Queensland Government
Department of Main Roads

ENGINEERING BOREHOLE LOG

FOR GEOTECHNICAL TERMS AND SYMBOLS REFER FORM F:GEOT 017/5-2009

BOREHOLE No BH022
SHEET 1 of 3
REFERENCE No H10577

PROJECT BRUCE HIGHWAY (COOROY - CURRA) SECTION A GEOTECHNICAL INVESTIGATION
LOCATION Cut 11 COORDINATES 486097.3 E; 7080803.0 N
PROJECT No FG5825 SURFACE R.L. 171.20m PLUNGE ____ DATE STARTED 15/7/09 GRID DATUM MGA94
JOB No 128/10A/901 HEIGHT DATUM AHD BEARING ____ DATE COMPLETED 15/7/09 DRILLER R & D Drilling

DEPTH (m)	R.L. (m)	AUGER / CASING / WASH BORING / CORE DRILLING	RQD ( )% CORE REC %	SAMPLE	MATERIAL DESCRIPTION	LITHOLOGY	USC	WEATHERING	INTACT STRENGTH (EH VH H M L VL EL)	DEFECT SPACING (mm) (20 60 200 600 2000)	GRAPHIC LOG	ADDITIONAL DATA AND TEST RESULTS	SAMPLES TESTS
0	171.20				**Clayey SILT (Residual)** Mottled red to pale grey, moist, stiff.								
				A	Iron cemented bands and nodules throughout; traces of organics.		(ML)					2,5,7 N=12	SPT
1	169.70			B	**PHYLLITE (XW):** Pale grey to mottled red, moist, very stiff.							4,7,11 N=18	SPT
2					Rock fabric visible throughout.		XW						
	168.52		(0)		**PHYLLITE (HW):** Mottled red to grey, fine grained, foliated.		HW					Is(50) = 0.07MPa Is(50) = 0.21MPa	x o
3	168.04				Foliation dips at 30°.								
			100		**PHYLLITE (MW):** Light grey to mottled brown and red, fine grained, Foliated.							Is(50) = 0.03MPa Is(50) = 0.12MPa	o x
4			(34)		Foliations dip at 30°.		MW						
					Defects are generally close to medium spaced.								
	166.40				Prominent defect set dipping parallel to foliation with another set at 70°.							Is(50) = 0.47MPa Is(50) = 0.63MPa	x o
5					Defect surfaces are typically clay infilled or iron stained.								
			100		**PHYLLITE (MW - SW):** Pale grey with minor dark grey mottling, fine grained, foliated.							Is(50) = 1.25MPa	o
			(77)		Foliation dips at 30°.							Is(50) = 3.06MPa Is(50) = 0.50MPa	o x
6					Defects are generally close to medium spaced.								
					Prominent defect set dipping parallel to foliation with another set dipping at 45°.							Is(50) = 0.21MPa Is(50) = 0.94MPa	x o
7					Defect surfaces are typically thinly clay coated or have minor iron staining.		MW-SW						
					Detailed defect descriptions are shown on Form GEOT533/8 attached.								
8													
			100									Is(50) = 0.06MPa Is(50) = 0.17MPa	x o
			(7)										
9													
												Broken zone	
10													

REMARKS **Detailed defect descriptions are shown on Form GEOT533/8 attached.** RAAX images taken of borehole.

LOGGED BY JA

QLD_DMR_LIB_01.GLB Log A_ENGINEERING BOREHOLE LOG W LITHOLOGY FG5825 BRUCE HWY COOROY-CURRA SECTION A BHS.GPJ DWG95012.GDW Datgel CPT Tool gINt Add-In 12/05/2010 10:29

Queensland Government
Department of Main Roads

ENGINEERING BOREHOLE LOG

FOR GEOTECHNICAL TERMS AND SYMBOLS REFER FORM F:GEOT 017/5-2009

BOREHOLE No BH022
SHEET 2 of 3
REFERENCE No H10577

PROJECT BRUCE HIGHWAY (COOROY - CURRA) SECTION A GEOTECHNICAL INVESTIGATION
LOCATION Cut 11 COORDINATES 486097.3 E; 7080803.0 N
PROJECT No FG5825 SURFACE R.L. 171.20m PLUNGE DATE STARTED 15/7/09 GRID DATUM MGA94
JOB No 128/10A/901 HEIGHT DATUM AHD BEARING DATE COMPLETED 15/7/09 DRILLER R & D Drilling

DEPTH (m)	R.L. (m)	AUGER / CASING / WASH BORING / CORE DRILLING	RQD ( )% CORE REC %	SAMPLE	MATERIAL DESCRIPTION	LITHOLOGY	USC	WEATHERING	INTACT STRENGTH (EH VH H M L VL EL)	DEFECT SPACING (mm) (20 60 200 600 2000)	GRAPHIC LOG	ADDITIONAL DATA AND TEST RESULTS	SAMPLES	TESTS
10	161.20				**PHYLLITE (MW - SW):** (Cont'd)									
11			100 (31)		10.8 - 11.0m: Clayey broken zone.							Clayey broken zone		
												Is(50) = 0.12MPa		x
												Is(50) = 0.45MPa		o
12					**Detailed defect descriptions are shown on Form GEOT533/8 attached.**									
13												Is(50) = 0.18MPa		o
												Is(50) = 0.19MPa		x
			100 (22)											
14	157.00				14.0 - 14.2m: Clayey broken zone.							Clayey broken zone		
15							MW-SW							
												Is(50) = 0.29MPa		o
												Is(50) = 0.55MPa		x
												Is(50) = 1.09MPa		o
16														
												Is(50) = 0.20MPa		x
17			100 (12)									Broken zone		
												Is(50) = 1.92MPa		o
												Broken zone with quartz veining		
18														
												Is(50) = 1.51MPa		o
												Is(50) = 0.80MPa		x
19			100 (35)									Broken zone with quartz veining		
												Broken zone		
20												Is(50) = 0.25MPa		x

REMARKS **Detailed defect descriptions are shown on Form GEOT533/8 attached.** RAAX images taken of borehole.

LOGGED BY JA

QLD_DMR_LIB_01.GLB Log A_ENGINEERING BOREHOLE LOG W LITHOLOGY FG5825 BRUCE HWY COOROY-CURRA SECTION A BHS.GPJ DWG95012.GDW Datgel CPT Tool gINt Add-In 12/05/2010 10:29

Queensland Government
Department of Main Roads

ENGINEERING BOREHOLE LOG

FOR GEOTECHNICAL TERMS AND SYMBOLS REFER FORM F:GEOT 017/5-2009

BOREHOLE No BH022
SHEET 3 of 3
REFERENCE No H10577

PROJECT BRUCE HIGHWAY (COOROY - CURRA) SECTION A GEOTECHNICAL INVESTIGATION
LOCATION Cut 11 COORDINATES 486097.3 E; 7080803.0 N
PROJECT No FG5825 SURFACE R.L. 171.20m PLUNGE DATE STARTED 15/7/09 GRID DATUM MGA94
JOB No 128/10A/901 HEIGHT DATUM AHD BEARING DATE COMPLETED 15/7/09 DRILLER R & D Drilling

DEPTH (m)	R.L. (m)	AUGER / CASING / WASH BORING / CORE DRILLING	RQD ( )% CORE REC %	SAMPLE	MATERIAL DESCRIPTION	LITHOLOGY	USC	WEATHERING	INTACT STRENGTH (EH VH H M L VL EL)	DEFECT SPACING (mm) (20 60 200 600 2000)	GRAPHIC LOG	ADDITIONAL DATA AND TEST RESULTS	SAMPLES	TESTS
20	151.20				**PHYLLITE (MW - SW):** (Cont'd)							Is(50) = 0.97MPa		o
					20.10 - 20.35m: Clayey broken zone.							Clayey broken zone		
			100 (38)									Is(50) = 0.66MPa		x
21												Is(50) = 0.80MPa		o
22					**Detailed defect descriptions are shown on Form GEOT533/8 attached.**		MW-SW							
												Clayey broken zone		
23												Is(50) = 1.33MPa		o
												Is(50) = 0.50MPa		x
			100 (11)											
24												Clayey broken zone		
	146.70		100											
					Borehole terminated at 24.5m									
25														
26														
27														
28														
29														
30														

REMARKS **Detailed defect descriptions are shown on Form GEOT533/8 attached.** RAAX images taken of borehole.

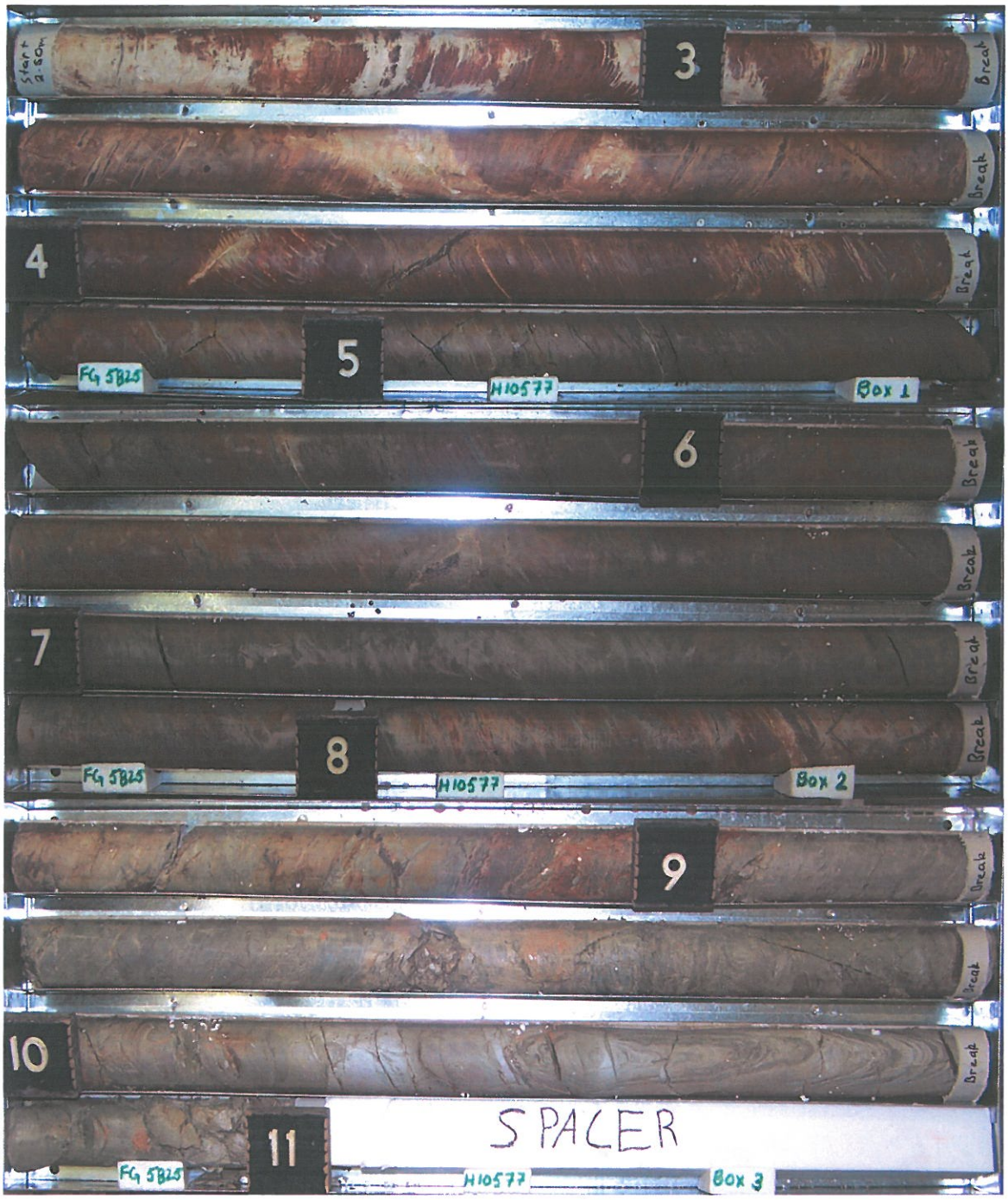
LOGGED BY JA

QLD_DMR_LIB_01.GLB Log A_ENGINEERING BOREHOLE LOG W LITHOLOGY FG5825 BRUCE HWY COOROY-CURRA SECTION A BHS.GPJ DWG95012.GDW Datgel CPT Tool gINt Add-In 12/05/2010 10:29

Project: **Bruce Highway Upgrade (Cooroy – Curra) Section A**

Borehole No: **BH22**

Start Depth: 2.50m
Finish Depth: 24.50m
Project No: FG5825
H No: 10577



0 100 200 300 400 500 600mm

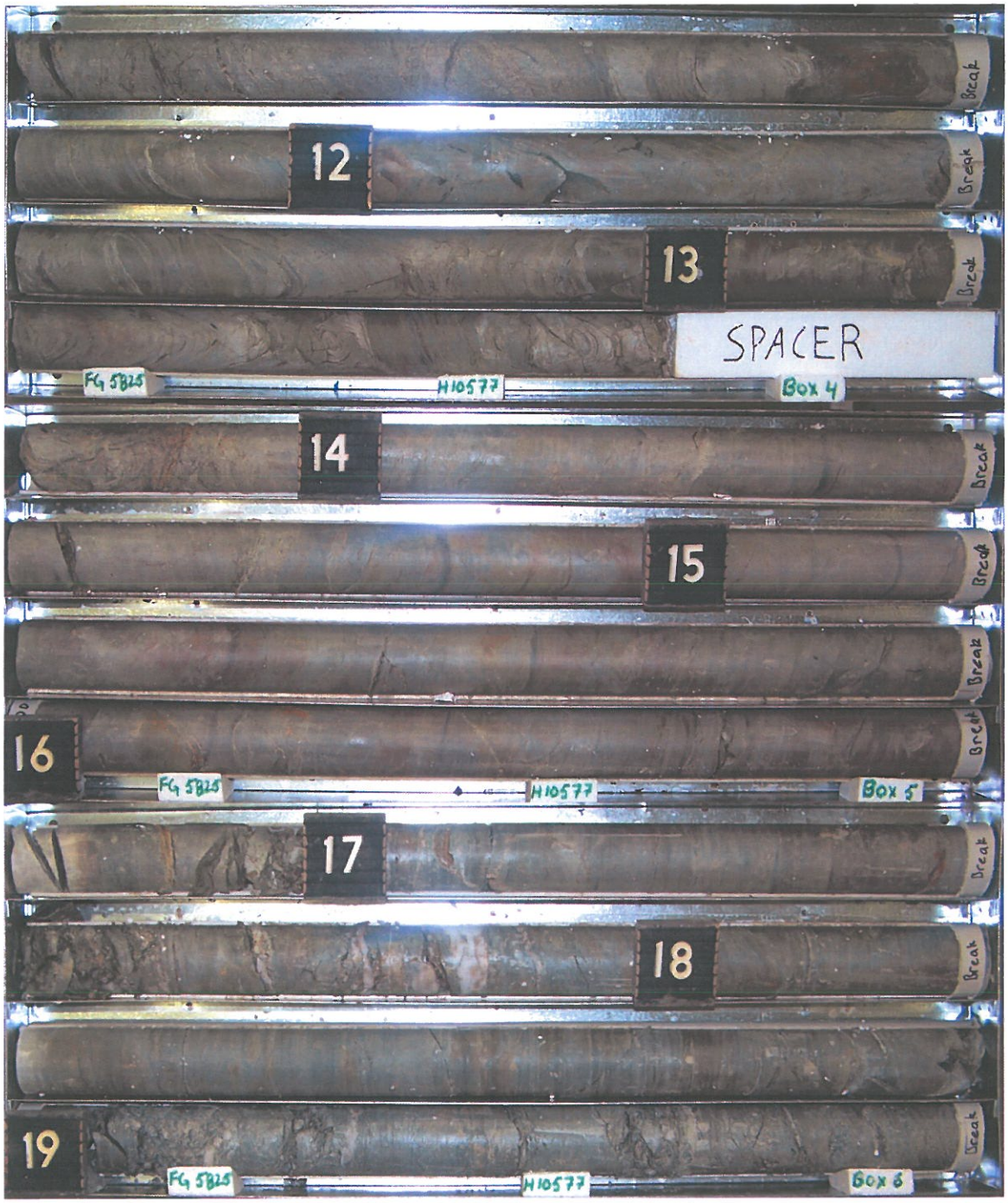
SCALE 1:5

F:GEOT043/1

Project: **Bruce Highway Upgrade (Cooroy – Curra) Section A**

Borehole No: **BH22**

Start Depth: 2.50m
Finish Depth: 24.50m
Project No: FG5825
H No: 10577



0 100 200 300 400 500 600mm

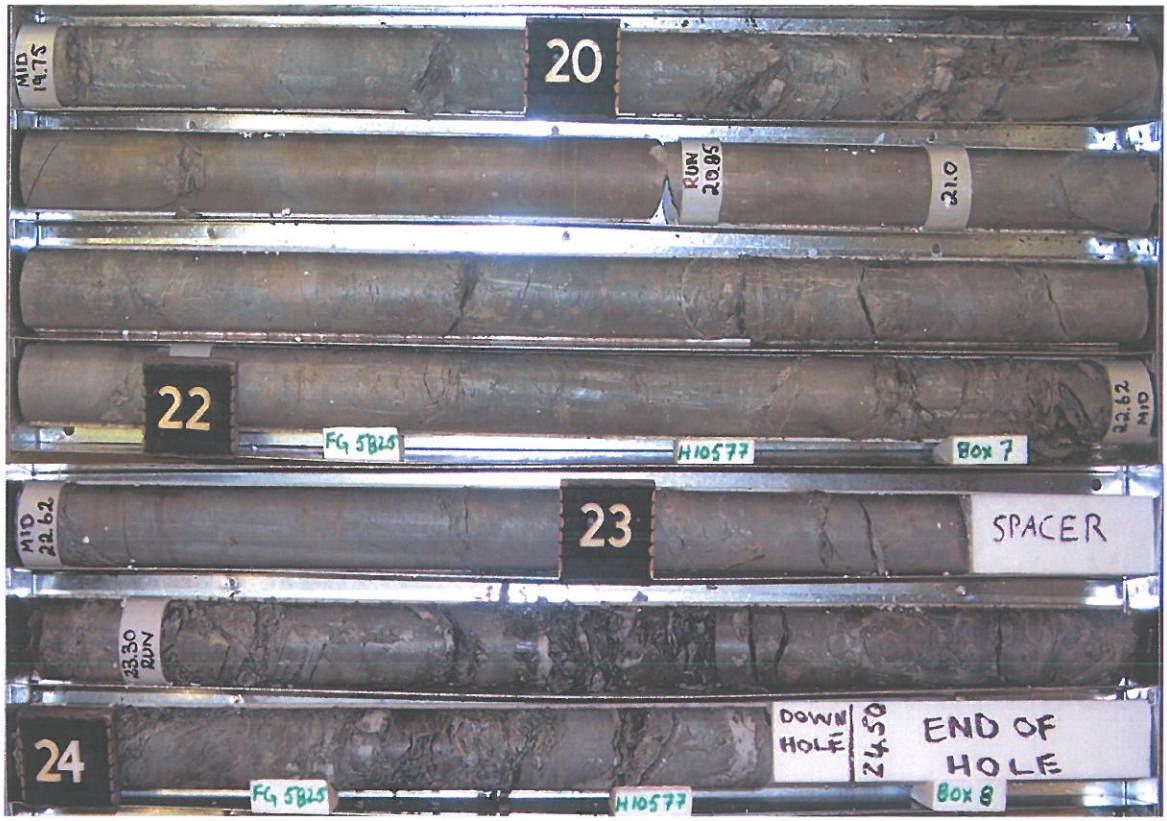
SCALE 1:5

F:GEOT043/1

Project: **Bruce Highway Upgrade (Cooroy – Curra) Section A**

Borehole No: **BH22**

Start Depth: 2.50m
Finish Depth: 24.50m
Project No: FG5825
H No: 10577



0 100 200 300 400 500 600mm

SCALE 1:5

F:GEOT043/1

GEOTECHNICAL BRANCH LABORATORY
Materials Services - Brisbane
35 Butterfield Street, HERSTON Q 4006
Phone: (07) 3115 3035 Fax: (07) 3115 3011

Queensland Government
Department of Main Roads

DEFECT DESCRIPTIONS OF ENGINEERING BORELOGS

[CHARACTERISATION OF DEFECTS ARE IN ACCORDANCE WITH ISRM SUGGESTED METHODS (1981)]

BOREHOLE NO.:	BH22
SHEET:	1 of 6
REFERENCE NO.:	H10577

PROJECT: Bruce Highway (Cooroy – Curra) Section A Geotechnical Investigation

LOCATION: Cut 11

PROJECT NO.:	FG5825	**SURFACE R.L.:**	171.2	**DRILLER:**	R & D Drilling
JOB NO.:	128/10A/901	**DATUM:**	MGA94	**DATE DRILLED:**	15/07/09

DEPTH	DEFECT TYPE	DIP°	PLANARITY	ROUGHNESS	APERTURE	WALL ALTERATION	OTHER
2.65	J	10°	Pl	S	O		
2.77	J	10°	Pl	S	O		
2.80	J	15°	Pl	S	O		
2.90	J	20°	Pl	S	O		
3.03	J	15°	Pl	R	O		
3.16	J	15°	Pl	S	O		
3.20	J	15°	Pl	S	O		
3.34	J	35°	Pl	S	C		
3.48	J	25°	Pl	S	C		
3.57	J	15°	Pl	S	C		
3.65	J	15°	Pl	S	O		
3.67	J	15°	Pl	S	O		
3.74	J	30°	Pl	S	O		
3.80	J	30°	Pl	S	O		
3.90	J	25°	Pl	S	O		
3.92	J	50°	Pl	S	O		Cn
4.03	J	20°	Pl	S	O		
4.14	J	50°	Pl	S	C		Cn

Abbreviations *(as per F: GEOT 017/5 – 2009)*

ROUGHNESS		WALL ALTERATIONS		TYPE		OTHER	
R	Rough	FeSt	Iron Stained	J, Js	Joint, Joints	Cln	Clay Infill
Sr	Slightly Rough	W	Weathered	B	Bedding	CLy	Clayey
S	Smooth	Smn	Secondary Mineralisation	BP	Bedding Parting	Co	Coal Seam
SL	Slickensided	Cn	Clean	FP	Foliation Parting	Carb	Carbonaceous
PO	Polished	MnSt	Manganese Stained	LP	Lamination Parting	Sl	Sand Infill
PLANARITY		**APERTURE**		CLV	Cleavage	QZ	Quartz
Pl	Planar	C	Closed	Fr	Fracture	CA	Calcite
St	Stepped	O	Open	SZ	Sheared Zone	Chl	Chlorite
Un	Undulating	F	Filled	CZ	Crushed Zone	In	Incipient
Cu	Curved	T	Tight	BZ	Broken Zone	Int	Intersecting
Ir	Irregular			HFZ	Highly Fractured Zone	Lam (s)	Lamination (s)
				WS	Weathered Seam	Di	Drilling Induced
				Vn	Vein	H	Horizontal
						V	Vertical

NOTE: This sheet should be read in conjunction with appropriate Engineering Borelog. Defect angles were measured with respect to horizontal plane.

BOREHOLE NO.:	BH22
SHEET:	2 of 6
REFERENCE NO.:	H10577

DEPTH	DEFECT TYPE	DIP°	PLANARITY	ROUGHNESS	APERTURE	WALL ALTERATION	OTHER
4.18	J	35°	Pl	S	O		
4.21	J	30°	Pl	S	O		
4.27	J	30°	Un	R	O		
4.40	J	25°	Pl	S	O		
4.56	J	10°	Pl	R	O		Cn
4.65	J	20°	Pl	S	O		
4.70	J	15°	Pl	S	O		
4.72	J	10°	Pl	S	C		Cn
4.88	J	50°	Pl	R	O	FeSt	
4.93	J	25°	Pl	R	O		
5.02	J	35°	Pl	S	O		
5.10	J	30°	Pl	R	O	FeSt	
5.13	J	50°	Pl	R	C	FeSt	
5.18	J	20°	St	R	O	FeSt	
5.22	J	25°	Pl	S	C		
5.27	J	10°	Pl	S	T		
5.31	J	25°	Pl	S	T		
5.37	J	20°	Pl	S	T		
5.55	J	20°	St	S	O		
5.70	J	15°	Pl	S	T		
5.87	J	20°	St	S	O		
6.01	J	50°	Pl	S	C		
6.02	J	25°	Pl	R	T		
6.06	J	20°	Un	R	O		
6.60	J	15°	Pl	R	O		
6.97	J	45°	Pl	S	T		Cn
7.11	J	15°	Pl	S	O		
7.14	J	15°	Pl	S	O		
7.41	J	35°	Pl	S	O		
7.50	J	25°	Pl	S	O		
7.69	J	20°	Pl	R	O		
7.81	J	25°	Pl	S	T		
7.92	J	25°	Pl	S	O		
8.17	J	20°	Pl	S	O		
8.30	J	20°	Pl	S	O		
8.34	J	15°	Ir	R	O		Cn
8.60	J	20°	Pl	R	O		
8.63	J	20°	Pl	S	O		
8.75	J	25°	Pl	S	O		
8.84	J	10°	Pl	S	O		
9.03	J	15°	Ir	R	T		
9.13	J	15°	Ir	R	O		
9.48	J	20°	Pl	R	O		
9.60	J	25°	Pl	R	C		Cn
9.69	J	25°	Pl	R	C		
9.86	J	65°	Pl	R	C		Cn
10.06	J	15°	Pl	S	O		
10.08	J	20°	Pl	S	T		
10.13	J	30°	St	S	O		
10.18	J	35°	Pl	S	T		
10.25	J	20°	Pl	S	T		
10.34	J	30°	St	R	C		Cn
10.40	J	80°	Pl	S	T		
10.43	J	15°	St	R	O		
10.61	J	5°	Pl	R	T		
10.62	J	70°	Pl	S	C		
10.78	J	35°	Pl	S	O		

BOREHOLE NO.:	BH22
SHEET:	3 of 6
REFERENCE NO.:	H10577

DEPTH	DEFECT TYPE	DIP°	PLANARITY	ROUGHNESS	APERTURE	WALL ALTERATION	OTHER
10.85	J	20°	Pl	R	T		
10.88	J	25°	St	R	O		
10.96	J	15°	St	R	O		
11.03	J	15°	Pl	R	O		
11.06	J	15°	Pl	R	O		
11.12	J	10°	Pl	S	T		
11.14	J	15°	Pl	S	O		
11.26	J	20°	Pl	R	T		
11.31	J	10°	Pl	R	C		
11.35	J	5°	Pl	R	O		
11.53	J	10°	Pl	R	O		
11.58	J	15°	Pl	R	T		
11.80	J	15°	Pl	S	O		
11.86	J	15°	Pl	R	C		
11.98	J	45°	Pl	S	C		
12.18	J	50°	Pl	S	O		
12.32	J	30°	Pl	S	O		
12.37	J	40°	Pl	R	O		
12.40	J	50°	Ir	R	O		
12.52	J	5°	Pl	R	O		
12.58	J	20°	St	S	O		
12.60	J	20°	Pl	S	T		
12.66	J	30°	Pl	S	T		
12.78	J	50°	Pl	S	T		
12.90	J	15°	Pl	R	T		
13.03	J	10°	Pl	R	T		
13.12	J	15°	Pl	S	O		
13.16	J	15°	Pl	S	T		
13.17	J	25°	Pl	R	O		
13.85	J	20°	Pl	R	C		Cn
13.94	J	15°	St	R	C		
13.97	J	10°	Pl	R	C		
14.01	J	10°	Pl	S	C		
14.04	J	15°	Pl	R	T		
14.14	J	15°	Pl	R	C		
14.16	J	25°	Pl	R	C		
14.22	J	20°	Pl	S	T		
14.27	J	10°	Pl	S	T		
14.30	J	15°	Pl	S	T		
14.35	J	10°	Pl	S	T		
14.38	J	15°	Pl	S	C		
14.45	J	5°	Pl	S	O		
14.54	J	15°	Pl	R	O		
14.63	J	15°	Pl	R	O		
14.73	J	20°	Pl	S	O		
14.77	J	20°	Pl	S	O		
15.03	J	25°	Pl	S	O		
15.10	J	10°	Pl	S	T		
15.20	J	15°	Pl	S	O		
15.30	J	45°	St	S	O		
15.53	J	10°	Pl	R	O		Cn
15.77	J	10°	Pl	S	O		
15.79	J	10°	Pl	S	O		
15.87	J	50°	Pl	R	O		Cn
16.05	J	15°	Pl	S	T		
16.14	J	30°	Pl	R	C		Cn
16.19	J	15°	Ir	R	T		Cn

BOREHOLE NO.:	BH22
SHEET:	4 of 6
REFERENCE NO.:	H10577

DEPTH	DEFECT TYPE	DIP°	PLANARITY	ROUGHNESS	APERTURE	WALL ALTERATION	OTHER
16.23	J	10°	Pl	S	C		
16.24	J	5°	St	R	T		
16.35	J	15°	Pl	S	T		
16.49	J	15°	Pl	R	O		
16.52	J	15°	Pl	S	T		
16.54	J	10°	St	R	O		
16.56	J	15°	Pl	S	T		
16.64	J	15°	Cu	S	O		
16.76	J	20°	Pl	S	O		
16.77	J	10°	Pl	S	O		
16.85	J	20°	Pl	R	T		
16.86	J	5°	Pl	R	O		
16.88	J	25°	Ir	R	O		
16.96	J	10°	Ir	R	O		
17.00	J	5°	Pl	R	O		
17.03	J	5°	Pl	R	C		
17.08	J	30°	Pl	R	C		
17.10	J	10°	Ir	R	O		
17.22	J	10°	Pl	S	C		
17.27	J	10°	Pl	S	C		
17.31	J	10°	Pl	S	C		
17.38	J	10°	Pl	S	O	FeSt	
17.41	J	15°	Pl	S	C		
17.46	J	15°	St	R	O	FeSt	
17.50	J	15°	Ir	R	O	W	
17.60	J	15°	St	R	O		
17.63	J	15°	Pl	S	C		
17.70	J	20°	Ir	R	O	W	
17.72	J	30°	Pl	R	O	W	
17.78	J	10°	St	R	C		Cn
17.80	J	10°	Pl	S	C	W	
17.83	J	15°	Pl	R	O	W	
17.87	J	10°	Pl	R	C	W	
17.94	J	15°	St	R	T		
18.00	J	5°	Pl	R	T		
18.09	J	20°	Pl	S	O	W	
18.12	J	5°	Pl	R	O	W	
18.38	J	5°	St	R	O		
18.58	J	5°	St	R	O	W	
18.63	J	0°	Pl	S	T		
18.67	J	50°	St	R	O		
18.70	J	5°	Pl	R	O		
18.73	J	5°	Pl	S	O		
18.79	J	5°	Pl	R	T		
18.82	J	20°	Pl	S	T	W	
18.89	J	20°	Pl	R	T	W	
18.95	J	20°	Ir	S	O		
19.13	HFZ	20°	Ir	R	O		
19.22	HFZ	10°	Ir	R	O	W	
19.30	J	15°	Pl	S	T		
19.36	J	0°	Pl	S	C		
19.38	J	5°	Ir	R	C		
19.40	QZ	10°	Pl	R	C		
19.48	HFZ	20°	Pl	R	O	W	
19.51	QZ	10°	Ir	R	C	W	
19.57	J	15°	St	R	T		
19.62	J	25°	Pl	R	T		

BOREHOLE NO.:	BH22
SHEET:	5 of 6
REFERENCE NO.:	H10577

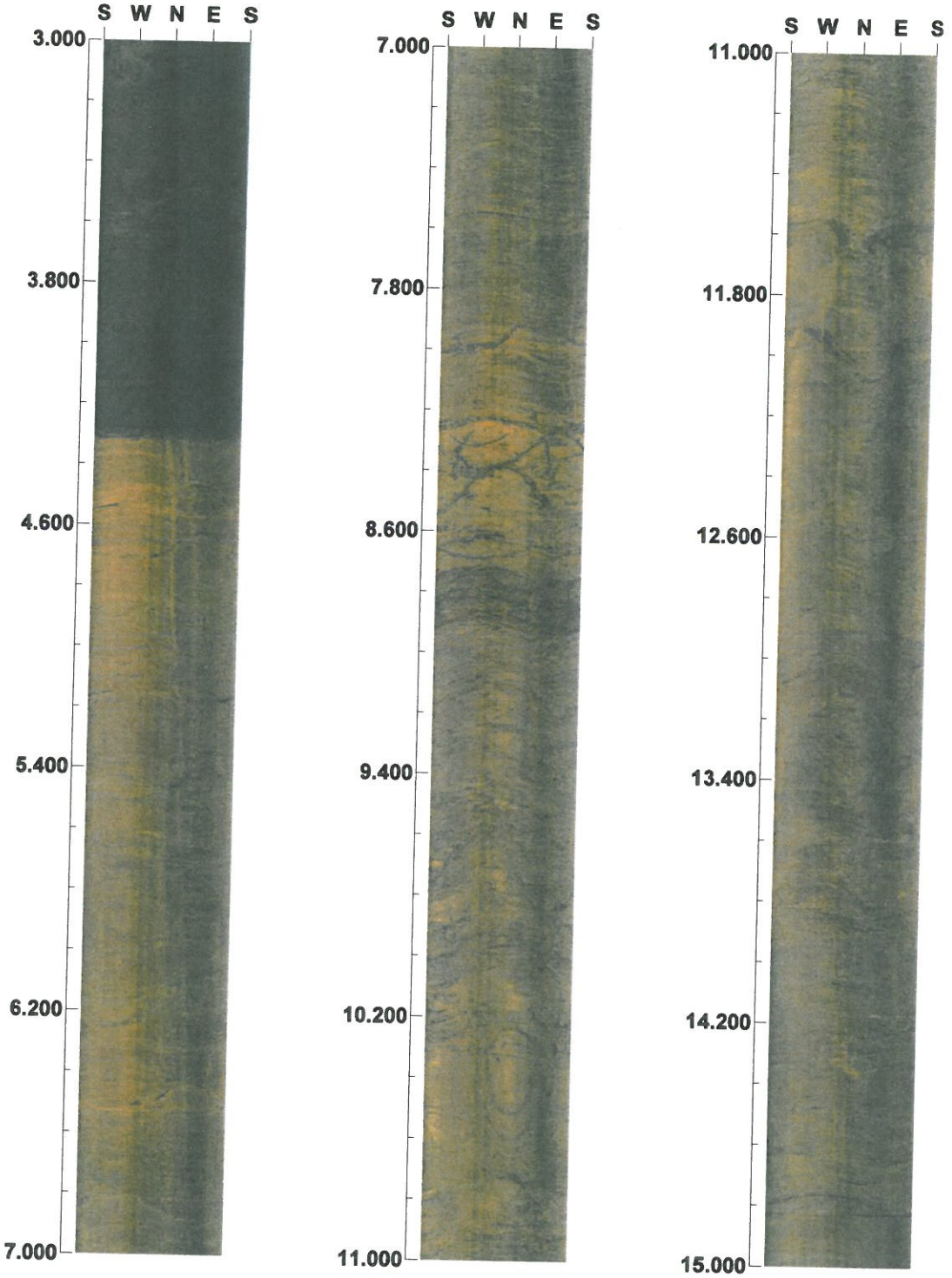
DEPTH	DEFECT TYPE	DIP°	PLANARITY	ROUGHNESS	APERTURE	WALL ALTERATION	OTHER
19.69	J	15°	St	R	T		
19.70	J	10°	Pl	R	C	W	
19.71	J	15°	Ir	R	T	W	
19.91	J	15°	Ir	R	O	W	
20.07	J	35°	Pl	R	T		
20.11	J	20°	Cu	R	O	W	
20.12	QZ	15°	Cu	R	C		
20.14	HFZ	10°	Cu	R	O	W	
20.21	HFZ	20°	Ir	R	O	W	
20.34	J	80°	Un	R	O		
20.35	J	65°	Un	R	O		
20.41	J	15°	Pl	S	O		
20.51	J	55°	Pl	R	O		
20.82	J	10°	Pl	S	O		
20.95	J	10°	Pl	S	T		
21.08	J	40°	Pl	S	O		
21.20	J	30°	Pl	S	T		
21.25	J	20°	Cu	R	O		
21.34	J	20°	St	R	T		
21.43	J	15°	Pl	R	O	W	
21.61	J	5°	Pl	R	O	W	
21.63	J	10°	Pl	S	T		
21.64	J	10°	Pl	S	T		
21.70	J	15°	Pl	R	O	W	
21.77	J	15°	Pl	S	T		
21.79	J	5°	Pl	R	T		
21.82	J	20°	Pl	R	O		
21.96	J	25°	Un	R	O		
22.12	J	35°	St	R	O		
22.14	J	30°	Ir	R	O	W	
22.39	J	25°	Pl	R	O	W	
22.45	QZ	15°	Pl	S	T		
22.49	J	20°	Pl	S	O		
22.54	J	10°	Pl	R	C	W	
22.55	HFZ	20°	Pl	R	T	W	
22.68	QZ	30°	Pl	S	O		
22.69	J	5°	Pl	S	O		
22.70	J	5°	Pl	S	O		
22.73	J	5°	Pl	S	O		
22.78	J	5°	Pl	R	O		
22.90	J	10°	Pl	R	C		
22.95	J	15°	Pl	R	T		
23.04	J	20°	Pl	S	T		
23.07	J	25°	Pl	S	T		
23.10	J	20°	Pl	S	T		
23.15	J	25°	Pl	R	O	W	
23.18	J	10°	Pl	S	O	W	
23.22	J	10°	Pl	S	C		
23.23	J	5°	Pl	S	C		
23.32	J	10°	Ir	R	O		
23.39	HFZ	15°	Ir	R	O	W	
23.49	J	10°	Pl	S	O	W	
23.58	J	20°	Pl	S	O		
23.63	QZ	10°	Ir	R	O		
23.64	HFZ	20°	Ir	R	O	W	
23.72	HFZ	10°	Pl	S	O	W	
23.75	J	10°	Pl	S	O		

BOREHOLE NO.:	BH22
SHEET:	6 of 6
REFERENCE NO.:	H10577

DEPTH	DEFECT TYPE	DIP°	PLANARITY	ROUGHNESS	APERTURE	WALL ALTERATION	OTHER
23.77	J	10°	Pl	S	O		
23.79	J	10°	Pl	S	O		
23.93	J	15°	Pl	R	O	W	
23.97	J	5°	Pl	S	T		
24.12	J	10°	St	R	O		
24.25	J	10°	Pl	R	C	W	
24.29	J	10°	Pl	R	O	W	
24.31	J	20°	Pl	S	T		
24.35	QZ	30°	Ir	R	O		
24.37	J	20°	Pl	S	O		

Project name: BRUCE HIGHWAY UPGRADE
Bore hole No.: BH22 **Azimuth: 0** **Inclination: -90**

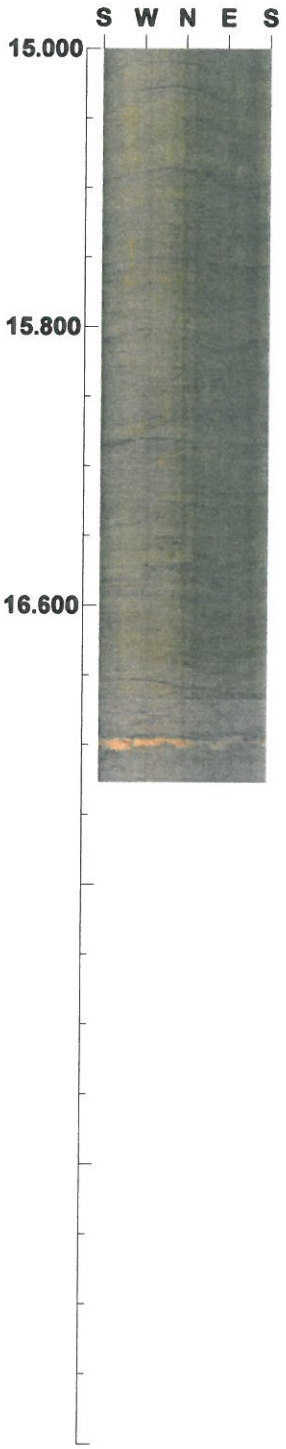
Depth range: 3.000 - 15.000 m



Scale: 1/20 **Aspect ratio: 200 %**

Project name: BRUCE HIGHWAY UPGRADE
Bore hole No.: BH22 **Azimuth: 0** **Inclination: -90**

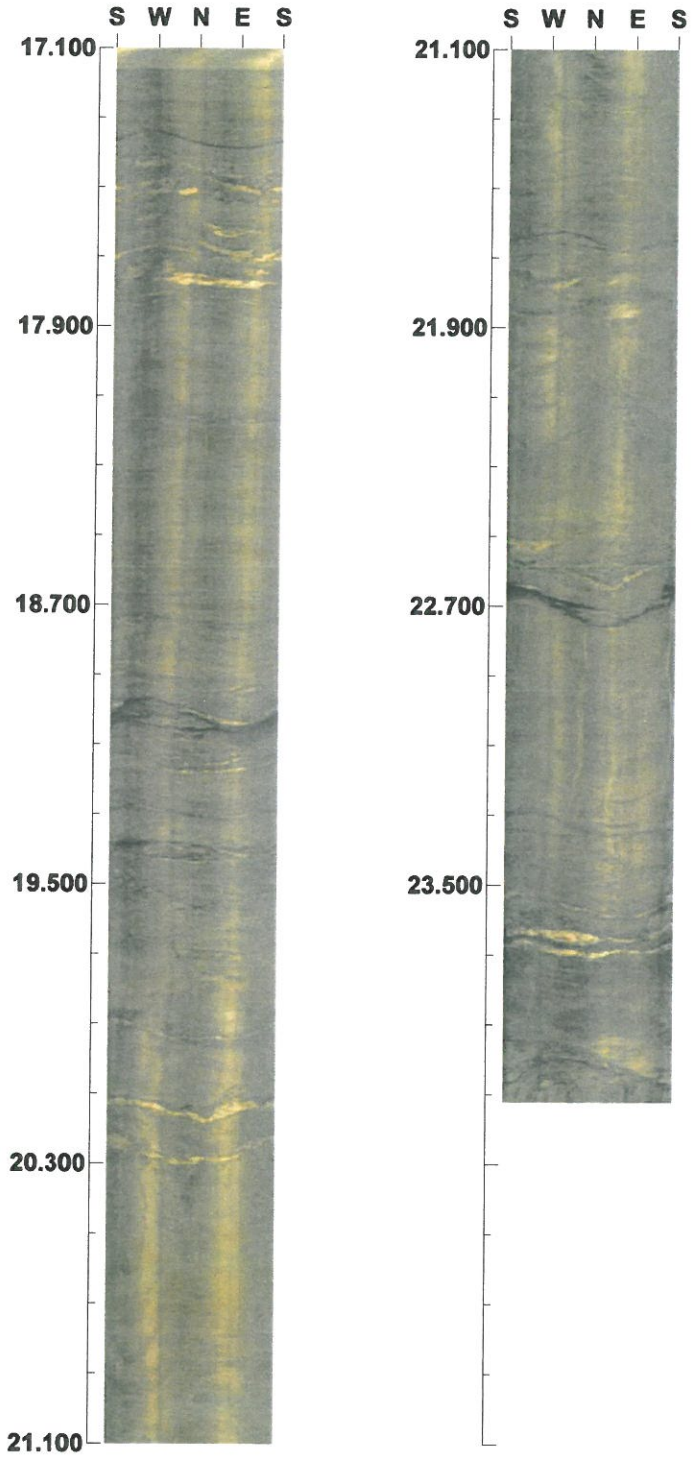
Depth range: 15.000 - 17.105 m



Scale: 1/20 **Aspect ratio: 200 %**

Project name: BRUCE HIGHWAY UPGRADE
Bore hole No.: BH22 **Azimuth: 0** **Inclination: -90**

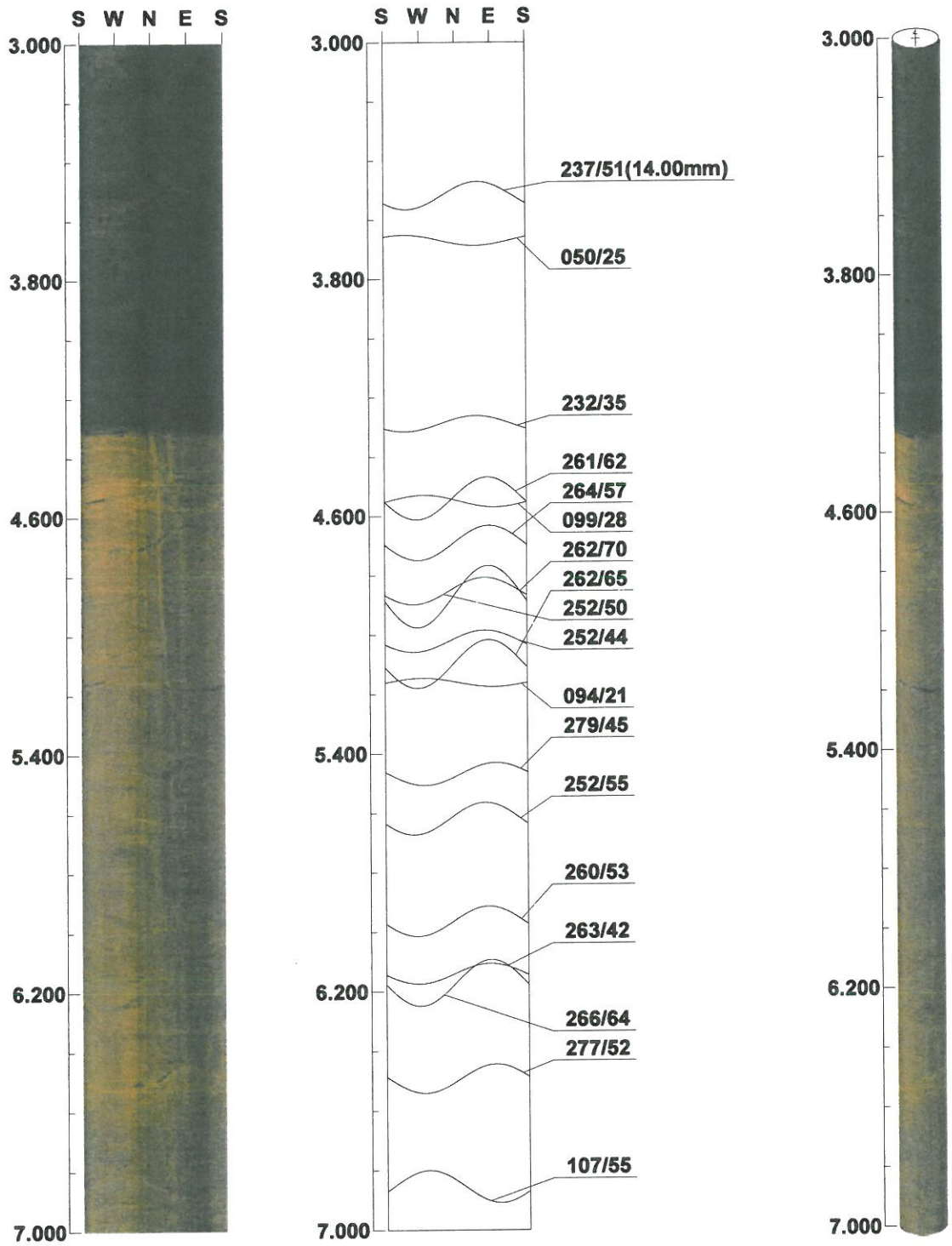
Depth range: 17.100 - 24.120 m



Scale: 1/20 **Aspect ratio: 200 %**

Project name: BRUCE HIGHWAY UPGRADE
Bore hole No.: BH22 **Azimuth: 0** **Inclination: -90**

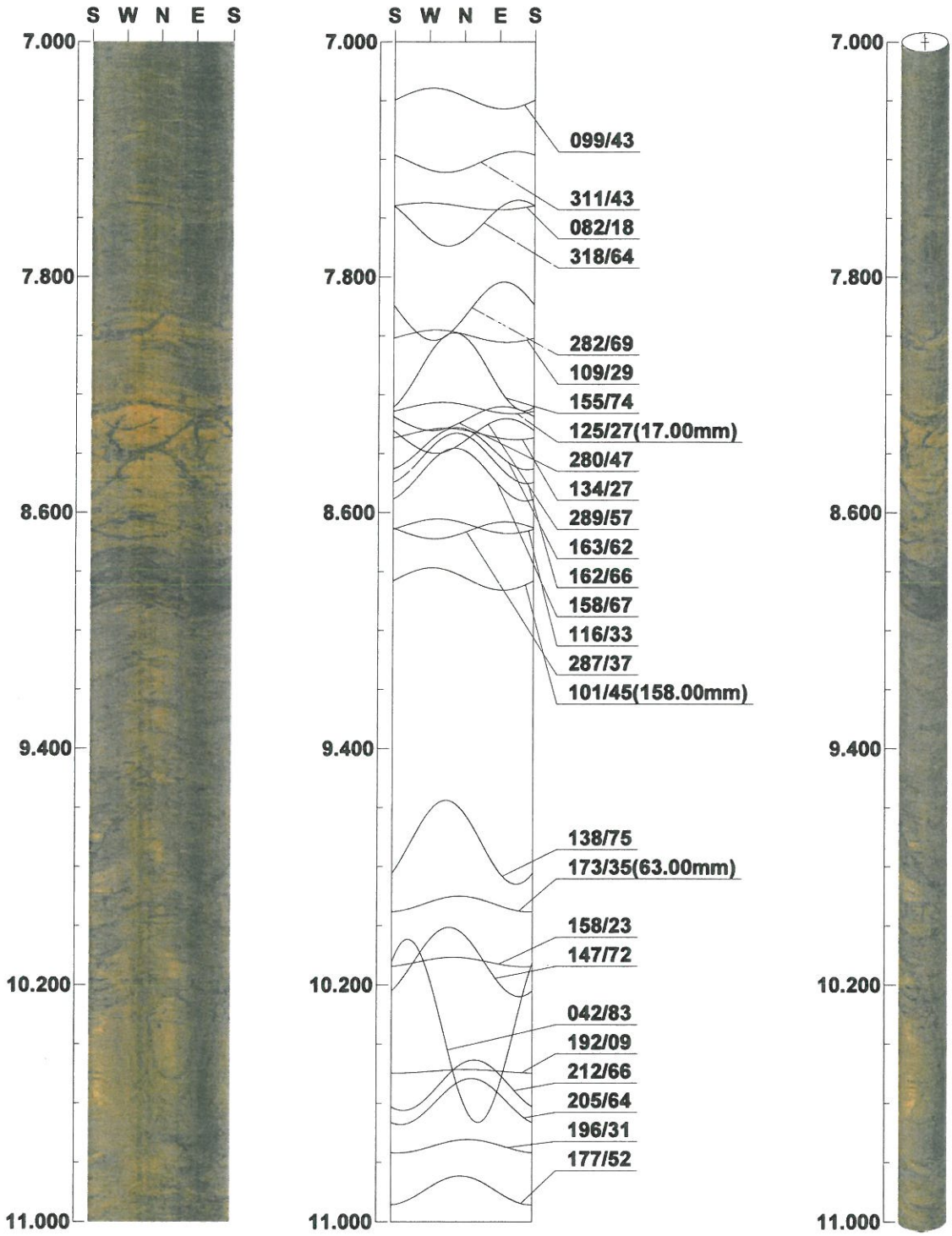
Depth range: 3.000 - 7.000 m



Scale: 1/20 **Aspect ratio: 200 %**

Project name: BRUCE HIGHWAY UPGRADE
Bore hole No.: BH22 **Azimuth: 0** **Inclination: -90**

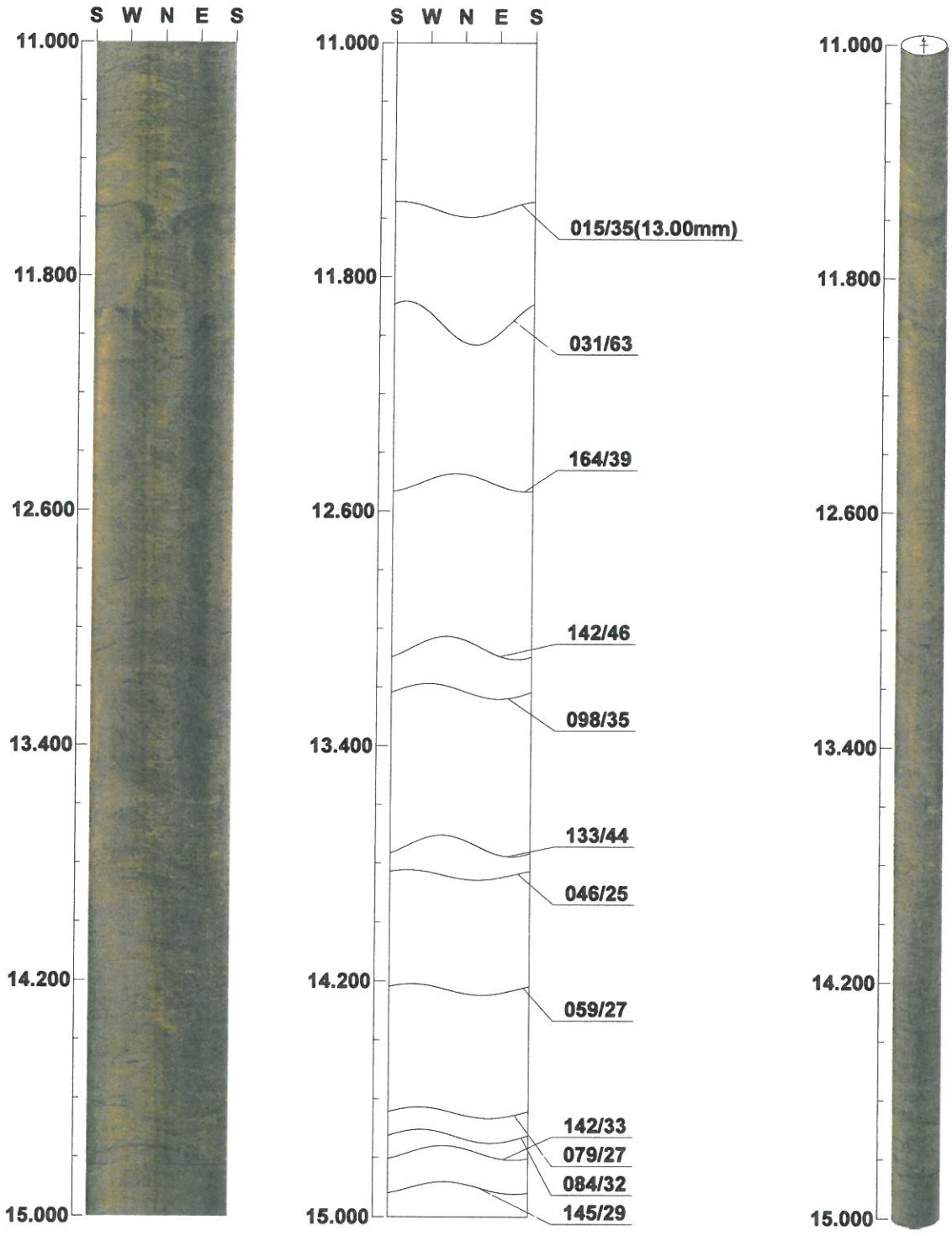
Depth range: 7.000 - 11.000 m



Scale: 1/20 **Aspect ratio: 200 %**

Project name: BRUCE HIGHWAY UPGRADE
Bore hole No.: BH22 **Azimuth: 0** **Inclination: -90**

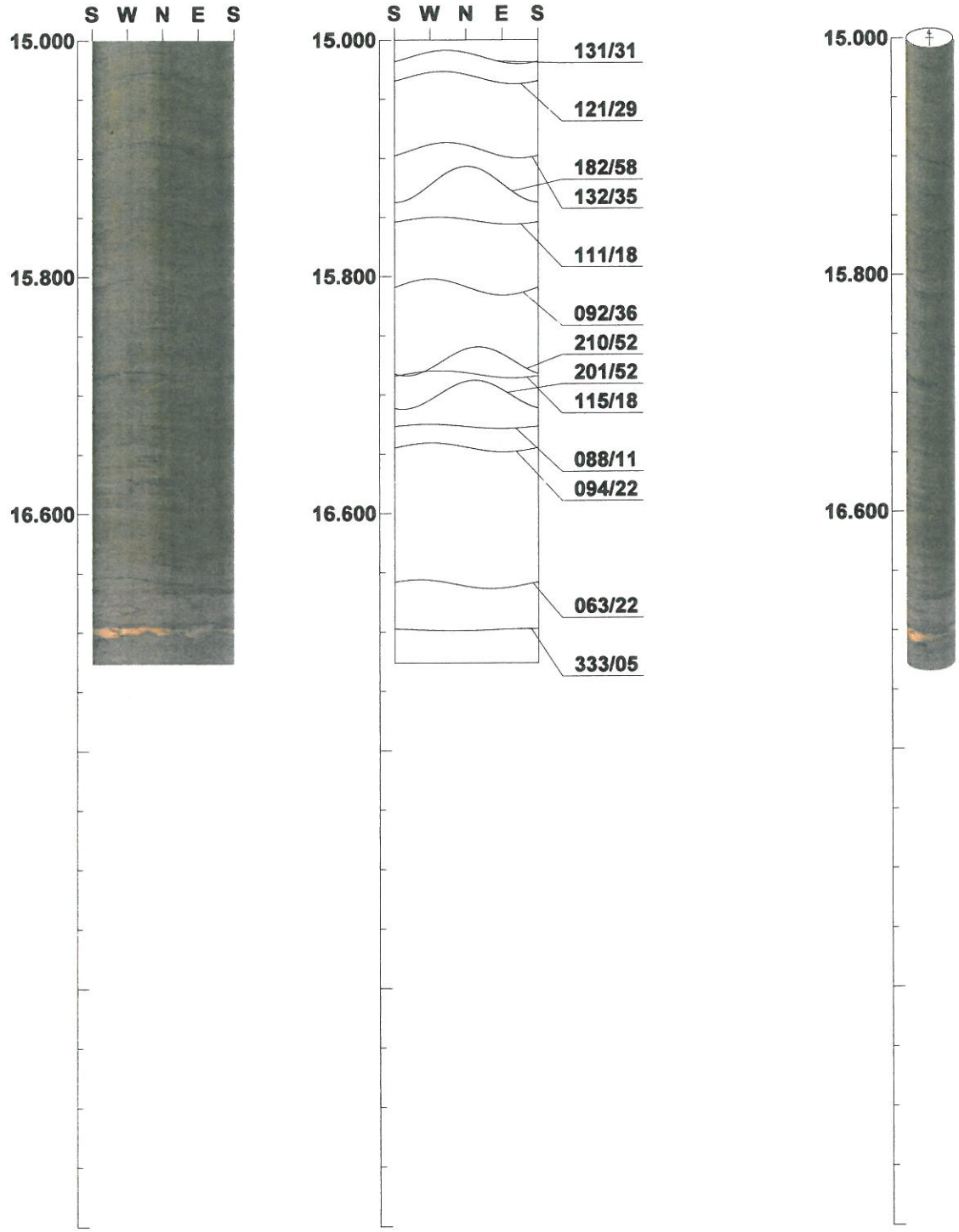
Depth range: 11.000 - 15.000 m



Scale: 1/20 **Aspect ratio: 200 %**

Project name: BRUCE HIGHWAY UPGRADE
Bore hole No.: BH22 **Azimuth: 0** **Inclination: -90**

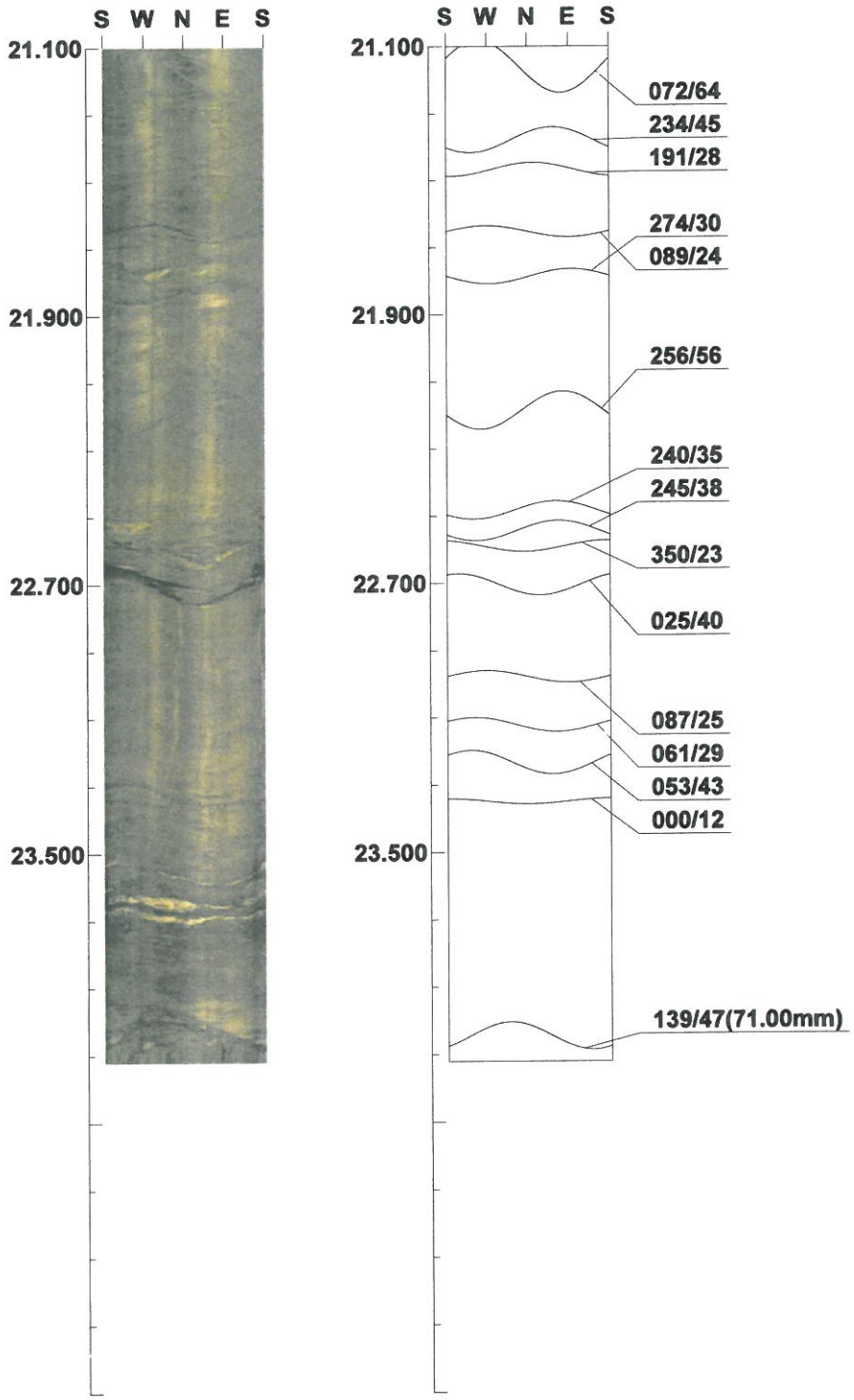
Depth range: 15.000 - 17.105 m



Scale: 1/20 **Aspect ratio: 200 %**

Project name: BRUCE HIGHWAY UPGRADE
Bore hole No.: BH22 **Azimuth: 0** **Inclination: -90**

Depth range: 21.100 - 24.120 m



Scale: 1/20 **Aspect ratio: 200 %**

Tab. Table of Discontinuity (1 / 2)

File name: BH22.STR
[ ]

No.	Depth (m)	Dir/Dip	Sort	Aperture (mm)	Form	Condition	Remark
1	3.518	237/51	ShearZn	14.0	Planar	Brec/crus'd	Open
2	3.669	050/25	ShearZn	58.0	Planar	Brec/crus'd	Open
3	4.288	232/35	Joint	0.5	Planar	Rough	Open
4	4.540	261/62	Joint	0.3	Planar	Rough	Tight
5	4.549	099/28	Parting	0.3	Planar	Smooth	Tight
6	4.690	264/57	Joint	0.3	Planar	Rough	Tight
7	4.852	252/50	Joint	0.3	Planar	Rough	Tight
8	4.871	262/70	Joint	0.3	Planar	Rough	Tight
9	5.021	252/44	Joint	0.3	Planar	Rough	Tight
10	5.098	262/65	Joint	0.3	Planar	Rough	Tight
11	5.160	094/21	Parting	0.3	Planar	Rough	Tight
12	5.468	279/45	Joint	0.3	Planar	Rough	Open
13	5.618	252/55	Joint	0.3	Planar	Rough	Tight
14	5.963	260/53	Joint	0.3	Planar	Rough	Tight
15	6.139	263/42	Joint	0.3	Planar	Rough	Open
16	6.170	266/64	Joint	0.3	Planar	Rough	Open
17	6.492	277/52	Joint	0.3	Planar	Rough	Tight
18	6.854	107/55	Joint	0.3	Planar	Smooth	Open
19	7.193	099/43	Parting	0.3	Planar	Smooth	Open
20	7.409	311/43	Joint	0.3	Planar	Rough	Open
21	7.560	082/18	Parting	0.3	Planar	Smooth	Open
22	7.617	318/64	Joint	0.3	Planar	Rough	Open
23	7.916	282/69	Joint	0.5	Planar	Rough	Open
24	8.005	109/29	Parting	0.3	Planar	Rough	Open
25	8.122	155/74	Joint	0.3	Planar	Rough	Tight
26	8.245	125/27	ShearZn	17.0	Planar	Brec/crus'd	Open
27	8.281	280/47	Joint	0.3	Planar	Rough	Open
28	8.329	134/27	Parting	0.3	Planar	Rough	Open
29	8.340	289/57	Joint	0.5	Planar	Rough	Open
30	8.383	163/62	Joint	0.3	Planar	Rough	Tight
31	8.416	162/66	Joint	0.3	Planar	Rough	Tight
32	8.471	158/67	Joint	0.5	Planar	Smooth	Open
33	8.646	116/33	Parting	0.5	Planar	Smooth	Open
34	8.660	287/37	Joint	0.5	Planar	Rough	Open
35	8.825	101/45	ShearZn	158.0	Planar	Brec/crus'd	Open/loose
36	9.717	138/75	Joint	0.5	Planar	Rough	Open
37	9.926	173/35	ShearZn	63.0	Planar	Brec/crus'd	Open
38	10.122	158/23	Parting	0.3	Planar	Rough	Open
39	10.122	147/72	Joint	0.3	Undulating	Rough	Open
40	10.355	042/83	ShearZn	17.0	Planar	Brec/crus'd	Open
41	10.492	192/09	Joint	0.3	Planar	Rough	Open
42	10.539	212/66	Joint	0.3	Planar	Rough	Open
43	10.594	205/64	Joint	0.3	Planar	Rough	Open
44	10.745	196/31	Joint	0.3	Planar	Rough	Open
45	10.894	177/52	ShearZn	26.0	Planar	Brec/crus'd	Open
46	11.570	015/35	Fault	13.0	Undulating	Rough	Open
47	11.958	031/63	Fault	16.0	Undulating	Rough	Open
48	12.503	164/39	Fault	6.0	Planar	Sheared	Tight
49	13.066	142/46	Parting	0.3	Planar	Smooth	Open
50	13.213	098/35	Fault	0.3	Planar	Rough	Tight

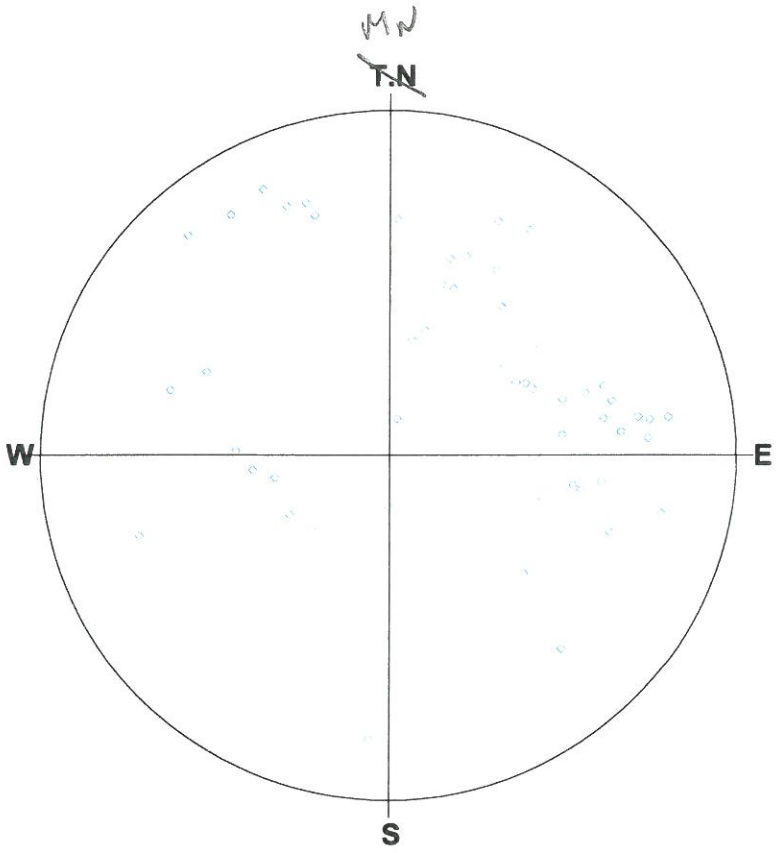
Tab. Table of Discontinuity (2 / 2)

File name: BH22.STR
[ ]

No.	Depth (m)	Dir/Dip	Sort	Aperture (mm)	Form	Condition	Remark
51	13.740	133/44	Parting	0.3	Planar	Rough	Open
52	13.839	046/25	Joint	0.5	Planar	Smooth	Open
53	14.228	059/27	Joint	0.3	Planar	Smooth	Tight
54	14.647	079/27	Joint	0.3	Planar	Smooth	Tight
55	14.727	084/32	Joint	0.3	Planar	Rough	Tight
56	14.783	142/33	Parting	0.5	Planar	Smooth	Open
57	14.902	145/29	Parting	0.3	Planar	Smooth	Open
58	15.058	131/31	Parting	0.5	Planar	Rough	Open
59	15.128	121/29	Parting	1.0	Planar	Smooth	Open
60	15.374	132/35	Parting	1.0	Planar	Smooth	Open
61	15.489	182/58	Joint	0.3	Planar	Smooth	Tight
62	15.612	111/18	Parting	1.0	Planar	Smooth	Open
63	15.836	092/36	Joint	0.5	Planar	Rough	Open
64	16.087	210/52	Joint	0.3	Planar	Rough	Open
65	16.131	115/18	Parting	0.5	Planar	Rough	Open
66	16.200	201/52	Joint	0.3	Planar	Rough	Open
67	16.310	088/11	Parting	0.5	Planar	Smooth	Open
68	16.378	094/22	Parting	0.3	Planar	Rough	Open
69	16.839	063/22	ShearZn	27.0	Planar	Brec/crus'd	Open/loose
70	16.993	333/05	Vein	30.0	Undulating	Rough	Tight
71	17.165	115/48	Joint	0.3	Undulating	Rough	Tight
72	17.358	078/31	Parting	1.0	Planar	Smooth	Open
73	18.739	080/21	Parting	0.3	Planar	Rough	Open
74	19.040	080/43	ShearZn	60.0	Planar	Brec/crus'd	Open/loose
75	19.404	037/18	ShearZn	38.0	Planar	Brec/crus'd	Open/loose
76	19.635	242/37	Joint	0.3	Planar	Rough	Tight
77	19.779	217/45	Joint	0.3	Planar	Rough	Tight
78	20.225	197/43	Joint	0.3	Planar	Rough	Open
79	20.305	004/71	Joint	0.5	Undulating	Rough	Tight/Fil'd
80	20.606	201/43	Joint	0.3	Planar	Smooth	Tight
81	21.037	197/50	Joint	0.3	Planar	Smooth	Tight
82	21.160	072/64	Joint	0.3	Planar	Rough	Tight/Fil'd
83	21.379	234/45	Joint	0.3	Planar	Rough	Tight
84	21.467	191/28	Joint	0.3	Planar	Rough	Tight
85	21.652	089/24	ShearZn	9.0	Planar	Brec/crus'd	Open/loose
86	21.786	274/30	ShearZn	84.0	Planar	Brec/crus'd	Tight/Fil'd
87	22.185	256/56	Joint	0.3	Planar	Rough	Tight
88	22.487	240/35	Joint	0.3	Planar	Rough	Open
89	22.543	245/38	Joint	0.3	Planar	Rough	Tight
90	22.589	350/23	ShearZn	17.0	Planar	Brec/crus'd	Open
91	22.703	025/40	ShearZn	37.0	Planar	Brec/crus'd	Open/loose
92	22.977	087/25	Parting	0.3	Planar	Smooth	Tight
93	23.120	061/29	Parting	0.3	Planar	Rough	Tight
94	23.232	053/43	Parting	0.3	Planar	Rough	Tight
95	23.348	000/12	Joint	0.5	Planar	Rough	Open
96	24.044	139/47	ShearZn	71.0	Planar	Brec/crus'd	Open/loose

BH22.STR

<<JOINT>>



Number of Data : 52/96

<Legend>

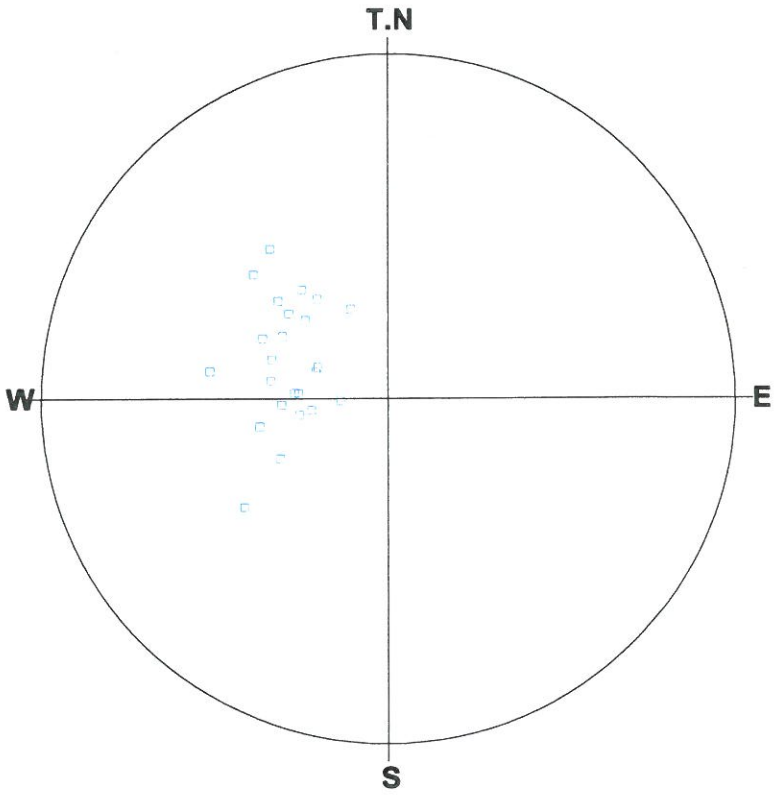
:Bed/foliat	-- 0	:Boundary	-- 0
:Joint	-- 52		
:Parting	-- 0		
:ShearZn	-- 0		
:Fault	-- 0		
:Vein	-- 0		

Schmidt (L.H)

Depth : 3.518 - 24.044 m

BH22.STR

<<PARTING>>



Number of Data : 24/96

<Legend>

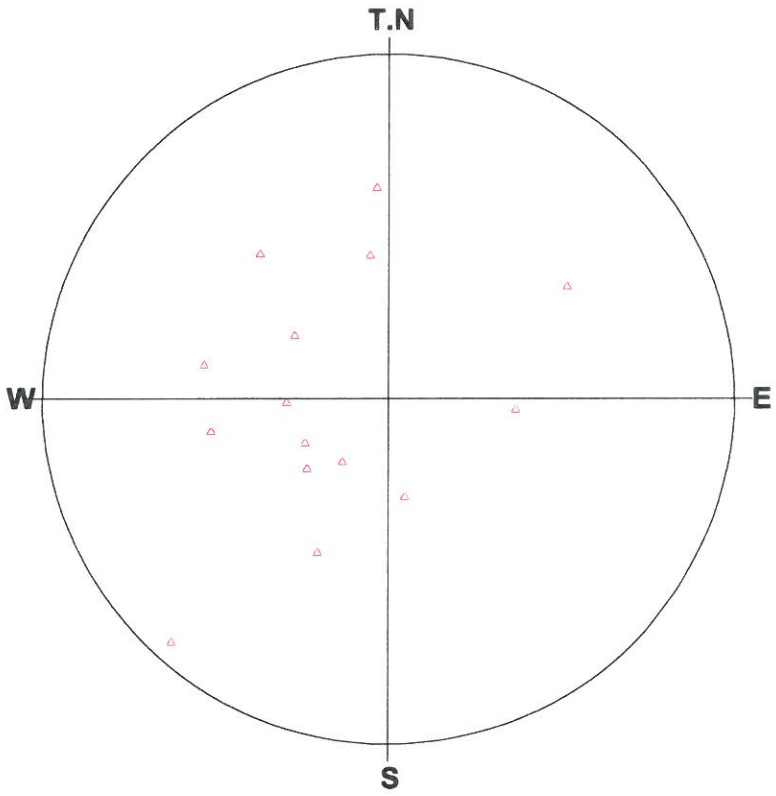
:Bed/foliat	-- 0	:Boundary	-- 0
:Joint	-- 0		
:Parting	-- 24		
:ShearZn	-- 0		
:Fault	-- 0		
:Vein	-- 0		

Schmidt (L.H)

Depth : 3.518 - 24.044 m

BH22.STR

<<SHEAR ZONE>>



Number of Data : 15/96

<Legend>

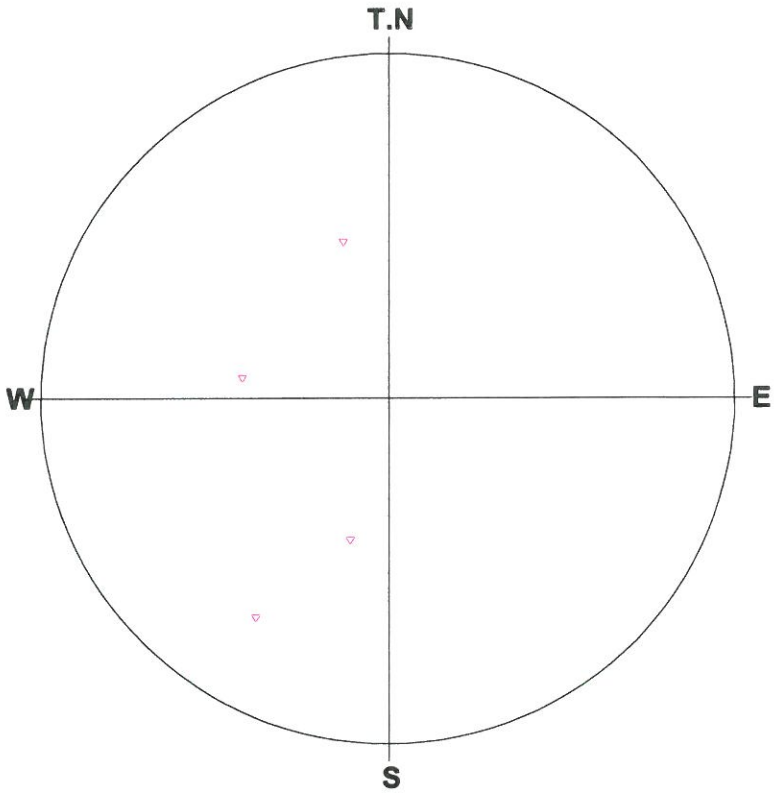
:Bed/foliat	-- 0	:Boundary	-- 0
:Joint	-- 0		
:Parting	-- 0		
:ShearZn	-- 15		
:Fault	-- 0		
:Vein	-- 0		

Schmidt (L.H)

Depth : 3.518 - 24.044 m

BH22.STR

<<FAULT>>



Number of Data : 4/96

<Legend>

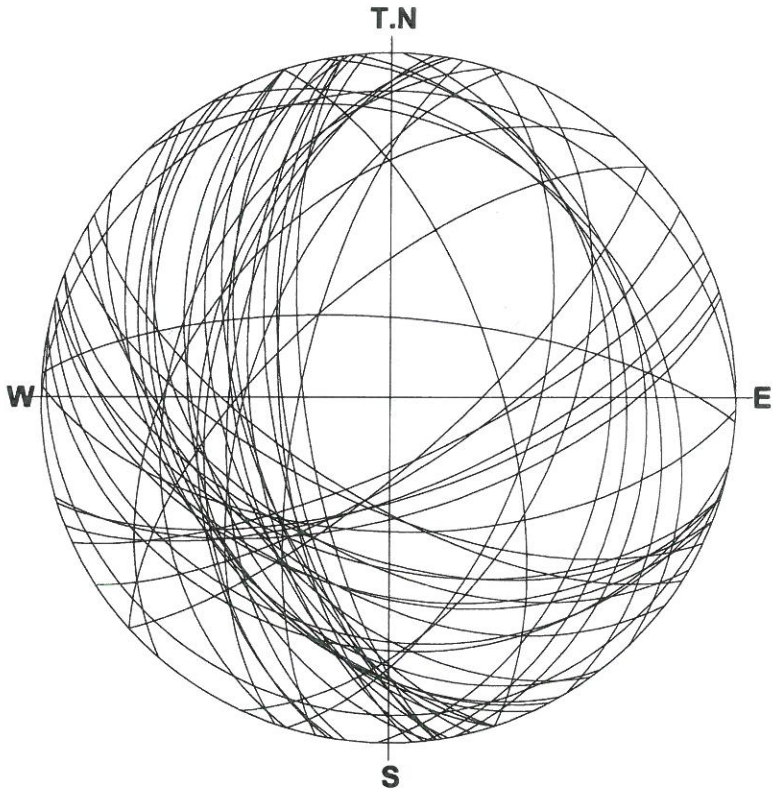
	:Bed/foliat	-- 0		:Boundary	-- 0
◇	:Joint	-- 0			
□	:Parting	-- 0			
△	:ShearZn	-- 0			
▽	:Fault	-- 4			
×	:Vein	-- 0			

Schmidt (L.H)

Depth : 3.518 - 24.044 m

BH22.STR

<<JOINT>>



Number of Data:52/96

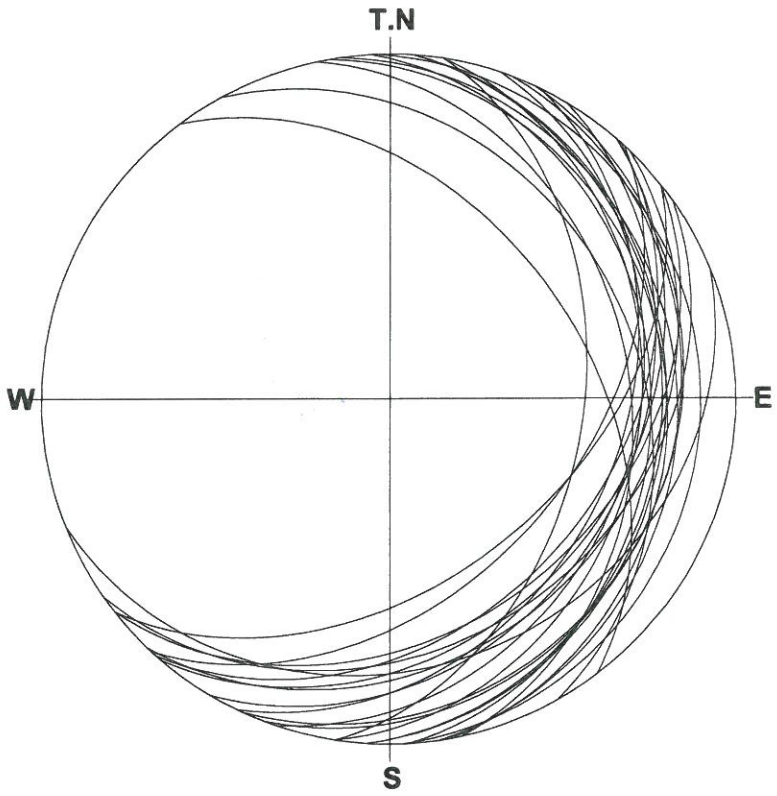
1 : 232/35(3)	**6 : 252/44(9)**
2 : 261/62(4)	**7 : 262/65(10)**
3 : 264/57(6)	**8 : 279/45(12)**
4 : 252/50(7)	**9 : 252/55(13)**
5 : 262/70(8)	**10 : 260/53(14)**

Schmidt (L.H)

Depth : 3.518 - 24.044 m

BH22.STR

<<PARTING>>



Number of Data:24/96

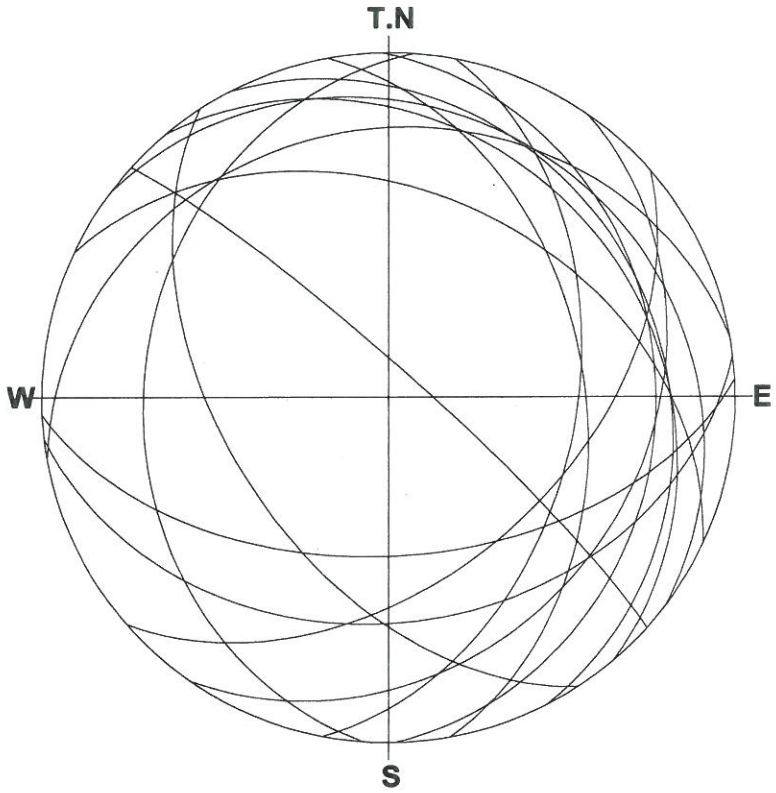
1 : 099/28(5)	**6 : 134/27(28)**
2 : 094/21(11)	**7 : 116/33(33)**
3 : 099/43(19)	**8 : 158/23(38)**
4 : 082/18(21)	**9 : 142/46(49)**
5 : 109/29(24)	**10 : 133/44(51)**

Schmidt (L.H)

Depth : 3.518 - 24.044 m

BH22.STR

<<SHEAR ZONE>>



Number of Data:15/96

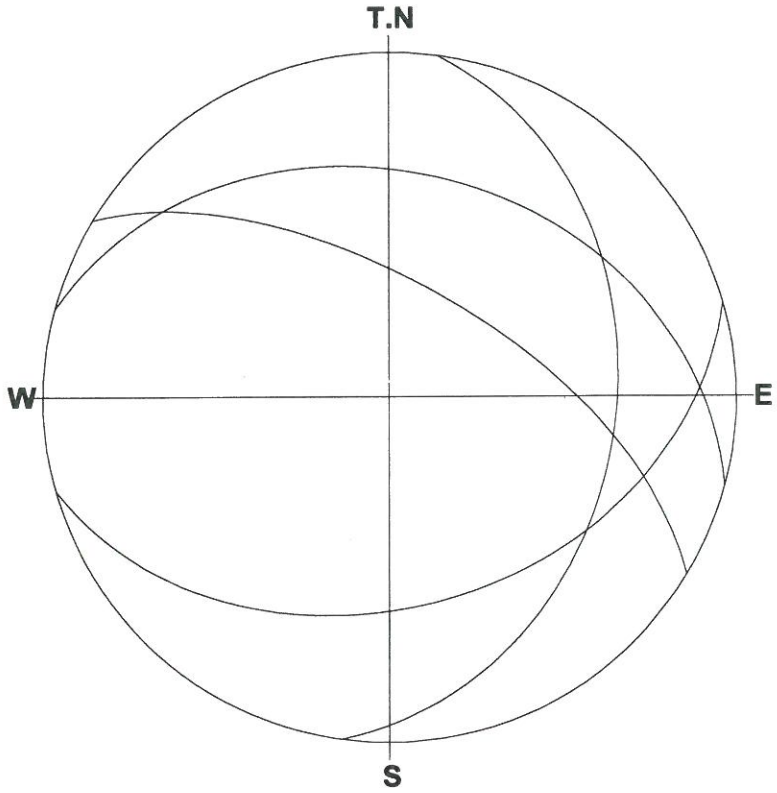
1 : 237/51(1)	**6 : 042/83(40)**
2 : 050/25(2)	**7 : 177/52(45)**
3 : 125/27(26)	**8 : 063/22(69)**
4 : 101/45(35)	**9 : 080/43(74)**
5 : 173/35(37)	**10 : 037/18(75)**

Schmidt (L.H)

Depth : 3.518 - 24.044 m

BH22.STR

<<FAULT>>



Number of Data:4/96

1 : 015/35(46)

2 : 031/63(47)

3 : 164/39(48)

4 : 098/35(50)

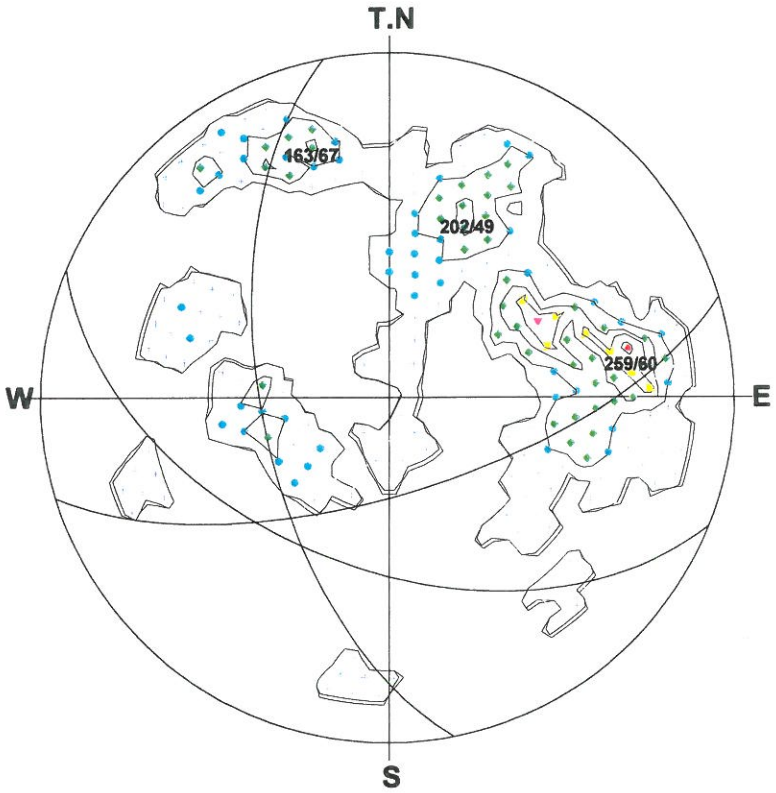
Schmidt (L.H)

Depth : 3.518 - 24.044 m

BH22.STR

<<JOINT>>

******** % Diagram ********



Number of Data : 52

<Legend> Sym. (%)	Contour Value (%)
▲ : 13	Contour 1 : 0 ☐
▼ : 10 - 13	Contour 2 : 2 ☐
■ : 8 - 10	Contour 3 : 5 ☐
◆ : 5 - 8	Contour 4 : 8 ☐
● : 2 - 5	Contour 5 : 10 ☐
— : 0 - 2	Contour 6 : 13 ☐

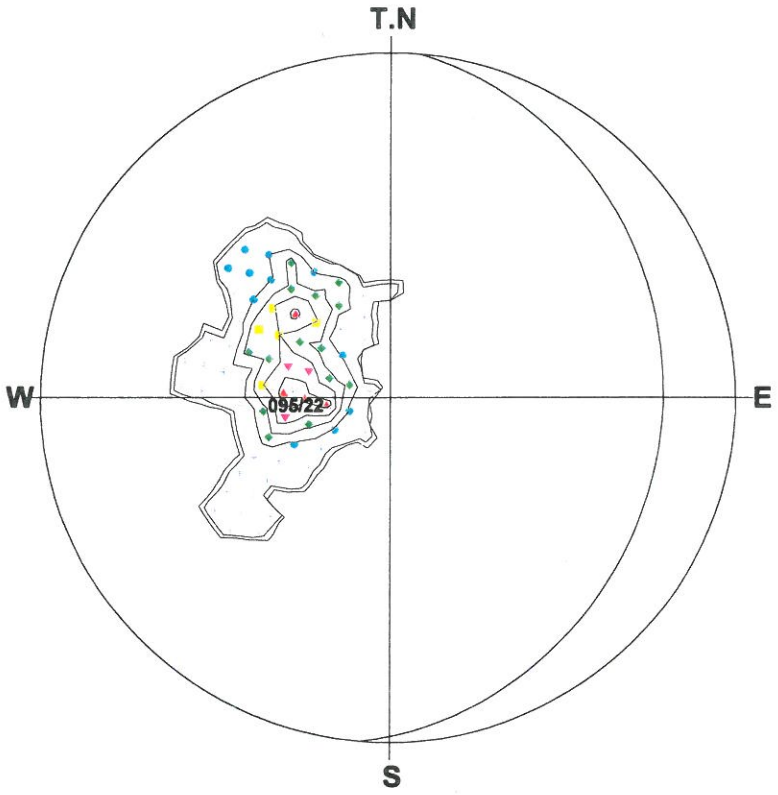
Schmidt (L.H)

Depth : 3.518 - 24.044 m

BH22.STR

<<PARTING>>

******** % Diagram ********



Number of Data : 24

<Legend> Sym. (%)	Contour Value (%)
▲ : 29	Contour 1 : 0 ☐
▼ : 23 - 29	Contour 2 : 5 ☐
■ : 17 - 23	Contour 3 : 11 ☐
◆ : 11 - 17	Contour 4 : 17 ☐
● : 5 - 11	Contour 5 : 23 ☐
· : 0 - 5	Contour 6 : 29 ☐

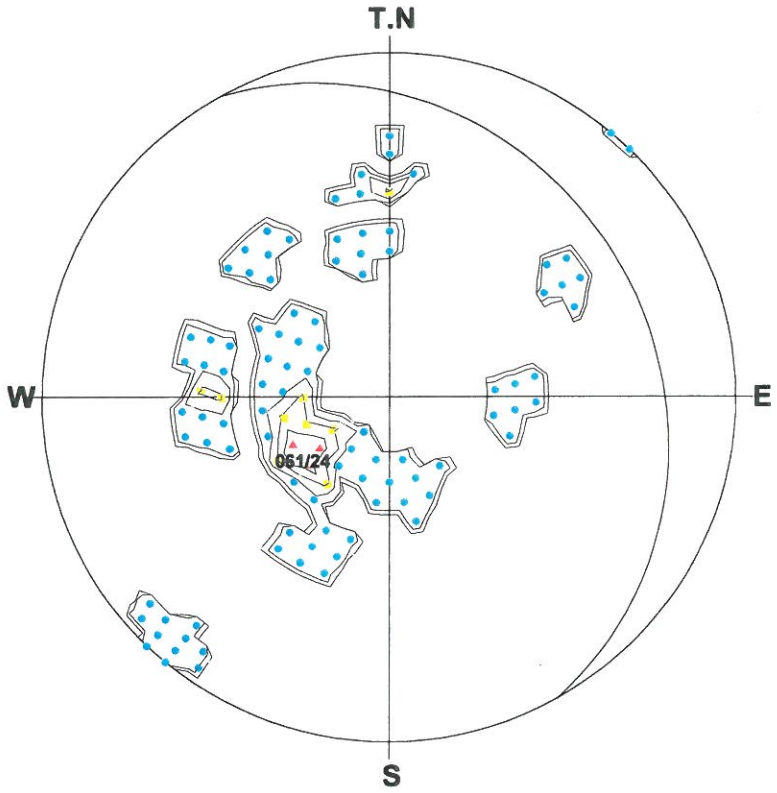
Schmidt (L.H)

Depth : 3.518 - 24.044 m

BH22.STR

<<SHEAR ZONE>>

******** % Diagram ********



Number of Data : 15

<Legend> Sym. (%)	Contour Value (%)	
▲ : 20	Contour 1 : 0	☐
▼ : 16 - 20	Contour 2 : 4	☐
■ : 12 - 16	Contour 3 : 8	☐
◆ : 8 - 12	Contour 4 : 12	☐
● : 4 - 8	Contour 5 : 16	☐
: 0 - 4	Contour 6 : 20	☐

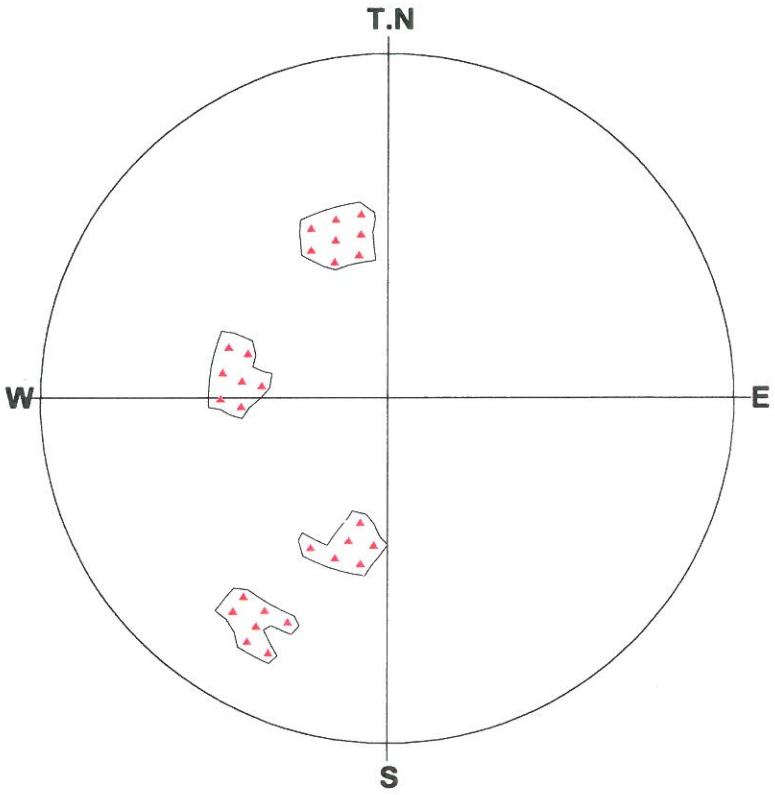
Schmidt (L.H)

Depth : 3.518 - 24.044 m

BH22.STR

<<FAULT>>

******** % Diagram ********



Number of Data : 4

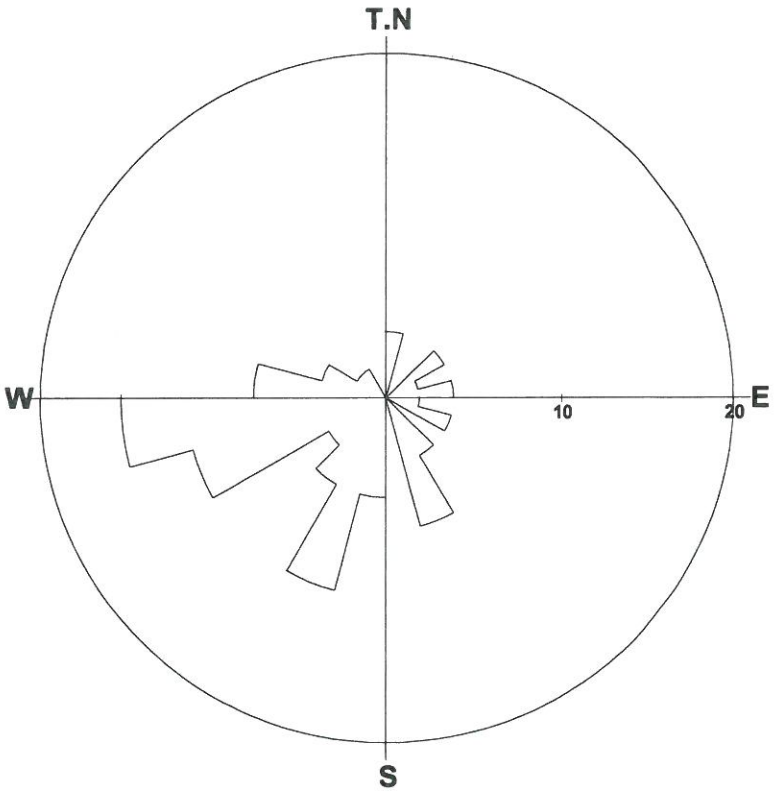
<Legend> Sym. (%)	Contour Value (%)
▲ : 25	Contour 1 : 0 ☐
▼ : 20 - 25	Contour 2 : 5 ☐
■ : 15 - 20	Contour 3 : 10 ☐
◆ : 10 - 15	Contour 4 : 15 ☐
● : 5 - 10	Contour 5 : 20 ☐
····· : 0 - 5	Contour 6 : 25 ☐

Schmidt (L.H)

Depth : 3.518 - 24.044 m

BH22.STR

<<JOINT>>



Number of Data : 52/96

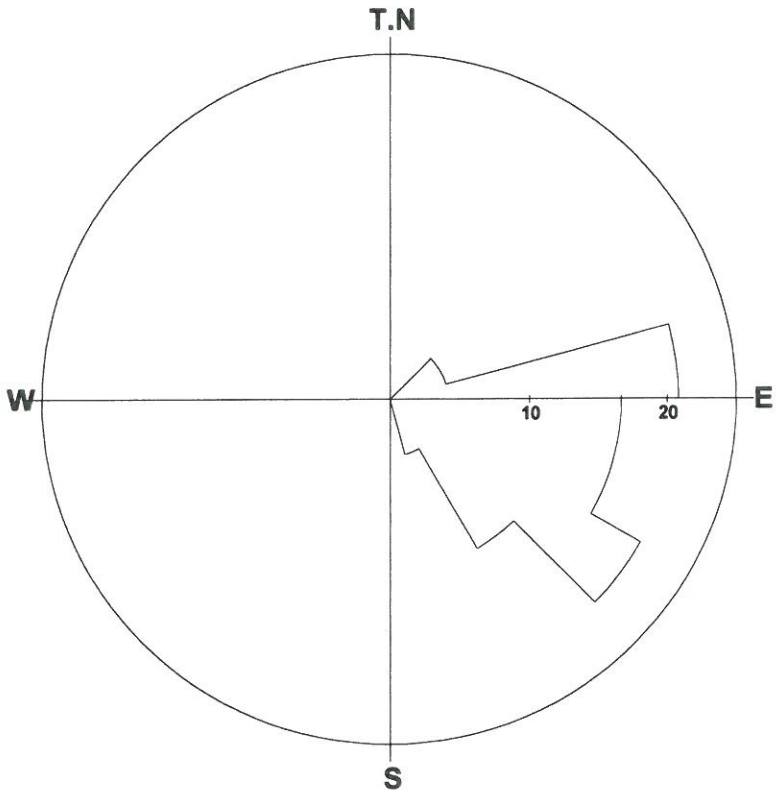
Max : 15.4% **Grouping Angle : 15 deg**

Dir	%	Dir	%	Dir	%
0-	4	135-	4	270-	8
15-	0	150-	8	285-	4
30-	0	165-	0	300-	2
45-	4	180-	6	315-	2
60-	2	195-	12	330-	0
75-	4	210-	6	345-	0
90-	2	225-	4		
105-	4	240-	12		
120-	0	255-	15		

Depth : 3.518 - 24.044 m

BH22.STR

<<PARTING>>



Number of Data : 24/96

Max : 20.8%

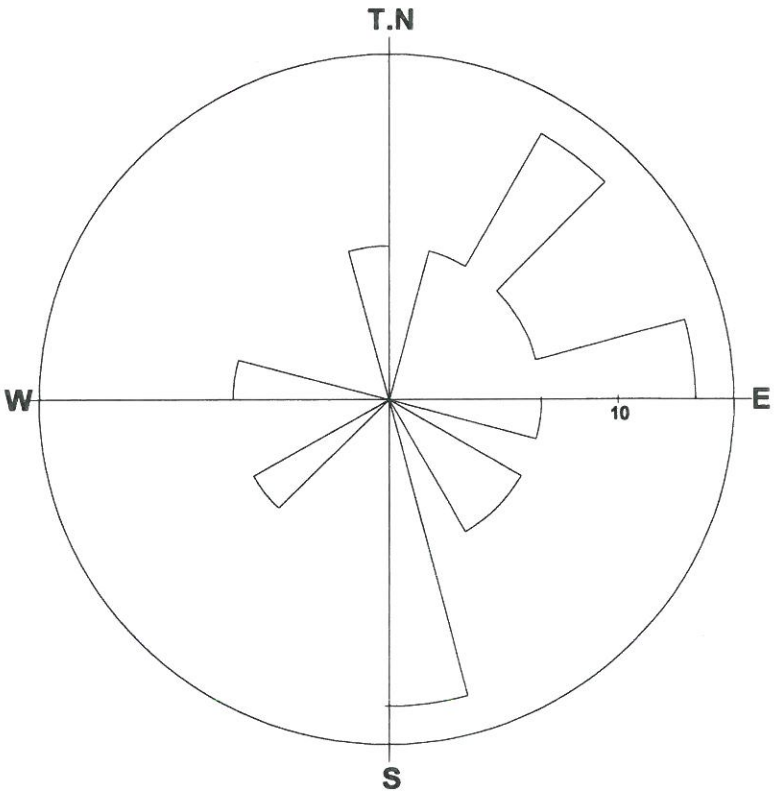
Grouping Angle : 15 deg

Dir	%	Dir	%	Dir	%
0-	0	135-	13	270-	0
15-	0	150-	4	285-	0
30-	0	165-	0	300-	0
45-	4	180-	0	315-	0
60-	4	195-	0	330-	0
75-	21	210-	0	345-	0
90-	17	225-	0		
105-	17	240-	0		
120-	21	255-	0		

Depth : 3.518 - 24.044 m

BH22.STR

<<SHEAR ZONE>>



Number of Data : 15/96

Max : 13.3%

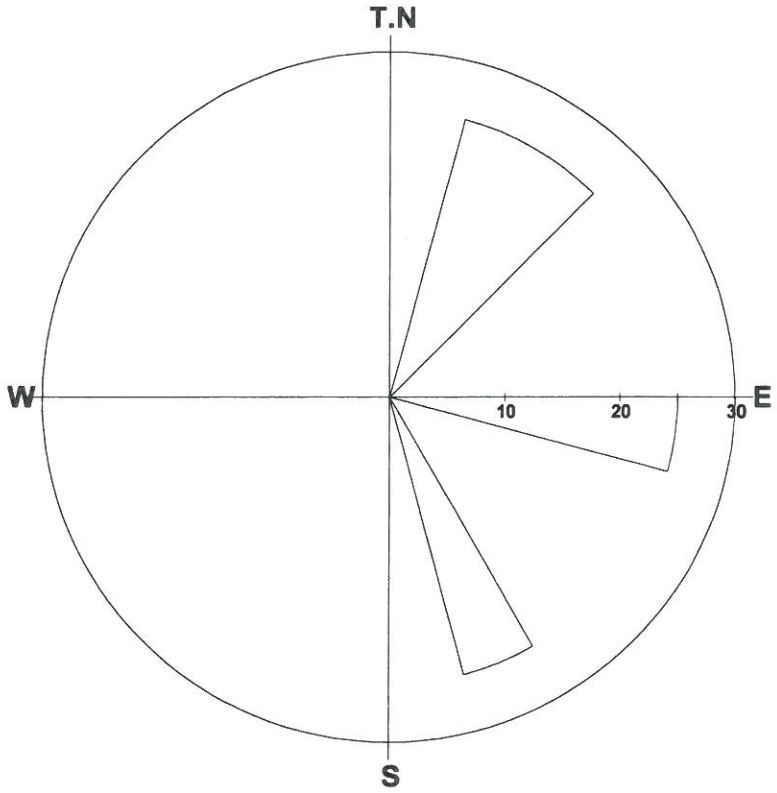
Grouping Angle : 15 deg

Dir	%	Dir	%	Dir	%
0-	0	135-	7	270-	7
15-	7	150-	0	285-	0
30-	13	165-	13	300-	0
45-	7	180-	0	315-	0
60-	7	195-	0	330-	0
75-	13	210-	0	345-	7
90-	7	225-	7		
105-	0	240-	0		
120-	7	255-	0		

Depth : 3.518 - 24.044 m

BH22.STR

<<FAULT>>



Number of Data : 4/96

Max : 25.0% **Grouping Angle : 15 deg**

Dir	%	Dir	%	Dir	%
0-	0	135-	0	270-	0
15-	25	150-	25	285-	0
30-	25	165-	0	300-	0
45-	0	180-	0	315-	0
60-	0	195-	0	330-	0
75-	0	210-	0	345-	0
90-	25	225-	0		
105-	0	240-	0		
120-	0	255-	0		

Depth : 3.518 - 24.044 m

Title: BH22.STR
Comment: JOINT
Depth: 3.518 - 24.044 m
Aperture: 0.3 - 158.0 mm

Sort: 1/ 7
Form: 8/ 8
Condition: 11/11
Remark: 11/11

2009/ 9/ 1

Elevation: 0.000m
Water Level: 14.830m

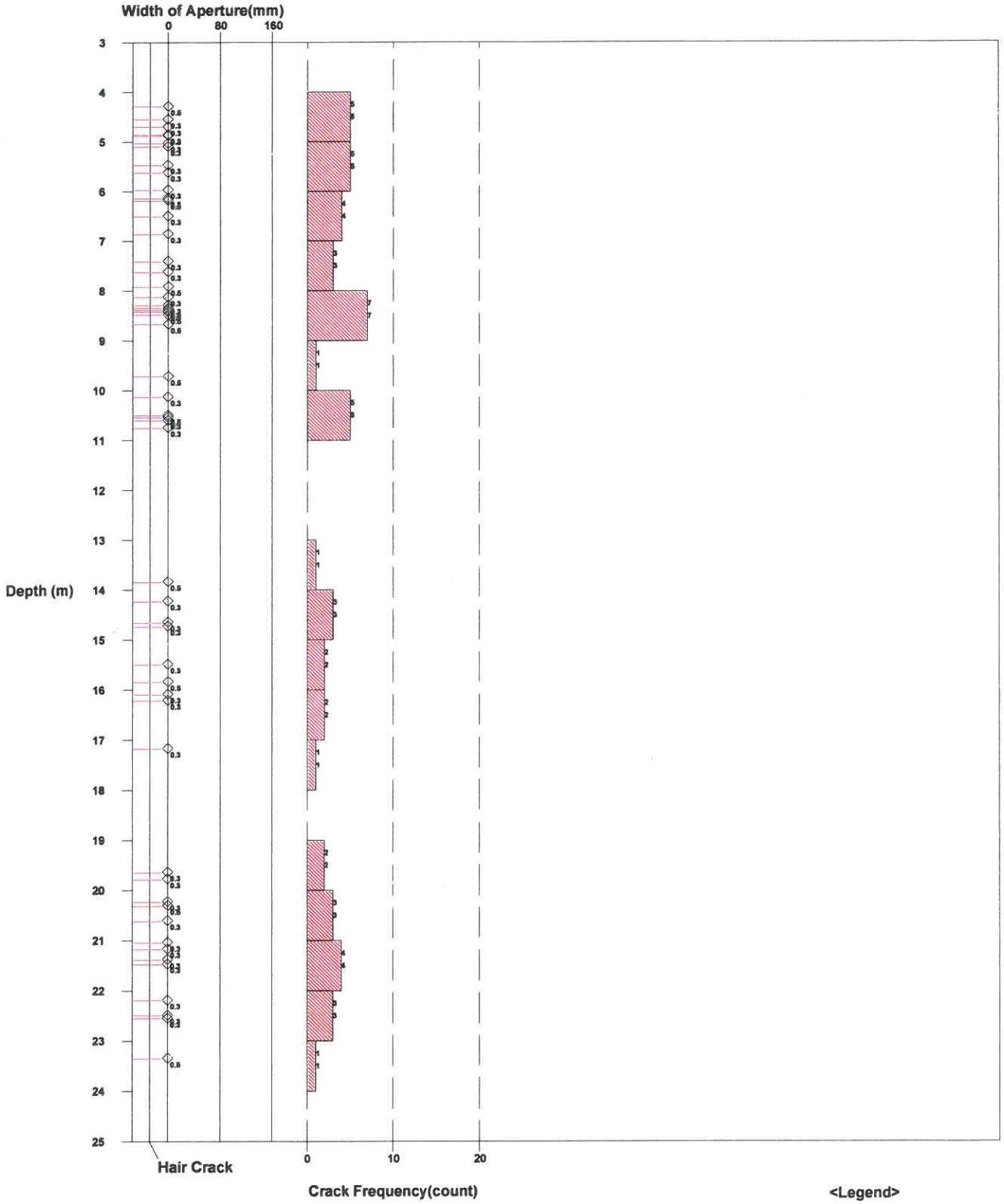


Fig. Rock Mass Condition Graph

Title: BH22.STR
Comment: PARTING
Depth: 3.518 - 24.044 m
Aperture: 0.3 - 158.0 mm

Sort: 1/ 7
Form: 8/ 8
Condition: 11/11
Remark: 11/11

2009/ 9/ 1

Elevation: 0.000m
Water Level: 14.830m

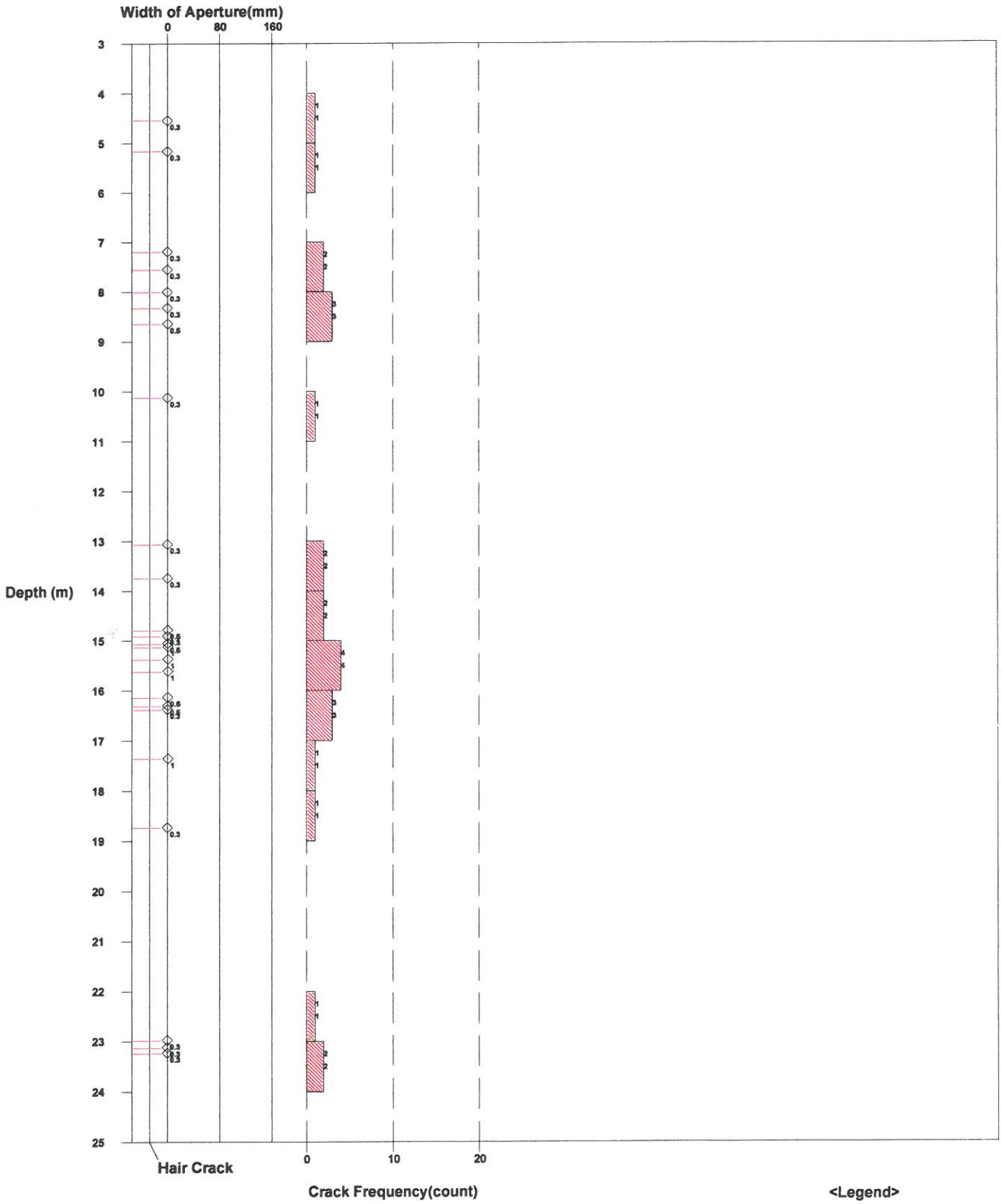


Fig. Rock Mass Condition Graph

Title: BH22.STR
Comment: SHEAR ZONE
Depth: 3.518 - 24.044 m
Aperture: 0.3 - 158.0 mm

Sort: 1/ 7
Form: 8/ 8
Condition: 11/11
Remark: 11/11

2009/ 9/ 1

Elevation: 0.000m
Water Level: 14.830m

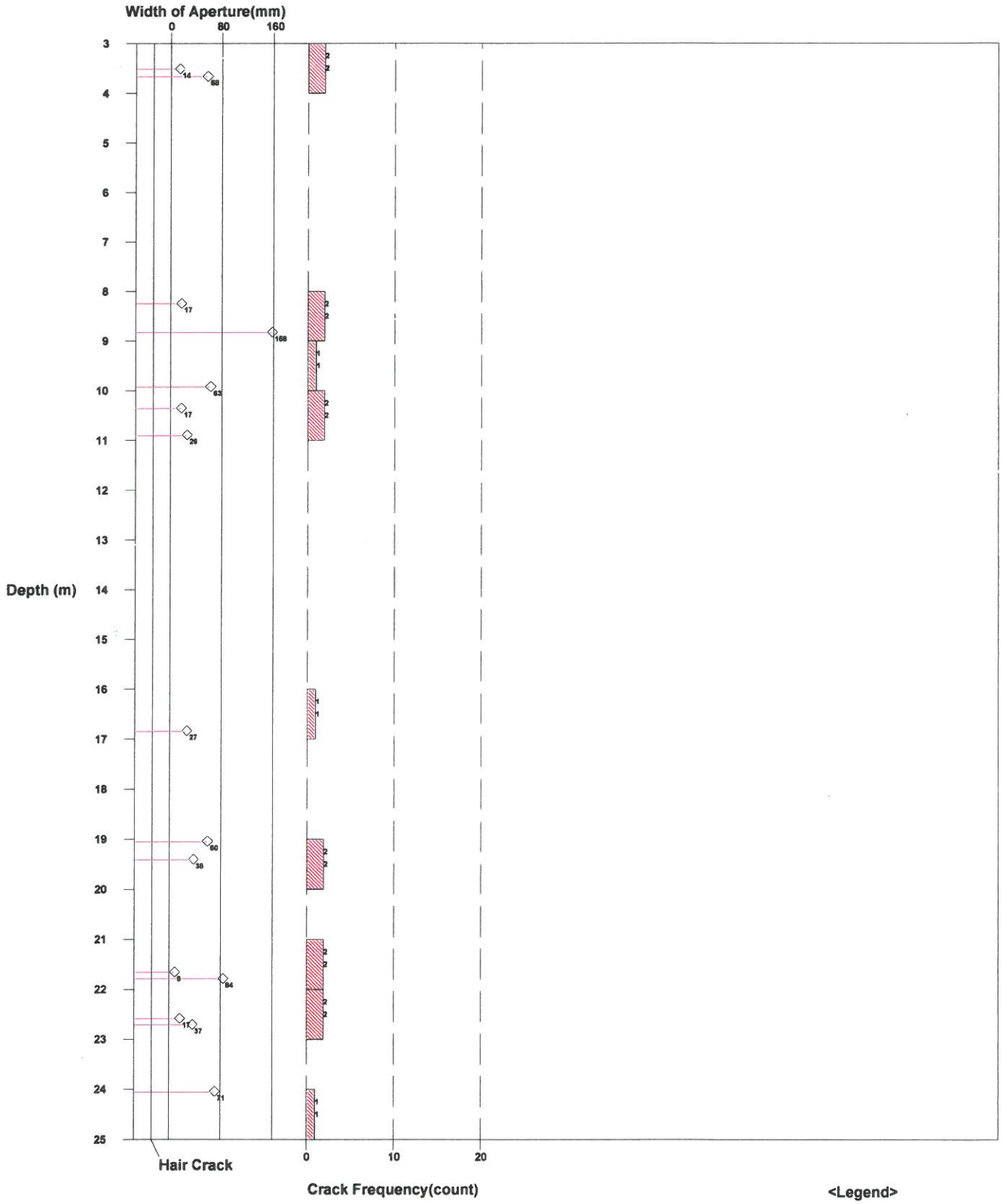


Fig. Rock Mass Condition Graph

Title: BH22.STR
Comment: FAULT
Depth: 3.518 - 24.044 m
Aperture: 0.3 - 158.0 mm

Sort: 1/ 7
Form: 8/ 8
Condition: 11/11
Remark: 11/11

2009/ 9/ 1

Elevation: 0.000m
Water Level: 14.830m

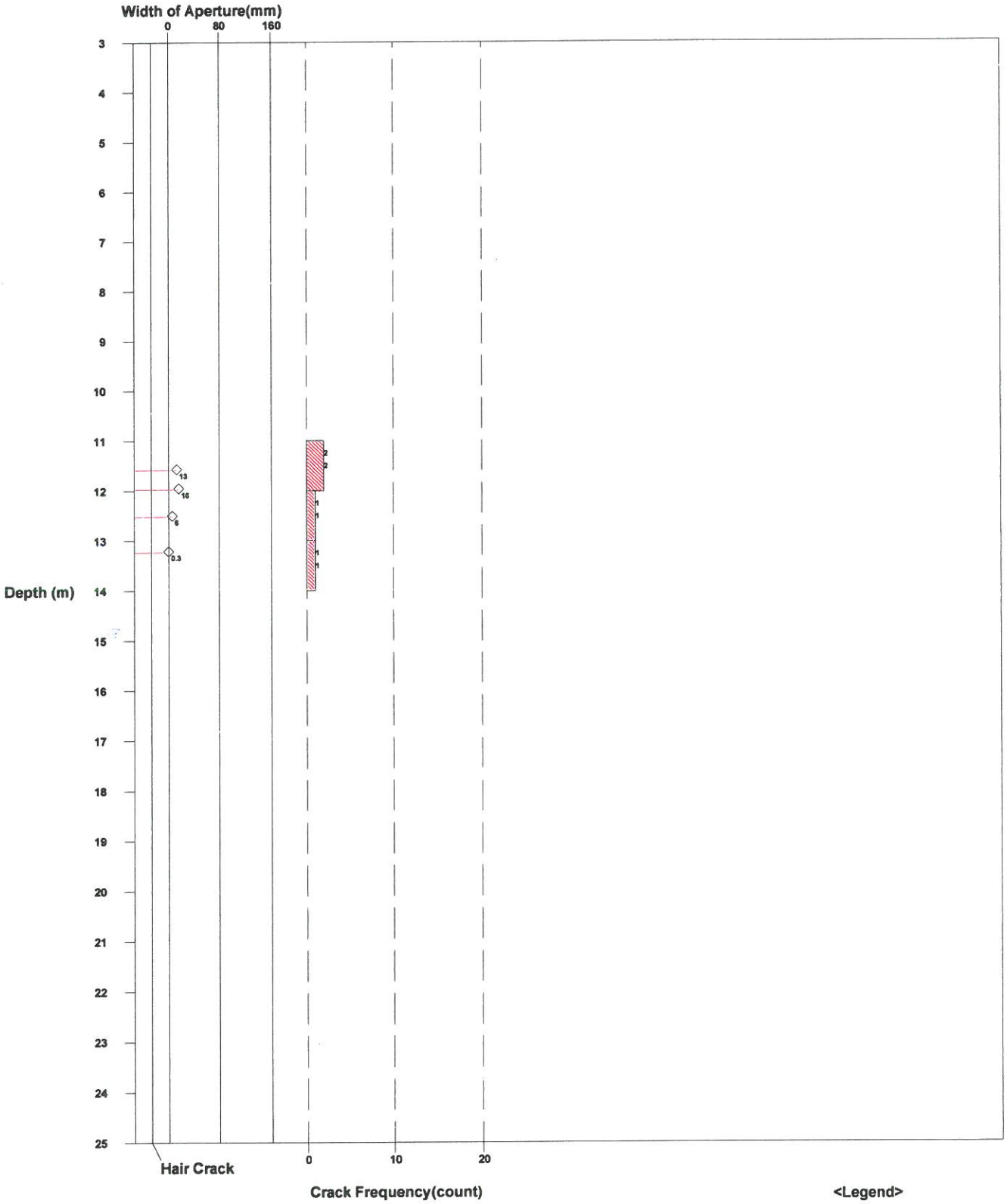
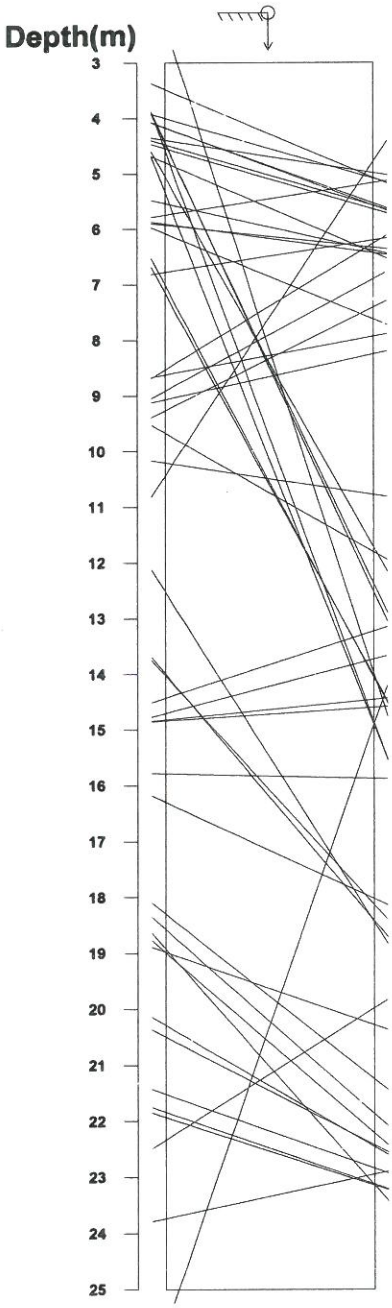


Fig. Rock Mass Condition Graph

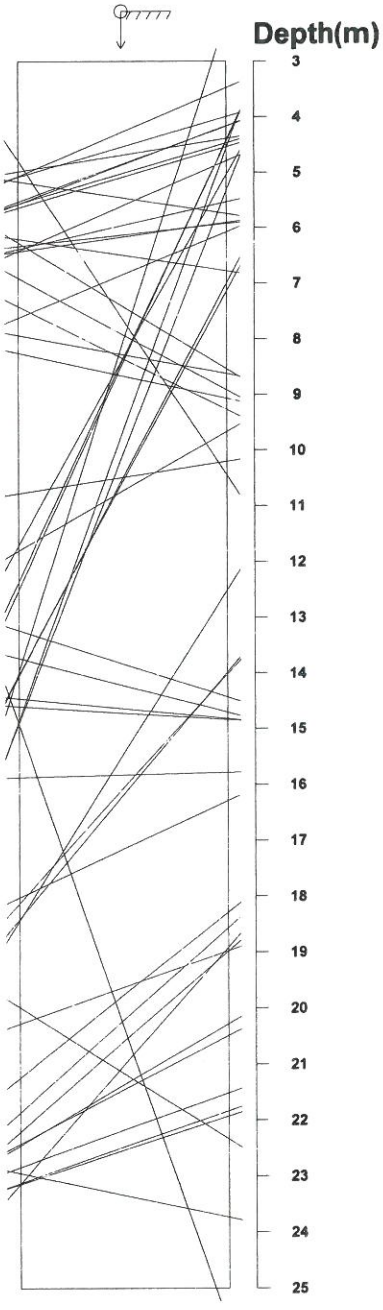
Title: BH22.STR
Comment: JOINT
Depth: 3.518 - 24.044 m
Aperture: 0.3 - 158.0 mm

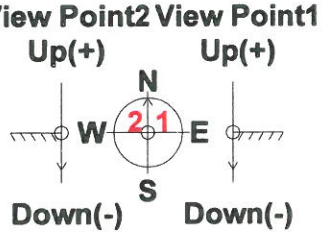
Sort: 1/ 7
Form: 8/ 8
Condition: 11/11
Remark: 11/11

View Point 2
Profile of Apparent Borehole



View Point 1
Profile of Apparent Borehole





Direction: 0 deg
Inclination: Vertical(Down)

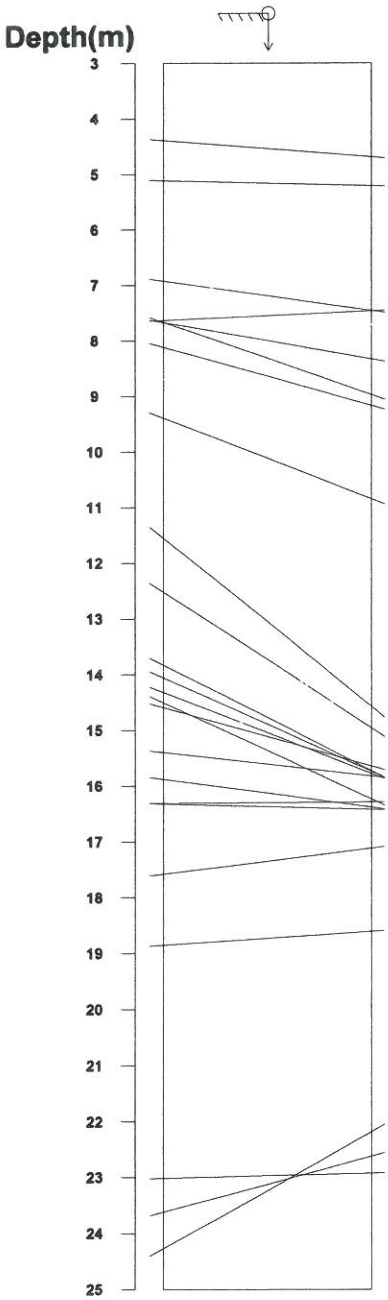
<Legend>
Entrance G.L
Bottom

Fig. Apparent Dip

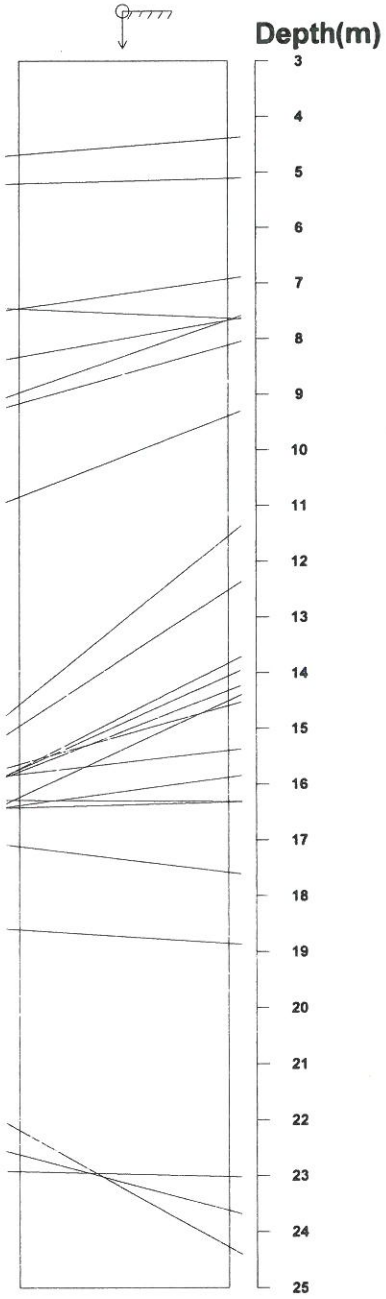
Title: BH22.STR
Comment: PARTING
Depth: 3.518 - 24.044 m
Aperture: 0.3 - 158.0 mm

Sort: 1/ 7
Form: 8/ 8
Condition: 11/11
Remark: 11/11

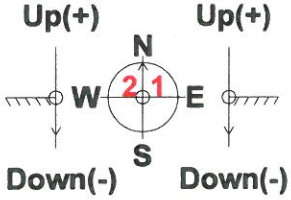
View Point 2
Profile of Apparent Borehole



View Point 1
Profile of Apparent Borehole



View Point2 View Point1



Direction: 0 deg
Inclination: Vertical(Down)

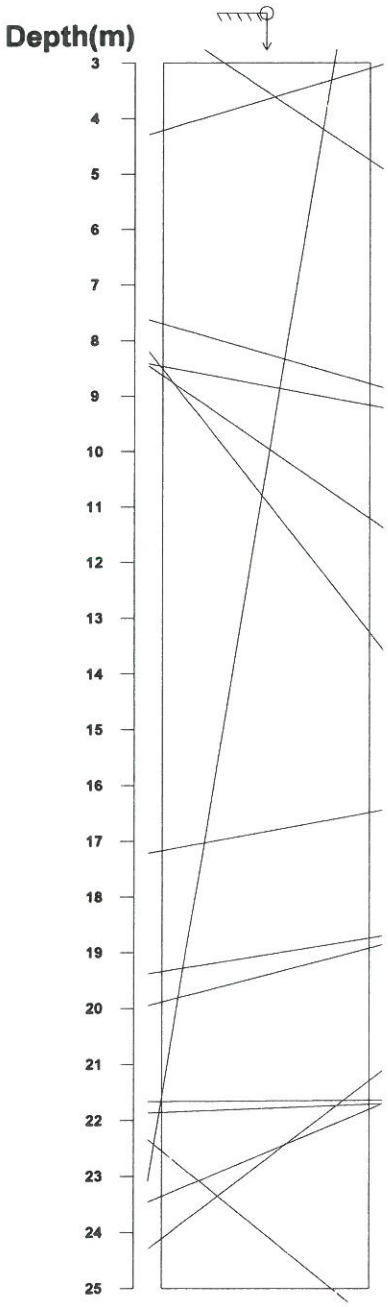
<Legend>
Entrance G.L
Bottom

Fig. Apparent Dip

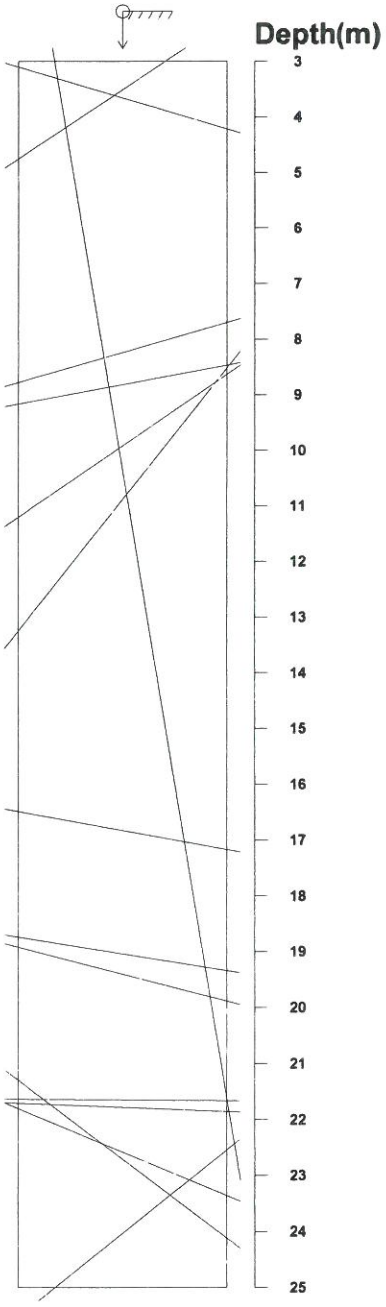
Title: BH22.STR
Comment: SHEAR ZONE
Depth: 3.518 - 24.044 m
Aperture: 0.3 - 158.0 mm

Sort: 1/ 7
Form: 8/ 8
Condition: 11/11
Remark: 11/11

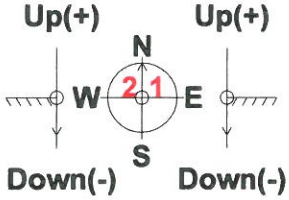
View Point 2
Profile of Apparent Borehole



View Point 1
Profile of Apparent Borehole



View Point2 View Point1



Direction: 0 deg
Inclination: Vertical(Down)

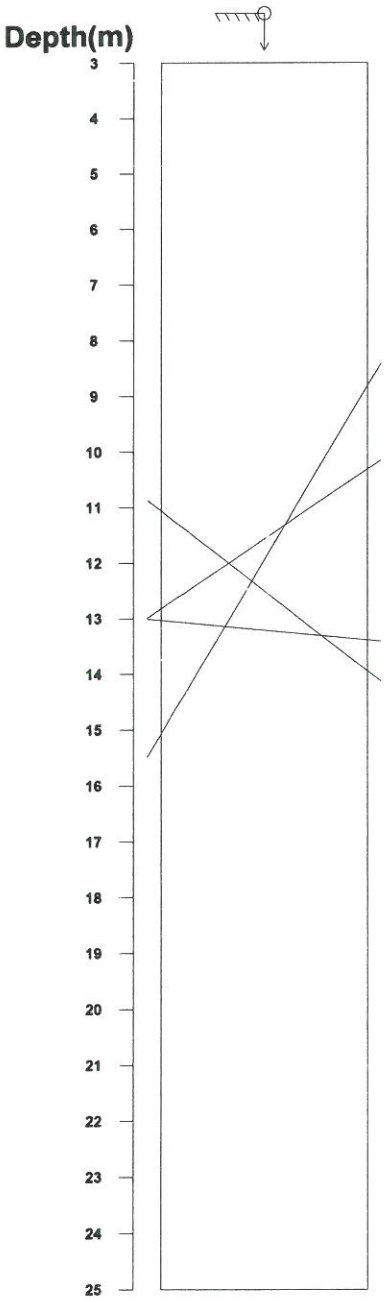
<Legend>
Entrance G.L
Bottom

Fig. Apparent Dip

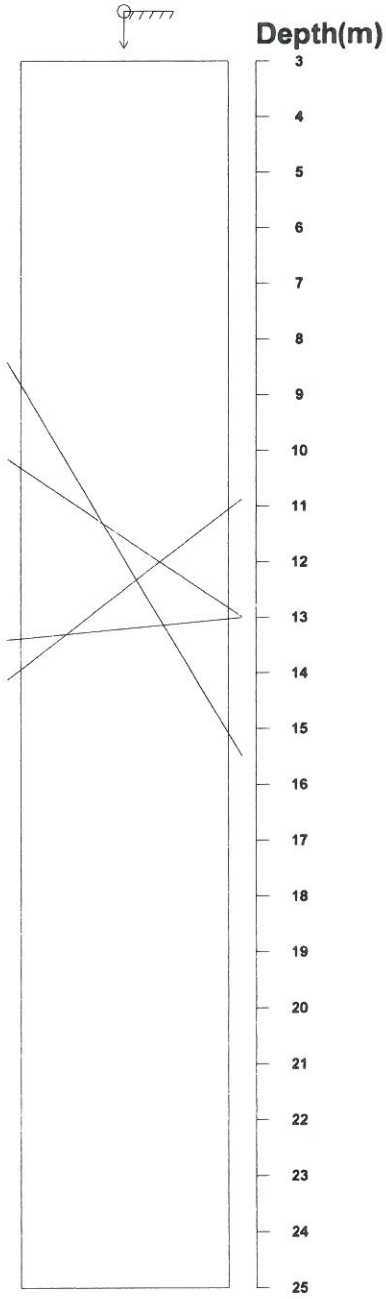
Title: BH22.STR
Comment: FAULT
Depth: 3.518 - 24.044 m
Aperture: 0.3 - 158.0 mm

Sort: 1/ 7
Form: 8/ 8
Condition: 11/11
Remark: 11/11

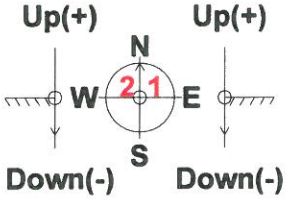
View Point 2
Profile of Apparent Borehole



View Point 1
Profile of Apparent Borehole



View Point2 View Point1



Direction: 0 deg
Inclination: Vertical(Down)

<Legend>
Entrance G.L
Bottom

Fig. Apparent Dip