FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT

55 Port Street East

City of Mississauga (TBD)
Region of Peel (TBD)

Prepared for

FRAM + SLOKKER

Project #: 17-548W

February 2018

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1. INTRODUCTION

1.1. Background

Urbantech West has been retained to prepare a Functional Servicing Report / Stormwater Management Report in support of an official plan and zoning by-law amendment application for 55 Port Street East (hereafter referred to as the "subject lands" or "site"). The site is located southeast corner of Port Street East and Helene Street South in the City of Mississauga. The legal description of this property is Block 9 and Block 10, Plan 43M-1463.

Please refer to **Figure 1** for the **Site Location Plan**

This report reviews offsite servicing capacities and provides functional servicing design and stormwater management information for the proposed development. The proposed site grading, site servicing and stormwater management designs are in accordance with accepted engineering practices, as well as, both City of Mississauga and Region of peel standards and specifications.

1.2. Subject Site

The site is approximately 0.23 ha in size and is currently occupied by an existing commercial building and associated parking. The site is bounded by Port Street East to the north, Lake Ontario/Waterfront Trail to the south, existing residential development to the east and Helene Street South to the west. The site is located in the Credit Valley Conservation Watershed, within the Norval to Port Credit subwatershed.

Based on the findings of the soil investigation undertaken for the adjacent property (Terraprobe Ltd., March 2001), the site is partially underlain by fill, at least 3 metres thick. The undisturbed stratigraphy in this area consists of sand and silt. The boreholes suggest a high ground water level at an elevation of 74 m which is similar to the level adjacent to Lake Ontario.

The Geotechnical Report and construction recommendations can be found in **Appendix A.**

1.3. Proposed Development

The proposed works include redeveloping the subject lands with a 10 storey, 35 unit residential development with underground parking areas, associated water, storm and sanitary servicing. Vehicle access to the loading bay is proposed at Port Street East.

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55 PORT STREET EAST

FIGURE 1
SITE LOCATION PLAN

PROJECT No.: 17-548W	FIGURE No.: 1
DATE: NOVEMBER 2017	
SCALE: 1:1250	

2. GRADING

The future grades required to service the site will generally be influenced by boundary conditions and matching existing grades on the north, south, east and west sides of the site. The site grading design will take into consideration the following requirements and constraints:

- Conform to City of Mississauga's design criteria.
- Minimize cut and fill operations and work towards a balanced site.
- Match existing boundary conditions.
- Provide overland flow conveyance for major storm conditions.
- Reduce the number of gravity servicing outlets.
- Reduce or eliminate the need for retaining walls.
- Provide suitable cover on proposed servicing.
- Achieve stormwater management and environmental objectives required for the site.

The grading has been designed to match the existing perimeter to minimize disturbance to the existing boundaries. Please refer to **Drawing GSP-1** for **Grading Plan**.

3. STORM SERVICING AND STORMWATER MANAGEMENT

3.1. Existing Storm Servicing

Currently the site is serviced for minor (10-year) system drainage. Flows are captured at three internal low points; one at the north end of the lot and two at the south end of the lot. Flows from the site are conveyed to a 450mm diameter storm sewer within Helene Street South. This sewer extends beneath the waterfront trail and discharges into Lake Ontario via a headwall.

The existing 10-year storm design sheet is included in **Appendix B.** The design sheet is re-created based on the following assumptions;

1) Storm sewers upstream of the site range from 375 mm to 450 mm in size. Presently a 3 m storm easement conveys the 100-year storm flows from a 0.11 ha residential development and conveys it through an inlet headwall (EX. HW2), to the existing storm sewer network and ultimately discharges into Lake Ontario.
2) Pipe size, lengths and slope are based on topographical surveyed data. Inverts at EX. HW1 and EX. HW2 were retrieved from the Plan and Profile drawings received from the Region of Peel.
3) The existing storm sewer only conveys minor flows (except at the inlet of EX. HW2). From the topographical survey and plan and profile it was noted that all CB's located on Port St. East and Helene St. South are not connected to the existing STM network.

3.2. Proposed Storm Servicing

The existing conditions flows that are conveyed from the site are shown in Table 2, with associated drainage areas and runoff coefficients. Flows are conveyed to the existing sewers via CB located in the parking lot at the north end of the site and two CB's at the rear end.

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Under proposed conditions flows from the subject lands will be captured at low points within the site and conveyed through the underground parking lot into EX. MH49. The existing structures within the site will be removed.

Drawing **GSP- 1** shows a single proposed drainage area. A weighted run-off coefficient of 0.73 was used to calculate proposed flows.

Table 1: Area breakdown and run-off coefficient

	Drainage Area (ha)	**Run-off Coefficient C**
Landscaped Area	0.08	0.25
Building Footprint	0.12	1
Hard Surface	0.03	1
Overall Site	**0.23**	**0.73**

The existing and proposed condition flows from the subject site are shown in Table 2.

Table 2: Existing and Proposed Conditions flows

Outlet Point	**Drainage Area**	**Runoff Coefficient**	**Description**	**Existing Condition Flows m^3/s**	
	(ha)			**Return Period (Years)**	
				10	**100***
Existing Condition	0.23	0.9	Conveyed to existing STM network via CB's	0.057	0.090
Proposed Condition	0.23	0.73	Drains to low points within the site and outlets into EX. MH 49	0.046	0.082

* As per City of Mississauga guidelines a 1.25 adjustment factor is incorporated in calculating the 100-year flow

The 10-year and 100-year design storm event flows were calculated using the rainfall intensity equation: $I\ (mm / hr) = A / (T+B)^C$, where T is the Time of Concentration in minutes. The values for the A, B and C parameters for the various storms were obtained from the latest Engineering Design Criteria from the City of Mississauga, with an initial time of concentration set at 15 minutes.

The 10-year flow from the existing development is $0.057m^3/s$ which is greater than the peak flows from the proposed development ($0.046m^3/s$), as demonstrated in Table 2.

Under existing conditions the 450mm diameter storm sewer downstream of EX. MH 49 with a slope of 0.25% (Plan and Profile – Region of Peel) has been estimated to be at 67% capacity (determined through Existing Conditions STM design sheet). Under proposed conditions the 100-year flow from the development will outlet into the existing storm sewer network. This added flow increases the pipe capacity to 85% (determined through Proposed Conditions STM design

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sheet). Since this is the last leg of the sewer before it outlets into Lake Ontario there are no anticipated impacts due to the increase in flow.

Refer to drawing **GSP-1** for servicing details.

The proposed 10-year storm design sheet is included in **Appendix B**.

3.3. Storm Water Management

3.3.1. Quantity and Quality Control

Post-development flows from the roof areas and hard surfaces will be directed to capture points and landscape areas. No Quantity control is required to facilitate the site (CVC SWM Criteria, August 2012) however some amount of retention will be provided at low points and landscaped areas.

Flows captured within the low point at the loading bay will be conveyed through the underground parking lot and will outlet into EX. MH49. Flows from south end of the lot will be directed to the landscaped areas, converge at a low point and will be conveyed to EX. MH49 through the underground parking lot.

Minor and Major system flows generated from the site directly outlet into Lake Ontario. Because the post-development flows are mainly directed to the landscaped areas with marginal flows conveyed through the loading bay, no quality control measures are proposed.

4. Sanitary Servicing

4.1. Wastewater Servicing Design Criteria

Wastewater infrastructure will be designed in accordance with the latest Region of Peel standards and specifications as follows:

Wastewater Design Criteria

- Average Dry Weather Flow: 302.8 litres per capita per day
- Infiltration: 0.2 litres per second per hectare
- Peaking Factor: Section 2.3 of Peel Region Standards
- Population: 2.7 people per unit

4.2. Existing Wastewater Infrastructure

The existing 450 mm wastewater sewer along Port Street East is the designated gravity outlet for wastewater servicing of the subject lands. Sanitary drainage is captured from the site and conveyed via 250mm diameter sanitary sewer to the existing control manhole outlet at Port Street East, north of the site.

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4.3. Proposed Wastewater Servicing

The existing 250mm sanitary sewer has sufficient capacity to convey flows from the proposed development. Refer to water demand calculations found in **Appendix B**

Refer to drawing **GSP-1** for servicing details.

5. Water Distribution

Water servicing for the development will conform to the Region of Peel Watermain Design Criteria (2010).

There are three existing fire hydrants in the immediate vicinity of the proposed development; one immediately north of the site on Port Street East, one north east of the subject lands on Port Street East and one North West off the intersection of Port Street East and Helene Street South.

Hydraulic Analysis is required to determine if the fire hydrant located in the immediate vicinity on Port Street can provide adequate fire protection to the site. Analysis will be provided at a later date.

Refer to Drawing **GSP-1** for further details.

6. Erosion and Sediment Control

The erosion and sediment control plan for the site will be designed in conformance with the City of Mississauga guidelines and CVC. Since the site falls within a CVC regulated area, a detailed erosion and sediment control plan will be prepared in support of a site alteration/O.Reg. 160/06 permit.

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7. Conclusion

The proposed residential development at Port Street East and Helene Street South can be serviced via the existing storm sewer, sanitary sewer and watermain on Port Street East. The development does not adversely impact any of the surrounding infrastructure or residential development.

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Appendix A:

Geotechnical Report

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Terraprobe

Consulting Geotechnical & Environmental Engineering
Construction Materials Engineering, Inspection & Testing

PRELIMINARY GEOTECHNICAL DESIGN PORT STREET RESIDENTIAL DEVELOPMENT MISSISSAUGA, ONTARIO

Prepared for:

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File No. 01153

March 7, 2001

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THE PROJECT

Terraprobe Limited was retained by the Fram Building Group to provide a preliminary geotechnical deisgn report for a proposed residential building in the Villages of Port Credit development. The proposed building is located on the south side of Port Street , east of the Helene Street right of way. The Site Plan is provided as Figure No. 1

It is proposed to build a multi- storey residential structure with two levels of underground parking. The structure is expected to occupy the site to the property lines. The founding level for the structure is anticipated to be approximately 6.5 metres below present grade level.

A subsurface investigation has been conducted an adjacent site by Terraprobe Limited (File No. 99335). From this investigation there are three borings near the eastern edge of the proposed residential development property. These borings are the basis of this preliminary report and the logs of the borings have been incorporated in Appendix A for reference purposes.

The scope of this assignment was to review this available information from the 1999 Terraprobe investigation and to provide, based on the previously secured subsurface information, interpretation, analysis and advice with respect to the geotechnical engineering aspects of the proposed development. The anticipated construction conditions pertaining to constructibility are discussed also, but only with regards to how these might influence the design. The environmental aspects of this project are beyond the scope of our work. It is understood that the environmental aspects of this project are being undertaken by Frontline Environmental Management on behalf of the owner.

SUBSURFACE CONDITIONS

The Borehole Location Plan is provided as Figure No. 1. The detailed results of the individual boreholes are recorded on the borehole logs in Appendix 'A'. The ground surface elevations at the borehole locations are referenced to the geodetic datum.

Stratigraphy

The boreholes suggest that site will be partially underlain by fill, at least 3 metres thick. In general, this fill is brown sand or silt material with gravel. Some of the borehole records indicate the presence of brick rubble, asphalt, and topsoil (organics) mixed within the soil fill matrix. Recent works on the site suggest that the organic materials may not be fill and are in fact undisturbed organic deposits that have been buried for some time. The density and consistency of the fill is highly variable.

The undisturbed stratigraphy in this area consists of surficial deposits of sand and silt. These deposits were found in a generally compact to dense state.

The significant underlying portion of the undisturbed stratigraphy is comprised of a glacial till with a clayey silt matrix. As is typical of glacial till deposits the matrix contains embedded sand and larger clasts. Locally, the till matrix grades to sandy silt and is cohesionless. The silt till deposit extends to the bedrock surface, where it was underlain by bedrock of the Georgian Bay Formation.

The bedrock surface is apparently shallower at the north end of the proposed site (Borehole 00-1), where the base of the overburden was found as high about 69.4 metres. The bedrock apparently dips toward Lake Ontario to the south. The most southerly of the borings (Borehole 00-6) found the surface of the bedrock as deep as Elevation 67 metres.

The bedrock of the Georgian Bay Formation is predominantly grey shale, which contains interbeds of limestone, dolostone, shaley limestone and calcareous sandstone. These harder interbedded layers are normally less than 300 mm thick. Experience at other excavations in the near lakefront area suggests that there will be some areas of the rock where up to a metre of the rock surface will be weathered and more fractured than underlying sound material.

Ground Water

The boreholes suggest a ground water level of about Elev. 74 metres, which is similar to the level in adjacent Lake Ontario. The ground water level is probably at this depth throughout most of the year. However, it should be noted that the observations made represent short term observations and the water levels are likely to vary seasonally and/or during wetter periods. Complete characterization of the ground water regime beneath the site

would be required over a period of several months because of the fine grained nature of the till soils and their low hydraulic conductivity.

GEOTECHNICAL DESIGN

Foundation Design Parameters

It is proposed to build a multi- storey structure with two levels of underground parking. The structure is expected to occupy the site to the property lines. The founding level for the structure is anticipated to be approximately 6.5 metres below present grade level, where it will likely encounter hard glacial till with a silty clay matrix. The proposed building can be constructed on conventional spread footings.

For preliminary purposes spread footings established on the hard clayey silt till can be designed for a maximum net allowable bearing pressure not exceeding 400 kPa. The settlement at this design bearing pressure is expected to be less than 20 mm. It is recommended that the minimum footing width for all spread foundations be 450 mm.

Another alternative is drilled footing foundations bearing on the shale bedrock of the Georgian Bay Formation. It can be assumed that these short drilled piers would have to penetrate the rock surface by about a metre to achieve founding on sound rock. Footings designed to bear on sound bedrock of the Georgian Bay Formation are routinely designed for end bearing pressures of up to 5000 kPa, and settlement of the units is limited to about 10 mm.

All footings exposed to freezing temperatures must be provided with at least 1.2 metres of earth cover for frost protection or equivalent insulation.

Earthquake Design Parameters

The Ontario Building Code (1997) provides an equation to calculate the minimum lateral earthquake force, V, for consideration in the structural design of the structure. This force can act non-concurrently in any direction on the structure.

$$V=0.6(vSIFW/R)$$

The terms, which are derived on the geographical and geotechnical conditions at this site, are the zonal velocity ratio, v, and the foundation factor, F. The zonal velocity ratio for this area, determined in accordance with Subsection 2.5.1.1 of the code, is 0.05. The foundation factor, F, appropriate for spread footing foundations established on the sand and silt, or glacial till is 1.0, from Table 4.1.9.1.C of the same code.

Slab on Grade Design Parameters

The modulus of subgrade reaction appropriate for slab design is 40,000 kN/m^3. The lowest floor of the building can be made as a slab on grade. Where the subgrade will be a dense glacial till. Care should be taken to preserve its integrity. Proof rolling or other vehicle traffic will only disturb or weaken this material and should be specifically precluded.

It is recommended that any building floor slabs be provided with a capillary moisture barrier drainage layer. A capillary moisture barrier can be made by placing the slab on a minimum 200 mm layer of 19 mm stone (OPSS 1004) compacted by vibration to a dense state.

Perimeter and subfloor drainage of the building is required.

Earth Pressure Design Parameters

The appropriate values for use in the design structures subject to unbalanced earth pressures at this site are tabulated as follows:

Soil	φ	γ	K_a	K_o	K_p
Compact Granular Fill Granular 'B', (OPSS 1010)	32	20	0.31	0.47	3.25
Fill	28	19	0.36	0.53	2.77
Undisturbed sand & silt	32	21	0.31	0.47	3.25
Glacial Till	35	22	0.27	0.43	3.65

Earth Pressure Design Considerations

Walls subject to unbalanced earth pressures must be designed to resist a pressure that can be calculated based on the following equation:

$$P = K[\gamma (h-h_w) + \gamma' h_w + q] + \gamma_w h_w$$

where:

- P = the horizontal pressure at depth, h (m)
- K = the earth pressure coefficient,
- h_w = the depth below the ground water level (m)
- γ = the bulk unit weight of soil, (kN/m^3)
- γ' = the submerged unit weight of the exterior soil, (γ - 9.8 kN/m^3)
- q = the complete surcharge loading (kPa)

Where the wall backfill can be drained effectively to eliminate hydrostatic pressures on the wall. Acting in conjunction with the earth pressure, this equation can be simplified to:

$$P = K[\gamma h + q]$$

This equation assumes that free-draining granular backfill such as Granular 'B' (OPSS 1010) is used and positive drainage is provided to ensure that there is no hydrostatic pressure acting in conjunction with the earth pressure.

Resistance to sliding of earth retaining structures is developed by friction between the base of the footing and the soil. This friction (R) depends on the normal load on the soil contact (N) and the frictional resistance of the soil ($\tan \varphi$) expressed as: $R = N \tan \varphi$. This is an ultimate resistance value and does not contain a factor of safety.

Passive earth pressure resistance is generally not considered as a resisting force against sliding for conventional retaining structure design because a structure must deflect significantly to develop the full passive resistance.

DESIGN CONSIDERATIONS FOR CONSTRUCTIBILITY

Excavation

It is anticipated that excavations for proposed foundations and site servicing will extend to depths of about 6.50 metres below proposed grades. Based on the findings in the boreholes, it is anticipated that earth fill, sand and silt, and glacial till materials will be encountered.

Where workers must enter excavations carried deeper than 1.2 metres (4 ft.) the trench excavations should be suitably sloped and/or braced in accordance with the Occupational Health and Safety Act and Regulations for Construction Projects, Nov. 1993 (Part III - Excavations, Section 226). These regulations designate four broad classifications of soils to stipulate appropriate measures for excavations safety. The materials found at this site can be classified as follows:

Earthfill:	Type 3 soil
Peat:	Type 3 soil
Sand and Silt, above water table:	Type 3 soil
Sand and Silt, below water table:	Type 4 soil
Glacial Till:	Type 1 soil

Site Work

Most of the soil at this site is fine-grained and will become weakened when subjected to traffic when wet. If there is site work carried out during periods of wet weather, then it can be expected that the subgrade will be disturbed unless an adequate granular working surface is provided to protect the integrity of the subgrade soils. The disturbance caused by the traffic can result in the removal of disturbed soil and use of fill material for site restoration or underfloor fill that is not intrinsic to the project requirements.

Where the clear stone capillary moisture barrier is used for the underfloor design, this material has poor stability under wheel loading and can be an impediment to other site activities such as steel and mechanical erection. If this is the case, substitution of the upper 50 mm with compacted Granular 'A' to provide a travel surface, constitutes no technical compromise to the capillary barrier effect intended.

If construction proceeds during freezing weather conditions, adequate temporary frost protection for the exposed soil in the foundation excavations is required. The soil at this site is susceptible to frost damage. Consideration must be given to frost effects, such as heave or softening, on exposed soil surfaces in the context of this particular project development.

Quality Control

The proposed structure will be founded on spread footing or drilled pier foundations. Prior to placing concrete for foundations, the foundation areas must be cleaned of all deleterious materials such as topsoil, fill, softened, disturbed or caved materials, as well as any standing water. The foundation bases must be evaluated by Terraprobe prior to placing concrete to ensure that the founding soil exposed at the excavation base is consistent with the design bearing intended by the geotechnical engineer. If Terraprobe is not retained to carry out foundation evaluations during construction, then Terraprobe accepts no responsibility for the performance or non-performance of the foundations, even if they are constructed in accordance with the design recommendations contained in this report. The on-site review of the condition of the foundation soil as the foundations are constructed is an integral part of the geotechnical design function and required by the Ontario Building Code.

It has been assumed that the concrete for this structure will be specified in accordance with the requirements of CAN3 - CSA A23.1. Terraprobe maintains a CSA certified concrete laboratory and can provide concrete sampling and testing services for the project as necessary.

The requirements for fill placement on this project have been stipulated relative to Standard Proctor Maximum Dry Density as determined by ASTM D698. In-situ determinations of density during fill placement, by procedure Method B of ASTM D2922 are recommended to demonstrate that the specified soil density is achieved. Terraprobe is a licensed operator of appropriate nuclear density gauges for this work and can provide sampling and testing services for the project as necessary. Terraprobe is also certified for aggregate and asphaltic concrete quality control by the Canadian Council of Independent Laboratories, (CCIL).

Terraprobe can provide through in house resources, quality control services for Building Envelope, Roofing and Structural Steel, as necessary, for the Structural and Architectural quality control requirements of the project. Terraprobe is certified by the Canadian Welding Bureau for work under CSA Standard W178.1

LIMITATIONS AND RISK

Procedures

This investigation has been carried out using investigation techniques and engineering analysis methods consistent with those ordinarily exercised by Terraprobe and other engineering practitioners, working under similar conditions and subject to the time, financial and physical constraints applicable to this project. The discussions and recommendations that have been presented are based on the factual data obtained from this geotechnical investigation.

The drilling work was carried out by a drilling contractor under the full-time supervision of a Terraprobe technician. The borings were made by a continuous flight power auger machine using solid stem augers. The supervising technician logged the borings and examined the samples as they were obtained. The samples obtained were sealed in clean, air-tight containers and transferred to the Terraprobe laboratory, where they were reviewed for consistency of description by a geotechnical engineer. Ground water observations were made in the boreholes as drilling proceeded. No long term ground water monitoring provisions were made in this investigative programme.

The samples of the strata penetrated were obtained using the technique, Split-Barrel Method, ASTM D1586. The samples were taken at intervals. The conventional interval sampling procedure used for this investigation does not recover continuous samples of soil at any borehole location. There is consequently some interpolation of the borehole layering between samples and indications of changes in stratigraphy as shown on the borehole logs are therefore approximate.

It must be recognized that there are special risks whenever engineering or related disciplines are applied to identify subsurface conditions. Even a comprehensive sampling and testing programme implemented in accordance with the most stringent level of care may fail to detect certain conditions. Terraprobe has assumed for the purposes of providing preliminary design parameters and advice, that the conditions that were found in boreholes immediately east of this site are similar to those that would be found on the subject property. The conditions that Terraprobe has assumed to exist for the purposes of this preliminary assessment may not be the conditions beneath the site. Site specific borings must be made prior to undertaking final design of a structure on this site or construction.

Changes In Site And Scope

It must also be recognized that the passage of time, natural occurrences, and direct or indirect human intervention at or near the site have the potential to alter subsurface conditions. Groundwater conditions are particularly susceptible to change as a result of season variation and alterations in drainage conditions.

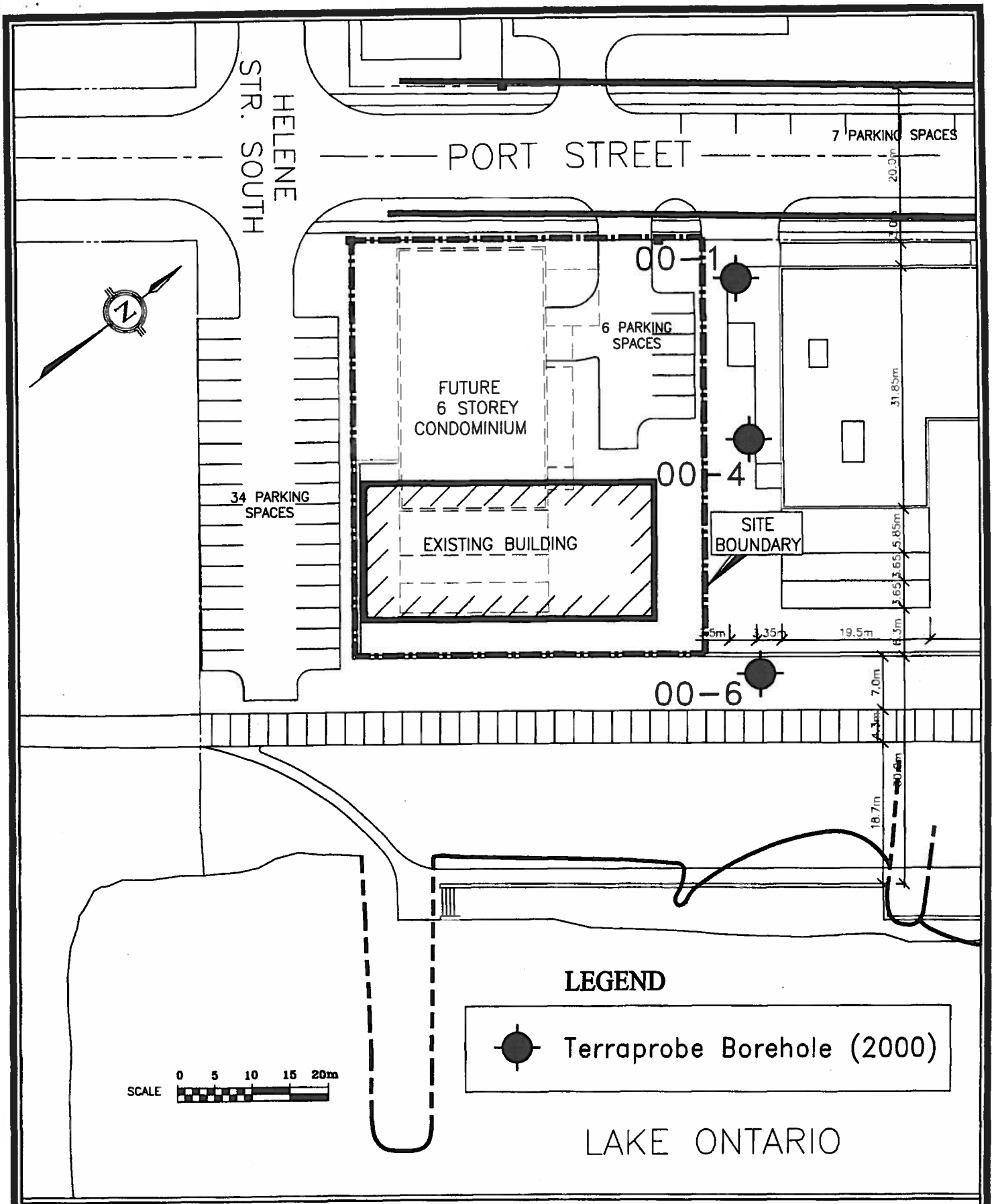
The discussions provided are based on the factual data obtained at specific borings in this area made by Terraprobe and are intended for use by the owner and preliminary designers in the preliminary design phase of the project. The project scope and development features are poorly defined at this time and the interpretations made of the subsurface information, the geotechnical design parameters and comments relating to constructibility issues and quality control may not be relevant or complete for the final project. Terraprobe should be retained to carry out a site specific investigation and review the implications of the findings from such investigation with respect to the contents of this report prior to undertaking final design work.

Terraprobe Limited

T. Orpwood, M.A.Sc., P.Eng.
Principal

FIGURES

Terraprobe Limited



BOREHOLE LOCATION PLAN

TERRAPROBE

File No. 01153

FIGURE 1

APPENDIX A

Terraprobe Limited

BOREHOLE LOGS

SAMPLING METHOD

SS	split spoon
ST	Shelby tube
AS	auger sample
WS	wash sample
RC	rock core
WH	weight of hammer
PH	pressure, hydraulic

PENETRATION RESISTANCE

Standard Penetration Test (SPT) resistance ('N' values) is defined as the number of blows by a hammer weighing 63.6 kg (140 lb.) falling freely for a distance of 0.76 m (30 in.) required to advance a standard 50 mm (2 in.) diameter split spoon sampler for a distance of 0.3 m (12 in.).

Dynamic Cone Test (DCT) resistance is defined as the number of blows by a hammer weighing 63.6 kg (140 lb.) falling freely for a distance of 0.76 m (30 in.) required to advance a conical steel point of 50 mm (2 in.) diameter and with 60° sides on 'A' size drill rods for a distance of 0.3 m (12 in.).

SOIL DESCRIPTION - COHESIONLESS SOILS

Relative Density	'N' value
very loose	< 4
loose	4 - 10
compact	10 - 30
dense	30 - 50
very dense	> 50

SOIL DESCRIPTION - COHESIVE SOILS

Consistency	Undrained Shear Strength, kPa	'N' value
very soft	< 12	< 2
soft	12 - 25	2 - 4
firm	25 - 50	4 - 8
stiff	50 - 100	8 - 16
very stiff	100 - 200	16 - 32
hard	> 200	> 32

SOIL COMPOSITION

	% by weight
'trace' (e.g. trace silt)	< 10
'some' (e.g. some gravel)	10 - 20
adjective (e.g. sandy)	20 - 35
'and' (e.g. sand and gravel)	35 - 50

TESTS, SYMBOLS

MH	mechanical sieve and hydrometer analysis
w, w_c	water content
w_l	liquid limit
w_p	plastic limit
I_p	plasticity index
k	coefficient of permeability
γ	soil unit weight, bulk
ϕ'	angle of internal friction
c'	cohesion shear strength
C_c	compression index

GENERAL INFORMATION, LIMITATIONS

The conclusions and recommendations provided in this report are based on the factual information obtained from the boreholes and/or test pits. Subsurface conditions between the test holes may vary.

The engineering interpretation and report recommendations are given only for the specific project detailed within, and only for the original client. Any third party decision, reliance, or use of this report is the sole and exclusive responsibility of such third party. The number and siting of boreholes and/or test pits may not be sufficient to determine all factors required for different purposes.

It is recommended Terraprobe be retained to review the project final design and to provide construction inspection and testing.

Terraprobe

LOG OF BOREHOLE 00-1

PROJECT: St. Lawrence Starch Condominiums
DATE: January 31, 2000
LOCATION: Port Credit, Ontario
EQUIPMENT: CME 45 Bombadier
CLIENT: Ralph Giannone, Architect
ELEVATION DATUM: Geodetic
FILE: 99335

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES
77.9	Ground Surface				
0.0	FILL - sand and gravel to silty sand, trace clay, glass and wood, brown		1	SS	17
			2	SS	8
76.5					
1.4	SANDY SILT TO SILT, some silt, compact, brown		3	SS	27
			4	SS	19
			5	SS	19
73.9					
4.0	CLAYEY SILT TILL, trace to some sand, trace gravel, hard, brown / grey		6	SS	31
			7	SS	50
			8	SS	42
69.4					
8.5	WEATHERED SHALE BEDROCK		9	SS	50/5cm
68.7					
9.2	End of Borehole				

ELEVATION SCALE: 77, 76, 75, 74, 73, 72, 71, 70, 69

PENETRATION RESISTANCE PLOT: 20 40 60 80 100

SHEAR STRENGTH kPa: ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE; 20 40 60 80 100

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L

WATER CONTENT (%): 10 20 30

ORGANIC VAPOUR (ppm)

STANDPIPE INSTALLATION OR REMARKS

NOTES:
Borehole was open and dry on completion of drilling.

Terraprobe

LOG OF BOREHOLE 00-4

PROJECT: St. Lawrence Starch Condominiums
DATE: February 2, 2000
LOCATION: Port Credit, Ontario
EQUIPMENT: CME 45 Bombadier
CLIENT: Ralph Giannone, Architect
ELEVATION DATUM: Geodetic
FILE: 99335

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES
78.5 / 0.0	Ground Surface				
78.3 / 0.3	250mm TOPSOIL				
	SILTY SAND compact to dense brown		1	SS	5
			2	SS	25
			3	SS	38
			4	SS	23
74.5 / 4.0			5	SS	34
	CLAYEY SILT TILL some sand, trace gravel stiff to hard grey		6	SS	14
			7	SS	44
	---------- trace shale fragments hard		8	SS	47
			9	SS	67
68.4 / 10.1	WEATHERED SHALE BEDROCK		10	SS	50/5cm
67.7 / 10.8	End of Borehole				

ELEVATION SCALE: 78, 77, 78, 75, 74, 73, 72, 71, 70, 69, 68

PENETRATION RESISTANCE PLOT: 20 40 60 80 100
SHEAR STRENGTH kPa
○ UNCONFINED + FIELD VANE
● QUICK TRIAXIAL × LAB VANE
20 40 80 80 100

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%): 10 20 30

ORGANIC VAPOUR (ppm)

STANDPIPE INSTALLATION OR REMARKS

NOTES:
Borehole was open and dry on completion of drilling.

Terraprobe

LOG OF BOREHOLE 00-6

PROJECT: St. Lawrence Starch Condominiums
LOCATION: Port Credit, Ontario
CLIENT: Ralph Giannone, Architect

DATE: February 2, 2000
EQUIPMENT: CME 45 Bombadier
ELEVATION DATUM: Geodetic
FILE: 99335

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES
75.8	Ground Surface				
0.0	FILL - sand, some silt, trace brick, brown		1	SS	29
74.9 / 0.7	FILL - sandy silt, trace gravel & brick & organics, black		2	SS	24
			3	SS	30
			4	SS	20
72.7 / 2.9	CLAYEY SILT TILL some sand, trace gravel, very stiff to hard, grey		5	SS	22
			6	SS	48
	trace shale fragments, hard		7	SS	84
			8	SS	84
67.1 / 8.5	WEATHERED SHALE BEDROCK		9	SS	50/8cm
66.4 / 9.2	End of Borehole				

ELEVATION SCALE: 75, 74, 73, 72, 71, 70, 69, 68, 67

PENETRATION RESISTANCE PLOT: 20 40 60 80 100

SHEAR STRENGTH kPa
○ UNCONFINED + FIELD VANE
● QUICK TRIAXIAL × LAB VANE
20 40 80 80 100

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L

WATER CONTENT (%): 10 20 30

ORGANIC VAPOUR (ppm)

STANDPIPE INSTALLATION OR REMARKS

NOTES:
Borehole was open and water level at 1.5m depth on completion of drilling.

Appendix B:

Storm and Sanitary Design sheets and calculations

Urbantech West, A Division of Leighton-Zec West Ltd.
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STORM SEWER DESIGN SHEET

10 Year Storm - Existing

55 Port Street East

City of Mississauga

PROJECT DETAILS

Project No: 17-548W
Date: 22-Feb-18
Designed by: JL
Checked by: RM

DESIGN CRITERIA

Min. Diameter =	300	mm	Rainfall Intensity =	A / (Tc+B)^c
Mannings 'n'=	0.013			
Starting Tc =	15	min	A =	1010
			B =	4.6
Factor of Safety =	10	%	c =	0.78

NOMINAL PIPE SIZE USED

STREET	FROM MH	TO MH	AREA (ha)	RUNOFF COEFFICIENT "R"	'AR'	ACCUM. 'AR'	RAINFALL INTENSITY (mm/hr)	FLOW (m3/s)	CONSTANT FLOW (m3/s)	ACCUM. CONSTANT FLOW (m3/s)	TOTAL FLOW (m3/s)	LENGTH (m)	SLOPE (%)	PIPE DIAMETER (mm)	FULL FLOW CAPACITY (m3/s)	FULL FLOW VELOCITY (m/s)	INITIAL Tc (min)	TIME OF CONCENTRATION (min)	ACC. TIME OF CONCENTRATION (min)	PERCENT FULL (%)
External	EX. HW2	EX. MH46	0.11	0.90	0.10	0.10	99.2	0.027	0.016	0.016	0.043	28.4	0.56	375	0.131	1.19	15.00	0.40	15.40	33%
Port St. E	EX. MH46	EX. MH47				0.10	97.6	0.027		0.016	0.043	24.7	0.73	375	0.150	1.36	15.40	0.30	15.70	29%
Helene St. South	EX. MH47	EX. MH48				0.10	96.5	0.027		0.016	0.043	25.1	0.80	450	0.255	1.60	15.70	0.26	15.96	17%
Helene St. South	EX. MH48	EX. MH49				0.10	95.5	0.026		0.016	0.042	39.8	0.30	450	0.156	0.98	15.96	0.68	16.64	27%
	SITE	EX. MH49	0.23	0.90	0.21	0.21	99.2	0.057			0.057									
Helene St. South	EX. MH49	EX. HW1				0.31	93.1	0.079		0.016	0.095	38.0	0.25	450	0.143	0.90	16.64	0.71	17.35	67%

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STORM SEWER DESIGN SHEET

Proposed with 100 Year Flows

55 Port Street East

City of Mississauga

PROJECT DETAILS

Project No: 17-548W
Date: 22-Feb-18
Designed by: JL
Checked by: RM

DESIGN CRITERIA

Min. Diameter =	300	mm	Rainfall Intensity =	A / (Tc+B)^c
Mannings 'n'=	0.013			
Starting Tc =	15	min	A =	1010
			B =	4.6
Factor of Safety =	10	%	c =	0.78

NOMINAL PIPE SIZE USED

STREET	FROM MH	TO MH	AREA (ha)	RUNOFF COEFFICIENT "R"	'AR'	ACCUM. 'AR'	RAINFALL INTENSITY (mm/hr)	FLOW (m3/s)	CONSTANT FLOW (m3/s)	ACCUM. CONSTANT FLOW (m3/s)	TOTAL FLOW (m3/s)	LENGTH (m)	SLOPE (%)	PIPE DIAMETER (mm)	FULL FLOW CAPACITY (m3/s)	FULL FLOW VELOCITY (m/s)	INITIAL Tc (min)	TIME OF CONCENTRATION (min)	ACC. TIME OF CONCENTRATION (min)	PERCENT FULL (%)
External	HW2	EX. MH46	0.11	0.90	0.10	0.10	99.2	0.027	0.016	0.016	0.043	28.4	0.56	375	0.131	1.19	15.00	0.40	15.40	33%
Port St. E	EX. MH46	EX. MH47				0.10	97.6	0.027		0.016	0.043	24.7	0.73	375	0.150	1.36	15.40	0.30	15.70	29%
Helene St. South	EX. MH47	EX. MH48				0.10	96.5	0.027		0.016	0.043	25.1	0.80	450	0.255	1.60	15.70	0.26	15.96	17%
Helene St. South	EX. MH48	EX. MH49				0.10	95.5	0.026		0.016	0.042	39.8	0.30	450	0.156	0.98	15.96	0.68	16.64	27%
Proposed Development	Site	EX. MH49	0.23	0.73	0.17	0.17	99.2	0.046	0.036	0.036	0.082									
Helene St. South	EX. MH49	HW1				0.27	93.1	0.069		0.052	0.121	38.0	0.25	450	0.143	0.90	16.64	0.71	17.35	85%

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PROJECT DETAILS

Title1:	**STORM SEWER DESIGN SHEET**
Title2:	**100 Year Storm Capture**
Project Name:	**55 Port Street East**
Municipality:	**City of Mississauga**
Project No:	**17-548W**
Date:	**22-Feb-18**
Designed by:	**JL**
Checked by:	**RM**

IDF Parameters for Mississauga			
		10-yr	100-yr
$I=A/(T+b)^C$	A	1010	1450
	B	4.6	4.9
	C	0.78	0.78

CAPTURE LOCATION	AREA ID	CAPTURE POINT	Area ha	R 10 yr	R 100 yr	AR 10 yr	AR 100 yr	Flow Length m	Velocity m/s	Tc* min	I10 mm/hr	I100 mm/hr	Q10 m3/s	Q100 m3/s	Q100-Q10 m3/s	Const. flow m3/s
3 m STM Easement		Inlet Headwall	0.11	0.9	1.00	0.10	0.11			15.00	99.2	140.7	0.027	0.043	0.016	0.016
Helene St.		MH 49	0.23	0.7	0.9	0.17	0.21			15.00	99.2	140.7	0.046	0.082	0.036	0.036

*Where available, Tc is calculated from design sheet or overland flow calculation

Tc calcs *where Tc = starting Tc + flow length/velocity*
(starting Tc = 10min)

Assumed Velocities for Calculation of time of Concentration
Pipe Flow Velocity= 2.0 m/s
OLF Velocity= 1.5 m/s
External Flow Velocity= 0.25 m/s

WASTEWATER DEMAND CALCULATIONS

Project Name: 55 Port Street South
Municipality: City of Mississauga
Region: Region of Peel
Project No.: 17-548W
Date: Dec-18

Existing Conditions

3 Storey Commercial

Population density =		225	p/ha
Area =		0.23	ha
Population =		52	persons
Unit Sewage Flow=	303		litres/person/day
Average daily Flow=	0.181		litres/sec
Harmon Peak Factor for Site, Me=	(1+14/(4+P^0.5)		
	4.31		
Maximum daily Flow=	0.78		litres/sec
Site Area =	0.23		ha
Infiltration Allowance=	0.200		litres/sec/ha
Total Infiltration=	0.05		litres/sec
Total wastewater flow=	0.83		litres/sec

Proposed Condition

10 Storey Apartment -

Population density =		2.7	ppu
Units		35	ha
Population =		95	persons
Unit Sewage Flow=	303		litres/person/day
Average daily Flow=	0.331		litres/sec
Harmon Peak Factor for Site, Me=	(1+14/(4+P^0.5)		
	4.25		
Maximum daily Flow=	1.41		litres/sec
Site Area =	0.23		ha
Infiltration Allowance=	0.200		litres/sec/ha
Total Infiltration=	0.05		litres/sec
Total wastewater flow=	1.45		litres/sec

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