## C2.3 Bore Holes Water Level Record of Grand Falls Dam Site

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### 1 Record of water level in boreholes (Grand Falls: 1/7) (after the completion of drilling works)

Left abutr	nent (Upstrea	am)	<del></del>				
	G95-1(EL.:	520.37m)	G95-2(EL	.493,42m)	G95-3(EL.478.76m)		
Date	Depth(m)	EL.(m)	Depth(m)	EL.(m)	Depth(m)	EL(m)	
Jul. 31			16.80	476.62	12.90	465.86	
Aug. 2			17.50	475.92	12.90	465.86	
4			17.60	475.82	12.90	465.86	
7	10.50	509.87	17.70	475.72	13.20	465.56	
9	16.10	504.27	18.10	475.32	13.50	465.26	
12	16.50	503.87	18.10	475.32	18.50	460.26	
16	16.70	503.67	18.25	475.17	18.85	459.91	
18	17.05	503.32	18.35	475.07	19.05	459.71	
29			.,				

Left abutn	Left abutment (Downstream)							
	G95-6(EL.:	522.82m)	G95-7(EL,492,71m)					
Date	Depth(m)	EL.(m)	Depth(m)	EL.(m)				
Jul. 28			11.20	481.51				
31			12.15	480.56				
Aug. 2			13.00	479.71				
4			13.10	479.61				
7	9.00	513.82	13.40	479.31				
9	12.60	510.22	13.50	479.21				
12	12.90	509.92	13.55	479.16				
16	13.00	509.82						
18	13.00	509.82						

Right abu	itment (Upstro	eam)				
-	G95-9(EL.4	164.46m)	G95-10(E	EL.473.62m)	G95-4(EI	L.505.59m)
<u>Date</u>	Depth(m)	EL.(m)	Depth(m)	) EL.(m)	Depth(m)	<u>EL.(m)</u>
Jul. 8	19.80	444.66	21.00	452.62	14.80	490,79
10	20.10	444.36	21.40	452.22	15.90	489.69
12	20.20	444.26	21.50	452,12	15.90	489.69
14	20,30	444,16	21.60	452.02	16.10	489.49
17	20.40	444.06	21.90	451.72	16.20	489.39
19	20.50	443.96	21.90	451.72	16.20	489.39
21	20.50	443.96	21.90	451. <b>7</b> 2	19.70	485.89
24	20.60	443.86	21.90	451.72	19.70	485.89
26	20.60	443.86	21.90	451.72	19.70	485.89
28	20.70	443.76	22.00	451.62	20.25	485.34
31	20.70	443.76	22.00	451.62	21.00	484.59
Aug. 2	20,70	443.76	22.00	451.62	21.10	484.49
4	20.70	443.76	22.00	451.62	21.10	484.49
7	20.70	443.76	22.00	451.62	21.10	484.49
9	20.80	443.66	22.10	451.52	21.10	484.49
29	20.80	443.66	22.70	450.92	23,60	481.99

\*

## 2 Record of water level in boreholes (Grand Falls: 2/7) (after the completion of drilling works)

Right abutment (Downstream)

G95-11(EL 465.06m) G95-12(EL.491.83m) G95-13(EL.484.45m)

		- <b>G95-11(E</b> L	.465.06m)	G95-12(I	EL.491.83m)	G95-13(E	3L.484.45m)
<u>Date</u>		Depth(m)	EL.(m)	Depth(m	) EL.(m)	Depth(m	) EL.(m)
Jul.	12	15.60	449.46	23.40	468.43	•	
	14	15.80	449.26	25.40	466.43		
	17	15.80	449.26	25.60	466.23		
	19	16.00	449.06	26.70	465.13		
	21	16.00	449.06	27.15	464.68		
	24	16.00	449.06	27.40	464.43	23.20	461.25
	26	16.00	449.06	27.60	464.23	23.20	461.25
	28	16.00	449.06	27.65	464.18	23.60	460.85
	31	16.10	448,96	27.70	464.13	23.70	460.75
Aug.	2	16.10	448.96	27.70	464.13	23.70	460.75
	4	16.10	448.96	27.70	464.13	23.80	460.65
	7	16.10	448.96	27.70	464.13	23.90	460.55
	9	16.10	448.96	28.20	463.63	23.90	460.55
	29	16.10	448,96	28.60	463.23	23.90	460,55

Right abu	itment				River bed	1	
	G95-5(EL.:	530.37m)	G95-14(E	EL.521.78m)	G95-8(EL.442.97m)		
Date	Depth(m)	EL.(m)	Depth(m)	) EL.(m)	Depth(m)	EL.(m)	
Jul. 14					0.60	442.37	
17					0.60	442.37	
19					0.60	442.37	
21					0.60	442.37	
24	18.50	511.87	37.00	484.78	0.60	442.37	
26	22.30	508.07	37.10	484.68	0.60	442.37	
28	22.75	507.62	37.20	484.58	0.60	442.37	
31	22.80	507.57	37.20	484.58	0.50	442.27	
Aug. 2	22.80	507.57	37.30	484.48	0.50	442.27	
4	22.80	507.57	37.30	484.48	0.50	442.27	
7	22.80	507.57	37.30	484.48	0.50	442.27	
9	22.80	507.57	37.30	484.48	0.50	442.27	
12	23.80	506.57	36.90	484.88			
16	23.80	506.57	36.95	484.83			
18	23.85	506.52	36.95	484.83			
29	24.30	506.07	36.95	484.83	1.30	441.67	

### 3 Record of water level in borcholes (Grand Falls: 3/7) (Measured at morning before start drilling works)

G95-1	Hole mouth EL.(m)	520.37	
Date	Depth of hole (m)	Depth of water level(m)	EL. of water level(m)
1995/8/2	15.80	4.50	515,87
1995/8/3	27.65	5,60	514.77
1995/8/4	44.50	12.40	507.97
G95-2	Hole mouth EL.(m)	493.42	
Date	Depth of hole (m)	Depth of water level(m)	EL. of water level(m)
1995/7/28	6.00	5.35	488.07
1995/7/29	16.00	15.75	477.67
1995/7/30	27.00	15.35	478.07
G95-3	Hole mouth EL.(m)	478.76	
Date	Depth of hole (m)	Depth of water level(m)	
1995/7/26	10.85	3.15	475.61
1995/7/27	18.65	3.15	475.61
1995/7/28	24.25	3.15	475.61
1995/7/29	30.20	3.15	475.61
1995/7/30	35.50	3.15	475.61
G95-4	Hole mouth EL.(m)	505,59	
Date	Depth of hole (m)	Depth of water level(m)	EL. of water level(m)
1995/6/29	12.00	6.25	499.34
1995/6/30	12.00	11.04	494.55
1995/7/1	19.60	14.65	490.94
1995/7/2	22.60	14.75	490.84
1995/7/3	29.60	14.60	490.99
1995/7/4	34,50	15.00	490.59
1995/7/5	44.50	13.80	491,79
G95-5	Hole mouth EL.(m)	530.37	
Date	Depth of hole (m)	Depth of water level(m)	EL. of water level(m)
1995/7/13	5.00	2.50	527.87
1995/7/14	6.00	3.00	527.37
1995/7/15	9.00	5.00	525.37
1995/7/16	12.60	nil	
1995/7/17	21.00	17.55	512.82
1995/7/18	33.00	17.10	513.27
1995/7/19	40,50	15.85	514.52
1995/7/20	43.90	15.40	514.97
1995/7/21	47.10	15.90	514.47
1995/7/22	49.50	16.50	513.87

### 4 Record of water level in borcholes (Grand Falls: 4/7) (Measured at morning before start drilling works)

G95-6	Hole mouth EL.(m)	522.82	
Date	Depth of hole (m)	Depth of water level(m)	EL, of water level(m)
1995/7/29	4.00	3.50	519.32
1995/7/30	4.00	3.50	519.32
1995/7/31	13.00	1.50	521.32
1995/8/1	23.00	10.00	512.82
1995/8/2	38.00	10.00	512.82
1995/8/3	46.80	11,50	511.32
1995/8/4	58.00	12.00	510.82
1995/8/5	66.60	10.00	512.82
1995/8/6	73.60	9.40	513.42
1995/8/7	80.15	9.80	513.02
G95-7	Hole mouth EL.(m)	492.71	
Date	Depth of hole (m)	Depth of water level(m)	EL. of water level(m)
1995/7/20	8.40	7.40	485.31
1995/7/21	10.50	7.60	485,11
1995/7/22	13.90	8.00	484.71
1995/7/23	20.20	8.00	484.71
1995/7/24	30.05	10.35	482.36
G95-8	Hole mouth EL.(m)	442.97	
Date	Depth of hole (m)	Depth of water level(m)	EL. of water level(m)
1995/7/2	3.00	1.00	441,97
1995/7/3	4,50	1.00	441.97
1995/7/4	6.40	1.00	441.97
1995/7/5	10.00	1.00	441.97
1995/7/6	15.00	1.00	441.97
1995/7/7	18.00	1.00	441.97
1995/7/8	25.40	1.00	441.97
1995/7/9	34.50	1.00	441.97
1995/7/10	40.15	1.00	441,97
1995/7/11	48.40	1.00	441.97
1995/7/12	50.20	1.00	441.97
G95-9	Hole mouth EL.(m)	464.46	
Date	Depth of hole (m)	Depth of water level(m)	EL of water level(m)
1995/7/2	6.00	3.35	461.11
1995/7/3	12.00	nil	
1995/7/4	18.00	nil	
1995/7/5			
	21.40	17.70	446.76

### 5 Record of water level in boreholes (Grand Falls: 5/7) (Measured at morning before start drilling works)

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G95-10	Hole mouth EL.(m)	473.62	
Date	Depth of hole (m)	Depth of water level(m)	FL of water level(m)
1995/6/29	9.00	6.45	467.17
1995/6/30	11.00	nil	407.17
1995/7/1	15.00	14.40	459.22
1995/7/2	19.50	16.15	457.47
	26.50	16.80	
1995/7/3			456.82
1995/7/4	30.20	17.10	456.52
G95-11	Hole mouth EL.(m)	465.06	
Date	Depth of hole (m)	Depth of water level(m)	EL. of water level(m)
1995/7/5	4.50	1.70	463.36
1995/7/6	8.00	5,65	459.41
1995/7/7	12.50	10.75	454.31
1995/7/8	17.00	nil	757.71
1995/7/9	21.35	15.45	449.61
1995/7/10	24.25	15.25 14.95	449.81
1995/7/11	30.25	14,93	450.11
G95-12	Hole mouth EL.(m)	491.83	
Date	Depth of hole (m)	Depth of water level(m)	EL. of water level(m)
1995/7/11	7.50	7.10	484.73
1995/7/12	19.75	15.20	476,63
1995/7/13	27.30	17.80	
1993/1/13	27.30	17.00	474.03
G95-13	Hole mouth EL.(m)	484,45	
Date	Depth of hole (m)	Depth of water level(m)	EL. of water level(m)
1995/7/17	12.20	10.40	474.05
1995/7/18	17.50	12.60	471.85
1995/7/19	21.30	17.85	466.60
1995/7/20	27.30	21.15	463.30
1995/7/21	30.10	18.30	466.15
1993/1121	30.10	10.50	400.13
G95-14	Hole mouth EL.(m)	521.78	
Date	Depth of hole (m)	Depth of water level(m)	EL. of water level(m)
1995/7/15	5.00	2.75	519.03
1995/7/16	11.20	6.05	515.73
1995/7/17	21.00	17.00	504.78
1995/7/18	29.30	25.00	496.78
1995/7/19	36.75	33.75	488.03
1995/7/20	42,00	36.00	485.78
1995/7/21	48.75	38.27	483.51
1995/7/22	50.20	38.55	483.23
1775.77.22		20.00	105.25
GQ95-1	Hole mouth EL (m)	572.15	
Date	Depth of hole (m)	Depth of water level(m)	EL. of water level(m)
1995/7/8	9.00	5.40	566.75
1995/7/9	16.50	8.55	563.60
1995/7/10	22.50	5.35	566.80

#### 6 Record of water level in boreholes (Grand Falls: 6/7) (Measured at morning before start drilling works)

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94-1 495 66 Hole mouth EL.(m) Date Depth of hole (m) Depth of water level(m) EL, of water level(m) 1994/8/19 16.05 1.00 494.66 1994/8/20 22 20 10.30 485.36 1994/8/21 32.75 7.00 488.66 1994/8/22 41.35 21.00 474.66 1994/8/23 52.00 28.40 467.26 1994/8/24 57.85 30.00 465.66 1994/8/25 67.25 29.30 466.36 1994/8/26 72.05 28.80 466.86 1994/8/27 79.10 29.35 466.31 1994/8/28 85.90 29.45 466.21 1994/8/29 93.15 29.05 466.61 94-2 Hole mouth EL.(m) 474.36 <u>Date</u> Depth of hole (m) Depth of water level(m) EL. of water level(m) 1994/8/14 5.50 1.10 473.26 1994/8/15 5.50 1.00 473.36 1994/8/16 11.35 4.40 469.96 1994/8/17 18.50 6.65 467.71 1994/8/20 18.50 11.00 463.36 1994/8/21 23.50 15,30 459.06 1994/8/22 33.65 18.60 455.76 1994/8/23 39.75 21.30 453.06 1994/8/24 45.75 7.15 467.21 1994/8/27 47.40 14.20 460.16 1994/8/28 22,90 57.05 451.46 1994/8/29 65.85 19.20 455,16 1994/8/30 66,85 20.15 454.21 1994/8/31 72.00 19.40 454.96 1994/9/1 75,00 21.10 453.26 94-3 Hole mouth EL.(m) 444.20 Date Depth of hole (m) Depth of water level(m) EL. of water level(m) 1994/9/13 10.40 5.00 439.87 1994/9/14 12.40 6.00 439.00 1994/9/15 13.00 4.30 440.48 1994/9/16 16.80 3.00 441.60 1994/9/17 22.70 3.00 441.60 1994/9/18 33.00 3.00 441.60 1994/9/19 37.60 3.00 441.60 1994/9/20 45.60 3.00 441.60 1994/9/21 57.50 3.00 441.60 1994/9/22 67.60 3.00 441,60 1994/9/23 80.05 3.00 441.60 1994/9/24 87.80 3.00 441.60 1994/9/25 91.60 3.00 441.60 1994/9/26 96.10 3.00 441.60

### 7 Record of water level in boreholes (Grand Falls: 7/7) (Measured at morning before start drilling works)

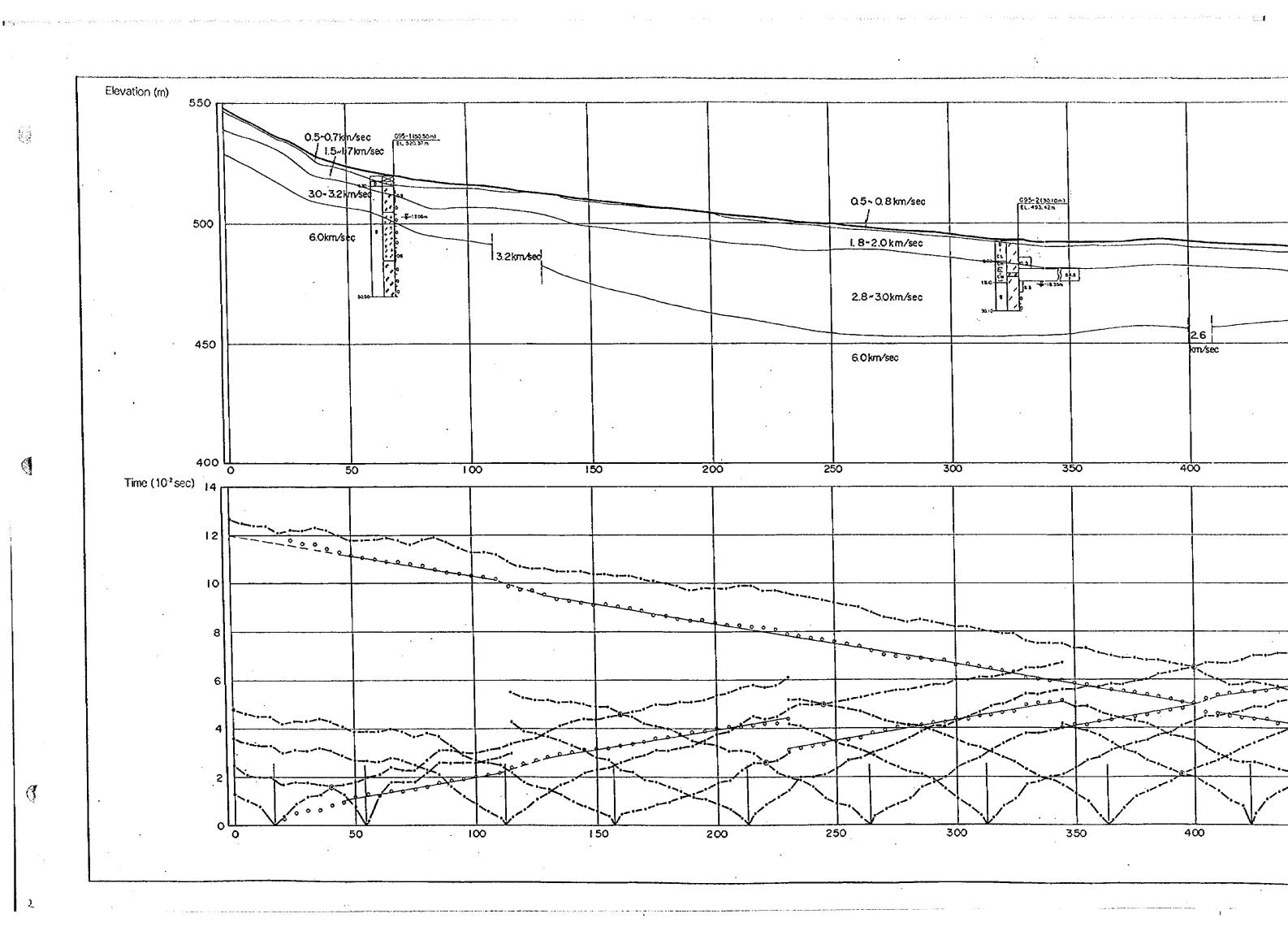
94-4	Hole mouth EL (m)	536.62	
Date	Depth of hole (m)	Depth of water level(m)	EL of water level(m)
1994/9/14	14.05	8.20	528.42
1994/9/15	26.15	9.30	527.32
1994/9/16	39.35	10.90	525.72
1994/9/17	47,20	10.50	526.12
1994/9/18	56.00	42.70	493.92
1994/9/19	63.65	44.90	491.72
1994/9/20	77.40	32,00	504.62
1994/9/21	91.40	19.60	517.02
1994/9/22	106.40	32.00	504.62
1994/9/23	113.40	32.00	504.62
1994/9/24	125.35	32.00	504.62
1994/9/25	125.35	36.40	500,22
1994/9/26	125,35	42.80	493.82
1994/9/27	125.35	45.65	490.97

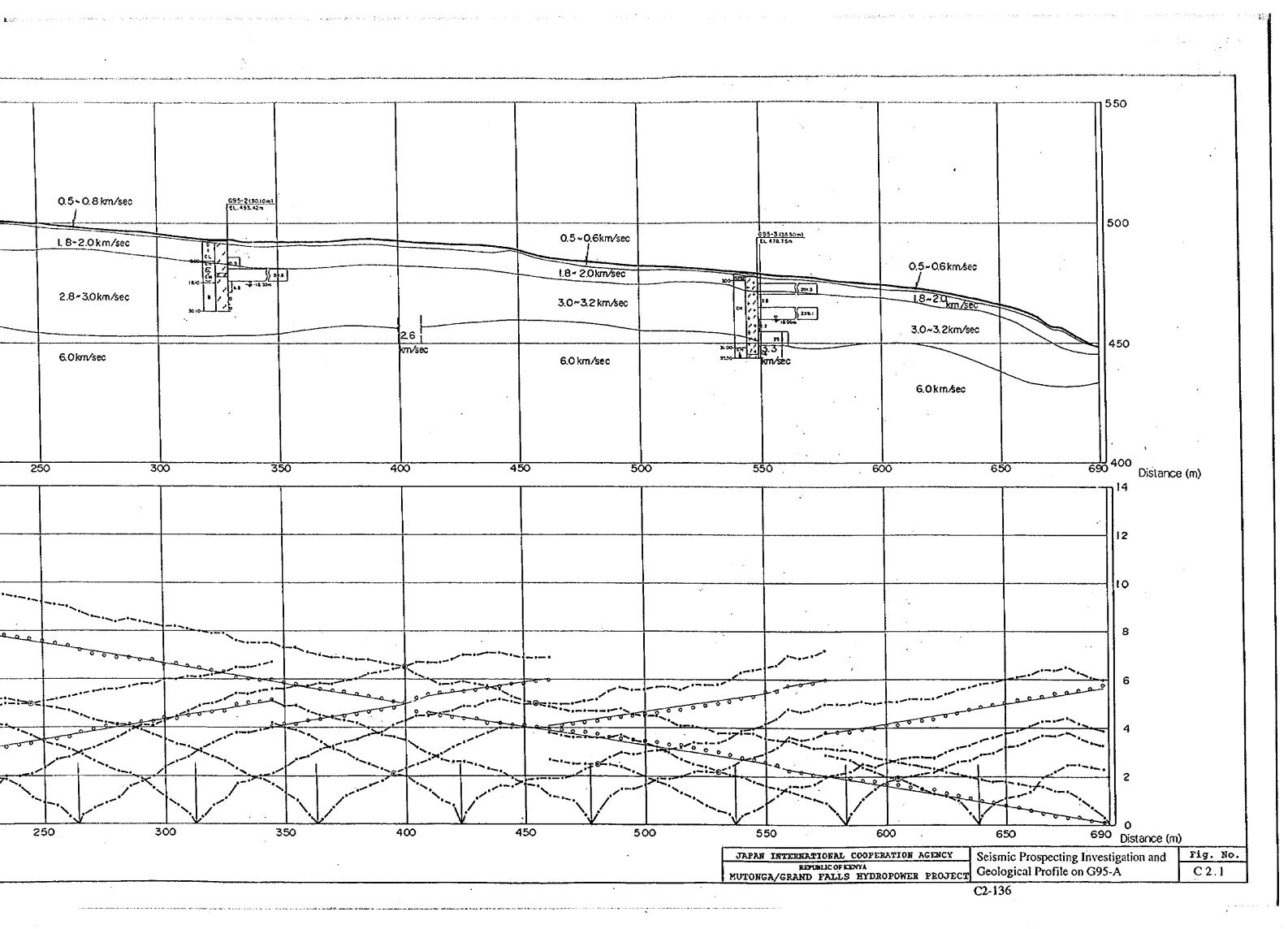
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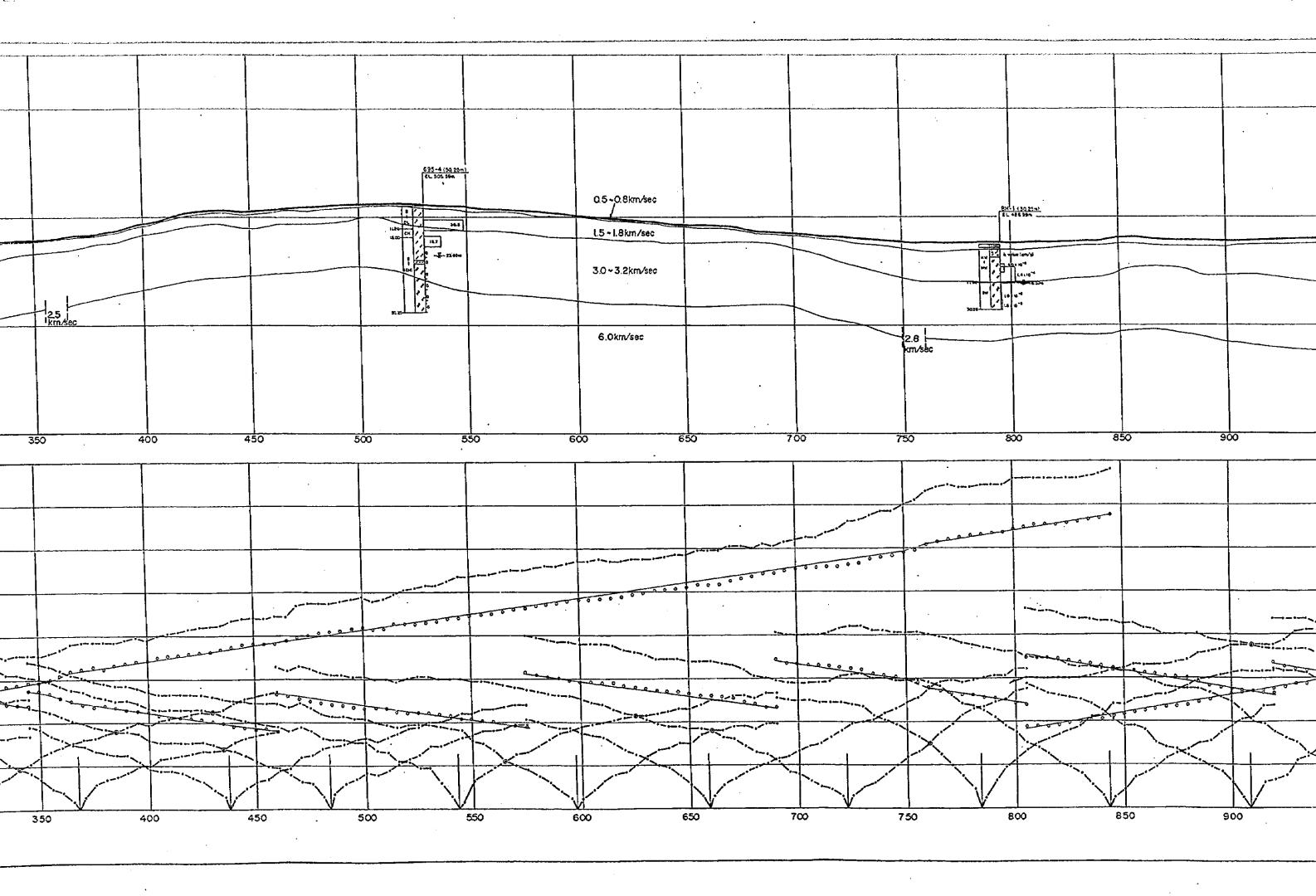
# C2.4 Seismic Prospecting Investigation of Grand Falls Dam Site

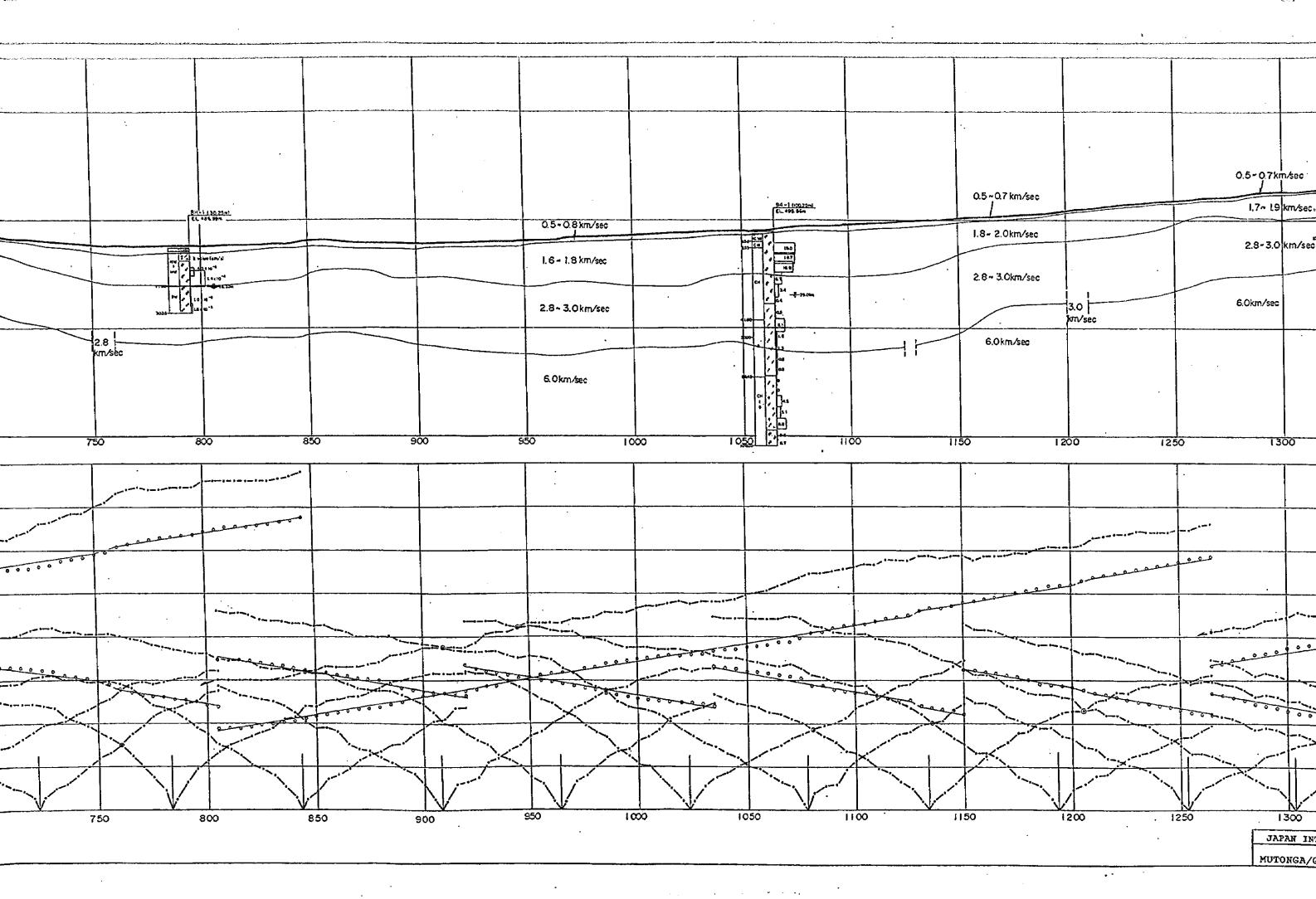
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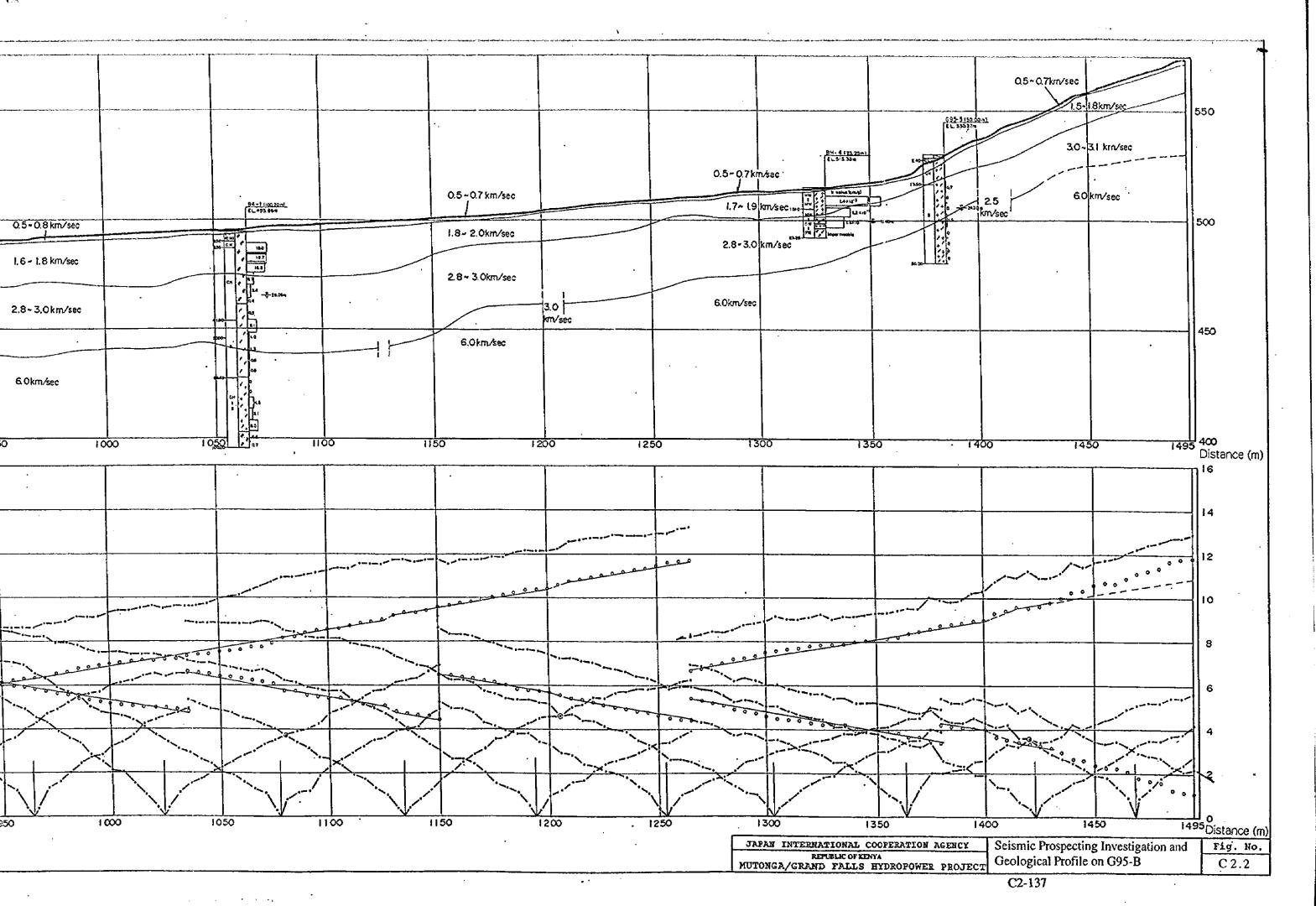
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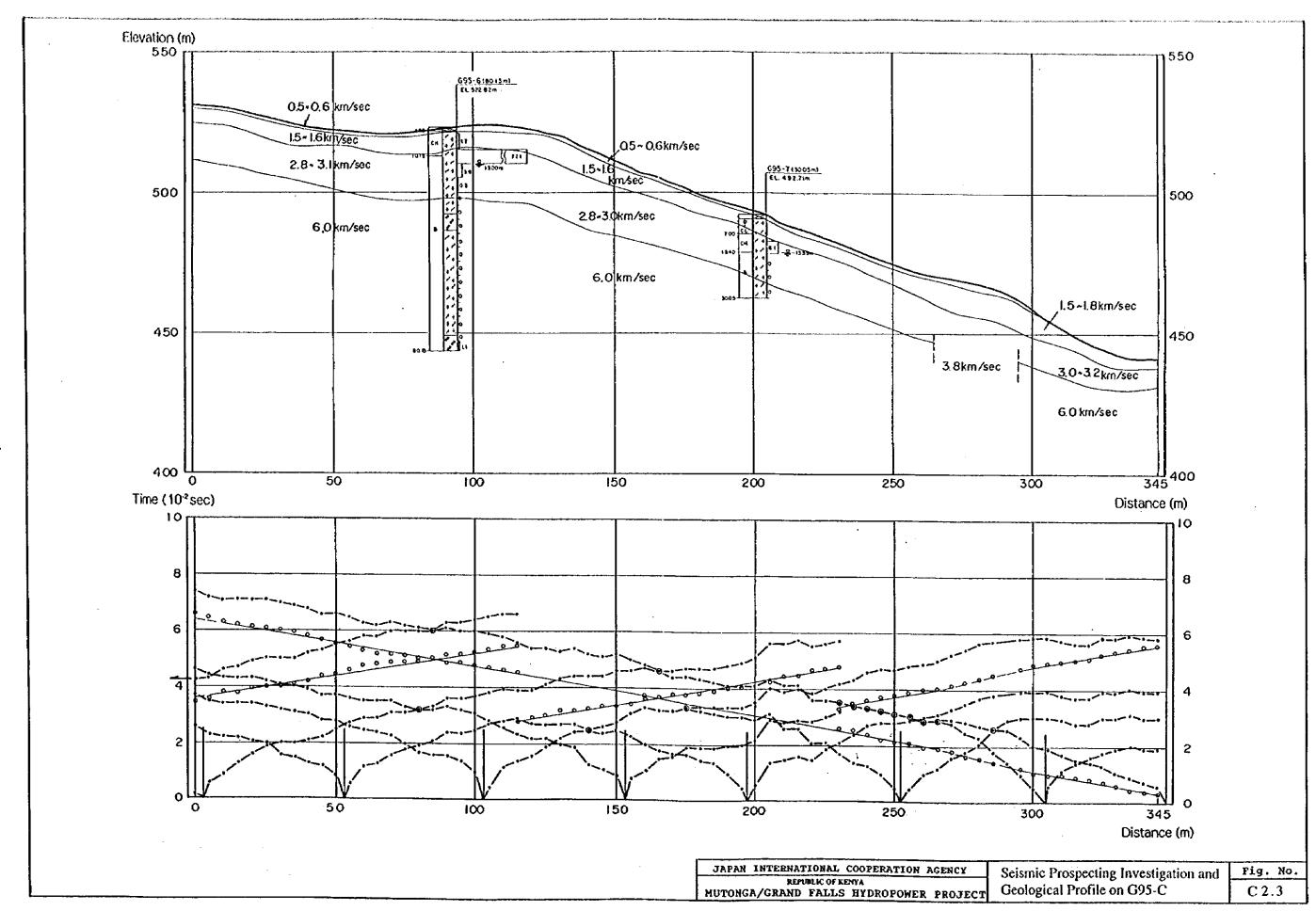




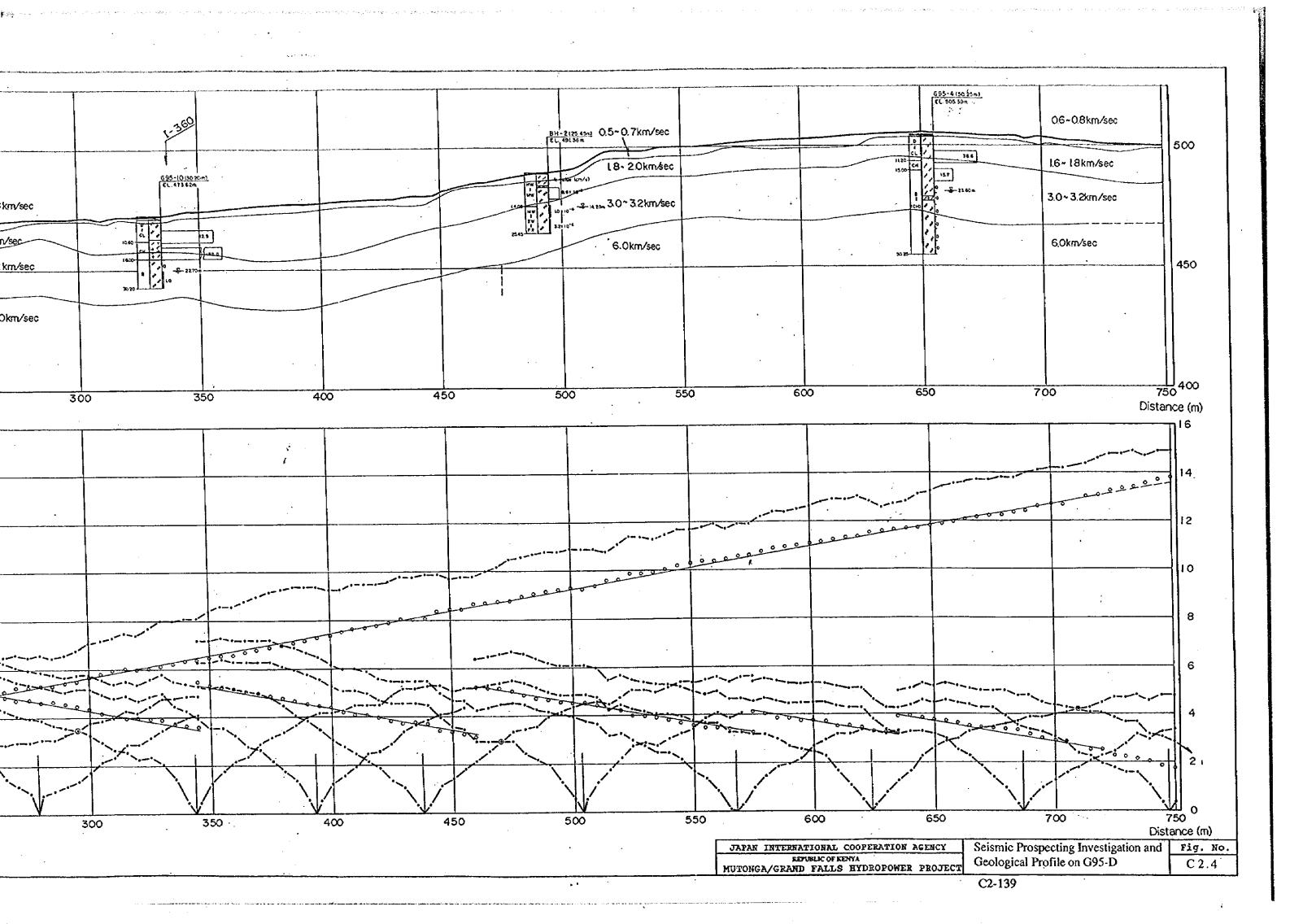


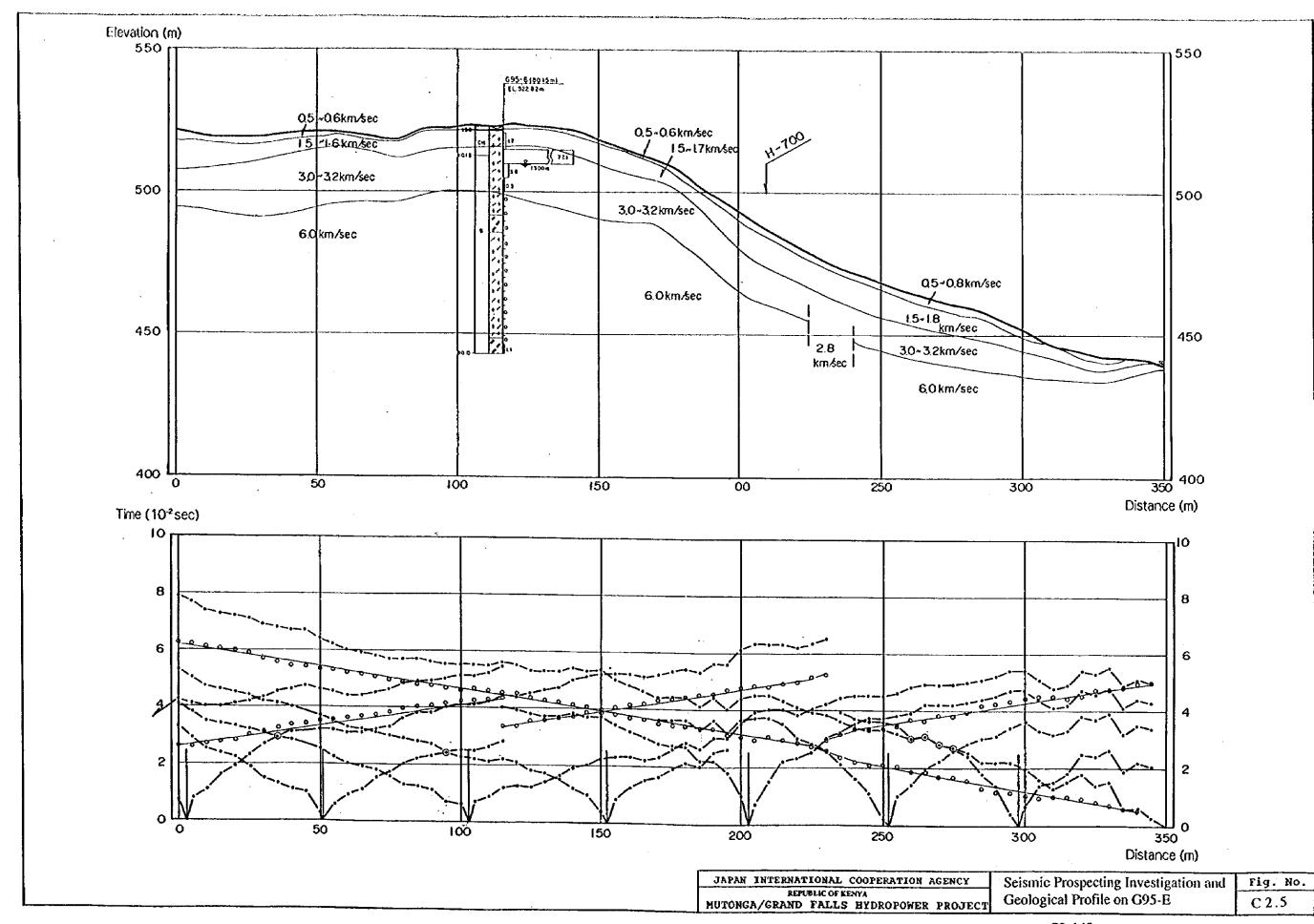


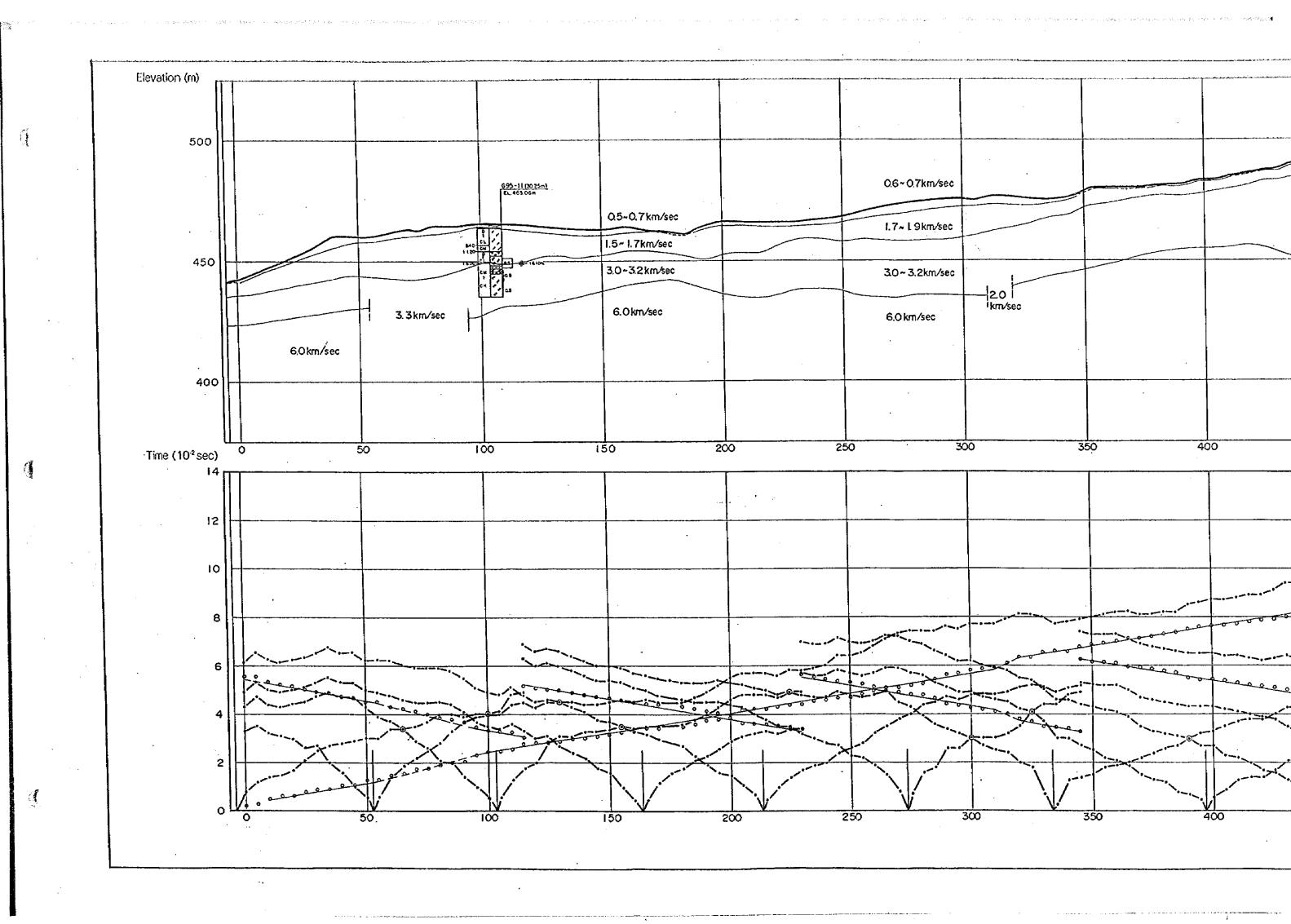


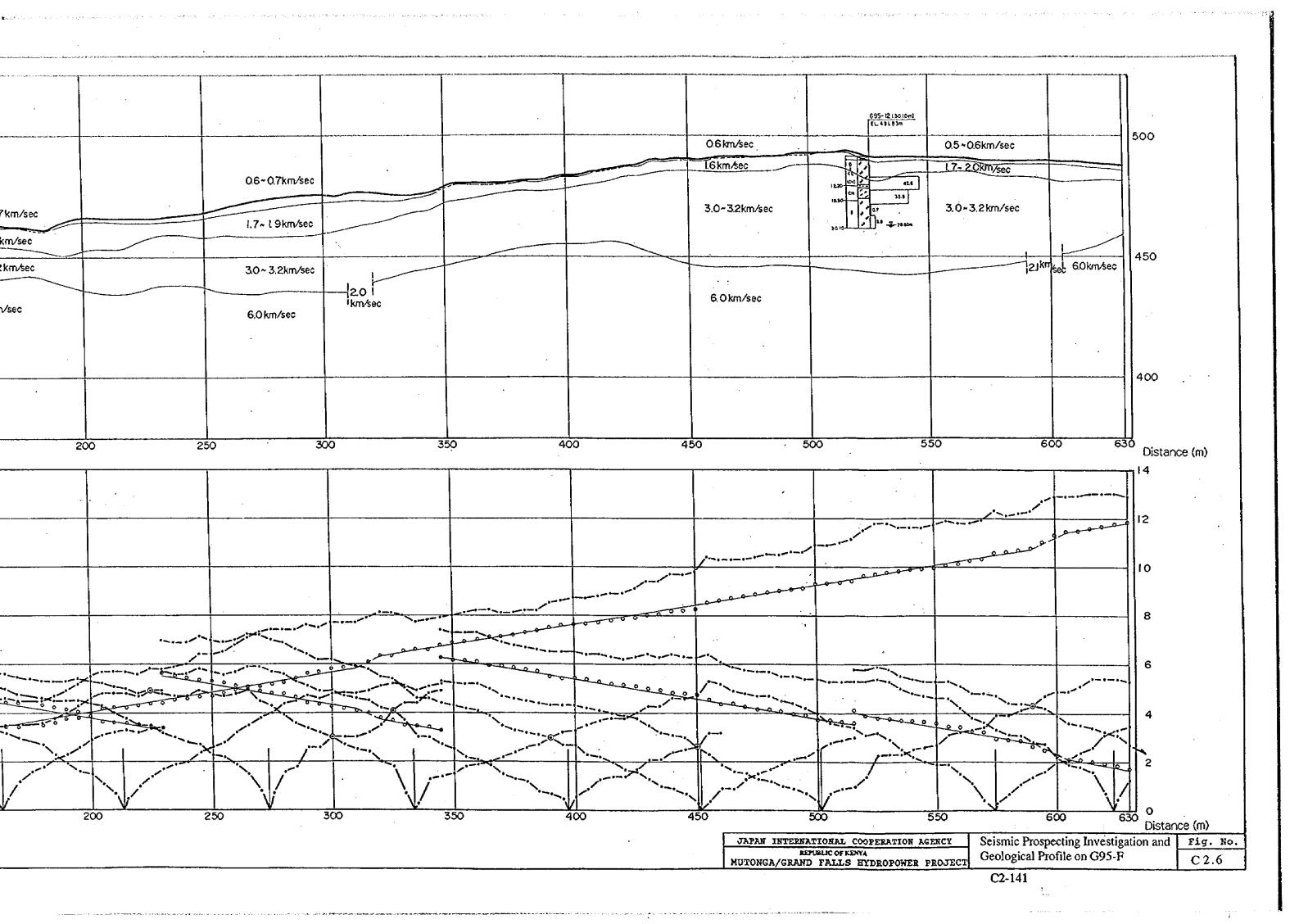


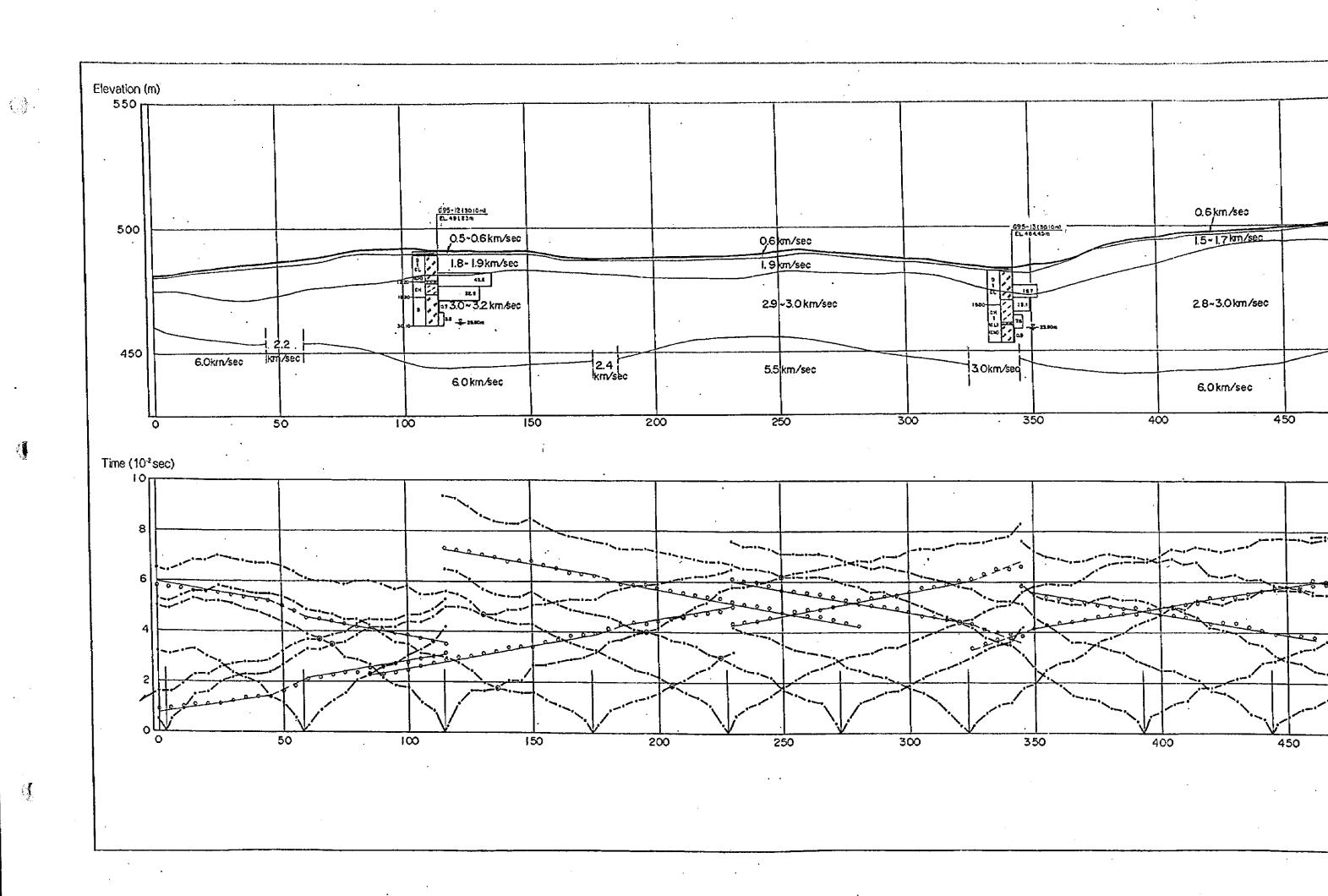
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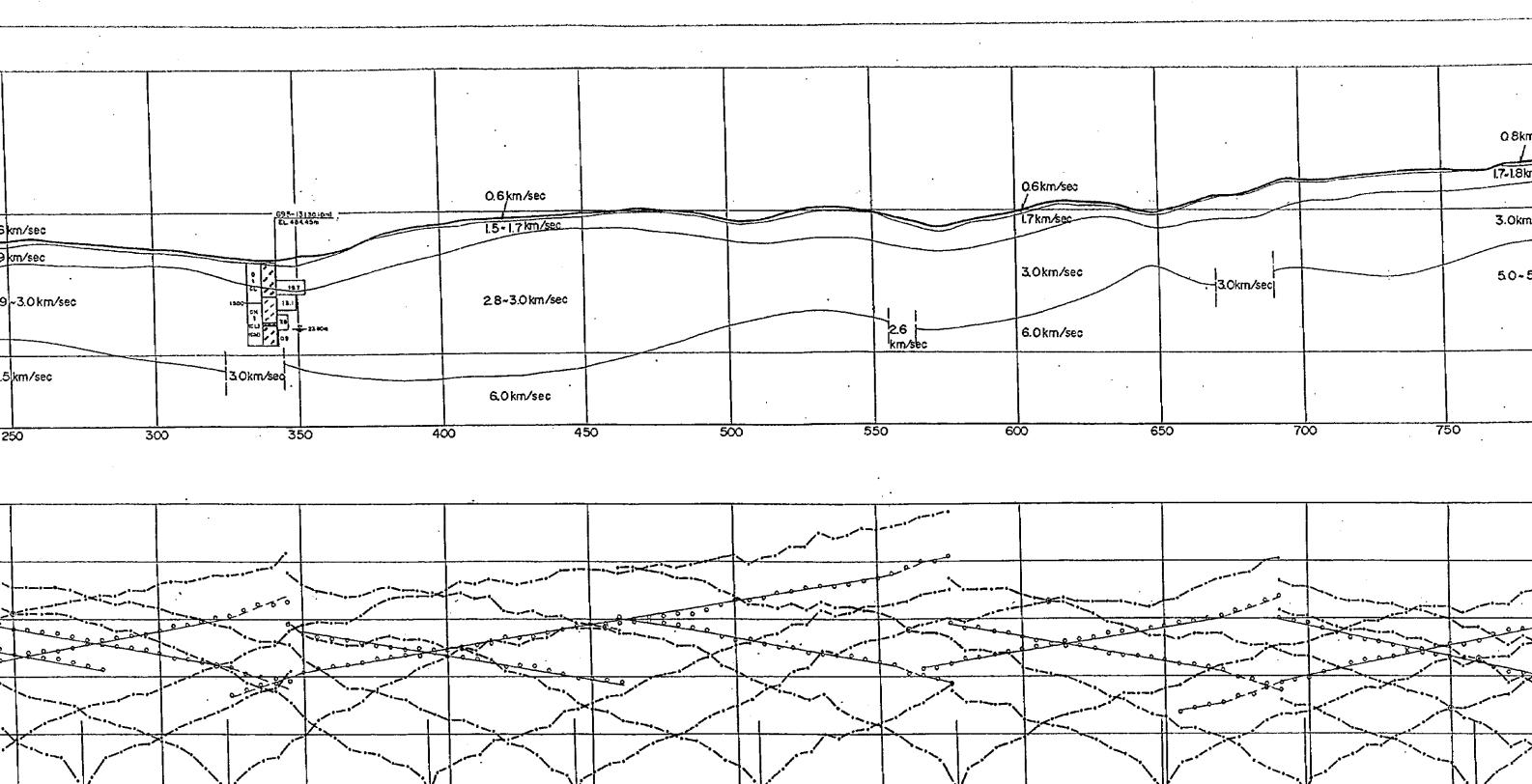


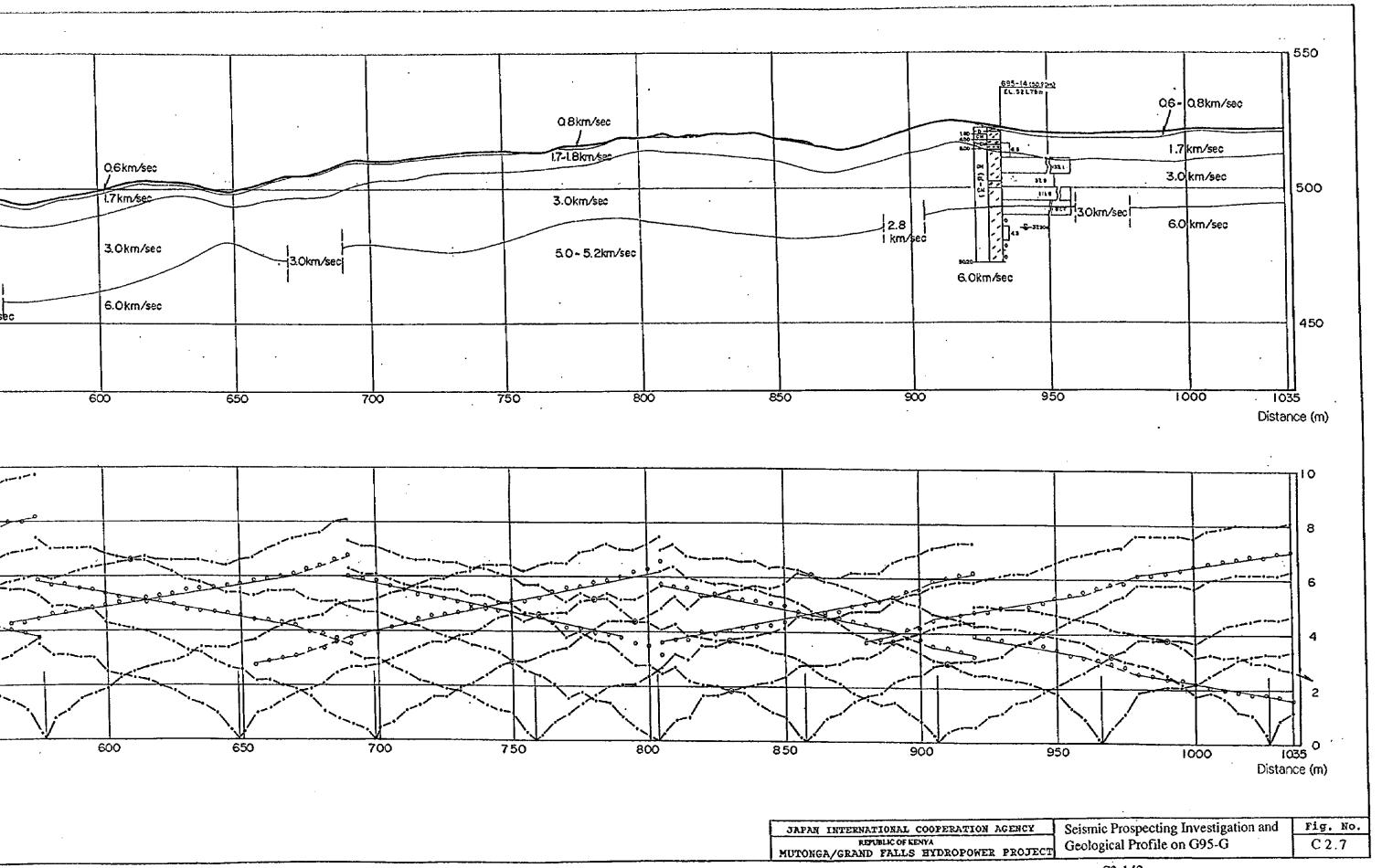


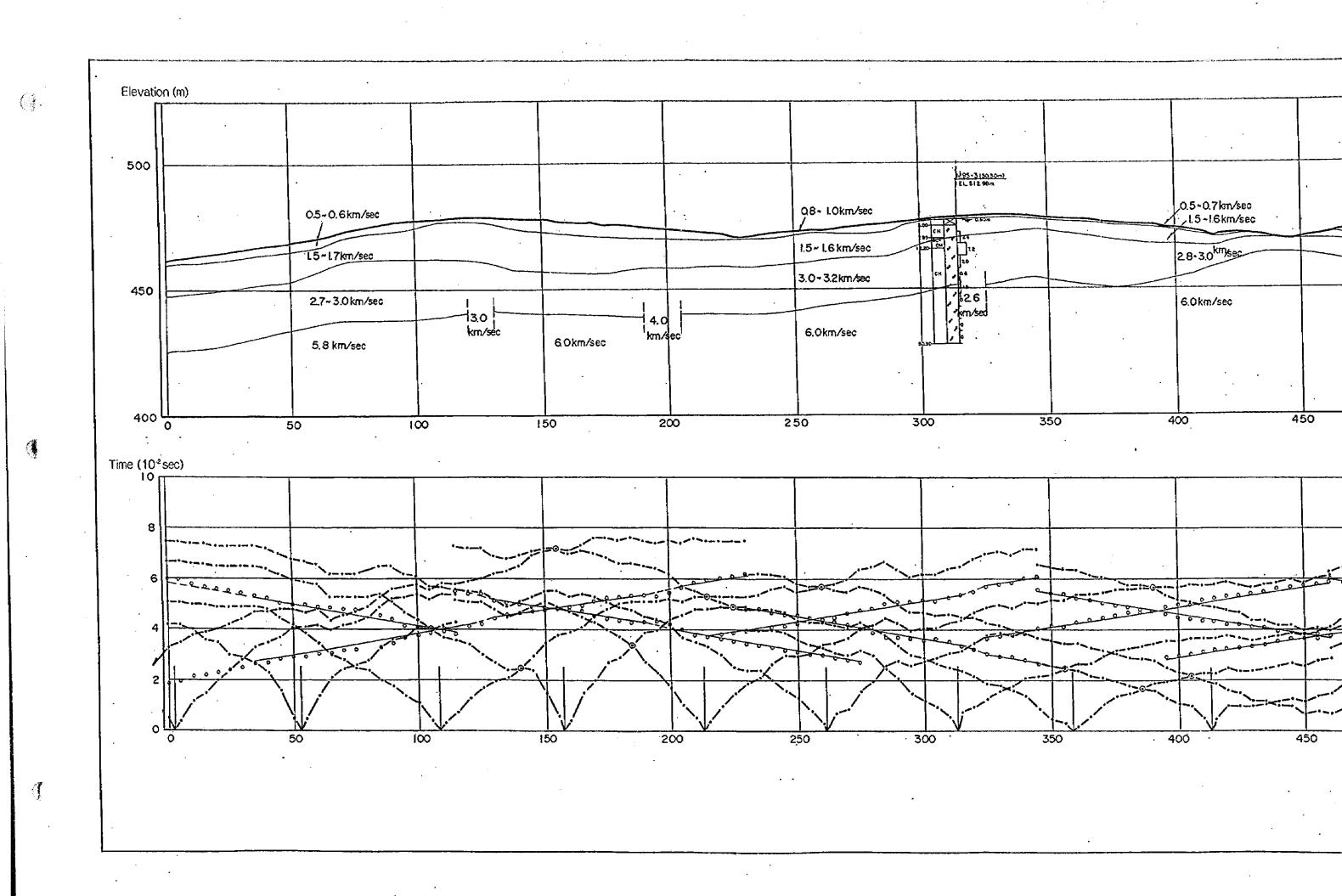


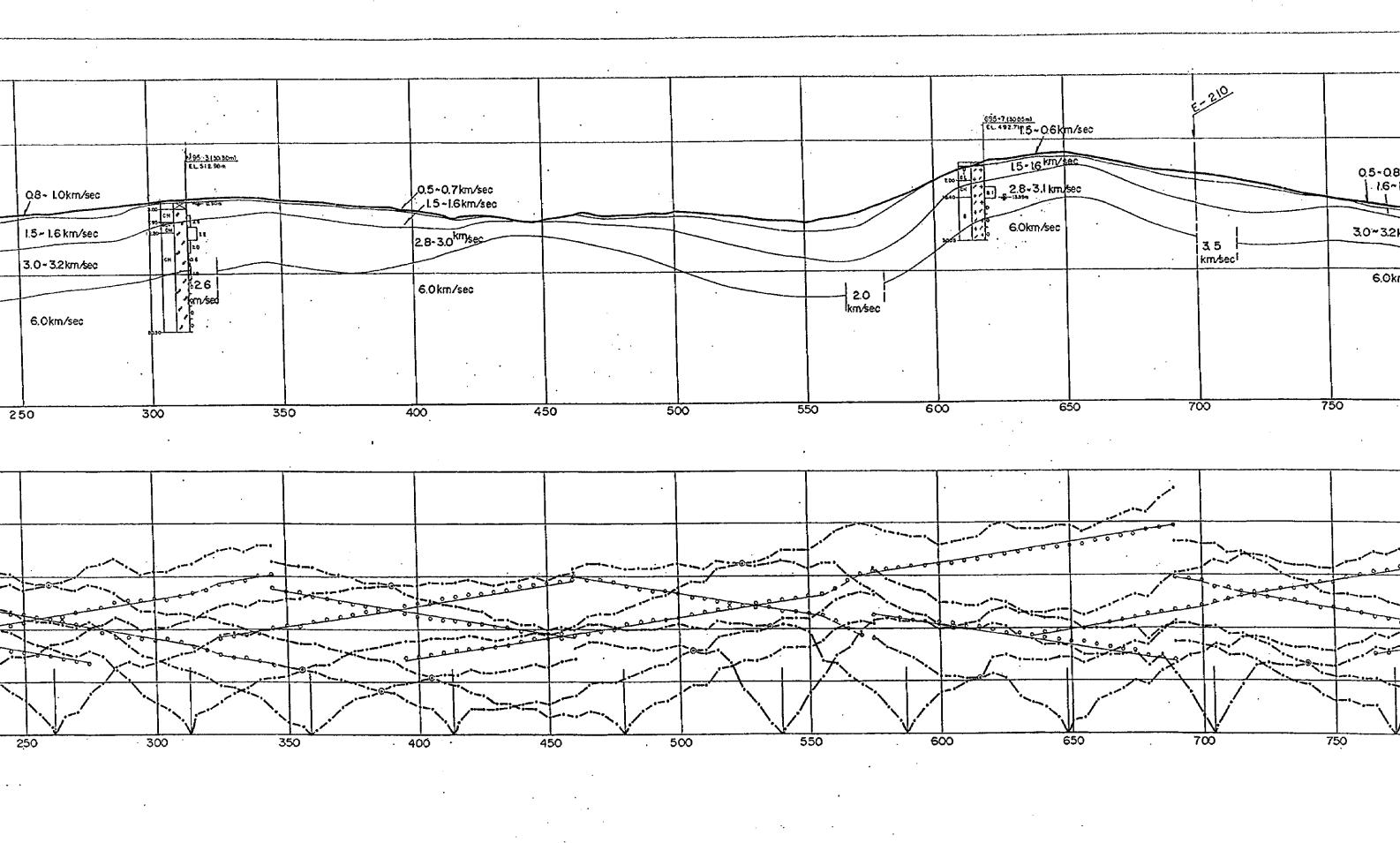


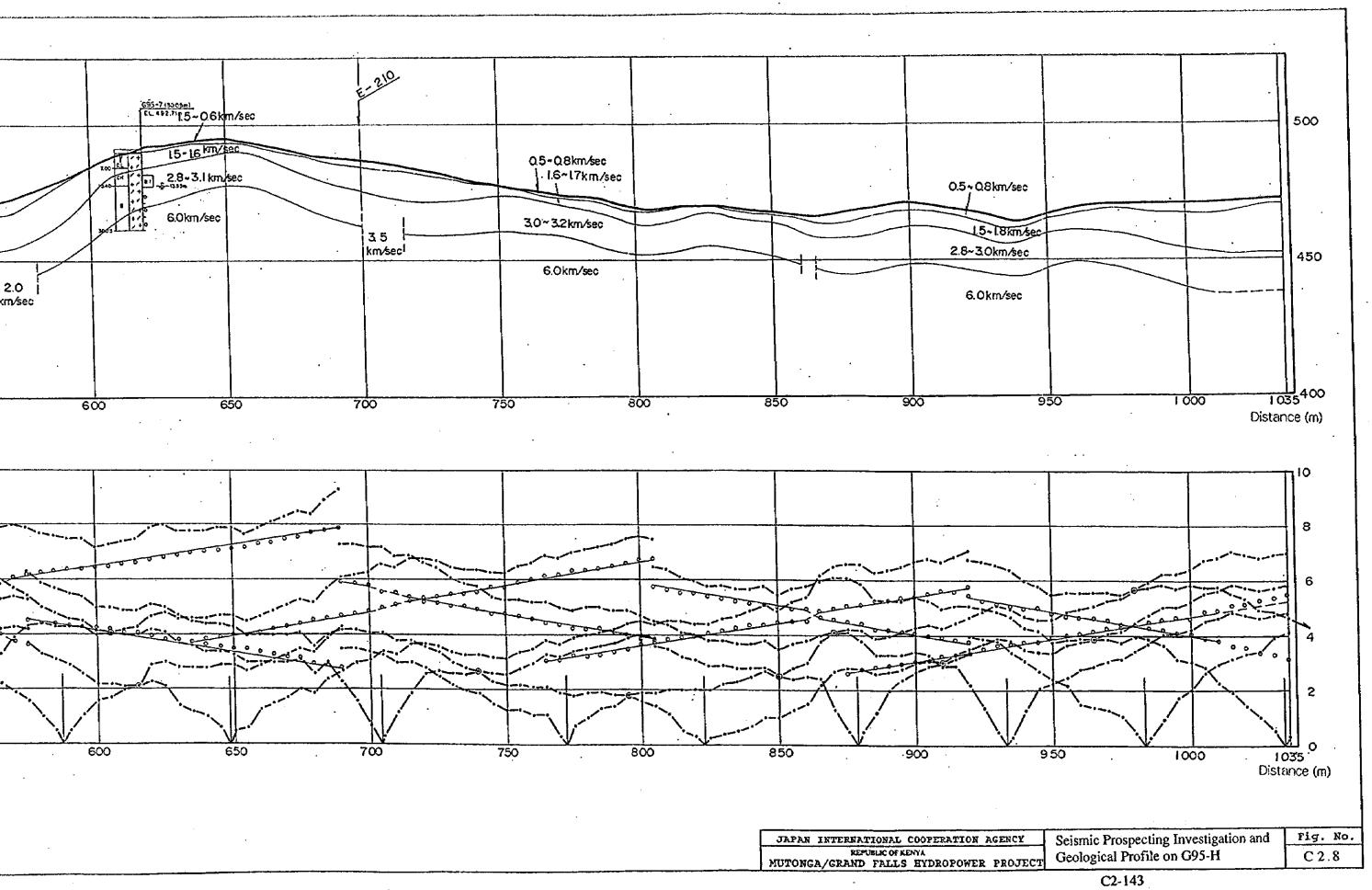




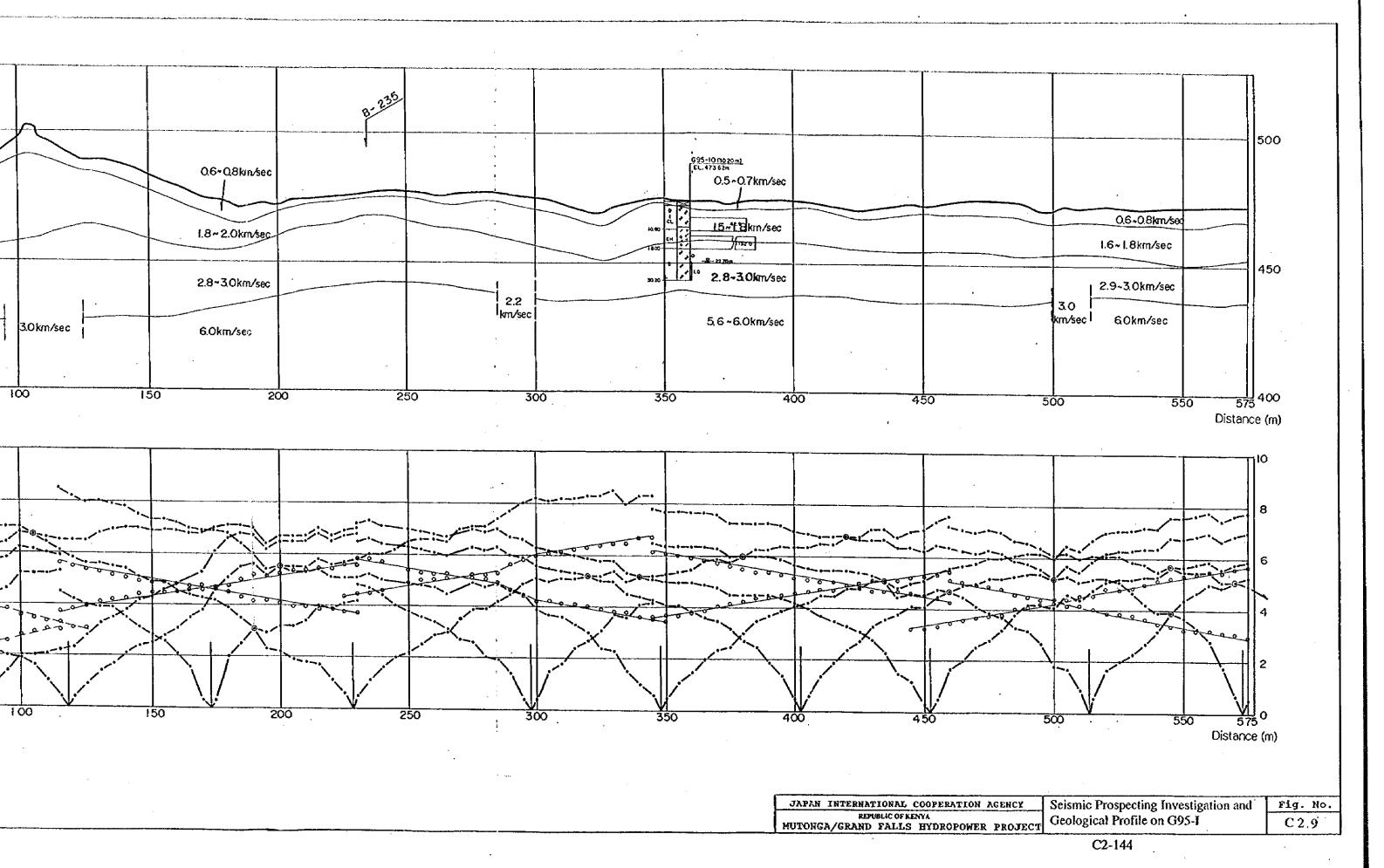












#### C3.1 Test Pit Logs of Mutonga Dam Site

	DRILL	LO	G	HOLL	100 l	1 <u>C 1</u>	SHEET	NO. 1	_OF_1_	
DATE HTP30	ROCK TYPE OR FORMATION	COLUMN SECTION	DESCRIPTION	ROCK	1 25	EURE RECEVENT	k Q. D		GESSURE TES ON VALUE	DEPTH
0.40	CLAYEY SILT		Reddish brown very sandy		81,01					
	GNE1SS	)	Moderately weathered light grey with green tinge coarse grained quartz-feldspar-biotite.							
	<u> </u>	l	Pick/shovel hand tools ex	cavati	on.		NIPPO	N KOEI	CO., L	ΓĎ.
					•				INEERS, TOKY	

DRILL		utonga/grand fa				OWER F SHEET 2		
HE SE SOR TYPE OR FORMATION	COLUMN SECTION	DESCRIPTION	ROCK	ΕX	CORE SECOVERY		WATER PRESSURE TEST LUGEON VALUE	регтн
CLAYEY SILT  0.80 CRAVEL 1.00 GNEISS		Reddish brown very sandy  Brown angular fine and medium mainly quartz fragment.  Highly weathered altered brown medium and coarse grained quartz-feldspar-fiotite.		33,01 82,02				
	.1	Pick/shovel hand tools exc	avati	on	4 20 10 70 2		ON KOEL CO., LTI	

DATE	нтазо	ELEVATION	ROCK TYPE OR FORMATION	COLUMN SECTION	DESCRIPTION	KOCK GRADE	8	COYE	() R. Q. D	ESSURE TEST ON VALUE
	0.30		CLAYEY STLT	X	Reddish brown very sandy		81, DI			
	0.80		GRAVEL		Brown angular fine, medium and coarse mainly quartz in reddish brown clayey sand matrix.		B 2, 02			
	0.90		QEISS	~^^	Highly weathered light grey medium grained quartz-feldspar-biotite					
_			<del> </del>	<del></del>	Pick/shovel hand tools ex					 CO., LT

				FALLS		DROP	WER (	PROJECT	•	
	DRILL	LO	G	ROL	: NO.	MC 1 TP 95	<u>ŞHEET</u>	NO. 1	OF 1	
DEPTH BLEVATION	ROCK TYPE OR FORMATION	COLUMN SECTION	DESCRIPTION	KOCN	చ	CORE SECUVERY		!	ESSURE TEST IN VALUE	0£PTH
1.50	CLAYEY SILT  CPAVEL  CPAVEL		Reddish brown sandy, trace fine gravel.  Brown angular fine medium and coarse mainly quartz  Highly weathered light grey with green tinge medium grained quartz-feldspar-hiotite.		82,02					
			Pick/shovel hand tools	excavati	on		NIPPO	N KOEI	CO., LTI	D.

C3-2

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

			DRILL	LO	G <u>1</u>	lOL E	NO 1	10 2 TP 95	SHEET 1	<u> </u>	<u> </u>	 
DATE	рерти	ELEVATION	ROCK TYPE OR FORMATION	COLUMN SECTION	DESCRIPTION	ROCK	GROUND#AGER LEVEL	CORE		WATER PRE		DEPTH
-	0,50		SILTY CLAY	X X X X X X	Reddish brown slightly sandy		B1, 01					
	1.00		CRAVEL,		Orange brown angular fine and medium in sandy clayey silt matrix.		82,02					1
	1.20		QE13S		Highly weathered light brown coarse grained quartz-feldspathic, occasional black biotite flekes.							
	<u></u>	<u> </u>			Pick/shovel hand tools exc	avati	.en			KOEI		١.
									<b>4</b> 000	,		

MUTONGA / GRAND FALLS HYDROPOWER PROJECT SHEET NO. HOLE NO. M.C.2 DRILL LOG GROUNDWATER ROCK TYPE WATER PRESSURE TEST COLUMN ROCK DESCRIPTION RECOVER R. Q. D 0R FORMATION 81,01 CLAYEY SILT Reddish brown very sandy 3 2 D 2 × × × 2.20 Orange brown angular fine, medium and coarse; sandy silt matrix. CRAVEL NIPPON KOEI CO., LTD.

Pick/shovel hand tools excavation

	DRILL	LO	G	HOLE	NO.	MC 3. YP 95	SHEET 7	NO. 1 OF 1		
DATE DEPTH NOTTON	ROCK TYPE OR FORMATION	COLUMN	DESCRIPTION	ROCK	15 at	CORE HECUVERY		WATER PRESSURE DEST LUGEON VALUE	DEPTH	
0.50	SILTY CLAY		Reddish brown sandy occasional fragments upto 5mm,							
2.3	CLAYEY SILT		Brown sandy with trace gravel		B1, 01				timber timber in the standard of	
	Pick/shovel hand tools excavation NIPPON KOEL CO., LTD.									

					k.t.	HIONGA / COAND G		11.54				
				DRILL	LO	UTONGA / GRAND FA	OLE	H V. NO. 1	DROPO 10-3 10-35	JWER F <u>SHEET</u>	PROJECT NO. 1 OF 1	
1	2140	DEPTH	ELEVATION	ROCK TYPE OR FORMATION	COLUMN SECTION	DESCRIPTION	ROCK	ŭ	HECOVERY RECOVERY			ретти
-	L.	0.20		SAVOY SILT	2 X X	Reddish brown, trace clay		B1,01				
		0.90	i	GRAVEL.		Brown angular fine and medium; silty sand matrix.		B 2,O 2				ويواب استالويواسياسياني
				QUARTZITE	+++++	Highly weathered white with pink tinge medium grained with muscovite						
	سنسلسلسلسلسلسن											

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

MUTONGA /	GRAND	FALLS	HYDROPOWER	PROJECT

	DRILL	LO	Ĵ	<u> 1.10H</u>	: <u>NO</u>	MC 3 IP 95	SHEET 9	<u>NO.</u>	1	OF I		***********
DATF DEPTH ELEVATION	ROCK TYPE OR FORMATION	COLUMN SECTION	DESCRIPTION	ROCK GRADE	i a	COLC		WATE	ж 1905	SSURE T VALUE	•	DEPTH
1.20	SILTY CLAY		Reddish brown sandy  Brown angular fine medium and coarse; mainly quartz fragments.		B 2,							
<u> </u>	<u> </u>	<u></u>	Pick/shovel hand tools e	xçavat	ion		NIPP( cons			CO.,		1.

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		FALLS HYDROPOWER PROJECT HOLE NO MC 3 SHEET NO. 1 OF 1	
DRILL LO	)G	TP 95 - 10	_
A S ROCK TYPE COLUM	DESCRIPTION	" (5   "+ (ra  y   10 3 3 4 3 1	HT130
CLAYEY SILT	Reddish brown sandy	\$7,02 BZ,02	1 1 1 min
O.50  GPAVEL  O.60  O.70  O.70	Brown angular fine, medium and coarse; sandy silt matrix trace clay.		in the standard of the first of the standard of
	•	NIPPON KOEI CO., LTD	ł.,

MUTONGA / GRAND	FALLS	HYDROPOWER PROJECT	Г
LOC	HOLE	NO MC 3 SHEET NO 1	

ROCK TYPE OR FORMATION SECTION  DESCRIPTION  DESCRIPTION
O'AVEY SILT  Reddish brown sandy, trace fine gravel  O'AVE  O'AVE  O'O'O'O'O  Brown angular fine.  nedium and coarse mainly quartz fragments; occasional cobbles; sandy
0 0 0 medium and coarse mainly quartz fragments; occasional cobbles; sandy

			ווממ	М	UTONGA / GRAND FA	LLS	HY	DROPO	WER F	PROJECT NO. 1 OF 1	
DATF	ОЕРТН	ELEVATION	DRILL ROCK TYPE OR FORMATION		DESCRIPTION	ROCK	<u>ب</u>	P 95 - CORE RECOVERY	SHEET 12 R.Q.D	WATER PRESSURE TEST LUGEON VALUE	DEPTH
	0.50		SILTY CLAY		Reddish brown sandy		51,01 82,02				I t Ludiui
	٥.60		GRAVEL		grown angular, five medium						a sharifa da
					C 3 - 6					ON KOEL CO., LTE ULTING ENGINEERS, TOKYO.	<b>}.</b>

## C3.2 Test Pit Logs of Grand Falls Dam Site

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MUTONGA / GRAND FALLS HYDROPOWER PROJECT HOLE NO. GC 1 SHEET NO. 1 OF 1 DRILL LOG ROCK TYPE COLUMN COLL WATER PRESSURE TEST ROUNDWATE ROCK DEPTH (ECOVER) R. U. D DESCRIPTION OR LUGEON VALUE SECTION FORMATION 81, 01 SANDY SILT Reddish brown clayey 0.80 Brown angular fine, medium and coarse, in GRAVEL reddish brown sandy silt matrix. 82,0 1.30 Highly weathered white concretionary; with quartz-LIMESTONE feldspar gneiss zones. (as gravel) 1.60

Pick/shovel hand tools excavation

LOC FORM-C'

MUTONGA / GRAND FALLS HYDROPOWER PROJECT HOLE NO. 6C 1 OF 1 SHEET NO. 1 DRILL LOG CROUNDWATER COKE WATER PRESSURE TEST ROCK TYPE ROCK 13,31 COLUMN HL430 KECOVERY R. Q. D DESCRIPTION LUGEON VALUE OΧ SECTION FORMATION B1, 01 SILTY CLAY Reddish brown, sandy Brown angular medium, in reddish brown sandy silt GRAVEL 0.70 82,02 Highly weathered light grey with green tinge quartz-biotite-feldspar-GNEISS hornblende; mafic

Pick/shovel hand tools excavation

CONSULTING ENGINEERS, TOXYO.

NIPPON KOEL CO.,

NIPPON

CO.,

KOEI

DRILL LO	UTONGA / GRAND F				PROJECT NO. 1 OF 1	
THE SECTION SECTION	DESCRIPTION	ROCK	<b>3</b> 5 1	CONER RECOVERY	WATER PROSSURE TEST FUGEON VALUE	DEPTH
CLAYEY SILT	Reddish brown very sandy		в), 0 1			
GRAVEL GOOD OF OR	Brown angular fine medium and coarse					
GNEISS POO	Highly weathered thinly laminated light grey with green tinge medium grained		BS, 03			1llll.
	Pick/shovel hand tools ex	cavati	on.	•	ON KOEL CO., LTI	

CONSULTING ENGINEERS, TOXYO.

ОЕРТН	ELEVATION	DRILL ROCK TYPE OR FORMATION	COLUMN	DESCRIPTION	ROCK	NO. G C TP 9	E	WATER PRESSURE TEST LUGEON VALUE
0.10		SILTY CLAY GRAVEL	X	Reddish brown, sandy Brown angular fine, medium and coarse, mainly quartz and feldspar fragments	,	81,01		
		GNEISS		Highly weathered light brown with dark greenish grey specks; semi-pelitic				

	DRILL		utonga / grand f			DROPO GC I P95-1	PROJECT NO. 1 OF 1
DATE DEPTH SELEVATION	ROCK TYPE OR FORMATION	1	DESCRIPTION	ROCK GRADE	ă,	CUKE RECOVERY	WATER PRESSURE TEST ENGEON VALUE G
0.30	SILTY CLAY	× × × × × × × × × × × × × × × × × × ×	Reddish brown, sandy		81,01		
	GRAVEL	0000	Brown angular fine, medium and coarse;mainly quartz and feldspar fragments		92,02		
0.70	GNEISS		Moderately weathered greenish grey mafic hornblende biotite; with little quartz, feldspar				

LOC FORM-C"

NIPPON KOEL CO., LTD. Pick/shovel hand tools excavation CONSULTING ENGINEERS, TOKYO.

MUTONGA / GRAND **FALLS** HYDROPOWER PRO JE CT HOLE SHEET NO. 1 DRILL LOG CROUNDWATER WATER PRESSURE TEST ROCK TYPE ROCK GRADE COLUMN RECOVERY DESCRIPTION R. Q. D OR LUGEON VALUE SECTION FORMATION Reddish brown silty and 81,01 clayey; trace gravel SAND 0.20 Brown angular fine to coarse mainly quartz and feldspar fragments in clayey silt matrix 32, D2 GRAVEL 0.50 Moderately weathered banded greenish grey/ whitish mafic hornblende biotite; with little felsic minerals GNEISS CO.,

Pick/shavel hand tools excavation

CONSULTING ENGINEERS, TOKYO.

NIPPON KOEL

MUTONGA / GRAND FALLS HYDROPOWER PROJECT

DRIL	L LOG	HOLE NO. GC:2	SHEET NO. 1 OF 1
DO DOK T. OK OK TO NOCK T.	DESCRIPTION	CRADE CROCNOWAGEN STATE OF THE STATE OF THE	R Q D LUGGEON VALUE
GRAVEL	brown angular medium  o o o o o o o o o o o o o o o o o o o	81,01 sh 1t 82,02	
CHEISS	Moderately weathered greenish grey mafic hornblende-biotite wi little felsic mineral		
	Pick/shovel hand tool	s excavation	NIPPON KOEI CO., LTD.

MUTONGA / GRAND FALLS HYDROPOWER PROJECT DRILL LOG

DATE		DEPTH	ELEVATION	ROCK TYPE OR FORMATION	COLUMN SECTION	DESCRIPTION	ROCK GRADE	CROUNDWATER LEVEL	COAL RECOVI	- 1	R. Q. D	WATER PRESSURE TEST LUGEON VALUE	DEPTH	
		0.50		SILTY CLAY		Reddish brown,sandy		81, 6 1					humanani m	
		ox		GRAVEL		Brown angular fine medium and coarse; quartz, feldspar fragments in sandy silt, trace clay		87,02					Landantanhan	
		1.20		CNEISS		Highly becoming moderately weathered greenish grey coarse grained, mafic		<u> </u>					111	
													1111	
														1
	سلسلسل													

Pick/shovel hand tools excavation

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

MUTONGA / GRAND FALLS HYDROPOWER PROJECT HOLE NO. 6C 2 SHEET NO. 1 OF 1 DRILL LOG ROCK TYPE WATER PRESSURE TEST COLUMN LEVEL ROCK RECOVERY R. U. II OR DESCRIPTION DUCKON VALUE SECTION **FORMATION** Reddish brown 61,01 SILTY CLAY very sandy 0.25 Brown angular fine to 82,02 (PAVI). coarse, in very sandy clayey silt matrix 0.65 Moderately weathered 9/ O EISS foliated dark greenish natio grey with light coloured felsic lamination medium grained.

Pick/shovel hand tools excavation

CONSULTING ENGINEERS, TOKYO.

CONSULTING ENGINEERS, TOKYO.

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MUTONGA / GRAND FALLS HYDROPOWER PROJECT HOLE NO. GC 2 SHEET NO. OF 1 DRILL LOG ROCK TYPE COLUMN CORE CROUNDWATER WATER PRESSURE TEST ROCK 0R DESCRIPTION (ECOVER) R. U. D LUCEON VALUE SECTION FORMATION B1, 0 Reddish brown, sandy SILTY CLAY with roots 0.35 GRAVEL Brown angular mainly quartz  $\frac{0.45}{0.40}$ GMETSS Slightly weathered grey mafic horrblende biotite with felsic bands upto Foliation trend 020/80f CO. NIPPON KOEI

Pick/shovel hand tools excavation

MUTONGA / GRAND FALLS HYDROPOWER PROJECT HOLE NO. 6C 3 SHEET NO. 1 SHEET NO. 1 OF 1 DRILL LOG CROUNDING ER ROCK TYPE COLUMN CORE WATER PRESSURE TEST ROCK R Q. D DESCRIPTION oх LUGEON VALUE SECTION FORMATION Brown angular fine, GRAVEL medium and coarse 81,01 mainly quartz fragments in sandy clay matrix. 0.60 Completely weathered grey medium grained quartz-feldspar-82,02 GNEISS hornblende biotite 1.20

Pick/shovel hand tools excavation

CO., NIPPON KOEI CONSULTING ENGINEERS, TOKYO.

CONSULTING ENGINEERS, TOXYO.

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						JTONGA / GRAND FA						
				DRILL	LOC	<u>H</u>	OLE	NO. (	95-1	SHEET Z	NO. 1 OF 1	_
	2100	рертн	ELEVATION	ROCK TYPE OR FORMATION	COLUMN	DESCRIPTION	ROCK	CROUNDWATER LEVEL	ECONE RECOVERY	R. Q. H	WATER PRESSURE TEST	DEPTH
·		0.25		CLAYEY		Reddish brown sandy		<u> </u>				
	مانستاسياسياساني	0.75		GRAVEL		Brown angular medium and coarse mainly quartz fragments in sandy silt		81,01				اسلمسلسياسياس
	لمستانيس استياستانين	1.30		CNEISS		Compeltely weathered grey with green tinge mafic biotite-hornblende- feldspar, little quartz.		52,0	2			استاساساساسا
	فتندون العدون برياليدونات	- - - -										بالساسياسياسيا
		- -										hlh
		-				Pick/shovel hand tools exca				NIPP	ON KOE! CO., LTD	

C3 - 12

MUTONGA / GRAND FALLS HYDROPOWER PROJECT

O.90 CLAYEY SILT Reddish brown sandy, gravelly  Brown angular fine, medium and coarse, mainly quartz fragments.  Completely weathered finely laminated light grey with green tinge medium grained quartz-feldspar biotite.  Brown angular fine, medium and coarse, mainly quartz fragments.  B1, D1  B2, D2  B1, D1  B1, D1	CKOLNOWAGER CKOLNOWAGER LEVEL	DESCRIPTION	COLURN	DRILL ROCK TYPE OR FORMATION	ELEVATION	DEPTH	i Y
Completely weathered finely laminated light grey with green tinge medium grained quartz-feldspar biotite.	a1, 01	Brown angular fine, medium and coarse,mainly					مندهما أعرب أعرب أعرب المحمالين والمراجع والمراع
	B 2, 02	finely laminated light grey with green tinge medium grained quartz-		GNEISS		•	عجرها فيعقما فمصنا فنمديا فمعرما فمهرين إهريها مصففهم
						-	

			]	DRILL		JTONGA / GRAND		HYDROP NO.GC 3 TP 95 -		PROJECT NO. 1 OF 1	
DATE	RLAGO		ELEVATION	ROCK TYPE OR FORMATION	COLUMN SECTION	DESCRIPTION	ROCK GRADE	GROUNDWATER LEVEL ** GONE	R.Q.D	WATER PRESSURE TEST LUGEON VALUE	DEPTH
		1.40		SILTY CLAY	. <u></u> .	Reddish brown sandy		81,01			
		0.65		GRAVEL		Brown angular fine, medium and coarse mainly quartz with cobbles at bottom.		82,02			
		).88			V V V						
											Andron Salas Androhambar
	111										
	1l					Pick/shovel hand tools	excavation		NIPP	ON KOEI CO., LT	D.

CONSULTING ENGINEERS, TOKYO.

MUTONGA / GRAND FALLS HYDROPOWER PROJECT HOLE NO. GC 3 DRILL LOG COLE GROUNDWATER ROCK TYPE WATER PRESSURE TEST COLUMN ROCK HECGVERY OR DESCRIPTION R. Q. D LUGEON VALUE SECTION FORMATION 61,01 - . CLAYEY Brown sandy 2.40 Brown angular medium, in thin GRAVEL 0.50 Moderately weathered concretionary white fine and medium grained with reddish silty clay pockets. 32,02 LIMESTONE 0.85

Pick/shovel hand tools excavation

LOC FORM-C'

LOC FORM-C'

NIPPON KOEL CO., LTD.

CONSULTING ENGINEERS, TOKYO.

MUTONGA / GRAND FALLS HYDROPOWER PROJECT HOLE NO. GC 4 SHEET NO. 1 OF 1 DRILL LOG CORE ELEVATION SROUNDW/CE WATER PRESSURE TEST ROCK TYPE COLUMN ROCK LEVEL RECOVERY R. Q. D OR DESCRIPTION LUGEON VALUE SECTION FORMATION Reddish brown sandy SILTY CLAY 81,01 0.50 Brown angular fine, medium and coarse mainly quartz, GRAVEL occasional feldspar and

O.50

CHAVEL

O.60

Brown angular fine, medium and coarse mainly quartz, occasional feldspar and grey gneiss fragments in reddish brown sandy silt.

1.10

CNEISS

O.60

Brown angular fine, medium and coarse mainly quartz, occasional feldspar and grey gneiss fragments in reddish brown sandy silt.

1.30

CNEISS

O.60

Brown angular fine, medium and coarse mainly quartz, occasional feldspar and grey gneiss fragments in reddish brown sandy silt.

32,02

Indicate the province of the province of

Pick/shovel hand tools excavation

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

MUTONGA / GRAND FALLS HYDROPOWER PROJECT

				DRILL	LO	G 1	101.1	: N	$\Omega_{1}^{O}$	5 Ç 4	SHEET	NO. 1 OF 1
DATE		DEPTH	ELEVATION	ROCK TYPE OR FORMATION	COLUMN SECTION	DESCRIPTION	ROCK GRADE	CROUNDWATER		HEILONE) CORE		WATER PRESSURE TEST LUGEON VALUE
	-	0.15		CLAYEY SILT		Reddish brown sandy		е	J, 01			
		0.50		TUFF	A A A	Noterately weathered light grey with green tings fine and redirn grained outcrops on northern side of pit.		B	2,D2			
	- -					A couple of metres away from pit, mafic gneiss exposed.	:					
	1											
	1											
	1 1				:							
	111											
							<u>L</u>	<u> </u>			NIPP	ON KOEL CO., LTD.
	Pick/shovel hand tools excavation									SULTING ENGINEERS, TOKYO.		

		М			H YDROP		
	DRILL	LO	<b>3</b>	<u> ROLE</u>	NO. GC 4 TP 9.5	SHEET ~ 18	NO. 1 OF 1
БЕРТИ	ROCK TYPE OR FORMATION	COLUMN	DESCRIPTION	ROCK	SOUNDWINE CONF.		WATER PRESSURE TEST ELUGEON VALUE
0.90	CLAYEY		Reddish brown sandy		81,01		
1.40	GRAVEL		Brown angular medium and coarse; occasional cobbles; mainly quartz		B 2, D2		
1.90	GNEISS		Highly weathered dark grey medium grained mafic, hornblende-biotite Nearly outcrop foliation trend 010/70° W				
Pick/shovel hand tools excavation NIPPON KOEI CO., LTD.							

Pick/shovel hand tools excavation

CONSULTING ENGINEERS, TOKYO.