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A REPORT TO
BRIARWOOD (DUNDALK) LTD.

A PRELIMINARY GEOTECHNICAL INVESTIGATION FOR PROPOSED RESIDENTIAL DEVELOPMENT

CON 2 SWTSR PT LOT 234
SOUTHEAST OF GREY ROAD 9 AND IDA STREET

TOWNSHIP OF SOUTHGATE (DUNDALK)

REFERENCE NO. 2310-S058

DECEMBER 2024
(REVISION OF REPORT DATED JANUARY 2024)

DISTRIBUTION

Digital Copy - Briarwood (Dundalk) Ltd.

TABLE OF CONTENTS

TABLES

ENCLOSURES

1.0 INTRODUCTION

In accordance with written authorization dated October 30, 2023 from Mr. Enzo Di Giovanni of Briarwood (Dundalk) Ltd., a geotechnical investigation was carried out on a parcel of land, legally described as "CON SWTSR PT LOT 234", located southeast of Grey Road 9 and Ida Street in the Township of Southgate (Dundalk).

The purpose of the preliminary geotechnical investigation was to reveal the subsurface conditions and determine the engineering properties of the disclosed soils for the design and construction of a proposed residential development. The geotechnical findings and resulting recommendations are presented in this Report.

2.0 SITE AND PROJECT DESCRIPTION

The Township of Southgate (Dundalk) is situated in the physiographic region known as the Dundalk Till Plain, where moraines and eskers occur in areas that have been partly eroded by glacial Lake Algonquin and filled with lacustrine sands, silts, clays and reworked till.

The subject site is located east of Ida Street, approximately 650 m south of Grey Road 9 in the Township of Southgate (Dundalk). The property is approximately 51.3 acres and is generally weed-covered, with two watercourses traversing through the property. At the time of investigation, the center portion of the site was flooded.

Based on the Functional Servicing & Grading Plan prepared by Valdor Engineering Inc. dated September 27, 2024, the western portion of the site will be developed into 4 buildings, to be built in phases, with a shared 1-level underground parking garage. The development will be provided with municipal services and paved roadways meeting the Town's standards.

3.0 FIELD WORK

The field work within the present development limits, consisting of 4 boreholes extending to depths ranging from 6.3 to 6.6 m, was performed on October 30 and 31, 2023. Upon completion of the borehole drilling and sampling, groundwater monitoring wells were installed in 3 of the boreholes to facilitate a hydrogeological assessment, which will be presented under a separate cover. The borehole locations are shown on the Borehole and Monitoring Well Location Plan, Drawing No. 1. Due to access difficulties, no boreholes were carried out within the eastern portion of the development limits.

The boreholes were advanced at intervals to the sampling depths by a track-mounted machine using hollow stem augers and equipped with split spoon sampler for soil sampling. Standard Penetration Tests, using the procedures described on the enclosed "List of Abbreviations and Terms", were performed at the sampling depths. The test results are recorded as the Standard Penetration Resistance (or 'N' values) of the subsoil. The relative density of the non-cohesive strata and the consistency of the cohesive strata are inferred from the 'N' values. Split-spoon samples were recovered for soil classification and laboratory testing. The field work was supervised and the data was recorded by a geotechnical technician.

The depth and details of the monitoring wells are presented on the respective Borehole Logs. The ground elevation at each borehole and monitoring well location was determined using a handheld Global Navigation Satellite System (GNSS) equipment.

4.0 SUBSURFACE CONDITIONS

The investigation revealed that beneath the topsoil, the site is generally underlain by a stratum of sandy silt till.

Detailed descriptions of the encountered subsurface conditions are presented on the Borehole Logs, comprising Figures 1 to 4, inclusive, and Subsurface Profile on Drawing No. 2. The engineering properties of the disclosed soils are discussed herein.

4.1 Topsoil

The layer of topsoil, ranging from 18 to 40 cm thick, was encountered at all borehole locations. The topsoil is dark brown in colour, indicating appreciable amounts of roots and humus which are compressible under loads. The thickness of the topsoil may vary, and thicker topsoil can occur in the low-lying and treed areas.

4.2 Sandy Silt Till

The sandy silt till was encountered beneath the topsoil in all boreholes. It consists of a random mixture of particle sizes ranging from clay to gravel, with sand and silt predominating the soil stratigraphy. A grain size analysis was performed on a representative sandy silt till sample and the result is presented on Figure 5.

The obtained 'N' values of the till range from 4 to over 100, with a median of 25 blows per 30 cm of penetration, indicating that the till is very loose to very dense, being generally compact in relative density. The very loose condition is generally restricted to the weathered zone which extends to a depth of up to 1.2 m below the prevailing ground surface.

The natural water content values range from 7% to 17%, with a median of 9%, indicating that the sandy silt till is dry to very moist, generally in moist condition. The high water content values are restricted to the weathered zone.

The engineering properties of the sandy silt till are presented below:

- Highly frost susceptible and low water erodibility.
- In excavation, the till will be stable in steep cuts. However, local sloughing and sheet collapse may occur under prolonged exposure.

4.3 Compaction Characteristics of the Revealed Soils

The obtainable degree of compaction is primarily dependent on the soil moisture and, to a lesser extent, on the type of compactor used and the effort applied. As a general guide, the typical water content values of the revealed soils for Standard Proctor compaction are presented in Table 1.

Table 1 - Estimated Water Content for Compaction

Soil Type	Determined Natural Water Content (%)	Water Content (%) for Standard Proctor Compaction	
		100% (optimum)	Range for 95% or +
Sandy Silt Till	7 to 17 (median 9)	13	8 to 17

* The above values are provided as a guideline. Standard Proctor Tests must be performed on bulk samples collected from the site during construction prior to backfill and compaction.

5.0 GROUNDWATER CONDITION

The boreholes were checked for the presence of groundwater on completion of the field work. The groundwater levels are summarized in Table 2.

Table 2 - Groundwater Level on Completion

Borehole No.	Ground Elevation (m)	Borehole Depth (m)	Monitoring Well Depth (m)	Groundwater Level on Completion	
				Depth (m)	Elevation (m)
1	513.0	6.6	6.1	5.3	507.7
2	512.3	6.3	6.1	4.6	507.7
3	513.5	6.6	No well	Dry	-
4	511.7	6.6	6.1	3.7	508.0

Groundwater was detected in Boreholes 1, 2 and 4 at depths ranging from 3.7 to 5.3 m below the prevailing ground surface, or between El. 508.0 to 505.7 m, on completion of the borehole drilling. The groundwater is subject to seasonal fluctuation.

Additional groundwater level measurements will be carried out in the monitoring wells and will be presented in the hydrogeological assessment report, to be presented under separate cover.

6.0 DISCUSSION AND RECOMMENDATIONS

The investigation revealed that beneath the topsoil, the site is generally underlain by a stratum of sandy silt till.

Groundwater was detected in Boreholes 1,2 and 4 at depths ranging from 3.7 to 5.3 m below the prevailing ground surface, or between El. 508.0 to 505.7 m on completion of the borehole drilling. The groundwater is subject to seasonal fluctuation.

A review of the latest site plan indicates that the western portion of the site will be developed into 4 buildings, to be built in phases, with a shared 1-level underground parking garage. The development will be provided with municipal services and paved roadways meeting the Town's standards. The geotechnical findings which warrant special consideration are presented below:

1. Due to access difficulties, limited number of boreholes were carried out within the area of the proposed development. Additional boreholes must be completed once the proposed development plans are finalized.

2. Where shoring is considered for the building construction, close monitoring of vertical and lateral movement of the shoring wall should be carried out, and frequent site inspections be conducted, to ensure that the excavation does not adversely affect the structural stability of the adjacent structures.
3. Additional deeper boreholes should be carried out to elaborate on the findings of this investigation for the proposed underground parking level and in the area where it was inaccessible at the time of the field work.

The recommendations appropriate for the project are presented herein. One must be aware that the subsurface conditions may vary between boreholes. Should this become apparent during construction, a geotechnical engineer must be consulted to determine whether the following recommendations require revision.

6.1 Site Preparation

All topsoil must be stripped prior to the construction of the development. The topsoil can only be reused in the landscape area. Any surplus must be removed off the site. The area around the proposed development must be graded and properly prepared prior to the construction of a crane pad. The crane pad must be properly designed to ensure stability.

6.2 Foundations

The proposed development will consist of 4 buildings with 1 shared underground parking level. The proposed finished floor elevation of the underground level is El. 510.25 m and the underside of footing is expected to be at El. 509.0 m. The proposed buildings can be supported by conventional spread and strip footings founded on engineered fill or sound native soils below the frost penetration depth. The recommended soil bearing pressures at Serviceability Limit State (SLS) and Ultimate Limit State (ULS) for the design of the footings are presented below:

- Maximum Allowable Bearing Pressure (SLS) = 300 kPa
- Factored Ultimate Bearing Pressure (ULS) = 475 kPa

The total and differential settlements of the footings, designed using bearing pressure at SLS, are estimated to be 25 mm and 20 mm, respectively.

During construction, the foundation subgrade should be inspected by the geotechnical engineer or a senior geotechnical technician to ensure that the revealed conditions are compatible with the foundation design requirements.

Additional boreholes must be completed to elaborate on the findings of this investigation.

Footings exposed to weathering should be protected against frost action by a minimum 1.4 m of earth cover or must be properly insulated.

If groundwater seepage is encountered in excavation, the foundation must be poured immediately after subgrade inspection or the subgrade should be protected by a concrete mud-slab immediately after exposure. This will prevent construction disturbance and costly rectification of the bearing subsoil.

The building foundation must meet the requirements specified in the latest Ontario Building Code. As a guide, the structure should be designed to resist an earthquake force using Site Classification 'D' (stiff soil).

6.3 Underground Parking Structures

The underground parking structure should be designed to sustain a lateral earth pressure calculated using the soil parameters stated in Section 6.7. Any applicable surcharge loads adjacent to the underground structure, hydrostatic pressure and uplift forces must also be considered in the design of the underground structure.

Where open cut excavation can be carried out, the underground parking garage structure should be dampproofed and provided with a drainage system (Drawing No. 3). The subdrains should be encased in a fabric filter to protect them against blockage by silting.

Where shoring structure is required for excavation, the perimeter walls of the underground structure should be dampproofed by blindside application and provided with a perimeter subdrain encased in a fabric filter at the wall base. Prefabricated drainage board, such as Miradrain 6000 or equivalent, must be provided between the shoring wall and the cast-in-place foundation wall (Drawing No. 4).

The subgrade should consist of sound native soils or well compacted earth fill, the floor slab should be constructed on a granular base of at least 15 cm thick, consisting of 19-mm Crusher-Run Limestone (CRL), or equivalent, compacted to 100% Standard Proctor Dry Density (SPDD).

If the Municipality does not allow any discharge of subsurface water into the sewer system, a separate storage cistern should be provided and can be used for irrigation purposes or discharge overtime.

The elevator pit, which normally extends below the floor level, should be designed as a submerged 'tank' structure with waterproofed pit walls and pit floor.

The ground around the buildings must be graded to direct water away from the structures.

6.4 Underground Services

The subgrade for the underground services should consist of sound native soils or properly compacted engineered fill. In areas where the weak subgrade was encountered, it should be subexcavated and replaced with properly compacted inorganic soil and/or bedding material compacted to at least 98% SPDD.

A Class 'B' bedding is recommended for construction of the underground services. The bedding material should consist of compacted 19-mm CRL, or equivalent, as approved by a geotechnical engineer. The pipe joints connecting to the manholes and catch basins should be leak proof or wrapped with a waterproof membrane, to prevent any soil penetration and filtration through the joints.

In order to prevent pipe floatation when the sewer trench is deluged with water derived from precipitation, a minimum soil cover equal to the diameter of the pipe should be in place at all times after completion of the pipe installation. Openings to subdrains and catch basins should be shielded with a fabric filter to prevent blockage by silting.

Any metal pipe and fitting for the underground services should be protected against soil corrosion. For estimation of anode weight requirements, the estimated electrical resistivity of the disclosed soils can be used and it should meet the minimum requirement as stipulated for the Region's and/or Town's requirement.

6.5 Backfilling in Trenches and Excavated Areas

The backfill in service trenches or beside foundation walls or below transformer pads should be compacted to at least 95% SPDD. In the zone within 1.0 m below the pavement, floor subgrade or concrete slabs, the material should be compacted with the water content 2% to 3% drier than the optimum, compacted to 98% of the respective maximum SPDD.

In normal construction practice, the problem areas of settlement largely occur adjacent to manholes, catch basins, services crossings, foundation walls and columns. A granular backfill should be used for compaction in confined spaces with a smaller vibratory compactor.

6.6 Pavement Design

A review of the proposed site plan indicates that a courtyard and parking area is proposed on the structural slab on the rooftop of the underground garage, a sufficient granular base and adequate drainage must be provided to prevent frost damage to the pavement. A waterproof membrane must be placed above the structural slab exposed to weathering to prevent water leakage, as well as to protect the steel reinforcing bars against brine corrosion. The recommended pavement structure to be placed on top of the underground garage is presented in Table 3.

Table 3 - Pavement Design (Roof of Underground Garage)

Course	Thickness (mm)	OPS Specifications
Asphalt Surface	40	HL3
Asphalt Binder	65	HL8
Granular Base	200	Granular 'A' or 19 mm Crusher-Run Limestone
Granular Sub-base	250	Free-draining Sand Fill

The pavement design for the access road beyond the underground garage envelope is presented in Table 4.

Table 4 - Pavement Design (Private On-Grade Access Roadway)

Course	Thickness (mm)	OPS Specifications
Asphalt Surface	40	HL3
Asphalt Binder	50	HL8
Granular Base	150	Granular 'A' or equivalent
Granular Sub-base	450	Granular 'B' or equivalent

In preparation of the pavement, the final subgrade surface must be proof-rolled. Any soft/loose spots identified should be subexcavated and replaced with selected on-site material, free of organics, and uniformly compacted to at least 98% SPDD. The granular bases should be compacted to 100% SPDD.

Along the perimeter where surface runoff may drain onto the pavement, an intercept subdrain system should be installed to prevent infiltrating precipitation from seeping into the granular bases (since this may inflict frost damage on the pavement). The subdrains should consist of filter wrapped weepers, and connected to the catch basins and storm manholes. The subdrains should be backfilled with free-draining granular material.

6.7 Soil Parameters

The recommended soil parameters for the project design are given in Table 5.

Table 5 - Soil Parameters

Unit Weight and Bulk Factor	**Bulk Unit Weight (kN/m^3)**	**Estimated Bulk Factor**	
		Loose	**Compacted**
Sandy Silt Till	22.5	1.33	1.05
Lateral Earth Pressure Coefficients	**Active K_a**	**At Rest K_o**	**Passive K_p**
Sandy Silt Till	0.32	0.48	3.12
Estimated Coefficients of Permeability (K) and Percolation Times (T)		**K (cm/sec)**	**T (min/cm)**
Sandy Silt Till		10^{-5} to 10^{-6}	20 to 50
Coefficients of Friction			
Between Concrete and Granular Base		0.50	
Between Concrete and Sound Native Soils		0.35	
Estimated Electrical Resistivity			
Sandy Silt Till		5000 ohm·cm	

6.8 Excavation

Excavation should be carried out in accordance with Ontario Regulation 213/91. For excavation purposes, the types of soils are classified in Table 6.

Table 6 - Classification of Soils for Excavation

Material	**Type**
Sandy Silt Till	2
Weathered Till	3

Excavation into the till containing boulders may require extra effort and the use of a heavy-duty excavator.

Minor groundwater seepage is anticipated for the 1-level underground parking garage excavation and it can generally be controlled by pumping from sumps, or if necessary,

vigorous pumping from closely spaced sump-wells. Detailed groundwater condition of the site and the requirement for groundwater control is discussed in the hydrogeological report.

Prospective contractors must be asked to assess the in situ subsurface conditions for soil cuts by digging test pits to 0.5 m below the anticipated depth of excavation. These test pits should be allowed to remain open for a few hours to assess the trenching conditions.

6.9 **Monitoring of Performance**

It is recommended that close monitoring of vertical and lateral movement of the shoring wall be carried out, and frequent site inspections be conducted, to ensure that the excavation does not adversely affect the structural stability of the adjacent structures. Extra bracing or support may be required if any movement is found to be excessive. The contractor should maintain the shoring to ensure any movement is within the design limit.

The foundation details of adjacent structures must be investigated and incorporated into the design and construction of the proposed project. It is recommended that a pre-construction survey and a monitoring program be carried out for all adjacent structures in order to verify any potential future liability claims.

Vibration control and pre-construction survey is strongly recommended for the adjacent properties and structures prior to any excavation activities at the site. Further advice or undertaking of the vibration control and pre-construction survey can be provided as necessary.

7.0 LIMITATIONS OF REPORT

This report was prepared by Soil Engineers Ltd. for the account of Briarwood (Dundalk) Ltd., for review by their designated consultants, financial institutions, and government agencies. The material in the report reflects the judgement of Curtis Lee, B.Eng., EIT and Kelvin Hung, P.Eng., in light of the information available to it at the time of preparation.

Use of the report is subject to the conditions and limitations of the contractual agreement. Any use which a Third Party makes of this report, or any reliance on decisions to be made based on it, is the responsibility of such Third Parties. Soil Engineers Ltd. accepts no responsibility for damages, if any, suffered by any Third Party as a result of decisions made or actions based on this report.

SOIL ENGINEERS LTD.

Curtis Lee, B.Eng., EIT

Kelvin Hung, P.Eng.
CL/KH

LIST OF ABBREVIATIONS AND DESCRIPTION OF TERMS

The abbreviations and terms commonly employed on the borehole logs and figures, and in the text of the report, are as follows:

SAMPLE TYPES

AS Auger sample
CS Chunk sample
DO Drive open (split spoon)
DS Denison type sample
FS Foil sample
RC Rock core (with size and percentage recovery)
ST Slotted tube
TO Thin-walled, open
TP Thin-walled, piston
WS Wash sample

PENETRATION RESISTANCE

Standard Penetration Resistance or 'N' Value:

The number of blows of a 63.5 kg hammer falling from a height of 76 cm required to advance a 51 mm outer diameter drive open sampler 30 cm into undisturbed soil, after an initial penetration of 15 cm.

Plotted as '○'

Dynamic Cone Penetration Resistance:

A continuous profile showing the number of blows per each 30 cm of penetration of a 51 mm diameter, 90° point cone driven by a 63.5 kg hammer falling from a height of 76 cm.

Plotted as '—●—'

WH Sampler advanced by static weight
PH Sampler advanced by hydraulic pressure
PM Sampler advanced by manual pressure
NP No penetration

SOIL DESCRIPTION

Cohesionless Soils:

'N' (blows/30 cm)	Relative Density
0 to 4	very loose
4 to 10	loose
10 to 30	compact
30 to 50	dense
>50	very dense

Cohesive Soils:

Undrained Shear Strength (kPa)	'N' (blows/30 cm)	Consistency
<12	<2	very soft
12 to <25	2 to <4	soft
25 to <50	4 to <8	firm
50 to <100	8 to <15	stiff
100 to 200	15 to 30	very stiff
>200	>30	hard

Method of Determination of Undrained Shear Strength of Cohesive Soils:

x 0.0 Field vane test in borehole; the number denotes the sensitivity to remoulding
△ Laboratory vane test

METRIC CONVERSION FACTORS

1 ft = 0.3048 m
1 inch = 25.4 mm
1 lb = 0.454 kg
1 ksf = 47.88 kPa

JOB NO.: 2310-S058

LOG OF BOREHOLE: 1

FIGURE NO.: 1

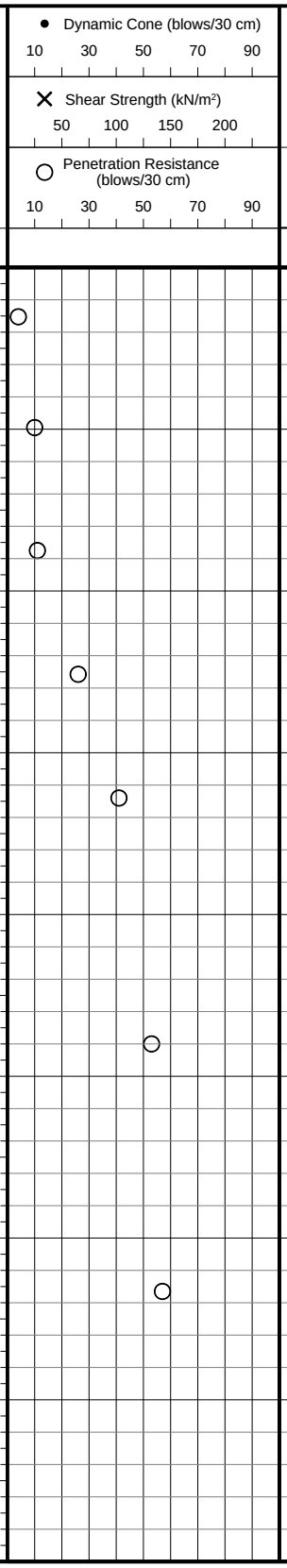
PROJECT DESCRIPTION: Proposed Residential Development

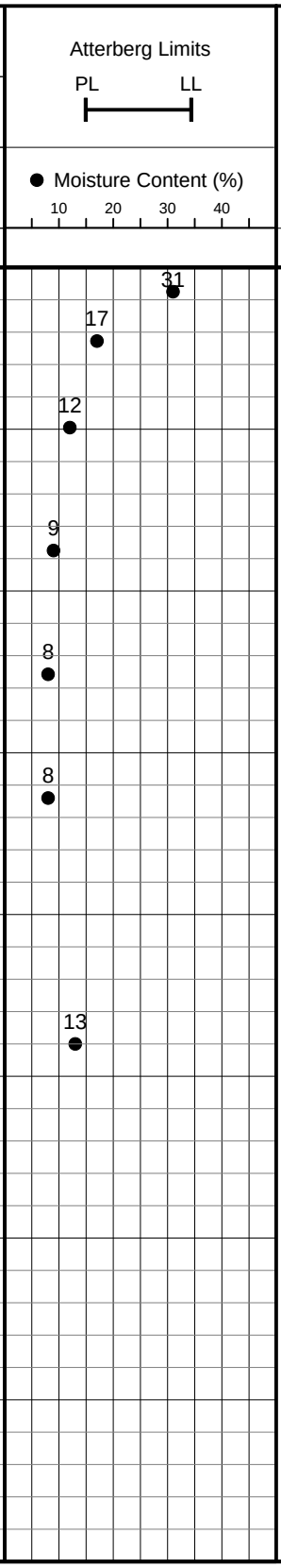
METHOD OF BORING: Hollow Stem Auger

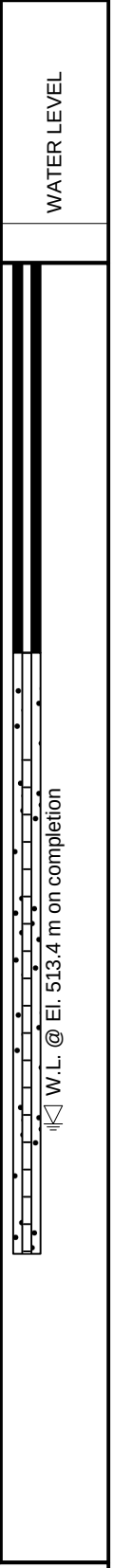
PROJECT LOCATION: CON 2 SWTSR PT LOT 234
Southeast of Grey Road 9 and Ida Street,
Township of Southgate (Dundalk)

DRILLING DATE: October 30, 2023

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)
513.0 / 0.0	Ground Surface				
	30 cm TOPSOIL	1A	DO	4	0
		1B			
	Brown, loose to very dense				
		2	DO	10	1
	weathered				
		3	DO	11	
	SANDY SILT TILL				2
		4	DO	26	
					3
	traces to some clay and gravel occ. cobbles and boulders	5	DO	41	
					4
		6	DO	53	5
		7	DO	57	6
506.4 / 6.6	**END OF BOREHOLE**				
	Installed 50 mm Ø monitoring well to 6.1 m completed with 3.0 m PVC slotted screen Sand backfill from 2.4 to 6.1 m Bentonite seal from 0.0 m to 2.4 m Provided with a monument casing				7
					8







Soil Engineers Ltd.

JOB NO.: 2310-S058

LOG OF BOREHOLE: 2

FIGURE NO.: 2

PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Hollow Stem Auger

PROJECT LOCATION: CON 2 SWTSR PT LOT 234
Southeast of Grey Road 9 and Ida Street,
Township of Southgate (Dundalk)

DRILLING DATE: October 30, 2023

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)
512.3 / 0.0	Ground Surface				
	18 cm TOPSOIL	1A			0
	Brown, loose to very dense	1B	DO	12	
		2	DO	7	1
	weathered				
	SANDY SILT TILL	3	DO	20	2
		4	DO	22	
	traces to some clay and gravel occ. cobbles and boulders	5	DO	27	3
		6	DO	73	4
					5
506.0 / 6.3		7	DO	50/8	6
	END OF BOREHOLE				7
	Installed 50 mm Ø monitoring well to 6.1 m completed with 3.0 m PVC slotted screen Sand backfill from 2.4 to 6.1 m Bentonite seal from 0.0 m to 2.4 m Provided with a monument casing				8

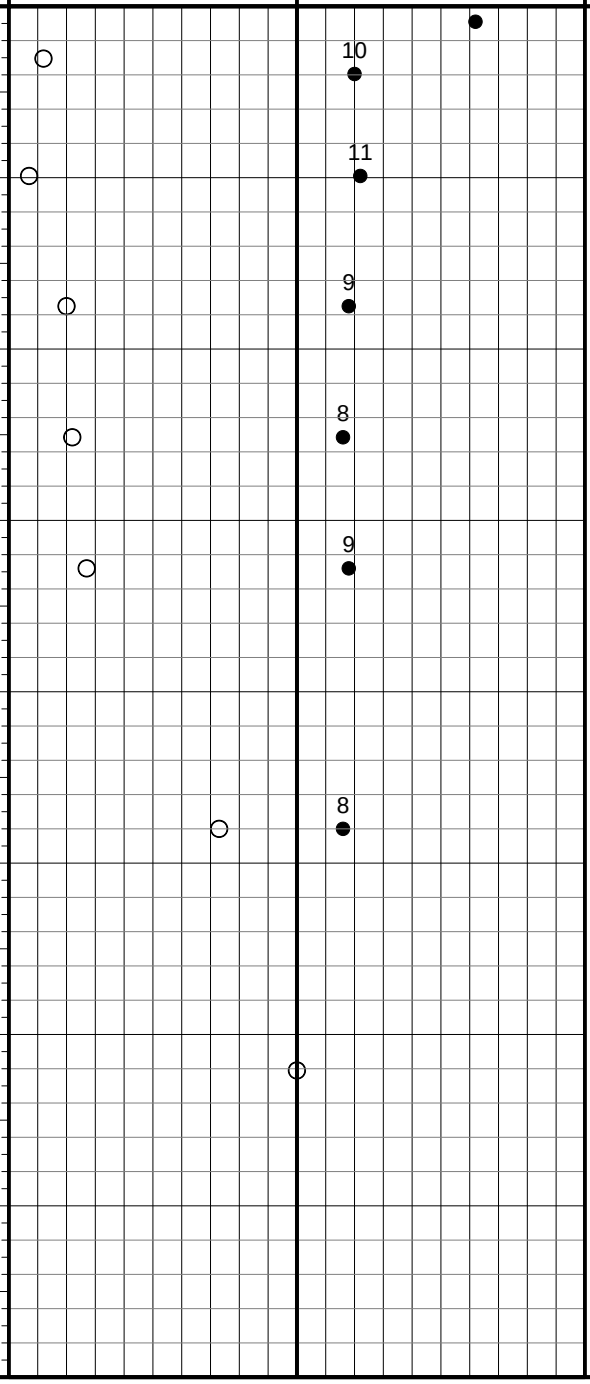
Dynamic Cone (blows/30 cm) 10 30 50 70 90

Shear Strength (kN/m²) 50 100 150 200

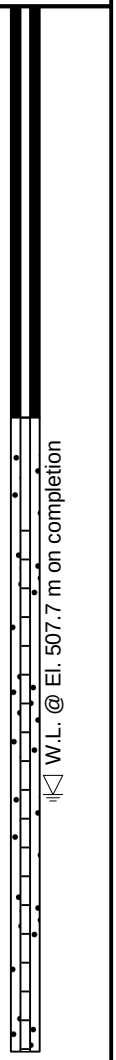
Penetration Resistance (blows/30 cm) 10 30 50 70 90

Atterberg Limits PL LL

Moisture Content (%) 10 20 30 40



WATER LEVEL



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JOB NO.: 2310-S058

LOG OF BOREHOLE: 3

FIGURE NO.: 3

PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Hollow Stem Auger

PROJECT LOCATION: CON 2 SWTSR PT LOT 234
Southeast of Grey Road 9 and Ida Street,
Township of Southgate (Dundalk)

DRILLING DATE: October 30, 2023

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)	Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90	Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40	WATER LEVEL
513.5	Ground Surface							
0.0	**40 cm TOPSOIL**	1A	DO	8	0		28	
		1B					10	
	Brown, loose to dense							
	weathered	2	DO	17	1		11	
		3	DO	18	2		10	
	SANDY SILT TILL	4	DO	29				
		5	DO	23	3		9	
	traces to some clay and gravel occ. cobbles and boulders	6	DO	35	4 5		9	
		7	DO	47	6		9	
506.9					7			
6.6	**END OF BOREHOLE**				8			Dry on Completion

Soil Engineers Ltd.

JOB NO.: 2310-S058

LOG OF BOREHOLE: 4

FIGURE NO.: 4

PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Hollow Stem Auger

PROJECT LOCATION: CON 2 SWTSR PT LOT 234
Southeast of Grey Road 9 and Ida Street,
Township of Southgate (Dundalk)

DRILLING DATE: October 31, 2023

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)
511.7 / 0.0	Ground Surface				
	18 cm TOPSOIL	1A			0
	Brown, loose to very dense	1B	DO	10	
		2	DO	6	1
	weathered				
	SANDY SILT TILL	3	DO	19	2
		4	DO	51	
	traces to some clay and gravel occ. cobbles and boulders	5	DO	47	3
		6	DO	82	4
		7	DO	81	5
505.1 / 6.6	**END OF BOREHOLE**				6
	Installed 50 mm Ø monitoring well to 6.1 m completed with 3.0 m PVC slotted screen Sand backfill from 2.4 to 6.1 m Bentonite seal from 0.0 m to 2.4 m Provided with a monument casing				7
					8

Dynamic Cone (blows/30 cm) 10 30 50 70 90

Shear Strength (kN/m²) 50 100 150 200

Penetration Resistance (blows/30 cm) 10 30 50 70 90

Atterberg Limits PL LL

Moisture Content (%) 10 20 30 40

Moisture values: 10, 11, 10, 7, 7, 7

WATER LEVEL

W.L. @ El. 508.0 m on completion

Soil Engineers Ltd.

Soil Engineers Ltd.

GRAIN SIZE DISTRIBUTION

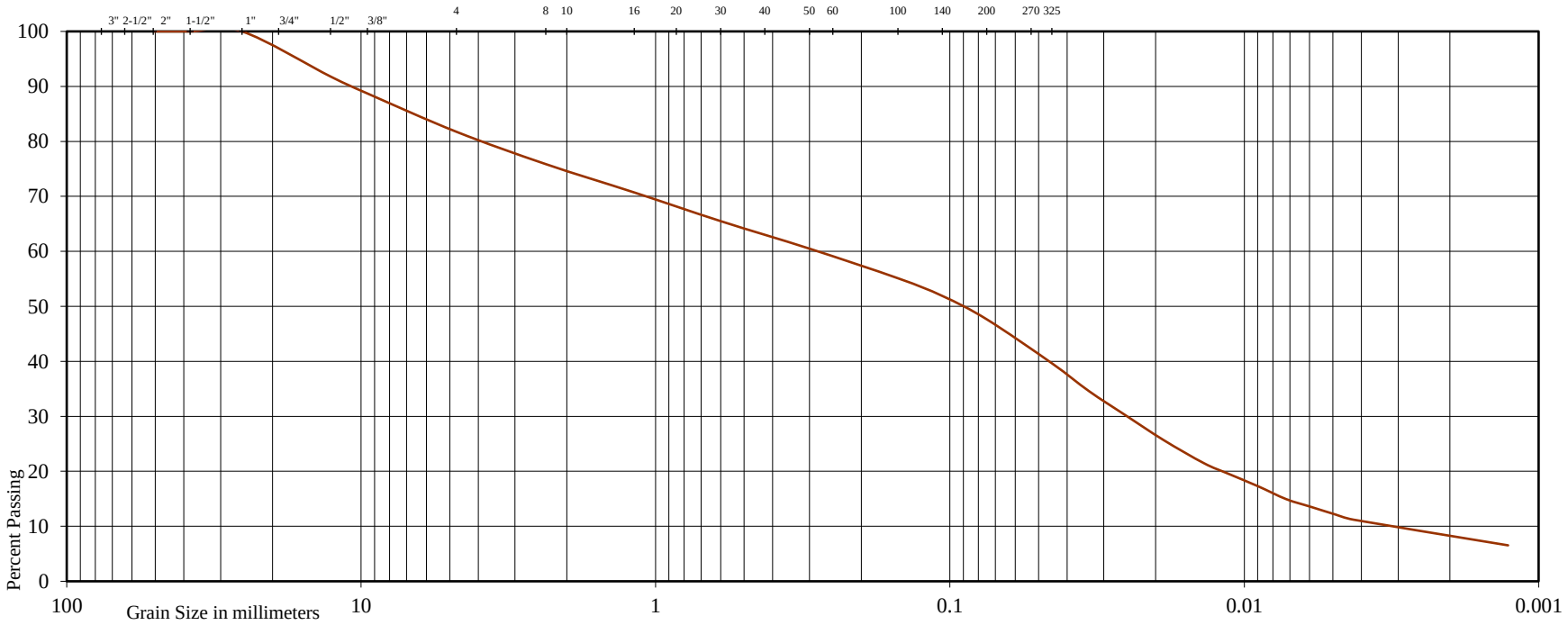
Reference No: 2310-S058

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: CON SWTSR PT LOT 234, Southeast of Grey Road 9 and Ida Street
Township of Southgate (Dundalk)

Borehole No: 2

Sample No: 5

Depth (m): 3.3

Elevation (m): 509.0

Liquid Limit (%) = -

Plastic Limit (%) = -

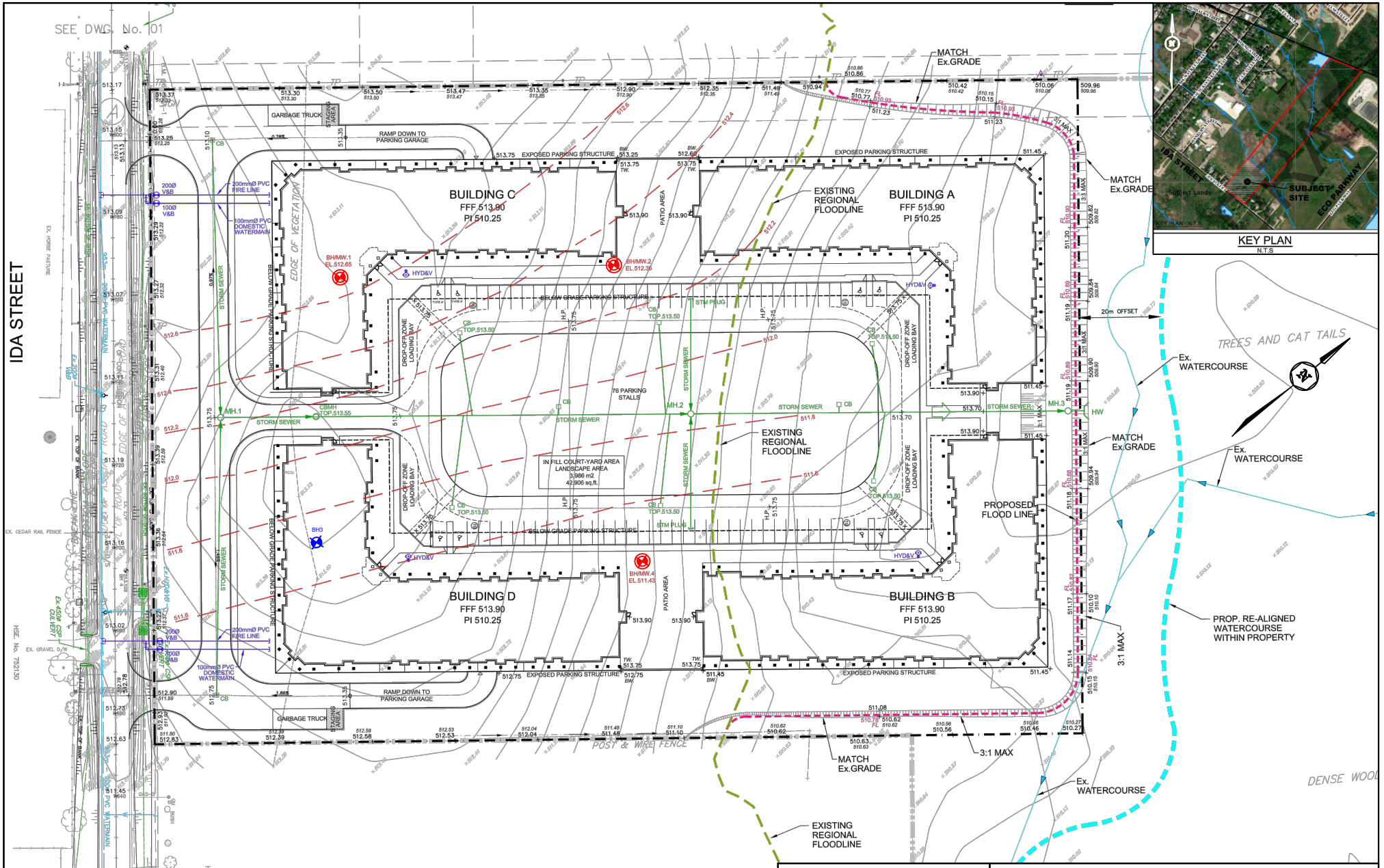
Plasticity Index (%) = -

Moisture Content (%) = 9

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

Classification of Sample [& Group Symbol]: SANDY SILT, TILL
some gravel, a trace of clay

Figure: 5



LEGEND

- Borehole
- Borehole and Monitoring Well

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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 and Monitoring Well Location Plan

SITE: CON SWTSR PT LOT 234
Southeast of Grey Road 9 and Ida Street, Township of Southgate (Dundalk)

DESIGNED BY: C.L.	CHECKED BY: K.H.	DWG NO.: 1	
SCALE: 1:1250	REF. NO.: 2310-S058	DATE: December 2024	REV -

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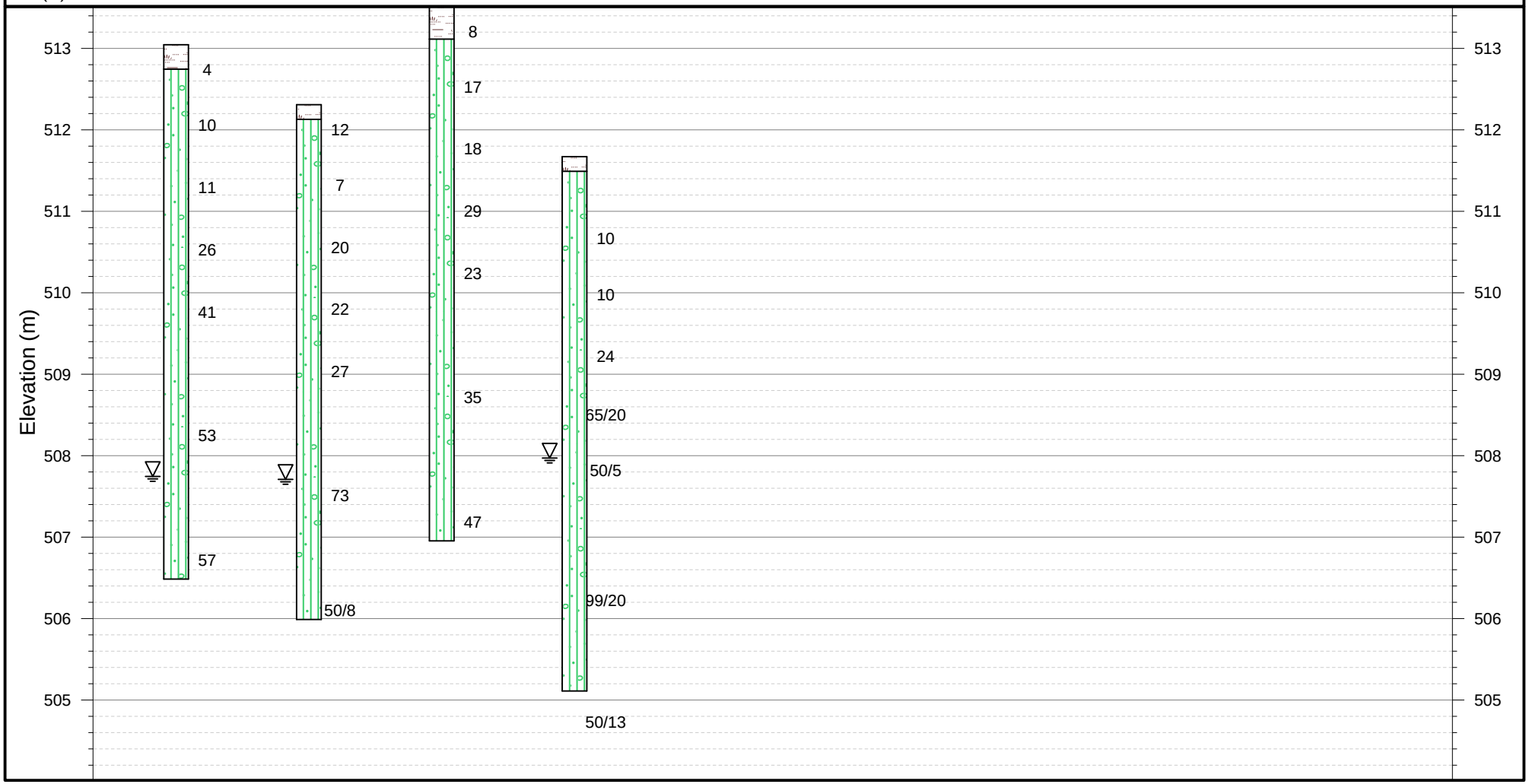
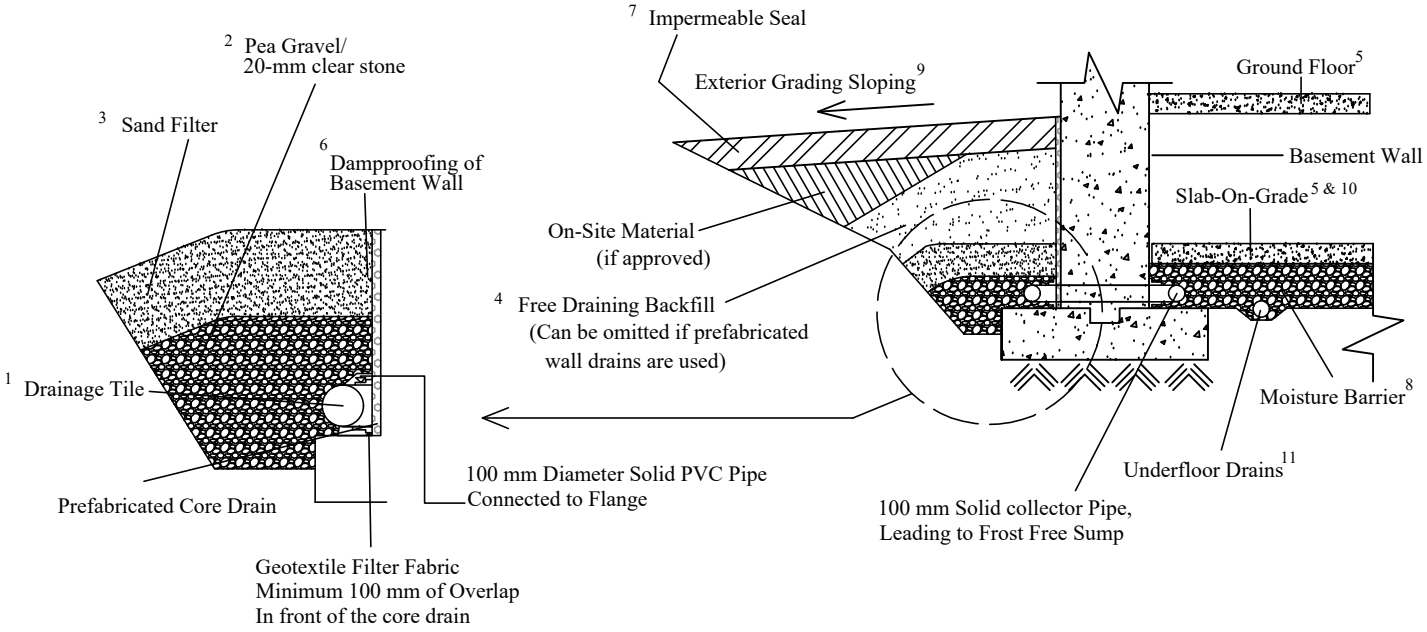
SUBSURFACE PROFILE
DRAWING NO. 2
SCALE: AS SHOWN

JOB NO.: 2310-S058
REPORT DATE: December 2024
PROJECT DESCRIPTION: Proposed Residential Development

PROJECT LOCATION: CON 2 SWTSR PT LOT 234
Southeast of Grey Road 9 and Ida Street,
Township of Southgate (Dundalk)

LEGEND
SANDY SILT TILL
TOPSOIL
WATER LEVEL (END OF DRILLING)





NOTES:

1. **Drainage tile**: consists of 100 mm (4") diameter weeping tile or equivalent perforated pipe leading to a positive sump or outlet. Invert to be at minimum of 150 mm (6") below underside of basement floor slab.

2. **Pea gravel**: at 150 mm (6") on the top and sides of drain. If drain is not placed on concrete footing, provide 100 mm (4") of pea gravel below drain. The pea gravel may be replaced by 20 mm clear stone provided that the drain is covered by a porous geotextile membrane of Terrafix 270R or equivalent.

3. **Filter material**: consists of C.S.A. fine concrete aggregate. A minimum of 300 mm (12") on the top and sides of gravel. This may be replaced by an approved porous geotextile membrane of Terrafix 270R or equivalent.

4. **Free-draining backfill**: OPSS Granular 'B' or equivalent, compacted to 95% to 98% (maximum) Standard Proctor dry density. Do not compact closer than 1.8 m (6') from wall with heavy equipment. This may be replaced by on-site material if prefabricated wall drains (Miradrain) extending from the finished grade to the bottom of the basement wall are used.

5. **Do not backfill** until the wall is supported by the basement floor slab and ground floor framing, or adequate bracing.

6. **Dampproofing** of the basement wall is required before backfilling

7. **Impermeable backfill seal** of compacted clay, clayey silt or equivalent. If the original soil in the vicinity is a free-draining sand, the seal may be omitted.

8. **Moisture barrier**: 19-mm CRL or compacted OPSS Granular 'A', or equivalent. The thickness of this layer should be 150 mm (6") minimum.

9. **Exterior Grade**: slope away from basement wall on all the sides of the building.

10. **Slab-On-Grade** should not be structurally connected to walls or foundations.

11. **Underfloor drains*** should be placed in parallel rows at 6 to 8 m (20'-25') centre, on 100 mm (4") of pea gravel with 150 mm (6") of pea gravel on top and sides. The spacing should be at least 300 mm (12") between the underside of the floor slab and the top of the pipe. The drains should be connected to positive sumps or outlets. Do not connect the underfloor drains to the perimeter drains.

* Underfloor drains can be deleted where not required.

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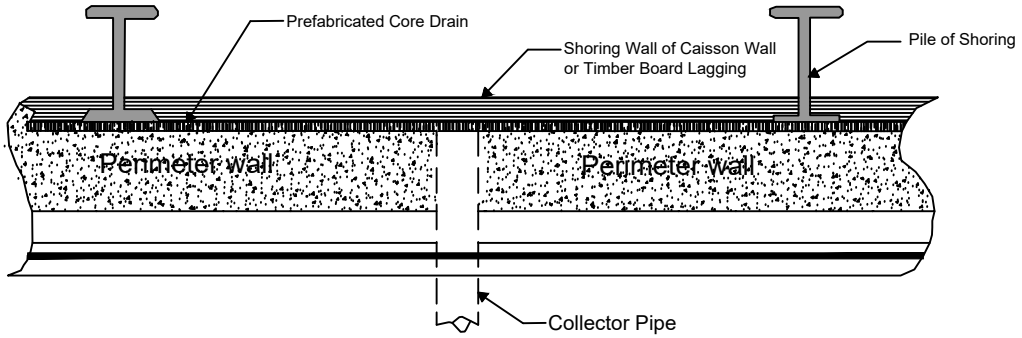
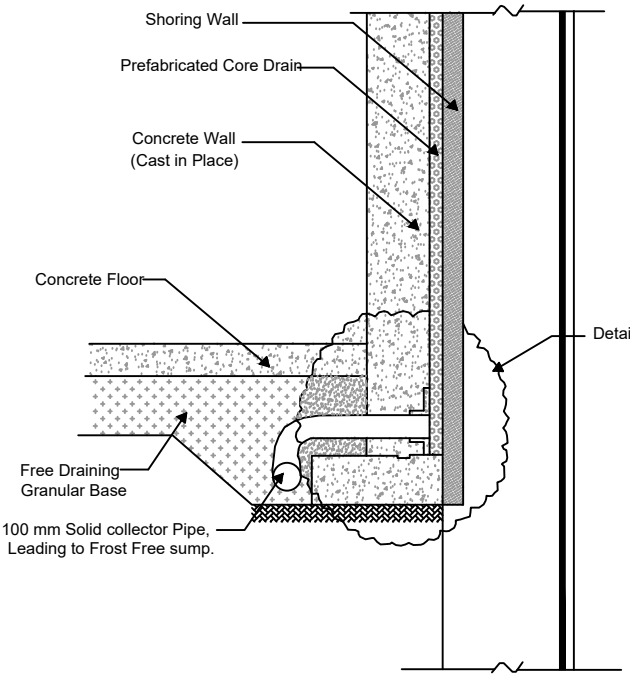
Perimeter Drainage System

SITE: CON 2 SWTSR PT LOT 234
Southeast of Grey Road 9 and Ida Street,
Township of Southgate (Dundlalk)

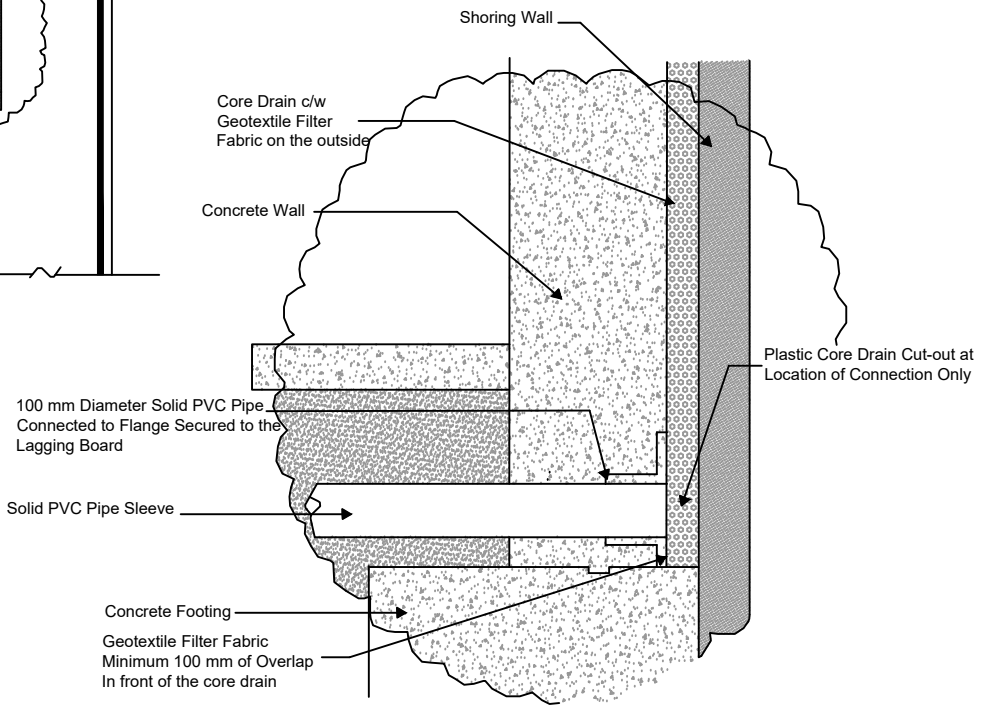
DESIGNED BY: C.L.	**CHECKED BY:** K.H.	**DWG NO.:** 3	
SCALE: N.T.S.	**REF. NO.:** 2310-S058	**DATE:** December 2024	**REV** -



PLAN



TYPICAL SECTION



DETAIL A

NOTES:

1. A continuous blanket of prefabricated drainage system, Miradrain 6000 or equivalent, should extend continuously from the top of footings to the ground surface.
2. All joints of the Miradrain should be taped. All openings above the concrete footing must be covered with filter fabric to prevent intrusion of fresh concrete into the core of the drain.
3. Backfill behind the lagging board must be free draining. Filter fabric or straw should be used to prevent loss of fines behind the lagging.
4. The perimeter drainage and any subfloor drainage systems must be kept separate.

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Perimeter Subdrain System
(Shored Excavation)

SITE: CON 2 SWTSR PT LOT 234
Southeast of Grey Road 9 and Ida Street,
Township of Southgate (Dundalk)

DESIGNED BY: C.L.	**CHECKED BY:** K.H.	**DWG NO.:** 4	
SCALE: N.T.S.	**REF. NO.:** 2310-S058	**DATE:** December 2024	**REV** -