



THURBER ENGINEERING LTD.

July 5, 2022

File No.: 32122

Alberta Transportation
Construction and Maintenance Division
North Central Region
Box 4596, 4513 – 62 Avenue
Barrhead, Alberta
T7N 1A5

Attention: Ms. Amy Driessen, P.Eng.

**ALBERTA TRANSPORTATION GRMP (CON0022163)
NORTH CENTRAL (ATHABASCA AND FORT McMURRAY DISTRICTS)
INSTRUMENTATION MONITORING RESULTS – SPRING 2022**

SECTION C

SITE NC058 (NC58A): HWY 858:02 SLIDE 45 km NORTH OF HWY 55

Dear Ms. Driessen:

This report provides the results of the annual geotechnical instrumentation monitoring for the above-mentioned site as part of Alberta Transportation's Geohazard Risk Management Program for North Central – Athabasca and Fort McMurray Districts (CON0022163).

It is a condition of this letter report that Thurber's performance of its professional services will be subject to the attached Statement of Limitations and Conditions.

1. FIELD PROGRAM AND INSTRUMENTATION STATUS

Three pneumatic piezometers (PN10-3, PN14-1 and PN14-2) were read at the Hwy 858:02 slide site on May 27, 2022 by Mr. Niraj Regmi, G.I.T. and Mr. Jayden Del Cid, both of Thurber Engineering Ltd.

A site plan showing approximate instrument locations is included in Appendix A

The pneumatic piezometers were read using a RST C108 pneumatic piezometer reader.

2. DATA PRESENTATION

2.1 General

All slope inclinometers (SIs) at this site are no longer operational. The pneumatic piezometer plots are provided in Appendix A. Slope inclinometer and piezometer reading summary tables are provided below. These tables include instruments deleted from the GRMP or not read during this monitoring event for future reference.



**TABLE NC058-1
 SPRING 2022 – HWY 858:02 SLIDE 45 km NORTH OF HWY 55
 SLOPE INCLINOMETER INSTRUMENTATION READING SUMMARY**

Date Monitored: May 27, 2022

INSTRUMENT #	DATE INITIALIZED	TOTAL CUMULATIVE RESULTANT MOVEMENT AND DEPTH OF MOVEMENT TO DATE (mm)	MAXIMUM RATE OF MOVEMENT (mm/yr)	CURRENT STATUS OF SI	DATE OF PREVIOUS READING	INCREMENTAL MOVEMENT SINCE PREVIOUS READING (mm)	CURRENT RATE OF MOVEMENT (mm/yr)	CHANGE IN RATE OF MOVEMENT SINCE PREVIOUS READING (mm/yr)
<i>SI14-1</i>	<i>March 12, 2014</i>	<i>120.0 over 4.3 m to 6.7 m depth in 350 directions</i>	<i>282.1 on September 11, 2014</i>	<i>Sheared at 5.2 mBGS</i>	<i>May 29, 2015</i>	<i>N/A</i>	<i>N/A</i>	<i>N/A</i>
<i>SI14-2</i>	<i>March 12, 2014</i>	<i>20.2 over 2.9 m to 6.0 m depth in 9° direction</i>	<i>637 on October 24, 2016 (during pile wall construction)</i>	<i>Damaged at 1.8 mBGS</i>	<i>October 29, 2016</i>	<i>N/A</i>	<i>N/A</i>	<i>N/A</i>

Drawing 32122-NC058 in Appendix A provides a sketch of the approximate location of the monitoring instrumentation for this site



**TABLE NC058-2
 SPRING 2022 – HWY 858:02 SLIDE 45 km NORTH OF HWY 55
 PNEUMATIC PIEZOMETER INSTRUMENTATION READING SUMMARY**

Date Monitored: May 27, 2022

INSTRUMENT #	DATE INITIALIZED	TIP DEPTH (m)	GROUND ELEV. (m)	CURRENT STATUS	HIGHEST MEASURED GROUNDWATER LEVEL BGS (m)	MEASURED PORE PRESSURE (kPa)	CURRENT GROUNDWATER LEVEL BGS (m)	PREVIOUS GROUNDWATER LEVEL BGS (m)	CHANGE IN WATER LEVEL SINCE PREVIOUS READING (m)
PP10-3	March 15, 2010	5.33	547.83	Active	0.13 m in September, 2017	45.0	0.74	0.55	-0.19
PN14-1	March 6, 2014	6.10	N/A	Active	0.83 in September, 2020	50.1	0.99	0.85	-0.14
PN14-2	March 12, 2014	9.14	N/A	Active	0.84 in September, 2016	74.9	1.50	1.60	0.10

Drawing 32122-NC058 in Appendix A provides a sketch of the approximate location of the monitoring instrumentation for this site



3. INTERPRETATION OF MONITORING RESULTS

PP10-3 and PN14-1 showed decreases in groundwater level of 0.19 m and 0.14 m, respectively since the spring of 2021 readings. PN14-2 showed an increase in groundwater level of 0.10 m since the spring of 2021 readings. The pneumatic piezometer readings are summarized in Table NC058-2 and are plotted on Figure NC058-1, included in Appendix A.

4. RECOMMENDATIONS

4.1 Future Work

The instruments should be read again in the spring of 2023.

4.2 Instrumentation Repairs

No instrument repairs are required at this time.

5. CLOSURE

We trust this report meets your requirements at present. If you have any questions, please contact the undersigned at your convenience.

Yours very truly,
Thurber Engineering Ltd.
Tarek Abdelaziz, Ph.D., P.Eng.
Principal | Senior Geotechnical Engineer

Bruce Nestor, P.Eng.
Geotechnical Engineer
/jf

Attachments:

- Statement of Limitations and Conditions
- Appendix A
 - Field Inspector's report
 - Site Plan Showing Approximate Instrument Locations (Drawing No. 32122-NC058)
 - Figure NC058-1 (Piezometric Depths)



STATEMENT OF LIMITATIONS AND CONDITIONS

1. STANDARD OF CARE

This Report has been prepared in accordance with generally accepted engineering or environmental consulting practices in the applicable jurisdiction. No other warranty, expressed or implied, is intended or made.

2. COMPLETE REPORT

All documents, records, data and files, whether electronic or otherwise, generated as part of this assignment are a part of the Report, which is of a summary nature and is not intended to stand alone without reference to the instructions given to Thurber by the Client, communications between Thurber and the Client, and any other reports, proposals or documents prepared by Thurber for the Client relative to the specific site described herein, all of which together constitute the Report.

IN ORDER TO PROPERLY UNDERSTAND THE SUGGESTIONS, RECOMMENDATIONS AND OPINIONS EXPRESSED HEREIN, REFERENCE MUST BE MADE TO THE WHOLE OF THE REPORT. THURBER IS NOT RESPONSIBLE FOR USE BY ANY PARTY OF PORTIONS OF THE REPORT WITHOUT REFERENCE TO THE WHOLE REPORT.

3. BASIS OF REPORT

The Report has been prepared for the specific site, development, design objectives and purposes that were described to Thurber by the Client. The applicability and reliability of any of the findings, recommendations, suggestions, or opinions expressed in the Report, subject to the limitations provided herein, are only valid to the extent that the Report expressly addresses proposed development, design objectives and purposes, and then only to the extent that there has been no material alteration to or variation from any of the said descriptions provided to Thurber, unless Thurber is specifically requested by the Client to review and revise the Report in light of such alteration or variation.

4. USE OF THE REPORT

The information and opinions expressed in the Report, or any document forming part of the Report, are for the sole benefit of the Client. NO OTHER PARTY MAY USE OR RELY UPON THE REPORT OR ANY PORTION THEREOF WITHOUT THURBER'S WRITTEN CONSENT AND SUCH USE SHALL BE ON SUCH TERMS AND CONDITIONS AS THURBER MAY EXPRESSLY APPROVE. Ownership in and copyright for the contents of the Report belong to Thurber. Any use which a third party makes of the Report, is the sole responsibility of such third party. Thurber accepts no responsibility whatsoever for damages suffered by any third party resulting from use of the Report without Thurber's express written permission.

5. INTERPRETATION OF THE REPORT

- a) Nature and Exactness of Soil and Contaminant Description: Classification and identification of soils, rocks, geological units, contaminant materials and quantities have been based on investigations performed in accordance with the standards set out in Paragraph 1. Classification and identification of these factors are judgmental in nature. Comprehensive sampling and testing programs implemented with the appropriate equipment by experienced personnel may fail to locate some conditions. All investigations utilizing the standards of Paragraph 1 will involve an inherent risk that some conditions will not be detected and all documents or records summarizing such investigations will be based on assumptions of what exists between the actual points sampled. Actual conditions may vary significantly between the points investigated and the Client and all other persons making use of such documents or records with our express written consent should be aware of this risk and the Report is delivered subject to the express condition that such risk is accepted by the Client and such other persons. Some conditions are subject to change over time and those making use of the Report should be aware of this possibility and understand that the Report only presents the conditions at the sampled points at the time of sampling. If special concerns exist, or the Client has special considerations or requirements, the Client should disclose them so that additional or special investigations may be undertaken which would not otherwise be within the scope of investigations made for the purposes of the Report.
- b) Reliance on Provided Information: The evaluation and conclusions contained in the Report have been prepared on the basis of conditions in evidence at the time of site inspections and on the basis of information provided to Thurber. Thurber has relied in good faith upon representations, information and instructions provided by the Client and others concerning the site. Accordingly, Thurber does not accept responsibility for any deficiency, misstatement or inaccuracy contained in the Report as a result of misstatements, omissions, misrepresentations, or fraudulent acts of the Client or other persons providing information relied on by Thurber. Thurber is entitled to rely on such representations, information and instructions and is not required to carry out investigations to determine the truth or accuracy of such representations, information and instructions.
- c) Design Services: The Report may form part of design and construction documents for information purposes even though it may have been issued prior to final design being completed. Thurber should be retained to review final design, project plans and related documents prior to construction to confirm that they are consistent with the intent of the Report. Any differences that may exist between the Report's recommendations and the final design detailed in the contract documents should be reported to Thurber immediately so that Thurber can address potential conflicts.
- d) Construction Services: During construction Thurber should be retained to provide field reviews. Field reviews consist of performing sufficient and timely observations of encountered conditions in order to confirm and document that the site conditions do not materially differ from those interpreted conditions considered in the preparation of the report. Adequate field reviews are necessary for Thurber to provide letters of assurance, in accordance with the requirements of many regulatory authorities.

6. RELEASE OF POLLUTANTS OR HAZARDOUS SUBSTANCES

Geotechnical engineering and environmental consulting projects often have the potential to encounter pollutants or hazardous substances and the potential to cause the escape, release or dispersal of those substances. Thurber shall have no liability to the Client under any circumstances, for the escape, release or dispersal of pollutants or hazardous substances, unless such pollutants or hazardous substances have been specifically and accurately identified to Thurber by the Client prior to the commencement of Thurber's professional services.

7. INDEPENDENT JUDGEMENTS OF CLIENT

The information, interpretations and conclusions in the Report are based on Thurber's interpretation of conditions revealed through limited investigation conducted within a defined scope of services. Thurber does not accept responsibility for independent conclusions, interpretations, interpolations and/or decisions of the Client, or others who may come into possession of the Report, or any part thereof, which may be based on information contained in the Report. This restriction of liability includes but is not limited to decisions made to develop, purchase or sell land.



**ALBERTA TRANSPORTATION GRMP (CON0022163)
NORTH CENTRAL (ATHABASCA AND FORT McMURRAY DISTRICTS)
INSTRUMENTATION MONITORING RESULTS**

SPRING 2022

**APPENDIX A
DATA PRESENTATION AND SITE PLANS**

SITE NC058 (NC58A): HWY 858:02 SLIDE 45 km NORTH OF HWY 55

**ALBERTA TRANSPORTATION
 NORTH CENTRAL REGION - ATHABASCA AND FORT McMURRAY DISTRICTS
 INSTRUMENTATION MONITORING FIELD SUMMARY (NC058)
 SPRING 2022**

Location: Slide 45 km N of Hwy 55 (HWY 858:02 C1 40.378) File Number: 13357	Readout: RST C108 PN Unit 4 Temp: 18 Read by: NKR/JD
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PNEUMATIC PIEZOMETER READINGS

PN#	GPS Location (UTM 12)		Date	Reading kPa	Identification Number
	Northing	Easting			
PN10-3	6085214	436774	27-May-22	45	32098
PN14-1	6085212	436752	27-May-22	50.1	35506
PN14-2	6085213	436702	27-May-22	74.9	35507

DAILY INSPECTOR REPORT

**FIGURE NC058-1
PIEZOMETRIC DATA FOR HWY 858:02 SLIDE 45 km NORTH OF HWY 55**

