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BOREHOLE ENGINEERING LOG

BOREHOLE NO.

BH13B

SHEET 1 OF 5

Client:	QUEENSLAND DEPARTNENT OF MAIN ROADS	Date Commenced:	31/1/02
Project:	TUGUN BYPASS GEOTECHNICAL INVESTIGATION	Date Completed:	8/2/02
Borehole Location:	TUGUN	Recorded By:	MCM
Project Number:	2134070A	Log Checked By:	

Drill Model/Mounting:		Hole Angle:	90°	Surface RL:	0.83 m AHD
Borehole Diameter:	120 mm	Bearing:	---	Co-ords:	E 50617 N 86945 PMG

Borehole Information						Field Material Description					
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) AHD / DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY (VS S F FB VL L MD ST VST VD H)	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
WB	Nil		0 / 1				SP	**SAND**: medium grained, grey to dark grey.	W			ESTUARINE/ FLOODPLAIN/TIDAL DELTA DEPOSITS
			-1 / 2									
			-2 / 3	2,0,1 N=1	SPT			... contains traces of silt.				
			-3 / 4									
			-4 / 5									
			-5 / 6	3,5,14 N=19	SPT			... becoming pale grey to off-white.	M			
			-6 / 7									
			-7 / 8									
			-8 / 9	22,29,28 N=57	SPT		SM	**Cemented Silty SAND (Coffee Rock)**:medium grained, dark brown with apparent mottling.				
			-9 / 10									
			-10 / 11									
			-11 / 12	7,15,30 N=45	SPT							
			-12 / 13									
			-13 / 14									
			-14									

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENGINEERING LOG

BOREHOLE NO.

BH13B

SHEET 2 OF 5

Client:	QUEENSLAND DEPARTNENT OF MAIN ROADS	Date Commenced:	31/1/02
Project:	TUGUN BYPASS GEOTECHNICAL INVESTIGATION	Date Completed:	8/2/02
Borehole Location:	TUGUN	Recorded By:	MCM
Project Number:	2134070A	Log Checked By:	DAW

Drill Model/Mounting:		Hole Angle:	90°	Surface RL:	0.83 m AHD
Borehole Diameter:	120 mm	Bearing:	--- .	Co-ords:	E 50617 N 86945 PMG

Borehole Information						Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) AHD / DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY (VS S F ST VST H; FB VL L MD D VD)	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
WB			15 / 16	5,10,20 N=30	SPT		SM	**Cemented Silty SAND (Coffee Rock)**:medium grained, dark brown with apparent mottling. *(continued)* ... becoming yellow-brown to pale brown with a trace of black heavy mineral.	M			
			16 / 17									
			17 / 18.00 18	9,15,18 N=33	SPT		SP	**SAND** medium grained, white with some silt.				
			18 / 19									
			19 / 20									
			20 / 21.00 21	4,5,6 N=11	SPT		CH	**CLAY**: dark grey, organic material visible in irregular laminations.				
			21 / 22									
			22 / 23		U50			... becoming grey.				
			23 / 24		U50							
			24 / 25									
			25 / 26									
			26 / 27.00 27		U50		SP	**SAND**: medium grained, pale grey to grey, some clay.				
			27 / 28.00 28				CH	**CLAY**: white to pale grey.				RESIDUAL SOIL
			28 / 29									
			29									

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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BOREHOLE ENGINEERING LOG

BOREHOLE NO.

BH13B

SHEET 3 OF 5

Client:	QUEENSLAND DEPARTNENT OF MAIN ROADS	Date Commenced:	31/1/02
Project:	TUGUN BYPASS GEOTECHNICAL INVESTIGATION	Date Completed:	8/2/02
Borehole Location:	TUGUN	Recorded By:	MCM
Project Number:	2134070A	Log Checked By:	DAW

Drill Model/Mounting: | Hole Angle: 90° | Surface RL: 0.83 m AHD

Borehole Diameter: 120 mm | Bearing: --- | Co-ords: E 50617 N 86945 PMG

Borehole Information						Field Material Description						
1	2	3	4	5	6	7	8	9	10	11	12	13
METHOD	SUPPORT	WATER	RL(m) AHD / DEPTH(m)	FIELD TEST	SAMPLE	GRAPHIC LOG	USC SYMBOL	SOIL/ROCK MATERIAL FIELD DESCRIPTION	MOISTURE	RELATIVE DENSITY / CONSISTENCY (VS S F FB VL L MD ST D VST VD H)	HAND PENETROMETER (kPa)	STRUCTURE AND ADDITIONAL OBSERVATIONS
WB			30 / 31		U50		CH	**CLAY:** white to pale grey *(continued)* ... becoming off-white	M			
			31 / 32					... becoming pale grey with pale orange mottling.				
			32 / 33		U50			... colour varies pale grey with green-grey and grey mottling, contains residual quartz grains (weathered argillite).				Lost tube down hole
			33 / 34.04	R	SPT			**ARGILLITE:** green-grey with brown staining along fractures/joints, extremely weathered, extremely low strength, clayey, contains many fractures and joints with angles at approximately 70°.				WEATHERED ROCK
			36 / 37	R	SPT			... decrease in weathering to highly and moderately weathered.				
			40 / 41					REFER TO CORED BOREHOLE LOG				
			43 / 44									

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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CORED BOREHOLE ENGINEERING LOG

BOREHOLE NO.

BH13B

SHEET 4 OF 5

Client:	QUEENSLAND DEPARTNENT OF MAIN ROADS	Date Commenced:	31/1/02
Project:	TUGUN BYPASS GEOTECHNICAL INVESTIGATION	Date Completed:	8/2/02
Borehole Location:	TUGUN	Recorded By:	MCM
Project Number:	2134070A	Log Checked By:	DAW

Drill Model/Mounting:
Borehole Diameter: 120 mm
Hole Angle: 90°
Bearing: ---
Surface RL: 0.83 m AHD
Co-ords: E 50617 N 86945 PMG

Borehole Information						Field Material Description					
1	2	3	4	5	6	7	8	9	10	11	12
METHOD	SUPPORT	WATER	CORE RECOVERY	ROD	RL(m) AHD / DEPTH(m)	GRAPHIC LOG	SOIL/ROCK MATERIAL FIELD DESCRIPTION	WEATHERING	INFERRED STRENGTH Is(50) MPa (EL 0.03, VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	AVERAGE DEFECT SPACING mm (30, 100, 300, 1000, 3000)	STRUCTURE AND ADDITIONAL OBSERVATIONS
					30 31 31 32 32 33 33 34 34 35 35 36 36 37 37 38 38 39 39 40		COMMENCE CORING AT 40 m				
NMLC	Nil		100	0	40		**ARGILLITE:** very fine grained, argillaceous, pale grey to grey, highly to moderately weathered, very low to low strength.	HW-MW			WEATHERED ROCK Extensive jointing (45-70°) planar, smooth, often with a patchy clay veneer.
WB					41 41.18		**WASH BORED**				
NMLC			97	22	42 43.04 43		**GREYWACKE:** very fine to fine grained, grey, moderately weathered, low strength.	MW			Numerous joints and crush zones (0-45°), planar, smooth with white patchy clay veneer.
WB					44 44.16 44.20		**CORE LOSS** **WASH BORED**				

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

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CORED BOREHOLE ENGINEERING LOG

BOREHOLE NO.

BH13B

SHEET 5 OF 5

Client:	QUEENSLAND DEPARTNENT OF MAIN ROADS	Date Commenced:	31/1/02
Project:	TUGUN BYPASS GEOTECHNICAL INVESTIGATION	Date Completed:	8/2/02
Borehole Location:	TUGUN	Recorded By:	MCM
Project Number:	2134070A	Log Checked By:	DAW

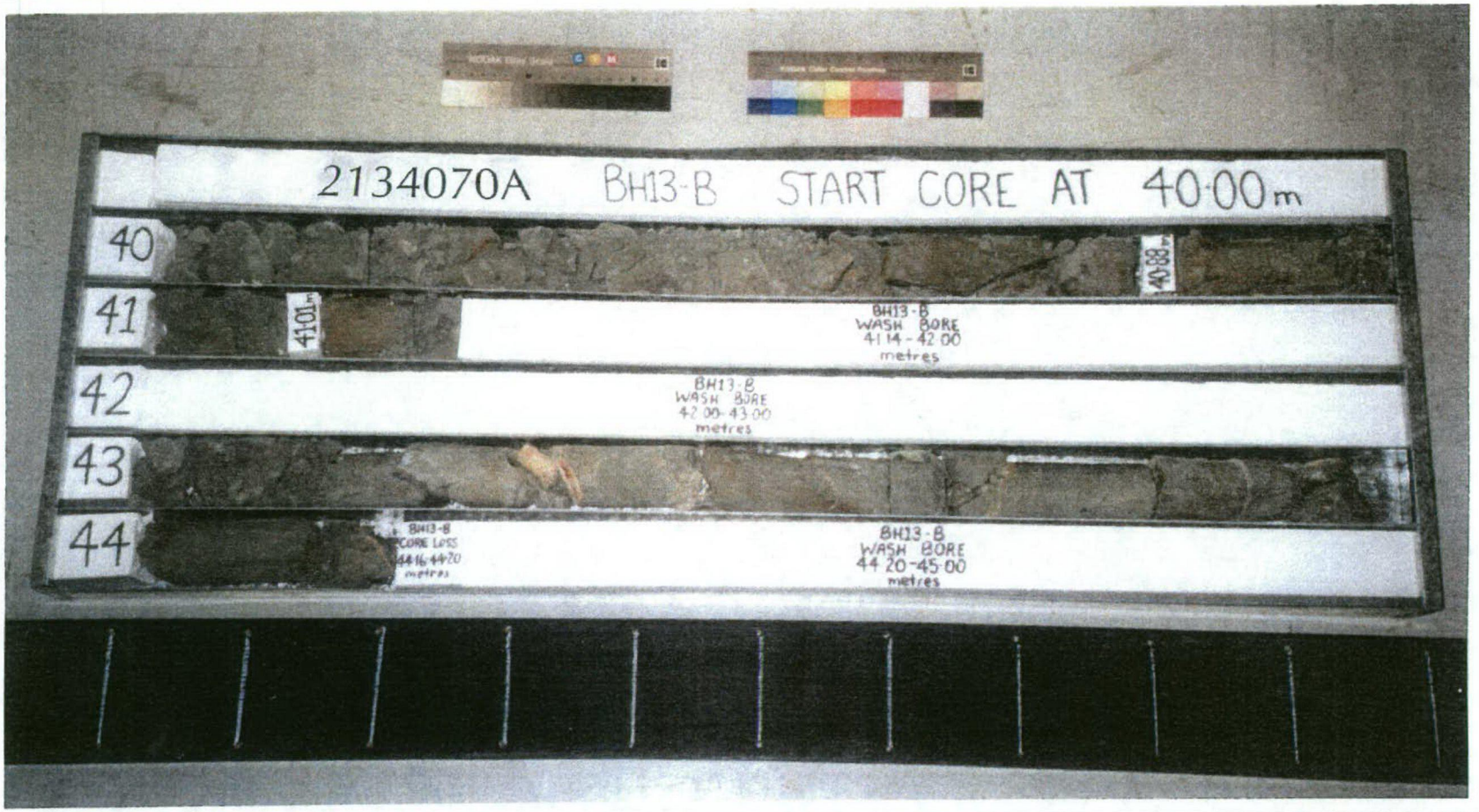
Drill Model/Mounting:		Hole Angle:	90°	Surface RL:	0.83 m AHD
Borehole Diameter:	120 mm	Bearing:	---	Co-ords:	E 50617 N 86945 PMG

Borehole Information						Field Material Description					
1	2	3	4	5	6	7	8	9	10	11	12
METHOD	SUPPORT	WATER	CORE RECOVERY	RQD	RL(m) AHD / DEPTH(m)	GRAPHIC LOG	SOIL/ROCK MATERIAL FIELD DESCRIPTION	WEATHERING	INFERRED STRENGTH Is(50) MPa: 0.03, 0.1, 0.3, 1, 3, 10; EL VL L M H VH EH	AVERAGE DEFECT SPACING mm: 10, 30, 100, 300, 1000, 3000	STRUCTURE AND ADDITIONAL OBSERVATIONS
WB					45.50 / 45 / 46		**WASH BORED** *(continued)*				
NMLC			91	0	46.50 / 46.60		**GREYWACKE:** very fine to fine grained, grey, moderately weathered, low strength. ... several dark, high angle lenses with pyrite infilling contacts.	MW			Joints typically planar, slightly rough, iron stained
WB					46 / 47 / 47 / 48		**CORE LOSS** **WASH BORED**				Attempted core run at 47.5 but "gibber" in hole caused core run to be abandoned
					48 / 49 / 49 / 50 / 50 / 51 / 51 / 52 / 52 / 53 / 53 / 54 / 54 / 55 / 55 / 56 / 56 / 57 / 57 / 58 / 58 / 59 / 59		END OF BOREHOLE AT 48.33 m				

This borehole log should be read in conjunction with Parsons Brinckerhoff's accompanying standard notes.

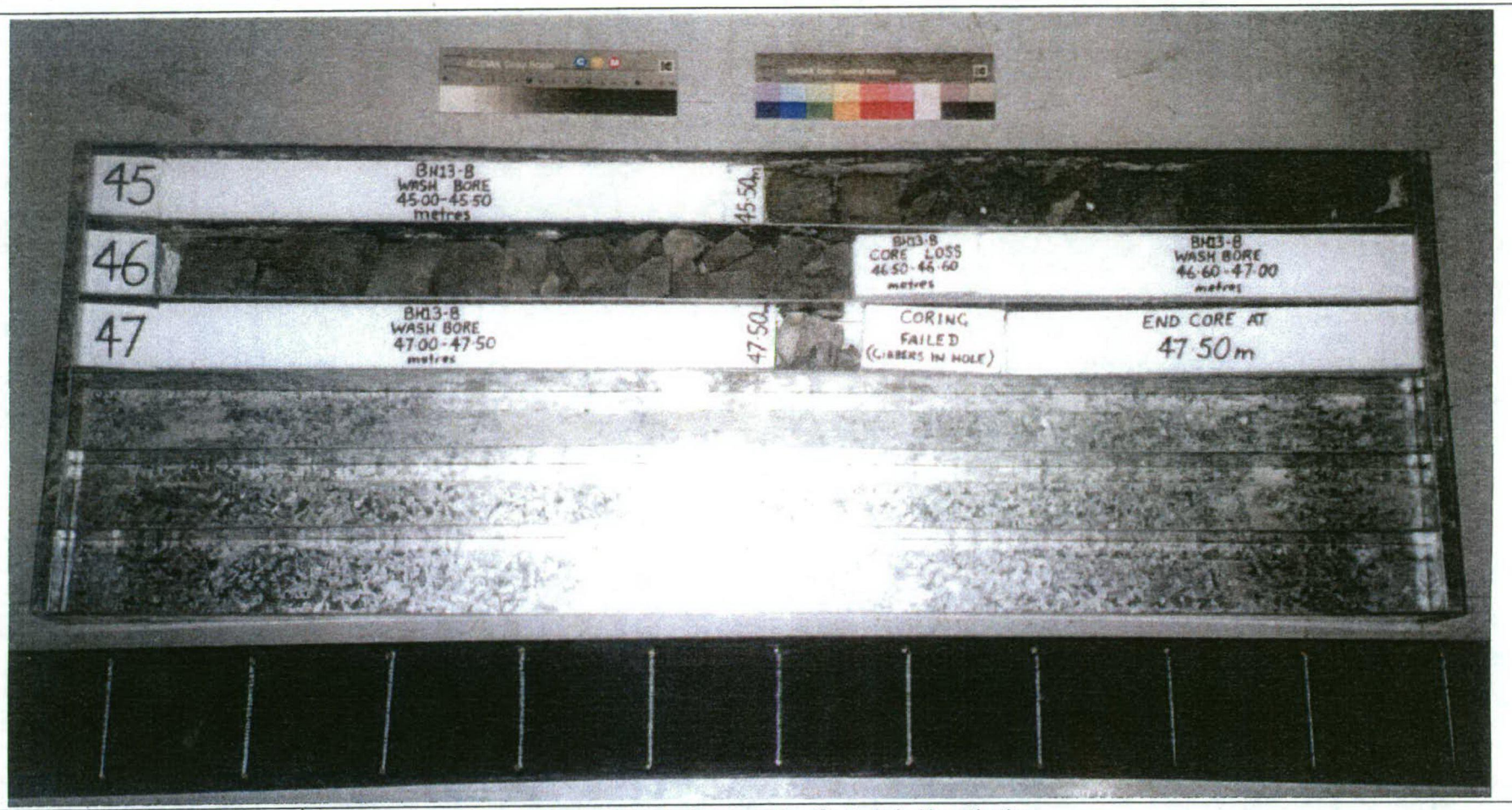
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PB PARSONS BRINCKERHOFF

Project	:	Tugun Bypass Project – Supplementary Geotechnical Investigation
Job Number	:	2134070A
Location	:	Borehole 13 - B
Depth	:	40.00 – 45.00 m (Tray 1 of 2)
Date Drilled	:	31 January – 8 February 2002



PARSONS BRINCKERHOFF

Project	: Tugun Bypass Project – Supplementary Geotechnical Investigation
Job Number	: 2134070A
Location	: Borehole 13 - B
Depth	: 45.00 – 47.50 m (Tray 2 of 2)
Date Drilled	: 31 January – 8 February 2002