STORMWATER MANAGEMENT & FUNCTIONAL SERVICING REPORT

BAYPORT COMMERCIAL
BLOCK 76
TOWN of MIDLAND

November 2024
WMI File No. 07-010FH

Prepared by

WMI & Associates Limited
119 Collier Street, Barrie Ontario L4M 1H5

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1.0 Introduction

WMI & Associates Limited was retained by 2428568 Ontario Limited (Kaitlin) to prepare a Stormwater Management Report for a proposed commercial development located along the frontage of Harbourview Drive, located southwest of the Bayport Marina in the Town of Midland.

The site is bounded by Harbourview Drive (formerly Sunnyside Drive which was previously Fifth Street) to the west, Marina Park Ave to the south and the existing Bayport Subdivision to the northeast. The general location of this property is illustrated on the site grading and servicing drawings located in **Appendix A.**

The proposed development consists of a high-rise building with a total of 504 units (416 condo units & 88 hotel units), 107m^2 (1143sq.ft) of retail area. The site contains surface level parking, a 3-storey above grade parking structure and a 1storey below grade parking structure. This report has been prepared in support of detailed design pertaining to the overall stormwater management system for this development (i.e., flow routes, external drainage, sediment and erosion control, criteria, etc.). Included in this report is an assessment of water balance as is required under the South Georgian Bay Lake Simcoe Source Protection Plan.

An LID approach will be considered to address SWM quality controls including the water balance assessment. The stormwater drainage system for the commercial development is a completely separate catchment area from the Bayport subdivision and thus will have its own stormwater controls independent of the residential stormwater controls.

2.0 Sanitary Sewage Servicing

2.1 Existing Works

Currently there is an existing 200mmø gravity sewer through Bayport Village development that services the existing Phase 1, 1A, 1C and Phase 2 portions of the development. An existing 200mmø stub is installed at the south limit of Chatten Court to service the block 76 development. The Chatten Court gravity sewer drains to Bayport Boulevard and then towards the center of the development (east) to an existing pump station (Town of Midland No. 7). This existing sanitary sewage pumping station is designed for a peak flow of 42.7L/s, consisting of a 3m diameter wet well equipped with two (2) self-priming centrifugal pumps, one for duty and one for standby, each pump has a rated capacity of 42.7L/s at a total dynamic head of 27m, complete with electrical and electronic control systems, an ultrasonic level control system with back-up float switches, suction and discharge piping, ventilation system, valves, by-pass piping, overflow pipe and a 40hp standby natural gas engine. The pump station flows are conveyed via a forcemain to the Fourth Street gravity sewer system (MH #817).

2.2 Proposed Works

It is proposed that a 50mmø (mechanical engineer to verify) forcemain will service the proposed high-rise building and run through the underground parking structure to a proposed manhole on the development's north property limit. From the proposed manhole a 200mmø sewer will connect to the existing sanitary stub (Chatten Court). The proposed high-rise development will ultimately discharge to the existing pumping station (No. 7) by way of Chatten Court and Bayport Boulevard existing sewers.

The accumulative flow rate for the proposed 504 units and 107m^2 of retail was determined to be 12.2L/s which is within the approved rated capacity of the existing pump station (Town of Midland No. 7).

In terms of sewage treatment allocation, the Town had, at the time of the pump station approval, indicated that there appears to be sufficient sewage treatment capacity to accommodate the Bayport Village development.

3.0 Water Supply

3.1 Existing Works

There is an existing 300mmø watermain on Harbourview Drive (formerly Sunnyside Drive) on the west limit of the block 76 high-rise development site.

3.2 Proposed Works

The proposed water distribution system for the block 76 high-rise development will be a connection to the 300mmø watermain on Harbourview Drive. The proposed 200mmø fire service will connect directly to the existing watermain and the 50mmø domestic service will connect to the proposed fire service, internal to the subject development's property. The high-rise's domestic and fire service sizes will be updated and confirmed by AECOM during detailed design. Refer to **Appendix D** for the Memo report by AECOM.

A total domestic water supply flow calculation was completed to verify the original design and it is noted that the total flows will be less than previously stated in the original functional servicing report (February 21, 2006). The Maximum Day Demand (MDD) for the 504 unit high-rise development was determined to be 8.61L/s. Refer to **Appendix D** for the domestic water demand spreadsheet.

In terms of water supply allocation, the Town had previously indicated that there appears to be sufficient water production capacity to accommodate the Bayport Village development.

4.0 Stormwater Management

4.1 Site Design Criteria Guidelines

The stormwater management design for the proposed development will incorporate the policies and criteria of a number of agencies including the Ministry of Environment, Conservation and Parks (MECP) and the Town of Midland (Town). The agency stormwater design criteria for the development are summarized below:

- Stormwater Quality controls will be provided based on the guidelines described in the Ministry of Environment 2003 Stormwater Management Planning and Design Manual utilizing an integrated treatment train approach. An Enhanced Level of Protection will be provided.
- South Georgian Bay Lake Simcoe Source Protection Plan Amended May 14, 2015.
- The Town of Midland Design Guidelines will be used as a reference for the design of the stormwater management and conveyance system.
- The storm sewer system shall have the capacity to convey the major storm event (100-year storm).
- The MTO IDF CURVE LOOKUP rainfall intensity-duration-frequency curve is to be used.
- Due to the close proximity of the site to Georgian Bay, quantity control will not be provided. This is consistent with Bayport Master SWM Report approved by MECP (MOE) Number 0134-7FZQ32, July 14/08.
- Erosion and sediment control shall be provided during the construction phase and will remain in place until the site is stabilized.

5.0 Pre-Development Site Conditions

5.1 General

The site generally consists of mainly open grass field, some granular parking area, along with areas of sparse vegetation and trees and a granular bike/walking path. The existing flow pattern is from west to east with some drainage flowing back to Harbourview Drive. The site consists of gentle to moderate slopes ranging from 1% to 4% for most of the site. Ultimately overland flows drain towards the existing Bayport Marina and discharges into Georgian Bay.

5.2 Soil Conditions

According to the Soil Map of Simcoe County, Ontario, North Sheet, Soil Survey Report No. 29, prepared for the Department of Agriculture in 1959, the site consists of Vasey sandy loam. Soil Engineers Ltd. has conducted on-site investigations and a summary of these borehole (BH) logs is included in **Appendix E**. In describing the soil profiles, they generally consist of some fill material underlain with slag, peat and

alluvium extending to depths ranging from 2.3m to 5.2m. The site is underlain with soft to firm silty clay and compact to loose sand and silts.

5.3 Existing Drainage

The site does not have any external drainage areas as the Harbourview Drive right-of-way has a ditch draining along its west limit, as well as a storm sewer/culvert located in the east boulevard. These features convey runoff approximately 80m south of Marina Park Avenue into a tributary that flows west to east and outlets into Georgian Bay in the area of Pettersen Park.

The internal site drains from west to east overland via sheet flow, with parts of the site being collected by the existing storm sewer system on Bayport Boulevard (Private) which provides access to the Marina Yachting Centre (referred to as Bayport Marina). Ultimately all overland flows drain towards the existing Bayport Marina and then discharge directly into Georgian Bay.

6.0 Post-Development Conditions

6.1 Post-Development Drainage

Drainage from catchment area A1 (having a total drainage area of 1.18ha) will have overland flow as well as an underground conveyance system (designed by mechanical engineer) and will ultimately be collected by a storm sewer and catchbasin system at the southeast corner of the property. The storm sewer in turn will discharge to an on-site Oil Grit Separator (OGS) followed by proposed manholes located on Marina Park Avenue before conveying the major storm to the Sailing Club (Town property) and outletting via a 600mm Ø storm sewer into Georgian Bay.

There are very minor catchment areas on the west and south side of the proposed hotel which flows directly to the road systems on Marina Park Ave and Harbourview, as they currently do today.

The post-development drainage patterns are illustrated on **Drawing STM**.
The site generally consists of mainly open grass field, some granular parking area, along with areas

7.0 Hydrologic Analysis

7.1 Stormwater Modelling

The Rational Method was used to assess peak pre-development & post-development flows for the subject property (refer to **Appendix B** for storm runoff calculations). In assessing storm flows for events less frequent than the 1:5 year return interval, the runoff coefficient was modified to account for more saturated ground conditions. A summary of flows is provided below.

7.2 Rainfall Intensity Curves

The recorded rainfall data from the MTO Intensity-Duration-Frequency (IDF) values was used and a copy of these are included in **Appendix B**.

7.3 Pre-Development Drainage Results

The pre-development unattenuated flows are summarized in **Table 1**.

Table 1: Pre-Development Unattenuated Flows

Catchment	Area (ha)	Pre-Development Flows (m^3/s)		
		5 yr. m^3/s	25 yr. m^3/s	100 yr. m^3/s
PRE (TOTAL)	1.38	0.091	0.181	0.252

7.4 Post-Development Drainage Results

The post-development unattenuated flows are summarized in **Table 2**.

Table 2: Post-Development Unattenuated Flows

Catchment	Area (ha)	Post-Development Unattenuated Flows (m^3/s)		
		5 yr. m^3/s	25 yr. m^3/s	100 yr. m^3/s
POST (TOTAL)	1.38	0.255	0.385	0.536

Although an increase in peak flows is noted when comparing **Table 1** and **Table 2**, no quantity control is required for the site due to the close proximity to (and ultimately its direct discharge) into Georgian Bay. Since peak flows do not need to be attenuated for the site, no upstream storage volume needs to be provided on-site. All stormwater management features will be designed to safely convey the post-development flows.

7.5 Overflow Route

Due to an inability to obtain an easement on the neighbouring Marina property, the natural overland drainage route is not available. In lieu of an overflow spillway easement, the underground storm system has been upsized to contain a 100-year major storm event.

In order for the storm sewer to convey 1:100-year peak flows, storm sewer must be installed to the east limits of Marina Park Avenue where a suitable outlet can be achieved. No alterations to Marina Park Avenue are proposed, although following installation of the storm sewer, the conditions of the right-of-way will be reinstated to existing conditions, or better. The outlet into Georgian Bay is located on the Town's

leased property, currently occupied by the sailing club. An easement has been surveyed for this outlet. For outlet location and details refer to drawing **GEN2**.

8.0 Stormwater Quality Control

8.1 Total Suspended Solids Removal Initiatives

In determining the best approach to provide quality control for the proposed development, various factors were considered, as follows:

- Existing land characteristics and uses (soils, topography, treatment area, location, etc.).
- The nature of contamination of stormwater runoff in the post-development condition.
- The magnitude of increase in impervious area from the pre-development condition.
- Local requirements and maintenance considerations with regard to quality control;
- Utilizing an 'integrated treatment train' approach to treat stormwater runoff;
- Ability to utilize landscaped areas and providing water balance and nutrient uptake benefits;

Based on the above noted factors, the application of a storm sewer with deep sump structures and a downstream OGS have been chosen as the preferred means of providing a treatment train approach capable of filtration benefits in the treatment of stormwater runoff generated on-site.

Referencing the LID & MECP Guidelines, runoff from the site's contaminated impervious area (surface parking area) is directed to a treatment train of Low Impact Development Best Management Practices (LID BMP) capable of providing water balance and quality control benefits. An 'Enhanced' Level of Protection, as defined in the MOE's Stormwater Management Planning & Design Manual will be achieved using the proposed treatment train.

The proposed storm sewer outlet will capture major system flows (100-year design storm) from the paved parking area and convey them into the downstream OGS. Each structure within the proposed storm sewer will include a deep sump which will provide pre-treatment to the stormwater by capturing sediment and allow suspended solids to settle out of the stormwater before it is conveyed downstream.

The site grading shall be such that all surface parking impervious area generating contaminated runoff is directed to the OGS. The current concept has limited land use availability for soft vegetative stormwater controls. As such, consideration to providing greater than 80% TSS removal is desired. An appropriate OGS unit will be designed for the site to provide a minimum TSS removal of 80%. It should be noted that the majority of this site is comprised of rooftop runoff. Only a small portion of the

generated runoff will be contaminated by the surface level parking area, the other rooftop is considered clean runoff.

Considering the above, a minimum of 80% Total Suspended Solids (TSS) removal efficiency is considered to be achievable on-site via the use of the proposed treatment train.

Refer to **Drawings GEN1 and GEN2** (General Servicing Plans), **Drawing LGR1** (Lot Grading Plan) and **Drawing STM** (Storm Drainage Plan) located in **Appendix A,** and to the supporting calculations provided in **Appendix B** for additional details related to the design of the proposed storm sewer and oil-grit-separator.

9.0 Erosion and Sedimentation Controls

Slopes within the subject lands are anticipated to vary in grade from relatively flat areas in the order of 1% to slopes of 4%. The site is fairly stable with a mix of vegetative cover and sandy silt soil. The commercial building and ancillary structures will be graded as close to existing elevations as possible to match into adjacent road and property elevation. Although exposure of the soil during construction will not be avoidable due to the underground parking structure, it should be minimized to avoid erosion and sedimentation. All excavation will require diligent stockpiling of material with sufficient erosion and sediment control measures in place. Stockpiling of material should be limited; where reasonable, material should be removed from site as it is excavated.

The following is a sediment and erosion schedule.

Table 3: Sediment and Erosion Work Schedule

Order	Work	Time (days)
1	Install sediment controls	5
2	Inspect controls (Engineer, Town)	0.5
3	Strip and stockpile topsoil (if any)	2
4	Check sediment controls	0.5
5	Complete earth works	10
6	Construct underground parking structure	200
7	Construct services/ES	60
8	Construct parking lot	60
9	Stabilize ditches	2
10	Construct hotel	18 (months)
11	Check and maintain	Ongoing

The following measures must be carried out prior to construction and maintained until disturbed areas have regained a significant grass cover:

Topsoil Stripping: Topsoil stripping will be reduced as much as possible. Individual lots should be stabilized by seeding as soon as possible. Topsoil stockpiles are to be

kept at manageable levels for grass/weed cutting purposes. The construction of this project will occur in stages, construction the entire site will be stripped and excavated material piled away front the building location with proper sediment control in place, then the temporary entrance off of Marina Park Ave and then creation of a staging area for building and servicing and parking lot construction while the building will be constructed.

Silt Fencing: Silt fences will be placed on the down slope of all excavated material to prevent sediment transport. Periodic inspections and repairs to the silt fence should be performed regularly, as well as after every rainfall.

Conveyance Protection: Straw bales will be placed at intervals along constructed ditches and at the outlet of all culverts prior to construction commencement, and should be removed only after the area has been fully stabilized.

Mud Mat: Mud tracking from construction traffic must be controlled through the use of a mud-mat consisting of large diameter rip-rap at any proposed entrance.

The Site Engineer is responsible for completing routine inspections of the sediment and erosion control structures throughout the construction phase of the development. A copy of the Engineer's Inspection Form is to be forwarded to the Town upon an agreed schedule.

Refer to the site's erosion and sediment control details on **Drawing ESC,** included in **Appendix A**.

10.0 Maintenance Report

A maintenance report can be provided if required under separate cover after the Town is in agreement with the stormwater concept. Maintenance access to each inlet and outlet structure and the OGS will be provided.

11.0 Recommendations and Conclusions

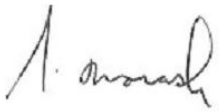
An integrated stormwater management treatment train will provide quality control benefits which will help minimize any negative impacts the proposed development may have on the existing quality of stormwater runoff. An 'Enhanced' Level of Protection, as defined in the MOE's Stormwater Management Planning & Design Manual, will be provided through the use of a storm sewer with deep sump structures and a downstream oil-grit-separator (OGS) will all inherently provide quality control benefits.
The use of erosion and sediment control features such as silt fences, vegetated buffers and conveyance protection such as rock check dams/straw bales will ensure downstream stormwater quality is maintained during construction.

The stormwater management design as described above, can be constructed and maintained as a feasible method of treating all stormwater run-off generated by the proposed development. This Stormwater Management Report and the associated engineering design drawings are based on information provided at the time of their preparation and are considered only applicable to the proposed works as described in this report.

Any changes subsequent to the report and drawings date of issuance should be reviewed by WMI & Associates Ltd. to ensure applicability of the design contained within the documents.

Respectively submitted,

WMI & Associates Limited



Stephen Morash, P. Eng.

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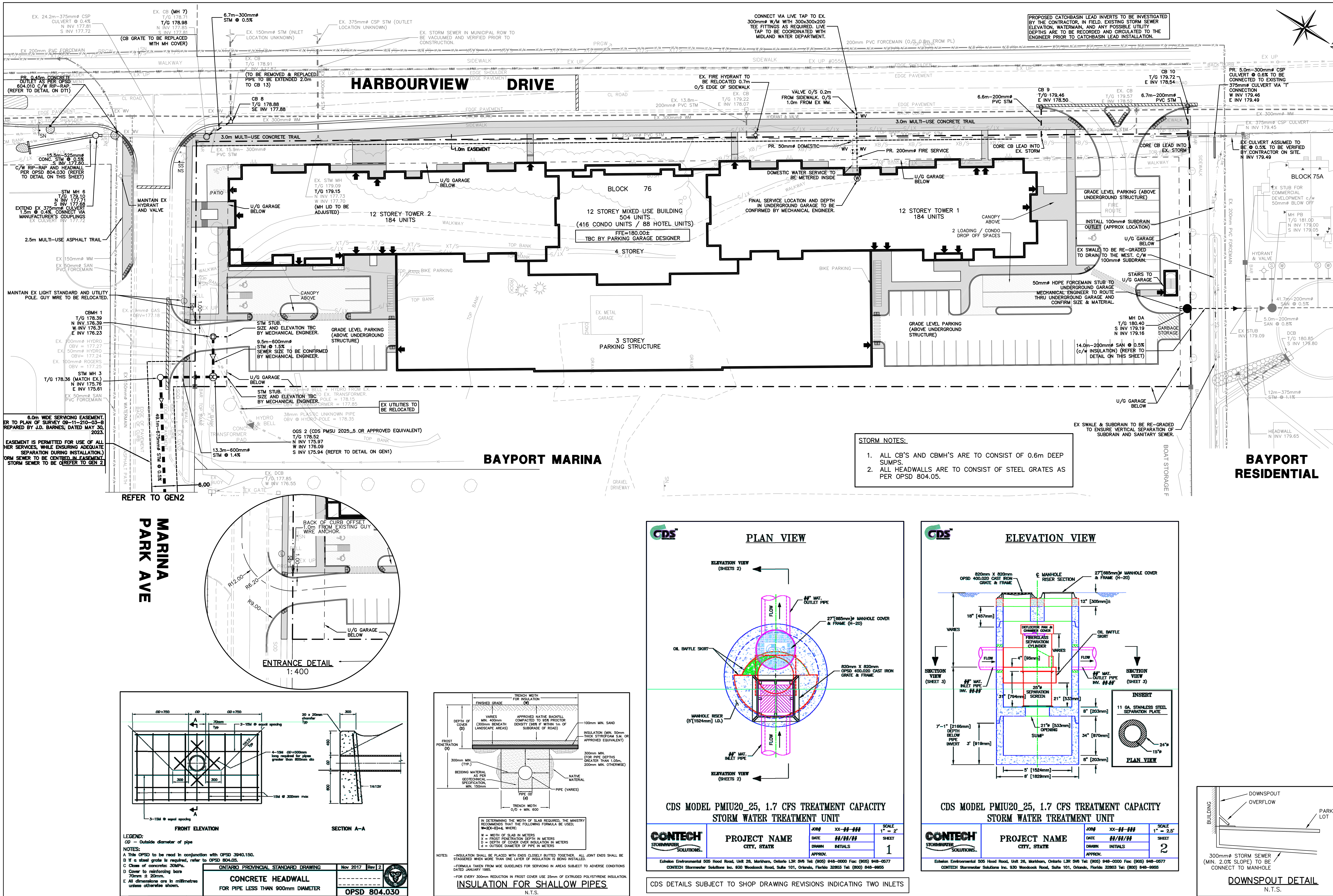
APPENDIX A

FIGURES & CONCEPT PLANS



Legend:

EXISTING FEATURES (EX)

- EX STD IRON BAR
- EX IRON BAR
- EX UTILITY POLE
- EX BELL PED
- EX WATER SERVICE
- EX FIRE HYD.
- EX ST NAME SIGN
- EX STOP SIGN
- EX ELEVATION
- EX FENCE
- EX U/G GASMAIN
- EX U/G BELL
- EX WATERMAIN & VALVE
- EX SAN SEWER & MH
- EX STM SEWER & MH

PROPOSED FEATURES (PR)

- PR STREET NAME SIGN
- PR STOP SIGN
- PR SIGN
- PR SILT FENCE
- PR STRAW BALE CHECK DAM
- PR STREET LIGHT
- PR WATER SERVICE
- PR SAN SERVICE
- PR STM SERVICE
- PR HYDRO TRANSFORMER
- PR WATERMAIN & VALVE
- PR FIRE HYDRANT
- PR WATER VALVE
- PR SAN SEWER
- PR SANITARY MANHOLE
- PR STM SEWER
- PR CATCHBASIN MANHOLE
- PR MANHOLE
- PR CATCHBASIN
- PR SWALE
- PR ELEVATION
- PR MATCH EXISTING ELEVATION (INTERPOLATED)
- PR TOP OF CURB ELEVATION
- PR BOTTOM OF CURB ELEVATION
- PR TOP OF RETAINING WALL ELEVATION
- PR BOTTOM OF RETAINING WALL ELEVATION
- PR 3:1 SLOPE
- PR CURB CUTS
- PR CONCRETE
- PR ROAD LINE PAINTING
- PR HARDSCAPED ISLAND
- PR FIRE ROUTE/LOADING DOCK
- DIRECTION OF PR TRAFFIC
- PR TACTILE PLATES
- PR ASPHALT LAP JOINT
- PR STREETLIGHT DUCTS AND CROSSING

NOTE: SCALE IS AS SHOWN WHEN PRINTED ON 24"x36" PAPER.

NOTE: DRAWINGS ARE NOT FOR CONSTRUCTION AND ARE SUBJECT TO MUNICIPAL REVIEW

CAUTION
CONTRACTOR TO DETERMINE LOCATION OF EXISTING UTILITIES PRIOR TO CONSTRUCTION.

Notes:

1. Unless noted otherwise, the measurements and distances shown on this drawing are shown in meters.
2. Do not scale drawings.
3. It is the contractor's responsibility to verify all dimensions, levels and datums on site and report any discrepancies or omissions to WMI & Associates Ltd. prior to construction.
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5. This drawing is the exclusive property of WMI & Associates Ltd. and the reproduction of any part of this document without prior written consent is strictly prohibited.

Benchmark: 180.420m

Top nut of hydrant located north of lot #9 and south of the southeast corner of block 69.

No.	Issue / Revision	Date
1	SPA SUBMISSION	NOV. 8, 2024

Bayport Village
Commercial Development

GENERAL SERVICING PLAN 1

Client:
Lanarose Midland Ltd.
220 Duncan Mill Road, Suite 315
North York, Ontario
M3B 3J5

WMI & Associates Limited
119 Collier Street
Barrie, Ontario
L4M 1H5
Ph 705-797-2027
www.wmiengineering.ca

Drawn By	Checked By	Drawing No.
JB	SM	GEN1
Scale 1:400	Project No. 07-010FH	

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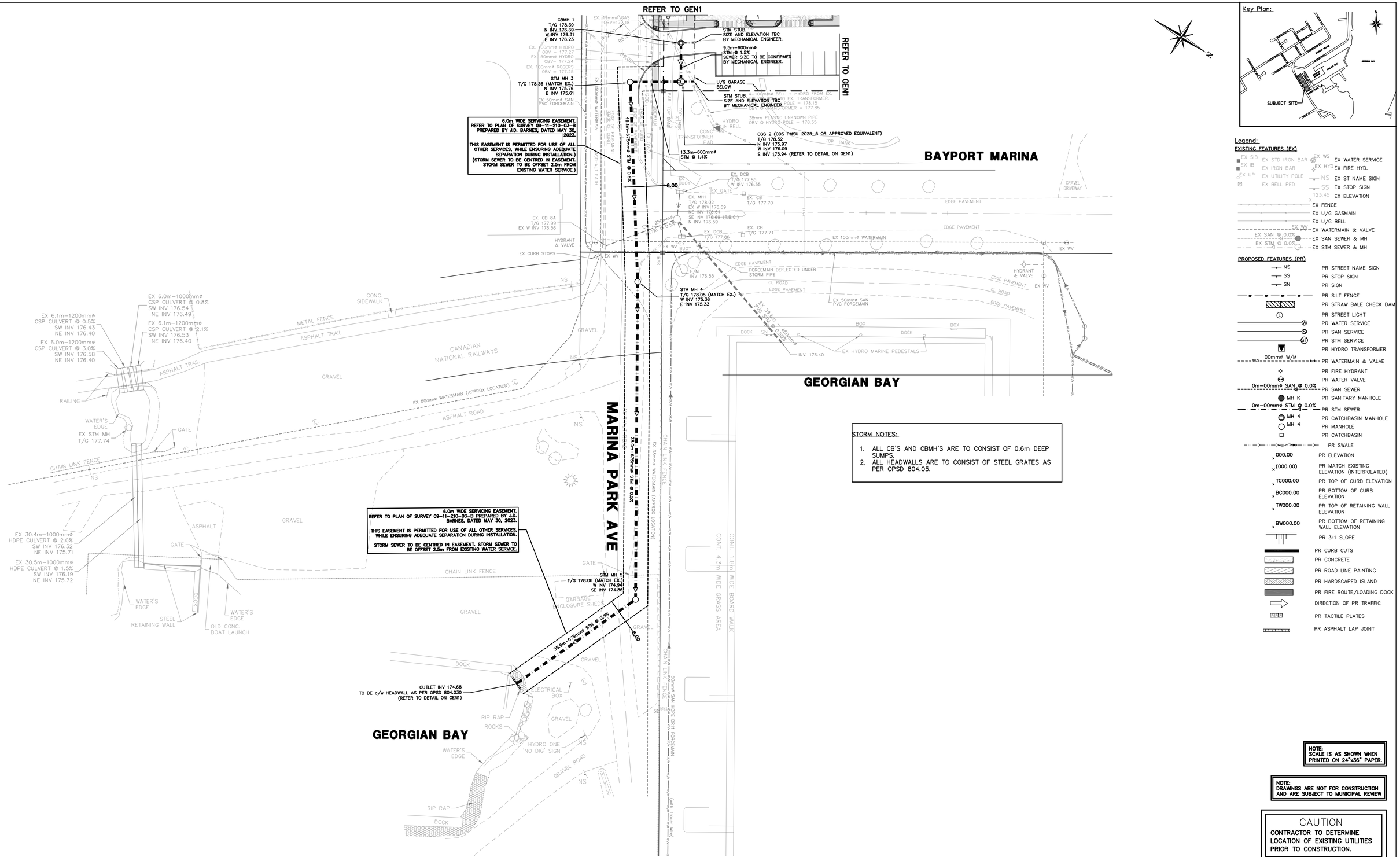

STORM NOTES:

1. ALL CB'S AND CBMH'S ARE TO CONSIST OF 0.6m DEEP SUMPS.
2. ALL HEADWALLS ARE TO CONSIST OF STEEL GRATES AS PER OPSD 804.05.

Key Plan:

Legend:

EXISTING FEATURES (EX)

- EX SIB / EX IB — EX STD IRON BAR / EX IRON BAR
- EX UP — EX UTILITY POLE
- EX BELL PED
- EX WS — EX WATER SERVICE
- EX HYD — EX FIRE HYD.
- NS — EX ST NAME SIGN
- SS — EX STOP SIGN
- 123.45 — EX ELEVATION
- EX FENCE
- EX U/G GASMAIN
- EX U/G BELL
- EX WV — EX WATERMAIN & VALVE
- EX SAN @ 0.0% — EX SAN SEWER & MH
- EX STM @ 0.0% — EX STM SEWER & MH

PROPOSED FEATURES (PR)

- NS — PR STREET NAME SIGN
- SS — PR STOP SIGN
- SN — PR SIGN
- PR SILT FENCE
- PR STRAW BALE CHECK DAM
- L — PR STREET LIGHT
- W — PR WATER SERVICE
- S — PR SAN SERVICE
- ST — PR STM SERVICE
- PR HYDRO TRANSFORMER
- 150 — 00mmø W/M — PR WATERMAIN & VALVE
- PR FIRE HYDRANT
- PR WATER VALVE
- 0m–00mmø SAN @ 0.0% — PR SAN SEWER
- MH K — PR SANITARY MANHOLE
- 0m–00mmø STM @ 0.0% — PR STM SEWER
- MH 4 — PR CATCHBASIN MANHOLE
- MH 4 — PR MANHOLE
- PR CATCHBASIN
- PR SWALE
- x 000.00 — PR ELEVATION
- x (000.00) — PR MATCH EXISTING ELEVATION (INTERPOLATED)
- x TC000.00 — PR TOP OF CURB ELEVATION
- x BC000.00 — PR BOTTOM OF CURB ELEVATION
- x TW000.00 — PR TOP OF RETAINING WALL ELEVATION
- x BW000.00 — PR BOTTOM OF RETAINING WALL ELEVATION
- PR 3:1 SLOPE
- PR CURB CUTS
- PR CONCRETE
- PR ROAD LINE PAINTING
- PR HARDSCAPED ISLAND
- PR FIRE ROUTE/LOADING DOCK
- DIRECTION OF PR TRAFFIC
- PR TACTILE PLATES
- PR ASPHALT LAP JOINT

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Benchmark: 180.420m

Top nut of hydrant located north of lot #9 and south of the southeast corner of block 69.

No.	Issue / Revision	Date
1	SPA SUBMISSION	NOV. 8, 2024

Bayport Village
Commercial Development

GENERAL SERVICING PLAN 2

Client:

Lanarose Midland Ltd.

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North York, Ontario
M3B 3J5

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Drawn By	Checked By	Drawing No.
JB	SM	GEN2
Scale: 1:400	Project No. 07-010FH	

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FOR ALL EXTERNAL SITE GRADING DETAILS REFER TO HB1

REFER TO INTERSECTION DESIGN COMPLETED BY TATHAM ENGINEERING LTD. & ASSOCIATES INC.

30.00 | 35.00 | 65.00

HARBOURVIEW DRIVE

RIGHT-IN RIGHT-OUT ISLAND

0.6m LAP JOINT (REFER TO DETAIL ON DT1)

LIMIT OF NEW CURB

REMOVE EX. CURB

3.0m MULTI-USE CONCRETE TRAIL

1.0m EASEMENT

PR. 5.0m-300mmø CSP CULVERT @ 0.6% TO BE CONNECTED TO EXISTING 375mmø CULVERT VIA "T" CONNECTION
W INV 179.46
E INV 179.49

EX. CULVERT ASSUMED TO BE @ 0.5% TO BE VERIFIED BY CONTRACTOR ON SITE.
N. INV 179.49

RELOCATE SIGN

CULVERT C/W HEADWALL AS PER OPSD 804.030 (REFER TO DETAIL ON GEN1). C/W RIP RAP OUTLET PROTECTION.

MAINTAIN EX HYDRANT & VALVE

LIMIT OF PR. ASPHALT

0.6m LAP JOINT (REFER TO DETAIL ON DT1)

2.5m MULTI-USE ASPHALT TRAIL

TACTILE PLATES IN ASPHALT TRAIL TO BE INSTALLED IN CONCRETE. CONCRETE TO BE FULL WIDTH OF TRAIL AND MIN. 150mm AROUND ALL OTHER EDGES (TYP.)

MAINTAIN EX LIGHT STANDARD AND UTILITY POLE. PROPOSED BACK OF CURB IS 1.0m OFFSET GUY WIRE ANCHOR.

RELOCATE STREET NAME AND STOP SIGN.
MAINTAIN EX. STREETLIGHT

U/G GARAGE BELOW

2 RISERS

6 RISERS

PATIO

BUILDING CORNER SUNKEN HERE TO OBTAIN 5% MAX SIDEWALK SLOPE TO SITE ENTRANCE. MECHANICAL ENGINEER TO VERIFY ELEVATION WORKS WITH UNDERGROUND GARAGE.

12 STOREY TOWER 2
184 UNITS

1.5m PLATFORM C/W 3 RISERS

1.5m PLATFORM @ 4.0% C/W 2 RISERS

BLOCK 76

12 STOREY MIXED USE BUILDING
504 UNITS
(416 CONDO UNITS / 88 HOTEL UNITS)
FFE=180.00±
TBC BY PARKING GARAGE DESIGNER

4 STOREY

1.5m PLATFORM @ 3.0% C/W 1 RISER

12 STOREY TOWER 1
184 UNITS

CANOPY ABOVE

2 LOADING / CONDO DROP OFF SPACES

INSTALL 100mmø SUBDRAIN OUTLET (APPROX LOCATION)

EX SWALE TO BE RE-GRADED TO DRAIN TO THE WEST. C/W 100mmø SUBDRAIN.

STAIRS TO U/G GARAGE

FIRE ROUTE

BLOCK 75A

BAYPORT RESIDENTIAL

CANOPY ABOVE

3 STOREY PARKING STRUCTURE

TACTILE PLATES (TYP.)

GARBAGE STORAGE

REMOVE EX. CURB THRU ENTRANCE

0.6m LAP JOINT (REFER TO DETAIL ON DT1)

GRADE LEVEL PARKING (ABOVE UNDERGROUND STRUCTURE) ARCHITECT TO PROVIDE ELEVATIONS AND TO SHOW DISCHARGE (INCLUDING 1:100YR OVERFLOW) TO MARINA PARK AVE.

GRADE LEVEL PARKING (ABOVE UNDERGROUND STRUCTURE) ARCHITECT TO PROVIDE ELEVATIONS AND TO SHOW DISCHARGE (INCLUDING 1:100YR OVERFLOW) TO MARINA PARK AVE.

EX SWALE & SUBDRAIN TO BE RE-GRADED TO ENSURE VERTICAL SEPARATION OF SUBDRAIN AND SANITARY SEWER.

6.0m WIDE SERVICING EASEMENT. REFER TO PLAN OF SURVEY 09-11-210-03-B PREPARED BY J.D. BARNES, DATED MAY 30, 2023.

THIS EASEMENT IS PERMITTED FOR USE OF ALL OTHER SERVICES, WHILE ENSURING ADEQUATE SEPARATION DURING INSTALLATION.) (STORM SEWER TO BE CENTRED IN EASEMENT. STORM SEWER TO BE OFFSET 2.5m FROM EXISTING WATER SERVICE.)

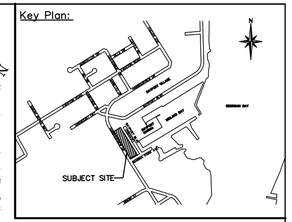
REFER TO GEN 2

3.0m X 3.0m DAYLIGHTING (TYP.)

BAYPORT MARINA

MARINA PARK AVE

Key Plan:



Legend:

EXISTING FEATURES (EX)

- EX SIB / EX STD IRON BAR / EX IB / EX IRON BAR / EX UP / EX UTILITY POLE / EX BELL PED
- EX WS — EX WATER SERVICE
- EX HYD — EX FIRE HYD.
- NS — EX ST NAME SIGN
- SS — EX STOP SIGN
- 123.45 — EX ELEVATION
- EX FENCE
- EX U/G GASMAIN
- EX U/G BELL
- EX WV — EX WATERMAIN & VALVE
- EX SAN @ 0.0% — EX SAN SEWER & MH
- EX STM @ 0.0% — EX STM SEWER & MH

PROPOSED FEATURES (PR)

- NS — PR STREET NAME SIGN
- SS — PR STOP SIGN
- SN — PR SIGN
- PR SILT FENCE
- PR STRAW BALE CHECK DAM
- L — PR STREET LIGHT
- W — PR WATER SERVICE
- S — PR SAN SERVICE
- ST — PR STM SERVICE
- PR HYDRO TRANSFORMER
- 150 — 00mmø W/M — PR WATERMAIN & VALVE
- PR FIRE HYDRANT
- PR WATER VALVE
- 0m-00mmø SAN @ 0.0% — PR SAN SEWER
- MH K — PR SANITARY MANHOLE
- 0m-00mmø STM @ 0.0% — PR STM SEWER
- MH 4 — PR CATCHBASIN MANHOLE
- MH 4 — PR MANHOLE
- PR CATCHBASIN
- PR SWALE
- x 000.00 — PR ELEVATION
- x (000.00) — PR MATCH EXISTING ELEVATION (INTERPOLATED)
- x TC000.00 — PR TOP OF CURB ELEVATION
- x BC000.00 — PR BOTTOM OF CURB ELEVATION
- x TW000.00 — PR TOP OF RETAINING WALL ELEVATION
- x BW000.00 — PR BOTTOM OF RETAINING WALL ELEVATION
- PR 3:1 SLOPE
- PR CURB CUTS
- PR CONCRETE
- PR ROAD LINE PAINTING
- PR HARDSCAPED ISLAND
- PR FIRE ROUTE/LOADING DOCK
- DIRECTION OF PR TRAFFIC
- PR TACTILE PLATES
- PR ASPHALT LAP JOINT
- x TB000.00 — PR TOP OF BANK ELEVATION
- x BB000.00 — PR BOTTOM OF BANK ELEVATION

NOTE: SCALE IS AS SHOWN WHEN PRINTED ON 24"x36" PAPER.

NOTE: DRAWINGS ARE NOT FOR CONSTRUCTION AND ARE SUBJECT TO MUNICIPAL REVIEW

CAUTION
CONTRACTOR TO DETERMINE LOCATION OF EXISTING UTILITIES PRIOR TO CONSTRUCTION.

Notes:

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Benchmark: 180.420m

Top nut of hydrant located north of lot #9 and south of the southeast corner of block 69.

No.	Issue / Revision	Date
1	SPA SUBMISSION	NOV. 8, 2024

Bayport Village
Commercial Development

LOT GRADING PLAN

Client:
Lanarose Midland Ltd.
220 Duncan Mill Road, Suite 315
North York, Ontario
M3B 3J5

WMI & Associates Limited
119 Collier Street
Barrie, Ontario
L4M 1H5
Ph 705-797-2027
www.wmiengineering.ca

Drawn By	Checked By	Drawing No.
JB	SM	LGR1
Scale 1:400	Project No. 07-010FH	

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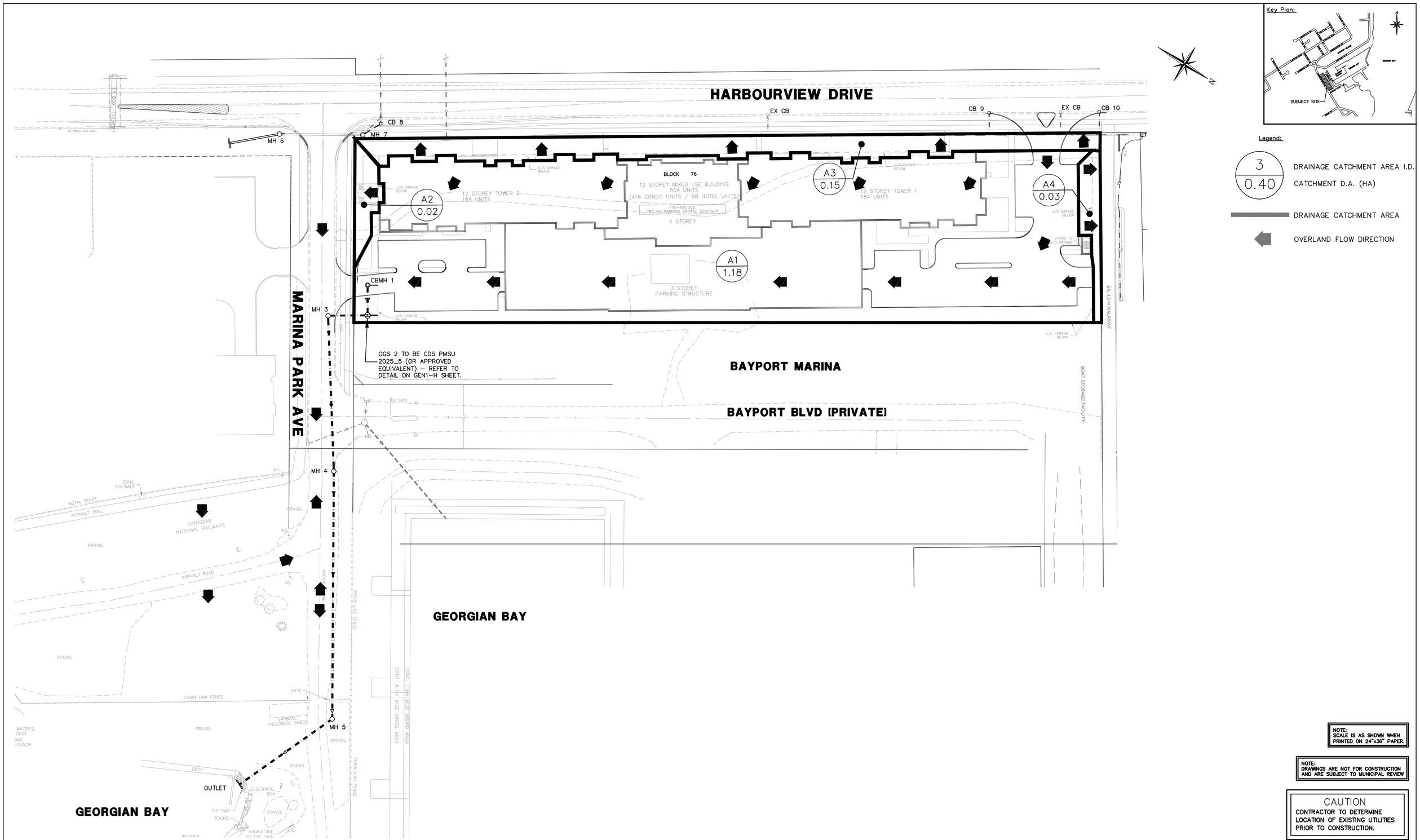

Key Plan:

Legend:

3 / 0.40 — DRAINAGE CATCHMENT AREA I.D. / CATCHMENT D.A. (HA)

DRAINAGE CATCHMENT AREA

OVERLAND FLOW DIRECTION

NOTE:
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Benchmark: 180.420m

Top nut of hydrant located north of lot #9 and south of the southeast corner of block 69.

No.	Issue / Revision	Date
1	SPA SUBMISSION	NOV. 8, 2024

Bayport Village Commercial Development

STORM DRAINAGE PLAN

Client:

Lanarose Midland Ltd.

220 Duncan Mill Road, Suite 315
North York, Ontario
M3B 3J5

WMI & Associates Limited
119 Collier Street
Barrie, Ontario
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Ph 705-797-2027
www.wmiengineering.ca

Drawn By	Checked By	Drawing No.
JB	SM	STM
Scale 1:500	Project No. 07-010FH	

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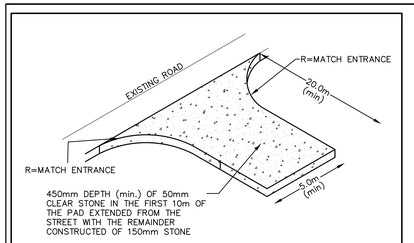
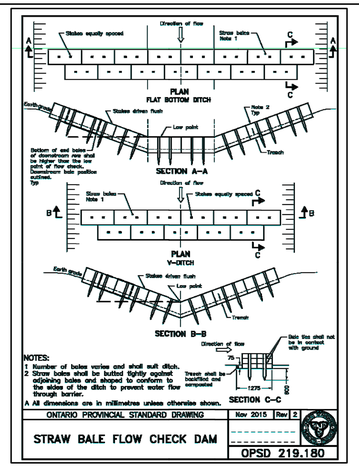
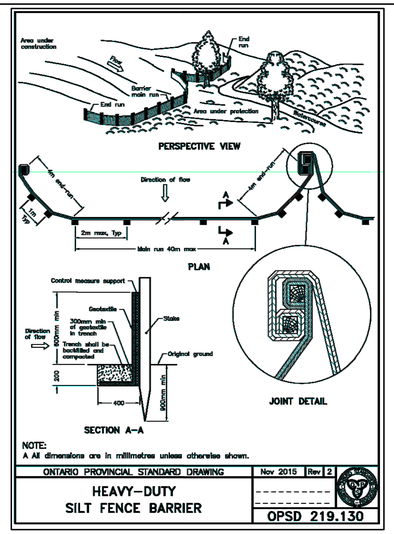


MUD MAT DETAIL (CONSTRUCTION ACCESS)

N.T.S.





SEDIMENT AND EROSION CONTROL NOTES:

EROSION CONTROL WORKS TO BE INSPECTED REGULARLY AFTER EVERY RAINFALL AND REPAIRED/REPLACED AS REQUIRED BY THE MUNICIPALITY OR DEVELOPER'S ENGINEER.

ALL DISTURBED AREAS TO BE RESTORED USING TOPSOIL AND SEED IMMEDIATELY UPON ESTABLISHING FINAL GRADES.

EROSION CONTROL WORKS TO BE MAINTAINED UNTIL THE SITE HAS STABILIZED AND REMOVAL IS DIRECTED BY THE MUNICIPALITY AND DEVELOPER'S ENGINEER.

SILT FENCE TO BE MAINTAINED ON THE DOWNSTREAM SIDE OF ALL STOCK PILES.

SILT FENCE IS TO BE CONSTRUCTED/INSTALLED WHERE INDICATED ON THE DRAWING PRIOR TO CONSTRUCTION COMMENCEMENT.

THE DEVELOPER AND DEVELOPER'S ENGINEER ARE RESPONSIBLE FOR COMPLETING ROUTINE INSPECTIONS OF THE SILT FENCE DURING THE CONSTRUCTION PHASE.

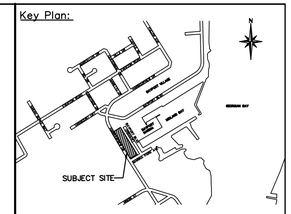
SILT FENCE IS TO BE CONSTRUCTED/INSTALLED AND MAINTAINED AROUND ALL STOCK PILE MATERIALS.

SILT FENCES ARE TO BE ERECTED PRIOR TO THE START OF ANY GRADING/ SERVICING WORKS, AND ARE TO REMAIN UNTIL THE SITE IS FINE GRADED AND VEGETATION TAKES ROOT.

MUD MATS ARE TO BE ERECTED PRIOR TO THE START OF ANY GRADING/ SERVICING WORKS, AND ARE TO REMAIN UNTIL THE ROADS ARE PAVED.

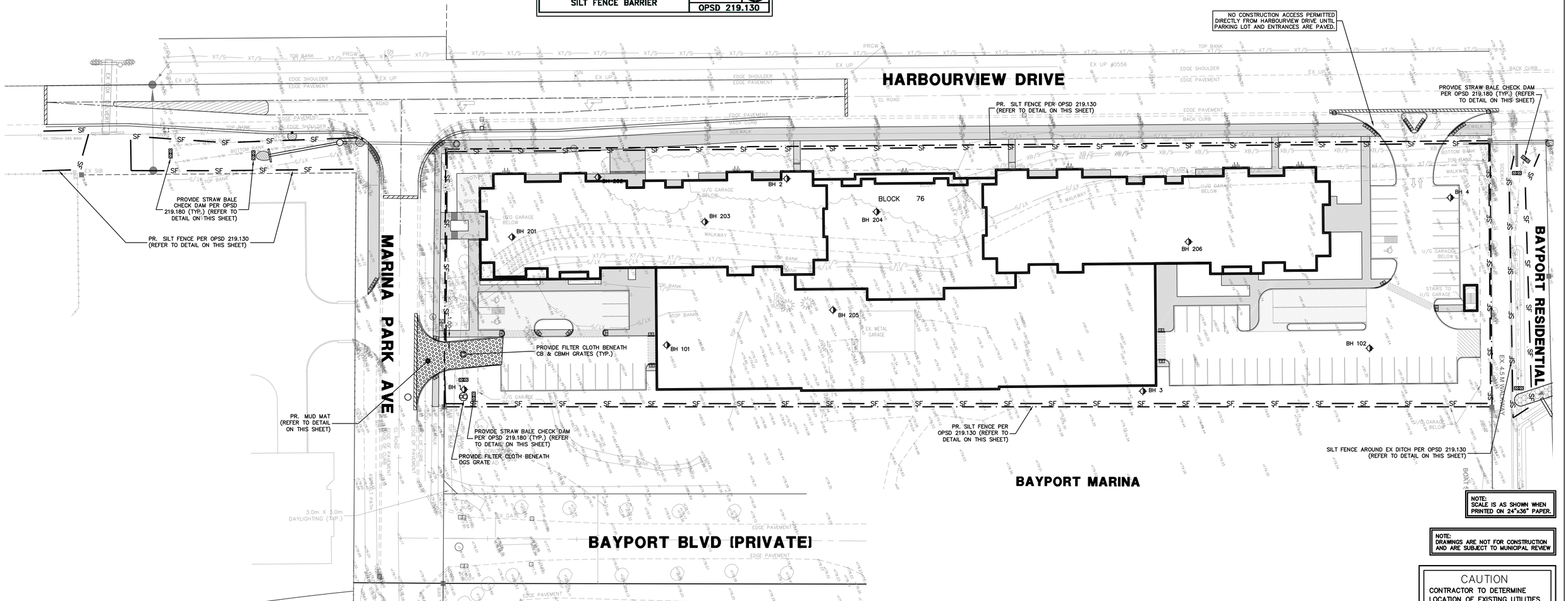
CATCHBASIN INLET PROTECTION AND STRAW BALE CHECK DAMS ARE TO BE INSTALLED IMMEDIATELY FOLLOWING SWALE AND CATCHBASIN CONSTRUCTION, AND ARE TO REMAIN UNTIL THE AREA AROUND THE CATCHBASINS AND SWALES ARE FINE GRADED AND VEGETATION TAKES ROOT.

Key Plan:



Legend:

- SF — PR SILT FENCE (TYPICAL)
- PR STRAW BALE CHECK DAM
- PR MUD MAT



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CAUTION
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Benchmark: 180.420m

Top nut of hydrant located north of lot #9 and south of the southeast corner of block 69.

No.	Issue / Revision	Date
1	SPA SUBMISSION	NOV. 8, 2024

Bayport Village
Commercial Development

EROSION & SEDIMENT CONTROL PLAN

Client:
Lanarose Midland Ltd.
220 Duncan Mill Road, Suite 315
North York, Ontario
M3B 3J5

WMI & Associates Limited
119 Collier Street
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Ph 705-797-2027
www.wmiengineering.ca

Drawn By	Checked By	Drawing No.
JB	SM	ESC
Scale 1: 400	Project No. 07-010FH	

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GENERAL

1. ALL MEASUREMENTS ARE IN METRES, PIPE SIZES IN MILLIMETRES, UNLESS OTHERWISE NOTED.
2. THE ONTARIO PROVINCIAL STANDARDS AND SPECIFICATIONS AND THE ONTARIO PROVINCIAL DRAWINGS, MIDLAND PUC AND TOWN OF MIDLAND DEVELOPMENT DESIGN STANDARDS SHALL APPLY TO THIS CONTRACT.
3. ORDER OF PRECEDENCE OF STANDARD DRAWINGS IS FIRSTLY TOWN OF MIDLAND DEVELOPMENT DESIGN STANDARDS, SECONDLY MIDLAND PUC STANDARDS, AND THIRDLY ONTARIO PROVINCIAL STANDARD DRAWINGS (OPSD).
4. LOCATIONS OF EXISTING SERVICES ARE NOT GUARANTEED. CONFIRM EXISTING UTILITY LOCATIONS AND ELEVATIONS PRIOR TO CONSTRUCTION. THE CONTRACTOR IS REQUIRED TO NOTIFY THE VARIOUS UTILITY COMPANIES 48 HOURS PRIOR TO THE COMMENCEMENT OF ANY WORK.
5. A ROAD OCCUPANCY PERMIT IS REQUIRED FROM THE TOWN OF MIDLAND PRIOR TO THE COMMENCEMENT OF WORK WITHIN ANY TOWN RIGHT-OF-WAY.
6. NATIVE MATERIAL SUITABLE FOR BACKFILL SHALL BE COMPACTED TO 98% STANDARD PROCTOR MAXIMUM DRY DENSITY, UNLESS OTHERWISE NOTED. ENGINEERED FILL (ON LOTS), SHALL BE COMPACTED TO 100% STANDARD PROCTOR MAXIMUM DRY DENSITY.
7. GRANULAR MATERIAL AND BEDDING MATERIAL SHALL BE PLACED IN LAYERS 150mm IN DEPTH AND COMPACTED TO 98% (ROAD GRAN 'A' & GRAN 'B') OR 98% (BEDDING AND COVER) STANDARD PROCTOR MAXIMUM DRY DENSITY OR AS DIRECTED BY THE SOILS CONSULTANT.
8. ALL DISTURBED AREAS WITHIN EXISTING MUNICIPAL RIGHT-OF-WAYS ARE TO BE REINSTATED TO THEIR ORIGINAL CONDITION OR BETTER AS DETERMINED BY THE TOWN OF MIDLAND (MIN 150mm TOPSOIL AND SOD). ALL OTHER DISTURBED AREAS TO BE TOPSOILED AND SEADED PRIOR TO ACCEPTANCE.
9. ALL SILT CONTROL AND EROSION PROTECTION DEVICES ARE TO BE IN PLACE PRIOR TO THE COMMENCEMENT OF CONSTRUCTION AND SHALL REMAIN IN PLACE AND BE MAINTAINED BY THE CONTRACTOR UNTIL CONSTRUCTION IS COMPLETE, THE GRASS HAS ESTABLISHED GROWTH AND APPROVED BY THE ENGINEER.
10. UTILITY CROSSING, WHERE REQUIRED, SHALL BE SUPPORTED AS PER OPSD 1007.01 AND ANY EXISTING STRUCTURES SHALL BE PROPERLY SUPPORTED.
11. CONTRACTOR SHALL COORDINATE HIS WORK SUCH THAT HE DOES NOT INTERFERE WITH WORK BEING UNDERTAKEN BY A UTILITY COMPANY.
12. ALL SIDEWALKS SHALL BE CONSTRUCTED ON A PROPERLY CONSTRUCTED FOUNDATION OF 150 mm MINIMUM DEPTH OF GRANULAR "A" AND BE PAVED WITH CONCRETE FULL WIDTH. THICKNESS TO BE 200 mm ACROSS COMMERCIAL AND INDUSTRIAL ENTRANCES. ALL CONCRETE MATERIALS AND WORK SHALL CONFORM TO O.P.S. SPECIFICATIONS, USING THE TOWN OF MIDLAND CONCRETE MIX DESIGN.
13. ALL SEWER SYSTEMS INCLUDING SERVICE CONNECTIONS TO THE BUILDING, MANHOLES AND CATCHBASINS SHALL BE THOROUGHLY FLUSHED AND/OR CLEANED OF DEBRIS AND ALL PIPES SHALL BE TESTED IN ACCORDANCE WITH OPSS AND SHALL BE INSPECTED BY AN APPROVED VIDEO CAMERA TESTING COMPANY AND THE ENGINEER SHALL BE PROVIDED A COPY OF APPROPRIATE DATA UPON COMPLETION OF CONSTRUCTION AND PRIOR TO FINAL APPROVAL. ANY SECTIONS OF SEWER OR SERVICE CONNECTIONS THAT FAIL TO MEET THE REQUIREMENTS SHALL BE REPAIRED OR REPLACED AT THE DIRECTION OF THE ENGINEER. ONLY CHEMICAL PRESSURE GROUTING REPAIR TECHNIQUES WILL BE CONSIDERED ACCEPTABLE.

ROADS

1. ROADS TO CONFORM TO ROAD CROSS-SECTION ON DRAWING HB1.
2. PROVISIONS MUST BE MADE TO CLEAN THE ROADS DAILY IF NECESSARY, DURING CONSTRUCTION, AT THE CONTRACTOR'S EXPENSE.
3. NATIVE SUBGRADE TO BE COMPACTED TO MINIMUM 98% STANDARD PROCTOR MAXIMUM DRY DENSITY AND SHALL BE PROOF ROLLED WITH TOWN AND ENGINEER PRESENT.
4. NON-COMPRESSIBLE BACK FILL WILL BE USED DURING REBUILDING, ADJUSTING, OR ANY OTHER APPLICABLE CATCHBASIN OR MAINTENANCE HOLE WORKS.
5. CURBING AT ENTRANCES TO BE CONCRETE CURB AND GUTTER AS PER OPSD 600.040.
6. CURBING WITHIN PARKING LOT TO BE CONCRETE BARRIER CURB AS PER OPSD 600.110.
7. CURBS TO BE DEPRESSEED AT INTERSECTION FOR SIDEWALKS PER OPSD 310.030 AND HAVE TACTILE PLATES PER OPSD 310.039.

STORM

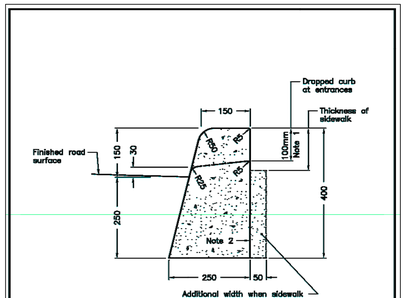
1. STORM SEWER UNDER 450mm DIAMETER TO BE EITHER PVC DR35 OR CONCRETE. STORM SEWER GREATER THAN 450mm DIAMETER TO BE CONCRETE. CONCRETE STORM SEWERS TO CONFORM TO CSA A257.1 AND A257.2 (.65-D OR EQUIVALENT).
2. SEWERS SHALL BE CONSTRUCTED WITH BEDDING AS PER OPSD 802.03, CLASS B-1, GRANULAR A.
3. PRECAST STORM MANHOLES (MIN. 1200MMø) OPSD 701.010 UNLESS OTHERWISE NOTED AND CATCHBASINS OPSD 705.010.
4. CATCHBASIN LEADS TO BE 2.0% MIN. GRADE, 250mmø FOR SINGLE CATCHBASIN AND 300mmø FOR DOUBLE CATCHBASIN.
5. MANHOLES & CATCH BASINS SHALL HAVE SUMPS AS NOTED.
6. MAINTENANCE HOLE TOPS (FRAMES) OPSD 401.01 AND CATCH BASIN (FRAMES) OPSD 400.02 (WITH TYPE B OPEN COVER) ARE TO BE SET TO BASE COURSE ASPHALT GRADE AND THEN ADJUSTED TO FINAL GRADE WHEN THE TOP LIFT OF OF ASPHALT IS PLACED.
7. ALL CONNECTIONS TO THE STORM MAIN SHALL BE MADE WITH A STORM MANHOLE OR APPROVED FACTORY TEE CONNECTION AS PER OPSD 708.03.
8. ALL STORM MANHOLES SHALL BE COMPLETED WITH FROST STRAPS PER OPSD 701.100.

SANITARY

1. SANITARY SEWER SHALL BE PVC (SDR 35) PIPE WITH RUBBER GASKET JOINTS WHICH CONFORM TO C.S.A. B-182.2,3,4.
2. PRECAST SANITARY MANHOLES IN ROAD R.O.W. SHALL CONFORM WITH OPSD 701.010 (1200mmø) WITH FRAME & COVER OPSD 401.010 AND SOLID RECTANGULAR RUNGS, OPSD 405.020.
3. PRECAST SANITARY MANHOLES NOT IN ROAD R.O.W. SHALL CONFORM WITH OPSD 701.010 (1200mmø) WITH FRAME & COVER OPSD 401.03 AND SOLID RECTANGULAR RUNGS, OPSD 405.020.
4. SANITARY MANHOLE BENCHING AS PER OPSD 701.021.
5. SANITARY SERVICE CONNECTIONS TO BE MARKED 2.0m PAST PROPERTY LINE WITH A 50x100mm WOOD MARKER, PAINTED GREEN, EXTENDING FROM THE SERVICE INVERT TO 300mm ABOVE GROUND LEVEL.
6. SANITARY SERVICE CONNECTION PIPE TO BE A MINIMUM 125mmø PVC DR28, RUBBER GASKET TYPE JOINTS AND SHALL CONFORM TO CSA (B-182.2,3,4) (COLOURED) FOR A RESIDENTIAL HOUSE AND MINIMUM 150mmø PVC DR28 FOR INDUSTRIAL, COMMERCIAL DEVELOPMENT. PVC TEST TEES TO BE INSTALLED AT PROPERTY LINE FOR RESIDENTIAL HOUSES, COMPLETE WITH SCREW ON CAP.
7. SEWERS SHALL BE CONSTRUCTED WITH BEDDING AS PER OPSD-802.010, (GRAN. 'A' EMBEDMENT MATERIAL) FOR FLEXIBLE PIPES UNLESS OTHERWISE ADVISED BY A GEOTECHNICAL ENGINEER.
8. MAINTENANCE HOLE TOPS (FRAMES) ARE TO BE SET TO BASE COURSE ASPHALT GRADE AND THEN ADJUSTED TO FINAL GRADE WHEN THE TOP LIFT OF ASPHALT IS PLACED.
9. ALL SANITARY MANHOLES SHALL BE COMPLETED WITH FROST STRAPS PER OPSD 701.100.
10. FORCEMAIN TO BE HDPE 50mmø SDR 11 BURIED WITH 1.7m COVER OR APPROVED INSULATION c/w TRACER WIRE AND SHALL INCLUDE CAUTION TAPE PLACED 300mm ABOVE TO IDENTIFY AS A SEWAGE LINE. FORCEMAIN TO BE PLACED WITH POSITIVE SLOPE; NO HIGH OR LOW POINTS ARE PERMITTED. SIZE/FLOW TO BE CONFIRMED BY MECHANICAL ENGINEER FOR HOTEL.

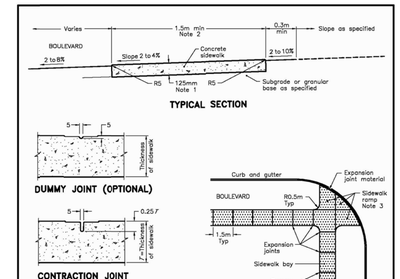
WATERMAIN

1. CONTRACTOR SHALL INFORM THE TOWN OF MIDLAND A MINIMUM OF 48 HOURS IN ADVANCE OF THEIR INTENTIONS TO WORK.
2. WATERMAIN MATERIAL TO BE PVC (CLASS 150, DR-18) AND, SHALL SATISFY AWWA C900 SPECIFICATION. AND ALL WATERMAIN TESTING IN ACCORDANCE WITH TOWN STANDARDS.
3. MECHANICAL JOINT FITTINGS MEETING AWWA SPECIFICATIONS C-907 AND CSA B137.2 SHALL BE USED WHERE APPLICABLE, ON 150 MM TO 400 MM IN DIAMETER PVC WATERMAINS. SHOULD DUCTILE IRON MECHANICAL JOINT FITTINGS BE EMPLOYED, THE CONTRACTOR SHALL INSTALL SACRIFICIAL CAPS ON EVERY BOLT. PVC JOINTS USING MECHANICAL JOINT FITTINGS ARE TO BE SQUARE CUT, NOT BEVELED.
4. WATERMAIN BEDDING SHALL CONFORM TO OPSD 802.010 (GRAN "A" EMBEDMENT) FOR FLEXIBLE PIPE UNLESS OTHERWISE APPROVED BY THE TOWN OF MIDLAND.
5. NO WATERMAIN IS TO BE LAID ON FILL UNTIL THE DENSITY REPORT HAS BEEN SUBMITTED TO AND APPROVED BY THE ENGINEER. FILL TO BE PLACED TO 0.6m MINIMUM ABOVE THE TOP OF THE WATERMAIN GRADED AND COMPACTED AS PER OPSS 501. TESTS SHALL BE TAKEN ALONG THE CENTRE LINE OF THE WATERMAIN AND 2.50m EITHER SIDE OF THE WATERMAIN AT A MAXIMUM INTERVAL OF 30m AT EACH 0.6m LIFTS. ALL TEES, HORIZONTAL BENDS, AND BRANCH VALVES IN FILL AREAS TO BE TIED WITH THE TIE RODS IN ADDITION TO CONCRETE THRUST BLOCKING PER OPSD 1103.010 AND 1103.020.
6. ROMAC GRIP RINGS TO BE USED ON ALL MECHANICAL FITTINGS.
7. TRACING WIRE TO BE INSTALLED ON TOTAL LENGTH OF PVC WATERMAIN (#12 TWU STRANDED COPPER), BROUGHT UP AT ALL VALVE AND HYDRANT LOCATIONS AND SECURED TO TOP FLANGE BOLT.
8. INSULATE WATER SERVICES WITH HI-40 INSULATION WHERE 0.5m SEPARATION FROM OTHER UTILITIES CANNOT BE MAINTAINED. INSULATION TO EXTEND 0.5m BEYOND OUTSIDE DIAMETER OF BOTH PIPES.
9. ALL WATER SERVICES SHALL BE 19mm TYPE 'K' COPPER PER TOWN OF MIDLAND STANDARD (SEE DETAIL ON DT3.) OR 25mm MUNICIPLEX WITH TRACER WIRE. URECON INSULATION REQUIRED WHERE DEPTH OF COVER IS LESS THAN 1.9m. WATER SERVICE SADDLES SHALL BE USED WHEN TAPPING INTO PVC WATERMAIN.
10. SERVICE TAPPINGS SHALL BE PLACED AT A MINIMUM SEPARATION OF 1.0m AND A MINIMUM OF 0.6 m FROM JOINTS (ENDS OF PIPE).
11. MINIMUM DEPTH OF COVER OVER WATERMAIN TO BE 1.9 METRES.
12. WHERE WATERMAIN CONFLICTS WITH SEWER PIPES, DEFLECT WATERMAIN OVER OR UNDER SEWERS. PROVIDE A MINIMUM OF 0.5 METRE CLEARANCE BETWEEN WATERMAIN AND SEWERS.
13. MINIMUM HORIZONTAL CLEARANCE BETWEEN WATERMAIN AND SEWERS TO BE 2.5 METRES.
14. MATERIAL SPECIFICATIONS ARE AS FOLLOWS:
    - HYDRANTS: CANADA VALVE CENTURY/PREMIERE MODEL OPENING COUNTER CLOCKWISE, AWWA C502 WITH STORTZ PUMPER ATTACHMENTS (SEE TOWN OF MIDLAND, TYPICAL HYDRANT AND VALVE INSTALLATION DETAIL ON DT3)
    - VALVES: MUELLER RESILIENT SEAT AWWA C509
    - VALVE BOXES: BIBBY
    - SADDLES: ROCKWELL 371 & 372
    - MAIN STOP: MUELLER AWWA C800
    - CURB STOP: MUELLER AWWA C800
    - SERVICE BOXES: MUELLER WITH STAINLESS STEEL RODS
15. WATERMAIN TESTING TO BE IN ACCORDANCE WITH TOWN OF MIDLAND ENGINEERING DEVELOPMENT STANDARDS (IE. SWABBING, PRESSURE TESTING, CHLORINATING ETC.).
16. PRESSURE REDUCING VALVES SHALL BE CLA-VAL MODEL 90-48 (OR EQUIVALENT) COMPLETE WITH DURTLYN SLEEVES AND PRESSURE GAUGES IN 1500 VALVE CHAMBER OPSD 1101.010 C/W SUMP.



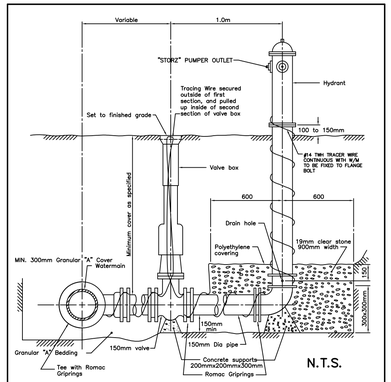
NOTES:
1 When sidewalk is continuously adjacent, the dropped curb at entrances shall be reduced to 75mm.
2 For slipforming procedure a 5% batter is acceptable.
A Treatment at entrances shall be according to OPSD 351.010.
B Outlet treatment shall be according to the OPSD 810 Series.
C The transition from one curb type to another shall be a minimum length of 3.0m, except in conjunction with guide rail where it shall be according to the OPSD 900 Series.
D All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2012	Rev 2
CONCRETE BARRIER CURB		OPSD 600.110



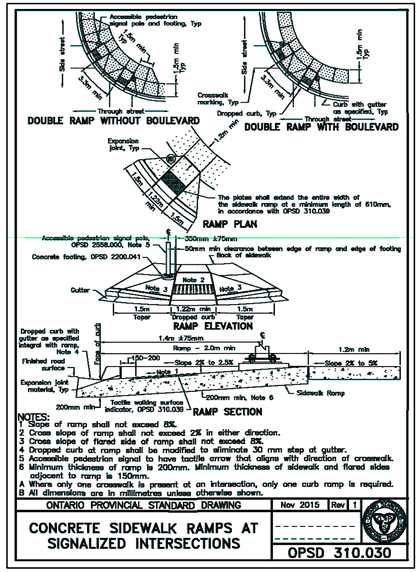
NOTES:
1 Sidewalk thickness at residential driveways and adjacent to curb shall be 150mm. At commercial and industrial driveways, the thickness shall be 200mm.
2 Sidewalk width shall be wider when specified.
3 This OPSD shall be read in conjunction with OPSD 310.030, 310.031, 310.032, 310.033 and 310.039.
A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2015	Rev 2
CONCRETE SIDEWALK		OPSD 310.010



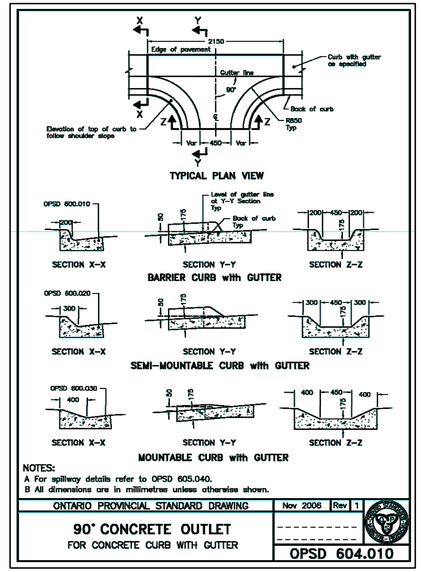
NOTES:
A All concrete supports to be poured against undisturbed ground.
B Polyethylene bond breaker to be used between concrete and fittings.
C Flange of standpipe extensions not to be in frost zone.
D All dimensions are in millimetres or metres unless otherwise shown.
E All hydrants to be self draining unless otherwise specified.

TOWN OF MIDLAND
TYPICAL HYDRANT AND VALVE INSTALLATION DETAIL
SD 101.2



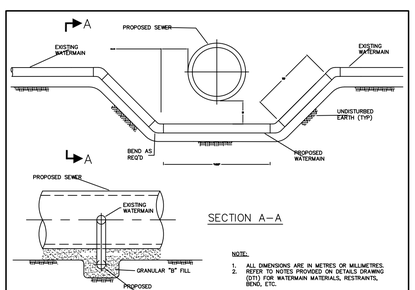
NOTES:
1 Slope of ramp shall not exceed 8%.
2 Cross slope of ramp shall not exceed 2% in either direction.
3 Cross slope of flared side of ramp shall not exceed 8%.
4 Dropped curb at ramp shall be modified to eliminate 20 mm step at gutter.
5 Accessible pedestrian signal to have tactile arrow that aligns with direction of crosswalk.
6 Minimum thickness of ramp is 200mm. Minimum thickness of sidewalk and flared sides adjacent to ramp is 150mm.
A Where only one crosswalk is present at an intersection, only one curb ramp is required.
B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2015	Rev 1
CONCRETE SIDEWALK RAMPS AT SIGNALIZED INTERSECTIONS		OPSD 310.030



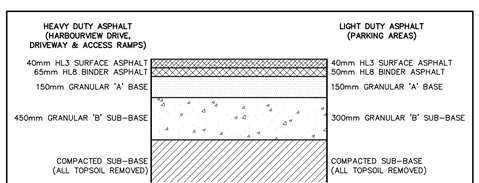
NOTES:
A For spillway details refer to OPSD 605.040.
B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2006	Rev 1
90° CONCRETE OUTLET FOR CONCRETE CURB WITH GUTTER		OPSD 604.010



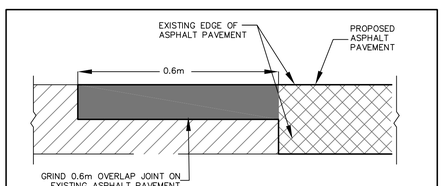
NOTE:
1. ALL DIMENSIONS ARE IN METRES OR MILLIMETRES.
2. REFER TO NOTES PROVIDED ON DETAILS DRAWING (DT1) FOR WATERMAIN MATERIALS, RESTRAINTS, BEND, ETC.

TYPICAL WATERMAIN DEFLECTION DETAIL
N.T.S.



NOTE: GEOTECHNICAL ENGINEER TO CONFIRM MATERIAL THICKNESS AND COMPACTION REQUIREMENTS.

PARKING & ACCESS ROAD CROSS SECTION
N.T.S.



ASPHALT LAP-JOINT
N.T.S.

Notes:

1. Unless noted otherwise, the measurements and distances shown on this drawing are shown in meters.
2. Do not scale drawings.
3. It is the contractor's responsibility to verify all dimensions, levels and datums on site and report any discrepancies or omissions to WMI & Associates Ltd. prior to construction.
4. This drawing is to be read and understood in conjunction with all other relevant documents applicable to this project.
5. This drawing is the exclusive property of WMI & Associates Ltd. and the reproduction of any part of this document without prior written consent is strictly prohibited.

Benchmark: 180.420m

Top nut of hydrant located north of lot #9 and south of the southeast corner of block 69.

No.	Issue / Revision	Date
1	SPA SUBMISSION	NOV. 8, 2024

Bayport Village
Commercial Development

DETAILS SHEET 1

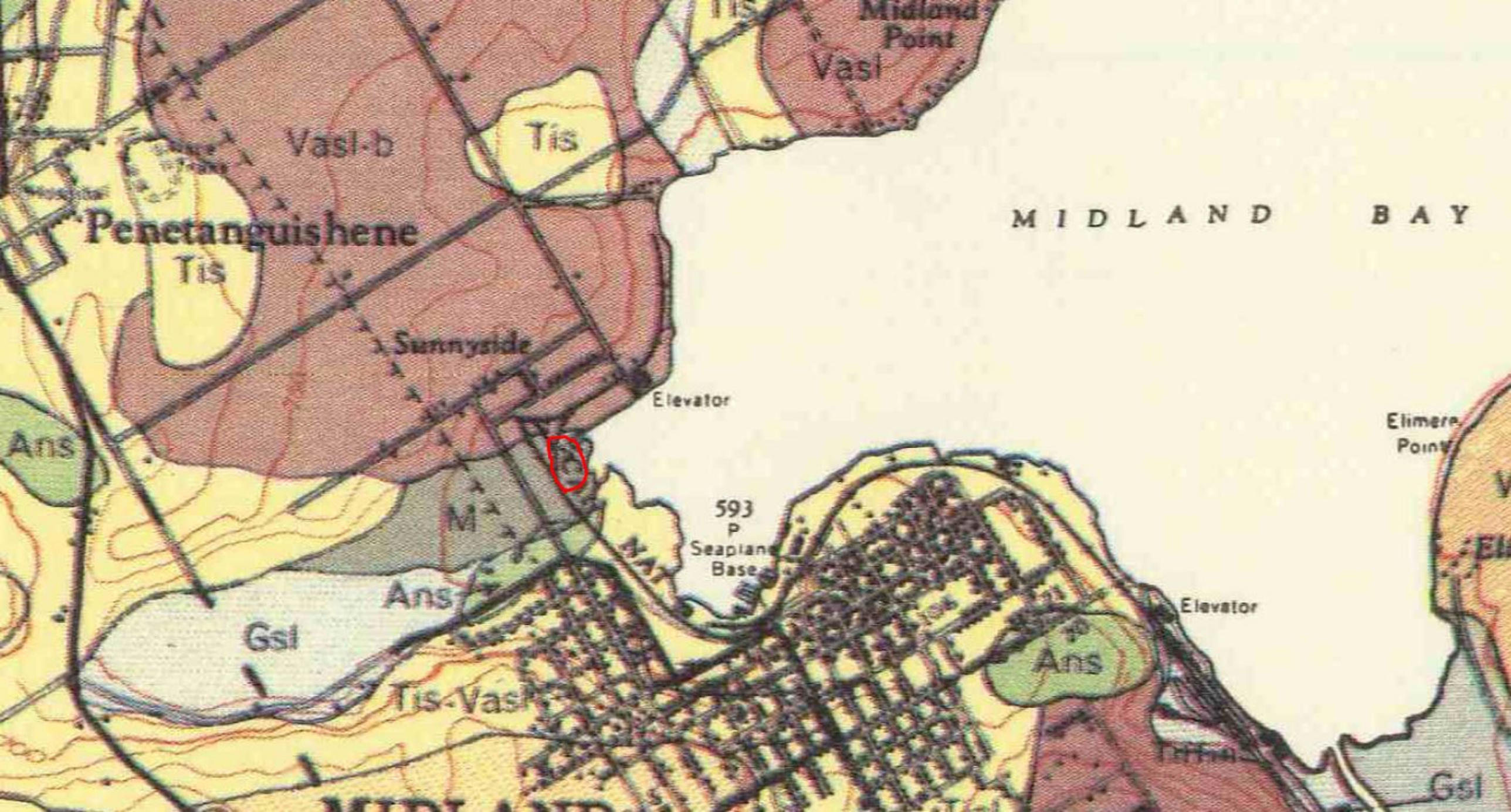
Client:
Lanarose Midland Ltd.
220 Duncan Mill Road, Suite 315
North York, Ontario
M3B 3J5

WMI & Associates Limited
119 Collier Street
Barrie, Ontario
L4M 1H5
Ph 705-797-2027
www.wmiengineering.ca

Drawn By	Checked By	Drawing No.
JB	SM	DT1
Scale: N.T.S.	Project No. 07-010FH	

APPENDIX B

STORMWATER CALCULATIONS


Midland Point
Vasl
Tis
Vasl-b
Penetanguishene
Tis
Sunnyside
MIDLAND BAY
Elevator
Ans
593
P
Seaplane Base
Ans
Gsl
Tis-Vasl
Elevator
Ans
Gsl

MUCK

M	60,600

Well decomposed organic material over 1 foot deep underlain by rock, sand, silt or clay.

Very poor.

Depressional.

Stonefree.

Neutral.

Organic.

CHART H2 - 6A (Cont'd)

CHART H2-6A - continued

Soils Series	Soil Texture	Hyd. Soil Grp.	Soils Series	Soil Texture	Hyd. Soil Grp.	Soils Series	Soil Texture	Hyd. Soil Grp.
Lockport	c	D	Mountain	s l	AB	"	l	C
London	l	BC	Muck	m	B	"	si l	C
"	si l	BC	Murray	si l /f		"	si c l	CD
Lovering	si c l	C		s	B	"	c l	CD
"	c	D	Napanee	c /si l	C	"	c	CD
"	c l	CD	Neebing	s /si	B	Petherwick	si l	BC
Lyons	l	B	Nepean	s	AB	Phipps	si c l	C
Macton	l	B	Newburgh	s l	A	"	c l	C
Magnetawan	si l	BC	"	si l	BC	Piccadilly	s l	B
Mallard	s	AB	Newcastle	l	BC	"	l	BC
"	s l	AB	"	c l	C	"	si l	BC
Malton	c	C	"	si l	BC	Pike	c	D
Mannheim	l	B	Newton	s l	B	Pike Lake	l	B
Manotick	s	AB	Nelson	c	D	Plainfield	s	A
Maplewood	si l	BC	New lisk.	si c	C	Pontypool	s	A
Marionville	s	B	"	c	C	"	s l	AB
"	s l	B	Niagara	c	D	Powassan	si l	BC
Martin	s /g	AB	Nipissing	s /si	B	Preston	s l	B
Maryhill	l	BC	Norham	si l	BC	Raglan	s /g	A
Matilda	l	BC	North Gow.	c l	C	Rainy Riv.	p	B
Matson	si l	BC	"	c	C	Renfrew	c l	C
Medonte	si l	BC	O'Connor	c	D	"	l	BC
"	si c l	C	Oliver	l /si l	B-BC	Rideau	c l	D
McCool	c	C	Oneida	l	BC	"	c	D
McInnis Cr	c l/l		"	si l	BC	Rosslyn	s /g	A
	&P	BC	"	si c l	C	Rubicon	s	AB
McIntyre	s	AB	"	c l	D	"	s l	AB
Miami	l	BC	Ontario	l	BC	Sandford	c	D
"	si l	BC	Osgoode	l	BC	Sargent	s /g	A
"	c l	D	"	si l	BC	"	s l	AB
"	g l	AB	"	si c l	C	Saugeen	si l	BC
Milberta	c /si		Oshtemo	s	A	"	si c l	C
	c l	C	Osnabruck	c l	C	"	c l	D
Mill	s	B	Osprey	s l	A	Schomberg	si l	BC
	s l	B	"	l	B	"	si c l	C
Milliken	s l	AB	Otonabee	s l	A	"	c l	C
"	l	BC	"	l	B	Scoble	si c	C
Minesing	ma si		Otterskin	s l	B	Seely's Bay	si c l	C
	c l	BC	Oxdrift	c	D	Shashawan	l	B
"	ma c	C	Paipoonge	c	C	Shenston	c l &p	BC
Mississauga	c	C	Parkhill	l	BC	Sidney	c	C
Monaghan	l	BC	"	si l	BC	Sifton	si c /c	
"	si l	BC	Peat	p	B		l	C
"	c l	C	Peel	c	D	Simcoe	si l	BC
Monteagle	s l	A	Pelham	s l	A	"	si c l	C
"	sl + r	B	Pense	si l	BC	"	c l	C
Moose	s l	B	Pense	si c l	C	Slate River	s /l	B
"	l	BC	Perch	c	C	Smithfield	si l	C
Morley	c si		Percy	s	A	"	si l	C
	c l	C	"	f s l	B	"	c l	CD
Morrisburg	c	C	"	s l	B	Smithville	l	BC
Moscow	si c	C	Perth	s l	AB	"	si c l	C

WMI & Associates Limited
119 Collier Street, Barrie, Ontario L4M 1H5
p (705) 797-2027 f (705) 797-2028

RUNOFF COEFFICIENT CALCULATIONS
"C" SPREADSHEET

Date: 26-Feb-20 **Project No.:** 07-010FH

Project: Bayport Commercial Development **Prepared By:** JB

RUNOFF COEFFICIENT NUMBERS

Land Cover		Hydrologic Soil Groups		
		A-AB	B-BC	C-D
Cultivated Land	0 - 5% grade	0.22	0.35	0.55
	5 - 10% grade	0.3	0.45	0.6
	10 - 30% grade	0.4	0.65	0.7
Pasture Land	0 - 5% grade	0.1	0.28	0.4
	5 - 10% grade	0.15	0.35	0.45
	10 - 30% grade	0.22	0.4	0.55
Woodlot or Cutover	0 - 5% grade	0.08	0.25	0.35
	5 - 10% grade	0.12	0.3	0.42
	10 - 30% grade	0.18	0.35	0.52
Lakes and Wetlands		0.05	0.05	0.05
Impervious Area	(i.e. buildings, roads, parking lot, etc.)	0.95	0.95	0.95
Gravel	(not used for proposed parking or storage areas)	0.4	0.5	0.6
Residential	Single Family	0.3	0.4	0.5
	Multiple (i.e. semi, townhouse, apartment, etc.)	0.5	0.6	0.7
Industrial	Light	0.55	0.65	0.75
	Heavy	0.65	0.75	0.85
Commercial		0.6	0.7	0.8
Unimproved Areas		0.1	0.2	0.3
Lawn	< 2% grade	0.05	0.11	0.17
	2 - 7% grade	0.1	0.16	0.22
	> 7% grade	0.15	0.25	0.35

Ref: Runoff Coefficient Numbers - Adapted from Design Chart 1.07, Ontario Ministry of Transportation, "MTO Drainage Management Manual", MTO. (1997)

<<< **Elements Requiring Input Information**

PRE-DEVELOPMENT CONDITION

Land Cover		Hydrologic Soil Groups		
		A-AB	B-BC	C-D
Cultivated Land	0 - 5% grade			
	5 - 10% grade			
	10 - 30% grade			
Pasture Land	0 - 5% grade			
	5 - 10% grade			
	10 - 30% grade			
Woodlot or Cutover	0 - 5% grade			0.11
	5 - 10% grade			
	10 - 30% grade			
Lakes and Wetlands				
Impervious Area	(i.e. buildings, roads, parking lot, etc.)			0.01
Gravel	(not used for proposed parking or storage areas)			0.13
Residential	Single Family			
	Multiple (i.e. semi, townhouse, apartment, etc.)			
Industrial	Light			
	Heavy			
Commercial				
Unimproved Areas				0.67
Lawn	< 2% grade			0.10
	2 - 7% grade			0.22
	> 7% grade			0.14

Total Area (ha) = 1.38 **Runoff Coefficient, C =** **0.32**

POST-DEVELOPMENT CONDITION

Land Cover		Hydrologic Soil Groups		
		A-AB	B-BC	C-D
Cultivated Land	0 - 5% grade			
	5 - 10% grade			
	10 - 30% grade			
Pasture Land	0 - 5% grade			
	5 - 10% grade			
	10 - 30% grade			
Woodlot or Cutover	0 - 5% grade			
	5 - 10% grade			
	10 - 30% grade			
Lakes and Wetlands				
Impervious Area	(i.e. buildings, roads, parking lot, etc.)			0.80
Gravel	(not used for proposed parking or storage areas)			
Residential	Single Family			
	Multiple (i.e. semi, townhouse, apartment, etc.)			0.16
Industrial	Light			
	Heavy			
Commercial				
Unimproved Areas				
Lawn	< 2% grade			0.43
	2 - 7% grade			
	> 7% grade			

Total Area (ha) = 1.38 **Runoff Coefficient, C =** **0.68**

\\WMI-SERVER\wmi-server\Data\Projects\2007\07-010\Spreadsheets\Phase2\Storm\191120-Hotel_Block76_STM\[200225_1.0-C_CALCS.xlsx]C CALCS

Ontario IDF CURVE LOOKUP

Active coordinate

44° 45' 15" N, 79° 54' 15" W (44.754167,-79.904167)

Retrieved: Fri, 28 Feb 2020 20:31:12 GMT

Location summary

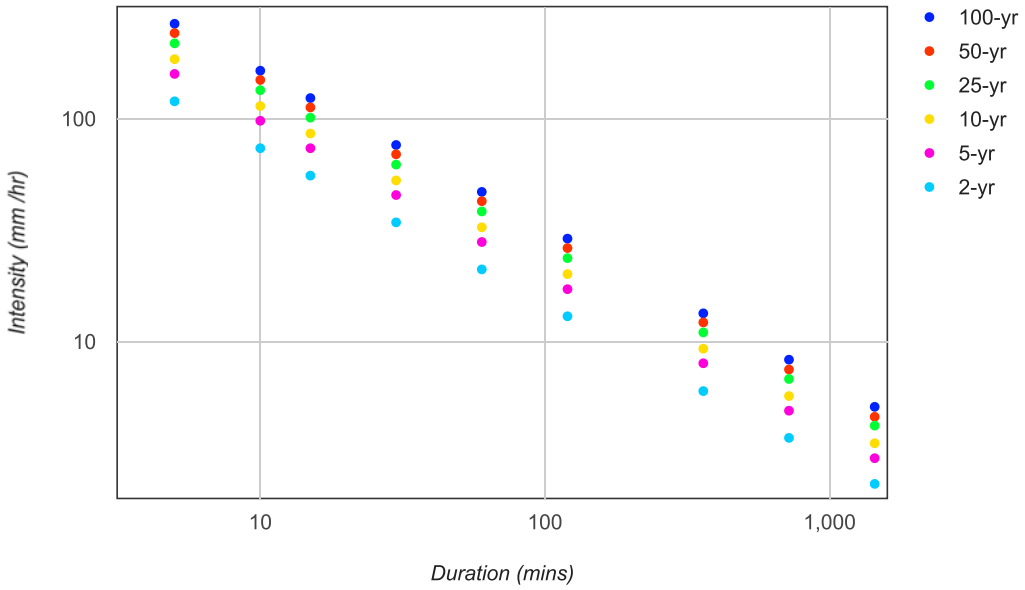
These are the locations in the selection.

IDF Curve: 44° 45' 15" N, 79° 54' 15" W (44.754167,-79.904167)

Results

An IDF curve was found.

Coordinate: 44.754167, -79.904167
IDF curve year: 2010



Coefficient summary

IDF Curve: 44° 45' 15" N, 79° 54' 15" W (44.754167,-79.904167)

Retrieved: Fri, 28 Feb 2020 20:31:12 GMT

Data year: 2010
IDF curve year: 2010

Return period	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
A	21.1	28.0	32.6	38.4	42.7	47.0
B	-0.699	-0.699	-0.699	-0.699	-0.699	-0.699

Statistics

Rainfall intensity (mm hr^{-1})

Duration	5-min	10-min	15-min	30-min	1-hr	2-hr	6-hr	12-hr	24-hr
2-yr	119.8	73.8	55.6	34.3	21.1	13.0	6.0	3.7	2.3
5-yr	159.0	98.0	73.8	45.5	28.0	17.2	8.0	4.9	3.0
10-yr	185.2	114.1	85.9	52.9	32.6	20.1	9.3	5.7	3.5
25-yr	218.1	134.4	101.2	62.3	38.4	23.7	11.0	6.8	4.2
50-yr	242.5	149.4	112.5	69.3	42.7	26.3	12.2	7.5	4.6
100-yr	267.0	164.4	123.9	76.3	47.0	29.0	13.4	8.3	5.1

Rainfall depth (mm)

Duration	5-min	10-min	15-min	30-min	1-hr	2-hr	6-hr	12-hr	24-hr
2-yr	10.0	12.3	13.9	17.1	21.1	26.0	36.2	44.6	54.9
5-yr	13.3	16.3	18.4	22.7	28.0	34.5	48.0	59.2	72.9
10-yr	15.4	19.0	21.5	26.5	32.6	40.2	55.9	68.9	84.9
25-yr	18.2	22.4	25.3	31.2	38.4	47.3	65.8	81.1	99.9
50-yr	20.2	24.9	28.1	34.7	42.7	52.6	73.2	90.2	111.1
100-yr	22.2	27.4	31.0	38.1	47.0	57.9	80.6	99.3	122.3

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Last Modified: September 2016

WMI & Associates Limited
119 Collier Street, Barrie, Ontario L4M 1H5
p (705) 797-2027 f (705) 797-2028

RATIONAL METHOD CALCULATIONS

Date: 7-Nov-24 **Project No.:** 07-010

Project: Bayport Village Commercial Development **Prepared By:** JB

<<< **Elements Requiring Input Information**

Rainfall Intensity-Duration-Frequency Coefficients from: http://www.mto.gov.on.ca/IDF_Curves/terms.shtml

2-year		5-year		10-year		25-year		50-year		100-year	
A =	21.1	A =	28.0	A =	32.6	A =	38.4	A =	42.7	A =	47.0
B =	-0.699	B =	-0.699	B =	-0.699	B =	-0.699	B =	-0.699	B =	-0.699

Rational Method Formula

$$Q = \frac{C \times I \times A}{360} \quad (m^3/s)$$

where, C = Runoff Coefficient
I = Rainfall Intensity, (mm/hr)
A = Drainage Area, (ha)

Rainfall Intensity Equation (2-100 year storm events)

$$I_{2\text{-}100} = A \times (T_C / 60)^B \quad (mm/hr)$$

where, A = Rainfall IDF Coefficient
B = Rainfall IDF Coefficient
T_C = Time of Concentration, (min)

Runoff Coefficient Equations
Based on MTO Drainage Manual (1984), page BD-4

2-year	C_2 =	C
5-year	C_5 =	C
10-year	C_{10} =	C
25-year	C_{25} =	1.10 x C
50-year	C_{50} =	1.20 x C
100-year	C_{100} =	1.25 x C

For storms having a return period of more than 10 years, the Runoff Coefficient, C, will be increased as indicated above, up to a maximum value of 1.

Rainfall Intensity Equation (25mm storm event)
Based on the MOE SWMP Manual (2003), Eq'n 4.9

$$I_{25mm} = (43 \times C) + 5.9 \quad (mm/hr)$$

where, C = Runoff Coefficient

Catchment I.D.	A (ha)	T_C (min.)	C	Q_{25mm} (m^3/s)	Q_2 (m^3/s)	Q_5 (m^3/s)	Q_{10} (m^3/s)	Q_{25} (m^3/s)	Q_{50} (m^3/s)	Q_{100} (m^3/s)
PRE	1.38	10.0	0.32	0.024	0.091	0.120	0.140	0.181	0.220	0.252
POST (TOTAL)	1.38	10.0	0.68	0.092	0.192	0.255	0.297	0.385	0.467	0.536

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD
BASED ON A FINE PARTICLE SIZE DISTRIBUTION

Project Name: 1191 Harbourview Drive
Location: Midland, ON
OGS #: 1

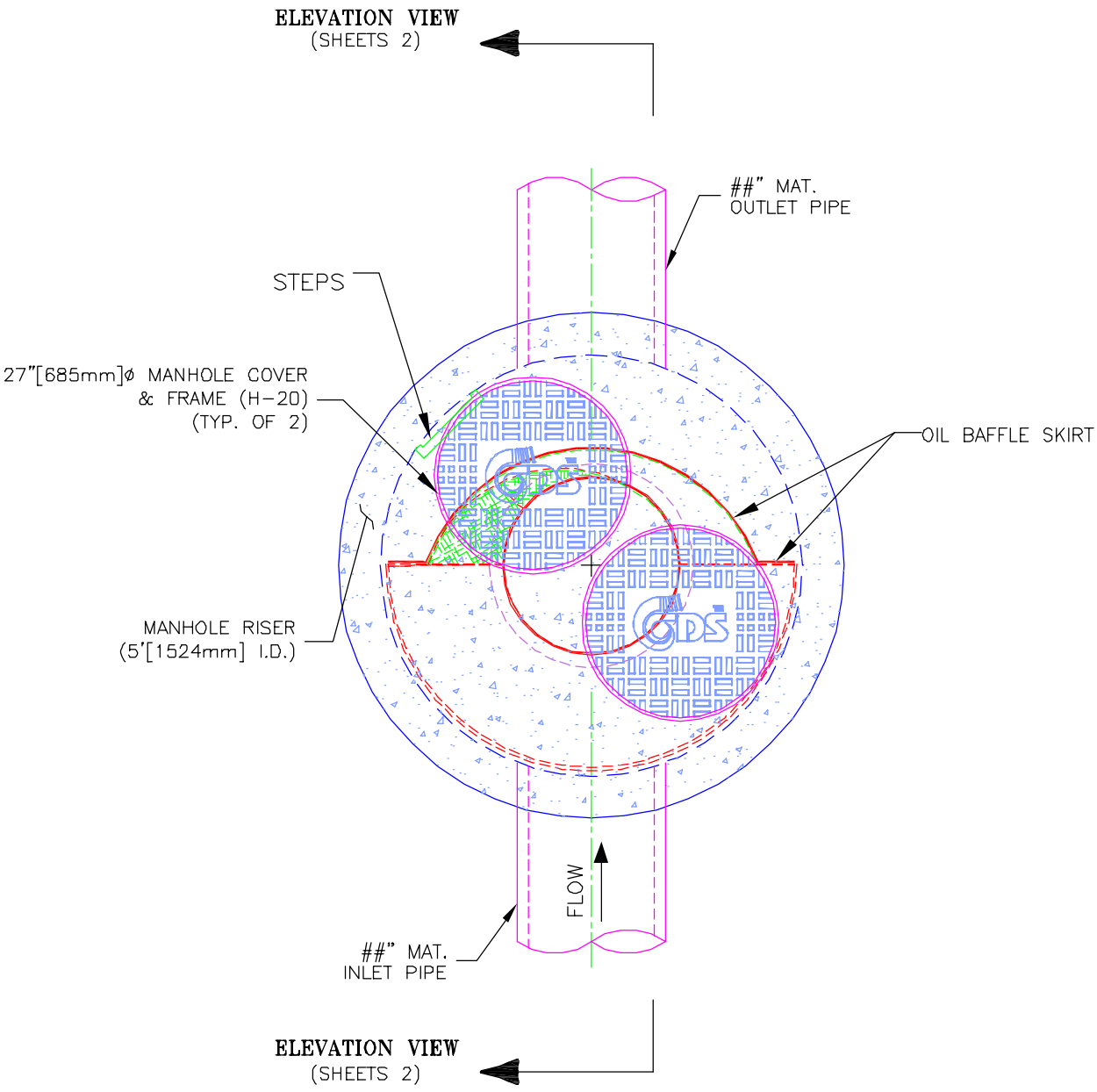
Engineer: **WMI & Associates**
Contact: Benjamin Daniels, B.Eng
Report Date: 20-Nov-20

Area	1.380	ha	**Rainfall Station #**	202	
Weighted C	0.68		**Particle Size Distribution**	FINE	
CDS Model	2025		**CDS Treatment Capacity**	45	l/s

Rainfall Intensity[1] (mm/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (l/s)	Treated Flowrate (l/s)	Operating Rate (%)	Removal Efficiency (%)	Incremental Removal (%)
1.0	10.8%	19.7%	2.6	2.6	5.8	97.2	10.5
1.5	8.7%	28.4%	3.9	3.9	8.6	96.4	8.3
2.0	9.4%	37.8%	5.2	5.2	11.5	95.6	9.0
2.5	6.1%	43.9%	6.5	6.5	14.4	94.7	5.8
3.0	7.4%	51.3%	7.8	7.8	17.3	93.9	6.9
3.5	4.7%	55.9%	9.1	9.1	20.2	93.1	4.3
4.0	4.8%	60.7%	10.4	10.4	23.0	92.3	4.4
4.5	3.0%	63.7%	11.7	11.7	25.9	91.4	2.7
5.0	3.7%	67.4%	13.0	13.0	28.8	90.6	3.3
6.0	5.3%	72.7%	15.7	15.7	34.5	89.0	4.7
7.0	5.0%	77.7%	18.3	18.3	40.3	87.3	4.4
8.0	3.3%	81.0%	20.9	20.9	46.1	85.7	2.8
9.0	3.1%	84.1%	23.5	23.5	51.8	84.0	2.6
10.0	2.3%	86.4%	26.1	26.1	57.6	82.4	1.9
15.0	7.8%	94.2%	39.1	39.1	86.4	74.1	5.8
20.0	3.8%	98.0%	52.2	45.3	100.0	61.0	2.3
25.0	1.0%	99.0%	65.2	45.3	100.0	48.8	0.5
30.0	0.6%	99.6%	78.3	45.3	100.0	40.6	0.2
35.0	0.0%	99.6%	91.3	45.3	100.0	34.8	0.0
40.0	0.4%	100.0%	104.4	45.3	100.0	30.5	0.1
45.0	0.0%	100.0%	117.4	45.3	100.0	27.1	0.0
50.0	0.0%	100.0%	130.4	45.3	100.0	24.4	0.0
							89.5
						Removal Efficiency Adjustment[2] =	6.5%
						Predicted Net Annual Load Removal Efficiency =	**83.0%**
						Predicted Annual Rainfall Treated =	**98.5%**

1 - Based on 25 years of hourly rainfall data from Canadian Station 6113490, Honey Harbor / Beausoleil ON
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.
3 - CDS Efficiency based on testing conducted at the University of Central Florida
4 - CDS design flowrate and scaling based on standard manufacturer model & product specifications

PLAN VIEW

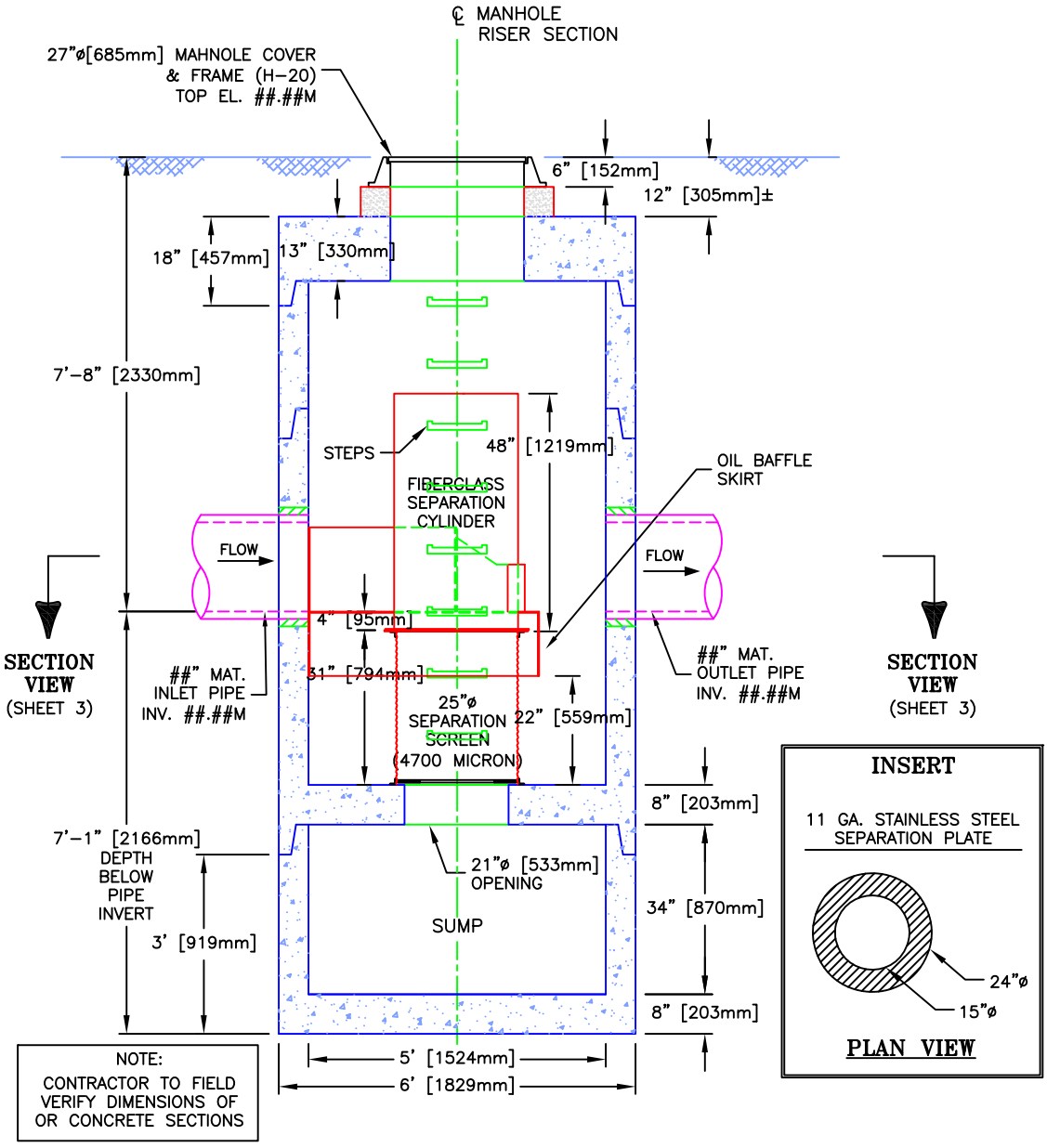


CDS MODEL PMSU20_25m, 1.7 CFS TREATMENT CAPACITY STORM WATER TREATMENT UNIT

CONTECH STORMWATER SOLUTIONS	PROJECT NAME CITY, STATE	JOB# XX-##-###	SCALE 1" = 2'
		DATE ##/##/##	SHEET
		DRAWN INITIALS	1
		APPROV.	

Echelon Environmental 505 Hood Road, Unit 26, Markham, Ontario L3R 5V6 Tel: (905) 948-0000 Fax: (905) 948-0577
CONTECH Stormwater Solutions Inc. 930 Woodcock Road, Suite 101, Orlando, Florida 32803 Tel: (800) 848-9955

ELEVATION VIEW



CDS MODEL PMSU20_25m, 1.7 CFS TREATMENT CAPACITY STORM WATER TREATMENT UNIT

CONTECH STORMWATER SOLUTIONS	PROJECT NAME CITY, STATE	JOB# XX-##-###	SCALE 1" = 3'
		DATE ##/##/##	SHEET 2
		DRAWN INITIALS	
		APPROV.	

Echelon Environmental 505 Hood Road, Unit 26, Markham, Ontario L3R 5V6 Tel: (905) 948-0000 Fax: (905) 948-0577
CONTECH Stormwater Solutions Inc. 930 Woodcock Road, Suite 101, Orlando, Florida 32803 Tel: (800) 848-9955

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p (705) 797-2027 f (705) 797-2028

Storm Sewer Design Sheet - 100yr
Bayport Village Commercial Development

Date: 7-Nov-24
Project No: 07-010FH
Prepared by: JB

<<< Elements Requiring Input Information

Rational Method Calculation:

Q = 2.78*(C_F*C*I*A)

where,

Q = peak flow rate (L/s)
C_F = runoff coefficient factor for storms **> 10-yr**
C = runoff coefficient
I = rainfall intensity (mm/hr)
A = area (ha)

(C_F = 1.0 for the 2, 5 & 10-yr storm events and C_F = 1.1, 1.2 & 1.25 for the 25, 50 & 100-yr storm events respectively)

Manning's Formula Calculation:

$V = (k*R^{2/3}*S^{1/2}) / n$ Q = V*A

MOE Velocity Requirements: 0.8m/s - 6.0m/s

where,

V = mean velocity (m/s)
k = 1.0 for SI units
R = hydraulic radius (m)
S = friction slope (m/s)
n = Mannings Coefficient **0.013**

Rainfall Intensity Calculation:

$I = A*T^B$ Rainfall IDF Data: http://www.mto.gov.on.ca/IDF_Curves/terms.shtml

	50-year	100-year
A =	42.7	47.0
B =	-0.699	-0.699

where,
I = Rainfall Intensity (mm/hr)
T = Time of Concentration (hr)
A = Rainfall IDF Coefficient
B = Rainfall IDF Coefficient

Runoff Coeff. Factors, C_F = 1.20 1.25

Location			Runoff Calculation Data									Sewer Calculation Data							Sewer Profile Data					
Street	Upstream MH	Downstream MH	Drainage Areas (ha) C = 0.20	C = 0.40	C = 0.68	C = 0.75	Individual 2.78CA	Accumulated 2.78CA	Time of Concentration (mins)	Storm Event	Rainfall Intensity (mm/hr)	Peak Runoff Flow (L/s)	Diameter (mm)	Slope (%)	Length (m)	Capacity (L/s)	Velocity (m/s)	Pipe Flow Time (mins)	Pipe Storage Volume (m^3)	Fall in Sewer (m)	Drop in MH (m) DS	Top of Grate Elevation (m) US	Top of Grate Elevation (m) DS	Invert Elevation (m) US	Invert Elevation (m) DS
A1	CBMH 1	OGS 2			1.18		2.23	2.23	10.00	100-year	164.45	458.53	600	1.50	9.00	784.52	2.69	0.06	2.6	0.14	0.15	178.39	178.58	176.23	176.09
	OGS 2	MH 3			0.00		0.00	2.23	10.06	100-year	163.81	456.75	600	1.40	12.50	757.92	2.60	0.08	3.6	0.18	0.15	178.58	178.36	175.94	175.76
	MH 3	MH 4			0.00		0.00	2.23	10.14	100-year	162.90	454.22	675	0.50	49.10	620.09	1.68	0.49	18.1	0.25	0.03	178.36	178.05	175.61	175.36
	MH 4	MH 5			0.00		0.00	2.23	10.62	100-year	157.64	439.55	675	0.50	78.00	620.09	1.68	0.77	28.8	0.39	0.08	178.05	178.06	175.33	174.94
	MH 5	OUTLET			0.00		0.00	2.23	11.40	100-year	150.07	418.46	675	0.50	35.90	620.09	1.68	0.36	13.3	0.18		178.06	177.90	174.86	174.68
		Sum of Drainage Areas (ha):	0.00	0.00	1.18	0.00																			
		Total Drainage Area (ha):	1.18																						

NOTES:

WMI & Associates Limited
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Storm Sewer Design Sheet - 100yr

Storm Sewer Design Sheet -5yr Storm Event with 100yr Sewer Size
Bayport Village Commercial Development

Date: 7-Nov-24
Project No: 07-010FH
Prepared by: JB

<<< **Elements Requiring Input Information**

Rational Method Calculation:

Q = 2.78*(C_F*C*I*A)

where,

Q = peak flow rate (L/s)
C_F = runoff coefficient factor for storms **> 10-yr**
C = runoff coefficient
I = rainfall intensity (mm/hr)
A = area (ha)

(C_F = 1.0 for the 2, 5 & 10-yr storm events and C_F = 1.1, 1.2 & 1.25 for the 25, 50 & 100-yr storm events respectively)

Manning's Formula Calculation:

$V = (k*R^{2/3}*S^{1/2}) / n$ Q = V*A

MOE Velocity Requirements: 0.8m/s - 6.0m/s

where,

V = mean velocity (m/s)
k = 1.0 for SI units
R = hydraulic radius (m)
S = friction slope (m/s)
n = Mannings Coefficient **0.013**

Rainfall Intensity Calculation:

$I = A*T^B$ Rainfall IDF Data: http://www.mto.gov.on.ca/IDF_Curves/terms.shtml

	5-year	100-year
A =	**28.0**	**47.0**
B =	**-0.699**	**-0.699**

where,
I = Rainfall Intensity (mm/hr)
T = Time of Concentration (hr)
A = Rainfall IDF Coefficient
B = Rainfall IDF Coefficient

Runoff Coeff. Factors, C_F = 1.00 1.25

Location			Runoff Calculation Data									Sewer Calculation Data							Sewer Profile Data					
Street	Upstream MH	Downstream MH	Drainage Areas (ha) C = 0.20	C = 0.40	C = 0.68	C = 0.75	Individual 2.78CA	Accumulated 2.78CA	Time of Concentration (mins)	Storm Event	Rainfall Intensity (mm/hr)	Peak Runoff Flow (L/s)	Diameter (mm)	Slope (%)	Length (m)	Capacity (L/s)	Velocity (m/s)	Pipe Flow Time (mins)	Pipe Storage Volume (m^3)	Fall in Sewer (m)	Drop in MH (m) DS	Top of Grate Elevation (m) US	Top of Grate Elevation (m) DS	Invert Elevation (m) US	Invert Elevation (m) DS
A1	**CBMH 1**	**OGS 2**			**1.18**		2.23	2.23	**10.00**	**5-year**	97.97	218.54	**600**	**1.50**	**9.00**	784.52	2.69	0.06	2.6	0.14	**0.15**	**178.39**	178.58	176.23	176.09
	OGS 2	**MH 3**			**0.00**		0.00	2.23	10.06	**5-year**	97.59	217.69	**600**	**1.40**	**12.50**	757.92	2.60	0.08	3.6	0.18	**0.15**	**178.58**	178.36	175.94	175.76
	MH 3	**MH 4**			**0.00**		0.00	2.23	10.14	**5-year**	97.05	216.48	**675**	**0.50**	**49.10**	620.09	1.68	0.49	18.1	0.25	**0.03**	**178.36**	178.05	175.61	175.36
	MH 4	**MH 5**			**0.00**		0.00	2.23	10.62	**5-year**	93.91	209.49	**675**	**0.50**	**78.00**	620.09	1.68	0.77	28.8	0.39	**0.08**	**178.05**	178.06	175.33	174.94
	MH 5	**OUTLET**			**0.00**		0.00	2.23	11.40	**5-year**	89.41	199.43	**675**	**0.50**	**35.90**	620.09	1.68	0.36	13.3	0.18		**178.06**	**177.90**	174.86	**174.68**
Sum of Drainage Areas (ha):			0.00	0.00	1.18	0.00																			
Total Drainage Area (ha):			1.18																						

NOTES:

WMI & Associates Limited
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Hydraulic Grade Line Analysis Sheet - 5yr Storm Event with 100yr Sewer Size
Bayport Village Commercial Development

 <<< **Elements Requiring Input Information**

Outlet Control Calculations:

Mannings Formula

Hydraulic Radius, R = $\frac{D}{4}$

where, Pipe is flowing full
D = Pipe Diameter (m)

$V = (k*R^{2/3}*S^{1/2}) / n$

where, V = full flow velocity (m/s)
k = 1.0 for SI units
R = hydraulic radius (m)
S = friction slope (m/m)
n = Mannings Coefficient
A = Pipe End Area (m^2)

$Q_{CAP} = V*A$

Friction Factor, $f = \frac{124(n)^2}{D^{1/3}}$

where, n = Mannings Coefficient
D = Pipe Diameter (m)

Mean Velocity, $V = \frac{Q_{TOTAL}}{A}$

where, Q_{TOTAL} = Total Peak Flow (m^3/s)
A = Pipe End Area (m^2)

Pipe Losses, $H_{PIPE} = \frac{k(V)^2}{2g} = \frac{f(L)(V)^2}{D(2g)}$

where, f = friction factor
L/D = Pipe Length/Diameter
V = mean velocity (m/s)
g = 9.81 (acceleration due to gravity, m/s^2)

Manhole Losses, H_{MH} =

Straight MH $H_S = 0.05(V_{DS}^2/2g)$, where $D_{US}=D_{DS}$ OR
$H_I = K(V_{DS}^2/2g - V_{US}^2/2g)$, where $V_{DS}>V_{US}$ OR
$H_D = K(V_{US}^2/2g - V_{DS}^2/2g)$, where $V_{US}>V_{DS}$,

where, HS = Straight MH no Velocity Change, H_I = Increasing Velocity through MH and H_D = Decreasing Velocity through

MH Bends	K_B
15° Bend	0.08
30° Bend	0.21
45° Bend	0.39
60° Bend	0.63
75° Bend	0.93
90° Bend	1.33

$H_B = K_B(V_{US}^2/2g)$, where $D_{DS}=D_{US}$

$H_{MH} = H_B$, where $D_{DS}=D_{US}$
OR
$H_{MH} = H_B + H_I$, where $V_{DS}>V_{US}$
OR
$H_{MH} = H_B + H_D$, where $V_{US}>V_{DS}$

Entrance/Exit Losses, $H_{ENT/EXIT}$ =
Inlet Structure $H_{ENT} = K(V^2/2g)$, where K = 0.5
Outlet Structure $H_{EXIT} = K(V^2/2g)$, where K = 1.0

Inlet Control Calculations:
Submerged Orifice (Orifice Flow)

$H = \frac{(Q / C_O A_O)^2}{2g}$ (m)

where, Q = Flow through submerged orifice (m^3/s)
C_O = Orifice Discharge Coefficient (0.75)
A_O = Cross-sectional area of orifice (m^2)
g = Gravitational acceleration ($9.81 m^2/s$)
H = Head/Depth of water acting on orifice measured from centroid of opening (m)

Hydraulic Grade Line Calculations:

HGL (US) = Greater of the following 3 values (m)

1) = Downstream HGL + Total Head Loss based on Outlet Control
2) = Upstream Pipe Invert + Depth to pipe centroid + Head required to pass the flow based on Inlet Control
3) = Upstream Pipe Obvert

Surcharge (US) = HGL (US) - Obvert Elevation (US)

Date: 7-Nov-24
Project No: 07-010FH
Prepared by: JB

Total Head Loss, H_{TOTAL} = Pipe Losses, H_{PIPE} + Entrance/Exit Losses, $H_{ENT/EXIT}$ + Manhole Losses, H_{MH}

Location			Sewer Data						Flow Data					Head Loss Calculations										Sewer Profile						Hydraulic Grade Line Calculations						Surcharge	Head above		Sewer Cover	
Street	Upstream MH	Downstream MH	Diameter	Slope	Length	Manning's n'	Pipe End Area	Hydraulic Radius, R	Peak Flow Q_1	Surplus Flow Q_2	Total Peak Flow, Q_{TOTAL}	Full Flow Capacity, Q_{CAP}	Q_{TOTAL}/Q_{CAP}	Friction Factor, f	Pipe Length/ Diameter	Mean Velocity	Velocity Head $V^2/2g$	Pipe Losses H_{PIPE}	Manhole Transition	Entrance/Exit K_{ENT} OR K_{EXIT}	Entrance/Exit Losses, $H_{ENT/EXIT}$	Manhole K	Manhole Losses H_{MH}	Total Head Loss H_{TOTAL}	Fall in Sewer	Drop in MH	Top of Grate Elevation		Invert Elevation		Obvert Elevation	Inlet Check	Outlet Check	Governing	HGL		above Obvert	Top of Grate Elevation		to Obvert	
																											US	DS	US	DS					US	DS					
			(mm)	(%)	(m)		(m^2)	(m)	(L/s)	(L/s)	(L/s)	(L/s)				(m/s)	(m)	(m)	DS		(m)	DS	(m)	(m)	(m)	DS	(m)	(m)	(m)	(m)	(m)	(m)	Control	(m)	(m)	(m)	(m)	(m)	(m)	(m)	(m)
	CBMH 1	**OGS 2**	**600**	**1.50**	**9.00**	**0.013**	0.292	0.152	**218.54**		218.54	785	0.28	0.0247	14.8	0.75	0.029	0.010	**90° Bend**	0.50	0.014	1.33	0.038	0.063	0.14	**0.15**	**178.39**	178.52	176.23	176.09	176.84	UNSUBMERGED	177.74	OUTLET	177.74	177.67	0.90			1.55	1.82
	OGS 2	**MH 3**	**600**	**1.40**	**12.50**	**0.013**	0.292	0.152	**217.69**		217.69	758	0.29	0.0247	20.5	0.75	0.028	0.014	**90° Bend**		0.000	1.33	0.041	0.055	0.18	**0.15**	**178.52**	178.36	175.94	175.76	176.55	UNSUBMERGED	177.67	OUTLET	177.67	177.62	1.12			1.97	1.99
	MH 3	**MH 4**	**675**	**0.50**	**49.10**	**0.013**	0.369	0.171	**216.48**		216.48	620	0.35	0.0238	71.6	0.59	0.018	0.030	**Straight**		0.000	0.05	0.001	0.031	0.25	**0.03**	**178.36**	178.05	175.61	175.36	176.30	UNSUBMERGED	177.62	OUTLET	177.62	177.59	1.32			2.06	2.00
	MH 4	**MH 5**	**675**	**0.50**	**78.00**	**0.013**	0.369	0.171	**209.49**		209.49	620	0.34	0.0238	113.7	0.57	0.016	0.044	**60° Bend**		0.000	0.63	0.010	0.055	0.39	**0.08**	**178.05**	178.06	175.33	174.94	176.02	UNSUBMERGED	177.59	OUTLET	177.59	177.53	1.57			2.03	2.43
	MH 5	**OUTLET**	**675**	**0.50**	**35.90**	**0.013**	0.369	0.171	**199.43**		199.43	620	0.32	0.0238	52.3	0.54	0.015	0.018		1.00	0.015		0.000	0.033	0.18		**178.06**	**177.90**	174.86	**174.68**	175.55	UNSUBMERGED	177.53	OUTLET	177.53	**177.50**	1.99			2.51	2.53

NOTES:

1 - This design sheet reflects a 5year storm event with sewer sizes designed to convey the 100year storm event.

APPENDIX C

SANITARY CALCULATIONS

WMI & Associates Limited
119 Collier Street, Barrie, Ontario L4M 1H5
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TOTAL DAILY COMMERCIAL SANITARY DESIGN FLOW CALCULATIONS
Bayport Commercial Development
PROPOSED HOTEL

Date: 5-Nov-24 **Project No.:** 07-010

Project: Bayport Commercial Development **Prepared By:** JB
Reviewed By: SM

<<< **Elements Requiring Input Information**

Total Daily Design Flow Calculations

References: - Ontario Building Code (OBC), 2012, Division B, Part 8, Table 8.2.1.3.A. Residential Occupancy & Table 8.2.1.3.B. Other Occupancies
- Ministry of the Environment (MOE), Design Guidelines for Sewage Works (2008), Chapter 5

Proposed Condition:

Establishment:	# of people	# of water closets	# of rooms	# of pools+saunas	# of seats	Gross Floor Area (m^2)	Land Area (ha)	Total Daily Design Sanitary Sewage Volume		Total Max. Full Day Design Sanitary Sewage Flow (L/day)
Uses:										
Retail [1]						**107.0**		**5**	L/m^2	535
										0
Subtotal =						**107**				**535**

Peaking Factor =	**1**	
Total Daily Design Sanitary Sewage Flow (L/day) =		**535**
Average Extraneous Unit Flow (0.308L/mmØ)/pipe length(100m)/hr) =		
Pipe Length (m) =		
Pipe Diameter (mm) =		

Equivalent Residential Unit Flow:	**ERU's**					
Dwellings (units @ 1350 L/dwelling)	**0.40**			**1350**	L/dwelling	535

Notes:
1 Daily design flow for retail area as per OBC Table 8.2.1.3.B. Gross retail floor area taken from Chamberlain Architect Services Limited Site Plan, dated Oct 18/2024.
2 Flow of 535 L/Day is input directly into the Sanitary Design Sheet.

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Sanitary Sewer Design Sheet
Bayport Village

<<< Elements Requiring Input Information

Peak Flow Formulaes:
Q_{pop} = (P*q*M)/86.4 (L/s)
$Q_{Comm/Inst}$ = Design Flow x Peaking Factor (L/s)
Q_{Ind} = Design Flow x Peaking Factor (L/s)

Q_{Infilt} = I/(pipe dia.(mm)/pipe length (km)) (L/s)

$Q_p = Q_{pop} + Q_{Comm/Inst} + Q_{Ind} + Q_{Infilt}$ (L/s)

MOE Velocity Requirements: 0.6m/s - 3.0m/s

P = population in 1000's
q = residential sewage unit flow rate
M = Ultimate Flow Factor (residential peaking factor)
(Harmon) $M=1+(14/(4+P^{0.5}))$
Q_{pop} = peak population flow (L/s)
$Q_{Comm/Inst}$ = peak commercial/institutional flow (L/s)
Q_{Ind} = peak industrial flow (L/s)

Q_{Infilt} = peak extraneous (i.e. infiltration) flow (L/s)
i = **peak** extraneous (i.e. infiltration) unit flow rate

Q_p = total peak flow (L/s)

Comm/Inst	Peaking Factor:		**1.5**			
Industrial	Peaking Factor:		**2**			
Res - LD	Low Density:	q:	**450**	L/cap./day	ppu =	**3**
Res - MD	Medium Density:	q:	**450**	L/cap./day	ppu =	**2.5**
Res - HD1	High Density:	q:	**275**	L/cap./day	ppu =	**2**
Res - HD2	High Density:	q:	**275**	L/cap./day	ppu =	**2**
Res HD1 and HD2 ; High Density as per OBC 8.2.1.3.A						
Infiltration		i:	**80**	L/s/(pipe dia.(mm)/pipe length (km))		
Mannings Coefficient		n:	**0.013**			

Date: 5-Nov-24
Project No: 07-010
Prepared by: JWL
Reviewed by: SM

Location			Sewage Flow Data																	Sewer Capacity Data					Sewer Profile Data					
Street	Manhole		Res - LD # of Units	Res - LD # of People	Res - MD # of Units	Res - MD # of People	Res - HD1 # of Units	Res - HD1 # of People	Res - HD2 # of Units	Res - HD2 # of People	Comm/Inst Total Daily Flow (L/day)	Industrial Total Daily Flow (L/day)	Cum. Res - LD # of People	Cum. Res - MD # of People	Cum. Res - HD1 # of People	Cum. Res - HD2 # of People	Cum. Comm/Inst Total Daily Flow (L/day)	Cum. Industrial Total Daily Flow (L/day)	Residential Peaking Factor	Sewage Flow (L/s)	Infiltration Individual (L/s)	Infiltration Cumulative (L/s)	Total Peak Flow Q_p (L/s)	Dia. (mm)	Slope (%)	Length (m)	Capacity Q_{full} (L/s)	Velocity V_{full} (m/s)	Fall in Sewer (m)	MH Drop (m)	Top of Grate Elevation (m)		Invert Elevation (m)	
	US	DS																											DS	US	DS	US	DS
CMRI	**6**	**EX STUB**	**40**	120		0		0		0			120	0	0	0	0	0	**4.00**	2.50	0.276	0.276	**2.78**	**200**		**690.0**								
Bayport Blvd	**EX STUB**	**MHH**	0	0		0		0		0			120	0	0	0	0	0	4.22	2.64	0.022	0.298	2.94	**200**	**0.50**	**55.0**	24.19	0.75	0.28					
	MHH	**MHG**	**2**	6		0		0		0			126	0	0	0	0	0	4.21	2.76	0.025	0.323	3.09	**200**	**7.26**	**63.5**	92.19	2.84	4.61	**1.03**	**187.18**	182.97	184.09	179.48
CMRI	**38**	**EX MH**	**51**	153		0		0		0			153	0	0	0	0	0	**4.00**	3.19	0.700	0.700	**3.89**	**200**		**1750.0**								
Bayport Blvd	**EX MH**	**MHI**		0		0		0		0			153	0	0	0	0	0	4.19	3.34	0.022	0.722	4.06	**200**	**0.50**	**55.0**	24.19	0.75	0.28	**0.03**			179.10	178.82
	MHI	**MHG**	**13**	39		0		0		0			192	0	0	0	0	0	4.15	4.15	0.024	0.746	4.90	**200**	**0.52**	**59.5**	24.67	0.76	0.31	**0.03**	**182.60**	182.97	178.79	178.48
	MHG	**MHF**	**9**	27		0		0		0			345	0	0	0	0	0	4.05	7.28	0.032	1.101	8.38	**200**	**0.49**	**80.0**	23.95	0.74	0.39	**0.01**	**182.97**	181.70	178.45	178.06
	MHF	**MHE**	**5**	15		0		0		0			360	0	0	0	0	0	4.04	7.58	0.032	1.133	8.71	**200**	**0.46**	**80.0**	23.21	0.72	0.37	**0.01**	**181.70**	179.95	178.05	177.68
	MHE	**DH MH QQ**	**3**	9		0		0		0			369	0	0	0	0	0	4.04	7.76	0.025	1.158	8.92	**200**	**1.60**	**61.5**	43.28	1.33	0.98	**0.02**	**179.95**	179.47	177.67	176.69
O'Hare Lane	**NN**	**MM**		0	**15**	37.5		0		0			0	37.5	0	0	0	0	4.34	0.85	0.039	0.039	0.89	**200**	**1.00**	**98.1**	34.22	1.06	0.98	**0.05**	**180.69**	180.13	178.06	177.08
	MM	**DH MH QQ**		0	**0**	0		0		0			0	37.5	0	0	0	0	4.34	0.85	0.012	0.051	0.90	**200**	**1.00**	**30.6**	34.22	1.06	0.31	**0.05**	**180.13**	179.47	177.03	176.72
	DH MH QQ	**MHD**		0		0		0		0			369	37.5	0	0	0	0	4.02	8.51	0.005	1.215	9.73	**200**	**1.62**	**13.7**	43.55	1.34	0.22	**0.02**	**179.47**	179.40	176.67	176.45
	MHD	**MHC**	**0**	0		0		0		0			369	37.5	0	0	0	0	4.02	8.51	0.025	1.240	9.75	**200**	**0.48**	**63.1**	23.71	0.73	0.30	**0.02**	**179.40**	180.20	176.43	176.13
	MHC	**MHB**	**1**	3		0		0		0			372	37.5	0	0	0	0	4.02	8.57	0.021	1.261	9.84	**200**	**0.53**	**52.8**	24.91	0.77	0.28	**0.09**	**180.20**	180.20	176.11	175.83
	MHB	**MHA**	**5**	15		0		0		0			387	37.5	0	0	0	0	4.01	8.87	0.037	1.298	10.16	**200**	**0.53**	**91.7**	24.91	0.77	0.49	**0.05**	**180.20**	180.10	175.74	175.25
	F/M to MH DA																																
Commercial (Blk 76)	**MH DA**	**1C STUB**		0		0		0	**504**	1008	**535**		0	0	0	1008	535	0	3.80	12.20	0.006	0.006	12.21	**200**	**0.50**	**14.0**	24.19	0.75	0.07	**0.00**	**180.40**	181.00	179.16	179.09
18m ROW (Ph 1C)	**1C STUB**	**PB**		0		0		0		0			0	0	0	1008	535	0	3.80	12.20	0.002	0.008	12.21	**200**	**0.80**	**5.0**	30.60	0.94	0.04	**0.05**	**181.00**	181.35	179.09	179.05
	PB	**PA**		0	**4**	10		0		0			0	10	0	1008	535	0	3.79	12.37	0.016	0.024	12.39	**200**	**0.54**	**40.7**	25.14	0.78	0.22	**0.05**	**181.35**	181.00	179.00	178.78
	PA	**MHR**		0	**3**	7.5		0		0			0	17.5	0	1008	535	0	3.79	12.51	0.017	0.041	12.55	**200**	**0.50**	**42.0**	24.19	0.75	0.21	**0.10**	**181.00**	181.80	178.73	178.52
Bayport Blvd & Ph 1A	**MHR**	**MHQ**		0	**6**	15		0		0			0	32.5	0	1008	535	0	3.79	12.81	0.016	0.057	12.87	**200**	**1.00**	**40.0**	34.22	1.06	0.40	**0.04**	**181.80**	181.00	178.42	178.02
	MHQ	**MHP**		0	**5**	12.5		0		0			0	45	0	1008	535	0	3.79	13.06	0.016	0.073	13.13	**200**	**0.67**	**40.2**	28.01	0.86	0.27	**0.01**	**181.00**	180.30	177.98	177.71
	MHP	**MHN**	**4**	12	**9**	22.5		0		0			12	67.5	0	1008	535	0	3.78	13.70	0.040	0.113	13.81	**200**	**0.51**	**100.0**	24.44	0.75	0.51	**0.01**	**180.30**	179.90	177.70	177.19
	MHN	**MHM**	**6**	18	**8**	20		0		0			30	87.5	0	1008	535	0	3.77	14.41	0.033	0.146	14.56	**200**	**0.47**	**83.5**	23.46	0.72	0.39	**0.05**	**179.90**	179.60	177.18	176.79
	MHM	**DH MH**	**2**	6	**4**	10		0		0			36	97.5	0	1008	535	0	3.76	14.69	0.022	0.169	14.86	**200**	**0.43**	**56.0**	22.44	0.69	0.24	**0.02**	**179.60**	179.07	176.74	176.50
Hudson Cres (West)	**EE**	**DD**		0	**3**	7.5		0		0			0	7.5	0	0	0	0	4.43	0.17	0.009	0.009	0.18	**200**	**1.00**	**22.3**	34.22	1.06	0.22	**0.05**	**181.51**	181.15	178.93	178.71
	DD	**CC**		0	**18**	45		0		0			0	52.5	0	0	0	0	4.31	1.18	0.037	0.046	1.22	**200**	**0.59**	**91.6**	26.28	0.81	0.54	**0.05**	**181.15**	181.00	178.66	178.12
	CC	**BB**	**0**	0	**22**	55		0		0			0	107.5	0	0	0	0	4.23	2.37	0.037	0.082	2.45	**200**	**0.58**	**91.6**	26.06	0.80	0.53	**0.05**	**181.00**	180.75	178.07	177.54
	BB	**AA**	**0**	0	**24**	60		0		0			0	167.5	0	0	0	0	4.18	3.65	0.037	0.119	3.77	**200**	**0.50**	**91.8**	24.19	0.75	0.46	**0.05**	**180.75**	179.78	177.49	177.03
Hudson Cres (East)	**GG-west**	**FF**		0	**18**	45		0		0			0	45	0	0	0	0	4.32	1.01	0.027	0.027	1.04	**200**	**1.00**	**66.8**	34.22	1.06	0.67	**0.05**	**181.53**	180.71	178.42	177.75
	FF	**AA**		0	**8**	20		0		0			0	65	0	0	0	0	4.29	1.45	0.027	0.053	1.51	**200**	**1.00**	**66.8**	34.22	1.06	0.67	**0.05**	**180.71**	179.78	177.70	177.03
Oakley Way	**AA**	**DH MH**		0	**0**	0		0		0			0	232.5	0	0	0	0	4.12	4.99	0.034	0.207	5.20	**200**	**0.50**	**85.4**	24.19	0.75	0.43	**0.07**	**179.78**	179.07	176.98	176.55
Bayport Blvd	**DH MH**	**MHL**	**0**	0		0		0		0			36	330	0	1008	535	0	3.71	18.98	0.008	0.383	19.37	**200**	**0.45**	**21.0**	22.95	0.71	0.09	**0.01**	**179.07**	179.15	176.48	176.39
& Phase 1A	**MHL**	**MHK**	**3**	9	**4**	10		0		0			45	340	0	1008	535	0	3.70	19.30	0.032	0.415	19.71	**200**	**0.47**	**79.0**	23.46	0.72	0.37	**0.01**	**179.15**	179.30	176.38	176.01
	MHK	**MHJ**	**6**	18	**9**	22.5		0		0			63	362.5	0	1008	535	0	3.69	20.03	0.037	0.452	20.48	**200**	**0.46**	**93.0**	23.21	0.72	0.43	**0.04**	**179.30**	179.80	176.00	175.57
	MHJ	**DH MH PP**	**4**	12	**3**	7.5		0		0			75	370	0	1008	535	0	3.69	20.40	0.017	0.469	20.87	**200**	**0.47**	**42.9**	23.46	0.72	0.20	**0.01**	**179.80**	179.98	175.53	175.33
	GG-east	**HH**	**5**	15	**20**	50		0		0			15	50	0	0	0	0	4.29	1.45	0.044	0.044	1.50	**200**	**1.00**	**110.0**	34.22	1.06	1.10	**0.05**	**181.53**	181.51	178.80	177.70
	HH	**JJ**		0		0		0		0			15	50	0	0	0	0	4.29	1.45	0.019	0.063	1.52	**200**	**1.90**	**46.7**	47.16	1.45	0.89	**0.85**	**181.51**	179.97	177.65	176.76
High-Rise Apt (Blk 58)	**CONDO SERV1**	**LL**		0		0	**290**	580		0			0	0	580	0	0	0	3.94	7.27	0.006	0.006	7.28	**200**	**1.00**	**13.8**	34.22	1.06	0.14	**0.05**	**183.50**	180.69	177.49	177.35
Reynolds Lane	**LL**	**KK**		0	**15**	37.5		0		0			0	37.5	580	0	0	0	3.93	8.02	0.039	0.045	8.07	**200**	**1.00**	**98.1**	34.22	1.06	0.98	**0.05**	**180.69**	180.13	177.30	176.32
	KK	**JJ**		0	**0**	0		0		0			0	37.5	580	0	0	0	3.93	8.02	0.012	0.057	8.08	**200**	**1.00**	**30.6**	34.22	1.06	0.31	**0.05**	**180.13**	179.97	176.27	175.96
	JJ	**DH MH PP**		0	**0**	0		0		0			15	87.5	580	0	0	0	3.90	9.28	0.015	0.135	9.42	**200**	**1.24**	**38.5**	38.10	1.17	0.48	**0.11**	**179.97**	179.98	175.91	175.43
	DH MH PP	**MHA**		0		0		0		0			90	457.5	580	1008	535	0	3.56	28.15	0.006	0.610	28.76	**250**	**0.45**	**18.1**	41.62	0.82	0.08	**0.04**	**179.98**	180.10	175.32	175.24
	MHA	**PS**		0		0		0		0			477	495	580	1008	535	0	3.50	35.42	0.003	1.912	**37.33**	**300**	**0.80**	**13.1**	90.23	1.24	0.10		**180.10**	**180.10**	175.20	**175.10**
		Individual Totals:		477		495		580		1008	535	0																						
		Cumulative # of People (LD + MD + HD1 + HD2):		1552																														

NOTES: - # of people for all residential dwellings is calculated based on # of units x the associated population density (people per unit).
- Flows from CMRI to both MHI & MHH calculated by Richardson Foster Ltd. for Midland Bay Estates (Project No. 1790 / DS) dated October 2008, 1790 - Sanitary Sewer Design (DR).xls, Date Printed: 3/18/2009. are indicated in the yellow highlighted areas.
- Pump station capacity is 42.7 L/s
- Commercial flow based on 1,143 ft2 see separate calc.

APPENDIX D

WATER CALCULATIONS

WMI & Associates Limited
119 Collier Street, Barrie, Ontario L4M 1H5
p (705) 797-2027 f (705) 797-2028

TOTAL DAILY DOMESTIC WATER SUPPLY FLOW CALCULATIONS
Bayport Village - Phase 1A, 1C, 2, & Commercial

Date: 7-Nov-24 **Project No.:** 07-010

Project: Bayport Village **Prepared By:** JB
Reviewed By: SM

<<< **Elements Requiring Input Information**

Total Daily Design Flow Calculations

References: - Ontario Building Code (OBC), 2012, Division B, Part 8, Table 8.2.1.3.A. Residential Occupancy & Table 8.2.1.3.B. Other Occupancies
- Ministry of the Environment (MOE), Design Guidelines for Drinking-Water Systems (2008), Chapter 3

Proposed Condition:

Establishment:	# of people	# of units	# of fuel outlets	# of seats	Gross Floor Area (m^2)	Land Area (ha)	Total Daily Design Volume		Avg Day Demand ADD (L/s)	Max Day Demand MDD (L/s)	Peak Hourly Demand PHD (L/s)
Residential Uses:											
Phase 2 Freehold Townhouses (117 units @ 2.5ppu)	**292.5**	**117**					**450**	L/person	1.52	4.08	6.14
Phase 2 Condo Townhouses (30 units @ 2.5ppu)	**75**	**30**					**450**	L/person	0.39	1.05	1.57
Phase 2 High-rise Condo (289 units @ 2.0ppu)	**578**	**289**					**450**	L/person	3.01	8.07	12.13
									0.00	0.00	0.00
Phase 1A Townhouses (38 units @ 2.5ppu)	**95**	**38**					**450**	L/person	0.49	1.33	1.99
Phase 1C Townhouses (13 units @ 2.5ppu)	**32.5**	**13**					**450**	L/person	0.17	0.45	0.68
Single Family Dwellings (63 units @ 3.0ppu)	**189**	**63**					**450**	L/person	0.98	2.64	3.97
Subtotal =	**1262**	**550**							**6.57**	**17.62**	**26.49**
Refer to Table 3-1 and/or Table 3.3 of the MOE Design Guidelines for Drinking-Water Systems (2008) >>>									**Peaking Factor =**	**2.68**	**4.03**
Commercial Uses:											
Block 76 Hotel (504 units @ 2.0ppu)	**1008**	**504**					**275**	L/person	3.21	8.60	12.93
Block 76 Hotel (Retail)					**107.0**		**5**	L/m^2	0.01	0.02	0.02
Subtotal =	**1008**	**504**			**107**				**3.21**	**8.61**	**12.95**
Total =	**2270**	**1054**							**9.79**	**26.23**	**39.44**

Notes:
1. Commercial Block 76 comprises of a 6-storey Hotel / Condo (504 total units @ 2.0ppu @ 275L/person per OBC) (1143ft2 Retail @ $5L/m^2$ per OBC). Unit count and retail information per Chamberlain site plan dated October 18, 2024.

AECOM Canada Ltd.
105 Commerce Valley Drive West
7th Floor
Markham, ON L3T 7W3
Canada

T: 905.886.7022
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To: Stephen Morash
WMI & Associates Limited

CC:
Mukesh Choudhary, AECOM

Project name:
Water Distribution Analysis for Bayport Village Subdivision - Town of Midland

Project ref:
TBD

From:
Kevin Sze, AECOM

Date:
November 29, 2019

Memo

Subject: **Consulting Engineering Services - Water Distribution Analysis for Bayport Village Subdivision - Town of Midland**

1. Introduction

WMI & Associates Limited has retained AECOM to conduct a hydraulic modeling analysis in support of the proposed Bayport Village development in the Town of Midland (the "Town"). There are 63 single family homes along Bayport Blvd. A total of approximately 517 residential units (including townhouses and apartments) and one (1) commercial site are planned to be developed within the subject site under the full build-out condition.

The subject site is located in the north-east portion of the Town, bounded by Harbourview Drive to the north and west as well as Bayport Boulevard to the south and east. The location of the Bayport Village Subdivision is shown Figure 1-1.

The purpose of this study is to evaluate the proposed water servicing capacity for the subject development under the normal (e.g. peak hour) and fire flow conditions.

The following background documents have been reviewed for this study:

- Town of Midland Engineering Development Design Standards, December 2012
- Ontario Ministry of Environment Conservation and Parks (MECP) Design Guidelines for Drinking-Water Systems 2008

Figure 1-1: Site Location

2. Design Guidelines

As per the Town's design criteria and standards, the following summarizes the system design pressure and water demand requirements applied for the subject development.

2.1 System Pressure

The Town's system pressure requirements are shown in Table 2-1.

Table 2-1: System Pressure Criteria

Criteria	Value
Minimum Pressure, Normal Conditions	275 kPa (40 psi)
Maximum Pressure, Normal Conditions	550 kPa (80 psi)
Minimum Pressure, Fire Flow Conditions	140 kPa (20 psi)

2.2 Domestic Demand

The following summarizes the Town's design criteria and standards for the water demand estimation:

- Domestic Demand: Average daily demand (ADD) of 450 L/cap/day
- Population Density:
  - Residential: Single Family – 3 persons per unit (ppu); Townhouse – 2.5 ppu; Apartment – 2.0 ppu
  - Commercial: 50 m^3/day/ha (as per MECP 2008)
- Peaking Factors:
  - Maximum Day Demand (MDD) = 2.0 x ADD
  - Peak Hour Demand (PHD) = 4.5 x ADD

2.3 Fire Flow

As per the Town's design standards, the minimum required fire flow rate in a residential area is 38 L/s and the minimum fire flow in an industrial area is 75 L/s. The fire flow requirements for the subject site shall be confirmed and determined during the detailed site plan stage for the proposed development.

2.4 Hazen-Williams "C" Factor

The Hazen-Williams "C" Factor values for new watermains are based on the Town's Design Guidelines. Table 2-2 summarizes these values.

Table 2-2: System Hazen-Williams "C" Factor

Criteria	Value
150 mm diameter watermain	120
200 mm diameter watermain	110

3. Water System

Water supply to the subject site is from the Town's East Pressure Zone through two (2) existing pressure reducing valves (PRVs): one located at Harbourview and Sunnyside Drive, and another at Harbourview Drive and Fuller Avenue.

There is an existing 300 mm diameter watermain along Harbourview Drive on the north and west limits of the site. The existing 200 mm diameter watermain along Bayport Blvd. with existing stubs provides water servicing connections to the proposed development. The proposed 150 mm watermain within the subject site will service the proposed residential development. The condominium apartment building will be serviced by proposed 200 mm watermain for domestic and fire supply.

4. Model Update

4.1 Water Network Update

The InfoWater hydraulic model was provided by the Town and used as a baseline model for this study. The hydraulic network model was updated to include the latest proposed watermain layout within the development. In addition, the two PRVs (with settings estimated from field test) was added to the model to maintain the adequate system pressures for the PRV system areas. Water demands for the development were distributed and allocated among the modelling junctions.

The schematic model layout for the subject development is presented in Figure 4-1.

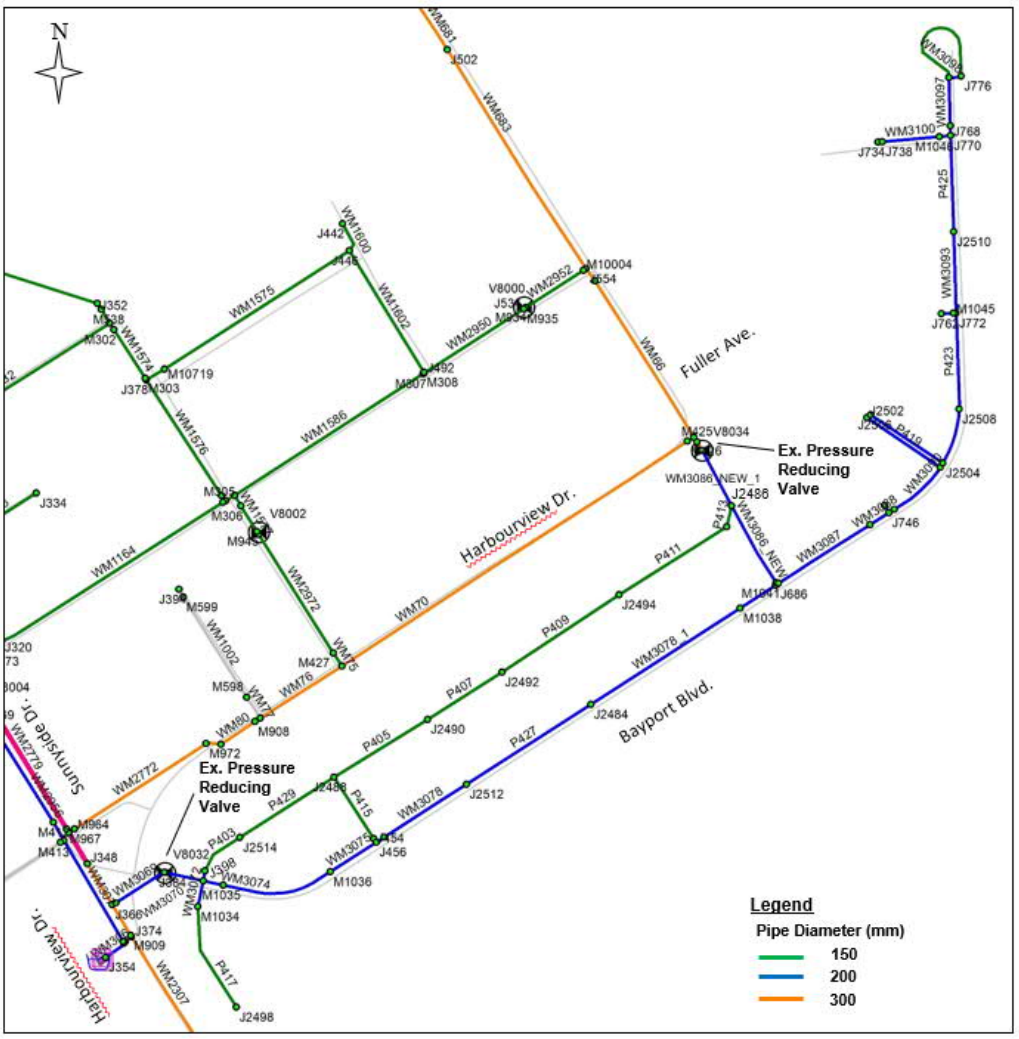


Figure 4-1: Model Schematic

4.2 Water Demand

Water demand for the proposed development was estimated based on the Town's design criteria. Based on the above assumptions, the estimated water consumption for the subject site is shown in Table 4-1.

Table 4-1: Water Demand Summary

Development	Land Use	Residential Units	Residential Population Estimate	Average Day Demand (ADD) (L/s)	Maximum Day Demand (MDD) (L/s)	Peak Hour Demand (PHD) (L/s)
Bayport Village Subdivision	Existing (Single Family Homes)	63	189	1.0	2.0	4.4
	Under Construction (Freehold Townhouses)	37	93	0.5	1.0	2.2
	Phase Fall 2019 Construction (Condominium Townhouses)	13	33	0.2	0.3	0.8
	Future Phase Draft Plan (Condominium Apartments, Freehold Townhouses and Condominium Townhouses)	467	1168	6.1	12.2	27.4
	Future Commercial Area (1.28 ha)*	--	--	0.5	1.0	2.3
	Total	580	1482	8.2	16.5	37.1

*Assume 70% building coverage area

5. Hydrant Flow Testing

In order to confirm the available system head / pressure along the existing pipelines in the vicinity of the proposed development, two (2) fire hydrant flow tests were conducted by Troy Life & Fire Safety Ltd. at hydrants connected to the existing water pipelines along Bayport Blvd. downstream of the PRVs on July 29, 2019. The test results and analysis are presented in Table 5-1. The field test data are included in Appendix A.

Based on the fire flow test results, the detected static pressure was approximately 449 kPa (or 65 psi, corresponding to average system head of approximately 225.6 m) at the site location. The hydrant test results were used as the system water supply boundary for the hydraulic model analysis.

Table 5-1: Hydrant Flow Test Analysis

Test Number	Location		Static		Residual		Flow (L/s)
	Pressure Measurement	Flow Measurement	Pressure (kPa)	Head (m)	Pressure (kPa)	Head (m)	
Test 1	547 Bayport Blvd. (Elevation = 179 m)	511 Bayport Blvd.	449 (65 psi)	225.4	415 (60 psi)	221.6	107 (1,690 USGPM)
Test 2	511 Bayport Blvd. (Elevation = 180 m)	547 Bayport Blvd.	449 (65 psi)	225.7	408 (59 psi)	221.5	107 (1,690 USGPM)

The InfoWater hydraulic model was used to simulate the fire flow test results and system pressures. The modelling outputs were compared with the fire flow test results. The system head difference between the field measurements and simulated results at the two hydrant test locations is within 1.5 m (less than 2 psi). The

model was considered adequately reliable for the system analysis and watermain sizing for the proposed development.

6. Hydraulic Modelling Analysis

6.1 Modelling Methodology

Modelling analysis was completed for the future system conditions under the following demand conditions:

- Normal operating condition (e.g. Peak Hour Demand)
- Fire flow condition under Maximum Day Demand

It is noted that the analysis encompassed the full build-out of the development and did not include phasing considerations.

6.2 Supply Boundary Conditions

The hydraulic analysis was undertaken using the boundary conditions shown in Table 6-1.

Table 6-1: Supply Boundary Conditions

PRV Location	Downstream Modelled PRV Setting*	
	Pressure (kPa / psi)	Head (m)
Harbourview and Sunnyside Dr.	428 / 62	225.6
Harbourview and Fuller Ave.	318 / 46	

*Estimated from the hydrant flow tests

6.3 Network Analysis Results

The updated hydraulic network model was used to estimate the system pressures within the proposed development under the future system conditions. Based on the modelling results from Table 6-2, the following summarizes the modelling analysis results:

System pressures within the development range between 386 kPa and 454 kPa under the normal system operating condition (e.g. peak hour) for the future condition. The hydraulic model outputs under the future condition are shown in Appendix B.

The available fire flow was evaluated against the 140 kPa (20 psi) pressure limits at each junction node within the subject site, as shown in Appendix B. Based on the fire flow simulations, the available fire flows in the proposed development under the future water system conditions range between 96 L/s and 321 L/s. Table 6-3 shows the minimum available fire flows for the different land use areas.

Table 6-2: System Pressures

Demand Scenario	Minimum Pressure (kPa / psi)	Maximum Pressure (kPa / psi)
Peak Hour (PHD)	386 / 56	454 / 66

Table 6-3: Available Fire Flows

Demand Scenario	Land Use	Min. AFF (L/s)	Model Junction ID
MDD plus Fire – Available Fire Flow (AFF) at 140 kPa (20 psi)	Townhouse	96	J762
	Apartment	117	J2502
	Commercial	112	J2498

7. Conclusions and Recommendations

Based on the results of the water system hydraulic analysis, the conclusions are summarized as follows:

- The modelling results indicate that the anticipated system pressures within the subject site meet the Town's pressure requirements for the normal operating condition (e.g. peak hour) under the future water system conditions. Sufficient flow and pressure are available to service the proposed development under the normal operating condition.

- The available fire flow ranges between 96 L/s and 321 L/s for the proposed Bayport Village development.

- The proposed water service connection for the commercial block development will be confirmed during the detailed site plan stage.

- It is recommended that the fire flow requirements for the subject site be confirmed and determined as per Water Supply for Public Fire Protection by Fire Underwriters Survey FUS, based on the floor areas, construction types, etc, during the detailed site plan stage for the proposed development.

Encl.: Appendix A – Hydrant Flow Test Reports
Appendix B – Model Results

Troy
Life & Fire Safety Ltd.

FLOW TEST REPORT

OFFICE REPORT:

LOCATION: MIDLAND - 511 BAYPORT BLVD.

DATE OF FLOW TEST: JULY 29, 2019 TIME OF FLOW TEST: 08:00 AM

TEST BY: TROY LIFE & FIRE SAFETY TEST CONDUCTED BY: STEVE GREEN

WITNESSED BY: TOWN OF MIDLAND

FLOW NOZZLE TYPE (IE HOSE MONSTER/PLAY PIPE): HOSE MONSTER

WATER MAIN SIZE (IF AVAILABLE): N/A

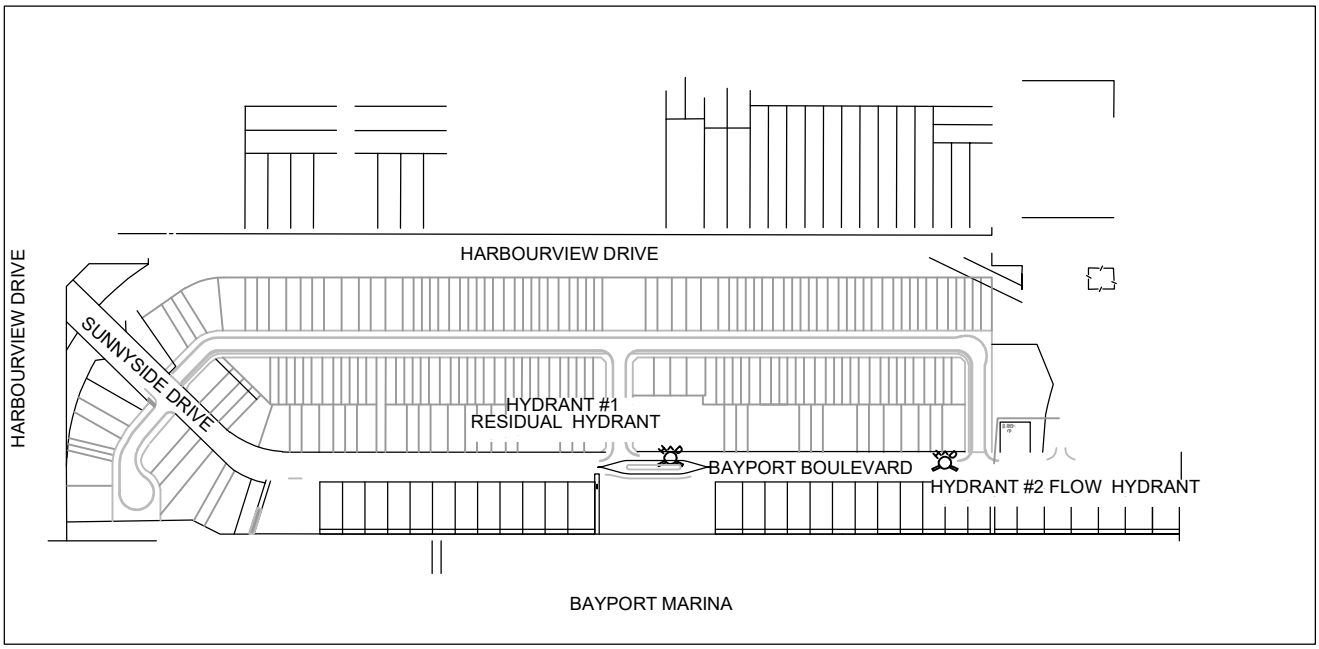
HYDRANT ELEVATION COMPARED TO BUILDING: SAME ELEVATION

HYDRANT FLOW DATA:

STANDING PRESSURE (HYDRANT #1): 65 PSI

SIZE OF OPENING:	1 1/8"	1 3/4"	2 1/2"	2 - $2\frac{1}{2}$"
DISCHARGE COEFFICIENT:	0.90			0.90
PITOT READING (HYDRANT #2):	50 PSI			25/25
FLOW USGPM:	264 GPM			845/845
RESIDUAL PRESSURE (HYDRANT #1):	60 PSI			60 PSI

DRAWING OF SITE



Troy Life & Fire Safety Ltd.

FLOW TEST REPORT

OFFICE REPORT:

LOCATION: MIDLAND - 547 BAYPORT BLVD.

DATE OF FLOW TEST: JULY 29, 2019 TIME OF FLOW TEST: 08:30 AM

TEST BY: TROY LIFE & FIRE SAFETY TEST CONDUCTED BY: STEVE GREEN

WITNESSED BY: TOWN OF MIDLAND

FLOW NOZZLE TYPE (IE HOSE MONSTER/PLAY PIPE): HOSE MONSTER

WATER MAIN SIZE (IF AVAILABLE): N/A

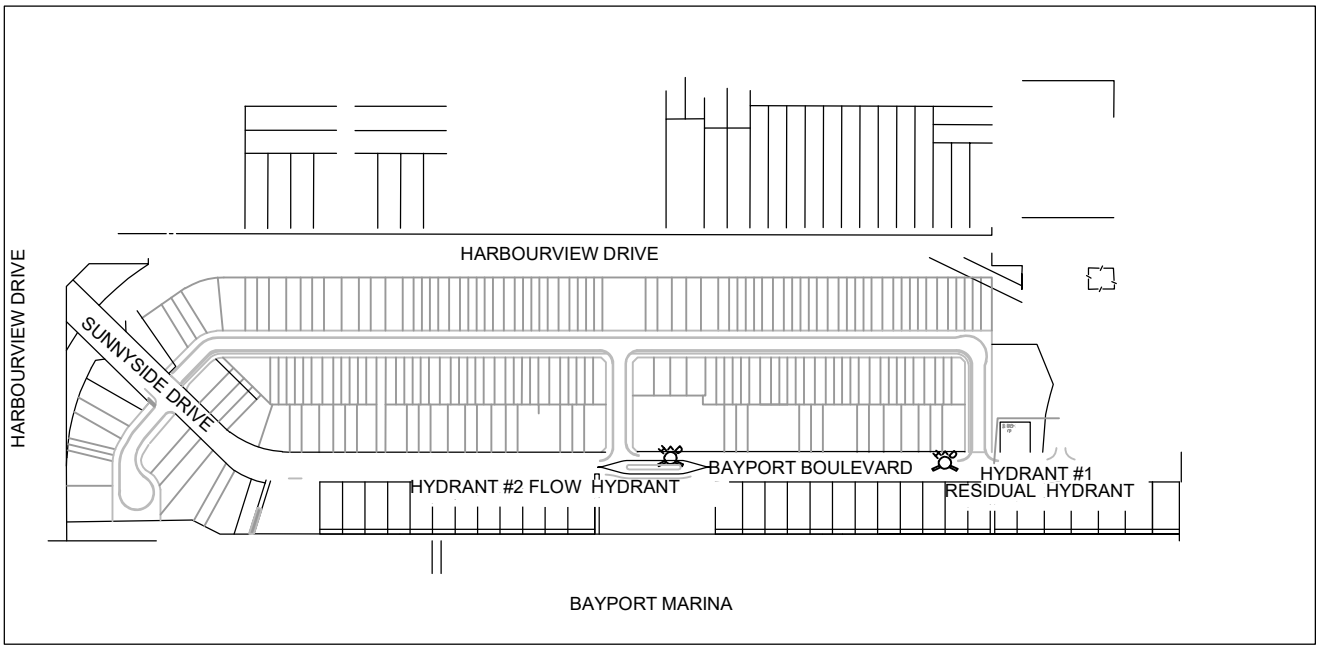
HYDRANT ELEVATION COMPARED TO BUILDING: SAME ELEVATION

HYDRANT FLOW DATA:

STANDING PRESSURE (HYDRANT #1): 65 PSI

SIZE OF OPENING:	1 1/8"	1 3/4"	2 1/2"	2 - $2\frac{1}{2}$"
DISCHARGE COEFFICIENT:	0.90			0.90
PITOT READING (HYDRANT #2):	50 PSI			25/25
FLOW USGPM:	264 GPM			845/845
RESIDUAL PRESSURE (HYDRANT #1):	59 PSI			59 PSI

DRAWING OF SITE



Appendix B: Peak Hour Hydraulic Model Junction Output

Junction Nodes within Subject Site

ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
J2486	0.0	186	225.4	386
J2506	5.1	184	225.1	407
J2502	0.0	184	225.1	407
J762	0.0	183	225.1	412
M1033	0.0	183	225.5	417
J398	0.0	183	225.5	417
M1045	0.0	182	225.1	422
J772	2.2	182	225.1	422
J2504	5.1	182	225.1	423
J2498	2.3	182	225.5	426
M1035	0.0	182	225.5	426
M1034	0.0	182	225.5	426
J2500	0.0	181	225.1	428
J2494	0.0	181	225.3	431
J2496	0.0	181	225.4	432
J2514	0.0	181	225.5	432
M1041	0.0	181	225.3	434
M1039	0.0	181	225.3	434
J686	0.0	181	225.3	434
M1040	0.0	181	225.3	434
J2490	0.0	181	225.3	436
J2488	0.0	181	225.3	438
M1042	0.0	180	225.2	440
J2492	10.1	180	225.2	440
M1043	0.0	180	225.2	443
J746	0.0	180	225.2	443
M1044	0.0	180	225.2	443
M1036	0.0	180	225.4	443
J2508	0.0	180	225.1	443
M1037	0.4	180	225.3	444
J454	0.0	180	225.3	444
M1038	0.1	180	225.3	448
J2512	0.0	180	225.3	449
J2484	2.2	179	225.3	452
J456	10.1	179	225.3	454

Appendix B: Peak Hour Hydraulic Model Pipeline Output

Pipes within Subject Site

ID	From Node	To Node	Length (m)	Diameter (mm)	Roughness	Flow (L/s)	Velocity (m/s)	Headloss (m)
WM3070	J384	J398	33	200	110	20	0.6	0.1
P395	V8032	J384	1	200	110	20	0.6	0.0
WM3086_NEW_1	J2486	J2482	53	200	110	-18	0.6	0.1
P401	V8034	J2482	0	200	110	18	0.6	0.0
WM3086_NEW	M1040	J2486	75	200	110	-13	0.4	0.1
WM3085	J686	M1040	2	200	110	-13	0.4	0.0
WM3084	J686	M1041	1	200	110	12	0.4	0.0
WM3087	M1041	M1042	92	200	110	12	0.4	0.1
WM3088	M1042	J746	19	200	110	12	0.4	0.0
WM3091	J746	M1043	5	200	110	12	0.4	0.0
WM3090	M1043	J2500	53	200	110	12	0.4	0.1
WM3090_1	J2500	J2504	4	200	110	12	0.4	0.0
WM3075	M1036	J456	46	200	110	11	0.4	0.1
WM3074	M1035	M1036	96	200	110	11	0.4	0.1
WM3073	J398	M1035	17	200	110	11	0.4	0.0
P403	M1033	J2514	42	150	120	6	0.3	0.1
P429	J2514	J2488	95	150	120	6	0.3	0.1
P409	J2492	J2494	119	150	120	-5	0.3	0.1
P411	J2494	J2496	108	150	120	-5	0.3	0.1
P413	J2496	J2486	18	150	120	-5	0.3	0.0
P405	J2488	J2490	93	150	120	5	0.3	0.1
P407	J2490	J2492	75	150	120	5	0.3	0.1
WM3071	J398	M1033	9	200	110	6	0.2	0.0
P421	J2504	J2506	74	200	110	5	0.2	0.0
P417	M1034	J2498	94	150	120	2	0.1	0.0
WM3077	J456	M1037	8	200	110	2	0.1	0.0
WM3072	J398	M1034	22	200	110	2	0.1	0.0
P423	J2508	J772	81	200	110	2	0.1	0.0
WM3090_2	J2504	J2508	48	200	110	2	0.1	0.0
P415	J454	J2488	62	150	120	-1	0.1	0.0
P427	J2512	J2484	125	200	110	2	0.1	0.0
WM3078	M1037	J2512	83	200	110	2	0.1	0.0
WM3076	J456	J454	4	200	110	-1	0.0	0.0
WM3083	M1039	J686	2	200	110	0	0.0	0.0
WM3082	M1038	M1039	36	200	110	0	0.0	0.0
WM3078_1	J2484	M1038	151	200	110	0	0.0	0.0
WM3101	M1045	J762	10	200	110	0	0.0	0.0
P419	J2500	J2502	75	200	110	0	0.0	0.0
WM3092	J772	M1045	2	200	110	0	0.0	0.0
WM3089	J746	M1044	7	200	110	0	0.0	0.0

Appendix B: Hydraulic Model Junction Output for Available Fire Flow

Junction Nodes within Subject Site

ID	Static Demand (L/s)	Static Pressure (kPa)	Static Head (m)	Design Flow (L/s)*	Design Pressure (kPa)
J762	0.0	416	225.5	96	140
M1045	0.0	426	225.5	96	140
J772	1.0	426	225.5	97	140
J2508	0.0	447	225.5	110	140
J2498	1.0	427	225.6	113	140
J2502	0.0	411	225.5	117	140
J2506	2.3	411	225.5	118	140
J2500	0.0	432	225.5	122	140
J2504	2.3	426	225.5	123	140
M1043	0.0	446	225.5	141	140
M1044	0.0	446	225.5	144	140
J746	0.0	446	225.5	144	140
J2492	4.5	443	225.5	153	140
M1042	0.0	443	225.5	153	140
J2494	0.0	433	225.5	157	140
J2490	0.0	439	225.5	162	140
M1041	0.0	436	225.5	236	140
J686	0.0	436	225.5	238	140
M1039	0.0	436	225.5	238	140
M1040	0.0	436	225.5	238	140
J2514	0.0	433	225.6	244	140
J2484	1.0	454	225.5	246	140
M1038	0.0	450	225.5	247	140
J2496	0.0	433	225.5	250	140
J2488	0.0	440	225.5	256	140
J2512	0.0	451	225.5	262	140
J2486	0.0	388	225.5	283	140
M1037	0.2	446	225.5	286	140
J454	0.0	446	225.5	288	140
M1036	0.0	445	225.6	289	140
M1034	0.0	427	225.6	289	140
J456	4.5	456	225.5	294	140
M1035	0.0	427	225.6	310	140
M1033	0.0	417	225.6	311	140
J398	0.0	417	225.6	321	140

Note:

* Maximum available flow to maintain minimum residual pressure of 140 kPa (20 psi)

APPENDIX E

GEOTECHNICAL REPORT
SOIL ENGINEERS DEC 24/19

Soil Engineers Ltd.
CONSULTING ENGINEERS
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December 24, 2019 Reference No. 1911-S109

Lanarose Midland Ltd.
28 Sandiford Drive, Suite 201
Whitchurch-Stouffville, Ontario
L4A 1L8

Attention: Mr. Enzo Bertucci, Director of Land Development

Re: Geotechnical Investigation - Preliminary Report
Proposed Hotel
Block 76 Bayport Village
Town of Midland

Dear Sir:

As per your authorization, we herein present our preliminary recommendations based on boreholes previously completed within the captioned property.

BACKGROUND

The site of investigation, located on the east side of Harbourview Drive, north of Marina Park Avenue in the Town of Midland is a vacant land with scattered trees and bushes. A review of the site plan indicates that a new 6-storey hotel building is proposed on the property. It will be provided with outdoor amenities and parking at street level.

FIELD WORK

Additional boreholes for the development will be carried out shortly. Previous field work, consisting of six (6) boreholes, were performed on October 2007 and November 2010, at the locations shown on the Borehole Location Plan, Drawing No. 1. These boreholes were completed in stages:

- Four boreholes (Boreholes 1 to 4), extending to depths of 6.6 to 19.8 m, were completed on October 30 and 31, 2007 for the general subsurface profiles of the site.
- Two boreholes (Boreholes 101 and 102), extending to depths 19.8 m and 19.9 m, were completed on November 3, 2010 to obtain additional subsurface profile information of the site.

At the time of the previous borehole investigation, the topographic survey or a benchmark were not available for Boreholes 1 to 4, inclusive, therefore, the sampling depths and the depth of the soil strata changes were referred to the prevailing ground surface at each of those borehole locations. The ground elevation for Boreholes 101 and 102 was determined with reference to the site bench mark located on the southeast corner of the wooden planter near the existing sales office. It has a geodetic elevation of 180.4 m.

SUBSURFACE CONDITION

Beneath a layer of earth fill, slag fill, peat and alluvium extending to depths ranging from 2.3 to 5.2 m from grade, the site is underlain by a deposit of very soft to firm silty clay overlying loose to compact silt and sand, and compact to very dense glacial till at lower depths. Detailed descriptions of the encountered subsurface conditions are presented on the Borehole Logs, enclosed in the Appendix.

Upon completion of borehole drilling, free groundwater was recorded in Boreholes 1, 3, 4, 101 and 102 at depths of 1.8 to 4.0 m from the ground surface. Boreholes 2, 3, 4 and 101 caved at depths ranging from 0.9 to 11.4 m from grade. The free groundwater level generally represents the groundwater level at the time of the investigation and will fluctuate with seasons. The water level will be affected by the water level of the adjacent Midland Bay.

In excavation, the yield of groundwater in the slag fill will be appreciable at first, but will drain with time. In the sandy material, it will be moderate to appreciable. Excavation into the water-bearing soils will require vigorous pumping from closely spaced sumps, or by well-point dewatering.

SITE GRADING AND FOUNDATION DESIGN

The existing earth and slag fills, due to their unknown history, are not suitable to support structures sensitive to settlement. Furthermore, the underlying peat, alluvium and soft clay may undergo long-term settlement under external loadings, such as regrading of the site and from the building foundations.

Prior to development, the property will have to be pregraded and/or preloaded to allow for the consolidation of the underlying soft clay in order to reduce the settlement to within a tolerable level. Before construction of the proposed structure and the service pipe in the vicinity, the ground settlement must be monitored by settlement plates during the pregrading and preloading process. The expected to be completed between six to twelve months, depending

on the drainage condition of the subsoil. Details of the preloading process must be reviewed by our office.

The proposed hotel is located on the southwest quadrant of the property, in the vicinity of Boreholes 1, 2 and 101. Additional boreholes will be carried out to elaborate on the subsurface conditions for detailed design. Based on the available borehole findings, the following options can be considered for the foundation construction of the proposed hotel:

Option 1 - Engineered Fill

The existing earth fill, slag fill, peat and alluvium must be subexcavated and replaced with properly compacted inorganic earth fill. The excavation depth is expected to range from 2.3 to 4.3 m from grade. Due to the high groundwater level encountered, dewatering will be necessary to complete the engineered fill operation.

Following the completion of the engineered fill, a preloading program with surcharge fill to model the future building will need to be implemented. Once the preloading program and the consolidation of the underlying soft silty clay is complete (to ensure that any long-term settlement is reduced to a tolerable level), conventional spread and strip footings or raft foundation can designed for the proposed structure.

The appropriate bearing capacity can be further assessed once the additional boreholes are completed.

Option 2 - Deep Foundation

If the earth fill, slag fill, peat and alluvium are to be left in place, ground settlement is expected; in this case, pile or micropile foundation can be considered for the proposed structure. The anticipated depth of the pile will be over 18 m from grade. The design load of micropile can be assessed by the prospective foundation contractor in these specialties. Full scale load test in the field must be conducted to confirm the load carrying characteristics of the pile. The appropriate bearing capacity shall be confirmed by the micropile/pile designer/contractor based on in-situ load tests.

The carrying capacity of the piles will depend upon the configuration and the depth of penetration, which should be assessed by a qualified specialist based on the results of the borehole findings and verified by a load test.

A grade beam system with a structural slab must be provided for the proposed hotel. It must be constructed of concrete and either backfilled with non-frost-susceptible pit-run granular, or shielded with a polyethylene slip-membrane. The pile caps or grade beams must have at least 1.8 m of soil cover for frost protection or they should be properly insulated.

The pile/micropile construction of the foundation must be supervised and inspected by either a geotechnical engineer, or a geotechnical technician under the supervision of a geotechnical engineer, to ensure that the pilings are compatible with the foundation design requirements.

The ground must be graded to direct water away from the structure to minimize the frost heave phenomenon generally associated with the disclosed soils.

Where the peat and alluvium is to be left in place, a passive venting system should be placed beneath the floor of the structure to prevent upfiltration of volatile gas generated from the topsoil and plant debris.

Option 3 - Soil Improvement

Geopiers or Menard's controlled modulus column (CMC) can be considered. Once completed, the proposed structures can be constructed with conventional footings and slab-on-grade on the pads at the desired elevation. A specialist contractor can be consulted for this alternative.

It should be noted that augering through the slag material may be difficult and may require extra effort and appropriate equipment due to its rock fill-like characteristic.

Where the organics are left in place, a passive venting system will need to be implemented.

Other Recommendations

In unheated areas, the foundation and grade beams should have at least 1.8 m of earth cover for protection against frost action, unless they are properly insulated. In order to alleviate the risk of frost damage, the foundation walls must be constructed of concrete and either backfilled with non-frost susceptible granular material, or shielded with a polyethylene slip-membrane. The membrane will allow vertical movement of the heaving soil (due to frost) without imposing structural distress on the foundation.

The building foundation must meet the requirements specified in the latest Ontario Building Code. As a guide, the structures should be designed to resist an earthquake force using the following Site Classifications:

- Site Classification 'C' for deep foundations
- Site Classification 'D' for conventional footings after soil improvement
- Site Classification 'E' for conventional footings on engineered fill

A more accurate site class can be determined by shear wave velocity test.

UNDERGROUND SERVICES

Under structural loading or additional earth fill for site grading, the peat, alluvium and soft clay stratum will undergo long-term settlement. The ground settlement must be monitored by settlement plates before construction of site services. When the monitoring work indicates no further significant ground settlement, the underground services can be installed at the proposed invert level.

In case the construction schedule does not allow consolidation of the soft clay, geopiers can be installed for soil improvement along the service trenches to prevent long-term settlement of the service pipes.

A Class 'B' bedding, consisting of compacted 20-mm Crusher-Run Limestone, or equivalent, is recommended for the service pipes. In water-bearing soils where extensive dewatering is required or subgrade stabilization is required, a Class 'A' bedding will be required. Any use of pea gravel or clear stone bedding must be wrapped with a fabric filter to prevent the migration of finer particles into the bedding.

Openings to subdrains and catch basins should be shielded with geofabric filter to prevent blockage by silting. Sewer joints in water-bearing sands and silt should be leak-proof or wrapped with waterproof membrane to prevent subgrade migration.

In order to prevent pipe floatation when the sewer trench is deluged with water, a soil cover with a thickness equal to the diameter of the pipe should be in place at all times after completion of the pipe installation.

The underground services should be protected against soil corrosion. The on site soils have moderately high corrosivity to ductile iron pipes and metal fittings, with an electrical

resistivity ranging from 2500 to 5500 ohm·cm. This, however, should be confirmed by testing the soil along the pipe alignment at the time of construction.

PAVEMENT DESIGN

Following the completion of site grading, the recommended pavement structure for the parking lot and the access driveway is given in the following table.

Course	Thickness (mm)	OPS Specifications
Asphalt Surface	40	HL-4
Asphalt Binder Light-Duty Parking Heavy-Duty and Fire Route	 50 65	HL-8
Granular Base	150	OPSS Granular 'A', or equivalent
Granular Sub-base Light-Duty Parking Heavy-Duty and Fire Route	 300 400	OPSS Granular 'B', or equivalent

If the pavement is to be constructed during the wet seasons and soft subgrade is encountered, the granular sub-base may require thickening. This can be assessed during construction.

The existing peat and alluvium must be removed from the pavement area. Prior to placement of the granular bases, the subgrade should be proof-rolled and any soft subgrade as identified should be subexcavated and replaced by properly compacted earth fill of competent material. In the zone within 1.0 m below the pavement, the fill must be compacted to 98% or + of its maximum Standard Proctor dry density, with the moisture content 2% to 3% drier than the optimum.

The granular bases should be compacted to 100% of their maximum Standard Proctor dry density.

In order to prevent infiltrated precipitation from seeping into the granular bases, since this may inflict frost damage on the pavement, a swale or an intercept subdrain system should be installed along the perimeter where surface runoff may drain onto the pavement. In paved areas, catch basins with stub drains in all four directions should be provided. The stub drains and subdrains should drain into the catch basin through filter-sleeved weepers. The invert of

the subdrains should be at least 0.4 m beneath the underside of the granular sub-base and should be backfilled with free-draining granular material.

SOIL PARAMETERS

The recommended soil parameters for the project design are given in the following table:

Unit Weight and Bulk Factor

	Unit Weight (kN/m^3)		Estimated Bulk Factor	
	Bulk	**Submerged**	**Loose**	**Compacted**
Earth Fill	20.5	10.5	1.20	0.98
Silty Clay, Sands and Silt	21.0	11.0	1.25	1.00
Glacial Tills	22.5	12.5	1.30	1.03

Lateral Earth Pressure Coefficients

	Active K_a	At Rest K_o	Passive K_p
Compacted Earth Fill, Silty Clay	0.40	0.60	2.50
Sand, Silt, Glacial Tills	0.35	0.50	3.00

Maximum Allowable Soil Pressure (SLS) For Thrust Block Design

Sound natural Soils and Engineered Fill	25 kPa

EXCAVATION

Excavation should be carried out in accordance with Ontario Regulation 213/91. For excavation purposes, the types of soils are classified in the following table:

Material	Type
Sound Tills	2
Earth Fill, dewatered Silt and Sands	3
Saturated Soils and very soft to firm Silty Clay	4

Bottom heaving will likely occur in trenches cut steeply into the very soft to soft silty clay. Therefore, the sides should be cut at 1 vertical:2.5 or + horizontal, and the spoil from the

excavation and/or trenches must be placed at a distance from the edge of the excavation equal to at least 3 times the depth of the excavation.

Alternatively, interlocking sheeting can be used for the excavation. This must be properly designed by a qualified engineer.

Extra effort and a properly equipped backhoe will be required for excavation into the slag fill. Slag fill larger than 15 cm in size are not suitable for structural backfill.

In excavation, the groundwater yield will be moderate to appreciable and persistent. Any excavation into the saturated sand or silt will require vigorous pumping from sumps or by well-point dewatering. The appropriate dewatering method should be assessed by test pumping at the site.

Prospective contractors must be asked to assess the in situ subsurface conditions for soil cuts by digging test pits to the intended bottom of excavation. These test pits should be allowed to remain open for a period of at least 4 hours to assess the trenching conditions.

We trust this preliminary Letter Report satisfies your present requirements.

One must recognize that the above recommendations are preliminary in nature and may be revised in the comprehensive Engineering Report, which will be provided at a later date upon completion of the boreholes.

Yours very truly,
SOIL ENGINEERS LTD.

LICENSED PROFESSIONAL ENGINEER
12/24/2019
K. W. K. HUNG
100124295
PROVINCE OF ONTARIO

Kelvin Hung, P.Eng.

LICENSED PROFESSIONAL ENGINEER
Dec 24, 2019
B. P. Y. LEE
100104568
PROVINCE OF ONTARIO

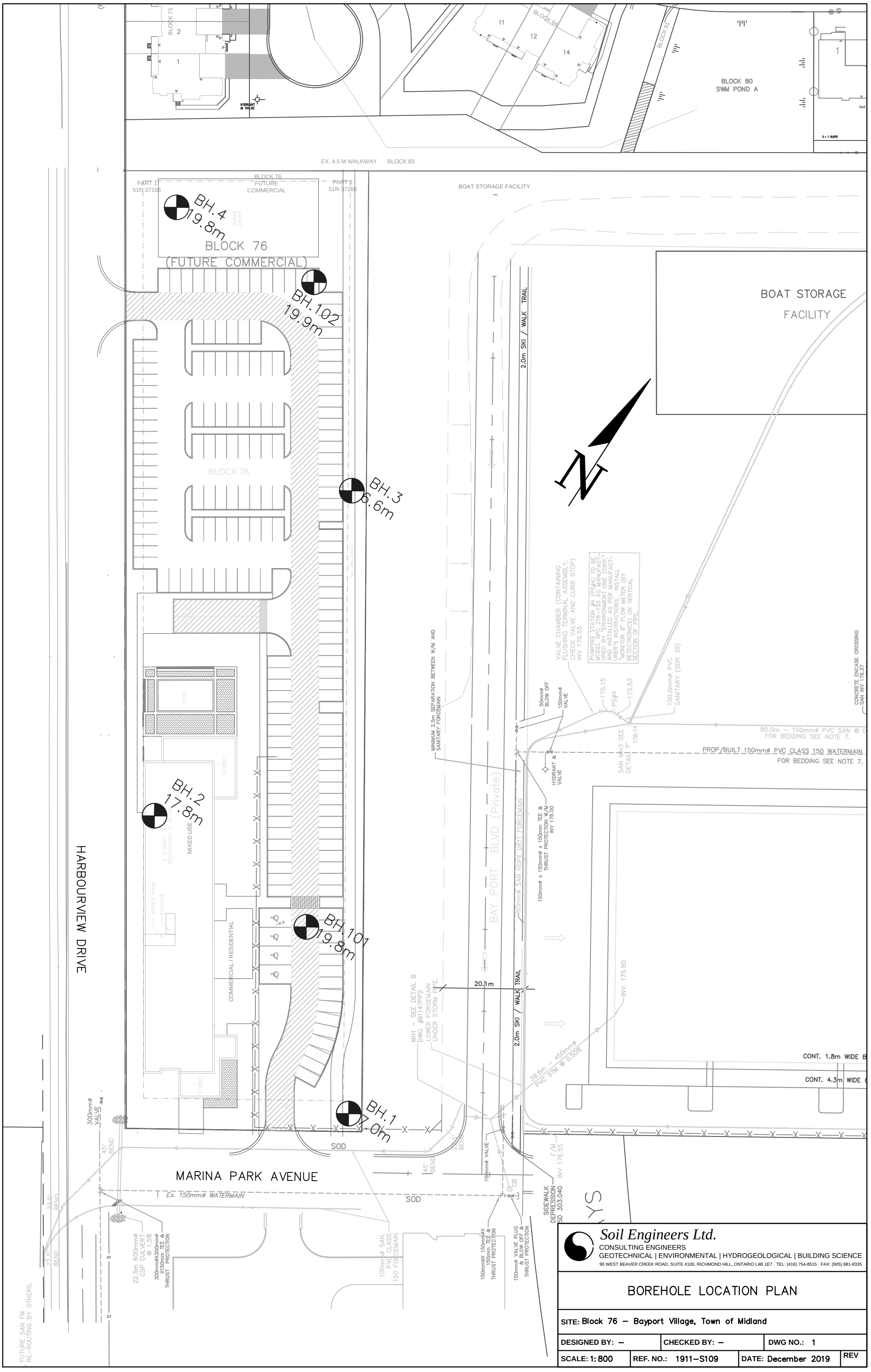
Bernard Lee, P.Eng.

KH/BS:dd

ENCLOSURES

Borehole Location Plan	Drawing No. 1
Subsurface Profile	Drawing No. 2
Log of Boreholes	Appendix

c. WMI & Associates Ltd. Attn: Mr. Stephen Morash, P.Eng.
Soil Engineers Ltd. Attn: Mr. Darcy Heitzner, C.Tech.,rcji



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90 WEST BEAVER CREEK ROAD, SUITE #100, RICHMOND HILL, ONTARIO L4B 1E7 · TEL: (416) 754-8515 · FAX: (905) 881-8335

BOREHOLE LOCATION PLAN

SITE: Block 76 – Bayport Village, Town of Midland

DESIGNED BY: –	CHECKED BY: –	DWG NO.: 1	
SCALE: 1:800	REF. NO.: 1911–S109	DATE: December 2019	REV

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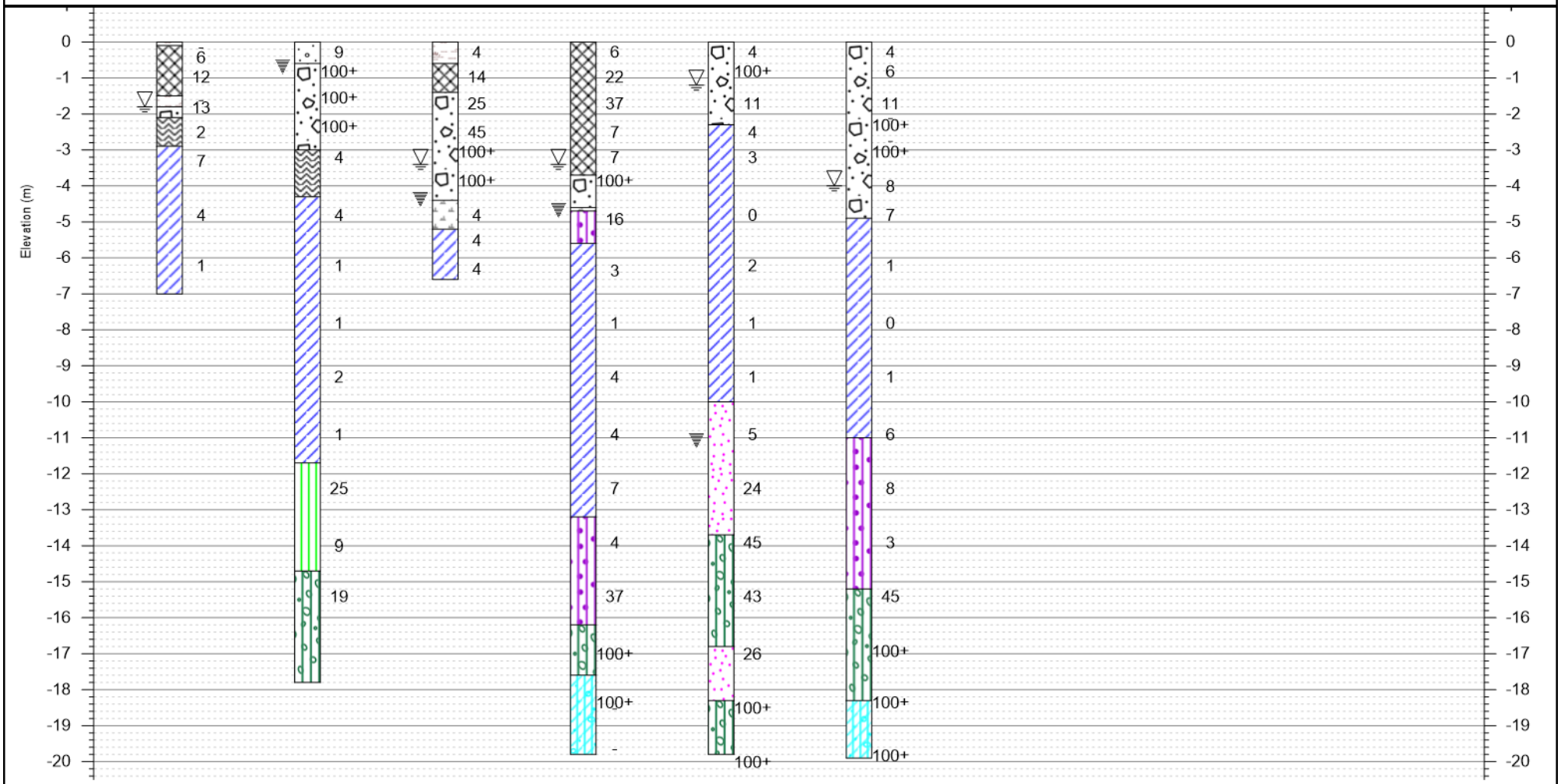
SUBSURFACE PROFILE
DRAWING NO. 2
SCALE: AS SHOWN

JOB NO.: 1911-S109
REPORT DATE: December 2019
PROJECT DESCRIPTION: Proposed Hotel
PROJECT LOCATION: Block 76 - Bayport Village, Town of Midland

LEGEND

TOPSOIL, GRANULAR, FILL, SLAG, SAND, SILTY SAND, SILTY SAND TILL, SILT, SILTY CLAY, SILTY CLAY TILL, PEAT, ALLUVIUM, WATER LEVEL (END OF DRILLING), CAVE-IN



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FAX: (705) 721-7864	FAX: (905) 542-2769	FAX: (905) 725-1315	FAX: (905) 881-8335	FAX: (705) 684-8522	FAX: (905) 542-2769

APPENDIX

LOG OF BOREHOLES FROM 2007 AND 2010

REFERENCE NO. 1911-S109

JOB NO.: 0705-S060

LOG OF BOREHOLE NO.: 1

FIGURE NO.: 1

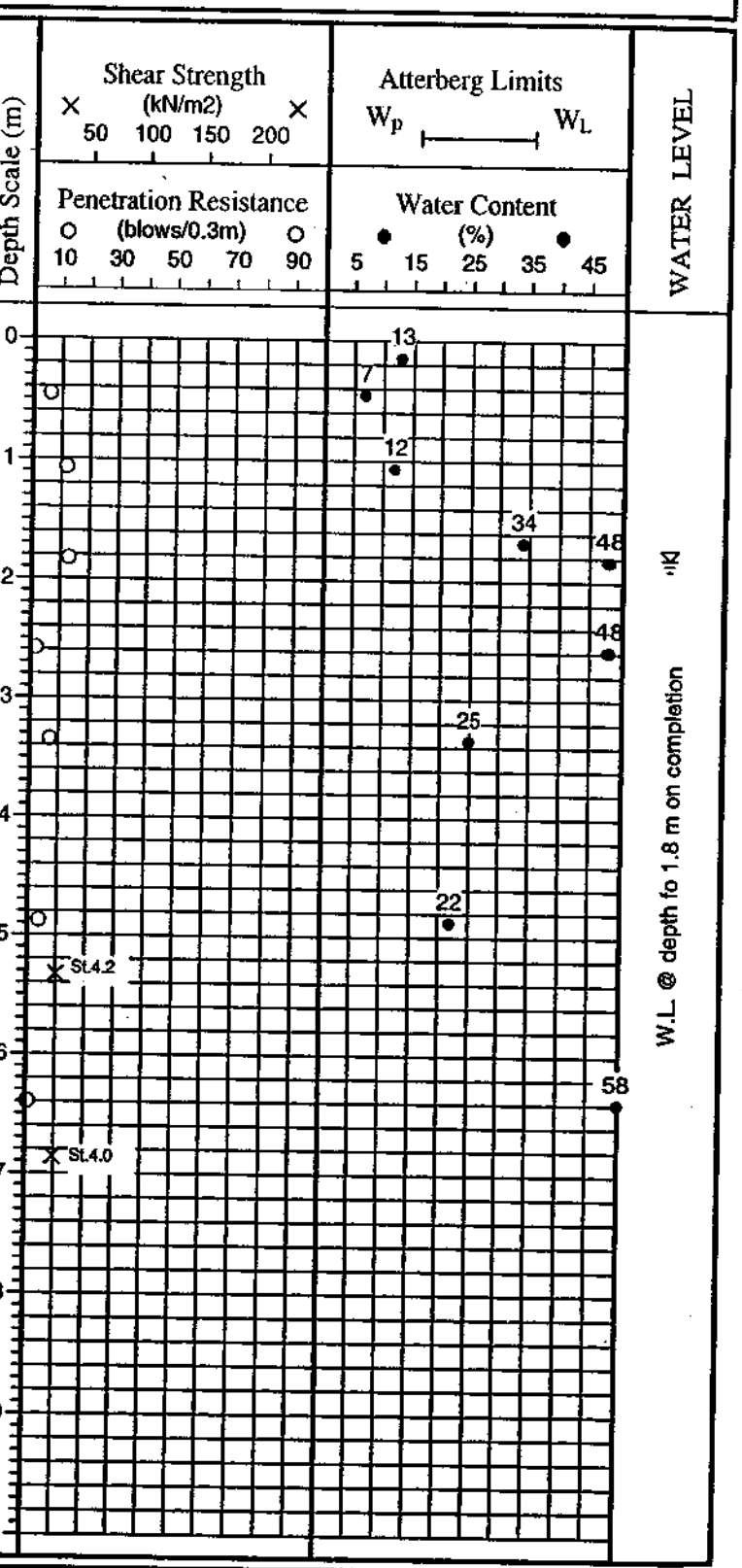
JOB DESCRIPTION: Proposed Residential Development

JOB LOCATION: Sunnyside Dr./Harbourview Dr., Town of Midland

METHOD OF BORING: Flight-Auger

DATE: October 31, 2007

Elev. / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value
	Ground Surface			
0.0	**10cm TOPSOIL, Fill**	1A	DO	-
	Dark brown **SAND, Fill**	1B	DO	6
	occ. peat seams	2	DO	12
1.5	**30cm TOPSOIL, Fill**	3A	DO	-
	Black **SLAG, Fill**	3B	DO	13
2.1	Dark brown to black **ALLUVIAL DEPOSIT**	4	DO	2
2.9	Very soft to firm grey to brown **SILTY CLAY**	5	DO	7
		6	DO	4
	a tr. of sand, occ. wet sand and silt seams and layers, brown to grey	7	DO	1
7.0	**END OF BOREHOLE**			



Soil Engineers Ltd.

JOB NO.: 0705-S060

LOG OF BOREHOLE NO.: 2

FIGURE NO.: 2

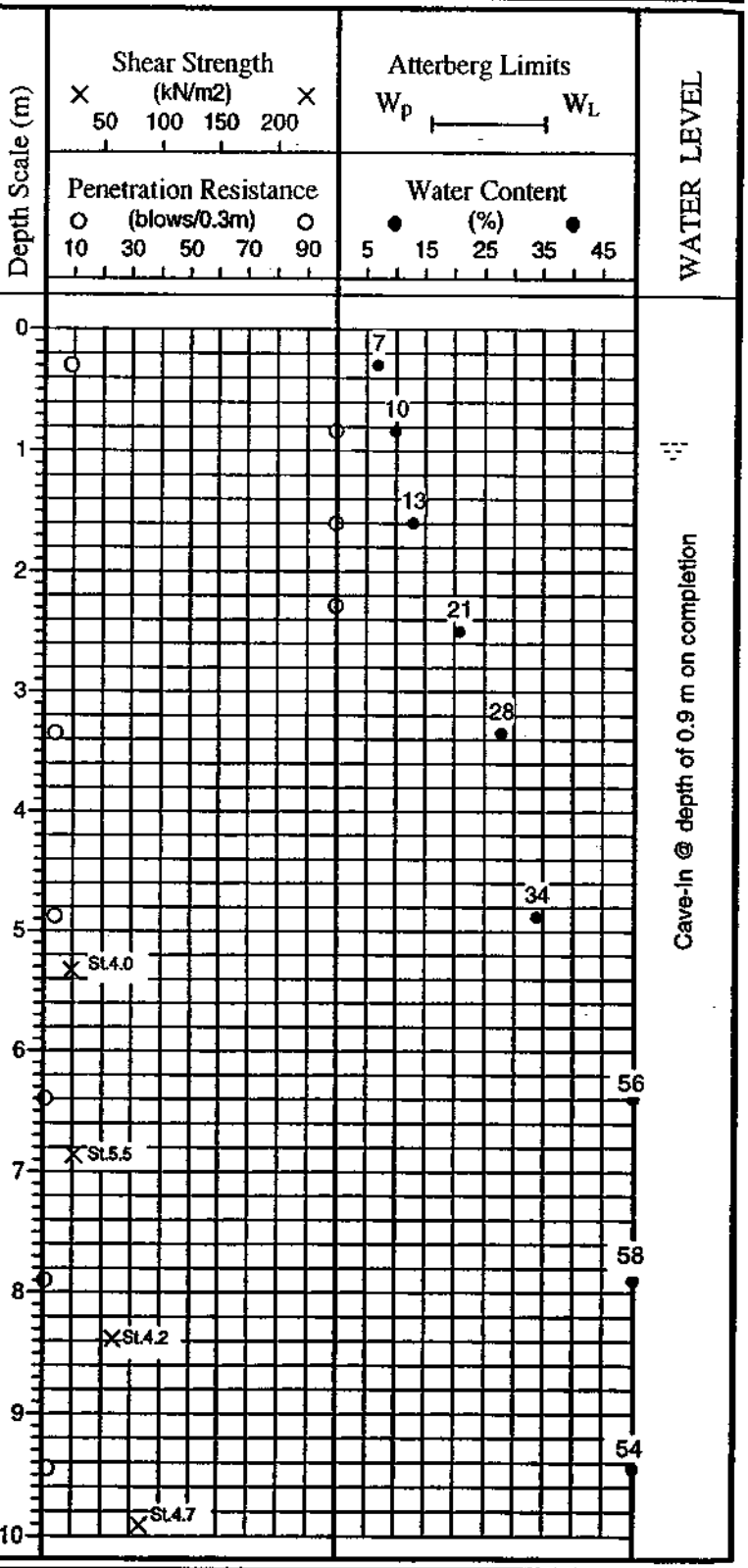
JOB DESCRIPTION: Proposed Residential Development

JOB LOCATION: Sunnyside Dr./Harbourview Dr., Town of Midland

METHOD OF BORING: Flight-Auger

DATE: October 31, 2007

Elev. / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value
	Ground Surface			
0.0	**GRANULAR, Fill**	1A	DO	9
0.6	Dark brown and grey	2	DO	100+
	SLAG, Fill	3A	DO	100+
		4	DO	100+
		4A	AS	-
3.0	Dark brown to black	5	DO	4
	ALLUVIAL DEPOSIT			
4.3	Very soft to firm	6	DO	4
	brown / grey			
	SILTY CLAY	7	DO	1
	a tr. of sand occ. wet sand and silt seams and layers	8	DO	1
		9	DO	2
10.0	Cont'd on Fig. 2A			



Soil Engineers Ltd.

JOB NO.: 0705-S060

LOG OF BOREHOLE NO.: 2

FIGURE NO.: 2 A

JOB DESCRIPTION: Proposed Residential Development

JOB LOCATION: Sunnyside Dr./Harbourview Dr., Town of Midland

METHOD OF BORING: Flight-Auger

DATE: October 31, 2007

Elev. / Depth (m)	SOIL DESCRIPTION Cont'd	SAMPLES Number	Type	N-Value
10.0	Grey, very soft **SILTY CLAY** a tr. of sand occ. wet sand and silt seams and layers	10	DO	1
11.7	Brown, loose to compact **SILT** a tr. of clay	11	DO	25
	sand layer	12A	DO	-
		12B	DO	9
14.7	Brown, compact **SILTY SAND, Till** traces of clay and gravel occ. wet sand and silt seams and layers, cobbles and boulders	13	DO	19
17.8	Refusal to augering, inferred bedrock or boulder. **END OF BOREHOLE**			

Depth Scale (m): 11, 12, 13, 14, 15, 16, 17, 18, 19, 20

Shear Strength (kN/m2): 50 100 150 200

Penetration Resistance (blows/0.3m): 10 30 50 70 90

Atterberg Limits: W_P — W_L

Water Content (%): 5 15 25 35 45

Water Content values: 27, 22, 14, 27, 10

WATER LEVEL

Soil Engineers Ltd.

JOB NO.: 0705-S060

LOG OF BOREHOLE NO.: 3

FIGURE NO.: 3

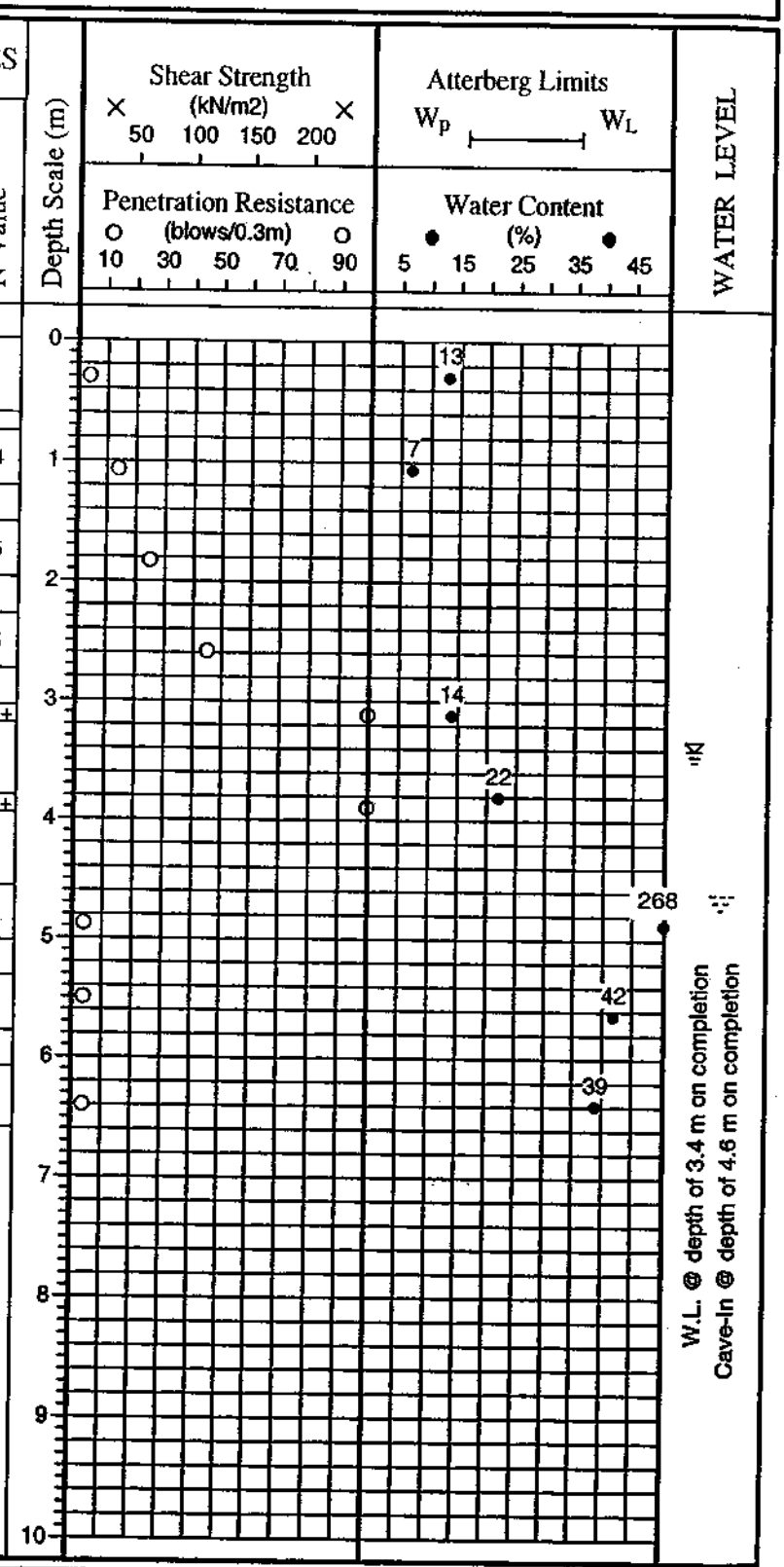
JOB DESCRIPTION: Proposed Residential Development

JOB LOCATION: Sunnyside Dr./Harbourview Dr., Town of Midland

METHOD OF BORING: Flight-Auger

DATE: October 30, 2007

Elev. / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value
	Ground Surface			
0.0	**60cm TOPSOIL, Fill**	1	DO	4
	Dark brown **SAND, Fill**	2	DO	14
1.4	Grey **SLAG, Fill**	3	DO	25
		4	DO	45
		5	DO	100+
		6	DO	100+
4.4	Black, granular-amorphous **PEAT**	7	DO	4
5.2	Grey, firm **SILTY CLAY**	8	DO	4
		9	DO	4
6.6	**END OF BOREHOLE**			



Soil Engineers Ltd.

JOB NO.: 0705-S060

LOG OF BOREHOLE NO.: 4

FIGURE NO.: 4

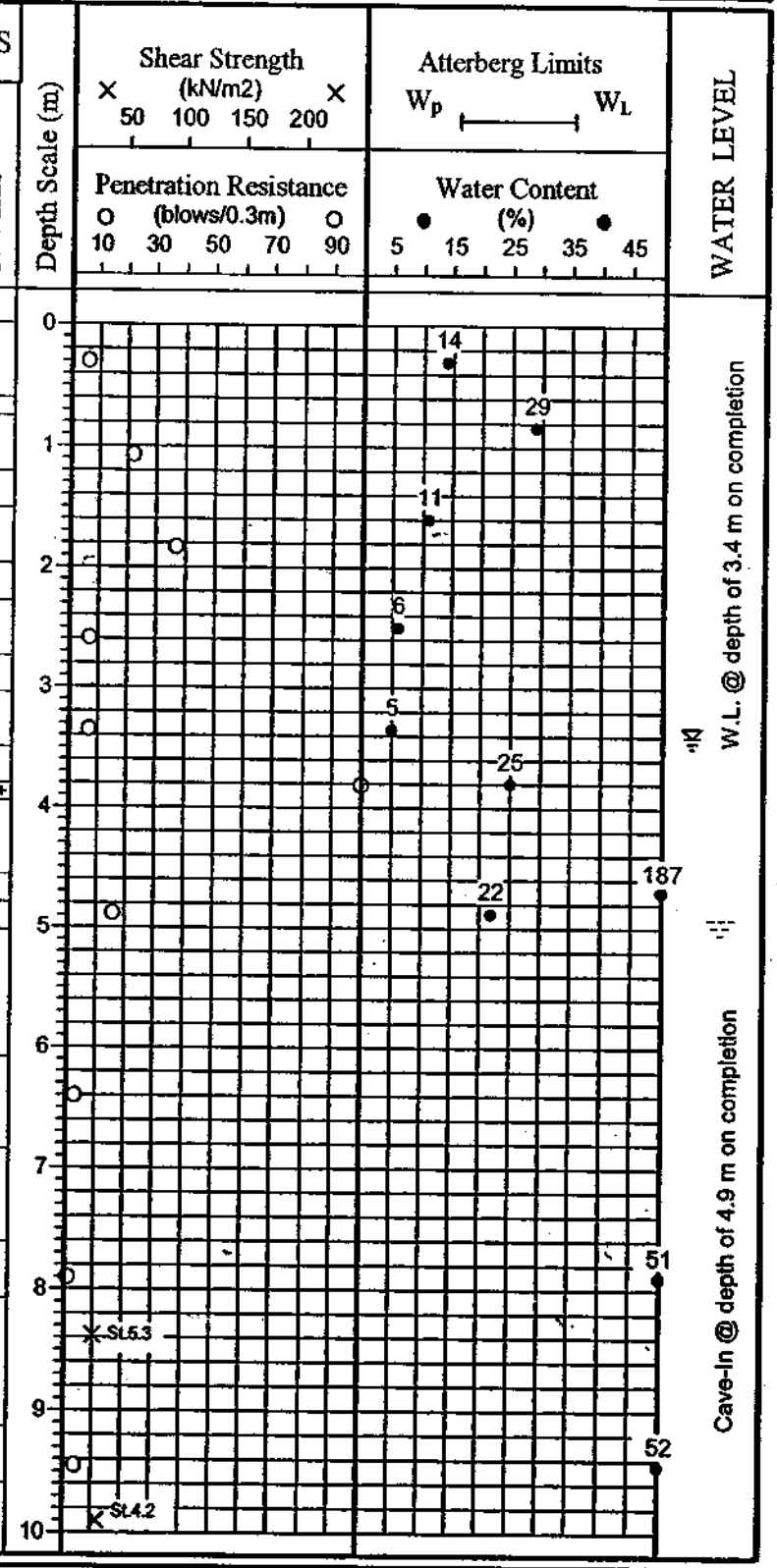
JOB DESCRIPTION: Proposed Residential Development

JOB LOCATION: Sunnyside Dr./Harbourview Dr., Town of Midland

METHOD OF BORING: Flight-Auger

DATE: October 31, 2007

Elev. / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value
	Ground Surface			
0.0	Brown, dark brown	1	DO	6
	SILTY CLAY, Fill	2	DO	22
		3	DO	37
2.1	Brown	4	DO	7
	SAND, Fill	5	DO	7
3.7	Brown	6	DO	100+
	SLAG, Fill			
4.6	**10cm PEAT**	7A	DO	-
	Brown, compact	7B	DO	16
	SILTY FINE SAND			
5.6	Very soft to firm	8	DO	3
	SILTY CLAY			
	a tr. of sand occ. wet sand and silt seams and layers	9	DO	1
	grey / brown	10	DO	4
10.0	Cont'd on Fig. 4A			



Soil Engineers Ltd.

JOB NO.: 0705-S060

LOG OF BOREHOLE NO.: 4

FIGURE NO.: 4 A

JOB DESCRIPTION: Proposed Residential Development

JOB LOCATION: Sunnyside Dr./Harbourview Dr., Town of Midland

METHOD OF BORING: Flight-Auger

DATE: October 31, 2007

Elev. / Depth (m)	SOIL DESCRIPTION Cont'd	SAMPLES Number	Type	N-Value
10.0	Brown, firm **SILTY CLAY** a tr. of sand occ. wet sand and silt seams and layers	11	DO	4
		12	DO	7
13.2	Brown, loose to dense **SILTY FINE SAND**	13	DO	4
		14	DO	37
16.2	Brown, very dense **SILTY SAND, TILL** traces of clay and gravel occ. wet sand and silt seams and layers, cobbles and boulders	15	DO	100+
17.6	Grey, hard **SILTY CLAY, TILL** sandy, a tr. of gravel occ. wet sand and silt seams and layers, cobbles and boulders	16	DO	100+
		16A	AS	-
		17	AS	-
19.8	**END OF BOREHOLE**			

Depth Scale (m): 11, 12, 13, 14, 15, 16, 17, 18, 19, 20

Shear Strength (kN/m2) × 50 100 150 200 ×

Penetration Resistance O (blows/0.3m) O 10 30 50 70 90

Atterberg Limits W_P ⊢—⊣ W_L

Water Content ● (%) ● 5 15 25 35 45

St.4.3

46 29 24 21 10 15 14

WATER LEVEL

Soil Engineers Ltd.

JOB NO: 1010-S027

LOG OF BOREHOLE NO: 101

FIGURE NO: 1A

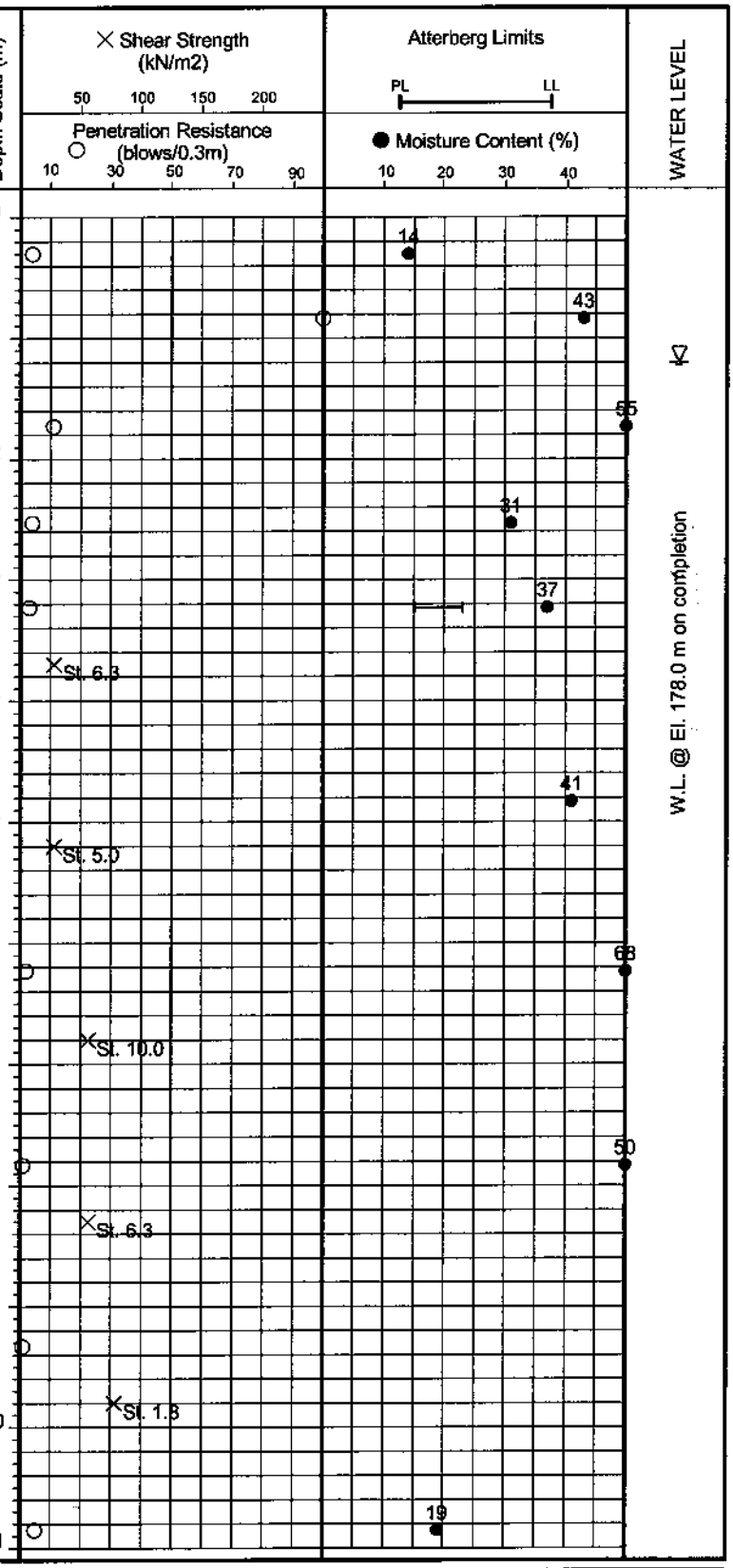
JOB DESCRIPTION: Proposed Townhouse Development

JOB LOCATION: Bayport Village - Phase 2, Town of Midland

METHOD OF BORING: Flight-Auger

DATE: November 3, 2010

Depth / Elev. (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value
0.0 / 179.2	Ground Surface			
	Brown/grey	1	AS	4
	SLAG, FIll	2	DO	100+
	mixed with sand, rock and cobbles with topsoil and organic inclusions	3	DO	11
2.3 / 176.9	Very soft to soft	4	DO	4
		5	DO	3
	SILTY CLAY brown / grey	6	DO	WH
	a trace to some sand with wet silt and clay seams and layers	7	DO	2
		8	DO	1
		9	DO	1
10.0 / 169.2	Brown, loose **FINE TO MEDIUM SAND** a trace to some silt a trace of gravel			
11.0	*Cont'd on Fig. 1B*	10	DO	5



Soil Engineers Ltd.

JOB NO: 1010-S027

LOG OF BOREHOLE NO: 101

FIGURE NO: 1B

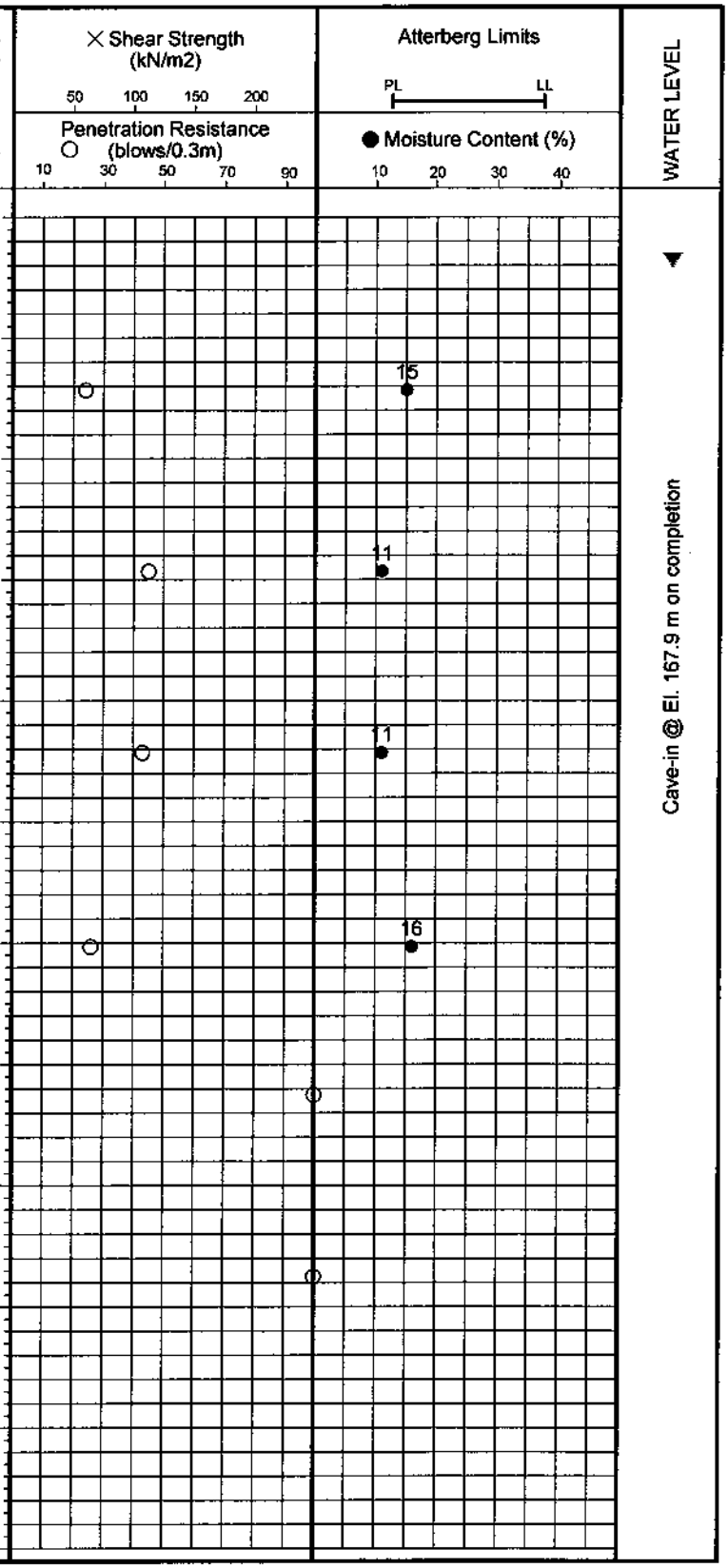
JOB DESCRIPTION: Proposed Townhouse Development

JOB LOCATION: Bayport Village - Phase 2, Town of Midland

METHOD OF BORING: Flight-Auger

DATE: November 3, 2010

Depth Elev. (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value
11.0				
168.2	Brown **FINE TO MEDIUM SAND** a trace to some silt a trace of gravel with silt seams and layers			
12.2				
167.0	Brown, compact **FINE TO COARSE SAND** a trace to some silt a trace of gravel with silt seams and layers	11	DO	24
13.7				
165.5	Brown, dense **SILTY SAND, Till** traces of gravel and clay with wet silt and clay seams and layers, cobbles and boulders	12	DO	45
		13	DO	43
16.8				
162.4	Grey, compact **FINE TO MEDIUM SAND** a trace to some silt a trace of gravel with silt seams and layers	14	DO	26
18.3				
160.9	Brown, very dense **SILTY SAND, Till** traces of gravel and clay frequent cobbles and boulders with wet silt and clay seams and layers	15	DO	100+
19.8				
159.4	**END OF BOREHOLE**	16	DO	100+



Soil Engineers Ltd.

JOB NO: 1010-S027

LOG OF BOREHOLE NO: 102

FIGURE NO: 2A

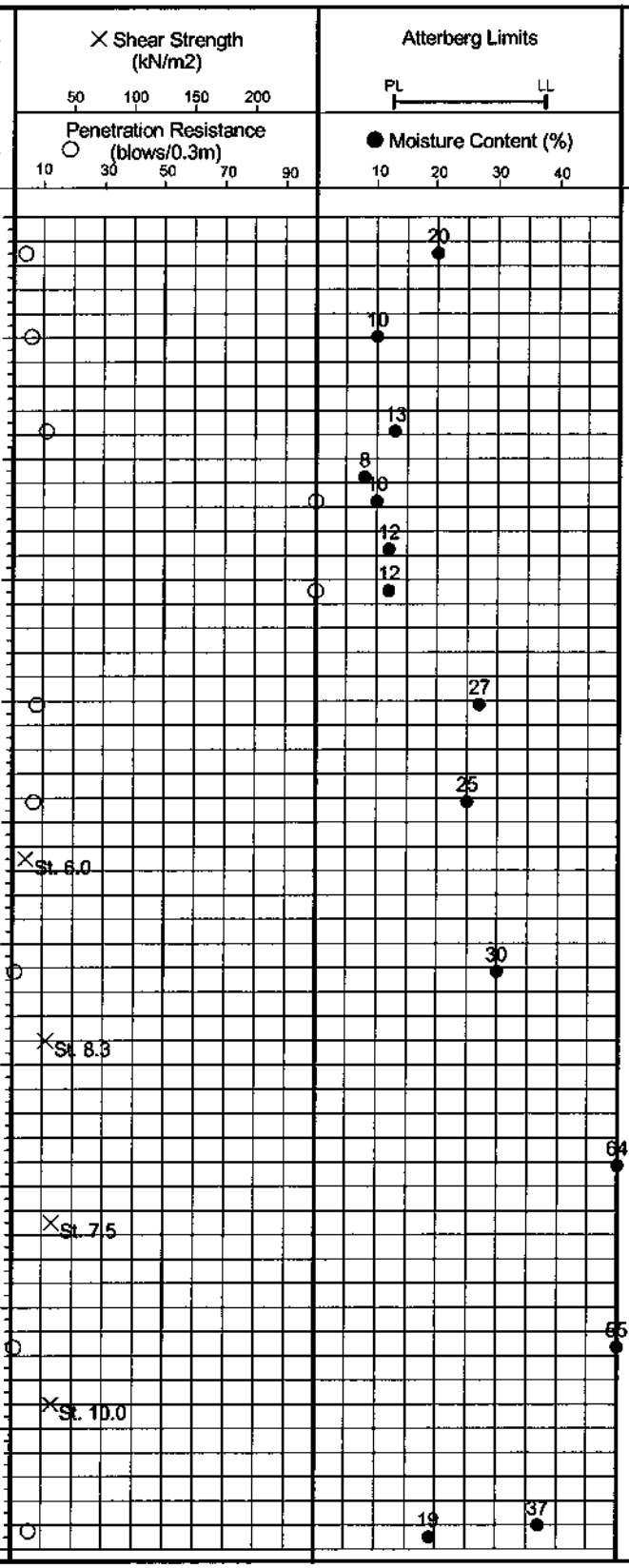
JOB DESCRIPTION: Proposed Townhouse Development

JOB LOCATION: Bayport Village - Phase 2, Town of Midland

METHOD OF BORING: Flight-Auger

DATE: November 3, 2010

Depth / Elev. (m)	SOIL DESCRIPTION	Number	Type	N-Value
0.0 / 181.6	Ground Surface			
	Dark brown/brown/grey	1	DO	4
		2	DO	6
		3	DO	11
	SLAG, FIII	4	AS	-
		5	DO	100+
		6	AS	-
		7	DO	100+
	mixed with sand, rock and cobbles with silty clay layers and topsoil inclusions	8	DO	8
4.9 / 176.7		9	DO	7
	Very soft to firm			
		10	DO	1
	SILTY CLAY			
		11	DO	WH
	a trace to some sand with wet silt and clay seams and layers — brown / grey	12	DO	1
	Cont'd on Fig. 2B — grey / brown	13	DO	6
11.0				



Soil Engineers Ltd.

JOB NO: 1010-S027

LOG OF BOREHOLE NO: 102

FIGURE NO: 2B

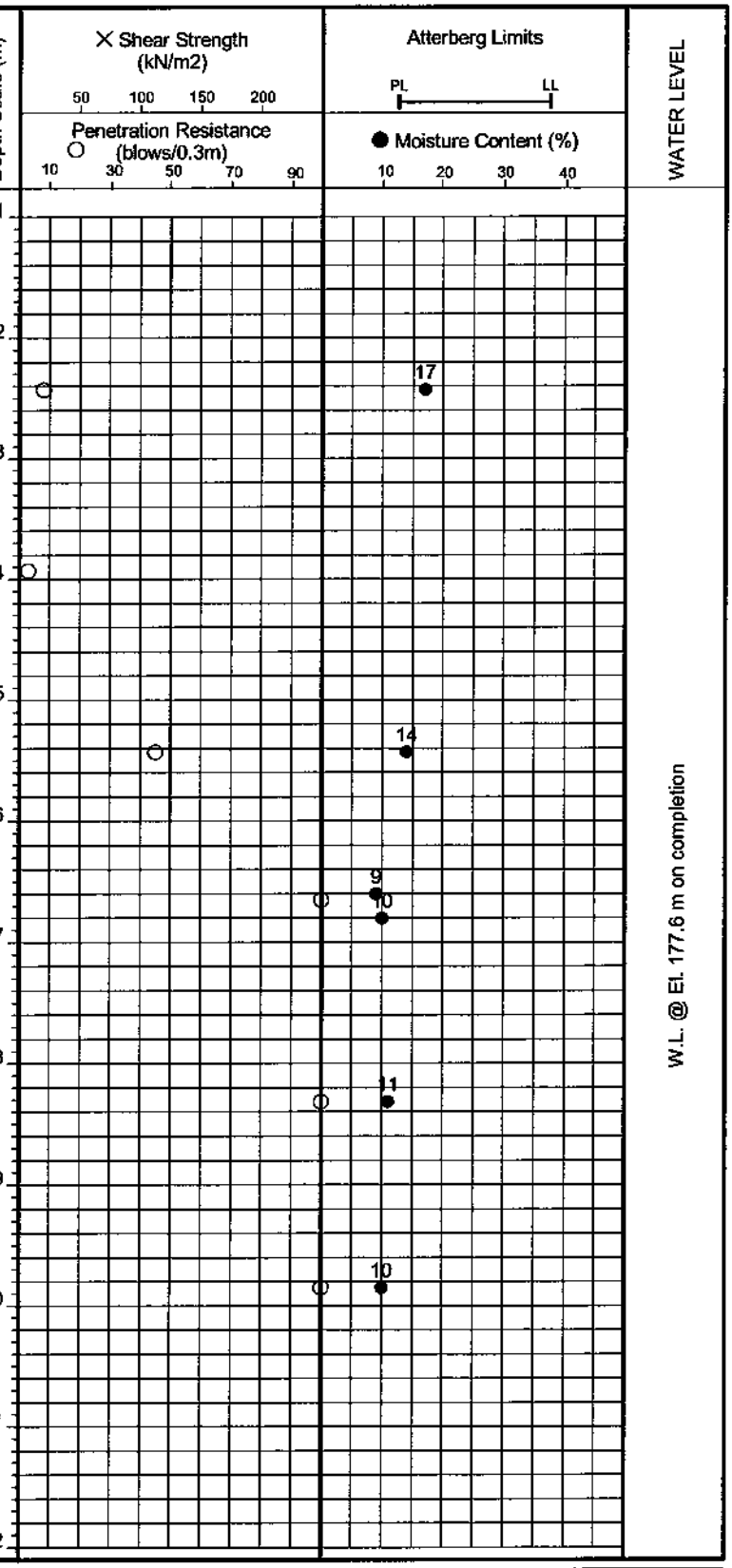
JOB DESCRIPTION: Proposed Townhouse Development

JOB LOCATION: Bayport Village - Phase 2, Town of Midland

METHOD OF BORING: Flight-Auger

DATE: November 3, 2010

Depth / Elev. (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value
11.0 / 170.6	Brown, very loose to loose			
	SANDY SILT, Till (REWORKED OR WATER-LAID)	14	DO	8
	with silty fine sand layers occ. wet sand and clay seams and layers, cobbles and boulders	15	DO	3
15.2 / 166.4	Brown, dense to very dense	16	DO	45
	SILTY SAND, Till	17	DO	100+
	traces of gravel and clay frequent cobbles and boulders with wet silt and clay seams and layers			
18.3 / 163.3	Grey, hard	18	DO	100+
	SILTY CLAY, Till sandy, a trace of gravel frequent cobbles and boulders with wet sand and silt seams and layers			
19.9 / 161.7	**END OF BOREHOLE**	19	DO	100+



Soil Engineers Ltd.

APPENDIX F

HYDROGEOLOGICAL REPORT
DEC 10/19 WILSON

Ian D. Wilson Associates Ltd.
since 1974

Tel: 519.233.3500
Fax: 519.233.3501

P. O. Box 299
Clinton, Ontario
N0M 1L0

December 10, 2019

Wilson Associates

Consulting Hydrogeologists

Mr. Stephen Morash, P.Eng.
WMI & Associates
119 Collier Street
Barrie, Ontario
L4M 1H5

Dear Mr. Morash:

Re: PRELIMINARY Hydrogeological Study and Water Balance Analysis
Bayport Hotel Block 76 - Bayport Commercial Development
1191 Harbourview Drive, Midland

It is proposed to re-develop the existing 1.38ha property known as Bayport Hotel Block 76 at the municipal address of 1191 Harbourview Drive, in the Town of Midland, as a commercial property with hotel building, parking area and associated facilities.

As requested by WMI & Associates, this preliminary report has been prepared to address the requirements of the June 2013 "Hydrogeological Assessment Submissions: Conservation Authority Guidelines for Development Applications" (the CA Guideline). The report is required as the property is located within Wellhead Protection Areas C and Q1, as detailed by County of Simcoe website mapping.

Provided for this preliminary study were the following documentation:

- Logs of Geotechnical Boreholes E2, E3, E4, 1, 2, 3, and 4 (October 2007), Boreholes 101 and 102 (November 2010) and applicable grain-size analysis curves for samples from these boreholes, Soil Engineers Ltd. (SEL).
- Bayport Hotel Concept Plan, Chamberlain Architect Services Limited, November 27, 2019.

Copies of the above documentation are attached for reference.

It is understood that additional geotechnical studies are underway on the property, and this preliminary report will be updated as appropriate upon receipt of the completed additional geotechnical work.

LOCATION AND HYDROGEOLOGICAL SETTING

The subject lands occupy a 1.38ha parcel located on the east side of Harbourview Drive, immediately north of Marina Park Avenue. The site is currently mainly cleared, with minor scrub vegetation, and is undeveloped except for a walkway. On-site relief is essentially flat, with a slight slope towards Midland Bay to the east.

No surface water bodies are located on-site, however Marina facilities on Midland Bay are situated within about 60m east of the site.

Lands surrounding the site are a Marina facility to the east, undeveloped forested lands to the west, undeveloped cleared lands to the north and multi-story residential to the south.

The subject lands are located within the Simcoe Uplands physiographic region of southern Ontario, an area of northern Simcoe County characterized by till upland plains and steep-sided, flat floored valleys.

According to Ontario Geological Survey Open File Map 194 "Quaternary Geology of the Penetanguishene and Christian Island Areas", the upper soils in the vicinity of the site consist of glaciolacustrine coarse-grained deposits of fine to very fine sand, minor pebbly sand, and silt. The SEL logs for nine exploratory boreholes completed on the property to date indicate that the site has been filled with 1.5m to 4.9m of a variety of materials (sand, silty clay, slag, granular aggregate, etc...). Underlying the fill materials are native deposits mainly consisting of silty clay with minor peat, alluvial deposits or fine sand deposits overlying the silty clay.

According to historical Ministry of the Environment, Conservation and Parks (MECP) water well records for nearby test holes associated with the development of the Vinden Well Field (copies attached), the overburden in the vicinity of the site is in the range of 38m deep. The overburden consists mainly of fine-grained deposits, except for a 6m to 8m thick intermediate-depth granular deposit.

The bedrock beneath the site consists mainly of limestone and dolostone of the Simcoe Group.

Although the area is municipally serviced, current municipal and historical water wells will have obtained potable groundwater from the intermediate-depth overburden aquifer. The bedrock beneath the site is not locally typically used as a source of potable groundwater due to the likelihood of obtaining lower yields of aesthetically-poorer quality groundwater.

WATERTABLE

Watertable levels were observed by SEL in the nine open boreholes, and the watertable surface was encountered at relatively inconsistent depths (0.3m to 4.0m below grade) in the open boreholes. Based on the proximity to Midland Bay, the encountered water levels will represent the watertable surface. No monitoring wells were installed by SEL in the 2007 and 2010 boreholes.

Based on the setting, shallow groundwater flow is expected to be generally eastwards towards the Bay.

WATER BUDGET ANALYSIS

The following assumptions are made for this assessment:

- Based on the relatively small site area and relatively flat relief, the site is assumed to act as one catchment. The site is considered to exhibit a flat topography (per the 1995 MECP definitions referenced by the CA guideline) and clay soil conditions (native soils reported by SEL).

- According to calculations provided by WMI & Associates Limited, the 1.38ha site currently exhibits a pervious area of 90% (1.24ha) and an impervious area of 10% (0.14ha). The proposed development of the site will exhibit a pervious area of 26.1% (0.36ha) and an impervious area of 73.9% (1.02ha).

- The water surplus for the site is assumed to be 454mm/year, based on an evapotranspiration rate of 586mm/year to 587mm/year (Penetanguishene and Tay Point subwatershed and the Midland Area subwatershed, 2015 Severn Sound Source Protection Area Approved Assessment Report) and normal precipitation for the area of 1040.6mm/year (1981-2010 precipitation normal for the closest Environment Canada weather station - Midland WPCP weather station).

The following tables provide a water budget analysis following the general guidance of the April 2013 Conservation Authority Guidelines for Hydrogeological Assessments.

Table 1 - Water Budget - Undeveloped Conditions

Catchment Designation	Site		
	Pervious	Impervious	Totals
Area (m^2)	12400	1400	13800
Pervious Area (m^2)	12400	0	12400
Impervious Area (m^2)	0	1400	1400
Impervious Factors (Per MECP Guidelines referenced by CA Guideline)			
Topography Infiltration Factor	Flat 0.30		
Soil Infiltration Factor	Clay 0.1		
Land Cover Infiltration Factor	Cleared 0.1		
MOECC Infiltration Factor	0.5		
Actual Infiltration Factor	0.5		
Run-Off Coefficient	0.5		
Runoff from Impervious Surfaces*	0		
Inputs (per Unit Area)			
Precipitation (mm/year)	1041	1041	1041
Run-On (mm/year)	0	0	0
Other Inputs (mm/year)	0	0	0
Total Inputs (mm/year)	1041	1041	1041
Outputs (per Unit Area)			
Precipitation Surplus (mm/year)	454	454	454
Net Surplus (mm/year)	454	454	454
Evapotranspiration (mm/year)	587	587	587
Infiltration (mm/year)	227	227	203
Impervious Area Infiltration (mm/year)	0	0	0
Total Infiltration (mm/year)	227	227	203
Runoff Pervious Areas (mm/year)	227	227	203
Runoff Impervious Areas (mm/year)	0	0	0
Total Runoff (mm/year)	227	227	203
Total Outputs (mm/year)	1041	1041	1041
Difference (Inputs - Outputs) (mm/year)	0	0	0

Inputs (Volume)			
Precipitation (m^3/year)	12908	1457	14365
Run-On (m^3/year)	0	0	0
Other Inputs (m^3/year)	0	0	0
Total Inputs (m^3/year)	12908	1457	14365
Outputs (Volume)			
Precipitation Surplus (m^3/year)	5630	636	6266
Net Surplus (m^3/year)	5630	636	6266
Evapotranspiration (m^3/year)	7279	822	8101
Infiltration (m^3/year)	2815	318	3133
Impervious Area Infiltration (m^3/year)	0	0	0
Total Infiltration (m^3/year)	2815	318	3133
Runoff Pervious Areas (m^3/year)	2815	318	3133
Runoff Impervious Areas (m^3/year)	0	0	0
Total Runoff (m^3/year)	2815	318	3133
Total Outputs (m^3/year)	12909	1458	14367
Difference (Inputs - Outputs) (m^3/year)	+1**	+1**	+2**

Note: ** Minor differences attributable to rounding.

Table 2 - Water Budget - Post-Development Conditions

Under Post-Development conditions, The proposed re-development of the site will exhibit a pervious area of 26.1% (0.36ha) and an impervious area of 73.9% (1.02ha).

Catchment Designation	Site		
	Pervious	Impervious	Totals
Area (m^2)	3600	10200	13800
Pervious Area (m^2)	3600	0	3600
Impervious Area (m^2)	0	10200	10200
Impervious Factors (Per MECP Guidelines referenced by CA Guideline)			
Topography Infiltration Factor	Flat 0.30	Flat 0.30	
Soil Infiltration Factor	Clay 0.1	Clay 0.1	
Land Cover Infiltration Factor	Cleared 0.1	Cleared 0.1	
MOECC Infiltration Factor	0.5	0.5	
Actual Infiltration Factor	0.5	0.5	
Run-Off Coefficient	0.5	1	
Runoff from Impervious Surfaces*	0	0.8	
Inputs (per Unit Area)			
Precipitation (mm/year)	1041	1041	1041
Run-On (mm/year)	0	0	0
Other Inputs (mm/year)	0	0	0
Total Inputs (mm/year)	1041	1041	1041
Outputs (per Unit Area)			
Precipitation Surplus (mm/year)	454	833	734
Net Surplus (mm/year)	454	833	734
Evapotranspiration (mm/year)	587	208	307
Infiltration (mm/year)	227	0	59
Impervious Area Infiltration (mm/year)	0	0	0
Total Infiltration (mm/year)	227	0	59
Runoff Pervious Areas (mm/year)	227	0	59
Runoff Impervious Areas (mm/year)	0	833	616
Total Runoff (mm/year)	227	833	675
Total Outputs (mm/year)	1041	1041	1041
Difference (Inputs - Outputs) (mm/year)	0	0	0

Inputs (Volume)			
Precipitation (m^3/year)	3748	10618	14366
Run-On (m^3/year)	0	0	0
Other Inputs (m^3/year)	0	0	0
Total Inputs (m^3/year)	3748	10618	14366
Outputs (Volume)			
Precipitation Surplus (m^3/year)	1634	8497	10131
Net Surplus (m^3/year)	1634	8497	10131
Evapotranspiration (m^3/year)	2113	2122	4235
Infiltration (m^3/year)	817	0	817
Impervious Area Infiltration (m^3/year)	0	0	0
Total Infiltration (m^3/year)	817	0	817
Runoff Pervious Areas (m^3/year)	817	0	817
Runoff Impervious Areas (m^3/year)	0	8497	8497
Total Runoff (m^3/year)	817	8497	9314
Total Outputs (m^3/year)	3747	10619	14366
Difference (Inputs - Outputs) (m^3/year)	-1**	+1**	0

Note: * Per guidelines, evaporation from impervious areas assumed to be 20% of precipitation.

** Minor differences attributable to rounding.

Table 3 - Water Budget - Post-Development Conditions with Mitigation

Based on the above assessment, approximately 2,316m^3/year (27%) of the runoff from the impervious areas of the site will need to be infiltrated on the site in order to maintain the overall rate of infiltration relative to pre-development conditions. The viability of infiltrating this volume of water is discussed below.

Catchment Designation	Site		
	Pervious	Impervious	Totals
Area (m^2)	3600	10200	13800
Pervious Area (m^2)	3600	0	3600
Impervious Area (m^2)	0	10200	10200
Impervious Factors (Per MECP Guidelines referenced by CA Guideline)			
Topography Infiltration Factor	Flat 0.30	Flat 0.30	
Soil Infiltration Factor	Clay 0.1	Clay 0.1	
Land Cover Infiltration Factor	Cleared 0.1	Cleared 0.1	
MOECC Infiltration Factor	0.5	0.5	
Actual Infiltration Factor	0.5	0.5	
Run-Off Coefficient	0.5	1	
Runoff from Impervious Surfaces*	0	0.8	
Inputs (per Unit Area)			
Precipitation (mm/year)	1041	1041	1041
Run-On (mm/year)	0	0	0
Other Inputs (mm/year)	0	0	0
Total Inputs (mm/year)	1041	1041	1041
Outputs (per Unit Area)			
Precipitation Surplus (mm/year)	454	833	734
Net Surplus (mm/year)	454	833	734
Evapotranspiration (mm/year)	587	208	307
Infiltration (mm/year)	227	0	59
Impervious Area Infiltration (mm/year)	0	227	168
Total Infiltration (mm/year)	227	227	227
Runoff Pervious Areas (mm/year)	227	0	59
Runoff Impervious Areas (mm/year)	0	606	448
Total Runoff (mm/year)	227	606	507
Total Outputs (mm/year)	1041	1041	1041

Difference (Inputs - Outputs) (mm/year)	0	0	0
Inputs (Volume)			
Precipitation (m^3/year)	3748	10618	14366
Run-On (m^3/year)	0	0	0
Other Inputs (m^3/year)	0	0	0
Total Inputs (m^3/year)	3748	10618	14366
Outputs (Volume)			
Precipitation Surplus (m^3/year)	1634	8497	10131
Net Surplus (m^3/year)	1634	8497	10131
Evapotranspiration (m^3/year)	2113	2122	4235
Infiltration (m^3/year)	817	0	817
Impervious Area Infiltration (m^3/year)	0	2316	2316
Total Infiltration (m^3/year)	817	0	3133
Runoff Pervious Areas (m^3/year)	817	0	817
Runoff Impervious Areas (m^3/year)	0	6181	6181
Total Runoff (m^3/year)	817	6181	6998
Total Outputs (m^3/year)	3747	10619	14366
Difference (inputs - Outputs) (m^3/year)	-1**	+1**	0

Note: * Per guidelines, evaporation from impervious areas assumed to be 20% of precipitation.

** Minor differences attributable to rounding.

Table 4 - Water Budget Summary

Characteristic	Site				
	Current	Post-Development	% Change (Current to Post)	Post Development with Mitigation	% Change (Current to Post with Mitigation)
Inputs (Volumes)					
Precipitation (m^3/year)	14365	14366	0	14366	0
Run-On (m^3/year)	0	0	0	0	0
Other Inputs (m^3/year)	0	0	0	0	0
Total Inputs (m^3/year)	14365	14366	0	14366	0
Outputs (Volumes)					
Precipitation Surplus (m^3/year)	6266	10131	62	10131	62
Net Surplus (m^3/year)	6266	10131	62	10131	62
Evapotranspiration (m^3/year)	8101	4235	-48	4235	-48
Infiltration (m^3/year)	3133	817	-74	817	-74
Impervious Area Infiltration (m^3/year)	0	0	0	2316	27
Total Infiltration (m^3/year)	3133	817	-74	3133	0
Runoff Pervious Areas (m^3/year)	3133	817	-74	817	-74
Runoff Impervious Areas (m^3/year)	0	8497	+8497 m^3/year	6181	+6181 m^3/year
Total Runoff (m^3/year)	3133	9314	197	6998	123
Total Outputs (m^3/year)	14367	14366	0	14366	0

Mitigation assumes that 27% of runoff from the impervious areas of the site can be infiltrated on-site, or about 2,316m^3/year. It is assumed that most of this will be infiltrated into grass swales, infiltration galleries, or other equivalent Low Impact Development (LID) measures. According to the grain-size analyses for the native overburden deposits provided in the SEL report (attached), the native soils (i.e. a silty clay) will exhibit a percolation rate (T-time) in the range of 50min/cm (per Ontario Building Code guidelines for Unified Soil Classification Type "ML"), or about 0.3m/day. Conservatively assuming that the impervious area drainage of 2,316m^3/year is to be infiltrated over 30 days throughout the year, approximately 77.2m^3 of water needs to be infiltrated per day. Based on an infiltration rate of 0.3m/day, LID measures with a total site footprint of at least 257m^2 are required.

SUMMARY

1. The upper overburden in the vicinity of the site is reported to be a variety of fill materials, overlying mainly native clayey silt.

2. Based on a review of the SEL borehole data, inconsistent groundwater levels were encountered, however shallow watertable conditions are anticipated based on setting and proximity to Midland Bay.

3. The site is located within Well Head Protection Area C and Q1.

4. Based on known site conditions (i.e. clay soils, flat relief, cleared cover), an MECP infiltration factor of 0.5 is indicated for the undeveloped site.

5. Water budget analysis indicates that the development proposal of the site will reduce overall infiltration by about 74% from pre-development conditions.

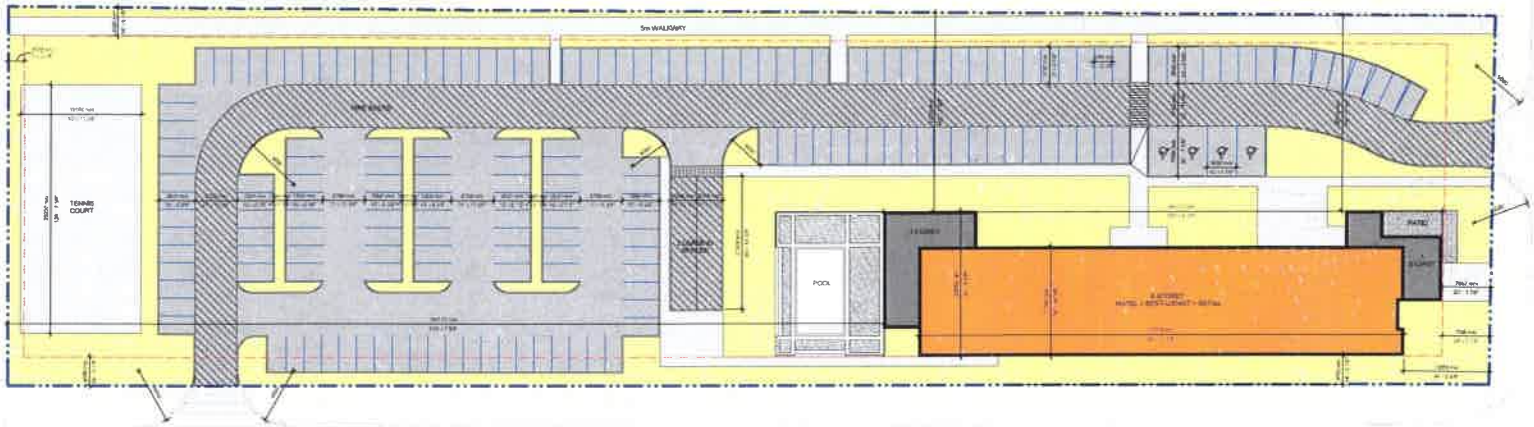
6. Due to the calculated loss in overall infiltration of the development proposal in comparison to pre-development conditions, infiltration enhancement measures must be adopted to infiltrate approximately 27% of runoff from impervious surfaces. It is assumed that most of this will be infiltrated into grass swales, infiltration galleries, or other equivalent Low Impact Development (LID) measures (see above for minimum LID areas). The infiltration measures need to be maintained in a low-sediment condition to avoid infiltration loss over time.

Should there be any questions regarding the above information and analysis, please feel free to contact this office.

Yours sincerely.
IAN D. WILSON ASSOCIATES LIMITED

Geoffrey Rether, P.Geo.

PROFESSIONAL GEOSCIENTIST
GEOFFREY B. RETHER
PRACTISING MEMBER
0426
ONTARIO



Site Plan A
1/8" = 1'-0" 1 : 300

RETAIL		
Name	Area	Count
T/O GROUND FLOOR		
RETAIL	2074 SF	1
		1

Name	Area	Count
T/O GROUND FLOOR		
KITCHEN	732 SF	1
RESTAURANT	1753 SF	1
T/O SECOND FLOOR		
BAR	711 SF	1
	3196 SF	3

UNIT SCHEDULE		
Name	Area	Count
T/O FIFTH FLOOR		
1 BR	421 SF ... 624 SF	10
1 BR + DEN	644 SF	4
STUDIO	280 SF	8
T/O FOURTH FLOOR		
1 BR	421 SF ... 624 SF	10
1 BR + DEN	644 SF	4
STUDIO	280 SF	9
T/O SECOND FLOOR		
1 BR	421 SF ... 624 SF	10
1 BR + DEN	644 SF	3
STUDIO	280 SF	9
T/O SIXTH FLOOR		
1 BR	421 SF ... 624 SF	10
1 BR + DEN	644 SF	4
STUDIO	280 SF	9
T/O THIRD FLOOR		
1 BR	421 SF ... 624 SF	10
1 BR + DEN	644 SF	4
STUDIO	280 SF	4
		114

REQUIRED PARKING

HOTEL
STUDIOS = 45
1 BR = 56
2 BR = 10
TOTAL = 114

114 x 1.25 = 142.5 = 143 SPACES NEEDED

RESTAURANT
3457 ft² / 100 Seats:
100 / 4 = 25 (25 SPACES NEEDED)

RETAIL
30m² / 180m²

180m² x 0.05 = 9 SPACES NEEDED

TOTAL SPACES NEEDED = 178

TYPE	DESCRIPTION	COUNT
T/O GROUND FLOOR		
ACCESSIBLE PARKING	ACCESSIBLE PARKING 4.8m x 7.3m	4
TYPICAL PARKING	TYPICAL SPACE 2.6m x 5.8m	177
		181

ZONING - PARKING

Hotel and Motel

1.25 per guest room plus 1 for each 4 persons that can be accommodated at any one time in a dining room, licensed beverage room, banquet room

Eating Establishment
1 per every 4 persons seating capacity

Retail store, personal service establishment, service shop, studio

5 per 90 m2 GFA

SITE STATISTICS			
	AREA (SM)	AREA (SF)	PERCENTAGE
BUILDING FOOTPRINT			
BUILDING FOOTPRINT	1588.56 m²	17099 ft²	12.0%
	1588.56 m²	17099 ft²	12.0%
HARD LANDSCAPE			
ASPHALT	5891.39 m²	6341 3 ft²	44.8%
SIDEWALK	2066.85 m²	22571 ft²	15.8%
	7958.24 m²	85693 ft²	60.4%
SOFT LANDSCAPE			
LANDSCAPE	3643.72 m²	39221 ft²	27.6%
	3643.72 m²	39221 ft²	27.6%
	13230.53 m²	142304 ft²	100.0%
SITE TOTAL	14821.49 m²	159626 ft²	100.0%

Chamberlain Architect Services Limited
4671 Palladium Way (Unit 1)
Burlington, Ontario, L7M 0W8
CANADA
Phone: 905.631.7777
www.chamberlainPD.com

NO.		DATE

Owner

TRUE NORTH

Bayport Hotel Concept

Marina Park Drive & Harbourview Drive

SITE PLAN

2019.04.14
CMC
CMC
1 : 300
118074

A001a

HISTORICAL LOCAL WELL RECORDS

UTM 17 | 5 8 6 9 8 8 | E
| 9 | R | 4 9 5 6 2 5 4 | N
Elev. | 9 | R | 0 5 9 5 |
Basin | 2 2 | | | |

ONTARIO

The Well Drillers Act
Department of Mines, Province of Ontario

57 No 1879

RECEIVED
MAR 14 1958
GEOLOGICAL BRANCH
DEPARTMENT of MINES

Water Well Record

County or Territorial District... SIMCOE ..... ~~Township, Village,~~ Town ~~or City~~ ... MIDLAND .....
Con. ..... Lot ..... Street and Number (if in Village, Town or City) .....
Owner. PUBLIC UTILITIES COMMISSION ..... Address... MIDLAND, ONT. .....
Date Completed ... 15 (day) ... NOV (month) ... 1949 (year). Cost of Well (excluding pump) ... — .....

Pipe and Casing Record

Casing diameter(s) ... 5 1/2" .....
Length(s) of casing(s) .....
Type of screen ... NONE .....
Length of screen .....
Distance from top of screen to ground level .....
Is well a gravel-wall type? .....

Pumping Test

Date .....
Static level .....
Pumping level ... NONE .....
Pumping rate .....
Duration of test .....
Distance from cylinder or bowls to ground level .....

Water Record

Kind (fresh or mineral) .....
Quality (hard, soft, contains iron, sulphur, etc.) .....
Appearance (clear, cloudy, coloured) .....
For what purpose(s) is the water to be used? ... NONE .....
.....
How far is well from possible source of contamination? .....
What is the source of contamination? .....
Enclose a copy of any mineral analysis that has been made of water .....

Depth(s) to Water Horizon(s)	Kind of Water	No. of Feet Water Rises

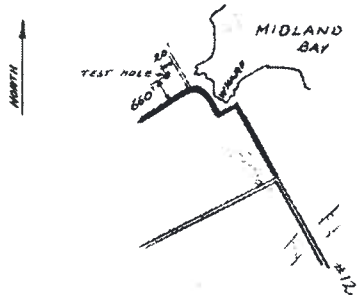
Well Log

Overburden and Bedrock Record	From	To
BLACK MUCK AND SAND	0 ft.	10 ft.
BROWN CLAY	10	20
SOFT SANDY CLAY	20	38
GRAVEL WITH CLAY AND SAND	38	54
COARSE GRAVEL BOULDERS	54	70
COARSE SAND, PACKED	70	75
BOULDER	75	76
PEAT	76	79

Location of Well

2 TESTHOLE at Well 4.

In diagram below show distances of well from road and lot line. Indicate north by arrow.



Situation: Is well on upland, in valley, or on hillside? .....
Drilling Firm .....
Address .....
Name of Driller ... B. S. ABBOTT ..... Address ... MIDLAND, ONT. .....
Date ..... Licence Number .....

.....
Signature of Licensee

FORM 5

CSS.58

UTM 17 | 5 8 6 3 8 7 E
| 9 R | 4 9 1 5 6 3 9 8 N
Elev. 9 R | 0 5 9 5
Basin 2 2

ONTARIO

The Well Drillers Act
Department of Mines, Province of Ontario

57 No 1882

RECEIVED
MAR 14 1952
GEOLOGICAL BRANCH
DEPARTMENT OF MINES

Water Well Record

County or Territorial District.... SIMCOE ..... ~~Township, Village~~, Town ~~or City~~ MIDLAND .....
Con. ..... Lot ..... Street and Number (if in Village, Town or City) .....
Owner. PUBLIC UTILITIES COMMISSION Address. MIDLAND, ONT .....
Date Completed.... 15 (day) Nov (month) 1949 (year) Cost of Well (excluding pump).... - .....

Pipe and Casing Record

Casing diameter(s).... 5 1/2" .....
Length(s) of casing(s).....
Type of screen..... -
Length of screen.....
Distance from top of screen to ground level.....
Is well a gravel-wall type?.....

Pumping Test

Date.....
Static level.....
Pumping level.....
Pumping rate..... -
Duration of test.....
Distance from cylinder or bowls to ground level.....

Water Record

Kind (fresh or mineral).....
Quality (hard, soft, contains iron, sulphur, etc.).....
Appearance (clear, cloudy, coloured).....
For what purpose(s) is the water to be used?..... -
.....
How far is well from possible source of contamination?.....
What is the source of contamination?.....
Enclose a copy of any mineral analysis that has been made of water.....

Depth(s) to Water Horizon(s)	Kind of Water	No. of Feet Water Rises

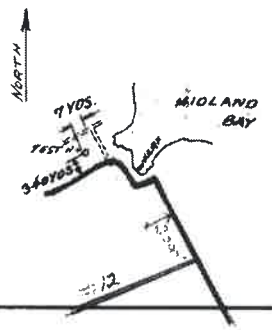
Well Log

Overburden and Bedrock Record	From	To
BLACK MUCK	0 ft.	2 ft.
SAND	2	7
CLAY	7	18
SAND	18	26
SAND & CLAY	26	35
GRAVEL SAND & CLAY	35	67
CEMENTED GRAVEL	67	68
COARSE GRAVEL (TIGHT)	68	78
CEMENTED SAND & GRAVEL	78	92
CLAY	92	95
CLAY WITH STREAKS OF CEM. SAND & GRAVEL	95	110
CLAY & GRAVEL	110	125
BED ROCK	125	

Location of Well

6 TEST HOLE

In diagram below show distances of well from road and lot line. Indicate north by arrow.



Situation: Is well on upland, in valley, or on hillside?.....
Drilling Firm..... INTERNATIONAL WATER SURVEY LTD.
Address.....
Name of Driller... B. S. ABBOTT .....Address.. LONDON, ONTARIO..
Date.....Licence Number.....

.....
Signature of Licensee

FORM 5

CSS.58

UTM 17 | 5 8 6 8 5 7 | E
19 | R | 4 9 5 6 4 7 8 | N
Elev. | 9 | R | 0 5 9 5 |
Basin | 2 | 2 |

ONTARIO

The Well Drillers Act
Department of Mines, Province of Ontario

57 No. 1883

RECEIVED
MAR 14 1952
GEOLOGICAL BRANCH
DEPARTMENT OF MINES

Water Well Record

County or Territorial District... SIMCOE ... ~~Township, Village,~~ Town ~~or City...~~ MIDLAND
Con. — Lot — Street and Number (if in Village, Town or City)
Owner PUBLIC UTILITIES COMMISSION Address MIDLAND, ONT.
Date Completed 15 (day) Nov. (month) 1949 (year) Cost of Well (excluding pump) —

Pipe and Casing Record

Casing diameter(s) 5 1/2"
Length(s) of casing(s)
Type of screen —
Length of screen
Distance from top of screen to ground level
Is well a gravel-wall type?

Pumping Test

Date
Static level
Pumping level
Pumping rate —
Duration of test
Distance from cylinder or bowls to ground level

Water Record

Kind (fresh or mineral)
Quality (hard, soft, contains iron, sulphur, etc.)
Appearance (clear, cloudy, coloured)
For what purpose(s) is the water to be used? —
How far is well from possible source of contamination?
What is the source of contamination?
Enclose a copy of any mineral analysis that has been made of water

Depth(s) to Water Horizon(s)	Kind of Water	No. of Feet Water Rises

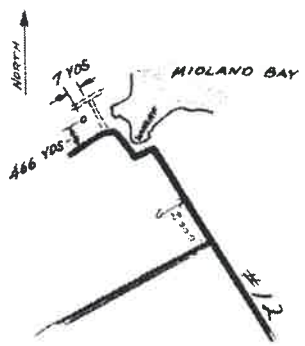
Well Log

Overburden and Bedrock Record	From	To
BLACK MUCK	0 ft.	2 ft.
SAND	2	5
CLAY	5	38
CLAY AND GRAVEL	38	45
GRAVEL WITH INTERMITTENT CEMENTED STREAKS	45	55
CEMENTED GRAVEL	55	60
GRAVEL WITH CEMENTED STREAKS	60	64
GRAVEL HARD & TIGHT	64	80
CEMENTED SAND & GRAVEL	80	82

Location of Well

7 TEST HOLE

In diagram below show distances of well from road and lot line. Indicate north by arrow.



Situation: Is well on upland, in valley, or on hillside? IN
Drilling Firm
Address
Name of Driller B. S. ABBOTT Address ... ONTARIO
Date Licence Number

Signature of Licensee

FORM 5

CSS 58

EXCERPTS FROM 2007 AND 2010 SOIL ENGINEERS LTD. REPORTS

JOB NO.: 0705-S060E

LOG OF BOREHOLE NO.: E2

FIGURE NO.: 2

JOB DESCRIPTION: Proposed Residential Development

JOB LOCATION: Sunnyside Dr./Harbourview Dr., Town of Midland

METHOD OF BORING: Flight-Auger

DATE: October 30, 2007

Elev. / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	Gas (ppm)
	Ground Surface			
0.0	60cm TOPSOIL, Fill			
	Dark brown SAND, Fill	1	DO	-
1.4	Grey SLAG, Fill	2	DO	-
		3	DO	150
		4	DO	130
		5	DO	-
4.4	Black PEAT	6	DO	-
5.3	Grey SILTY CLAY	7	DO	-
6.0	END OF BOREHOLE			

Depth Scale (m): 0 1 2 3 4 5 6 7 8 9 10

Shear Strength (kN/m2): × 50 100 150 200 ×

Penetration Resistance (blows/0.3m): ○ 10 30 50 70 90 ○

Atterberg Limits: W_P ⊢——⊣ W_L

Water Content (%): ● 5 15 25 35 45 ●

WATER LEVEL

W.L. @ depth of 3.4 m on completion

Cave-In @ depth of 4.6 m on completion

Soil Engineers Ltd.

JOB NO.: 0705-S060E

LOG OF BOREHOLE NO.: E3

FIGURE NO.: 3

JOB DESCRIPTION: Proposed Residential Development

JOB LOCATION: Sunnyside Dr./Harbourview Dr., Town of Midland

METHOD OF BORING: Flight-Auger

DATE: October 30, 2007

Elev. / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	Gas (ppm)
	Ground Surface			
0.0	Grey **GRANULAR, Fill**	1A	DO	-
0.6	Grey **SLAG, Fill** occ. gravel layers	1B	DO	225
		2A	DO	300
		2B	DO	-
3.0	Grey **SAND, Fill** with wood debris	3A	DO	-
		3B	DO	-
3.8	Grey **SILTY CLAY**	4A	DO	-
		4B	DO	-
5.5	**END OF BOREHOLE**			

Depth Scale (m): 0 1 2 3 4 5 6 7 8 9 10

Shear Strength (kN/m2): × 50 100 150 200 ×

Penetration Resistance (blows/0.3m): O 10 30 50 70 90 O

Atterberg Limits: W_P ⊢——⊣ W_L

Water Content (%): ● 5 15 25 35 45 ●

WATER LEVEL: Dry on completion

Soil Engineers Ltd.

JOB NO.: 0705-S060E

LOG OF BOREHOLE NO.: E4

FIGURE NO.: 4

JOB DESCRIPTION: Proposed Residential Development

JOB LOCATION: Sunnyside Dr./Harbourview Dr., Town of Midland

METHOD OF BORING: Flight-Auger

DATE: October 30, 2007

Elev. / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	Gas (ppm)
	Ground Surface			
0.0	Grey **GRANULAR, Fill**	1A	DO	-
		1B	DO	-
1.5	Grey **SLAG. Fill** with stones and cobbles	2	DO	-
		3	DO	22
3.0	Grey **FINE SAND**	4A	DO	-
		4B	DO	-
3.8	Grey **SILTY CLAY**	5	DO	-
4.9	**END OF BOREHOLE**			

Depth Scale (m): 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

Shear Strength (kN/m2): × 50 100 150 200 ×

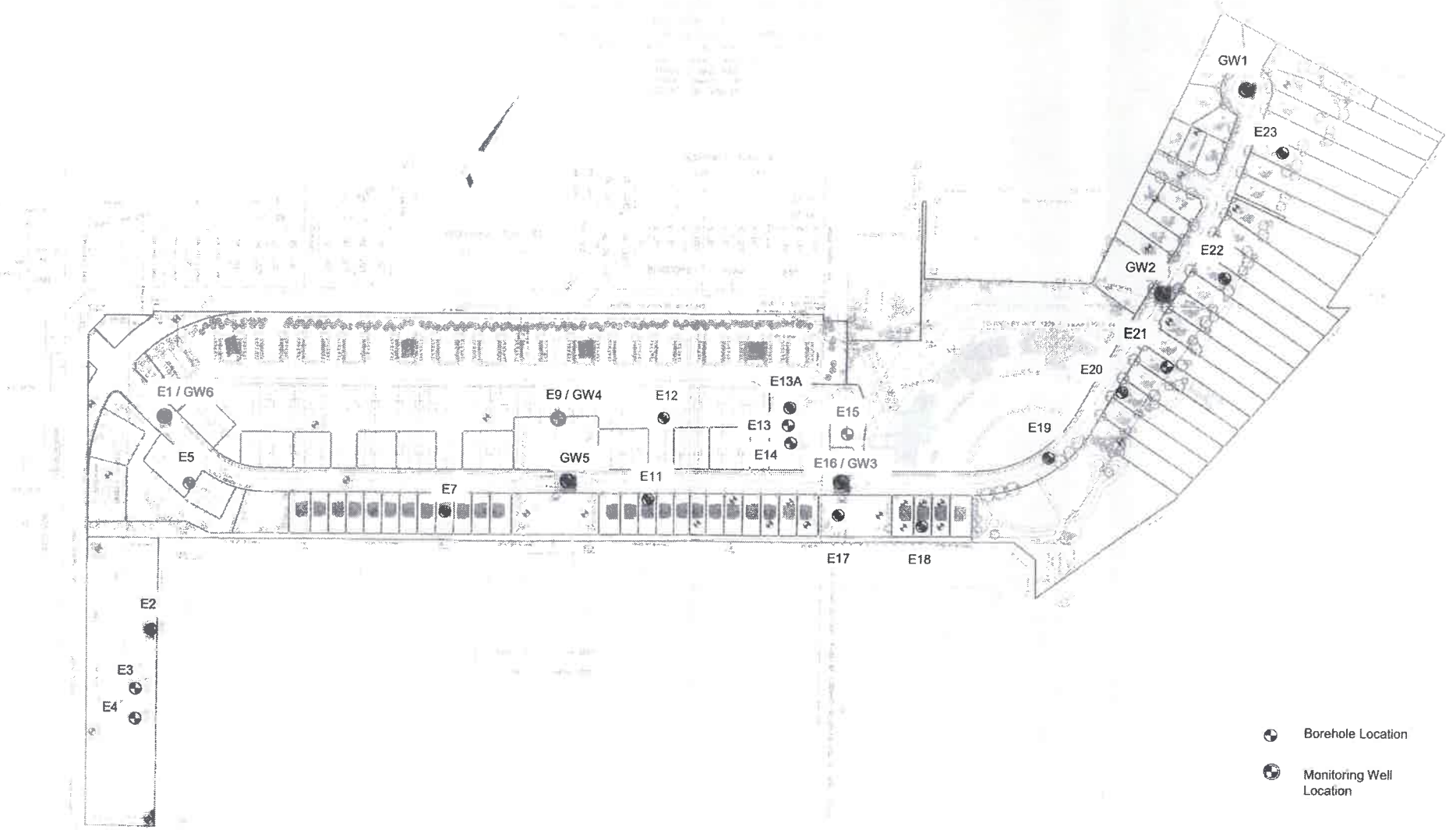
Penetration Resistance (blows/0.3m): O 10 30 50 70 90 O

Atterberg Limits: W_P ⊢——⊣ W_L

Water Content (%): ● 5 15 25 35 45 ●

WATER LEVEL: Dry on completion

Soil Engineers Ltd.



Soil Engineers Ltd.	Title	Project	Reference No.	Date	Scale	Drawing No.
	Borehole Location Plan	Proposed Residential Development Sunnyside Drive and Harbourview Drive Town of Midland	0705-S060E	January 18, 2008	NTS	1

JOB NO.: 0705-5060

LOG OF BOREHOLE NO.: 1

FIGURE NO.: 1

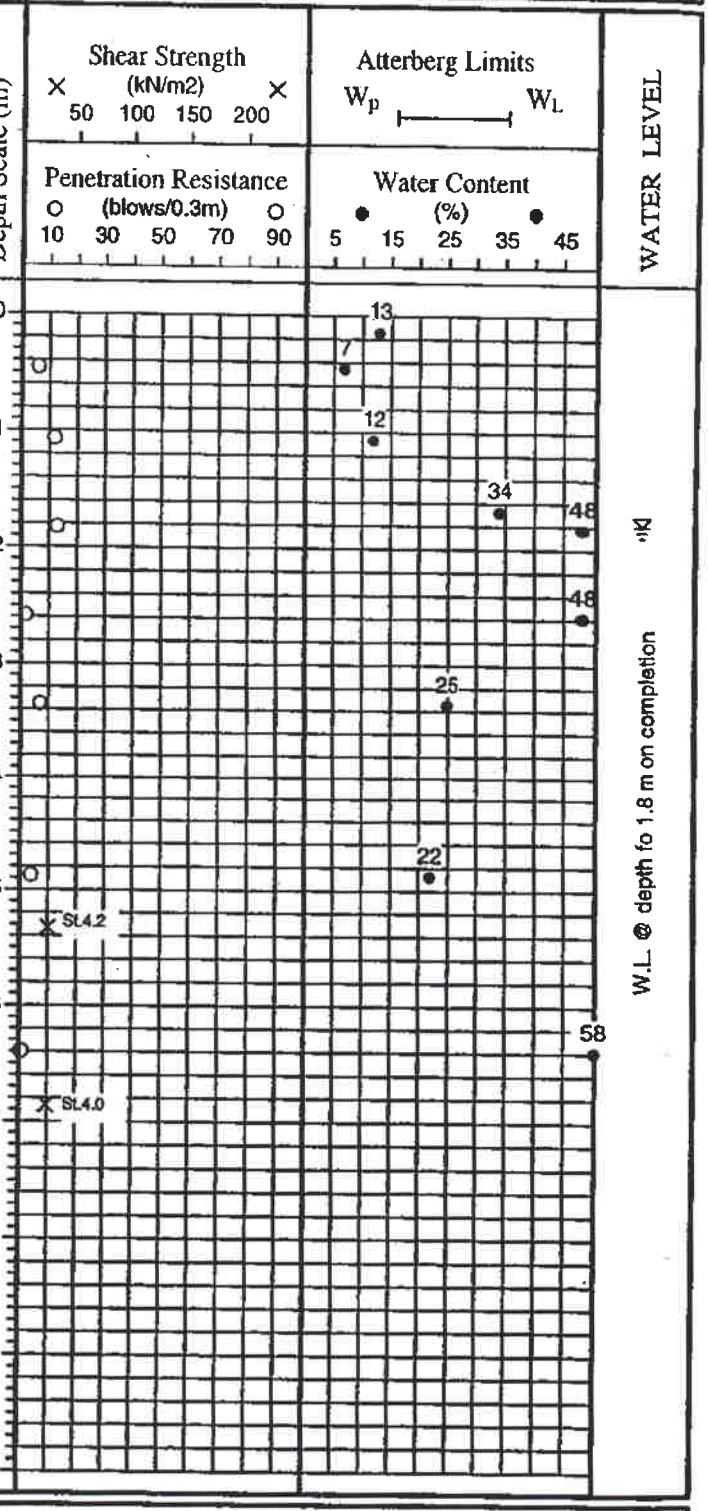
JOB DESCRIPTION: Proposed Residential Development

JOB LOCATION: Sunnyside Dr./Harbourview Dr., Town of Midland

METHOD OF BORING: Flight-Auger

DATE: October 31, 2007

Elev. / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value
	Ground Surface			
0.0	**10cm TOPSOIL, Fill**	1A	DO	-
	Dark brown **SAND, Fill**	1B	DO	6
	occ. peat seams	2	DO	12
1.5	**30cm TOPSOIL, Fill**	3A	DO	-
	Black **SLAG, Fill**	3B	DO	13
2.1	Dark brown to black **ALLUVIAL DEPOSIT**	4	DO	2
2.9	Very soft to firm grey / brown **SILTY CLAY**	5	DO	7
	a tr. of sand, occ. wet sand and silt seams and layers, brown / grey	6	DO	4
		7	DO	1
7.0	**END OF BOREHOLE**			



Soil Engineers Ltd.

JOB NO.: 0705-S060

LOG OF BOREHOLE NO.: 2

FIGURE NO.: 2

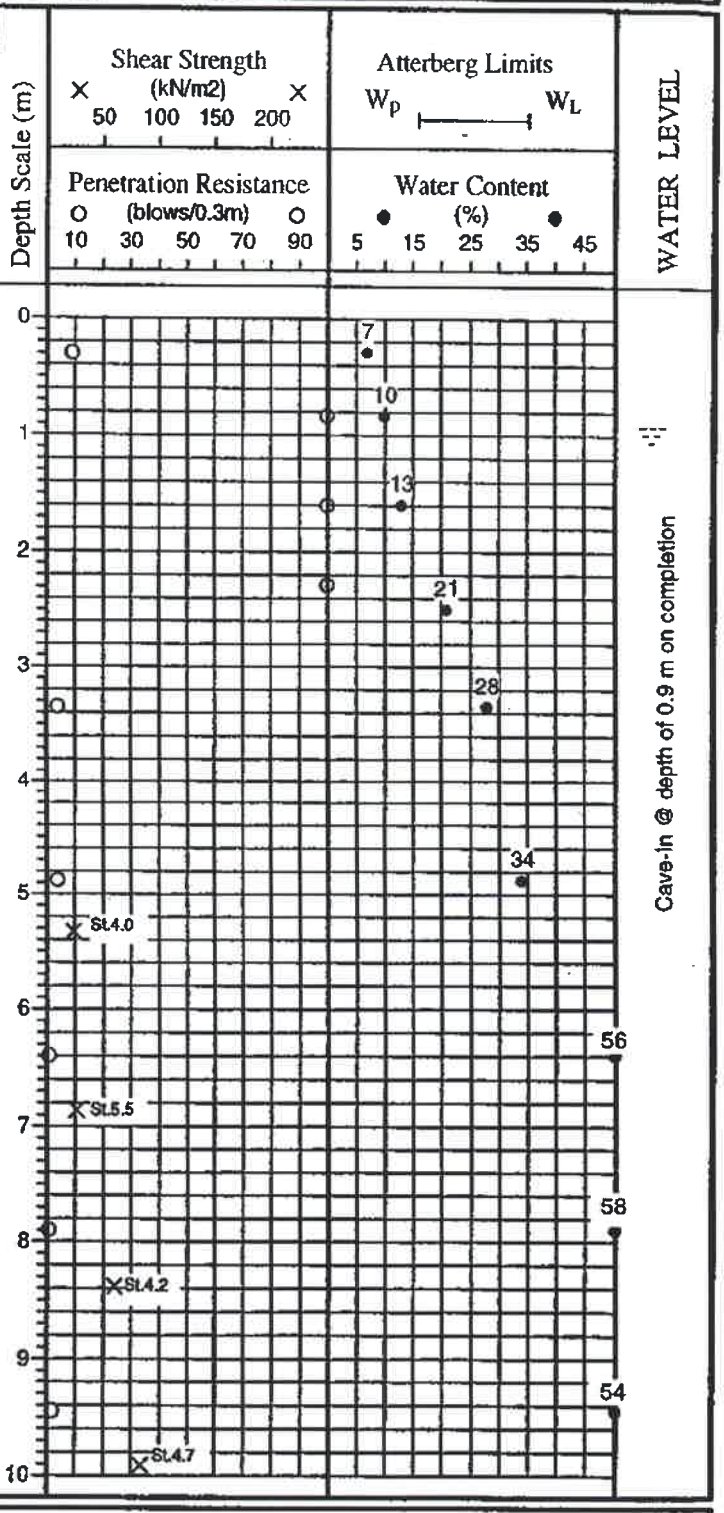
JOB DESCRIPTION: Proposed Residential Development

JOB LOCATION: Sunnyside Dr./Harbourview Dr., Town of Midland

METHOD OF BORING: Flight-Auger

DATE: October 31, 2007

Elev. / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value
	Ground Surface			
0.0	**GRANULAR, Fill**	1A	DO	9
0.6	Dark brown and grey	2	DO	100+
	SLAG, Fill	3A	DO	100+
		4	DO	100+
		4A	AS	-
3.0	Dark brown to black	5	DO	4
	ALLUVIAL DEPOSIT			
4.3	Very soft to firm	6	DO	4
	brown / grey			
	SILTY CLAY	7	DO	1
	a tr. of sand occ. wet sand and silt seams and layers	8	DO	1
		9	DO	2
10.0	Cont'd on Fig. 2A			



Soil Engineers Ltd.

JOB NO.: 0705-S060

LOG OF BOREHOLE NO.: 2

FIGURE NO.: 2 A

JOB DESCRIPTION: Proposed Residential Development

JOB LOCATION: Sunnyside Dr./Harbourview Dr., Town of Midland

METHOD OF BORING: Flight-Auger

DATE: October 31, 2007

Elev. / Depth (m)	SOIL DESCRIPTION Cont'd	SAMPLES Number	Type	N-Value
10.0	Grey, very soft **SILTY CLAY** a tr. of sand occ. wet sand and silt seams and layers	10	DO	1
11.7	Brown, loose to compact **SILT** a tr. of clay	11	DO	25
	sand layer	12A	DO	-
		12B	DO	9
14.7	Brown, compact **SILTY SAND, TIll** traces of clay and gravel occ. wet sand and silt seams and layers, cobbles and boulders	13	DO	19
17.8	Refusal to augering, inferred bedrock or boulder. **END OF BOREHOLE**			

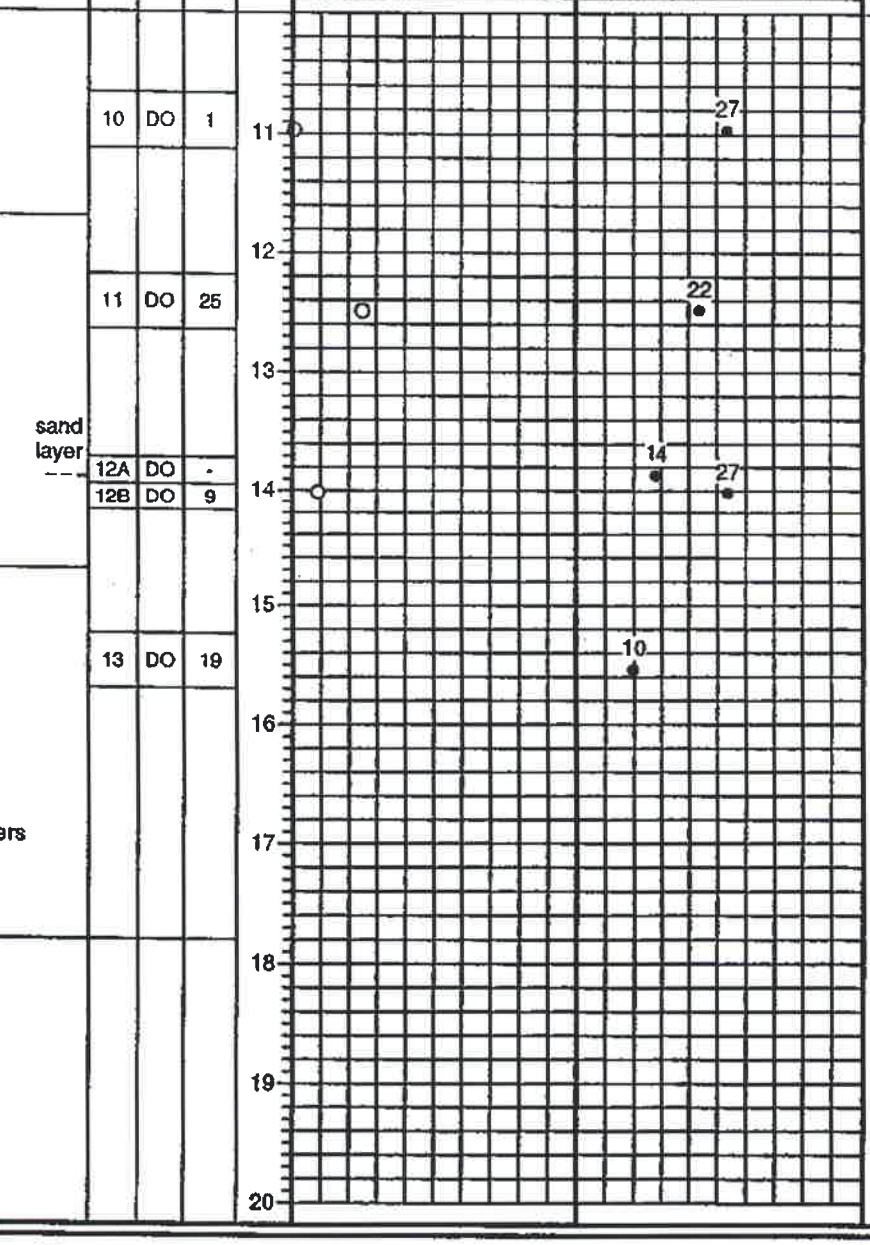
Depth Scale (m): 11, 12, 13, 14, 15, 16, 17, 18, 19, 20

Shear Strength (kN/m2): × 50 100 150 200 ×

Penetration Resistance (blows/0.3m): ○ 10 30 50 70 90 ○

Atterberg Limits: W_P ⊢——⊣ W_L

Water Content (%): ● 5 15 25 35 45 ●



WATER LEVEL

Soil Engineers Ltd.

JOB NO.: 0705-S060

LOG OF BOREHOLE NO.: 3

FIGURE NO.: 3

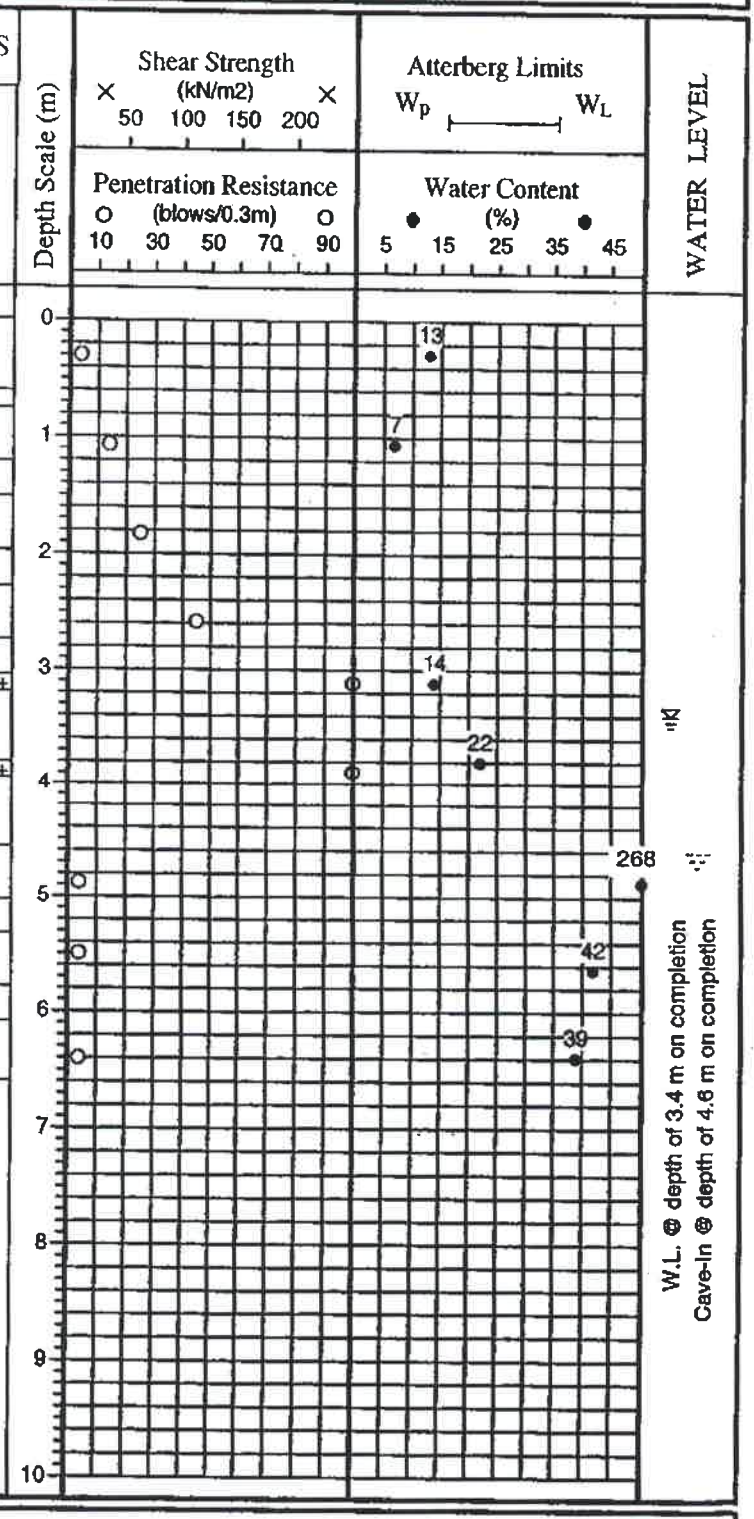
JOB DESCRIPTION: Proposed Residential Development

JOB LOCATION: Sunnyside Dr./Harbourview Dr., Town of Midland

METHOD OF BORING: Flight-Auger

DATE: October 30, 2007

Elev. / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value
	Ground Surface			
0.0	**60cm TOPSOIL, Fill**	1	DO	4
	Dark brown **SAND, Fill**	2	DO	14
1.4	Grey **SLAG, Fill**	3	DO	25
		4	DO	45
		5	DO	100+
		6	DO	100+
4.4	Black, granular-amorphous **PEAT**	7	DO	4
5.2	Grey, firm **SILTY CLAY**	8	DO	4
		9	DO	4
6.6	**END OF BOREHOLE**			



Soil Engineers Ltd.

JOB NO.: 0705-S060

LOG OF BOREHOLE NO.: 4

FIGURE NO.: 4

JOB DESCRIPTION: Proposed Residential Development

JOB LOCATION: Sunnyside Dr./Harbourview Dr., Town of Midland

METHOD OF BORING: Flight-Auger

DATE: October 31, 2007

Elev. / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value
	Ground Surface			
0.0	Brown, dark brown	1	DO	6
	SILTY CLAY, Fill	2	DO	22
		3	DO	37
2.1	Brown	4	DO	7
	SAND, Fill	5	DO	7
3.7	Brown	6	DO	100+
	SLAG, Fill			
4.6	10cm PEAT	7A	DO	-
	Brown, compact SILTY FINE SAND	7B	DO	16
5.6	Very soft to firm	8	DO	3
	SILTY CLAY			
	a tr. of sand occ. wet sand and silt seams and layers	9	DO	1
	grey / brown	10	DO	4
10.0	Cont'd on Fig. 4A			

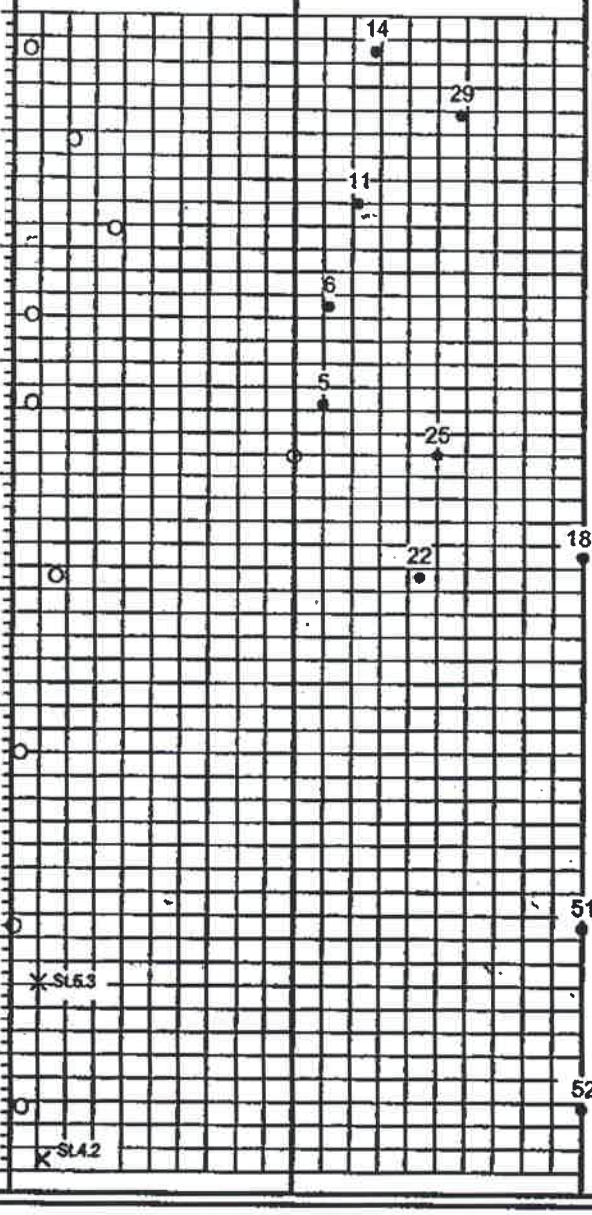
Depth Scale (m): 0 1 2 3 4 5 6 7 8 9 10

Shear Strength (kN/m2) × 50 100 150 200 ×

Penetration Resistance O (blows/0.3m) O 10 30 50 70 90

Atterberg Limits W_P ⟷ W_L

Water Content ● (%) ● 5 15 25 35 45



WATER LEVEL

W.L. @ depth of 3.4 m on completion

Cave-In @ depth of 4.9 m on completion

Soil Engineers Ltd.

JOB NO.: 0705-S060

LOG OF BOREHOLE NO.: 4

FIGURE NO.: 4 A

JOB DESCRIPTION: Proposed Residential Development

JOB LOCATION: Sunnyside Dr./Harbourview Dr., Town of Midland

METHOD OF BORING: Flight-Auger

DATE: October 31, 2007

Elev. / Depth (m)	SOIL DESCRIPTION Cont'd	SAMPLES Number	Type	N-Value
10.0	Brown, firm **SILTY CLAY** a tr. of sand occ. wet sand and silt seams and layers	11	DO	4
		12	DO	7
13.2	Brown, loose to dense **SILTY FINE SAND**	13	DO	4
		14	DO	37
16.2	Brown, very dense **SILTY SAND, Till** traces of clay and gravel occ. wet sand and silt seams and layers, cobbles and boulders	15	DO	100+
17.6	Grey, hard **SILTY CLAY, Till** sandy, a tr. of gravel occ. wet sand and silt seams and layers, cobbles and boulders	16	DO	100+
		16A	AS	-
		17	AS	-
19.8	**END OF BOREHOLE**			

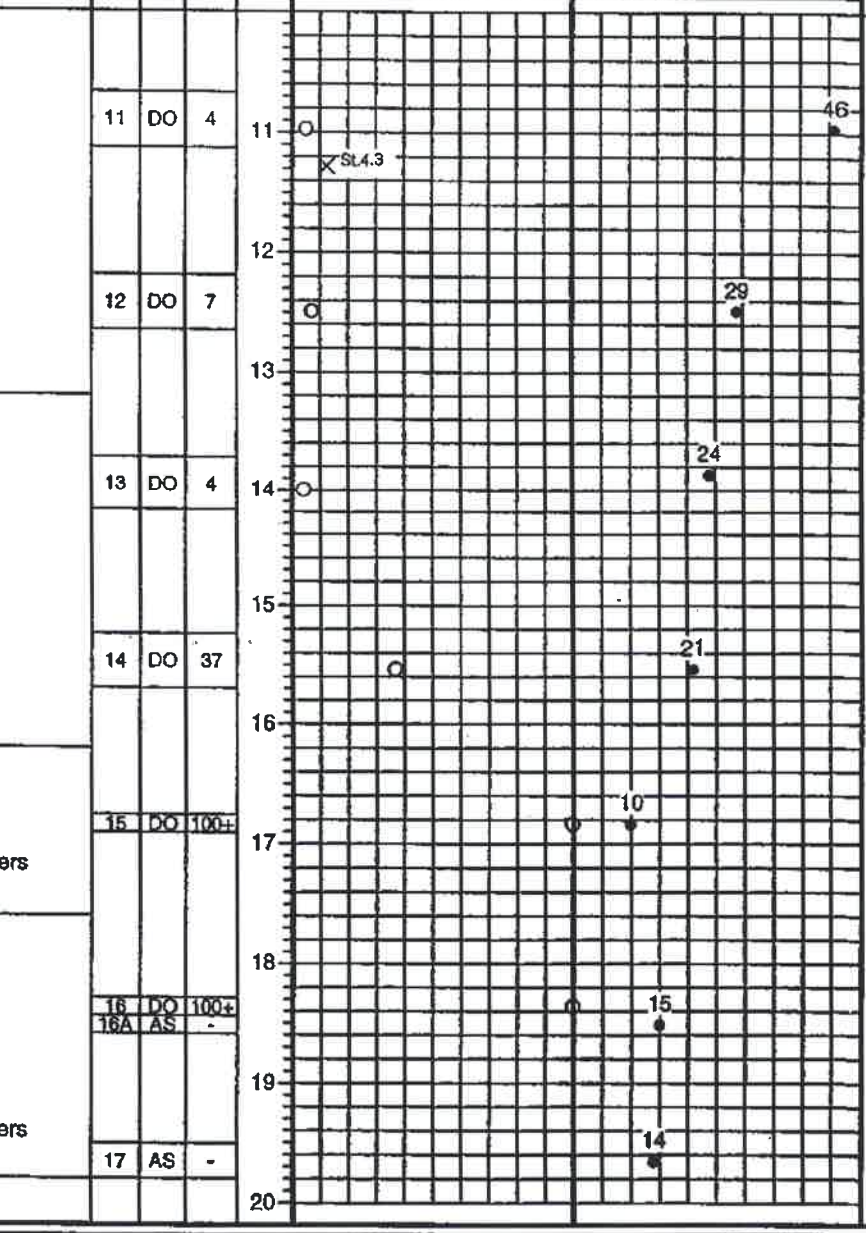
Depth Scale (m): 11, 12, 13, 14, 15, 16, 17, 18, 19, 20

Shear Strength (kN/m2): × 50 100 150 200 ×

Penetration Resistance (blows/0.3m): o 10 30 50 70 90 o

Atterberg Limits: W_P ⊢——⊣ W_L

Water Content (%): ● 5 15 25 35 45 ●



WATER LEVEL

Soil Engineers Ltd.

Soil Engineers Ltd.

GRAIN SIZE DISTRIBUTION

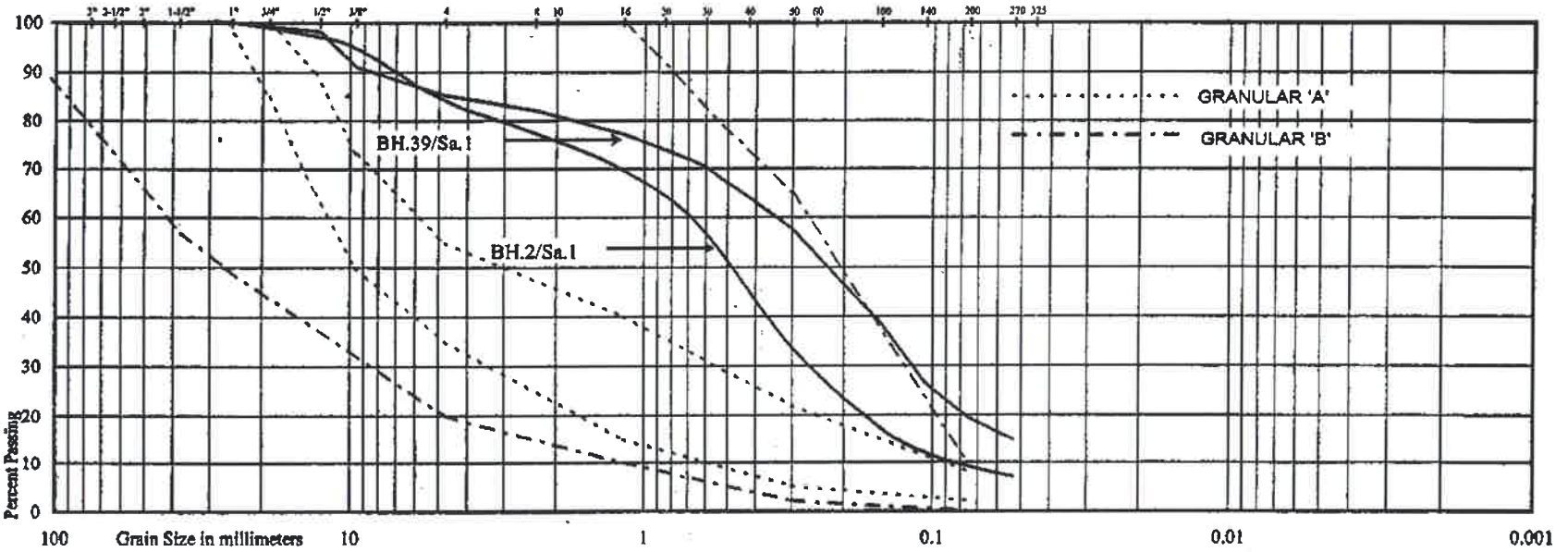
Reference No: 0705-S060

U.S. BUREAU OF SOILS CLASSIFICATION

GRAVEL		SAND				SILT	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	V. FINE		

UNIFIED SOIL CLASSIFICATION

GRAVEL		SAND			SILT & CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	



Project:	Proposed Residential Development	
Location:	Sunnyside Dr./Harbourview Dr., Town of Midland	
Borehole No:	2	39
Sample No:	1	1
Depth (m):	0.3	0.3
Elevation (m):	-	178.8

BH./Sa.	2/1	39/1
Liquid Limit (%) =	-	-
Plastic Limit (%) =	-	-
Plasticity Index (%) =	-	-
Moisture Content (%) =	7	21
Estimated Permeability (cm./sec.) =	10^{-2}	10^{-3}

Classification of Sample [& Group Symbol]: GRANULAR, Fill

(fine to coarse sand, some gravel and silt)

Figure: 57

Soil Engineers Ltd.

GRAIN SIZE DISTRIBUTION

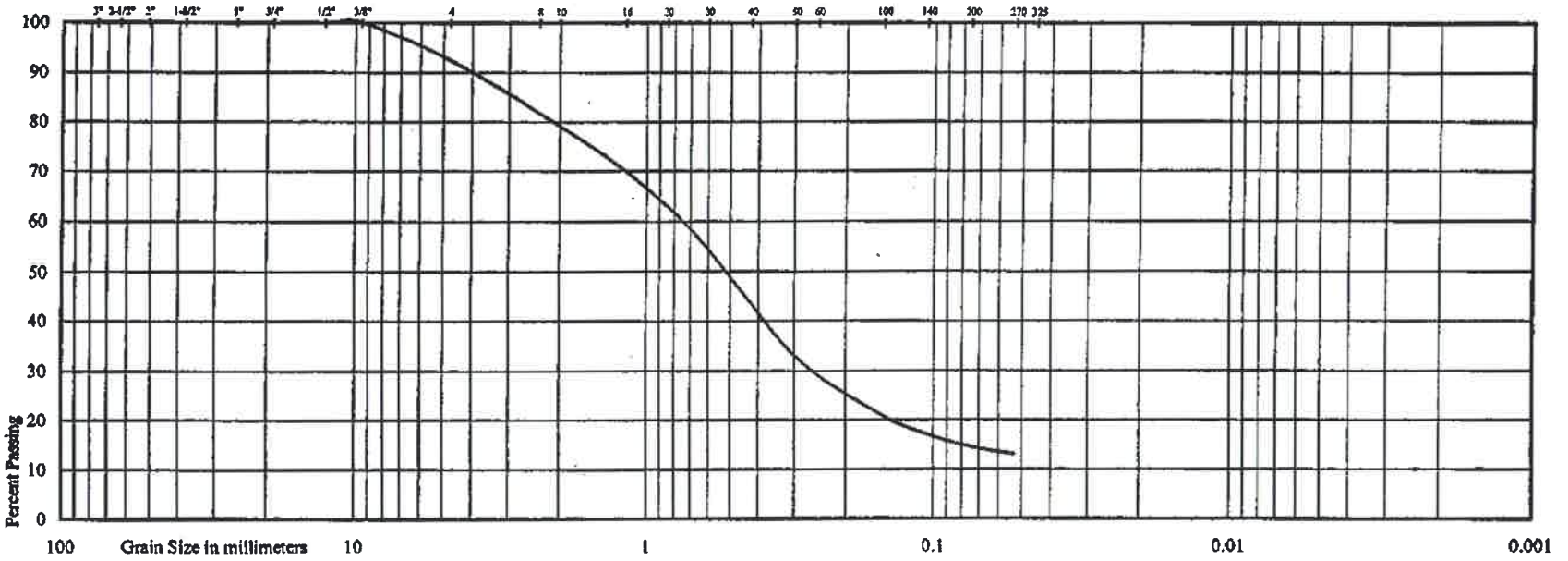
Reference No: 0705-S060

U.S. BUREAU OF SOILS CLASSIFICATION

GRAVEL		SAND				SILT	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	V. FINE		

UNIFIED SOIL CLASSIFICATION

GRAVEL		SAND			SILT & CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	



Project: Proposed Residential Development

Location: Sunnyside Dr./Harbourview Dr., Town of Midland

Borehole No: 4

Sample No: 4

Depth (m): 2.6

Elevation (m): -

Liquid Limit (%) = -

Plastic Limit (%) = -

Plasticity Index (%) = -

Moisture Content (%) = 6

Estimated Permeability (cm./sec.) = 10^{-3}

Classification of Sample [& Group Symbol]: SAND, Fill

(fine to coarse sand, a trace of gravel)

Figure: 58

Soil Engineers Ltd.

GRAIN SIZE DISTRIBUTION

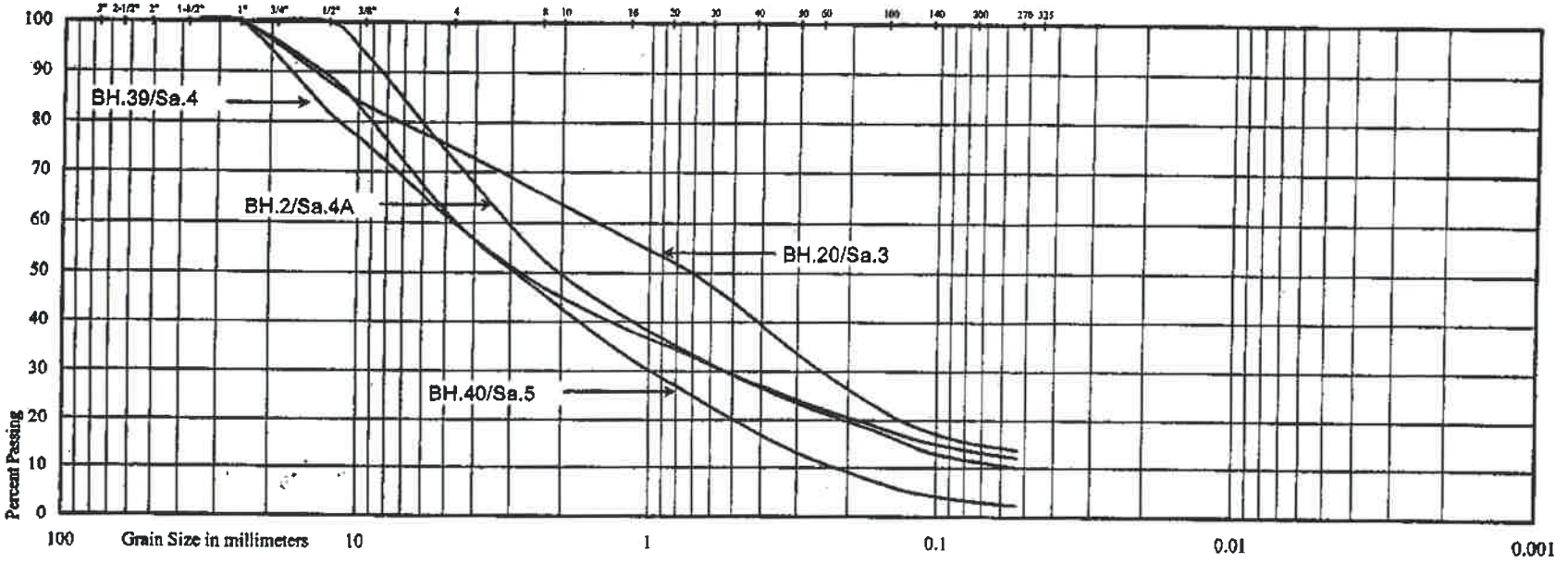
Reference No: 0705-S060

U.S. BUREAU OF SOILS CLASSIFICATION

GRAVEL		SAND				SILT	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	V. FINE		

UNIFIED SOIL CLASSIFICATION

GRAVEL		SAND			SILT & CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	



Project: Proposed Residential Development

Location: Sunnyside Dr./Harbourview Dr., Town of Midland

Borehole No:	2	20	39	40
Sample No:	4A	3	4	5
Depth (m):	2.5	1.8	2.6	3.4
Elevation (m):	-	177.6	176.5	174.8

BH./Sa.	2/4A	20/3	39/4	40/5
Liquid Limit (%) =	-	-	-	-
Plastic Limit (%) =	-	-	-	-
Plasticity Index (%) =	-	-	-	-
Moisture Content (%) =	21	18	16	26
Estimated Permeability (cm./sec.) =	10^{-3}	10^{-3}	10^{-3}	10^{-2}

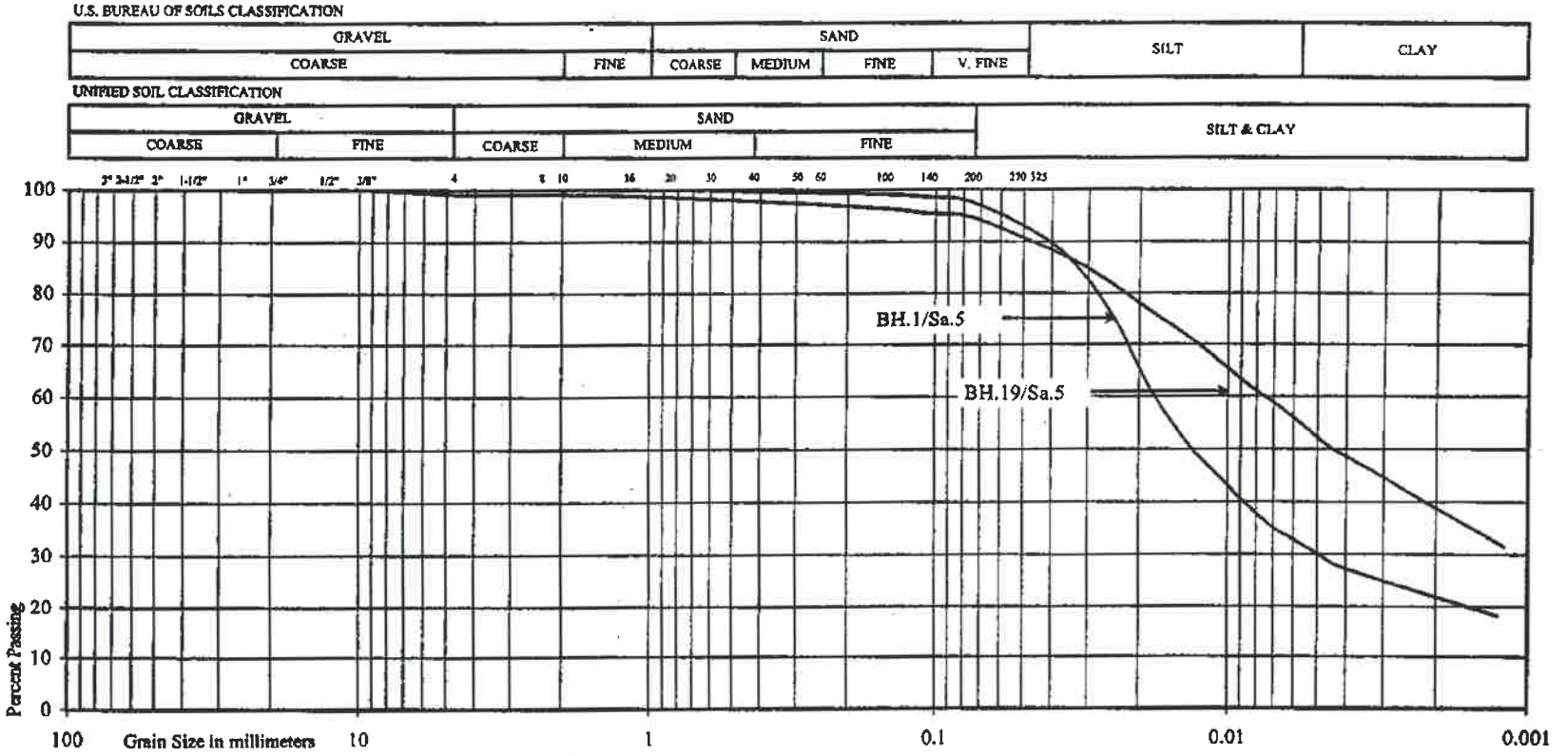
Classification of Sample [& Group Symbol]: SLAG, Fill

Figure: 61

Soil Engineers Ltd.

GRAIN SIZE DISTRIBUTION

Reference No: 0705-S060



Project: Proposed Residential Development

Location: Sunnyside Dr./Harbourview Dr., Town of Midland

Borehole No:	1	19
Sample No:	5	5
Depth (m):	3.4	3.4
Elevation (m):	-	176.3

BH./Sa.	1/5	19/5
Liquid Limit (%) =	30	36
Plastic Limit (%) =	17	19
Plasticity Index (%) =	13	17
Moisture Content (%) =	25	44
Estimated Permeability (cm./sec.) =	10^{-7}	10^{-7}

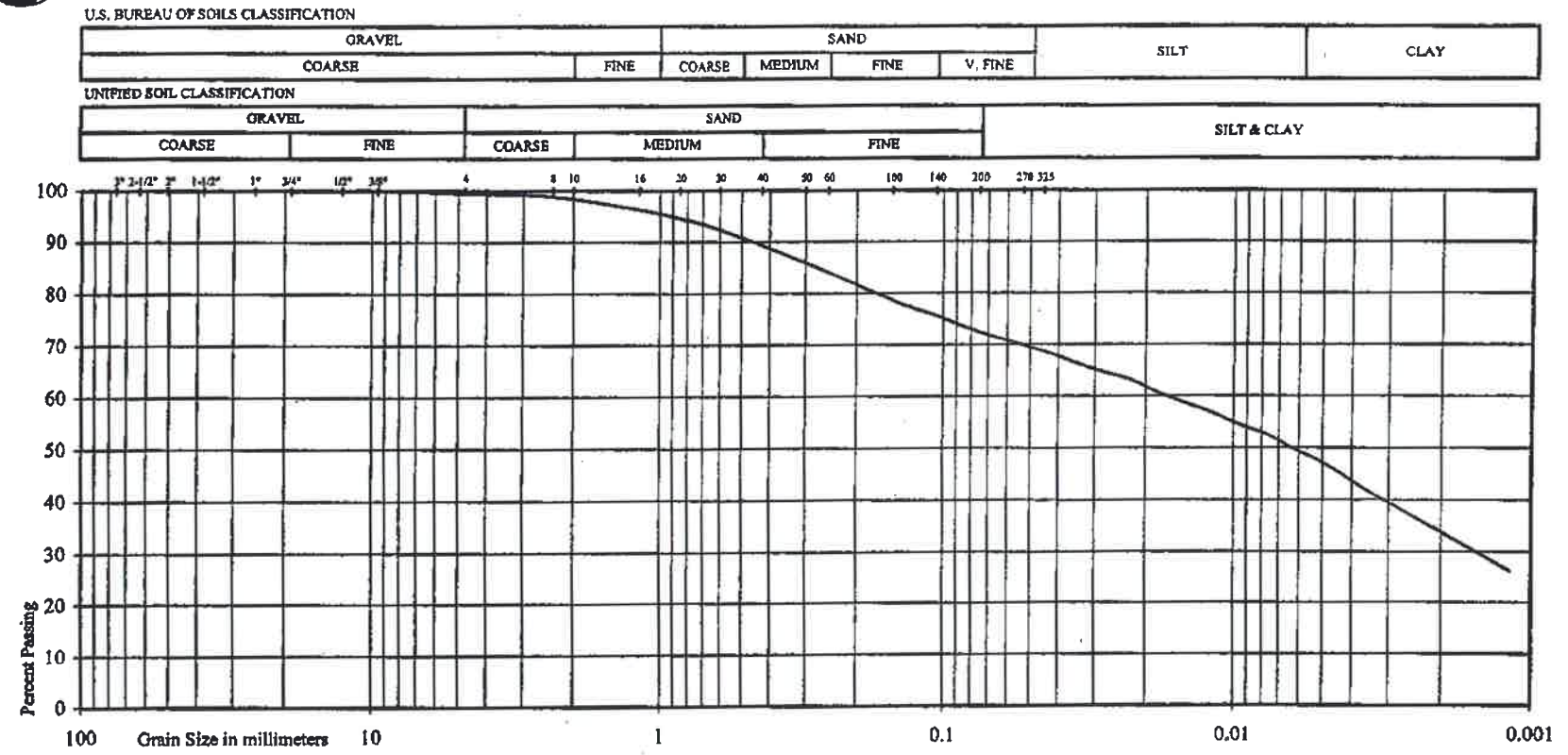
Classification of Sample [& Group Symbol]: SILTY CLAY
traces of sand and gravel

Figure: 62

Soil Engineers Ltd.

GRAIN SIZE DISTRIBUTION

Reference No: 0705-S060



Project: Proposed Residential Development

Location: Sunnyside Dr./Harbourview Dr., Town of Midland

Borehole No: 4

Sample No: 17

Depth (m): 19.7

Elevation (m): -

Liquid Limit (%) = 27

Plastic Limit (%) = 16

Plasticity Index (%) = 11

Moisture Content (%) = 14

Estimated Permeability (cm./sec.) = 10^{-7}

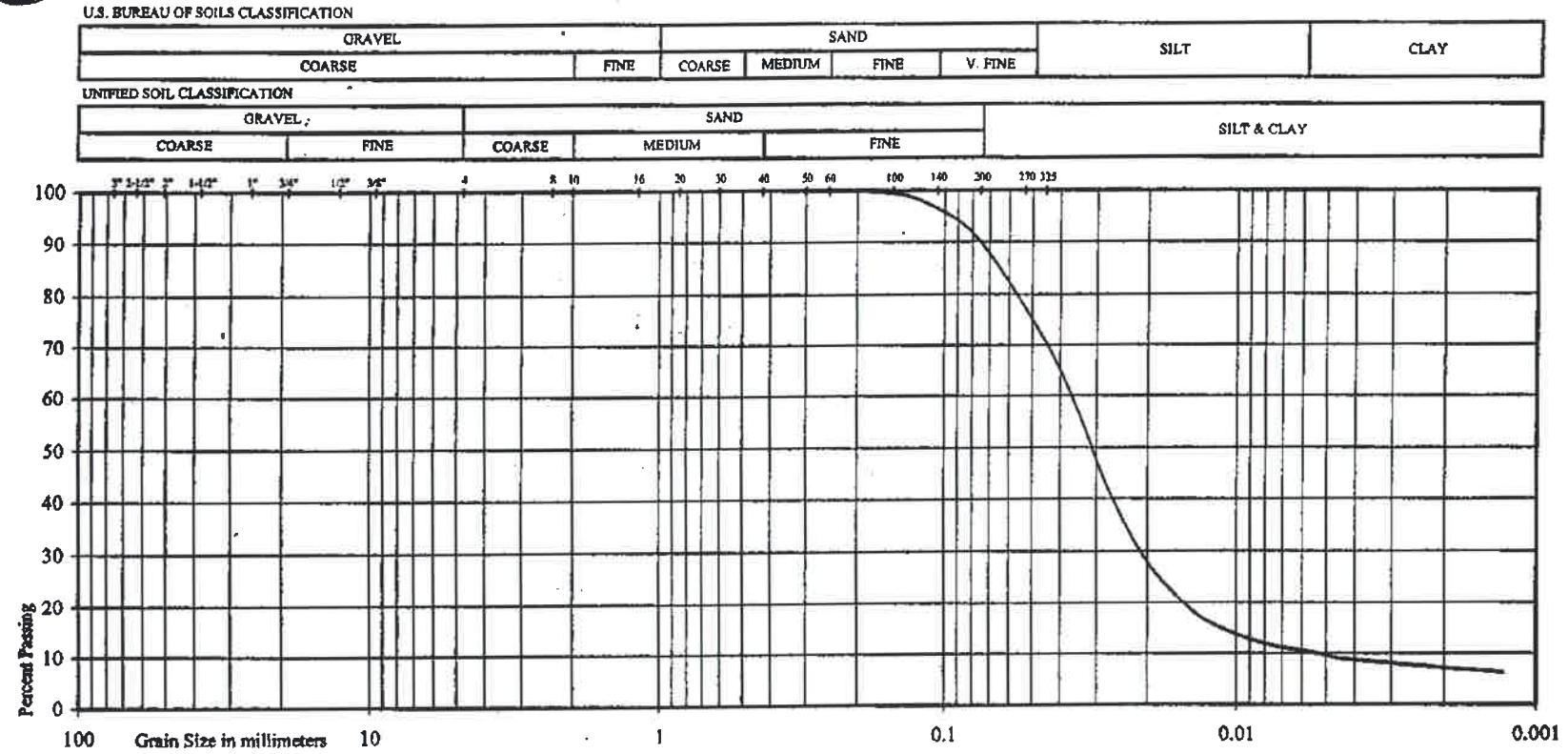
Classification of Sample [& Group Symbol]: SILTY CLAY, Till
sandy, a trace of gravel

Figure: 63

Soil Engineers Ltd.

GRAIN SIZE DISTRIBUTION

Reference No: 0705-S060



Project: Proposed Residential Development

Location: Sunnyside Dr./Harbourview Dr., Town of Midland

Borehole No: 2

Sample No: 11

Depth (m): 12.5

Elevation (m): -

Liquid Limit (%) = -

Plastic Limit (%) = -

Plasticity Index (%) = -

Moisture Content (%) = 22

Estimated Permeability (cm./sec.) = 10^{-5}

Classification of Sample [& Group Symbol]: SILT

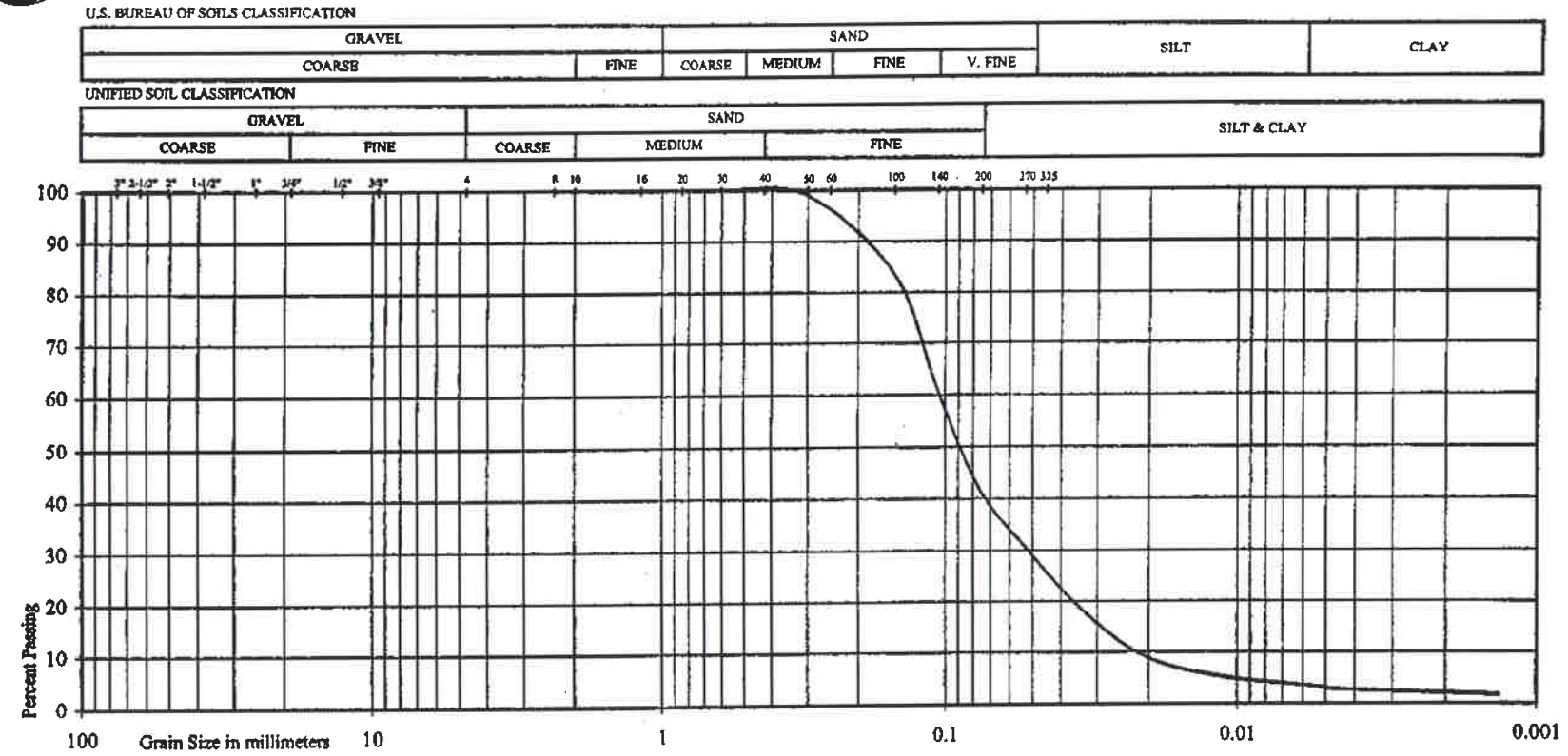
a trace of clay

Figure: 66

Soil Engineers Ltd.

GRAIN SIZE DISTRIBUTION

Reference No: 0705-S060



Project: Proposed Residential Development

Location: Sunnyside Dr./Harbourview Dr., Town of Midland

Borehole No: 4

Sample No: 14

Depth (m): 15.6

Elevation (m): -

Liquid Limit (%) = -

Plastic Limit (%) = -

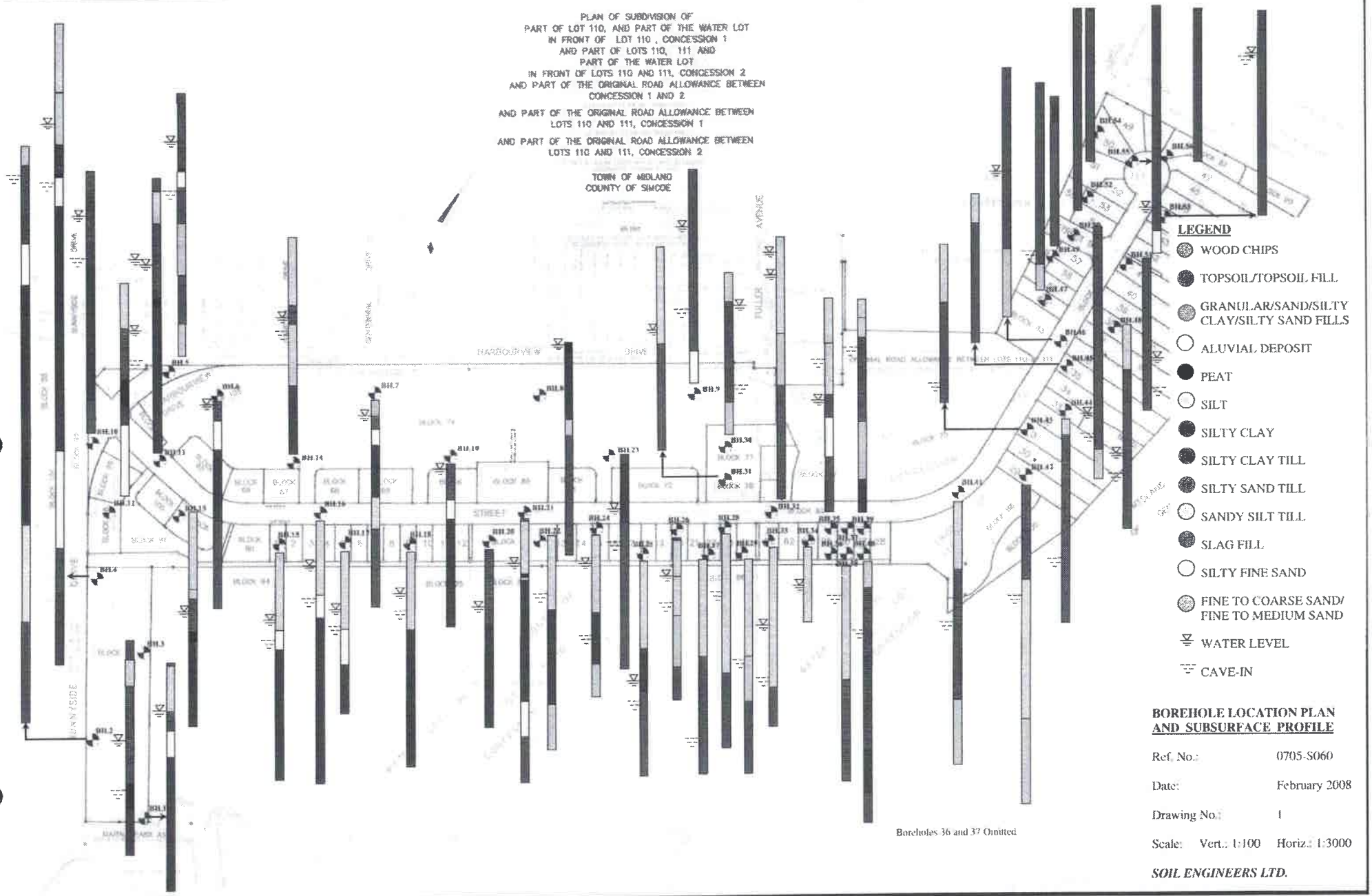
Plasticity Index (%) = -

Moisture Content (%) = 21

Estimated Permeability (cm./sec.) = 10^{-4}

Classification of Sample [& Group Symbol]: SILTY FINE SAND

Figure: 67



Boreholes 36 and 37 Omitted

BOREHOLE LOCATION PLAN AND SUBSURFACE PROFILE

Ref. No.: 0705-S060

Date: February 2008

Drawing No.: 1

Scale: Vert.: 1:100 Horiz.: 1:3000

SOIL ENGINEERS LTD.

JOB NO: 1010-S027

LOG OF BOREHOLE NO: 101

FIGURE NO: 1A

JOB DESCRIPTION: Proposed Townhouse Development

JOB LOCATION: Bayport Village - Phase 2, Town of Midland

METHOD OF BORING: Flight-Auger

DATE: November 3, 2010

Depth Elev. (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value
0.0	Ground Surface			
179.2	Brown/grey	1	AS	4
		2	DO	100+
	SLAG, FILL			
	mixed with sand, rock and cobbles with topsoil and organic inclusions	3	DO	11
2.3				
176.9	Very soft to soft	4	DO	4
		5	DO	3
	SILTY CLAY — brown / grey	6	DO	WH
	a trace to some sand with wet silt and clay seams and layers	7	DO	2
		8	DO	1
		9	DO	1
10.0				
169.2	Brown, loose **FINE TO MEDIUM SAND** a trace to some silt a trace of gravel	10	DO	5
11.0	*Cont'd on Fig. 1B*			

Depth Scale (m): 0 1 2 3 4 5 6 7 8 9 10 11

× Shear Strength (kN/m2): 50 100 150 200

○ Penetration Resistance (blows/0.3m): 10 30 50 70 90

Atterberg Limits: PL — LL

● Moisture Content (%): 10 20 30 40

St. 6.3 (at 3.5 m)

St. 5.0 (at 4.8 m)

St. 10.0 (at 6.5 m)

St. 6.3 (at 7.8 m)

St. 1.3 (at 9.5 m)

Moisture Content (%): 14, 43, 55, 31, 37, 41, 68, 50, 19

WATER LEVEL: W.L. @ El. 178.0 m on completion

Soil Engineers Ltd.

JOB NO: 1010-S027

LOG OF BOREHOLE NO: 101

FIGURE NO: 1B

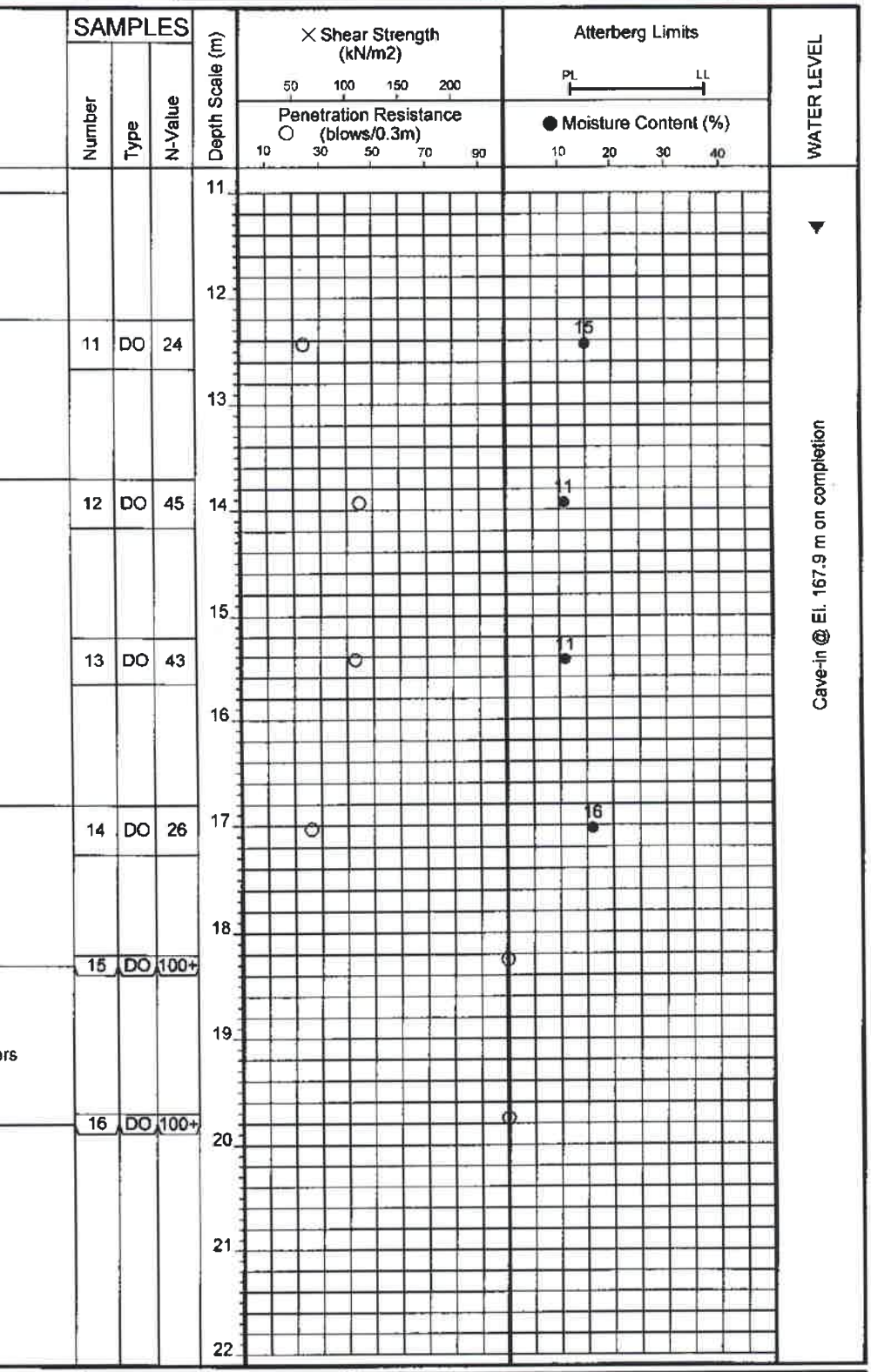
JOB DESCRIPTION: Proposed Townhouse Development

JOB LOCATION: Bayport Village - Phase 2, Town of Midland

METHOD OF BORING: Flight-Auger

DATE: November 3, 2010

Depth Elev. (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value
11.0				
168.2	Brown **FINE TO MEDIUM SAND** a trace to some silt a trace of gravel with silt seams and layers			
12.2				
167.0	Brown, compact **FINE TO COARSE SAND** a trace to some silt a trace of gravel with silt seams and layers	11	DO	24
13.7				
165.5	Brown, dense **SILTY SAND, Till** traces of gravel and clay with wet silt and clay seams and layers, cobbles and boulders	12	DO	45
		13	DO	43
16.8				
162.4	Grey, compact **FINE TO MEDIUM SAND** a trace to some silt a trace of gravel with silt seams and layers	14	DO	26
18.3		15	DO	100+
160.9	Brown, very dense **SILTY SAND, Till** traces of gravel and clay frequent cobbles and boulders with wet silt and clay seams and layers			
19.8		16	DO	100+
159.4	**END OF BOREHOLE**			



Soil Engineers Ltd.

JOB NO: 1010-S027

LOG OF BOREHOLE NO: 102

FIGURE NO: 2A

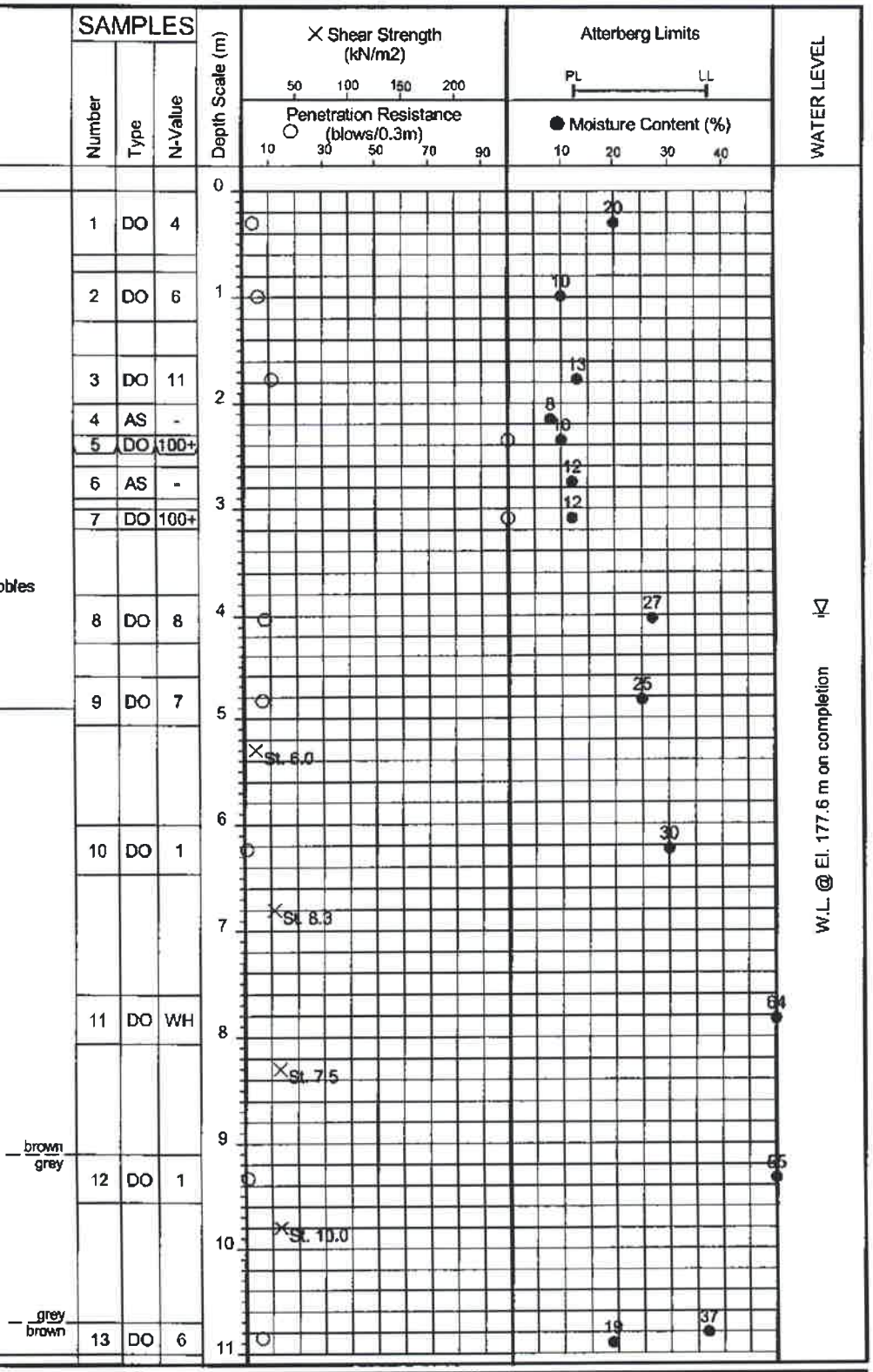
JOB DESCRIPTION: Proposed Townhouse Development

JOB LOCATION: Bayport Village - Phase 2, Town of Midland

METHOD OF BORING: Flight-Auger

DATE: November 3, 2010

Depth Elev. (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value
0.0 / 181.6	Ground Surface			
	Dark brown/brown/grey	1	DO	4
		2	DO	6
		3	DO	11
	SLAG, FILL	4	AS	-
		5	DO	100+
		6	AS	-
		7	DO	100+
	mixed with sand, rock and cobbles with silty clay layers and topsoil inclusions	8	DO	8
4.9 / 176.7		9	DO	7
	Very soft to firm			
		10	DO	1
	SILTY CLAY			
		11	DO	WH
	a trace to some sand with wet silt and clay seams and layers			
	brown / grey	12	DO	1
	grey / brown	13	DO	6
11.0	*Cont'd on Fig. 2B*			



Soil Engineers Ltd.

JOB NO: 1010-S027

LOG OF BOREHOLE NO: 102

FIGURE NO: 2B

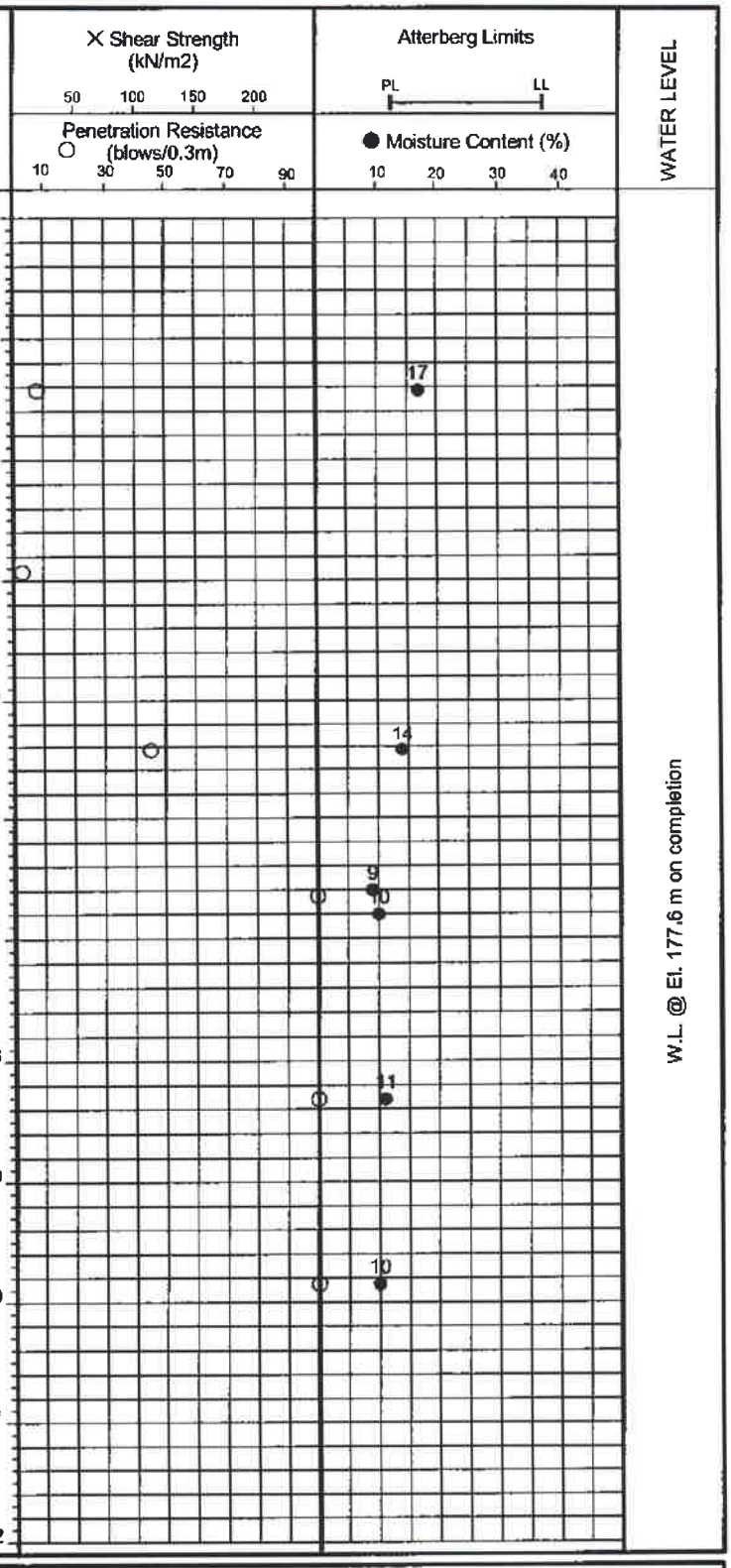
JOB DESCRIPTION: Proposed Townhouse Development

JOB LOCATION: Bayport Village - Phase 2, Town of Midland

METHOD OF BORING: Flight-Auger

DATE: November 3, 2010

Depth Elev. (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value
11.0				
170.6	Brown, very loose to loose			
	SANDY SILT, Till (REWORKED OR WATER-LAID)	14	DO	8
	with silty fine sand layers occ. wet sand and clay seams and layers, cobbles and boulders	15	DO	3
15.2				
166.4	Brown, dense to very dense	16	DO	45
	SILTY SAND, Till	17	DO	100+
	traces of gravel and clay frequent cobbles and boulders with wet silt and clay seams and layers			
18.3				
163.3	Grey, hard	18	DO	100+
	SILTY CLAY, Till sandy, a trace of gravel frequent cobbles and boulders with wet sand and silt seams and layers			
19.9				
161.7	**END OF BOREHOLE**	19	DO	100+



WATER LEVEL

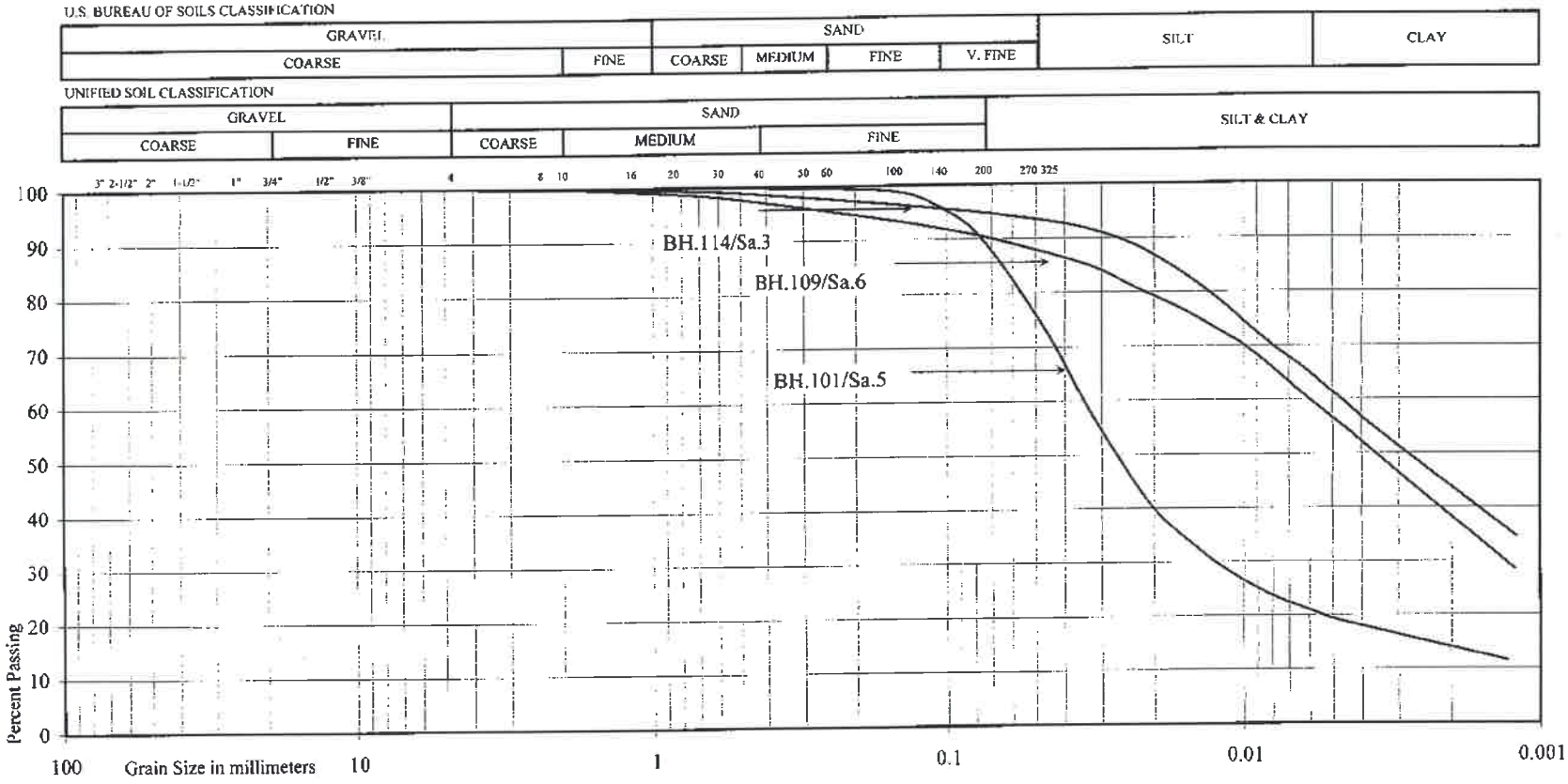
W.L. @ El. 177.6 m on completion

Soil Engineers Ltd.

Soil Engineers Ltd.

GRAIN SIZE DISTRIBUTION

Reference No: 1010-S027



Project: Proposed Townhouse Development

Location: Bayport Village - Phase 2, Town of Midland

Borehole No:	101	109	114
Sample No:	5	6	3
Depth (m):	3.3	4.9	1.8
Elevation (m):	175.9	175.5	178.8

BH./Sa.	101/5	109/6	114/3
Liquid Limit (%) =	23	38	40
Plastic Limit (%) =	15	21	22
Plasticity Index (%) =	8	17	0
Moisture Content (%) =	37	22	47
Estimated Permeability (cm./sec.) =	10^{-7}	10^{-7}	10^{-7}

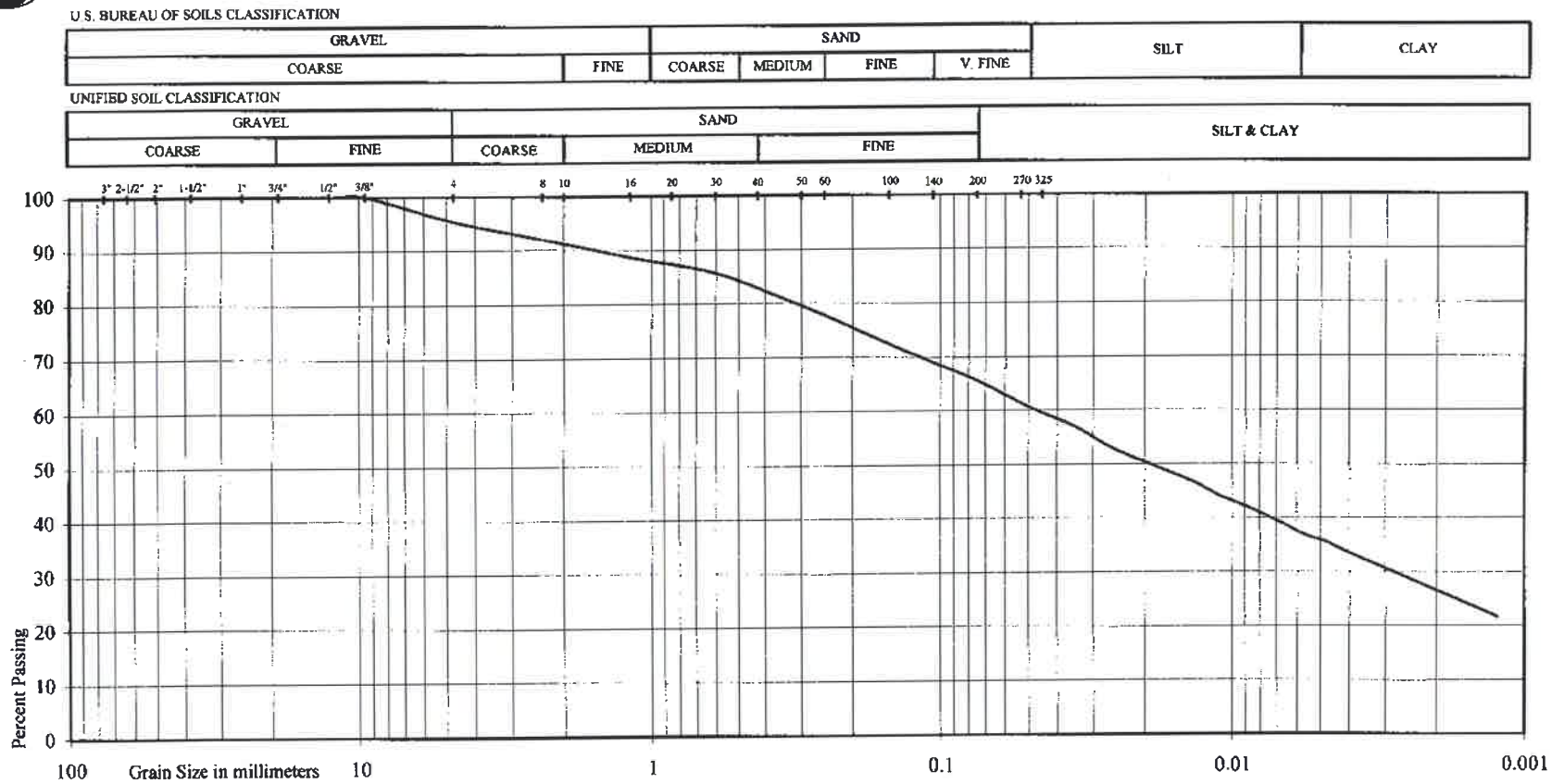
Classification of Sample [& Group Symbol]: SILTY CLAY
a trace to some sand

Figure: 29

Soil Engineers Ltd.

GRAIN SIZE DISTRIBUTION

Reference No: 1010-S027



Project: Proposed Townhouse Development

Location: Bayport Village - Phase 2, Town of Midland

Borehole No: 102

Sample No: 18

Depth (m): 18.4

Elevation (m): 163.2

Liquid Limit (%) = -

Plastic Limit (%) = -

Plasticity Index (%) = -

Moisture Content (%) = 11

Estimated Permeability (cm./sec.) = 10^{-7}

Classification of Sample [& Group Symbol]: SILTY CLAY, Till sandy, a trace of gravel

Figure: 30

Soil Engineers Ltd.

GRAIN SIZE DISTRIBUTION

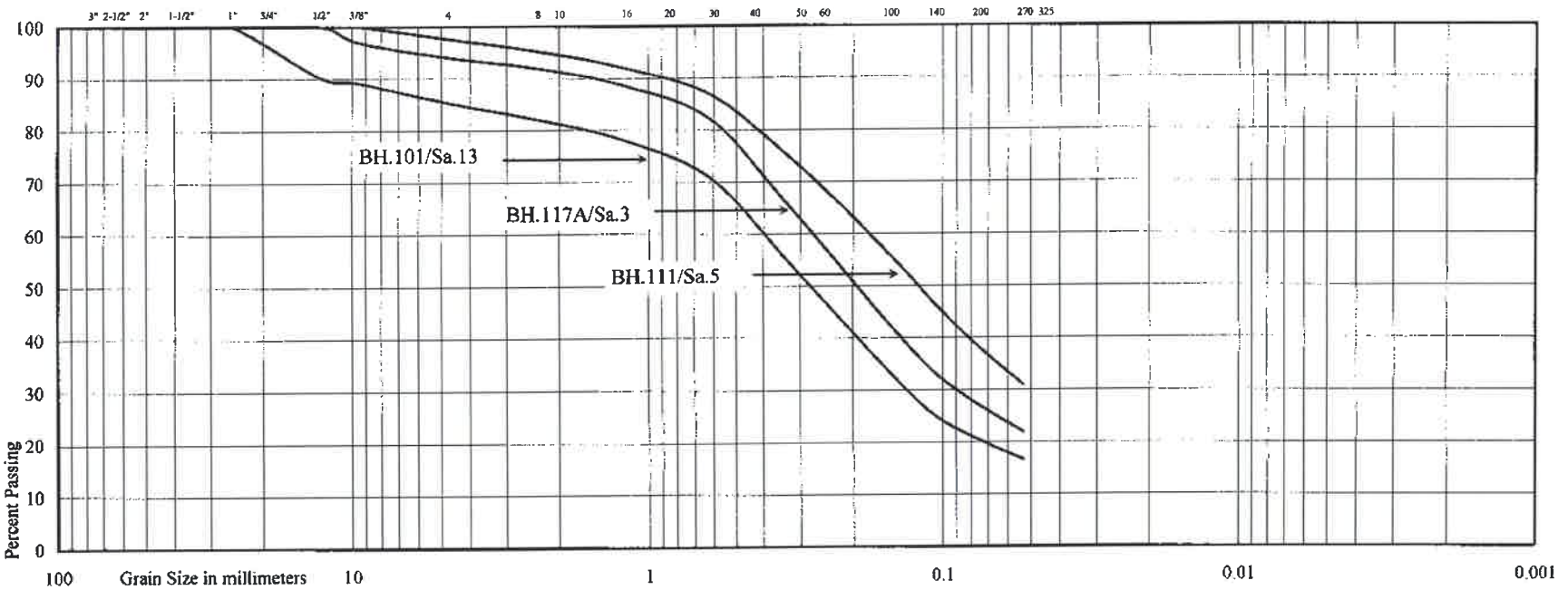
Reference No: 1010-S027

U.S. BUREAU OF SOILS CLASSIFICATION

GRAVEL		SAND				SILT	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	V. FINE		

UNIFIED SOIL CLASSIFICATION

GRAVEL		SAND			SILT & CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	



Project: Proposed Townhouse Development

Location: Bayport Village - Phase 2, Town of Midland

Borehole No:	101	111	117A
Sample No:	13	5	3
Depth (m):	15.5	3.3	1.8
Elevation (m):	163.7	178.1	182.5

BH./Sa.	101/13	111/5	117A/3
Liquid Limit (%) =	-	-	-
Plastic Limit (%) =	-	-	-
Plasticity Index (%) =	-	-	-
Moisture Content (%) =	11	18	9
Estimated Permeability (cm./sec.) =	10^{-3}	10^{-4}	10^{-3}

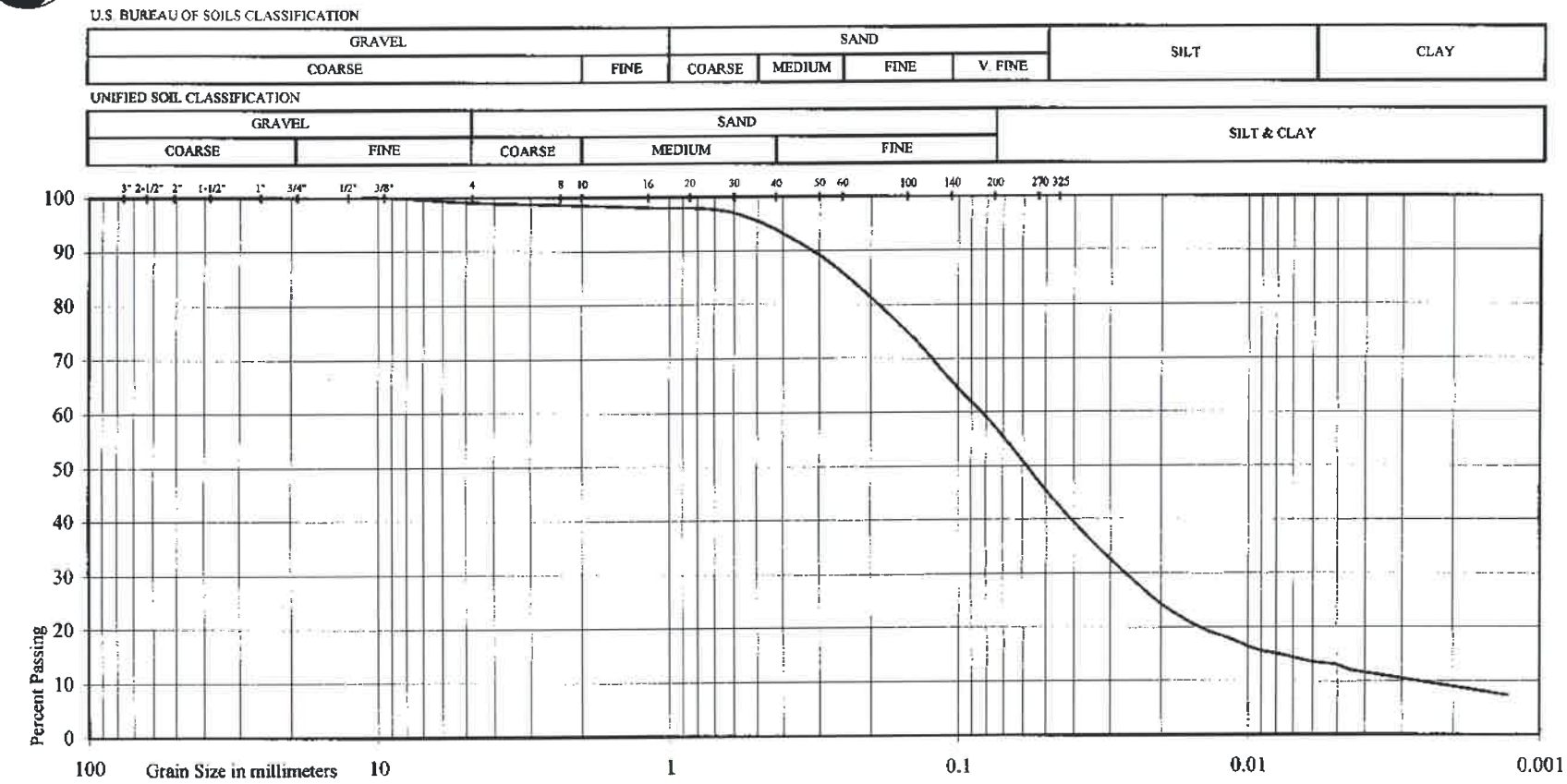
Classification of Sample [& Group Symbol]: SILTY SAND, Till
a trace to some gravel and clay

Figure: 31

Soil Engineers Ltd.

GRAIN SIZE DISTRIBUTION

Reference No: 1010-S027



Project: Proposed Townhouse Development

Location: Bayport Village - Phase 2, Town of Midland

Borehole No: 102

Sample No: 14

Depth (m): 12.4

Elevation (m): 169.2

Liquid Limit (%) = -

Plastic Limit (%) = -

Plasticity Index (%) = -

Moisture Content (%) = 17

Estimated Permeability (cm./sec.) = 10^{-5}

Classification of Sample [& Group Symbol]: SANDY SILT, Till (REWORKED OR WATER-LAID)
some clay, a trace of gravel

Figure: 33

Soil Engineers Ltd.

GRAIN SIZE DISTRIBUTION

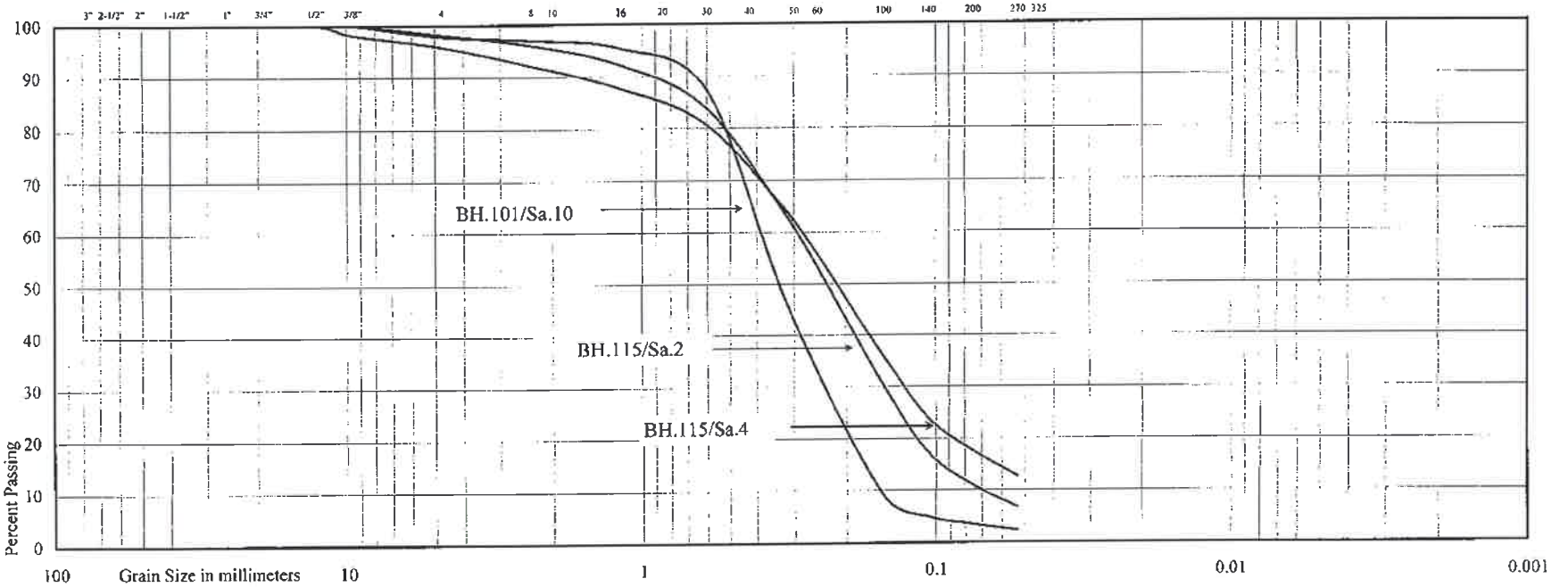
Reference No: 1010-S027

U.S. BUREAU OF SOILS CLASSIFICATION

GRAVEL		SAND				SILT	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	V. FINE		

UNIFIED SOIL CLASSIFICATION

GRAVEL		SAND			SILT & CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	



Project: Proposed Townhouse Development

Location: Bayport Village - Phase 2, Town of Midland

Borehole No:	101	115	115.4
Sample No:	10	2	3
Depth (m):	10.9	1.0	2.6
Elevation (m):	168.3	181.7	180.1

BH./Sa.	101/10	115/2	115/4
Liquid Limit (%) =	-	-	-
Plastic Limit (%) =	-	-	-
Plasticity Index (%) =	-	-	-
Moisture Content (%) =	11	18	9
Estimated Permeability (cm./sec.) =	10^{-3}	10^{-4}	10^{-3}

Classification of Sample [& Group Symbol]: FINE TO MEDIUM SAND
a trace to some silt; a trace of gravel

Figure: 35

Soil Engineers Ltd.

GRAIN SIZE DISTRIBUTION

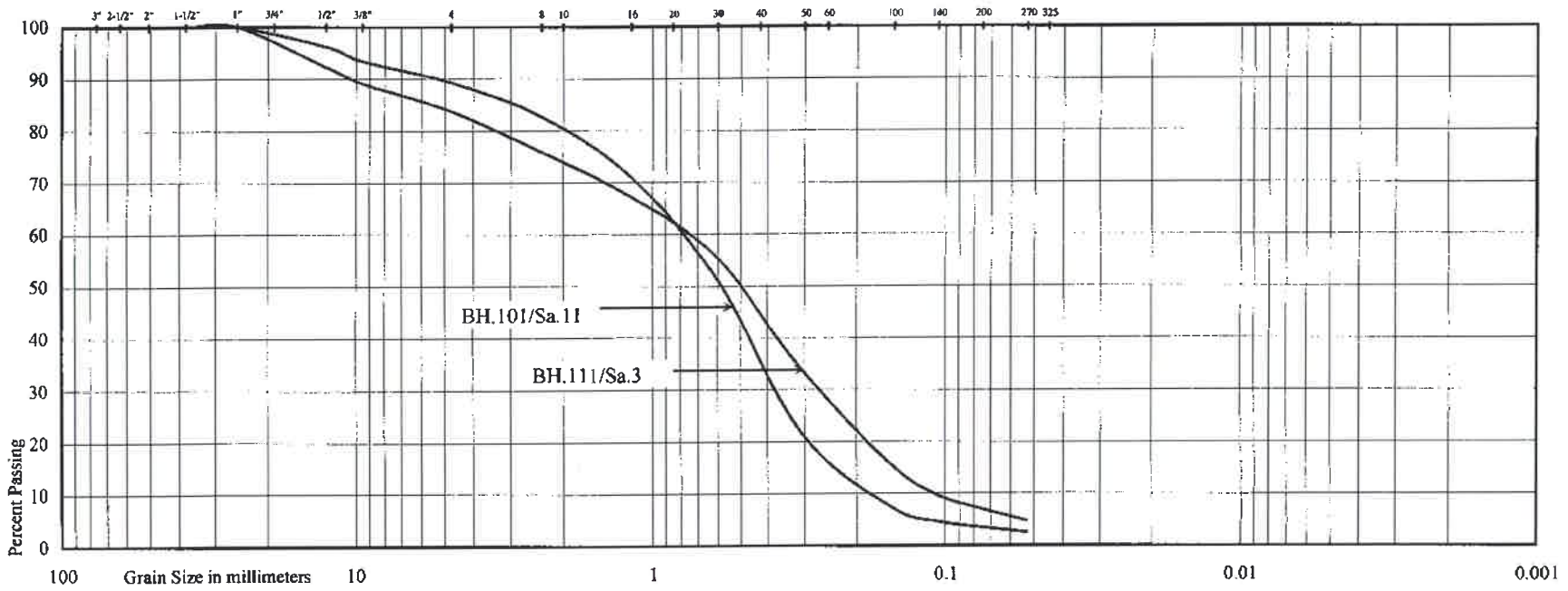
Reference No: 0101-S01

U.S. BUREAU OF SOILS CLASSIFICATION

GRAVEL		SAND				SILT	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	V. FINE		

UNIFIED SOIL CLASSIFICATION

GRAVEL		SAND			SILT & CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	



Project: Proposed Townhouse Development

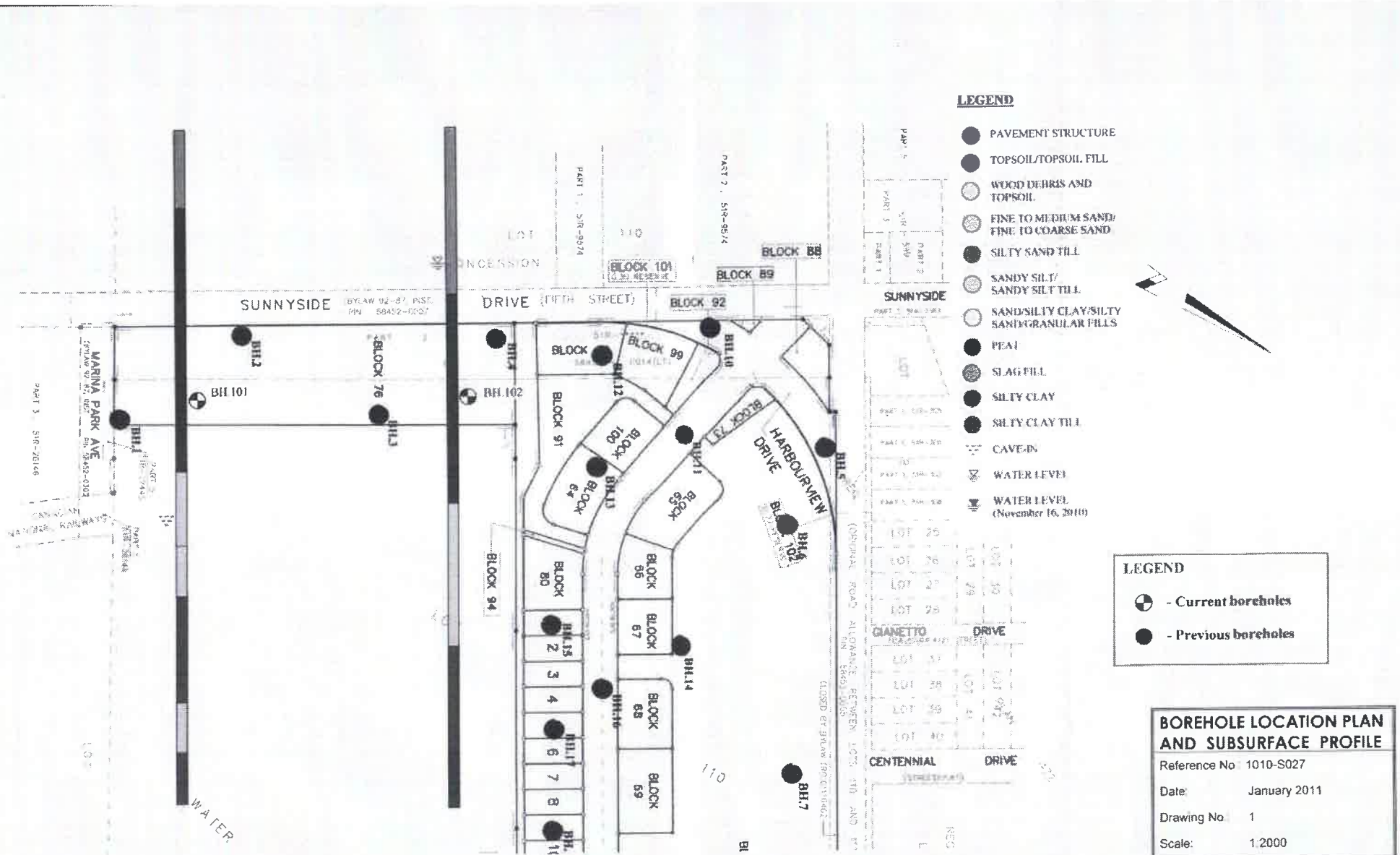
Location: Bayport Village - Phase 2, Town of Midland

Borehole No:	101	111
Sample No:	11	3
Depth (m):	12.5	1.8
Elevation (m):	166.7	179.6

BH./Sa.	101/11	111/3
Liquid Limit (%) =	-	-
Plastic Limit (%) =	-	-
Plasticity Index (%) =	-	-
Moisture Content (%) =	15	13
Estimated Permeability (cm./sec.) =	10^{-2}	10^{-2}

Classification of Sample [& Group Symbol]: FINE TO COARSE SAND
some gravel, a trace of silt

Figure: 37


LEGEND
PAVEMENT STRUCTURE
TOPSOIL/TOPSOIL FILL
WOOD DEBRIS AND TOPSOIL
FINE TO MEDIUM SAND/ FINE TO COARSE SAND
SILTY SAND TILL
SANDY SILT/ SANDY SILT TILL
SAND/SILTY CLAY/SILTY SAND/GRANULAR FILLS
PEAT
SLAG FILL
SILTY CLAY
SILTY CLAY TILL
CAVE-IN
WATER LEVEL
WATER LEVEL (November 16, 2010)
SUNNYSIDE DRIVE (FIFTH STREET)
MARINA PARK AVE
HARBOURVIEW DRIVE
GIANETTO DRIVE
CENTENNIAL DRIVE
BH 101
BH 102
BH.1
BH.2
BH.3
BH.4
BH.5
BH.6
BH.7
BH.10
BH.11
BH.12
BH.13
BH.14
BH.15
BH.16
BH.17
BLOCK 76
BLOCK 88
BLOCK 89
BLOCK 92
BLOCK 99
BLOCK 91
BLOCK 90
BLOCK 94
BLOCK 80
BLOCK 66
BLOCK 67
BLOCK 68
BLOCK 59
LOT 110
CONCESSION
WATER
LEGEND
- Current boreholes
- Previous boreholes
BOREHOLE LOCATION PLAN AND SUBSURFACE PROFILE
Reference No: 1010-S027
Date: January 2011
Drawing No: 1
Scale: 1:2000
SOIL ENGINEERS LTD.