

Fig. A - 15

PROJECT Main dam site

SUMMARY OF DRILL LOG

HOLE NO. BM-11

DEPTH	ELEVATION	THICKNESS	COLUMN SECTION	ROCK TYPE OR FORMATION	DESCRIPTION	G. W. L.	CORE RECOVERY	R. Q. D	WATER PRESSURE TEST (LUGEON VALUE)									
									50 %	50 %	10	20	30	40	50			
0.40	31.12	0.40		Sand	Fine to coarse river sand													
					0.4 - 0.6 m Brownish, severely weathered, fractured. 0.6 - 11.7 m Bluish grey, poorly to moderately fractured fresh coarse grained conglomerate. Diameter of fragments are 3cm in maximum. 5.4 - 5.8 m ; Fractured and cracky zone.													
12.20	39.82	11.80		Conglomerate														
					Alternation of grey sand stone and bluish grey thin conglomerate. 12.8 - 14.3 m, 15.1 - 15.6 m ; Fractured conglomerate and sandstone. 17.4 - 18.1 m moderately cracky. Other part are cylindrical and stable sandstone, conglomerate.													
25.40	26.72	13.20		Sandstone and Thin conglomerate														
26.90	25.22	1.50		Conglomerate	Bluish grey conglomerate. Cylindrical and stable core.													
					Grey, moderately fractured gritty sandstone and sandstone.													
30.32	21.82	3.42		Alternation of gritty sandstone and sandstone														
30.62	21.52	0.30		Conglomerate	Grey, poorly to moderately fractured.													

LOG FORM - A

Fig. A - 16

PROJECT Main dam site

SUMMARY OF DRILL LOG

HOLE NO. BM-12

DEPTH	ELEVATION	THICKNESS	COLUMN SECTION	ROCK TYPE OR FORMATION	DESCRIPTION	G. W. L.	CORE RECOVERY	R. Q. D.	WATER PRESSURE TEST				
									LUGEON VALUE				
							50	50	10	20	30	40	50
1.45	49.22	1.45	X	River deposit, gravels & boulders	Yellow-brown, round boulders ϕ 3 - 20 cm.	Full							
			○	Conglomerate Sandstone	1.45 - 4.6 m: Light grey, partly weathered along cracks. 4.6 - 11.5 m: Dark grey, partly fractured (7.5 m and 8.1 - 8.4 m), moderately stable conglomerate, poorly cracks dip vertical to 60°. 11.5 - 11.9 m: Dark grey, fine grained sandstone. Bedding plane dips 5 to 10°								
			○		Conglomerate	11.9 - 15.34 m: Dark grey, poorly fractured and poorly weathered conglomerate. Cylindrical core.							
15.37	35.30	13.92	○	Conglomerate									
17.60	33.07	2.23	○	Sandstone	15.34 - 17.60 m Dark grey moderately fractured (15.4 and 17.5 m)								
			○	Gritty sandstone	17.6 - 22.1 m: Grey, medium grained gritty sandstone Partly fractured at 18.6 m, 19.0 m and 19.6 m								
22.10	28.57	4.50	○										
			○	Sandstone and Gritty sandstone	22.1 - 28.9 m: Grey, heavily to moderately fractured sandstone and gritty sandstone. Cracks dip 45 to 60°.								
28.90	21.77	6.80	○			28.9 - 30.0 m: Light grey, heavily fractured, medium grained gritty sandstone. Cracks dip 60°, cylindrical core.							
30.00	20.67	1.10	○	Gritty sandstone									

LOG FORM - A

Fig. A - 17

PROJECT Saddle dam site

SUMMARY OF DRILL LOG

HOLE NO. BRS - 1

DEPTH	ELEVATION	THICKNESS	COLUMN SECTION	ROCK TYPE OR FORMATION	DESCRIPTION	G. W. L.	CORE RECOVERY	R. Q. D.	WATER PRESSURE TEST (LUGEON VALUE)						
									50	50	10	20	30	40	50
1.95		1.95		Soil	Brownish grey clay with sand and plant root soft.										
4.05		2.10		Soil	Reddish brown partially whitish grey clay soft.	3.5 m									
12.40		8.35		Alternation of Shale and M. Sandstone	Dark grey shale and yellowish brown m. sandstone alternated layers. Intensively weathered (as a whole) M. hard										
20.00		8.60		Alternation of Shale and M. Sandstone	Dark grey shale and grey m. sandstone alternated layers. Severely fractured Fresh to slightly weathered Hard 15.10 - 15.20; Crack with greyish yellow clay.										

LOG FORM - A

Fig. A - 19

PROJECT Saddle dam site

SUMMARY OF DRILL LOG

HOLE NO. BSS-2(2/2)

DEPTH	ELEVATION	THICKNESS	COLUMN SECTION	ROCK TYPE OR FORMATION	DESCRIPTION	G. W. L.	CORE RECOVERY	R. Q. D.	WATER PRESSURE TEST (LUGEON VALUE)						
									50	10	20	30	40	50	
23.60		3.60		Sandstone	Completely to highly fractured; average 3 cm angular fragment.										
24.90		1.30		Conglomerate	Moderately strong to strong grey brown moderately to lightly weathered, poorly fractured, stained.										30.38
					Moderately strong grey with stained brown sandstone with trace of grit highly fractured, moderately stained angular fracture, with average size 2-3 cm in length wedge like fractured moderately to slightly weathered.										EL = 56.4
30.00		5.10		Sandstone	END OF BORE HOLE										

LOG FORM A

Fig. A - 22

PROJECT Saddle dam site

SUMMARY OF DRILL LOG

HOLE NO. BSS-4(1/2)

DEPTH	ELEVATION	THICKNESS	COLUMN SECTION	ROCK TYPE OR FORMATION	DESCRIPTION	G. W. L.	CORE RECOVERY	R. Q. D.	WATER PRESSURE TEST				
									LUGEON VALUE				
							50	50	10	20	30	40	50
0.40		0.40	x	Soil	Hard brown clayey SILT.								
			x		Hard mottled grey and brown clayey SILT.								N value > 80
			x										N value > 80
3.10		2.70	x	Soil									N value > 80
			x		Hard brown clayey SILT.								0.48
4.85		1.75	x	Soil									
5.00		0.15	x	Shale	Very weak grey and brown interbedded SHALE (completely weathered)								
5.60		0.60	x	Soil									
6.40		0.80	x	Soil	Very stiff to hard brown clayey SILT with fine to medium gravel.								
					Hard grey clayey SILT with fine to coarse gravel.								
					Moderately weak to moderately strong, grey with brown lamination, SHALE.								
					Highly to moderately weathered. Completely fractured. The parting are along the bedding plane, the weakly cemented bedding are mainly the thin laminated sandy silt.								1.98
11.60		5.20		Shale	The poor recovery are due to higher weathering strata which are friable highly fractured and stained.	FEB							
					Moderately strong grey moderately weathered SHAL with laminated sandy silt.	JAN							
					Highly fractured and stained.								3.995
					Occasional 65° joints are found perpendicular to bedding plane which dipped at 30°.								2.75
18.15		6.55		Shale									
					Moderately strong to strong grey moderately weathered shale with thin laminations of sandy silt.								
					Average spacing of parting of bedding plane is 80 mm moderately fractured.								
21.60		3.45		Shale		21.40							7.4

LOG FORM-A

Fig. A - 24

PROJECT Quarry-3 site

SUMMARY OF DRILL LOG

HOLE NO. BQ-1 (1/2)

DEPTH	ELEVATION	THICKNESS	COLUMN SECTION	ROCK TYPE OR FORMATION	DESCRIPTION	G. W. L.	CORE RECOVERY	R. Q. D.	WATER PRESSURE TEST LUGEON VALUE									
									50	50	10	20	30	40	50			
1.30		1.30	x x x x	Colluvium	Medium stiff greyish brown fine sandy SILT.													
3.25		1.95	x x x x	Soil	Very dense brown silty sand with gravel.													
4.15		0.90	o o	Conglomerate	Very weak to weak grey brown completely to highly weathered subrounded fractured recovery.													
7.10		2.95	.	Sandstone	Strong light grey. Slightly weathered moderately fractured stained 45° joints.	6.80m												
10.20		3.10	o o	Conglomerate	Strong light grey. Slightly weathered moderately fractured lightly stained 60° and 30° jointing.	5.7 JAN												
11.70		1.50	.	Interbedded S.S. and conglomerate	Weak light grey with stained fractured surface. Completely fractured highly to moderately weathered.													
14.60		2.90	.	Interbedded sandstone and conglomerate	Moderately weak light grey severely fractured moderately weathered, stained.													
18.80		4.20	o o	Conglomerate	Moderately strong to strong light grey moderately to slightly weathered angular fractured slightly stained 70° and 40° jointing severely fractured.													
21.80		3.00	o o	Conglomerate	Moderately strong to strong light grey slightly weathered moderately fractured 20.4 - 20.8 m completely fractured zone (conglomerate zone)													




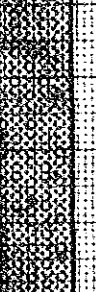

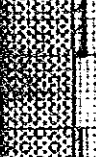


LOG FORM-A

Fig. A - 25

PROJECT Quarry-3 site

SUMMARY OF DRILL LOG

HOLE NO. BQ-1 (2/2)

DEPTH	ELEVATION	THICKNESS	COLUMN SECTION	ROCK TYPE OR FORMATION	DESCRIPTION	G. W. L.	CORE RECOVERY	R. Q. D.	WATER PRESSURE TEST				
									LUGEON VALUE				
							50	50	10	20	30	40	50
23.50		1.70		Conglomerate	Moderately strong to strong light grey moderately to slightly weathered severely fractured.								
28.00		4.50		Conglomerate	Weak brown grey Completely fractured. Very stained joints with mudstone inclusion highly stained.								
30.50		2.50		Conglomerate	Moderately strong light grey Completely to severely fractured moderately to slightly weathered 29.0 - 29.7 m completely fractured zone.								
33.00		2.50		Conglomerate	Strong grey moderately fractured slightly weathered.								
					END OF BORE HOLE								

LOG FORM A

Fig. A - 26

PROJECT Quarry-1 site

SUMMARY OF DRILL LOG

HOLE NO. BQ-2

DEPTH	ELEVATION	THICKNESS	COLUMN SECTION	ROCK TYPE OR FORMATION	DESCRIPTION	G. W. L.	CORE RECOVERY	R. Q. D.	WATER PRESSURE TEST (LEGON VALUE)				
									50	50	10	20	30
0.80		0.80	x x x	Colluvium	Soft dark grey sandy silt.				N value > 50				
2.20		1.40	x x x	Completely weathered soil	Very dense brown completely to highly weathered silty sand and conglomerate stone.								
3.00		0.80	○ ○ ○	Conglomerate	Strong light grey moderately to slightly weathered.								
4.20		1.20	○ ○ ○	Conglomerate	Moderately weak to moderately strong light grey, severely fractured.								
5.00		0.80	○ ○ ○	Conglomerate	Strong light grey slightly weathered, moderately fractured.								
5.60		0.60	○ ○ ○	Conglomerate	Moderately strong light grey moderately to lightly weathered, completely fractured.								
6.70		1.10	○ ○ ○	Sandstone	Moderately strong to strong light grey moderately to slightly weathered severely fractured, highly stained.	6180m							
8.60		1.90	○ ○ ○	Conglomerate	Strong light grey slightly weathered severely fractured, angular fractured.	28-31 JAN							
12.40		3.80	○ ○ ○	Conglomerate	Strong light grey slightly weathered, moderately fractured: slightly stained 45° dipping joints.								
14.50		2.10	○ ○ ○	Conglomerate	Moderately weak light grey severely fractured; angular fractured.								
19.00		4.50	○ ○ ○	Interbedded SS & conglomerate	Moderately strong light grey moderately to slightly weathered stained angular fracture completely fractured.								
20.00		1.00	○ ○ ○	Conglomerate	Strong light grey slightly weathered severely fractured, slightly stained.								
22.00		2.00	○ ○ ○	Conglomerate	Moderately strong light grey moderately to slightly weathered stained angular fracture completely fractured.								

LOG FORM-A

Fig. A - 27

PROJECT Quarry-1 site

SUMMARY OF DRILL LOG

HOLE NO. BQ-3 (1/2)

DEPTH	ELEVATION	THICKNESS	COLUMN SECTION	ROCK TYPE OR FORMATION	DESCRIPTION	G. W. L.	CORE RECOVERY	R. Q. D.	WATER PRESSURE TEST (LUCEON VALUE)					
									10	20	30	40	50	
					Very dense brown silty sand and gravel. Completely weathered soil.									
4.50		4.50		Soil										
5.10		0.60		Breccia	Moderately weak moderately strong light grey moderately weathered breccia.									
5.90		0.80		Conglomerate	Moderately weak grey brown moderately weathered.									
					Moderately strong light grey with stained moderately fractured. Clay deposited joints at the level of 6.00m. 7.70 - 8.80m fractured zone 45° dipping joints (stained)									
14.20		8.30		Sandstone										
					Weak to moderately weak brown grey highly stained. Completely fractured angular fractured (stained) moderately weathered.									
19.20		5.00		Conglomerate										
					Weak to moderately weak brown grey Completely fractured angular fractured (stained) moderately weathered.									
22.00		2.80		Sandstone										

LOG FORM A

Fig. A - 28

PROJECT Quarry-1 site

SUMMARY OF DRILL LOG

HOLE NO. BQ-3(2/2)

DEPTH	ELEVATION	THICKNESS	COLUMN SECTION	ROCK TYPE OR FORMATION	DESCRIPTION	G. W. L.	CORE RECOVERY	R. Q. D.	WATER PRESSURE TEST				
									LUGEON VALUE				
							50	50	10	20	30	40	50
30.50		8.50		Conglomerate	Moderately weak brown grey completely to severely fractured highly stained highly to moderately weathered.								
35.00		4.50		Interbedded sandstone & conglomerate	Weak grey brown Highly weathered interbedded sandstone and conglomerate, highly stained. (Decomposed rock of variable thickness containing angular boulders separated by friable material)								

LOG FORM-A

Fig. A - 29

PROJECT Quarry-3 site

SUMMARY OF DRILL LOG

HOLE NO. BQ-4 (1/2)

DEPTH	ELEVATION	THICKNESS	COLUMN SECTION	ROCK TYPE OR FORMATION	DESCRIPTION	G. W. L.	CORE RECOVERY	R. Q. D.	WATER PRESSURE TEST (LUGEON VALUE)									
									50	50	10	20	30	40	50			
0.50		0.50		Colluvium	Soft greyish brown silty sand													
					Very dense brown silty sand with conglomerate stone.													
3.00		2.50		Completely weathered soil														
4.10		1.10		Interbedded conglomerate & Sandstone	Weak to moderately weak grey brown highly to moderately weathered subrounded recovery.													
6.20		2.10		Sandstone	Strong light grey slightly weathered 45° jointing.	6.00												
					Moderately strong to strong light grey with stained moderately fractured around 6.8 and 10.2m level, conglomerate zone are found 45° jointing moderately to slightly weathered.	7.9												
11.80		5.60		Sandstone														
					Strong light grey slightly weathered moderately fractured slightly stained 45° jointing.													
16.20		4.40		Sandstone														
					Weak light grey with stained angular fracture moderately weathered completely fractured.													
20.00		3.80		Sandstone														
21.00		1.00		Conglomerate	Moderately weathered, moderately weak light grey completely fractured, highly stains moderately weathered.													
					Moderately strong light grey, moderately weathered.													

LOG FORM - A

Fig. A - 30

PROJECT Quarry - 3 site

SUMMARY OF DRILL LOG

HOLE NO. BQ-4(2/2)

DEPTH	ELEVATION	THICKNESS	COLUMN SECTION	ROCK TYPE OR FORMATION	DESCRIPTION	C. W. L.	CORF. RECOVERY	R. Q. D.	WATER PRESSURE TEST LUGEON VALUE										
									50	50	10	20	30	40	50				
22.30		1.30		Sandstone	completely fractured, highly stained angular fractured.														
24.00		1.70		Conglomerate	Moderately strong light grey completely fractured, highly stained moderately weathered.														
27.00		3.00		Conglomerate	Moderately strong light grey moderately weathered with some mudstone inclusion completely fractured.														
30.00		3.00		Conglomerate	Moderately strong light grey moderately weathered completely fractured, highly stained angular fractured: 50° and 30° jointing with mudstone inclusion.														
					END OF BORE HOLE														

LOG FORM-A

Fig. A -31

PROJECT Quarry-2 site

SUMMARY OF DRILL LOG

HOLE NO. BQ-5

DEPTH	ELEVATION	THICKNESS	COLUMN SECTION	ROCK TYPE OR FORMATION	DESCRIPTION	C. W. L.	CORE RECOVERY	R. Q. D.	WATER PRESSURE TEST							
									LUGEON VALUE							
									50	50	10	20	30	40	50	
1.30		1.30		Residual soil	Yellow brown, loose day silt.											
2.50	130.73	1.20		Decomposed cong.	Completely decomposed, weathered.											
7.35	125.88	4.85		Conglomerate	2.6 - 3.1m Strongly weathered 3.1 - 7.5 m Grey, reddish, black spotted, poorly fractured conglomerate. Cracks dip 45° to 60°. 6.75 to 6.86m: core loss.											
10.13	123.10	2.78		Sandstone	Grey, poorly crack, fresh, hard sandstone. Cracks dip 70° and horizontal.											
					Grey with reddish, black spotted, poorly fractured, fresh conglomerate with partly dark grey thin shale (max. thickness is 10 cm). Interval of each cracks are 50 to 100 cm. Weakly weathered, reddish brown along cracks.	NO G.W.L.										
25.90	107.33	15.77		Conglomerate												
27.50	105.73	1.60		Sandstone	25.5 - 27.6 Dark grey to light grey, poorly fractured sandstone Cylindrical core.											
29.90	103.33	2.40		Conglomerate	Dark grey to reddish grey fresh, very hard conglomerate											

LOG FORM A

Fig. A - 32

PROJECT Quarry - 2 site

SUMMARY OF DRILL LOG

HOLE NO. BQ - 6

DEPTH	ELEVATION	THICKNESS	COLUMN SECTION	ROCK TYPE OR FORMATION	DESCRIPTION	C. W. J.	CORE RECOVERY	R. Q. D.	WATER PRESSURE TEST				
									LUGEON VALUE				
		0.50		Top soil					10	20	30	40	50
		0.50		Residual	0 - 0.5 : Yellow - brown, clayey silt.								
		1.30		Residual cobble	0.5-1.0 m 2.3-2.8 m, Light, reddish grey clayey silt.								
2.80	140.71	0.50		Residual soil									
					2.8 - 3.8 m brown, severely fractured and weathered, highly stained conglomerate.								
6.10	137.41	3.30			3.8 - 5.0 m Reddish grey, partly stained, moderately fractured.								
		0.25			5.0 - 12.4 m Grey, reddish, moderate to poorly fractured, fresh, hard conglomerate with thin sandstone.								
						No G.W.L.							
12.40	131.11	6.05		Conglomerate									
13.10	130.41	0.70		Sandstone	Very hard, interbedded thin sandstone								
16.00	127.51	2.90		Conglomerate	Reddish grey, slightly weathered, partly fractured conglomerate with thin sandstone.								
17.00	126.51	1.00		Sandstone	Bedding plane dip 20° and poorly cracks dip 45° to 60°.								
					18.5 - 19.4 m : Severely fractured.								
					21.5 - 23.0 m : Slightly fractured, cylindrical hard core.								
26.00	117.91	9.00		Conglomerate									
					Light grey, poorly fractured, fresh, fine grained sandstone. Slightly stained along cracks.								
30.00	113.51	4.00		Sandstone									

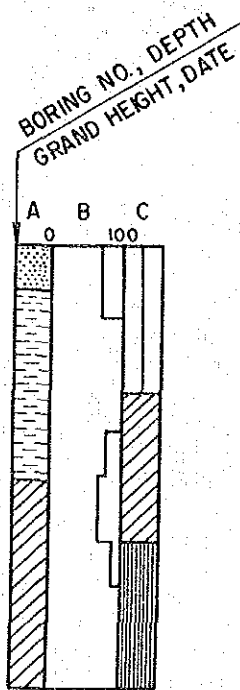
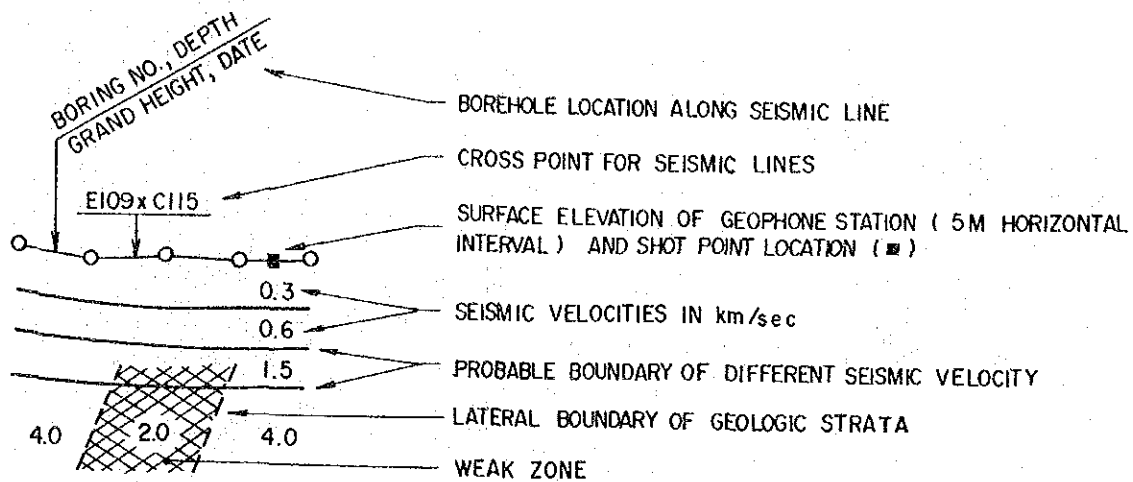
LOG FORM-A

APPENDIX B
SEISMIC EXPLORATION

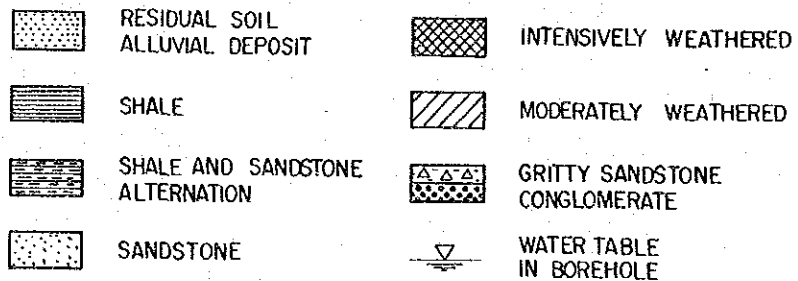
LIST OF FIGURES

- B-1. Legend for Seismic Exploration Results
- B-2. Seismic Exploration Results, Main Dam-Line A
- B-3. Seismic Exploration Results, Main Dam-Line B
- B-4. Seismic Exploration Results, Main Dam-Line C
- B-5. Seismic Exploration Results, Main Dam-Line D
- B-6. Seismic Exploration Results, Main Dam-Line E
- B-7. Seismic Exploration Results, Saddle Dam-Line S1
- B-8. Seismic Exploration Results, Saddle Dam-Line S2
- B-9. Seismic Exploration Results, Saddle Dam-Line S3
- B-10. Seismic Exploration Results, Quarry Site 1-Line QS1
- B-11. Seismic Exploration Results, Quarry Site 1-Line QS2

LEGEND



A. ROCK



B. ROCK QUALITY DESIGNATION (%)

D. CORE RECOVERY (%)

C. PERMEABILITY IN LUGEON UNIT (Lu)

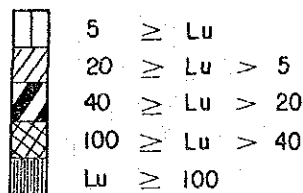


Fig.B-1 Legend for Seismic Exploration Results

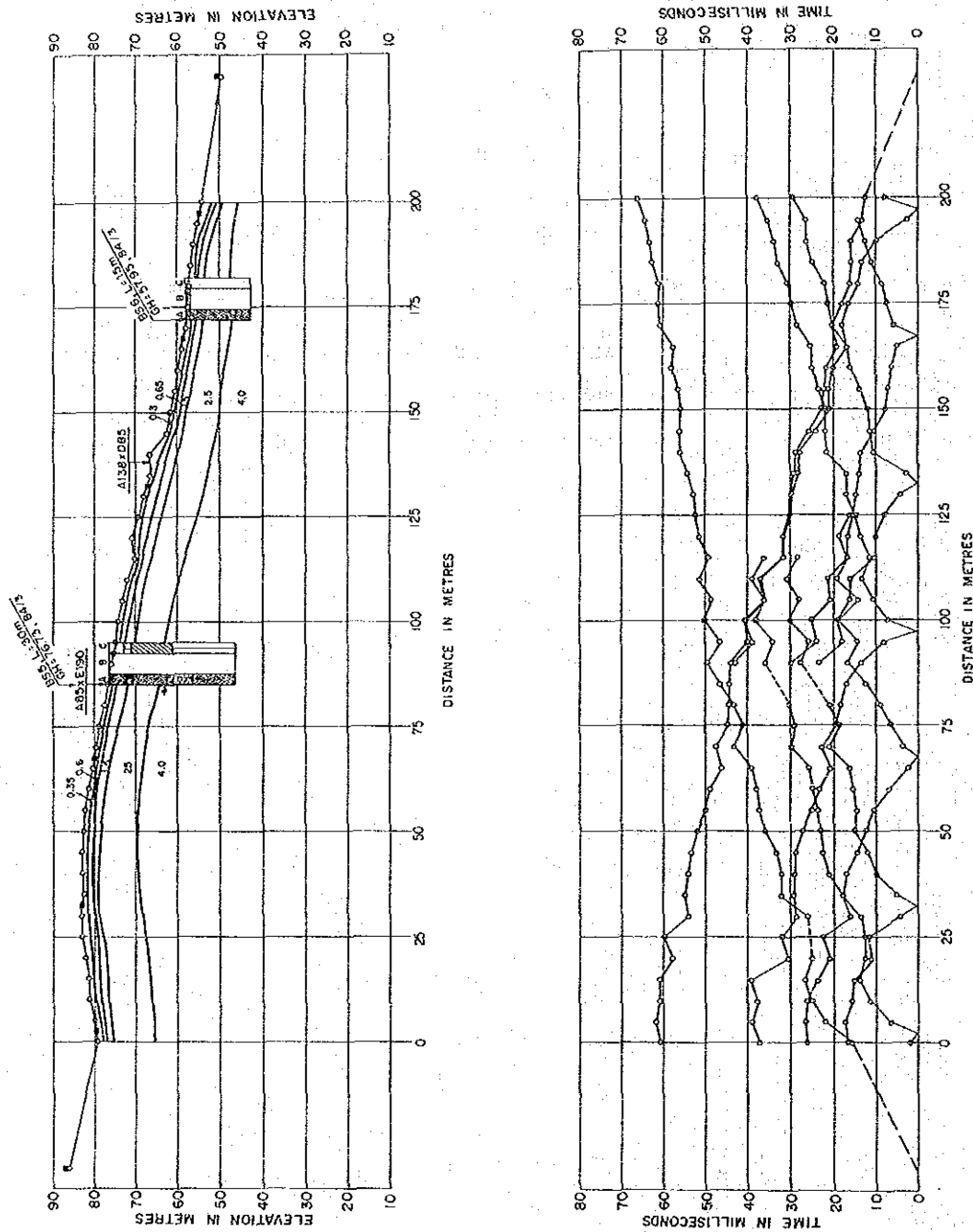


Fig.B-2 Seismic Exploration Results,
Main Dam - Line A

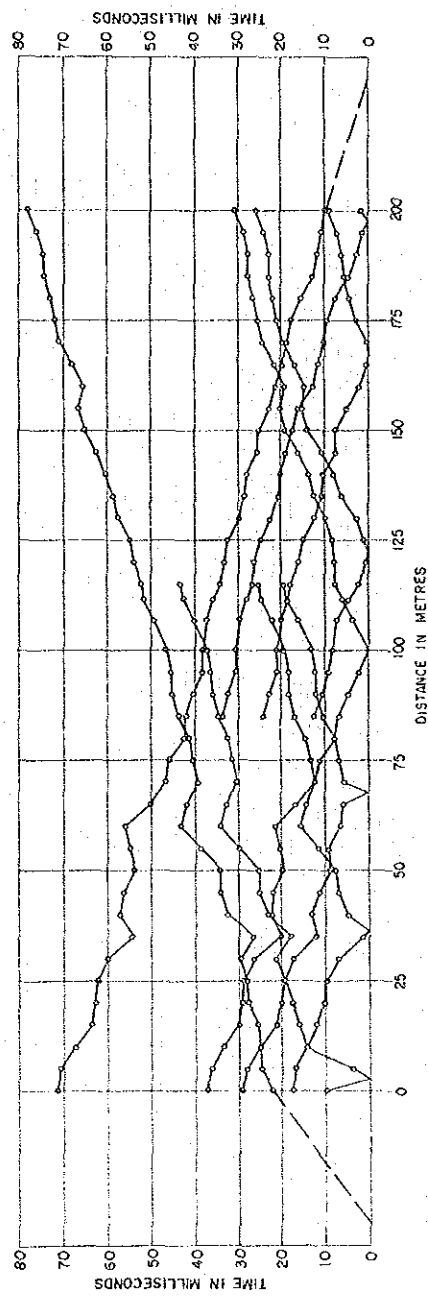
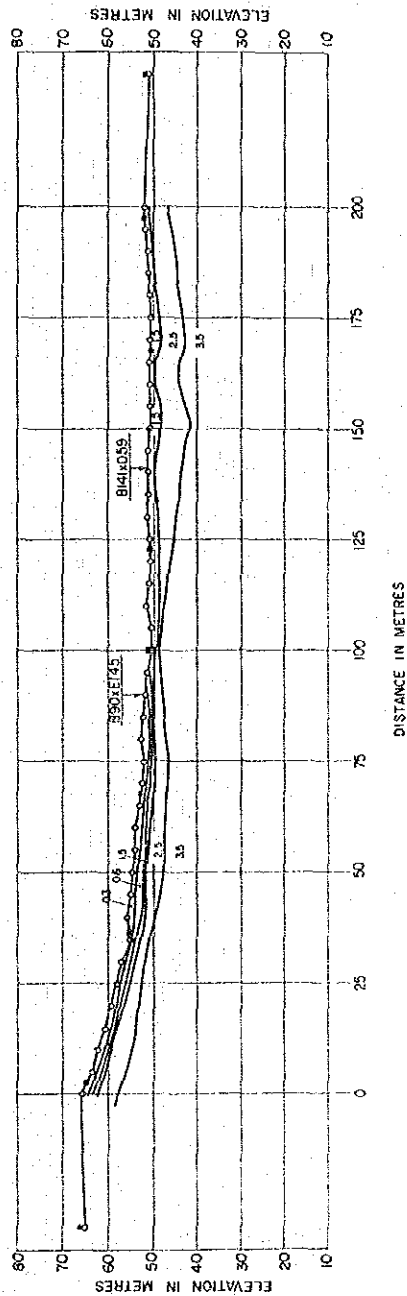


Fig.B-3 Seismic Exploration Results,
Main Dam - Line B

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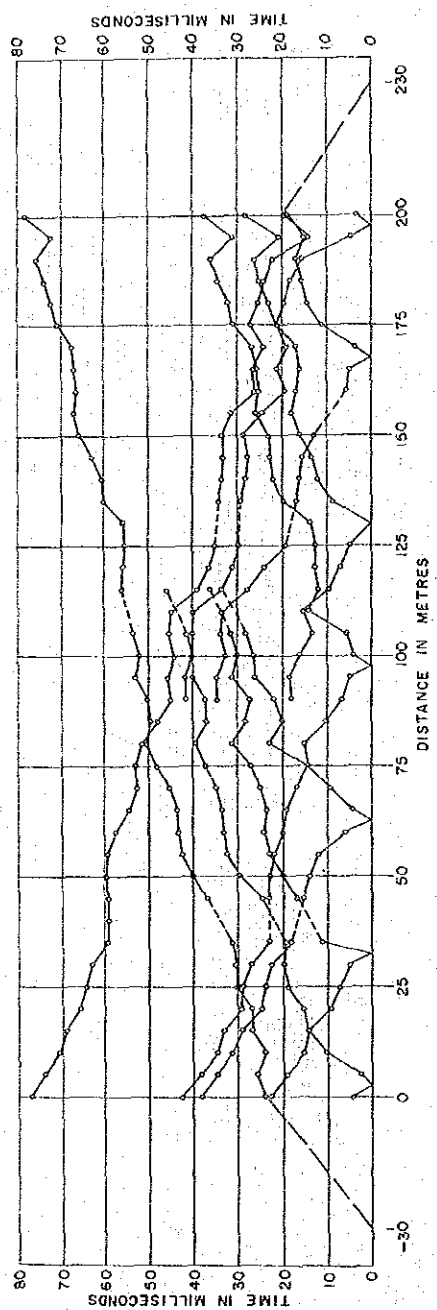
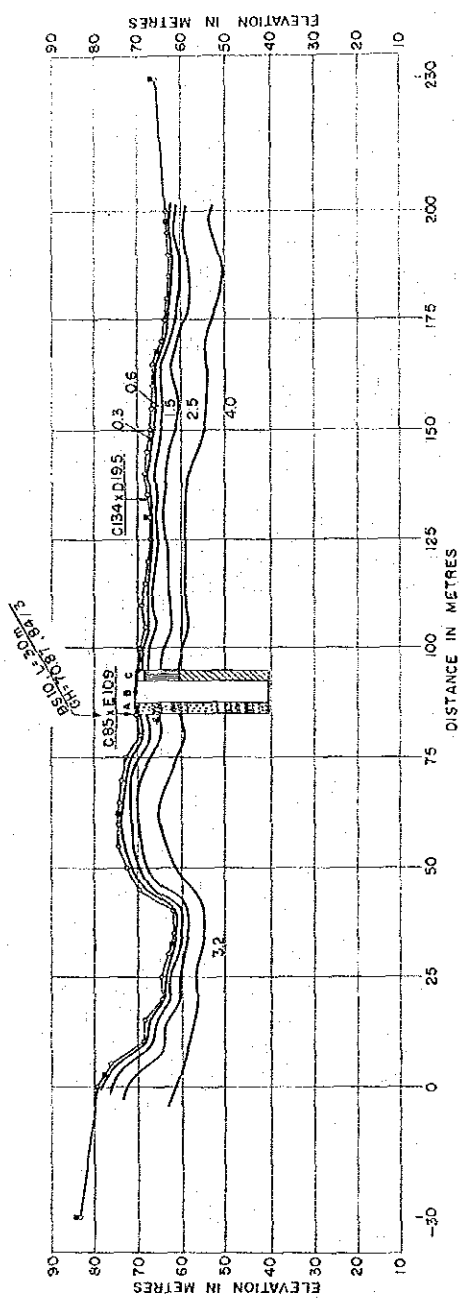


Fig.B-4 Seismic Exploration Results,
 Main Dam - Line C

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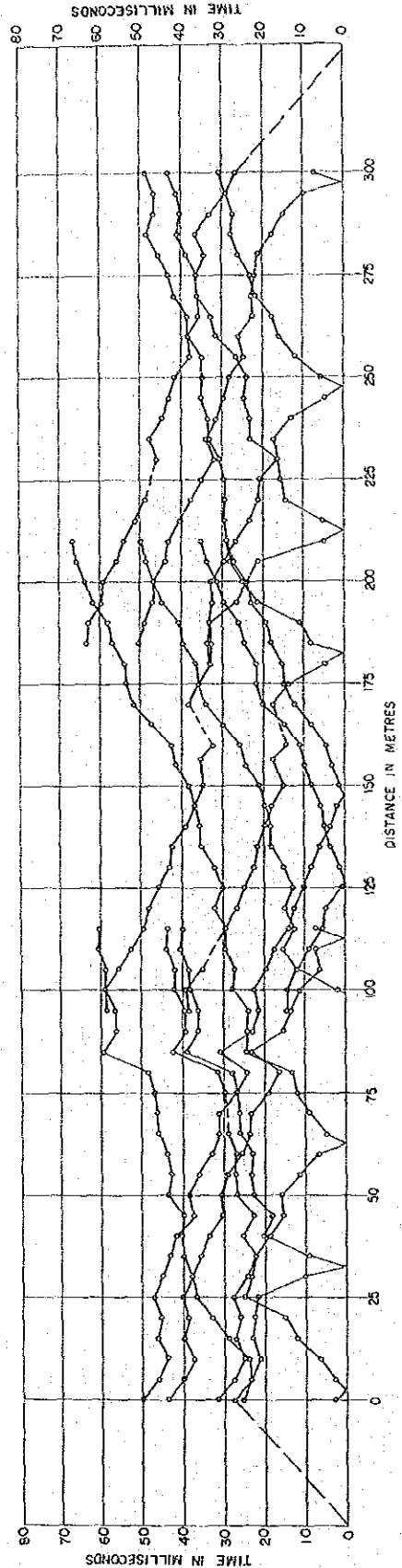
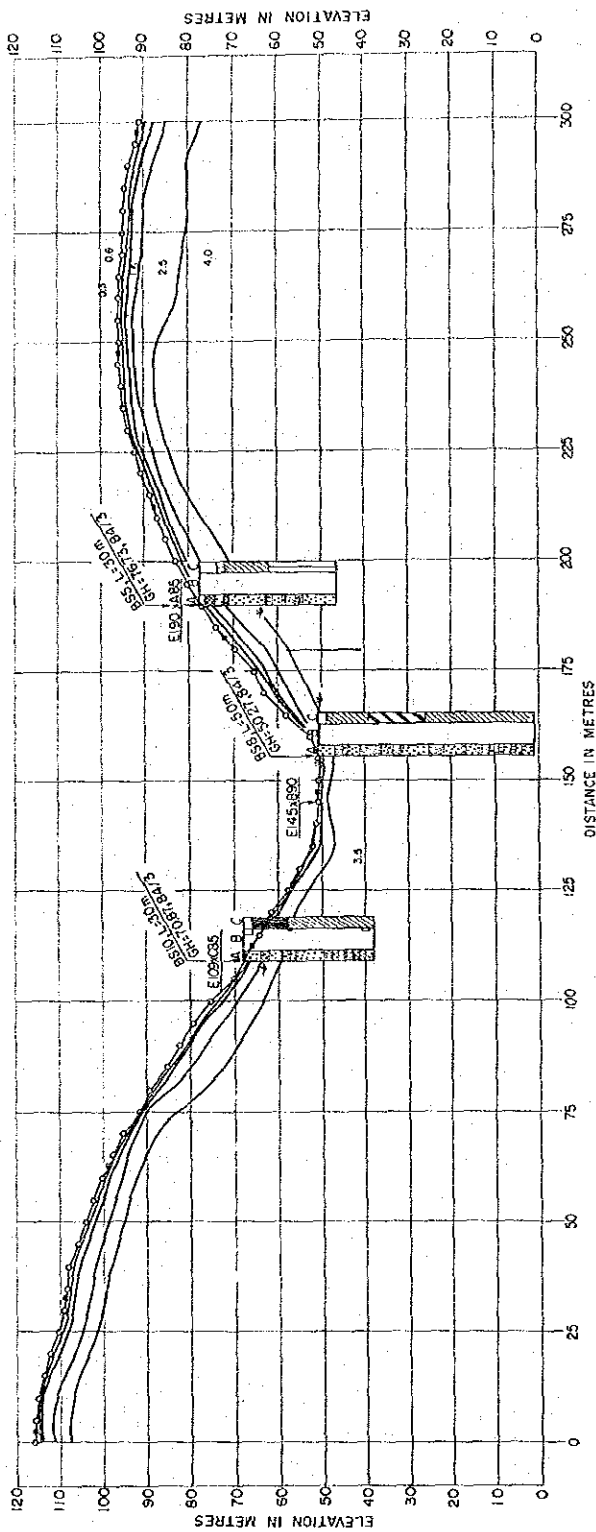


Fig.B-6 Seismic Exploration Results,
Main Dam-Line E

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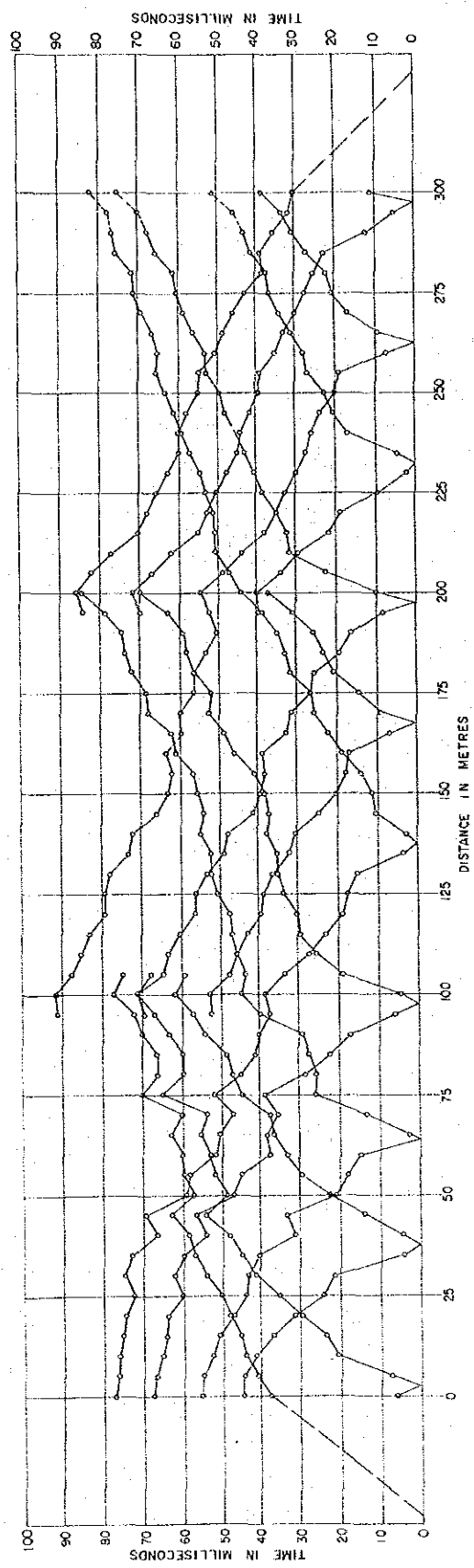
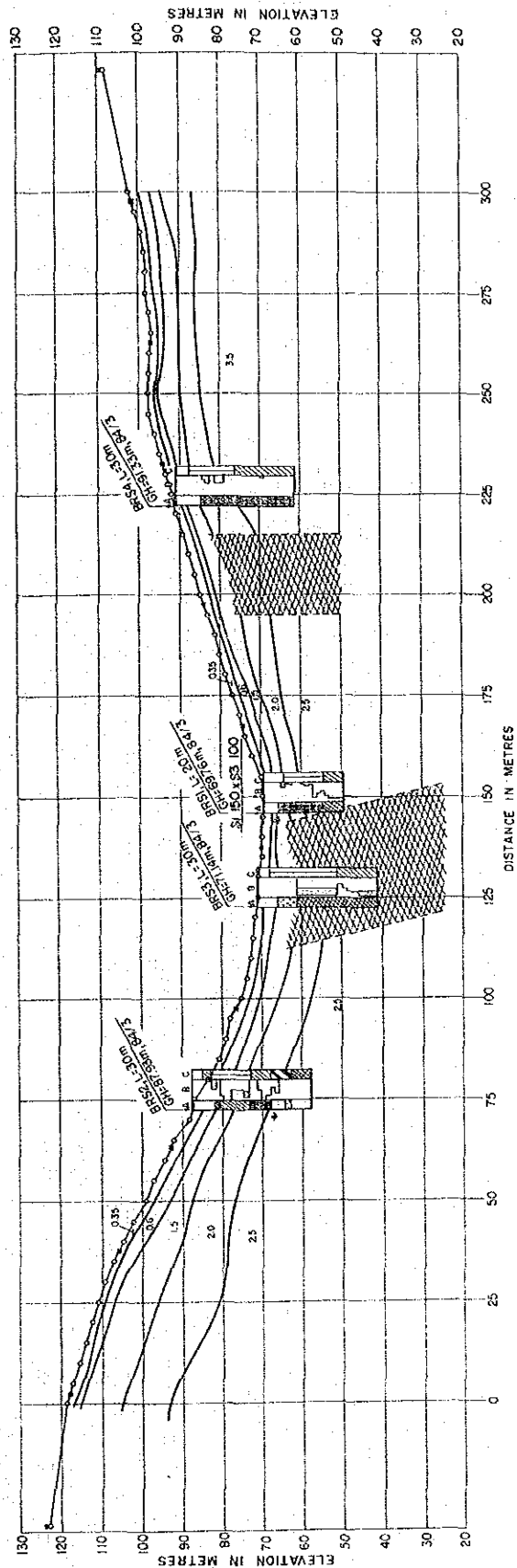


Fig.B-7 Seismic Exploration Results,
Saddle Dam-Line S1

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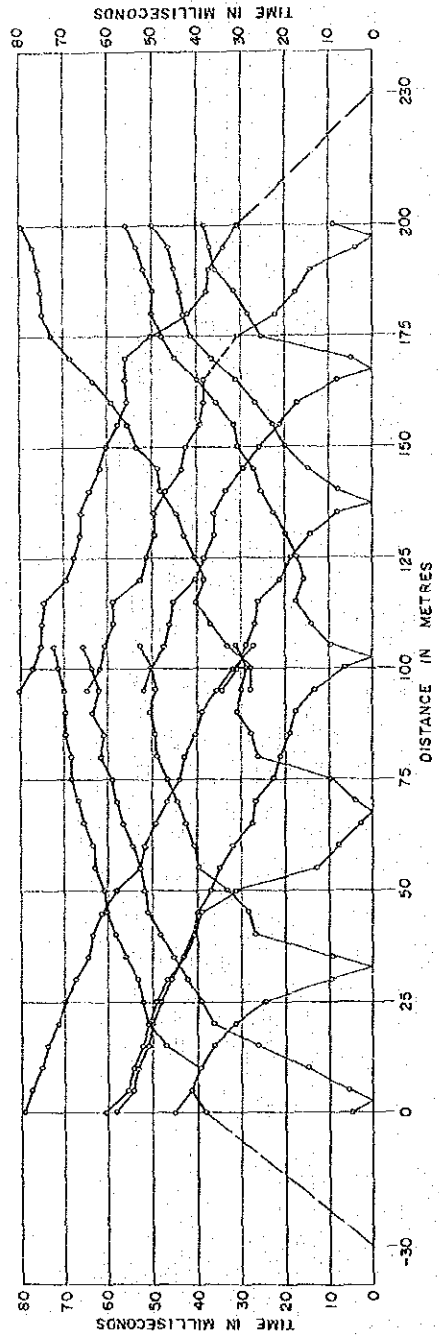
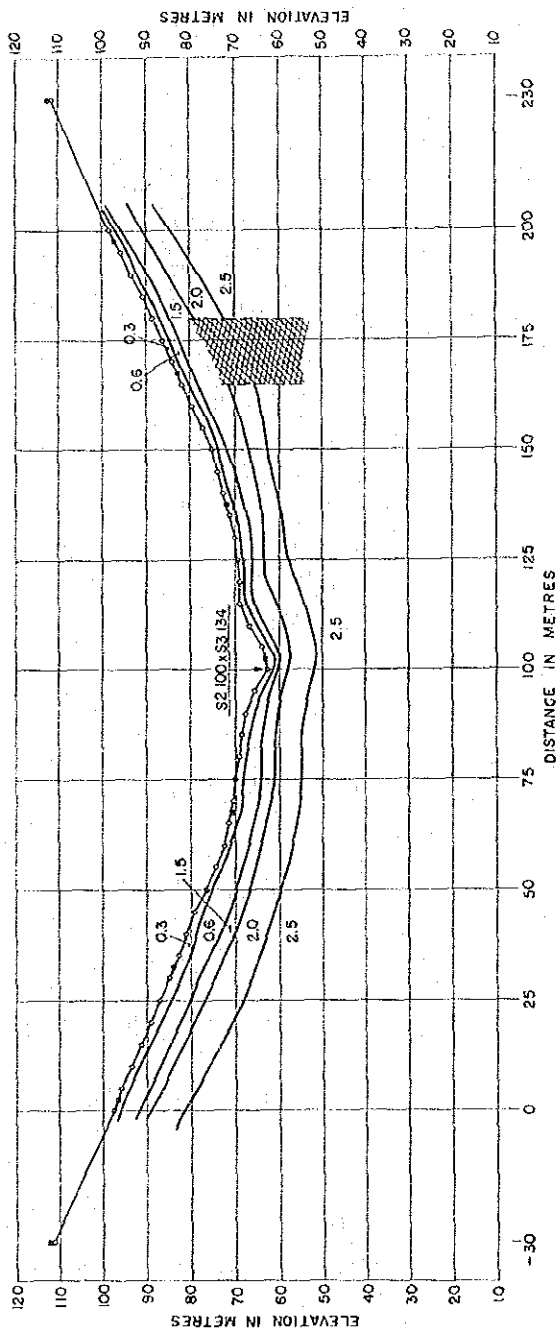


Fig.B-8 Seismic Exploration Results,
Saddle Dam - Line S2

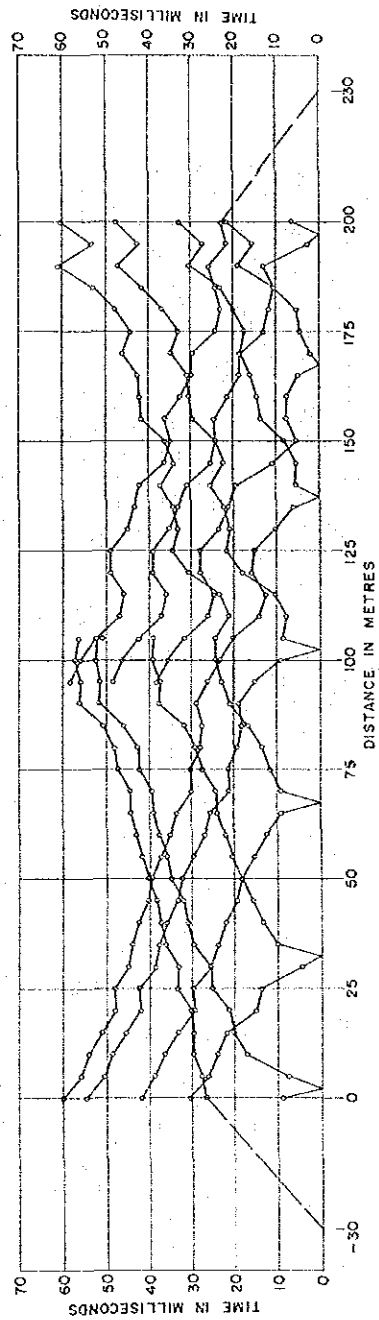
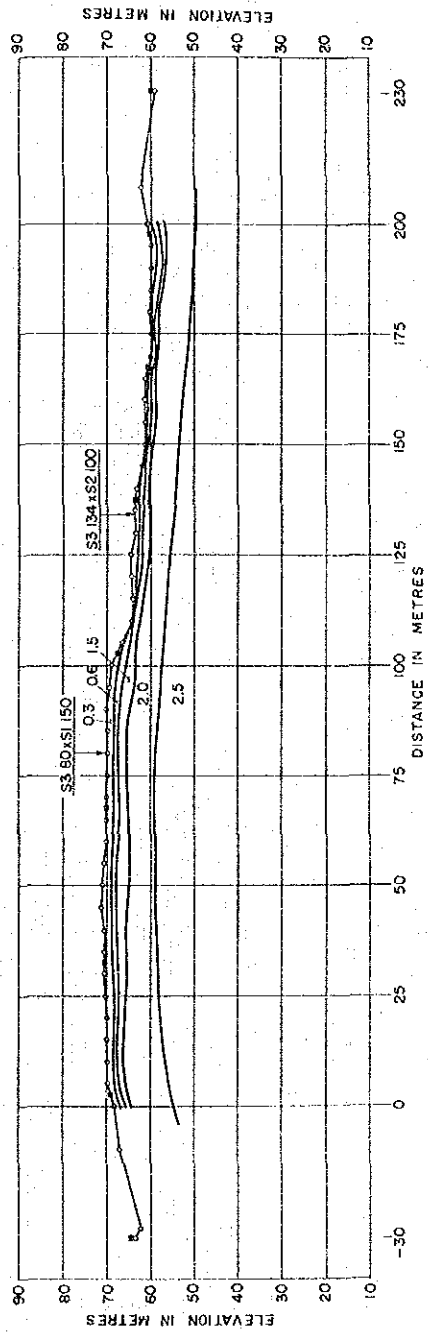


Fig.B-9 Seismic Exploration Results,
Saddle Dam-Line S3

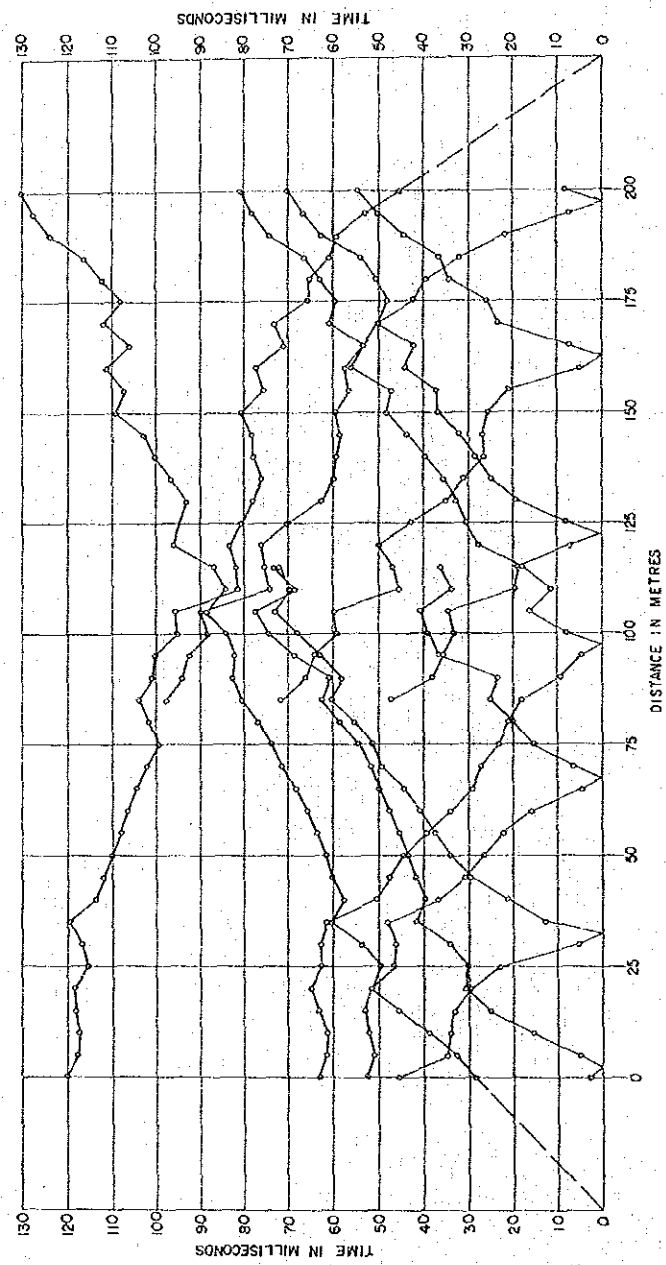
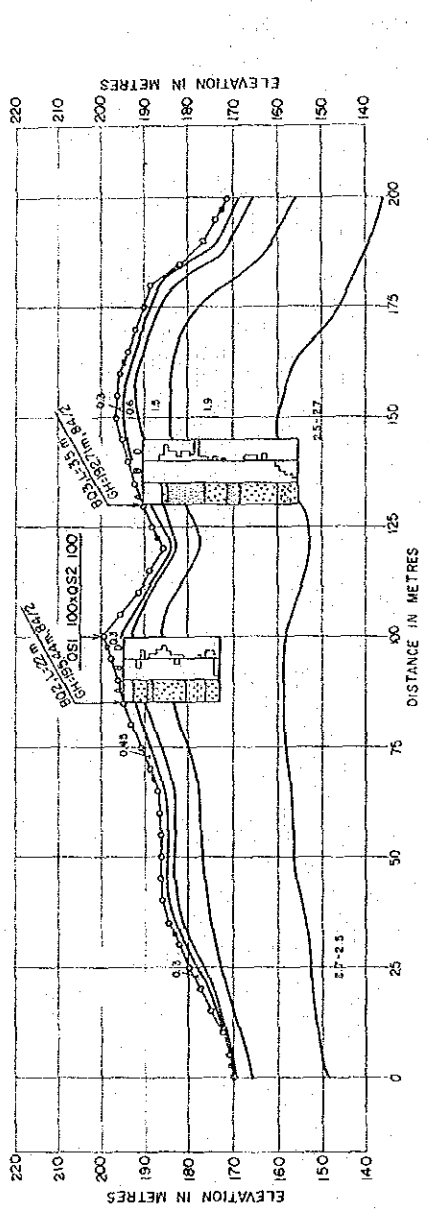


Fig.B-10 Seismic Exploration Results,
Quarry Site 1-Line QS1

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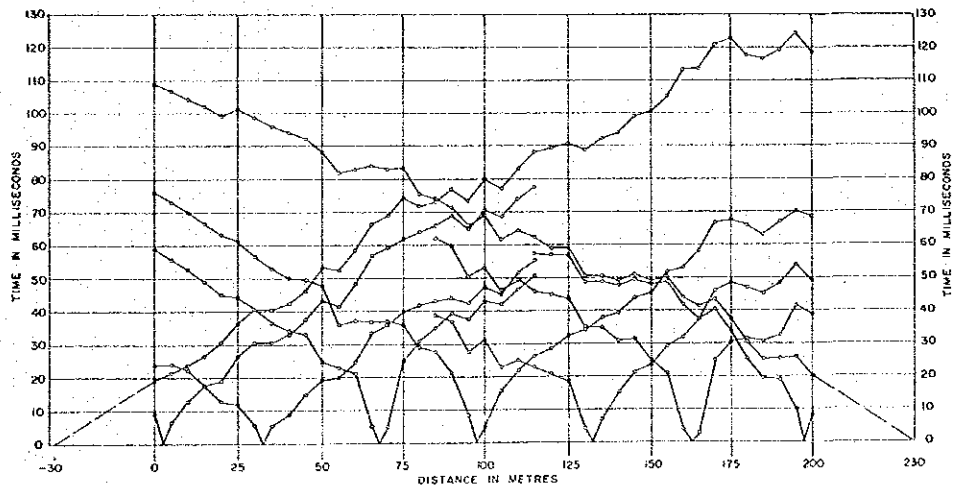
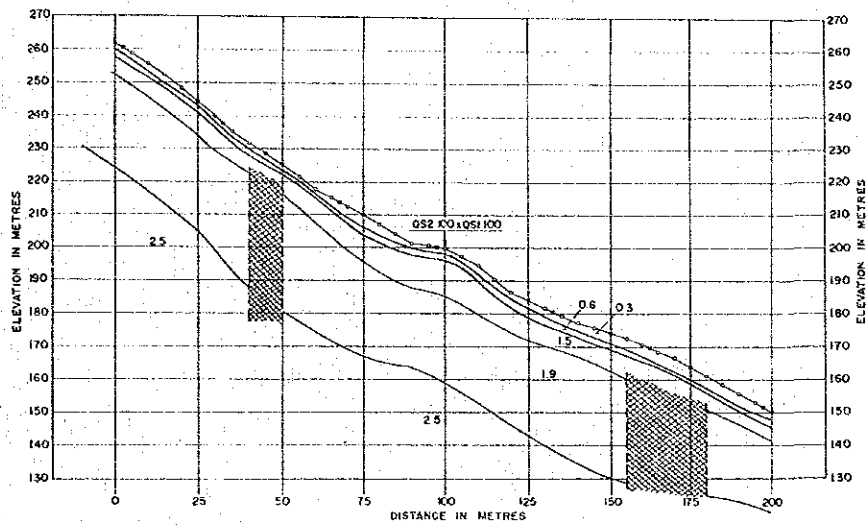


Fig.B-11 Seismic Exploration Results,
Quarry Site 1 - Line QS2

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