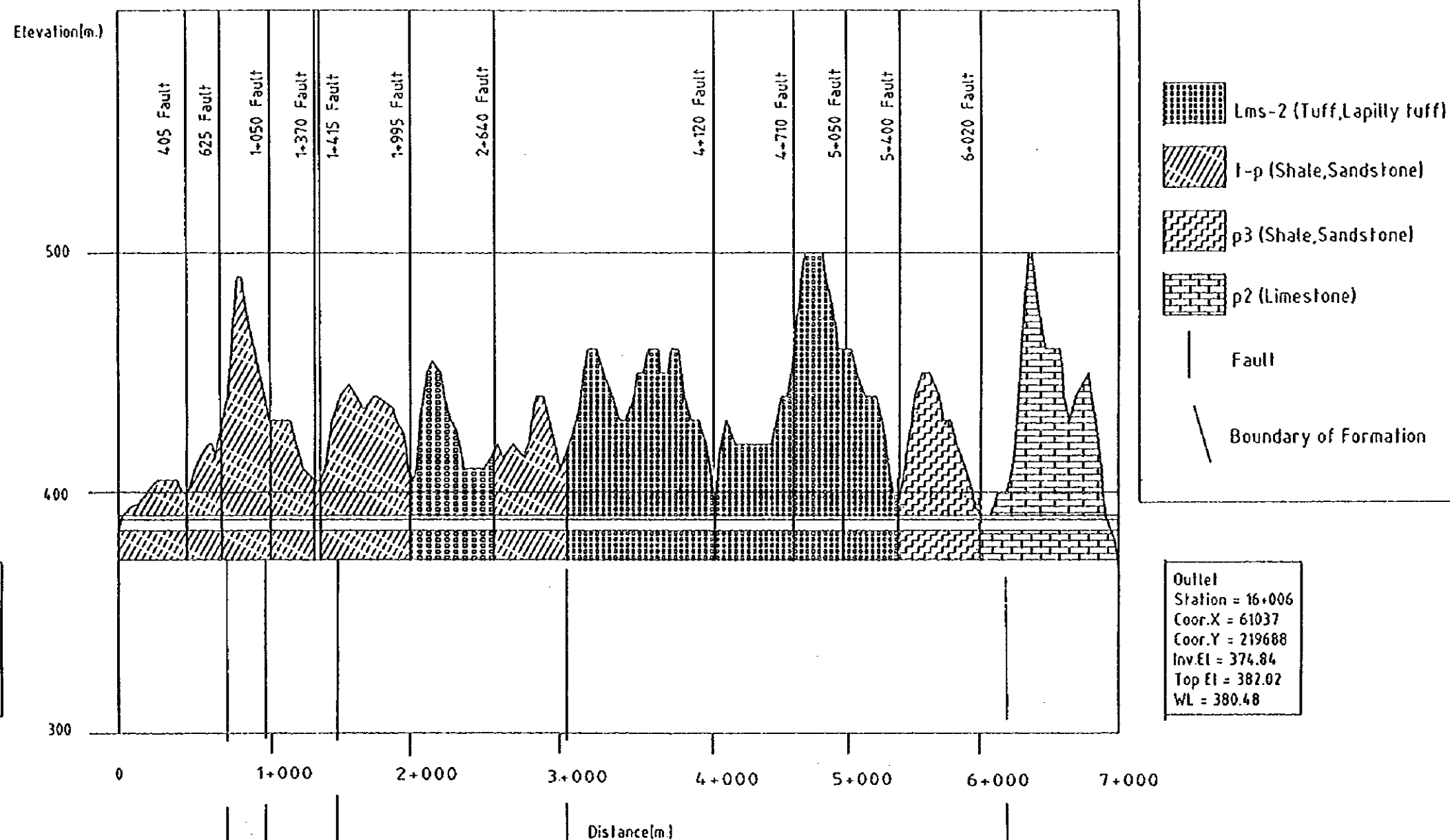


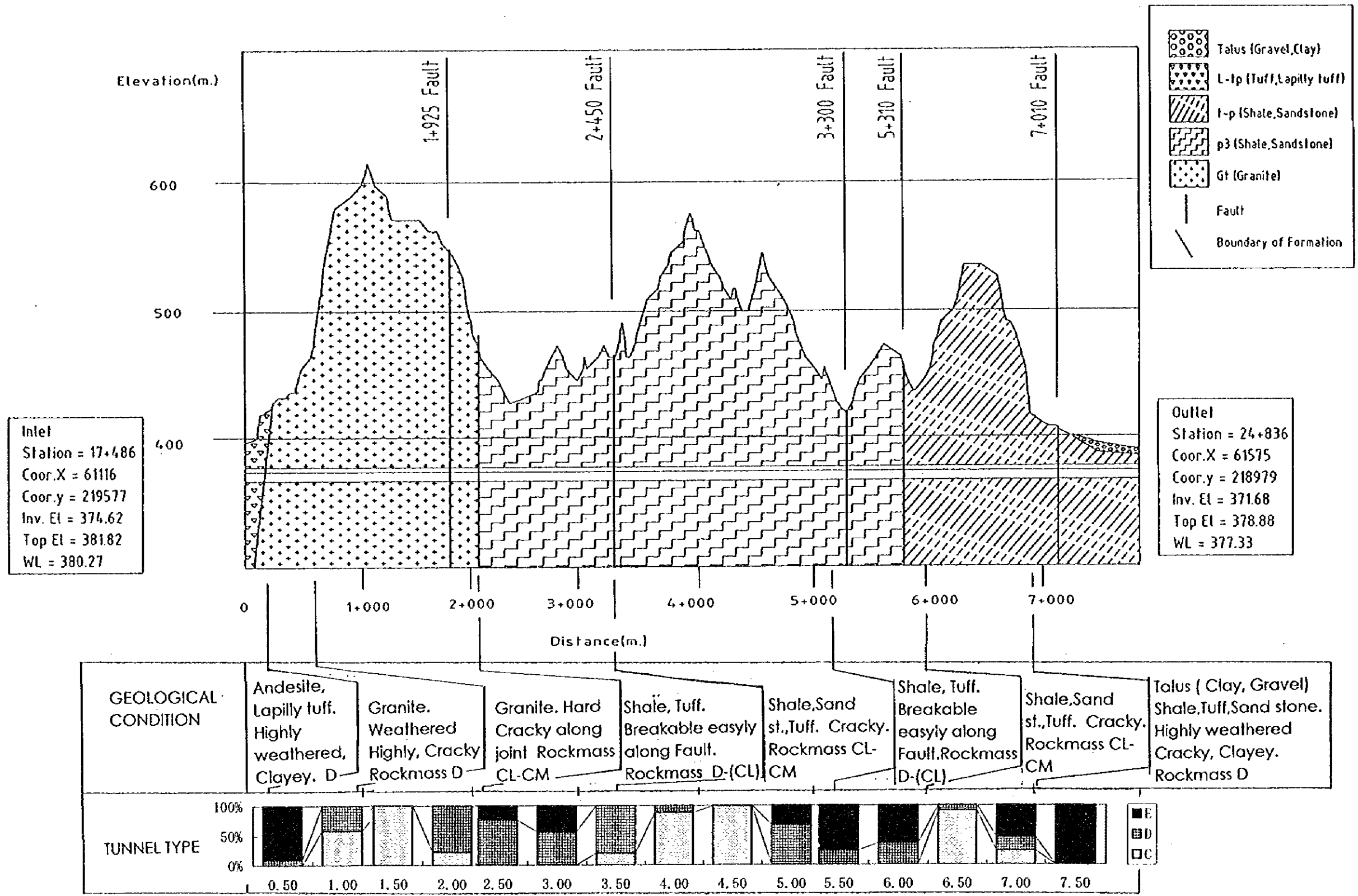
THE STUDY ON THE KOK-ING-NAN WATER DIVERSION PROJECT	
GEOLOGICAL MAP OF ING-YOT TUNNEL ALIGNMENT (Chart 3)	Map & Draw-Ing No.
JAPAN INTERNATIONAL COOPERATION AGENCY (JICA) SANYU CONSULTANTS INC. & NIPPON KOGI CO., LTD.	Figure G-5



Inlet
 Station = 9+046
 Coord. X = 60928
 Coord. Y = 219024
 Inv. El = 377.62
 Top El = 384.82
 WL = 383.26

Outlet
 Station = 16+006
 Coord. X = 61037
 Coord. Y = 219688
 Inv. El = 374.84
 Top El = 382.02
 WL = 380.48

GEOLOGICAL CONDITION	Shale, Tuff Weathered highly. Clayey D Shale, Tuff. Cracky. Breakable. D-CL Fault zone. Weathered highly. Clayey. Water Discharge. D Shale, Tuff. Weathered highly. Cracky. Clayey. D Rhyolitic Tuff. Weathered highly. Breakable along small fault, bedding. Cracky, Clayey. Take care Groundwater discharge from fault Rockmass D-partly CL Limestone. Breakable along joint. Take care Groundwater discharge Cave. D-CL (CREPI=JAPAN)						
TUNNEL TYPE							



THE STUDY ON THE KOK-ING-NAN WATER DIVERSION PROJECT
GEOLOGICAL PROFILE OF KOK-ING A No.2 TUNNEL ALIGNMENT (AT-2)
 JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
 SANYU CONSULTANTS INC. & NIPPON KOBEL CO., LTD.

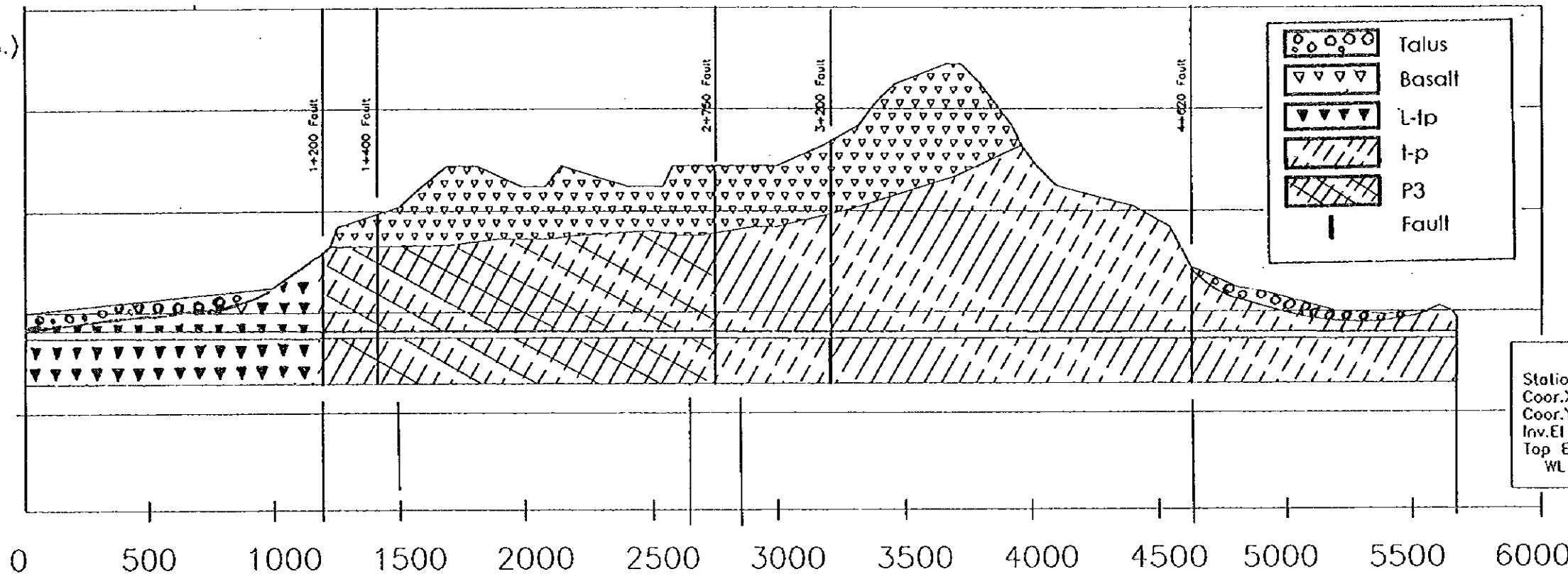
Map & Drawing No.
 Figure G-7

Elevation(m.)

600

500

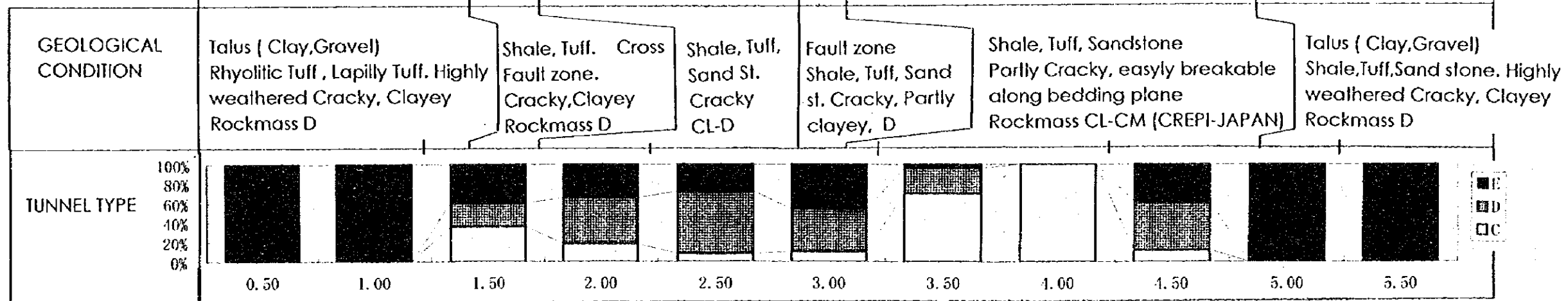
400

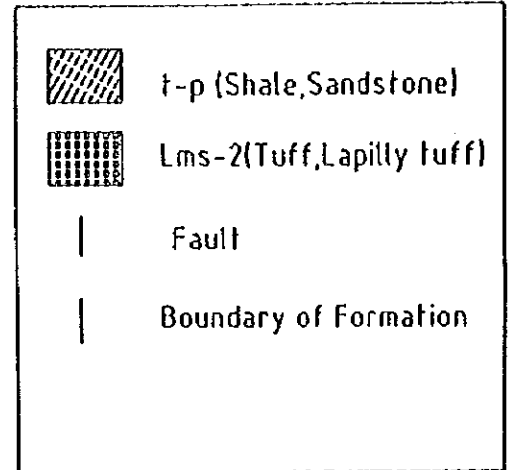


Intet
 Station = 29+350
 Coord.X = 60926
 Coord.Y = 219027
 Inv.El = +374.660
 Top EL = +381.858
 WL = +380.304

Outlet
 Station = 34+856
 Coord.X = 61442
 Coord.Y = 218835
 Inv.El = +372.460
 Top EL = +319.640
 WL = +378.090

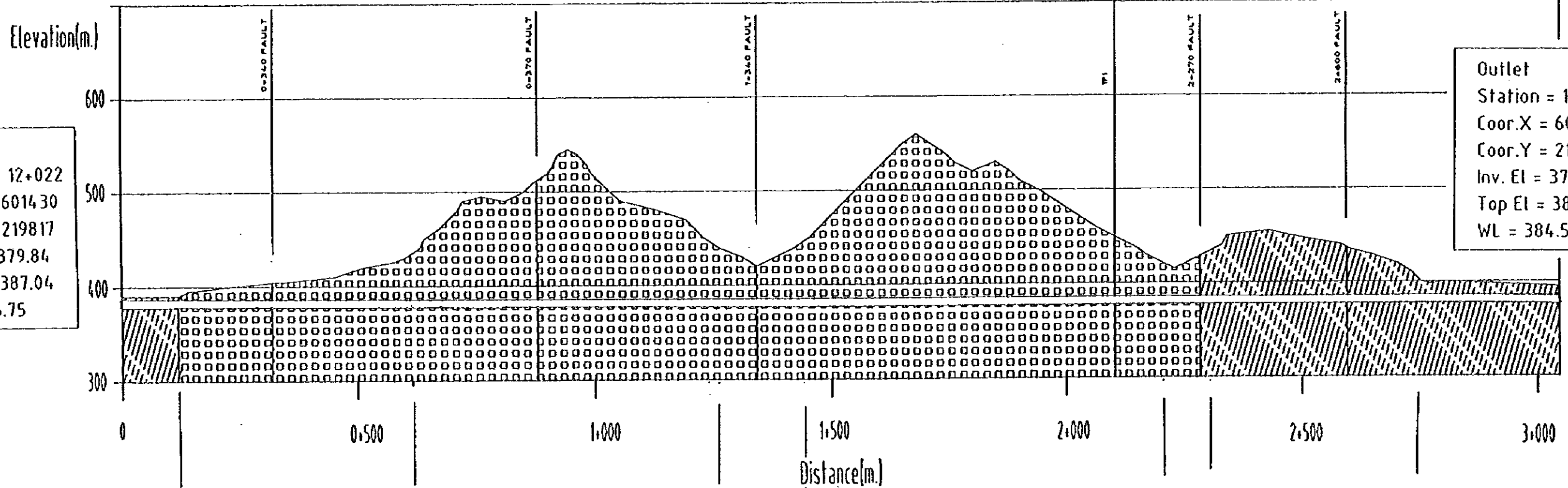
Distance(m.)



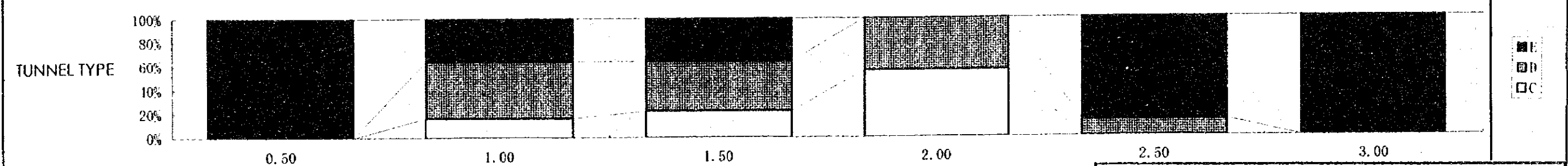


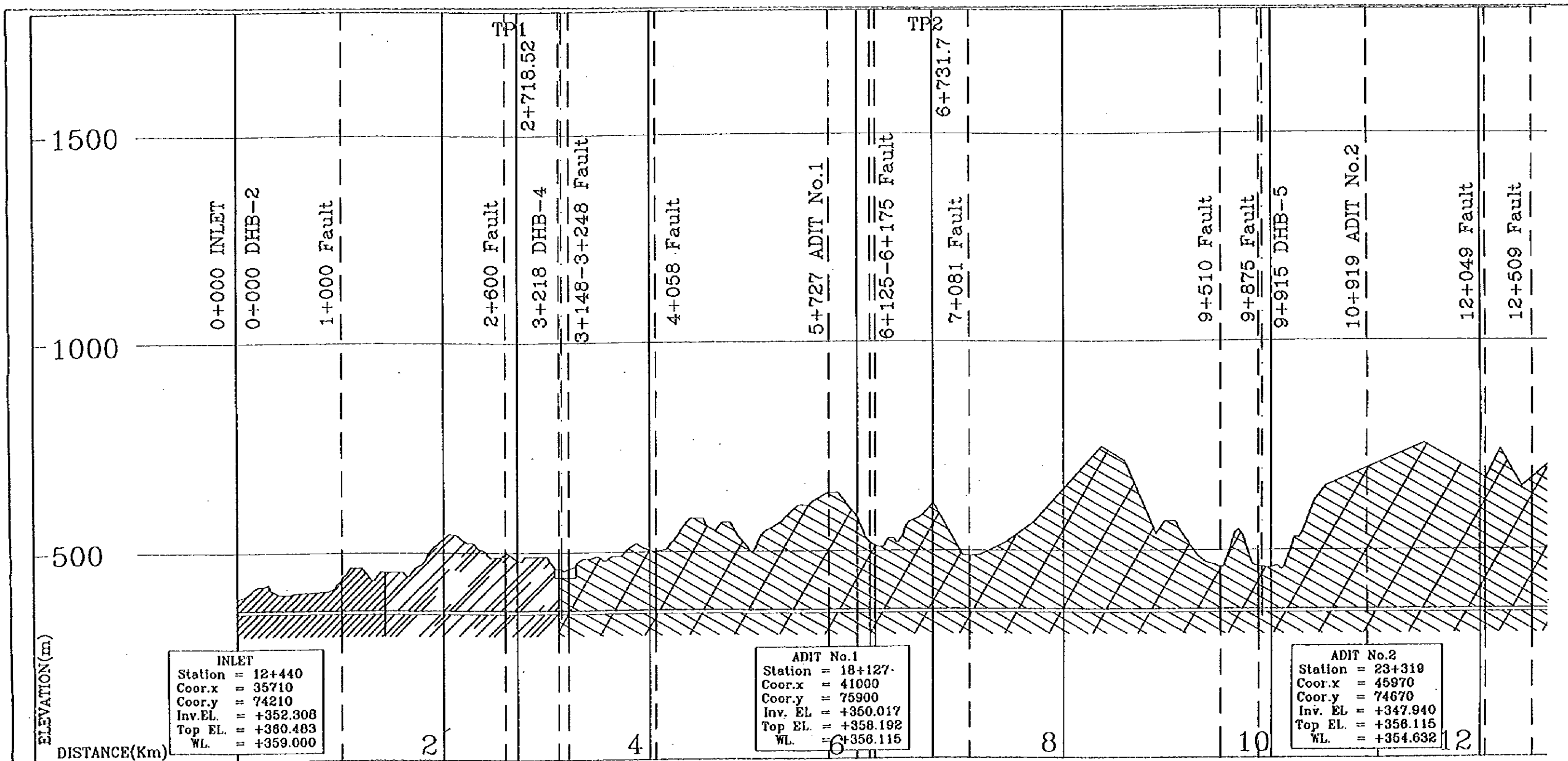
Inlet
 Station = 12+022
 Coord.X = 6014.30
 Coord.Y = 219817
 Inv. El = 379.84
 Top El = 387.04
 WL = 385.75

Outlet
 Station = 15+136
 Coord.X = 604170
 Coord.Y = 219671
 Inv. El = 378.59
 Top El = 385.79
 WL = 384.51



GEOLOGICAL CONDITION	0.00 - 0.340	0.340 - 0.370	0.370 - 1.340	1.340 - 2.270	2.270 - 2.800	2.800 - 3.000
	Talus (Clay & Gravel)	Tuff (Rhyolitic). Highly weathered. Cracky, Clayey Rockmass (CRIEPI.JAPAN) D	Tuff (Rhyolitic). Cracky, Brittle. Partly clayey Rockmass D-CL	Fault zone Highly weathered, Cracky, clayey Rockmass D	Tuff (Rhyolitic). Cracky, Brittle. Partly clayey Rockmass D-CL	Fault zone Highly weathered, Cracky, clayey Rockmass D
					Shale, Tuff Alternation weathered highly cracky Rockmass D-CL	Highly weathered Shale, Tuff clayey Rockmass D





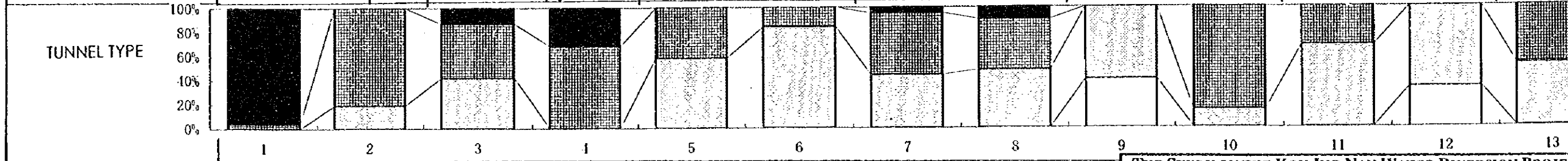
GEOLOGICAL CONDITION

browmish gray Shale, Sandstone, Tuff Easily break along bedding plane, CL-CM, Fault zone D

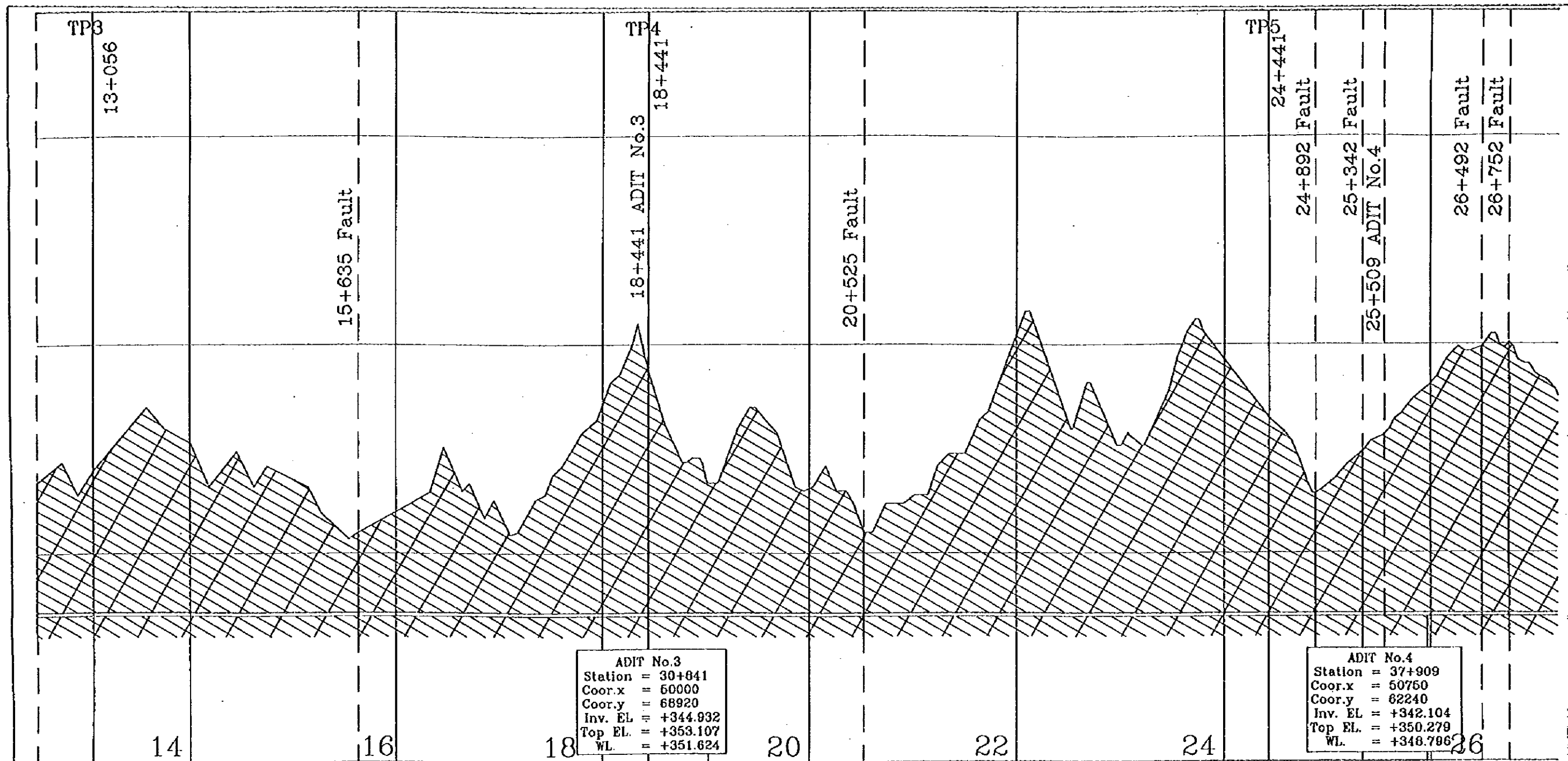
Shale, Sandstone

Fault zone Deeply weathered, cracky CL-D, Phyllite become talc, Limestone interbed

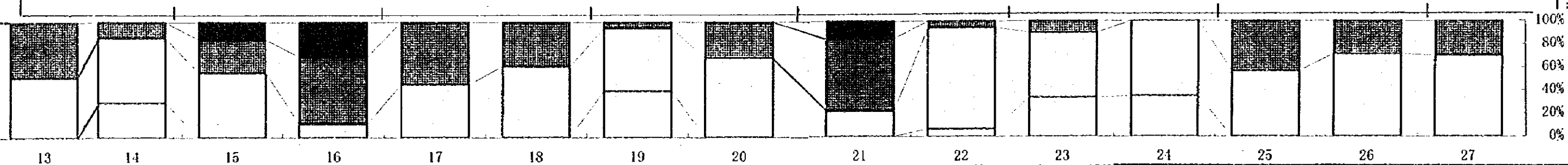
Phyllite, Sandstone, fin alternation. Sandstone hard, Partly breakable along bedding plane, Phyllite bearing Graphyle, Small scale fault is made along bedding plane.
 Rock mass classification CM-CH (Classified by CRIEPI, JAPAN)
 Remarkable Fault zone supposed 6125m Rock mass CL-D

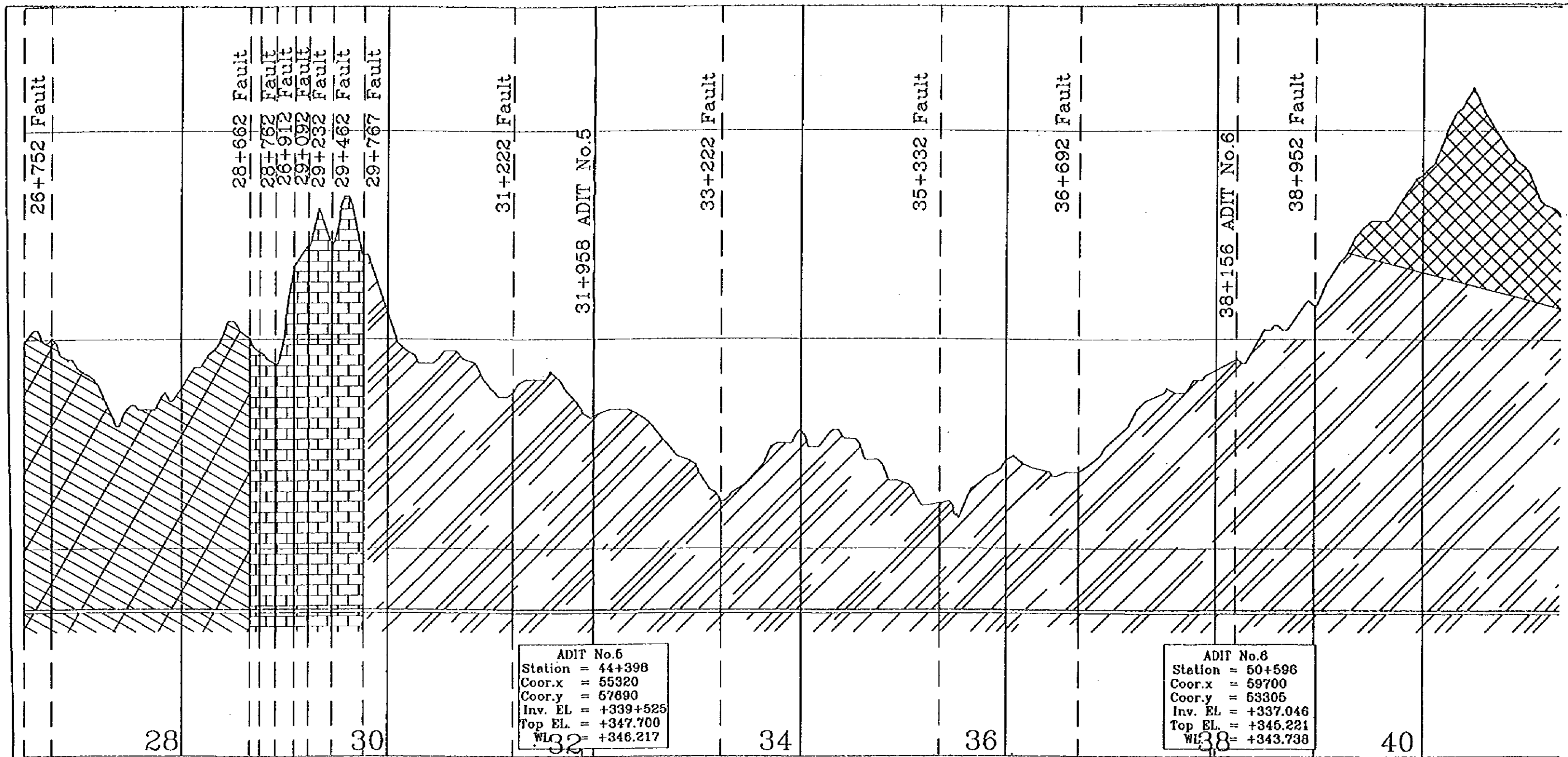


■ E
 ▨ D
 □ C
 □ B



Phyllite, Sandstone fin alternation. Sandstone hard, partly breakable along bedding plane.
 Phyllite bearing Graphite. Intraformation folding is formed. Small scale fault formed along bedding
 Rockmass classification CM-CH.
 Remarkable fault zone is supposed 16635 m, 18441 m, 20525 m

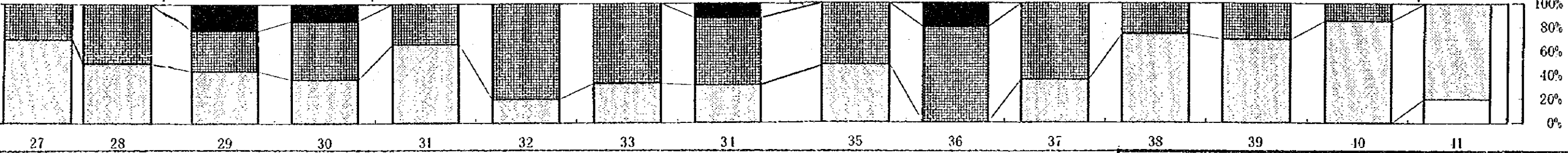




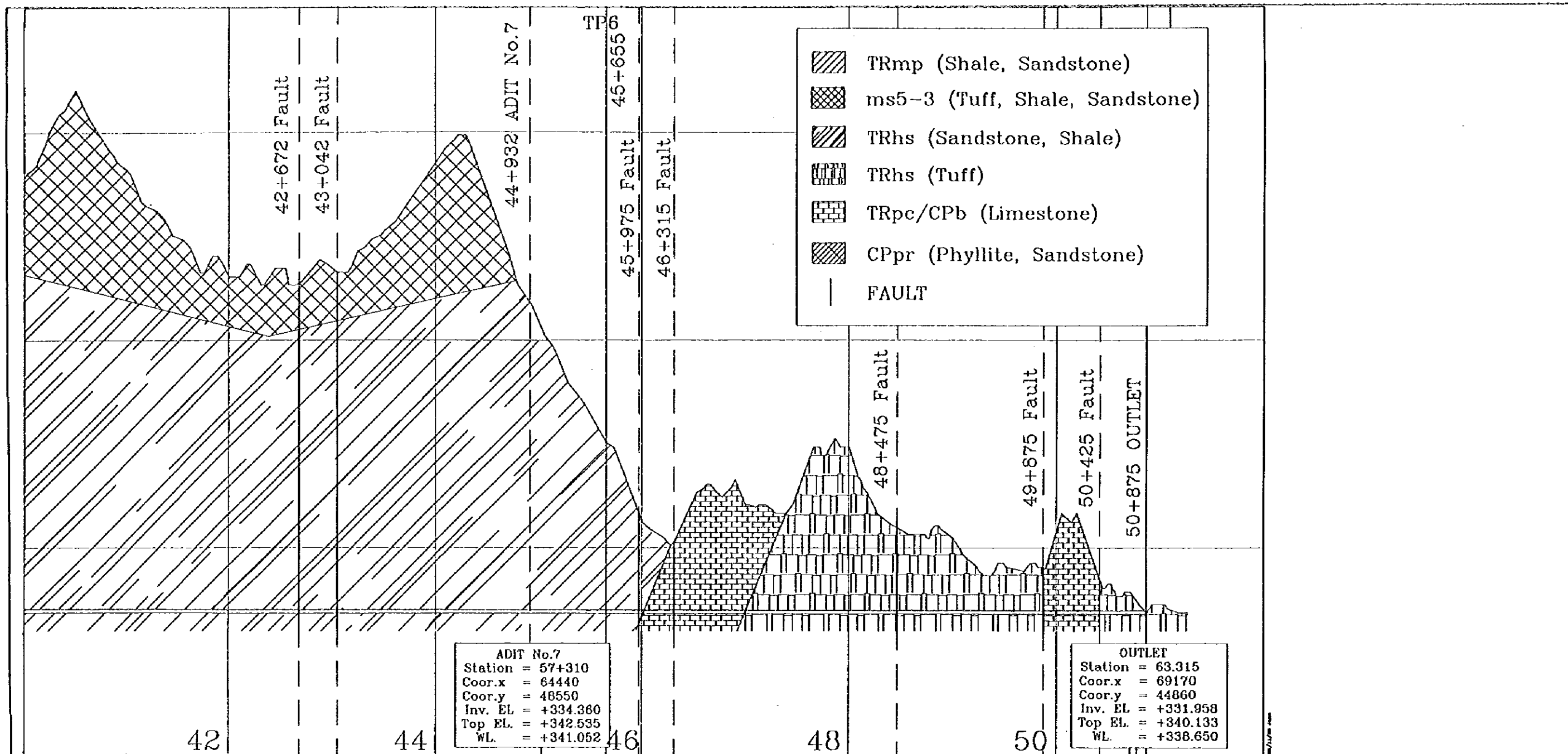
ADIT No.5
 Station = 44+398
 Coord. x = 55320
 Coord. y = 57890
 Inv. EL = +339+525
 Top EL = +347.700
 WL = +346.217

ADIT No.6
 Station = 50+596
 Coord. x = 59700
 Coord. y = 53305
 Inv. EL = +337.046
 Top EL = +345.221
 WL = +343.738

Phyllite, sandstone, conglomerate Rockmass CM-CH	Limestone, Calcareous Shale, hard compact without fault zone Cave is formed water discharge will be occurred. Rock mass CM-CH. 7 fault is supposed	Sandstone, Shale fin alternation. Hard and compact. Joint interval is wide. Rockmass is CM-CH Fault zone is supposed along the river Yuan but has not been confirmed.
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- E
- ▒ D
- C
- B



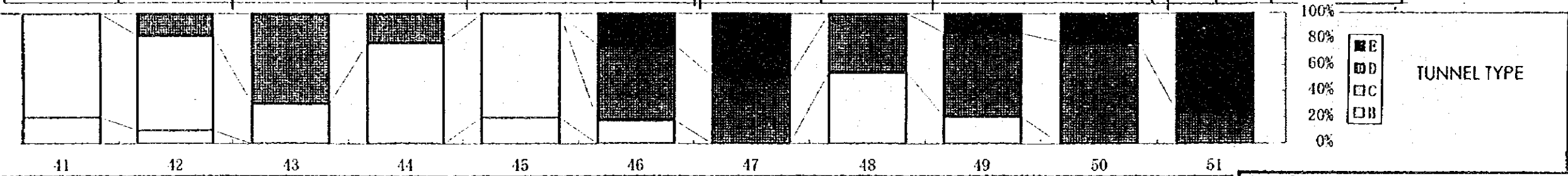
Sandstone, Shale fin alternation
Mountain top overlain by ms5-3
formation, so it is difficult to confirm
geological condition of tunnel level.

Limestone, hard
qu=194 MPa
Cave will be formed
and groundwater
discharge is supposed

Sandy Tuff,
Blocky joint is formed
Rock is hard CM

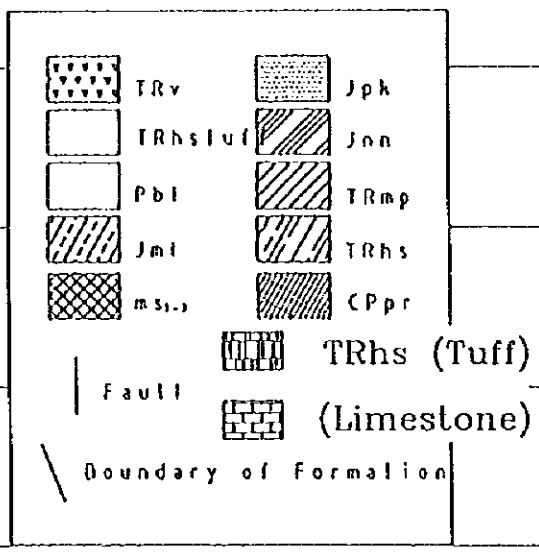
Limestone, hard
Cave will be formed
and groundwater
discharge is supposed

Tuffaceous Sandstone,
Shale alternation
Highly weathered
clayey. Rockmass D



Elevation(m.)

1600
1400
1200
1000
800
600
400
200
0



0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000 11000 12000 13000 14000 15000 16000 17000 18000 19000 20000 21000 22000 23000 24000 25000 26000 27000 28000 29000 30000 31000 32000 33000 34000 35000 36000 37000 38000 39000 40000 41000 42000 43000 44000 45000 46000 47000 48000 49000 50000 51000

