

APPENDIX 'A' - GEOTECHNICAL REPORT

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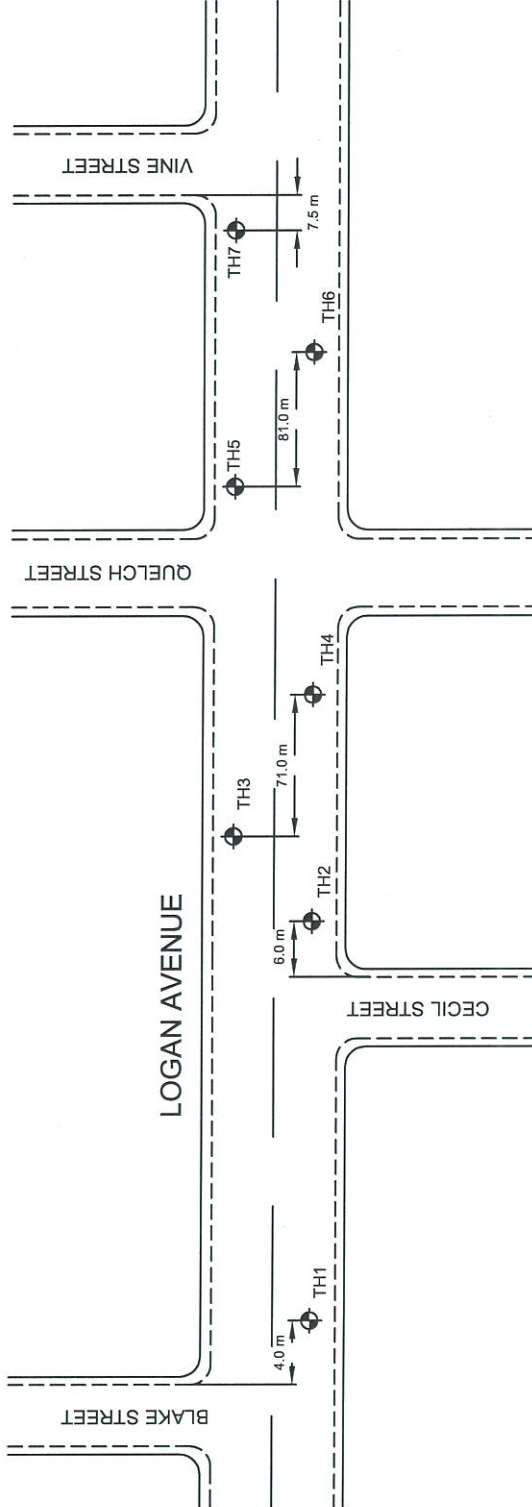
The geotechnical report is provided to aid in the Contractor's evaluation of the existing pavement structure and/or soil conditions. The information presented is considered accurate at the locations shown on the Drawings and at the time of drilling. However, variations in pavement structure and/or soil conditions may exist between test holes and fluctuations in groundwater levels can be expected seasonally and may occur as a result of construction activities. The nature and extent of variations may not become evident until construction commences.



Test Hole
Location



Curb Line



#6 - 854 Marion Street
Winnipeg, MB R2J 0K4
Phone: (204) 233-1694
Fax: (204) 235-1579



ENG. STAMP:



| | | | |
|------------------------|--|----------------------|---------------|
| CLIENT: | CITY OF WINNIPEG C/O UMA ENGINEERING LTD. | | |
| PROJECT: | CITY OF WINNIPEG 2007 RESIDENTIAL STREET RENEWAL PROGRAM | | |
| DWG DESCRIPTION: | TEST HOLE LOCATION PLAN LOGAN AVENUE | | |
| SCALE: | NTS | | |
| DRAWN BY: | OB | DATE: | DECEMBER 2006 |
| FILE No.: | 06-027-05 | CLIENT DWG/FIG. No.: | |
| ENG-TECH DWG/FIG. No.: | | REV.: | 0 |

**City of Winnipeg
2007 Residential Street Renewal Program
Logan Avenue**

| 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 |
| 1 | Logan Avenue | Asphalt | 241 | Sand | 100 | Clay Fill | 0.7 | 25.4 | - | - | - | - | - | - | - |
| | | Concrete | 176 | | | | | | | | | | | | |
| 2 | Logan Avenue | Asphalt | 190 | Sand | 100 | Clay | 0.8 | 33.3 | 0.0 | 3.1 | 26.7 | 70.2 | 93.3 | 27.2 | 66.1 |
| | | | | | | | | | | | | | | | |
| 3 | Logan Avenue | Asphalt | 160 | Sand | 75 | Clay Fill | 0.5 | 27.3 | - | - | - | - | - | - | - |
| | | | | | | | | | | | | | | | |
| 4 | Logan Avenue | Asphalt | 230 | Sand | 375 | Clay | 0.7 | 26.9 | - | - | - | - | - | - | - |
| | | | | | | | | | | | | | | | |
| 5 | Logan Avenue | Asphalt | 210 | Sand | 225 | Clay | 1.9 | 32.3 | - | - | - | - | - | - | - |
| | | | | | | | | | | | | | | | |
| 6 | Logan Avenue | Asphalt | 185 | Sand | 210 | Clay Fill | 1.0 | 28.8 | - | - | - | - | - | - | - |
| | | | | | | | | | | | | | | | |
| 7 | Logan Avenue | Asphalt | 140 | Sand | 425 | Clay | 1.0 | 30.8 | - | - | - | - | - | - | - |
| | | | | | | | | | | | | | | | |

ENG-TECH CONSULTING LIMITED

GEOTECHNICAL • ENVIRONMENTAL • MATERIALS TESTING

Client: UMA Engineering Ltd.

Project: City of Winnipeg 2007 Residential Street Renewal Program

Site: Logan Avenue

Location: See Figure 3

Test Hole #: TH 1

File No: 06-027-05

Date Drilled: December 13, 2006

Grade Elevation: 100.0 m (local)

Water Elevation: - -

| SUBSURFACE PROFILE | | | | SAMPLE DATA | | | | GRAIN SIZE DISTRIBUTION % | | | | | | | | | | |
|--------------------|-------------|--|---------------|-------------|-------------|--------------|--------------|---------------------------|----|--------|------|------|------|--|--|--|--|--|
| Depth (m) | Soil Symbol | Description | Elevation (m) | Number | Sample Type | Recovery (%) | blows/300 mm | Water Content (%) | | | | | | | | | | |
| | | | | | | | | PL | LL | Gravel | Sand | Silt | Clay | | | | | |
| 0 | | Ground Surface | 100 | | | | | | | | | | | | | | | |
| | | Asphalt (241 mm) | | | | | | | | | | | | | | | | |
| | | Concrete (176 mm) | | | | | | | | | | | | | | | | |
| | | Sand (SP) (100 mm) - light grey, damp, medium grain sizes, some silt & gravel. | | S1 | Shelby Tube | | | | | | | | | | | | | |
| | | Clay Fill (CH) - dark brown, moist, high plastic, with sand, occa. silt pocket. | | S2 | Shelby Tube | | | | | | | | | | | | | |
| 1 | | Clay (CH) - dark brown, moist, high plastic, trace sand. | 99 | S3 | Shelby Tube | | | | | | | | | | | | | |
| | | | | S4 | Shelby Tube | | | | | | | | | | | | | |
| | | Silt (ML) - light brown, moist, low plastic, some clay. | | S5 | Shelby Tube | | | | | | | | | | | | | |
| | | - at 2.0 m medium brown, with clay. | | S6 | Shelby Tube | | | | | | | | | | | | | |
| 2 | | End of Test Hole - end of test hole at 2.0 m below grade. - no groundwater or sloughing encountered. - backfilled test hole with auger cuttings and topped with asphalt cold mix. | 98 | | | | | | | | | | | | | | | |
| 3 | | | 97 | | | | | | | | | | | | | | | |

ENG-TECH Consulting Limited

Logged by: ERM

Reviewed by: *ERM*

Sample Type



Split Barrel



Shelby Tube



Auger Cuttings



Split Spoon

Drilled By: Paddock Drilling Ltd.

Drill Rig: Acker MP5-T

Auger Size: 125 mm Solid Stem

Completion Depth: 2.0 m

Completion Elevation: 98.0 m

Sheet: 1 of 1

ENG-TECH CONSULTING LIMITED

GEOTECHNICAL • ENVIRONMENTAL • MATERIALS TESTING

Client: UMA Engineering Ltd.

Project: City of Winnipeg 2007 Residential Street Renewal Program

Site: Logan Avenue

Location: See Figure 3

Test Hole #: TH 2

File No: 06-027-05

Date Drilled: December 13, 2006

Grade Elevation: 100.0 m (local)

Water Elevation: - -

| SUBSURFACE PROFILE | | | | SAMPLE DATA | | | | Water Content (%) | GRAIN SIZE DISTRIBUTION % | | | | | |
|--------------------|-------------|--|---------------|-------------|-------------|--------------|--------------|-------------------|---------------------------|----|--------|------|------|------|
| Depth (m) | Soil Symbol | Description | Elevation (m) | Number | Sample Type | Recovery (%) | blows/300 mm | | PL | LL | Gravel | Sand | Silt | Clay |
| 0 | | Ground Surface Asphalt (190 mm) | 100 | | | | | | | | | | | |
| | | Sand (SP) (100 mm) - light grey, damp, medium to coarse grain sizes, some silt & gravel. | | S1 | ▲ | | | | | | | | | |
| | | | | S2 | ▲ | | | | | | | | | |
| | | | | S3 | ▲ | | | | | | | | | |
| | | Clay (CH) - dark brown, moist, high plastic, with silt, trace sand, occa. silt pockets to 0.8 m. - between 0.4 m to 0.6 m, medium brown. | | S4 | ▲ | | | | | | | | | |
| | | | | S5 | ▲ | | | | | | 0.0 | 3.1 | 26.7 | 70.2 |
| 1 | | | 99 | S6 | ▲ | | | | | | | | | |
| | | | | S7 | ▲ | | | | | | | | | |
| | | Silt (ML) - light brown, moist, medium to low plastic, some clay. | | S8 | ▲ | | | | | | 0.0 | 4.3 | 78.4 | 17.3 |
| | | | | S9 | ▲ | | | | | | | | | |
| 2 | | End of Test Hole - end of test hole at 2.0 m below grade. - no groundwater or sloughing encountered. - backfilled test hole with auger cuttings and topped with asphalt cold mix. | 98 | | | | | | | | | | | |
| 3 | | | 97 | | | | | | | | | | | |

ENG-TECH Consulting Limited

Logged by: ERM

Reviewed by: *ctt*

Sample Type



Split Barrel



Shelby Tube



Auger Cuttings



Split Spoon

Drilled By: Paddock Drilling Ltd.

Drill Rig: Acker MP5-T

Auger Size: 125 mm Solid Stem

Completion Depth: 2.0 m

Completion Elevation: 98.0 m

Sheet: 1 of 1

ENG-TECH CONSULTING LIMITED

GEOTECHNICAL • ENVIRONMENTAL • MATERIALS TESTING

Client: UMA Engineering Ltd.

Project: City of Winnipeg 2007 Residential Street Renewal Program

Site: Logan Avenue

Location: See Figure 3

Test Hole #: TH 3

File No: 06-027-05

Date Drilled: December 13, 2006

Grade Elevation: 100.0 m (local)

Water Elevation: - -

| SUBSURFACE PROFILE | | | | SAMPLE DATA | | | | GRAIN SIZE DISTRIBUTION % | | | | | | |
|--------------------|-------------|--|---------------|-------------|-------------|--------------|--------------|---------------------------|---|----|--|--|--|--|
| Depth (m) | Soil Symbol | Description | Elevation (m) | Number | Sample Type | Recovery (%) | blows/300 mm | Water Content (%) | | | | | | |
| | | | | | | | | PL | 0 | LL | | | | |
| 0 | | Ground Surface Asphalt (160 mm) | 100 | | | | | | | | | | | |
| | | Sand (SP) (75 mm) - light brown, damp, medium to coarse grain sizes, some silt & gravel. | | S1 | | | | | | | | | | |
| | | Clay Fill (CH) - dark brown, moist, high plastic, some sand, trace oxides, occa. silt inclusion. below 0.8 m, occa. silt pocket. | | S2 | | | | | | | | | | |
| | | Silt (ML) - light brown, moist, low plastic, some clay. - between 1.5 m to 1.6 m, occa. grey clay pocket. - below 1.6 m, grey. | 99 | S3 | | | | | | | | | | |
| | | | | S4 | | | | | | | | | | |
| | | | | S5 | | | | | | | | | | |
| | | | | S6 | | | | | | | | | | |
| 2 | | End of Test Hole - end of test hole at 2.0 m below grade. - no groundwater or sloughing encountered. - backfilled test hole with auger cuttings and topped with asphalt cold mix. | 98 | | | | | | | | | | | |
| 3 | | | 97 | | | | | | | | | | | |

ENG-TECH Consulting Limited

Logged by: ERM

Reviewed by:

Sample Type



Split Barrel



Shelby Tube



Auger Cuttings



Split Spoon

Drilled By: Paddock Drilling Ltd.

Drill Rig: Acker MP5-T

Auger Size: 125 mm Solid Stem

Completion Depth: 2.0 m

Completion Elevation: 98.0 m

Sheet: 1 of 1

ENG-TECH CONSULTING LIMITED

GEOTECHNICAL • ENVIRONMENTAL • MATERIALS TESTING

•Client: UMA Engineering Ltd.

Project: City of Winnipeg 2007 Residential Street Renewal Program

Site: Logan Avenue

Location: See Figure 3

Test Hole #: TH 4

File No: 06-027-05

Date Drilled: December 13, 2006

Grade Elevation: 100.0 m (local)

Water Elevation: - -

| SUBSURFACE PROFILE | | | | SAMPLE DATA | | | | GRAIN SIZE DISTRIBUTION % | | | | | | |
|--------------------|-------------|---|---------------|-------------|-------------|--------------|--------------|---------------------------|---|----|--|--|--|--|
| Depth (m) | Soil Symbol | Description | Elevation (m) | Number | Sample Type | Recovery (%) | blows/300 mm | Water Content (%) | | | | | | |
| | | | | | | | | PL | 0 | LL | | | | |
| 0 | | Ground Surface Asphalt (230 mm) | 100 | | | | | | | | | | | |
| | | Sand (SP) (375 mm) - light brown, damp, medium to coarse grain sizes, some silt & gravel. | | S1 | Shelby Tube | | | | | | | | | |
| | | Clay (CH) - dark brown, black, moist, high plastic, some sand & silt, occa. silt inclusion. - below 0.9 m grey, occa. silt pocket. | | S2 | Shelby Tube | | | | | | | | | |
| 1 | | | 99 | S3 | Shelby Tube | | | | | | | | | |
| | | Silt (ML) - light brown, moist, low plastic, some clay. - between 1.5 m to 1.6 m, occa. grey clay pocket. - below 1.6 m, grey. | | S4 | Shelby Tube | | | | | | | | | |
| | | Clay (CH) - grey, moist, high plastic, trace silt. | | S5 | Shelby Tube | | | | | | | | | |
| 2 | | | 98 | S6 | Shelby Tube | | | | | | | | | |
| | | End of Test Hole - end of test hole at 2.0 m below grade. - no groundwater observed. - sloughing encountered at 0.5 m below grade. - backfilled test hole with auger cuttings and topped with asphalt cold mix. | | | | | | | | | | | | |
| 3 | | | 97 | | | | | | | | | | | |

ENG-TECH Consulting Limited

Logged by: ERM

Reviewed by: *ERM*

Sample Type



Split Barrel



Shelby Tube



Auger Cuttings



Split Spoon

Drilled By: Paddock Drilling Ltd.

Drill Rig: Acker MP5-T

Auger Size: 125 mm Solid Stem

Completion Depth: 2.0 m

Completion Elevation: 98.0 m

Sheet: 1 of 1

ENG-TECH CONSULTING LIMITED

GEOTECHNICAL • ENVIRONMENTAL • MATERIALS TESTING

Client: UMA Engineering Ltd.

Project: City of Winnipeg 2007 Residential Street Renewal Program

Site: Logan Avenue

Location: See Figure 3

Test Hole #: TH 5

File No: 06-027-05

Date Drilled: December 13, 2006

Grade Elevation: 100.0 m (local)

Water Elevation: - -

| SUBSURFACE PROFILE | | | | SAMPLE DATA | | | | GRAIN SIZE DISTRIBUTION % | | | | | | |
|--------------------|-------------|---|---------------|-------------|-------------|--------------|--------------|---------------------------|---|----|--|--|--|--|
| Depth (m) | Soil Symbol | Description | Elevation (m) | Number | Sample Type | Recovery (%) | blows/300 mm | Water Content (%) | | | | | | |
| | | | | | | | | PL | 0 | LL | | | | |
| 0 | | Ground Surface | 100 | | | | | | | | | | | |
| | | Asphalt (210 mm) | | | | | | | | | | | | |
| | | Concrete (140 mm) | | | | | | | | | | | | |
| | | Sand (SP) (225 mm) - light grey, damp, medium to coarse grain sizes, some silt.. | | S1 | Shelby Tube | | | | | | | | | |
| | | Clay (CH) - dark brown, moist, high plastic, some sand & gravel, trace black pockets. - below 0.9 m, trace sand & gravel. | | S2 | Shelby Tube | | | | | | | | | |
| 1 | | | 99 | S3 | Shelby Tube | | | | | | | | | |
| | | | | S4 | Shelby Tube | | | | | | | | | |
| | | | | S5 | Shelby Tube | | | | | | | | | |
| | | Silt (ML) - light brown, moist, low plastic, some clay. | | S6 | Shelby Tube | | | | | | | | | |
| 2 | | End of Test Hole - end of test hole at 2.0 m below grade. - moved test hole 2.0 m east. - no groundwater or sloughing encountered. - backfilled test hole with auger cuttings and topped with asphalt cold mix. | 98 | | | | | | | | | | | |
| 3 | | | 97 | | | | | | | | | | | |

ENG-TECH Consulting Limited

Logged by: ERM

Reviewed by: *CA*

Sample Type



Split Barrel



Shelby Tube



Auger Cuttings



Split Spoon

Drilled By: Paddock Drilling Ltd.

Drill Rig: Acker MP5-T

Auger Size: 125 mm Solid Stem

Completion Depth: 2.0 m

Completion Elevation: 98.0 m

Sheet: 1 of 1

ENG-TECH CONSULTING LIMITED

GEOTECHNICAL • ENVIRONMENTAL • MATERIALS TESTING

Client: UMA Engineering Ltd.

Project: City of Winnipeg 2007 Residential Street Renewal Program

Site: Logan Avenue

Location: See Figure 3

Test Hole #: TH 6

File No: 06-027-05

Date Drilled: December 13, 2006

Grade Elevation: 100.0 m (local)

Water Elevation: - -

| SUBSURFACE PROFILE | | | | SAMPLE DATA | | | | GRAIN SIZE DISTRIBUTION % | | | | |
|--------------------|-------------|---|---------------|-------------|-------------|--------------|--------------|---------------------------|------|------|------|--|
| Depth (m) | Soil Symbol | Description | Elevation (m) | Number | Sample Type | Recovery (%) | blows/300 mm | Water Content (%) | | | | |
| | | | | | | | | PL | 0 | LL | | |
| | | | | | | | | Gravel | Sand | Silt | Clay | |
| 0 | | Ground Surface <i>Asphalt (185 mm)</i> | 100 | | | | | | | | | |
| | | <i>Sand (SP) (210 mm)</i> - medium brown, moist, medium to coarse grain sizes, some gravel. | | S1 | | | | | | | | |
| | | <i>Clay Fill (CH)</i> - dark brown, moist, high plastic, with sand, trace gravel, some silt. | | S2 | | | | | | | | |
| | | - below 0.9 m, medium brown, occa. oxide & silt pocket. | | S3 | | | | | | | | |
| 1 | | | 99 | S4 | | | | | | | | |
| | | | | S5 | | | | | | | | |
| | | | | S6 | | | | | | | | |
| 2 | | <i>End of Test Hole</i> - end of test hole at 2.0 m below grade. - no groundwater or sloughing encountered. - backfilled test hole with auger cuttings and topped with asphalt cold mix. | 98 | | | | | | | | | |
| 3 | | | 97 | | | | | | | | | |

ENG-TECH Consulting Limited

Logged by: ERM

Reviewed by: *CA*

Sample Type



Split Barrel



Shelby Tube



Auger Cuttings



Split Spoon

Drilled By: Paddock Drilling Ltd.

Drill Rig: Acker MP5-T

Auger Size: 125 mm Solid Stem

Completion Depth: 2.0 m

Completion Elevation: 98.0 m

Sheet: 1 of 1

ENG-TECH CONSULTING LIMITED

GEOTECHNICAL • ENVIRONMENTAL • MATERIALS TESTING

Client: UMA Engineering Ltd.

Project: City of Winnipeg 2007 Residential Street Renewal Program

Site: Logan Avenue

Location: See Figure 3

Test Hole #: TH 7

File No: 06-027-05

Date Drilled: December 13, 2006

Grade Elevation: 100.0 m (local)

Water Elevation: - -

| SUBSURFACE PROFILE | | | | SAMPLE DATA | | | | GRAIN SIZE DISTRIBUTION % | | | | | | | |
|--------------------|-------------|--|---------------|-------------|-------------|--------------|--------------|---------------------------|---|----|--|--|--|--|--|
| Depth (m) | Soil Symbol | Description | Elevation (m) | Number | Sample Type | Recovery (%) | blows/300 mm | Water Content (%) | | | | | | | |
| | | | | | | | | PL | 0 | LL | | | | | |
| 0 | | Ground Surface Asphalt (140 mm) | 100 | | | | | | | | | | | | |
| | | Sand (SP) (425 mm) - medium brown, moist, medium to coarse grain sizes, some gravel. | | S1 | | | | | | | | | | | |
| | | Clay Fill (CH) - medium brown, moist, high plastic, some sand, trace gravel. | | S2 | | | | | | | | | | | |
| | | Clay (CH) - dark brown, moist, high plastic, some sand, some silt. | | S3 | | | | | | | | | | | |
| | | Clay (CH) - dark brown, moist, high plastic, some sand, some silt. - at 1.0 m, occa. grey pocket. | 99 | S4 | | | | | | | | | | | |
| | | Silt (ML) - light brown, moist, low plastic, some clay. | | S5 | | | | | | | | | | | |
| | | | | S6 | | | | | | | | | | | |
| 2 | | End of Test Hole - end of test hole at 2.0 m below grade. - no groundwater or sloughing encountered. - backfilled test hole with auger cuttings and topped with asphalt cold mix. | 98 | | | | | | | | | | | | |
| 3 | | | 97 | | | | | | | | | | | | |

ENG-TECH Consulting Limited

Logged by: ERM

Reviewed by:

Sample Type



Split Barrel



Shelby Tube



Auger Cuttings



Split Spoon

Drilled By: Paddock Drilling Ltd.

Drill Rig: Acker MP5-T

Auger Size: 125 mm Solid Stem

Completion Depth: 2.0 m

Completion Elevation: 98.0 m

Sheet: 1 of 1



#6 - 854 Marion Street
 Winnipeg, Manitoba
 R2J 0K4
 eng_tech@mts.net
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**PARTICLE SIZE
 ANALYSIS REPORT**

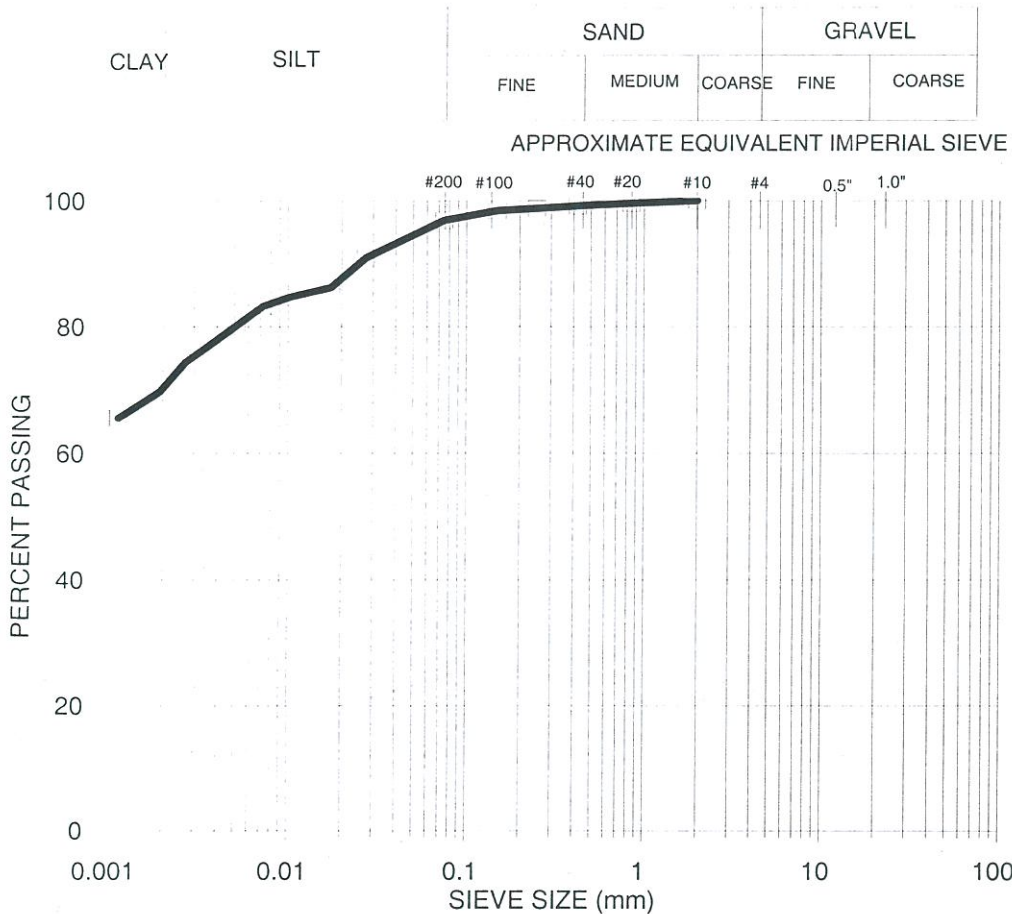
UMA Engineering Ltd.
 1479 Buffalo Place
 Winnipeg, Manitoba
 R3T 1L7

File No.: 06-027-05
Reference No.: 6-27-5-4

ATTENTION: Ron Bruce, P. Eng.

PROJECT: CITY OF WINNIPEG 2007 RESIDENTIAL STREET RENEWAL PROGRAM

Test Hole No. TH2 **Sample No.** S5 **Depth:** 0.7 m
Sampled By: ENG-TECH **Type of Sample:** Bag **Source:** Logan Ave.
Date Sampled: December 13/06 **Date Received:** December 13/06 **Date Tested:** December 20/06



| SIEVE SIZE (mm) | PERCENT PASSING |
|-----------------|-----------------|
| 2.0000 | 100.0 |
| 0.8500 | 99.6 |
| 0.4250 | 99.2 |
| 0.2500 | 98.8 |
| 0.1500 | 98.5 |
| 0.0750 | 96.9 |
| 0.0272 | 90.9 |
| 0.0175 | 86.3 |
| 0.0103 | 84.8 |
| 0.0073 | 83.3 |
| 0.0052 | 80.2 |
| 0.0027 | 74.4 |
| 0.0019 | 69.7 |
| 0.0011 | 65.6 |
| | |
| | |
| | |
| | |

Percent of: GRAVEL (0.0%), SAND (3.1%), SILT (26.7%) and CLAY (70.2%)
 Sample Description: Clay

COMMENTS:

ENG-TECH Consulting Limited

per *Clark Hryhoruk*
 Clark Hryhoruk, President
 Ph: (204) 233-1694 Fax: (204) 235-1579



Logan Avenue



Logan Avenue



Logan Avenue



Logan Avenue