PATERSON GROUP

memorandum

re: **Excavation, Grading and Drainage Plan Review**
Proposed Residential Development
100 Steacie Drive, Ottawa, Ontario

to: Brigil - **James Battison** - jamesbattison@brigil.com

date: June 1, 2026

file: PG5788-MEMO.03 Revision 3

Further to your request and authorization, Paterson Group (Paterson) prepared the current memorandum to complete an excavation, grading and site servicing plan review for the proposed residential development at the aforementioned site. The following memorandum should be read in conjunction with the following reports:

- Paterson Group Report PG5788-1 Revision 2, dated September 17, 2025
- Project No. 160401570, Drawing No. GP-1 Revision 8 – Grading Plan, dated February 26, 2026, prepared by Stantec Consulting Ltd.
- Project No.160401570, Drawing No. SSP-1 Revision 8 – Site Servicing Plan, dated March 24, 2026, prepared by Stantec Consulting Ltd.
- Project No. 13264, Drawing No. A200 Revision 2 – Basement Floor Plan, dated December 2, 2024, prepared by NEUF Architects Inc.

1.0 Grading Plan Review

The proposed building is expected to be constructed over conventional footings bearing on bedrock or on piles end bearing on bedrock where the bedrock is deeper, generally within the north and northeastern portions of the site.

Due to the silty clay deposit a permissible grade raise restriction of 2.2 m is applicable for site.

Based on our review of the site grading plans, the north and northeast portions of the site were noted to have grade raise exceedance above the permissible grade raise limits. Since the building's footings are expected to be founded on bedrock, the proposed grade raise exceedance will not negatively impact the building. However, some minor settlement can be expected within the surrounding landscaping areas – including any retaining walls and the patios.

It should also be noted that based on the proposed building elevations, pre-loading will also take place during construction, which will assist with pre-consolidating the underlying clay layer to some extent.

To mitigate the settlement in the landscaping areas, some lightweight (LWF) will be required surrounding the proposed retaining walls and the hardscaped areas located along the north and northeast side of the building. The LWF material should consist of EPS 15.

Reference should be made to the attached grading plan markup and LWF details attached below for the required LWF thickness within the respective areas.

It is not recommended to plant medium to large trees directly above the LWF EPS. The EPS should be covered with a polyethylene sheet and surrounded with a non-woven geotextile such as Terrafix 270R.

A minimum of 200 mm of OPSS Granular A should be placed above the LWF under the hardscaped areas and a minimum 200 mm of approved fill material and a minimum of 100 mm of topsoil should be placed under landscaped areas.

2.0 Site Servicing Plan Review

2.1 Frost Protection

Based on our review of the above reference site servicing drawings, it was noted that , the proposed watermain will have less than 2.4 m of soil cover available above the pipe at the following locations: **STN 1 + 138.2, STN 1 + 141.8** and **STN 0 + 222.8**. As per the City of Ottawa standards, all watermain pipes are recommended to be provided with minimum 2.4 m of soil cover.

Where insufficient soil cover (i.e.- less than 2.4 m) is available for the watermain, the following frost protection criteria outlined in Table 1 is applicable.

Table 1 – Frost Protection for Watermain

Soil Cover Provided (mm)	Insulation Thickness (mm)
1800 to 2400	50
1500 to 1800	75
1200 to 1500	100

The rigid insulation should be installed in accordance with City of Ottawa Drawing W22. The rigid insulation should be placed 150 mm above the pipe on top of a compacted Granular A backfill and should have a minimum of 150 mm of Granular A or Granular B Type II backfill above the rigid insulation. The rigid insulation should extend a minimum of 150 mm horizontally beyond the edge of the pipe and vertically down to the bottom of the pipe bedding, or alternatively to extend minimum 1.2 m on each side of the pipe.

Further to our review, some of the stormwater services were noted to have less than 2.0 m of soil cover. All the storm and sanitary service pipes should be provided with a minimum of 2.0 m of soil cover for frost protection. Where insufficient soil cover (i.e.- less than 2.0 m) is available for the stormwater pipes, the following frost protection criteria outlined in Table 2 is applicable.

Table 2- Frost Protection for Stormwater Services		
Soil Cover Provided D (mm)	**Insulation Dimensions (mm)**	
	Thickness (mm)	**Length (mm)**
800 to 1,100	100	Extend 1,200 mm horizontally beyond the edge face of the pipe
1,100 to 1,400	75	Extend 900 mm horizontally beyond the edge face of the pipe
1,400 to 1,700	50	Extend 600 mm horizontally beyond the edge face of the pipe
1,700 to 2,000	50	Extend 300 mm horizontally beyond the edge face of the pipe

The rigid insulation should be placed 150 mm above the pipe on top of a compacted Granular A backfill and should have a minimum of 150 mm of Granular A or Granular B Type II backfill above the rigid insulation. Rigid insulation placed underneath roadways should consist of minimum HI-40 or SR.P400 equivalent.

2.2 Stormwater Pipe Protection

Based on our review of the Site Servicing plan it was noted that the invert of the stormwater building service connection from STM 1 along the east side of the building, was lower than the proposed USF elevation of the footings. Based on the proposed building loading, it is recommended that the stormwater connection pipe to the building be sleeved and surrounded by minimum 10 MPa lean concrete extending from the bedrock surface to the USF elevation of the building, to transfer the building load to the bedrock.

3.0 Proposed Berm

Based on our review of the above-referenced grading plans a proposed crash berm will be constructed along the north and northeastern portions of the site that is located approximately within 30 m from the existing railway line. It is understood that the proposed berm will be constructed to a height to 2.5 m above ground surface using a brown silty clay fill material. It is expected the maximum slope of the berm will be 40% or approximately 2.5H to 1V. Furthermore, within the northwest portion of the berm, a proposed retaining wall – approximately 1.5 m high, is located above the berm.

Based on the above-noted information, Paterson completed a slope stability analysis, based on one (1) critical cross-section being considered as the worst-case scenario for slope stability.

The slope stability analysis was modelled in SLIDE, a computer program which permits a two-dimensional slope stability analysis calculating several methods including the Bishop's method and Morgenstern-Price Method, which are widely accepted slope analysis methods. The program calculates a factor of safety, which represents the ratio of the forces resisting failure to forces favouring failure. Theoretically, a factor of safety of 1.0 represents a condition where the slope is stable.

However, due to intrinsic limitations of the calculation methods and the variability of the subsurface soil and groundwater conditions, a factor of safety greater than 1.0 is generally required for the failure risk to be considered acceptable. A minimum factor of safety of 1.5 is generally recommended for conditions where the slope failure would comprise permanent structures.

An analysis considering seismic loading was also completed. A horizontal acceleration of 0.15 g was considered for the sections for the seismic loading condition in accordance with OBC 2024. A factor of safety of 1.1 is considered to be satisfactory for stability analyses including seismic loading.

The effective strength soil parameters used for static analysis were chosen based on the subsoil information recovered during the site visit, and our general knowledge of the geology in the area. The effective strength soil parameters used for static condition are presented in Table 1 below.

Table 1 - Effective Strength Soil and Material Parameters (Static Analysis)

Soil Layer	Unit Weight (kN/m^3)	Friction Angle (degrees)	Cohesion (kPa)
Topsoil	15	28	3
Brown Silty Clay Crust	18	32	5
Brown Silty Clay Fill	18	29	5
Grey Silty Clay	16	30	5
Glacial Till	18	35	2
Bedrock	22	-	-
Engineered Fill	22	34	0
Lightweight Fill	0.3	-	10

The total strength soil parameters used for seismic analysis were chosen based on the hand excavated holes completed at the time of our site visit, and our general knowledge of the geology in the area. The strength parameters used for seismic condition at the slope cross-sections are presented in Table 2 below:

Table 2 - Effective Strength Soil and Material Parameters (Seismic Analysis)			
Soil Layer	**Unit Weight (kN/m^3)**	**Friction Angle (degrees)**	**Cohesion (kPa)**
Topsoil	15	28	3
Brown Silty Clay Crust	18	-	100
Brown Silty Clay Fill	18	-	20
Grey Silty Clay	16	-	50
Glacial Till	18	35	2
Bedrock	22	-	-
Engineered Fill	22	34	0
Lightweight Fill	0.3	-	10

The static and seismic analysis results for slope cross-section A are presented in the figures attached below. In summary, the factor of safety for the slope was more than 1.5 under static conditions and more than 1.1 under seismic conditions.

4.0 Summary

Provided the above recommendations are taken into consideration, the proposed grading and site servicing plan is acceptable from a geotechnical perspective.

We trust that the current submission meets your immediate requirements.

Best Regards,

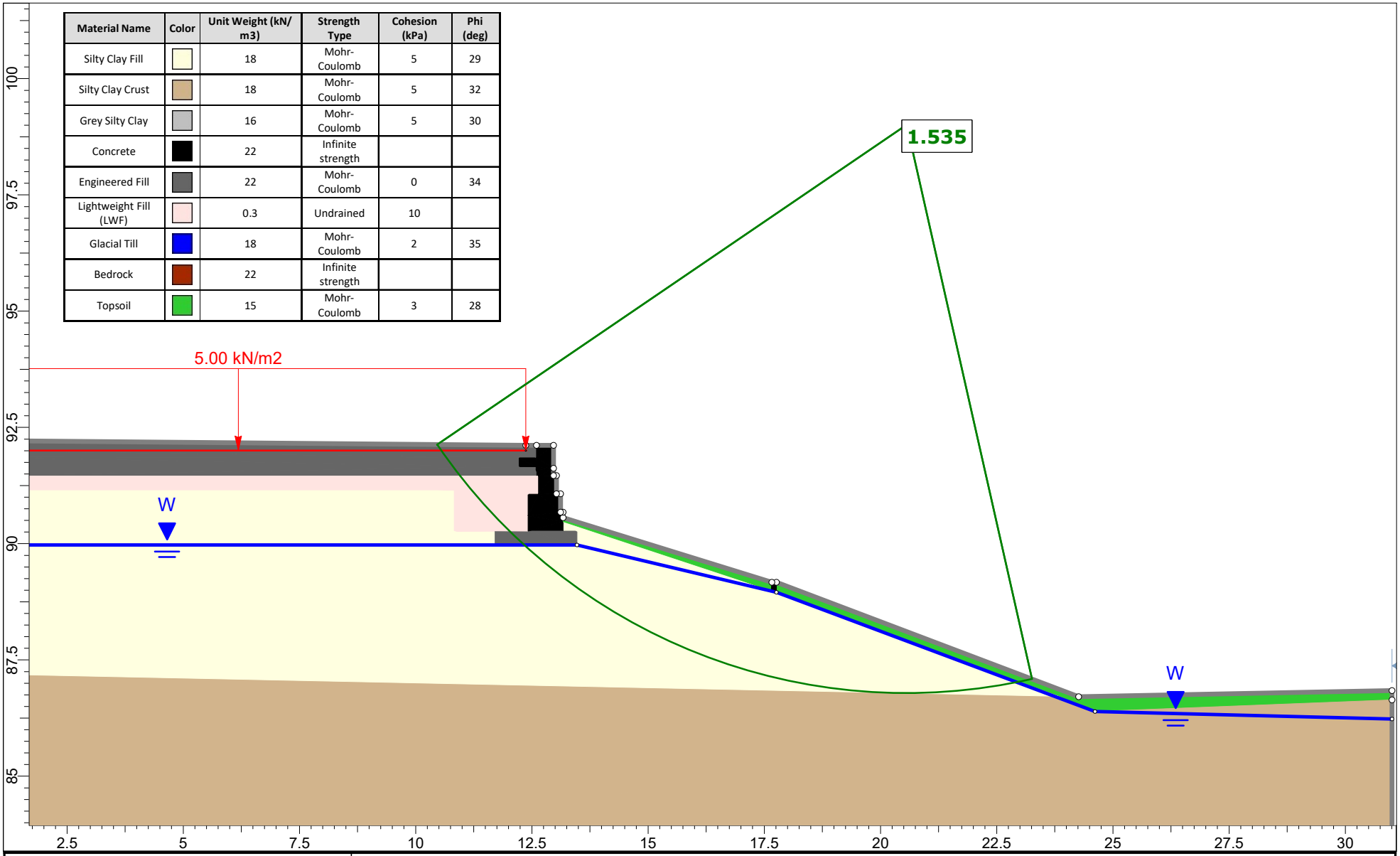
Paterson Group Inc.

June 1, 2026

Pratheep Thirumoolan, M.Eng., P.Eng.

Joey R. Villeneuve, M.A.Sc., P.Eng.

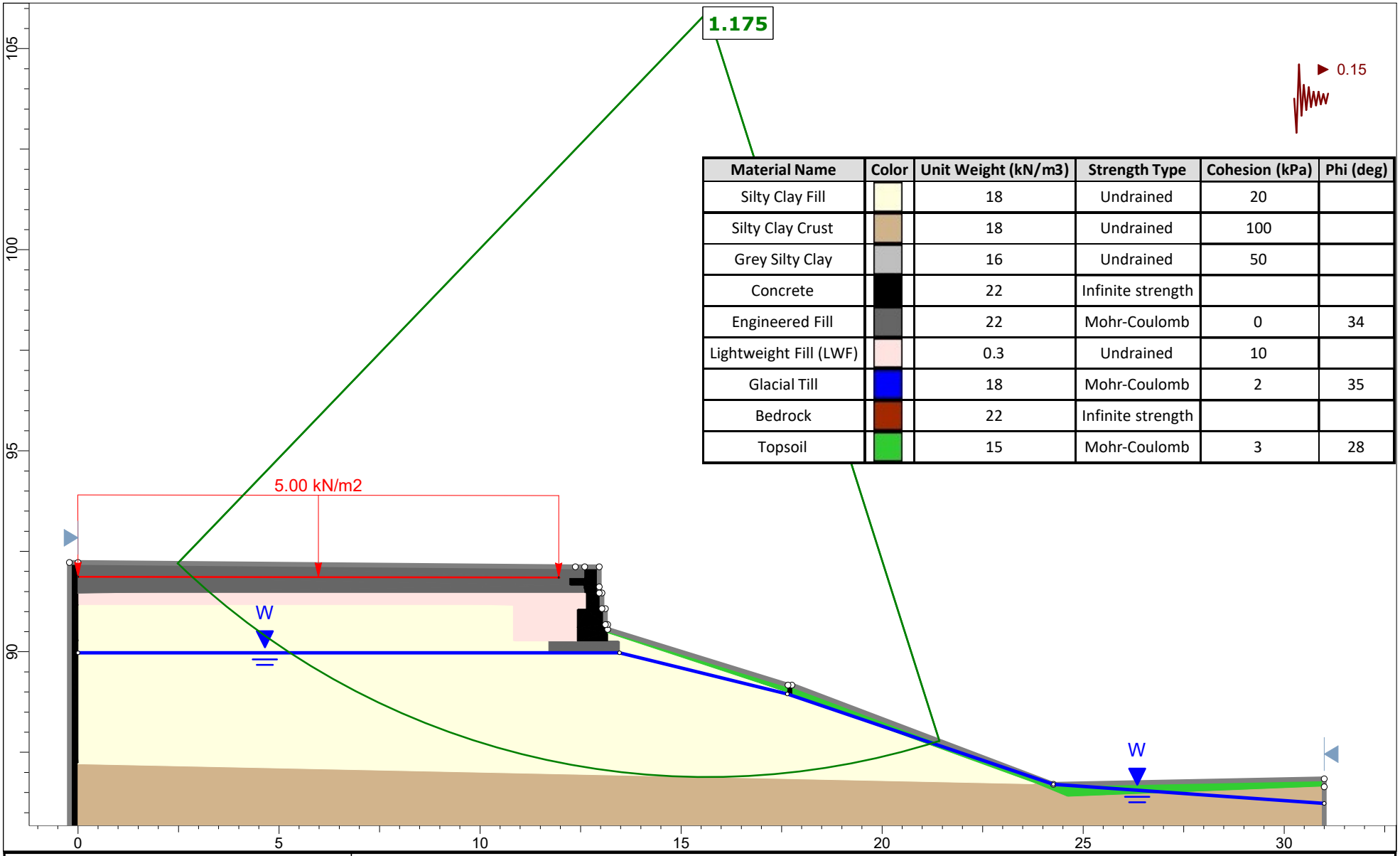
Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)
Silty Clay Fill		18	Mohr-Coulomb	5	29
Silty Clay Crust		18	Mohr-Coulomb	5	32
Grey Silty Clay		16	Mohr-Coulomb	5	30
Concrete		22	Infinite strength		
Engineered Fill		22	Mohr-Coulomb	0	34
Lightweight Fill (LWF)		0.3	Undrained	10	
Glacial Till		18	Mohr-Coulomb	2	35
Bedrock		22	Infinite strength		
Topsoil		15	Mohr-Coulomb	3	28



PATERSON GROUP

SLIDEINTERPRET 9.025

Project	PG5788 - 100 Steacie Drive		
Group	Section A - Static Analysis		
Drawn By	PT	*Company*	Brigil
Date	04/2026	*File Name*	Slope Stability Assessment

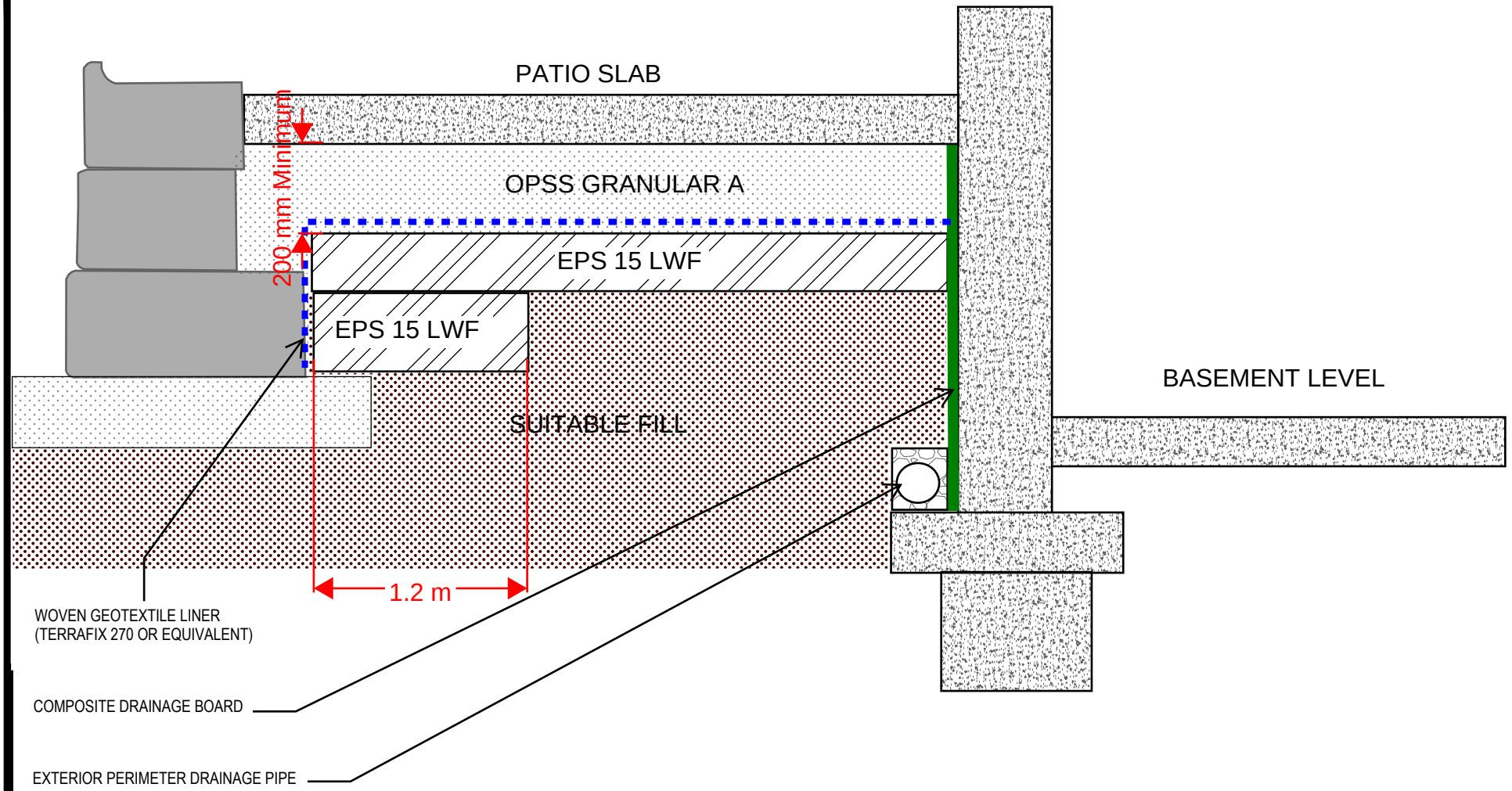


Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)
Silty Clay Fill		18	Undrained	20	
Silty Clay Crust		18	Undrained	100	
Grey Silty Clay		16	Undrained	50	
Concrete		22	Infinite strength		
Engineered Fill		22	Mohr-Coulomb	0	34
Lightweight Fill (LWF)		0.3	Undrained	10	
Glacial Till		18	Mohr-Coulomb	2	35
Bedrock		22	Infinite strength		
Topsoil		15	Mohr-Coulomb	3	28

PATERSON GROUP

SLIDEINTERPRET 9.025

Project	PG5788 - 100 Steacie Drive		
Group	Section A - Seismic Analysis		
Drawn By	PT	*Company*	Brigil
Date	04/2026	*File Name*	Slope Stability Assessment



PATERSON GROUP
9 AURIGA DRIVE
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BRIGIL
GRADING PLAN REVIEW
100 STEACIE DRIVE

OTTAWA, ONTARIO

Title:

LIGHTWEIGHT FILL DETAIL

Scale: N.T.S.	Date: 09/2025
Drawn by: PT	Report No.: PG5788-MEMO.03
Checked by: PT	Drawing No.: FIGURE 1
Approved by: JV	Revision No.:

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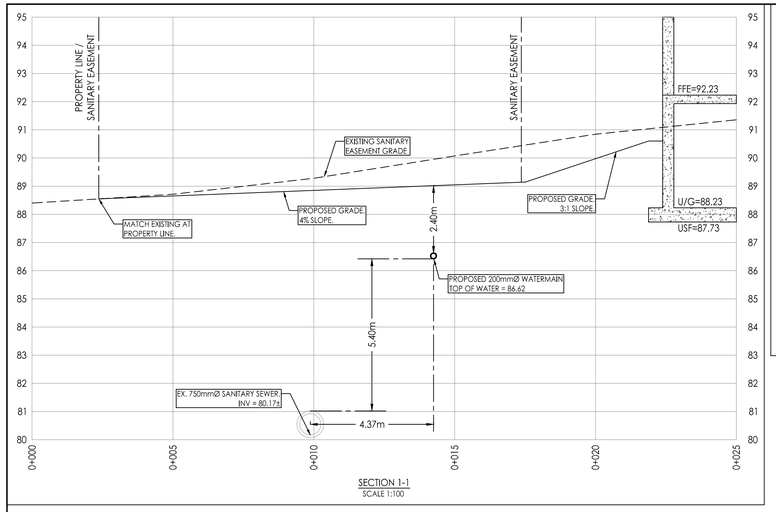
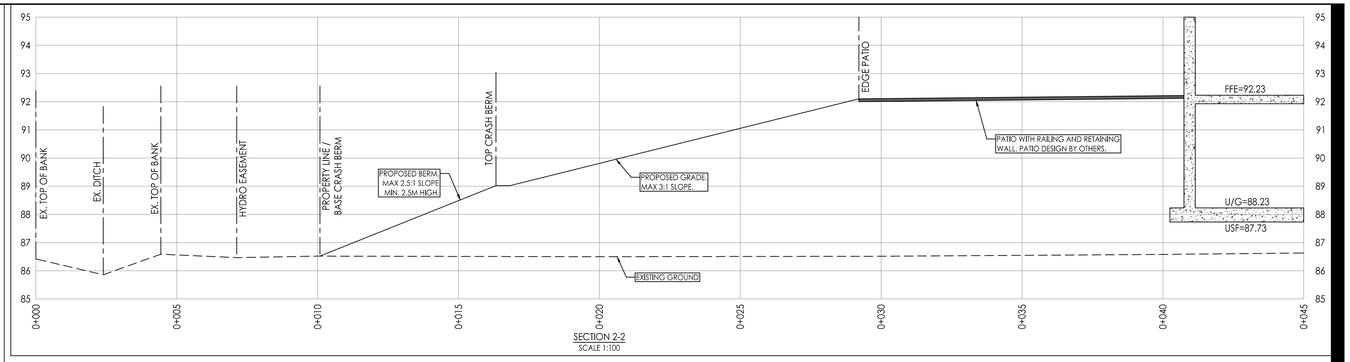
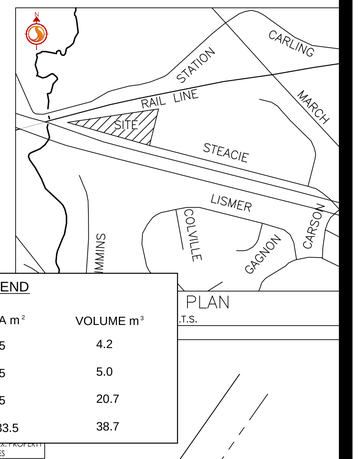


SECTION 1-1
SCALE 1:100



SECTION 2-2
SCALE 1:100



KEY PLAN
N.T.S.

LEGEND

LWF THICKNESS	AREA m²	VOLUME m³
1.2 m EPS 15	3.5	4.2
0.9 m EPS 15	5.5	5.0
0.6 m EPS 15	5.5	20.7
0.3 m EPS 15	133.5	38.7

Stantec

Stantec Consulting Ltd.
400 - 1331 Clyde Avenue
Ottawa ON
Tel. 613.722.4420
www.stantec.com

Legend

- ORIGINAL GROUND ELEVATION
- PROPOSED ELEVATION
- PROPOSED LOT CORNER ELEVATION / EXISTING ELEVATION AT LOT CORNER
- FLOW DIRECTION AND GRADE
- FFE=99.99 — FINISHED FIRST FLOOR ELEVATION
- UG PARK=96.99 — UNDERGROUND PARKING SLAB
- TERRACING 3:1 SLOPE MAXIMUM (UNLESS OTHERWISE SHOWN)
- DIRECTION OF EMERGENCY OVERLAND FLOW
- PROPOSED VALVE BOX
- PROPOSED VALVE CHAMBER
- PROPOSED FIRE HYDRANT
- PROPOSED VALVE AND DMA CHAMBER AS PER CITY STD W3
- PROPOSED SANITARY SEWER MANHOLE
- PROPOSED STORM SEWER MANHOLE
- PROPOSED CATCHBASIN MANHOLE
- PROPOSED CATCHBASIN
- D.C. — PROPOSED DEPRESSED CURB LOCATION
- PROPOSED BARRIER CURB
- OVERLAND SPILL / HIGH POINT LOCATION
- TWSI LOCATION AS PER CITY STD
- EX. TREE TO BE REMOVED
- EX. TREE TO BE RETAINED
- ROAD CUT ASPHALT RE-INSTATEMENT PER CITY STD R10
- GRAVEL RE-INSTATEMENT AREA
- LANDSCAPE RE-INSTATEMENT AREA. 150mm TOPSOIL AND SEED
- HEAVY DUTY ASPHALT
- ASPHALT ACCESS PER MODIFIED SC21. SEE DETAIL DWG EC/DS-1
- RETAINED TREE CRITICAL ROOT ZONES (REFER TO TCR FOR DETAILS)
- TREE PROTECTION FENCING PER CITY STD F7 (REFER TO TCR FOR DETAILS)
- RD — ROOF DRAIN LOCATION

Notes

8	REVISED PER CITY COMMENTS	MJS	DT	26.02.26
7	REVISED PER CITY COMMENTS	MJS	DT	25.11.28
6	REVISED PER NEW SITE PLAN	MJS	DT	25.07.11
5	REVISED AS PER SITE PLAN AND CITY COMMENTS	MJS	DT	24.12.02
4	REVISED AS PER SITE PLAN AND CITY COMMENTS	MJS	DT	24.04.08
3	REVISED WATERMAIN SIZE	MJS	DT	22.04.08
2	REVISED AS PER CITY COMMENTS	MJS	TR	21.05.07
1	ISSUED FOR REVIEW	MJS	TR	20.11.23
	Revision	By	Appd.	YY.MM.DD

File Name: 160401570 DB	MJS	AMP	MJS	20.08.17
	Dwn.	Chkd.	Dsgn.	YY.MM.DD

Permit-Seal

Client/Project
BRIGIL

100 STEACIE DRIVE

OTTAWA, ON

Title
GRADING PLAN

Project No.	Scale	Drawing No.	Sheet	Revision
160401570	1:500 (0 5 15 25m)	GP-1	5 of 12	8

PLAN# 18327

D07-12-24-0086

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