

## **APPENDIX A**

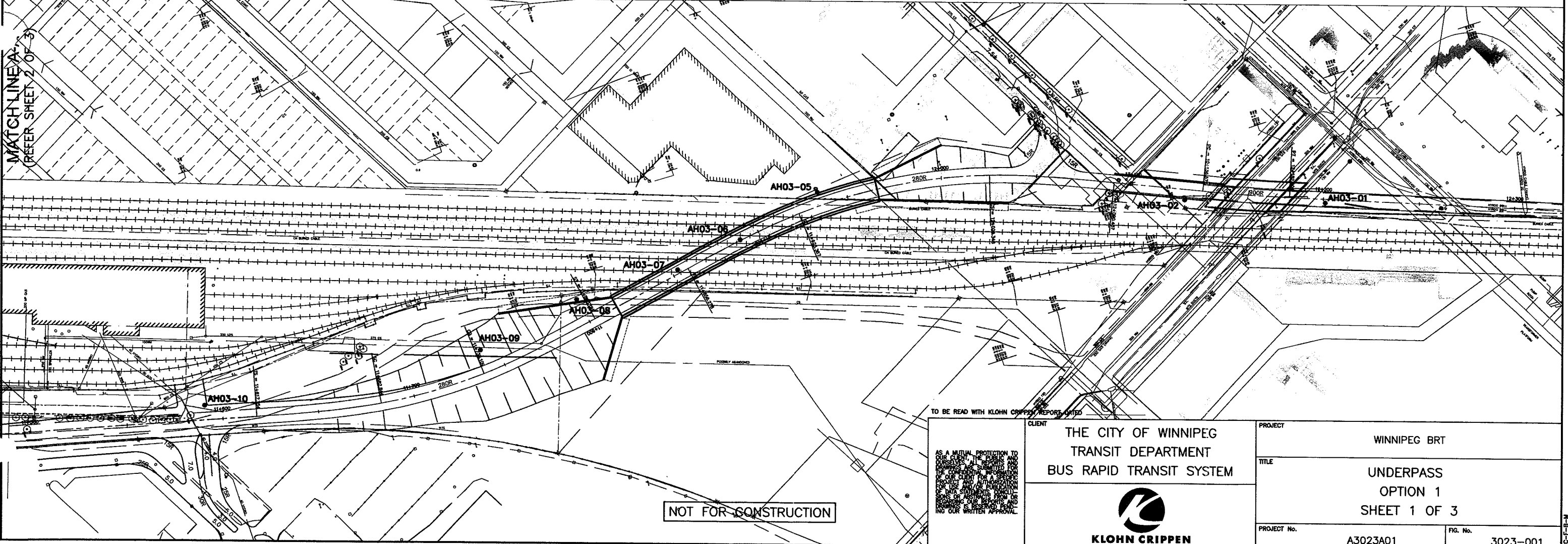
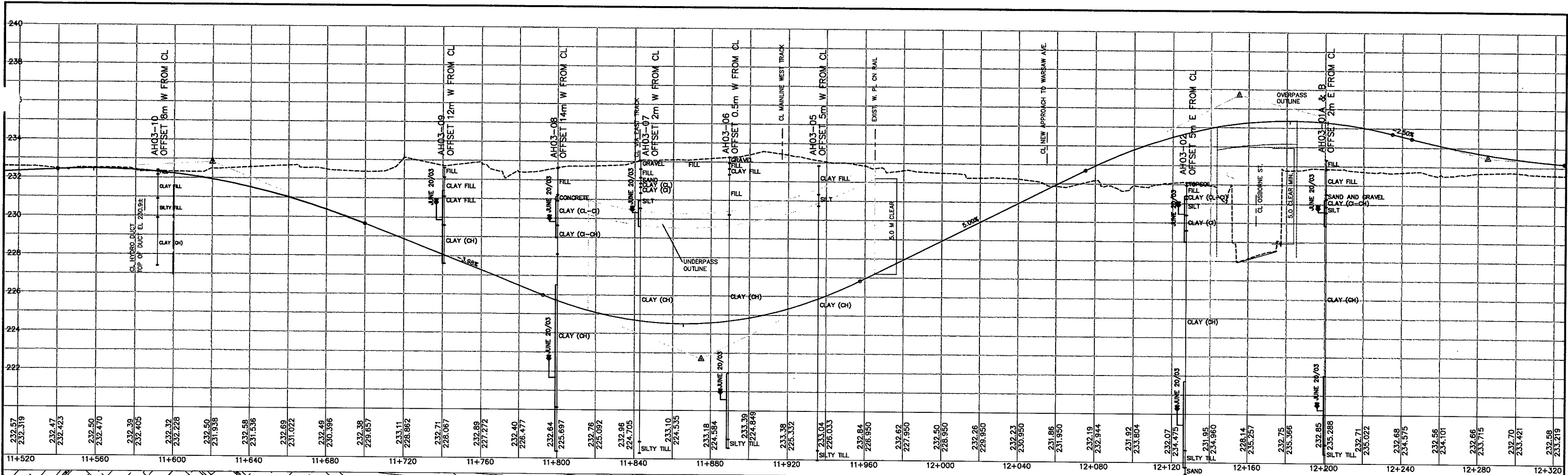
# **KLOHN CRIPPEN TEST HOLE LOGS MAY 2004**

# **Dillon Consulting Limited**

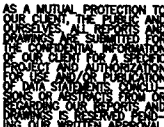

## **The City of Winnipeg Bus Rapid Transit System – Southwest Corridor Geotechnical Investigation and Preliminary Recommendations *Report***

A03023A01.01

May 2004



TO BE READ WITH KLOHN CRIPPEN REPORTS LIMITED

|  |  |  |
|--|--|--|
|  <p>AS A MUTUAL PROTECTION TO OUR CLIENTS, WE REQUEST THAT YOU OBTAIN OUR WRITTEN APPROVAL FOR ANY REVISIONS TO THIS DRAWING.</p> | <p>CLIENT</p> <p><b>THE CITY OF WINNIPEG<br/>TRANSIT DEPARTMENT<br/>BUS RAPID TRANSIT SYSTEM</b></p>                     | <p>PROJECT</p> <p>WINNIPEG BRT</p>                                 |
|  | <p></p> <p><b>KLOHN CRIPPEN</b></p> | <p>TITLE</p> <p><b>UNDERPASS<br/>OPTION 1<br/>SHEET 1 OF 3</b></p> |
| <p>PROJECT No. A3023A01</p>  |  | <p>FIG. No. 3023-001</p>   |

NOT FOR CONSTRUCTION

# TEST HOLE LOG

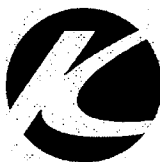
Su - kPa

20    60    100    140    180

| DEPTH (m)                | SPT BLOWS PER 0.15m | SAMPLE TYPE | SAMPLE No. | SYMBOL   | STARTED: June 27, 2003 FINISHED: June 27, 2003   |  | INSTRUMENT | DETAILS | Su - kPa  |         |                  |           |                  |
|--------------------------|---------------------|-------------|------------|----------|--|--|------------|---------|-----------|---------|------------------|-----------|------------------|
|                          |                     |             |            |          | DRILL METHOD: Solid Stem Auger   |  |            |         | VANE PEAK | FIELD   | LAB              | UC/2      |                  |
|                          |                     |             |            |          | GROUND ELEV. (m): 232.84   |  |            |         | REMOLD    | ◇       | □                | △ P.PEN/2 |                  |
|                          |                     |             |            |          | COORDINATES (m): N 5525985.5 E 633502.1  |  |            |         | * % FINES | ● SPT N | W <sub>p</sub> % | W%        | W <sub>L</sub> % |
| DESCRIPTION OF MATERIALS |                     |             |            |          |  |  |            |         | 20        | 40      | 60               | 80        |                  |
| 1                        |                     |             |            | [Symbol] | CLAY FILL<br>Silty, trace to some fine gravel, low plasticity, firm, black, moist, surface covered by 50 mm of crushed limestone (20mm diam) |  |            |         |           |         |                  |           |                  |
|                          |                     | Bag         | 1          |          | 0.9 - 1.2 m: sand seam, wet  |  |            |         |           |         |                  |           |                  |
|                          |                     | Bag         | 2          |          |  |  |            |         |           |         |                  |           |                  |
|                          |                     |             |            | [Symbol] | 1.50<br>231.34   | SILT (ML)<br>Low plasticity, soft, light brown, moist                                    |            |         |           |         |                  |           |                  |
| 2                        |                     | Bag         | 3          |          |  |  |            |         |           |         |                  |           |                  |
|                          |                     |             |            | [Symbol] | 2.10<br>230.74   | CLAY (CH)<br>High plasticity, firm, mottled brown with olive grey, trace silt inclusions |            |         |           |         |                  |           |                  |
|                          |                     | Bag         | 4          |          |  |  |            |         |           |         |                  |           |                  |
| 3                        |                     | Shelby      | 5          |          |  | Unconfined Compressive Strength = 57.0 kPa   |            |         |           |         |                  |           |                  |
| 4                        | 2<br>2<br>3         | SPT         | 6          |          |  | Some silt inclusions below 3.8 m   |            |         |           |         |                  |           |                  |
| 5                        |                     | Shelby      | 7          |          |  | Trace sulphates below 4.6 m  |            |         |           |         |                  |           |                  |
| 6                        | 2<br>2<br>4         | SPT         | 8          |          |  | Trace oxidation below 5.8 m  |            |         |           |         |                  |           |                  |
| 7                        |                     | Shelby      | 9          |          |  |  |            |         |           |         |                  |           |                  |
| 8                        |                     |             |            | [Symbol] |  | 8.20 m: becoming grey  |            |         |           |         |                  |           |                  |
| 9                        | 1<br>1<br>3         | SPT         | 10         |          |  |  |            |         |           |         |                  |           |                  |
| 10                       |                     |             |            |          |  |  |            |         |           |         |                  |           |                  |

Continued Next Page

KC\_TEST\_HOLE-SI SW



**KLOHN CRIPPEN**

PROJECT NO.: A03023A01

PROJECT: Winnipeg BRT

LOCATION: Southwest Corridor - CNR Underpass

LOGGED BY: NTL

CHECKED BY: DWR

SHEET 1 OF 2

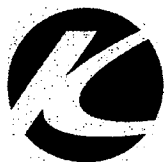
HOLE NO.: AH03-05

# TEST HOLE LOG

| DEPTH (m) | SPT BLOWS PER 0.15m | SAMPLE TYPE | SAMPLE No. | SYMBOL | DESCRIPTION OF MATERIALS   | INSTRUMENT DETAILS                         | Su - kPa |    |     |     |     |  |  |  |  |  |  |  |  |  |
|-----------|---------------------|-------------|------------|--------|--|--|----------|----|-----|-----|-----|--|--|--|--|--|--|--|--|--|
|           |                     |             |            |        |  |  | 20       | 60 | 100 | 140 | 180 |  |  |  |  |  |  |  |  |  |
|           |                     |             |            |        | STARTED: June 27, 2003 FINISHED: June 27, 2003   | VANE PEAK    FIELD    LAB                  |          |    |     |     |     |  |  |  |  |  |  |  |  |  |
|           |                     |             |            |        | DRILL METHOD: Solid Stem Auger   | REMOULD    ◊    ◻    ▲ UC/2                |          |    |     |     |     |  |  |  |  |  |  |  |  |  |
|           |                     |             |            |        | GROUND ELEV. (m): 232.84   | * % FINES    ● SPT N                       |          |    |     |     |     |  |  |  |  |  |  |  |  |  |
|           |                     |             |            |        | COORDINATES (m): N 5525985.5 E 633502.1  | W <sub>p</sub> %    W%    W <sub>L</sub> % |          |    |     |     |     |  |  |  |  |  |  |  |  |  |
|           |                     |             |            |        |  | x - - - - - o - - - - - x                  |          |    |     |     |     |  |  |  |  |  |  |  |  |  |
|           |                     |             |            |        |  | 20    40    60    80                       |          |    |     |     |     |  |  |  |  |  |  |  |  |  |
| 11        | 1                   | Shelby      | 11         |        |  |  |          |    |     |     |     |  |  |  |  |  |  |  |  |  |
| 12        | 1                   | SPT         | 12         |        |  |  |          |    |     |     |     |  |  |  |  |  |  |  |  |  |
| 13        |                     |             |            |        |  |  |          |    |     |     |     |  |  |  |  |  |  |  |  |  |
| 14        |                     | Shelby      | 13         |        | 13.7 m: trace till inclusions  |  |          |    |     |     |     |  |  |  |  |  |  |  |  |  |
| 15        | 4                   | SPT         |            |        | 14.90<br>217.94 SILT (ML)<br>Gravelly (fine to coarse), dense, light reddish brown, wet<br>(TILL-LIKE) |  |          |    |     |     |     |  |  |  |  |  |  |  |  |  |
|           | DNF                 |             | 14         |        | 15.40<br>217.44 15.4 m: auger refusal, suspect boulder on bedrock                                      |  |          |    |     |     |     |  |  |  |  |  |  |  |  |  |
| 16        |                     |             |            |        | End of Hole at: 15.4 m   |  |          |    |     |     |     |  |  |  |  |  |  |  |  |  |
|           |                     |             |            |        | Hole drilled under supervision of National Test Labs   |  |          |    |     |     |     |  |  |  |  |  |  |  |  |  |
| 17        |                     |             |            |        |  |  |          |    |     |     |     |  |  |  |  |  |  |  |  |  |
| 18        |                     |             |            |        |  |  |          |    |     |     |     |  |  |  |  |  |  |  |  |  |
| 19        |                     |             |            |        |  |  |          |    |     |     |     |  |  |  |  |  |  |  |  |  |
| 20        |                     |             |            |        |  |  |          |    |     |     |     |  |  |  |  |  |  |  |  |  |

J ROCK\_008.GDT 24/10/03

KC\_TEST\_HOLES1.SVL



**KLOHN CRIPPEN**

PROJECT NO.: A03023A01

PROJECT: Winnipeg BRT

LOCATION: Southwest Corridor - CNR Underpass







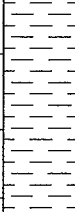
































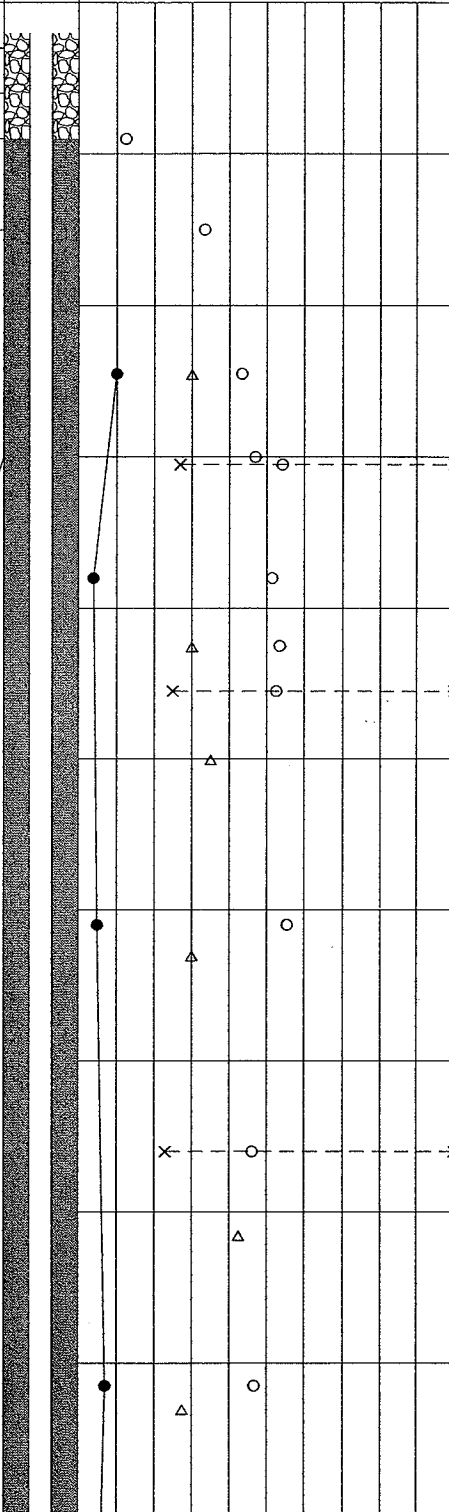
LOGGED BY: NTL

CHECKED BY: DWR

SHEET 2 OF 2

HOLE NO.: AH03-05

# TEST HOLE LOG

| DEPTH (m)   | SPT BLOWS PER 0.15m  | SAMPLE TYPE  | SAMPLE No.   | SYMBOL   | DESCRIPTION OF MATERIALS  | INSTRUMENT   | DETAILS | Su - kPa |    |     |     |     |
|---|--|--|--|--|---|--|---------|----------|----|-----|-----|-----|
|   |  |  |  |  |   |  |         | 20       | 60 | 100 | 140 | 180 |
|   |  |  |  |  | STARTED: June 18, 2003 FINISHED: June 18, 2003  |  |         |          |    |     |     |     |
|   |  |  |  |  | DRILL METHOD: Hollow Stem Auger   |  |         |          |    |     |     |     |
|   |  |  |  |  | GROUND ELEV. (m): 233.24  |  |         |          |    |     |     |     |
|   |  |  |  |  | COORDINATES (m): N 5525939.3 E 633513.3   |  |         |          |    |     |     |     |
|   |  |  |  |  | <b>DESCRIPTION OF MATERIALS</b>   |  |         |          |    |     |     |     |
| 1<br><br>2<br><br>3<br><br>4<br><br>5<br><br>6<br><br>7<br><br>8<br><br>9<br><br>10 | 6<br>16<br>DNF<br><br>3<br>5<br>5<br><br>2<br>2<br>2<br><br>2<br>2<br>3<br><br>3<br>3<br>4 | Grab<br><br>SPT<br><br>SPT<br><br>Bulk SY<br><br>SPT<br><br>Bulk SY<br><br>SPT<br><br>SY<br><br>SPT<br><br>SPT | 1<br><br>2<br><br>3<br><br>14<br>4&5<br><br>6<br><br>15<br><br>7<br><br><br><br>8<br><br><br><br>9<br><br><br><br>10 | <br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br> | <p>GRAVEL / CRUSHED ROCK (GP)</p> <p>0.30 Coarse, trace cobbles, poorly graded, track bed</p> <p>232.94 FILL</p> <p>0.60 Cinders, some sand, trace gravel, trace silt, black, moist</p> <p>232.64 CLAY FILL (CL)</p> <p>0.90 Silty, low plasticity, stiff, dark grey, dry to moist</p> <p>232.34 FILL</p> <p>Sand, silty, some cinders, some gravel, light brown, black in some zones, moist</p> <p>1.50</p> <p>231.74 CLAY, SAND and GRAVEL (FILL)</p> <p>- no quality samples obtained with Shelby tubes or SPT</p> <p>- no auger flight samples with hollow stem</p> <p>1.5 m: poor sample recovery (SPT on top of rock)</p> <p>~1.5 - 2.2 m: appear to have drilled through an abandoned wooden sewer - wood fragments in samples 3,4&amp;5; visible cavern on side of borehole, trickling water, surrounded by sand.</p> <p>No recovery in Shelby tubes pushed at 2.25 m and 2.45 m.</p> <p>2.45 m: Clay in SPT sample (possibly native but highly disturbed by a sloughed rock caught in shoe - explains high SPT N)</p> <p>CLAY (CH)</p> <p>High plasticity, firm to stiff, brown mottled with olive grey, occasional salt/silt inclusions (light brown, powdery)</p> <p>3.00 m: Standard Proctor Results -<br/>Maximum Dry Density = 1400 kg/m<sup>3</sup><br/>Optimum Moisture Content = 23.5%</p> <p>3.05 m: Sample 5 repushed over same depth as Sample 4</p> <p>4.25 m: Standard Proctor Results -<br/>Maximum Dry Density = 1390 kg/m<sup>3</sup><br/>Optimum Moisture Content = 28.0%</p> <p>4.55 m: becoming spotted with rusty brown</p> <p>Sample 7: 1.63% sulphate by weight</p> <p>6.10 m: occasional salt deposits (white crystals), mottling of olive grey and brown in horizontal seams.</p> <p>Sample 9: Consolidation test performed<br/>Direct shear test performed</p> <p>8.15 m - becoming drier</p> <p>9.15 m: becoming trace spots of silt (light brown), trace gravel (fine - coarse, subangular)</p> |  |         |          |    |     |     |     |

J ROCK\_008.GDT 24/10/03

KC\_TEST\_HOLE-SI\_SW



**KLOHN CRIPPEN**

Continued Next Page

|  |
|--|
| PROJECT NO.: A03023A01                       |
| PROJECT: Winnipeg BRT                        |
| LOCATION: Southwest Corridor - CNR Underpass |
| LOGGED BY: JNH      CHECKED BY: DWR          |
| SHEET 1 OF 2      HOLE NO.: AH03-06          |

# TEST HOLE LOG

| DEPTH (m)  | SPT BLOWS PER 0.15m | SAMPLE TYPE | SAMPLE No. | SYMBOL    | DESCRIPTION OF MATERIALS  | INSTRUMENT DETAILS  | Su - kPa |    |     |     |     |  |  |  |  |  |  |  |
|--|---------------------|-------------|------------|-----------|---|---|----------|----|-----|-----|-----|--|--|--|--|--|--|--|
|  |                     |             |            |           |   |   | 20       | 60 | 100 | 140 | 180 |  |  |  |  |  |  |  |
| <b>STARTED: June 18, 2003 FINISHED: June 18, 2003</b><br><b>DRILL METHOD: Hollow Stem Auger</b><br><b>GROUND ELEV. (m): 233.24</b><br><b>COORDINATES (m): N 5525939.3 E 633513.3</b> |                     |             |            |           |   | <b>VANE PEAK</b> <b>FIELD</b> <b>LAB</b><br>REMOLD    ◊    ◻    ▲ UC/2<br>* % FINES    ● SPT N<br>W <sub>p</sub> %    W%    W <sub>L</sub> %<br>x - - - - - o - - - - - x<br>20    40    60    80 |          |    |     |     |     |  |  |  |  |  |  |  |
| 11   |                     | SY          | 11         | / / / / / | 10.65 m: frequent spots of silt   |   |          |    |     |     |     |  |  |  |  |  |  |  |
| 12   | 2<br>2<br>2         | SPT         | 12         | / / / / / | 12.20 m: more frequent spots of silt  | ▽   |          |    |     |     |     |  |  |  |  |  |  |  |
| 13   |                     |             |            | / / / / / |   |   |          |    |     |     |     |  |  |  |  |  |  |  |
| 14   |                     | SY          | 13         | / / / / / |   |   |          |    |     |     |     |  |  |  |  |  |  |  |
| 15   |                     |             |            | / / / / / | 14.75<br>218.49 <b>SILT (ML)</b><br>- No sample retrieved, assumed to be gravelly from SPT (TILL-LIKE, inferred from drill action)<br>15.20<br>218.04 15.20 m: Auger refusal<br>15.25 m: SPT bouncing on rock<br><br>End of Hole at: 15.2 m<br><br>25 mm standpipe installed with flush mount cover<br>Recess = 0.20 m<br>Initial water level = 12.34 m bgl |   |          |    |     |     |     |  |  |  |  |  |  |  |
| 16   |                     |             |            | / / / / / |   |   |          |    |     |     |     |  |  |  |  |  |  |  |
| 17   |                     |             |            | / / / / / |   |   |          |    |     |     |     |  |  |  |  |  |  |  |
| 18   |                     |             |            | / / / / / |   |   |          |    |     |     |     |  |  |  |  |  |  |  |
| 19   |                     |             |            | / / / / / |   |   |          |    |     |     |     |  |  |  |  |  |  |  |
| 20   |                     |             |            | / / / / / |   |   |          |    |     |     |     |  |  |  |  |  |  |  |

J ROCK\_006.GDT 24/10/03  
KC\_TEST\_HOLE-SI SWL



**KLOHN CRIPPEN**

**PROJECT NO.:** A03023A01  
**PROJECT:** Winnipeg BRT  
**LOCATION:** Southwest Corridor - CNR Underpass  
**LOGGED BY:** JNH    **CHECKED BY:** DWR  
**SHEET 2 OF 2**    **HOLE NO.:** AH03-06

# TEST HOLE LOG

| DEPTH (m) | SPT BLOWS PER 0.15m | SAMPLE TYPE | SAMPLE No. | SYMBOL         | DESCRIPTION OF MATERIALS  | INSTRUMENT DETAILS                   | Su - kPa |    |     |     |     |  |  |  |  |  |  |  |  |
|-----------|---------------------|-------------|------------|----------------|---|--------------------------------------|----------|----|-----|-----|-----|--|--|--|--|--|--|--|--|
|           |                     |             |            |                |   |                                      | 20       | 60 | 100 | 140 | 180 |  |  |  |  |  |  |  |  |
|           |                     |             |            |                | STARTED: June 17, 2003 FINISHED: June 17, 2003  | VANE PEAK REMOLD                     |          |    |     |     |     |  |  |  |  |  |  |  |  |
|           |                     |             |            |                | DRILL METHOD: Solid Stem Auger  | FIELD LAB                            |          |    |     |     |     |  |  |  |  |  |  |  |  |
|           |                     |             |            |                | GROUND ELEV. (m): 233.05  | UC/2 P.PEN/2                         |          |    |     |     |     |  |  |  |  |  |  |  |  |
|           |                     |             |            |                | COORDINATES (m): N 5525903.1 E 633518.1   | * % FINES SPT N                      |          |    |     |     |     |  |  |  |  |  |  |  |  |
|           |                     |             |            |                |   | W <sub>p</sub> % W% W <sub>L</sub> % |          |    |     |     |     |  |  |  |  |  |  |  |  |
|           |                     |             |            |                |   | x - - - - - o - - - - - x            |          |    |     |     |     |  |  |  |  |  |  |  |  |
|           |                     |             |            |                |   | 20 40 60 80                          |          |    |     |     |     |  |  |  |  |  |  |  |  |
| 1         |                     | Grab        | 1          | 0.45<br>232.60 | GRAVEL / CRUSHED ROCK (GM)<br>Coarse, silty, trace cobbles, subrounded, track bed   |                                      |          |    |     |     |     |  |  |  |  |  |  |  |  |
|           |                     | Grab        | 2          | 0.90<br>232.15 | FILL<br>Cinders, sandy, black, saturated  |                                      |          |    |     |     |     |  |  |  |  |  |  |  |  |
|           |                     | SPT         | 3          | 1.20<br>231.88 | SAND (SW)<br>Fine to medium, trace fine gravel, trace silt, brown, saturated (FILL)   |                                      |          |    |     |     |     |  |  |  |  |  |  |  |  |
| 2         | 1                   |             |            | 231.65         | CLAY (CL)<br>Organic, black, rootlets, soft, wet  |                                      |          |    |     |     |     |  |  |  |  |  |  |  |  |
| 2         | 1                   |             |            | 1.70<br>231.35 | CLAY (CI)<br>Medium plasticity, firm to stiff, grey mottled with some rusty brown, moist  |                                      |          |    |     |     |     |  |  |  |  |  |  |  |  |
|           |                     | SY          | 4          | 2.50<br>230.55 | SILT (ML)<br>Nonplastic to low plasticity, soft, light brown, saturated - bottom contact is somewhere between 2.25 and 2.8 (within Shelby tube) |                                      |          |    |     |     |     |  |  |  |  |  |  |  |  |
| 3         | 3                   | SPT         | 5          |                | CLAY (CH)<br>High plasticity, firm to stiff, mottled brown and grey, moist<br>3.00 m: major gypsum deposits and rusty zones                     |                                      |          |    |     |     |     |  |  |  |  |  |  |  |  |
| 4         | 1                   |             |            |                |   |                                      |          |    |     |     |     |  |  |  |  |  |  |  |  |
| 4         | 2                   | Grab        | 6          |                | 3.75 m: no recovery in Shelby tube (hole is wet - making clay slick)  |                                      |          |    |     |     |     |  |  |  |  |  |  |  |  |
| 5         | 2                   | SPT         | 8          |                |   |                                      |          |    |     |     |     |  |  |  |  |  |  |  |  |
| 5         | 3                   |             |            |                |   |                                      |          |    |     |     |     |  |  |  |  |  |  |  |  |
| 5         | 4                   |             |            |                |   |                                      |          |    |     |     |     |  |  |  |  |  |  |  |  |
| 6         |                     | SY          | 9          |                | Unconfined Compressive Strength = 52.1  |                                      |          |    |     |     |     |  |  |  |  |  |  |  |  |
| 7         |                     |             |            |                |   |                                      |          |    |     |     |     |  |  |  |  |  |  |  |  |
| 8         | 3                   | SPT         | 10         |                | 7.60 m: becoming medium plasticity, trace silt  |                                      |          |    |     |     |     |  |  |  |  |  |  |  |  |
| 8         | 3                   |             |            |                |   |                                      |          |    |     |     |     |  |  |  |  |  |  |  |  |
| 8         | 4                   |             |            |                |   |                                      |          |    |     |     |     |  |  |  |  |  |  |  |  |
| 9         |                     | SY          | 11         |                | 9.15 m: becoming medium to high plasticity, soft to firm, wetter (possibly from seepage above)  |                                      |          |    |     |     |     |  |  |  |  |  |  |  |  |
| 10        |                     |             |            |                |   |                                      |          |    |     |     |     |  |  |  |  |  |  |  |  |

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KC\_TEST\_HOLE-SI SW



**KLOHN CRIPPEN**

|  |                   |
|--|-------------------|
| PROJECT NO.: A03023A01                       |                   |
| PROJECT: Winnipeg BRT                        |                   |
| LOCATION: Southwest Corridor - CNR Underpass |                   |
| LOGGED BY: JNH                               | CHECKED BY: DWR   |
| SHEET 1 OF 2                                 | HOLE NO.: AH03-07 |



# TEST HOLE LOG

| DEPTH (m)   | SPT BLOWS PER 0.15m | SAMPLE TYPE | SAMPLE No. | SYMBOL | DESCRIPTION OF MATERIALS  | INSTRUMENT DETAILS  | Su - kPa |    |     |     |     |  |  |  |  |  |  |  |
|---|---------------------|-------------|------------|--------|---|---|----------|----|-----|-----|-----|--|--|--|--|--|--|--|
|   |                     |             |            |        |   |   | 20       | 60 | 100 | 140 | 180 |  |  |  |  |  |  |  |
| <b>STARTED: June 17, 2003 FINISHED: June 17, 2003</b><br><b>DRILL METHOD: Solid Stem Auger</b><br><b>GROUND ELEV. (m): 233.05</b><br><b>COORDINATES (m): N 5525903.1 E 633518.1</b> |                     |             |            |        |   | VANE PEAK REMOLD    FIELD    LAB    UC/2 P.PEN/2<br>* % FINES    • SPT N<br>W <sub>p</sub> %    W%    W <sub>L</sub> %<br>x - - - - - o - - - - - x<br>20    40    60    80 |          |    |     |     |     |  |  |  |  |  |  |  |
| 11  | 2<br>2              | SPT         | 12         | /      | 11.40 m: Hole is squeezing in preventing retrieval of a Shelby sample   |   |          |    |     |     |     |  |  |  |  |  |  |  |
| 12  |                     | Grab        | 13         | /      | 12.50 m: Very soft clay (driller can push drill in without rotating) - could be due to infiltration of water from above   |   |          |    |     |     |     |  |  |  |  |  |  |  |
| 14  |                     | Grab        | 14         | /      |   |   |          |    |     |     |     |  |  |  |  |  |  |  |
| 15  |                     | Grab        | 15         | /      | 14.70<br>218.35 SILT (ML)<br>Low plasticity to non-plastic, some fine gravel, trace sand, trace clay, light pinkish brown, wet (TILL-LIKE)<br>15.30 m: Auger refusal<br>15.30<br>217.75 |   |          |    |     |     |     |  |  |  |  |  |  |  |
| 16  |                     |             |            |        | End of Hole at: 15.3 m<br><br>Hole backfilled with cuttings. Top 3.0 m sealed with bentonite chips.   |   |          |    |     |     |     |  |  |  |  |  |  |  |
| 17  |                     |             |            |        |   |   |          |    |     |     |     |  |  |  |  |  |  |  |
| 18  |                     |             |            |        |   |   |          |    |     |     |     |  |  |  |  |  |  |  |
| 19  |                     |             |            |        |   |   |          |    |     |     |     |  |  |  |  |  |  |  |
| 20  |                     |             |            |        |   |   |          |    |     |     |     |  |  |  |  |  |  |  |

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|  |                   |
|--|-------------------|
| PROJECT NO.: A03023A01                       |                   |
| PROJECT: Winnipeg BRT                        |                   |
| LOCATION: Southwest Corridor - CNR Underpass |                   |
| LOGGED BY: JNH                               | CHECKED BY: DWR   |
| SHEET 2 OF 2                                 | HOLE NO.: AH03-07 |

# TEST HOLE LOG

| DEPTH (m) | SPT BLOWS PER 0.15m | SAMPLE TYPE | SAMPLE No. | SYMBOL | DESCRIPTION OF MATERIALS   | INSTRUMENT DETAILS                   | Su - kPa |    |     |     |     |
|-----------|---------------------|-------------|------------|--------|--|--------------------------------------|----------|----|-----|-----|-----|
|           |                     |             |            |        |  |                                      | 20       | 60 | 100 | 140 | 180 |
|           |                     |             |            |        | STARTED: June 19, 2003 FINISHED: June 19, 2003   | VANE PEAK REMOLD                     |          |    |     |     |     |
|           |                     |             |            |        | DRILL METHOD: Solid Stem Auger   | FIELD LAB                            |          |    |     |     |     |
|           |                     |             |            |        | GROUND ELEV. (m): 232.62   | UC/2 P.PEN/2                         |          |    |     |     |     |
|           |                     |             |            |        | COORDINATES (m): N 5525848.3 E 633516.7  | * % FINES SPT N                      |          |    |     |     |     |
|           |                     |             |            |        |  | W <sub>p</sub> % W% W <sub>L</sub> % |          |    |     |     |     |
|           |                     |             |            |        |  | x - - - - - o - - - - - x            |          |    |     |     |     |
|           |                     |             |            |        |  | 20 40 60 80                          |          |    |     |     |     |
| 1         |                     | Grab        | 1*         |        | FILL<br>Silt, clay, some gravel, trace sand, low plasticity to non-plastic, dry to moist<br><br>0.75 m: sample of fill was taken from a failed hole ~ 13m NEE of AH03-08   |                                      |          |    |     |     |     |
| 2         |                     | Grab        | 1          |        | 1.40<br>231.22 CONCRETE - probably a basement foundation, surface and basement foundations prevalent to the east of AH03-08<br>1.70<br>230.92 CLAY (CL-CI)<br>Low to medium plasticity, trace gravel, trace silt, firm, grey mottled with brown, moist (POSSIBLY FILL) |                                      |          |    |     |     |     |
| 3         |                     |             |            |        | 3.00<br>229.62 CLAY (CI-CH)<br>Medium to high plasticity, firm to stiff, brown mottled with olive grey, moist to wet   |                                      |          |    |     |     |     |
| 4         |                     | SY          | 2          |        |  |                                      |          |    |     |     |     |
| 5         | 2<br>4<br>4         | SPT         | 3          |        | 4.50<br>228.12 CLAY (CH)<br>High plasticity, firm to stiff, mottled brown and olive grey, moist, occasional salt inclusions  |                                      |          |    |     |     |     |
| 6         |                     | SY          | 4          |        |  |                                      |          |    |     |     |     |
| 7         |                     |             |            |        |  |                                      |          |    |     |     |     |
| 8         | 4<br>7<br>7         | SPT         | 5          |        | 7.60 m: SPT N high due to sloughed rock (sample showed rock fragments, clay was twisted)<br>8.00 m: more frequent silt inclusions  |                                      |          |    |     |     |     |
| 9         |                     | SY          | 6          |        | 9.00 m: becoming soft to firm, occasional pebbles<br>PP/2 < 25 kPa   |                                      |          |    |     |     |     |
| 10        |                     |             |            |        |  |                                      |          |    |     |     |     |

Continued Next Page ▾



**KLOHN CRIPPEN**

PROJECT NO.: A03023A01

PROJECT: Winnipeg BRT

LOCATION: Southwest Corridor - CNR Underpass

LOGGED BY: JNH

CHECKED BY: DWR

SHEET 1 OF 2

HOLE NO.: AH03-08

# TEST HOLE LOG

| DEPTH (m) | SPT BLOWS PER 0.15m | SAMPLE TYPE | SAMPLE No. | SYMBOL | STARTED: June 19, 2003 FINISHED: June 19, 2003 |   | Su - kPa         |       |                  |           |
|-----------|---------------------|-------------|------------|--------|--|---|------------------|-------|------------------|-----------|
|           |                     |             |            |        | DRILL METHOD: Solid Stem Auger                 |   | 20               | 60    | 100              | 140       |
|           |                     |             |            |        | GROUND ELEV. (m): 232.62                       |   | VANE PEAK        | FIELD | LAB              | UC/2      |
|           |                     |             |            |        | COORDINATES (m): N 5525848.3 E 633516.7        |   | REMOLD           | ◆     | □                | ▲ P.PEN/2 |
|           |                     |             |            |        | DESCRIPTION OF MATERIALS                       |   | * % FINES        |       | ● SPT N          |           |
|           |                     |             |            |        |  |   | W <sub>p</sub> % | W%    | W <sub>L</sub> % |           |
|           |                     |             |            |        |  |   | X                | ○     | ○                | X         |
|           |                     |             |            |        |  |   | 20               | 40    | 60               | 80        |
| 11        | 3                   | SPT         | 7          |        |  |   |                  |       |                  |           |
| 12        |                     |             |            |        |  |   |                  |       |                  |           |
| 13        |                     | SY          | 8          |        | 12.50<br>220.12                                | SILT (ML)<br>Non-plastic to low plasticity, some gravel, trace sand, trace clay, soft, light grey, wet (TILL-LIKE)  |                  |       |                  |           |
| 14        | 3<br>5              | SPT         | 9          |        |  | 13.90 m: becoming gravely, trace to some sand, light pinkish brown<br><br>14.80 m: Auger refusal  |                  |       |                  |           |
| 15        |                     |             |            |        | 14.80<br>217.82                                | End of Hole at: 14.8 m<br><br>2 x 25 mm standpipes installed in one lockable steel casing<br>Stick-up = 0.87 m for both<br>AH03-08A: Initial water level = 7.84 m bgl<br>June 20/03 water level = 9.87 m bgl<br>AH03-08B: Initial water level = 3.17 m bgl<br>June 20/03 water level = 2.70 m bgl |                  |       |                  |           |
| 16        |                     |             |            |        |  |   |                  |       |                  |           |
| 17        |                     |             |            |        |  |   |                  |       |                  |           |
| 18        |                     |             |            |        |  |   |                  |       |                  |           |
| 19        |                     |             |            |        |  |   |                  |       |                  |           |
| 20        |                     |             |            |        |  |   |                  |       |                  |           |

P1 ROCK\_008.GDT 24/1/003

KC\_TEST\_HOLE-SI SW



**KLOHN CRIPPEN**

|  |                   |
|--|-------------------|
| PROJECT NO.: A03023A01                       |                   |
| PROJECT: Winnipeg BRT                        |                   |
| LOCATION: Southwest Corridor - CNR Underpass |                   |
| LOGGED BY: JNH                               | CHECKED BY: DWR   |
| SHEET 2 OF 2                                 | HOLE NO.: AH03-08 |

# TEST HOLE LOG

| DEPTH (m)   | SPT BLOWS PER 0.15m | SAMPLE TYPE | SAMPLE No. | SYMBOL         | DESCRIPTION OF MATERIALS  | INSTRUMENT DETAILS | Su - kPa  |    |     |     |     |
|---|---------------------|-------------|------------|----------------|---|--------------------|---|----|-----|-----|-----|
|   |                     |             |            |                |   |                    | 20  | 60 | 100 | 140 | 180 |
| <b>STARTED: June 17, 2003 FINISHED: June 17, 2003</b><br><b>DRILL METHOD: Solid Stem Auger</b><br><b>GROUND ELEV. (m): 232.60</b><br><b>COORDINATES (m): N 5525792.1 E 633526.2</b> |                     |             |            |                |   |                    | VANE PEAK REMOLD    FIELD    LAB    UC/2 P.PEN/2<br>* % FINES    • SPT N<br>W <sub>p</sub> %    W%    W <sub>L</sub> %<br>X - - - - - O - - - - - X<br>20    40    60    80 |    |     |     |     |
| 1   |                     | Grab        | 1          | 0.50<br>232.10 | FILL<br>Silty clay and coarse gravel, low plasticity, firm to stiff, dark brown, moist, rootlets<br>CLAY (CL)<br>Silty, low plasticity, trace gravel, trace cinders, trace organic clay (black), firm to stiff, brown, fragments of wood (probably old lumber) (FILL) | ●                  |   |    |     |     |     |
| 2   | 2<br>2<br>1         | SPT         | 2          | 1.50<br>231.10 | CLAY (CL)<br>Clay (as above) mixed with silt (light brown, soft, wet), low plasticity, trace coarse gravel, light brown mottled with brown, moist (FILL)  | ●                  |   |    |     |     |     |
|   |                     | Grab        | 3          |                |   | △                  |   |    |     |     |     |
| 3   | 2<br>1<br>3         | SPT         | 4          | 3.00<br>229.60 | CLAY (CH)<br>High plasticity, firm to stiff, brown to olive grey mottled with grey, moist, occasional gypsum deposits, occasional deposits (possibly organic, dark brown, angular)  | ●                  |   |    |     |     |     |
|   |                     | Grab        | 5          |                |   | △                  |   |    |     |     |     |
| 5   | 3<br>3<br>4         | SPT         | 6          | 5.00<br>227.60 | 4.50 m: more frequent salt inclusions, occasional rust spots, occasional spots of silt (thin seams, near vertical)  | ●                  |   |    |     |     |     |
| 6   |                     |             |            |                | End of Hole at: 5.0 m<br><br>25 mm standpipe installed in lockable steel casing<br>Stick-up = 0.91 m<br>Initial water level = no water<br>June 20/03 water level = 1.73 m bgl   |                    |   |    |     |     |     |

PJ ROCK\_006.GDT 24/10/03

KC\_TEST\_HOLE-SW



**KLOHN CRIPPEN**

**PROJECT NO.:** A03023A01

**PROJECT:** Winnipeg BRT

**LOCATION:** Southwest Corridor - Test Section

**LOGGED BY:** JNH

**CHECKED BY:** DWR

**SHEET 1 OF 1**

**HOLE NO.:** AH03-09

# TEST HOLE LOG

| DEPTH (m) | SPT BLOWS PER 0.15m | SAMPLE TYPE | SAMPLE No. | SYMBOL         | DESCRIPTION OF MATERIALS  | INSTRUMENT DETAILS | Su - kPa               |       |                  |      |         |
|-----------|---------------------|-------------|------------|----------------|---|--------------------|------------------------|-------|------------------|------|---------|
|           |                     |             |            |                |   |                    | 20                     | 60    | 100              | 140  | 180     |
|           |                     |             |            |                | STARTED: June 17, 2003 FINISHED: June 17, 2003  | INSTRUMENT DETAILS | VANE PEAK              | FIELD | LAB              | UC/2 |         |
|           |                     |             |            |                | DRILL METHOD: Solid Stem Auger  |                    | REMOLD                 | ◆     | ■                | ▲    | P.PEN/2 |
|           |                     |             |            |                | GROUND ELEV. (m): 232.40  |                    | * % FINES      ● SPT N |       |                  |      |         |
|           |                     |             |            |                | COORDINATES (m): N 5525647 E 633509.5   |                    | W <sub>p</sub> %       | W%    | W <sub>L</sub> % |      |         |
|           |                     |             |            |                |   | X                  | ○                      | X     |                  |      |         |
|           |                     |             |            |                |   | 20                 | 40                     | 60    | 80               |      |         |
| 1         |                     | Grab        | 1          | 0.25<br>232.15 | FILL<br>Clay, sand, cinders, black, moist   |                    |                        |       |                  |      |         |
| 2         | 2<br>1<br>1         | SPT         | 2          | 1.50<br>230.90 | FILL<br>Silt (light grey, nonplastic to low plastic) mixed with clay (grey, medium to high plasticity), soft, wet |                    |                        |       |                  |      |         |
|           |                     | Grab        | 3          | 2.50<br>229.90 | 2.25 m: some organic clay mixed in  |                    |                        |       |                  |      |         |
| 3         | 2<br>1<br>4         | SPT         | 4          | 2.50<br>229.90 | CLAY (CH)<br>High plasticity, firm to stiff, olive grey mottled brown, moist, gypsum deposits                     |                    |                        |       |                  |      |         |
| 4         |                     | Grab        | 5          | 2.50<br>229.90 |   |                    |                        |       |                  |      |         |
| 5         | 2<br>3<br>3         | SPT         | 6          | 5.00<br>227.40 |   |                    |                        |       |                  |      |         |
| 6         |                     |             |            |                | End of Hole at: 5.0 m   |                    |                        |       |                  |      |         |
| 7         |                     |             |            |                | Hole backfilled with cuttings to 2.5 m and sealed with bentonite chips from 0 to 2.5 m.                           |                    |                        |       |                  |      |         |
| 8         |                     |             |            |                | Survey coordinates are approximate. Hole was moved 10m NNE prior to drilling.                                     |                    |                        |       |                  |      |         |
| 9         |                     |             |            |                |   |                    |                        |       |                  |      |         |
| 10        |                     |             |            |                |   |                    |                        |       |                  |      |         |

PJ ROCK\_006.GDT 24/10/03

KC\_TEST\_HOLE-SI\_SW



**KLOHN CRIPPEN**

PROJECT NO.: A03023A01

PROJECT: Winnipeg BRT

LOCATION: Southwest Corridor - Test Section

LOGGED BY: JNH

CHECKED BY: DWR

SHEET 1 OF 1

HOLE NO.: AH03-10