750 St. David Street North

Geotechnical Investigation Report

Project Location:
750 St David Street North, Fergus, ON

Prepared for:
2587722 Ontario Inc.
750 St. David Street North
Fergus, ON N1M 2K9

Prepared by:
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April 26, 2024

MTE File No.: 54925-200

Engineers, Scientists, Surveyors.

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1.0 INTRODUCTION

MTE Consultants Inc. (MTE) was retained by 2587722 Ontario Inc. to conduct a geotechnical investigation for the proposed redevelopment of the property at 750 St. David Street North in Fergus, Ontario. The subject area (the site) is located on the northeast corner lot of the St. David Street North and Parkside Drive East intersection, as shown on **Figure 1 in Appendix A**.

The site currently has a residential home with a detached garage to the southeast of the building. It is understood, the existing residence is to be demolished and a 3-storey building consisting of stacked townhomes are to be constructed at the southwest half of the site. Parking areas and drive aisles are proposed for the redevelopment on the northeast side of the site. It is anticipated that the redevelopment will be provided with new municipal services. The design details of the redevelopment are referenced from Fryett Turner Architects Inc. Site Plan Drawing, dated November 25, 2023.

The ground surface in the area of the proposed townhomes is generally flat with a grade difference of up to 1.0m between the borehole locations.

The purpose of this geotechnical investigation is to determine the soil and groundwater conditions in the area of the proposed redevelopment and provide geotechnical engineering recommendations for site grading, site servicing, foundations, basements, floor slabs, and pavement design and subdrainage requirements.

2.0 FIELD AND LABORATORY PROGRAM

The fieldwork for this investigation was carried out on March 25, 2024, and involved the drilling of four (4) boreholes (Boreholes MW101-24 to MW104-24) to depths ranging from 4.7m to 6.5m. The locations of the boreholes are shown on the Site Plan, **Figure 1 in Appendix A**.

Private and public utility companies were contacted prior to the start of drilling activities in order to isolate underground utilities near the boring locations.

The boreholes were advanced with a Diedrich D50T track mounted drill rig equipped with continuous flight hollow stem augers, supplied and operated by London Soil Test Ltd.

Representative soil samples were recovered throughout the depths explored. Standard Penetration Tests (SPT) were carried out during sampling operations in the boreholes using conventional split spoon equipment. The SPT N-values recorded are plotted on the borehole logs in **Appendix B**.

Upon completion of drilling, three 50 mm diameter monitoring wells were installed in Boreholes MW101-24, MW103-24, and MW104-24 to allow measurement of stabilized groundwater levels and groundwater sampling and testing, if required. The installations comprised 1.5 m filtered screens with bentonite seals above. Details of the installation and groundwater observations and measurements are provided on the appended borehole logs.

The monitoring wells were installed in accordance to Ontario Regulation 468/10. A licensed well technician must properly decommission all wells before construction. The construction, maintenance and abandonment of the wells are regulated under the province's Water Resources Act.

The remaining borehole was backfilled with soil cuttings and bentonite in accordance with Ontario Regulation 468/10 (formerly O. Reg. 903) under the provinces Water Resources Act.

The fieldwork was monitored throughout by a member of our geotechnical engineering staff, who directed the drilling procedures; recorded SPT tests; documented the soil stratigraphies;

monitored the groundwater conditions and monitoring well installations; and transported the recovered soil samples to our office for further classification.

The geodetic ground surface elevations at the borehole locations were surveyed by MTE.

All of the soil samples collected were submitted for moisture content testing with the results provided on the borehole logs in **Appendix B**. Additionally, four soil samples were submitted for particle size distribution analyses and the results are provided in **Appendix C**. The remaining soil samples will be stored for a period of 1 month and will be discarded of at that time without prior request from the client to extend storage time.

3.0 SOIL CONDITIONS

Reference is provided to the appended borehole logs for soil stratigraphy details, SPT N-values, moisture content profiles, and groundwater observations and measurements. Soil conditions encountered in the boreholes typically include topsoil and fill overlying native deposits of sandy silt and glacial till.

3.1 Topsoil

Topsoil was encountered surficially for all boreholes drilled on site and was 125 to 500 mm thick (average thickness of 295 mm). The composition of the topsoil was typically dark brown sandy silt and was very moist at the time of the fieldwork.

3.2 Fill

Fill was encountered beneath the topsoil in each borehole and extended to depths of 1.5 m. The fill was brown to black in colour and typically ranges in composition from silty sand to sandy silt with trace gravel. SPT N-values measured in the fill range from 4 to above 12 per 300 mm penetration of the split spoon sampler indicating very loose to compact conditions.

Insitu moisture contents in the fill range from about 15 to greater than 40% indicating very moist to wet conditions.

3.3 Sandy Silt

Sandy silt was encountered beneath the topsoil and fill, in Boreholes BH102-24 to MW104-24 and was 0.8 to 1.5 m thick. The sandy silt was brown in colour and typically had the composition of sandy silt with trace gravel and clay. SPT N-values measured in the sand range from 4 to 13 blows per 300 mm penetration of the split spoon sampler indicating very loose to compact conditions. It is noted the loose conditions as well as organics were encountered within the upper sandy silt deposits at Borehole MW103-24.

Table 1 – Results of Sandy Silt Particle Size Distribution Analysis

Borehole Number	Sample Depth (mbgs)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
MW104-24	1.5 to 2.1	9	29	52	10

Insitu moisture contents in the silt range from about 13 to 23% indicating very moist to wet conditions.

3.4 Glacial Till

Glacial till was encountered beneath the fill and/or sandy silt in all of the boreholes and extends to the termination depth at each location. The glacial till typically comprises light brown to grey sandy silt till with trace to some gravel and clay. Cobbles were noted at variable depths in the till and should be expected throughout. The results of particle size distribution analyses conducted on samples of the glacial till are provided in **Appendix C** and summarized in the following table;

Table 2 - Results of Glacial Till Particle Size Distribution Analyses

Borehole Number	Sample Depth (mbgs)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
MW101-24	3.0 to 3.7	6	26	55	13
MW103-24	3.0 to 3.7	19	28	44	9
MW104-24	3.0 to 3.7	13	22	48	17

SPT N-values measured in the till range from 12 to above 50 blows per 300 mm penetration of the split spoon sampler indicating compact to very dense conditions.

Insitu moisture contents in glacial till range from about 5 to 15% indicating moist to wet conditions.

4.0 GROUNDWATER CONDITIONS

Groundwater observations and measurements were carried out in the open boreholes at the time of drilling and are summarized on the borehole logs. Wet soil conditions were encountered at depths of 1.5 to 2.3 m (Elevation 418.7 to 420.1 masl).

Monitoring wells were installed at the locations of Boreholes MW101-24, MW103-24, and MW104-24 to facilitate the collection of groundwater samples and measurement of groundwater elevation. Water level measurements were taken on April 12, 2024 are summarized in the following table;

Table 3 - Water Level Measurements on April 12, 2024

Monitoring Well Number	Ground Surface Elevation (masl)	Water Level Depth (mbgs)	Water Level Elevation (masl)
MW101-24	422.0	0.6	421.4
MW103-24	421.0	1.3	419.8
MW104-24	422.1	0.8	421.4

It should be noted that the groundwater levels can vary and are subject to seasonal fluctuations and local variations.

5.0 DISCUSSION AND RECOMMENDATIONS

5.1 General

The project will involve the redevelopment of the property at 750 St. David Street North in Fergus, Ontario. The site currently has a residential home on the property. It is understood, the existing residence is proposed to be demolished and a 3-storey building of stacked townhomes are to be constructed at the southwest half of the site. Parking areas and drive aisles are proposed for the redevelopment. It is anticipated that the redevelopment will be provided with new municipal services.

The subsurface stratigraphy at the site comprises topsoil and fill overlying native deposits of sandy silt, and glacial till. Water level measurements within the installed monitoring wells range from 0.6 to 1.3 mbgs (Elevation 419.8 to 421.4 m).

Based on the results of this geotechnical investigation the site is suitable for the proposed redevelopment; however, the upper loose native soils will affect design and construction. The following subsections of this report contain geotechnical recommendations pertaining to development of the property including site grading, site servicing, foundations, basements, floor slabs, and pavement design and subdrainage requirements.

5.2 Site Preparation

The first construction activity that will be required for the proposed redevelopment will be demolishing the existing building at the site. All existing foundations and slabs must be removed. The fill surrounding the existing building should also be removed; however, the depth of the fill was not confirmed at the time of this report.

Prior to carrying out any engineering fill operations all fill, topsoil, trees, and deleterious material should be removed from the proposed building and parking areas. The average depth of topsoil and fill measured in the boreholes was 295 mm and 1.5 m, respectively. The topsoil and fill could be used in landscaping areas to raise grades.

The subgrade should be inspected, and proof rolled in the presence of qualified geotechnical personnel to verify if the subgrade will provide support as intended in the original design. The primary purpose of the inspection is to identify poorly performing areas which should be sub-excavated.

Structural fill used for raising grades beneath the proposed buildings footings should comprise granular material such as OPSS 1010 Granular ‘B’, if required. Subgrade fill material beneath the proposed pavement areas and services should meet the requirements of OPSS 1010 Select Subgrade Material. Any imported fill should be tested and verified by qualified geotechnical personnel prior to placement.

The majority of the native soils are considered suitable for reuse as engineered fill. Wet soils are not considered suitable for engineered fill. Granular material such as OPSS 1010 Granular ‘B’ may also be used as engineered fill. All engineered fill should be placed in maximum 300 mm thick lifts and compacted to the following percentages;

Table 4 - Engineered Fill Requirements

Fill Use	Minimum Compaction Required
Structural fill to support buildings	100% SPMDD
Subgrade fill beneath pavements or services	98% SPMDD
Bulk fill in landscape areas	90% SPMDD

The native subgrade soils are susceptible to disturbance and it is recommended that construction traffic on the subgrade be minimized.

Structural fill pads should extend a minimum 0.3 m beyond the edge of the footing envelope of any building and down to subgrade at an angle of 45 degrees to the horizontal. Full time testing by geotechnical personnel is required during fill placement and compaction to monitor material quality, lift thickness, and verify the compaction by in-situ density testing (as per the 2012 Ontario Building Code).

In order to minimize the effects of weather and groundwater, fill operations onsite should be carried out in the dry summer months.

5.3 Site Servicing

5.3.1 Excavations and Dewatering

It is anticipated the redevelopment will be provided with new municipal services. It is anticipated that the invert levels of the sewers will be at conventional depths.

Temporary excavations to conventional depths for installation of underground pipes at this site must comply with the Ontario Occupational Health and Safety Act and Regulations for Construction Projects. The topsoil, fill and sandy silt encountered in the boreholes would be classified as Type 3 soils (O. Reg. 213/91, s. 226 (4)). Temporary side slopes must be cut at an inclination of 1.0 horizontal to 1.0 vertical or less from the base of the excavation for open cut pipe installation. The compact to very dense glacial till soils encountered at the site are classified as Type 2 soils. Temporary side slopes for Type 2 soils can be cut near vertical to 1.2 m above the base of excavation and at an inclination of 1 horizontal to 1 vertical or less above this level, exclusive of groundwater effects. Where wet conditions are encountered, excavation side slopes should be expected to slough to flatter inclinations, potentially 3.0 horizontal to 1.0 vertical or flatter.

Trench side slopes must be continuously inspected especially after periods of heavy rainfall or snow melt to identify areas of instability. Surface water should be directed away from entering the trench.

Minor groundwater inflow should be expected where excavations extend into the wet glacial till encountered in Boreholes MW101-24 to MW104-24 at depths of 1.5 to 3.0m (Elevation 417.9 to 420.5 masl). It is envisioned that conventional sump pump techniques will be able to control the inflow.

It will be necessary to flatten or support the excavation side slopes where groundwater seepage is occurring to ensure stability. Every excavation that a worker may be required to enter shall be kept reasonably free of water (O. Reg. 213/91, s. 230).

It should be noted that an Environmental Activity and Sector Registry (EASR) or Permit to Take Water (PTTW), issued by the Ministry of Environment, Conservation and Parks, will be required

if the dewatering system/sumps result in a water taking of more than 50,000 L/day to 400,000 L/day, respectively. A hydrogeological assessment is recommended to be conducted prior to the start of construction to assess the EASR/PTTW requirements for the project.

5.3.2 Pipe Bedding

It is anticipated invert elevation of the pipes will be at conventional 2 to 3 m depths below ground surface. No bearing problems are anticipated for pipes set on native inorganic subsoil or imported structural fill. The bedding material may need to be thickened if excavations encounter soft or spongy soil from the base of the service trench.

Pipe bedding for sewer services should be conventional Class 'B' pipe bedding comprising a minimum 150 mm thick layer of OPSS 1010 Granular 'A' aggregate below the pipe invert. Granular 'A' type aggregate should be provided around the pipe to at least 300 mm above the pipe and the bedding aggregate should be compacted to a minimum 98% Standard Proctor Maximum Dry Density (SPMDD), as per Township of Centre Wellington 2018 Development Manual.

5.3.3 Trench Backfilling

The trenches above the specified pipe bedding should be backfilled with inorganic onsite soils placed in 300 mm thick lifts and compacted to at least 95% SPMDD. Where trenches enter the proposed buildings the backfill should be compacted to 100% SPMDD or 5 MPa lean-mix concrete may be used. Wet native mineral soils are not considered suitable for reuse as trench backfill. Any additional material required to be imported at the site should meet OPSS Select Subgrade Material specifications.

To minimize potential problems, backfilling operations should follow closely after excavation so that only a minimal length of trench is exposed. Care should be taken to protect side slopes of excavations by diverting surface run-off away from the excavations. If construction extends into the winter, then additional steps should be taken to minimize frost and ensure that frozen material is not used as backfill.

5.4 Pavement Structure

It is understood that pavements will be constructed for new drive aisles and parking areas at the site The existing fill, topsoil, trees, and deleterious material in the vicinity of the drive aisles, and proposed parking areas should be removed. The subgrade is expected to comprise loose to compact native soils or approved engineered fill.

The pavement component thicknesses in the following table are recommended based on the proposed pavement usage and the frost-susceptibility and strength of the subgrade soils.

Table 5 – Pavement Design

Pavement Component	Light Duty Areas	Heavy Duty Areas
Asphalt Hot Mix	90 mm	120 mm
OPSS 1010 Granular ‘A’ Base	150 mm	150 mm
OPSS 1010 Granular ‘B’ Subbase	400 mm	400 mm

Samples of aggregates should be checked for conformance to OPSS 1010 prior to utilization on site and during construction. The Granular 'B' subbase and Granular 'A' base courses must be compacted to 100% SPMDD, as verified by insitu density testing.

The asphaltic concrete paving materials should conform to the requirements of OPSS 1150. The asphalt should be placed and compacted in accordance with OPSS 310. The Performance Graded Asphalt Cement (PG-AC) designation for the asphaltic concrete is 58-28.

The asphaltic concrete should comprise 40 mm of the HL3 surface over 50 mm of HL8 binder for light duty and car parking areas and 40 mm of HL3 surface over 80 mm of HL8 binder for truck traffic areas.

The pavement design is based on the assumption that construction will be carried out during the drier time of the year and that the subgrade soil is stable as determined by proof-rolling inspected by qualified geotechnical personnel. If the subgrade is wet and unstable, additional granular subbase or geogrid reinforcement will be required.

All materials and construction services required for the work should be in accordance with the relevant sections of the Ontario Provincial Standard Specifications.

It is **strongly recommended** to install subdrains beneath the low lying areas of the pavement structure and connected to catchbasins. The purpose of the subdrains is to remove excess subsurface water in order to improve overall pavement serviceability and increase the pavement life.

The work of subdrain installation shall be in accordance with OPSS 405 and OPSD 216.021. The subdrain shall be 150 mm diameter perforated pipe conforming to OPSS 1801 or 1840, and wrapped with geotextile conforming to OPSS 1860.

5.5 Curbs, Gutters, and Sidewalks

The concrete for curbs, gutters and sidewalks should be proportioned, mixed, placed and cured in accordance with the requirements of OPSS 353, and OPSS 1350 and shall meet the following specific requirements (OPSS 353.05.01):

- Minimum compressive strength = 32 MPa at 28 days;
- Coarse aggregate = 19.0 mm nominal max. size;
- Maximum slump = 60 mm for curbs and gutter, 70 mm for sidewalks; and
- Air entrainment = 6.5 ± 1.5%.

During cold weather any freshly placed concrete must be covered with insulating blankets to protect against freezing as per OPSS 904. Three cylinders from each days pour should be taken for compressive strength testing. Air entrainment, temperature and slump tests should be conducted on the same batch of concrete from the test cylinders made.

5.6 Foundation Design

It is understood that 3-storey building of stacked townhomes are to be constructed at the southwest half of the site. It is also understood that the townhomes may have basements and the buildings will be constructed using conventional strip and/or pad footings.

In general, the undisturbed compact to very dense native mineral soils are considered suitable to support the proposed buildings foundations. The following table provides the minimum

recommended depth and elevation for footing placement on suitable native mineral soil elevation.

Table 6 – Recommended Footing Elevation for Building Footings

Borehole Number	Borehole Ground Surface Elevation (masl)	Depth Below Existing Ground Surface to Suitable Native Soil (mbgs)	Native Soil Type	Elevation of Suitable Native Soil (masl)
MW101-24	422.0	3.0	Glacial Till	419.0
BH102-24	421.9	3.0	Glacial Till	418.9
MW103-24	421.0	3.0	Glacial Till	417.9
MW104-24	422.1	3.0	Glacial Till	419.0

Conventional spread footings founded on the suitable undisturbed native mineral soils or approved structural fill may be designed for a factored geotechnical bearing resistance at Ultimate Limit States (ULS) of 225 kPa, and soil bearing resistance for 25 mm of settlement at Serviceability Limit States (SLS) of 150 kPa.

The founding native mineral soils are susceptible to disturbance by construction activity, especially during wet weather and care should be taken to preserve the integrity of the material as bearing strata.

The footing areas must be inspected by qualified geotechnical personnel to ensure that the soil/rock conditions encountered at the time of construction are suitable to support the design resistances prior to pouring concrete. Any loose, disturbed, organic and deleterious material identified during the inspection should be removed from the footing areas and replaced with concrete.

All exterior floor slabs and footings in unheated areas must be provided with a minimum 1.2 m of earth cover or equivalent insulation after final grading in order to minimize the potential of damage due to frost action, as per Ontario Provincial Standard Drawing, OPSD 3090.101, dated November 2010. It is noted that the earth cover or insulation is not required for footing bearing on clean rock. If construction is undertaken during the winter, the subgrade soil and concrete should be protected from freezing.

Where spread footings are constructed at different elevations, the difference in elevation in the individual footing should not be greater than one half of the clear distance between the footings. The lower footing should be constructed first so that if it is necessary to construct the lower footings at a greater depth than anticipated, the elevation of the upper footings can be adjusted accordingly. Stepped strip footings should be constructed in accordance with OBC Section 9.15.3.8.

A Site Classification ‘D’ should be used for earthquake load and effects in accordance with Table 4.1.8.4.A. of the 2012 Ontario Building Code.

All excavations at the site should be carried out in conformance with the Ontario Occupational Health and Safety Act and Regulations for Construction Projects. The topsoil, fill, and sandy silt soils encountered at the site are classified as Type 3 soils, and temporary side slopes through this material must be cut at an inclination of 1.0 horizontal to 1.0 vertical or less from the base of the excavation. The compact to very dense glacial till soils encountered at the site are classified as Type 2 soils. Temporary side slopes for Type 2 soils can be cut near vertical to 1.2 m above the base of excavation and at an inclination of 1 horizontal to 1 vertical or less above this level,

exclusive of groundwater effects. Where wet conditions are encountered, excavation side slopes should be expected to slough to flatter inclinations, potentially 3.0 horizontal to 1.0 vertical or flatter.

5.6.1 Basements

The encountered wet conditions will impact basement design and it is recommended that further hydrogeological assessment be completed to determine the feasibility of conventional basements.

Basements at this site must be provided with perimeter weeping tile systems as per the Ontario Building Code (Section 9.14). The drain tile or pipe should be laid on undisturbed or well-compacted soil so that the top of the tile or pipe (minimum 100 mm diameter) is below the bottom of the basement floor slab. The top and sides of the drain tile or pipe shall be surrounded with not less than 150 mm of crushed stone or other clean coarse granular material containing no more than 10% of material that will pass the 4 mm sieve. The crushed stone should be wrapped with filter cloth. The weeping tile must drain to a suitable frost-free outlet or sump equipped with an automatic pump that will discharge water into a storm sewer service or other frost free outlet.

The portion of the exterior basement walls and floor slabs below finished ground level must be waterproofed as per the Ontario Building Code (Subsection 9.13.3). Free-draining sand materials should be used for basement wall backfill. The basement wall backfill should be graded to allow drainage away from the foundation.

The basement walls should be designed to resist the lateral earth pressure. For calculating the lateral earth pressure, the coefficient of earth pressure (K) may be assumed as 0.50 for cohesionless sandy soils and 1.0 for silt and clay (Section 24.12.3.3 Canadian Foundation Engineering Manual). The bulk unit weight of the retained backfill may be taken as 21 kN/m^3 for well-compacted soil. An appropriate factor of safety should be employed.

The subgrade for the basement floor slabs should comprise undisturbed native soil, or well-compacted fill. A minimum 100 mm thick layer of coarse clean granular material containing not more than 10% material that will pass a 4 mm sieve shall be placed beneath slabs in buildings as per Subsection 9.16.2 of the Ontario Building Code. If the subgrade soil is wet, we strongly recommend that subfloor weeping tiles be placed and connected to the sump pit.

If a moisture-sensitive floor finish is to be applied to the slab, then we recommend that a 15 mil polyethylene moisture vapour barrier be installed directly beneath the slab as per Article 9.13.2.7 of the Ontario Building Code. The purpose of the vapour barrier is to reduce moisture transfer by diffusion as per Article 5.5.1.2 of the Ontario Building Code. Joints in the vapour barrier should be lapped not less than 100 mm.

Concrete testing should be performed onsite to determine the slump, temperature, and air entrainment; and concrete cylinders should be cast for compressive strength testing.

5.7 Infiltration Potential

Given the relatively fine-grained nature of the native soils and the encountered wet conditions, insitu infiltration of rain water is not considered to be feasible on the site.

5.8 Construction Inspection and Testing

MTE recommends that geotechnical inspection and testing procedures be conducted throughout the various phases of the project.

Engineer site visits should be conducted to confirm geotechnical bearing resistances for footings. Soil compaction testing should be carried out on structural fill beneath the proposed buildings, foundation wall backfill, subslab granular fill, and trench backfill. Laboratory and field testing of the pavement structure components (granulars and asphaltic concrete) should be conducted, as well as concrete testing for foundations, curbs and sidewalks.

MTE offers soil compaction, concrete, and asphalt testing, as well as soil inspection services through our Stratford, Kitchener, and London offices.

6.0 LIMITATIONS OF REPORT

Services performed by MTE Consultants Inc. (MTE) were conducted in a manner consistent with the level of care and skill ordinarily exercised by members of the Geotechnical Engineering & Consulting profession practicing under similar conditions in the same geographic area were the services are provided. No other warranty or representation expressed or implied as to the accuracy of the information, conclusions or recommendations is included or intended in this report.

This report was completed for the sole use of the Client. This report is not intended to be exhaustive in scope or to imply a risk-free site. As such, this report may not deal with all issues potentially applicable to the site and may omit aspects which are or may be of interest to the reader.

In addition, it should be recognized that a soil sample result represents one distinct portion of a site at the time it is collected, and that the findings of this report are based on conditions as they existed during the time period of the investigation. The material in the report reflects our best judgment using the information available at the time the report was written. The soil and groundwater conditions between and beyond the test holes may differ from those encountered in the test holes. Should subsurface conditions arise that are different from those in the test holes MTE should be notified to determine whether or not changes should be made as a result of these conditions.

It should be recognized that the passage of time may affect the views, conclusions and recommendations (if any) provided in this report because groundwater conditions of a property can change, along with regulatory requirements. All design details were not known at the time of submission of this report and it is recommended MTE should be retained to review the final design documents prior to construction to confirm they are consistent with our report recommendations. Should additional or new information become available, MTE recommends that it be brought to our attention in order that we may determine whether it affects the contents of this report.

Any use which another party makes of this report, or any reliance on, or decisions to be made based upon it, are the responsibility of such parties. MTE accepts no responsibility for liabilities incurred by or damages, if any, suffered by another party as a result of decisions made or actions taken, based upon this report. Others with interest in the site should undertake their own investigations and studies to determine how or if the condition affects them or their plans. The contractors bidding on this project or undertaking the construction should make their own interpretation of the factual information and draw their own conclusions as to how subsurface conditions may affect their work.

The benchmark and elevations provided in this report are primarily established to identify differences between the test hole locations and should not be used for other purposes such as, planning, development, grading, and excavation.

All of which is respectfully submitted,

MTE Consultants Inc.

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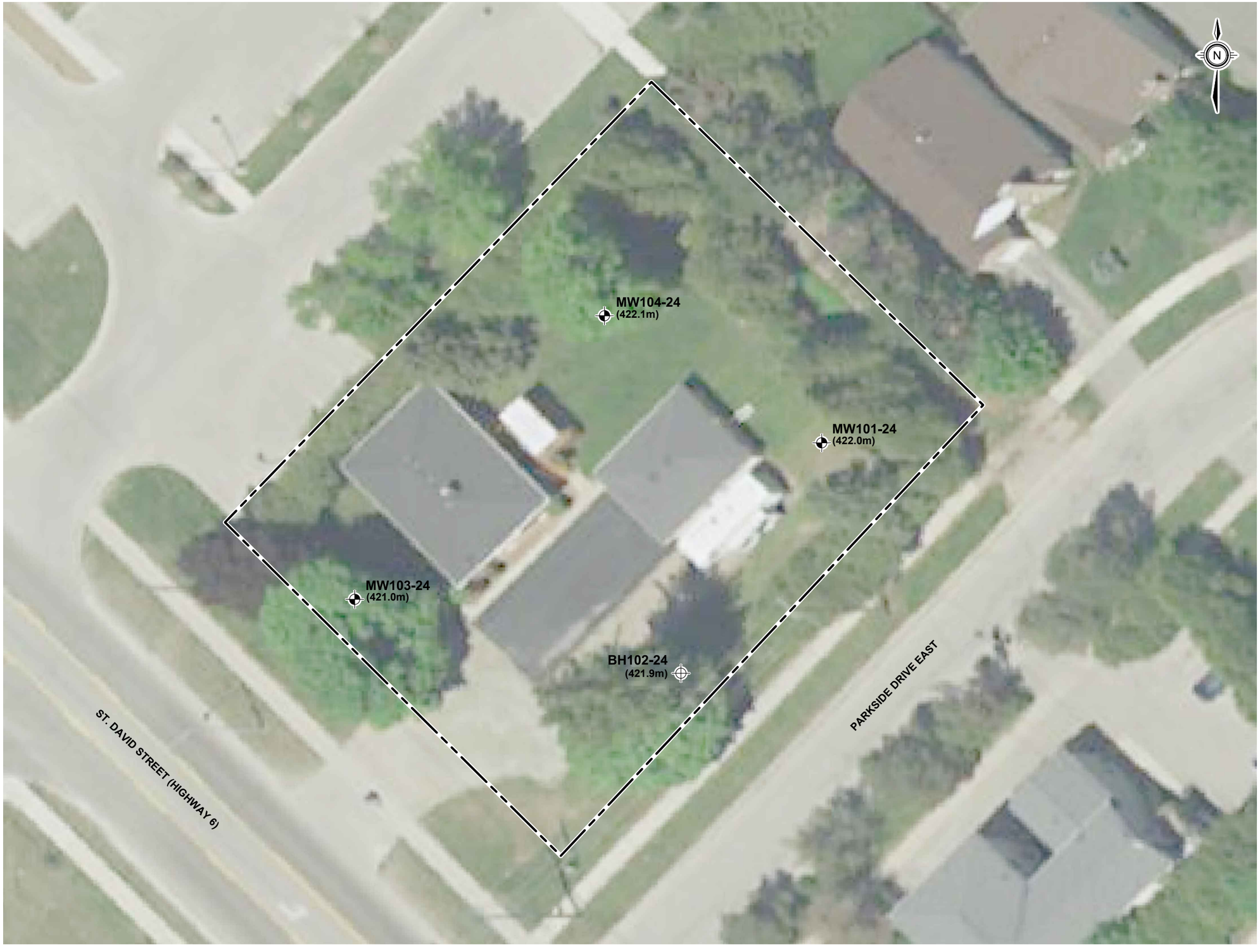
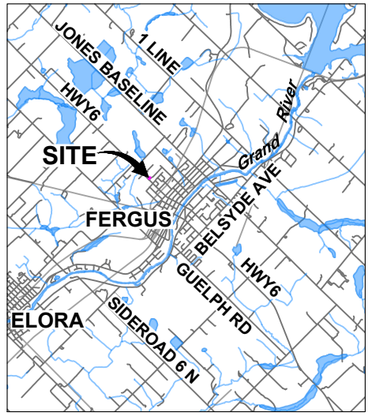
Appendix A

Figures





KEY PLAN (nts)

LEGEND

- BOREHOLE
- BOREHOLE/MONITORING WELL

(422.0m) ELEVATION (m AMSL)

REFERENCES

SOUTHWESTERN ONTARIO ORTHOPHOTOGRAPHY PROJECT (2015), SOURCE: DATA PROVIDED BY ONTARIO MINISTRY OF NATURAL RESOURCES AND FORESTRY, © COPYRIGHT: 2024 KINGS PRINTER OF ONTARIO, ALL RIGHTS RESERVED.; AND
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NOTES

THIS FIGURE IS SCHEMATIC ONLY AND TO BE READ IN CONJUNCTION WITH ACCOMPANYING TEXT.

ALL LOCATIONS ARE APPROXIMATE.

0 3 6 9 12 15m

MTE
Engineers, Scientists, Surveyors

PROJECT
GEOTECHNICAL INVESTIGATION
750 ST. DAVID STREET NORTH,
FERGUS, ONTARIO

TITLE
SITE PLAN

Drawn: SS	Scale: 1:300	Figure: 1
Checked:	Project No.: 54925-200	
Date: 2024-04-18	Rev No.: 0	

Appendix B

Borehole Logs

The following are abbreviations and symbols commonly used on borehole logs, figures and reports.

Sample Types

AS	Auger Sample
CS	Chunk Sample
BS	Bulk Sample
GS	Grab Sample
WS	Wash Sample
SS	Split Spoon
RC	Rock Core
SC	Soil Core
TW	Thinwall, Open
TP	Thinwall, Piston

Soil Tests

PP	Pocket Penetrometer
FV	Field Vane
SPT	Standard Penetration Test
CPT	Cone Penetration Test
WC	Water Content
WL	Water Level

Penetration Resistance

Standard Penetration Test, N (ASTM D1586)	The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in.) required to drive a 50 mm (2 in.) open spilt spoon sampler for a distance of 300 mm (12 in.).
Dynamic Cone Penetration Resistance	The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in.) required to drive an uncased 50 mm (2 in.) diameter, 60o cone attached to “A” size drill rods for a distance of 300 mm (12 in.).

Soil Description

Cohesive Soils	Undrained Shear Strength (Cu)	
Consistency	kPa	psf
Very Soft	0 to 12	0 to 250
Soft	12 to 25	250 to 500
Firm	25 to 50	500 to 1,000
Stiff	50 to 100	1,000 to 2,000
Very Stiff	100 to 200	2,000 to 4,000
Hard	Above 200	Above 4,000

Cohesionless Soils	
Relative Density	SPT N Value
Very Loose	0 to 4
Loose	4 to 10
Compact	10 to 30
Dense	30 to 50
Very Dense	Above 50

WH	Sampler advanced by static weight of hammer
WR	Sampler advanced by static weight of drilling rods
PH	Sampler advanced by hydraulic force
PM	Sampler advanced by manual force

DTPL	Drier than Plastic Limit
APL	About Plastic Limit
WTPL	Wetter than Plastic Limit
mbgs	Metres below Ground Surface

ID No.: MW101-24

Project Name: 750 St. David Street North Geotechnical Investigation

MTE File No.: 54925-200

Client: 2587722 Ontario Inc.

Site Location: 750 St. David Street North, Fergus

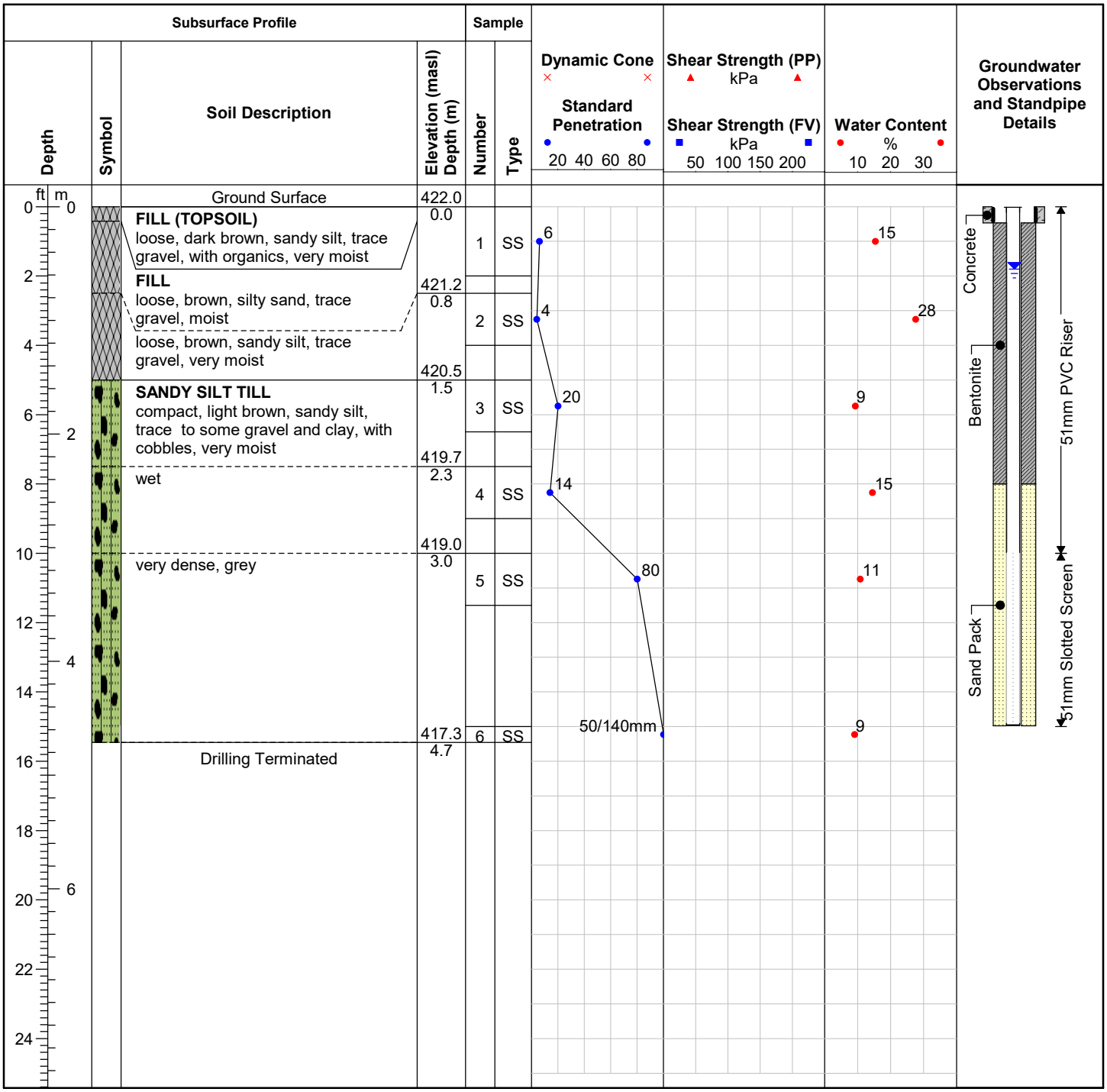
Date Completed: 3/25/2024

Drilling Contractor: London Soil Test Ltd.

Drill Rig: Diedrich D-50T Track

Drill Method: Hollow Stem Augers

Protective Cover: Flush Mount



Field Technician: H. Sandhu

Drafted by: N. Baird

Reviewed by: D. Gonser

Sheet: 1 of 1

Notes:
Water encountered at 2.3mbgs (Elevation 419.7masl) during drilling
Water measured at 0.6mbgs (Elevation 421.4masl) on April 12, 2024

ID No.: BH102-24

Project Name: 750 St. David Street North Geotechnical Investigation

MTE File No.: 54925-200

Client: 2587722 Ontario Inc.

Site Location: 750 St. David Street North, Fergus

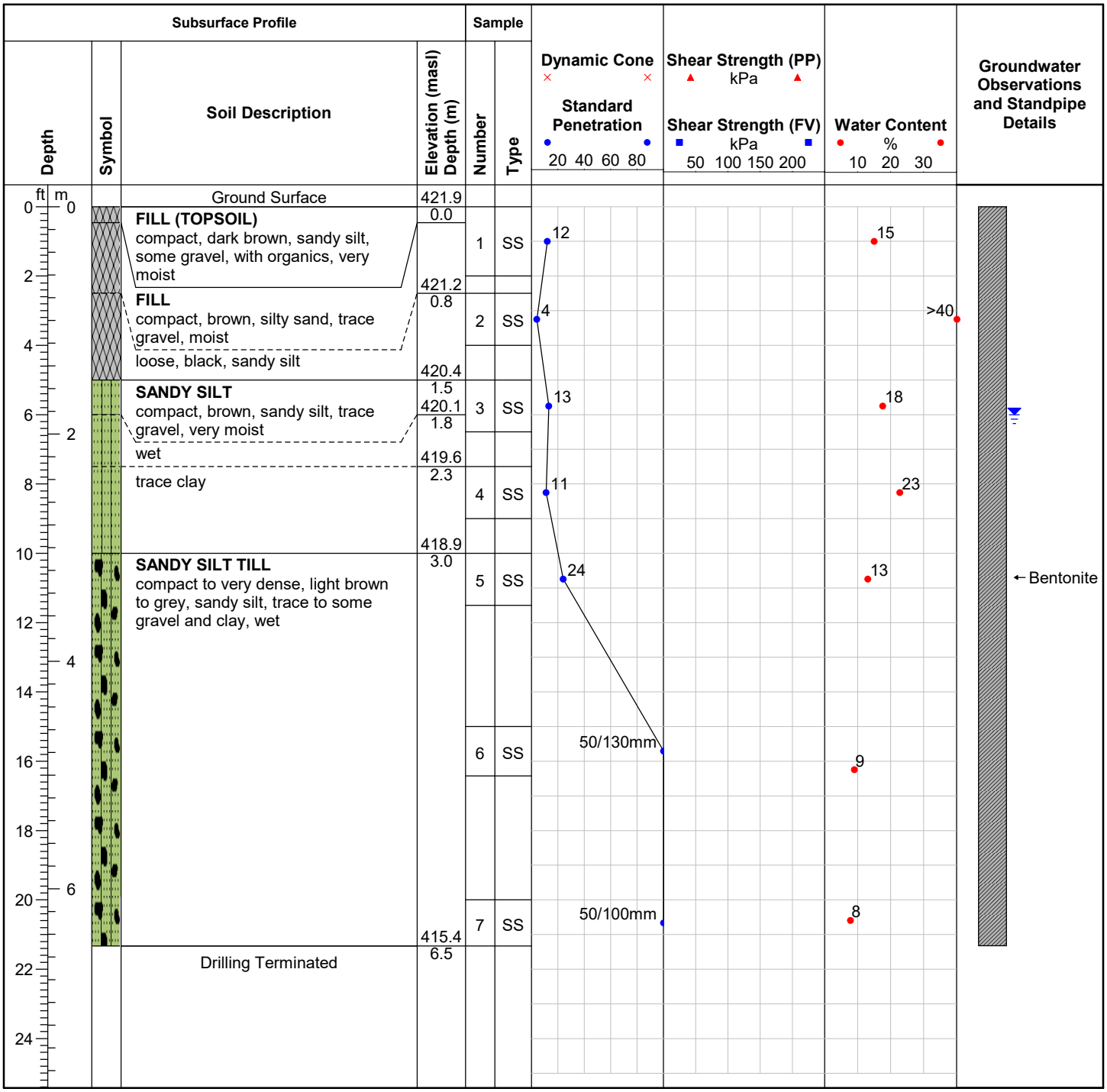
Date Completed: 3/25/2024

Drilling Contractor: London Soil Test Ltd.

Drill Rig: Diedrich D-50T Track

Drill Method: Hollow Stem Augers

Protective Cover: N/A



Field Technician: H. Sandhu

Drafted by: N. Baird

Reviewed by: D. Gonser

Notes:
Water encountered at 1.8mbgs (Elevation 420.1masl) during drilling

ID No.: MW103-24

Project Name: 750 St. David Street North Geotechnical Investigation

MTE File No.: 54925-200

Client: 2587722 Ontario Inc.

Site Location: 750 St. David Street North, Fergus

Date Completed: 3/25/2024

Drilling Contractor: London Soil Test Ltd.

Drill Rig: Diedrich D-50T Track

Drill Method: Hollow Stem Augers

Protective Cover: Flush Mount

Depth (ft / m)	Symbol	Soil Description	Elevation (masl) / Depth (m)	Sample Number	Sample Type	Dynamic Cone / Standard Penetration (20 40 60 80)	Shear Strength (PP) kPa / Shear Strength (FV) kPa (50 100 150 200)	Water Content % (10 20 30)	Groundwater Observations and Standpipe Details
0 / 0		Ground Surface	421.0						
		FILL (TOPSOIL) loose, dark brown, sandy silt, trace gravel, with organics, very moist	0.0 / 420.5	1	SS	8		22	
2		**FILL** loose, dark brown, sandy silt, trace gravel, with organics, very moist	0.5						
		loose, dark brown to brown, sandy silt, trace gravel, very moist	419.5	2	SS	4		15	
4 / 2		**SANDY SILT** loose to compact, brown, sandy silt, trace gravel, with organics, wet	1.5 / 418.7	3	SS	4		23	
8		trace clay	2.3 / 417.9	4	SS	13		13	
10		**SANDY SILT TILL** very dense, brown to grey, sandy silt, trace to some gravel and clay, with cobbles, wet	3.0 / 416.4	5	SS	58		11	
12 / 4		moist	4.6	6	SS	50/100mm		5	
16									
18									
20 / 6			414.7	7	SS	50/75mm		7	
		Drilling Terminated	6.3						
22									
24									

Groundwater Observations and Standpipe Details: Concrete; Bentonite; Sand Pack; 51mm PVC Riser; 51mm Slotted Screen

Field Technician: H. Sandhu

Drafted by: N. Baird

Reviewed by: D. Gonser

Sheet: 1 of 1

Notes:
Water encountered at 1.5mbgs (Elevation 419.5masl) during drilling
Water measured at 1.3mbgs (Elevation 419.7masl) on April 12, 2024

ID No.: MW104-24

Project Name: 750 St. David Street North Geotechnical Investigation

MTE File No.: 54925-200

Client: 2587722 Ontario Inc.

Site Location: 750 St. David Street North, Fergus

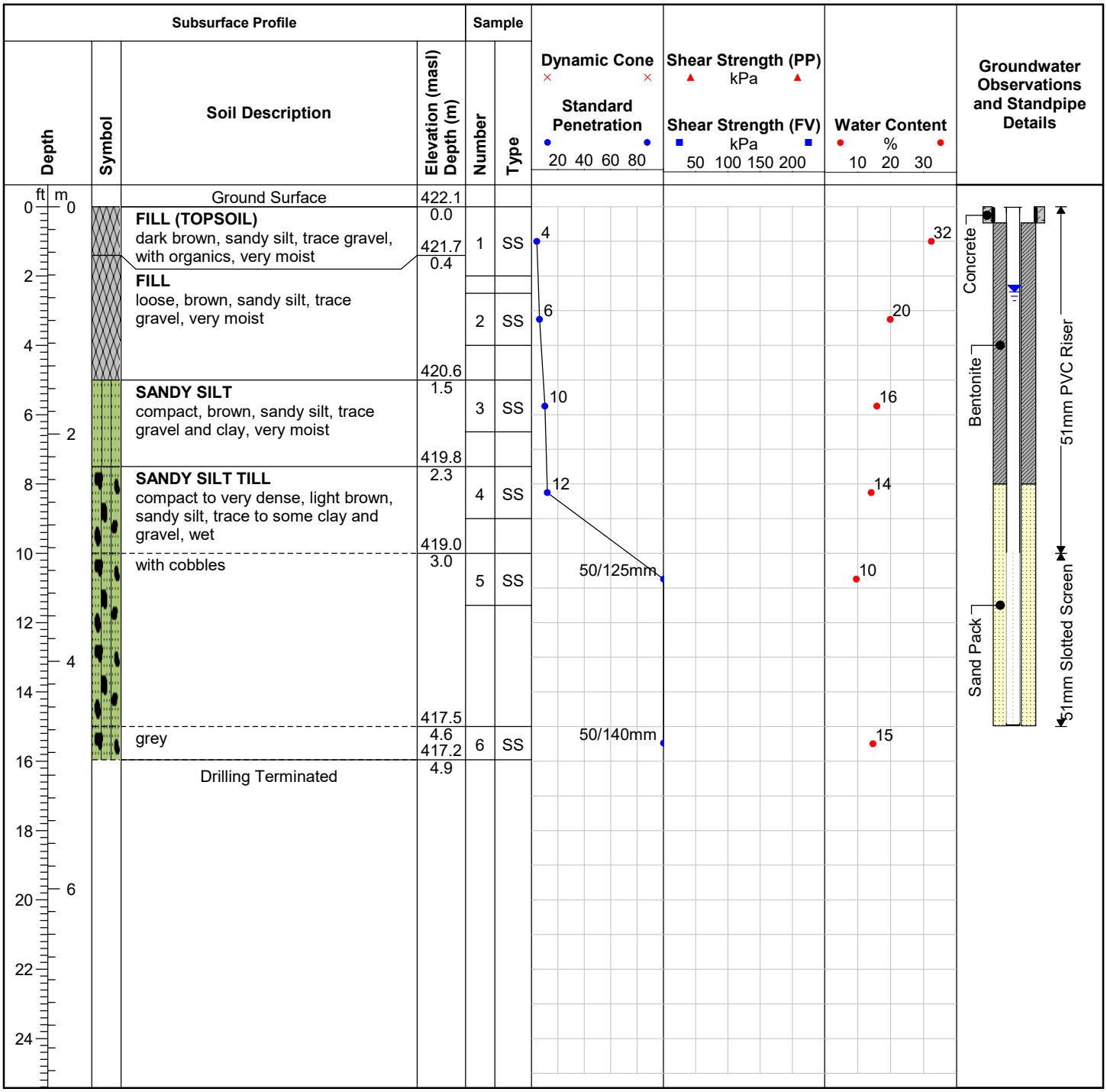
Date Completed: 3/25/2024

Drilling Contractor: London Soil Test Ltd.

Drill Rig: Diedrich D-50T Track

Drill Method: Hollow Stem Augers

Protective Cover: Flush Mount



Field Technician: H. Sandhu

Drafted by: N. Baird

Reviewed by: D. Gonser

Sheet: 1 of 1

Notes:
Water encountered at 2.3mbgs (Elevation 419.8masl) during drilling
Water measured at 0.8mbgs (Elevation 421.3masl) on April 12, 2024

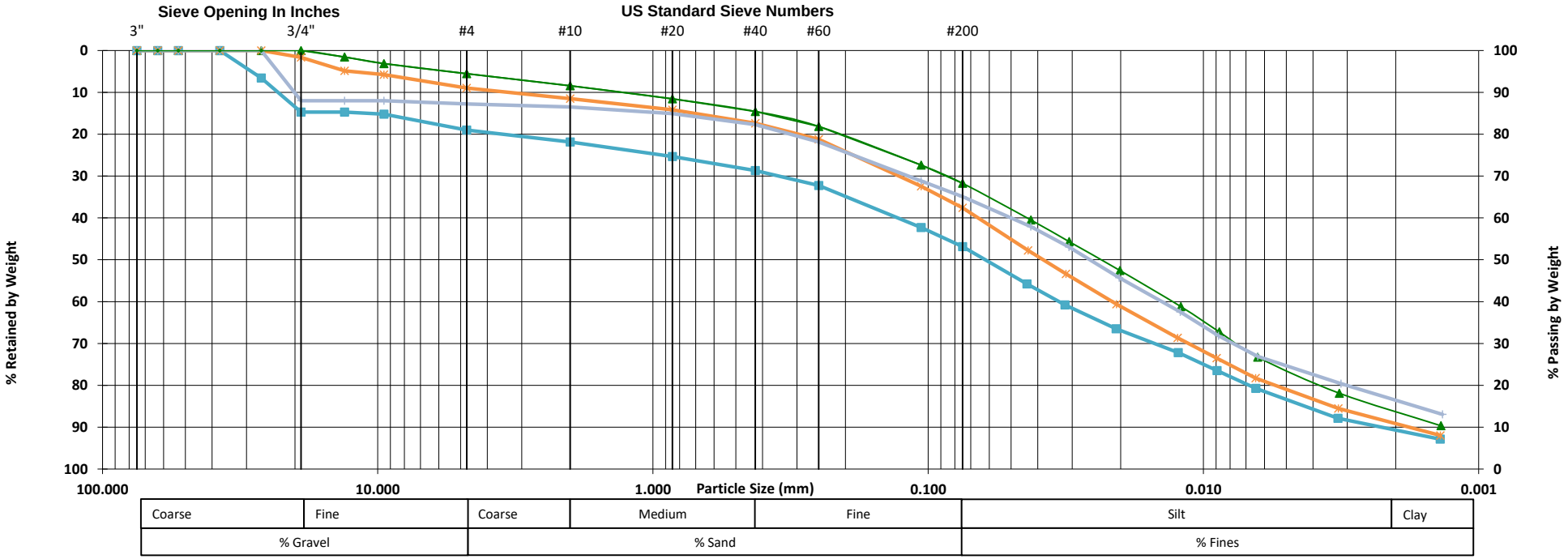
Appendix C

Laboratory Test Results

Particle Size Distribution Analysis Test Results

Project Name:	**Geotechnical Investigation**	**Date Sampled:**	**Mar. 25, 2024**	**MTE File No.:**	**54925-200**
Client:	**2587722 Ontario Inc.**	**Date Tested:**	**Apr. 4-8, 2024**	**Table No:**	**101**
Project Location:	**750 St. David Street North, Fergus, ON**				

Unified Soil Classification



Symbol	Borehole ID	Sample #	Sample Depth	Description
▲	MW101-24	SS-5	3.0-3.7 mbgs	Sandy SILT, some Clay, trace Gravel
■	MW103-24	SS-5	3.0-3.7 mbgs	Sandy SILT, some Gravel, trace Clay
✳	MW104-24	SS-3	1.5-2.1 mbgs	Sandy SILT, some Clay, trace Gravel
+	MW104-24	SS-5	3.0-3.7 mbgs	Sandy SILT, some Clay and Gravel

CERTIFIED BY CCIL
Canadian Council of Independent Laboratories
For specific tests as listed on www.ccil.com

NOTES: