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ENGINEERING BOREHOLE LOG

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

BOREHOLE No BH C19
SHEET 1 of 2
REFERENCE No H11112

PROJECT Bruce Highway Upgrade (Cooroy to Curra) Section C
LOCATION Cut 7 COORDINATES 472656.8 E; 7092308.6 N
PROJECT No FG5799 SURFACE R.L. 91.80m PLUNGE DATE STARTED 05/08/11 GRID DATUM MGA94
JOB No 232/10A/2 HEIGHT DATUM AHD BEARING DATE COMPLETED 05/08/11 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
									CU	CH	UH	20	60	200			
0	91.80					TOPSOIL: Grey, loamy.											
0.40	91.40				A	SANDSTONE (XW): Orange/brown, fine grained.	XW								Based on drillers logs only	30/100 N>50	SPT
1.30	90.30		(28)			SANDSTONE (MW): Brown, fine grained, massive, medium strength, indurated and/or slightly metamorphosed. Defects: -Joint at 10° (2/m) -Joint at 40° (2-3/m) -Joint at 60° (2-3/m) Defects are generally closely spaced. Defects are planar, tight, slightly rough, clay infilled.	MW							J, 40°, Pl, T, Clnf XW Clay Seam J, 20°, Pl, T, Clnf Clayey Seam J, 60°, Pl, T, S, Clnf J, 10°, Pl, O, Clnf, 5mm J, 70°, Pl, T, SR, Clnf	Is(50) = 0.56MPa Is(50) = 0.39MPa	x o	
2.30	88.80		100 (0)			SILTSTONE (HW): Brown/grey, fine grained, massive, extremely low to very low strength. Indurated and/or slightly metamorphosed. Defects: -Clayey and broken throughout. -Joint at 80° (~5/m)	HW									Is(50) = 0.42MPa Ts(50) = 0.51MPa	x o
5.30	86.60					Boundary indistinct. ANDESITE (HW): Brown, fine grained, massive, very low to low strength. Defects: -Joint at 50°-60°(3-4/m) -Joint at 70° (1/m) Defects are generally close to medium spaced. Defect surfaces are planar, tight, slightly rough, clay infilled.	HW										
7.30			100 (85)				HW								J, 30°, Pl, T, Clnf BD = 1.88t/m³; MC = 10.8%; UCS=3.28MPa		UCS
8.30			100 (27)				HW								J, 40°, Pl, T, S, Thinly Clnf J, 60°, Pl, T, S, Clnf		
9.30			100 (17)												BZ	Is(50) = 0.11MPa	x

REMARKS

LOGGED BY
JA/DC



ENGINEERING BOREHOLE LOG

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

BOREHOLE No BH C19

SHEET 2 of 2

REFERENCE No H11112

PROJECT Bruce Highway Upgrade (Cooroy to Curra) Section C
 LOCATION Cut 7 COORDINATES 472656.8 E; 7092308.6 N
 PROJECT No FG5799 SURFACE R.L. 91.80m PLUNGE _____ DATE STARTED 05/08/11 GRID DATUM MGA94
 JOB No 232/10A/2 HEIGHT DATUM AHD BEARING _____ DATE COMPLETED 05/08/11 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					ANDESITE (HW): Cont'd	▼	HW					
11	81.25		100 (0)			ANDESITE (MW): Grey/brown, fine grained, massive, medium to high strength. Defects: -Highly fractured throughout. -Joint at 50° (>5/m) Defect spacing is close. Defect surfaces are planar, closed, iron stained.	▼	MW				HFZ Is(50) = 0.68MPa Is(50) = 1.05MPa	x o
12	79.73		100			Borehole terminated at 12.07m							
13													
14													
15													
16													
17													
18													
19													
20													

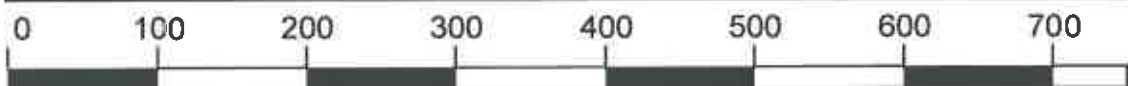
QLD_DMR_LIB_01A_GLB_Log_A_ENGINEERING_BOREHOLE_LOG_WLITHOLOGY_FG5799 - BRUCE HWY UPGRADE SECTION C.GPJ DWG46362.GDW Dataplot CPT Tool.gInl Add-in 12/12/2011 16:28

REMARKS _____

LOGGED BY
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CORE PHOTO LOG - BH C19

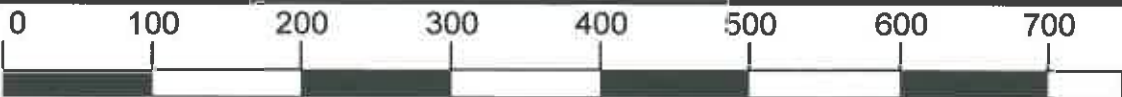
Project Name:	BRUCE HIGHWAY UPGRADE - SECTION C		
Project No.:	FG5799	Date:	06/09/2011
Details:	Cut 7	Start Depth (m):	1.50
Reference No.:	H11112	Finish Depth (m):	12.07



SCALE 1:5

CORE PHOTO LOG - BH C19

Project Name:	BRUCE HIGHWAY UPGRADE - SECTION C		
Project No.:	FG5799	Date:	06/09/2011
Details:	Cut 7	Start Depth (m):	1.50
Reference No.:	H11112	Finish Depth (m):	12.07



SCALE 1:5

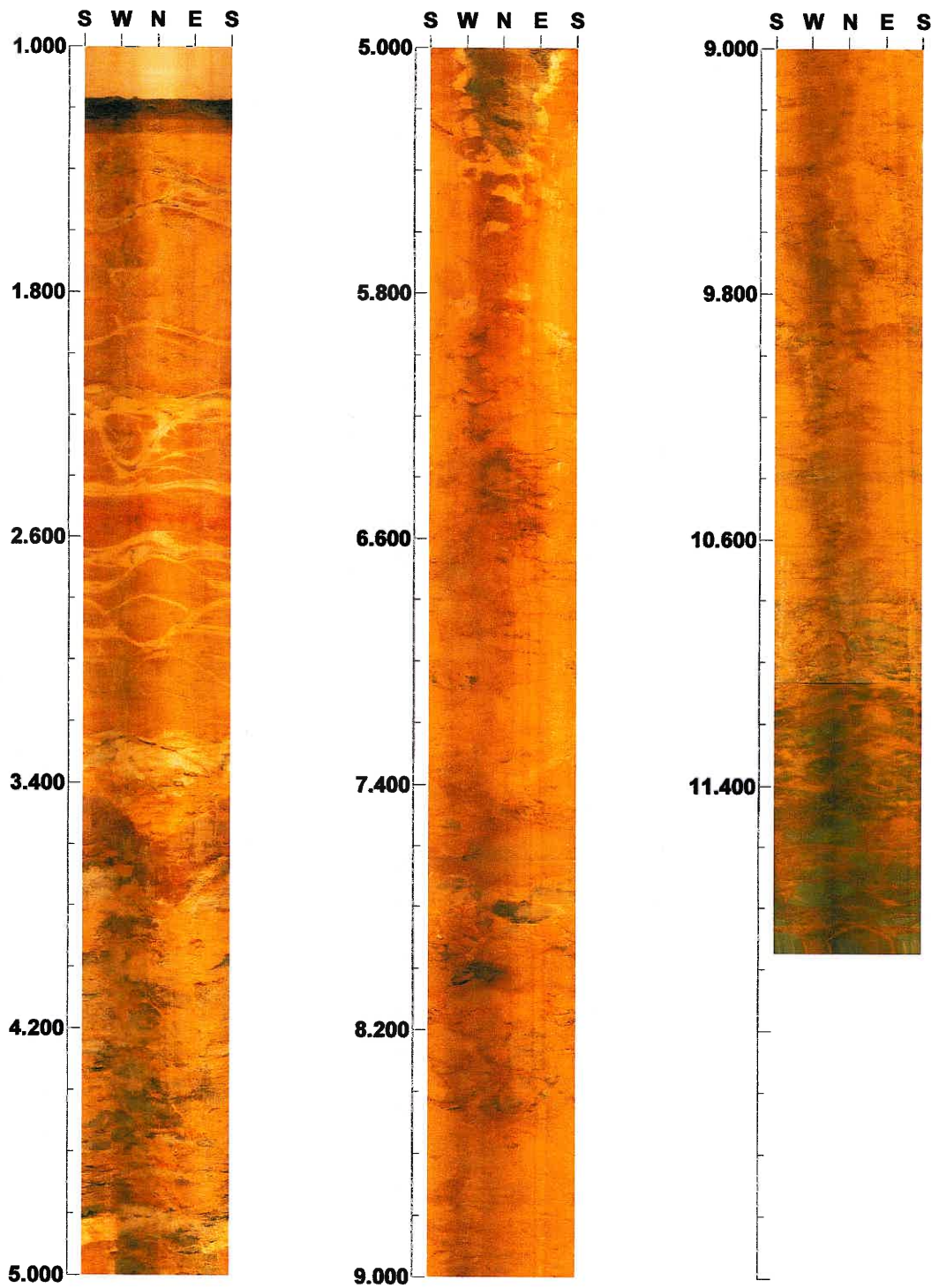
Project name: BRUCE HIGHWAY UPGRADE SECTION C

Bore hole No.: C-19

Azimuth: 0

Inclination: -90

Depth range: 1.000 - 11.947 m



Scale: 1/20

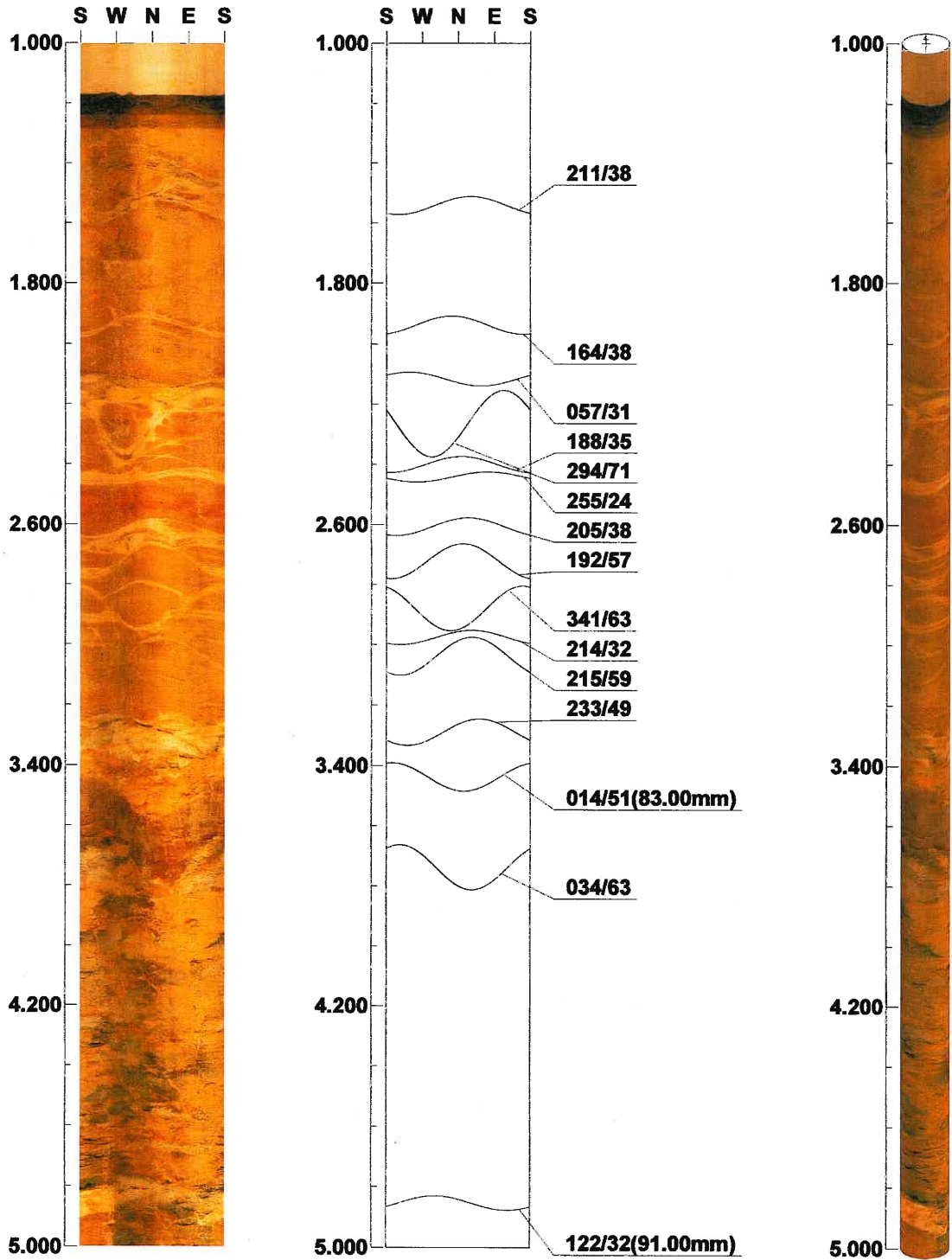
Aspect ratio: 200 %

Project name: BRUCE HIGHWAY UPGRADE SECTION C
Bore hole No.: C-19

Azimuth: 0

Inclination: -90

Depth range: 1.000 - 5.000 m



Scale: 1/20

Aspect ratio: 200 %

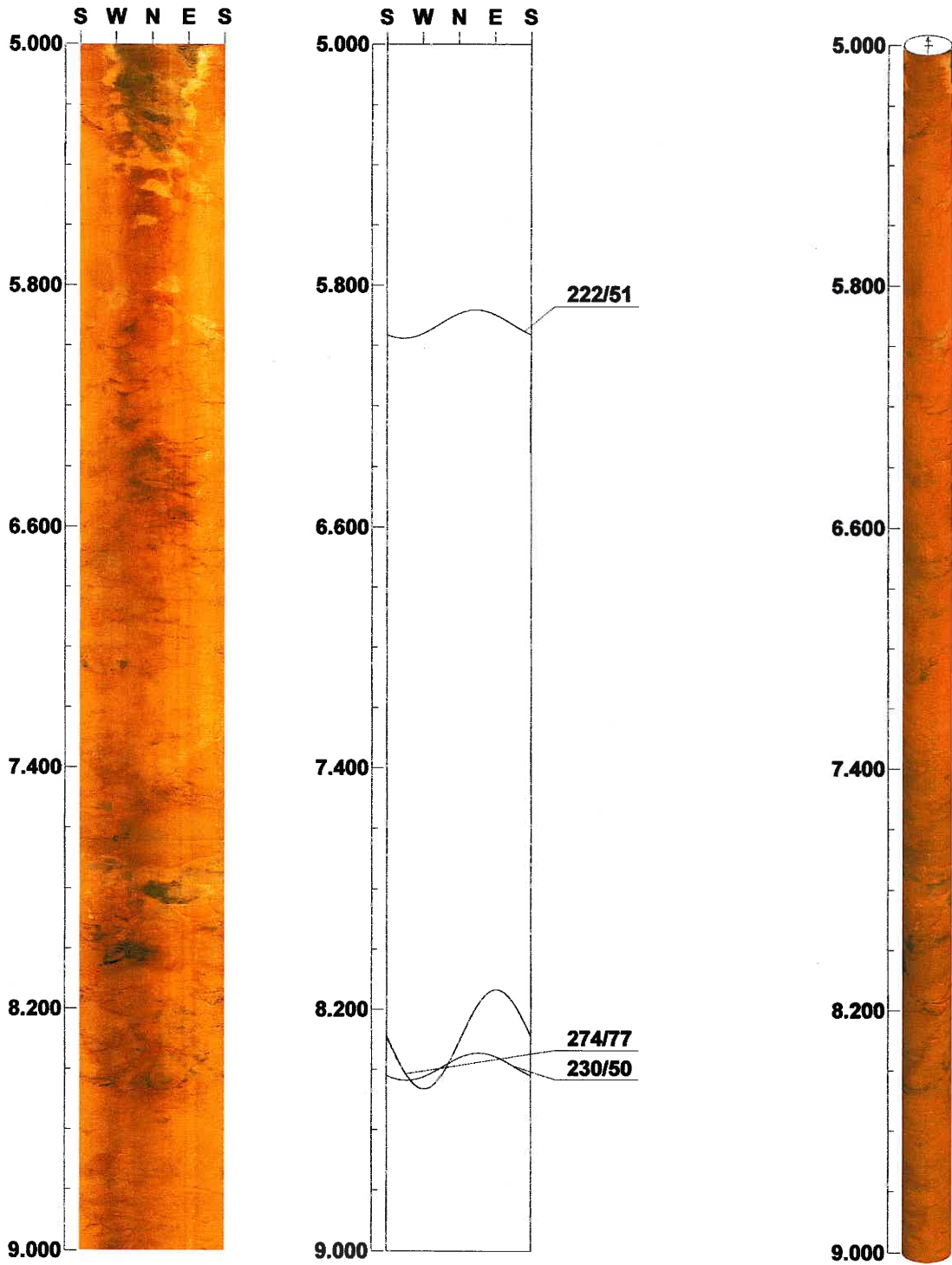
Project name: BRUCE HIGHWAY UPGRADE SECTION C

Bore hole No.: C-19

Azimuth: 0

Inclination: -90

Depth range: 5.000 - 9.000 m



Scale: 1/20

Aspect ratio: 200 %

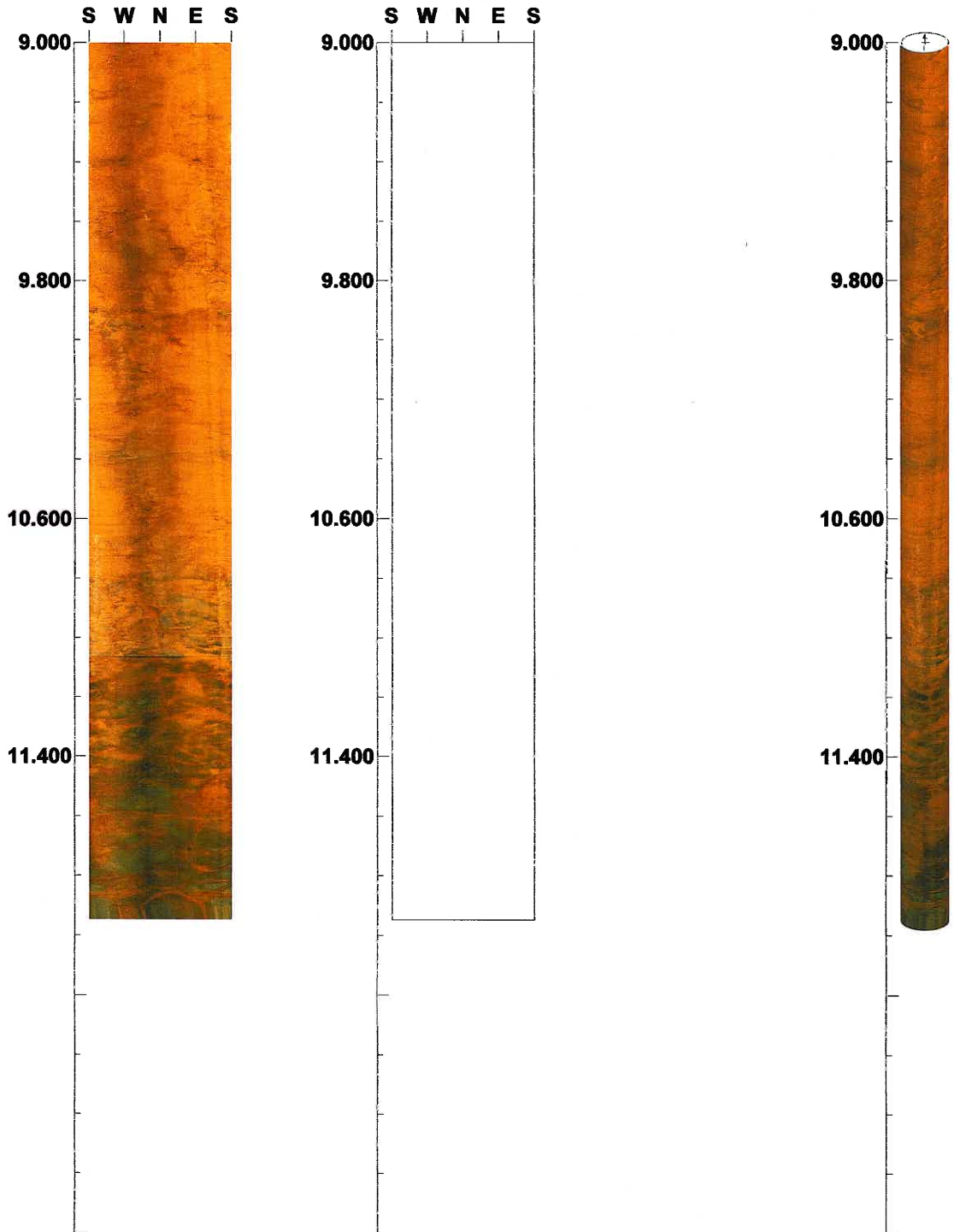
Project name: BRUCE HIGHWAY UPGRADE SECTION C

Bore hole No.: C-19

Azimuth: 0

Inclination: -90

Depth range: 9.000 - 11.947 m



Scale: 1/20

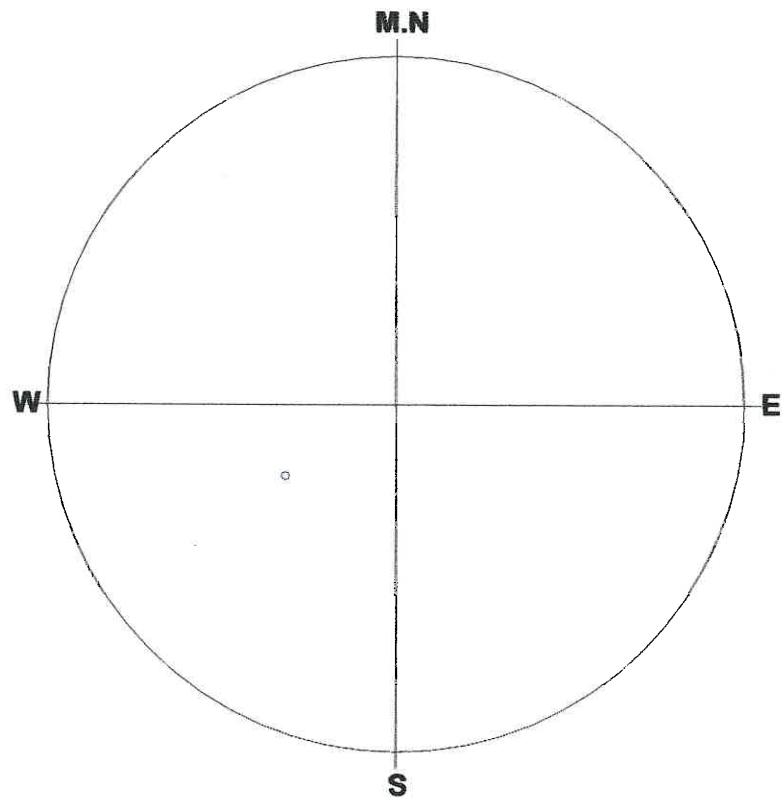
Aspect ratio: 200 %

Tab. Table of Discontinuity (1 / 1)

File name: C-19.STR
[]

No.	Depth (m)	Dir/Dip	Sort	Aperture (mm)	Form	Condition	Remark
1	1.542	211/38	Joint	1.0	Planar	Brec/crus'd	Open/loose
2	1.938	164/38	Joint	0.5	Planar	Smooth	Open
3	2.116	057/31	Foliation	0.0	Planar	Smooth	Tight
4	2.264	294/71	Joint	1.0	Planar	Smooth	Open
5	2.400	188/35	Joint	0.3	Planar	Smooth	Open
6	2.441	255/24	Joint	0.5	Planar	Smooth	Open
7	2.606	205/38	Joint	0.3	Planar	Smooth	Tight
8	2.722	192/57	Joint	0.3	Planar	Smooth	Open
9	2.879	341/63	Joint	0.5	Planar	Smooth	Open
10	2.976	214/32	Joint	0.5	Planar	Smooth	Open
11	3.038	215/59	Joint	0.3	Planar	Smooth	Open
12	3.289	233/49	Joint	0.5	Planar	Smooth	Open
13	3.437	014/51	ShearZone	83.0	Planar	Weathered	Open/loose
14	3.737	034/63	ShearZone	28.0	Planar	Weathered	Open
15	4.853	122/32	ShearZone	91.0	Planar	Brec/crus'd	Open/loose
16	5.929	222/51	Joint	0.5	Planar	Rough	Open
17	8.299	274/77	Joint	0.5	Planar	Rough	Open
18	8.390	230/50	Joint	0.5	Planar	Smooth	Open

C-19.STR
<<FOLIATION>>



Number of Data : 1/18

<Legend>

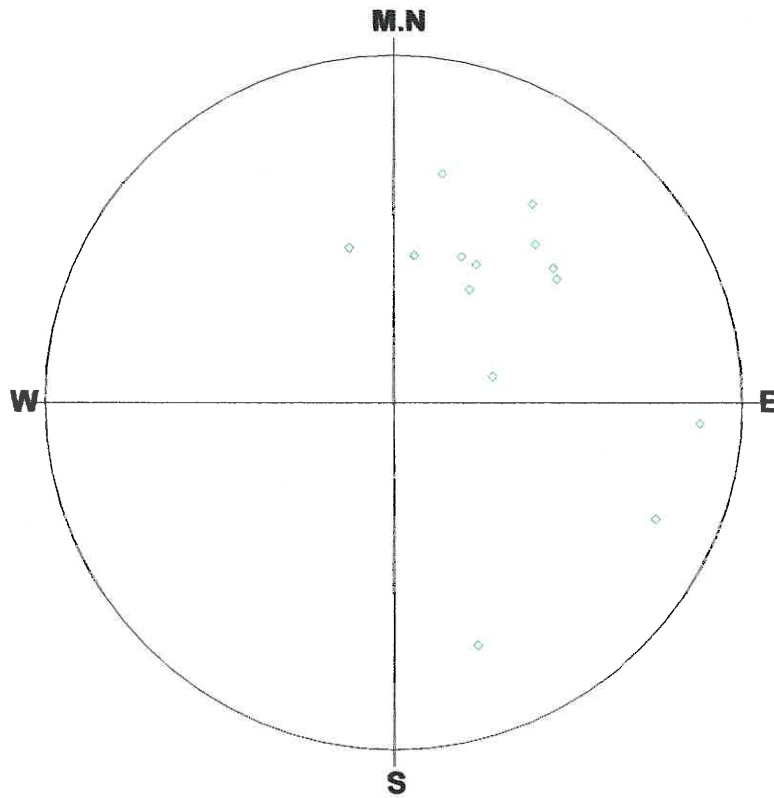
- | | | | | |
|--------------|----|---|---------------|---|
| ○:Foliation | -- | 1 | +:Mineralbar- | 0 |
| ◇:Joint | -- | 0 | | |
| □:Parting | -- | 0 | | |
| △:Fault | -- | 0 | | |
| ▽:ShearZone- | | 0 | | |
| ×:Vein | -- | 0 | | |

Schmidt (L.H)

Depth : 1.542 - 8.390 m

Aperture : 0.0 - 91.0 mm

C-19.STR
<<JOINT>>



Number of Data : 14/18

<Legend>

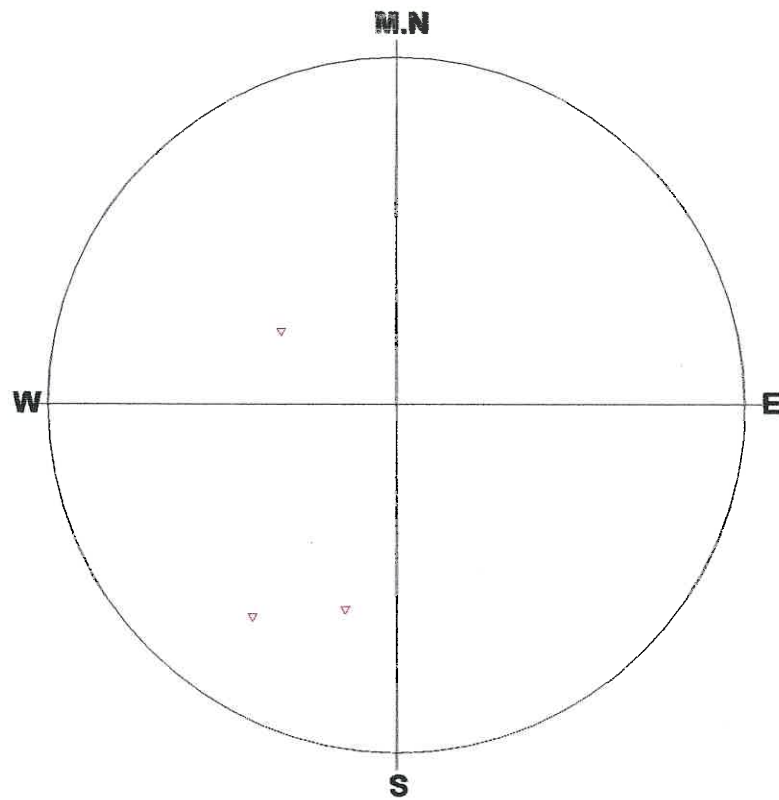
- | | | | |
|-------------|-------|---------------|---|
| ○:Foliation | -- 0 | + :Mineralban | 0 |
| ◇:Joint | -- 14 | | |
| □:Parting | -- 0 | | |
| △:Fault | -- 0 | | |
| ▽:ShearZone | -- 0 | | |
| ×:Vein | -- 0 | | |

Schmidt (L.H)

Depth : 1.542 - 8.390 m

Aperture : 0.0 - 91.0 mm

C-19.STR
<<SHEAR ZONE>>



Number of Data : 3/18

<Legend>

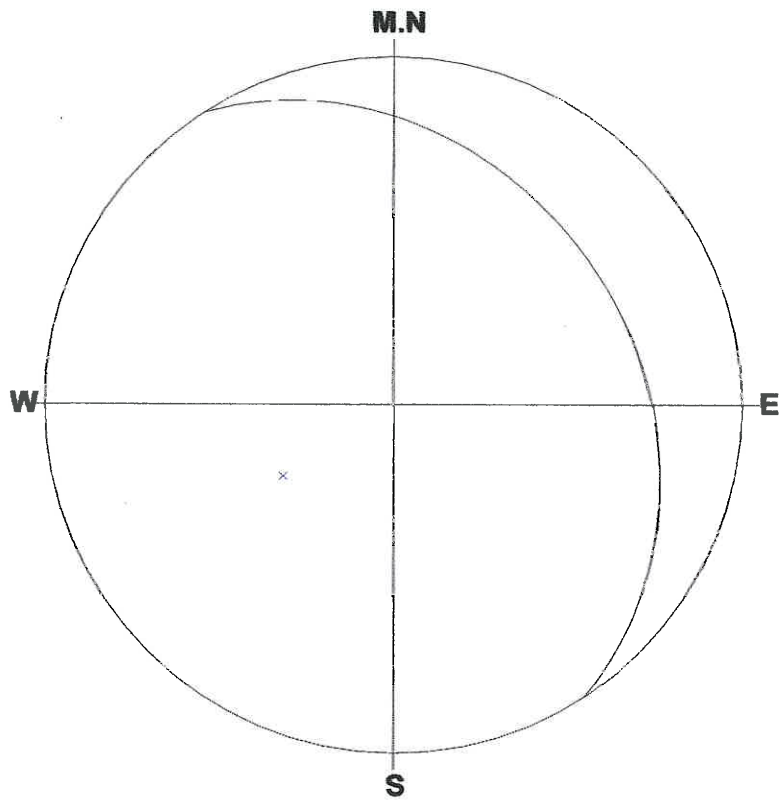
- | | | | | |
|--------------|----|---|---------------|---|
| ○:Foliation | -- | 0 | +:Mineralbar- | 0 |
| ◇:Joint | -- | 0 | | |
| □:Parting | -- | 0 | | |
| △:Fault | -- | 0 | | |
| ▽:ShearZone- | | 3 | | |
| ×:Vein | -- | 0 | | |

Schmidt (L.H)

Depth : 1.542 - 8.390 m

Aperture : 0.0 - 91.0 mm

C-19.STR
<<FOLIATION>>



Number of Data:1/18

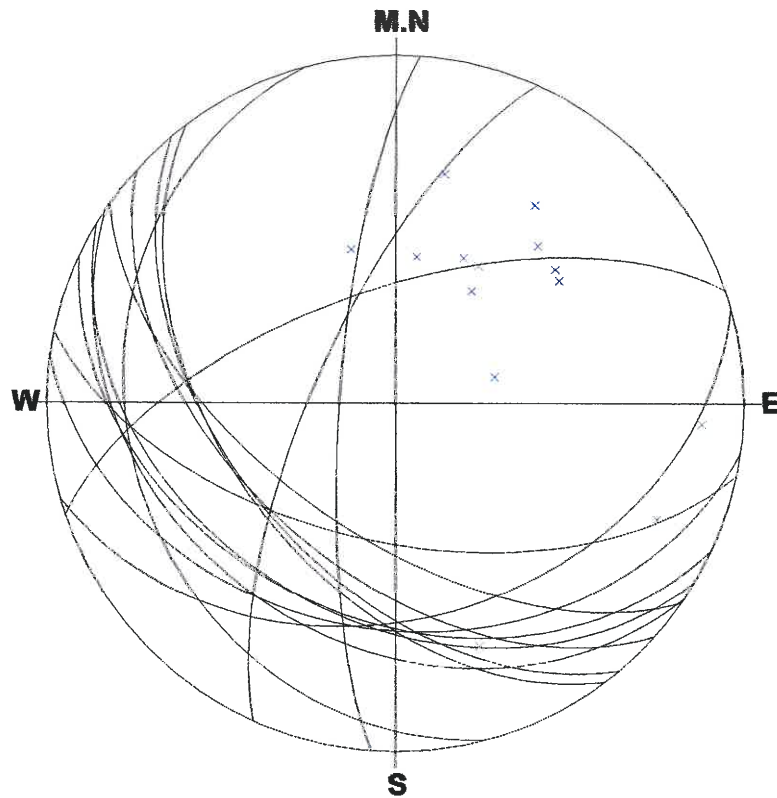
1 : 057/31(3)

Schmidt (L.H) M

Depth : 1.542 - 8.390 m

Aperture : 0.0 - 91.0 mm

C-19.STR
<<JOINT>>



Number of Data:14/18

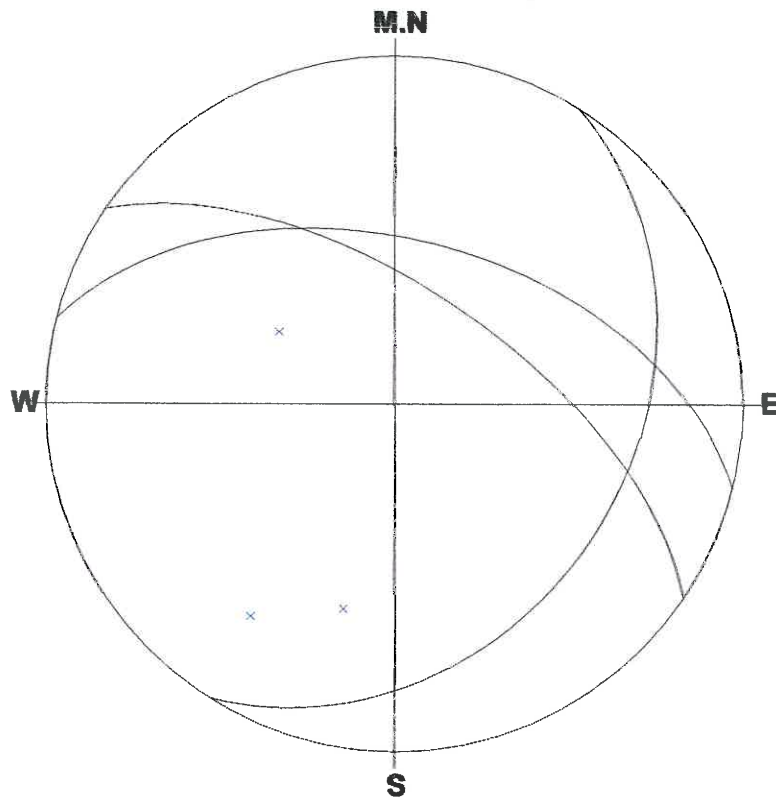
- | | |
|----------------------|------------------------|
| 1 : 211/38(1) | 6 : 205/38(7) |
| 2 : 164/38(2) | 7 : 192/57(8) |
| 3 : 294/71(4) | 8 : 341/63(9) |
| 4 : 188/35(5) | 9 : 214/32(10) |
| 5 : 255/24(6) | 10 : 215/59(11) |

Schmidt (L.H)

Depth : 1.542 - 8.390 m

Aperture : 0.0 - 91.0 mm

C-19.STR
<<SHEAR ZONE>>



Number of Data:3/18

1 : 014/51(13)

2 : 034/63(14)

3 : 122/32(15)

Schmidt (L.H)

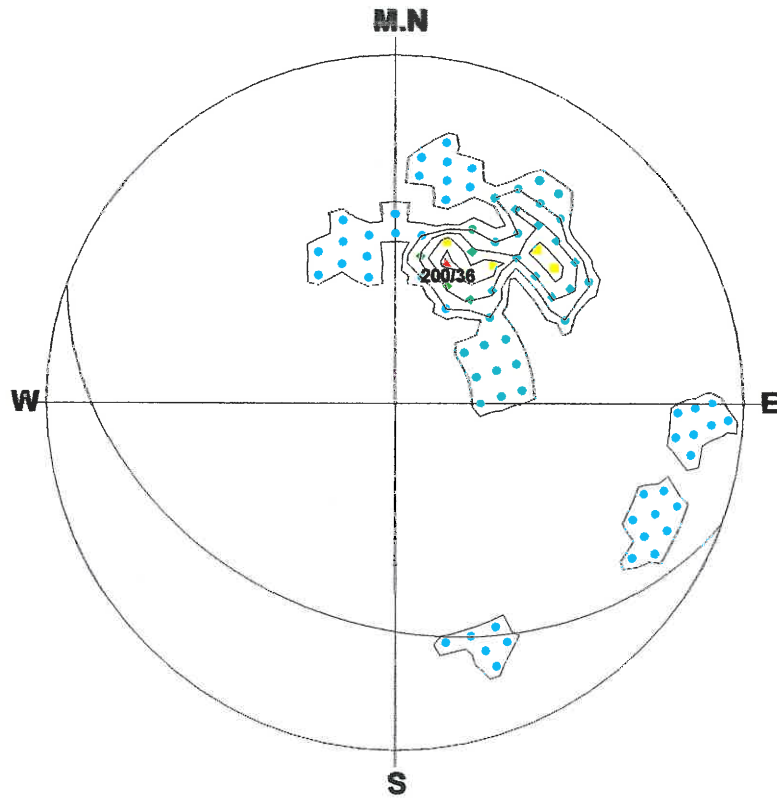
Depth : 1.542 - 8.390 m

Aperture : 0.0 - 91.0 mm

C-19.STR

<<JOINT>>

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



Number of Data : 14

<Legend> Sym. (%)

- ▲ : 28
- ▼ : 22 - 28
- : 17 - 22
- ◆ : 11 - 17
- : 5 - 11
- ⊕ : 0 - 5

Contour Value (%)

- Contour 1 : 0
- Contour 2 : 5
- Contour 3 : 11
- Contour 4 : 17
- Contour 5 : 22
- Contour 6 : 28

Schmidt (L.H)

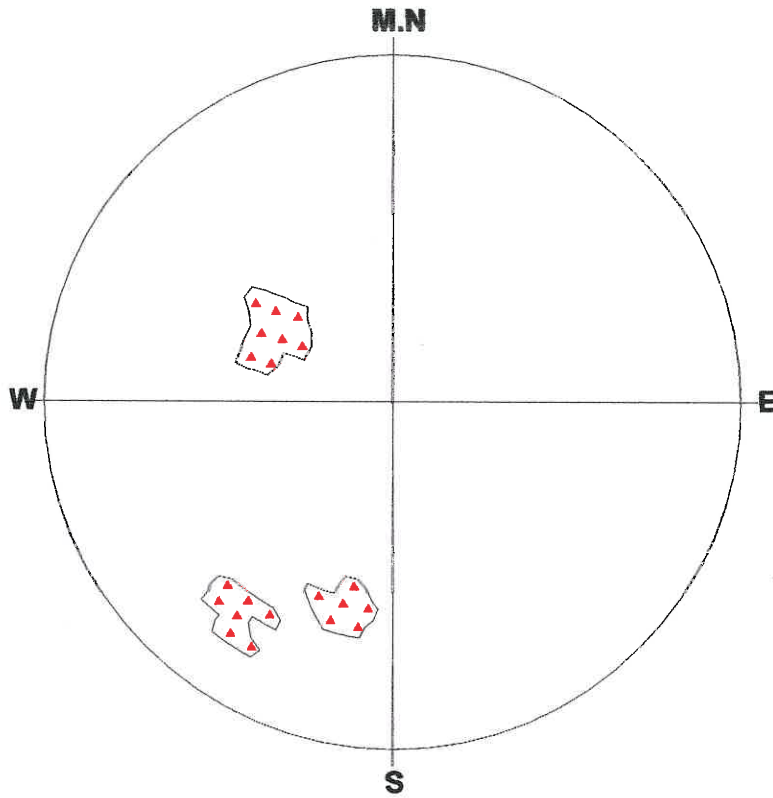
Depth : 1.542 - 8.390 m

Aperture : 0.0 - 91.0 mm

C-19.STR

<<SHEAR ZONE>>

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



Number of Data : 3

<Legend> Sym. (%)

- ▲ : 33**
- ▼ : 26 - 33**
- : 20 - 26**
- ◆ : 13 - 20**
- : 6 - 13**
- ⊕ : 0 - 6**

Contour Value (%)

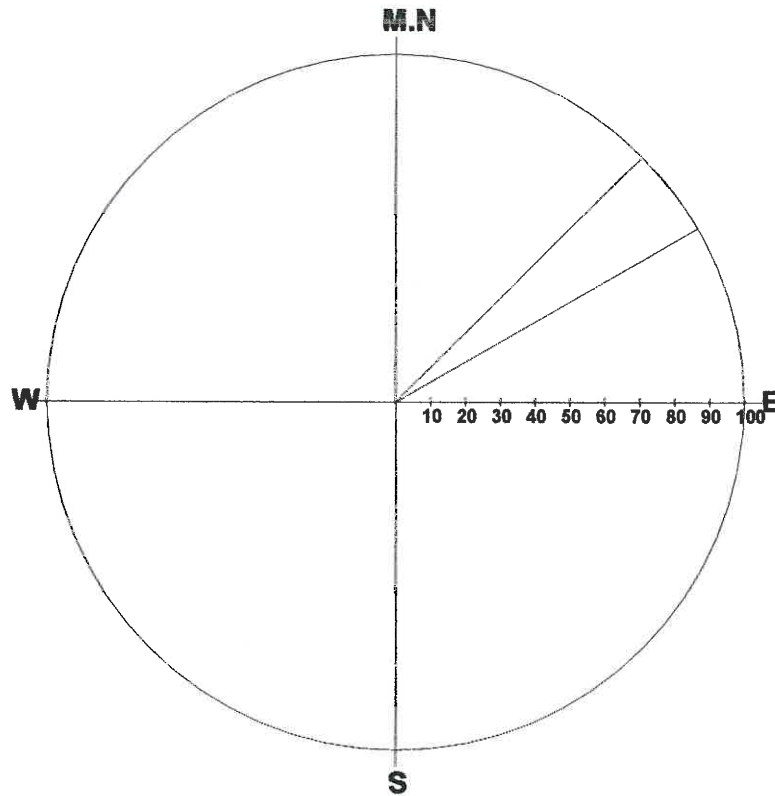
- Contour 1 : 0**
- Contour 2 : 6**
- Contour 3 : 13**
- Contour 4 : 20**
- Contour 5 : 26**
- Contour 6 : 33**

Schmidt (L.H)

Depth : 1.542 - 8.390 m

Aperture : 0.0 - 91.0 mm

C-19.STR
<<FOLIATION>>



Number of Data : 1/18

Max : 100.0%

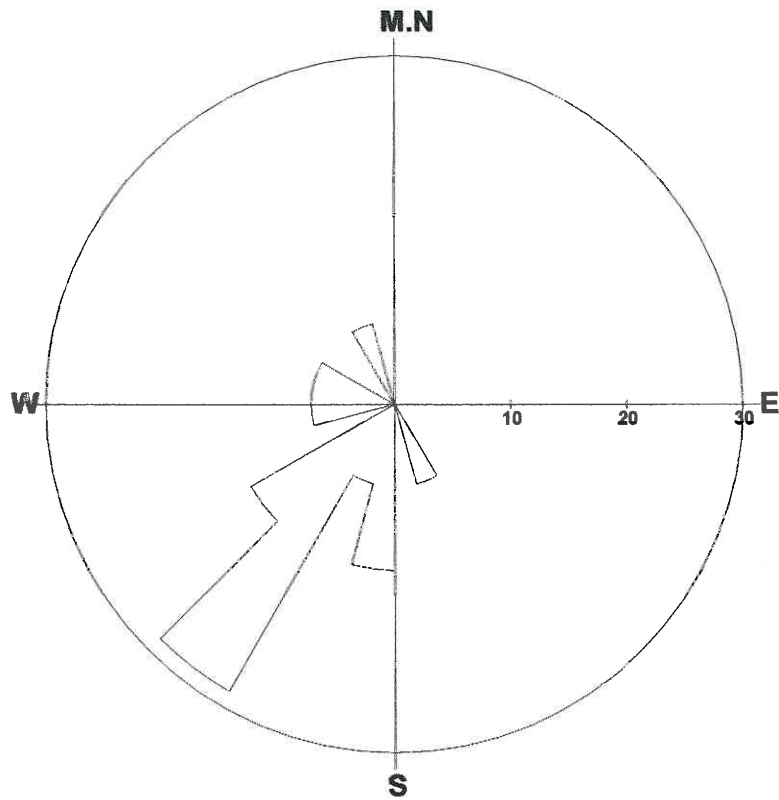
Grouping Angle : 15 deg

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

Depth : 1.542 - 8.390 m

Aperture : 0.0 - 91.0 mm

C-19.STR
<<JOINT>>



Number of Data : 14/18

Max : 28.6%

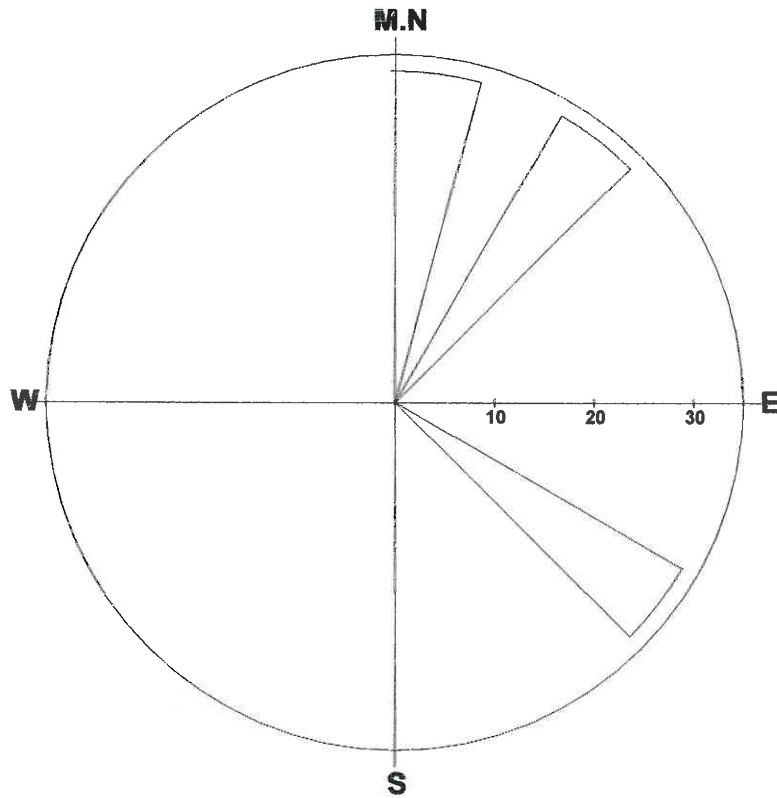
Grouping Angle : 15 deg

Dir	%	Dir	%	Dir	%
0-	0	135-	0	270-	7
15-	0	150-	7	285-	7
30-	0	165-	0	300-	0
45-	0	180-	14	315-	0
60-	0	195-	7	330-	7
75-	0	210-	29	345-	0
90-	0	225-	14		
105-	0	240-	0		
120-	0	255-	7		

Depth : 1.542 - 8.390 m

Aperture : 0.0 - 91.0 mm

C-19.STR
<<SHEAR ZONE>>



Number of Data : 3/18

Max : 33.3%

Grouping Angle : 15 deg

Dir	%	Dir	%	Dir	%
0-	33	135-	0	270-	0
15-	0	150-	0	285-	0
30-	33	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-	0	240-	0		
120-	33	255-	0		

Depth : 1.542 - 8.390 m

Aperture : 0.0 - 91.0 mm

Title: C-19.STR
 Comment: JOINT
 Depth: 1.542 - 8.390 m
 Aperture: 0.0 - 91.0 mm

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

2011/ 8/ 31
 Elevation: 0.000m
 Water Level: 11.060m

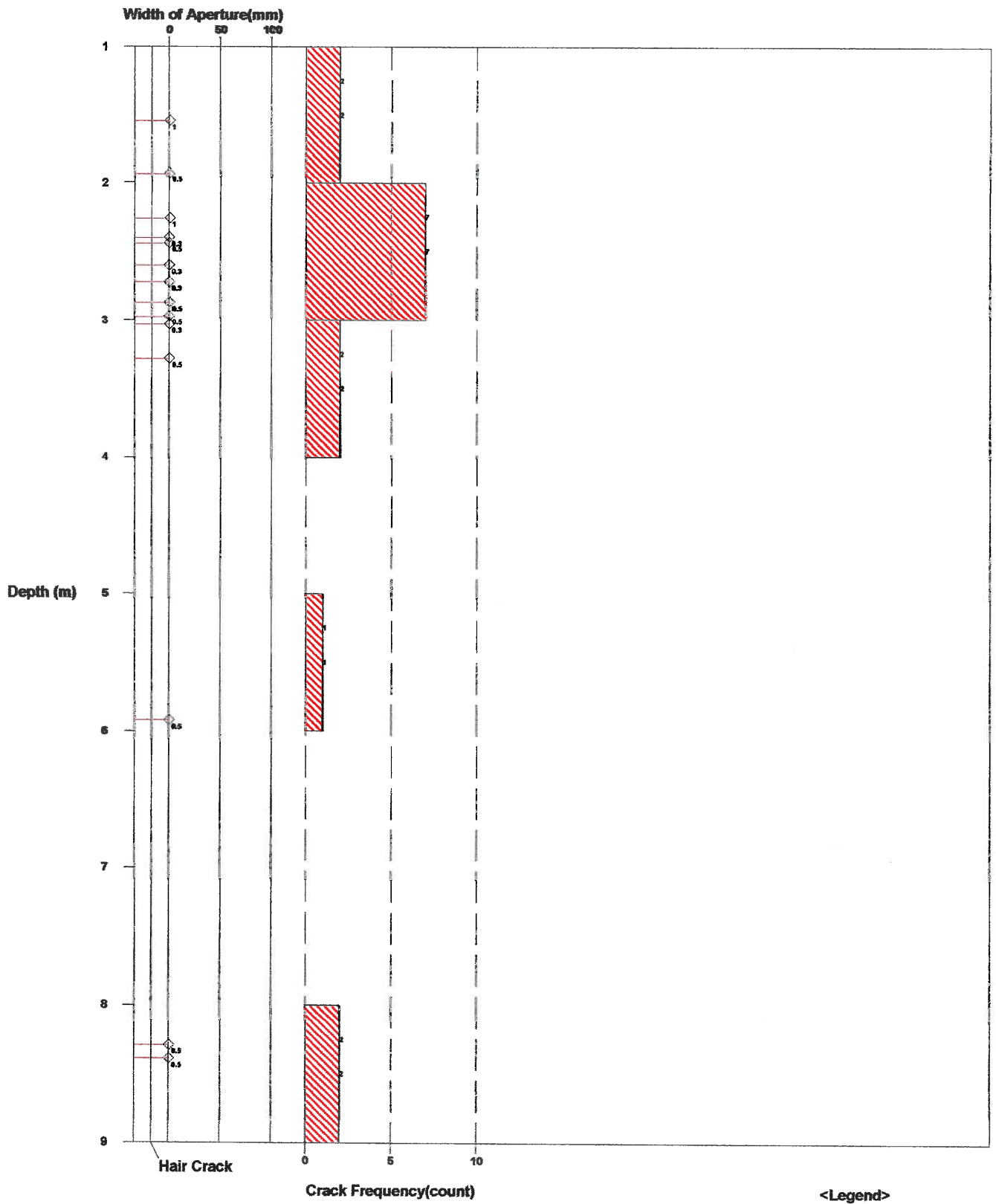


Fig. Rock Mass Condition Graph

- All Crack Frequency
- Open Crack Frequency
- Water Level

Title: C-19.STR
 Comment: SHEAR ZONE
 Depth: 1.542 - 8.390 m
 Aperture: 0.0 - 91.0 mm

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

2011/ 8/ 31
 Elevation: 0.000m
 Water Level: 11.060m

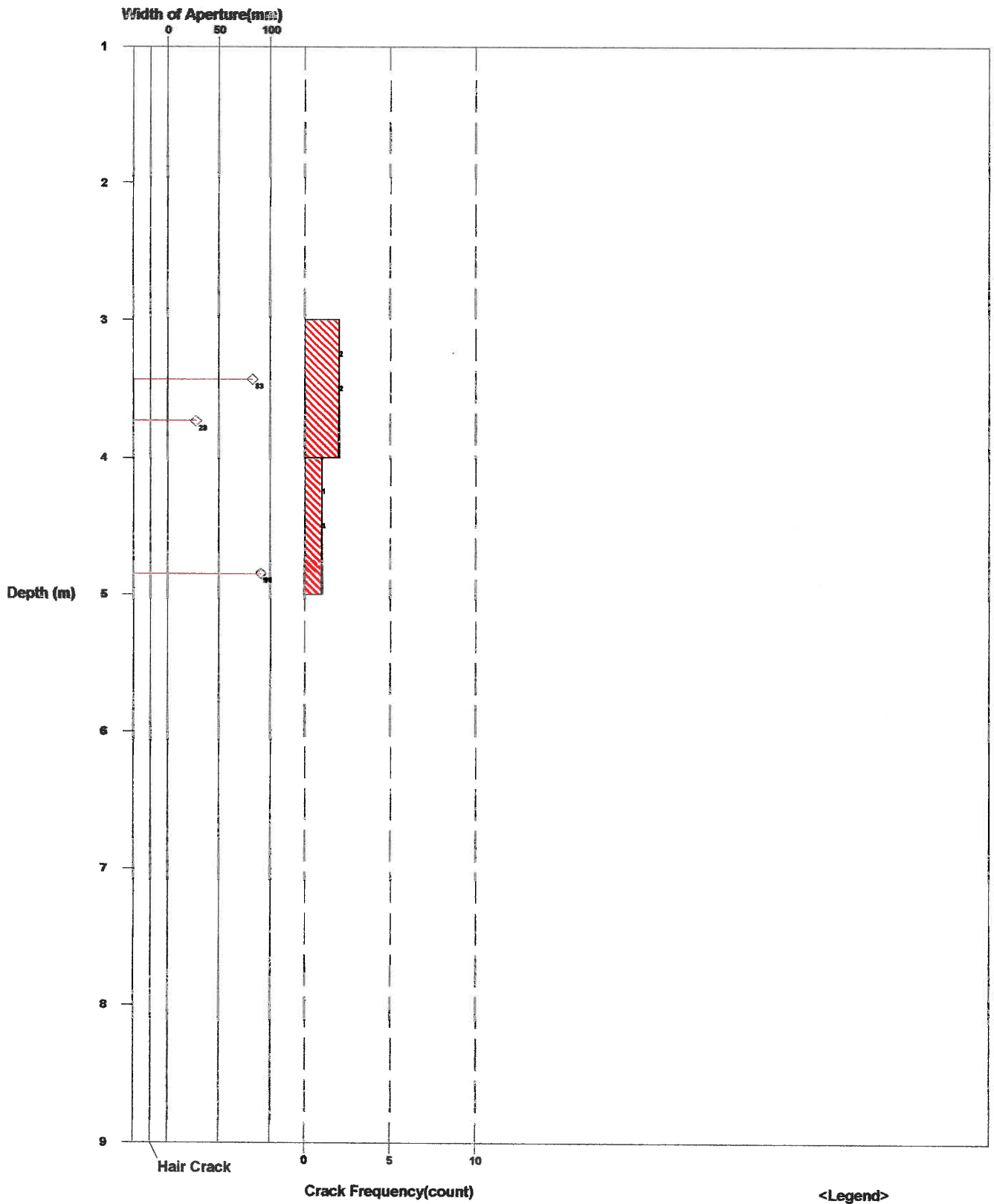
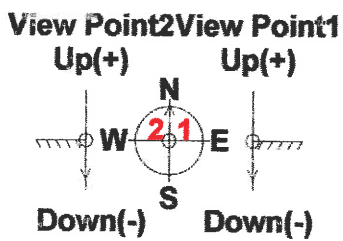
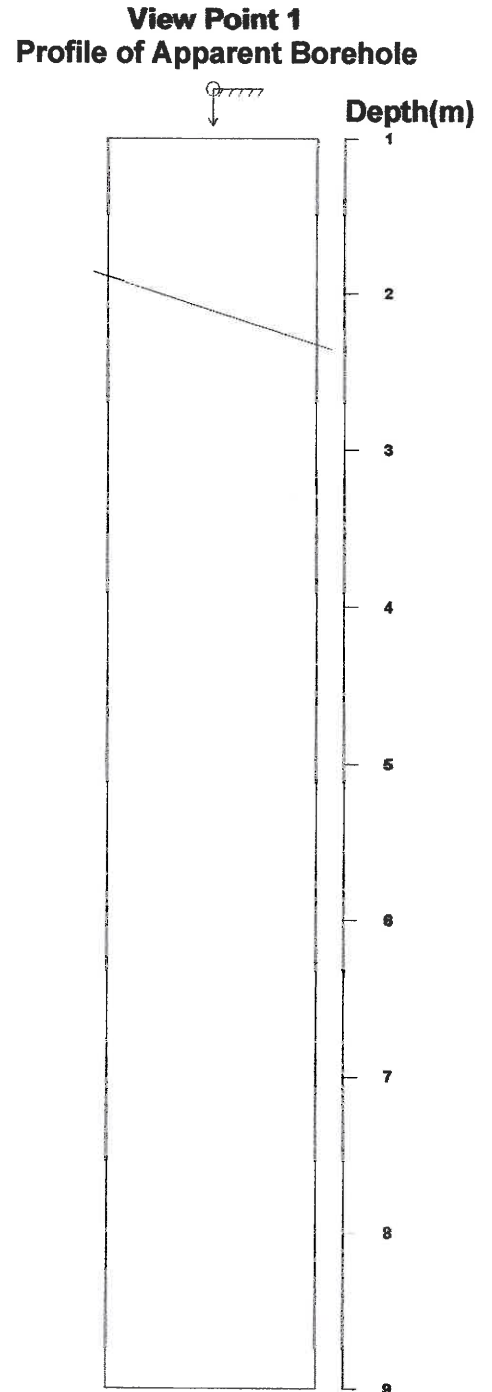
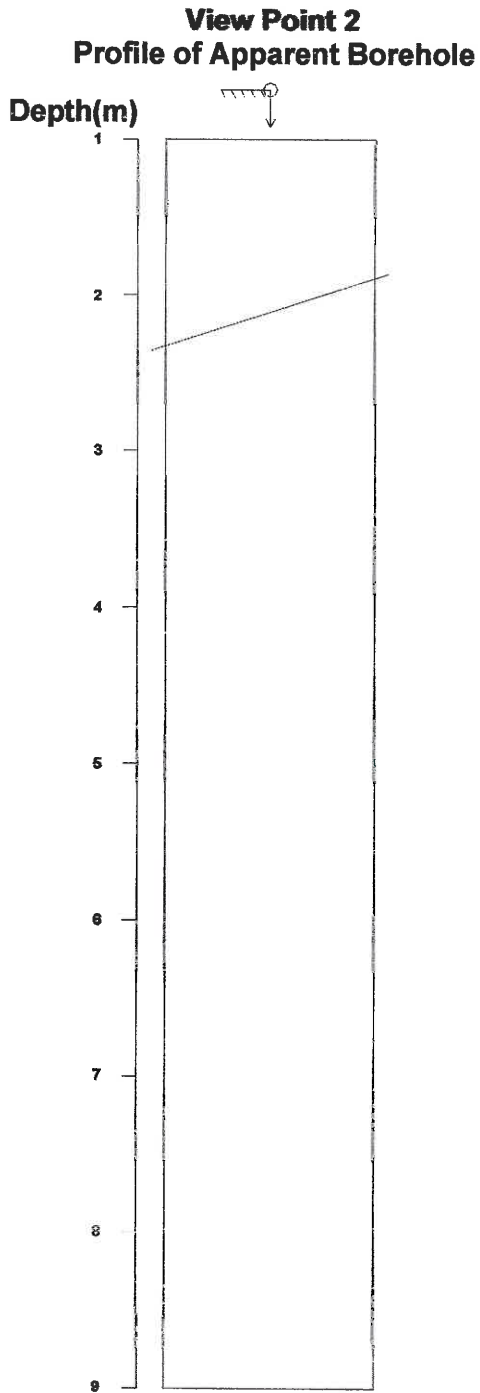


Fig. Rock Mass Condition Graph

- All Crack Frequency
- Open Crack Frequency
- Water Level

Title: C-19.STR
 Comment: FOLIATION
 Depth: 1.542 - 8.390 m
 Aperture: 0.0 - 91.0 mm

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



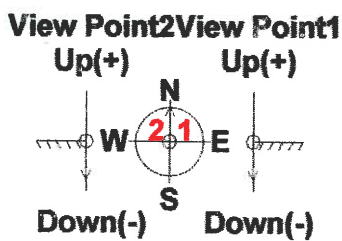
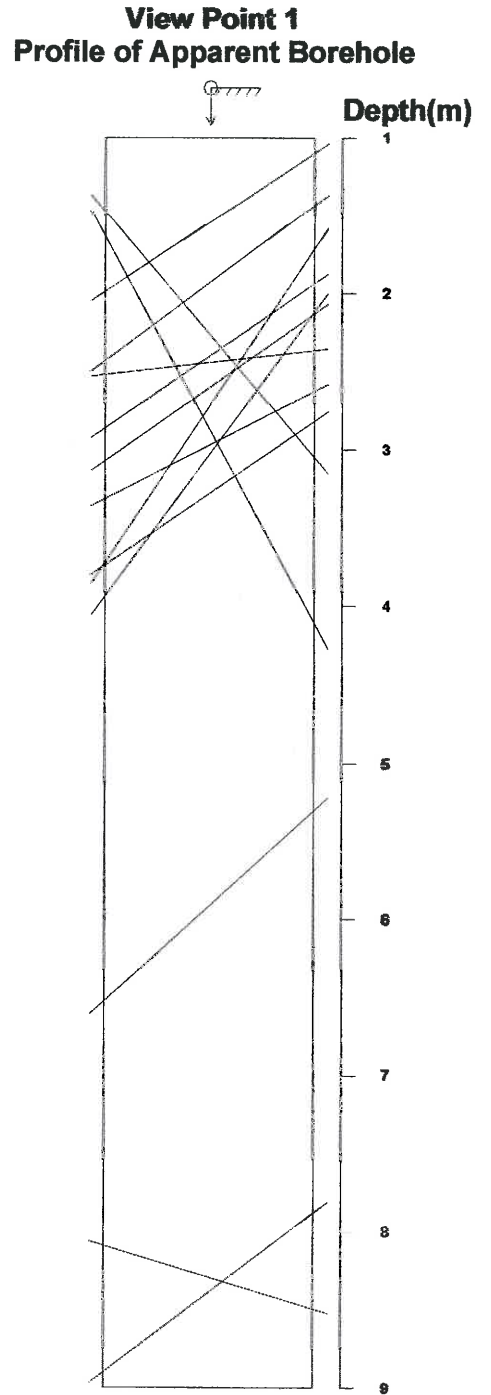
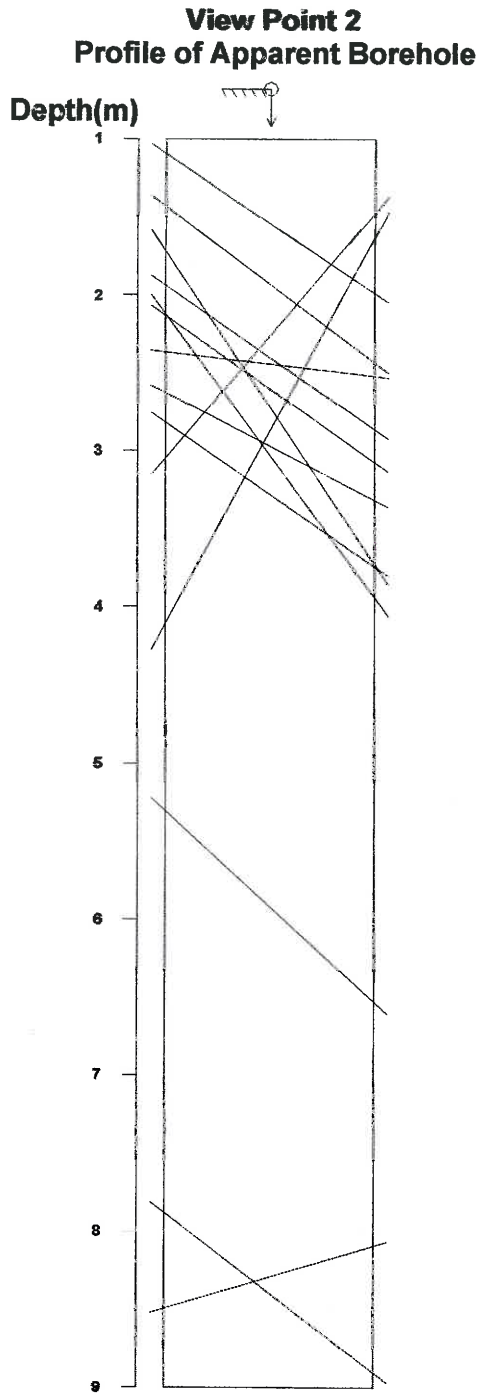
Direction: 0 deg
 Inclination: Vertical(Down)

<Legend>
 Entrance G.L.
 Bottom

Fig. Apparent Dip

Title: C-19.STR
 Comment: JOINT
 Depth: 1.542 - 8.390 m
 Aperture: 0.0 - 91.0 mm

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



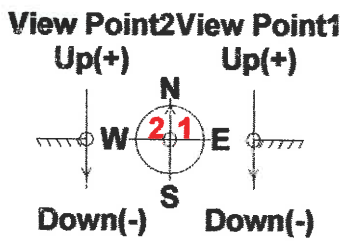
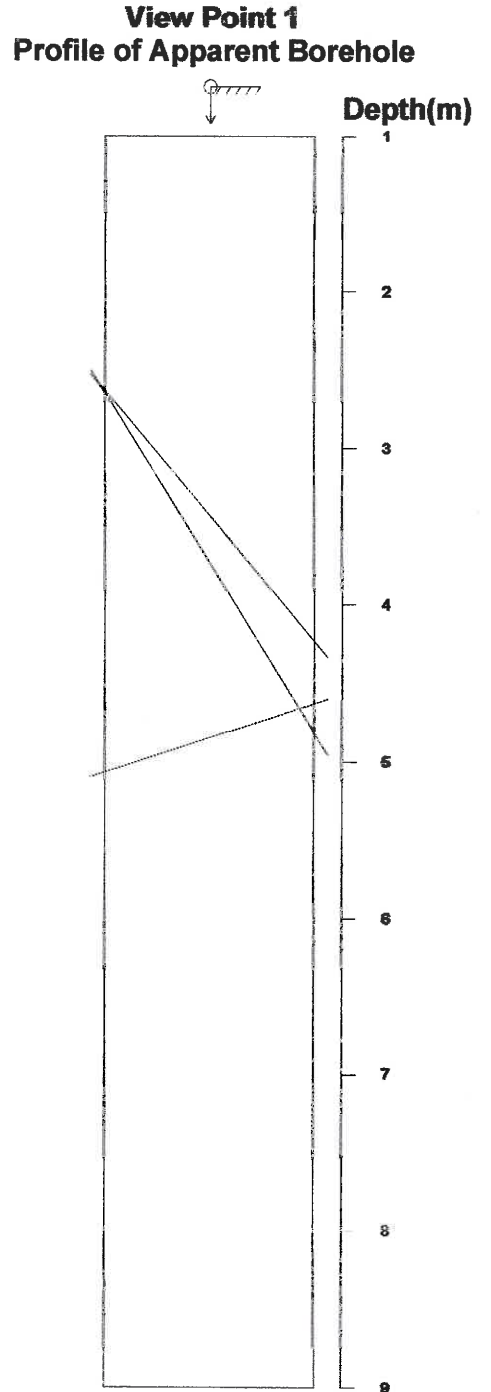
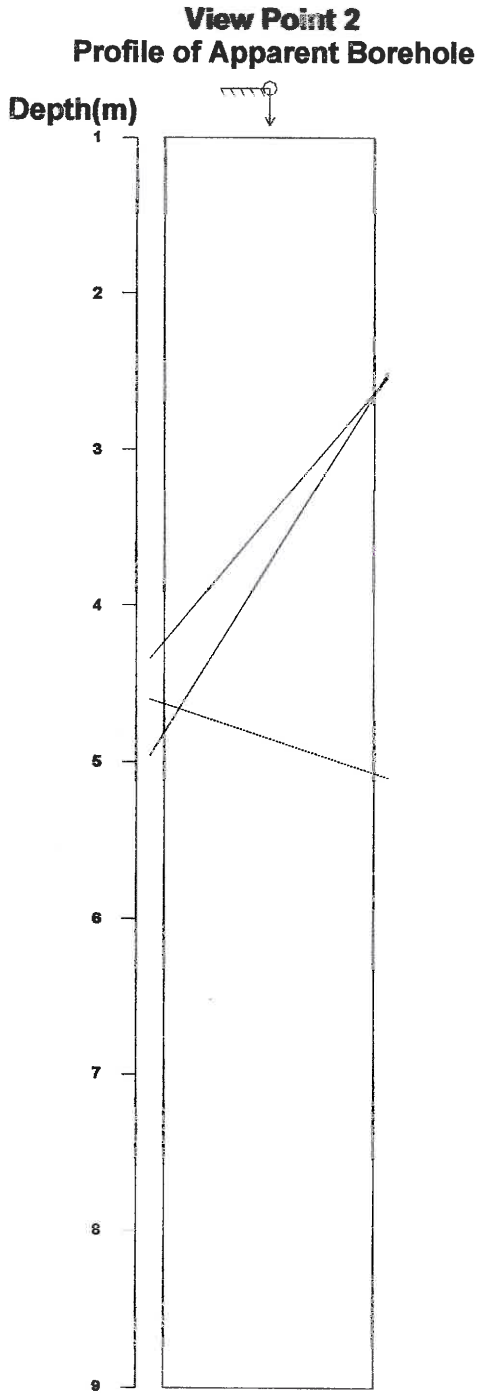
Direction: 0 deg
 Inclination: Vertical(Down)

<Legend>
 Entrance G.L.
 Bottom

Fig. Apparent Dip

Title: C-19.STR
 Comment: SHEAR ZONE
 Depth: 1.542 - 8.390 m
 Aperture: 0.0 - 91.0 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