THE REPUBLIC OF TURKEY

FEASIBILITY REPORT
ON
BESKONAK HYDROELECTRIC POWER DEVELOPMENT PROJECT

Volume 2
(Appendix)

November 1983

JAPAN INTERNATIONAL COOPERATION AGENCY

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APPENDIX

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DATA PROVIDED BY DSI

List of Data Provided by DSI

The obtained foundamental data to study this project are as follows

1. Meteorological Data

(1) Location Map of Meteorological Stations in ANTALYA Province

(2) Precipitation Data

a) Daily Precipitation at Gauging Stations

ANTALYA	'29 ∿ '80	SÜTCÜLER	'51 ∿ '80
SERIK	'57 ∿ '80	YENICE	'62 ∿ '80
DÖSEMEALTI	'62 ∿ '80	KARACAÖREN	'62 ∿ '80
KOVADA	'63 ∿ '80	ANAMAS	'64 ∿ '80
BEŞKONAK	'64 ∿ '80	KASIMLAR	'70 ∿ '80
DEREBUCAK	'76 ∿ '80		

b) Hourly Precipitation

ANTALYA '40 ∿ '80

(3) Temperature Data

a) Daily or Monthly Maximum Temperature at Gauging Stations

ANTALYA (Monthly)	'29 ∿ '80
SÜTCÜLER (Daily)	'64 ∿ '80
SERIK (Daily)	'72 ∿ '80

b) Daily or Monthly Minimum Temperature at Gauging Stations

ANTALYA (Monthly)	'29 ∿ '80
SÜTCÜLER (Daily)	'64 ∿ '80
SERIK (Daily)	'72 ∿ '80

c) Daily Average Temperature at Gauging Stations

ANTALYA	'30 ∿ '80	SÜTCÜLER	'64 ∿ '80
SERIK	'72 ∿ '80		

(4) Humidity Data

a) Daily Maximum Humidity at Gauging Stations

ANTALYA	'30 ∿ '80	SERIK	'72 ∿ '80
SÜTCÜLER	'64 ∿ '80		

b) Daily Minimum Humidity at Gauging Stations

SERIK	'72 ∿ '80	SÜTCÜLER	'64 ∿ '80

c) Daily Average Humidity at Gauging Stations

ANTALYA	'30 ∿ '80	SERIK	'72 ∿ '80
DÖSEMEALTI	'76 ∿ '80	SÜTCÜLER	'64 ∿ '80
KARACAÖREN	'62 ∿ '80	KOVADA	'71 ∿ '80

(5) Daily Evaporation Data

ANTALYA	'62 ∿ '80	KOVADA	'71 ∿ '80
DÖSEMEALTI	'76 ∿ '80	KARACAÖREN	'62 ∿ '80
YENICE	'71 ∿ '80		

(6) Vapor Pressure Data

ANTALYA	'29 ∿ '80	(Daily Average)
"	'30 ∿ '80	(Daily Maximum)

(7) Snowfall Data

BEYŞEHIR SAGLIK OCAGI	'77 ∿ '82
DUMANLI	'77 ∿ '82
CARIKSARAYLAR	'77 ∿ '82

(8) Wind Data

ANTALA '30 ∿ '80 (Daily Maximum Wind Speed & Wind Direction)

2. Hydrological Data

(1) Run-off Data

a) Daily Flow at Gauging Station

BEŞKONAK '40 ∿ '80 ('74 ∿ '76 None)

b) Monthly Flow at Gauging Stations

BEŞKONAK	'40 ∿ '80	KISIK	'41 ∿ '64
BULASAN	'63 ∿ '70	ZINDAN BOGAZI	'61 ∿ '80

c) Monthly Max. & Min. Flow at Gauging Station

BEŞKONAK '40 ∿ '80 (Apr. ∿ Nov.)

(2) Observed Flood Hydrographs at BEŞKONAK Gauging Station ('74 ∿ '80)

(3) Suspended Sediment Concentration and River Flow at BEŞKONAK Gauging Station ('69 ∿ '80)

(4) Location Map of Run-off Gauging Stations in ANTALYA Province

3. Geology and Construction Materials

(1) Maps and Others

a) Geological Map of KÖPRÜÇAY Basin 1/25,000

b) Geological Map of BEŞKONAK Dam Site and Surroundings 1/5,000

c) Geological Map of BEŞKONAK Dam Site 1/1,000

d) Geological Section of BEŞKONAK Dam Site 1/10,000, 1/4,000

e) Logs of Drilling Holes

f) Diagram showing Relationship between Carstification and Water Losses in the Drilling Holes

g) Geological Map of the Grout Curtain Alignment on the Right Bank and its Vicinity

h) Geological Section of the Grout Curtain on the Left Bank

i) Geological Profile of Right Side Tunnels - RT3, RT4 & RT6

j) Geological Profile of Left Side Tunnels - LT1, LT2 & LA5

k) Geological Map 1/100,000

l) Record of River Water Level and Underground Water Level

m) Record of Grout Test in the Drilling Holes

(2) Reports

a) "Geological Engineering Investigation of Dam Site and Grout Curtain", K. Sümerman, 1973

b) Eroskay, S.O., (1968), KÖPRÜÇAY-BEŞKONAK Reservuari Jeolojik Incelemesi, EIE Idaresi, Rap. No. II-06-5,-6 (contents, Summary and Recommendation)

c) Sümerman, K., (1973), KÖPRÜÇAY-BEŞKONAK Bent Yeri ve Enjeksiyon Perde Güzergahlari, Mühendislik Jeolojisi Incelemesi

d) Technical Report of UNDP/DSI Project on "Regime of Olukköprü and Kocadere Springs of Köprüçay Basin Based on Hydrograph Analysis", by J. Karanjac and A. Altug, 1976

e) Final Technical Report of UNDP/DSI Project on "Karst Waters of Southern Turkey" by V. Yevjevich, 1981

f) "Jeoloji Çalişma Raporu" by T. Tarimci, 1982

g) "Dalaman, Akköprü, Cökyar, Narli, Sandarcik ve Beşkonak Baraj Yerleri Deprem Risk Analiz Raporu", 1982

h) "Explanatory Notes on the Hydrogeology of Olukköprü Springs, Proceedings of First International Symposium on Karst Hydrogeology," by M. Atalay and H. Sipahi, 1979

i) Test Report of Construction Materials

j) Earthquake Data in Southern Turkey

4. Topographical Data

(1)	Topographical Map of KÖPRÜÇAY Basin	1/100,000
(2)	Topographical Map of KÖPRÜÇAY Basin	1/25,000
(3)	Topographical Map	1/25,000, 1/5,000
(4)	Topographical Map of BEŞKONAK Dam Site	1/1,000
(5)	Topographical Map of BEŞKONAK Reservoir	1/5,000
(6)	Topographical Map Covering Catchment Area of BEŞKONAK Dam	1/100,000, 1/25,000
(7)	Topographical Map of Secondary Dam Site	1/1,000
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(9)	List and Data of Bench-Mark near the Project	

5. Development Planning Data

(1) Data about KÖPRÜÇAY Diversion Dam of DSI

(2) Longitudinal Section of KÖPRÜÇAY River

(3) Report on the Existing Irrigation Projects and Future Irrigation Projects on KÖPRÜÇAY River

(4) Summary of Lower KÖPRÜÇAY Irrigation Project

6. Power Demand/Supply and Electrical Data

(1) List of Hydroelectrical Power Plants in Operation, under Construction, in Program and in Study and its Commissioning Date

(2) Installed Capacity and the Commissioning Dates of Power Plants

(3) Regional Distribution of Provinces

(4) Forecast of Population, GDP, Total Investment, Industrial Output and Industrial Investment

(5) Electric Power Supply

(6) Thermal Power Plants under Construction

(7) Generation Cost of Power Plants

(8) Fuel Characteristics and Fuel Cost of Thermal Power Plant

(9) Turkish Electricity Authority, Electricity Supply Tariff

(10) Official Gazette Date: August 13, 1981 No. 17427

(11) (1) Population Growth-Rate and Population in Last 5 Years and in Future in Turkey

(2) Economic Growth-Rate and Per Capita GNP

(12) The Most Highest Unit Prices that may be Offered (Appendix to List 1981)

(13) TÜRKIYE ELECTRIK ENERJISI ISTATISKLERI 1981 : 6

(14) TEK - Annual Report '79

(15) TEK - Annual Report '80

(16) Electric Power Situation

(17) Demand Forecast, Demand and Supply Balance (TEK)

(18) Construction Schedule of Power Stations in Turkey

7. Power System & Transmission Data

(1) List of Hydraulic Power Plants in Operating and Planning - DSI -

(2) Power Plant List in Operating and Planning - TEK -

(3) Installed Capacity of Power Station in Turkey (1960-1981) - TEK -

(4) Ratings of Power Stations and Substations in Operating and Planning - TEK -

(5) Load Forecast for the Substations (1981-2000) - TEK -

(6) Peak Load of Interconnected System (1975-1981) - TEK -

(7) Power Flow Diagram (Peak Time in 1990) - TEK -

(8) Ratings of Transmission Lines in Operating and Planning - TEK -

(9) Impedance List of the Network, 380 kV and 154 kV - TEK -

(10) 380 kV Transmission System in Operating and Planning - TEK -

(11) Transmission Lines According to Years Based on their Voltages (1970-1981) - TEK -

(12) Transmission Lines According to the Companies - TEK -

(13) Power Load Capacity of Conductors - TEK -

(14) Short-circuit Capacity According to Year (1983-1996) - TEK -

(15) Construction Cost of Transmission Lines, 380 kV and 154 kV - TEK -

(16) Kepez Annual Energy Report (1980) - KEPEZ -

8. Cost Estimation Data

(1) DSI Construction Cost General Index

(2) DSI Unit Price Table for Civil Works and Hydraulic Works

(3) Construction Cost of Relocation Road

(4) Report on Compensation Cost Estimation of BEŞKONAK & KISIK Reservoir

(5) Notes on Calculation of Transportation Cost

(6) Construction Cost of Transmission Lines, 154 kV and 380 kV

9. Economic Evaluation

(1) Value for the Scale of the Alternative Oil-fired Thermal Power Plant

(2) Values for the Scale of the Alternative Gas Turbine

(3) Fuel Cost in Mar. of 1982

(4) The Tariff of Electric Selling Prices in Dec. of 1981 (TEK)

(5) Turkish Electricity Association Sold Energy and Income in 1982 (TEK)

10. General Information Data

(1) Statistical Yearbook of Turkey, 1981

(2) Report on the Regional Activities of Project Area

(geographical features, natural conditions, social and economic activities)

(3) Water and Land Resources Potential and Investments by DSI 13th

11. Others

(1) "OYMAPINAR Dam and Reservoir Feasibility Study," ENERGO CO., 1967

(2) "OYMAPINAR Dam and Hydroelectric Project, Second Phase Final Report," Coyne & Bellier, 1969

(3) Feasibility Report of Yamula and Bayrambacili Project

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METEOROLOGICAL AND HYDROLOGICAL DATA

2-1 Run-off Data

2-2 Precipitation Data

2-3 Temperature Data

2-4 Evaporation Data

2-5 Suspended Sediment and Run-off Data

2-6 Historical Floods Record at Beskonak G.S.

2-1-1 Monthly Flow at Beskonak Gauging Station

Unit: $10^6 m^3$

Year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Total
1951	139.03	171.09	626.36	605.65	393.71	395.27	309.77	248.74	179.83	149.32	126.65	115.23	3,458.77
1952	151.23	158.43	191.59	519.66	486.20	488.84	365.50	297.60	194.32	145.93	124.16	112.72	3,256.66
1953	132.53	240.83	256.52	492.30	252.72	232.83	349.65	289.58	186.95	139.52	116.93	104.52	2,824.73
1954	124.00	127.42	236.64	384.95	544.07	526.27	402.00	326.35	326.60	170.93	137.66	112.23	3,421.93
1955	120.93	209.23	311.51	459.30	334.01	292.16	350.31	342.27	211.42	156.33	129.19	112.01	3,028.67
1956	151.00	130.22	566.75	328.81	395.94	376.66	412.68	358.51	279.65	202.43	162.74	117.59	3,512.78
1957	127.03	101.97	458.83	396.85	504.30	291.54	230.15	212.11	155.33	112.40	83.14	74.24	2,747.98
1958	73.00	175.23	434.32	591.59	476.27	247.47	267.07	257.63	181.96	156.40	91.75	75.00	2,949.69
1959	70.60	64.00	103.72	141.00	155.49	428.71	332.20	295.65	169.84	115.65	83.41	70.78	2,028.85
1960	66.83	79.32	135.30	193.69	111.84	167.54	254.94	261.52	118.88	96.98	78.37	62.70	1,645.72
1961	62.33	59.47	92.84	378.63	182.87	385.01	365.49	345.95	269.88	213.17	178.23	162.24	2,690.11
1962	190.38	116.18	147.80	281.97	392.68	320.35	285.16	260.97	155.95	132.62	108.91	84.97	2,506.33
1963	85.62	310.55	1,137.61	831.85	452.57	490.93	350.00	332.39	249.07	176.69	127.32	156.53	4,826.56
1964	103.34	92.27	92.31	222.93	310.93	334.95	288.73	280.50	202.65	115.60	91.32	78.10	2,213.67
1965	88.93	161.04	381.97	520.52	328.52	265.16	248.31	159.92	137.57	105.81	88.48	80.76	2,556.99
1966	85.03	120.48	139.32	199.06	397.33	371.68	275.82	232.60	153.20	108.04	84.28	77.15	2,243.99
1967	71.37	332.19	832.24	359.31	159.66	303.32	179.06	197.04	139.91	93.99	75.44	69.92	3,683.52
1968	73.34	85.53	192.31	816.55	236.04	446.93	354.72	257.01	189.64	135.66	93.09	69.92	3,018.54
1969	74.68	69.92	327.21	662.26	265.34	177.86	190.97	173.15	135.70	102.57	78.83	82.63	2,321.07
1970	85.26	93.82	134.01	463.67	199.63	303.78	277.62	212.91	138.58	103.61	83.82	62.61	2,250.77
1971	85.40	80.60	258.00	267.00	483.00	267.00	342.00	156.00	117.00	95.60	83.70	83.26	2,222.30
1972	83.20	77.80	126.00	185.00	495.00	384.00	277.00	217.00	149.00	117.00	93.00	77.00	2,302.70
1973	102.00	93.00	474.00	506.00	458.00	318.00	282.00	297.00	218.00	145.00	114.00	92.73	3,132.33
1974	93.60	90.50	211.00	118.00	219.00	272.00	170.00	146.00	134.00	103.00	86.43	95.30	1,733.10
1975	79.60	83.30	178.00	297.00	533.00	436.00	447.00	406.00	217.00	133.00	109.00	78.83	3,024.60
1976	88.40	95.40	526.00	1,019.00	492.00	386.00	495.00	292.00	192.00	149.00	124.00	97.70	3,759.80
1977	99.50	93.00	371.00	343.00	230.00	272.00	423.00	300.00	180.00	140.00	119.00	105.00	2,681.50
1978	212.00	218.00	341.00	566.00	324.00	535.00	303.00	249.00	154.00	129.00	114.00	106.00	3,393.00
1979	811.00	163.00	383.00	568.00	305.00	372.00	373.00	352.00	206.00	151.00	126.00	121.00	3,223.00
1970	107.00	99.93	475.00	564.00	533.00	457.00	296.00	252.00	183.00	145.00	119.00	110.00	3,338.93
1971	116.82	136.95	191.65	135.00	305.10	332.29	276.26	238.25	165.78	117.84	100.47	107.00	2,267.84
1972	82.85	127.89	301.70	152.65	215.52	223.25	194.87	156.05	146.26	121.21	101.56	90.37	1,950.95
1973	128.03	111.16	97.04	120.43	238.74	338.78	235.25	202.47	142.32	108.58	93.06	92.18	1,949.05
1974	90.01	82.75	163.53	100.71	257.55	329.06	156.89	177.93	123.68	93.38	83.18	88.70	1,733.45
1975	93.45	102.95	359.43	435.83	322.65	331.74	369.73	376.63	222.27	149.51	113.83	93.95	2,556.01
1976	111.35	269.72	251.85	304.15	231.21	192.21	353.72	247.35	163.20	121.61	102.42	93.21	2,437.01
1977	145.06	129.87	495.23	225.13	259.18	241.31	308.76	236.69	149.24	108.43	95.65	91.06	2,418.47
1978	94.85	91.39	337.51	562.87	684.55	379.21	352.69	308.27	190.61	136.48	112.04	107.36	3,358.03
1979	135.63	125.83	353.39	683.12	414.70	245.47	225.04	245.38	223.10	149.02	108.45	95.65	3,055.71
1980	120.73	204.10	330.62	445.84	244.36	295.65	333.68	255.97	157.17	117.38	98.95	89.22	2,655.09
Ave.	104.32	129.91	306.54	406.41	345.65	332.92	326.85	264.28	181.33	131.21	106.25	91.30	2,729.93

2-1-2 Monthly Flow at Kisik Gauging Station

Unit: $10^6 m^3$

Year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Total
1941	150.42	189.73	244.65	219.26	651.05	441.82	359.87	285.12	199.56	162.90	135.83	121.49	3,589.10
1942	165.31	176.23	216.86	614.53	573.91	576.85	451.55	343.80	218.06	158.80	132.31	118.48	3,742.69
1943	142.52	274.91	342.41	568.97	289.09	265.73	407.62	334.00	209.15	151.01	123.53	108.68	3,216.42
1944	132.13	136.62	269.74	650.32	643.56	622.54	431.67	376.48	380.19	189.39	145.41	124.08	3,944.93
1945	128.32	236.28	360.67	549.88	388.28	337.10	408.69	395.25	238.98	178.50	138.42	117.69	3,458.89
1946	164.99	139.81	671.93	391.78	459.74	439.93	481.78	454.63	322.24	227.66	179.23	124.39	4,055.16
1947	135.71	105.39	572.06	464.73	595.90	356.39	261.90	239.56	158.32	117.93	82.25	71.57	3,146.62
1948	69.56	194.76	522.55	592.54	554.92	282.73	337.05	295.03	203.06	169.19	92.63	72.45	3,357.10
1949	65.95	59.05	107.32	152.63	179.55	503.59	386.49	345.09	182.14	121.73	82.55	67.34	2,245.61
1950	62.46	77.66	145.92	213.28	117.26	185.18	292.12	239.71	162.73	95.74	67.76	57.44	1,778.26
1951	56.85	53.55	94.09	442.53	203.94	450.32	622.14	402.75	302.82	240.87	199.17	178.93	3,951.92
1952	213.07	122.78	161.11	324.73	458.50	321.57	327.86	299.12	207.95	141.93	113.72	81.65	2,826.97
1953	85.25	360.68	1,367.93	1,069.36	532.93	459.71	498.21	392.28	285.02	196.38	136.12	111.48	5,613.81
1954	106.95	93.68	97.95	252.75	360.17	289.32	333.45	322.91	228.28	121.84	93.65	76.25	2,371.42
1955	89.35	177.53	455.62	603.34	381.58	306.21	284.03	212.45	149.81	109.92	88.76	79.47	2,926.08
1956	146.51	256.93	263.39	420.75	939.18	670.40	594.97	497.91	338.26	240.47	178.01	139.81	4,675.58
1957	87.66	105.57	142.71	176.93	175.63	350.79	199.56	221.16	151.73	95.54	72.85	68.45	1,826.54
1958	70.36	79.59	215.37	924.11	341.95	525.88	414.02	296.33	212.47	146.32	99.74	81.75	3,615.92
1959	78.97	65.47	379.68	768.49	304.49	197.77	218.07	191.93	165.73	156.40	76.95	57.34	2,660.49
1960	95.65	93.36	319.83	593.75	266.62	346.50	306.74	231.47	145.53	110.54	89.46	82.37	2,626.51
1961	79.25	79.47	261.33	329.71	613.83	215.36	245.70	184.83	121.69	99.35	80.54	75.06	2,386.15
1962	77.57	78.07	155.72	256.25	568.00	441.43	296.94	226.35	146.69	109.84	89.86	85.05	2,530.67
1963	95.85	85.67	603.85	659.31	657.38	349.19	330.44	329.70	218.45	136.63	101.24	83.67	3,628.39
1964	103.75	118.48	259.65	1,163.17	267.12	313.72	214.36	330.00	-	-	-	-	-
Ave.	531.21	429.35	358.65	349.91	313.75	214.85	150.53	112.81	95.05	107.49	139.81	365.45	3,199.42

2-2-1 Monthly Total Precipitation at Yenice Meteorological Station

Unit: mm

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1963	154.9	149.1	77.7	78.6	165.9	49.3	44.5	0	0.2	45.7	39.1	59.1	861.9
1964	8.3	135.9	104.6	12.3	71.8	78.3	17.8	0	20.0	2.9	94.7	161.7	708.3
1965	125.1	257.6	101.2	122.6	98.1	45.6	3.8	10.8	0	19.7	65.6	333.3	1,185.4
1966	431.9	45.8	114.0	133.7	32.6	31.6	18.7	10.3	43.9	2.7	58.1	257.3	1,217.6
1967	99.8	50.8	69.1	135.5	65.1	2.6	14.4	0	49.5	69.8	95.1	206.9	852.6
1968	167.9	134.1	141.5	10.8	38.1	8.9	0	27.4	71.2	47.7	136.6	162.0	946.0
1969	205.7	123.9	69.4	145.4	69.0	13.5	3.9	0	4.1	24.3	55.6	252.1	553.9
1970	174.1	133.9	87.1	73.9	34.1	23.7	5.7	0	11.0	93.3	53.6	68.5	818.7
1971	43.5	106.1	91.1	65.5	73.4	40.8	15.9	34.1	19.6	22.4	123.9	223.5	852.8
1972	17.8	111.6	39.9	95.3	47.7	66.0	7.8	20.7	10.0	106.4	22.3	13.1	559.6
1973	117.5	137.8	58.1	69.6	64.1	22.5	6.5	2.7	27.8	54.9	27.4	73.3	681.2
1974	41.6	224.1	62.5	42.0	72.8	0.7	0	18.9	32.8	52.6	53.4	144.2	745.6
1975	250.2	65.8	130.5	115.5	331.9	54.9	0.8	41.5	0.7	65.6	76.4	316.6	1,051.4
1976	131.5	48.9	33.8	145.9	83.3	31.7	2.9	0	8.7	95.2	35.7	170.5	794.1
1977	58.9	52.2	67.1	144.7	15.8	32.0	9.2	0	38.9	49.3	23.7	90.5	582.3
1978	270.5	233.1	160.2	67.4	24.6	19.1	0	0	49.2	170.0	35.4	135.1	1,058.2
1979	223.2	64.9	29.5	61.4	119.6	65.0	4.2	4.2	2.3	100.8	149.6	93.4	918.9
1980	159.6	45.0	78.2	81.4	47.7	39.6	0	0	3.2	53.8	71.8	121.0	533.3
Ave.	143.4	120.2	88.5	89.6	69.9	33.7	8.5	9.5	21.7	58.7	67.6	150.7	861.2

2-2-2 Monthly Total Precipitation at Anamas (Aksu) Meteorological Station

Unit: mm

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1954	5.9	127.3	104.9	16.4	83.2	72.7	23.3	0	18.8	2.0	90.3	141.1	686.9
1955	98.7	240.9	101.3	122.0	107.7	52.4	2.7	11.6	0	21.3	70.9	288.3	1,118.6
1956	379.6	69.9	142.6	129.3	38.9	33.5	30.5	10.1	42.1	17.7	56.4	227.2	1,151.6
1957	84.5	49.8	65.7	131.8	56.7	4.1	15.7	0	45.5	69.4	39.7	187.8	779.9
1958	158.6	97.1	127.9	14.0	49.4	39.0	0	29.3	51.0	65.7	128.3	147.1	879.4
1959	180.8	89.2	80.9	130.3	50.3	10.7	3.7	0.6	2.5	41.6	59.8	260.4	910.8
1960	168.9	254.6	91.3	95.2	32.9	15.7	6.0	0	10.3	87.1	53.4	84.6	850.0
1961	49.8	98.8	88.6	74.0	69.9	22.6	21.2	53.3	24.2	11.7	115.7	227.2	849.0
1962	13.3	110.1	33.9	65.3	47.8	83.0	21.2	24.5	6.7	118.7	24.1	13.3	554.9
1963	91.6	120.3	92.0	53.8	61.6	39.3	2.9	1.0	6.0	62.1	30.4	85.1	649.3
1964	37.0	204.7	58.1	35.3	66.4	2.7	0.2	17.7	33.8	47.6	53.0	136.6	693.1
1965	279.3	69.0	121.1	124.5	130.7	32.8	1.3	40.6	1.3	67.4	77.3	158.3	1,003.7
1966	157.5	47.5	35.0	142.0	84.5	37.2	4.6	0.7	11.8	93.8	33.5	163.5	851.6
1967	49.8	67.1	69.3	149.6	6.8	29.9	7.5	0	45.4	59.5	30.1	99.4	806.4
1968	157.6	250.6	152.9	71.5	23.9	12.1	0	0	74.1	169.7	49.6	145.4	1,099.4
1969	255.7	76.9	34.0	61.9	127.3	67.8	6.6	9.7	3.1	126.7	182.5	88.3	1,003.9
1970	176.8	48.4	93.2	99.4	54.9	29.9	0	0	3.6	63.7	76.8	154.5	800.0
Ave.	136.5	118.4	88.4	90.2	63.3	34.3	8.8	11.7	22.2	63.5	69.6	151.3	852.1

2-2-3 Monthly Total Precipitation at Kasimlar Meteorological Station

Unit: mm

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1970	227.3	323.1	106.8	32.7	43.7	65.5	8.0	0	33.0	83.8	79.4	134.3	1,138.6
1971	134.2	229.2	133.1	92.5	62.8	65.9	17.9	88.5	20.0	30.3	172.8	245.9	1,293.1
1972	60.3	146.3	53.8	35.0	52.0	53.1	28.5	32.7	62.1	173.9	28.6	20.7	745.0
1973	137.9	272.7	97.2	53.7	15.9	36.3	3.8	15.2	9.7	84.0	14.2	92.1	872.7
1974	47.2	331.5	99.2	37.5	52.7	20.3	0.7	9.8	17.3	26.4	48.4	264.2	955.2
1975	433.8	109.8	70.0	120.0	117.3	45.5	33.6	49.8	0.4	63.2	116.3	137.3	1,295.0
1976	257.1	81.3	46.0	104.0	88.0	36.3	42.3	0.7	18.8	148.6	75.4	174.8	1,071.3
1977	93.8	57.1	81.6	175.1	15.5	62.2	7.7	0	37.6	28.1	31.3	225.7	865.7
1978	315.0	319.9	234.6	61.9	31.5	26.1	2.6	6.5	78.8	110.3	90.1	220.7	1,523.0
1979	436.7	112.5	52.7	56.1	141.4	43.9	50.2	39.8	17.0	135.5	182.3	167.0	1,473.1
1980	326.9	62.1	110.1	82.6	54.1	79.2	2.1	8.2	1.9	67.6	95.2	287.5	1,178.5
Ave.	228.0	185.6	93.5	77.4	61.4	49.5	17.9	22.6	27.0	92.4	85.0	179.1	1,128.4

2-2-4 Monthly Total Precipitation at Beskonak Meteorological Station

Unit: mm

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1954	-	-	43.5	2.0	45.5	22.0	0	5.0	58.5	0	85.0	255.5	
1955	353.5	558.5	177.0	136.6	134.0	39.2	0	2.8	0	22.8	99.0	527.5	2,180.9
1956	833.3	92.5	149.8	35.0	54.4	0	0	10.0	66.2	3.5	100.4	436.3	1,784.8
1957	211.8	138.1	165.9	300.5	39.8	5.2	5.2	0	47.3	51.4	264.2	366.3	1,595.1
1958	457.0	218.0	161.1	42.7	4.1	2.6	3	112.4	133.9	125.6	250.1	420.5	1,878.0
1959	368.9	269.5	145.8	156.0	88.7	21.2	0.2	31.4	15.0	31.9	43.1	512.2	1,609.9
1970	264.8	626.0	178.7	28.6	93.7	19.0	9.2	0.4	22.4	133.3	151.7	225.6	1,750.4
1971	159.5	305.2	126.6	85.5	39.9	7.3	0	39.0	33.9	34.0	248.9	116.9	1,114.7
1972	146.9	339.3	99.7	69.0	129.1	103.9	10.0	18.7	80.4	171.7	55.5	35.9	1,037.1
1973	211.6	204.8	26.5	107.0	4.7	83.1	10.2	22.1	0	69.1	54.9	127.7	364.7
1974	80.4	249.5	107.9	25.2	21.6	0.3	0	18.4	49.5	101.9	100.9	359.0	1,105.4
1975	499.9	221.6	26.6	86.8	113.6	54.3	0	3.5	0	121.7	296.6	312.8	1,749.6
1976	301.9	138.1	69.0	191.9	118.7	13.5	1.2	22.9	51.8	298.8	115.9	279.6	1,583.3
1977	177.4	58.6	107.5	243.8	10.7	17.5	0	0	65.0	26.4	132.9	363.2	1,209.9
1978	433.6	569.1	145.0	120.1	6.2	0	0	0	181.4	215.3	263.1	373.2	2,218.0
1979	357.7	190.3	85.3	70.8	64.3	47.7	5.8	0	0	218.8	181.2	235.8	1,417.7
1980	345.5	214.1	238.2	70.6	69.2	11.9	0	2.1	1.5	49.0	262.0	311.9	1,563.8
Ave.	321.4	259.3	128.4	102.8	61.3	26.7	2.7	14.0	65.8	101.3	160.0	322.8	1,545.5

2-2-5 Monthly Total Precipitation at Antalya Meteorological Station (1)

Unit: mm

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1929	-	-	-	28.7	69.4	33.7	0	0	65.6	143.1	77.7	245.3	
1930	269.2	256.5	63.0	44.9	103.8	32.2	0	1.5	65.3	102.2	83.6	276.4	1,316.6
1931	629.2	553.5	62.6	47.8	28.3	5.0	0	5.1	8.0	11.7	27.0	279.3	1,653.5
1932	322.4	29.1	67.2	13.4	11.4	0	0	0	0	51.4	236.2	0.4	729.5
1933	228.7	351.1	20.2	34.8	3.9	78.6	0.2	0	3.5	0	135.0	176.3	830.3
1934	129.3	31.5	26.2	1.2	25.4	26.4	0	0	15.6	24.9	32.9	650.9	970.3
1935	287.6	292.0	67.7	30.1	0	0	0	0	4.6	47.9	408.5	102.0	1,235.4
1936	610.8	268.2	86.0	41.3	193.9	69.8	0	0	93.8	14.4	31.6	225.1	1,659.9
1937	219.5	131.3	32.2	53.1	21.2	0	0	0	0.1	69.1	259.6	89.2	845.3
1938	263.6	175.6	56.9	29.8	2.5	0	0	7.8	7.8	23.5	250.6	263.9	1,132.0
1939	281.7	113.7	337.5	1.5	3.1	43.5	0.4	0.2	2.4	24.3	56.8	409.1	1,075.2
1940	243.2	135.6	311.2	56.4	29.8	8.1	0.7	5.7	0	51.2	93.2	218.7	1,016.8
1941	170.1	107.3	118.7	35.3	0.2	4.9	0	0	0	33.8	53.3	82.5	586.1
1942	264.0	241.4	83.5	13.2	5.5	1.3	18.5	2.4	52.2	127.3	259.6	72.4	1,141.3
1943	179.6	64.4	66.4	182.2	31.0	6.7	0	0	4.8	186.0	70.2	218.6	1,009.9
1944	295.3	122.9	61.9	56.9	20.7	0	3.8	5.8	0	126.4	87.4	612.7	1,393.8
1945	411.6	184.1	28.0	12.5	0	0	6.0	0	0.3	14.1	194.1	386.8	1,235.3
1946	90.5	236.3	183.6	10.0	90.0	0	0	0	0	63.3	45.7	536.9	1,256.3
1947	191.1	325.1	20.0	2.8	12.4	6.6	0	0	0	31.6	74.9	322.3	786.8
1948	183.4	178.8	23.9	58.2	26.3	13.4	0	0	13.3	30.3	39.5	99.4	657.5
1949	177.2	57.5	175.2	20.1	0	2.0	0.4	0	0.2	1.8	9.4	582.8	1,025.6
1950	71.2	58.9	170.8	21.2	77.4	5.1	0	0.3	2.6	58.6	116.2	210.1	792.4
1951	413.1	115.7	216.5	2.4	16.5	2.9	0	3.3	6.7	125.3	99.4	117.8	1,116.6
1952	321.0	78.2	215.5	22.7	9.1	1.3	2.5	49.6	0	15.9	232.8	634.7	1,614.3
1953	416.7	52.9	54.0	67.9	15.1	15.8	0	0	0	7.4	84.9	220.9	935.6
1954	229.6	220.0	69.7	58.7	17.6	2.4	0	0	0.1	201.4	144.3	373.3	1,213.1
1955	247.2	122.8	45.0	96.8	2.4	0.4	32.3	19.2	1.9	21.6	45.1	120.9	647.6
1956	107.1	244.3	64.3	26.5	10.2	0.6	0	0	0.6	22.8	12.2	511.2	999.8
1957	25.3	37.1	124.0	69.7	76.5	3.8	1.8	0	29.5	60.7	84.9	67.5	589.8
1958	352.7	117.7	43.6	32.0	12.4	4.2	0.6	0	24.1	143.3	36.5	357.2	1,134.1
1959	336.1	0	1.8	37.1	0.8	9.5	1.7	1.0	5.1	68.9	118.1	233.2	813.3
1960	358.5	39.0	133.1	34.3	44.5	18.6	2.2	0	27.9	7.3	331.3	524.6	1,321.3
1961	204.6	169.0	21.7	131.7	1.6	34.2	0	0	13.2	16.4	37.2	319.6	949.9
1962	208.2	235.0	106.6	42.9	76.1	0	0.9	0	62.6	69.3	19.7	228.1	1,049.2
1963	245.7	308.8	91.8	26.2	78.9	3.4	1.8	0	0	4.4	88.8	185.1	537.9
1964	65.5	218.0	108.8	0.5	31.5	13.7	0	0	25.6	0	45.6	23.3	533.3
1965	301.7	264.7	234.7	65.5	80.3	2.1	0	1.4	0.1	37.2	21.5	366.3	1,375.5
1966	525.0	66.8	114.4	63.6	3.6	2.4	0	0.2	11.5	1.2	29.0	335.4	1,263.1
1967	339.8	102.1	103.5	107.7	34.1	5.6	2.2	0.3	13.6	330.7	188.4	176.1	1,304.1
1968	164.4	70.8	87.4	48.5	2.5	2.8	0	24.1	49.7	119.3	410.4	354.5	1,322.4
1969	292.8	149.4	223.2	32.9	31.2	3.8	0	0	6.2	30.7	55.7	585.0	1,416.3
1970	316.5	264.8	82.4	20.3	39.9	1.1	0	0.5	7.3	57.2	60.5	142.0	992.5
1971	127.5	394.8	61.7	39.3	16.5	3.8	41.9	0.3	0.9	9.1	169.2	206.0	1,068.0

2-2-5 Monthly Total Precipitation at Antalya Meteorological Station (2)

Unit: mm

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1972	219.9	138.9	64.4	31.4	41.7	9.6	0	0	13.5	83.5	9.2	27.5	630.6
1973	92.6	220.8	36.3	17.3	3.6	16.2	0	0	0	22.6	55.6	83.9	552.9
1974	95.4	424.6	145.6	15.0	11.3	0.6	0	0.1	9.2	66.4	128.0	205.2	1,392.4
1975	465.8	202.0	10.9	27.8	53.7	22.1	0	3.4	0	54.5	142.5	308.6	1,285.4
1976	163.7	59.5	62.9	83.9	64.5	6.7	6.7	0.2	40.9	235.2	207.1	204.4	1,135.7
1977	162.7	35.9	113.4	107.0	10.6	9.6	0.6	0	0.2	68.1	61.1	426.1	995.3
1978	287.3	322.5	136.6	43.0	0.5	0	0	0	8.6	122.6	127.4	388.6	1,436.3
1979	381.3	249.0	63.4	3.9	16.6	5.9	0	0.5	0.8	165.0	242.3	155.2	1,283.9
1980	218.2	82.9	79.7	58.6	32.5	2.4	0	0	42.6	21.5	96.8	192.1	826.3
Ave.	255.2	172.6	92.0	43.7	29.8	9.3	2.4	2.4	13.2	82.9	113.2	272.5	1,667.2

2-2-6 Monthly Total Precipitation at Kovada Meteorological Station

Unit: mm

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1963	-	-	-	-	-	-	-	0	0	65.8	50.5	139.6	
1964	23.4	204.1	145.0	35.3	54.0	145.7	13.1	0	45.1	0	88.7	241.0	976.4
1965	216.2	333.8	160.1	159.3	158.2	33.1	2.0	13.3	0	42.6	113.6	440.6	1,722.8
1966	617.6	130.1	232.8	137.8	27.9	39.0	10.0	9.2	21.7	6.7	83.0	403.5	1,719.3
1967	199.5	83.7	179.5	212.6	53.7	9.3	3.0	0	67.3	103.4	336.0	369.6	1,352.4
1968	438.0	174.6	218.2	30.5	38.8	12.5	0	34.7	47.9	67.9	169.2	342.6	1,565.9
1969	339.1	192.7	159.1	169.9	84.2	12.1	14.6	7.7	1.9	38.2	25.9	498.4	1,583.5
1970	283.2	321.6	116.2	150.3	51.4	47.0	1.3	2.5	24.1	70.7	91.7	156.2	1,316.0
1971	73.3	215.3	179.9	81.6	53.3	27.5	14.0	35.5	2.4	17.6	232.2	220.2	1,152.8
1972	31.0	177.9	56.5	47.2	192.6	83.0	63.0	5.5	14.8	142.0	28.5	9.2	767.2
1973	131.6	241.2	167.8	57.4	48.8	32.8	29.4	1.0	4.0	79.5	63.8	95.5	932.6
1974	74.7	397.6	103.9	33.5	45.0	1.5	0.4	22.9	44.2	57.0	113.8	270.3	1,155.5
1975	611.0	133.7	82.3	370.2	183.6	70.9	3.0	19.2	0	45.7	227.3	150.6	1,408.5
1976	232.1	76.6	70.3	312.7	89.5	37.6	33.5	1.5	7.7	142.2	65.4	250.6	1,318.7
1977	89.8	91.4	98.3	160.9	15.3	31.7	23.2	0	36.1	65.6	39.7	181.4	813.6
1978	304.9	436.2	241.5	131.8	31.8	10.1	0	0.6	51.5	156.2	111.7	227.8	1,793.2
1979	457.4	163.2	53.2	48.8	184.3	106.9	31.8	0.2	25.9	122.2	233.1	209.9	1,636.9
1980	260.8	74.6	119.0	93.6	51.0	49.2	11.4	0	15.9	56.9	133.5	345.7	1,202.7
Ave.	245.0	232.9	137.3	121.2	76.3	43.5	14.9	9.0	23.0	70.3	109.1	259.8	1,311.1

2-2-7 Monthly Total Precipitation at Karacaören Meteorological Station

Unit: mm

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1962	-	-	-	-	-	-	-	-	38.4	64.1	36.6	377.1	
1963	413.2	300.8	49.5	81.9	151.8	32.6	3.3	0	0	61.1	70.0	152.6	1,331.8
1964	26.6	217.0	66.1	0	44.7	50.7	0	0	39.0	0.1	70.6	179.8	694.6
1965	127.6	338.1	155.2	333.5	163.0	8.3	1.0	13.3	0	29.0	107.0	456.2	1,652.2
1966	518.3	156.0	267.5	370.8	8.1	25.1	0	0	5.7	1.2	91.2	523.8	1,992.7
1967	183.1	59.5	113.0	167.0	45.3	7.0	3.9	0.0	16.2	143.6	173.6	513.4	1,424.6
1968	270.5	168.6	149.0	44.3	6.6	2.3	0	19.9	53.8	106.2	232.4	325.6	1,373.2
1969	467.2	179.2	152.5	181.7	30.8	3.0	3.9	18.4	5.7	32.2	177.0	629.3	1,880.9
1970	329.3	300.1	155.5	57.1	12.8	16.3	9.3	2.6	64.7	88.0	89.9	121.5	1,242.1
1971	85.5	295.9	238.7	27.8	39.4	15.0	67.1	21.6	0.9	13.2	364.3	424.7	1,595.1
1972	93.5	156.0	50.6	54.9	66.7	48.8	44.5	35.9	83.0	236.8	133.3	13.5	1,017.3
1973	159.0	117.6	183.6	44.4	2.3	65.4	2.1	0	0	57.6	20.5	148.9	801.4
1974	70.0	516.7	101.1	24.7	29.6	7.2	0	22.6	27.2	45.6	60.7	271.8	1,169.2
1975	495.8	105.7	247.8	158.5	66.8	60.7	0.0	3.1	0	43.5	225.1	244.3	1,692.3
1976	188.8	53.2	43.5	260.9	99.6	45.1	27.5	0	2.1	155.0	97.3	342.7	1,326.7
1977	124.7	48.9	64.1	293.6	15.0	61.2	6.3	0	45.9	49.4	86.5	227.0	1,020.6
1978	387.2	363.6	359.3	84.1	73.7	17.6	0	0	301.8	202.4	88.3	240.9	2,018.9
1979	545.6	172.0	46.7	99.4	55.5	57.6	1.3	0	0	197.7	214.7	133.5	1,579.0
1980	265.0	69.6	23.0	78.8	28.1	18.0	0	0	10.5	62.6	237.4	406.5	1,229.5
Ave.	265.5	205.9	135.1	121.3	55.5	27.8	9.2	7.6	36.5	85.0	142.0	300.8	1,390.3

2-2-8 Monthly Total Precipitation at Serik Meteorological Station

Unit: mm

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1957	83.4	47.0	91.3	41.6	29.9	3.1	0	0	4.5	26.3	51.0	170.5	548.6
1958	338.5	77.6	157.7	19.4	7.7	35.0	0	0	7.1	16.3	26.1	202.9	886.3
1959	329.4	7.3	0	24.9	6.7	13.7	0	0	3.7	78.3	82.8	369.9	916.7
1960	226.3	87.9	83.1	85.3	37.4	3.8	0	0	6.6	10.6	23.5	306.9	900.4
1961	223.9	322.7	30.9	11.1	2.4	65.1	0	0	9.2	34.7	13.8	322.2	1,039.0
1962	256.3	291.3	25.8	19.4	58.0	0	0	0	137.3	112.2	6.9	352.7	1,259.9
1963	280.5	247.8	193.8	27.8	95.7	7.7	0	0	0	52.2	122.1	159.3	1,186.9
1964	28.6	225.9	32.7	0	34.5	0	0	0	33.9	0	112.7	163.2	631.5
1965	302.3	252.1	98.4	67.1	103.9	3.9	0.9	0	0	115.0	22.2	300.2	1,266.0
1966	358.8	150.9	75.5	57.4	14.8	2.5	0	9.9	12.8	0	120.5	272.0	1,075.1
1967	356.4	160.7	81.5	186.5	22.2	34.7	0	0	4.9	54.8	176.2	291.7	1,209.6
1968	186.3	164.7	94.5	65.1	4.2	0	0	10.0	39.1	91.7	275.2	415.9	1,347.7
1969	304.7	152.0	167.9	51.8	50.1	7.6	0	0	0	29.8	61.5	456.4	1,271.8
1970	233.9	289.3	73.5	9.5	69.8	9.9	6.9	0	35.5	131.1	98.6	219.4	1,375.4
1971	87.2	289.3	95.1	113.9	22.2	6.7	8.0	23.9	68.4	7.4	156.9	157.0	956.0
1972	129.0	75.7	95.9	52.8	119.6	27.0	0	0	8.6	139.4	20.0	61.0	721.0
1973	206.9	92.1	30.3	29.2	12.4	2.1	0	0	0	83.1	86.4	57.2	599.7
1974	111.5	185.9	71.3	21.3	16.0	0	0	0	22.6	36.2	127.8	287.8	880.4
1975	430.6	228.8	14.2	33.3	62.5	37.8	1.2	0.2	0	35.5	145.1	244.9	1,234.9
1976	345.2	224.6	51.8	87.2	93.7	6.0	0	4.2	7.7	188.1	186.3	180.5	1,285.3
1977	170.9	39.1	51.3	93.4	4.6	16.2	0	0	13.5	64.4	122.3	447.0	1,022.7
1978	342.9	337.5	238.5	56.7	0	0	0	0	0.6	192.5	329.9	359.8	1,638.4
1979	196.3	240.0	62.0	45.3	15.8	3.4	0	0	0	154.0	173.1	289.6	1,190.5
1980	211.1	140.3	110.4	45.5	43.6	6.9	0	0	15.3	42.8	56.9	167.7	838.5
Ave.	232.4	176.3	73.5	51.2	37.7	12.2	0.6	2.0	16.8	71.5	101.1	259.6	1,640.8

2-2-9 Monthly Total Precipitation at Dösemealti Meteorological Station

Unit: mm

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1952	-	-	-	-	-	-	-	-	-	-	-	230.5	
1953	118.6	345.9	49.6	70.3	236.9	20.2	5.7	0	0	27.0	54.8	137.0	1,066.0
1954	80.2	241.9	70.5	0	16.2	17.1	0	0	0.8	0.7	41.3	96.1	565.3
1955	295.1	152.6	206.4	60.1	81.8	28.3	0	8.4	0.1	20.3	10.5	530.2	1,392.6
1956	376.3	56.3	158.1	67.8	11.9	42.3	0	0	16.2	0.3	63.9	669.5	1,440.6
1957	165.8	22.5	75.2	91.2	52.7	1.4	0	0	11.4	317.1	312.3	64.5	715.1
1958	275.0	85.5	99.5	88.0	97.8	1.5	0	42.3	37.0	158.1	271.2	219.8	1,225.7
1959	992.5	214.8	209.0	78.0	57.1	1.8	0	0	9.7	60.7	45.1	687.1	2,335.8
1970	239.1	160.6	74.5	74.0	77.0	12.6	0.3	2.6	9.7	25.8	66.5	78.1	820.8
1971	109.9	458.2	54.9	31.3	29.4	5.9	1.1	13.0	0	31.7	118.7	256.4	1,682.6
1972	810.1	132.2	41.8	51.0	23.7	24.2	6.1	2.7	5.3	149.0	10.9	8.8	620.8
1973	164.0	122.8	12.0	50.7	33.6	6.6	0	0	0	16.2	16.3	81.9	502.1
1974	82.0	656.5	175.4	15.7	19.6	0	0	8.2	2.1	18.0	15.7	126.2	1,348.4
1975	637.8	122.5	70.8	159.6	45.4	43.7	0	2.9	0	24.3	187.6	239.9	1,343.3
1976	244.0	105.1	54.6	112.3	103.9	10.2	34.1	2.0	3.3	99.2	135.2	82.8	934.7
1977	185.8	55.5	66.3	78.6	32.7	21.6	15.2	0	11.0	64.4	32.3	358.0	829.0
1978	247.3	345.6	334.6	63.0	6.9	0	0	0	36.8	47.0	38.4	227.9	1,347.3
1979	315.5	191.6	39.2	32.3	57.8	26.3	5.0	0	2.6	86.5	259.2	109.4	1,127.0
1980	134.5	93.6	91.6	68.8	35.0	58.2	0	0.2	5.3	24.1	47.1	409.5	964.9
Ave.	243.6	211.3	104.6	66.8	57.9	20.6	3.8	4.6	8.8	49.9	82.2	248.5	1,098.5

2-2-10 Monthly Total Precipitation at Sütüler Meteorological Station

Unit: mm

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1951	119.8	22.1	241.0	31.4	55.2	41.5	37.2	0	9.9	125.3	68.9	35.0	787.3
1952	0	70.1	110.6	0	128.1	15.0	58.3	33.0	0	34.1	213.7	118.1	774.0
1953	337.6	119.1	68.0	34.0	128.0	138.1	0	29.7	15.5	69.2	51.7	46.5	1,037.4
1954	269.4	170.9	122.7	58.1	52.8	10.0	0	10.0	7.0	111.0	117.0	162.5	1,076.4
1955	151.1	80.9	56.3	123.5	18.2	19.5	18.3	24.9	31.2	38.7	124.7	25.3	754.0
1956	71.3	241.1	95.3	58.3	60.3	0	75.0	0	1.5	14.6	72.5	173.0	762.9
1957	38.2	63.0	73.9	56.1	69.9	32.0	6.3	0	22.1	59.9	61.0	85.6	531.0
1958	253.7	39.5	122.8	115.6	88.2	98.1	15.7	0	75.5	72.4	21.1	161.0	1,063.6
1959	253.3	0	4.5	25.6	19.3	27.8	19.6	12.6	6.9	-	-	-	
1960	-	-	67.2	90.4	47.4	45.9	0	0	36.7	10.7	16.5	25.8	
1961	108.6	184.6	45.0	47.5	9.0	79.7	0	0	10.0	37.7	10.0	206.6	738.5
1962	106.9	308.7	107.6	72.4	69.1	5.0	0	18.5	50.0	67.3	33.0	250.2	1,058.7
1963	259.6	206.6	62.3	93.7	143.7	15.0	10.3	0	0	87.3	36.8	63.5	955.6
1964	6.6	141.0	97.6	5.0	72.6	127.8	0	0	28.1	0	69.5	125.4	644.4
1965	121.3	170.6	138.8	99.7	121.0	35.2	0	9.2	0	22.1	91.6	295.7	1,106.2
1966	306.6	69.0	136.0	142.6	41.6	6.8	15.8	8.5	55.0	0	93.4	155.5	1,058.6
1967	45.6	32.1	63.5	100.3	53.8	-	-	-	-	30.6	145.7	155.1	
1968	138.0	97.0	114.7	36.8	69.7	4.8	0	19.8	74.9	59.9	138.3	220.2	950.1
1969	242.9	108.1	140.8	132.1	63.9	5.5	0	2.0	2.6	46.4	86.7	264.1	1,073.1
1970	111.8	212.7	83.8	55.7	13.0	63.6	33.3	2.0	29.0	55.1	47.8	84.7	793.5
1971	53.3	145.9	116.4	52.9	34.9	29.3	2.6	43.1	3.3	7.6	148.7	133.5	771.3
1972	43.6	95.2	47.0	65.7	71.0	49.9	16.8	33.9	48.6	159.0	85.6	15.9	732.0
1973	125.7	122.9	58.6	48.3	1.9	114.6	33.7	9.2	13.4	41.8	28.4	69.8	711.1
1974	51.1	209.6	60.2	33.6	40.4	12.4	0	7.8	29.3	36.6	48.1	206.8	735.7
1975	287.9	95.7	163.7	152.3	126.1	21.4	0	9.2	0	52.2	88.6	165.8	1,141.9
1976	169.4	60.4	56.6	151.7	65.8	109.0	9.3	3.0	3.5	113.2	65.9	168.0	975.8
1977	75.0	63.7	81.0	229.1	9.4	14.6	8.1	0	45.3	50.6	43.3	155.7	775.9
1978	217.6	375.6	134.5	72.9	43.5	2.1	0	0	153.7	137.3	65.7	353.0	1,169.9
1979	227.8	126.3	47.8	113.3	187.4	31.5	6.7	6.5	22.7	174.8	155.1	80.2	1,199.1
1980	180.6	59.9	87.0	109.1	65.2	12.1	0	0	12.2	66.2	165.7	149.1	887.1
Ave.	147.6	122.3	101.1	82.5	65.8	40.6	12.1	9.7	25.9	63.7	82.1	142.8	833.1

2-2-11 Monthly Total Precipitation at Derebucak Meteorological Station

Unit: mm

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1977	80.7	38.2	71.0	202.9	9.1	36.5	1.2	0	45.3	22.2	16.3	154.8	677.2
1978	249.1	311.8	351.6	45.3	13.9	29.5	0	0	55.6	322.4	77.5	185.0	1,333.5
1979	277.1	68.8	53.4	52.9	76.6	37.3	33.2	25.1	19.2	92.3	169.7	170.0	1,042.6
1980	263.2	98.6	128.8	84.7	63.6	15.3	0	0	7.5	71.3	316.2	213.0	1,065.2
Ave.	217.5	129.9	151.2	96.7	40.8	22.4	8.6	6.3	29.9	76.6	93.9	183.7	1,003.5

2-3-1 Monthly Average Temperature at Antalya Meteorological Station (1)

Unit: °C

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	
1930	10.5	11.3	14.1	16.7	19.6	25.6	28.3	28.3	25.1	19.7	15.3	13.6	
1931	11.3	10.9	12.8	16.0	20.8	26.2	29.8	28.8	25.4	19.5	12.8	11.1	
1932	8.8	9.9	12.0	15.3	19.3	25.3	28.2	28.6	25.1	22.7	15.5	10.7	
1933	8.8	10.9	12.1	13.8	18.6	22.4	26.5	26.3	21.9	18.3	15.6	10.7	
1934	9.6	8.1	13.6	17.9	20.5	24.7	28.2	26.9	23.3	18.9	15.9	11.7	
1935	10.1	10.9	12.5	15.2	23.7	26.5	26.9	27.0	24.2	19.7	13.9	13.1	
1936	11.8	11.0	13.7	16.9	19.0	23.3	27.6	26.5	23.3	19.6	14.2	8.9	
1937	7.8	12.0	13.6	16.3	20.1	25.5	27.4	26.9	24.6	20.9	16.9	13.1	
1938	9.4	9.0	11.7	16.5	21.0	26.5	29.1	29.2	26.8	20.5	14.9	12.6	
1939	13.7	10.3	12.2	17.2	21.0	23.9	29.5	28.1	25.9	22.2	15.3	12.9	
1940	9.6	12.1	12.5	16.4	20.8	24.5	27.7	26.9	25.0	21.5	16.2	12.3	
1941	11.6	12.8	13.6	17.5	21.9	24.7	28.1	28.3	23.5	18.8	15.0	8.8	
1942	7.9	11.2	13.7	17.1	21.8	26.6	28.8	27.1	25.0	19.8	15.4	11.5	
1943	9.0	9.8	11.0	15.1	19.8	23.8	27.8	28.7	26.6	21.7	17.7	13.3	
1944	9.0	11.1	12.4	17.5	20.3	25.2	27.6	27.1	24.1	20.6	16.9	11.6	
1945	10.2	8.7	11.1	15.5	22.7	26.1	29.2	28.9	25.5	19.4	15.5	11.3	
1946	9.9	10.3	12.1	17.1	20.5	26.5	28.9	29.5	26.1	19.5	17.4	12.8	
1947	9.7	12.1	16.0	18.6	22.1	25.1	28.8	29.2	25.3	19.8	15.7	13.2	
1948	12.8	11.2	10.7	15.5	20.4	23.8	27.6	28.9	25.0	20.6	16.5	8.9	
1949	9.8	9.1	11.3	14.8	22.1	24.3	27.6	27.9	23.8	20.4	17.5	12.9	
1950	7.6	9.8	13.3	17.8	20.7	26.4	29.9	28.0	25.4	19.4	15.7	13.5	
1951	10.7	12.1	14.4	17.6	21.2	25.8	28.2	28.8	25.7	18.4	14.7	9.9	
1952	10.3	10.9	11.6	16.6	20.0	25.1	27.6	28.7	26.4	20.7	15.5	13.3	
1953	10.1	10.6	9.7	15.6	19.2	24.2	30.1	28.4	24.5	20.6	12.8	9.3	
1954	8.7	10.3	13.4	15.3	11.9	26.0	29.0	28.7	25.9	20.4	15.3	18.9	
1955	11.9	12.8	13.5	15.8	21.2	26.1	29.4	26.9	24.7	21.8	15.9	12.1	
1956	13.2	10.6	11.3	16.4	20.0	25.5	29.6	28.3	25.6	18.9	14.5	9.8	
1957	9.5	11.3	13.4	16.0	18.7	25.9	27.4	28.1	26.6	15.2	-	10.9	
1958	10.5	11.2	13.5	15.9	21.0	24.0	27.0	29.1	24.6	20.4	16.3	12.4	
1959	10.5	7.8	12.5	16.5	20.4	24.0	27.0	27.8	23.8	18.7	14.7	12.6	
1960	10.4	11.1	12.5	16.3	21.7	24.8	28.2	28.6	24.7	21.9	17.0	14.1	
1961	9.8	10.2	13.1	17.0	20.4	24.7	28.3	28.9	24.0	20.0	15.6	12.5	
1962	11.6	10.1	14.6	16.4	21.0	25.0	28.1	28.0	25.3	20.5	18.7	8.7	
1963	11.5	12.5	12.1	16.9	19.4	24.6	29.4	30.0	25.9	21.4	15.9	12.4	
1964	7.8	10.0	14.2	16.2	18.9	25.0	27.7	28.0	24.5	21.1	16.2	12.8	
1965	10.5	9.7	13.4	15.2	19.5	26.3	-	27.0	25.1	18.7	14.6	12.1	
1966	11.1	13.1	13.1	16.7	20.0	24.7	27.9	28.2	24.6	22.3	18.3	12.4	
1967	10.1	8.6	12.7	15.7	20.1	24.7	28.7	29.4	24.7	20.1	14.6	12.3	
1968	9.2	12.1	12.7	17.8	23.5	25.4	28.6	26.4	23.6	19.3	15.0	12.1	
1969	9.9	11.5	13.9	14.7	21.6	25.5	27.3	27.6	25.6	20.5	15.8	12.7	
1970	11.5	12.0	14.1	18.3	19.7	26.2	27.6	29.1	25.0	19.6	16.6	11.1	

2-3-1 Monthly Average Temperature at Antalya Meteorological Station (2)

Unit: °C

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	
1971	12.9	10.6	12.5	16.1	21.6	26.1	27.4	28.6	25.1	19.6	15.9	11.4	
1972	9.6	10.3	14.7	17.4	20.4	24.6	26.7	27.4	25.3	19.8	15.1	13.7	
1973	10.0	12.1	12.8	15.6	21.8	25.9	28.2	28.4	26.6	21.8	14.4	13.3	
1974	8.5	11.8	15.0	16.0	19.8	24.8	29.5	27.6	25.4	22.0	16.3	11.4	
1975	10.8	10.0	14.4	18.3	19.3	24.4	27.6	26.1	24.4	18.6	13.8	9.5	
1976	8.8	7.8	12.2	15.3	19.8	24.2	26.4	26.6	22.5	18.9	14.6	11.3	
1977	8.8	11.5	12.1	15.6	20.4	25.0	29.4	27.3	24.0	17.2	15.2	9.5	
1978	10.5	11.0	12.6	15.3	20.8	25.7	29.2	26.9	23.0	19.6	13.2	10.9	
1979	10.4	11.7	13.0	15.5	19.9	26.1	28.4	27.1	25.2	19.8	14.7	11.2	
1980	8.6	9.3	11.3	15.1	18.8	24.9	27.5	28.0	23.1	19.2	15.1	11.3	
Ave.	10.0	10.7	12.9	16.3	20.4	25.1	28.2	28.0	24.7	20.0	15.5	11.8	

2-3-2 Monthly Maximum Temperature at Antalya Meteorological Station (1)

Unit: °C

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Max.
1929	-	-	-	26.7	36.3	37.5	-	-	35.4	28.0	29.0	20.9	-
1930	19.4	19.5	27.0	29.5	37.6	35.4	39.9	41.8	39.2	30.8	23.8	21.0	41.8
1931	18.9	21.0	22.7	25.5	36.4	38.9	40.9	42.1	40.3	32.2	24.7	19.5	42.1
1932	17.5	19.6	25.0	22.5	32.9	40.9	42.0	39.9	35.5	31.9	27.4	20.9	42.0
1933	17.4	18.5	23.9	23.9	26.5	35.0	38.3	37.7	32.2	30.6	32.7	19.7	38.3
1934	20.1	18.5	23.2	30.4	32.0	40.0	43.4	40.2	36.0	34.6	30.8	21.1	43.4
1935	18.6	18.8	21.8	27.6	37.8	39.3	38.5	40.9	35.7	34.6	29.3	22.1	40.9
1936	20.4	19.4	25.5	26.5	28.4	32.0	40.0	35.4	37.3	31.2	27.4	18.5	40.0
1937	17.2	20.0	25.2	27.7	32.3	36.7	41.9	40.6	36.0	34.3	27.0	22.0	41.9
1938	19.2	18.8	22.3	26.0	33.0	38.0	43.4	40.4	42.5	30.6	24.6	20.2	42.5
1939	19.1	20.0	21.5	29.5	31.3	39.6	40.0	40.4	37.0	36.0	26.0	20.8	40.4
1940	18.9	22.4	22.5	27.9	27.5	35.5	39.4	38.4	36.2	38.7	27.1	21.4	39.4
1941	20.6	20.1	21.5	26.9	35.0	38.0	40.7	42.0	31.5	32.5	25.4	20.0	42.0
1942	19.2	18.9	24.9	27.5	38.1	41.5	40.8	39.2	37.0	30.2	26.8	20.5	41.5
1943	17.5	18.7	18.5	27.9	30.0	-	-	40.7	39.6	37.9	27.9	22.9	-
1944	19.0	18.2	20.7	33.8	34.1	36.9	42.9	38.5	39.8	34.9	28.7	20.0	42.9
1945	17.3	19.3	22.5	23.4	38.7	37.2	41.9	41.0	36.9	29.7	25.3	20.1	41.9
1946	18.5	23.3	23.5	26.0	32.4	37.3	39.5	40.0	39.7	30.9	28.5	20.6	40.0
1947	17.4	18.8	27.5	32.5	32.4	32.6	41.1	40.7	36.3	32.8	26.4	23.0	41.1
1948	19.5	21.7	19.5	26.2	34.6	35.5	41.2	40.2	37.7	33.2	28.4	18.6	41.2
1949	18.8	19.2	19.8	25.8	32.9	36.4	41.4	38.0	36.2	33.0	27.2	21.4	41.4
1950	18.0	20.0	25.1	32.2	36.0	37.8	40.7	39.4	36.3	29.8	27.4	22.8	40.7
1951	18.2	19.8	21.9	26.9	34.7	38.7	40.0	41.6	40.0	28.7	23.7	20.5	41.6
1952	19.1	18.6	20.4	28.1	31.3	40.6	39.9	43.6	38.6	33.4	24.3	23.3	43.6
1953	18.7	20.1	20.0	24.4	27.6	34.8	42.0	39.5	38.7	34.0	25.1	21.7	42.0
1954	16.6	17.9	23.1	29.2	31.2	40.0	41.4	43.1	38.0	34.5	24.3	21.9	43.1
1955	18.5	19.5	24.3	27.6	34.3	38.7	41.9	38.5	35.4	33.6	27.5	22.1	41.9
1956	19.2	19.3	19.1	32.8	35.2	38.4	43.9	43.3	39.9	34.8	26.4	22.4	43.9
1957	18.1	20.0	22.1	26.3	33.2	39.8	41.2	41.6	38.4	33.3	24.9	23.9	41.6
1958	18.3	21.2	22.4	22.6	35.7	35.9	40.3	41.6	36.5	34.7	26.8	19.3	41.6
1959	18.7	16.8	21.6	28.6	29.3	35.6	37.9	38.6	36.7	29.9	26.8	20.9	38.6
1960	18.0	22.1	24.6	25.2	38.0	36.9	40.4	41.0	39.0	35.1	28.9	23.5	41.0
1961	18.8	19.9	25.7	26.1	29.9	39.1	42.2	40.6	35.0	34.4	27.9	23.6	42.2
1962	20.1	18.8	22.4	28.6	35.9	37.7	42.6	39.8	39.9	31.5	28.7	22.7	42.6
1963	22.2	19.2	22.7	26.7	29.1	39.2	41.6	42.2	36.9	34.8	24.6	22.3	42.2
1964	17.9	16.6	22.3	25.7	33.5	37.7	41.6	38.1	37.2	35.6	29.8	21.0	41.6
1965	17.5	20.2	23.0	27.6	35.6	38.3	40.4	39.1	37.9	30.3	24.6	19.6	40.4
1966	20.1	25.9	20.3	29.7	31.0	39.9	41.1	37.9	37.0	32.6	30.1	22.3	41.1
1967	19.2	18.6	19.1	26.6	31.7	35.5	40.0	42.3	35.7	30.9	26.6	20.3	42.3
1968	19.2	17.7	23.6	27.5	35.8	38.1	40.1	39.1	36.9	28.9	24.5	18.9	40.1
1969	17.5	18.3	21.2	24.9	34.7	38.6	38.6	38.3	34.4	32.4	23.4	19.9	38.3

2-3-2 Monthly Maximum Temperature at Antalya Meteorological Station (2)

Unit: °C

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Max.
1970	18.7	19.4	23.5	31.6	29.5	38.4	39.3	41.8	35.2	29.7	28.6	20.3	41.8
1971	23.9	17.2	24.3	32.3	36.1	40.9	39.2	39.2	35.6	30.3	25.8	21.6	40.9
1972	16.6	17.9	23.2	31.7	33.3	39.1	39.3	39.4	36.9	33.0	24.7	22.0	39.4
1973	19.3	20.0	25.2	23.0	35.6	40.6	42.7	39.6	37.7	37.5	25.9	22.0	42.7
1974	17.1	18.8	26.6	27.2	32.8	37.0	41.9	39.5	36.3	29.9	23.3	19.8	41.9
1975	17.9	17.4	22.3	30.6	32.9	37.7	39.4	38.6	37.8	32.3	26.2	19.5	39.4
1976	17.6	18.1	25.8	27.7	31.4	34.9	36.9	33.3	35.0	33.8	28.0	21.1	33.3
1977	18.6	21.6	27.7	27.6	35.7	37.2	44.7	39.6	37.2	28.2	28.8	19.1	44.7
1978	19.3	20.1	23.7	25.3	32.6	38.9	42.2	39.2	35.0	36.5	25.1	20.3	42.2
1979	20.1	22.6	23.5	30.6	32.3	40.4	41.0	39.9	40.6	34.9	25.7	21.2	41.0
1980	15.1	19.3	24.4	24.6	33.1	39.6	42.3	40.8	34.5	34.6	28.3	20.7	42.3
Max.	23.9	25.9	27.7	32.8	38.7	41.5	44.7	44.6	42.5	38.7	32.7	23.6	44.7

2-3-3 Monthly Minimum Temperature at Antalya Meteorological Station (1)

Unit: °C

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Min.
1929	-	-	-	5.0	12.3	12.2	-	-	12.0	9.7	8.0	2.9	-
1930	1.3	-0.9	6.3	6.1	9.4	14.4	17.1	16.1	15.0	9.5	3.1	3.1	-0.9
1931	1.1	3.4	-0.9	6.3	8.9	15.3	17.9	18.4	10.3	8.9	0.7	0.7	-0.9
1932	0.5	-4.5	1.5	5.0	6.3	13.2	15.0	17.0	12.6	12.0	4.3	0.9	-4.5
1933	-1.1	2.4	1.2	3.3	9.4	11.5	16.1	15.9	12.1	7.8	6.0	-1.5	-1.5
1934	-0.3	0.2	3.7	7.8	11.5	13.6	17.1	14.9	11.2	10.7	5.3	6.2	-0.3
1935	0.7	0.6	3.2	6.9	10.1	15.3	16.6	13.5	15.6	9.0	4.2	2.7	0.6
1936	5.2	-0.1	4.0	6.8	10.8	14.0	16.7	17.0	10.5	10.3	0.9	-0.1	-0.1
1937	-3.0	3.6	6.5	7.6	10.1	13.1	17.6	17.2	13.4	12.8	8.7	3.0	-3.0
1938	3.2	-0.4	1.2	6.9	11.5	17.5	20.7	21.4	13.4	10.6	7.0	3.5	-0.4
1939	2.5	0.5	2.0	7.3	13.0	15.6	20.6	19.7	17.8	13.9	8.2	3.4	0.5
1940	0.6	5.6	1.6	8.0	12.8	15.2	18.4	19.9	16.9	13.0	8.8	4.5	0.6
1941	1.9	4.0	2.0	5.8	11.5	16.5	20.7	19.4	15.3	8.1	5.5	-1.1	-1.1
1942	-4.3	4.4	2.0	9.5	13.2	16.4	18.6	20.0	15.7	12.1	7.4	4.4	-4.3
1943	0.9	2.0	0.4	6.6	11.9	13.7	18.8	18.4	19.3	14.2	10.0	2.0	0.4
1944	0.7	3.2	5.3	6.4	7.9	14.5	20.0	18.6	15.9	12.2	6.9	3.2	0.7
1945	0.3	0.4	0.9	8.0	13.4	18.1	20.1	20.9	18.3	10.7	6.0	2.5	0.3
1946	-3.6	-1.3	4.3	6.0	12.5	15.4	20.9	20.5	17.5	9.2	9.5	2.6	-3.6
1947	0.5	2.3	2.4	7.5	13.6	15.7	21.6	22.4	17.4	8.1	7.4	3.0	0.5
1948	4.2	1.3	1.4	4.4	10.7	15.4	19.3	20.7	16.6	8.4	0.0	-0.4	-0.4
1949	1.3	-1.2	1.5	6.0	14.3	16.3	18.0	18.6	17.1	12.5	9.9	5.6	-1.2
1950	-2.5	-4.6	5.0	8.0	12.1	16.4	18.5	20.2	19.0	9.1	6.2	6.6	-4.6
1951	0.2	5.0	7.3	10.0	12.4	17.0	19.0	20.8	12.8	8.4	5.5	-1.7	-1.7
1952	0.3	1.5	2.8	7.0	11.1	15.5	19.5	20.2	15.3	10.6	6.9	4.3	0.3
1953	2.1	1.7	0.3	8.1	13.6	13.8	18.2	17.5	16.1	6.9	1.2	-0.6	-0.6
1954	-1.1	1.7	3.6	6.4	9.9	15.3	19.5	19.8	15.5	13.1	6.4	2.0	-1.1
1955	3.4	5.2	3.8	6.6	8.8	12.6	17.6	18.5	13.6	12.1	5.4	3.3	3.3
1956	-2.2	0.1	4.0	6.9	9.8	14.8	19.4	19.8	14.9	2.9	2.6	0.0	-2.2
1957	-0.9	1.0	3.9	6.9	11.4	16.8	18.3	17.9	16.0	13.7	3.5	3.0	-0.9
1958	2.3	0.8	2.9	7.8	8.5	15.4	17.8	20.0	15.2	12.0	5.6	3.3	0.8
1959	0.5	0.1	1.0	7.8	13.7	14.8	16.5	18.7	13.5	10.6	4.0	4.9	0.1
1960	1.2	-1.0	4.3	9.1	12.1	15.9	19.5	19.8	15.0	11.7	6.8	7.4	-1.0
1961	-1.7	0.5	0.0	9.0	12.1	15.0	19.9	21.3	15.3	10.4	6.0	2.4	-1.7
1962	4.0	2.6	2.7	7.9	11.3	16.6	18.6	19.6	16.4	13.6	9.9	4.9	2.6
1963	3.0	4.4	3.6	8.4	12.3	15.7	21.9	21.7	15.5	10.9	7.6	0.9	0.9
1964	-3.4	1.3	6.3	7.4	9.3	15.6	19.9	20.4	12.7	12.9	5.9	4.3	-3.4
1965	2.0	0.6	3.1	4.5	8.2	17.4	20.4	19.9	17.0	9.6	5.6	3.8	0.6
1966	2.2	5.0	5.3	7.6	11.3	15.1	18.3	22.4	15.6	13.7	11.3	2.4	2.2
1967	-2.0	1.0	3.4	6.3	10.8	14.5	16.8	20.9	17.3	13.2	3.4	-0.1	-2.0
1968	-1.5	2.9	1.4	9.2	14.6	17.2	21.3	18.9	15.2	12.3	8.2	-1.5	-1.5
1969	-1.2	2.1	6.9	6.7	11.9	17.9	18.3	19.4	17.4	9.8	6.8	6.3	-1.2

2-3-3 Monthly Minimum Temperature at Antalya Meteorological Station (2)

Unit: °C

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Min.
1970	2.7	3.0	6.0	9.5	9.1	16.0	20.3	19.6	12.4	11.8	9.9	3.4	2.7
1971	4.5	1.8	2.0	8.1	12.2	15.2	18.3	20.3	17.5	8.7	6.7	2.9	1.8
1972	0.4	1.0	0.8	9.1	11.5	14.7	19.1	19.3	17.6	10.4	6.3	4.5	0.4
1973	-3.1	5.4	3.7	7.9	14.2	17.3	20.5	21.2	19.3	12.3	5.5	-2.8	-2.8
1974	0.0	2.6	7.4	9.2	11.2	15.2	19.9	20.9	15.2	13.9	8.9	6.0	0.0
1975	6.0	0.8	6.6	7.8	8.9	12.2	16.0	15.3	12.8	8.8	3.8	0.6	0.6
1976	0.0	-1.2	2.7	7.5	10.9	13.4	16.7	16.2	12.4	10.4	5.4	3.5	-1.2
1977	1.0	3.4	0.5	5.1	9.6	13.6	18.4	17.1	15.6	6.2	4.6	2.1	0.5
1978	2.9	2.7	3.4	7.0	10.0	13.2	18.6	15.5	13.8	11.0	6.5	2.9	2.7
1979	-0.6	3.8	4.1	4.8	10.9	15.2	16.9	18.4	12.9	12.5	6.7	1.5	-0.6
1980	-2.0	1.5	2.2	6.3	6.7	11.6	18.2	17.6	12.1	10.0	2.0	1.1	-2.0
Min.	-4.3	-4.6	-0.9	3.3	6.3	11.5	15.0	13.6	10.3	2.9	0.0	-1.7	-4.6

2-3-4 Monthly Average Temperature at Sütcüler Meteorological Station

Unit: °C

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	
1954	3.0	3.7	6.7	9.5	12.0	17.7	20.9	20.4	16.6	11.7	7.7	3.4	
1955	1.0	2.2	-	7.7	13.1	22.0	23.9	21.6	15.4	9.2	4.7	1.9	
1956	1.2	3.2	6.2	10.1	11.8	18.1	21.8	20.5	16.2	12.8	8.8	4.1	
1957	0.7	1.2	2.3	5.9	10.2	-	-	-	-	14.2	8.9	6.6	
1958	2.2	5.2	6.5	14.0	15.7	20.2	24.9	22.0	18.2	13.9	9.8	5.9	
1959	3.9	4.8	7.8	8.0	17.7	21.2	22.7	24.5	21.1	14.9	10.4	6.3	
1970	5.8	5.7	8.2	13.2	15.5	21.3	23.7	24.4	20.1	13.0	10.7	6.2	
1971	6.4	3.6	6.5	10.3	16.6	20.9	23.1	23.1	23.5	13.8	9.6	4.1	
1972	3.1	2.7	7.7	12.0	15.8	20.0	22.2	22.2	20.2	14.0	8.9	5.5	
1973	3.3	5.3	6.1	9.9	17.8	19.8	24.2	23.8	20.7	16.0	7.6	6.5	
1974	1.3	4.9	8.8	9.9	15.2	23.9	25.6	22.6	19.3	17.5	9.3	6.3	
1975	3.5	2.9	8.2	12.2	14.8	19.6	24.0	23.4	20.6	14.9	8.9	6.1	
1976	3.2	1.4	7.1	9.8	15.7	19.6	21.7	22.3	18.7	15.5	10.7	6.1	
1977	2.9	7.0	7.4	10.6	16.8	20.8	25.0	24.7	19.6	12.8	10.4	3.3	
1978	6.1	5.5	7.1	10.6	17.0	20.9	25.2	22.8	17.8	15.5	8.0	5.6	
1979	3.8	6.1	8.3	13.7	14.8	20.4	22.9	23.8	21.1	14.8	9.2	5.5	
1980	2.0	3.5	5.9	9.9	14.6	21.1	24.7	24.6	19.3	15.5	10.3	5.2	
Ave.	3.0	3.9	6.8	10.3	15.1	20.3	23.9	23.3	19.1	14.3	9.1	4.9	

2-3-5 Monthly Maximum Temperature at Sütcüler Meteorological Station

Unit: °C

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Max.
1954	9.5	13.8	16.3	19.8	22.8	33.8	32.0	31.3	25.3	28.5	23.5	31.3	33.8
1955	7.2	6.8	-	15.0	27.0	31.2	37.8	34.4	25.2	18.5	10.0	6.7	37.8
1956	5.2	12.6	12.3	19.1	17.5	25.7	32.4	32.4	23.2	20.7	17.3	12.0	32.4
1957	7.2	5.6	7.4	19.8	17.0	-	-	-	-	25.1	20.1	16.1	25.1
1958	12.0	16.4	19.0	25.5	28.2	30.0	35.0	32.7	31.0	23.5	18.7	13.2	35.0
1959	12.3	12.7	18.2	20.7	31.0	32.3	33.2	34.5	35.5	26.2	20.7	12.7	35.5
1970	15.7	13.5	19.5	28.5	27.4	31.0	33.0	36.0	31.5	23.7	22.3	13.5	36.0
1971	18.3	11.4	17.8	25.5	30.5	32.0	32.5	32.7	32.5	25.2	21.3	14.3	32.7
1972	12.5	13.6	19.8	23.5	29.5	31.7	33.1	33.5	32.0	28.0	19.5	17.5	33.5
1973	14.0	14.3	19.9	22.1	32.5	33.6	35.5	34.5	32.5	32.3	19.3	16.2	35.5
1974	11.6	14.6	21.5	21.4	27.8	31.5	35.9	34.7	30.2	28.7	17.6	12.7	35.9
1975	11.8	12.3	22.8	26.2	28.0	30.2	33.5	35.8	31.2	25.1	19.2	14.0	35.8
1976	11.2	12.2	18.5	23.5	26.1	29.4	31.5	35.6	32.2	29.0	24.2	15.0	35.0
1977	13.2	20.8	25.2	26.0	33.5	30.3	36.5	35.5	33.1	26.5	23.8	15.0	36.5
1978	33.3	17.0	20.5	22.3	28.6	33.7	35.8	35.5	30.0	31.5	20.2	17.5	35.8
1979	14.2	19.2	19.5	25.3	22.5	33.0	35.0	37.0	34.2	29.5	21.2	16.5	37.0
1980	10.0	15.5	21.0	21.3	31.3	35.0	36.0	35.0	30.6	31.0	23.0	16.8	36.0
Max.	18.3	20.8	25.2	28.5	31.3	35.0	37.8	37.0	35.5	31.5	24.2	17.5	37.8

2-3-6 Monthly Minimum Temperature at Sütcüler Meteorological Station

Unit: °C

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Min.
1964	-8.5	-5.7	-2.7	3.8	6.5	9.6	15.5	8.5	4.2	4.3	0.5	-1.9	-8.5
1965	-6.7	1.3	-	0.1	6.0	14.2	14.0	13.2	9.3	1.3	1.5	0.0	-6.7
1966	-3.3	-1.3	-3.5	3.0	7.0	12.0	16.0	13.5	10.0	6.0	4.1	-0.6	-3.5
1967	-4.8	-3.0	-1.3	2.0	6.7	-	-	-	-	7.2	1.5	0.0	-4.8
1968	-10.5	-6.8	-6.7	4.4	10.1	10.2	14.5	12.8	7.2	7.0	3.5	-3.0	-10.5
1969	-8.9	-5.7	0.0	-2.6	7.5	12.5	13.3	17.5	13.5	1.2	0.0	0.5	-8.9
1970	-3.0	-5.1	-2.0	2.0	4.5	9.5	16.0	13.7	5.0	3.5	4.2	-6.8	-6.8
1971	-2.1	-5.5	-7.8	1.5	8.0	9.7	14.0	15.5	12.5	2.0	2.6	-4.5	-7.8
1972	-8.8	-8.0	-3.5	1.6	6.0	10.5	13.0	13.5	12.0	2.2	-2.7	-5.0	-8.8
1973	-8.6	-4.0	-5.6	2.0	7.0	10.3	13.3	14.5	13.8	5.5	-3.4	-3.8	-8.6
1974	-10.5	-5.5	1.5	0.6	7.0	11.0	11.5	14.5	7.5	8.0	0.0	-4.5	-10.5
1975	-4.5	-9.0	-4.4	1.7	4.5	8.5	13.0	14.6	11.2	5.5	-1.0	-5.6	-9.0
1976	-7.8	-9.8	-4.5	3.0	7.0	9.2	14.6	12.6	8.8	-	0.0	-3.0	-9.8
1977	-5.8	-2.8	-5.2	2.0	7.0	11.0	16.3	14.5	10.1	0.0	1.5	-6.0	-6.8
1978	-3.0	-3.5	-3.5	2.0	5.5	9.0	13.5	14.0	8.3	5.2	1.0	-2.0	-3.5
1979	-5.0	-3.0	0.3	1.0	6.5	9.5	11.5	14.7	11.3	7.0	-0.8	-5.0	-5.0
1980	-8.2	-4.5	-5.2	-1.0	2.7	8.0	15.0	15.5	9.3	5.3	-2.5	-2.7	-8.2
Min.	-10.5	-9.8	-7.8	-2.6	2.7	8.0	10.5	8.5	4.2	0.0	-3.4	-6.8	-10.5

2-3-7 Monthly Average Temperature at Serik Meteorological Station

Unit: °C

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
1972	8.5	7.7	11.1	14.1	17.3	22.6	-	23.3	23.9	16.2	10.9	6.6
1973	7.6	7.1	9.0	12.1	16.6	18.3	23.1	23.8	19.8	15.5	9.4	9.8
1974	6.7	9.6	11.8	11.6	16.0	19.3	19.7	21.8	15.0	17.0	11.3	9.0
1975	8.5	8.4	9.2	11.3	16.9	19.7	23.9	25.0	20.9	14.6	9.7	8.5
1976	8.2	6.8	10.5	12.8	17.5	20.5	22.9	20.2	17.8	16.0	12.8	11.0
1977	8.8	10.3	9.3	12.1	15.1	20.1	20.6	23.0	20.7	12.3	12.8	9.0
1978	10.2	10.5	11.3	13.6	16.7	15.0	19.8	20.5	19.3	16.0	9.4	10.7
1979	10.5	11.6	12.8	15.3	19.8	25.8	27.5	26.6	24.9	19.8	14.7	10.6
1980	8.1	7.6	9.4	12.7	15.0	19.1	24.9	22.8	17.0	14.2	12.1	9.4
Ave.	8.6	8.8	10.5	12.8	16.5	20.0	22.8	23.0	19.6	15.8	11.5	9.4

2-3-8 Monthly Maximum Temperature at Serik Meteorological Station

Unit: °C

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Max.
1972	17.0	18.0	22.0	30.5	33.5	37.5	-	39.0	39.0	34.7	24.8	23.5	39.0
1973	20.5	21.2	26.5	25.2	36.5	41.6	43.5	38.1	38.8	37.0	27.4	21.1	43.5
1974	17.6	22.2	25.7	28.5	31.1	37.0	42.0	38.8	35.7	33.4	24.8	19.7	42.0
1975	17.5	19.3	27.3	32.7	33.6	36.8	39.4	38.3	39.4	31.0	26.5	19.8	39.4
1976	19.2	18.5	25.7	28.5	31.3	35.2	37.0	40.5	35.0	35.1	28.2	20.5	40.5
1977	19.7	22.1	27.5	28.5	34.0	35.5	43.0	40.3	38.6	29.7	30.0	19.5	43.0
1978	20.0	20.4	25.5	25.2	33.0	39.5	41.8	39.2	36.7	37.1	25.4	20.4	41.8
1979	20.0	23.0	23.7	31.2	31.3	39.5	40.5	40.2	40.5	34.7	25.9	21.5	43.5
1980	17.5	19.2	24.5	25.1	34.5	37.7	40.9	41.2	34.3	35.2	28.0	20.5	41.2
Max.	20.5	23.0	27.5	32.7	36.5	41.6	43.5	41.2	40.5	37.1	30.0	23.5	43.5

2-3-9 Monthly Minimum Temperature at Serik Meteorological Station

Unit: °C

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Min.
1972	-2.3	-1.1	2.6	6.6	10.1	15.0	-	17.0	14.4	7.8	2.5	-4.7	-4.7
1973	-2.2	0.0	-1.5	5.6	9.9	13.2	16.5	16.7	13.6	5.7	-1.5	1.5	-2.2
1974	-4.3	-2.8	4.0	5.0	8.5	14.5	17.0	17.2	9.2	9.5	0.3	-2.9	-4.3
1975	-2.0	-3.7	0.1	5.8	8.2	12.8	16.3	12.9	11.1	3.2	1.1	-3.2	-3.7
1976	-1.6	-4.2	-2.0	5.5	10.3	12.2	15.8	16.1	9.6	9.2	3.5	0.7	-4.2
1977	0.6	0.2	1.5	5.8	8.6	14.0	16.2	15.0	14.2	3.0	1.2	-0.2	-0.2
1978	0.2	1.0	1.8	7.0	7.5	11.2	16.0	13.6	10.4	8.2	-2.0	0.7	-2.0
1979	-3.0	1.8	2.5	2.8	7.5	13.6	15.5	16.0	11.0	10.9	4.8	0.2	-3.0
1980	-3.0	-1.0	1.0	3.9	5.8	12.1	17.5	15.4	10.0	7.5	-1.1	-1.1	-3.0
Min.	-4.3	-4.2	-2.0	2.8	7.5	11.2	15.8	12.9	9.2	2.8	-2.0	-4.7	-4.7

2-4 Monthly Evaporation at Antalya G.S.

Unit: mm

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1963	90.3	68.9	119.1	151.1	137.1	207.9	305.5	331.2	238.1	157.7	83.7	84.6	1,972.2
1964	69.4	61.3	113.8	166.0	147.9	210.8	234.0	255.0	234.2	122.5	105.1	82.0	1,802.0
1965	85.3	65.2	102.8	107.2	134.1	193.3	280.0	183.3	161.9	116.6	84.8	54.7	1,569.5
1966	61.5	57.4	80.5	83.0	162.3	193.7	231.0	193.1	173.7	135.9	67.5	68.5	1,458.1
1967	79.8	76.7	108.1	106.2	167.0	239.1	330.8	303.1	215.6	151.6	95.3	51.6	1,932.5
1968	82.2	62.6	103.9	122.2	202.9	223.5	261.6	231.5	160.1	112.9	56.1	61.8	1,651.4
1969	63.1	58.5	72.6	134.0	173.3	227.4	311.7	252.9	247.3	123.5	95.7	68.0	1,877.0
1970	82.9	56.0	103.5	149.3	192.4	208.5	190.8	265.3	239.1	150.7	65.5	61.8	1,778.8
1971	68.3	75.9	103.3	122.9	191.6	259.2	232.6	233.3	143.5	159.9	88.6	91.9	1,770.8
1972	69.3	73.7	94.1	118.7	165.1	194.3	195.1	205.0	133.8	108.4	97.7	73.6	1,529.8
1973	64.3	73.4	129.0	118.0	176.6	233.8	239.2	249.5	137.5	148.4	119.2	87.6	1,816.5
1974	76.7	68.2	106.1	135.8	147.2	202.3	316.2	245.8	242.7	125.3	117.6	96.6	1,881.5
1975	77.0	74.1	120.0	141.2	142.7	208.8	252.4	232.5	245.7	160.6	73.3	85.6	1,813.9
1976	78.1	87.2	94.9	121.7	159.3	224.1	243.6	258.3	193.9	104.5	69.7	82.0	1,733.3
1977	75.9	71.3	63.5	112.7	123.9	223.2	357.7	265.3	183.2	148.7	71.0	75.5	1,830.9
1978	72.0	85.2	93.7	153.2	182.7	236.4	287.1	245.4	168.1	185.9	95.6	77.4	1,886.7
1979	71.0	72.4	102.8	126.2	163.2	252.7	270.8	223.7	192.0	122.8	73.9	82.7	1,734.2
1980	70.7	66.9	101.1	106.1	134.2	235.3	233.7	242.6	187.9	129.6	84.3	87.6	1,700.0
Ave.	73.2	71.0	100.7	126.2	153.0	229.7	265.7	239.8	197.9	137.0	85.2	75.2	1,764.6

2-5 Suspended Sediment and Runoff at Beşkonak G.S. (1)

Date	Q (m^3/sec)	C (ppm)	Date	Q (m^3/sec)	C (ppm)
Aug. 28, 1969	42.7	30	Jan. 11, 1973	34.0	46
Oct. 31, 1969	38.3	79	Feb. 10, 1973	58.4	30
Nov. 25, 1969	40.4	43	Mar. 3, 1973	179.0	944
Dec. 29, 1969	194.0	511	Apr. 13, 1973	99.9	89
Jan. 12, 1970	153.0	541	May 8, 1973	87.9	138
Jun. 14, 1970	45.3	44	Jun. 20, 1973	54.2	140
Jun. 24, 1970	51.1	42	Jul. 10, 1973	40.0	32
Jun. 29, 1970	62.5	51	Aug. 20, 1973	34.2	73
Sep. 9, 1970	40.2	28	Sep. 19, 1973	32.4	50
Oct. 13, 1970	39.7	15	Oct. 19, 1973	30.1	129
Nov. 10, 1970	42.6	15	Nov. 23, 1973	30.1	33
Dec. 10, 1970	53.2	25	Dec. 15, 1973	38.5	54
Jan. 12, 1971	102.0	57	Jan. 27, 1974	38.1	114
Feb. 27, 1971	146.0	208	Feb. 26, 1974	190.0	1,065
Mar. 14, 1971	86.0	51	Mar. 23, 1974	125.0	54
Apr. 10, 1971	101.0	24	Apr. 13, 1974	71.6	16
May 16, 1971	78.9	100	May 16, 1974	66.0	48
Jun. 11, 1971	68.9	151	Jun. 15, 1974	46.8	12
Jul. 13, 1971	43.7	25	Jul. 13, 1974	35.2	41
Aug. 14, 1971	36.7	20	Aug. 13, 1974	33.5	28
Sep. 13, 1971	33.5	35	Nov. 20, 1974	34.1	35
Nov. 26, 1971	71.1	172	Dec. 18, 1974	185.0	479
Dec. 16, 1971	114.0	85	Jan. 4, 1975	196.0	346
Jan. 22, 1972	69.1	51	Feb. 18, 1975	116.2	52
Feb. 17, 1972	175.0	25	Mar. 18, 1975	116.2	93
Mar. 14, 1972	83.3	7	Apr. 18, 1975	130.0	257
Apr. 9, 1972	83.8	9	May 16, 1975	183.0	437
Jun. 7, 1972	54.5	100	Jun. 13, 1975	86.7	56
Jul. 23, 1972	36.9	170	Jul. 8, 1975	60.8	50
Aug. 13, 1972	36.8	54	Aug. 26, 1975	40.4	39
Sep. 18, 1972	35.6	79	Sep. 13, 1975	37.9	30
Nov. 23, 1972	34.2	47	Oct. 21, 1975	35.7	29
Dec. 18, 1972	40.2	33	Nov. 14, 1975	35.0	21

2-5 Suspended Sediment and Runoff at Beşkonak G.S. (2)

Date	Q (m^3/sec)	C (ppm)	Date	Q (m^3/sec)	C (ppm)
Dec. 27, 1975	86.0	215	Sep. 12, 1978	43.8	31
Jan. 20, 1976	122.0	74	Oct. 17, 1978	36.5	17
Feb. 22, 1976	74.3	25	Nov. 22, 1978	39.0	19
Mar. 12, 1976	68.6	35	Dec. 22, 1978	96.2	11
Apr. 17, 1976	256.0	1,391	Jan. 9, 1979	136.4	104
May 15, 1976	75.6	47	Feb. 23, 1979	118.0	34
Jun. 11, 1976	61.8	24	Mar. 23, 1979	91.7	56
Jul. 17, 1976	47.0	65	Apr. 12, 1979	79.0	9
Aug. 22, 1976	41.0	31	May 17, 1979	88.0	40
Sep. 18, 1976	33.7	45	Jun. 15, 1979	72.3	26
Oct. 10, 1976	89.5	69	Jul. 9, 1979	54.4	85
Oct. 16, 1976	76.0	449	Aug. 14, 1979	39.6	19
Nov. 20, 1976	39.1	98	Sep. 28, 1979	34.8	21
Dec. 29, 1976	133.0	143	Oct. 18, 1979	36.0	14
Jan. 14, 1977	55.0	323	Nov. 16, 1979	57.6	49
Feb. 4, 1977	83.2	68	Dec. 21, 1979	132.0	109
Mar. 19, 1977	88.3	15	Jan. 14, 1980	117.0	75
Apr. 15, 1977	88.2	59	Feb. 15, 1980	134.7	103
May 14, 1977	82.7	31	Mar. 22, 1980	98.2	117
Jun. 16, 1977	54.5	25	Apr. 10, 1980	137.2	139
Jul. 14, 1977	42.9	6	May 16, 1980	90.7	20
Aug. 13, 1977	38.2	39	Jun. 20, 1980	57.2	16
Sep. 23, 1977	35.5	7	Jul. 17, 1980	41.0	8
Oct. 15, 1977	33.1	3	Aug. 22, 1980	35.2	11
Dec. 13, 1977	37.7	23			
Jan. 8, 1978	248.0	352	Ave.		112.4
Jan. 9, 1978	193.0	168			
Feb. 7, 1978	308.0	598			
Mar. 17, 1978	92.1	61			
Apr. 15, 1978	144.6	101			
May 16, 1978	120.0	55			
Jun. 15, 1978	70.8	49			
Aug. 23, 1978	40.0	12			

2-6 Historical Floods observed at Beşkonak G.S. (1)

Date	Time (hr.)	Discharge (m^3/sec)
Jan. 29, 1973	1	202
Jan. 29, 1973	12	180
Jan. 29, 1973	18	94
Jan. 30, 1973	6	387
Jan. 30, 1973	9	259
Jan. 30, 1973	14	395
Jan. 30, 1973	24	195
Jan. 31, 1973	24	107
Feb. 1, 1973	10	94
Feb. 1, 1973	24	84.5
Feb. 2, 1973	24	72.5
Feb. 4, 1973	24	63.2
Feb. 5, 1973	24	59.3
Feb. 6, 1973	24	58
Feb. 7, 1973	24	56.9
Feb. 8, 1973	24	55.8
Feb. 9, 1973	24	55.7
Feb. 10, 1973	24	55
Feb. 11, 1973	24	61.9
Feb. 12, 1973	24	83
Feb. 13, 1973	24	130
Feb. 14, 1973	24	111
Feb. 15, 1973	24	92.4
Feb. 16, 1973	24	84.5
Feb. 17, 1973	24	78.5
Feb. 18, 1973	24	86
Feb. 19, 1973	24	86
Feb. 20, 1973	24	78.5
Feb. 21, 1973	24	75.5
Feb. 22, 1973	24	69.7
Feb. 23, 1973	24	64.5
Feb. 24, 1973	24	194
Feb. 25, 1973	24	130
Feb. 26, 1973	20	752
Feb. 27, 1973	10	453
Feb. 28, 1973	15	620
Feb. 28, 1973	24	515
Mar. 1, 1973	24	268
Mar. 2, 1973	24	201
Mar. 3, 1973	24	168

Date	Time (hr.)	Discharge (m^3/sec)
Dec. 31, 1974	12	66
Dec. 31, 1974	24	68.8
Jan. 1, 1975	12	105
Jan. 1, 1975	24	230
Jan. 2, 1975	6	515
Jan. 2, 1975	14	680
Jan. 2, 1975	24	515
Jan. 3, 1975	12	294
Jan. 4, 1975	12	206
Jan. 5, 1975	12	166
Jan. 6, 1975	12	143
Jan. 7, 1975	12	124
Jan. 8, 1975	12	114
Jan. 8, 1975	24	114
Jan. 9, 1975	24	515
Jan. 10, 1975	24	246
Jan. 11, 1975	24	175
Jan. 12, 1975	24	143
Jan. 13, 1975	24	124

Date	Time (hr.)	Discharge (m^3/sec)
Dec. 18, 1975	24	66.8
Dec. 19, 1975	12	66.6
Dec. 19, 1975	18	77.2
Dec. 19, 1975	22	103
Dec. 20, 1975	6	240
Dec. 20, 1975	12	350
Dec. 20, 1975	24	236
Dec. 21, 1975	12	185
Dec. 21, 1975	24	156

2-6 Historical Floods observed at Beşkonak G.S. (2)

Date	Time (hr.)	Discharge (m^3/sec)
Dec. 31, 1977	24	68.8
Jan. 1, 1978	12	70.2
Jan. 1, 1978	19	80
Jan. 1, 1978	24	166
Jan. 2, 1978	5	392
Jan. 2, 1978	9	918
Jan. 2, 1978	12	870
Jan. 2, 1978	24	475
Jan. 3, 1978	8	324
Jan. 3, 1978	12	280
Jan. 3, 1978	24	213
Jan. 4, 1978	12	183
Jan. 4, 1978	24	164
Jan. 5, 1978	12	151
Jan. 5, 1978	24	138
Jan. 6, 1978	12	130

Date	Time (hr.)	Discharge (m^3/sec)
Jan. 18, 1978	0	113
Jan. 18, 1978	8	114
Jan. 18, 1978	14	128
Jan. 18, 1978	22	101
Jan. 18, 1978	24	126
Jan. 19, 1978	12	143
Jan. 19, 1978	21	156
Jan. 20, 1978	3	815
Jan. 20, 1978	10	1,200
Jan. 20, 1978	24	425
Jan. 21, 1978	12	300
Jan. 21, 1978	24	246
Jan. 22, 1978	5	239
Jan. 22, 1978	11	351
Jan. 22, 1978	18	271
Jan. 23, 1978	1	345
Jan. 23, 1978	12	268
Jan. 23, 1978	24	239

Date	Time (hr.)	Discharge (m^3/sec)
Jan. 30, 1978	12	156
Jan. 31, 1978	12	152
Jan. 31, 1978	16	154
Jan. 31, 1978	21	366
Jan. 31, 1978	23	348
Feb. 1, 1978	1	381
Feb. 1, 1978	12	264
Feb. 1, 1978	18	252
Feb. 1, 1978	24	280
Feb. 2, 1978	12	425
Feb. 2, 1978	24	315
Feb. 3, 1978	15	258
Feb. 4, 1978	9	239
Feb. 4, 1978	18	425
Feb. 4, 1978	22	303
Feb. 5, 1978	8	432
Feb. 5, 1978	24	315
Feb. 6, 1978	4	297
Feb. 6, 1978	8	415
Feb. 6, 1978	12	421
Feb. 6, 1978	24	360
Feb. 7, 1978	12	315
Feb. 7, 1978	24	286
Feb. 8, 1978	12	300
Feb. 8, 1978	24	425
Feb. 9, 1978	12	345
Feb. 9, 1978	24	315
Feb. 10, 1978	12	271
Feb. 11, 1978	12	212
Feb. 12, 1978	12	194
Feb. 13, 1978	12	173
Feb. 14, 1978	12	160
Feb. 15, 1978	12	149
Feb. 15, 1978	24	271
Feb. 16, 1978	2	286
Feb. 16, 1978	24	235
Feb. 17, 1978	24	192
Feb. 18, 1978	12	181
Feb. 18, 1978	24	246

2-6 Historical Floods observed at Beşkonak G.S. (3)

Date	Time (hr.)	Discharge (m^3/sec)
Mar. 21, 1978	12	98
Mar. 22, 1978	24	145
Mar. 23, 1978	12	327
Mar. 23, 1978	24	216
Mar. 24, 1978	12	179
Mar. 24, 1978	24	166
Mar. 25, 1978	12	152
Mar. 25, 1978	24	147
Mary 26, 1978	14	477
Mar. 26, 1978	24	309
Mar. 27, 1978	12	246
Mar. 28, 1978	12	212
Mar. 29, 1978	12	190
Mar. 29, 1978	20	179
Mar. 30, 1978	3	184
Mar. 30, 1978	20	158
Mar. 31, 1978	16	154

Date	Time (hr.)	Discharge (m^3/sec)
Nov. 27, 1978	24	42.4
Nov. 28, 1978	12	42.4
Nov. 28, 1978	17	44
Nov. 28, 1978	18	48.5
Nov. 29, 1978	24	123
Nov. 29, 1978	2	191
Nov. 29, 1978	4	168
Nov. 29, 1978	5	157
Nov. 29, 1978	7	158
Nov. 29, 1978	8	215
Nov. 29, 1978	9	176
Nov. 29, 1978	11	299
Nov. 29, 1978	12	360
Nov. 29, 1978	13	366
Nov. 29, 1978	14	425
Nov. 29, 1978	14.30	725
Nov. 29, 1978	15	840
Nov. 29, 1978	17	603
Nov. 29, 1978	18	664
Nov. 29, 1978	21	425
Nov. 30, 1978	24	312
Nov. 30, 1978	8	256
Nov. 30, 1978	12	237
Nov. 30, 1978	24	177
Dec. 1, 1978	12	147
Dec. 1, 1978	24	130
Dec. 2, 1978	12	124
Dec. 2, 1978	24	118
Dec. 3, 1978	12	113
Dec. 3, 1978	24	106
Dec. 4, 1978	12	93.6
Dec. 4, 1978	24	94.5

2-6 Historical Floods observed at Beşkonak G.S. (4)

Date	Time (hr.)	Discharge (m^3/sec)
Jan. 26, 1980	8	80.1
Jan. 26, 1980	12	84.1
Jan. 26, 1980	16	83.4
Jan. 26, 1980	19	86
Jan. 26, 1980	22	93
Jan. 26, 1980	24	95.8
Jan. 27, 1980	4	103
Jan. 27, 1980	12	106
Jan. 27, 1980	17	109
Jan. 27, 1980	23	123
Jan. 27, 1980	24	138
Jan. 28, 1980	2	142
Jan. 28, 1980	4	200
Jan. 28, 1980	8	312
Jan. 28, 1980	10	280
Jan. 28, 1980	13	271
Jan. 28, 1980	16	242
Jan. 28, 1980	18	219
Jan. 28, 1980	24	193
Jan. 29, 1980	8	168
Jan. 29, 1980	12	159
Jan. 29, 1980	17	149
Jan. 29, 1980	22	144
Jan. 29, 1980	24	142
Jan. 30, 1980	8	135
Jan. 30, 1980	12	131
Jan. 30, 1980	16	128
Jan. 30, 1980	24	123
Jan. 31, 1980	8	115
Jan. 31, 1980	12	114
Jan. 31, 1980	24	108
Feb. 1, 1980	12	102
Feb. 1, 1980	24	97.2
Feb. 2, 1980	12	94.4
Feb. 2, 1980	24	90.2
Feb. 3, 1980	12	88.1
Feb. 3, 1980	24	86

A—3

GEOLOGICAL DATA

3-1 Log of Drillhole

3-2 P-Q Diagram

3-1 Log of Drillhole (scale 1:1,000)

Original data is the log of drillhole (scale 1:100) attached to Sumerman's report, entitled "The Geological Engineering Investigation of Koprucay - Beskonak Dam Site and Grout Curtain Courses (1973)".

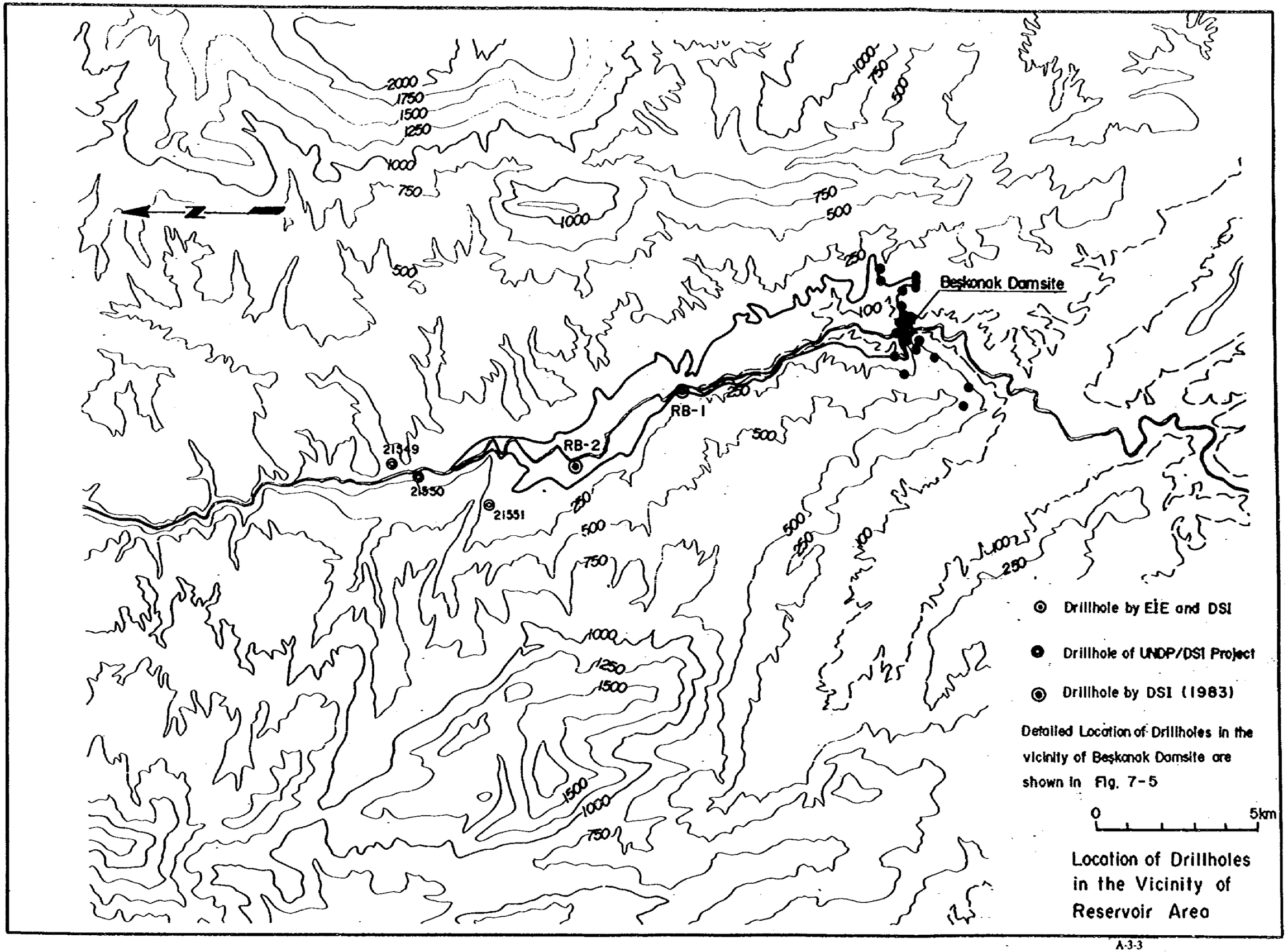
In calculating the Lugeon value, hydro static head is considered in addition to the gauge pressure.

List of Drillholes at Beskonak Dam Site and its Vicinity

Name	Elevation (m)	Coordination		Length (m)	Remarks
		X	Y		
*LS-1	180.24	4,103,863.29	609,625.83	360.00	Inclined hole (53°)
*LSI-2	177.05	4,103,823.93	609,734.37	392.23	
*RS-3	89.83	4,103,891.09	609,427.18	140.10	In Adit RT-3
*LS-4	72.59	4,103,948.43	609,590.69	90.20	In Adit LT-1
*LS-5	113.73	4,103,948.84	609,656.59	125.00	In Adit LT-2
LS-6	196.74	4,103,745.98	609,894.05	400.22	
*RH-7	-	-	-	150.70	
*RH-8	-	-	-	125.00	
RH-10	-	-	-	150.25	
LS-11	193.22	4,103,811.40	610,193.62	300.00	
RS-12	115.40	4,104,040.99	608,722.27	150.00	
RS-13	243.90	4,103,685.95	609,225.64	353.23	
LS-14	207.62	4,103,806.20	610,569.61	330.17	
RS-15	267.71	4,103,463.14	609,051.62	314.80	
RS-16	198.86	4,103,421.63	609,264.01	230.00	
LS-17	136.75	4,103,565.07	609,903.42	190.00	
RS-18	297.64	4,102,666.64	608,592.24	371.00	
LS-19	194.14	4,104,551.58	611,376.23	431.00	
RS-20	289.52	4,101,652.78	607,867.06	375.00	
LS-21	137.94	4,104,417.59	610,852.60	228.00	
RS-22	254.70	4,103,792.75	608,257.28	260.00	
LS-23	68.68	4,104,128.61	609,744.94	152.00	
RS-24	272.20	-	-	320.00	
H1	164.79	4,103,540.21	610,709.94	100.00	Secondary damsite
H2	143.95	4,103,527.75	610,821.18	200.00	"
H3	164.05	4,103,524.00	610,960.37	65.00	"
Total	26 holes			6,310.68	

Note 1: Drillholes except RS-24, which was drilled by DSI in 1977, were drilled by EIE between 1967 and 1971.

2: Drillhoes marked with * are located at Damsite


2000
1750
1500
1250
1000
750
500
250
100
Beşkonak Damsite
RB-1
RB-2
21549
21550
21551
Drillhole by EİE and DSI
Drillhole of UNDP/DSI Project
Drillhole by DSI (1983)
Detailed Location of Drillholes in the vicinity of Beşkonak Damsite are shown in Fig. 7-5
0
5km
Location of Drillholes in the Vicinity of Reservoir Area

LEGEND OF FACIES IN BORING LOG


SAND and GRAVEL

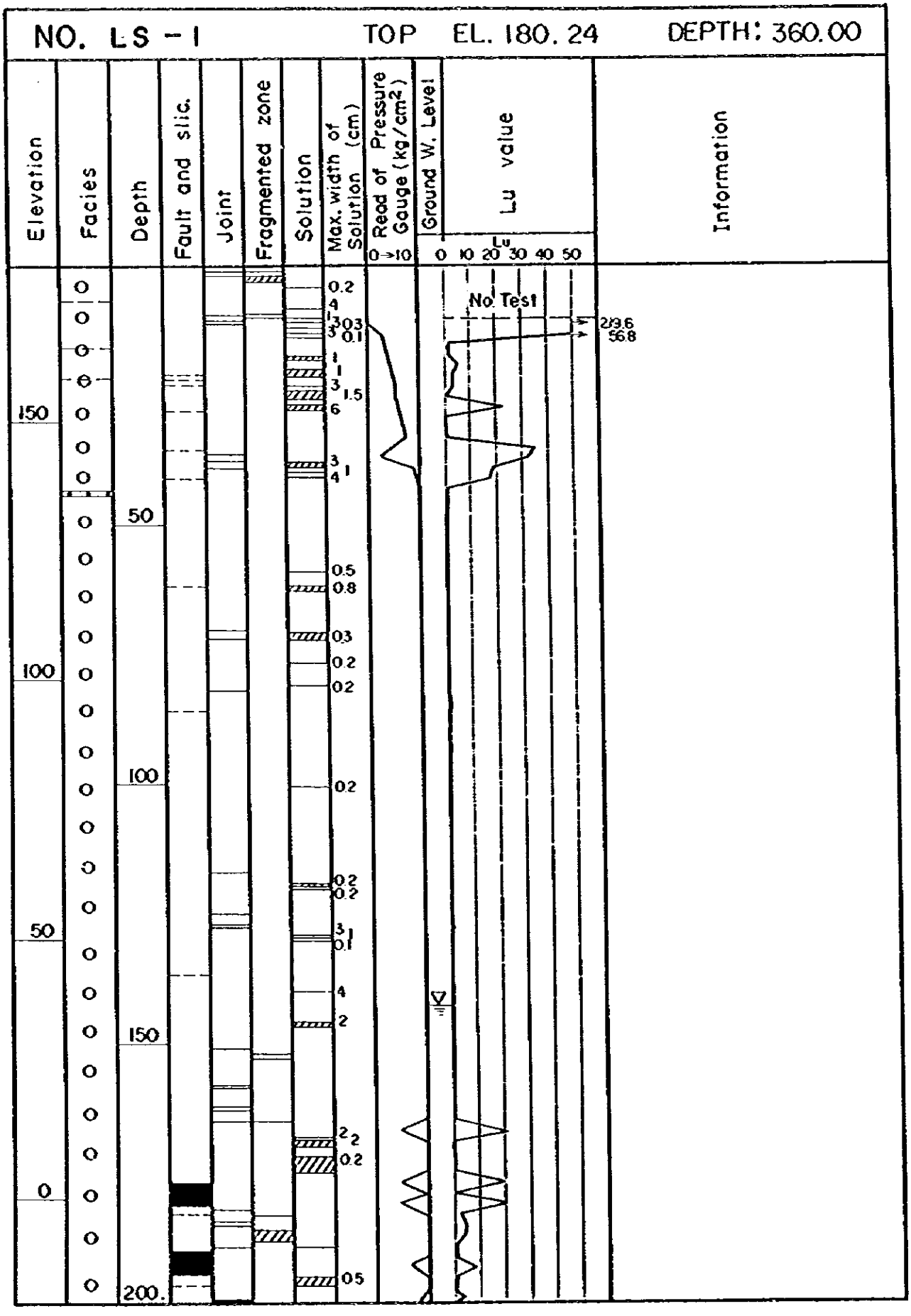

SHALE

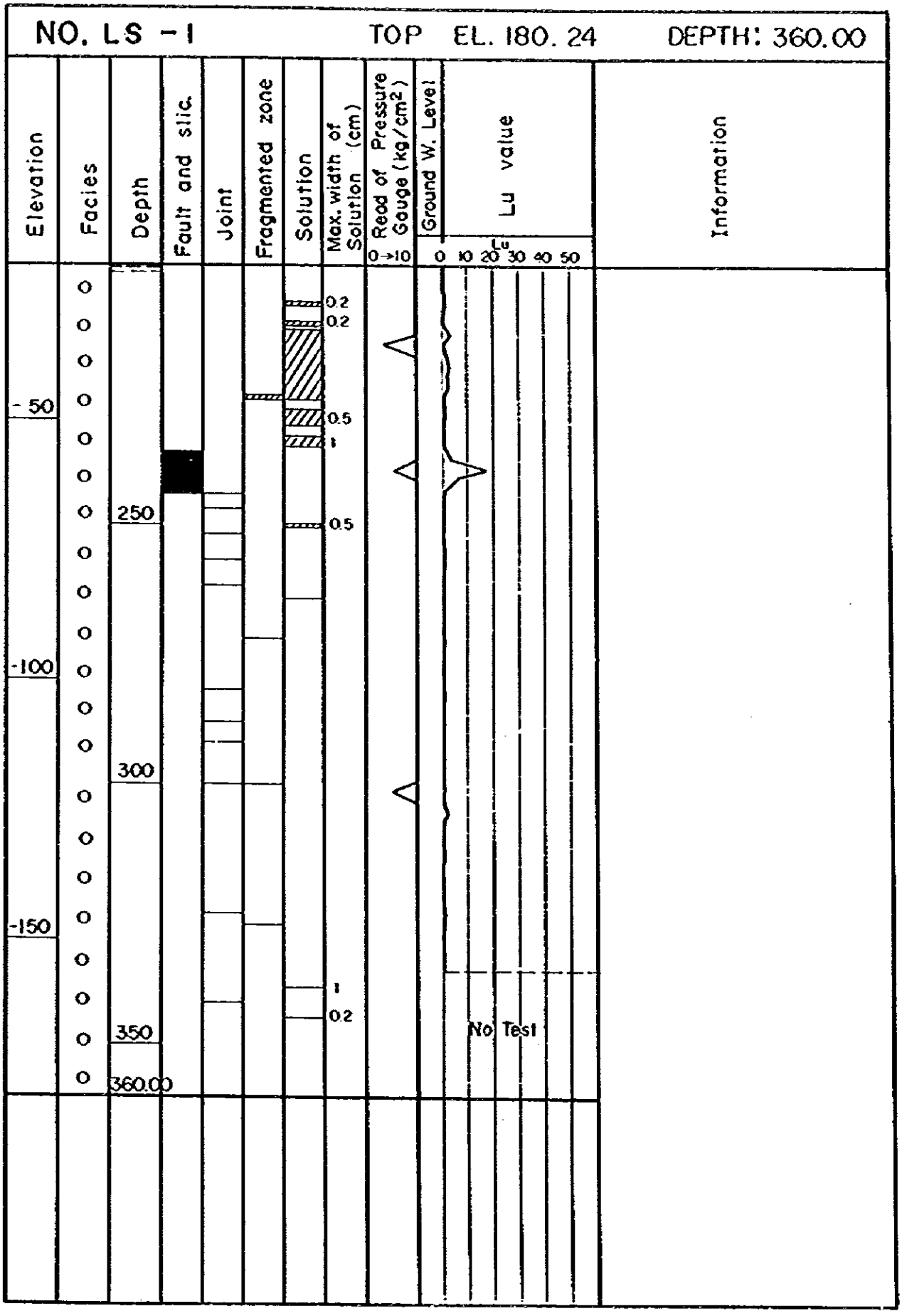

ALTERNATION of SHALE and SANDSTONE

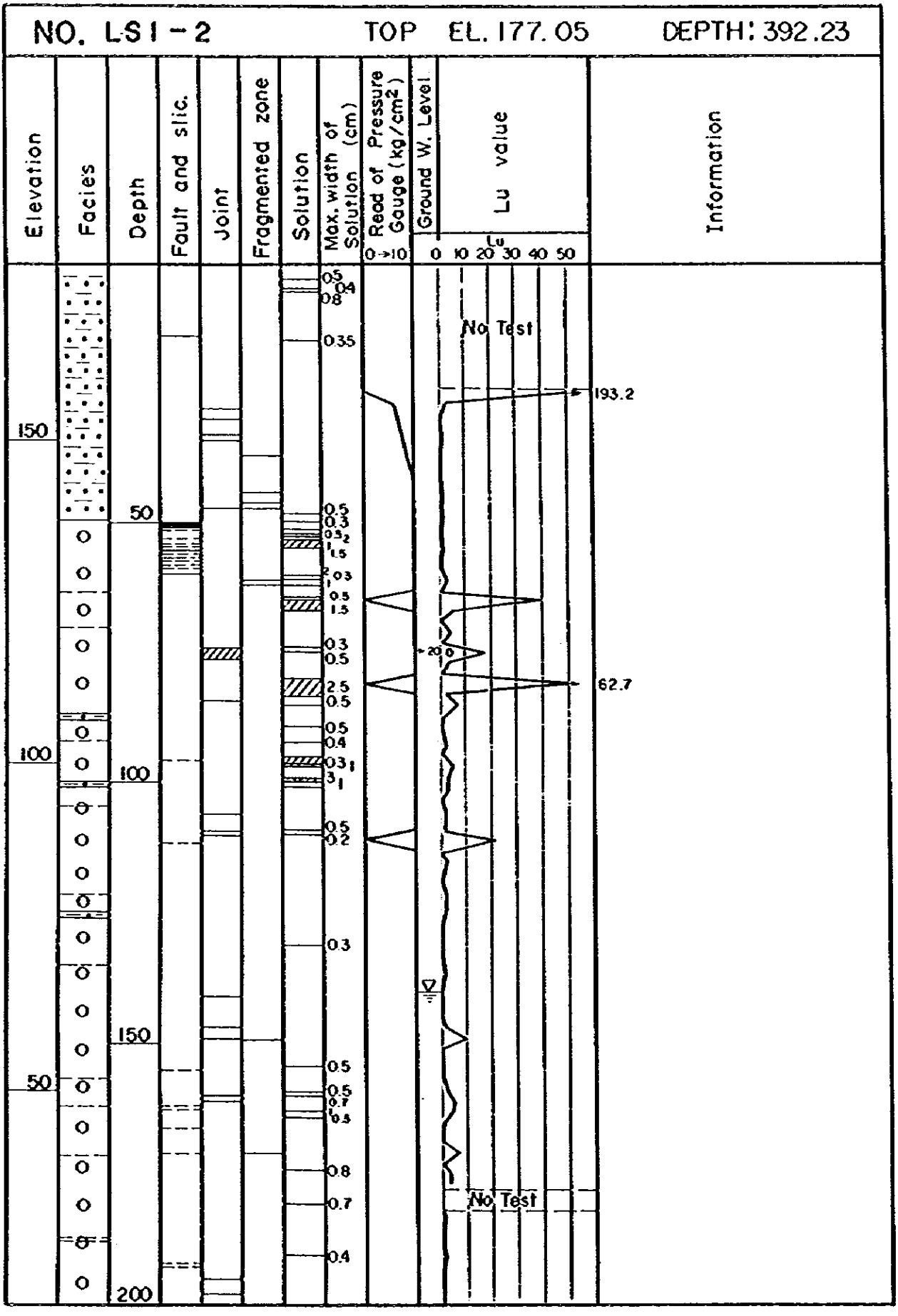

SANDSTONE

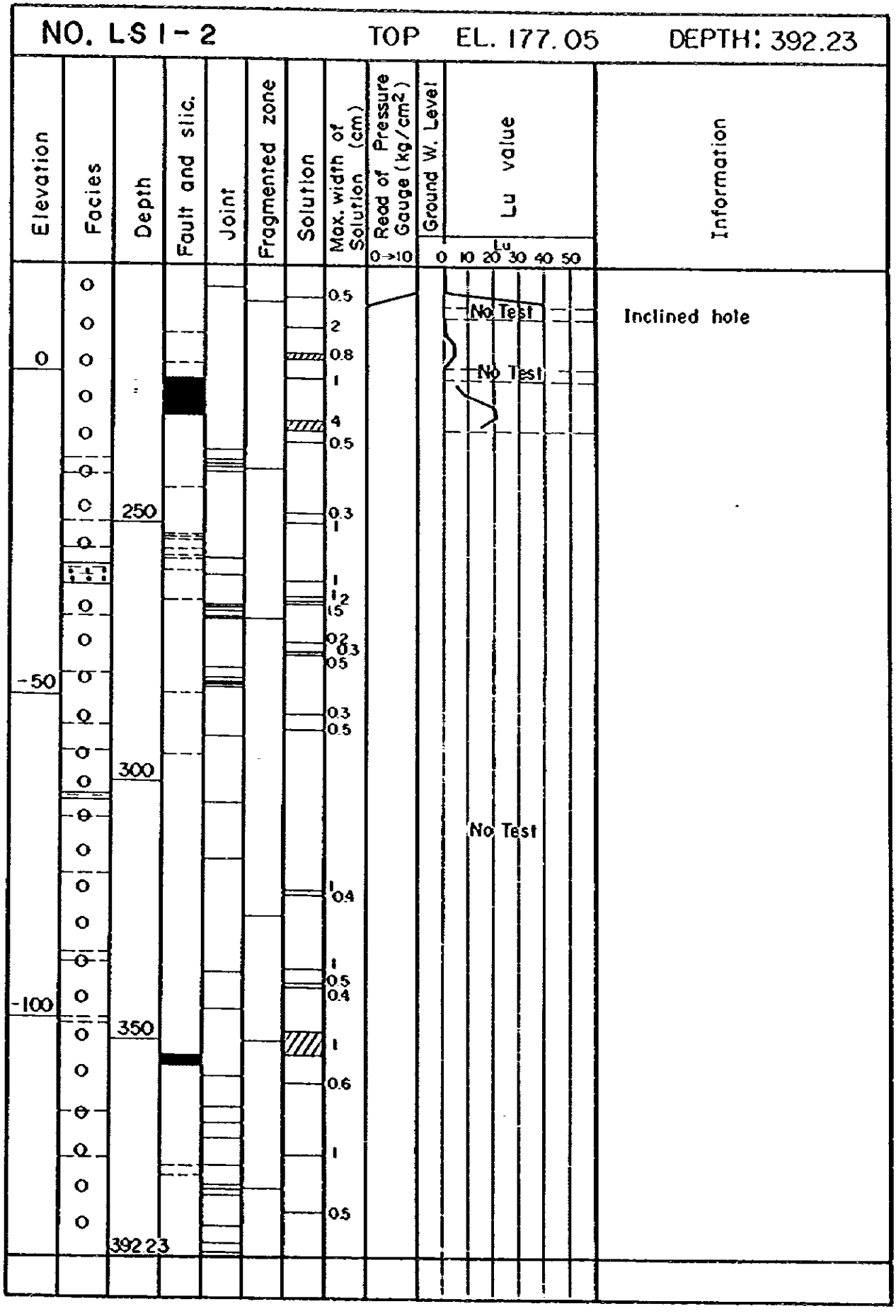

CONGLOMERATE

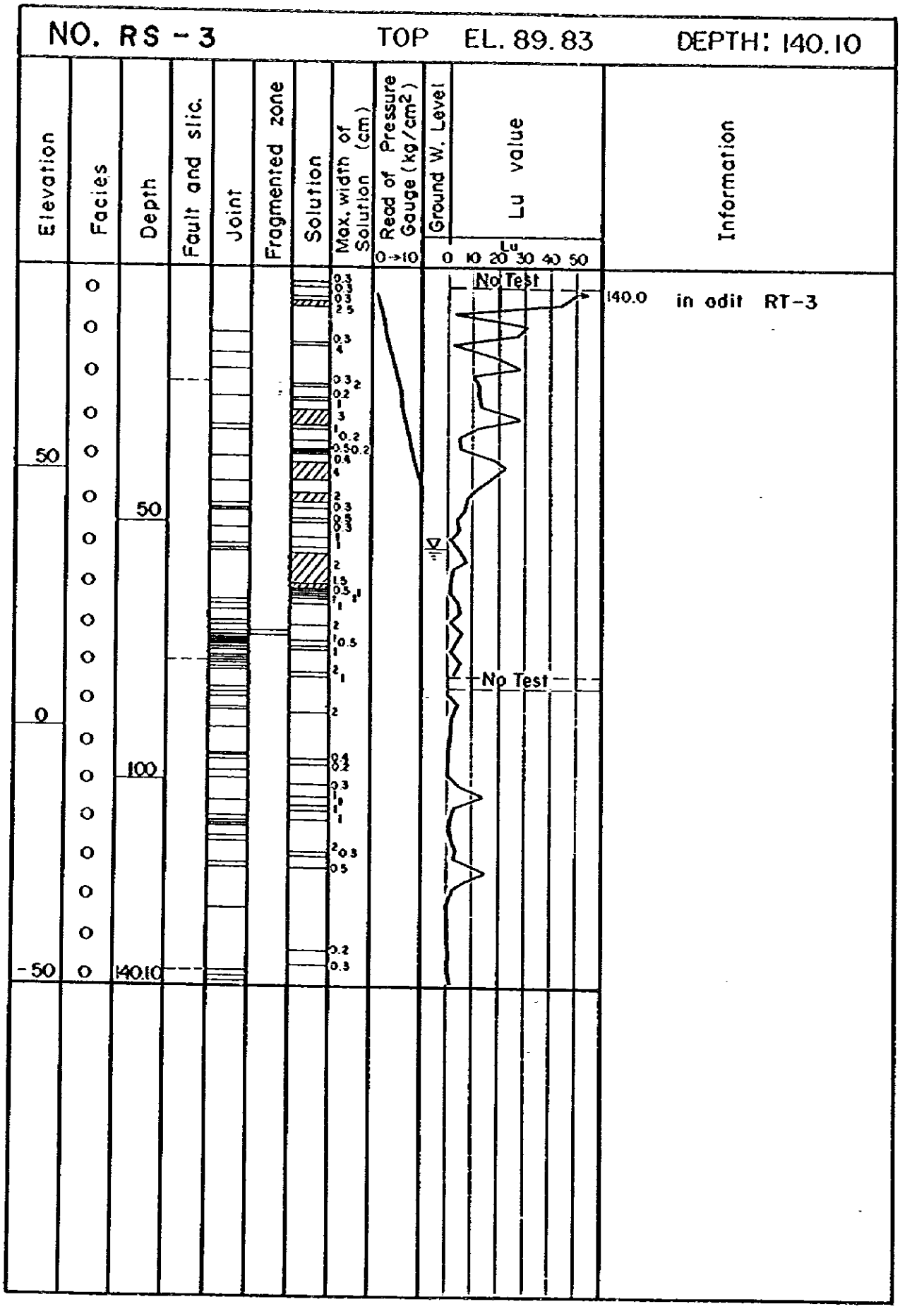

THIN SHALE

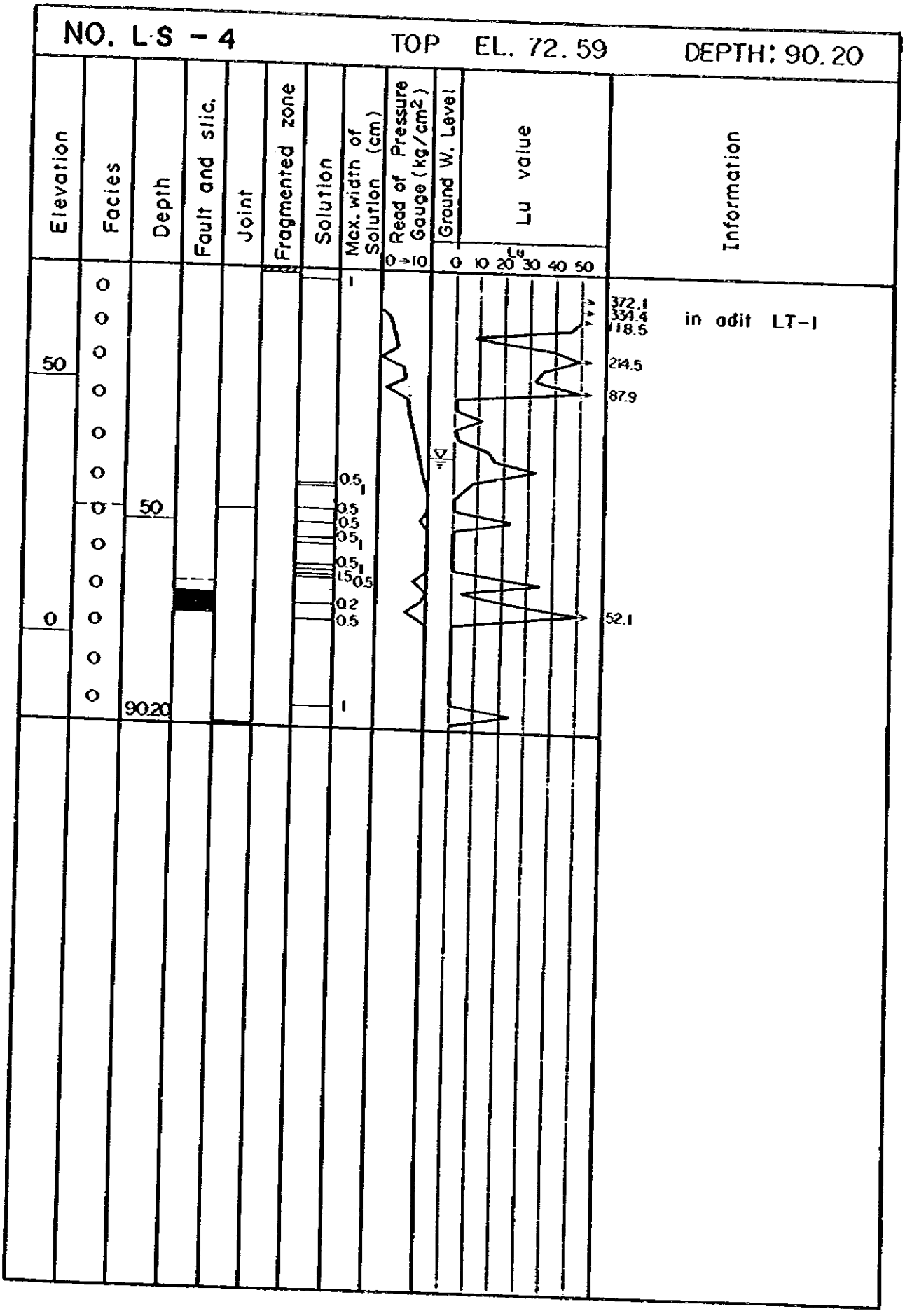

NO. LS-1
TOP EL. 180.24
DEPTH: 360.00
Elevation
Facies
Depth
Fault and slic.
Joint
Fragmented zone
Solution
Max. width of Solution (cm)
Read of Pressure Gauge (kg/cm2)
Ground W. Level
Lu value
Information
0→10
0 10 20 30 40 50
Lu
No. Test
2/3.6
5/6.8
150
100
50
0
50
100
150
200.
0.2
4
3
3
0.3
0.1
1
1
3
1.5
6
3
4
1
0.5
0.8
0.3
0.2
0.2
0.2
0.2
3
1
0.1
4
2
2
2
0.2
0.5

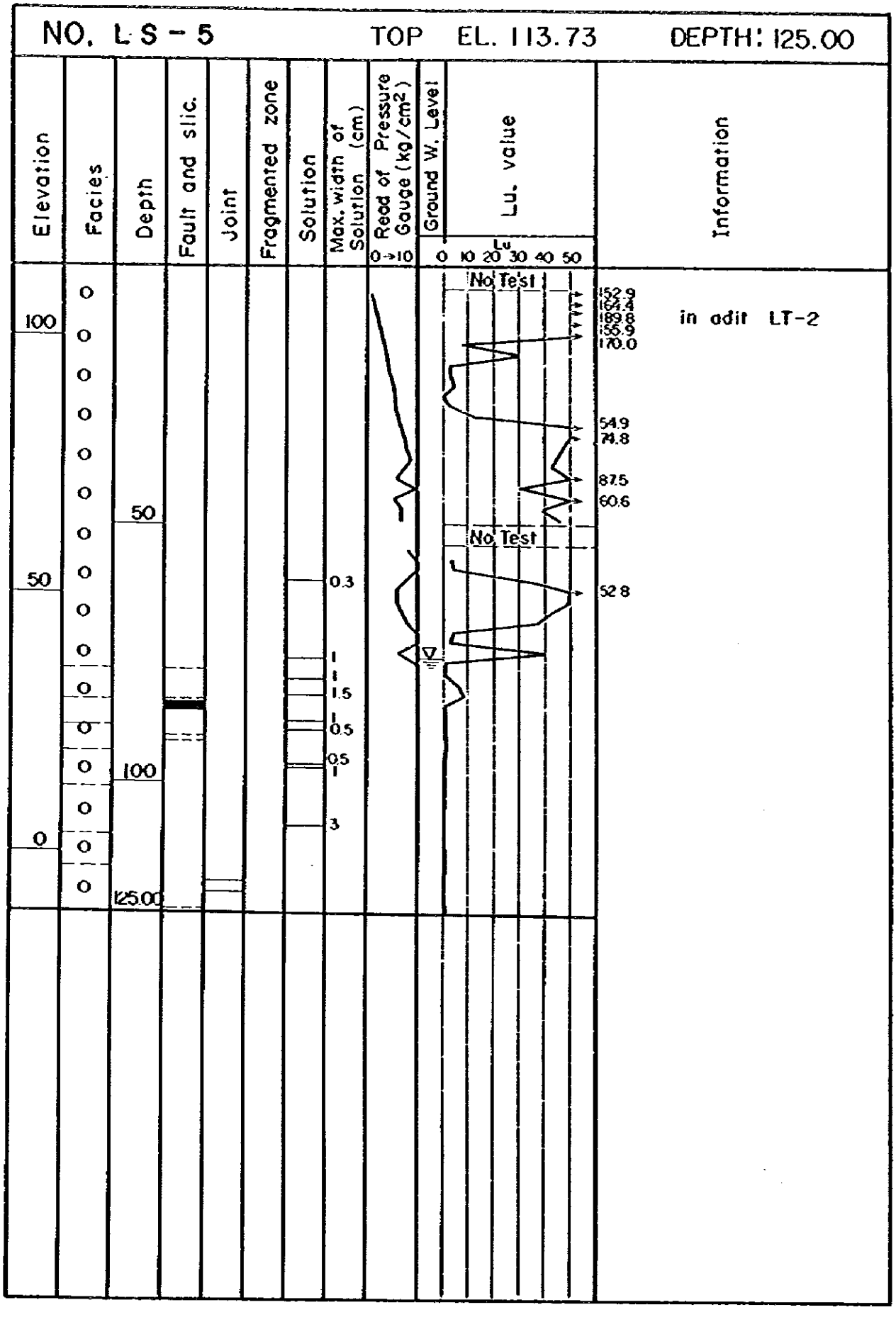

NO. LS -1
TOP EL. 180.24
DEPTH: 360.00
Elevation
Facies
Depth
Fault and slic.
Joint
Fragmented zone
Solution
Max. width of Solution (cm)
Read of Pressure Gauge (kg/cm²)
0 → 10
Ground W. Level
Lu value
0 10 20 30 40 50
Information
-50
-100
-150
250
300
350
360.00
0.2
0.2
0.5
1
0.5
1
0.2
No Test

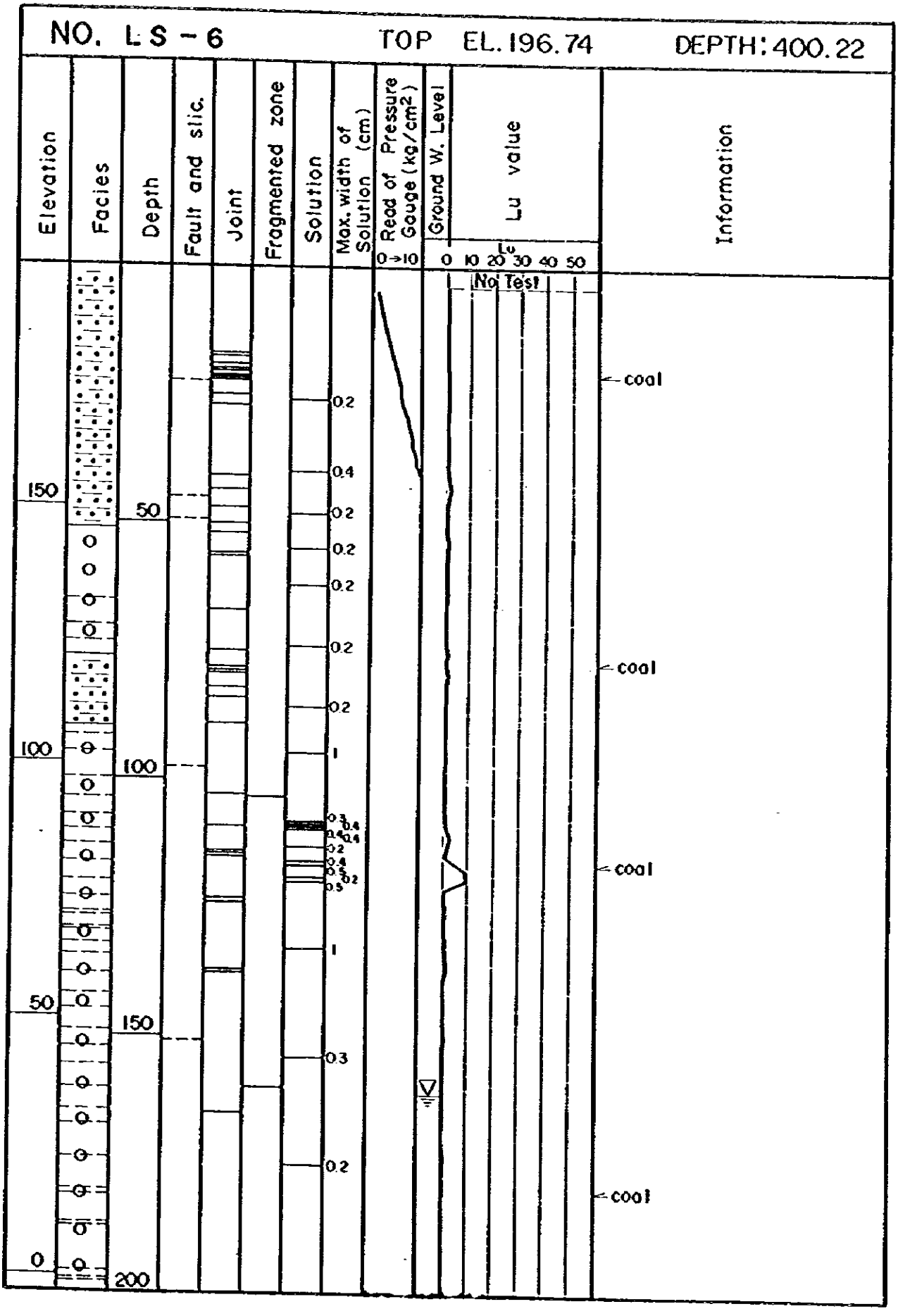

NO. LS1-2
TOP EL. 177.05
DEPTH: 392.23
Elevation
Facies
Depth
Fault and slic.
Joint
Fragmented zone
Solution
Max. width of Solution (cm)
Read of Pressure Gauge (kg/cm²)
Ground W. Level
Lu value
Information
0→10
0 10 20 30 40 50
150
100
50
50
100
150
200
No Test
193.2
62.7
No Test

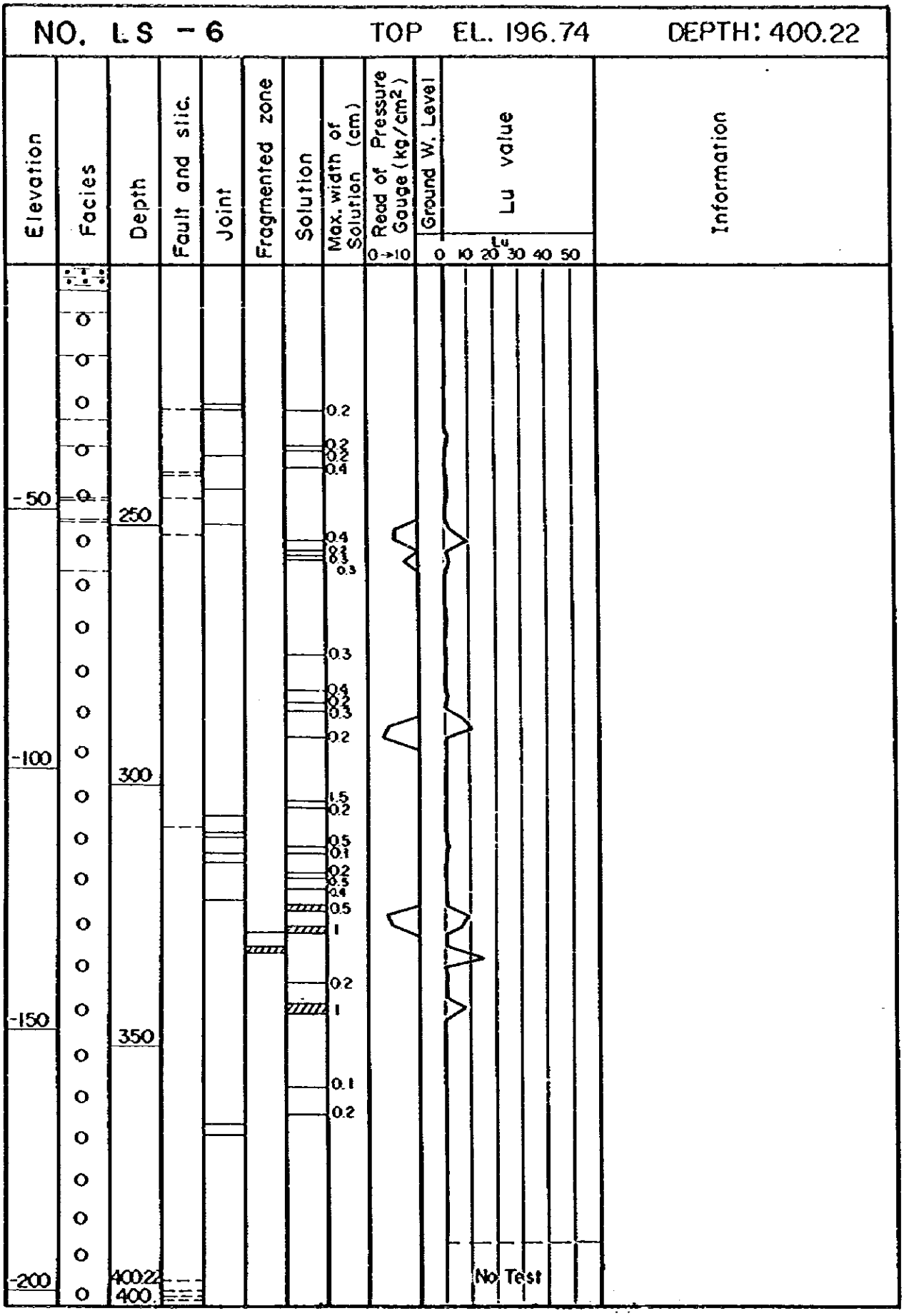

NO. LS I - 2
TOP EL. 177.05
DEPTH: 392.23
Elevation
Facies
Depth
Fault and slic.
Joint
Fragmented zone
Solution
Max. width of Solution (cm)
Read of Pressure Gauge (kg/cm²)
0→10
Ground W. Level
Lu value
0 10 20 30 40 50
Information
0
-50
-100
250
300
350
392.23
No Test
No Test
No Test
Inclined hole

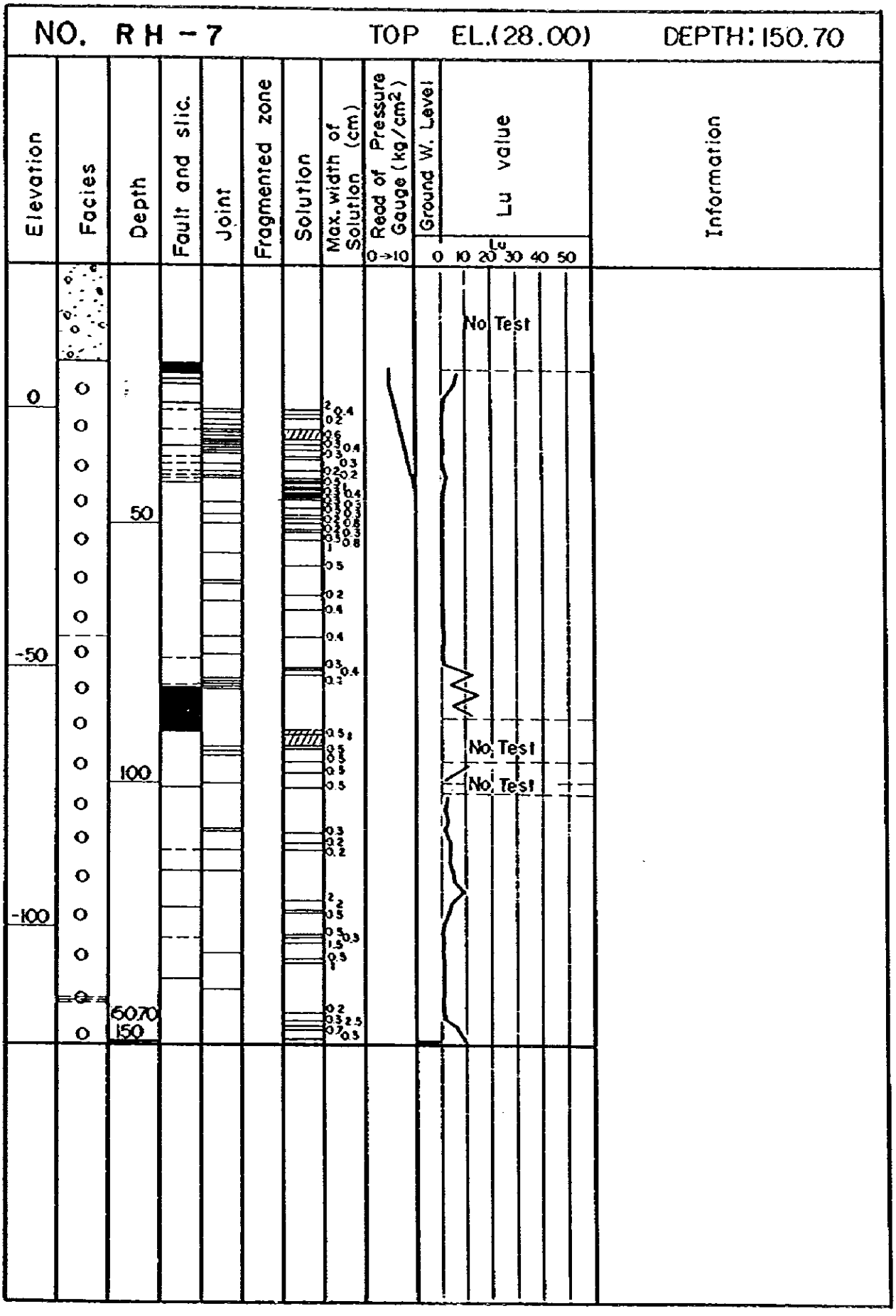

NO. RS - 3
TOP EL. 89.83
DEPTH: 140.10
Elevation
Facies
Depth
Fault and slic.
Joint
Fragmented zone
Solution
Max. width of Solution (cm)
Read of Pressure Gauge (kg/cm²)
0→10
Ground W. Level
Lu value
0 10 20 30 40 50
Information
No Test
140.0
in adit RT-3
No Test
50
0
-50
50
100
140.10

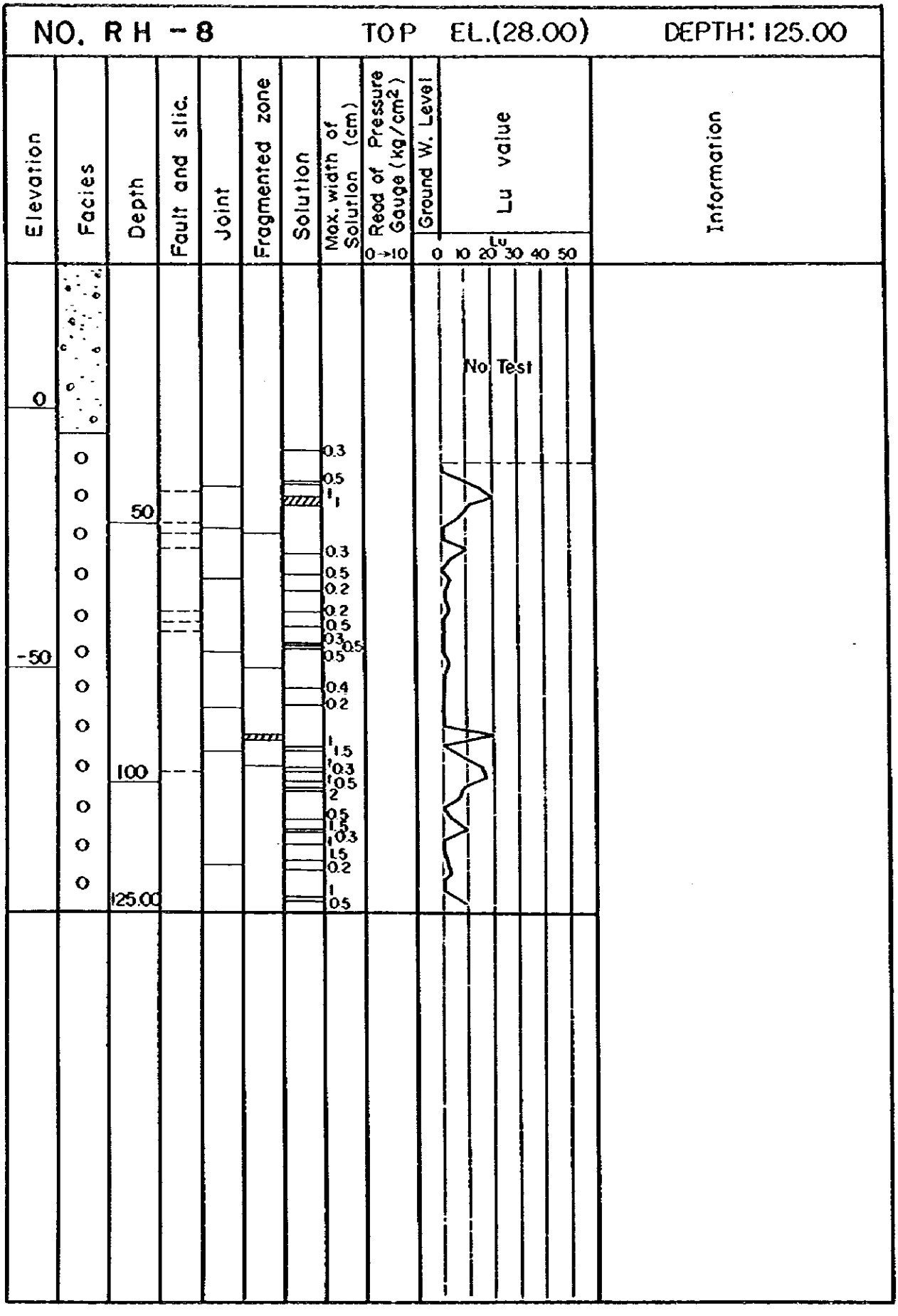

NO. L-S - 4
TOP EL. 72.59
DEPTH: 90.20
Elevation
Facies
Depth
Fault and slic.
Joint
Fragmented zone
Solution
Max. width of Solution (cm)
Read of Pressure Gauge (kg/cm2)
0→10
Ground W. Level
Lu value
0 10 20 30 40 50
Information
50
0
50
90.20
0.5
0.5
0.5
0.5
1.5
0.5
0.2
0.5
372.1
334.4
318.5
214.5
87.9
52.1
in adit LT-1

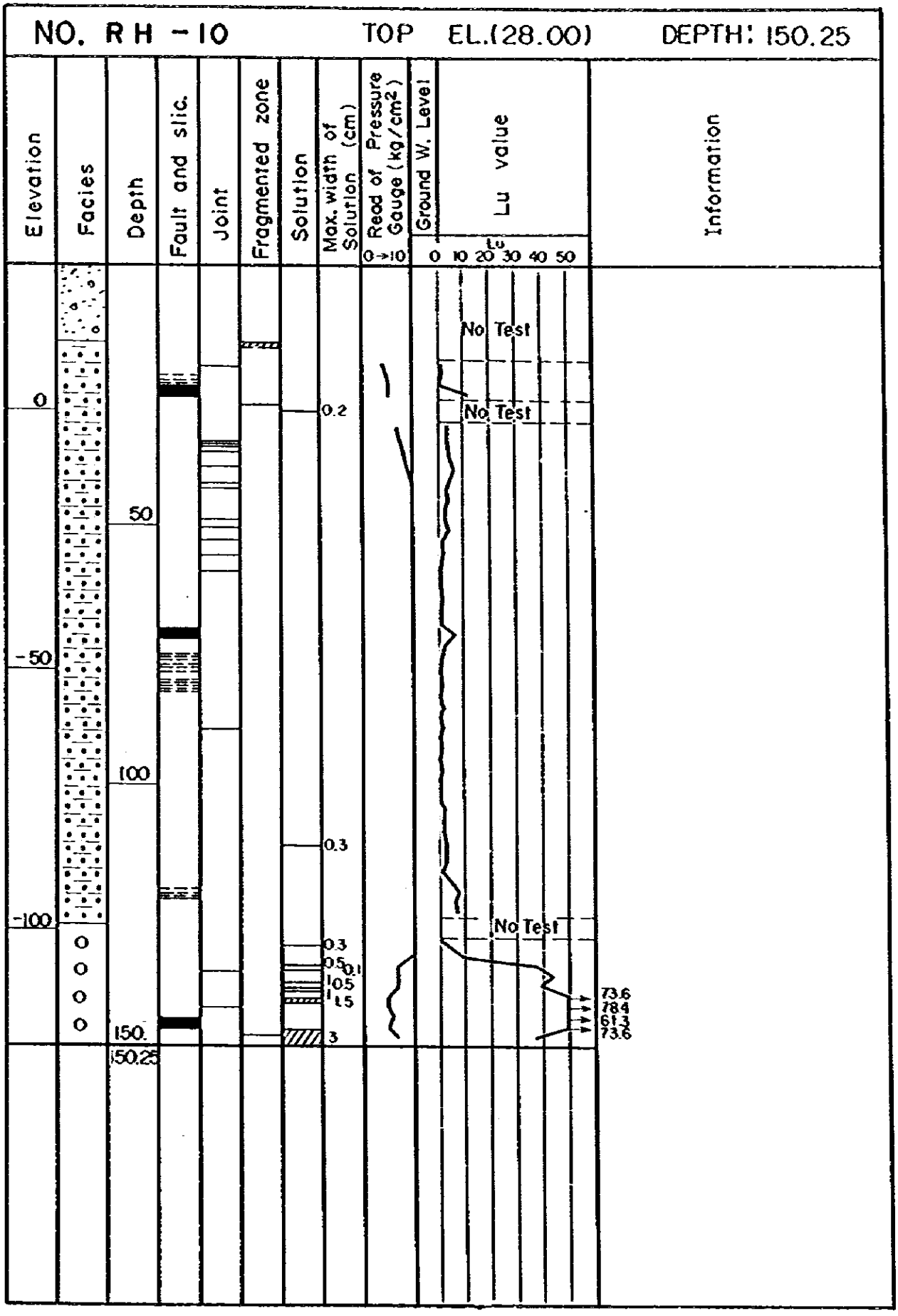

NO. L-S-5
TOP EL. 113.73
DEPTH: 125.00
Elevation
Facies
Depth
Fault and slic.
Joint
Fragmented zone
Solution
Max. width of Solution (cm)
Read of Pressure Gauge (kg/cm²)
0→10
Ground W. Level
Lu. value
0 10 20 30 40 50
Information
100
50
0
50
100
125.00
0.3
1
1
1.5
1
0.5
0.5
1
3
No Test
No Test
152.9
164.4
189.8
155.9
170.0
54.9
74.8
87.5
60.6
52.8
in adit LT-2

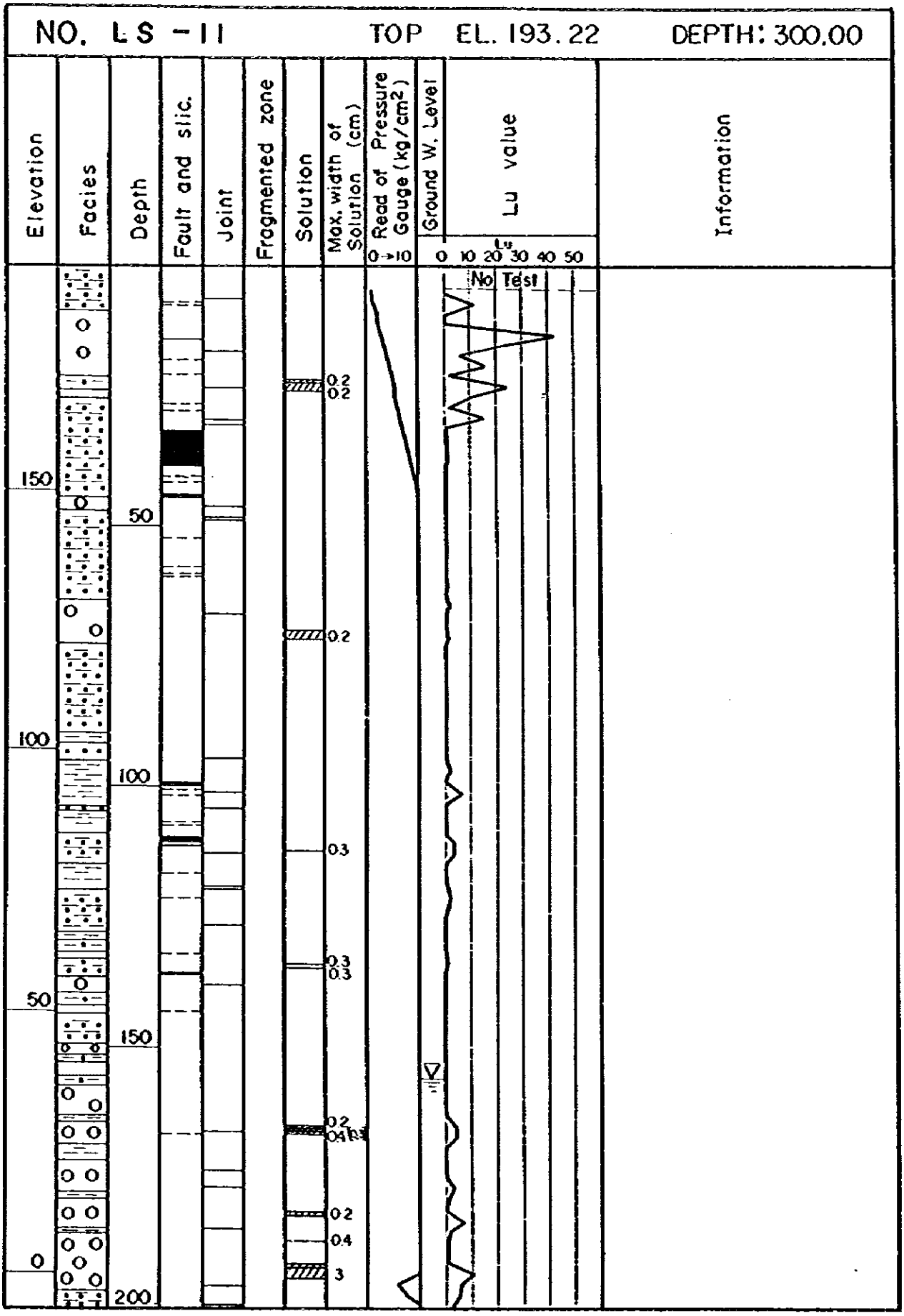

NO. LS-6
TOP EL. 196.74
DEPTH: 400.22
Elevation
Facies
Depth
Fault and slic.
Joint
Fragmented zone
Solution
Max. width of Solution (cm)
Read of Pressure Gauge (kg/cm²)
Ground W. Level
Lu value
Information
0→10
0 10 20 30 40 50
Le
No Test
150
100
50
0
50
100
150
200
0.2
0.4
0.2
0.2
0.2
0.2
0.2
1
0.3
0.4
0.4
0.2
0.4
0.5
0.2
0.5
1
0.3
0.2
coal
coal
coal
coal

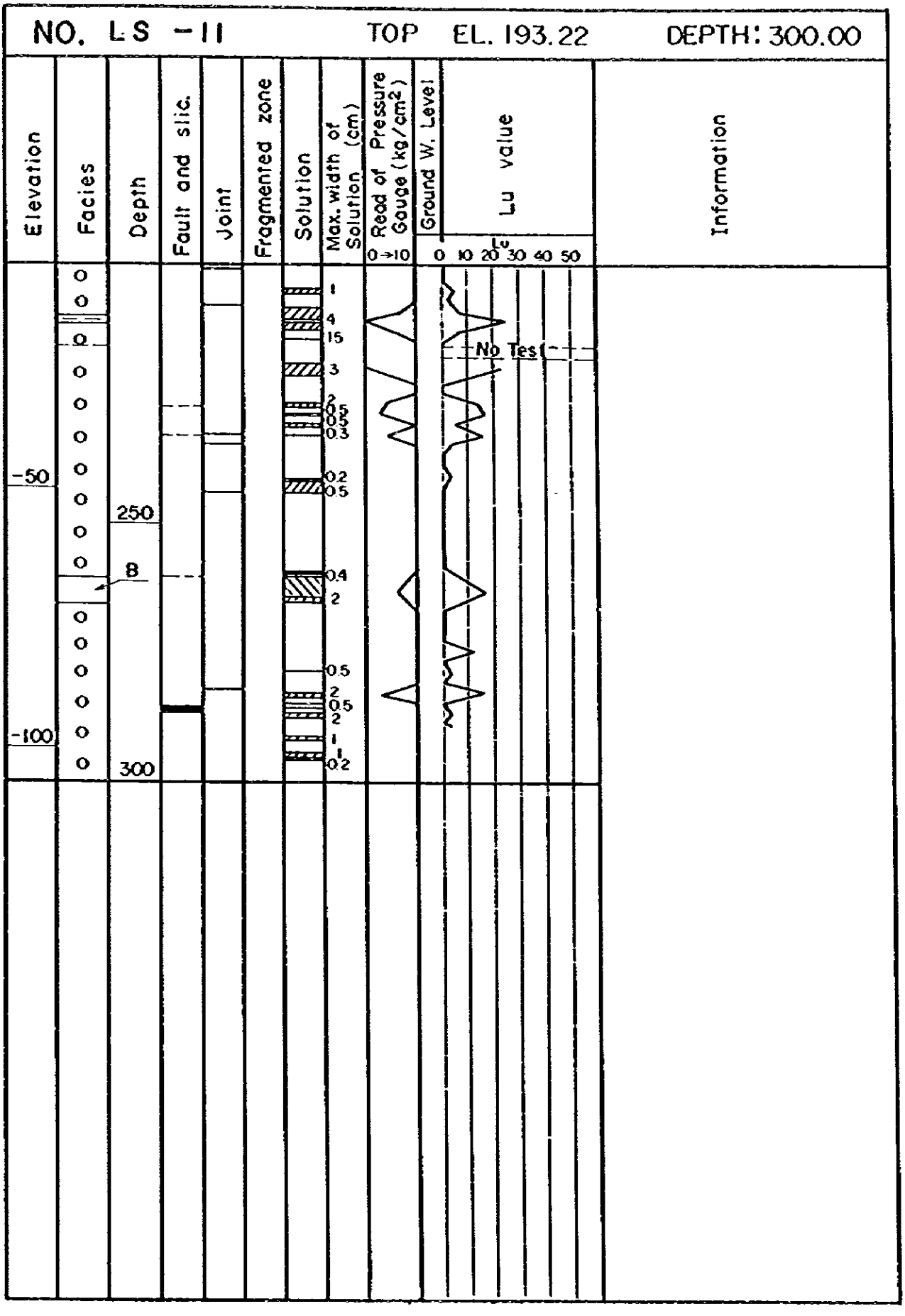

NO. LS - 6
TOP EL. 196.74
DEPTH: 400.22
Elevation
Facies
Depth
Fault and slic.
Joint
Fragmented zone
Solution
Max. width of Solution (cm)
Read of Pressure Gauge (kg/cm²)
0→10
Ground W. Level
Lu value
0 10 20 30 40 50
Information
-50
-100
-150
-200
250
300
350
400.22
No Test

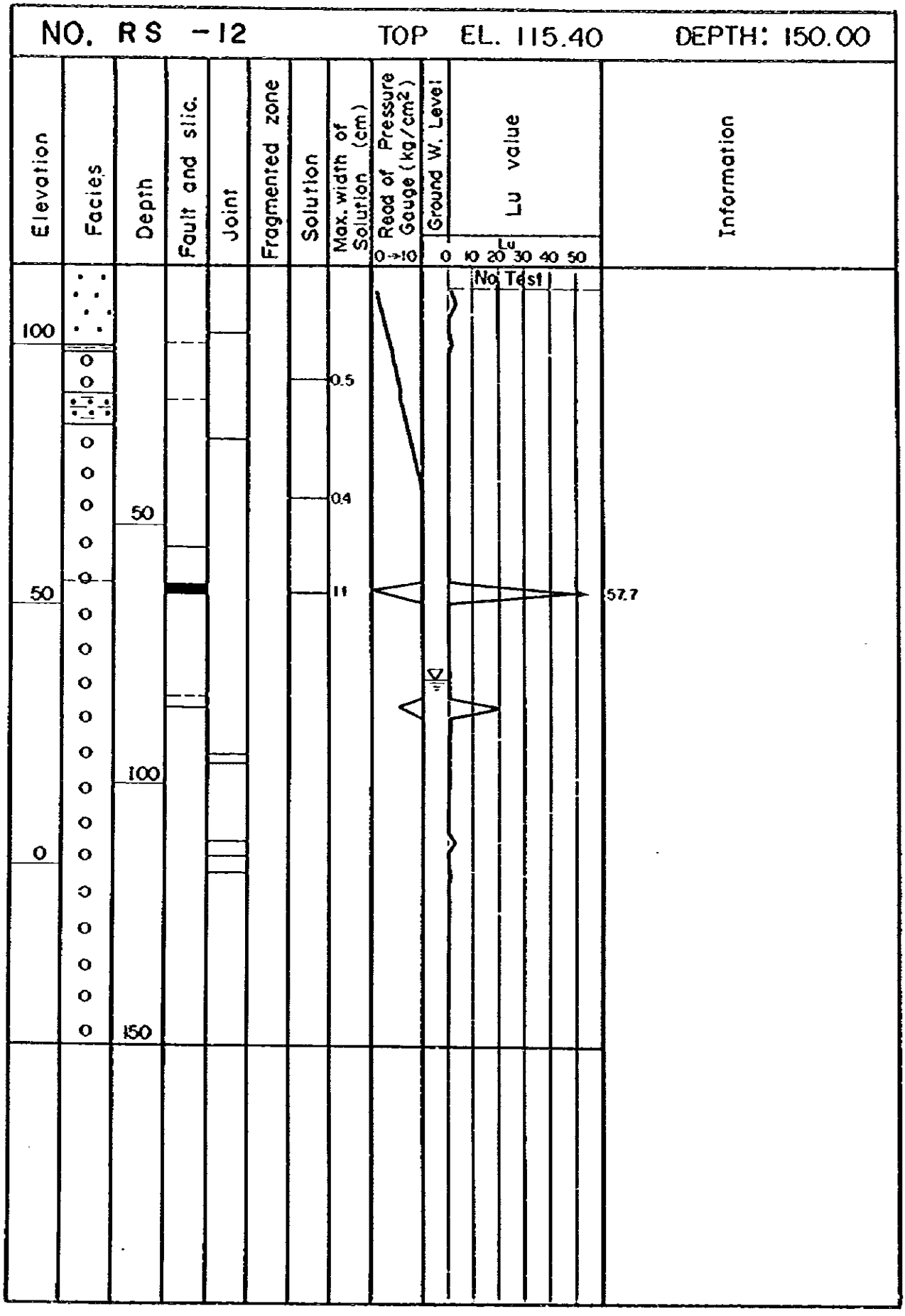

NO. RH-7
TOP EL.(28.00)
DEPTH: 150.70
Elevation
Facies
Depth
Fault and slic.
Joint
Fragmented zone
Solution
Max. width of Solution (cm)
Read of Pressure Gauge (kg/cm²)
0→10
Ground W. Level
Lu value
0 10 20 30 40 50
Information
No Test
No Test
No Test
0
-50
-100
50
100
150
60
70

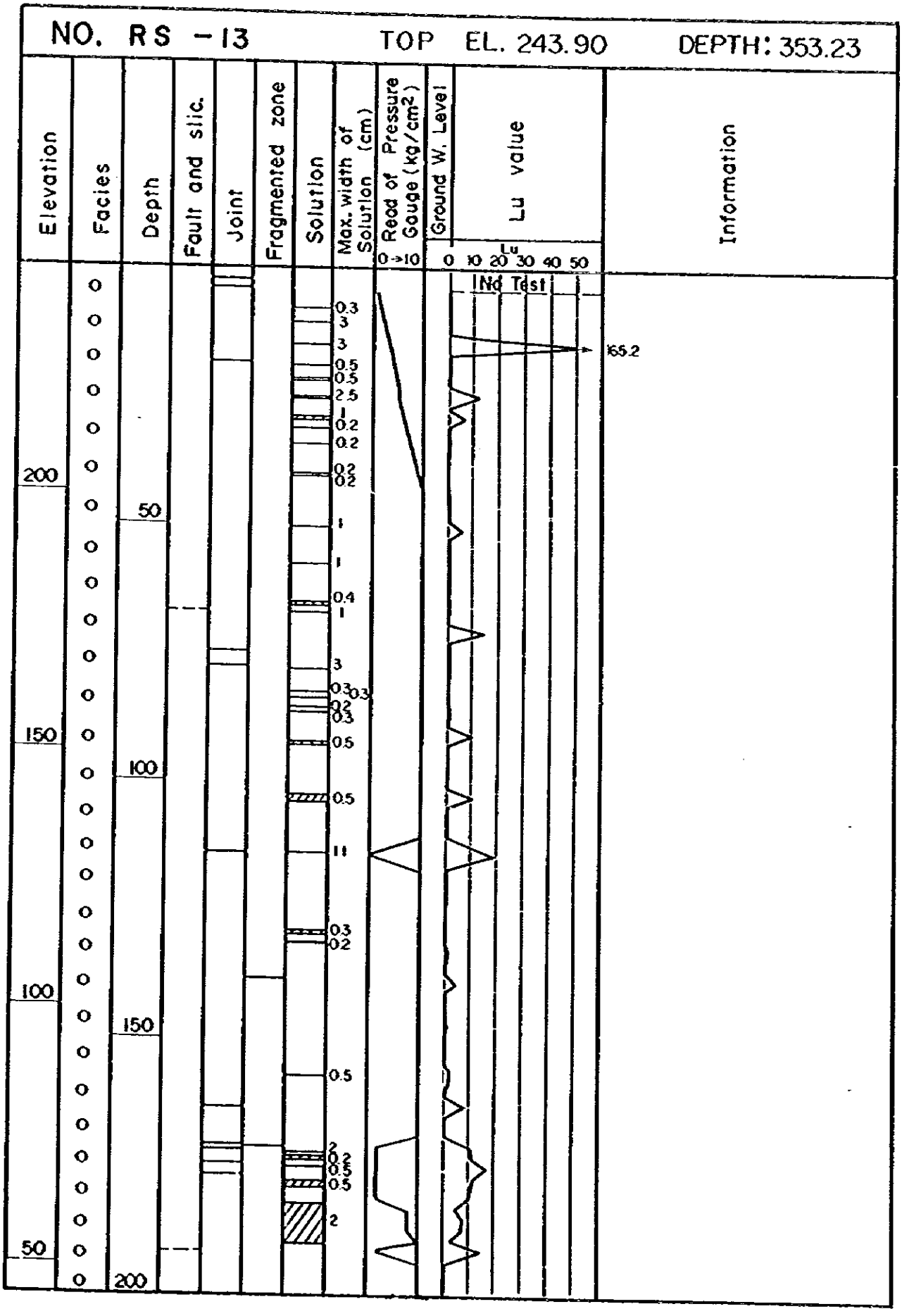

NO. RH - 8
TOP EL.(28.00)
DEPTH: 125.00
Elevation
Facies
Depth
Fault and slic.
Joint
Fragmented zone
Solution
Max. width of Solution (cm)
Read of Pressure Gauge (kg/cm²)
0→10
Ground W. Level
Lu value
0 10 20 30 40 50
Lu
Information
No Test
0
-50
50
100
125.00
0.3
0.5
1
0.3
0.5
0.2
0.2
0.5
0.3
0.5
0.5
0.4
0.2
1
1.5
0.3
0.5
2
0.5
1.5
0.3
1.5
0.2
1
0.5

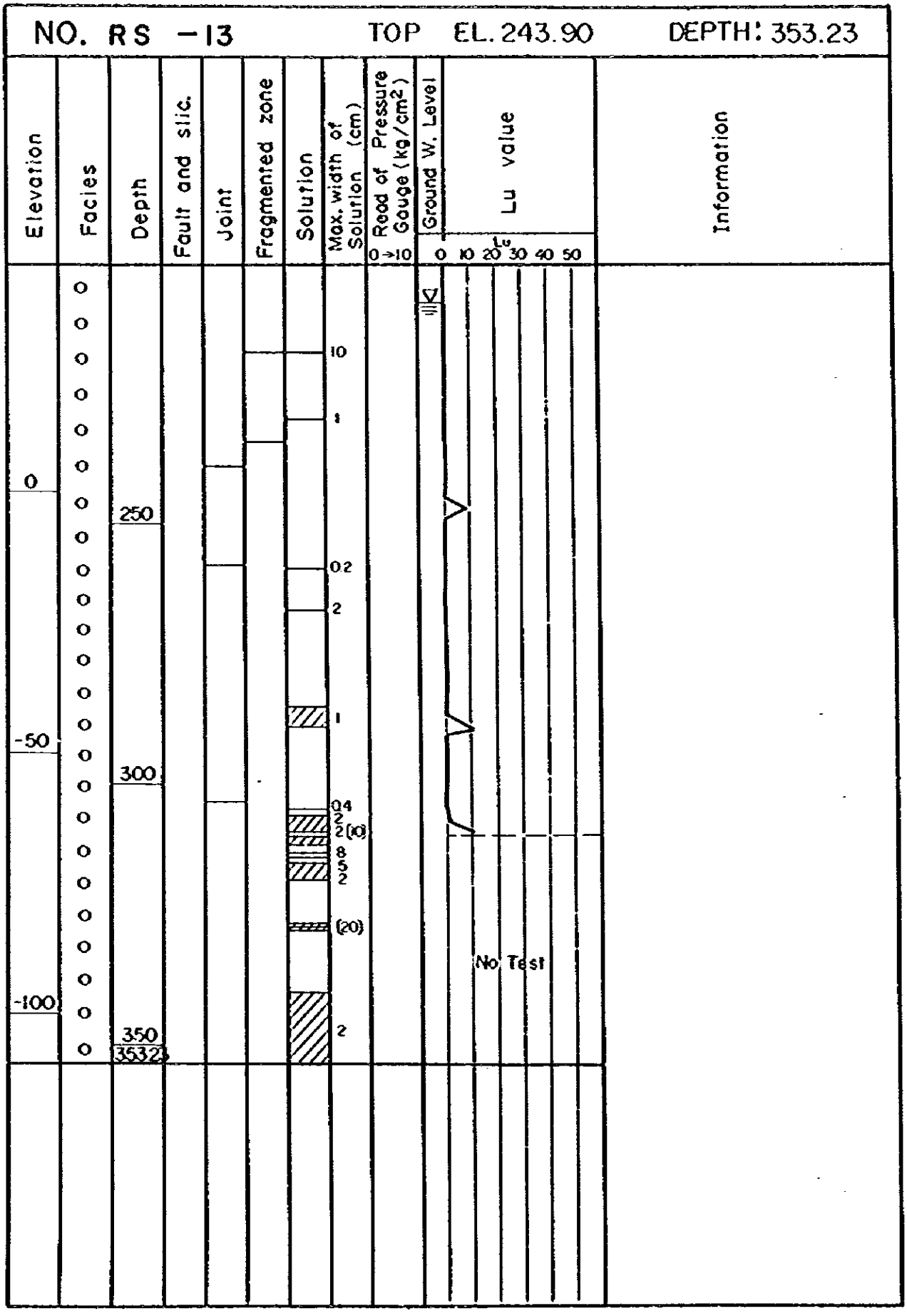

NO. RH -10
TOP EL.(28.00)
DEPTH: 150.25
Elevation
Facies
Depth
Fault and slic.
Joint
Fragmented zone
Solution
Max. width of Solution (cm)
Read of Pressure Gauge (kg/cm²)
Ground W. Level
Lu value
0→10
0 10 20 30 40 50
Lu
Information
0
-50
-100
50
100
150.
150.25
0.2
0.3
0.3
0.5
0.1
0.5
1.5
3
No Test
No Test
No Test
73.6
78.4
61.3
73.6

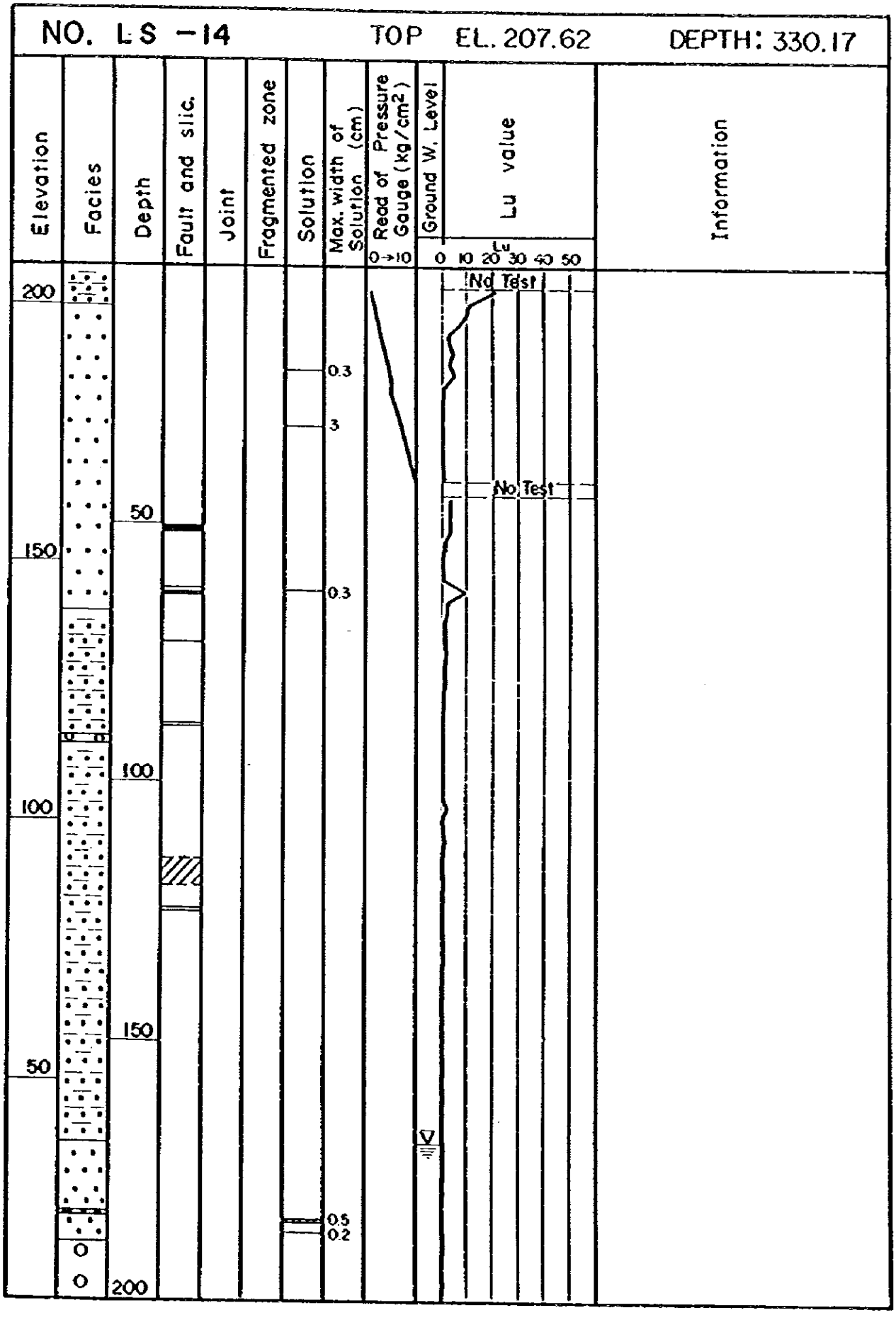

NO. LS - 11
TOP EL. 193.22
DEPTH: 300.00
Elevation
Facies
Depth
Fault and slic.
Joint
Fragmented zone
Solution
Max. width of Solution (cm)
Read of Pressure Gauge (kg/cm²)
Ground W. Level
Lu value
Information
No Test
150
100
50
0
50
100
150
200
0.2
0.2
0.2
0.3
0.3
0.3
0.2
0.4
0.2
0.4
3

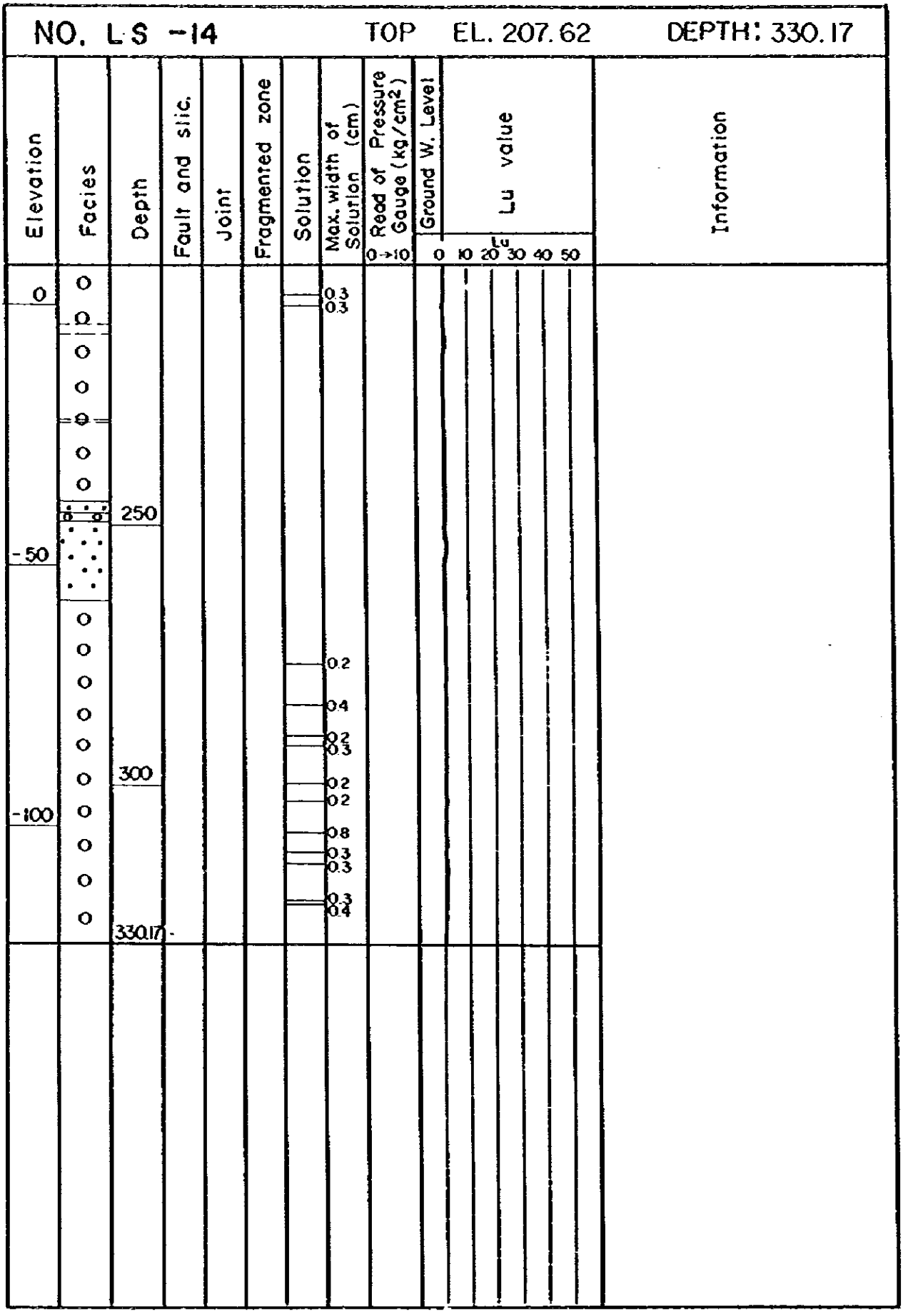

NO. LS -11
TOP EL. 193.22
DEPTH: 300.00
Elevation
Facies
Depth
Fault and slic.
Joint
Fragmented zone
Solution
Max. width of Solution (cm)
Read of Pressure Gauge (kg/cm²)
0→10
Ground W. Level
Lu value
0 10 20 Le 30 40 50
Information
-50
-100
250
8
300
1
4
15
3
2
0.5
0.5
0.3
0.2
0.5
0.4
2
0.5
2
0.5
2
1
1
0.2
No Test

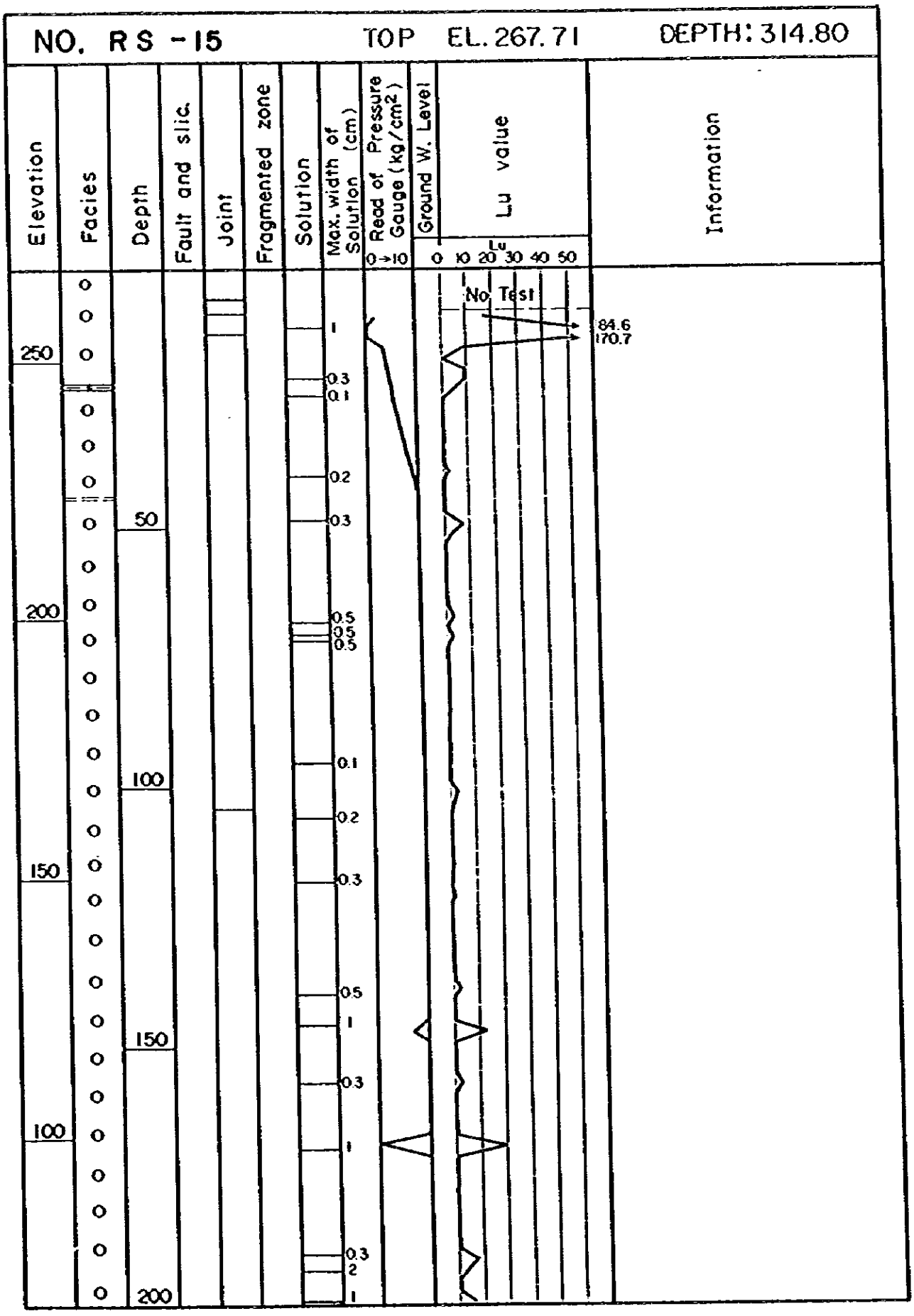

NO. RS -12
TOP EL. 115.40
DEPTH: 150.00
Elevation
Facies
Depth
Fault and slic.
Joint
Fragmented zone
Solution
Max. width of Solution (cm)
Head of Pressure Gauge (kg/cm²)
Ground W. Level
Lu value
Information
0→10
0 10 20 30 40 50
No Test
100
50
0
50
100
150
0.5
0.4
1.1
57.7

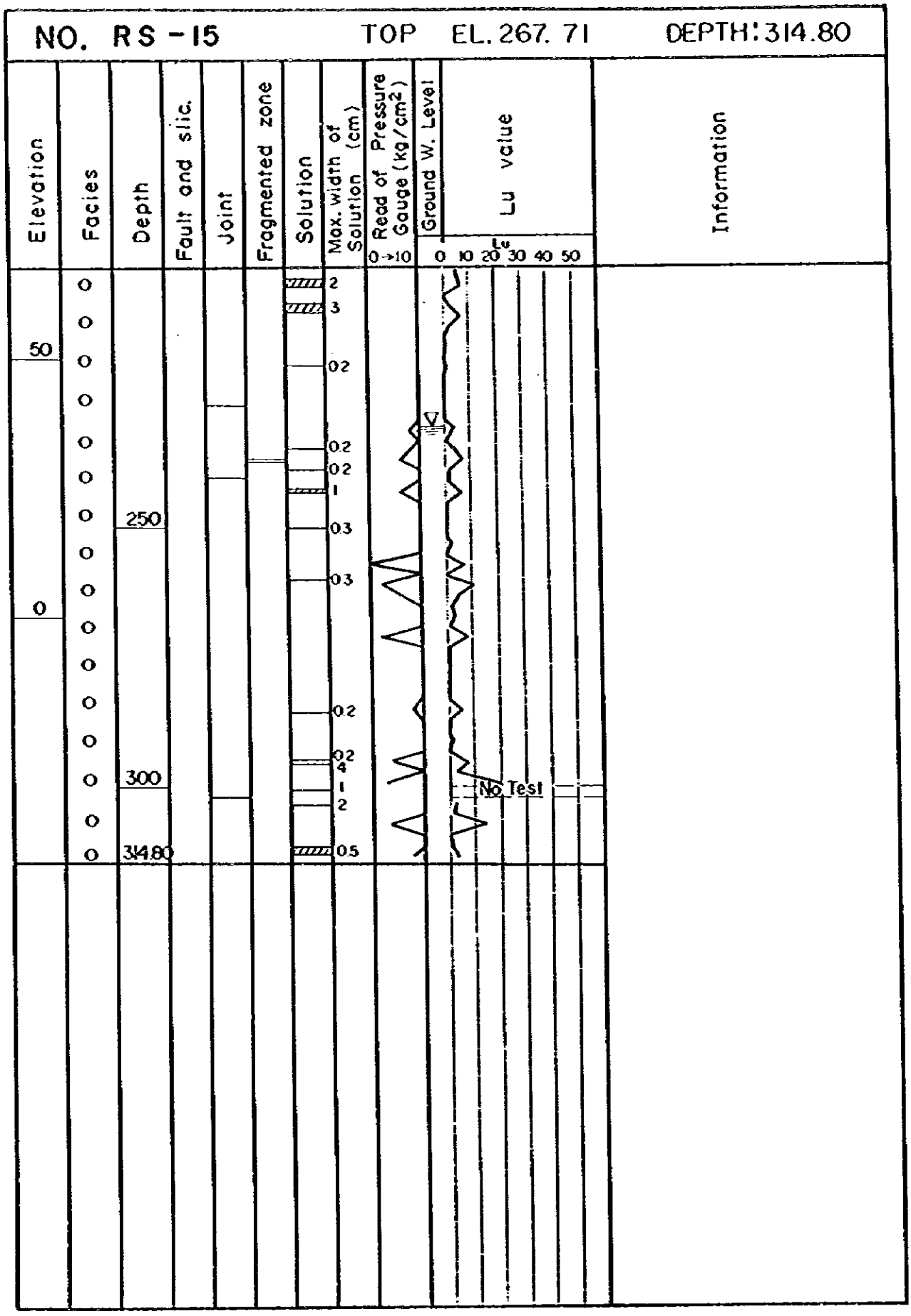

NO. RS -13
TOP EL. 243.90
DEPTH: 353.23
Elevation
Facies
Depth
Fault and slic.
Joint
Fragmented zone
Solution
Max. width of Solution (cm)
Read of Pressure Gauge (kg/cm²)
0→10
Ground W. Level
Lu value
0 10 20 30 40 50
Lu
No Test
165.2
Information
200
150
100
50
50
100
150
200

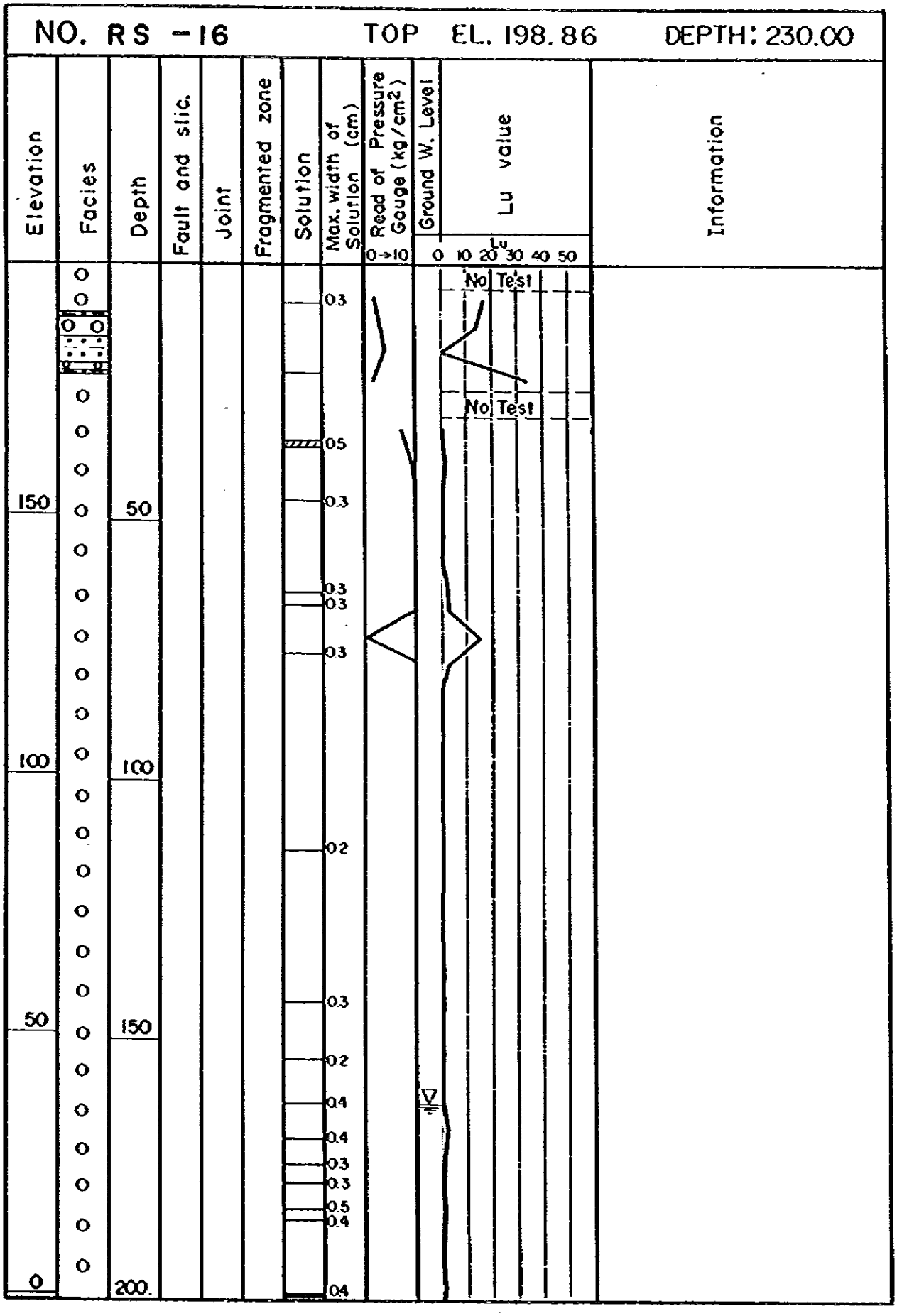

NO. RS -13
TOP EL. 243.90
DEPTH: 353.23
Elevation
Facies
Depth
Fault and slic.
Joint
Fragmented zone
Solution
Max. width of Solution (cm)
Read of Pressure Gauge (kg/cm²)
0 → 10
Ground W. Level
Lu value
0 10 20 30 40 50
Information
0
-50
-100
250
300
350
353.2
10
1
0.2
2
1
0.4
2
2 (10)
8
5
2
(20)
2
No Test

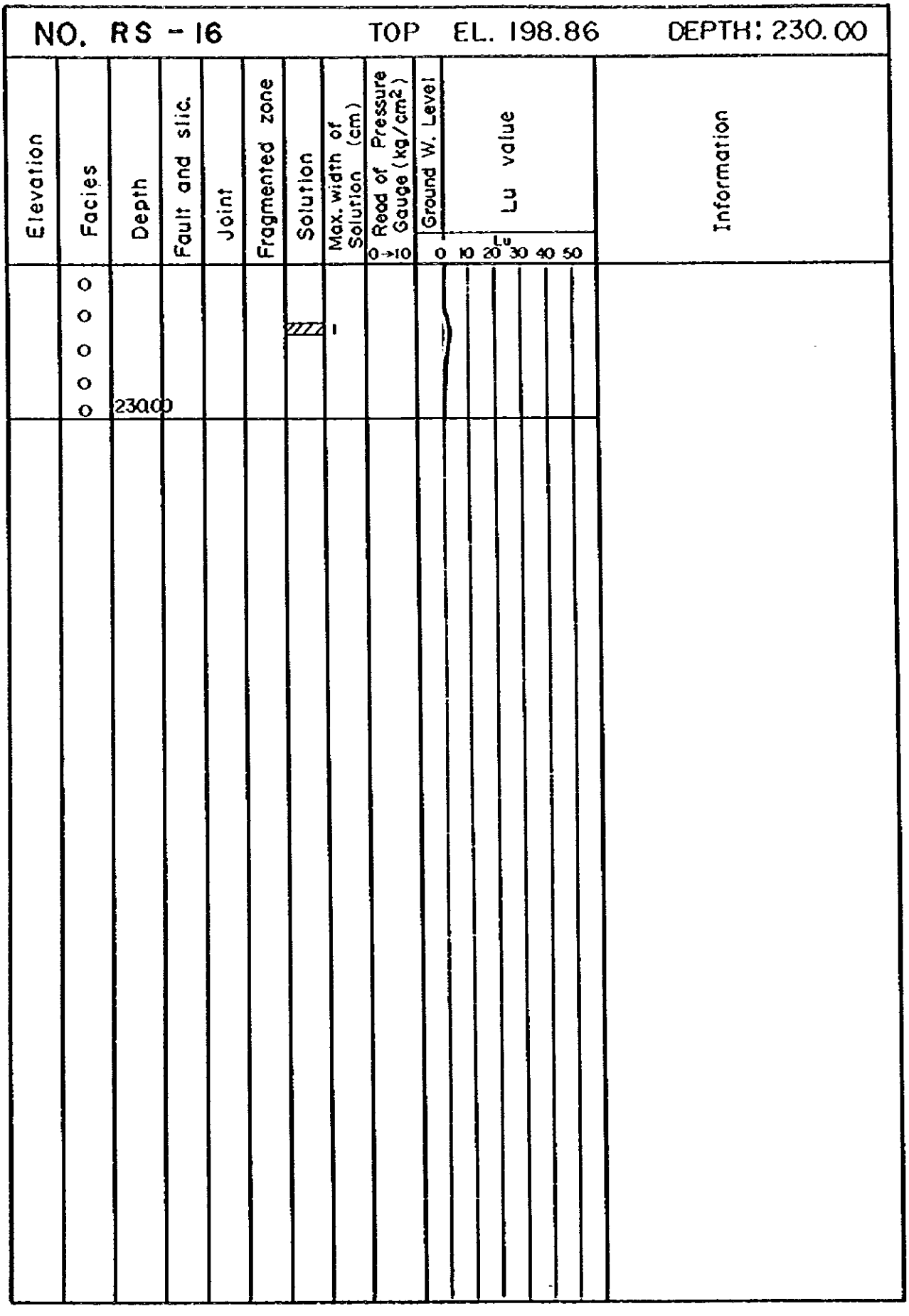

NO. LS -14
TOP EL. 207.62
DEPTH: 330.17
Elevation
Facies
Depth
Fault and slic.
Joint
Fragmented zone
Solution
Max. width of Solution (cm)
Read of Pressure Gauge (kg/cm²)
Ground W. Level
Lu value
Information
0→10
0 10 20 30 40 50
Lu
No Test
No Test
200
150
100
50
0
50
100
150
200
0.3
3
0.3
0.5
0.2

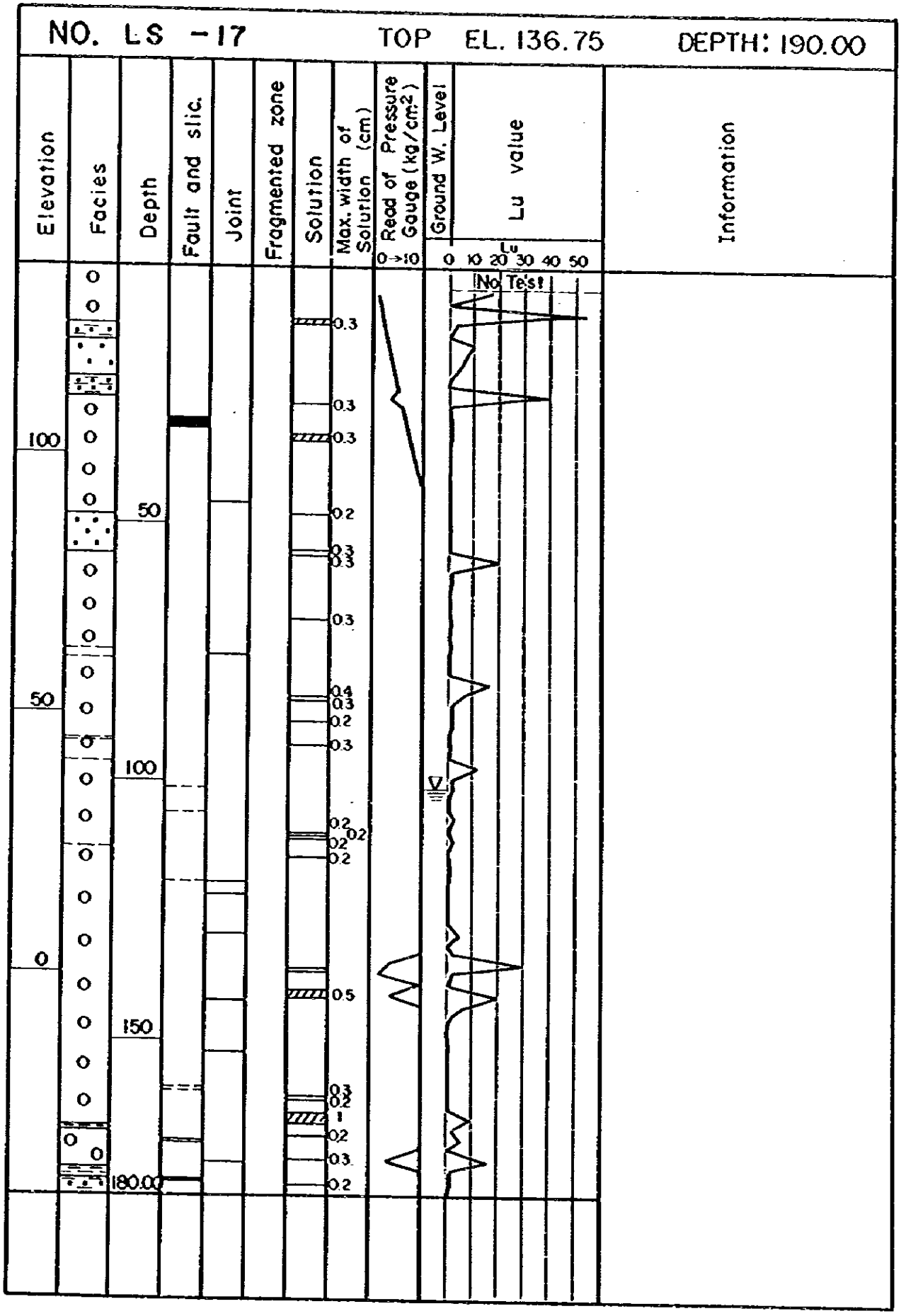

NO. L·S -14
TOP EL. 207.62
DEPTH: 330.17
Elevation
Facies
Depth
Fault and slic.
Joint
Fragmented zone
Solution
Max. width of Solution (cm)
Read of Pressure Gauge (kg/cm²)
Ground W. Level
Lu value
Information
0
-50
-100
250
300
330.17
0→10
0 10 20 30 40 50
0.3
0.3
0.2
0.4
0.2
0.3
0.2
0.2
0.8
0.3
0.3
0.3
0.4

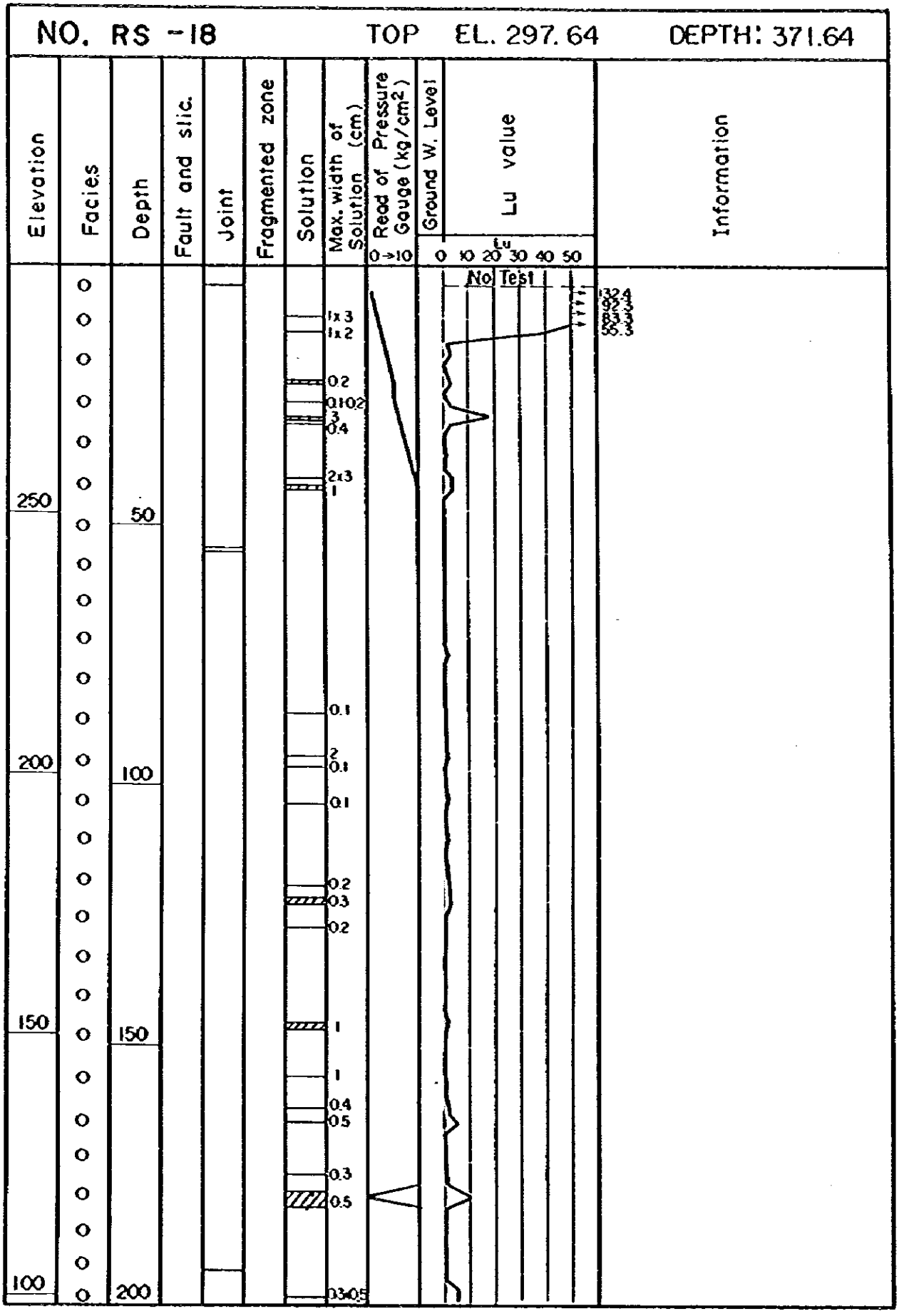

NO. RS -15
TOP EL. 267.71
DEPTH: 314.80
Elevation
Facies
Depth
Fault and slic.
Joint
Fragmented zone
Solution
Max. width of Solution (cm)
Read of Pressure Gauge (kg/cm²)
0→10
Ground W. Level
Lu value
0 10 20 30 40 50
Lu
Information
No Test
84.6
170.7
250
200
150
100
50
100
150
200
1
0.3
0.1
0.2
0.3
0.5
0.5
0.5
0.1
0.2
0.3
0.5
1
0.3
1
0.3
2
1

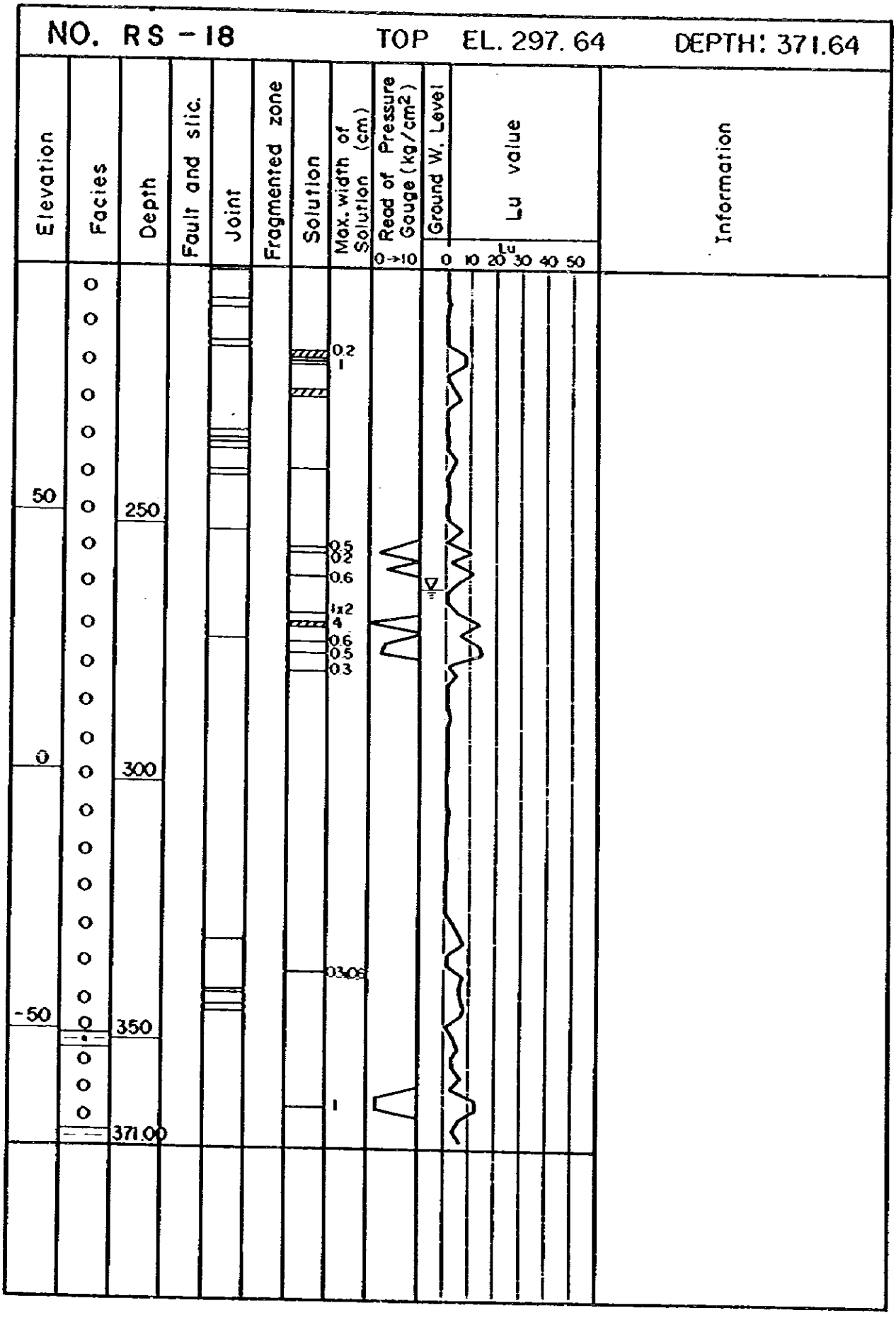

NO. RS-15
TOP EL. 267. 71
DEPTH: 314.80
Elevation
Facies
Depth
Fault and slic.
Joint
Fragmented zone
Solution
Max. width of Solution (cm)
Read of Pressure Gauge (kg/cm²)
Ground W. Level
Lu value
0→10
0 10 20 30 40 50
Information
50
0
250
300
314.80
2
3
02
02
02
1
03
03
02
02
4
1
2
05
No Test

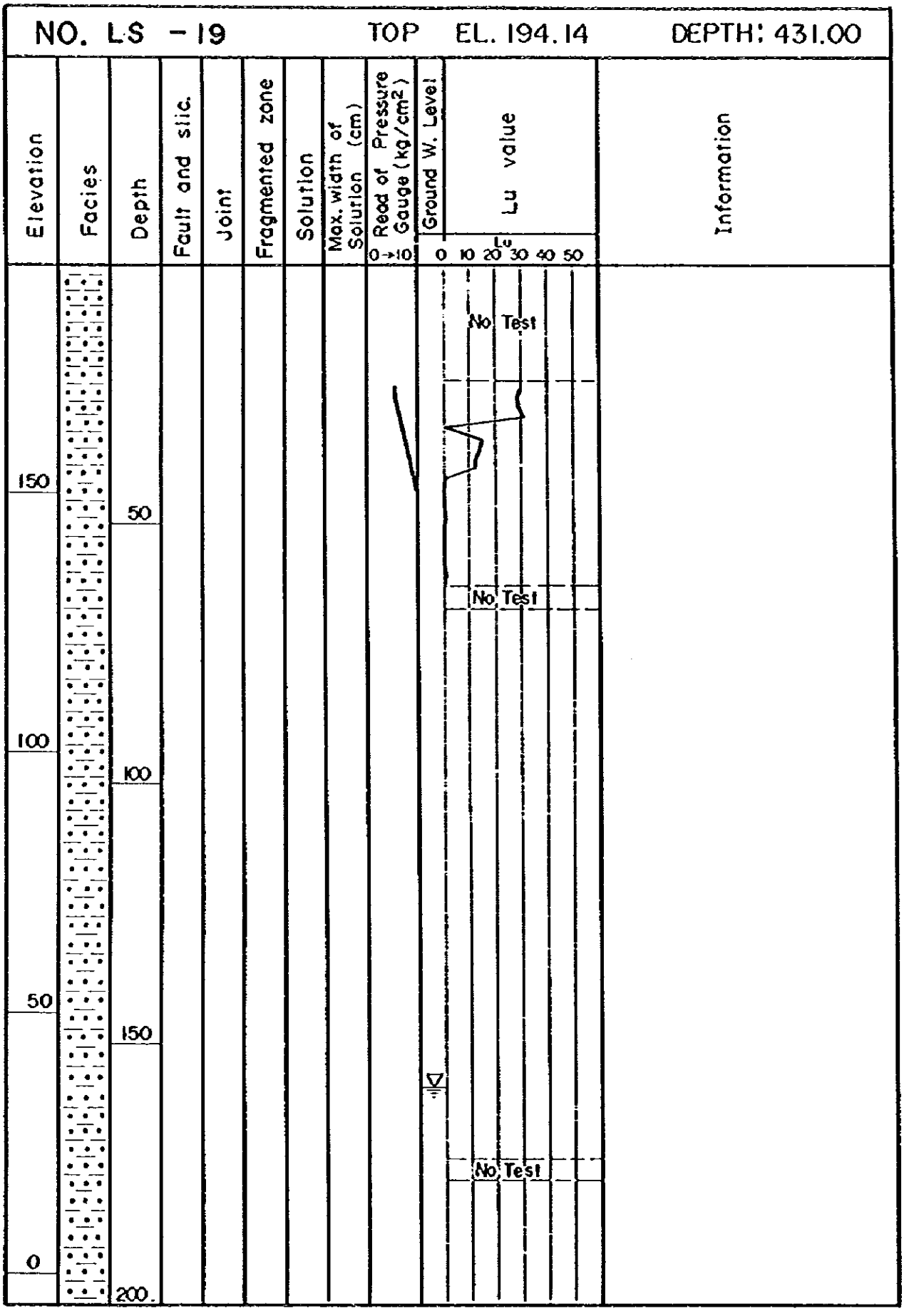

NO. RS -16
TOP EL. 198.86
DEPTH: 230.00
Elevation
Facies
Depth
Fault and slic.
Joint
Fragmented zone
Solution
Max. width of Solution (cm)
Read of Pressure Gauge (kg/cm²)
0→10
Ground W. Level
Lu value
0 10 20 30 40 50
Information
No Test
No Test
150
100
50
0
50
100
150
200.
0.3
0.5
0.3
0.3
0.3
0.3
0.2
0.3
0.2
0.4
0.4
0.3
0.3
0.5
0.4
0.4

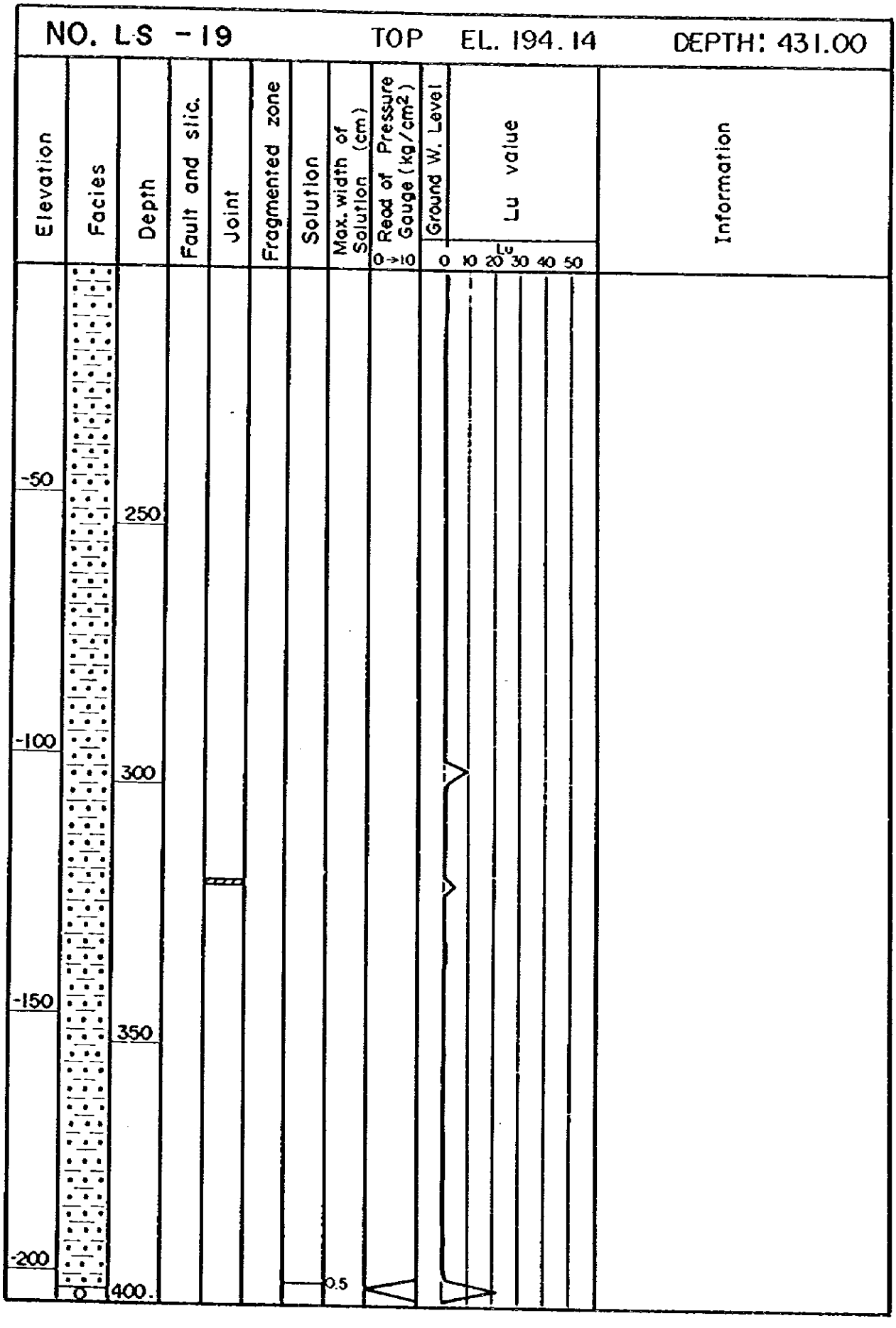

NO. RS - 16
TOP EL. 198.86
DEPTH: 230.00
Elevation
Facies
Depth
Fault and slic.
Joint
Fragmented zone
Solution
Max. width of Solution (cm)
Read of Pressure Gauge (kg/cm²)
0 → 10
Ground W. Level
Lu value
0 10 20 30 40 50
Lu
Information
230.00


NO. LS -17
TOP EL. 136.75
DEPTH: 190.00
Elevation
Facies
Depth
Fault and slic.
Joint
Fragmented zone
Solution
Max. width of Solution (cm)
Read of Pressure Gauge (kg/cm²)
Ground W. Level
Lu value
Information
No Test
100
50
0
50
100
150
180.00

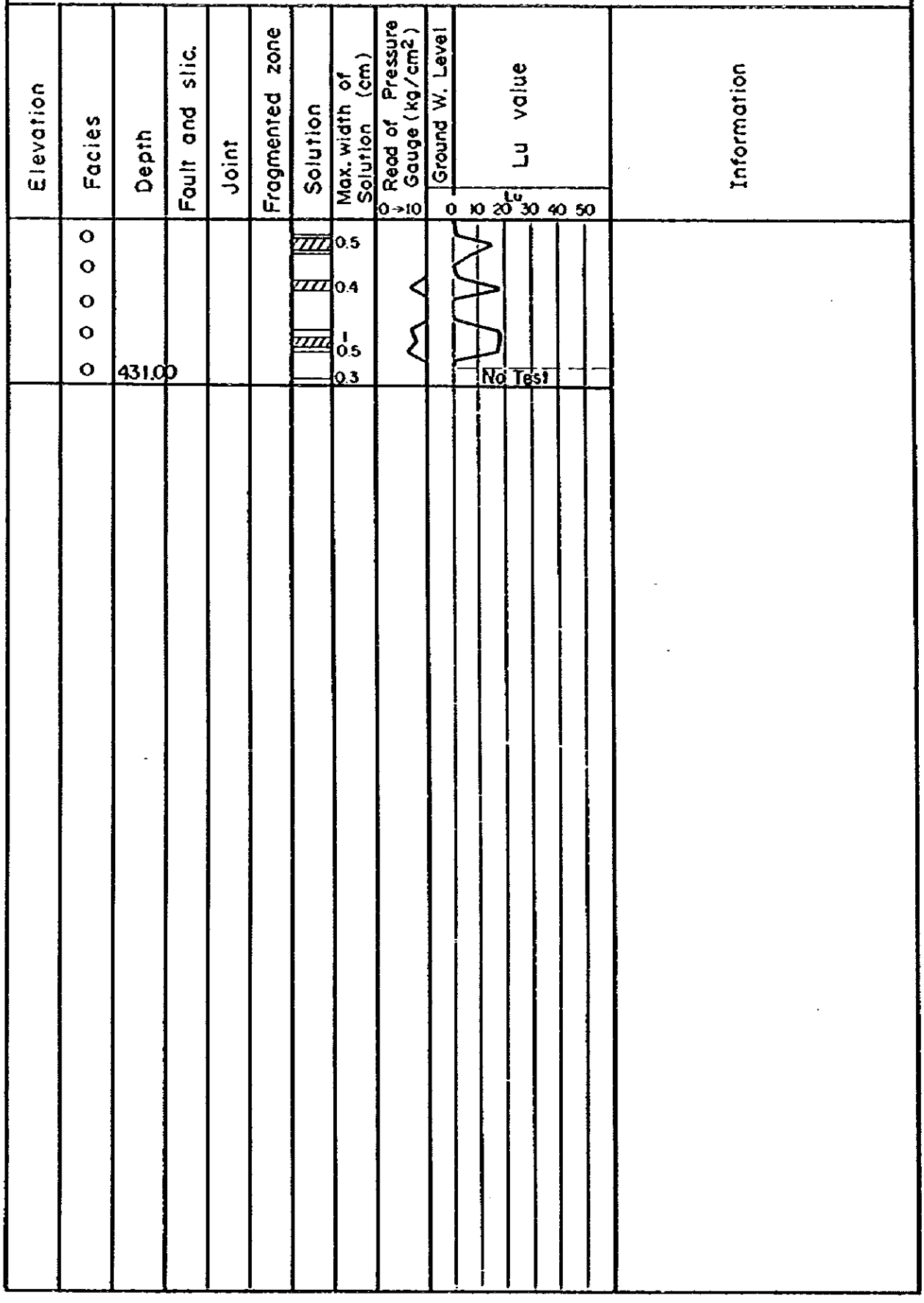

NO. RS -18
TOP EL. 297.64
DEPTH: 371.64
Elevation
Facies
Depth
Fault and slic.
Joint
Fragmented zone
Solution
Max. width of Solution (cm)
Read of Pressure Gauge (kg/cm²)
Ground W. Level
Lu value
0 10 20 30 40 50
No Test
Information
250
200
150
100
50
100
150
200
1x3
1x2
0.2
0.1
0.2
3
0.4
2x3
1
0.1
2
0.1
0.1
0.2
0.3
0.2
1
1
0.4
0.5
0.3
0.5
0.3
0.5

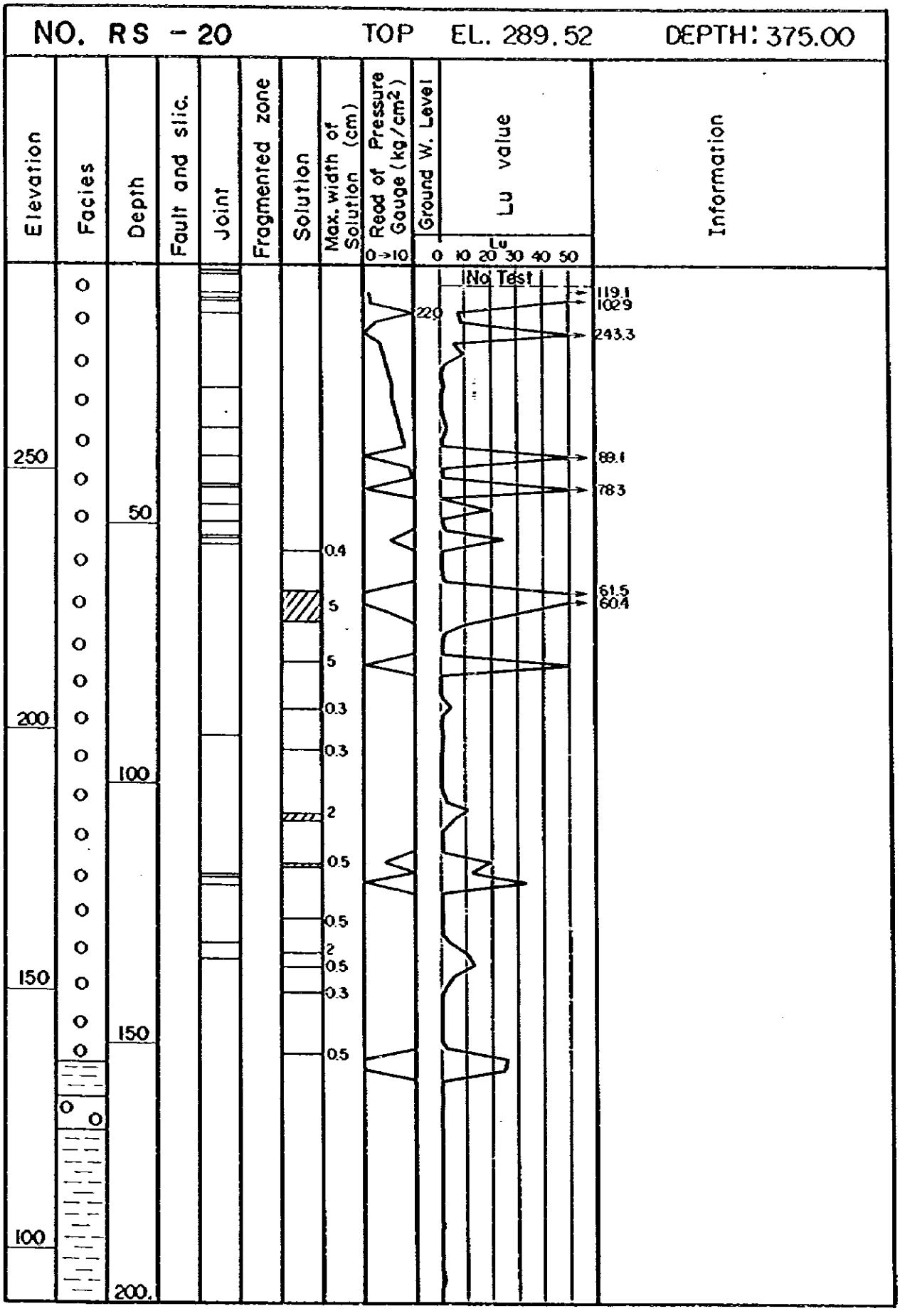

NO. RS - 18
TOP EL. 297.64
DEPTH: 371.64
Elevation
Facies
Depth
Fault and slic.
Joint
Fragmented zone
Solution
Max. width of Solution (cm)
Read of Pressure Gauge (kg/cm²)
0→10
Ground W. Level
Lu value
0 10 20 30 40 50
Lu
Information
50
0
-50
250
300
350
371.00
0.2
1
0.5
0.2
0.6
1x2
4
0.6
0.5
0.3
0.3
0.6
1

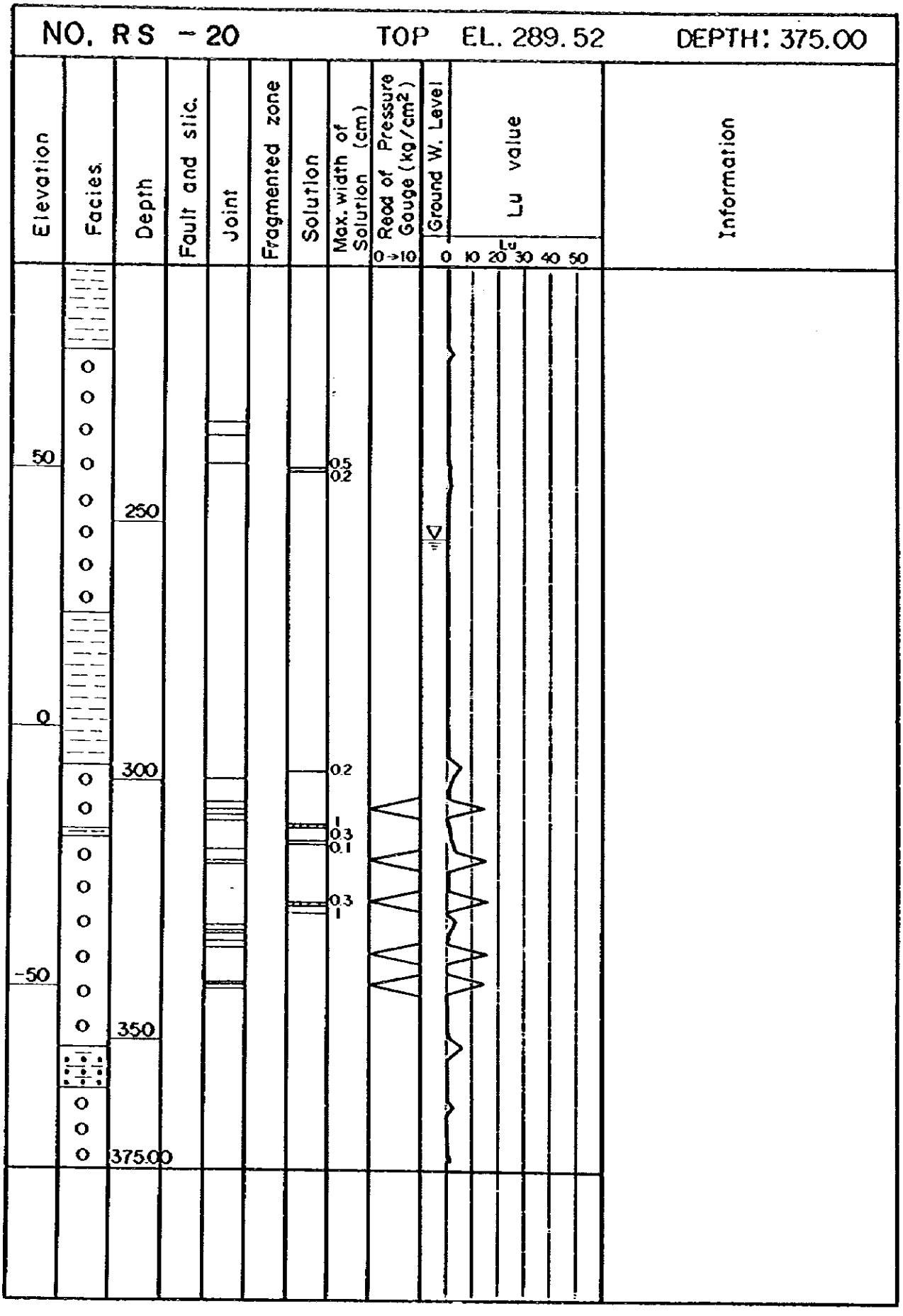

NO. LS - 19
TOP EL. 194.14
DEPTH: 431.00
Elevation
Facies
Depth
Fault and slic.
Joint
Fragmented zone
Solution
Max. width of Solution (cm)
Read of Pressure Gauge (kg/cm²)
0→10
Ground W. Level
Lu value
0 10 20 30 40 50
Lu
Information
No Test
No Test
No Test
150
100
50
0
50
100
150
200.

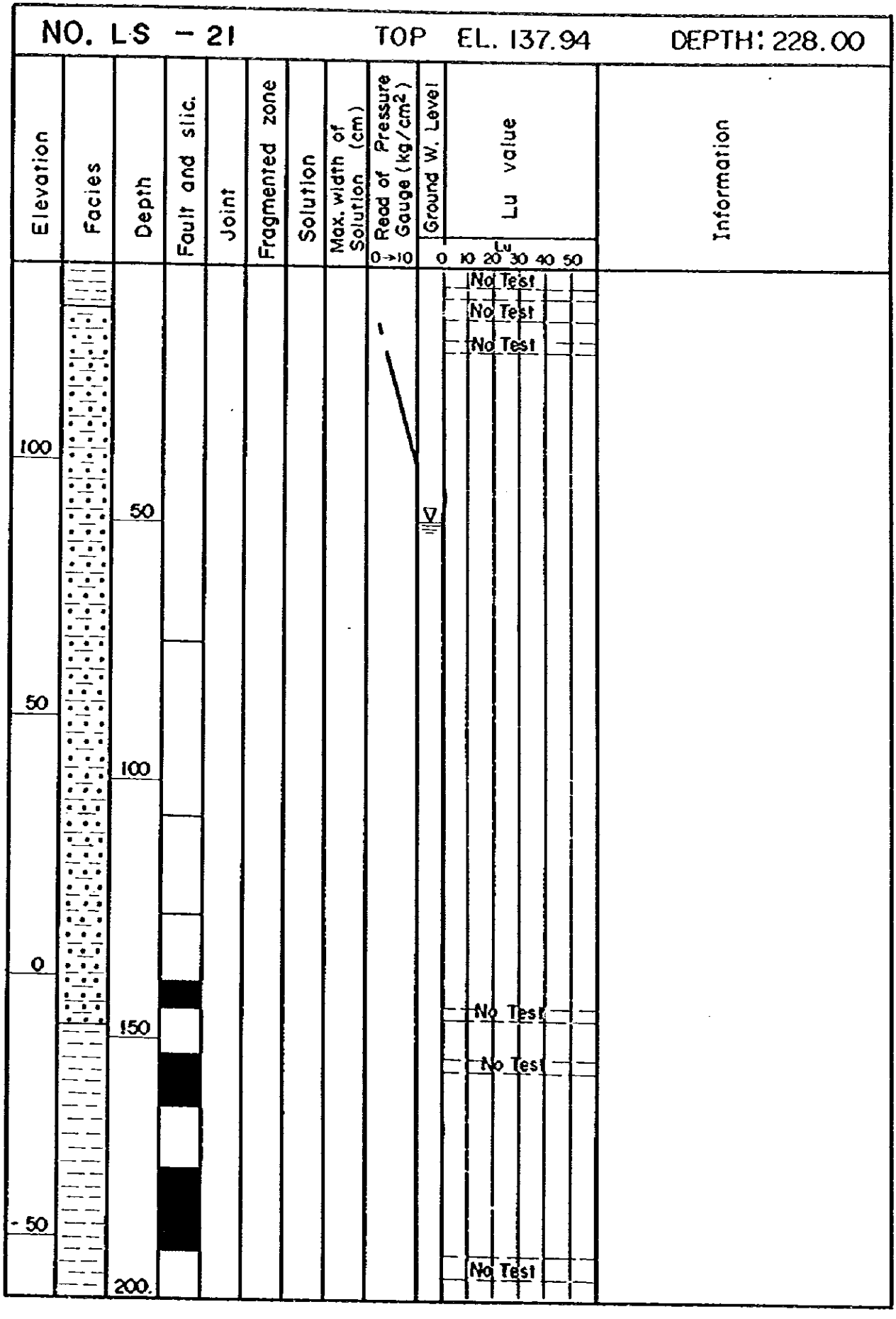

NO. LS -19
TOP EL. 194.14
DEPTH: 431.00
Elevation
Facies
Depth
Fault and slic.
Joint
Fragmented zone
Solution
Max. width of Solution (cm)
Read of Pressure Gauge (kg/cm²)
0 → 10
Ground W. Level
Lu value
0 10 20 30 40 50
Lu
Information
-50
-100
-150
-200
250
300
350
400.
0
0.5

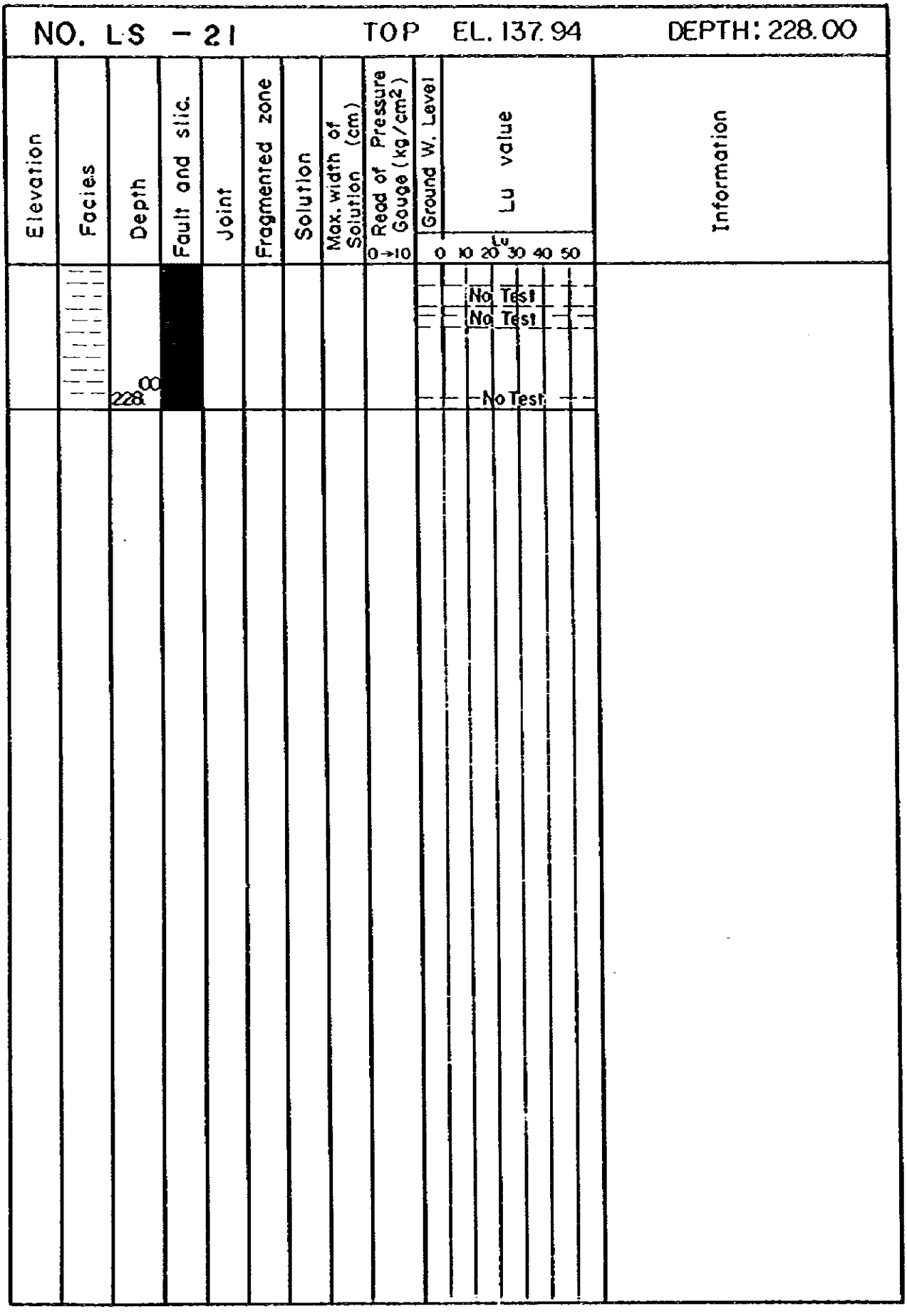
NO. LS - 19 TOP EL. 194.14 DEPTH: 431.00

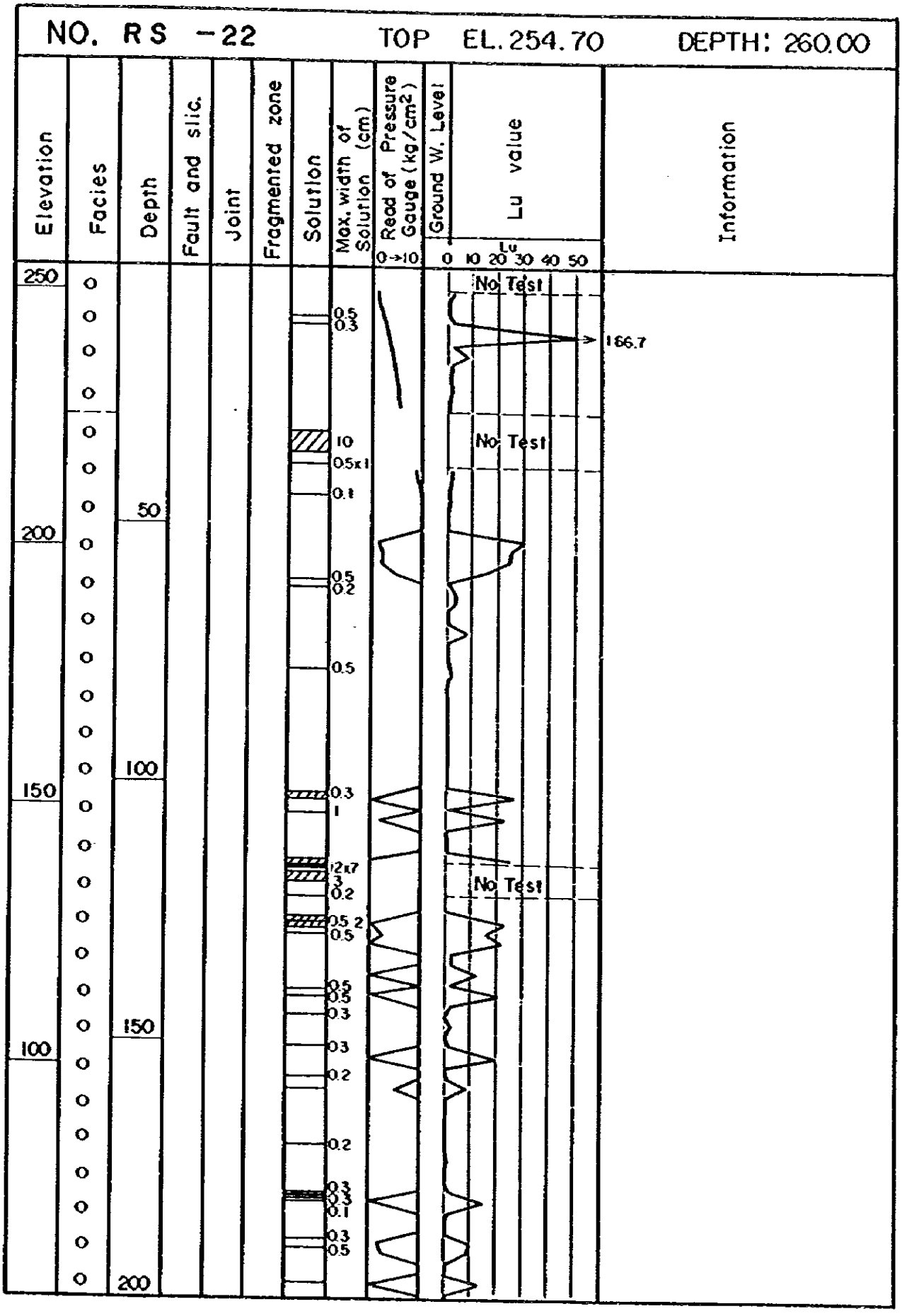


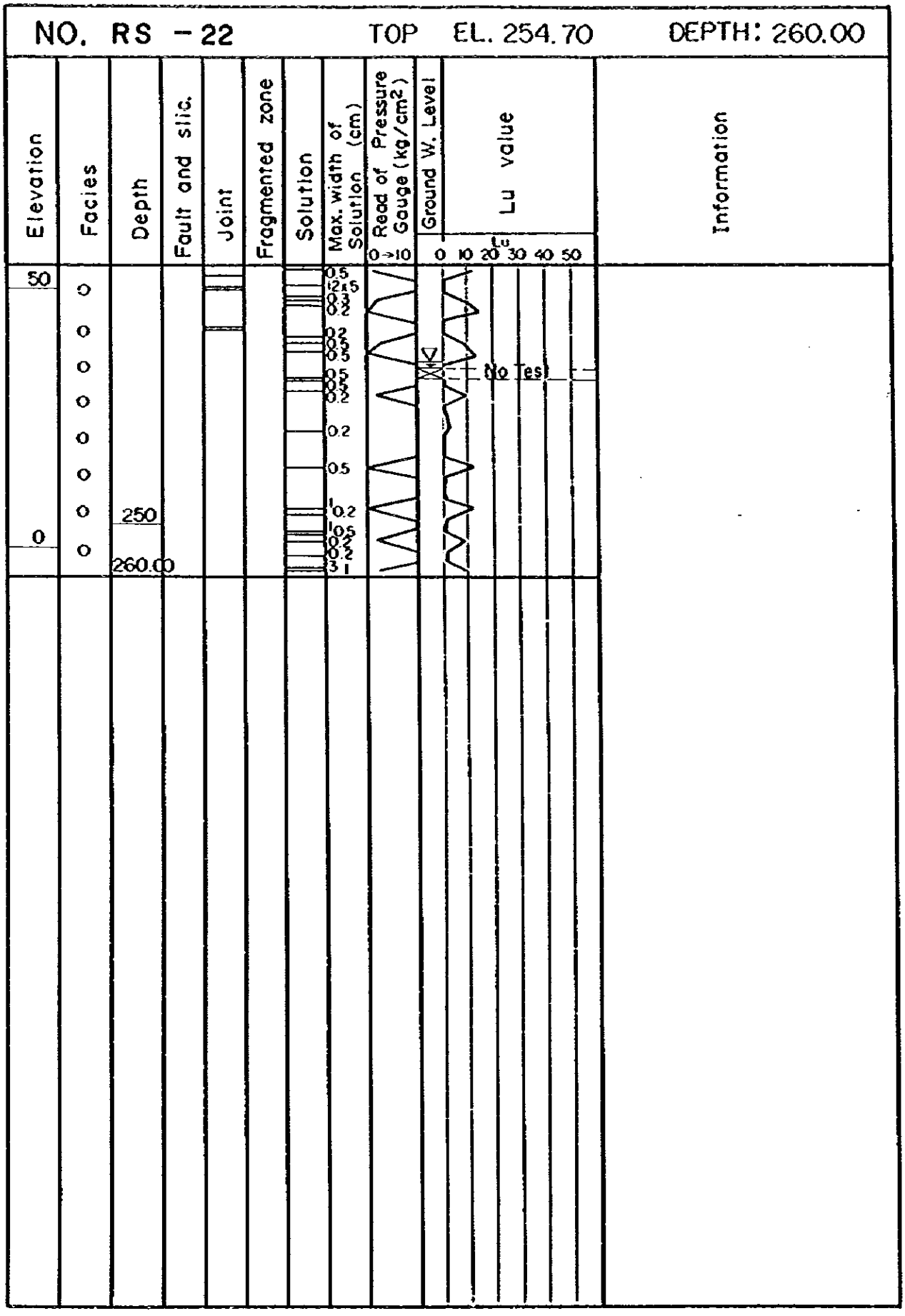

NO. RS - 20
TOP EL. 289.52
DEPTH: 375.00
Elevation
Facies
Depth
Fault and slic.
Joint
Fragmented zone
Solution
Max. width of Solution (cm)
Read of Pressure Gauge (kg/cm²)
0→10
Ground W. Level
Lu value
0 10 20 30 40 50
Lu
Information
No Test
250
200
150
100
50
100
150
200.
0.4
5
5
0.3
0.3
2
0.5
0.5
2
0.5
0.3
0.5
220
119.1
102.9
243.3
89.1
78.3
61.5
60.4

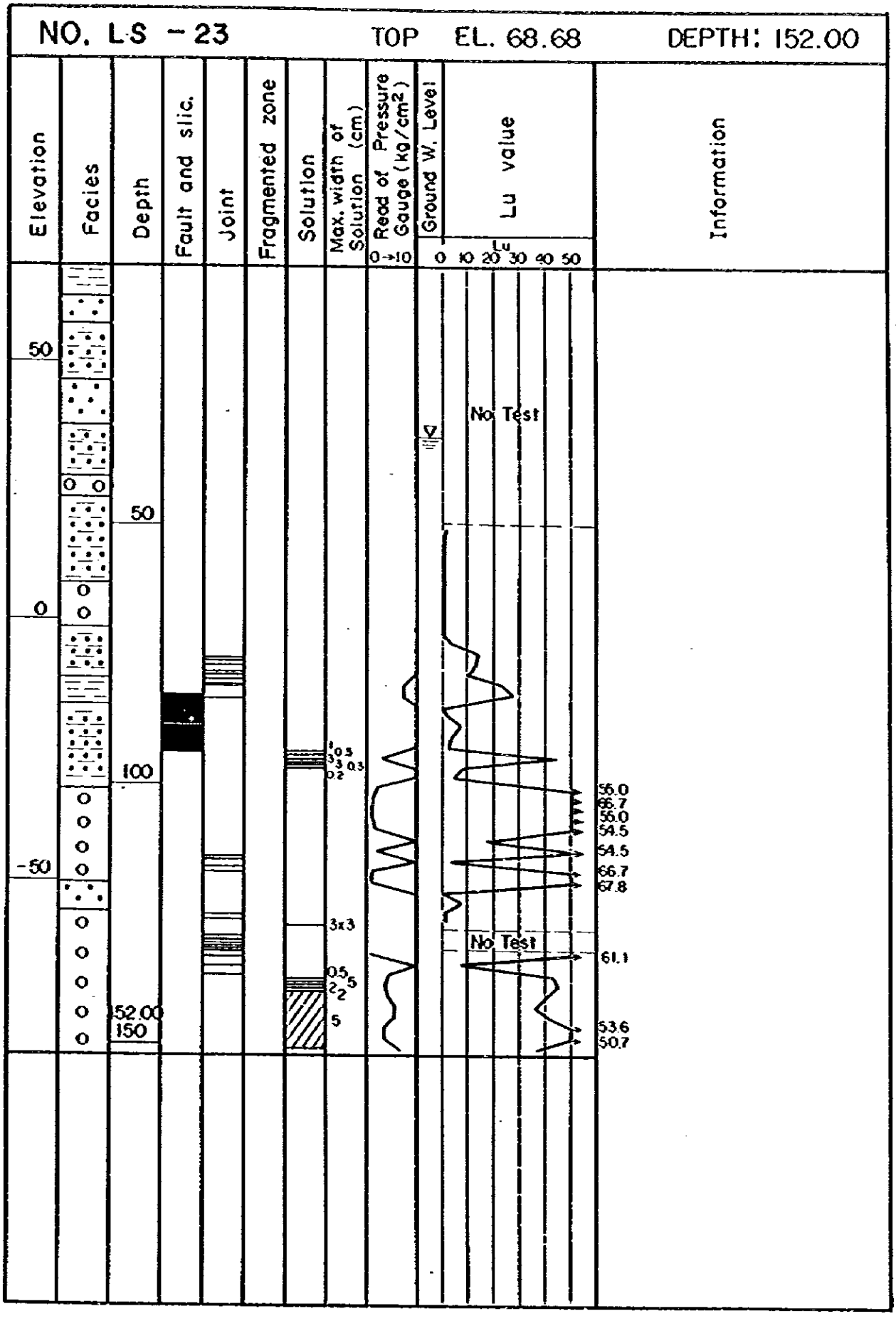

NO. RS - 20
TOP EL. 289.52
DEPTH: 375.00
Elevation
Facies
Depth
Fault and slic.
Joint
Fragmented zone
Solution
Max. width of Solution (cm)
Read of Pressure Gauge (kg/cm²)
0 → 10
Ground W. Level
Lu value
0 10 20 30 40 50
Information
50
0
-50
250
300
350
375.00
0.5
0.2
0.2
1
0.3
0.1
0.3
1

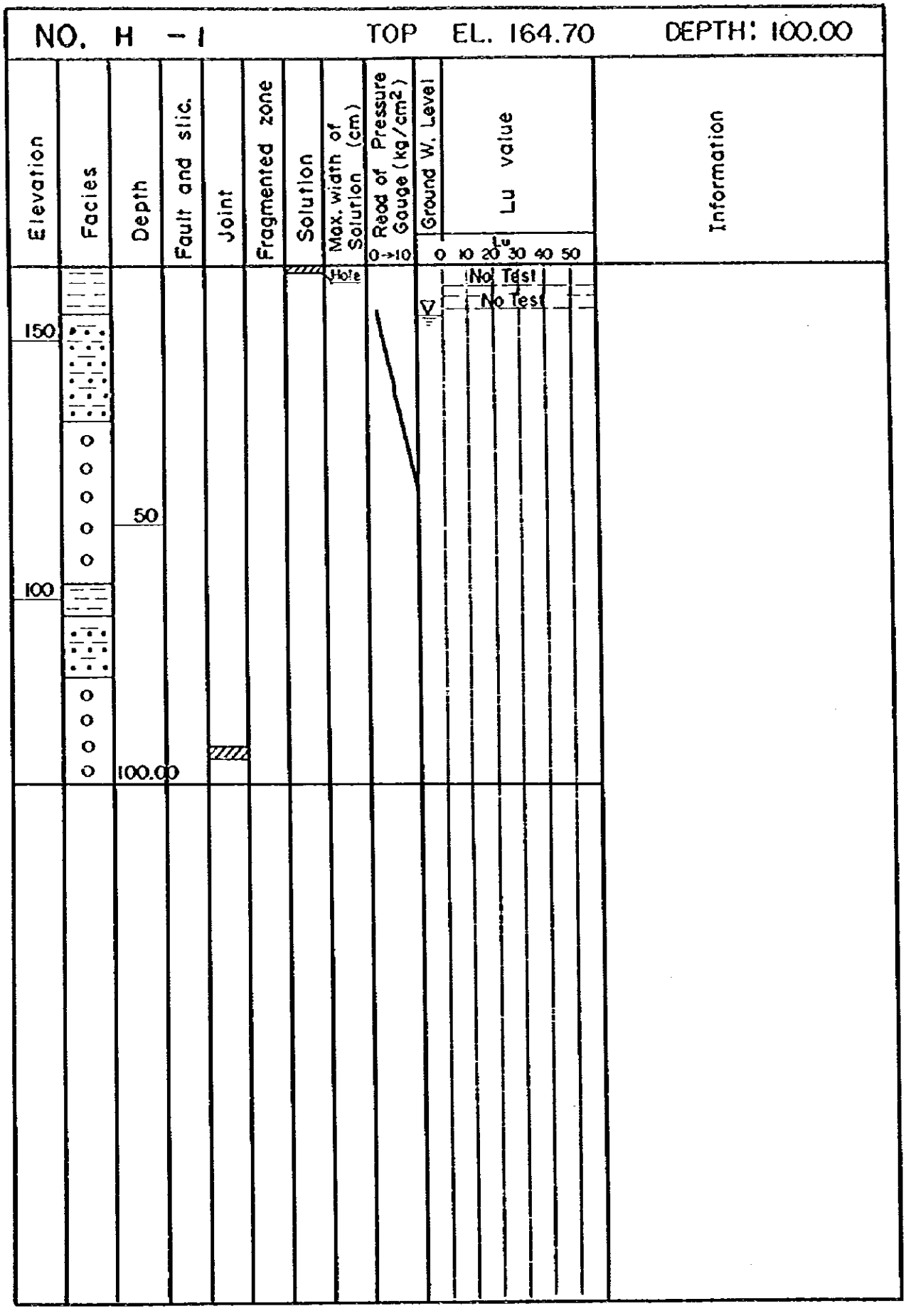

NO. LS - 21
TOP EL. 137.94
DEPTH: 228.00
Elevation
Facies
Depth
Fault and slic.
Joint
Fragmented zone
Solution
Max. width of Solution (cm)
Read of Pressure Gauge (kg/cm²)
0→10
Ground W. Level
Lu value
Lu
0 10 20 30 40 50
Information
100
50
0
-50
50
100
150
200.
No Test
No Test
No Test
No Test
No Test
No Test

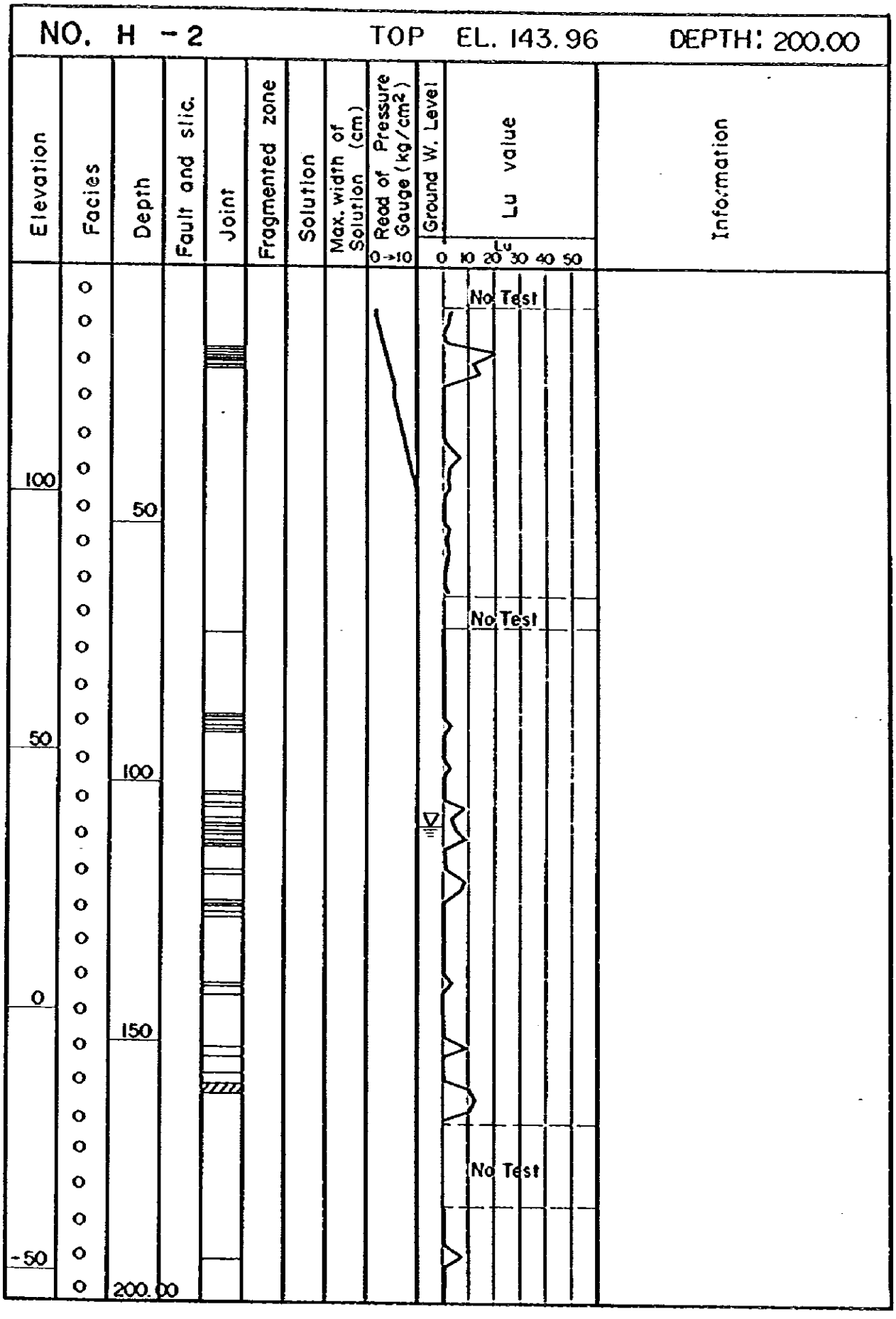

NO. LS - 21
TOP EL. 137.94
DEPTH: 228.00
Elevation
Facies
Depth
Fault and slic.
Joint
Fragmented zone
Solution
Max. width of Solution (cm)
Read of Pressure Gauge (kg/cm²)
0 → 10
Ground W. Level
Lu value
0 10 20 30 40 50
Information
No Test
No Test
No Test
228.00

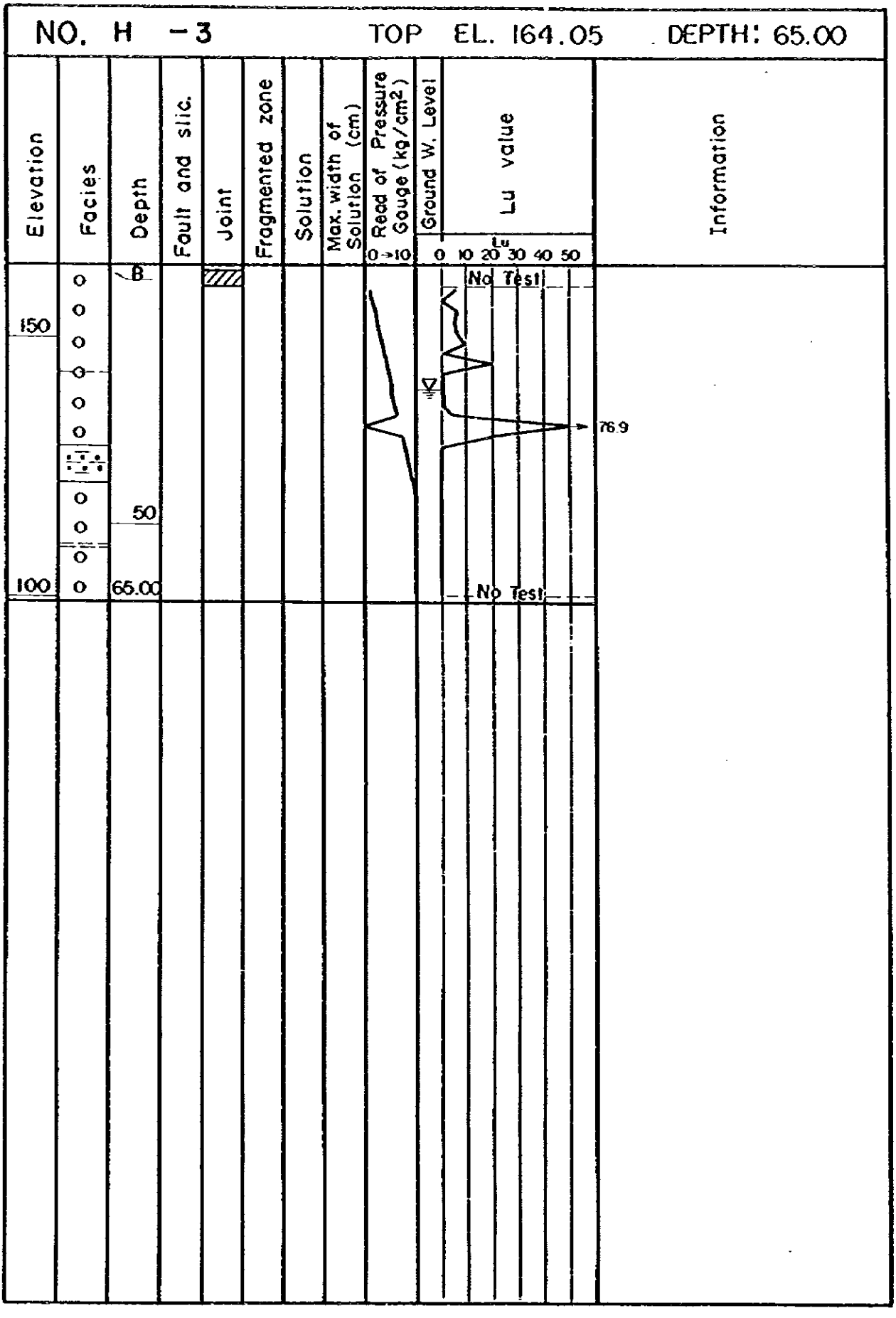

NO. RS -22
TOP EL. 254.70
DEPTH: 260.00
Elevation
Facies
Depth
Fault and slic.
Joint
Fragmented zone
Solution
Max. width of Solution (cm)
Read of Pressure Gauge (kg/cm2)
Ground W. Level
Lu value
Information
0→10
Lu
0 10 20 30 40 50
250
200
150
100
50
100
150
200
No Test
No Test
No Test
166.7
0.5
0.3
10
0.5x1
0.1
0.5
0.2
0.5
0.3
1
2x7
3
0.2
0.5 2
0.5
0.5
0.5
0.3
0.3
0.2
0.2
0.3
0.3
0.1
0.3
0.5


NO. RS - 22
TOP EL. 254.70
DEPTH: 260.00
Elevation
Facies
Depth
Fault and slic.
Joint
Fragmented zone
Solution
Max. width of Solution (cm)
Read of Pressure Gauge (kg/cm²)
0→10
Ground W. Level
Lu value
0 10 20 30 40 50
Information
50
0
250
260.00
0.5
2~5
0.3
0.2
0.2
0.5
0.5
0.5
0.2
0.2
0.5
1
0.2
1
0.5
0.2
0.2
3~1
No Test


NO. LS - 23
TOP EL. 68.68
DEPTH: 152.00
Elevation
Facies
Depth
Fault and slic.
Joint
Fragmented zone
Solution
Max. width of Solution (cm)
Read of Pressure Gauge (kg/cm²)
Ground W. Level
Lu value
Information
0→10
0 10 20 30 40 50
Lu
50
0
-50
50
100
152.00
150
No Test
No Test
56.0
66.7
56.0
54.5
54.5
66.7
67.8
61.1
53.6
50.7


NO. H -1
TOP EL. 164.70
DEPTH: 100.00
Elevation
Facies
Depth
Fault and slic.
Joint
Fragmented zone
Solution
Max. width of Solution (cm)
Read of Pressure Gauge (kg/cm²)
Ground W. Level
Lu value
Information
0→10
0 10 20 30 40 50
Hole
No Test
No Test
150
100
50
100.00


NO. H -2
TOP EL. 143.96
DEPTH: 200.00
Elevation
Facies
Depth
Fault and slic.
Joint
Fragmented zone
Solution
Max. width of Solution (cm)
Read of Pressure Gauge (kg/cm²)
0 → 10
Ground W. Level
Lu value
0 10 20 Lu 30 40 50
Information
100
50
0
-50
50
100
150
200.00
No Test
No Test
No Test


NO. H -3
TOP EL. 164.05
DEPTH: 65.00
Elevation
Facies
Depth
Fault and slic.
Joint
Fragmented zone
Solution
Max. width of Solution (cm)
Read of Pressure Gauge (kg/cm²)
0→10
Ground W. Level
Lu value
0 10 20 30 40 50
Lu
Information
B
150
50
100
66.00
No Test
76.9
No Test

3-2 P-Q Diagram

In order to obtain the indirect informations about the state of openings, such as joints, cracks and cavities, P-Q diagrams were drawn. P-Q diagrams of those permeability test sections are shown below, in which sections Lugeon value showed more than 1 Lu and tests were executed under specified pressure steps.

The drillhole RB-2 has several test sections where more water was injected in pressure decrease stage than in pressure increase stage under same injection pressure. In these sections the openings are supposed to be widened because the injected water washed away the filled materials.

P - Q Diagram Drillhole RB - 1 (1 - 3)

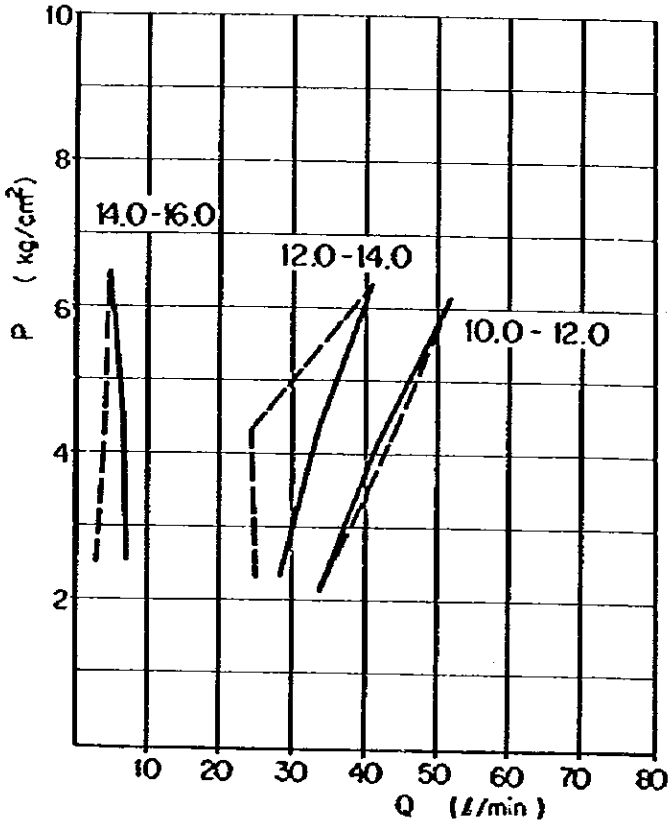
10.0 ~ 12.0 m

12.0 ~ 14.0 m

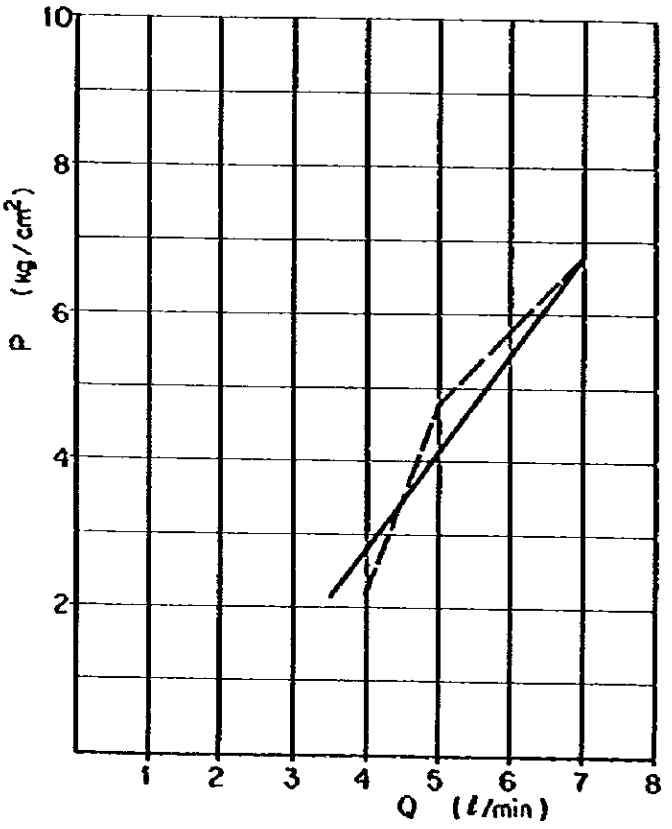
14.0 ~ 16.0 m

—— Pressure increase

--- Pressure decrease

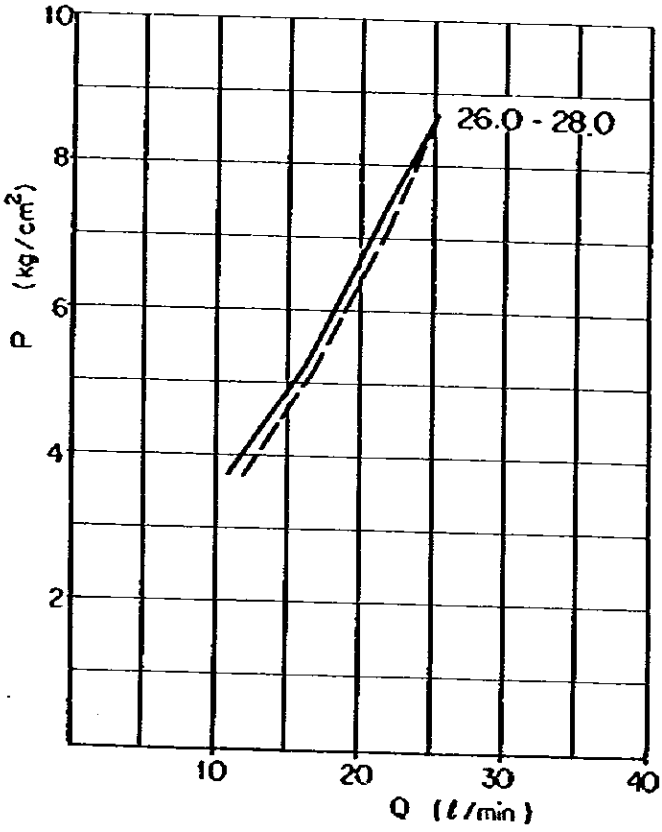


16.0 ~ 18.0 m

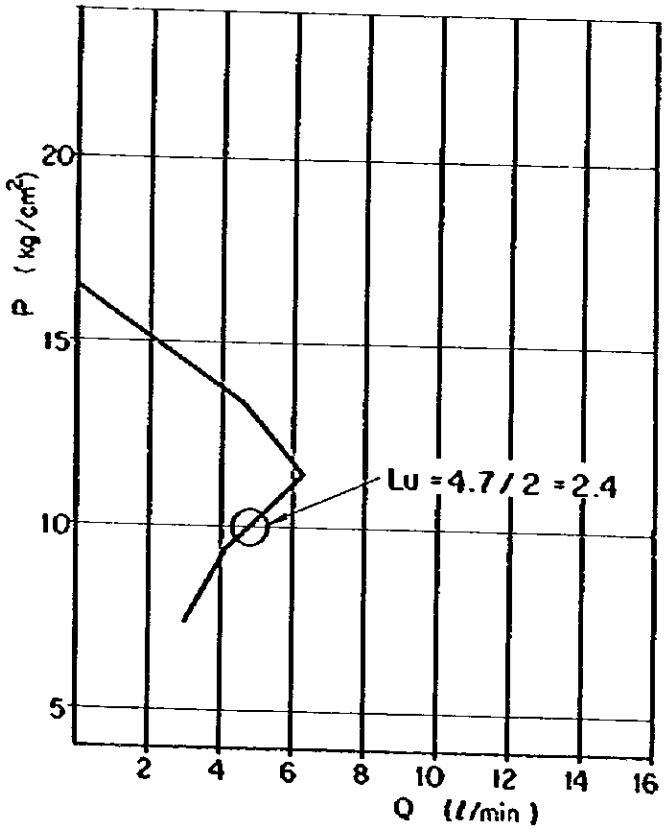


P - Q Diagram Drillhole RB - 1 (2 - 3)

26.0 ~ 28.0 m

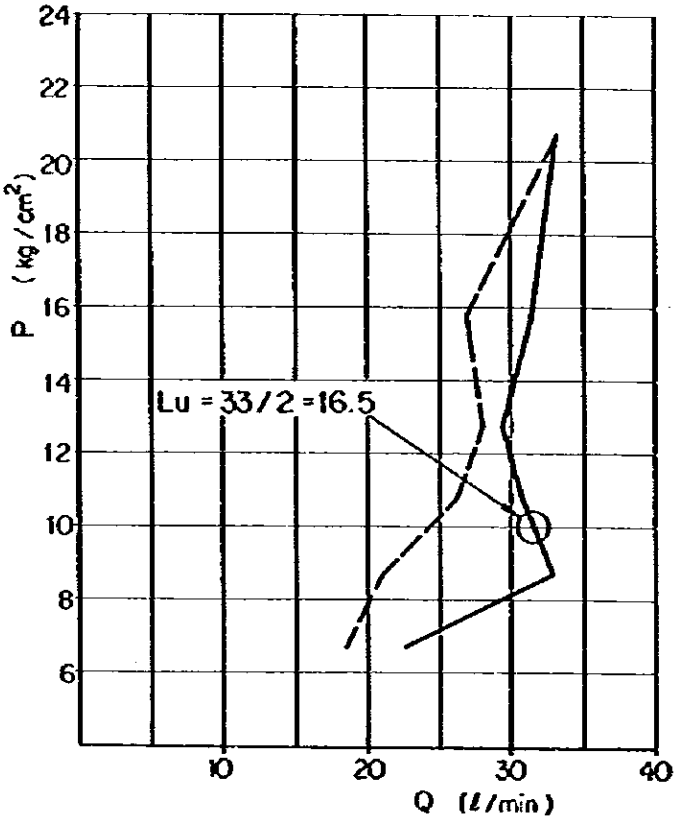


60.0 ~ 62.0 m



P - Q Diagram Drillhole RB - 1 (3-3)

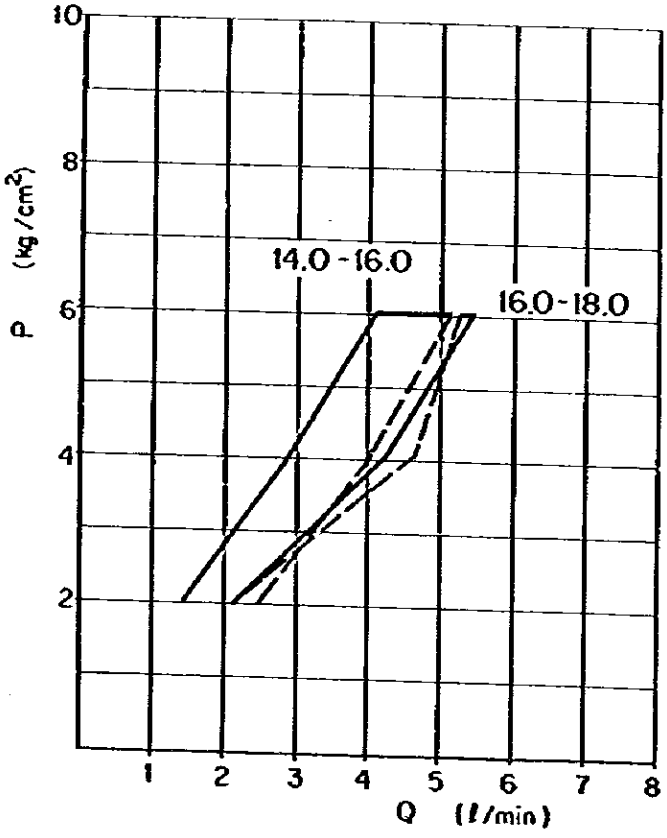
86.0 ~ 88.0 m



P - Q Diagram Drillhole RB - 2 (1 - 7)

14.0 ~ 16.0m

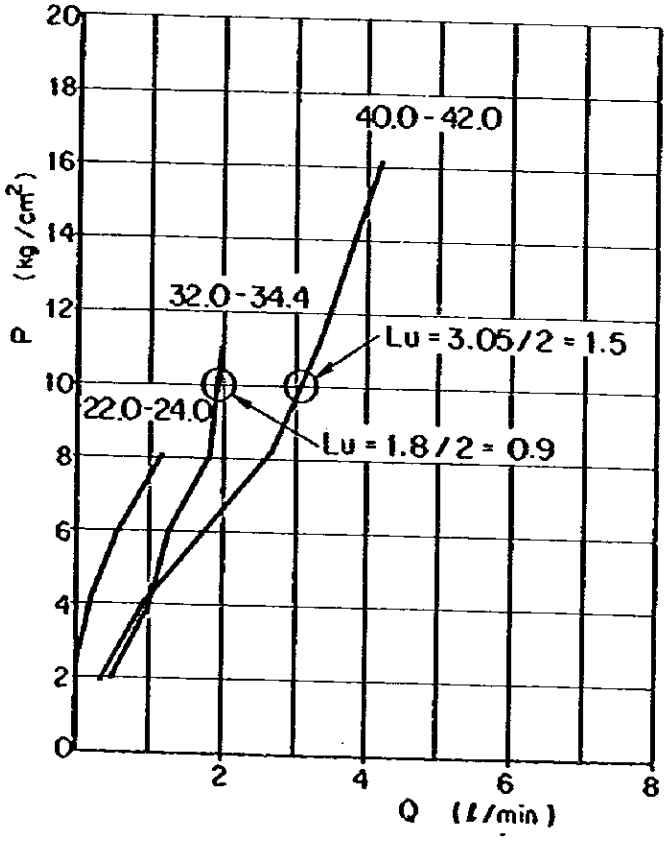
16.0 ~ 18.0m



22.0 ~ 24.0m

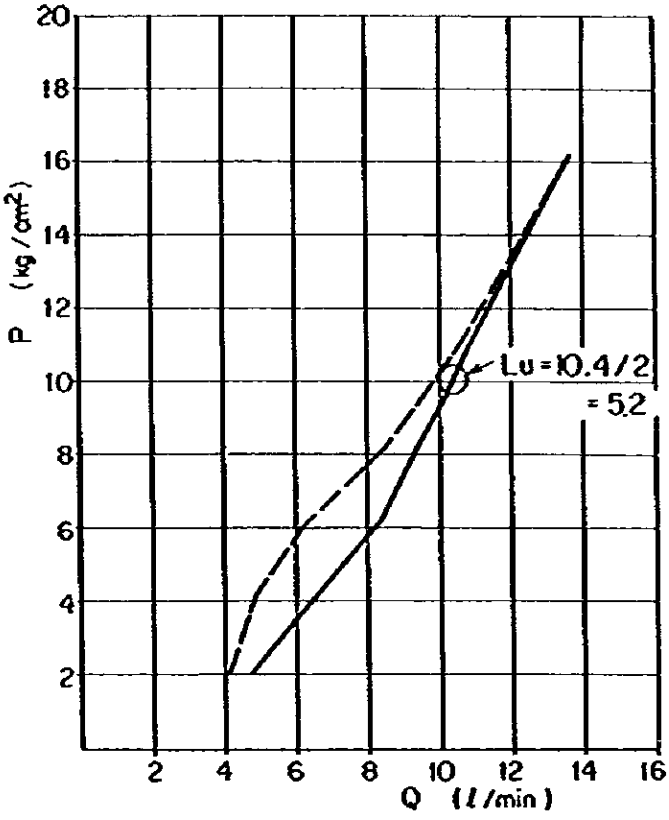
32.0 ~ 34.0m

40.0 ~ 42.0m

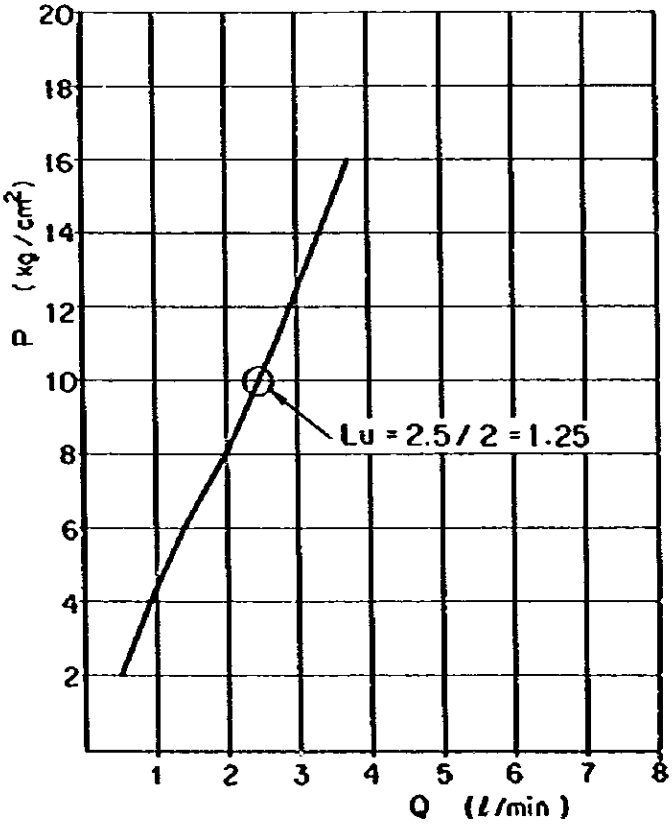


P - Q Diagram Drillhole RB - 2 (2-7)

50.0 ~ 52.0 m

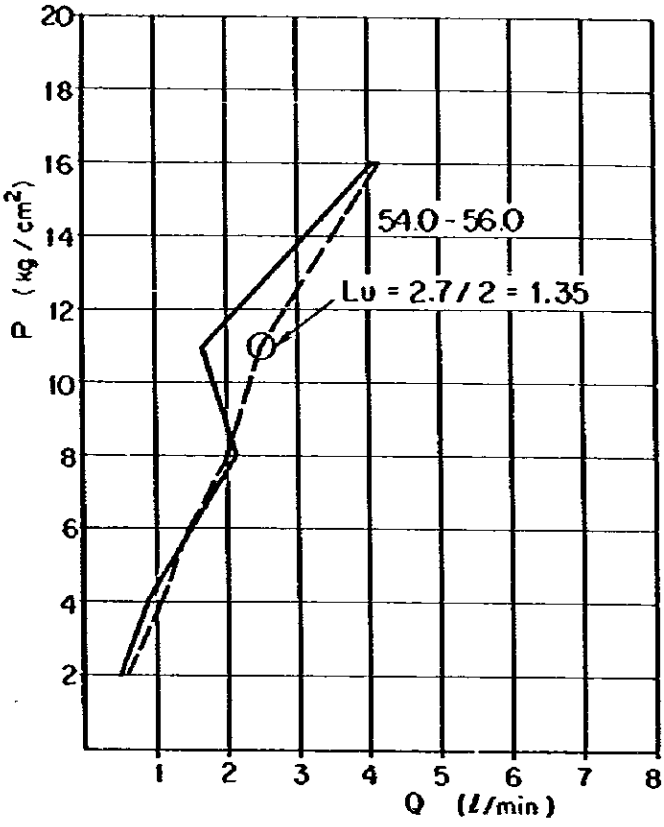


52.0 ~ 54.0 m

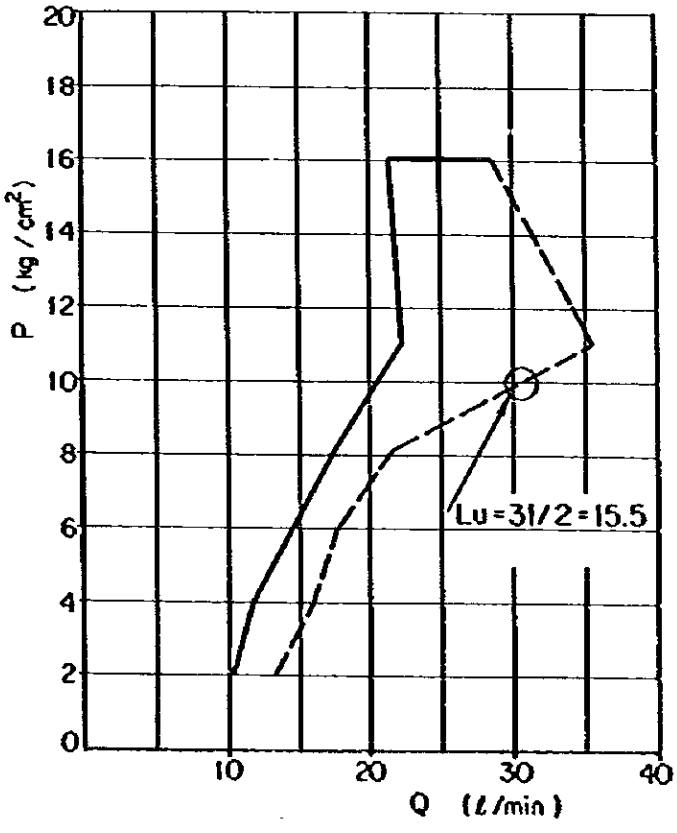


P - Q Diagram Drillhole RB - 2 (3 - 7)

54.0 ~ 56.0 m

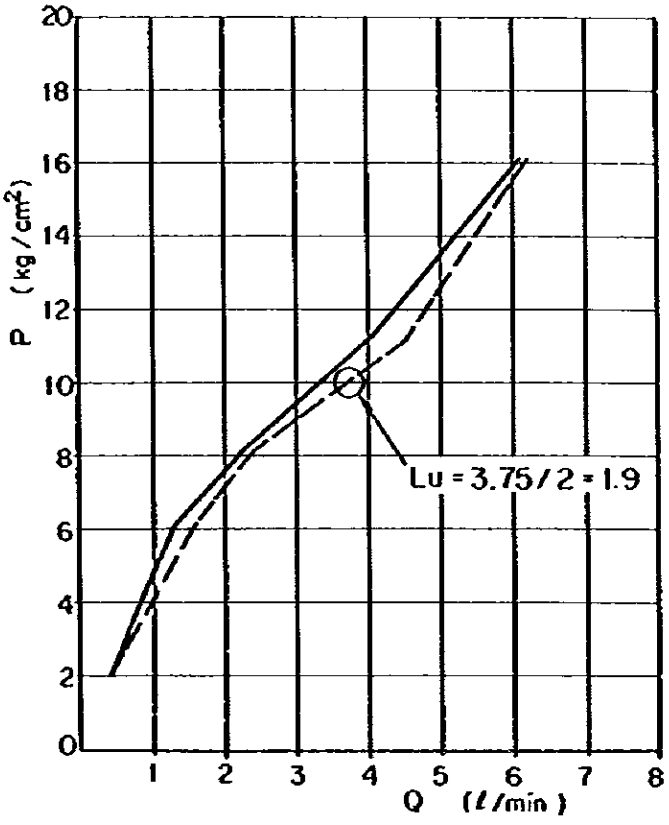


58.0 ~ 60.0 m

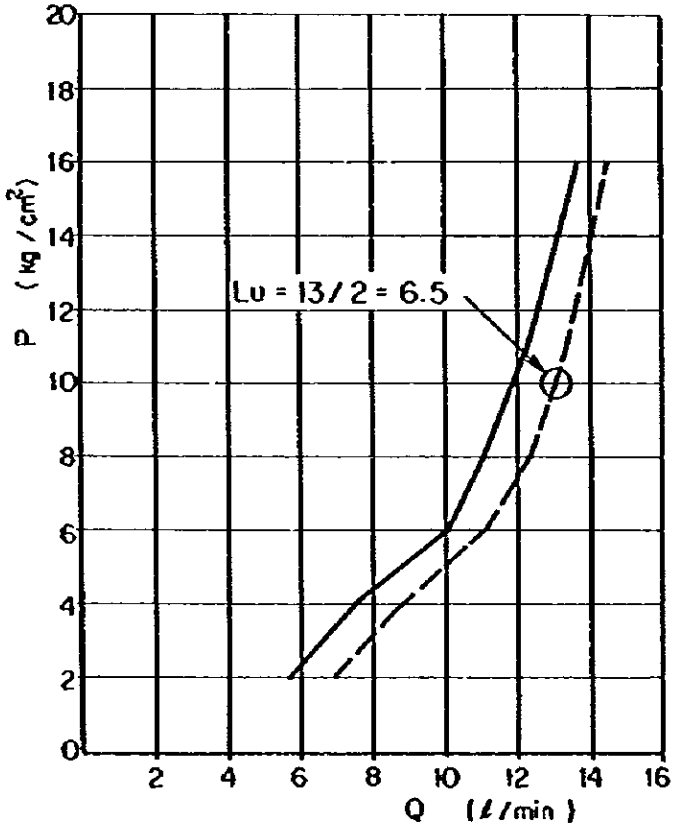


P - Q Diagram Drillhole RB - 2 (4 - 7)

74.0 ~ 76.0m

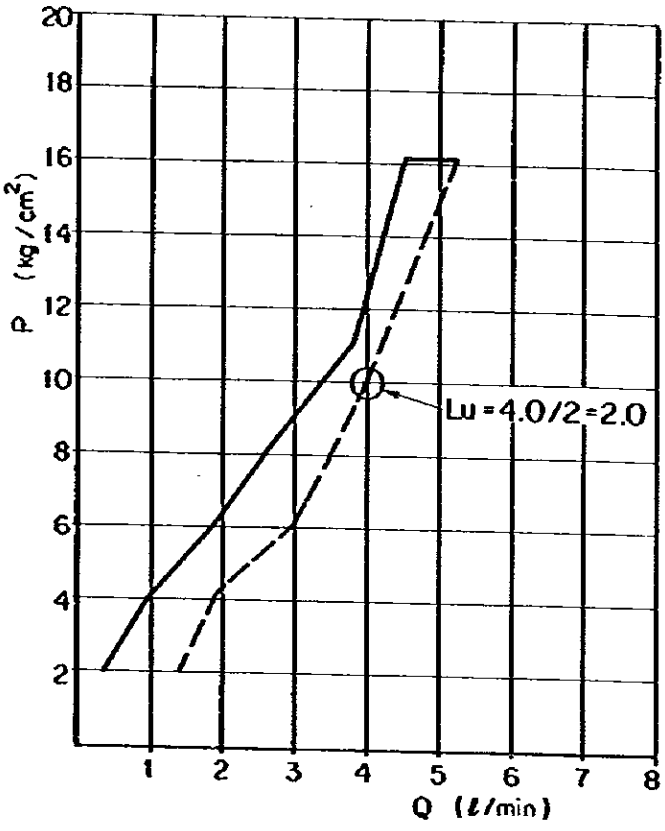


90.0 ~ 92.0m



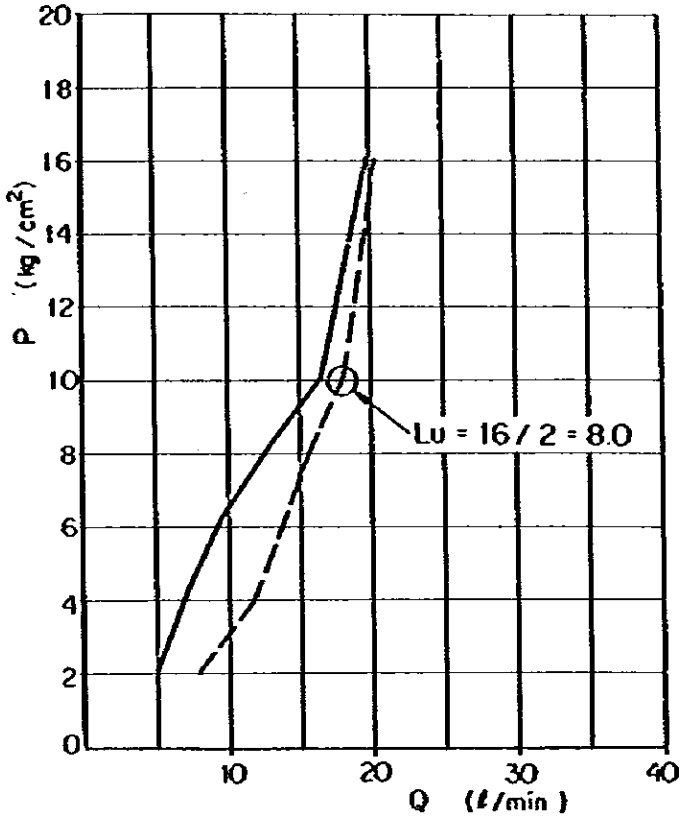
P - Q Diagram Drillhole RB - 2 (5 - 7)

100.0 ~ 102.0 m

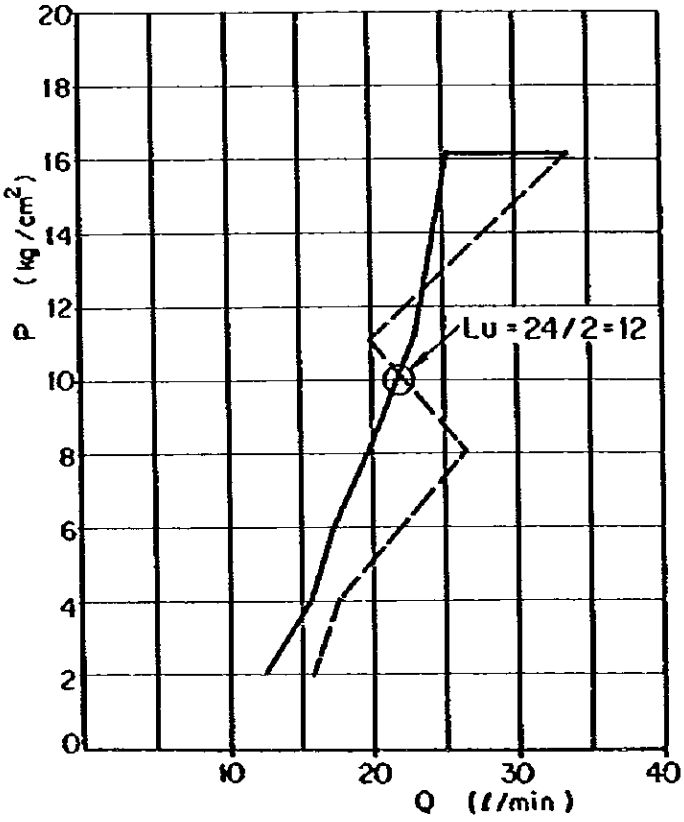


P - Q Diagram Drillhole RB - 2 (6 - 7)

102.0 ~ 104.0 m

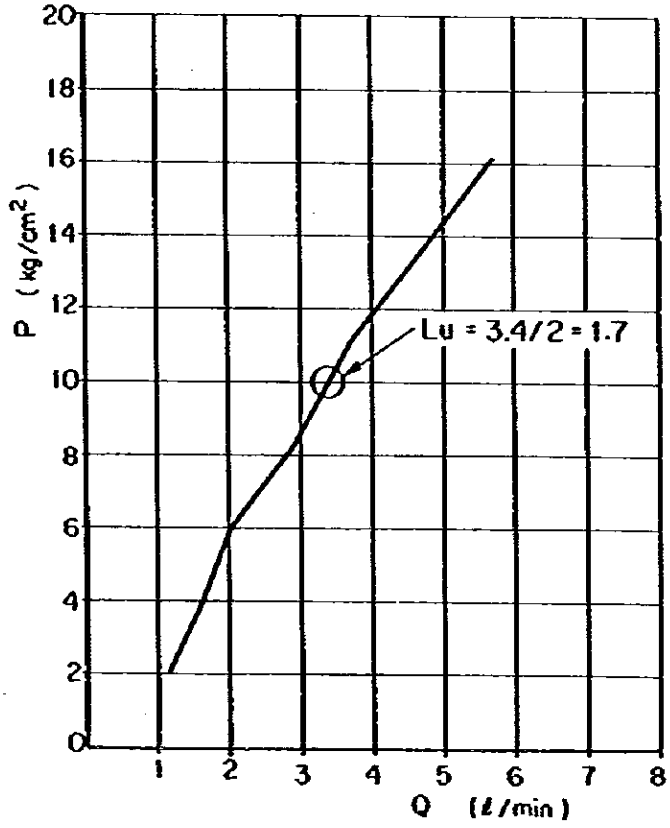


104.0 ~ 106.0 m



P - Q Diagram Drillhole RB - 2 (7 - 7)

108.0 ~ 110.0 m



A–4

DATA OF SEEPAGE FLOW ANALYSIS

4-1 Lugeon Values Adopted for the Analysis

Unit: Lugeon

Item		Measured Average Value	Adopted Values		
			K_1	K_2	K_3
Surface (Depth 40 m)	Köprüçay Conglomerate	35.2	40	200	400
	Shale and Sandstone	13.3	20	100	200
Facies	Köprüçay Conglomerate	5.9	10	50	100
	Shale and Sandstone	1.6	2	10	20
Sheared zone (Width 40 m P-1 Fault)	Köprüçay Conglomerate	41	40	200	400
	Shale and Sandstone	-	40	200	400
Sheared zone (Width 30 m Fault except P-1)	Köprüçay Conglomerate	9.9	20	100	200
	Shale and Sandstone	-	20	100	200
Grout zone	Curtain	-	5	5	5
	Consolidation	-	1	1	1

4-2 Calculation Cases

	Grout Condition	Without Grout			Grout EL.-60 m (A)			Grout EL.-120 m (B)		
	Permeability Coe.	K_1	K_2	K_3	K_1	K_2	K_3	K_1	K_2	K_3
Slice Section (EL.80 m)	Right Bank	H-R-1	-	-	*H-R-2A	-	-	-	-	*H-R-2B **H-R-2C
	Left Bank	H-L-1	-	-	*H-L-2A	-	-	-	-	*H-L-2B **H-L-2C
Vertical Section	Dam Foundation	D-1-01	D-1-02	-	D-1-A1	-	D-1-A3	D-1-B1	-	D-1-B3
	Right Bank (R-1)	R-1-01	R-1-02	R-1-03	R-1-A1	R-1-A2	R-1-A3	R-1-B1	R-1-B2	R-1-B3
	Right Bank (R-2)	R-2-01	-	-	-	-	-	-	-	-
	Right Bank (R-3)	R-3-01	-	-	-	-	-	-	-	-
	Left Bank (L-1)	L-1-01	-	-	L-1-A1	-	-	-	-	-
	Left Bank (L-2)	L-2-01	-	-	-	-	-	-	-	-
Considered Crack	Right Bank (R-1)									
	W = 2 mm	-	-	-	R-1-A1-C1	-	-	-	-	-
	W = 2 cm	R-1-01-C2	-	-	R-1-A1-C2	-	-	R-1-B1-C2	-	-

Remarks: * Considered horizontal grout line.

** Considered horizontal grout line in half length.

4-3-1 Result of Seepage Flow Analysis
(Case of Permeability Coefficient K_1)

Calculated Section			Distance (m)	Non Grouted		Grout A (EL. - 60 m)		Grout B (EL. - 120 m)	
				Unit seepage flow (l/min/m)	Seepage flow (l/min)	Unit seepage flow (l/min/m)	Seepage flow (l/min)	Unit seepage flow (l/min/m)	Seepage flow (l/min)
Dam foundation			100	16.80	1,680	8.52	852	8.42	842
Right Bank	R-1		100	7.78	778	7.75	775	7.73	773
	R-2		200	4.54	908	(4.52)	(904)	(4.51)	(902)
	R-3		800	1.65	1,320	(1.64)	(1,312)	(1.64)	(1,312)
	Sub-total		1,100		3,006		(2,991)		(2,987)
Left Bank	L-1		100	8.15	815	8.14	814	(8.10)	(810)
	L-2		400	2.52	1,008	(2.51)	(1,004)	(2.50)	(1,000)
	Sub-total		500		1,823		(1,818)		(1,812)
Grand Total					6,509		(5,661)		(5,639)
Solution Crack	R-1	0.2 cm		(12.61)		7.78		(3.48)	
		2.0 cm		148.04		91.31		40.83	

Remark; ( ) shows estimated values

4-3-2 Result of Seepage Flow Analysis
(Case of Permeability Coefficient K_2)

Calculated Section			Distance (m)	Non Grouted		Grout A (EL. - 60 m)		Grout B (EL. - 120 m)	
				Unit seepage flow (l/min/m)	Seepage flow (l/min)	Unit seepage flow (l/min/m)	Seepage flow (l/min)	Unit seepage flow (l/min/m)	Seepage flow (l/min)
Dam foundation			100	76.83	7,683	(27.15)	(2,715)	(18.83)	(1,883)
Right Bank	R-1		100	28.28	2,828	23.47	2,347	21.61	2,161
	R-2		200	(16.50)	(3,300)	(13.69)	(2,738)	(12.61)	(2,522)
	R-3		800	(6.00)	(4,800)	(4.98)	(3,984)	(4.58)	(3,664)
	Sub-total		1,100		(10,928)		(9,069)		(8,347)
Left Bank	L-1		100	(29.63)	(2,963)	(24.59)	(2,459)	(22.64)	(2,264)
	L-2		400	(9.16)	(3,664)	(7.60)	(3,040)	(7.00)	(2,800)
	Sub-total		500		(6,627)		(5,499)		(5,064)
Grand Total					(25,238)		(17,283)		(15,294)
Solution Crack	R-1	0.2 cm							
		2.0 cm							

Remark; ( ) shows estimated values

4-3-3 Result of Seepage Flow Analysis (Case of Permeability Coefficient K_3)

Calculated Section		Distance (m)	Non Grouted		Grout A (EL. - 60 m)		Grout B (EL. - 120 m)	
			Unit seepage flow (l/min/m)	Seepage flow (l/min)	Unit seepage flow (l/min/m)	Seepage flow (l/min)	Unit seepage flow (l/min/m)	Seepage flow (l/min)
Dam foundation		100	(142.09)	(14.209)	46.02	4,602	28.66	2,866
Right Bank	R-1	100	52.30	5,230	39.78	3,978	32.90	3,290
	R-2	200	(30.52)	(6,104)	(23.21)	(4,642)	(19.20)	(3,840)
	R-3	800	(11.09)	(8,872)	(8.44)	(6,752)	(6.98)	(5,584)
	Sub-total	1,100		(20,206)		(15,372)		(12,714)
Left Bank	L-1	100	(54.79)	(5,479)	(41.67)	(4,167)	(34.47)	(3,447)
	L-2	400	(16.94)	(6,776)	(12.88)	(5,152)	(10.66)	(4,264)
	Sub-total	500		(12,255)		(9,139)		(7,711)
Grand Total				(46,670)		(29,293)		(23,291)
Solution Crack	R-1 0.2 cm							
	R-1 2.0 cm							

Remark; ( ) shows estimated values

4-4-1(a) Inflow & Outflow of Seepage Flow (H-R-1)

Inflow

Joint Number	Joint Seepage (ℓ/min/m)	Percentage for Total Seepage (%) at Joint	Percentage for Total Seepage (%) Accumulated
219	5.948	24.0	24.0
218	1.877	7.6	31.6
217	5.478	22.1	53.7
216	1.894	7.6	61.3
215	0.991	4.0	65.3
214	0.748	3.0	68.3
213	0.582	2.3	70.6
212	0.364	1.5	72.1
211	0.668	2.7	74.8
210	0.975	3.9	78.7
209	0.537	2.2	80.9
208	0.403	1.6	82.5
207	0.490	2.0	84.5
206	2.120	8.5	93.0
181	0.337	1.4	94.4
182	0.116	0.5	94.9
183	0	0	94.9
154	0.100	0.4	95.3
142	0.425	1.7	97.0
156	0.038	0.2	97.2
155	0.003	0	97.2
184	0.006	0	97.2
187	0.001	0	97.2
188	0	0	97.2
186	0.001	0	97.2
160	0.002	0	97.2
143	0.001	0	97.2
124	0.062	0.2	97.4
89	0.269	1.1	98.5
90	0	0	98.5
73	0.119	0.5	99.0
74	0.023	0.1	99.1
62	0.150	0.6	99.7
76	0.005	0	99.7
91	0	0	99.7
95	0	0	99.7
94	0.001	0	99.7
93	0.001	0	99.7
79	0.003	0	99.7
65	0.024	0.1	99.8
66	0.007	0	99.8
68	0.045	0.2	100.0
Total	24.82 ℓ/min/m		100.0 %

Outflow

Joint Number	Joint Seepage (ℓ/min/m)	Percentage for Total Seepage (%) at Joint	Percentage for Total Seepage (%) Accumulated
314	10.496	42.3	42.3
312	3.381	13.6	55.9
330	1.718	6.9	62.8
332	1.030	4.2	67.0
342	0.383	1.5	68.5
348	0.439	1.8	70.3
372	0.645	2.6	72.9
379	0.631	2.5	75.4
402	0.421	1.7	77.1
413	0.122	0.5	77.6
410	0.497	2.0	79.6
414	0.235	0.9	80.5
421	0.122	0.5	81.0
447	0.020	0.1	81.1
446	0.094	0.4	81.5
445	0.402	1.6	83.1
482	0.014	0	83.1
488	0.016	0.1	83.2
489	0.009	0	83.2
491	0.001	0	83.2
486	0.013	0	83.2
480	0.217	0.9	84.1
479	0.322	1.3	85.4
485	0.024	0.1	85.5
484	0.089	0.4	85.9
483	0.022	0.1	86.0
475	0.091	0.4	86.4
474	0.096	0.4	86.8
469	0.431	1.7	88.5
467	0.306	1.2	89.7
466	0.377	1.5	91.2
526	0.149	0.6	91.8
527	0.069	0.3	92.1
528	0.017	0.1	92.2
529	0.002	0	92.2
531	0.002	0	92.2
532	0.001	0	92.2
533	0.001	0	92.2
523	0.096	0.4	92.6
520	0.215	0.9	93.5
516	0.166	0.7	94.6
507	0.102	0.4	96.1
506	0.256	1.0	97.1
501	0.111	0.4	98.1
494	0.237	1.0	100.0
Total	24.82 ℓ/min/m		100.0 %

Condition

Section: Right Bank (EL. 80m)
Reservoir W.L.: EL. 150.00m
Downstream W.L.: EL. 40.00m
Grout Curtain: None
Permeability Coef.: K_1

4-4-1(b) Inflow & Outflow of Seepage Flow (H-L-1)

Inflow

Joint Number	Joint Seepage (ℓ/min/m)	Percentage for Total Seepage (%) at Joint	Percentage for Total Seepage (%) Accumulated
191	12.281	54.8	54.8
200	2.389	10.7	65.5
201	1.505	6.7	72.2
202	1.252	5.6	77.8
203	0.778	3.5	81.3
204	1.334	6.0	87.3
205	0.633	2.8	90.1
210	0.073	0.3	90.4
211	0.330	1.5	91.9
229	0	0	91.9
228	0	0	91.9
227	0	0	91.9
226	0	0	91.9
225	0.091	0.4	92.3
224	0.524	2.3	94.6
223	0.088	0.4	95.0
221	0.169	0.7	95.7
165	0.310	1.4	97.1
166	0.661	2.9	100.0
167	-0.008	0	100.0
168	-0.019	-0.1	99.9
230	0.002	0	99.9
235	0.017	0.1	100.0
Total	22.41 ℓ/min/m		100.0 %

Outflow

Joint Number	Joint Seepage (ℓ/min/m)	Percentage for Total Seepage (%) at Joint	Percentage for Total Seepage (%) Accumulated
180	14.063	62.8	62.8
177	1.590	7.1	69.9
174	1.264	5.6	75.5
172	1.213	5.4	80.9
153	0.923	4.1	85.0
137	0.674	3.0	88.0
135	0.058	0.3	88.3
133	0.002	0	88.3
114	0.002	0	88.3
110	0.027	0.1	88.4
111	0.543	2.4	90.8
112	0.142	0.6	91.4
113	0.807	3.6	95.0
94	0.717	3.2	98.2
93	0.025	0.1	98.3
92	0.001	0	98.3
87	0.006	0	98.3
84	0.008	0	98.3
83	0.016	0.1	98.4
82	0.002	0	98.4
81	0	0	98.4
78	0	0	98.4
79	0.012	0.1	98.5
65	0.150	0.7	99.2
44	0.147	0.7	99.9
25	0.021	0.1	100.0
10	0.021	0.1	100.1
9	0	0	100.1
1	-0.026	-0.1	100.0
Total	22.41 ℓ/min/m		100.0 %

Condition

Section: Left Bank (EL. 80 m)
Reservoir W.L.: EL. 150.00 m
Downstream W.L.: EL. 40.00 m
Grout Curtain: None
Permeability Coef.: K_1

4-4-2(a) Inflow & Outflow of Seepage Flow (H-R-2A)

Inflow

Joint Number	Joint Seepage (ℓ/min/m)	Percentage for Total Seepage (%) at Joint	Percentage for Total Seepage (%) Accumulated
219	3.090	15.6	15.6
218	1.355	6.9	22.5
217	4.182	21.2	43.7
216	1.722	8.7	52.4
215	0.940	4.8	57.2
214	0.725	3.7	60.9
213	0.575	2.9	63.8
212	0.363	1.8	65.6
211	0.665	3.4	69.0
210	0.960	4.9	73.9
209	0.533	2.7	76.6
208	0.389	2.0	78.6
207	0.472	2.4	81.0
206	1.947	9.9	90.9
181	0.356	1.8	92.7
182	0.121	0.6	93.3
183	0	0	93.3
154	0.105	0.5	93.8
142	0.449	2.3	96.1
156	0.040	0.2	96.3
155	0.004	0	96.3
184	0.006	0	96.3
187	0.001	0	96.3
188	0	0	96.3
186	0.001	0	96.3
160	0.002	0	96.3
143	0.001	0	96.3
124	0.065	0.3	96.6
89	0.281	1.4	98.0
90	0	0	98.0
73	0.124	0.6	98.6
74	0.023	0.1	98.7
62	0.156	0.8	99.5
76	0.005	0	99.5
91	0	0	99.5
95	0	0	99.5
94	0.001	0	99.5
93	0.001	0	99.5
79	0.004	0	99.5
65	0.024	0.1	99.6
66	0.007	0	99.6
68	0.047	0.2	99.8
70	0	0	99.8
69	0.007	0.2	100.0
Total	19.75 ℓ/min/m		100.0 %

Outflow

Joint Number	Joint Seepage (ℓ/min/m)	Percentage for Total Seepage (%) at Joint	Percentage for Total Seepage (%) Accumulated
314	5.959	30.2	30.2
312	3.240	16.4	46.6
330	1.599	8.1	54.7
332	0.977	4.9	59.6
342	0.367	1.9	61.5
348	0.423	2.1	63.6
372	0.623	3.2	66.8
379	0.612	3.1	69.9
402	0.409	2.1	72.0
413	0.119	0.6	72.6
410	0.483	2.4	75.0
414	0.229	1.2	76.2
421	0.119	0.6	76.8
447	0.020	0.1	76.9
446	0.091	0.5	77.4
445	0.392	2.0	79.4
482	0.013	0.1	79.5
488	0.015	0.1	79.6
489	0.008	0	79.6
491	0.001	0	79.6
486	0.012	0.1	79.7
480	0.212	1.1	80.8
479	0.314	1.6	82.4
485	0.023	0.1	82.5
484	0.087	0.4	82.9
483	0.021	0.1	83.0
475	0.088	0.4	83.4
474	0.093	0.5	83.9
469	0.420	2.1	86.0
467	0.299	1.5	87.5
466	0.369	1.9	89.4
526	0.146	0.7	90.1
527	0.067	0.3	90.4
528	0.016	0.1	90.5
529	0.002	0	90.5
520	0.210	1.1	92.1
516	0.162	0.8	93.3
509	0.086	0.4	94.6
506	0.251	1.3	96.4
548	0.009	0	98.5
547	0	0	98.5
543	0.012	0.1	98.6
539	0.046	0.2	98.8
494	0.233	1.2	100.0
Total	19.75 ℓ/min/m		100.0 %

Condition

Section: Right Bank (EL. 80m)
Reservoir W.L.: EL. 150.00m
Downstream W.L.: EL. 40.00m
Grout Curtain: ℓ = 1100m
Permeability Coef.: K_1

4-4-2(b) Inflow & Outflow of Seepage Flow (H-L-2A)

Inflow

Joint Number	Joint Seepage (ℓ/min/m)	Percentage for Total Seepage (%) at Joint	Percentage for Total Seepage (%) Accumulated
191	5.245	37.2	37.2
200	1.428	10.1	47.3
201	1.258	8.9	56.2
202	1.160	8.2	64.4
203	0.759	5.4	69.8
204	1.305	9.3	79.1
205	0.646	4.6	83.7
210	0.077	0.5	84.2
211	0.353	2.5	86.7
249	0	0	86.7
228	0	0	86.7
227	0	0	86.7
226	0	0	86.7
225	0.098	0.7	87.4
224	0.550	3.9	91.3
223	0.090	0.6	91.9
221	0.173	1.2	93.1
165	0.311	2.2	95.3
166	0.662	4.7	100.0
167	-0.008	0	100.0
168	-0.019	-0.1	99.9
230	0.002	0	99.9
235	0.027	0.1	100.0
Total	14.11 ℓ/min/m		100.0 %

Outflow

Joint Number	Joint Seepage (ℓ/min/m)	Percentage for Total Seepage (%) at Joint	Percentage for Total Seepage (%) Accumulated
180	6.724	47.7	47.7
177	1.230	8.7	56.4
174	1.001	7.1	63.5
172	1.029	7.3	70.8
153	0.849	6.0	76.8
137	0.642	4.6	81.4
135	0.056	0.4	81.8
133	0.002	0	81.8
114	0.002	0	81.8
110	0.026	0.2	82.0
111	0.528	3.7	85.7
112	0.139	1.0	86.7
113	0.792	5.6	92.3
94	0.709	5.0	97.3
93	0.025	0.2	97.5
92	0.001	0	97.5
87	0.005	0	97.5
84	0.008	0.1	97.6
83	0.016	0.1	97.7
82	0.002	0	97.7
81	0	0	97.7
78	0	0	97.7
79	0.012	0.1	97.8
65	0.150	1.1	98.9
44	0.146	1.0	99.9
25	0.021	0.1	100.0
10	0.021	0.1	100.1
9	0	0	100.1
1	0.026	-0.1	100.0
Total	14.11 ℓ/min/m		100.0 %

Condition

Section: Left Bank (EL. 80m)
Reservoir W.L.: EL. 150.00m
Downstream W.L.: EL. 40.00m
Grout Curtain: ℓ = 450m
Permeability Coef.: K_1

4-4-3(a) Inflow & Outflow of Seepage Flow (H-R-2B)

Inflow

Joint Number	Joint Seepage (ℓ/min/m)	Percentage for Total Seepage (%) at Joint	Percentage for Total Seepage (%) Accumulated
219	5.014	5.0	5.0
218	3.048	3.0	8.0
217	11.447	11.4	19.4
216	7.583	7.6	27.0
215	5.183	5.2	32.2
214	4.651	4.7	36.9
213	4.164	4.2	41.1
212	2.802	2.8	43.9
211	5.052	5.1	49.0
210	6.838	6.8	55.8
209	3.916	3.9	59.7
208	2.741	2.7	62.4
207	3.167	3.2	65.6
206	12.191	12.2	77.8
181	3.894	3.9	81.7
182	1.379	1.4	83.1
183	0	0	83.1
154	1.268	1.3	84.4
142	5.738	5.7	90.1
156	0.510	0.5	90.6
155	0.045	0	90.6
184	0.074	0.1	90.7
187	0.011	0	90.7
188	0	0	90.7
186	0.010	0	90.7
160	0.024	0	90.7
143	0.011	0	90.7
124	0.824	0.8	91.5
89	3.514	3.5	95.0
90	0	0	95.0
73	1.526	1.5	96.5
74	0.288	0.3	96.8
62	1.906	1.9	98.7
76	0.060	0.1	98.8
91	0.004	0	98.8
95	0.002	0	98.8
94	0.007	0	98.8
93	0.015	0	98.8
79	0.043	0	98.8
65	0.299	0.3	99.1
66	0.091	0.1	99.2
68	0.572	0.6	99.8
70	0	0	99.8
69	0.085	0.2	100.0
Total	100.00 ℓ/min/m		100.0 %

Outflow

Joint Number	Joint Seepage (ℓ/min/m)	Percentage for Total Seepage (%) at Joint	Percentage for Total Seepage (%) Accumulated
314	12.131	12.1	12.1
312	12.843	12.8	24.9
330	8.284	8.3	33.2
332	5.692	5.7	38.9
342	2.296	2.3	41.2
348	2.750	2.8	44.0
372	4.153	4.2	48.2
379	4.207	4.2	52.4
402	2.922	2.9	55.3
413	0.861	0.9	56.2
410	3.535	3.5	59.7
414	1.690	1.7	61.4
421	0.889	0.9	62.3
447	0.148	0.1	62.4
446	0.685	0.7	63.1
445	2.981	3.0	66.1
482	0.101	0.1	66.2
488	0.118	0.1	66.3
489	0.064	0.1	66.4
491	0.010	0	66.4
486	0.095	0.1	66.5
480	1.634	1.6	68.1
479	2.447	2.4	70.5
485	0.182	0.2	70.7
484	0.681	0.7	71.4
483	0.166	0.2	71.6
475	0.701	0.7	72.3
474	0.741	0.7	73.0
469	3.381	3.4	76.4
467	2.436	2.4	78.8
466	3.049	3.0	81.8
526	1.218	1.2	83.0
527	0.564	0.6	83.6
528	0.138	0.1	83.7
523	0.790	0.8	84.5
534	0.545	0.5	86.8
516	1.384	1.4	88.4
510	0.343	0.3	89.8
506	2.163	2.2	93.6
501	0.947	0.9	95.6
542	0.168	0.2	97.1
548	0.077	0.1	97.4
539	0.397	0.4	97.9
494	2.029	2.0	99.9
538	0.064	0.1	100.0
Total	100.00 ℓ/min/m		100.0 %

Condition

Section: Right Bank (EL. 80m)
Reservoir W.L.: EL. 150.00m
Downstream W.L.: EL. 40.00m
Grout Curtain: ℓ = 1100 m
Permeability Coef.: K_3

4-4-3(b) Inflow & Outflow of Seepage Flow (H-L-2B)

Inflow

Joint Number	Joint Seepage (ℓ/min/m)	Percentage for Total Seepage (%) at Joint	Percentage for Total Seepage (%) Accumulated
191	9.013	14.5	14.5
200	3.321	5.3	19.8
201	4.724	7.6	27.4
202	5.326	8.6	36.0
203	3.977	6.4	42.4
204	7.806	12.5	54.9
205	4.710	7.6	62.5
210	0.604	1.0	63.5
211	3.103	5.0	68.5
229	0	0	68.5
228	0	0	68.5
227	0	0	68.5
226	0	0	68.5
225	0.937	1.5	70.0
224	5.878	9.4	79.4
223	0.998	1.6	81.0
221	1.906	3.1	84.1
165	3.238	5.2	89.3
166	6.793	10.9	100.2
167	-0.080	-0.1	100.1
168	-0.195	-0.3	99.8
230	0.023	0	99.8
235	0.171	0.2	100.0
Total	62.25 ℓ/min/m		100.0 %

Outflow

Joint Number	Joint Seepage (ℓ/min/m)	Percentage for Total Seepage (%) at Joint	Percentage for Total Seepage (%) Accumulated
180	17.129	27.5	27.5
177	4.839	7.8	35.3
174	4.158	6.7	42.0
172	5.125	8.2	50.2
153	5.022	8.1	58.3
137	4.158	6.7	65.0
135	0.373	0.6	65.6
133	0.012	-	-
114	0.015	-	-
110	0.187	0.3	65.9
111	3.866	6.2	72.1
112	1.071	1.7	73.8
113	6.415	10.3	84.1
94	6.211	10.0	94.1
93	0.221	0.4	94.5
92	0.007	-	-
87	0.049	0.1	94.6
84	0.070	0.1	94.7
83	0.149	0.2	94.9
82	0.016	0	94.9
81	0	0	94.9
78	0	0	94.9
79	0.111	0.2	95.1
65	1.458	2.3	97.4
44	1.430	2.3	99.7
25	0.209	0.3	100.0
10	0.208	0.3	100.3
9	0	0	100.3
1	-0.257	-0.3	100.0
	62.25 ℓ/min/m		100.0 %

Condition

Suction: Left Bank (EL. 80m)
Reservoir W.L.: EL. 150.00m
Downstream W.L.: EL. 40.00m
Grout Curtain ℓ = 450m
Permeability Coef.: Kj

4-4-4(a) Inflow & Outflow of Seepage Flow (H-R-2C)

Inflow

Joint Number	Joint Seepage (ℓ/min/m)	Percentage for Total Seepage (%) at Joint	Percentage for Total Seepage (%) Accumulated
219	5.010	4.3	4.3
218	3.041	2.6	6.9
217	11.310	9.8	16.7
216	7.300	6.3	23.0
215	4.830	4.2	27.2
214	4.158	3.6	30.8
213	3.619	3.1	33.9
212	2.573	2.2	36.1
211	6.408	5.5	41.6
210	12.268	10.6	52.2
209	6.178	5.3	57.5
208	4.367	3.8	61.3
207	5.196	4.5	65.8
206	21.776	18.8	84.6
181	3.413	3.0	87.6
182	1.173	1.0	88.6
154	1.011	0.9	89.5
142	4.298	3.7	93.2
156	0.383	0.3	93.5
155	0.034	0.1	93.6
184	0.056	0.1	93.7
187	0.008	0	93.7
186	0.007	0	93.7
160	0.018	0	93.7
143	0.009	0	93.7
124	0.623	0.5	94.2
89	2.711	2.3	96.5
90	0	0	96.5
73	1.202	1.0	97.5
74	0.227	0.2	97.7
62	1.510	1.3	99.0
76	0.048	0.1	99.1
91	0.003	0	99.1
95	0.002	0	99.1
94	0.006	0	99.1
93	0.012	0	99.1
79	0.034	0.1	99.2
65	0.238	0.2	99.4
66	0.073	0.1	99.5
68	0.455	0.4	99.9
70	0	0	99.9
69	0.067	0.1	100.0
Total	115.66 ℓ/min/m		100.0 %

Outflow

Joint Number	Joint Seepage (ℓ/min/m)	Percentage for Total Seepage (%) at Joint	Percentage for Total Seepage (%) Accumulated
314	12.272	10.6	10.6
312	13.426	11.6	22.2
330	8.989	7.8	30.0
332	6.388	5.5	35.5
342	2.654	2.3	37.8
348	3.257	2.8	40.6
372	4.998	4.3	44.9
379	5.168	4.5	49.4
402	3.674	3.2	52.6
413	1.091	0.9	53.5
410	4.490	3.9	57.4
414	2.151	1.9	59.3
421	1.136	1.0	60.3
447	0.189	0.2	60.5
446	0.875	0.8	61.3
445	3.801	3.3	64.6
482	0.129	0.1	64.7
488	0.150	0.1	64.8
489	0.081	0.1	64.9
491	0.013	0.7	65.0
486	0.121	0.1	65.1
480	2.077	1.8	66.9
479	3.099	2.7	69.6
485	0.230	0.2	69.8
484	0.859	0.7	70.5
483	0.209	0.2	70.7
475	0.881	0.8	71.5
474	0.930	0.8	72.3
469	4.211	3.6	75.9
467	3.003	2.6	78.5
466	3.720	3.2	81.7
526	1.473	1.3	83.0
506	2.541	2.2	94.4
503	0.904	0.8	95.2
502	0.380	0.3	95.5
501	1.102	0.1	95.6
498	1.502	1.3	96.9
542	0.196	0.2	97.1
546	0.026	0.1	97.2
549	0.053	0.1	97.3
548	0.090	0.1	97.4
543	0.126	0.1	97.5
539	0.462	0.4	97.9
494	2.357	2.0	99.9
538	0.075	0.1	100.0
Total	115.66 ℓ/min/m		100.0 %

Condition

Section: Right Bank (EL. 80m)
Reservoir W.L.: EL. 150.00m
Downstream W.L.: EL. 40.00m
Grout Curtain: ℓ = 550m
Permeability Coef.: K_3

4-4-4(b) Inflow & Outflow of Seepage Flow (H-L-2C)

Inflow

Joint Number	Joint Seepage (ℓ/min/m)	Percentage for Total Seepage (%) at Joint	Percentage for Total Seepage (%) Accumulated
191	8.838	11.7	11.7
200	3.207	4.3	16.0
201	4.503	6.0	22.0
202	5.597	7.4	29.4
203	6.047	8.0	37.4
204	15.780	20.9	58.3
205	7.674	10.2	68.5
210	0.858	1.1	69.6
211	3.799	5.0	74.6
229	0	0	74.6
228	0	0	74.6
227	0	0	74.6
226	0	0	74.6
225	1.017	1.3	75.9
224	5.690	7.5	83.4
223	0.927	1.2	84.6
221	1.780	2.4	87.0
165	3.140	4.2	91.2
166	6.658	8.8	100.0
167	-0.076	-0.1	99.9
168	-0.191	-0.2	99.7
230	0.023	0.1	99.8
235	0.168	0.2	100.0
Total	75.44 ℓ/min/m		100.0 %

Outflow

Joint Number	Joint Seepage (ℓ/min/m)	Percentage for Total Seepage (%) at Joint	Percentage for Total Seepage (%) Accumulated
180	19.507	25.9	25.9
177	5.977	7.9	33.8
174	5.258	7.0	40.8
172	6.815	9.0	49.8
133	6.946	9.2	59.0
137	5.667	7.5	66.5
135	0.500	0.7	67.2
133	0.016	0	67.2
114	0.020	0	67.2
110	0.241	0.3	67.5
111	4.912	6.5	74.0
112	1.310	1.7	75.7
113	7.581	10.0	85.7
94	6.905	9.2	94.9
93	0.242	0.3	95.2
92	0.008	-	-
87	0.054	0.1	95.3
84	0.076	0.1	95.4
83	0.158	0.2	95.6
82	0.017	0	95.6
81	0	0	95.6
78	0	0	95.6
79	0.116	0.2	95.8
65	1.491	2.0	97.8
44	1.457	1.9	99.7
25	0.213	0.3	100.0
10	0.212	0.3	100.3
9	0	0	100.3
1	-0.261	-0.3	100.0
Total	75.44 ℓ/min/m		100.0 %

Condition:

Section: Left Bank (EL. 80m)
Reservoir W.L.: EL. 150.00m
Downstream W.L.: EL. 40.00m
Grout Curtain: ℓ = 225m
Permeability Coef.: K_3

4-4-5 Inflow & Outflow of Seepage Flow (D-1-01)

Inflow

Joint Number	Joint Seepage (ℓ/min/m)	Percentage for Total Seepage (%) at Joint	Percentage for Total Seepage (%) Accumulated
225	9.891	58.9	58.9
224	0.762	4.5	63.4
257	0.239	1.4	64.8
256	0.943	5.6	70.4
255	0.683	4.1	74.5
254	0.467	2.8	77.3
253	0.483	2.9	80.2
252	0.654	3.9	84.1
251	0.537	3.2	87.3
250	0.398	2.4	89.7
249	0.277	1.6	91.3
248	0.244	1.5	92.8
247	0.273	1.6	94.4
246	0.309	1.8	96.2
245	0.267	1.6	97.8
244	0.252	1.5	99.3
243	0.121	0.7	100.0
Total	16.80 ℓ/min/m		100.0 %

Outflow

Joint Number	Joint Seepage (ℓ/min/m)	Percentage for Total Seepage (%) at Joint	Percentage for Total Seepage (%) Accumulated
227	9.463	56.3	56.3
228	1.837	10.9	67.2
229	0.870	5.2	72.4
230	0.611	3.6	76.0
231	0.436	2.6	78.6
232	0.343	2.0	80.6
233	0.372	2.2	82.8
234	0.378	2.3	85.1
235	0.446	2.7	87.8
236	0.460	2.7	90.5
237	0.338	2.0	92.5
238	0.347	2.1	94.6
239	0.317	1.9	96.5
240	0.240	1.4	97.9
241	0.230	1.4	99.3
242	0.110	0.7	100.0
Total	16.80 ℓ/min/m		100.0 %

Condition

Section: Dam Foundation
Reservoir W.L.: EL. 150.00m
Downstream W.L.: EL. 40.00m
Grout Curtain: None
Permeability Coef.: K_1

4-4-6 Inflow & Outflow of Seepage Flow (D-1-02)

Inflow

Joint Number	Joint Seepage (ℓ/min/m)	Percentage for Total Seepage (%) at Joint	Percentage for Total Seepage (%) Accumulated
225	49.283	64.0	64.0
224	3.744	4.9	68.9
257	1.143	1.5	70.4
256	4.500	5.9	76.3
255	3.183	4.1	80.4
254	2.073	2.7	83.1
253	1.936	2.5	85.6
252	2.501	3.3	88.9
251	1.994	2.6	91.5
250	1.422	1.8	93.3
249	0.961	1.2	94.5
248	0.824	1.1	95.6
247	0.853	1.1	96.7
246	0.885	1.2	97.9
245	0.660	0.9	98.8
244	0.594	0.8	99.6
243	0.274	0.4	100.0
Total	76.83 ℓ/min/m		100.0 %

Outflow

Joint Number	Joint Seepage (ℓ/min/m)	Percentage for Total Seepage (%) at Joint	Percentage for Total Seepage (%) Accumulated
227	47.293	61.6	61.6
228	9.079	11.8	73.4
229	4.178	5.4	78.8
230	2.838	3.7	82.5
231	1.923	2.5	85.0
232	1.452	1.9	86.9
233	1.498	1.9	88.8
234	1.430	1.8	90.6
235	1.596	2.1	92.7
236	1.584	2.1	94.8
237	1.104	1.4	96.2
238	0.987	1.3	97.5
239	0.769	1.0	98.5
240	0.477	0.6	99.1
241	0.430	0.6	99.7
242	0.196	0.3	100.0
Total	76.83 ℓ/min/m		100.0 %

Condition

Section: Dam Foundation
Reservoir W.L.: EL. 150.00m
Downstream W.L.: EL. 40.00m
Grout Curtain: None
Permeability Coef.: K2

4-4-7 Inflow & Outflow of Seepage Flow (D-1-A1)

Inflow

Joint Number	Joint Seepage (ℓ/min/m)	Percentage for Total Seepage (%) at Joint	Percentage for Total Seepage (%) Accumulated
225	1.998	23.5	23.5
224	0.597	7.0	30.5
257	0.214	2.5	33.0
256	0.844	9.9	42.9
255	0.637	7.5	50.4
254	0.447	5.3	55.7
253	0.473	5.6	61.3
252	0.645	7.6	68.9
251	0.531	6.2	75.1
250	0.395	4.6	79.7
249	0.275	3.2	82.9
248	0.243	2.8	85.7
247	0.273	3.2	88.9
246	0.309	3.6	92.5
245	0.267	3.1	95.6
244	0.252	3.0	98.6
243	0.121	1.4	100.0
Total	8.52 ℓ/min/m		100.0 %

Outflow

Joint Number	Joint Seepage (ℓ/min/m)	Percentage for Total Seepage (%) at Joint	Percentage for Total Seepage (%) Accumulated
227	1.841	21.6	21.6
228	1.443	16.9	38.5
229	0.761	8.9	47.4
230	0.561	6.6	54.0
231	0.412	4.8	58.8
232	0.329	3.9	62.7
233	0.360	4.2	66.9
234	0.369	4.3	71.2
235	0.437	5.1	76.3
236	0.451	5.3	81.6
237	0.332	3.9	85.5
238	0.341	4.0	89.5
239	0.313	3.7	93.2
240	0.237	2.8	96.0
241	0.227	2.7	98.7
242	0.109	1.3	100.0
Total	8.52 ℓ/min/m		100.0 %

Condition

Section: Dam Foundation
Reservoir W.L.: EL. 150.00m
Downstream W.L.: EL. 40.00m
Grout Curtain : EL. -60m
Permeability Coef.: K_1

4-4-8 Inflow & Outflow of Seepage Flow (D-1-A3)

Inflow

Joint Number	Joint Seepage (ℓ/min/m)	Percentage for Total Seepage (%)	
		at Joint	Accumulated
225	7.702	16.7	16.7
224	2.977	6.5	23.2
257	1.364	3.0	26.2
256	5.371	11.7	37.9
255	4.351	9.5	47.4
254	3.078	6.7	54.1
253	3.110	6.8	60.9
252	4.133	9.0	69.9
251	3.329	7.2	77.1
250	2.389	5.2	82.3
249	1.617	3.5	85.8
248	1.381	3.0	88.8
247	1.416	3.1	91.9
246	1.441	3.1	95.0
245	1.033	2.2	97.2
244	0.916	2.0	99.2
243	0.415	0.8	100.0
Total	46.02 ℓ/min/m		100.0 %

Outflow

Joint Number	Joint Seepage (ℓ/min/m)	Percentage for Total Seepage (%)	
		at Joint	Accumulated
227	8.167	17.7	17.7
228	7.996	17.4	35.1
229	5.002	10.9	46.0
230	3.882	8.4	54.4
231	2.894	6.3	60.7
232	2.262	4.9	65.6
233	2.395	5.2	70.8
234	2.317	5.0	75.8
235	2.587	5.6	81.4
236	2.556	5.6	87.0
237	1.768	3.8	90.8
238	1.535	3.3	94.1
239	1.148	2.5	96.6
240	0.668	1.5	98.1
241	0.589	1.3	99.4
242	0.263	0.6	100.0
Total	46.02 ℓ/min/m		100.0 %

Condition

Section: Dam Foundation
Reservoir W.L.: EL. 150.00m
Downstream W.L.: EL. 40.00m
Grout Curtain: EL. -60m
Permeability Coef.: Kj

4-4-9 Inflow & Outflow of Seepage Flow (D-1-B1)

Inflow

Joint Number	Joint Seepage (ℓ/min/m)	Percentage for Total Seepage (%) at Joint	Percentage for Total Seepage (%) Accumulated
225	1.989	23.6	23.6
224	0.592	7.0	30.6
257	0.211	2.5	33.1
256	0.831	9.9	43.0
255	0.626	7.4	50.4
254	0.438	5.2	55.6
253	0.464	5.5	61.1
252	0.634	7.5	68.6
251	0.523	6.2	74.8
250	0.389	4.6	79.4
249	0.271	3.2	82.6
248	0.239	2.8	85.4
247	0.269	3.2	88.6
246	0.305	3.6	92.2
245	0.264	3.3	95.5
244	0.250	3.0	98.5
243	0.120	1.5	100.0
Total	8.42 ℓ/min/m		100.0 %

Outflow

Joint Number	Joint Seepage (ℓ/min/m)	Percentage for Total Seepage (%) at Joint	Percentage for Total Seepage (%) Accumulated
227	1.829	21.7	21.7
228	1.428	17.0	38.9
229	0.749	8.9	47.6
230	0.551	6.5	54.1
231	0.405	4.8	58.9
232	0.323	3.8	62.7
233	0.354	4.2	66.9
234	0.363	4.3	71.2
235	0.431	5.1	76.3
236	0.445	5.3	81.6
237	0.327	3.9	85.5
238	0.337	4.0	89.5
239	0.309	3.7	93.2
240	0.235	2.8	96.0
241	0.225	2.7	98.7
242	0.108	1.3	100.0
Total	8.42 ℓ/min/m		100.0 %

Condition

Section: Dam Foundation
Reservoir W.L.: EL. 150.00m
Downstream W.L.: EL. 40.00m
Grout Curtain: EL. -120m
Permeability Coef.: K1

4-4-10 Inflow & Outflow of Seepage Flow (D-1-B3)

Inflow

Joint Number	Joint Seepage (ℓ/min/m)	Percentage for Total Seepage (%) at Joint	Percentage for Total Seepage (%) Accumulated
225	5.561	19.4	19.4
224	1.994	7.0	26.4
257	0.828	2.9	29.3
256	3.260	11.4	40.7
255	2.560	8.9	49.6
254	1.791	6.2	55.8
253	1.814	6.3	62.1
252	2.421	8.4	70.5
251	1.958	6.8	77.3
250	1.416	4.9	82.2
249	0.964	3.4	85.6
248	0.829	2.9	88.5
247	0.864	3.0	91.5
246	0.891	3.1	94.6
245	0.657	2.3	96.9
244	0.589	2.1	99.0
243	0.269	1.0	100.0
Total	28.67 ℓ/min/m		100.0 %

Outflow

Joint Number	Joint Seepage (ℓ/min/m)	Percentage for Total Seepage (%) at Joint	Percentage for Total Seepage (%) Accumulated
227	5.640	19.7	19.7
228	5.148	18.0	37.7
229	2.984	10.4	48.1
230	2.266	7.9	56.0
231	1.678	5.9	61.9
232	1.318	4.6	66.5
233	1.407	4.9	71.4
234	1.377	4.8	76.2
235	1.553	5.4	81.6
236	1.543	5.4	87.0
237	1.074	3.7	90.7
238	0.950	3.3	94.0
239	0.727	2.5	96.5
240	0.435	1.5	98.0
241	0.387	1.4	99.4
242	0.175	0.6	100.0
Total	28.67 ℓ/min/m		100.0

Condition

Section: Dam Foundation
Reservoir W.L.: EL. 150.00m
Downstream W.L.: EL. 40.00m
Grout Curtain: EL. -120m
Permeability Coef.: K_3

4-4-11 Inflow & Outflow of Seepage Flow (R-1-01)

Inflow

Joint Number	Joint Seepage (ℓ/min/m)	Percentage for Total Seepage (%)	
		at Joint	Accumulated
217	0.396	5.1	5.1
207	0.678	8.7	13.8
195	0.603	7.7	21.5
192	0.425	5.5	27.0
178	0.510	6.6	33.6
165	0.621	8.0	41.6
152	0.585	7.5	49.1
151	0.892	11.5	60.6
150	0.915	11.8	72.4
149	1.509	19.4	91.8
148	0.433	5.6	97.4
147	0.009	0.1	97.5
146	0.019	0.2	97.7
145	0.035	0.4	98.1
144	0.005	0.1	98.2
123	0.092	1.2	99.4
122	0.050	0.6	100.0
Total	7.78 ℓ/min/m		100.0 %

Outflow

Joint Number	Joint Seepage (ℓ/min/m)	Percentage for Total Seepage (%)	
		at Joint	Accumulated
143	-0.893	-11.5	-11.5
141	2.842	36.5	25.0
118	2.508	32.2	57.2
119	1.827	23.5	80.7
120	1.049	13.5	94.2
121	0.443	5.8	100.0
Total	7.78 ℓ/min/m		100.0 %

Condition

Section: Right Bank - 1
Reservoir W.L.: EL. 150.00m
Downstream W.L.: EL. 40.00m
Grout Curtain: None
Permeability Coef.: K_1

4-4-12 Inflow & Outflow of Seepage Flow (R-2-02)

Inflow

Joint Number	Joint Seepage (ℓ/min/m)	Percentage for Total Seepage (%) at Joint	Percentage for Total Seepage (%) Accumulated
217	0.918	3.2	3.2
207	1.265	4.4	7.6
195	0.928	3.2	10.8
192	0.634	2.2	13.0
178	0.738	2.7	15.7
165	1.079	3.7	19.4
152	3.769	13.0	32.4
151	4.891	16.9	49.3
150	4.679	16.1	65.4
149	7.268	25.1	90.5
148	2.042	7.0	97.5
147	0.037	0.1	97.6
146	0.078	0.3	97.9
145	0.138	0.5	98.4
144	0.019	0.1	98.5
123	0.319	1.1	99.6
122	0.167	0.4	100.0
Total	29.01 ℓ/min/m		100.0 %

Outflow

Joint Number	Joint Seepage (ℓ/min/m)	Percentage for Total Seepage (%) at Joint	Percentage for Total Seepage (%) Accumulated
141	6.047	21.4	21.4
118	9.397	33.2	54.6
119	7.105	25.1	79.7
120	4.034	14.3	94.0
121	1.692	6.0	100.0
Total	28.28 ℓ/min/m		100.0 %

Condition

Section: Right Bank - 1
Reservoir W.L.: EL. 150.00m
Downstream W.L.: EL. 40.00m
Grout Curtain: None
Permeability Coef.: K2

4-4-13 Inflow & Outflow of Seepage Flow (R-1-03)

Inflow

Joint Number	Joint Seepage (ℓ/min/m)	Percentage for Total Seepage (%) at Joint	Percentage for Total Seepage (%) Accumulated
217	0.948	1.8	1.8
207	1.311	2.4	4.2
195	0.972	1.8	6.0
192	0.672	1.3	7.3
178	0.844	1.6	8.9
165	1.200	2.2	11.1
152	8.014	15.0	26.1
151	10.058	18.8	44.9
150	9.488	17.7	62.6
149	14.555	27.2	89.8
148	4.074	7.6	97.4
147	0.071	0.1	97.5
146	0.152	0.3	97.8
145	0.264	0.5	98.3
144	0.037	0.1	98.4
123	0.595	1.1	99.5
122	0.307	0.5	100.0
Total	53.56 ℓ/min/m		100.0 %

Outflow

Joint Number	Joint Seepage (ℓ/min/m)	Percentage for Total Seepage (%) at Joint	Percentage for Total Seepage (%) Accumulated
141	10.548	20.2	20.2
118	17.553	33.6	53.8
119	13.411	25.6	79.4
120	7.603	14.5	93.9
121	3.185	6.1	100.0
Total	52.30 ℓ/min/m		100.0 %

Condition

Section: Right Bank - 1
Reservoir W.L.: EL. 150.00m
Downstream W.L.: EL. 40.00m
Grout Curtain: None
Permeability Coef.: K3

4-4-14 Inflow & Outflow of Seepage Flow (R-1-A1)

Inflow

Joint Number	Joint Seepage (ℓ/min/m)	Percentage for Total Seepage (%) at Joint	Percentage for Total Seepage (%) Accumulated
217	0.457	5.5	5.5
207	0.739	8.9	14.4
193	0.748	9.0	23.4
192	0.501	6.0	29.4
178	0.575	6.9	36.3
165	0.662	8.0	44.3
152	0.604	7.3	51.6
151	0.908	10.9	62.5
150	0.930	11.2	73.7
149	1.535	18.5	92.1
148	0.440	5.3	97.4
147	0.009	0.1	97.5
146	0.020	0.2	97.7
145	0.036	0.4	98.1
144	0.005	0.1	98.2
123	0.094	1.1	99.3
122	0.051	0.7	100.0
Total	8.31 ℓ/min/m		100.0 %

Outflow

Joint Number	Joint Seepage (ℓ/min/m)	Percentage for Total Seepage (%) at Joint	Percentage for Total Seepage (%) Accumulated
141	2.110	27.2	27.2
118	2.438	31.5	58.7
119	1.764	22.8	81.5
120	1.014	13.1	94.6
121	0.429	5.4	100.0
Total	7.75 ℓ/min/m		100.0 %

Condition

Section: Right Bank - 1
Reservoir W.L.: EL. 150.00m
Downstream W.L.: EL. 40.00m
Grout Curtain: EL. -60m
Permeability Coef.: K_1

4-4-15 Inflow & Outflow of Seepage Flow (R-1-A2)

Inflow

Joint Number	Joint Seepage (ℓ/min/m)	Percentage for Total Seepage (%)	
		at Joint	Accumulated
217	0.274	1.2	1.2
207	0.589	2.5	3.7
195	0.767	3.3	7.0
192	0.564	2.4	9.4
178	0.675	2.9	12.3
165	0.841	3.6	15.9
152	2.725	11.6	27.5
151	4.027	17.2	44.7
150	4.002	17.1	61.8
149	6.439	27.4	89.2
148	1.828	7.8	97.0
147	0.034	0.1	97.1
146	0.075	0.3	97.4
145	0.132	0.6	98.0
144	0.018	0.1	98.1
123	0.311	1.3	99.4
122	0.163	0.6	100.0
Total	23.46 ℓ/min/m		100.0 %

Outflow

Joint Number	Joint Seepage (ℓ/min/m)	Percentage for Total Seepage (%)	
		at Joint	Accumulated
141	4.075	17.4	17.4
118	8.072	34.4	51.8
119	6.247	26.6	78.4
120	3.570	15.2	93.6
121	1.500	6.4	100.0
Total	23.46 ℓ/min/m		100.0 %

Condition

Section: Right Bank - 1
Reservoir W.L.: EL. 150.00m
Downstream W.L.: EL. 40.00m
Grout Curtain: EL. -60m
Permeability Coef.: K_2

4-4-16 Inflow & Outflow of Seepage Flow (R-1-A3)

Inflow

Joint Number	Joint Seepage (ℓ/min/m)	Percentage for Total Seepage (%) at Joint	Percentage for Total Seepage (%) Accumulated
217	0.271	0.7	0.7
207	0.581	1.5	2.2
195	0.768	1.9	4.1
192	0.569	1.4	5.5
178	0.666	1.7	7.2
165	0.794	2.0	9.2
152	4.671	11.7	20.9
151	7.341	18.5	39.4
150	7.377	18.5	57.9
149	11.985	30.1	88.0
148	3.411	8.6	96.6
147	0.064	0.2	96.8
146	0.139	0.3	97.1
145	0.247	0.6	97.7
144	0.034	0.1	97.8
123	0.568	1.4	99.2
122	0.295	0.8	100.0
Total	39.78 ℓ/min/m		100.0 %

Outflow

Joint Number	Joint Seepage (ℓ/min/m)	Percentage for Total Seepage (%) at Joint	Percentage for Total Seepage (%) Accumulated
141	6.519	16.4	16.4
118	13.684	34.4	50.8
119	10.789	27.1	77.9
120	6.186	15.6	93.5
121	2.602	6.5	100.0
Total	39.78 ℓ/min/m		100.0 %

Condition

Section: Right Bank - 1
Reservoir W.L.: EL. 150.00m
Downstream W.L.: EL. 40.00m
Grout Curtain: EL. -60m
Permeability Coef.: K_3

4-4-17 Inflow & Outflow of Seepage Flow (R-1-B1)

Inflow

Joint Number	Joint Seepage (ℓ/min/m)	Percentage for Total Seepage (%) at Joint	Percentage for Total Seepage (%) Accumulated
217	0.458	5.5	5.5
207	0.743	9.0	14.5
195	0.753	9.1	23.6
192	0.500	6.0	29.6
178	0.571	6.9	36.5
165	0.664	8.0	44.5
152	0.604	7.3	51.8
151	0.902	10.9	62.7
150	0.924	11.1	73.8
149	1.523	18.4	92.2
148	0.437	5.3	97.5
147	0.069	0.1	97.6
146	0.020	0.2	97.8
145	0.036	0.4	98.2
144	0.005	0.1	98.3
123	0.093	1.1	99.4
122	0.051	0.6	100.0
Total	8.29 ℓ/min/m		100.0 %

Outflow

Joint Number	Joint Seepage (ℓ/min/m)	Percentage for Total Seepage (%) at Joint	Percentage for Total Seepage (%) Accumulated
141	2.108	27.3	27.3
118	2.431	31.4	58.7
119	1.758	22.7	81.4
120	1.010	13.1	94.5
121	0.427	5.5	100.0
Total	7.73 ℓ/min/m		100.0 %

Condition

Section : Right Bank - 1
Reservoir W.L. : EL. 150.00m
Downstream W.L. : EL. 40.00m
Grout Curtain : EL. -120m
Permeability Coef. : K_1

4-4-18 Inflow & Outflow of Seepage Flow (R-1-B2)

Inflow

Joint Number	Joint Seepage (ℓ/min/m)	Percentage for Total Seepage (%) at Joint	Percentage for Total Seepage (%) Accumulated
217	0.269	1.2	1.2
207	0.575	2.7	3.9
195	0.752	3.5	7.4
192	0.558	2.6	10.0
178	0.670	3.1	13.1
165	0.833	3.9	17.0
152	2.697	12.5	29.5
151	3.699	17.1	46.6
150	3.605	16.7	63.3
149	5.704	26.4	89.7
148	1.613	7.5	97.2
147	0.030	0.1	97.3
146	0.064	0.3	97.6
145	0.114	0.5	98.1
144	0.016	0.1	98.2
123	0.268	1.2	99.4
122	0.140	0.6	100.0
Total	21.61 ℓ/min/m		100.0 %

Outflow

Joint Number	Joint Seepage (ℓ/min/m)	Percentage for Total Seepage (%) at Joint	Percentage for Total Seepage (%) Accumulated
141	3.775	17.5	17.5
118	7.449	34.5	52.0
119	5.738	26.6	78.6
120	3.270	15.1	93.7
121	1.373	6.3	100.0
Total	21.61 ℓ/min/m		100.0 %

Condition

Section: Right Bank - 1
Reservoir W.L.: EL. 150.00m
Downstream W.L.: EL. 40.00m
Grout Curtain: EL. -120m
Permeability Coef.: K_2

4-4-19 Inflow & Outflow of Seepage Flow (R-1-B3)

Inflow

Joint Number	Joint Seepage (ℓ/min/m)	Percentage for Total Seepage (%) at Joint	Percentage for Total Seepage (%) Accumulated
217	0.281	0.9	0.9
207	0.605	1.8	2.7
195	0.800	2.4	5.1
192	0.591	1.8	6.9
178	0.681	2.1	9.0
165	0.780	2.4	11.4
152	4.486	13.6	25.0
151	6.048	18.4	43.4
150	5.849	17.8	61.2
149	9.200	28.0	89.2
148	2.596	7.9	97.1
147	0.047	0.1	97.2
146	0.102	0.3	97.5
145	0.179	0.5	98.0
144	0.025	0.1	98.1
123	0.411	1.2	99.3
122	0.213	0.6	99.9
Total	32.89 ℓ/min/m		99.9 %

Outflow

Joint Number	Joint Seepage (ℓ/min/m)	Percentage for Total Seepage (%) at Joint	Percentage for Total Seepage (%) Accumulated
141	5.547	16.9	16.9
118	11.375	34.6	51.5
119	8.834	26.9	78.4
120	5.030	15.3	93.7
121	2.110	6.4	100.1
Total	32.89 ℓ/min/m		100.1 %

Condition

Section: Right Bank - 1
Reservoir W.L.: EL. 150.00m
Downstream W.L.: EL. 40.00m
Grout Curtain: EL. -120m
Permeability Coef.: K3

4-4-20 Inflow & Outflow of Seepage Flow (R-2-01)

Inflow

Joint Number	Joint Seepage (ℓ/min/m)	Percentage for Total Seepage (%)	
		at Joint	Accumulated
267	1.161	23.9	23.9
252	0.490	10.1	34.0
251	0.232	4.8	38.8
233	0.400	8.2	47.0
226	0.232	4.8	51.8
201	0.286	5.9	57.7
173	0.582	12.0	69.7
172	1.068	22.0	91.7
171	0.183	3.8	95.5
169	0.052	1.1	96.6
222	0.028	0.6	97.2
223	0.017	0.4	97.6
225	0.012	0.2	97.8
224	0.002	0	97.8
219	0.013	0.3	98.1
197	0.013	0.3	98.4
163	0.012	0.2	98.6
146	0.011	0.2	98.8
145	0.003	0.1	98.9
114	0.024	0.5	99.4
113	0.028	0.6	100.0
Total	4.85 ℓ/min/m		100.0 %

Outflow

Joint Number	Joint Seepage (ℓ/min/m)	Percentage for Total Seepage (%)	
		at Joint	Accumulated
160	1.147	25.3	25.3
140	1.155	25.4	50.7
141	0.889	19.6	70.3
142	0.663	14.6	84.9
143	0.475	10.5	95.4
144	0.210	4.6	100.0
Total	4.54 ℓ/min/m		100.0 %

Condition

Section : Right Bank - 2
Reservoir W.L.: EL. 150.00m
Downstream W.L.: EL. 40.00m
Grout Curtain : None
Permeability Coef. : K_1

4-4-21 Inflow & Outflow of Seepage Flow (R-3-01)

Inflow

Joint Number	Joint Seepage (ℓ/min/m)	Percentage for Total Seepage (%) at Joint	Percentage for Total Seepage (%) Accumulated
250	0.009	0.5	0.5
252	0.020	1.1	1.6
254	0.012	0.7	2.3
256	0.004	0.2	2.5
258	0.006	0.3	2.8
260	0.015	0.9	3.7
261	0.016	0.9	4.6
262	0.017	1.0	5.6
265	0.012	0.7	6.3
267	0.008	0.4	6.7
270	0.008	0.4	7.1
272	0.006	0.4	7.5
274	0.015	0.8	8.3
275	0.028	1.5	9.8
276	0.126	7.0	16.8
277	0.323	18.0	34.8
278	0.213	11.9	46.7
280	0.280	15.6	62.3
283	0.260	14.5	76.8
454	0.416	23.2	100.0
Total	1.79 ℓ/min/m		100.0 %

Outflow

Joint Number	Joint Seepage (ℓ/min/m)	Percentage for Total Seepage (%) at Joint	Percentage for Total Seepage (%) Accumulated
462	0.717	43.5	43.5
463	0.531	32.2	75.8
464	0.286	17.4	93.1
468	0.113	6.9	100.0
Total	1.65 ℓ/min/m		100.0 %

Condition

Section: Right Bank - 3
Reservoir W.L.: EL. 150.00m
Downstream W.L.: EL. 40.00m
Grout Curtain : None
Permeability Coef.: K1

4-4-22 Inflow & Outflow of Seepage Flow (L-1-01)

Inflow

Joint Number	Joint Seepage (ℓ/min/m)	Percentage for Total Seepage (%) at Joint	Percentage for Total Seepage (%) Accumulated
196	1.228	15.1	15.1
191	0.902	11.1	26.2
182	0.401	4.9	31.1
171	0.556	6.8	37.9
158	0.587	7.2	45.1
145	0.640	7.9	53.0
143	0.710	8.7	61.7
127	0.464	5.7	67.4
126	0.682	8.4	75.8
125	0.794	9.7	85.5
124	0.198	2.4	87.9
107	0.773	9.5	97.4
106	0.150	1.8	99.2
105	0.065	0.8	100.0
Total	8.15 ℓ/min/m		100.0 %

Outflow

Joint Number	Joint Seepage (ℓ/min/m)	Percentage for Total Seepage (%) at Joint	Percentage for Total Seepage (%) Accumulated
121	2.192	26.9	26.9
101	2.520	30.9	57.8
102	1.822	22.4	80.2
103	1.156	14.2	94.4
104	0.461	5.6	100.0
Total	8.15 ℓ/min/m		100.0 %

Condition

Section : Left Bank - 1
Reservoir W.L. : EL. 150.00m
Downstream W.L. : EL. 40.00m
Grout Curtain : None
Permeability Coef. : K_1

4-4-23 Inflow & Outflow of Seepage Flow (L-1-A1)

Inflow

Joint Number	Joint Seepage (ℓ/min/m)	Percentage for Total Seepage (%) at Joint	Percentage for Total Seepage (%) Accumulated
196	1.053	12.3	12.3
191	1.091	12.7	25.0
182	0.485	5.7	30.7
171	0.645	7.5	38.2
158	0.648	7.6	45.8
145	0.678	7.9	53.7
143	0.741	8.7	62.4
127	0.481	5.6	68.0
126	0.703	8.2	76.2
125	0.817	9.5	85.7
124	0.203	2.4	88.1
107	0.795	9.3	97.4
106	0.154	1.8	99.2
105	0.066	0.8	100.0
Total	8.56 ℓ/min/m		100.0 %

Outflow

Joint Number	Joint Seepage (ℓ/min/m)	Percentage for Total Seepage (%) at Joint	Percentage for Total Seepage (%) Accumulated
121	2.513	30.9	30.9
101	2.374	29.2	60.1
102	1.719	21.1	81.2
103	1.096	13.5	94.7
104	0.438	5.3	100.0
Total	8.14 ℓ/min/m		100.0 %

Condition

Section: Left Bank - 1
Reservoir W.L.: EL. 150.00m
Downstream W.L.: EL. 40.00m
Grout Curtain: EL. -60m
Permeability Coef.: K_1

4-4-24 Inflow & Outflow of Seepage Flow (L-2-01)

Inflow

Joint Number	Joint Seepage (ℓ/min/m)	Percentage for Total Seepage (%) at Joint	Percentage for Total Seepage (%) Accumulated
331	0.727	27.9	27.9
330	0.361	13.9	41.8
329	0.257	9.9	51.7
328	0.276	10.6	62.3
327	0.407	15.6	77.9
326	0.285	10.9	88.8
325	0.123	4.7	93.5
324	0.045	1.7	95.2
323	0.027	1.0	96.2
322	0.019	0.7	96.9
321	0.014	0.5	97.4
320	0.011	0.4	97.8
319	0.008	0.3	98.1
318	0.004	0.2	98.3
317	0.004	0.2	98.5
316	0.006	0.2	98.7
315	0.008	0.3	99.0
314	0.008	0.3	99.3
313	0.005	0.2	99.5
312	0.001	0	99.5
311	0.001	0	99.5
310	0	0	99.5
309	0.002	0.1	99.6
308	0.002	0.1	99.7
307	0	0	99.7
306	0.003	0.2	99.9
305	0.001	0.1	100.0
Total	2.61 ℓ/min/m		100.0 %

Outflow

Joint Number	Joint Seepage (ℓ/min/m)	Percentage for Total Seepage (%) at Joint	Percentage for Total Seepage (%) Accumulated
349	0.054	2.1	2.1
350	-0.052	-2.1	0
351	-0.033	-1.3	-1.3
352	-0.385	-15.3	-16.6
353	1.290	51.2	34.6
354	0.313	12.4	47.0
355	-0.535	-21.2	25.8
356	-	-	-
357	-	-	-
358	-	-	-
359	0.498	19.8	45.6
360	0.463	18.4	64.0
361	0.417	16.5	80.5
207	0.244	9.7	90.2
265	0.171	6.8	97.0
266	0.076	3.0	100.0
Total	2.52 ℓ/min/m		100.0 %

Condition

Section : Left Bank - 2
Reservoir W.L.: EL. 150.00m
Downstream W.L. : EL. 40.00m
Grout Curtain : None
Permeability Coef.: K_1

4-4-25 Inflow & Outflow of Seepage Flow (R-1-01-C2)

Inflow

Joint Number	Joint Seepage (ℓ/min/m)	Percentage for Total Seepage (%) at Joint	Percentage for Total Seepage (%) Accumulated
217	0.482	0.3	0.3
207	0.850	0.6	0.9
195	0.845	0.6	1.5
192	0.646	0.4	1.9
178	0.878	0.6	2.5
165	1.446	1.0	3.5
152	43.756	29.6	33.1
151	9.134	6.2	39.3
150	12.418	8.4	47.7
149	32.032	21.7	69.4
148	7.014	4.7	74.1
147	16.437	11.1	85.2
146	-0.373	-0.3	84.9
145	18.550	12.5	97.4
144	1.505	1.0	98.4
123	2.158	1.5	99.9
122	0.111	0.1	100.0
Total	147.89 ℓ/min/m		100.0 %

Outflow

Joint Number	Joint Seepage (ℓ/min/m)	Percentage for Total Seepage (%) at Joint	Percentage for Total Seepage (%) Accumulated
164	-2.289	-1.6	-1.6
162	23.423	15.8	14.2
143	0.736	0.5	14.7
141	3.076	2.1	16.8
118	59.390	40.1	56.9
119	34.582	23.4	80.3
120	24.400	16.5	96.8
121	4.678	3.2	100.0
Total	148.00 ℓ/min/m		100.0 %

Condition

Section: Right Bank - 1
Reservoir W.L.: EL. 150.00m
Downstream W.L.: EL. 40.00m
Grout Curtain: None
Permeability Coef.: K_1
Crack: Width 2 cm

4-4-26 Inflow & Outflow of Seepage Flow (R-1-A1-C2)

Inflow

Joint Number	Joint Seepage (ℓ/min/m)	Percentage for Total Seepage (%) at Joint	Percentage for Total Seepage (%) Accumulated
217	0.281	0.3	0.3
207	0.610	0.7	1.0
195	0.822	0.9	1.9
192	0.630	0.7	2.6
178	0.775	0.8	3.4
165	0.934	1.0	4.4
152	20.083	22.0	26.4
151	4.681	5.1	31.5
150	6.434	7.0	38.5
149	18.869	20.7	59.2
148	4.702	5.1	64.3
147	13.505	14.8	79.1
146	-0.332	-0.4	78.7
145	16.045	17.6	96.3
144	1.301	1.4	97.7
123	1.870	2.0	99.7
122	0.099	0.3	100.0
Total	91.31 ℓ/min/m		100.0 %

Outflow

Joint Number	Joint Seepage (ℓ/min/m)	Percentage for Total Seepage (%) at Joint	Percentage for Total Seepage (%) Accumulated
162	0.159	0.2	0.2
143	0.440	0.5	0.7
141	2.798	3.1	3.8
118	41.425	45.4	49.2
119	24.980	27.4	76.6
120	18.038	19.8	96.4
121	3.471	3.0	100.0
Total	91.31 ℓ/min/m		100.0 %

Condition

Section: Right Bank - 1
Reservoir W.L.: EL. 150.00m
Downstream W.L.: EL. 40.00m
Grout Curtain: EL. -60m
Permeability Coef.: K_1
Crack: Width 2 cm

4-4-27 Inflow & Outflow of Seepage Flow (R-1-B1-C2)

Inflow

Joint Number	Joint Seepage (ℓ/min/m)	Percentage for Total Seepage (%) at Joint	Percentage for Total Seepage (%) Accumulated
217	0.274	0.7	0.7
207	0.567	1.4	2.1
195	0.781	1.9	4.0
192	0.592	1.5	5.5
178	0.696	1.7	7.2
165	0.695	1.7	8.9
152	10.272	25.0	33.9
151	2.157	5.3	39.2
150	2.946	7.2	46.4
149	8.092	19.7	66.1
148	1.896	4.6	70.7
147	4.982	12.1	82.8
146	0.119	0.3	83.1
145	5.796	14.1	97.2
144	0.470	1.1	98.3
123	0.675	1.6	99.9
122	0.035	0.1	100.0
Total	41.07 ℓ/min/m		100.0 %

Outflow

Joint Number	Joint Seepage (ℓ/min/m)	Percentage for Total Seepage (%) at Joint	Percentage for Total Seepage (%) Accumulated
141	0.604	1.5	1.5
118	19.322	47.3	48.8
119	11.333	27.8	76.6
120	8.029	19.7	96.3
121	1.541	3.7	100.0
Total	40.83 ℓ/min/m		100.0 %

Condition

Section : Right Bank - 1
Reservoir W.L.: EL. 150.00m
Downstream W.L. : EL. 40.00m
Grout Curtain : EL. -120m
Permeability Coef.: K_1
Crack: Width 2 cm

4-4-28 Inflow & Outflow of Seepage Flow (R-1-A1-C1)

Inflow

Joint Number	Joint Seepage (ℓ/min/m)	Percentage for Total Seepage (%) at Joint	Percentage for Total Seepage (%) Accumulated
217	0.458	5.5	5.5
207	0.743	8.9	14.4
195	0.753	9.0	23.4
192	0.500	6.0	29.4
178	0.572	6.9	36.3
165	0.665	8.0	44.3
152	0.607	7.3	51.6
151	0.910	10.9	62.5
150	0.933	11.2	73.7
149	1.539	18.5	92.2
148	0.442	5.3	97.5
147	0.009	0.1	97.6
146	0.020	0.2	97.8
145	0.037	0.4	98.2
144	0.005	0.1	98.3
123	0.095	1.1	99.4
122	0.052	0.6	100.0
Total	8.34 ℓ/min/m		100.0 %

Outflow

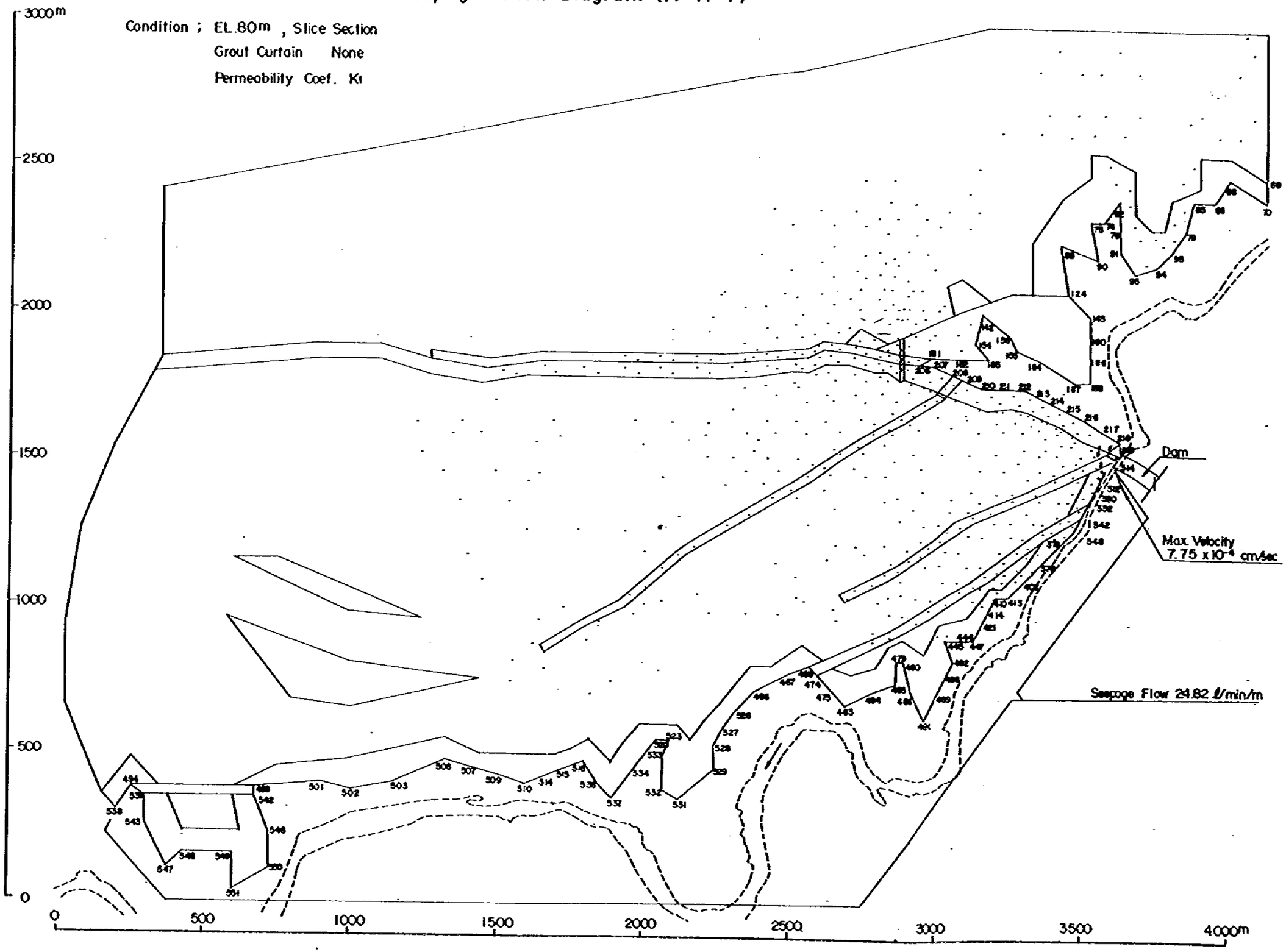
Joint Number	Joint Seepage (ℓ/min/m)	Percentage for Total Seepage (%) at Joint	Percentage for Total Seepage (%) Accumulated
141	2.113	27.2	27.2
118	2.447	31.5	58.7
119	1.770	22.8	81.5
120	1.017	13.1	94.6
121	0.430	5.4	100.0
Total	7.78 ℓ/min/m		100.0 %

Condition

Section: Right Bank - 1
Reservoir W.L.: EL. 150.00m
Downstream W.L.: EL. 40.00m
Grout Curtain: EL. -60m
Permeability Coef.: K_1
Crack: Width 2 mm

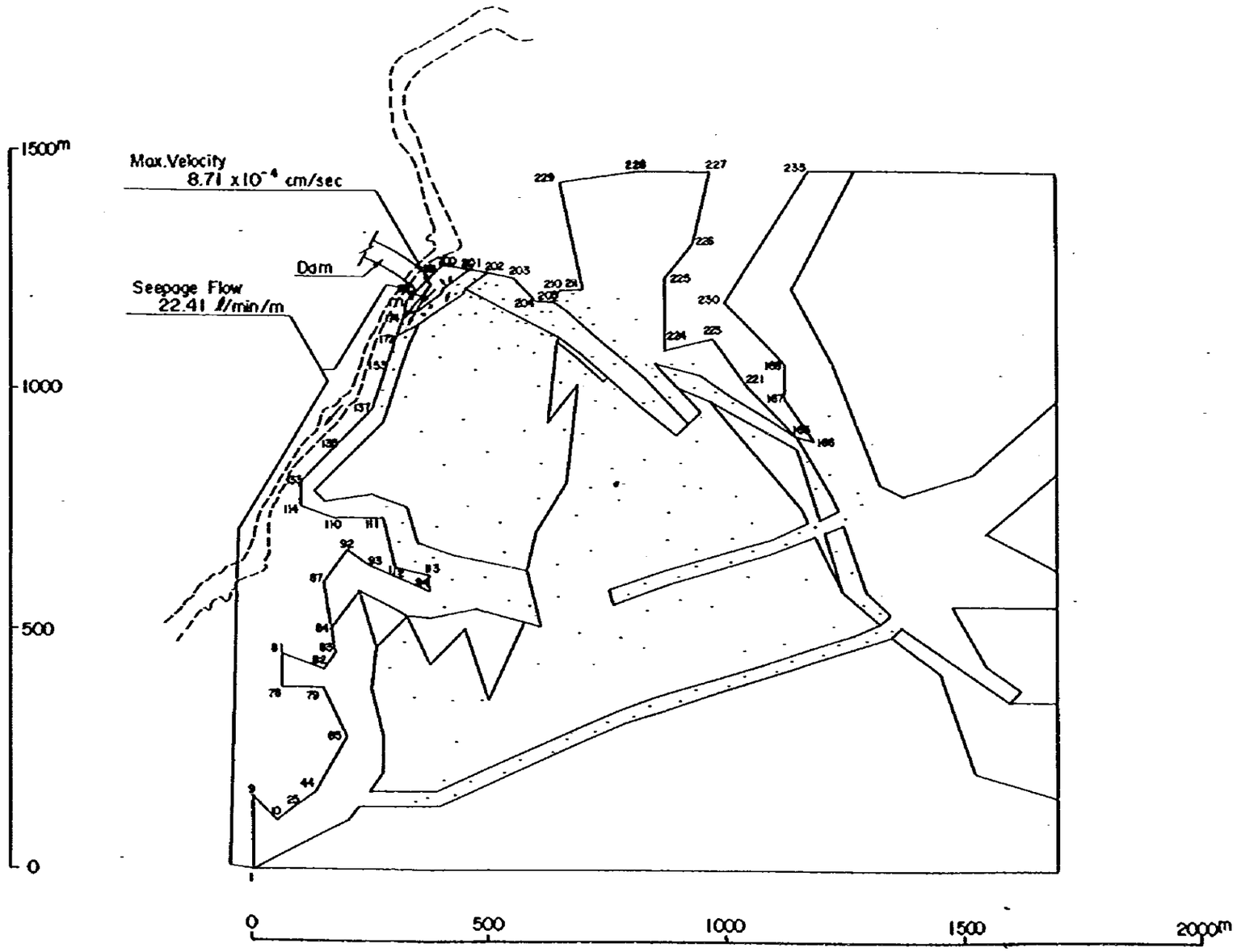
4-5-1 Seepage Flow Diagram (H-R-1)

Condition ; EL.80m , Slice Section
Grout Curtain None
Permeability Coef. Ki



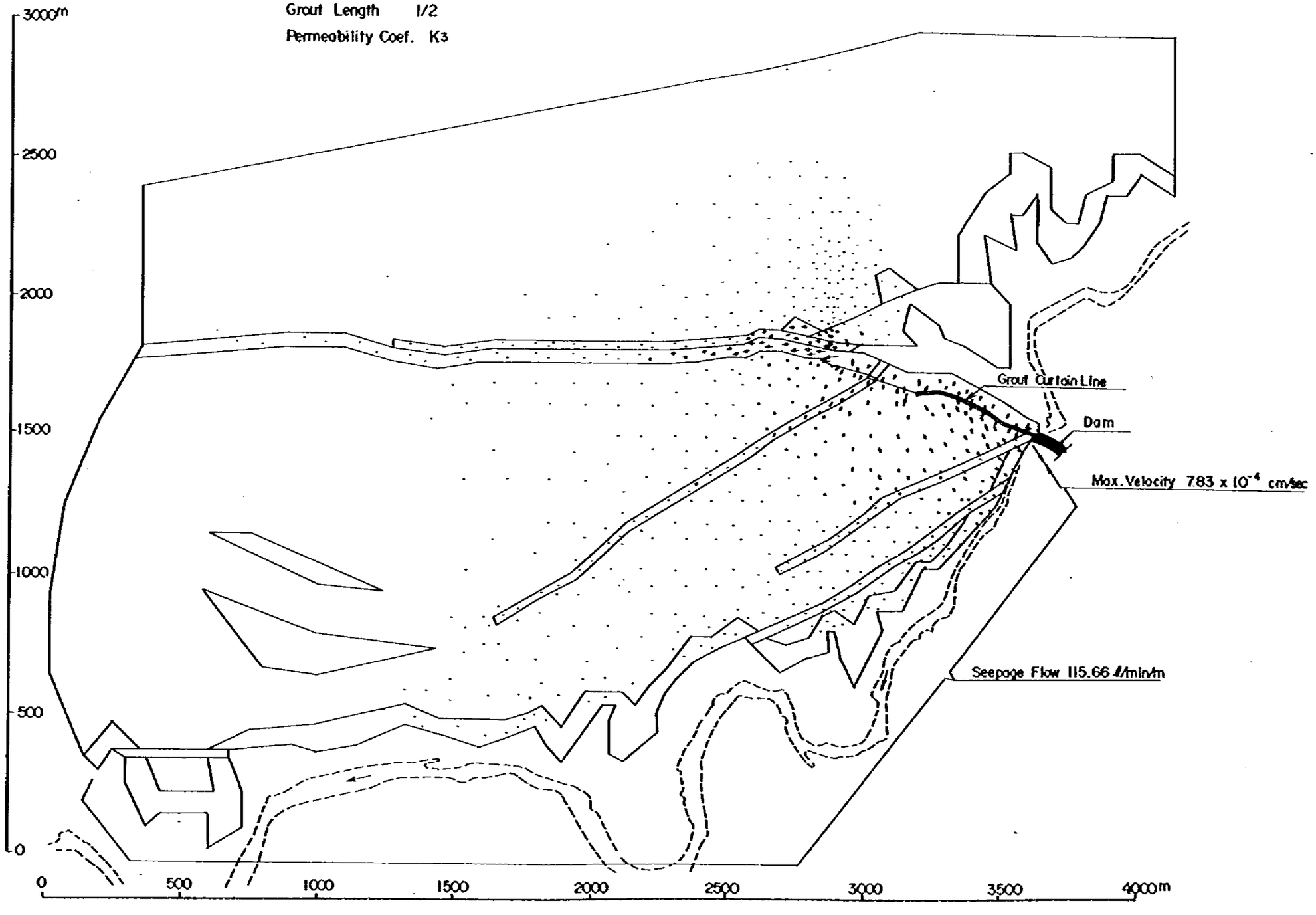
4-5-2 Seepage Flow Diagram (H-L-I)

Condition ; EL.80m, Slice Section
Grount. Curtain None
Permeability Coef. Ki



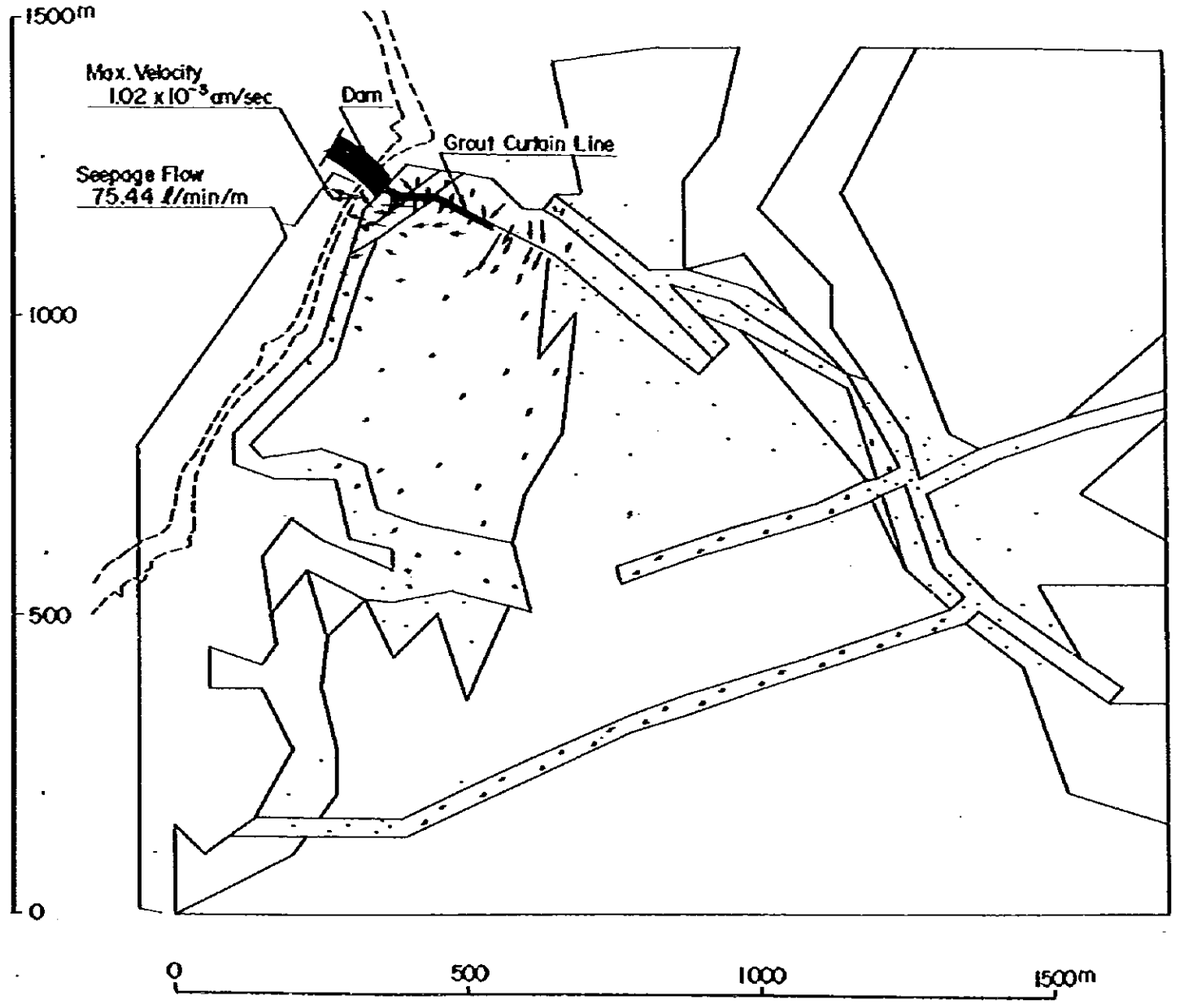
4-5-3 Seepage Flow Diagram (H-R-2C)

Condition ; EL. 80.00 m , Slice Section
Grout Length 1/2
Permeability Coef. K3

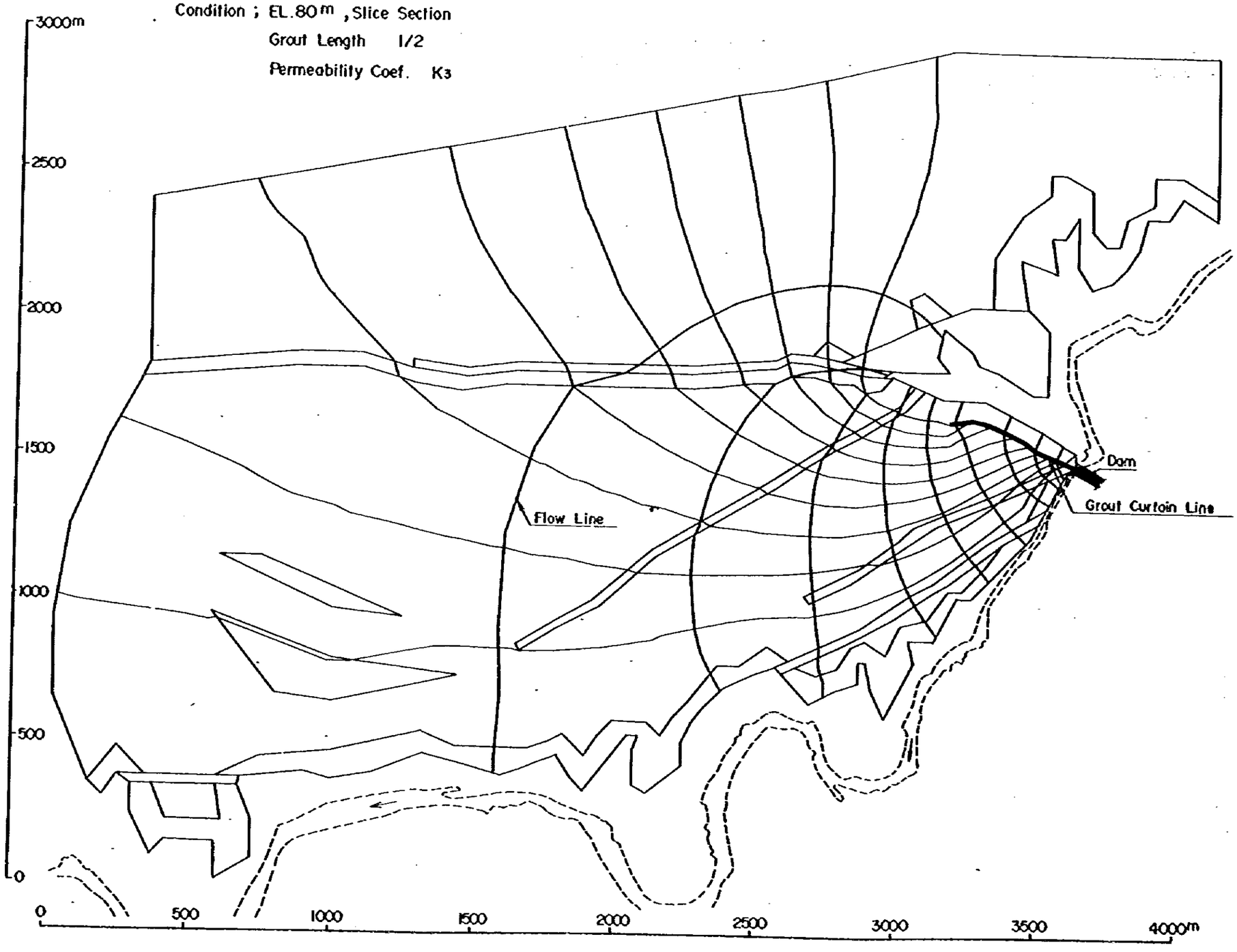


4-5-4 Seepage Flow Diagram (H-L-2C)

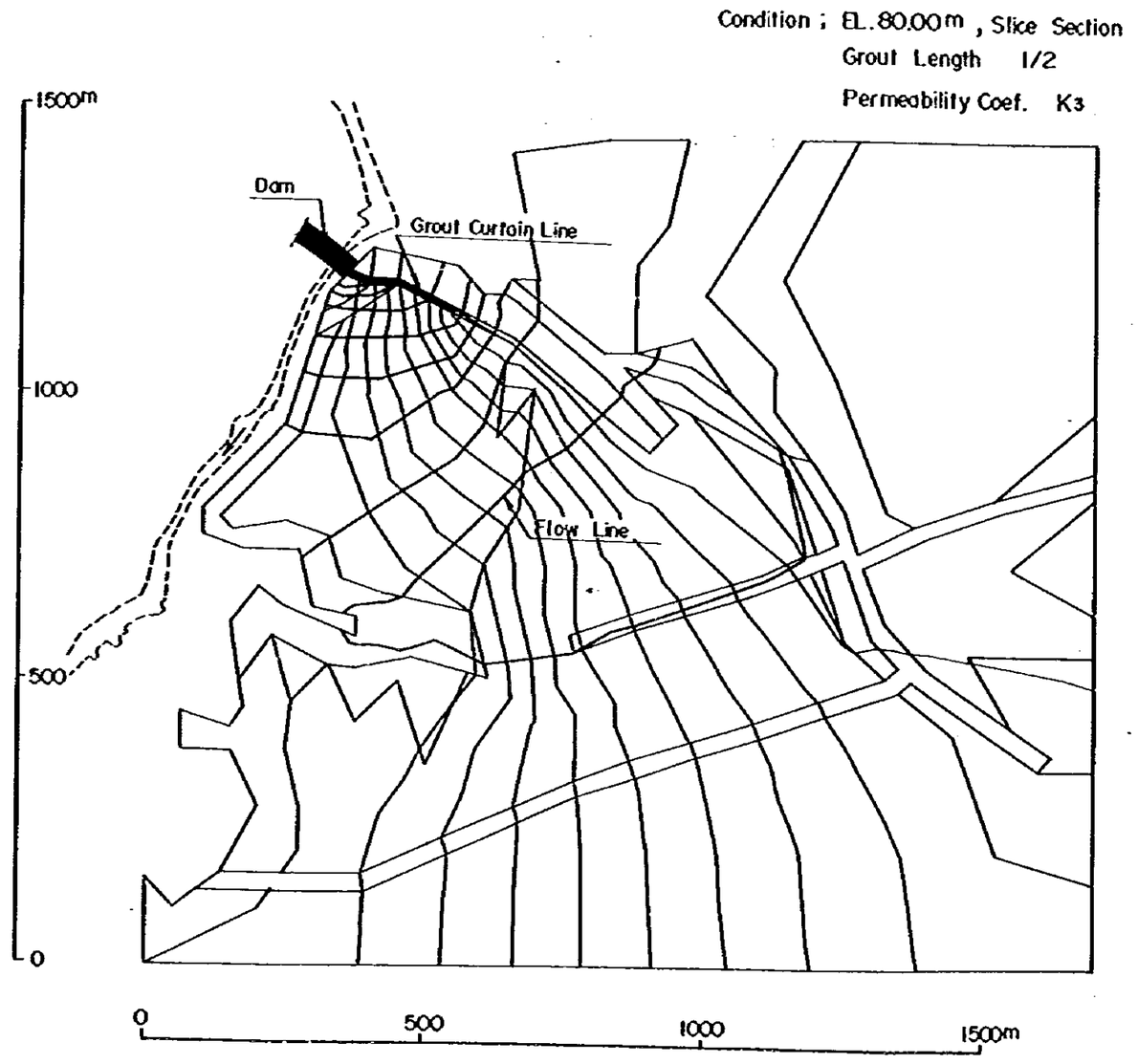
Condition; EL. 80m , Slice Section
Grout Length 1/2
Permeability Coef. Ks



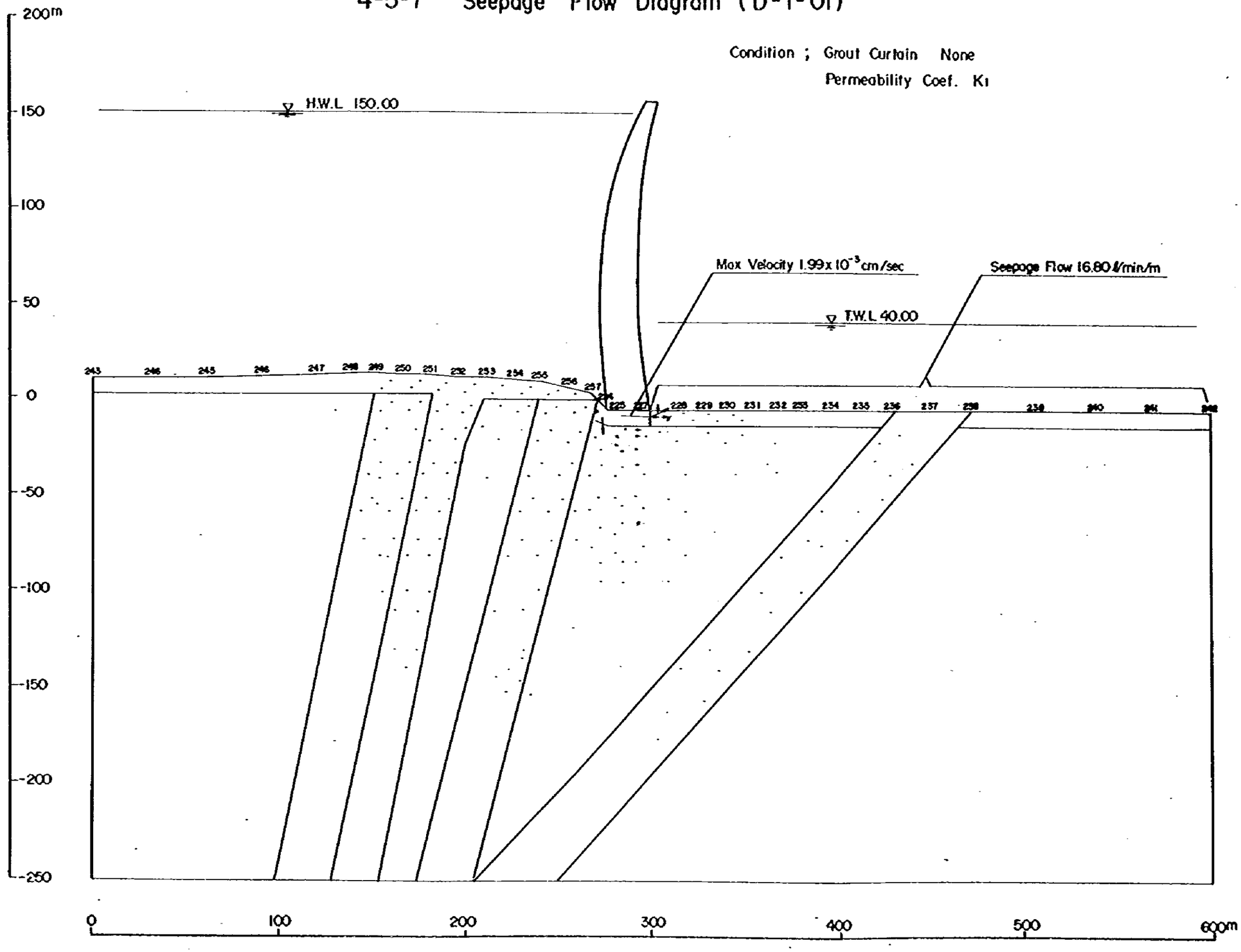
4-5-5 Flow Net Diagram (H-R-2C)



4-5-6 Flow Net Diagram (H-L-2C)



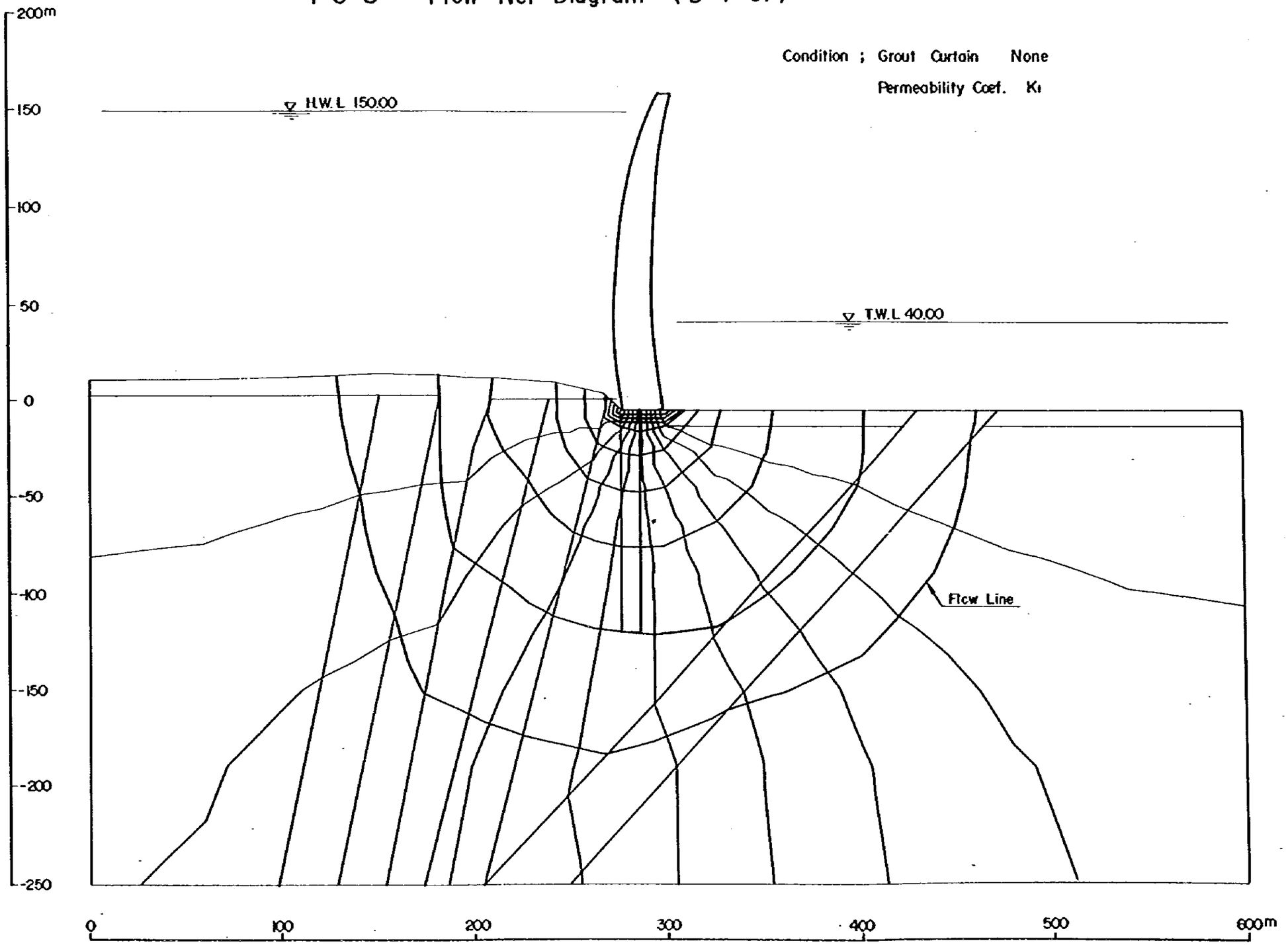
4-5-7 Seepage Flow Diagram (D-1-01)



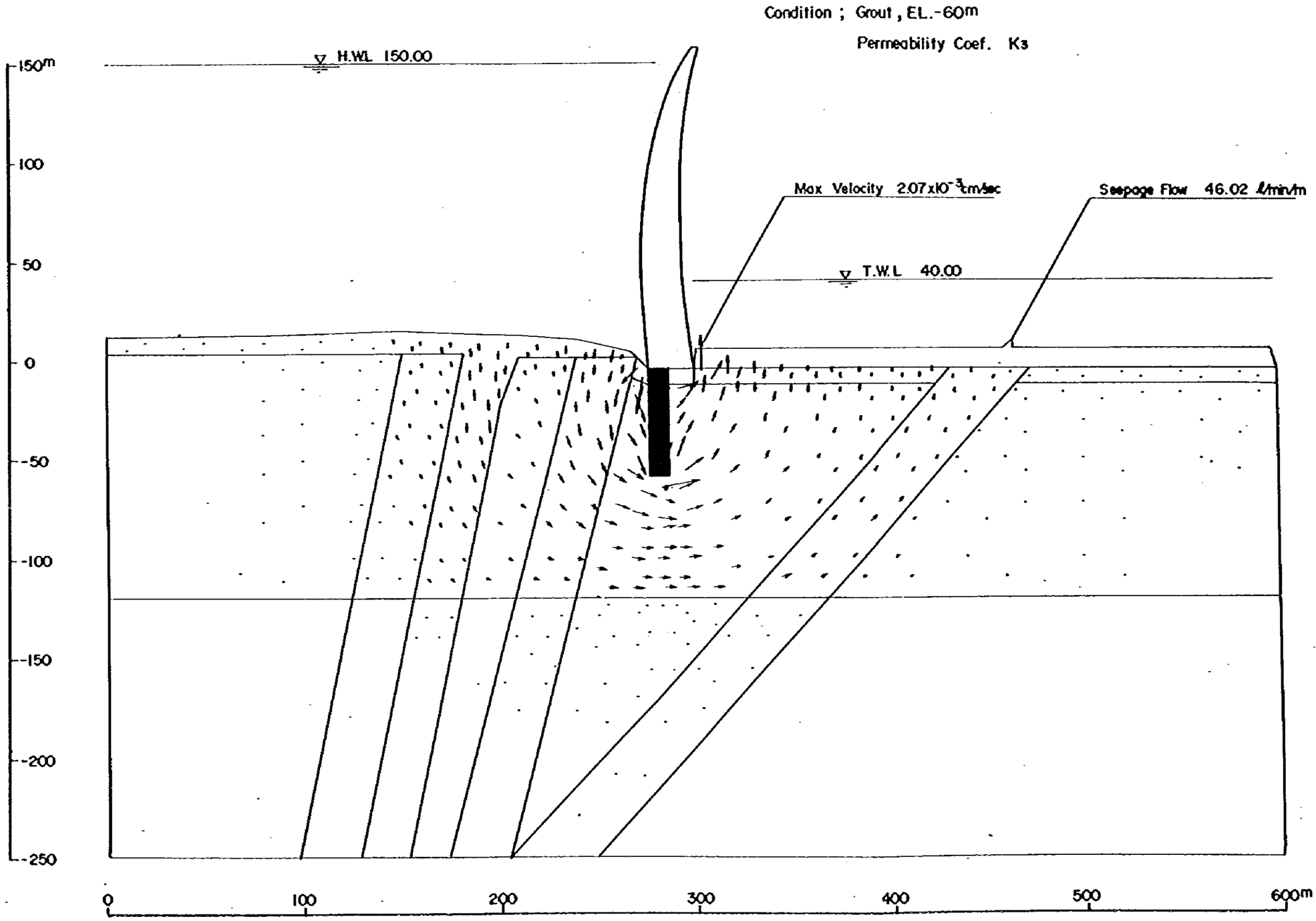
4-5-8 Flow Net Diagram (D-I-01)

Condition ; Grout Curtain None

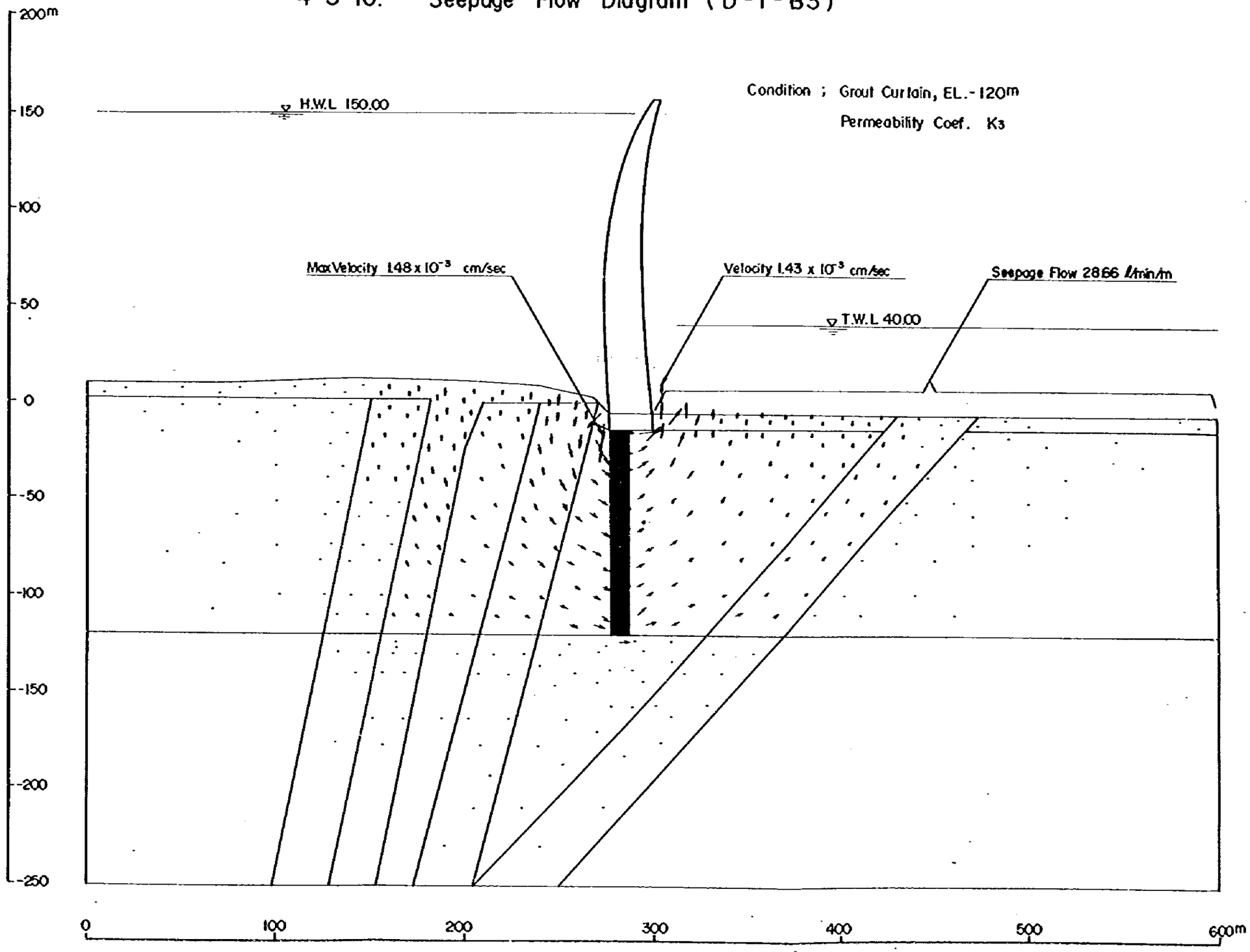
Permeability Coef. K₁



4-5-9 Seepage Flow Diagram (D-I-A3)



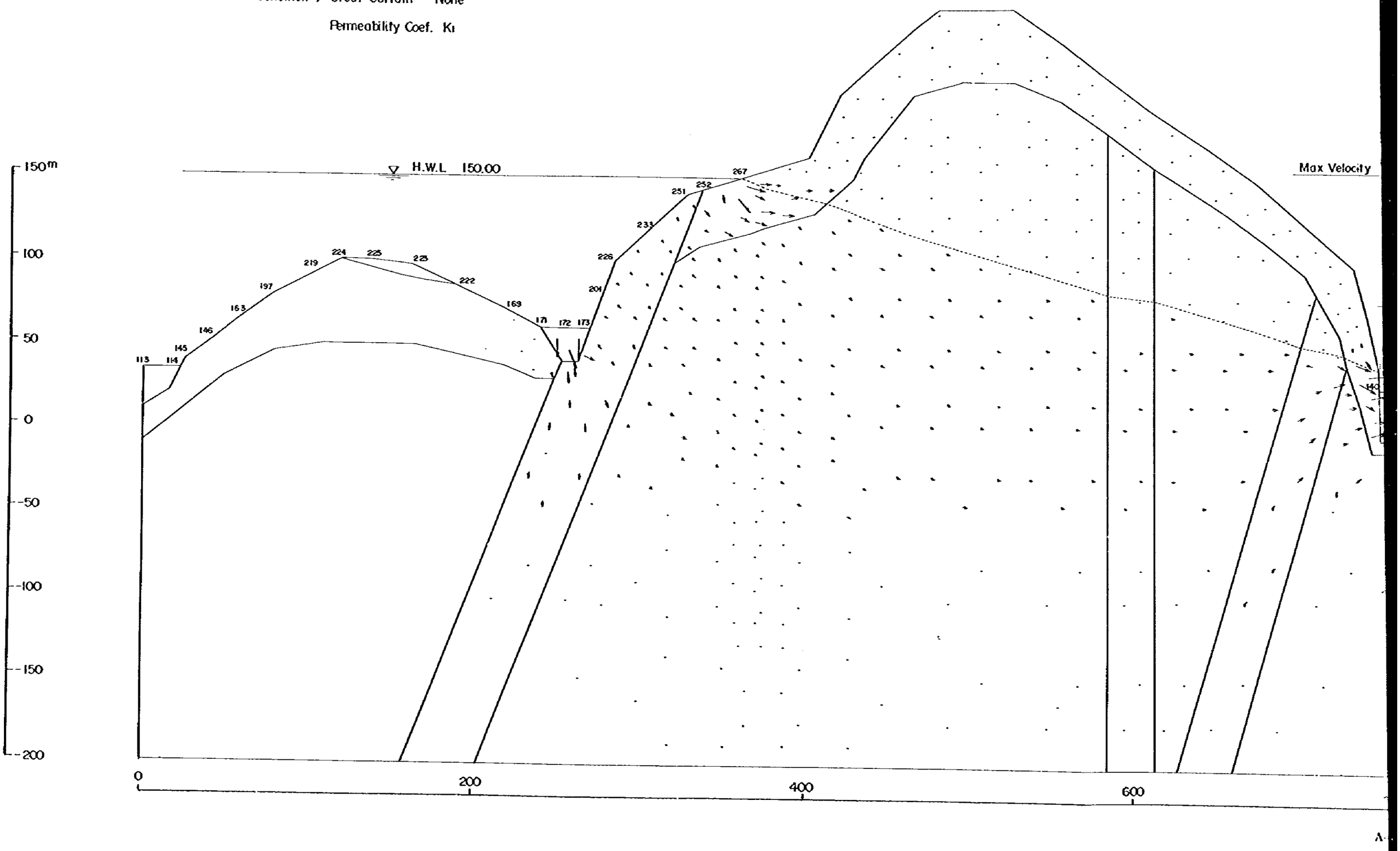
4-5-10. Seepage Flow Diagram (D-I-B3)



4-5-11 Seepage Flow Diagram (R-2-01)

Condition ; Grout Curtain None

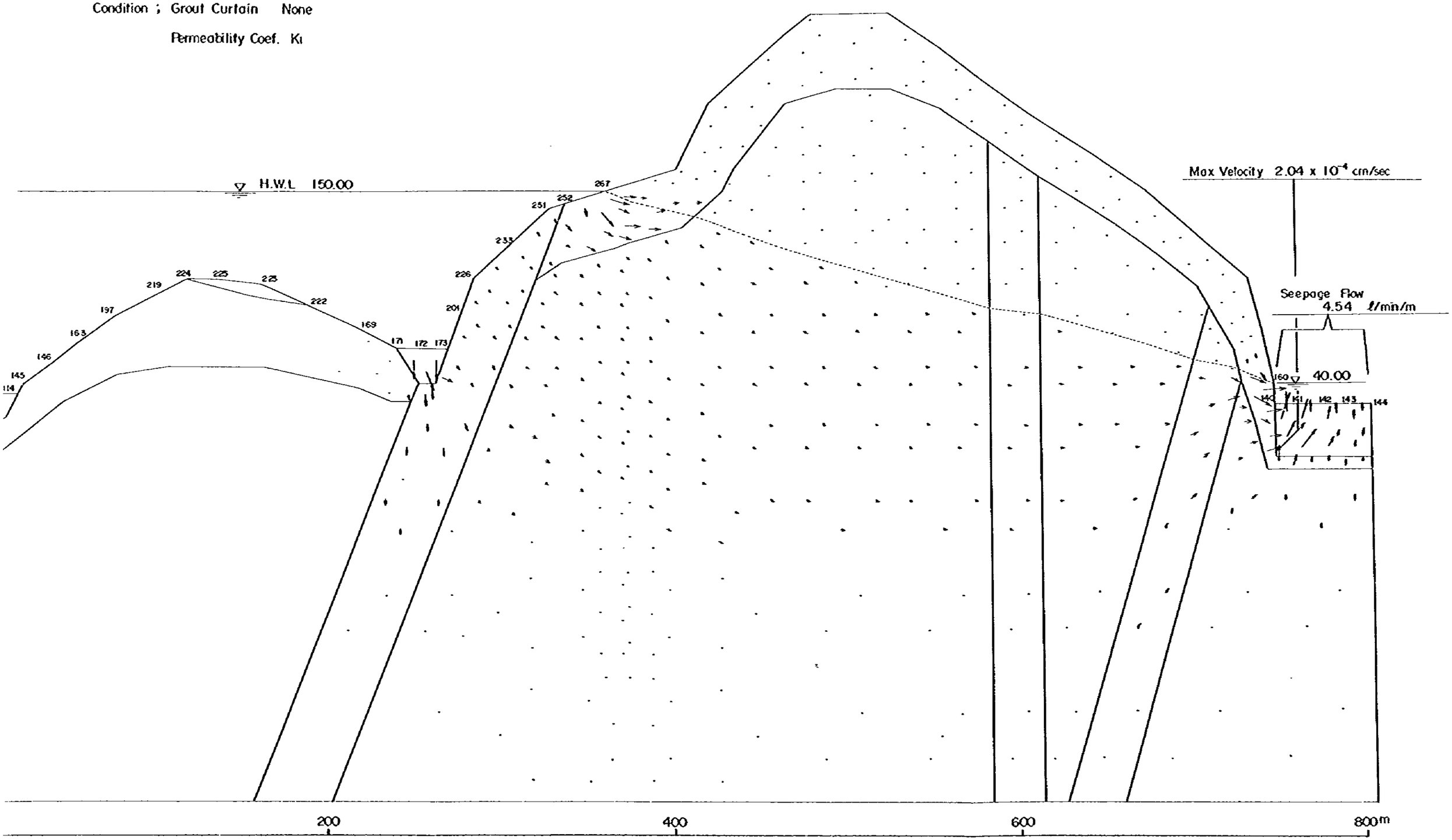
Permeability Coef. Ki



4-5-11 Seepage Flow Diagram (R-2-01)

Condition ; Grout Curtain None

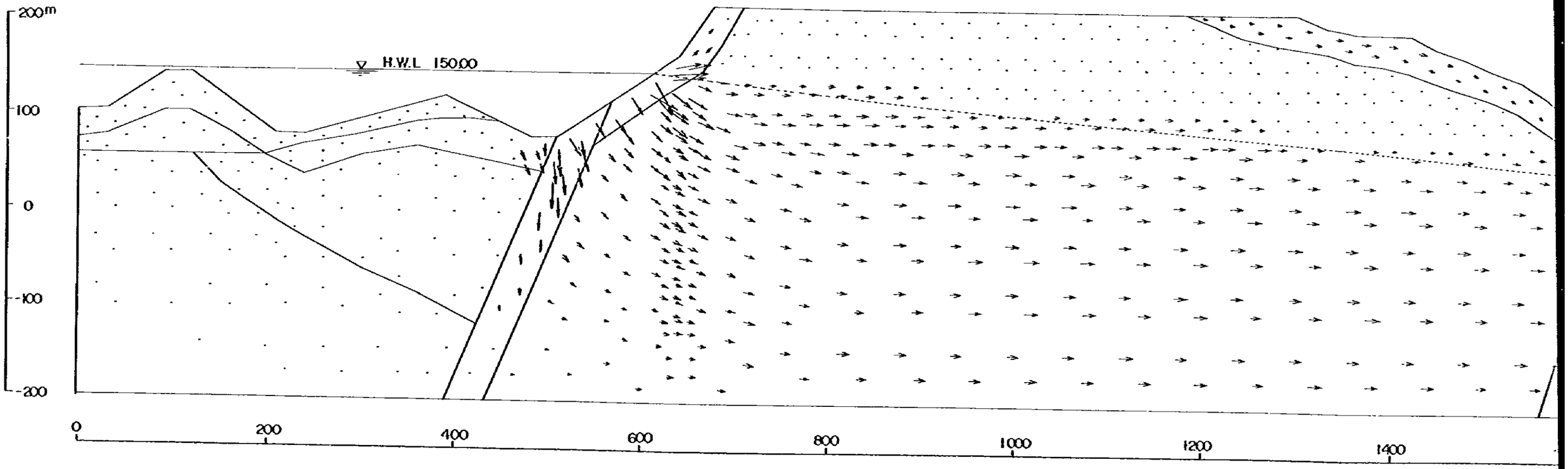
Permeability Coef. Ki



4-5-12 Seepage Flow Diagram (R-3-01)

Condition ; Grout Curtain None

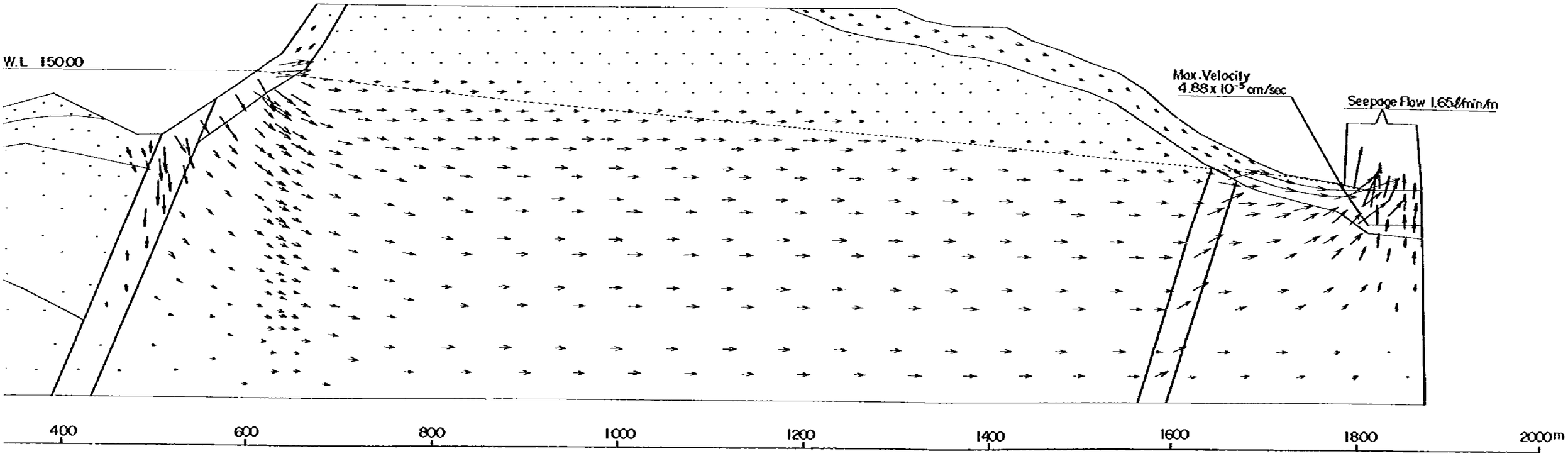
Permeability Coef. Kf



4-5-12 Seepage Flow Diagram (R-3-01)

Condition ; Grout Curtain None

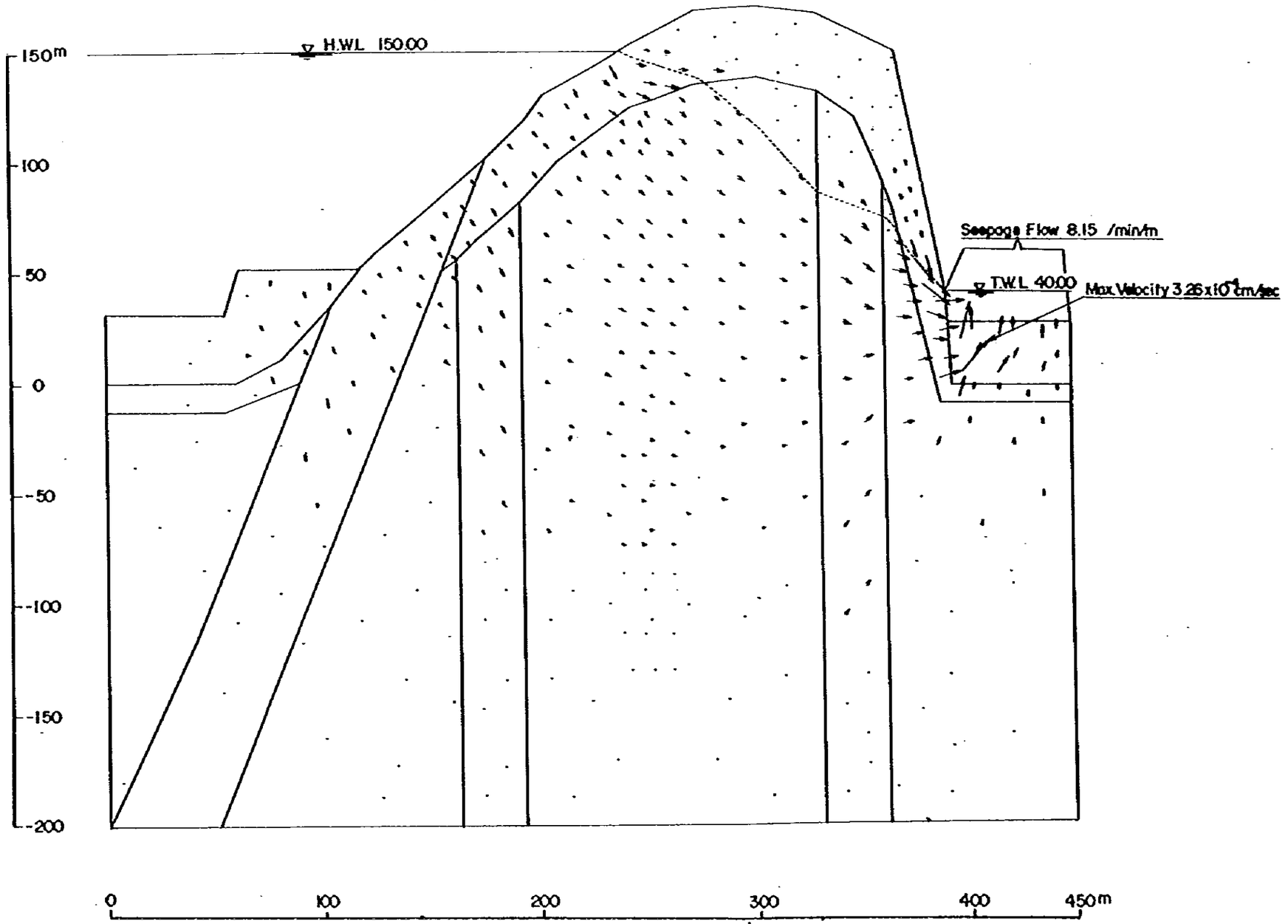
Permeability Coef. K1



4-5-13 Seepage Flow Diagram (L-1-01)

Condition ; Grout Curtain None

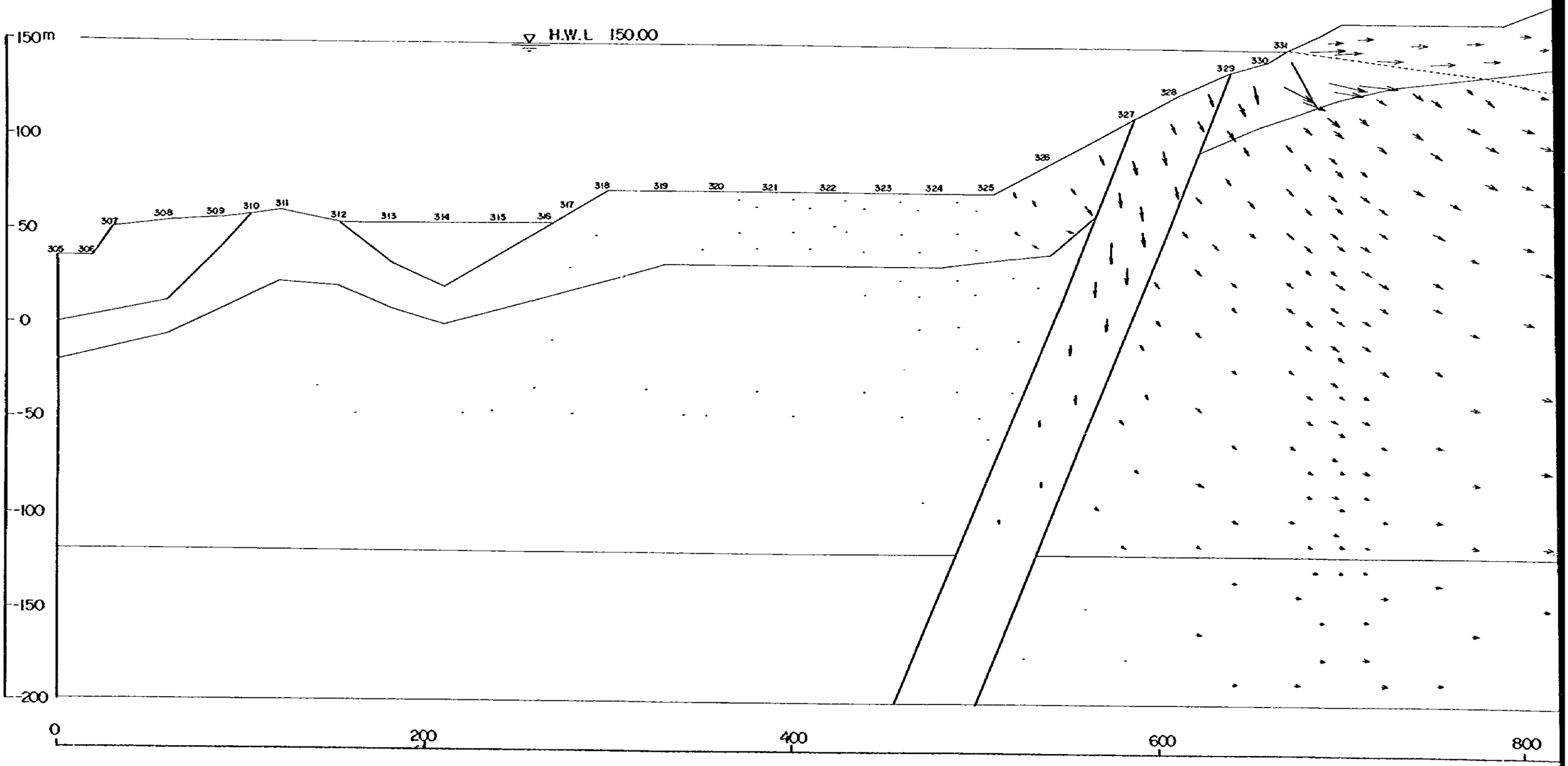
Permeability Coef. K1



4-5-14 Seepage Flow Diagram (L-2-01)

Condition ; Grout Curtain None

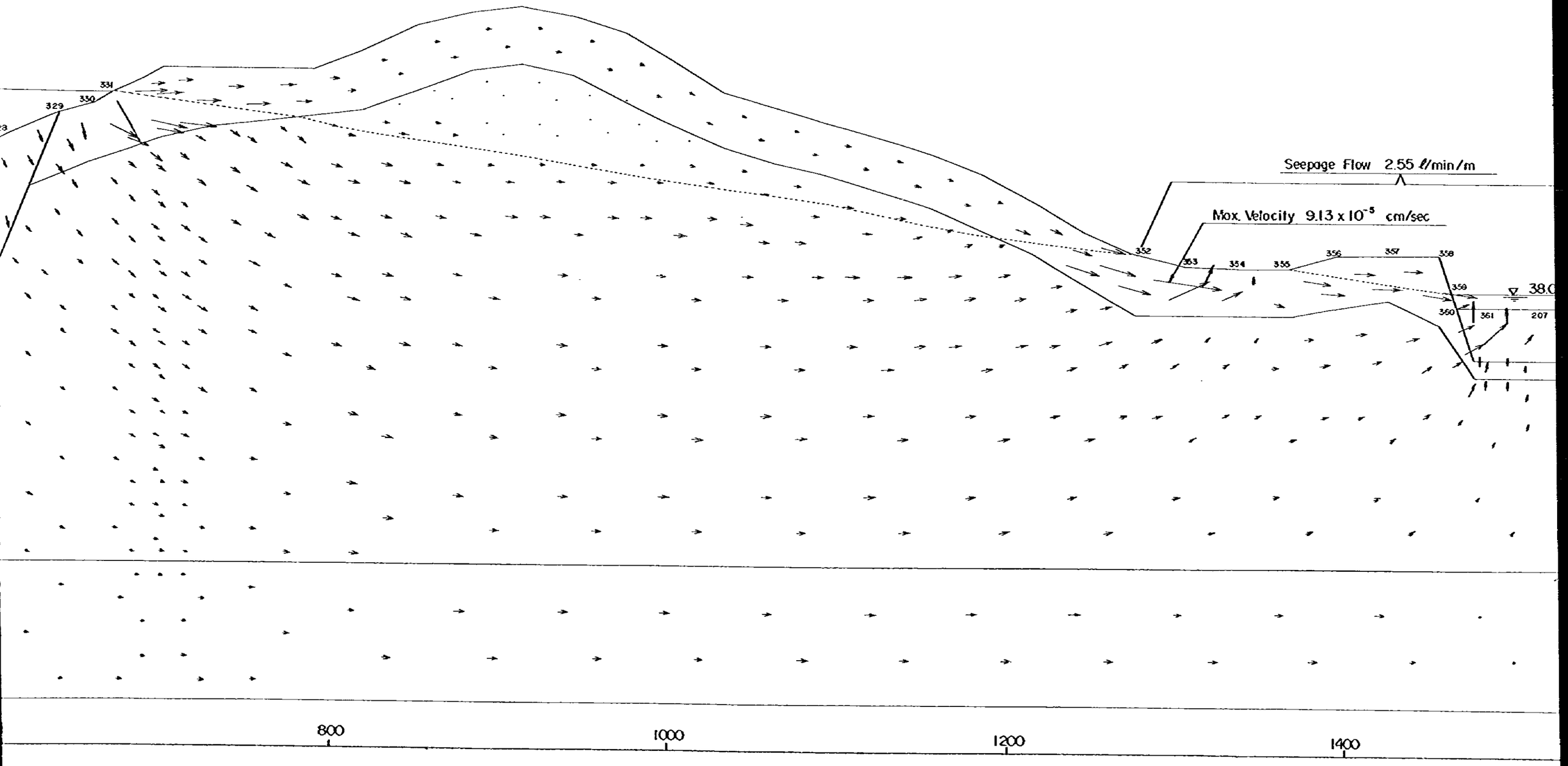
Permeability Coef. Ki

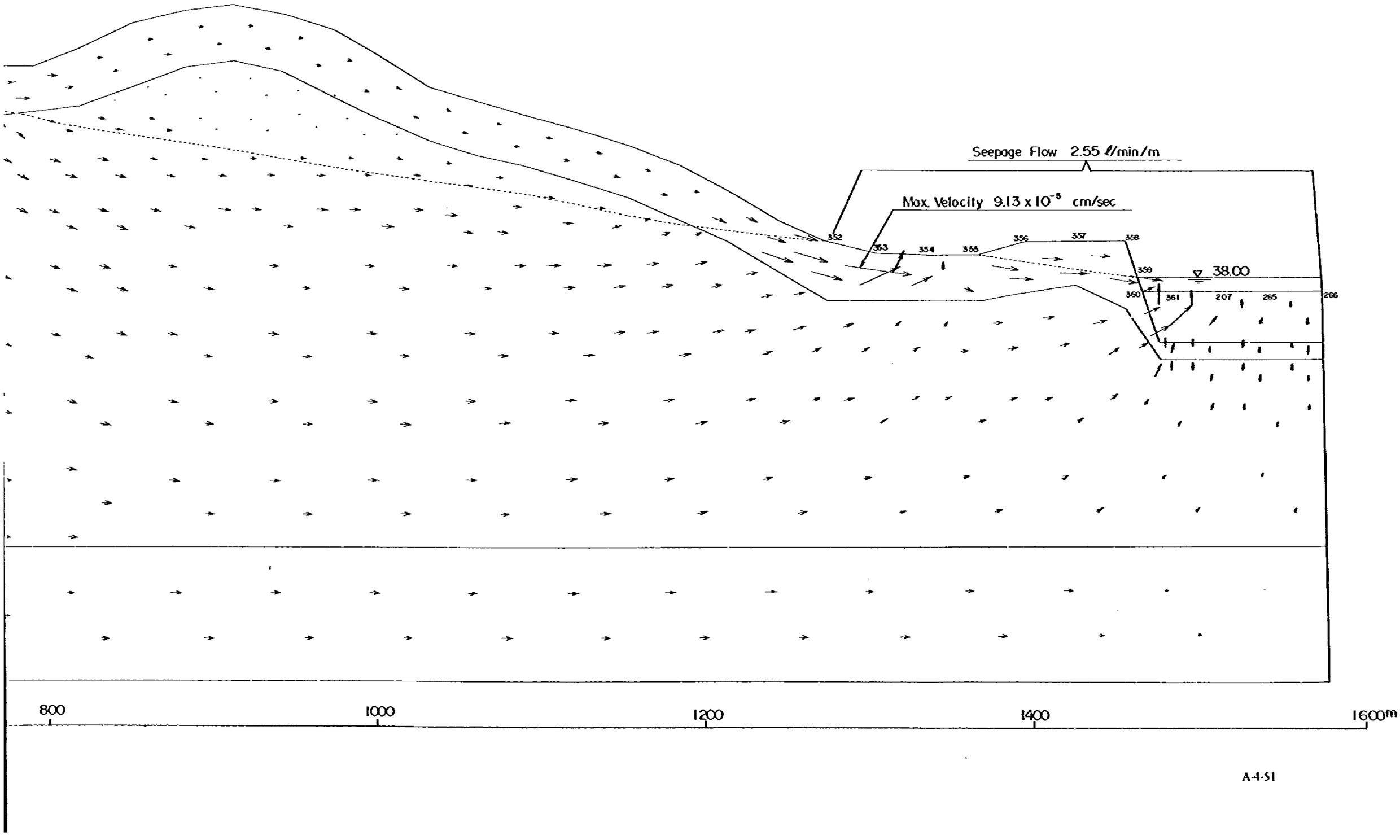


Flow Diagram (L-2-01)

n ; Grout Curtain None

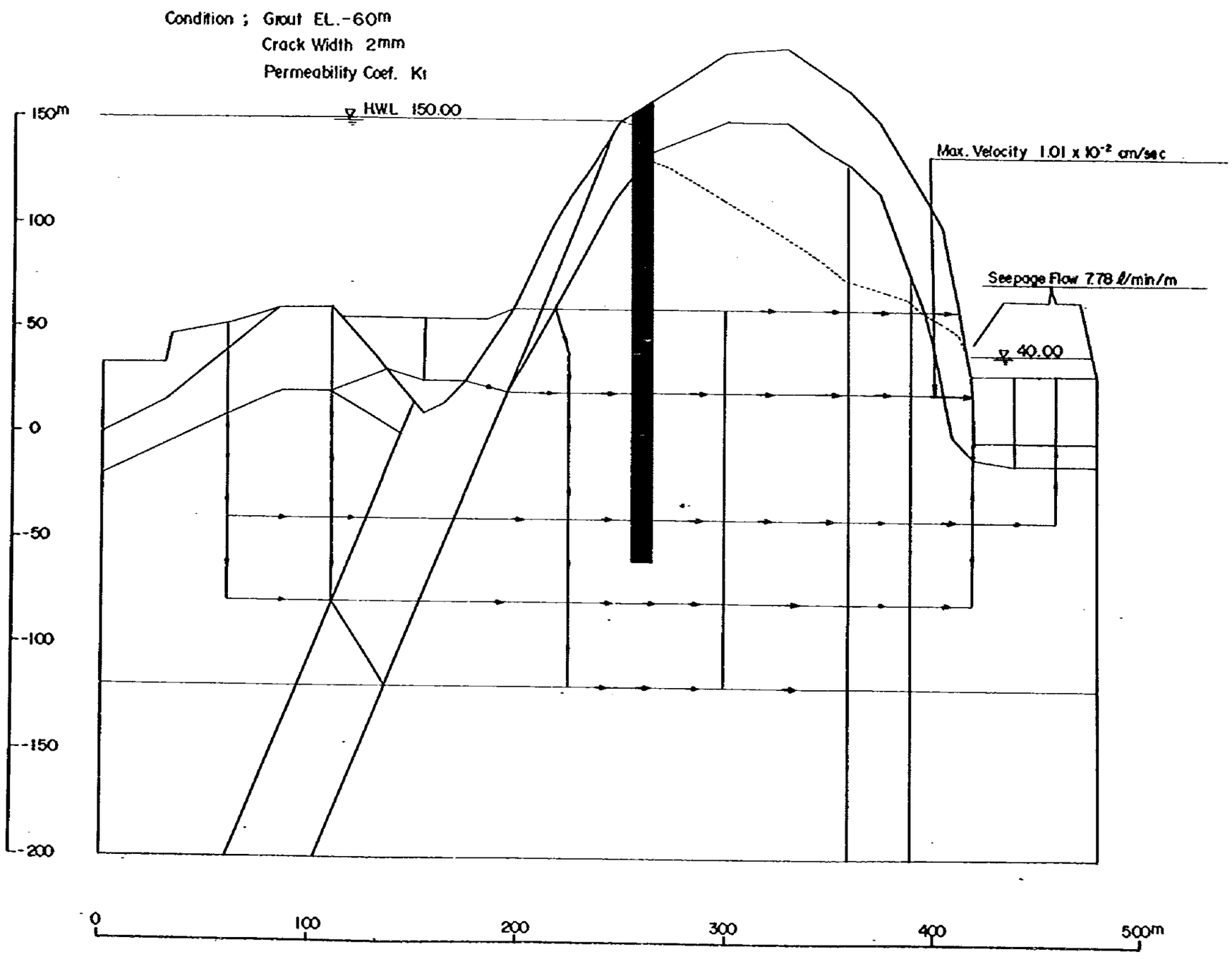
Permeability Coef. Ki




Seepage Flow 2.55 ℓ/min/m
Max. Velocity 9.13 x 10⁻⁵ cm/sec
352
353
354
355
356
357
358
359
360
361
38.00
207
265
286
800
1000
1200
1400
1600m

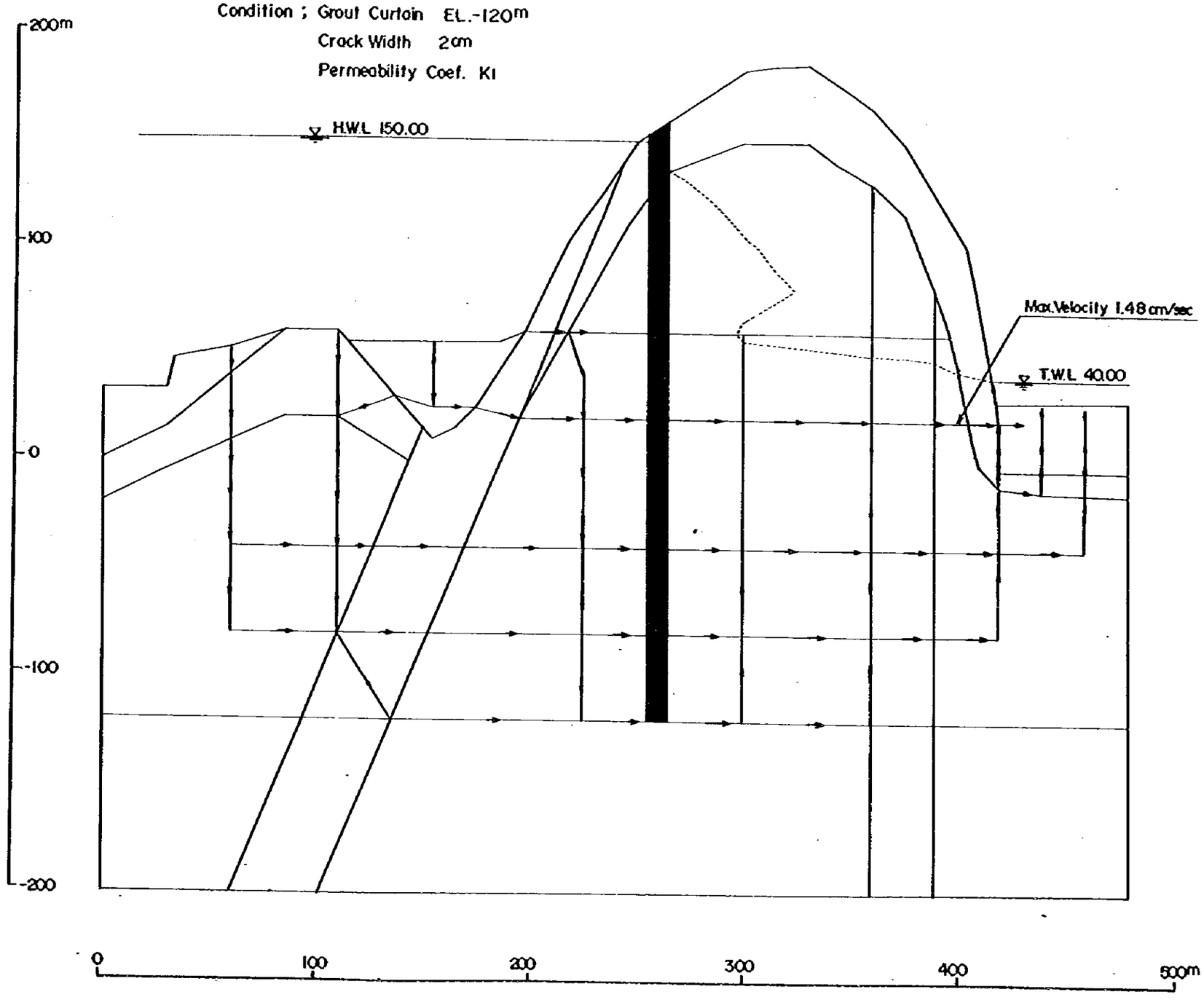
A-4-51

4-5-15 Seepage Flow Diagram along Solution Crack (R-I-AI-CI)

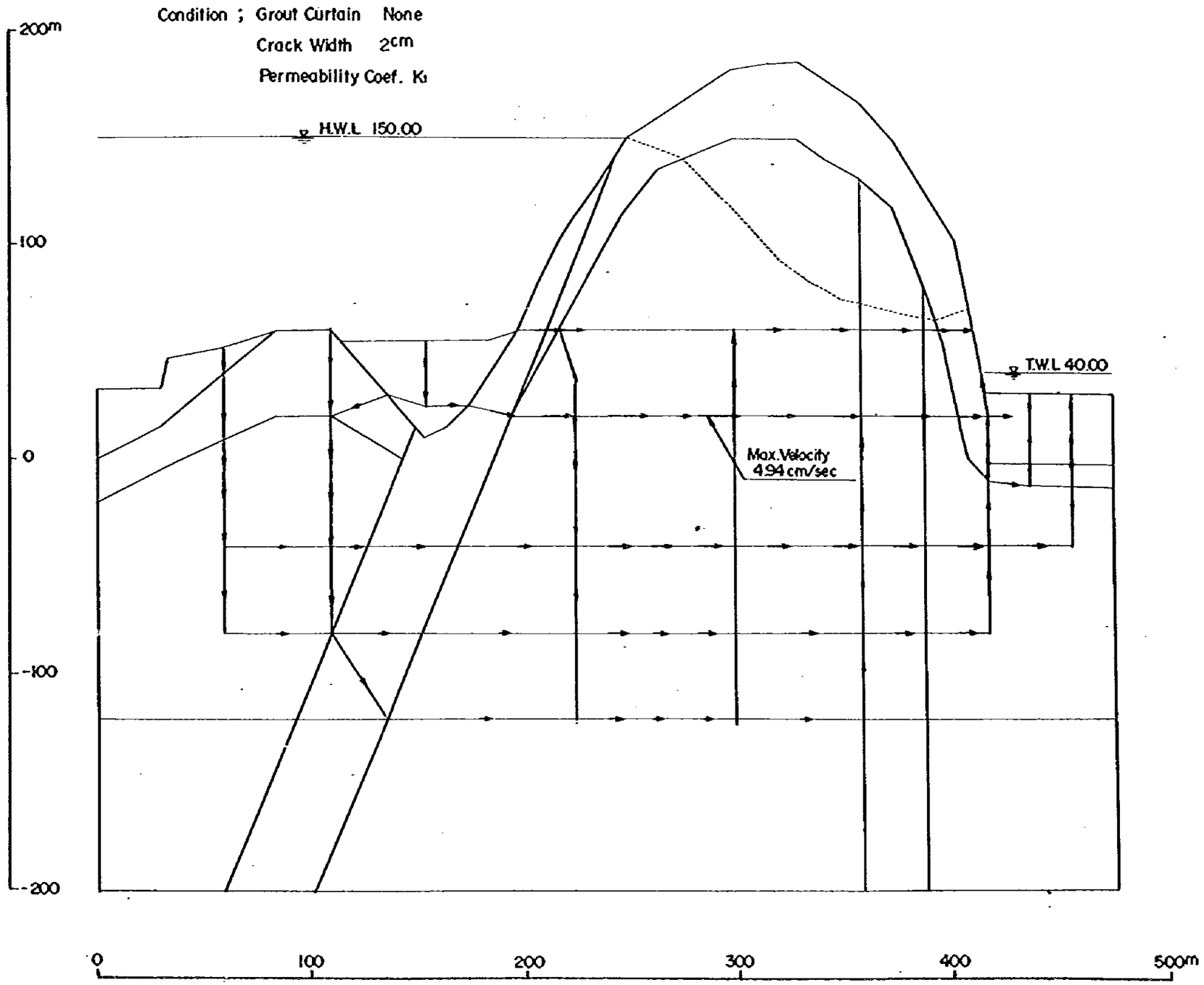


4-5-16 Seepage Flow Diagram along Solution Crack (R-1-B1-C2)

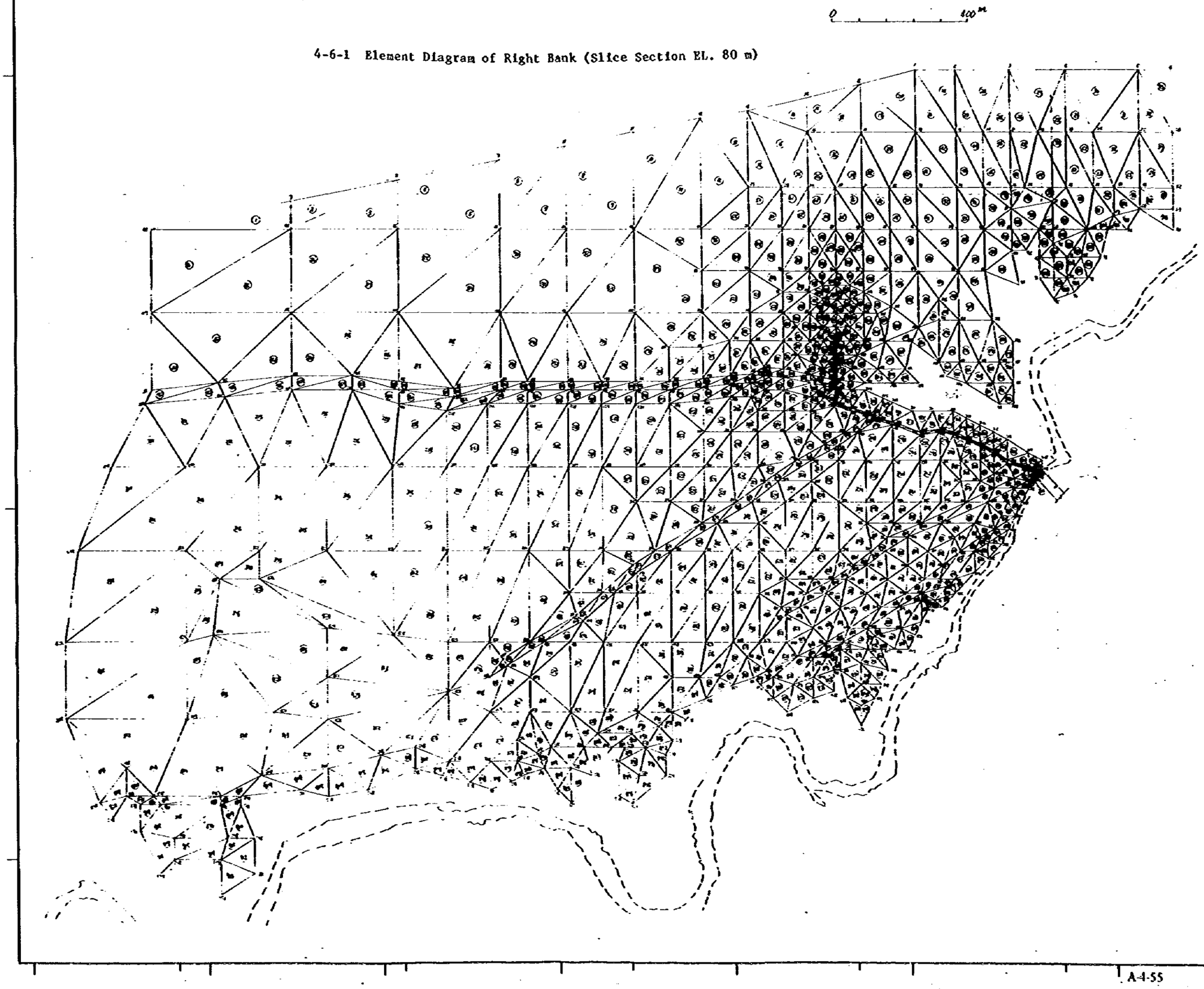
Condition ; Grout Curtain EL.-120m
Crack Width 2cm
Permeability Coef. K1



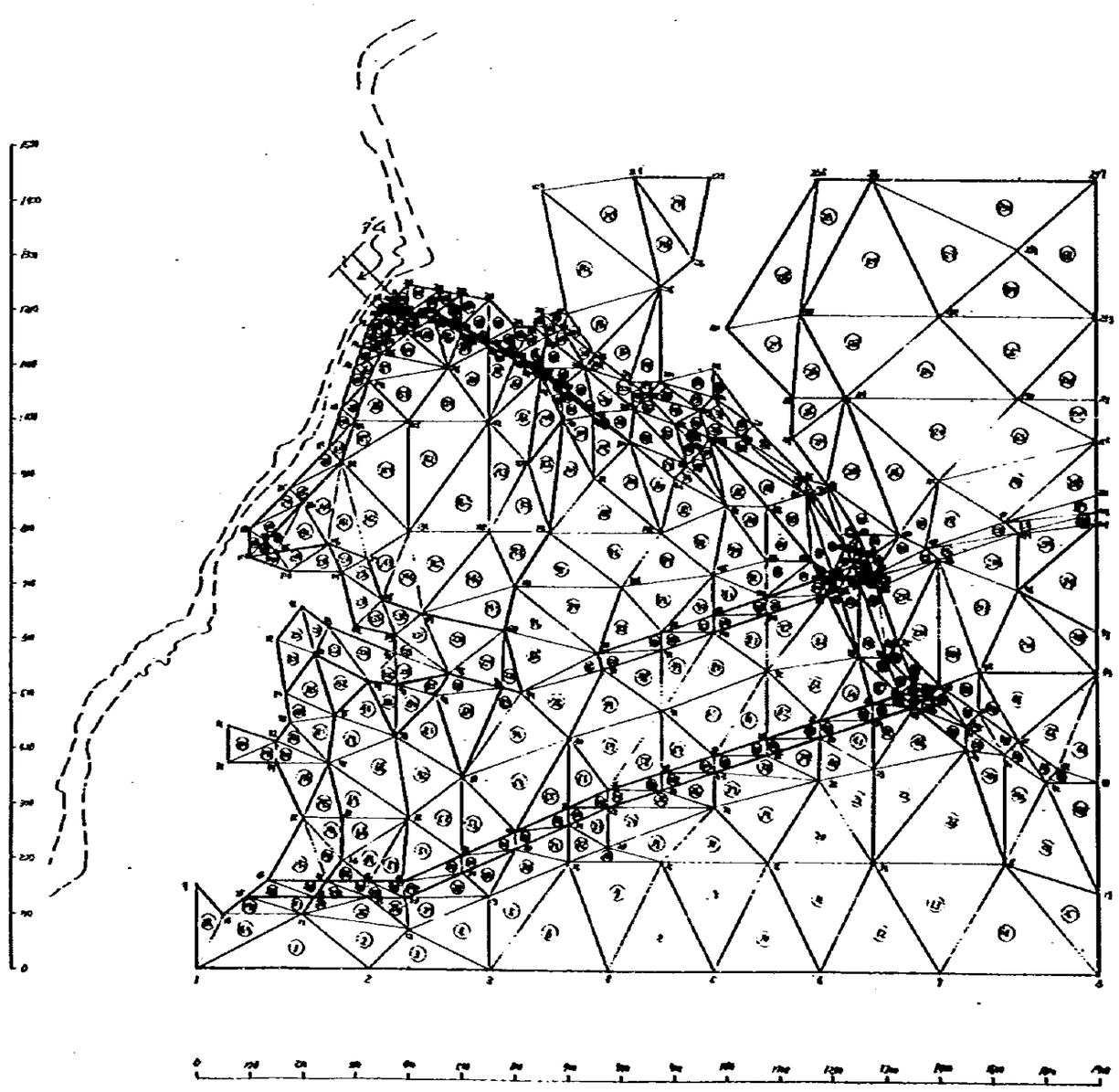
4-5-17 Seepage Flow Diagram along Solution Crack (R-1-01-C2)



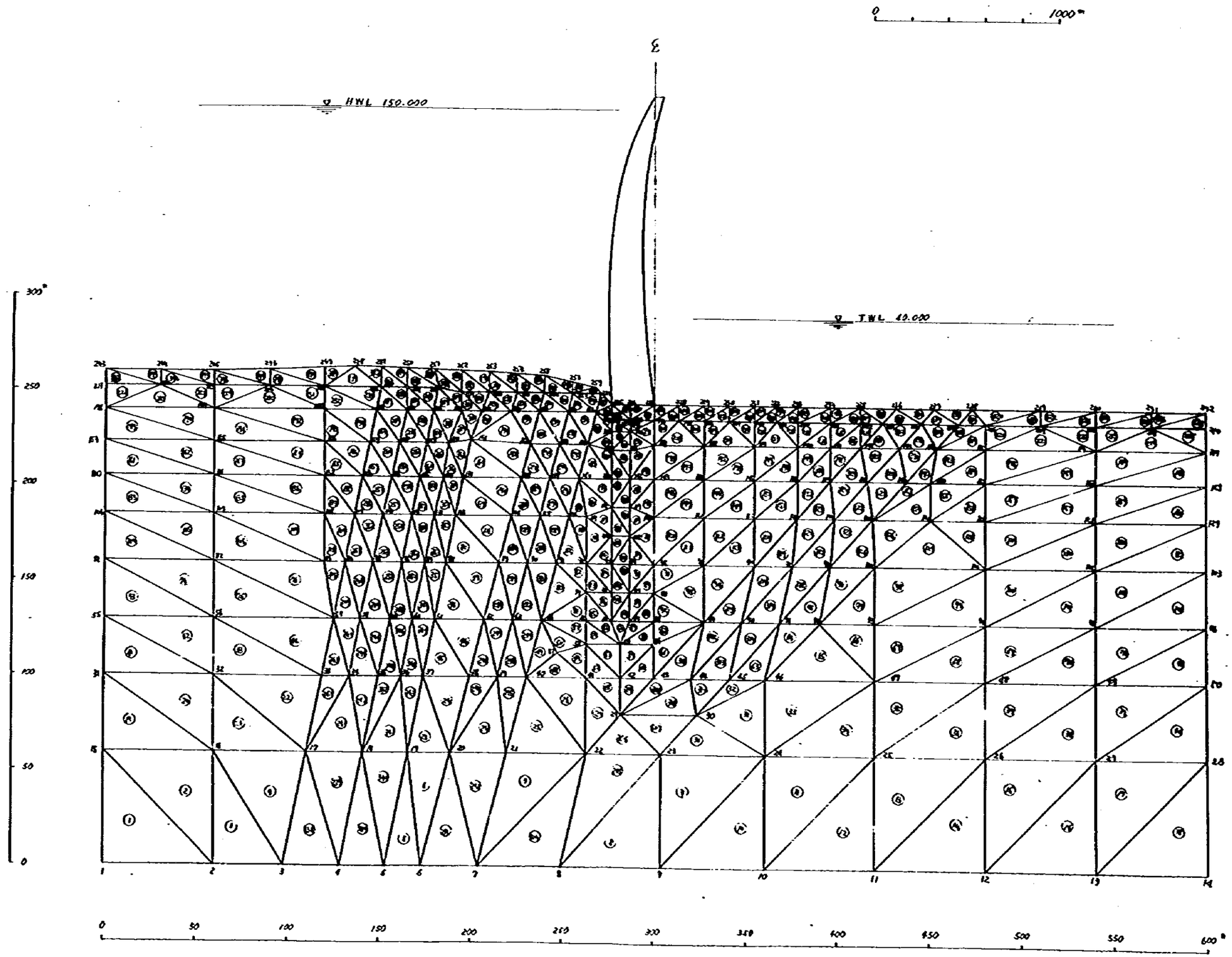
4-6-1 Element Diagram of Right Bank (Slice Section EL. 80 m)



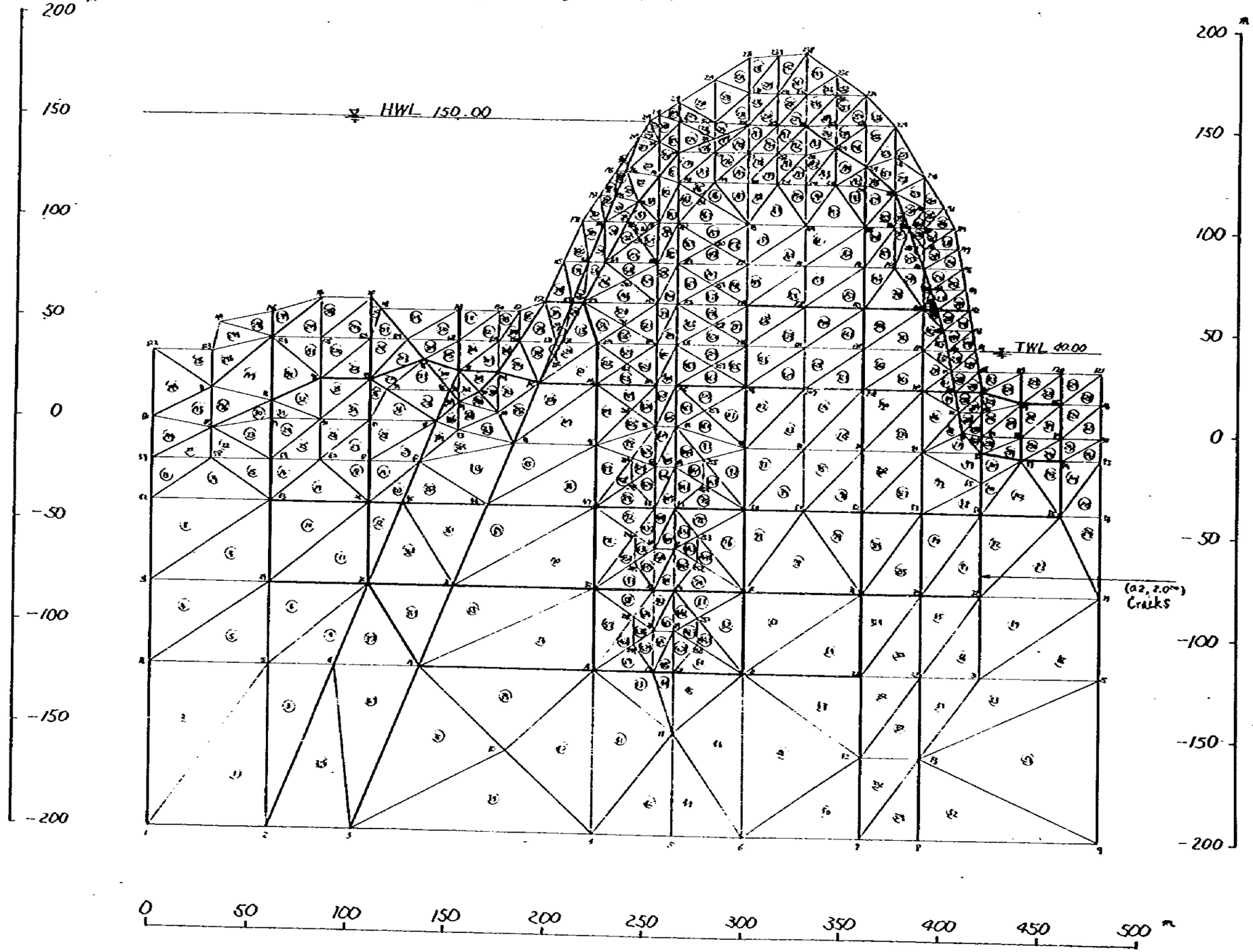
4-6-2 Element Diagram of Left Bank (Slice Section EL. 80 m)



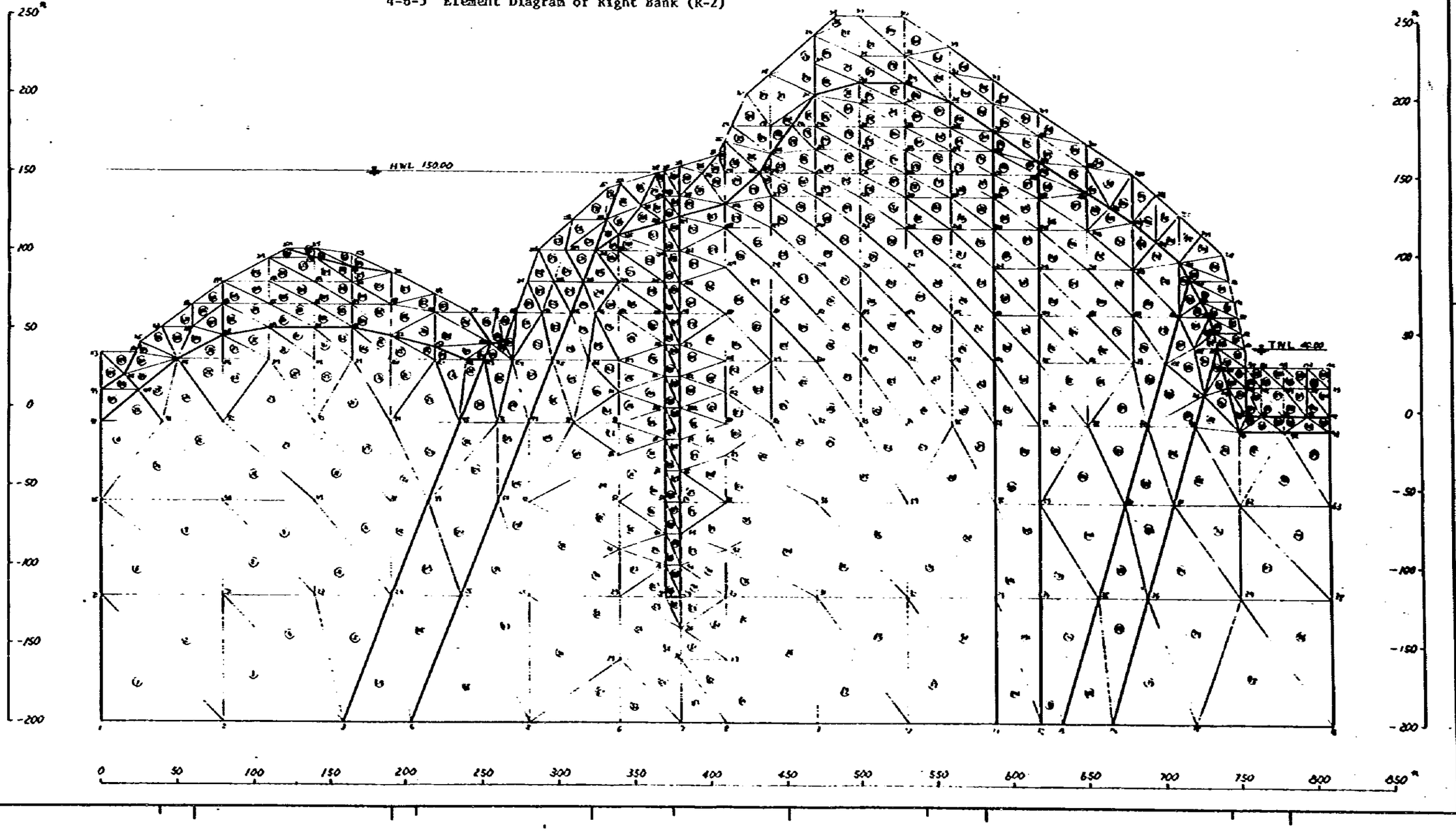
4-6-3 Element Diagram of Dam Foundation (D-1)



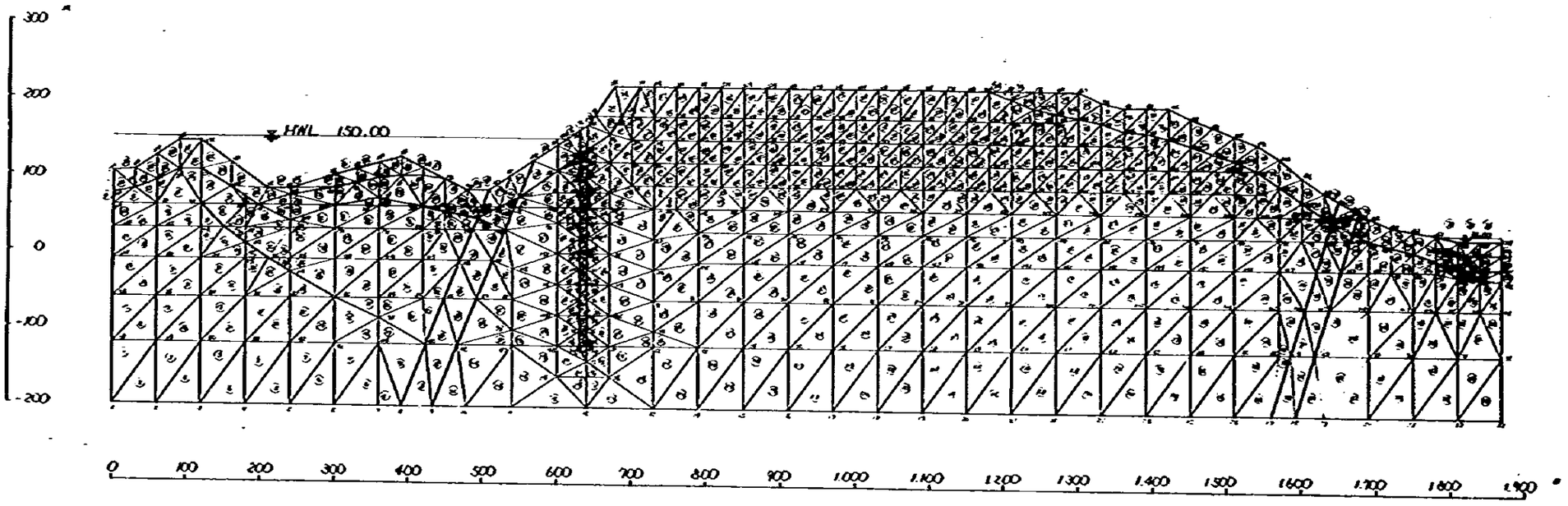
4-6-4 Element Diagram of Right Bank (R-1)



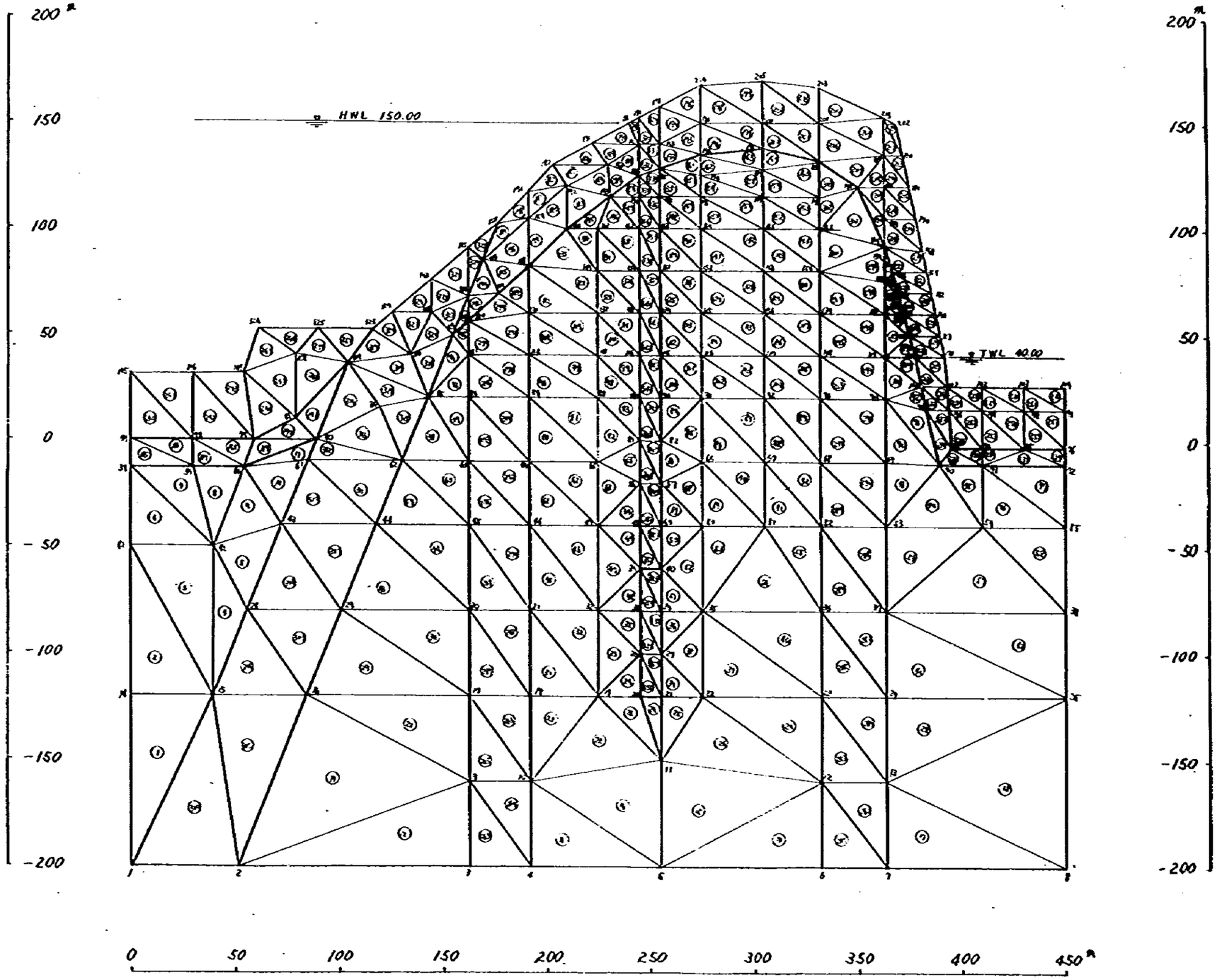
4-6-5 Element Diagram of Right Bank (R-2)



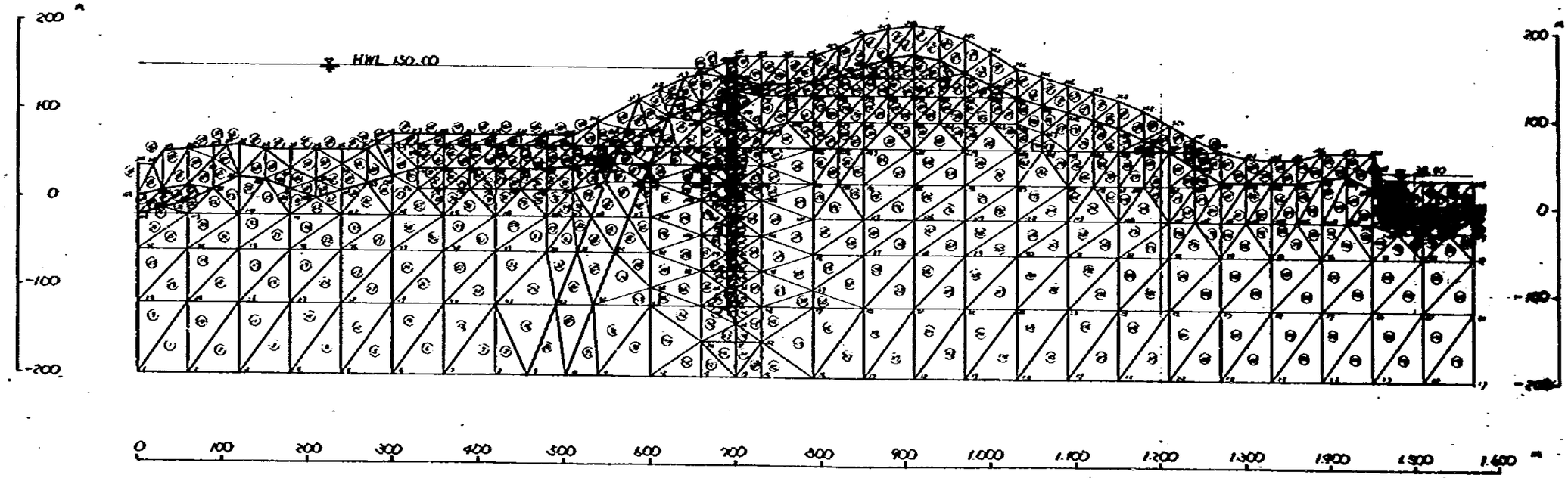
4-6-6 Element Diagram of Right Bank (R-3)



4-6-7 Element Diagram of Left Bank (L-1)



4-6-8 Element Diagram of Left Bank (L-2)



A—5

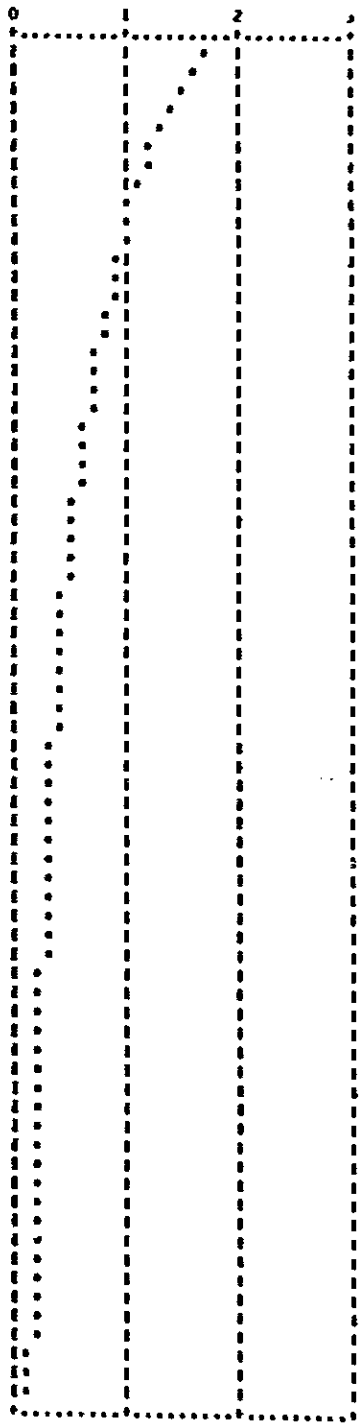
ECONOMIC EVALUATION DATA

5-1 Estimation of Financial Internal Rate of Return (FIRR)

DISCOUNT RATE (%)	HYDRO TOTAL INVEST (MIL.TL)	ALT TOTAL INVEST (MIL.TL)	BENEFIT - COST COST (MIL.TL)	BENEFIT (MIL.TL)	ANALYSYS B-C (MIL.TL)	B/C RATIO
5.0	36415.58	0.0	30778.78	51618.03	20839.25	1.6771
5.5	36415.58	0.0	29598.84	46528.11	16929.27	1.5720
6.0	36415.58	0.0	28529.02	42102.17	13573.16	1.4758
6.5	36415.58	0.0	27556.02	38235.94	10681.92	1.3877
7.0	36415.58	0.0	26661.11	34864.16	8183.05	1.3069
7.5	36415.58	0.0	25839.33	31854.95	6015.62	1.2328
8.0	36415.58	0.0	25079.86	29210.70	4130.84	1.1647
8.5	36415.58	0.0	24374.66	26881.02	2485.36	1.1020
9.0	36415.58	0.0	23717.37	24765.59	1048.21	1.0442
9.4	36415.58	0.0	23222.39	23249.23	26.85	1.0012
9.5	36415.58	0.0	23102.54	22890.20	-212.34	0.9908
10.0	36415.58	0.0	22525.36	21205.93	-1319.42	0.9414
10.5	36415.58	0.0	21981.86	19688.43	-2293.43	0.8957
11.0	36415.58	0.0	21468.38	18316.59	-3151.78	0.8532
11.5	36415.58	0.0	20981.96	17072.61	-3909.36	0.8137
12.0	36415.58	0.0	20520.06	15941.71	-4578.35	0.7769
12.5	36415.58	0.0	20080.36	14910.77	-5169.59	0.7426
13.0	36415.58	0.0	19660.93	13968.66	-5692.27	0.7105
13.5	36415.58	0.0	19259.88	13105.41	-6154.47	0.6805
14.0	36415.58	0.0	18875.79	12312.71	-6563.07	0.6523
14.5	36415.58	0.0	18507.31	11583.30	-6924.01	0.6259
15.0	36415.58	0.0	18153.21	10910.63	-7242.58	0.6010
15.5	36415.58	0.0	17812.48	10289.20	-7523.28	0.5776
16.0	36415.58	0.0	17484.22	9714.15	-7770.07	0.5556
16.5	36415.58	0.0	17167.46	9180.84	-7986.61	0.5348
17.0	36415.58	0.0	16861.49	8685.53	-8175.96	0.5151
17.5	36415.58	0.0	16565.68	8224.83	-8340.85	0.4965
18.0	36415.58	0.0	16279.39	7795.64	-8483.74	0.4789
18.5	36415.58	0.0	16002.11	7395.39	-8606.72	0.4622
19.0	36415.58	0.0	15733.25	7021.39	-8711.85	0.4463
19.5	36415.58	0.0	15472.37	6671.58	-8800.79	0.4312
20.0	36415.58	0.0	15219.10	6344.09	-8875.10	0.4168
20.5	36415.58	0.0	14973.03	6036.89	-8936.14	0.4032
21.0	36415.58	0.0	14733.86	5748.70	-8985.17	0.3902
21.5	36415.58	0.0	14501.15	5477.82	-9023.33	0.3778
22.0	36415.58	0.0	14274.70	5223.03	-9051.61	0.3659
22.5	36415.58	0.0	14054.17	4983.26	-9070.91	0.3546
23.0	36415.58	0.0	13839.37	4757.24	-9082.13	0.3437
23.5	36415.58	0.0	13630.02	4544.07	-9085.95	0.3334
24.0	36415.58	0.0	13425.91	4342.90	-9083.01	0.3235
24.5	36415.58	0.0	13226.82	4152.79	-9074.04	0.3140
25.0	36415.58	0.0	13032.56	3973.10	-9059.46	0.3049
25.5	36415.58	0.0	12842.93	3803.01	-9039.93	0.2961
26.0	36415.58	0.0	12657.79	3641.95	-9015.84	0.2877
26.5	36415.58	0.0	12477.01	3489.35	-8987.66	0.2797
27.0	36415.58	0.0	12300.36	3344.63	-8955.71	0.2719
27.5	36415.58	0.0	12127.71	3207.31	-8920.41	0.2645
28.0	36415.58	0.0	11958.96	3076.92	-8882.04	0.2573
28.5	36415.58	0.0	11793.94	2953.05	-8840.89	0.2504
29.0	36415.58	0.0	11632.61	2835.31	-8797.30	0.2437
29.5	36415.58	0.0	11474.75	2723.30	-8751.45	0.2373
30.0	36415.58	0.0	11320.28	2616.71	-8703.57	0.2312
30.5	36415.58	0.0	11169.13	2515.20	-8653.93	0.2252
31.0	36415.58	0.0	11021.16	2418.50	-8602.66	0.2194
31.5	36415.58	0.0	10876.30	2326.32	-8549.98	0.2139
32.0	36415.58	0.0	10734.46	2238.43	-8496.03	0.2085
32.5	36415.58	0.0	10595.53	2154.58	-8440.97	0.2033
33.0	36415.58	0.0	10459.43	2074.50	-8384.94	0.1983
33.5	36415.58	0.0	10326.10	1998.04	-8328.06	0.1935
34.0	36415.58	0.0	10195.43	1924.93	-8270.49	0.1888
34.5	36415.58	0.0	10067.39	1855.18	-8212.21	0.1843
35.0	36415.58	0.0	9941.85	1788.41	-8153.44	0.1799
35.5	36415.58	0.0	9818.78	1724.56	-8094.24	0.1756
36.0	36415.58	0.0	9698.10	1663.41	-8034.69	0.1715
36.5	36415.58	0.0	9579.74	1604.93	-7974.86	0.1675
37.0	36415.58	0.0	9463.70	1548.86	-7914.83	0.1637
37.5	36415.58	0.0	9349.82	1495.17	-7854.65	0.1599
38.0	36415.58	0.0	9238.13	1443.71	-7794.42	0.1563
38.5	36415.58	0.0	9128.51	1394.37	-7734.14	0.1527
39.0	36415.58	0.0	9020.94	1347.05	-7673.89	0.1493
39.5	36415.58	0.0	8915.36	1301.65	-7613.71	0.1460
40.0	36415.58	0.0	8811.75	1258.09	-7553.66	0.1428

* --- E.R.D (HYDROPOWER)

B/C - DISCOUNT RATE



5-2 Calculation Sheet of Economic Cost Flow

YEAR	INVESTMENT (MIL.TL)	GENERATING END: INSTALLED CAPACITY (MW)	GENERATING END: PRODUCTION (MIL.KWH)	SALABLE ENERGY (MIL.KWH)	GENERATING OEM COST: FIXED COST (MIL.TL)	GENERATING OEM COST: VARIABLE COST (MIL.TL)	GENERATING OEM COST: TOTAL COST (MIL.TL)	TRANSMISSION OEM COST (MIL.TL)	SUBSTATION OEM COST (MIL.TL)	ANNUAL COST (MIL.TL)	COST FLOW (MIL.TL)
1	1384.90	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1384.90
2	1787.70	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1787.70
3	3249.20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3249.20
4	5788.70	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5788.70
5	5787.80	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5787.80
6	2602.10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2602.10
7	0.0	200.0	659.9	631.5	238.50	0.0	298.50	3.90	0.0	302.40	302.40
8	0.0	200.0	659.9	631.5	238.50	0.0	298.50	3.90	0.0	302.40	302.40
9	0.0	200.0	659.9	631.5	238.50	0.0	298.50	3.90	0.0	302.40	302.40
10	0.0	200.0	659.9	631.5	238.50	0.0	298.50	3.90	0.0	302.40	302.40
11	0.0	200.0	659.9	631.5	238.50	0.0	298.50	3.90	0.0	302.40	302.40
12	0.0	200.0	659.9	631.5	238.50	0.0	298.50	3.90	0.0	302.40	302.40
13	0.0	200.0	659.9	631.5	238.50	0.0	298.50	3.90	0.0	302.40	302.40
14	0.0	200.0	659.9	631.5	238.50	0.0	298.50	3.90	0.0	302.40	302.40
15	0.0	200.0	659.9	631.5	238.50	0.0	298.50	3.90	0.0	302.40	302.40
16	0.0	200.0	659.9	631.5	238.50	0.0	298.50	3.90	0.0	302.40	302.40
17	0.0	200.0	659.9	631.5	238.50	0.0	298.50	3.90	0.0	302.40	302.40
18	0.0	200.0	659.9	631.5	238.50	0.0	298.50	3.90	0.0	302.40	302.40
19	0.0	200.0	659.9	631.5	238.50	0.0	298.50	3.90	0.0	302.40	302.40
20	0.0	200.0	659.9	631.5	238.50	0.0	298.50	3.90	0.0	302.40	302.40
21	0.0	200.0	659.9	631.5	238.50	0.0	298.50	3.90	0.0	302.40	302.40
22	0.0	200.0	659.9	631.5	238.50	0.0	298.50	3.90	0.0	302.40	302.40
23	0.0	200.0	659.9	631.5	238.50	0.0	298.50	3.90	0.0	302.40	302.40
24	0.0	200.0	659.9	631.5	238.50	0.0	298.50	3.90	0.0	302.40	302.40
25	0.0	200.0	659.9	631.5	238.50	0.0	298.50	3.90	0.0	302.40	302.40
26	0.0	200.0	659.9	631.5	238.50	0.0	298.50	3.90	0.0	302.40	302.40
27	0.0	200.0	659.9	631.5	238.50	0.0	298.50	3.90	0.0	302.40	302.40
28	679.60	200.0	659.9	631.5	238.50	0.0	298.50	3.90	0.0	302.40	982.00
29	3018.40	200.0	659.9	631.5	238.50	0.0	298.50	3.90	0.0	302.40	3320.80
30	2855.50	200.0	659.9	631.5	238.50	0.0	298.50	3.90	0.0	302.40	3158.90
31	969.70	200.0	659.9	631.5	238.50	0.0	298.50	3.90	0.0	302.40	1272.10
32	0.0	200.0	659.9	631.5	238.50	0.0	298.50	3.90	0.0	302.40	302.40
33	0.0	200.0	659.9	631.5	238.50	0.0	298.50	3.90	0.0	302.40	302.40
34	0.0	200.0	659.9	631.5	238.50	0.0	298.50	3.90	0.0	302.40	302.40
35	0.0	200.0	659.9	631.5	238.50	0.0	298.50	3.90	0.0	302.40	302.40
36	0.0	200.0	659.9	631.5	238.50	0.0	298.50	3.90	0.0	302.40	302.40
37	0.0	200.0	659.9	631.5	238.50	0.0	298.50	3.90	0.0	302.40	302.40
38	0.0	200.0	659.9	631.5	238.50	0.0	298.50	3.90	0.0	302.40	302.40
39	0.0	200.0	659.9	631.5	238.50	0.0	298.50	3.90	0.0	302.40	302.40
40	0.0	200.0	659.9	631.5	238.50	0.0	298.50	3.90	0.0	302.40	302.40
41	0.0	200.0	659.9	631.5	238.50	0.0	298.50	3.90	0.0	302.40	302.40
42	0.0	200.0	659.9	631.5	238.50	0.0	298.50	3.90	0.0	302.40	302.40
43	0.0	200.0	659.9	631.5	238.50	0.0	298.50	3.90	0.0	302.40	302.40
44	0.0	200.0	659.9	631.5	238.50	0.0	298.50	3.90	0.0	302.40	302.40
45	0.0	200.0	659.9	631.5	238.50	0.0	298.50	3.90	0.0	302.40	302.40
46	0.0	200.0	659.9	631.5	238.50	0.0	298.50	3.90	0.0	302.40	302.40
47	0.0	200.0	659.9	631.5	238.50	0.0	298.50	3.90	0.0	302.40	302.40
48	0.0	200.0	659.9	631.5	238.50	0.0	298.50	3.90	0.0	302.40	302.40
49	0.0	200.0	659.9	631.5	238.50	0.0	298.50	3.90	0.0	302.40	302.40
50	0.0	200.0	659.9	631.5	238.50	0.0	298.50	3.90	0.0	302.40	302.40
51	0.0	200.0	659.9	631.5	238.50	0.0	298.50	3.90	0.0	302.40	302.40
52	0.0	200.0	659.9	631.5	238.50	0.0	298.50	3.90	0.0	302.40	302.40
53	0.0	200.0	659.9	631.5	238.50	0.0	298.50	3.90	0.0	302.40	302.40
54	0.0	200.0	659.9	631.5	238.50	0.0	298.50	3.90	0.0	302.40	302.40
55	0.0	200.0	659.9	631.5	238.50	0.0	298.50	3.90	0.0	302.40	302.40
56	0.0	200.0	659.9	631.5	238.50	0.0	298.50	3.90	0.0	302.40	302.40

5-3 Calculation Sheet of Economic Benefit Flow

YEAR	INVESTMENT (MIL.TL)	GENERATING END: INSTALLED CAPACITY (MW)	GENERATING END: PRODUCTION (MIL.KWH)	SALABLE ENERGY (MIL.KWH)	GENERATING O&M COST: FIXED COST (MIL.TL)	GENERATING O&M COST: VARIABLE COST (MIL.TL)	GENERATING O&M COST: TOTAL COST (MIL.TL)	TRANSMISSION O&M COST (MIL.TL)	SUBSTATION O&M COST (MIL.TL)	ANNUAL COST (MIL.TL)	COST FLOW (MIL.TL)
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	1588.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1588.30
4	6353.20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6353.20
5	6353.20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6353.20
6	1588.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1588.30
7	0.0	190.6	671.8	631.5	337.10	4971.52	5395.51	0.0	0.0	5395.51	5395.51
8	0.0	190.6	671.8	631.5	337.10	4971.52	5395.51	0.0	0.0	5395.51	5395.51
9	0.0	190.6	671.8	631.5	337.10	4971.52	5395.51	0.0	0.0	5395.51	5395.51
10	0.0	190.6	671.8	631.5	337.10	4971.52	5395.51	0.0	0.0	5395.51	5395.51
11	0.0	190.6	671.8	631.5	337.10	4971.52	5395.51	0.0	0.0	5395.51	5395.51
12	0.0	190.6	671.8	631.5	337.10	4971.52	5395.51	0.0	0.0	5395.51	5395.51
13	0.0	190.6	671.8	631.5	337.10	4971.52	5395.51	0.0	0.0	5395.51	5395.51
14	0.0	190.6	671.8	631.5	337.10	4971.52	5395.51	0.0	0.0	5395.51	5395.51
15	0.0	190.6	671.8	631.5	337.10	4971.52	5395.51	0.0	0.0	5395.51	5395.51
16	0.0	190.6	671.8	631.5	337.10	4971.52	5395.51	0.0	0.0	5395.51	5395.51
17	0.0	190.6	671.8	631.5	337.10	4971.52	5395.51	0.0	0.0	5395.51	5395.51
18	0.0	190.6	671.8	631.5	337.10	4971.52	5395.51	0.0	0.0	5395.51	5395.51
19	0.0	190.6	671.8	631.5	337.10	4971.52	5395.51	0.0	0.0	5395.51	5395.51
20	0.0	190.6	671.8	631.5	337.10	4971.52	5395.51	0.0	0.0	5395.51	5395.51
21	0.0	190.6	671.8	631.5	337.10	4971.52	5395.51	0.0	0.0	5395.51	5395.51
22	0.0	190.6	671.8	631.5	337.10	4971.52	5395.51	0.0	0.0	5395.51	5395.51
23	0.0	190.6	671.8	631.5	337.10	4971.52	5395.51	0.0	0.0	5395.51	5395.51
24	0.0	190.6	671.8	631.5	337.10	4971.52	5395.51	0.0	0.0	5395.51	5395.51
25	0.0	190.6	671.8	631.5	337.10	4971.52	5395.51	0.0	0.0	5395.51	5395.51
26	0.0	190.6	671.8	631.5	337.10	4971.52	5395.51	0.0	0.0	5395.51	5395.51
27	0.0	190.6	671.8	631.5	337.10	4971.52	5395.51	0.0	0.0	5395.51	5395.51
28	1588.30	190.6	671.8	631.5	337.10	4971.52	5395.51	0.0	0.0	5395.51	5395.51
29	6353.20	190.6	671.8	631.5	337.10	4971.52	5395.51	0.0	0.0	5395.51	6983.81
30	6353.20	190.6	671.8	631.5	337.10	4971.52	5395.51	0.0	0.0	5395.51	11768.71
31	1588.30	190.6	671.8	631.5	337.10	4971.52	5395.51	0.0	0.0	5395.51	11768.71
32	0.0	190.6	671.8	631.5	337.10	4971.52	5395.51	0.0	0.0	5395.51	6983.81
33	0.0	190.6	671.8	631.5	337.10	4971.52	5395.51	0.0	0.0	5395.51	5395.51
34	0.0	190.6	671.8	631.5	337.10	4971.52	5395.51	0.0	0.0	5395.51	5395.51
35	0.0	190.6	671.8	631.5	337.10	4971.52	5395.51	0.0	0.0	5395.51	5395.51
36	0.0	190.6	671.8	631.5	337.10	4971.52	5395.51	0.0	0.0	5395.51	5395.51
37	0.0	190.6	671.8	631.5	337.10	4971.52	5395.51	0.0	0.0	5395.51	5395.51
38	0.0	190.6	671.8	631.5	337.10	4971.52	5395.51	0.0	0.0	5395.51	5395.51
39	0.0	190.6	671.8	631.5	337.10	4971.52	5395.51	0.0	0.0	5395.51	5395.51
40	0.0	190.6	671.8	631.5	337.10	4971.52	5395.51	0.0	0.0	5395.51	5395.51
41	0.0	190.6	671.8	631.5	337.10	4971.52	5395.51	0.0	0.0	5395.51	5395.51
42	0.0	190.6	671.8	631.5	337.10	4971.52	5395.51	0.0	0.0	5395.51	5395.51
43	0.0	190.6	671.8	631.5	337.10	4971.52	5395.51	0.0	0.0	5395.51	5395.51
44	0.0	190.6	671.8	631.5	337.10	4971.52	5395.51	0.0	0.0	5395.51	5395.51
45	0.0	190.6	671.8	631.5	337.10	4971.52	5395.51	0.0	0.0	5395.51	5395.51
46	0.0	190.6	671.8	631.5	337.10	4971.52	5395.51	0.0	0.0	5395.51	5395.51
47	0.0	190.6	671.8	631.5	337.10	4971.52	5395.51	0.0	0.0	5395.51	5395.51
48	0.0	190.6	671.8	631.5	337.10	4971.52	5395.51	0.0	0.0	5395.51	5395.51
49	0.0	190.6	671.8	631.5	337.10	4971.52	5395.51	0.0	0.0	5395.51	5395.51
50	0.0	190.6	671.8	631.5	337.10	4971.52	5395.51	0.0	0.0	5395.51	5395.51
51	0.0	190.6	671.8	631.5	337.10	4971.52	5395.51	0.0	0.0	5395.51	5395.51
52	0.0	190.6	671.8	631.5	337.10	4971.52	5395.51	0.0	0.0	5395.51	5395.51
53	0.0	190.6	671.8	631.5	337.10	4971.52	5395.51	0.0	0.0	5395.51	5395.51
54	0.0	190.6	671.8	631.5	337.10	4971.52	5395.51	0.0	0.0	5395.51	5395.51
55	0.0	190.6	671.8	631.5	337.10	4971.52	5395.51	0.0	0.0	5395.51	5395.51
56	0.0	190.6	671.8	631.5	337.10	4971.52	5395.51	0.0	0.0	5395.51	5395.51

A–6

DATA FOR POWER SYSTEM ANALYSIS AND OUT-PUT OF POWER FLOW CALCULATION

* BRANCH DATA (POSITIVE-SEQUENCE) *

CODE	FROM	TO	R	X	Y/2	CCT OLD	CCT NOW	CAPACITY	ID.	TAP REAL	TAP IMAG.	F/T
1	1	2	0.2700	2.7200	31.7100	0	0	0.0		0.0	0.0	
2	2	3	0.3300	0.6300	10.6300	0	0	0.0		0.0	0.0	
3	3	4	0.1200	1.5800	107.5200	0	0	0.0		0.0	0.0	
4	4	5	0.1300	1.3400	15.6000	0	0	0.0		0.0	0.0	
5	4	6	0.1670	1.9300	131.2500	0	0	0.0		0.0	0.0	
6	2	7	0.3300	0.4000	6.9000	0	0	0.0		0.0	0.0	
7	7	3	0.0300	0.3700	6.2500	0	0	0.0		0.0	0.0	
8	3	8	0.0350	0.4600	7.8200	0	0	0.0		0.0	0.0	
9	8	9	0.0460	0.4400	21.1000	0	0	0.0		0.0	0.0	
10	9	10	0.0700	0.8800	42.1700	0	0	0.0		0.0	0.0	
11	10	4	0.1500	1.5600	18.2000	0	0	0.0		0.0	0.0	
12	4	12	0.1300	1.5800	106.8900	0	0	0.0		0.0	0.0	
13	12	6	0.1680	2.2100	37.5000	0	0	0.0		0.0	0.0	
14	10	11	0.2800	2.8500	34.2600	0	0	0.0		0.0	0.0	
15	11	12	0.1800	1.8700	22.4000	0	0	0.0		0.0	0.0	
16	12	13	0.0920	0.2200	10.5400	0	0	0.0		0.0	0.0	
17	9	19	0.4000	4.0100	46.8000	0	0	0.0		0.0	0.0	
18	10	19	0.2400	2.1300	25.5700	0	0	0.0		0.0	0.0	
19	19	12	0.3200	3.2500	39.0000	0	0	0.0		0.0	0.0	
20	1	14	0.6600	6.2400	72.8000	0	0	0.0		0.0	0.0	
21	14	15	0.2500	2.6800	31.1900	0	0	0.0		0.0	0.0	
22	15	10	0.3200	3.2300	37.7000	0	0	0.0		0.0	0.0	
23	15	18	0.2500	2.6800	31.2000	0	0	0.0		0.0	0.0	
24	18	19	0.1200	1.1700	17.7000	0	0	0.0		0.0	0.0	
25	19	13	0.3500	3.6800	42.9000	0	0	0.0		0.0	0.0	
26	15	16	0.1900	1.9600	22.8700	0	0	0.0		0.0	0.0	
27	16	17	0.0900	0.9400	10.9200	0	0	0.0		0.0	0.0	
28	17	18	0.1200	1.1700	17.7000	0	0	0.0		0.0	0.0	
29	14	20	0.1300	1.3400	15.6000	0	0	0.0		0.0	0.0	
30	20	21	0.1800	1.8300	21.3100	0	0	0.0		0.0	0.0	
31	21	22	0.1100	1.1100	12.9500	0	0	0.0		0.0	0.0	
32	22	17	0.6200	6.2200	75.4000	0	0	0.0		0.0	0.0	
33	17	27	0.6600	6.5000	78.0000	0	0	0.0		0.0	0.0	
34	21	23	0.4600	4.7200	56.6500	0	0	0.0		0.0	0.0	
35	22	24	0.3200	3.2600	37.9000	0	0	0.0		0.0	0.0	
36	23	24	0.0600	0.4200	5.0000	0	0	0.0		0.0	0.0	
37	24	25	0.5900	6.0200	70.2000	0	0	0.0		0.0	0.0	
38	25	26	0.2200	2.2300	25.9900	0	0	0.0		0.0	0.0	
39	26	27	0.1300	1.3400	15.6000	0	0	0.0		0.0	0.0	
40	27	29	0.1500	2.0200	137.5000	0	0	0.0		0.0	0.0	
41	26	29	0.3100	4.0500	68.7500	0	0	0.0		0.0	0.0	
42	29	30	0.0960	0.4460	20.8000	0	0	0.0		0.0	0.0	
45	25	34	0.1320	1.3380	15.5940	0	0	0.0		0.0	0.0	
46	34	26	0.0440	0.8920	10.3960	0	0	0.0		0.0	0.0	
47	34	33	0.0550	0.5590	6.4980	0	0	0.0		0.0	0.0	
51	6	51	0.3100	3.1200	36.4000	0	0	0.0		0.0	0.0	
52	51	52	0.1760	1.7800	20.8000	0	0	0.0		0.0	0.0	
53	6	52	0.2930	3.8600	65.6000	0	0	0.0		0.0	0.0	
54	52	53	0.1940	2.0100	23.4900	0	0	0.0		0.0	0.0	
55	53	54	0.0220	0.2100	9.8800	0	0	0.0		0.0	0.0	

* BRANCH DATA (POSITIVE-SEQUENCE) *

CODE	FROM	TO	R	X	Y/2	CCT OLD	CCT NOW	CAPPACITY	ID.	TAP REAL	TAP IMAG.	F/T
56	6	55	0.1453	1.8400	125.0200	0	0	0.0		0.0	0.0	
57	56	53	0.2793	2.7900	32.4900	0	0	0.0		0.0	0.0	
58	12	75	0.3933	5.1500	87.5000	0	0	0.0		0.0	0.0	
59	57	58	0.7333	7.3600	85.8000	0	0	0.0		0.0	0.0	
60	60	61	0.4664	4.9100	57.2000	0	0	0.0		0.0	0.0	
61	61	58	0.2462	2.4500	28.6000	0	0	0.0		0.0	0.0	
62	58	59	0.2303	2.0100	23.3900	0	0	0.0		0.0	0.0	
63	13	62	0.2933	2.9150	152.2000	0	0	0.0		0.0	0.0	
64	63	58	0.3333	3.0000	157.4000	0	0	0.0		0.0	0.0	
65	63	60	0.3663	3.6800	35.8700	0	0	0.0		0.0	0.0	
66	60	58	0.3703	3.7700	43.9000	0	0	0.0		0.0	0.0	
67	58	72	0.3953	6.8900	41.5800	0	0	0.0		0.0	0.0	
68	13	68	0.5003	7.3600	125.0000	0	0	0.0		0.0	0.0	
69	12	64	0.3333	4.2300	71.8900	0	0	0.0		0.0	0.0	
70	65	68	0.3333	4.2300	71.8900	0	0	0.0		0.0	0.0	
71	18	66	0.4203	5.5200	93.7500	0	0	0.0		0.0	0.0	
72	67	68	0.4203	5.5200	93.7500	0	0	0.0		0.0	0.0	
73	68	72	0.2943	3.8600	65.6300	0	0	0.0		0.0	0.0	
74	28	69	0.8903	9.0800	105.7800	0	0	0.0		0.0	0.0	
75	70	71	0.2433	2.9800	50.6400	0	0	0.0		0.0	0.0	
76	71	72	0.2103	2.6600	45.6300	0	0	0.0		0.0	0.0	
77	72	73	0.1133	1.1200	26.0000	0	0	0.0		0.0	0.0	
78	73	74	0.1353	1.6700	78.0000	0	0	0.0		0.0	0.0	
C-28	27	28	0.0	-2.0800	0.0	0	0	0.0		0.0	0.0	
C-55	55	56	0.0	-1.1800	0.0	0	0	0.0		0.0	0.0	
C-56	75	56	0.0	-2.4200	0.0	0	0	0.0		0.0	0.0	
C-57	56	57	0.0	-2.4300	0.0	0	0	0.0		0.0	0.0	
C-60	56	60	0.0	-2.4300	0.0	0	0	0.0		0.0	0.0	
C-62	62	63	0.0	-1.2100	0.0	0	0	0.0		0.0	0.0	
C-65	64	65	0.0	-4.5700	0.0	0	0	0.0		0.0	0.0	
C-66	66	67	0.0	-5.3300	0.0	0	0	0.0		0.0	0.0	
C-70	69	70	0.0	-2.0800	0.0	0	0	0.0		0.0	0.0	
79	70	68	0.3703	3.7700	43.9300	0	0	0.0		0.0	0.0	
R4	4	EARTH	0.0	-50.0000	0.0	0	0	0.0		0.0	0.0	
R5	5	EARTH	0.0	-500.0000	0.0	0	0	0.0		0.0	0.0	
R7	7	EARTH	0.0	-25.0000	0.0	0	0	0.0		0.0	0.0	
R9	9	EARTH	0.0	-25.0000	0.0	0	0	0.0		0.0	0.0	
R10	10	EARTH	0.0	-25.0000	0.0	0	0	0.0		0.0	0.0	
R13	13	EARTH	0.0	-40.0000	0.0	0	0	0.0		0.0	0.0	
R18	18	EARTH	0.0	-200.0000	0.0	0	0	0.0		0.0	0.0	
R20	20	EARTH	0.0	-50.0000	0.0	0	0	0.0		0.0	0.0	
A	A	1	0.0	2.3900	0.0	0	0	0.0		1.0500	0.0	T
B	B	20	0.0	2.1600	0.0	0	0	0.0		1.0500	0.0	T
C	C	21	0.0	5.5200	0.0	0	0	0.0		1.0500	0.0	T
D	D	23	0.0	2.5000	0.0	0	0	0.0		1.0500	0.0	T
E	E	24	0.0	2.2900	0.0	0	0	0.0		1.0500	0.0	T
F	F	17	0.0	2.3900	0.0	0	0	0.0		1.0500	0.0	T
G	G	19	0.0	5.1600	0.0	0	0	0.0		1.0500	0.0	T
H	H	11	0.0	2.3900	0.0	0	0	0.0		1.0500	0.0	T
I	I	26	0.0	2.6700	0.0	0	0	0.0		1.0500	0.0	T

* BRANCH DATA (POSITIVE-SEQUENCE) *

CODE	FROM	TO	R	X	Y/2	C C T OLD	C C T NOW	CAPACITY	ID.	T A P REAL	T A P IMAG.	F/T
J	J	29	0.0	0.6900	0.0	0	0	0.0		1.0500	0.0	T
K	K	30	0.0	3.4000	0.0	0	0	0.0		1.0500	0.0	T
L	L	15	0.0	3.5500	0.0	0	0	0.0		1.0500	0.0	T
M	N	33	0.0	5.2200	0.0	0	0	0.0		1.0500	0.0	T
N	N	2	0.0	2.3800	0.0	0	0	0.0		1.0500	0.0	T
O	O	51	0.0	2.8100	0.0	0	0	0.0		1.0500	0.0	T
P	P	52	0.0	2.0500	0.0	0	0	0.0		1.0500	0.0	T
Q	Q	54	0.0	2.7600	0.0	0	0	0.0		1.0500	0.0	T
R	R	61	0.0	4.4400	0.0	0	0	0.0		1.0500	0.0	T
S	S	58	0.0	0.9400	0.0	0	0	0.0		1.0500	0.0	T
T	T	72	0.0	0.8000	0.0	0	0	0.0		1.0500	0.0	T
U	U	68	0.0	0.2600	0.0	0	0	0.0		1.0500	0.0	T
V	V	71	0.0	4.7100	0.0	0	0	0.0		1.0500	0.0	T
W	W	74	0.0	1.1900	0.0	0	0	0.0		1.0500	0.0	T

* NODE DATA *

CODE	θ-KV	FKS	PG	QG	PL	QL	C/R	TO
1	0	0.0	0.0	0.0	558.6000	183.4060	0.0	0.0
2	0	0.0	0.0	0.0	808.0000	265.5750	0.0	0.0
3	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	0	0.0	0.0	0.0	259.0000	85.1201	0.0	0.0
5	0	0.0	0.0	0.0	170.0000	55.8763	0.0	0.0
6	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	0	0.0	0.0	0.0	939.0000	308.6340	0.0	0.0
8	0	97.5000	0.0	0.0	1109.0000	364.5100	0.0	0.0
10	0	0.0	0.0	0.0	1064.0000	351.0339	0.0	0.0
12	0	90.0000	0.0	0.0	1060.0000	348.4060	0.0	0.0
11	0	0.0	0.0	0.0	874.0000	287.2700	0.0	0.0
13	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	0	0.0	0.0	0.0	1109.0000	364.5100	0.0	0.0
14	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	0	0.0	0.0	0.0	269.0000	88.0873	0.0	0.0
17	0	0.0	0.0	0.0	153.0000	50.2446	0.0	0.0
20	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	0	0.0	0.0	0.0	292.0000	95.9757	0.0	0.0
22	0	97.5000	0.0	0.0	737.0000	242.2400	0.0	0.0
27	0	97.5000	0.0	0.0	1709.0000	561.7200	0.0	0.0
23	0	0.0	0.0	0.0	1264.0000	415.4561	0.0	0.0
24	0	0.0	0.0	0.0	461.0000	151.5230	0.0	0.0
25	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26	0	0.0	0.0	0.0	324.0000	106.4940	0.0	0.0
29	0	0.0	0.0	0.0	500.0000	164.3420	0.0	0.0
30	0	0.0	0.0	0.0	284.0000	93.3462	0.0	0.0
34	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
33	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
32	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
51	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
52	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
53	0	0.0	0.0	0.0	315.0000	103.5330	0.0	0.0
54	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
55	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
56	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
75	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
57	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
58	0	0.0	0.0	0.0	110.0000	36.1552	0.0	0.0
60	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
61	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
59	0	0.0	0.0	0.0	182.0000	59.8205	0.0	0.0
62	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
63	0	0.0	0.0	0.0	394.0000	129.5010	0.0	0.0
68	0	0.0	0.0	0.0	213.0000	70.0007	0.0	0.0
72	0	0.0	0.0	0.0	630.0000	207.0710	0.0	0.0
64	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
65	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
66	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

* NODE DATA *

CODE	B-KV	EKS	PG	QG	PL	QL	C/R	ID		
67	0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
28	0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
69	0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
70	0	0.0	0.0	0.0	710.0000	233.3660	0.0		0.0	0.0
71	0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
73	0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
74	0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
EARTH	0	0.0013	0.0	0.0	0.0	0.0	0.0		0.0	0.0
A	0	0.0	360.0000	260.0000	0.0	0.0	0.0	BABAESKI	0.0	0.0
B	0	0.0	520.0000	300.0000	0.0	0.0	0.0	SONA	0.0	0.0
C	0	0.0	260.0000	116.0000	0.0	0.0	0.0	ALIAGA	0.0	0.0
D	0	0.0	540.0000	260.0000	0.0	0.0	0.0	SEKIK	0.0	0.0
E	0	0.0	590.0000	280.0000	0.0	0.0	0.0	YATAGAN	0.0	0.0
F	0	0.0	570.0000	270.0000	0.0	0.0	0.0	SEYITOMR	0.0	0.0
G	0	0.0	278.0000	136.0000	0.0	0.0	0.0	GOKCEKAY	0.0	0.0
H	0	0.0	570.0000	270.0000	0.0	0.0	0.0	BEYPAZAR	0.0	0.0
I	0	0.0	560.0000	266.0000	0.0	0.0	0.0	OYMAPINR	0.0	0.0
J	0	102.5000	4620.0000	0.0	0.0	0.0	0.0	AKKUYU	0.0	0.0
K	0	102.0000	620.0000	0.0	0.0	0.0	0.0	KAYRAKTP	0.0	0.0
L	0	0.0	380.0000	180.0000	0.0	0.0	0.0	BURSA	0.0	0.0
M	0	0.0	200.0000	90.0000	0.0	0.0	0.0	BESKONAK	0.0	0.0
N	0	0.0	570.0000	270.0000	0.0	0.0	0.0	ANBARLI	0.0	0.0
O	0	102.0000	500.0000	0.0	0.0	0.0	0.0	BOYABAT	0.0	0.0
P	0	102.0000	500.0000	0.0	0.0	0.0	0.0	ALTINKAY	0.0	0.0
Q	0	102.0000	600.0000	0.0	0.0	0.0	0.0	H.UGURLU	0.0	0.0
R	0	102.0000	280.0000	0.0	0.0	0.0	0.0	KANGAL	0.0	0.0
S	0	102.0000	1600.0000	0.0	0.0	0.0	0.0	KEBAN	0.0	0.0
T	0	101.5000	1600.0000	0.0	0.0	0.0	0.0	KARAKAYA	0.0	0.0
U	0	102.0000	3550.0000	0.0	230.0000	75.5973	0.0	ELBISTAN	0.0	0.0
V	0	102.0000	300.0000	0.0	0.0	0.0	0.0	ATATURK	0.0	0.0
W	0	100.5000	1000.0000	0.0	0.0	0.0	0.0	ILISU	0.0	0.0

*** POWER FLOW ***

NODE	CODE	ND	E(KV)	VOLTAGE |E|(%)	VOLTAGE ANGLE	GENERATOR P(%)	GENERATOR Q(%)	LOAD P(%)	LOAD Q(%)
	1	1	99.641	99.641	-62.806	0.0	0.0	558.003	183.404
	2	2	96.836	96.836	-62.860	0.0	0.0	808.005	265.562
	3	3	96.851	96.851	-61.412	0.0	0.0	0.014	-0.001
	4	4	96.318	96.318	-46.648	0.0	0.0	259.000	85.127
	5	5	95.727	95.727	-48.044	0.0	0.0	169.999	55.876
	6	6	100.122	100.122	-29.424	0.0	0.0	-0.004	-0.003
	7	7	96.836	96.806	-63.219	0.0	0.0	939.004	308.627
	8	8	97.500	97.500	-62.303	0.0	0.0	1108.970	-479.266
	9	9	96.395	96.395	-60.056	0.0	0.0	1068.001	351.029
	10	10	95.825	95.825	-53.079	0.0	0.0	1059.997	348.398
	12	11	96.000	96.000	-35.316	0.0	0.0	873.989	261.787
	11	12	97.887	97.887	-38.509	0.0	0.0	0.001	0.001
	13	13	95.767	95.767	-34.696	0.0	0.0	1108.966	364.470
	19	14	96.377	96.377	-43.951	0.0	0.0	0.002	-0.002
	14	15	98.389	98.389	-61.686	0.0	0.0	0.001	-0.001
	15	16	97.690	97.690	-49.680	0.0	0.0	267.997	88.085
	18	17	96.371	96.371	-42.181	0.0	0.0	152.998	50.290
	16	18	96.880	96.880	-45.398	0.0	0.0	0.002	0.002
	17	19	96.662	96.662	-43.319	0.0	0.0	291.999	95.971
	20	20	98.848	98.848	-67.218	0.0	0.0	737.001	242.238
	21	21	97.500	97.500	-73.365	0.0	0.0	1708.993	-27.802
	22	22	97.500	97.500	-71.539	0.0	0.0	1264.000	-315.937
	27	23	100.892	100.892	-16.961	0.0	0.0	461.000	151.521
	23	24	98.656	98.656	-54.745	0.0	0.0	-0.003	-0.004
	24	25	98.013	98.013	-54.414	0.0	0.0	324.998	106.488
	25	26	96.601	96.601	-26.010	0.0	0.0	500.002	164.343
	26	27	100.238	100.238	-18.306	0.0	0.0	283.997	93.339
	29	28	105.340	105.340	-4.133	0.0	0.0	0.000	-0.023
	30	29	105.648	105.648	-3.177	0.0	0.0	-0.001	0.011
	34	30	99.213	99.213	-20.723	0.0	0.0	-0.001	0.002
	33	31	99.714	99.714	-20.099	0.0	0.0	0.001	-0.001
	31	32	104.706	104.706	-21.210	0.0	0.0	-0.002	0.002
	32	33	105.212	105.212	-21.294	0.0	0.0	-0.001	-0.001
	53	34	104.691	104.691	-22.425	0.0	0.0	315.001	103.535
	54	35	104.895	104.895	-21.993	0.0	0.0	-0.001	0.001
	55	36	102.660	102.660	-18.184	0.0	0.0	0.0	0.0
	56	37	103.094	103.094	-25.239	0.0	0.0	0.001	-0.001
	75	38	105.411	105.411	-17.170	0.0	0.0	-0.000	-0.001
	57	39	105.583	105.583	-34.159	0.0	0.0	-0.000	-0.001
	58	40	105.156	105.156	-5.646	0.0	0.0	110.001	36.165
	60	41	106.623	106.623	-35.994	0.0	0.0	0.001	0.001
	61	42	104.707	104.707	-13.399	0.0	0.0	-0.000	0.002
	59	43	104.084	104.084	-7.525	0.0	0.0	182.000	59.821
	62	44	101.481	101.481	-11.290	0.0	0.0	0.001	-0.003
	63	45	100.666	100.666	-20.550	0.0	0.0	394.000	129.502

*** POWER FLOW ***

NODE	CODE	NO	VOLTAGE E(KV)	VOLTAGE |E|(%)	VOLTAGE ANGLE	GENERATOR P(%)	GENERATOR Q(%)	LOAD P(%)	LOAD Q(%)
	69	46	104.977	104.978	-6.108	0.0	0.0	213.006	70.102
	72	47	105.246	105.246	-0.134	0.0	0.0	630.001	207.066
	64	48	104.727	104.727	-4.246	0.0	0.0	0.000	0.002
	65	49	103.954	103.954	-36.246	0.0	0.0	0.0	0.0
	66	50	104.625	104.625	-8.228	0.0	0.0	-0.000	-0.000
	67	51	104.762	104.762	-38.922	0.0	0.0	0.0	0.0
	28	52	98.871	98.871	-18.805	0.0	0.0	-0.000	-0.002
	69	53	100.377	100.377	-10.634	0.0	0.0	-0.000	0.000
	70	54	102.380	102.380	-12.450	0.0	0.0	710.001	233.367
	71	55	105.213	105.213	-3.721	0.0	0.0	0.000	0.002
	73	56	105.424	105.424	5.591	0.0	0.0	-0.001	-0.002
	74	57	105.842	105.842	14.196	0.0	0.0	0.003	-0.001
	EARTH	58	2.428	2.428	-54.756	0.0	0.0	0.049	-43.183
BABAESKI	A	59	99.667	99.667	-54.915	540.000	260.000	-0.001	0.003
SOMA	B	60	99.578	99.678	-59.013	620.000	300.000	-0.002	0.002
ALIAGA	C	61	98.384	98.384	-65.027	240.000	116.000	-0.000	-0.001
SEKIK	D	62	99.505	99.505	-46.442	540.000	260.000	-0.001	0.001
YATAGAN	E	63	98.827	98.827	-45.993	590.000	280.000	-0.001	0.002
SEYITOMR	F	64	97.606	97.606	-34.598	570.000	270.000	0.001	0.001
GOKCEKAY	G	65	97.481	97.481	-34.726	278.000	130.000	0.0	0.000
BEYPAZAR	H	66	98.735	98.735	-29.998	570.000	270.000	-0.001	0.000
OYMAPINR	I	67	101.253	101.253	-9.727	540.000	260.000	0.0	0.0
AKKUYU	J	68	102.500	102.500	2.926	1420.000	338.177	-0.000	0.0
KAYRAKTP	K	69	102.000	102.000	4.821	420.000	70.859	-0.000	0.0
BURSA	L	70	97.959	97.959	-41.115	380.000	180.000	0.000	-0.000
BESKONAK	M	71	99.120	99.120	-13.731	200.000	90.000	0.000	0.002
ANBARLI	N	72	97.749	97.749	-54.205	570.000	270.000	-0.001	0.002
BOYABAT	O	73	102.000	102.000	-13.270	500.000	117.455	0.000	0.0
ALTINKAY	P	74	102.000	102.000	-15.538	500.000	114.625	-0.000	0.0
H.UGURLU	Q	75	102.000	102.000	-15.774	400.000	99.339	-0.001	0.0
KANGAL	R	76	102.000	102.000	-6.378	280.000	69.532	0.000	0.0
KEBAN	S	77	102.000	102.000	1.756	1400.000	291.457	0.000	0.0
KARAKAYA	T	78	101.500	101.500	6.186	1400.000	237.898	0.000	0.0
ELBISTAN	U	79	102.000	102.000	0.0	4403.355	1091.289	230.000	75.597
ATATURK	V	80	102.000	102.000	4.226	300.000	59.760	0.0	0.0
ILISU	W	81	100.500	100.500	20.942	1000.000	33.456	-0.001	0.0

*** LINE FLOW ***

BRANCH	FROM	TO	P ===>	Q ===>	I ===>	LOSS-P	LOSS-Q	<=== P	<=== Q	<=== I
1	1	2	11.203	48.683	0.4985	0.176	-59.066	-11.024	-107.169	1.1123
20	1	14	-29.202	-57.911	0.6548	0.064	-141.227	29.267	-83.316	0.8975
A	1	A	-540.001	-173.575	5.7270	0.001	86.423	540.000	259.998	6.0134
2	2	3	-373.639	22.177	3.8653	0.751	-10.497	374.390	-32.673	3.8803
6	2	7	101.658	-9.057	1.5177	0.070	-12.025	-146.580	-2.368	1.5144
N	2	N	-573.001	-170.912	6.1452	0.001	99.087	570.000	270.000	6.4524
3	3	4	-1477.324	243.579	15.4596	30.664	187.001	1507.988	-56.578	15.6673
8	3	8	307.084	-164.935	3.5991	0.445	-8.929	-306.638	156.007	3.5286
4	4	5	472.354	13.545	1.7743	0.418	-24.463	-169.946	-38.008	1.8192
5	4	6	-1459.435	24.337	15.2477	34.506	199.694	1502.941	175.356	15.1129
12	4	12	-1134.326	127.429	11.8200	18.654	29.047	1149.980	-98.382	12.0227
R4	4	EARTH	-3.653	-180.913	1.8783	0.000	-176.400	0.660	4.513	1.8783
R5	5	EARTH	-3.054	-17.866	0.1866	0.000	-17.416	0.054	0.450	0.1866
51	6	51	-486.466	-100.787	4.9619	7.446	-1.454	493.912	99.333	4.8116
53	6	52	-391.595	-145.922	4.1567	4.600	-77.152	396.195	63.770	3.8142
56	6	55	-1386.598	-70.810	10.8558	17.060	-40.618	1101.658	30.192	10.7351
7	7	3	-793.815	59.307	8.2229	2.032	13.315	795.847	-45.991	8.2310
R7	7	EARTH	1.384	-365.552	3.7762	0.000	-356.487	-1.384	9.065	3.7762
9	8	9	-832.347	323.286	8.8721	3.606	-4.420	805.952	-327.706	9.0257
10	9	10	-1267.533	226.604	13.1573	15.769	76.274	1263.299	-152.330	13.2789
17	9	19	-627.295	116.448	6.6076	17.960	93.084	645.255	-17.364	6.6976
R9	9	EARTH	0.865	-362.356	3.7591	0.000	-353.269	-0.865	9.088	3.7591
11	10	4	-655.963	53.257	6.8679	7.110	40.337	663.070	-12.920	6.8855
14	10	11	-815.477	85.236	8.5668	20.742	146.847	837.219	61.611	8.5760
18	10	19	-573.289	73.471	7.1198	10.739	61.672	689.028	-11.799	7.1504
R10	10	EARTH	-3.272	-357.990	3.7359	0.000	-348.921	0.272	9.069	3.7359
13	12	6	-455.669	-156.005	5.0170	4.054	-18.824	459.723	137.181	4.7917
16	12	13	-463.163	125.740	4.7682	0.456	-14.342	460.598	-140.082	4.8267
58	12	75	-616.319	-111.819	6.5043	16.011	33.567	630.331	145.386	6.1368
69	12	64	-1238.113	170.905	12.7098	54.276	550.617	1262.390	379.713	12.5876
15	11	12	-257.223	110.866	2.9555	1.670	-24.754	268.890	-135.620	3.1370
H	11	H	-573.303	-172.475	6.0838	0.000	97.527	570.301	270.002	6.3880
63	13	62	-1332.468	79.456	13.6228	56.087	257.831	1358.555	178.375	13.5022
68	13	68	-665.431	-18.553	6.7514	26.069	90.176	672.500	108.729	6.4893
R13	13	EARTH	-1.995	-223.915	2.3277	0.000	-218.600	1.995	5.315	2.3377
19	19	12	-419.093	48.477	4.3775	6.297	-8.204	425.387	-56.681	4.4703
25	19	13	-396.987	46.895	4.1272	6.338	-14.417	401.325	-61.312	4.2384
G	19	G	-278.303	-78.657	2.9583	0.000	51.143	278.000	130.000	3.1482
21	14	15	-722.422	165.558	7.5328	15.045	95.495	737.468	-70.063	7.6299
29	14	20	693.155	-82.257	7.0944	6.513	36.787	-686.642	119.024	7.0500
22	15	10	173.333	-9.610	1.7881	1.042	-59.629	-172.296	-50.019	1.8723
23	15	18	-465.036	69.775	4.6499	5.759	0.970	451.795	-68.805	4.7421
26	15	16	-352.769	35.421	3.6527	2.576	-16.450	355.345	-52.871	3.7083
L	15	L	-380.303	-114.594	4.0880	0.001	65.406	380.000	180.000	4.2924
24	18	19	242.976	-38.048	2.5520	0.770	-25.385	-242.204	12.663	2.5165

*** LINE FLOW ***

BRANCH	FROM	TO	P --->	Q --->	I --->	LOSS-P	LOSS-Q	<--- P	<--- Q	<--- I
71	18	66	-1001.658	156.491	10.5199	48.056	441.897	1049.714	285.406	10.3973
R18	18	EARTH	-0.255	-45.295	0.4700	0.000	-44.182	0.255	1.113	0.4700
27	16	17	-353.346	52.873	3.7083	1.248	-7.405	356.594	-60.278	3.7414
28	17	18	-153.821	24.835	1.6119	0.327	-29.799	154.148	-54.634	1.6970
33	17	27	-650.663	64.258	6.7875	30.690	159.419	681.350	75.161	6.7942
F	17	F	-569.999	-170.205	6.1541	0.000	99.794	569.999	269.999	6.4618
30	20	21	568.695	26.350	5.7585	5.997	19.889	-562.608	-6.460	5.7707
R20	20	EARTH	1.036	-190.732	1.9296	0.000	-186.162	-1.036	4.570	1.9296
B	20	B	-620.002	-196.865	6.5809	0.001	103.133	620.002	299.998	6.9099
31	21	22	-269.002	18.777	2.7739	0.854	-16.008	270.656	-34.785	2.7988
34	21	23	-636.583	90.992	6.5954	20.624	102.633	657.708	11.641	6.6627
C	21	C	-240.000	-75.480	2.5804	0.000	40.521	240.000	116.001	2.7094
32	22	17	-690.867	189.326	7.3473	35.000	214.761	725.888	25.435	7.5142
35	22	24	-843.767	161.419	8.8109	25.278	185.078	869.044	23.659	8.8699
40	27	29	-1168.412	-144.082	11.6685	20.117	-21.628	1188.529	122.454	11.3425
C-28	27	28	-154.382	-100.509	1.8259	0.000	-6.934	154.382	93.574	1.8259
36	23	24	-117.202	157.677	1.9914	0.167	-7.950	117.369	-165.628	2.0711
D	23	D	-540.002	-169.304	5.7363	0.000	90.696	540.002	260.000	6.0231
37	24	25	-721.426	215.504	7.6721	36.793	242.466	757.219	26.961	7.8436
E	24	E	-590.002	-179.999	6.2935	0.001	100.001	590.001	280.000	6.6062
38	25	26	-588.075	-84.618	6.1504	8.238	33.147	596.312	117.765	6.0638
45	25	34	-659.166	-106.682	7.0144	6.454	35.513	675.599	142.195	6.9588
39	26	27	-180.010	-45.032	1.8512	0.431	-27.117	180.441	17.915	1.7972
41	26	29	-638.233	-67.154	6.4020	12.567	18.804	650.770	85.961	6.2314
I	26	I	-540.002	-166.455	5.6373	0.0	93.546	540.000	260.001	5.9192
42	29	30	-419.301	-50.772	4.0095	0.700	-39.199	420.001	11.574	3.9770
J	29	J	-1420.002	-157.662	13.5629	0.000	180.501	1420.000	338.163	14.2411
K	30	K	-420.002	-11.572	3.9770	0.000	59.288	420.000	70.859	4.1758
46	34	26	-675.861	-67.396	4.8440	2.054	0.118	677.895	67.514	4.8149
47	34	33	-199.749	-74.784	2.1498	0.248	-10.342	199.997	64.442	2.1072
M	33	M	-200.002	-64.443	2.1073	0.000	25.555	200.000	89.998	2.2126
52	51	52	5.089	-53.127	0.5107	0.015	-45.673	-5.074	7.454	0.0914
O	51	O	-500.000	-46.208	4.7956	0.000	71.248	500.000	117.456	5.0354
54	52	53	109.882	-8.429	1.0475	0.222	-49.302	-109.661	-40.873	1.1179
P	52	P	-500.001	-62.777	4.7896	0.0	51.848	500.001	114.625	5.0291
55	53	54	-399.719	-72.863	3.8809	0.302	-18.560	400.011	54.303	3.8484
O	54	O	-400.001	-54.277	3.8483	0.000	45.062	400.000	99.339	4.0407
C-55	55	56	-1101.658	-30.194	10.7351	0.000	-135.987	1101.657	-105.793	10.7351
57	56	53	-193.378	-70.184	1.9955	0.982	-59.992	194.361	10.193	1.8591
C-57	56	57	-694.508	51.441	6.7551	0.0	-110.885	694.508	-162.326	6.7551
C-60	56	60	-844.106	70.281	8.2161	0.0	-164.035	844.106	-234.316	8.2161
C-56	75	56	-630.331	-145.387	6.1368	0.0	-91.137	630.331	54.250	6.1368
59	57	58	-694.508	162.326	6.7551	35.944	171.865	730.451	9.539	6.9469
62	58	59	182.633	14.982	1.7426	0.634	-44.837	-182.000	-59.819	1.8406
67	58	72	-1179.193	113.518	11.2656	10.884	21.926	1190.074	-91.592	11.3410

*** LINE FLOW ***

BRANCH	FROM	TO	P ===>	Q ===>	I ===>	LOSS-P	LOSS-Q	<=== P	<=== Q	<===== I
S	58	S	-1400.000	-106.689	13.3521	0.000	184.762	1400.000	291.451	14.0198
60	60	61	-806.138	234.314	8.2161	34.150	218.695	878.258	-15.619	8.3891
61	61	5A	-598.257	49.627	5.7332	8.045	18.467	606.302	-31.160	5.7733
R	61	R	-280.000	-34.011	2.6938	0.0	35.521	280.000	69.532	2.8285
C-62	62	63	-1358.554	-176.373	13.5023	0.0	-220.596	1358.558	-42.223	13.5023
64	63	5A	-901.744	-101.249	9.0142	24.173	-91.824	925.917	9.471	8.8056
65	63	6A	-853.812	14.017	8.4530	21.506	144.911	872.318	130.894	8.4026
66	6A	5A	-23.867	-50.913	0.5356	0.019	-96.726	23.886	-45.813	0.4913
73	6A	72	-295.560	-41.570	2.8492	2.356	-114.095	297.915	-72.524	2.9133
U	6A	U	-4173.355	-554.636	40.1043	0.0	461.055	4173.355	1015.692	42.1096
77	72	73	-973.682	99.711	9.3185	9.617	40.223	985.269	-59.488	9.3628
T	72	T	-1400.000	-81.296	13.3746	0.0	156.596	1400.000	237.892	13.9908
C-65	64	65	-1252.391	-379.713	12.5876	0.000	-724.101	1262.391	-344.389	12.5876
70	65	6A	-1262.389	344.342	12.5876	54.106	536.624	1316.495	192.232	12.6737
C-66	66	67	-1059.714	-285.406	10.3973	0.000	-576.199	1049.714	-290.792	10.3973
72	67	6A	-1059.712	290.794	10.3973	48.100	425.952	1097.812	135.158	10.5365
74	28	69	-136.381	-93.575	1.8259	2.179	-187.757	156.562	-94.182	1.8202
C-70	69	70	-136.561	94.182	1.8202	0.000	-6.891	156.561	-101.074	1.8202
75	70	71	-569.483	-64.278	5.4637	6.916	-23.261	556.399	41.017	5.3027
79	70	6A	-317.074	-68.316	3.1675	3.566	-58.124	320.644	9.892	3.0559
76	71	72	-296.399	-23.622	2.4473	1.261	-84.964	257.660	-61.342	2.5166
V	71	V	-300.000	-17.397	2.8562	0.0	42.362	300.000	59.760	2.9990
78	73	74	-985.273	59.493	9.3628	14.729	-24.996	999.999	-84.490	9.4817
W	74	W	-1000.001	84.493	9.4817	0.000	117.952	1000.001	33.459	9.9558

TOTAL LOSS 931.330 1944.514

ITERATION 7 MUMIN= 7.69116-01 IT= 1

TURKEY 1993 LOAD FLOW NAME=TURK93-A

GENERATOR TYPE DATA

NO.	GTYPE	XL(%)	KD''(%)	TA	TDO''	TQO''
1	TH1	18.000	0.0	0.400	0.050	0.070
2	NU1	22.000	0.0	0.300	0.041	0.060
3	XXX	14.000	0.0	0.200	0.041	0.100

TURKEY 1993 LOAD PLAN

GENERATOR CONSTANT DATA

GEN	GMVA(MVA)	XP(%)	XD"(%)	X2(%)	XO(%)	PDM(%-S)	PDD(%-S)
A	670.00	0.0	25.00	155.00	155.00	5360.00	0.0
B	740.00	0.0	25.00	155.00	155.00	5920.00	0.0
C	290.00	0.0	25.00	155.00	155.00	2320.00	0.0
D	640.00	0.0	25.00	155.00	155.00	5120.00	0.0
E	700.00	0.0	25.00	155.00	155.00	5600.00	0.0
F	670.00	0.0	25.00	155.00	155.00	5360.00	0.0
H	670.00	0.0	25.00	155.00	155.00	5360.00	0.0
L	450.00	0.0	25.00	155.00	155.00	3600.00	0.0
R	360.00	0.0	25.00	155.00	155.00	2880.00	0.0
U	6200.00	0.0	25.00	155.00	155.00	49600.00	0.0
N	670.00	0.0	25.00	155.00	155.00	5360.00	0.0
G	310.00	0.0	30.00	90.00	100.00	2108.00	0.0
I	600.00	0.0	30.00	90.00	100.00	4080.00	0.0
K	470.00	0.0	30.00	90.00	100.00	3196.00	0.0
M	230.00	0.0	30.00	90.00	100.00	1564.00	0.0
O	570.00	0.0	30.00	90.00	100.00	3876.00	0.0
P	780.00	0.0	30.00	90.00	100.00	5304.00	0.0
Q	580.00	0.0	30.00	90.00	100.00	3944.00	0.0
S	1700.00	0.0	30.00	90.00	100.00	11560.00	0.0
T	2000.00	0.0	30.00	90.00	100.00	13600.00	0.0
V	340.00	0.0	30.00	90.00	100.00	2312.00	0.0
W	1340.00	0.0	30.00	90.00	100.00	9112.00	0.0
J	1800.00	0.0	30.00	170.00	170.00	15300.00	0.0

GENERATOR CONSTANT DATA(2)

GEN	XD**(%)	XQ**(%)	XL(%)	TDO**(S)	TQO**(S)	TA(S)	GM(S)	GD(S)	GPF(P.U)	AVR	PSS	GOV
A	20.00	20.00	15.00	3.05	0.07	0.40	8.00	0.0	0.0	(0) 0	(0) 0	(0)
B	20.00	20.00	15.00	3.05	0.07	0.40	8.00	0.0	0.0	(0) 0	(0) 0	(0)
C	20.00	20.00	18.00	3.05	0.07	0.40	8.00	0.0	0.0	(0) 0	(0) 0	(0)
D	20.00	20.00	18.00	3.05	0.07	0.40	8.00	0.0	0.0	(0) 0	(0) 0	(0)
E	20.00	20.00	18.00	3.05	0.07	0.40	8.00	0.0	0.0	(0) 0	(0) 0	(0)
F	20.00	20.00	18.00	3.05	0.07	0.40	8.00	0.0	0.0	(0) 0	(0) 0	(0)
H	20.00	20.00	18.00	3.05	0.07	0.40	8.00	0.0	0.0	(0) 0	(0) 0	(0)
L	20.00	20.00	18.00	3.05	0.07	0.40	8.00	0.0	0.0	(0) 0	(0) 0	(0)
R	20.00	20.00	18.00	3.05	0.07	0.40	8.00	0.0	0.0	(0) 0	(0) 0	(0)
U	20.00	20.00	18.00	3.05	0.07	0.40	8.00	0.0	0.0	(0) 0	(0) 0	(0)
N	20.00	20.00	18.00	3.05	0.07	0.40	8.00	0.0	0.0	(0) 0	(0) 0	(0)
G	22.00	22.00	16.00	3.04	0.10	0.20	6.80	0.0	0.0	(0) 0	(0) 0	(0)
I	22.00	22.00	16.00	3.04	0.10	0.20	6.80	0.0	0.0	(0) 0	(0) 0	(0)
K	22.00	22.00	16.00	3.04	0.10	0.20	6.80	0.0	0.0	(0) 0	(0) 0	(0)
M	22.00	22.00	16.00	3.04	0.10	0.20	6.80	0.0	0.0	(0) 0	(0) 0	(0)
O	22.00	22.00	16.00	3.04	0.10	0.20	6.80	0.0	0.0	(0) 0	(0) 0	(0)
P	22.00	22.00	16.00	3.04	0.10	0.20	6.80	0.0	0.0	(0) 0	(0) 0	(0)
Q	22.00	22.00	16.00	3.04	0.10	0.20	6.80	0.0	0.0	(0) 0	(0) 0	(0)
S	22.00	22.00	16.00	3.04	0.10	0.20	6.80	0.0	0.0	(0) 0	(0) 0	(0)
T	22.00	22.00	16.00	3.04	0.10	0.20	6.80	0.0	0.0	(0) 0	(0) 0	(0)
V	22.00	22.00	16.00	3.04	0.10	0.20	6.80	0.0	0.0	(0) 0	(0) 0	(0)
W	22.00	22.00	16.00	3.04	0.10	0.20	6.80	0.0	0.0	(0) 0	(0) 0	(0)
J	25.00	25.00	22.00	3.04	0.06	0.30	8.50	0.0	0.0	(0) 0	(0) 0	(0)

GENERATOR = 23 FREQUENCY = 50.0 DELT = 0.010 DK = 1.00 DKD = 0.0 ICASE = 3

JICA