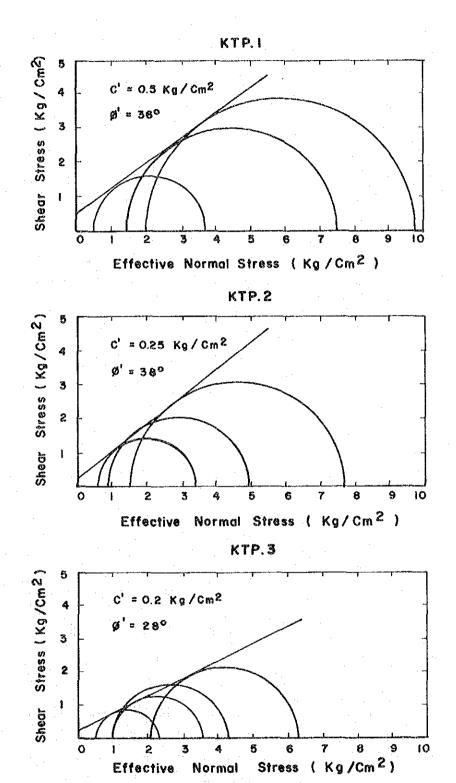
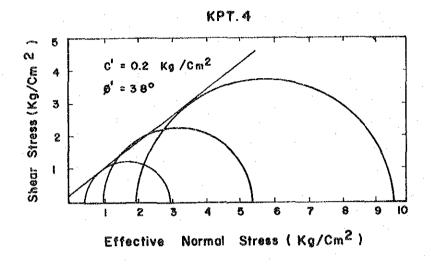


Fig. A2.5 TRIAXIAL COMPRESSION TEST RESULTS SAMPLED FROM KEDUNGWARAK BORROW AREA (1/2)



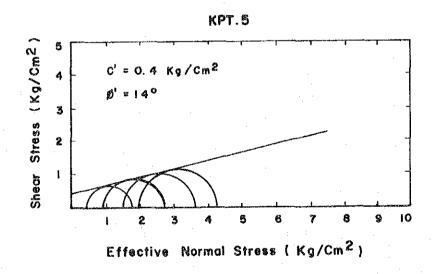
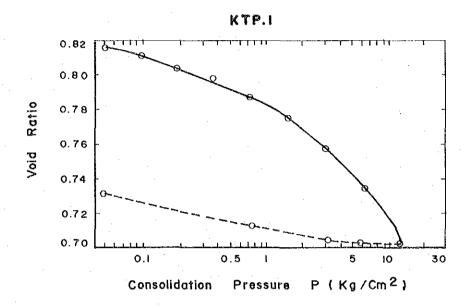


Fig. A2.5 TRIAXIAL COMPRESSION TEST RESULTS (CU) SAMPLED FROM KEDUNGWARAK BORROW AREA (2/2)



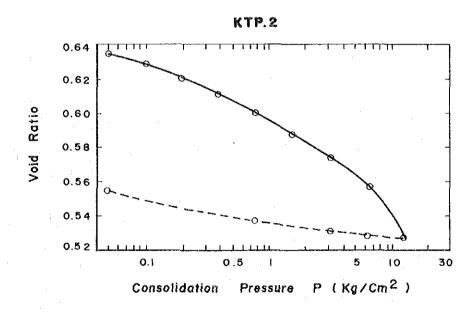
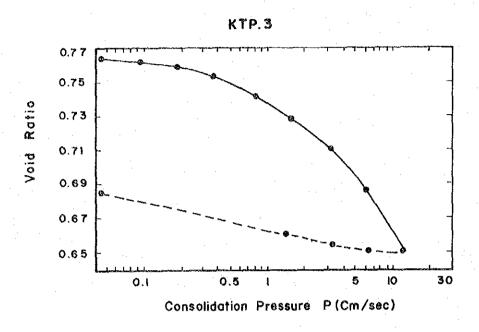


Fig. A 2.6 VOID RATIO - CONSOLIDATION PRESSURE
RELATIONSHIP OF EARTH MATERIAL SAMPLED
FROM KEDUNGWARAK BORROW AREA (1/3)



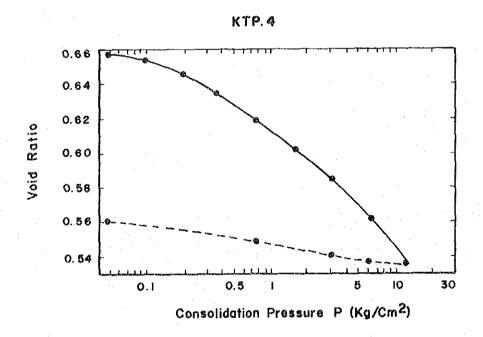


Fig. A2.6 VOID RATIO-CONSOLIDATION PRESSURE
RELATIONSHIP OF EARTH MATERIAL
SAMPLED FROM KEDUNGWARAK
BORROW AREA (2/3)

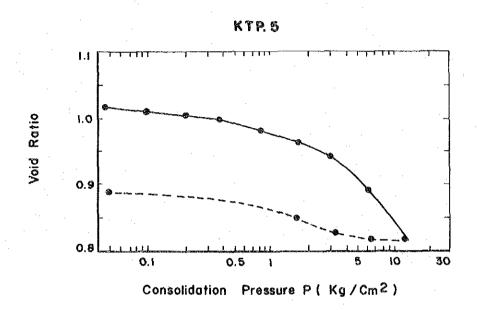
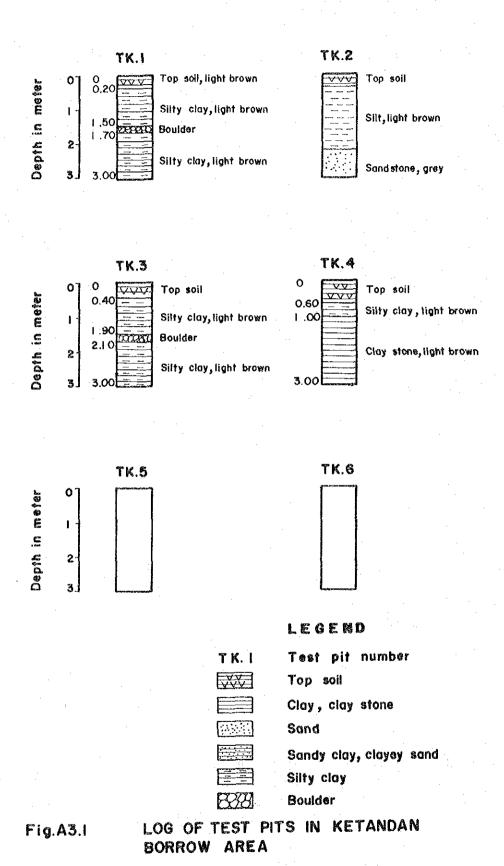


Fig. A 2.6 VOID RATIO - CONSOLIDATION PRESSURE RELATIONSHIP OF EARTH MATERIAL SAMPLED FROM KEDUNGWARAK BORROW AREA (3/3)



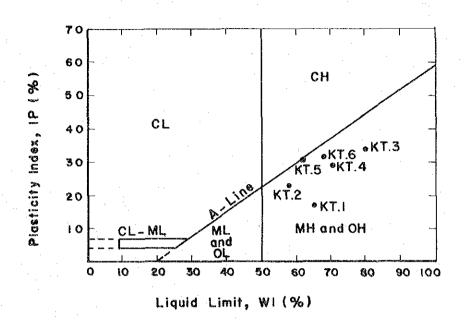


Fig. A 3.2

PLASTICITY CHART FOR UNIFIED SOIL CLASSIFICATION SYSTEM OF EARTH MATERIALS IN KETANDAN BORROW AREA

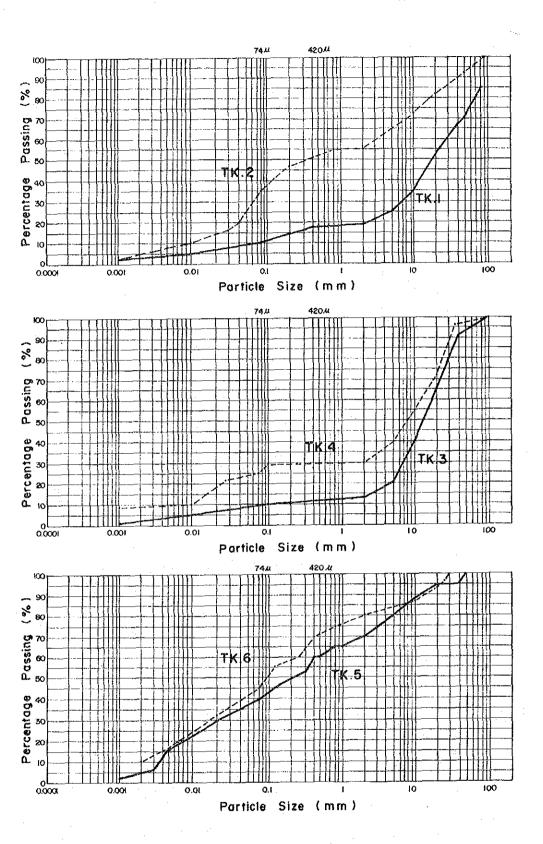


Fig.A3.3 PARTICLE SIZE DISTRIBUTION OF EARTH MATERIAL IN KETANDAN BORROW AREA

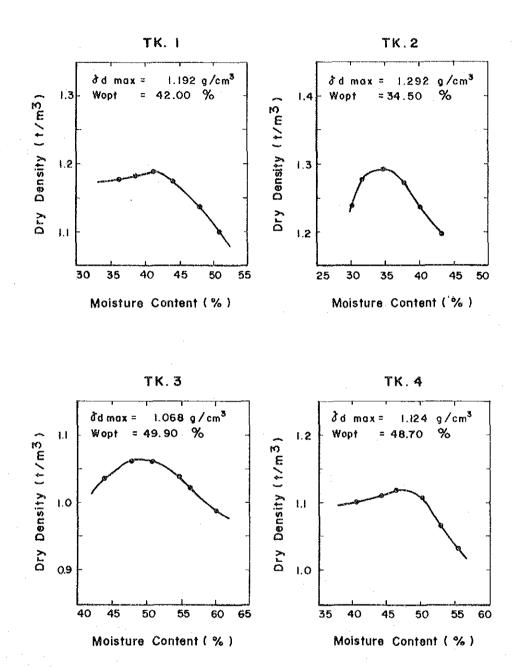


Fig. A3.4 MOISTURE - DRY DENSITY RELATIONSHIP OF EARTH MATERIAL SAMPLED FROM KETANDAN BORROW AREA (1/2)

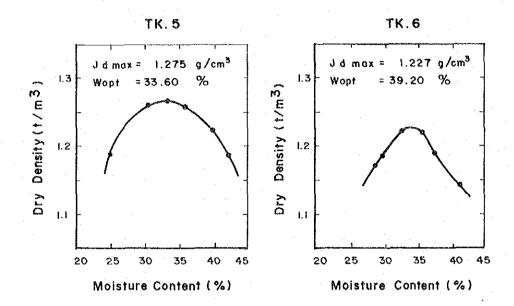
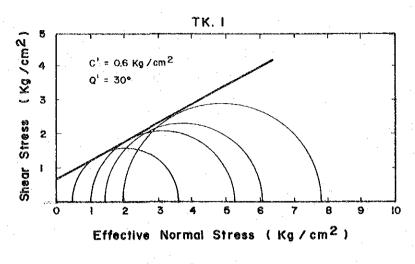
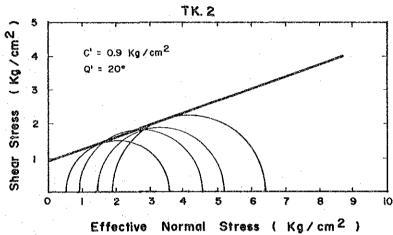


Fig. A 3.4 MOISTURE - DRY DENSITY RELATIONSHIP OF EARTH MATERIAL SAMPLED FROM KETANDAN BORROW AREA (2/2)





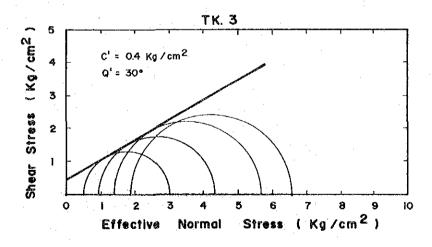


Fig. A 3.5 TRIAXIAL COMPRESSION TEST RESULTS
SAMPLED FROM KETANDAN BORROW AREA (1/2)

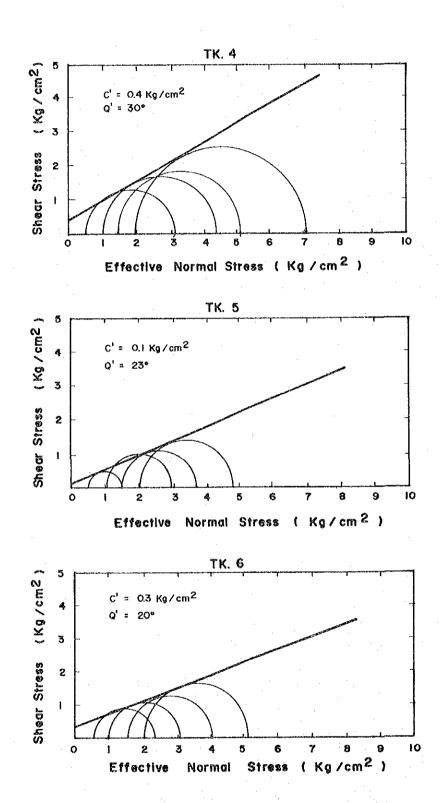
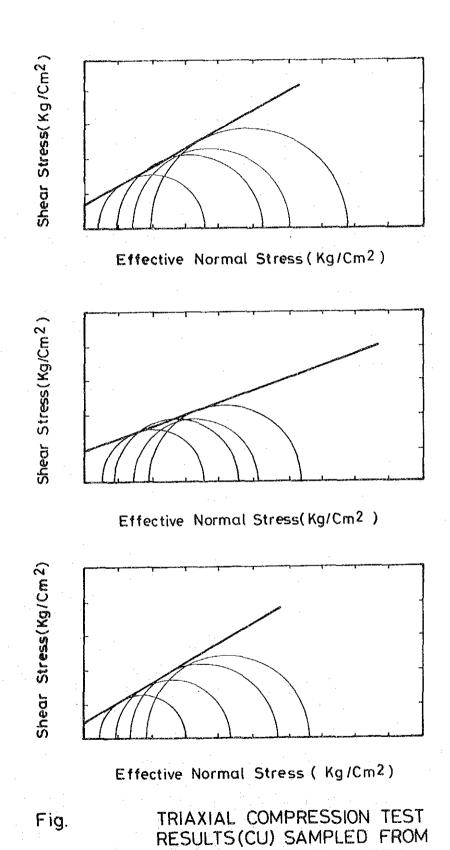


Fig. A3.5 TRIAXIAL COMPRESSION TEST RESULTS SAMPLED FROM KETANDAN BORROW AREA (2/2)



3.139

KETANDAN BORROW AREA

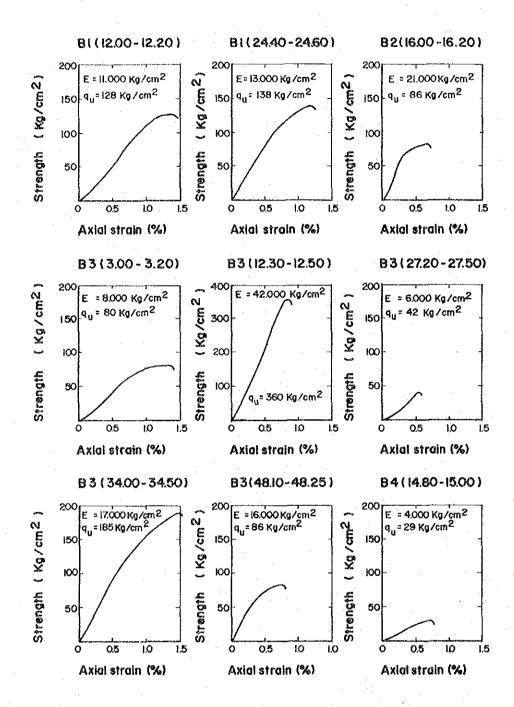


Fig. A 3.6 UNCONFINED COMPRESSION TEST RESULTS
ON BORING CORE AT THE KETANDAN DAM SITE
(1/3)

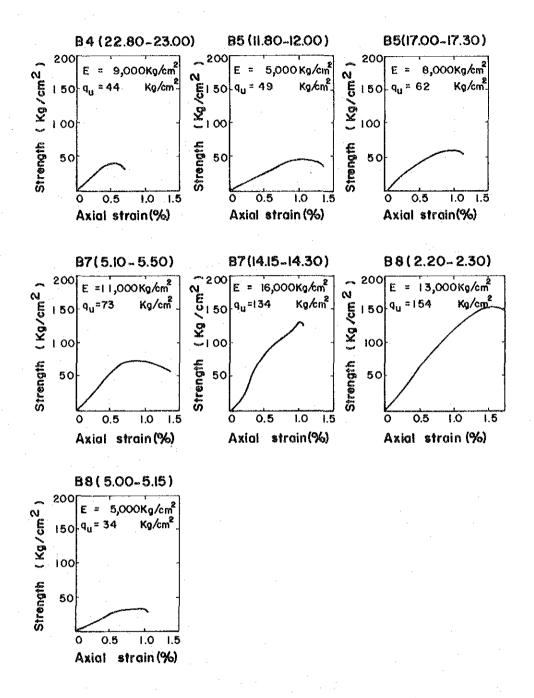


Fig. A 3.6 UNCONFINED COMPRESSION TEST RESULTS
ON BORING CORE AT THE KETANDAN DAM SITE
(2/3)

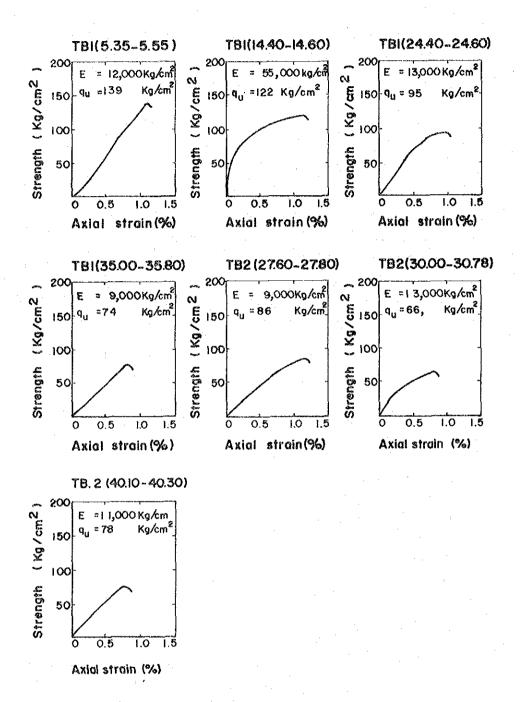


Fig. A 3.6 UNCONFINED COMPRESSION TEST RESULTS ON BORING CORE AT TRANS BASIN TUNNEL (3/3)

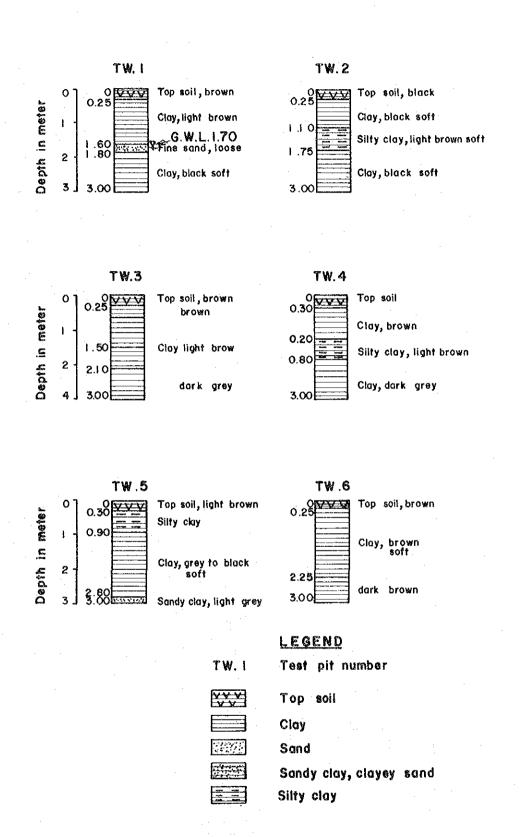
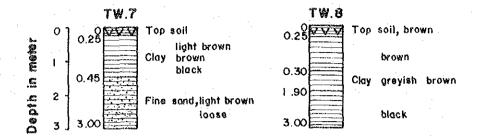
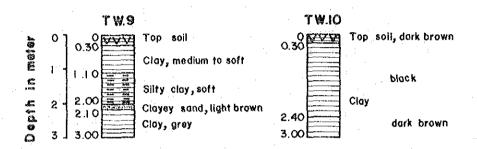
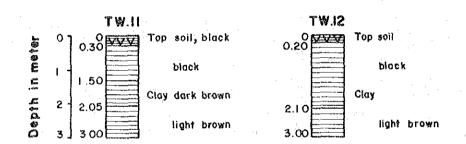


Fig. A 4.1 LOG OF TEST PITS IN WIDAS LOWER REACH (1/2)







## LEGEND.

TW.7 Test pit number

Top soil
Clay
Sand

Sandy clay, clayey sand

Silty clay

Fig. A4.1 LOG OF TEST PITS IN WIDAS LOWER REACH (2/2)

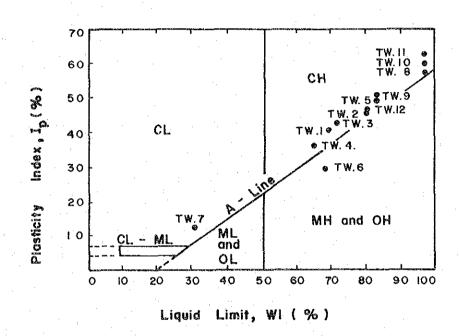


Fig. A 4.2 PLASTICITY CHART FOR UNINFIED SOIL CLASSIFICATION SYSTEM OF EARTH MATERIALS ON WIDAS RIVER IMPROVEMENT PLAN

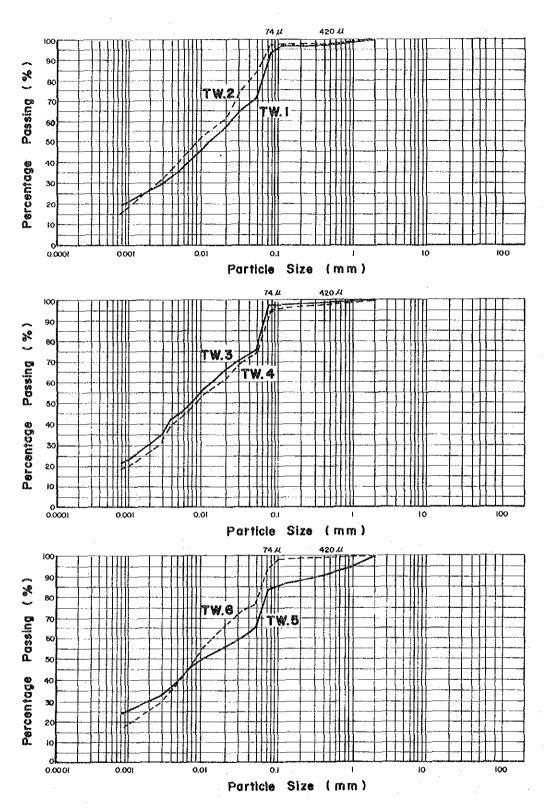


Fig. A4.3 PARTICLE SIZE DISTRIBUTION OF EARTH MATERIAL IN WIDAS LOWER REACH BORROW AREA (1/2)

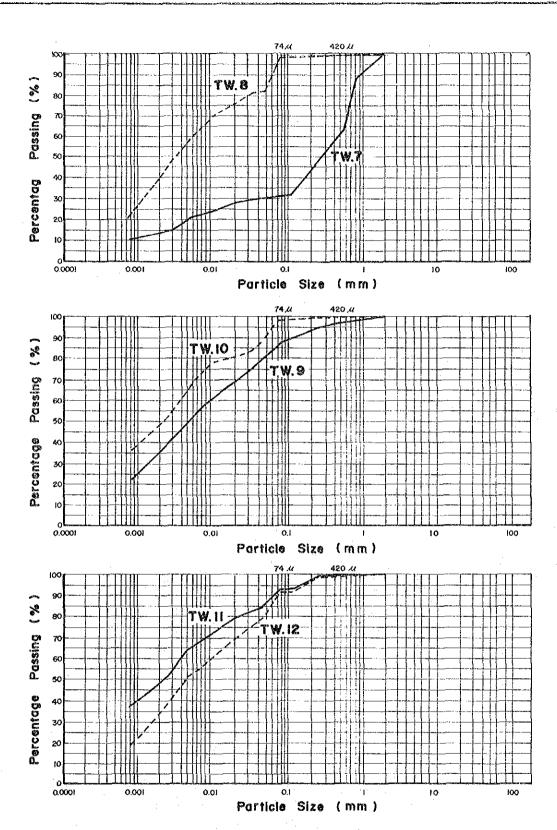


Fig. A4.3 PARTICLE SIZE DISTRIBUTION ON EARTH MATERIAL IN WIDAS LOWER REACH BORROW AREA (2/2)