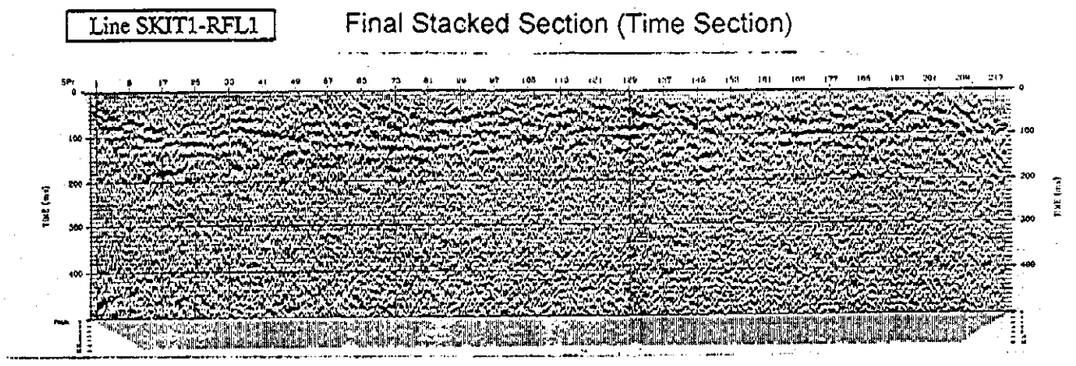
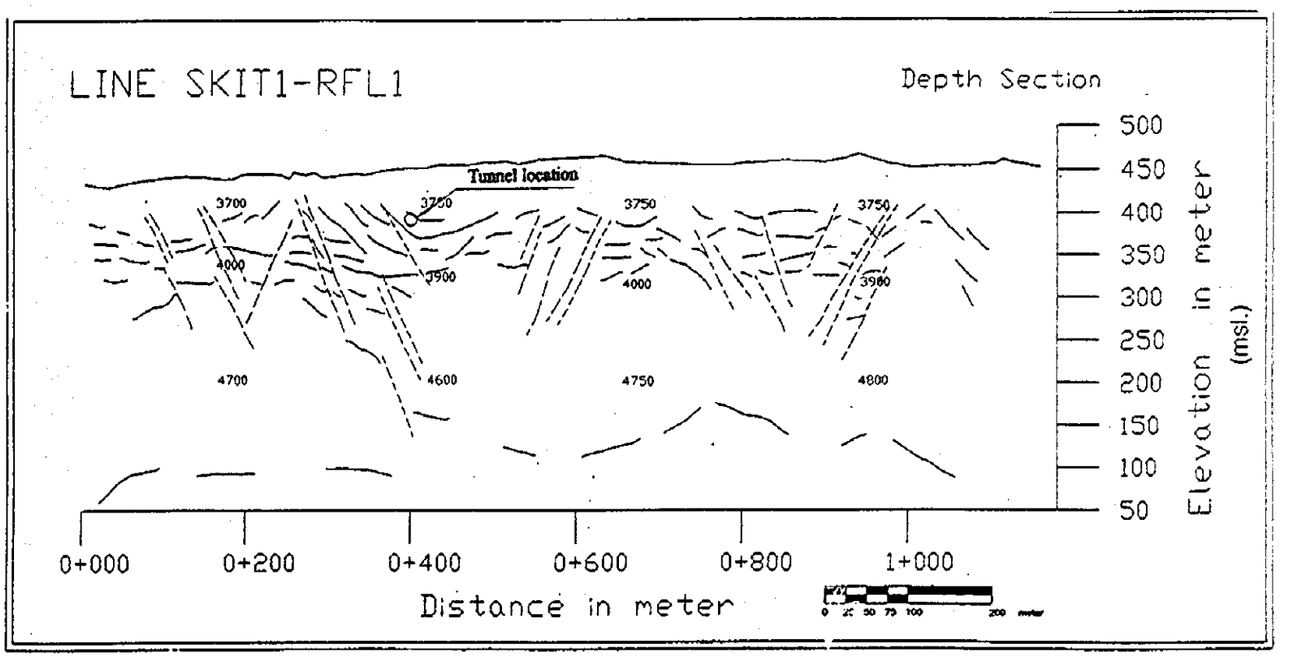
10. Seismic Reflection Survey

Figure 10.1 Results of Seismic Reflection Prospecting (1)





SEISMIC VELOCITY CONTOUR INTERPRETATION
KOK-ING-NAN PROJECT
LINE SKIT1-RFL1

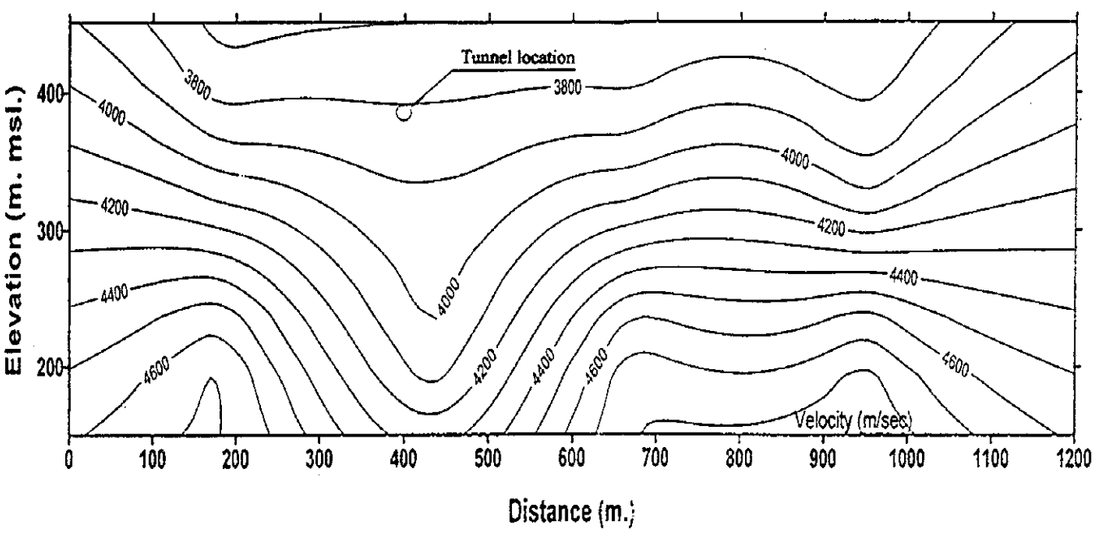
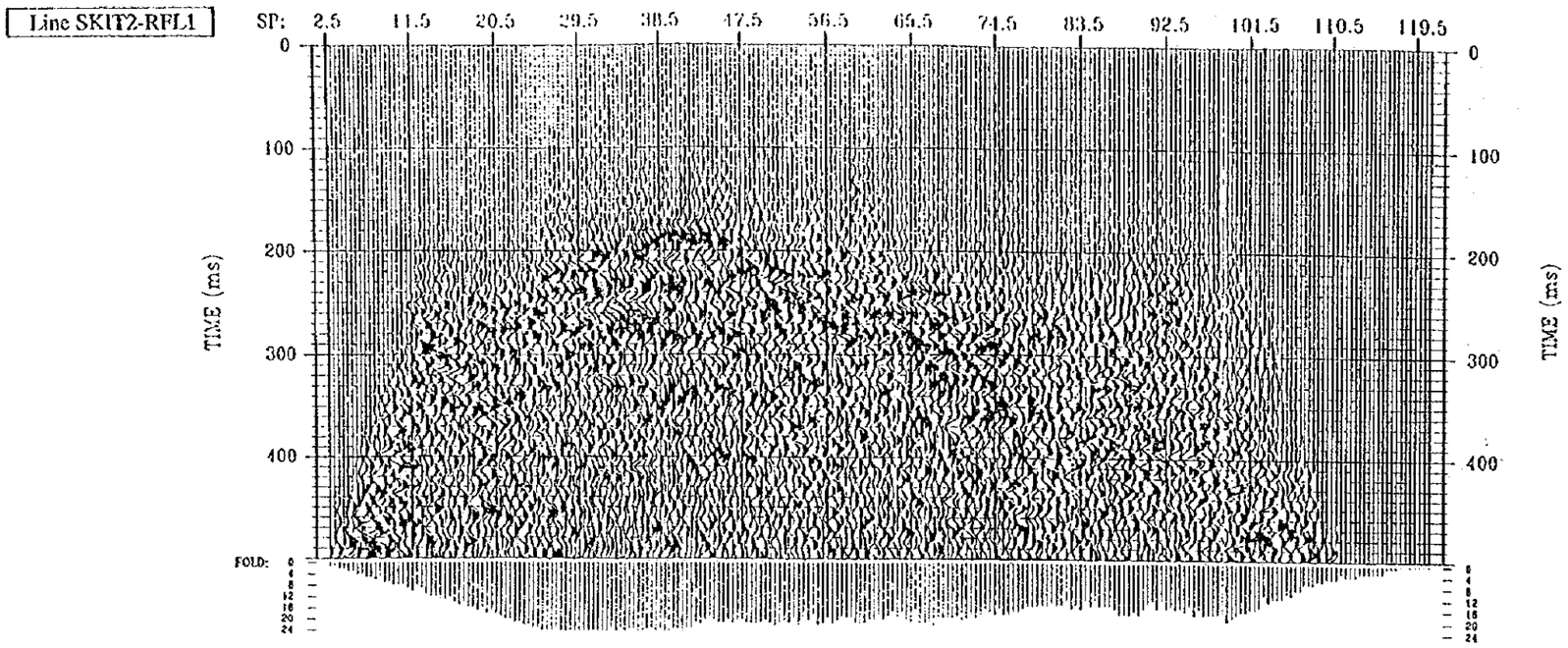


Figure 10.2 Results of Seismic Reflection Prospecting (2)



Reflection Seismic Survey Line SKIT-2-RFL1

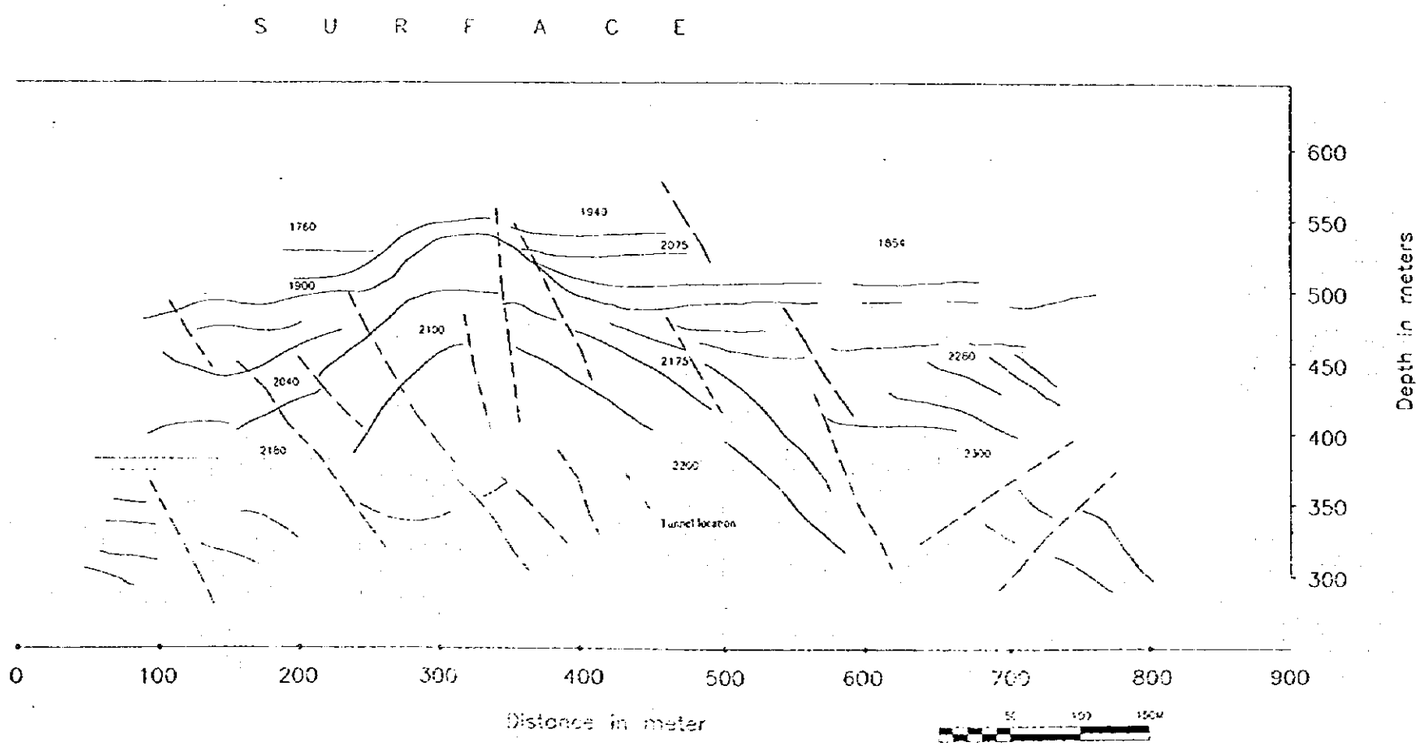
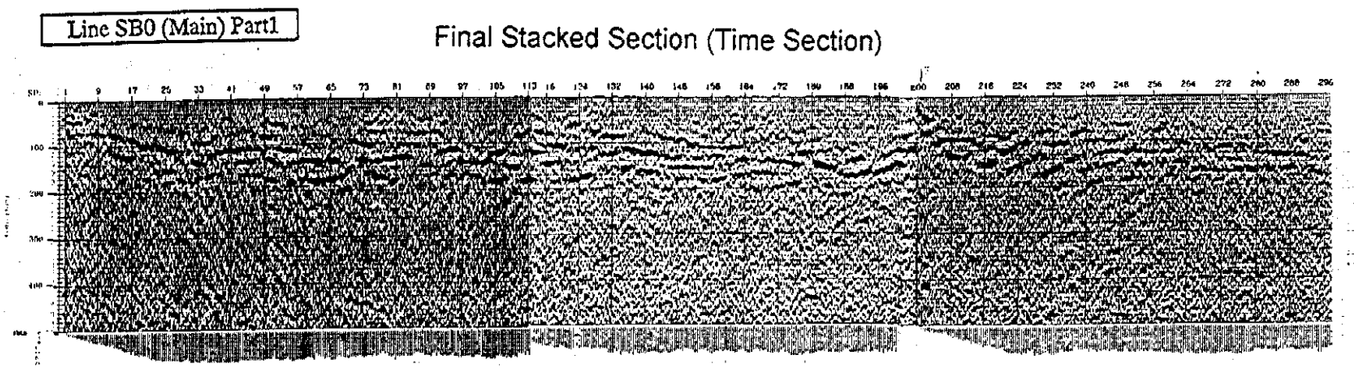
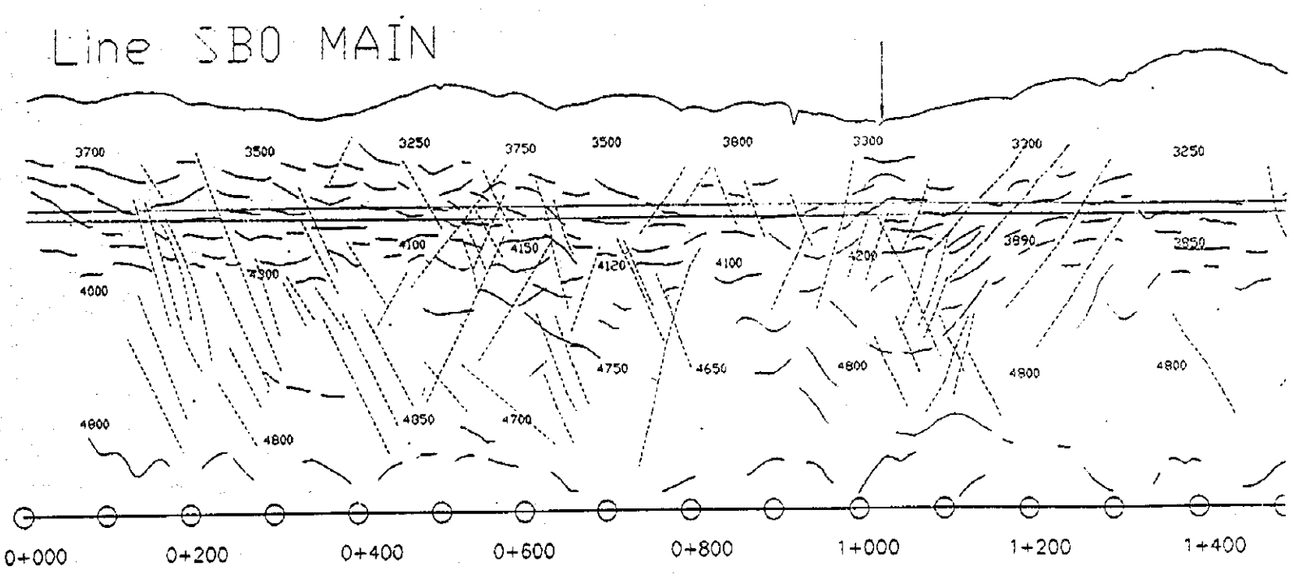


Figure 10.3 Results of Seismic Reflection Prospecting (3)





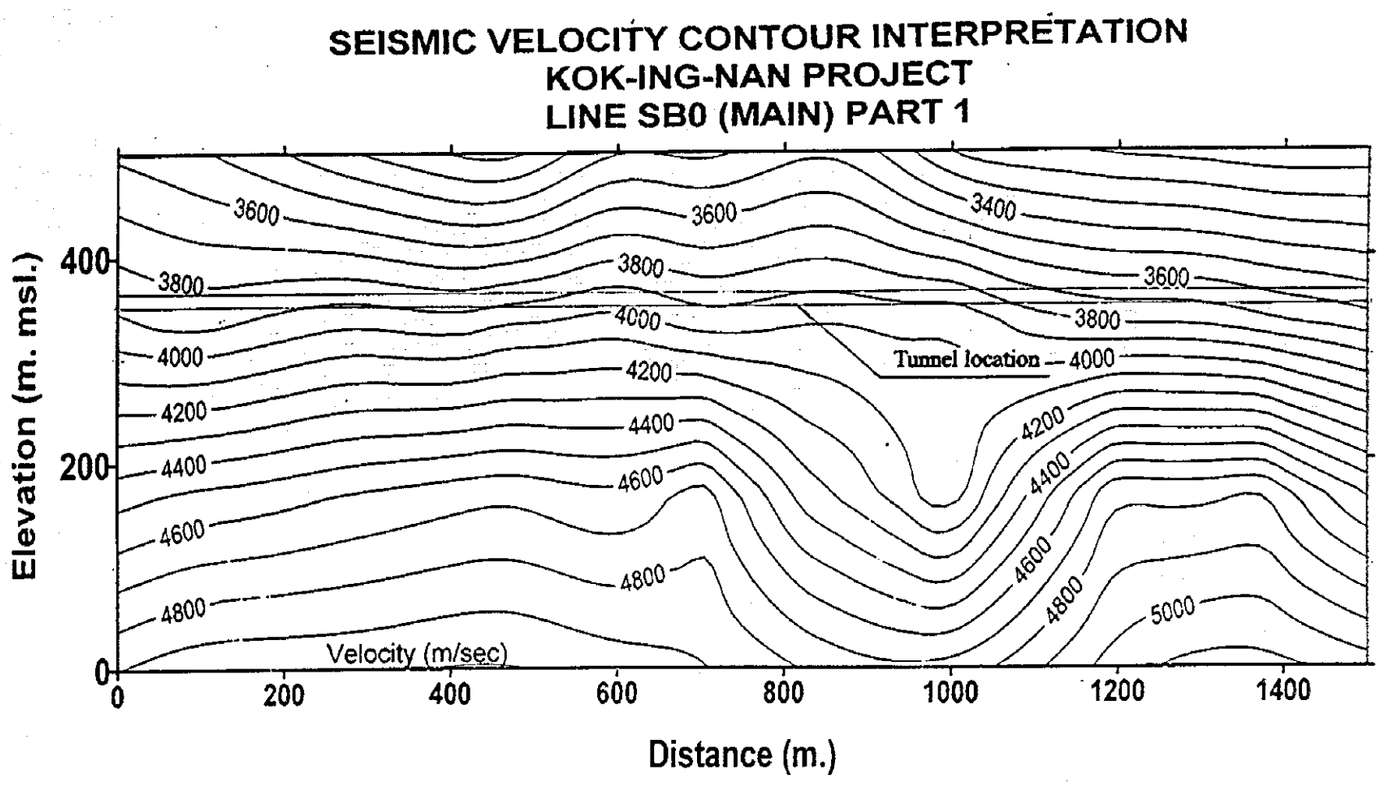
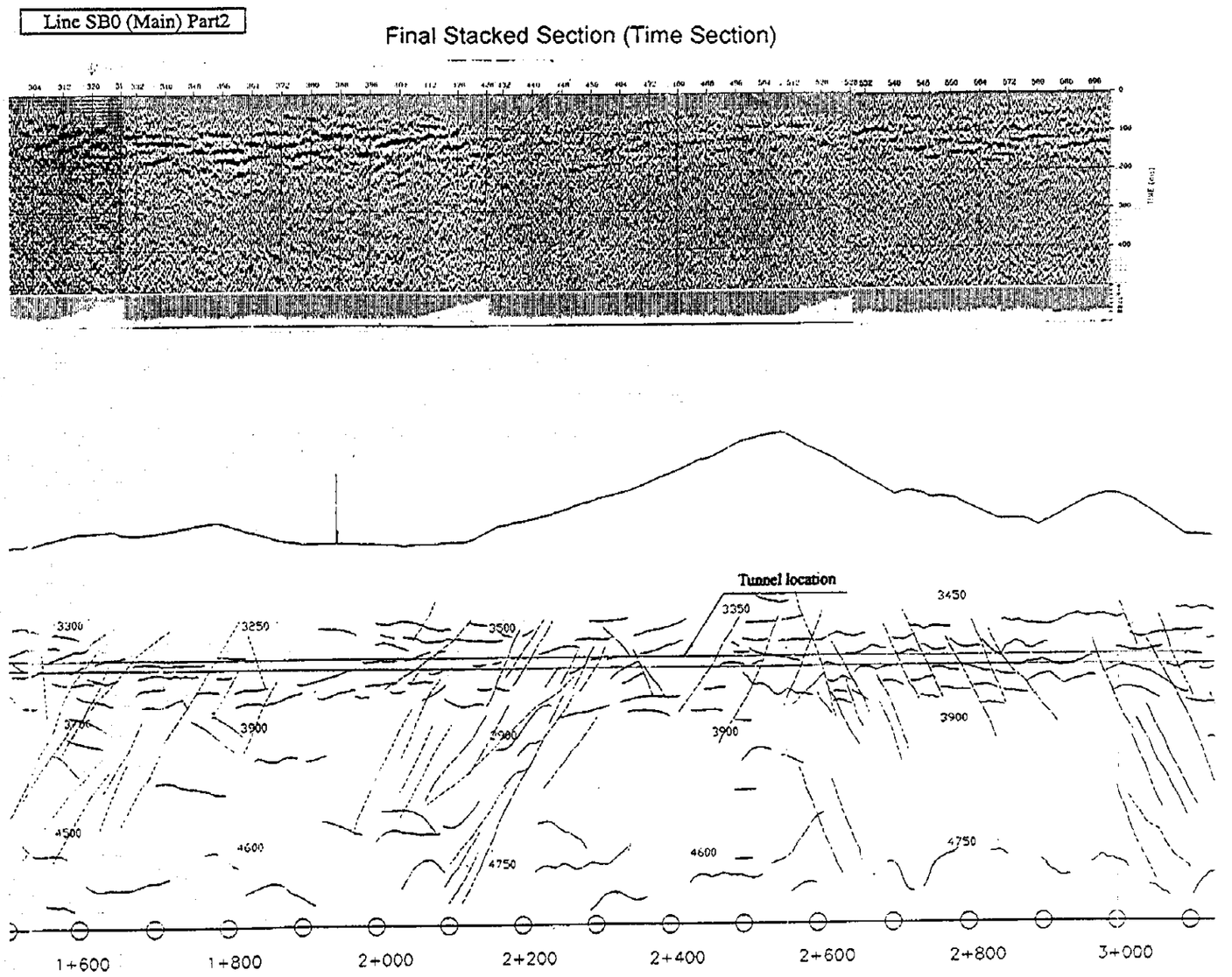


Figure 10.4 Results of Seismic Reflection Prospecting (4)



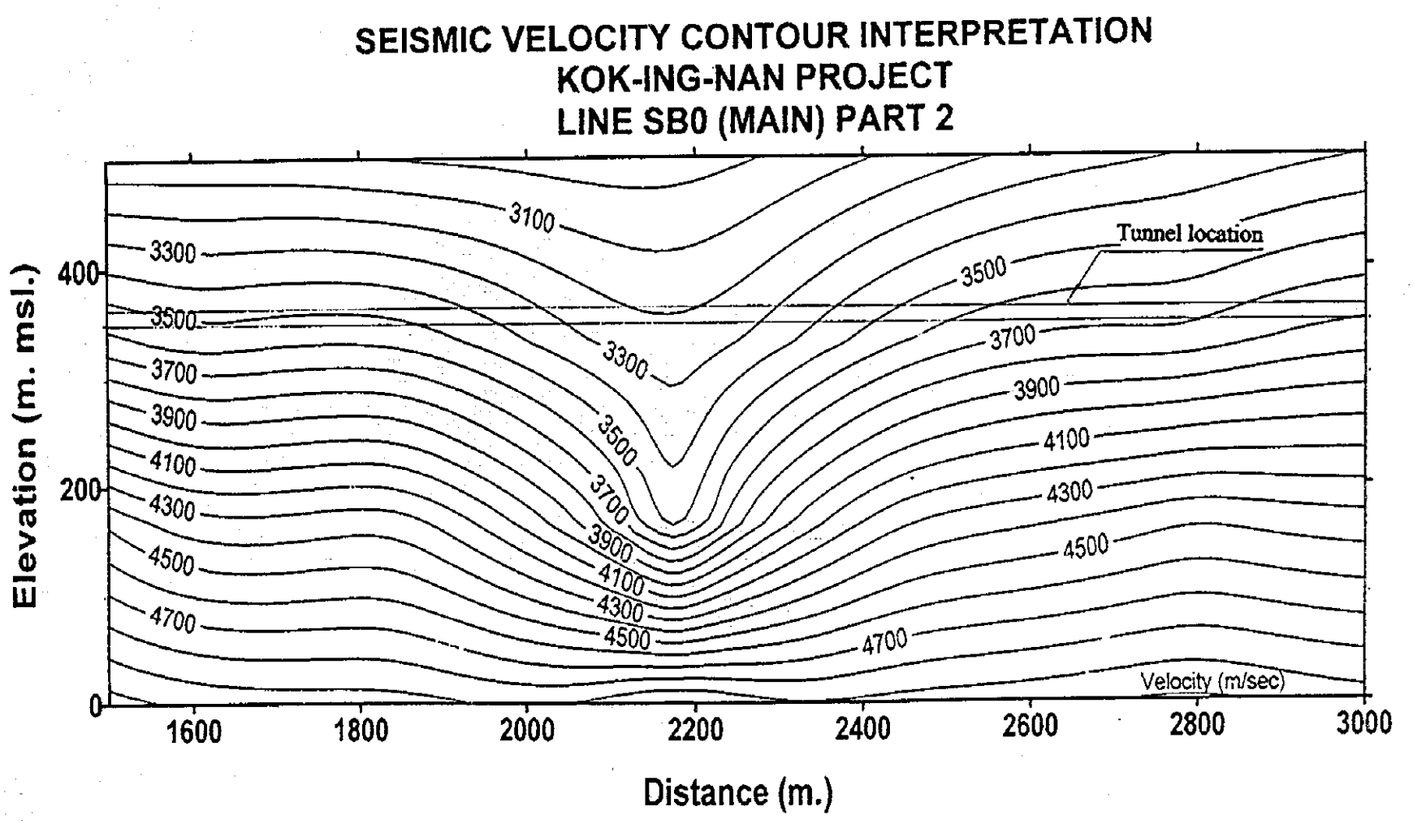
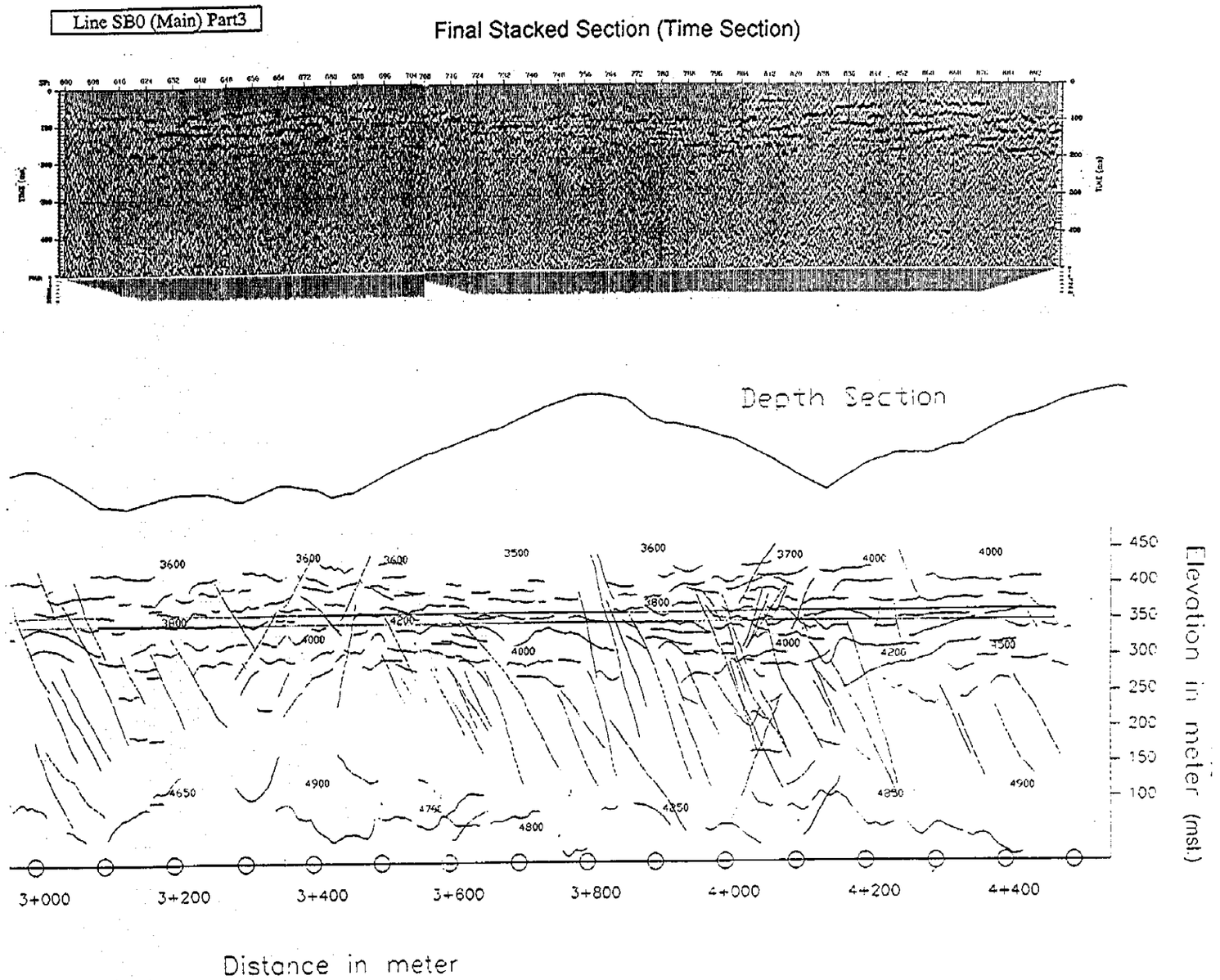


Figure 10.5 Results of Seismic Reflection Prospecting (5)



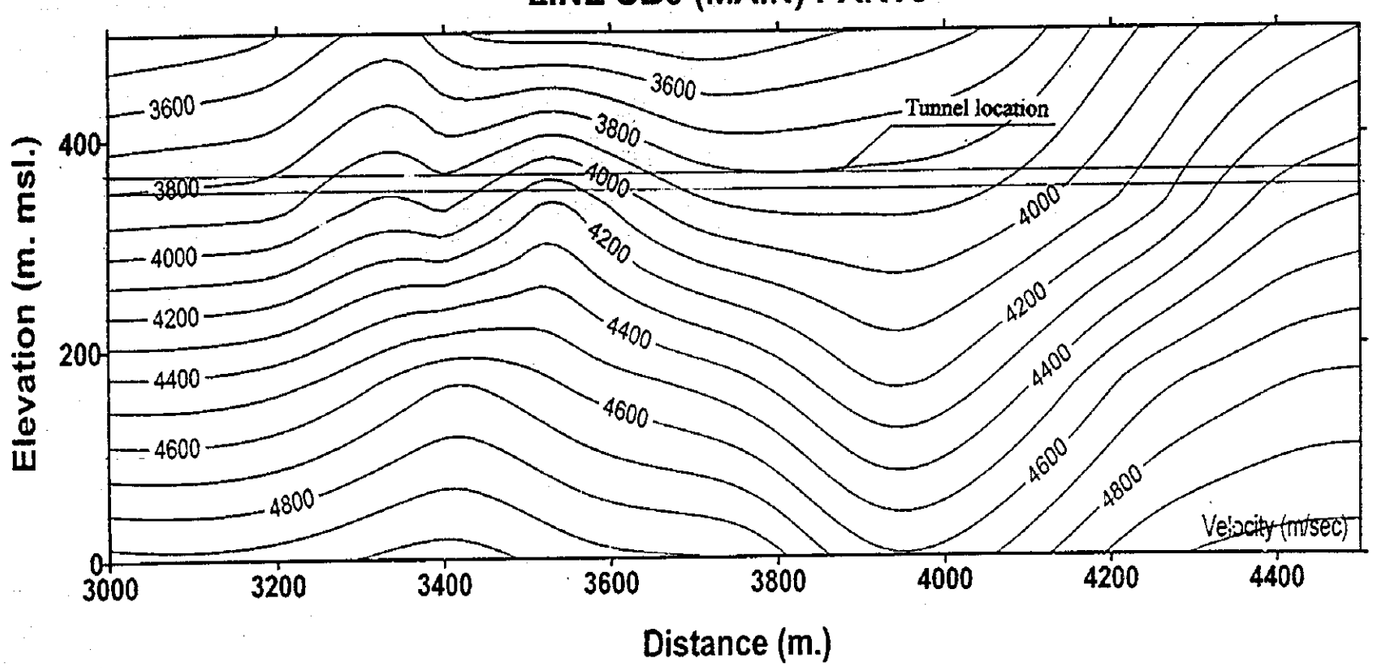
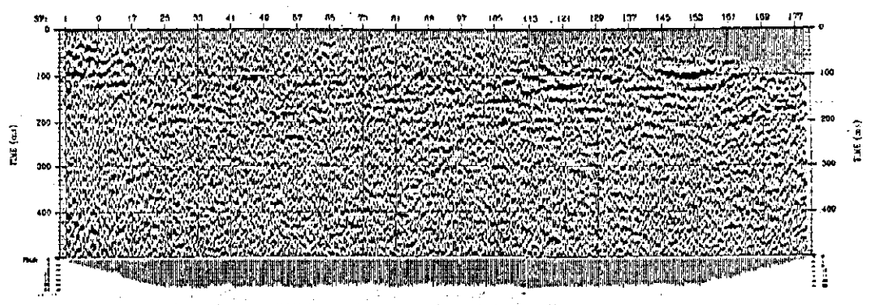
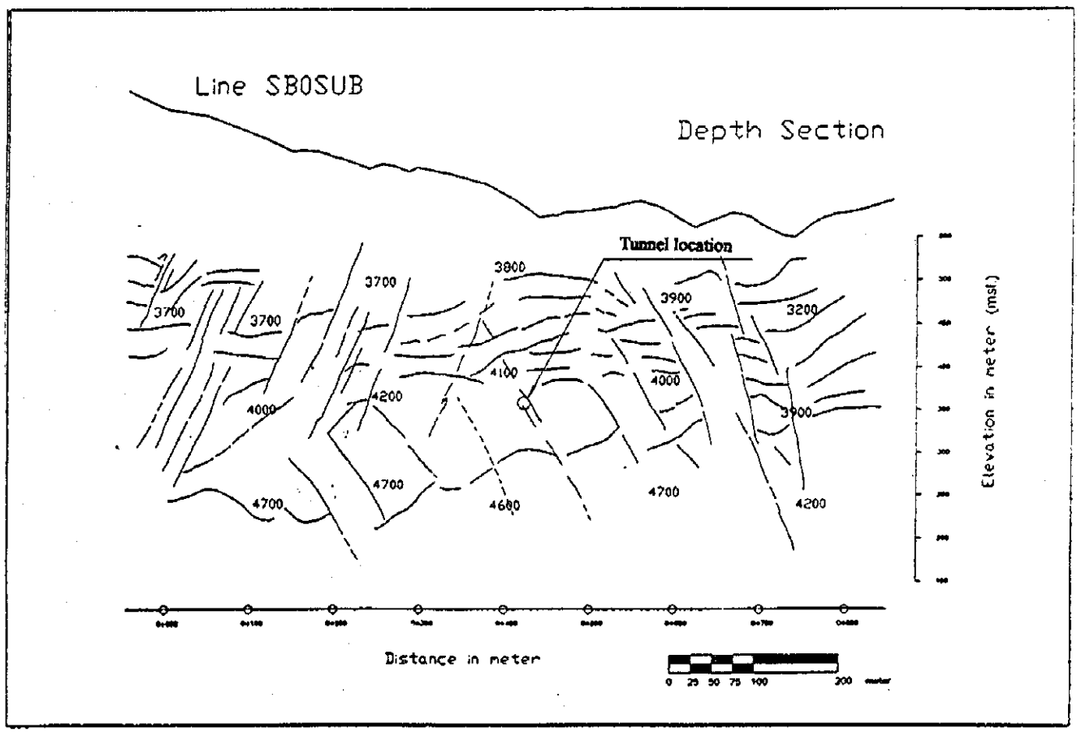


Figure 10.6 Results of Seismic Reflection Prospecting (6)

Line SB0 (Sub) Final Stacked Section (Time Section)





SEISMIC VELOCITY CONTOUR INTERPRETATION
KOK-ING-NAN PROJECT
LINE SB0 (SUB)

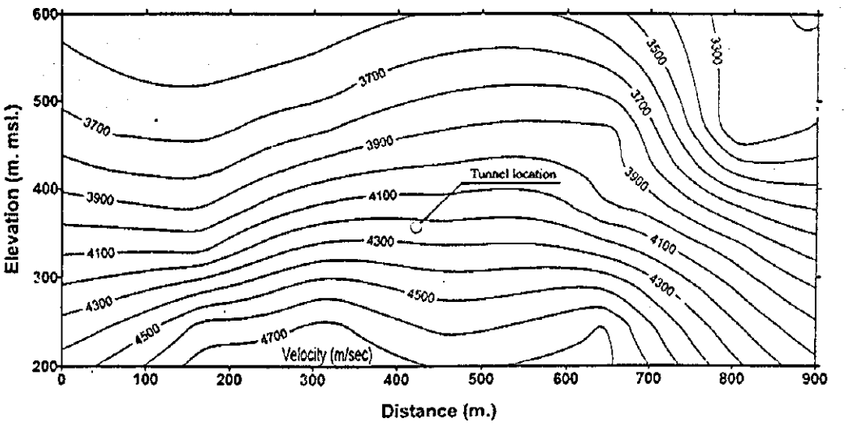
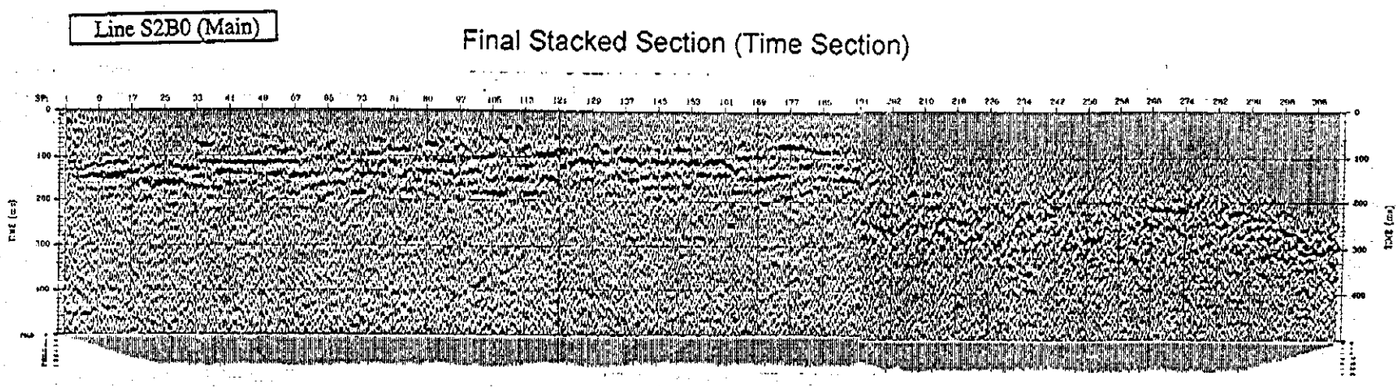
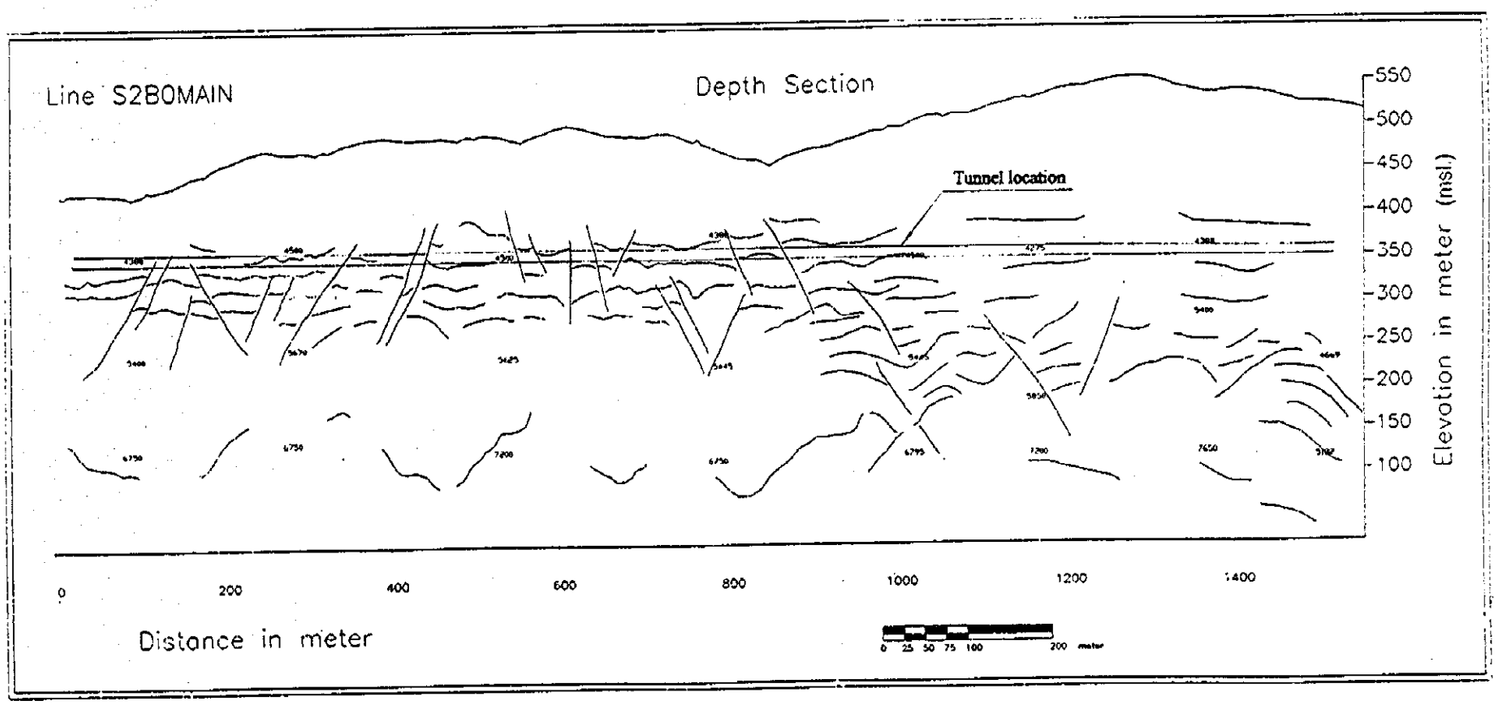


Figure 10.7 Results of Seismic Reflection Prospecting (7)





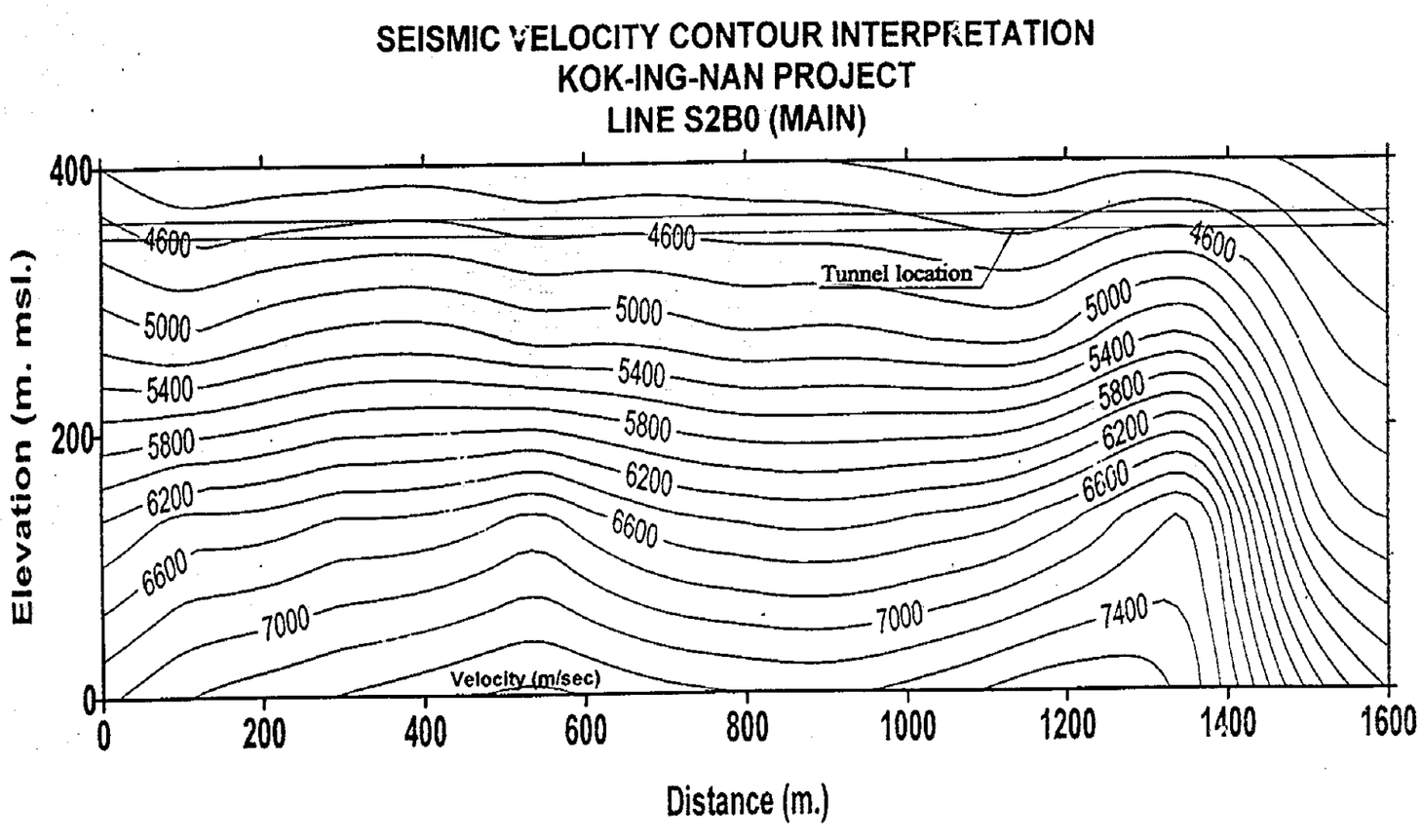
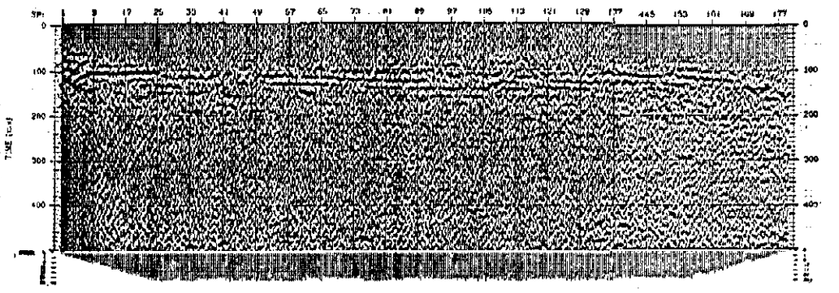
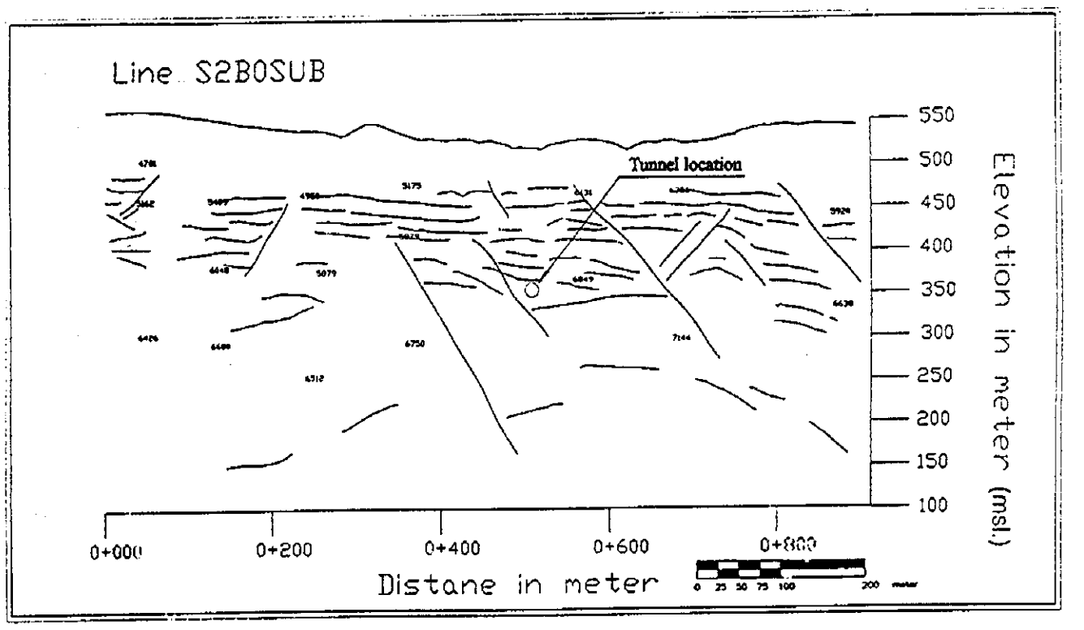


Figure 10.8 Results of Seismic Reflection Prospecting (8)

Line S2B0 (Sub) Final Stacked Section (Time Section)





SEISMIC VELOCITY CONTOUR INTERPRETATION
KOK-ING-NAN PROJECT
LINE S2B0 (SUB)

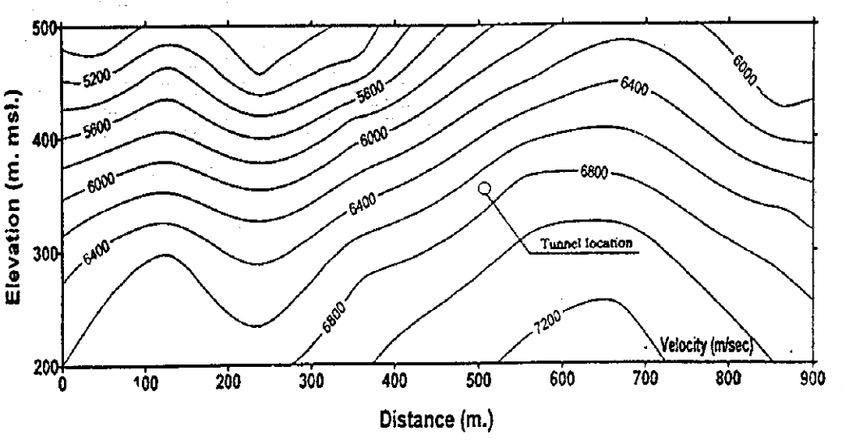
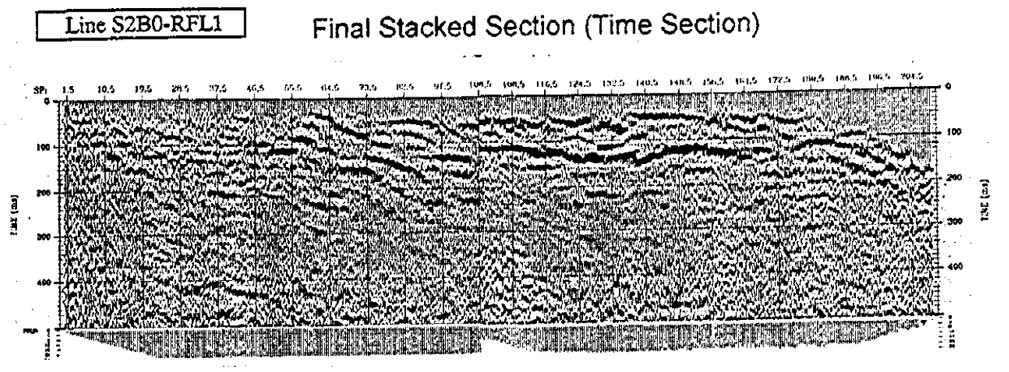
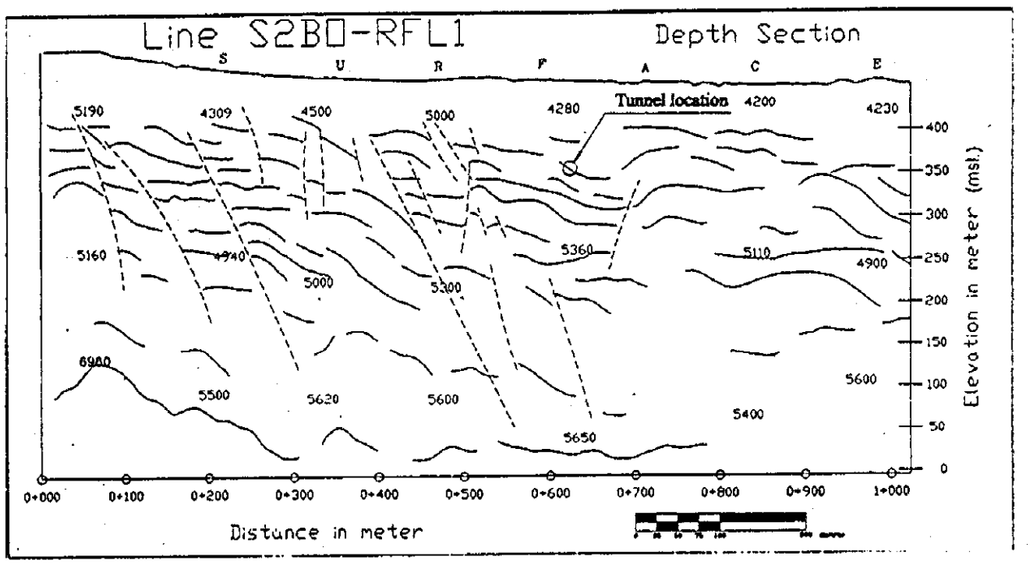


Figure 10.9 Results of Seismic Reflection Prospecting (9)





SEISMIC VELOCITY CONTOUR INTERPRETATION
KOK-ING-NAN PROJECT
LINE S2B0-RFL1

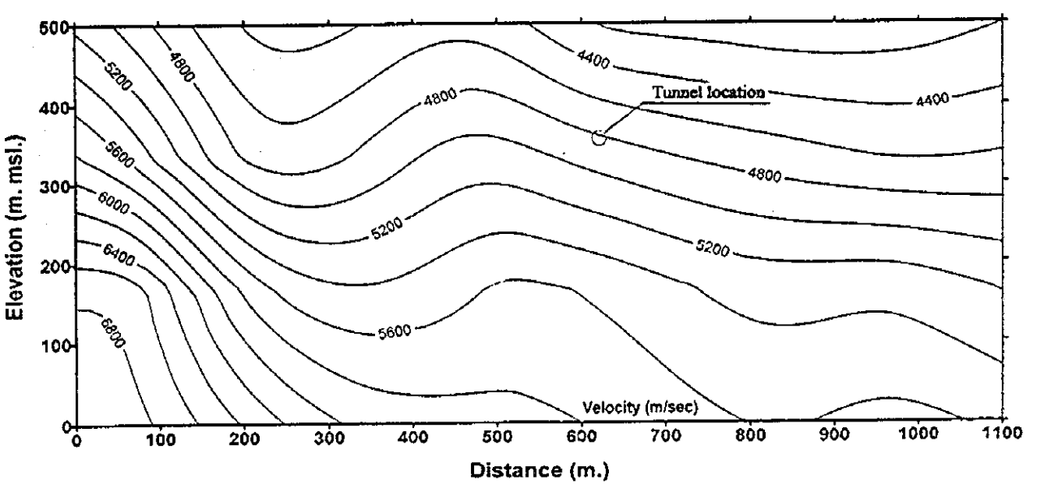
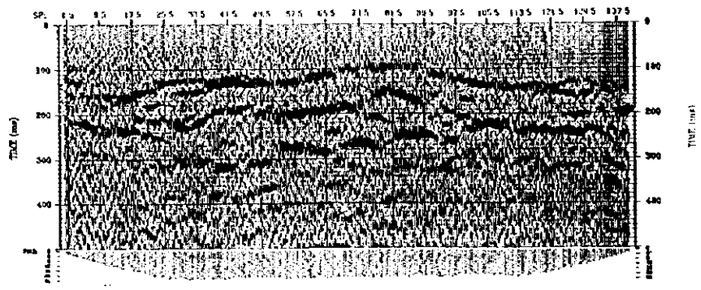


Figure 10.10 Results of Seismic Reflection Prospecting (10)

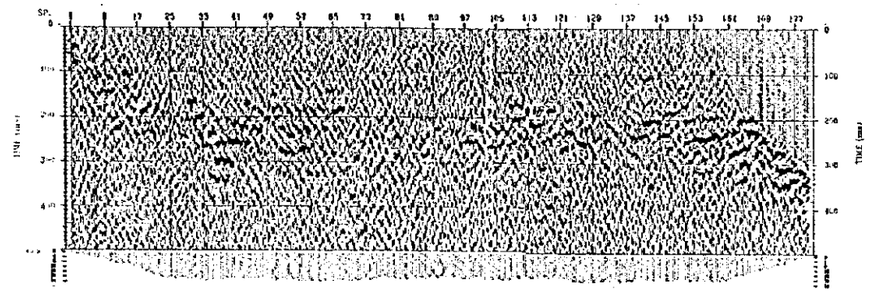
Final Stacked Section (Time Section)

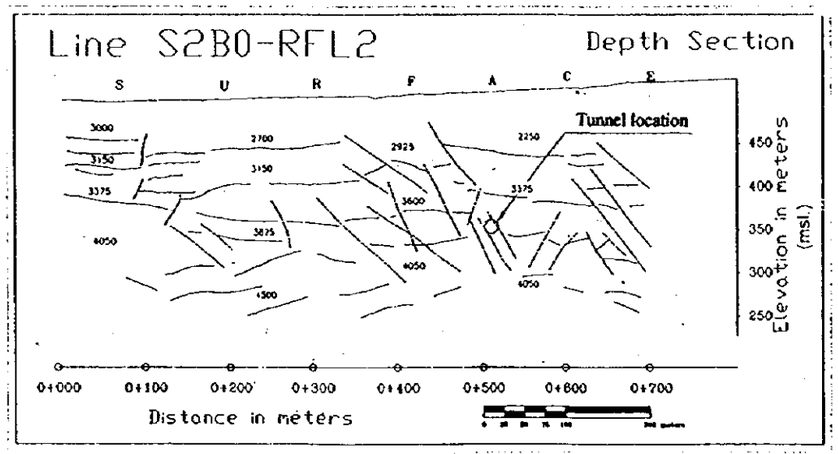
Line S2B0-RFL2

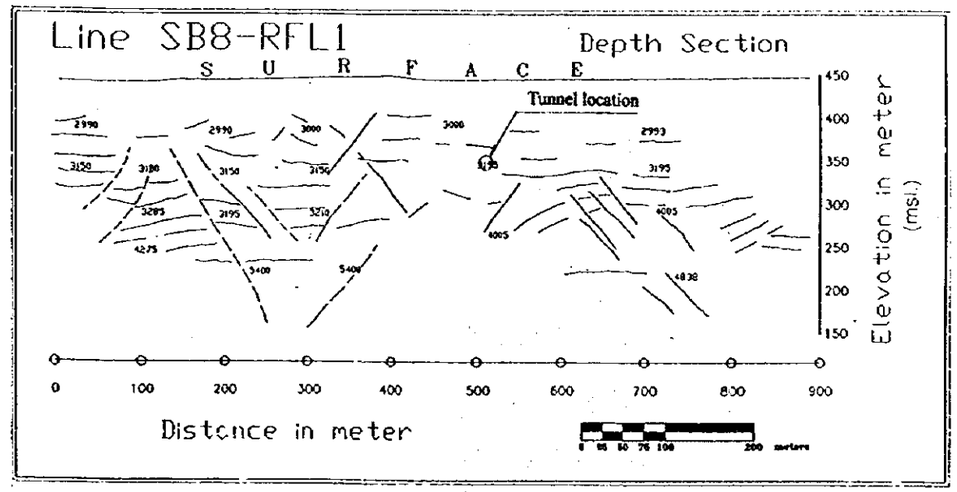


Final Stacked Section (Time Section)

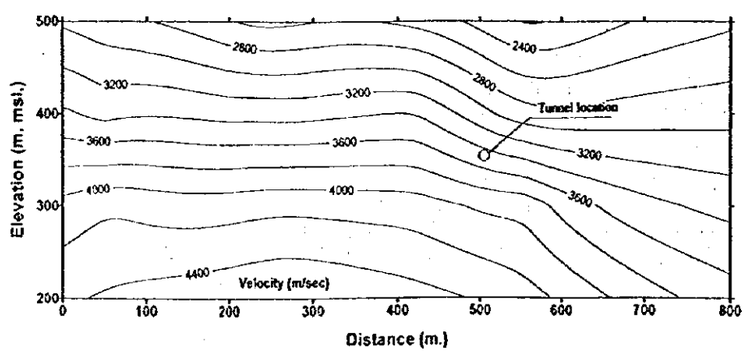
Line SB8-RFL1







SEISMIC VELOCITY CONTOUR INTERPRETATION
KOK-ING-NAN PROJECT
LINE S2B0-RFL2



SEISMIC VELOCITY CONTOUR INTERPRETATION
KOK-ING-NAN PROJECT
LINE SB8-RFL1

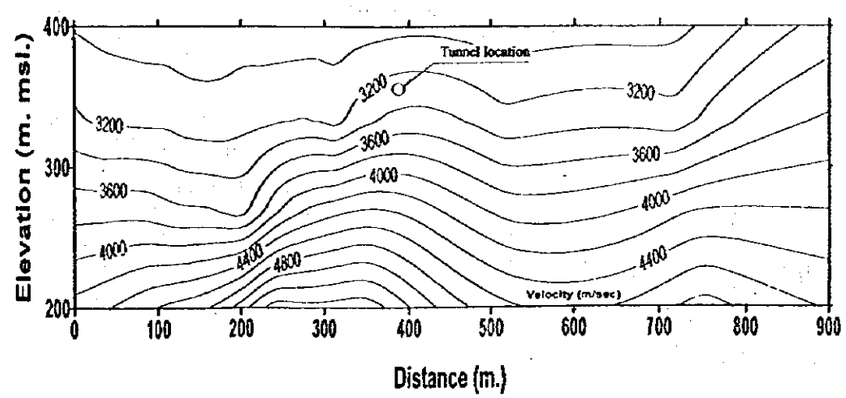
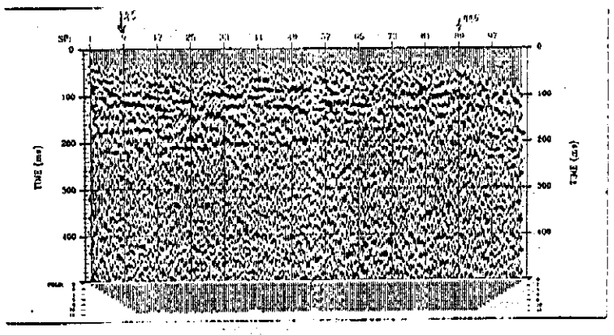


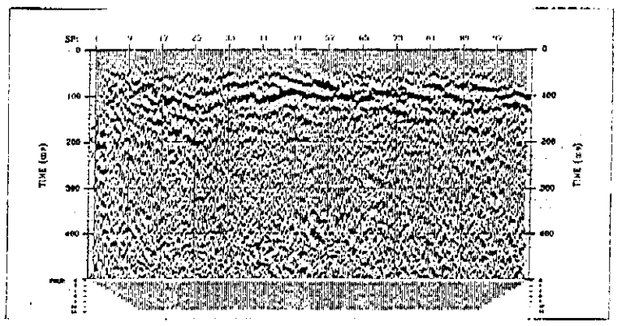
Figure 10.11 Results of Seismic Reflection Prospecting (11)

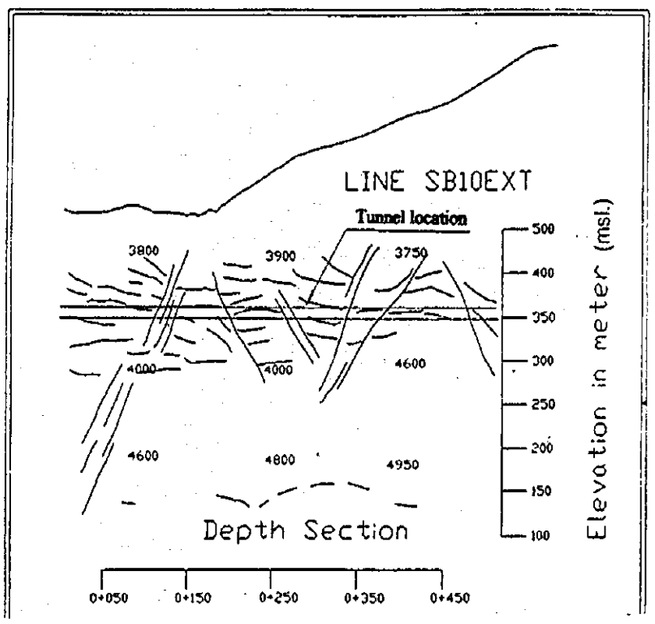
Line SB10 (Ext)

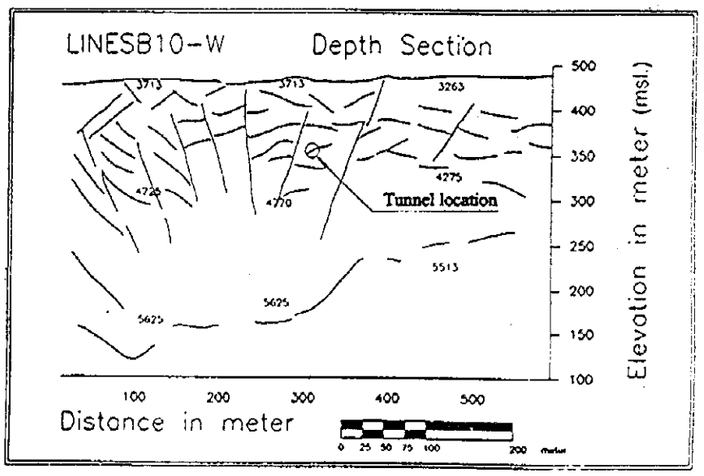
Final Stacked Section (Time Section)

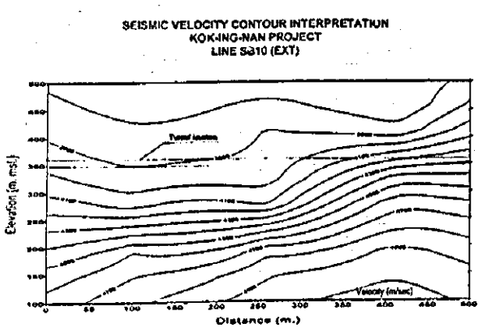
Line SB10 (W)











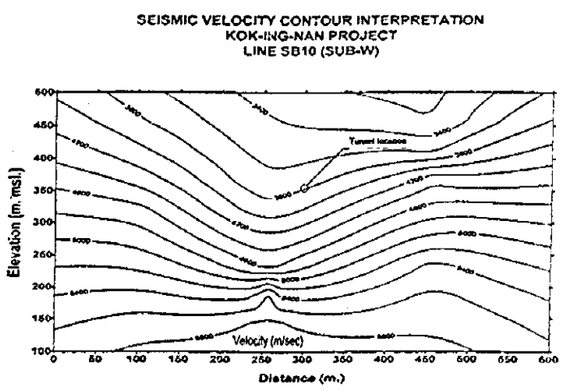
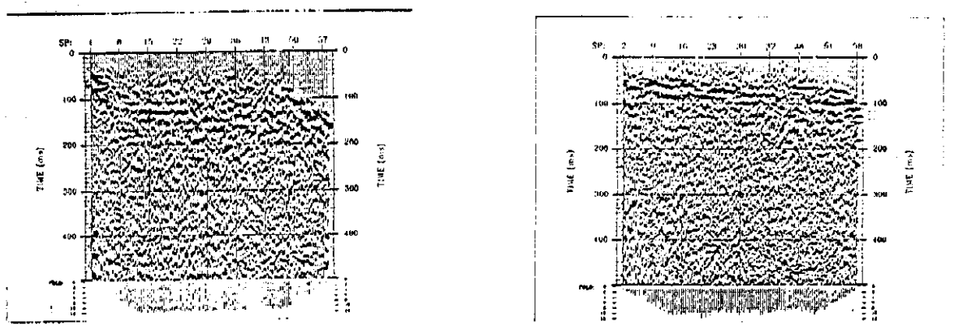
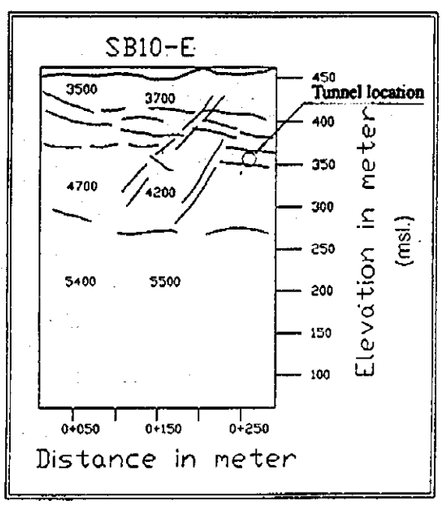


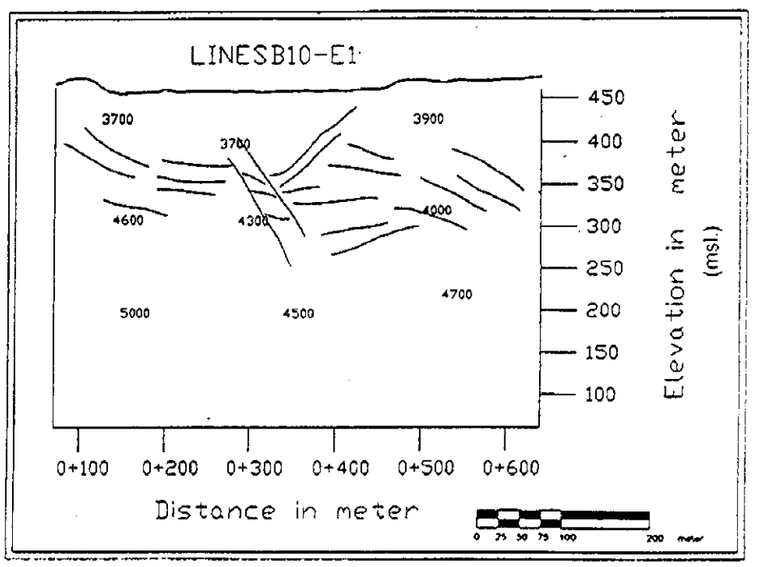
Figure 10.12 Results of Seismic Reflection Prospecting (12)

Line SB10 (E.E')

Final Stacked Section (Time Section)







SEISMIC VELOCITY CONTOUR INTERPRETATION
KOK-ING-NAN PROJECT
LINE SB10 (SUB-E)

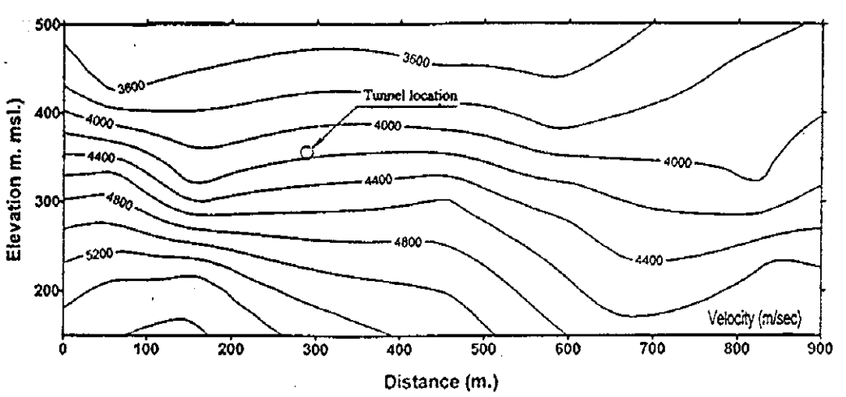
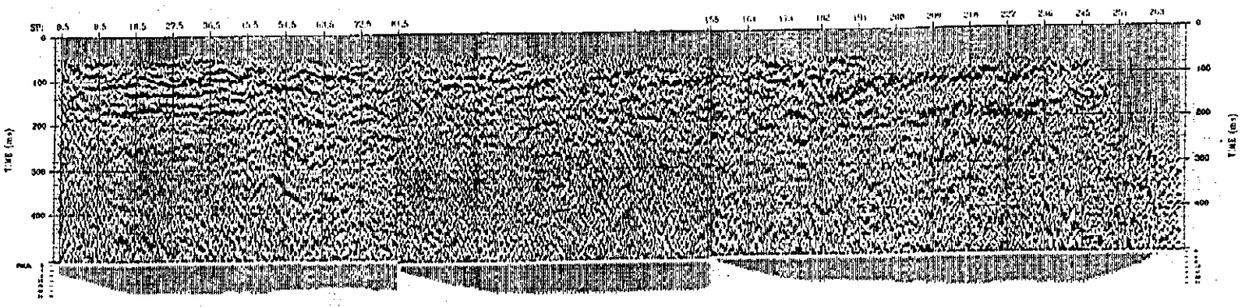
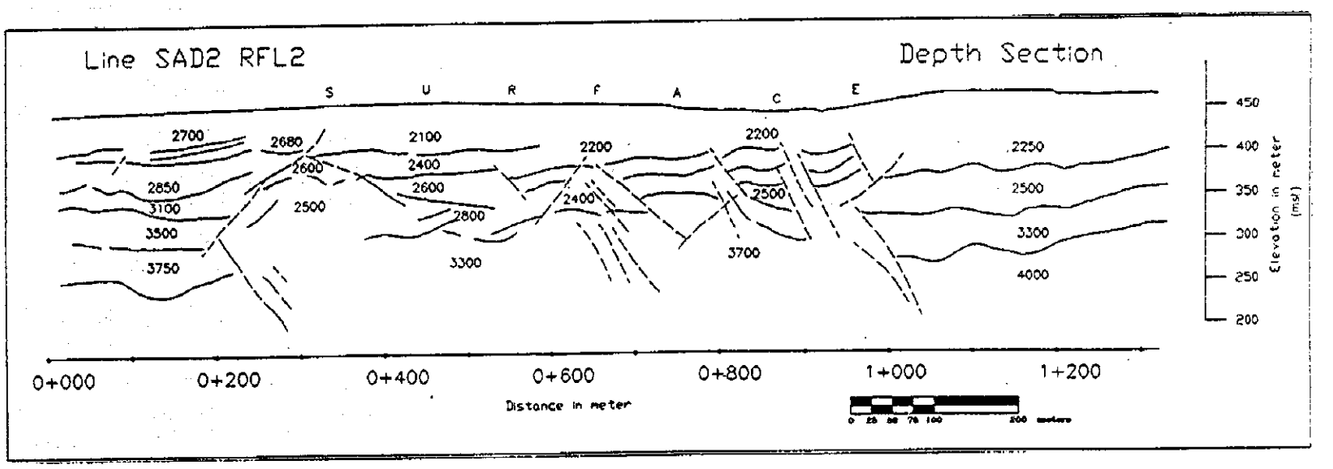


Figure 10.13 Results of Seismic Reflection Prospecting (13)

Line SAd2-RFL2

Final Stacked Section (Time Section)





SEISMIC VELOCITY CONTOUR INTERPRETATION
KOK-ING-NAN PROJECT
LINE SAD2-RFL2

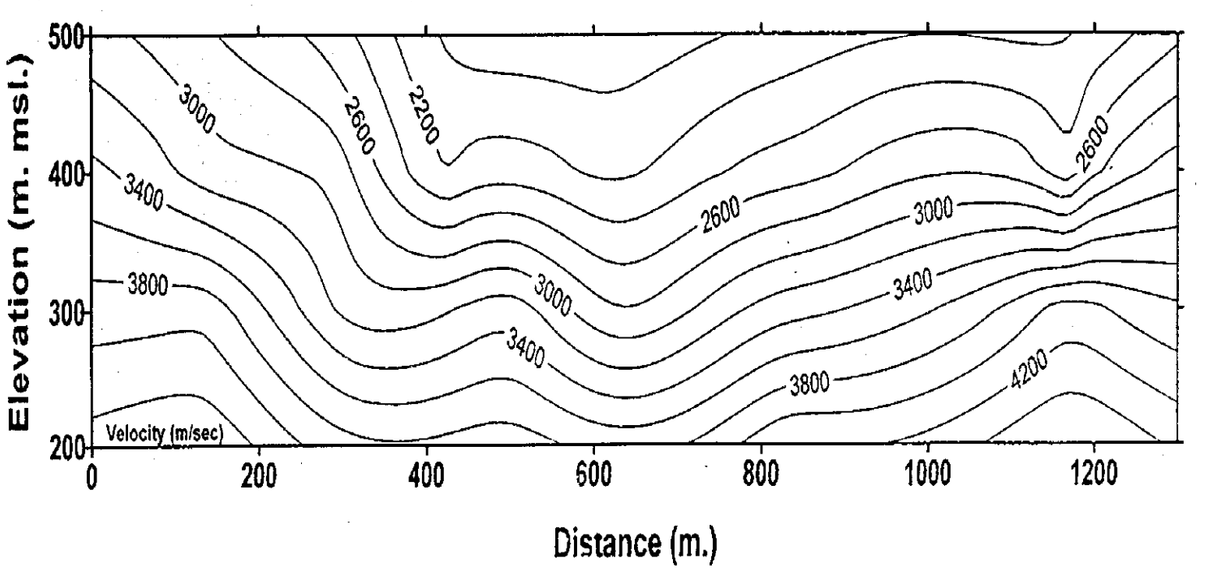
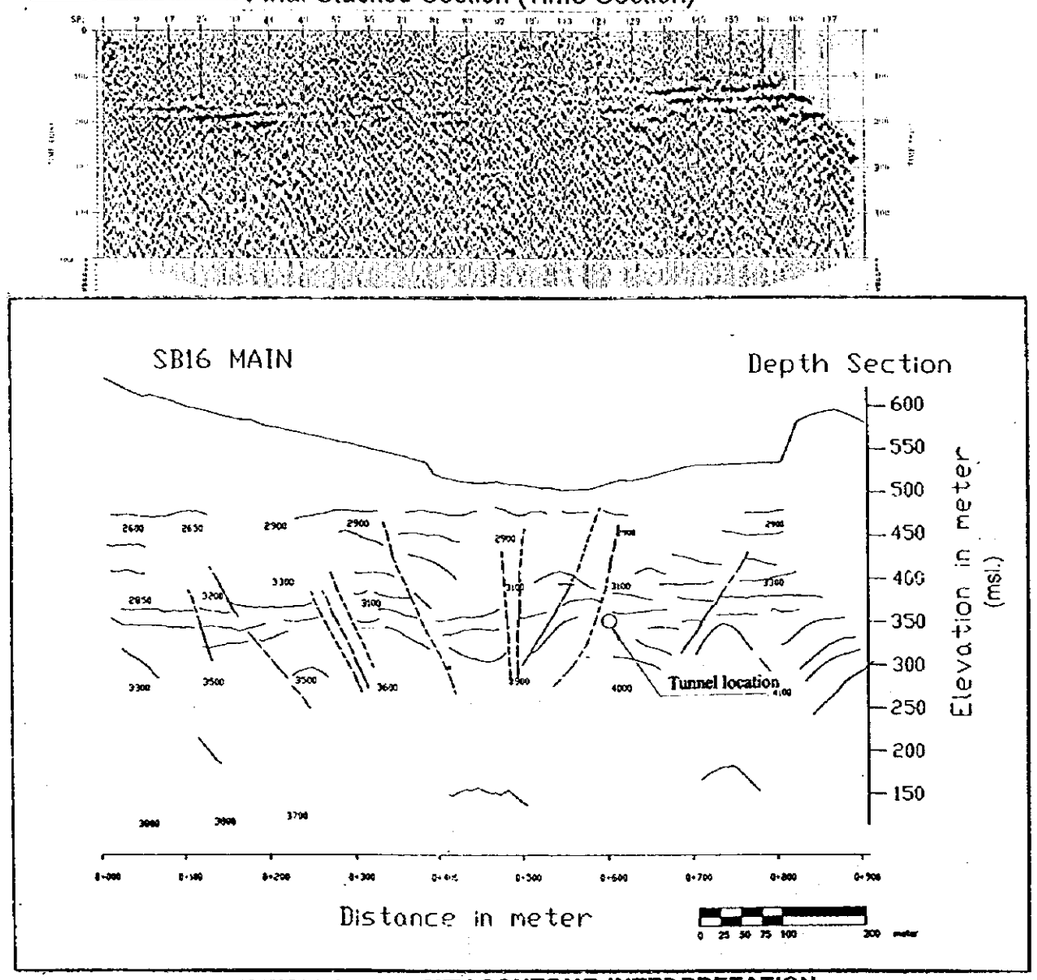
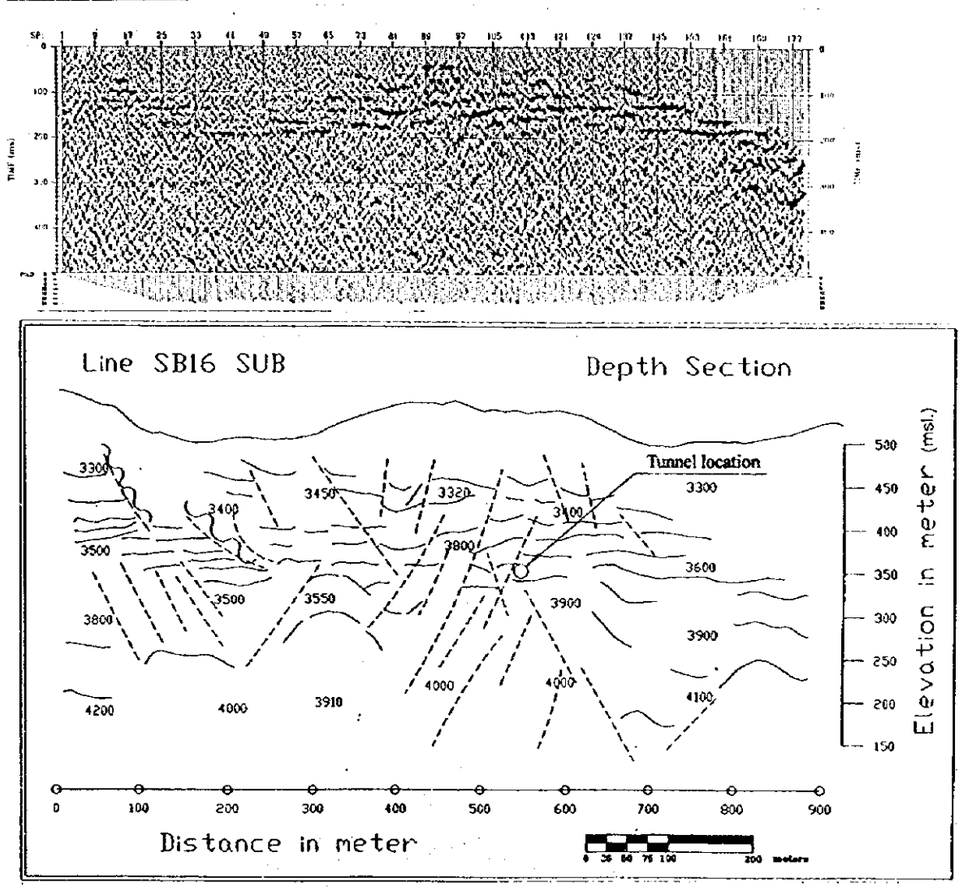


Figure 10.14 Results of Seismic Reflection Prospecting (14)

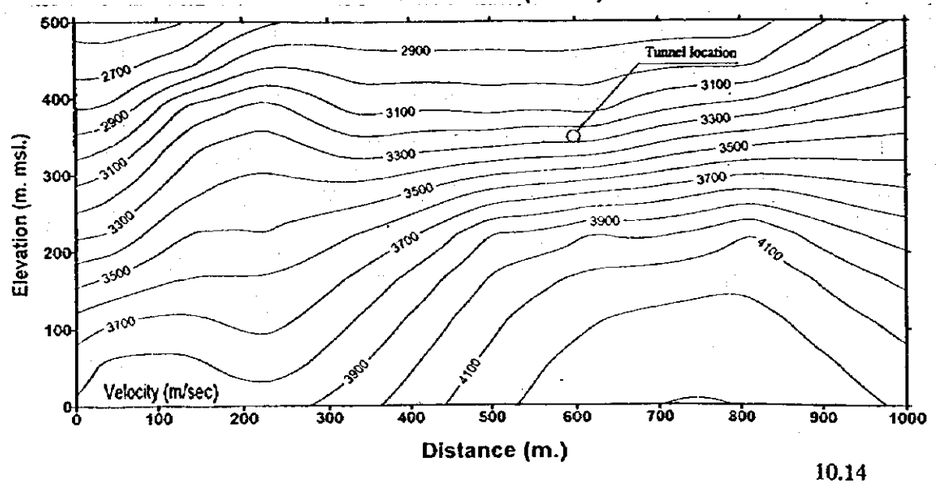
Line SB16 (Main) Final Stacked Section (Time Section)



Line SB16 (Sub) Final Stacked Section (Time Section)



SEISMIC VELOCITY CONTOUR INTERPRETATION
KOK-ING-NAN PROJECT
LINE SB16 (MAIN)



SEISMIC VELOCITY CONTOUR INTERPRETATION
KOK-ING-NAN PROJECT
LINE SB16 (SUB)

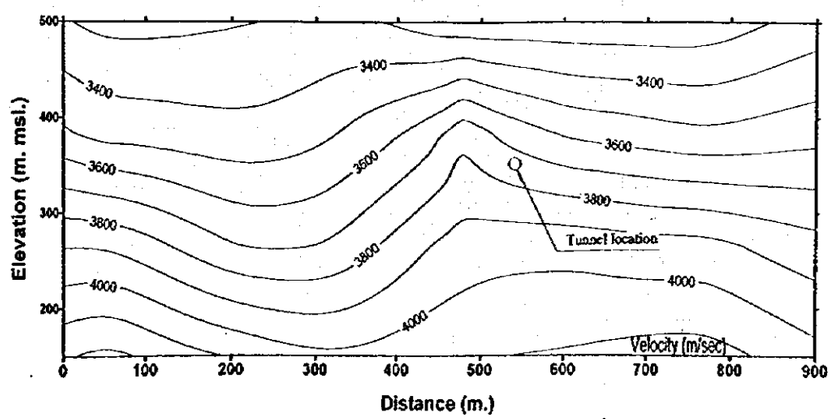
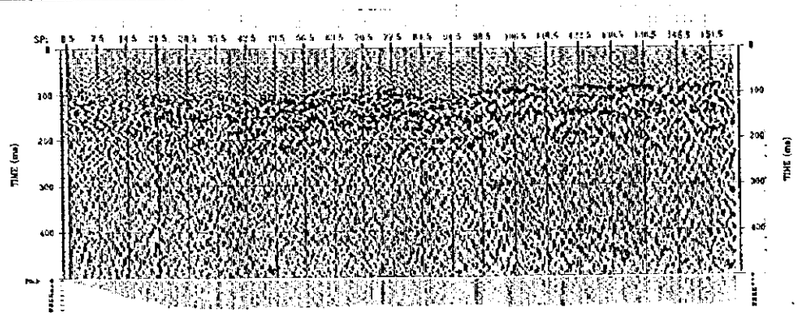
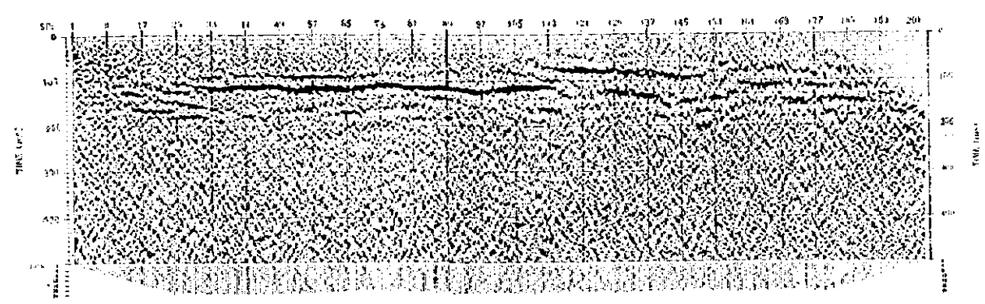


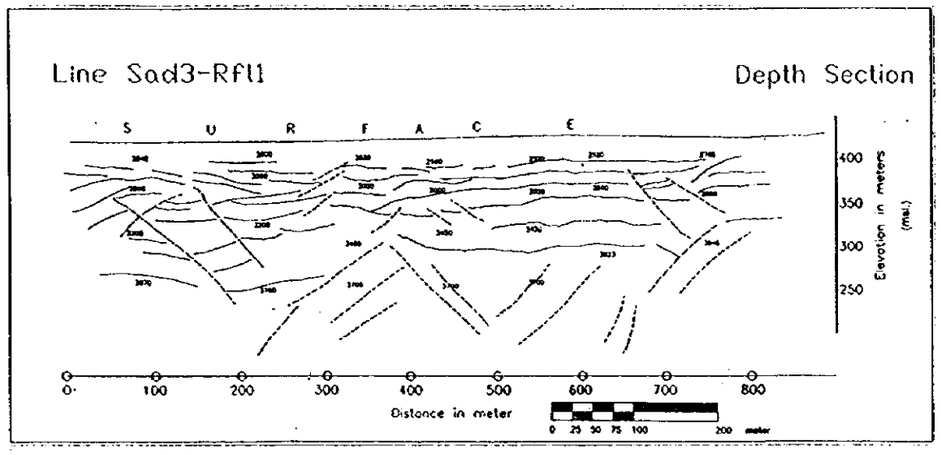
Figure 10.15 Results of Seismic Reflection Prospecting (15)

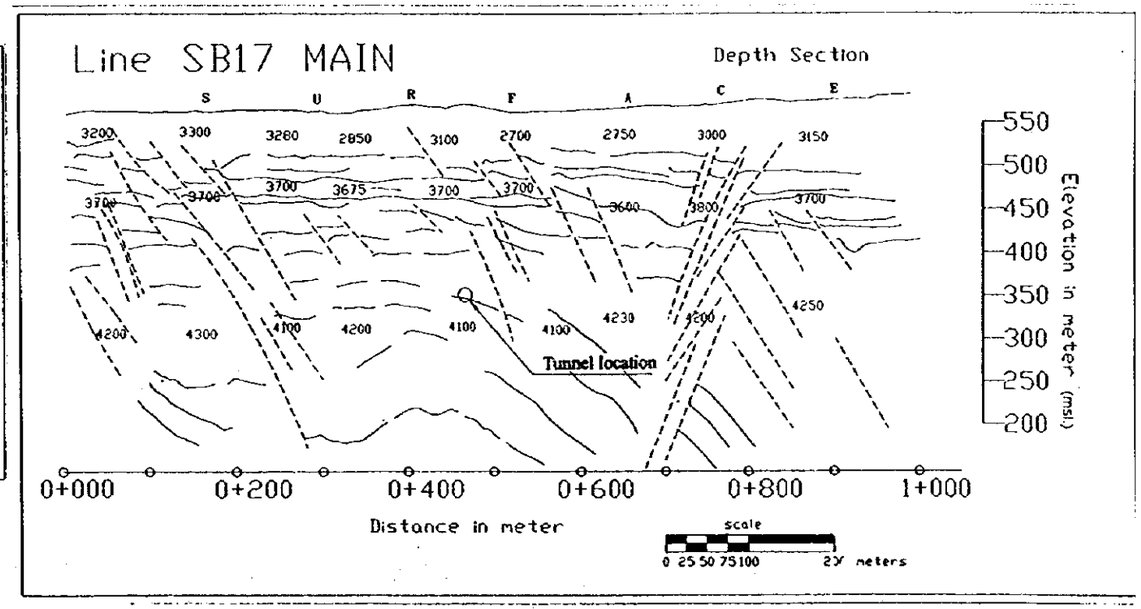
Line SAd3-RFL1 Final Stacked Section (Time Section)



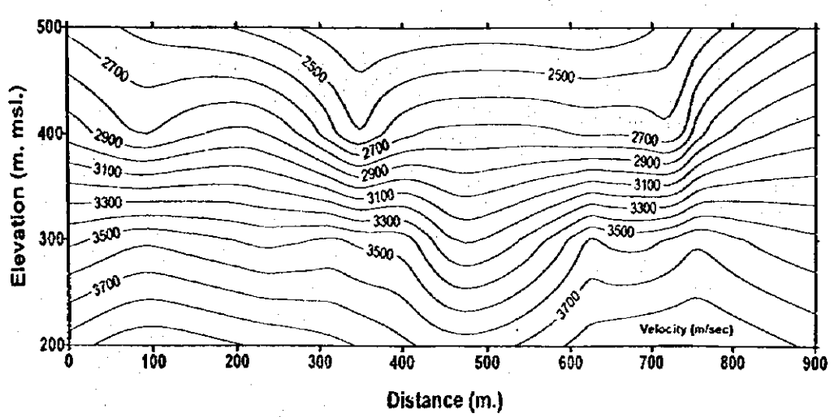
Line SB17 (Main) Final Stacked Section (Time Section)







SEISMIC VELOCITY CONTOUR INTERPRETATION
KOK-ING-NAN PROJECT
LINE SAD3-RFL1



SEISMIC VELOCITY CONTOUR INTERPRETATION
KOK-ING-NAN PROJECT
LINE SB17 (MAIN)

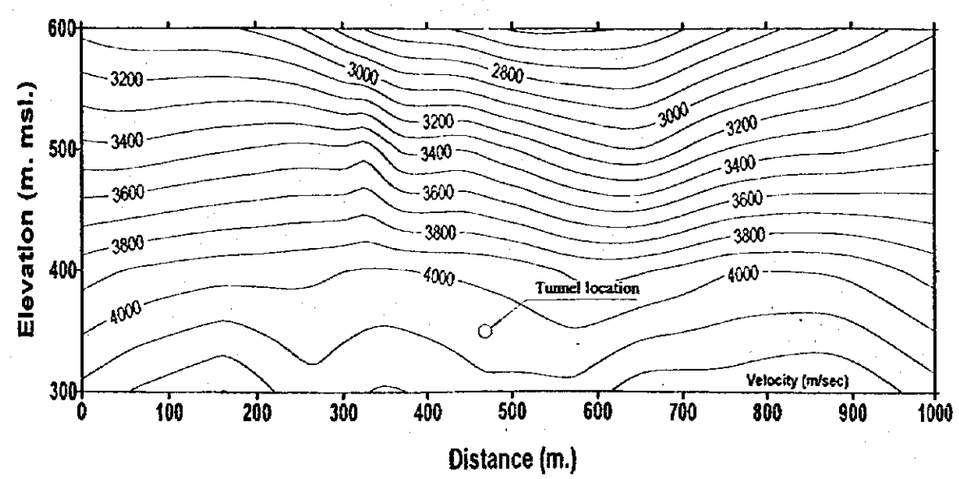
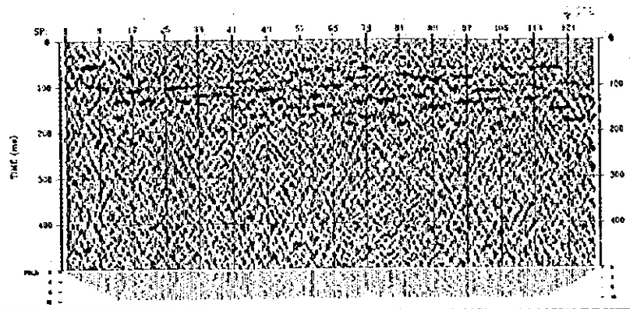
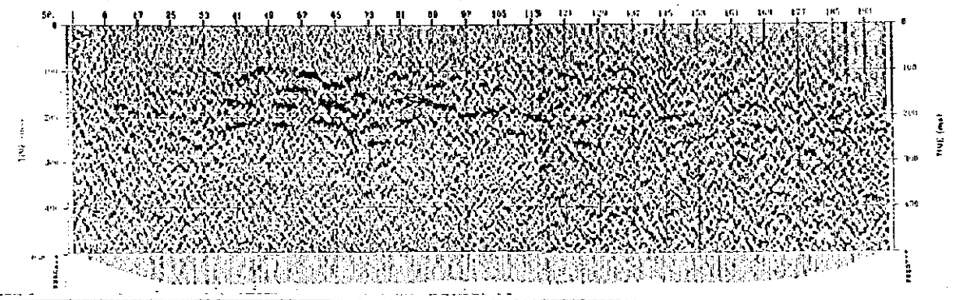


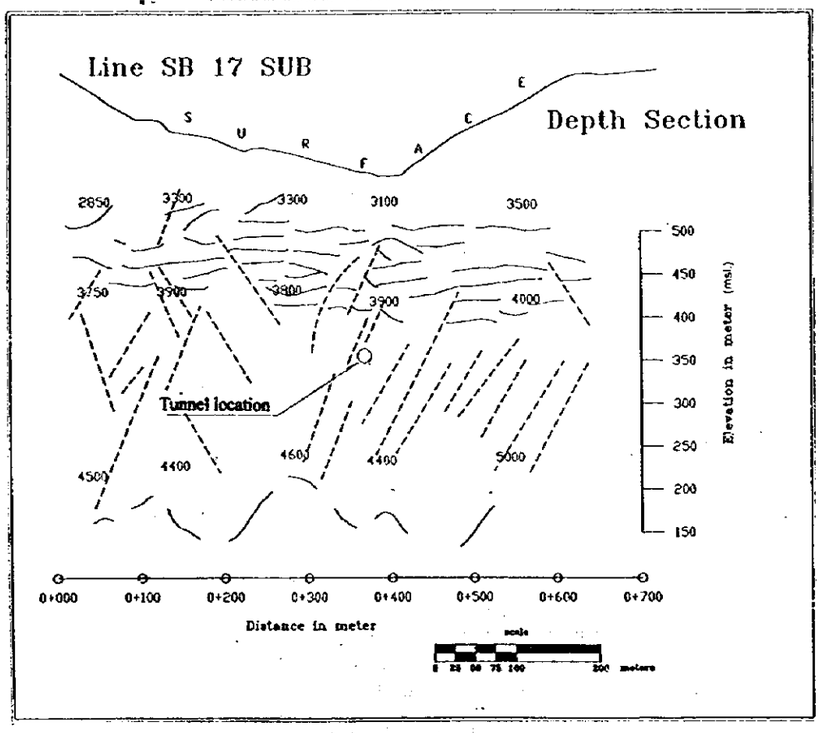
Figure 10.16 Results of Seismic Reflection Prospecting (16)

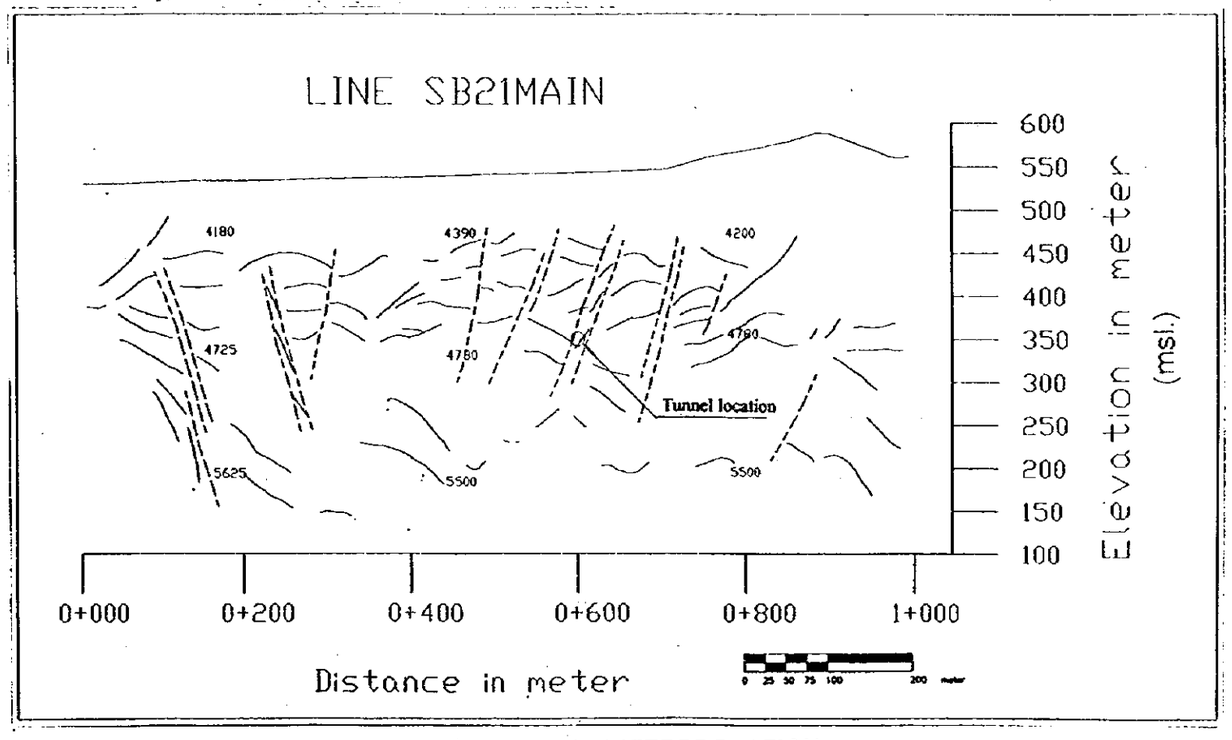
Line SB17 (Sub) Final Stacked Section (Time Section)



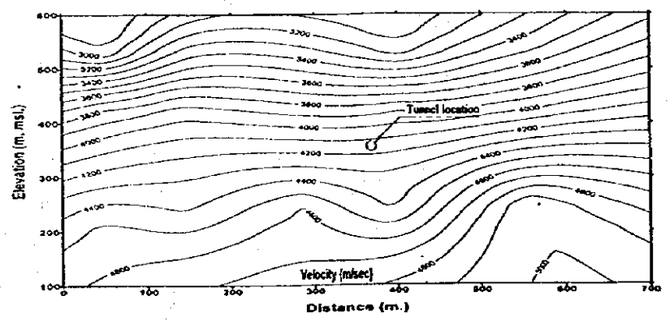
Line SB21 (Main) Final Stacked Section (Time Section)







SEISMIC VELOCITY CONTOUR INTERPRETATION
KOK-ING-NAN PROJECT
LINE SB-17 (SUB)



SEISMIC VELOCITY CONTOUR INTERPRETATION
KOK-ING-NAN PROJECT
LINE SB21 (MAIN)

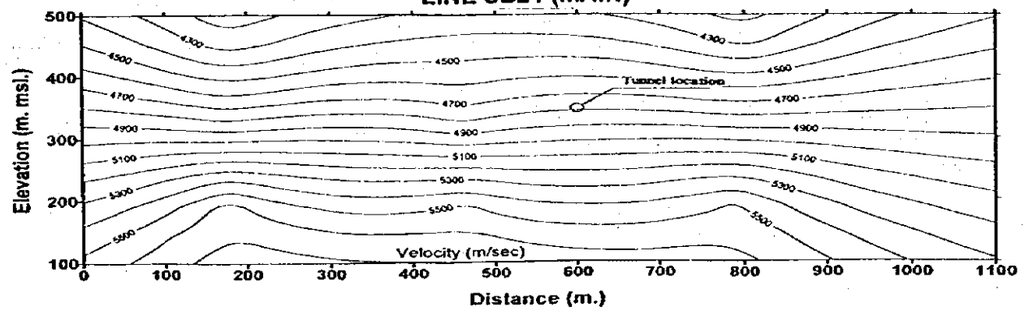
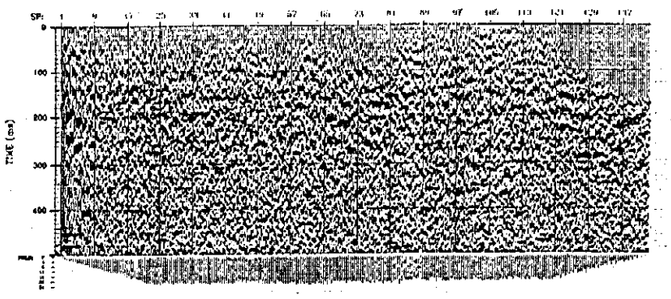
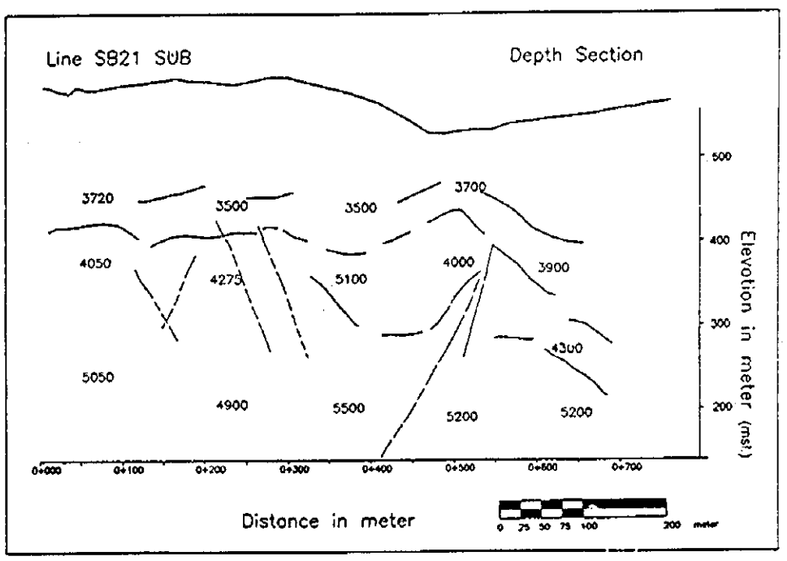


Figure 10.17 Results of Seismic Reflection Prospecting (17)

Line SB21 (Sub) Final Stacked Section (Time Section)





SEISMIC VELOCITY CONTOUR INTERPRETATION
KOK-ING-NAN PROJECT
LINE SB-21 (SUB)

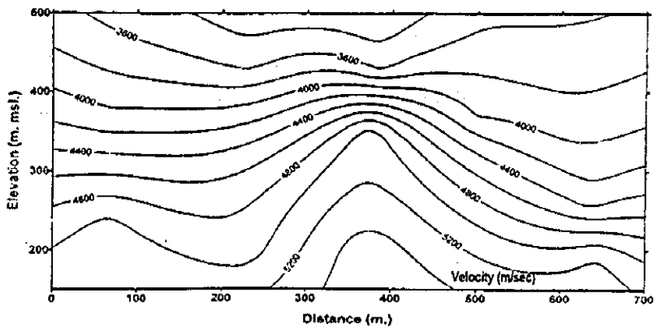
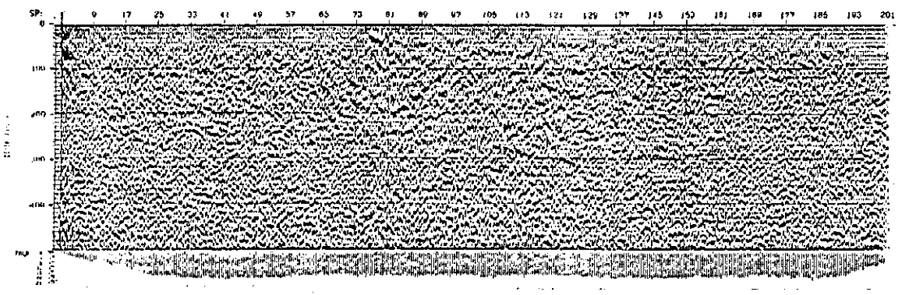
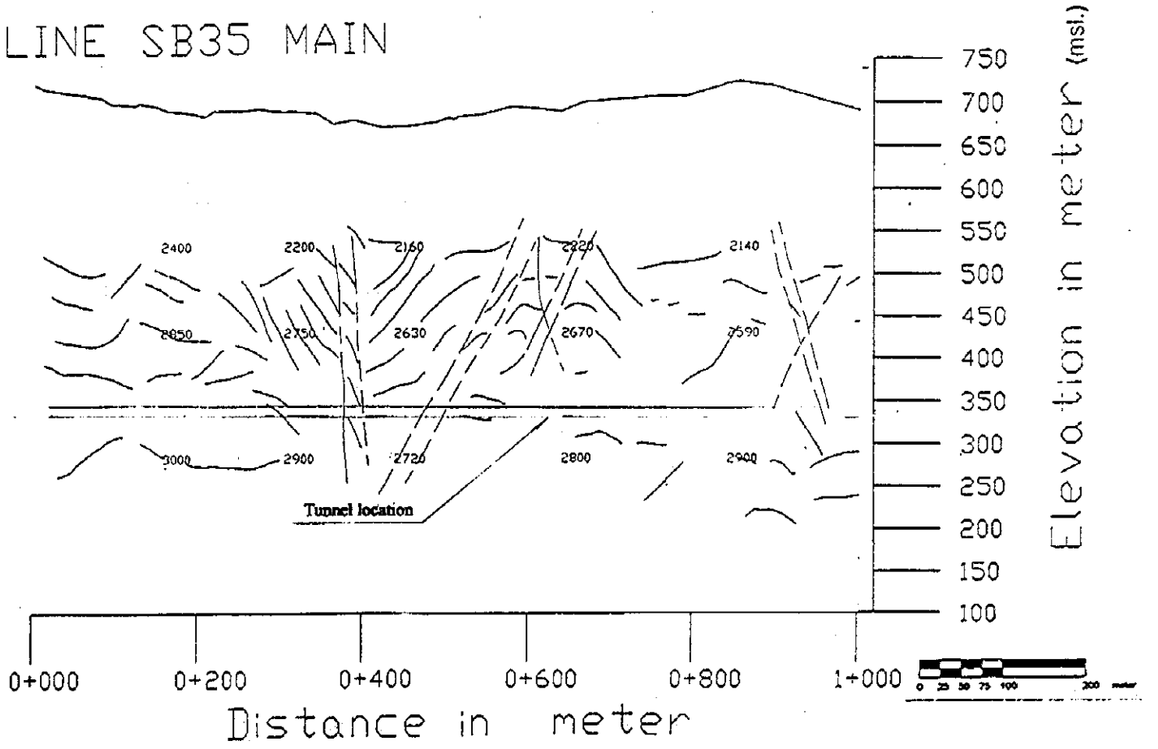


Figure 10.18 Results of Seismic Reflection Prospecting (18)

Line SB35 (Main) Final Stacked Section (Time Section)





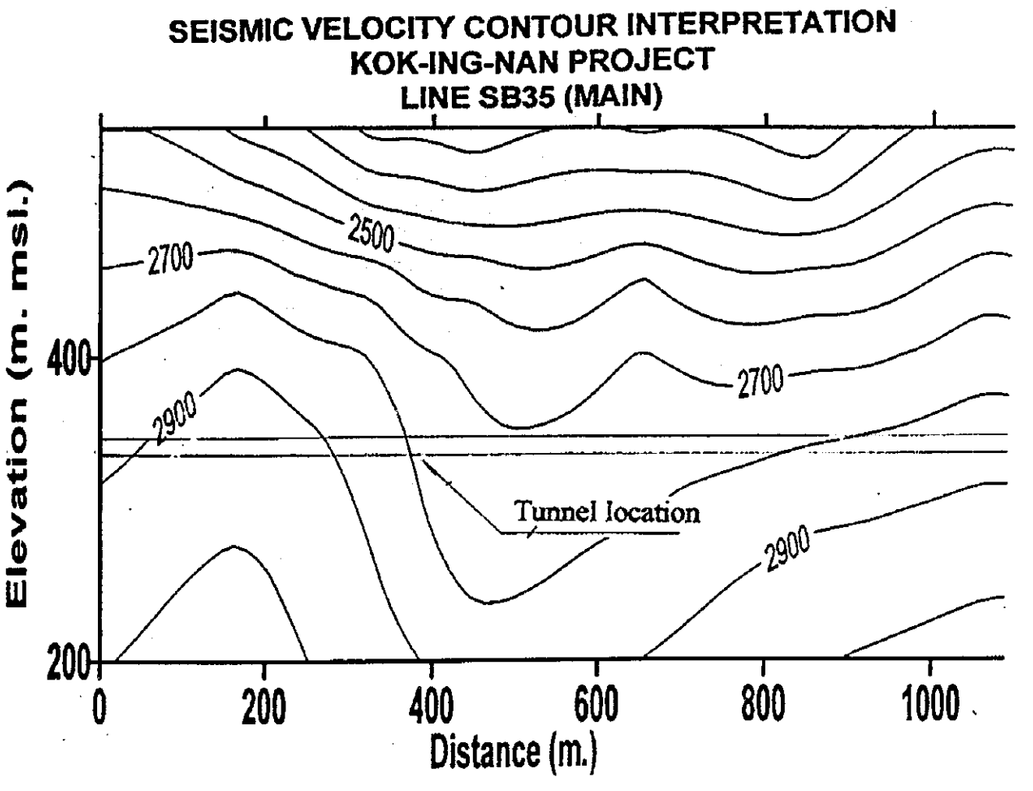
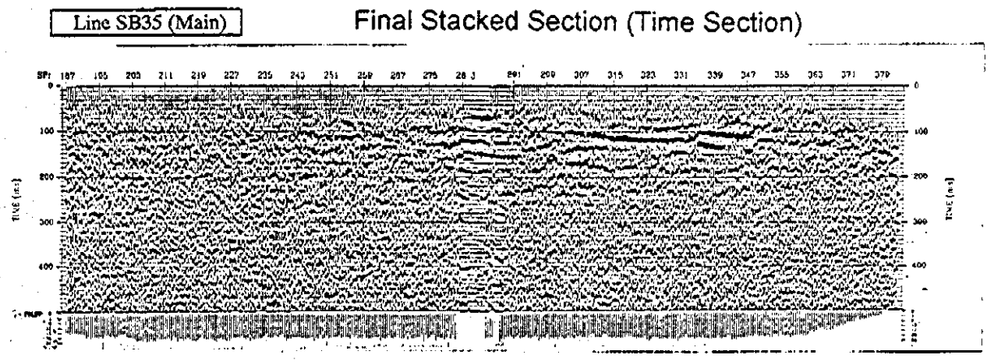
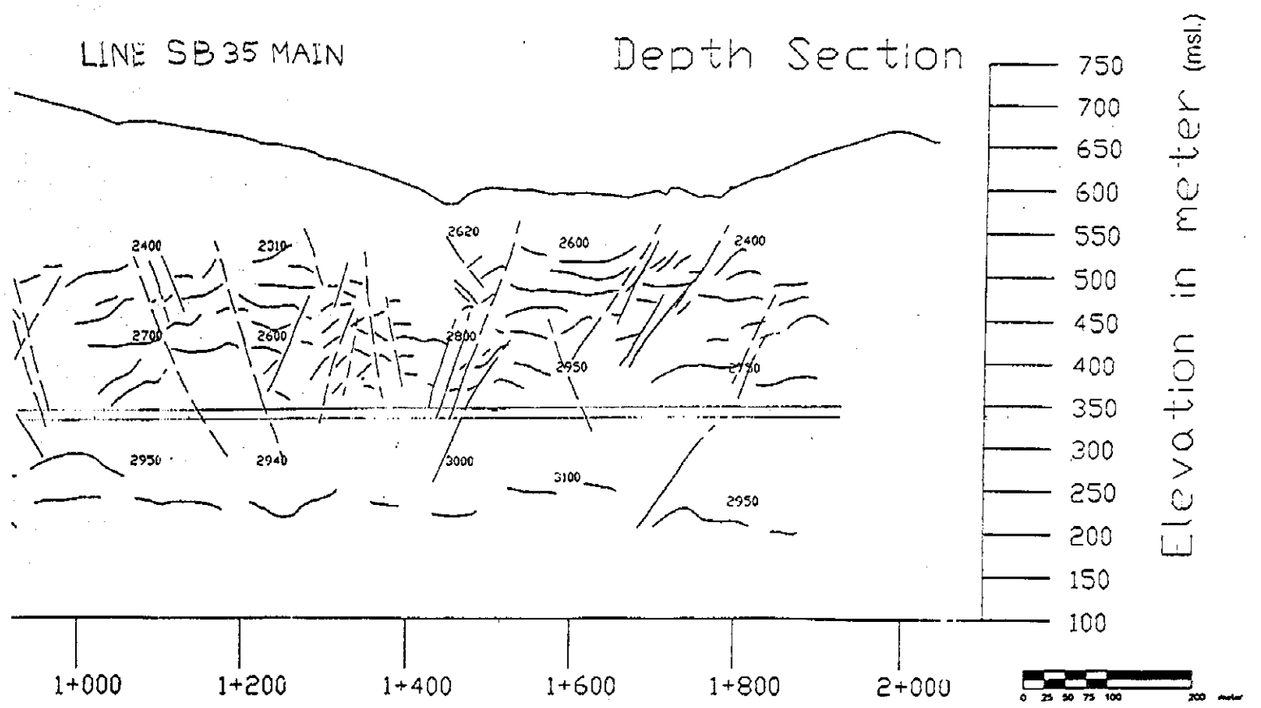


Figure 10.19 Results of Seismic Reflection Prospecting (19)





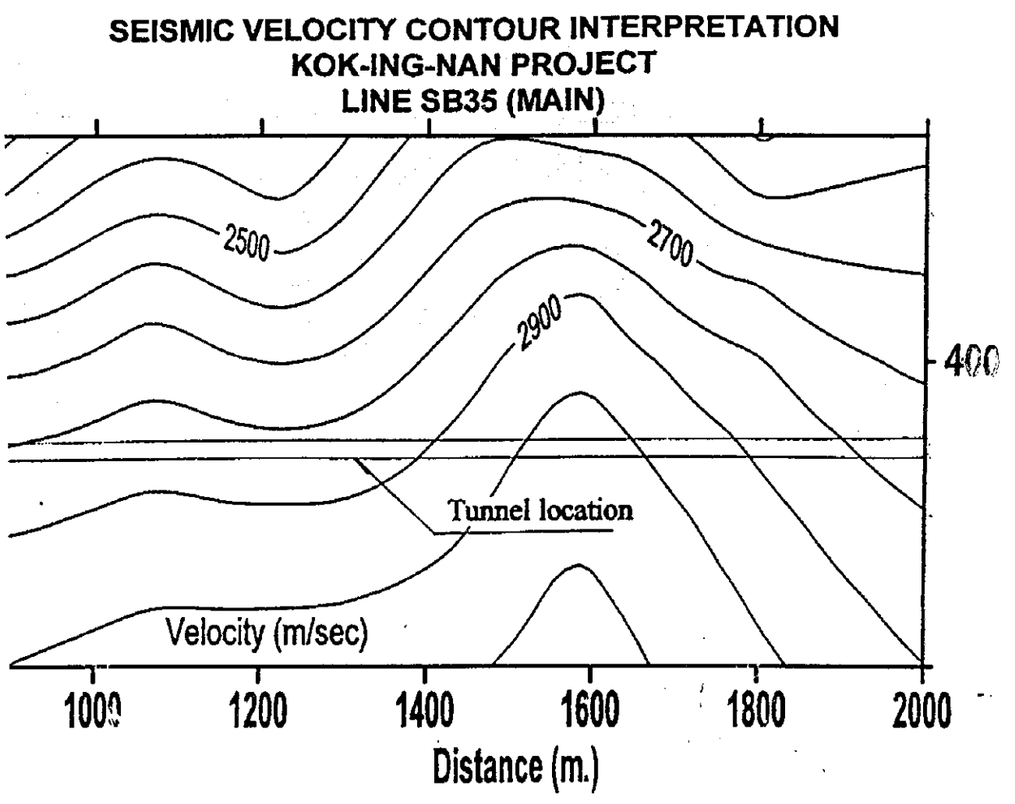
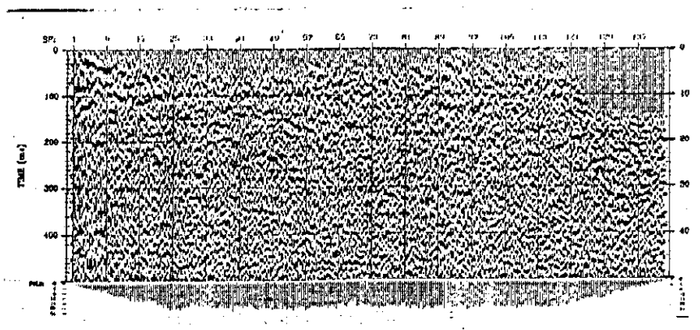
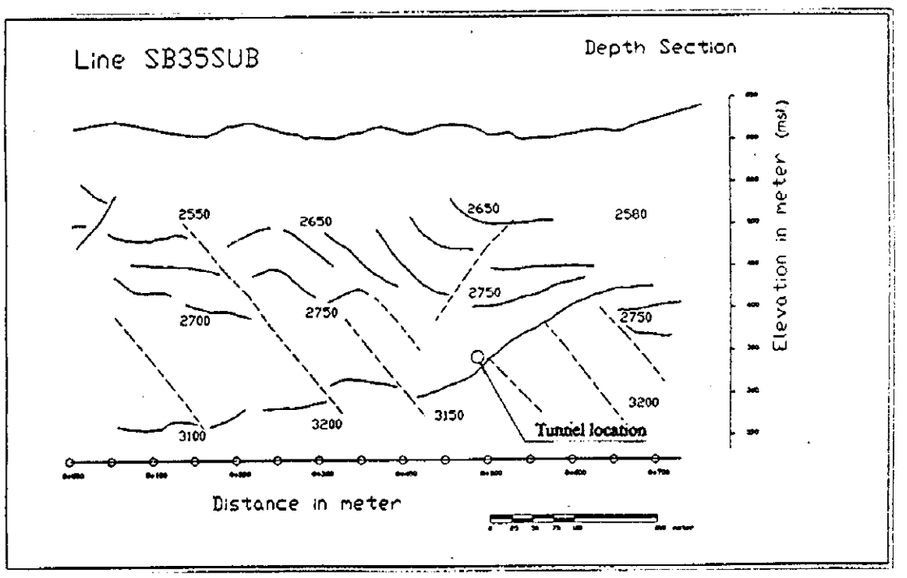


Figure 10.20 Results of Seismic Reflection Prospecting (20)

Line SB35 (Sub) Final Stacked Section (Time Section)





SEISMIC VELOCITY CONTOUR INTERPRETATION
KOK-ING-NAN PROJECT
LINE SB35 (SUB)

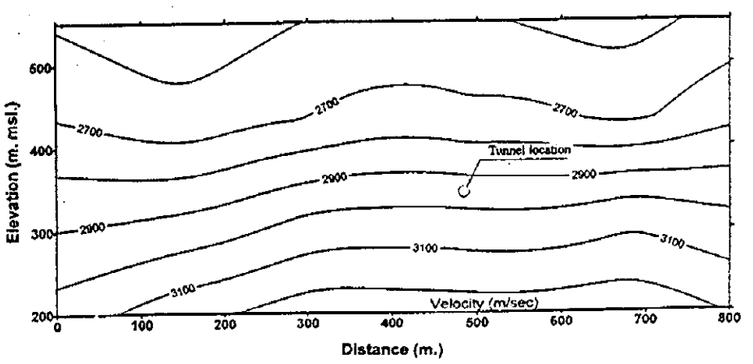
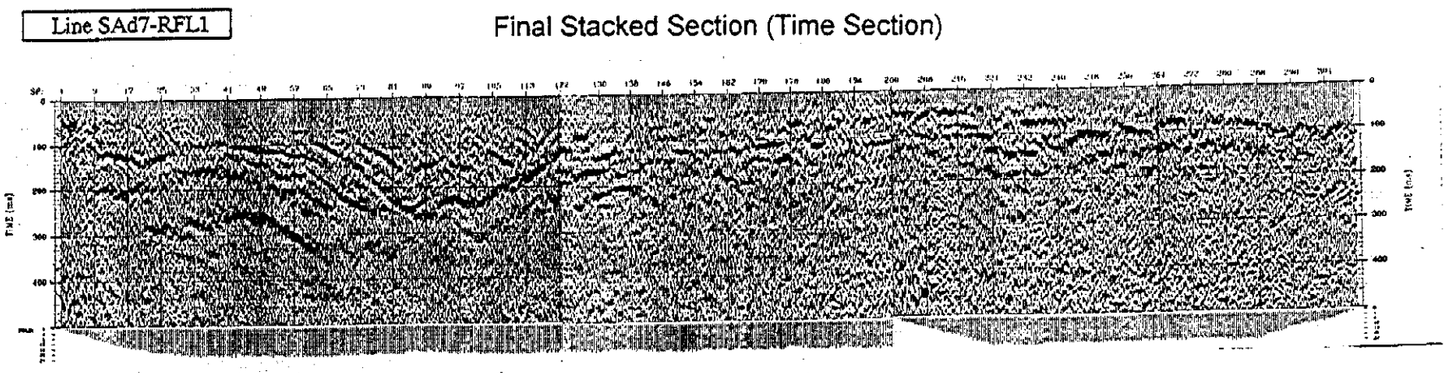
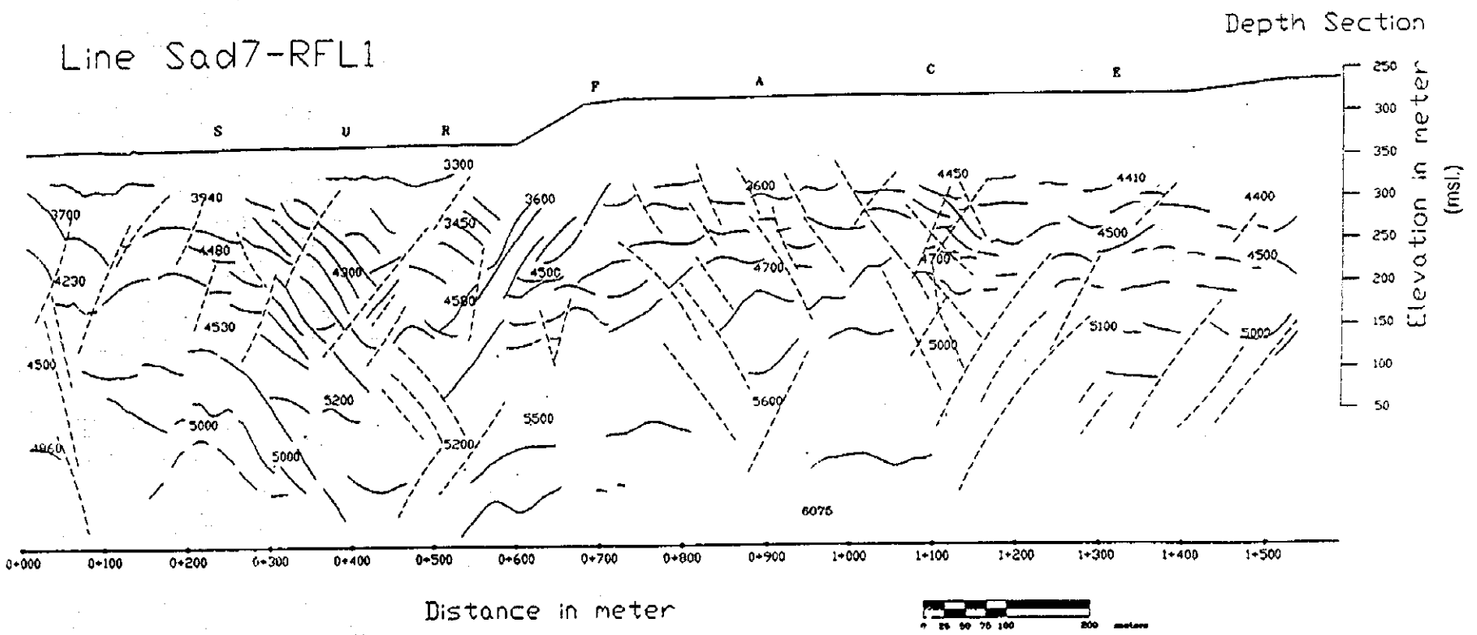


Figure 10.21 Results of Seismic Reflection Prospecting (21)





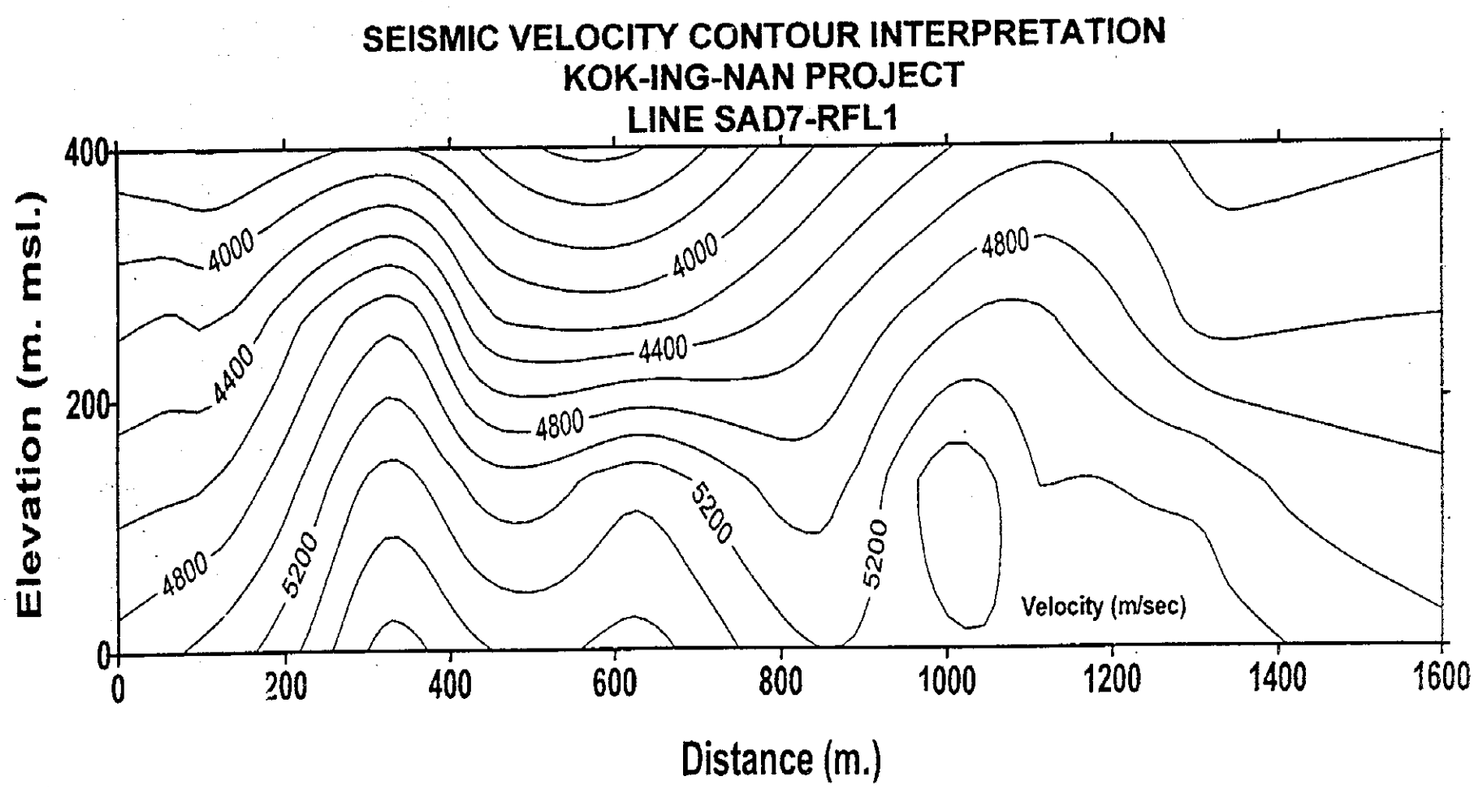
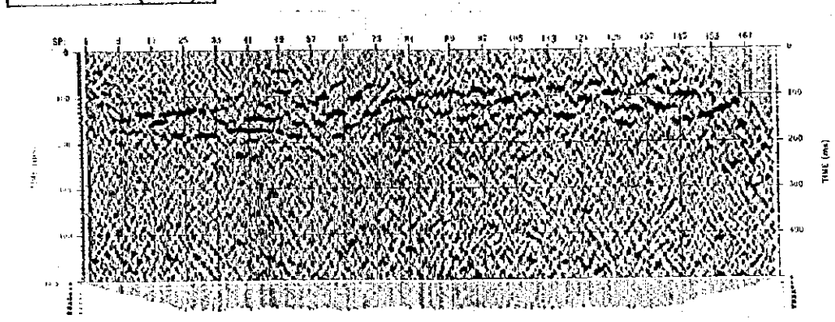
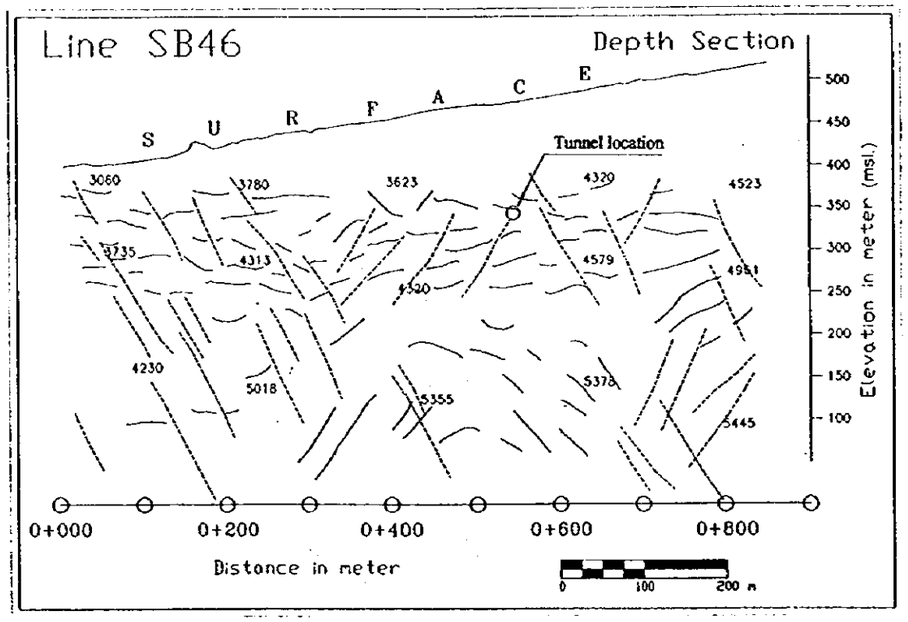


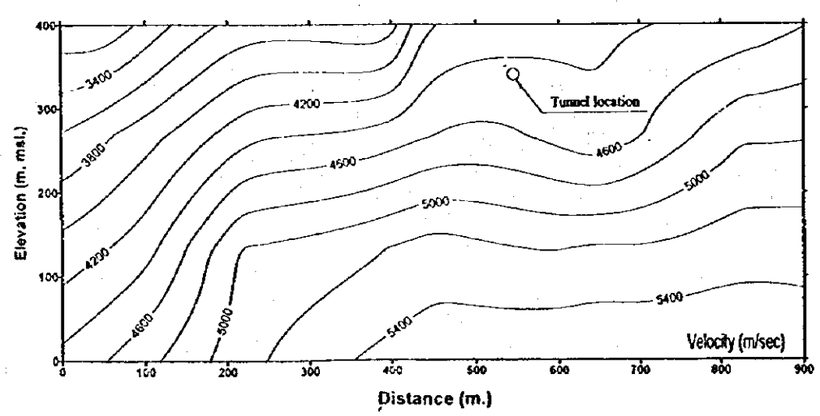
Figure 10.22 Results of Seismic Reflection Prospecting (22)

Line SB46 (Main) Final Stacked Section (Time Section)

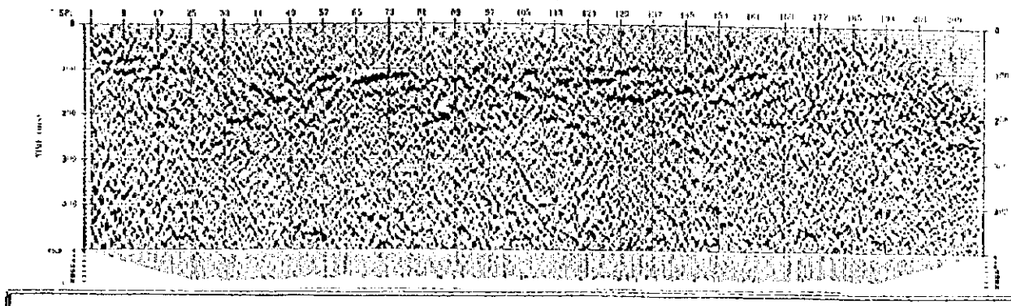


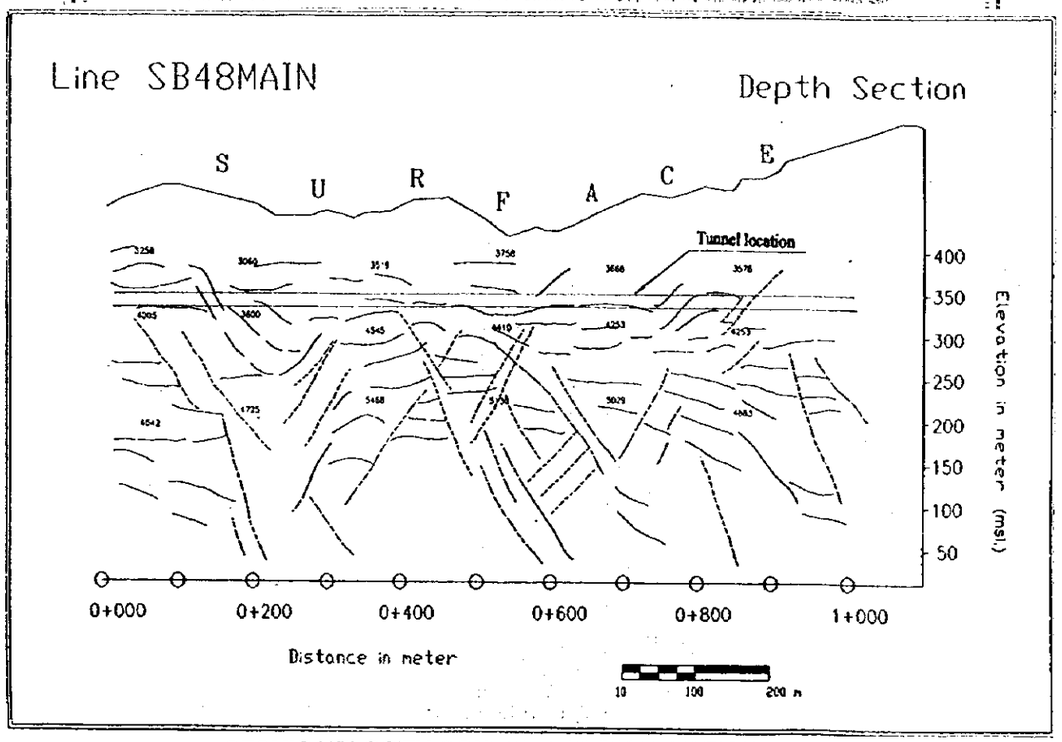


SEISMIC VELOCITY CONTOUR INTERPRETATION
KOK-ING-NAN PROJECT
LINE SB46



Line SB48 (Main) Final Stacked Section (Time Section)





SESMIC VELOCITY CONTOUR INTERPRETATION
KOK-ING-NAN PROJECT
LINE SB48 (MAIN)

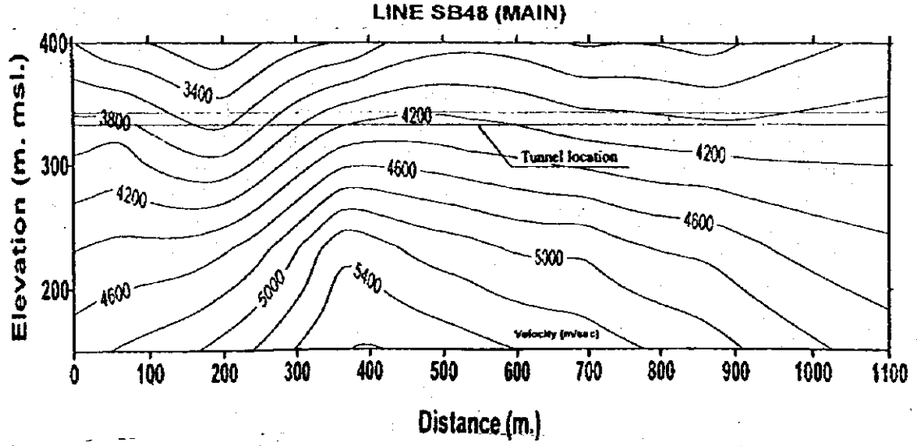
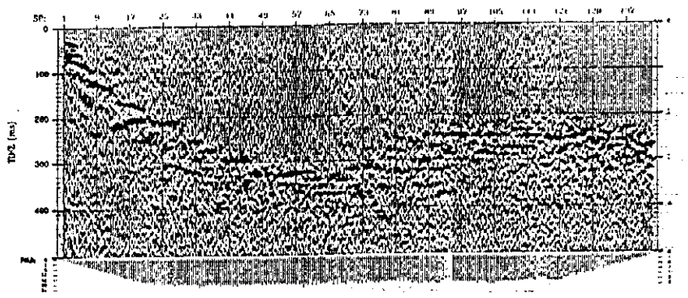
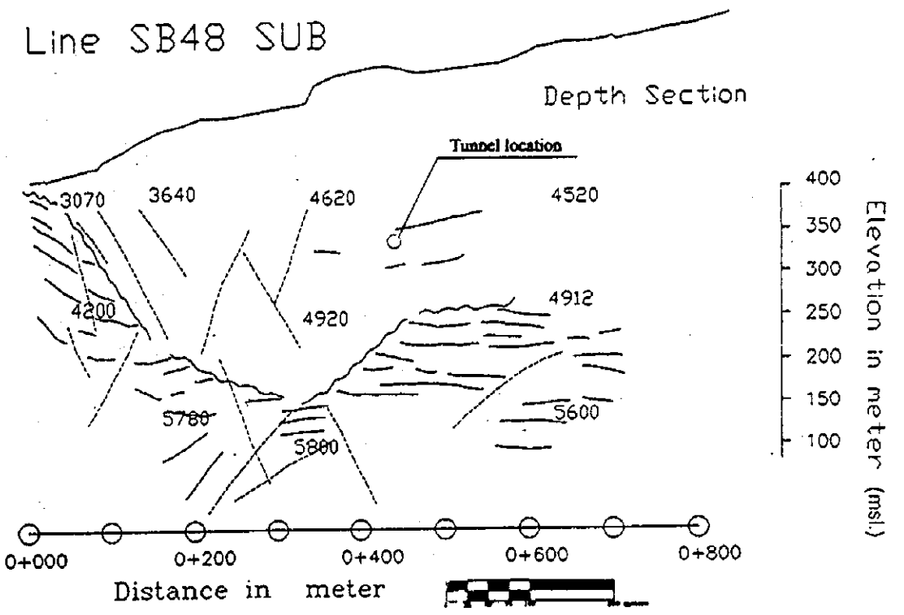


Figure 10.23 Results of Seismic Reflection Prospecting (23)

Line SB48 (Sub) Final Stacked Section (Time Section)





SEISMIC VELOCITY CONTOUR INTERPRETATION
KOK-ING-NAN PROJECT
LINE SB-48 (SUB)

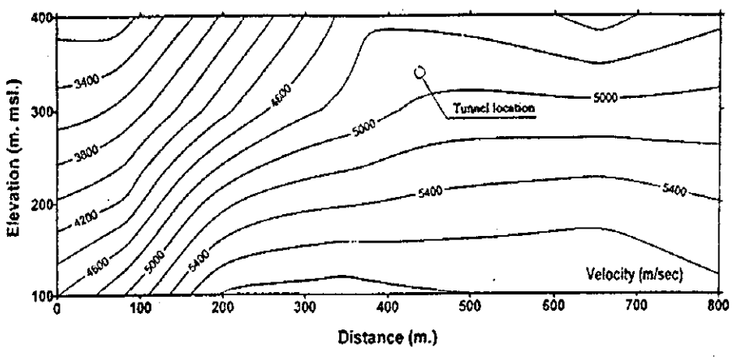
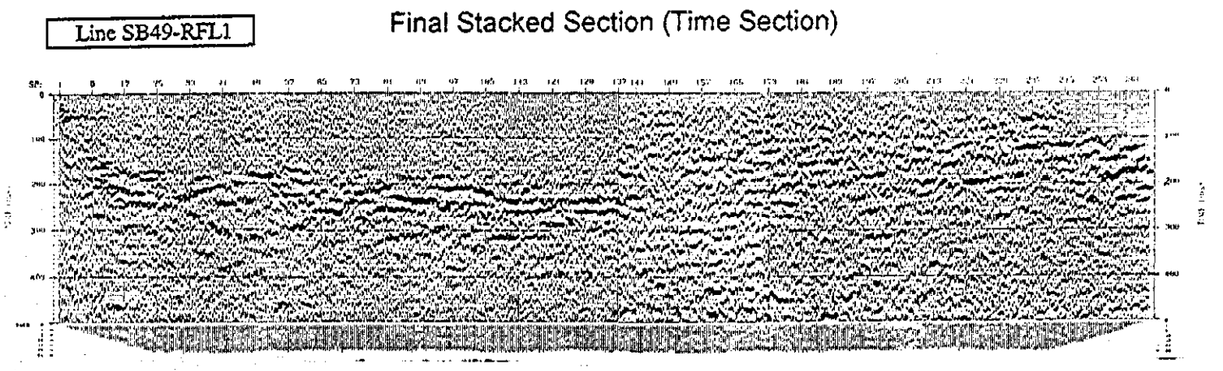
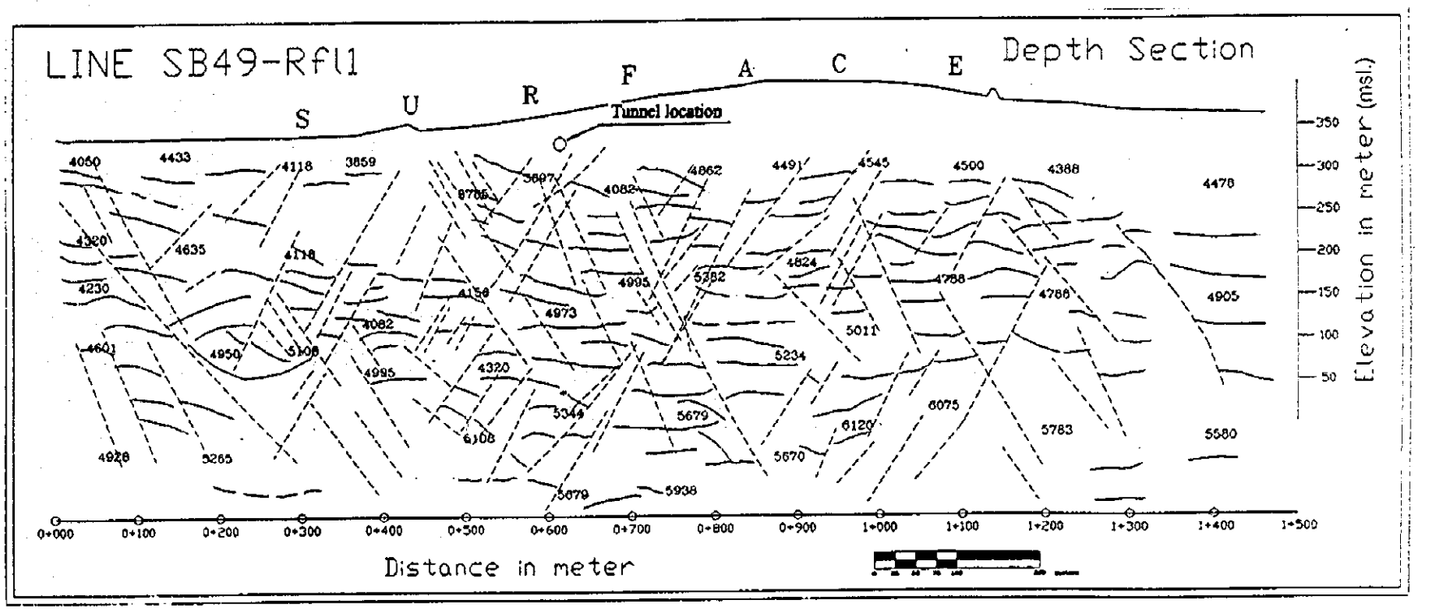
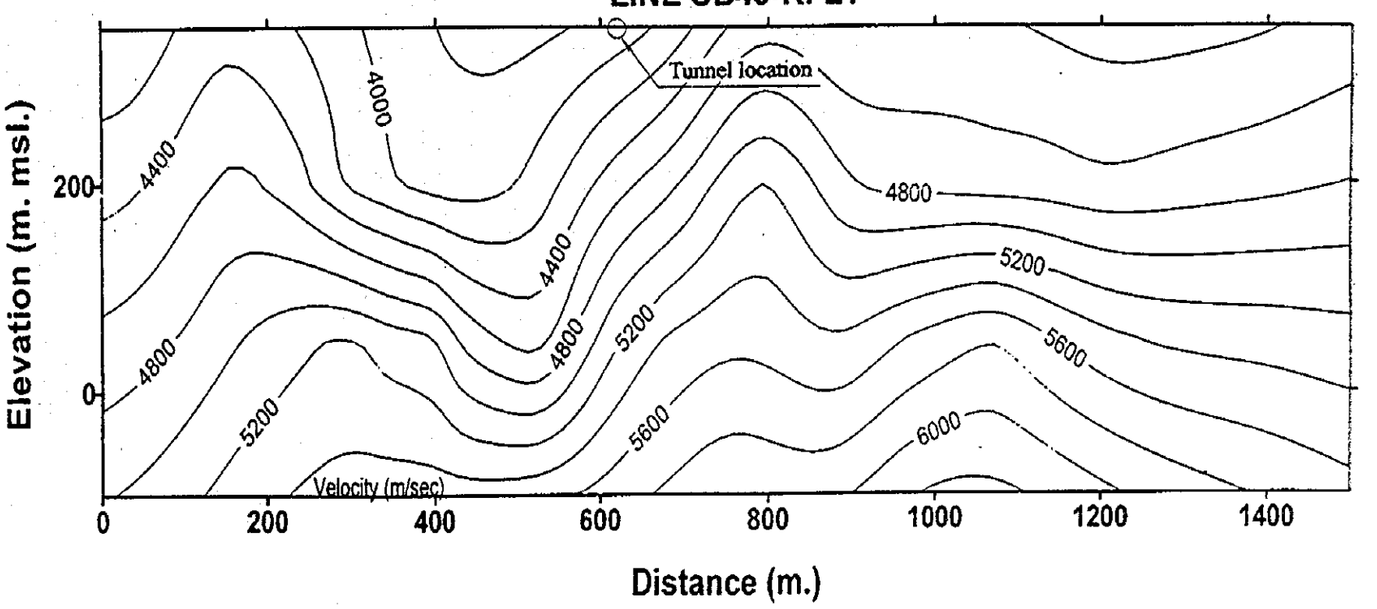


Figure 10.24 Results of Seismic Reflection Prospecting (24)





SEISMIC VELOCITY CONTOUR INTERPRETATION
KOK-ING-NAN PROJECT
LINE SB49-RFL1



11. Electromagnetic Prospecting Survey

(TEM,TDEM)

Figure 11.1 Results of Electromagnetic Prospecting Survey (TEM and TDEM) (1)

Resistivity section by Occam's Inversion

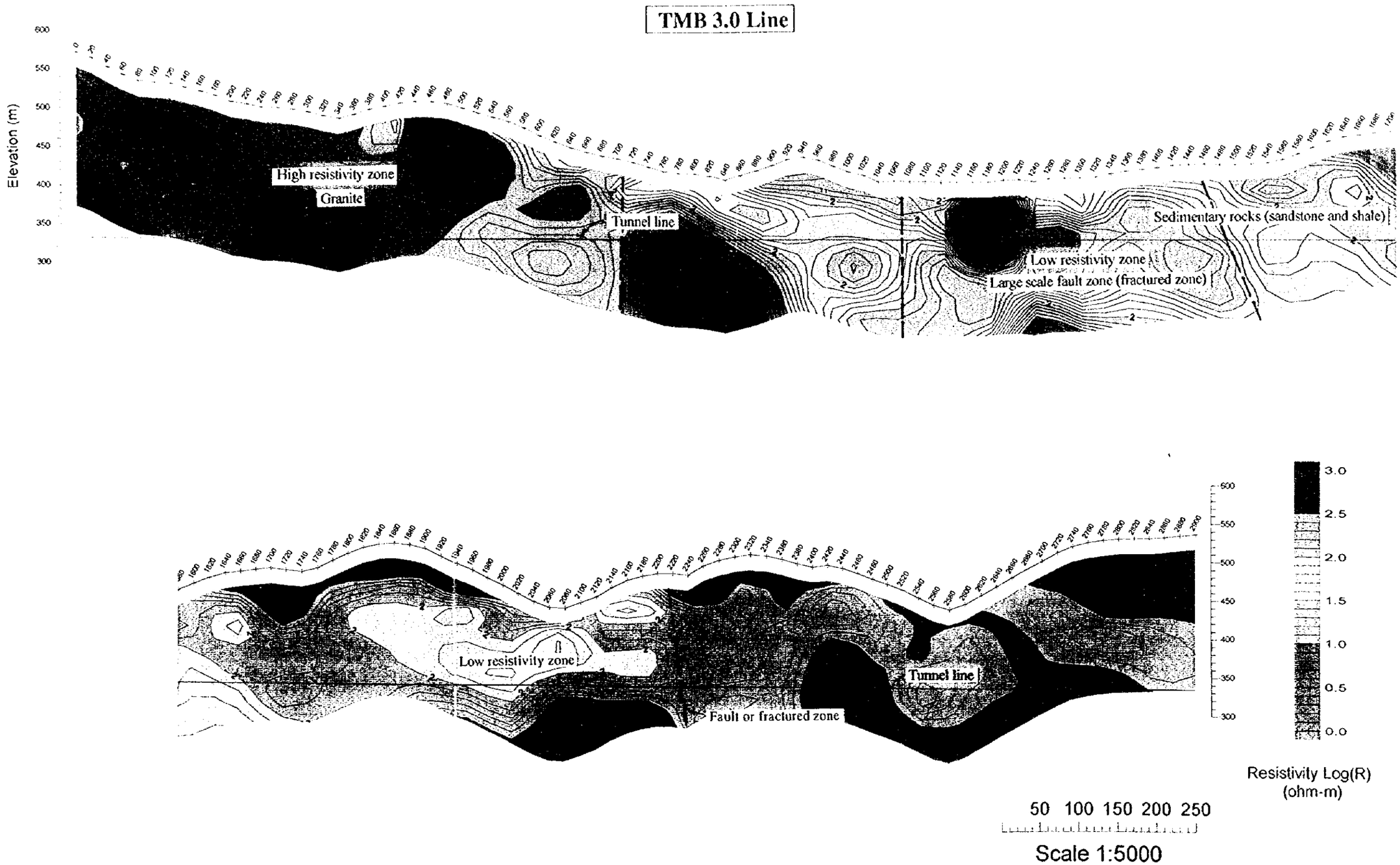
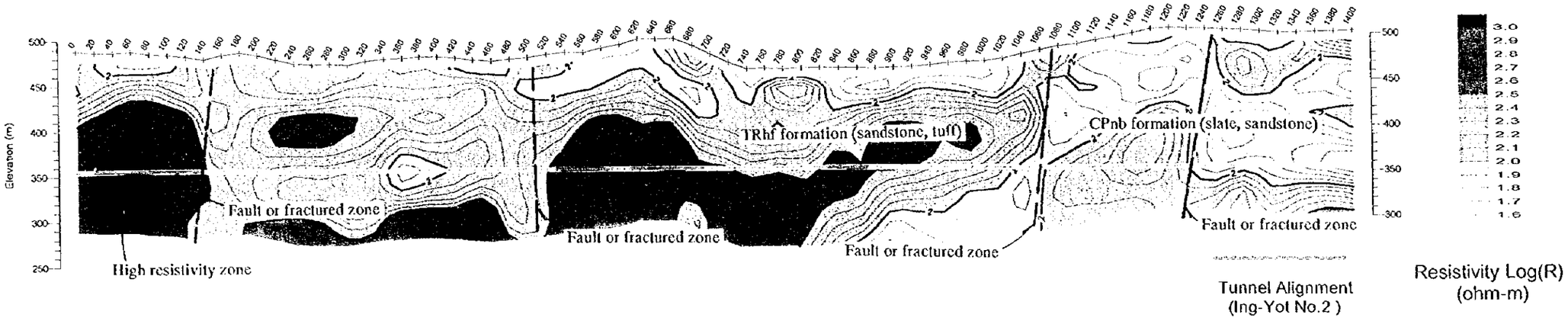


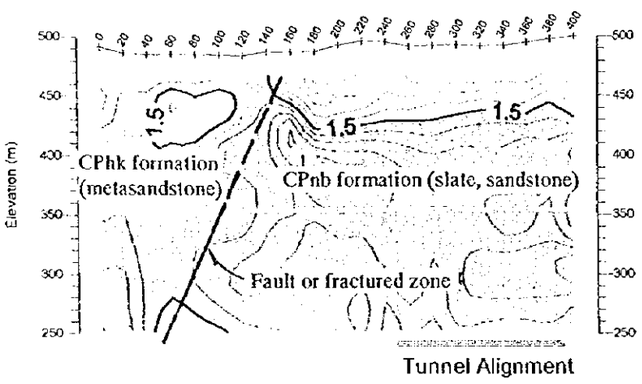
Figure 11.2 Results of Electromagnetic Prospecting Survey (TEM and TDEM) (2)

Resistivity section by Occam's Inversion

TMB 3.9 Line



TMB 8.1 Line



50 100 150 200 250

Scale 1:5000

TMB 11a Line

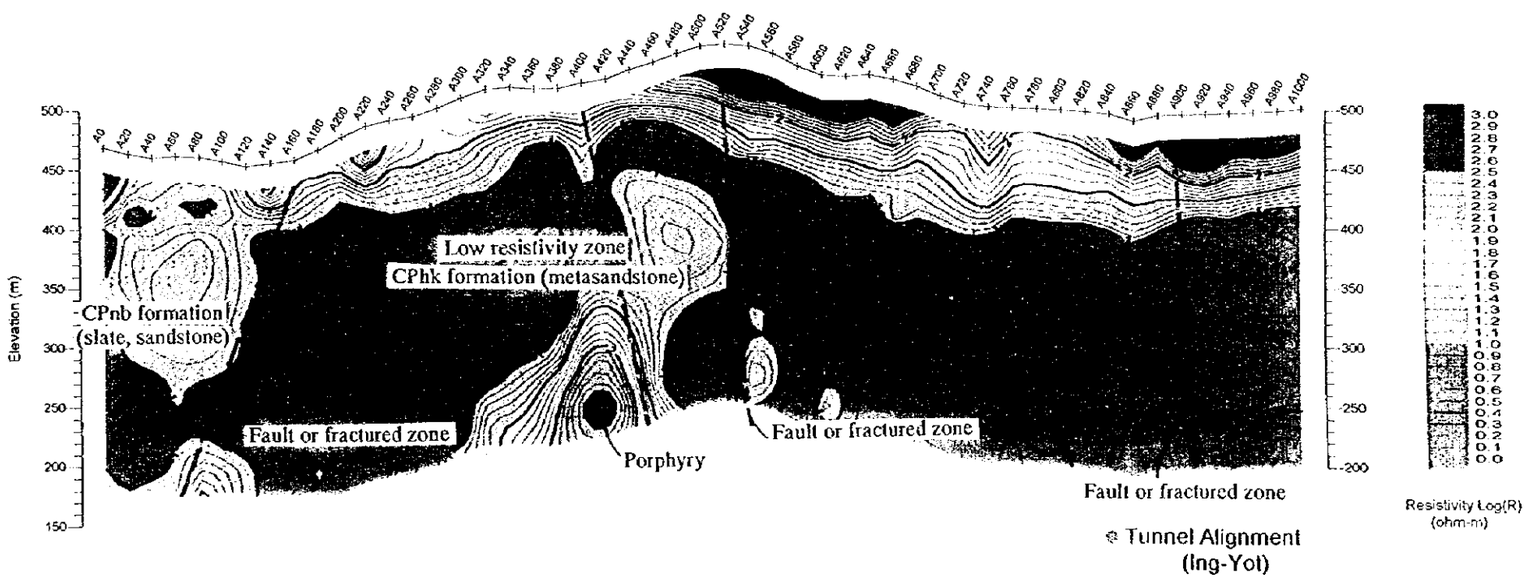
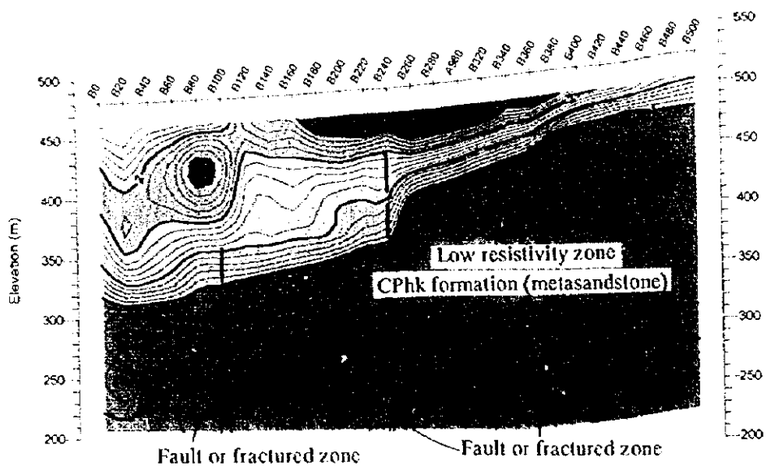


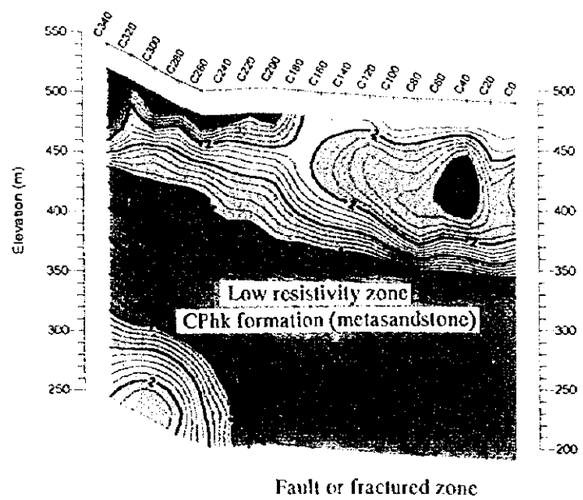
Figure 11.3 Results of Electromagnetic Prospecting Survey (TEM and TDEM) (3)

Resistivity section by Occam's Inversion

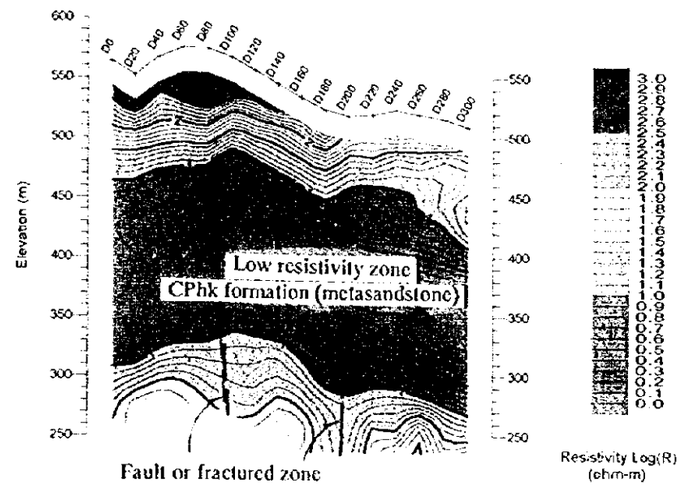
TMB 11b Line



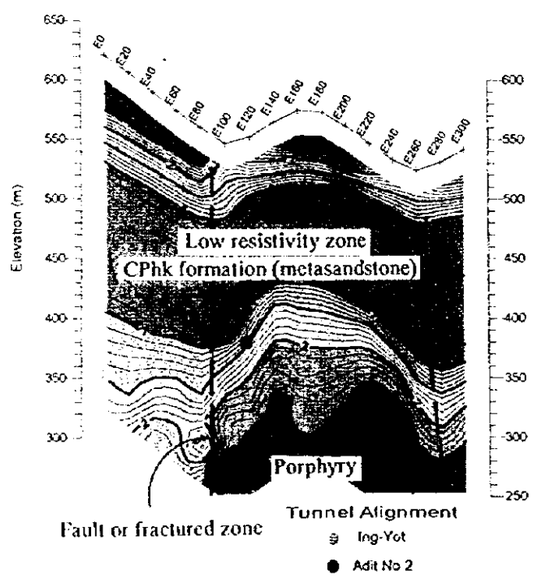
TMB 11c Line



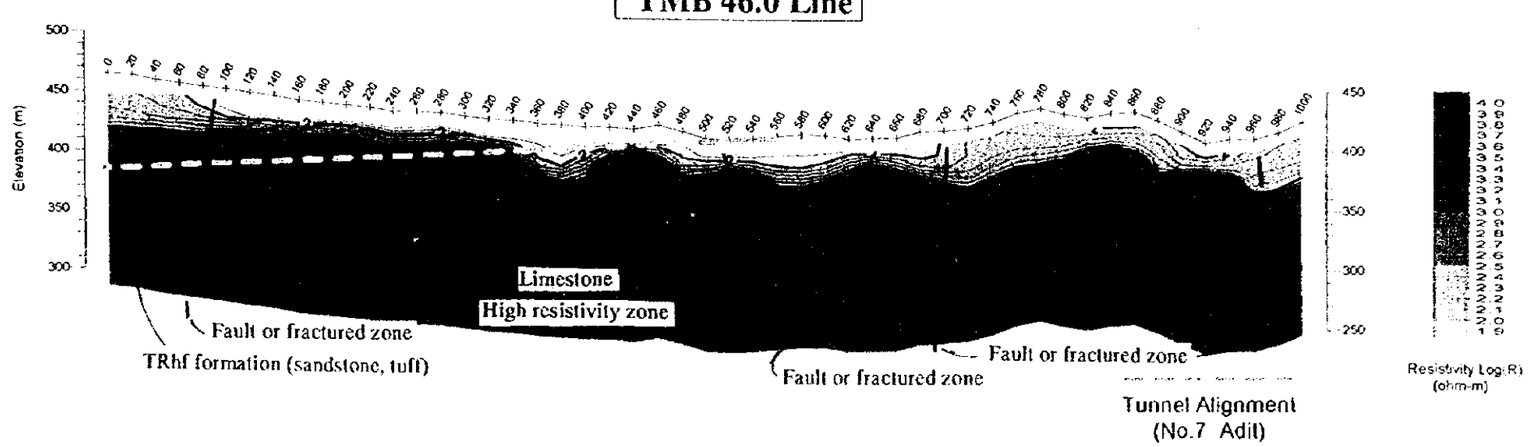
TMB 11d Line



TMB 11e Line



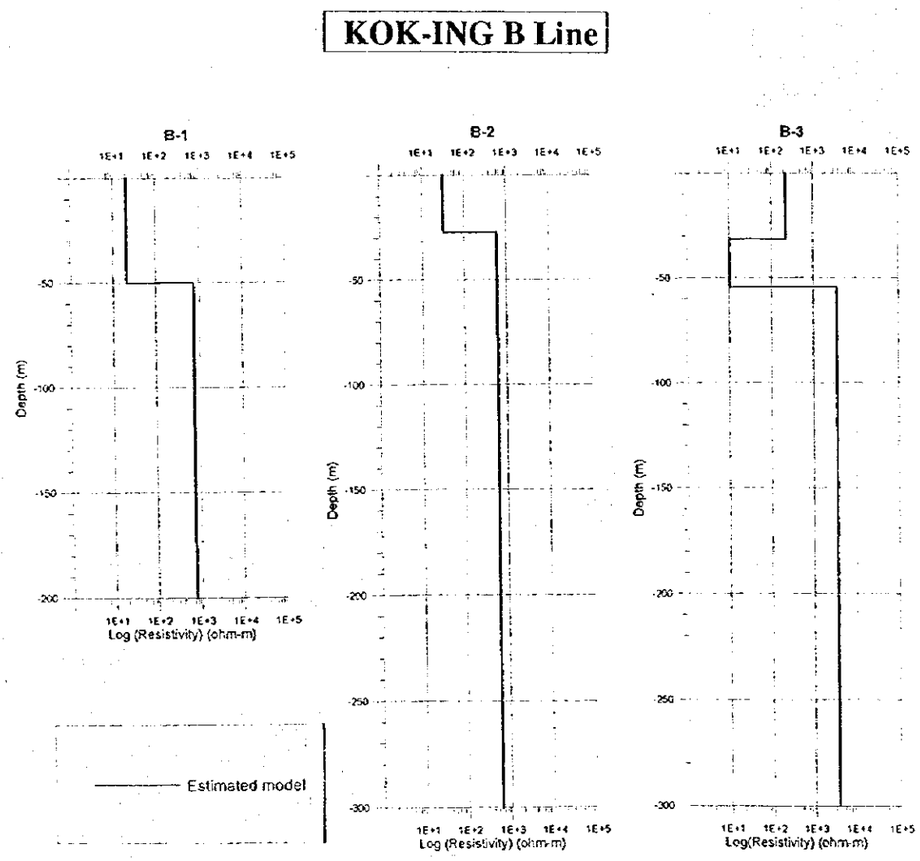
TMB 46.0 Line



50 100 150 200 250

Scale 1:5000

Figure 11.4 Results of Electromagnetic Prospecting Survey (TEM and TDEM) (4)



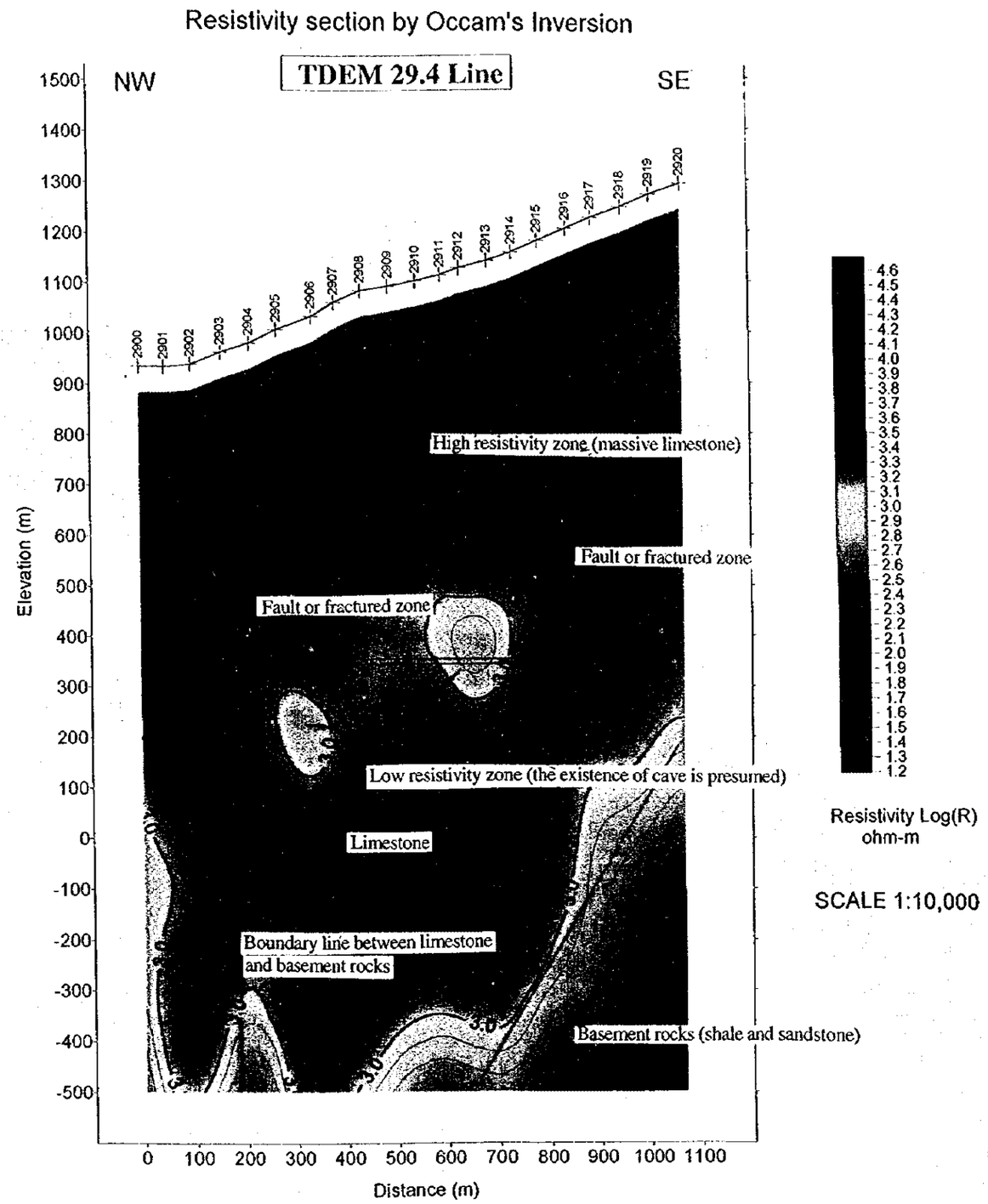
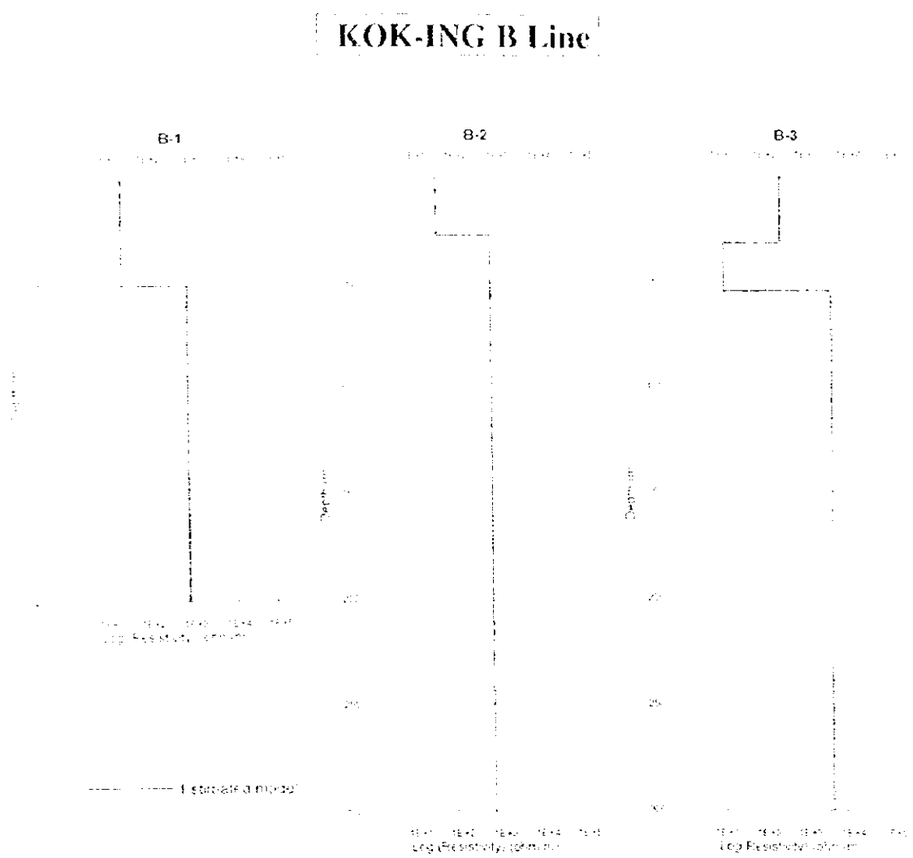


Figure 11.4 Results of Electromagnetic Prospecting Survey (TEM and TDEM) (4)



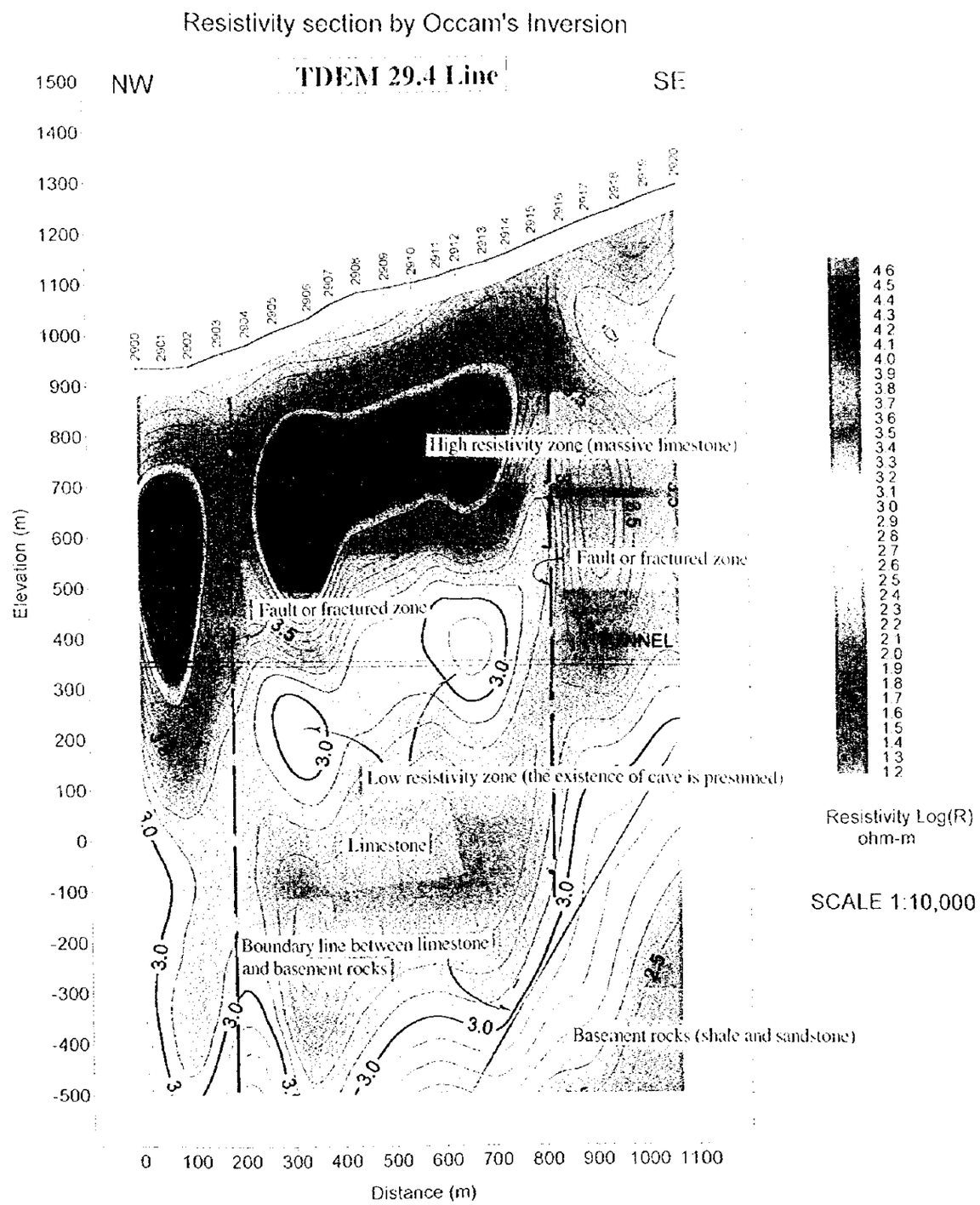
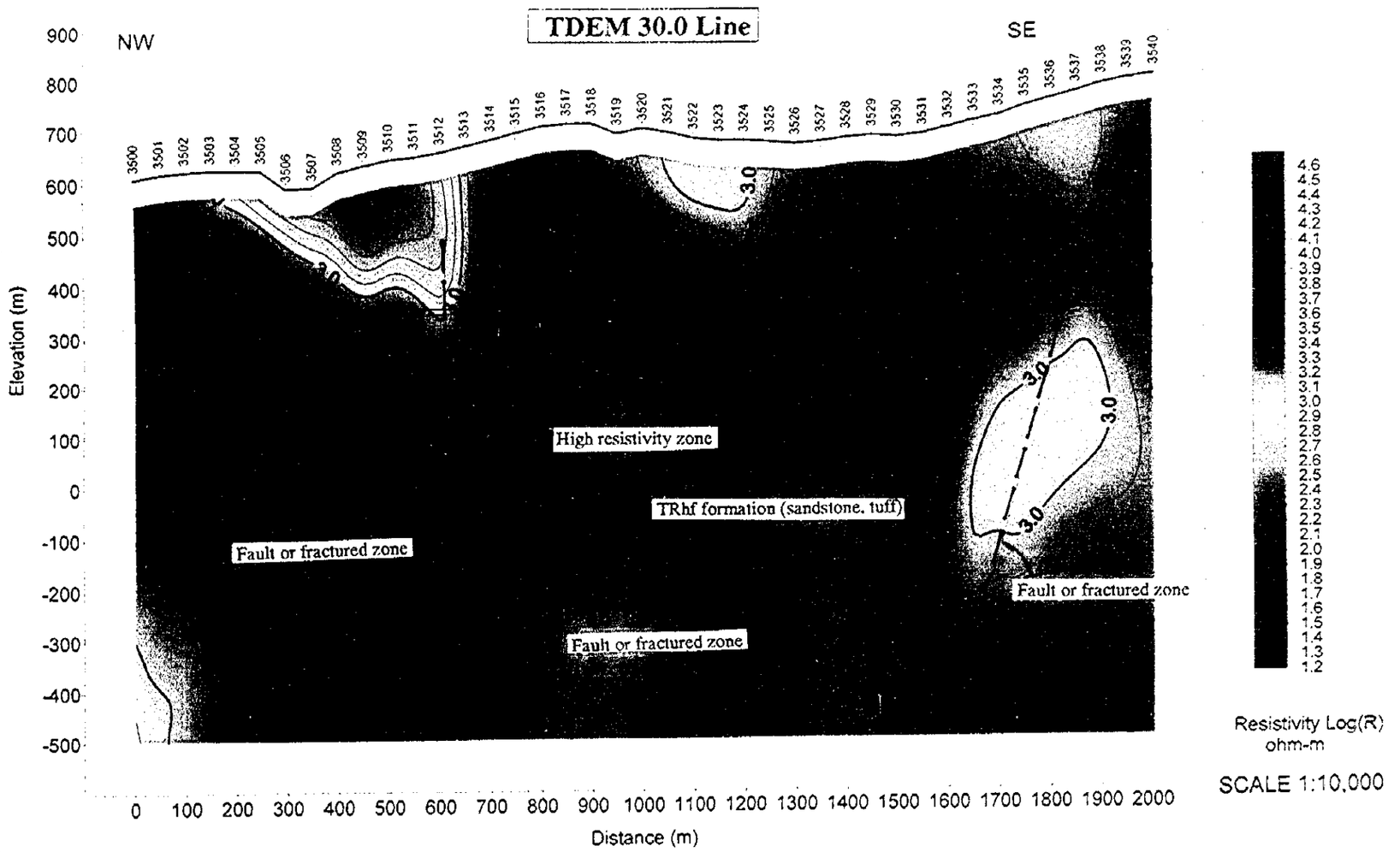


Figure 11.5 Results of Electromagnetic Prospecting Survey (TEM and TDEM) (5)

Resistivity section by Occam's Inversion



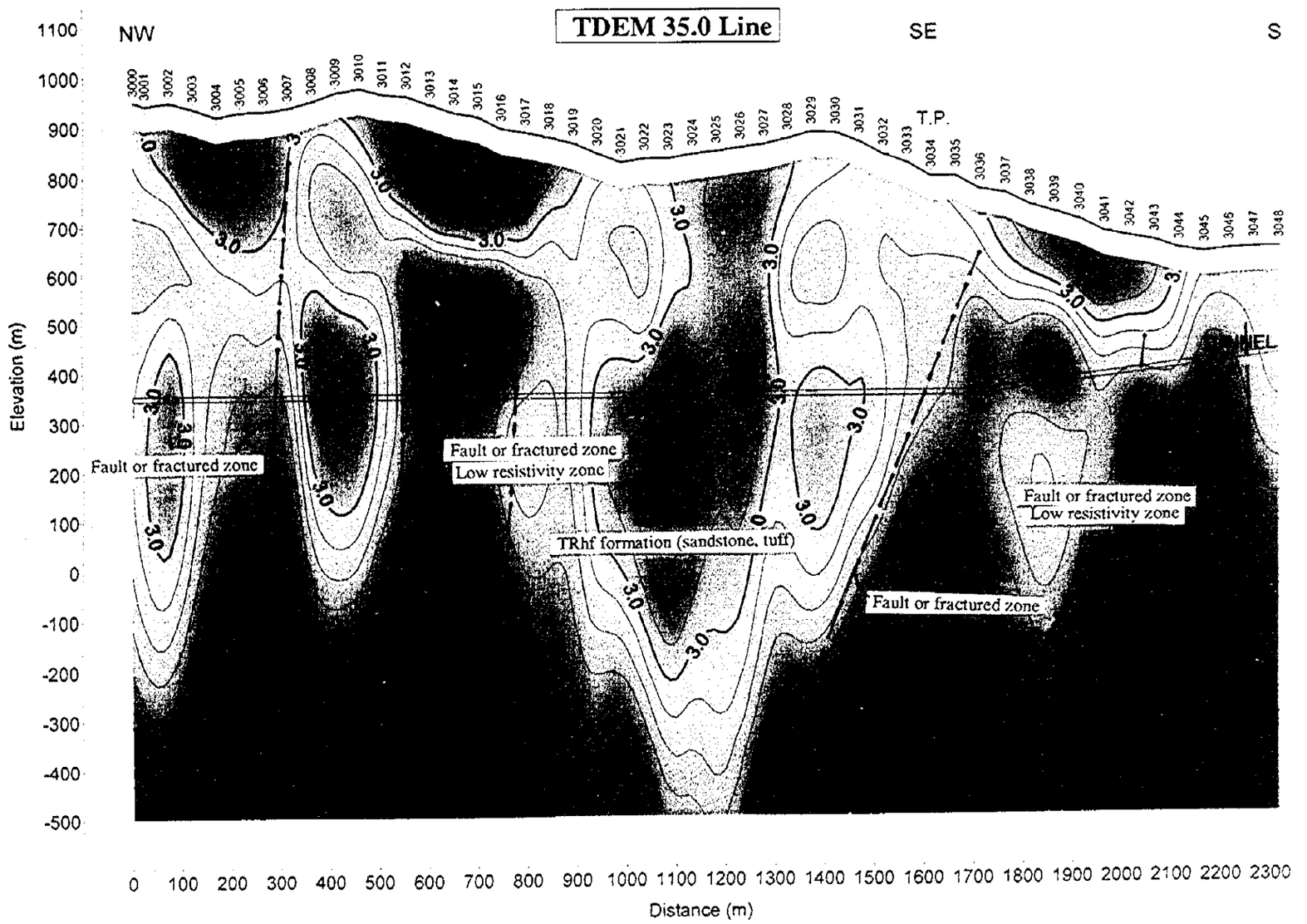
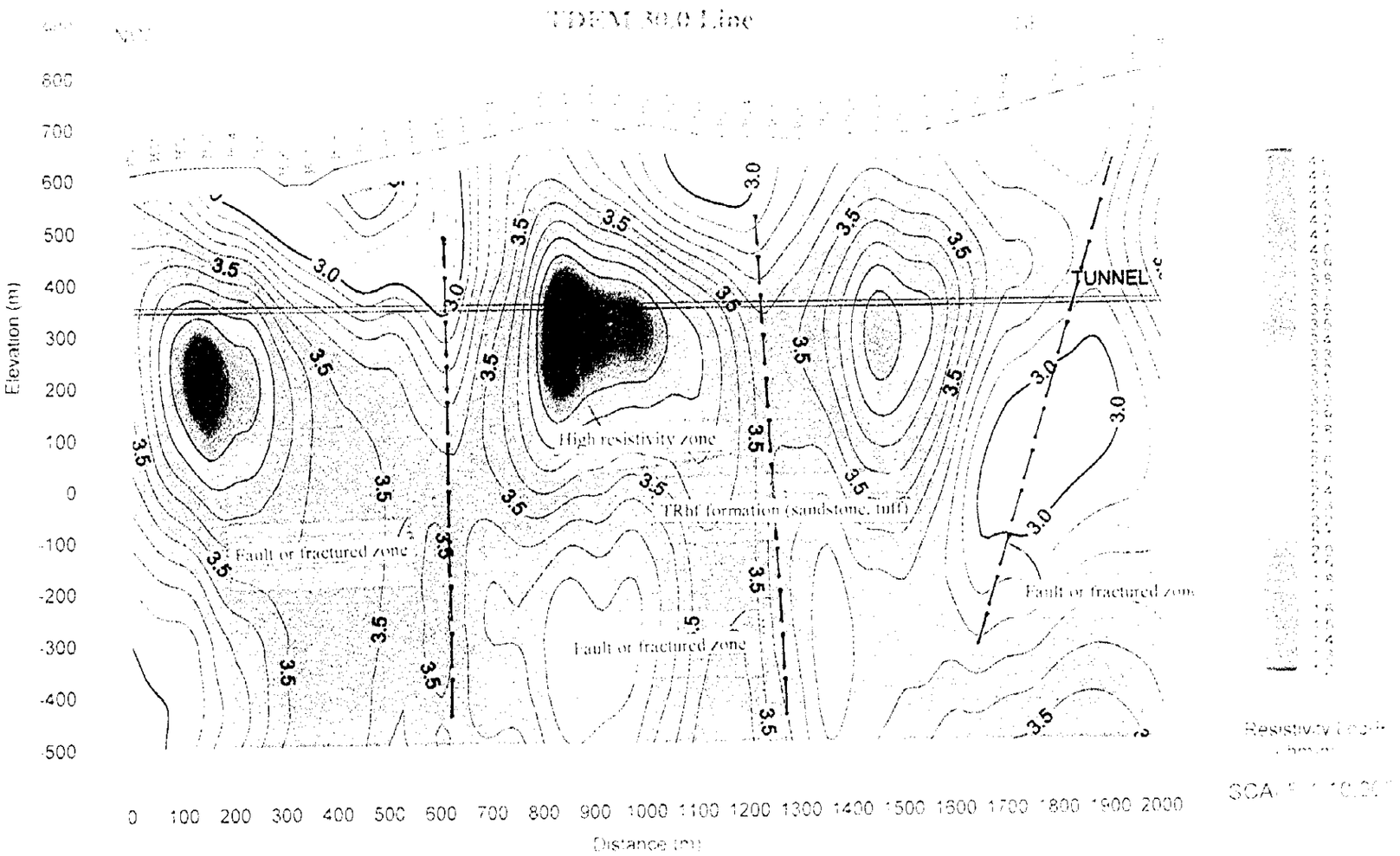
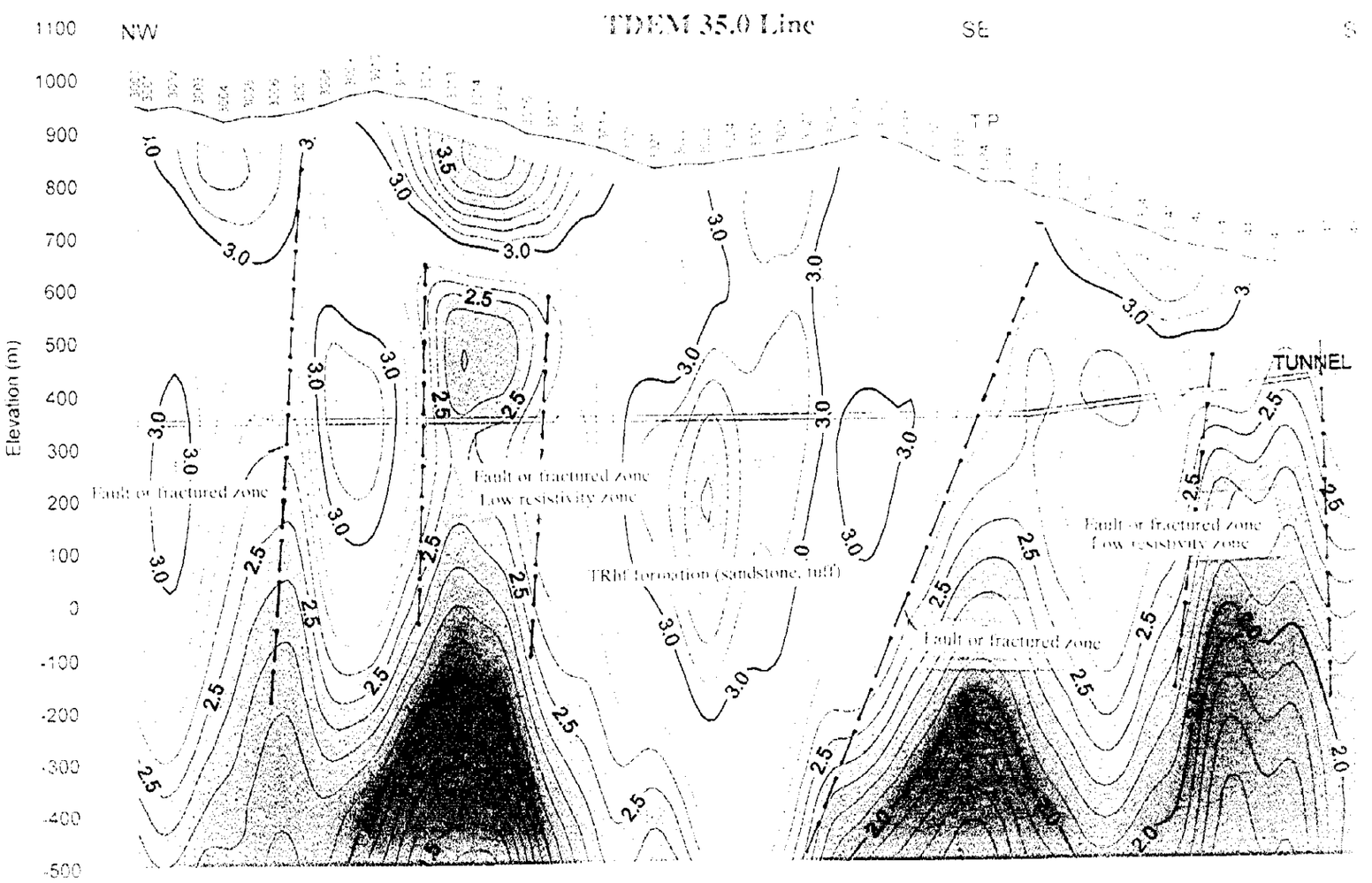
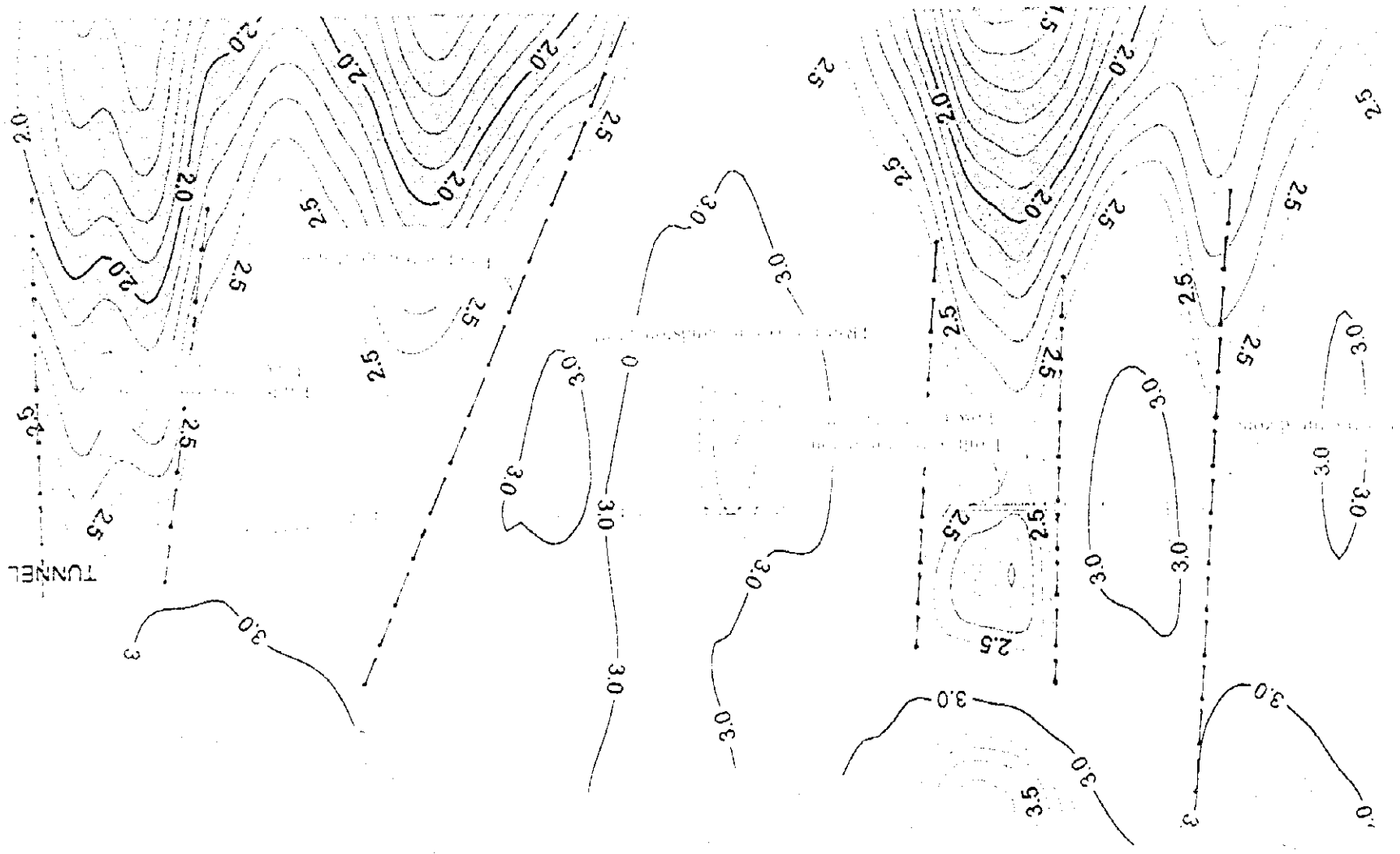


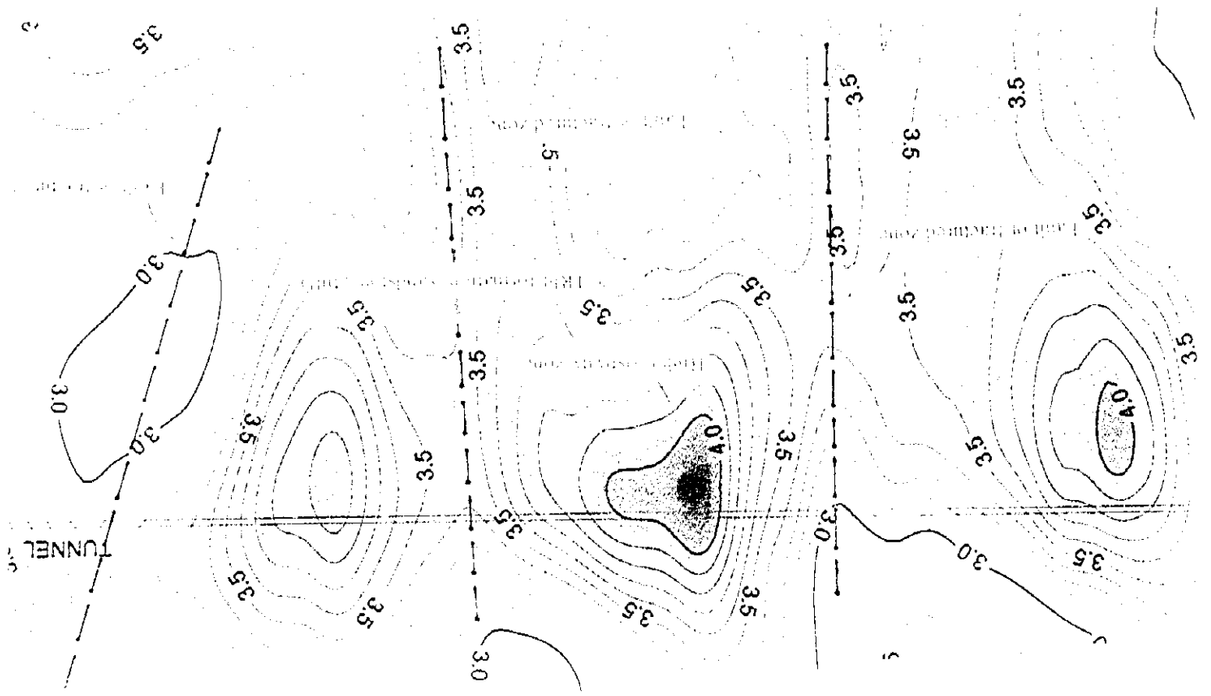
Figure 11.5 Results of Electromagnetic Prospecting Survey (TEM and TDEM) [illegible]

Resistivity section by Program Interpreter






TUNNEL


TUNNEL

12. Laboratory Test

(Rock Test)

Table 12.1 Results of Laboratory Test (Rock Test)

Location	Borehole No.	Sampling Depth (m)	Unit Weigh (g/cm³)	Absorption Weight (%)	Ultra Sonic Velocity Vp(km/s)	Ultra Sonic Velocity Vs(km/s)	Young ratio (Gpa)	Poisson Ratio	U.C.S (kgf/cm²)	Petrographic Examination	Boring Core Condition Form. Name	Boring Core Condition Geology	Boring Core Condition Rock Class.	Performed by
Kok-Ing No.1 tunnel	DHKBJT1-1SP	39.60 - 39.80	2.63	---	5.87	2.91	59.8	0.34	506.3	Granite	PTR	Granite	CM	Thai side
	DHKBJT1-1SP	63.00 - 63.30	2.75	---	5.73	2.81	51.2	0.37	937.4	---		Tuff	CH	Thai side
	DHKBJT1-1SP	66.60 - 66.90	2.70	---	5.00	3.20	63.7	0.18	367.7	(Micro)diorite		Diorite	CH	Thai side
Kok-Ing No.2 tunnel (B-J route)	DHKBJT2-1	37.10 - 37.40	2.62	---	6.48	2.95	65.6	0.37	953.5	(Meta)basalt	An	Basalt	CH	Thai side
	DHKBJT2-1	45.30 - 45.50	2.76	---	6.16	3.08	69.9	0.33	1,212.2	---		Basalt	CH	Thai side
	DHKBJT2-1	63.00 - 63.30	2.77	---	6.34	3.54	83.8	0.27	2,784.0	Dacite porphyry		Porphyry	CH	Thai side
Kok-Ing No.2 tunnel	DHKB1	50.05 - 50.25	2.72	---	6.34	3.06	66.0	0.35	445.0	Marble	P2	Marble	CM	Thai side
	DHKB2	30.00 - 30.60	2.79	---	6.29	3.35	81.6	0.30	836.9	Slate	PTR	Shale	CH-B	Thai side
	DHBJ4.5	132.60 - 133.30	2.71	0.42	5.52	3.14	67.1	0.26	32.1	Andesite	P3	Andesite	CM	JICA side
	DHBJ4.5	142.00 - 142.30	2.71	0.06	6.04	2.99	64.8	0.34	307.8	Andesite		Andesite	CM	JICA side
	DHBJ4.5	143.30 - 143.60	2.76	0.03	6.21	3.11	71.0	0.33	590.3	Andesite		Andesite	CM	JICA side
	DHBJ4.5	148.40 - 149.00	2.76	0.03	6.54	2.73	57.4	0.39	685.2	Andesite		Andesite	CM	JICA side
Ing-Yot No2. tunnel adit	DH3AD1	59.45 - 59.65	2.69	---	3.66	2.29	32.9	0.19	229.1	---	CPnb	Shale	CH	Thai side
	DH6AD1SP	95.50 - 96.00	2.63	---	4.75	2.64	44.1	0.30	566.4	(Meta-)sandstone	TRhf	Sandstone	CH	Thai side
	DH6AD1SP	114.55 - 114.80	2.72	---	4.50	2.57	45.4	0.26	---	---		Sandstone	CH	Thai side
	DH6AD1SP	119.55 - 120.00	2.73	---	5.41	2.92	60.0	0.29	1,983.4	---		Sandstone	B	Thai side
	DH7AD1	42.00 - 42.25	2.68	---	5.71	2.77	55.6	0.35	983.0	Meta-sandstone	TRhf	Sandstone	CM	Thai side
	DH7AD1	52.50 - 52.80	2.54	---	6.19	3.94	91.7	0.18	467.0	---		Sandstone	CH	Thai side
Ing-Yot No.2 tunnel	DHB0.6	48.50 - 48.80	2.55	---	4.08	2.27	33.5	0.28	228.1	---	TRpn	Sandstone	CM	Thai side
	DHB1SP	67.50 - 67.80	2.66	---	5.72	2.91	59.9	0.33	1,069.8	Granite porphyry	PTRgr	Granite porphyry	B	Thai side
	DHB8SP	109.75 - 110.00	2.71	---	5.08	2.09	33.1	0.40	418.0	Slate	CPnb	S.s.& shale alt.	CH	Thai side
	DHB8SP	126.50 - 126.65	2.70	---	3.12	1.89	23.7	0.22	247.2	Slate		S.s.& shale alt.	CM	Thai side
	DHBJ-16.5	45.10 - 45.35	2.73	---	3.35	1.76	22.1	0.31	248.0	---	CPnb	Shale	CH	Thai side
	DHBJ-16.5	45.40 - 45.60	2.72	---	3.42	1.75	22.0	0.32	47.8	---		Shale	CH	Thai side
	DHBJ-16.5	73.20 - 73.35	2.70	---	3.21	1.76	21.5	0.29	174.2	Slate		Slate	CM	Thai side
	DHBJ-16.5	160.20 - 160.80	2.74	0.35	4.00	2.04	30.1	0.32	65.8	Slate		Slate	CM	JICA side
	DHBJ-16.5	183.40 - 184.00	2.75	0.07	3.98	2.44	39.2	0.20	404.7	Slate		Slate	CH	JICA side
	DHBJ-16.5	188.10 - 188.60	2.76	0.19	4.95	2.81	54.9	0.26	123.8	Slate		S.s.& shale alt.	CM	JICA side
	DHBJ-18.0	157.30 - 157.50	2.69	---	5.30	2.32	40.0	0.38	65.3	Slate (with s.s.)	CPnb	S.s.& shale alt.	CM	Thai side
	DHBJ-18.0	165.60 - 166.00	2.67	0.04	5.67	3.13	66.9	0.28	287.2	Sandstone		Sandstone	CM	JICA side
	DHBJ-18.0	185.60 - 186.00	2.65	0.03	5.86	3.01	63.3	0.32	1,173.3	Sandstone		Sandstone	CH	JICA side
	DHBJ-18.0	196.30 - 197.00	2.68	0.04	5.70	2.62	50.3	0.37	678.8	Sandstone		Sandstone	CM	JICA side
	DHBJ-22.5	189.50 - 189.90	2.77	0.13	4.22	2.55	43.7	0.21	177.0	Slate	CPnb	S.s.& shale alt.	CH	JICA side
	DHBJ-22.5	190.40 - 191.00	2.73	0.06	5.33	2.36	42.0	0.38	101.4	Slate		S.s.& shale alt.	CH	JICA side
	DHBJ-22.5	194.00 - 194.60	2.73	0.10	4.30	2.48	42.0	0.25	406.4	Slate		Slate	CM	JICA side
	DHBJ-22.5	201.00 - 201.40	2.70	0.14	4.12	2.43	39.3	0.23	174.1	Sandstone		Sandstone	CH	JICA side
Ing-Yot No.2 tunnel	DHBJ-26.0	258.00 - 259.00	2.78	0.02	6.39	3.29	79.3	0.32	531.0	Dacite	PTRv	Dacite	CH-B	JICA side
	DHBJ-26.0	265.00 - 266.00	2.75	0.03	5.89	3.00	65.7	0.33	1,098.4	Tuff		Tuff	CH-B	JICA side
	DHBJ-26.0	270.00 - 271.00	2.80	0.04	5.11	3.14	66.1	0.20	566.4	Tuff		Tuff	CH	JICA side
	DHBJ-26.0	276.00 - 277.00	2.77	0.06	3.76	2.42	37.1	0.15	820.6	Tuff		Tuff	CH	JICA side
	DHBJ-33.0	181.50 - 181.80	2.71	---	4.25	2.73	48.4	0.15	888.1	Tuff(Marble)	TRhf	Tuff	CM	Thai side
	DHBJ-33.0	198.30 - 198.60	2.74	---	5.42	3.31	74.1	0.18	1,229.0	(Meta-)tuff		Tuff	CH	Thai side
	DHBJ-33.0	273.00 - 274.00	2.67	0.22	3.81	2.48	37.1	0.13	776.1	Tuff		Tuff	CH	JICA side
	DHBJ-33.0	289.00 - 290.00	2.72	0.04	5.36	2.59	49.2	0.35	650.5	Tuff		Tuff	CH	JICA side
	DHBJ-33.0	296.00 - 297.00	2.66	0.13	4.69	2.68	48.0	0.26	1,150.3	(Silicified) tuff		Tuff	CH	JICA side
	DHB46SP	57.20 - 57.50	2.72	---	6.49	2.56	50.2	0.41	2,007.8	---	TRpl	Limestone	CH	Thai side
	DHB46SP	71.50 - 71.75	2.69	---	6.51	3.42	82.5	0.31	1,101.5	Limestone		Limestone	CM	Thai side
	DHB46SP	89.25 - 89.50	2.72	---	6.53	2.58	51.2	0.41	772.2	---		Limestone	CM	Thai side
	DHB50SP	77.30 - 77.60	2.69	---	5.50	3.07	64.6	0.27	181.4	(Meta-)sandstone	TRhf	Sandstone	CM	Thai side
Ing-Yot No.2 tunnel ('97)	DHA-1	27.5	---	---	---	---	---	---	1,523.4	---	TRpn	Tuff	CH	Thai side
	DHB-7	52.0	---	---	---	---	---	---	1,978.3	---	TRpl	Limestone	B	Thai side
	DHB-8	48.0	---	---	---	---	---	---	1,267.9	---	TRhf	Tuff	CH	Thai side
Ing-Yot No.2 tunnel ('96) (south route)	DHC-1	29.5	---	---	---	---	---	---	1,032.0	---	TRpn	Siltstone	CH-B	Thai side
	DHC-2	64.5	---	---	---	---	---	---	271.3	---	ms3	Sandstone	CL	Thai side

* Unit weight (Bulk S.G.) = W(dry) / Volume
* Poisson's ratio, GPa = 1.0197×10^4 kgf/cm²
* U.C.S. : Uniaxial compressive strength, in case of getting two data at the same sample, higher strength data is adopted.
* Tensile strength (by Brazillian test), DHBJ22.5 (194.0-194.6 m) : 97.9 kgf/cm², DHBJ26.0 (270.0-271.0 m) : 227.4 kgf/cm²
* Point load strength (by point load test), DHBJ22.5 (194.0-194.6 m) : 18.5 kgf/cm², DHBJ26.0 (270.0-271.0 m) : 10.0 kgf/cm²