

November 15, 2016
File: PG3780-LET.02

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Environmental Engineering
Hydrogeology
Geological Engineering
Materials Testing
Building Science
Archaeological Services

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Attention: **Mr. Ryan Rutherford**

Subject: **Geotechnical Investigation
Proposed Residential Development
244 Fountain Place - Ottawa**

Dear Sir,

Upon your request, Paterson Group (Paterson) has completed a slope stability analysis to assess the stability of the existing slopes within the subject site. This report should be read in conjunction with Paterson's Letter Report PG3780-LET.01 dated April 24, 2016.

It is to our understanding that the proposed development consists of 2 multi-storey residential buildings with underground parking. The site is bordered by two (2) slopes along the north and west property lines.

As part of this assessment, Paterson reviewed the following drawings:

- Additional Topographic Information of Part of Lot C Concession D (Rideau Front), Reference No. 16-10-027-00, City of Ottawa, dated May 3, 2016, Prepared by J. D. Barnes Limited.

1.0 Background Information

Based on our review of the above noted drawing, two (2) major slopes are currently present along the north and west property lines of the subject site. The ground surface slopes down toward the east and south portions of the subject site. A retaining wall varying in height between 0.5 to 1.5 m was also noted within the north boundary of the subject site.

Based on the available subsurface information, the ground surface is covered with a layer of topsoil with rootlets overlying a stiff to very stiff silty clay deposit. The test pit was terminated without encountering the groundwater table. However, based on experience with the immediate area, the long term groundwater level is expected between 4 to 5 m depth.

Based on available geological mapping, the subject site is located in an area where the bedrock consists of interbedded limestone and shale bedrock from the Verulam formation. The overburden drift thickness ranges between 15 to 25 m.

2.0 Slope Stability Analysis

A slope stability analysis was completed by Paterson for the subject slope. Two (2) slope sections were assessed within the most critical portions of the existing conditions within the subject site. The location of both cross-sections are presented in Drawing PG3965-2 - Slope Stability Analysis Sections.

The analysis of the stability of the slope was carried out using SLIDE, a computer program which permits a two-dimensional slope stability analysis using several methods including the Bishop's method, which is a widely used and accepted analysis method. The program calculates a factor of safety, which represents the ratio of the 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 one is usually required to ascertain the risks of failure are acceptable. A minimum factor of safety of 1.5 is generally recommended for conditions where the failure of the slope would endanger permanent structures. Under seismic loading, a minimum factor of safety of 1.1 is considered to be satisfactory.

The sections were analysed taking into account a groundwater level at ground surgence. Subsoil conditions at the cross-sections were inferred based on the findings at nearby test hole location and general knowledge of the area's geology.

Static Conditions Analysis

The results for the static conditions of the existing slopes, Section A running west to east and Section B running North to South are shown in Figures 1 and 3, respectively, and are attached to the present letter. The results of the slope stability analysis indicate that both sections have a slope stability factor of safety greater than 1.5.

Seismic Loading Analysis

An analysis considering seismic loading was also completed. A horizontal seismic acceleration, K_h , of 0.16G was considered for the analysed sections. The results of the analysis including seismic loading are shown in Figures 2 and 4 for the slope sections. The slope stability factors of safety for the subject sections were found to be greater than 1.1 for both sections.

3.0 Statement of Limitations

The recommendations made in this report are in accordance with our present understanding of the project. Should any conditions at the site be encountered which differ from those detailed within our report, we request that we be notified immediately in order to permit reassessment of our recommendations.

The present report applies only to the project described in this document. Use of this report TC United Group or their agents, without review by this firm for the applicability of our recommendations to the altered use of the report.

We trust that this information satisfies your requirements.

Best Regards,

Paterson Group Inc.

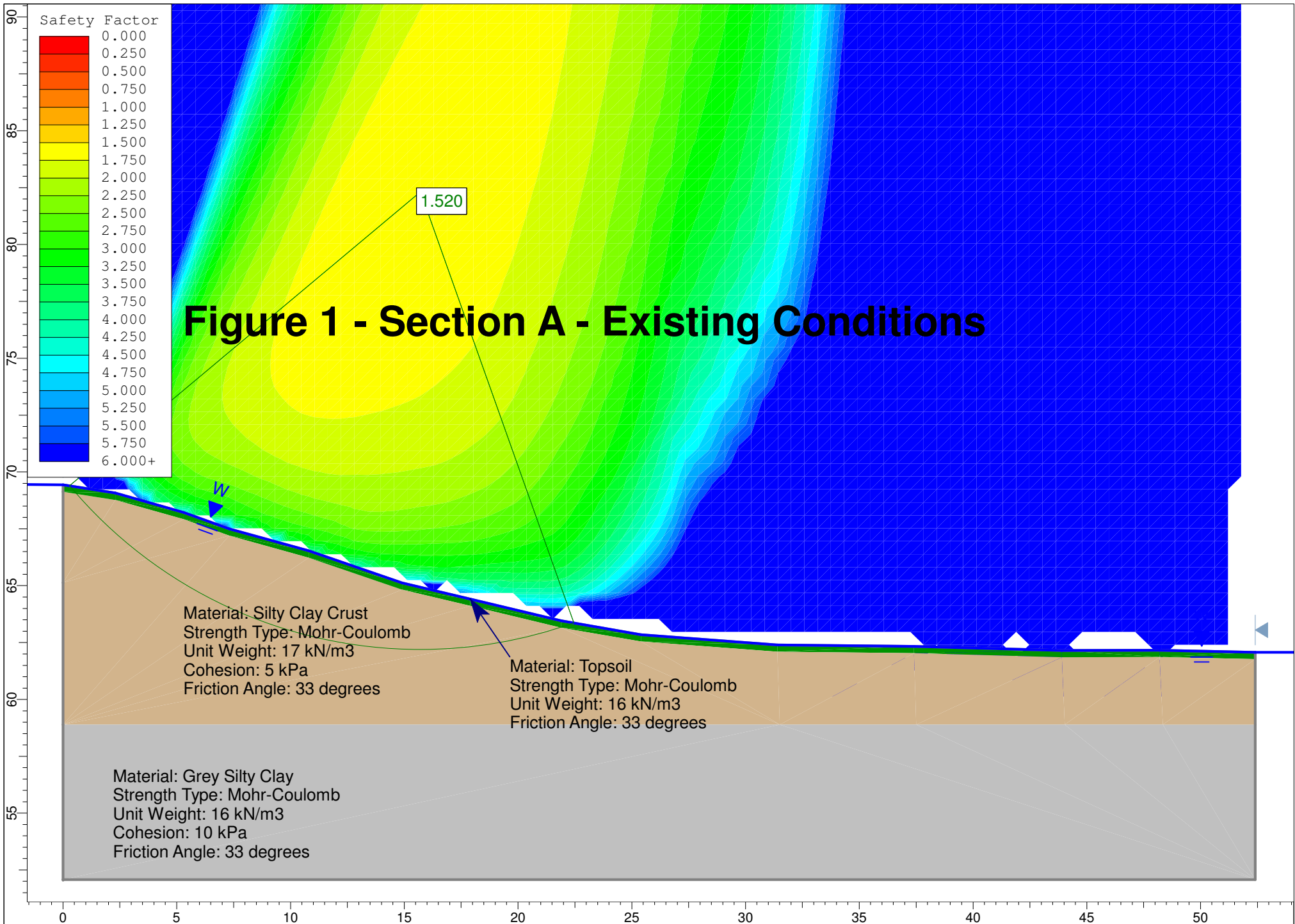


Faisal Abou-Seido, P.Eng.



Attachments

- Figures 1, 2, 3 and 4 - Sections for Slope Stability Analysis
- Drawing PG3965-1 - Slope Stability Analysis Sections



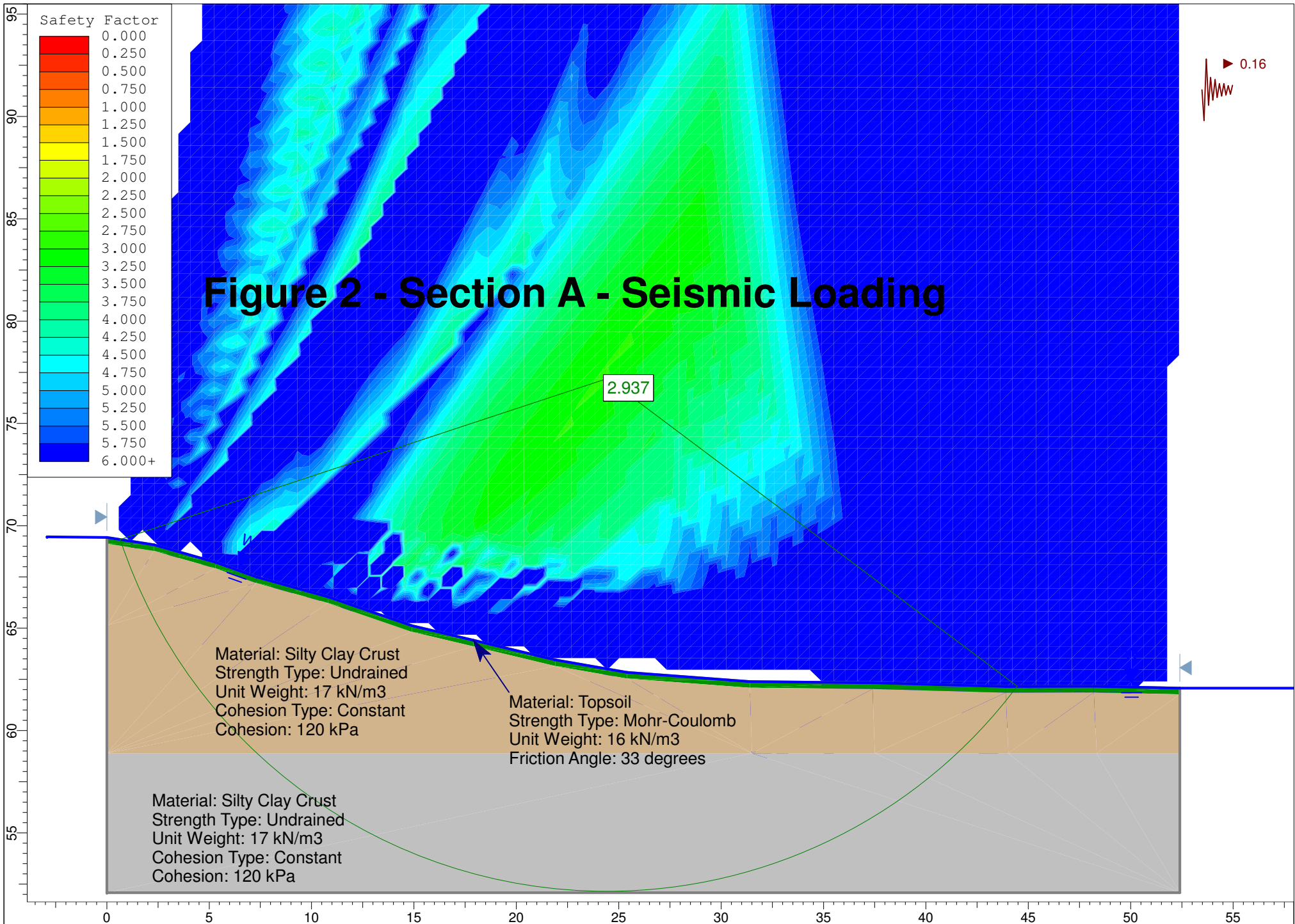


Figure 3 - Section B - Existing Conditions

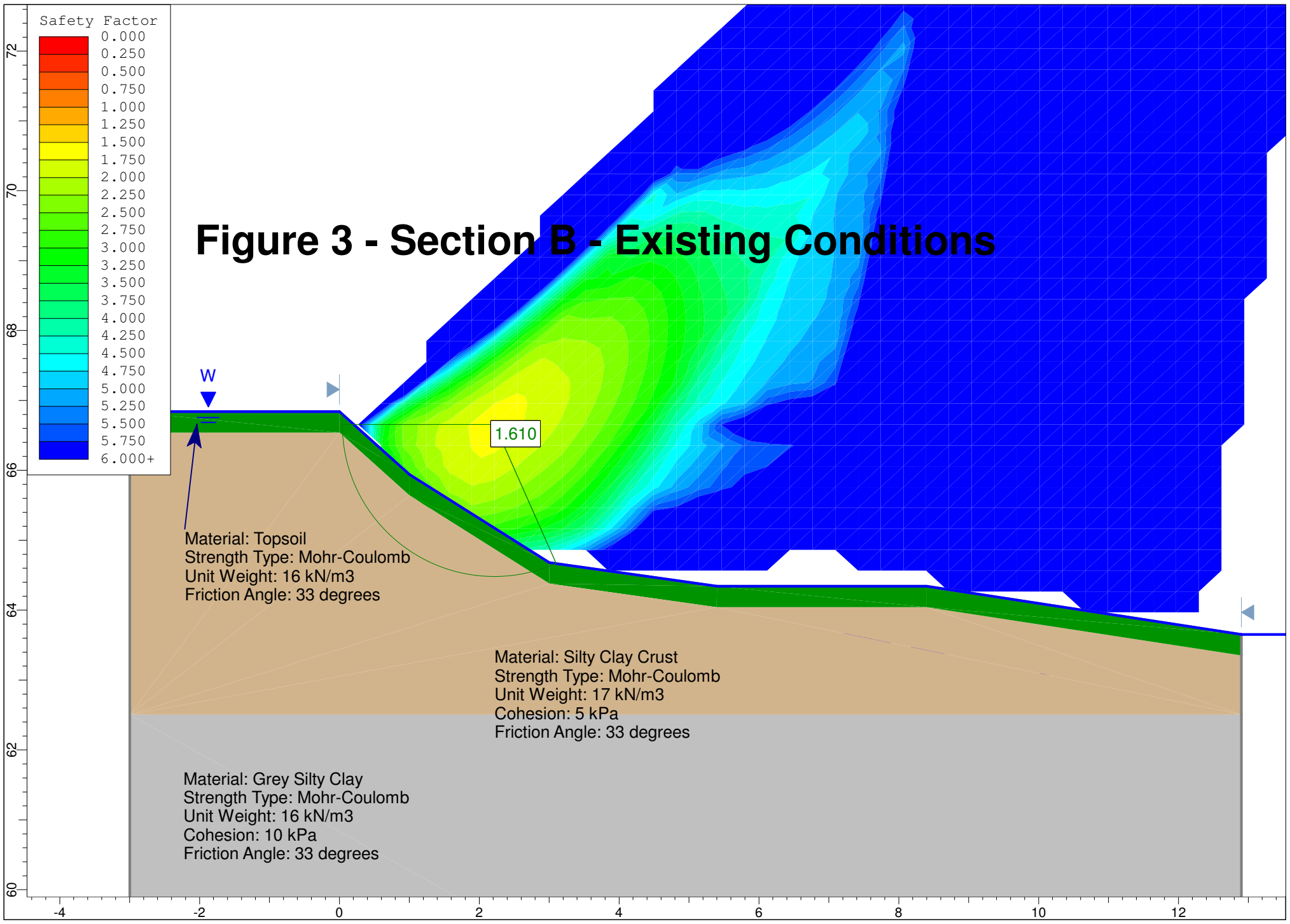
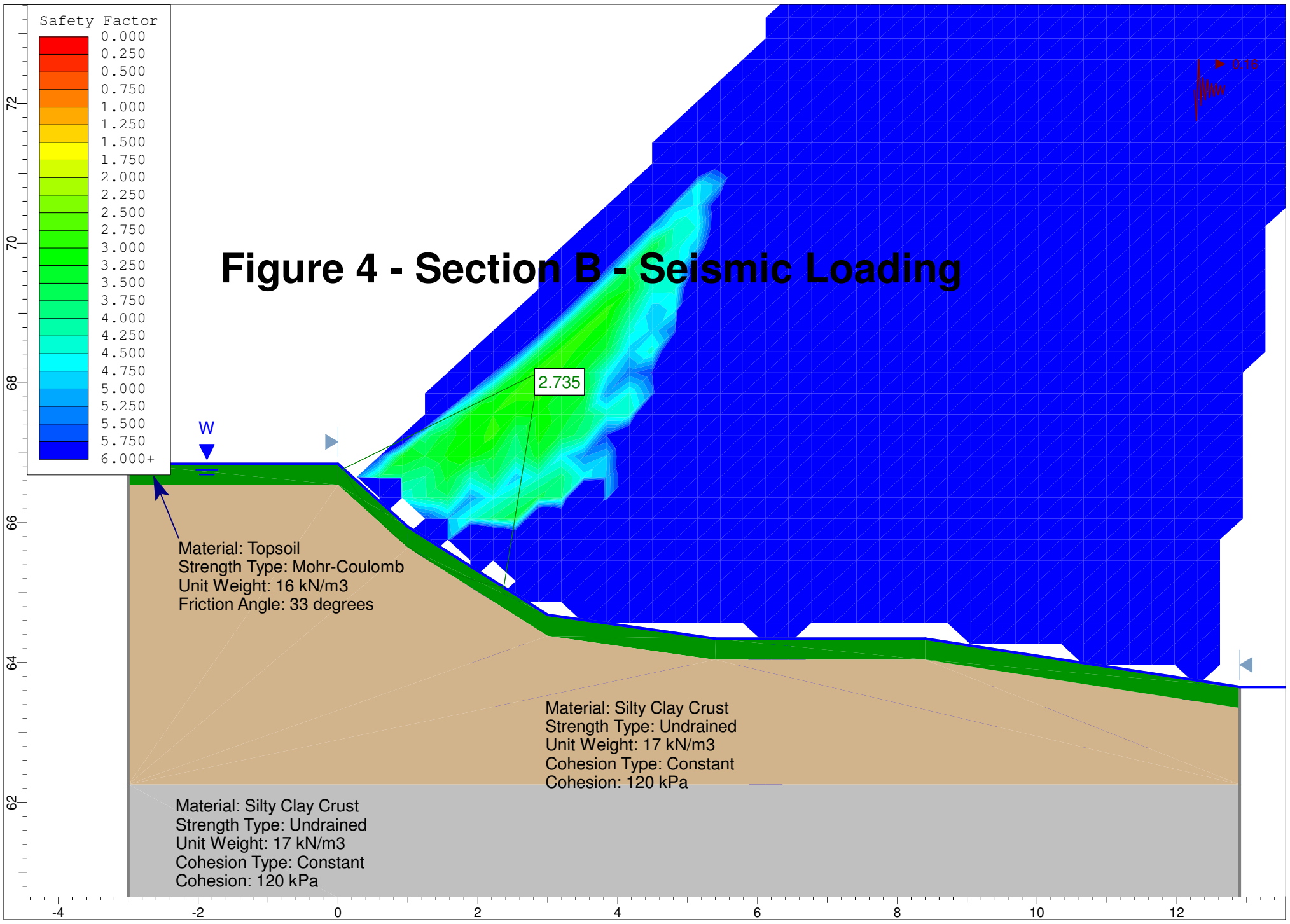


Figure 4 - Section B - Seismic Loading



BESSERER STREET

PART 4, PLAN 4R-290

NEW WOOD RETAINING WALL
(IRON FENCE ON TOP)

REGISTERED PLAN No. 6

LOT 58

PART 2, PLAN 4R-25594

PART 2, PLAN 5R-12325

CONCESSION "D" (R.F.)



TP 1
100.07

RIDEAU PLACE

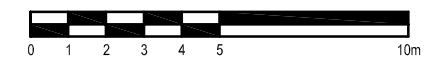
BLOCK 15539

CARLETON CONDOMINIUM PLAN 539

LEGEND:

-  TEST PIT LOCATION
-  CROSS-SECTION LOCATION
- 67.86 GROUND SURFACE ELEVATION (m)

TBM - TOP SPINDLE OF FIRE HYDRANT. AN ARBITRARY ELEVATION OF 100.00m WAS ASSIGNED TO THE TBM.



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NO.	REVISIONS	DATE	INITIAL
0			

TC UNITED GROUP
GEOTECHNICAL INVESTIGATION
PROPOSED RESIDENTIAL BUILDING - 244 RIDEAU PLACE

OTTAWA, ONTARIO

Title: **SLOPE STABILITY ANALYSIS - SECTIONS**

Scale:	1:200	Date:	11/2016
Drawn by:	MPG	Report No.:	PG3780-LET.02
Checked by:	FA	Dwg. No.:	PG3780-2
Approved by:	DJG	Revision No.:	0