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BOREHOLE RECORD SHEET

Location Number: BH 329

Project Number: 110-12936
Project Name: Cross River Rail
Location: Brisbane
Client: AECOM
Date: 29/02/2012

Easting: 501504 Northing: 6955864 RL: 15.01 m
Logger: JI/CB Operator: PD Machine: MC450

Depth	Description	Weathering	Strength (Estimated)	Defect Spacing	Rec (%)	RQD	Samples and Remarks
0.20	FILL Sandy CLAY (CH) Stiff, high plasticity, dark brown, fine to medium grained sand, with some organics.						
	FILL Silty CLAY (CH) Very stiff, high plasticity, grey brown and mottled red, trace of fine grained sand from 1.0m, with some fine to coarse size gravel.						
1.70							1.50 m; ,U50 - Tube bent
	NATURAL CLAY (CH) Hard, high plasticity, red mottled grey, trace of fine grained sand.						SPT 5, 9, 11 N=20
2.40							
	Silty CLAY (CH) Hard, high plasticity, light grey, with some fine grained sand, trace orange brown weakly cemented sand bands.						SPT 6, 11, 10 N=21
4.55							
4.92	CLAY (CH) stiff to very stiff, high plasticity, pale light grey, with weak red sandstone inclusions.						SPT 18, 30/100mm N=R
	SANDSTONE, fine to medium grained, red, granular, with moderately widely spaced fractures.	DW			100	40	
5.60		DW - SW					
	SANDSTONE, fine to medium grained, light brown mottled red, granular, with widely spaced fractures, with trace 50mm bands of extremely weak light grey sandstone.				100	99	5.73 m; J, **5°,** S, V, O, L 5.74 m; J, **5°,** S, V, O, L
8.21							
	SANDSTONE, fine to medium grained, light grey, granular, moderately widely spaced fractures, with trace laminae of organics.						
9.04							8.87 m; C, **10°,** P, S, O, C
	SANDSTONE, fine to coarse grained, light grey, granular, moderately widely spaced fractures, with some fine size gravel and trace medium size gravel, trace laminae of organics, with a fine grained sandstone from 9.74m to 9.82m.				98	87	
10.0							

Drilling Method: TC, WB, RR, NMLC, Casing

Comments:
1) Groundwater noted at 4.3m, 2) U50 at 1.5m failed. 3) Monitoring well installed to 16.5m on completion.

Water First Noted Water Steady Level

Defects - 1.54m : F,60°,P,R,O,C

Depth (m) | Type | Dip (deg) | Planarity | Roughness | Aperature | Infill

Type: B - Bedding; C - Clay seam; F - Foliation; H - Schistosity; J - Joint; L - Cleavage; R - Fracture; S - Shear zone; T - Contact; V - Vein; Z - Decomposed Zone; DI - Drilling Induced break

Planarity: C - Curvilinear; D - Discontinuous; P - Planar; S - Subplanar; T - Stepped; U - Undulating

Roughness: L - Slickensides; P - Polished; R - Rough; S - Smooth; V - Very rough

Aperature: C - Closed; F - Filled; N - Clean; O - Open; S - Stain

Infill: C - Clay; F - Iron Oxide; K - Calcite; L - Limonite; Q - Quartz; S- Secondary mineral; U - Unidentified mineral; W - Weathered rock; X - Carbonaceous; Z - Clean

Weathering Grades
RS - Residual Soil
XW - Extremely weathered
DW - Distinctly weathered
SW - Slightly weathered
FR - Fresh

Rock Strength
VW - Very weak
W - Weak
MS - Medium strong
S - Strong
VS - Very strong
ES - Extremely strong

Samples
U50
SPT
Disturbed Sample

Approved:
Date:

SOIL_SURVEYS_00 LIBRARY 2012-05.GLB Log SOIL SURVEY BOREHOLE LOG 111-12936 NEW.GPJ <<DrawingFile>> 21/05/2012 14:34 8.30.002 Developed by Datgel

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BOREHOLE RECORD SHEET

Location Number: BH 329

Project Number: 110-12936
Project Name: Cross River Rail
Location: Brisbane
Client: AECOM
Date: 29/02/2012

Easting: 501504 Northing: 6955864 RL: 15.01 m
Logger: JI/CB Operator: PD Machine: MC450

Depth	Description	Weathering	Strength (Estimated)	Defect Spacing	Rec (%)	RQD	Samples and Remarks
10.60		DW - SW					
	SANDSTONE, fine to medium grained, light grey mottled orange, granular, widely spaced fractures, with trace laminae of organics.				98	87	
11.60							11.39 m; J, **5°**, S, R, O, Coal
	SANDSTONE, fine to medium grained, light grey mottled orange, granular, widely spaced fractures, with trace laminae of organics, with some 50mm bands of fine to coarse grained or fine grained sandstone, trace of limonite staining.	SW					
12.90							
	SANDSTONE, fine to coarse grained, light grey, granular, widely spaced fractures, with some fine size gravel and trace medium size gravel, trace laminae of organics.				98	91	
13.70							
	SANDSTONE, fine to medium grained, light grey mottled orange, granular, widely spaced fractures, with trace laminae of organics, with trace of limonite staining, trace of fine to medium size gravel clasts.						14.39 m; J, **10°**, P, S, O, L
							15.03 m; J, **10°**, P, R, O, Coal
					100	0	
15.84							
	SANDSTONE/MUDSTONE -Non intact (transition zone)	DW - SW					
16.20							
	MUDSTONE, fine grained, light brown grey, thinly laminated, closely spaced fractures.	SW					
17.12					100	48	
17.32	COAL						
	SILTSTONE, fine grained, dark grey, with trace thin black bands, thinly laminated, closely to moderately widely spaced fractures, with sandstone laminae from 20.0m.						17.70-18.24 m; C, **5°**, P, S, O, C
		SW - FR					
					98	68	
20.0							18.24-21.56 m; DI, **5°**, P, S, O,

Drilling Method: TC, WB, RR, NMLC, Casing

Comments:
1) Groundwater noted at 4.3m, 2) U50 at 1.5m failed. 3) Monitoring well installed to 16.5m on completion.

Water First Noted Water Steady Level

Defects - 1.54m : F,60°,P,R,O,C

Depth (m) | Type: B - Bedding, C - Clay seam, F - Foliation, H - Schistosity, J - Joint, L - Cleavage, R - Fracture, S - Shear zone, T - Contact, V - Vein, Z - Decomposed Zone, DI - Drilling Induced break | Dip (deg) | Planarity: C - Curvilinear, D - Discontinuous, P - Planar, S - Subplanar, T - Stepped, U - Undulating | Roughness: L - Slickensides, P - Polished, R - Rough, S - Smooth, V - Very rough | Aperature: C - Closed, F - Filled, N - Clean, O - Open, S - Stain | Infill: C - Clay, F - Iron Oxide, K - Calcite, L - Limonite, Q - Quartz, S- Secondary mineral, U - Unidentified mineral, W - Weathered rock, X - Carbonaceous, Z - Clean

Weathering Grades
RS - Residual Soil
XW - Extremely weathered
DW - Distinctly weathered
SW - Slightly weathered
FR - Fresh

Rock Strength
VW - Very weak
W - Weak
MS - Medium strong
S - Strong
VS - Very strong
ES - Extremely strong

Samples
U50
SPT
Disturbed Sample

Approved:
Date:

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SOIL SURVEYS

BOREHOLE RECORD SHEET

Location Number: BH 329
Project Number: 110-12936
Project Name: Cross River Rail
Location: Brisbane
Client: AECOM
Date: 29/02/2012

Easting: 501504 Northing: 6955864 RL: 15.01 m
Logger: JI/CB Operator: PD Machine: MC450

Drilling Method: TC | WB | RR | NMLC | Casing (NMLC throughout)

Depth (m)	Graphic	Description	Weathering	Rec (%)	RQD	Samples and Remarks
20.0 – 22.00	Siltstone	SILTSTONE, fine grained, dark grey, with trace thin black bands, thinly laminated, closely to moderately widely spaced fractures, with sandstone laminae from 20.0m. *(continued)*	SW - FR; SW	98	68	Z; 21.68 m; C, **5°**, C; 21.75 m; C, **5°**, C
22.00 – 22.33	Mudstone	MUDSTONE, fine grained, light brown grey, thinly laminated, closely spaced fractures.	SW - FR			
22.33 – 22.72	Siltstone	SILTSTONE, fine grained, dark grey, with trace thin black bands, thinly laminated, closely to moderately widely spaced fractures, with sandstone laminae from 20.0m.	FR	100	58	
22.72 – 23.47	Sandstone	SANDSTONE, fine to medium grained, light grey, granular, massively bedded with moderately widely spaced fractures.				23.22 m; J, **75°**, S, R, O, Z; 23.40 m; J, **80°**, S, R, O, Z; 23.46 m; J, **10°**, S, R, O, Coal
23.47 – 28.07	Sandstone	SANDSTONE, fine to medium grained, light grey, granular, massively bedded with widely spaced fractures.		100	100	24.75 m; J, **41°**, P, V, O, Z; 25.81 m; J, **80°**, S, R, O, Z
28.07 – 28.33	Coal	COAL band				
28.33 – 30.00	Siltstone	SILTSTONE, fine grained, dark grey, thinly laminated, with moderately widely spaced fractures, with some sandstone laminae.		100	90	28.32 m; J, **25°**, P, S, O, Z; 28.71 m; J, **10°**, C, R, O, Z

BOREHOLE BH 329 TERMINATED AT 30.00m

Comments:
1) Groundwater noted at 4.3m. 2) U50 at 1.5m failed. 3) Monitoring well installed to 16.5m on completion.

Water First Noted — Water Steady Level

Defects - 1.54m - J, 60°, P, R, O, C

Depth (m); Type; Dip (deg); Planarity; Roughness; Aperature; Infill

Type: B - Bedding, C - Clay seam, F - Foliation, H - Schistosity, J - Joint, L - Cleavage, R - Fracture, S - Shear zone, T - Contact, V - Vein, Z - Decomposed Zone, DI - Drilling Induced break

Planarity: C - Curvilinear, D - Discontinuous, P - Planar, S - Subplanar, T - Stepped, U - Undulating

Roughness: L - Slickensides, P - Polished, R - Rough, S - Smooth, V - Very rough

Aperature: C - Closed, F - Filled, N - Clean, O - Open, S - Stain

Infill: C - Clay, F - Iron Oxide, K - Calcite, L - Limonite, Q - Quartz, S- Secondary mineral, U - Unidentified mineral, W - Weathered rock, X - Carbonaceous, Z - Clean

Weathering Grades
RS - Residual Soil
XW - Extremely weathered
DW - Distinctly weathered
SW - Slightly weathered
FR - Fresh

Rock Strength
VW - Very weak
W - Weak
MS - Medium strong
S - Strong
VS - Very strong
ES - Extremely strong

Samples
U50
SPT
Disturbed Sample

Approved:
Date:

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SOIL SURVEYS

TITLE: AECOM Brisbane Cross River Rail Core Photo - BH 329	DRAWN: DT	DATE: 26/04/2012	
	CHECKED: CB	DATE: 26/04/2012	
	SCALE: Not To Scale		A4
	PROJECT No: 110-12936	FIGURE No: 1/2	

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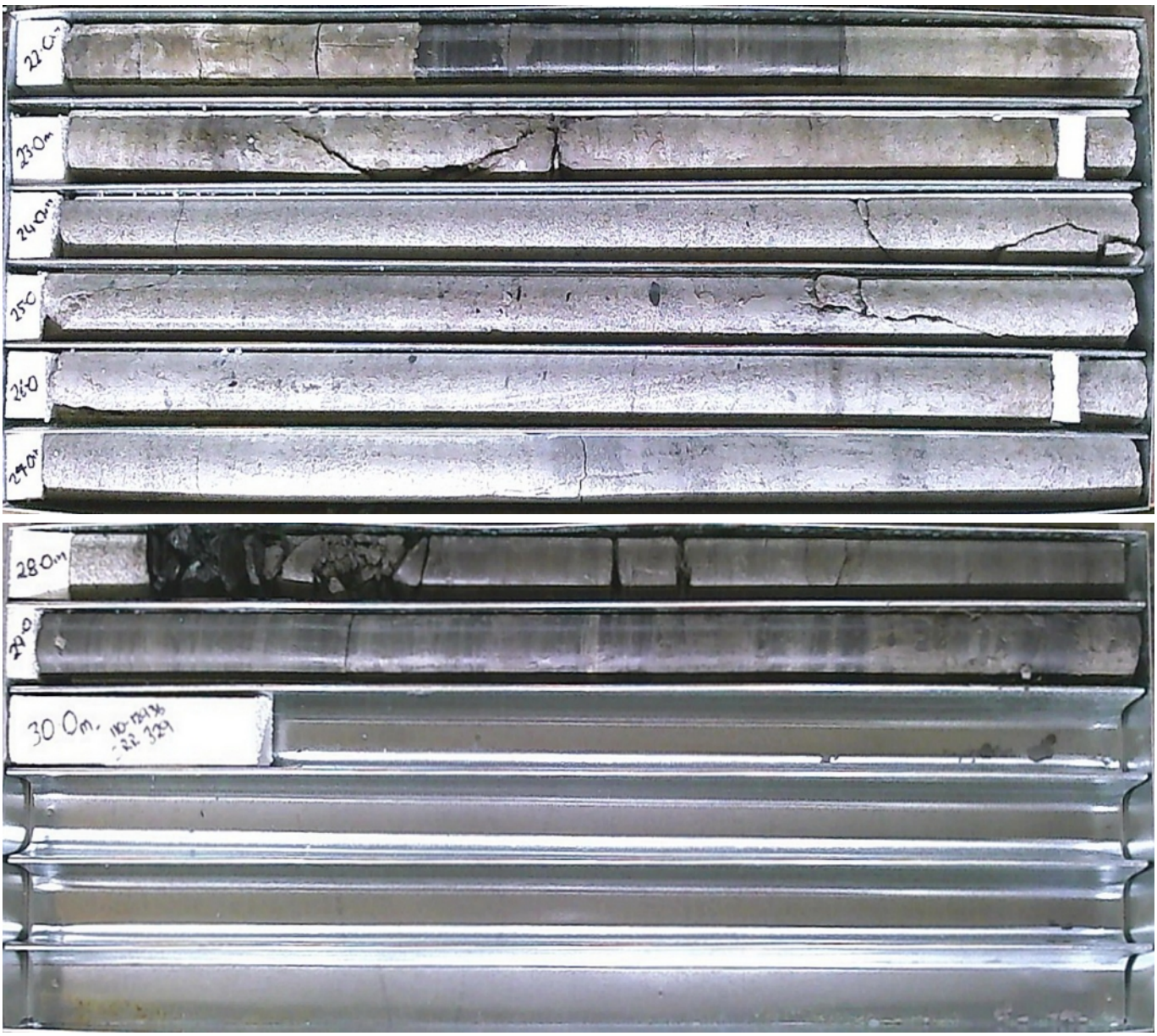

SOIL SURVEYS

TITLE

AECOM
Brisbane
Cross River Rail
Core Photo - BH 329

DRAWN	DT	DATE	26/04/2012
CHECKED	CB	DATE	26/04/2012
SCALE	Not To Scale		A4
PROJECT No	110-12936	FIGURE No	2/2

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IN-SITU PACKER PERMEABILITY TEST RESULT

PROJECT: CRR
PROJECT No.: 110-12936
BH No.: 329
Test No.: 1
Date: 2/03/2012

Packer type: Double
Packer pressure: 2000kPa
Gauge pressures measured in: kPa
Tested by: CS

Vertical depth to:

Top of test section (m):	22.00
Base of test section (m):	23.50
Centre of test section(m):	22.75
Base of casing (m):	21.00
Ground water (m)	NR

Depth of centre of test section (m)	22.75
Length of test section (m):	1.50

Gauge Height above ground level	0.00
Hole Diameter in test section (mm	75

1st period	Time (mins)	0	5	10	15	Average
Gauge Pressure	Flow reading	4172.0	4272.0	4309.5	4319.5	Flow (l/min)
100	Water Take	0.00	100.00	37.50	10.00	9.833
2nd period	Time (mins)	0	5	10	15	Average
Gauge Pressure	Flow reading	4326.0	4542.0	4643.0	4745.0	Flow (l/min)
200	Water Take	0.00	216.00	101.00	102.00	27.933
3rd period	Time (mins)	0	5	10	15	Average
Gauge Pressure	Flow reading	4810.0	4956.0	5082.0	5275.0	Flow (l/min)
250	Water Take	0.00	146.00	126.00	193.00	31.000
4th period	Time (mins)	0	5	10	15	Average
Gauge Pressure	Flow reading	5290.0	5369.0	5513.0	5622.0	Flow (l/min)
200	Water Take	0.00	79.00	144.00	109.00	22.133
5th period	Time (mins)	0	5	10	15	Average
Gauge Pressure	Flow reading	5615.0	5576.0	5562.0	5521.0	Flow (l/min)
100	Water Take	0.00	-39.00	-14.00	-41.00	-6.267

Period	Flow (q) (l/min)	Gauge Press (kPa)	Gauge Press (m of water)	Friction Loss (m)*		Total Head (m)	Lugeon Value	Perm. (m/s)
				Basic	In extra rods			
1st	9.833	100.00	10.220	0.000	0.000	32.970	20.312	1.94E-06
2nd	27.933	200.00	20.440	0.000	0.000	43.190	44.046	4.21E-06
3rd	31.000	250.00	25.550	0.000	0.000	48.300	43.710	4.18E-06
4th	22.133	200.00	20.440	0.000	0.000	43.190	34.901	3.34E-06
5th	-6.267	100.00	10.220	0.000	0.000	32.970	-12.945	-1.24E-06

*Where friction loss is assumed to be negligible.

N.B. Pressure Conversion: 1 bar = 100 kPa = 14.503 psi

Note - unable to keep steady pressure above 250kPa. Backflow in period 5 continued after removal of packer

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IN-SITU PACKER PERMEABILITY TEST RESULT

PROJECT: CRR
PROJECT No.: 110-12936
BH No.: 329
Test No.: 2
Date: 2/03/2012

Packer type: Double
Packer pressure: 2000kPa
Gauge pressures measured in: kPa
Tested by: CS

Vertical depth to:

Top of test section (m):	12.00
Base of test section (m):	13.50
Centre of test section(m):	12.75
Base of casing (m):	11.00
Ground water (m)	NR

Depth of centre of test section (m)	12.75
Length of test section (m):	1.50

Gauge Height above ground level	0.00
Hole Diameter in test section (mm	75

1st period	Time (mins)	0	5	10	15	Average
Gauge Pressure	Flow reading	5450.0	5452.0	5452.5	5452.9	Flow (l/min)
100	Water Take	0.00	2.00	0.50	0.40	0.193
2nd period	Time (mins)	0	5	10	15	Average
Gauge Pressure	Flow reading	5453.0	5453.5	5454.0	5454.3	Flow (l/min)
200	Water Take	0.00	0.50	0.50	0.30	0.087
3rd period	Time (mins)	0	5	10	15	Average
Gauge Pressure	Flow reading	5454.9	5455.0	5455.2	5455.3	Flow (l/min)
500	Water Take	0.00	0.10	0.20	0.10	0.027
4th period	Time (mins)	0	5	10	15	Average
Gauge Pressure	Flow reading	5454.0	5454.0	5454.0	5454.0	Flow (l/min)
200	Water Take	0.00	0.00	0.00	0.00	0.000
5th period	Time (mins)	0	5	10	15	Average
Gauge Pressure	Flow reading					Flow (l/min)
	Water Take	0.00	0.00	0.00	0.00	0.000

Period	Flow (q) (l/min)	Gauge Press (kPa)	Gauge Press (m of water)	Friction Loss (m)*		Total Head (m)	Lugeon Value	Perm. (m/s)
				Basic	In extra rods			
1st	0.193	100.00	10.220	0.000	0.000	22.970	0.573	5.48E-08
2nd	0.087	200.00	20.440	0.000	0.000	33.190	0.178	1.70E-08
3rd	0.027	500.00	51.100	0.000	0.000	63.850	0.028	2.72E-09
4th	0.000	200.00	20.440	0.000	0.000	33.190	0.000	0.00E+00
5th	0.000	0.00	0.000	0.000	0.000	12.750	0.000	0.00E+00

*Where friction loss is assumed to be negligible.

N.B. Pressure Conversion: 1 bar = 100 kPa = 14.503 psi

Note - zero flow in 4th period - test ended

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