

APPENDIX 'F'

GEOTECHNICAL REPORT

February 10, 2016

Mr. Kevin Rae
AECOM Canada Ltd.
99 Commerce Drive
Winnipeg, Manitoba
R3P 0Y7

Dear Mr. Rae:

Project No: 60481153 (402)

Regarding: Local Streets Package 16-R-06 – Contract 1 – Stack Street and Acheson Drive

This report summarizes the results of the subsurface investigation completed for the proposed 2016 Local Street Renewals of Stack Street and Acheson Drive. The objective of the investigation was to provide information related to the existing pavement and soil stratigraphy underneath.

Two test holes (TH16-01 and TH16-02) were drilled along Stack Street and three test holes (TH16-04 to TH16-06) along Acheson Drive. The approximate location of the test holes are shown on Figure 01 for Stack Street and on Figure 02 for Acheson Drive in Appendix A.

Pavement coring was completed using a hollow 150 mm diameter diamond core drill bit. Core samples were recovered and logged at AECOM's Materials Laboratory. Photos of core samples are included in Appendix A.

The test hole drilling was completed by Maple Leaf Drilling Ltd. using a truck mounted drill rig equipped with 125 mm diameter solid stem augers. The test holes were advanced to a depth of 2.1 m below road surface. During the drilling, AECOM personnel observed subsurface conditions and visually classified the soil. Other pertinent information such as groundwater and drilling conditions were also recorded. Disturbed soil samples from auger cuttings retrieved during the field investigation were transported to AECOM's Materials Laboratory for further testing and classification.

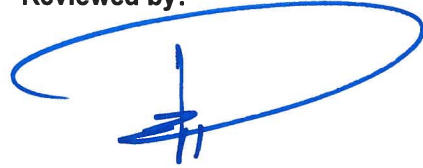
The laboratory soil testing consisted of Moisture Content determination, Atterberg Limits and Grain Size Distribution tests. The test results are recorded on the test hole logs and in the laboratory testing summary Table 01, both included in Appendix A.

Sincerely,
AECOM Canada Ltd.



Aaron Kaluzniak, EIT
Geotechnical Engineering

Reviewed by:



Zeyad Shukri, M.Sc., P.Eng.
Senior Geotechnical Engineer

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- represents Consultant's professional judgement in light of the Limitations and industry standards for the preparation of similar reports;
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F3. GEOTECHNICAL INVESTIGATION REQUIREMENTS FOR PUBLIC WORKS PROJECTS (SEPTEMBER 2015)

F3.1 Fieldwork

- (a) Clear all underground services at each test-hole location.
- (b) On most projects, test-holes are required every 50 metres with a minimum of three (3) test holes per Project Location. For street projects greater than 500 metres, test holes may be taken every 100 m. More or fewer test-holes may be required depending upon known Site conditions – confirm with the Project Manager.
- (c) Record location of test-hole (offset from curb, distance from cross street and house number).
- (d) Drill 150 mm-diameter cores in pavement.
- (e) Drill 125 mm-diameter test-holes into fill materials and subgrade.
- (f) If a service trench backfilled with granular materials is encountered, another hole shall be drilled to define the existing sub-surface conditions.
- (g) Test-holes shall be drilled to depth of 2 m \pm 150 mm below surface of the pavement.
- (h) Recover pavement core sample and representative samples of soil (fill materials, pavement structure materials and subgrade).
- (i) Measure and record pavement section exposed in the test-hole (thickness of concrete or asphalt and different types of pavement structure materials).
- (j) Pavement structure materials to be identified as crushed limestone or granular fill and the maximum aggregate size of the material (20 mm, 50 mm or 150 mm).
- (k) Log soil profile for the subgrade.
- (l) Representative samples of soil must be obtained at the following depths below the bottom of the pavement structure materials – 0.1 m, 0.4 m, 0.7 m, 1.0 m, 1.3 m, 1.6 m, etc. Ensure a sample is obtained from each soil type encountered in the test-hole.
- (m) Make note of any water seepage into the test-hole.
- (n) Backfill test-hole with native materials and additional granular fill, if required. Patch pavement surface with hot mix asphalt or high strength durable concrete mix.
- (o) Return core sample from the pavement and soil samples to the laboratory.

F3.2 Lab Work

- (a) Test all soil samples for moisture content.
- (b) Photograph core samples recovered from the pavement surface.
- (c) Conduct tests for plasticity index and hydrometer analysis on selected soil samples which are between 0.5 m and 1 m below top of pavement (this is the sub-grade on which the pavement and sub-base will be built). The selection will be based upon visual classification and moisture content test results, with a minimum of one sample of each soil type per street to be tested.
- (d) Prepare test-hole logs and classify subgrade (based on hydrometer) as follows:
 - < 30% silt - classify as clay
 - 30% - 50% silt - classify as silty clay
 - 50% - 70% silt - classify as clayey silt
 - > 70% silt - classify as silt
- (e) For Pavement Rehabilitations and Mill and Fill Pavement Rehabilitation Method pavement cores may be required. Contact the City's Project Manager to confirm requirements.
- (f) For any uncertain situations and/or locations, or clarification of these requirements, contact the Project Manager.

AECOM Canada Ltd.

GENERAL STATEMENT

NORMAL VARIABILITY OF SUBSURFACE CONDITIONS

The scope of the investigation presented herein is limited to an investigation of the subsurface conditions as to suitability for the proposed project. This report has been prepared to aid in the evaluation of the site and to assist the engineer in the design of the facilities. Our description of the project represents our understanding of the significant aspects of the project relevant to the design and construction of earth work, foundations and similar. In the event of any changes in the basic design or location of the structures as outlined in this report or plan, we should be given the opportunity to review the changes and to modify or reaffirm in writing the conclusions and recommendations of this report.

The analysis and recommendations presented in this report are based on the data obtained from the borings and test pit excavations made at the locations indicated on the site plans and from other information discussed herein. This report is based on the assumption that the subsurface conditions everywhere are not significantly different from those disclosed by the borings and excavations. However, variations in soil conditions may exist between the excavations and, also, general groundwater levels and conditions may fluctuate from time to time. The nature and extent of the variations may not become evident until construction. If subsurface conditions differ from those encountered in the exploratory borings and excavations, are observed or encountered during construction, or appear to be present beneath or beyond excavations, we should be advised at once so that we can observe and review these conditions and reconsider our recommendations where necessary.

Since it is possible for conditions to vary from those assumed in the analysis and upon which our conclusions and recommendations are based, a contingency fund should be included in the construction budget to allow for the possibility of variations which may result in modification of the design and construction procedures.

In order to observe compliance with the design concepts, specifications or recommendations and to allow design changes in the event that subsurface conditions differ from those anticipated, we recommend that all construction operations dealing with earth work and the foundations be observed by an experienced soils engineer. We can be retained to provide these services for you during construction. In addition, we can be retained to review the plans and specifications that have been prepared to check for substantial conformance with the conclusions and recommendations contained in our report.

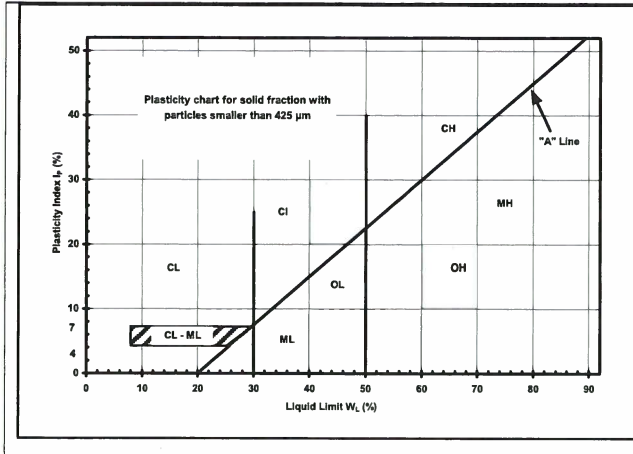
EXPLANATION OF FIELD & LABORATORY TEST DATA

| Description | | UMA Log Symbols | USCS Classification | Laboratory Classification Criteria | | | | | |
|----------------------|--|---------------------------------------|---|------------------------------------|---------|-------------------------------|---|--|--|
| | | | | Fines (%) | Grading | Plasticity | Notes | | |
| COARSE GRAINED SOILS | GRAVELS (More than 50% of coarse fraction of gravel size) | CLEAN GRAVELS (Little or no fines) | Well graded gravels, sandy gravels, with little or no fines | | GW | 0-5 | $C_u > 4$ $1 < C_c < 3$ | Dual symbols if 5-12% fines. Dual symbols if above "A" line and $4 < W_p < 7$ $C_u = \frac{D_{60}}{D_{10}}$ $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ | |
| | | | Poorly graded gravels, sandy gravels, with little or no fines | | GP | 0-5 | Not satisfying GW requirements | | |
| | | DIRTY GRAVELS (With some fines) | Silty gravels, silty sandy gravels | | GM | > 12 | | | Atterberg limits below "A" line or $W_p < 4$ |
| | | | Clayey gravels, clayey sandy gravels | | GC | > 12 | | | Atterberg limits above "A" line or $W_p < 7$ |
| | SANDS (More than 50% of coarse fraction of sand size) | CLEAN SANDS (Little or no fines) | Well graded sands, gravelly sands, with little or no fines | | SW | 0-5 | $C_u > 6$ $1 < C_c < 3$ | | |
| | | | Poorly graded sands, gravelly sands, with little or no fines | | SP | 0-5 | Not satisfying SW requirements | | |
| | | DIRTY SANDS (With some fines) | Silty sands, sand-silt mixtures | | SM | > 12 | | | Atterberg limits below "A" line or $W_p < 4$ |
| | | | Clayey sands, sand-clay mixtures | | SC | > 12 | | | Atterberg limits above "A" line or $W_p < 7$ |
| FINE GRAINED SOILS | SILTS (Below 'A' line negligible organic content) | $W_L < 50$ | Inorganic silts, silty or clayey fine sands, with slight plasticity | | ML | | Classification is Based upon Plasticity Chart | | |
| | | $W_L > 50$ | Inorganic silts of high plasticity | | MH | | | | |
| | CLAYS (Above 'A' line negligible organic content) | $W_L < 30$ | Inorganic clays, silty clays, sandy clays of low plasticity, lean clays | | CL | | | | |
| | | $30 < W_L < 50$ | Inorganic clays and silty clays of medium plasticity | | CI | | | | |
| | | $W_L > 50$ | Inorganic clays of high plasticity, fat clays | | CH | | | | |
| | ORGANIC SILTS & CLAYS (Below 'A' line) | $W_L < 50$ | Organic silts and organic silty clays of low plasticity | | OL | | | | |
| | | $W_L > 50$ | Organic clays of high plasticity | | OH | | | | |
| | HIGHLY ORGANIC SOILS | Peat and other highly organic soils | | Pt | | Von Post Classification Limit | | Strong colour or odour, and often fibrous texture | |
| | Asphalt | | Till | | | AECOM | | | |
| | Concrete | | Bedrock (Undifferentiated) | | | | | | |
| | Fill | | Bedrock (Limestone) | | | | | | |

When the above classification terms are used in this report or test hole logs, the designated fractions may be visually estimated and not measured.

NOT USED TO CLASSIFY SUBGRADE. REFER TO CITY OF WINNIPEG SPECIFICATIONS FOR GEOTECHNICAL INVESTIGATION REQUIREMENTS FOR PUBLIC WORKS PROJECTS (SEPTEMBER, 2015)

NOT USED TO CLASSIFY SUBGRADE. REFER TO CITY OF WINNIPEG SPECIFICATIONS FOR GEOTECHNICAL INVESTIGATION REQUIREMENTS FOR PUBLIC WORKS PROJECTS (SEPTEMBER, 2015)



| FRACTION | SEIVE SIZE (mm) | | DEFINING RANGES OF PERCENTAGE BY WEIGHT OF MINOR COMPONENTS | | |
|--------------------------------------|-----------------|----------|---|---------------------|-------|
| | Passing | Retained | Percent | Identifier | |
| Gravel | Coarse | 76 | 19 | 35-50 and | |
| | Fine | 19 | 4.75 | | |
| Sand | Coarse | 4.75 | 2.00 | 20-35 "y" or "ey" * | |
| | Medium | 2.00 | 0.425 | | |
| | Fine | 0.425 | 0.075 | | |
| Silt (non-plastic) or Clay (plastic) | < 0.075 mm | | 10-20 | some | |
| 1-10 | | | | | trace |

* for example: gravelly, sandy clayey, silty

Definition of Oversize Material
 COBBLES: 76mm to 300mm diameter
 BOULDERS: >300mm diameter

LEGEND OF SYMBOLS

Laboratory and field tests are identified as follows:

- q_u - undrained shear strength (kPa) derived from unconfined compression testing.
- T_v - undrained shear strength (kPa) measured using a torvane
- pp - undrained shear strength (kPa) measured using a pocket penetrometer.
- L_v - undrained shear strength (kPa) measured using a lab vane.
- F_v - undrained shear strength (kPa) measured using a field vane.
- γ - bulk unit weight (kN/m³).
- SPT - Standard Penetration Test. Recorded as number of blows (N) from a 63.5 kg hammer dropped 0.76 m (free fall) which is required to drive a 51 mm O.D. Raymond type sampler 0.30 m into the soil.
- DPPT - Drive Point Pentrometer Test. Recorded as number of blows from a 63.5 kg hammer dropped 0.76 m (free fall) which is required to drive a 50 mm drive point 0.30 m into the soil.
- w - moisture content (W_L, W_P)

The undrained shear strength (Su) of a cohesive soil can be related to its consistency as follows:

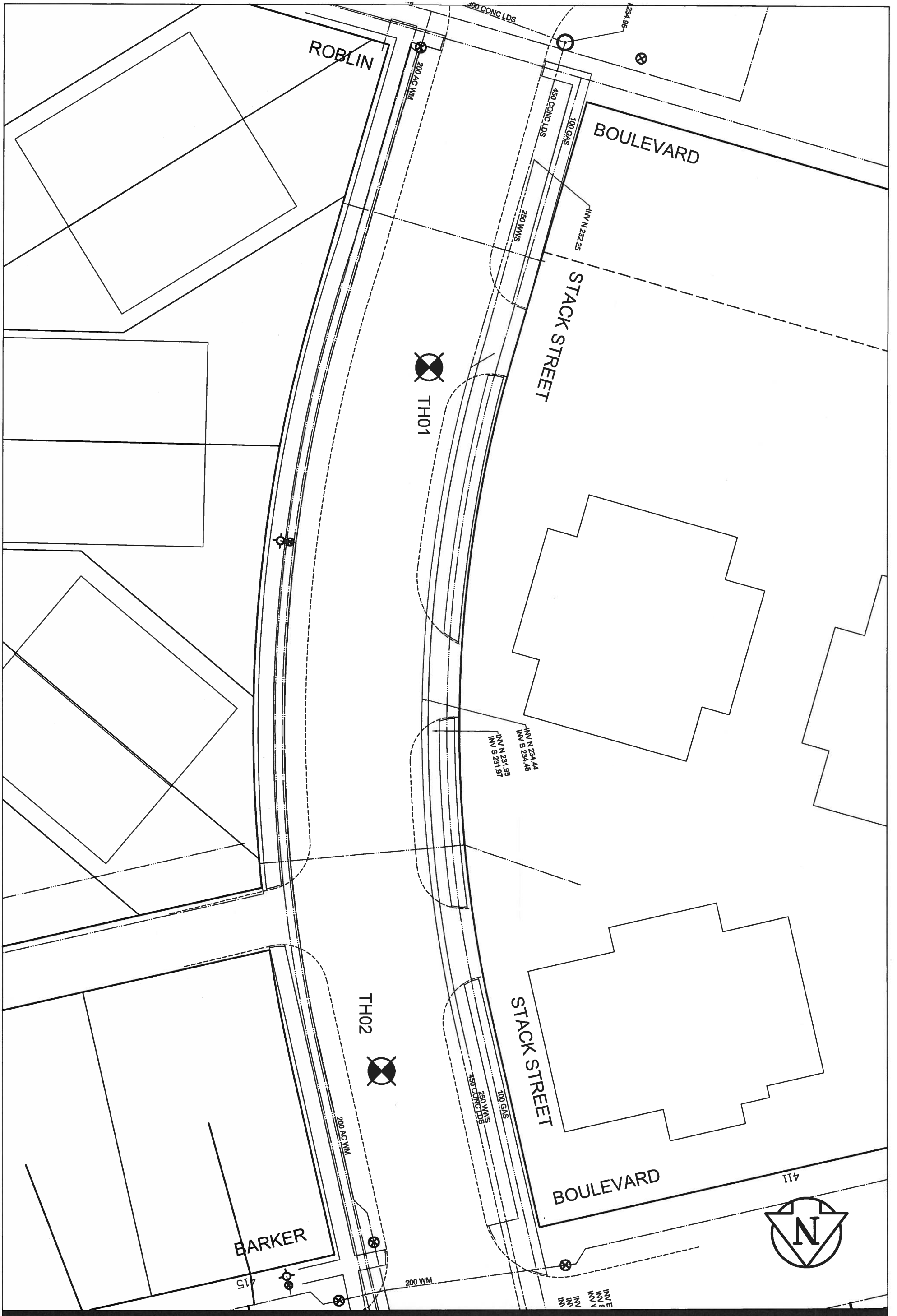
| Su (kPa) | CONSISTENCY |
|-----------|----------------|
| <12 | very soft |
| 12 – 25 | soft |
| 25 – 50 | medium or firm |
| 50 – 100 | stiff |
| 100 – 200 | very stiff |
| 200 | hard |

The resistance (N) of a non-cohesive soil can be related to compactness condition as follows

| N – BLOWS/0.30 m | COMPACTNESS |
|------------------|-------------|
| 0 - 4 | very loose |
| 4 - 10 | loose |
| 10 - 30 | compact |
| 30 - 50 | dense |
| 50 | very dense |

Appendix A

- Test Hole Location Plans
- Test Hole Logs
- Summary of Laboratory Soil Testing
- Pavement Core Photographs



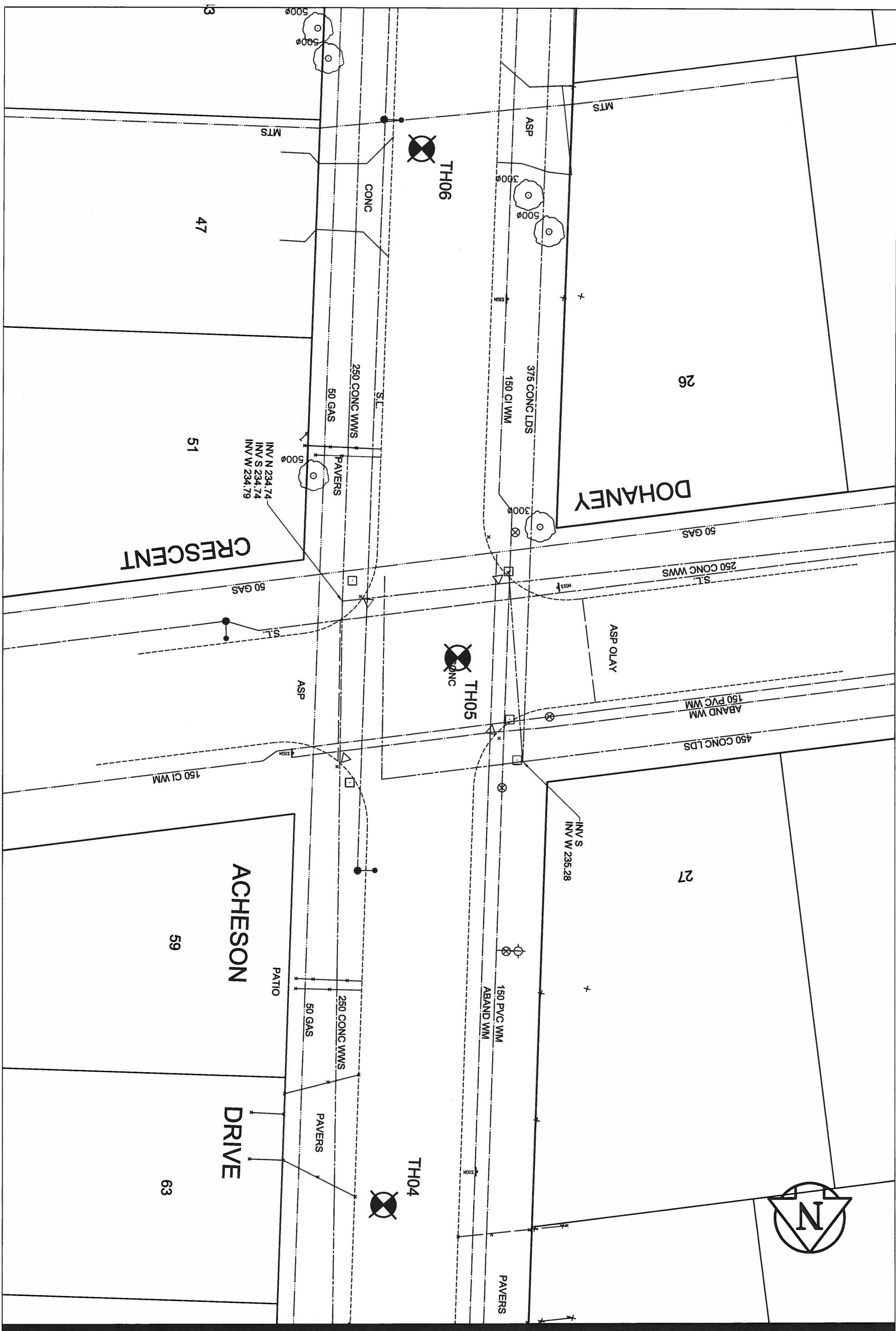


FIGURE 02: TEST HOLES LOCATION PLAN

PROJECT: 2016 Local Streets Pkg 16-R-06 Contract 1 CLIENT: City of Winnipeg TESTHOLE NO: **TH16-01**
 LOCATION: Stack Street; 40 m N of Roblin Blvd, 3 m E of W Curb, Apartment Parking Lot Entrance PROJECT NO.: 60481153
 CONTRACTOR: Maple Leaf Drilling Ltd. METHOD: 125 mm SSA ELEVATION (m):
 SAMPLE TYPE GRAB SHELBY TUBE SPLIT SPOON BULK NO RECOVERY CORE

| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE # | PENETRATION TESTS | | UNDRAINED SHEAR STRENGTH | | COMMENTS | DEPTH |
|-----------|-------------|--|-------------|----------|---|---|--------------------------|--|---|-------|
| | | | | | * Becker * ◇ Dynamic Cone ◇ ◆ SPT (Standard Pen Test) ◆ (Blows/300mm) 0 20 40 60 80 100 ■ Total Unit Wt ■ (kN/m ³) 16 17 18 19 20 21 Plastic MC Liquid 20 40 60 80 100 | + Torvane + × QU/2 × □ Lab Vane □ △ Pocket Pen. △ ⊕ Field Vane ⊕ (kPa) 50 100 150 200 | | | | |
| 0 | | Concrete (190 mm) | | | | | | | | |
| | | SAND and GRAVEL - clayey - brown, moist | | G127 | ● | | | | | |
| | | CLAY - some silt, trace sand, trace gravel, trace silt inclusions - brown, moist - high plasticity | | G128 | ● | | | | | |
| | | - frozen to 0.9 m - firm below 0.9 m | | G129 | ● | | | | | |
| | | | | G130 | ● | — | | | (G130): Gravel: 2.5%, Sand: 6.3%, Silt: 16.5%, Clay 74.7% | |
| | | | | G131 | ● | | | | | |
| | | | | G132 | ● | | | | | |
| | | | | G133 | ● | | | | | |
| | | END OF TEST HOLE AT 2.1 m IN CLAY. NOTES: 1. No sloughing. 2. No seepage. 3. Test hole backfilled with auger cuttings and bentonite seal, and 150 mm asphalt patch at surface. | | | | | | | | |

LOG OF TEST HOLE TH16-ACHESON-STACK_60481153.GPJ UMA WINN.GDT 2/9/16



LOGGED BY: Matt Lotecki COMPLETION DEPTH: 2.13 m
 REVIEWED BY: Aaron Kaluzniak COMPLETION DATE: 1/20/16
 PROJECT ENGINEER: Kevin Rae Page 1 of 1

PROJECT: 2016 Local Streets Pkg 16-R-06 Contract 1 CLIENT: City of Winnipeg TESTHOLE NO: **TH16-02**
 LOCATION: Stack Street; 100 m N of Roblin Blvd, 3 m W of E Curb, Apartment Parking Lot Entrance PROJECT NO.: 60481153
 CONTRACTOR: Maple Leaf Drilling Ltd. METHOD: 125 mm SSA ELEVATION (m):

SAMPLE TYPE GRAB SHELBY TUBE SPLIT SPOON BULK NO RECOVERY CORE

| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE # | PENETRATION TESTS | | UNDRAINED SHEAR STRENGTH | | COMMENTS | DEPTH |
|-----------|-------------|--|-------------|----------|-------------------|-----|--------------------------|-----|--|-------|
| | | | | | 0 | 100 | 50 | 200 | | |
| 0 | | Concrete (180 mm) | | | | | | | | |
| | | SAND - some gravel, some silt, trace clay - brown, frozen, low plasticity | | | | | | | | |
| | | CLAY - silty, trace sand, trace silt inclusions - brown, moist - intermediate to high plasticity | | | | | | | | |
| | | - frozen to 1.1 m - firm below 1.1 m | | | | | | | | |
| | | | | G134 | ● | | | | (G134): Gravel: 15.8%, Sand 63.9%, Silt: 12.7%, Clay: 7.6% | |
| | | | | G135 | ● | | | | | |
| | | | | G136 | ● | | | | | |
| | | | | G137 | ● | | | | | |
| | | | | G138 | ● | | | | | |
| | | | | G139 | ● | | | | | |
| | | | | G140 | ● | | | | | |
| | | END OF TEST HOLE AT 2.1 m IN CLAY. NOTES: 1. No sloughing. 2. No seepage. 3. Test hole backfilled with auger cuttings and bentonite seal, and 150 mm asphalt patch at surface. | | | | | | | | |

LOG OF TEST HOLE TH16-ACHESON-STACK_60481153.GPJ UMA WINN.GDT 2/9/16



LOGGED BY: Matt Lotecki COMPLETION DEPTH: 2.13 m
 REVIEWED BY: Aaron Kaluzniak COMPLETION DATE: 1/20/16
 PROJECT ENGINEER: Kevin Rae Page 1 of 1

PROJECT: 2016 Local Streets Pkg 16-R-06 Contract 1 CLIENT: City of Winnipeg TESTHOLE NO: **TH16-04**
 LOCATION: Acheson Drive; 40 m N of Dohaney Crescent, 3 m W of E Curb, #63 Acheson Drive PROJECT NO.: 60481153
 CONTRACTOR: Maple Leaf Drilling Ltd. METHOD: 125 mm SSA ELEVATION (m):

SAMPLE TYPE GRAB SHELBY TUBE SPLIT SPOON BULK NO RECOVERY CORE

| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE # | PENETRATION TESTS | | UNDRAINED SHEAR STRENGTH | | COMMENTS | DEPTH |
|-----------|-------------|--|-------------|----------|---|---|--------------------------|--|----------|-------|
| | | | | | * Becker * ◇ Dynamic Cone ◇ ◆ SPT (Standard Pen Test) ◆ (Blows/300mm) 0 20 40 60 80 100 ■ Total Unit Wt ■ (kN/m ³) 16 17 18 19 20 21 Plastic MC Liquid 20 40 60 80 100 | + Torvane + × QU/2 × □ Lab Vane □ △ Pocket Pen. △ ⊕ Field Vane ⊕ (kPa) 50 100 150 200 | | | | |
| 0 | | Asphalt (20 mm) Concrete (160 mm) | | | | | | | | |
| | | SAND and GRAVEL - brown - non plastic | | | | | | | | |
| | | CLAY - silty, trace sand, trace silt inclusions - brown, moist - intermediate to high plasticity | | G141 | ● | | | | | |
| | | | | G142 | ● | | | | | |
| | | | | G143 | ● | | | | | |
| 1 | | - frozen to 1.1 m - firm below 1.1 m | | G144 | ● | | | | | 1 |
| | | | | G145 | ● | | | | | |
| | | | | G146 | ● | | | | | |
| | | | | G147 | ● | | | | | 2 |
| 2 | | END OF TEST HOLE AT 2.1 m IN CLAY. NOTES: 1. No sloughing. 2. No seepage. 3. Test hole backfilled with auger cuttings and bentonite seal, and 150 mm asphalt patch at surface. | | | | | | | | |
| 3 | | | | | | | | | | |

LOG OF TEST HOLE TH16-ACHESON-STACK_60481153.GPJ UMA WINN.GDT 2/9/16



LOGGED BY: Matt Lotecki COMPLETION DEPTH: 2.13 m
 REVIEWED BY: Aaron Kaluzniak COMPLETION DATE: 1/20/16
 PROJECT ENGINEER: Kevin Rae Page 1 of 1

PROJECT: 2016 Local Streets Pkg 16-R-06 Contract 1 CLIENT: City of Winnipeg TESTHOLE NO: **TH16-05**
 LOCATION: Acheson Drive and Dohaney Crescent Intersection PROJECT NO.: 60481153
 CONTRACTOR: Maple Leaf Drilling Ltd. METHOD: 125 mm SSA ELEVATION (m):
 SAMPLE TYPE GRAB SHELBY TUBE SPLIT SPOON BULK NO RECOVERY CORE

| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE # | PENETRATION TESTS | | UNDRAINED SHEAR STRENGTH | | COMMENTS | DEPTH |
|-----------|-------------------|--|-------------|----------|---|---|--------------------------|--|--|-------|
| | | | | | * Becker * ◇ Dynamic Cone ◇ ◆ SPT (Standard Pen Test) ◆ (Blows/300mm) 0 20 40 60 80 100 ■ Total Unit Wt ■ (kN/m ³) 16 17 18 19 20 21 Plastic MC Liquid 20 40 60 80 100 | + Torvane + × QU/2 × □ Lab Vane □ △ Pocket Pen. △ ⊕ Field Vane ⊕ (kPa) 50 100 150 200 | | | | |
| 0 | Concrete (150 mm) | | | | | | | | | |
| | | SAND - some gravel, some clay, some silt - brown, damp, low plasticity | | G148 | ● | | | | (G148): Gravel: 18.8%, Sand: 50.6%, Silt: 13.1%, Clay: 17.4% | |
| | | SILTY CLAY - trace sand - brown, moist - high plasticity | | G149 | ● | | | | | |
| | | | | G150 | ● | | | | | |
| 1 | | - frozen to 0.9 m - firm below 0.9 m | | G151 | ● | | | | | |
| | | | | G152 | ● | | | | | |
| | | | | G153 | ● | — | | | (G153): Gravel: 0.0%, Sand: 3.5%, Silt: 32.3%, Clay: 64.1% | |
| | | | | G154 | ● | | | | | |
| | | END OF TEST HOLE AT 2.1 m IN SILTY CLAY. NOTES: 1. No sloughing. 2. No seepage. 3. Test hole backfilled with auger cuttings and bentonite seal, and 150 mm asphalt patch at surface. | | | | | | | | |

LOG OF TEST HOLE TH16-ACHESON-STACK_60481153.GPJ UMA WINN.GDT 2/9/16



LOGGED BY: Matt Lotecki COMPLETION DEPTH: 2.13 m
 REVIEWED BY: Aaron Kaluzniak COMPLETION DATE: 1/20/16
 PROJECT ENGINEER: Kevin Rae Page 1 of 1

PROJECT: 2016 Local Streets Pkg 16-R-06 Contract 1 CLIENT: City of Winnipeg TESTHOLE NO: **TH16-06**
 LOCATION: Acheson Drive; 40 m S of Dohaney Crescent, 3 m W of E Curb, #47 Acheson Drive PROJECT NO.: 60481153
 CONTRACTOR: Maple Leaf Drilling Ltd. METHOD: 125 mm SSA ELEVATION (m):

SAMPLE TYPE GRAB SHELBY TUBE SPLIT SPOON BULK NO RECOVERY CORE

| DEPTH (m) | SOIL SYMBOL | SOIL DESCRIPTION | SAMPLE TYPE | SAMPLE # | PENETRATION TESTS | | UNDRAINED SHEAR STRENGTH | | COMMENTS | DEPTH |
|-----------|-------------|--|-------------|----------|---|---|--------------------------|--|----------|-------|
| | | | | | * Becker * ◇ Dynamic Cone ◇ ◆ SPT (Standard Pen Test) ◆ (Blows/300mm) 0 20 40 60 80 100 ■ Total Unit Wt ■ (kN/m ³) 16 17 18 19 20 21 Plastic MC Liquid 20 40 60 80 100 | + Torvane + × QU/2 × □ Lab Vane □ △ Pocket Pen. △ ⊕ Field Vane ⊕ (kPa) 50 100 150 200 | | | | |
| 0 | ▲▲▲▲▲ | Asphalt (10 mm) | | | | | | | | |
| | ■ | Concrete (160 mm) | | | | | | | | |
| | ▲▲▲▲▲ | SAND and GRAVEL - silty, trace clay - brown | | | | | | | | |
| | ▨▨▨▨▨ | CLAY - silty, trace sand - brown, moist - intermediate to high plasticity | | G155 | ● | | | | | |
| | ▨▨▨▨▨ | | | G156 | ● | | | | | |
| | ▨▨▨▨▨ | | | G157 | ● | | | | | |
| 1 | ▨▨▨▨▨ | - frozen to 0.9 m - firm below 0.9 m | | G158 | ● | | | | | 1 |
| | ▨▨▨▨▨ | | | G159 | ● | | | | | |
| | ▨▨▨▨▨ | | | G160 | ● | | | | | |
| | ▨▨▨▨▨ | | | G161 | ● | | | | | 2 |
| 2 | | END OF TEST HOLE AT 2.1 m IN CLAY. NOTES: 1. No sloughing. 2. No seepage. 3. Test hole backfilled with auger cuttings and bentonite seal, and 150 mm asphalt patch at surface. | | | | | | | | |
| 3 | | | | | | | | | | |

LOG OF TEST HOLE TH16-ACHESON-STACK_60481153.GPJ UMA WINN.GDT 2/9/16



LOGGED BY: Matt Lotecki COMPLETION DEPTH: 2.13 m
 REVIEWED BY: Aaron Kaluzniak COMPLETION DATE: 1/20/16
 PROJECT ENGINEER: Kevin Rae Page 1 of 1

City of Winnipeg

Local Streets Pkg 16-R-06 – Contract 1

Geotechnical Investigation

Table 01- Summary of Laboratory Soil Testing

| Test Hole No. | Testhole Location | Pavement Surface | | Pavement Structure Material | | Subgrade Description * | Sample Depth (m) | Moisture Content (%) | Hydrometer Analysis | | | | Atterberg Limits | | |
|---------------|---|------------------|----------------|-----------------------------|----------------|------------------------|------------------|----------------------|---------------------|----------|----------|----------|------------------|---------------|------------------|
| | | Type | Thickness (mm) | Type | Thickness (mm) | | | | Gravel (%) | Sand (%) | Silt (%) | Clay (%) | Liquid Limit | Plastic Limit | Plasticity Index |
| TH16-01 | Stack Street; 40 m N of Roblin Blvd, 3 m E of W Curb, Apartment Parking Lot Entrance | Asphalt | 0 | SAND and GRAVEL | 40 | CLAY | 0.3 | 36.4 | | | | | | | |
| | | | | | | CLAY | 0.6 | 37.5 | | | | | | | |
| | | | | | | CLAY | 0.9 | 39.2 | | | | | | | |
| | | Concrete | 190 | | | CLAY | 1.2 | 35.0 | 2.5 | 6.3 | 16.5 | 74.7 | 86.1 | 22.7 | 63.4 |
| | | | | | | CLAY | 1.5 | 36.3 | | | | | | | |
| | | | | | | CLAY | 1.8 | 36.7 | | | | | | | |
| | | | | | | CLAY | 2.1 | 38.3 | | | | | | | |
| TH16-02 | Stack Street; 100 m N of Roblin Blvd, 3 m W of E Curb, Apartment Parking Lot Entrance | Asphalt | 0 | SAND – some GRAVEL | 130 | SAND | 0.3 | 5.6 | 15.8 | 63.9 | 12.7 | 7.6 | 11.3 | 6.9 | 4.4 |
| | | | | | | CLAY | 0.6 | 33.6 | | | | | | | |
| | | Concrete | 180 | | | CLAY | 0.9 | 35.5 | | | | | | | |
| | | | | | | CLAY | 1.2 | 34.1 | | | | | | | |
| | | | | | | CLAY | 1.5 | 37.3 | | | | | | | |
| | | | | | | CLAY | 1.8 | 39.0 | | | | | | | |
| | | | | | | CLAY | 2.1 | 45.6 | | | | | | | |
| TH16-04 | Acheson Drive; 40 m N of Dohaney Crescent, 3 m W of E Curb, #63 Acheson Drive | Asphalt | 20 | SAND and GRAVEL | 130 | SAND | 0.3 | 7.7 | | | | | | | |
| | | | | | | CLAY | 0.6 | 38.2 | | | | | | | |
| | | Concrete | 160 | | | CLAY | 0.9 | 38.2 | | | | | | | |
| | | | | | | CLAY | 1.2 | 39.5 | | | | | | | |
| | | | | | | CLAY | 1.5 | 39.2 | | | | | | | |
| | | | | | | CLAY | 1.8 | 44.0 | | | | | | | |
| | | | | | | CLAY | 2.1 | 45.5 | | | | | | | |
| TH16-05 | Acheson Drive and Dohaney Crescent Intersection | Asphalt | 0 | SAND – some GRAVEL | 150 | SAND | 0.3 | 13.5 | 18.8 | 50.6 | 13.1 | 17.4 | 29.0 | 12.0 | 17.0 |
| | | | | | | SILTY CLAY | 0.6 | 35.0 | | | | | | | |
| | | Concrete | 150 | | | SILTY CLAY | 0.9 | 35.4 | | | | | | | |
| | | | | | | SILTY CLAY | 1.2 | 36.4 | | | | | | | |
| | | | | | | SILTY CLAY | 1.5 | 38.1 | | | | | | | |
| | | | | | | SILTY CLAY | 1.8 | 44.7 | 0.0 | 3.5 | 32.3 | 64.1 | 75.4 | 21.8 | 53.6 |
| | | | | | | SILTY CLAY | 2.1 | 42.9 | | | | | | | |
| TH16-06 | Acheson Drive; 40 m S of Dohaney Crescent, 3 m W of E Curb, #47 Acheson Drive | Asphalt | 10 | SAND and GRAVEL | 130 | SAND | 0.3 | 7.7 | | | | | | | |
| | | | | | | CLAY | 0.6 | 31.5 | | | | | | | |
| | | | | | | CLAY | 0.9 | 32.3 | | | | | | | |
| | | Concrete | 160 | | | CLAY | 1.2 | 34.9 | | | | | | | |
| | | | | | | CLAY | 1.5 | 34.2 | | | | | | | |
| | | | | | | CLAY | 1.8 | 44.1 | | | | | | | |
| | | | | | | CLAY | 2.1 | 43.7 | | | | | | | |

* Note – Subgrade Description based on City of Winnipeg Specifications for Geotechnical Investigation Requirements for Public Works Projects (September 2015)



Photograph 1. Stack Street – TH16-01



Photograph 2. Stack Street – TH16-02



Photograph 3. Acheson Drive – TH16-04



Photograph 4. Acheson Drive – TH16-05



Photograph 5. Acheson Drive – TH16-06