Queensland Government
Department of Main Roads

ENGINEERING BOREHOLE

FOR GEOTECHNICAL TERMS AND SYMBOLS REFER FORM F:GEOT 017/2-2004

BOREHOLE No BH16
SHEET 1 of 13
REFERENCE No H9565

PROJECT GATEWAY UPGRADE PROJECT - GATEWAY BRIDGE DUPLICATION FOUNDATION INVESTIGATION
LOCATION PIER 7 - SOUTHERN FACE OF PILE CAP- LEFT HAND/UPSTREAM SIDE COORDINATES 10202.7 E; 167918.8 N
PROJECT No FG5388 SURFACE R.L. -3.25 DATE STARTED 16/04/05 DATUM SETP
JOB No DATUM AHD DATE COMPLETED 24/04/05 DRILLER CAIRNS DRILLING

DEPTH (m)	R.L. (m)	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	-3.25				**ESTUARINE SILTY CLAY** Dark grey to black, mainly moist to slightly wet, very soft to soft. High plasticity, high organic content; occasional partly decomposed shell fragments. Minor sand towards bottom.		OH					RW,-,- N<1		SPT
1														
2														
3												RW,-,- N<1		SPT
4														
5	-8.25											RW,- N<1		SPT

BOREHOLE WITH LITHOLOGY MEERA PIER 7 BOREHOLES-GATEWAY BRIDGE - GATEWAY UPGRADE PROJECT.GPJ ENGINEERING BOREHOLE 09_04.GDT 31/08/05

REMARKS SPT N values in gravel can overestimate density due to influence of coarser size gravel particles. This borelog should be read in conjunction with the appropriate Defect Description Sheets. Defect angles were measured with respect to a horizontal plane.

LOGGED BY
A. DISSANAYAKE (DISS)

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BOREHOLE No BH16
SHEET 2 of 13
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LOCATION PIER 7 - SOUTHERN FACE OF PILE CAP- LEFT HAND/UPSTREAM SIDE COORDINATES 10202.7 E; 167918.8 N
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DEPTH (m)	R.L. (m)	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
5	-8.25				**ESTUARINE SILTY CLAY** Dark grey to black, mainly moist to slightly wet, very soft to soft. As above								
6							OH					RW,-,- N<1	SPT
7	-10.25				**ESTUARINE CLAYEY SAND** Dark grey, moist to mainly wet, very loose to loose. Some silty clay interlayers; occasional shell fragments.		SC					RW,-,- N<1	SPT
8													
	-11.75				**ESTUARINE SILTY CLAY** Dark grey to black, mainly moist to slightly wet, very soft to soft.								
9							OH					RW,-,- N<1	SPT
10	-13.25												

BOREHOLE WITH LITHOLOGY MEERA PIER 7 BOREHOLES-GATEWAY BRIDGE - GATEWAY UPGRADE PROJECT.GPJ ENGINEERING BOREHOLE 09_04.GDT 31/08/05

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BOREHOLE No BH16
SHEET 3 of 13
REFERENCE No H9565

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LOCATION PIER 7 - SOUTHERN FACE OF PILE CAP- LEFT HAND/UPSTREAM SIDE COORDINATES 10202.7 E; 167918.8 N
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DEPTH (m)	R.L. (m)	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	-13.25				**ESTUARINE SILTY CLAY** (As above). Some fissuring & dessicated features towards bottom.								
11								OH				RW,-,- N<1	SPT
12												RW,-,- N<1	SPT
13	-16.25				**ALLUVIAL SILTY CLAY** Pale grey to mottled brown, moist, firm to stiff. Frequent dessicated and oxidised zones; incipient lateritic features throughout; medium to high plasticity.								
14								CI-CH				2,5,7 N=12	SPT
15	-18.25												

BOREHOLE WITH LITHOLOGY MEERA PIER 7 BOREHOLES-GATEWAY BRIDGE - GATEWAY UPGRADE PROJECT.GPJ ENGINEERING BOREHOLE 09_04.GDT 31/08/05

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BOREHOLE No BH16
SHEET 4 of 13
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DEPTH (m)	R.L. (m)	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
15	-18.25				**ALLUVIAL SILTY CLAY** Pale grey to mottled brown, moist, firm to stiff. As above							2,5,9 N=14	SPT
16												2,3,6 N=9	SPT
17							CI- CH						
18												1,3,6 N=9	SPT
19													
20	-23.25											1,4,6 N=10	SPT

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BOREHOLE No BH16
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DEPTH (m)	R.L. (m)	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	-23.25				**ALLUVIAL SILTY CLAY** (As above).								
21							CI-CH					4,7,11 N=18	SPT
22	-25.25				**ALLUVIAL CLAYEY SAND** Grey to pale brown, mainly moist to slightly wet, medium dense becoming dense with depth. Fine sand becoming medium grained with depth; occasional silty clay interlayers up to 20mm.								
23												3,6,10 N=16	SPT
24							SC						
25	-28.25											16,21,27 N=48	SPT

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25	-28.25				**SAND AND GRAVEL** Orange brown to brown, moist, very dense. Subrounded to subangular rock and quartzitic fragements sizing up to 40mm.		GP-GM					7,27,30/120 N>50		SPT
26														
	-30.05				**LOW GRADE COAL** **FINE GRAINED MAINLY DULL TO SLIGHTLY VITREOUS THINLY LAMINATED FRAGILE CARBONACEOUS SEDIMENTARY ROCK** HW : Dark grey to black, fine grained, moist, very dense gravelly silt gradually grading into very low to low strength with depth. Frequent siltstone interbeds.							30/110 N>50		SPT
27														
28							HW							
			(0)									Coreloss Weathered & broken seam		
29	-32.35				MW : Dark grey to black, fine grained thinly laminated, low to medium strength with occasional high strength siltstone/sandstone interbeds.		MW							
			90 (31)									Is(50)=0.07 MPa Coreloss		o
30	-33.25													

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BOREHOLE No BH16
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30	-33.25	1			**LOW GRADE COAL** MW : (As above).							Coreloss Intermittent waterloss between 29.81m to 31m. Water return above river water level with artesian condition when stop drilling. Weathered & broken seam		
31												Broken zone Broken & weathered zone		
												Is(50)=0.35 MPa		o
32			64 (29)				MW					Clay seam Coreloss		
33												Weathered seam Clay seam		
												Is(50)=0.03 MPa		o
												Broken zone Is(50)=0.42 MPa		o
												Fractured zone		
			72 (23)									Fractured zone Coreloss Fractured zone		
34	-37.30											Fractured zone		
					SILTSTONE **FINE GRAINED THINLY LAMINATED SEDIMENTARY ROCK** MW - SW : Pale grey to grey, fine grained, thinly laminated, mainly medium strength. Defects: Generally rare with occasional drilling induced lamination partings.		SW							
												Broken zone		
35	-38.25						MW					Clay seam		

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DEPTH (m)	R.L. (m)	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
35	-38.25				**SILTSTONE, FINE GRAINED THINLY LAMINATED SEDIMENTARY ROCK** MW - SW : As above		SW					Is(50)=0.37 MPa Is(50)=1.04 MPa Is(50)=0.30 MPa Is(50)=0.41 MPa	x o x o	
	-39.00		99 (30)		**SANDSTONE** **FINE TO MEDIUM GRAINED MAINLY LAMINATED TO SLIGHTLY MASSIVE SEDIMENTARY ROCK** MW - SW : Pale grey to white, fine to medium grained, mainly massive to slightly laminated, mainly medium strength. Occasional mudstone & carbonaceous laminations; frequent irregular fractures throughout; some shearing and faulting features; core appears to be slightly erodable.		MW SW MW SW MW-SW SW					Clay seam Broken zone Is(50)=0.32 MPa Is(50)=1.44 MPa Fractured & altered zone Is(50)=0.47 MPa Is(50)=0.31 MPa Is(50)=0.50 MPa Is(50)=0.44 MPa Weathered & altered band Erodable seam Clay seam with subvertical dip of 80°-90° Clay seam Clay seam Clay seam Coreloss Clay seam Is(50)=1.96 MPa Is(50)=1.39 MPa Clay seam Is(50)=0.10 MPa Is(50)=0.23 MPa Is(50)=0.47 MPa Is(50)=1.50 MPa Is(50)=0.08 MPa Is(50)=0.59 MPa	x o x o x o x o x o x o x o	
			90 (42)											
			100 (92)											
40	-43.25													

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BOREHOLE No BH16
SHEET 9 of 13
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40	-43.25				**SANDSTONE** SW : (As above) Rockmass becoming less erodable and better quality with depth; some faulting & shearing features between 41.4m to 41.74m.							Is(50)=0.13 MPa		o
41								SW				Pressuremeter Test 5 @41.05m		
42												Is(50)=0.06 MPa Is(50)=0.11 MPa		x o
	-45.76													
			100 (61)		**MUDSTONE** **FINE GRAINED THINLY LAMINATED SEDIMENTARY ROCK** SW : Dark grey to black, fine grained, thinly laminated, mainly medium strength. Highly fractured and broken along the profile.			SW						
43												Is(50)=0.74 MPa		o
	-46.48													
					SANDSTONE **FINE TO MEDIUM GRAINED MAINLY LAMINATED TO SLIGHTLY MASSIVE SEDIMENTARY ROCK** SW : Pale grey to white, fine to medium grained, mainly massive to slightly laminated, mainly medium strength. Core appears to be slightly erodable.							Is(50)=3.20 MPa Is(50)=2.67 MPa Clay infilled weathered band		x o
												Is(50)=0.28 MPa		x
44												Is(50)=0.65 MPa		o
								SW						
												Is(50)=0.80 MPa		x
			100 (100)											
45	-48.25													

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SHEET 10 of 13
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45	-48.25				**SANDSTONE, FINE TO MEDIUM GRAINED MAINLY LAMINATED TO SLIGHTLY MASSIVE SEDIMENTARY ROCK** SW : As above		SW					Is(50)=0.31 MPa Is(50)=0.09 MPa		x o
												UCS=11MPa MC=3.74% WD=2470N/m^2 **Pressuremeter Test 4 @ 45.6m**	Is(50)=0.81 MPa Is(50)=0.49 MPa	x o
	-49.08				**INTERBEDDED SANDSTONE AND MUDSTONE. SANDSTONE DOMINANT FINE TO MEDIUM GRAINED INTERBEDDED /LAMINATED SEDIMENTARY ROCK** SW : Pale grey to black banded, fine grained, interbedded/laminated medium to high strength. Some healed faulting features below 46.65m.								Is(50)=1.30 MPa	o
46													Is(50)=0.31 MPa Is(50)=0.05 MPa	x o
							SW					**Pressuremeter Test 3 @ 46.6m**	Is(50)=0.57 MPa Is(50)=1.45 MPa	x o
47												Rehealed fault zones		
	-50.60		100 (94)		**SANDSTONE FINE TO MEDIUM GRAINED MAINLY LAMINATED TO SLIGHTLY MASSIVE SEDIMENTARY ROCK** SW : Pale grey to white, fine to medium grained, mainly massive to slightly laminated, mainly medium to high strength.								Is(50)=0.44 MPa Is(50)=0.89 MPa	o x
												Rehealed fault zones	Is(50)=0.03 MPa	o
48							SW					UCS=26MPa MC=3.82% WD=2530N/m^2	Is(50)=1.10 MPa	x
												Pressuremeter Test 2 @ 48.2m		
												Rehealed fault zones	Is(50)=0.82 MPa Is(50)=0.41 MPa	x o
	-52.20				**INTERBEDDED SANDSTONE AND MUDSTONE. MUDSTONE DOMINANT** SW : Pale grey to black banded, fine grained, interbedded/laminated, medium to high strength. Some healed faulting features in the upper area.								Is(50)=0.72 MPa Is(50)=0.50 MPa	x o
49													Is(50)=0.07 MPa	x
												Rehealed fault zones	Is(50)=0.06 MPa	o
							SW							
	-53.10												Is(50)=0.28 MPa Is(50)=1.39 MPa	x o
50	-53.25				**MUDSTONE** SW: (see next page).		SW							

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BOREHOLE No BH16
SHEET 11 of 13
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50	-53.25				**MUDSTONE** **FINE GRAINED THINLY LAMINATED SEDIMENTARY ROCK** SW : Dark grey to black, fine grained thinly laminated medium to high strength. Frequent brecciated and sheared zones up to 600mm; some areas were healed with cemented matrix and the other areas were infilled with high plastic silty clay exhibiting rockfill properties.		MW-SW				Brecciated zone @ 60° - Rock fragments in clayey matrix		
			100 (60)								Is(50)=0.07 MPa		x
											Is(50)=0.12 MPa		o
											Sheared zone		
											Is(50)=1.03 MPa		o
51			100 (50)				SW				Clay seam with subvertical dip of 70°-90°		
											Is(50)=0.34 MPa		x
											Is(50)=0.36 MPa		x
											Pressuremeter Test 1 @ 51.55m		
											Is(50)=0.22 MPa		x
52											Calcite vein UCS=12MPa MC=3.96% WD=2540N/m^2		
											Is(50)=0.28 MPa		x
											Is(50)=0.01 MPa		o
							HW				Brecciated zone- rock fragments in clayey matrix.		
											Brecciated zone- rock fragments in clayey matrix		
53							MW-SW						
			100 (0)								Broken zone Clay infilled broken zone		
											Is(50)=0.16 MPa		x
							HW-MW						
54											Is(50)=0.22 MPa		x
							MW-SW				Clay seam		
							HW				Brecciated zone- rock fragments in clayey matrix. Is(50)=0.13 MPa		x
55	-58.25												

BOREHOLE WITH LITHOLOGY MEERA PIER 7 BOREHOLES-GATEWAY BRIDGE - GATEWAY UPGRADE PROJECT.GPJ ENGINEERING BOREHOLE 09_04.GDT 31/8/05

REMARKS SPT N values in gravel can overestimate density due to influence of coarser size gravel particles. This borelog should be read in conjunction with the appropriate Defect Description Sheets. Defect angles were measured with respect to a horizontal plane.

LOGGED BY
A. DISSANAYAKE (DISS)

Queensland Government
Department of Main Roads

ENGINEERING BOREHOLE

FOR GEOTECHNICAL TERMS AND SYMBOLS REFER FORM F:GEOT 017/2-2004

BOREHOLE No BH16
SHEET 12 of 13
REFERENCE No H9565

PROJECT GATEWAY UPGRADE PROJECT - GATEWAY BRIDGE DUPLICATION FOUNDATION INVESTIGATION
LOCATION PIER 7 - SOUTHERN FACE OF PILE CAP- LEFT HAND/UPSTREAM SIDE COORDINATES 10202.7 E; 167918.8 N
PROJECT No FG5388 SURFACE R.L. -3.25 DATE STARTED 16/04/05 DATUM SETP
JOB No DATUM AHD DATE COMPLETED 24/04/05 DRILLER CAIRNS DRILLING

DEPTH (m)	R.L. (m)	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
55	-58.25				**MUDSTONE** HW -SW : As above		HW-MW					Is(50)=0.18 MPa Is(50)=0.10 MPa Is(50)=0.08 MPa Is(50)=0.13 MPa	x o o x	
			100 (17)											
56							MW-SW					Brecciated zone		
												Clay infilled broken zone		
57	-60.35				**SILTSTONE** **FINE GRAINED THINLY LAMINATED SEDIMENTARY ROCK** SW : Pale grey to grey, fine grained thinly laminated, medium to high strength. Defects : Generally rare		SW							
	-60.85				**MUDSTONE** HW - SW : Dark grey to black, highly fractured, brecciated in most places, medium to mainly high strength. Rehealed brecciated rock fragments, some areas, matrix is high plastic clay and some feldspathic matrix.		MW						Broken zone		
58			100 (4)									Brecciated zone- rock fragments in clayey matrix.		
							HW							
							SW					Is(50)=0.03 MPa	x	
59							HW							
							MW-SW							
60	-63.25													

BOREHOLE WITH LITHOLOGY MEERA PIER 7 BOREHOLES-GATEWAY BRIDGE - GATEWAY UPGRADE PROJECT.GPJ ENGINEERING BOREHOLE 09_04.GDT 31/08/05

REMARKS SPT N values in gravel can overestimate density due to influence of coarser size gravel particles. This borelog should be read in conjunction with the appropriate Defect Description Sheets. Defect angles were measured with respect to a horizontal plane.

LOGGED BY
A. DISSANAYAKE (DISS)

Queensland Government
Department of Main Roads

ENGINEERING BOREHOLE

FOR GEOTECHNICAL TERMS AND SYMBOLS REFER FORM F:GEOT 017/2-2004

BOREHOLE No BH16
SHEET 13 of 13
REFERENCE No H9565

PROJECT GATEWAY UPGRADE PROJECT - GATEWAY BRIDGE DUPLICATION FOUNDATION INVESTIGATION
LOCATION PIER 7 - SOUTHERN FACE OF PILE CAP- LEFT HAND/UPSTREAM SIDE COORDINATES 10202.7 E; 167918.8 N
PROJECT No FG5388 SURFACE R.L. -3.25 DATE STARTED 16/04/05 DATUM SETP
JOB No DATUM AHD DATE COMPLETED 24/04/05 DRILLER CAIRNS DRILLING

DEPTH (m)	R.L. (m)	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
60	-63.25				**MUDSTONE** SW : (As above).			SW					
								HW				Brecciated zone- rock fragments in clayey matrix.	
	-64.23		100					SW					
61					Borehole terminated at 60.98m								
62													
63													
64													
65													

BOREHOLE WITH LITHOLOGY MEERA PIER 7 BOREHOLES-GATEWAY BRIDGE - GATEWAY UPGRADE PROJECT.GPJ ENGINEERING BOREHOLE 09_04.GDT 31/08/05

REMARKS SPT N values in gravel can overestimate density due to influence of coarser size gravel particles. This borelog should be read in conjunction with the appropriate Defect Description Sheets. Defect angles were measured with respect to a horizontal plane.

LOGGED BY
A. DISSANAYAKE (DISS)

Project: **Gateway Upgrade Project - Gateway Bridge**

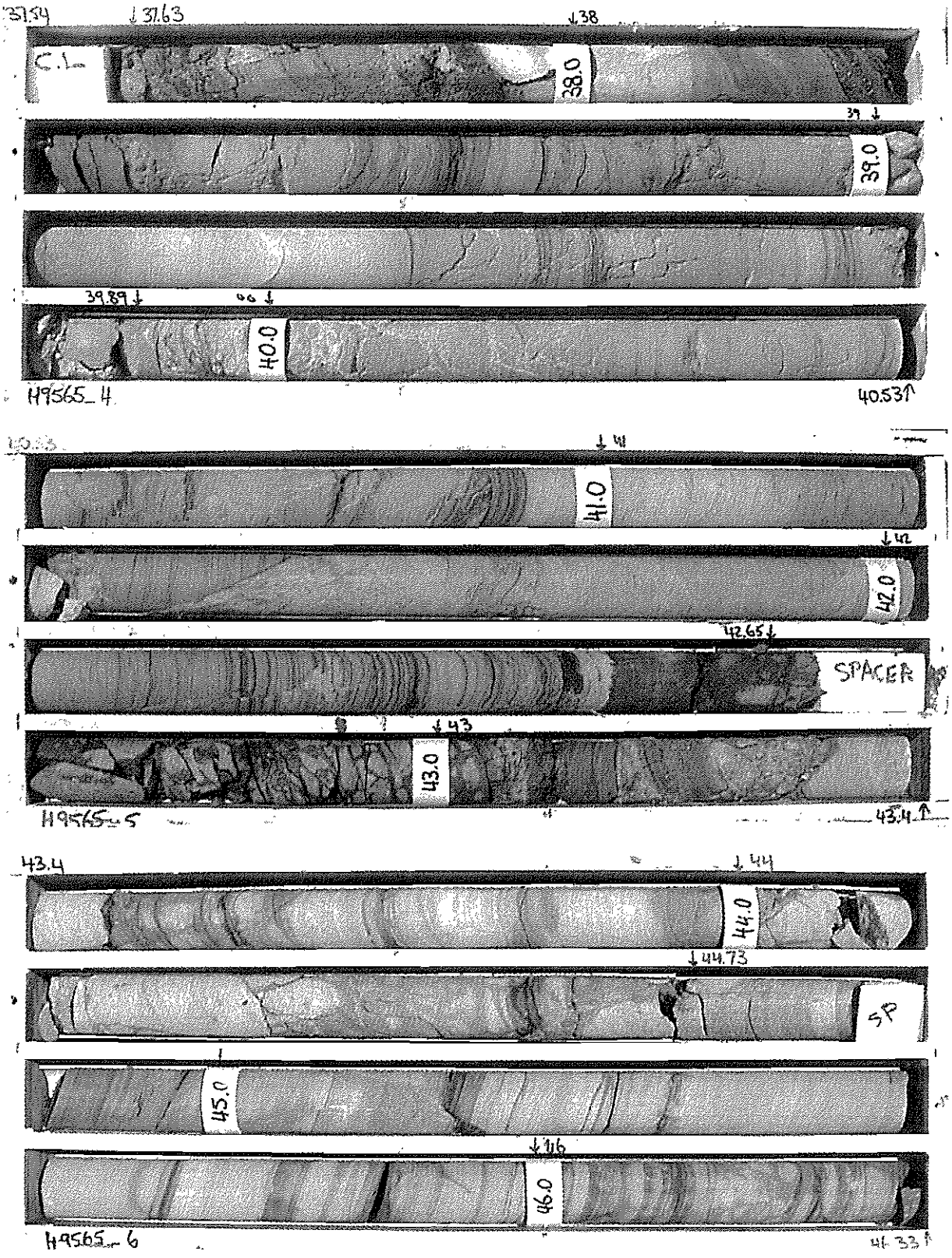
Borehole No: **BH 16**

Start Depth: 28.50m
Finish Depth: 60.98m
Project No: FG 5388
H No: 9565

Project: **Gateway Upgrade Project - Gateway Bridge**

Borehole No: **BH 16**

Start Depth: 28.50m
Finish Depth: 60.98m
Project No: FG 5388
H No: 9565



Project: **Gateway Upgrade Project - Gateway Bridge**

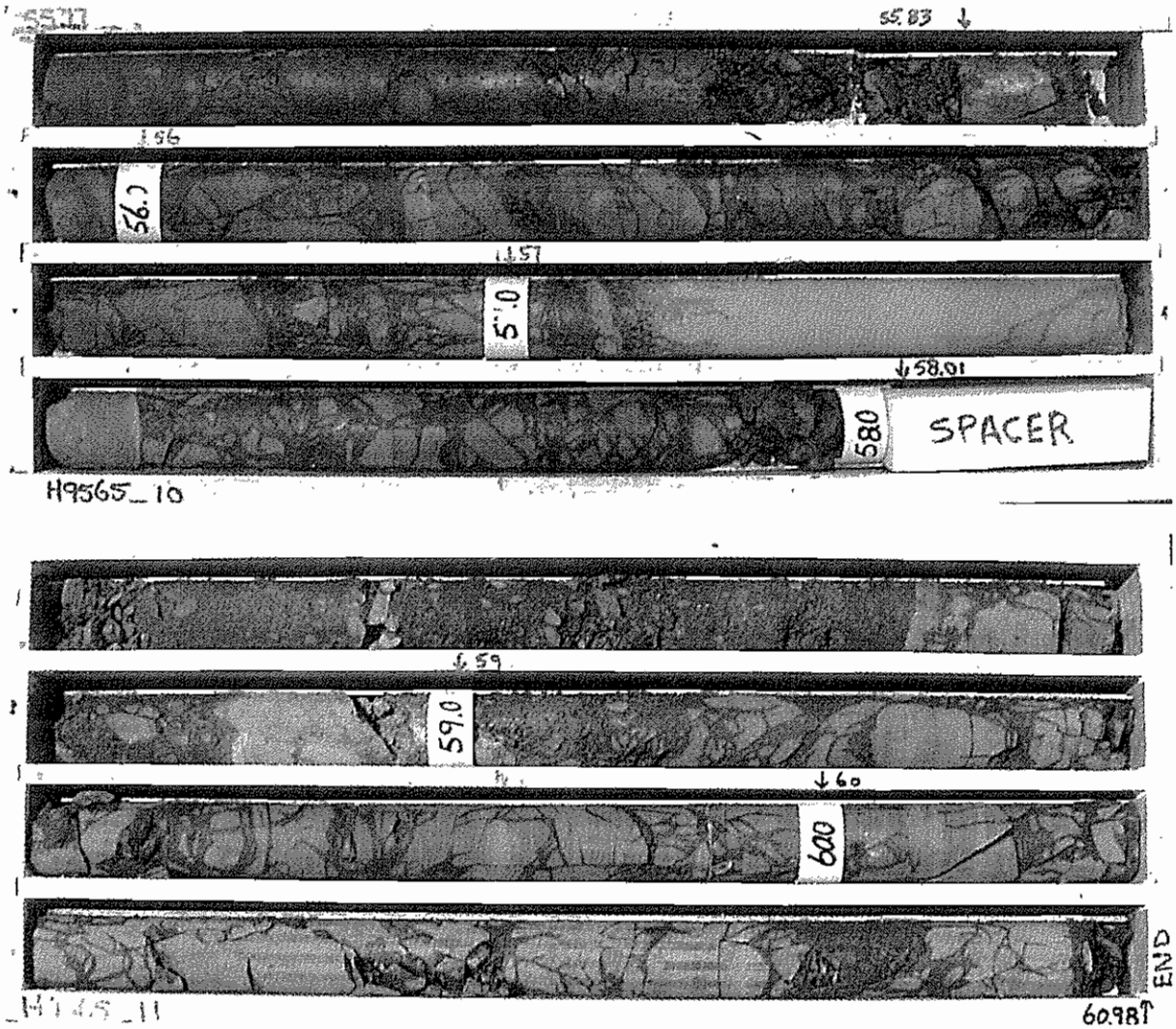
Borehole No: **BH 16**

Start Depth: 28.50m
Finish Depth: 60.98m
Project No: FG 5388
H No: 9565

Project: **Gateway Upgrade Project - Gateway Bridge**

Borehole No: **BH 16**

Start Depth: 28.50m
Finish Depth: 60.98m
Project No: FG 5388
H No: 9565



ROAD SYSTEM AND ENGINEERING
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Department of Main Roads

DEFECT DESCRIPTIONS OF ENGINEERING BORELOGS

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

BOREHOLE NO	:	BH 16
SHEET	:	1 of 6
REFERENCE NO	:	H9565

PROJECT : GATEWAY UPGRADE PROJECT – GATEWAY BRIDGE DUPLICATION FOUNDATION INVESTIGATION

LOCATION : PIER 7 – SOUTHERN FACE OF PILE CAP – LEFT HAND /UPSTREAM SIDE

PROJECT NO :	FG5388	SURFUCE RL	-3.25	DRILLER	CAIRNS DRILLING
JOB NO :		DATUM	AHD	DATE DRILLED	16-24/4/05

DEPTH	DEFECT TYPE	DIP	PLANARITY	ROUGHNESS	APERTURE	WALL ALTERATION	OTHER
28.13-29.10	WS/BZ	-	-		O	W	
30.76-31.03	WS/BZ	-	-	-	O	W	
31.12-31.18	WS/BZ	-	-	-	O	W	
31.22-31.32	WS/BZ	-	-	-	O	W	
31.60	LP	15°	P	S	C	Cn	DI
31.62	LP	15°	P	S	C	Cn	DI
31.74	LP	15°	P	S	C	Cn	DI
31.78	LP	15°	P	S	C	Cn	DI
32.08-32.18	WS	<10°	P	-	O	W	Parallel to LP
32.18-32.22	CB						
32.64-32.77	BZ/WS		-	-	O	WS	
32.84-32.89	WS			-	O	W	Parallel to LP
33.15-33.21	BZ/WS	-	-	-	C	W	
33.29-33.36	BZ	-	-	-	O		
33.48-33.54	BZ/WS	-	-	-	O	W	
33.62-3.72	BZ/WS	-	-	-	O	W	
33.90-34.05	BZ/WS	-	-	-	C	W	CI
34.25	Fr	-	Cu	-	T		DI
34.33	LP	40°	ST	R	C		DI
34.45	J	40° & 90°	CM	R	C		DI
34.50-34.56	FZ	20°	P	-	C		DI
34.62	LP	20°	P	-	C	-	CI
34.65	J	50°	P	S	C		CI

Abbreviations

ROUGHNESS		WALL ALTERATIONS		TYPE		OTHER	
R	Rough	FeSt	Iron Stained	J	Joint	P	Partly
S	Smooth	W	Weathered	B	Bedding	CL	Carbonaceous lamination
SL	Slickensided	SM	Secondary Mineralisation	CB	Clay Band	Co	Coal seam
				Fu	Fault	In	Incipient
PLANARITY		APERTURE		LP	Lamination Parting	SI	Sand Infill
Pl	Planar	C	Closed	SZ	Sheared Zone	H	Horizontal
St	Stepped	O	Open	CZ	Crushed Zone	V	Vertical
Un	Undulating	F	Filled	WS	Weathered Seam	CI	Clay Infill
Cu	Curved	T	Tight	BZ	Broken Zone	Cn	Clean
Ir	Irregular			HFZ	Highly Fractured Zone	CS	Clay Seam
				Fr	Fracture	DI	Drilling Induced

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

F:GEOT533/4

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DEFECT DESCRIPTIONS OF ENGINEERING BORELOGS

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

BOREHOLE NO	:	BH 16
SHEET	:	2 of 6
REFERENCE NO	:	H9565

PROJECT : GATEWAY UPGRADE PROJECT – GATEWAY BRIDGE DUPLICATION FOUNDATION INVESTIGATION

LOCATION : PIER 7 – SOUTHERN FACE OF PILE CAP – LEFT HAND /UPSTREAM SIDE

PROJECT NO :	FG5388	SURFUCE RL	-3.25	DRILLER	CAIRNS DRILLING
JOB NO :		DATUM	AHD	DATE DRILLED	16-24/4/05

DEPTH	DEFECT TYPE	DIP	PLANARITY	ROUGHNESS	APERTURE	WALL ALTERATION	OTHER
34.66-35.05	BZ	-	Ir	-	C	-	Slightly
35.05	J	50°	Cu	-	C	-	CI
35.12	J	30°	St	S	C	DI	DI
35.52	J	65°	Ir	-	C	-	CI
35.58	LP	30°	P	S	C	DI	DI
35.65	Fr	-	Ir	-			DI
35.75-35.80	CS						CI
35.85	J	70°	P	-	T		CI, 5mm
35.73-35.95	WS	-	-	-	C	W	
36.20-36.30	SZ	20°	P	-		W	CI
36.30-36.40	BZ		P	-	C		DI, Parallel to LP
36.50	LP	30°	P	S	C		DI
36.68-38.71	WS	-	-		O	W	
36.80	J	70°	P	R	C	Cn	DI
37.00	CS	80°-90°	Un	-	C		CI, Parallel to LP
37.10-37.15	CS	30°					CI, Parallel to LP
37.40-37.47	CS	10°	-	-	C		Parallel to LP
37.54-37.63							Coreloss
37.90-37.93							Coreloss
37.93-37.95							Coreloss
37.95	BP	30°	P	S	C		DI
38.22	BP	30°	P	R	C		DI, Parallel to LP
38.35-38.29	CB						

Abbreviations

ROUGHNESS		WALL ALTERATIONS		TYPE		OTHER	
R	Rough	FeSt	Iron Stained	J	Joint	P	Partly
S	Smooth	W	Weathered	B	Bedding	CL	Carbonaceous lamination
SL	Slickensided	SM	Secondary Mineralisation	CB	Clay Band	Co	Coal seam
				Fu	Fault	In	Incipient
PLANARITY		APERTURE		LP	Lamination Parting	SI	Sand Infill
Pl	Planar	C	Closed	SZ	Sheared Zone	H	Horizontal
St	Stepped	O	Open	CZ	Crushed Zone	V	Vertical
Un	Undulating	F	Filled	WS	Weathered Seam	CI	Clay Infill
Cu	Curved	T	Tight	BZ	Broken Zone	Cn	Clean
Ir	Irregular			HFZ	Highly Fractured Zone	CS	Clay Seam
				Fr	Fracture	DI	Drilling Induced

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

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DEFECT DESCRIPTIONS OF ENGINEERING BORELOGS

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

BOREHOLE NO	:	BH 16
SHEET	:	3 of 6
REFERENCE NO	:	H9565

PROJECT : GATEWAY UPGRADE PROJECT – GATEWAY BRIDGE DUPLICATION FOUNDATION INVESTIGATION

LOCATION : PIER 7 – SOUTHERN FACE OF PILE CAP – LEFT HAND /UPSTREAM SIDE

PROJECT NO :	FG5388	SURFUCE RL	-3.25	DRILLER	CAIRNS DRILLING
JOB NO :		DATUM	AHD	DATE DRILLED	16-24/4/05

DEPTH	DEFECT TYPE	DIP	PLANARITY	ROUGHNESS	APERTURE	WALL ALTERATION	OTHER
38.45	LP	<10°	Ir	R	C	Cn	
38.50	LP	<15°	Ir	R	C	Cn	
38.65	LP	25°	P	S	C		DI
38.71	BP	25°	P	S	C		DI
38.83-38.87	WS	-	-	-		W	
39.20	J	70°	P	R	C		
39.37	LP	15°	P	S	C		
39.45-39.65	BZ	-	-	-	C		Irregular cracking
39.90	LP	5°	P	S	C		CL
40.0	J	45°	P	R	C	-	-
40.20	J	60°	P	-	T		
40.40	J	60°	P	-	C		DI
40.42	LP	20°	P	R	C		DI
40.78	J	50°	Ir	R	C		
40.90	BP	30°	P	S	C		CI
41.35-41.60	Fu	65°	P	-	T		
41.90	J	60°	P	S	C		CI
41.90	J	70°	P	S	C		CI
42.13	BP	30°	P	S	T		DI
42.21	BP	30°	P	S	T		DI
42.35	BP	30°	P	S	T		DI
42.47	BP	30°	P	S	T		DI, Co
42.60-42.62	70°-90°						CI

Abbreviations

ROUGHNESS		WALL ALTERATIONS		TYPE		OTHER	
R	Rough	FeSt	Iron Stained	J	Joint	P	Partly
S	Smooth	W	Weathered	B	Bedding	CL	Carbonaceous lamination
SL	Slickensided	SM	Secondary Mineralisation	CB	Clay Band	Co	Coal seam
				Fu	Fault	In	Incipient
PLANARITY		**APERTURE**		LP	Lamination Parting	SI	Sand Infill
Pl	Planar	C	Closed	SZ	Sheared Zone	H	Horizontal
St	Stepped	O	Open	CZ	Crushed Zone	V	Vertical
Un	Undulating	F	Filled	WS	Weathered Seam	CI	Clay Infill
Cu	Curved	T	Tight	BZ	Broken Zone	Cn	Clean
Ir	Irregular			BrZ	Brecciated Zone	CS	Clay Seam
				Fr	Fracture	DI	Drilling Induced

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

F:GEOT533/4

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DEFECT DESCRIPTIONS OF ENGINEERING BORELOGS

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

BOREHOLE NO	:	BH 16
SHEET	:	4 of 6
REFERENCE NO	:	H9565

PROJECT : GATEWAY UPGRADE PROJECT – GATEWAY BRIDGE DUPLICATION FOUNDATION INVESTIGATION

LOCATION : PIER 7 – SOUTHERN FACE OF PILE CAP – LEFT HAND /UPSTREAM SIDE

PROJECT NO :	FG5388	SURFUCE RL	-3.25	DRILLER	CAIRNS DRILLING
JOB NO :		DATUM	AHD	DATE DRILLED	16-24/4/05

DEPTH	DEFECT TYPE	DIP	PLANARITY	ROUGHNESS	APERTURE	WALL ALTERATION	OTHER
42.55-42.95	HFZ	5°	-	-	O		CI, Parallel to LP
43.05-43.10	BZ	-	-	-	O		CI, Parallel to LP
43.15-43.17	CS						CI
43.23-43.30	BrZ	-	-	-	C		CI
43.56	J	60°	P	-	C		
43.60	LP	20°	P	S	C		
43.82	LP	20°	P	S	T		
44.02	LP	20°	P	S	C		CI
44.02	J	60°	P	S	C		CI
44.36	J	80°	P	-	C		
44.37	LP	30°	P	S	C		
44.73	Fr						DI
44.95	LP	30°	P	S	C		DI
45.20	BP		St	S	C		Faulted
45.33	BP	30°	P	S	C		DI
45.70	BP	30°	P	S	C		DI
45.85	BP	30°	P	S	C		DI
46.05	BP	30°	P	S	C		DI
46.55	LP	15°	P	S	T		DI
46.70-46.95	Fu	60°	P	-	T		
46.95-47.05	Fu	70°-80°		-	T		
47.36	LP	20°	P	S	C		DI
47.53-47.70	Fu	50°	P	R	T		

Abbreviations

ROUGHNESS		WALL ALTERATIONS		TYPE		OTHER	
R	Rough	FeSt	Iron Stained	J	Joint	P	Partly
S	Smooth	W	Weathered	B	Bedding	CL	Carbonaceous lamination
SL	Slickensided	SM	Secondary Mineralisation	CB	Clay Band	Co	Coal seam
				Fu	Fault	In	Incipient
PLANARITY		APERTURE		LP	Lamination Parting	SI	Sand Infill
Pl	Planar	C	Closed	SZ	Sheared Zone	H	Horizontal
St	Stepped	O	Open	CZ	Crushed Zone	V	Vertical
Un	Undulating	F	Filled	WS	Weathered Seam	CI	Clay Infill
Cu	Curved	T	Tight	BZ	Broken Zone	Cn	Clean
Ir	Irregular			HFZ	Highly Fractured Zone	CS	Clay Seam
				BrZ	Brecciated Zone	DI	Drilling Induced

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

F:GEOT533/4

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DEFECT DESCRIPTIONS OF ENGINEERING BORELOGS

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

BOREHOLE NO :	BH 16
SHEET :	5 of 6
REFERENCE NO :	H9565

PROJECT : GATEWAY UPGRADE PROJECT – GATEWAY BRIDGE DUPLICATION FOUNDATION INVESTIGATION

LOCATION : PIER 7 – SOUTHERN FACE OF PILE CAP – LEFT HAND /UPSTREAM SIDE

PROJECT NO :	FG5388	SURFUCE RL	-3.25	DRILLER	CAIRNS DRILLING
JOB NO :		DATUM	AHD	DATE DRILLED	16-24/4/05

DEPTH	DEFECT TYPE	DIP	PLANARITY	ROUGHNESS	APERTURE	WALL ALTERATION	OTHER
47.70	J	70°	P	-	T	Cn	
47.85	J	50°	P	P	T	Cn	DI
47.85	J	60°	P	R	T	Cn	DI
48.15	J	45°	Un	-	T	-	DI
48.45	J	45°	P	-	T		Healed
48.65-49.70	Fu	45°	-	-	T		Healed
48.95-49.25	Fu	35°	-	-	-		Healed
49.37	LP	25°	P	S	C	-	DI
49.43	F	70°	Un	-	C	-	
49.50	F	60°	P	-	C	-	
49.66	LP	30°	P	S	C	-	DI
50.01-50.21	BrZ	60°		-	C	-	Healed
50.35	Fr		St	R	T		DI
50.40-50.43	SZ	70°	-	-	C	-	CI
50.56	LP	35°	St	R	O	Cn	
50.60	LP	35°	P	S	T		DI
50.66	J	60°	P	-	T		
50.85-51.00	BrZ	70°-90°	Cu	-	T	-	Healed, CI
51.03	Fr	-	-	-			DI
51.05	LP	30°	P	-	O		DI
51.20	LP	5°	P	S	C		DI
51.35	LP	20°	P	S	C		DI
51.38	LP	20°	P	S	C		DI

Abbreviations

ROUGHNESS		WALL ALTERATIONS		TYPE		OTHER	
R	Rough	FeSt	Iron Stained	J	Joint	P	Partly
S	Smooth	W	Weathered	B	Bedding	CL	Carbonaceous lamination
SL	Slickensided	SM	Secondary Mineralisation	CB	Clay Band	Co	Coal seam
				Fu	Fault	In	Incipient
PLANARITY		**APERTURE**		LP	Lamination Parting	SI	Sand Infill
Pl	Planar	C	Closed	SZ	Sheared Zone	H	Horizontal
St	Stepped	O	Open	CZ	Crushed Zone	V	Vertical
Un	Undulating	F	Filled	WS	Weathered Seam	CI	Clay Infill
Cu	Curved	T	Tight	BZ	Broken Zone	Cn	Clean
Ir	Irregular			BrZ	Brecciated Zone	CS	Clay Seam
				Fr	Fracture	DI	Drilling Induced

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

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DEFECT DESCRIPTIONS OF ENGINEERING BORELOGS

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

BOREHOLE NO	:	BH 16
SHEET	:	6 of 6
REFERENCE NO	:	H9565

PROJECT : GATEWAY UPGRADE PROJECT – GATEWAY BRIDGE DUPLICATION FOUNDATION INVESTIGATION

LOCATION : PIER 7 – SOUTHERN FACE OF PILE CAP – LEFT HAND /UPSTREAM SIDE

PROJECT NO :	FG5388	SURFUCE RL	-3.25	DRILLER	CAIRNS DRILLING
JOB NO :		DATUM	AHD	DATE DRILLED	16-24/4/05

DEPTH	DEFECT TYPE	DIP	PLANARITY	ROUGHNESS	APERTURE	WALL ALTERATION	OTHER
51.45	J	60°	P	-	T		
51.90	J	70°	P	-	T		CV
52.05	Fr	70°	Cu	-	T		CV
52.00	LP	10°	Un	S	T		DI
52.15	LP	5°	P	S	T		DI
52.35-52.95	BrZ	-	-	-	C		CI
52.95-53.53	HFZ	-	-	-	O		CI
52.46-52.51	BrZ	-	-	-	O		CI, Healed
52.57-52.64	BZ		Ir		O	W	CI
52.57-52.85	BrZ				C	W	CI, Healed
52.95-54.65	HFZ		Ir		O	W	CI
54.65-55.85	BrZ				C	W	CI, Healed
56.02-57.15	HFZ		Ir		O	W	CI
57.90-59.25	BrZ				O-C	W	CI
59.25-60.75	BZ		Ir		O		CI
60.75-60.80	BZ		Ir		O	W	CI

Abbreviations

ROUGHNESS		WALL ALTERATIONS		TYPE		OTHER	
R	Rough	FeSt	Iron Stained	J	Joint	P	Partly
S	Smooth	W	Weathered	BrZ	Brecciated Zone	CL	Carbonaceous lamination
SL	Slickensided	SM	Secondary Mineralisation	CB	Clay Band	Co	Coal seam
				Fu	Fault	In	Incipient
PLANARITY		APERTURE		LP	Lamination Parting	Sf	Sand Infill
Pl	Planar	C	Closed	SZ	Sheared Zone	H	Horizontal
St	Stepped	O	Open	CZ	Crushed Zone	CV	Calcite Vein
Un	Undulating	F	Filled	WS	Weathered Seam	CI	Clay Infill
Cu	Curved	T	Tight	BZ	Broken Zone	Cn	Clean
Ir	Irregular			HFZ	Highly Fractured Zone	CS	Clay Seam
				Fr	Fracture	DI	Drilling Induced

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

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