

March 19, 2009
File: PG0861-LET.02

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K1G 4K1

Attention: **Ms. Lisa Dalla Rosa**

Subject: **Limit of Hazard Lands
Proposed Residential Development
Eden Park - Renaud Road
Ottawa, Ontario**

Geotechnical Engineering
Environmental Engineering
Hydrogeology
Geological Engineering
Materials Testing
Building Science

www.patersongroup.ca

Dear Ms. Dalla Rosa,

Further to your request, Paterson Group (Paterson) conducted a review to determine the limit of hazard lands, including a slope stability analysis of the existing slope along the existing watercourse within the aforementioned property. The present letter summarizes the results of our review.

1.0 Introduction

The subject site is located along the north side of Renaud Road, west of Mer Bleue Road. The watercourse running in an east-west direction crosses the majority of the subject site. The ground surface is grass covered and slightly undulating throughout the subject site.

2.0 Slope Condition and Soils Information

The slope condition was reviewed by Paterson field personnel. Two (2) slope cross-sections were studied as the worst case scenarios. The cross section locations are presented on Drawing PG0861-8 attached to the present letter. The existing slope is currently grass and tree covered with little to no signs of erosion within the lower portions of the slope face. The watercourse was also noted to be approximately 150 to 300 mm deep.

Geotechnical investigations recently completed by Paterson for the subject site indicate the subsoil profile consists of topsoil followed by a 1 to 1.5 m thick silty sand layer underlain by a deep, sensitive silty clay deposit. For specific details at the borehole locations in close proximity to the existing slope, reference should be made to the Soil Profile and Test Data sheets attached to this letter.

3.0 Slope Stability Analysis

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 favoring 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 that 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.

The cross-sections were analyzed taking into account a groundwater level at ground surface. Subsoil conditions at the cross-sections were inferred based on the subsoil conditions encountered at the nearby borehole locations and general knowledge of the area's geology.

The results for the existing slope conditions at Sections A and B are shown in Figures 1 and 3 attached to the present letter. The factors of safety were found to be greater than 1.5 at both Sections A and B.

Seismic Loading Analysis

An analysis considering seismic loading was also completed. A horizontal seismic acceleration, K_h , of 0.1G was considered for the analyzed sections. A factor of safety of 1.1 is considered to be satisfactory for stability analyses including seismic loading.

The results of the analyses including seismic loading are shown in Figures 2 and 4 for the existing slope conditions. The results indicate that the factors of safety are greater than 1.1. Based on these results, the slopes are considered to be stable under seismic loading.

4.0 Erosion and Access Allowances

No signs of active erosion were noted along the subject section of the existing watercourse. A 1 m toe erosion is deemed appropriate for this slope based on the nature of the soils, the observed erosion areas and the current watercourse width and location. It is considered that a toe erosion allowance of 1 m and an access allowance of 6 m is required from the top of stable slope (ie.- slope with factor of safety greater than 1.5). The limit of hazard lands, which include these allowances, is indicated on Drawing PG0861-8.

The existing vegetation on the slope face should not be removed as it contributes to the stability of the slope and reduces erosion.

6.0 Statement of Limitations

The information gathered for this report is based on a soils investigation, which is a limited sampling of a site. Should any conditions at the site be encountered which differ from those at the test hole locations, 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 for purposes other than those described herein or by person(s) other than Richcraft Homes or their agent(s) is not authorized without review by this firm for the applicability of our recommendations to the altered use of the report.

We trust that this letter satisfies your requirements.

Sincerely,

Paterson Group Inc.



David J. Gilbert, P.Eng.

Attachments:

- Figures 1 to 4 - Slope Stability Analysis
- Soil and Profile Test Data sheets
- Drawing PG0861-8 - Test Hole Location Plan

Figure 1 - Section A - Static Conditions

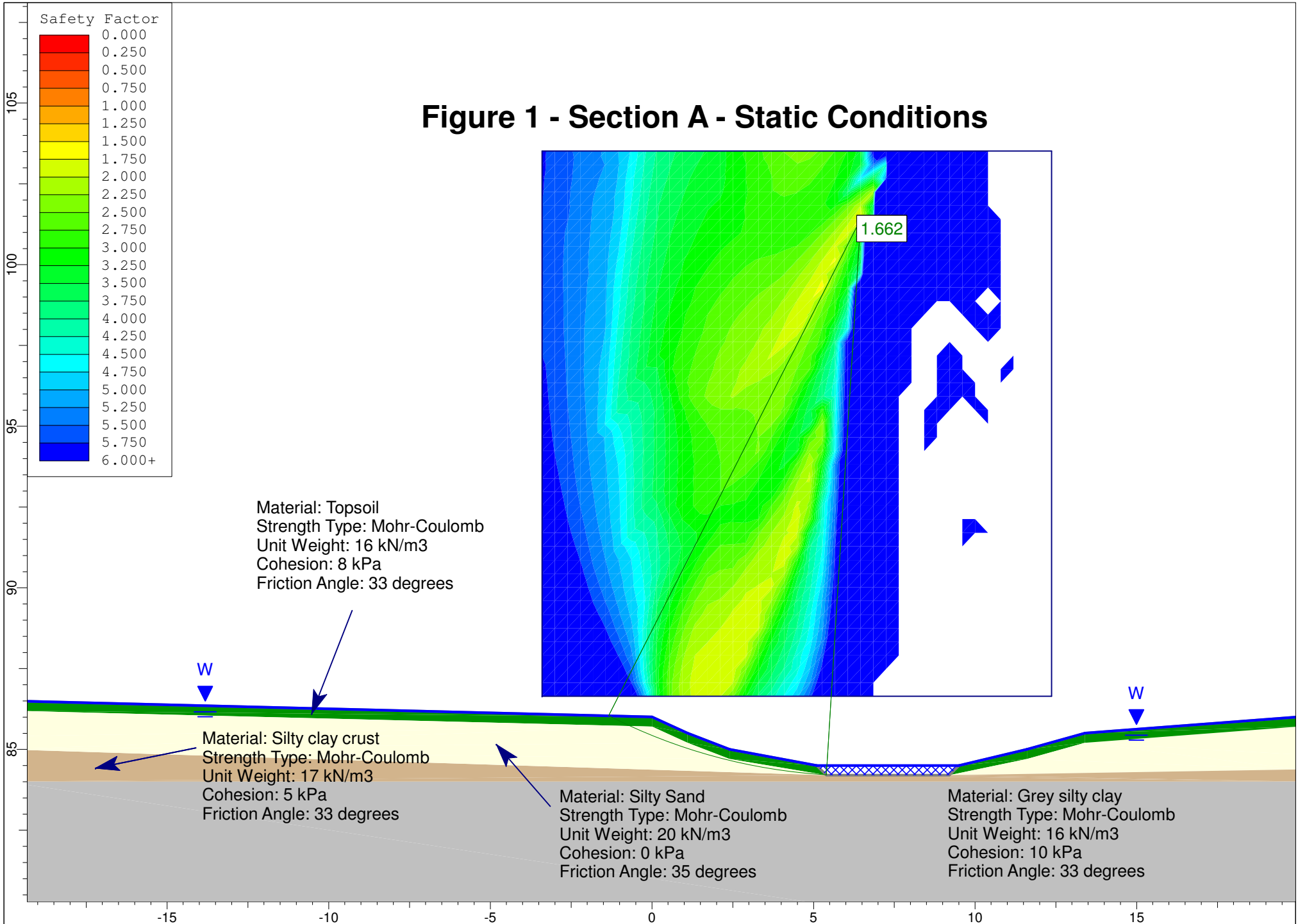


Figure 2 - Section A - Seismic Conditions

0.21

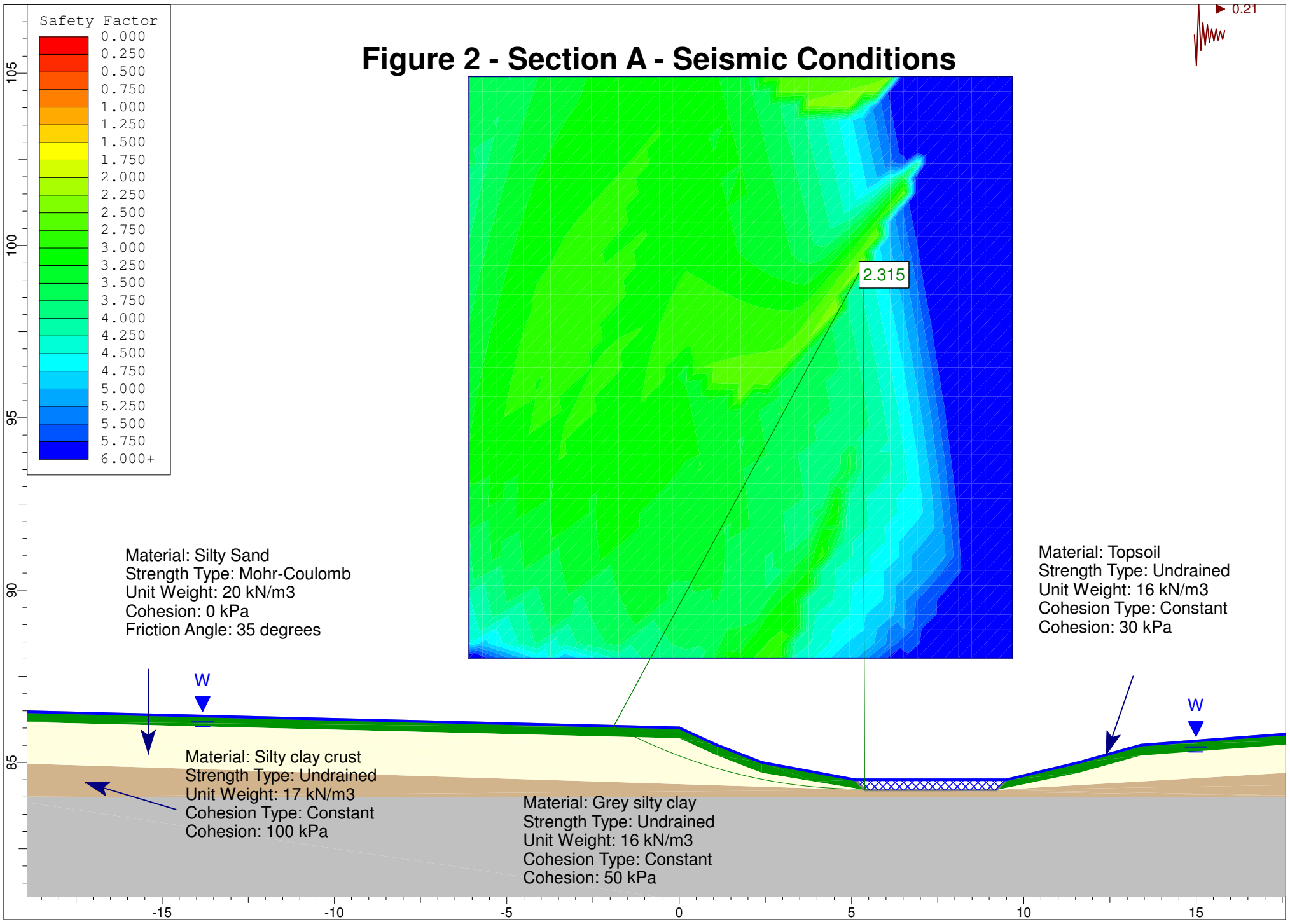


Figure 3 - Section B - Static Conditions

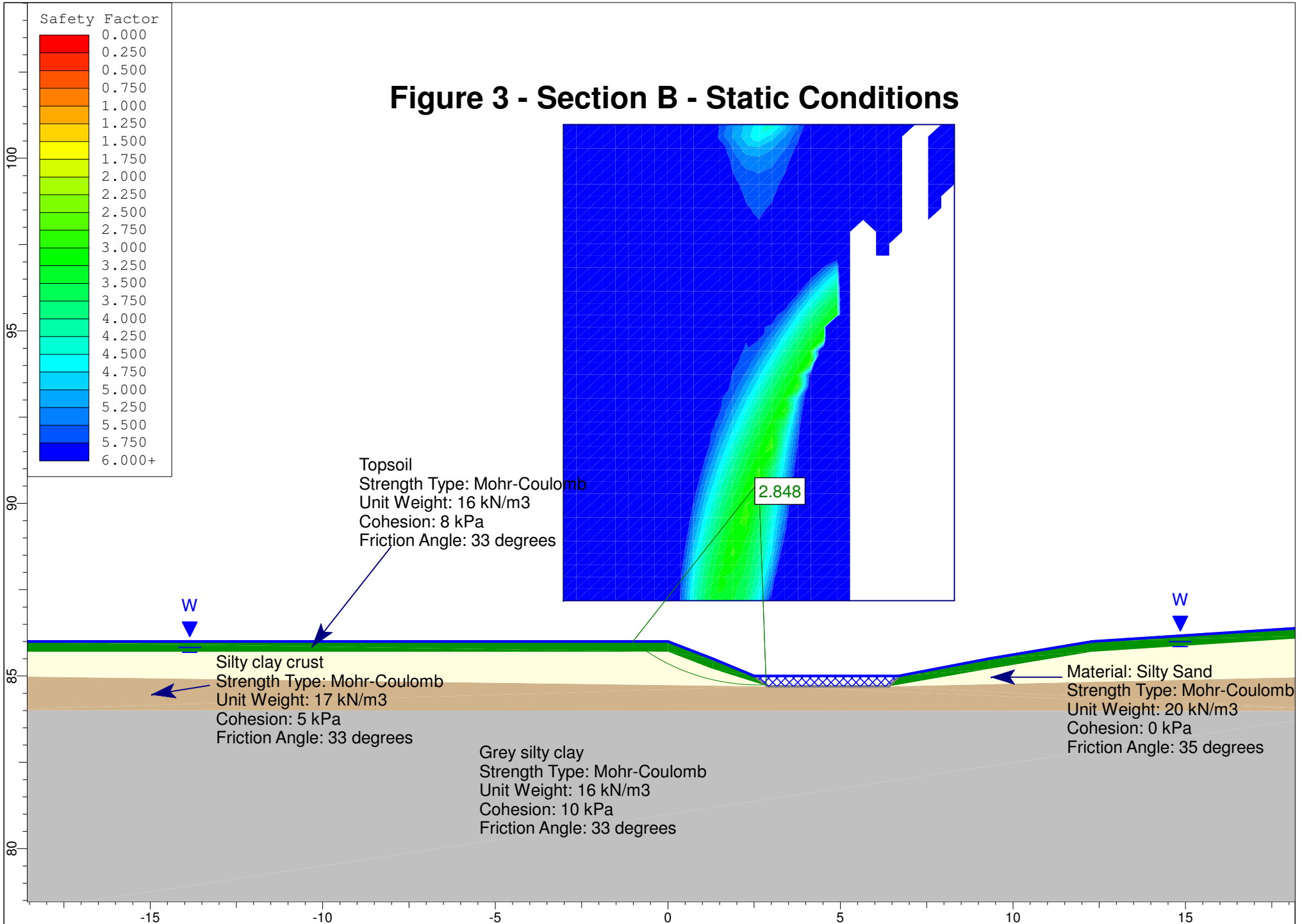
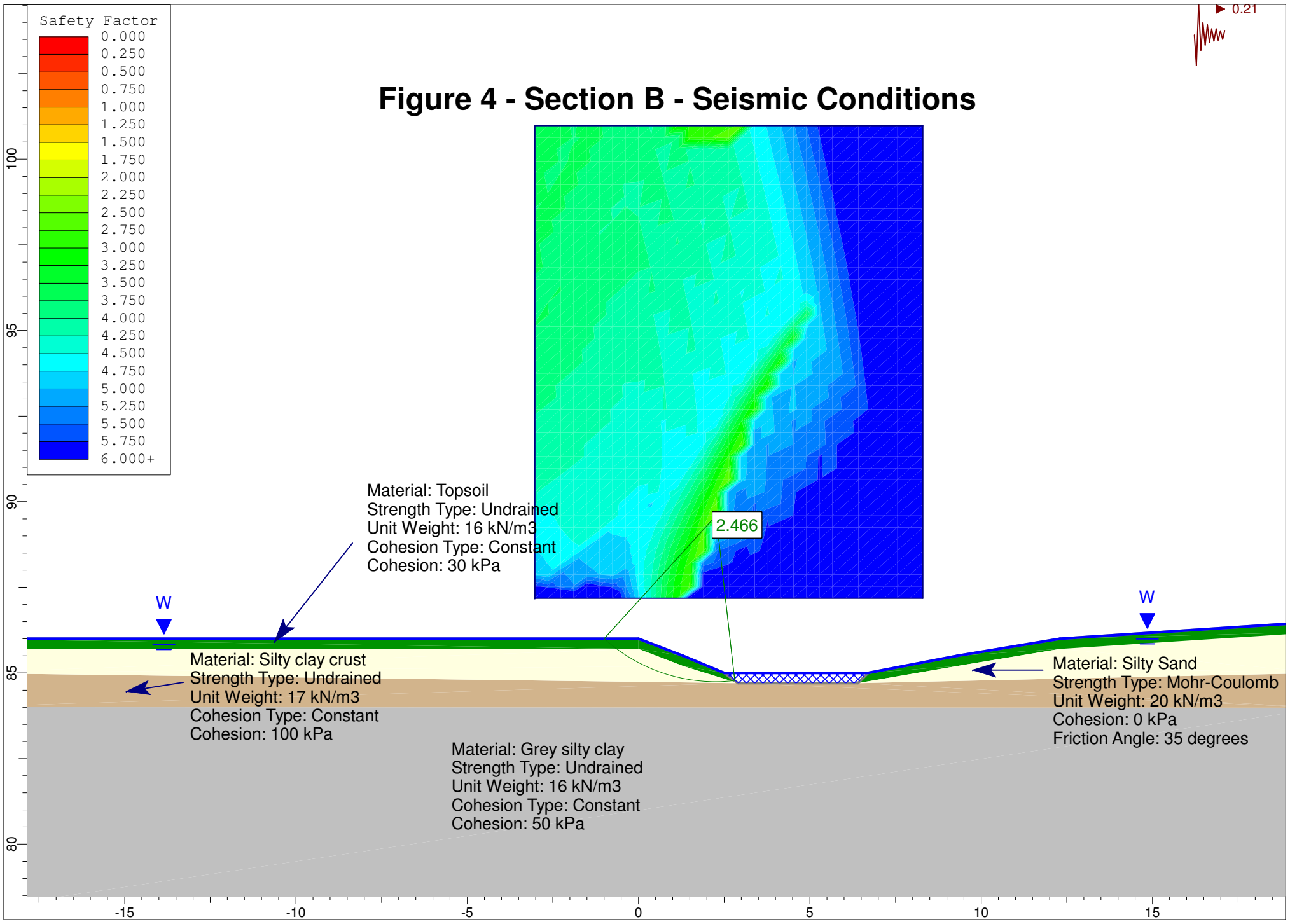


Figure 4 - Section B - Seismic Conditions



DATUM Ground surface elevations provided by Stantec Geomatics Ltd.

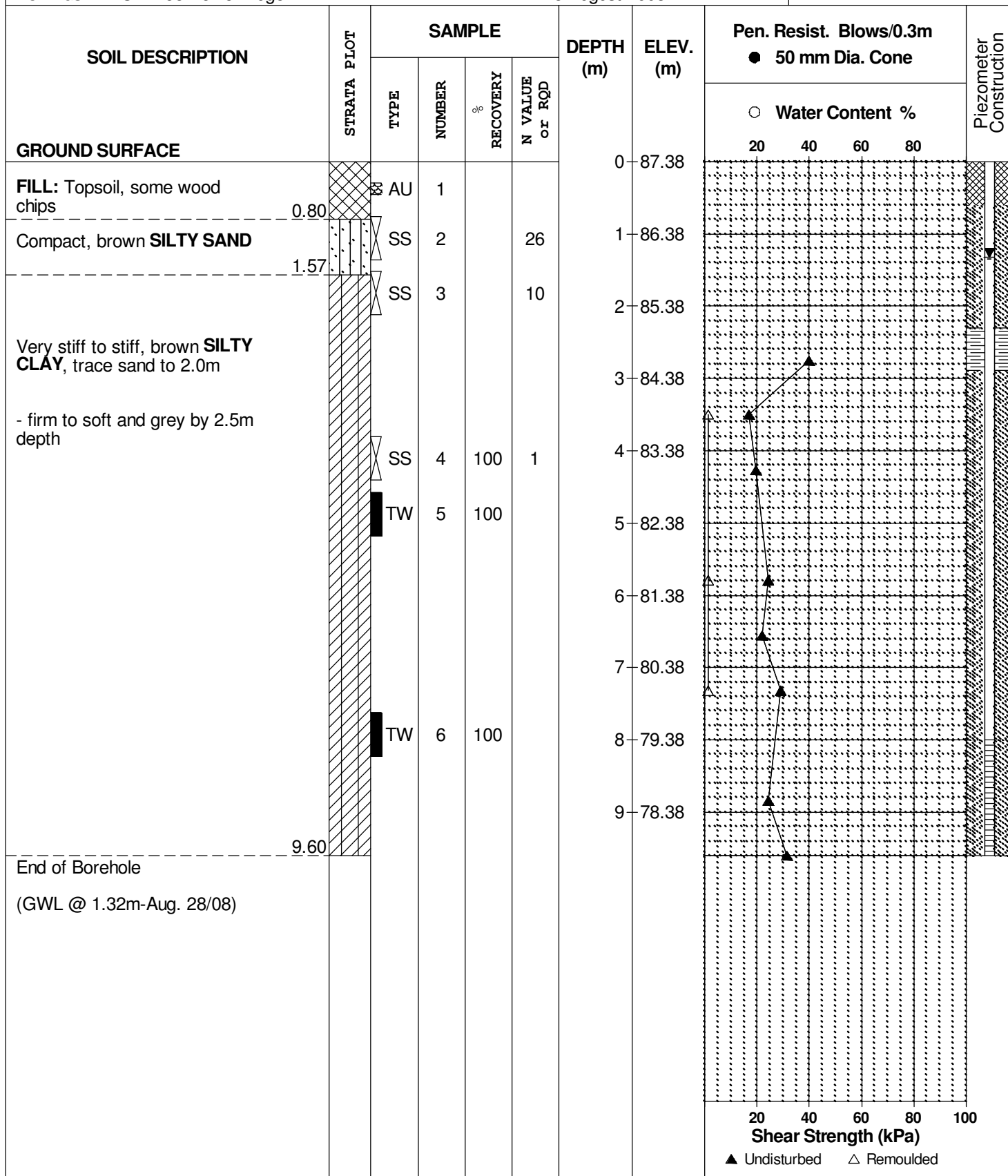
REMARKS

BORINGS BY CME 55 Power Auger

DATE 5 August 2008

FILE NO. PG0861

HOLE NO. BH 4-08



DATUM Ground surface elevations provided by Stantec Geomatics Ltd.

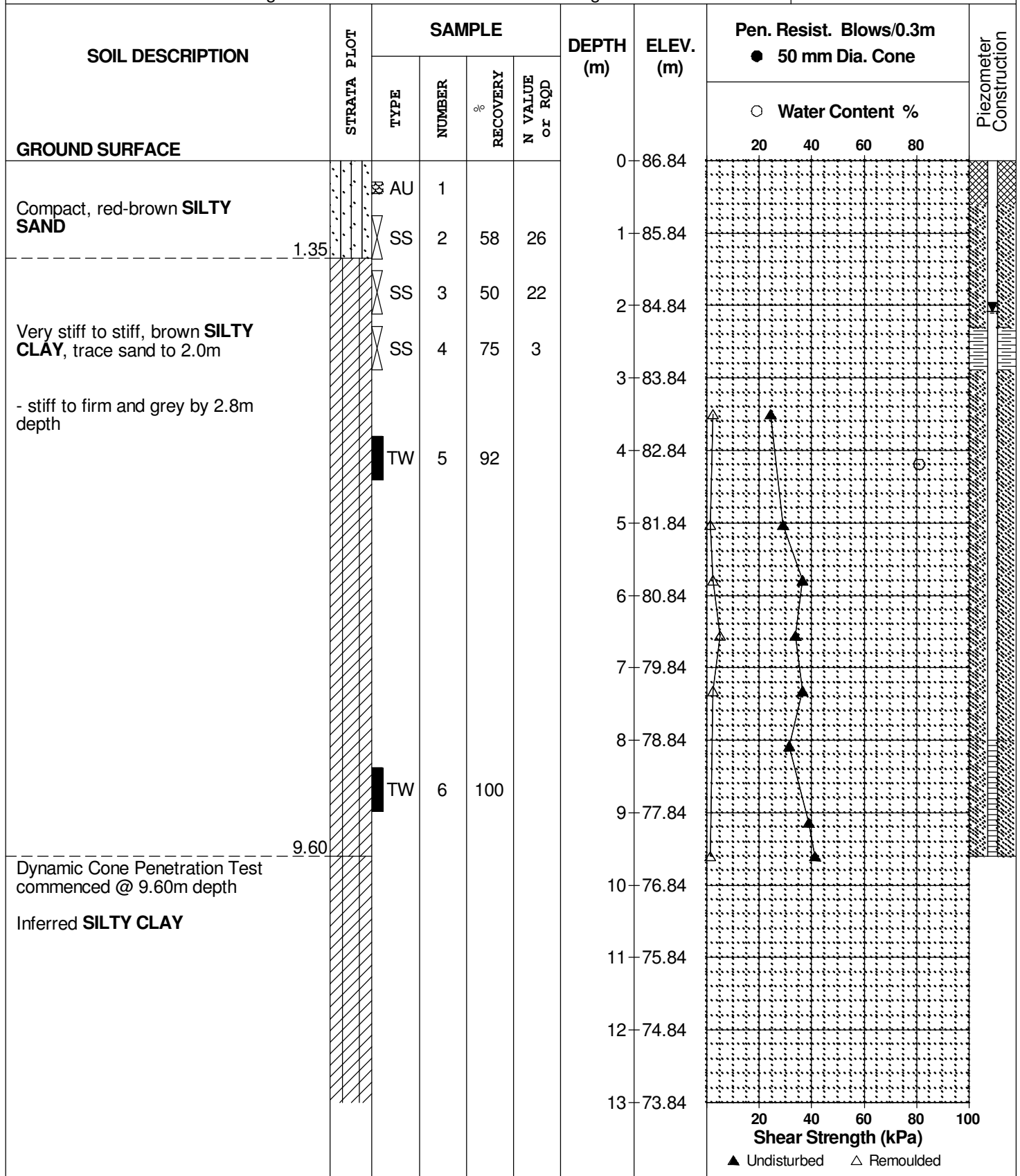
REMARKS

BORINGS BY CME 55 Power Auger

DATE 6 August 2008

FILE NO. **PG0861**

HOLE NO. **BH 5-08**



DATUM Ground surface elevations provided by Stantec Geomatics Ltd.

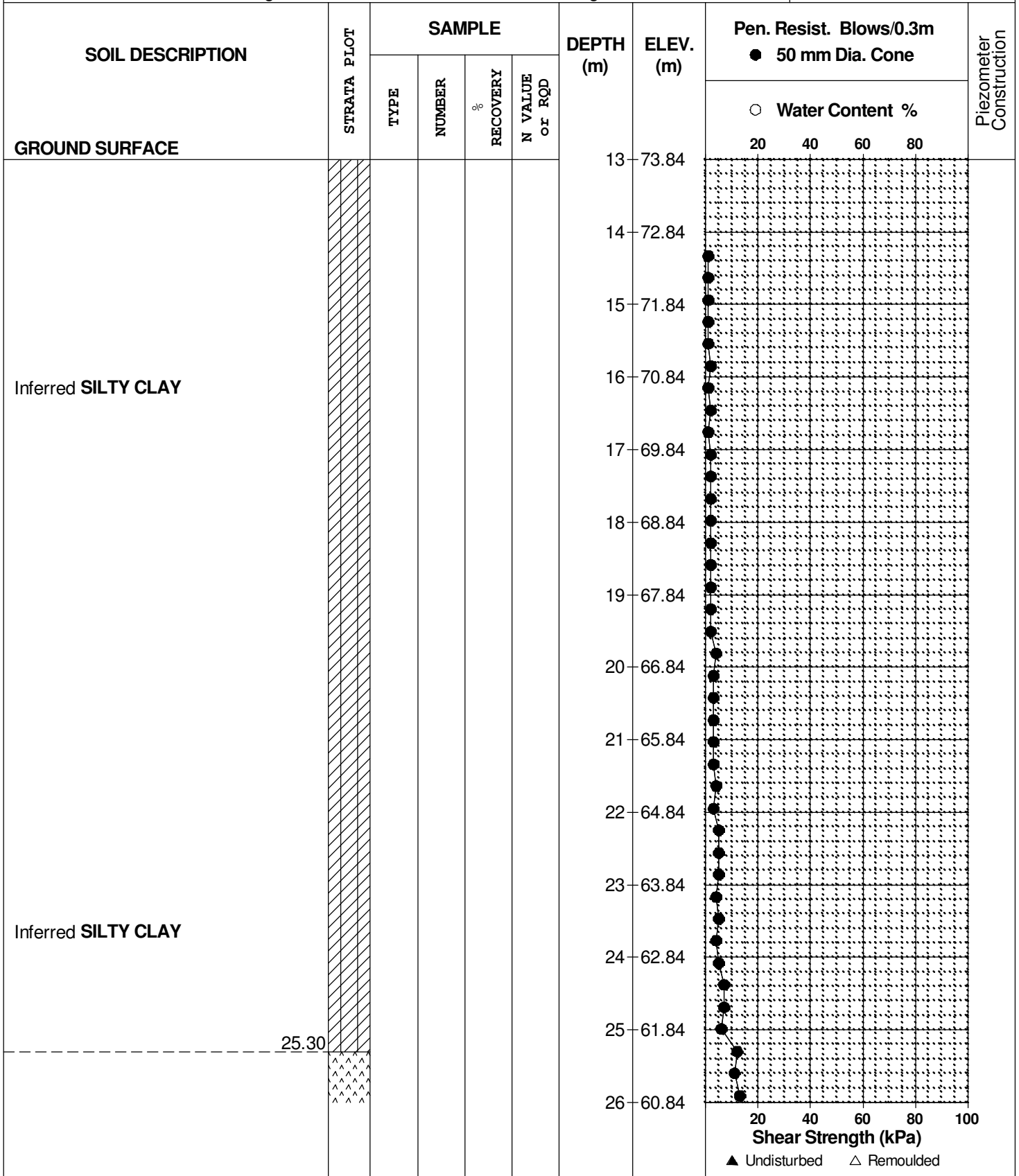
FILE NO. **PG0861**

REMARKS

HOLE NO. **BH 5-08**

BORINGS BY CME 55 Power Auger

DATE 6 August 2008



SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Residential Development - Eden Park East Portion
Ottawa, Ontario

DATUM Ground surface elevations provided by Stantec Geomatics Ltd.

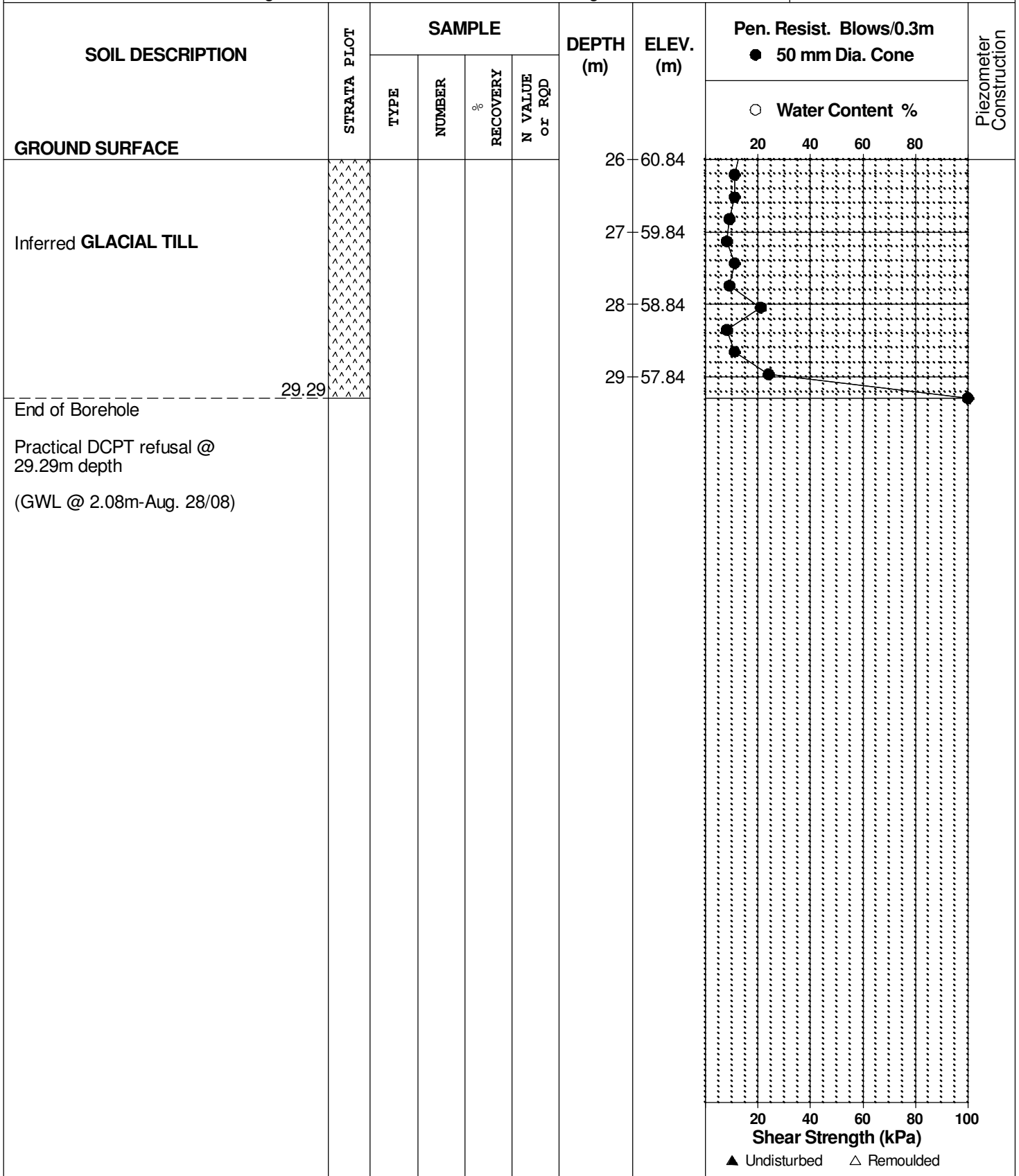
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REMARKS

HOLE NO. **BH 5-08**

BORINGS BY CME 55 Power Auger

DATE 6 August 2008



DATUM Ground surface elevations provided by Stantec Geomatics Ltd.

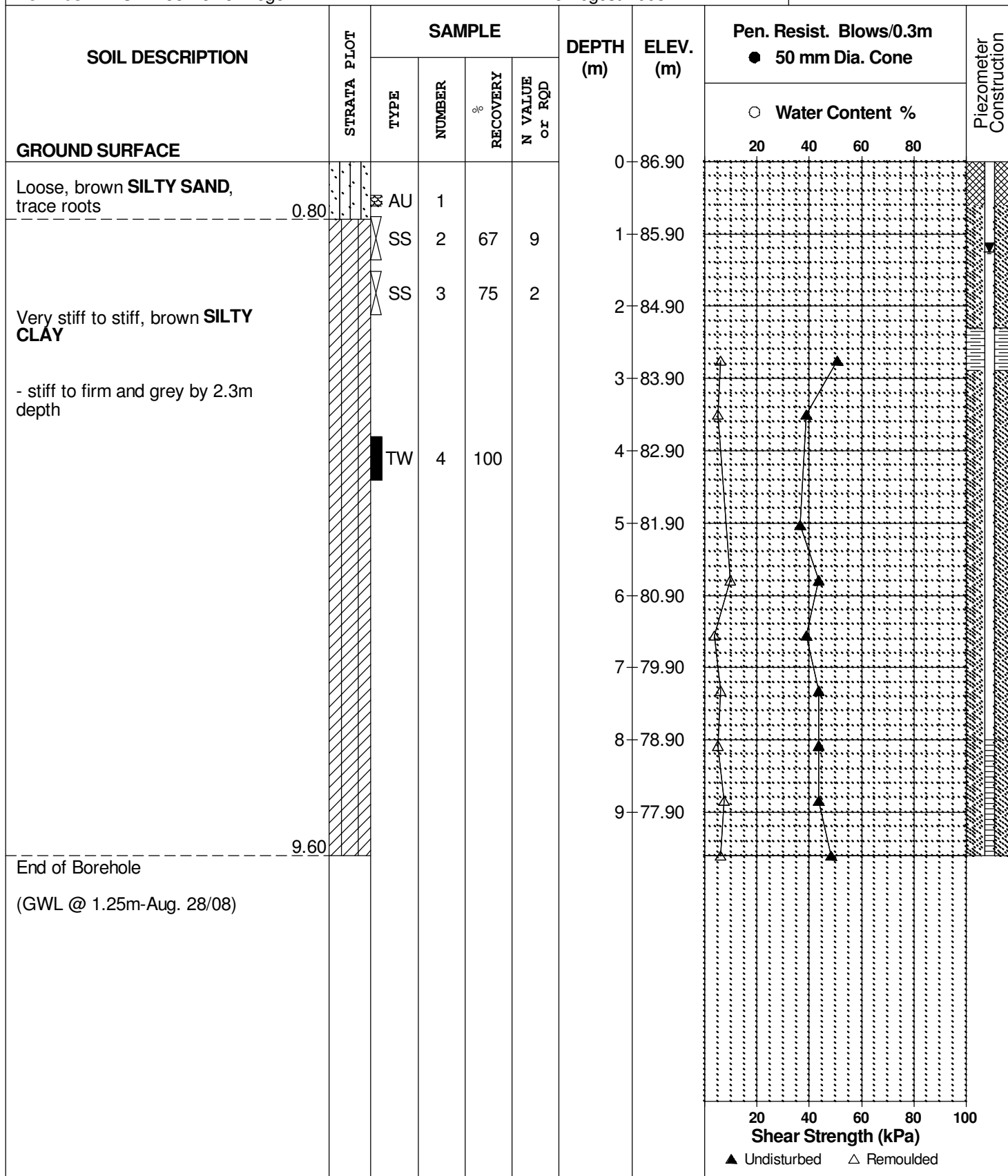
REMARKS

BORINGS BY CME 55 Power Auger

DATE 6 August 2008

FILE NO. **PG0861**

HOLE NO. **BH 7-08**



DATUM Ground surface elevations provided by Stantec Geomatics Ltd.

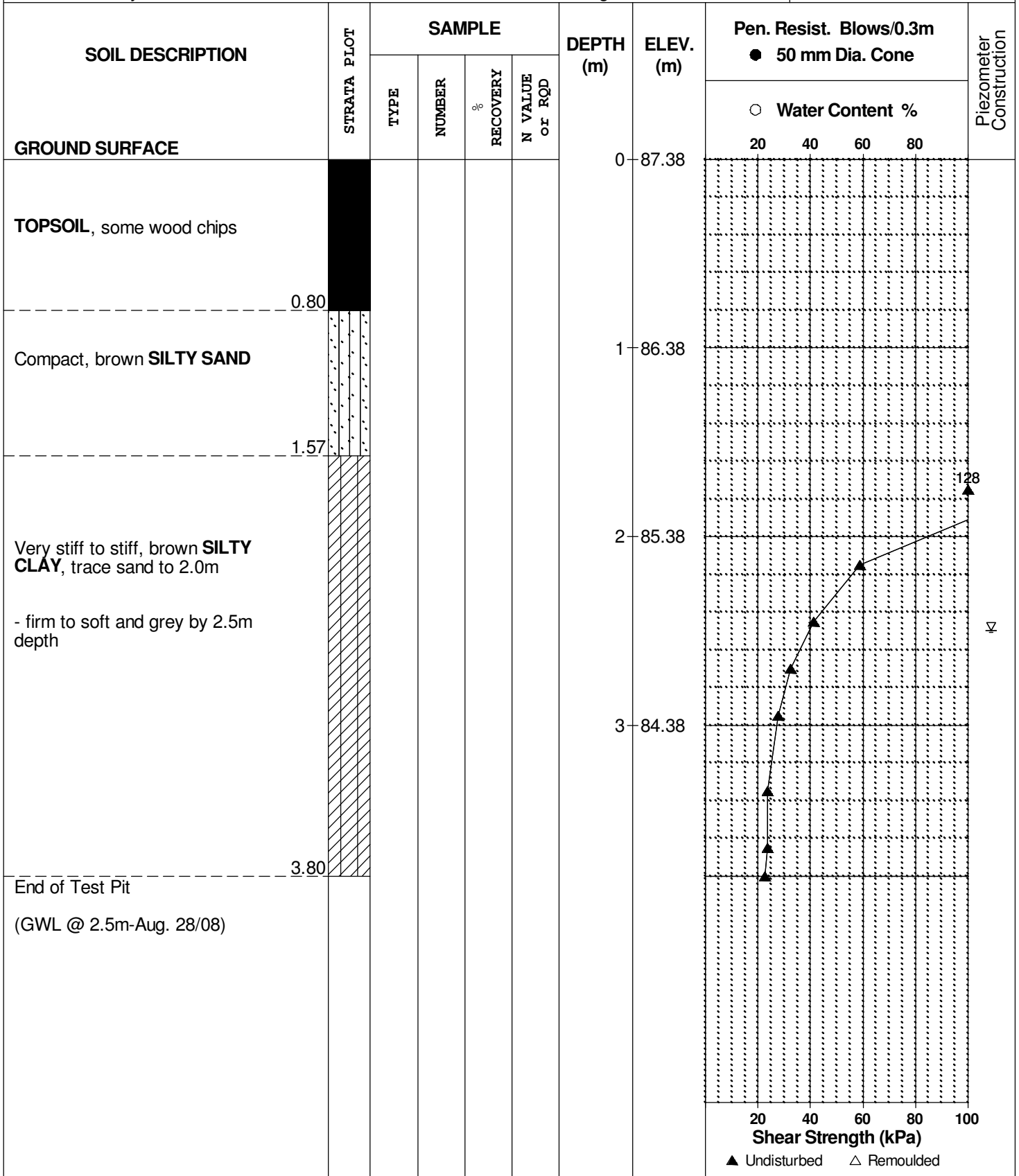
FILE NO. **PG0861**

REMARKS

HOLE NO. **TP 4-08**

BORINGS BY Hydraulic Shovel

DATE 28 August 2008



DATUM Ground surface elevations provided by Stantec Geomatics Ltd.

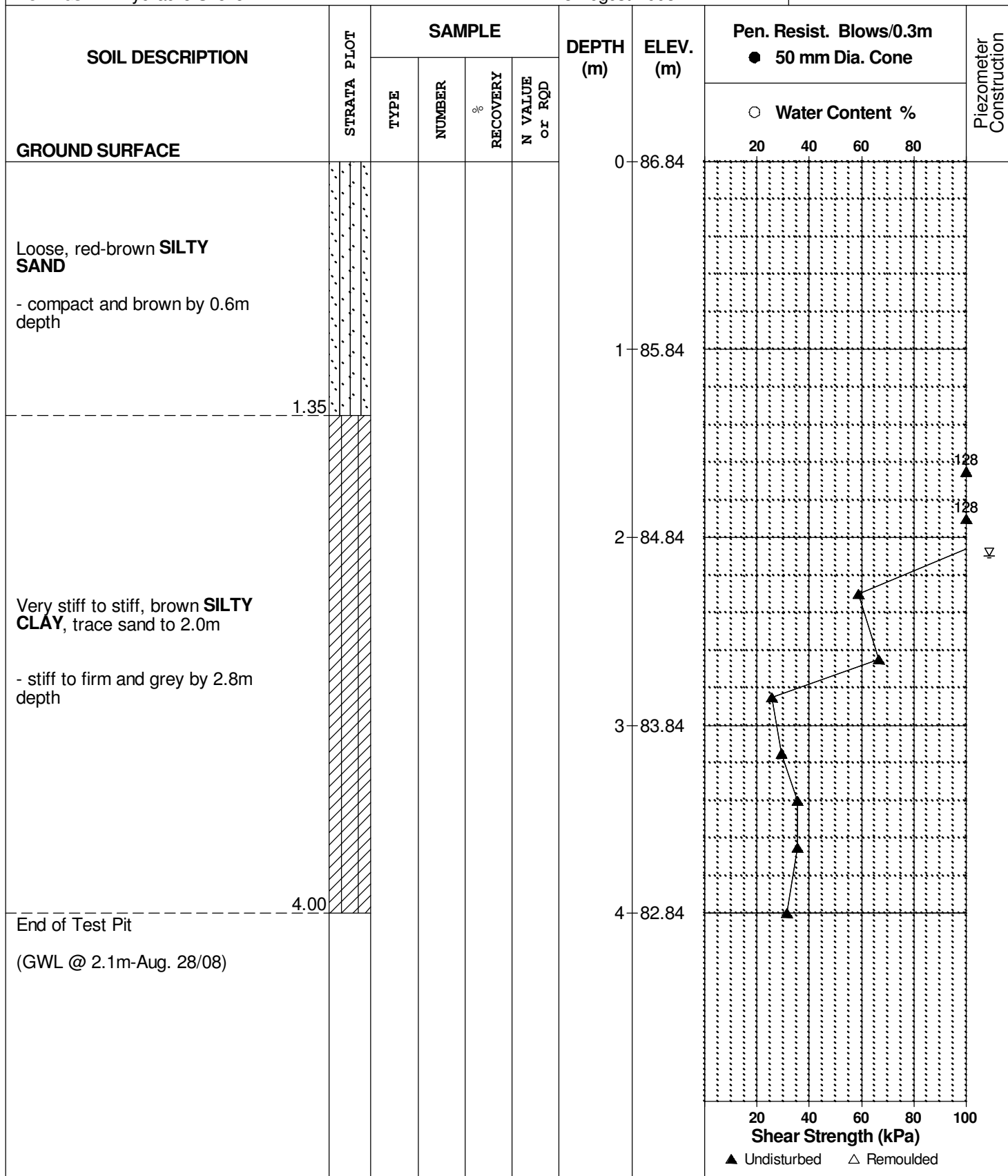
REMARKS

BORINGS BY Hydraulic Shovel

DATE 28 August 2008

FILE NO. **PG0861**

HOLE NO. **TP 5-08**



DATUM Ground surface elevations provided by Stantec Geomatics Ltd.

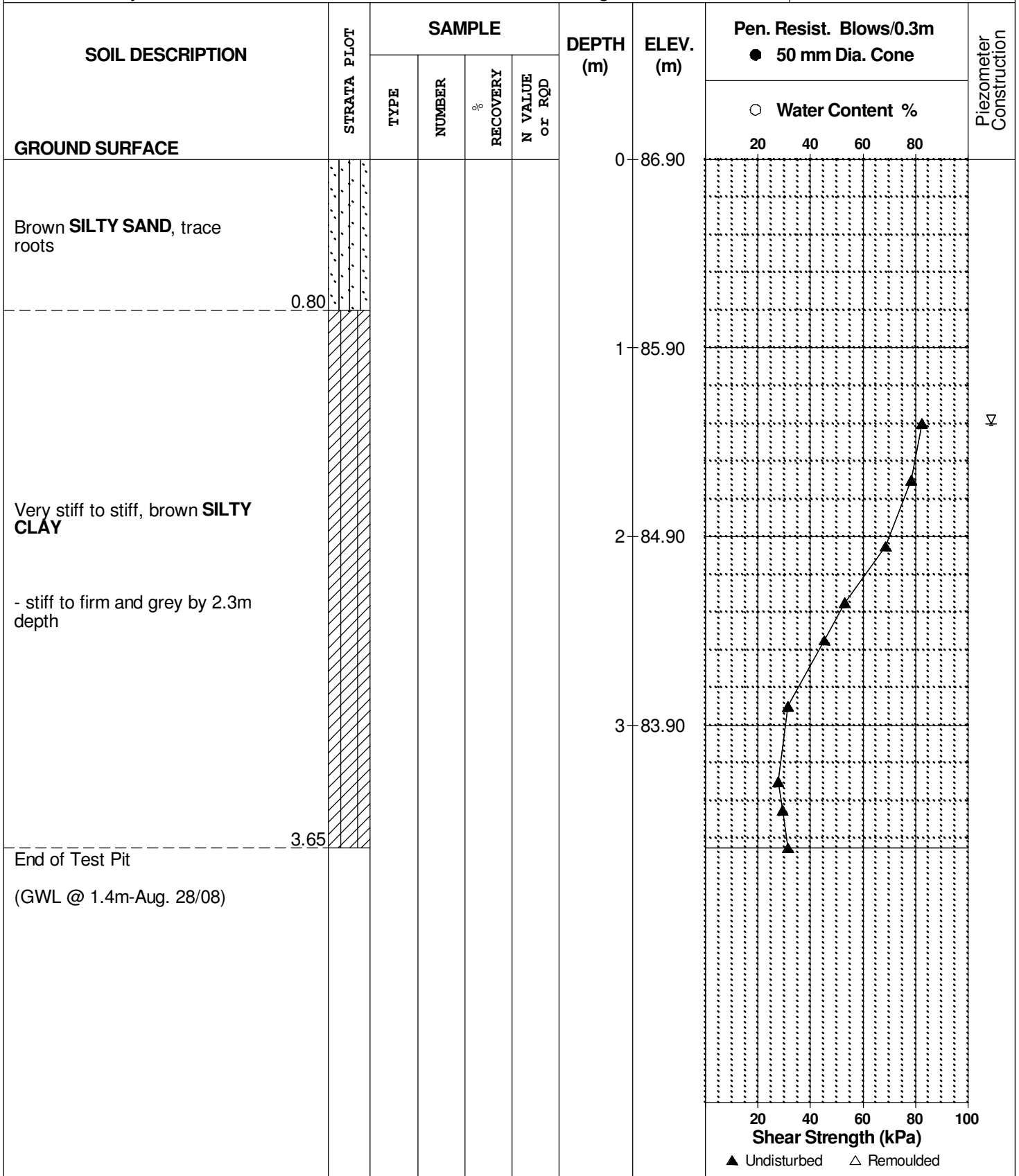
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REMARKS

HOLE NO. **TP 7-08**

BORINGS BY Hydraulic Shovel

DATE 28 August 2008



DATUM Ground surface elevations provided by Stantec Geomatics Ltd.

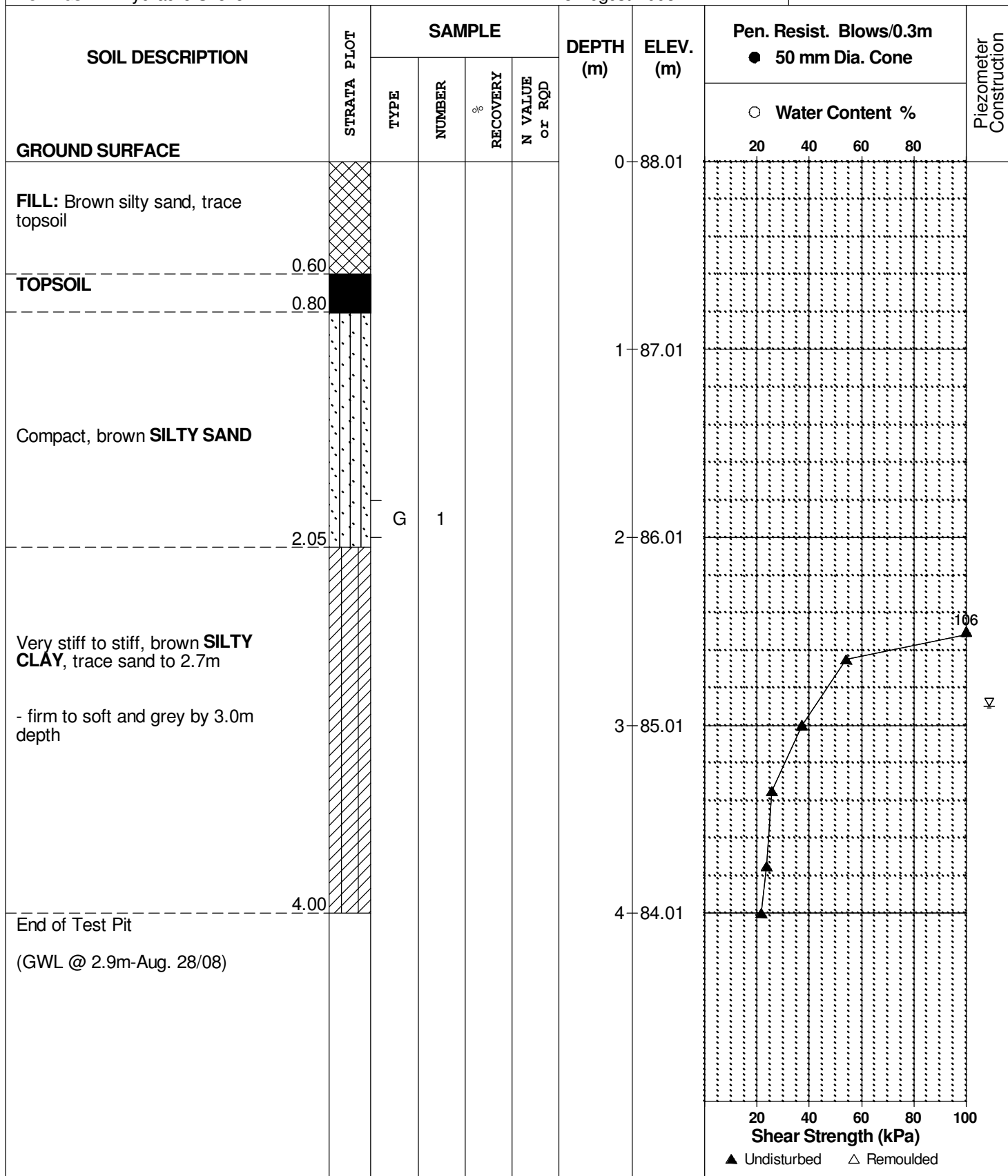
REMARKS

BORINGS BY Hydraulic Shovel

DATE 28 August 2008

FILE NO. **PG0861**

HOLE NO. **TP12-08**



DATUM Ground surface elevations provided by Stantec Geomatics Ltd.

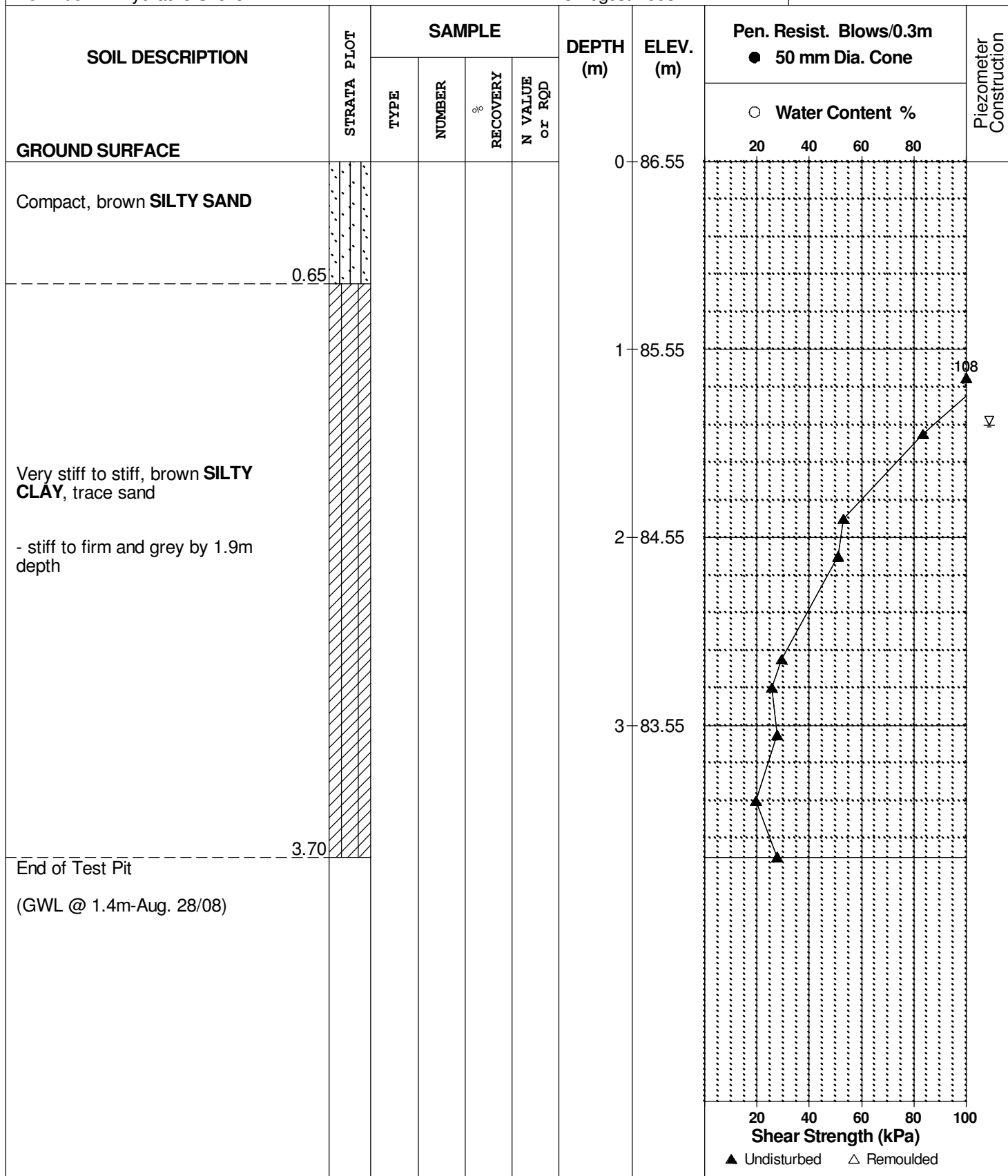
REMARKS

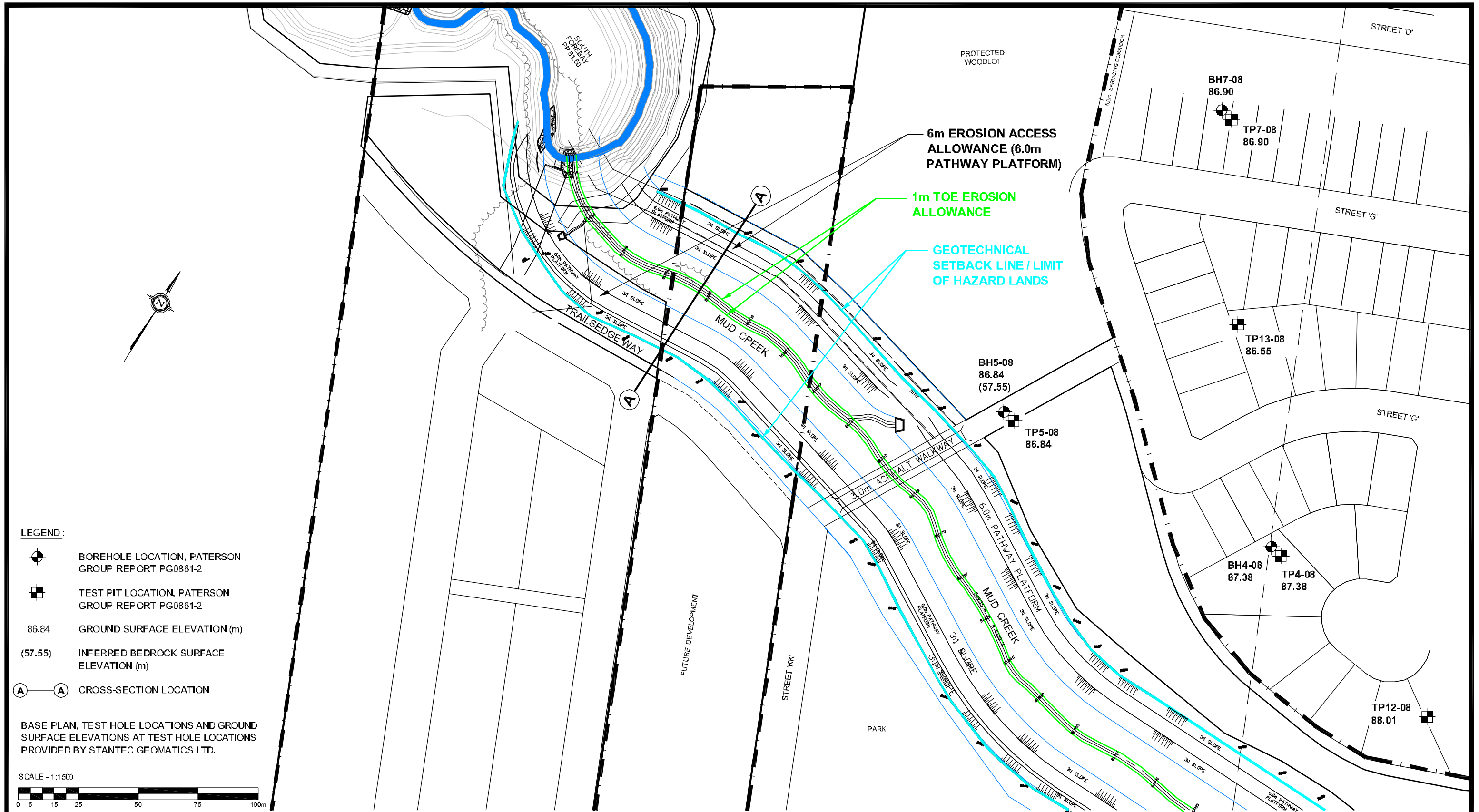
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DATE 28 August 2008




FILE NO. **PG0861**

HOLE NO. **TP13-08**





LEGEND:

-  BOREHOLE LOCATION, PATERSON GROUP REPORT PG0861-2
-  TEST PIT LOCATION, PATERSON GROUP REPORT PG0861-2
- 86.84 GROUND SURFACE ELEVATION (m)
- (57.55) INFERRED BEDROCK SURFACE ELEVATION (m)
-  CROSS-SECTION LOCATION

BASE PLAN, TEST HOLE LOCATIONS AND GROUND SURFACE ELEVATIONS AT TEST HOLE LOCATIONS PROVIDED BY STANTEC GEOMATICS LTD.



paterson group
 consulting engineers
 154 Colonnade Road South, Ottawa, Ontario K2E 7J5

Scale:	1:1500
Des.:	RG
Dwn:	MPG
Chkd:	DG

RICHCRAFT GROUP OF COMPANIES
 GEOTECHNICAL INVESTIGATION
 RESIDENTIAL DEVELOPMENT - EDEN PARK - RENAUD ROAD
 OTTAWA, ONTARIO

TEST HOLE LOCATION PLAN

Dwg. No.	PG0861-8R
Report No.:	PG0861-MEMO-14R
Date:	03/2013