patersongroup **memorandum**

consulting engineers

re:	**Geotechnical Slope Stability Review** **Rideau Carleton Raceway** **4837 Albion Road - Ottawa**
to:	Novatech **- Mr. Lee Sheets** - l.sheets@novatech-eng.com
cc:	A2S Consulting Engineers - **Mr. Albert Celli** - albert@a2s.ca
date:	April 23, 2020
file:	PG4315-MEMO.04 Revision 1

Further to your request and authorization, Paterson Group (Paterson) prepared the following memorandum to provide a geotechnical review of the slopes requiring to match proposed grades along the north portion of the parking lot to existing grades at the subject site.

Background Information

The following drawing was provided to Paterson and were reviewed as part of the current geotechnical review:

- ❏ Project No. 116111 - Drawing No. GR-4 - Grading Plan North-East Development - Revision 1 dated November 20, 2019 prepared by Novatech

Based on our review of the above noted plan, a maximum slope height of 1.5 m is required to match existing grades. Based on the space available, it is expected that a maximum 3H:1V slope profile will be used to shape the slopes required to meet existing grades.

Geotechnical Assessment

A geotechnical investigation was completed between October 2 and 9, 2019 for the subject site. Based on the results of the investigation the subsurface conditions conists mainly of silty sand and silty sand with gravel fill. The groundwater levels were measure at depths greater than 7 m below ground surface.

A section of the proposed slope was analyzed for global stability for the proposed development conditions under static and seismic loading. The slope stability analysis was completed using SLIDE, a computer program which permits a two-dimensional slope stability analysis using several methods including Bishop's method, which is a widely used and accepted analysis method.

The program calculates a factor of safety, which represents the ratio of forces resisting failure to those 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 subsoil and groundwater conditions, a factor of safety greater than 1.0 is usually required to ascertain that the risks of failure are acceptable.

A single section (Section B-B) of the slope was analysed since the slope is to be consistent throughout the entire north portion of the site. The location of the cross-section is presented on Drawing GR-4 - Grading Plan North attached to the current report.

The results of the static loading analyses for the cross-section is shown in Figure 2. The minimum slope stability factor of safety was calculated to exceed the minimum recommended factor of safety of 1.5 for static conditions. Based on the results, the proposed slope is considered stable under static loading.

The result of the analysis including seismic loading is shown in Figure 3. The overall slope stability factor of safety for the subject section considering seismic loading was found to be greater than 1.1. Based on the results, the slope is considered stable under seismic loading.

Based on the results of the slope stability analysis, the proposed slope is considered stable from a geotechnical perspective. Construction activities are not anticipated to affect the global stability of the subject site.

Geotechnical Recommendations

Proposed Slope

From a geotechnical perspective a 3H:1V slope is considered stable. It is recommended that the slope face be protected during construction against surficial erosion until vegetation is established. A minimum layer of 100 mm of topsoil is recommended. The topsoil should be covered with an erosion control blanket and hardy grass seeds should be used to establish vegetation.

We trust that this information satisfies your immediate requirements.

Paterson Group Inc.

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

David J. Gilbert, P.Eng.

Attachments:

- ❏ Figure 1 - Key Plan
- ❏ Figure 2 - Section B - Proposed Conditions (Static)
- ❏ Figure 3 - Section B - Proposed Conditions (Seismic)
- ❏ Drawing No. GR-4 - Grading Plan North-East Development

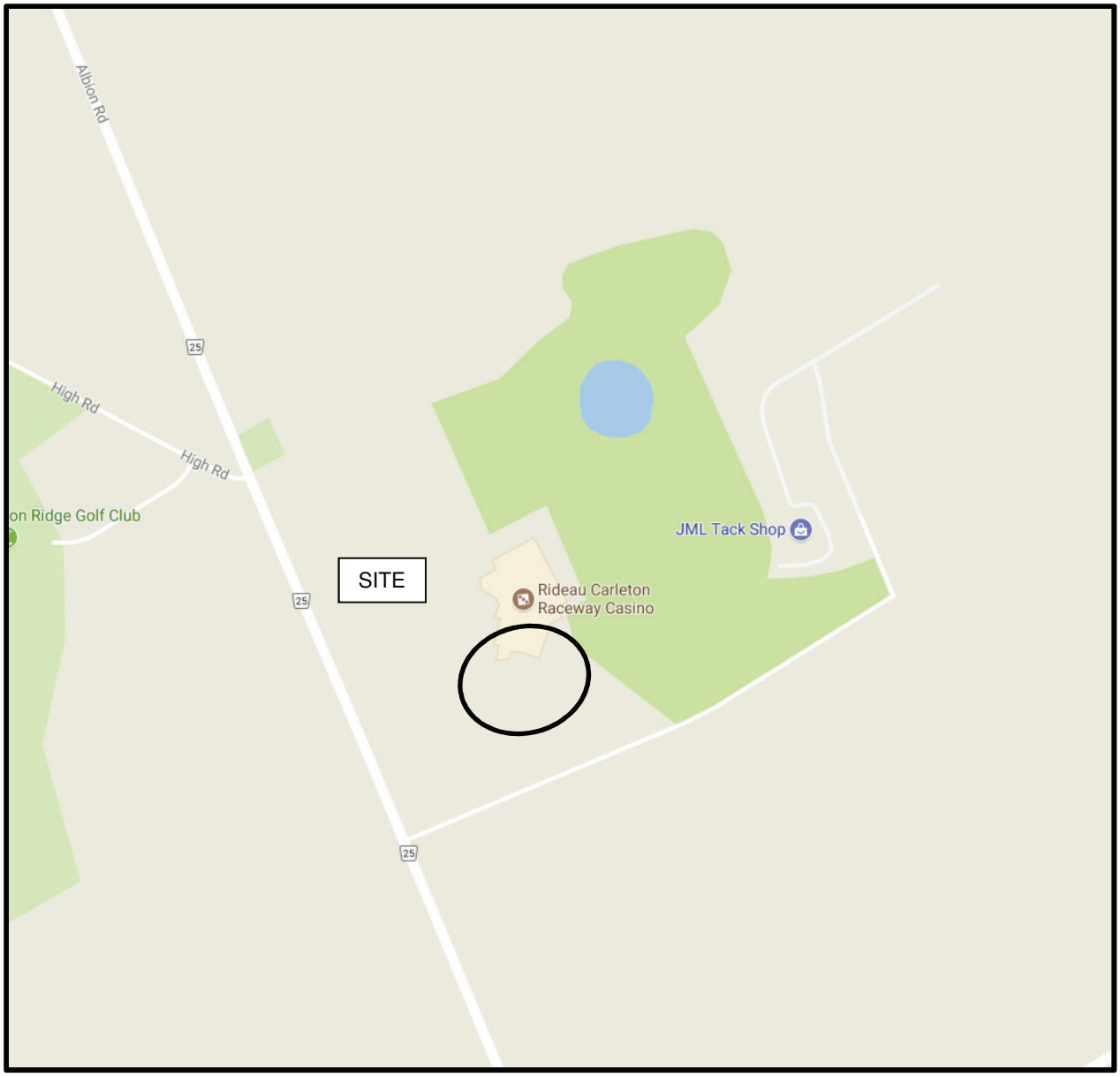
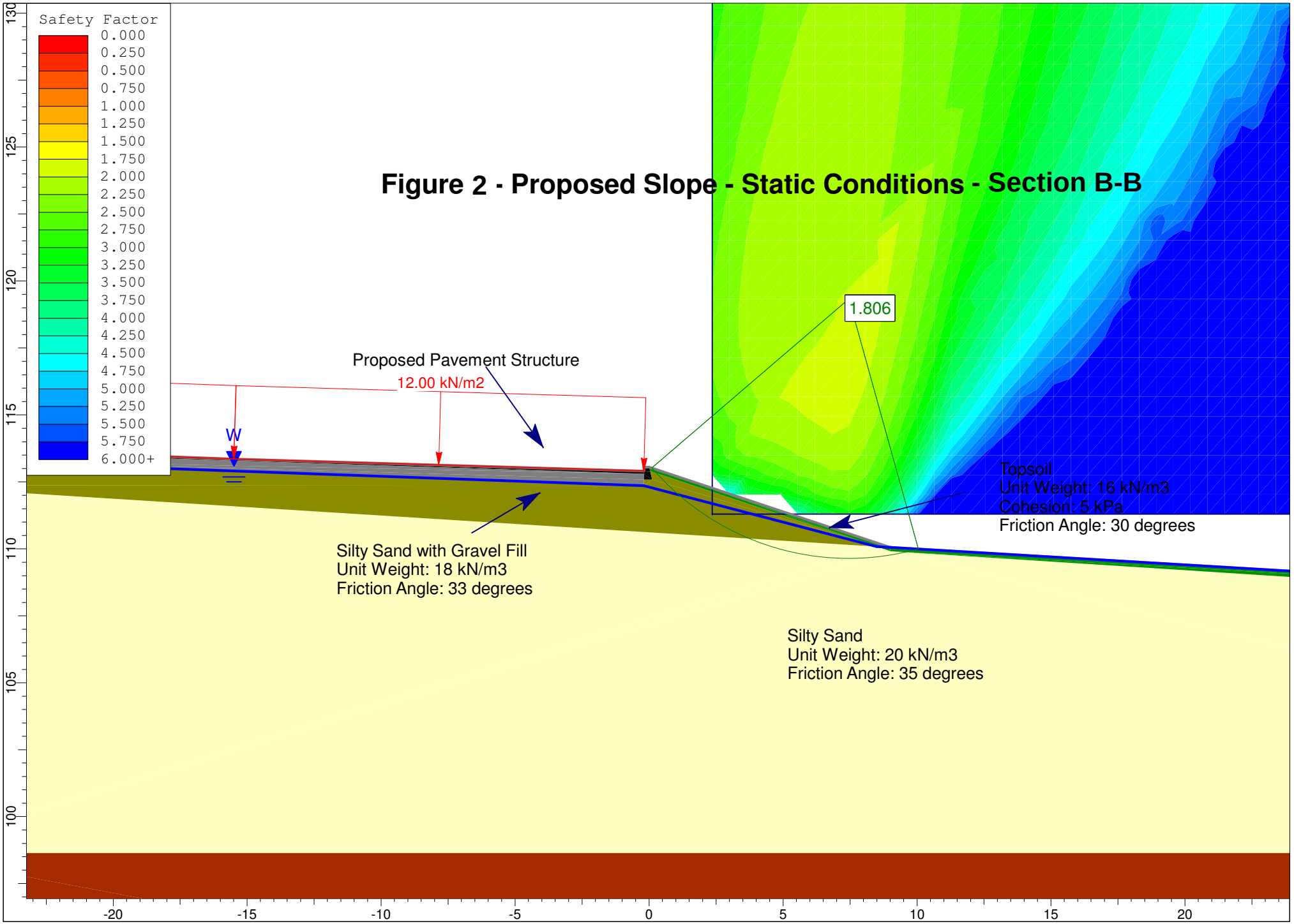


FIGURE 1

KEY PLAN


Safety Factor
0.000
0.250
0.500
0.750
1.000
1.250
1.500
1.750
2.000
2.250
2.500
2.750
3.000
3.250
3.500
3.750
4.000
4.250
4.500
4.750
5.000
5.250
5.500
5.750
6.000+
Figure 2 - Proposed Slope - Static Conditions - Section B-B
1.806
Proposed Pavement Structure
12.00 kN/m2
W
Topsoil
Unit Weight: 16 kN/m3
Cohesion: 5 kPa
Friction Angle: 30 degrees
Silty Sand with Gravel Fill
Unit Weight: 18 kN/m3
Friction Angle: 33 degrees
Silty Sand
Unit Weight: 20 kN/m3
Friction Angle: 35 degrees
130
125
120
115
110
105
100
-20
-15
-10
-5
0
5
10
15
20

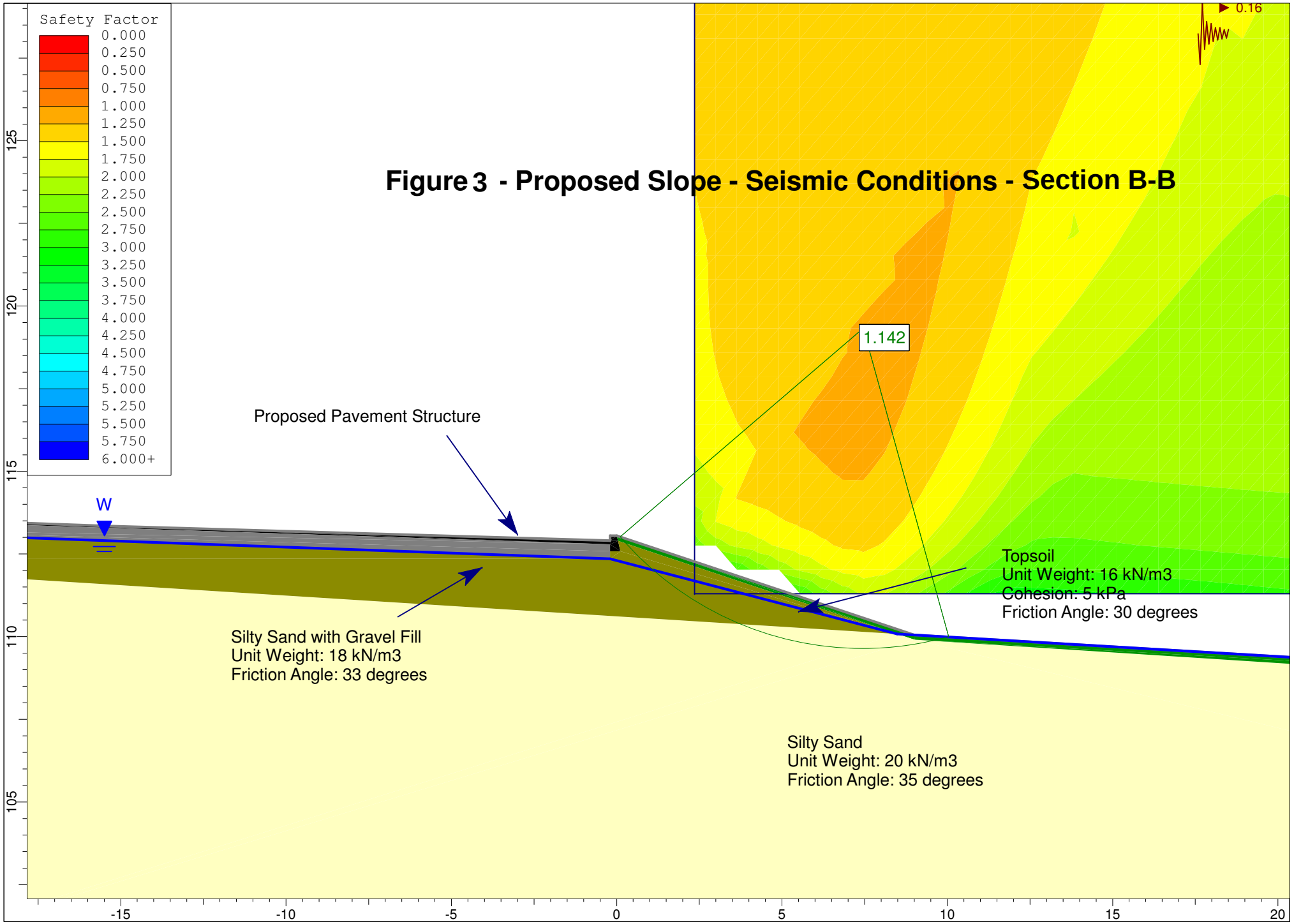


Figure 3 - Proposed Slope - Seismic Conditions - Section B-B

NOTE:
THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

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NOT FOR CONSTRUCTION

No.	REVISION	DATE	BY
1	ISSUED FOR SITE PLAN APPROVAL	NOV 20/19	CJR

SCALE 1:400

1:400 — 0 4 8 12 16

DESIGN	MJH
CHECKED	CJR
DRAWN	MJH
CHECKED	CJR
APPROVED	JLS

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER M.J. HREHORIAK 100211256 NOV 20/19 PROVINCE OF ONTARIO

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LOCATION
4837 ALBION ROAD, CITY OF OTTAWA
HARD ROCK OTTAWA

DRAWING NAME
GRADING PLAN
NORTH-EAST DEVELOPMENT

PROJECT No. 116111
REV REV # 1
DRAWING No. 116111-GR4

PLANB1.DWG - 1000mmx707mm