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

| BOREHOLE No | BH17 |
|--------------|--------|
| SHEET | 1 of14 |
| REFERENCE No | H9566 |

| | DJECT | | | | RADE PROJECT - GATEWAY BRIDGE DU | | | | A <u>TION IN/</u> | / <u>ES]</u> | TIGATION | |
|---|-------------|--|----------------------------|--------|--|-----------|-------------------|--|---|--------------|------------------------------------|----------|
| | CATION | | | | E OF PILE CAP | | | | | | OORD(NATES 10209.3 E; 167940.6 N | <u> </u> |
| | DJECT No | _F <u>G</u> 5 <u>:</u> | 38 <u>8</u> | | | | | ATE START | | | | |
| JOE | 3 No | | | | DATUM AHD | | DAT | E COMPLET | ED <u>13/05</u> | <u>/05</u> | DRILLER CAIRNS DRIL | TING _ |
| O DEPTH (m) | R.L. (m) | CASING WASH BORING CORE DRILLING | RQD ()% CORE REC% | SAMPLE | MATERIAL DESCRIPTION | LITHOLOGY | USC | ボスエミンジボ STRENGTH ボスエミンジボ | DEFECT SPACING (mm) | GRAPHIC LOG | ADDITIONAL DATA AND TEST RESULTS | SAMPLES |
| BOREHOLE WITH LITHOLOGY MEERA PIER 7 BOREHOLES-GATEWAY BRIDGE - GATEWAY UPGRADE PROJECT GPJ ENGINEERING BOREHOLE 09_04.GDT 31/08/05 | -2.18 | CORE C | CORE REC % | | ESTUARINE SILTY CLAY Dark grey to black, moist to mainly wet, very soft to soft. High plasticity, minor amout of partly decomposed plant materials; some shell fragments. | | USC WEATHE WEATHE | H3 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - | - 20 - 500 - | GRAPHIC | | SAMPLES |
| | -7.18 | COL | | | | | | | | | RW,- N<1 | SPT |

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.



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

| BOREHOLE No | BH17 |
|---------------|-----------------------------|
| SHEET | _ <u>2</u> _ of1 <u>4</u> _ |
| REFERENCE No. | H9566 |

GATEWAY UPGRADE PROJECT - GATEWAY BRIDGE DUPLICATION FOUNDATION INVESTIGATION PROJECT LOCATION PIER 7 - CENTRE OF PILE CAP COORDINATES 10209.3 E; 167940.6 N PROJECT No <u>FG5388</u> ____ SURFACE R.L. __-2.18 ___ DATE STARTED _08/05/05 DATUM SETP JOB No DATUM _AHD __. DATE COMPLETED _13/05/05 DRILLER CAIRNS DRILLING RQD INTACT DEFECT CASING WASH BORING CORE DRILLING (m) ()% STRENGTH SPACING ADDITIONAL DATA DEPTH (m) MATERIAL AND SAMPLE DESCRIPTION SAMPL CORE TESTS 888888 미수구조ェ<u>수</u>퍼 중8 TEST RESULTS REC % 5 -7.18 11111 **ESTUARINE SILTY CLAY** (As above). Very high amout of partly decomposed plant materials at 6.0m; becoming slightly sandy with depth. BOREHOLE WITH LITHOLOGY MEERA PIER 7 BOREHOLES-GATEWAY BRIDGE - GATEWAY UPGRADE PROJECT.GPJ ENGINEERING BOREHOLE 99_04,GDT 31/08/05 ОН RW.-. SPT -9.18 ESTUARINE SILTY SAND / SAND Dark grey, wet, very loose to loose. Very fine grained silty sand becoming sand with depth. RW. SPT N<1 SC SM SPT RW,-,-

REMARKS 3PT N values in gravel care 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



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

| BOREHOLE No | BH17 |
|--------------|-------------------------------|
| SHEET | _ <u>3</u> _ of _ <u>14</u> _ |
| REFERENCE No | <u>H9566</u> |

| | | | | RADE PROJECT - GATEWAY BRIDGE DUI | PLIC! | <u>ATIC</u> | N FOUNDA | TIŌN IN | | _ | |
|--------------|---|------------|--------|---|-----------|-------------|--------------------|-----------------|-------------|------------------------------------|---------------|
| | ATION <u>PIE</u> JECT No <u>FG</u> | | | E OF PILE CAP | | | | | | OORDINATES 10209.3 E; 167940.6 N | <u> </u> |
| JOB | | <u> </u> | | | | | ATE START | | | | |
| 000 | | | | DATUM <u>AHD</u> . | _ | DAT | E COMPLETI | ED _13/05 | <u> 705</u> | DRILLER <u>CAIRNS DRIL</u> | <u>LING</u> _ |
| DEPTH (m) | R.L. (m) System Core Drilling Core Drilling | RQD ()% | SAMPLE | MATERIAL DESCRIPTION | LITHOLOGY | CEATHERING | INTACT STRENGTH | (mm) | GRAPHIC LOG | ADDITIONAL DATA AND TEST RESULTS | SAMPLES |
| 10 | -12.18 3≩8 | REC % | S, | ALLED HALL CHECK OF AV | 5 | S | 다 다 무숙포르기속력 | TTTTT VQQQQQ | 8 | TEST NESSETS | SAN |
| - | | | | ALLUVIAL SILTY CLAY Pale green grey to grey brown, moist, stiff becoming firm with depth. | | | | _ | | | - |
| - | | | | Medium to high plasticity; exhibits some fissuring and cubic structures with excessive drying; some incipient lateritic | | | - - - - | · · | | | |
| - | | | | features. | | | | | | 1,5,8 | SPT |
| | | | | | | | . | - | | N=13 | |
| 11 | | | | | | | | | | | 1 |
| | | | | | | | | . : | | | |
| | | | | | | | · ; - - ; - | - | ı | | - |
| | | | | | | | | . !! | | | - |
| 12 | | | | | | | · - | - | | | |
| 1000 | | | | | | | : 1 | | | 4,6,7 N=13 | SPT |
| | | | | | | CI- CH | - | - - | | | |
| | | | | | | | | | | | 1 |
| 5 - 13 | | | | | | | 1 | - | | | - |
| 2 | | | | | | | - | . : | | | - |
| 100 | | | | | | l | | - - | | | - |
| | | | | | | | . : | - | | 124 | |
| | | | | | | | .] | | | 1,2,4 N=6 | SPT |
| - 14 | | | | | | | | - | | | |
| 1 1 | | | | | | | | - | | | - |
| WIN LINGLOOM | | | | | | | . :- | | | | - |
| ⊢ I | | | | | | | | | | |] |
| 15 | -17,18 | | | | | | | - : . | | | - |
| RI | EMARKS SP | Γ N values | in ar | ave) can overestimate density due to influence of o | nareo | - 6170 | arayal partial | oo Thio h | rolog | r should LOCGED BY | |

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.



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

| BOREHOLE No | BH17 |
|--------------|-------------|
| SHEET | _4_ of _14_ |
| REFERENCE No | H9566 |

| PROJECT | GATEWAY UPO | RADE PROJECT - GATEWAY BRIDGE DI | JPLICATION FOUNDATION INVESTIG | ATION |
|---|--|----------------------------------|--|--------------------------------|
| | PIER 7 - CENTE | RE OF PILE CAP | coor | RDINATES 10209.3 E; 167940.6 N |
| PROJECT N | o_F <u>G5388</u> | SURFACE R.L2.18 | DATE STARTED <u>08/05/05</u> | DATUM SETP |
| JOB No | | DATUM <u>AHD</u> | DATE COMPLETED 13/05/05 | DRILLER CAIRNS DRILLING |
| (iii) HLdag (m) HLdag (m) 15 -17.18 | CASING CA | MATERIAL DESCRIPTION | LITHOLOGY USE CHAPTER AND CHAP | SAMPLES SAMPLES STATESTS |
| | : | ALLUVIAL SILTY CLAY (As above). | | 2,3,6 N=9 |
| 20 - 16 - 16 - 16 - 16 - 16 - 16 - 16 - 1 | | | | - |
| 17 | | | CL- | 1,3,4 N=7 |
| 18 | | | | RW,3,3 N=5 |
| 19 | | | | 1,2,4 N=6 SPT |
| 20 -22.18 | | | | 14-0 |

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.



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

| BOREHOLE No | BH17 |
|--------------|-------------------------|
| SHEET | _ <u>5</u> of1 <u>4</u> |
| REFERENCE No | H9566 |

| | JECT | | | | RADE PROJECT - GATEWAY BRIDGE DUE | LIC | ATIC | N FOUNDA | YTION IN | | | |
|--|-------------|-----------------------|------------|--------|--|-----------|-----------|--------------------------|---|------------|----------------------------------|---------|
| | | | | | E OF_PILE CAP | | | | | | OORDINATES 10209.3 E; 167940.6 N | |
| JOB | | | | | DATUM AUD | | | ATE STARTI E COMPLETI | | | | |
| | | | | | | | יאס | | | <u> </u> | DRILLER <u>CAIRNS DRILL</u> | -IING . |
| (⊋ | R L. (m) | 2 2 2 2 2 | RQD ()% | | MATERIA | | ၂၀ | INTACT STRENGTH | DEFECT SPACING | ပ္ | ADDITIONAL DATA | |
| DEPTH (m) | | BORIL DRILL | | ا پ | MATERIAL | 9 | I RES | STRENGTH | (mm) | 50 LOG | AND | S |
| | | ASIN ASH ORE | CORE | SAMPLE | DESCRIPTION | LITHOLOGY | S 및 | ᇎᇎᅩᄝᆢᅥᆿᆏ | 2000 | GRAPHIC | TEST RESULTS | SAMPLES |
| 20 | -22.18 | 0\$0 | REC % | Ŋ | ALLUVIAL SILTY CLAY | Ξ | ĭ ≥ | | . _ _ | ত | | S E |
| | | | | | (As above). | | | | | | | |
| 20 CARENCIE WITH LINGUIST WEEK PIECE WITH LINGUIST WAS A STANDARD WEEK PIECE WITH LINGUIST WAS A STANDARD WEEK PIECE WAS A STANDARD WEEK PIECE WAS A STANDARD WAS A STANDAR | | | | | | | CI- | : | - - | | | - |
| | | | | | | | | · · · · · · | - : : : : : : : : : : : : : : : : : : : | | | - |
| - 22 | -24.18 | | | | | | | | | | | |
| 20. | | | | | ALLUVIAL SILTY SAND / SAND Pale brown to brown, moist to mainly wet, medium dense. | | | .: - | - : | | | - |
| | | | | | Fine grained sifty sand becoming sand with depth. | | | : | - · · | | | |
| | | | | | | | | | | | 2,6,9 N=15 | SPT |
| -23 | | | | | | | | | - - - : | | | LEVE |
| | | | | | | | | :: - | | | | |
| | | | | | | | | ; · .] | | | | |
| <u>}</u> - | | | 1 | | | | CI- CH | - | | | | |
| | | | | | | | | | | | 9 | |
| <u> </u> | | | | | | | | | | | | |
| - 24 | | | | | | | | | | | | |
| Ş - 24 | | | | | | | | - | - - | | | |
| | | | | | | | | | : | | 5,7,9 N=16 | SPT |
| | | | | | | | | - : | | | N=16 | |
| - | | | | | | | | | · - | | | 101-1 |
| E . | | 30 | | | | | | - | | | | |
| | | | | | | | | | | | | |
| | -27.18 | | | | | | 1 | | : . | | | |
| | | ODT. | | | avelican overestimate density due to influence of co | 1// | | | es This be | <u>_</u> _ | V chould LOCOTO BY | a lite |

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.



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

PROJECT GATEWAY UPGRADE PROJECT - GATEWAY BRIDGE DUPLICATION FOUNDATION INVESTIGATION PIER 7 - CENTRE OF PILE CAP LOCATION COORDINATES 10209.3 E; 167940.6 N PROJECT No FG5388 SURFACE R.L. _-2.18 __ DATE STARTED 08/05/05 DATUM SETP_____ DATUM _AHD __ JOB No DATE COMPLETED 13/05/05 DRILLER CAIRNS DRILLING RΙ ROD INTACT DEFECT ()% ADDITIONAL DATA STRENGTH SPACING DEPTH (m) MATERIAL (mm) AND SAMPLE SAMPLES DESCRIPTION CORE TEST RESULTS REC % -27.18 ALLUVIAL SAND AND GRAVEL Pale brown to pale grey brown, wet, medium dense becoming dense with 7.11.13 SPT depth Poorly sorted coarse sand and gravel sizing up to 40mm; subrounded to subangular lithic and quartzitic fragments; minor silt fraction. Gravel size increases with depth. 31/08/05 ENGINEERING BOREHOLE 09 04.GDT SM-MEERA PIER 7 BOREHOLES-GATEWAY BRIDGE - GATEWAY UPGRADE PROJECT.GPJ 16.27.30/50 N>50 SPT N>50 -30.38 LOW GRADE COAL FINE GRAINED MAINLY DULL TO SLIGHTLY VITREOUS THINLY -30.68 LAMINATED FRAGILE (17) CARBONACEOUS SEDIMENTARY ROCK Drillers record only. HW (?): ls(50)=0.13 MPa MW : Black mainly dull to occasionally !s(50)=0.04 MPa vitreous, fine grained, thinly laminated, mainly low to medium strength. - 29 Highly fractured, weathered and altered seams throughout; frequent sittstone interbeds. BOREHOLE WITH LITHOLOGY MINA Is(50)=0.68 MPa Defects - Numerous lamination/bedding partings<**deg - Fractured, weathered & altered seams<** (55)

REMARKS SPT N values in gravel can overestimate density due to influence of coarser size gravel particles. This borelog should



31/08/05

ENGINEERING BOREHOLE 09_04.GDT

MEERA PIER 7 BOREHOLES-GATEWAY BRIDGE - GATEWAY UPGRADE PROJECT.GPJ

horizontal plane.

ENGINEERING BOREHOLE

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

BOREHOLE No BH17 SHEET __7__ of __14__ H9566 REFERENCE No

PROJECT GATEWAY UPGRADE PROJECT - GATEWAY BRIDGE DUPLICATION FOUNDATION INVESTIGATION PIER 7 - CENTRE OF PILE CAP LOCATION 10209.3 E; 167940.6 N COORDINATES PROJECT No FG5388 SURFACE R.L. _-2.18 __. DATE STARTED _08/05/05 DATUM SETP ____ JOB No DATUM _AHD ___ DATE COMPLETED 13/05/05 DRILLER CAIRNS DRILLING R.L ROD INTACT DEFECT BORING DRILLING (m) ()% SPACING ADDITIONAL DATA STRENGTH DEPTH (m) 8 MATERIAL (mm) AND SAMPLE DESCRIPTION SAMPLES TESTS CORE TEST RESULTS REC % 30 -32.18 LOW GRADE COAL MW: (As above) ls(50)=0.09 MPa ls(50)=0.03 MPa ls(50)=0.02 MPa 0 Is(50)=0.20 MPa ls(50)=0.28 MPa ls(50)=0.48 MPa 0 Is(50)=0.12 MPa (s(50)=0.26 MPa 0 Is(50)=0.06 MPa Is(50)=0.09 MPa o ls(50)=0.25 MPa ls(50)=0.11 MPa X O Coreloss MW ls(50)=0.09 MPa Is(50)=0.19 MPa 0 (s(50)=0.06 MPa ls(50)=0.12 MPa O BOREHOLE WITH LITHOLOGY (70) ls(50)=0.65 MPa 0 -37.18 REMARKS SPT N values in gravel can overestimate density due to influence of coarser size gravel particles. This borelog should LOGGED BY A. DISSANAYAKE (DISS)

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be read in conjunction with the appropriate Defect Description Sheets. Defect angles were measured with respect to a



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

BOREHOLE No __BH17__ SHEET _ 8 _ of _ 14 _ __H9566__ REFERENCE No

GATEWAY UPGRADE PROJECT - GATEWAY BRIDGE DUPLICATION FOUNDATION INVESTIGATION PROJECT LOCATION PIER 7 - CENTRE OF PILE CAP COORDINATES 10209.3 E; 167940.6 N

| PROJECT No <u>FG</u> 5 | <u> </u> | SURFACE R.L2,18 | DATE STARTED 8/5/05 DATUM SETP | |
|---|------------|---|--|---------|
| JOB No | | DATUM <u>AHD</u> . | DATE COMPLETED 13/5/05 DRILLER CAIRNS DE | |
| 8.T. (m) (m) (MASSH BORING ONE DRILLING | RQD ()% | MATERIAL DESCRIPTION | INTACT DEFECT STRENGTH SPACING O (mm) O O O O O O O O O O O O O O O O O O | SAMPLES |
| | | SANDY SILTSTONE SW: Pale grey to white, fine grained, thinly laminated, mainly medium to high strength. Defects: Generally rare. Occasional drilling induced lamination partings <10° (1-2/0.5m) | Is(50)=0.15 MPa Is(50)=0.55 MPa Is(50)=0.55 MPa | 9 X |
| -37.83 | | LOW GRADE COAL FINE GRAINED MAINLY DULL TO SLIGHTLY VITREOUS THINLY LAMINATED FRAGILE CARBONACEOUS SEDIMENTARY ROCK MW: Black mainly dull to occasionally vitreous, fine grained, thinly laminated, | Is(50)=1.75 MP ₈ | a x |
| -38 -40.33 -41.06 -39 -42.08 40 -42.18 | 100 (72) | mainly low to medium strength with high strength sandstone interbeds. Highly fractured, weathered and altered seams throughout. Defects: Numerous lamination/bedding partings <15° Fractured, weathered & altered seams <200mm | XW Siltstone interbed. Coreloss | |
| -39.26 | | SILTY SANDSTONE SW: Pale grey to white, fine to medium grained, laminated, medium to high strength. Defects: Generally rare. | Is(50)=0.27 MPa | İ |
| | | position : earlierany raise. | Is(50)=1.47 MPε | 0 |
| 38 | | | Is(50)=0.50 MPa Is(50)=1.06 MPa | |
| -40.33 | | LOW GRADE COAL FINE GRAINED MAINLY DULL TO SLIGHTLY VITREOUS THINLY LAMINATED FRAGILE CARBONACEOUS SEDIMENTARY | Is(50)=0.80 MPa Is(50)=0.09 MPa | L . |
| -41.06 | 97 | ROCK MW: Black mainly dull to occasionally vitreous, fine grained, thinly laminated, mainly low to medium strength. | Is(50)=0.41 MPa Is(50)=0.03 MPa | |
| -39 | (93) | SANDY SILTSTONE SW: Pale grey to white, fine to medium, laminated, medium to mainly high strength. Defects: Nil | Is(50)=1.23 MPa Is(50)=0.83 MPa | a o |
| - | | | Pressuremeter Is(50)=0.88 MPa × × × SW Is(50)=1.51 MPa V × V V V V V V V V V V V V V V V V V V | 0 |
| | | | UCS=27MPa Is(50)=0.84 MPa MC=2.70% Is(50)=1.52 MPa WD=2510N/m² | a × |
| -42.08 40 -42.18 | | see next page | UCS=29MPa | |
| | 100 | gravel can overgetimate density due to influence of a | | |

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



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

BOREHOLE No <u>BH17</u>

SHEET <u>9 of 14</u>

REFERENCE No <u>H9566</u>

GATEWAY UPGRADE PROJECT - GATEWAY BRIDGE DUPLICATION FOUNDATION INVESTIGATION PROJECT PIER 7 - CENTRE OF PILE CAP LOCATION COORDINATES 10209.3 E; 167940.6 N PROJECT No FG5388 _ _ _ SURFACE R.L. __-2.18 ___ DATE STARTED 8/5/05 DATUM SETP _____ DATUM _AHD __ JOB No DATE COMPLETED _13/5/05_ DRILLER CAIRNS DRILLING R.L ROD INTACT DEFECT ()% STRENGTH SPACING ADDITIONAL DATA $\widehat{\mathbf{E}}$ MATERIAL (mm) DEPTH AND SAMPLE DESCRIPTION TESTS CORE 2808 EYLXTYE TEST RESULTS REC % 40 INTERBEDDED SANDSTONE & ls(50)=1.28 MPa 0 SILTSTONE. SANDSTONE DOMINANT Is(50)=0.70 MPa SW: Pale grey to grey, fine grained, thinly Pressuremeter ls(50)=0.39 MPa laminated, medium to high strength. Test 6 @ 40.2m Is(50)=1.96 MPa 0 Defects: Generally rare. Occasional drilling induced lamination partings <10° - 35° (1/m) ls(50)=0.41 MPa Is(50)=1.14 MPa 0 ls(50)=0.66 MPa ls(50)=1.11 MPa 0 31/8/05 - 41 ENGINEERING BOREHOLE 09_04.GDT ls(50)=3.63 MPa Is(50)=5.32 MPa Is(50)=3.93 MPa Is(50)=1.66 MPa 0 0 X X SW Is(50)=1.85 MPa Is(50)=2.80 MPa 0 (s(50)=0.84 MPa 0 ls(50)=0.25 MPa х Is(50)=1.03 MPa х ls(50)=3.09 MPa 0 (94)BRIDGE - GATEWAY UPGRADE PROJECT.GPJ UCS=33MPa -44.78 MC=3.88% INTERBEDDED SANDSTONE & MUDSTONE. SANDSTONE DOMINANT ls(50)=0.24 MPa SW: Pale grey to dark grey, fine grained, (s(50)=1.08 MPa 0 thinly laminated and interbedded, medium Pressuremeter to high strength. Is(50)=0.88 MPa 0 Test 5 @ 42.9m ls(50)=0.39 MPa SW Defects: Generally rare. Is(50)=0.36 MPa х Occasional drilling induced lamination (s(50)=1.05 MPa MEERA PIER 7 BOREHOLES-GATEWAY partings <10°(1/m) 0 -45.68 SANDSTONE FINE TO MEDIUM GRAINED, LAMINATED TO MASSIVE SEDIMENTARY ROCK SW: Grey to white grey, laminated to massive, medium to mainly high strength. Defects: Generally rare. Occasional drilling induced lamination partings <10° (1/2m). Is(50)=0.87 MPa Is(50)=0.45 MPa Pressuremeter X BOREHOLE WITH LITHOLOGY SW Test 4 @44.2m Occasional coal seams <40mm. ls(50)=0.56 MPa ls(50)=0.91 MPa UCS=40MPa 0 MC=3.50% WD=2510N/m2 Is(50)=0.31 MPa х ls(50)=0.57 MPa 0 ls(50)=0.15 MPa (98) ls(50)=1.34 MPa

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



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BOREHOLE No <u>BH17</u>

SHEET <u>10</u> of <u>14</u>

REFERENCE No **H9566**

GATEWAY UPGRADE PROJECT - GATEWAY BRIDGE DUPLICATION FOUNDATION INVESTIGATION **PROJECT** PIER 7 - CENTRE OF PILE CAP LOCATION COORDINATES 10209.3 E; 167940.6 N PROJECT No <u>FG5388</u> _ _ _ SURFACE R.L. __-2.18 __. DATE STARTED 8/5/05 DATUM SETP _____ JOB No DATE COMPLETED 13/5/05 DATUM AHD DRILLER CAIRNS DRILLING R.L ROD INTACT DEFECT (m)()% STRENGTH SPACING ADDITIONAL DATA DEPTH (m) MATERIAL (mm) AND GRAPHIC SAMPLES DESCRIPTION CASIN(WASH CORE SAMPL TESTS CORE TEST RESULTS REC % -47.18 45 SANDSTONE SW :(As above) SW ls(50)=1.47 MPa Is(50)=4.47 MPa Is(50)=2.42 MPa Is(50)=3.46 MPa 0 46 04.GDT Is(50)=0.88 MPa ls(50)=1.89 MPa -48.45 0 ENGINEERING BOREHOLE 09_ Is(50)=2.76 MPa MUDSTONE Is(50)=2.69 MPa 0 FINE GRAINED THINLY LAMINATED SEDIMENTARY ROCK Pressuremeter Is(50)=0.42 MPa SW: Dark grey to black, fine grained, thinly Test 3 @ 46.5m Is(50)=1.84 MPa 0 laminated, medium to mainly high strength UCS≃51MPa with some very high strength areas. MC=2.87% Is(50)=3.37 MPa Is(50)=0.54 MPa Is(50)=0.73 MPa 0 WD=2500N/m² Defects: Generally rare. Occasional drilling induced lamination SW ls(50)=3.31 MPa 0 47 partings <10° (1/1.5m) ls(50)=1.46 MPa ls(50)=3.83 MPa GATEWAY UPGRADE PROJECT.GPJ - Joints @ 60°-70° (1/1.5m) UCS=59MPa 0 MC=2.64% WD=2530N/m² ls(50)=3.62 MPa Pressuremeter Is(50)=0.85 MPa 0 Test 2 @ 47.3m ls(50)=0.07 MPa 49.72 Is(50)=0.50 MPa 0 INTERBEDDED MUDSTONE AND SANDSTONE (SHEARED). SANDSTONE DOMINANT HW -MW rock HW. HW -MW : Pale grey to black, fine grained, MW thinly laminated and interbedded, very low 100 (49) to medium with some high strength bands. 48 BOREHOLES-GATEWAY BRIDGE Faulted, contorted and sheared throughout SW with some clayey and rehealed zones. Rockmass appears to be erodable in most places. ΜW MEERA PIER 7 -51.18 49 Is(50)=0.65 MPa SANDSTONE (s(50)=0.96 MPa FINE TO MEDIUM GRAINED, LAMINATED TO MASSIVE ls(50)=0.44 MPa ls(50)=0.49 MPa WITH LITHOLOGY SEDIMENTARY ROCK SW ٥ Pressuremeter XW-SW: Grey to white grey, fine grained, ls(50)=0.78 MPa х Test 1 @ 49.3m laminated, mainly medium to high strength ls(50)=0.83 MPa 0 becoming low to medium strength with UCS=34MPa Is(50)=0.46 MPa х depth. MC=4.24% Is(50)=1.25 MPa 0 Defects: Generally rare. WD=2530N/m2 ls(50)=0.54 MPa MW Stiff clay (?) BOREHOLE Occasional drilling induced lamination -51.98 partings <10° (1/m). A weathered clayey seam <300mm SW See below. -52.18 REMARKS SPT N values in gravel can overestimate density due to influence of coarser size gravel particles. This borelog should LOGGED BY

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.

A. DISSANAYAKE (DISS)



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

| BOREHOLE No | BH17 |
|--------------|--------------------------------|
| SHEET | _ <u>11</u> _ of _ <u>14</u> _ |
| REFERENCE No | H9566 |

PROJECT. GATEWAY UPGRADE PROJECT - GATEWAY BRIDGE DUPLICATION FOUNDATION INVESTIGATION PIER 7 - CENTRE OF PILE CAP LOCATION COORDINATES 10209.3 E; 167940.6 N PROJECT No FG5388 SURFACE R.L. _ -2.18 __ DATE STARTED _08/05/05 DATUM SETP JOB No DATUM __AHD __. DATE COMPLETED _13/05/05 DRILLER CAIRNS DRILLING R.L RQD INTACT DEFECT ING SH BORING SE DRILLING ()% MEATH REALING (mm) SPACING SOSS STRENGTH SPACING ADDITIONAL DATA (E) MATERIAL DEPTH AND SAMPLES DESCRIPTION CORE TEST RESULTS REC % 50 -52.18 INTERBEDDED MUDSTONE AND SANDSTONE (SHEARED). MUDSTONE DOMINANT SW: Pale grey to black, fine grained, thinly laminated and interbedded, medium to mainly high strength. Faulted, sheared and healed area with occasional calcite veins especialy below (37)SW Defects: Lamination partings <15 °(3-4//m) Weathered seams <**mm ENGINEERING BOREHOLE 09_04.GDT Stiff clay (?) -53.63 MUDSTONE FINE GRAINED THINLY LAMINATED SEDIMENTARY ROCK HW - SW : Dark grey to black, fine grained, thinly laminated medium to high strength with very low to medium strength brecciated zones. BOREHOLE WITH LITHOLOGY MEERA PIER 7 BOREHOLES-GATEWAY BRIDGE - GATEWAY UPGRADE PROJECT.GPJ Highly fractured throughout with some clay infilled brecciated zones. Defects: Fractured and brecciated zones<**mm.
 Mutidirectional joints @ ********. - Frequent brecciated zones<**mm. SW Is(50)=1.15 MPa 0 Is(50)=0.85 MPa 0 ls(50)=0.52 MPa 100 (24) Is(50)=0.05 MPa 0 ls(50)=0.03 MPa Is(50)=0.02 MPa HW Brecciated zone MW

REMARKS SPT N values in gravel car 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.



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

| BOREHOLE No | BH17 |
|--------------|--------------|
| SHEET | _12 of _14 _ |
| REFERENCE No | H9566 |

PROJECT GATEWAY UPGRADE PROJECT - GATEWAY BRIDGE DUPLICATION FOUNDATION INVESTIGATION PIER 7 - CENTRE OF PILE CAP LOCATION COORDINATES 10209.3 E; 167940.6 N PROJECT No_FG5388 SURFACE R.L. __-2.18 __. DATE STARTED 08/05/05 DATUM SETP _ _ _ JOB No DATUM AHD DATE COMPLETED _13/05/05 DRILLER CAIRNS DRILLING RL. RQD INTACT DEFECT CASING WASH BORING CORE DRILLING (m) ()% ADDITIONAL DATA STRENGTH SPACING 90 DEPTH (m) MATERIAL (mm) GNA SAMPLE SAMPLES DESCRIPTION TESTS CORE TEST RESULTS 55 -57.18 REC % MUDSTONE HW - SW: (As above). HW Brecciated zone BOREHOLE WITH LITHOLOGY MEERA PIER 7 BOREHOLES-GATEWAY BRIDGE - GATEWAY UPGRADE PROJECT.GPJ ENGINEERING BOREHOLE 09_04,GDT 31/08/05 (42)HW Brecciated zone ls(50)=0.26 MPa SW Is(50)=0.08 MPa o Is(50)=0.44 MPa Brecciated zone нw ls(50)=0.47 MPa SW ls(50)=0.49 MPa o Is(50)=0.46 MPa Is(50)=0.02 MPa 0 Brecciated zone MW Brecciated zone (38)SW Brecciated zone HW MW SW

REMARKS SPT N values in gravei car; 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.



FOR GEOTECHNICAL TERMS AND SYMBOLS REFER FORM F:GEOT 017/2-2004 BOREHOLE No BH17 SHEET 13 of 14 REFERENCE No H9566

GATEWAY UPGRADE PROJECT - GATEWAY BRIDGE DUPLICATION FOUNDATION INVESTIGATION **PROJECT** PIER 7 - CENTRE OF PILE CAP LOCATION COORDINATES 10209.3 E; 167940.6 N SURFACE R.L. _-2.18 __. PROJECT No_FG5388 ____ DATE STARTED _08/05/05 DATUM SETP JOB No DATUM _AHD ___ DATE COMPLETED 13/05/05 DRILLER CAIRNS DRILLING R.I. RQD INTACT DEFECT ()% ADDITIONAL DATA STRENGTH SPACING ε 200 MATERIAL DEPTH AND GRAPHIC SAMPLE SAMPLES DESCRIPTION CASIN WASH CORE CORE USC WEAT TEST RESULTS REC % 60 -62.18 MUDSTONE SW HW - SW: (As above). НΜ Brecciated zone MW ls(50)=0.41 MPa BOREHOLE WITH LITHOLOGY MEERA PIER 7 BOREHOLES-GATEWAY BRIDGE - GATEWAY UPGRADE PROJECT.GPJ ENGINEERING BOREHOLE 09, 04.GDT 31/08/05 (44) ls(50)=0.60 MPa Is(50)=0.19 MPa SW Is(50)=0.86 MPa Brecciated zone ls(50)=0.27 MPa -65.13 SILTSTONE FINE GRAINED THINLY LAMINATED ls(50)=0.48 MPa SEDIMENTARY ROCK MW - SW : Pale grey to grey, fine grained SW thinly laminated, medium to high strength. -65.58 MUDSTONE FINE GRAINED THINLY LAMINATED Brecciated zone SEDIMENTARY ROCK HW - SW : Dark grey to black, fine grained, thinly laminated medium to high strength 100 HW (23)with very low to medium strength brecciated zones. Highly fractured throughout with some clay infilled brecciated zones. MW SW ls(50)≂1.56 MPa ls(50)=0.32 MPa НΝ Brecciated zone нW MW REMARKS SPT N values in gravel can overestimate density due to influence of coarser size gravel particles. This borelog should LOGGED BY

be read in conjunction with the appropriate Defect Description Sheets. Defect angles were measured with respect to a

A. DISSANAYAKE (DISS)

Class of Ouespeland (Description with the appropriate Defect Description Sheets.



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

| BOREHOLE No | BH17 |
|--------------|----------------------------|
| SHEET | <u>_14</u> of <u>_14</u> _ |
| REFERENCE No | H9566 |

PROJECT GATEWAY UPGRADE PROJECT - GATEWAY BRIDGE DUPLICATION FOUNDATION INVESTIGATION PIER 7 - CENTRE OF PILE CAP LOCATION COORDINATES 10209.3 E; 167940.6 N SURFACE R.L. _-2.18 __. PROJECT No FG5388 DATE STARTED _08/05/05_ DATUM SETP ____ JOB No DATUM AHD DATE COMPLETED 13/05/05 DRILLER CAIRNS DRILLING RΙ ROD INTACT DEFECT K.L. (m) (m) CASING (w) WASH BORING CORE DRILLING ()% STRENGTH SPACING ADDITIONAL DATA (E) MATERIAL (mm)DEPTH AND DESCRIPTION CORE TEST RESULTS REC % <u>6</u>5 MUDSTONE Brecciated zone MW - MW : (As above). HW MW -67.68 (23) SILTSTONE Is(50)=0.21 MPa MW-MW-SW: Pale grey to grey, fine grained thinly lamianed, medium to high strength. SW -67.93 MUDSTONE (SHEARED) BOREHOLE WITH LITHOLOGY MEERA PIER 7 BOREHOLES-GATEWAY BRIDGE - GATEWAY UPGRADE PROJECT.GPJ. ENGINEERING BOREHOLE 09. 04.GDT. 31/08/05 FINE GRAINED THINLY LAMINATED Is(50)=0.88 MPa х SW SEDIMENTARY ROCK HW -SW : Dark grey to black, mainly very low strength, highly fractured throughout Is(50)=0.51 MPa with clay infilled brecciated zones. Exhibits engineering properties of clayey rockfill. ΗW Brecciated zone -70.08 100 Borehole terminated at 67.9m

REMARKS SPT N values in gravel can expressimate 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.



Borehole No: BH 17
Start Depth: 28.50m
Finish Depth: 67.90m
Project No: FG 5388



Project: Gateway Upgrade Project - Gateway Bridge

Borehole No: BH 17

Start Depth: Finish Depth:

28.50m 67.90m FG 5388

Project No: H No:

9566



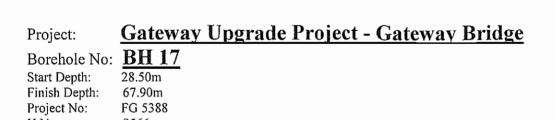
Project: Gateway Upgrade Project - Gateway Bridge

Borehole No: BH 17
Start Depth: 28.50m
Finish Depth: 67.90m

Project No: H No:

FG 5388 9566







Project: Gateway Upgrade Project - Gateway Bridge

Borehole No: BH 17
Start Depth: 28.50m
Finish Depth: 67.90m
Project No: FG 5388

Project No: FG 5388 H No: 9566



Geotechnical Branch

PROJECT

35 Butterfield Street HERSTON Q 4006 Phone: (07) 38343035 Fax: (07) 38343011



DEFECT DESCRIPTIONS OF ENGINEERING BORELOGS

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

BOREHOLE NO : BH17

SHEET : 1 of 8

REFERENCE NO: H9566

GATEWAY BRIDGE FOUNDATION INVESTIGATION - GATEWAY UPGRADE PROJECT PIER 7 - CENTRE OF PIER LOCATION

PROJECT NO: FG5388 SURFACE R.L: -2.18 DRILLER : CAIRNS DRILLING PTY LTD

JOB NO DATUM AHD / SETP DATE DRILLED : 08/05/05 - 13/05/05

| DEPTH | DEFECT TYPE | DIP | PLANARITY | ROUGHNESS | APERTURE | WALL ALTERATION | OTHER |
|--------------|----------------|----------|-----------|-----------|----------|--------------------|----------------|
| 28.5 - 28.57 | BZ/WS | - | - | - | 0 | W | - |
| 28.60 | LP | <16° | P | 5 | 0 | - | - |
| 28.64-28.67 | BZ/WS | - | - | | 0- | W | Parallel to LP |
| 28.80-29.07 | BZ/WS | _ | - | - | 0 | W | |
| 29.12 | LP | <20° | P | S | 0 | - | - |
| 29.21 | LP | <20° | P | S | 0 | - | DI |
| 29.26 | LP | <5° | P | S | С | | DĪ |
| 29.30-29.34 | BZ/WS | - | - | - | 0 | w | - |
| 29.40 | LP | <10° | P | S | С | - | - |
| 29.45-29.55 | BZ/WS | <10° | P | S | 0 | W | Parallel to LP |
| 29.60 | BP/LP | <10° | P | S | Т | - | DĬ |
| 29.62-29.71 | BZ/WS | <15° | - | - | 0 | W | |
| 29.85-30.00 | BZ/WS | - | - | - | 0 | W | 14 |
| 30.12 | LP | <10° | P | S | С | - | DI |
| 30.16-36.40 | BZ/WS | - | - | - | 0 | W | - |
| 30.57 | LP | <10° | P | S | С | - | _ |
| 31.15-31.20 | BZ/WS | - | - | - | 0 | W | CI |
| 31.22 | LP | <10° | P | S | С | - | 15.5 |
| 31.27-31.62 | BZ/WS | - | - | - | 0 | W | 21 |
| 31.68 | BP/LP | <10° | P | S | 0 | - | - |
| 31.76 | BP | <u>-</u> | - | | 0 | - | Parallel to LP |
| 31.89-31.91 | BZ | - | - | - | 0 | - | Parallel to LF |
| 32.08-32.16 | BZ/WS | _ | - | - | 0 | W | Parallel to LF |

Abbreviations

| | ROUGHNESS | | WALL ALTERATIONS | | TYPE | | OTHER | |
|----|--------------|------|-----------------------------|-----|-----------------------|----|-------------------------|--|
| R | Rough | FeSt | Iron Stained | J | Joint | P | Partly | |
| Sm | Smooth | W | Weathered | В | Bedding | CL | Carbonaceous lamination | |
| SL | Slickensided | SM | SM Secondary Mineralisation | | Bedding Parting | Co | Coal seam | |
| | | | | FP | Foliation Parting | In | Incipient | |
| | PLANARITY AP | | APERTURE | LP | Lamination Parting | SI | Sand Infill | |
| Pl | Planar | С | Closed | SZ | Sheared Zone | Н | Horizontal | |
| Şŧ | Stepped | 0 | Open | CZ | Crushed Zone | V | Vertical | |
| Un | Undulating | F | Filled | ws | Weathered Seam | CI | Clay Infill | |
| Cu | Curved | Т | Tight | BZ | Broken Zone | Cn | Clean | |
| Ir | bregular | | | 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.

Geotechnical Branch

LOCATION

35 Butterfield Street HERSTON Q 4006 Phone: (07) 38343035 Fax: (07) 38343011



DEFECT DESCRIPTIONS OF ENGINEERING BORELOGS

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

BOREHOLE NO : BH17

SHEET : 2 of 8

REFERENCE NO: H9566

PROJECT : GATEWAY BRIDGE FOUNDATION INVESTIGATION - GATEWAY UPGRADE PROJECT

PIER 7 - CENTRE OF PIER

PROJECT NO: FG5388 SURFACE R.L: -2.18 DRILLER : CAIRNS DRILLING PTY LTD

JOB NO : DATUM : AHD / SETP DATE DRILLED : 08/05/05 - 13/05/05

| DEPTH | DEFECT TYPE | DIP | PLANARITY | ROUGHNESS | APERTURE | WALL ALTERATION | OTHER |
|-------------|----------------|------|-----------|-----------|----------|--------------------|----------------|
| 32.08-32.65 | 1 | 1.2 | - | - | - | - | Coreloss |
| 32.65-33.12 | BZ/WS | - | - | - | 0 | W | Parallel to LP |
| 33.25-33.41 | BZ/WS | - | - | - | 0 | W | Parallel to LP |
| 33.51 | J | 45° | P | S | С | | =- |
| 33.52 | LP | <10° | P | S | 0 | - | - |
| 33.71 | LP | <10° | P | S | С | - | - |
| 34.19-34.35 | BZ/WS | - | - | - | 0 | W | Parallel to LP |
| 34.43 | LP | <10° | P | S | С | | DÏ |
| 34.51 | LP | <10° | P | S | С | - | DI |
| 34.69-34.74 | BZ | - | - | - | 0 | - | Parallel to LP |
| 34.90 | LP | <10° | P | S | С | | DI |
| 34.94-34.97 | BZ/WS | - | - | - | 0 | W | _ |
| 35.10 | BP/LP | <10° | P | S | С | - | , |
| 35.30 | J | 65° | P | S | С | | CI |
| 35.41 | LP | <10° | P | S | 0 | - | CI |
| 35.58 | LP | <5° | P | - | T | | DI |
| 36.20-36.30 | BZ/WS | - | - | - | 0 | W | - |
| 36.35 | LP | <15° | P | 5 | С | | DI |
| 36.40-36.45 | BZ/WS | - | - | - | 0 | | - |
| 36.57 | LP/BP | <5° | P | - | T | w | DI |
| 36.59-36.65 | BZ/WS | - | - | - | 0 | W | PCI |
| 36.65-36.72 | | | | | | | Coreloss |
| 36.72-37.98 | BZ/WS | - | - | - | 0 | w | PCI |

Abbreviations

| | | | 7100101 | tuttons | | | |
|----|--------------|------|--------------------------|---------|-----------------------|----|-------------------------|
| | ROUGHNESS | | WALL ALTERATIONS | | ТҮРЕ | | OTHER |
| R | Rough | FeSt | Iron Stained | 3 | Joint | P | Partly |
| Sm | Smooth | W | Weathered | В | Bedding | CL | Carbonaceous lamination |
| SL | Slickensided | SM | Secondary Mineralisation | ВР | Bedding Parting | Co | Coal seam |
| | | | | FP | Foliation Parting | In | Incipient |
| | PLANARITY | | APERTURE | | Lamination Parting | SI | Sand Infill |
| Pl | Planar | С | Closed | SZ | Sheared Zone | Н | Horizontal |
| St | Stepped | 0 | 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 | IQ | Drilling Induced |

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

Geotechnical Branch 35 Butterfield Street HERSTON Q 4006 Phone: (07) 38343035 Fax: (07) 38343011



DEFECT DESCRIPTIONS OF ENGINEERING BORELOGS

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

BOREHOLE NO : BH17
SHEET : 3 of 8

REFERENCE NO: H9566

PROJECT : GATEWAY BRIDGE FOUNDATION INVESTIGATION - GATEWAY UPGRADE PROJECT
LOCATION : PIER 7 - CENTRE OF PIER

PROJECT NO: FG5388 SURFACE R.L: -2.18 DRILLER : CAIRNS DRILLING PTY LTD

JOB NO : DATUM : AHD / SETP DATE DRILLED : 08/05/05 - 13/05/05

| DEPTH | DEFECT TYPE | DIP | PLANARITY | ROUGHNESS | APERTURE | WALL ALTERATION | OTHER |
|-------------|----------------|---------|-----------|-----------|----------|--------------------|--------|
| 37.07 | LP | <15° | St | S | 0 | - | - |
| 37.45 | Ј | 60°-70° | Un | R | С | | PCI |
| 38.08 | LP/BP | <15° | P | S | С | - | DI |
| 38.25-38.29 | BZ | - | - | - | С | | DI |
| 38.35 | J | 60° | St | | Τ | - | Cv |
| 38.45 | LP/BP | 15° | P | S | С | | DI |
| 38.51 | LP | 15° | P | S | С | | DI |
| 38.67-38.73 | WS | - | - | | 0 | W | |
| 39.05 | LP | <10° | Ir | - 4 | 0 | - | CI |
| 40.31 | LP/BP | <5° | P | S | T | - | DI |
| 40.55 | LP | 15° | Un | R | С | - | DI |
| 40.53 | BP/LP | <15° | W | S | С | | DI, Co |
| 40.75 | LP | <10° | P | S | С | - | DI |
| 40.79 | LP | <10° | P | S | С | - | DI |
| 40.87 | LP | <10° | P | S | С | | DI |
| 40.92 | LP | 20° | Ir | R | С | | DI |
| 40.96 | LP | <5° | P | S | С | | DI |
| 41.90 | LP/BP | <15° | Р | R | С | - | DI |
| 42.06 | LP | 35° | Р | R | С | - | CI |
| 42.19 | LP | 25° | Un | R | С | _ | DI |
| 42.29 | LP | <10° | Ir | R | С | - | DI |
| 42.45 | LP | <5° | P | R | Т | - | DI |

Abbreviations

| | Abbreviations | | | | | | | | | | | |
|----|--------------------|------|--------------------------|-----|-----------------------|----------------|-------------------------|--|--|--|--|--|
| | ROUGHNESS | , | WALL ALTERATIONS | | TYPE | | OTHER | | | | | |
| R | Rough | FeSt | Iron Stained | J | Joint | Р | Partly | | | | | |
| S | Smooth | w | Weathered | В | Bedding | CL | Carbonaceous lamination | | | | | |
| SL | Slickensided | SM | Secondary Mineralisation | BP | Bedding Parting | Co | Coal seam | | | | | |
| | | | | FP | Foliation Parting | In | Incipient | | | | | |
| | PLANARITY APERTURE | | APERTURE | LP | Lamination Parting | SI Sand Infill | | | | | | |
| Ρl | Planar | С | Closed | SZ | Sheared Zone | Н | Horizontal | | | | | |
| St | Stepped | 0 | Open | CZ | Crushed Zone | V | Vertical | | | | | |
| Un | Undulating | F | Filled | WS | Weathered Seam | CI | Clay Infill | | | | | |
| Cu | Curved | Т | Tight | BZ | Broken Zone | Cn | Clean | | | | | |
| Ιr | 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.

Geotechnical Branch 35 Butterfield Street HERSTON Q 4006 Phone: (07) 38343035 Fax: (07) 38343011



DEFECT DESCRIPTIONS OF ENGINEERING BORELOGS

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

BOREHOLE NO : BH17
SHEET : 4 of 8

REFERENCE NO: H9566

PROJECT : GATEWAY BRII

GATEWAY BRIDGE FOUNDATION INVESTIGATION - GATEWAY UPGRADE PROJECT

LOCATION : PIER 7 – CENTRE OF PIER

PROJECT NO: FG5388 SURFACE R.L: -2.18 DRILLER: CAIRNS DRILLING PTY LTD

JOB NO : DATUM : AHD / SETP DATE DRILLED : 08/05/05 - 13/05/05

| DEPTH | DEFECT TYPE | DIP | PLANARITY | ROUGHNESS | APERTURE | WALL ALTERATION | OTHER |
|-------------|----------------|------|-----------|-----------|----------|--------------------|----------------|
| 42.55 | J | <5° | Un | R | T | - | DI |
| 42.68 | LP/BP | 10° | P | S | Т | | DI |
| 42.94 | LP/BP | 5° | P | S | Т | - | DI |
| 43.33 | LP/BP | 5° | P | S | С | - | DI |
| 43.43 | LP/BP | 5° | P | S | С | - | Со |
| 43.83 | LP | 15° | P | R | С | - | DI |
| 43.97 | LP | <5° | P | R | С | - | DI |
| 44.32 | LP | <10° | P | R | J | - | DI |
| 44.60 | LP | <10° | P | R | C | - | DI |
| 45.35-45.39 | BZ | - | | - | 0 | - | Со |
| 46.0 | LP | <15° | P | R | С | - | DI |
| 46.27 | BP | <10° | PP | S | Т | - | DI |
| 46.50 | LP | 15° | P | S | C | - | DI |
| 46.90 | J | 75° | P | S | С | - | DI |
| 47.22 | LP | 10° | P | S | С | - | DI |
| 47.30 | LP | 10° | P | S | С | - | DI |
| 47.36 | LP | 15° | P | S | С | - | CI |
| 47.54-48.10 | SZ/BrZ | - | - | - | Т | | CI |
| 48.20-49.00 | SZ/HFZ | - | - | - | T | | CI healed |
| 52.45-52.55 | BZ | 10° | | | С | (-) | Parallel to LP |
| 52.60 | LP | 15° | P | S | 0 | - | DI |
| 52.61 | J | 45° | P | S | 0 | <u> </u> | ~ |
| 52.71 | LP | 15° | P | S | 0 | - | - |

Abbreviations

| | Aobreviations | | | | | | | | | | | |
|-----|---------------|------------------|--------------------------|-----|-----------------------|----|-------------------------|--|--|--|--|--|
| | ROUGHNESS | WALL ALTERATIONS | | | ТҮРЕ | | OTHER | | | | | |
| R | Rough | FeSt | Iron Stained | J | Joint | Р | Partly | | | | | |
| S | Smooth | W | Weathered | В | Bedding | CL | Carbonaceous lamination | | | | | |
| SL | Slickensided | SM | Secondary Mineralisation | BP | Bedding Parting | Co | Coal seam | | | | | |
| | | | | BrZ | Brecciated Zone | In | Incipient | | | | | |
| | PLANARITY | | APERTURE | | Lamination Parting | SI | Sand Infill | | | | | |
| Pl | Planar | С | Closed | SZ | Sheared Zone | H | Horizontal | | | | | |
| St | Stepped | 0 | Open | CZ | Crushed Zone | V | Vertical | | | | | |
| -Un | Undulating | F | Filled | WS | Weathered Seam | CI | Clay Infill | | | | | |
| Cu | Curved | Т | Tight | BZ | Broken Zone | Cn | Clean | | | | | |
| Ŀ | 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.

Geotechnical Branch 35 Butterfield Street HERSTON Q 4006 Phone: (07) 38343035 Fax: (07) 38343011



DEFECT DESCRIPTIONS OF ENGINEERING BORELOGS

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

BOREHOLE NO : BH17

SHEET : 5 of 8

REFERENCE NO: H9566

PROJECT

GATEWAY BRIDGE FOUNDATION INVESTIGATION - GATEWAY UPGRADE PROJECT

LOCATION

PIER 7 – CENTRE OF PIER

PROJECT NO:

FG5388

SURFACE R.L: -2.18

DRILLER

: CAIRNS DRILLING PTY LTD

JOB NO

DATUM

: AHD / SETP

DATE DRILLED : 08/05/05 - 13/05/05

| рертн | DEFECT TYPE | DIP | PLANARITY | ROUGHNESS | APERTURE | WALL ALTERATION | OTHER |
|-------------|----------------|--------|-----------|-----------|----------|--------------------|--------|
| 52.75 | J | 70° | Un | S | T | | - |
| 52.80-52.87 | WS | - | - | - | · | W | - |
| 52.90 | LP | 15° | P | S | С | - | CI |
| 52.98 | LP | 15-30° | Cn | - | С | - | CI |
| 53.48-53.52 | BZ | - | | - | 0 | | |
| 53.55 | J | 60° | P | S | С | - | |
| 53.87 | LP | 25° | P | S | С | | DI |
| 53.91-53.94 | WS | 10-20° | Un | - | 0 | W | CI |
| 54.04-54.28 | BZ | | - | | С | _ | CI |
| 54.38-54.50 | BZ/WS | - | - | | С | W | CI |
| 54.78 | LP | 20° | P | S | С | - | D |
| 54.88-55.88 | BrZ | MDJ | - | - | С | W | CI |
| 56.05 | J | 55° | Р | S | С | - | CI |
| 56.05 | J | 60° | P | S | С | - | CI |
| 56.20-56.30 | BrZ | MDJ | - | - | С | - | - |
| 56.42 | LP | 30° | Un | S | С | - | DI |
| 56.80-57.00 | BrZ | - | _ | - | С | - | CI |
| 57.10-57.12 | BrZ | - | - | S | С | _ | CI |
| 57.15 | J | 80° | P | _ | С | - | - |
| 57.20-57.23 | BrZ | - | - | - | С | _ | CI |
| 57.25 | J | 70° | P | - | Т | - | Cv |
| 57.48 | LP | <10° | P | - | T | - | Cv, DI |
| 57.78 | LP | 30° | P-Ir | S | С | - | - |

Abbreviations

| | ROUGHNESS | , | WALL ALTERATIONS | | ТҮРЕ | | OTHER |
|----|--------------|------|--------------------------|---------------------------|-------------------------|----|-------------------------|
| R | Rough | FeSt | Iron Stained | J | Joint | Р | Partly |
| S | Smooth | W | Weathered | MDJ | Multidirectional Joints | CL | Carbonaceous lamination |
| SL | Slickensided | SM | Secondary Mineralisation | BrZ | Brecciated Zones | Со | Coal seam |
| | | | | FP Foliation Parting | | Cv | Calcite vein |
| | PLANARITY | | APERTURE | | Lamination Parting | SI | Sand Infill |
| Pl | Planar | С | Closed | SZ | Sheared Zone | Н | Horizontal |
| St | Stepped | 0 | Open | CZ | Crushed Zone | V | Vertical |
| Un | Undulating | F | Filled | WS | Weathered Seam | CI | Clay Infill |
| Cu | Curved | τ | Tight | BZ | Broken Zone | Cn | Clean |
| ŀr | Irregular | | | HFZ Highly Fractured Zone | | ÇS | 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.

PROJECT

Geotechnical Branch 35 Butterfield Street HERSTON Q 4006 Phone: (07) 38343035 Fax: (07) 38343011



DEFECT DESCRIPTIONS OF ENGINEERING BORELOGS

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

BOREHOLE NO : BH17
SHEET : 6 of 8

REFERENCE NO: H9566

GATEWAY BRIDGE FOUNDATION INVESTIGATION - GATEWAY UPGRADE PROJECT

LOCATION : PIER 7 - CENTRE OF PIER

PROJECT NO: FG5388 SURFACE R.L: -2.18 DRILLER: CAIRNS DRILLING PTY LTD

JOB NO : DATUM : AHD / SETP DATE DRILLED : 08/05/05 - 13/05/05

| рертн | DEFECT TYPE | DIP | PLANARITY | ROUGHNESS | APERTURE | WALL ALTERATION | OTHER |
|-------------|----------------|--------|-----------|-----------|----------|--------------------|--------|
| 57.85 | LP/BP | 35° | Ir | Ŝ | Т | - | Cv, DI |
| 58.05-58.65 | BrZ | MDJ | - | - | С | - | CI |
| 58.74 | J | 20-35° | Un | S | С | 83 - 03 | CI |
| 58.92-59.20 | BrZ | MDJ | - | | - | - | CI |
| 59.78-60.40 | J | 70-90° | Un | - | С | _ | CI |
| 60.15-60.32 | SZ | - | - | • | 1 | - | - |
| 60.44-60.65 | BZ | MDJ | P | S | С | - | CI |
| 60.90-60.95 | BZ | 70° | 120 | - | С | | CI |
| 61.10-61.18 | BZ | MDJ | - | - | C? | | CI |
| 61.18-61.33 | BZ | - | - | - | - | - | DI |
| 61.45 | J | 65° | P | S | T | - | DI |
| 61.55 | J | 45° | P | S | Т | - | DI |
| 61.60 | J | 60° | P | S | T | - | DI |
| 61.62 | J | 70° | P | S | C | - | |
| 61.70-61.74 | BZ/WS | - | | - | 0 | W | CI |
| 61.75 | J | 40° | P | S | Т | - | DI |
| 62.07 | LP | 25° | P | S | T | - 4 | DI |
| 62.18 | J | 45° | St | S | 0 | - | - |
| 62.30 | J | 60° | P | S | 0 | | |
| 62.40 | LP | 25° | P | S | Т | - | DI |
| 62.40 | J | 40° | P | S | T | - | DI |
| 62.45 | J | 50° | P | S | Т | - h | - |

Abbreviations

| | | Audici | interiors | | | | |
|------------------|---|--|--|--|--|--|--|
| ROUGHNESS | | WALL ALTERATIONS | | ТУРЕ | | OTHER | |
| Rough | FeSt | Iron Stained | J | Joint | P | Partly | |
| Smooth | W | Weathered | MDJ | Multidirectional Joints | CL | Carbonaceous lamination | |
| Slickensided | SM | Secondary Mineralisation | BrZ | Brecciated Zones | Со | Coal seam | |
| | | | FP | Foliation Parting | Cv | Calcite vein | |
| PLANARITY APERTU | | APERTURE | LP | Lamination Parting | SI | Sand Infill | |
| Planar | С | Closed | SZ | Sheared Zone | Н | Horizontal | |
| Stepped | 0 | Open | CZ | Crushed Zone | V | Vertical | |
| Undulating | F | Filled | WS | Weathered Seam | CI | Clay Infill | |
| Curved | Т | Tight | BZ | Broken Zone | Cn | Clean | |
| Irregular | | | HFZ | Highly Fractured Zone | CS | Clay Seam | |
| | | | Fr | Fracture | DI | Drilling Induced | |
| | Rough Smooth Slickensided PLANARITY Planar Stepped Undulating Curved | Rough FeSt Smooth W Slickensided SM PLANARITY Planar C Stepped O Undulating F Curved T | ROUGHNESS Rough FeSt Iron Stained Smooth W Weathered Slickensided SM Secondary Mineralisation PLANARITY APERTURE Planar C Closed Stepped O Open Undulating F Filled Curved T Tight | ROUGHNESS Rough FeSt Iron Stained J Smooth W Weathered MDJ Slickensided SM Secondary Mineralisation BrZ PLANARITY APERTURE LP Planar C Closed SZ Stepped O Open CZ Undulating F Filled WS Curved T Tight BZ Irregular | Rough FeSt Iron Stained J Joint Smooth W Weathered MDJ Multidirectional Joints Slickensided SM Secondary Mineralisation BrZ Brecciated Zones FP Foliation Parting PLANARITY APERTURE LP Lamination Parting Planar C Closed SZ Sheared Zone Stepped O Open CZ Crushed Zone Undulating F Filled WS Weathered Seam Curved T Tight BZ Broken Zone Irregular HFZ Highly Fractured Zone | ROUGHNESS WALL ALTERATIONS FeSt Iron Stained J Joint P Smooth W Weathered MDJ Multidirectional Joints CL Slickensided SM Secondary Mineralisation BrZ Brecciated Zones Co FP Foliation Parting Cv PLANARITY APERTURE LP Lamination Parting SI Planar C Closed SZ Sheared Zone H Stepped O Open CZ Crushed Zone V Undulating F Filled WS Weathered Seam CI Curved T Tight BZ Broken Zone CS CS | |

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 : BH17 SHEET : 7 of 8

REFERENCE NO: H9566

GATEWAY BRIDGE FOUNDATION INVESTIGATION - GATEWAY UPGRADE PROJECT PIER 7 - CENTRE OF PIER LOCATION

PROJECT

PROJECT NO: FG5388 SURFACE R.L: -2.18 DRILLER : CAIRNS DRILLING PTY LTD

JOB NO **DATUM** AHD / SETP DATE DRILLED : 08/05/05 - 13/05/05

| DEPTH | DEFECT TYPE | DIP | PLANARITY | ROUGHNESS | APERTURE | WALL ALTERATION | OTHER |
|-------------|----------------|------|----------------|-----------|----------|--------------------|------------|
| 62.56-62.62 | FZ | MDJ | - | <u> 1</u> | T | | CI |
| 62.65 | J | 80° | P | S | Т | | DI |
| 62.65-62.98 | BrZ | - | - | _ | C | W | CI |
| 63.15 | J | 75° | P | - | Т | - | - |
| 63.18-63.21 | _ | ~ |) - | - | Т | W | CS |
| 63.21-63.40 | BrZ | - | - | - | Т | - | CI, Healed |
| 63.40-63.71 | BrZ | - | _ | - | 0 | - | CI |
| 63.75 | J | 75° | P | S | С | ~ | CI |
| 63.84-64.10 | BZ | - | - | - | 0 | - | CI |
| 64.12 | J | 60° | P | S | T | - | DĪ |
| 64.16 | LP | <10° | P | S | С | | DI |
| 64.20 | LP | <15° | Un | - | С | | CI |
| 64.22 | LP | 15° | Р | S | - | - 1 | CI |
| 64.30 | J | 40° | P | S | С | - | CI |
| 64.30 | LP | 35° | Un | - | С | - | CI |
| 64.33 | LP | 15° | Ir | - | С | - | PCI |
| 64.37 | LP | 20° | P | - | С | - | CI |
| 64.42 | LP | 15° | P | S | С | - | - |
| 64.50-64.65 | SZ | 65° | P | - | C-T | - | CI, Healed |
| 64.65-65.25 | HFZ | MDJ | - 1 | - | O-C | _ | CI |
| 65.55 | j | 60° | P | S | Т | _ | |
| 65.60 | LP | <5° | P | - | Т | - | |

Abhroviations

| | Abbreviations | | | | | | | | |
|-----------|--------------------|------|--------------------------|--------------------|-------------------------|-------------|-------------------------|--|--|
| ROUGHNESS | | , | WALL ALTERATIONS | | TYPE | | OTHER | | |
| R | Rough | FeSt | Iron Stained | J | Joint | P | Partly | | |
| S | Smooth | W | Weathered | MDJ | Multidirectional Joints | CL | Carbonaceous lamination | | |
| SL | Slickensided | SM | Secondary Mineralisation | BrZ | Brecciated Zones | Co | Coal seam | | |
| | | | | FP | Foliation Parting | In | Incipient | | |
| | PLANARITY APERTURE | | LP | Lamination Parting | SI | Sand Infill | | | |
| P1 | Planar | С | Closed | SZ | Sheared Zone | IH. | Horizontal | | |
| St | Stepped | 0 | Open | CZ | Crushed Zone | V | Vertical | | |
| Un | Undulating | F | Filled | WS | Weathered Seam | CI | Clay Infill | | |
| Си | Curved | T | Tight | BZ | Broken Zone | Cn | Clean | | |
| lr | 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 : BH17 SHEET : 8 of 8 REFERENCE NO: H9566

PROJECT

: GATEWAY BRIDGE FOUNDATION INVESTIGATION - GATEWAY UPGRADE PROJECT

LOCATION

: PIER 7 - CENTRE OF PIER

PROJECT NO

FG5388

SURFACE R.L: -2.18

DATUM

DRILLER

: CAIRNS DRILLING PTY LTD

JOB NO

AHD / SETP

DATE DRILLED : 08/05/05 - 13/05/05

| DEPTH | DEFECT TYPE | DIP | PLANARITY | ROUGHNESS | APERTURE | WALL ALTERATION | OTHER |
|-------------|----------------|-----|-----------|-----------|----------|--------------------|-------|
| 65.75 | J | 60° | P | S | Ţ | - | CI |
| 65.78 | J | 60° | P | S | Т | | Cv |
| 65.80 | LP | 10° | P | S | Т | - | DI |
| 65.90 | LP | 15° | P | S | С | - | - |
| 66.07-67.90 | BrZ | MDJ | - | - | С | - | CI |
| | | | | | | | |
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Abbreviations

| ROUGHNESS WALL ALTERATIONS | | ТҮРЕ | | OTHER | | | |
|----------------------------|--------------|----------|--------------------------|--------------------|-------------------------|-------------|-------------------------|
| R | Rough | FeSt | Iron Stained | J | Joint | P | Partly |
| S | Smooth | W | Weathered | MDJ | Multidirectional Joints | CL | Carbonaceous lamination |
| SL | Slickensided | SM | Secondary Mineralisation | BrZ | Brecciated Zones | Co | Coal seam |
| | | | | FP | Foliation Parting | Cv | Calcite Vein |
| PLANARITY | | APERTURE | LP | Lamination Parting | SI | Sand Infill | |
| Pl | Planar | С | Closed | SZ | Sheared Zone | Н | Horizontal |
| St | Stepped | 0 | Open | CZ | Crushed Zone | V | Vertical |
| Un | Undulating | F | Filled | WS | Weathered Seam | CI | Clay Infill |
| Cu | Curved | Ť | Tight | BZ | Broken Zone | Cn | Clean |
| Ir | Irregular | | | HFZ | Highly Fractured Zone | CS | Clay Seam |
| | | | | Fr | Fracture | Ιď | Drilling Induced |

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