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ENGINEERING BOREHOLE LOG

FOR GEOTECHNICAL TERMS AND
SYMBOLS REFER FORM F:GEOT 017/6-2010

BOREHOLE No BH C13

SHEET 1 of 2

REFERENCE No H11106

PROJECT Bruce Highway Upgrade (Cooroy to Curra) Section C
 LOCATION Cut 6 COORDINATES 472798.1 E; 7091619.2 N
 PROJECT No FG5799 SURFACE R.L. 91.80m PLUNGE _____ DATE STARTED 09/08/11 GRID DATUM MGA94
 JOB No 232/10A/2 HEIGHT DATUM AHD BEARING _____ DATE COMPLETED 09/08/11 DRILLER Cairns Drilling Contract

DEPTH (m)	R.L. (m)	AUGER CASING WASH BORING CORE DRILLING	RQD (%)	SAMPLE	MATERIAL DESCRIPTION	LITHOLOGY	USC WEATHERING	INTACT STRENGTH	DEFECT SPACING (mm)	GRAPHIC LOG	ADDITIONAL DATA AND TEST RESULTS	SAMPLES TESTS
0	91.80											
	91.60				TOPSOIL: Brown.							
	91.30				Clayey SAND (Residual):		(SC)					
1				A	SANDSTONE (HW): Red/brown/pale grey, fine to medium grained, massive, generally low to medium strength.						Based on driller's logs only	
			(13)		Defects: -XW Clayey seams throughout sizing up to 170mm. -Joint at 20°-25° (3-4/m) -Joint at 60° (1/m) -Joint at subvertical (1-2/m)						30/130 N>50	SPT
2					Defect spacing is mainly close. Defect surfaces are planar or irregular, tight or closed, rough, clay infilled, iron stained.							
3					Occassional pebble occurrence. Pebble fraction is subangular. Occassional siltstone interbeds up to 700mm.							
			(11)									
4												
5												
6												
			(27)									
7												
8												
9												
			(21)									
10												

REMARKS *Point load failed along existing defect

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ENGINEERING BOREHOLE LOG

FOR GEOTECHNICAL TERMS AND
SYMBOLS REFER FORM F:GEOT 017/6-2010

BOREHOLE No BH C13

SHEET 2 of 2

REFERENCE No H11106

PROJECT Bruce Highway Upgrade (Cooroy to Curra) Section C

LOCATION Cut 6 COORDINATES 472798.1 E; 7091619.2 N

PROJECT No FG5799 SURFACE R.L. 91.80m PLUNGE DATE STARTED 09/08/11 GRID DATUM MGA94

JOB No 232/10A/2 HEIGHT DATUM AHD BEARING DATE COMPLETED 09/08/11 DRILLER Cairns Drilling Contract

DEPTH (m)	R.L. (m)	AUGER CASING WASH BORING CORE DRILLING	RQD (%)	CORE REC %	SAMPLE	MATERIAL DESCRIPTION	LITHOLOGY	USC WEATHERING	INTACT STRENGTH	DEFECT SPACING (mm)	GRAPHIC LOG	ADDITIONAL DATA AND TEST RESULTS	SAMPLES TESTS
10	81.80					SANDSTONE (HW): Cont'd						Is(50) = 0.50MPa Is(50) = 0.69MPa	x o
				96				HW				Clayey Zone Siltstone Interbed	
	81.01			(9)		SANDSTONE (MW): Pale grey/slightly red, fine to medium grained, massive, mainly medium strength, indurated and/or slightly metamorphosed.						Is(50) = 0.44MPa Is(50) = 0.48MPa	x o
11						Defects: -Irregular closed fractures throughout. -Joint at 30°-40° (1/m)						Is(50) = 1.76MPa Is(50) = 1.12MPa	x o
12				(9)		Defect spacing is close. Defect surfaces are planar or irregular, tight or closed, rough, clay infilled, iron stained.		MW				HFZ, Closed fractures	
13	78.40					Borehole terminated at 13.4m						Is(50) = 0.47MPa Is(50) = 0.65MPa	x o
14													
15													
16													
17													
18													
19													
20													

REMARKS *Point load failed along existing defect

LOGGED BY
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CORE PHOTO LOG - BH C13

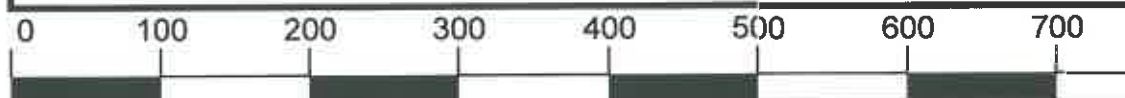
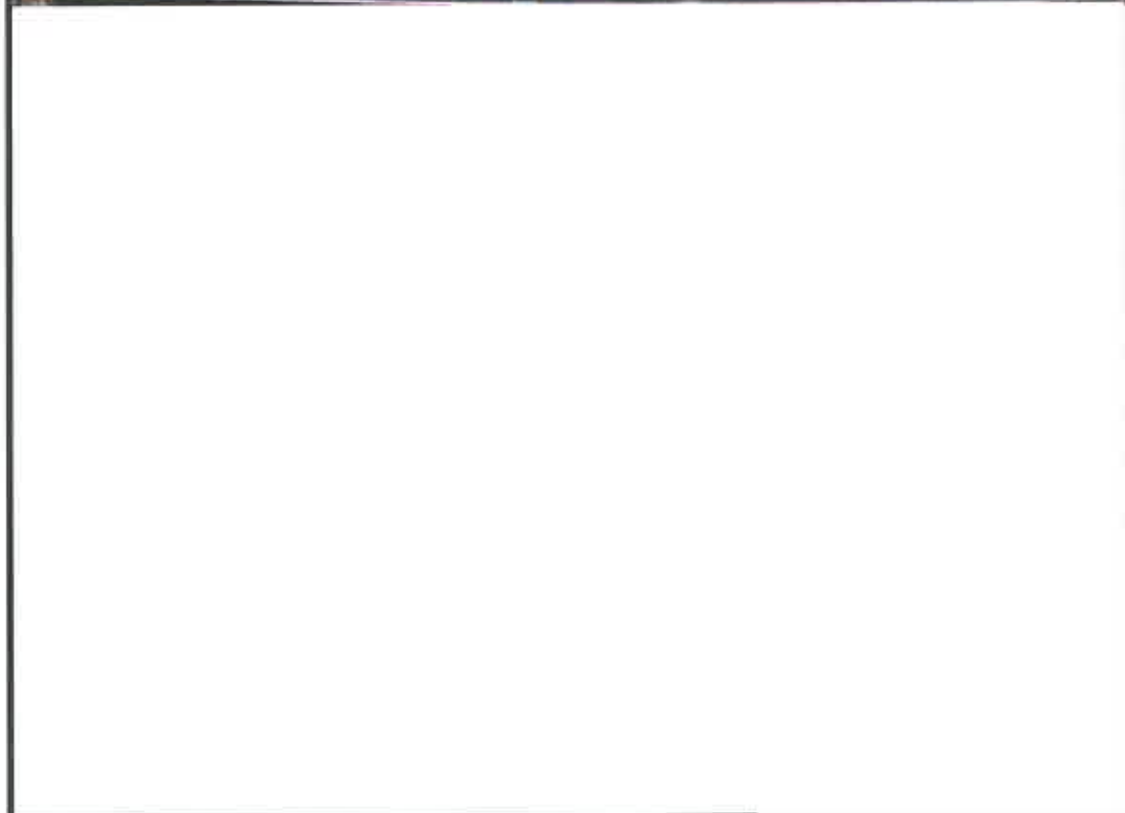
Project Name:	BRUCE HIGHWAY UPGRADE - SECTION C		
Project No.:	FG5799	Date:	06/09/2011
Details:	Cut 6	Start Depth (m):	1.50
Reference No.:	H11106	Finish Depth (m):	13.40



SCALE 1:5

CORE PHOTO LOG - BH C13

Project Name:	BRUCE HIGHWAY UPGRADE - SECTION C		
Project No.:	FG5799	Date:	06/09/2011
Details:	Cut 6	Start Depth (m):	1.50
Reference No.:	H11106	Finish Depth (m):	13.40



SCALE 1:5

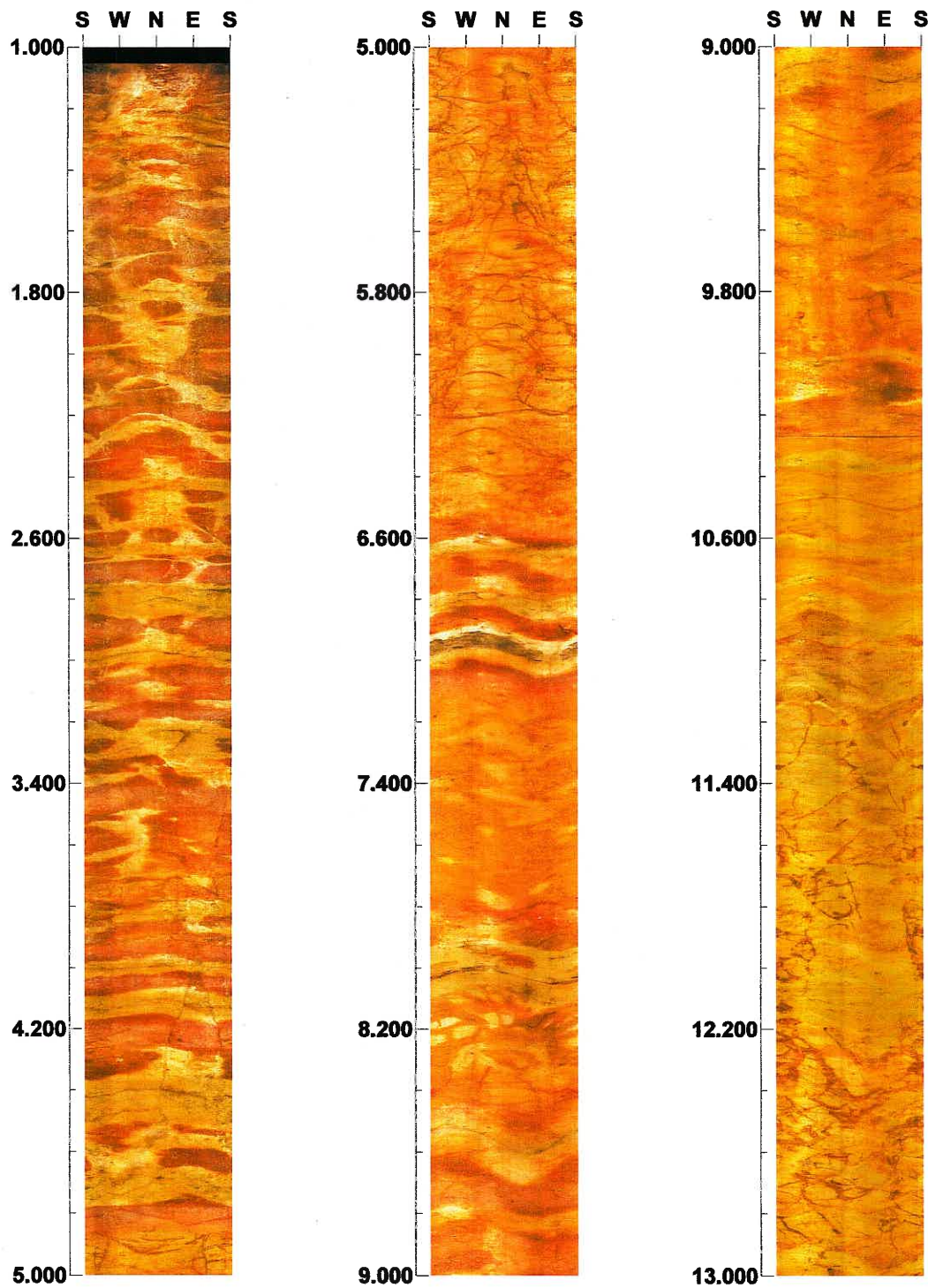
Project name: BRUCE HIGHWAY UPGRADE SECTION C

Bore hole No.: C-13

Azimuth: 0

Inclination: -90

Depth range: 1.000 - 13.000 m



Scale: 1/20

Aspect ratio: 200 %

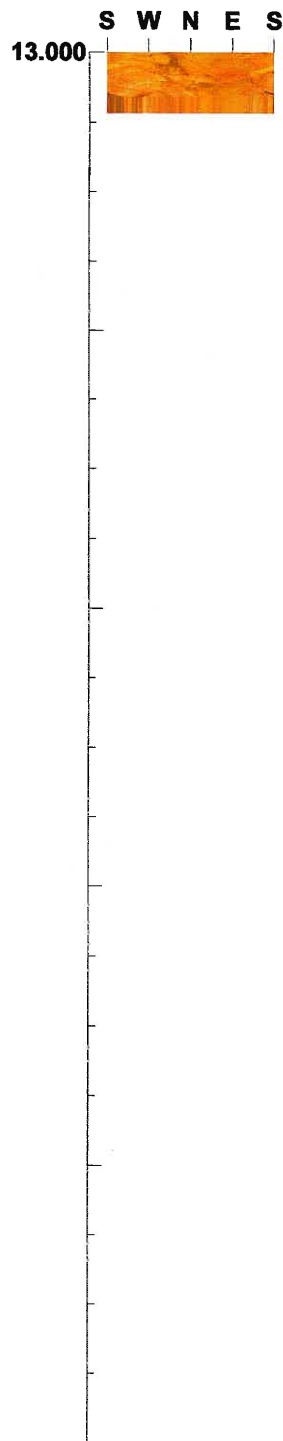
Project name: BRUCE HIGHWAY UPGRADE SECTION C

Bore hole No.: C-13

Azimuth: 0

Inclination: -90

Depth range: 13.000 - 13.172 m



Scale: 1/20

Aspect ratio: 200 %

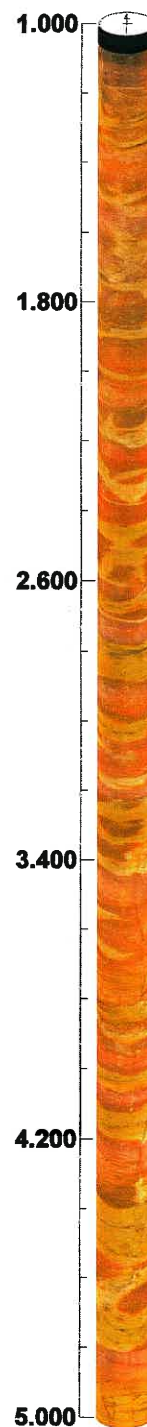
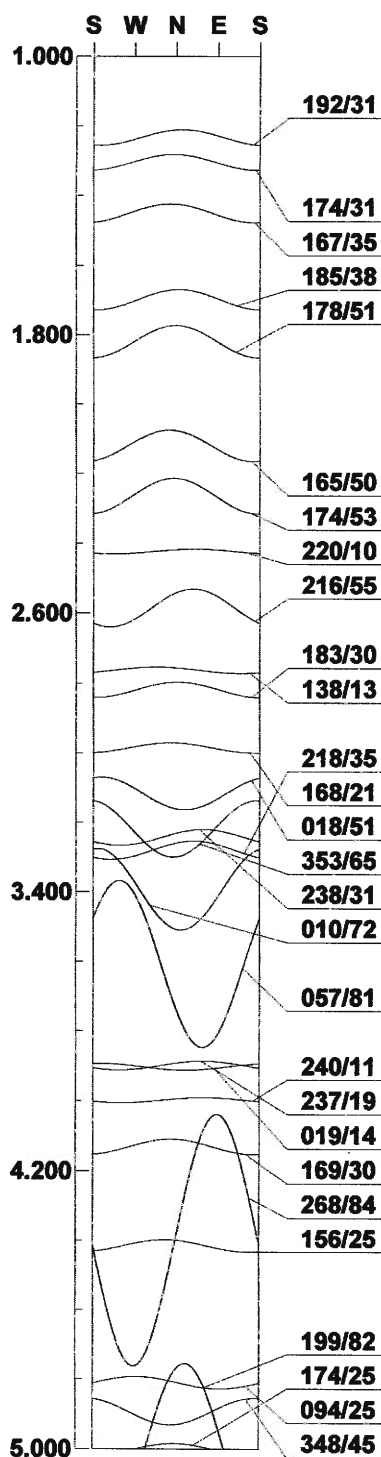
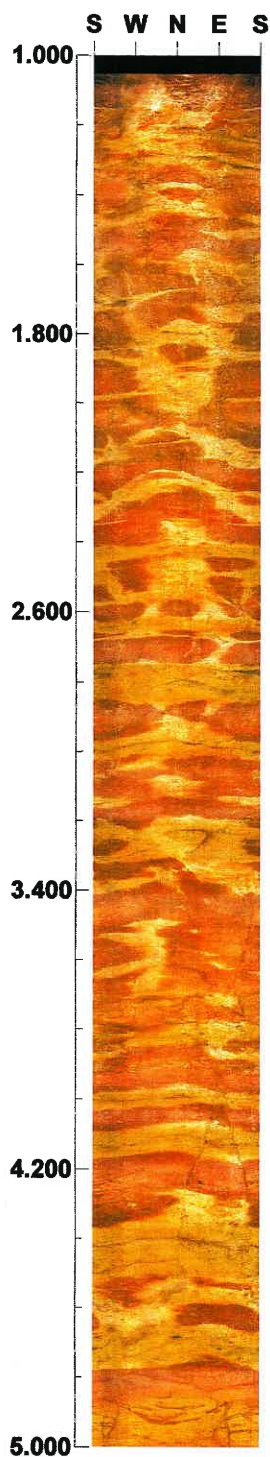
Project name: BRUCE HIGHWAY UPGRADE SECTION C

Bore hole No.: C-13

Azimuth: 0

Inclination: -90

Depth range: 1.000 - 5.000 m



Scale: 1/20

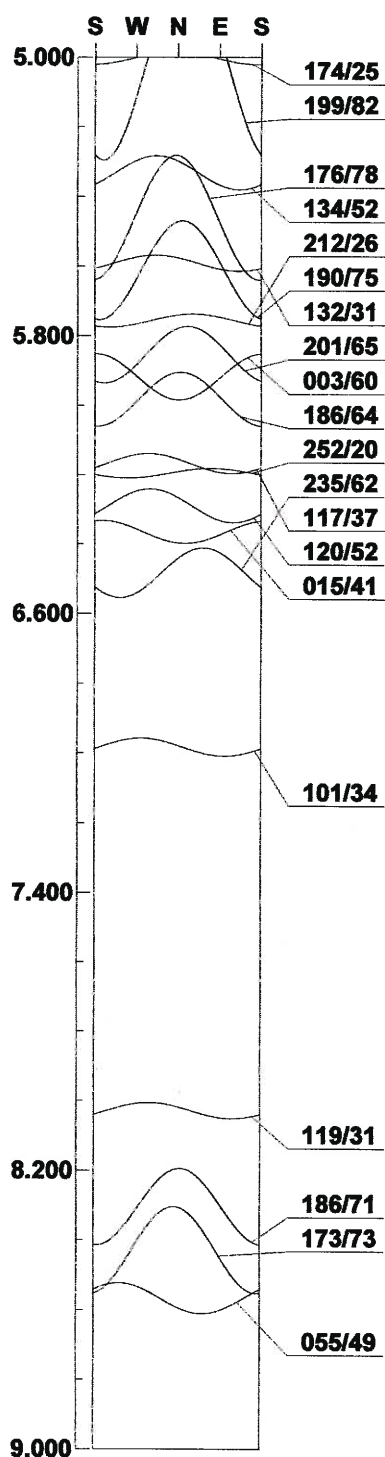
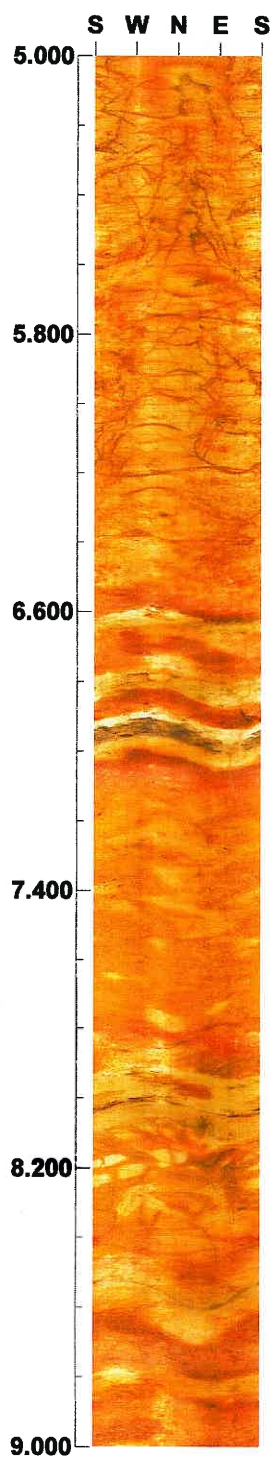
Aspect ratio: 200 %

Project name: BRUCE HIGHWAY UPGRADE SECTION C
Bore hole No.: C-13

Azimuth: 0

Inclination: -90

Depth range: 5.000 - 9.000 m



Scale: 1/20

Aspect ratio: 200 %

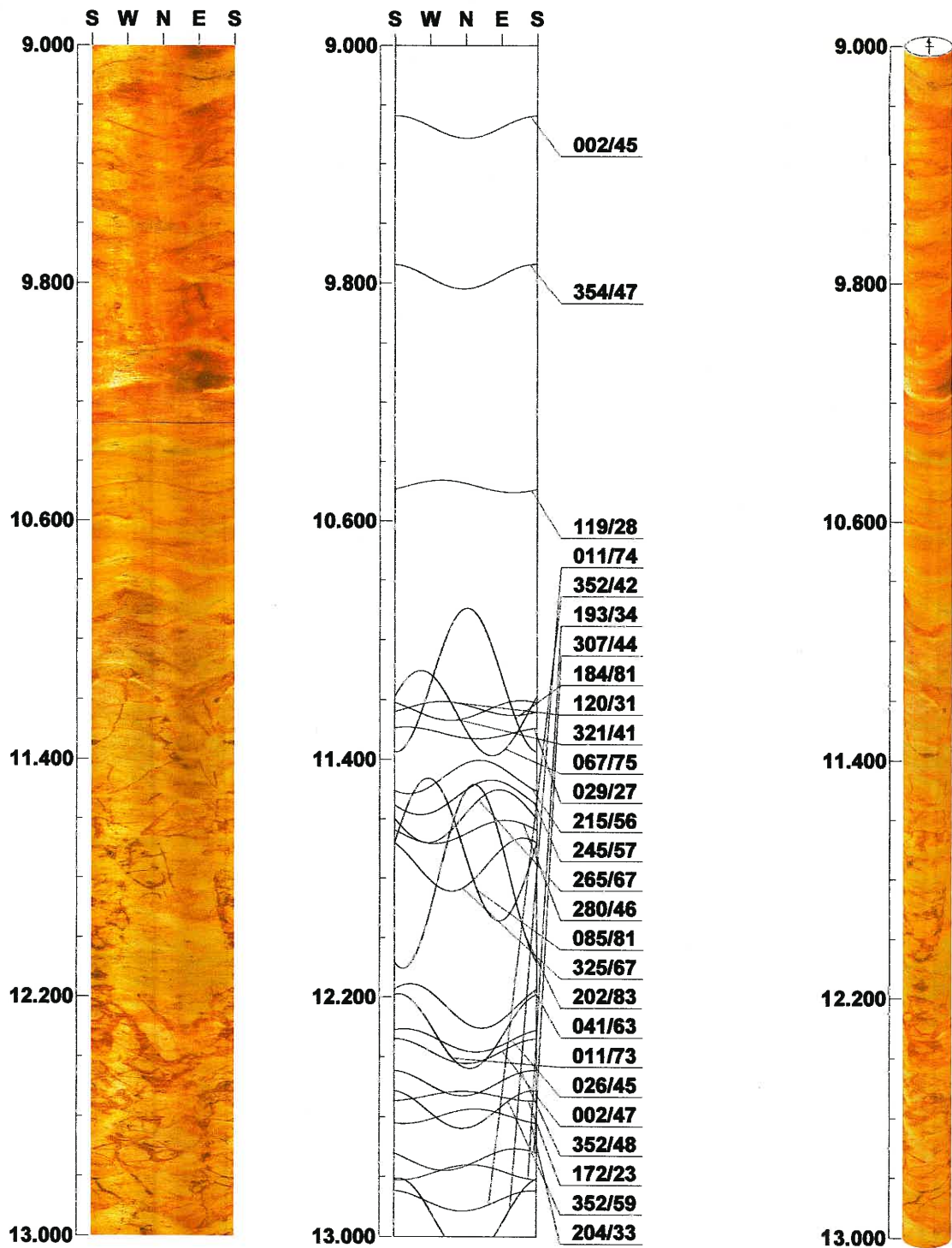
Project name: BRUCE HIGHWAY UPGRADE SECTION C

Bore hole No.: C-13

Azimuth: 0

Inclination: -90

Depth range: 9.000 - 13.000 m



Scale: 1/20

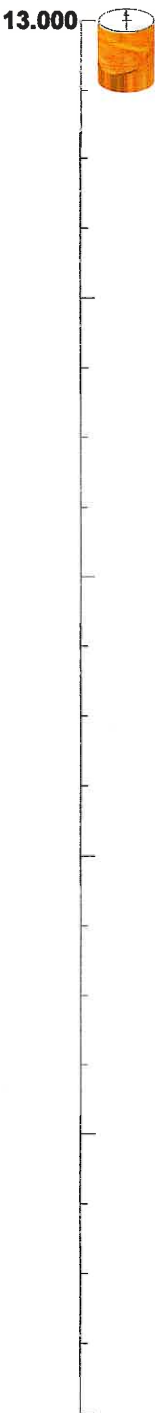
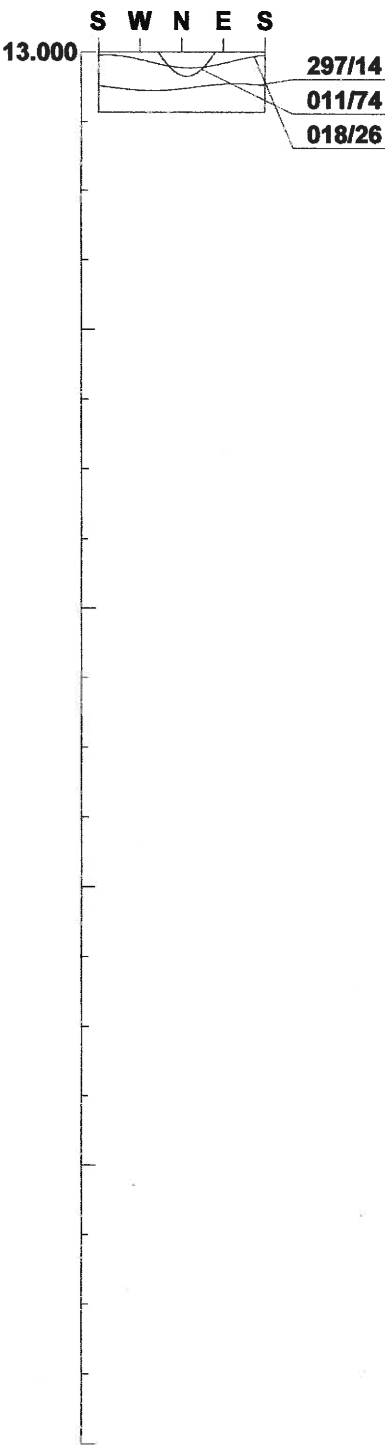
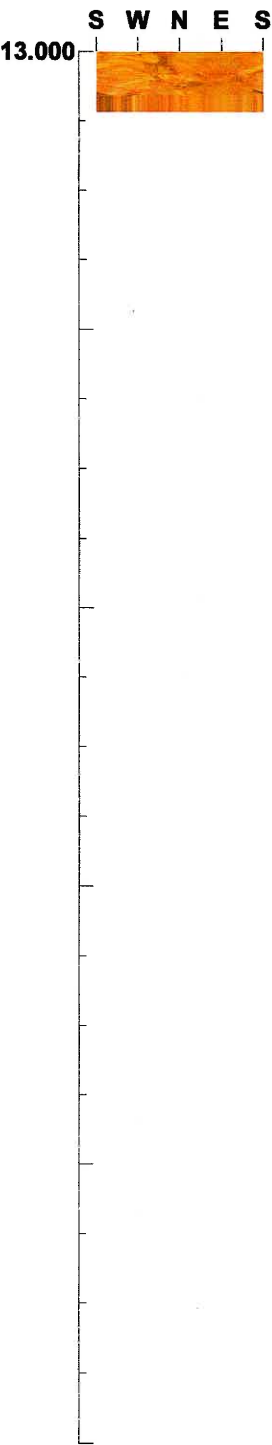
Aspect ratio: 200 %

Project name: BRUCE HIGHWAY UPGRADE SECTION C
Bore hole No.: C-13

Azimuth: 0

Inclination: -90

Depth range: 13.000 - 13.172 m



Scale: 1/20 Aspect ratio: 200 %

Tab. Table of Discontinuity (1 / 2)

File name: C-13.STR

[]

No.	Depth (m)	Dir/Dip	Sort	Aperture (mm)	Form	Condition	Remark
1	1.234	192/31	Joint	3.0	Planar	Weathered	Open
2	1.305	174/31	Joint	3.0	Planar	Weathered	Open
3	1.451	167/35	Joint	3.0	Planar	Weathered	Open
4	1.699	185/38	Joint	5.0	Planar	Weathered	Open
5	1.820	178/51	Joint	0.5	Planar	Weathered	Open
6	2.120	165/50	Joint	0.5	Planar	Weathered	Open
7	2.264	174/53	Joint	0.5	Planar	Weathered	Open
8	2.423	220/10	Joint	1.0	Planar	Weathered	Open
9	2.585	216/55	Joint	0.5	Planar	Weathered	Open
10	2.762	138/13	Joint	0.5	Planar	Rough	Open
11	2.818	183/30	Joint	0.5	Planar	Weathered	Open
12	2.984	168/21	Joint	1.0	Planar	Weathered	Open
13	3.116	018/51	Joint	0.3	Planar	Smooth	Open
14	3.218	353/65	Joint	0.5	Planar	Smooth	Open
15	3.243	238/31	Joint	0.5	Planar	Weathered	Open
16	3.280	218/35	Joint	0.3	Planar	Smooth	Open
17	3.392	010/72	Joint	0.3	Planar	Smooth	Open
18	3.607	057/81	Joint	0.5	Planar	Smooth	Open
19	3.899	237/19	Joint	0.5	Planar	Smooth	Open
20	3.903	019/14	Joint	0.5	Planar	Smooth	Open
21	3.998	240/11	Joint	1.0	Planar	Weathered	Open
22	4.131	169/30	Joint	0.5	Planar	Weathered	Open
23	4.400	268/84	Joint	1.0	Undulating	Rough	Open
24	4.415	156/25	Joint	1.0	Planar	Smooth	Open
25	4.810	094/25	Joint	1.0	Planar	Rough	Open
26	4.893	348/45	Joint	0.5	Planar	Rough	Open
27	5.003	174/25	Joint	0.5	Planar	Smooth	Open
28	5.025	199/82	Joint	1.0	Undulating	Rough	Open
29	5.332	134/52	Joint	1.0	Planar	Rough	Open
30	5.461	176/78	Joint	1.0	Undulating	Rough	Open
31	5.591	132/31	Joint	1.0	Planar	Rough	Open
32	5.612	190/75	Joint	1.0	Undulating	Rough	Open
33	5.756	212/26	Joint	1.0	Planar	Rough	Open
34	5.854	201/65	Joint	0.5	Undulating	Rough	Open
35	5.918	003/60	Joint	1.0	Planar	Rough	Open
36	5.982	186/64	Joint	0.5	Planar	Rough	Open
37	6.167	117/37	Joint	0.5	Planar	Smooth	Open
38	6.195	252/20	Joint	3.0	Planar	Mineralized	Open
39	6.289	120/52	Joint	1.0	Planar	Smooth	Open
40	6.365	015/41	Joint	0.5	Planar	Smooth	Open
41	6.483	235/62	Joint	0.5	Planar	Smooth	Open
42	6.982	101/34	Foliation	0.0	Planar	Smooth	Tight
43	8.028	119/31	Parting	1.0	Planar	Smooth	Open
44	8.304	186/71	Joint	0.5	Undulating	Smooth	Open
45	8.428	173/73	Joint	0.3	Undulating	Smooth	Open
46	8.566	055/49	Joint	0.5	Planar	Smooth	Open
47	9.275	002/45	Joint	0.5	Planar	Smooth	Open
48	9.778	354/47	Joint	0.5	Planar	Rough	Open
49	10.483	119/28	Parting	1.0	Planar	Smooth	Open
50	11.134	184/81	Joint	0.5	Planar	Rough	Open

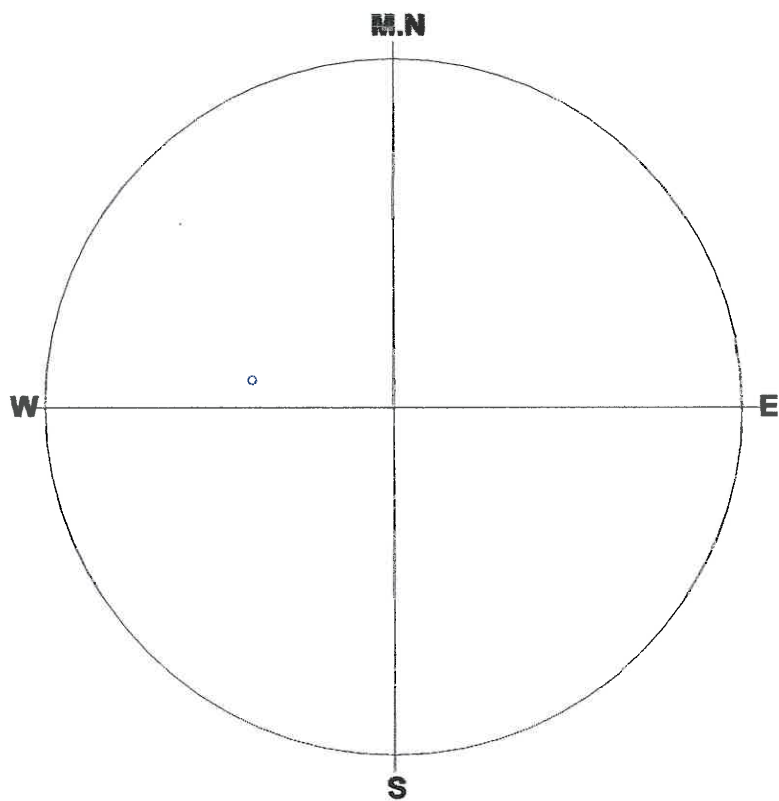
Tab. Table of Discontinuity (2 / 2)

File name: C-13.STR
[]

No.	Depth (m)	Dir/Dip	Sort	Aperture (mm)	Form	Condition	Remark
51	11.228	120/31	Joint	0.5	Planar	Rough	Open
52	11.235	321/41	Joint	0.5	Planar	Rough	Open
53	11.244	067/75	Joint	0.3	Planar	Rough	Tight
54	11.310	029/27	Joint	0.5	Planar	Smooth	Open
55	11.458	215/56	Joint	0.5	Undulating	Rough	Open
56	11.527	245/57	Joint	0.5	Planar	Rough	Open
57	11.590	265/67	Joint	0.5	Planar	Rough	Open
58	11.643	280/46	Joint	0.5	Planar	Smooth	Open
59	11.702	085/81	Joint	0.5	Planar	Rough	Open
60	11.753	325/67	Joint	0.5	Planar	Rough	Open
61	11.793	202/83	Joint	0.5	Undulating	Rough	Open
62	12.229	041/63	Joint	1.0	Planar	Smooth	Open
63	12.313	011/73	Joint	2.0	Planar	Brec/crus'd	Open
64	12.344	026/45	Joint	0.5	Planar	Smooth	Open
65	12.380	002/47	Joint	0.5	Planar	Smooth	Open
66	12.486	352/48	Joint	0.5	Planar	Rough	Open
67	12.529	172/23	Joint	0.5	Planar	Rough	Open
68	12.574	352/59	Joint	0.5	Planar	Rough	Open
69	12.597	204/33	Joint	0.5	Planar	Rough	Open
70	12.742	307/44	Joint	0.5	Planar	Rough	Open
71	12.785	193/34	Joint	1.0	Planar	Smooth	Open
72	12.880	352/42	Joint	0.5	Planar	Rough	Open
73	12.937	011/74	Joint	0.5	Undulating	Rough	Open
74	13.027	018/26	Joint	0.5	Planar	Rough	Open
75	13.101	297/14	Joint	0.5	Planar	Rough	Open

C-13.STR

<<FOLIATION>>



Number of Data : 1/75

<Legend>

○:Foliation	--	1	+ :Mineralban-	0
◇:Joint	--	0		
□:Parting	--	0		
△:Fault	--	0		
▽:ShearZone	--	0		
×:Vein	--	0		

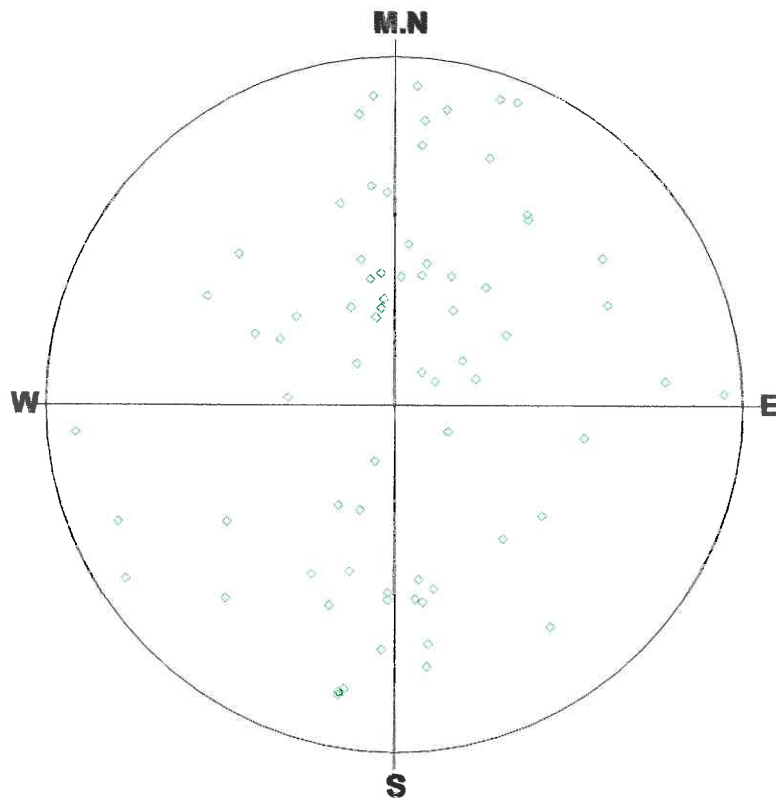
Schmidt (L.H)

Depth : 1.234 - 13.101 m

Aperture : 0.0 - 5.0 mm

C-13.STR

<<JOINT>>



Number of Data : 72/75

<Legend>

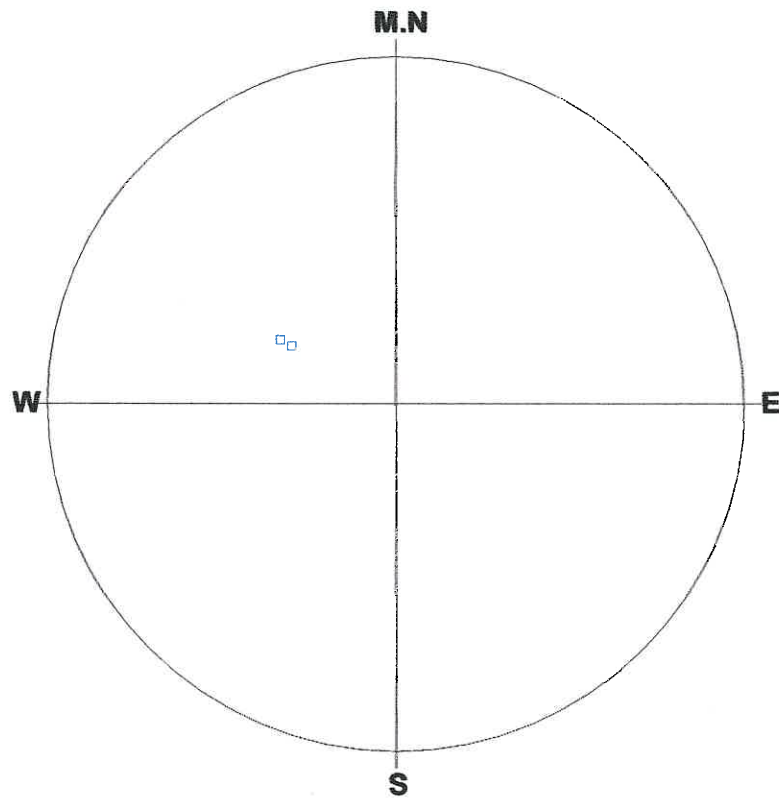
○:Foliation	--	0	+ :Mineralban	0
◇:Joint	--	72		
□:Parting	--	0		
△:Fault	--	0		
▽:ShearZone	--	0		
×:Vein	--	0		

Schmidt (L.H)

Depth : 1.234 - 13.101 m

Aperture : 0.0 - 5.0 mm

C-13.STR
<<PARTING>>



Number of Data : 2/75

<Legend>

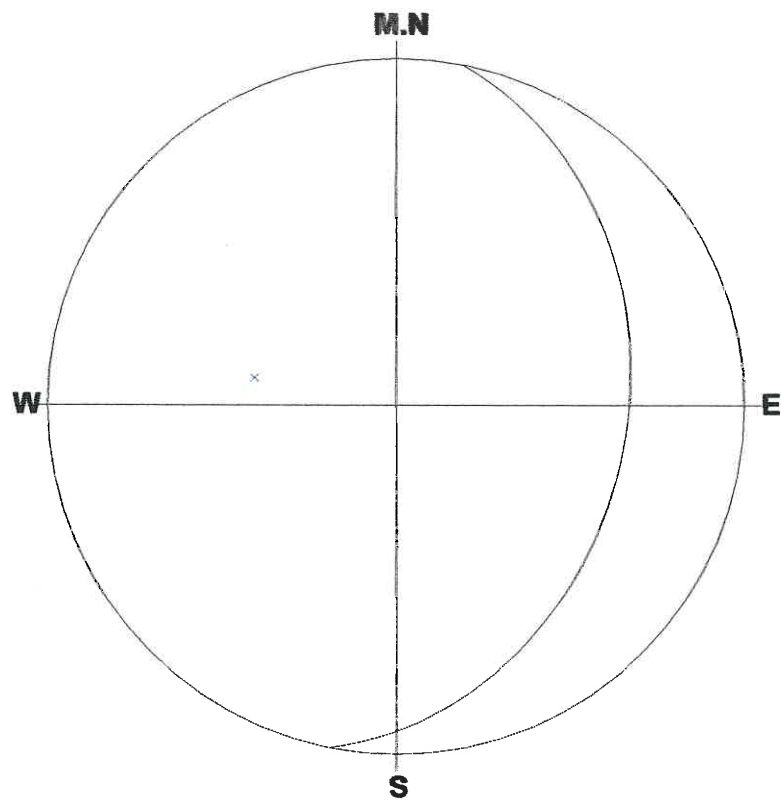
○:Foliation	--	0	+ :Mineralban-	0
◇:Joint	--	0		
□:Parting	--	2		
△:Fault	--	0		
▽:ShearZone-		0		
×:Vein	--	0		

Schmidt (L.H)

Depth : 1.234 - 13.101 m

Aperture : 0.0 - 5.0 mm

C-13.STR
<<FOLIATION>>



Number of Data:1/75

1 : 101/34(42)

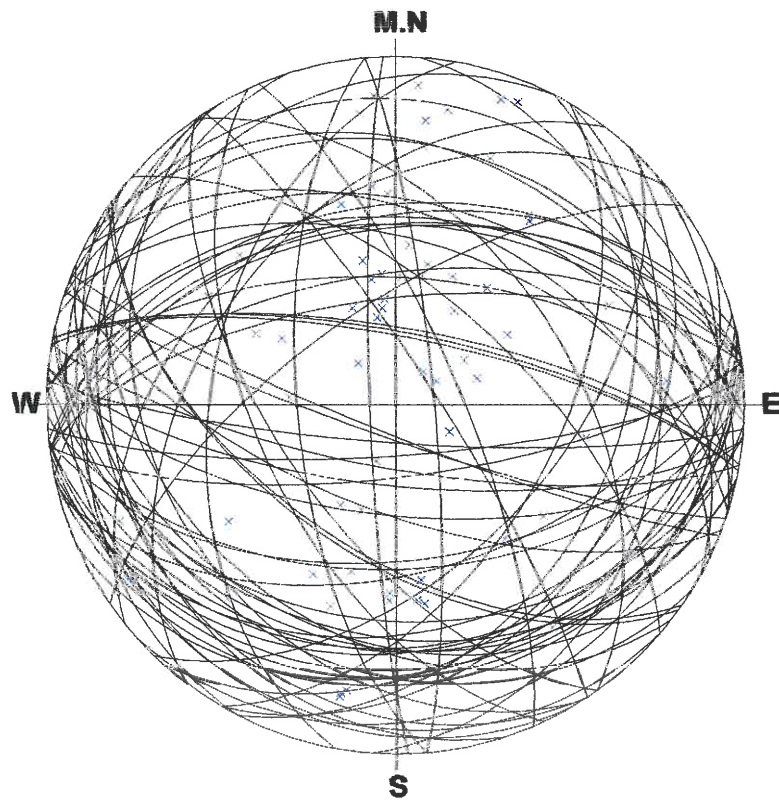
Schmidt (L.H)

Depth : 1.234 - 13.101 m

Aperture : 0.0 - 5.0 mm

C-13.STR

<<JOINT>>



Number of Data:72/75

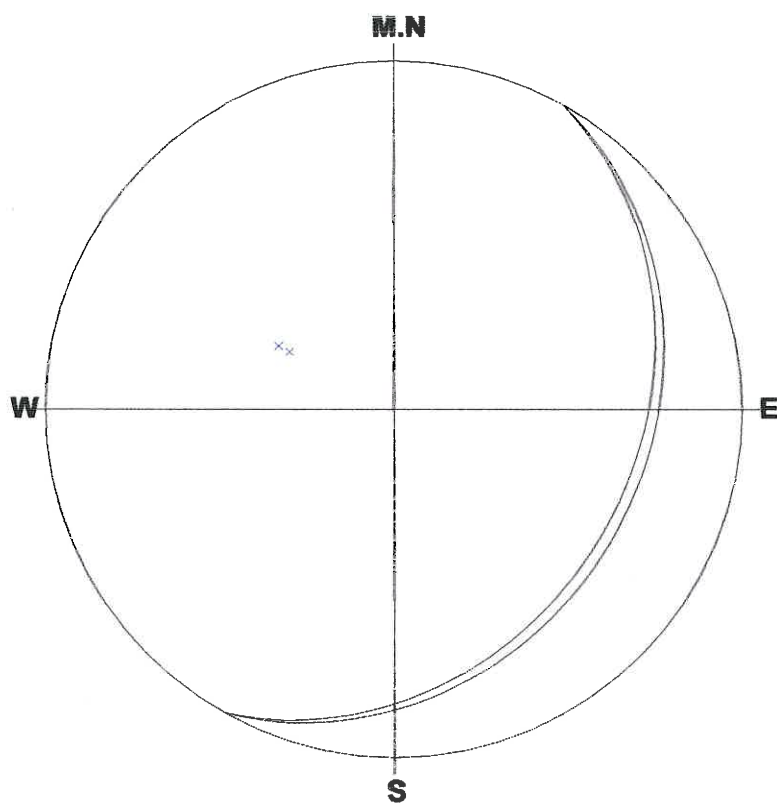
1 : 192/31(1)	6 : 165/50(6)
2 : 174/31(2)	7 : 174/53(7)
3 : 167/35(3)	8 : 220/10(8)
4 : 185/38(4)	9 : 216/55(9)
5 : 178/51(5)	10 : 138/13(10)

Schmidt (L.H)

Depth : 1.234 - 13.101 m

Aperture : 0.0 - 5.0 mm

C-13.STR
<<PARTING>>



Number of Data:2/75

1 : 119/31(43)

2 : 119/28(49)

Schmidt (L.H)

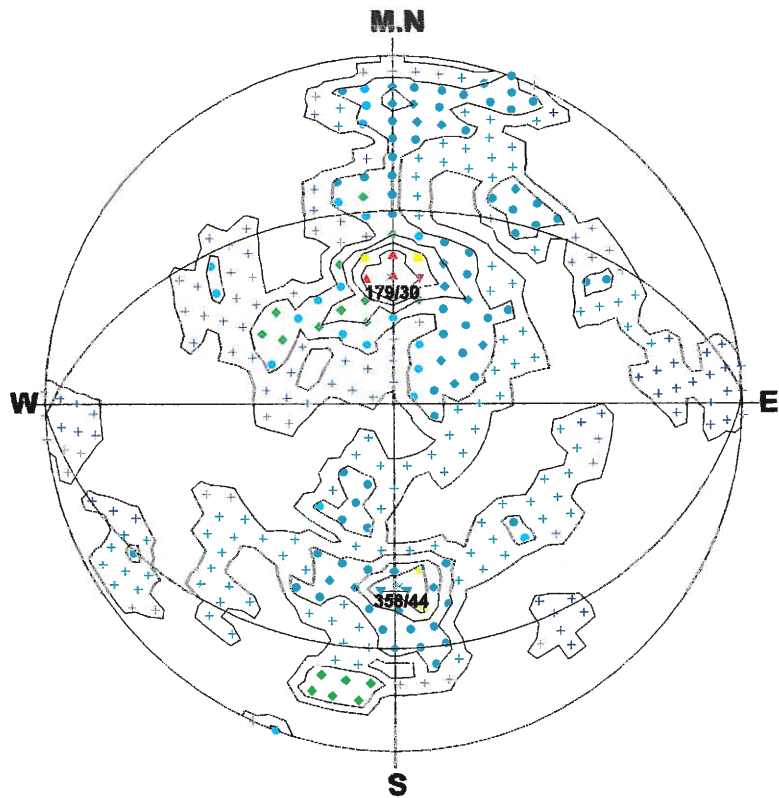
Depth : 1.234 - 13.101 m

Aperture : 0.0 - 5.0 mm

C-13.STR

<<JOINT>>

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



Number of Data : 72

<Legend> Sym. (%)

- ▲ : 9
- ▼ : 7 - 9
- : 5 - 7
- ◆ : 3 - 5
- : 1 - 3
- ✚ : 0 - 1

Contour Value (%)

- Contour 1 : 0
- Contour 2 : 1
- Contour 3 : 3
- Contour 4 : 5
- Contour 5 : 7
- Contour 6 : 9



Schmidt (L.H)

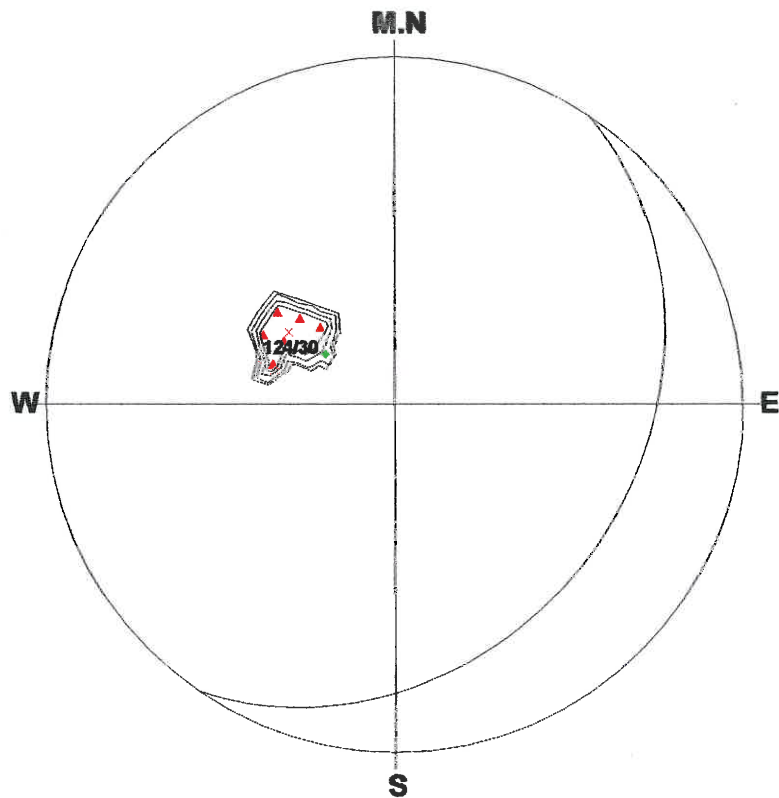
Depth : 1.234 - 13.101 m

Aperture : 0.0 - 5.0 mm

C-13.STR

<<PARTING>>

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



Number of Data : 2

<Legend> Sym. (%)

- ▲ : 100
- ▼ : 80 - 100
- : 60 - 80
- ◆ : 40 - 60
- : 20 - 40
- ⊕ : 0 - 20

Contour Value (%)

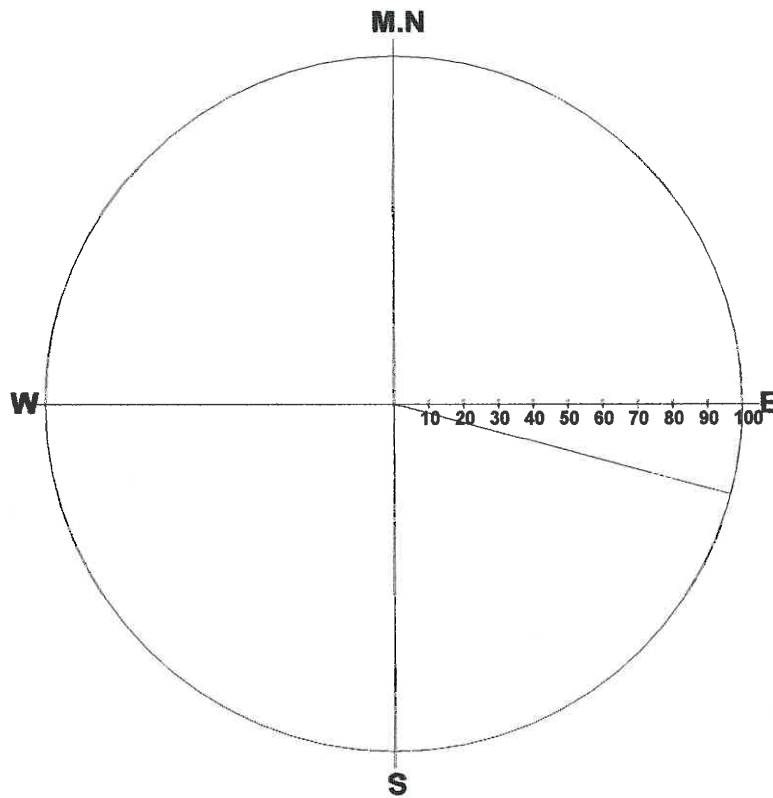
- Contour 1 : 0 ☐
- Contour 2 : 20 ☐
- Contour 3 : 40 ☐
- Contour 4 : 60 ☐
- Contour 5 : 80 ☐
- Contour 6 : 100 ☐

Schmidt (L.H)

Depth : 1.234 - 13.101 m

Aperture : 0.0 - 5.0 mm

C-13.STR
<<FOLIATION>>



Number of Data : 1/75

Max : 100.0%

Grouping Angle : 15 deg

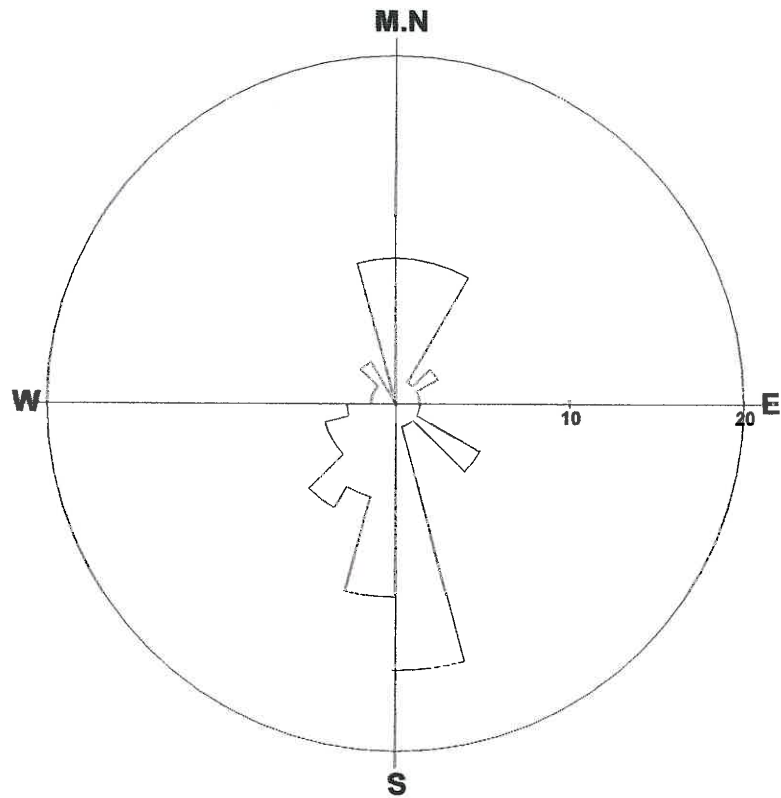
Dir	%	Dir	%	Dir	%
0-	0	135-	0	270-	0
15-	0	150-	0	285-	0
30-	0	165-	0	300-	0
45-	0	180-	0	315-	0
60-	0	195-	0	330-	0
75-	0	210-	0	345-	0
90-	100	225-	0		
105-	0	240-	0		
120-	0	255-	0		

Depth : 1.234 - 13.101 m

Aperture : 0.0 - 5.0 mm

C-13.STR

<<JOINT>>



Number of Data : 72/75

Max : 15.3%

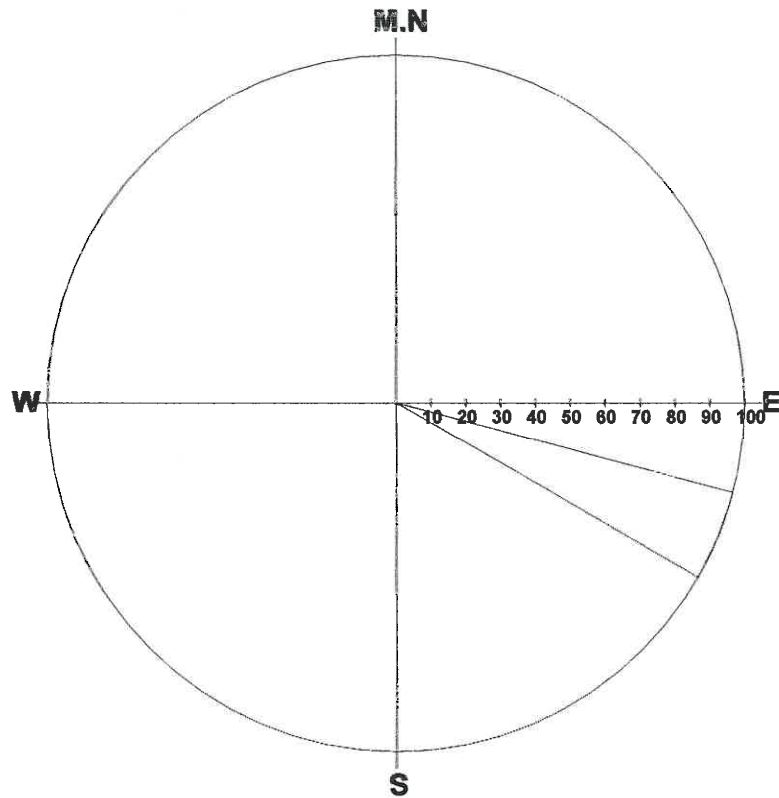
Grouping Angle : 15 deg

Dir	%	Dir	%	Dir	%
0-	8	135-	1	270-	1
15-	8	150-	1	285-	1
30-	1	165-	15	300-	1
45-	3	180-	11	315-	3
60-	1	195-	6	330-	0
75-	1	210-	7	345-	8
90-	1	225-	4		
105-	1	240-	4		
120-	6	255-	3		

Depth : 1.234 - 13.101 m

Aperture : 0.0 - 5.0 mm

C-13.STR
<<PARTING>>



Number of Data : 2/75

Max : 100.0%

Grouping Angle : 15 deg

Dir	%	Dir	%	Dir	%
0-	0	135-	0	270-	0
15-	0	150-	0	285-	0
30-	0	165-	0	300-	0
45-	0	180-	0	315-	0
60-	0	195-	0	330-	0
75-	0	210-	0	345-	0
90-	0	225-	0		
105-	100	240-	0		
120-	0	255-	0		

Depth : 1.234 - 13.101 m

Aperture : 0.0 - 5.0 mm

Title: C-13.STR
 Comment: JOINT
 Depth: 1.234 - 13.101 m
 Aperture: 0.0 - 5.0 mm

Sort: 1/ 7
 Form: 5/ 5
 Condition: 11/11
 Remark: 9/ 9

2011/ 8/ 13
 Elevation: 0.000m
 Water Level: 10.300m

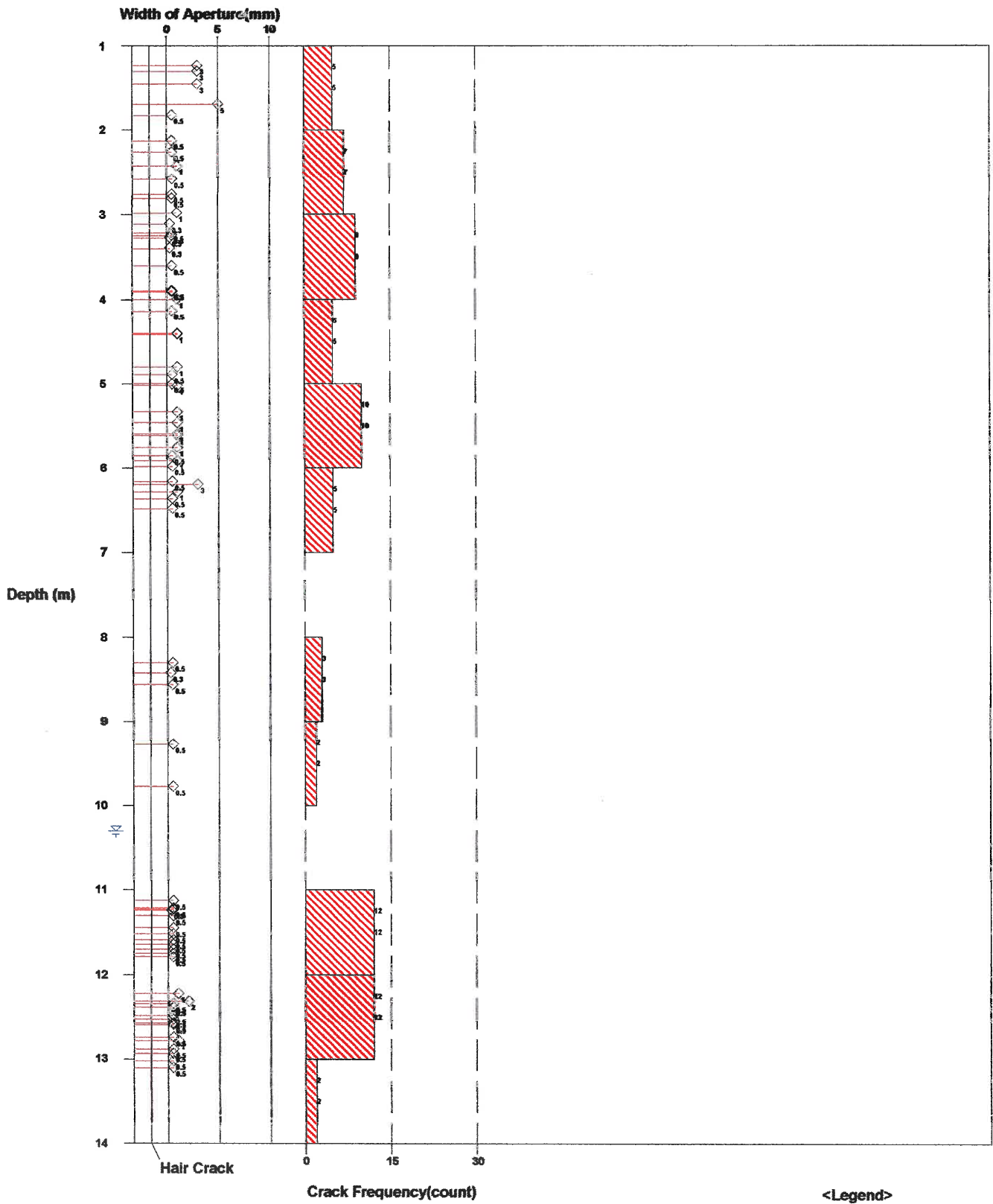


Fig. Rock Mass Condition Graph

☒ All Crack Frequency
☐ Open Crack Frequency
 Water Level

Title: C-13.STR
 Comment: PARTING
 Depth: 1.234 - 13.101 m
 Aperture: 0.0 - 5.0 mm

Sort: 1/ 7
 Form: 5/ 5
 Condition: 11/11
 Remark: 9/ 9

2011/ 8/ 13
 Elevation: 0.000m
 Water Level: 10.300m

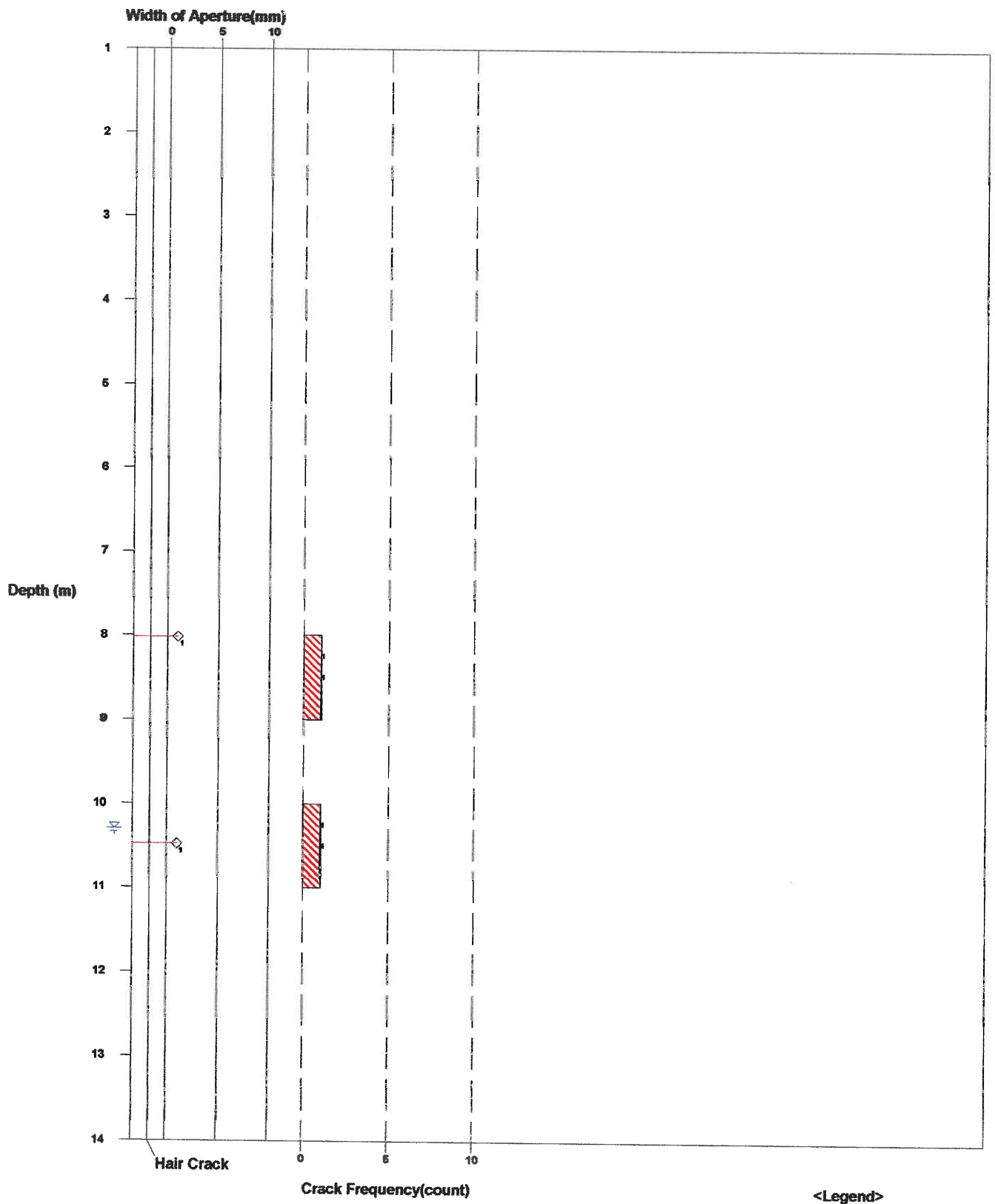


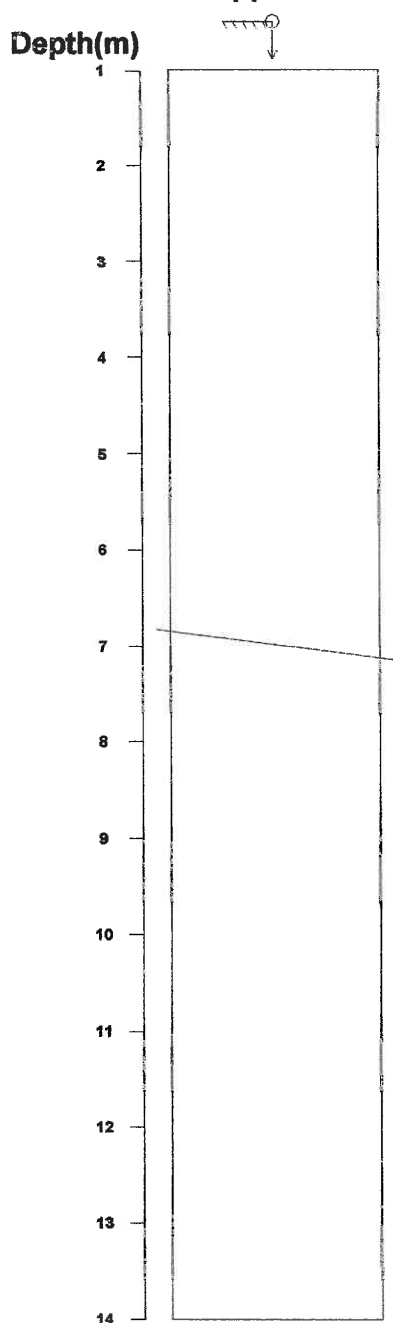
Fig. Rock Mass Condition Graph

☒ All Crack Frequency
☐ Open Crack Frequency
 Water Level

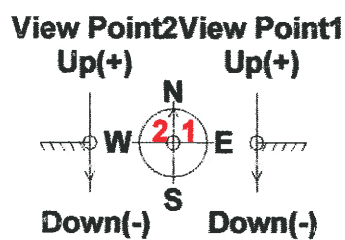
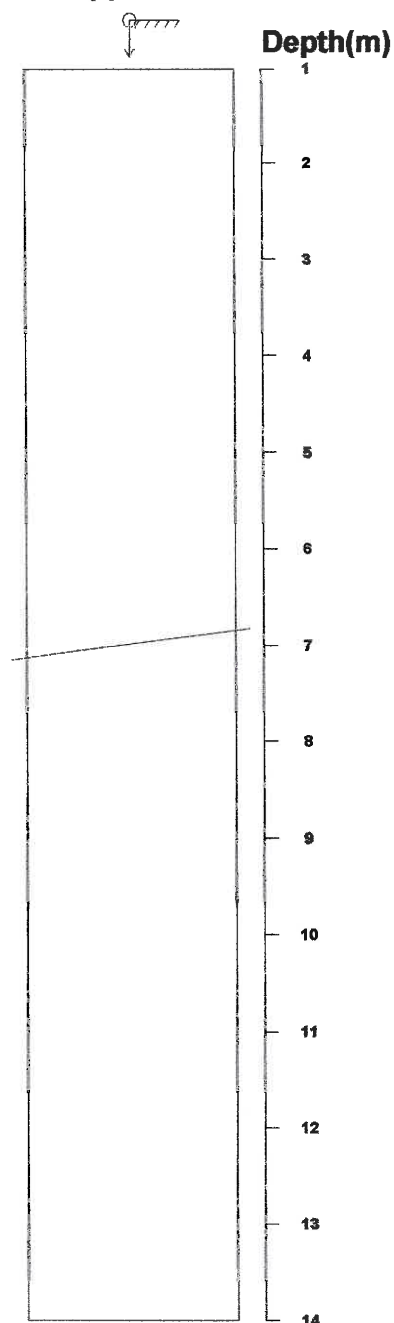
Title: C-13.STR
 Comment: FOLIATION
 Depth: 1.234 - 13.101 m
 Aperture: 0.0 - 5.0 mm

Sort: 1/ 7
 Form: 5/ 5
 Condition: 11/11
 Remark: 9/ 9

View Point 2
 Profile of Apparent Borehole



View Point 1
 Profile of Apparent Borehole



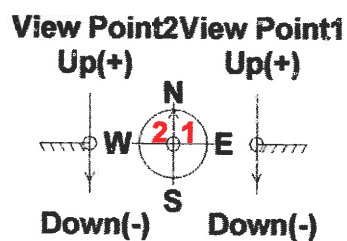
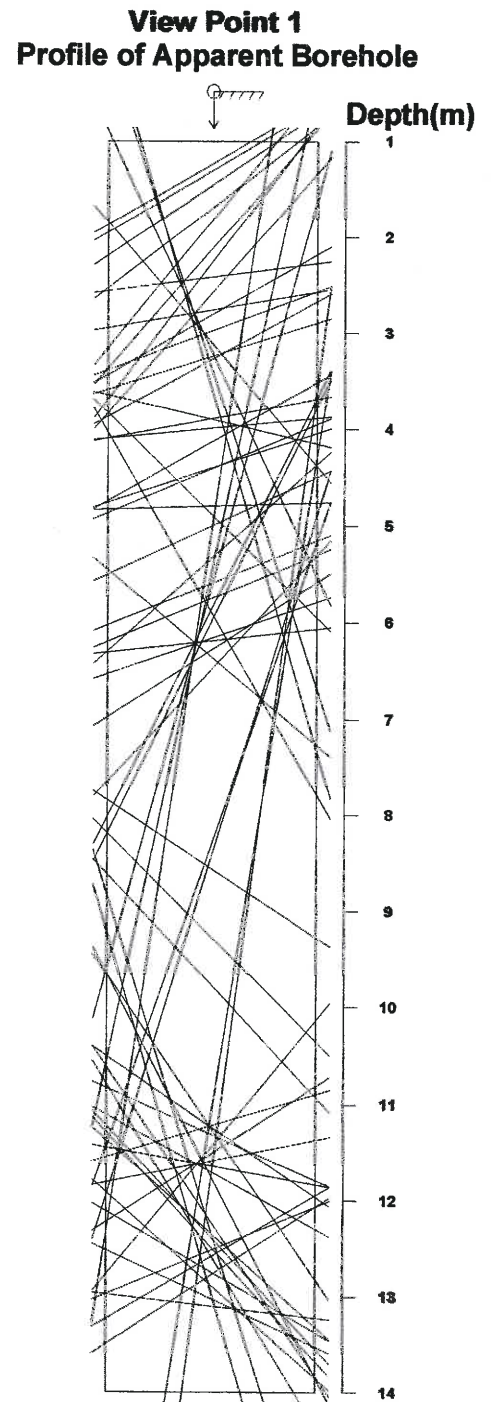
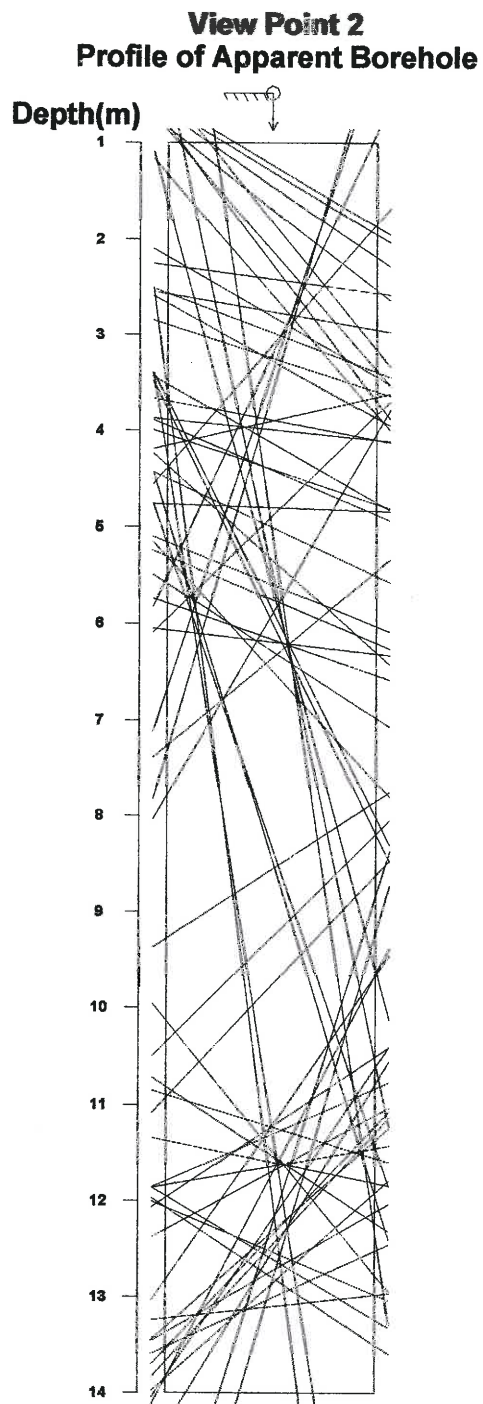
Direction: 0 deg
 Inclination: Vertical(Down)

<Legend>
 Entrance G.L.
 Bottom

Fig. Apparent Dip

Title: C-13.STR
Comment: JOINT
Depth: 1.234 - 13.101 m
Aperture: 0.0 - 5.0 mm

Sort: 1/ 7
Form: 5/ 5
Condition: 11/11
Remark: 9/ 9



Direction: 0 deg
Inclination: Vertical(Down)

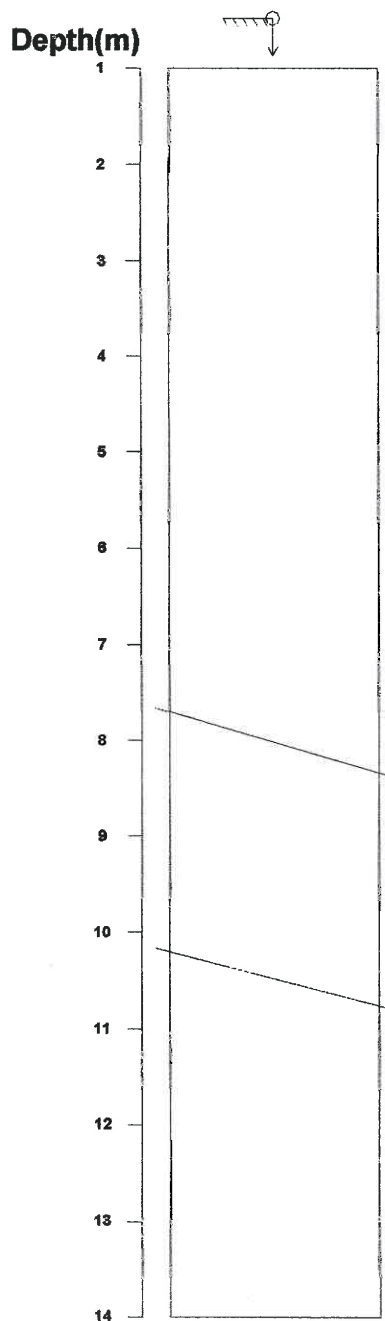
<Legend>
 Entrance G.L.
 Bottom

Fig. Apparent Dip

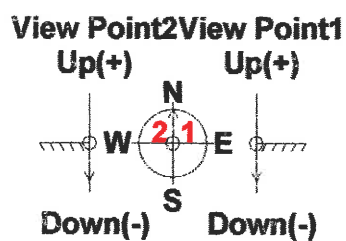
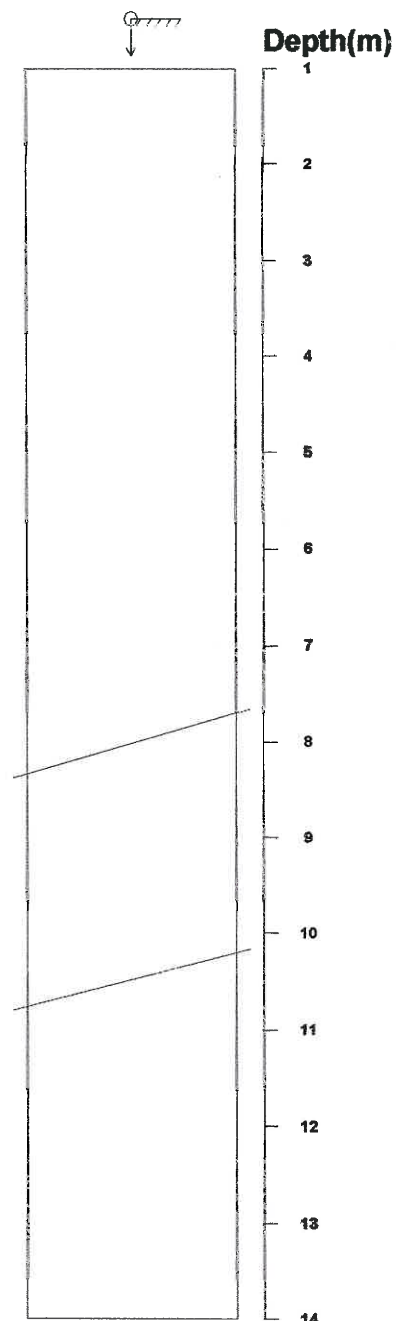
Title: C-13.STR
 Comment: SHEAR ZONE
 Depth: 1.234 - 13.101 m
 Aperture: 0.0 - 5.0 mm

Sort: 1/ 7
 Form: 5/ 5
 Condition: 11/11
 Remark: 9/ 9

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