# APPENDIX 'C'

## Rue des Trappistes Sub-Surface Investigation

Quality Engineering | Valued Relationships

Morrison Hershfield

# Rue Des Trappistes
# Sub-Surface Investigation

**Prepared for:**

Morrison Hershfield
25 Scurfield Blvd, Unit 1
Winnipeg, MB R3Y 1G4
Attention: Ron Bruce

**Distribution:**

Ron Bruce, P.Eng.

**Project Number:**
0035-049-00

**Date:**
June 16, 2017

www.trekgeotechnical.ca
1712 St. James Street | Winnipeg, Manitoba R3H 0L3 | Tel 1.204.975.9433 | Fax 1.204.975.9435

TREK GEOTECHNICAL Quality Engineering | Valued Relationships

June 16, 2017 Our File No. 0035-049-00

Ron Bruce, P.Eng.
Morrison Hershfield
59 Scurfield Blvd, Unit 1
Winnipeg, MB R3Y 1V2

**RE: Rue Des Trappistes**
**Sub-Surface Investigation Report**

TREK Geotechnical Inc. is pleased to submit our report for a sub-surface investigation for Rue Des Trappistes.

Please contact the undersigned if you have any questions. Thank you for this opportunity.

Sincerely,

**TREK Geotechnical Inc.**
**Per:**

Nelson John Ferreira, Ph.D., P. Eng.
Geotechnical Engineer, Principal
Tel: 204.975.9433 ext. 103

cc: Shane Broderick, Assistant Lab and Field Services Manager, (TREK Geotechnical)

## Revision History

| Revision No. | Author | Issue Date | Description |
|---|---|---|---|
| 0 | SGBR | June 16, 2017 | Final Report |
| | | | |
| | | | |

## Authorization Signatures

**Prepared By:**

Shane Broderick, Assistant Lab and Field Services Manager.

**Reviewed By:**

PROVINCE OF MANITOBA
REGISTERED PROFESSIONAL ENGINEER
FERREIRA
Member
22892
June 16, 2017

Nelson John Ferreira, Ph.D., P.Eng.
Geotechnical Engineer

APEGM
Certificate of Authorization
Trek Geotechnical Inc.
No. 4877 Date: June 16, 2017

# Table of Contents



# List of Figures



# List of Appendices

# 1.0 Introduction

This report summarizes the results of the sub-surface investigation completed for Rue Des Trappistes. The information collected describes the pavement structure of the existing road as well as the soil stratigraphy beneath the pavement structure.

# 2.0 Sub-Surface Investigation and Laboratory Program

A total of six (6) test holes were drilled along Rue Des Trappistest. The test holes were drilled at a 80 to 140 m spacing at the locations shown in Figure 01 and Figure 02. The test holes were drilled to determine sub-surface conditions for the road reconstruction. The sub-surface investigation was conducted on June 1, 2017. The test holes were drilled to a depth of 2.1 m below road surface by Trek Geotechnical Inc. (Trek) using a 70 mm hand auger. The pavement structure (asphalt or concrete) was cored by Paul Bevel of Trek Geotechnical, using a portable coring press equipped with a hollow 150 mm diameter diamond core drill bit. The sub-surface conditions were observed during drilling and visually classified by Shane Broderick of TREK. Other pertinent information such as groundwater and drilling conditions were also recorded during the drilling. Disturbed (auger cuttings) samples retrieved during the sub-surface investigation were transported to TREK's material testing laboratory for further testing. Core samples were also retrieved and logged at TREK's material testing laboratory.

The laboratory testing program consisted of moisture content determination, Atterberg limits, and grain size analysis (mechanical sieve and hydrometer methods) on selected samples. Information gathered for Rue Des Trappistes is included in Appendix A. The information provided in the Appendix includes test hole logs, laboratory testing summary table and results, and photos of the asphalt cores.

Test hole locations noted on the test hole logs and shown on Figure 01 and Figure 02 are based on a GPS survey conducted by Morrison Hershfield and measured distances from the nearest address, edge of pavement or other permanent features.

# 3.0 Closure

The geotechnical information provided in this report is in accordance with current engineering principles and practices (Standard of Practice). The findings of this report were based on information provided (field investigation and laboratory testing). Soil conditions are natural deposits that can be highly variable across a site. If subsurface conditions are different than the conditions previously encountered on-site or those presented here, we should be notified to adjust our findings if necessary.

All information provided in this report is subject to our standard terms and conditions for engineering services, a copy of which is provided to each of our clients with the original scope of work, or a mutually executed standard engineering services agreement. If these conditions are not attached, and you are not already in possession of such terms and conditions, contact our office and you will be promptly provided with a copy.

This report has been prepared by TREK Geotechnical Inc. (the Consultant) for the exclusive use of Morrison Hershfield Ltd. (the Client) and their agents for the work product presented in the report. Any findings or recommendations provided in this report are not to be relied upon by any third parties, except as agreed to in writing by the Client and Consultant prior to use.

# Figures

TREK GEOTECHNICAL

**0035 049 00**
Morrison Hershfield
Rue De Trappistes Sub Surface Investigation





KEYPLAN
SCALE N.T.S.

0 10 20 30 40 50 m
SCALE = 1 : 1 000 (279 mm x 432 mm)

LEGEND: TEST HOLE (TREK, 2017)

NOTES:
1. AERIAL IMAGE FROM BING MAPS.

**Figure 01**
Test Hole Location Plan

ANSI full bleed B (11.00 x 17.00 Inches)

Z:\Projects\0035 Morrison Hershfield\0035 049 00 Rue Des Trappistes Sub Surface\3 Survey and Dwg\3.4 CAD\3.4.3 Working Folder, 6/16/2017 1:41:26 PM

TREK GEOTECHNICAL

**0035 049 00**
Morrison Hershfield
Rue De Trappistes Sub Surface Investigation





KEYPLAN
SCALE N.T.S.

0 10 20 30 40 50 m
SCALE = 1 : 1 000 (279 mm x 432 mm)

LEGEND: TEST HOLE (TREK, 2017)

NOTES:
1. AERIAL IMAGE FROM BING MAPS.

**Figure 02**
Test Hole Location Plan

# Appendix A

# Test Hole Logs

# Sub-Surface Log

**Test Hole TH17-01**
1 of 1

| | | | |
|---|---|---|---|
| **Client:** | Morrison Hershfield | **Project Number:** | 0035-049-00 |
| **Project Name:** | Rue Des Trappistes | **Location:** | UTM N-632933.291, E-5514056.187 |
| **Contractor:** | TREK Geotechnical Inc. | **Ground Elevation:** | 233.32 m |
| **Method:** | 50 mm Hand Auger | **Date Drilled:** | 1 June 2017 |

Sample Type: Grab (G) | Shelby Tube (T) | Split Spoon (SS) | Split Barrel (SB) | Core (C)

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

| Elevation (m) | Depth (m) | Soil Symbol | MATERIAL DESCRIPTION | Sample Type | Sample Number |
|---|---|---|---|---|---|
| 233.1 | 0 | | ASPHALT (170 mm THICK) | | C37 |
| | | | SAND AND GRAVEL (FILL) - trace clay, trace silt<br>- light brown<br>- moist, loose to compact<br>- poorly graded fine sand to fine gravel (<20 mm dia.)<br>- rounded to sub-rounded | | G38 |
| | 0.5 | | - some clay below 0.6 m | | G39 |
| 232.3 | 1.0 | | CLAY (FILL)- silty, trace sand, trace gravel, trace organics<br>- grey to dark grey<br>- moist, stiff to very stiff<br>- high plasticity | | G40 |
| | 1.5 | | | | G41 |
| 231.6 | | | | | G42A |
| 231.5 | | | SILT AND CLAY - trace sand, trace gravel, trace organics, mottled light to dark grey, moist, stiff, intermediate plasticity | | G42B |
| | | | SILT - some clay, trace sand, trace gravel<br>- light brown to grey<br>- moist, very soft<br>- low plasticity | | |
| 231.2 | 2.0 | | | | G43 |

Bulk Unit Wt (kN/m³): 16 17 18 19 20 21

Particle Size (%): 0 20 40 60 80 100

PL MC LL: 0 20 40 60 80 100

Undrained Shear Strength (kPa)

Test Type: △ Torvane △ ✤ Pocket Pen. ✤ ☒ Qu ☒ ○ Field Vane ○

0 50 100 150 200 250

END OF TEST HOLE AT 2.1 m in SILT

Notes:
1) No sloughing or seepage observed.
2) Backfilled test hole with auger cuttings to ~ 1.0 m below top of pavement, sand to 0.1 m below top of pavement and asphalt cold patch to the surface.
3) Test hole location in the eastbound lane, 60 m west of Pembina Highway, 1.8 m north from south curb.
4) UTM coordinates and ground elevation surveyed by Morrison Hershfield.

**Logged By:** Shane Broderick **Reviewed By:** Paul Bevel **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2017-06-01 RUE DES TRAPPISTES 0_A_SGBR 0035-049-00.GPJ TREK GEOTECHNICAL.GDT 15/6/17

# Sub-Surface Log

**Test Hole TH17-02**
1 of 1

| | | | |
|---|---|---|---|
| **Client:** | Morrison Hershfield | **Project Number:** | 0035-049-00 |
| **Project Name:** | Rue Des Trappistes | **Location:** | UTM N-632861.307, E-5514023.867 |
| **Contractor:** | TREK Geotechnical Inc. | **Ground Elevation:** | 233.52 m |
| **Method:** | 50 mm Hand Auger | **Date Drilled:** | 1 June 2017 |

Sample Type: Grab (G) | Shelby Tube (T) | Split Spoon (SS) | Split Barrel (SB) | Core (C)

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

| Elevation (m) | Depth (m) | Soil Symbol | MATERIAL DESCRIPTION | Sample Type | Sample Number | Bulk Unit Wt (kN/m³) 16 17 18 19 20 21 / Particle Size (%) 0 20 40 60 80 100 / PL MC LL 0 20 40 60 80 100 | Undrained Shear Strength (kPa) Test Type △ Torvane △ ✤ Pocket Pen. ✤ ☒ Qu ☒ ○ Field Vane ○ 0 50 100 150 200 250 |
|---|---|---|---|---|---|---|---|
| 233.4 | | | CONCRETE (125 mm THICK) | | C44 | | |
| | | | SAND AND GRAVEL (FILL) - trace silt, trace clay<br>- brown<br>- moist, loose to compact<br>- poorly graded fine sand to fine gravel (<20 mm dia.)<br>- rounded to sub-rounded | | G45 | | |
| | | | | | G46 | | |
| 233.0 | 0.5 | | CLAY (FILL) - silty, some gravel, trace sand<br>- mottled dark brown to black<br>- moist, stiff to very stiff<br>- high plasticity | | G47 | | |
| | 1.0 | | - trace gravel below 1.0 m | | G48 | | |
| | | | | | G49 | | |
| | 1.5 | | | | G50 | | |
| | | | | | G51 | | |
| 231.4 | 2.0 | | END OF TEST HOLE AT 2.1 m in Clay | | | | |

Notes:
1) No sloughing or seepage observed.
2) Backfilled test hole with auger cuttings to ~ 1.0 m below top of pavement, sand to 0.1 m below top of pavement and asphalt cold patch to the surface.
3) Test hole location in the westbound lane, 25 m east of Villeneuve Blvd., 1.6 m south from north curb.
4) UTM coordinates and ground elevation surveyed by Morrison Hershfield.

**Logged By:** Shane Broderick **Reviewed By:** Paul Bevel **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2017-06-01 RUE DES TRAPPISTES 0_A_SGBR 0035-049-00.GPJ TREK GEOTECHNICAL.GDT 15/6/17

# Sub-Surface Log

**Test Hole TH17-03**
1 of 1

| | | | |
|---|---|---|---|
| **Client:** | Morrison Hershfield | **Project Number:** | 0035-049-00 |
| **Project Name:** | Rue Des Trappistes | **Location:** | UTM N-632758.677, E-5513926.49 |
| **Contractor:** | TREK Geotechnical Inc. | **Ground Elevation:** | 233.15 m |
| **Method:** | 50 mm Hand Auger | **Date Drilled:** | 1 June 2017 |

Sample Type: Grab (G) | Shelby Tube (T) | Split Spoon (SS) | Split Barrel (SB) | Core (C)

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

| Elevation (m) | Depth (m) | Soil Symbol | MATERIAL DESCRIPTION | Sample Type | Sample Number |
|---|---|---|---|---|---|
| 233.1 | | | ASPHALT (50 mm THICK) | | C29 |
| 233.0 | | | SAND AND GRAVEL (FILL) - trace clay, trace silt, light brown to brown, moist, loose to compact, well graded fine sand to fine gravel (<20 mm dia.), carbonate (limestone), sub-angular to angular | | G30 |
| 232.8 | | | SAND AND GRAVEL (FILL) - trace clay, trace silt, brown, moist, loose to compact, poorly graded fine sand to fine gravel (<20 mm dia.), rounded to sub-rounded | | G31 |
| | 0.5 | | CLAY (FILL) - silty, trace sand, trace gravel to 0.6 m<br>- black<br>- moist, stiff to very stiff<br>- high plasticity | | G32 |
| | | | - below 0.7 m mottled green to dark grey | | |
| | 1.0 | | | | G33 |
| | 1.5 | | | | G34 |
| 231.5 | | | CLAY - silty, trace oxidation, trace sand, trace silt inclusion (<15 mm dia.)<br>- grey to dark grey<br>-moist, firm to stiff<br>-high plasticity | | G35 |
| | 2.0 | | | | G36 |
| 231.0 | | | END OF TEST HOLE AT 2.1 m in CLAY | | |

Bulk Unit Wt (kN/m³): 16 17 18 19 20 21
Particle Size (%): 0 20 40 60 80 100
PL MC LL: 0 20 40 60 80 100
Undrained Shear Strength (kPa): 0 50 100 150 200 250
Test Type: △ Torvane △ ✤ Pocket Pen. ✤ ☒ Qu ☒ ○ Field Vane ○

Notes:
1) No sloughing or seepage observed.
2) Backfilled test hole with auger cuttings to ~ 1.0 m below top of pavement, sand to 0.1 m below top of pavement and asphalt cold patch to the surface.
3) Test hole location in the eastbound lane, 120 m west of Villeneuve Blvd., 1.3 m north from south edge of pavement.
4) UTM coordinates and ground elevation surveyed by Morrison Hershfield.

**Logged By:** Shane Broderick **Reviewed By:** Paul Bevel **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2017-06-01 RUE DES TRAPPISTES 0_A_SGBR 0035-049-00.GPJ TREK GEOTECHNICAL.GDT 15/6/17

# Sub-Surface Log

**Test Hole TH17-04**
1 of 1

| | | | |
|---|---|---|---|
| **Client:** | Morrison Hershfield | **Project Number:** | 0035-049-00 |
| **Project Name:** | Rue Des Trappistes | **Location:** | UTM N-632692.349, E-5513876.612 |
| **Contractor:** | TREK Geotechnical Inc. | **Ground Elevation:** | 233.38 m |
| **Method:** | 50 mm Hand Auger | **Date Drilled:** | 1 June 2017 |

Sample Type: Grab (G) | Shelby Tube (T) | Split Spoon (SS) | Split Barrel (SB) | Core (C)

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

| Elevation (m) | Depth (m) | Soil Symbol | MATERIAL DESCRIPTION | Sample Type | Sample Number |
|---|---|---|---|---|---|
| 233.4 | | | ASPHALT (25 mm THICK) | | C18 |
| 233.3 | | | SAND AND GRAVEL (FILL) - trace clay, trace silt, light brown to brown, moist, loose to compact, well graded fine sand to fine gravel (<20 mm dia.), carbonate (limestone), sub-angular to angular | | G19 G20 |
| 233.1 | | | SAND AND GRAVEL (FILL) - some clay, trace oil between 0.22 m and 0.25 m, poorly graded fine sand to fine gravel (<20 mm dia.), rounded to sub-rounded | | G21 G22 |
| | 0.5 | | CLAY (FILL) - some silt, some gravel, trace sand, trace organics<br>- dark brown to grey<br>- moist, firm to stiff<br>- intermediate plasticity<br>- trace gravel, mottled grey to black, high plasticity, below 0.5 m | | G23 |
| | | | - silty, light brown to black, below 0.6 m | | G24 |
| | 1.0 | | - dark grey to black, below 1.0 m | | G25 |
| 232.1 | | | CLAY - silty, trace sand, trace gravel, trace organics, trace silt inclustion (<10 mm dia.)<br>- mottled green to light grey<br>- moist, firm to stiff<br>- high plasticity | | G26 |
| | 1.5 | | | | G27 |
| 231.5 | | | SILT - some clay, trace oxidation, light brown to brown, moist, very soft | | |
| | 2.0 | | | | G28 |
| 231.2 | | | END OF TEST HOLE AT 2.1 m in Silt | | |

Bulk Unit Wt (kN/m³): 16 17 18 19 20 21
Particle Size (%): 0 20 40 60 80 100
PL MC LL: 0 20 40 60 80 100
Undrained Shear Strength (kPa): 0 50 100 150 200 250
Test Type: △ Torvane △ ✤ Pocket Pen. ✤ ☒ Qu ☒ ○ Field Vane ○

Notes:
1) No sloughing or seepage observed.
2) Backfilled test hole with auger cuttings to ~ 1.0 m below top of pavement, sand to 0.1 m below top of pavement and asphalt cold patch to the surface.
3) Test hole location in the westbound lane, 200 m west of Villeneuve Blvd., 1.4 m south from north edge of pavement.
4) UTM coordinates and ground elevation surveyed by Morrison Hershfield.

**Logged By:** Shane Broderick **Reviewed By:** Paul Bevel **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2017-06-01 RUE DES TRAPPISTES 0_A_SGBR 0035-049-00.GPJ TREK GEOTECHNICAL.GDT 15/6/17

# Sub-Surface Log

**Test Hole TH17-05**
1 of 1

| | | | |
|---|---|---|---|
| **Client:** | Morrison Hershfield | **Project Number:** | 0035-049-00 |
| **Project Name:** | Rue Des Trappistes | **Location:** | UTM N-632573.764, E-5513800.922 |
| **Contractor:** | TREK Geotechnical Inc. | **Ground Elevation:** | 232.83 m |
| **Method:** | 50 mm Hand Auger | **Date Drilled:** | 1 June 2017 |

Sample Type: Grab (G) | Shelby Tube (T) | Split Spoon (SS) | Split Barrel (SB) | Core (C)

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

| Elevation (m) | Depth (m) | Soil Symbol | MATERIAL DESCRIPTION | Sample Type | Sample Number |
|---|---|---|---|---|---|
| 232.8 | | | ASPHALT (40 mm THICK) | | C10 |
| 232.7 | | | SAND AND GRAVEL (FILL) - trace clay, trace silt, light brown to brown, moist, loose to compact, well graded fine sand to fine gravel (<20 mm dia.), carbonate (limestone), sub-angular to angular | | G11 |
| | | | SAND AND GRAVEL (FILL) - trace clay, trace silt, brown, moist, loose to compact, poorly graded fine sand to fine gravel (<20 mm dia.), rounded to sub-rounded | | G12 |
| 232.4 | | | | | |
| | 0.5 | | CLAY (FILL) - silty, trace sand, trace gravel<br>- mottled dark grey to black<br>- moist, firm to stiff<br>- high plasticity | | G13 |
| | 1.0 | | | | G14 |
| | | | | | G15 |
| | 1.5 | | | | |
| | | | - mottled green to grey, below 1.7 m | | G16 |
| | 2.0 | | | | |
| 230.7 | | | - trace silt inclusions (<15 mm dia.), below 2.0 m | | G17 |

Bulk Unit Wt (kN/m³): 16 17 18 19 20 21

Particle Size (%): 0 20 40 60 80 100

PL MC LL: 0 20 40 60 80 100

Undrained Shear Strength (kPa)

Test Type: △ Torvane △ ✤ Pocket Pen. ✤ ☒ Qu ☒ ○ Field Vane ○

0 50 100 150 200 250

END OF TEST HOLE AT 2.1 m in CLAY

Notes:
1) No sloughing or seepage observed.
2) Backfilled test hole with auger cuttings to ~ 1.0 m below top of pavement, sand to 0.1 m below top of pavement and asphalt cold patch to the surface.
3) Test hole location in the eastbound lane, 340 m west of Villeneuve Blvd., 1.3 m north from south edge of pavement.
4) UTM coordinates and gound elevation surveyed by Morrison Hershfield.

**Logged By:** Shane Broderick **Reviewed By:** Paul Bevel **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2017-06-01 RUE DES TRAPPISTES 0_A_SGBR 0035-049-00.GPJ TREK GEOTECHNICAL.GDT 15/6/17

# Sub-Surface Log

**Test Hole TH17-06**
1 of 1

| | | | |
|---|---|---|---|
| **Client:** | Morrison Hershfield | **Project Number:** | 0035-049-00 |
| **Project Name:** | Rue Des Trappistes | **Location:** | UTM N-632482.452, E-5513746.761 |
| **Contractor:** | TREK Geotechnical Inc. | **Ground Elevation:** | 232.41 m |
| **Method:** | 50 mm Hand Auger | **Date Drilled:** | 1 June 2017 |

Sample Type: Grab (G) | Shelby Tube (T) | Split Spoon (SS) | Split Barrel (SB) | Core (C)

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

| Elevation (m) | Depth (m) | Soil Symbol | MATERIAL DESCRIPTION | Sample Type | Sample Number |
|---|---|---|---|---|---|
| 232.3 | 0 | | ASPHALT (70 mm THICK) | | C01 |
| | | | SAND AND GRAVEL (FILL) - trace clay, trace silt, light brown to brown, moist, loose to compact, well graded coarse sand to fine gravel(<20 mm dia.), carbonate (limestone), sub-angular to angular | | G02 |
| 232.2 | | | | | G03 |
| | | | SAND AND GRAVEL (FILL) - trace clay, trace silt, light brown to brown, moist, loose to compact, poorly graded fine sand to fine gravel(<20 mm dia.), carbonate (limestone), rounded to sub-rounded | | G04 |
| 232.0 | | | CLAY (FILL) - silty, trace sand, trace organics<br>- black to dark grey<br>- moist, firm to stiff<br>- high plasticity | | |
| | 0.5 | | | | G05 |
| | 1.0 | | | | G06 |
| 230.9 | 1.5 | | CLAY- silty, trace sand, trace gravel, trace oxidation, trace silt inclusion (<25 mm dia.)<br>- mottled light brown to brown<br>- moist, firm<br>- high plasticity | | G07 |
| | | | | | G08 |
| | 2.0 | | | | G09 |
| 230.3 | | | END OF TEST HOLE AT 2.1 m in CLAY | | |

Bulk Unit Wt (kN/m³): 16 17 18 19 20 21
Particle Size (%): 0 20 40 60 80 100
PL MC LL: 0 20 40 60 80 100
Undrained Shear Strength (kPa): 0 50 100 150 200 250
Test Type: △ Torvane △ ✤ Pocket Pen. ✤ ☒ Qu ☒ ○ Field Vane ○

Notes:
1) No sloughing or seepage observed.
2) Backfilled test hole with auger cuttings to ~ 1.0 m below top of pavement, sand to 0.1 m below top of pavement and asphalt cold patch to the surface.
3) Test hole location in the westbound lane, 450 m west of Villeneuve Blvd., 1.4 m south from north edge of pavement.
4) UTM coordinates and gound elevation surveyed by Morrison Hershfield.

**Logged By:** Shane Broderick **Reviewed By:** Paul Bevel **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2017-06-01 RUE DES TRAPPISTES 0_A_SGBR 0035-049-00.GPJ TREK GEOTECHNICAL.GDT 15/6/17

# Appendix B

## Lab Testing Summary and Lab Testing Results – Rue Des Trappistes

**Local Street Renewal (Rue Des Trappistes)**
**Sub-Surface Investigation**
**Summary Table**

| Test Hole No. | Test Hole Location | Pavement Surface | | Pavement Structure Material | | Subgrade Description | Sample Depth (m) | | Moisture Content (%) | Grain Size Analysis | | | | Atterberg Limits | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Type | Thickness (mm) | Type | Thickness (mm) | | Top (m) | Bottom (m) | | Gravel (%) | Sand (%) | Silt (%) | Clay (%) | Liquid | Plastic | Plasticity Index |
| TH17-01 | U14 (5514056.187m N, 6632933.291m E) 60 m west of Pembina Highway, eastbound lane, 1.8 m north from south curb. | Asphalt | 170 | | | | | | - | | | | | | | |
| | | | | | | SAND AND GRAVEL (FILL) | 0.3 | 0.5 | 8.8 | 31 | 50 | 18 | | | | |
| | | | | | | SAND AND GRAVEL (FILL) | 0.6 | 0.8 | 12.5 | | | | | | | |
| | | | | | | CLAY FILL | 1.1 | 1.2 | 31.0 | | | | | | | |
| | | | | | | CLAY FILL | 1.4 | 1.5 | 28.5 | | | | | | | |
| | | | | | | CLAY FILL | 1.5 | 1.7 | 13.6 | | | | | | | |
| | | | | | | SILT AND CLAY | 1.7 | 1.9 | 33.1 | | | | | | | |
| | | | | | | SILT | 2.0 | 2.1 | 30.0 | | | | | | | |
| TH17-02 | U14 (5514023.867m N, 632861.307m E) 25 m east of Villeneuve Blvd., westbound lane, 1.6 m south from north curb. | Asphalt | 125 | | | | | | | | | | | | | |
| | | | | | | SAND AND GRAVEL (FILL) | 0.1 | 0.3 | 6.0 | 39 | 50 | 2 | | | | |
| | | | | | | SAND AND GRAVEL (FILL) | 0.3 | 0.5 | 4.7 | | | | | | | |
| | | | | | | CLAY FILL | 0.6 | 0.8 | 15.0 | | | | | | | |
| | | | | | | CLAY FILL | 1.1 | 1.2 | 31.3 | | | | | | | |
| | | | | | | CLAY FILL | 1.4 | 1.5 | 34.6 | | | | | | | |
| | | | | | | CLAY FILL | 1.7 | 1.8 | 36.5 | | | | | | | |
| | | | | | | CLAY FILL | 2.0 | 2.1 | 35.8 | | | | | | | |
| TH17-03 | U14 (5513926.490m N, 632758.677m E) 120 m west of Villeneuve Blvd., eastbound lane, 1.3 m north from south edge of pavement. | Asphalt | 50 | | | | | | | | | | | | | |
| | | | | | | GRAVEL FILL (limestone) | 0.1 | 0.2 | 4.2 | | | | | | | |
| | | | | | | SAND AND GRAVEL (FILL) | 0.2 | 0.3 | 6.7 | | | | | | | |
| | | | | | | CLAY FILL | 0.5 | 0.6 | 25.4 | | | | | | | |
| | | | | | | CLAY FILL | 0.9 | 1.1 | 32.3 | 0 | 2 | 25 | 73 | 76 | 23 | 53 |
| | | | | | | CLAY FILL | 1.4 | 1.5 | 34.4 | | | | | | | |
| | | | | | | CLAY | 1.7 | 1.8 | 35.1 | | | | | | | |
| | | | | | | CLAY | 2.0 | 2.1 | 37.5 | | | | | | | |
| TH17-04 | U14 (5513876.612m N, 632692.349m 200 m west of Villeneuve Blvd., westbound lane, 1.4 m south from north edge of pavement. | Asphalt | 25 | | | | | | | | | | | | | |
| | | | | | | GRAVEL FILL (limestone) | 0.0 | 0.1 | 4.6 | | | | | | | |
| | | | | | | SAND AND GRAVEL (FILL) | 0.1 | 0.2 | 8.1 | | | | | | | |
| | | | | | | SAND AND GRAVEL (FILL) | 0.2 | 0.3 | 3.4 | | | | | | | |
| | | | | | | CLAY FILL | 0.3 | 0.4 | 12.5 | | | | | | | |
| | | | | | | CLAY FILL | 0.5 | 0.6 | 23.6 | 0 | 5 | 34 | 62 | 62 | 21 | 41 |
| | | | | | | CLAY FILL | 0.6 | 0.8 | 26.5 | | | | | | | |
| | | | | | | CLAY FILL | 1.0 | 1.1 | 32.8 | | | | | | | |
| | | | | | | CLAY | 1.3 | 1.4 | 32.0 | | | | | | | |
| | | | | | | CLAY | 1.7 | 1.8 | 28.4 | | | | | | | |
| | | | | | | SILT | 2.0 | 2.1 | 25.4 | | | | | | | |

**Local Street Renewal (Rue Des Trappistes)**
**Sub-Surface Investigation**
**Summary Table**

| Test Hole No. | Test Hole Location | Pavement Surface | | Pavement Structure Material | | Subgrade Description | Sample Depth (m) | | Moisture Content (%) | Grain Size Analysis | | | | Atterberg Limits | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Type | Thickness (mm) | Type | Thickness (mm) | | Top (m) | Bottom (m) | | Gravel (%) | Sand (%) | Silt (%) | Clay (%) | Liquid | Plastic | Plasticity Index |
| TH17-05 | U14 (5513800.922m N, 632573.764m E) 340 m west of Villeneuve Blvd., eastbound lane, 1.3 m north from south edge of pavement. | Asphalt | 40 | | | | | | | | | | | | | |
| | | | | | | GRAVEL FILL (limestone) | 0.0 | 0.1 | 5.4 | | | | | | | |
| | | | | | | SAND AND GRAVEL (FILL) | 0.1 | 0.5 | 5.0 | | | | | | | |
| | | | | | | CLAY FILL | 0.6 | 0.8 | 27.3 | | | | | | | |
| | | | | | | CLAY FILL | 0.9 | 1.1 | 29.3 | | | | | | | |
| | | | | | | CLAY FILL | 1.2 | 1.4 | 36.4 | | | | | | | |
| | | | | | | CLAY FILL | 1.7 | 1.8 | 33.5 | | | | | | | |
| | | | | | | CLAY FILL | 2.0 | 2.2 | 32.8 | | | | | | | |
| TH17-06 | U14 (5513746.761m N, 632482.452m E) 450 m west of Villeneuve Blvd., westbound lane, 1.4 m south from north of edge of pavement. | Asphalt | 70 | | | | | | | | | | | | | |
| | | | | | | GRAVEL FILL (limestone) | 0.1 | 0.2 | 5.4 | | | | | | | |
| | | | | | | GRAVEL FILL (limestone) | 0.2 | 0.3 | 5.7 | | | | | | | |
| | | | | | | SAND AND GRAVEL (FILL) | 0.3 | 0.4 | 3.8 | | | | | | | |
| | | | | | | CLAY FILL | 0.6 | 0.8 | 28.3 | 0 | 7 | 34 | 59 | 61 | 22 | 38 |
| | | | | | | CLAY FILL | 1.1 | 1.2 | 33.7 | | | | | | | |
| | | | | | | CLAY | 1.5 | 1.7 | 36.9 | | | | | | | |
| | | | | | | CLAY | 1.8 | 2.0 | 36.3 | | | | | | | |
| | | | | | | CLAY | 2.0 | 2.1 | 37.7 | | | | | | | |

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# Moisture Content Report
## ASTM D2216-10

**Project No.** 0035-049-00
**Client** Morrison Hershfield
**Project** Rue Des Trappistes

**Sample Date** 01-Jun-17
**Test Date** 05-Jun-17
**Technician** SC

| Test Pit | TH17-06 | TH17-06 | TH17-06 | TH17-06 | TH17-06 | TH17-06 |
|---|---|---|---|---|---|---|
| Depth (m) | 0.1 - 0.2 | 0.2 - 0.3 | 0.3 - 0.4 | 0.6 - 0.8 | 1.1 - 1.2 | 1.5 - 1.7 |
| Sample # | G02 | G03 | G04 | G05 | G06 | G07 |
| Tare ID | H22 | Z73 | D17 | N96 | D15 | E69 |
| Mass of tare | 8.6 | 8.5 | 8.9 | 8.7 | 8.4 | 8.5 |
| Mass wet + tare | 363.0 | 373.2 | 224.3 | 369.8 | 352.2 | 371.0 |
| Mass dry + tare | 344.8 | 353.6 | 216.4 | 290.2 | 265.6 | 273.3 |
| Mass water | 18.2 | 19.6 | 7.9 | 79.6 | 86.6 | 97.7 |
| Mass dry soil | 336.2 | 345.1 | 207.5 | 281.5 | 257.2 | 264.8 |
| Moisture % | 5.4% | 5.7% | 3.8% | 28.3% | 33.7% | 36.9% |

| Test Pit | TH17-06 | TH17-06 | TH17-05 | TH17-05 | TH17-05 | TH17-05 |
|---|---|---|---|---|---|---|
| Depth (m) | 1.8 - 2.0 | 2.0 - 2.1 | 0.0 - 0.1 | 0.1 - 0.5 | 0.6 - 0.8 | 0.9 - 1.1 |
| Sample # | G08 | G09 | G11 | G12 | G13 | G14 |
| Tare ID | F124 | N82 | N07 | Z09 | D27 | AB50 |
| Mass of tare | 8.3 | 8.5 | 8.5 | 8.6 | 8.3 | 6.6 |
| Mass wet + tare | 390.1 | 395.5 | 336.7 | 398.9 | 429 | 396.3 |
| Mass dry + tare | 288.4 | 289.5 | 320.0 | 380.3 | 338.8 | 308.0 |
| Mass water | 101.7 | 106.0 | 16.7 | 18.6 | 90.2 | 88.3 |
| Mass dry soil | 280.1 | 281.0 | 311.5 | 371.7 | 330.5 | 301.4 |
| Moisture % | 36.3% | 37.7% | 5.4% | 5.0% | 27.3% | 29.3% |

| Test Pit | TH17-05 | TH17-05 | TH17-05 | TH17-04 | TH17-04 | TH17-04 |
|---|---|---|---|---|---|---|
| Depth (m) | 1.2 - 1.4 | 1.7 - 1.8 | 2.0 - 2.2 | 0.0 - 0.1 | 0.1 - 0.2 | 0.2 - 0.3 |
| Sample # | G15 | G16 | G17 | G19 | G20 | G21 |
| Tare ID | F152 | W101 | AB59 | F7 | N01 | AB29 |
| Mass of tare | 8.5 | 8.5 | 6.7 | 8.5 | 8.6 | 6.7 |
| Mass wet + tare | 394.2 | 378.8 | 375.4 | 390.8 | 382.0 | 296.0 |
| Mass dry + tare | 291.2 | 285.8 | 284.4 | 374.1 | 354.1 | 286.5 |
| Mass water | 103.0 | 93.0 | 91.0 | 16.7 | 27.9 | 9.5 |
| Mass dry soil | 282.7 | 277.3 | 277.7 | 365.6 | 345.5 | 279.8 |
| Moisture % | 36.4% | 33.5% | 32.8% | 4.6% | 8.1% | 3.4% |

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# Moisture Content Report
## ASTM D2216-10

**Project No.** 0035-049-00
**Client** Morrison Hershfield
**Project** Rue Des Trappistes

**Sample Date** 01-Jun-17
**Test Date** 05-Jun-17
**Technician** SC

| Test Pit | TH17-04 | TH17-04 | TH17-04 | TH17-04 | TH17-04 | TH17-04 |
|---|---|---|---|---|---|---|
| Depth (m) | 0.3 - 0.35 | 0.5 - 0.6 | 0.6 - 0.8 | 1.0 - 1.1 | 1.3 - 1.4 | 1.7 - 1.8 |
| Sample # | G22 | G23 | G24 | G25 | G26 | G27 |
| Tare ID | AA02 | E17 | E77 | D9 | H44 | A30 |
| Mass of tare | 6.6 | 8.5 | 8.6 | 8.5 | 8.4 | 8.0 |
| Mass wet + tare | 434.6 | 401.5 | 390.7 | 418.0 | 388.5 | 382.5 |
| Mass dry + tare | 387.2 | 326.5 | 310.7 | 316.8 | 296.3 | 299.6 |
| Mass water | 47.4 | 75.0 | 80.0 | 101.2 | 92.2 | 82.9 |
| Mass dry soil | 380.6 | 318.0 | 302.1 | 308.3 | 287.9 | 291.6 |
| Moisture % | 12.5% | 23.6% | 26.5% | 32.8% | 32.0% | 28.4% |

| Test Pit | TH17-04 | TH17-03 | TH17-03 | TH17-03 | TH17-03 | TH17-03 |
|---|---|---|---|---|---|---|
| Depth (m) | 2.0 - 2.1 | 0.1 - 0.2 | 0.2 - 0.3 | 0.5 - 0.6 | 0.9 - 1.1 | 1.4 - 1.5 |
| Sample # | G28 | G30 | G31 | G32 | G33 | G34 |
| Tare ID | E114 | AB29 | H56 | AB54 | W111 | W106 |
| Mass of tare | 8.2 | 6.3 | 8.4 | 6.5 | 8.4 | 8.4 |
| Mass wet + tare | 380.0 | 266.0 | 400.6 | 374.5 | 383.1 | 439.0 |
| Mass dry + tare | 304.7 | 255.6 | 376.1 | 299.9 | 291.7 | 328.9 |
| Mass water | 75.3 | 10.4 | 24.5 | 74.6 | 91.4 | 110.1 |
| Mass dry soil | 296.5 | 249.3 | 367.7 | 293.4 | 283.3 | 320.5 |
| Moisture % | 25.4% | 4.2% | 6.7% | 25.4% | 32.3% | 34.4% |

| Test Pit | TH17-03 | TH17-03 | TH17-01 | TH17-01 | TH17-01 | TH17-01 |
|---|---|---|---|---|---|---|
| Depth (m) | 1.7 - 1.8 | 2.0 - 2.1 | 0.3 - 0.5 | 0.6 - 0.8 | 1.1 - 1.2 | 1.4 - 1.5 |
| Sample # | G35 | G36 | G38 | G39 | G40 | G41 |
| Tare ID | AA22 | F78 | AB21 | AB62 | AA07 | AB08 |
| Mass of tare | 6.9 | 8.8 | 6.9 | 6.5 | 6.7 | 6.7 |
| Mass wet + tare | 408.5 | 325.8 | 274.6 | 426.2 | 442.8 | 214.8 |
| Mass dry + tare | 304.1 | 239.3 | 252.9 | 379.6 | 339.7 | 168.6 |
| Mass water | 104.4 | 86.5 | 21.7 | 46.6 | 103.1 | 46.2 |
| Mass dry soil | 297.2 | 230.5 | 246.0 | 373.1 | 333.0 | 161.9 |
| Moisture % | 35.1% | 37.5% | 8.8% | 12.5% | 31.0% | 28.5% |

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# Moisture Content Report
## ASTM D2216-10

**Project No.** 0035-049-00
**Client** Morrison Hershfield
**Project** Rue Des Trappistes

**Sample Date** 01-Jun-17
**Test Date** 05-Jun-17
**Technician** SC

| Test Pit | TH17-01 | TH17-01 | TH17-01 | TH17-02 | TH17-02 | TH17-02 |
|---|---|---|---|---|---|---|
| Depth (m) | 1.5 - 1.7 | 1.7 - 1.9 | 2.0 - 2.1 | 0.1 - 0.3 | 0.3 - 0.5 | 0.6 - 0.8 |
| Sample # | G42A | G42B | G43 | G45 | G46 | G47 |
| Tare ID | F144 | AB79 | AC22 | F60 | H13 | AB11 |
| Mass of tare | 8.4 | 6.8 | 6.7 | 8.5 | 8.5 | 6.6 |
| Mass wet + tare | 255.0 | 367.3 | 397.0 | 325.9 | 363.3 | 444.1 |
| Mass dry + tare | 225.5 | 277.7 | 307.0 | 307.8 | 347.5 | 387.2 |
| Mass water | 29.5 | 89.6 | 90.0 | 18.1 | 15.8 | 56.9 |
| Mass dry soil | 217.1 | 270.9 | 300.3 | 299.3 | 339.0 | 380.6 |
| Moisture % | 13.6% | 33.1% | 30.0% | 6.0% | 4.7% | 15.0% |

| Test Pit | TH17-02 | TH17-02 | TH17-02 | TH17-02 | | |
|---|---|---|---|---|---|---|
| Depth (m) | 1.1 - 1.2 | 1.4 - 1.5 | 1.7 - 1.8 | 2.0 - 2.1 | | |
| Sample # | G48 | G49 | G50 | G51 | | |
| Tare ID | Z75 | H4 | N09 | F99 | | |
| Mass of tare | 8.4 | 0.4 | 8.6 | 8.5 | | |
| Mass wet + tare | 383.6 | 423.1 | 384.2 | 377.5 | | |
| Mass dry + tare | 294.1 | 314.4 | 283.8 | 280.2 | | |
| Mass water | 89.5 | 108.7 | 100.4 | 97.3 | | |
| Mass dry soil | 285.7 | 314.0 | 275.2 | 271.7 | | |
| Moisture % | 31.3% | 34.6% | 36.5% | 35.8% | | |

| Test Pit | | | | | | |
|---|---|---|---|---|---|---|
| Depth (m) | | | | | | |
| Sample # | | | | | | |
| Tare ID | | | | | | |
| Mass of tare | | | | | | |
| Mass wet + tare | | | | | | |
| Mass dry + tare | | | | | | |
| Mass water | | | | | | |
| Mass dry soil | | | | | | |
| Moisture % | | | | | | |

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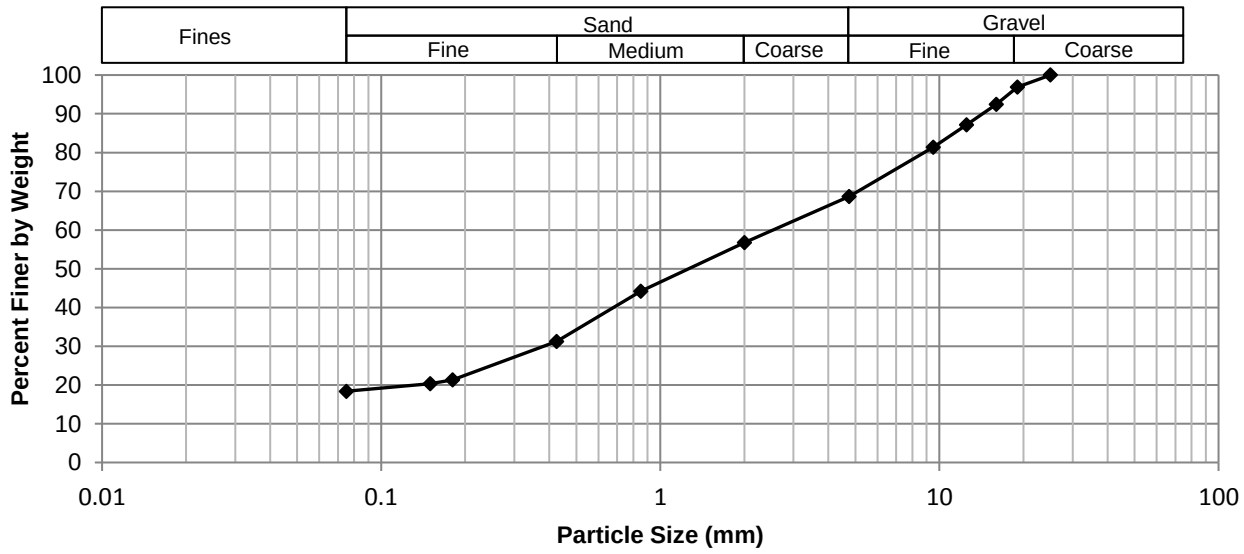
# Grain Size Analysis (Sieve Method)
## ASTM C136-14

| | |
|---|---|
| **Project No.** | 0035-049-00 |
| **Client** | Morrison Hershfield |
| **Project** | Rue Des Trappistes |
| **Sample #** | G38 |
| **Source** | Site |
| **Soil Desc.** | Sand and Gravel |
| **Date Sampled** | 1-Jun-17 |
| **Date Tested** | 8-Jun-17 |
| **Technician** | SC |

| | |
|---|---|
| **Gravel %** | 31.4 |
| **Sand %** | 50.3 |
| **Fines %** | 18.4 |

### Particle Size Distribution Curve




| Sieve Number | Sieve Opening (mm) | Percent Passing | Specification (Min-Max) |
|---|---|---|---|
| 6" | 150 | | |
| 5" | 125 | | |
| 4" | 100 | | |
| 3" | 75.0 | | |
| 2" | 50.0 | | |
| 1 1/2" | 37.5 | | |
| 1" | 25.0 | 100 | |
| 3/4" | 19.0 | 97 | |
| 5/8" | 16.0 | 92 | |
| 1/2" | 12.5 | 87 | |
| 3/8" | 9.50 | 81 | |
| no. 4 | 4.75 | 69 | |
| no. 10 | 2.00 | 57 | |
| no. 20 | 0.850 | 44 | |
| no. 40 | 0.425 | 31 | |
| no. 80 | 0.180 | 21 | |
| no. 100 | 0.150 | 20 | |
| no. 200 | 0.075 | 18 | |

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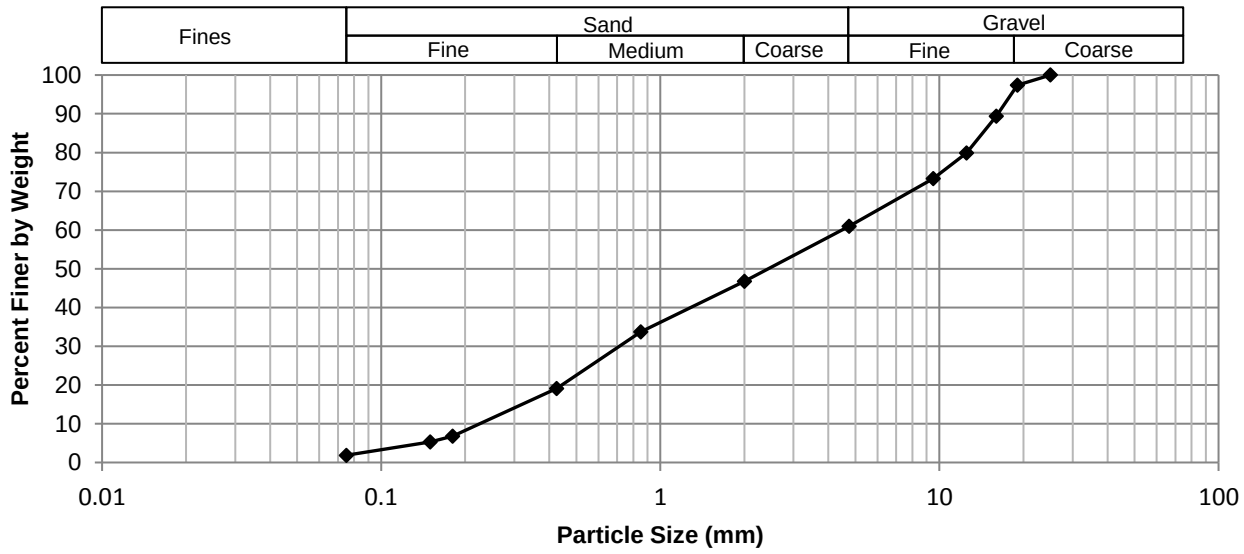
# Grain Size Analysis (Sieve Method)
## ASTM C136-14

| | |
|---|---|
| **Project No.** | 0035-049-00 |
| **Client** | Morrison Hershfield |
| **Project** | Rue Des Trappistes |
| **Sample #** | G45 |
| **Source** | Site |
| **Soil Desc.** | Sand and Gravel |
| **Date Sampled** | 1-Jun-17 |
| **Date Tested** | 8-Jun-17 |
| **Technician** | SC |

| | |
|---|---|
| **Gravel %** | 39.0 |
| **Sand %** | 59.1 |
| **Fines %** | 1.9 |

### Particle Size Distribution Curve




| Sieve Number | Sieve Opening (mm) | Percent Passing | Specification (Min-Max) |
|---|---|---|---|
| 6" | 150 | | |
| 5" | 125 | | |
| 4" | 100 | | |
| 3" | 75.0 | | |
| 2" | 50.0 | | |
| 1 1/2" | 37.5 | | |
| 1" | 25.0 | 100 | |
| 3/4" | 19.0 | 97 | |
| 5/8" | 16.0 | 89 | |
| 1/2" | 12.5 | 80 | |
| 3/8" | 9.50 | 73 | |
| no. 4 | 4.75 | 61 | |
| no. 10 | 2.00 | 47 | |
| no. 20 | 0.850 | 34 | |
| no. 40 | 0.425 | 19 | |
| no. 80 | 0.180 | 7 | |
| no. 100 | 0.150 | 5 | |
| no. 200 | 0.075 | 2 | |

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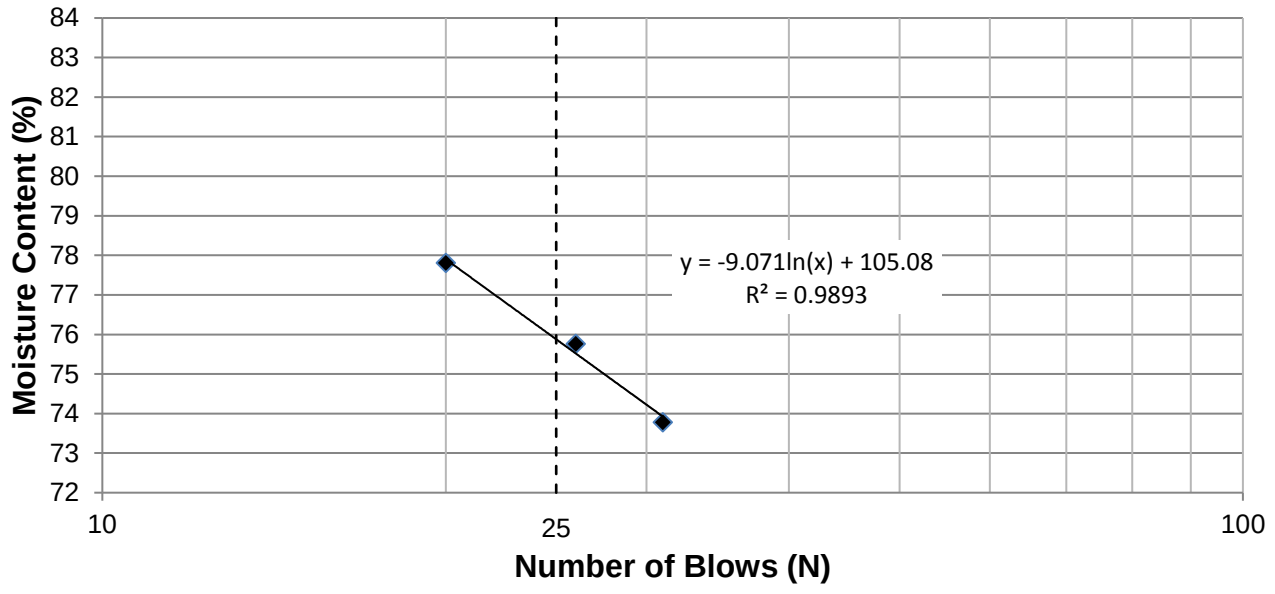
# Atterberg Limits
## ASTM D4318-10e1

| | |
|---|---|
| **Project No.** | 0035-049-00 |
| **Client** | Morrison Hershfield |
| **Project** | Rue Des Trappistes |
| **Test Hole** | TH17-03 |
| **Sample #** | G33 |
| **Depth (m)** | 0.9 - 1.1 |
| **Sample Date** | 1-Jun-17 |
| **Test Date** | 8-Jun-17 |
| **Technician** | SC |

| | |
|---|---|
| **Liquid Limit** | 76 |
| **Plastic Limit** | 23 |
| **Plasticity Index** | 53 |

## Liquid Limit

| Trial # | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| **Number of Blows (N)** | 20 | 26 | 31 | | |
| **Mass Wet Soil + Tare (g)** | 22.693 | 22.374 | 22.399 | | |
| **Mass Dry Soil + Tare (g)** | 18.963 | 18.786 | 18.898 | | |
| **Mass Tare (g)** | 14.169 | 14.050 | 14.153 | | |
| **Mass Water (g)** | 3.730 | 3.588 | 3.501 | | |
| **Mass Dry Soil (g)** | 4.794 | 4.736 | 4.745 | | |
| **Moisture Content (%)** | 77.806 | 75.760 | 73.783 | | |




## Plastic Limit

| Trial # | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| **Mass Wet Soil + Tare (g)** | 21.078 | 21.332 | | | |
| **Mass Dry Soil + Tare (g)** | 19.820 | 19.989 | | | |
| **Mass Tare (g)** | 14.185 | 14.205 | | | |
| **Mass Water (g)** | 1.258 | 1.343 | | | |
| **Mass Dry Soil (g)** | 5.635 | 5.784 | | | |
| **Moisture Content (%)** | 22.325 | 23.219 | | | |

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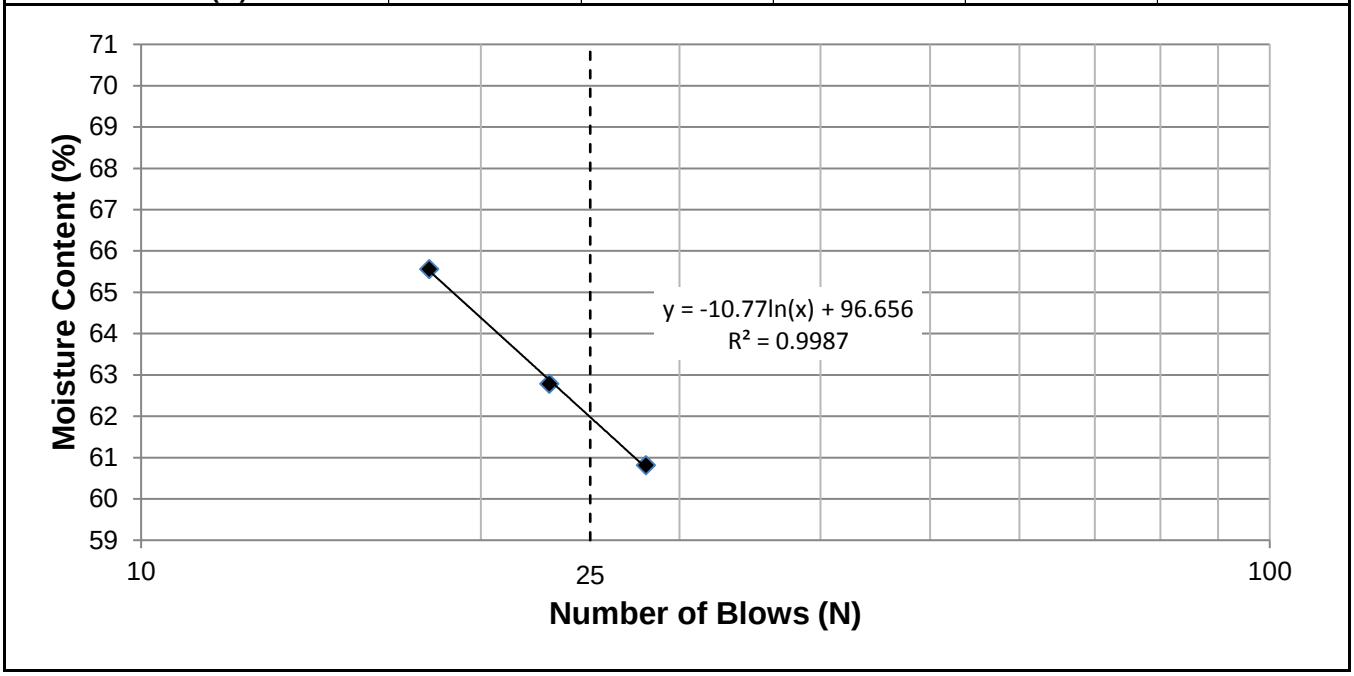
# Atterberg Limits
## ASTM D4318-10e1

| | |
|---|---|
| **Project No.** | 0035-049-00 |
| **Client** | Morrison Hershfield |
| **Project** | Rue Des Trappistes |
| **Test Hole** | TH17-04 |
| **Sample #** | G23 |
| **Depth (m)** | 0.5 - 0.6 |
| **Sample Date** | 01-Jun-17 |
| **Test Date** | 08-Jun-17 |
| **Technician** | SC |

| | |
|---|---|
| **Liquid Limit** | 62 |
| **Plastic Limit** | 21 |
| **Plasticity Index** | 41 |

### Liquid Limit

| Trial # | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| **Number of Blows (N)** | 18 | 23 | 28 | | |
| **Mass Wet Soil + Tare (g)** | 25.789 | 23.095 | 22.115 | | |
| **Mass Dry Soil + Tare (g)** | 21.220 | 19.676 | 19.002 | | |
| **Mass Tare (g)** | 14.251 | 14.230 | 13.883 | | |
| **Mass Water (g)** | 4.569 | 3.419 | 3.113 | | |
| **Mass Dry Soil (g)** | 6.969 | 5.446 | 5.119 | | |
| **Moisture Content (%)** | 65.562 | 62.780 | 60.813 | | |




### Plastic Limit

| Trial # | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| **Mass Wet Soil + Tare (g)** | 20.362 | 20.430 | | | |
| **Mass Dry Soil + Tare (g)** | 19.252 | 19.298 | | | |
| **Mass Tare (g)** | 14.007 | 13.780 | | | |
| **Mass Water (g)** | 1.110 | 1.132 | | | |
| **Mass Dry Soil (g)** | 5.245 | 5.518 | | | |
| **Moisture Content (%)** | 21.163 | 20.515 | | | |

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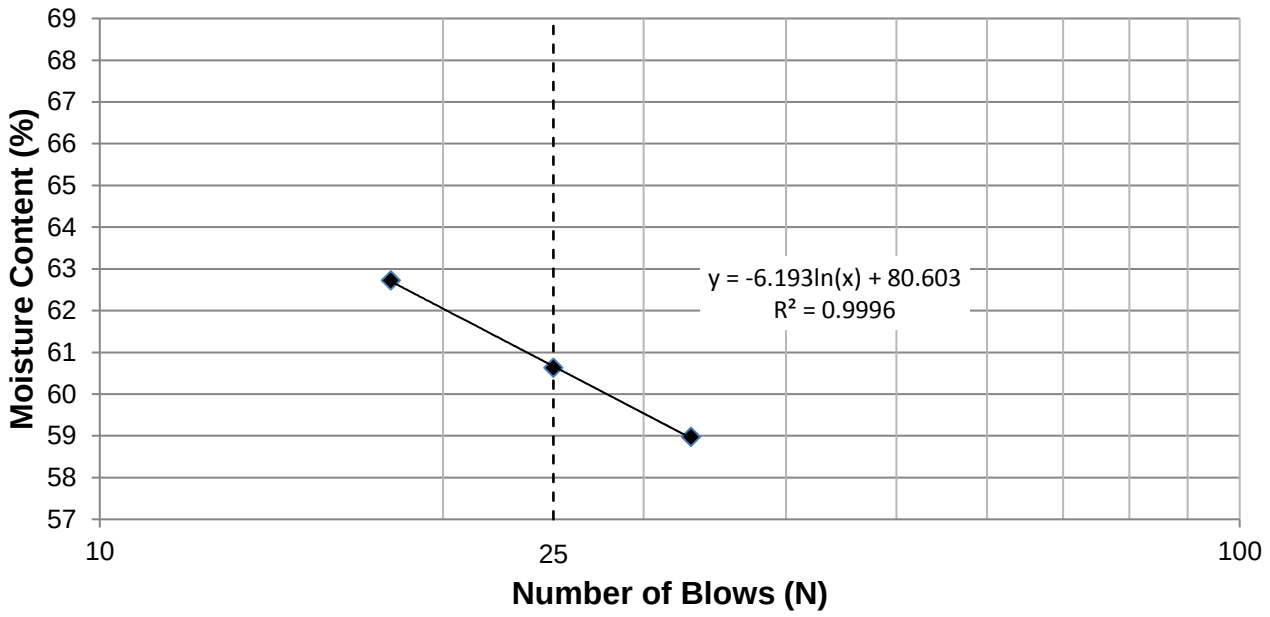
# Atterberg Limits
## ASTM D4318-10e1

| | |
|---|---|
| **Project No.** | 0035-049-00 |
| **Client** | Morrison Hershfield |
| **Project** | Rue Des Trappistes |
| **Test Hole** | TH17-06 |
| **Sample #** | G05 |
| **Depth (m)** | 0.5 - 0.6 |
| **Sample Date** | 01-Jun-17 |
| **Test Date** | 08-Jun-17 |
| **Technician** | SC |

| | |
|---|---|
| **Liquid Limit** | 61 |
| **Plastic Limit** | 22 |
| **Plasticity Index** | 38 |

### Liquid Limit

| Trial # | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| **Number of Blows (N)** | 18 | 25 | 33 | | |
| **Mass Wet Soil + Tare (g)** | 21.890 | 21.732 | 21.734 | | |
| **Mass Dry Soil + Tare (g)** | 18.954 | 18.882 | 18.822 | | |
| **Mass Tare (g)** | 14.273 | 14.181 | 13.884 | | |
| **Mass Water (g)** | 2.936 | 2.850 | 2.912 | | |
| **Mass Dry Soil (g)** | 4.681 | 4.701 | 4.938 | | |
| **Moisture Content (%)** | 62.722 | 60.625 | 58.971 | | |




### Plastic Limit

| Trial # | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| **Mass Wet Soil + Tare (g)** | 20.051 | 20.401 | | | |
| **Mass Dry Soil + Tare (g)** | 18.973 | 19.281 | | | |
| **Mass Tare (g)** | 14.208 | 14.150 | | | |
| **Mass Water (g)** | 1.078 | 1.120 | | | |
| **Mass Dry Soil (g)** | 4.765 | 5.131 | | | |
| **Moisture Content (%)** | 22.623 | 21.828 | | | |

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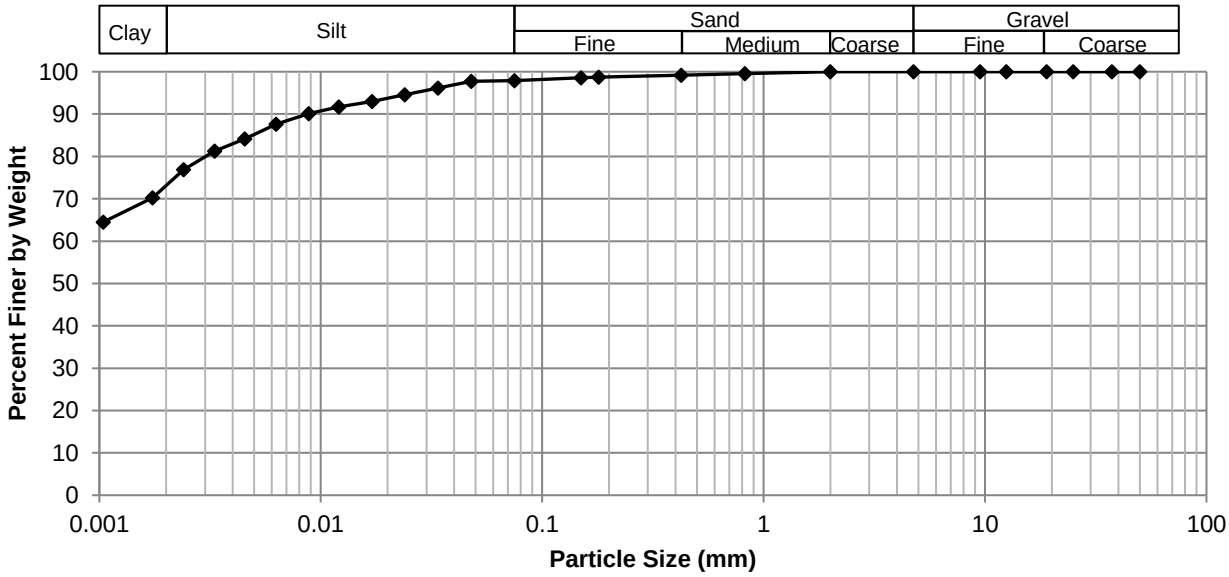
Tel: 204.975.9433 Fax: 204.975.9435

# Grain Size Analysis (Hydrometer Method)
## ASTM D422

| | |
|---|---|
| **Project No.** | 0035-049-00 |
| **Client** | Morrison Herschfield |
| **Project** | Rue Des Trappistes |
| **Test Hole** | TH17-03 |
| **Sample #** | G33 |
| **Depth (m)** | 0.9 - 1.1 |
| **Sample Date** | 1-Jun-17 |
| **Test Date** | 8-Jun-17 |
| **Technician** | SC |

| | |
|---|---|
| **Gravel** | 0.0% |
| **Sand** | 2.1% |
| **Silt** | 25.1% |
| **Clay** | 72.8% |

### Particle Size Distribution Curve




| Gravel | | Sand | | Silt and Clay | |
|---|---|---|---|---|---|
| **Particle Size (mm)** | **Percent Passing** | **Particle Size (mm)** | **Percent Passing** | **Particle Size (mm)** | **Percent Passing** |
| 50.0 | 100.00 | 4.75 | 100.00 | 0.0750 | 97.89 |
| 37.5 | 100.00 | 2.00 | 100.00 | 0.0479 | 97.73 |
| 25.0 | 100.00 | 0.825 | 99.52 | 0.0338 | 96.15 |
| 19.0 | 100.00 | 0.425 | 99.21 | 0.0239 | 94.57 |
| 12.5 | 100.00 | 0.180 | 98.70 | 0.0171 | 92.99 |
| 9.50 | 100.00 | 0.150 | 98.58 | 0.0121 | 91.72 |
| 4.75 | 100.00 | 0.075 | 97.89 | 0.0088 | 90.14 |
| | | | | 0.0063 | 87.61 |
| | | | | 0.0045 | 84.13 |
| | | | | 0.0033 | 81.29 |
| | | | | 0.0024 | 76.86 |
| | | | | 0.0017 | 70.22 |
| | | | | 0.0010 | 64.53 |

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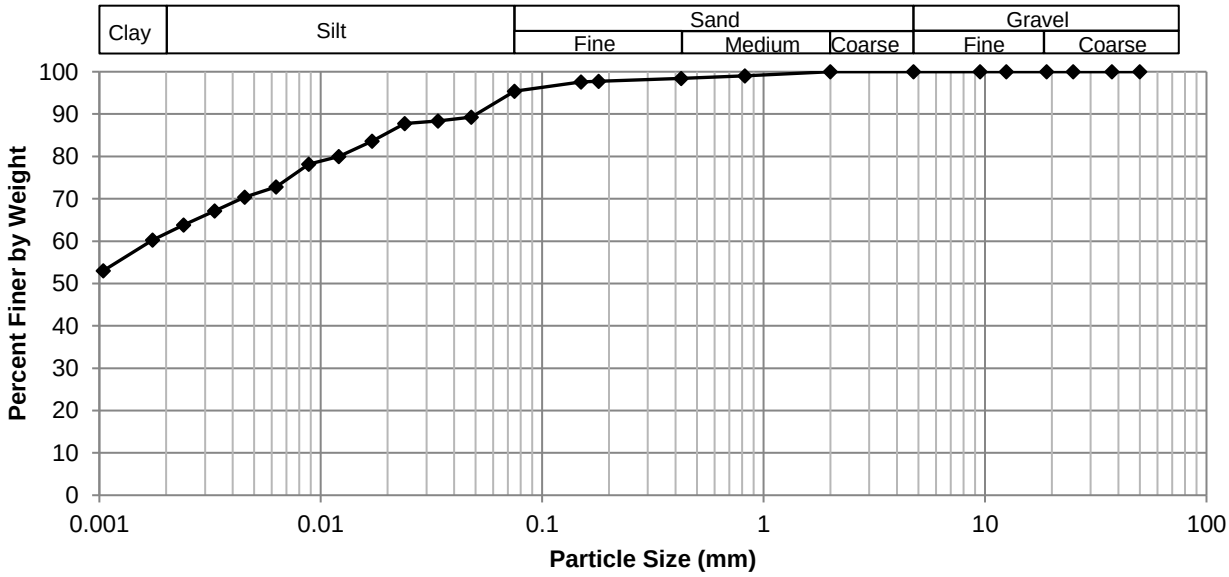
## ASTM D422

| | |
|---|---|
| **Project No.** | 0035-049-00 |
| **Client** | Morrison Hershfield |
| **Project** | Rue Des Trappistes |
| **Test Hole** | TH17-04 |
| **Sample #** | G23 |
| **Depth (m)** | 0.5 - 0.6 |
| **Sample Date** | 1-Jun-17 |
| **Test Date** | 8-Jun-17 |
| **Technician** | SC |

| | |
|---|---|
| **Gravel** | 0.0% |
| **Sand** | 4.6% |
| **Silt** | 33.8% |
| **Clay** | 61.6% |

### Particle Size Distribution Curve




| Gravel | | Sand | | Silt and Clay | |
|---|---|---|---|---|---|
| **Particle Size (mm)** | **Percent Passing** | **Particle Size (mm)** | **Percent Passing** | **Particle Size (mm)** | **Percent Passing** |
| 50.0 | 100.00 | 4.75 | 100.00 | 0.0750 | 95.38 |
| 37.5 | 100.00 | 2.00 | 100.00 | 0.0479 | 89.28 |
| 25.0 | 100.00 | 0.825 | 99.04 | 0.0338 | 88.38 |
| 19.0 | 100.00 | 0.425 | 98.41 | 0.0239 | 87.78 |
| 12.5 | 100.00 | 0.180 | 97.72 | 0.0171 | 83.59 |
| 9.50 | 100.00 | 0.150 | 97.57 | 0.0121 | 79.99 |
| 4.75 | 100.00 | 0.075 | 95.38 | 0.0088 | 78.20 |
| | | | | 0.0063 | 72.81 |
| | | | | 0.0045 | 70.41 |
| | | | | 0.0033 | 67.12 |
| | | | | 0.0024 | 63.82 |
| | | | | 0.0017 | 60.23 |
| | | | | 0.0010 | 53.04 |

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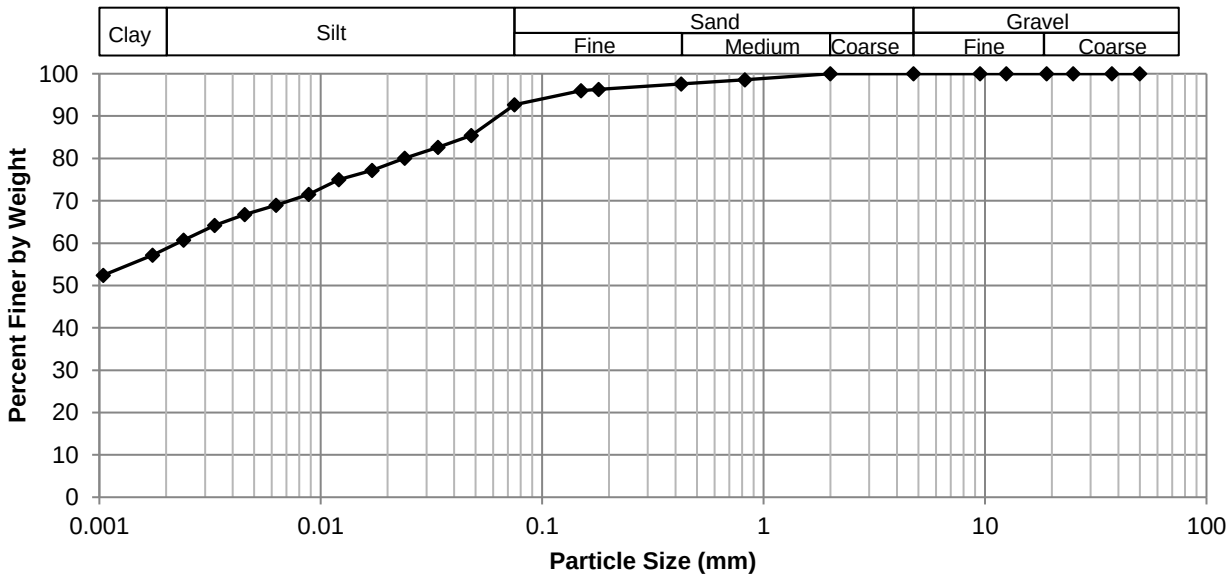
# Grain Size Analysis (Hydrometer Method)
## ASTM D422

| | |
|---|---|
| **Project No.** | 0035-049-00 |
| **Client** | Morrison Hershfield |
| **Project** | Rue Des Trappistes |
| **Test Hole** | TH17-06 |
| **Sample #** | G05 |
| **Depth (m)** | 0.6 - 0.8 |
| **Sample Date** | 1-Jun-17 |
| **Test Date** | 8-Jun-17 |
| **Technician** | SC |

| | |
|---|---|
| **Gravel** | 0.0% |
| **Sand** | 7.3% |
| **Silt** | 34.1% |
| **Clay** | 58.6% |

### Particle Size Distribution Curve




| Gravel | | Sand | | Silt and Clay | |
|---|---|---|---|---|---|
| **Particle Size (mm)** | **Percent Passing** | **Particle Size (mm)** | **Percent Passing** | **Particle Size (mm)** | **Percent Passing** |
| 50.0 | 100.00 | 4.75 | 100.00 | 0.0750 | 92.67 |
| 37.5 | 100.00 | 2.00 | 100.00 | 0.0479 | 85.46 |
| 25.0 | 100.00 | 0.825 | 98.58 | 0.0338 | 82.60 |
| 19.0 | 100.00 | 0.425 | 97.57 | 0.0239 | 80.06 |
| 12.5 | 100.00 | 0.180 | 96.31 | 0.0171 | 77.21 |
| 9.50 | 100.00 | 0.150 | 96.01 | 0.0121 | 74.98 |
| 4.75 | 100.00 | 0.075 | 92.67 | 0.0088 | 71.49 |
| | | | | 0.0063 | 68.95 |
| | | | | 0.0045 | 66.73 |
| | | | | 0.0033 | 64.19 |
| | | | | 0.0024 | 60.69 |
| | | | | 0.0017 | 57.20 |
| | | | | 0.0010 | 52.44 |

# Appendix C

# Photographs of Pavement Core Samples


Photo 1: Pavement Core Sample at Test Hole TH17-01


Photo 2: Pavement Core Sample at Test Hole TH17-02


Photo 3: Pavement Core Sample at Test Hole TH17-03


Photo 4: Pavement Core Sample at Test Hole TH17-04


Photo 5: Pavement Core Sample at Test Hole TH17-05


Photo 6: Pavement Core Sample at Test Hole TH17-06