



**PUBLIC AGENDA
EXECUTIVE COMMITTEE**

**Monday, March 16, 2015, 1:00 p.m.
Council Chamber, City Hall**

Pages

1. CALL TO ORDER
2. CONFIRMATION OF AGENDA
3. DECLARATION OF PECUNIARY INTEREST
4. ADOPTION OF MINUTES
 - 4.1 Minutes of regular meeting of Executive Committee held on February 11, 2015.
5. UNFINISHED BUSINESS
 - 5.1 **Nutana Slope Failure - Options Matrix (File No. CK. 4000-1)** 5 - 325

On February 11, 2015, Executive Committee considered a report of the General Manager, Transportation and Utilities Department regarding the above. The Committee resolved that it receive a further report no later than March 16, 2015.

Recommendation

That Executive Committee consider the attached information and make a recommendation to City Council, for approval.
6. COMMUNICATIONS (requiring the direction of the Committee)
 - 6.1 Delegated Authority Matters
 - 6.1.1 **C. Gutmann, Project Manager, P4G Regional Plan - Saskatoon North Partnership for Growth - 2014 Annual Report (File No. CK. 4250-1)** 326 - 331

Recommendation

That the information be received.

6.2 Matters Requiring Direction

- 6.2.1 **G. Burke, Executive Director/CEO, Mendel Art Gallery - Remail Modern Business Plan 2015-2019 (File No. CK. 153-1 x 1705-RL)** 332 - 425

Recommendation

That Executive Committee recommend to City Council:

1. That the Remail Modern Business Plan: 2015 to 2019 be received as information; and
2. That the approval and phased implementation of The Remail Modern Business Plan: 2015 to 2019 occur on an annual basis through the Corporate Business Plan and Budget review process.

- 6.2.2 **Notice - Councillor Donauer - Unpaid Leave of Absence - Federal Election (File No. CK. 255-1)** 426 - 426

Recommendation

That the information be forwarded to City Council.

- 6.2.3 **D. Button, President, SUMA - 2015 Membership Fee (File No. CK. 155-3)** 427 - 430

Recommendation

That Executive Committee recommend to City Council that the 2015 membership fee in the Saskatchewan Urban Municipalities Association in the amount of \$110,244.79, be paid.

6.2.4 P. Kilgour, Director of Finance, TCU Place - Notice of Annual General Meetings of Saskatoon Centennial Auditorium & Convention Centre Corporation and Foundation (File No CK. 175-28)

431 - 431

Recommendation

That Executive Committee recommend to City Council:

1. That the City of Saskatoon, being a member of the Saskatoon Centennial Auditorium & Convention Centre Corporation Board of Directors, appoint Donald Atchison, or in his absence, Tiffany Paulsen or Ann Iwanchuk, of the City of Saskatoon, in the Province of Saskatchewan, as its proxy to vote for it on its behalf at the Annual General Meeting of the members of the Saskatoon Centennial Auditorium & Convention Centre Corporation, to be held on the 30th day of April, 2015, or at any adjournment or adjournments thereof; and
2. That the City of Saskatoon, being a member of the Saskatoon Centennial Auditorium Foundation Board of Directors, appoint Donald Atchison, or in his absence, Tiffany Paulsen or Ann Iwanchuk, of the City of Saskatoon, in the Province of Saskatchewan, as its proxy to vote for it on its behalf at the Annual General Meeting of the members of the Saskatoon Centennial Auditorium Foundation, to be held on the 30th day of April, 2015, or at any adjournment or adjournments thereof.

6.2.5 H. Hails, Recording Secretary, SaskTel Centre - Notice of Annual Members' Meeting - Saskatchewan Place Association Inc. (File No. CK. 175-31)

432 - 434

Recommendation

That Executive Committee recommend to City Council that the City of Saskatoon, being a member of the Saskatchewan Place Association Inc., appoint Donald Atchison, or in his absence, Councillors Davies or Hill, of the City of Saskatoon, in the Province of Saskatchewan, as its proxy to vote for it on its behalf at the Annual General Meeting of the members of the Saskatchewan Place Association Inc., to be held on the 6th day of May, 2015, or at any adjournment or adjournments thereof.

6.3 Requests to Speak (new matters)

7. REPORTS FROM ADMINISTRATION

7.1 Delegated Authority Matters

7.2 Matters Requiring Direction

7.2.1 SREDA Bonus Payment - 2014 (File No. CK. 1870-10) 435 - 437

Recommendation

That the Executive Committee recommend to City Council that a bonus payment in the amount of \$110,000 to the Saskatoon Regional Economic Development Authority Inc. be approved.

8. LEGISLATIVE REPORTS

8.1 Delegated Authority Matters

8.2 Matters Requiring Direction

8.2.1 Municipal Governance and Public Accountability (File No. CK. 255-1) 438 - 454

Recommendation

1. That the information be received;
2. That the processes for in camera matters be amended as outlined in this report; and
3. That the City Solicitor provide any required bylaw amendments to Council for consideration.

8.2.2 The Adult Services Licensing Bylaw, 2012 - Implications of Criminal Code Amendments (File No CK. 4350-25) 455 - 458

Recommendation

That Executive Committee recommend to City Council that *The Adult Services Licensing Bylaw, 2012* be amended by:

1. inserting a “whereas” clause at the commencement of The Adult Services Licensing Bylaw, 2012; and
2. amending the definition of “adult service agency” to remove any reference to advertising.

9. URGENT BUSINESS

10. ADJOURNMENT



EXECUTIVE COMMITTEE

Nutana Slope Failure – Options Matrix

Recommendation of the Committee

That Executive Committee consider the attached information and make a recommendation to City Council, for approval.

Topic and Purpose

The purpose of this report is to provide Executive Committee with a matrix of scenarios regarding the Nutana slope failure situation with consequences, commentary and impacts.

Report Highlights

1. A matrix of situational scenarios regarding the Nutana slope failure with consequences, commentary, and impacts is attached as Attachment 1.
2. The matrix is intended to assist the Committee in deciding which option to pursue.

Strategic Goal

The investment in monitoring the slope and site for safety concerns supports the Strategic Goal of Quality of Life.

Background

In June 2012, a slope failure occurred on the riverbank between 11th Street East and Saskatchewan Crescent East. Many residents of 11th Street had to be evacuated at the time because there was risk that the gas line located in the back alley might be compromised and cause explosion. The gas line was eventually relocated to the front area of the homes and the residents were permitted to return to their homes. Also, in response to the slope failure in 2012, the City of Saskatoon (City) retained Golder Associates to investigate, monitor and report about the slope failure. The investigation and monitoring was limited to the lane between the private properties. Monitoring of the lane continued on a monthly basis throughout 2012 and into the spring of 2013.

In June 2013, a new slide area to the east of the first location was reported. The City declared a voluntary evacuation and retained Golder Associates to conduct an extensive study of the entire slope failure area. This included analysis of the failure and evaluation of conceptual remediation options. Monitoring was expanded to include both the lane and private property.



EXECUTIVE COMMITTEE

Beginning in the spring of 2012, the City provided ongoing information and updates to affected property owners.

On February 11, 2015, Executive Committee considered the attached report of the General Manager of Transportation and Utilities (Attachment 2), providing an update on the Nutana Slope Stability. Following a presentation by a representative of the private property owners in the area, Executive Committee resolved that it receive a further report no later than March 16, 2015. The referenced report noted that there is a wide range of legal and associated risk consequences to the City related to this location. These matters were reported to Executive Committee *In Camera*, and are of the following nature:

1. Current approach, which is to monitor the site and provide detailed information to adjacent property owners and residents.
2. Offer mediation services, with or without participation by the City.
3. Become actively involved with property owners in the remediation approach.
4. Provide some level of grant or financial aid to property owners.

The Administration provided draft recommendations to Executive Committee. Executive Committee did not deal with the draft recommendations. Executive Committee decided to forward the matrix and options to its public agenda to be considered along with any public representation.

Report

Attached is a Nutana Slope Failure Scenario Matrix, which provides an assessment of a number of possible courses of action for this site.

Option A does not include financial participation by the City. Option A could include offering mediation services to homeowners. Option A is consistent with the City's past practice of not intervening on private property.

Options B through H include financial participation by the City in any remediation.

For Options B and C, a subjective value of \$240,000 per home was used to determine the City's potential financial participation. This represents the maximum value payable by the Province of Saskatchewan under the Provincial Disaster Assistance Program.

For Options D, E, F and H, the City's potential financial participation was determined based on the estimates provided by Golder Associates to remediate the site.



EXECUTIVE COMMITTEE

The Committee intends to receive a presentation from Administration outlining the options described in the matrix, along with Administration's recommendations.

Public Safety

Although a sudden and catastrophic failure is not predicted by the Geotechnical experts, a sudden and catastrophic failure is a distinct possibility and homeowners have been clearly advised of this. Selection of any option, in the short term, does not preclude this from happening. Your Committee recommends that the City continue to address public safety as it has in the past, which is through regular monitoring and reporting to residents. Your Committee further recommends that if an imminent hazard is observed, evacuation orders will be issued upon expert advice and as necessary.

Options

The options are outlined in the attached matrix.

Communications

Relevant property owners are being provided with a copy of this report on the date of release of this report.

Due Date for Follow-up and/or Project Completion

A report to Council with a recommendation from Committee is required.

Public Notice

Public Notice pursuant to Section 3 of Policy No. C01-021, Public Notice Policy, is not required.

Attachments

1. Slope Failure Scenario Matrix
2. Report of the General Manager, Transportation and Utilities Department dated February 11, 2015

Slope Failure Scenario Matrix

March 16, 2015

		ORDERED BY TOTAL PROJECT COST TO COS								
		A	B	C	D	E	F	G	H	
		Continue to Monitor and Report	Continue to Monitor and Report + Provide Grant	COS & Owners "Shear Zone Remediation" Solution	COS "Groundwater Reduction" Solution	COS Redeveloped "Slope Remediation" Solution	COS Undeveloped "Slope Remediation" Solution	Acquire Affected Properties and Demolish	COS only "Shear Zone Remediation" Solution	
FINANCIAL CONSIDERATIONS										
101	Slope Remediation Project Costs	\$ -	\$ -	\$ 20,000,000	\$ 4,500,000	\$ 10,000,000	\$ 10,000,000		\$ 20,000,000	101
<i>Project Costs</i>										
102	COS Portion of Solution Cost*	\$ -	\$ 3,840,000	\$ 3,840,000	\$ 4,500,000	\$ 10,000,000	\$ 10,000,000	\$ 4,000,000	\$ 20,000,000	102
103	Acquired Property Costs **	\$ -	\$ -	\$ -	\$ -	\$ 6,400,000	\$ 6,400,000	\$ 13,000,000	\$ -	103
104	Estimated Demolition Costs	\$ 120,000	\$ 120,000	\$ -	\$ -	\$ 200,000	\$ 400,000	\$ 400,000	\$ -	104
105	Project Cost to COS	\$ 120,000	\$ 3,960,000	\$ 3,840,000	\$ 4,500,000	\$ 16,600,000	\$ 16,800,000	\$ 17,400,000	\$ 20,000,000	105
106	Estimated Land Sale Value Following Remediation (RM3 zoning)	\$ -	\$ -	\$ -	\$ -	\$ 1,800,000	\$ -	\$ -	\$ -	106
107	TOTAL PROJECT COST to COS	\$ 120,000	\$ 3,960,000	\$ 3,840,000	\$ 4,500,000	\$ 14,800,000	\$ 16,800,000	\$ 17,400,000	\$ 20,000,000	107
108	Total COS Cost per home (total of 16 homes affected)	\$ -	\$ 240,000	\$ 240,000	\$ 281,250	\$ 925,000	\$ 1,050,000	\$ 1,087,500	\$ 1,250,000	108
109	Homeowners' Project Cost	Unknown	Unknown	\$ 16,160,000	NONE	NONE	NONE	NONE	NONE	109
<i>Annual Ongoing Costs</i>										
110	ANNUAL Municipal Portion of Property Tax Loss (gain)	\$ 31,000	\$ 31,000	\$ -	\$ -	\$ (65,000)	\$ 31,000	\$ 57,000	\$ -	110
111	ANNUAL Continued Slope Monitoring Costs	\$ 80,000	\$ 80,000	\$ -	\$ 80,000	\$ -	\$ -	\$ 20,000	\$ -	111
112	ANNUAL COST	\$ 111,000	\$ 111,000	\$ -	\$ 80,000	\$ (65,000)	\$ 31,000	\$ 77,000	\$ -	112
113	FINANCIAL SUMMARY	LOWEST	LOW	LOW	LOW	HIGH	HIGH	HIGH	HIGHEST	113
ENGINEERING RISK CONSIDERATIONS										
114	Risk of Construction Cost Overruns for COS	NONE	NONE	Moderate/High	Moderate	Moderate	Moderate	Low	High	114
115	Risk of Failure During Remediation	NONE	NONE	High	Moderate	Low	Low	Low	High	115
116	Probability of Effective and Permanent Solution	Unknown/Low	Unknown/Low	Moderate	Low	High	Very High	High	Moderate	116
117	Precedent for Future Slope Failures	NONE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	117
118	ENIGNEERING RISK SUMMARY	NONE	NONE	HIGH	MODERATE	LOW	LOW	LOW	VERY HIGH	118
COMMUNITY CONSIDERATIONS										
119	Timing for Solution	Owner Dependant	Owner Dependant	Owner Dependant	2017	Timed w Purchases	Timed w Purchases	Timed w Purchases	2017	119
120	Property Owner Agreement Required	No	No	Yes	No	Yes	Yes	Yes	No	120
121	Possible Emergency Intervention	Ongoing	Ongoing	During Construction	Ongoing	Low	Low	Low then NONE	During Construction	121
122	Use of Funds for Damage Remediation	N/A	Moderate	Moderate	Poor	Very Poor	Very Poor	Very Poor	Very Poor	122
123	Impact of Precedent Set for Other Private Property Issues	NONE	Moderate	Moderate	Moderate	Very Poor	Very Poor	Very Poor	Very Poor	123

* For Option B and C, a subjective value of \$240,000 per home was used, which represents the maximum value payable by the Province of Saskatchewan under Provincial Disaster Assistance Program.

** Acquired property costs estimated using 2011 assessed value of properties plus 20%

Nutana Slope Stability Update

Recommendation

That the report of the General Manager, Transportation & Utilities Department dated February 11, 2015, be forwarded to City Council for information.

Topic and Purpose

This report is intended to present the results of the in-depth geotechnical investigation of the Nutana Slope Failure, including causes, potential remediation options and relative remediation costs. The report also provides an update on the current situation with the riverbank slope failure occurring in Nutana between 11th Street East & Saskatchewan Crescent East.

Report Highlights

1. The river bank slope between Saskatchewan Crescent East & 11th Street has moved as much as 2.7 meters over the past two and a half years.
2. An in-depth geotechnical investigation of the slope failure was conducted by Golder Associates including causes of failure and conceptual remediation options.
3. The extensive geotechnical investigation revealed that the cause of the failure was natural and due to three key geological features – geometry; geology; and groundwater.
4. Public safety remains a paramount focus of the City. The slope has been monitored regularly by appropriate civic staff as well as consultants, and information has been provided to residents on a regular basis.
5. There have been slope remediation projects conducted at different sites in Saskatoon where the failure is primarily on public property.

Strategic Goals

The investment in monitoring the slope and site for safety concerns supports the City's Quality of Life Strategic Goal.

Background

In June 2012, a slope failure occurred on the river bank between 11th Street East and Saskatchewan Crescent East. This failure directly impacted the backyards of two properties. This was known as the west slide area. A temporary evacuation was issued for these properties due to concerns with a gas line in the lane. This gas line has since been removed. In response to the slope failure, the City initiated an investigation and monitoring program within the lane (Cherry Lane) between the private properties. Golder Associates was retained to provide this geotechnical expertise and the investigation led to a report that recommended actions that could be taken to stabilize the slope. The scope of this study was contained to the lane. Monitoring of the lane continued on a monthly basis throughout 2012 and into the spring of 2013, showing

negligible movement of the slope. Following initial movement, the west slide area recorded approximately 140 millimeters of movement throughout 2012.

In June 2013, a new slide area to the east of the first location was reported. Monitoring was expanded, and throughout 2013 this new east slide area moved over 1200 millimeters, which is significant. The west slide also continued moving for a total of 500 millimeters in 2013. This situation prompted the City to declare a voluntary evacuation and initiate an extensive study with Golder Associates with the scope of the study involving a complete investigation of the entire slope area, analysis of the failure and evaluation of conceptual remediation options.

Report

Slope Movement

The Nutana slope failure is comprised of two distinct slide areas; west slide and east slide. These areas are represented in Attachment 1. Following the initial sudden movement reported in backyards in June 2012, the following table documents the recorded horizontal movement progression of the slope.

West Slide		East Slide	
Initial failure	<i>Not recorded</i>		
2012	140 millimeters		
2013	500 millimeters	2013	1,200 millimeters
2014	400 millimeters	2014	1,500 millimeters
TOTAL	1,040 millimeters (3' 5")	TOTAL	2,700 millimeters (8' 10")

Golder Associates Study

In the fall of 2013, the Administration received the final draft report from Golder Associates, outlining the causes of the failure and possible solutions for the remediation.

The extensive geotechnical investigation revealed that the cause of the failure was natural and due to three key geological features. The first is due to the geometry of the slope referring to its steepness and tendency to be pulled down. The second is due to the geology referring to weak soil formations existing deep within the slope that are not sufficient to hold the slope up. The third feature causing failure is groundwater. Water tables throughout Saskatoon have risen over the past decade due to unprecedented amounts of rainfall. This high water table leads to a buoyancy force within the slope that causes it to lift and facilitate movement.

This study identified two possible high level options for remediation. The first option is the removal of 8 - 10 homes along 11th Street East and Saskatchewan Crescent East and re-grading the slope including groundwater lowering. Once re-graded, this slope would not be developed again. The cost of this option would be in the order of \$10M plus the value of the homes and lots which could total another \$10M. Attachment 2 provides an overview of the affected area of Option 1. The second option would result

in the homes remaining intact by constructing a stabilization zone in the midpoint of the slope along the lane. This option would be complex and require specialized contractors. The initial conceptual costs for this would be in the order of \$20M. Attachment 3 provides an overview of the affected area of Option 2.

The Administration commissioned Clifton Associates to conduct a third-party review of this work. The Clifton Associates analysis presents a bleaker picture than the Golder Associates report, and suggests that soil shear strengths could be even lower. In either case, the severity of the situation and the options to remediate are of the same general nature.

The City provided the consulting reports to the residents affected, and has been providing weekly updates to residents during all but the winter months. These updates have repeatedly reminded homeowners that there is a voluntary evacuation notice in effect, and that it is their responsibility to consult with their own engineers on the stability of their property.

A copy of the Golder Associates Report is included as Attachment 4.

Public Safety

In this situation, safety is paramount for residents and anybody else that may be near this area. The approach that has and will continue to be taken includes monitoring, providing the monitoring information to residents, and regular evaluation of the site and situation. If at any point, the City's engineers or the Saskatoon Fire Department decide that safety is at an elevated risk, a mandatory evacuation notice will be issued. The Emergency Measures Organization has developed a response plan for catastrophic slope failure and will implement it if required. The City will continue to provide information to residents as it becomes available, and will continue to remind residents of the voluntary evacuation notice due to the known instability of the slope. A sudden failure could also occur at any time, and affected homeowners have been made aware of this risk.

On June 3, 2014, an evacuation alert was issued to three properties immediately affected by the slope movement. This was triggered by a rapid increase in movement rate as high as 40mm/day. On June 24, 2014, further movement prompted an expansion of the evacuation alert to include eight properties in total.

The evacuation alert was issued on the recommendation of the Saskatoon Emergency Measures Organization. The purpose of the alert was to warn affected residents of the risk of sudden property movement and failure including a recommendation to evacuate. The alert also drew attention to the necessity of each homeowner to be vigilant about the stability of their property, seek professional advice and make decisions regarding their own comfort level in their home.

Monitoring of the slope movement has occurred on a weekly, bi-weekly and monthly basis as required through the summer of 2014. Since late July, insignificant movement has been recorded. The situation has not reached a stable state and remains a critical

matter, but given the decreased movement and the onset of winter, the evacuation alert was rescinded on October 31, 2014. This recommendation was again made by the Saskatoon Emergency Measures Organization.

Ongoing Monitoring

A detailed monitoring program remains in place for the Nutana slope. Due to the lack of movement, the frequency of monitoring is currently scaled back and will be increased as movement resumes in the spring of 2015. This monitoring will provide residents with up-to-date information on the slope status. This will help enable them to make informed decisions about their own safety, and the information may be an input to remediation activities they choose to undertake to protect their properties.

Past Slope Remediation Projects

There have been three notable slope stability projects in the past 15 years:

1. Rotary Park at the Broadway Bridge south abutment;
2. Cosmopolitan Park near the University Bridge east abutment; and
3. 17th Street & Saskatchewan Crescent East.

Each of these failures occurred exclusively on public right of way. The City funded these repairs because the affected areas were on public right of way and because further failure would impact public infrastructure.

Next Steps

City Council may choose from a wide number of possible roles for the City at this site. They range from the current approach, which is to monitor the slope movement and provide information to residents, to participating in remediation and contributing financially. The City typically does not contribute financially to remediation or restitution on private property.

There is a wide range of legal and associated risk consequences to the City related to this location. These will be reported to Executive Committee In-Camera, and are of the following nature:

1. Current approach, which is to monitor the site and provide detailed information to adjacent property owners and residents.
2. Offer mediation services, with or without participation by the City.
3. Become actively involved with property owners in the remediation approach.
4. Provide some level of grant or financial aid to property owners.

Public and/or Stakeholder Involvement

Since the initial movement in June 2012, the residents affected have been kept fully informed on the status of the slope and its recorded movements. These updates have been delivered via print and email. Meetings with affected residents have been held in July 2013, May 2014, and June 2014 to discuss, in detail, the extent of the problem and the nature of the evacuation recommendations. Homeowners have also been corresponding with Administration in small groups and one-on-one. The City will continue to keep affected residents informed of the situation in this manner.

Communication Plan

Communication will continue with the residents by providing print and email updates of the monitoring results. Administration will also continue to provide City Council with similar updates as the residents receive them.

Financial Implications

This project and all East Riverbank Stabilization initiatives have been funded by the Storm Water Utility, Capital Project #1493 – TU East Riverbank Stabilization. To date, nearly \$700,000 has been spent on geotechnical engineering to install instrumentation, monitor and analyse the Nutana slope failure. It is anticipated that approximately \$80,000 per year will be required to fund the necessary monitoring for public safety as long as the slope is unstable and moving at the rates that have been seen in the previous two seasons.

Sufficient budget has been allocated in 2015 to manage this.

Due Date for Follow-up and/or Project Completion

Administration will continue its current course of action of monitoring slope movement and informing residents of new information as it is available. Further reports on the updated status of the slope situation will be presented to the Standing Policy Committee on Environment, Utilities and Corporate Services as required.

Public Notice

Public Notice pursuant to Section 3 of Policy No. C01-021, Public Notice Policy, is not required.

Attachments

1. Nutana Slope Failure Overview
2. Conceptual Area Affected by Re-Grading
3. Conceptual Area Affected by Shear Zone Modification
4. Golder Associates Report – Geotechnical Investigation and Evaluation of Conceptual Remedial Options

Report Approval

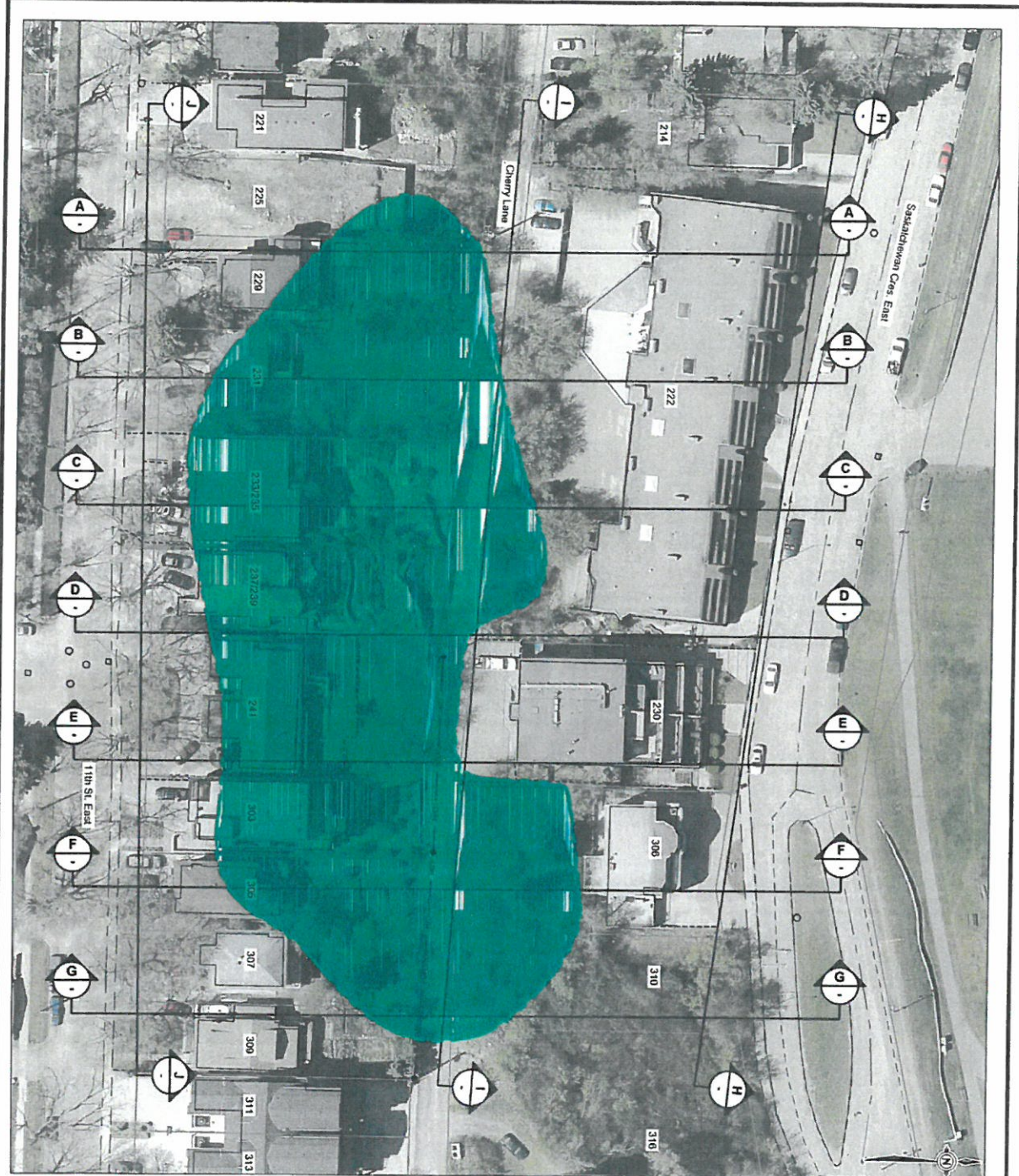
Written by: Andrew Hildebrandt, Director of Community Standards
Reviewed by: Mike Gutek, Director of Major Projects
Approved by: Jeff Jorgenson, General Manager, Transportation & Utilities
Department
Approved by: Murray Totland, City Manager

Exec AH - Nutana Slope Stability Update-Feb 11-15

Nutana Slope Failure Overview



G:\2011\1362\11-1362-0057 COS East Riverbank\Figures\Phase 5100 Cherry Lane Remediation\Task 6000\11-1362-0057 Remedial Options.dwg 11/13/2013 1:48 PM



LEGEND

- BENCHMARK LOCATION (OTHERS)
- ⊕ BENCHMARK LOCATION (GOLDER)
- ⊕ 3015 PANEL BENCHMARKS (GOLDER)
- ⊕ POWER POLE
- ⊕ CANCH BARN
- MANHOLE
- OVERHEAD POWER LINE
- 303 LOT NUMBER

REFERENCE
AERIAL PHOTOGRAPH PROVIDED BY CITY OF SASKATOON, MAY 15, 2011
CITY OF SASKATOON/DATA/IM

DRAFT

10 0 10
SCALE: 1:600 METRES

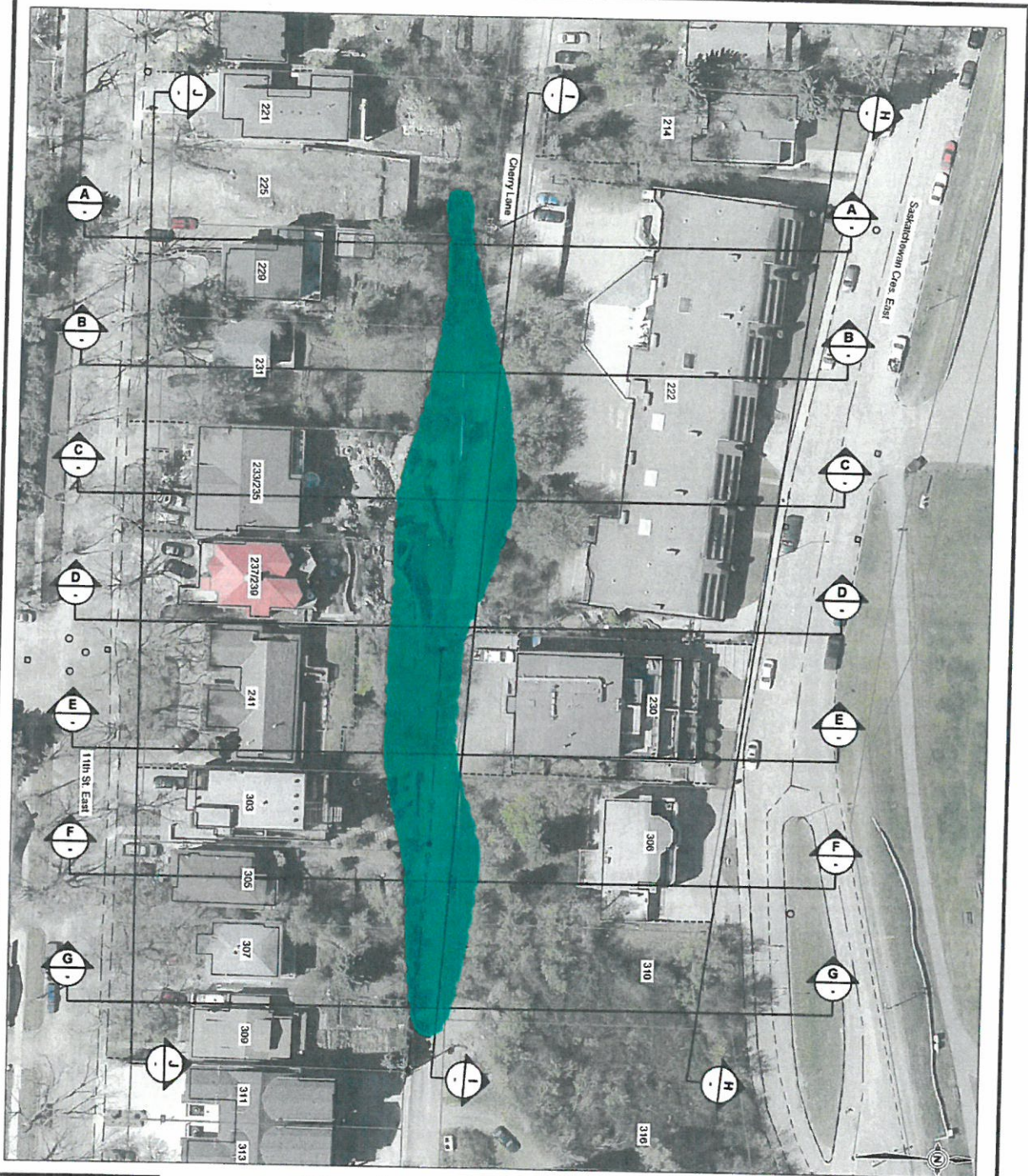
PROJECT
City of Saskatoon
CHERRY LANE
SLOPE INSTABILITY

CONCEPTUAL AREA AFFECTED BY RE-GRADING

PROJECT	11-1362-0057	DATE	2013
DESIGN	2013	DATE	2013
CHECK		DATE	
APPROVE		DATE	

FIGURE: 1

C:\2011\1562\11-1362-0057 CCS East Riverbank\Figures\Phase 5100 Cherry Lane Remediation\Task 6000\11-1362-0057 Remedial Options.dwg 11/13/2013 1:46 PM



LEGEND

- BENCHMARK LOCATION (OTHERS)
- BENCHMARK LOCATION (C/C/CRN)
- 2013 FIELD BENCHMARK (S/10/L/1/N)
- POWER POLE
- CATCH BASIN
- MANHOLE
- OVERHEAD POWERLINE
- 303 LOT NUMBERS

REFERENCE
 AERIAL PHOTOGRAPHS PROVIDED BY CITY OF SASKATOON, JAN 15, 2011
 CITY OF SASKATOON DATA

DRAFT

10
0
10
SCALE 1:800
METRES

City of Saskatchewan
CHERRY LANE
 SLOPE INSTABILITY

CONCEPTUAL AREA AFFECTED BY SHEAR ZONE MODIFICATION

PROJECT	11-1362-0057	FILE NO.	0007 Remedial Op.
DESIGNER	Goldier Associates	SCALE	AS SHOWN
CHECK	WES	DATE	NOV. 13
REVISION			

FIGURE: 2



May 2014

CHERRY LANE SLOPE MOVEMENT, SASKATOON, SK

Geotechnical Investigation and Evaluation of Conceptual Remedial Options

Submitted to:

City of Saskatoon
Infrastructure Services
222 - 3rd Avenue North
Saskatoon, SK S7K 0J5

Attention: Mr. Andrew Hildebrandt

REPORT



Report Number: 11-1362-0057/5100

Distribution:

2 Copies - City of Saskatoon, Saskatoon, SK
2 Copies - Golder Associates Ltd., Saskatoon, SK





Executive Summary

Golder Associates Ltd. was retained by the City of Saskatoon to conduct a geotechnical investigation and evaluation of conceptual remedial options for the slope instability located in the area of Cherry Lane (back alley), the 200 to 300 blocks between the 11th Street East and the Saskatchewan Crescent East, Saskatoon (the Site).

Two slope failures recently occurred in this area, affecting approximately a 120 metre long section of Cherry Lane and the backyards of several houses and buildings. The first failure (referred to as the West Failure) occurred on June 20, 2012. The second failure (referred to as the East Failure) occurred sometime between June 20 and June 24, 2013. The West Failure impacted a slope area approximately 70 metre section of Cherry Lane and 40 metres from the head scarp to the toe; it was most pronounced in the backyards of 229, 231, 233/235 and 237/239 11th Street East, through Cherry Lane, and into the backyard of 222 Saskatchewan Crescent East. The West Failure resulted in the disruption and interference with the Electrical Utility Services, requiring repairs and adjustment, and disruption of the geometry and stability of the public right-of-way land, requiring closure of Cherry Lane. The East Failure affected a slope area approximately 30 metre section of Cherry Lane and 45 metres from the head scarp to the toe; it was most pronounced in the backyard of 303, 305 and 307 11th Street East, through Cherry Lane, and into the backyard of 306 Saskatchewan Crescent East. The West Failure and East Failure were separated by two residential houses/apartment building, 241 11th Street East and 230 Saskatchewan Crescent East. No obvious cracking or slope movement was observed in this slope section between the two failure areas to date (May 2014).

Soil investigation and instrumentation installation were carried out to determine stratigraphy, location of the failure plane, rate of landslide movement and groundwater conditions; which are required for the development of conceptual remedial option. Monitoring of slope movements has been conducted since the West Failure occurred. The slope failures along Cherry Lane are most likely a result of a combination of the geology of the area along the riverbank, the heavy and prolonged precipitation in the spring of 2012 and 2013 that resulted in increased groundwater levels, and changes to the geometry as a result of landscaping of the slope.

The following conceptual remedial options have been evaluated for the Site:

- Option 1: Do nothing option;
- Option 2: Installation of a sub-drainage system;
- Option 3: Slope flattening with the installation of a sub-drainage system; and
- Option 4: Modification of shear zone with installation of a sub-drainage system.

As this Site poses a high risk to the public, infrastructure, and property in the area; a minimum slope factor of safety of 1.5 is recommended as the criteria for the evaluation of conceptual remedial options.



CHERRY LANE GEOTECHNICAL INVESTIGATION AND EVALUATION

Based on the results of the option evaluation, Option 4 is recommended as a potential remedial option for the Site. The conceptual Option 4 involves the shear zone modification along Cherry Lane and the installation of a sub-drainage system (one section along 11th Street East and another along Cherry Lane). The approximate extent of the conceptual shear zone modification area is approximately 120 metres long and 4 to 13 metres wide. The construction cost estimate for this Option is in the range of 10 to 20 million dollars. While the conceptual cost of this option is estimated to be higher than the other three options, this option will result in the least disturbance to the surrounding properties (e.g., the majority of the remedial work can be confined to the area surrounding Cherry Lane), and can achieve the recommended minimum factor of safety of 1.5 for the remedial slope.



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Cost Estimates for Conceptual Remediation Options



1.0 INTRODUCTION

Golder Associates Ltd. (Golder) was retained by the City of Saskatoon (the City) to conduct a geotechnical investigation and evaluation of conceptual remedial options for the slope instability located in the area of Cherry Lane (back alley), the 200 to 300 blocks between the 11th Street East and the Saskatchewan Crescent East, Saskatoon (the Site).

Two slope failures recently occurred in this area, affecting approximately a 120 metre (m) long section of Cherry Lane and the backyards of several houses and buildings. The first failure (referred to as the West Failure) occurred on June 20, 2012. The second failure (referred to as the East Failure) occurred sometime between June 20 and June 24, 2013. Site location, locations of the slope failures and civic addresses of residential properties are shown in Figure 1.

The West Failure impacted a slope area approximately 70 m section of Cherry Lane and 40 m from the head scarp to the toe; it was most pronounced in the backyards of 229, 231, 233/235 and 237/239 11th Street East, through Cherry lane, and into the backyard of 222 Saskatchewan Crescent East. The West Failure resulted in the disruption and interference with the Electrical Utility Services, requiring repairs and adjustment, and disruption of the geometry and stability of the public right-of-way (ROW) land, requiring closure of Cherry Lane. The East Failure affected a slope area approximately 30 m section of Cherry Lane and 45 m from the head scarp to the toe; it was most pronounced in the backyard of 303, 305 and 307 11th Street East, through Cherry Lane, and into the backyard of 306 Saskatchewan Crescent East. The West Failure and East Failure were separated by two residential houses/apartment building, 241 11th Street East and 230 Saskatchewan Crescent East. No obvious cracking or slope movement was observed in this slope section between the two failure areas.

This report presents a summary of field observations, the results of field investigation and monitoring program, assessment of slope stability conditions, and conceptual slope remediation options for the Site.

This report should be read in conjunction with “Information and Limitations of the Report”, included in Appendix A. The reader is specifically directed to this information as it is essential for the proper interpretation and usage of this report.

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LEGEND

- CRACK LOCATION (APPROXIMATE)
- TOE OF SLUMP (APPROXIMATE)
- 303 LOT NUMBER

REFERENCE

AERIAL PHOTOGRAPH PROVIDED BY CITY OF SASKATOON, MAY 15, 2011



<p>PROJECT</p> <p>City of Saskatoon</p>	<p>CHERRY LANE SLOPE INSTABILITY</p>																				
<p>TITLE</p> <p>SITE LOCATION PLAN</p>																					
<p>Golder Associates Saskatoon, Saskatchewan</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">PROJECT</td> <td style="width: 15%;">11-1362-0057</td> <td style="width: 15%;">FILE No.</td> <td style="width: 15%;"></td> </tr> <tr> <td>DESIGN</td> <td>LM 08/05/14</td> <td>SCALE</td> <td>AS SHOWN REV.</td> </tr> <tr> <td>CADD</td> <td>BDS/JDS 08/05/14</td> <td></td> <td></td> </tr> <tr> <td>CHECK</td> <td>HV 08/05/14</td> <td></td> <td></td> </tr> <tr> <td>REVIEW</td> <td>PGB 08/05/14</td> <td></td> <td></td> </tr> </table> <p style="text-align: right; font-weight: bold; font-size: 1.2em;">FIGURE: 1</p>	PROJECT	11-1362-0057	FILE No.		DESIGN	LM 08/05/14	SCALE	AS SHOWN REV.	CADD	BDS/JDS 08/05/14			CHECK	HV 08/05/14			REVIEW	PGB 08/05/14		
PROJECT	11-1362-0057	FILE No.																			
DESIGN	LM 08/05/14	SCALE	AS SHOWN REV.																		
CADD	BDS/JDS 08/05/14																				
CHECK	HV 08/05/14																				
REVIEW	PGB 08/05/14																				



2.0 OBJECTIVE AND SCOPE OF WORK

The objective of this work was to develop a conceptual remediation plan for the Site (i.e., the West Failure, the East Failure, and the section of Cherry Lane between the two existing failures).

The scope of work for this study, as presented in our work plan dated July 12, 2013 includes:

- project management and meetings;
- geotechnical information review and compilation;
- structural engineering support;
- installation of survey control network and topographic survey;
- development of soil investigation program and monitoring system;
- soil investigation and instrumentation installation;
- soil laboratory testing;
- field monitoring;
- geotechnical analysis;
- development and evaluation of conceptual remediation options; and
- preparation of this engineering report.

Site reconnaissance, slope movement monitoring, and meetings with the City began when the slope movement occurred in June 2012, as part of the emergency response to the slope movement. Prior to July 2013, site reconnaissance and monitoring conducted by Golder was restricted to a portion of the Site owned by the City (i.e., Cherry Lane). Recent site reconnaissance and monitoring have been conducted for the entire Site, which is partially-owned by the City and partially-owned properties of private landowners. These tasks have been continued to date (May 2014); the results of our field observations and monitoring program have been provided to the City following each monitoring visit.

3.0 BACKGROUND

3.1 Riverbank Instability History

The topography of Saskatoon is a generally level plain of low relief dissected by the valley of the South Saskatchewan River. The South Saskatchewan River within Saskatoon runs through glacial till underlying surficial stratified deposits (SSD) of lacustrine clays, silts, and sands. The river is a discharge receptor for many of the aquifer systems in this geographic region. Slope instability along the east riverbank in the City has been an ongoing problem since 1913 (Clifton et al. 1981). Clifton et al. (1981), Clifton (1985), Eckel et al. (2002) and Golder (2008a) provide a detailed review of the geology, hydrogeology, historical slope instability activities and remedial works for the east river bank.



There is an increasing level of slope instability along the riverbank in recent years. High annual precipitation and heavy and prolonged precipitation events occurring in the last few years have increased piezometric levels in soils and contributed to slope instability.

3.2 Historical Slope Stability Condition of the Site

Riverbank instability occurs as a result of shear failure within the soil mass. Slope stability conditions depend on the site stratigraphy, soil materials, slope geometry, groundwater conditions and time. Most of the slope failures occur as shear within the lacustrine clay of the SSD at the contact with the till. The stability of a slope can be negatively affected by a number of activities (Clifton 1985), including: i) adding weight to the slope (such as fills on the slope and snow dumps); ii) increase in the elevation of the water table (resulting from lawn watering, leaking water mains, sewers and storm water lines, surface runoff directed towards the slope, blockage of the zone of seepage by placed fill, and the reduction in evapotranspiration through removal of vegetation, covering the slope with a membrane, or covering the slope with gravel); iii) excavation of the slope face (e.g., for road cuts and basement excavations); iv) removing natural vegetation (e.g., mature trees that tend to stabilize the slope); v) erosion of toe of the slope; and vi) vibrations (e.g., pile driving and explosives).

P. Machibroda Engineering Ltd. (PMEL) (1997) suggested the following primary mechanisms contributing to instability:

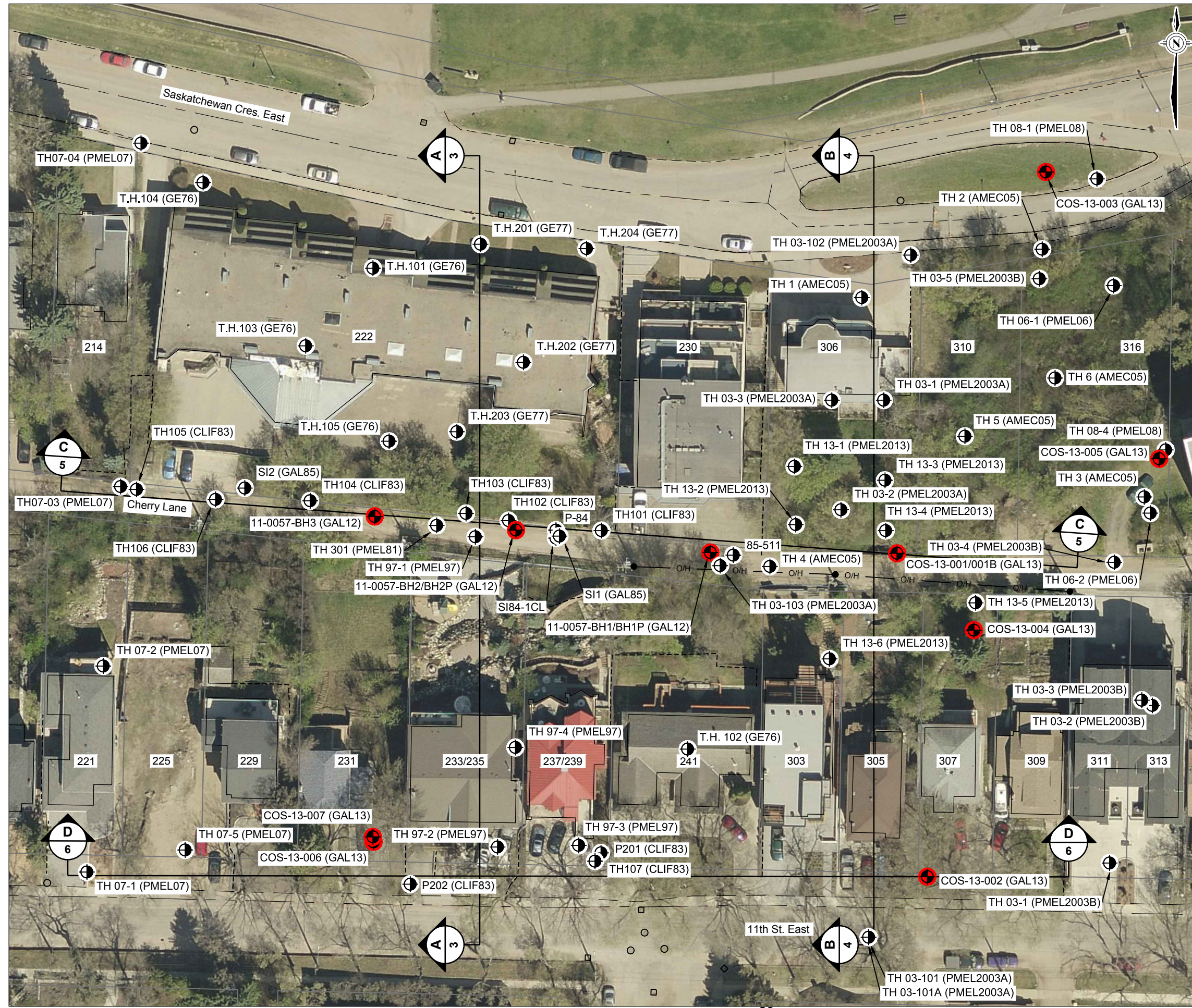
- prolonged periods of precipitation and/or spring snowmelt resulting in induced surface infiltration;
- toe erosion at the lower reach of the riverbank; and
- influences from upslope or down slope development including site grading, groundwater discharge or recharge and/or building development.

Clifton (1985) highlights the Cherry Lane area as an area where “existing landslides potentially threaten structures or improvements placed on or near the top of the slopes” and states that “the effects of movement can be seen on several parcels of private property and on several structures”. The report also states that new improvements would require detailed slope stability analysis with particular consideration to sites that “lie on a landform, such as the old head scarps landward from Cherry Lane, where shear strain, however slow, can be expected”.

Following the findings of the Clifton (1985) report, an agreement between Meewasin Valley Authority (MVA) and the City was signed on October 7, 1985 (City of Saskatoon 1985). This agreement outlined the responsibilities of each party in monitoring 17 inclinometers mentioned in the agreement, as well as any additional instrumentation that may be installed pursuant to the agreement. The 17 inclinometers that form the basis of the monitoring program were installed in 1984 and 1985. This agreement recommended monitoring the inclinometers in the spring and fall of each year, with more frequent monitoring during unusually heavy precipitation periods, and at locations where large displacements were observed.

Two inclinometers, designated as SI84-1CL and 85-511 with locations presented on Figure 2 were installed and monitored in Cherry Lane. However Inclinometer SI84-1CL was blocked in 2004 and inclinometer 85-511 was bent in 2006. Inclinometer SI-84 ICL recorded approximately 20 millimetres (mm) of total movement for the period from November 1992 to October 2001. Inclinometer 85-511 recorded approximately 32 mm of total movement for the period from August 1985 to October 2005.

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- REFERENCES**
- GE76 - GOLDER ENGINEERING LTD. APR. 9, 1976. GEOTECHNICAL INVESTIGATION 216, 218 AND 220 SASKATCHEWAN CRESCENT
 - GE77 - GOLDER ENGINEERING LTD. JULY 4, 1977. GEOTECHNICAL SITE INVESTIGATION PROPOSED HOUSING COMPLEX, SASKATCHEWAN CRESCENT
 - PMEL81 - P. MACHIBRODA ENGINEERING LTD. JUNE 17, 1981. GEOTECHNICAL INVESTIGATION PROPOSED APARTMENT BUILDING SASKATCHEWAN CRESCENT, SASKATOON, SASKATCHEWAN
 - CLIF83 - CLIFTON ASSOCIATES LTD. AUG. 17, 1983. GEOTECHNICAL STUDIES PROPOSED PARK TERRACE CONDOMINIUMS 222 SASKATCHEWAN CRESCENT EAST SASKATOON, SK.
 - GAL85 - GOLDER ASSOCIATES LTD. MAY 1985. PROGRESS REPORT NO. 1 SLOPE MONITORING PROGRAM, PARK TERRACE CONDOMINIUMS, 222 SASKATCHEWAN CRESCENT EAST, SASKATOON, SASKATCHEWAN
 - PMEL97 - P. MACHIBRODA ENGINEERING LTD. SEPT. 15, 1997. GEOTECHNICAL INVESTIGATION AND SLOPE STABILITY STUDY PROPOSED RESIDENTIAL DEVELOPMENT, 237-11TH STREET EAST, SASKATOON, SASKATCHEWAN
 - PMEL03A - P. MACHIBRODA ENGINEERING LTD. SEPTEMBER 11, 2003. GEOTECHNICAL INVESTIGATION AND SLOPE STABILITY STUDY PROPOSED GARAGE, 306 SASKATCHEWAN CRESCENT EAST, SASKATOON, SASKATCHEWAN, PMEL FILE NO. S03-4869
 - PMEL03B - P. MACHIBRODA ENGINEERING LTD. OCTOBER 31, 2003. GEOTECHNICAL INVESTIGATION AND SLOPE STABILITY STUDY PROPOSED RESIDENCE, 313-11TH STREET EAST, SASKATOON, SASKATCHEWAN, PMEL FILE NO. S03-4925
 - AMEC05 - AMEC EARTH & ENVIRONMENTAL. JULY 27, 2005. REVISED SLOPE STABILITY ASSESSMENT PROPOSED CONDOMINIUM DEVELOPMENT, 316 SASKATCHEWAN CRESCENT, SASKATOON, SASKATCHEWAN
 - PMEL06 - P. MACHIBRODA ENGINEERING LTD. JULY 14, 2006. GEOTECHNICAL INVESTIGATION AND SLOPE STABILITY STUDY PROPOSED CONDOMINIUM 316 - SASKATCHEWAN CRESCENT EAST, SASKATOON, SK
 - PMEL07 - P. MACHIBRODA ENGINEERING LTD. JUNE 12, 2007. GEOTECHNICAL INVESTIGATION AND SLOPE STABILITY STUDY PROPOSED RESIDENCES, 221 & 225 - 11TH STREET EAST, SASKATOON, SK
 - PMEL08 - P. MACHIBRODA ENGINEERING LTD. JULY 8, 2008. PROPOSED COMMERCIAL/RESIDENTIAL DEVELOPMENT 328 SASKATCHEWAN CRESCENT EAST, SASKATOON, SK
 - GAL12 - GOLDER ASSOCIATES LTD. MAY 2013. ASSESSMENT OF SLOPE INSTABILITY AT 200 BLOCK, 11TH STREET EAST.
 - PMEL13 - P. MACHIBRODA ENGINEERING LTD. JULY 18, 2013. SLOPE INSTABILITY 230/306 SASKATCHEWAN CRESCENT SASKATOON, SK. DRAWING NO S13-8517-1 TO 7

- LEGEND**
- ◉ BOREHOLE LOCATION (OTHERS)
 - ◉ BOREHOLE LOCATION (GOLDER)
 - ◉ 2013 & 2012 BOREHOLES LOCATION (GOLDER)
 - POWER POLE
 - CATCH BASIN
 - MANHOLE
 - O/H — OVERHEAD POWER LINE
 - 303 LOT NUMBER

REFERENCE
 AERIAL PHOTOGRAPH PROVIDED BY CITY OF SASKATOON, MAY 15, 2011
 CITY OF SASKATOON DATUM



		CERRY LANE SLOPE INSTABILITY	
BOREHOLE AND CROSS SECTION LOCATION PLAN			
PROJECT	11-1362-0057	FILE No.	
DESIGN	LM 08/05/14	SCALE	AS SHOWN REV. 0
CADD	JDS 08/05/14		
CHECK	HV 08/05/14		
REVIEW	PGB 08/05/14		
		FIGURE: 2	



As part of the City's site reconnaissance program for the east riverbank; site reconnaissance for Cherry Lane was conducted yearly by Golder since 2006. The 2012 site reconnaissance was conducted on April 26, 2012. As noted during these inspections, deflected curbs and fences, drops in the pavement and tension cracks were present; however, no noticeable slope movement was observed at the time of inspection.

The City noted that during surveys and inspections in 2012, there was no evidence of leaking water mains, storm drains or sewers in the vicinity of the study area.

3.3 Aerial Photos

Aerial photos covering the City area, including the Site were taken in 1939, 1958, 1961, 1970, 1974, 1977, 1987, 1997, 2001, 2006 and 2011 and are included Appendix B. The site is located in a meander bend of the South Saskatchewan River, where river erosion may affect the stability of the slope. Rotary Park and the fill area immediately north of Saskatchewan Crescent East were constructed in the 1960s. Apartment building 328 on Saskatchewan Crescent East was constructed before a portion of the river immediately north of Saskatchewan Crescent East (now Rotary Park) was filled in in the 1960s. Apartment buildings 222 and 230 on Saskatchewan Crescent East were constructed before 1987. Construction of 233/235 and 237/239 11th Street East and some landscaping work was completed before 2001. The landscaping in the backyards of 233/235 and 237/239 11th Street East was completed before 2006. Construction of 303 11th Street East and landscaping of this property was completed before 2011.

3.4 Previous Geotechnical Studies

A large amount of background information is available on the geology, hydrogeology, slope conditions and soil properties for the east riverbank within the City in general and at the Site. General background information related to slope stability assessment for the east riverbank includes various geologic and hydrogeologic data published in the physical environment of Saskatoon (Christiansen 1968, 1970, 1979, Sauer 1975, Haug et al. 1977, Clifton et al. 1981); riverbank instability study reports prepared for the MVA and the City (Clifton 1985, Golder 2008a, 2013a); and riverbank site reconnaissance and monitoring reports (Eckel et al. 2002, Golder 2013b, AMEC 2005a to 2010, 2013).

Available geotechnical information and documents for the area surrounding the Cherry Lane slope movement include geotechnical and riverbank assessment reports and aerial imagery provided by the City, the MVA and local landowners for the 200 to 300 block of 11th Street East and the 200 to 300 block of Saskatchewan Crescent East in Saskatoon. Table 1 shows a summary of the site specific reports for the Site. These reports were mainly prepared for residential development at various times.



CHERRY LANE GEOTECHNICAL INVESTIGATION AND EVALUATION

Table 1: Summary of Historical Reports Reviewed

Title (Abbreviation)	Author	Year	Location
Geotechnical Investigation 216, 218 and 220 Saskatchewan Crescent (GE76)	Ground Engineering Ltd.	Apr. 9, 1976	222 Saskatchewan Crescent East
Geotechnical Site Investigation Proposed Housing Complex, Saskatchewan Crescent (GE77)	Ground Engineering Ltd.	Jul. 4, 1977	222 Saskatchewan Crescent East
Geotechnical Investigation Proposed Apartment Building Saskatchewan Crescent, Saskatoon, Saskatchewan (PMEL81)	P. Machibroda Engineering Ltd.	Jun. 17, 1981	222 Saskatchewan Crescent East
Geotechnical Studies, Proposed Park Terrace Condominiums 222 Saskatchewan Crescent East Saskatoon, SK (CLIF83)	Clifton Associates Ltd.	Aug. 17, 1983	222 Saskatchewan Crescent East
Progress Report No. 1 Slope Monitoring Program, Park Terrace Condominiums, 222 Saskatchewan Crescent East, Saskatoon, Saskatchewan (GAL85)	Golder Associates Ltd.	May 1985	222 Saskatchewan Crescent East
Slope Instability Study, South Saskatchewan River Bank Saskatoon, Saskatchewan (CLIF85)	Clifton Associates Ltd.	Dec. 23, 1985	East Riverbank
Feasibility of Horizontal Drains for Slope Stabilization East Bank – South Saskatoon, Saskatchewan (GAL89)	Golder Associates Ltd.	Apr. 1989	East Riverbank
Geotechnical Investigation and Slope Stability Study, Proposed Residential Development, 237-11 th Street East, Saskatoon, Saskatchewan (PMEL97)	P. Machibroda Engineering Ltd.	Sept. 15, 1997	237 – 11 th Street East
Geotechnical Investigation and Slope Stability Study, Proposed Garage, 306 Saskatchewan Crescent East, Saskatoon, Saskatchewan, PMEL File No. S03-4869 (PMEL03A)	P. Machibroda Engineering Ltd.	Sept. 11, 2003	306 Saskatchewan Crescent East
Geotechnical Investigation and Slope Stability Study, Proposed Residence, 313-11 th Street East, Saskatoon, Saskatchewan, PMEL File No. S03-4925 (PMEL03B)	P. Machibroda Engineering Ltd.	Oct. 31, 2003	313 – 11 th Street East
Revised Slope Stability Assessment, Proposed Condominium Development, 316 Saskatchewan Crescent, Saskatoon, Saskatchewan (AMEC05)	AMEC Earth & Environmental	Jul. 27, 2005	316 Saskatchewan Crescent East
Geotechnical Investigation, Proposed Idylwyld Lift Station Saskatoon, Saskatchewan (GAL06)	Golder Associates Ltd.	Feb. 2006	East of Sid Buckwold Bridge
Geotechnical Investigation and Slope Stability Study, Proposed Condominium 316 - Saskatchewan Crescent East, Saskatoon, SK (PMEL06)	P. Machibroda Engineering Ltd.	Jul. 14, 2006	316 Saskatchewan Crescent East
Geotechnical Investigation and Slope Stability Study, Proposed Residences, 221 & 225 - 11 th Street East, Saskatoon, SK (PMEL07)	P. Machibroda Engineering Ltd.	Jun. 12, 2007	221 and 225 – 11 th Street East
Proposed Commercial/Residential Development, 328 Saskatchewan Crescent East, Saskatoon, SK (PMEL08)	P. Machibroda Engineering Ltd.	Jul. 8, 2008	328 Saskatchewan Crescent East
Storm Sewer Preservation, East River Bank Slope Stabilization, City of Saskatoon File No. PW 8250-4/IS 7821-3 (GAL08)	Golder Associates Ltd.	Jul. 28, 2008	East Riverbank
Supplementary Comments and Visual Review and Groundwater Monitoring Results, Proposed Condominium 316-Saskatchewan Crescent East Saskatoon, Saskatchewan, PMEL File No. S09-5722.1 (PMEL09)	P. Machibroda Engineering Ltd.	Nov. 16, 2009	316 Saskatchewan Crescent East
Assessment of Slope Instability at 200 to 300 block, 11 th Street East (GAL12)	Golder Associates Ltd.	May 2013a	200 to 300 block, 11 th Street East



In addition to the geotechnical reports listed above, Golder also reviewed building permit information provided by the City for 222 and 230 Saskatchewan Crescent East and 229, 233-236, 239, 241, and 303 – 11th Street East.

3.5 Summary of Existing Foundation Plans

Foundation plans provided to the City as part of the building permit process were reviewed to determine the type and depths of foundation for those buildings located near the Cherry Lane slope failure, and are summarized in Table 2. It is not known if the installed foundations match the proposed building plans provided for review.

Table 2: Summary of Building Foundations in Building Permits

Location	Foundation Type	Foundation Size
222 Saskatchewan Crescent East	cast-in-place concrete piles	23 – 305 mm diameter, 6 m long 88 – 406 mm diameter, 6 m to 14 m long 20 – 600 mm diameter, 10 m to 14 m long
	battered concrete piles	5 – 406 mm diameter, 8 m to 10 m long
230 Saskatchewan Crescent East	cast-in-place concrete piles	2 – 500 mm diameter, 7.6 m long 25 – 406 mm diameter, 6.1 m to 7.9 m long 17 – 406 mm diameter, 3.0 m to 5.8 m long 8 – 406 mm diameter, 0.6 m to 2.7 m long
306 Saskatchewan Crescent East	cast-in-place concrete piles	2 – 254 mm diameter, 3.0 m deep (garage) 1 – 203 mm diameter, 3.0 m deep (garage)
	concrete footings	610 mm square, 203 mm thick and 1,372 mm square, 229 mm thick, step down (ground floor)
229 – 11 th Street East	cast-in-place concrete piles	10 – 305 mm diameter, 6.1 m long
	concrete footings	610 mm square, 203 mm thick, step down, minimum 1.2 m deep
231 – 11 th Street East	Demolished	N/A
233/235 – 11 th Street East	cast-in-place concrete piles	5 – 305 mm diameter, 6.1 m long 15 – 406 mm diameter, 6.1 m to 9.1 m long 15 – 406 mm diameter, 10.7 m to 13.7 m long
237/239 – 11 th Street East	cast-in-place concrete piles	1 – 305 mm diameter, 6.1 m long 17 – 406 mm diameter, 7.6 m to 9.1 m long 14 – 406 mm diameter, 10.7 m to 12.2 m long
241 – 11 th Street East	concrete footings	610 mm strip, 305 mm thick
303 – 11 th Street East	cast-in-place concrete piles	44 – 305 mm diameter, 4.9 m to 5.8 m long 8 – 406 mm diameter, 5.8 m to 7.0 m long
305 – 11 th Street East	cast-in-place concrete piles	8 – 305 mm diameter, 3.7 m long (rear addition)
307 – 11 th Street East	cast-in-place concrete piles	10 – 254 mm diameter, 6.1 m long (back porch) 1 – 203 mm diameter, 2.4 m long (2 nd floor addition)
	concrete footings	610 mm square, 305 mm thick (front veranda)

mm = millimetre; m = metre

Buildings located along Saskatchewan Crescent East are founded on piles and/or strip footings. Foundation elevations of the buildings at 222 and 306 Saskatchewan Crescent East appeared to be below the till/clay contact (i.e., shear zone) and likely have an insignificant effect on the slope movement. The retaining wall and foundation system of 230 Saskatchewan Crescent East, which extended further upslope, appears to have a positive effect to the stability of the upper slope south of this building. However, it is unknown to what degree this retaining wall and foundation system can sustain slope movement.



3.6 Precipitation Data and Changes in Groundwater Table

Groundwater levels in the SSD, especially in the clay layer overlying till, have a significant influence on slope stability at the Site. Increases in groundwater elevation decrease the stability of the slope. In general, groundwater levels vary in response to the amount of water available at the ground surface and the amount of discharge or recharge potential of the soil profile, which are dependent on the variation of precipitation.

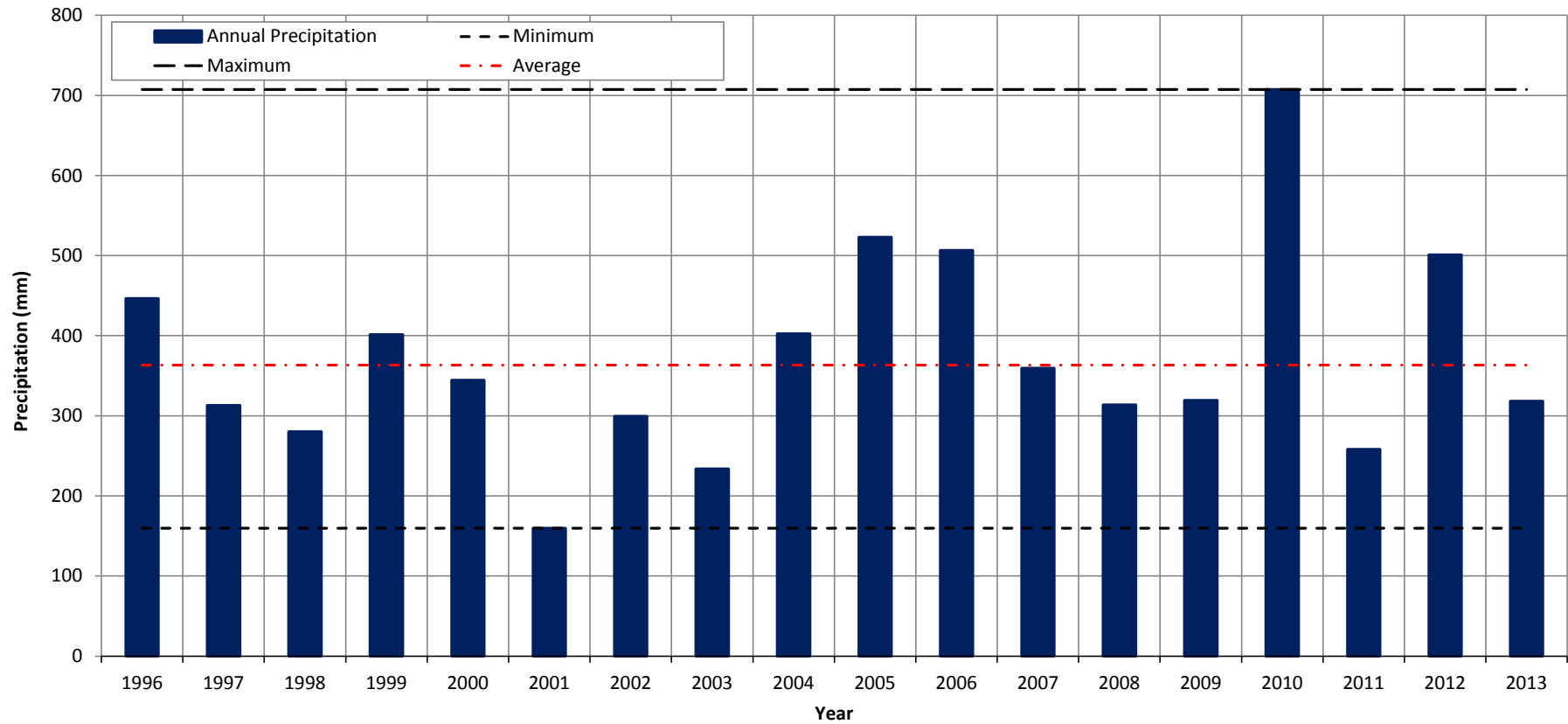
The 105 year daily total precipitation record for Saskatoon was analysed by Golder to determine the climatic conditions that may have influenced slope stability at the Site. The record was based on observations from the Environment Canada Reference Climate Station (EC 2013) for the years 1908 to 2007 and the Saskatchewan Research Council Climate Reference Station (SRC-CRS) (SRC 2013) from 2008 to present.

Saskatoon has experienced a wet cycle over the past ten years. Following a severe drought from 1997-2003, precipitation was above average between 2004 and 2006 (Figure 3) with 2005 and 2006 being the fourth and fifth wettest years on record, respectively. Although precipitation was below average between 2007 and 2009, the wettest year on record occurred in 2010 when 708 mm fell, almost double the historic average. High precipitation in 2010 created the antecedent conditions that led to flooding throughout the Prairie Provinces during 2011.

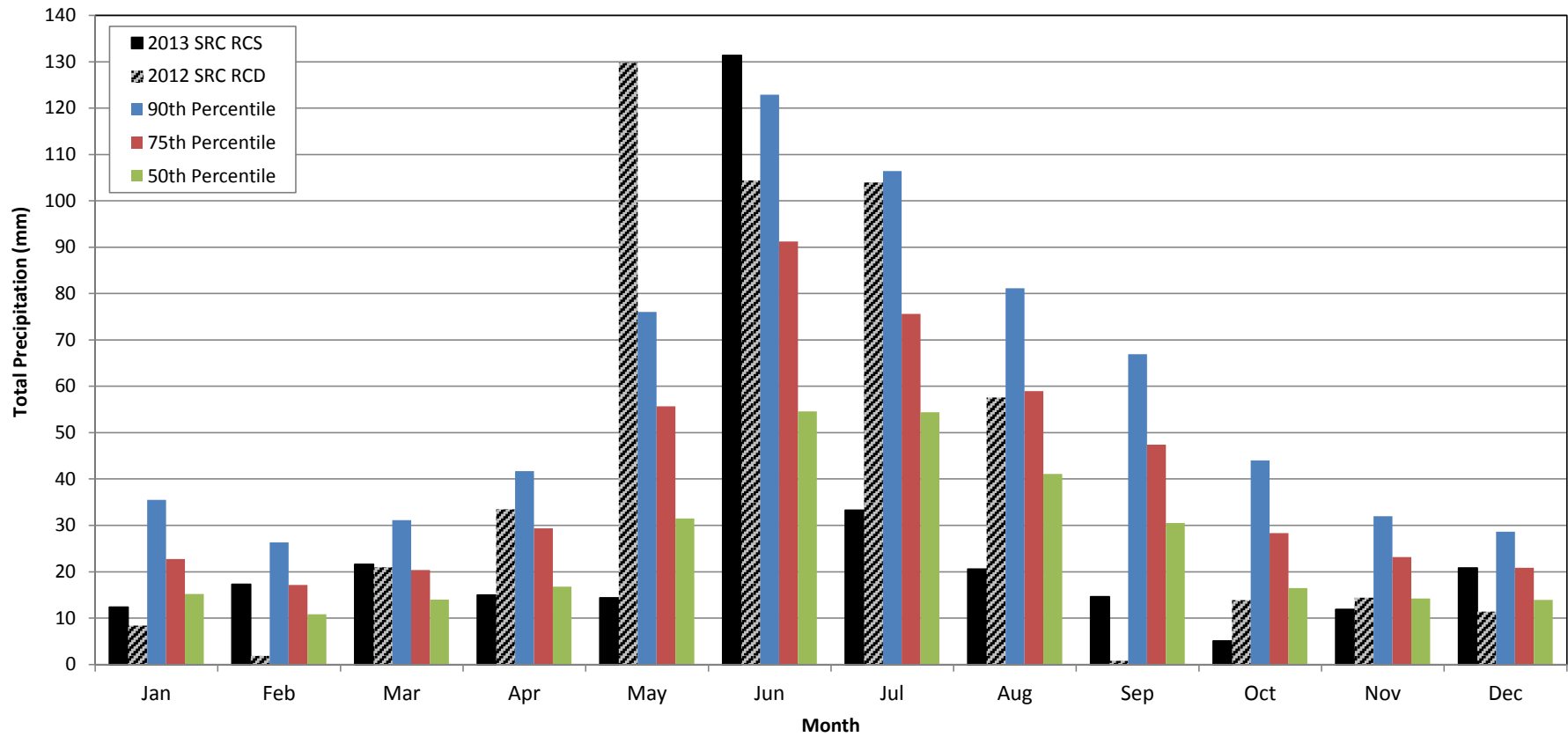
Although low through the winter of 2011-2012, precipitation was above normal during the spring and summer of 2012, particularly May and June (Figure 4). Several rain events between 10 and 25 mm led to a total precipitation of 129.8 mm in May 2012, making it the third wettest year observed between 1908 and 2012 and more than three times the median value of 31.5 mm: 69.6 mm of rain fell in the first week of May with 61.2 mm concentrated on May 5 and 6, 2012. On May 22 and 23, 2012, 33.6 mm of rain fell.

Rainfall in June 2012 was 104.4 mm, making it almost twice the median June precipitation of 54.6 mm (Figure 4). Sustained daily rainfall between June 9 and June 19, 2012 amounted to 81mm with 47.6 mm concentrated on June 9 and 10, 2012 (Figure 5). An additional 18.6 mm fell between June 24 and June 27, 2012.

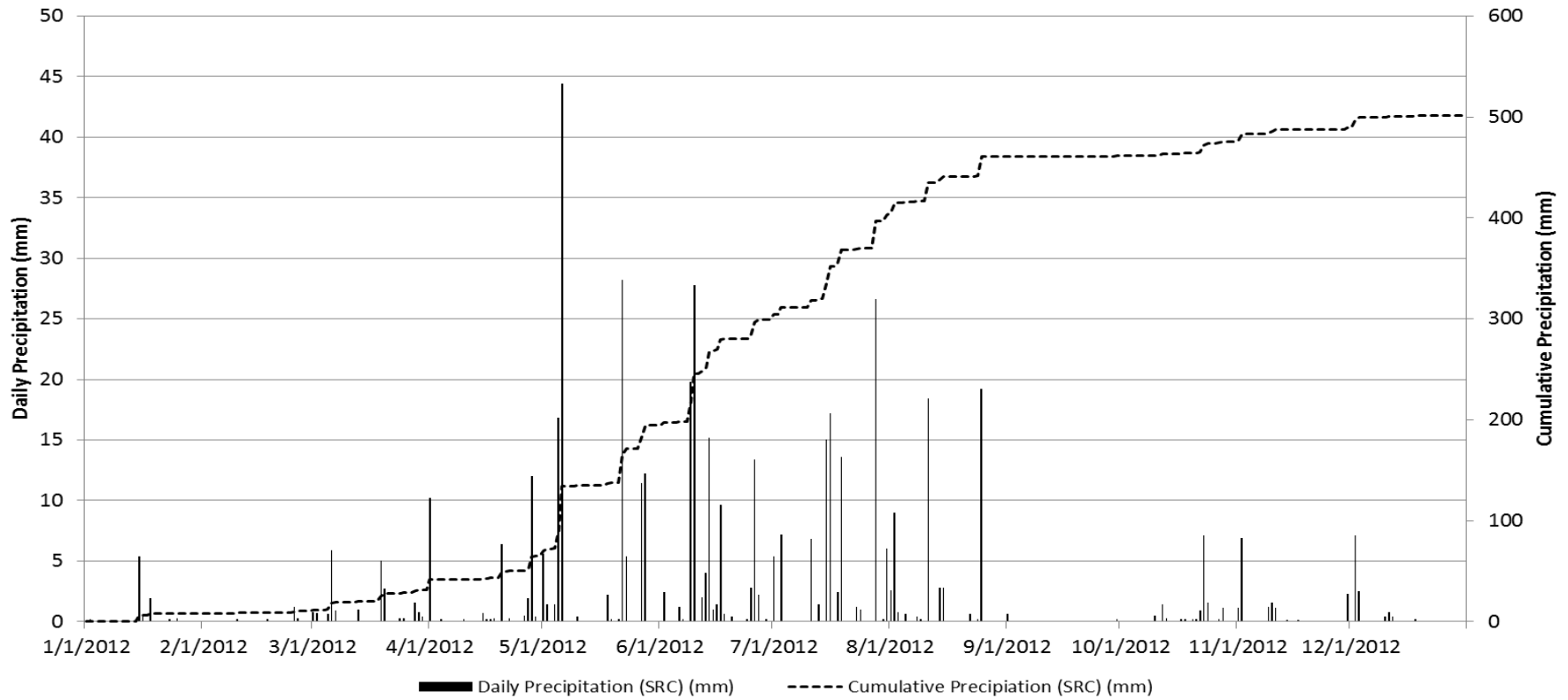
The 2012-2013 winter snowpack leading up to the spring runoff was high. Cumulative winter precipitation from November 1, 2012 to March 4, 2013 exceeded 200% of average in Saskatoon (WSA 2013). There was below normal precipitation during April and May of 2013 (Figure 5). However, total June precipitation was approximately twice the median with 131.4 mm total precipitation of which 101.6 mm fell between June 13, 2013 and June 23, 2013 (Figure 6).



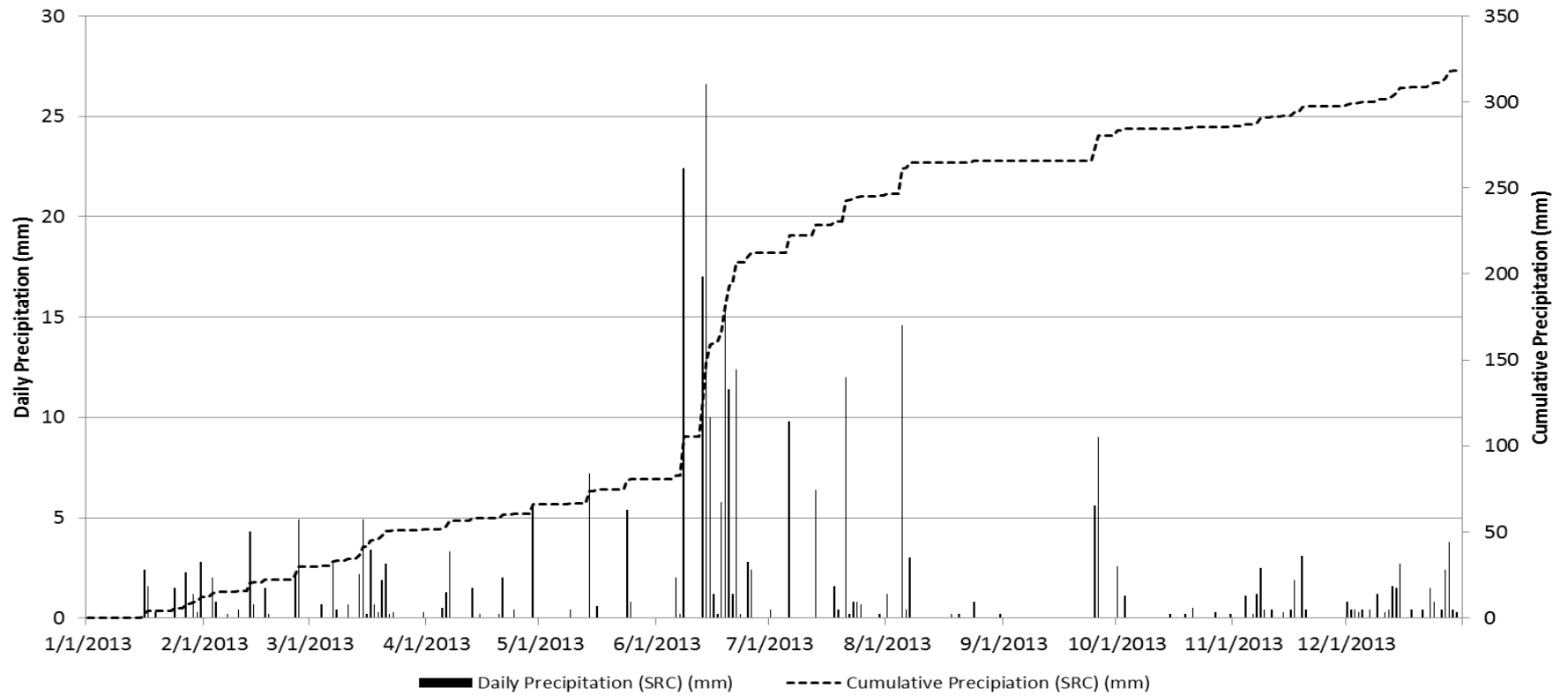
		CHERRY LANE SLOPE INSTABILITY	
TITLE SASKATOON AREA ANNUAL PRECIPITATION (1996 - 2013)			
		PROJECT 11-1362-0057 DESIGN LNM 08/05/14 CADD CHECK PGB 08/05/14 REVIEW HQV 08/05/14	FILE No. SCALE N/A REV.
			FIGURE: 3





		CHERRY LANE SLOPE INSTABILITY	
TITLE SASKATOON AREA TOTAL PRECIPITATION (1908 - 2013)			
		PROJECT 11-1362-0057 DESIGN LNM 08/05/14 CADD CHECK PGB 08/05/14 REVIEW HQV 08/05/14	FILE No. SCALE N/A REV.
			FIGURE: 4



		CHERRY LANE SLOPE INSTABILITY	
TITLE SASKATOON AREA DAILY AND CUMULATIVE PRECIPITATION (2012)			
		PROJECT 11-1362-0057 DESIGN LNM 08/05/14 CADD CHECK PGB 08/05/14 REVIEW HOV 08/05/14	FILE No. SCALE N/A REV.
			FIGURE: 5



		CHERRY LANE SLOPE INSTABILITY	
TITLE SASKATOON AREA DAILY AND CUMULATIVE PRECIPITATION (2013)			
		PROJECT 11-1362-0057 DESIGN LNM 08/05/14 CADD CHECK PGB 08/05/14 REVIEW HQV 08/05/14	FILE No. SCALE N/A REV.
			FIGURE: 6



4.0 SITE RECONNAISSANCE

Visual inspection of the Site has been conducted yearly since 2006; more frequent inspection was conducted after the West Slide Failure in June 2012. Observations during the inspections are presented in Golder (2008a, 2008b, 2009, 2010, 2011, 2013a, 2013b). A summary of key observations and events from visual monitoring across the site has been broken down into a timeline, as follows. Photographs taken during the inspections are presented in Appendix C:

■ 2006 to June 20, 2012

The site had experienced deformation and some movement prior to the West Failure event on June 20, 2012. During the annual site reconnaissance conducted by Golder, active land development (e.g., new house/building construction and landscaping work) was noted; deflected curbs and fences, drops in pavement and tension cracks were observed, as shown in Photos C.1, C.2, and C.3. However, no noticeable slope failure was observed. The toe of the upper slope, along Cherry Lane, prior to the West Failure event is shown in Photo C.4.

■ June 21, 2012

Golder was notified by the City that a slope failure (i.e., the West Failure) had occurred at Cherry Lane. During the site inspection conducted by Golder and the City, the following observations were noted:

- The failure was predominately in the backyards of 229, 231, 233/235 and 237/239 - 11th Street East, through Cherry Lane, and into the backyard of 222 Saskatchewan Crescent East.
- The head scarp of the slide crossed through the backyard of 233/235 - 11th Street East (Photo C.5).
- The toe of the slide crossed through the lane into the backyard of 222 Saskatchewan Crescent East (Photos C.6 and C.7).
- There was cracking behind and displacement of the bricks along the retaining wall in the backyard of 237/239 - 11th Street East (Photos C.8 and C.9).
- There was tension cracking along the lane, behind 237/239 - 11th Street East (Photo C.10).
- There was cracking along the head scarp of the East Failure location (behind 303 and 305 - 11th Street East, Photo C.11).

■ After June 21, 2012

Subsequent to the West Failure, the following activities and observations were made in the summer of 2012. Field inspection and slope monitoring was restricted to portion of the Site owned by the City (i.e., Cherry Lane).

- The SaskEnergy gas line that runs along Cherry Lane was shut off and relocated to reduce the public safety hazard.
- Subsequent to the West Failure event, Golder initiated a slope monitoring program along the lane. The monitoring program included the installation of slope movement and groundwater monitoring equipment.



- Homeowners affected by the slide were advised to seek independent geotechnical advice on their residences.
- Golder continued to conduct visual inspections approximately every other day throughout July 2012. The frequency of site inspections decreased as the rate of slope movement decreased in the fall and winter seasons.
- No significant slope movement was recorded east of 230 Saskatchewan Crescent East along Cherry Lane in 2012.

■ June 24, 2013

Golder was notified by the City that a second slide had occurred at Cherry Lane (i.e., the East Failure); predominantly in the backyards of 303 and 305 - 11th Street East, through Cherry Lane, and into the backyard of 306 Saskatchewan Crescent East. During the site inspection conducted by Golder and the City, the following observations were noted:

- The head scarp of the slide crossed through the backyards of 303 and 305 - 11th Street East; the ground surface had dropped approximately 0.6 m to 0.9 m (Photos C.12 and C.13).
- The toe of the slide was located in the backyard of 306 Saskatchewan Crescent East (Photo C.14).
- There was severe cracking along the lane behind 305 - 11th Street East; the ground surface had dropped approximately 0.5 m (Photo C.15).
- There was tension cracking along the lane behind 303 - 11th Street East (Photo C.16).
- Damage to the retaining wall in the backyard of 237/239 - 11th Street East, in the West Slide area, was also noted to be more extensive during the site inspection on June 24, 2013, compared to the observations noted on June 4 and 20, 2013 (Photos C.17, C.18, and C.19).

■ July to August 2013

Site reconnaissance and monitoring had been conducted for the entire Site. Subsequent to the East Failure, the following activities and observations were made in the summer of 2013.

- Golder conducted daily site inspections for the remainder of June 2013 and the majority of July 2013. Additional slope movement and groundwater monitoring equipment was installed in July and August 2013.
- Homeowners affected by the slide were advised to seek independent geotechnical advice on their residences.
- Cracking along Cherry Lane, between 303 and 305 - 11th Street East and 306 Saskatchewan Crescent East became more severe in the weeks following the East Failure. The drop in the pavement observed behind 305 - 11th Street East increased to approximately 0.5 m by June 4, 2013 (Photo C.20).
- On July 5 and 6, 2013, the City's Public Works was on site to seal tension cracking along the lane and re-grade the section of Cherry Lane behind 305 - 11th Street East (Photo C.21). That night there was a rainfall event that continued into the following morning. That afternoon (July 6, 2013), Golder and the City were notified by the owners of 306 Saskatchewan Crescent East that runoff was flowing from the



parking lot of the apartment building at 328 Saskatchewan Crescent East, along the lane and into the backyard of 306 Saskatchewan Crescent East. The runoff was causing erosion along the lane (Photo C.22) and washing the cold patch material that had been used to re-grade the section of the lane behind 305 - 11th Street East into the backyard of 306 Saskatchewan Crescent East. The City subsequently re-graded the eroded area and constructed a soil berm along the north edge of the lane, adjacent to the backyard of 306 Saskatchewan Crescent East (Photo C.23).

■ July 7, 2013

During the site inspection the following observations were noted:

- A trench was being excavated, by one of the residents, along the east side of the concrete retaining wall between 230 and 306 Saskatchewan Crescent East (Photo C.24). The retaining wall had been flexing and cracking under the loading of the adjacent soil on the lower slope (Photo C.25 and C.26).
- New tension cracks had appeared along the section of lane that had been re-graded, behind 305-11th Street East (Photo C.27). The City's Public Works returned to site to re-grade the lane and seal tension cracks again on July 12 and 21, 2013.

■ July 12, 2013

The City implemented a voluntary evacuation notice due to the accelerated rate of movement that was observed at that time.

■ July 17, 2013

It was noted that the trench that had been excavated along the east side of the concrete retaining wall between 230 and 306 Saskatchewan Crescent East had been partially backfilled with soil (Photo C.28).

■ August 18, 2013

The City Public Works constructed an asphalt berm on the north edge of Cherry Lane, between 303 and 305 - 11th Street East and 306 Saskatchewan Crescent East. A V-shaped berm was installed on the lane, behind 311 - 11th Street East to capture runoff from the parking lot of 328 - 11th Street East and direct the water to a 200 mm diameter pipe on the surface of the lane (Photo C.29).

■ Fall 2013

The frequency of site inspections decreased as slope movement decreased in the fall and winter seasons.



5.0 TOPOGRAPHIC SURVEY, GEOTECHNICAL INVESTIGATION AND INSTRUMENTATION INSTALLATION

5.1 Topographic Survey

Topographic survey was conducted for the West Failure by the City and Golder in 2012 (Golder 2013a) after the West Failure occurred, and then for the entire Site (including 219 to 313 – 11th Street East, 212 to 316 Saskatchewan Crescent East, and Cherry Lane) by Meridian Surveys Ltd. of Saskatoon during the period from July 16 to July 25, 2013, after the East Slide occurred. The survey included the property outlines, roads and landslide features surrounding Cherry Lane. An additional survey of installed instrumentation was completed on September 4, 2013. The surface feature elevations in 2013 were tied to the City Benchmark D1-008 (Orthometric Elevation 499.033 masl), located at the southwest abutment of the Broadway Bridge. The survey is referenced to the NAD 83 Universal Transverse Mercator coordinate system. Figure 7 shows the plan view of the survey area contours and survey features completed in 2013. Locations and co-ordinates of control points and Bench Mark used by Meridian Survey are shown in Appendix D.

5.2 Geotechnical Investigation and Instrumentation Installation

Geotechnical investigation and instrumentation installation for the slope failure study of the Site were completed in 2012 for the West Failure, and in 2013 for both the West Failure and East Failure area. The site investigation was conducted, to supplement the historical site investigation programs, to provide information for assessing soil stratigraphy, soil properties, groundwater, and slope stability conditions for the Site.

A representative of Golder was on site during the field investigation to monitor the borehole drilling, install instrumentation, and collect samples for further laboratory testing. Borehole locations were selected in advance of drilling to determine whether conflicts with utilities or site access existed. Boreholes were drilled through the pavement, surficial stratified deposits, and into glacial till to depths of up to 7.6 metres below ground surface (mbgs) during the 2012 drilling and up to 16.8 mbgs during the 2013 drilling.

Disturbed samples and Shelby Tube samples were collected from each borehole and returned to Golder's Saskatoon Laboratory for further testing and analysis. Disturbed samples were collected from the auger flights at the intervals noted on the Record of Borehole sheets. Shelby tube samples were collected to provide undisturbed samples for further testing. Groundwater conditions at the time of drilling were noted and the boreholes were backfilled with a bentonite-cement grout mixture to ground surface upon the completion of drilling.



LEGEND

- CONTOURS (MAJOR / MINOR)
- 303 LOT NUMBER

REFERENCE

CONTOURS PROVIDED BY MERIDIAN SURVEYS, AUGUST 2013
 CONTOURS SHOWN AT 0.5m INTERVALS
 AERIAL PHOTOGRAPH PROVIDED BY CITY OF SASKATOON, MAY 15, 2011



City of Saskatoon		CHERRY LANE SLOPE INSTABILITY																				
<p>TOPOGRAPHIC SURVEY PLAN (2013)</p>																						
Golder Associates <small>Saskatoon, Saskatchewan</small>	<table border="1" style="width: 100%; border-collapse: collapse; font-size: 0.8em;"> <tr> <td colspan="2">PROJECT</td> <td>11-1362-0057</td> <td>FILE No.</td> </tr> <tr> <td>DESIGN</td> <td>LM</td> <td>08/05/14</td> <td>SCALE AS SHOWN</td> </tr> <tr> <td>CADD</td> <td>BDS/JDS</td> <td>08/05/14</td> <td>REV.</td> </tr> <tr> <td>CHECK</td> <td>HV</td> <td>08/05/14</td> <td></td> </tr> <tr> <td>REVIEW</td> <td>PGB</td> <td>08/05/14</td> <td></td> </tr> </table>	PROJECT		11-1362-0057	FILE No.	DESIGN	LM	08/05/14	SCALE AS SHOWN	CADD	BDS/JDS	08/05/14	REV.	CHECK	HV	08/05/14		REVIEW	PGB	08/05/14		FIGURE: 7
PROJECT		11-1362-0057	FILE No.																			
DESIGN	LM	08/05/14	SCALE AS SHOWN																			
CADD	BDS/JDS	08/05/14	REV.																			
CHECK	HV	08/05/14																				
REVIEW	PGB	08/05/14																				



CHERRY LANE GEOTECHNICAL INVESTIGATION AND EVALUATION

Downhole instrumentation included slope inclinometer to measure slope movement, and vibrating wire and/or standpipe piezometers to monitor pore water pressure. Vibrating wire piezometers were attached to the slope inclinometer casing or installed in a separate borehole, and the boreholes were backfilled with a bentonite-cement grout mixture to ground surface upon the completion of drilling. The standpipe piezometers installed by Golder consisted of a 50 mm (2 inch) polyvinyl chloride pipe with a 1.5 m (5 ft) slotted screen which were covered with commercial filter sand and then backfilled with a bentonite-cement grout mixture to ground surface. In general, a flush mount casing was installed over the piezometer/slope inclinometer location to protect it from damage. Borehole locations were located in the field by Golder in 2012 and by Meridian Surveys Ltd. in 2013.

A field log was prepared for the boreholes to record the description and relative position of the soil strata, the location of samples, and the instrumentation installation details, in addition to other drilling notes. The Record of Borehole sheets are included in Appendix E.

In addition, six boreholes were drilled and standpipe piezometers installed by PMEL in the area of the East Slide, these piezometers are designated as TH13-1 to TH13-6. A cone penetration test (CPT) was conducted by PMEL at TH13-1 location.

Table 3 provides a summary of installed downhole instrumentation, locations of boreholes are shown in Figure 2, and locations of installed instrumentation are shown in Figure 8. Borehole records and instrumentation installation details are provided in Appendix E.

A Health and Safety Plan was developed prior to the start of drilling activities. All workers involved in the field investigation conducted a daily field hazard level assessment and toolbox meeting prior to starting work in order to identify potential site hazards and to address health and safety concerns.

Table 3: Summary of Installed Downhole Instrumentation

Borehole No.	Slope Inclinometer	VW Piezometer	Standpipe Piezometer	Location	Date of Installation
11-0057-BH1	SI1	VW11192	---	behind 241-11 th Street East on Cherry Lane	23-Jun-12
11-0057-BH2	SI2	VW11200	---	behind 233/235-11 th Street East on Cherry Lane	23-Jun-12
11-0057-BH3	SI3	VW11984	---	behind 231-11 th Street East on Cherry Lane	23-Jun-12
COS-13-001B	COS-13-001B	VW25927	---	behind 305-11 th Street East on Cherry Lane	26-Jul-13
COS-13-002	COS-13-002	VW25400 VW25399	---	front yard of 307-11 th Street East	25-Jul-13
COS-13-003	---	---	COS-13-003	Saskatchewan Crescent East	26-Jul-13
COS-13-004	COS-13-004	VW26020 VW25397	---	backyard of 307-11 th Street East	19-Aug-13



CHERRY LANE GEOTECHNICAL INVESTIGATION AND EVALUATION

Table 3: Summary of Installed Downhole Instrumentation (continued)

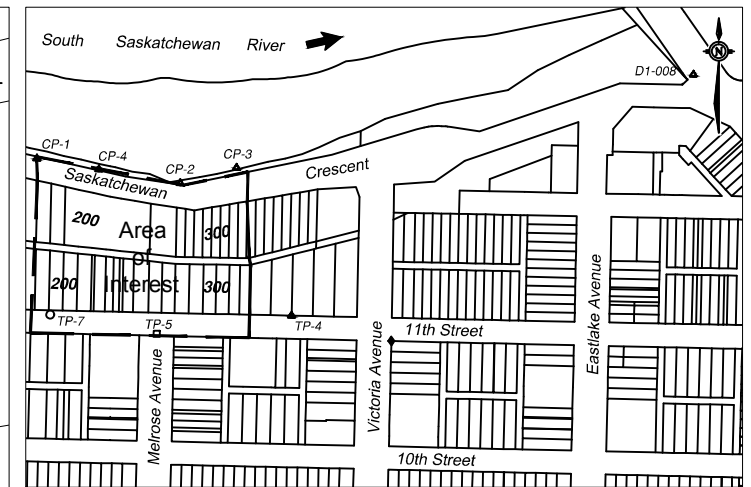
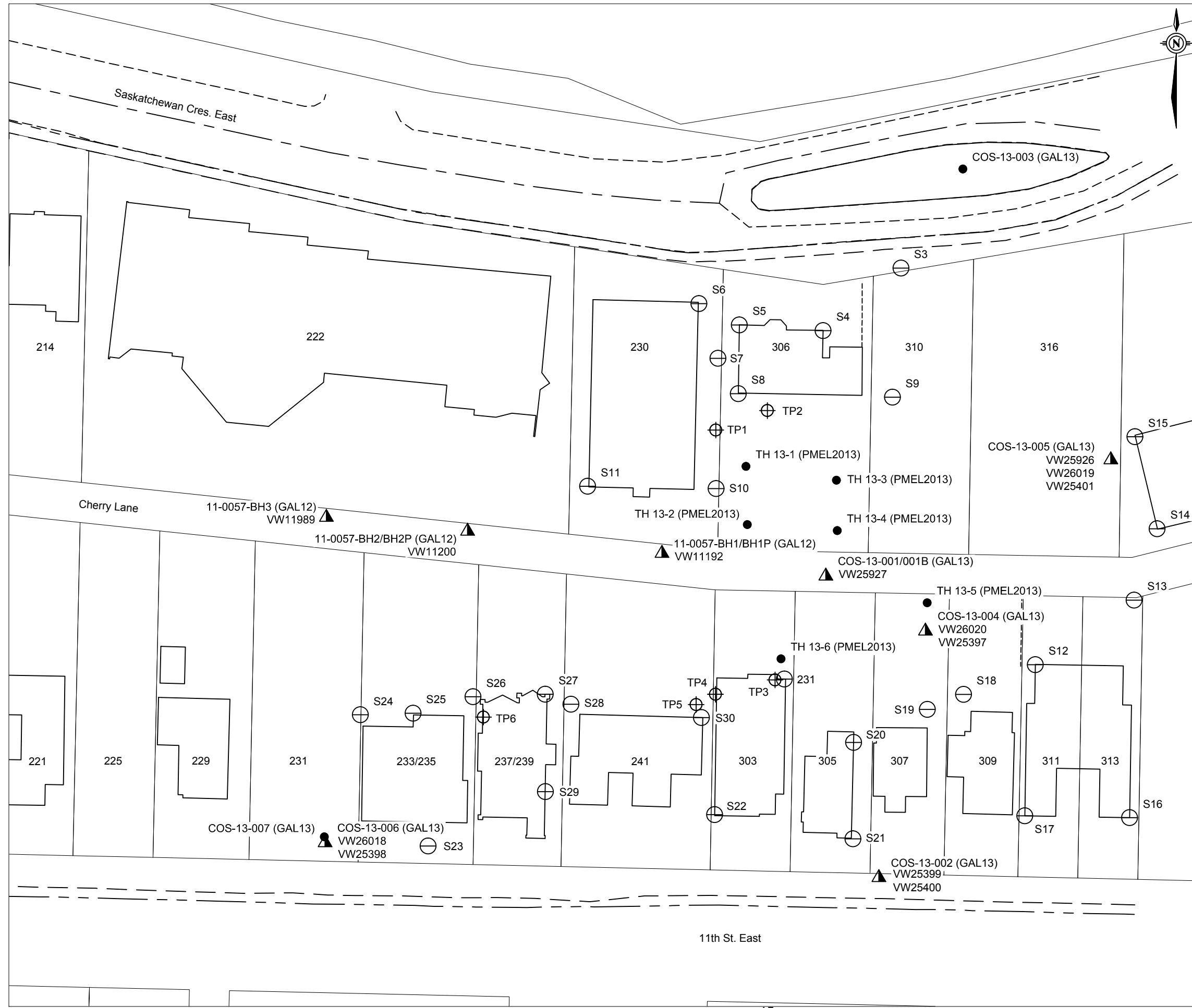
Borehole No.	Slope Inclinator	VW Piezometer	Standpipe Piezometer	Location	Date of Installation
COS-13-005	COS-13-005	VW25926 VW26019 VW25401	---	empty lot 316 Saskatchewan Crescent East	20-Aug-13
COS-13-006	COS-13-006	VW26018 VW25398	---	empty lot 231-11 th Street East	21-Aug-13
COS-13-007	---	---	COS-13-007	empty lot 231-11 th Street East	21-Aug-13
TH 13-1	---	---	TH 13-1	backyard of 306 Saskatchewan Crescent East	17-Jul-13
TH 13-2	---	---	TH 13-2	backyard of 306 Saskatchewan Crescent East	17-Jul-13
TH 13-3	---	---	TH 13-3	backyard of 306 Saskatchewan Crescent East	17-Jul-13
TH 13-4	---	---	TH 13-4	backyard of 306 Saskatchewan Crescent East	17-Jul-13
TH 13-5	---	---	TH 13-5	backyard of 307-11 th Street East	18-Jul-13
TH 13-6	---	---	TH 13-6	backyard of 30311 th Street East	18-Jul-13

VW = vibrating wire

The 2012 soil investigation and instrumentation installation program was completed on June 23, 2012. Boreholes were drilled on Cherry Lane using Solid Stem Augers through the pavement, surficial stratified deposits, and into glacial till. The drilling was conducted by Paddock Drilling Ltd. with Acker MP-5 drill rig and monitored by Golder. The 2012 field program consisted of five (5) boreholes drilled to the depth ranging between 3.4 to 7.6 mbgs; three (3) slope inclinometers (in boreholes 11-0057-BH1, 11-0057-BH2 and 11-0057-BH3); and three (3) vibrating wire piezometers (in boreholes 11-0057-BH1P, 11-0057-BH2P and 11-0057-BH3).

The 2013 soil investigation and instrumentation installation program was completed using hollow and solid stem augers. The 2013 drilling program consisted of three phases: 1) on July 25 and 26, 2013 with a CME75 truck mounted drill rig operated by Boss Drilling Ltd. of Saskatoon, SK; 2) on August 19, 2013 with an MC4T track mounted drill rig operated by Mobile Augers and Research Ltd. of Saskatoon, SK; and 3) on August 20 and 21, 2013 with an M10 truck mounted drill rig operated by Mobile Augers and Research Ltd. of Saskatoon, SK. The 2013 field program conducted by Golder consisted of eight (8) boreholes drilled to depths ranging between 9.1 m and 16.8 m below ground surface (mbgs); five (5) slope inclinometer casings were installed to depths ranging between 7.5 and 15.5 mbgs (in boreholes COS-13-001B, COS-13-002, and COS-13-004 to COS-13-006); ten (10) vibrating wire piezometers installed to depths ranging between 5.7 mbgs and 16.1 mbgs (in boreholes COS-13-001B, COS-13-002, and COS-13-004 to COS-13-006); and two (2) standpipe piezometers installed to depths of 7.6 mbgs and 4.1 mbgs (in boreholes COS-13-003 and COS 13-007). Six standpipe piezometers installed by PMEL in the area of the East Failure are designated as TH13-1 to TH13-6.

G:\2011\136211-1362-0057 COS East Riverbank\Figures\Phase 5100 Cherry Lane Remediation\Task 700011-1362-0057 Instrument Loc Plan.dwg 5/5/2014 4:31 PM



CONTROL POINTS				
COORDINATE TABLE NAD 83 (CSRS)			UTM ZONE 13	
POINT	NORTHING (m)	EASTING (m)	ORTHOMETRIC ELEVATION (m) HTv2.0	DESCRIPTION
CP-1	5,775,701.84	385,897.84	477.97	24" REBAR WITH PLASTIC CAP
CP-2	5,775,680.32	386,022.25	478.99	24" REBAR WITH PLASTIC CAP
CP-3	5,775,693.72	386,071.10	479.49	24" REBAR WITH PLASTIC CAP
CP-4	5,775,692.40	385,951.67	477.95	GPS CONTROL POINT
TP-4	5,775,565.50	386,118.76	499.32	X IN CONCRETE
TP-5	5,775,549.79	386,001.87	498.05	X IN NORTH RIM CATCH BASIN
TP-7	5,775,566.48	385,909.52	491.32	X IN SOUTH RIM MANHOLE
TP-8	5,775,560.37	385,809.26	484.62	X IN WEST RIM MANHOLE
D1-008	5,775,775.85	386,467.62	499.033	CONTROL TABLET

- LEGEND**
- ⊖ SETTLEMENT POINT LOCATION
 - △ TELL-TALE CRACK LOCATION MONITOR
 - ⊕ TILT PLATE LOCATION
 - ▲ SI & VIBRATING WIRE PIEZOMETER LOCATION
 - STANDPIPE PIEZOMETER LOCATION
 - 303 LOT NUMBER
- REFERENCE**
- LOT LOCATIONS PROVIDED BY CITY OF SASKATOON
CITY OF SASKATOON DATUM



		CHERRY LANE SLOPE INSTABILITY	
INSTRUMENTATION LOCATION PLAN			
PROJECT	11-1362-0057	FILE No.	
DESIGN	LM 08/05/14	SCALE	AS SHOWN REV. 0
CADD	JDS/BDS 08/05/14		
CHECK	HV 08/05/14		
REVIEW	PGB 08/05/14		
		FIGURE: 8	



5.3 Summary of Installed Instrumentation

In addition to the downhole instrumentation (e.g., slope inclinometers, vibrating wire piezometers and standpipe piezometers) other instrumentation was also installed on the ground surface (e.g., survey pins) to monitor ground surface movement, and on the house/building structures (e.g., tilt plate, settlement points, and tell-tale crack monitors) to monitor potential tilt, vertical movement and cracks of the structures.

The following sections summarize the instrumentation installed by Golder to investigate and evaluate slope stability conditions near Cherry Lane. Monitoring data for the instrumentation is included in Appendix F of this report.

5.3.1 Slope Inclinometers

Slope inclinometers are used to determine the magnitude, rate, direction, depth, and type of slope movement. Inclinometer casings were installed in boreholes, in 2012 and 2013, at depths shown in Table 4 to serve as an access tube to guide an inclinometer probe down the borehole. Slope inclinometers were installed 3 m or more into the till (i.e., below the expected zone of movement). The 70 mm diameter glue and snap inclinometer casings were supplied by RST Instruments.

Table 4: Slope Inclinometer Casing Summary Table

Borehole No.	Date of Base Reading	Ground Elevation (masl)	Clay/Till Contact Elevation (masl)
11-0057-BH1P	25-Jun-12	488.25	484.64
11-0057-BH2P	25-Jun-12	485.87	483
11-0057-BH3	25-Jun-12	484.06	N/A
COS-13-001B	27-Jul-13	489.34	482.79
COS-13-002	30-Jul-13	498.48	484.46
COS-13-004	28-Aug-13	491.74	483.05
COS-13-005	28-Aug-13	494.48	482.14
COS-13-006	28-Aug-13	494.77	484.25

masl = metres above sea level

5.3.2 Piezometers

Both vibrating wire type and standpipe type piezometers were installed. Vibrating wire piezometers consist of a pressure transducer, which outputs a frequency signal, and an integral thermistor, which measures the temperature of the transducer and its surroundings. The frequency output and temperature reading are used to calculate piezometric levels in the soil. The installed vibrating wire piezometers were supplied by RST Instruments. The vibrating wire piezometers were equipped with data loggers programmed to record measurements every eight hours. The data was downloaded periodically to evaluate fluctuations in pore-water conditions with time.

Standpipe piezometers consist of slotted and solid sections of polyvinyl chloride (PVC) pipe, and were installed to monitor groundwater elevations within the area. The area around the section of slotted PVC pipe (the intake zone) was backfilled with sand, allowing pore-water to flow into the standpipe. The groundwater elevation near the intake zone was determined by measuring the water elevation in the standpipe.



CHERRY LANE GEOTECHNICAL INVESTIGATION AND EVALUATION

Table 5 summarizes the piezometers installed near Cherry Lane by Golder in 2012 and 2013, including six standpipe piezometers installed by PMEL. The targeted piezometer completion depths were at the Clay/Till contact, in the SSD and in the Till. Locations of piezometers are shown in Figure 8.

Table 5: Piezometer Summary Table

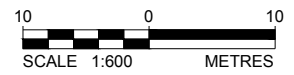
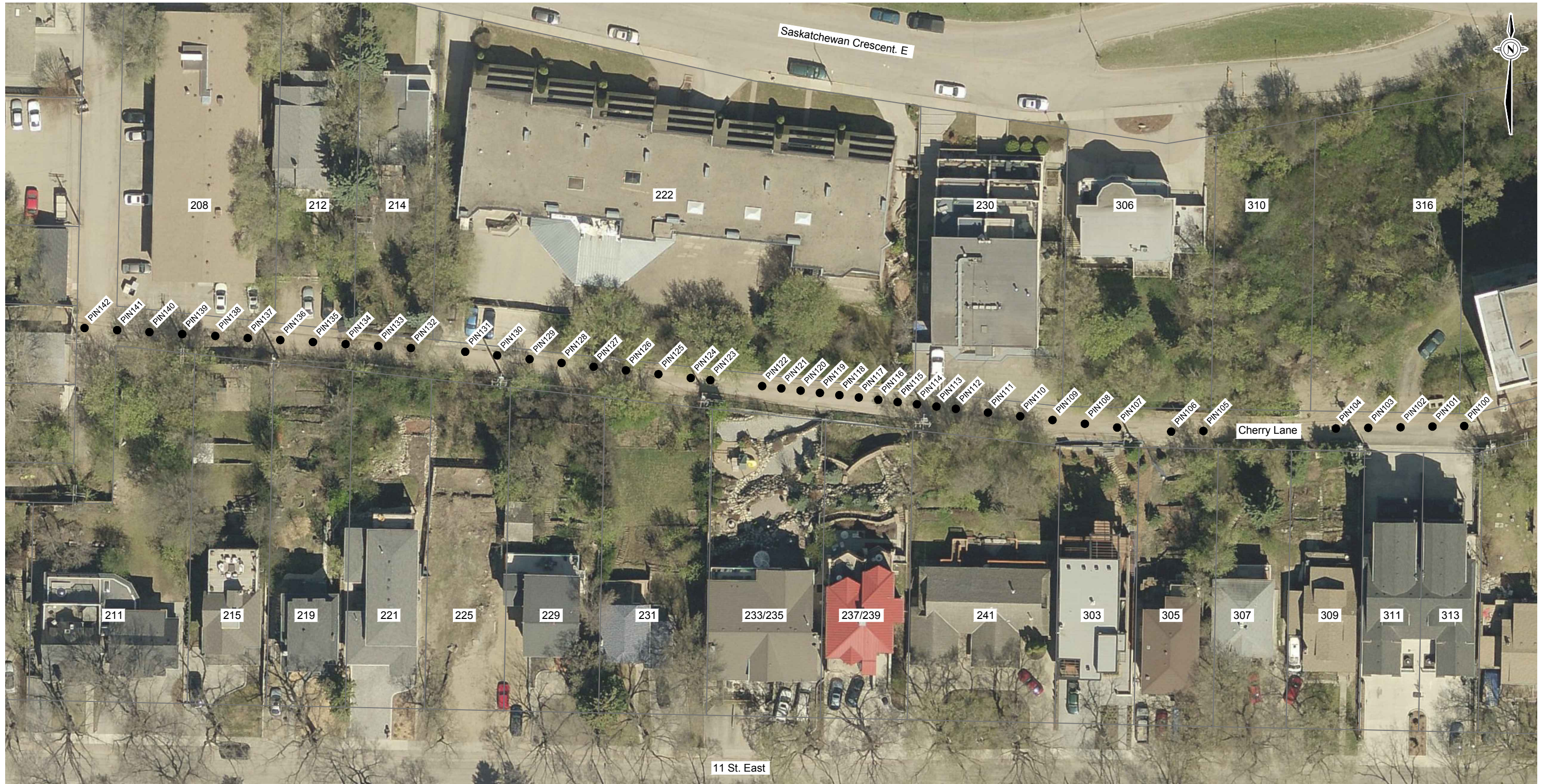
Piezometer Serial No.	Borehole No.	Type	Ground Elevation (masl)	Clay/Till Contact Elevation (masl)	Tip Elevation (masl)	Water Level (Oct 30)	Material at Tip Elevation
VW11192	11-0057-BH1P	VW	488.25	484.64	485.05	485.98	Clay
VW11200	11-0057-BH2P	VW	485.87	483.0	483.43	483.84	Clay
VW11984	11-0057-BH3	VW	484.06	-	482.84	dry	Clay
VW25927	COS-13-001B	VW	489.34	482.79	483.53	485.91	Clay
VW25400	COS-13-002	VW	498.48	484.46	485.38	490.80	Clay
VW25399	COS-13-002	VW	498.48	484.46	482.33	490.12	Till
-	COS-13-003	Standpipe	480.34	-	471.20	473.65	Gravel
VW26020	COS-13-004	VW	491.74	483.05	483.38	486.86	Clay
VW25397	COS-13-004	VW	491.74	483.05	481.50	485.08	Till
VW25926	COS-13-005	VW	494.48	482.14	487.30	dry	Sand
VW26019	COS-13-005	VW	494.48	482.14	482.73	485.93	Clay
VW25401	COS-13-005	VW	494.48	482.14	479.68	484.30	Till
VW26018	COS-13-006	VW	494.77	484.25	484.56	dry	Clay
VW25398	COS-13-006	VW	494.77	484.25	481.51	dry	Till
-	COS-13-007	Standpipe	494.80	-	489.21	dry	Clay
-	TH 13-1	Standpipe	486.55	483.5	482.7	482.73	Till
-	TH 13-2	Standpipe	487.84	484.0	482.0	483.53	Till
-	TH 13-3	Standpipe	487.85	482.8	482.0	483.07	Clay/Till
-	TH 13-4	Standpipe	488.60	483.3	482.2	483.59	Sand and Gravel/Till
-	TH 13-5	Standpipe	491.39	484.2	482.5	484.79	Till
-	TH 13-6	Standpipe	492.73	484.4	484.1	489.83	Clay/Till

masl = metres above sea level

5.3.3 Survey Pins

Three series of pins; 100, 200 and 300 series, were installed for monitoring of ground movement (primarily downslope, horizontal movement) along Cherry Lane. The pins were intended to be surveyed at regular intervals with reference to a reference line and a stable reference mark on Remai Arts Centre building. Pins were replaced in series over time as old pins were damaged or covered over, and to improve the monitoring accuracy. Survey markers were installed for the 300 series of survey pins. Figure 9, Figure 10 and Figure 11 show the location of survey pins of 100 series, 200 series, and 300 series installed by Golder along Cherry Lane, respectively. Survey pins consisted of nails driven into the surface of Cherry Lane. Survey markers consisted of square topped steel pins driven into the surface of Cherry Lane.

G:\2011\136211-1362-0057 COS East Riverbank\Figures\Phase 5100 Cherry Lane Remediation\Task 700011-1362-0057 2012 Series 100 Pins.dwg 5/8/2014 11:31 AM



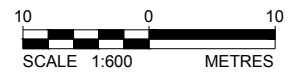
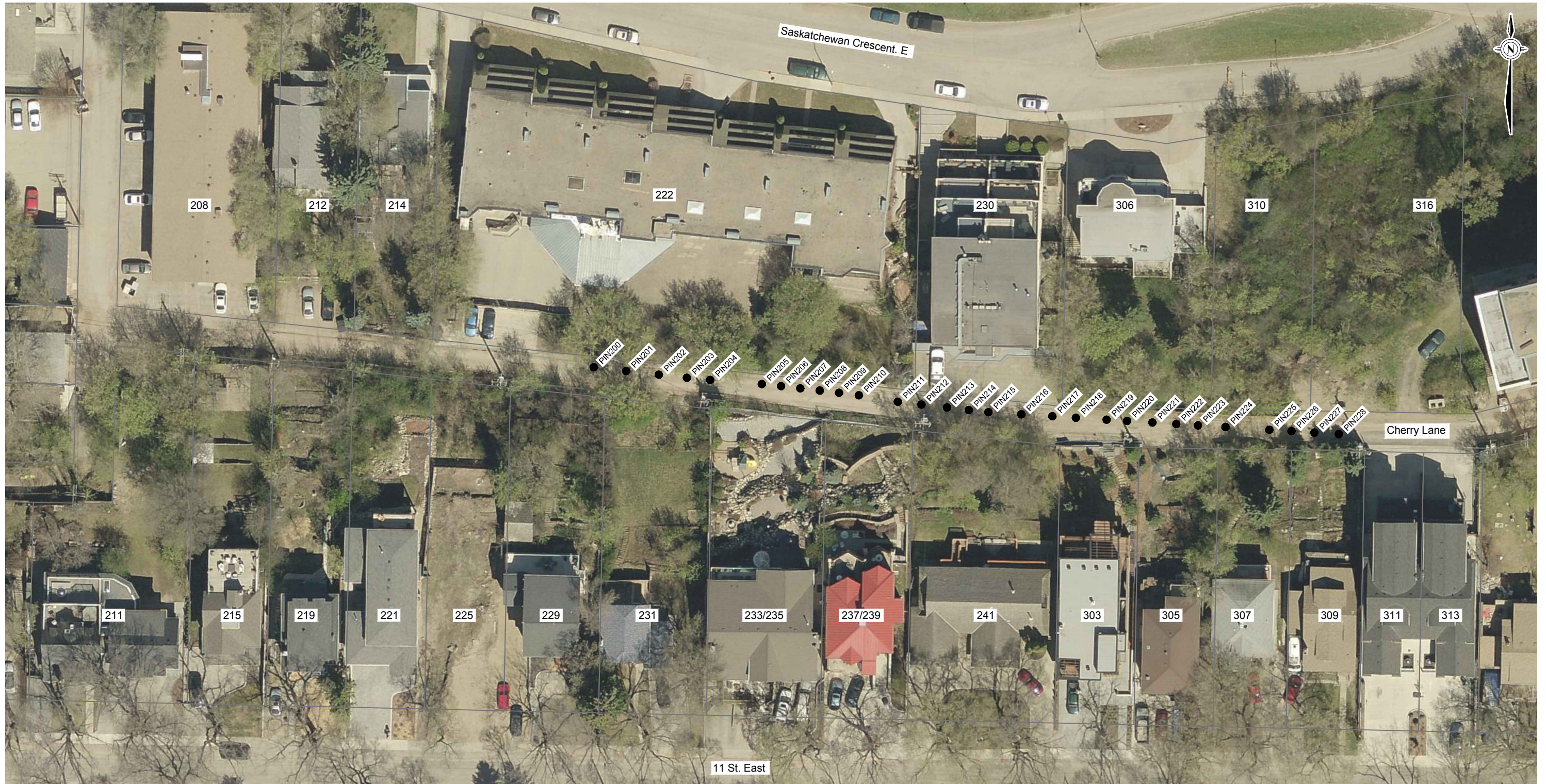
LEGEND
 ● PIN LOCATION
 303 LOT NUMBER

NOTE
 PINS 100-142 INSTALLED JUNE 28, 2012.

REFERENCE
 AERIAL PHOTOGRAPH PROVIDED BY CITY OF SASKATOON, MAY 15, 2011
 CITY OF SASKATOON DATUM

		CHERRY LANE SLOPE INSTABILITY	
CHERRY LANE SURVEY PIN LOCATION PLAN - 100 SERIES PINS (2012)			
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	DESIGN	LM 08/05/14	SCALE AS SHOWN REV. 0
	CADD	JDS 08/05/14	
	CHECK	HV 08/05/14	
	REVIEW	PGB 08/05/14	
			FIGURE: 9

G:\2011\136211-1362-0057 COS East Riverbank\Figures\Phase 5100 Cherry Lane Remediation\Task 700011-1362-0057 2013 Series 200 Pins.dwg 5/8/2014 11:32 AM



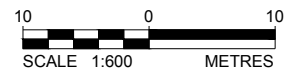
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 303 LOT NUMBER

NOTE
 PINS 200-216 INSTALLED JUNE 4, 2013
 PINS 217-228 INSTALLED JUNE 25, 2013

REFERENCE
 AERIAL PHOTOGRAPH PROVIDED BY CITY OF SASKATOON, MAY 15, 2011
 CITY OF SASKATOON DATUM

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CHERRY LANE SURVEY PIN LOCATION PLAN - 200 SERIES PINS (2013)			
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	CHECK	HV 08/05/14	
REVIEW	PGB 08/05/14		
			FIGURE: 10

G:\2011\136211-1362-0057 COS East Riverbank\Figures\Phase 5100 Cherry Lane Remediation\Task 700011-1362-0057 2013 Series 300 Pins.dwg 5/8/2014 11:35 AM



LEGEND

- PIN LOCATION
- 303 LOT NUMBER

NOTE

PINS INSTALLED SEPTEMBER 13, 2013

REFERENCE

AERIAL PHOTOGRAPH PROVIDED BY CITY OF SASKATOON, MAY 15, 2011
CITY OF SASKATOON DATUM

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CHERRY LANE SURVEY PIN LOCATION PLAN - 300 SERIES PINS (2013)			
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	CADD	BDS/JDS 08/05/14	
	CHECK	HV 08/05/14	
	REVIEW	PGB 08/05/14	
FIGURE: 11			



5.3.4 Tell-Tale Crack Monitors

Crack monitors were installed on selected retaining walls where there was an existing crack. The crack monitors consisted of two plates, which were installed to overlap for part of their length, and move relative to each other as a crack opened or closed. Standard Tell-Tale crack monitors were used on flat surfaces, to monitor movement across cracks in vertical and horizontal directions.

Crack monitors were installed at the following locations (Figure 8):

- north face of the retaining wall behind 306 Saskatchewan Crescent East;
- east face of the retaining wall between 230 and 306 Saskatchewan Crescent East; and
- west face of the retaining wall between 230 and 306 Saskatchewan Crescent East.

5.3.5 Tilt Plates

Stainless steel tilt plates were installed on selected external house foundations and retaining walls. Changes in the tilt of the structure were measured using a tilt meter, which allows the tilt of a structure to be monitored on a vertical plane. Measurements were taken periodically, and cover plates were placed on the tilt plates to protect them between readings.

Tilt plates were installed at the following locations (Figure 8):

- North-south retaining wall between 230 and 306 Saskatchewan Crescent East;
- East-west retaining wall at 306 Saskatchewan Crescent East;
- North side of house at 303 – 11th Street East;
- West side of house at 303 – 11th Street East;
- North side of house at 241 – 11th Street East; and
- West side of house at 237 – 11th Street East.

5.3.6 Settlement Points

Building settlement points were installed at selected locations to monitor long term vertical movement of the structure. The settlement points were monitored using precise leveling equipment. Point S14, installed in the southwest corner of 328 Saskatchewan Crescent East, is used as a local temporary bench mark for the settlement monitoring. Elevation of Point S14 has been referenced to the COS D1-008 benchmark elevation. The building settlement surveys are conducted by precise levelling method using Leica DN03 precise digital level equipment. Settlement points were installed at the locations shown on Figure 8.



6.0 TOPOGRAPHY AND STRATIGRAPHY

Borehole information from the various geotechnical reports listed in Section 3.3 was compiled to construct a physical model of the soils at the Site. The boreholes used to construct all cross-sections were obtained from many different studies, and have likely been located using various coordinate systems and survey datums. Efforts were made to reconcile the different elevation datums; however, there may still be some discrepancies in the elevation data due to the use of unknown or older elevation datums, or slope movement. Soil descriptions and laboratory test results were also reviewed and interpreted according to Golder's classification system to provide a more consistent classification of the soils. Two cross-sections, A-A' and B-B' were selected as representative cross-sections for the West Failure and East Failure, respectively. Stratigraphic cross-sections A-A' and B-B' are shown in Figure 12 and Figure 13, respectively. Soil stratigraphic conditions along Cherry Lane and 11th Street East are shown in Figure 14 (longitudinal stratigraphic section C-C') and Figure 15 (longitudinal stratigraphic section D-D'), respectively. Locations of cross sections and longitudinal sections are shown in Figure 2.

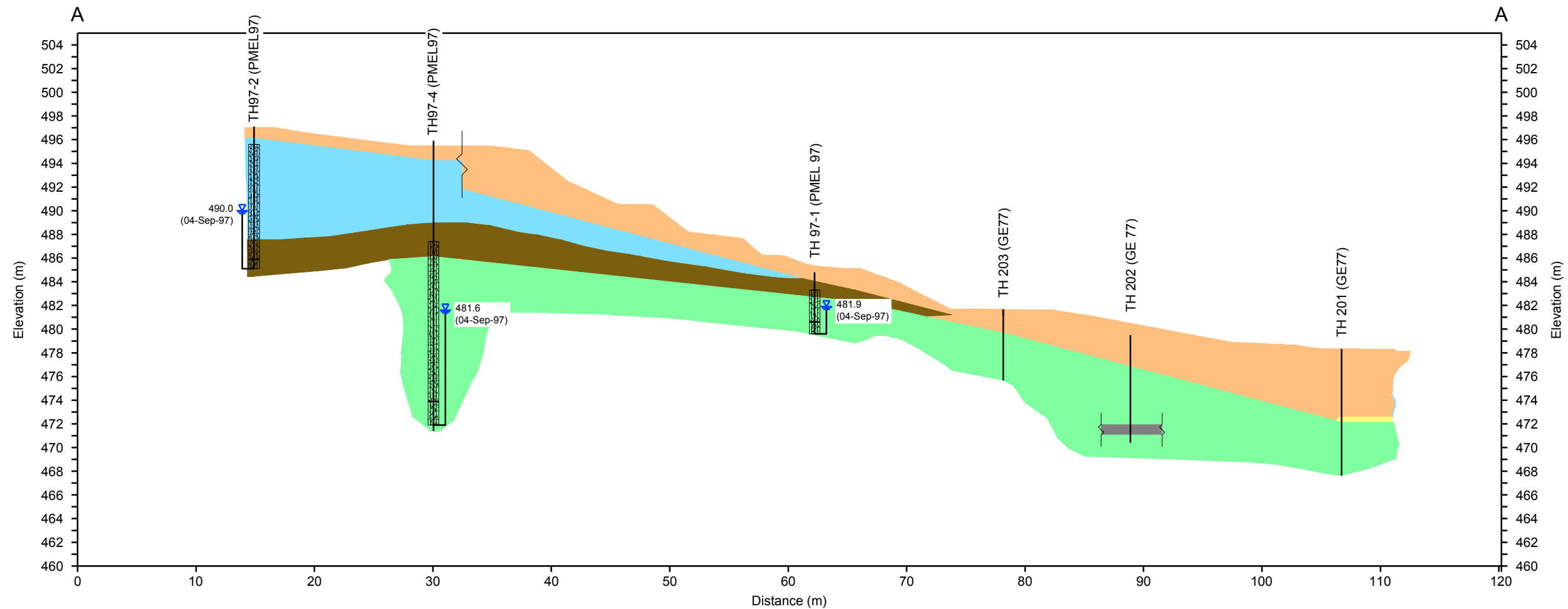
In general, the soil profile from 11th Street East to Saskatchewan Crescent East at this location consists of, in descending order: topsoil and/or fill, silty clay or clay of surficial stratified deposits (SSD), and glacial till. The ground elevation varies from approximately 496 m above sea level (masl) to 498 masl along 11th Street East, 481 to 486 masl along Cherry Lane and 474 to 479 masl along Saskatchewan Crescent East. The till/clay contact, at the failure area, is at elevation ranging from 482.8 to 484.6 masl. The silty clay and clay layer overlying till is up to 14 m thick. The topography of the area generally slopes downward to the northwest and the South Saskatchewan River. The river water elevation is at approximately 472 masl.

Topsoil thicknesses were generally less than 0.15 m at the borehole locations, and asphalt and fill up to 3 m deep were noted in various locations. The SSD at TH 97-3 location consist of less than 1 m of poorly graded sands and silty sands, less than 1 m of silt and clayey silt, 1 m to 2 m of poorly graded sands and silty sands, up to 2 m of silts and silty clay, and up to 5 m of highly plastic clay, in descending order.

The highly plastic clay unit is encountered above the till along the 11th Street East (Figure 14) and east portion of the Cherry Lane from TH101 (Figure 15). The contact between this highly plastic clay unit and till is at elevation approximately 485 masl along the 11th Street East, and at elevation approximately from 483 to 487 masl along the Cherry Lane. Extent of this highly plastic clay unit in the northwest portion of the West Failure was not known.

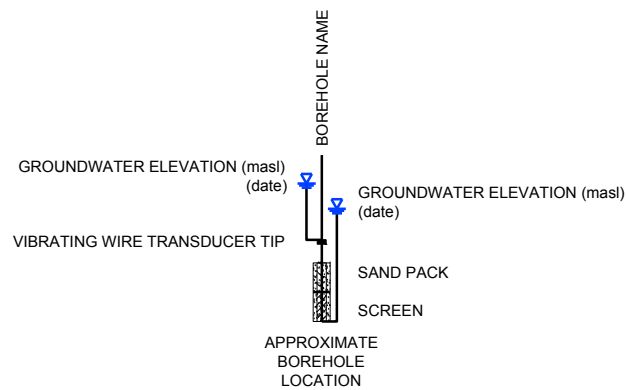
Much of the upper soil profile has been classified as fill in this report due to the unknown extent of slope modification and soil mixing caused by landscaping and slope movement. The layer thicknesses vary across the site, generally decreasing in thickness and daylighting in the lower slope between Cherry Lane and Saskatchewan Crescent East. The deposits of sand, silt and clay are present at the bottom of the slope, in addition to fill which was placed for landscaping and building construction.

The sand layers within the SSD were typically described as wet in the borehole logs reviewed. High sand content and layers of cobbles were noted in the silty clay till material at elevation approximately 467 masl below the SSD (at the TH 101 location).



A
2
CROSS SECTION A-A

LEGEND

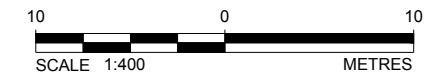


STRATIGRAPHIC COLOUR LEGEND

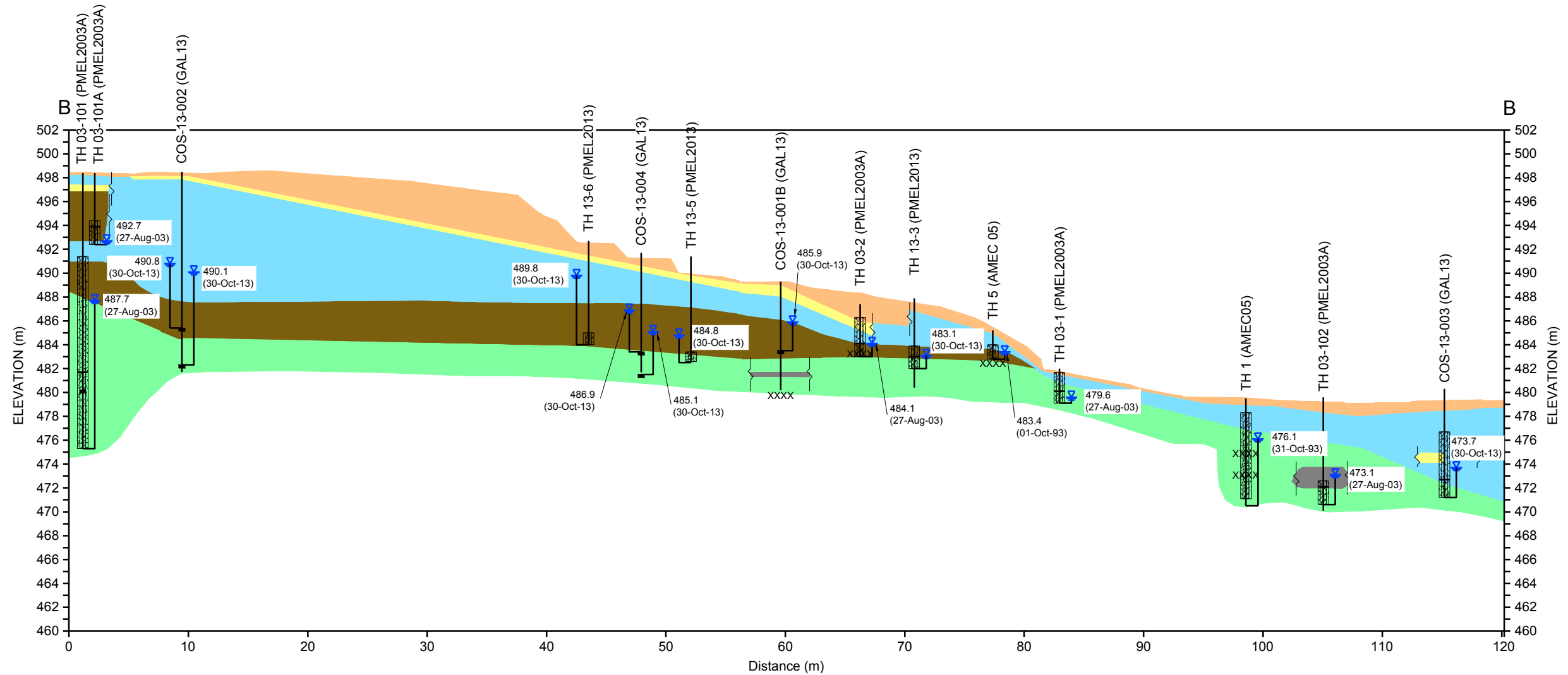
- UNDIFFERENTIATED FILL / SURFICIAL STRATIFIED DEPOSITS
- SURFICIAL STRATIFIED DEPOSITS, SAND AND GRAVEL
- SURFICIAL STRATIFIED DEPOSITS (SSD), SILT, SAND, CLAY
- SURFICIAL STRATIFIED DEPOSITS (SSD), CLAY
- TILL
- GLACIAL SANDS AND GRAVELS
- XXXX COBBLE

REFERENCES

- GE77 - GROUND ENGINEERING LTD. JULY 4, 1977. GEOTECHNICAL SITE INVESTIGATION PROPOSED HOUSING COMPLEX, SASKATCHEWAN CRESCENT
- PMEL97 - P. MACHIBRODA ENGINEERING LTD. SEPT. 15, 1997. GEOTECHNICAL INVESTIGATION AND SLOPE STABILITY STUDY PROPOSED RESIDENTIAL DEVELOPMENT, 237-11TH STREET EAST, SASKATOON, SASKATCHEWAN

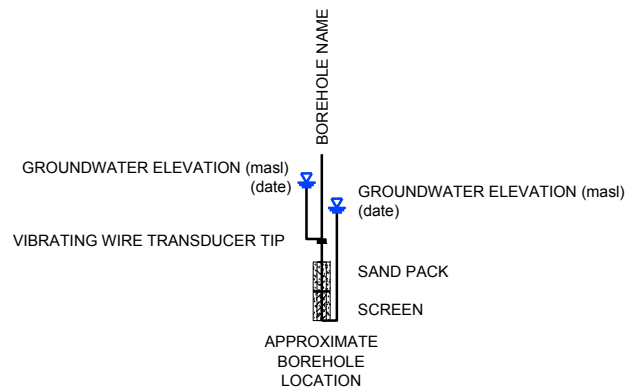


		CHERRY LANE SLOPE INSTABILITY	
CROSS SECTION A-A (WEST FAILURE)			
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CADD	BDS/JDS	08/05/14	
CHECK	HV	08/05/14	
REVIEW	PGB	08/05/14	
		FIGURE: 12	



B
2
CROSS SECTION B-B

LEGEND



STRATIGRAPHIC COLOUR LEGEND

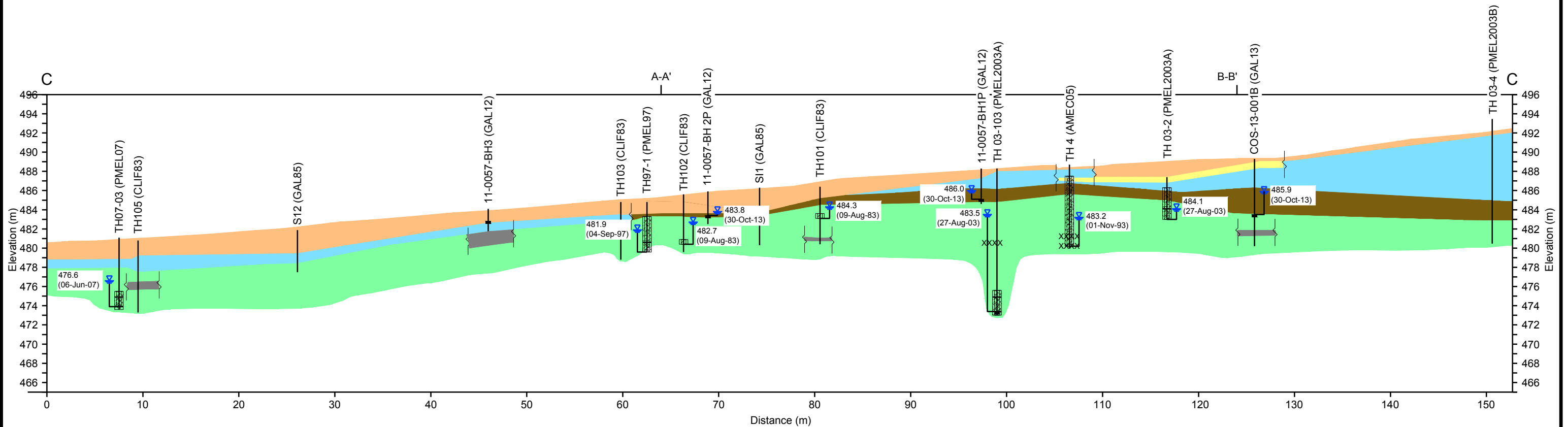
- UNDIFFERENTIATED FILL / SURFICIAL STRATIFIED DEPOSITS
- SURFICIAL STRATIFIED DEPOSITS, SAND AND GRAVEL
- SURFICIAL STRATIFIED DEPOSITS (SSD), SILT, SAND, CLAY
- SURFICIAL STRATIFIED DEPOSITS (SSD), CLAY
- TILL
- GLACIAL SANDS AND GRAVELS
- XXXX COBBLE

REFERENCES

- PMEL03A - P. MACHIBRODA ENGINEERING LTD. SEPTEMBER 11, 2003. GEOTECHNICAL INVESTIGATION AND SLOPE STABILITY STUDY PROPOSED GARAGE, 306 SASKATCHEWAN CRESCENT EAST, SASKATOON, SASKATCHEWAN, PMEL FILE NO. S03-4869
- AMEC05 - AMEC EARTH & ENVIRONMENTAL. JULY 27, 2005. REVISED SLOPE STABILITY ASSESSMENT PROPOSED CONDOMINIUM DEVELOPMENT, 316 SASKATCHEWAN CRESCENT, SASKATOON, SASKATCHEWAN
- PMEL13 - P. MACHIBRODA ENGINEERING LTD. JULY 18, 2013. SLOPE INSTABILITY 230/306 SASKATCHEWAN CRESCENT SASKATOON, SK. DRAWING NO S13-8517-1 TO 7

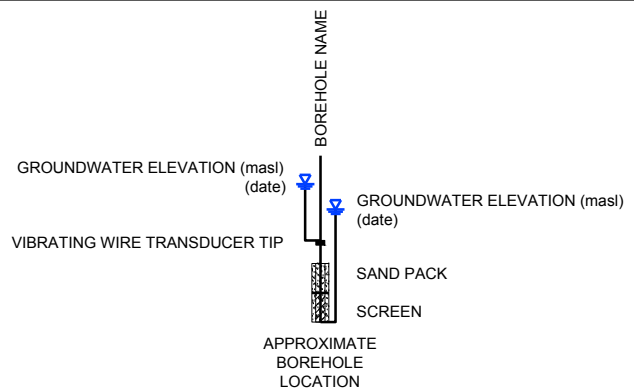


CHERRY LANE SLOPE INSTABILITY	
CROSS SECTION B-B (EAST FAILURE)	
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CADD BDS/JDS 08/05/14	
CHECK HV 08/05/14	
REVIEW PGB 08/05/14	FIGURE: 13



C
2
CROSS SECTION C-C

LEGEND



STRATIGRAPHIC COLOUR LEGEND

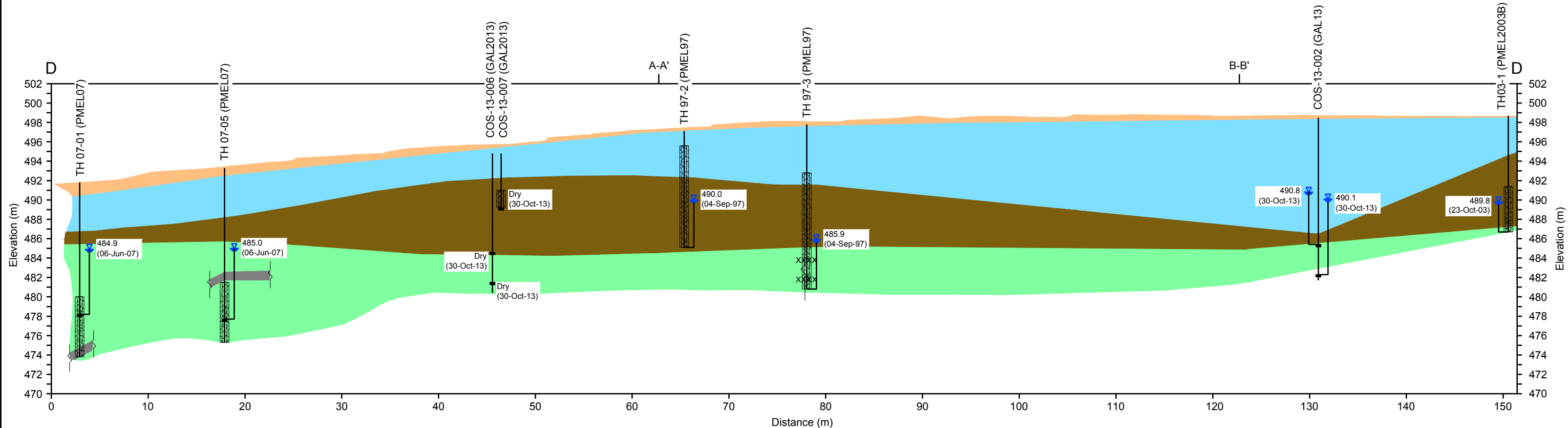
- UNDIFFERENTIATED FILL / SURFICIAL STRATIFIED DEPOSITS
- SURFICIAL STRATIFIED DEPOSITS, SAND AND GRAVEL
- SURFICIAL STRATIFIED DEPOSITS (SSD), SILT, SAND, CLAY
- SURFICIAL STRATIFIED DEPOSITS (SSD), CLAY
- TILL
- GLACIAL SANDS AND GRAVELS
- XXXX COBBLE

REFERENCES

- CLIF83 - CLIFTON ASSOCIATES LTD. AUG. 17, 1983. GEOTECHNICAL STUDIES PROPOSED PARK TERRACE CONDOMINIUMS 222 SASKATCHEWAN CRESCENT EAST SASKATOON, SK.
- PMEL97 - P. MACHIBRODA ENGINEERING LTD. SEPT. 15, 1997. GEOTECHNICAL INVESTIGATION AND SLOPE STABILITY STUDY PROPOSED RESIDENTIAL DEVELOPMENT, 237-11TH STREET EAST, SASKATOON, SASKATCHEWAN
- PMEL03A - P. MACHIBRODA ENGINEERING LTD. SEPTEMBER 11, 2003. GEOTECHNICAL INVESTIGATION AND SLOPE STABILITY STUDY PROPOSED GARAGE, 306 SASKATCHEWAN CRESCENT EAST, SASKATOON, SASKATCHEWAN, PMEL FILE NO. S03-4869
- PMEL03B - P. MACHIBRODA ENGINEERING LTD. OCTOBER 31, 2003. GEOTECHNICAL INVESTIGATION AND SLOPE STABILITY STUDY PROPOSED RESIDENCE, 313-11TH STREET EAST, SASKATOON, SASKATCHEWAN, PMEL FILE NO. S03-4925
- AMEC05 - AMEC EARTH & ENVIRONMENTAL. JULY 27, 2005. REVISED SLOPE STABILITY ASSESSMENT PROPOSED CONDOMINIUM DEVELOPMENT, 316 SASKATCHEWAN CRESCENT, SASKATOON, SASKATCHEWAN
- PMEL07 - P. MACHIBRODA ENGINEERING LTD. JUNE 12, 2007. GEOTECHNICAL INVESTIGATION AND SLOPE STABILITY STUDY PROPOSED RESIDENCES, 221 & 225 - 11TH STREET EAST, SASKATOON, SK
- GAL12 - GOLDER ASSOCIATES LTD. MAY 2013. ASSESSMENT OF SLOPE INSTABILITY AT 200 BLOCK, 11TH STREET EAST.

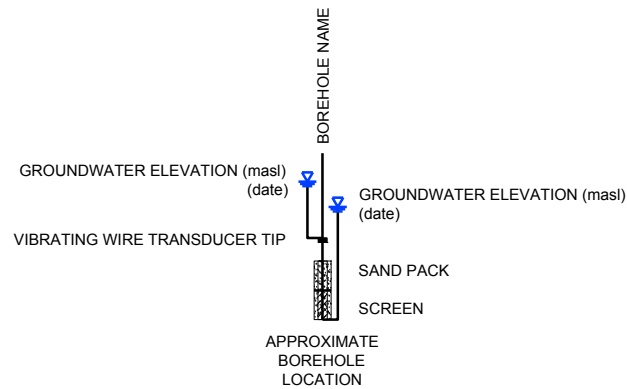


		CHERRY LANE SLOPE INSTABILITY	
LONGITUDINAL CROSS SECTION C-C (ALONG CHERRY LANE)			
		PROJECT 11-1362-0057	FILE No.
DESIGN	LM	08/05/14	SCALE AS SHOWN
CADD	BDS/JDS	08/05/14	REV. 0
CHECK	HV	08/05/14	FIGURE: 14
REVIEW	PGB	08/05/14	



D
2 **CROSS SECTION D-D**

LEGEND



STRATIGRAPHIC COLOUR LEGEND

- UNDIFFERENTIATED FILL / SURFICIAL STRATIFIED DEPOSITS
- SURFICIAL STRATIFIED DEPOSITS, SAND AND GRAVEL
- SURFICIAL STRATIFIED DEPOSITS (SSD), SILT, SAND, CLAY
- SURFICIAL STRATIFIED DEPOSITS (SSD), CLAY
- TILL
- GLACIAL SANDS AND GRAVELS
- COBBLE

REFERENCES

- PMEL97 - P. MACHIBRODA ENGINEERING LTD. SEPT. 15, 1997. GEOTECHNICAL INVESTIGATION AND SLOPE STABILITY STUDY PROPOSED RESIDENTIAL DEVELOPMENT, 237-11TH STREET EAST, SASKATOON, SASKATCHEWAN
- PMEL03B - P. MACHIBRODA ENGINEERING LTD. OCTOBER 31, 2003. GEOTECHNICAL INVESTIGATION AND SLOPE STABILITY STUDY PROPOSED RESIDENCE, 313-11TH STREET EAST, SASKATOON, SASKATCHEWAN, PMEL FILE NO. S03-4925
- PMEL07 - P. MACHIBRODA ENGINEERING LTD. JUNE 12, 2007. GEOTECHNICAL INVESTIGATION AND SLOPE STABILITY STUDY PROPOSED RESIDENCES, 221 & 225 - 11TH STREET EAST, SASKATOON, SK



		CHERRY LANE SLOPE INSTABILITY	
LONGITUDINAL CROSS SECTION D-D (ALONG 11TH STREET)			
	PROJECT 11-1362-0057		FILE No.
	DESIGN LM	08/05/14	SCALE AS SHOWN
	CADD BDS/JDS	08/05/14	REV. 0
	CHECK HV	08/05/14	
	REVIEW PGB	08/05/14	
FIGURE: 15			



7.0 GROUNDWATER CONDITION

Groundwater levels in the surficial stratified deposits (SSD), particularly in the clay above the till, and in the intertill sand and gravel have significant influence on slope stability in the east riverbank geologic setting. High water levels in the soil can be expected immediately following spring thaw, following intensive irrigation, or after prolonged precipitation. The minimum water table condition is reached during winter when there is minimum recharge. Most slope instability occurs following spring thaw, or after periods of prolonged precipitation (Clifton 1985).

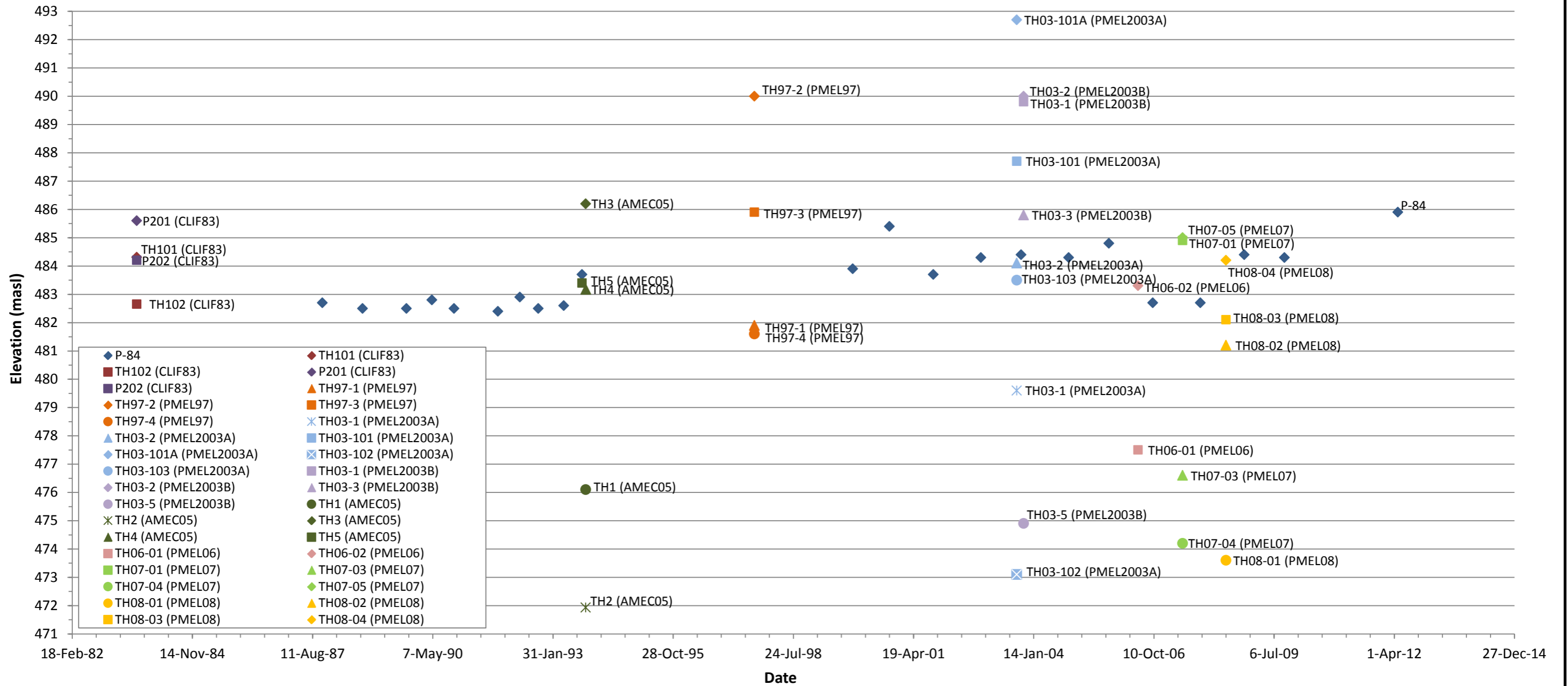
Hamilton and Tao (1977) reported the results of groundwater level measurements in SSD, spanning from six to fourteen years in three study areas in Saskatoon. Groundwater levels vary depending on annual weather cycles, the season of the year, and depending on rainfall and surface runoff conditions. It was reported that groundwater level rises of 6.1 m are reasonable, and 3.0 to 3.7 m might be considered average in clay soils for the typically semi-arid climatic conditions of Saskatoon. It was also reported that annual variation in groundwater levels can range from 0.6 m to more than 2.4 m, depending on many variables related to soil and weather conditions.

Historical groundwater levels (i.e., total head) in the area of Cherry Lane were compiled from data provided in the geotechnical reports reviewed and the East River Bank Monitoring Program reports provided by AMEC (2005b, 2009, 2013), PMEL (1994) and Ireland (2000) and are summarized in Figure 16. The groundwater table slopes downwards across the site from 11th Street to the river. Adjacent to 11th Street, the water table measured in September 1997 in TH07-2 was at about elevation 489.2, approximately 7 m below the ground surface. It should be noted that all groundwater elevations taken from the PMEL (1997) report have been converted from a local elevation presented in the report to be consistent with the surveyed elevations of the slope. It was noted that seepage was encountered during the August 5, 1997 investigation from sand layer at 490.3 masl in TH97-2, located in the front yard of 233/235 11th Street East.

With the exception of the data from piezometer P-84 (Figure 16), which was monitored on an annual basis from 1987 to 2012, there is insufficient data to interpret historical groundwater levels in this area. The highest groundwater elevation measured in P-84 was at 485.9 masl, or approximately 0.3 m below ground surface. It was recorded at this location in May 2012 prior to the occurrence of the West Failure. It should be noted that groundwater levels for this piezometer were generally monitored in fall or winter (October to December), when there is little recharge on ground surface and groundwater levels are expected to be at the lowest. High water table condition can be expected following spring thaw, or after heavy, prolonged precipitation during the summer.

During site walkovers immediately after the West Failure in 2012, water was observed in tension crack at the backyard of house 231 on June 21, 2012 which was approximately 0.5 mbgs. There was also seepage on the slope at the interface between Cherry Lane and Lot 231 immediately after the West Failure; the seepage was lessening since the West Failure occurred.

Groundwater levels recorded from the piezometers installed in 2012 and 2013 are presented and discussed in Section 9.2.



		CHERRY LANE SLOPE INSTABILITY	
HISTORICAL GROUNDWATER LEVELS			
	PROJECT 11-1362-0057 DESIGN LNM 08/05/14 CADD CHECK HQV 08/05/14 REVIEW PGB 08/05/14	FILE No. SCALE N/A REV.	FIGURE: 16



8.0 LABORATORY TESTING

Laboratory tests conducted on representative soil samples included visual classification, water content, Atterberg limits, unit weight, specific gravity, grain size analysis, and direct shear tests. The test results are presented in Appendix G.

Table 6 presents the results of water content tests and Atterberg limit tests for the selected samples. The samples were obtained from the field investigation conducted in 2012 and 2013 along Cherry Lane. Grain size analysis was completed using both the mechanical method (for cohesionless soils) and the hydrometer method (for cohesive soils) for soil classification.

Table 7 presents the results of grain-size analysis. Specific gravity and dry density tests were completed to assess the volume and density relationships of the soil. Dry density tests were completed on select undisturbed samples, the results of which are shown in Table 8.

Direct Shear tests were completed on select undisturbed samples to provide additional material property information for slope stability modelling, the results of which are shown in Table 9.

The silty clay was medium plastic. Measured water contents varied from 23 percent (%) to 35%. Atterberg limit tests for three samples of silty clay indicated that the plastic limit varied from 13% to 25%, liquid limit varied from 31% to 49%, and plasticity index varied from 12% to 29%. Dry density values of 1,371 and 1,306 kilograms per cubic metre (kg/m^3) were determined for sample BH1P-1 and COS-13-005-9, respectively.

The clay was high plastic. Measured water contents varied from 25% to 36%. Atterberg limit tests for four samples of clay indicated that the plastic limit varied from 18% to 27%, liquid limit varied from 50% to 74%, and plasticity index varied from 29% to 50%. Dry density values determined for BH1P-3 and BH2P-2 were $1,405 \text{ kg/m}^3$ and $1,415 \text{ kg/m}^3$, respectively.

The glacial till consisted of a silty clay matrix with some sand and gravel. Measured water contents varied from 8% to 16%. Atterberg limits for sample BH2-5 indicated the till was low plasticity with a plastic limit of 12%, liquid limit of 18% and plasticity index of 6%.



CHERRY LANE GEOTECHNICAL INVESTIGATION AND EVALUATION

Table 6: Atterberg Limit Test Results

Borehole	Material	Sample Number	Sample Elevation (masl)	Water Content (%)	Plastic Limit (%)	Liquid Limit (%)	Plastic Index
COS-13-005	Silty clay	005-5	488.9	23.2	20	49	29
COS-13-005	Silty clay	005-8	486.6	29.5	22	38	16
11-0057-BH1P	Silty clay	BH1P-1	486.4	34.6	21	43	22
11-0057-BH1	Silty clay	BH1-3	486.0	33.9	20	39	19
COS-13-006	Silty clay	006-10	486.0	29.5	13	41	28
COS-13-004	Silty clay	004-8	484.4	33.7	21	46	25
COS-13-005	Silty clay	005-12	483.5	28.7	21	33	12
11-0057-BH2	Silty Clay	BH2-4	483.3	30.4	25	48	23
COS-13-005	Silty clay	005-13	482.8	29.3	19	34	15
11-0057-BH3	Silty clay	BH3-2	482.7	24.3	17	31	14
COS-13-005	Silty clay	005-14	482.2	29.4	14	40	26
COS-13-005	Clayey sand	005-4	490.3	11.5	15	35	20
11-0057-BH3	Clayey sand	BH3-3	482.1	28.4	18	28	10
COS-13-005	Sandy, clayey silt	005-10	485.0	28.2	25	32	7
COS-13-006	Clay	006-3	492.9	25.3	22	65	43
COS-13-006	Clay	006-8	488.4	34.0	23	72	49
COS-13-004	Clay	004-5	487.2	33.6	24	74	50
11-0057-BH1P	Clay	BH1P-3	485.2	35.0	21	50	29
COS-13-002	Clay	002-17	485.2	32.7	21	69	48
COS-13-001	Clay	001-6	484.3	33.9	18	56	38
11-0057-BH1	Clay	BH1-5	484.7	36.3	22	62	40



CHERRY LANE GEOTECHNICAL INVESTIGATION AND EVALUATION

Table 6: Atterberg Limit Test Results (continued)

Borehole	Material	Sample Number	Sample Elevation (masl)	Water Content (%)	Plastic Limit (%)	Liquid Limit (%)	Plastic Index
11-0057-BH2P	Clay	BH2P-2	483.4	34.5	27	72	45
11-0057-BH2	Clay	BH2-2	484.5	31.8	24	55	31
COS-13-003	Clay	003-5	475.4	32.3	19	57	38
11-0057-BH2	Till	BH2-5	482.4	12.9	12	18	6
COS-13-001B	Till	001B-3	482.4	11.0	11	23	12
COS-13-004	Till	004-11	481.8	10.8	12	19	7

masl = metres above sea level; % = percent

Table 7: Grain-size Analysis Results

Borehole	Material	Sample Number	Sample Elevation (masl)	Percent Sand (%)	Percent Silt (%)	Percent Clay (%)
COS-13-004	Silty clay	004-2	491.3	1	68	31
COS-13-002	Silty clay	002-13	488.6	12	69	17
COS-13-005	Silty clay	005-8	486.6	1	72	25
11-0057-BH1P	Silty clay	BH1P-1	486.4	3	69	28
COS-13-006	Silty clay	006-10	486.0	1	66	33
COS-13-005	Silty clay	005-12	483.5	7	74	19
COS-13-005	Silty sand	005-1	494.3	66	23	11
COS-13-006	Silty sand	006-13	482.5	59	31	10
COS-13-001	Silty sand	001-9	481.3	51	41	8
COS-13-005	Sandy, clayey silt	005-10	485.0	14	68	18
COS-13-005	Sandy, clayey silt	005-11	484.3	12	73	15
11-0057-BH3	Clayey sand	BH3-3	482.1	39	47	14



CHERRY LANE GEOTECHNICAL INVESTIGATION AND EVALUATION

Table 7: Grain-size Analysis Results (continued)

Borehole	Material	Sample Number	Sample Elevation (masl)	Percent Sand (%)	Percent Silt (%)	Percent Clay (%)
11-0057-BH1P	Clay	BH1P-3	485.2	1	62	37
11-0057-BH1	Clay	BH1-5	484.7	3	62	35
COS-13-001	Clay	001-6	484.3	3	51	46
11-0057-BH2P	Clay	BH2P-2	483.4	1	47	52
COS-13-001B	Till	001B-3	482.4	44	36	18
COS-13-004	Till	004-11	481.8	49	36	12

masl = metres above sea level; % = percent

Table 8: Dry Density Test Results

Borehole	Material	Sample Number	Sample Elevation (masl)	Water Content (%)	Dry Density (kg/m ³)	Specific Gravity
11-0057-BH1P	Silty clay	BH1P-1	486.4	34.6	1,371	-
COS-13-004	Silty clay	004-7	485.8	30.1	1,699	2.61
COS-13-005	Silty clay	005-9	485.8	23.9	1,306	2.59
11-0057-BH1P	Clay	BH1P-3	485.2	35.0	1,405	-
COS-13-002	Clay	002-17	485.2	32.7	-	2.63
COS-13-001	Clay	001-6	484.3	33.9	-	2.63
11-0057-BH2P	Clay	BH2P-2	483.4	34.5	1,415	-
COS-13-001B	Till	001B-3	482.4	11.0	2,057	-

kg/m³ = kilogram per cubic metre; m = metre; % = percent



Table 9: Direct Shear Test Results

Borehole	Material	Sample Number	Sample Elevation (masl)	Peak		Residual	
				Friction Angle (°)	Cohesion (kPa)	Friction Angle (°)	Cohesion (kPa)
COS-13-004	Silty Clay	004-8	484.4	14.2	32	11.4	0
COS-13-005	Silty Clay	005-13	482.7	31.3	9	31.3	0
11-0057-BH2P	Clay	BH2P-2	483.4	23.7	18	22.0	0
11-0057-BH1P	Clay	BH1P-3	485.2	30.0	0	11.4	0
COS-13-001B	Clay	001B-1	483.8	26.6	12	21.7	0

mbgs = metres below ground surface; kPa = kiloPascal; ° = degrees; % = percent

9.0 INSTRUMENTATION MONITORING RESULTS

9.1 Slope Inclinometer Results

The monitoring results for the slope inclinometers are included in Appendix F. Location of historical inclinometers (i.e., SI84-1CL and SI85-511) are shown in Figure 2. Location of inclinometers installed by Golder in 2012 and 2013 are shown on Figure 8.

SI84-1CL: This inclinometer was blocked in 2004. A cumulative movement of 20 mm was recorded between November 2, 1992 and October 12, 2001, approximately 15 mm of which occurred for the period from October 31, 2000 to October 12, 2001.

SI85-511: This inclinometer was bent and not in service since 2006. Approximately 32 mm of cumulative movement was recorded for the period from August 1985 to October 2005. This inclinometer shows a zone of movement at approximately 2.5 mbgs.

11-0057-BH1: Less than 5 mm of cumulative movement was measured between June 25, 2012 and October 30, 2013.

11-0057-BH2: This inclinometer sheared off in June, 2013. A cumulative movement of 30 mm was recorded between June 25 and June 26, 2012. An approximate movement rate of 22 mm/day was recorded before it sheared off. This inclinometer shows a zone of movement at the clay/till interface at approximately elevation 483 masl (about 3.7 mbgs).

11-0057-BH3: Approximately 10 mm of cumulative movement was recorded between June 25, 2012 and October 30, 2013.

COS-13-001B: This inclinometer sheared off sometime between August and October, 2013. A cumulative movement of approximately 65 mm was recorded between July 27 and August 28, 2013. This inclinometer shows a consistent zone of movement at the clay/till interface at approximately elevation 482.8 masl (about 6.5 mbgs).

COS-13-002: Less than 5 mm of movement was recorded between July 30 and October 30, 2013.

COS-13-004: Less than 5 mm of movement was measured in the inclinometer installed in borehole COS-13-004 between August 28 and November 1, 2013.



COS-13-005: Less than 5 mm of movement was recorded between August 28 and October 30, 2013.

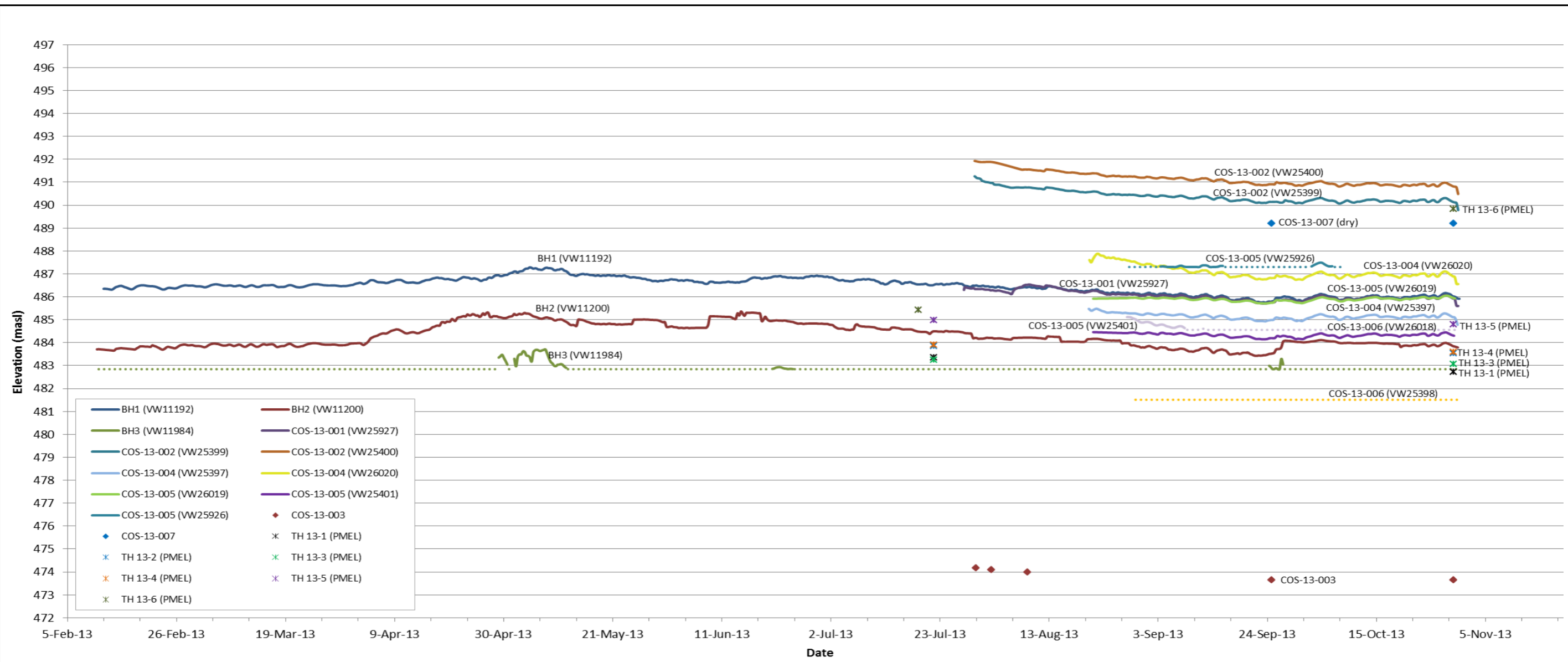
COS-13-006: Less than 5 mm of movement was recorded between August 28 and October 30, 2013.

9.2 Piezometers

The results of historical piezometer monitoring are presented and discussed in Section 7.0. Groundwater levels collected from the piezometers installed in 2012 and 2013 is included in Figure 17 for both types of piezometers (e.g., vibrating wire and standpipe). Piezometric levels recorded on October 30, 2013 are presented in Table 5, with the ground surface and till/clay contact elevation, and graphically presented in Figure 18, cross-sections A-A', B-B', and longitudinal sections C-C' and D-D'.

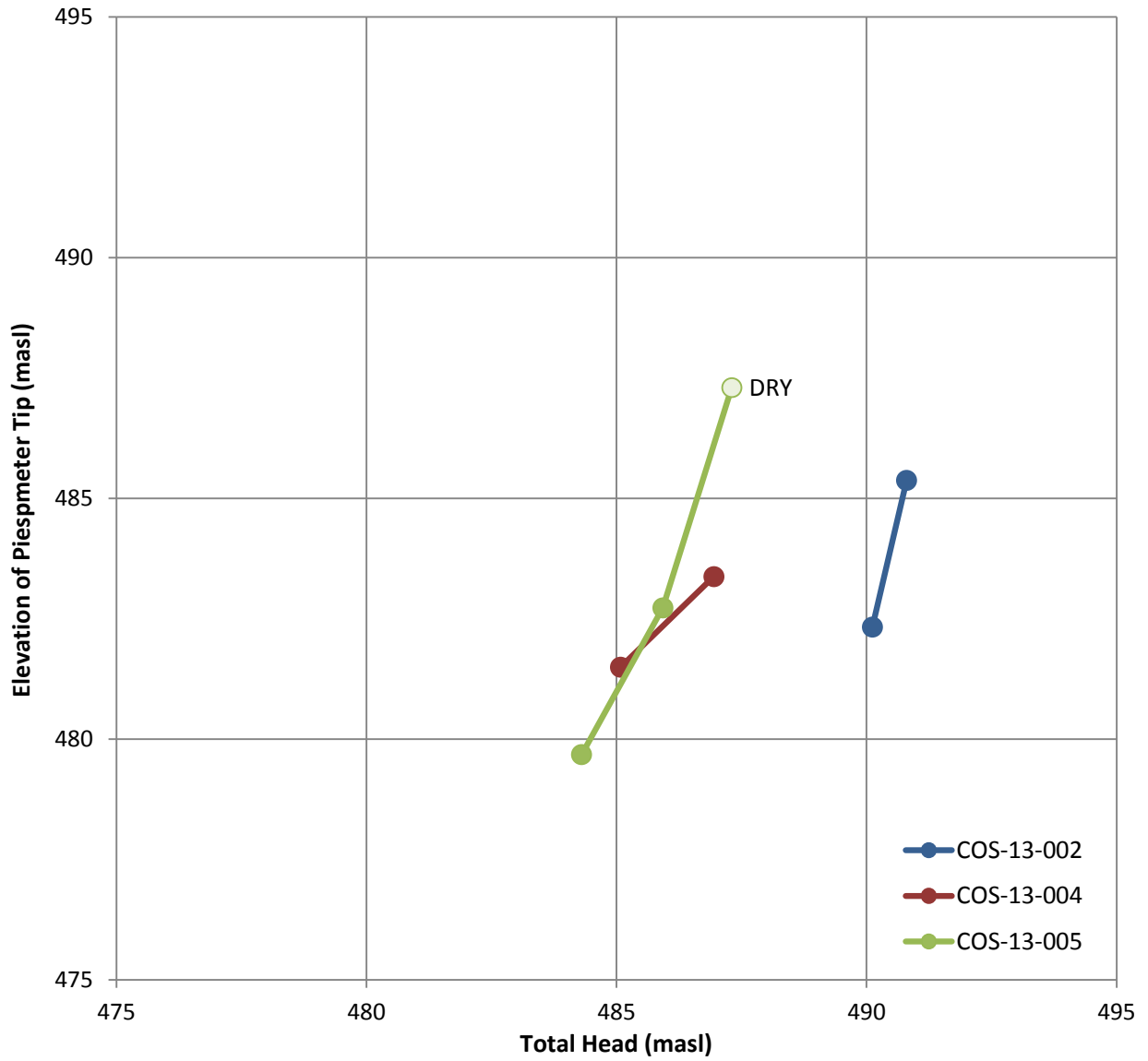
The vibrating wire piezometers installed in boreholes 11-1362-0057 BH1, BH2, and BH3 were installed during a period of high groundwater levels (June 2012); groundwater levels decreased approximately 0.5 m to 1.0 m during the fall and winter seasons. The trends in these vibrating wire piezometers throughout 2013 were as follows:



- Groundwater levels measured on October 30, 2013 show strong downward gradients at the piezometer nests, e.g., a gradient of 0.22 at COS-13-004, 0.53 at COS-13-005 and up to 0.95 at COS 13-004.
- Data collected from the vibrating wire piezometers revealed an increasing trend in groundwater levels starting around April 3, 2013 (at boreholes 11-1362-0057 BH1 and BH2).
- Measured annual variation in groundwater levels in 2013 was 0.86 m at 11-0057 BH3 and 1.93 m at 11-0057 BH2.
- The highest groundwater level recorded at borehole 11-1362-0057 BH1 was 487.3 masl (about 1.0 mbgs) on May 4, 2013.
- High groundwater levels recorded at borehole 11-1362-0057 BH2 were 485.3 masl (about 0.6 mbgs) and 485.4 masl (about 0.5 mbgs), recorded on April 27 and June 14, 2013, respectively.
- The highest groundwater level recorded in borehole 11-1362-0057 BH3 was 483.7 masl (about 0.4 mbgs) on May 8, 2013.
- Groundwater levels recorded at 11-0057 BH1 and BH2 started to decrease early in July 2013.



Notes:
 1) Dashed lines indicate negative pore water pressures.
 2) Piezometer TH13-1 to TH13-6 were installed by P.Machibroda Engineering Ltd. (PMEL) in July 2013.

		CHERRY LANE SLOPE INSTABILITY	
MONITORED PIEZOMETRIC LEVELS (2012-2013)			
	PROJECT	11-1362-0057	FILE No.
	DESIGN	LNK 08/05/14	SCALE N/A
	CADD		REV.
	CHECK	PGB 08/05/14	FIGURE: 17
REVIEW	HQV 08/05/14		



PROJECT		 City of Saskatoon		CHERRY LANE SLOPE INSTABILITY	
TITLE					
TOTAL HEAD MEASURED ON OCTOBER 30, 2013					
PROJECT		11-1362-0057		FILE No.	
DESIGN	LNМ	08/05/14	SCALE	N/A	REV.
CADD					
CHECK	PGB	08/05/14	FIGURE: 18		
REVIEW	HQV	08/05/14			
 Golder Associates Saskatoon, Saskatchewan					



9.3 Survey Pin Monitoring

9.3.1 June 21 to June 28, 2012

A network of survey pins was installed within the West Failure area and monitored daily for the period from June 21 to June 28, 2012, immediately after the West Failure occurred using a Total Station. Figure 19 presents locations of the survey pins installed for this monitoring period and horizontal movement vectors for selected survey pins. The horizontal movement vectors were determined for the period from June 22 to June 24, 2012. A summary of the results of ground movement monitoring for this period is as follows:

- Cherry Lane behind 233-11th Street East (Pin 18 location) moved 260 mm down slope and pushed up 0.05 m for the monitoring period from June 22 to 28. The rate of movement reduced from 110 mm/day from June 22 to June 23, to approximately 27 mm/day from June 24 to June 28, 2012.
- Cherry Lane behind 237-11th Street East (Pin 34) moved 220 mm down slope and dropped 30 mm for the monitoring period from June 22 to 28.
- The toe of the failure in the backyard of 222 Saskatchewan Crescent East (Pin 31) moved 150 mm from June 22 to June 24, 2012.

9.3.2 June 28, 2012 to Jun 4, 2013 (100 series pins)

Survey Pins 100 to 142 (Figure 9) were installed on June 28, 2012, along Cherry Lane at approximately 5 m intervals, to monitor the slope movement along the lane using a survey line. This series of pins was surveyed from July 4, 2012 to June 4, 2013. Horizontal movement of this series of survey pins was monitored every third day from June 28 to August 2, 2012; the rate of movement then reduced, and the frequency of monitoring was reduced to weekly. Cumulative horizontal movements and rates of movement between June 28, 2012 and June 4, 2013 are shown in Figure 20 and Figure 21, respectively.

A summary of the results of ground movement monitoring for this series of survey pins is as follows:

- Monitoring results show that a 45 m section of Cherry Lane, from Pin 112 to Pin 125, was impacted. No significant movement was measured east of Pin 112 or west of Pin 125.
- Total horizontal movement of 115 mm was measured behind 233/235 – 11th Street East (Pin 120 location) from June 28 to September 13, 2012.
- Recorded rate of movement reduced significantly from 12 mm/day at the start of monitoring (June 28, 2012) to less than 1 mm/day in early September 2012. Less than 5 mm of movement was monitored between February 4 and June 4, 2013

9.3.3 June 28, 2012 to June 28, 2013 (100 series pins)

Figure 22 presents the results of GPS survey of the 100 series pins between June 28, 2012 and June 27, 2013 for the Cherry Lane at the East Failure. The results show 765 mm of horizontal movement for Pin 106, 555 mm for Pin 107, and 366 mm for Pin 108. Most of these movements occurred in June 2013 because less than 5 mm of movement was measured by line survey for this location up to June 4, 2013 (Figure 20).

G:\2011\136211-1362-0057 COS East Riverbank\Figures\Phase 5100 Cherry Lane Remediation\Task 700011-1362-0057 Monitoring Pin Vectors.dwg 5/2/2014 2:38 PM



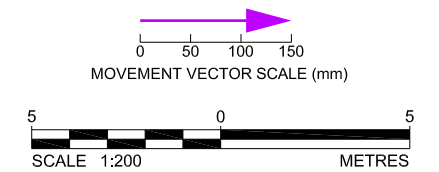
PIN MOVEMENT (BETWEEN JUNE 22-24, 2012)	
PIN NUMBER	RECORDED MOVEMENT (mm)
PIN13	20
PIN14	70
PIN15	91
PIN16	81
PIN17	90
PIN18	150
PIN19	76
PIN21	73
PIN22	91
PIN23	30
PIN29	112
PIN30	41
PIN31	150
PIN32	81
PIN33	89
PIN34	100
PIN35	110
PIN37	36

LEGEND

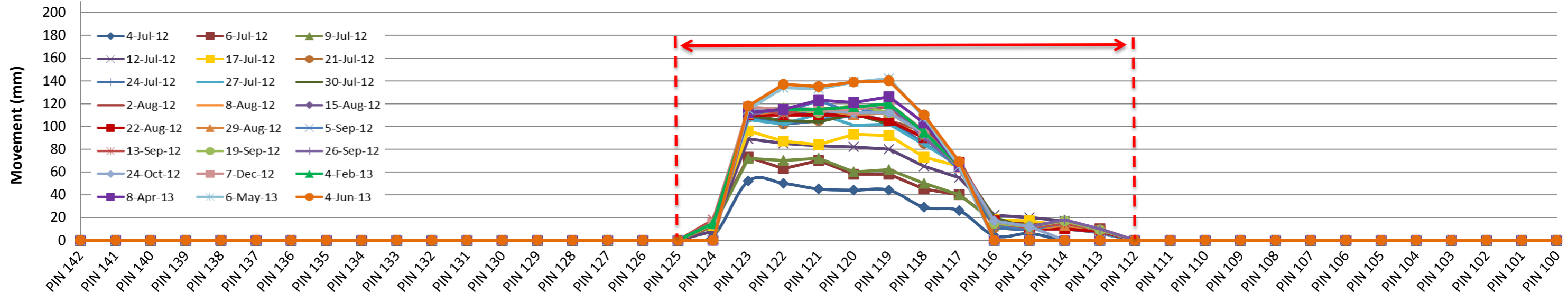
- PIN MOVEMENT VECTOR
- CRACK LOCATION
- TOE OF SLUMP

REFERENCE

AERIAL PHOTOGRAPH PROVIDED BY CITY OF SASKATOON

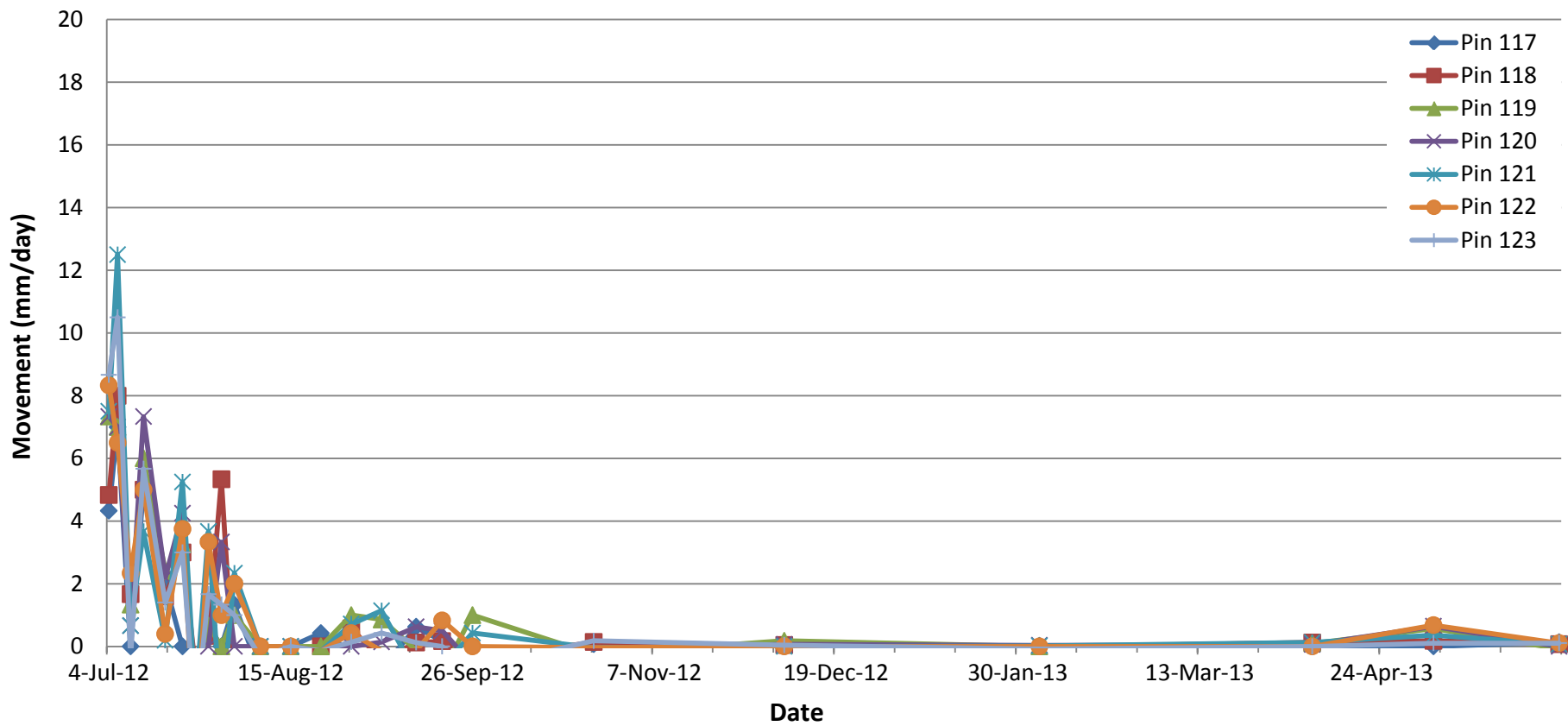


		CHERRY LANE SLOPE INSTABILITY	
MONITORING PIN LOCATION PLAN FOR THE PERIOD OF JUNE 22-24, 2012			
PROJECT	11-1362-0057	FILE No.	
DESIGN		SCALE	AS SHOWN
CADD	JDS 02/05/14	REV.	
CHECK			
REVIEW			
			FIGURE: 19





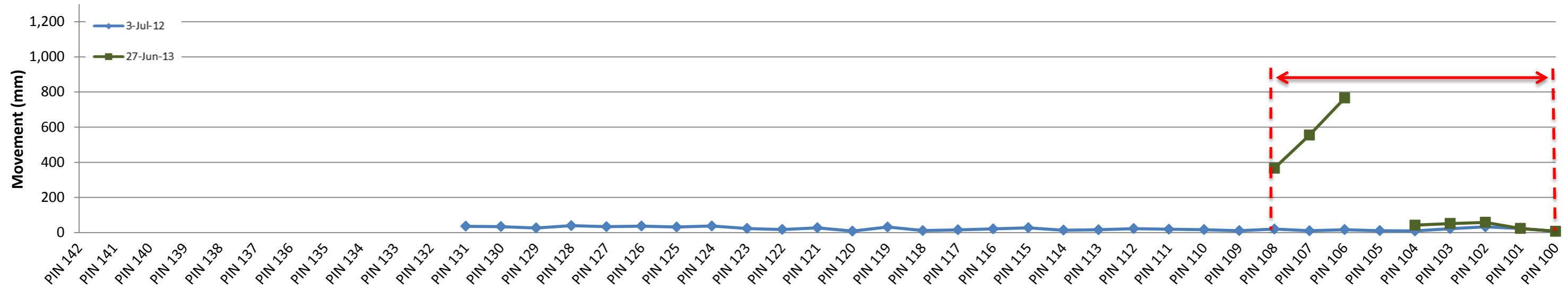
Notes:
 1) Positive values indicate down slope movement.
 2) Pins 100 to 142 were installed June 28, 2012.

		CHERRY LANE SLOPE INSTABILITY	
HORIZONTAL SLOPE MOVEMENT, 100 SERIES PINS (June 28, 2012 to June 4, 2013)			
	PROJECT	11-1362-0057	FILE No.
	DESIGN	LNLM	08/05/14
	CADD		
	CHECK	HQV	08/05/14
REVIEW	PGB	08/05/14	SCALE N/A REV.
			FIGURE: 20



- Notes:
- 1) Positive values indicate down slope movement.
 - 2) Pins 117 to 123 were installed June 28, 2012.

PROJECT		 CHERRY LANE SLOPE INSTABILITY	
TITLE			
RATE OF MOVEMENT vs TIME FOR SELECTED 100 SERIES PINS			
 Golder Associates Saskatoon, Saskatchewan	PROJECT	11-1362-0057	FILE No.
	DESIGN	LNLM	08/05/14
	CADD		
	CHECK	HQV	08/05/14
REVIEW	PGB	08/05/14	SCALE N/A REV.
			FIGURE: 21



Notes:
 1) Positive values indicate down slope movement.
 2) Pins 100 to 142 were installed June 28, 2012.

		CHERRY LANE SLOPE INSTABILITY	
HORIZONTAL SLOPE MOVEMENT, 100 SERIES PINS (June 28, 2012 to June 27, 2013)			
	PROJECT	11-1362-0057	FILE No.
	DESIGN	LNK 08/05/14	SCALE N/A
	CADD		REV.
	CHECK	HQV 08/05/14	
	REVIEW	PGB 08/05/14	
			FIGURE: 22

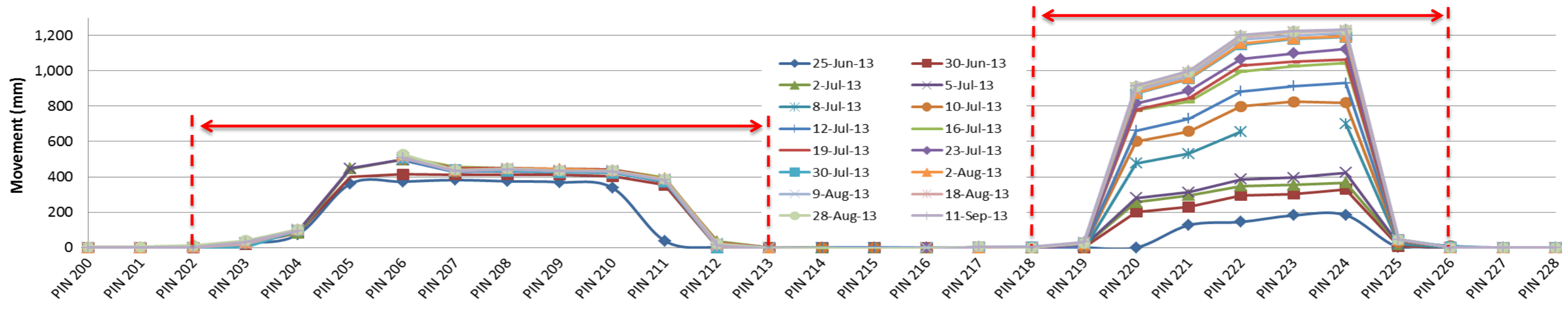


9.3.4 June 25, 2013 to September 11, 2013

The 100 series pins were replaced with Survey Pins 200 to 228 (Figure 10) to monitor horizontal slope movement along the Cherry Lane. This series of pins was surveyed from June 25 to September 11, 2013. Cumulative horizontal movements and rates of movement during this period are shown in Figure 23 and Figure 24, respectively. A summary of the ground movement monitoring for this series of survey pins is as follows:

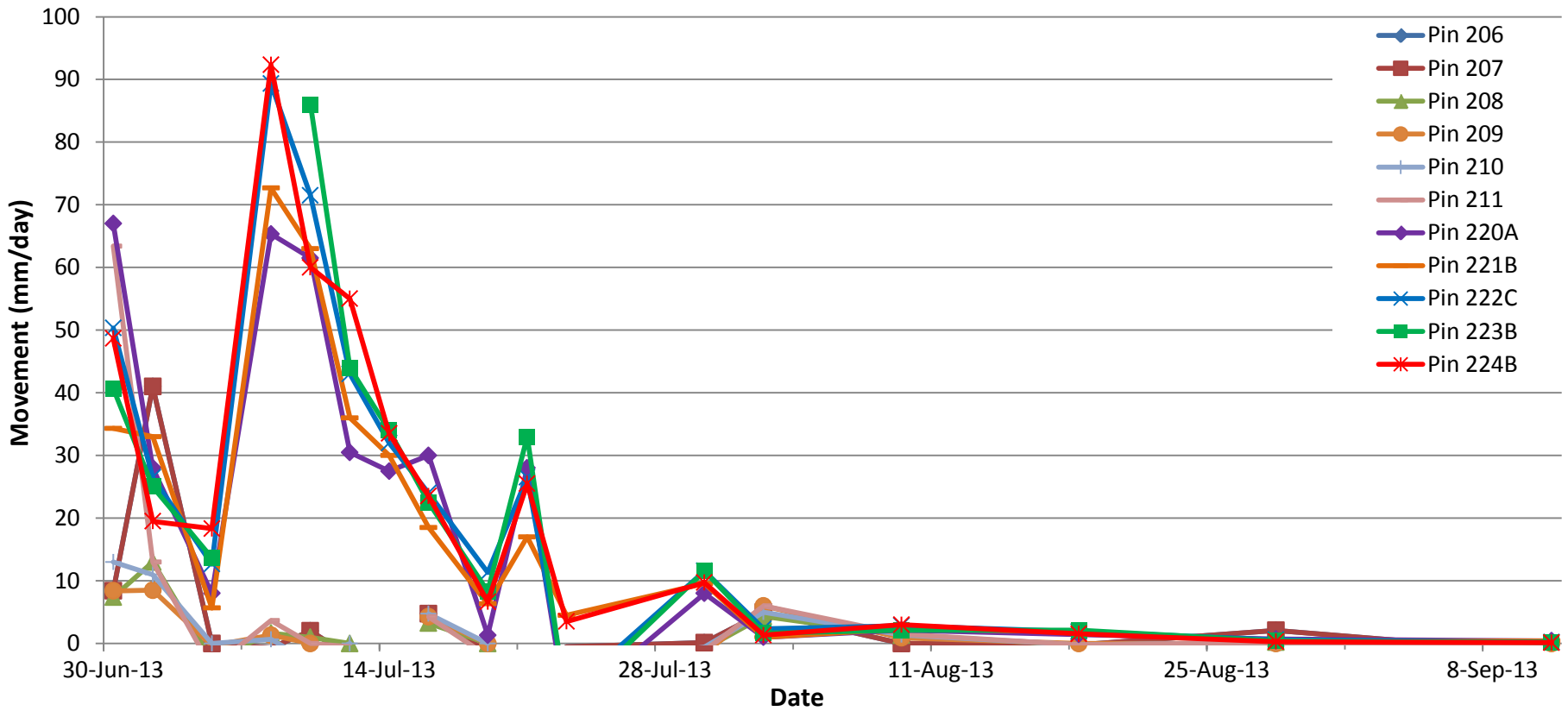
- Monitoring results show that a 45 m section of Cherry Lane, from Pin 202 to Pin 213, was impacted within the West Failure area and a 35 m section of Cherry Lane, from Pin 218 to Pin 226, was impacted within the East Failure area.
- West Failure:
 - Rate of movement of approximately 1.8 mm/day was measured behind 233/235 and 237/239 - 11th Street East (Pin 205 to 210 locations) between June 4 and 25, 2013.
 - Rate of movement of approximately 63 mm/day was measured behind 237/239 - 11th Street East (Pin 211 location) between June 25 and 30, 2013; the rate of movement at this location decreased to approximately 13 mm/day, between June 30 and July 2, 2013.
 - Rate of movement of approximately 41 mm/day measured behind 233/235 - 11th Street East (Pin 206 location) between June 30 and July 2, 2013.
 - Movement between zero and 7.5 mm/day was measured within the West Failure area between July 2 and September 11, 2013; except for behind 233/235 - 11th Street East (Pin 207 location) where a rate of movement of 12.5 mm/day was measured between July 12 and 14, 2013.
- East Failure:
 - Rate of movement measured behind 303, 305, and 307 - 11th Street East (Pin 220 to 224 location) was approximately 50 mm/day to 75 mm/day between June 25 and 30, 2013; the rate of movement at this location decreased to approximately 8 mm/day to 33 mm/day between June 30 and July 5, 2013; rate of movement at this location then increased to approximately 13 mm/day to 92 mm/day between July 5 and 8, 2013.
 - Rate of movement behind 305 - 11th Street East (Pin 223) increased from approximately 13 mm/day, during the June 5 to 8, 2013 monitoring period, to 195 mm/day, during the June 8 to 10, 2013 monitoring period.
 - Rate of movement generally decreased after July 10, 2013; movements between zero and 12 mm/day were measured after July 24, 2013.

The rate of movement for the 200 series of pins has been less than 5 mm since July 2013 at the West Failure and since August 2013 at the East Failure.





- Notes:
- 1) Positive values indicate down slope movement.
 - 2) Pins 200 to 216 were installed June 4, 2013.
 - 3) Pins 217 to 228 were installed June 25, 2013.

		CHERRY LANE SLOPE INSTABILITY	
HORIZONTAL SLOPE MOVEMENT, 200 SERIES PINS (June 25, 2013 to Sept. 11, 2013)			
	PROJECT	11-1362-0057	FILE No.
	DESIGN	LNLM 08/05/14	SCALE N/A
	CADD		REV.
	CHECK	HQV 08/05/14	FIGURE: 23
REVIEW	PGB 08/05/14		



Notes:
 1) Positive values indicate down slope movement.
 2) Pins 206 to 211 were installed June 4, 2013.

PROJECT		 CHERRY LANE SLOPE INSTABILITY	
TITLE			
RATE OF MOVEMENT vs TIME FOR SELECTED 200 SERIES PINS			
 Golder Associates Saskatoon, Saskatchewan	PROJECT	11-1362-0057	FILE No.
	DESIGN	LNLM	08/05/14
	CADD		SCALE N/A
	CHECK	HQV	08/05/14
REVIEW	PGB	08/05/14	REV.
			FIGURE: 24



9.3.5 September 11, 2013 to October 31, 2013 (300 series pins)

More permanent survey markers, numbered 303 to 327 were installed on September 13, 2013 to monitor slope movement along Cherry Lane, and will continue to be monitored over time. Locations of these survey markers are shown in Figure 11. The 300 series pins were surveyed on September 16, September 25 and October 31, 2013. Less than 5 mm of movements, which are in a range of measurement accuracy, were measured between September 13 and October 31, 2013.

9.4 Monitoring of Structures

9.4.1 Tell-Tale Crack Monitors

Tell-tale cracks monitors were monitored approximately every 10 days from August 7 to October 30, 2013. No noticeable crack developments were noticed for this monitoring period. Photographs of the crack monitors are included in Appendix F.

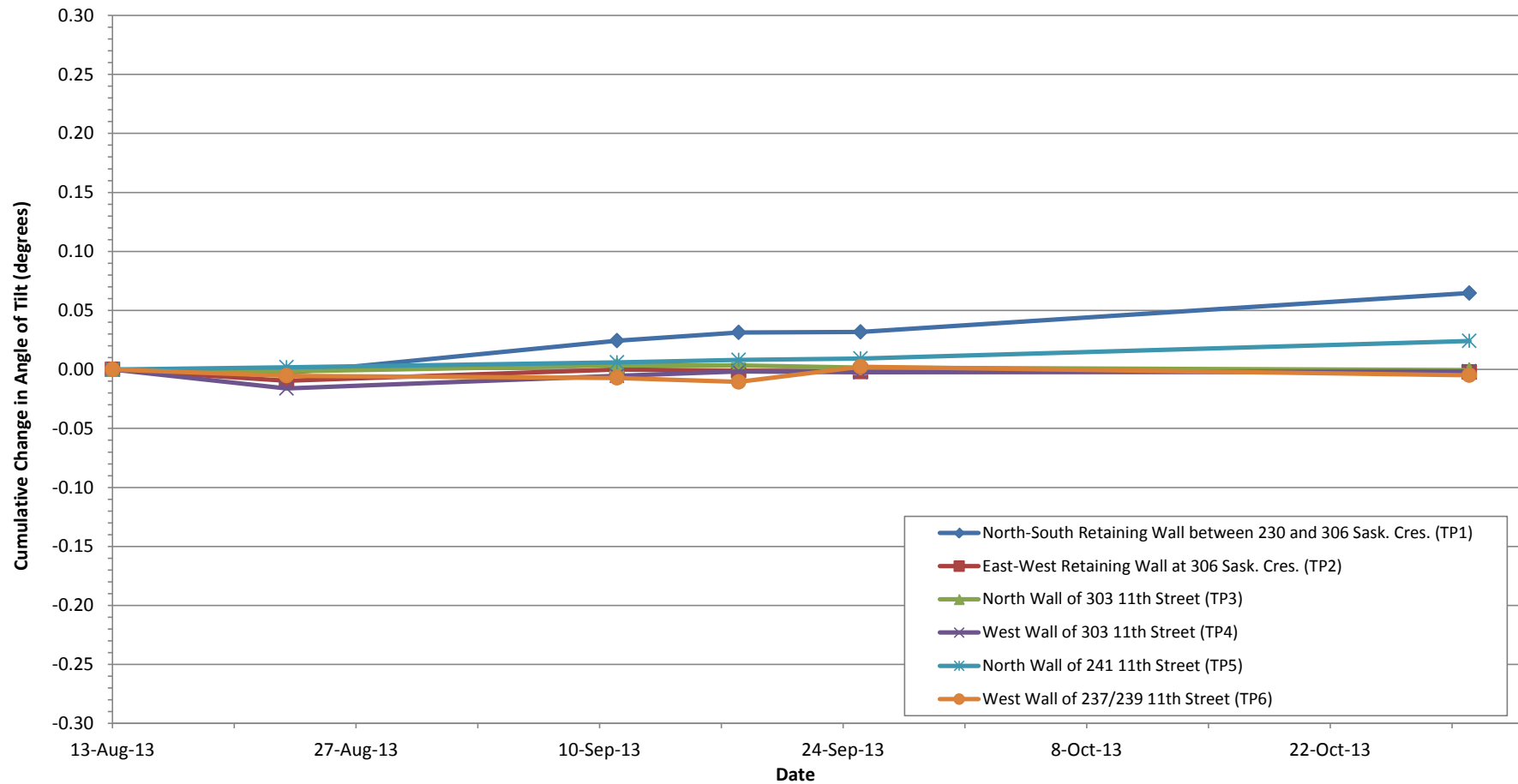
9.4.2 Tilt Plates

Tilt plates were monitored approximately every 10 days from August 13 to October 30, 2013. The results of tilt plate measurement are shown in Figure 25. During the monitoring period, a tilt of approximately 0.065 degrees towards the west direction was measured at the tilt plate located on the north-south retaining wall between 230 and 306 Saskatchewan Crescent East. The tilt plate located at 241 – 11th Street has measured a steady increase in tilt angle to 0.024 degrees; however total tilt is near the expected range of measurement accuracy and movement for this structure. Monitoring of the remaining tilt plates have measured variable results which were within the expected range of movement for most structures depending on time of day, weather and other factors.

A tilt plate was installed on the north side of the building at 1721 – 8th Street E. (Golder Associates Ltd.) to provide a check of the expected range of tilt of building due to climate and temperature changes. During the monitoring period, the angle of tilt at this location ranged from 0 to -0.009 degrees.

9.4.3 Settlement Points

Settlement Points were monitored on August 28 and 29, September 18, and November 28 and 29, 2013. The results of settlement monitoring from August 28 to November 29 are presented in Appendix F. The results of the settlement data analysis indicate that no noticeable differential settlement of the structures have been measured to date (November 2013).



Note: Positive changes in tilt indicate tilting toward the monitoring structure.

		CHERRY LANE SLOPE INSTABILITY			
RESULTS OF TILT MONITORING					
		PROJECT 11-1362-0057 DESIGN LNM 08/05/14 CADD CHECK PGB 08/05/14 REVIEW HQV 08/05/14	FILE No. SCALE N/A REV.01	FIGURE: 25	



10.0 SLOPE STABILITY ANALYSIS

10.1 General

Stability analyses of the Cherry Lane site were performed in order to identify failure mechanisms at the site and to evaluate conceptual remedial options.

The following information was used to model the riverbank slope at the Site:

- Ground surface topography was obtained from the topographic survey completed by Meridian in July 2013.
- Stratigraphy was inferred from review of available geotechnical reports and field investigations by Golder.
- Groundwater conditions were inferred from existing piezometric data.
- Geometry of the slip surface was inferred from observed landslide features, inclinometer data and site stratigraphy.
- Soil parameters used in this report were based on site specific laboratory test results, back-analysed values, or based on typical values reported in the literature.

10.2 Method of Analysis

The slope stability analysis was performed using the computer software SLOPE/W, marketed by Geo-Slope International Ltd. (2007). Two-dimensional analyses were conducted using the Morgenstern-Price limit equilibrium method.

10.3 Material Properties

Material properties for the slope stability analysis were selected based upon current and historical laboratory testing results for the Cherry Lane area and Saskatoon region. Table 10 shows the shear strength properties used for the slope stability analysis. Shear strength parameters for the shear zone are back-analyzed values. Effective cohesion value of 10 kiloPascals (kPa) was used for the silty clay, and clay materials to account for the contribution from soil suction to the unsaturated shear strength of these materials. Assumed material properties of fill or modified soils for several conceptual remediation options are also included, based on typical values.

Table 10: Shear Strength Parameters for the Preliminary Slope Stability Analysis

Material	Unit Weight (kN/m ³)	Effective Cohesion (kPa)	Effective Friction Angle (degrees)
Fill	19	5	22
Silty Clay	19	10	25
Clay	19	10	22
Shear Zone	19	0	12*
Till	impenetrable	-	-
Shear Zone Modification	20	0	30

*Back analysed value; kN/m³ = kiloNewtons per cubic metre; kPa = kiloPascal



10.4 Uncertainty of Input Parameters

There is uncertainty in the input data (e.g., till/clay contact, soil properties and piezometric conditions) for the analysis. A sensitivity analysis, where the influence of variations in each input variable is isolated, can be conducted to evaluate the implications of uncertainty in the results. A probabilistic analysis can be used for assessing the reliability of the slope stability conditions. Sensitivity analysis and probabilistic analysis were not conducted at this stage of the study where a conceptual remediation is being developed. Further soil investigation and laboratory tests, sensitivity analysis and probabilistic analysis may be recommended for detailed design if one of the remediation options is to be constructed.

10.5 Recommended Factor of Safety

The stability condition of the slope is evaluated in terms of a calculated factor of safety, which is the ratio of the resisting forces/moments to the driving forces/moments. The factor of safety of a slope can be calculated in terms of all the forces and moments acting on the slope. Based on the limit equilibrium analysis, a computed factor of safety of 1.0 means the available resisting forces (e.g., the available shear strength of the soil along the sliding plane) have been mobilized and a condition of equilibrium exists and failure occurs. A computed factor of safety of greater than 1.0 means that the resisting forces are more than are required for a condition of limiting equilibrium and the slope is in a stable condition.

Determination of a minimum acceptable factor of safety (FS) for a slope stability model depends on several factors, including: i) the assumptions necessary to complete the analysis; ii) the reliability of the input data, particularly shear strength and pore-water pressure conditions; and iii) the consequence of failure. For the Cherry Lane area, potential changes in the slope geometry, additional structural loads and piezometric conditions can occur through unknown future development and landscaping work, therefore these potential unknown changes should be considered.

The consequence of failure (or risk) is an important factor to take into consideration when determining an acceptable factor of safety for design purposes. A lower factors of safety would be accepted on a slope where movement would result in little property damage or pose little hazard to public safety. A higher FS is typically required when risk to public safety and economic loss are involved.

Golder reviewed existing geotechnical reports for the site, the MVA policy (MVA 2004), and policies of other municipalities or government agencies that have high risk slope development. Existing geotechnical reports for the area specified a minimum FS of 1.3 to 1.5 depending on the site studied. In a slope instability study of the east riverbank conducted for MVA, Clifton (1985) recommended a desirable FS of 1.5 for slope improvement involving substantial risk of economic loss and some public safety considerations; and a minimum FS of 1.3 with monitoring was recommended. The MVA policy does not specify a minimum FS, with the caveat that any construction should not increase the instability of the slope, before or after construction.

As this Site poses a high risk to the people and structures on the 200 to 300 blocks of 11th Street East and Saskatchewan Crescent East, difficulties in maintaining a monitoring program in the residential properties, and uncertainty associated with future development, a FS of 1.5 is recommended for the design criteria for the Site under consideration.



10.6 Back-Analysis of Failure Slope

As the slope has already failed, a stability back-analysis can be conducted. The back-analysis method models the geometry, soil, and groundwater conditions at failure, indicated by a factor of safety (FS) of 1.0. Back-analysis is shown in Figure 26 for the West Failure and Figure 27 for the East Failure.

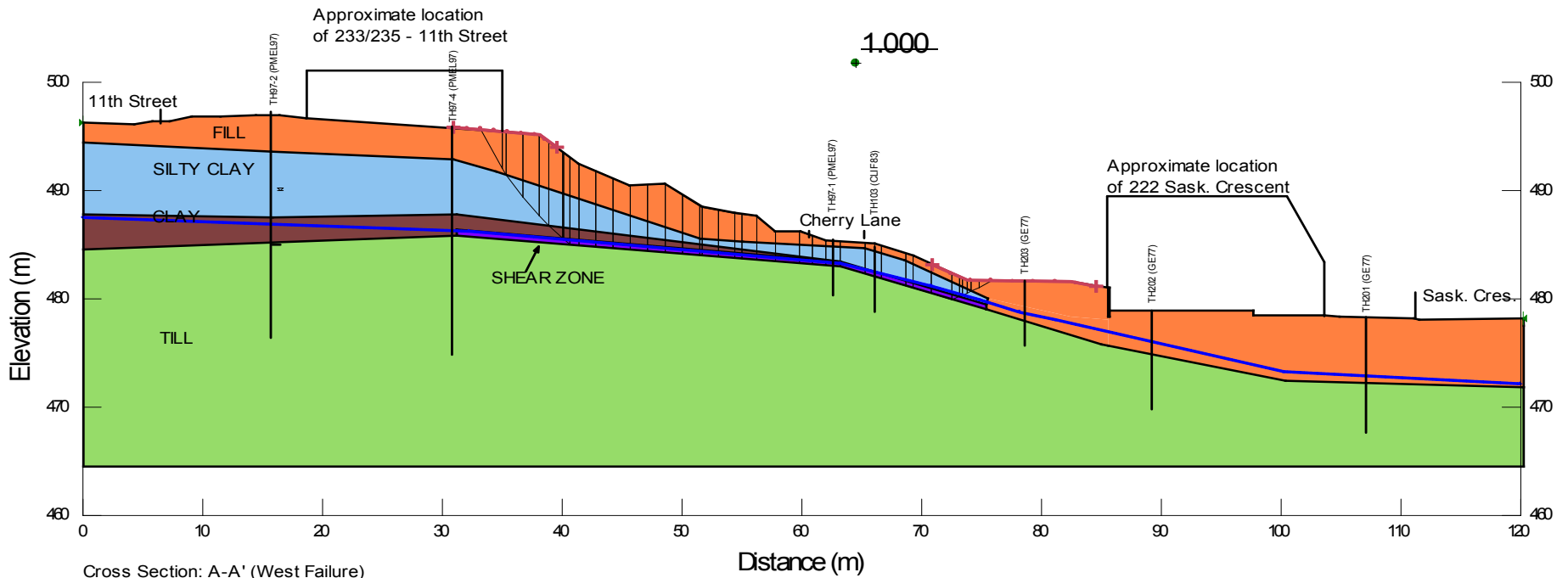
The condition modelled for back-analysis was for a time after the initial failure when the topography was surveyed, but when the slope was still actively moving. As such, groundwater levels shown in the model may be lower than those at the time of initial failure; but they are higher than those measured in the fall or winter months (Figure 17). Effective shear strength parameters of the clay at shear zone were expected to be near or at residual (i.e., having undergone movement).

Loading was not applied to any part of the slope within the stability analyses as it is understood that the houses within this area are founded on piles and therefore their associated vertical loads are distributed to a founding layer outside of the sliding mass. The retaining walls and large boulders present within the backyards of Lots 233/235 and 235/237 were modelled as soil within the stability analysis due to unknown geometries of these features. Retaining walls for the residences along Saskatchewan Crescent East were modelled as gravity walls and were based upon the geometry provided in the building permit plans. The slope stability analyses assume that the existing reinforced concrete wall and slab system of the basement structure of 222 Saskatchewan Crescent East (cross-section A-A'), and retaining wall behind 306 Saskatchewan Crescent East (cross-section B-B') were impenetrable. To date, no noticeable movements were observed at these two structures. The resistance of these structures against landslide activity in the future is currently unknown.

The slip surface of the sliding soil mass is in surficial stratified deposits at the contact between the clay and the underlying till. Therefore, a composite slope failure along a slip surface at the interface between the clay and till was considered in the analyses.

Cross-sections A-A and B-B were selected as the primary section for analysis for the West Failure and East Failure, respectively. The location of the cross-sections is shown on Figure 2. Figure 12 and Figure 13 show the inferred stratigraphic soil profiles along each cross-section. Both the West Failure and East Failure were back-analysed to determine the residual (or large strain) shear strength parameters corresponding to failure or a FS of 1.0.

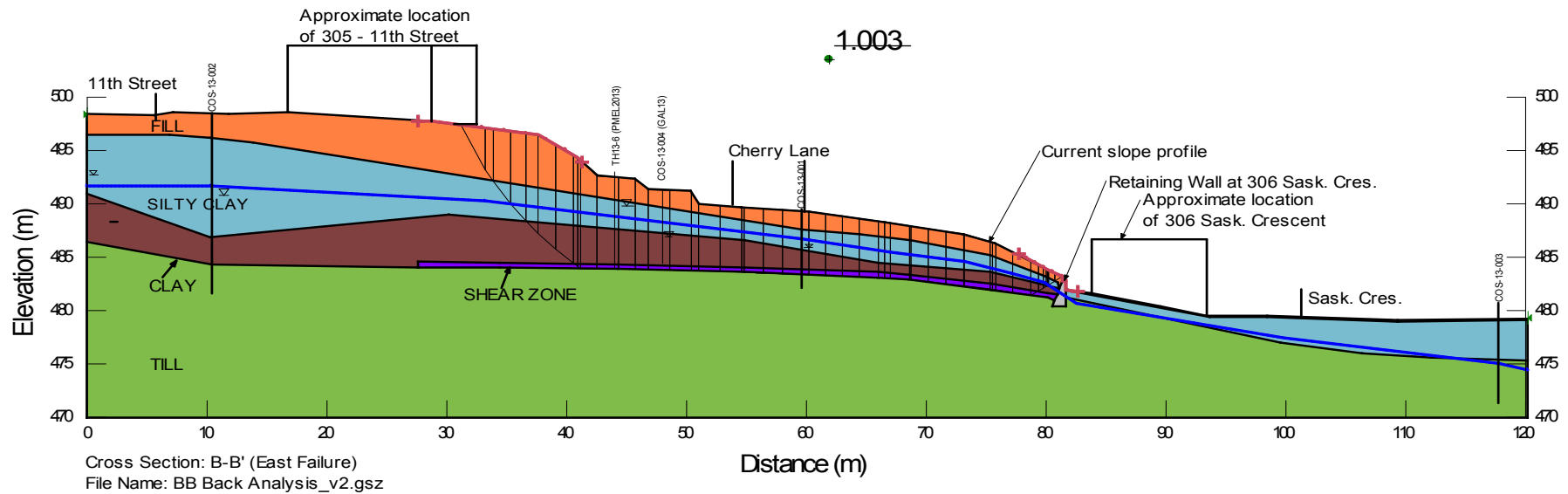
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 Name: Silty Clay Unit Weight: 19 kN/m³ Cohesion: 10 kPa Phi: 25 °
 Name: Clay Unit Weight: 19 kN/m³ Cohesion: 10 kPa Phi: 22 °
 Name: Shear zone Unit Weight: 19 kN/m³ Cohesion: 0 kPa Phi: 12 °
 Name: Till





Cross Section: A-A' (West Failure)
 File Name: AA Back Analysis_v2.gsz

		CHERRY LANE SLOPE INSTABILITY	
BACK ANALYSIS - CROSS SECTION A-A' WEST FAILURE			
	PROJECT	11-1362-0057	FILE No.
	DESIGN	LNLM 08/05/14	SCALE N/A REV.
	CADD	HQV 08/05/14	FIGURE: 26
	CHECK	PGB 08/05/14	

Name: Fill Unit Weight: 19 kN/m³ Cohesion: 5 kPa Phi: 22 °
 Name: Silty Clay Unit Weight: 19 kN/m³ Cohesion: 10 kPa Phi: 25 °
 Name: Clay Unit Weight: 19 kN/m³ Cohesion: 10 kPa Phi: 22 °
 Name: Shear zone Unit Weight: 19 kN/m³ Cohesion: 0 kPa Phi: 12 °
 Name: Till
 Name: Retaining wall



PROJECT		 CHERRY LANE SLOPE INSTABILITY	
TITLE			
BACK ANALYSIS - CROSS SECTION B-B' EAST FAILURE			
 Golder Associates Saskatoon, Saskatchewan	PROJECT 11-1362-0057		FILE No.
	DESIGN	LNLM 08/05/14	SCALE N/A
	CADD		REV.
	CHECK	PGB 08/05/14	
REVIEW	HQV 08/05/14	FIGURE: 27	



10.7 Conceptual Remedial Options

A number of conceptual remedial options were considered for the remediation of the slope, including:

- do nothing;
- installation of sub-drainage system to lower groundwater tables;
- re-grading of existing slope; and
- modification of the shear zone to increase shear strength.

It was understood that the primary focus of the slope remediation was to preserve existing residences along 11th Street East and Saskatchewan Crescent East, and maintain vehicle access along Cherry Lane. As discussed in Section 10.5, the required slope factor of safety for the conceptual remedial options was at least 1.5. Constructability and cost effectiveness were also considered in the process of evaluating conceptual remedial options.

Options evaluated are conceptual in nature, meaning specific design details such as detailed geometry, method of construction, sourcing and supply of materials, coordination of activities, etc. have not been considered.

Table 11 summarizes the calculated factor of safety (FS) for a number of conceptual remedial options, which is discussed in detail in the following sections.

Table 11: Calculated Factor of Safety for Remedial Options

Analysed Scenarios	Cross-section	Calculated FS	Figure
Back analysis	A-A'	1.00	26
	B-B'	1.00	27
Option 1: Do nothing, low groundwater table	A-A'	1.03	28
	B-B'	1.09	29
Option 1: Do nothing, high groundwater table	A-A'	0.89	30
	B-B'	0.87	31
Option 2: Installation of sub-drainage system	A-A'	1.03	32
	B-B'	1.26	33
Option 3: Site regrading with sub-drainage system	A-A'	1.51	34
	B-B'	1.50	35
Option 4: Shear zone modification with sub-drainage system	A-A'	1.51	37
	B-B'	1.51	38

FS = Factor of Safety

10.7.1 Option 1 – Do Nothing

The first remedial option considered was leaving the slope in its existing condition. Based on the slope stability analysis conducted, it is likely that the slope at the East and West Failure locations will continue to move, likely on a seasonal basis with higher rates of movement in the spring when groundwater levels in the area are high. Rates of movement are expected to be low in the winter months and in dry years where the groundwater table is at or near the contact surface between the glacial till and surficial stratified deposits. As noted in Sections 3.6 and 7.0, groundwater level fluctuations of up to 2 m during a year and up to 6 m in the long term are measured.



Figure 28 and Figure 29 show the stability analyses for the do nothing option, with the piezometric levels approximately 1 m lower than those used on the back-analysis to represent slope instability conditions. The calculated factors of safety are 1.03 and 1.09 for cross-sections A-A' and B-B', respectively, for the case where nothing is done other than lowering the groundwater table.

Figure 30 and Figure 31 show the stability analyses for the do nothing option, with the piezometric level elevated approximately 1.5 m above those used in the back-analysis to represent slope instability. The calculated factor of safety is 0.89 for cross-section A-A' and 0.87 for cross-section B-B' when the raised groundwater level is used in the analysis. There is also a significant potential for additional sloughing of the material at the scarps of the failure areas, where there is up to 2 m of vertical drop. There is also a buildup of material at the toe and the slope has reached a flatter angle. Advancement of the failure toward 11th Street East will result in undermining of existing building foundations. Additionally, properties located below 11th Street East may experience damage from debris or additional soil loading as material collects at the toe of the sliding zone. It is expected that there will continue to be slope movement along Cherry Lane as the slope failure progresses, disrupting traffic access and power service along the lane.

10.7.2 Option 2 – Installation of Sub-Drainage System

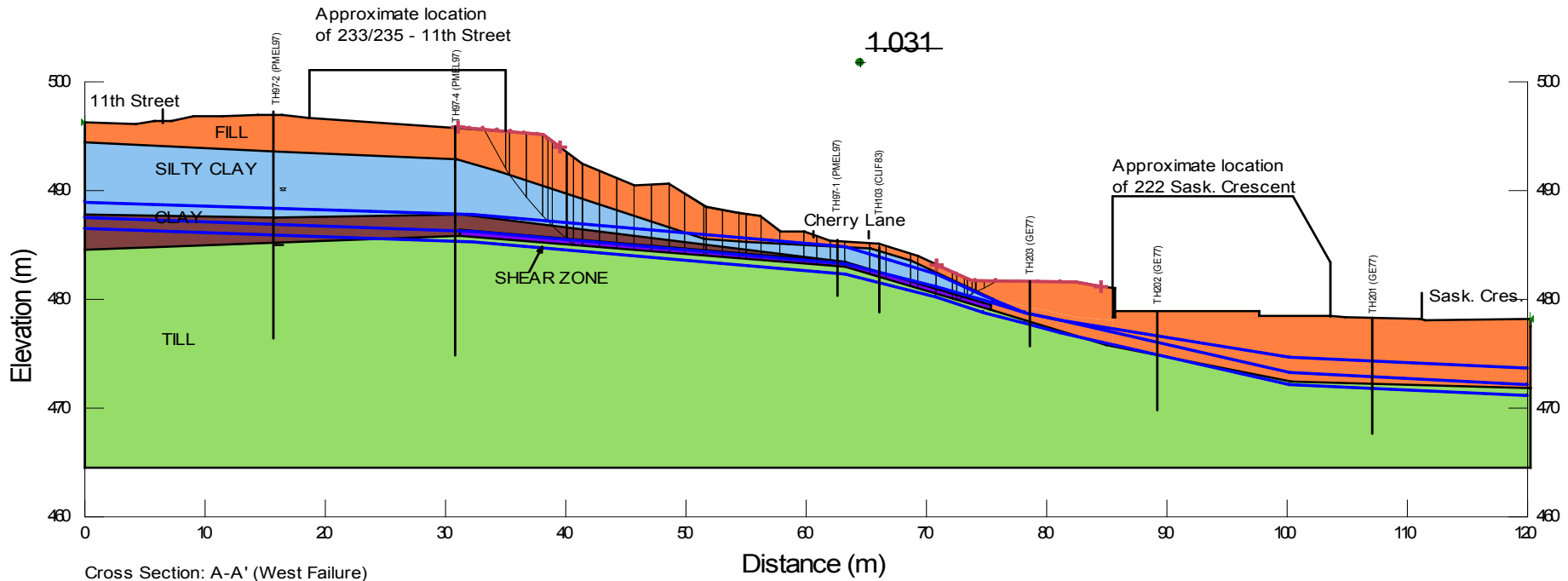
Pore-water pressures in surficial stratified deposits, especially in the highly plastic clay overlying the till, have significant influence on slope stability as indicated by the occurrence of the East and West Failures when groundwater levels were above average in both 2012 and 2013. Installation of sub-drainage system to lower groundwater levels and maintain it at low levels will result in an increase in the factor of safety of the slope and minimize the effect of seasonal and long term groundwater level variation.

Drainage systems installed in 11th Street East can be used to intercept groundwater prior to entering the slope, however the drains will not account for pore-water pressures that are generated from surface infiltration downslope of 11th Street East. A second or alternate drainage system could be installed along Cherry Lane to reduce the pore-water pressures near the middle of the slope. Drainage systems will have to be designed to reduce pore-water pressures over the entire area of potential slope instability to prevent mounding and increased instability between individual locations. Drainage systems would require regular maintenance to ensure that blockages do not occur, and to ensure that the system is effectively draining the slope.

For the slope stability analysis, groundwater conditions where drainage systems were installed along 11th Street East approximately 10 mbgs and along Cherry Lane between 3 mbgs and 8 mbgs were considered. Installation of drainage systems in both locations for the existing slope will be more effective than a single drainage system. For the West Failure (cross-section A-A'), the post-failure pore-water conditions along 11th Street East were already near the clay and till interface, resulting in marginal increase to FS when the level was lowered, however lowering the pore-water pressures along the East Failure (cross-section B-B') resulted in an approximate 20% increase in FS. It should be noted that this increase in slope FOS will not be achieved immediately after the sub-drainage system construction because pore-water pressure in clay slope may take several years to dissipate.

Figure 32 and Figure 33 show the stability analyses for this conceptual remedial option for the West Failure and East Failure, respectively. Installation of a drainage system in 11th Street East will require a minimum length of 135 m and a depth ranging between 8.6 m and 12.5 m. Installation of a drainage system in Cherry Lane will require a length of 135 m at a depth between 3.6 m and 8 m. Detailed design will refine the overall dimensions of this option.

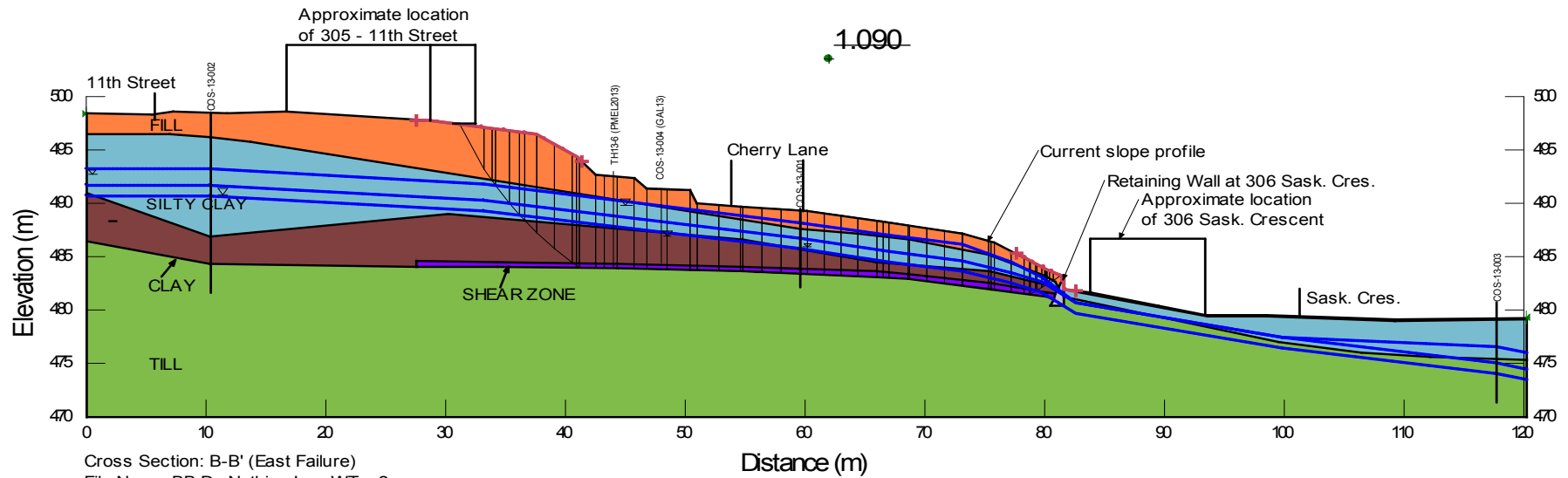
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 Name: Clay Unit Weight: 19 kN/m³ Cohesion: 10 kPa Phi: 22 °
 Name: Shear zone Unit Weight: 19 kN/m³ Cohesion: 0 kPa Phi: 12 °
 Name: Till




Cross Section: A-A' (West Failure)
 File Name: AA Do Nothing Low WT_v2.gsz

		CHERRY LANE SLOPE INSTABILITY	
SLOPE STABILITY ANALYSIS CROSS SECTION A-A' DO NOTHING OPTION WITH LOW WATER TABLE			
	PROJECT	11-1362-0057	FILE No.
	DESIGN	LNLM 08/05/14	SCALE N/A REV.
	CADD		
	CHECK	HQV 08/05/14	
	REVIEW	PGB 08/05/14	FIGURE: 28

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 Name: Shear zone Unit Weight: 19 kN/m³ Cohesion: 0 kPa Phi: 12 °
 Name: Till
 Name: Retaining wall

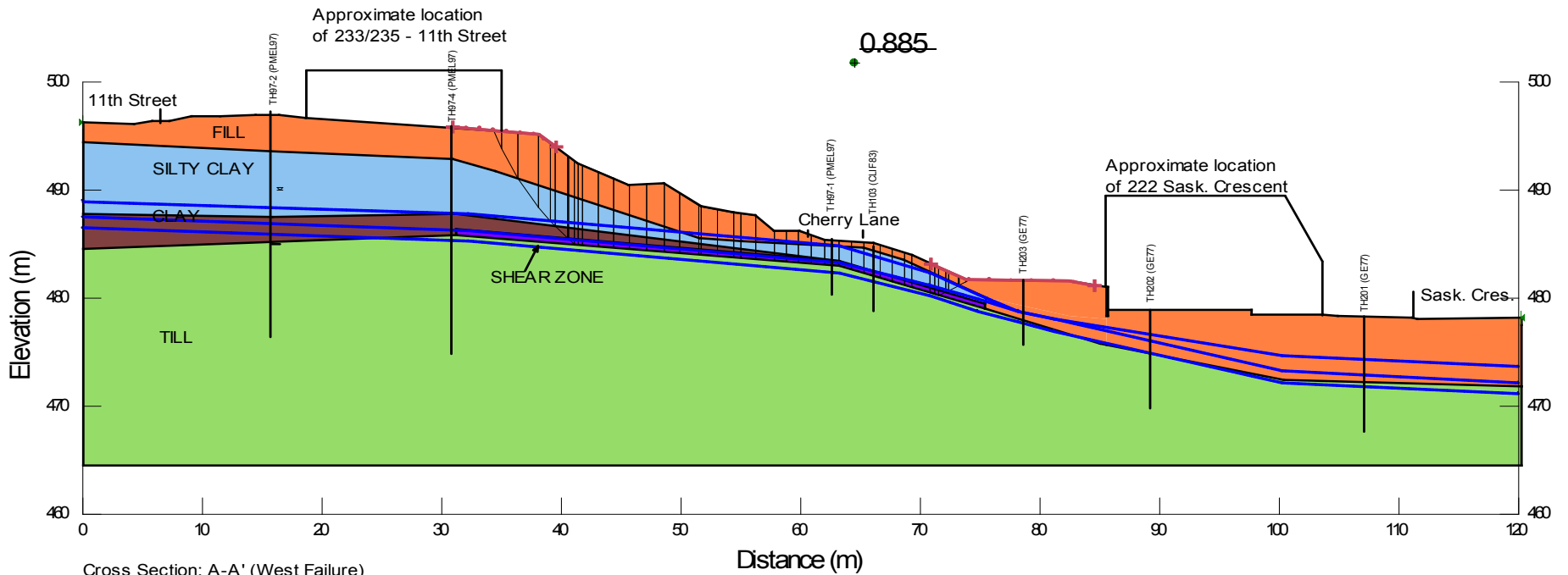


Cross Section: B-B' (East Failure)
 File Name: BB Do Nothing Low WT_v2.gsz

PROJECT		 CHERRY LANE SLOPE INSTABILITY	
TITLE			
SLOPE STABILITY ANALYSIS CROSS SECTION B-B' DO NOTHING OPTION WITH LOW WATER TABLE			
PROJECT		FILE No.	
DESIGN	LNLM 08/05/14	SCALE	N/A REV.
CADD			
CHECK	PGB 08/05/14	FIGURE: 29	
REVIEW	HQV 08/05/14		



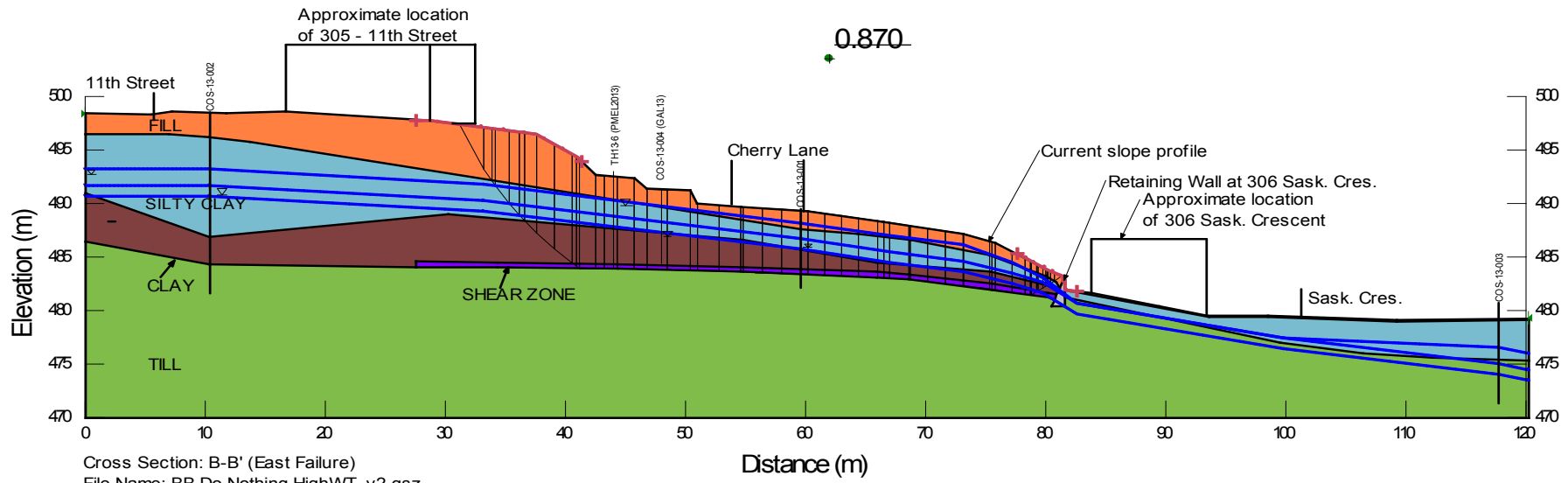
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 Name: Clay Unit Weight: 19 kN/m³ Cohesion: 10 kPa Phi: 22 °
 Name: Shear zone Unit Weight: 19 kN/m³ Cohesion: 0 kPa Phi: 12 °
 Name: Till



Cross Section: A-A' (West Failure)
 File Name: AA Do Nothing HighWT_v2.gsz

		CHERRY LANE SLOPE INSTABILITY	
SLOPE STABILITY ANALYSIS CROSS SECTION A-A' DO NOTHING OPTION WITH HIGH WATER TABLE			
	PROJECT	11-1362-0057	FILE No.
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	CADD	HQV 08/05/14	FIGURE: 30
	CHECK	PGB 08/05/14	

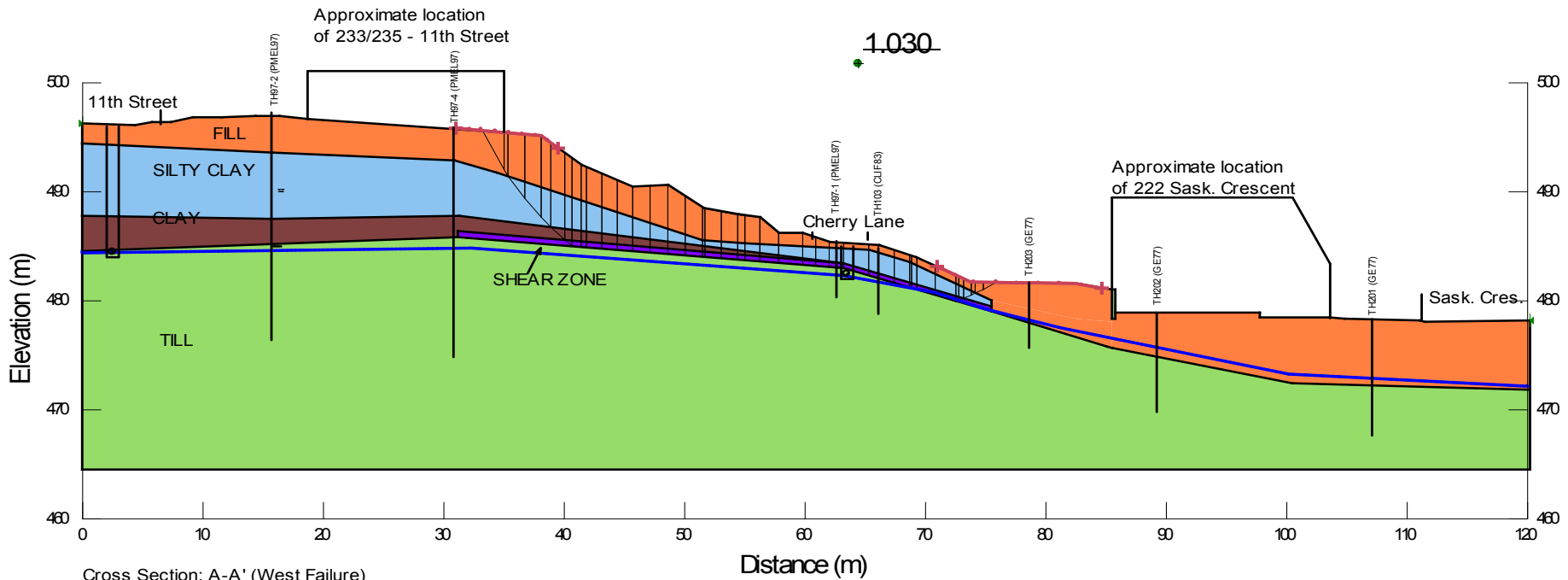
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 Name: Silty Clay Unit Weight: 19 kN/m³ Cohesion: 10 kPa Phi: 25 °
 Name: Clay Unit Weight: 19 kN/m³ Cohesion: 10 kPa Phi: 22 °
 Name: Shear zone Unit Weight: 19 kN/m³ Cohesion: 0 kPa Phi: 12 °
 Name: Till
 Name: Retaining wall



Cross Section: B-B' (East Failure)
File Name: BB Do Nothing HighWT_v2.gsz

		CHERRY LANE SLOPE INSTABILITY	
SLOPE STABILITY ANALYSIS CROSS SECTION B-B' DO NOTHING OPTION WITH HIGH WATER TABLE			
PROJECT	11-1362-0057	FILE No.	
DESIGN	LNLM 08/05/14	SCALE	N/A REV.
CADD			
CHECK	PGB 08/05/14	FIGURE: 31	
REVIEW	HQV 08/05/14		

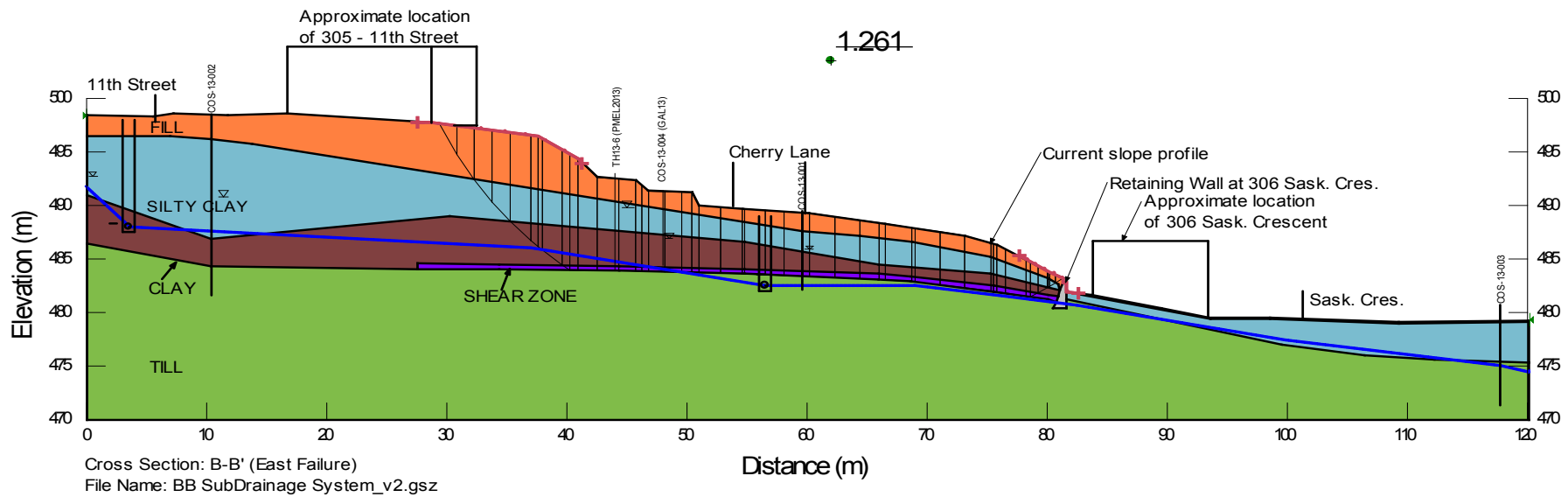
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 Name: Clay Unit Weight: 19 kN/m³ Cohesion: 10 kPa Phi: 22 °
 Name: Shear zone Unit Weight: 19 kN/m³ Cohesion: 0 kPa Phi: 12 °
 Name: Till





Cross Section: A-A' (West Failure)
 File Name: AA SubDrainage System_v2.gsz

		CHERRY LANE SLOPE INSTABILITY	
SLOPE STABILITY ANALYSIS CROSS SECTION A-A' DRAINAGE OPTION			
	PROJECT	11-1362-0057	FILE No.
	DESIGN	LNLM 08/05/14	SCALE N/A REV.
	CADD	HQV 08/05/14	FIGURE: 32
	CHECK	PGB 08/05/14	

Name: Fill Unit Weight: 19 kN/m³ Cohesion: 5 kPa Phi: 22 °
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 Name: Clay Unit Weight: 19 kN/m³ Cohesion: 10 kPa Phi: 22 °
 Name: Shear zone Unit Weight: 19 kN/m³ Cohesion: 0 kPa Phi: 12 °
 Name: Till
 Name: Retaining wall



PROJECT		 City of Saskatoon		CHERRY LANE SLOPE INSTABILITY	
TITLE					
SLOPE STABILITY ANALYSIS CROSS SECTION B-B' DRAINAGE OPTION					
PROJECT		11-1362-0057		FILE No.	
DESIGN	LNLM	08/05/14	SCALE	N/A	REV.
CADD					
CHECK	PGB	08/05/14			
REVIEW	HQV	08/05/14			
 Golder Associates Saskatoon, Saskatchewan				FIGURE: 33	



Installation of a sub-drainage system would require disturbance to roadways (11th Street East and Cherry Lane) and underground utilities in the area, but would result in only localized disturbance to the residences in this area and pose little additional risk for slope instability during construction. Construction of the drainage outlet would require connection to the sewer system or construction of a new drainage outlet downslope.

10.7.3 Option 3 – Site Re-grading

Site re-grading (e.g., slope flattening) reduces material weight at the top of the slope and, in some cases, increases weight at the toe of the slope; therefore improves the slope stability condition.

Review of the upper slope topography shows that the current slope has an average slope of 2.5H:1V along cross-section A-A' (West Failure), and 1.9H:1V along cross-section B-B' (East Failure).

Slope stability analyses for cross-section A-A' and B-B' were conducted to determine the required level of slope flattening (conceptual slope geometry) of the site to obtain a minimum FS = 1.5, as shown in Table 12. It is assumed that installation of a drainage system along Cherry Lane will be required in conjunction with the slope re-grading in order to maintain pore-water pressures at or below the till contact.

Table 12: Average Slope Gradient for Conceptual Option 3 – Re-grading

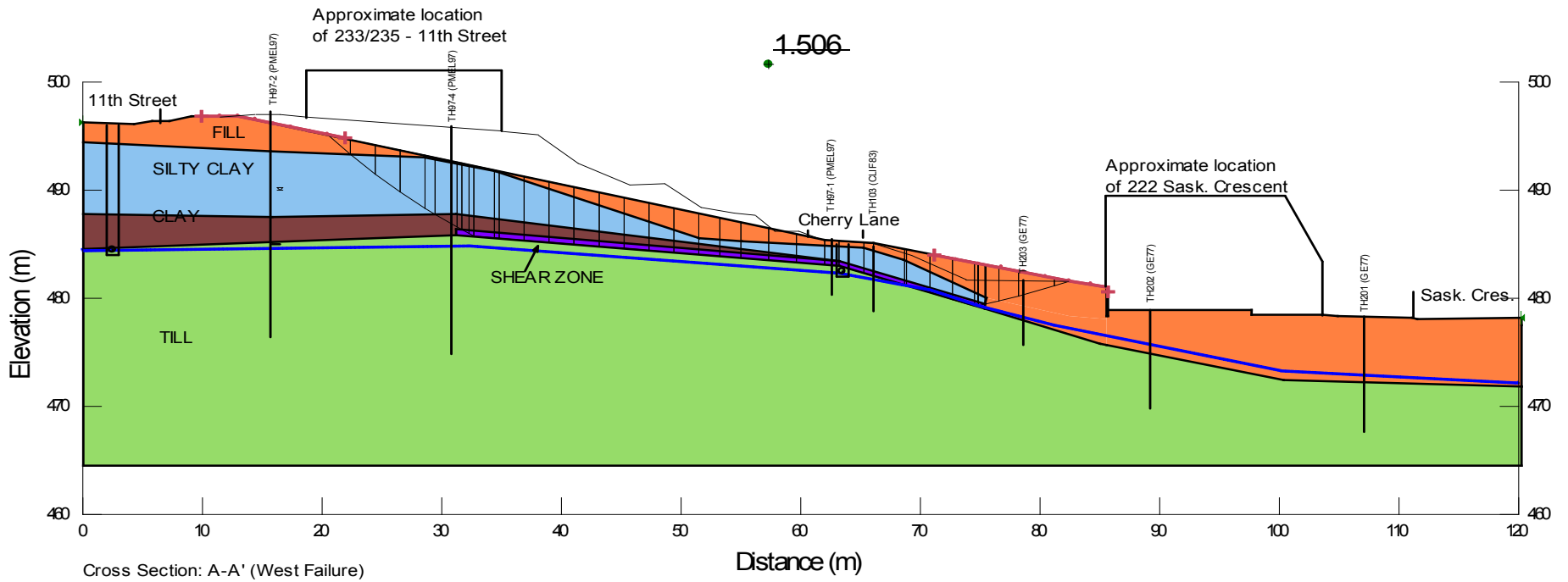
Cross Section	Average Slope Gradient	
	Upper Slope	Lower Slope
West Failure	4.4H:1V	4.8H:1V
East Failure	3.9H:1V	2.5H:1V

Figure 34 and Figure 35 show the stability analyses for this conceptual remedial slope flattening option. Figure 36 shows the plan view of the estimated extents of slope re-grading required to re-establish the slope to a minimum FS = 1.5. The approximate dimension of the conceptual slope re-grading is an area approximately 135 m long by 17 m to 67 m wide. Detailed design will refine the overall dimensions of this option.

Implementation of this option will cause significant disruption to residences along 11th Street East and Saskatchewan Crescent East, as well as the above ground power lines and landscaping in the area. Site access will be limited and large volumes of fill and debris will need to be hauled from site. Access to 11th Street East and Cherry Lane will be restricted during construction, but should not be affected in the long term.

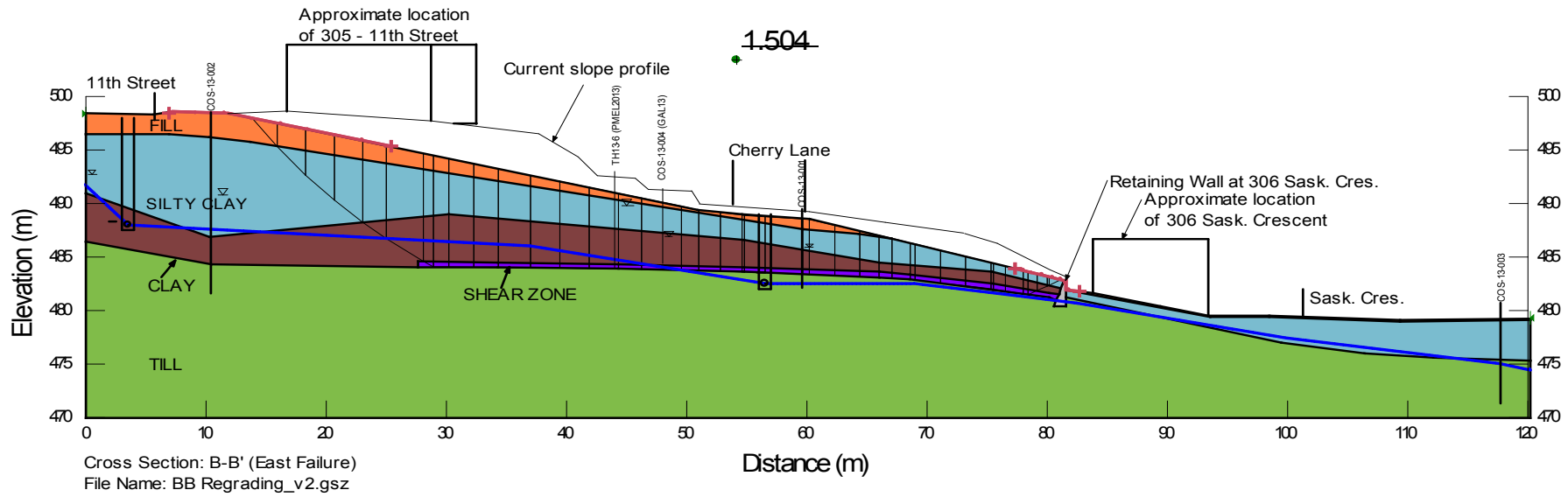
Installation of a drainage system will be required along 11th Street East and Cherry Lane in order to maintain long term stability of the slope with this option.

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 Name: Silty Clay Unit Weight: 19 kN/m³ Cohesion: 10 kPa Phi: 25 °
 Name: Clay Unit Weight: 19 kN/m³ Cohesion: 10 kPa Phi: 22 °
 Name: Shear zone Unit Weight: 19 kN/m³ Cohesion: 0 kPa Phi: 12 °
 Name: Till



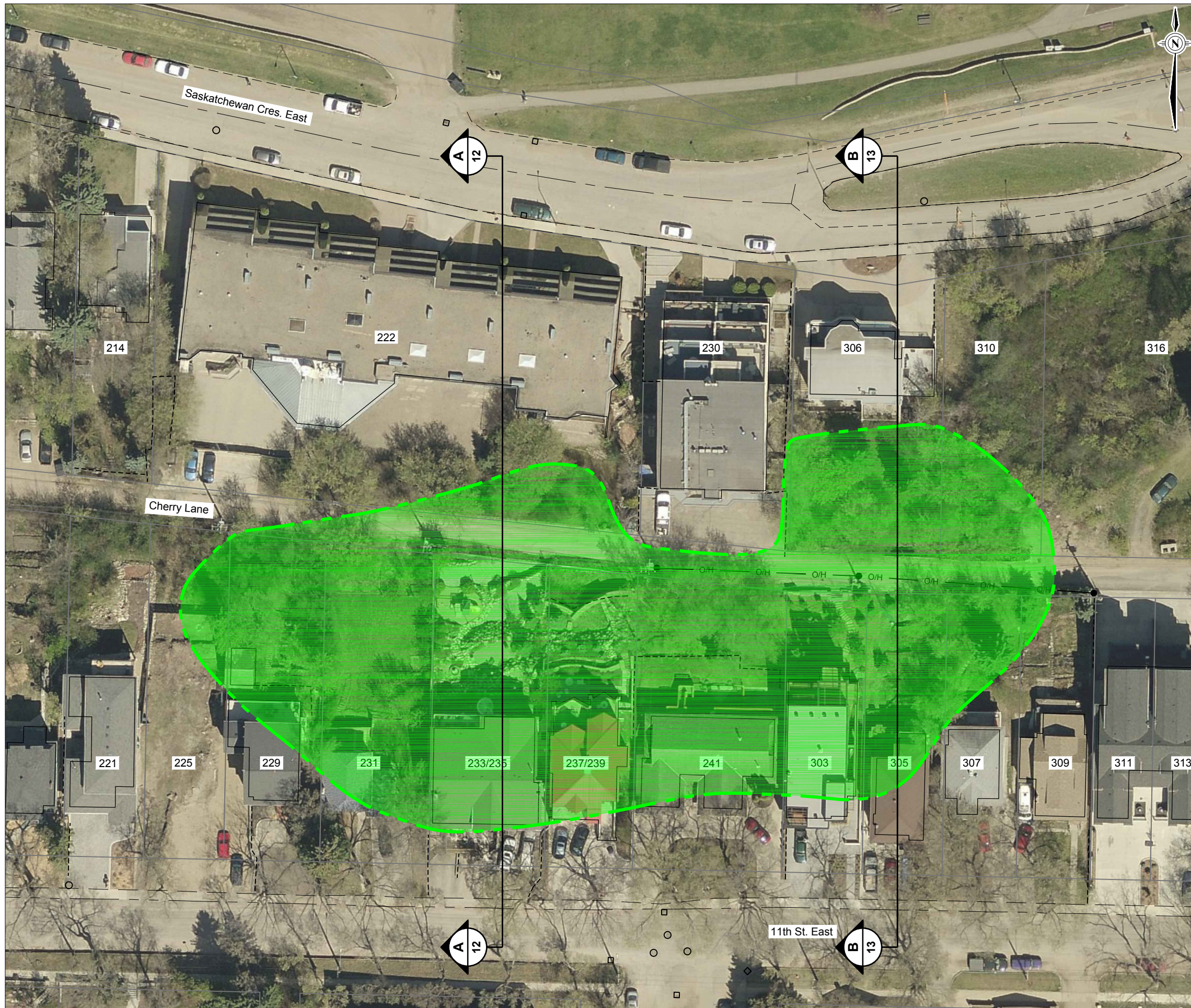
		CHERRY LANE SLOPE INSTABILITY	
SLOPE STABILITY ANALYSIS CROSS SECTION A-A' SITE REGRADING OPTION			
	PROJECT	11-1362-0057	FILE No.
	DESIGN	LNLM 08/05/14	SCALE N/A REV.
	CADD	HQV 08/05/14	FIGURE: 34
	CHECK	HQV 08/05/14	
REVIEW	PGB 08/05/14		

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 Name: Silty Clay Unit Weight: 19 kN/m³ Cohesion: 10 kPa Phi: 25 °
 Name: Clay Unit Weight: 19 kN/m³ Cohesion: 10 kPa Phi: 22 °
 Name: Shear zone Unit Weight: 19 kN/m³ Cohesion: 0 kPa Phi: 12 °
 Name: Till
 Name: Retaining wall



		CHERRY LANE SLOPE INSTABILITY		
SLOPE STABILITY ANALYSIS CROSS SECTION B-B' SITE REGRADING OPTION				
	PROJECT	11-1362-0057		FILE No.
	DESIGN	LNLM	08/05/14	SCALE N/A
	CADD			REV.
	CHECK	PGB	08/05/14	FIGURE: 35
REVIEW	HQV	08/05/14		

G:\2011\136211-1362-0057 COS East Riverbank\Figures\Phase 5100 Cherry Lane Remediation\Task 700011-1362-0057 Remedial Options.dwg 5/2/2014 2:50 PM



LEGEND

- POWER POLE
- CATCH BASIN
- MANHOLE
- O/H — OVERHEAD POWER LINE
- 303 LOT NUMBER

REFERENCE
 AERIAL PHOTOGRAPH PROVIDED BY CITY OF SASKATOON, MAY 15, 2011
 CITY OF SASKATOON DATUM



PROJECT 	CHERRY LANE SLOPE INSTABILITY																				
TITLE CONCEPTUAL AREA AFFECTED BY SITE RE-GRADING																					
	<table border="1" style="width: 100%; border-collapse: collapse; font-size: 8px;"> <tr> <td>PROJECT</td> <td>11-1326-0057</td> <td>FILE No.</td> <td></td> </tr> <tr> <td>DESIGN</td> <td>LM 08/05/14</td> <td>SCALE</td> <td>AS SHOWN REV. 0</td> </tr> <tr> <td>CADD</td> <td>BDS/JDS 08/05/14</td> <td></td> <td></td> </tr> <tr> <td>CHECK</td> <td>HV 08/05/14</td> <td></td> <td></td> </tr> <tr> <td>REVIEW</td> <td>PGB 08/05/14</td> <td></td> <td></td> </tr> </table> <p style="text-align: right; font-weight: bold; font-size: 12px;">FIGURE: 36</p>	PROJECT	11-1326-0057	FILE No.		DESIGN	LM 08/05/14	SCALE	AS SHOWN REV. 0	CADD	BDS/JDS 08/05/14			CHECK	HV 08/05/14			REVIEW	PGB 08/05/14		
PROJECT	11-1326-0057	FILE No.																			
DESIGN	LM 08/05/14	SCALE	AS SHOWN REV. 0																		
CADD	BDS/JDS 08/05/14																				
CHECK	HV 08/05/14																				
REVIEW	PGB 08/05/14																				



10.7.4 Option 4 – Shear Zone Modification

Shear zone modification, such as the installation of shear key, stone column, concrete or steel piles, or using a cutter soil mixing (CSM) method, can be undertaken to improve the shear strength of the shear zone, thus improving slope stability conditions.

Slope stability analyses were conducted to evaluate the extent of the shear zone modification required to obtain a minimum FS = 1.5, as shown in Table 13. A material with an equivalent 30 degree effective friction angle and zero cohesion was assumed for the modified shear zone area. It is assumed that a dewatering system has been installed upslope of the shear zone modification in order to maintain the pore-water pressures at or below the till contact.

Table 13: Shear Zone Modification Dimensions for Conceptual Option 4

Cross Section	Shear Zone Dimensions		Comments
	Width (m)	Depth (mbgs)	
West Failure	13	7	Modification in Cherry Lane extending up and down slope
East Failure	4	7	Modification in Cherry Lane

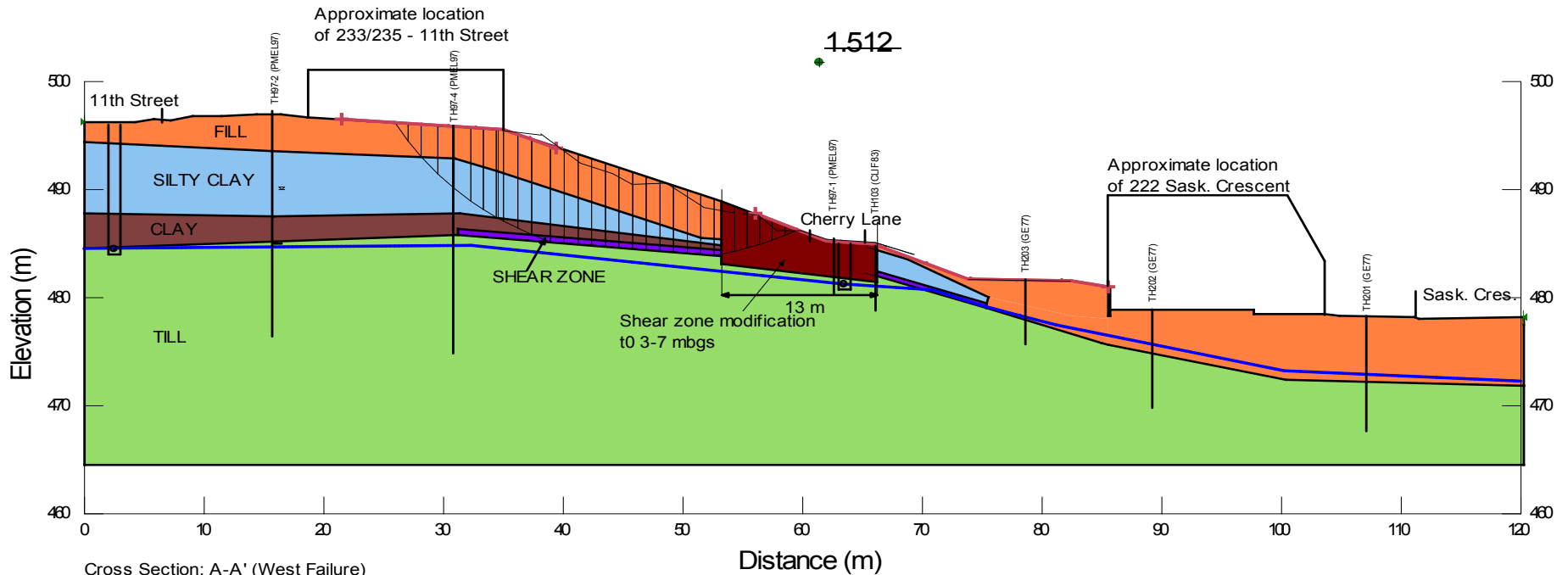
m = metre; mbgs = metres below ground surface

Figure 37 and Figure 38 show the stability analyses for this conceptual remedial option. Figure 39 shows the plan view of the estimated extent of shear zone modification required along Cherry Lane to achieve a minimum FS = 1.5. The approximate extent of the conceptual shear zone modification area is approximately 120 m long and 4 to 13 m wide. Detailed design will refine the overall dimensions of this option.

Implementation of this option will cause significant disruption to access and services along Cherry Lane, as well as the backyards of the residences along 11th Street East. Due to the unstable nature of this slope, the use of an open excavation method would not be acceptable. Construction methods where limited excavation is necessary would be required, such as stone columns, *in situ* cutter soil mixing, etc. Site access will be limited and large volumes of fill and debris will need to be hauled from site. Access to Cherry Lane will be restricted during construction.

Installation of a drainage system will be required along 11th Street East and Cherry Lane in order to maintain long term stability of the slope with this option.

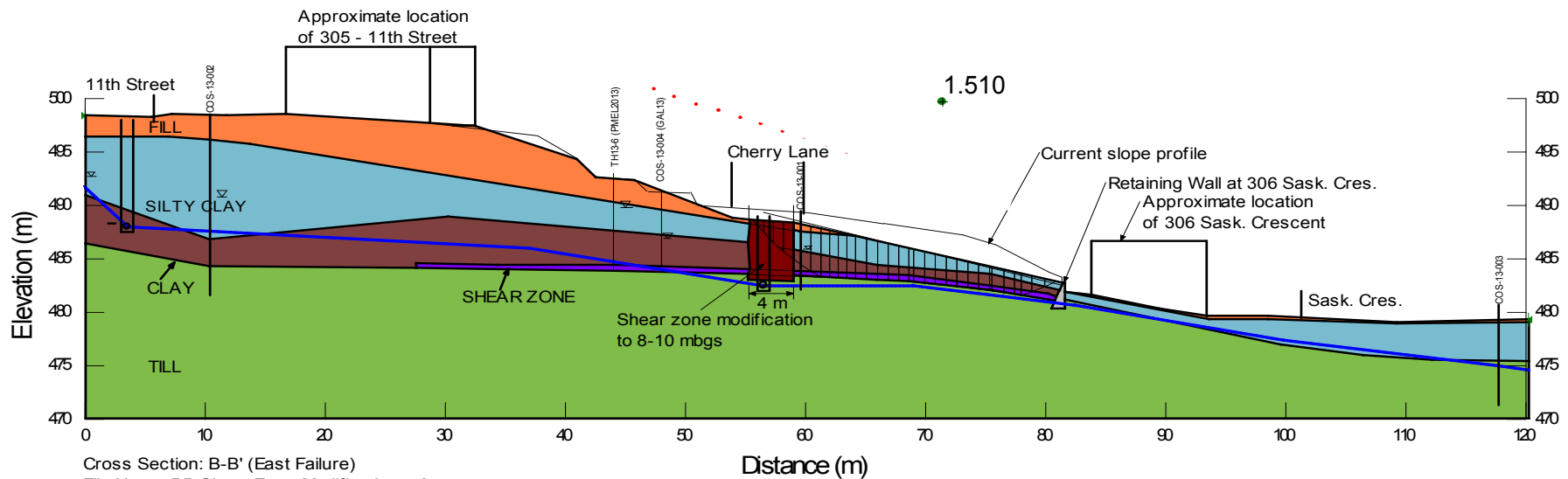
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 Name: Shear zone Unit Weight: 19 kN/m³ Cohesion: 0 kPa Phi: 12 °
 Name: Till
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Cross Section: A-A' (West Failure)
 File Name: AA Shear Zone Modification_v2.gsz

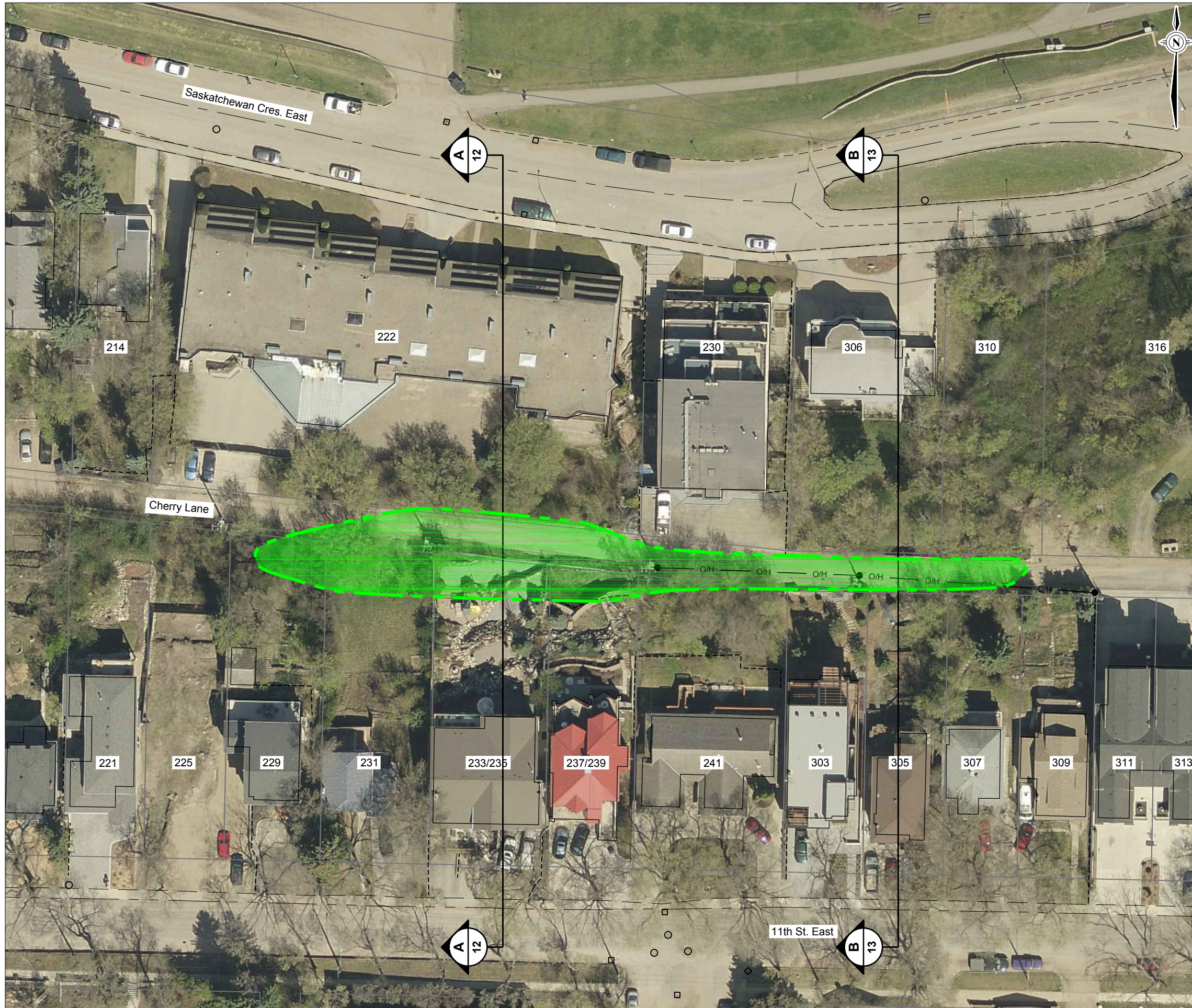
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SLOPE STABILITY ANALYSIS CROSS SECTION A-A' SHEAR ZONE MODIFICATION OPTION			
	PROJECT	11-1362-0057	FILE No.
	DESIGN	LNLM 08/05/14	SCALE N/A REV.
	CADD		
	CHECK	HQV 08/05/14	FIGURE: 37
REVIEW	PGB 08/05/14		

Name: Fill Unit Weight: 19 kN/m³ Cohesion: 5 kPa Phi: 22 °
 Name: Silty Clay Unit Weight: 19 kN/m³ Cohesion: 10 kPa Phi: 25 °
 Name: Clay Unit Weight: 19 kN/m³ Cohesion: 10 kPa Phi: 22 °
 Name: Shear zone Unit Weight: 19 kN/m³ Cohesion: 0 kPa Phi: 12 °
 Name: Till
 Name: Shear zone modification Unit Weight: 20 kN/m³ Cohesion: 0 kPa Phi: 30 °
 Name: Retaining wall



Cross Section: B-B' (East Failure)
 File Name: BB Shear Zone Modification_v2.gsz

PROJECT		 CHERRY LANE SLOPE INSTABILITY	
TITLE			
SLOPE STABILITY ANALYSIS CROSS SECTION B-B' SHEAR ZONE MODIFICATION OPTION			
PROJECT		FILE No.	
DESIGN	LNLM 08/05/14	SCALE	N/A REV.
CADD			
CHECK	PGB 08/05/14	FIGURE: 38	
REVIEW	HQV 08/05/14		
 Golder Associates Saskatoon, Saskatchewan			



LEGEND

- POWER POLE
- CATCH BASIN
- MANHOLE
- O/H — OVERHEAD POWER LINE
- 303 LOT NUMBER

REFERENCE

AERIAL PHOTOGRAPH PROVIDED BY CITY OF SASKATOON, MAY 15, 2011
CITY OF SASKATOON DATUM



City of Saskatoon		CHERRY LANE SLOPE INSTABILITY	
TITLE CONCEPTUAL AREA AFFECTED BY SHEAR ZONE MODIFICATION			
Golder Associates <small>Saskatoon, Saskatchewan</small>		PROJECT 11-1326-0057 DESIGN LM 08/05/14 CADD BDS/JDS 08/05/14 CHECK HV 08/05/14 REVIEW PGB 08/05/14	FILE No. SCALE AS SHOWN REV. 0
			FIGURE: 39



11.0 SUMMARY

The slope failures along Cherry Lane are most likely the result of a combination of the natural geology of the soils along the riverbank, the heavy and prolonged precipitation in the spring of 2012 and 2013 that resulted in increased groundwater levels, and changes to the geometry and landscaping of the slope. As such, this section of the riverbank is at a high risk of continuing slope failure. Action should be taken to reduce the risk to the public, infrastructure, and property in the area.

Conceptual slope remediation options were developed for the Site. Table 14 provides a summary of cost estimates, risks, and benefits associated with each of the conceptual options.

The conceptual cost estimate, shown in Table 14, was prepared by comparing the conceptual remedial options to similar projects conducted in and around the City of Saskatoon and scaling the costs to suit the estimated size and scope of the remedial option. A contingency of 50% has been added to the estimated costs to account for variations that will be generated from a more detailed analysis of the conceptual options. Similar projects include: shear key construction at Cosmopolitan Park in 2011, lightweight fill placement at 17th Street and Saskatchewan Crescent in 2013; and typical rates for CSM construction provided by Golder Construction. Costs associated with contractor mobilization, engineering design and support, and construction monitoring have been included. A more detailed breakdown of the costs for the conceptual estimates is provided in Appendix H.

It is recommended that shear zone modification with the installation of a sub-drainage system be considered as a remedial option for the properties affected by the slope movement at the Site. While the conceptual cost of the shear zone modification with drainage option is higher than the other options considered, this option will result in the least permanent disturbance to the surrounding properties, depending on the specific method of shear zone modification selected, and will achieve the required factor of safety for the remedial slope. Additionally, depending on the method selected, the majority of the remedial work can be confined to the area surrounding Cherry Lane, increasing accessibility for construction.



CHERRY LANE GEOTECHNICAL INVESTIGATION AND EVALUATION

Table 14: Risk/Benefit Summary of Conceptual Remediation Options

Conceptual Remediation Option	Estimated Cost ^(a)	Benefit/Advantage	Risk/Disadvantage
Option 1 – Do nothing	<\$500,000	<ul style="list-style-type: none"> ■ Low cost 	<ul style="list-style-type: none"> ■ High risk of continued failure, additional sloughing of the material at the scarps of the failure areas, and for buildup of material at the toe until the slope has reached a flatter angle. ■ Failure likely to retrogress toward 11th Street East may affect building foundations along 11th Street East, and may cause movement of the structures. ■ Properties located below 11th Street East may experience damage from debris or additional soil loading as material collects at the toe of the failure. ■ Ongoing cracking and movement along Cherry Lane as the slope movement progress, disrupting traffic access and power service along the lane.
Option 2 – Installation of Sub- Drainage System	\$4,500,000	<ul style="list-style-type: none"> ■ The FS for the slope increases for the existing failure areas. ■ Decreasing and maintaining the pore-water pressures along the slope will decrease the risk of additional slope movement during high precipitation years. ■ Little additional risk for slope instability during construction. ■ Only localized disturbance to the residences in this area. 	<ul style="list-style-type: none"> ■ Does not improve the Factor of Safety for the slope to target 1.5. ■ It may take several years for the remediation to be effective because dissipation of pore-water pressure in clay takes time. ■ Installation of a drainage system will require disturbance to roadways (11th Street East and Cherry Lane) and underground utilities in the area. ■ Construction of the drainage outlet would require connection to the sewer system or construction of a new drainage outlet downslope which will affect properties along Saskatchewan Crescent East. ■ Cross drains connecting between 11th Street East and Cherry Lane may require some disturbance in the yards of the residences on the 200 to 300 block of 11th Street East. ■ Long term maintenance and monitoring of the drainage system is required.
Option 3- Slope Re-grading and Installation of Sub-Drainage System	\$6,500,000	<ul style="list-style-type: none"> ■ Target Factor of Safety of 1.5 for the slope in this area is achievable. ■ Reduced risk of shallow failures in the upper slope due to the flatter grade. ■ Decreasing and maintaining the pore-water pressures along the slope will decrease the risk of additional slope movement during high precipitation years. ■ Access to 11th Street East and Cherry Lane should not be affected in the long term. 	<ul style="list-style-type: none"> ■ Construction will cause significant disruption to residences along 11th Street East and Saskatchewan Crescent East, as well as the above ground power lines and landscaping in the area. ■ Site access will be limited and large volumes of fill and debris will need to be hauled from site. ■ Access to 11th Street East and Cherry Lane will be restricted during construction. ■ Installation of a drainage system will require disturbance to roadways (11th Street East and Cherry Lane) and underground utilities in the area. ■ Construction of the drainage outlet would require connection to the sewer system or construction of a new drainage outlet downslope which will affect properties along Saskatchewan Crescent East. ■ Cross drains connecting between 11th Street East and Cherry Lane may require some disturbance in the yards of the residences on the 200 to 300 block of 11th Street East. ■ Long term maintenance and monitoring of the drainage system is required.
Option 4 - Shear Zone Modification and Installation of Sub- Drainage System	\$10,500,000	<ul style="list-style-type: none"> ■ Target Factor of Safety of 1.5 for the slope in this area is achievable. ■ Majority of work can be confined to Cherry Lane, resulting in less disruption to residences along 11th Street East and Saskatchewan Crescent East. ■ Decreasing and maintaining the pore-water pressures along the slope will decrease the risk of additional slope movement during high precipitation years. ■ Access to 11th Street East and Cherry Lane should not be affected in the long term. 	<ul style="list-style-type: none"> ■ Construction will cause significant disruption to Cherry Lane and the backyards and power line along Cherry Lane. ■ Temporary slope stabilization methods will need to be installed above Cherry Lane to reduce the risk of instability during construction. ■ Access to 11th Street East and Cherry Lane will be restricted during construction. ■ Installation of a drainage system will require disturbance to roadways (11th Street East and Cherry Lane) and underground utilities in the area. ■ Construction of the drainage outlet would require connection to the sewer system or construction of a new drainage outlet downslope which will affect properties along Saskatchewan Crescent East. ■ Cross drains connecting between 11th Street East and Cherry Lane may require some disturbance in the yards of the residences on the 200 to 300 block of 11th Street East. ■ Long term maintenance and monitoring of the drainage system is required.

^(a) Costs for alterations to existing properties, including removal of debris and landscaping, removal of structures, property purchase, and changes to existing utilities have not been considered in this estimate. Costs have been rounded to the nearest \$500,000.



12.0 CLOSURE

The findings of this report are based upon the results of field and laboratory investigations conducted by Golder. If conditions encountered at the surface or at depth during construction appear to be different than indicated in the report, or if the stated assumptions are not consistent with design, this office should be notified for review and adjustment of recommendations, if necessary.

Soil conditions are, by nature, are highly variable across a construction site. The placement of fill and prior construction activities can contribute to variables in the near-surface conditions. A contingency should be included in any construction budget to allow for the possibility of variation of soil conditions that may result in modification of design and construction procedures.

This report was prepared for the City of Saskatoon for the proposed works described in the text. The data and recommendations should not be used for any other purpose, or by any other parties, without written consent from Golder Associates Ltd. The findings and recommendations of this report were prepared in accordance with generally accepted professional engineering principles and practice. No other warranty, expressed or implied, is given.



Report Signature Page

GOLDER ASSOCIATES LTD.



Laurie McEachern

Laurie McEachern, B.Sc.
Engineer in Training



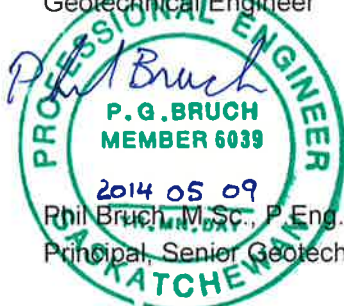
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LDN/GAM/HV/PB/DF/jlb/pls

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Association of Professional Engineers & Geoscientists of Saskatchewan		
CERTIFICATE OF AUTHORIZATION		
Golder Associates Ltd.		
Number C0230		
Permission to Consult held by:		
Discipline	Sk. Reg. No.	Signature
<i>Geotechnical</i>	<i>12797</i>	<i>[Signature]</i>



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APPENDIX A

Information and Limitations of this Report

IMPORTANT INFORMATION AND LIMITATIONS OF THIS REPORT

Standard of Care: Golder Associates Ltd. (Golder) has prepared this report in a manner consistent with that level of care and skill ordinarily exercised by members of the engineering and science professions currently practising under similar conditions in the jurisdiction in which the services are provided, subject to the time limits and physical constraints applicable to this report. No other warranty, expressed or implied is made.

Basis and Use of the Report: This report has been prepared for the specific site, design objective, development and purpose described to Golder by the Client. The factual data, interpretations and recommendations pertain to a specific project as described in this report and are not applicable to any other project or site location. Any change of site conditions, purpose, development plans or if the project is not initiated within eighteen months of the date of the report may alter the validity of the report. Golder can not be responsible for use of this report, or portions thereof, unless Golder is requested to review and, if necessary, revise the report.

The information, recommendations and opinions expressed in this report are for the sole benefit of the Client. No other party may use or rely on this report or any portion thereof without Golder's express written consent. If the report was prepared to be included for a specific permit application process, then upon the reasonable request of the client, Golder may authorize in writing the use of this report by the regulatory agency as an Approved User for the specific and identified purpose of the applicable permit review process. Any other use of this report by others is prohibited and is without responsibility to Golder. The report, all plans, data, drawings and other documents as well as all electronic media prepared by Golder are considered its professional work product and shall remain the copyright property of Golder, who authorizes only the Client and Approved Users to make copies of the report, but only in such quantities as are reasonably necessary for the use of the report by those parties. The Client and Approved Users may not give, lend, sell, or otherwise make available the report or any portion thereof to any other party without the express written permission of Golder. The Client acknowledges that electronic media is susceptible to unauthorized modification, deterioration and incompatibility and therefore the Client can not rely upon the electronic media versions of Golder's report or other work products.

The report is of a summary nature and is not intended to stand alone without reference to the instructions given to Golder by the Client, communications between Golder and the Client, and to any other reports prepared by Golder for the Client relative to the specific site described in the report. In order to properly understand the suggestions, recommendations and opinions expressed in this report, reference must be made to the whole of the report. Golder can not be responsible for use of portions of the report without reference to the entire report.

Unless otherwise stated, the suggestions, recommendations and opinions given in this report are intended only for the guidance of the Client in the design of the specific project. The extent and detail of investigations, including the number of test holes, necessary to determine all of the relevant conditions which may affect construction costs would normally be greater than has been carried out for design purposes. Contractors bidding on, or undertaking the work, should rely on their own investigations, as well as their own interpretations of the factual data presented in the report, as to how subsurface conditions may affect their work, including but not limited to proposed construction techniques, schedule, safety and equipment capabilities.

Soil, Rock and Groundwater Conditions: Classification and identification of soils, rocks, and geologic units have been based on commonly accepted methods employed in the practice of geotechnical engineering and related disciplines. Classification and identification of the type and condition of these materials or units involves judgment, and boundaries between different soil, rock or geologic types or units may be transitional rather than abrupt. Accordingly, Golder does not warrant or guarantee the exactness of the descriptions.

IMPORTANT INFORMATION AND LIMITATIONS OF THIS REPORT (cont'd)

Special risks occur whenever engineering or related disciplines are applied to identify subsurface conditions and even a comprehensive investigation, sampling and testing program may fail to detect all or certain subsurface conditions. The environmental, geologic, geotechnical, geochemical and hydrogeologic conditions that Golder interprets to exist between and beyond sampling points may differ from those that actually exist. In addition to soil variability, fill of variable physical and chemical composition can be present over portions of the site or on adjacent properties. **The professional services retained for this project include only the geotechnical aspects of the subsurface conditions at the site, unless otherwise specifically stated and identified in the report.** The presence or implication(s) of possible surface and/or subsurface contamination resulting from previous activities or uses of the site and/or resulting from the introduction onto the site of materials from off-site sources are outside the terms of reference for this project and have not been investigated or addressed.

Soil and groundwater conditions shown in the factual data and described in the report are the observed conditions at the time of their determination or measurement. Unless otherwise noted, those conditions form the basis of the recommendations in the report. Groundwater conditions may vary between and beyond reported locations and can be affected by annual, seasonal and meteorological conditions. The condition of the soil, rock and groundwater may be significantly altered by construction activities (traffic, excavation, groundwater level lowering, pile driving, blasting, etc.) on the site or on adjacent sites. Excavation may expose the soils to changes due to wetting, drying or frost. Unless otherwise indicated the soil must be protected from these changes during construction.

Sample Disposal: Golder will dispose of all uncontaminated soil and/or rock samples 90 days following issue of this report or, upon written request of the Client, will store uncontaminated samples and materials at the Client's expense. In the event that actual contaminated soils, fills or groundwater are encountered or are inferred to be present, all contaminated samples shall remain the property and responsibility of the Client for proper disposal.

Follow-Up and Construction Services: All details of the design were not known at the time of submission of Golder's report. Golder should be retained to review the final design, project plans and documents prior to construction, to confirm that they are consistent with the intent of Golder's report.

During construction, Golder should be retained to perform sufficient and timely observations of encountered conditions to confirm and document that the subsurface conditions do not materially differ from those interpreted conditions considered in the preparation of Golder's report and to confirm and document that construction activities do not adversely affect the suggestions, recommendations and opinions contained in Golder's report. Adequate field review, observation and testing during construction are necessary for Golder to be able to provide letters of assurance, in accordance with the requirements of many regulatory authorities. In cases where this recommendation is not followed, Golder's responsibility is limited to interpreting accurately the information encountered at the borehole locations, at the time of their initial determination or measurement during the preparation of the Report.

Changed Conditions and Drainage: Where conditions encountered at the site differ significantly from those anticipated in this report, either due to natural variability of subsurface conditions or construction activities, it is a condition of this report that Golder be notified of any changes and be provided with an opportunity to review or revise the recommendations within this report. Recognition of changed soil and rock conditions requires experience and it is recommended that Golder be employed to visit the site with sufficient frequency to detect if conditions have changed significantly.

Drainage of subsurface water is commonly required either for temporary or permanent installations for the project. Improper design or construction of drainage or dewatering can have serious consequences. Golder takes no responsibility for the effects of drainage unless specifically involved in the detailed design and construction monitoring of the system.



APPENDIX B

Aerial Photographs



APPENDIX B
Aerial Photographs



Figure B.1. Aerial Photograph, 1939



Figure B.2. Aerial Photograph, 1958



APPENDIX B
Aerial Photographs



Figure B.3. Aerial Photograph, 1961



Figure B.4. Aerial Photograph, 1970



APPENDIX B
Aerial Photographs



Figure B.5. Aerial Photograph, 1974



Figure B.6. Aerial Photograph, 1977



APPENDIX B
Aerial Photographs



Figure B.7. Aerial Photograph, 1987



Figure B.8. Aerial Photograph, 1997



APPENDIX B
Aerial Photographs



Figure B.9. Aerial Photograph, 2001

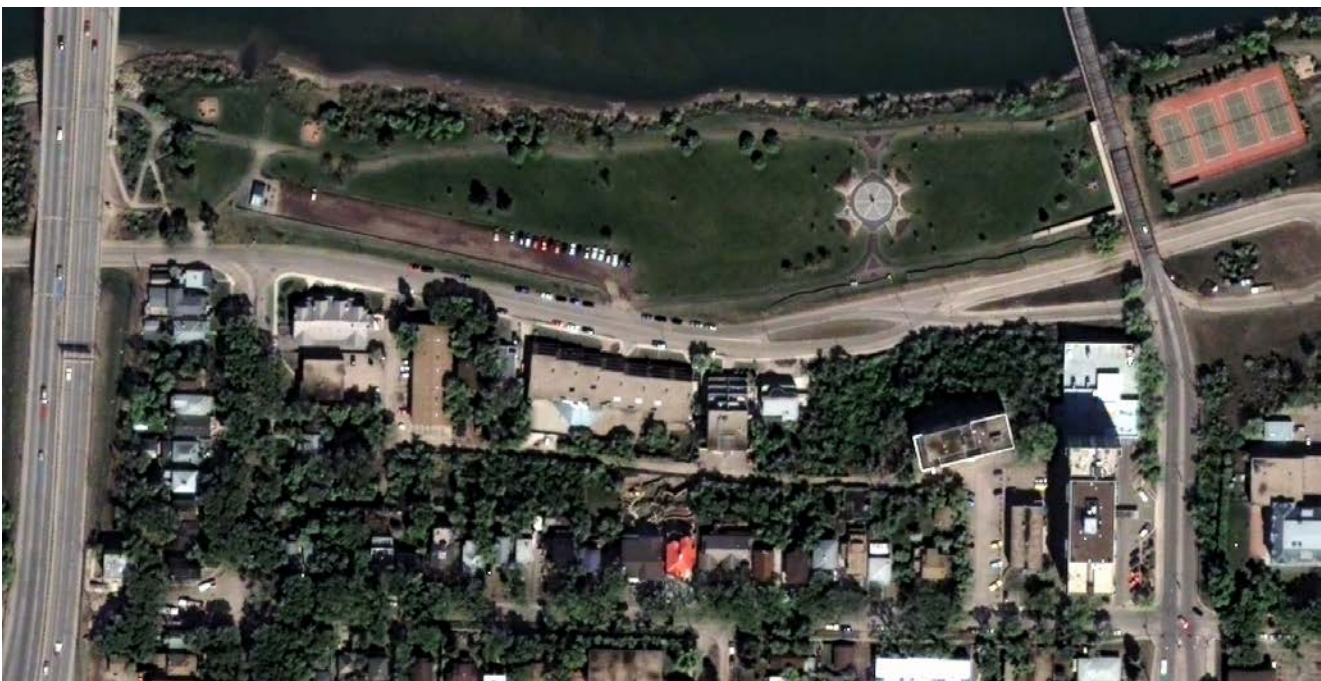


Figure B.10. Aerial Photograph, 2006



APPENDIX B
Aerial Photographs



Figure B.11. Aerial Photograph, 2011



APPENDIX C

Field Inspection Photographs



Photo C.1. Looking East at Deflection of Curb and Fence Line along Cherry Lane (Nov 5, 2006)



Photo C.2. Looking East at Deflection of Curb and Fence Line along Cherry Lane (May 27, 2010)



Photo C.3. Looking East at Deflection of Curb and Fence Line along Cherry Lane (April 26, 2012)



Photo C.4. Looking West at Toe of Upper Slope (April 26, 2012)



Photo C.5. Headscarp in the Backyard of 233-235 11th St. E. (June 21, 2012)



Photo C.6. Bulging Toe of Slide on Cherry Lane (June 21, 2012)



Photo C.7. Bulging Toe of Slide below Cherry Lane (June 21, 2012)



Photo C.8. Cracking Behind Retaining Wall in Backyard of 237-239 11th St. E. (June 21, 2012)



Photo C.9. Retaining Wall in Backyard of 237-239 11th St. E. (June 21, 2012)



Photo C.10. Looking East at Tension Cracking along Cherry Lane (June 21, 2013)

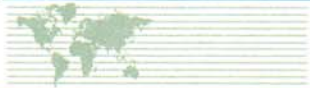


Photo C.11. Cracking along Headscarp of East Failure (June 21, 2012)



Photo C.12. Looking East at Headscarp of East Failure in Backyard of 305 11th St. E.; Approx. 90 cm Drop (June 24, 2013)



Photo C.13. Headscarp of East Failure in Backyard of 303 11th St. E.; Approx. 60 cm Drop (June 24, 2013)



Photo C.14. Looking East at Bulging Toe of Slide above Retaining Wall behind 306 Sask. Cres. E. (June 24, 2013)



Photo C.15. Looking East at Severe Cracking across Cherry Lane, Pavement; Approx. 50 cm Drop (June 24, 2013)

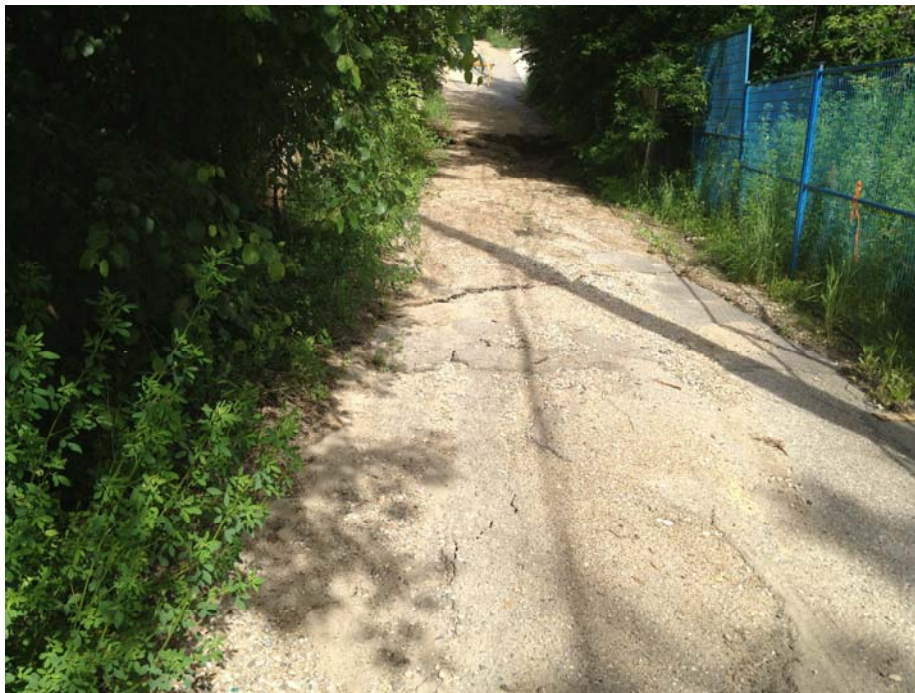


Photo C.16. Looking East at Scarp & Tension Cracking on Cherry Lane (June 24, 2013)



Photo C.17. Retaining Wall in Backyard of 237-239 11th St. E. (June 4, 2013)

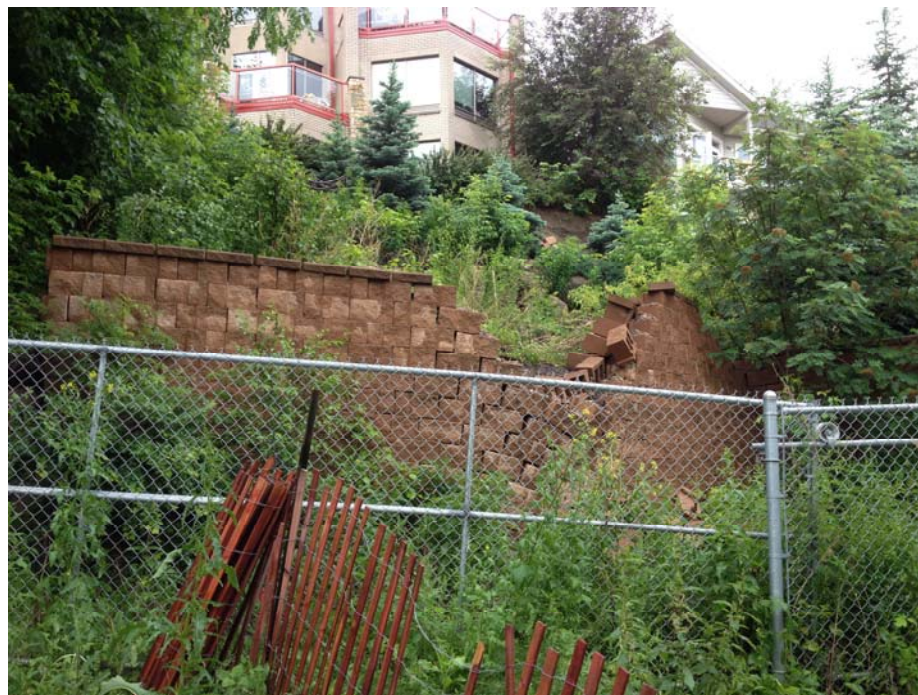


Photo C.18. Retaining Wall in Backyard of 237-239 11th St. E. (June 20, 2013)



Photo C.19. Retaining Wall in Backyard of 237-239 11th St. E. (June 24, 2013)



Photo C.20. Looking East at Drop in Pavement behind 305 11th St. E.; Approx 53 cm Drop (June 4, 2013)



Photo C.21. Looking East at Public Works Filling Cracks and Regrading Lane (June 5, 2013)



Photo C.22. Looking West at Erosion along Cherry Lane (June 6, 2013)



Photo C.23. Looking West at Berm Along North Edge of Cherry Lane, behind 306 Sask. Cres. E. (July 7, 2013)



Photo C.24. Looking Northeast at Trench being Excavated Adjacent to Wall between 230 & 306 Sask. Cres. E. (July 7, 2013)



Photo C.25. Looking Northeast at Concrete Retaining Wall between 230 & 306 Sask. Cres. E. (July 7, 2013)



Photo C.26. Looking North at Concrete Retaining Wall between 230 & 306 Sask. Cres. E. (July 7, 2013)



Photo C.27. Looking East at New Tension Cracking Forming on Regraded Lane (July 7, 2013)



Photo C.28. Looking North at Partially Filled Trench (July 17, 2013)

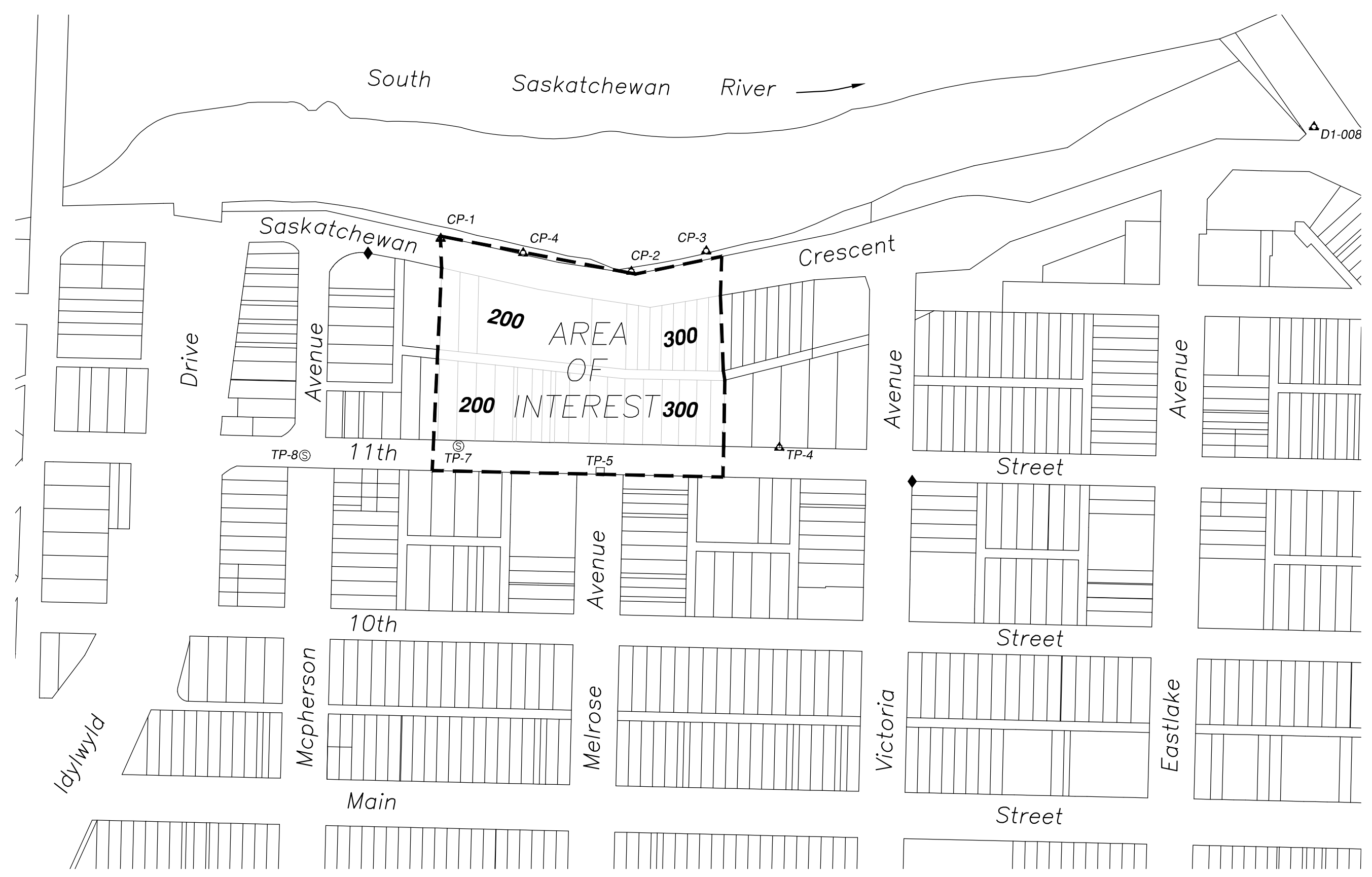


Photo C.29. Looking East at Above Ground Driantage System Installed on Cherry Lane (September 18, 2013)



APPENDIX D

Topographic Survey Plan



KEYPLAN
Scale: 1:2500

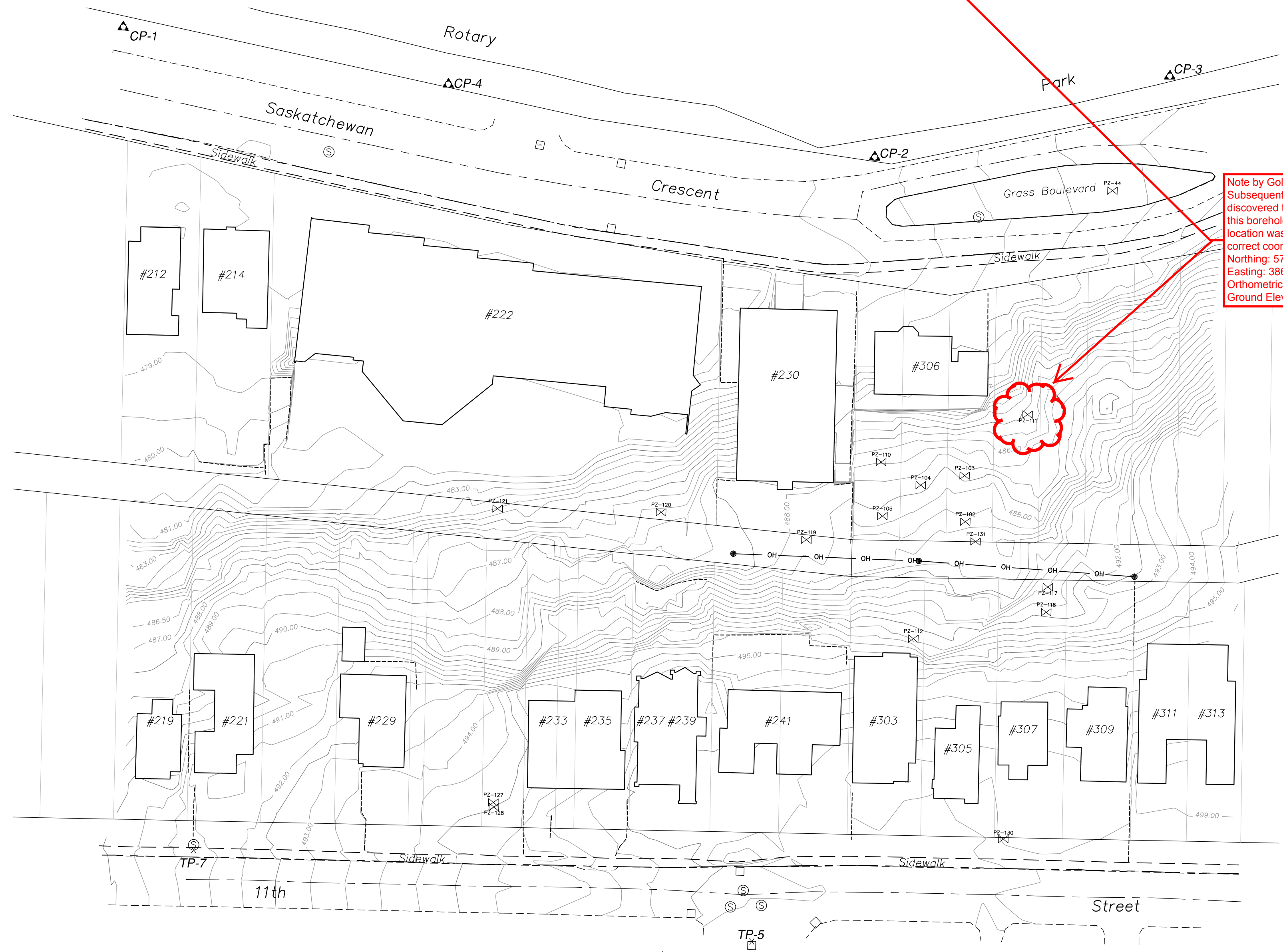
CONTROL POINTS				
POINT	NAD 83 (CSRS)		UTM ZONE 13	
	NORTHING (m)	EASTING (m)	ORTHOMETRIC ELEVATION (m) HTv2.0	DESCRIPTION
CP-1	5,775,701.84	385,897.84	477.97	24" REBAR WITH PLASTIC CAP
CP-2	5,775,680.32	386,022.25	478.99	24" REBAR WITH PLASTIC CAP
CP-3	5,775,693.72	386,071.10	479.49	24" REBAR WITH PLASTIC CAP
CP-4	5,775,692.40	385,951.67	477.95	GPS CONTROL POINT
TP-4	5,775,565.50	386,118.76	499.32	X IN CONCRETE
TP-5	5,775,549.79	386,001.87	498.05	X IN NORTH RIM CATCH BASIN
TP-7	5,775,566.48	385,909.52	491.32	X IN SOUTH RIM MANHOLE
TP-8	5,775,560.37	385,809.26	484.62	X IN WEST RIM MANHOLE
D1-008	5,775,775.85	386,467.62	499.033	CONTROL TABLET

STAND PIPES (PIEZOMETERS) and SLOPE INDICATORS					
POINT	NAD 83 (CSRS)		UTM ZONE 13		GROUND ELEVATION (m)
	NORTHING (m)	EASTING (m)	ORTHOMETRIC ELEVATION (m) HTv2.0	DESCRIPTION	
44	5,775,674.76	386,061.60	480.88	COS-13-003 (SP)	480.343
102	5,775,620.13	386,037.21	489.00	PIEZOMETER (SP)	488.597
103	5,775,627.80	386,037.09	488.65	PIEZOMETER (SP)	487.852
104	5,775,626.17	386,029.80	487.78	PIEZOMETER (SP)	487.340
105	5,775,621.04	386,023.51	488.17	PIEZOMETER (SP)	487.843
110	5,775,629.91	386,023.30	487.32	PIEZOMETER (SP)	486.554
111	5,775,637.71	386,047.56	486.00	COS-13-005 (SP)	485.408
112	5,775,600.60	386,028.65	493.75	PIEZOMETER (SP)	492.734
117	5,775,609.14	386,050.90	492.39	PIEZOMETER (SP)	491.388
127	5,775,573.48	385,959.11	495.34	COS-13-007 (SP)	494.799

STAND PIPES (PIEZOMETERS) and SLOPE INDICATORS					
POINT	NAD 83 (CSRS)		UTM ZONE 13		GROUND ELEVATION (m)
	NORTHING (m)	EASTING (m)	ORTHOMETRIC ELEVATION (m) HTv2.0	DESCRIPTION	
118	5,775,604.97	386,050.63	491.61	COS-13-004 (SI)	491.738
119	5,775,616.97	386,010.94	488.09	11-0057-BH1 (SI)	488.207
120*	5,775,621.52	385,986.89	486.16	11-0057-BH2 (SI)	486.157
121	5,775,622.14	385,959.83	483.97	11-0057-BH3 (SI)	484.035
128	5,775,572.72	385,959.21	494.62	COS-13-006 (SI)	494.767
130	5,775,567.41	386,043.54	498.37	COS-13-002 (SI)	498.483
131	5,775,616.67	386,038.94	489.23	COS-13-001 (SI)	489.339

* Could not locate PVC pipe in metal collar. Elevation to north rim of collar.

Elevations are to North Rim of PVC pipe and to typical ground beside said pipe.



Note by Golder:
Subsequent to this survey, Golder discovered that the surveyed location of this borehole was incorrect. The borehole location was resurveyed by Golder. The correct coordinates are:
Northing: 5775631.30 m
Easting: 386078.85 m
Orthometric Elevation: 494.39 masl
Ground Elevation: 494.48 masl

- NOTES**
- TOPOGRAPHIC SURVEY CONDUCTED TO PROVIDE THE OVERALL GEOMETRY OF THE SLOPE IN AREA OF INTEREST. SURVEY DOES NOT PURPORT TO ILLUSTRATE ALL SITE DETAIL. CERTAIN AREAS CONTAIN LESS TOPOGRAPHIC DETAIL DUE TO SCOPE LIMITATIONS OR SAFETY ISSUES OF WORKING IN PROXIMITY TO COMPROMISED STRUCTURES.
 - SPOT ELEVATIONS AND BREAKLINE INFORMATION RESIDE ON LAYERS "TOPO-ELEV" AND "TOPO-BREAKLINES" OF ASSOCIATED PROJECT CAD FILE.
 - MEASUREMENTS AND ELEVATIONS ARE IN METERS AND DECIMALS THEREOF.
 - ELEVATIONS ARE BASED ON COS BENCHMARK D1-008 (ORTHOMETRIC ELEV. 499.033).
 - HORIZONTAL COORDINATES ARE DERIVED FROM PRECISE POINT POSITIONING.
 - CONTOUR INTERVALS ARE 0.50 METERS.
 - BACKGROUND PARCEL INFORMATION IS DERIVED FROM THE GeoSask BASE.
 - DATA PICKUP BETWEEN HOUSES IS SPARSE AND CONTOURS ARE INTERPOLATED BASED ON DATA ACQUIRED.

LEGEND

- CONTROL POINTS ARE SHOWN THUS Δ
- STANDARD IRON POSTS ARE SHOWN THUS ◆
- PIEZOMETERS ARE SHOWN THUS PZ
- MANHOLES ARE SHOWN THUS M
- CATCHBASINS ARE SHOWN THUS CB
- BUILDINGS ARE SHOWN THUS [Outline]
- C OF ROAD IS SHOWN THUS [Dashed Line]
- EDGE OF ASPHALT ROAD IS SHOWN THUS [Dashed Line]
- EDGE OF SIDEWALK IS SHOWN THUS [Dashed Line]
- POWERLINES AND POWERPOLES ARE SHOWN THUS OH
- RETAINING WALLS ARE SHOWN THUS [Dashed Line]

TOPOGRAPHIC SURVEY
SHOWING Surface Features of the
200 & 300 Blocks of Saskatchewan Crescent & 11th Street
in
S.W. Sec. 28 Twp. 36 - Rge. 5 - W3rd Mer.
Saskatoon, Saskatchewan

Drawn By: kgb	Date: July 31, 2013	Drawing Name: S13152Topo-UTM.dwg	Scale: 1:500	Prepared by: Meridian Surveys Ltd.
Checked By: gar	Date: July 31, 2013	File No.: S13152	Rev: 1	

REVISIONS

NO.	DATE	REVISION	REV. BY	CHD. BY	DES. ENG.
1	Sept. 4, 2013	Added Piezometers and slope indicators.	kgb	mp	



APPENDIX E

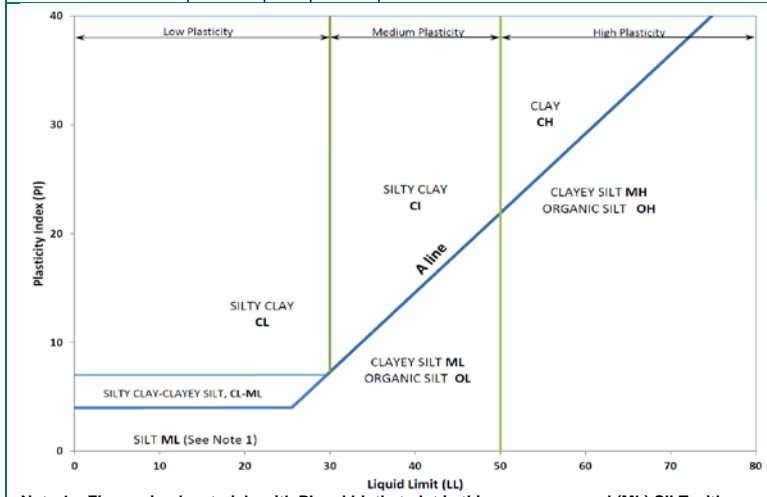
Records of Boreholes



METHOD OF SOIL CLASSIFICATION

The Golder Associates Ltd. Soil Classification System is based on the Unified Soil Classification System (USCS)

Organic or Inorganic	Soil Group	Type of Soil	Gradation or Plasticity	$Cu = \frac{D_{60}}{D_{10}}$	$Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$	Organic Content	USCS Group Symbol	Group Name				
INORGANIC (Organic Content $\leq 30\%$ by mass)	COARSE-GRAINED SOILS ($>50\%$ by mass is larger than 0.075 mm)	GRAVELS ($>50\%$ by mass of coarse fraction is larger than 4.75 mm)	Poorly Graded	<4	≤ 1 or ≥ 3	$\leq 30\%$	GP	GRAVEL				
			Well Graded	≥ 4	1 to 3		GW	GRAVEL				
			Below A Line	n/a			GM	SILTY GRAVEL				
			Above A Line	n/a			GC	CLAYEY GRAVEL				
		SANDS ($\geq 50\%$ by mass of coarse fraction is smaller than 4.75 mm)	Poorly Graded	<6	≤ 1 or ≥ 3		SP	SAND				
			Well Graded	≥ 6	1 to 3		SW	SAND				
			Below A Line	n/a			SM	SILTY SAND				
			Above A Line	n/a			SC	CLAYEY SAND				
Organic or Inorganic	Soil Group	Type of Soil	Laboratory Tests	Field Indicators					Organic Content	USCS Group Symbol	Primary Name	
				Dilatancy	Dry Strength	Shine Test	Thread Diameter	Toughness (of 3 mm thread)				
INORGANIC (Organic Content $\leq 30\%$ by mass)	FINE-GRAINED SOILS ($\geq 50\%$ by mass is smaller than 0.075 mm)	SILTS (Non-Plastic or PI and LL plot below A-Line on Plasticity Chart below)	Liquid Limit <50	Rapid	None	None	>6 mm	N/A (can't roll 3 mm thread)	$<5\%$	ML	SILT	
				Slow	None to Low	Dull	3mm to 6 mm	None to low	$<5\%$	ML	CLAYEY SILT	
			Liquid Limit ≥ 50	Slow to very slow	Low to medium	Dull to slight	3mm to 6 mm	Low	5% to 30%	OL	ORGANIC SILT	
				Slow to very slow	Low to medium	Slight	3mm to 6 mm	Low to medium	$<5\%$	MH	CLAYEY SILT	
			CLAYS (PI and LL plot above A-Line on Plasticity Chart below)	Liquid Limit <30	None	Low to medium	Slight to shiny	~ 3 mm	Low to medium	0% to 30% (see Note 2)	CL	SILTY CLAY
					None	Medium to high	Slight to shiny	1 mm to 3 mm	Medium		CI	SILTY CLAY
		None			High	Shiny	<1 mm	High	CH		CLAY	
		HIGHLY ORGANIC SOILS (Organic Content $>30\%$ by mass)	Peat and mineral soil mixtures	Predominantly peat, may contain some mineral soil, fibrous or amorphous peat						30% to 75%	PT	SILTY PEAT, SANDY PEAT
										75% to 100%		PEAT



Note 1 – Fine grained materials with PI and LL that plot in this area are named (ML) SILT with slight plasticity. Fine-grained materials which are non-plastic (i.e. a PL cannot be measured) are named SILT.
 Note 2 – For soils with $<5\%$ organic content, include the descriptor “trace organics” for soils with between 5% and 30% organic content include the prefix “organic” before the Primary name.

Dual Symbol — A dual symbol is two symbols separated by a hyphen, for example, GP-GM, SW-SC and CL-ML. For non-cohesive soils, the dual symbols must be used when the soil has between 5% and 12% fines (i.e. to identify transitional material between “clean” and “dirty” sand or gravel. For cohesive soils, the dual symbol must be used when the liquid limit and plasticity index values plot in the CL-ML area of the plasticity chart (see Plasticity Chart at left).

Borderline Symbol — A borderline symbol is two symbols separated by a slash, for example, CL/CI, GM/SM, CL/ML. A borderline symbol should be used to indicate that the soil has been identified as having properties that are on the transition between similar materials. In addition, a borderline symbol may be used to or indicates a range of similar soil types within a stratum.





ABBREVIATIONS AND TERMS USED ON RECORDS OF BOREHOLES AND TEST PITS

PARTICLE SIZES OF CONSTITUENTS

Soil Constituent	Particle Size Description	Millimetres	Inches (US Std. Sieve Size)
BOULDERS	Not Applicable	>300	>12
COBBLES	Not Applicable	75 to 300	3 to 12
GRAVEL	Coarse	19 to 75	0.75 to 3
	Fine	4.75 to 19	(4) to 0.75
SAND	Coarse	2.00 to 4.75	(10) to (4)
	Medium	0.425 to 2.00	(40) to (10)
	Fine	0.075 to 0.425	(200) to (40)
SILT/CLAY	Classified by plasticity	<0.075	< (200)

MODIFIERS FOR SECONDARY AND MINOR CONSTITUENTS

Percentage by Mass	Modifier
>35	Use 'and' to combine major constituents (i.e., SAND and GRAVEL, SAND and CLAY)
> 12 to 35	Primary soil name prefixed with "gravelly, sandy, SILTY, CLAYEY" as applicable
> 5 to 12	some
≤ 5	trace

PENETRATION RESISTANCE

Standard Penetration Resistance (SPT), N:

The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in.) required to drive a 50 mm (2 in.) split-spoon sampler for a distance of 300 mm (12 in.).

Cone Penetration Test (CPT)

An electronic cone penetrometer with a 60° conical tip and a project end area of 10 cm² pushed through ground at a penetration rate of 2 cm/s. Measurements of tip resistance (q_t), porewater pressure (u) and sleeve frictions are recorded electronically at 25 mm penetration intervals.

Dynamic Cone Penetration Resistance (DCPT); N_d:

The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in.) to drive uncased a 50 mm (2 in.) diameter, 60° cone attached to "A" size drill rods for a distance of 300 mm (12 in.).

- PH:** Sampler advanced by hydraulic pressure
PM: Sampler advanced by manual pressure
WH: Sampler advanced by static weight of hammer
WR: Sampler advanced by weight of sampler and rod

SAMPLES

AS	Auger sample
BS	Block sample
CS	Chunk sample
DO or DP	Seamless open ended, driven or pushed tube sampler – note size
DS	Denison type sample
FS	Foil sample
RC	Rock core
SC	Soil core
SS	Split spoon sampler – note size
ST	Slotted tube
TO	Thin-walled, open – note size
TP	Thin-walled, piston – note size
WS	Wash sample

SOIL TESTS

w	water content
PL , w _p	plastic limit
LL , w _L	liquid limit
C	consolidation (oedometer) test
CHEM	chemical analysis (refer to text)
CID	consolidated isotropically drained triaxial test ¹
CIU	consolidated isotropically undrained triaxial test with porewater pressure measurement ¹
D _R	relative density (specific gravity, G _s)
DS	direct shear test
GS	specific gravity
M	sieve analysis for particle size
MH	combined sieve and hydrometer (H) analysis
MPC	Modified Proctor compaction test
SPC	Standard Proctor compaction test
OC	organic content test
SO ₄	concentration of water-soluble sulphates
UC	unconfined compression test
UU	unconsolidated undrained triaxial test
V (FV)	field vane (LV-laboratory vane test)
γ	unit weight

1. Tests which are anisotropically consolidated prior to shear are shown as CAD, CAU.

NON-COHESIVE (COHESIONLESS) SOILS

Compactness²

Term	SPT 'N' (blows/0.3m) ¹
Very Loose	0 - 4
Loose	4 to 10
Compact	10 to 30
Dense	30 to 50
Very Dense	>50

1. SPT 'N' in accordance with ASTM D1586, uncorrected for overburden pressure effects.
 2. Definition of compactness descriptions based on SPT 'N' ranges from Terzaghi and Peck (1967) and correspond to typical average N₆₀ values.

Field Moisture Condition

Term	Description
Dry	Soil flows freely through fingers.
Moist	Soils are darker than in the dry condition and may feel cool.
Wet	As moist, but with free water forming on hands when handled.

COHESIVE SOILS

Consistency

Term	Undrained Shear Strength (kPa)	SPT 'N' ¹ (blows/0.3m)
Very Soft	<12	0 to 2
Soft	12 to 25	2 to 4
Firm	25 to 50	4 to 8
Stiff	50 to 100	8 to 15
Very Stiff	100 to 200	15 to 30
Hard	>200	>30

1. SPT 'N' in accordance with ASTM D1586, uncorrected for overburden pressure effects; approximate only.

Water Content

Term	Description
w < PL	Material is estimated to be drier than the Plastic Limit.
w ~ PL	Material is estimated to be close to the Plastic Limit.
w > PL	Material is estimated to be wetter than the Plastic Limit.



LIST OF SYMBOLS

Unless otherwise stated, the symbols employed in the report are as follows:

I. GENERAL

π	3.1416
$\ln x$	natural logarithm of x
$\log_{10} x$	x or log x, logarithm of x to base 10
g	acceleration due to gravity
t	time

II. STRESS AND STRAIN

γ	shear strain
Δ	change in, e.g. in stress: $\Delta \sigma$
ε	linear strain
ε_v	volumetric strain
η	coefficient of viscosity
ν	Poisson's ratio
σ	total stress
σ'	effective stress ($\sigma' = \sigma - u$)
σ'_{vo}	initial effective overburden stress
$\sigma_1, \sigma_2, \sigma_3$	principal stress (major, intermediate, minor)
σ_{oct}	mean stress or octahedral stress = $(\sigma_1 + \sigma_2 + \sigma_3)/3$
τ	shear stress
u	porewater pressure
E	modulus of deformation
G	shear modulus of deformation
K	bulk modulus of compressibility

III. SOIL PROPERTIES

(a) Index Properties

$\rho(\gamma)$	bulk density (bulk unit weight)*
$\rho_d(\gamma_d)$	dry density (dry unit weight)
$\rho_w(\gamma_w)$	density (unit weight) of water
$\rho_s(\gamma_s)$	density (unit weight) of solid particles
γ'	unit weight of submerged soil ($\gamma' = \gamma - \gamma_w$)
D_R	relative density (specific gravity) of solid particles ($D_R = \rho_s / \rho_w$) (formerly G_s)
e	void ratio
n	porosity
S	degree of saturation

(a) Index Properties (continued)

w	water content
w_l or LL	liquid limit
w_p or PL	plastic limit
I_p or PI	plasticity index = $(w_l - w_p)$
w_s	shrinkage limit
I_L	liquidity index = $(w - w_p) / I_p$
I_C	consistency index = $(w_l - w) / I_p$
e_{max}	void ratio in loosest state
e_{min}	void ratio in densest state
I_D	density index = $(e_{max} - e) / (e_{max} - e_{min})$ (formerly relative density)

(b) Hydraulic Properties

h	hydraulic head or potential
q	rate of flow
v	velocity of flow
i	hydraulic gradient
k	hydraulic conductivity (coefficient of permeability)
j	seepage force per unit volume

(c) Consolidation (one-dimensional)

C_c	compression index (normally consolidated range)
C_r	recompression index (over-consolidated range)
C_s	swelling index
C_α	secondary compression index
m_v	coefficient of volume change
C_v	coefficient of consolidation (vertical direction)
C_h	coefficient of consolidation (horizontal direction)
T_v	time factor (vertical direction)
U	degree of consolidation
σ'_p	pre-consolidation stress
OCR	over-consolidation ratio = σ'_p / σ'_{vo}

(d) Shear Strength

τ_p, τ_r	peak and residual shear strength
ϕ'	effective angle of internal friction
δ	angle of interface friction
μ	coefficient of friction = $\tan \delta$
c'	effective cohesion
c_u, s_u	undrained shear strength ($\phi = 0$ analysis)
p	mean total stress $(\sigma_1 + \sigma_3)/2$
p'	mean effective stress $(\sigma'_1 + \sigma'_3)/2$
q	$(\sigma_1 - \sigma_3)/2$ or $(\sigma'_1 - \sigma'_3)/2$
q_u	compressive strength $(\sigma_1 - \sigma_3)$
S_t	sensitivity

* Density symbol is ρ . Unit weight symbol is γ where $\gamma = \rho g$ (i.e. mass density multiplied by acceleration due to gravity)

Notes: 1
2

$$\tau = c' + \sigma' \tan \phi'$$

$$\text{shear strength} = (\text{compressive strength})/2$$



LITHOLOGICAL AND GEOTECHNICAL ROCK DESCRIPTION TERMINOLOGY

WEATHERINGS STATE

Fresh: no visible sign of weathering

Faintly weathered: weathering limited to the surface of major discontinuities.

Slightly weathered: penetrative weathering developed on open discontinuity surfaces but only slight weathering of rock material.

Moderately weathered: weathering extends throughout the rock mass but the rock material is not friable.

Highly weathered: weathering extends throughout rock mass and the rock material is partly friable.

Completely weathered: rock is wholly decomposed and in a friable condition but the rock and structure are preserved.

BEDDING THICKNESS

<u>Description</u>	<u>Bedding Plane Spacing</u>
Very thickly bedded	Greater than 2 m
Thickly bedded	0.6 m to 2 m
Medium bedded	0.2 m to 0.6 m
Thinly bedded	60 mm to 0.2 m
Very thinly bedded	20 mm to 60 mm
Laminated	6 mm to 20 mm
Thinly laminated	Less than 6 mm

JOINT OR FOLIATION SPACING

<u>Description</u>	<u>Spacing</u>
Very wide	Greater than 3 m
Wide	1 m to 3 m
Moderately close	0.3 m to 1 m
Close	50 mm to 300 mm
Very close	Less than 50 mm

GRAIN SIZE

<u>Term</u>	<u>Size*</u>
Very Coarse Grained	Greater than 60 mm
Coarse Grained	2 mm to 60 mm
Medium Grained	60 microns to 2 mm
Fine Grained	2 microns to 60 microns
Very Fine Grained	Less than 2 microns

Note: * Grains greater than 60 microns diameter are visible to the naked eye.

CORE CONDITION

Total Core Recovery (TCR)

The percentage of solid drill core recovered regardless of quality or length, measured relative to the length of the total core run.

Solid Core Recovery (SCR)

The percentage of solid drill core, regardless of length, recovered at full diameter, measured relative to the length of the total core run.

Rock Quality Designation (RQD)

The percentage of solid drill core, greater than 100 mm length, recovered at full diameter, measured relative to the length of the total core run. RQD varied from 0% for completely broken core to 100% for core in solid sticks.

DISCONTINUITY DATA

Fracture Index

A count of the number of discontinuities (physical separations) in the rock core, including both naturally occurring fractures and mechanically induced breaks caused by drilling.

Dip with Respect to Core Axis

The angle of the discontinuity relative to the axis (length) of the core. In a vertical borehole a discontinuity with a 90° angle is horizontal.

Description and Notes

An abbreviation description of the discontinuities, whether naturally occurring separations such as fractures, bedding planes and foliation planes or mechanically induced features caused by drilling such as ground or shattered core and mechanically separated bedding or foliation surfaces. Additional information concerning the nature of fracture surfaces and infillings are also noted.

Abbreviations

JN Joint	PL Planar
FLT Fault	CU Curved
SH Shear	UN Undulating
VN Vein	IR Irregular
FR Fracture	K Slickensided
SY Stylolite	PO Polished
BD Bedding	SM Smooth
FO Foliation	SR Slightly Rough
CO Contact	RO Rough
AXJ Axial Joint	VR Very Rough
KV Karstic Void	
MB Mechanical Break	



HISTORICAL BOREHOLE LOGS
TH 101, TH 101A, TH 102, TH103, TH 104, TH 105 (GE76)

Ground Engineering Ltd. Apr. 9, 1976. Geotechnical Investigation 216, 218 and 220 Saskatchewan Crescent

1/2 BH 101

JOB NO. GS-033
 LOCATION 216 - 220 Saskatchewan Crescent
SASKATOON, Saskatchewan
 TEST HOLE REFERENCE _____
 E LOGGED BY: _____ DATE _____
 SP. COND. WATER _____ mmhoes/cm. at _____ °C
 SP. COND. MUD _____ mmhoes/cm. at _____ °C
 SP _____ mv/cm. R _____ ohms/cm.

BOREHOLE NO. 101 DATE February 10, 1976
 SURFACE ELEVATION 1554.3 City Datum
 VERTICAL SCALE 1" = 20'
 DRILLED BY Hayter Drilling Co.
 DRILLER _____
 INTERPRETATION & SAMPLE DESCRIPTION BY:
GROUND ENGINEERING LTD.

GROUND ENGINEERING LTD.
 CIVIL AND GEOTECHNICAL ENGINEERS
 REGINA SASKATOON
BOREHOLE TEST REPORT

SHEET _____ OF _____

SHEAR STRENGTH K.S.F.

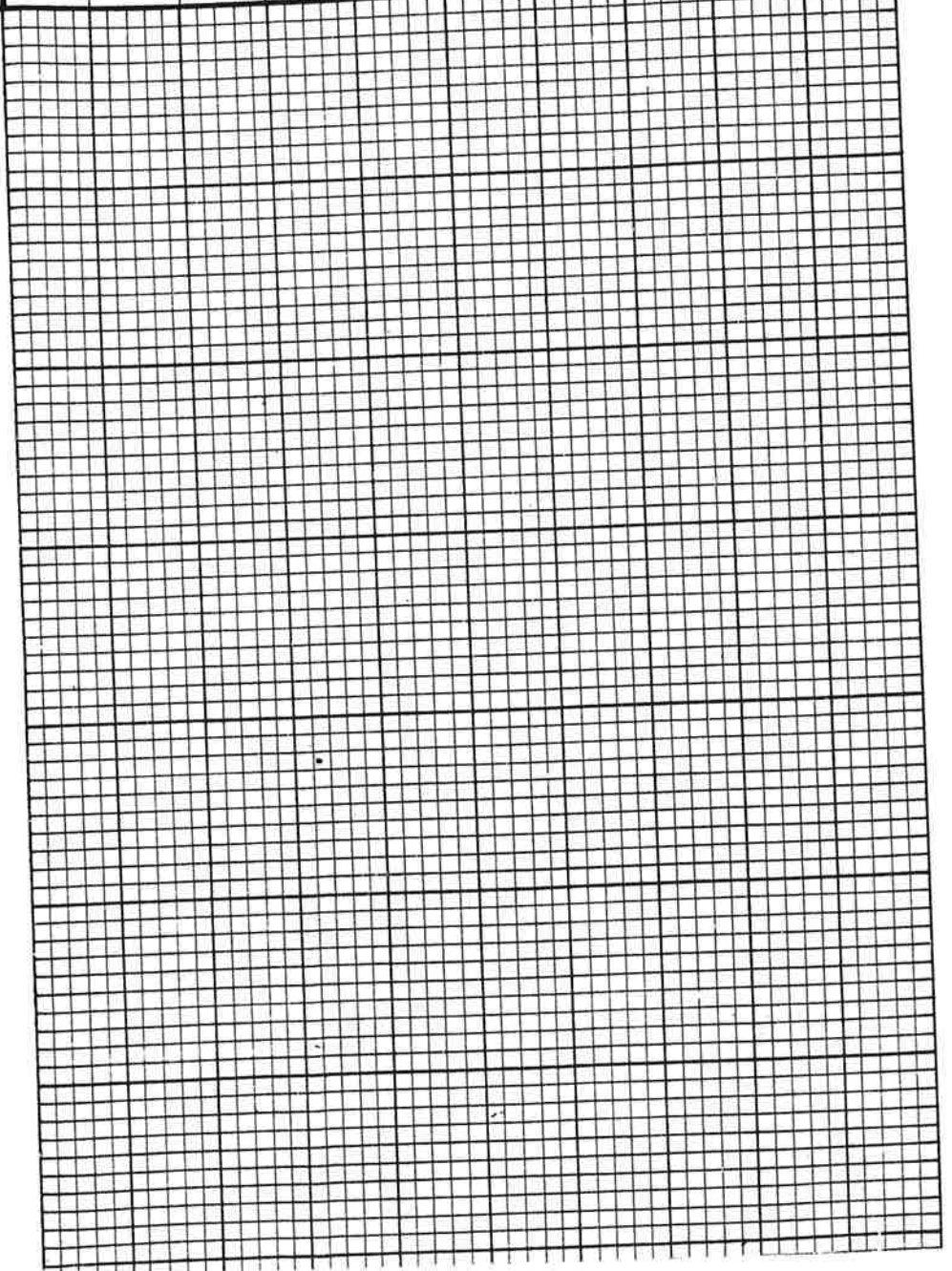
POCKET PEN 1.0 UNCONFINED 2.0 3.0 LAB VANE 4.0

▲ FIELD UNIT WEIGHT P.C.F. 105 110 115 120

MOISTURE CONTENT % 70 80 90

Nw ○ Pw | Lw →

ELEVATION	POTENTIAL	STRATIGRAPHIC SYMBOL	SAMPLE TYPE	RESISTIVITY	DEPTH	DESCRIPTION	P.I. & UNIFIED
			Bag			CLAY - silty, sandy - highly organic - becoming sandy @ 15'	
			Bag			- pale olive, oxidized	
			Bag			- massive, Fe stains	
			Bag		20'6"	- boulders @ 20'	
			Bag			SAND - coarse grained	
			Bag		26'0"	- well graded	
			Bag			TILL - clayey with fine sand lenses @ 58'	
			Bag			- grey	
			Bag			- unoxidized	
			Bag			- pebbles	
			Bag			- boulders @ 27', 38'6"	
			Bag			40'6", 60'6", 66'6"	
			Bag			and 72'0"	
			Bag			- hard	
			Bag			- massive	
			Bag				
			Bag				
			Bag				
			Bag				
			Bag		100'0"	GRAVEL - poorly graded	
			Bag		105'0"	- 1" diameter maximum size	
			Bag			CLAY SHALE - grey, unoxidized	
			Bag			- hard becoming softer with depth	
			Bag			- massive	
			Bag			- non calcareous	



TEST HOLE LOG

DATE February 10, 1976

HOLE NO. 101A

SAMPLE DATA			SYMBOL
WEIGHT HAMMER			
HEIGHT DROP			
DEPTH ELEV.	NO TYPE	UNIF PI	
10' 44.3			
20' 34.3			
30' 24.3	S721 Sy	CL 15.2	
	S722 Sy		
40' 14.3	S723 Sy	CL 19.5	
	S724 Sy		
50' 04.3			
	S725 Sy		
60' 4.3	S726 Sy	CL 22.0	

ELEV. COLLAR
ELEV. GROUND 1554.3 (City Datum)
CO-ORD. LOCATION

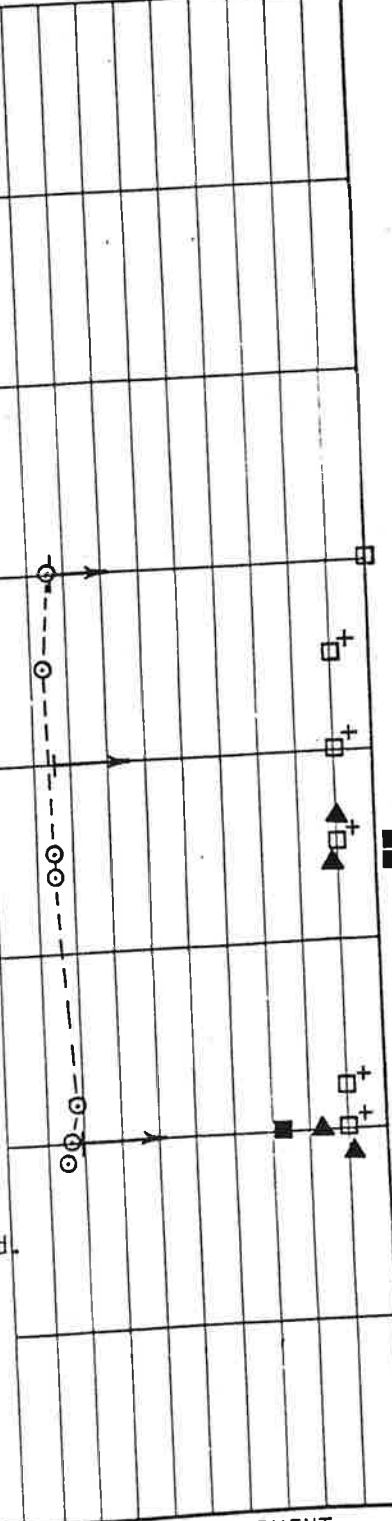
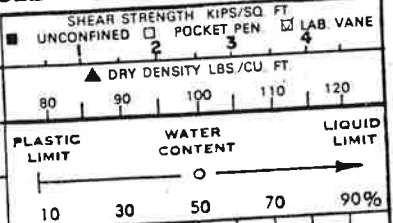
DESCRIPTION OF MATERIAL

CLAY - silty, sandy
 - highly organic becoming sandy @ 15'
 - pale olive
 - oxidized
 - massive
 - Fe stains
 - boulder @ 20'

20'6" SAND - coarse grained
 - well graded

26'0" TILL - clayey
 - unoxidized
 - hard & moist becoming extremely hard & dry @ 60'
 - pebbles
 - boulders encountered @ 30', 35' and 58'
 - massive

62'0" END OF HOLE



NOTES: 4-3/4" diameter rotary drill used.

GROUND ENGINEERING LTD.
 GEOTECHNICAL ENGINEERS/Soil Mechanics & Foundations

PROPOSED HOUSING DEVELOPMENT
 216 - 220 SASKATCHEWAN CRESCENT
 LOCATION
 SASKATOON, Saskatchewan

JOB NO. GS-033

LOCATION 216 - 220 Saskatchewan Crescent

SASKATOON, Saskatchewan

TEST HOLE REFERENCE

E LOGGED BY: DATE

SP. COND. WATER mmhoes/cm. at °C

SP. COND. MUD mmhoes/cm. at °C

SP 10 mv/cm. R 10 ohms/cm.

BOREHOLE NO. 102 DATE February 9, 1976

SURFACE ELEVATION 1615.3 City Datum

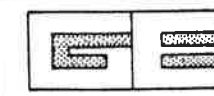
VERTICAL SCALE 1" = 20'

DRILLED BY Hayter Drilling Co.

DRILLER

INTERPRETATION & SAMPLE DESCRIPTION BY:

GROUND ENGINEERING LTD.



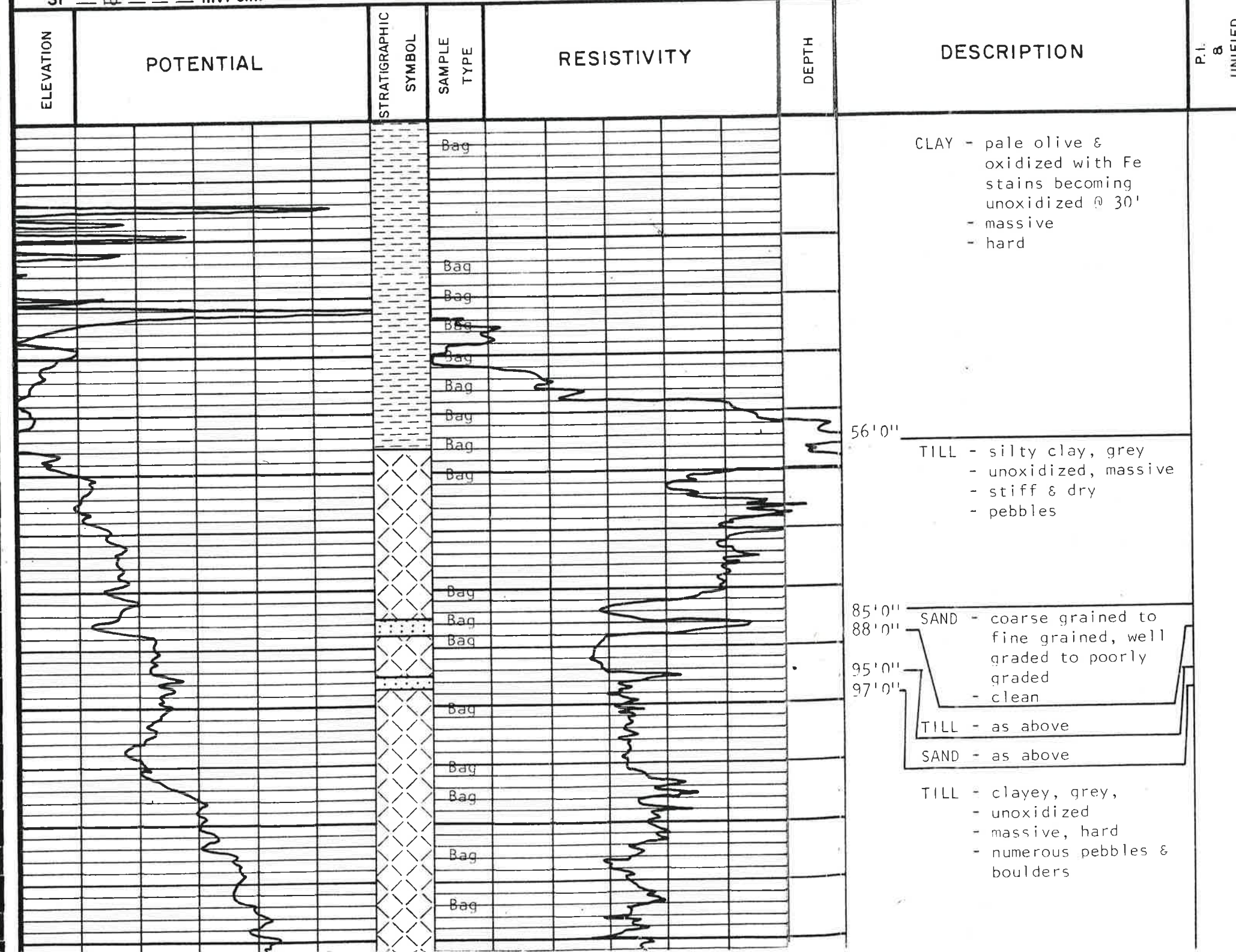
GROUND ENGINEERING LTD.

CIVIL AND GEOTECHNICAL ENGINEERS
REGINA SASKATOON

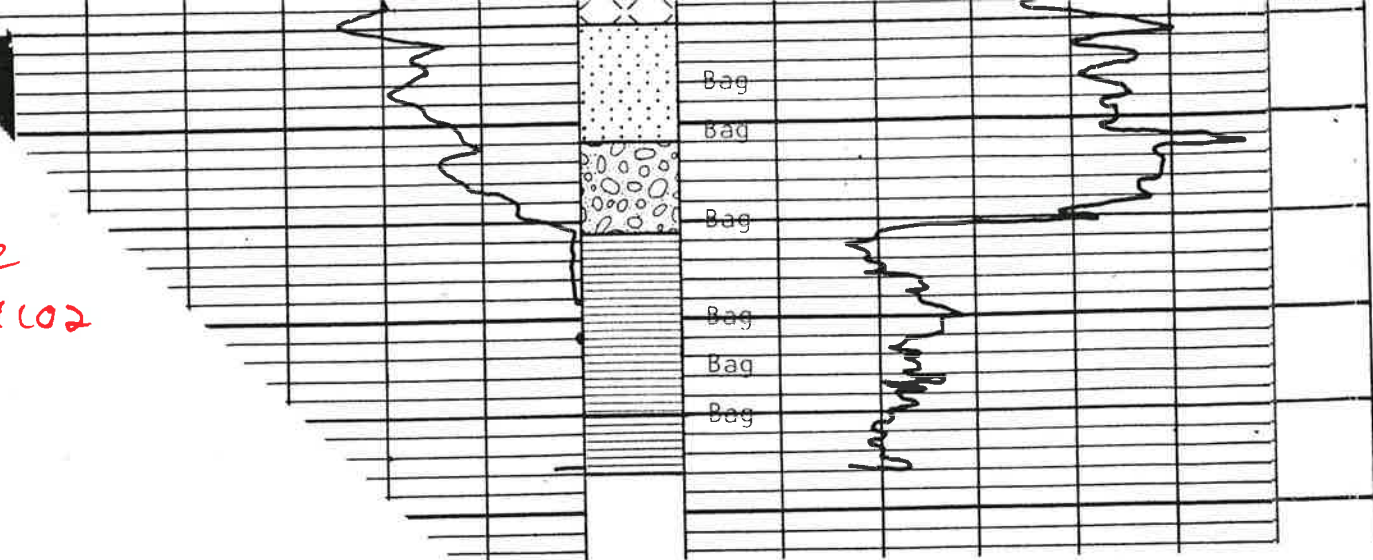
BOREHOLE TEST REPORT

SHEET ___ OF ___

SHEAR STRENGTH K.S.F.									
POCKET PEN		UNCONFINED		LAB VANE					
1.0		2.0		3.0		4.0			
80		85		90		95		100	
105		110		115		120			
FIELD UNIT WEIGHT P.C.F.		MOISTURE CONTENT %		N _w		P _w		L _w	
10		20		30		40		50	
60		70		80		90			



212
BH 102

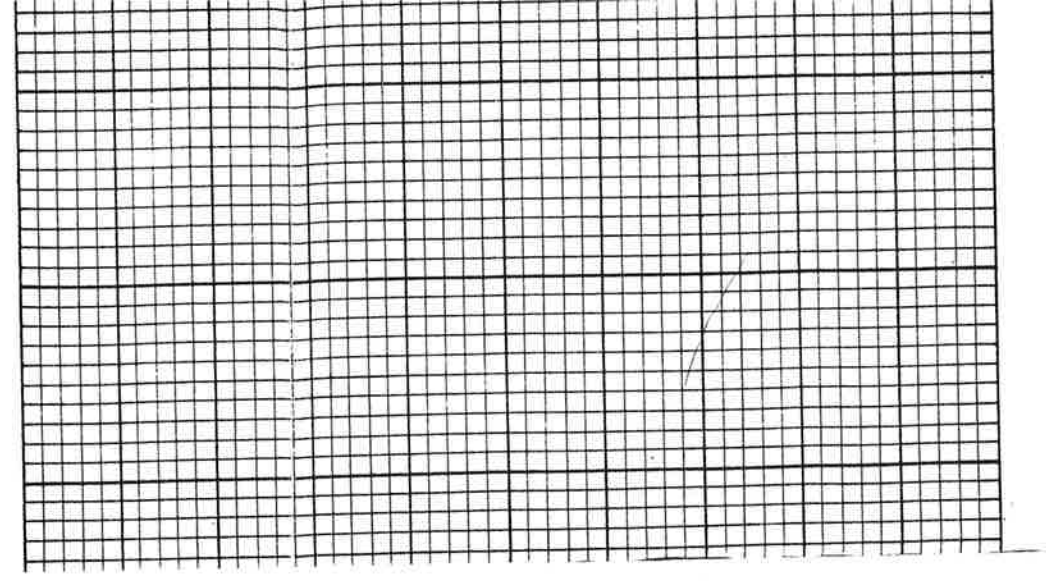


150'0" SAND - medium to coarse grained
- poorly graded to medium graded,
- grey, unoxidized

162'0" GRAVEL

171'0" CLAY SHALE - grey, unoxidized
- massive, hard
- non calcareous

196'0" END OF HOLE



TEST HOLE LOG

DATE February 9, 1976

HOLE NO. 103

SAMPLE DATA				SYMBOL	ELEV. COLLAR		SHEAR STRENGTH KIPS/SQ. FT.							
WEIGHT HAMMER					ELEV. GROUND 1554.7 (City Datum)		<input type="checkbox"/> UNCONFINED <input type="checkbox"/> POCKET PEN. <input type="checkbox"/> LAB. VANE ▲ DRY DENSITY LBS./CU. FT.							
HEIGHT DROP					CO-ORD. LOCATION		PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT					
DEPTH ELEV.	NO. TYPE	UNIF. PI	RE-COVERY	DESCRIPTION OF MATERIAL					10	30	50	70	90%	
				0'6"	TOPSOIL									
				4'0"	CLAY - silty with some organic material									
				7'0"	SAND - silty - medium brown - oxidized - non-plastic - moist									
10'	S750	CL-ML												
44.7	Bag	6.9												
	S751				CLAY - silty and sandy - olive brown becoming olive grey @ 20' - oxidized - low plastic									
	Bag	0.10												
20'	S752	CL												
34.7	Bag	10.8												
	S753	CL			- soft & moist becoming very soft and saturated @ 20' - massive becoming laminated @ 20' - Fe stains									
	Bag	25.1												
30'	S754	CL												
24.7	Bag	17.3												
				22'0"										
				30'0"	TILL - silty clay - grey - oxidized becoming unoxidized @ 24' - very soft becoming stiff & moist @ 25' & very stiff @ 30' - pebbles									

NOTES: Hole terminated @ 30'0"
6" diameter continuous flight auger used. Water seepage.

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PROJECT: PROPOSED HOUSING DEVELOPMENT
 216 - 220 SASKATCHEWAN CRESCENT
 LOCATION: SASKATOON, Saskatchewan

DATE February 9, 1976

TEST HOLE LOG

HOLE NO. 104

SAMPLE DATA				SYMBOL	ELEV. COLLAR	SHEAR STRENGTH KIPS/SQ. FT. UNCONFINED <input type="checkbox"/> POCKET PEN. <input type="checkbox"/> LAB. VANE <input type="checkbox"/>				
WEIGHT HAMMER					ELEV. GROUND 1553.2 (City Datum)	▲ DRY DENSITY LBS./CU. FT. 80 90 100 110 120				
HEIGHT DROP					CO-ORD. LOCATION 6'W & 6'S of NE lot corner	PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT		
DEPTH ELEV.	NO. TYPE	UNIF. PI	RE-COVERY	DESCRIPTION OF MATERIAL		10	30	50	70	90%
	S755 Bag			1'0" TOPSOIL	CLAY - silty and sandy with sand seams - olive brown - oxidized - dry becoming moist then soft & saturated @ 15'					
10' 43.2	S756 Bag				- massive - Fe stains					
	S757 Bag									
20' 33.2	S758 Bag			21'0"	SAND - medium to coarse grained					
	S759 Bag			23'0"	- poorly to medium graded - pale olive - wet					
	S760 Bag	CL								
30' 23.2	S761 Bag	CL	17.0	30'0"	TILL - clayey - grey - unoxidized - soft & wet becoming firm & moist @ 30' - pebbles					
			18.4							

NOTES: Hole terminated @ 30'0"
6" diameter continuous flight auger used.
Water seepage @ 14'
Water level @ 17'

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PROPOSED HOUSING PROJECT
216 - 220 SASKATCHEWAN CRESCENT
LOCATION
SASKATOON, SASKATCHEWAN

TEST HOLE LOG

DATE February 9, 1976

HOLE NO. 105

SAMPLE DATA			SYMBOL	ELEV. COLLAR		SHEAR STRENGTH KIPS/SQ. FT.		
WEIGHT HAMMER				ELEV. GROUND 1556.3 (City Datum)		■ UNCONFINED	□ POCKET PEN	□ LAB. VANE
HEIGHT DROP				CO-ORD. LOCATION		▲ DRY DENSITY LBS./CU. FT.		
DEPTH ELEV.	NO. TYPE	UNIF. P.I.		DESCRIPTION OF MATERIAL		PLASTIC LIMIT		WATER CONTENT
			10			30	50	70
	S762 CL-ML Bag	4.8	1'0"	TOPSOIL	CLAY - silty with some organic material - pale olive becoming olive @ 10' - oxidized - dry - massive - frost to 3'			
10' 46.3	S763 Bag	0.10	11'0"	TILL	- silty clay - grey-brown becoming grey and unoxidized @ 20' - low plastic - very stiff & moist becoming hard & dry @ 20' (Floral) - massive - few pebbles - Fe stains - boulders @ 25'			
	S764 CL Bag	25.4	0.09					
	S765 Sy							
20' 36.3	S766 CL Bag	20.0						
	S767 Sy							
	S768 CL Sy	20.4		25'0"				

NOTES: Hole terminated @ 25'0"
6" diameter continuous flight auger used.
Water level @ 19'

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PROJECT **PROPOSED HOUSING PROJECT**
216 - 220 SASKATCHEWAN CRESCENT
LOCATION **SASKATOON, Saskatchewan**



APPENDIX E
Record of Borehole Logs

HISTORICAL BOREHOLE LOGS
TH 201, TH 202, TH203, TH 204 (GE77)

Ground Engineering Ltd. July 4, 1977. Geotechnical Site Investigation Proposed Housing Complex, Saskatchewan Crescent

TEST HOLE LOG

DATE 77/06/07

HOLE NO. 201

SAMPLE DATA				SYMBOL	ELEV. COLLAR		SHEAR STRENGTH KIPS SQ FT <input checked="" type="checkbox"/> UNCONFINED <input type="checkbox"/> POCKET PEN <input checked="" type="checkbox"/> LAB VANE 0.2 0.6 1.0 1.4 1.8 ▲ DRY DENSITY LBS CU FT 80 90 100 110 120				
WEIGHT HAMMER					ELEV. GROUND		PLASTIC LIMIT WATER CONTENT LIQUID LIMIT -----○----- 10 30 50 70 90%				
HEIGHT DROP					CO-ORD. LOCATION						
DEPTH ELEV.	NO TYPE	UNIF PI	% SO.	DESCRIPTION OF MATERIAL							
	S42			Bags	2'6"	TOPSOIL - clay, silty, organic CLAY - low plasticity - very silty, organic to 10' - stratified, laminated - moist, firm, becoming stiff - light olive brown to olive grey, oxidized					
	Bag										
5	S43										
48	Bag										
	S44										
	Bag										
10	S45										
43	Bag										
	S46										
	S47										
15	S48				13'0"	SILT - trace of sand - well graded fine sand layer 13'-13½' - poorly graded fine, silty gravel layer 19-20½' - olive grey, oxidized - wet, soft, stratified - sloughing					
38	Bag										
	S49										
	Bag										
20	S50										
33	Bag										
	S51										
	Bag										
25	S52										
28	Bag										
	S53										
	Bag										
30	S54										
23	Bag										
	S55										
	Bag										
35	S56										
18	Bag										
END OF HOLE											
NOTES: - Mobile Model B52 continuous flight auger used, 6" diameter - sloughing at 16'											

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PROJECT PROPOSED HOUSING PROJECT
 222 - 224 SASKATCHEWAN CRESCENT
 LOCATION SASKATOON, SASKATCHEWAN

DATE 77/06/07

TEST HOLE LOG

HOLE NO. 202

SAMPLE DATA				SYMBOL	ELEV. COLLAR	SHEAR STRENGTH KIPS/SO FT UNCONFINED <input type="checkbox"/> POCKET PEN <input type="checkbox"/> LAB VANE <input type="checkbox"/>		
WEIGHT HAMMER					ELEV. GROUND	DRY DENSITY LBS CU FT 80 90 100 110 120		
HEIGHT DROP					CO-ORD. LOCATION	PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT
DEPTH ELEV.	NO TYPE		% SO.		DESCRIPTION OF MATERIAL			
	S57 Bag			TOPSOIL - clay, silty, organic				
5	S58 Bag			CLAY - very silty, low plasticity - light olive brown to olive, oxidized - stratified, laminated, soft, moist - organic to 10'	2'6"			
50	S59 Bag	6						
10								
45								
15	S60 Sy			TILL - clay, silty, frequent fine gravel, low plasticity - olive brown to dark olive grey, oxidized, becoming very dark grey, unoxidized at 23' - massive, moist, stiff becoming very stiff - Fe stains, shale fragments below 23' - layer of fine, brown gravel, sandy 21'-23', saturated, sloughing	13'0"			
40	S61 Bag							
20	S62 Bag	Bag						
35	S63 Sy	Sy						
25	S64 Bag							
30	S65 Bag							
30				30'0" END OF HOLE				
25								

NOTES: - Mobile Model B52 Continuous Flight Auger used, 6" diameter
 - sloughing 21-23', water level at 18' 2 hours after completion

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PROJECT PROPOSED HOUSING PROJECT
 222 - 224 SASKATCHEWAN CRESCENT
 LOCATION SASKATOON, SASKATCHEWAN

TEST HOLE LOG

DATE 77/06/07

HOLE NO. 203

SAMPLE DATA				SYMBOL	ELEV. COLLAR		SHEAR STRENGTH KIPS SQ FT				
WEIGHT HAMMER					ELEV. GROUND <u>1557.4 City Datum</u>		<input checked="" type="checkbox"/> UNCONFINED <input type="checkbox"/> POCKET PEN <input type="checkbox"/> LAB VANE 0.2 0.6 1.0 1.4 1.8				
HEIGHT DROP					CO-ORD. LOCATION		▲ DRY DENSITY LBS CU FT 80 90 100 110 120				
DEPTH ELEV.	NO TYPE	UNIF PI	% SO.		DESCRIPTION OF MATERIAL		PLASTIC LIMIT WATER CONTENT LIQUID LIMIT 10 30 50 70 90%				
	S64			[Symbol]	TOPSOIL - clay, silty, organic						
	5 S65			[Symbol]	2'0" CLAY - very silty, low plasticity, organic						
52				[Symbol]	- stratified, dry, stiff						
	S66			[Symbol]	6'6" - dark greyish brown, oxidized						
	10 S67			[Symbol]	TILL - clay, silty, low plasticity						
47				[Symbol]	frequent fine gravel						
	S68			[Symbol]	- massive, nuggetty to 9'						
	15 S69			[Symbol]	- dark greyish brown, oxidized						
42				[Symbol]	becoming very dark grey, unoxidized at 11'						
	S70			[Symbol]	- dry, stiff						
	20 S71			[Symbol]	- shale stones from 11', Fe stains, gypsum						
37				[Symbol]	20'0" END OF HOLE						

NOTES: - Mobile Model B52 continuous flight auger used, 6" diameter
 - hole dry

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PROJECT PROPOSED HOUSING PROJECT
 222 - 224 SASKATCHEWAN CRESCENT
 LOCATION
 SASKATOON, SASKATCHEWAN

TEST HOLE LOG

DATE 77/06/07

HOLE NO. 204

SAMPLE DATA				SYMBOL	ELEV. COLLAR	<input checked="" type="checkbox"/> UNCONFINED SHEAR STRENGTH KIPS SQ FT 0.2 0.5 1.0 1.4 1.8 <input type="checkbox"/> POCKET PEN <input checked="" type="checkbox"/> LAB VANE ▲ DRY DENSITY LBS CU FT 80 90 100 110 120
WEIGHT HAMMER					ELEV. GROUND	PLASTIC LIMIT WATER CONTENT LIQUID LIMIT ----- ----- ----- ----- ----- 10 30 50 70 90%
HEIGHT DROP					CO-ORD. LOCATION	DESCRIPTION OF MATERIAL
DEPTH ELEV.	NO TYPE	UNIF PT	% SO.			
				1'0"	TOPSOIL - clay, organic	
	S76				CLAY - very silty, moist - sand layer at 13'; silty - water bearing sand layer @ 18', sloughing - olive grey, oxidized	
5 49	S77					
	S78					
10 44	S79					
	S80					
15 39	S81			19'0"	TILL - clayey, silty, low plasticity frequent gravel. - 19 - 21½' gravel, fine, silty, water bearing - very dark grey, unoxidized - moist, stiff, massive	
	S82					
20 34	S83					
	S84					
25 29	S85					
	S86			30'0"	END OF HOLE	
30 24					NOTES: - Mobile Model B52 Continuous flight auger used, 6" diameter - sloughing to 17', water level at 16' on completion	

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PROJECT PROPOSED HOUSING PROJECT
 222-224 SASKATCHEWAN CRESCENT
 LOCATION
 SASKATOON, Saskatchewan



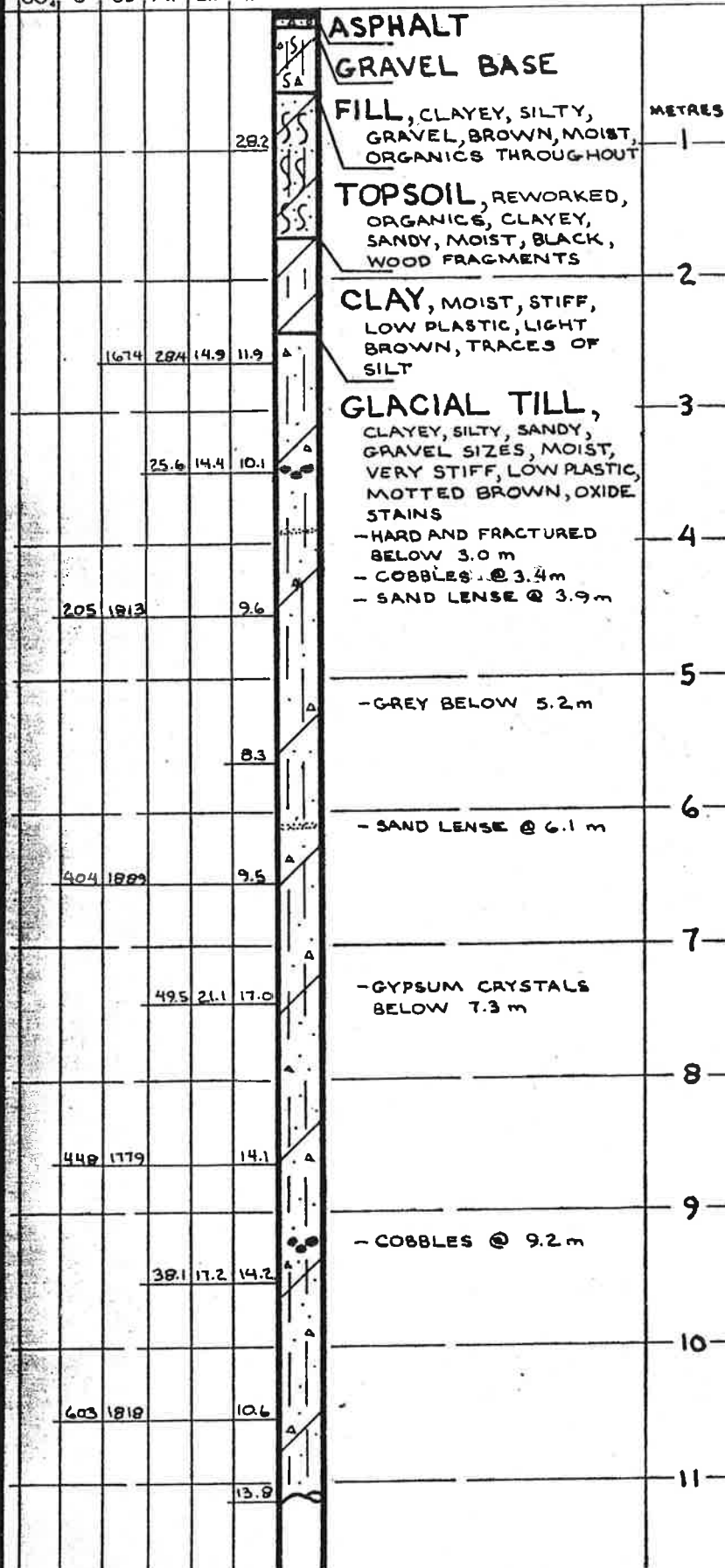
HISTORICAL BOREHOLE LOGS
TH 301 (PMEL81)

P. Machibroda Engineering Ltd. June 17, 1981. Geotechnical Investigation Proposed Apartment Building
Saskatchewan Crescent, Saskatoon, Saskatchewan

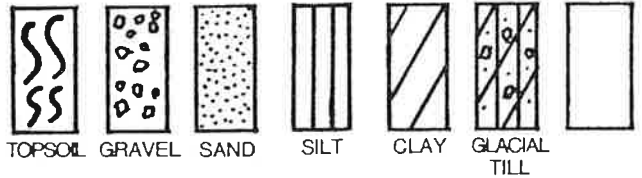
TEST HOLE 301

ELEV. 476.9 m (CITY DATUM)

SO, U, σ_d , Pw, Lw, w



LEGEND:



COMBINATION OF ABOVE SHOWN WITH PREDOMINANT SOIL TYPE IN HEAVY LINE AND MODIFYING SOIL TYPE IN LIGHT LINE.

σ_d DRY DENSITY (kg/m³)

w WATER CONTENT (PERCENT OF DRY SOIL WT)

Lw LIQUID LIMIT

Pw PLASTIC LIMIT

U UNCONFINED COMPRESSIVE STRENGTH (k Pa)

SO* SULPHATE CONTENT (PERCENT OF DRY SOIL)

TR TRACE

* SULPHATE CONTENT WATER SAMPLE (PPM)

v RECORDED WATER LEVEL

N NUMBER OF BLOWS TO ADVANCE A 51 mm O.D. SPLIT SAMPLER 30 cm INTO THE SOIL USING A 63.5 kg HAMMER DROPPING FREELY A DISTANCE OF 76 cm (475 J PER BLOW).

LIMITATIONS:

THE FIELD DRILL LOG IS A SUMMARY OF FIELD CONDITIONS ENCOUNTERED AT A SPECIFIC TEST HOLE LOCATION AT THE TIME OF TEST DRILLING. SUBSURFACE CONDITIONS MAY VARY AT OTHER LOCATIONS OF THIS SITE AND, IN TIME, MAY CHANGE AT THE SPECIFIC LOCATION OF ANY TEST HOLE.

P. MACHIBRODA ENGINEERING LTD.



2331 MILLAR AVENUE
SASKATOON, SASK.

CONSULTING
ENGINEERS

FIELD DRILL LOGS AND SOIL TEST RESULTS

PROJECT:

PROPOSED APARTMENT BUILDING
SASKATOON, SASKATCHEWAN

LOCATION:

200 BLOCK SASKATCHEWAN CRES.
SASKATOON, SASKATCHEWAN

SCALE: 1:50

DRAWING NUMBER:

DATE: JUNE 17, 1991

581-335-2



HISTORICAL BOREHOLE LOGS
TH 101, TH102, TH 103, TH 104, TH 105, TH 106, TH 107, P201, P202
(CLIF83)

Clifton Associates Ltd. Aug. 17, 1983. Geotechnical Studies Proposed Park Terrace Condominiums 222 Saskatchewan Crescent East Saskatoon, SK.

TEST HOLE LOG

DATE 83/07/28
 DRILL Brat 22
 LOGGED BY Dave Williamson

GROUND ELEV. 484.84 m (Geodetic)
 LOCATION _____

TEST HOLE NO. **103**

SHEAR STRENGTH - kPa
 UNCONF. POCKET PEN. LAB VANE

DEPTH m	SYMBOL	DESCRIPTION OF MATERIALS	SAMPLE	USC	SHEAR STRENGTH - kPa				
					PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT		
1		CLAY - silty - olive gray (5y5/2), oxidized - very moist, soft - organics - disturbed (Fill)							
2		1.5 m CLAY - medium plastic - silty - olive (5y5/3), oxidized - moist, firm - laminated, Fe stains							
3		2.3 m TILL - low plastic, sandy silty clay matrix - light olive brown (2.5y5/4), oxidized - damp, stiff - heavy Fe stains							
4		3.1 m SAND - fine grained, silty, occasional pebbles - yellowish brown (10YR5/6), oxidized - Fe stains							
5		3.6 m TILL - medium plastic, sandy clay matrix - olive grey (5y4/2), oxidized becoming very dark grey (5y3/1), unoxidized below 4.0 m - heavy Fe stains - saturated sand seams below 5.25 m							
6		6.0 m E.O.H.							
		NOTES: 1). Drilled using 125 mm diameter solid stem continuous flight augers.							
					1300	1500	1700	1900	2100
					▲ DRY DENSITY - kg/m ³				



Clifton Associates Ltd.
 CONSULTING GEOTECHNICAL ENGINEERS
 REGINA SASKATOON

PROJECT PARK TERRACE CONDOMINIUMS
 LOCATION Saskatoon, Saskatchewan
 PROJECT NO. S145 PAGE NO. _____

TEST HOLE LOG

DATE <u>83/07/28</u>	GROUND ELEV. <u>483.62 (Geodetic)</u>	TEST HOLE NO. <u>104</u>
DRILL <u>Brat 22</u>	LOCATION _____	SHEAR STRENGTH - kPa <input type="checkbox"/> UNCONF. <input type="checkbox"/> POCKET PEN. <input checked="" type="checkbox"/> LAB VANE 50 100 150 200
LOGGED BY <u>Dave Williamson</u>		

DEPTH m	SYMBOL	DESCRIPTION OF MATERIALS	SAMPLE	USC	SHEAR STRENGTH - kPa				
					PLASTIC LIMIT	WATER CONTENT		LIQUID LIMIT	
					10	30	50	70	90%
	[Cross-hatch]	0.05 m ASPHALT, TOPSOIL, AND GRAVEL FILL							
1	[Horizontal lines]	0.6 m CLAY - medium plastic, silty, laminated - olive (5y5/3), oxidized - very moist, soft to firm, Fe and salt stains							
2	[Diagonal lines]	1.0 m TILL - medium plastic, silty clay matrix - olive (5y5/3), oxidized - moist, firm - heavy Fe stains - salts							
3	[Dotted]	1.9 m SAND - fine grained, silty - olive yellow (2.5y6/6), oxidized - moist - Fe stains							
4	[Cross-hatch]	2.5 m TILL - medium plastic, silty clay matrix - olive brown (2.5y4/4), oxidized, becoming dark grey (5y4/1), unoxidized below 3.75 m - moist, stiff - becomes stiffer with depth							
5	[Cross-hatch]								
6	[Cross-hatch]	6.0 m E.O.H.							
		NOTES: 1). Drilled using 125 mm diameter continuous flight augers.							
					1300	1500	1700	1900	2100
					▲ DRY DENSITY - kg/m ³				

Clifton Associates Ltd.

CONSULTING GEOTECHNICAL ENGINEERS
REGINA SASKATOON

PROJECT <u>PARK TERRACE CONDOMINIUMS</u>	
LOCATION <u>Saskatoon, Saskatchewan</u>	
PROJECT NO. <u>S145</u>	PAGE NO. _____

TEST HOLE LOG

DATE 83/07/28

GROUND ELEV. 480.82 m (Geodetic)

TEST HOLE NO. **105**

DRILL Brat 22

LOCATION _____

LOGGED BY Dave Williamson

SHEAR STRENGTH - kPa
 UNCONF. POCKET PEN. LAB VANE

DEPTH m	SYMBOL	DESCRIPTION OF MATERIALS	SAMPLE	USC	SHEAR STRENGTH - kPa		
					PLASTIC LIMIT	WATER CONTENT	LIQUID LIMIT
1		SILT - with organics - black (10YR2/1), oxidized - moist, firm - wood chips - disturbed (Fill)	1		30	50	90
2		1.6 m CLAY - medium plastic, silty - dark greyish brown (2.5y4/2), oxidized - very moist, firm - laminated - Fe stains - trace organics - with silt and sand below 3.2 m	2		30	50	90
3			3		30	50	90
4		3.5 m TILL - medium plastic silty clay matrix - light olive brown (2.5y5/4), oxidized - moist, firm becoming stiffer with depth - Fe stains	4		30	50	90
5		4.5 m SAND - medium grained, silty - dark yellowish brown (10YR4/4), oxidized - moist - heavy Fe stains - occasional till lumps	5		30	50	90
6		5.4 m TILL - medium plastic silty clay matrix - olive brown (2.5y4/4), oxidized, becoming dark olive grey (5y3/2), unoxidized below 6.3 m - damp, very stiff - brittle - heavy Fe stains	6		30	50	90
7			7		30	50	90
8		7.5 m E.O.H. NOTES: 1). Drilled using 125 mm diameter solid stem continuous flight augers.	8		30	50	90



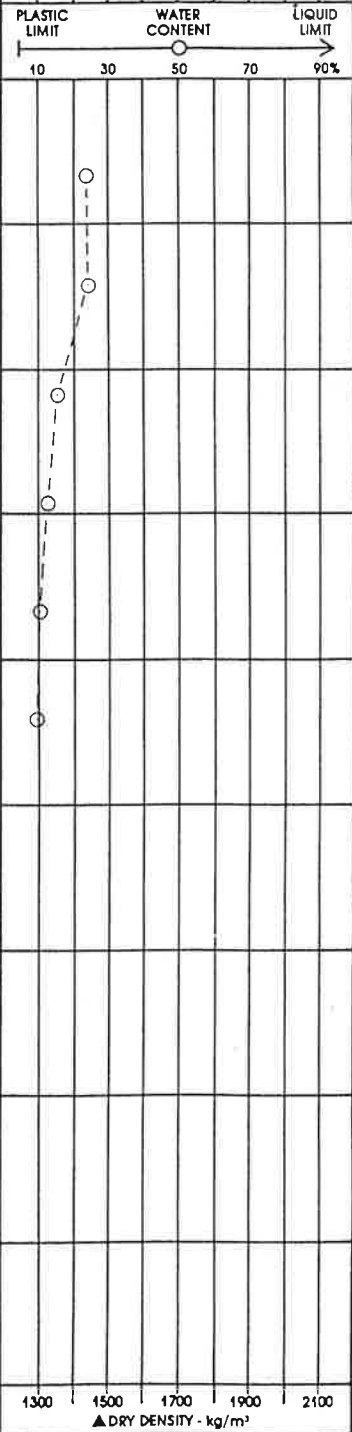
Clifton Associates Ltd.
 CONSULTING GEOTECHNICAL ENGINEERS
 REGINA SASKATOON

PROJECT PARK TERRACE CONDOMINIUMS
 LOCATION Saskatoon, Saskatchewan
 PROJECT NO. S145 PAGE NO. _____

TEST HOLE LOG

DATE <u>83/07/28</u>	GROUND ELEV. <u>481.95 m (Geodetic)</u>	TEST HOLE NO. 106
DRILL <u>Brat 22</u>	LOCATION _____	
LOGGED BY <u>Dave Williamson</u>		

DEPTH m	SYMBOL	DESCRIPTION OF MATERIALS	SAMPLE	USC	SHEAR STRENGTH - kPa		
					UNCONF. 50	POCKET PEN. 100 150	LAB VANE 200
1	[Symbol: Horizontal dashes]	CLAY - silty, with organics - black (10YR2/1), oxidized - moist - disturbed (Fill)					
1.4 m							
2	[Symbol: Diagonal cross-hatch]	TILL - medium plastic silty sandy clay matrix - light olive brown (2.5y5/4), oxidized - becoming olive brown (2.5y4/4), with depth - moist - stiff to very stiff - brittle - heavy Fe stains					
3							
4							
4.5 m E.O.H.							
5		NOTES: 1). Drilled using 125 mm diameter continuous flight, solid stem augers.					

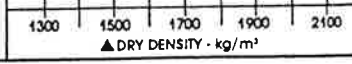


	Clifton Associates Ltd.	PROJECT <u>PARK TERRACE CONDOMINIUMS</u>
	CONSULTING GEOTECHNICAL ENGINEERS REGINA SASKATOON	LOCATION <u>Saskatoon, Saskatchewan</u>
		PROJECT NO. <u>S145</u> PAGE NO. _____

TEST HOLE LOG

DATE <u>83/07/28</u>	GROUND ELEV. <u>497.254 m (Geodetic)</u>	TEST HOLE NO. <u>107</u>
DRILL <u>Brat 22</u>	LOCATION _____	SHEAR STRENGTH - kPa <input checked="" type="checkbox"/> UNCONF. <input type="checkbox"/> POCKET PEN. <input checked="" type="checkbox"/> LAB VANE
LOGGED BY <u>Dave Williamson</u>		

DEPTH m	SYMBOL	DESCRIPTION OF MATERIALS	SAMPLE	USC	SHEAR STRENGTH - kPa					
					PLASTIC LIMIT	WATER CONTENT			LIQUID LIMIT	
					10	50	100	150	200	90%
1	+	0.1 m <u>TOPSOIL</u> SILT - with silty clay lumps and fine sand - dark brown (10YR3/3), oxidized, becoming light grey (2.5y7/2) below 0.8 m - heavy organics to 0.8 m - damp								
2	+									
3	+									
4	.	3.9 m <u>SAND</u> - fine grained, silty - light yellowish brown (2.5y6/4), oxidized - damp								
5	-	4.8 m <u>CLAY</u> - highly plastic - olive (5y4/3), oxidized - moist, stiff - laminated - organic odour - Fe stains								
6	-	6.0 m <u>E.O.H.</u> NOTES: 1). Drilled using 125 mm diameter, continuous flight, solid stem augers.								



Clifton Associates Ltd.
 CONSULTING GEOTECHNICAL ENGINEERS
 REGINA SASKATOON

PROJECT PARK TERRACE CONDOMINIUMS
 LOCATION Saskatoon, Saskatchewan
 PROJECT NO. S145 PAGE NO. _____

PIEZOMETER CONSTRUCTION DETAILS

DEPTH m	PIEZOMETER DETAIL	SYMBOL	SOIL DESCRIPTION	ELEV. m	PIEZOMETER NO. <u>P101</u> TEST HOLE NO. <u>101</u>
0		④		486.44	LOCATION _____
1		③	CLAY - fill - silty	486.36	TOP PIPE ELEV. <u>486.44</u> GROUND ELEV. <u>486.36</u> BASE SCREEN ELEV. <u>483.05</u> PIPE TYPE <u>38 mm PVC Schedule 80</u> SCREEN <u>51 mm PVC Johnson 10 slot</u>
2		②	CLAY - medium to highly plastic		TEST HOLE DIA. <u>125 mm</u> INST. DATE <u>July 28, 1983</u> TECHNICIAN <u>D.W. Williamson</u> CONTRACTOR <u>Anderson Drilling</u> DRILL <u>Brat 22 Continuous Flight</u>
3		①	TILL - oxidized	483.90	WATER LEVELS DATE TIME DEPTH-m ELEV.-m
4			- unoxidized		UPON COMPLETION
5					83/07/28 1545 ---- ----
6		GRAVEL	480.36	ADDITIONAL READINGS	
				83/08/02 0915 2.04 484.40	
				83/08/09 1355 2.13 484.31	
				REMARKS <u>Construction Materials</u>	
				<u>1. Auger Cuttings</u>	
				<u>2. 12-20 Silica Sand</u>	
				<u>3. Bentonite Pellets</u>	
				<u>4. Auger Cuttings</u>	
				<u>All elevations referenced to Geodetic Datum.</u>	
				DRAWN BY <u>GJB</u> APPROVED BY _____	



Clifton Associates Ltd.

CONSULTING GEOTECHNICAL ENGINEERS
REGINA SASKATOON

CLIENT Starport Investments Ltd.
PROJECT Park Terrace Condominiums
LOCATION Saskatoon, Saskatchewan
DATE 83/08/09 PROJECT NO. S145



APPENDIX E
Record of Borehole Logs

HISTORICAL BOREHOLE LOGS
SI1, SI2, SI3, P801G, P802G, P803G (GAL85)

Golder Associates Ltd. May 1985. Progress Report No. 1 Slope Monitoring Program, Park Terrace Condominiums, 222 Saskatchewan Crescent East, Saskatoon, Saskatchewan

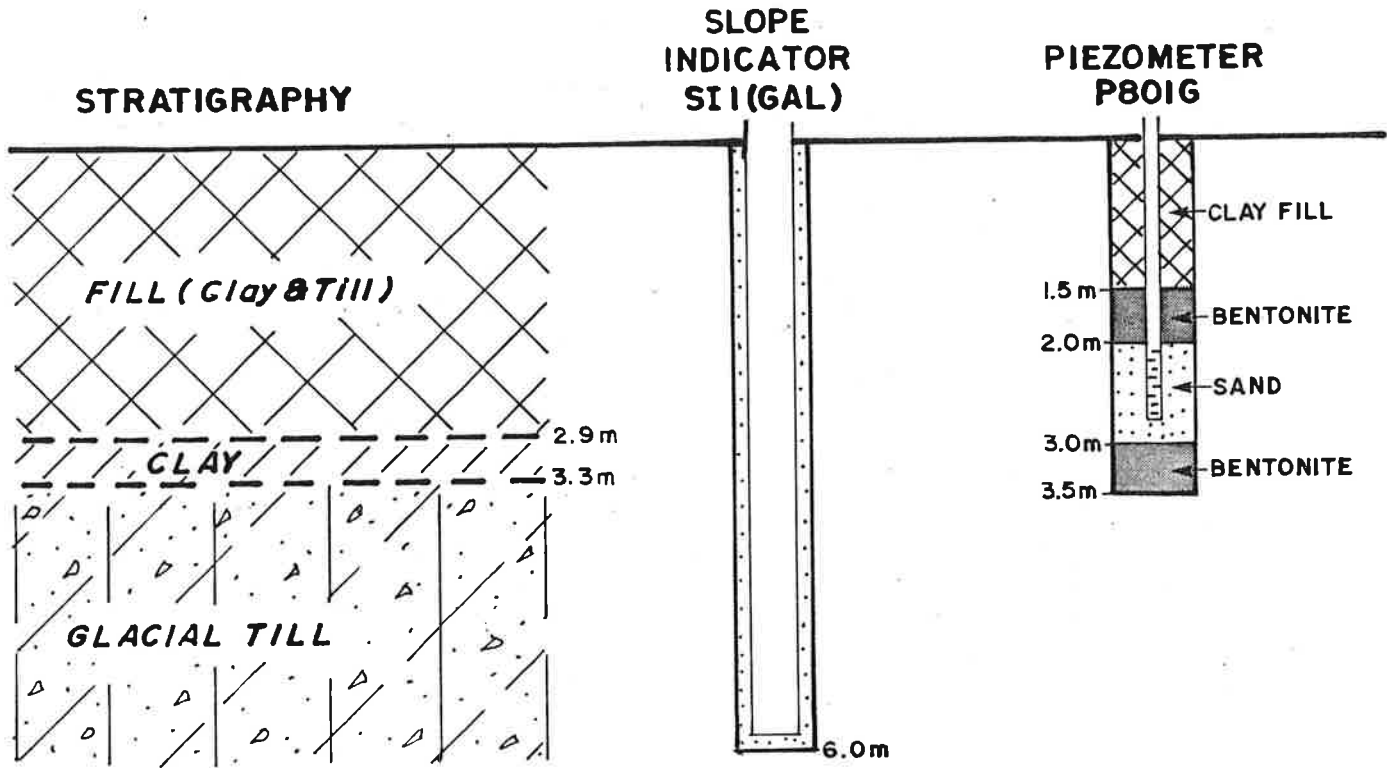
INSTRUMENTATION NEST NO. 1 SLOPE MONITORING PROGRAM

FIGURE SM 1

PARK TERRACE CONDOMINIUMS

SASKATOON, SASK.

LOCATION — IN CHERRY LANE NEAR EAST PROPERTY LINE. (SEE LOCATION PLAN.)



SCALE — 1 : 75

DATE OF INSTALLATION

SLOPE INDICATOR SI 1 — APRIL 2, 1985.

PIEZOMETER P801G — MAY 7, 1985.

Date MAY 16 / 85.
Project 852-6010

Golder Associates

Drawn N.E.
Chkd [Signature]

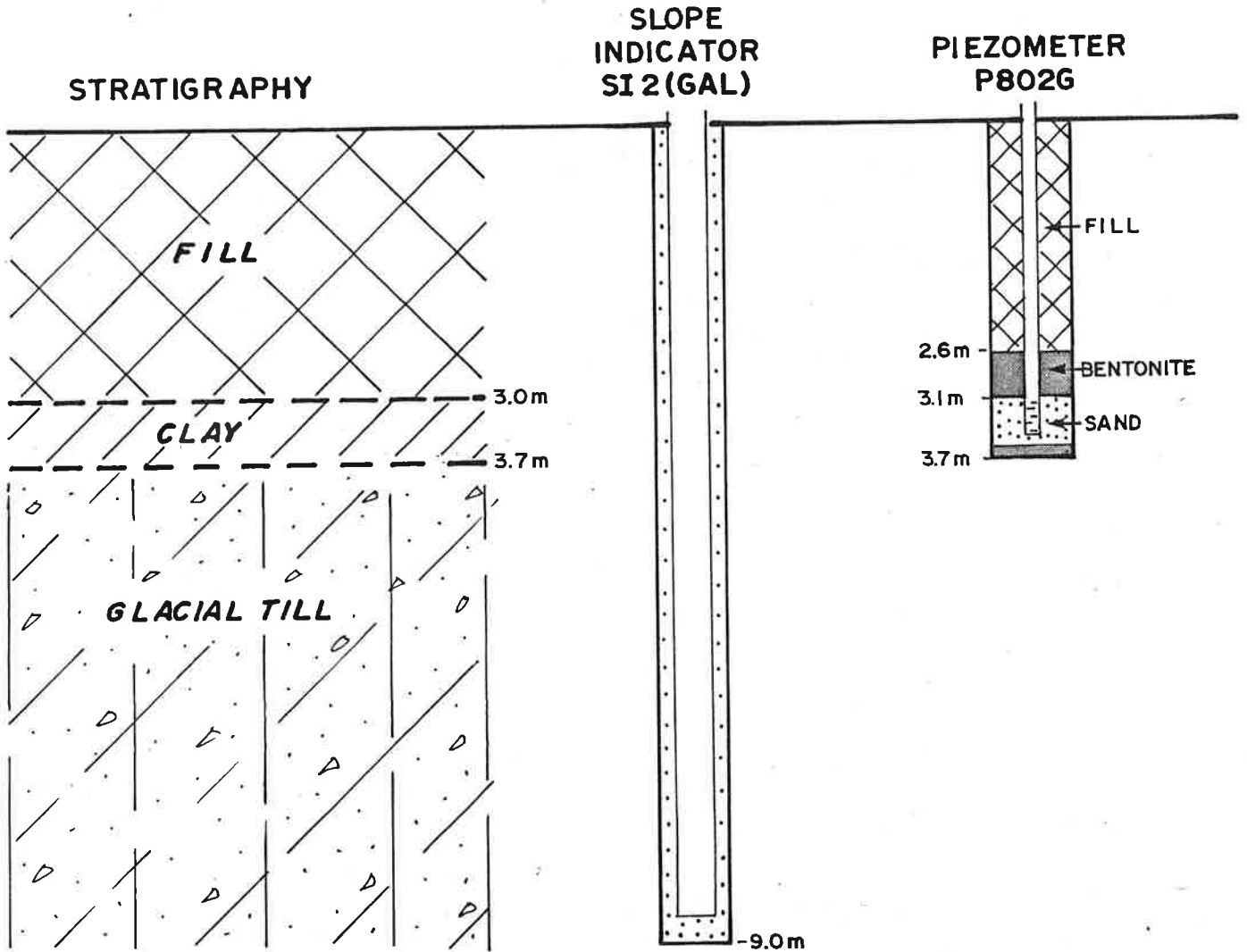
INSTRUMENTATION NEST NO. 2 SLOPE MONITORING PROGRAM

FIGURE SM 2

PARK TERRACE CONDOMINIUMS

SASKATOON, SASK.

LOCATION - CHERRY LANE NEAR WEST PROPERTY LINE (SEE LOCATION PLAN.)



SCALE - 1:75

DATE OF INSTALLATION

SLOPE INDICATOR SI 2 - APRIL 2, 1985.

PIEZOMETER P802G - MAY 7, 1985.

Date MAY 21/85.
Project 852-6010

Golder Associates

Drawn N.E.
Chkd [Signature]

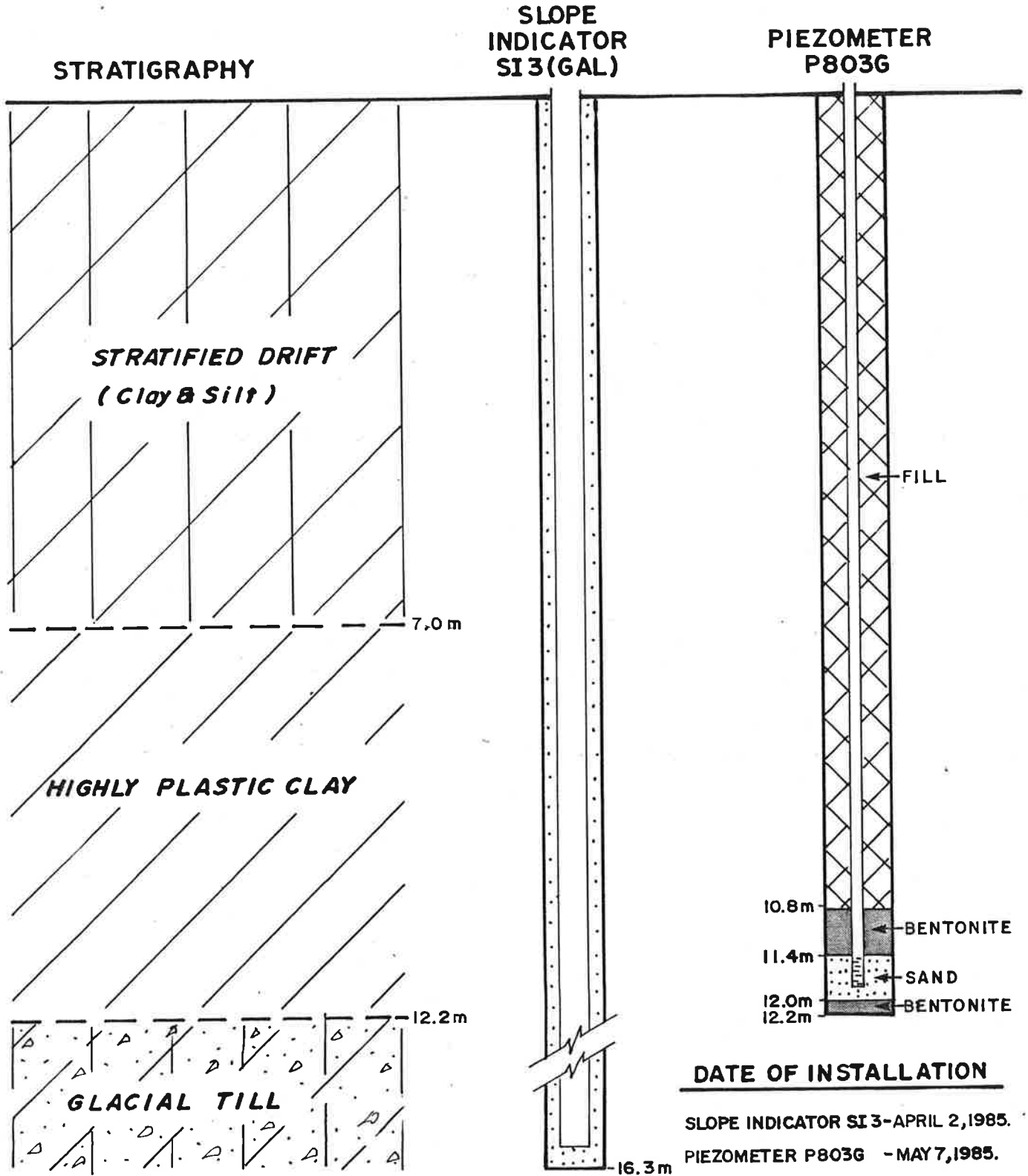
INSTRUMENTATION NEST NO. 3 SLOPE MONITORING PROGRAM

FIGURE SM 3

PARK TERRACE CONDOMINIUMS

SASKATOON, SASK.

LOCATION - TOP OF SLOPE NEAR ELEVENTH STREET.



DATE OF INSTALLATION

SLOPE INDICATOR SI3 - APRIL 2, 1985.

PIEZOMETER P803G - MAY 7, 1985.

SCALE - 1 : 75

Date MAY. 21/85
Project 852-6010

Golder Associates

Drawn N.E.
Chkd AM



APPENDIX E
Record of Borehole Logs

HISTORICAL BOREHOLE LOGS
TH 97-01, TH 97-02, TH 97-03, TH 97-04 (PMEL97)

P. Machibroda Engineering Ltd. Sept. 15, 1997. Geotechnical Investigation and Slope Stability Study Proposed Residential Development, 237-11th Street East, Saskatoon, Saskatchewan

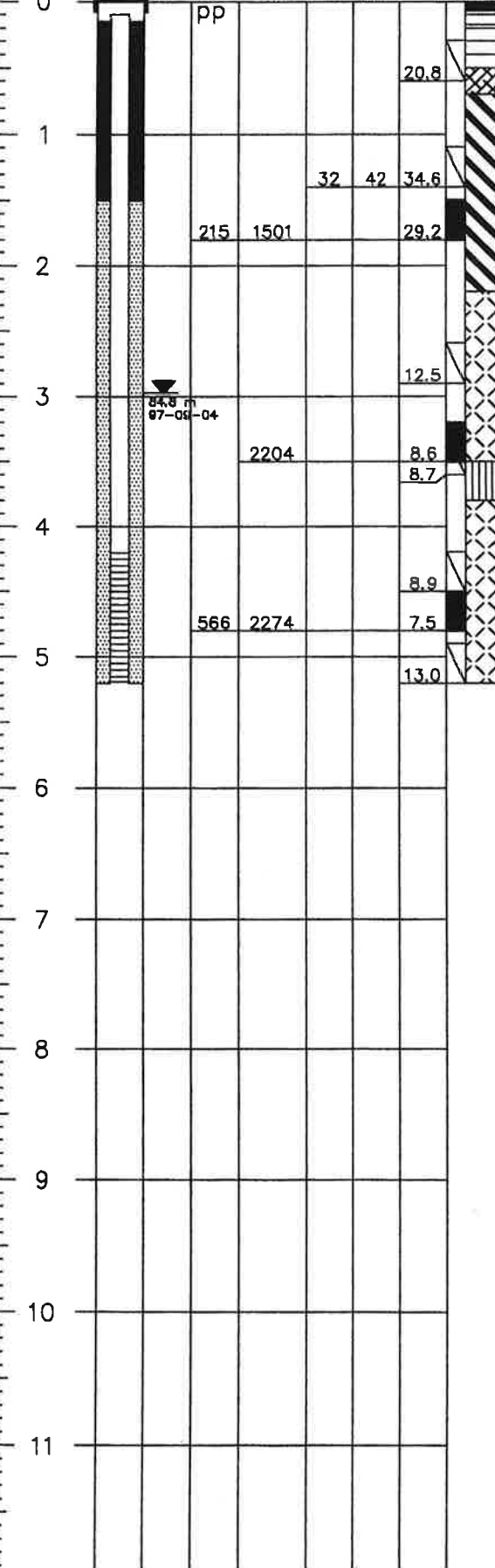
TEST HOLE 97-1

DEPTH (m)

PIEZO. ELEV. = 87.63 m

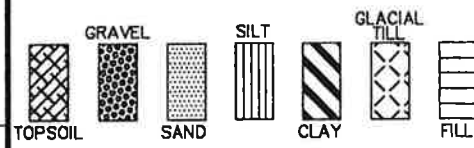
ELEV: 87.73 m

N U D Pw Lw w



NOTE:
1) Auger refusal at 5.2 m.

LEGEND:



pp....POCKET PENETROMETER (kg/cm²)
w.....WATER CONTENT (PERCENT OF DRY SOIL WEIGHT)
Lw....LIQUID LIMIT
Pw....PLASTIC LIMIT
D.....DRY DENSITY (kg/m³)
U.....UNCONFINED COMPRESSIVE STRENGTH (kPa)
N.....STANDARD PENETRATION TEST
SO....SULPHATE CONTENT (PERCENT OF DRY SOIL)
TR....TRACE
*.....SULPHATE CONTENT WATER SAMPL (ppm)
▼.....RECORDED WATER LEVEL

LIMITATIONS: THE FIELD DRILL LOG IS A SUMMARY OF THE FIELD CONDITIONS ENCOUNTERED AT A SPECIFIC TEST HOLE LOCATION AT THE TIME OF TEST DRILLING. SUBSURFACE CONDITIONS MAY VARY AT OTHER LOCATIONS OF THIS SITE AND IN TIME, MAY CHANGE AT THE SPECIFIC TEST HOLE LOCATION

P. MACHIBRODA ENGINEERING LTD.



FIELD DRILL LOG AND SOIL TEST RESULTS

PROJECT:
SLOPE STABILITY STUDY
237-11TH STREET EAST

LOCATION:
SASKATOON, SK

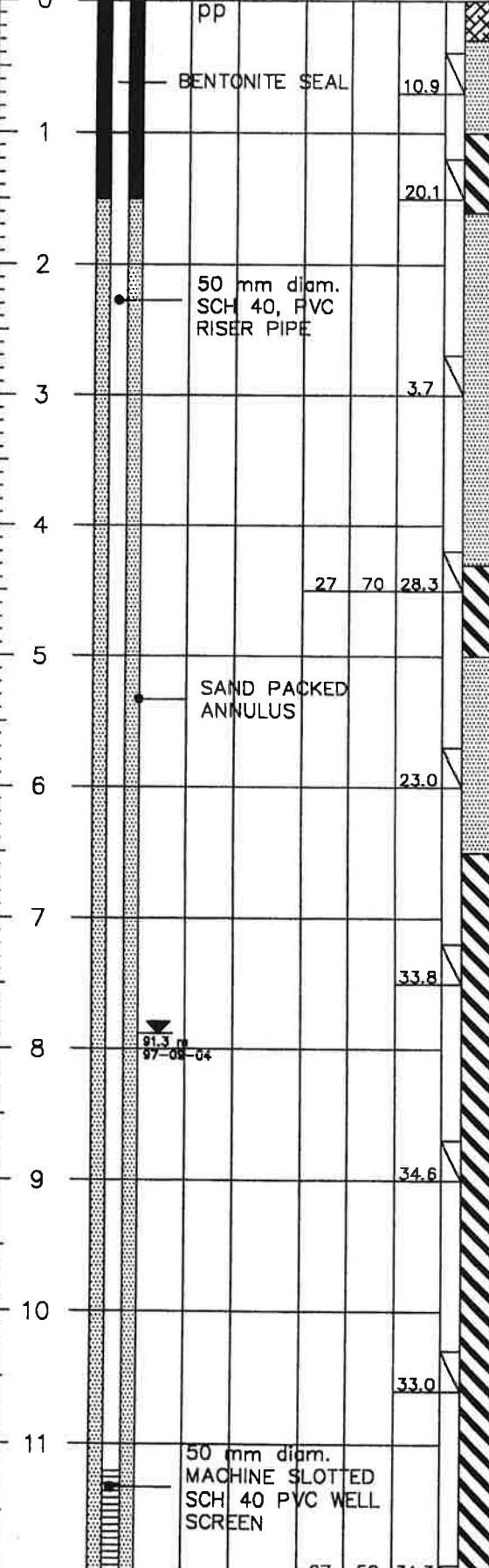
DATE DRILLED: AUG 5, 1997
DRAWING NUMBER: S97-2778-2

TEST HOLE 97-2

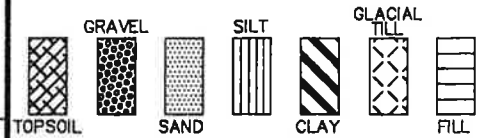
DEPTH (m)

PIEZO = 99.85 m

N U D Pw Lw w ELEV: 99.14 m



LEGEND:



pp....POCKET PENETROMETER (kg/cm²)
 w.....WATER CONTENT (PERCENT OF DRY SOIL WEIGHT)
 Lw....LIQUID LIMIT
 Pw....PLASTIC LIMIT
 D.....DRY DENSITY (kg/m³)
 U.....UNCONFINED COMPRESSIVE STRENGTH (kPa)
 N.....STANDARD PENETRATION TEST
 SO....SULPHATE CONTENT (PERCENT OF DRY SOIL)
 TR....TRACE
 *.....SULPHATE CONTENT WATER SAMPLE (ppm)
 ▼.....RECORDED WATER LEVEL



LIMITATIONS: THE FIELD DRILL LOG IS A SUMMARY OF THE FIELD CONDITIONS ENCOUNTERED AT A SPECIFIC TEST HOLE LOCATION AT THE TIME OF TEST DRILLING. SUBSURFACE CONDITIONS MAY VARY AT OTHER LOCATIONS OF THIS SITE AND IN TIME, MAY CHANGE AT THE SPECIFIC TEST HOLE LOCATION.

P. MACHIBRODA ENGINEERING LTD.



FIELD DRILL LOG AND SOIL TEST RESULTS

PROJECT:
 SLOPE STABILITY STUDY
 237-11TH STREET EAST

LOCATION:
 SASKATOON, SK

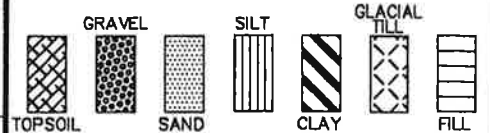
DATE DRILLED: AUG 5, 1997
DRAWING NUMBER: S97-2778-3

TEST HOLE 97-3

DEPTH (m)

N U D Pw Lw w ELEV: 99.33 m

LEGEND:



pp....POCKET PENETROMETER (kg/cm²)

w.....WATER CONTENT (PERCENT OF DRY SOIL WEIGHT)

Lw....LIQUID LIMIT

Pw....PLASTIC LIMIT

D.....DRY DENSITY (kg/m³)

U.....UNCONFINED COMPRESSIVE STRENGTH (kPa)

N.....STANDARD PENETRATION TEST

SO....SULPHATE CONTENT (PERCENT OF DRY SOIL)

TR....TRACE

*.....SULPHATE CONTENT WATER SAMPLE (ppm)

▼.....RECORDED WATER LEVEL



LIMITATIONS: THE FIELD DRILL LOG IS A SUMMARY OF THE FIELD CONDITIONS ENCOUNTERED AT A SPECIFIC TEST HOLE LOCATION AT THE TIME OF TEST DRILLING. SUBSURFACE CONDITIONS MAY VARY AT OTHER LOCATIONS OF THIS SITE AND IN TIME, MAY CHANGE AT THE SPECIFIC TEST HOLE LOCATION.

P. MACHIBRODA ENGINEERING LTD.

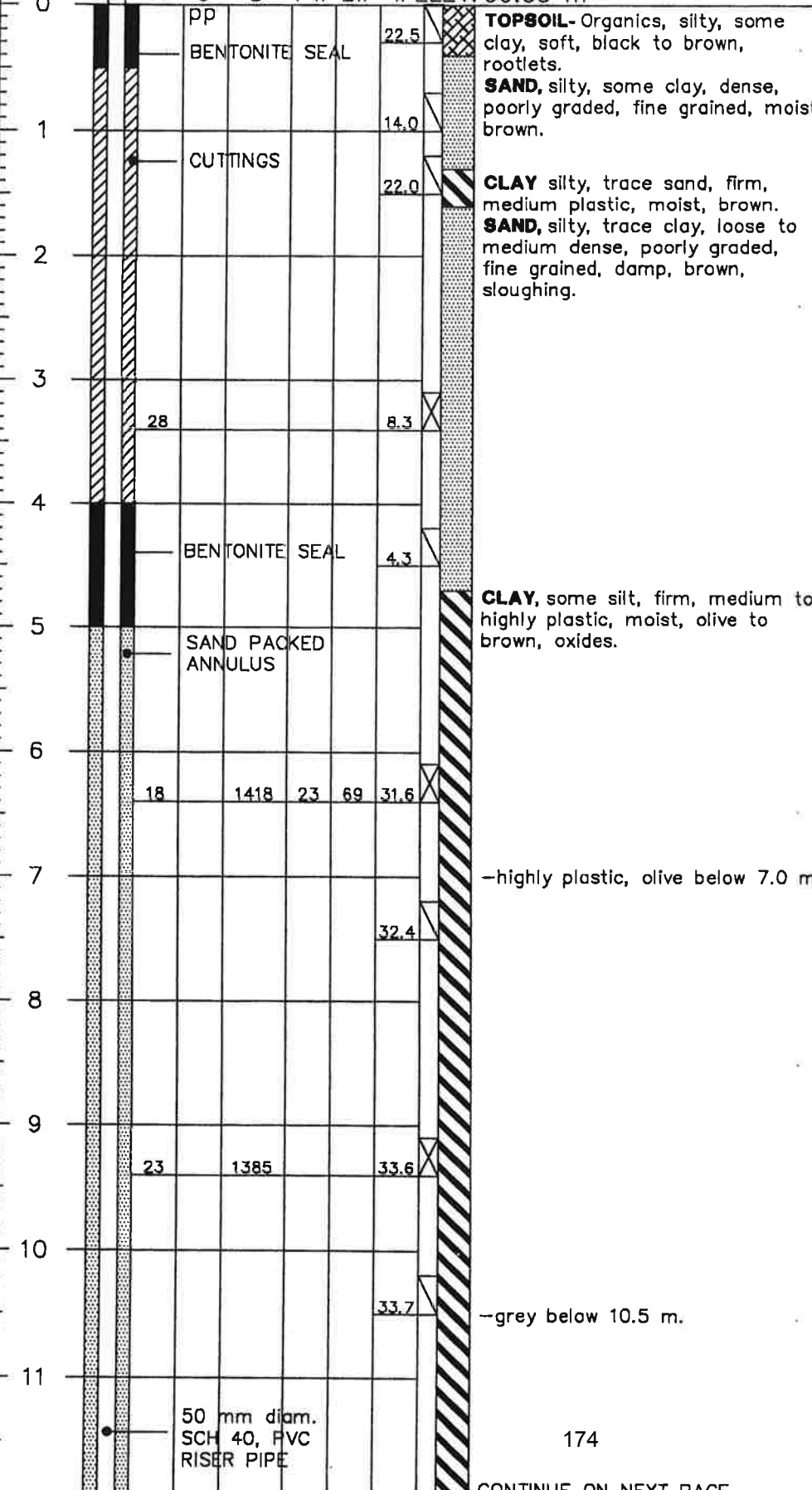


FIELD DRILL LOG AND SOIL TEST RESULTS

PROJECT:
SLOPE STABILITY STUDY
237-11TH STREET EAST

LOCATION:
SASKATOON, SK

DATE DRILLED: AUG 5, 1997
DRAWING NUMBER: S97-2778-4



TEST HOLE 97-3

DEPTH
(m)

DEPTH (m)	N	U	D	Pw	Lw	w
12		pp				
12.26			1454			30.3
12.88.8						
12.97-02-04						
13						
13.2						
14						
15						
15.3						
16						
15.8						
17						
18						
19						
20						
21						
22						
23						

CLAY, some silt, firm, highly plastic, moist, grey, oxides.

GLACIAL TILL- Clay, silty, some sand, trace gravel, firm, medium plastic, moist, grey, unoxidized.

SAND PACKED ANNULUS

50 mm diam. SCH 40, PVC RISER PIPE

50 mm diam. MACHINE SLOTTED SCH 40 PVC WELL SCREEN

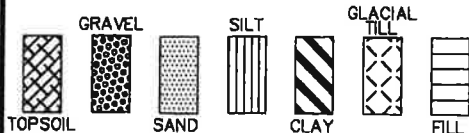
-sand silty, some clay below 14.9 m.
-seepage at 15.0 m.
-cobbles below 15.0 m.
-sloughed to 15.7 m immediately after drilling.

-cobbles/boulders at 17.0 m.

NOTE:

1. Auger refusal at 17.0 m.
2. Test Hole sloughed to 15.7 m immediately after drilling.

LEGEND:



pp....POCKET PENETROMETER (kg/cm²)

w.....WATER CONTENT (PERCENT OF DRY SOIL WEIGHT)

Lw....LIQUID LIMIT

Pw....PLASTIC LIMIT

D.....DRY DENSITY (kg/m³)

U.....UNCONFINED COMPRESSIVE STRENGTH (kPa)

N.....STANDARD PENETRATION TEST

SO....SULPHATE CONTENT (PERCENT OF DRY SOIL)

TR....TRACE

*.....SULPHATE CONTENT WATER SAMPLE (ppm)

▼.....RECORDED WATER LEVEL



LIMITATIONS: THE FIELD DRILL LOG IS A SUMMARY OF THE FIELD CONDITIONS ENCOUNTERED AT A SPECIFIC TEST HOLE LOCATION AT THE TIME OF TEST DRILLING. SUBSURFACE CONDITIONS MAY VARY AT OTHER LOCATIONS OF THIS SITE AND IN TIME, MAY CHANGE AT THE SPECIFIC TEST HOLE LOCATION.

P. MACHIBRODA ENGINEERING LTD.



FIELD DRILL LOG AND SOIL TEST RESULTS

PROJECT:
SLOPE STABILITY STUDY
237-11TH STREET EAST

LOCATION:
SASKATOON, SK

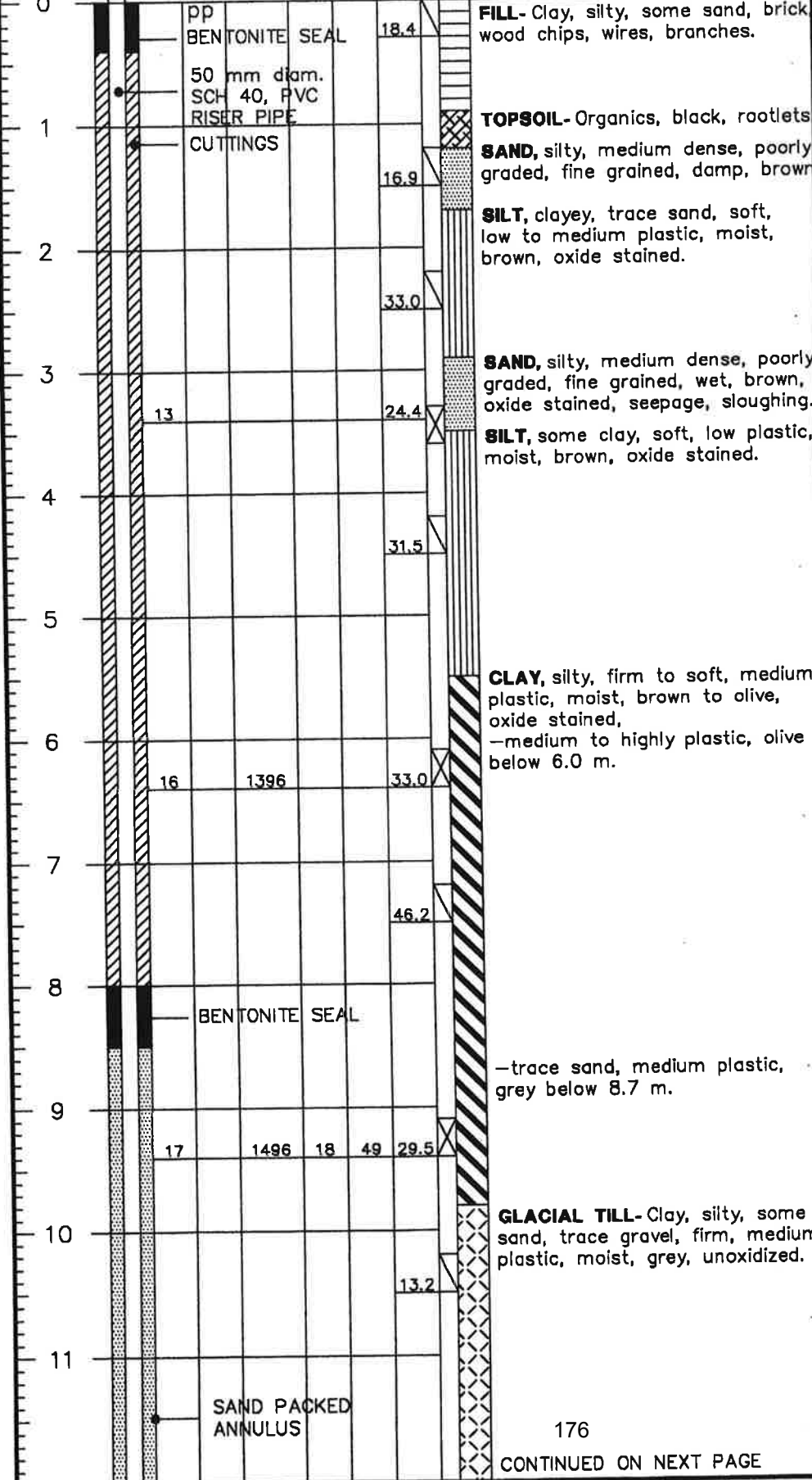
DATE DRILLED: AUG 5, 1997
DRAWING NUMBER: S97-2778-4A

TEST HOLE 97-4

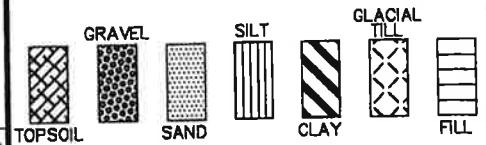
DEPTH (m)

PIEZO. ELEV. = 97.22 m

N U D Pw Lw w ELEV: 96.66 m



LEGEND:



pp....POCKET PENETROMETER (kg/cm²)

w.....WATER CONTENT (PERCENT OF DRY SOIL WEIGHT)

Lw....LIQUID LIMIT

Pw....PLASTIC LIMIT

D.....DRY DENSITY (kg/m³)

U.....UNCONFINED COMPRESSIVE STRENGTH (kPa)

N.....STANDARD PENETRATION TEST

SO....SULPHATE CONTENT (PERCENT OF DRY SOIL)

TR....TRACE

*.....SULPHATE CONTENT WATER SAMPLE (ppm)

▼.....RECORDED WATER LEVEL



LIMITATIONS: THE FIELD DRILL LOG IS A SUMMARY OF THE FIELD CONDITIONS ENCOUNTERED AT A SPECIFIC TEST HOLE LOCATION AT THE TIME OF TEST DRILLING. SUBSURFACE CONDITIONS MAY VARY AT OTHER LOCATIONS OF THIS SITE AND IN TIME, MAY CHANGE AT THE SPECIFIC TEST HOLE LOCATION.

P. MACHIBRODA ENGINEERING LTD.



FIELD DRILL LOG AND SOIL TEST RESULTS

PROJECT:
SLOPE STABILITY STUDY
237-11TH STREET EAST

LOCATION:
SASKATOON, SK

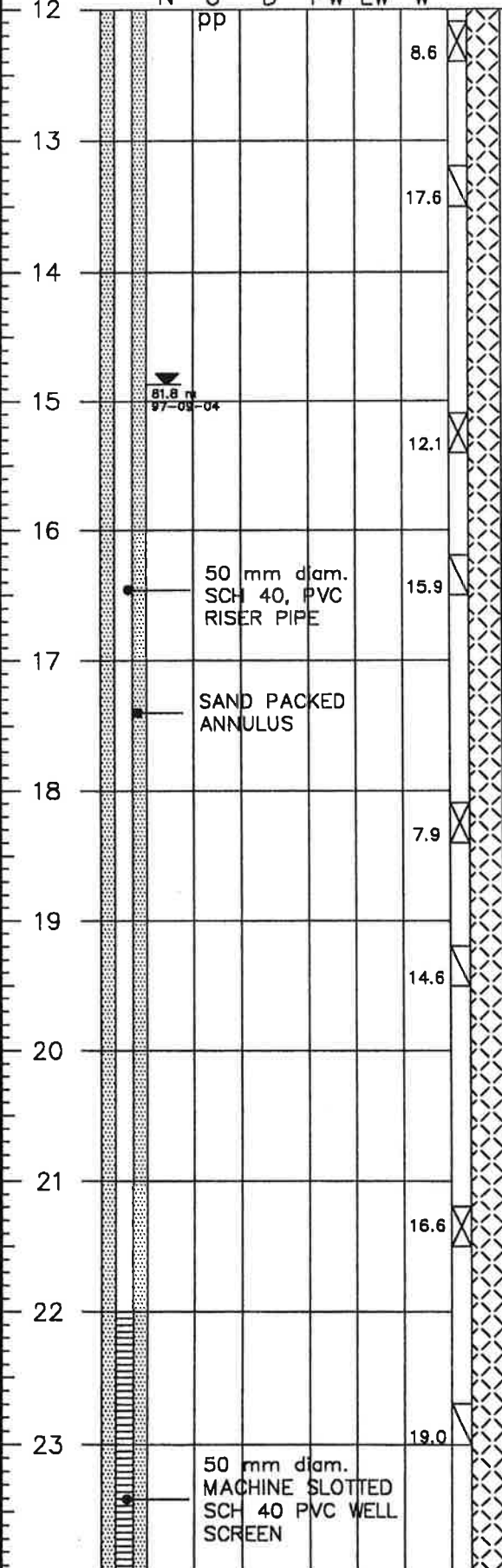
DATE DRILLED:
AUG 5, 1997

DRAWING NUMBER:
S97-2778-5

TEST HOLE 97-4

DEPTH (m)

N U D Pw Lw w



GLACIAL TILL-Clay, silty, some sand, trace gravel, stiff, low to medium plastic, moist, grey.
 -seepage at 12.0 m.
 -cobble below 12.5 m.
 -soft below 12.8 m.

-hard medium plastic below 13.5 m.

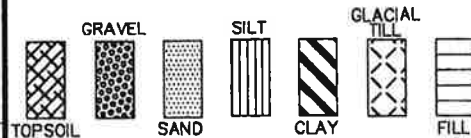
51.8 m
97-03-04

50 mm diam.
SCH 40, PVC
RISER PIPE

SAND PACKED
ANNULUS

50 mm diam.
MACHINE SLOTTED
SCH 40 PVC WELL
SCREEN

LEGEND:



pp....POCKET PENETROMETER (kg/cm²)

w.....WATER CONTENT (PERCENT OF DRY SOIL WEIGHT)

Lw....LIQUID LIMIT

Pw....PLASTIC LIMIT

D.....DRY DENSITY (kg/m³)

U.....UNCONFINED COMPRESSIVE STRENGTH (kPa)

N.....STANDARD PENETRATION TEST

SO....SULPHATE CONTENT (PERCENT OF DRY SOIL)

TR....TRACE

*.....SULPHATE CONTENT WATER SAMPL (ppm)

▼.....RECORDED WATER LEVEL



LIMITATIONS:THE FIELD DRILL LOG IS A SUMMARY OF THE FIELD CONDITIONS ENCOUNTERED AT A SPECIFIC TEST HOLE LOCATION AT THE TIME OF TEST DRILLING. SUBSURFACE CONDITIONS MAY VARY AT OTHER LOCATIONS OF THIS SITE AND IN TIME, MAY CHANGE AT THE SPECIFIC TEST HOLE LOCATION

P. MACHIBRODA ENGINEERING LTD.



FIELD DRILL LOG AND SOIL TEST RESULTS

PROJECT:
SLOPE STABILITY STUDY
237-11TH STREET EAST

LOCATION:
SASKATOON, SK


DATE DRILLED: AUG 5, 1997
DRAWING NUMBER: S97-2778-5A

TEST HOLE 97-4

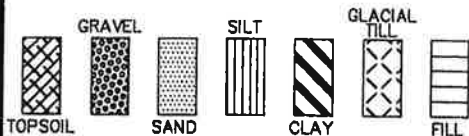
DEPTH
(m)

N U D Pw Lw w

24										
		pp								
								21.1		
25										
26										
27										
28										
29										
30										
31										
32										
33										
34										
35										

 **GLACIAL TILL**-Clay, silty, some sand, trace gravel, hard, medium plastic, moist, grey.

LEGEND:



pp....POCKET PENETROMETER (kg/cm²)

w.....WATER CONTENT (PERCENT OF DRY SOIL WEIGHT)

Lw....LIQUID LIMIT

Pw....PLASTIC LIMIT

D.....DRY DENSITY (kg/m³)

U.....UNCONFINED COMPRESSIVE STRENGTH (kPa)

N.....STANDARD PENETRATION TEST

SO....SULPHATE CONTENT (PERCENT OF DRY SOIL)

TR....TRACE

*.....SULPHATE CONTENT WATER SAMPLE (ppm)

▼.....RECORDED WATER LEVEL



LIMITATIONS:THE FIELD DRILL LOG IS A SUMMARY OF THE FIELD CONDITIONS ENCOUNTERED AT A SPECIFIC TEST HOLE LOCATION AT THE TIME OF TEST DRILLING. SUBSURFACE CONDITIONS MAY VARY AT OTHER LOCATIONS OF THIS SITE AND IN TIME, MAY CHANGE AT THE SPECIFIC TEST HOLE LOCATION.

P. MACHIBRODA ENGINEERING LTD.



**FIELD DRILL LOG
AND
SOIL TEST RESULTS**

PROJECT:
SLOPE STABILITY STUDY
237-11TH STREET EAST

LOCATION:
SASKATOON, SK

DATE DRILLED: AUG 5 1997
DRAWING NUMBER: S07 0778 50



HISTORICAL BOREHOLE LOGS
TH03-1, TH 03-2, TH 03-3, TH 03-101, TH 03-101A, TH 03-102, TH 03-103
(PMEL03A)

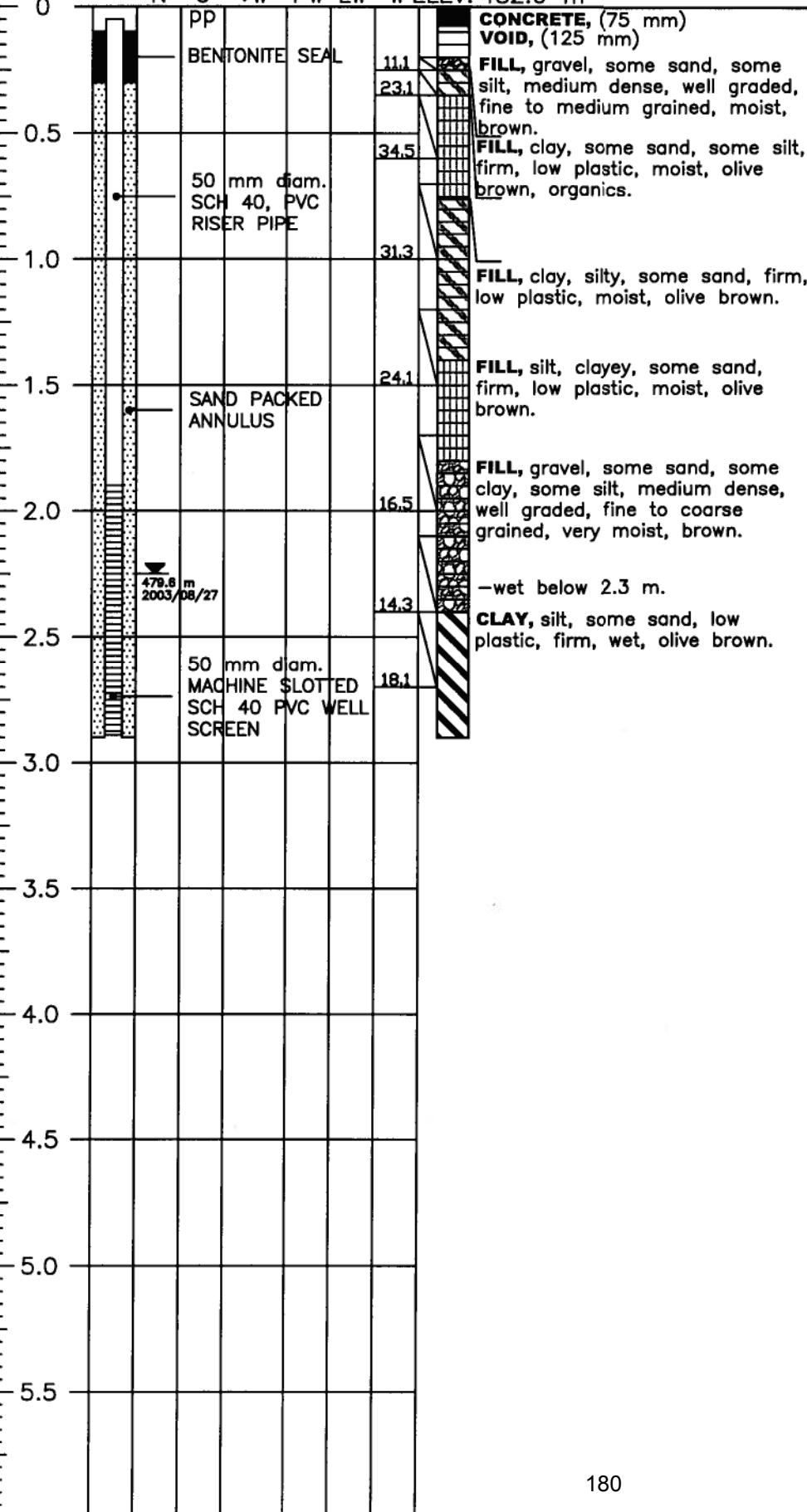
P. Machibroda Engineering Ltd. September 11, 2003. Geotechnical Investigation and Slope Stability Study
Proposed Garage, 306 Saskatchewan Crescent East, Saskatoon, Saskatchewan, PMEL File No. S03-4869

PIEZO. ELEV.= 481.9 m

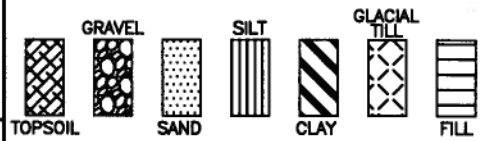
TEST HOLE 03-1

DEPTH (m)

N U γ_w Pw Lw w ELEV: 482.0 m



LEGEND:



pp....POCKET PENETROMETER (kg/cm²)

w.....WATER CONTENT (PERCENT OF DRY SOIL WEIGHT)

Lw....LIQUID LIMIT

Pw....PLASTIC LIMIT

γ_wWET UNIT WEIGHT (kN/m³)

U.....UNCONFINED COMPRESSIVE STRENGTH (kPa)

N.....STANDARD PENETRATION TEST

SO₄ ...SULPHATE CONTENT (PERCENT OF DRY SOIL)

I.A.D....IMMEDIATELY AFTER DRILLING

∇...RECORDED WATER LEVEL TEST HOLE (I.A.D.)

∇.....RECORDED WATER LEVEL (PIEZO)



LIMITATIONS: THE FIELD DRILL LOG IS A SUMMARY OF THE SUBSURFACE CONDITIONS ENCOUNTERED AT THE SPECIFIC TEST HOLE LOCATION AT THE TIME OF TEST DRILLING. SUBSURFACE CONDITIONS MAY VARY AT OTHER LOCATIONS OF THIS SITE AND, IN TIME, MAY CHANGE AT THIS SPECIFIC TEST HOLE LOCATION.

P. MACHIBRODA ENGINEERING LTD.



FIELD DRILL LOG AND SOIL TEST RESULTS

PROJECT:

306 SASK CRESCENT EAST

LOCATION:

SASKATOON, SK

DATE DRILLED:

JULY 3/03

DRAWING NUMBER:

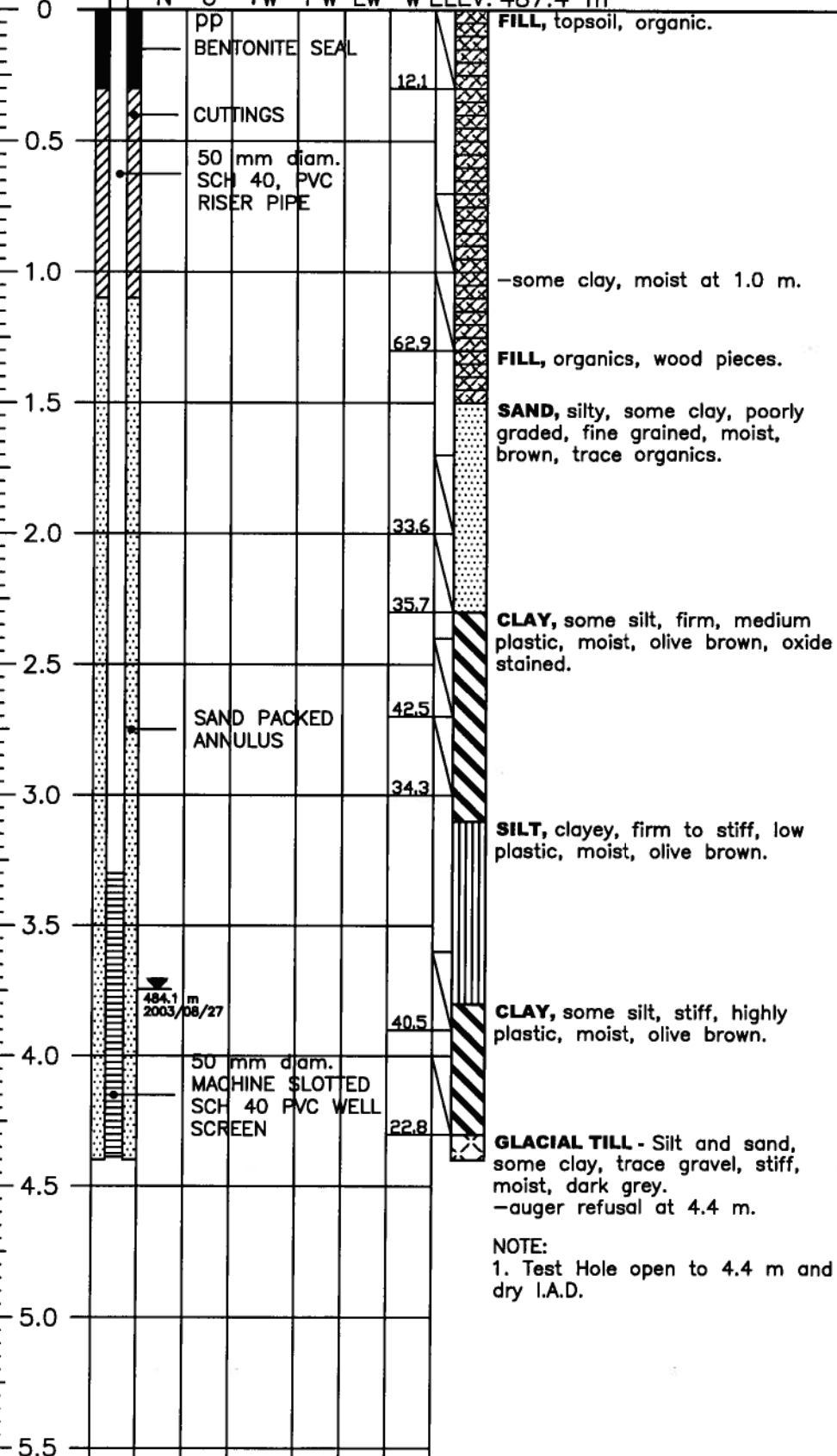
SO3-4869-2

PIEZO. ELEV.= 487.8 m

TEST HOLE 03-2

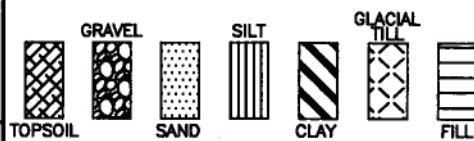
DEPTH (m)

N U γ_w Pw Lw w ELEV: 487.4 m



NOTE:
1. Test Hole open to 4.4 m and dry I.A.D.

LEGEND:



pp....POCKET PENETROMETER (kg/cm²)

w.....WATER CONTENT (PERCENT OF DRY SOIL WEIGHT)

Lw....LIQUID LIMIT

Pw....PLASTIC LIMIT

γ_wWET UNIT WEIGHT (kN/m³)

U.....UNCONFINED COMPRESSIVE STRENGTH (kPa)

N.....STANDARD PENETRATION TEST

SO₄...SULPHATE CONTENT (PERCENT OF DRY SOIL)

I.A.D....IMMEDIATELY AFTER DRILLING

∇...RECORDED WATER LEVEL TEST HOLE (I.A.D.)

∇.....RECORDED WATER LEVEL (PIEZO)



LIMITATIONS: THE FIELD DRILL LOG IS A SUMMARY OF THE SUBSURFACE CONDITIONS ENCOUNTERED AT THE SPECIFIC TEST HOLE LOCATION AT THE TIME OF TEST DRILLING. SUBSURFACE CONDITIONS MAY VARY AT OTHER LOCATIONS OF THIS SITE AND, IN TIME, MAY CHANGE AT THIS SPECIFIC TEST HOLE LOCATION.

P. MACHIBRODA ENGINEERING LTD.



FIELD DRILL LOG AND SOIL TEST RESULTS

PROJECT:

306 SASK CRESCENT EAST

LOCATION:

SASKATOON, SK

DATE DRILLED:

JULY 3/03

DRAWING NUMBER:

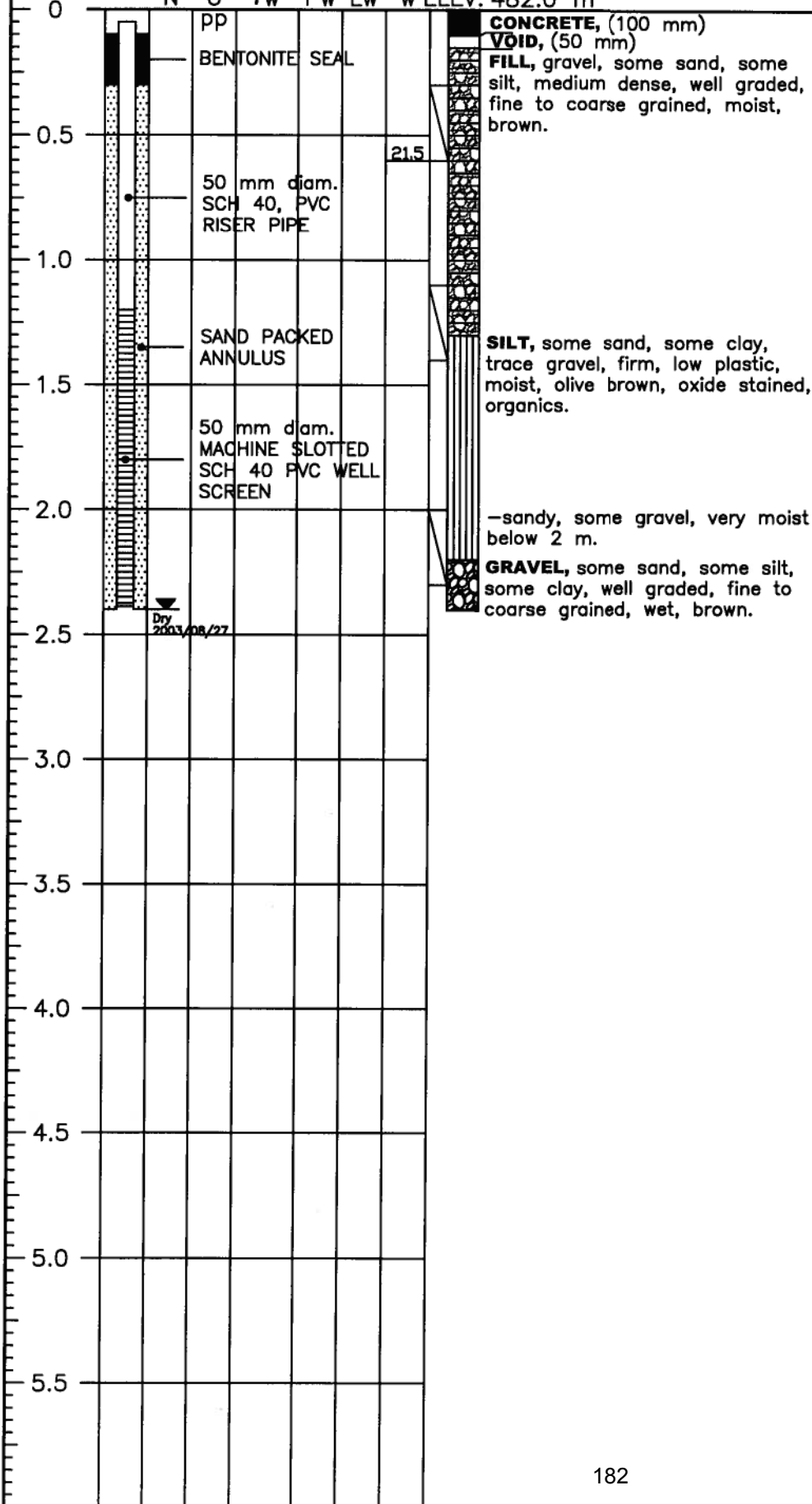
S03-4869-3

PIEZO. ELEV.= 481.9 m

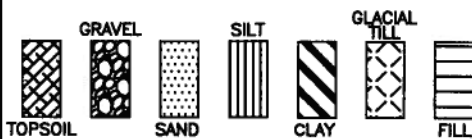
TEST HOLE 03-3

DEPTH (m)

N U γ_w Pw Lw w ELEV: 482.0 m



LEGEND:



- pp....POCKET PENETROMETER (kg/cm²)
- w.....WATER CONTENT (PERCENT OF DRY SOIL WEIGHT)
- Lw....LIQUID LIMIT
- Pw....PLASTIC LIMIT
- γ_wWET UNIT WEIGHT (kN/m³)
- U.....UNCONFINED COMPRESSIVE STRENGTH (kPa)
- N.....STANDARD PENETRATION TEST
- SO₄...SULPHATE CONTENT (PERCENT OF DRY SOIL)
- I.A.D....IMMEDIATELY AFTER DRILLING
- ▽...RECORDED WATER LEVEL TEST HOLE (I.A.D.)
- ▼.....RECORDED WATER LEVEL (PIEZO)



LIMITATIONS: THE FIELD DRILL LOG IS A SUMMARY OF THE SUBSURFACE CONDITIONS ENCOUNTERED AT THE SPECIFIC TEST HOLE LOCATION AT THE TIME OF TEST DRILLING. SUBSURFACE CONDITIONS MAY VARY AT OTHER LOCATIONS OF THIS SITE AND, IN TIME, MAY CHANGE AT THIS SPECIFIC TEST HOLE LOCATION.

P. MACHIBRODA ENGINEERING LTD.



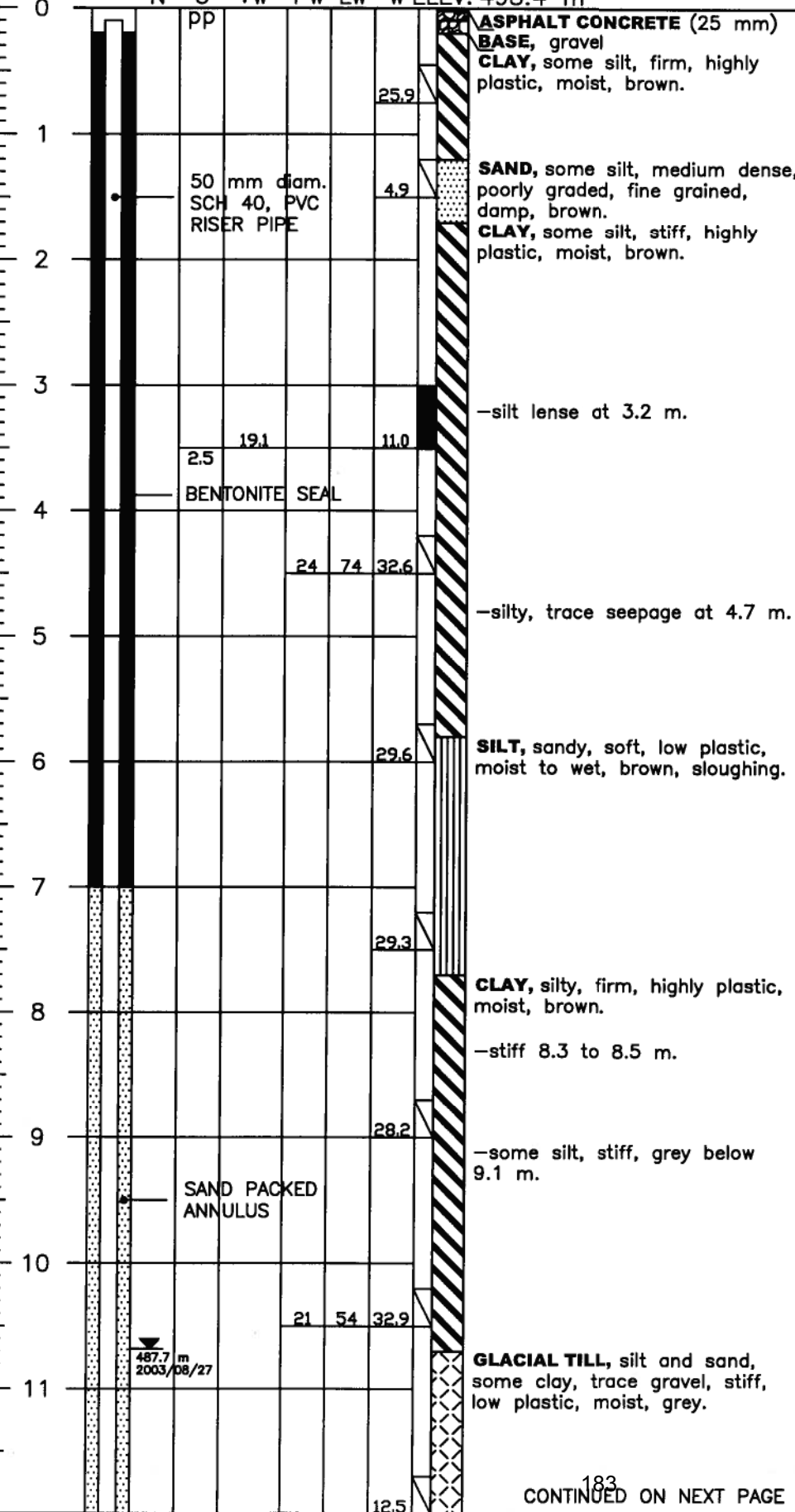
FIELD DRILL LOG AND SOIL TEST RESULTS

PROJECT: 306 SASK CRESCENT EAST	
LOCATION: SASKATOON, SK	
DATE DRILLED: JULY 3/03	DRAWING NUMBER: S03-4869-4

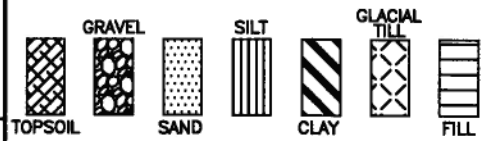
TEST HOLE 03-101

DEPTH (m)

N U γ_w Pw Lw w ELEV: 498.4 m



LEGEND:



- pp....POCKET PENETROMETER (kg/cm²)
- w.....WATER CONTENT (PERCENT OF DRY SOIL WEIGHT)
- Lw....LIQUID LIMIT
- Pw....PLASTIC LIMIT
- γ_wWET UNIT WEIGHT (kN/m³)
- U.....UNCONFINED COMPRESSIVE STRENGTH (kPa)
- N.....STANDARD PENETRATION TEST
- SO₄...SULPHATE CONTENT (PERCENT OF DRY SOIL)
- I.A.D....IMMEDIATELY AFTER DRILLING
- ▽...RECORDED WATER LEVEL TEST HOLE (I.A.D.)
- ▼.....RECORDED WATER LEVEL (PIEZO)



LIMITATIONS: THE FIELD DRILL LOG IS A SUMMARY OF THE SUBSURFACE CONDITIONS ENCOUNTERED AT THE SPECIFIC TEST HOLE LOCATION AT THE TIME OF TEST DRILLING. SUBSURFACE CONDITIONS MAY VARY AT OTHER LOCATIONS OF THIS SITE AND, IN TIME, MAY CHANGE AT THIS SPECIFIC TEST HOLE LOCATION.

P. MACHIBRODA ENGINEERING LTD.



FIELD DRILL LOG AND SOIL TEST RESULTS

PROJECT:
PROPOSED GARAGE
306 SASKATCHEWAN CRESCENT

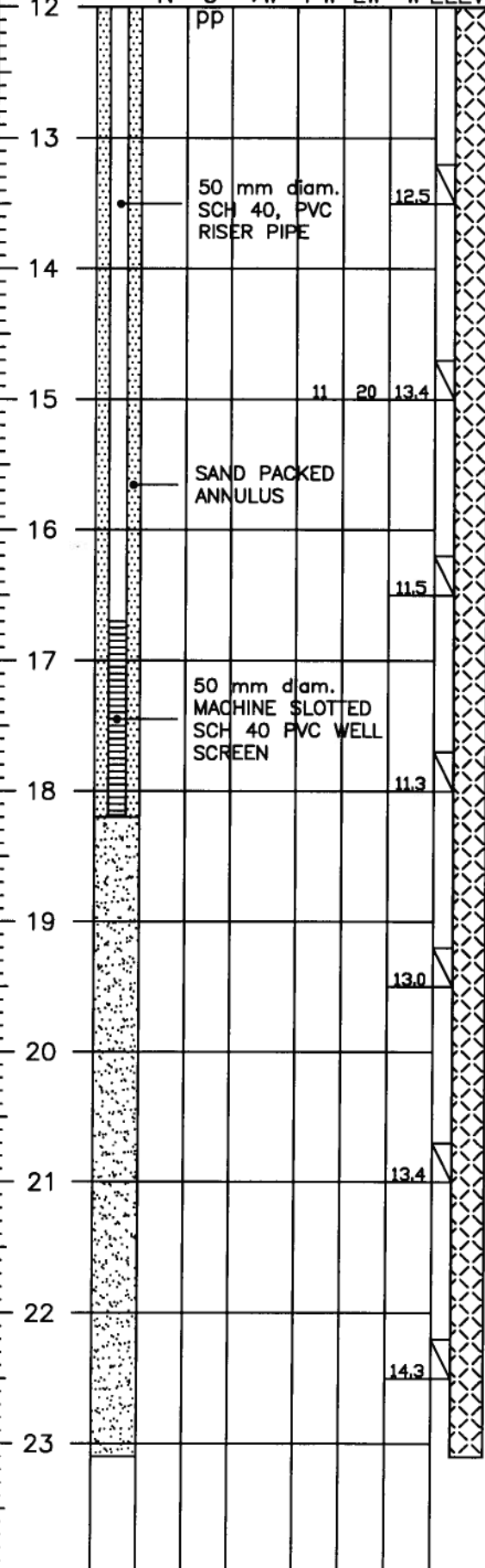
LOCATION:
SASKATOON, SK

DATE DRILLED: AUG 14/03
DRAWING NUMBER: S03-4869-5

TEST HOLE 03-101

DEPTH (m)

N U γ_w Pw Lw w ELEV: 498.4 m



GLACIAL TILL, silt and sand, some clay, trace gravel, stiff, low plastic, moist, grey.

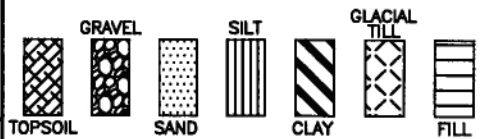
-very stiff below 12.8 m.

-hard below 13.8 m.

-broke auger at 23.1 m.

NOTE:
1. Test Hole sloughed to 5.2 m I.A.D.

LEGEND:



pp....POCKET PENETROMETER (kg/cm²)

w.....WATER CONTENT (PERCENT OF DRY SOIL WEIGHT)

Lw....LIQUID LIMIT

Pw....PLASTIC LIMIT

γ_wWET UNIT WEIGHT (kN/m³)

U.....UNCONFINED COMPRESSIVE STRENGTH (kPa)

N.....STANDARD PENETRATION TEST

SO₄...SULPHATE CONTENT (PERCENT OF DRY SOIL)

I.A.D....IMMEDIATELY AFTER DRILLING

∇...RECORDED WATER LEVEL TEST HOLE (I.A.D.)

∇.....RECORDED WATER LEVEL (PIEZO)



SHELBY TUBE



SPLIT SPOON



CUTTINGS

LIMITATIONS: THE FIELD DRILL LOG IS A SUMMARY OF THE SUBSURFACE CONDITIONS ENCOUNTERED AT THE SPECIFIC TEST HOLE LOCATION AT THE TIME OF TEST DRILLING. SUBSURFACE CONDITIONS MAY VARY AT OTHER LOCATIONS OF THIS SITE AND, IN TIME, MAY CHANGE AT THIS SPECIFIC TEST HOLE LOCATION.

P. MACHIBRODA ENGINEERING LTD.



FIELD DRILL LOG AND SOIL TEST RESULTS

PROJECT:
PROPOSED GARAGE
306 SASKATCHEWAN CRESCENT

LOCATION:
SASKATOON, SK

DATE DRILLED:
AUG 14/03

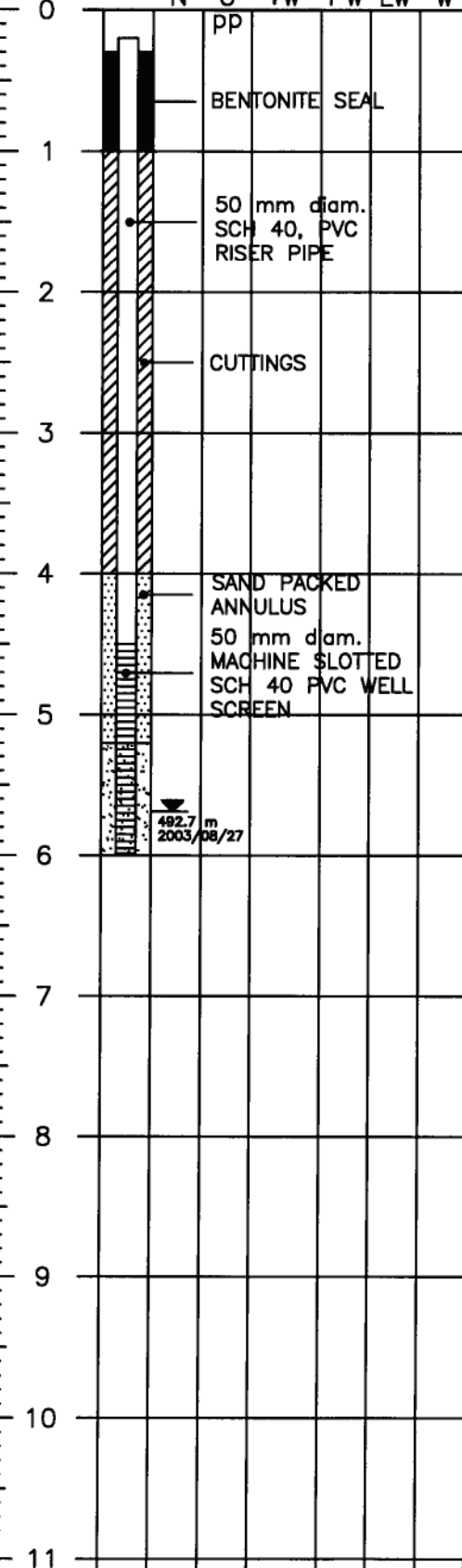
DRAWING NUMBER:
S03-4869-5A

PIEZO. ELEV.= 498.2 m

TEST HOLE 03-101A

DEPTH (m)

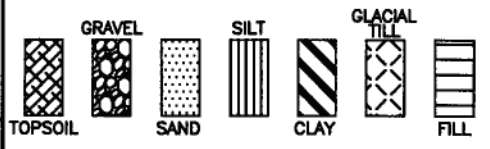
N U γ_w Pw Lw w ELEV: 498.4 m



ASPHALT CONCRETE (25 mm) FILL, gravel and sand, some silt, moist, brown.
CLAY, some silt, firm, highly plastic, moist, brown.
SAND, some silt, medium dense, poorly graded, fine grained, moist, brown.
CLAY, some silt, stiff, highly plastic, moist, brown.
 -silt lense 3.2 m.
 -silty, trace seepage, sloughing below 4.7 m.
SILT, sandy, soft, low plastic, wet, brown, seepage, sloughing.

NOTE:
 1. Test Hole sloughed to 5.2 m I.A.D.

LEGEND:



pp....POCKET PENETROMETER (kg/cm²)
 w.....WATER CONTENT (PERCENT OF DRY SOIL WEIGHT)
 Lw....LIQUID LIMIT
 Pw....PLASTIC LIMIT
 γ_wWET UNIT WEIGHT (kN/m³)
 U.....UNCONFINED COMPRESSIVE STRENGTH (kPa)
 N.....STANDARD PENETRATION TEST
 SO₄...SULPHATE CONTENT (PERCENT OF DRY SOIL)
 I.A.D....IMMEDIATELY AFTER DRILLING
 ▽...RECORDED WATER LEVEL TEST HOLE (I.A.D.)
 ▽.....RECORDED WATER LEVEL (PIEZO)



LIMITATIONS: THE FIELD DRILL LOG IS A SUMMARY OF THE SUBSURFACE CONDITIONS ENCOUNTERED AT THE SPECIFIC TEST HOLE LOCATION AT THE TIME OF TEST DRILLING. SUBSURFACE CONDITIONS MAY VARY AT OTHER LOCATIONS OF THIS SITE AND, IN TIME, MAY CHANGE AT THIS SPECIFIC TEST HOLE LOCATION.

P. MACHIBRODA ENGINEERING LTD.



FIELD DRILL LOG AND SOIL TEST RESULTS

PROJECT:
 PROPOSED GARAGE
 306 SASKATCHEWAN CRESCENT

LOCATION:
 SASKATOON, SK

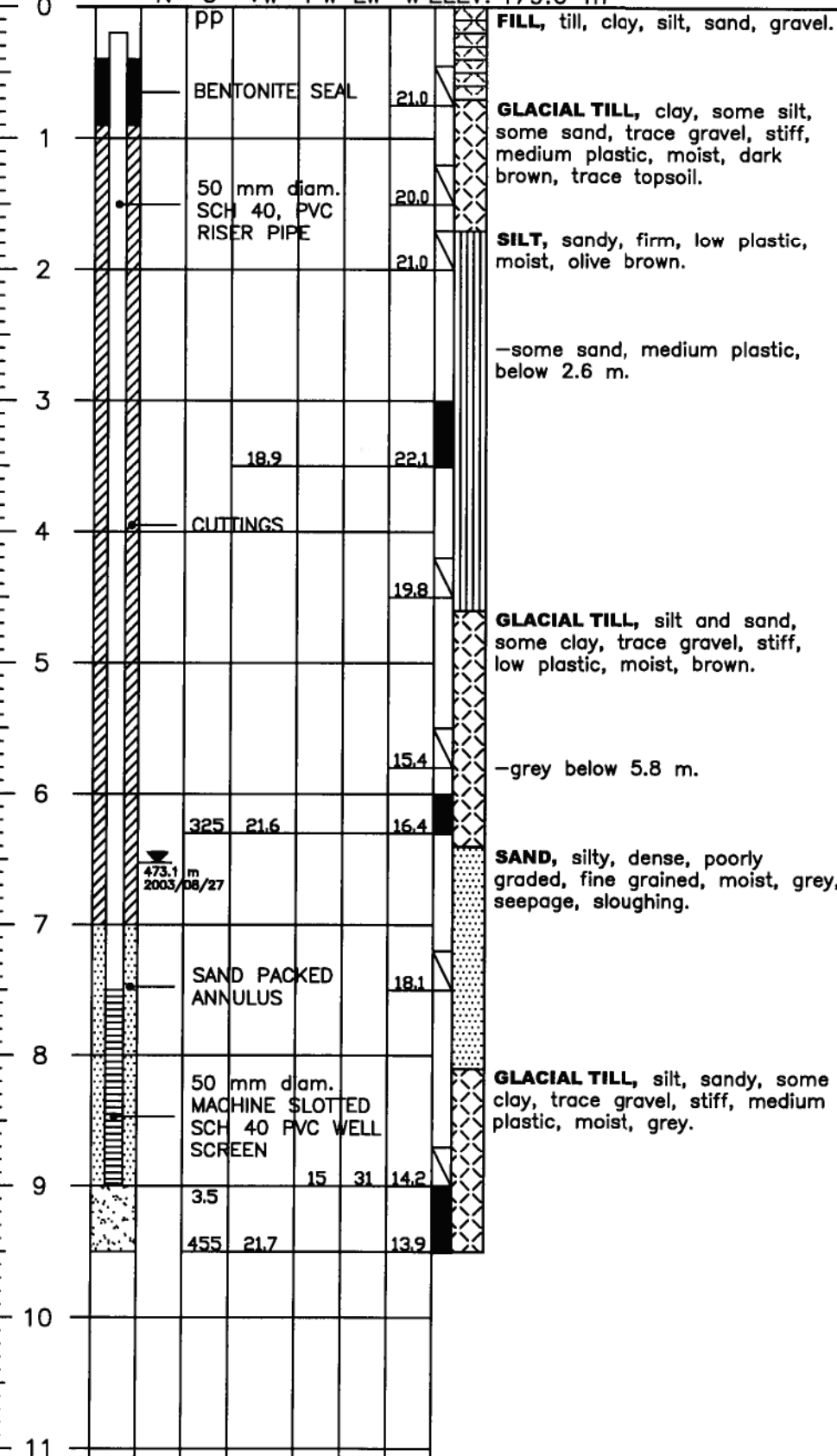
DATE DRILLED: AUG 14/03
DRAWING NUMBER: S03-4869-6

PIEZO. ELEV.= 479.4 m

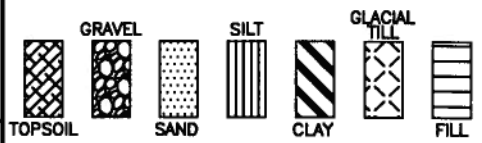
TEST HOLE 03-102

DEPTH (m)

N U γ_w Pw Lw w ELEV: 479.6 m



LEGEND:



pp....POCKET PENETROMETER (kg/cm²)
 w.....WATER CONTENT (PERCENT OF DRY SOIL WEIGHT)
 Lw....LIQUID LIMIT
 Pw....PLASTIC LIMIT
 γ_wWET UNIT WEIGHT (kN/m³)
 U.....UNCONFINED COMPRESSIVE STRENGTH (kPa)
 N.....STANDARD PENETRATION TEST
 SO₄...SULPHATE CONTENT (PERCENT OF DRY SOIL)
 I.A.D....IMMEDIATELY AFTER DRILLING
 ▽...RECORDED WATER LEVEL TEST HOLE (I.A.D.)
 ▼.....RECORDED WATER LEVEL (PIEZO)



LIMITATIONS: THE FIELD DRILL LOG IS A SUMMARY OF THE SUBSURFACE CONDITIONS ENCOUNTERED AT THE SPECIFIC TEST HOLE LOCATION AT THE TIME OF TEST DRILLING. SUBSURFACE CONDITIONS MAY VARY AT OTHER LOCATIONS OF THIS SITE AND, IN TIME, MAY CHANGE AT THIS SPECIFIC TEST HOLE LOCATION.

P. MACHIBRODA ENGINEERING LTD.



FIELD DRILL LOG AND SOIL TEST RESULTS

PROJECT:
 PROPOSED GARAGE
 306 SASKATCHEWAN CRESCENT

LOCATION:
 SASKATOON, SK

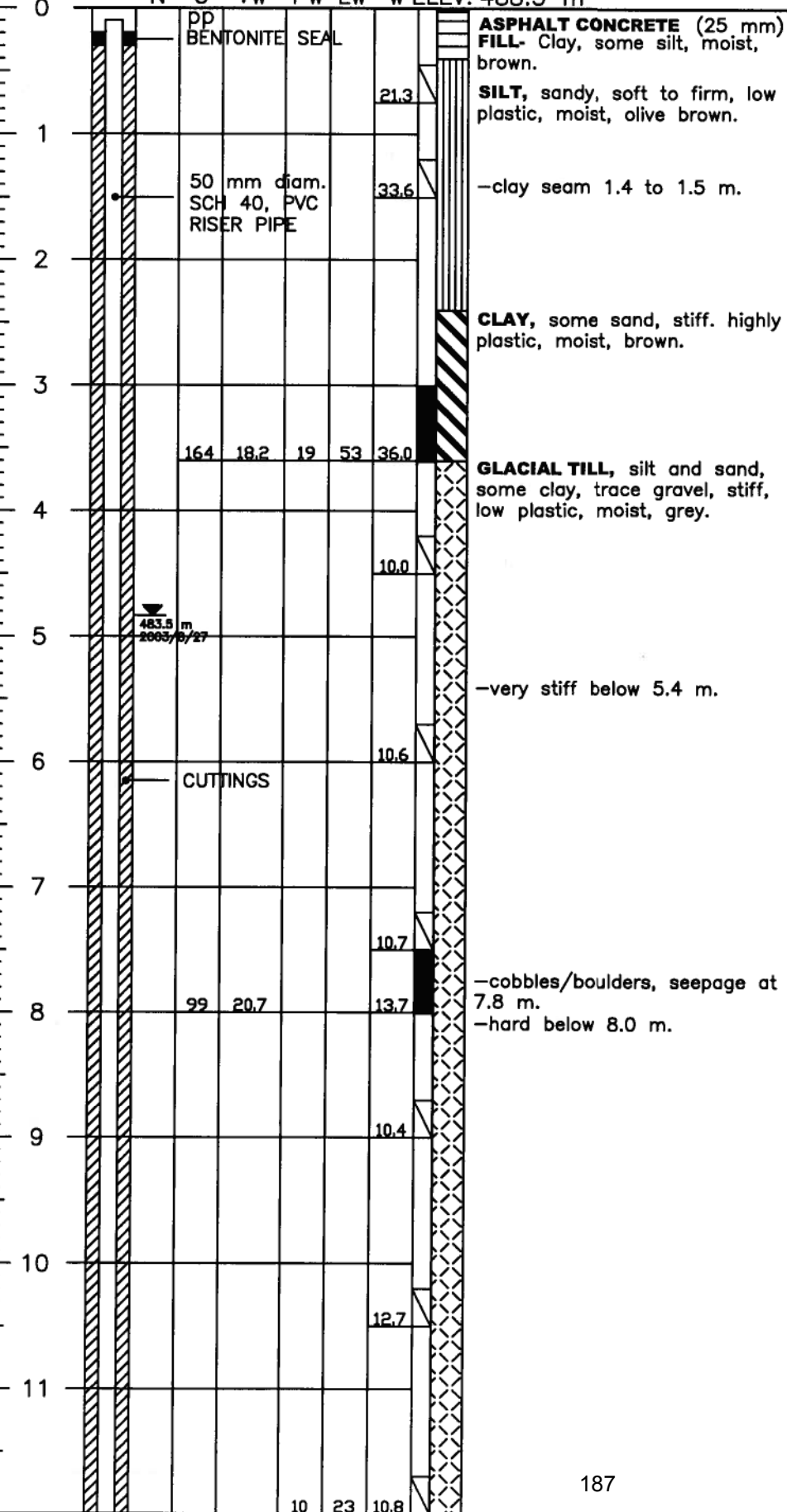
DATE DRILLED: AUG 15/03
DRAWING NUMBER: S03-4869-7

PIEZO. ELEV.= 488.1 m

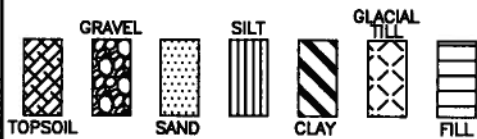
TEST HOLE 03-103

DEPTH (m)

N U γ_w Pw Lw w ELEV: 488.3 m



LEGEND:



pp....POCKET PENETROMETER (kg/cm²)

w.....WATER CONTENT (PERCENT OF DRY SOIL WEIGHT)

Lw....LIQUID LIMIT

Pw....PLASTIC LIMIT

γ_wWET UNIT WEIGHT (kN/m³)

U.....UNCONFINED COMPRESSIVE STRENGTH (kPa)

N.....STANDARD PENETRATION TEST

SO₄...SULPHATE CONTENT (PERCENT OF DRY SOIL)

I.A.D....IMMEDIATELY AFTER DRILLING

▽...RECORDED WATER LEVEL TEST HOLE (I.A.D.)

▼.....RECORDED WATER LEVEL (PIEZO)



LIMITATIONS: THE FIELD DRILL LOG IS A SUMMARY OF THE SUBSURFACE CONDITIONS ENCOUNTERED AT THE SPECIFIC TEST HOLE LOCATION AT THE TIME OF TEST DRILLING. SUBSURFACE CONDITIONS MAY VARY AT OTHER LOCATIONS OF THIS SITE AND, IN TIME, MAY CHANGE AT THIS SPECIFIC TEST HOLE LOCATION.

P. MACHIBRODA ENGINEERING LTD.



FIELD DRILL LOG AND SOIL TEST RESULTS

PROJECT:
PROPOSED GARAGE
306 SASKATCHEWAN CRESCENT

LOCATION:
SASKATOON, SK

DATE DRILLED:
AUG 15/03

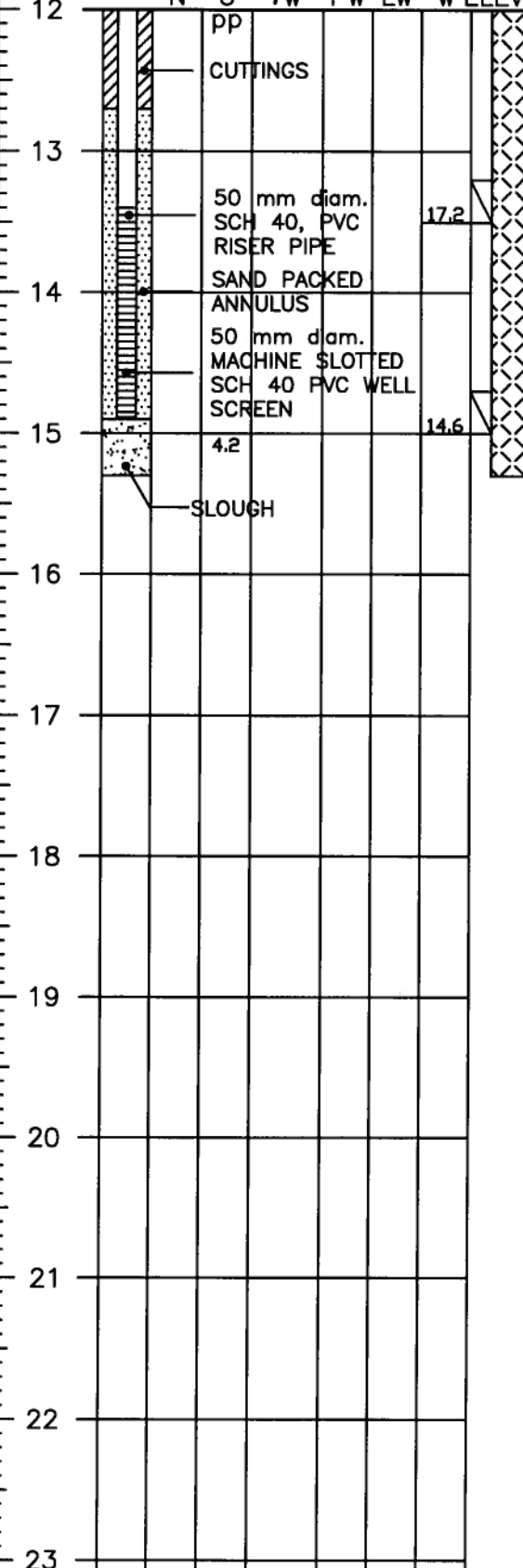
DRAWING NUMBER:
S03-4869-8

PIEZO. ELEV.= 488.1 m

TEST HOLE 03-103

DEPTH (m)

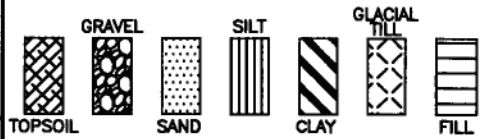
N U γ_w Pw Lw w ELEV: 488.3 m



GLACIAL TILL, silt and sand, some clay, trace gravel, hard, low plastic, moist, grey.

NOTE:
1. Test Hole open to 15.3 m I.A.D.

LEGEND:



pp....POCKET PENETROMETER (kg/cm²)

w.....WATER CONTENT (PERCENT OF DRY SOIL WEIGHT)

Lw....LIQUID LIMIT

Pw....PLASTIC LIMIT

γ_wWET UNIT WEIGHT (kN/m³)

U.....UNCONFINED COMPRESSIVE STRENGTH (kPa)

N.....STANDARD PENETRATION TEST

SO₄...SULPHATE CONTENT (PERCENT OF DRY SOIL)

I.A.D....IMMEDIATELY AFTER DRILLING

∇...RECORDED WATER LEVEL TEST HOLE (I.A.D.)

▼.....RECORDED WATER LEVEL (PIEZO)



SHELBY TUBE



SPLIT SPOON



CUTTINGS

LIMITATIONS: THE FIELD DRILL LOG IS A SUMMARY OF THE SUBSURFACE CONDITIONS ENCOUNTERED AT THE SPECIFIC TEST HOLE LOCATION AT THE TIME OF TEST DRILLING. SUBSURFACE CONDITIONS MAY VARY AT OTHER LOCATIONS OF THIS SITE AND, IN TIME, MAY CHANGE AT THIS SPECIFIC TEST HOLE LOCATION.

P. MACHIBRODA ENGINEERING LTD.



FIELD DRILL LOG AND SOIL TEST RESULTS

PROJECT:
PROPOSED GARAGE
306 SASKATCHEWAN CRESCENT

LOCATION:
SASKATOON, SK

DATE DRILLED:
AUG 15/03

DRAWING NUMBER:
S03-4869-8A



HISTORICAL BOREHOLE LOGS
TH03-1, TH 03-2, TH 03-3, TH 03-4, TH 03-5 (PMEL03B)

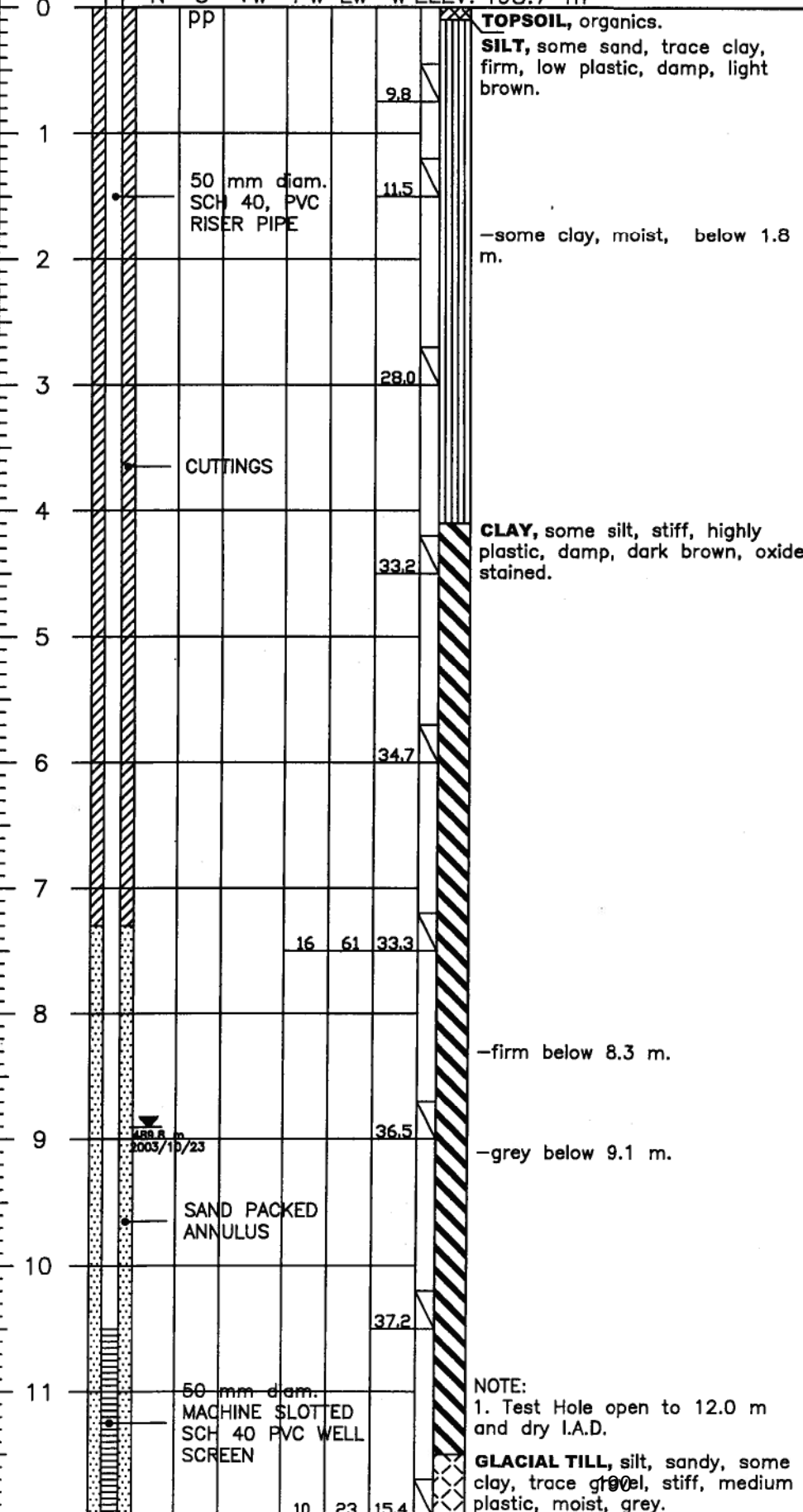
P. Machibroda Engineering Ltd. October 31, 2003. Geotechnical Investigation and Slope Stability Study
Proposed Residence, 313-11th Street East, Saskatoon, Saskatchewan, PMEL File No. S03-4925

PIEZO. ELEV.= 499.6 m

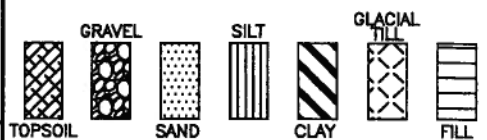
TEST HOLE 03-1

DEPTH (m)

N U γ_w Pw Lw w ELEV: 498.7 m



LEGEND:



- pp....POCKET PENETROMETER (kg/cm²)
- w.....WATER CONTENT (PERCENT OF DRY SOIL WEIGHT)
- Lw....LIQUID LIMIT
- Pw....PLASTIC LIMIT
- γ_wWET UNIT WEIGHT (kN/m³)
- U.....UNCONFINED COMPRESSIVE STRENGTH (kPa)
- N.....STANDARD PENETRATION TEST
- SO₄...SULPHATE CONTENT (PERCENT OF DRY SOIL)
- I.A.D....IMMEDIATELY AFTER DRILLING
- ▽...RECORDED WATER LEVEL TEST HOLE (I.A.D.)
- ▼.....RECORDED WATER LEVEL (PIEZO)



LIMITATIONS: THE FIELD DRILL LOG IS A SUMMARY OF THE SUBSURFACE CONDITIONS ENCOUNTERED AT THE SPECIFIC TEST HOLE LOCATION AT THE TIME OF TEST DRILLING. SUBSURFACE CONDITIONS MAY VARY AT OTHER LOCATIONS OF THIS SITE AND, IN TIME, MAY CHANGE AT THIS SPECIFIC TEST HOLE LOCATION.

P. MACHIBRODA ENGINEERING LTD.



FIELD DRILL LOG AND SOIL TEST RESULTS

PROJECT:

SLOPE STABILITY STUDY

LOCATION:

313 - 11TH STREET, SASKATOON, SK

DATE DRILLED:

OCTOBER 7/03

DRAWING NUMBER:

S03-4925-2

NOTE:

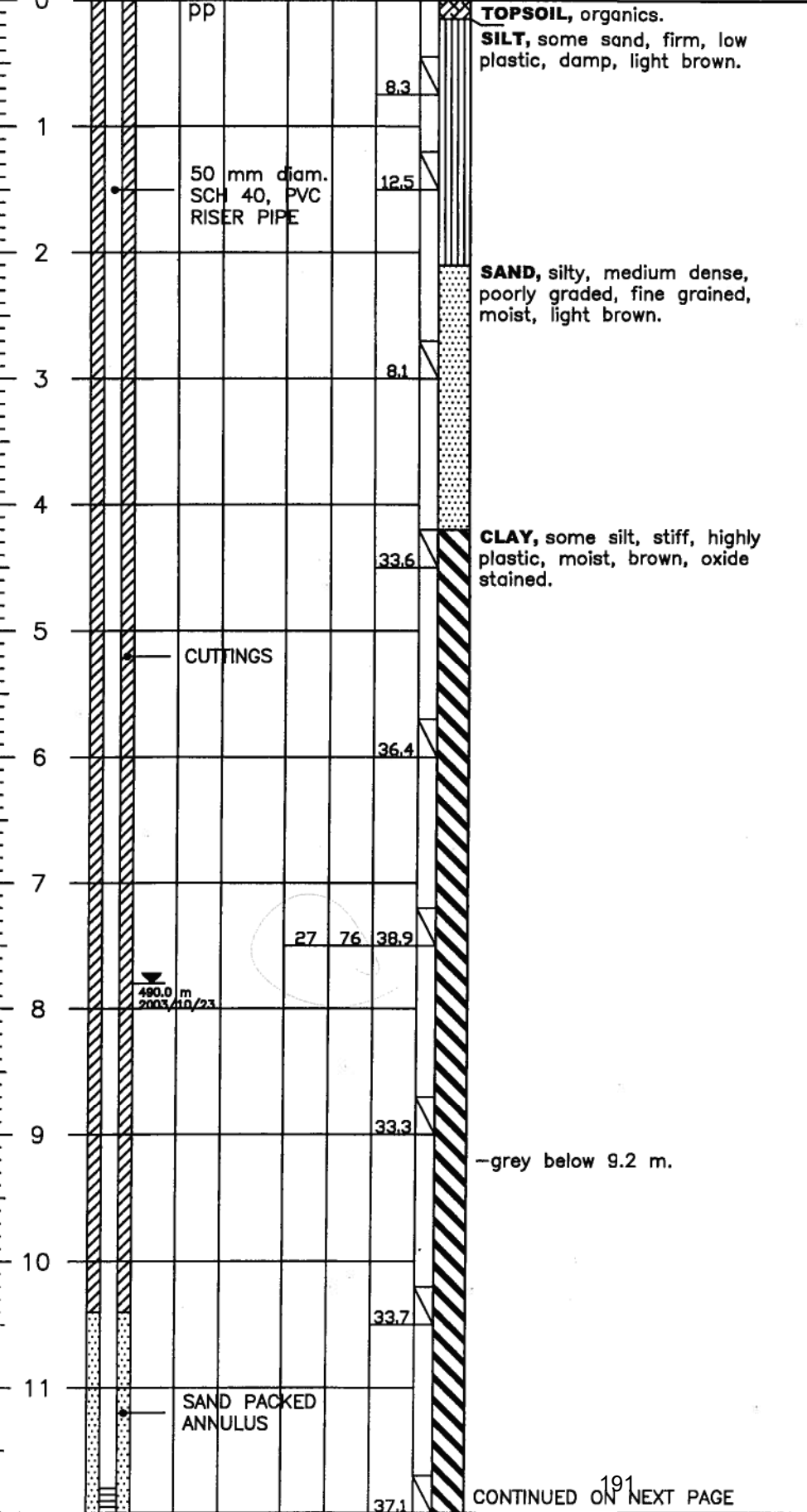
1. Test Hole open to 12.0 m and dry I.A.D.

GLACIAL TILL, silt, sandy, some clay, trace gravel, stiff, medium plastic, moist, grey.

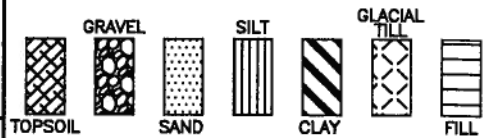
TEST HOLE 03-2

DEPTH (m)

N U γ_w Pw Lw w ELEV: 497.8 m



LEGEND:



pp....POCKET PENETROMETER (kg/cm²)

w.....WATER CONTENT (PERCENT OF DRY SOIL WEIGHT)

Lw....LIQUID LIMIT

Pw....PLASTIC LIMIT

γ_wWET UNIT WEIGHT (kN/m³)

U.....UNCONFINED COMPRESSIVE STRENGTH (kPa)

N.....STANDARD PENETRATION TEST

SO₄ ...SULPHATE CONTENT (PERCENT OF DRY SOIL)

I.A.D....IMMEDIATELY AFTER DRILLING

▽...RECORDED WATER LEVEL TEST HOLE (I.A.D.)

▼.....RECORDED WATER LEVEL (PIEZO)



LIMITATIONS: THE FIELD DRILL LOG IS A SUMMARY OF THE SUBSURFACE CONDITIONS ENCOUNTERED AT THE SPECIFIC TEST HOLE LOCATION AT THE TIME OF TEST DRILLING. SUBSURFACE CONDITIONS MAY VARY AT OTHER LOCATIONS OF THIS SITE AND, IN TIME, MAY CHANGE AT THIS SPECIFIC TEST HOLE LOCATION.

P. MACHIBRODA ENGINEERING LTD.



FIELD DRILL LOG AND SOIL TEST RESULTS

PROJECT:

SLOPE STABILITY STUDY

LOCATION:

313 - 11TH STREET, SASKATOON, SK

DATE DRILLED:

OCTOBER 7/03

DRAWING NUMBER:

S03-4925-3

TEST HOLE 03-2

DEPTH (m)

N U γ_w Pw Lw w ELEV: 497.8 m

12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									

PP
50 mm diam.
MACHINE SLOTTED
SCH 40 PVC WELL
SCREEN

SAND PACKED
ANNULUS

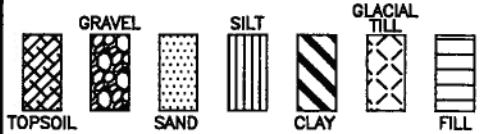
18 22 13.1

CLAY, some silt, stiff, highly plastic, moist, grey, gypsum crystals, oxide stained.

GLACIAL TILL, silt, sandy, some clay, trace gravel, stiff, low plastic, moist, grey.

NOTE:
1. Test Hole open to 13.5 m and dry I.A.D.

LEGEND:



pp....POCKET PENETROMETER (kg/cm²)

w.....WATER CONTENT (PERCENT OF DRY SOIL WEIGHT)

Lw....LIQUID LIMIT

Pw....PLASTIC LIMIT

γ_wWET UNIT WEIGHT (kN/m³)

U.....UNCONFINED COMPRESSIVE STRENGTH (kPa)

N.....STANDARD PENETRATION TEST

SO₄...SULPHATE CONTENT (PERCENT OF DRY SOIL)

I.A.D....IMMEDIATELY AFTER DRILLING

∇...RECORDED WATER LEVEL TEST HOLE (I.A.D.)

∇.....RECORDED WATER LEVEL (PIEZO)



LIMITATIONS: THE FIELD DRILL LOG IS A SUMMARY OF THE SUBSURFACE CONDITIONS ENCOUNTERED AT THE SPECIFIC TEST HOLE LOCATION AT THE TIME OF TEST DRILLING. SUBSURFACE CONDITIONS MAY VARY AT OTHER LOCATIONS OF THIS SITE AND, IN TIME, MAY CHANGE AT THIS SPECIFIC TEST HOLE LOCATION.

P. MACHIBRODA ENGINEERING LTD.



FIELD DRILL LOG AND SOIL TEST RESULTS

PROJECT:
SLOPE STABILITY STUDY

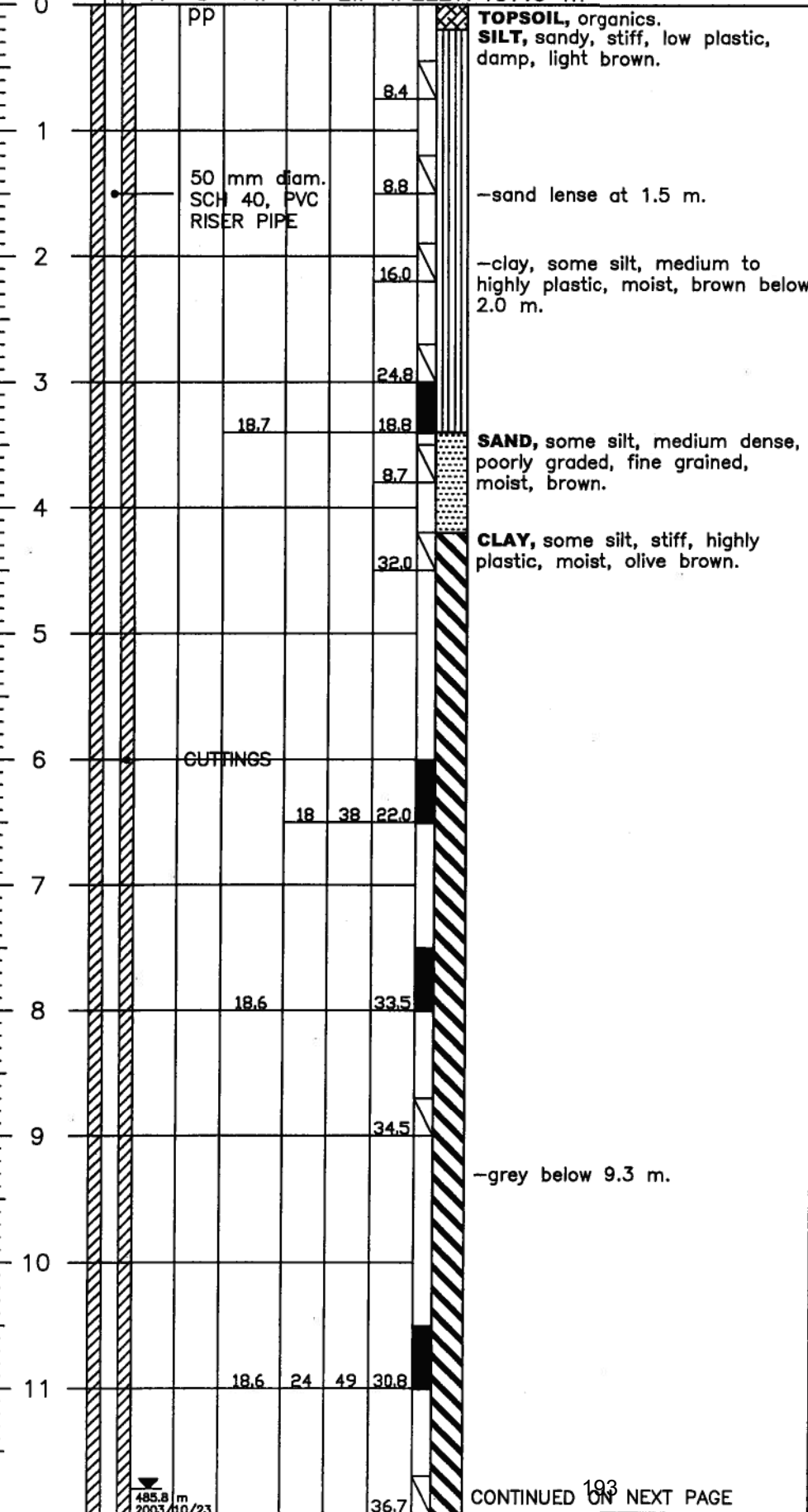
LOCATION:
313 - 11TH STREET, SASKATOON, SK

DATE DRILLED: OCTOBER 7/03
DRAWING NUMBER: S03-4925-3A

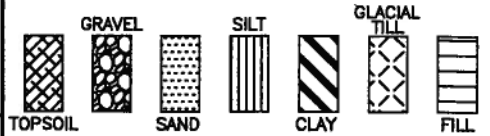
TEST HOLE 03-3

DEPTH (m)

N U γ_w Pw Lw w ELEV: 497.6 m



LEGEND:



pp....POCKET PENETROMETER (kg/cm²)

w.....WATER CONTENT (PERCENT OF DRY SOIL WEIGHT)

Lw....LIQUID LIMIT

Pw....PLASTIC LIMIT

γ_wWET UNIT WEIGHT (kN/m³)

U.....UNCONFINED COMPRESSIVE STRENGTH (kPa)

N.....STANDARD PENETRATION TEST

SO₄...SULPHATE CONTENT (PERCENT OF DRY SOIL)

I.A.D....IMMEDIATELY AFTER DRILLING

▽...RECORDED WATER LEVEL TEST HOLE (I.A.D.)

▼.....RECORDED WATER LEVEL (PIEZO)



LIMITATIONS: THE FIELD DRILL LOG IS A SUMMARY OF THE SUBSURFACE CONDITIONS ENCOUNTERED AT THE SPECIFIC TEST HOLE LOCATION AT THE TIME OF TEST DRILLING. SUBSURFACE CONDITIONS MAY VARY AT OTHER LOCATIONS OF THIS SITE AND, IN TIME, MAY CHANGE AT THIS SPECIFIC TEST HOLE LOCATION.

P. MACHIBRODA ENGINEERING LTD.



FIELD DRILL LOG AND SOIL TEST RESULTS

PROJECT:

SLOPE STABILITY STUDY

LOCATION:

313 - 11TH STREET, SASKATOON, SK

DATE DRILLED:

OCTOBER 7/03

DRAWING NUMBER:

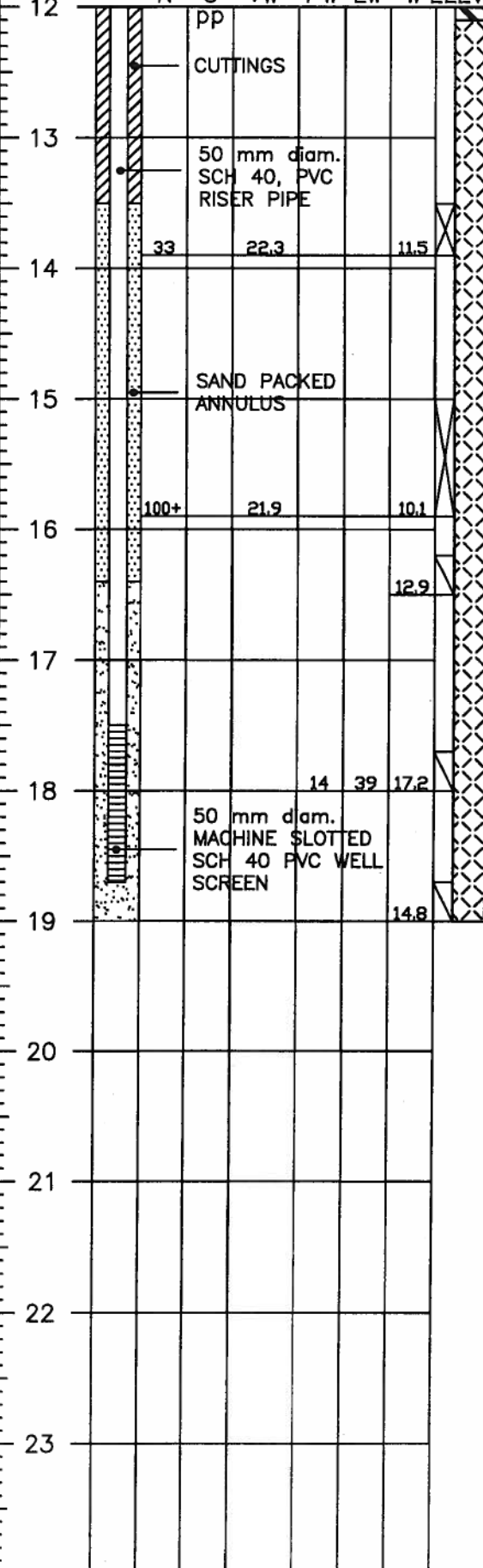
S03-4925-4

193
CONTINUED ON NEXT PAGE

TEST HOLE 03-3

DEPTH (m)

N U γ_w Pw Lw w ELEV: 497.6 m



CLAY, some silt, stiff, highly plastic, moist, olive brown.

GLACIAL TILL, silt, sandy, some clay, trace gravel, stiff, medium plastic, moist, grey.

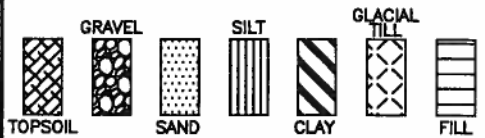
-very stiff to hard below 14.3 m.

-trace seepage at 15.5 m.

-hard below 16.0 m.

NOTE:
 1. Auger refusal at 19.0 m on boulder.
 2. Test Hole sloughed to 16.4 m I.A.D.

LEGEND:



pp....POCKET PENETROMETER (kg/cm²)

w.....WATER CONTENT (PERCENT OF DRY SOIL WEIGHT)

Lw....LIQUID LIMIT

Pw....PLASTIC LIMIT

γ_wWET UNIT WEIGHT (kN/m³)

U.....UNCONFINED COMPRESSIVE STRENGTH (kPa)

N.....STANDARD PENETRATION TEST

SO₄...SULPHATE CONTENT (PERCENT OF DRY SOIL)

I.A.D....IMMEDIATELY AFTER DRILLING

∇...RECORDED WATER LEVEL TEST HOLE (I.A.D.)

▼.....RECORDED WATER LEVEL (PIEZO)



SHELBY TUBE

SPLIT SPOON

CUTTINGS

LIMITATIONS: THE FIELD DRILL LOG IS A SUMMARY OF THE SUBSURFACE CONDITIONS ENCOUNTERED AT THE SPECIFIC TEST HOLE LOCATION AT THE TIME OF TEST DRILLING. SUBSURFACE CONDITIONS MAY VARY AT OTHER LOCATIONS OF THIS SITE AND, IN TIME, MAY CHANGE AT THIS SPECIFIC TEST HOLE LOCATION.

P. MACHIBRODA ENGINEERING LTD.



FIELD DRILL LOG AND SOIL TEST RESULTS

PROJECT:

SLOPE STABILITY STUDY

LOCATION:

313 - 11TH STREET, SASKATOON, SK

DATE DRILLED:

OCTOBER 7/03

DRAWING NUMBER:

S03-4925-4A

TEST HOLE 03-4

DEPTH (m)

N U γ_w Pw Lw w ELEV: 493.4 m

DEPTH (m)	N	U	γ_w	Pw	Lw	w	Notes
0		pp					
0.173							FILL, sand, gravelly, some silt, trace clay, dense, well graded, fine to coarse grained, damp, brown.
0.266							CLAY, silty, stiff, low to medium plastic, moist, brown. -highly plastic below 650 mm. -silt lense at 1.3 m.
0.163							SILT, some clay, trace sand, stiff, low plastic, moist, light olive brown.
0.169							
0.144							
0.19				30		27.3	-soft, wet, seepage, sloughing below 7.3 m.
0.317							CLAY, silty, firm, low to medium plastic, moist, olive brown. -highly plastic, stiff, grey below 9.1 m.
0.19				69		30.8	
0.102							GLACIAL TILL, silt, sandy, some clay, trace gravel, very stiff, medium plastic, moist, grey. -cobbles/boulders at 12.0 m.

FILL, sand, gravelly, some silt, trace clay, dense, well graded, fine to coarse grained, damp, brown.

CLAY, silty, stiff, low to medium plastic, moist, brown.
-highly plastic below 650 mm.

-silt lense at 1.3 m.

SILT, some clay, trace sand, stiff, low plastic, moist, light olive brown.

-soft, wet, seepage, sloughing below 7.3 m.

CLAY, silty, firm, low to medium plastic, moist, olive brown.

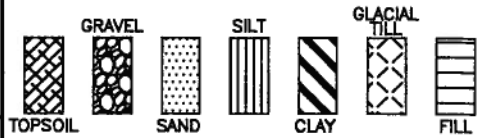
-highly plastic, stiff, grey below 9.1 m.

NOTE:
1. Test Hole sloughed to 11.8 m and dry I.A.D.

GLACIAL TILL, silt, sandy, some clay, trace gravel, very stiff, medium plastic, moist, grey.

-cobbles/boulders at 12.0 m.

LEGEND:



pp....POCKET PENETROMETER (kg/cm²)

w.....WATER CONTENT (PERCENT OF DRY SOIL WEIGHT)

Lw....LIQUID LIMIT

Pw....PLASTIC LIMIT

γ_wWET UNIT WEIGHT (kN/m³)

U.....UNCONFINED COMPRESSIVE STRENGTH (kPa)

N.....STANDARD PENETRATION TEST

SO₄ ...SULPHATE CONTENT (PERCENT OF DRY SOIL)

I.A.D....IMMEDIATELY AFTER DRILLING

▽...RECORDED WATER LEVEL TEST HOLE (I.A.D.)

▼.....RECORDED WATER LEVEL (PIEZO)



LIMITATIONS: THE FIELD DRILL LOG IS A SUMMARY OF THE SUBSURFACE CONDITIONS ENCOUNTERED AT THE SPECIFIC TEST HOLE LOCATION AT THE TIME OF TEST DRILLING. SUBSURFACE CONDITIONS MAY VARY AT OTHER LOCATIONS OF THIS SITE AND, IN TIME, MAY CHANGE AT THIS SPECIFIC TEST HOLE LOCATION.

P. MACHIBRODA ENGINEERING LTD.



FIELD DRILL LOG AND SOIL TEST RESULTS

PROJECT:

SLOPE STABILITY STUDY

LOCATION:

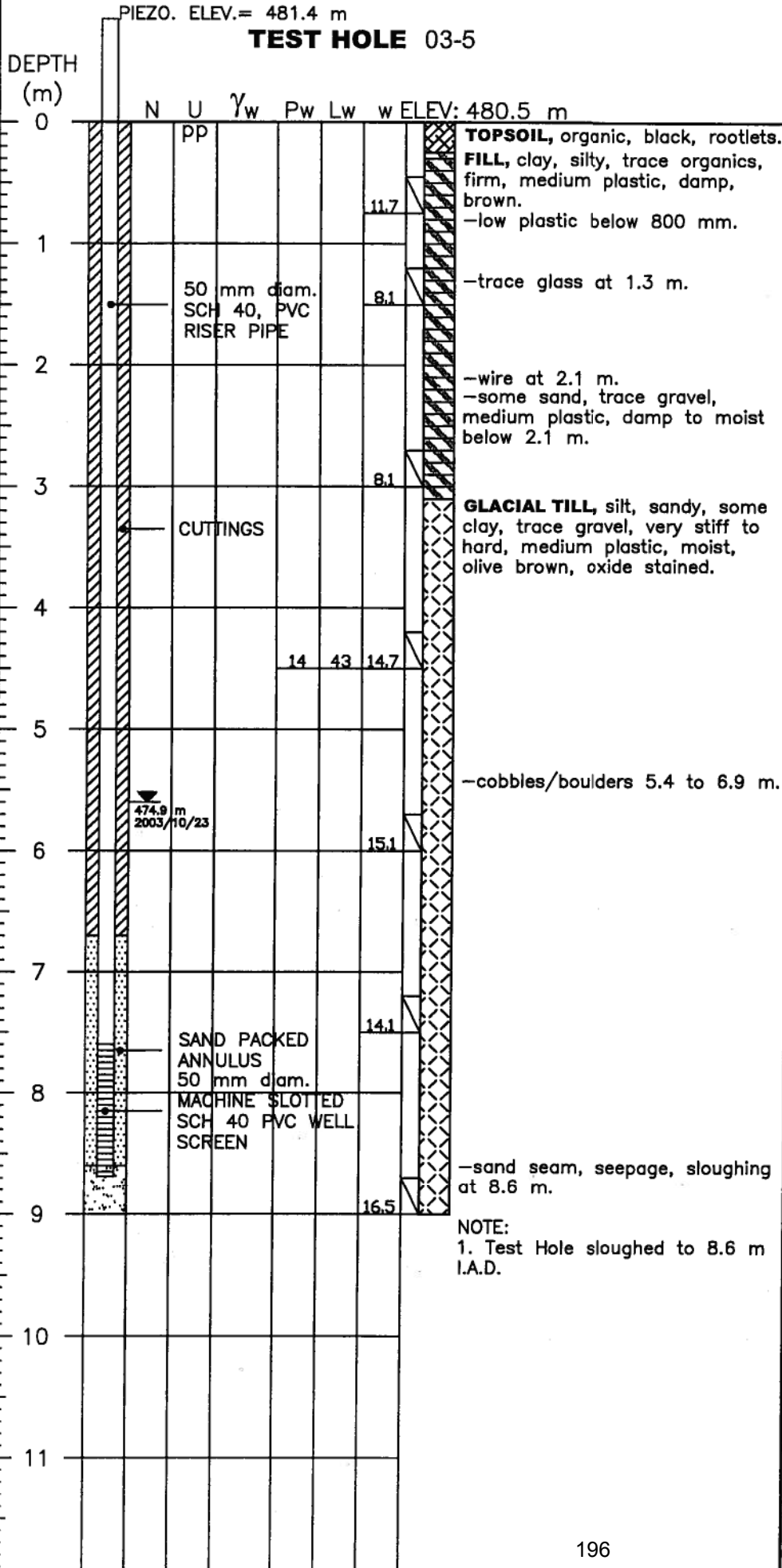
313 - 11TH STREET, SASKATOON, SK

DATE DRILLED:

OCTOBER 7/03

DRAWING NUMBER:

S03-4925-5



LEGEND:

TOPSOIL	GRAVEL	SAND	SILT	CLAY	GLACIAL TILL	FILL

- pp....POCKET PENETROMETER (kg/cm²)
 - w.....WATER CONTENT (PERCENT OF DRY SOIL WEIGHT)
 - Lw....LIQUID LIMIT
 - Pw....PLASTIC LIMIT
 - γ_wWET UNIT WEIGHT (kN/m³)
 - U.....UNCONFINED COMPRESSIVE STRENGTH (kPa)
 - N.....STANDARD PENETRATION TEST
 - SO₄....SULPHATE CONTENT (PERCENT OF DRY SOIL)
 - I.A.D....IMMEDIATELY AFTER DRILLING
 - ▽...RECORDED WATER LEVEL TEST HOLE (I.A.D.)
 - ▼.....RECORDED WATER LEVEL (PIEZO)
- | | | |
|-------------|-------------|----------|
| | | |
| SHELBY TUBE | SPLIT SPOON | CUTTINGS |

LIMITATIONS: THE FIELD DRILL LOG IS A SUMMARY OF THE SUBSURFACE CONDITIONS ENCOUNTERED AT THE SPECIFIC TEST HOLE LOCATION AT THE TIME OF TEST DRILLING. SUBSURFACE CONDITIONS MAY VARY AT OTHER LOCATIONS OF THIS SITE AND, IN TIME, MAY CHANGE AT THIS SPECIFIC TEST HOLE LOCATION.

P. MACHIBRODA ENGINEERING LTD.



FIELD DRILL LOG AND SOIL TEST RESULTS

PROJECT:
 SLOPE STABILITY STUDY

LOCATION:
 313 - 11TH STREET, SASKATOON, SK

DATE DRILLED: OCTOBER 7/03	DRAWING NUMBER: S03-4925-6
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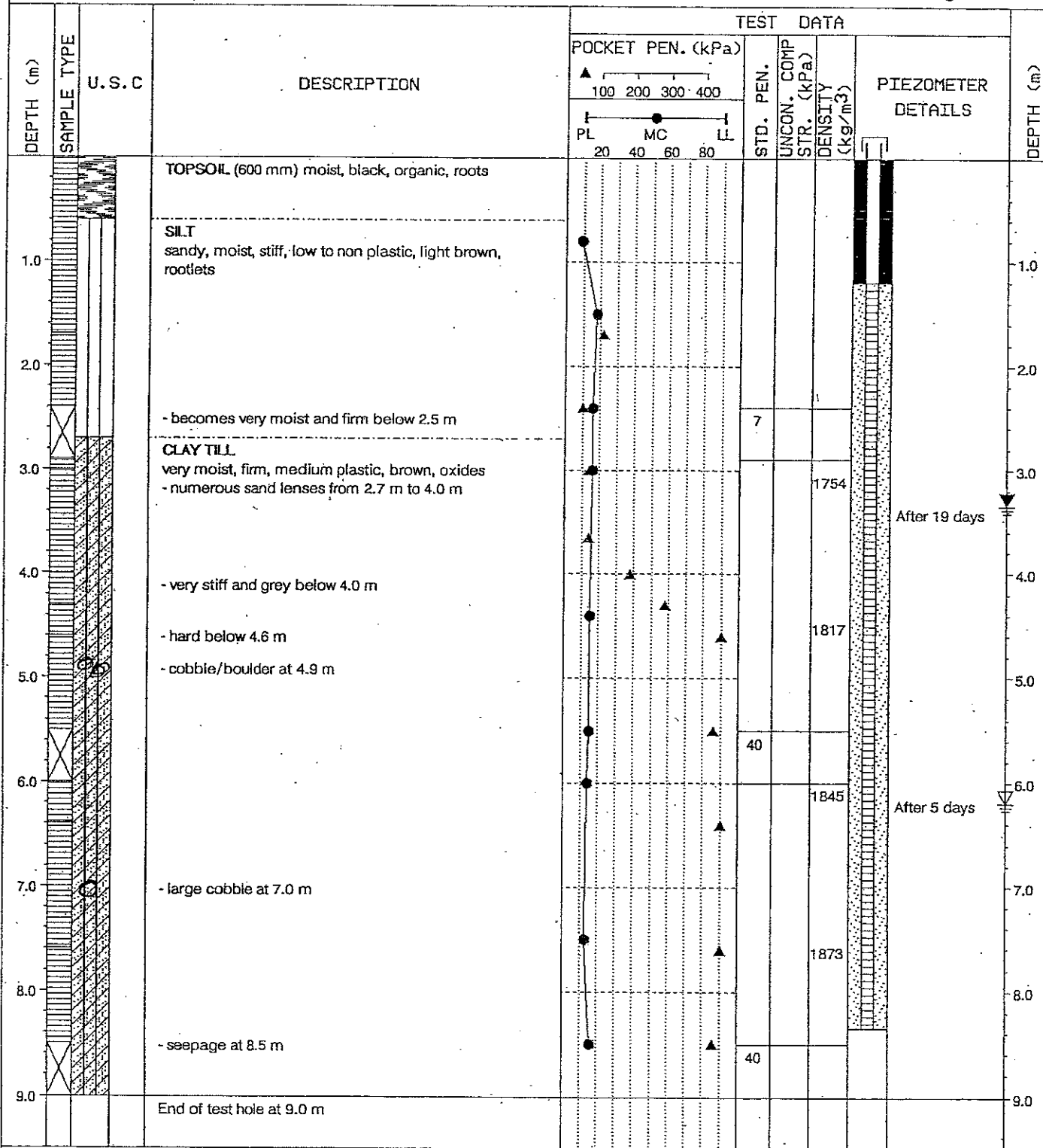


HISTORICAL BOREHOLE LOGS
TH 1, TH 2, TH 3, TH 4, TH 5, TH 6 (AMEC05)

AMEC Earth & Environmental. July 27, 2005. Revised Slope Stability Assessment Proposed Condominium Development, 316 Saskatchewan Crescent, Saskatoon, Saskatchewan

Project: PROPOSED CONDOMINIUM DEVELOPMENT
306 SASKATCHEWAN CRESCENT
SASKATOON, SASKATCHEWAN

Elevation(m): 479.50
Date Drilled: 12/10/93
Drill Method: CME 75 cont. hollow stem auger



Sample Type:

☐ DISTURBED
■ SHELBY

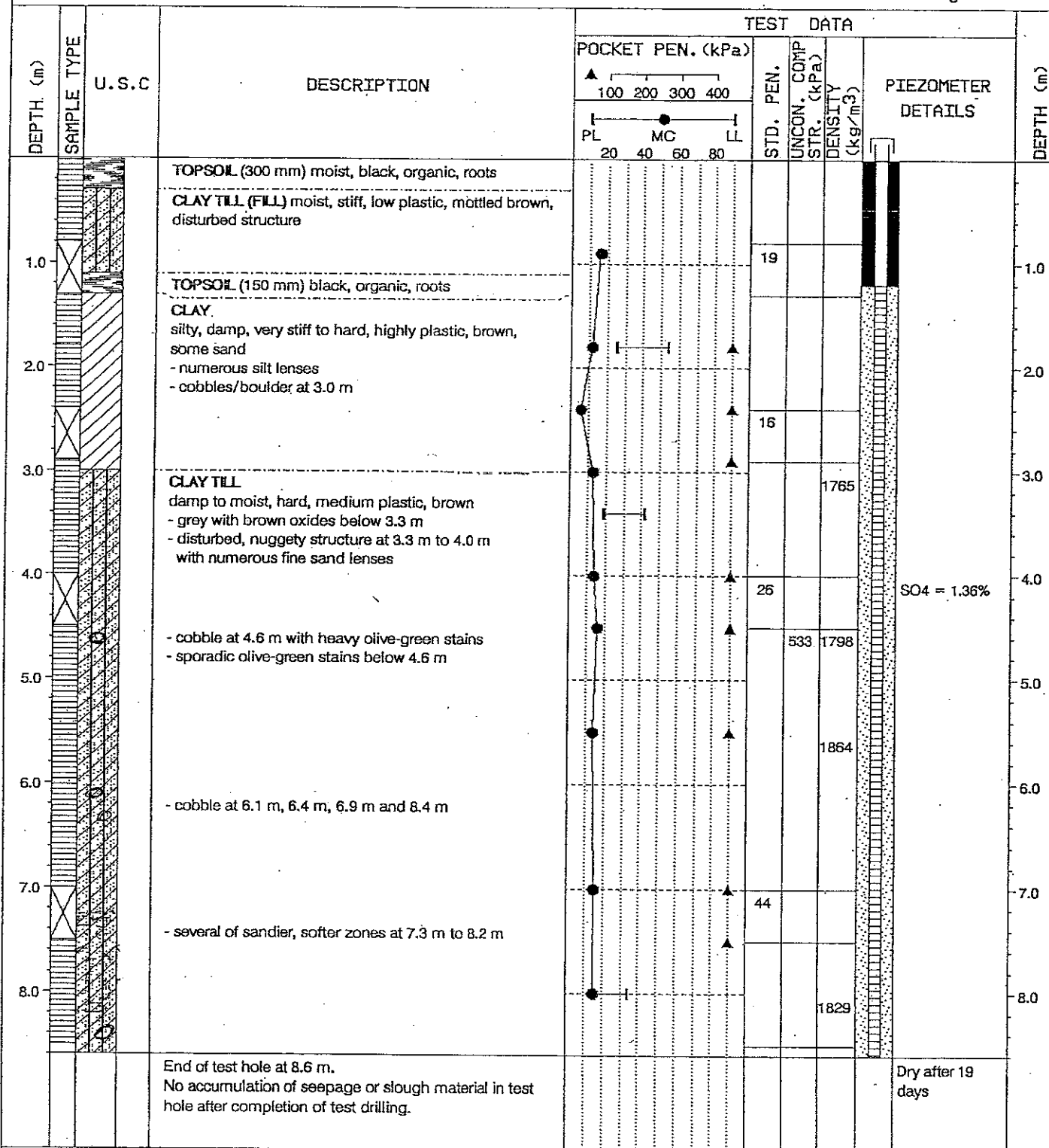
⊗ SPT SAMPLE
▨ CONT.SAMPLER

▩ CORE
▤ NO RECOVERY

FIGURE A4

Project: PROPOSED CONDOMINIUM DEVELOPMENT
306 SASKATCHEWAN CRESCENT
SASKATOON, SASKATCHEWAN

Elevation(m): 480.53
Date Drilled: 12/10/93
Drill Method: CME 75 cont. hollow stem auger



Sample Type:

☐ DISTURBED
■ SHELBY

⊗ SPT SAMPLE
▨ CONT. SAMPLER

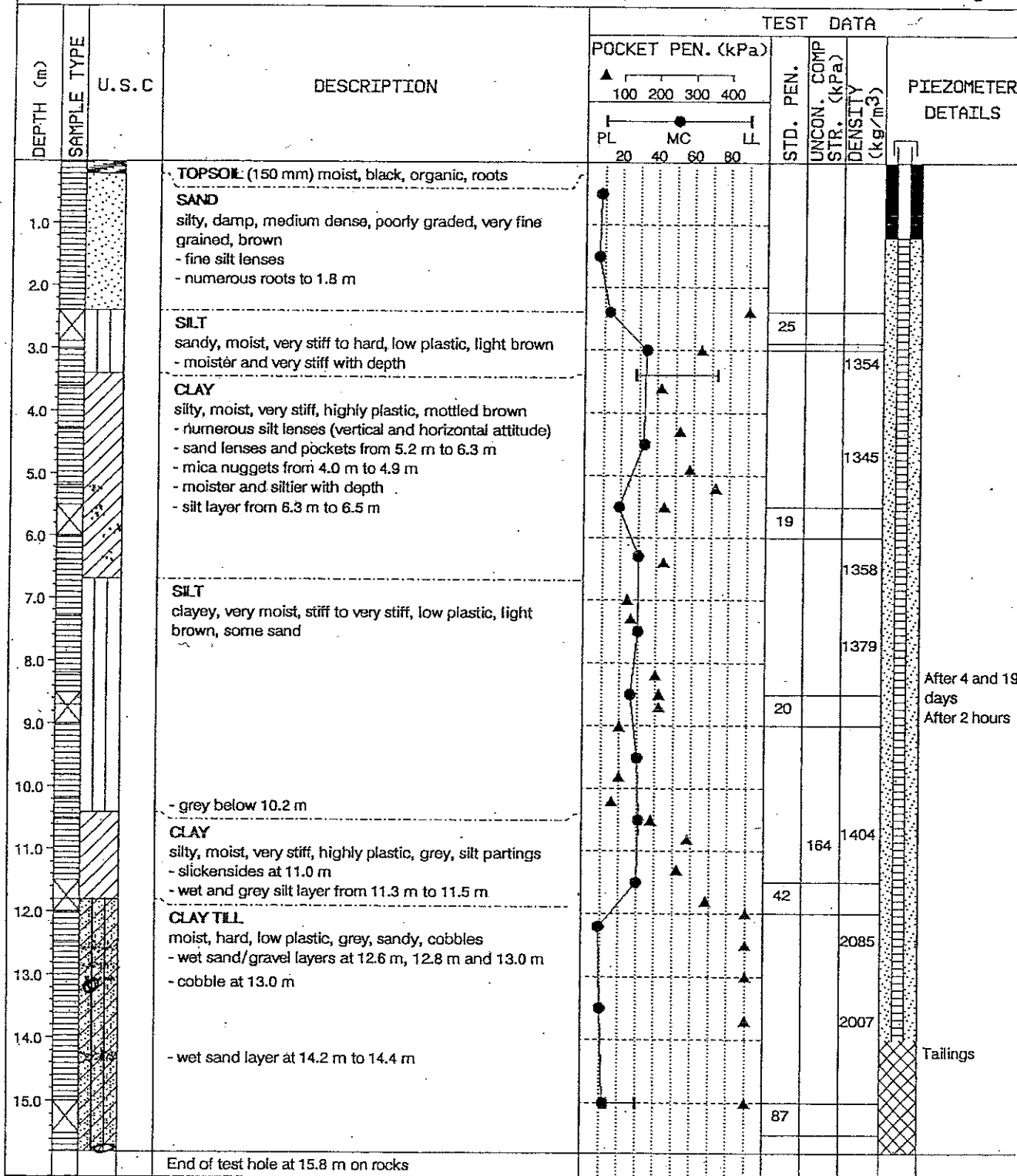
▩ CORE
▤ NO RECOVERY

FIGURE A5

Sheet 1 of 1

Project: PROPOSED CONDOMINIUM DEVELOPMENT
 306 SASKATCHEWAN CRESCENT
 SASKATOON, SASKATCHEWAN

Elevation(m): 494.36
 Date Drilled: 12/10/93
 Drill Method: CME 75 cont. hollow stem auger



Sample Type:

□ DISTURBED

■ SHELBY

⊠ SPT SAMPLE

▨ CONT. SAMPLER

▩ CORE

▤ NO RECOVERY

FIGURE A6

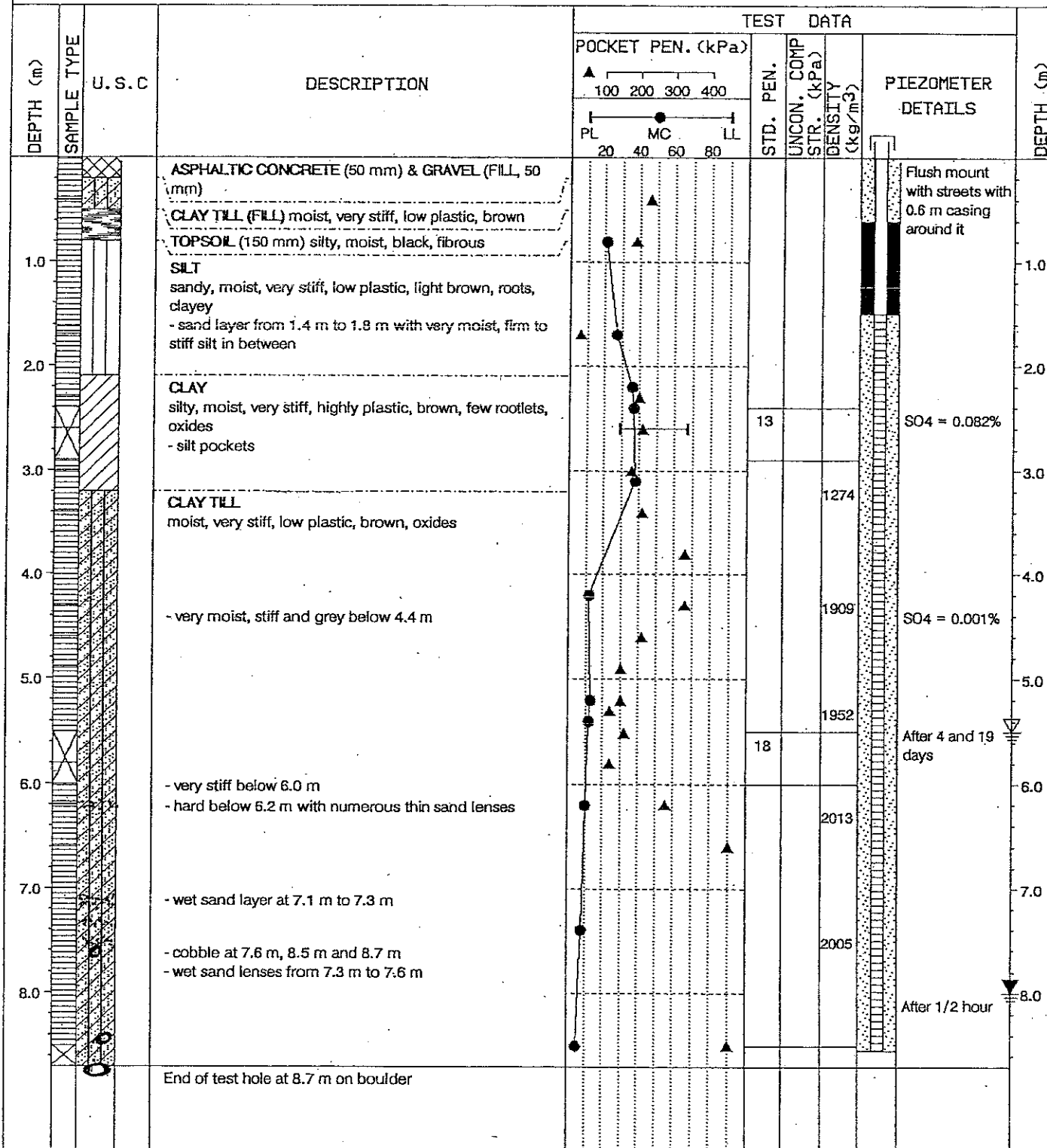
Sheet 1 of 1

Project: PROPOSED CONDOMINIUM DEVELOPMENT
 306 SASKATCHEWAN CRESCENT
 SASKATOON, SASKATCHEWAN

Elevation(m): 488.67

Date Drilled: 13/10/93

Drill Method: CME 75 cont. hollow stem auger



Sample Type:

▨ DISTURBED

▨ SPT SAMPLE

▨ CORE

▨ SHELBY

▨ CONT. SAMPLER

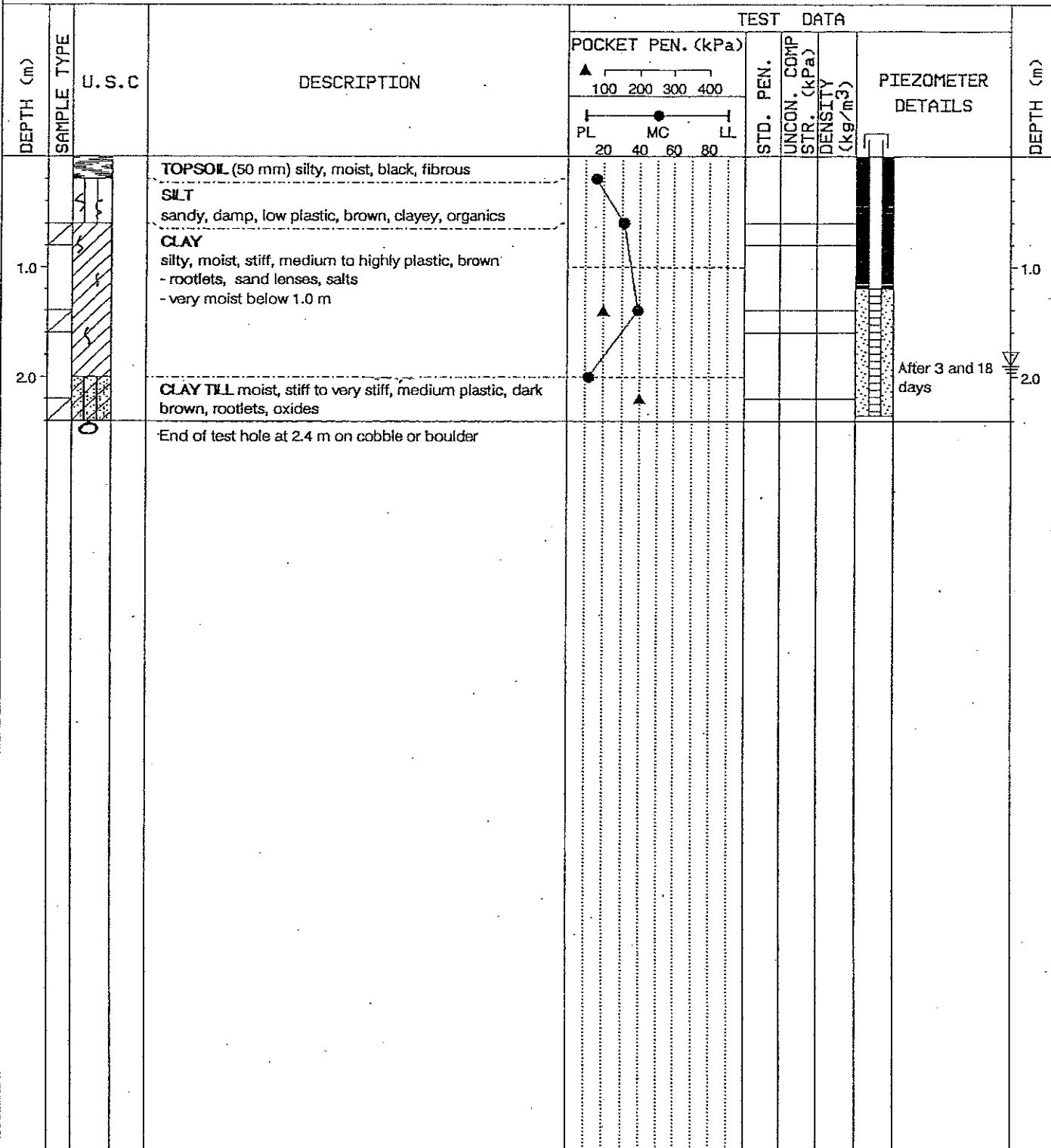
▨ NO RECOVERY

FIGURE A7

Sheet 1 of 1

Project: PROPOSED CONDOMINIUM DEVELOPMENT
306 SASKATCHEWAN CRESCENT
SASKATOON, SASKATCHEWAN

Elevation(m): 485.18
Date Drilled: 14/10/93
Drill Method: Hand auger



Sample Type:

☐ DISTURBED
■ SHELBY

☒ SPT SAMPLE
▨ CONT.SAMPLER

▣ CORE
▤ NO RECOVERY

FIGURE A8

Project: PROPOSED CONDOMINIUM DEVELOPMENT
 306 SASKATCHEWAN CRESCENT
 SASKATOON, SASKATCHEWAN

Elevation(m): 486.23
 Date Drilled: 14/10/93
 Drill Method: Hand auger

DEPTH (m)	SAMPLE TYPE	U. S. C	DESCRIPTION	TEST DATA				OTHER TESTS	DEPTH (m)
				POCKET PEN. (kPa)	STD. PEN.	UNCON. COMP STR. (kPa)	DENSITY (kg/m ³)		
0.0 - 0.1			TOPSOIL (190 mm) silty, moist, black, fibrous	▲					
0.1 - 0.3			SILT sandy, damp, low plastic, light brown, clayey, organics	PL					
0.3 - 1.5			CLAY TILL damp, low plastic, brown, oxides, few rootlets	MC					
1.5 - 1.5			End of test hole at 1.5 m on cobble or boulder	L					

Sample Type:

DISTURBED
 SHELBY

SPT SAMPLE
 CONT. SAMPLER

CORE
 NO RECOVERY

FIGURE A9

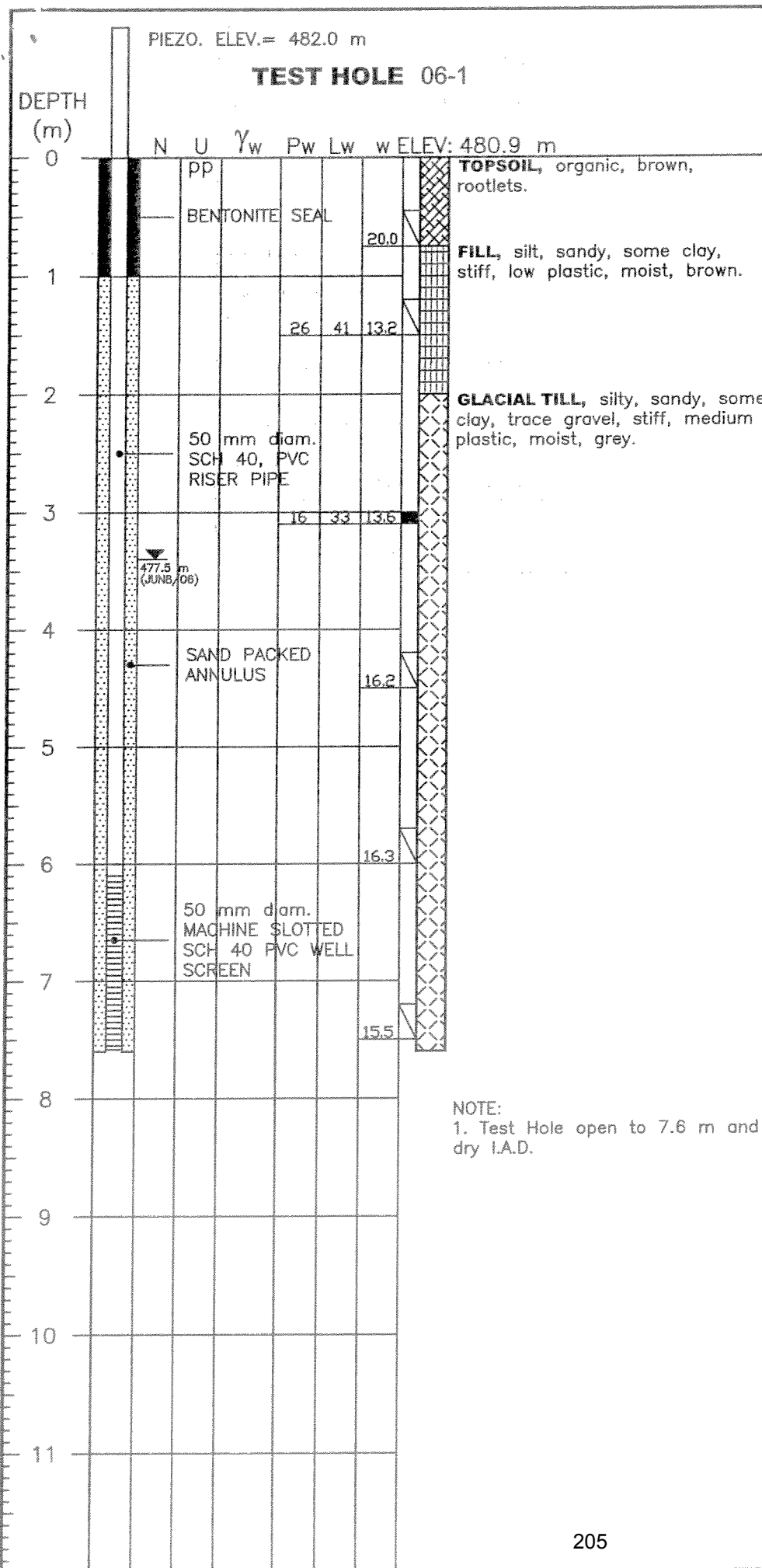
Sheet 1 of 1



APPENDIX E
Record of Borehole Logs

HISTORICAL BOREHOLE LOGS
TH 06-1, TH 06-2 (PMEL06)

P. Machibroda Engineering Ltd. July 14, 2006. Geotechnical Investigation and Slope Stability Study Proposed Condominium 316 - Saskatchewan Crescent East, Saskatoon, SK



LEGEND:

TOPSOIL
 GRAVEL
 SAND
 SILT
 CLAY
 GLACIAL TILL
 FILL

w.....WATER CONTENT (PERCENT OF DRY SOIL WEIGHT)
 Lw...LIQUID LIMIT
 Pw...PLASTIC LIMIT
 γ_w ...WET UNIT WEIGHT (kN/m³)
 U.....UNCONFINED COMPRESSIVE STRENGTH (kPa)
 pp...POCKET PENETROMETER (kg/cm²)
 N.....STANDARD PENETRATION TEST (ROPE-CATHEAD & DONUT HAMMER) (50/125mm = BLOWS/SAMPLER PENETRATION)
 SO₄.....SULPHATE CONTENT (PERCENT OF DRY SOIL WEIGHT)
 P200...% PASSING No. 200 SIEVE
 I.A.D.....IMMEDIATELY AFTER DRILLING
...RECORDED WATER LEVEL TEST HOLE (I.A.D.)
...RECORDED WATER LEVEL (PIEZO)

SHELBY TUBE
 SPLIT SPOON
 CUTTINGS

LIMITATIONS: THE FIELD DRILL LOG IS A SUMMARY OF THE SUBSURFACE CONDITIONS ENCOUNTERED AT THE SPECIFIC TEST HOLE LOCATION AT THE TIME OF TEST DRILLING. SUBSURFACE CONDITIONS MAY VARY AT OTHER LOCATIONS OF THIS SITE AND, IN TIME, MAY CHANGE AT THIS SPECIFIC TEST HOLE LOCATION.

NOTE:
 1. Test Hole open to 7.6 m and dry I.A.D.

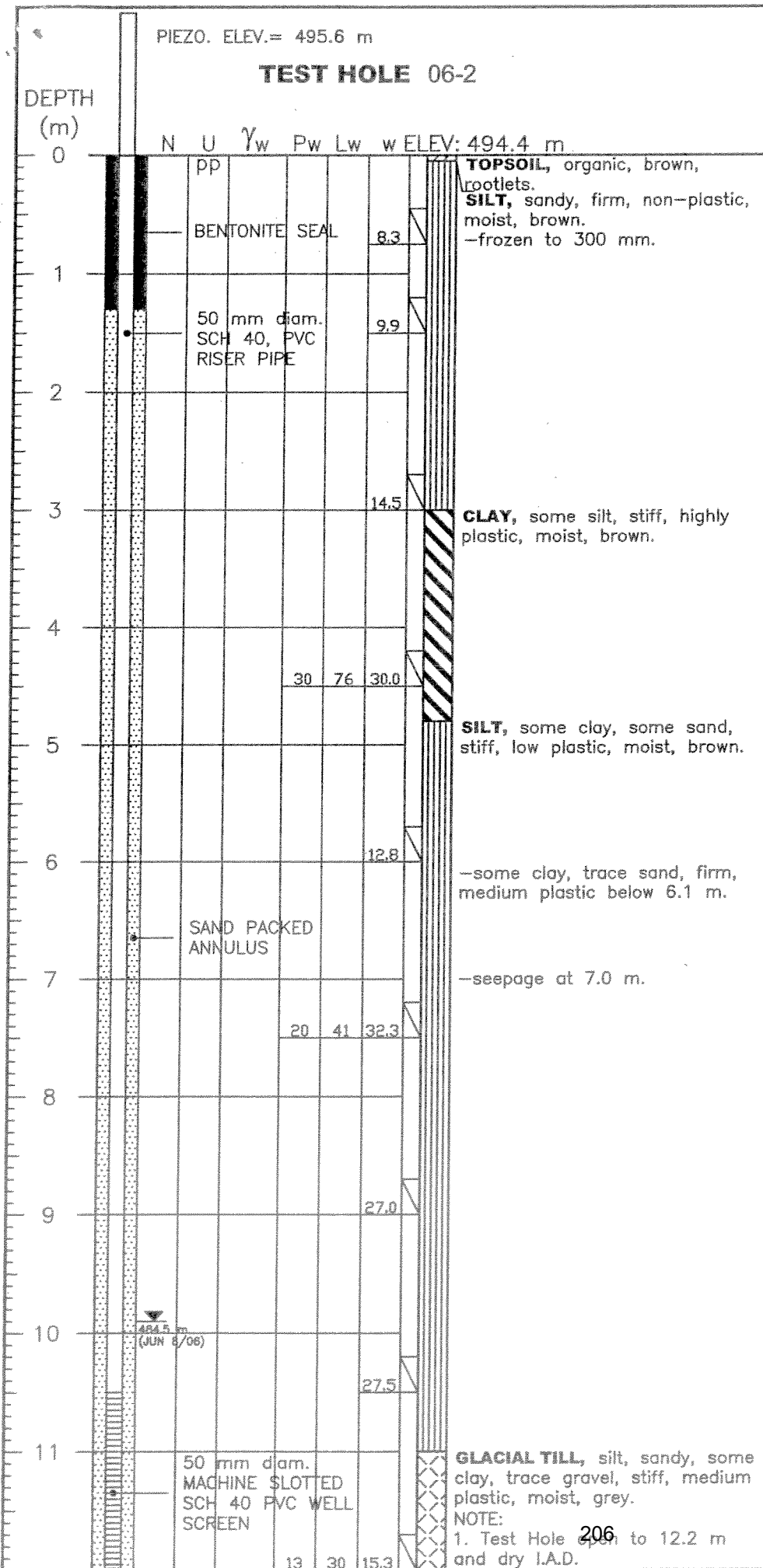
P. MACHIBRODA ENGINEERING LTD.

FIELD DRILL LOG AND SOIL TEST RESULTS

PROJECT: PROPOSED CONDOMINIUM DEVELOPMENT

LOCATION: SASKATOON, SK

DATE DRILLED: MAR 17/06 **DRAWING NUMBER:** S06-5722-3



LEGEND:

TOPSOIL	GRAVEL	SAND	SILT	CLAY	GLACIAL TILL	FILL

w.....WATER CONTENT
(PERCENT OF DRY SOIL WEIGHT)

Lw...LIQUID LIMIT

Pw...PLASTIC LIMIT

γ_w ...WET UNIT WEIGHT (kN/m³)

U.....UNCONFINED COMPRESSIVE STRENGTH (kPa)

pp...POCKET PENETROMETER (kg/cm²)

N.....STANDARD PENETRATION TEST (ROPE-CATHEAD & DONUT HAMMER) (50/125mm = BLOWS/SAMPLER PENETRATION)

SO₄.....SULPHATE CONTENT (PERCENT OF DRY SOIL WEIGHT)

P200...% PASSING No. 200 SIEVE

I.A.D.....IMMEDIATELY AFTER DRILLING


▽...RECORDED WATER LEVEL TEST HOLE (I.A.D.)

▼...RECORDED WATER LEVEL (PIEZO)

SHELBY TUBE	SPLIT SPOON	CUTTINGS

LIMITATIONS: THE FIELD DRILL LOG IS A SUMMARY OF THE SUBSURFACE CONDITIONS ENCOUNTERED AT THE SPECIFIC TEST HOLE LOCATION AT THE TIME OF TEST DRILLING. SUBSURFACE CONDITIONS MAY VARY AT OTHER LOCATIONS OF THIS SITE AND, IN TIME, MAY CHANGE AT THIS SPECIFIC TEST HOLE LOCATION.

P. MACHIBRODA ENGINEERING LTD.



FIELD DRILL LOG AND SOIL TEST RESULTS

PROJECT: PROPOSED CONDOMINIUM DEVELOPMENT

LOCATION: SASKATOON, SK

DATE DRILLED: MAR 17/06	DRAWING NUMBER: S06-5722-4
-----------------------------------	--------------------------------------



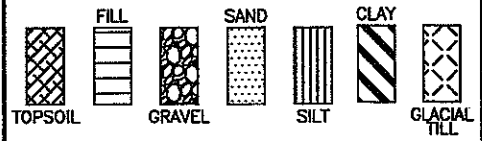
APPENDIX E
Record of Borehole Logs

HISTORICAL BOREHOLE LOGS
TH07-01, TH 07-02, TH 07-03, TH 07-04, TH 07-5 (PMEL07)

P. Machibroda Engineering Ltd. June 12, 2007. Geotechnical Investigation and Slope Stability Study Proposed Residences, 221 & 225 - 11th Street East, Saskatoon, SK

TEST HOLE 07-1

LEGEND:



- w.....WATER CONTENT (PERCENT OF DRY SOIL WEIGHT)
- Lw...LIQUID LIMIT
- Pw...PLASTIC LIMIT
- γ_w ...WET UNIT WEIGHT (kN/m³)
- U.....UNCONFINED COMPRESSIVE STRENGTH (kPa)
- pp...POCKET PENETROMETER (kg/cm²)
- N.....STANDARD PENETRATION TEST (ROPE-CATHEAD & DONUT HAMMER) (50/125 = BLOWS/SAMPLER PENETRATION [mm])
- SO₄.....SULPHATE CONTENT (PERCENT OF DRY SOIL WEIGHT)
- P200...% PASSING No. 200 SIEVE
- I.A.D.....IMMEDIATELY AFTER DRILLING
- ▽...RECORDED WATER LEVEL (TEST HOLE I.A.D.)
- ▼...RECORDED WATER LEVEL (PIEZO)



LIMITATIONS: THE FIELD DRILL LOG IS A SUMMARY OF THE SUBSURFACE CONDITIONS ENCOUNTERED AT THE SPECIFIC TEST HOLE LOCATION AT THE TIME OF TEST DRILLING. SUBSURFACE CONDITIONS MAY VARY AT OTHER LOCATIONS OF THIS SITE AND, IN TIME, MAY CHANGE AT THIS SPECIFIC TEST HOLE LOCATION.



**P. MACHIBRODA
ENGINEERING
LTD.**

**FIELD DRILL LOG
AND
SOIL TEST RESULTS**

PROJECT:

PROPOSED RESIDENCE

LOCATION:

221 & 225 - 11th STREET EAST
SASKATOON, SK

NORTHING:

EASTING:

DATE DRILLED:

MAY 1/07

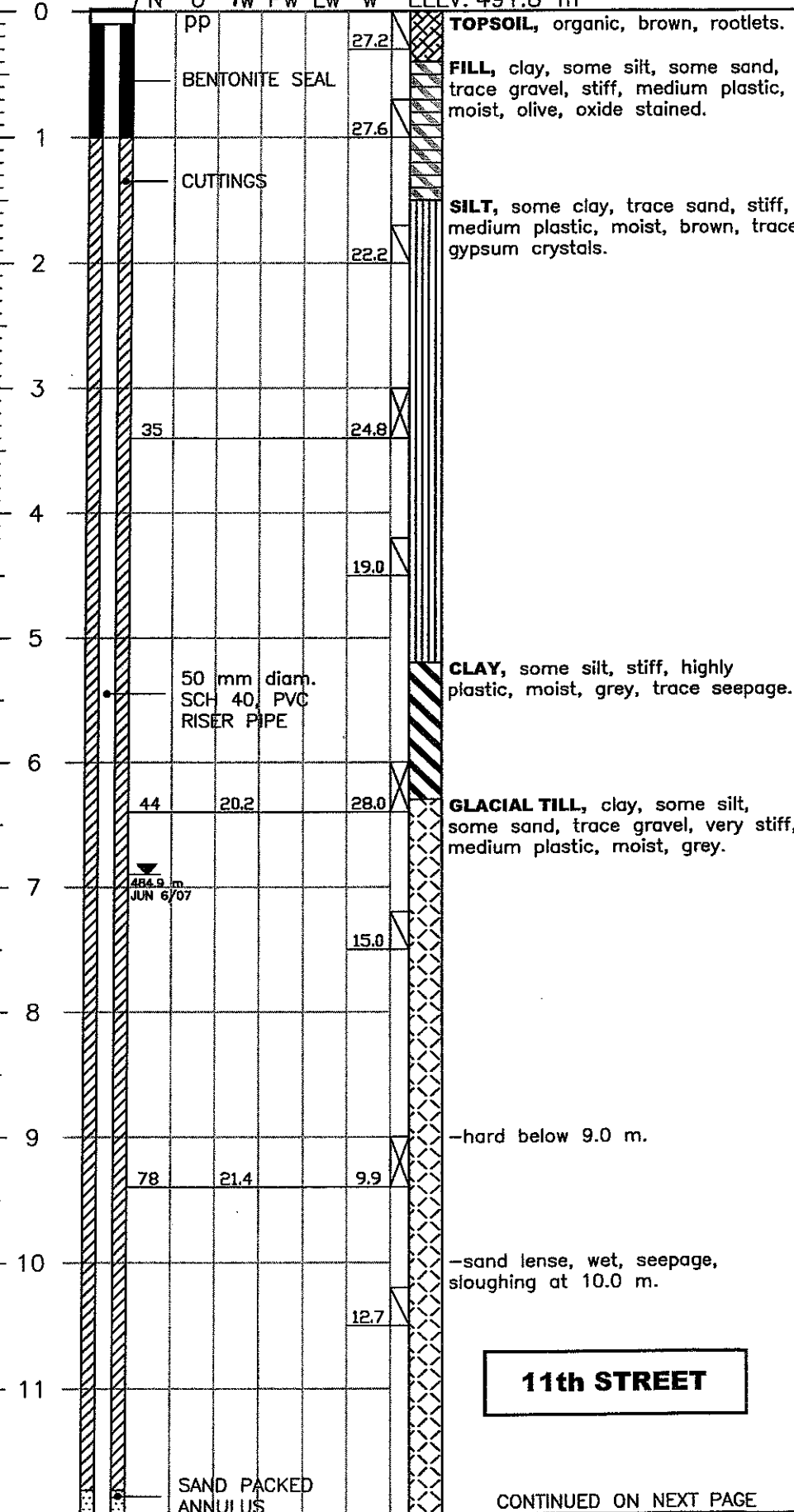
DRAWING NUMBER:

S07-6078-2

DEPTH (m)

ROADBOX

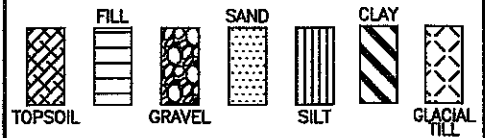
N U γ_w Pw Lw w ELEV: 491.8 m



11th STREET

CONTINUED ON NEXT PAGE

LEGEND:



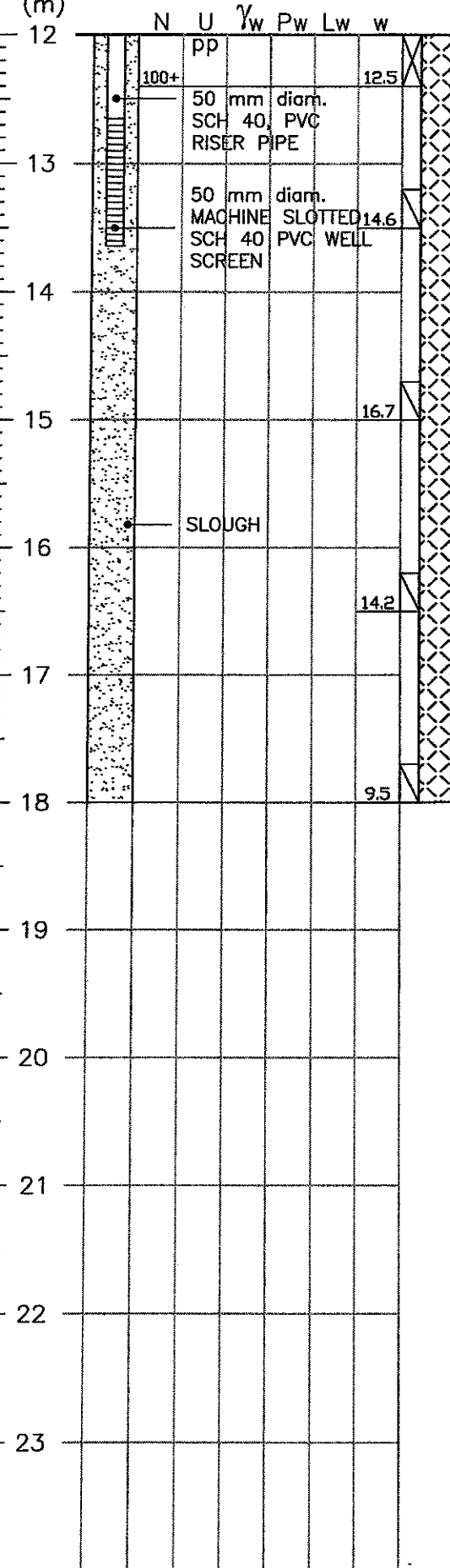
- w.....WATER CONTENT (PERCENT OF DRY SOIL WEIGHT)
- Lw...LIQUID LIMIT
- Pw...PLASTIC LIMIT
- γ_w ...WET UNIT WEIGHT (kN/m³)
- U.....UNCONFINED COMPRESSIVE STRENGTH (kPa)
- pp...POCKET PENETROMETER (kg/cm²)
- N.....STANDARD PENETRATION TEST (ROPE-CATHEAD & DONUT HAMMER) (50/125 = BLOWS/SAMPLER PENETRATION [mm])
- SO₄SULPHATE CONTENT (PERCENT OF DRY SOIL WEIGHT)
- P200...% PASSING No. 200 SIEVE
- I.A.D.....IMMEDIATELY AFTER DRILLING
- ∇...RECORDED WATER LEVEL (TEST HOLE I.A.D.)
- ▼...RECORDED WATER LEVEL (PIEZO)



LIMITATIONS: THE FIELD DRILL LOG IS A SUMMARY OF THE SUBSURFACE CONDITIONS ENCOUNTERED AT THE SPECIFIC TEST HOLE LOCATION AT THE TIME OF TEST DRILLING. SUBSURFACE CONDITIONS MAY VARY AT OTHER LOCATIONS OF THIS SITE AND, IN TIME, MAY CHANGE AT THIS SPECIFIC TEST HOLE LOCATION.

TEST HOLE 07-1

DEPTH (m)



NOTE:
1. Test Hole sloughed to 11.8 m I.A.D.

11th STREET



P. MACHIBRODA ENGINEERING LTD.

FIELD DRILL LOG AND SOIL TEST RESULTS

PROJECT:

PROPOSED RESIDENCE

LOCATION:

221 & 225 - 11th STREET EAST
SASKATOON, SK

NORTHING:

EASTING:

DATE DRILLED:

MAY 1/07

DRAWING NUMBER:

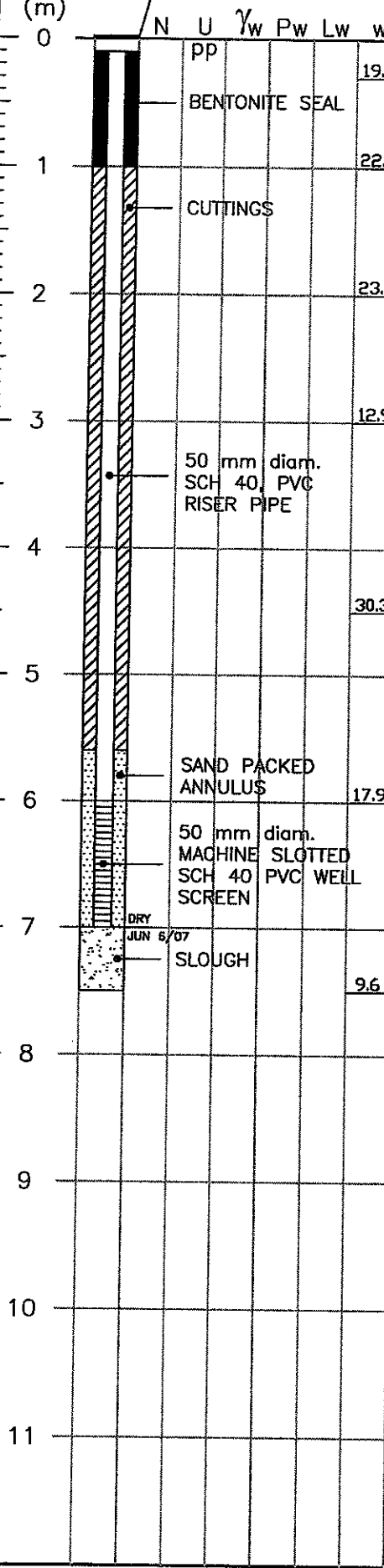
S07-6078-2A

TEST HOLE 07-2

DEPTH (m)

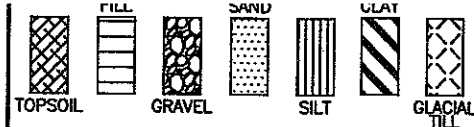
ROADBOX

ELEV: 489.4 m



NOTE:
1. Test Hole sloughed to 7.1 m and dry I.A.D.

11th STREET



- w....WATER CONTENT (PERCENT OF DRY SOIL WEIGHT)
- Lw...LIQUID LIMIT
- Pw...PLASTIC LIMIT
- γw...WET UNIT WEIGHT (kN/m³)
- U.....UNCONFINED COMPRESSIVE STRENGTH (kPa)
- pp...POCKET PENETROMETER (kg/cm²)
- N.....STANDARD PENETRATION TEST (ROPE-CATHEAD & DONUT HAMMER) (50/125 = BLOWS/SAMPLER PENETRATION [mm])
- SO₄.....SULPHATE CONTENT (PERCENT OF DRY SOIL WEIGHT)
- P200...% PASSING No. 200 SIEVE
- I.A.D.....IMMEDIATELY AFTER DRILLING
- ▽...RECORDED WATER LEVEL (TEST HOLE I.A.D.)
- ▼...RECORDED WATER LEVEL (PIEZO)
- SHELBY TUBE
- ⊠ SPLIT SPOON
- ◻ CUTTINGS

LIMITATIONS: THE FIELD DRILL LOG IS A SUMMARY OF THE SUBSURFACE CONDITIONS ENCOUNTERED AT THE SPECIFIC TEST HOLE LOCATION AT THE TIME OF TEST DRILLING. SUBSURFACE CONDITIONS MAY VARY AT OTHER LOCATIONS OF THIS SITE AND, IN TIME, MAY CHANGE AT THIS SPECIFIC TEST HOLE LOCATION.



P. MACHIBRODA ENGINEERING LTD.

FIELD DRILL LOG AND SOIL TEST RESULTS

PROJECT:
PROPOSED RESIDENCE

LOCATION:
221 & 225 - 11th STREET EAST
SASKATOON, SK

NORTHING: **EASTING:**

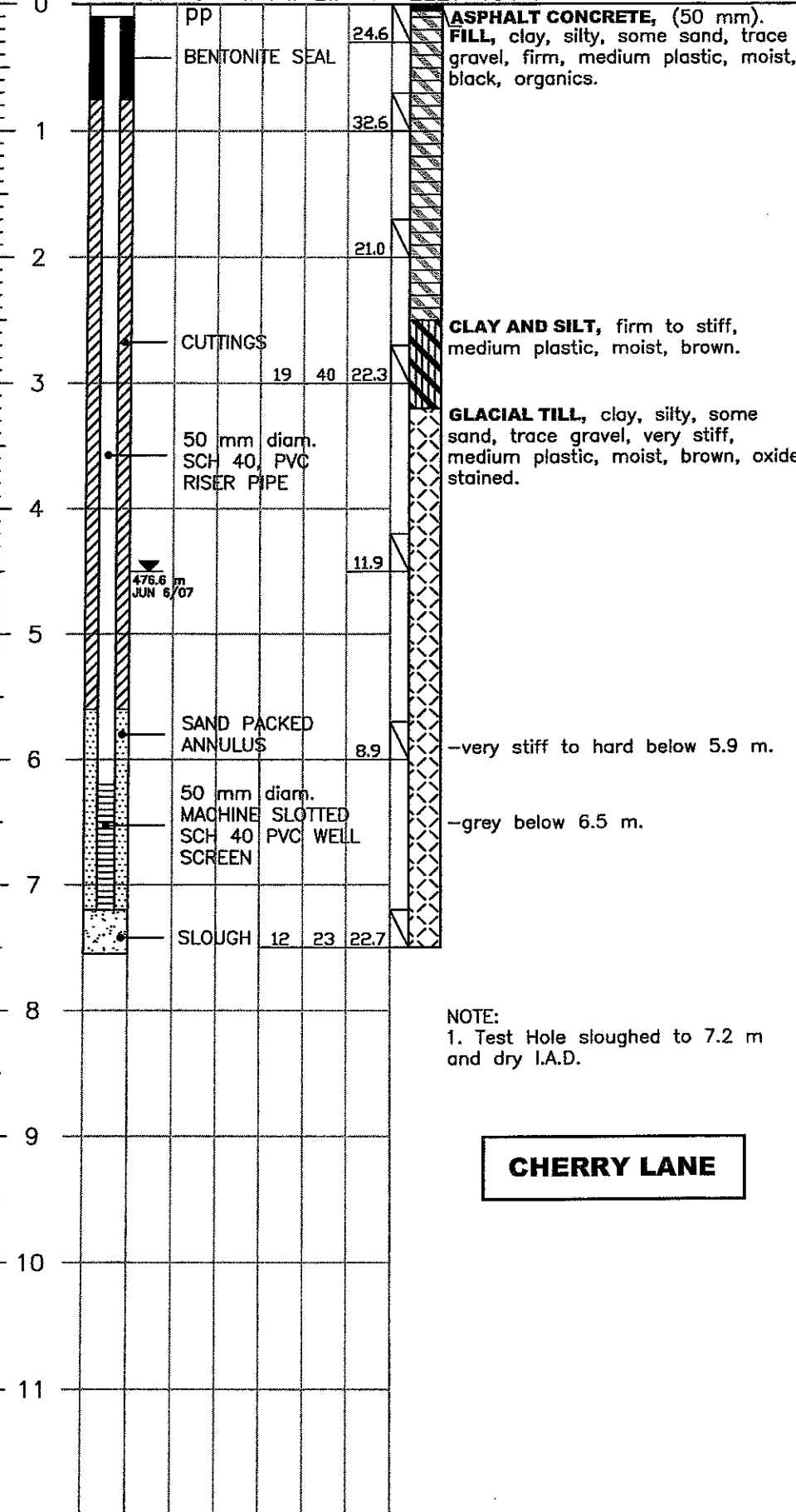
DATE DRILLED: **DRAWING NUMBER:**
MAY 3/07 S07-6078-3

PIEZO. ELEV.= 481.0 m

TEST HOLE 07-3

DEPTH (m)

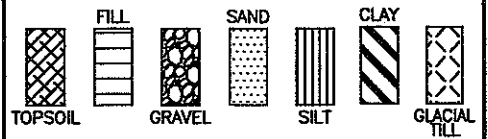
N U γ_w Pw Lw w ELEV: 481.1 m



NOTE:
1. Test Hole sloughed to 7.2 m and dry I.A.D.

CHERRY LANE

LEGEND:



- w.....WATER CONTENT (PERCENT OF DRY SOIL WEIGHT)
- Lw...LIQUID LIMIT
- Pw...PLASTIC LIMIT
- γ_w ...WET UNIT WEIGHT (kN/m³)
- U.....UNCONFINED COMPRESSIVE STRENGTH (kPa)
- pp...POCKET PENETROMETER (kg/cm²)
- N.....STANDARD PENETRATION TEST (ROPE-CATHEAD & DONUT HAMMER) (50/125 = BLOWS/SAMPLER PENETRATION [mm])
- SO₄SULPHATE CONTENT (PERCENT OF DRY SOIL WEIGHT)
- P200...% PASSING No. 200 SIEVE
- I.A.D.....IMMEDIATELY AFTER DRILLING
- ▽...RECORDED WATER LEVEL (TEST HOLE I.A.D.)
- ▼...RECORDED WATER LEVEL (PIEZO)
- SHELBY TUBE
- ⊠ SPLIT SPOON
- ◻ CUTTINGS

LIMITATIONS: THE FIELD DRILL LOG IS A SUMMARY OF THE SUBSURFACE CONDITIONS ENCOUNTERED AT THE SPECIFIC TEST HOLE LOCATION AT THE TIME OF TEST DRILLING. SUBSURFACE CONDITIONS MAY VARY AT OTHER LOCATIONS OF THIS SITE AND, IN TIME, MAY CHANGE AT THIS SPECIFIC TEST HOLE LOCATION.



P. MACHIBRODA ENGINEERING LTD.

FIELD DRILL LOG AND SOIL TEST RESULTS

PROJECT:
PROPOSED RESIDENCE

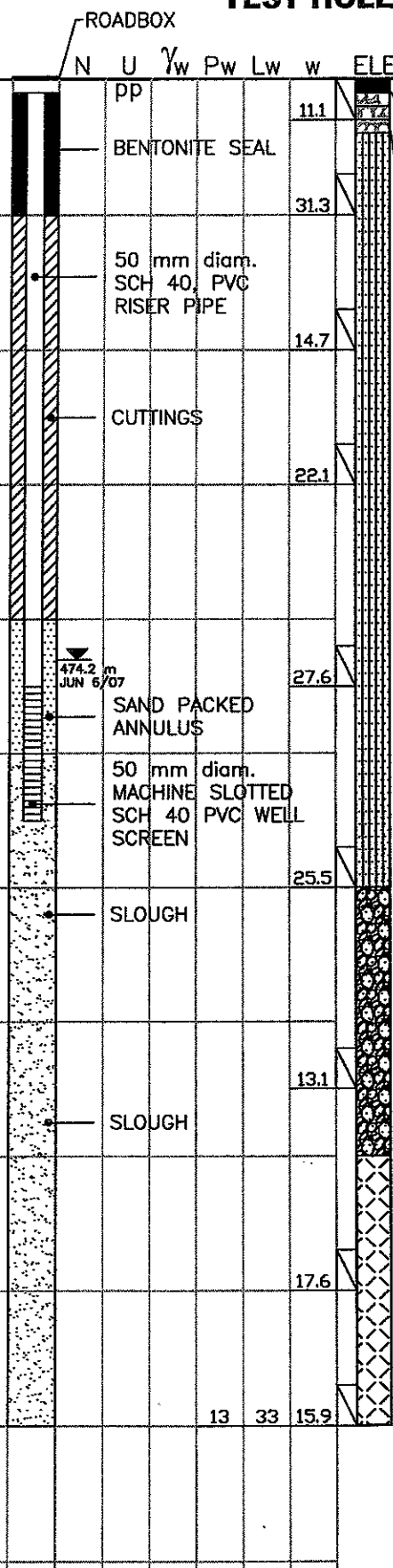
LOCATION:
221 & 225 - 11th STREET EAST
SASKATOON, SK

NORTHING: **EASTING:**
DATE DRILLED: **DRAWING NUMBER:**
MAY 10/07 S07-6078-4

PIEZO. ELEV.= 478.4 m

TEST HOLE 07-4

DEPTH (m)



ELEV: 478.5 m

ASPHALT CONCRETE, (100 mm).
 FILL, gravel, sandy, some silt, dense, well graded, fine to coarse grained, moist, brown.

SAND AND SILT, compact to dense, poorly graded, fine grained, moist, brown.

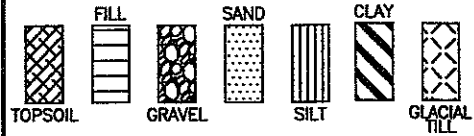
some silt below 2.7 m.
 -wet, seepage, sloughing below 3.0 m.

SAND AND GRAVEL, some silt, dense, well graded, fine to coarse grained, wet, brown, seepage, sloughing.

GLACIAL TILL, clay, some silt, some sand, trace gravel, hard, medium plastic, moist, grey.

11.1
31.3
14.7
22.1
27.6
25.5
13.1
17.6
13 33 15.9

LEGEND:



w.....WATER CONTENT (PERCENT OF DRY SOIL WEIGHT)

Lw...LIQUID LIMIT

Pw...PLASTIC LIMIT

γ_w ...WET UNIT WEIGHT (kN/m^3)

U.....UNCONFINED COMPRESSIVE STRENGTH (kPa)

pp...POCKET PENETROMETER (kg/cm^2)

N.....STANDARD PENETRATION TEST (ROPE-CATHEAD & DONUT HAMMER) (50/125 = BLOWS/SAMPLER PENETRATION [mm])

SO₄.....SULPHATE CONTENT (PERCENT OF DRY SOIL WEIGHT)

P200...% PASSING No. 200 SIEVE

I.A.D.....IMMEDIATELY AFTER DRILLING

▽...RECORDED WATER LEVEL (TEST HOLE I.A.D.)

▼...RECORDED WATER LEVEL (PIEZO)



LIMITATIONS: THE FIELD DRILL LOG IS A SUMMARY OF THE SUBSURFACE CONDITIONS ENCOUNTERED AT THE SPECIFIC TEST HOLE LOCATION AT THE TIME OF TEST DRILLING. SUBSURFACE CONDITIONS MAY VARY AT OTHER LOCATIONS OF THIS SITE AND, IN TIME, MAY CHANGE AT THIS SPECIFIC TEST HOLE LOCATION.

P. MACHIBRODA ENGINEERING LTD.

FIELD DRILL LOG AND SOIL TEST RESULTS

PROJECT:
 PROPOSED RESIDENCE

LOCATION:
 221 & 225 - 11th STREET EAST
 SASKATOON, SK

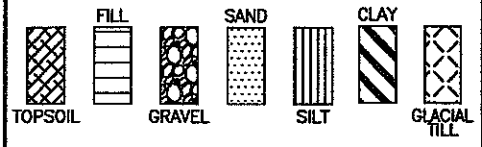
NORTHING: **EASTING:**

DATE DRILLED: **DRAWING NUMBER:**
 MAY 3/07 S07-6078-5

NOTE:
 1. Test Hole sloughed to 5.0 m I.A.D.

SASKATCHEWAN CRESCENT

LEGEND:

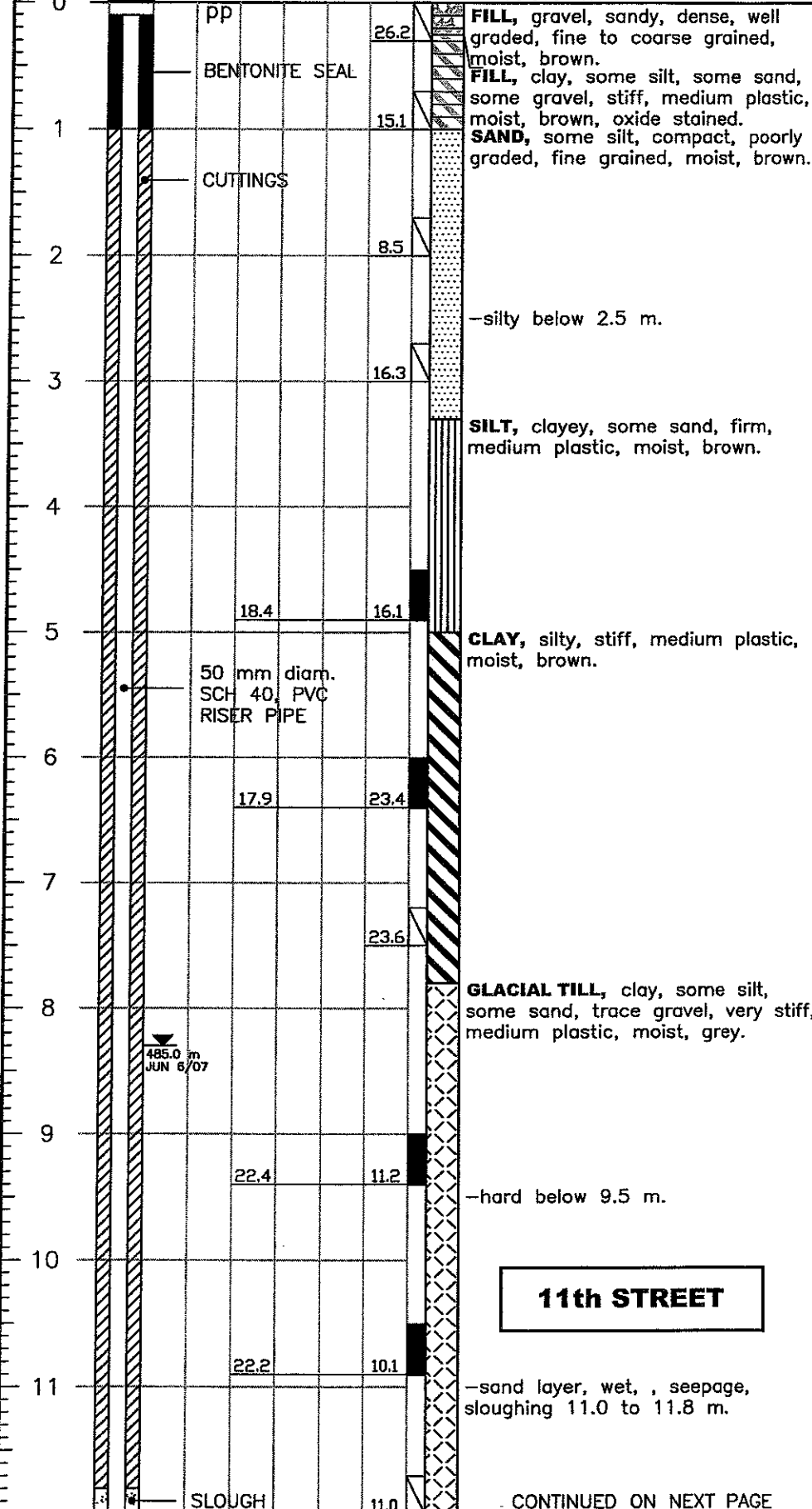


TEST HOLE 07-5

DEPTH (m)

ROADBOX

N U γ_w Pw Lw w ELEV: 493.3 m



w....WATER CONTENT (PERCENT OF DRY SOIL WEIGHT)

Lw...LIQUID LIMIT

Pw...PLASTIC LIMIT

γ_w ...WET UNIT WEIGHT (kN/m³)

U.....UNCONFINED COMPRESSIVE STRENGTH (kPa)

pp...POCKET PENETROMETER (kg/cm²)

N.....STANDARD PENETRATION TEST (ROPE-CATHEAD & DONUT HAMMER) (50/125 = BLOWS/SAMPLER PENETRATION [mm])

SO₄SULPHATE CONTENT (PERCENT OF DRY SOIL WEIGHT)

P200...% PASSING No. 200 SIEVE

I.A.D.....IMMEDIATELY AFTER DRILLING

▽...RECORDED WATER LEVEL (TEST HOLE I.A.D.)

▼...RECORDED WATER LEVEL (PIEZO)



LIMITATIONS: THE FIELD DRILL LOG IS A SUMMARY OF THE SUBSURFACE CONDITIONS ENCOUNTERED AT THE SPECIFIC TEST HOLE LOCATION AT THE TIME OF TEST DRILLING. SUBSURFACE CONDITIONS MAY VARY AT OTHER LOCATIONS OF THIS SITE AND, IN TIME, MAY CHANGE AT THIS SPECIFIC TEST HOLE LOCATION.



P. MACHIBRODA ENGINEERING LTD.

FIELD DRILL LOG AND SOIL TEST RESULTS

PROJECT:

PROPOSED RESIDENCE

LOCATION:

221 & 225 - 11th STREET EAST SASKATOON, SK

NORTHING:

EASTING:

DATE DRILLED:

MAY 2/07

DRAWING NUMBER:

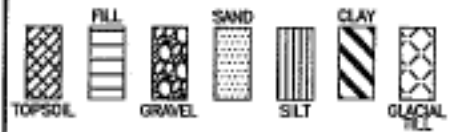
S07-6078-6

11th STREET

CONTINUED ON NEXT PAGE

TEST HOLE 07-5

LEGEND:



- w.....WATER CONTENT (PERCENT OF DRY SOIL WEIGHT)
- Lw...LIQUID LIMIT
- Pw...PLASTIC LIMIT
- γ_w ...WET UNIT WEIGHT (kN/m³)
- U.....UNCONFINED COMPRESSIVE STRENGTH (kPa)
- pp...POCKET PENETROMETER (kg/cm²)
- N.....STANDARD PENETRATION TEST (ROPE-CATHEAD & DONUT HAMMER) (50/125 = BLOWS/SAMPLER PENETRATION [mm])
- SO₄.....SULPHATE CONTENT (PERCENT OF DRY SOIL WEIGHT)
- P200...% PASSING No. 200 SIEVE
- I.A.D.....IMMEDIATELY AFTER DRILLING
- ▽...RECORDED WATER LEVEL (TEST HOLE I.A.D.)
- ▼...RECORDED WATER LEVEL (PIEZO)
- SHELBY TUBE
- ⊠ SPLIT SPOON
- CUTTINGS

LIMITATIONS: THE FIELD DRILL LOG IS A SUMMARY OF THE SUBSURFACE CONDITIONS ENCOUNTERED AT THE SPECIFIC TEST HOLE LOCATION AT THE TIME OF TEST DRILLING. SUBSURFACE CONDITIONS MAY VARY AT OTHER LOCATIONS OF THIS SITE AND, IN TIME, MAY CHANGE AT THIS SPECIFIC TEST HOLE LOCATION.



P. MACHIBRODA ENGINEERING LTD.

FIELD DRILL LOG AND SOIL TEST RESULTS

PROJECT:
PROPOSED RESIDENCE

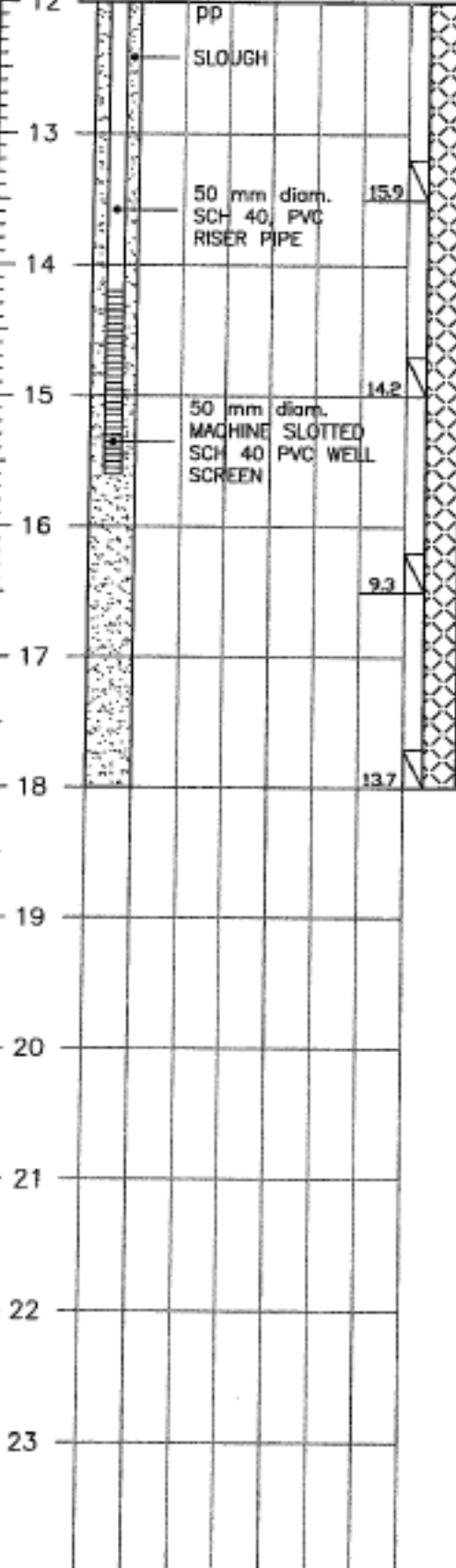
LOCATION:
221 & 225 - 11th STREET EAST
SASKATOON, SK

NORTHING: **EASTING:**

DATE DRILLED: **DRAWING NUMBER:**
MAY 2/07 S07-6078-6A

DEPTH (m)

N U γ_w Pw Lw w



GLACIAL TILL, clay, some silt, some sand, trace gravel, hard, medium plastic, moist, grey.

NOTE:
1. Test Hole sloughed to 11.8 m I.A.D.

11th STREET



APPENDIX E
Record of Borehole Logs

HISTORICAL BOREHOLE LOGS
TH08-01, TH 08-02, TH 08-03, TH 08-04 (PMEL08)

P. Machibroda Engineering Ltd. July 8, 2008. Proposed Commercial/Residential Development 328 Saskatchewan Crescent East, Saskatoon, SK

PIEZO. ELEV.= 480.4 m

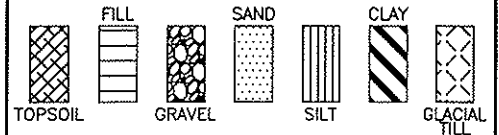
TEST HOLE 08-1

DEPTH (m)

ROAD BOX

N U γ_w Pw Lw w ELEV: 480.4 m

LEGEND:



w.....WATER CONTENT (PERCENT OF DRY SOIL WEIGHT)

Lw...LIQUID LIMIT

Pw...PLASTIC LIMIT

γ_w ...WET UNIT WEIGHT (kN/m³)

U.....UNCONFINED COMPRESSIVE STRENGTH (kPa)

pp...POCKET PENETROMETER (kg/cm²)

N.....STANDARD PENETRATION TEST (SAFETY HAMMER w/AUTOMATIC TRIP) (50/125 = BLOWS/SAMPLER PENETRATION [mm])

SO₄SULPHATE CONTENT (PERCENT OF DRY SOIL WEIGHT)

P200...% PASSING No. 200 SIEVE

I.A.D.....IMMEDIATELY AFTER DRILLING

▽...RECORDED WATER LEVEL (TEST HOLE I.A.D.)

▼...RECORDED WATER LEVEL (PIEZO)



LIMITATIONS: THE FIELD DRILL LOG IS A SUMMARY OF THE SUBSURFACE CONDITIONS ENCOUNTERED AT THE SPECIFIC TEST HOLE LOCATION AT THE TIME OF TEST DRILLING. SUBSURFACE CONDITIONS MAY VARY AT OTHER LOCATIONS OF THIS SITE AND, IN TIME, MAY CHANGE AT THIS SPECIFIC TEST HOLE LOCATION.



P. MACHIBRODA ENGINEERING LTD.

FIELD DRILL LOG AND SOIL TEST RESULTS

PROJECT:

PROPOSED COMMERCIAL / RESIDENTIAL DEVELOPMENT

LOCATION:

328 SASKATCHEWAN CRESCENT SASKATOON, SK

NORTHING:

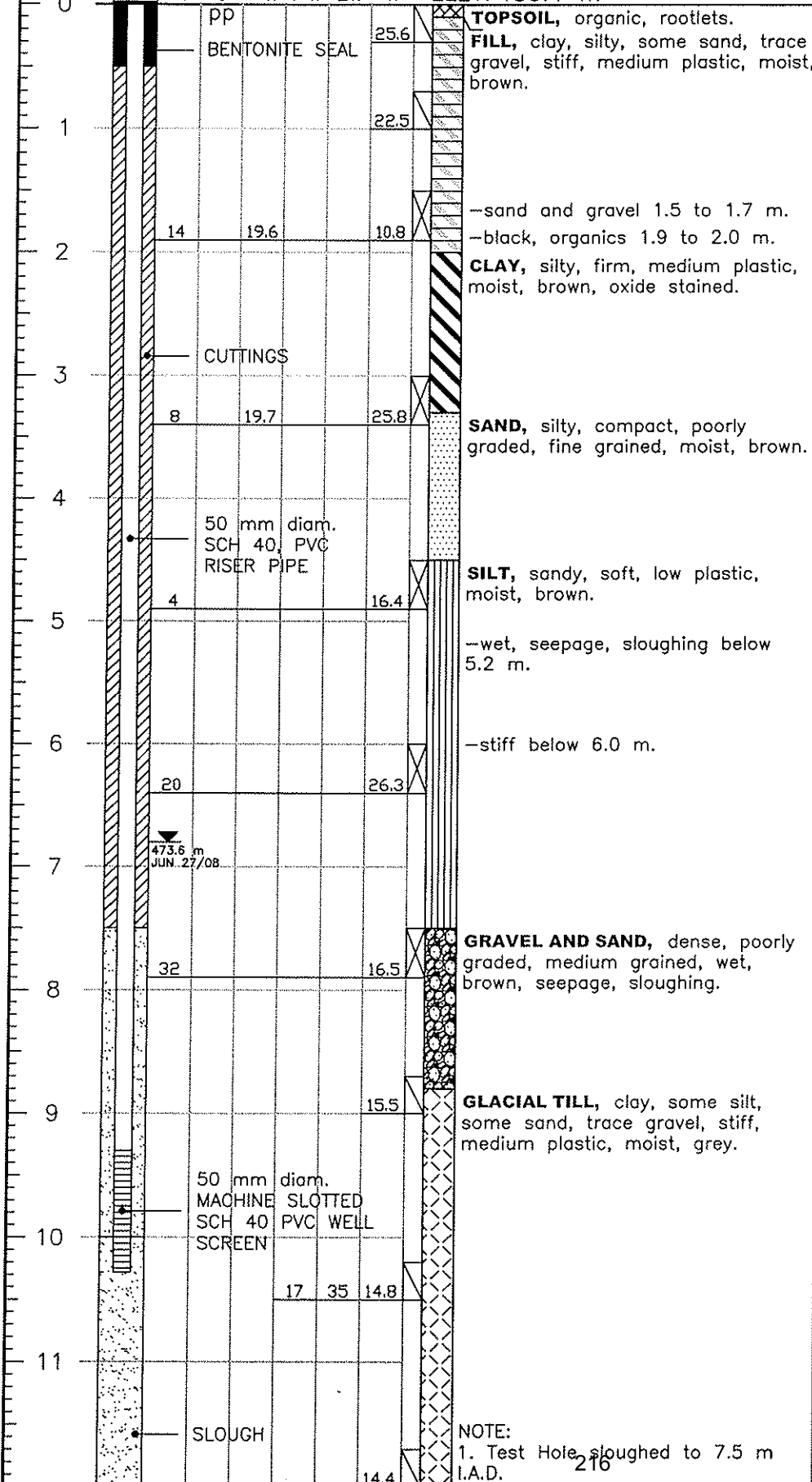
EASTING:

DATE DRILLED:

MAY 26/08

DRAWING NUMBER:

S08-6500-2

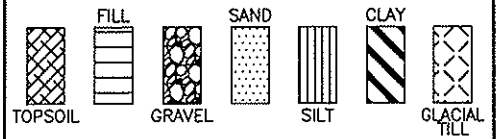


NOTE:
1. Test Hole, sloughed to 7.5 m I.A.D.

PIEZO. ELEV.= 485.9 m

TEST HOLE 08-2

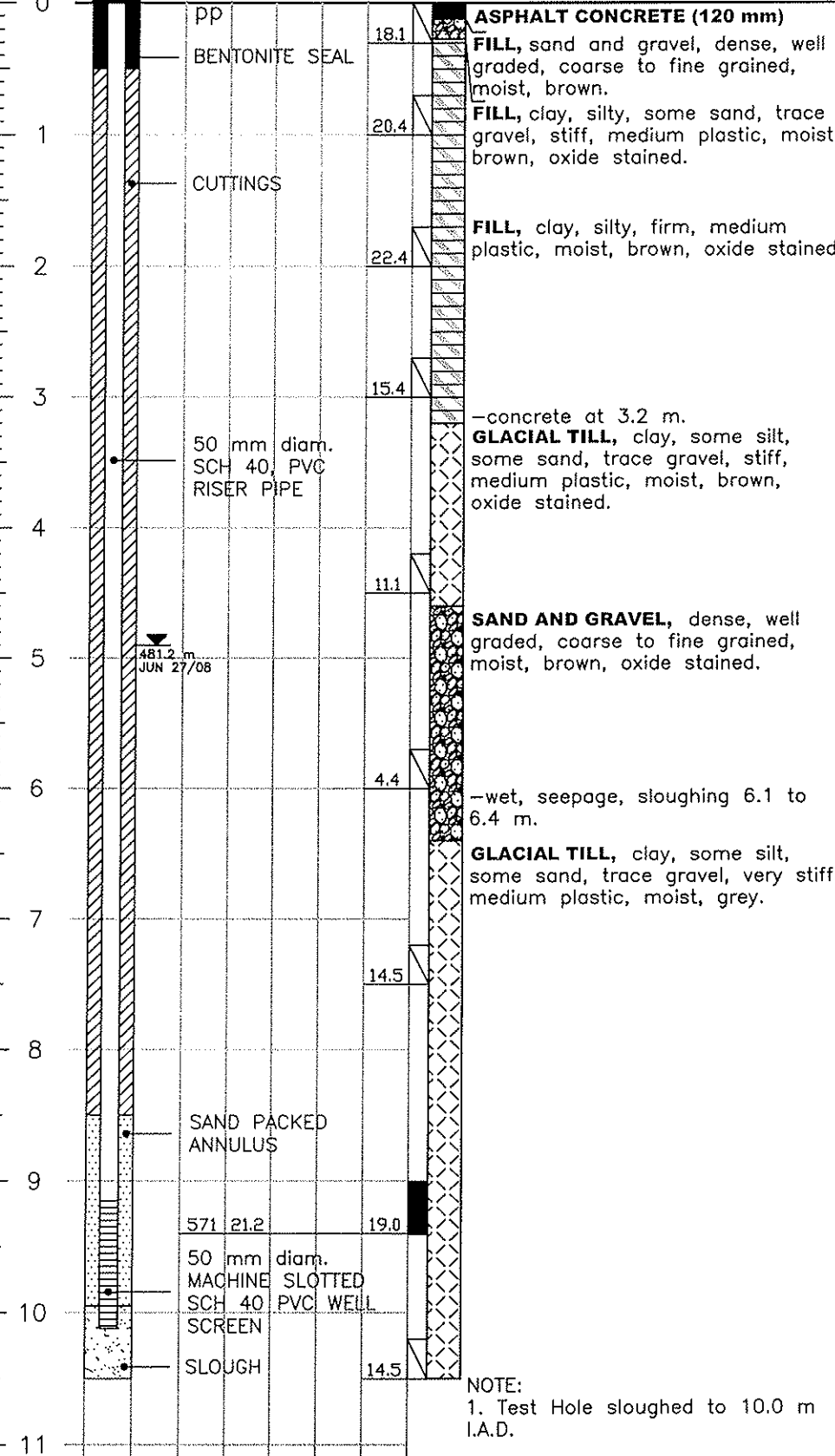
LEGEND:



DEPTH (m)

ROAD BOX

ELEV: 486.1 m



- w.....WATER CONTENT (PERCENT OF DRY SOIL WEIGHT)
- Lw...LIQUID LIMIT
- Pw...PLASTIC LIMIT
- γ_w...WET UNIT WEIGHT (kN/m³)
- U.....UNCONFINED COMPRESSIVE STRENGTH (kPa)
- pp...POCKET PENETROMETER (kg/cm²)
- N.....STANDARD PENETRATION TEST (SAFETY HAMMER w/AUTOMATIC TRIP) (50/125 = BLOWS/SAMPLER PENETRATION [mm])
- SO₄.....SULPHATE CONTENT (PERCENT OF DRY SOIL WEIGHT)
- P200...% PASSING No. 200 SIEVE
- I.A.D.....IMMEDIATELY AFTER DRILLING
- ▽...RECORDED WATER LEVEL (TEST HOLE I.A.D.)
- ▼...RECORDED WATER LEVEL (PIEZO)
- SHELBY TUBE
- ⊠ SPLIT SPOON
- CUTTINGS

LIMITATIONS: THE FIELD DRILL LOG IS A SUMMARY OF THE SUBSURFACE CONDITIONS ENCOUNTERED AT THE SPECIFIC TEST HOLE LOCATION AT THE TIME OF TEST DRILLING. SUBSURFACE CONDITIONS MAY VARY AT OTHER LOCATIONS OF THIS SITE AND, IN TIME, MAY CHANGE AT THIS SPECIFIC TEST HOLE LOCATION.



P. MACHIBRODA ENGINEERING LTD.

FIELD DRILL LOG AND SOIL TEST RESULTS

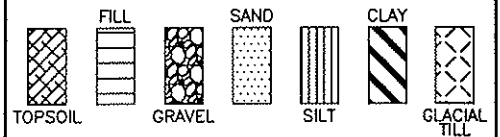
PROJECT:
PROPOSED COMMERCIAL / RESIDENTIAL DEVELOPMENT

LOCATION:
328 SASKATCHEWAN CRESCENT
SASKATOON, SK

NORTHING:	EASTING:
DATE DRILLED: MAY 23/08	DRAWING NUMBER: S08-6500-3

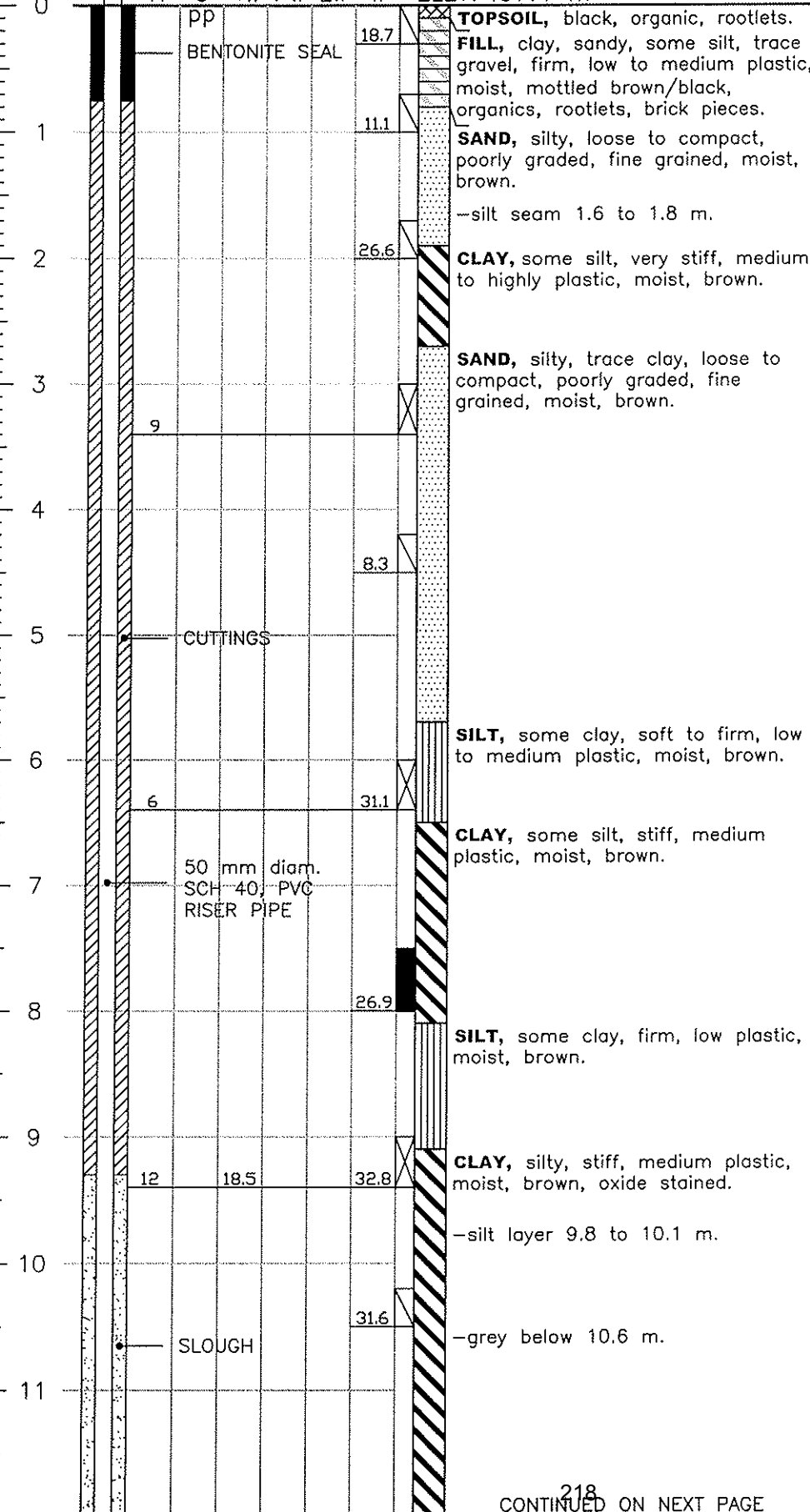
TEST HOLE 08-3

LEGEND:



DEPTH (m)

N U γ_w Pw Lw w ELEV: 497.4 m



- w....WATER CONTENT (PERCENT OF DRY SOIL WEIGHT)
- Lw...LIQUID LIMIT
- Pw...PLASTIC LIMIT
- γ_w ...WET UNIT WEIGHT (kN/m³)
- U.....UNCONFINED COMPRESSIVE STRENGTH (kPa)
- pp...POCKET PENETROMETER (kg/cm²)
- N.....STANDARD PENETRATION TEST (SAFETY HAMMER w/AUTOMATIC TRIP) (50/125 = BLOWS/SAMPLER PENETRATION [mm])
- SO₄.....SULPHATE CONTENT (PERCENT OF DRY SOIL WEIGHT)
- P200...% PASSING No. 200 SIEVE
- I.A.D.....IMMEDIATELY AFTER DRILLING
- ∇...RECORDED WATER LEVEL (TEST HOLE I.A.D.)
- ▼...RECORDED WATER LEVEL (PIEZO)
- SHELBY TUBE
- ⊠ SPLIT SPOON
- ◻ CUTTINGS

LIMITATIONS: THE FIELD DRILL LOG IS A SUMMARY OF THE SUBSURFACE CONDITIONS ENCOUNTERED AT THE SPECIFIC TEST HOLE LOCATION AT THE TIME OF TEST DRILLING. SUBSURFACE CONDITIONS MAY VARY AT OTHER LOCATIONS OF THIS SITE AND, IN TIME, MAY CHANGE AT THIS SPECIFIC TEST HOLE LOCATION.



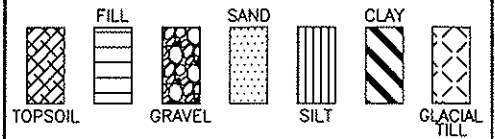
P. MACHIBRODA ENGINEERING LTD.

FIELD DRILL LOG AND SOIL TEST RESULTS

PROJECT: PROPOSED COMMERCIAL / RESIDENTIAL DEVELOPMENT	
LOCATION: 325 SASKATCHEWAN CRESCENT SASKATOON, SK	
NORTHING:	EASTING:
DATE DRILLED: MAY 22/08	DRAWING NUMBER: S08-6500-4

TEST HOLE 08-3

LEGEND:



- w.....WATER CONTENT (PERCENT OF DRY SOIL WEIGHT)
- Lw...LIQUID LIMIT
- Pw...PLASTIC LIMIT
- γ_w ...WET UNIT WEIGHT (kN/m³)
- U.....UNCONFINED COMPRESSIVE STRENGTH (kPa)
- pp...POCKET PENETROMETER (kg/cm²)
- N.....STANDARD PENETRATION TEST (SAFETY HAMMER w/AUTOMATIC TRIP) (50/125 = BLOWS/SAMPLER PENETRATION [mm])
- SO₄SULPHATE CONTENT (PERCENT OF DRY SOIL WEIGHT)
- P200...% PASSING No. 200 SIEVE
- I.A.D.....IMMEDIATELY AFTER DRILLING
- ▽...RECORDED WATER LEVEL (TEST HOLE I.A.D.)
- ▼...RECORDED WATER LEVEL (PIEZO)
- SHELBY TUBE
- SPLIT SPOON
- CUTTINGS

LIMITATIONS: THE FIELD DRILL LOG IS A SUMMARY OF THE SUBSURFACE CONDITIONS ENCOUNTERED AT THE SPECIFIC TEST HOLE LOCATION AT THE TIME OF TEST DRILLING. SUBSURFACE CONDITIONS MAY VARY AT OTHER LOCATIONS OF THIS SITE AND, IN TIME, MAY CHANGE AT THIS SPECIFIC TEST HOLE LOCATION.



P. MACHIBRODA ENGINEERING LTD.

FIELD DRILL LOG AND SOIL TEST RESULTS

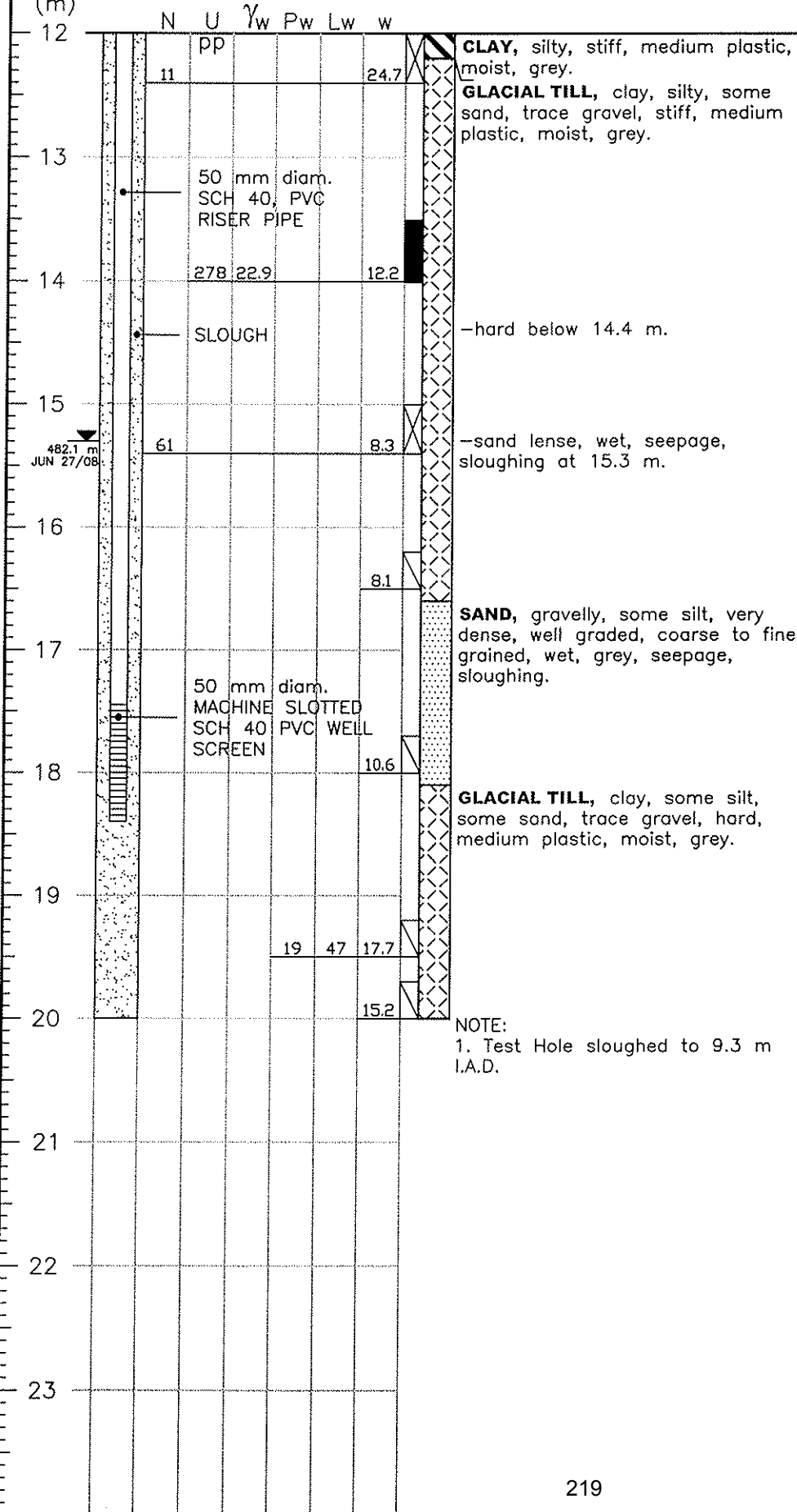
PROJECT:
PROPOSED COMMERCIAL / RESIDENTIAL DEVELOPMENT

LOCATION:
328 SASKATCHEWAN CRESCENT
SASKATOON, SK

NORTHING: **EASTING:**

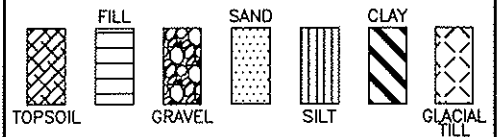
DATE DRILLED: **DRAWING NUMBER:**
MAY 22/08 S08-6500-4A

DEPTH (m)



TEST HOLE 08-4

LEGEND:



DEPTH (m)

N U γ_w Pw Lw w ELEV: 494.4 m

w.....WATER CONTENT (PERCENT OF DRY SOIL WEIGHT)

Lw...LIQUID LIMIT

Pw...PLASTIC LIMIT

γ_w ...WET UNIT WEIGHT (kN/m³)

U.....UNCONFINED COMPRESSIVE STRENGTH (kPa)

pp...POCKET PENETROMETER (kg/cm²)

N.....STANDARD PENETRATION TEST (SAFETY HAMMER w/AUTOMATIC TRIP) (50/125 = BLOWS/SAMPLER PENETRATION [mm])

SO₄SULPHATE CONTENT (PERCENT OF DRY SOIL WEIGHT)

P200...% PASSING No. 200 SIEVE

I.A.D.....IMMEDIATELY AFTER DRILLING

▽...RECORDED WATER LEVEL (TEST HOLE I.A.D.)

▼...RECORDED WATER LEVEL (PIEZO)



LIMITATIONS: THE FIELD DRILL LOG IS A SUMMARY OF THE SUBSURFACE CONDITIONS ENCOUNTERED AT THE SPECIFIC TEST HOLE LOCATION AT THE TIME OF TEST DRILLING. SUBSURFACE CONDITIONS MAY VARY AT OTHER LOCATIONS OF THIS SITE AND, IN TIME, MAY CHANGE AT THIS SPECIFIC TEST HOLE LOCATION.



P. MACHIBRODA ENGINEERING LTD.

FIELD DRILL LOG AND SOIL TEST RESULTS

PROJECT:

PROPOSED COMMERCIAL / RESIDENTIAL DEVELOPMENT

LOCATION:

328 SASKATCHEWAN CRESCENT SASKATOON, SK

NORTHING:

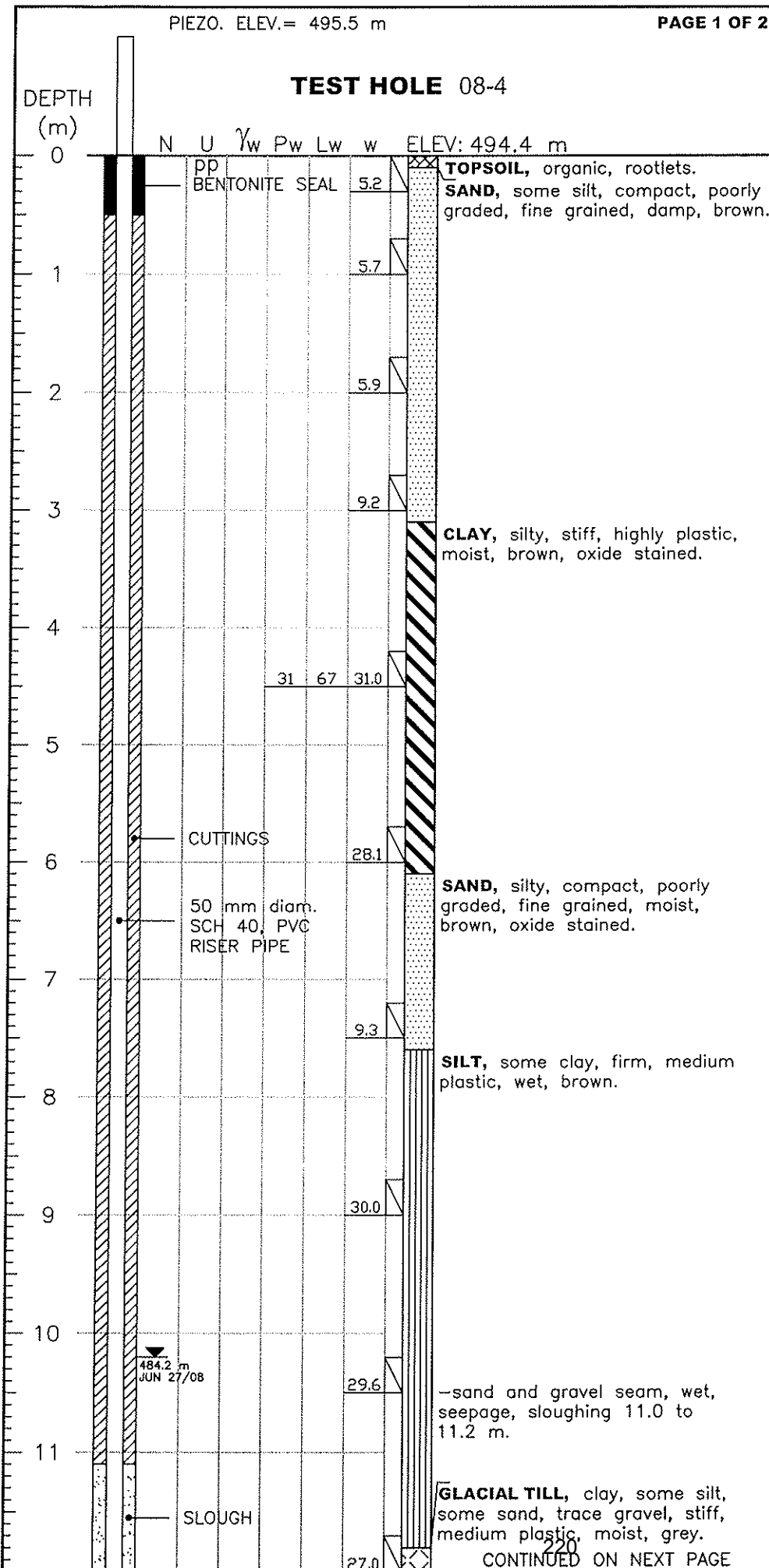
EASTING:

DATE DRILLED:

MAY 26/08

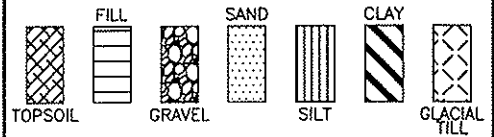
DRAWING NUMBER:

S08-6500-5



CONTINUED ON NEXT PAGE

LEGEND:



- w.....WATER CONTENT (PERCENT OF DRY SOIL WEIGHT)
- Lw...LIQUID LIMIT
- Pw...PLASTIC LIMIT
- γ_w ...WET UNIT WEIGHT (kN/m³)
- U.....UNCONFINED COMPRESSIVE STRENGTH (kPa)
- pp...POCKET PENETROMETER (kg/cm²)
- N.....STANDARD PENETRATION TEST (SAFETY HAMMER w/AUTOMATIC TRIP) (50/125 = BLOWS/SAMPLER PENETRATION [mm])
- SO₄SULPHATE CONTENT (PERCENT OF DRY SOIL WEIGHT)
- P200...% PASSING No. 200 SIEVE
- I.A.D.....IMMEDIATELY AFTER DRILLING
- ▽...RECORDED WATER LEVEL (TEST HOLE I.A.D.)
- ▼...RECORDED WATER LEVEL (PIEZO)
- SHELBY TUBE
- ⊠ SPLIT SPOON
- ◻ CUTTINGS

LIMITATIONS: THE FIELD DRILL LOG IS A SUMMARY OF THE SUBSURFACE CONDITIONS ENCOUNTERED AT THE SPECIFIC TEST HOLE LOCATION AT THE TIME OF TEST DRILLING. SUBSURFACE CONDITIONS MAY VARY AT OTHER LOCATIONS OF THIS SITE AND, IN TIME, MAY CHANGE AT THIS SPECIFIC TEST HOLE LOCATION.



**P. MACHIBRODA
ENGINEERING
LTD.**

**FIELD DRILL LOG
AND
SOIL TEST RESULTS**

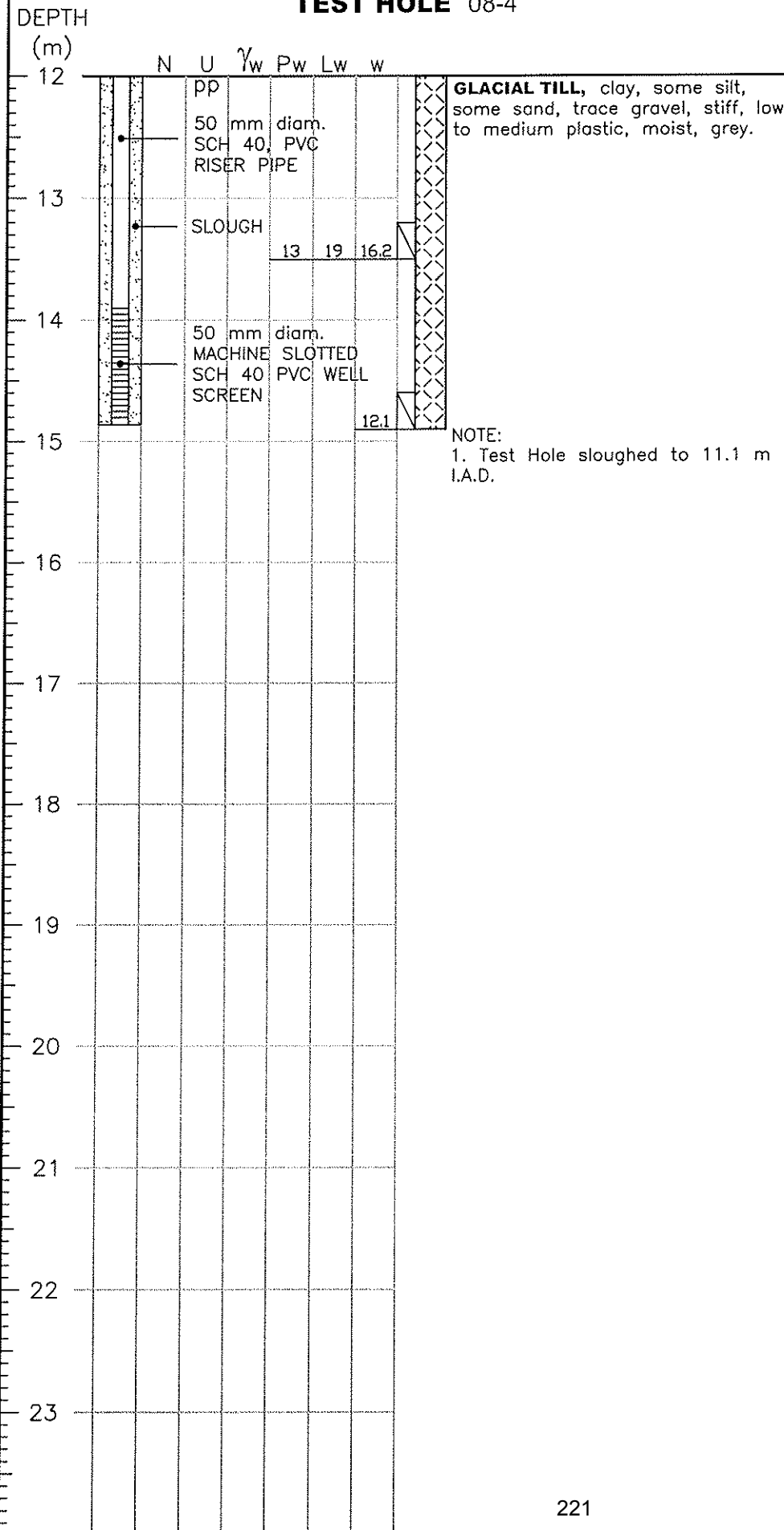
PROJECT:
PROPOSED COMMERCIAL /
RESIDENTIAL DEVELOPMENT

LOCATION:
328 SASKATCHEWAN CRESCENT
SASKATOON, SK

NORTHING: **EASTING:**

DATE DRILLED: **DRAWING NUMBER:**
MAY 26/08 S08-6500-5A

TEST HOLE 08-4





APPENDIX E
Record of Borehole Logs

HISTORICAL BOREHOLE LOGS
11-0057-BH1, 11-0057-BH2, 11-0057-BH3 (GAL12)

Golder Associates Ltd. May 2013. Assessment of Slope Instability at 200 Block, 11th Street East.

PROJECT: 11-1362-0057.5000

RECORD OF BOREHOLE: 11-0057-BH1

SHEET 1 OF 1

LOCATION: Cherry Lane N 5775616.80 E 386010.50

BORING DATE: 23/6/12

DATUM: City Datum

DRILL RIG: Acker MP-5

DRILLING CONTRACTOR: Paddock Drilling Ltd.

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION AND GROUNDWATER OBSERVATIONS		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT PERCENT					
								20 40 60 80		nat V. + Q - rem V. ⊕ U - ○		10 ⁻⁶ 10 ⁻⁵ 10 ⁻⁴ 10 ⁻³				Wp W Wi	
0	Acker MP-5 Power Auger Boring Solid Stem Augers	GROUND SURFACE		488.30											Flushmount Slope Indicator in Grout Slough		
		ASPHALT PAVEMENT		488.10													
		SAND and GRAVEL, well graded, angular, some silt, medium brown, dry (GRANULAR BASE)		487.84													
1		(ML) CLAYEY SILT, trace fine sand, medium brown, (FILL), w>PL, soft		487.08	1-1	AS								PP= 0.25			
		(CI) SILTY CLAY, medium brown, w>PL, soft to firm		487.08	1-2	AS								PP= 0.5			
2		(CH) CLAY, medium brown, w>PL, firm		485.86	1-3	AS								PP= 1.0			
		(CI) SILTY CLAY, some sand and gravel, medium brown, (TILL), w~PL, stiff - medium grey		484.64	1-5	AS								PP= 0.75 MH			
4				484.64	1-6	AS								PP= 1.25			
5				481.90	1-7	AS								PP= 1.25			
		(ML) sandy SILT, some fine gravel, medium grey, (TILL), w<PL, very stiff		481.90	1-8	AS								PP= 3.0			
7			481.29														
	(SM) SILTY SAND, fine grained, medium brown, wet		481.29														
7.62		END OF BOREHOLE = 7.62m		480.68													
8				7.62													

BOREHOLE 11-1362-0057-5000-BOREHOLES.GPJ GAL-SASK.GDT 1/10/12

DEPTH SCALE
1 : 50



LOGGED: CSF
CHECKED: HV

PROJECT: 11-1362-0057.5000

RECORD OF BOREHOLE: 11-0057-BH1P

SHEET 1 OF 1

LOCATION: Cherry Lane N 5775616.80 E 386010.50

BORING DATE: 23/6/12

DATUM: City Datum

DRILL RIG: Acker MP-5

DRILLING CONTRACTOR: Paddock Drilling Ltd.

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION AND GROUNDWATER OBSERVATIONS
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa		WATER CONTENT PERCENT		WATER CONTENT PERCENT			
								20	40	60	80	nat V. +	rem V. ⊕		
0	Acker MP-5 Power Auger Boring Solid Stem Augers	GROUND SURFACE		488.30											
		ASPHALT PAVEMENT		488.10											
		SAND and GRAVEL, well graded, angular, some silt, medium brown, dry (GRANULAR BASE)		487.84											
		(ML) CLAYEY SILT, trace fine sand, medium brown, (FILL), w>PL, soft		487.08											
1		(CI) SILTY CLAY, medium brown, w>PL, soft to firm		485.86	1.22	1P-1	TO								Grout PP= 0.5 MH
2	(CH) CLAY, medium brown, w>PL, firm		484.64	2.44	1P-2	TO								PP= 1.25	
3					1P-3	TO								PP= 1.5 MH	
4		END OF BOREHOLE = 3.66m		3.66											
5		NOTE: Borehole was drilled 0.3m west of borehole 11-0057-BH1. Soil description derived from the adjacent borehole.													

BOREHOLE 11-1362-0057-5000-BOREHOLES.GPJ GAL-SASK.GDT 1/10/12

DEPTH SCALE

1 : 50



LOGGED: CSF

CHECKED: HV

PROJECT: 11-1362-0057.5000

RECORD OF BOREHOLE: 11-0057-BH2

SHEET 1 OF 1

LOCATION: Cherry Lane N 5775620.20 E 385980.90

BORING DATE: 23/6/12

DATUM: City Datum

DRILL RIG: Acker MP-5

DRILLING CONTRACTOR: Paddock Drilling Ltd.

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION AND GROUNDWATER OBSERVATIONS		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT PERCENT					
								20 40 60 80		nat V. + Q - rem V. ⊕ U - ○		10 ⁻⁶ 10 ⁻⁵ 10 ⁻⁴ 10 ⁻³				Wp ----- W ----- Wi	
0	Acker MP-5 Power Auger Boring Solid Stem Augers	GROUND SURFACE		485.90											Flushmount		
		ASPHALT PAVEMENT		0.00													
		ORGANIC SILT, black, wet, soft		0.23													
1		(CI) SILTY CLAY, trace fine sand, medium brown, w>PL, firm		0.76	2-1	AS								PP= 0.5			
		- stiff			2-2	AS								PP= 0.75			
2					2-3	AS								PP= 1.5			
		(CH) CLAY, medium brown, w>PL, firm		2.44	2-4	AS								PP= 0.5			
3		(CI) SILTY CLAY, some sand and gravel, medium brown, (TILL), w~PL, very stiff		2.90	2-5	AS								PP= 3.0			
4		(ML) sandy SILT, some fine gravel, medium brown, (TILL), w<PL, very stiff		3.66	2-6	AS								PP= 3.0			
		- grey			2-7	AS											
5			5.21														
		END OF BOREHOLE = 5.21m															

BOREHOLE 11-1362-0057-5000-BOREHOLES.GPJ GAL-SASK.GDT 1/10/12

DEPTH SCALE

1 : 50



LOGGED: CSF

CHECKED: HV

PROJECT: 11-1362-0057.5000

RECORD OF BOREHOLE: 11-0057-BH2P

SHEET 1 OF 1

LOCATION: Cherry Lane N 5775620.20 E 385980.90

BORING DATE: 23/6/12

DATUM: City Datum

DRILL RIG: Acker MP-5

DRILLING CONTRACTOR: Paddock Drilling Ltd.

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION AND GROUNDWATER OBSERVATIONS
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa		WATER CONTENT PERCENT		WATER CONTENT PERCENT			
								20	40	60	80	nat V. + rem V. ⊕	Q - U - ⊙		
0	Acker MP-5 Power Auger Boring Solid Stem Augers	GROUND SURFACE		485.90											
		ASPHALT PAVEMENT		0.00											
		ORGANIC SILT, black, wet, soft		0.23											
1		(CI) SILTY CLAY, trace fine sand, medium brown, w>PL, firm		0.76											
2		- stiff				2P-1	TO								
		(CH) CLAY, medium brown, w>PL, firm		2.44		2P-2	TO								
3	(CI) SILTY CLAY, some sand and gravel, medium brown, (TILL), w~PL, very stiff		2.90		2P-3	TO									
	END OF BOREHOLE = 3.45m		3.45												
4	NOTE: Borehole was drilled 0.3m west of borehole 11-0057-BH2. Soil description derived from the adjacent borehole.														
5															
6															
7															
8															
9															
10															

BOREHOLE 11-1362-0057-5000-BOREHOLES.GPJ GAL-SASK.GDT 1/10/12

DEPTH SCALE

1 : 50



LOGGED: CSF

CHECKED: HV

PROJECT: 11-1362-0057.5000

RECORD OF BOREHOLE: 11-0057-BH3

SHEET 1 OF 1

LOCATION: Cherry Lane N 5775622.30 E 385959.40

BORING DATE: 23/6/12

DATUM: City Datum

DRILL RIG: Acker MP-5

DRILLING CONTRACTOR: Paddock Drilling Ltd.

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION AND GROUNDWATER OBSERVATIONS	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT PERCENT					
								20 40 60 80		nat V. + Q - rem V. ⊕ U - ⊙		10 ⁻⁶ 10 ⁻⁵ 10 ⁻⁴ 10 ⁻³		Wp ----- W ----- Wi			
0	Acker MP-5 Power Auger Boring Solid Stem Augers	GROUND SURFACE		484.10													
		ASPHALT PAVEMENT		0.08													Flushmount
		SAND and GRAVEL, well graded, angular, some silt, medium brown, moist (GRANULAR BASE)		0.13													GROUT
1		(CL) sandy SILTY CLAY, some gravel, medium brown, (Possibly FILL), w>PL			3-1	AS											
					3-2	AS											
					3-3	AS											
2		(SC) CLAYEY SAND, fine grained, some silt, medium brown, moist		482.58	1.52												
				3-3	AS												
3		(SM) SILTY SAND, fine grained, some to trace gravel, light brown, very moist		481.66	2.44												
				3-4	AS												
4		END OF BOREHOLE = 3.81m		480.29	3.81												
				3-5	AS												

BOREHOLE 11-1362-0057-5000-BOREHOLES.GPJ GAL-SASK.GDT 1/10/12

DEPTH SCALE

1 : 50



LOGGED: CSF

CHECKED: HV



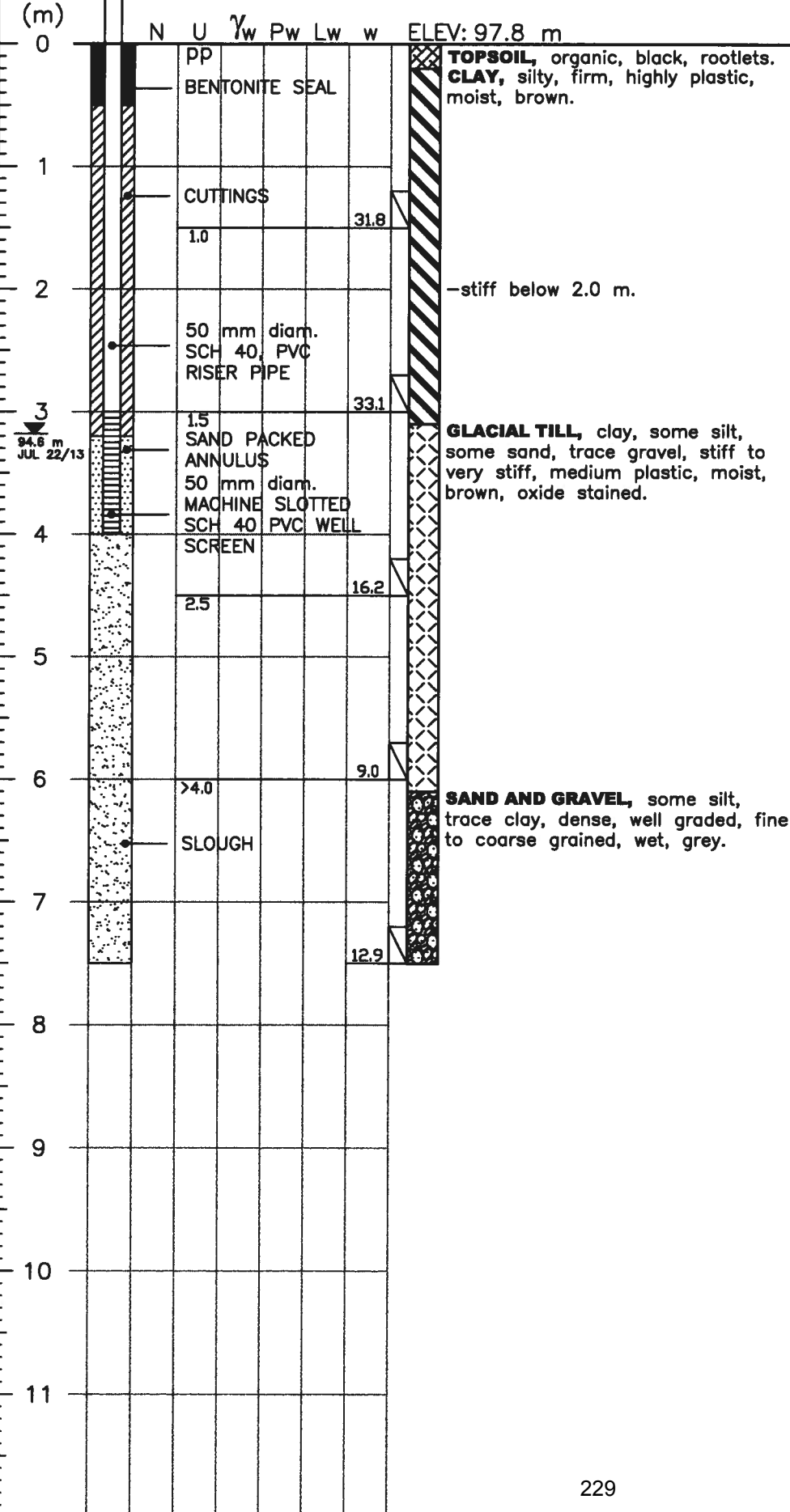
HISTORICAL BOREHOLE LOGS
TH 13-1, 13-2, 13-3, 13-4, 13-5, 13-6 AND CPT 13-1 (PMEL13)

P. Machibroda Engineering Ltd. July 18, 2013. Slope Instability 230/306 Saskatchewan Crescent Saskatoon, SK. Drawing No S13-8517-1 to 7,

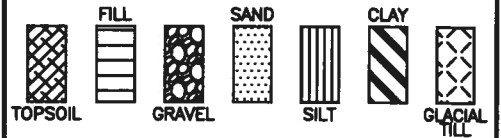
PIEZO. ELEV.= 99.0 m

TEST HOLE 13-1

DEPTH (m)



LEGEND:



- w.....WATER CONTENT (PERCENT OF DRY SOIL WEIGHT)
- Lw...LIQUID LIMIT
- Pw...PLASTIC LIMIT
- γ_w ...WET UNIT WEIGHT (kN/m³)
- U.....UNCONFINED COMPRESSIVE STRENGTH (kPa)
- pp...POCKET PENETROMETER (kg/cm²)
- N.....STANDARD PENETRATION TEST (SAFETY HAMMER w/AUTOMATIC TRIP) (50/125 = BLOWS/SAMPLER PENETRATION [mm])
- SO₄SULPHATE CONTENT (PERCENT OF DRY SOIL WEIGHT)
- P200...% PASSING No. 200 SIEVE
- I.A.D.....IMMEDIATELY AFTER DRILLING
- ∇...RECORDED WATER LEVEL (TEST HOLE I.A.D.)
- ∇...RECORDED WATER LEVEL (PIEZO)



LIMITATIONS: THE FIELD DRILL LOG IS A SUMMARY OF THE SUBSURFACE CONDITIONS ENCOUNTERED AT THE SPECIFIC TEST HOLE LOCATION AT THE TIME OF TEST DRILLING. SUBSURFACE CONDITIONS MAY VARY AT OTHER LOCATIONS OF THIS SITE AND, IN TIME, MAY CHANGE AT THIS SPECIFIC TEST HOLE LOCATION.



P. MACHIBRODA ENGINEERING LTD.

FIELD DRILL LOG AND SOIL TEST RESULTS

PROJECT:
SLOPE INSTABILITY

LOCATION:
230/306 SASKATCHEWAN CRESCENT
SASKATOON, SK

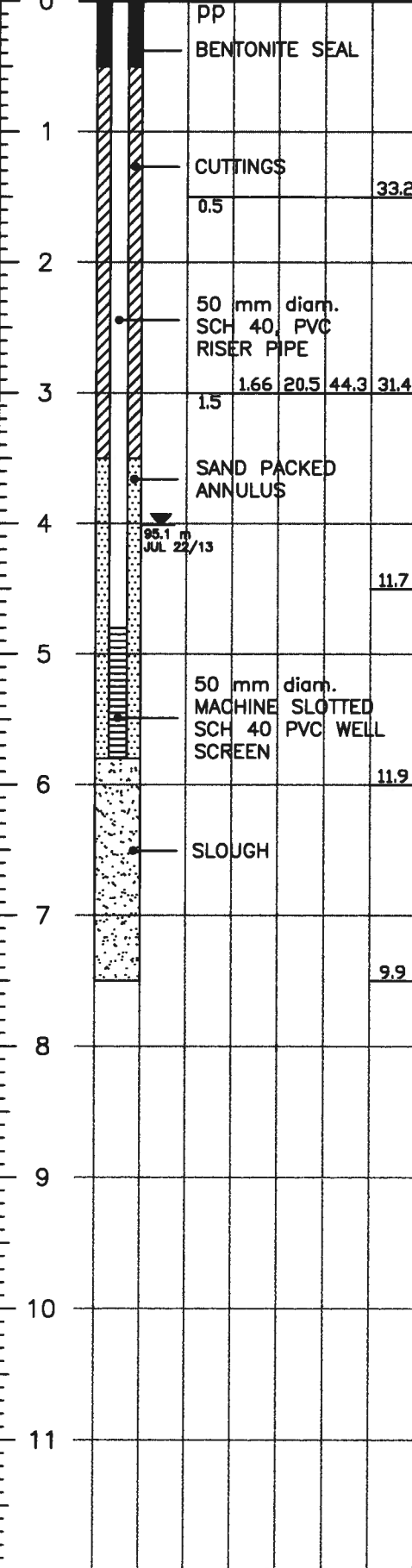
NORTHING: **EASTING:**

DATE DRILLED: JUL 17/13 **DRAWING NUMBER:** S13-8517-2

PIEZO. ELEV.= 99.5 m

TEST HOLE 13-2

DEPTH
(m)



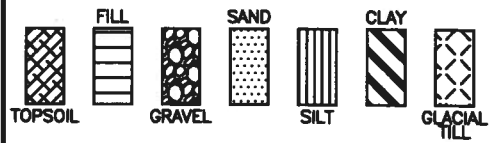
ELEV: 99.1 m
TOPSOIL, organic, black, rootlets.
CLAY, silty, firm, highly plastic, moist, brown, oxide stained.

GLACIAL TILL, clay, sandy, some silt, trace gravel, very stiff, medium plastic, moist, brown, oxide stained.
 -grey below 4.6 m.

-wet, seepage, sloughing 6.1 to 6.5 m.

NOTE:
 1. Test Hole sloughed to 5.8 m I.A.D.

LEGEND:



- w.....WATER CONTENT (PERCENT OF DRY SOIL WEIGHT)
- Lw...LIQUID LIMIT
- Pw...PLASTIC LIMIT
- γ_w ...WET UNIT WEIGHT (kN/m³)
- U.....UNCONFINED COMPRESSIVE STRENGTH (kPa)
- pp...POCKET PENETROMETER (kg/cm²)
- N.....STANDARD PENETRATION TEST (SAFETY HAMMER w/AUTOMATIC TRIP) (50/125 = BLOWS/SAMPLER PENETRATION [mm])
- SO₄SULPHATE CONTENT (PERCENT OF DRY SOIL WEIGHT)
- P200...% PASSING No. 200 SIEVE
- I.A.D.....IMMEDIATELY AFTER DRILLING
- ▽...RECORDED WATER LEVEL (TEST HOLE I.A.D.)
- ▼...RECORDED WATER LEVEL (PIEZO)



LIMITATIONS: THE FIELD DRILL LOG IS A SUMMARY OF THE SUBSURFACE CONDITIONS ENCOUNTERED AT THE SPECIFIC TEST HOLE LOCATION AT THE TIME OF TEST DRILLING. SUBSURFACE CONDITIONS MAY VARY AT OTHER LOCATIONS OF THIS SITE AND, IN TIME, MAY CHANGE AT THIS SPECIFIC TEST HOLE LOCATION.



FIELD DRILL LOG AND SOIL TEST RESULTS

PROJECT:
 SLOPE INSTABILITY

LOCATION:
 230/306 SASKATCHEWAN CRESCENT
 SASKATOON, SK

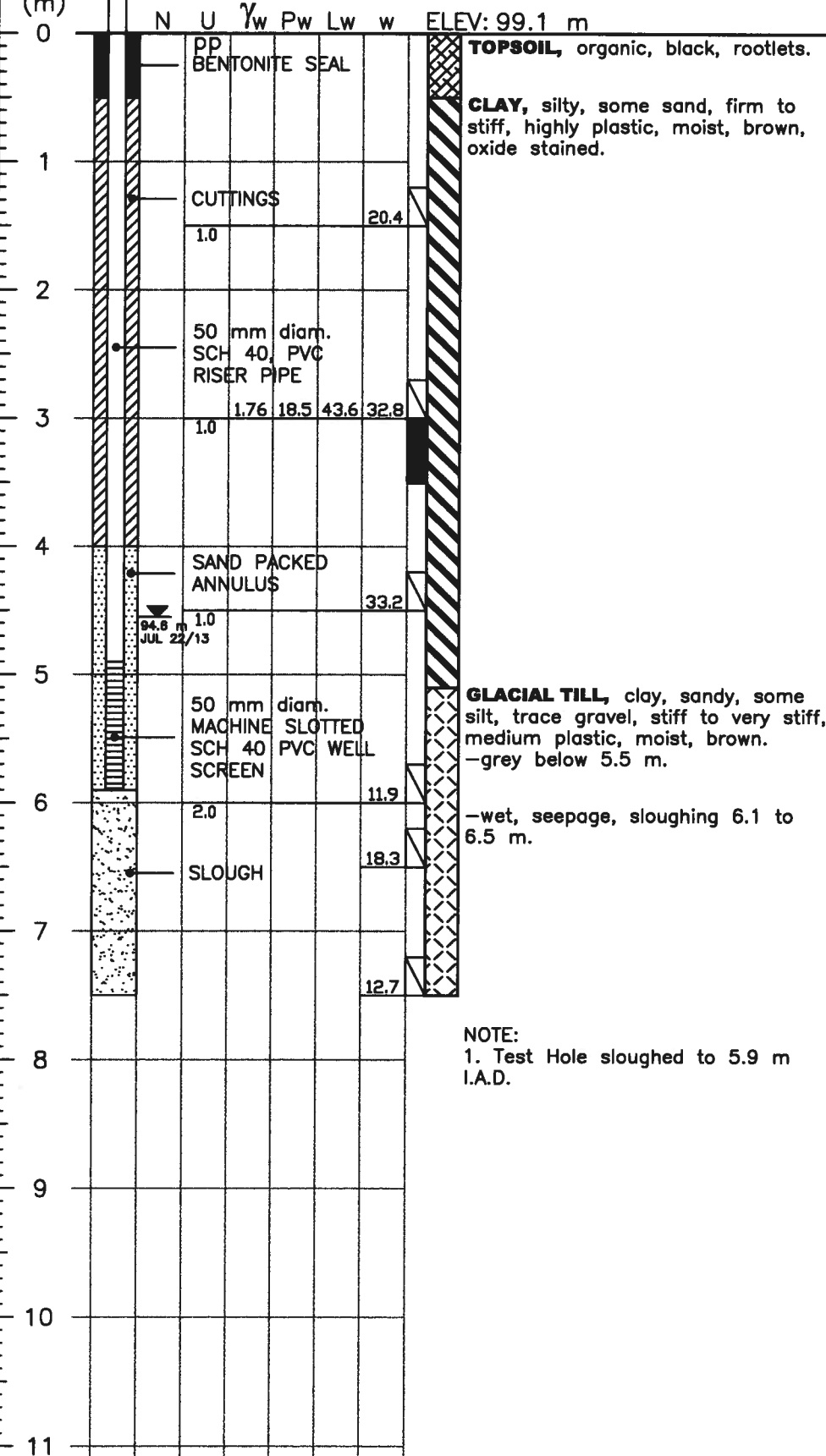
NORTHING: **EASTING:**

DATE DRILLED: JUL 17/13 **DRAWING NUMBER:** S13-8517-3

PIEZO. ELEV.= 99.9 m

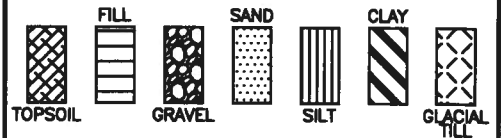
TEST HOLE 13-3

DEPTH (m)



NOTE:
1. Test Hole sloughed to 5.9 m I.A.D.

LEGEND:



- w.....WATER CONTENT (PERCENT OF DRY SOIL WEIGHT)
- Lw...LIQUID LIMIT
- Pw...PLASTIC LIMIT
- γ_w ...WET UNIT WEIGHT (kN/m³)
- U.....UNCONFINED COMPRESSIVE STRENGTH (kPa)
- pp...POCKET PENETROMETER (kg/cm²)
- N.....STANDARD PENETRATION TEST (SAFETY HAMMER w/AUTOMATIC TRIP) (50/125 = BLOWS/SAMPLER PENETRATION [mm])
- SO₄SULPHATE CONTENT (PERCENT OF DRY SOIL WEIGHT)
- P200...% PASSING No. 200 SIEVE
- I.A.D.....IMMEDIATELY AFTER DRILLING
- ∇...RECORDED WATER LEVEL (TEST HOLE I.A.D.)
- ∇...RECORDED WATER LEVEL (PIEZO)
- SHELBY TUBE
- ⊠ SPLIT SPOON
- ◻ CUTTINGS

LIMITATIONS: THE FIELD DRILL LOG IS A SUMMARY OF THE SUBSURFACE CONDITIONS ENCOUNTERED AT THE SPECIFIC TEST HOLE LOCATION AT THE TIME OF TEST DRILLING. SUBSURFACE CONDITIONS MAY VARY AT OTHER LOCATIONS OF THIS SITE AND, IN TIME, MAY CHANGE AT THIS SPECIFIC TEST HOLE LOCATION.



P. MACHIBRODA ENGINEERING LTD.

FIELD DRILL LOG AND SOIL TEST RESULTS

PROJECT:
SLOPE INSTABILITY

LOCATION:
230/306 SASKATCHEWAN CRESCENT
SASKATOON, SK

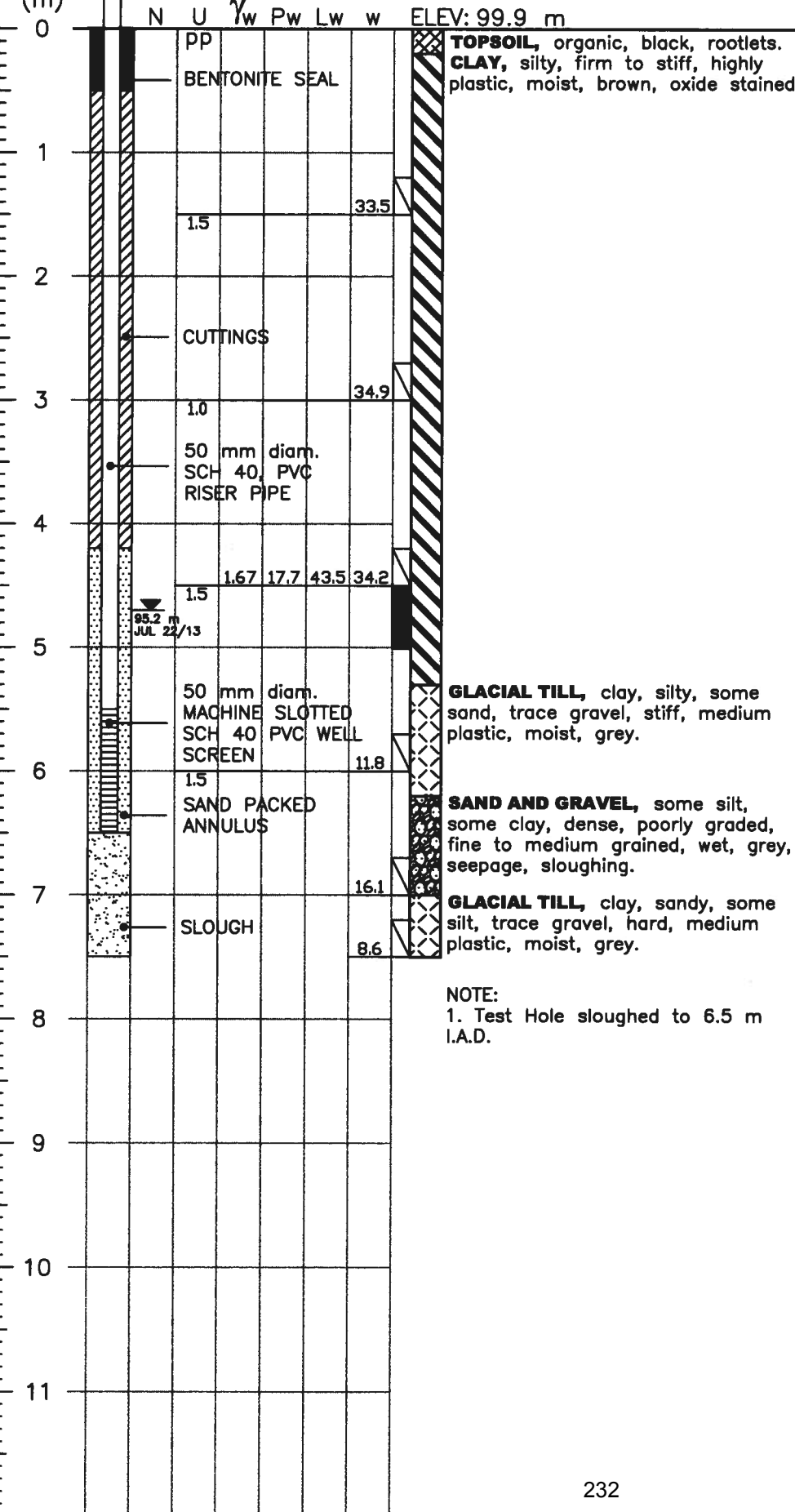
NORTHING: **EASTING:**

DATE DRILLED: JUL 17/13 **DRAWING NUMBER:** S13-8517-4

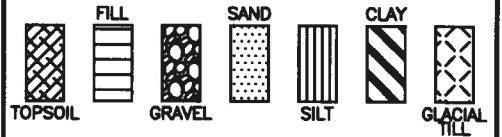
PIEZO. ELEV.= 100.3 m

TEST HOLE 13-4

DEPTH (m)



LEGEND:



- w.....WATER CONTENT (PERCENT OF DRY SOIL WEIGHT)
- Lw...LIQUID LIMIT
- Pw...PLASTIC LIMIT
- γ_w ...WET UNIT WEIGHT (kN/m³)
- U.....UNCONFINED COMPRESSIVE STRENGTH (kPa)
- pp...POCKET PENETROMETER (kg/cm²)
- N.....STANDARD PENETRATION TEST (SAFETY HAMMER w/AUTOMATIC TRIP) (50/125 = BLOWS/SAMPLER PENETRATION [mm])
- SO₄SULPHATE CONTENT (PERCENT OF DRY SOIL WEIGHT)
- P200...% PASSING No. 200 SIEVE
- I.A.D.....IMMEDIATELY AFTER DRILLING
- ▽...RECORDED WATER LEVEL (TEST HOLE I.A.D.)
- ▼...RECORDED WATER LEVEL (PIEZO)



LIMITATIONS: THE FIELD DRILL LOG IS A SUMMARY OF THE SUBSURFACE CONDITIONS ENCOUNTERED AT THE SPECIFIC TEST HOLE LOCATION AT THE TIME OF TEST DRILLING. SUBSURFACE CONDITIONS MAY VARY AT OTHER LOCATIONS OF THIS SITE AND, IN TIME, MAY CHANGE AT THIS SPECIFIC TEST HOLE LOCATION.



P. MACHIBRODA ENGINEERING LTD.

FIELD DRILL LOG AND SOIL TEST RESULTS

PROJECT:

SLOPE INSTABILITY

LOCATION:

230/306 SASKATCHEWAN CRESCENT SASKATOON, SK

NORTHING:

EASTING:

DATE DRILLED:

JUL 17/13

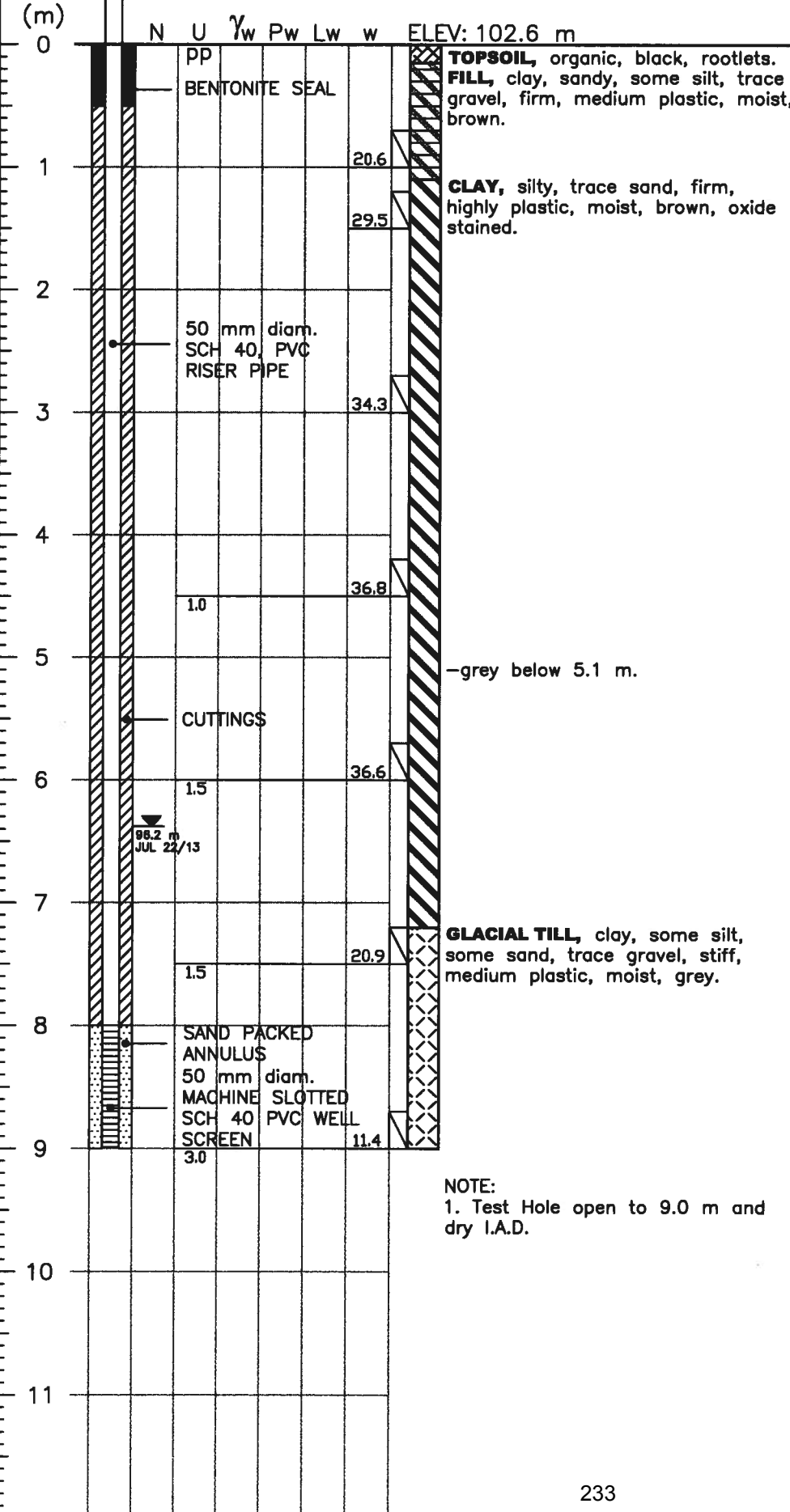
DRAWING NUMBER:

S13-8517-5

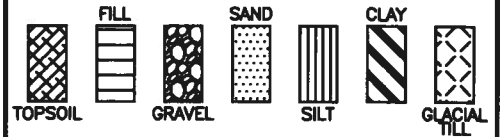
PIEZO. ELEV.= 103.6 m

TEST HOLE 13-5

DEPTH (m)



LEGEND:



- w.....WATER CONTENT (PERCENT OF DRY SOIL WEIGHT)
- Lw...LIQUID LIMIT
- Pw...PLASTIC LIMIT
- γ_w ...WET UNIT WEIGHT (kN/m³)
- U.....UNCONFINED COMPRESSIVE STRENGTH (kPa)
- pp...POCKET PENETROMETER (kg/cm²)
- N.....STANDARD PENETRATION TEST (SAFETY HAMMER w/AUTOMATIC TRIP) (50/125 = BLOWS/SAMPLER PENETRATION [mm])
- SO₄SULPHATE CONTENT (PERCENT OF DRY SOIL WEIGHT)
- P200...% PASSING No. 200 SIEVE
- I.A.D.....IMMEDIATELY AFTER DRILLING
- ▽...RECORDED WATER LEVEL (TEST HOLE I.A.D.)
- ▼...RECORDED WATER LEVEL (PIEZO)



LIMITATIONS: THE FIELD DRILL LOG IS A SUMMARY OF THE SUBSURFACE CONDITIONS ENCOUNTERED AT THE SPECIFIC TEST HOLE LOCATION AT THE TIME OF TEST DRILLING. SUBSURFACE CONDITIONS MAY VARY AT OTHER LOCATIONS OF THIS SITE AND, IN TIME, MAY CHANGE AT THIS SPECIFIC TEST HOLE LOCATION.



P. MACHIBRODA ENGINEERING LTD.

FIELD DRILL LOG AND SOIL TEST RESULTS

PROJECT:

SLOPE INSTABILITY

LOCATION:

230/306 SASKATCHEWAN CRESCENT SASKATOON, SK

NORTHING:

EASTING:

DATE DRILLED:

JUL 18/13

DRAWING NUMBER:

S13-8517-6

NOTE:

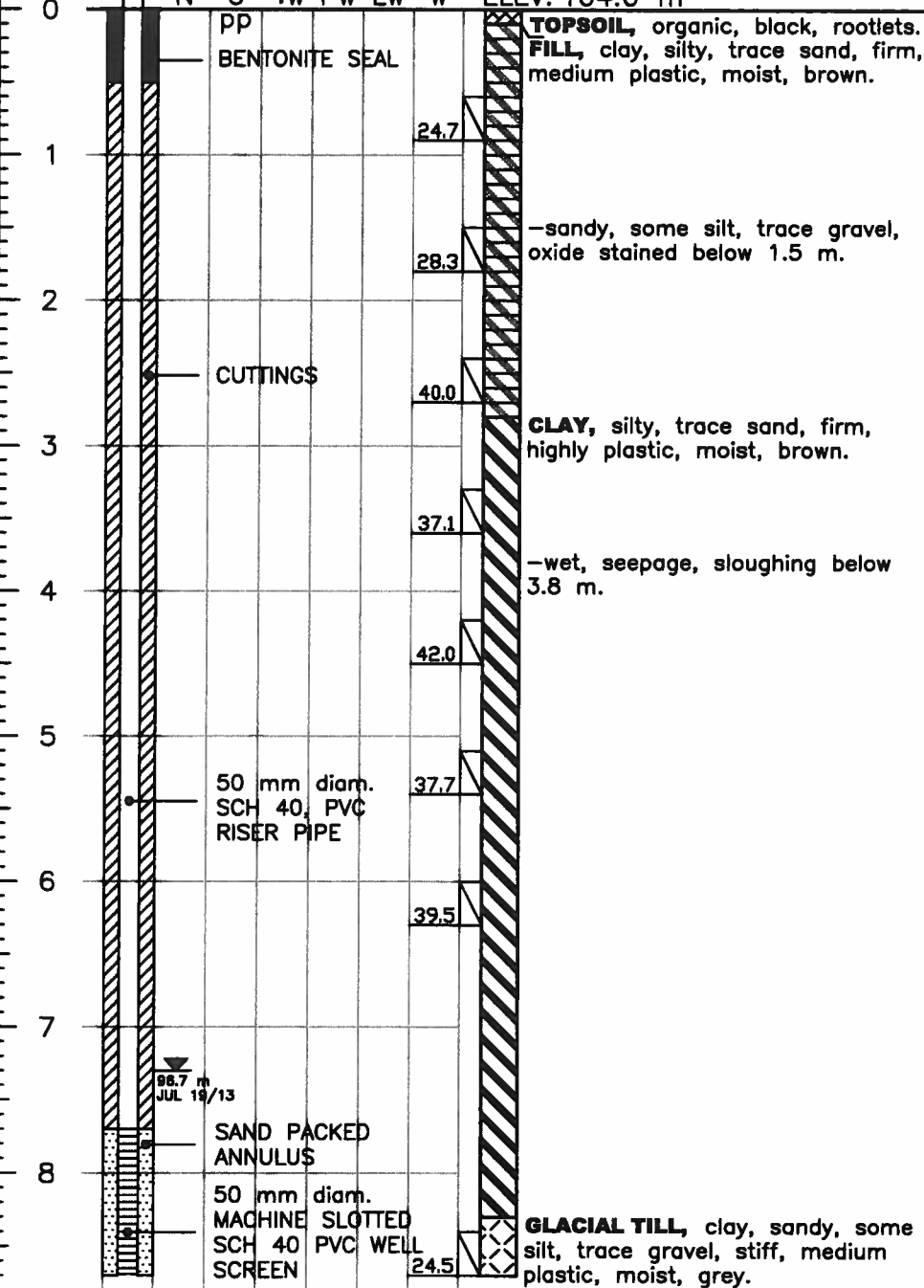
1. Test Hole open to 9.0 m and dry I.A.D.

PIEZO. ELEV.= 104.9 m

TEST HOLE 13-6

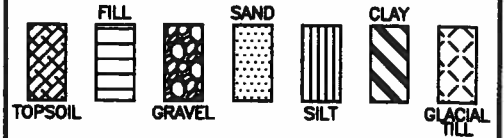
DEPTH
(m)

N U γ_w Pw Lw w ELEV: 104.0 m



NOTE:
1. Test Hole open to 8.7 m I.A.D.

LEGEND:



- w.....WATER CONTENT (PERCENT OF DRY SOIL WEIGHT)
- Lw...LIQUID LIMIT
- Pw...PLASTIC LIMIT
- γ_w ...WET UNIT WEIGHT (kN/m³)
- U.....UNCONFINED COMPRESSIVE STRENGTH (kPa)
- pp...POCKET PENETROMETER (kg/cm²)
- N.....STANDARD PENETRATION TEST (SAFETY HAMMER w/AUTOMATIC TRIP) (50/125 = BLOWS/SAMPLER PENETRATION [mm])
- SO₄SULPHATE CONTENT (PERCENT OF DRY SOIL WEIGHT)
- P200...% PASSING No. 200 SIEVE
- I.A.D.....IMMEDIATELY AFTER DRILLING
- ▽...RECORDED WATER LEVEL (TEST HOLE I.A.D.)
- ▽...RECORDED WATER LEVEL (PIEZO)



LIMITATIONS: THE FIELD DRILL LOG IS A SUMMARY OF THE SUBSURFACE CONDITIONS ENCOUNTERED AT THE SPECIFIC TEST HOLE LOCATION AT THE TIME OF TEST DRILLING. SUBSURFACE CONDITIONS MAY VARY AT OTHER LOCATIONS OF THIS SITE AND, IN TIME, MAY CHANGE AT THIS SPECIFIC TEST HOLE LOCATION.



**P. MACHIBRODA
ENGINEERING
LTD.**

**FIELD DRILL LOG
AND
SOIL TEST RESULTS**

PROJECT:

SLOPE INSTABILITY

LOCATION:

230/306 SASKATCHEWAN CRESCENT
SASKATOON, SK

NORTHING:

EASTING:

DATE DRILLED:

JUL 18/13

DRAWING NUMBER:

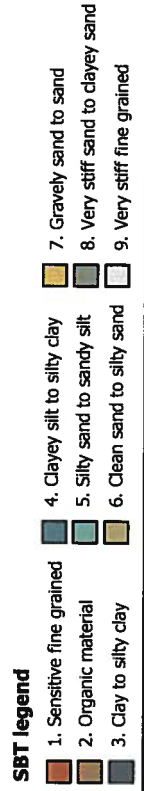
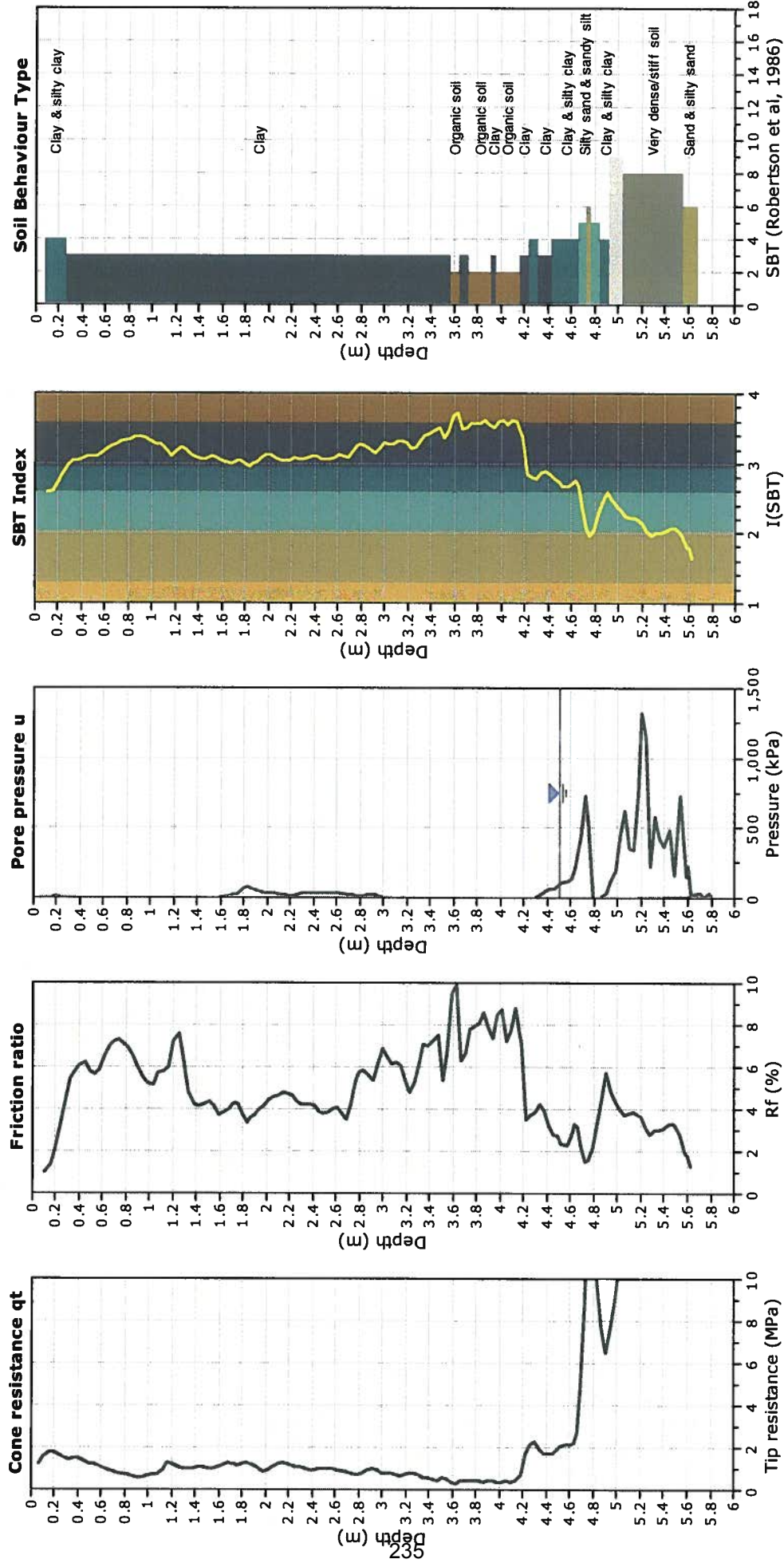
S13-8517-7



P. Machibroda Engineering Ltd.
 806-48th Street East
 Saskatoon, Saskatchewan S7K 4A2
 www.machibroda.com

CPT: 13-1
 Total depth: 5.81 m, Date: 18/07/2013
 Surface Elevation: 0.00 m
 Coords: X:0.00, Y:0.00
 Cone Type: 15 cm²
 Cone Operator: PMEL

Project: Slope Stability Assessment
Location: 230/306 Saskatchewan Crescent East, Saskatoon, Saskatchewan





APPENDIX E
Record of Borehole Logs

2013 BOREHOLE LOGS

**COS-13-001, COS-13-001B, COS-13-002, COS-13-003, COS-13-004,
COS 13-005, COS-13-006, COS-13-007 (GAL13)**

PROJECT: Cherry Lane Slope Remediation

RECORD OF BOREHOLE: COS-13-001

SHEET 1 OF 1

LOCATION: N 5775616.7 E 386038.9

BORING DATE: 07/26/13

DATUM: NAD83

DRILL RIG: CME

DRILLING CONTRACTOR: Boss Drilling

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION AND GROUNDWATER OBSERVATIONS	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT PERCENT					
								20 40 60 80		nat V. + Q - rem V. ⊕ U - ○		10 ⁻⁶ 10 ⁻⁵ 10 ⁻⁴ 10 ⁻³		Wp ----- W ----- Wi			
0		GROUND SURFACE		489.34													
		ASPHALT		489.03													
		(ML) CLAYEY SILT, some fine grained sand, brown, some black mottling, w>PL, very soft		0.30	001-1	AS									PP>0		
1				488.12													
		(CL) SILTY CLAY, low plasticity, trace fine grained gravel, brown/black, trace iron staining, trace gypsum/weathered gypsum, some organics, w>PL, soft to firm		1.22	001-2	AS											
2		-plasticity increases with depth															
				486.29													
3		(CI) SILTY CLAY, medium-high plasticity, trace fine grained gravel, brown, trace gypsum		3.05											PP=0.75		
					001-4	AS											
4																	
				484.46													
5		(CH) CLAY, high plasticity, some silt, brown, trace sand, trace gypsum, w>PL, soft to very soft		4.88	001-6	AS									SG MH		
6					001-7	AS									FP=0.75-1		
				482.79													
7		(CL) SILTY CLAY, some fine grained gravel, grey, (TILL), w~PL, stiff to very stiff		6.55	001-8	AS									PP=1.5		
8		(SM) SILTY SAND, trace gravel, fine to medium grained, grey, wet		7.92	001-9	AS									MH		
		(CL) SILTY CLAY, some sand, some gravel, fine to coarse grained, grey, (TILL), w~PL		8.23													
					001-10	AS											
9		END OF BOREHOLE = 9.4m															
		Notes: 1. Upon completion of drilling, the borehole was backfilled with bentonite chips to the ground surface.		479.89													
10				9.45													

SK SOIL 11-1362-0057-5100 BOREHOLES.GPJ GAL-SASK.GDT 05/05/14

07/26/13

DEPTH SCALE
1 : 50



LOGGED: LM
CHECKED: LDN

PROJECT: Cherry Lane Slope Remediation
 LOCATION: N 5775616.7 E 386038.9

RECORD OF BOREHOLE: COS-13-001B

SHEET 1 OF 1
 DATUM: NAD83

BORING DATE: 07/26/13
 DRILL RIG: CME
 DRILLING CONTRACTOR: Boss Drilling

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION AND GROUNDWATER OBSERVATIONS	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa		WATER CONTENT PERCENT		WATER CONTENT PERCENT					
								20	40	60	80	10 ⁻⁶	10 ⁻⁵	10 ⁻⁴			10 ⁻³
0	150mm Dia. Solid Stem Auger Continuous Flight	GROUND SURFACE		489.34													
		No Classification		0.00													
1																	
2																	
3																	
4																	
5																	
5.18			(CH) CLAY, high plasticity, some silt, brown, trace gypsum, w>PL, firm to soft		484.16												
5.18					5.18	001B-1	TO										
6																	
6.55				482.79	001B-2	TO											
6.55		(CL) SILTY CLAY and SAND, fine to coarse, some fine grained gravel, grey, (TILL), w~PL, stiff		6.55													
7				482.18	001B-3	TO											
7.16				482.18													
7.16		No Classification		7.16													
9.14		END OF BOREHOLE = 9.1m		480.20													
9.14		Notes: 1. Additional Lab testing * indicates Dry Density in kg/m ³		9.14													

SK SOIL 11-1362-0057-5100 BOREHOLES.GPJ GAL-SASK.GDT 05/05/14

DEPTH SCALE
 1 : 50



LOGGED: LM
 CHECKED: LDN

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION AND GROUNDWATER OBSERVATIONS		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT PERCENT					
								20 40 60 80		10 ⁻⁶ 10 ⁻⁵ 10 ⁻⁴ 10 ⁻³		nat V. + Q - ●				rem V. ⊕ U - ○	
0		GROUND SURFACE		498.48													
		TOPSOIL		498.33	002-1	AS											
		FILL, (SC) CLAYEY SILT, fine, dark brown, some organics, non-cohesive, dry (SM) SILTY SAND, fine, some clay, low plasticity, brown, some organics, non-cohesive, dry (CL) SILTY CLAY, low plastic, brown, some iron staining, some white staining, cohesive, w~PL, hard		498.18	002-2	AS											
					0.30	002-3	AS										
					497.87												
				0.61													
1					002-4	AS								PP=4.5			
					002-5	AS								PP=1.5			
2																	
					002-6	AS											
		-some fine grained sand at approximately 2.4m -becomes stiff at approximately 2.4m															
3				495.44													
				3.05													
		(Cl) SILTY CLAY, medium plastic, trace sand, fine, trace/some iron staining, trace/some white staining, cohesive, w>PL, stiff to very stiff			002-7	AS								PP=3			
4					002-8	AS											
5																	
					002-9	AS											
6																	
					002-10	AS								PP=0.25			
7																	
					002-11	AS											
8																	
					002-12	AS											
9																	
10				488.73													
				9.75	002-13	AS								PP=0			
		(Cl) sandy, SILTY CLAY, fine grained, brown, wet, very soft															

CONTINUED NEXT PAGE

SK SOIL 11-1362-0057-5100 BOREHOLES.GPJ GAL-SASK.GDT 05/05/14



PROJECT: Cherry Lane Slope Remediation

RECORD OF BOREHOLE: COS-13-002

SHEET 2 OF 2

LOCATION: N 5775616.7 E 386038.9

BORING DATE: 07/25/13

DATUM: NAD83

DRILL RIG: CME

DRILLING CONTRACTOR: Boss Drilling

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION AND GROUNDWATER OBSERVATIONS	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	SHEAR STRENGTH Cu, kPa		WATER CONTENT PERCENT							
							20	40	60	80	10 ⁻⁶	10 ⁻⁵	10 ⁻⁴			10 ⁻³
10	150mm Dia. Solid Stem Auger Continuous Flight	CONTINUED FROM PREVIOUS PAGE (CL) sandy, SILTY CLAY, fine grained, brown, wet, very soft (continued)		488.12												
		(CL) SILTY CLAY, low plasticity, some sand, fine, brown, cohesive, w>PL, soft to very soft	10.36	002-14	AS										PP=0.5	
11				487.21	11.28										PP=1.0	
		(Cl) SILTY CLAY, medium plastic, brown, cohesive, w>PL, firm to stiff			002-15	AS									PP=1.5	
12					002-16	AS									PP=1	
		-becomes grey at approximately 12m														
13		(CH) CLAY, some silt, high plasticity, grey, cohesive, w>PL, stiff	485.38	13.11	002-17	AS								PP=2 SG	VW25400 Slope Indicator in Grout	
14		(CL) SILTY CLAY, some gravel, fine-coarse, grey, (TILL), cohesive, w>PL, stiff	484.46	14.02	002-18	AS								PP=1		
15																
16					002-19	AS								PP=2.5	VW25399	
17		END OF BOREHOLE = 16.8m		481.72	16.76											

SK SOIL 11-1362-0057-5100 BOREHOLES.GPJ GAL-SASK.GDT 05/05/14

DEPTH SCALE
1 : 50



LOGGED: LM
CHECKED: LDN

PROJECT: Cherry Lane Slope Remediation

RECORD OF BOREHOLE: COS-13-003

SHEET 1 OF 1

LOCATION: N 5775674.7 E 386061.6

BORING DATE: 07/26/13

DATUM: NAD83

DRILL RIG: CME

DRILLING CONTRACTOR: Boss Drilling

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION AND GROUNDWATER OBSERVATIONS	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	SHEAR STRENGTH Cu, kPa				WATER CONTENT PERCENT					
							20	40	60	80	nat V. rem V.	+	Q - U -			Wp
0	150mm Dia. Solid Stem Auger Continuous Flight	GROUND SURFACE		480.34											TOC=0.5mags	
		FILL, (CL) SILTY CLAY and SAND, well graded, some gravel, fine to coarse grained, black, w-PL, stiff to very stiff		0.00	003-1	AS										
1		(CL) SILTY CLAY, low plasticity, some gravel, fine to coarse grained, brown, trace iron staining, trace gypsum and weathered gypsum, trace petrified wood, trace coal, w-PL, stiff to very stiff		0.91	003-2	AS									PP=2	
		(GW) GRAVEL, dry		1.68											Bentonite	
		(CL) SILTY CLAY, low plasticity, some gravel, fine to coarse grained, brown, trace iron staining, trace gypsum and weathered gypsum, trace petrified wood, trace coal, w-PL, stiff to very stiff		1.68	003-3	AS										
2																
3																
4																
5			(CH) CLAY, high plasticity, trace gravel, fine to coarse grained, brown, trace iron staining, some weathered gypsum, some coal, w-PL, stiff to very stiff		4.88	003-5	AS									
		(SM) SILTY SAND, brown, trace iron staining, wet		5.49	003-6	AS										
6					003-7	TO										
7																
8		(GW) GRAVEL, well graded, fine to coarse grained, brown, very wet		7.32	003-8	AS										
9		(CL) SILTY CLAY, some gravel, fine grained, (TILL), w>PL, firm to stiff		8.84	003-9	AS										
		END OF BOREHOLE = 9.1m		9.14												

SK SOIL 11-1362-0057-5100 BOREHOLES.GPJ GAL-SASK.GDT 05/05/14

DEPTH SCALE

1 : 50



LOGGED: LM

CHECKED: LDN

PROJECT: Cherry Lane Slope Remediation

RECORD OF BOREHOLE: COS-13-004

SHEET 1 OF 2

LOCATION: N 5775605.0 E 386050.6

BORING DATE: 08/19/13

DATUM: NAD83

DRILL RIG: M4CT

DRILLING CONTRACTOR: Mobile Augers and Research Ltd.

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION AND GROUNDWATER OBSERVATIONS	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m				WATER CONTENT PERCENT					
							SHEAR STRENGTH Cu, kPa				WATER CONTENT PERCENT					
		GROUND SURFACE		491.74												
0	150mm Dia. Solid Stem Auger Continuous Flight	TOPSOIL, clayey, some fine-medium grained sand, some fine gravel, some organics, dark brown/black (CL) SILTY CLAY, low plasticity, trace fine grained sand, light brown, some rust staining, some organics, trace weathered gypsum, cohesive, w>PL, very soft to soft		0.00	004-1	AS										
				491.43												
				0.30	004-2	AS										
1																
						004-3	DO									
2																
						004-4	DO									
3																
4																
5			(CH) CLAY, high plasticity, some silt, brown/black mottling, some rust staining, cohesive, w>PL, stiff		487.32											
				4.42	004-5	DO										
6		(CI) SILTY CLAY, medium plastic, brown, cohesive, w>PL, stiff		486.56												
				5.18	004-6	AS										
7																
					004-7	TO										
8																
9		(CL-ML) SILTY CLAY/CLAYEY SILT and fine to medium grained sand, some gravel, trace cobbles, grey, cohesive, (TILL), w~PL, very stiff		483.05												
				8.69	004-9	TO										
10																
					004-10	AS										
					004-11	AS										

CONTINUED NEXT PAGE

SK SOIL 11-1362-0057-5100 BOREHOLES.GPJ GAL-SASK.GDT 05/05/14

DEPTH SCALE

1 : 50



LOGGED: LM

CHECKED: LDN

08/19/13

VW26020

SG PP=1.5

DS PP=2.5

PP=3.5

Slope Indicator in Grout

MH

MH

PROJECT: Cherry Lane Slope Remediation

RECORD OF BOREHOLE: COS-13-004

SHEET 2 OF 2


LOCATION: N 5775605.0 E 386050.6

BORING DATE: 08/19/13

DATUM: NAD83

DRILL RIG: M4CT

DRILLING CONTRACTOR: Mobile Augers and Research Ltd.

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION AND GROUNDWATER OBSERVATIONS	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa				WATER CONTENT PERCENT					
								20	40	60	80	nat V. +	rem V. ⊕	Q - ●			U - ○
10	Continuous Flight	<p><i>CONTINUED FROM PREVIOUS PAGE</i> (CL-ML) SILTY CLAY/CLAYEY SILT and fine to medium grained sand, some gravel, trace cobbles, grey, cohesive, (TILL), w~PL, very stiff (<i>continued</i>)</p>		480.71												VW25397 Slope Indicator in Grout	
11		<p>END OF BOREHOLE = 11.02m</p>		11.02													
12																	
13																	
14																	
15																	
16																	
17																	
18																	
19																	
20																	

SK SOIL 11-1362-0057-5100 BOREHOLES.GPJ GAL-SASK.GDT 05/05/14

DEPTH SCALE

1 : 50



LOGGED: LM

CHECKED: LDN

PROJECT: Cherry Lane Slope Remediation

RECORD OF BOREHOLE: COS-13-005

SHEET 1 OF 2

LOCATION: N 5775637.7 E 386047.6

BORING DATE: 08/20/13

DATUM: NAD83

DRILL RIG: M10

DRILLING CONTRACTOR: Mobile Augers and Research Ltd.

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION AND GROUNDWATER OBSERVATIONS	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	SHEAR STRENGTH Cu, kPa				WATER CONTENT PERCENT					
				494.48												
0	150mm Dia. Solid Stem Auger Continuous Flight	GROUND SURFACE		0.00	005-1	AS									MH	
1		(SM) SILTY SAND, fine grained, light brown, trace organics, non-cohesive, moist, loose														
2					005-2	DO										
3																
4		(SC) CLAYEY SAND, fine grained, light brown with black and white seams, cohesive, dry, compact		490.82 3.66	005-4	DO										
5																Slope Indicator in Grout
6		(CI) SILTY CLAY, sand seams, brown, w~PL		488.99 5.49	005-5	TO	+									
7					005-6	TO										PP>4.5
8		(SM) SILTY SAND, some clay, light brown, cohesive, dry-moist, compact		487.77 6.71	005-7	TO										VW25926
9																
10		(CI) SILTY CLAY, medium plastic, trace sand, brown, cohesive, w~PL		486.86 7.62	005-8	TO										MH
				005-9	TO									SG		
	(ML) SANDY, CLAYEY SILT, fine grained, brown, moist, compact		485.34 9.14	005-10	TO									MH		
				005-11	TO											

CONTINUED NEXT PAGE

SK SOIL 11-1362-0057-5100 BOREHOLES.GPJ GAL-SASK.GDT 05/05/14

DEPTH SCALE

1 : 50



LOGGED: LM

CHECKED: LDN

PROJECT: Cherry Lane Slope Remediation

RECORD OF BOREHOLE: COS-13-005

SHEET 2 OF 2

LOCATION: N 5775637.7 E 386047.6

BORING DATE: 08/20/13

DATUM: NAD83

DRILL RIG: M10

DRILLING CONTRACTOR: Mobile Augers and Research Ltd.

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION AND GROUNDWATER OBSERVATIONS	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa		WATER CONTENT PERCENT		WATER CONTENT PERCENT				
								20	40	60	80	10 ⁻⁶	10 ⁻⁵			10 ⁻⁴
10	150mm Dia. Solid Stem Auger Continuous Flight	<i>CONTINUED FROM PREVIOUS PAGE</i> (ML) SANDY, CLAYEY SILT, fine grained, brown, moist, compact <i>(continued)</i>														
				483.81												
11		(CI) SILTY CLAY, medium plastic, fine grained, grey and brown laminated, w~PL, very stiff		10.67	005-12	TO									MH	
12															DS	VW26019
13		(CI) SILTY CLAY, medium plastic, some sand, grey, w>PL, (TILL)		482.14	005-14	TO										
				12.34												
14					005-15	DO	64									
15				479.16												
				15.32												
16		END OF BOREHOLE = 15.32m														
17																
18																
19																
20																

SK SOIL 11-1362-0057-5100 BOREHOLES.GPJ GAL-SASK.GDT 05/05/14

DEPTH SCALE

1 : 50



LOGGED: LM

CHECKED: LDN

PROJECT: Cherry Lane Slope Remediation

RECORD OF BOREHOLE: COS-13-006

SHEET 1 OF 2

LOCATION: N 5775572.7 E 385959.2

BORING DATE: 08/21/13

DATUM: NAD83

DRILL RIG: M10

DRILLING CONTRACTOR: Mobile Augers and Research Ltd.

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION AND GROUNDWATER OBSERVATIONS
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa		WATER CONTENT PERCENT		WATER CONTENT PERCENT			
								20	40	60	80	10 ⁻⁶	10 ⁻⁵		
0		GROUND SURFACE		494.77											
		FILL (CL) SILTY CLAY, low plasticity, sandy, some organics, black and brown, cohesive, w<PL		0.00											
		(CI-CL) SILTY CLAY, low to medium plastic, trace sand, brown, some white staining, some iron staining, cohesive, w~PL, very soft to stiff		494.46	006-1	AS									
				0.30											
1					006-2	AS									
				492.94											
2		(CH) CLAY, high plasticity, brown, some iron staining, cohesive, w~PL, very stiff		1.83	006-3	AS									
					006-4	AS									
3					006-5	AS									
		-some white staining and gypsum crystals below 3.4m													
4															
5					006-6	AS									
					006-7	AS									
6															
					006-8	AS									
7															
					006-9	AS									
8															
				486.23											
9		(CI) SILTY CLAY, medium plasticity, trace sand, cohesive, w>PL, firm to stiff		8.53	006-10	AS									MH
10															

CONTINUED NEXT PAGE

SK SOIL 11-1362-0057-5100 BOREHOLES.GPJ GAL-SASK.GDT 05/05/14

DEPTH SCALE

1 : 50



LOGGED: LM

CHECKED: LDN

PROJECT: Cherry Lane Slope Remediation

RECORD OF BOREHOLE: COS-13-006

SHEET 2 OF 2

LOCATION: N 5775572.7 E 385959.2

BORING DATE: 08/21/13

DATUM: NAD83

DRILL RIG: M10

DRILLING CONTRACTOR: Mobile Augers and Research Ltd.

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION AND GROUNDWATER OBSERVATIONS		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa		WATER CONTENT PERCENT		WATER CONTENT PERCENT					
								20	40	60	80	10 ⁻⁶	10 ⁻⁵			10 ⁻⁴	10 ⁻³
10	150mm Dia. Solid Stem Auger Continuous Flight	<i>CONTINUED FROM PREVIOUS PAGE</i>															
		(CI) SILTY CLAY, medium plasticity, trace sand, cohesive, w>PL, firm to stiff (continued)		484.25	10.52	006-11	AS									VW26018	
		(CL) SILTY CLAY, low plasticity, some fine gravel and sand, trace coarse gravel, grey, (TILL), cohesive, w~PL, stiff															
11						006-12	AS									Slope Indicator in Grout	
				482.57												08/21/13	
		(SM) SILTY SAND, some fine grained gravel, grey, non-cohesive, wet		482.42	12.34	006-13	AS									MH	
		(CL) SILTY CLAY, low plasticity, some fine gravel and sand, trace coarse gravel, grey, (TILL), cohesive, w~PL, stiff															
13			(SM) SILTY SAND, some fine grained gravel, grey, non-cohesive, wet		481.66	13.11	006-14	AS									VW25398
			(CL) SILTY CLAY, low plasticity, some fine gravel and sand, trace coarse gravel, grey, (TILL), cohesive, w~PL, stiff		481.36	13.41											
14			END OF BOREHOLE = 14.33m		480.44	14.33											

SK SOIL 11-1362-0057-5100 BOREHOLES.GPJ GAL-SASK.GDT 05/05/14

DEPTH SCALE

1 : 50



LOGGED: LM

CHECKED: LDN

PROJECT: Cherry Lane Slope Remediation

RECORD OF BOREHOLE: COS-13-007

SHEET 1 OF 1

LOCATION: N 5775573.5 E 385959.1

BORING DATE: 08/21/13

DATUM: NAD83

DRILL RIG: M10

DRILLING CONTRACTOR: Mobile Augers and Research Ltd.

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION AND GROUNDWATER OBSERVATIONS	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa				WATER CONTENT PERCENT					
								20	40	60	80	nat V. +	rem V. ⊕	Q - ●			U - ○
0	150mm Dia. Solid Stem Auger Continuous Flight	GROUND SURFACE		494.80													
		FILL (CL) SILTY CLAY, low plasticity, sandy, some organics, black and brown, w<PL		0.00													
		(CI-CL) SILTY CLAY, low to medium plasticity, trace sand, brown, some white staining, some iron staining, cohesive, w~PL, very soft to stiff		0.30													
2		(CH) CLAY, high plasticity, brown, some iron staining, cohesive, w~PL, very stiff with some soft spots		1.83													Bentonite
4		-some white staining and gypsum crystals below 3.4m															Sand
5.59		END OF BOREHOLE = 5.59m		5.59												Screen	

SK SOIL 11-1362-0057-5100 BOREHOLES.GPJ GAL-SASK.GDT 05/05/14

DEPTH SCALE

1 : 50



LOGGED: LM

CHECKED: LDN



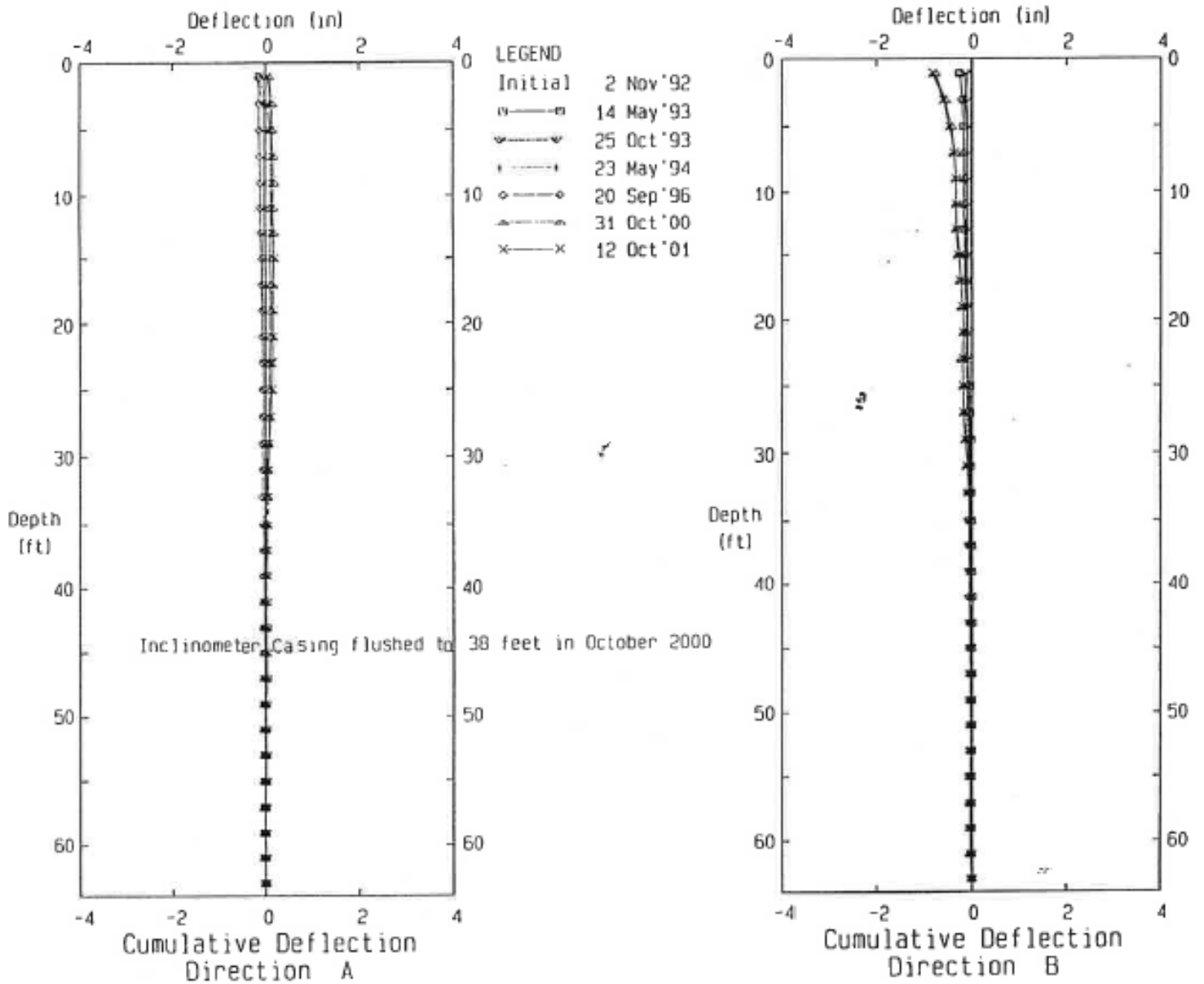
APPENDIX F

Monitoring Data



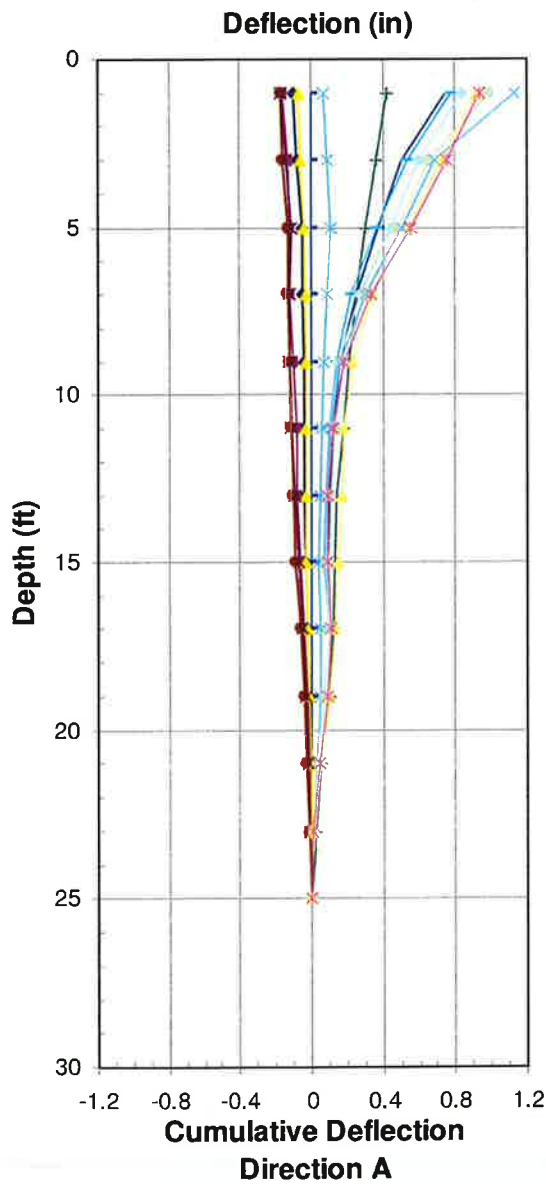
F.1. SLOPE INCLINOMETER PLOTS

AGRA Earth & Environmental Limited - Saskatoon, SK



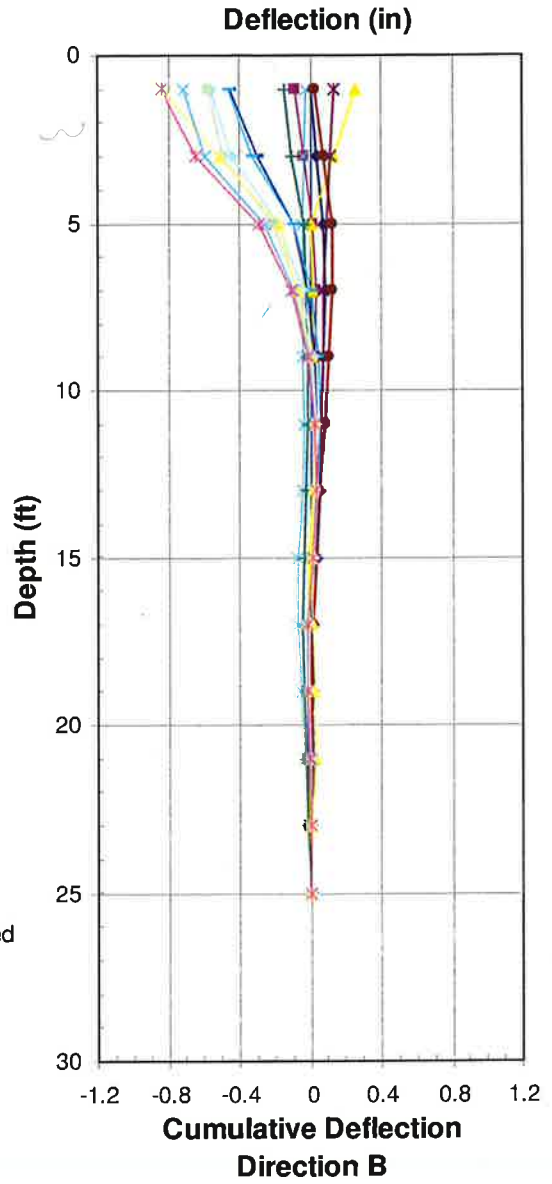
COS#12 - EAST RIVER BANK, Inclinometer SI-84ICL
Cherry Lane (West Casing)

AMEC Earth & Environmental - Saskatoon, SK



- 22-Aug-85
- 29-Oct-86
- 3-Nov-87
- 19-Oct-87
- 11-Oct-89
- 16-Nov-90
- 21-Nov-91
- 25-May-92
- 30-Nov-99
- 27-Oct-00
- 12-Oct-01
- 24-Oct-02
- 10-Oct-03
- 19-Nov-04
- 13-Oct-05

Note: Casing in need of repair since 2005



COS #11 - EAST RIVER BANK, Inclinometer 85-511 Cherry Lane (East Casing)



Earth & Environmental
A Division of AMEC Americas Limited

COS#11 – EAST RIVER BANK – 85-511
CUMULATIVE DEFLECTION

SOUTH SASKATCHEWAN RIVER
SASKATOON, SASKATCHEWAN

CITY OF SASKATOON
2008 EAST RIVER BANK MONITORING PROGRAM

Drawn: EM

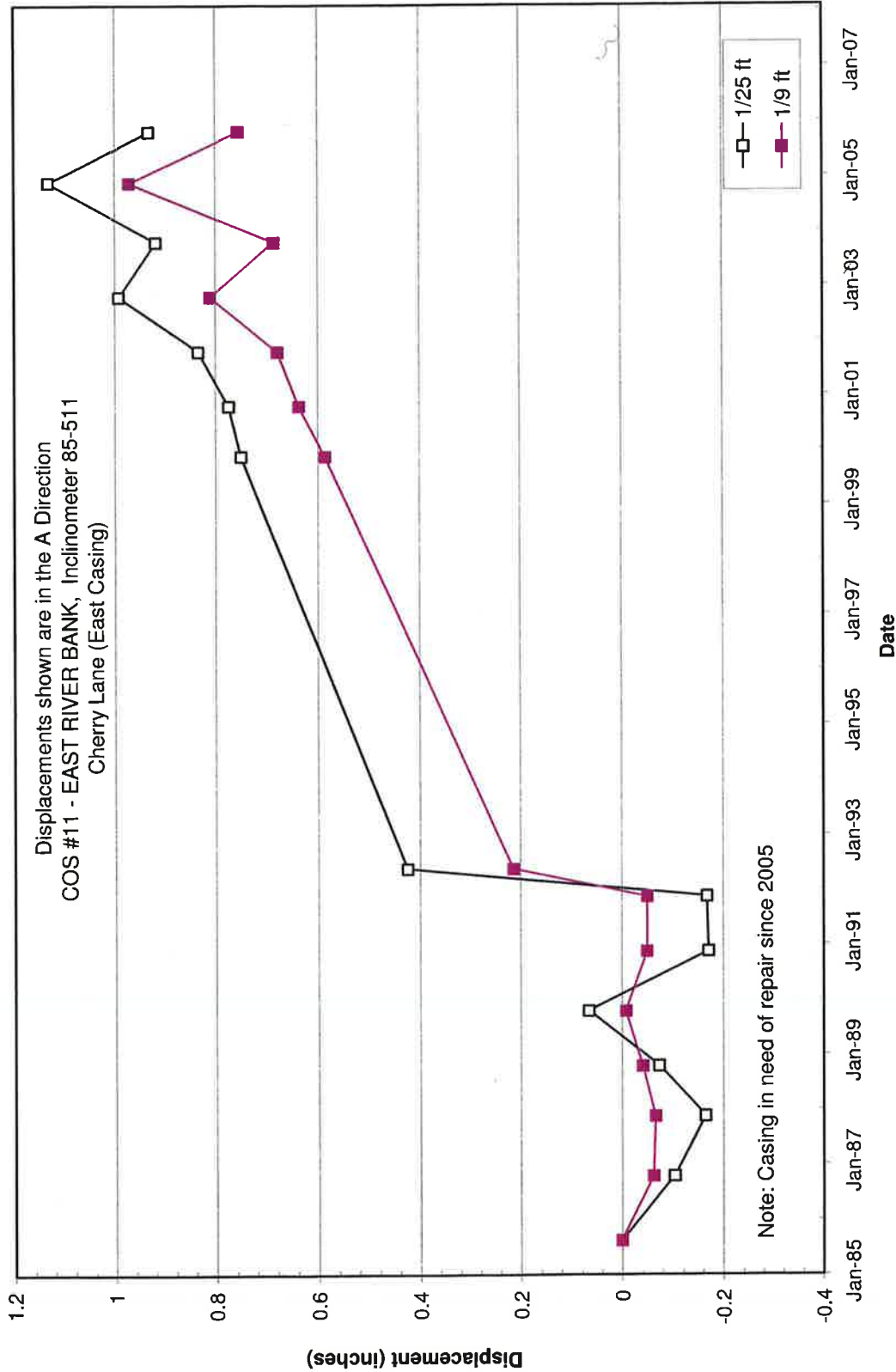
Scale: As Shown

Date: Nov/08

Proj. No: SX0258510

Figure: 33

AMEC Earth & Environmental - Saskatoon, SK



Earth & Environmental
 A Division of AMEC Americas Limited

Drawn by: EM Scale: As Shown

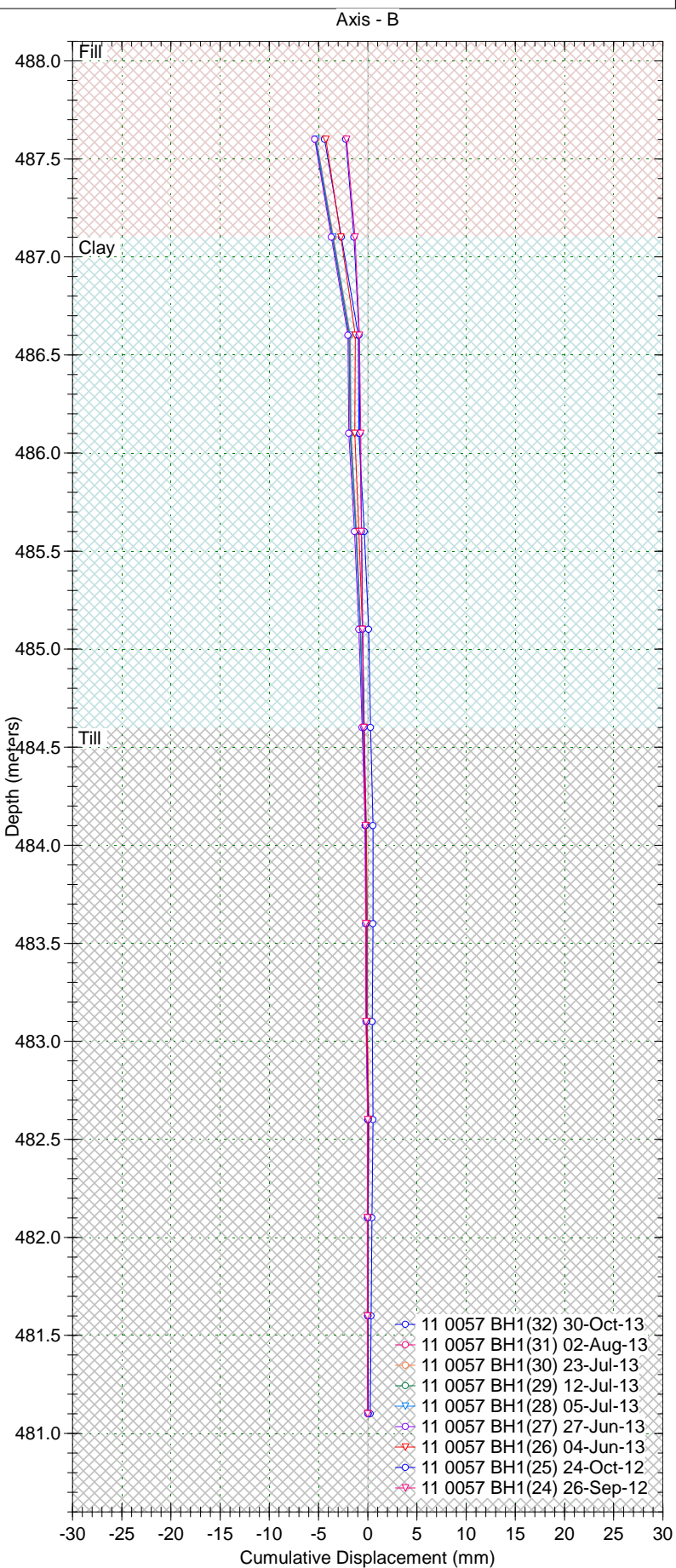
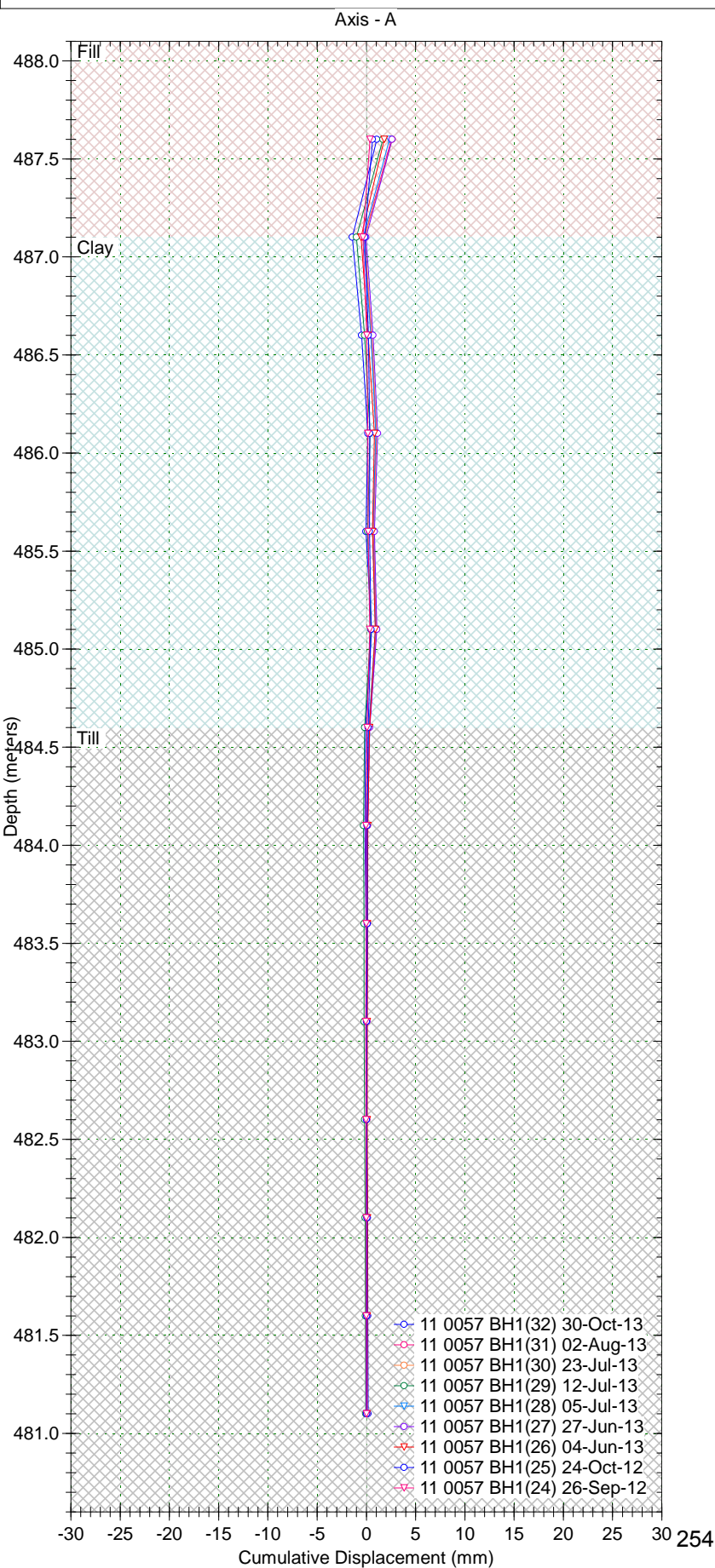
CITY OF SASKATOON
2008 EAST RIVER BANK MONITORING PROGRAM

Date: Nov/08 Proj. No: SX0258510 Figure: 34

COS#11 - EAST RIVER BANK - 85-511
DISPLACEMENT TIME - A-DIRECTION
SOUTH SASKATCHEWAN RIVER
SASKATOON, SASKATCHEWAN

Borehole : BH1
Project : 11-1362-0057 Cherry Lane
Location : Lane - 241 11th St E
Northing : 5775616.8
Easting : 386010.5
Collar :

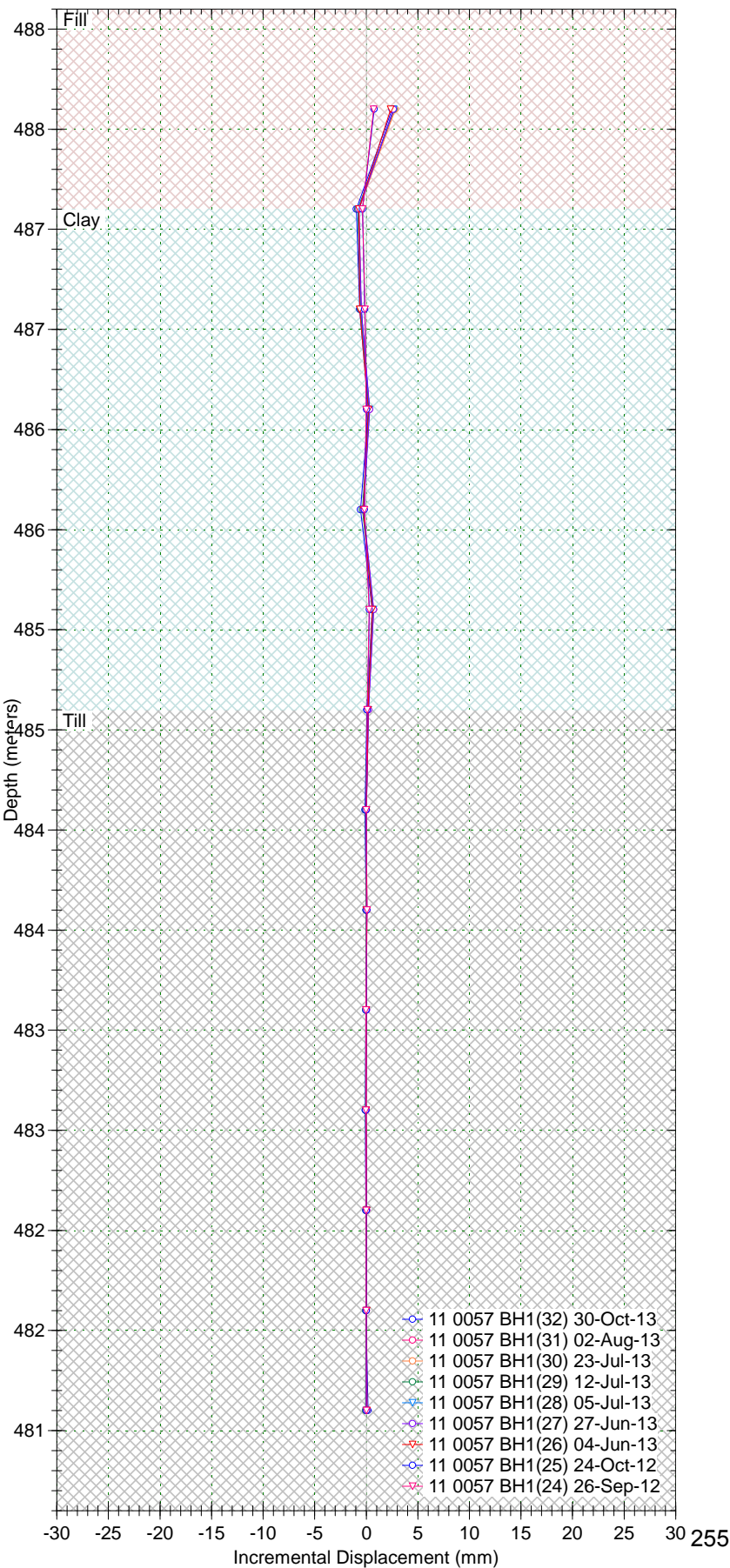
Spiral Correction : N/A
Collar Elevation : 488.1 meters
Borehole Total Depth : 7.0 meters
A+ Groove Azimuth :
Base Reading : 2012 Jun 25 08:55
Applied Azimuth : 0.0 degrees



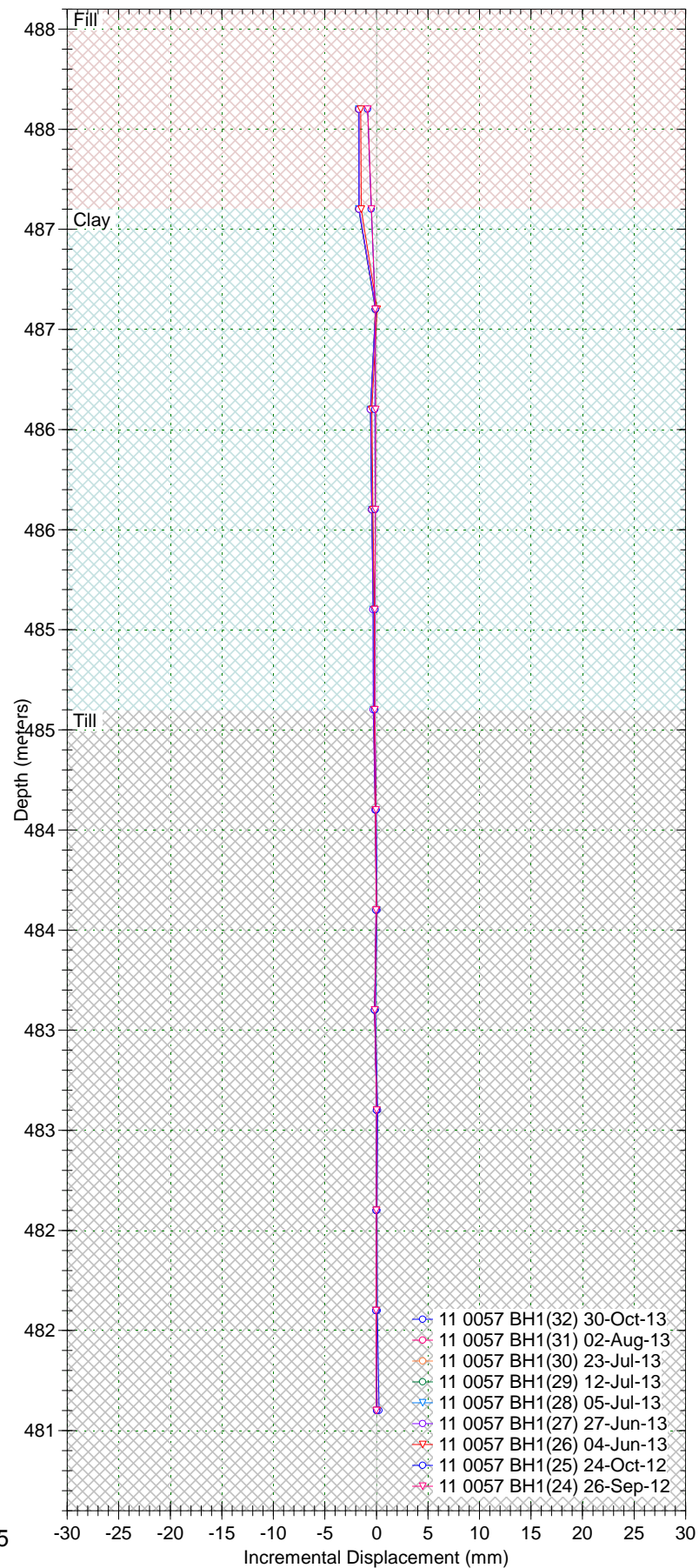
Borehole : BH1
Project : 11-1362-0057 Cherry Lane
Location : Lane - 241 11th St E
Northing : 5775616.8
Easting : 386010.5
Collar :

Spiral Correction : N/A
Collar Elevation : 488.1 meters
Borehole Total Depth : 7.0 meters
A+ Groove Azimuth :
Base Reading : 2012 Jun 25 08:55
Applied Azimuth : 0.0 degrees

Axis - A



Axis - B

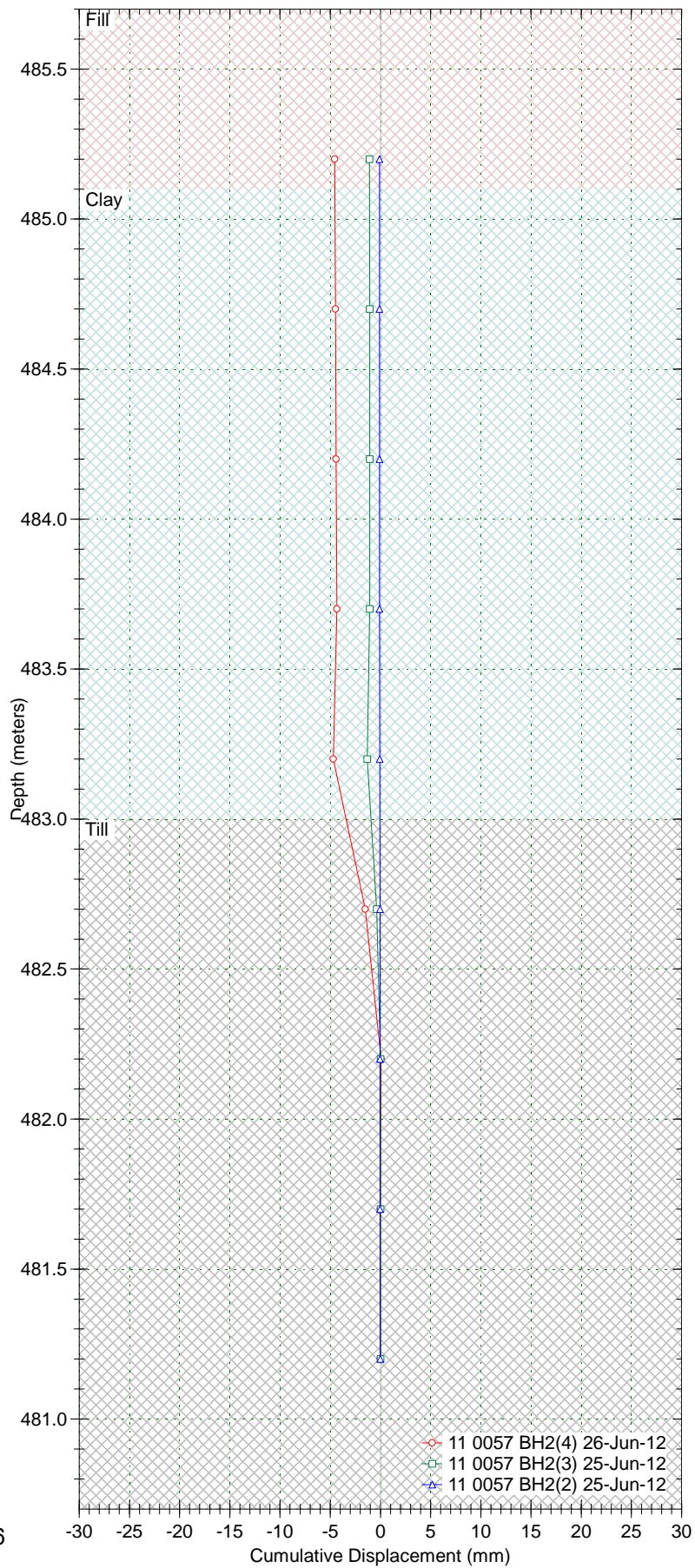
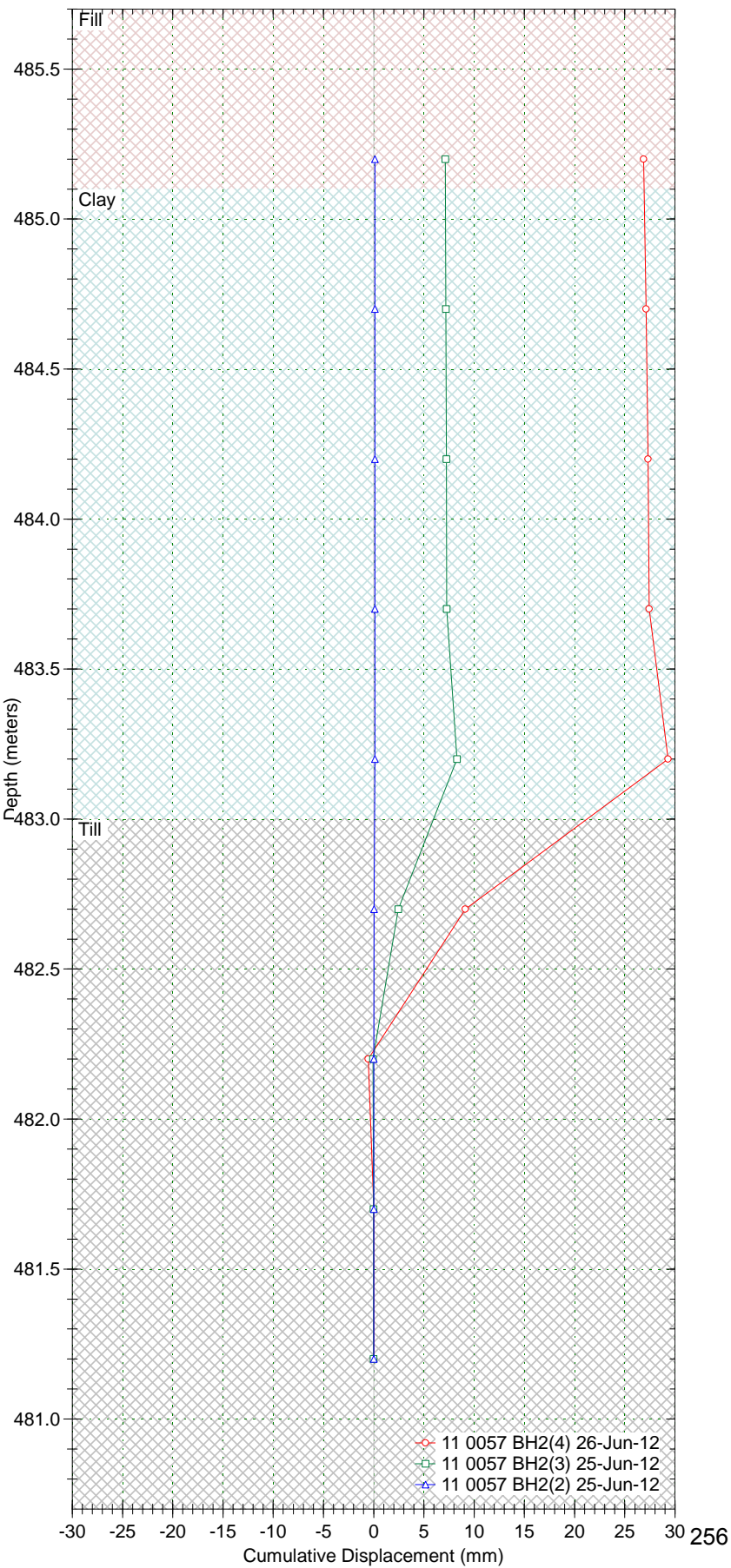


Borehole : BH 2
Project : 11-1362-0057 Cherry Lane
Location : Lane - 233 11th St E.
Northing : 5775623.7
Easting : 385980.0
Collar :

Spiral Correction : N/A
Collar Elevation : 485.7 meters
Borehole Total Depth : 4.5 meters
A+ Groove Azimuth :
Base Reading : 2012 Jun 25 09:39
Applied Azimuth : 0.0 degrees

Axis - A

Axis - B

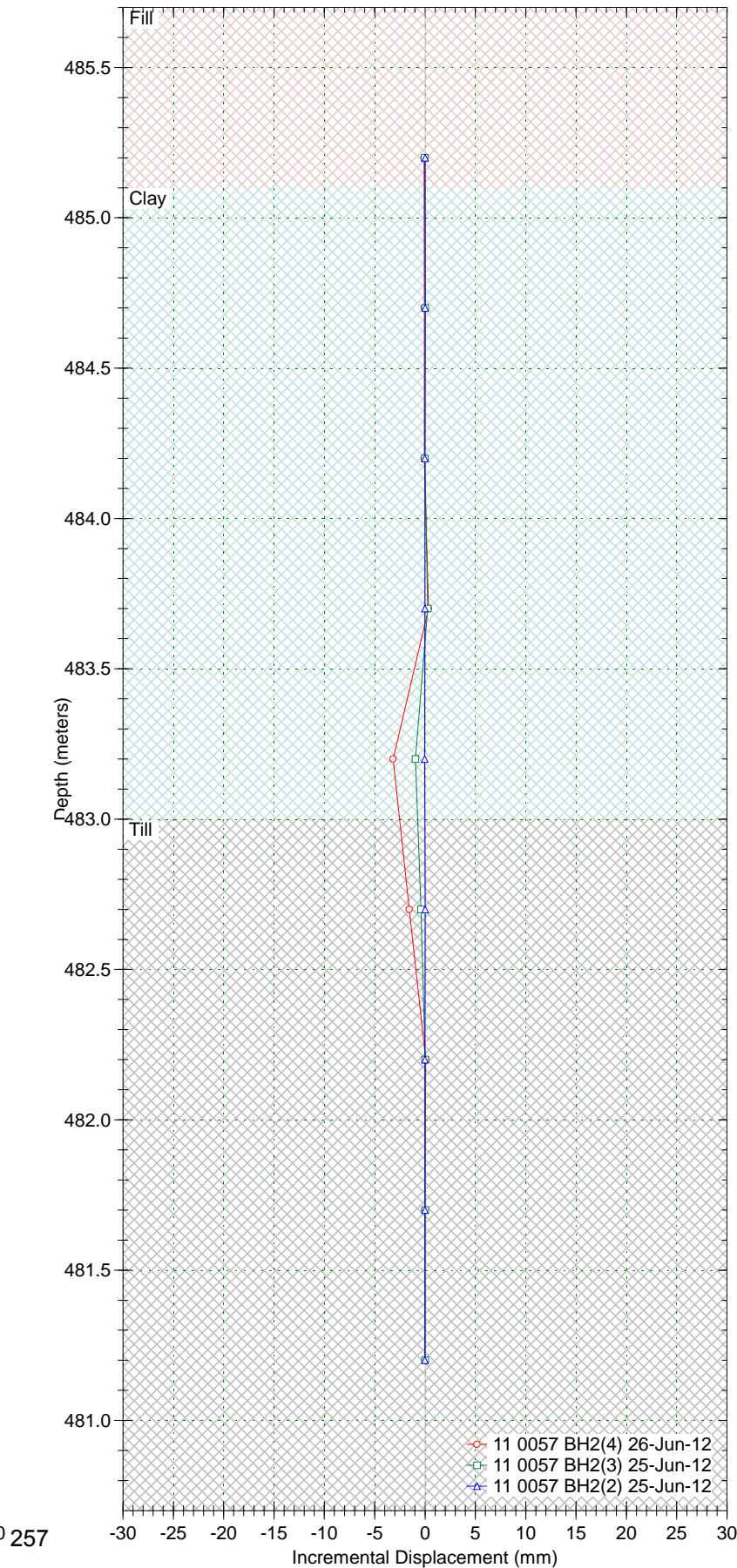


Borehole : BH 2
Project : 11-1362-0057 Cherry Lane
Location : Lane - 233 11th St E.
Northing : 5775623.7
Easting : 385980.0
Collar :

Spiral Correction : N/A
Collar Elevation : 485.7 meters
Borehole Total Depth : 4.5 meters
A+ Groove Azimuth :
Base Reading : 2012 Jun 25 09:39
Applied Azimuth : 0.0 degrees

Axis - A

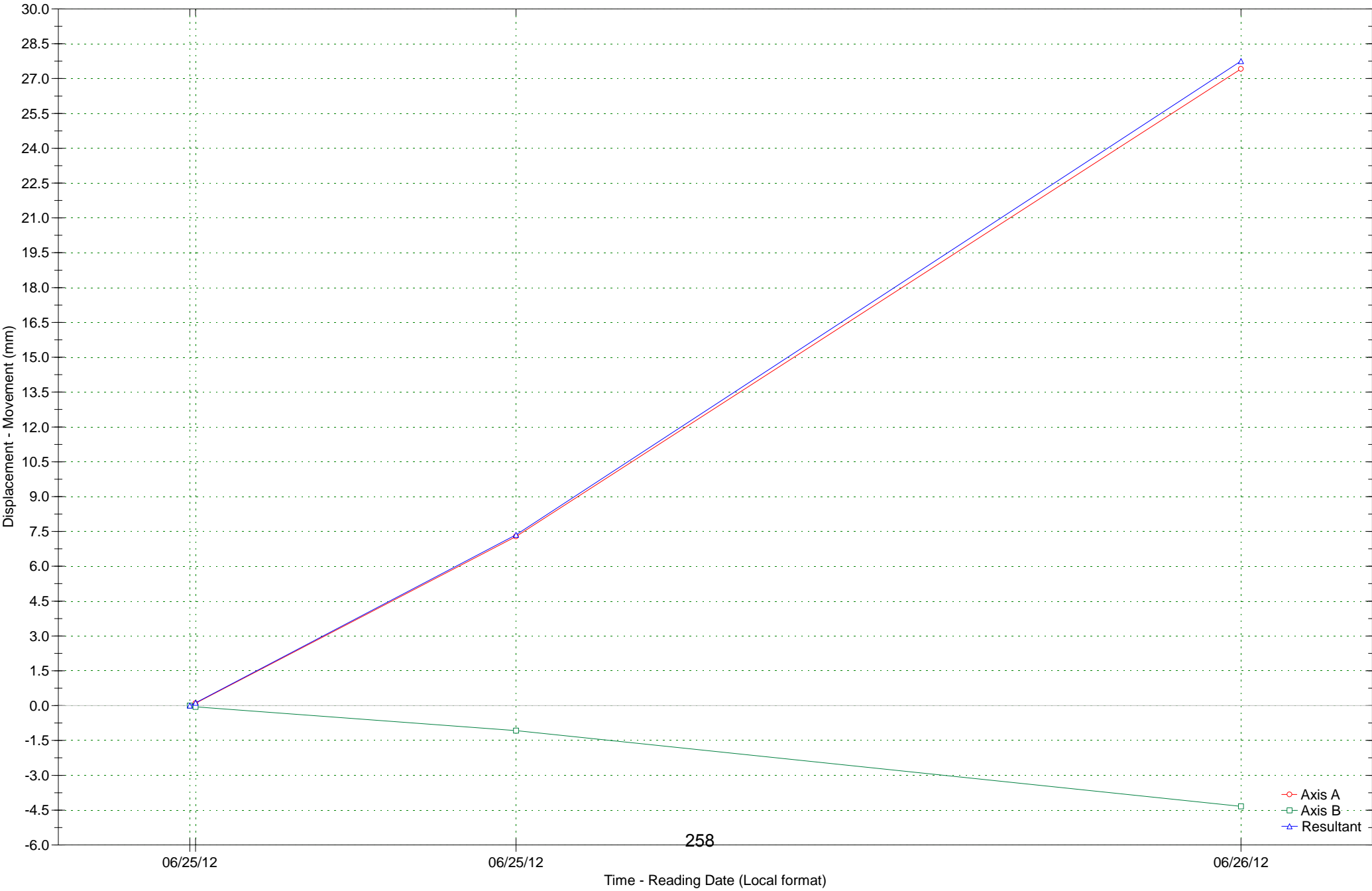
Axis - B



Borehole : BH 2
Project : 11-1362-0057 Cherry Lane
Location : Lane - 233 11th St E.
Northing : 5775623.7
Easting : 385980.0
Collar :
Collar Elev : 485.7 meters

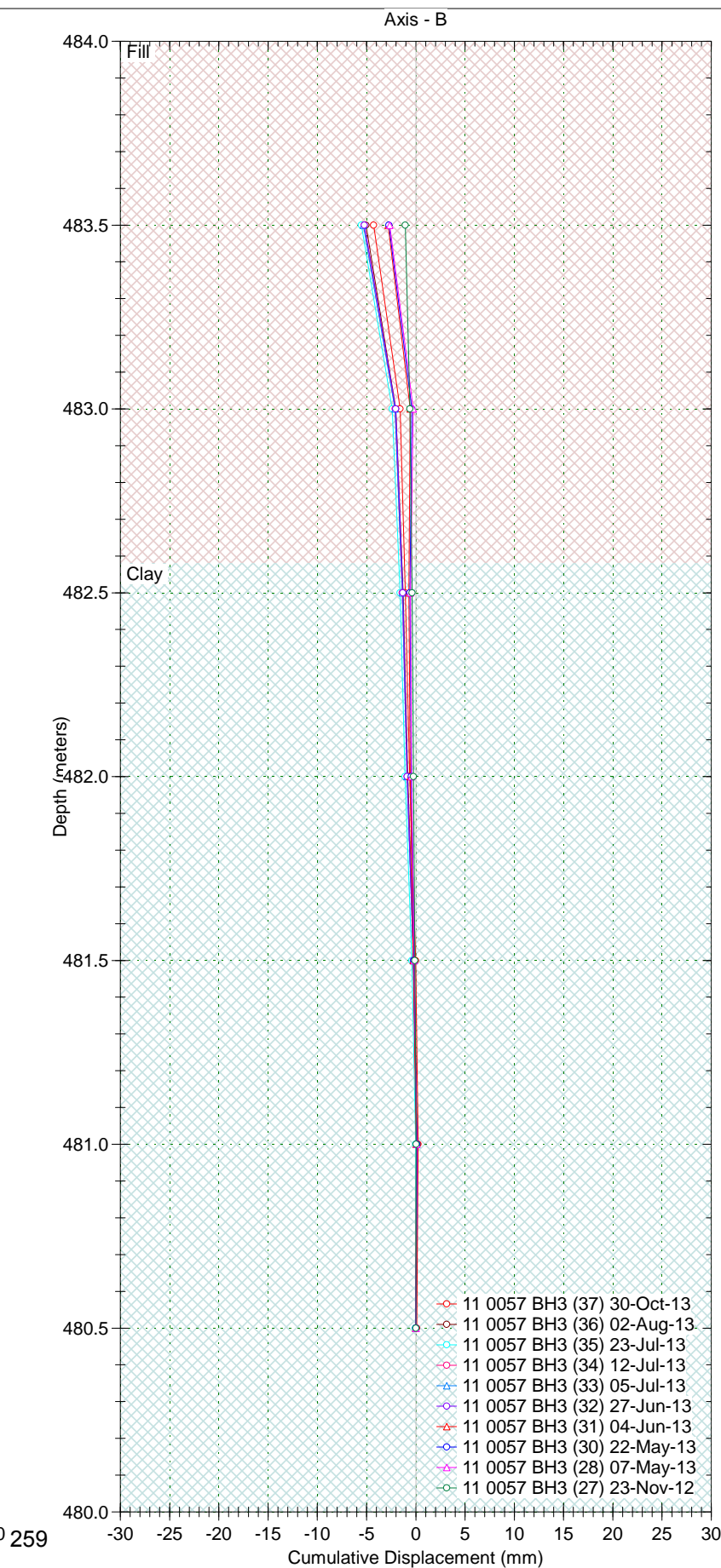
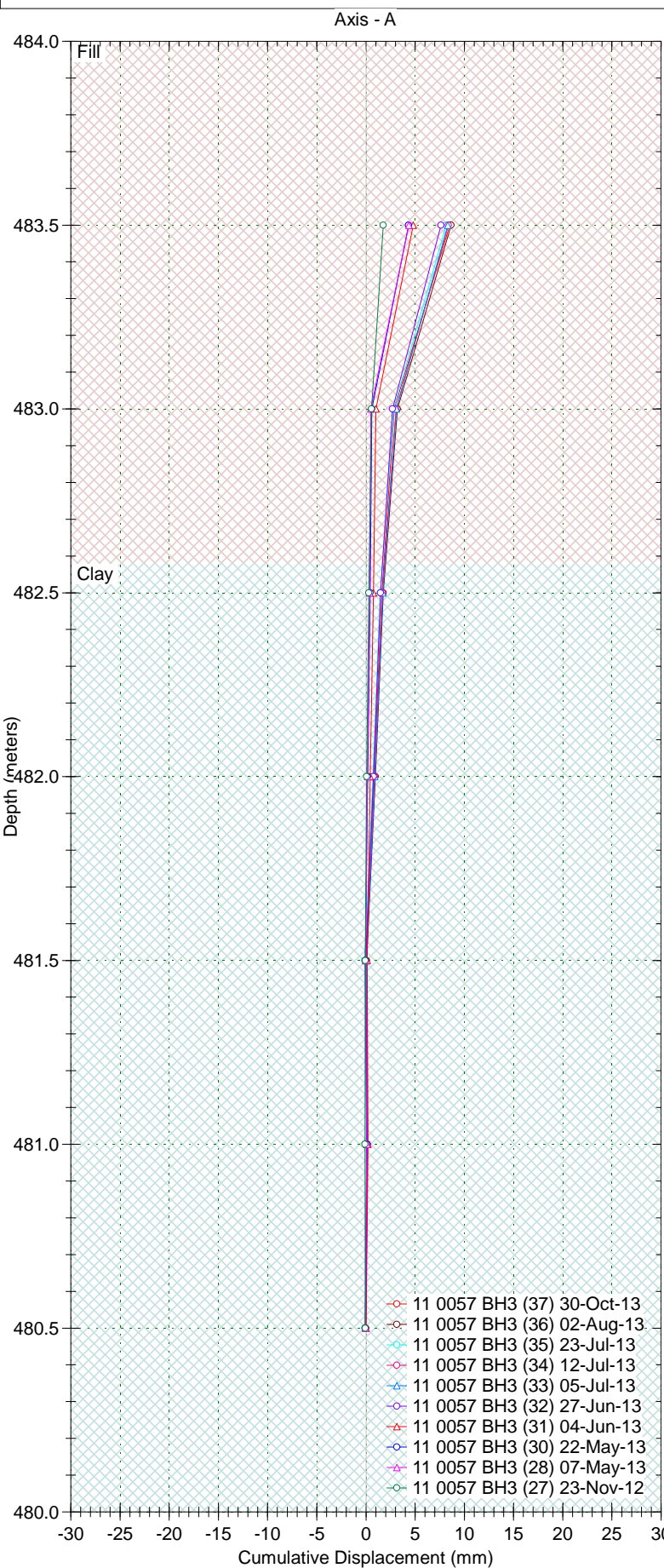
Spiral Correction : N/A
Movement Depth : 2.0 - 3.5 meters
Borehole Total Depth : 4.5 meters
A+ Groove Azimuth :
Latest Reading : 2012 Jun 26 09:02
Initial Reading : 2012 Jun 25 09:39
Applied Azimuth : 0.0 degrees

Time Plot : 2.0 - 3.5 meters



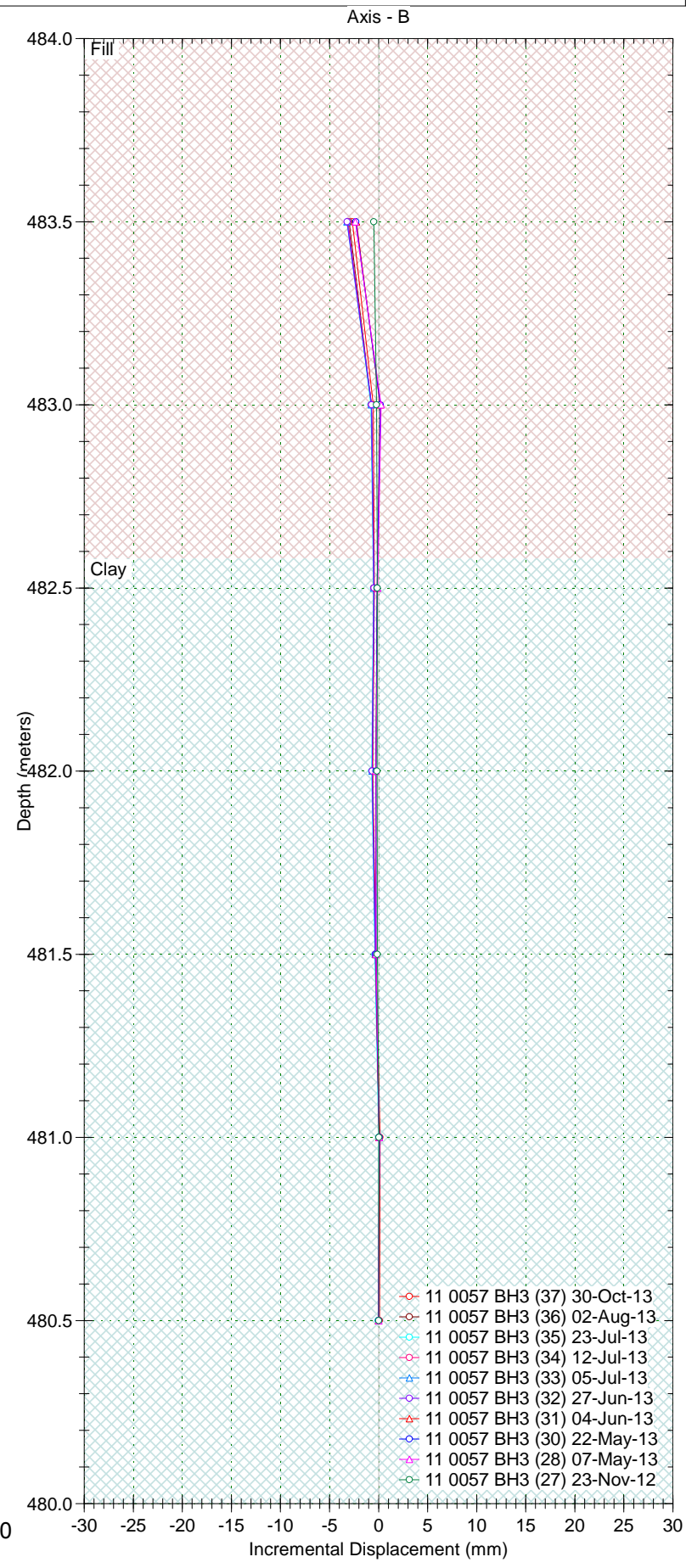
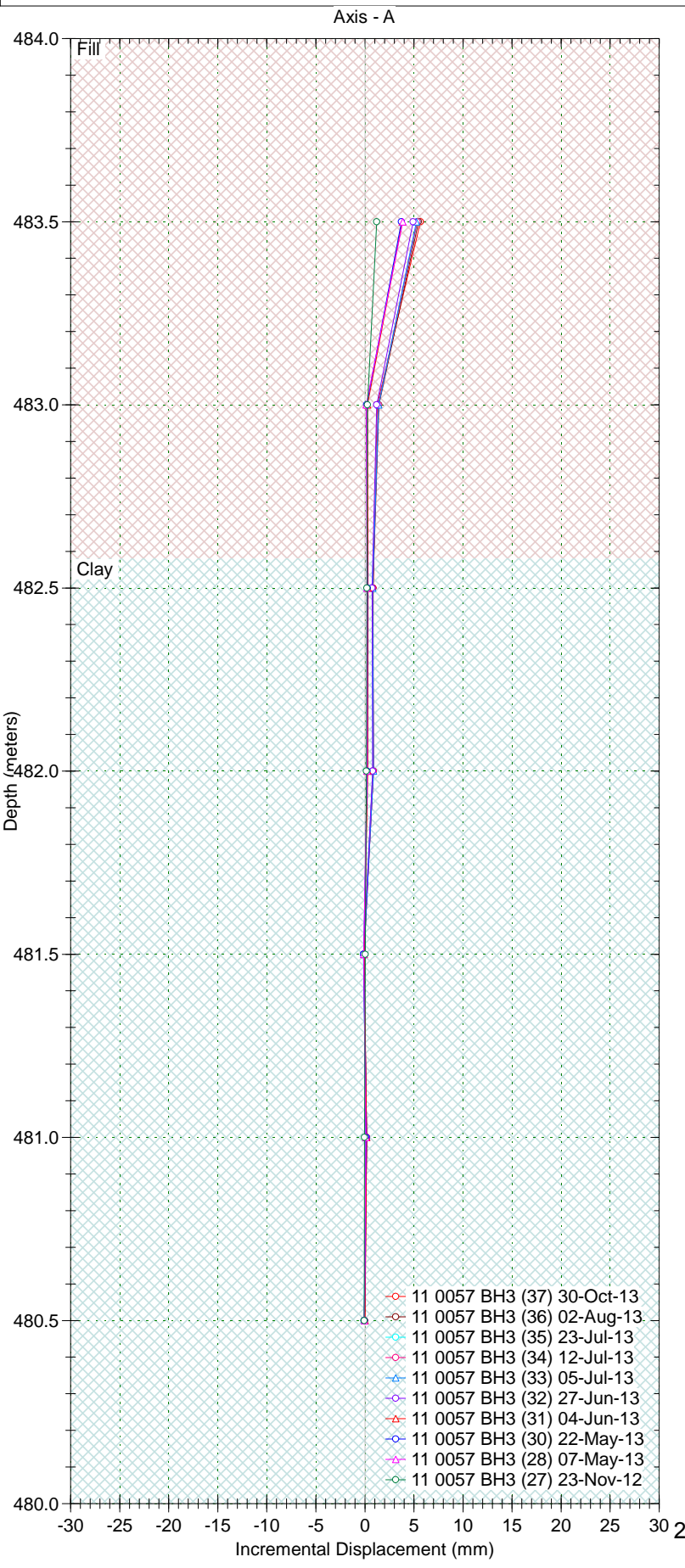
Borehole : BH 3
Project : 11-1362-0057 Cherry Lane
Location : Lane - 231 11th St E.
Northing : 5775623.7
Easting : 385980.0
Collar :

Spiral Correction : N/A
Collar Elevation : 484.0 meters
Borehole Total Depth : 3.5 meters
A+ Groove Azimuth :
Base Reading : 2012 Jun 25 10:17
Applied Azimuth : 0.0 degrees



Borehole : BH 3
Project : 11-1362-0057 Cherry Lane
Location : Lane - 231 11th St E.
Northing : 5775623.7
Easting : 385980.0
Collar :

Spiral Correction : N/A
Collar Elevation : 484.0 meters
Borehole Total Depth : 3.5 meters
A+ Groove Azimuth :
Base Reading : 2012 Jun 25 10:17
Applied Azimuth : 0.0 degrees



Borehole : BH 3
Project : 11-1362-0057 Cherry Lane
Location : Lane - 231 11th St E.
Northing : 5775623.7
Easting : 385980.0
Collar :
Collar Elev : 484.0 meters

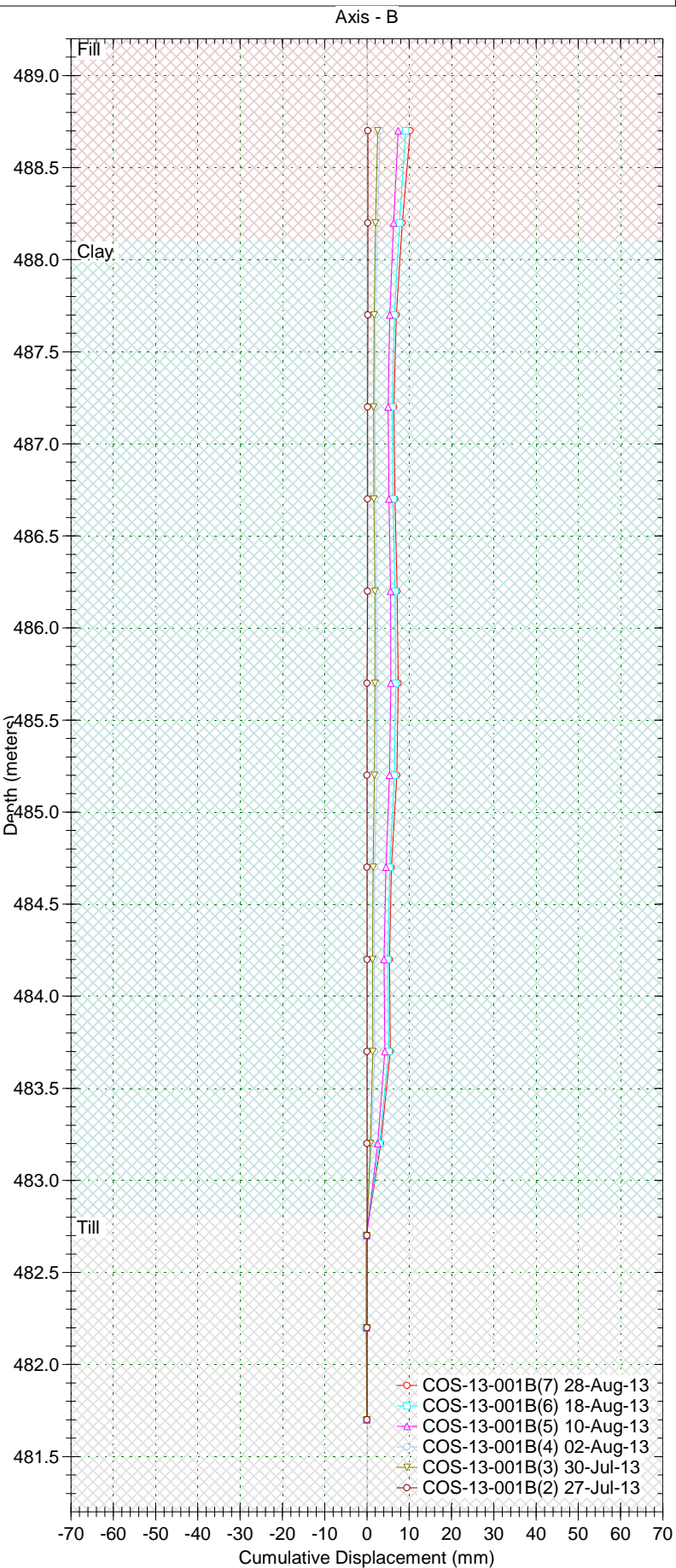
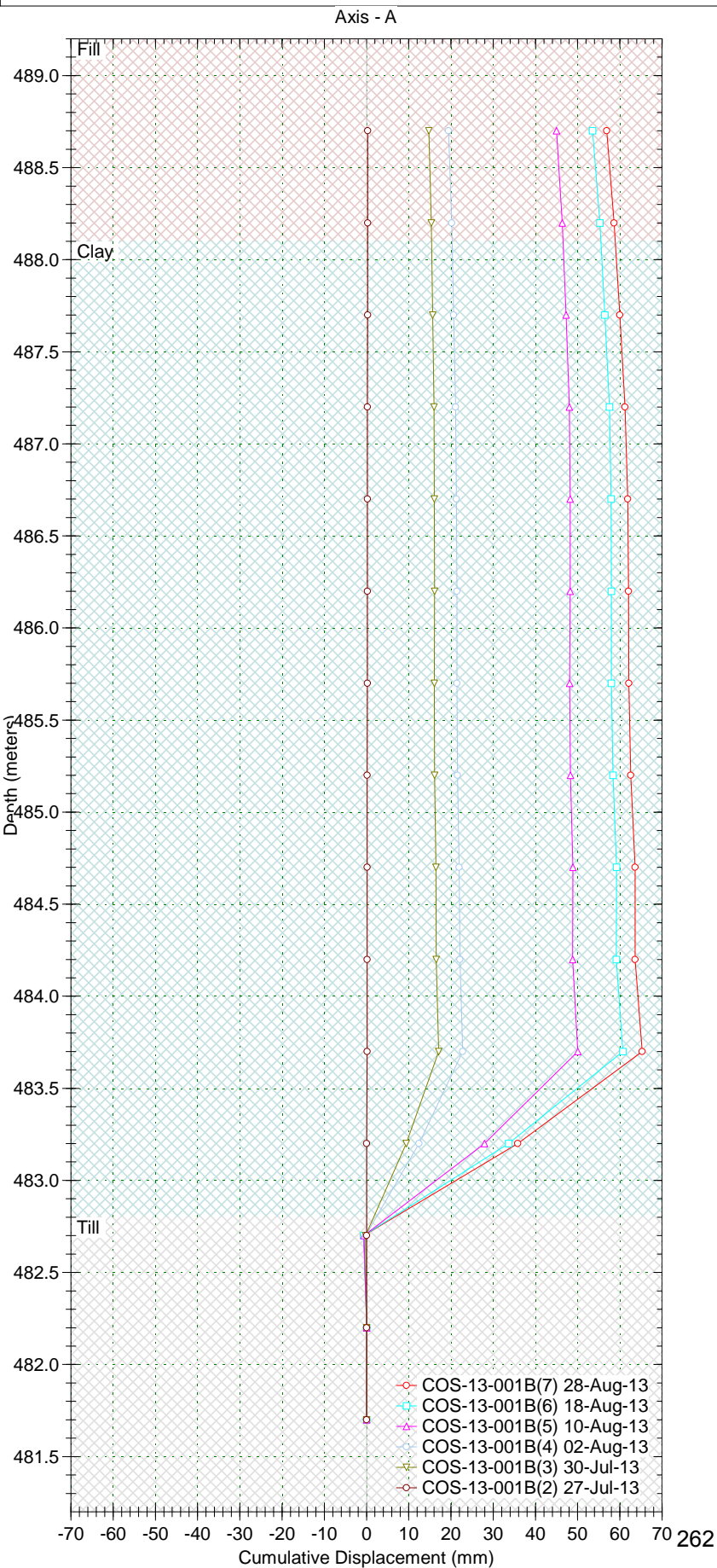
Spiral Correction : N/A
Movement Depth : 0.5 - 1.5 meters
Borehole Total Depth : 3.5 meters
A+ Groove Azimuth :
Latest Reading : 2013 Oct 30 10:49
Initial Reading : 2012 Jun 25 10:17
Applied Azimuth : 0.0 degrees

Time Plot : 0.5 - 1.5 meters



Borehole : COS-13-001B
Project : 11-1362-0057 Cherry Lane
Location : Lane - 306 SK. Cres. E.
Northing : 5775616.67
Easting : 386038.94
Collar : -0.109

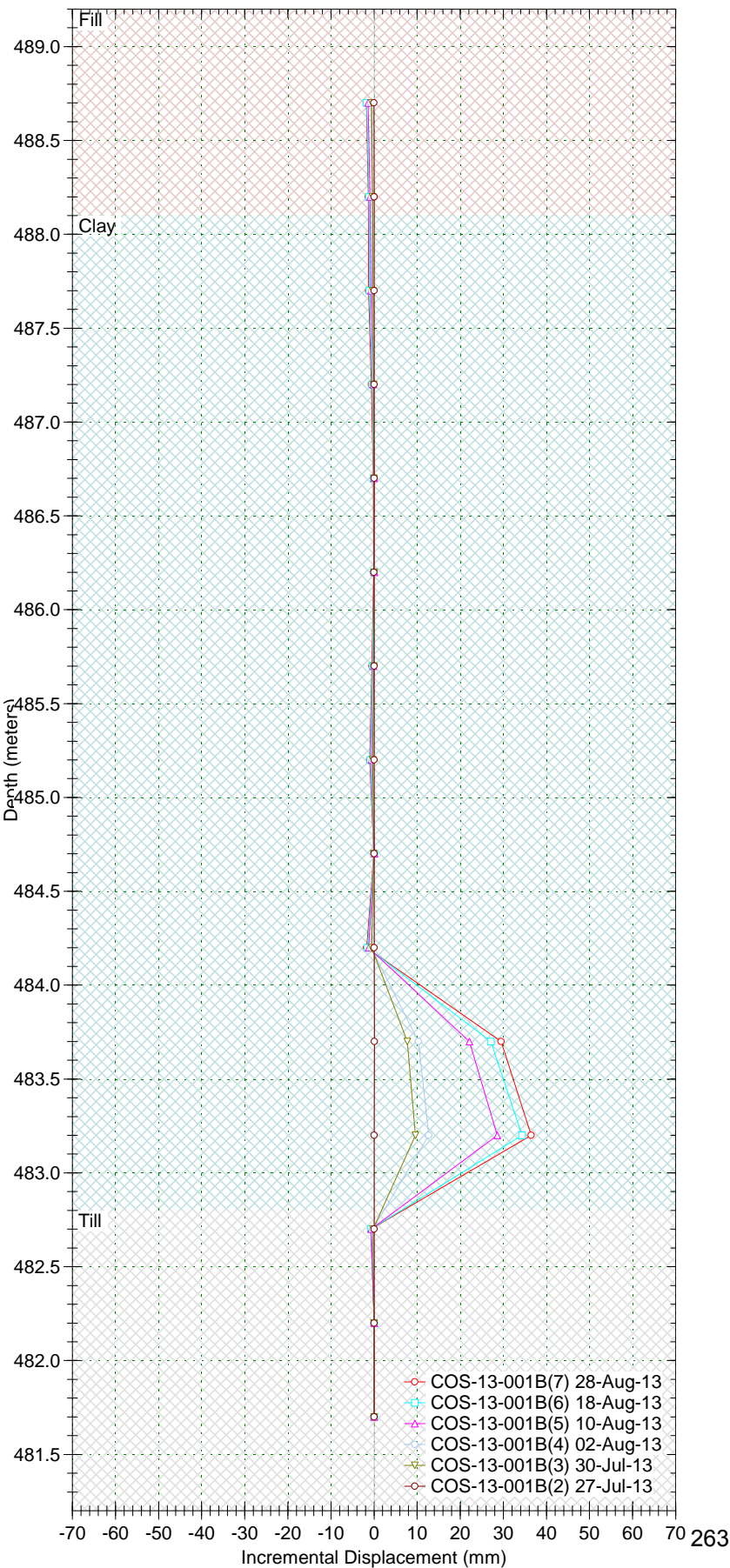
Spiral Correction : N/A
Collar Elevation : 489.2 meters
Borehole Total Depth : 7.5 meters
A+ Groove Azimuth :
Base Reading : 2013 Jul 27 15:17
Applied Azimuth : 0.0 degrees



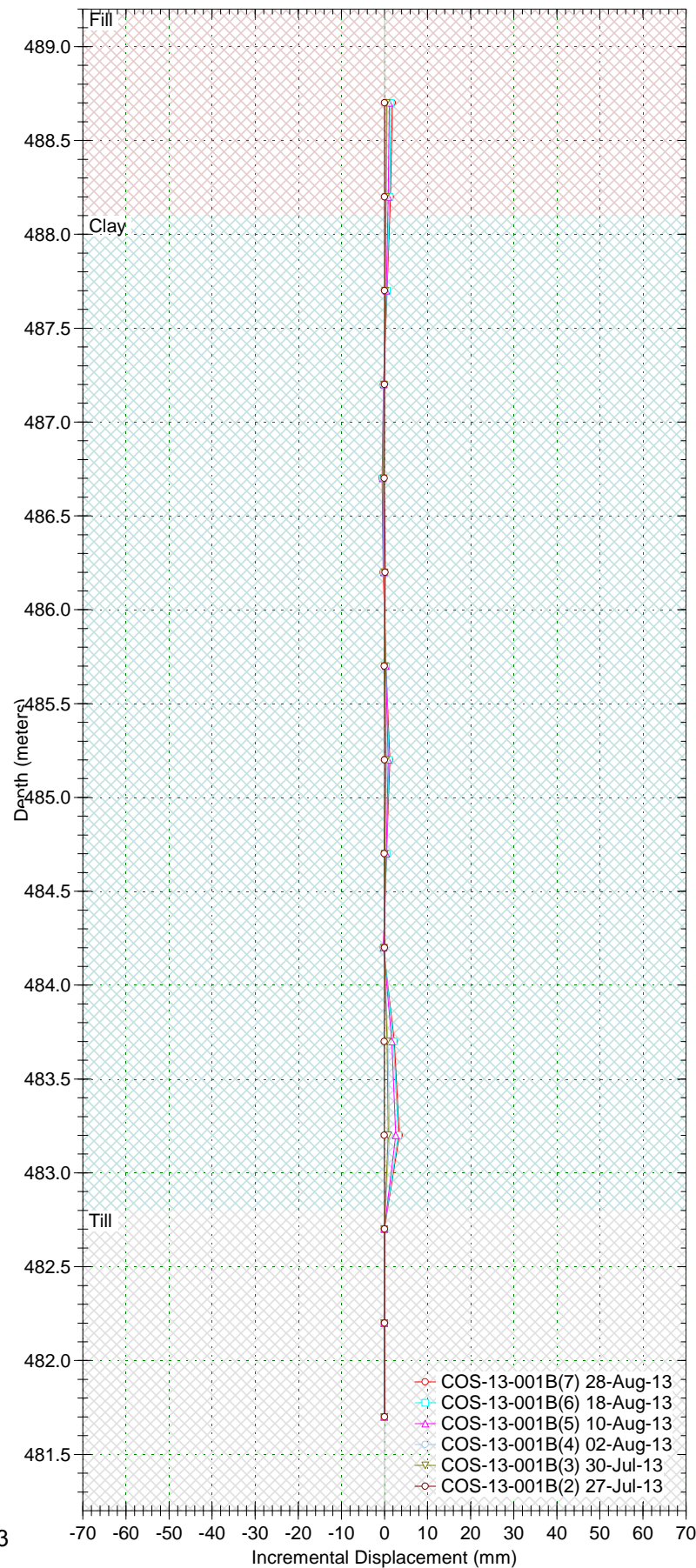
Borehole : COS-13-001B
Project : 11-1362-0057 Cherry Lane
Location : Lane - 306 SK. Cres. E.
Northing : 5775616.67
Easting : 386038.94
Collar : -0.109

Spiral Correction : N/A
Collar Elevation : 489.2 meters
Borehole Total Depth : 7.5 meters
A+ Groove Azimuth :
Base Reading : 2013 Jul 27 15:17
Applied Azimuth : 0.0 degrees

Axis - A



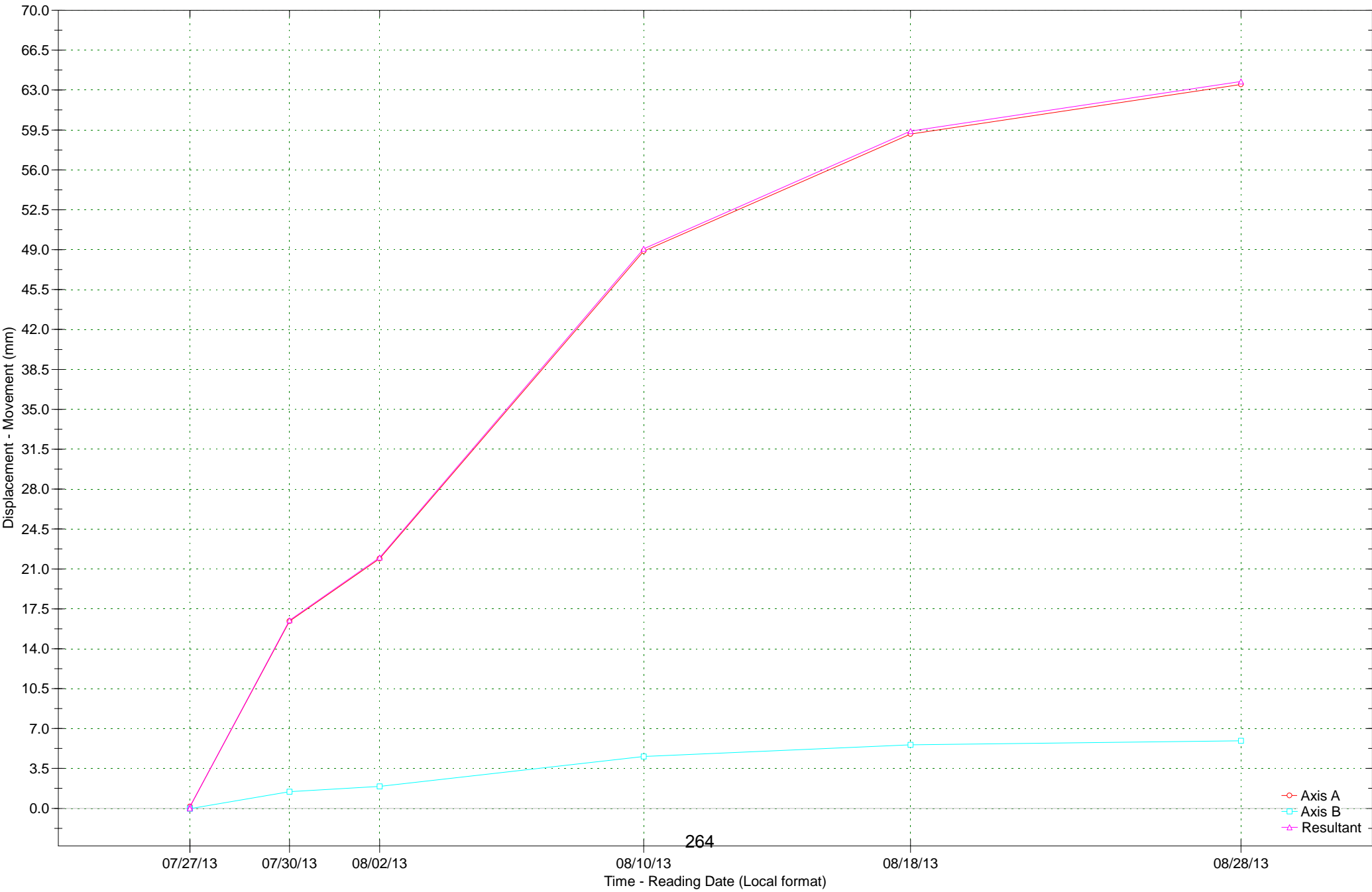
Axis - B



Borehole : COS-13-001B
Project : 11-1362-0057 Cherry Lane
Location : Lane - 306 SK. Cres. E.
Northing : 5775616.67
Easting : 386038.94
Collar : -0.109
Collar Elev : 489.2 meters

Spiral Correction : N/A
Movement Depth : 4.5 - 6.5 meters
Borehole Total Depth : 7.5 meters
A+ Groove Azimuth :
Latest Reading : 2013 Aug 28 08:05
Initial Reading : 2013 Jul 27 15:17
Applied Azimuth : 0.0 degrees

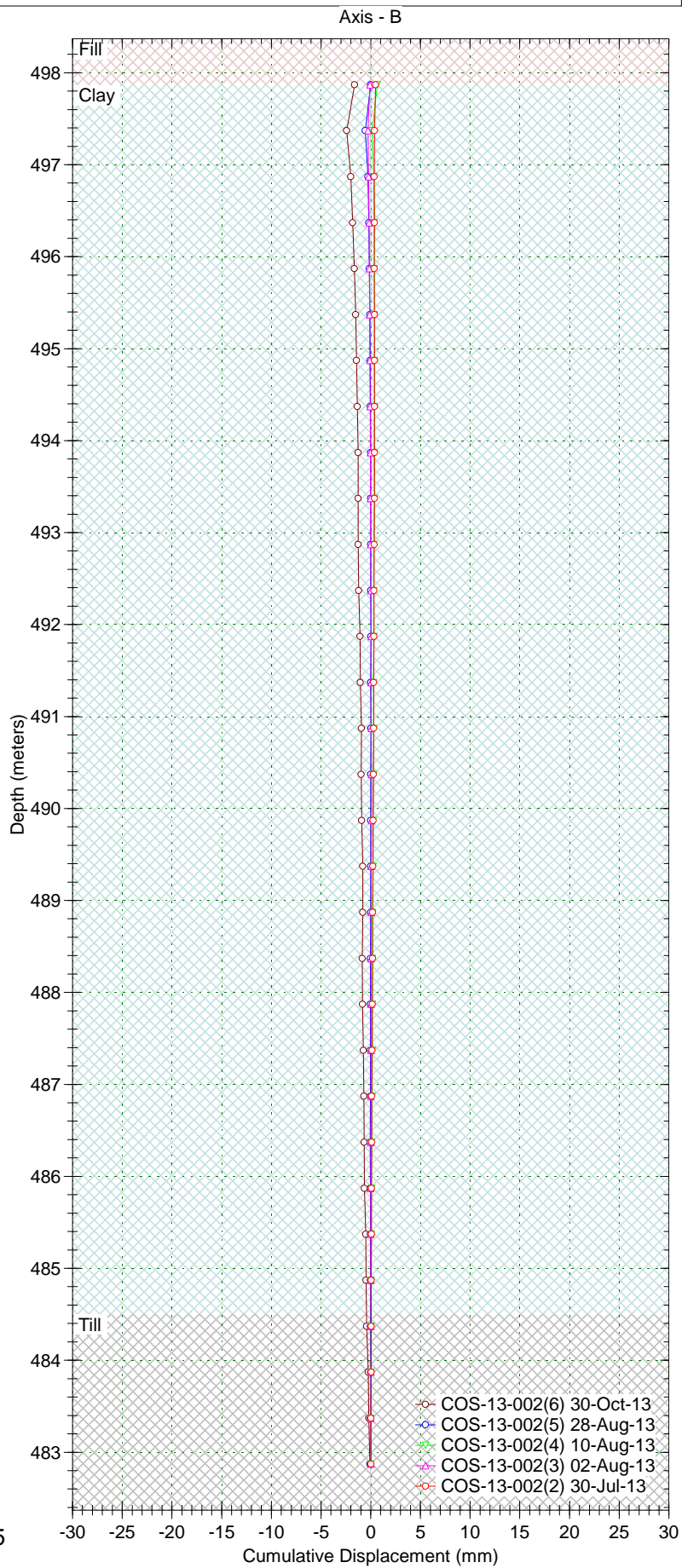
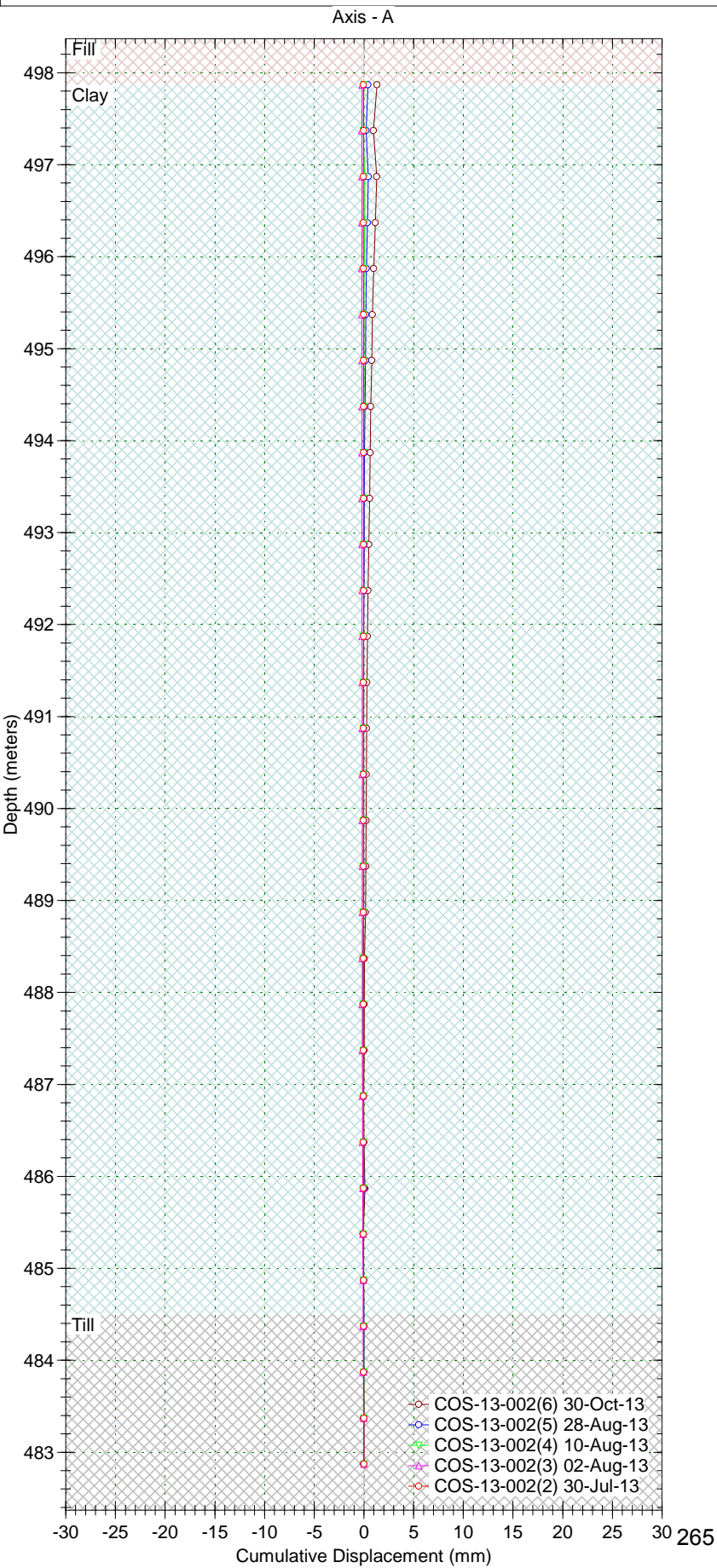
Time Plot : 4.5 - 6.5 meters



264

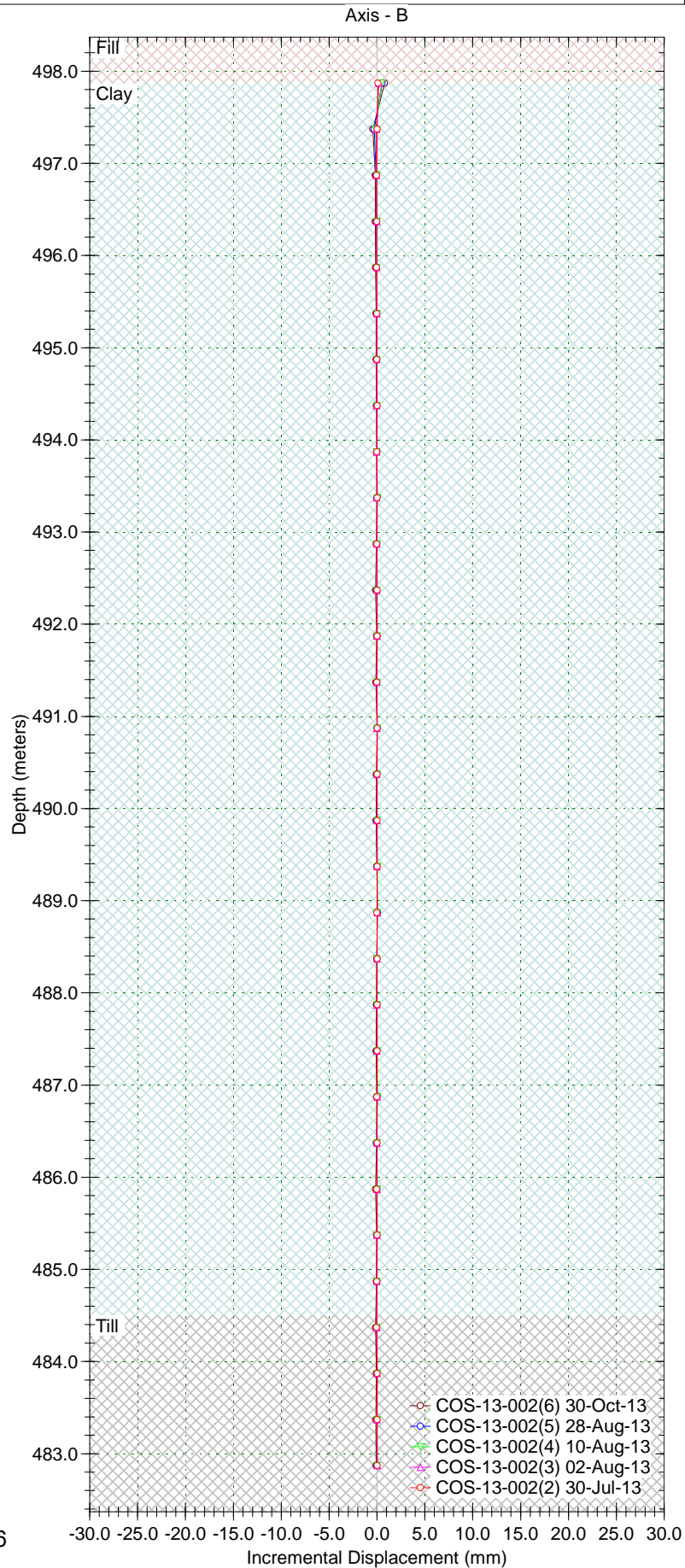
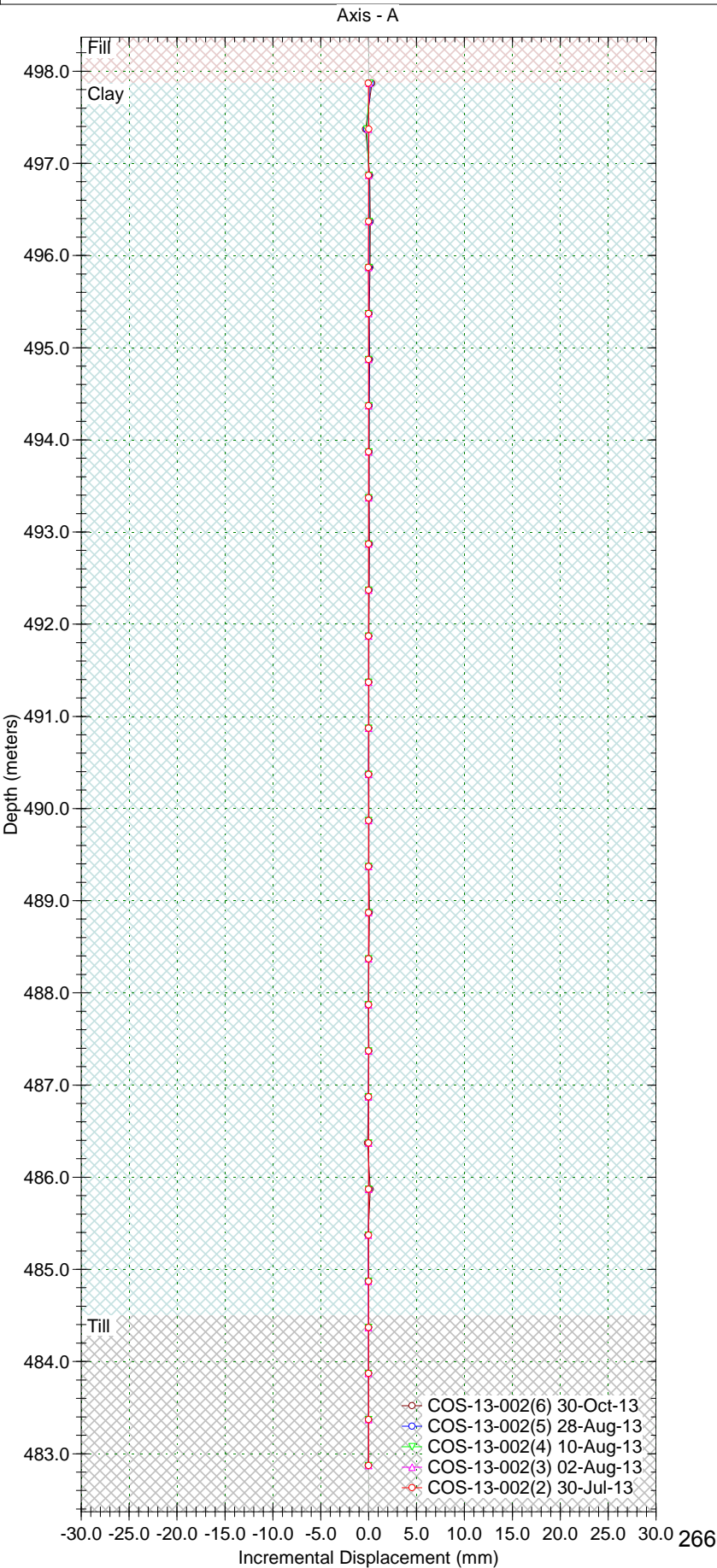
Borehole : COS-13-002
Project : 11-1362-0057 Cherry Lane
Location : 307 11th St. E. (Front)
Northing : 5775567.41
Easting : 386043.54
Collar : -0.113

Spiral Correction : N/A
Collar Elevation : 498.4 meters
Borehole Total Depth : 15.5 meters
A+ Groove Azimuth :
Base Reading : 2013 Jul 30 16:18
Applied Azimuth : 0.0 degrees



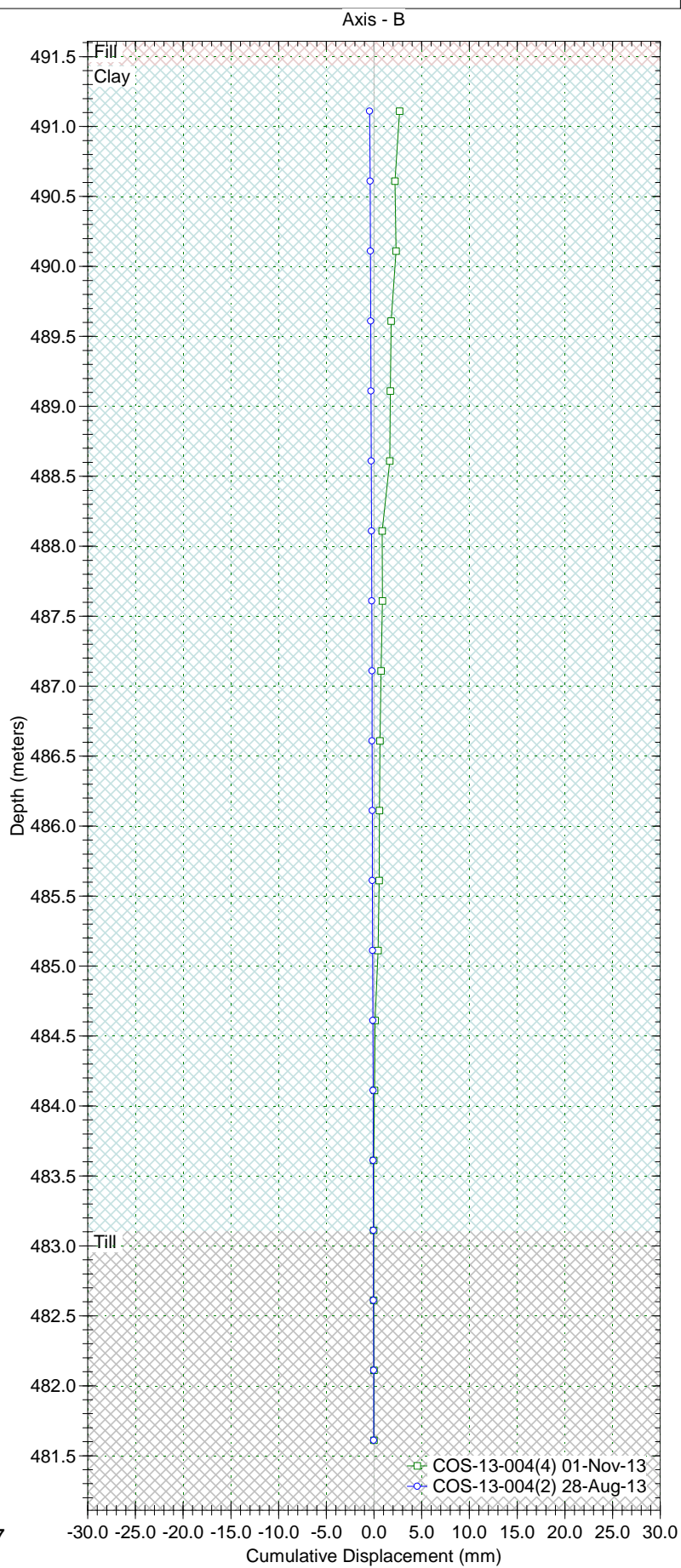
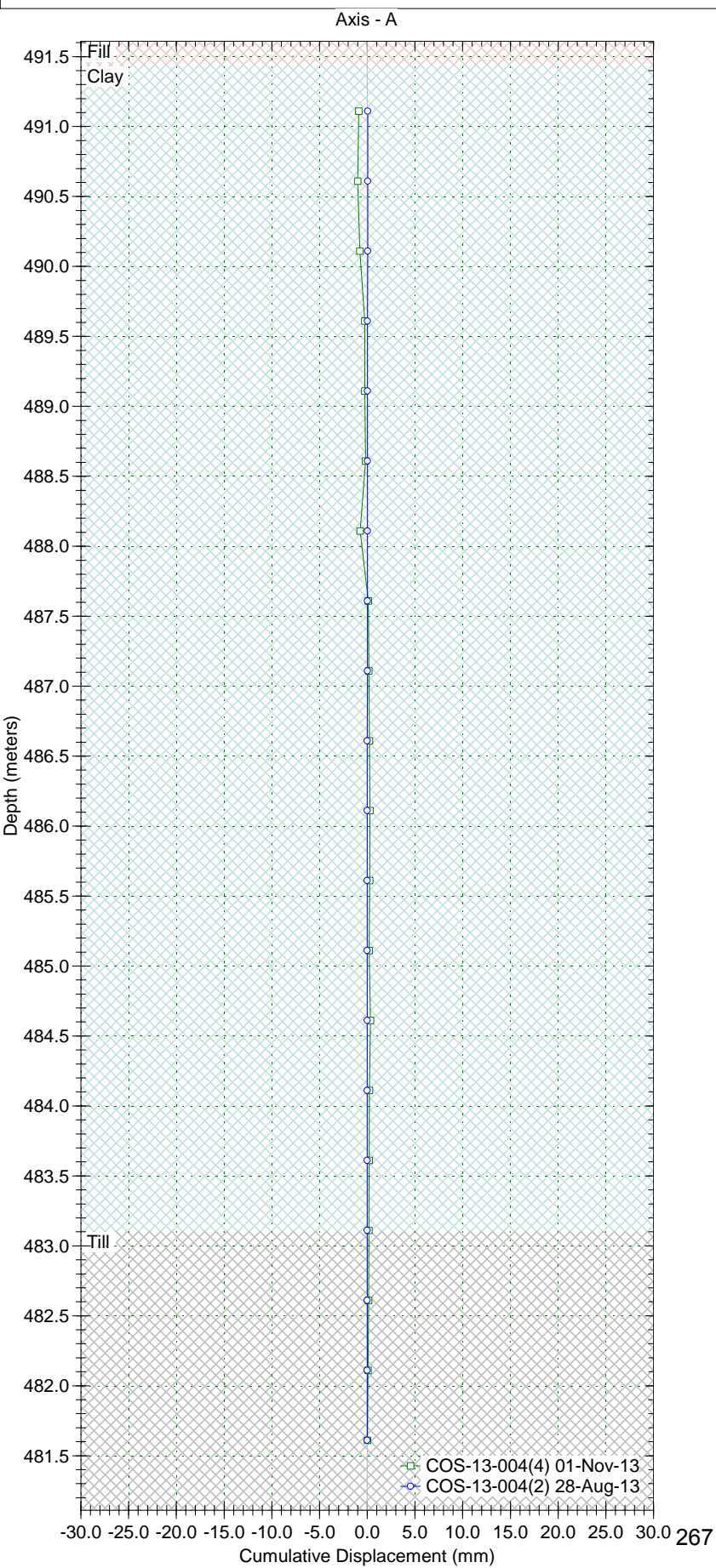
Borehole : COS-13-002
Project : 11-1362-0057 Cherry Lane
Location : 307 11th St. E. (Front)
Northing : 5775567.41
Easting : 386043.54
Collar : -0.113

Spiral Correction : N/A
Collar Elevation : 498.4 meters
Borehole Total Depth : 15.5 meters
A+ Groove Azimuth :
Base Reading : 2013 Jul 30 16:18
Applied Azimuth : 0.0 degrees



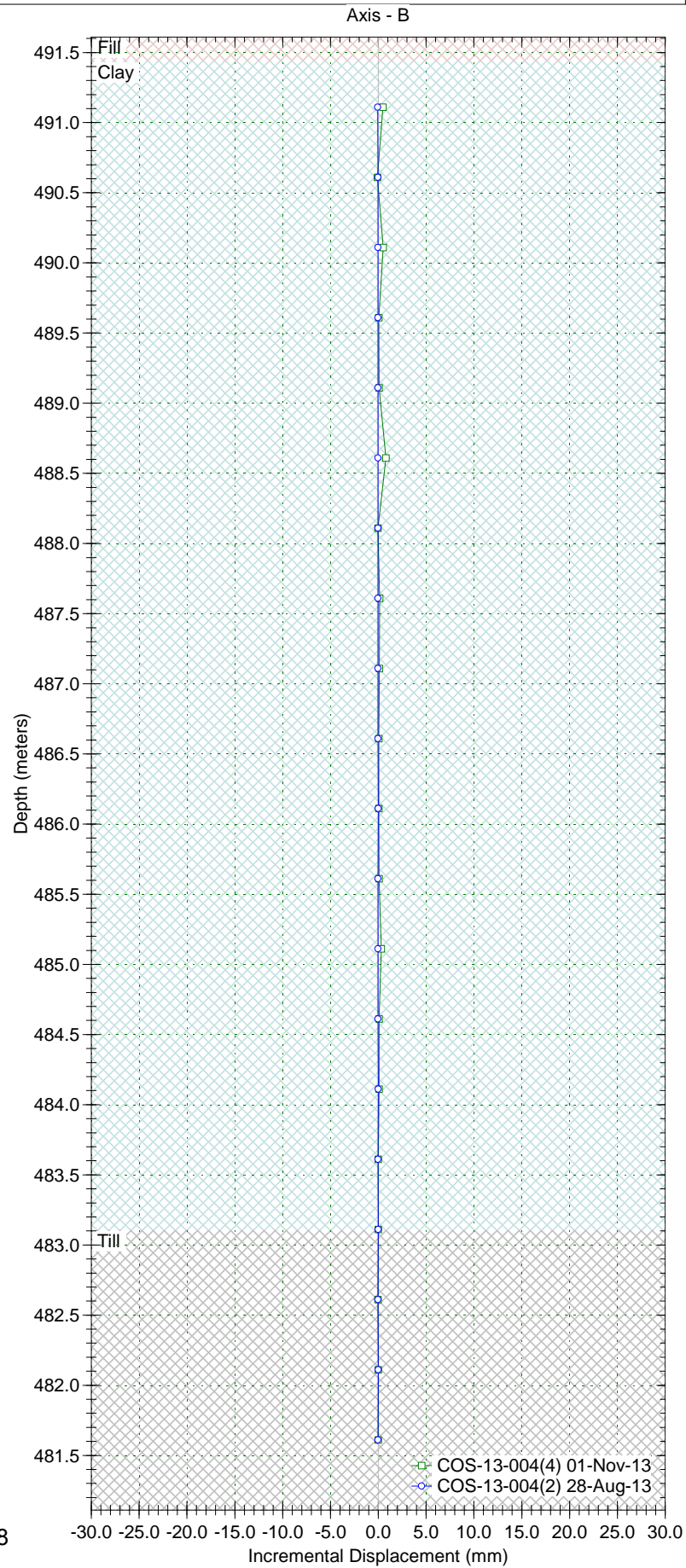
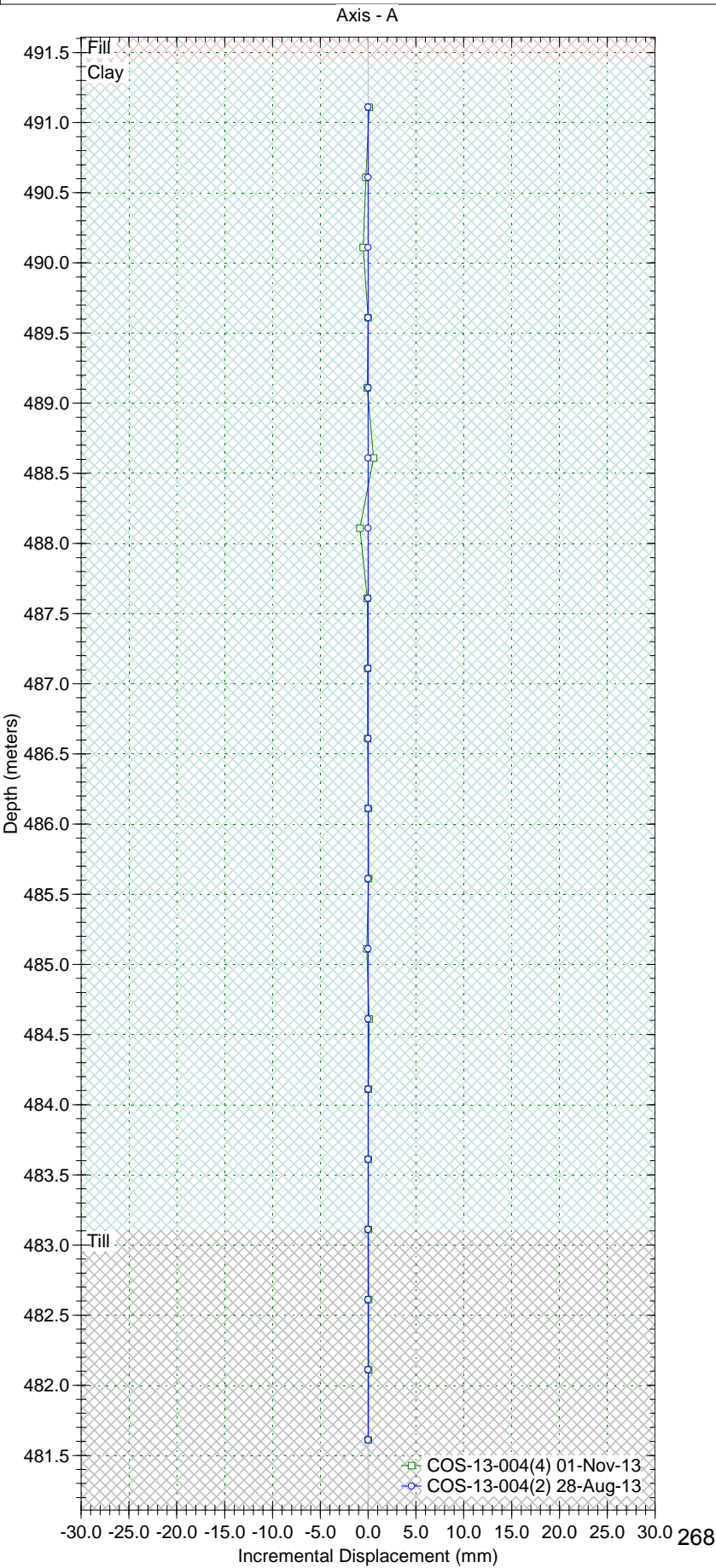
Borehole : COS-13-004
Project : 11-1362-0057 Cherry Lane
Location : 307 11th. St. E. (back)
Northing : 5775604.97
Easting : 386050.63
Collar : -0.677

Spiral Correction : N/A
Collar Elevation : 491.6 meters
Borehole Total Depth : 10.0 meters
A+ Groove Azimuth :
Base Reading : 2013 Aug 28 08:30
Applied Azimuth : 0.0 degrees



Borehole : COS-13-004
Project : 11-1362-0057 Cherry Lane
Location : 307 11th. St. E. (back)
Northing : 5775604.97
Easting : 386050.63
Collar : -0.677

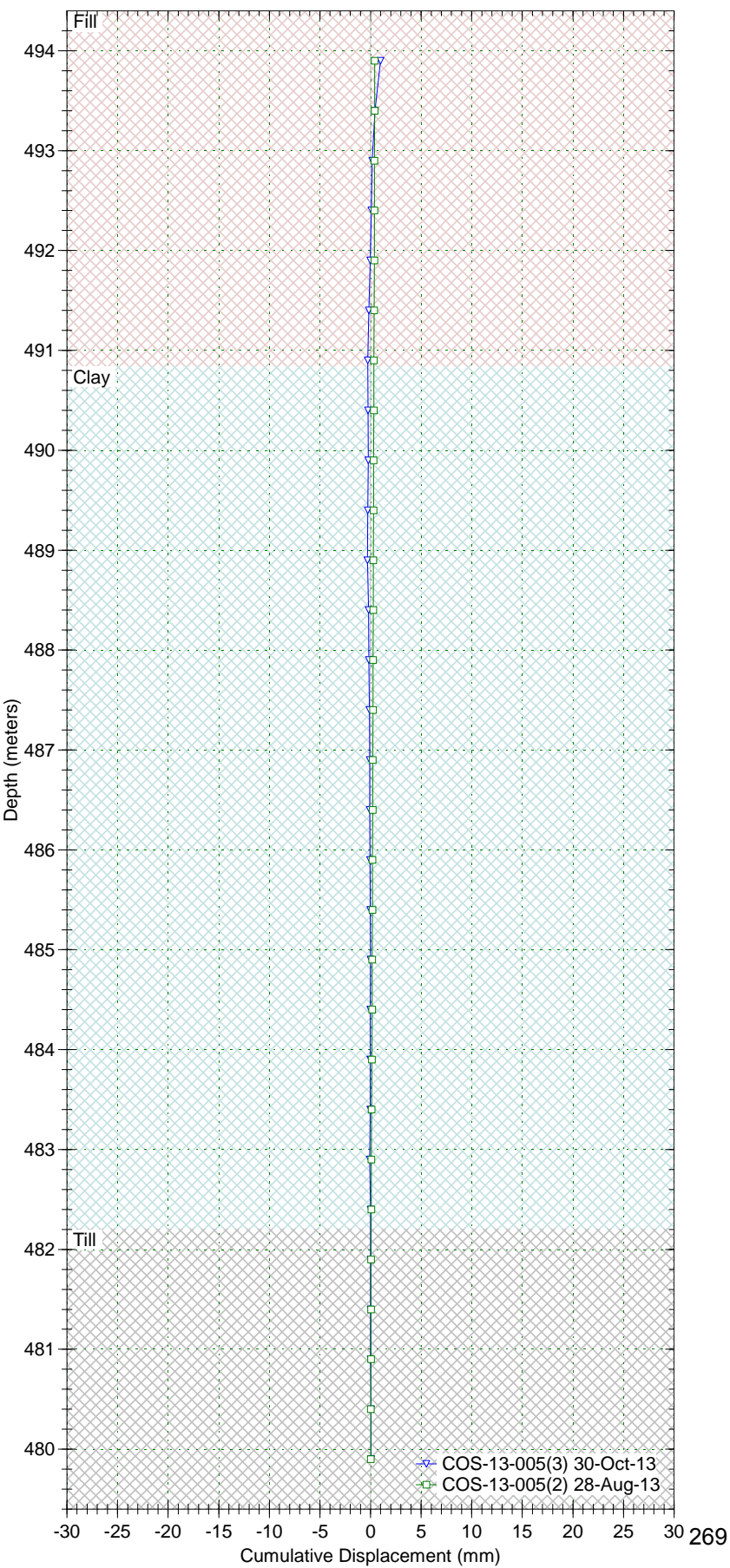
Spiral Correction : N/A
Collar Elevation : 491.6 meters
Borehole Total Depth : 10.0 meters
A+ Groove Azimuth :
Base Reading : 2013 Aug 28 08:30
Applied Azimuth : 0.0 degrees



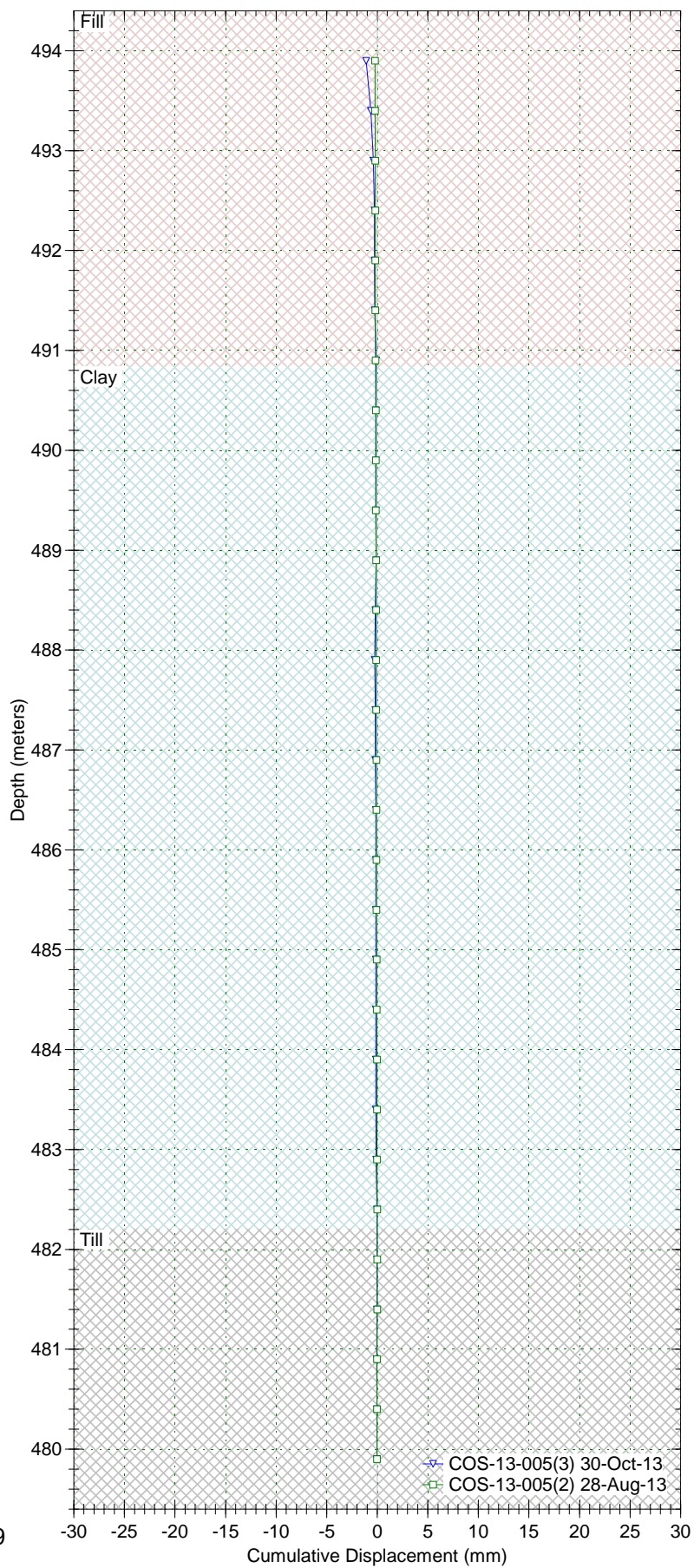
Borehole : COS-13-005
Project : 11-1362-0057 Cherry Lane
Location : 316 Sask. Cres. E.
Northing : 5775631.299
Easting : 386078.8467
Collar : -0.1

Spiral Correction : N/A
Collar Elevation : 494.4 meters
Borehole Total Depth : 14.5 meters
A+ Groove Azimuth :
Base Reading : 2013 Aug 28 09:11
Applied Azimuth : 0.0 degrees

Axis - A



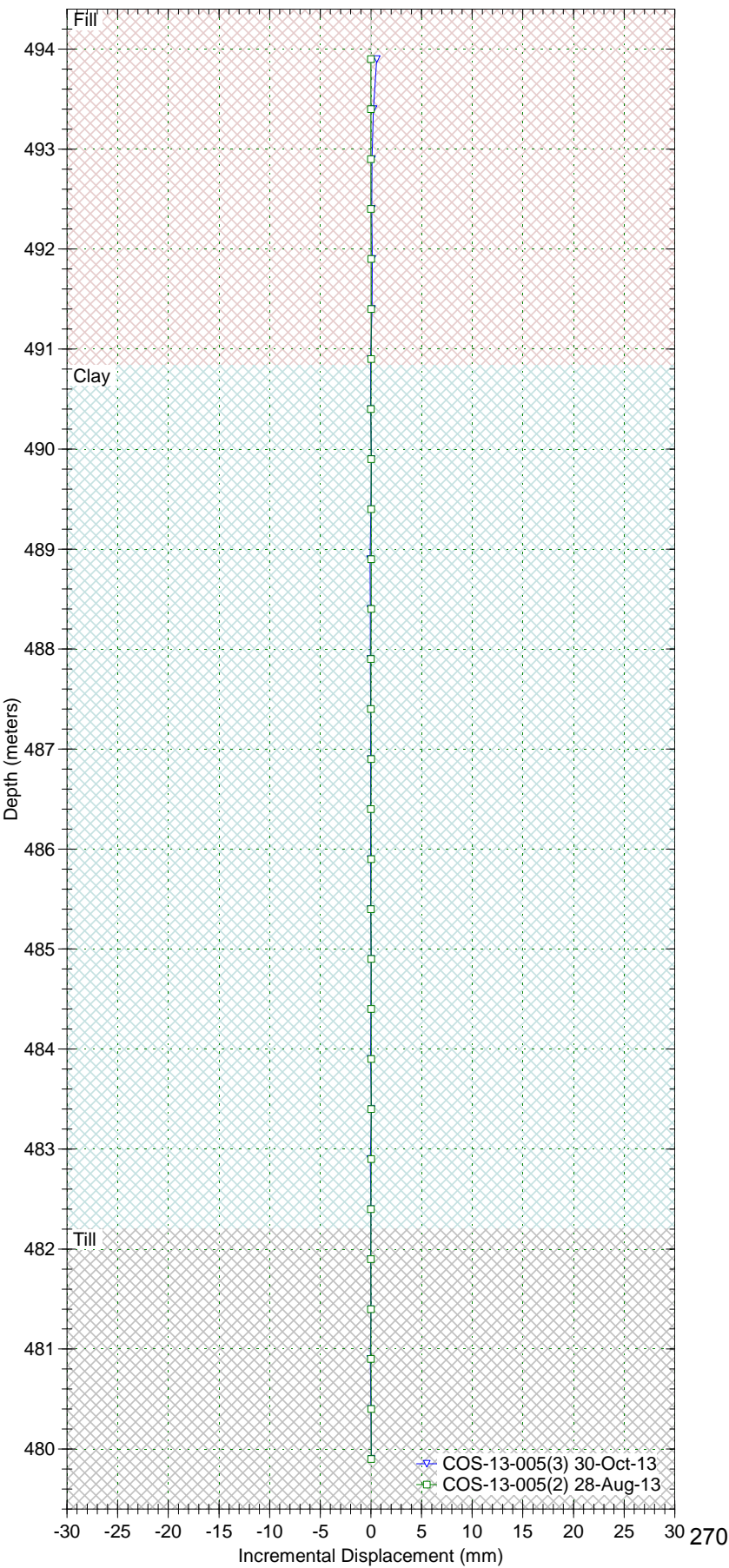
Axis - B



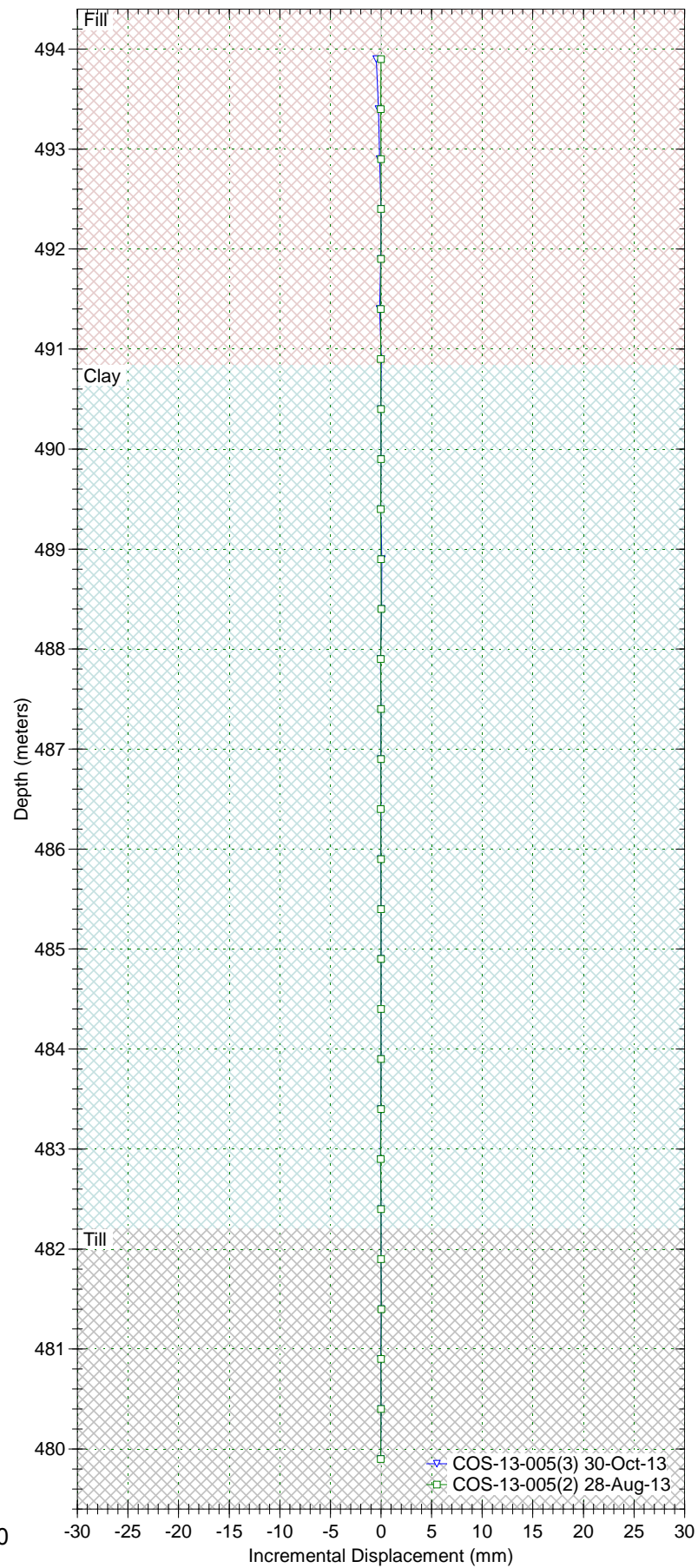
Borehole : COS-13-005
Project : 11-1362-0057 Cherry Lane
Location : 316 Sask. Cres. E.
Northing : 5775631.299
Easting : 386078.8467
Collar : -0.1

Spiral Correction : N/A
Collar Elevation : 494.4 meters
Borehole Total Depth : 14.5 meters
A+ Groove Azimuth :
Base Reading : 2013 Aug 28 09:11
Applied Azimuth : 0.0 degrees

Axis - A



Axis - B

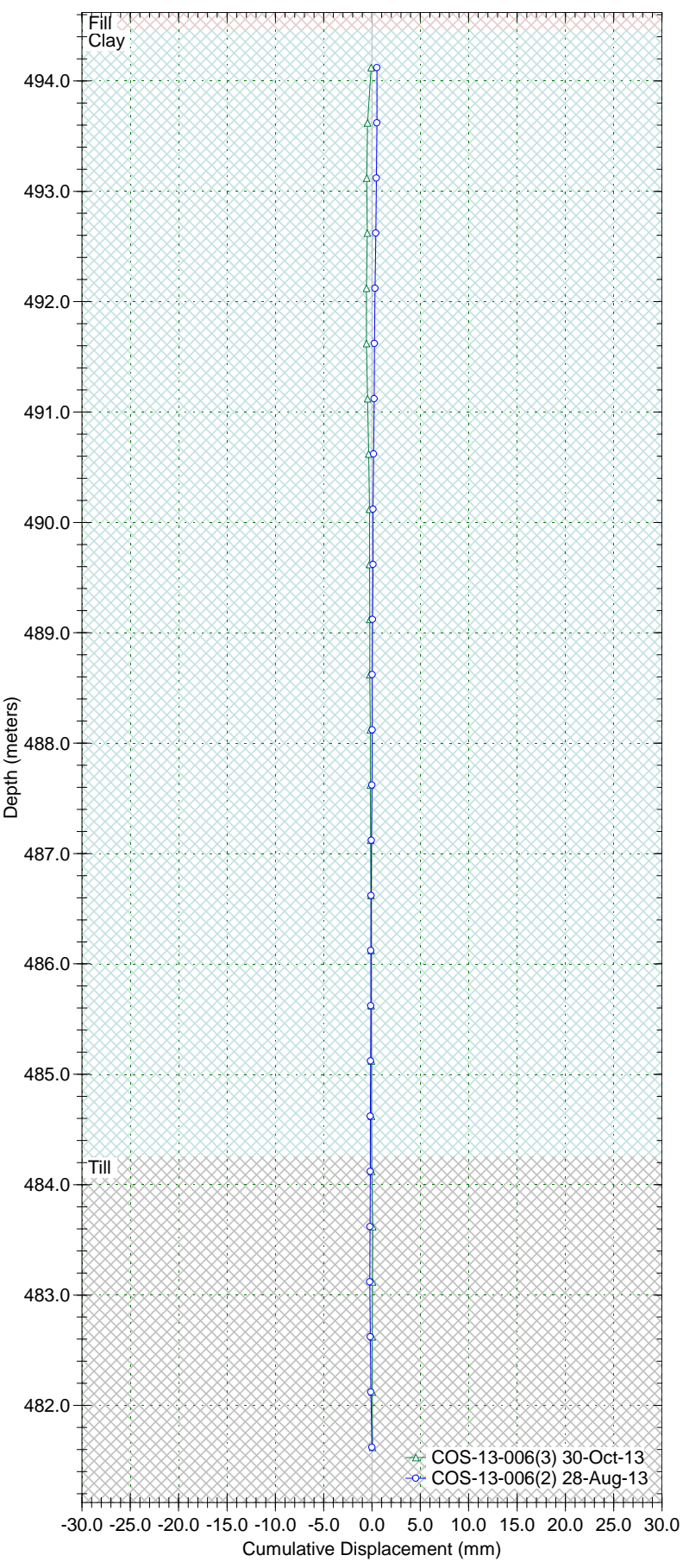
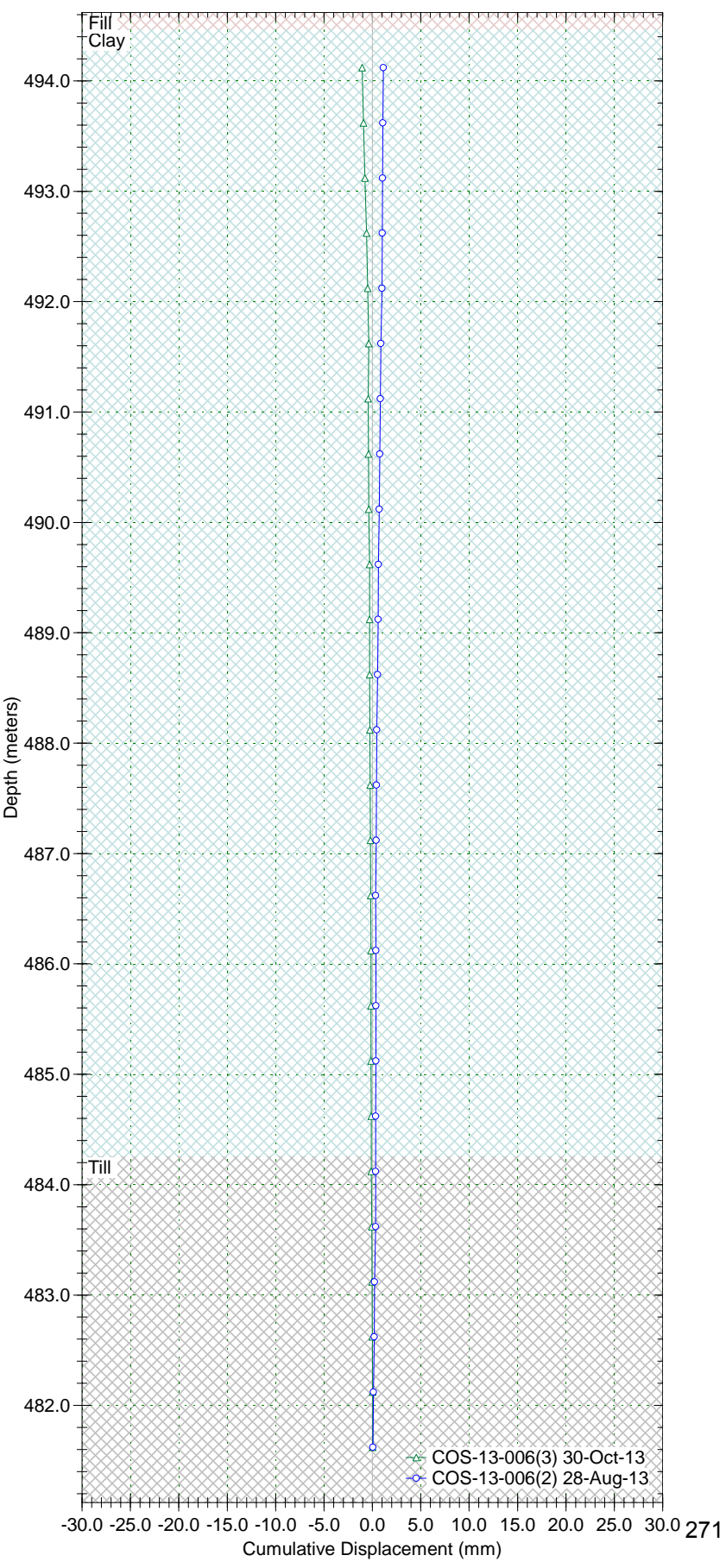


Borehole : COS-13-006
Project : 11-1362-0057 Cherry Lane
Location : 231 11th St. E.
Northing : 5775572.72
Easting : 385959.21
Collar : -0.147

Spiral Correction : N/A
Collar Elevation : 494.6 meters
Borehole Total Depth : 13.0 meters
A+ Groove Azimuth :
Base Reading : 2013 Aug 28 13:13
Applied Azimuth : 0.0 degrees

Axis - A

Axis - B

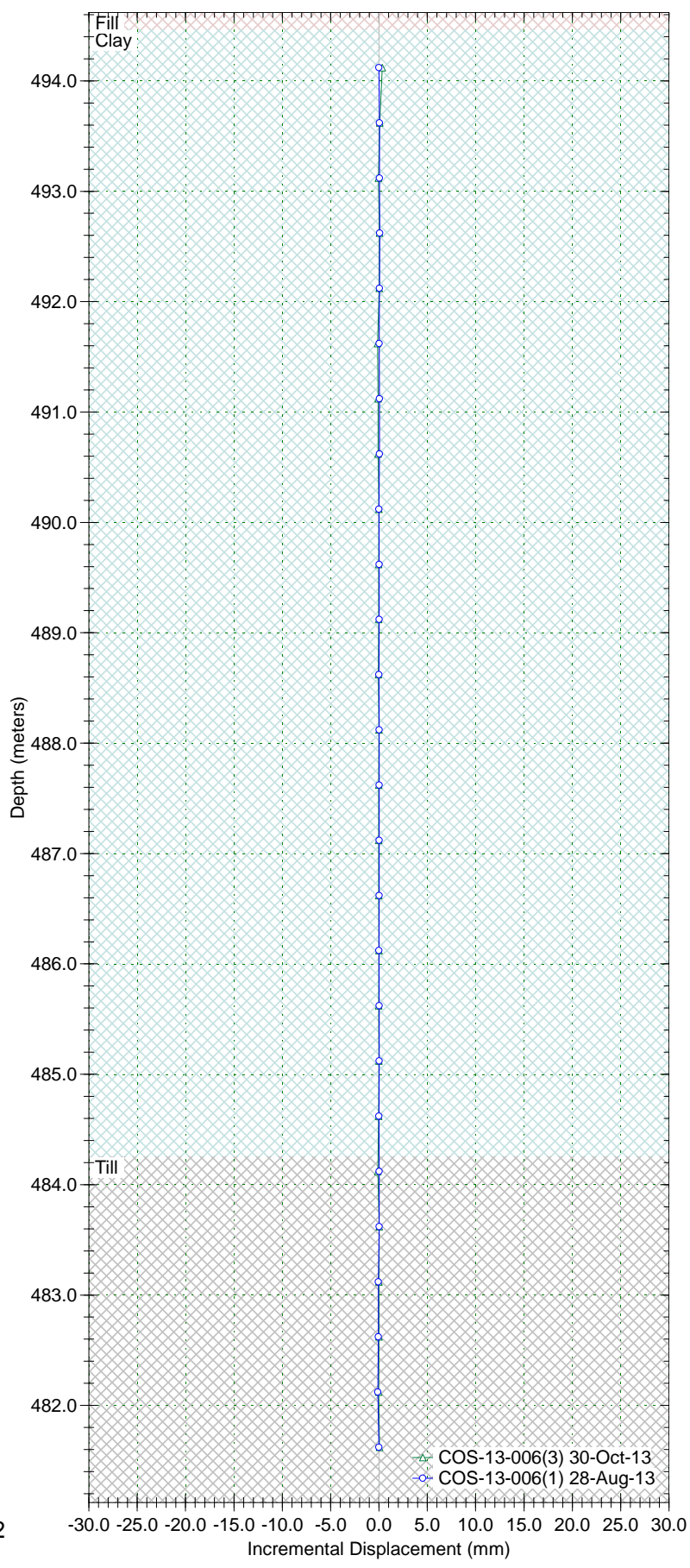
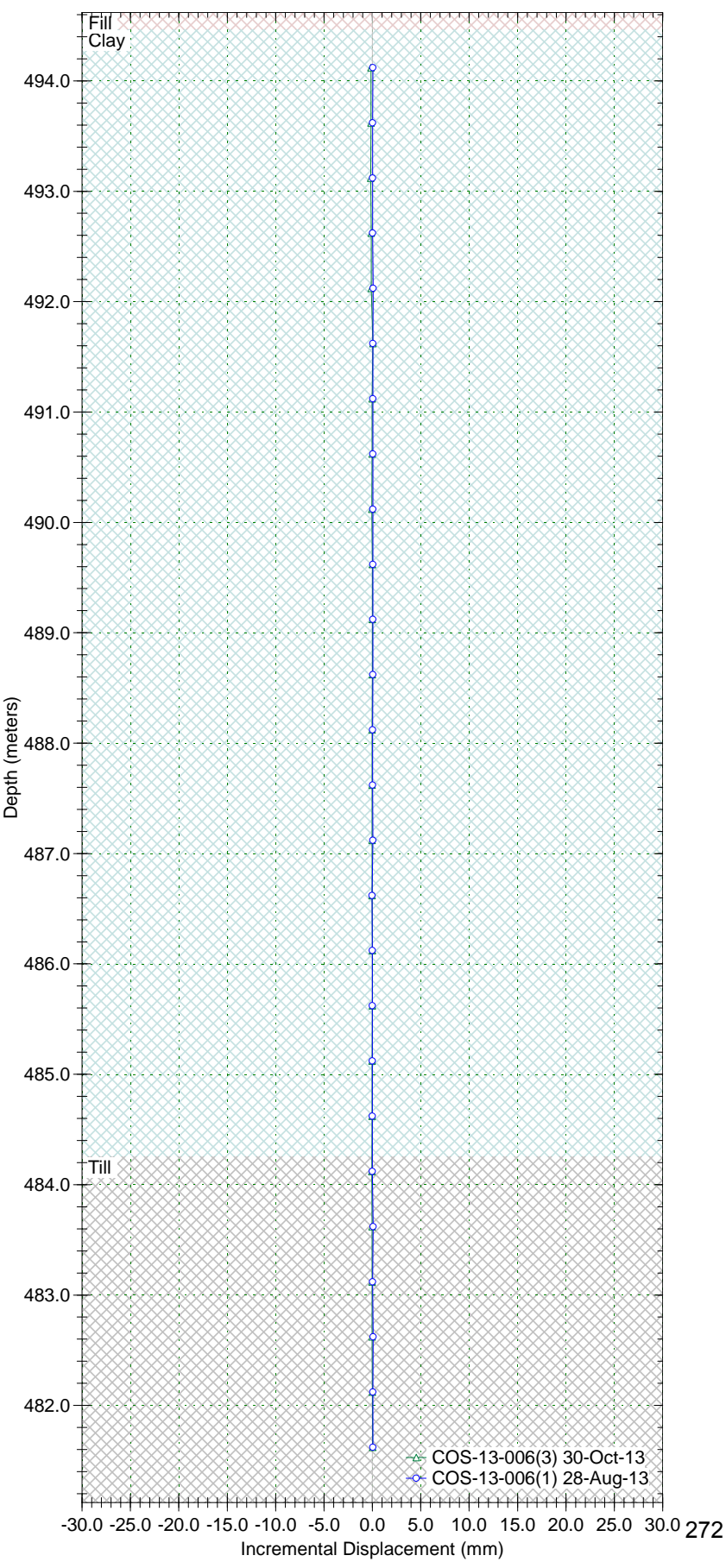


Borehole : COS-13-006
Project : 11-1362-0057 Cherry Lane
Location : 231 11th St. E.
Northing : 5775572.72
Easting : 385959.21
Collar : -0.147

Spiral Correction : N/A
Collar Elevation : 494.6 meters
Borehole Total Depth : 13.0 meters
A+ Groove Azimuth :
Base Reading : 2013 Aug 28 13:13
Applied Azimuth : 0.0 degrees

Axis - A

Axis - B





F.2. TELL-TALE CRACK MONITORS PHOTOS

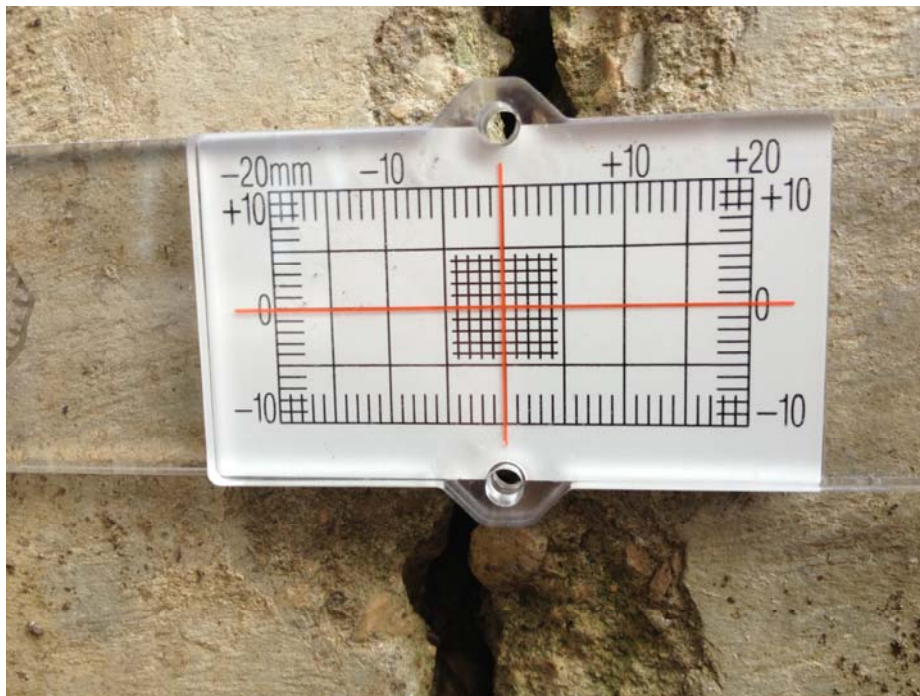


Photo F.1: Crack Meter Located on the Retaining Wall Behind 306 Sask. Cres. E. (CM1) (Aug 12, 2013)



Photo F.2: Crack Meter Located on the Retaining Wall Behind 306 Sask. Cres. E. (CM1) (Sept 18, 2013)



Photo F.3: Crack Meter Located on the East Face of the Retaining Wall Between 230 & 306 Sask. Cres. E. (CM2) (Aug 12, 2013)



Photo F.4: Crack Meter Located on the East Face of the Retaining Wall Between 230 & 306 Sask. Cres. E. (CM2) (Sept 18, 2013)



Photo F.5: Crack Meter Located on the West Face of the Retaining Wall Between 230 & 306 Sask. Cres. E. (CM3) (Aug 12, 2013)



Photo F.6: Crack Meter Located on the West Face of the Retaining Wall Between 230 & 306 Sask. Cres. E. (CM3) (Sept 18, 2013)



F.3. SETTLEMENT POINT DATA

Cherry Lane - Settlement Point Data

Point ID	Description	Elevation (masl)			Settlement (mm)	
		29-Aug-13	18-Sep-13	28-Nov-13	18-Sep-13	28-Nov-13
PT03	BM2 - Sask. Cres./sidewalk	480.12	480.12	480.12	-2.15	-5.98
PT04	306 Sask. Cres. (NE corner)	479.95	479.95	479.95	-0.50	-3.17
PT05	306 Sask. Cres. (NW corner)	479.52	479.52	479.52	-0.35	-3.27
PT06	230 Sask. Cres. (NE corner)	479.60	479.60	479.60	-0.60	-4.26
PT07	230 Sask. Cres. (E side)	479.71	479.71	479.71	-1.24	-4.33
PT08	306 Sask. Cres. (SW corner)	481.70	481.70	481.69	-1.47	-5.71
PT09	306 Sask. Cres. (SE corner)	482.40	482.39	482.39	-1.01	-3.99
PT10	230 Sask. Cres. (SE corner)	487.62	487.62	487.62	-0.38	-3.99
PT11	230 Sask. Cres. (SW corner)	487.85	487.85	487.85	-0.22	-2.77
PT12	311/313 - 11th St. (NW corner)	494.82	494.82	494.82	0.07	-0.55
PT13	311/313 - 11th St. (drive-way)	495.48	495.48	495.48	-0.36	-1.47
PT14	BM3 - Apt. 328 Sask. Cres. (SW corner)	496.41	496.41	496.41	0.00	0.00
PT15	Apt. 328 Sask. Cres. (NW corner)	494.56	494.56	494.56	0.03	0.20
PT16	311/313 - 11th St. (SE corner)	499.14	499.14	499.14	-1.62	-0.56
PT17	311/313 - 11th St. (SW corner)	499.19	499.19	499.19	-1.85	-1.19
PT18	309 - 11th St. (NW corner)	496.60	496.60	496.60	-0.63	-0.19
PT19	307 - 11th St. (back deck)	496.72	496.72	496.72	-0.46	0.53
PT20	305 - 11th St. (NE corner)	497.06	497.06	497.06	-0.50	-0.54
PT21	305 - 11th St. (SE corner)	498.84	498.84	498.84	-0.31	4.00
PT22	303 - 11th St. (SW corner)	498.28	498.28	498.28	1.38	0.02
PT23	233/235 - 11th St. (drive-way)	497.13	497.13	497.12	-0.61	-3.80
PT24	233/235 - 11th St. (NW corner)	492.74	492.74	492.74	0.01	-1.86
PT25	233/235 - 11th St. (N side)	492.80	492.80	492.80	1.48	-0.43
PT26	237/239 - 11th St. (NW side)	494.85	494.85	494.85	0.74	-1.21
PT27	237/239 - 11th St. (NE side)	494.89	494.89	494.89	1.90	0.71
PT28	241 - 11th St. (NW corner)	495.83	495.84	495.83	1.87	1.44
PT29	237/239 - 11th St. (E side)	497.83	497.84	497.84	1.47	0.76
PT30	241 - 11th St. (NE corner)	495.41	495.41	495.41	2.14	0.53
PT31	303 - 11th St. (NE corner)	494.42	494.42	494.42	1.77	1.08



APPENDIX G

Laboratory Test Results

GENERAL TESTING RESULTS

Project #: 11-1362-0057

Phase : 5000

Short Title: COS East Riverbank / Cherry Lane - Geotech Investigation / Saskatoon, SK

Tested by: S.H.

Date: July 4, 2012

Sample Identification				Laboratory Test Results									
Borehole #	Sample #	Depth (m)	Sample Type	Water Content (%)	Plastic Limit	Liquid Limit	Plasticity Index	% Passing #200	SHT Group Index	ASTM Group Index	Dry Density (Kg/m ³)	Pocket Penetrometer (kPa)	Lab Vane (kPa)
11-0057-BH1	BH1-1	0.61-0.91	AS	36.2									
11-0057-BH1	BH1-2	1.22-1.52	AS	37.0									
11-0057-BH1	BH1-3	2.13-2.44	AS	33.9	20	39	19						
11-0057-BH1	BH1-4	2.44-2.74	AS	36.1									
11-0057-BH1	BH1-5	3.35-3.66	AS	36.3	22	62	40						
11-0057-BH1	BH1-6	3.96-4.27	AS	14.5									
11-0057-BH1	BH1-7	4.88-5.18	AS	15.7									
11-0057-BH1	BH1-8	6.40-6.71	AS	8.3									
11-0057-BH1P	BH1P-1	1.52-2.13	TO	34.6	21	43	22				1371		
11-0057-BH1P	BH1P-2	2.44-3.05	TO	31.1									
11-0057-BH1P	BH1P-3	3.05	TO	35.0	21	50	29				1405		
11-0057-BH2	BH2-1	0.91-1.22	AS	33.0									
11-0057-BH2	BH2-2	1.22-1.52	AS	31.8	24	55	31						
11-0057-BH2	BH2-3	1.83-2.13	AS	31.7									
11-0057-BH2	BH2-4	2.44-2.74	AS	30.4	25	48	23						
11-0057-BH2	BH2-5	3.35-3.66	AS	12.9	12	18	6						
11-0057-BH2	BH2-6	3.66-3.96	AS	9.1									
11-0057-BH2	BH2-7	4.57-4.88	AS	14.9									
11-0057-BH2P	BH2P-1	1.52-2.13	TO	34.9									
11-0057-BH2P	BH2P-2	2.44	TO	34.5	27	72	45				1415		
11-0057-BH2P	BH2P-3	2.74-3.35	TO	10.9									
11-0057-BH3	BH3-1	0.61-0.91	AS	22.2									
11-0057-BH3	BH3-2	1.22-1.52	AS	24.3	17	31	14						
11-0057-BH3	BH3-3	1.83-2.13	AS	28.4	18	28	10						
11-0057-BH3	BH3-4	2.44-3.05	AS	15.9									
11-0057-BH3	BH3-5	3.66-3.96	AS	13.6									

The testing services reported herein have been performed in accordance with the indicated recognized standard, or in accordance with local industry practice. This report is for the sole use of the designated client. This report constitutes a testing service only and does not represent any results interpretation or opinion regarding specification compliance or material suitability. Engineering interpretation can be provided by Golder Associates Ltd. upon request.



GRAIN SIZE ANALYSIS - ASTM D422
(Mechanical & Hydrometer)

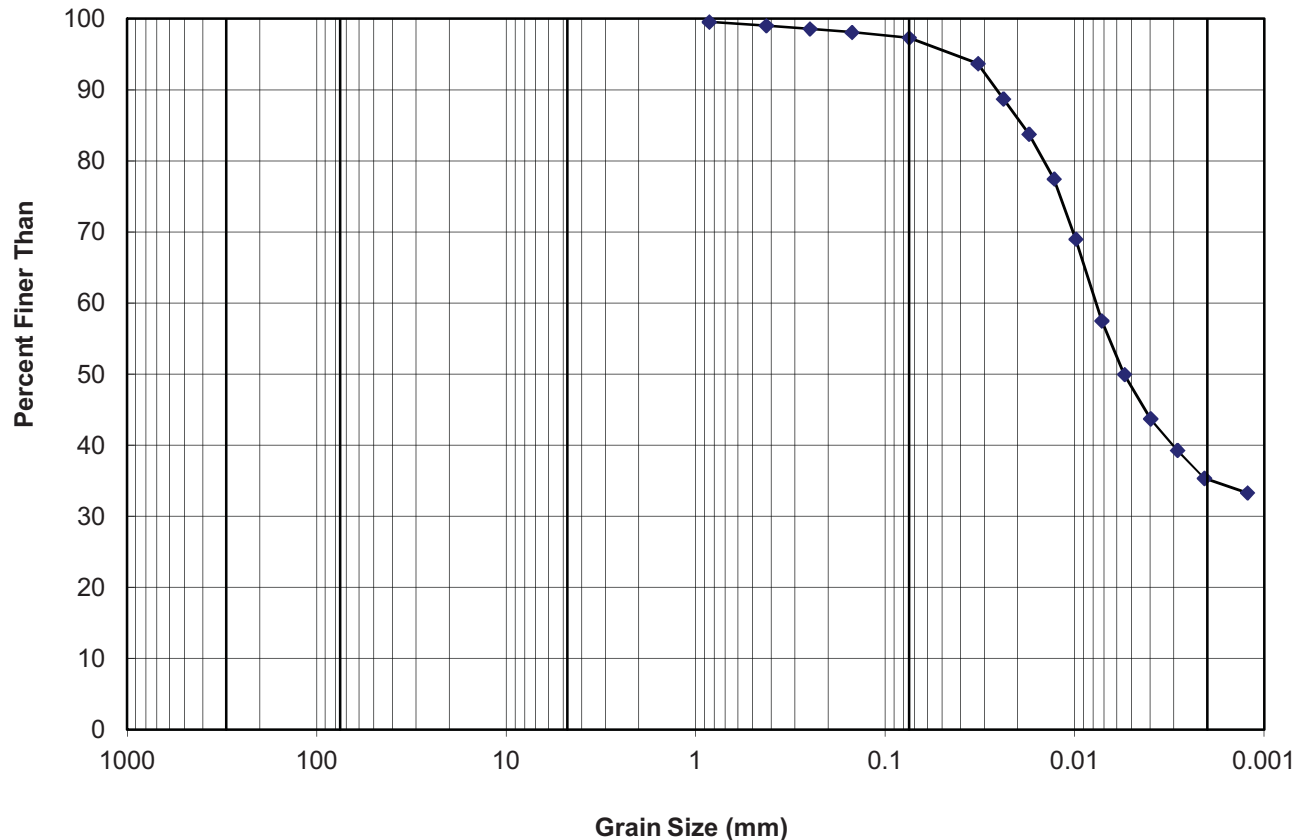
Project #: 11-1362-0057
 Short Title: COS East Riverbank / Cherry Lane - Geotech Investigation / Saskatoon, SK
 Tested by: S.B. / P.E.
 Borehole #: 11-0057-BH1 Sample #: BH1-5
 Source:
 Date Sample Received: June 25, 2012

Phase: 5000
 Date: July 3, 2012

Grain Size Analysis Results:

Opening (mm)	Percent Passing (%)
152	100
76	100
38	100
19	100
9.5	100
4.75	100
2.00	100
0.850	100
0.425	99
0.250	99
0.150	98
0.075	97
0.032	94
0.024	89
0.017	84
0.013	77
0.010	69
0.007	58
0.005	50
0.004	44
0.003	39
0.002	35
0.001	33

Graphical Analysis



BOULDERS	COBBLES	GRAVEL		SAND			SILT / CLAY
		Coarse	Fine	Coarse	Medium	Fine	

Comments:

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GRAIN SIZE ANALYSIS - ASTM D422

(Mechanical & Hydrometer)

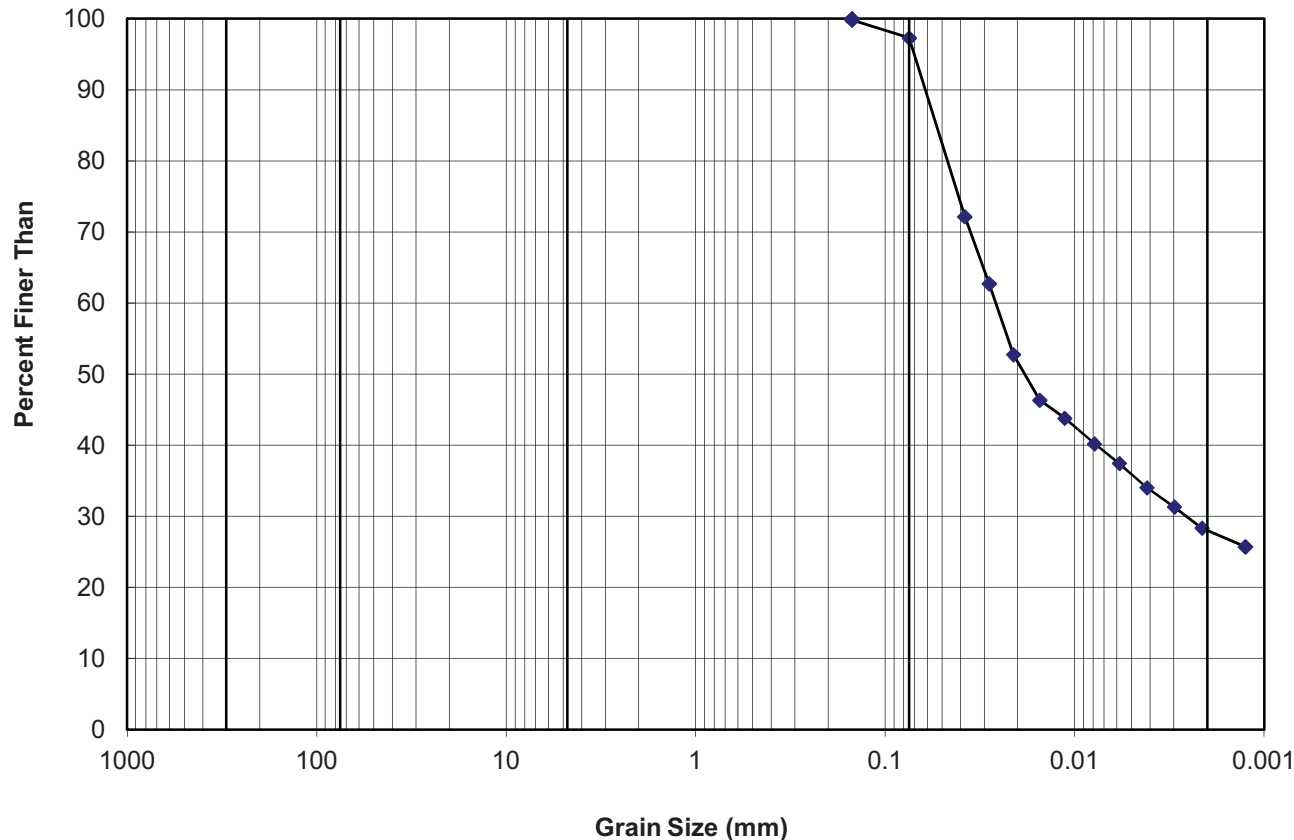
Project #: 11-1362-0057
 Short Title: COS East Riverbank / Cherry Lane - Geotech Investigation / Saskatoon, SK
 Tested by: S.B. / P.E.
 Borehole #: 11-0057-BH1P Sample #: BH1P-1
 Source:
 Date Sample Received: June 25, 2012

Phase: 5000
 Date: July 3, 2012

Grain Size Analysis Results:

Opening (mm)	Percent Passing (%)
152	100
76	100
38	100
19	100
9.5	100
4.75	100
2.00	100
0.850	100
0.425	100
0.250	100
0.150	100
0.075	97
0.038	72
0.028	63
0.021	53
0.015	46
0.011	44
0.008	40
0.006	37
0.004	34
0.003	31
0.002	28
0.001	26

Graphical Analysis



BOULDERS	COBBLES	GRAVEL		SAND			SILT / CLAY
		Coarse	Fine	Coarse	Medium	Fine	

Comments:

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GRAIN SIZE ANALYSIS - ASTM D422
(Mechanical & Hydrometer)

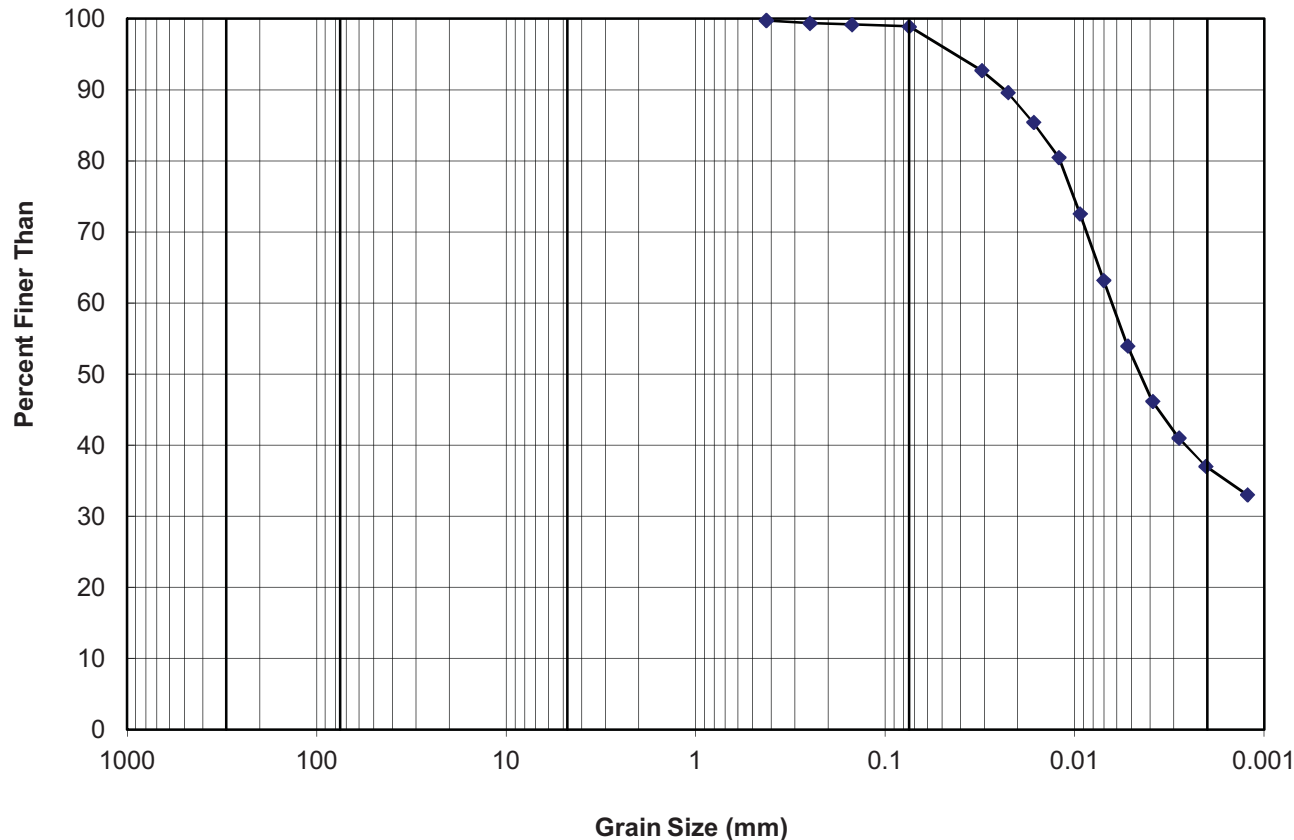
Project #: 11-1362-0057
 Short Title: COS East Riverbank / Cherry Lane - Geotech Investigation / Saskatoon, SK
 Tested by: S.B. / P.E.
 Borehole #: 11-0057-BH1P Sample #: BH1P-3
 Source:
 Date Sample Received: June 25, 2012

Phase: 5000
 Date: July 3, 2012

Grain Size Analysis Results:

Opening (mm)	Percent Passing (%)
152	100
76	100
38	100
19	100
9.5	100
4.75	100
2.00	100
0.850	100
0.425	100
0.250	99
0.150	99
0.075	99
0.031	93
0.023	90
0.016	85
0.012	80
0.009	73
0.007	63
0.005	54
0.004	46
0.003	41
0.002	37
0.001	33

Graphical Analysis



BOULDERS	COBBLES	GRAVEL		SAND			SILT / CLAY
		Coarse	Fine	Coarse	Medium	Fine	

Comments:

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GRAIN SIZE ANALYSIS - ASTM D422
(Mechanical & Hydrometer)

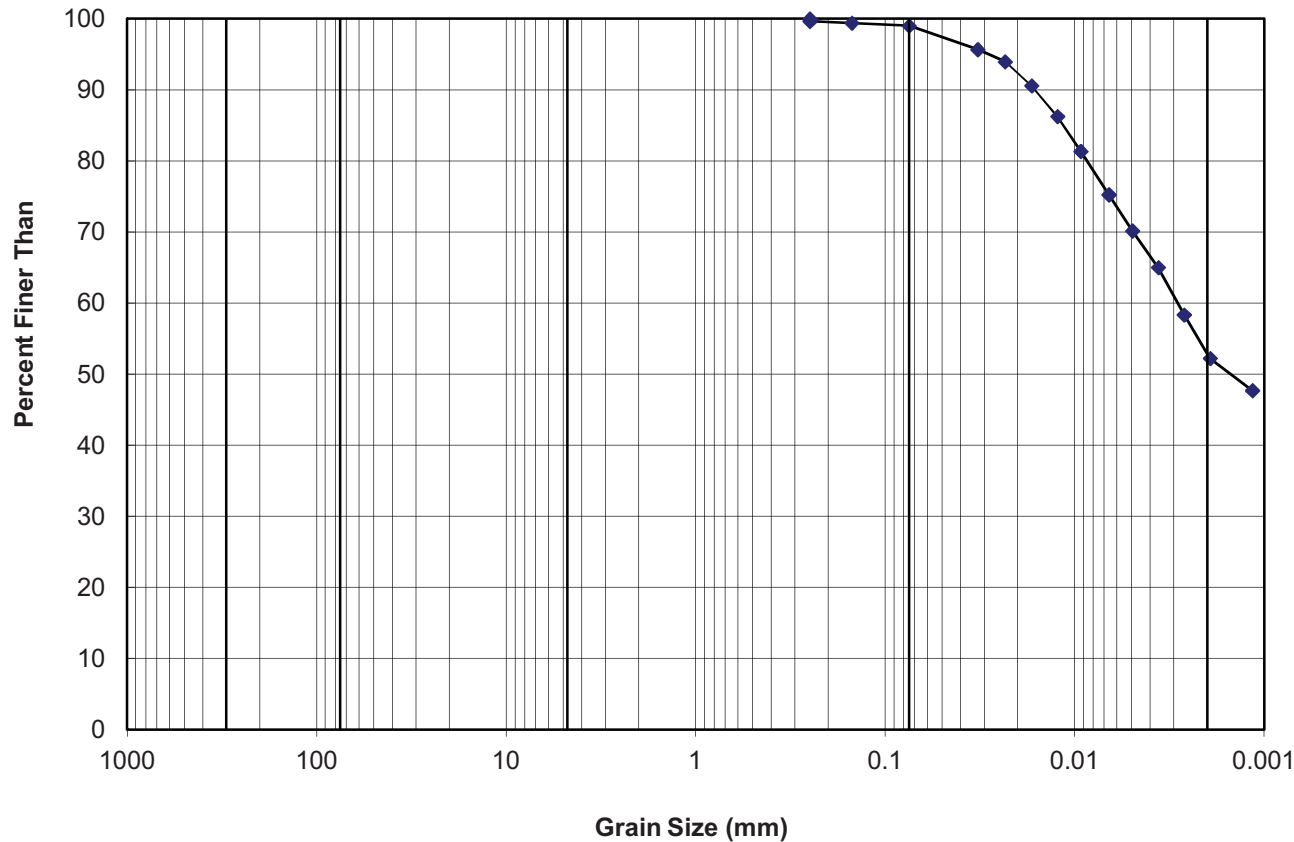
Project #: 11-1362-0057
 Short Title: COS East Riverbank / Cherry Lane - Geotech Investigation / Saskatoon, SK
 Tested by: S.B. / P.E.
 Borehole #: 11-0057-BH2P Sample #: BH2P-2
 Source:
 Date Sample Received: June 25, 2012

Phase: 5000
 Date: July 3, 2012

Grain Size Analysis Results:

Opening (mm)	Percent Passing (%)
152	100
76	100
38	100
19	100
9.5	100
4.75	100
2.00	100
0.850	100
0.425	100
0.250	100
0.150	99
0.075	99
0.033	96
0.023	94
0.017	91
0.012	86
0.009	81
0.007	75
0.005	70
0.004	65
0.003	58
0.002	52
0.001	48

Graphical Analysis



BOULDERS	COBBLES	GRAVEL		SAND			SILT / CLAY
		Coarse	Fine	Coarse	Medium	Fine	

Comments:

The testing services reported herein have been performed in accordance with the indicated recognized standard, or in accordance with local industry practice. This report is for the sole use of the designated client. This report constitutes a testing service only and does not represent any results interpretation or opinion regarding specification compliance or material suitability. Engineering interpretation can be provided by Golder Associates Ltd. upon request.



GRAIN SIZE ANALYSIS - ASTM D422
(Mechanical & Hydrometer)

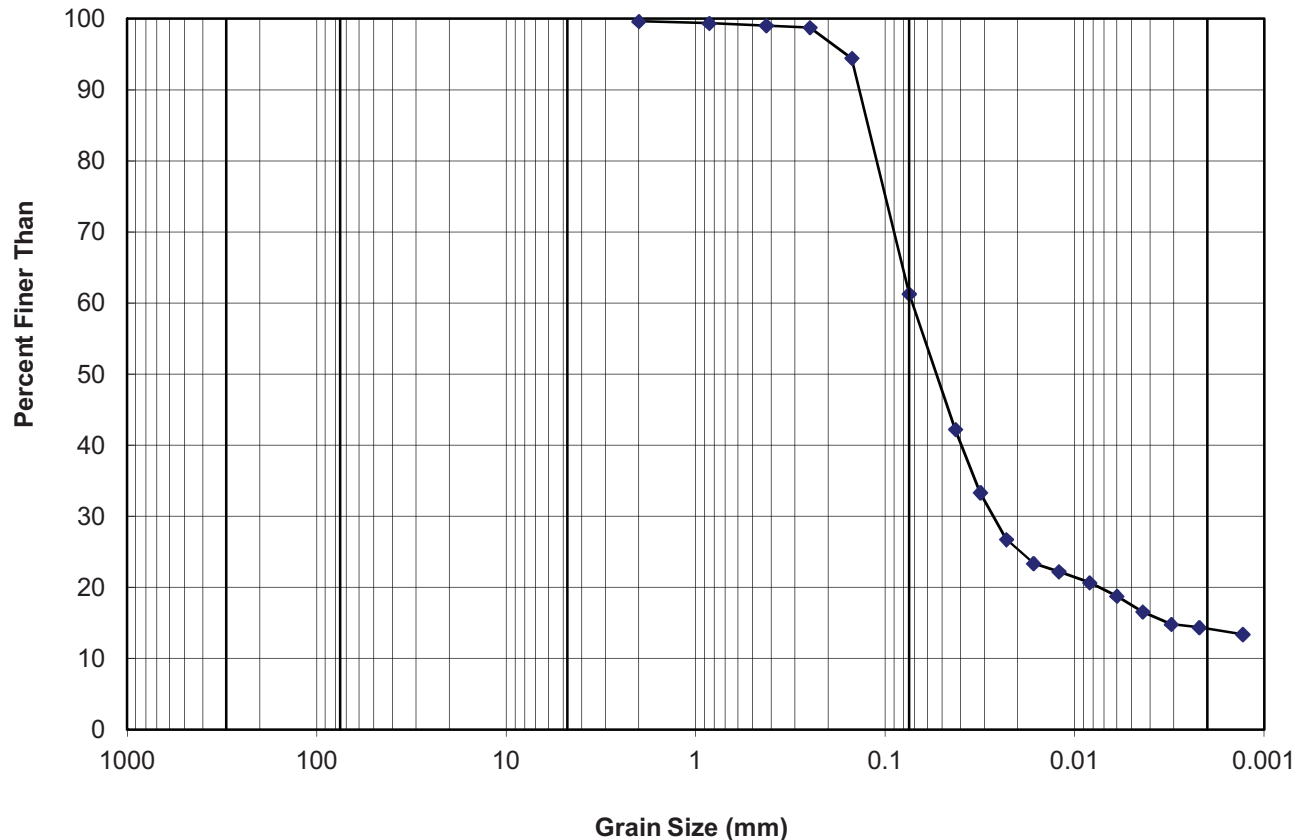
Project #: 11-1362-0057
 Short Title: COS East Riverbank / Cherry Lane - Geotech Investigation / Saskatoon, SK
 Tested by: S.B. / P.E.
 Borehole #: 11-0057-BH3 Sample #: BH3-3
 Source:
 Date Sample Received: June 25, 2012

Phase: 5000
 Date: July 3, 2012

Grain Size Analysis Results:

Opening (mm)	Percent Passing (%)
152	100
76	100
38	100
19	100
9.5	100
4.75	100
2.00	100
0.850	99
0.425	99
0.250	99
0.150	94
0.075	61
0.043	42
0.032	33
0.023	27
0.017	23
0.012	22
0.008	21
0.006	19
0.004	17
0.003	15
0.002	14
0.001	13

Graphical Analysis



BOULDERS	COBBLES	GRAVEL		SAND			SILT / CLAY
		Coarse	Fine	Coarse	Medium	Fine	

Comments:

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CONSOLIDATED DRAINED DIRECT SHEAR TEST-SUMMARY

Project #: 11-1362-0057

Phase: 5000

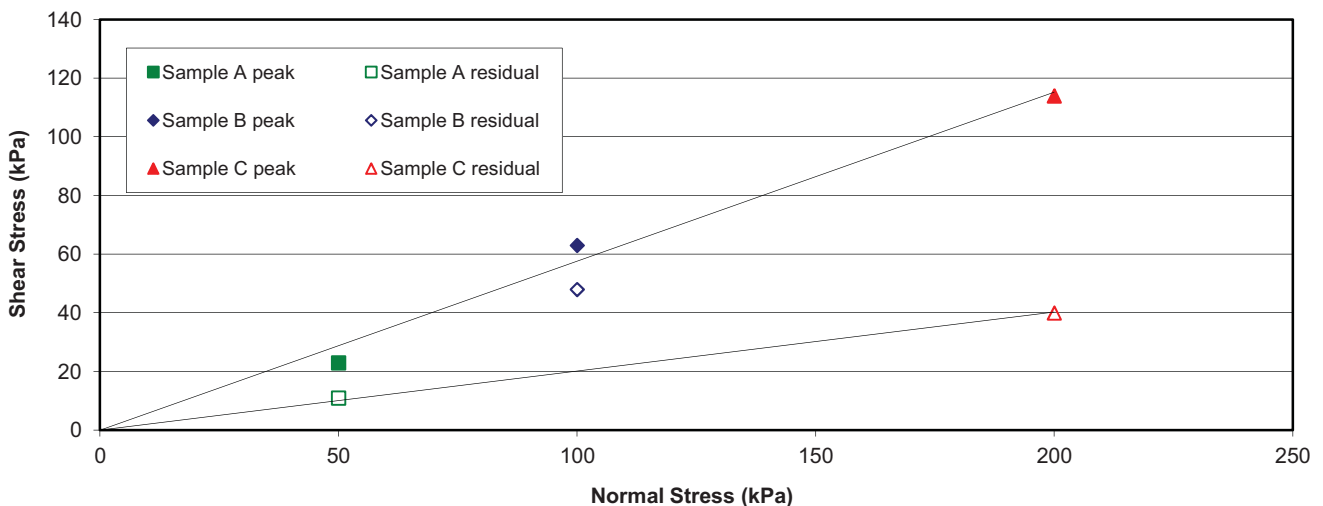
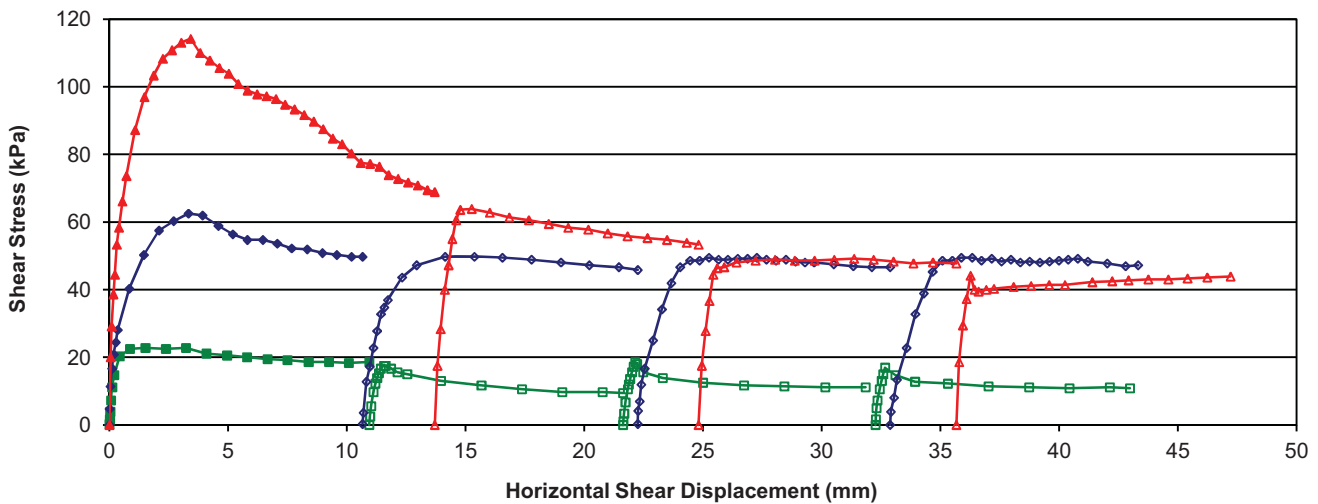
Short Title: COS East Riverbank / Cherry Lane - Geotech Investigation / Saskatoon, SK

Tested By: D.B.

Date: July 24, 2012

Sample	Normal Stress	Shear Stress	
	(kPa)	Peak (kPa)	Residual (kPa)
11-0057-BH1P BH1P-3	50	23	11
	100	63	48
	200	114	40

	Peak	Residual
Friction angle (degrees):	30.0	11.4
cohesion (kPa):	0	0



Comments:

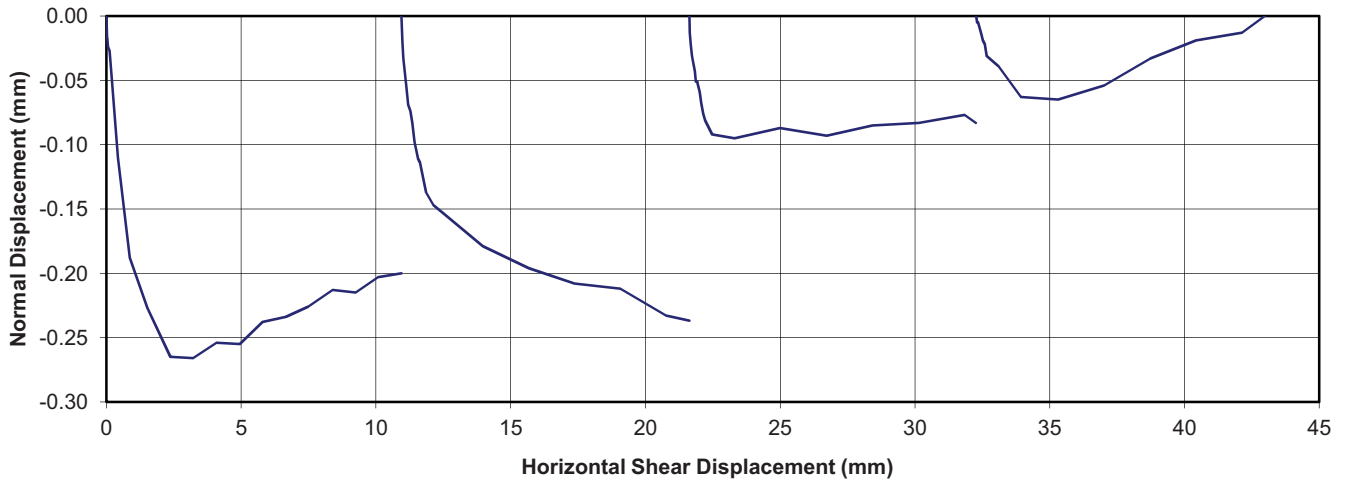
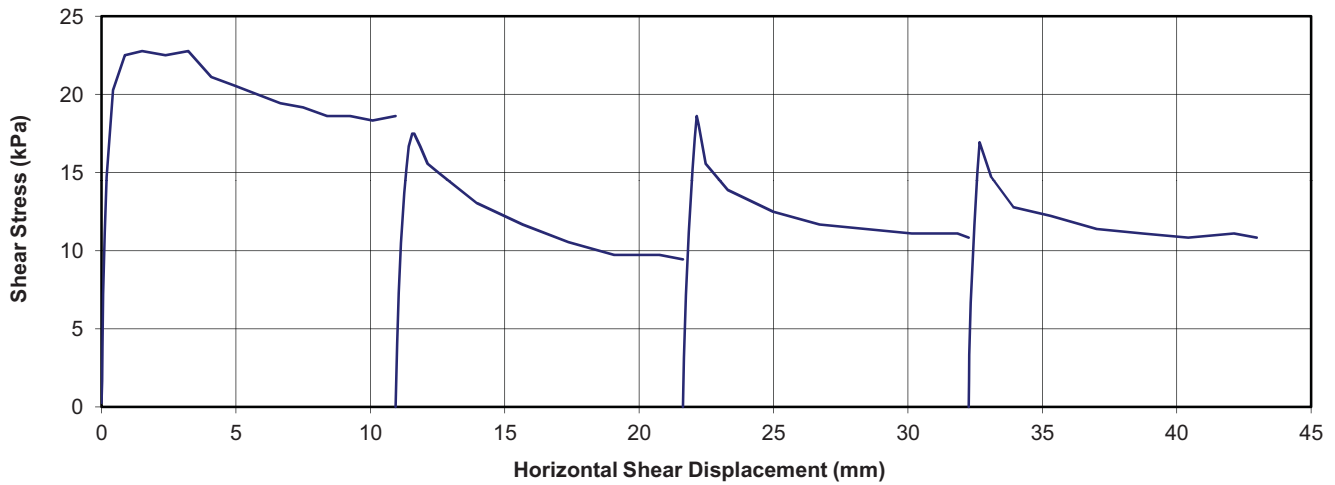
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CONSOLIDATED DRAINED DIRECT SHEAR TEST

Project #: 11-1362-0057 Phase: 5000
 Short Title: COS East Riverbank / Cherry Lane - Geotech Investigation / Saskatoon, SK
 Tested By: D.B. Date: July 24, 2012
 Sample: 11-0057-BH1P BH1P-3

Effective Stress:	50	kPa	Peak Shear Stress:	23	kPa
			Residual Shear Stress	11	kPa
Sample Data:			Comments:		
Sample Length:	60.0	mm			
Initial Height:	20.0	mm			
Initial Water Content:	33.7	%			
Initial Dry Density:	1372	kg/m ³			
Final Water Content:	42.7	%			



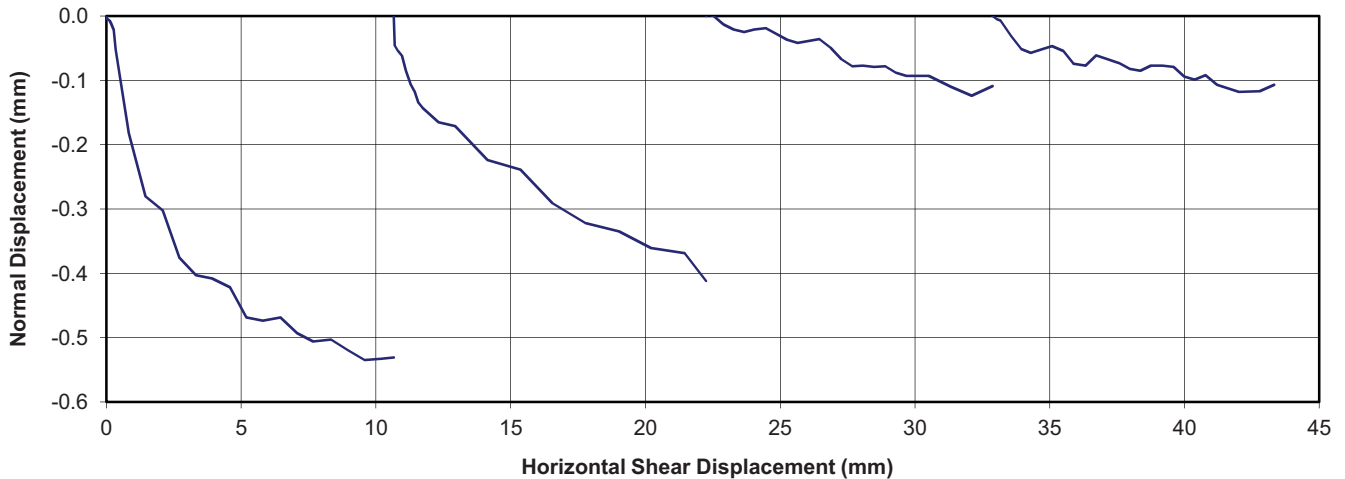
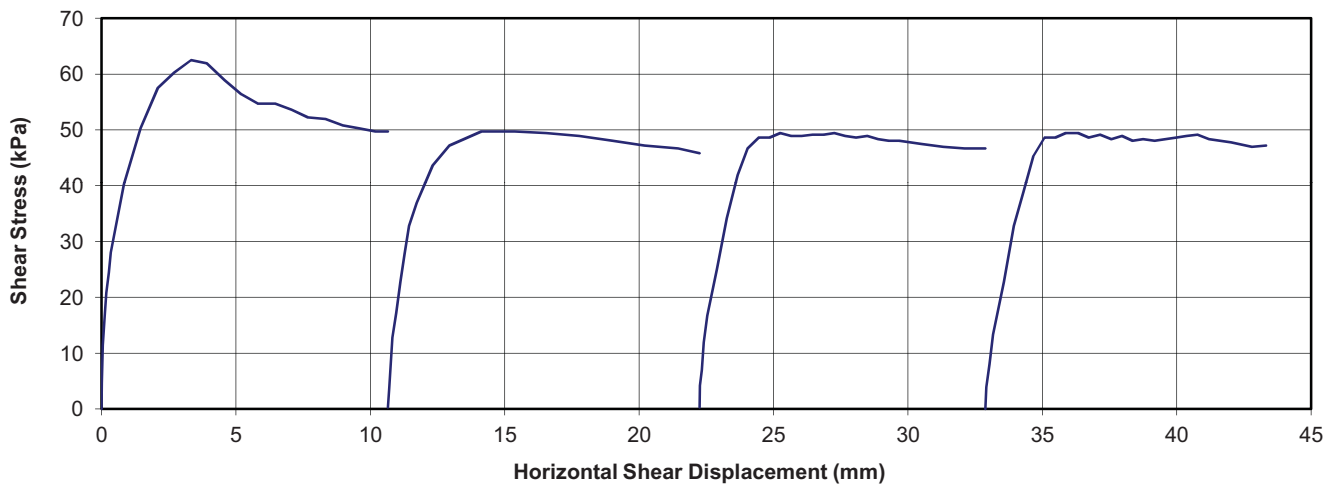
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CONSOLIDATED DRAINED DIRECT SHEAR TEST

Project #: 11-1362-0057 Phase: 5000
 Short Title: COS East Riverbank / Cherry Lane - Geotech Investigation / Saskatoon, SK
 Tested By: D.B. Date: July 24, 2012
 Sample: 11-0057-BH1P BH1P-3

Effective Stress:	100	kPa	Peak Shear Stress:	63	kPa
			Residual Shear Stress	48	kPa
Sample Data:			Comments:		
Sample Length:	60.0	mm			
Initial Height:	20.0	mm			
Initial Water Content:	34.4	%			
Initial Dry Density:	1416	kg/m ³			
Final Water Content:	34.2	%			



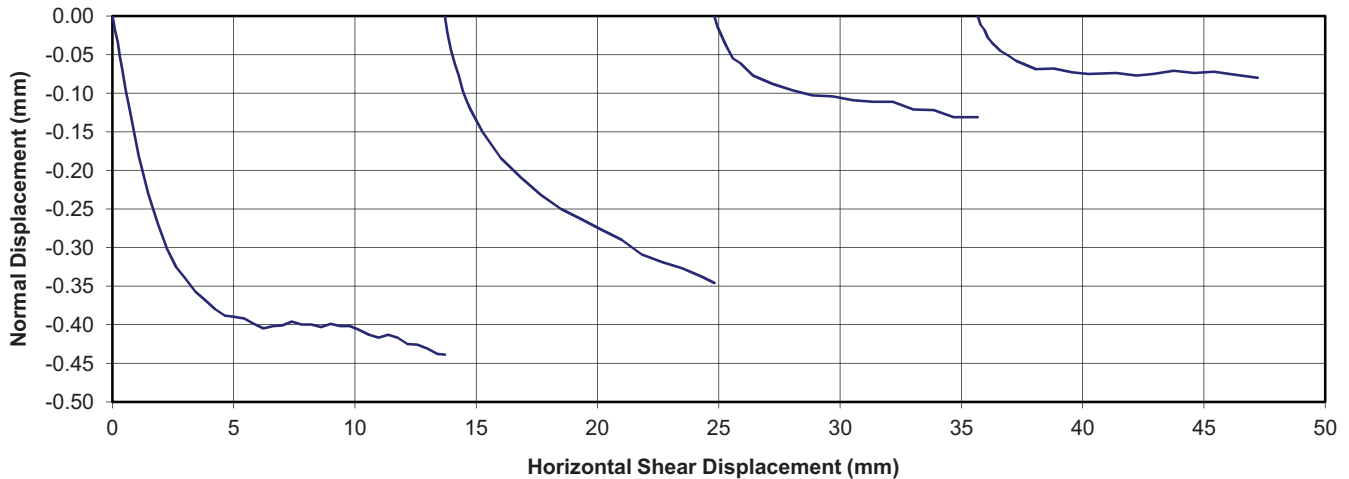
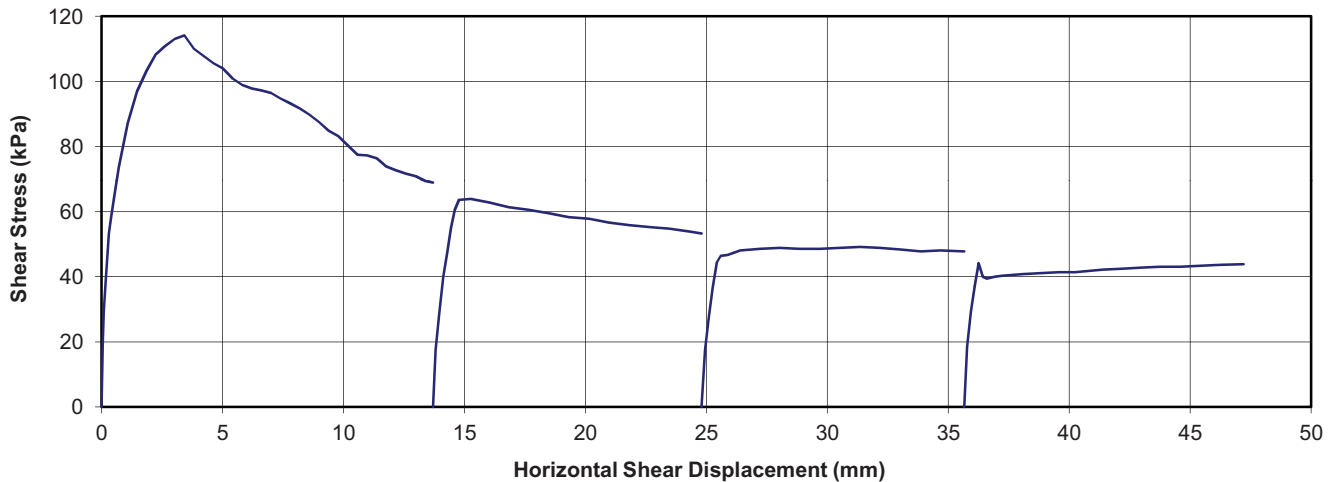
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CONSOLIDATED DRAINED DIRECT SHEAR TEST

Project #: 11-1362-0057	Phase: 5000
Short Title: COS East Riverbank / Cherry Lane - Geotech Investigation / Saskatoon, SK	
Tested By: D.B.	Date: July 24, 2012
Sample: 11-0057-BH1P BH1P-3	

Effective Stress: 200 kPa	Peak Shear Stress: 114 kPa
	Residual Shear Stress: 40 kPa
Sample Data:	Comments:
Sample Length: 60.0 mm	
Initial Height: 20.0 mm	
Initial Water Content: 33.2 %	
Initial Dry Density: 1386 kg/m ³	
Final Water Content: 35.8 %	



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CONSOLIDATED DRAINED DIRECT SHEAR TEST-SUMMARY

Project #: 11-1362-0057

Phase: 5000

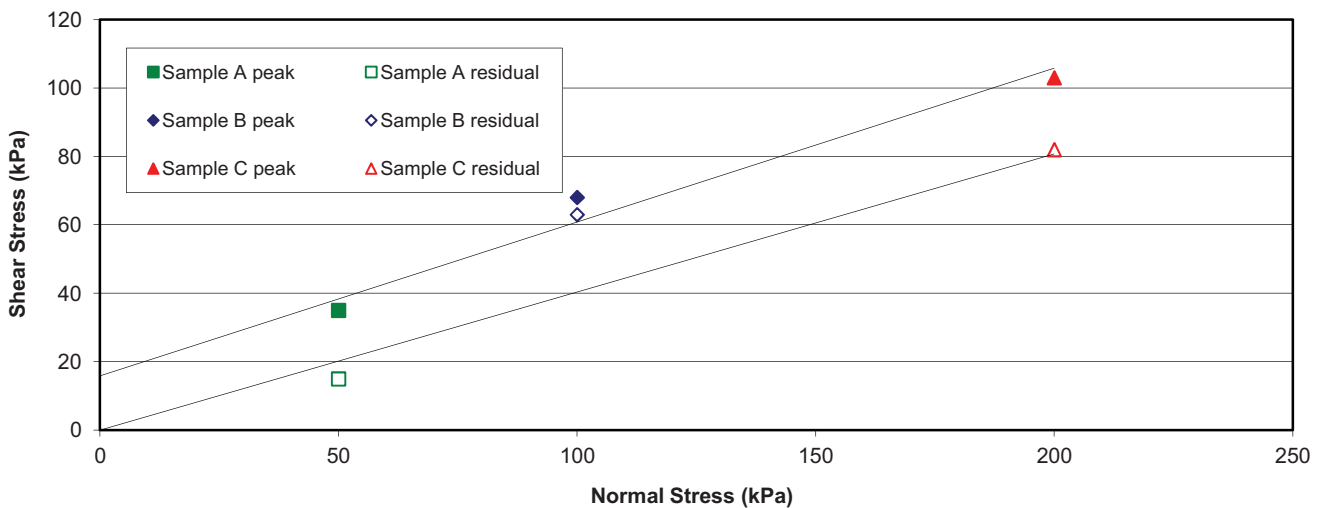
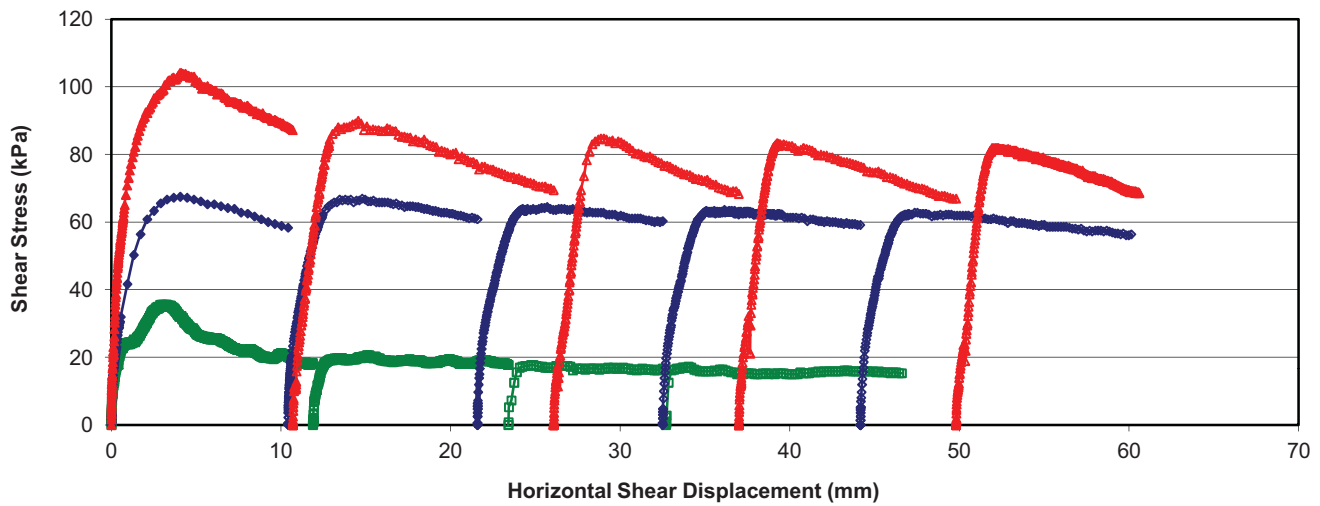
Short Title: COS East Riverbank / Cherry Lane - Geotech Investigation / Saskatoon, SK

Tested By: D.B.

Date: July 12, 2012

Sample	Normal Stress	Shear Stress	
	(kPa)	Peak (kPa)	Residual (kPa)
11-0057-BH2P BH2P-2	50	35	15
	100	68	63
	200	103	82

	Peak	Residual
Friction angle (degrees):	23.7	22.0
cohesion (kPa):	18	0



Comments:

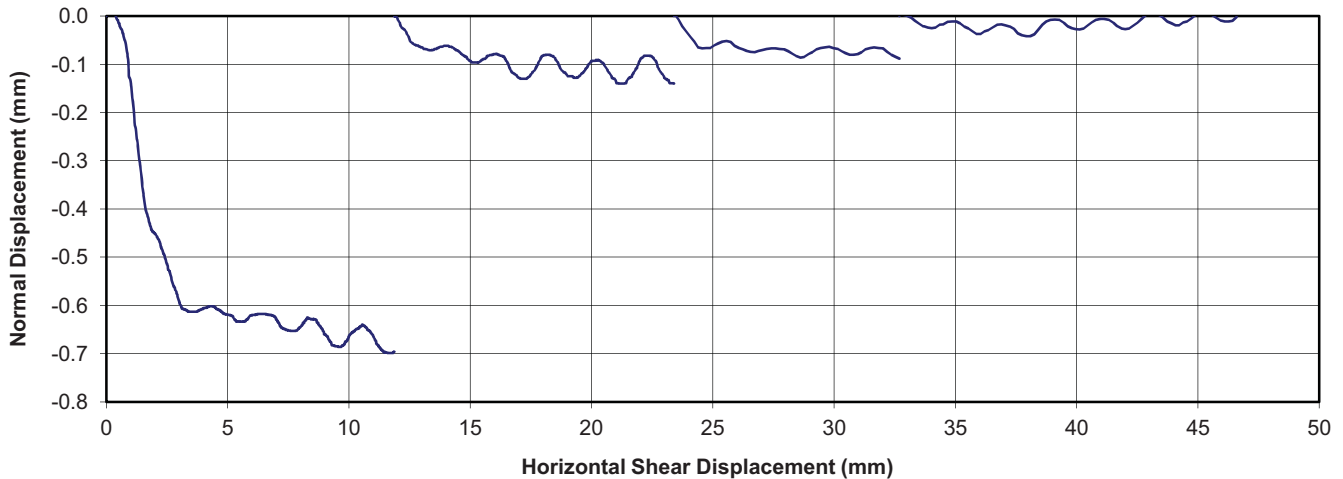
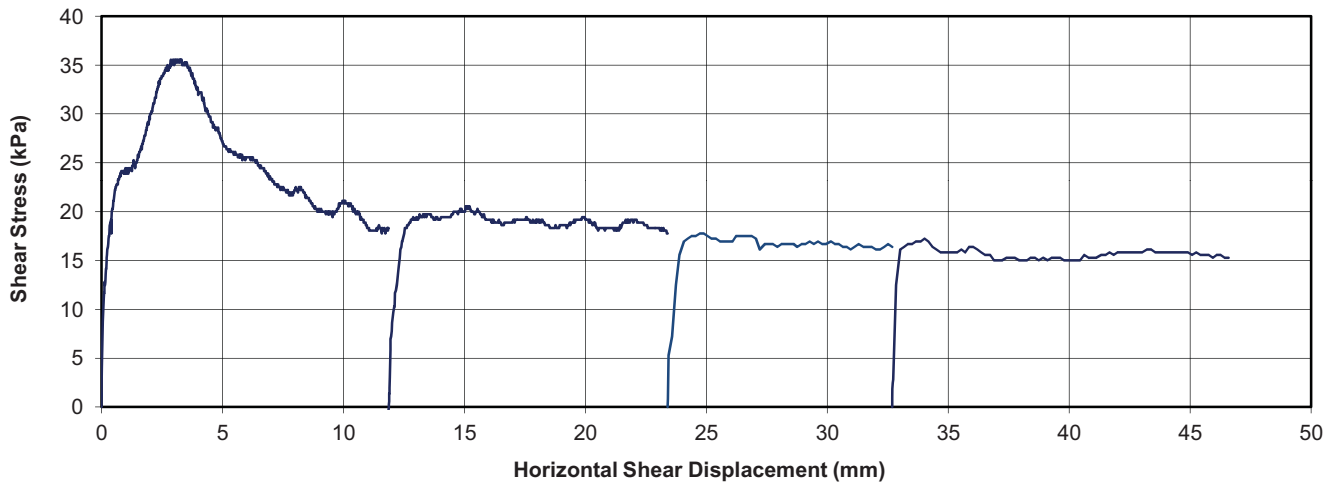
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CONSOLIDATED DRAINED DIRECT SHEAR TEST

Project #: 11-1362-0057	Phase: 5000
Short Title: COS East Riverbank / Cherry Lane - Geotech Investigation / Saskatoon, SK	
Tested By: D.B.	Date: July 12, 2012
Sample: 11-0057-BH2P BH2P-2	

Effective Stress: 50 kPa	Peak Shear Stress: 35 kPa
	Residual Shear Stress: 15 kPa
Sample Data:	Comments:
Sample Length: 60.0 mm	
Initial Height: 20.0 mm	
Initial Water Content: 34.8 %	
Initial Dry Density: 1346 kg/m ³	
Final Water Content: 40.3 %	



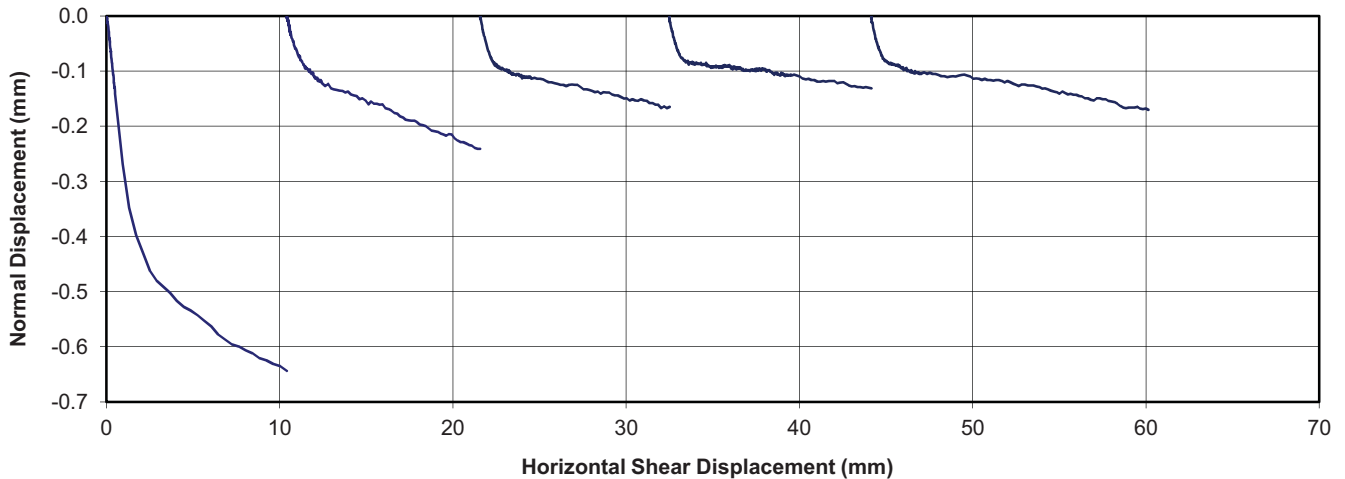
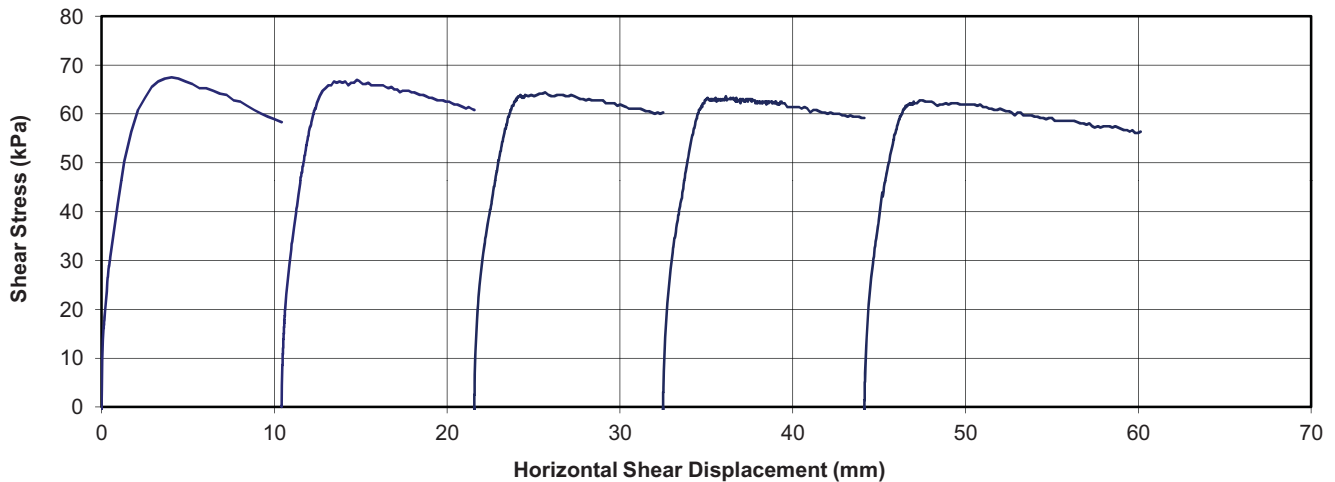
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CONSOLIDATED DRAINED DIRECT SHEAR TEST

Project #: 11-1362-0057 Phase: 5000
 Short Title: COS East Riverbank / Cherry Lane - Geotech Investigation / Saskatoon, SK
 Tested By: D.B. Date: July 12, 2012
 Sample: 11-0057-BH2P BH2P-2

Effective Stress:	100	kPa	Peak Shear Stress:	68	kPa
			Residual Shear Stress	63	kPa
Sample Data:			Comments:		
Sample Length:	60.0	mm			
Initial Height:	20.0	mm			
Initial Water Content:	36.6	%			
Initial Dry Density:	1336	kg/m ³			
Final Water Content:	38.3	%			



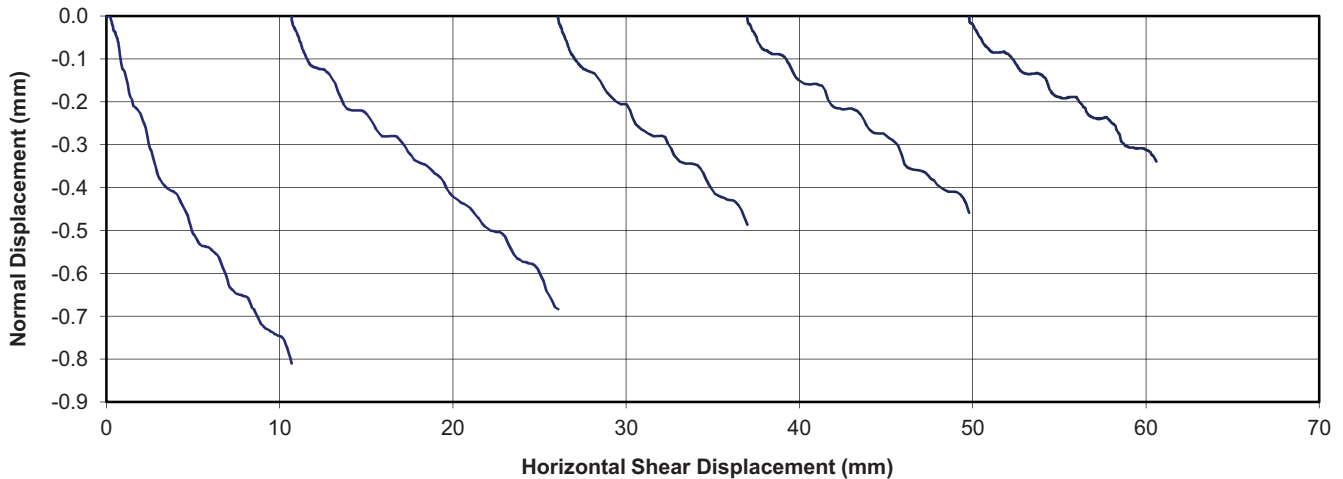
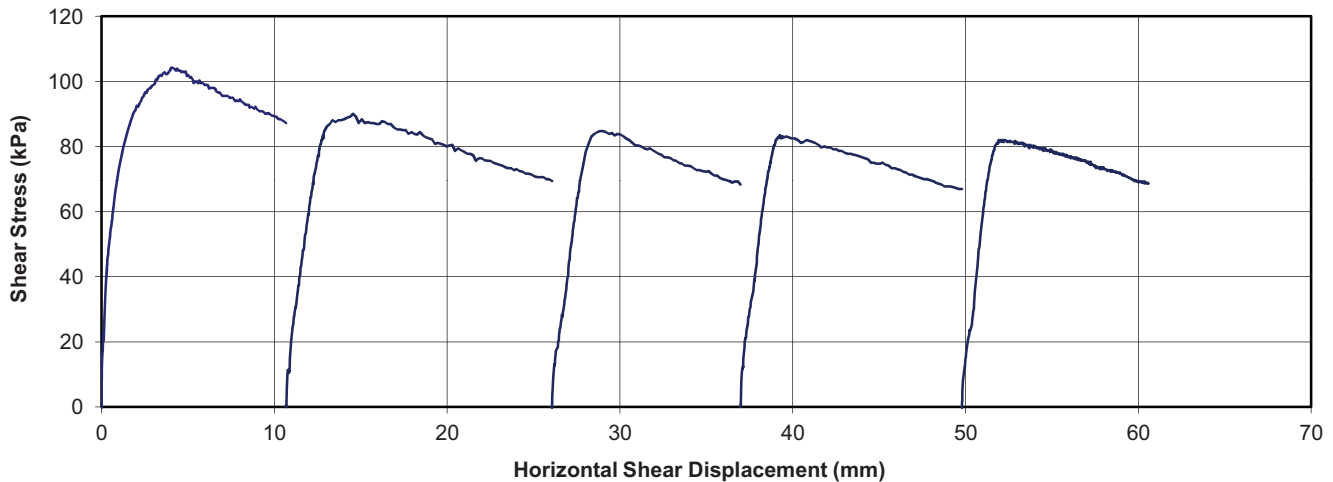
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CONSOLIDATED DRAINED DIRECT SHEAR TEST

Project #: 11-1362-0057	Phase: 5000
Short Title: COS East Riverbank / Cherry Lane - Geotech Investigation / Saskatoon, SK	
Tested By: D.B.	Date: July 12, 2012
Sample: 11-0057-BH2P BH2P-2	

Effective Stress: 200 kPa	Peak Shear Stress: 103 kPa
	Residual Shear Stress: 82 kPa
Sample Data:	Comments:
Sample Length: 60.0 mm	
Initial Height: 20.0 mm	
Initial Water Content: 34.4 %	
Initial Dry Density: 1359 kg/m ³	
Final Water Content: 36.3 %	



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GENERAL TESTING RESULTS

Project #: 11-1362-0057

Phase: 5100

Short Title: COS East Riverbank / Cherry Lane - Geotech Investigation / Saskatoon, SK

Tested by: S.E. / J.F. / S.J.B.

Date: August 15, 2013

Sample Identification				Laboratory Test Results									
Borehole #	Sample #	Depth (m)	Sample Type	Water Content (%)	Plastic Limit	Liquid Limit	Plasticity Index	% Passing #200	ASTM Group Index	Specific Gravity	Dry Density (Kg/m ³)	Pocket Penetrometer (kPa)	Lab Vane (kPa)
COS-13-001	001-1	0.61-0.91	AS	27.9									
COS-13-001	001-2	1.22-1.52	AS	37.4									
COS-13-001	001-3	2.44-2.74	AS	37.5									
COS-13-001	001-4	3.66-3.96	AS	34.7									
COS-13-001	001-5	4.27-4.57	AS	36.0									
COS-13-001	001-6	4.88-5.18	AS	33.9	18	56	38			2.63			
COS-13-001	001-7	5.79-6.10	AS	37.6									
COS-13-001	001-8	6.71-7.01	AS	12.1									
COS-13-001	001-9	7.92-8.23	AS	14.8									
COS-13-001	001-10	8.53-8.84	AS	9.7									
COS-13-001B	001B-1	5.18-5.87	TO	35.0									
COS-13-001B	001B-2	5.87-6.55	TO	32.1									
COS-13-001B	001B-3	6.55-7.24	TO	11.0	11	23	12				2057		
COS-13-002	002-1	0.00-0.15	AS	15.3									
COS-13-002	002-2	0.15-0.30	AS	14.0									
COS-13-002	002-3	0.30-0.61	AS	14.2									
COS-13-002	002-4	0.91-1.22	AS	25.9									
COS-13-002	002-5	1.52-1.83	AS	23.1									
COS-13-002	002-6	2.44-2.74	AS	30.1									
COS-13-002	002-7	3.35-3.66	AS	31.3									
COS-13-002	002-8	4.27-4.57	AS	32.2									
COS-13-002	002-9	5.49-5.79	AS	30.7									
COS-13-002	002-10	6.71-7.01	AS	32.1									
COS-13-002	002-11	7.62-7.92	AS	33.0									
COS-13-002	002-12	8.53-8.84	AS	30.2									
COS-13-002	002-13	9.75-10.06	AS	27.8									
COS-13-002	002-14	10.36-10.67	AS	32.5									
COS-13-002	002-15	11.58-11.89	AS	30.8									
COS-13-002	002-16	12.19-12.50	AS	33.7									
COS-13-002	002-17	13.11-13.41	AS	32.7	21	69	48			2.63			
COS-13-002	002-18	14.33-14.63	AS	15.4									
COS-13-002	002-19	16.15-16.46	AS	12.0									
COS-13-003	003-1	0.46-0.61	AS	18.4									
COS-13-003	003-2	0.91-1.22	AS	26.3									
COS-13-003	003-3	2.13-2.44	AS	20.7									
COS-13-003	003-4	3.96-4.27	AS	25.8									

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GENERAL TESTING RESULTS

Project #: 11-1362-0057

Phase: 5100

Short Title: COS East Riverbank / Cherry Lane - Geotech Investigation / Saskatoon, SK

Tested by: S.E. / J.F. / S.J.B.

Date: August 15, 2013

Sample Identification				Laboratory Test Results									
Borehole #	Sample #	Depth (m)	Sample Type	Water Content (%)	Plastic Limit	Liquid Limit	Plasticity Index	% Passing #200	ASTM Group Index	Specific Gravity	Dry Density (Kg/m ³)	Pocket Penetrometer (kPa)	Lab Vane (kPa)
COS-13-003	003-5	4.88-5.03	AS	32.3	19	57	38						
COS-13-003	003-6	5.49-5.79	AS	24.0									
COS-13-003	003-7	5.79-6.48	TO	24.2									
COS-13-003	003-8	7.32-7.62	AS	14.5									
COS-13-003	003-9	8.84-9.14	AS	17.7									

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GENERAL TESTING RESULTS

Project #: 11-1362-0057

Phase: 5100 / 4000

Short Title: COS East Riverbank / Cherry Lane - Geotech Investigation / Saskatoon, SK

Tested by: S.E. / W.C.

Date: September 6, 2013

Sample Identification				Laboratory Test Results									
Borehole #	Sample #	Depth (m)	Sample Type	Water Content (%)	Plastic Limit	Liquid Limit	Plasticity Index	% Passing #200	ASTM Group Index	Specific Gravity	Dry Density (Kg/m ³)	Pocket Penetrometer (kPa)	Lab Vane (kPa)
COS-13-004	004-1	0.00-0.15	AS	11.2									
COS-13-004	004-2	0.30-0.61	AS	32.5									
COS-13-004	004-3	1.22-1.37	DO	33.4									
COS-13-004	004-4	2.59-2.90	DO	33.4									
COS-13-004	004-5	4.42-4.72	DO	33.6	24	74	50						
COS-13-004	004-6	5.18-5.49	AS	31.6									
COS-13-004	004-7	5.79-6.10	TO	30.1						2.61	1699	72	80
COS-13-004	004-8	7.01-7.62	TO	33.7	21	46	25					120	99
COS-13-004	004-9	8.53-9.14	TO	27.2								168	188
COS-13-004	004-10	9.30-9.60	AS	10.2									
COS-13-004	004-11	9.75-10.06	AS	10.8	12	19	7						
COS-13-005	005-1	0.00-0.30	AS	8.9									
COS-13-005	005-2	1.07-1.22	DO	8.2									
COS-13-005	005-3	2.59-2.74	DO	7.5									
COS-13-005	005-4	4.11-4.27	DO	11.5	15	35	20						
COS-13-005	005-5	5.33-5.94	TO	23.2	20	49	29					180	91
COS-13-005	005-6	6.10-6.71	TO	8.4								>200	203
COS-13-005	005-7	6.86-7.47	TO	8.0									
COS-13-005	005-8	7.62-8.23	TO	29.5	22	38	16						
COS-13-005	005-9	8.38-8.99	TO	23.9						2.59	1306		
COS-13-005	005-10	9.14-9.75	TO	28.2	25	32	7						
COS-13-005	005-11	9.91-10.52	TO	33.0									
COS-13-005	005-12	10.67-11.28	TO	28.7	21	33	12						
COS-13-005	005-13	11.43-12.04	TO	29.3	19	34	15						
COS-13-005	005-14	12.19-12.34	TO	29.4	14	40	26						
COS-13-005	005-15	13.72-14.02	DO	9.0									
COS-13-006	006-1	0.15-0.30	AS	17.2									
COS-13-006	006-2	1.07-1.22	AS	28.7									
COS-13-006	006-3	1.83-1.98	AS	25.3	22	65	43						
COS-13-006	006-4	2.29-2.44	AS	24.6									
COS-13-006	006-5	2.90-3.05	AS	30.6									
COS-13-006	006-6	4.72-4.88	AS	29.6									
COS-13-006	006-7	5.33-5.49	AS	29.1									
COS-13-006	006-8	6.25-6.40	AS	34.0	23	72	49						
COS-13-006	006-9	7.62-7.77	AS	33.8									
COS-13-006	006-10	8.69-8.84	AS	29.5	13	41	28						

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GENERAL TESTING RESULTS

Project #: 11-1362-0057

Phase: 5100 / 4000

Short Title: COS East Riverbank / Cherry Lane - Geotech Investigation / Saskatoon, SK

Tested by: S.E. / W.C.

Date: September 6, 2013

Sample Identification				Laboratory Test Results									
Borehole #	Sample #	Depth (m)	Sample Type	Water Content (%)	Plastic Limit	Liquid Limit	Plasticity Index	% Passing #200	ASTM Group Index	Specific Gravity	Dry Density (Kg/m ³)	Pocket Penetrometer (kPa)	Lab Vane (kPa)
COS-13-006	006-11	10.06-10.21	AS	34.8									
COS-13-006	006-12	11.58-11.73	AS	13.0									
COS-13-006	006-13	12.19-12.34	AS	11.8									
COS-13-006	006-14	13.11-13.26	AS	10.3									

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GRAIN SIZE ANALYSIS - ASTM D422
(Mechanical & Hydrometer)

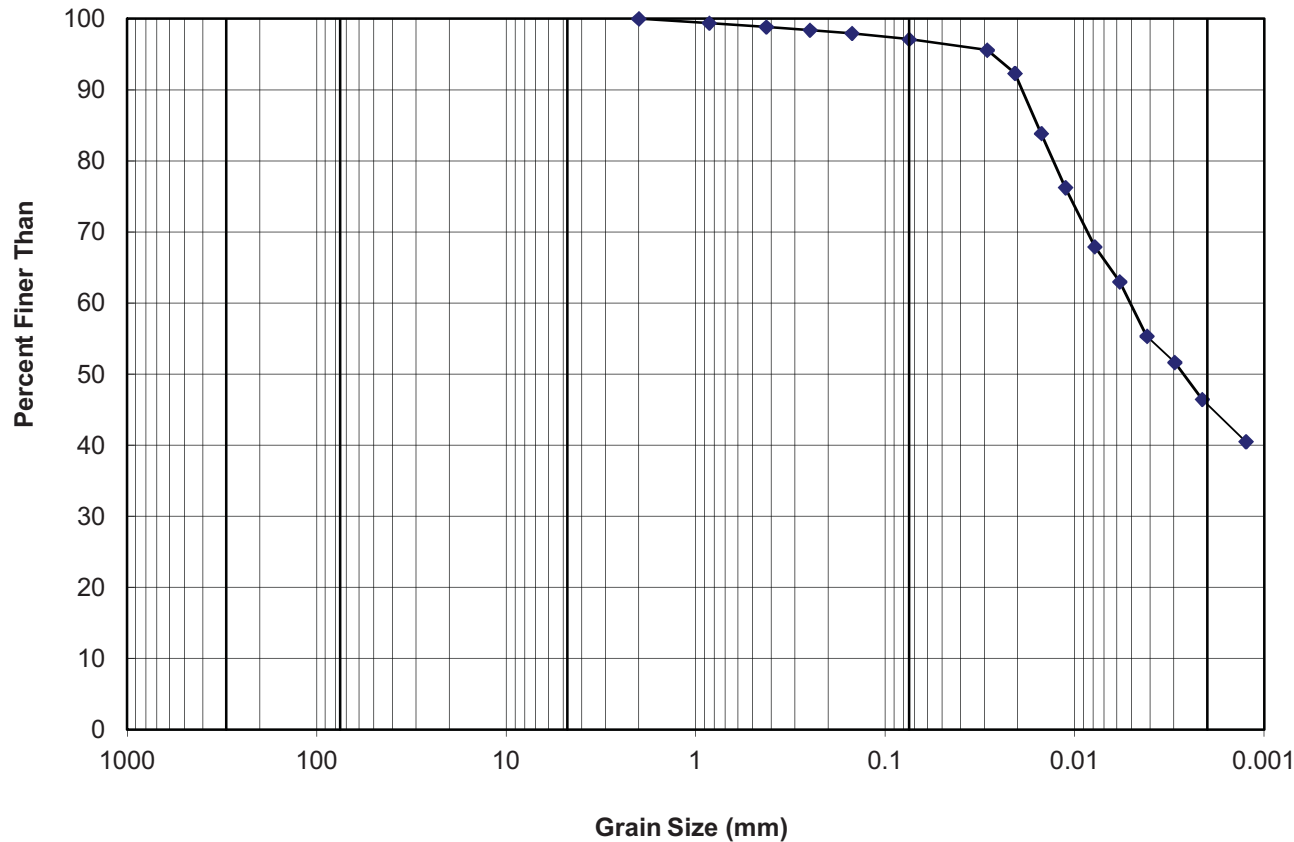
Project #: 11-1362-0057
 Short Title: COS East Riverbank / Cherry Lane - Geotech Investigation / Saskatoon, :
 Tested by: S.H. / S.B.
 Borehole #: COS-13-001 Sample #: 001-6
 Source:
 Date Sample Received: July 29, 2013

Phase: 5100
 Date: August 9, 2013

Grain Size Analysis Results:

Opening (mm)	Percent Passing (%)
152	100
76	100
38	100
19	100
9.5	100
4.75	100
2.00	100
0.850	99
0.425	99
0.250	98
0.150	98
0.075	97
0.029	96
0.021	92
0.015	84
0.011	76
0.008	68
0.006	63
0.004	55
0.003	52
0.002	46
0.001	41

Graphical Analysis



BOULDERS	COBBLES	GRAVEL		SAND			SILT / CLAY
		Coarse	Fine	Coarse	Medium	Fine	

Comments:

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GRAIN SIZE ANALYSIS - ASTM D422
(Mechanical & Hydrometer)

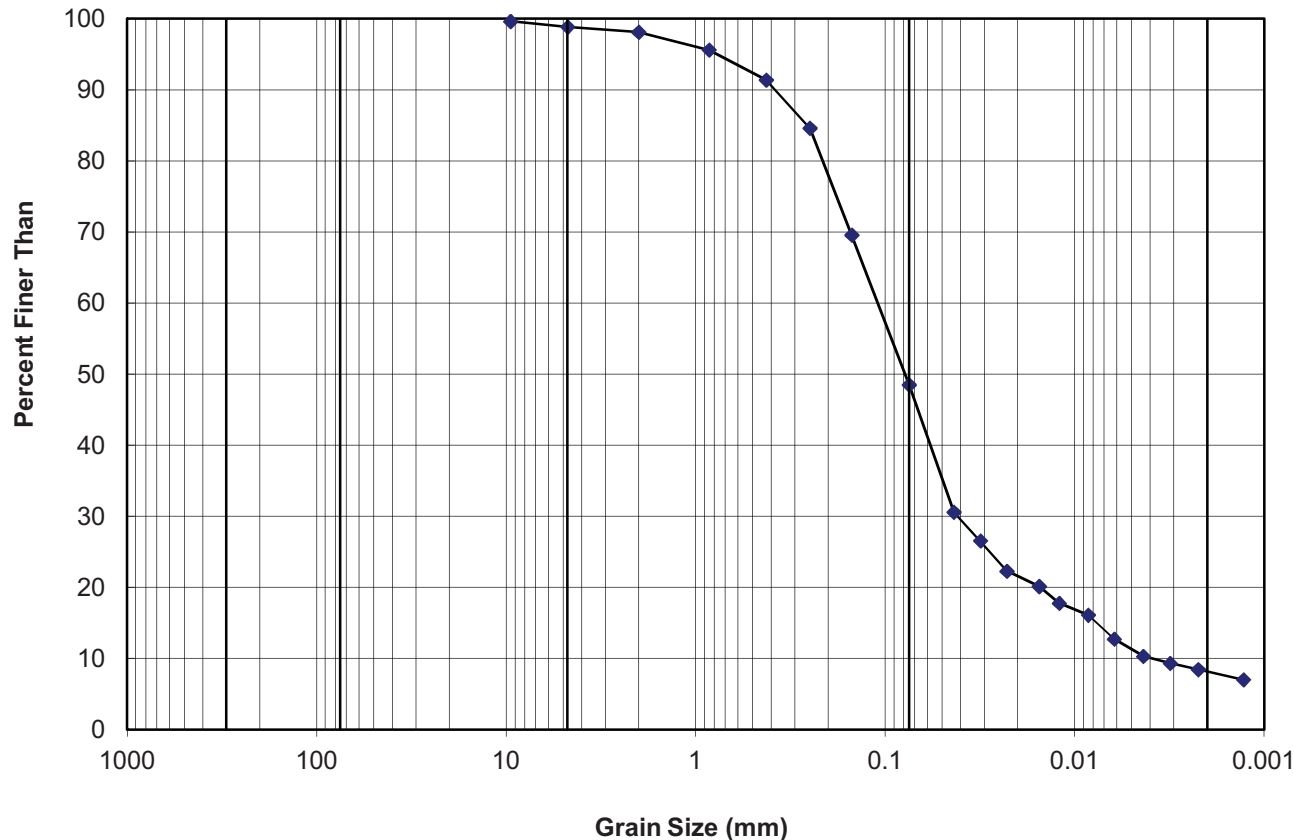
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 Short Title: COS East Riverbank / Cherry Lane - Geotech Investigation / Saskatoon, :
 Tested by: S.H. / S.B.
 Borehole #: COS-13-001 Sample #: 001-9
 Source:
 Date Sample Received: July 29, 2013

Phase: 5100
 Date: August 9, 2013

Grain Size Analysis Results:

Opening (mm)	Percent Passing (%)
152	100
76	100
38	100
19	100
9.5	100
4.75	99
2.00	98
0.850	96
0.425	91
0.250	85
0.150	70
0.075	49
0.043	31
0.031	27
0.023	22
0.015	20
0.012	18
0.008	16
0.006	13
0.004	10
0.003	9.3
0.002	8.5
0.001	7.1

Graphical Analysis



BOULDERS	COBBLES	GRAVEL		SAND			SILT / CLAY
		Coarse	Fine	Coarse	Medium	Fine	

Comments:

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GRAIN SIZE ANALYSIS - ASTM D422
(Mechanical & Hydrometer)

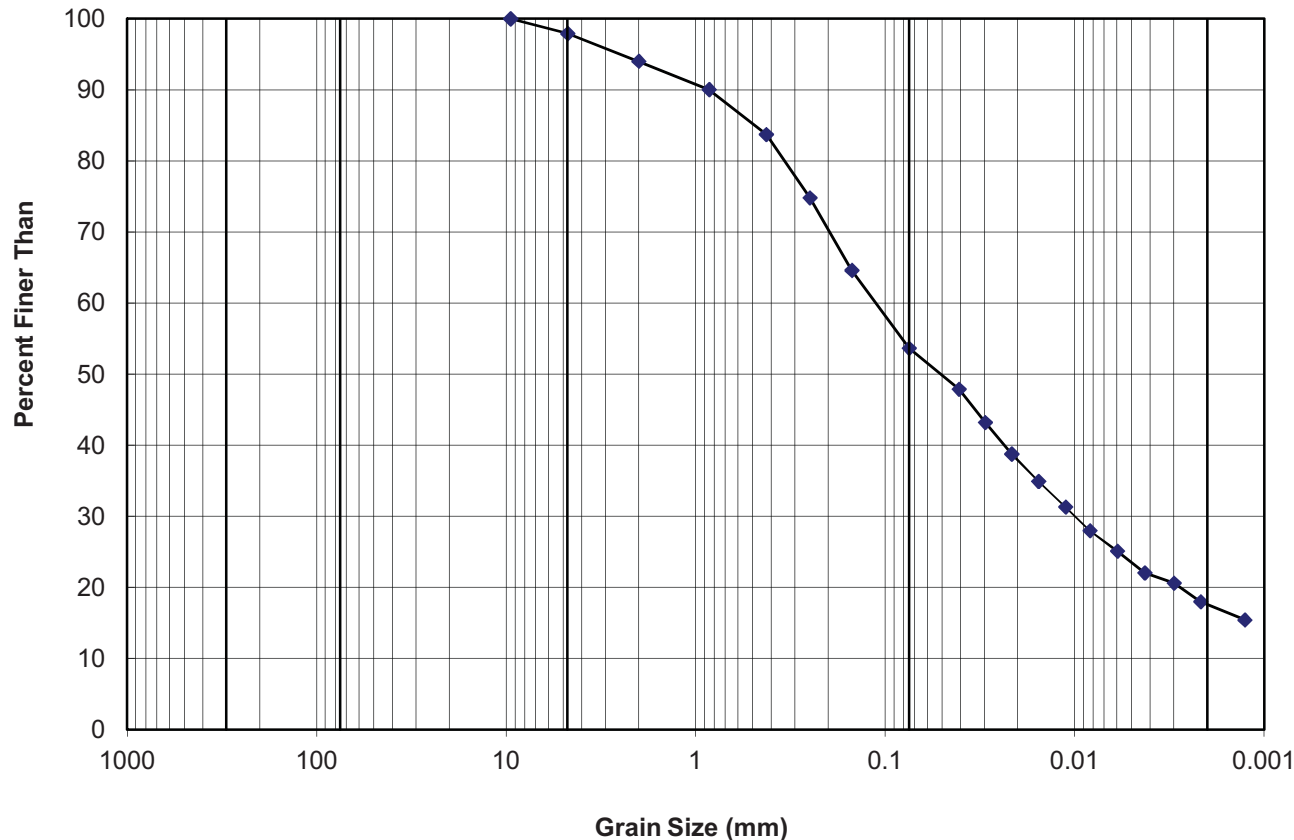
Project #: 11-1362-0057
 Short Title: COS East Riverbank / Cherry Lane - Geotech Investigation / Saskatoon, :
 Tested by: S.J.B. / S.B.
 Borehole #: CP-13-001B Sample #: 001B-3
 Source:
 Date Sample Received: July 29, 2013

Phase: 5100
 Date: August 10, 2013

Grain Size Analysis Results:

Opening (mm)	Percent Passing (%)
152	100
76	100
38	100
19	100
9.5	100
4.75	98
2.00	94
0.850	90
0.425	84
0.250	75
0.150	65
0.075	54
0.041	48
0.030	43
0.022	39
0.016	35
0.011	31
0.008	28
0.006	25
0.004	22
0.003	21
0.002	18
0.001	15

Graphical Analysis



BOULDERS	COBBLES	GRAVEL		SAND			SILT / CLAY
		Coarse	Fine	Coarse	Medium	Fine	

Comments:

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GRAIN SIZE ANALYSIS - ASTM D422
(Mechanical & Hydrometer)

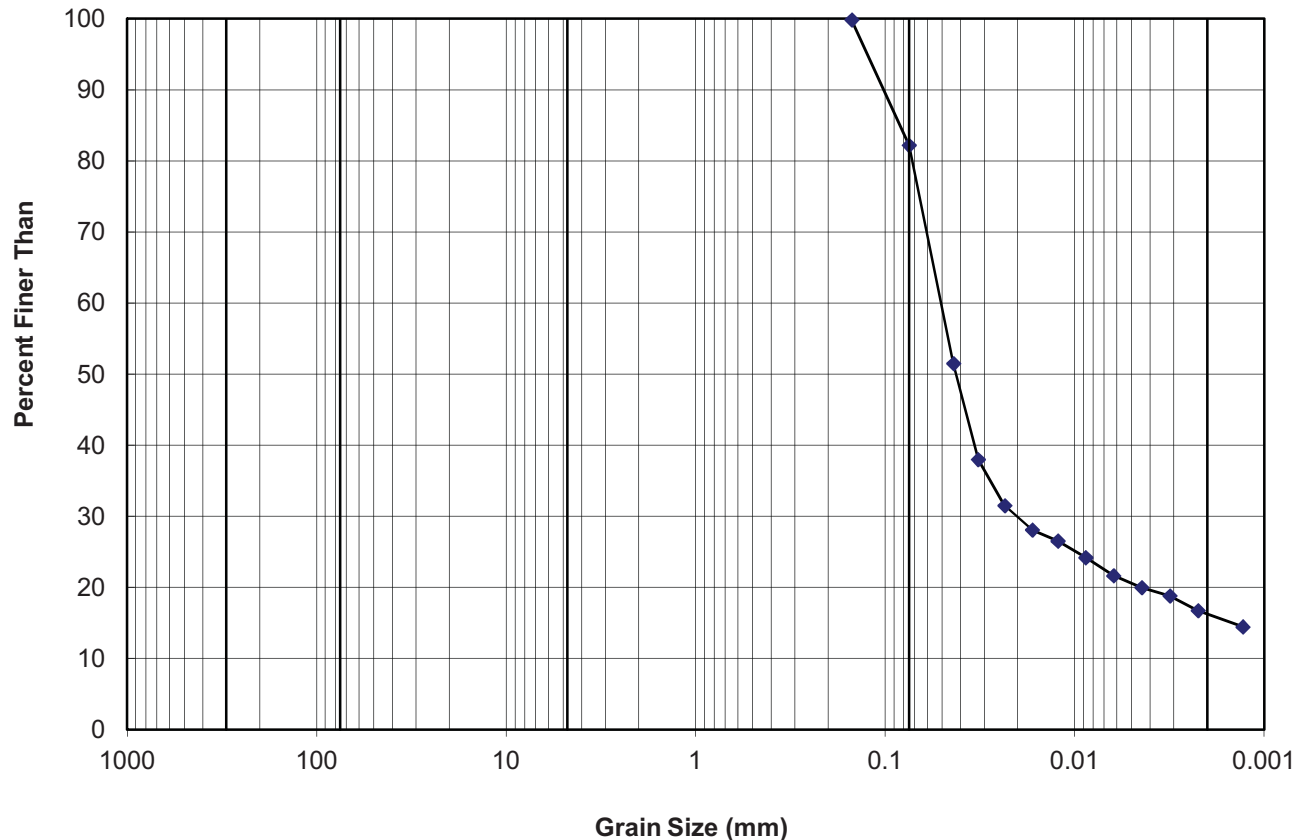
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 Short Title: COS East Riverbank / Cherry Lane - Geotech Investigation / Saskatoon, :
 Tested by: S.J.B. / S.B.
 Borehole #: COS-13-002 Sample #: 002-13
 Source:
 Date Sample Received: July 29, 2013

Phase: 5100
 Date: August 10, 2013

Grain Size Analysis Results:

Opening (mm)	Percent Passing (%)
152	100
76	100
38	100
19	100
9.5	100
4.75	100
2.00	100
0.850	100
0.425	100
0.250	100
0.150	100
0.075	82
0.044	52
0.032	38
0.023	32
0.017	28
0.012	27
0.009	24
0.006	22
0.004	20
0.003	19
0.002	17
0.001	14

Graphical Analysis



BOULDERS	COBBLES	GRAVEL		SAND			SILT / CLAY
		Coarse	Fine	Coarse	Medium	Fine	

Comments:

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GRAIN SIZE ANALYSIS - ASTM D422
(Mechanical & Hydrometer)

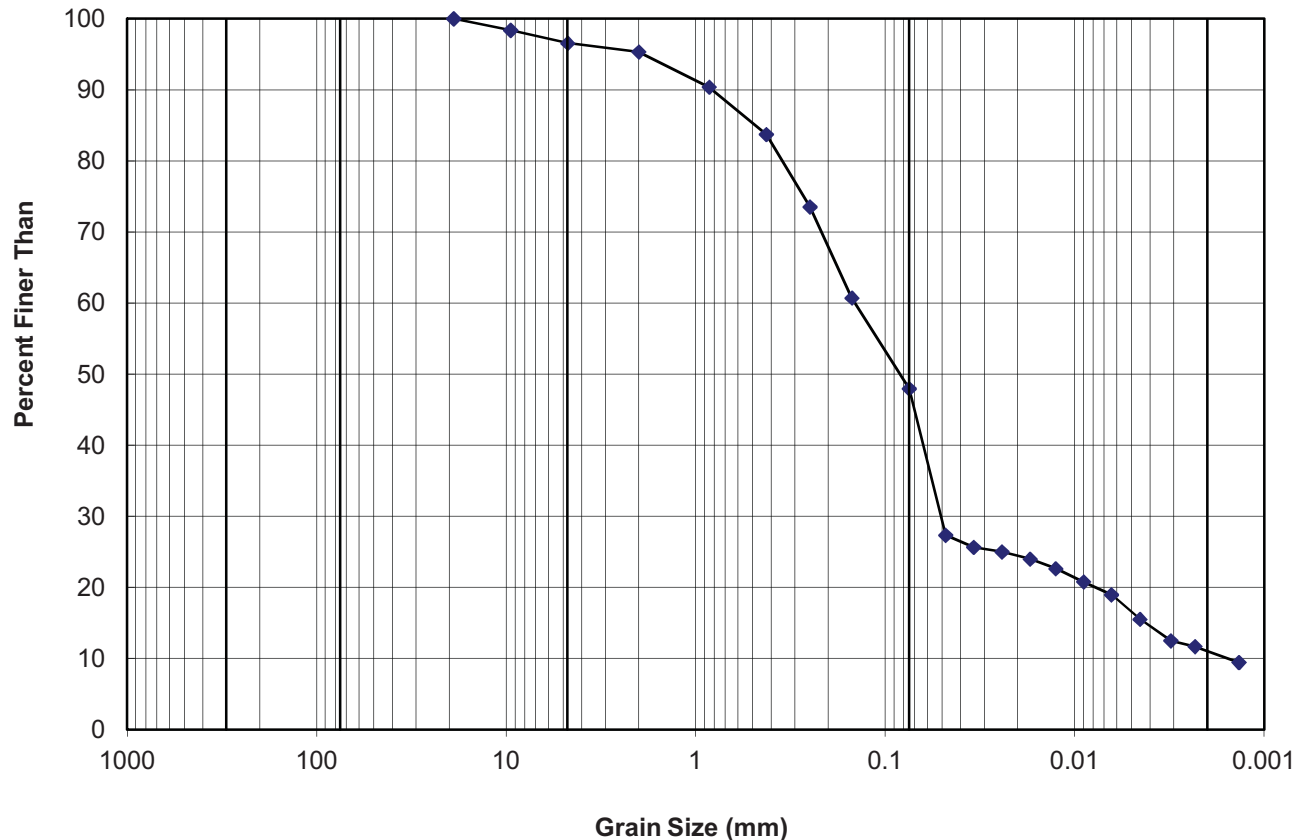
Project #: 11-1362-0057
 Short Title: COS East Riverbank / Cherry Lane - Geotech Investigation / Saskatoon, SK
 Tested by: S.E.
 Borehole #: COS-13-004 Sample #: 004-11
 Source:
 Date Sample Received: September 3, 2013

Phase: 5100 / 4000
 Date: September 16, 2013

Grain Size Analysis Results:

Opening (mm)	Percent Passing (%)
152	100
76	100
38	100
19	100
9.5	98
4.75	97
2.00	95
0.850	90
0.425	84
0.250	74
0.150	61
0.075	48
0.048	27
0.034	26
0.024	25
0.017	24
0.013	23
0.009	21
0.006	19
0.005	16
0.003	13
0.002	12
0.001	9.5

Graphical Analysis



BOULDERS	COBBLES	GRAVEL		SAND			SILT / CLAY
		Coarse	Fine	Coarse	Medium	Fine	

Comments:

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GRAIN SIZE ANALYSIS - ASTM D422
(Mechanical & Hydrometer)

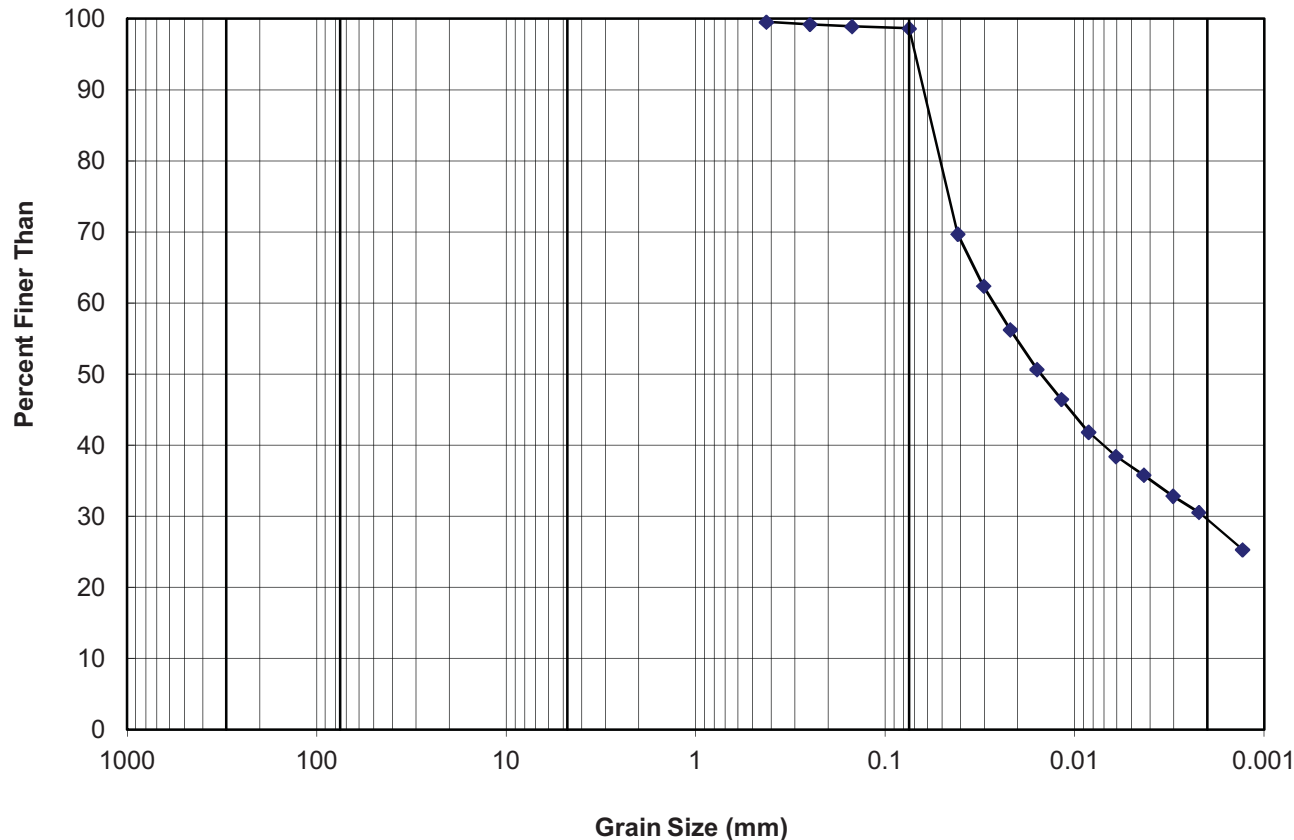
Project #: 11-1362-0057
 Short Title: COS East Riverbank / Cherry Lane - Geotech Investigation / Saskatoon, SK
 Tested by: S.E.
 Borehole #: COS-13-004 Sample #: 004-2
 Source:
 Date Sample Received: September 3, 2013

Phase: 5100 / 4000
 Date: September 16, 2013

Grain Size Analysis Results:

Opening (mm)	Percent Passing (%)
152	100
76	100
38	100
19	100
9.5	100
4.75	100
2.00	100
0.850	100
0.425	100
0.250	99
0.150	99
0.075	99
0.042	70
0.030	62
0.022	56
0.016	51
0.012	46
0.008	42
0.006	38
0.004	36
0.003	33
0.002	31
0.001	25

Graphical Analysis



BOULDERS	COBBLES	GRAVEL		SAND			SILT / CLAY
		Coarse	Fine	Coarse	Medium	Fine	

Comments:

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GRAIN SIZE ANALYSIS - ASTM D422
(Mechanical & Hydrometer)

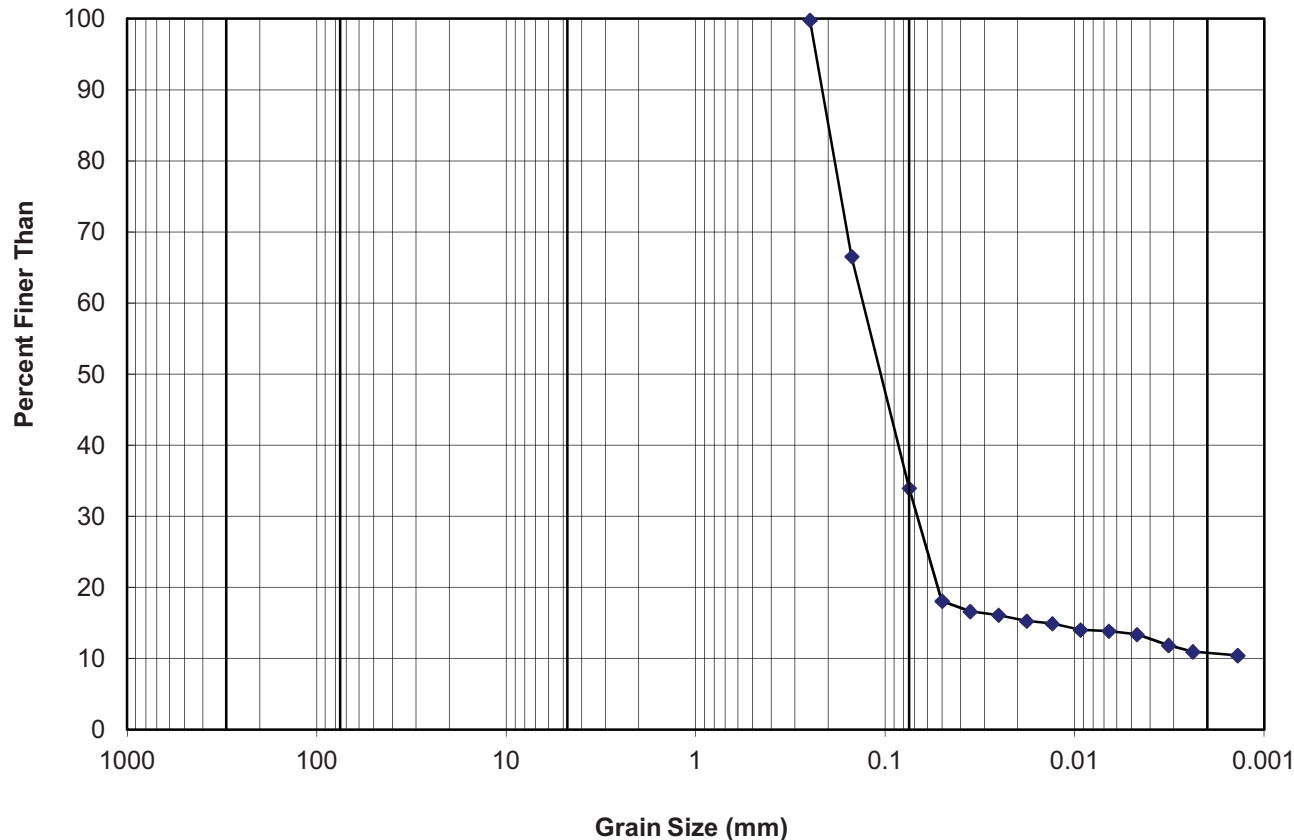
Project #: 11-1362-0057
 Short Title: COS East Riverbank / Cherry Lane - Geotech Investigation / Saskatoon, SK
 Tested by: S.E.
 Borehole #: COS-13-005 Sample #: 005-1
 Source:
 Date Sample Received: September 3, 2013

Phase: 5100 / 4000
 Date: September 16, 2013

Grain Size Analysis Results:

Opening (mm)	Percent Passing (%)
152	100
76	100
38	100
19	100
9.5	100
4.75	100
2.00	100
0.850	100
0.425	100
0.250	100
0.150	67
0.075	34
0.050	18
0.036	17
0.025	16
0.018	15
0.013	15
0.009	14
0.007	14
0.005	13
0.003	12
0.002	11
0.001	10

Graphical Analysis



BOULDERS	COBBLES	GRAVEL		SAND			SILT / CLAY
		Coarse	Fine	Coarse	Medium	Fine	

Comments:

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GRAIN SIZE ANALYSIS - ASTM D422
(Mechanical & Hydrometer)

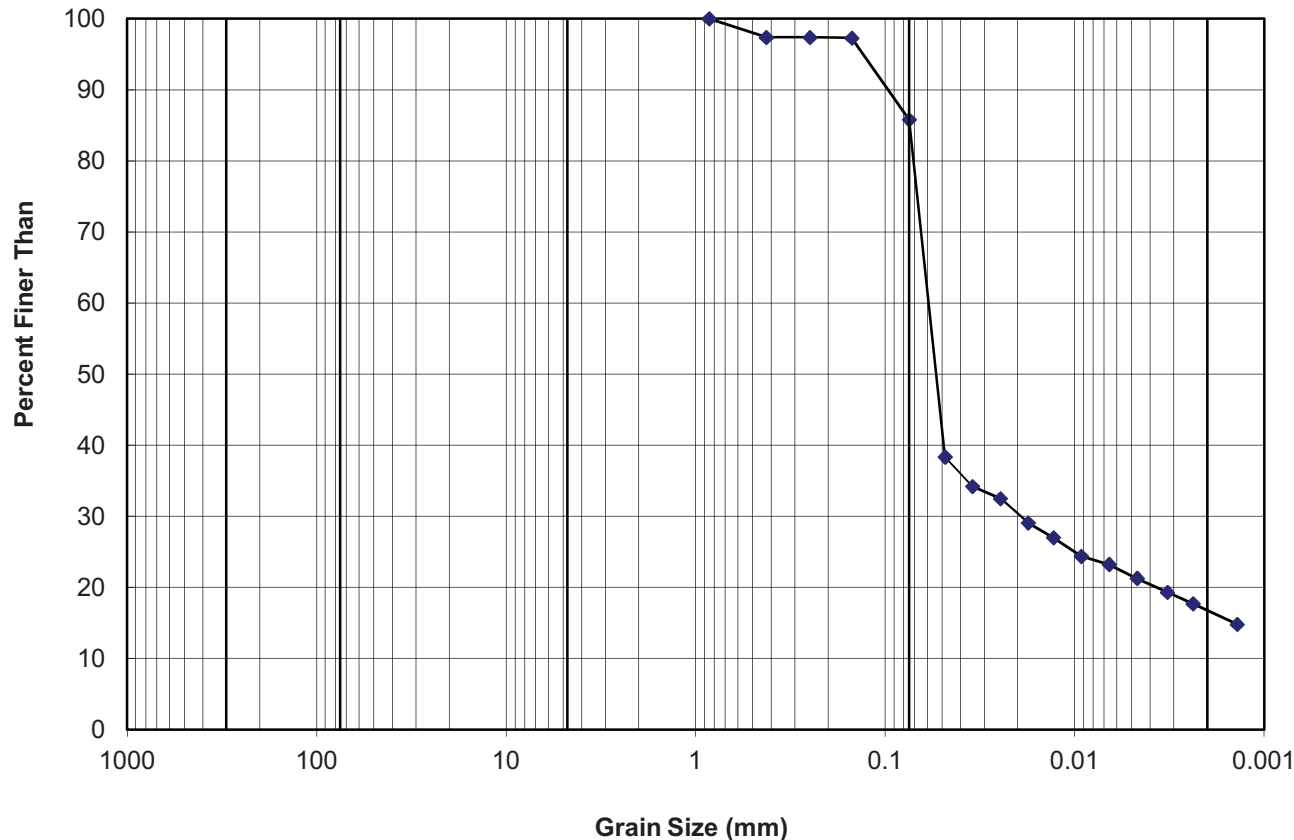
Project #: 11-1362-0057
 Short Title: COS East Riverbank / Cherry Lane - Geotech Investigation / Saskatoon, SK
 Tested by: S.E.
 Borehole #: COS-13-005 Sample #: 005-10
 Source:
 Date Sample Received: September 3, 2013

Phase: 5100 / 4000
 Date: September 16, 2013

Grain Size Analysis Results:

Opening (mm)	Percent Passing (%)
152	100
76	100
38	100
19	100
9.5	100
4.75	100
2.00	100
0.850	100
0.425	97
0.250	97
0.150	97
0.075	86
0.048	38
0.035	34
0.025	33
0.018	29
0.013	27
0.009	24
0.007	23
0.005	21
0.003	19
0.002	18
0.001	15

Graphical Analysis



BOULDERS	COBBLES	GRAVEL		SAND			SILT / CLAY
		Coarse	Fine	Coarse	Medium	Fine	

Comments:

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GRAIN SIZE ANALYSIS - ASTM D422
(Mechanical & Hydrometer)

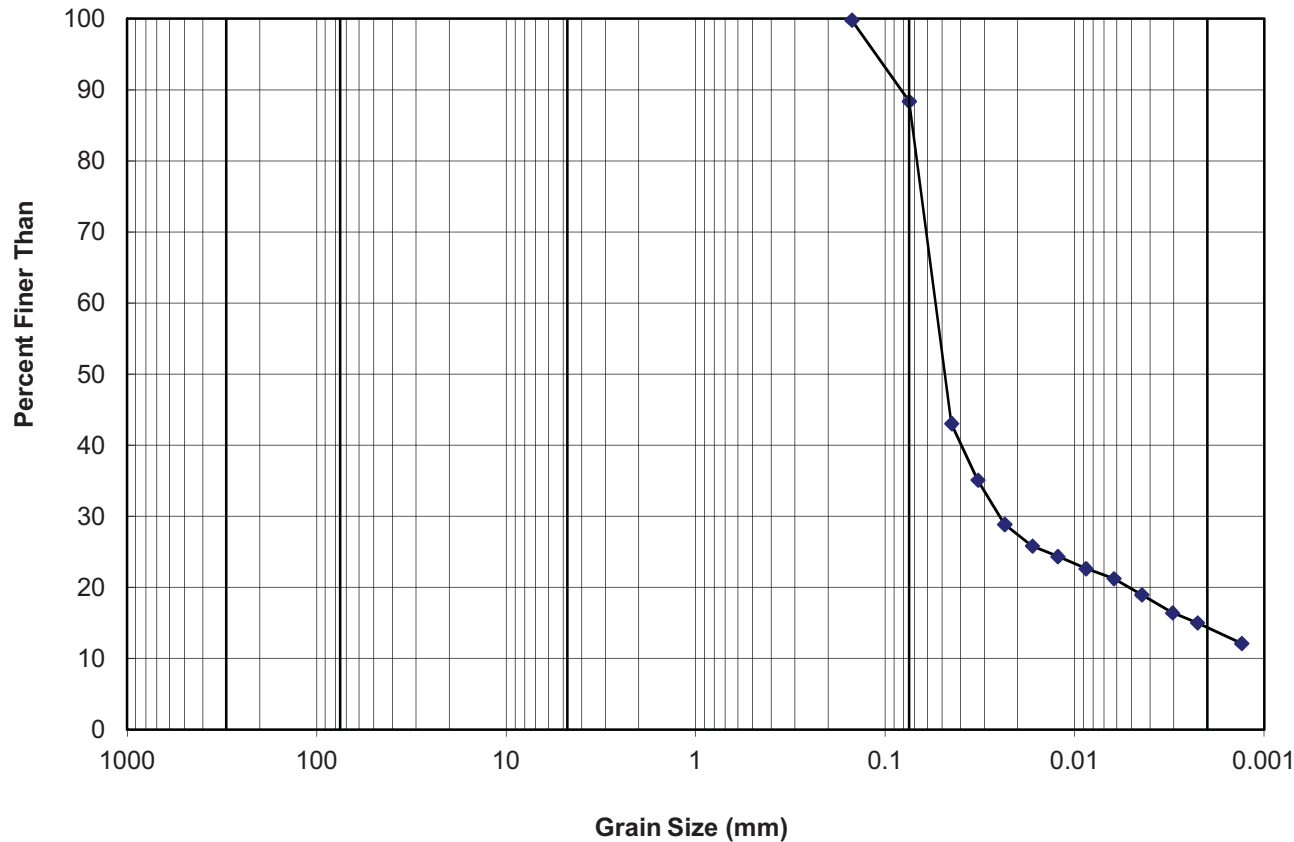
Project #: 11-1362-0057
 Short Title: COS East Riverbank / Cherry Lane - Geotech Investigation / Saskatoon, SK
 Tested by: S.E.
 Borehole #: COS-13-005 Sample #: 005-11
 Source:
 Date Sample Received: September 3, 2013

Phase: 5100 / 4000
 Date: September 16, 2013

Grain Size Analysis Results:

Opening (mm)	Percent Passing (%)
152	100
76	100
38	100
19	100
9.5	100
4.75	100
2.00	100
0.850	100
0.425	100
0.250	100
0.150	100
0.075	88
0.045	43
0.032	35
0.023	29
0.017	26
0.012	24
0.009	23
0.006	21
0.004	19
0.003	16
0.002	15
0.001	12

Graphical Analysis



BOULDERS	COBBLES	GRAVEL		SAND			SILT / CLAY
		Coarse	Fine	Coarse	Medium	Fine	

Comments:

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GRAIN SIZE ANALYSIS - ASTM D422

(Mechanical & Hydrometer)

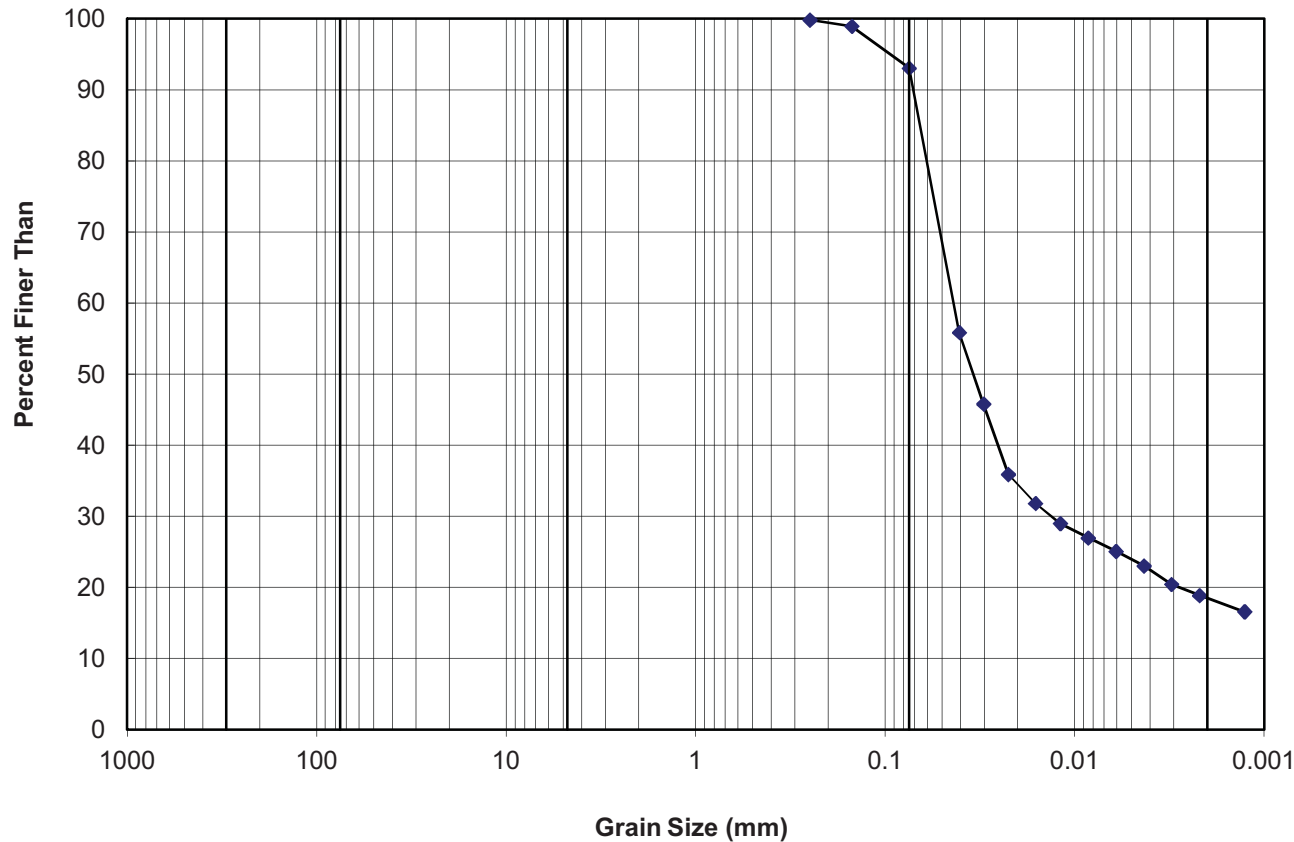
Project #: 11-1362-0057
 Short Title: COS East Riverbank / Cherry Lane - Geotech Investigation / Saskatoon, SK
 Tested by: S.E.
 Borehole #: COS-13-005 Sample #: 005-12
 Source:
 Date Sample Received: September 3, 2013

Phase: 5100 / 4000
 Date: September 16, 2013

Grain Size Analysis Results:

Opening (mm)	Percent Passing (%)
152	100
76	100
38	100
19	100
9.5	100
4.75	100
2.00	100
0.850	100
0.425	100
0.250	100
0.150	99
0.075	93
0.041	56
0.030	46
0.022	36
0.016	32
0.012	29
0.009	27
0.006	25
0.004	23
0.003	20
0.002	19
0.001	17

Graphical Analysis



BOULDERS	COBBLES	GRAVEL		SAND			SILT / CLAY
		Coarse	Fine	Coarse	Medium	Fine	

Comments:

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GRAIN SIZE ANALYSIS - ASTM D422
(Mechanical & Hydrometer)

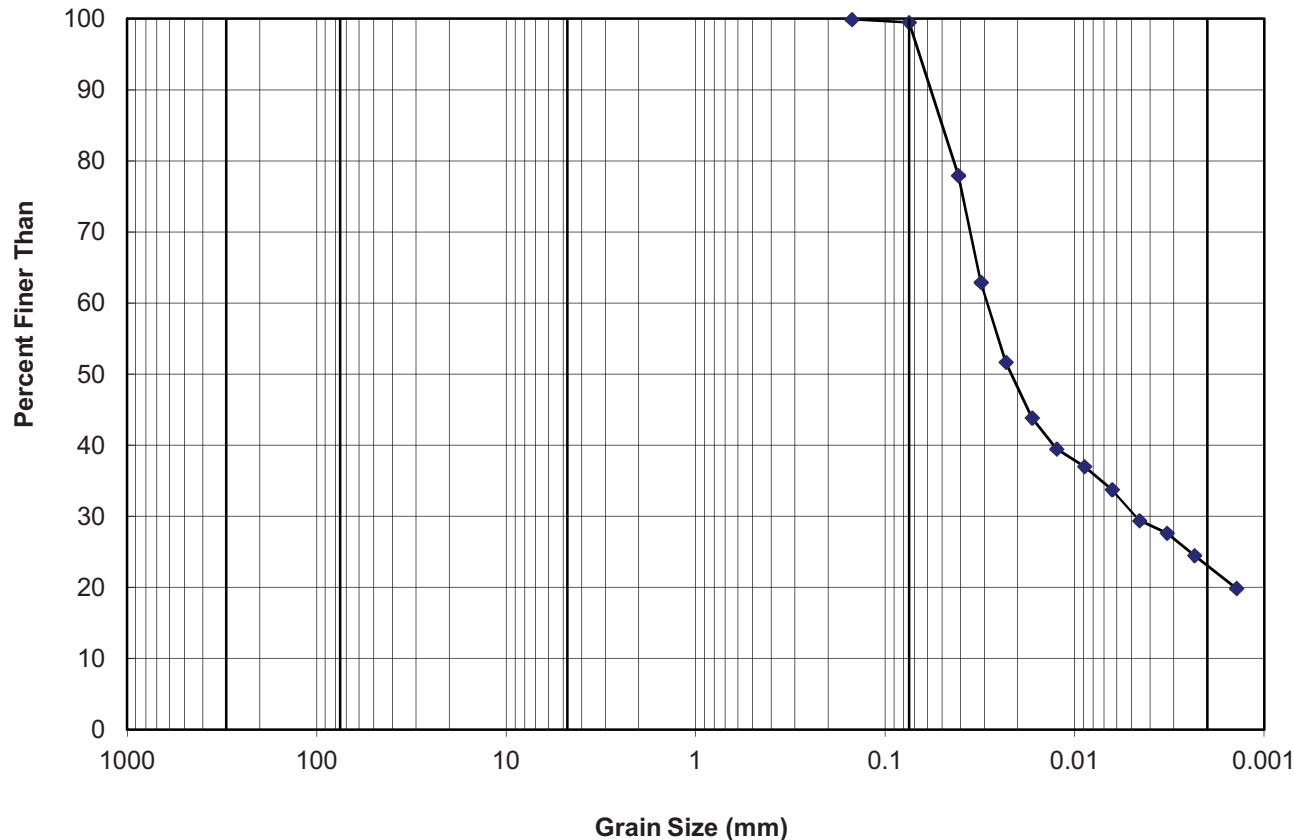
Project #: 11-1362-0057
 Short Title: COS East Riverbank / Cherry Lane - Geotech Investigation / Saskatoon, SK
 Tested by: S.E.
 Borehole #: COS-13-005 Sample #: 005-8
 Source:
 Date Sample Received: September 3, 2013

Phase: 5100 / 4000
 Date: September 16, 2013

Grain Size Analysis Results:

Opening (mm)	Percent Passing (%)
152	100
76	100
38	100
19	100
9.5	100
4.75	100
2.00	100
0.850	100
0.425	100
0.250	100
0.150	100
0.075	99
0.041	78
0.031	63
0.023	52
0.017	44
0.012	39
0.009	37
0.006	34
0.005	29
0.003	28
0.002	25
0.001	20

Graphical Analysis



BOULDERS	COBBLES	GRAVEL		SAND			SILT / CLAY
		Coarse	Fine	Coarse	Medium	Fine	

Comments:

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GRAIN SIZE ANALYSIS - ASTM D422
(Mechanical & Hydrometer)

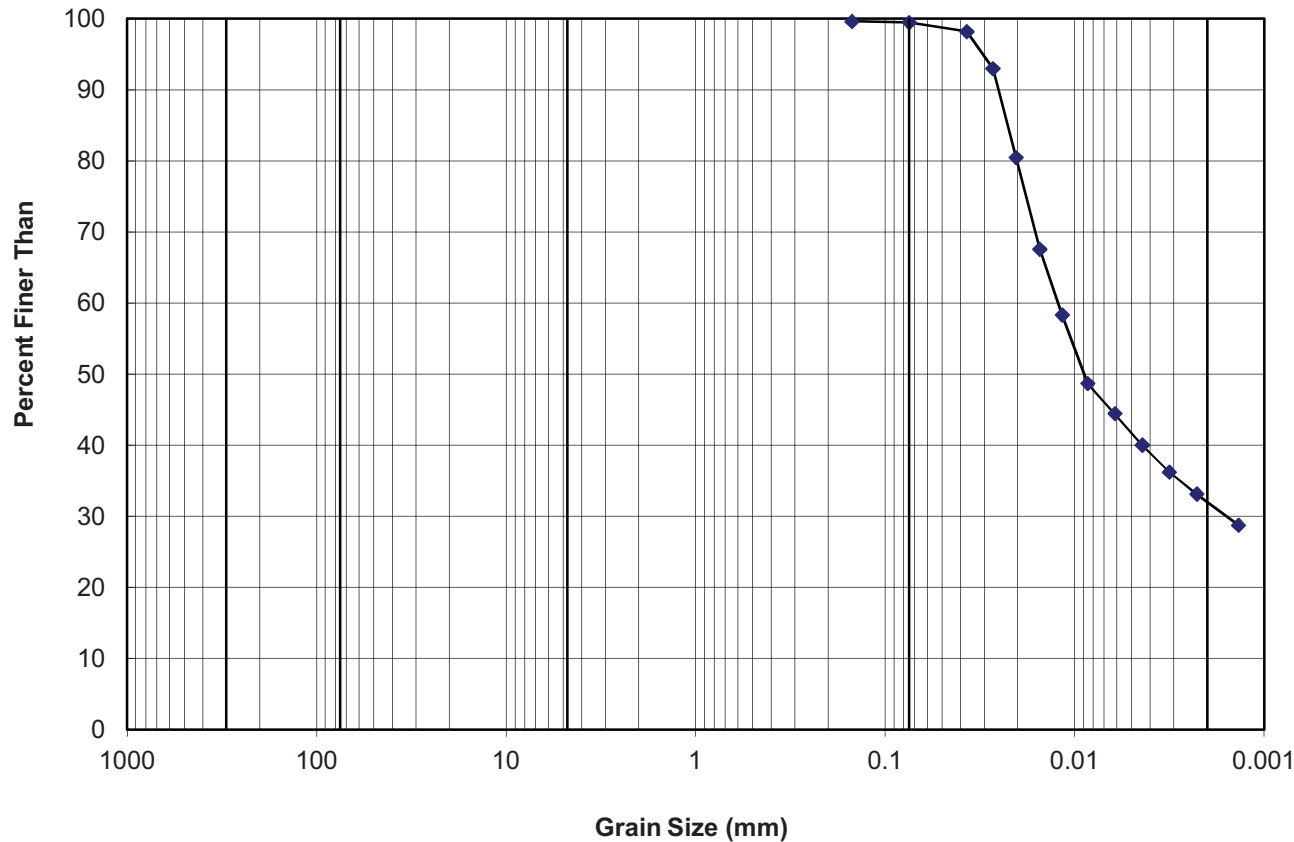
Project #: 11-1362-0057
 Short Title: COS East Riverbank / Cherry Lane - Geotech Investigation / Saskatoon, SK
 Tested by: S.E.
 Borehole #: COS-13-006 Sample #: 006-10
 Source:
 Date Sample Received: September 3, 2013

Phase: 5100 / 4000
 Date: September 16, 2013

Grain Size Analysis Results:

Opening (mm)	Percent Passing (%)
152	100
76	100
38	100
19	100
9.5	100
4.75	100
2.00	100
0.850	100
0.425	100
0.250	100
0.150	100
0.075	99
0.037	98
0.027	93
0.020	80
0.015	68
0.012	58
0.009	49
0.006	44
0.004	40
0.003	36
0.002	33
0.001	29

Graphical Analysis



BOULDERS	COBBLES	GRAVEL		SAND			SILT / CLAY
		Coarse	Fine	Coarse	Medium	Fine	

Comments:

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GRAIN SIZE ANALYSIS - ASTM D422
(Mechanical & Hydrometer)

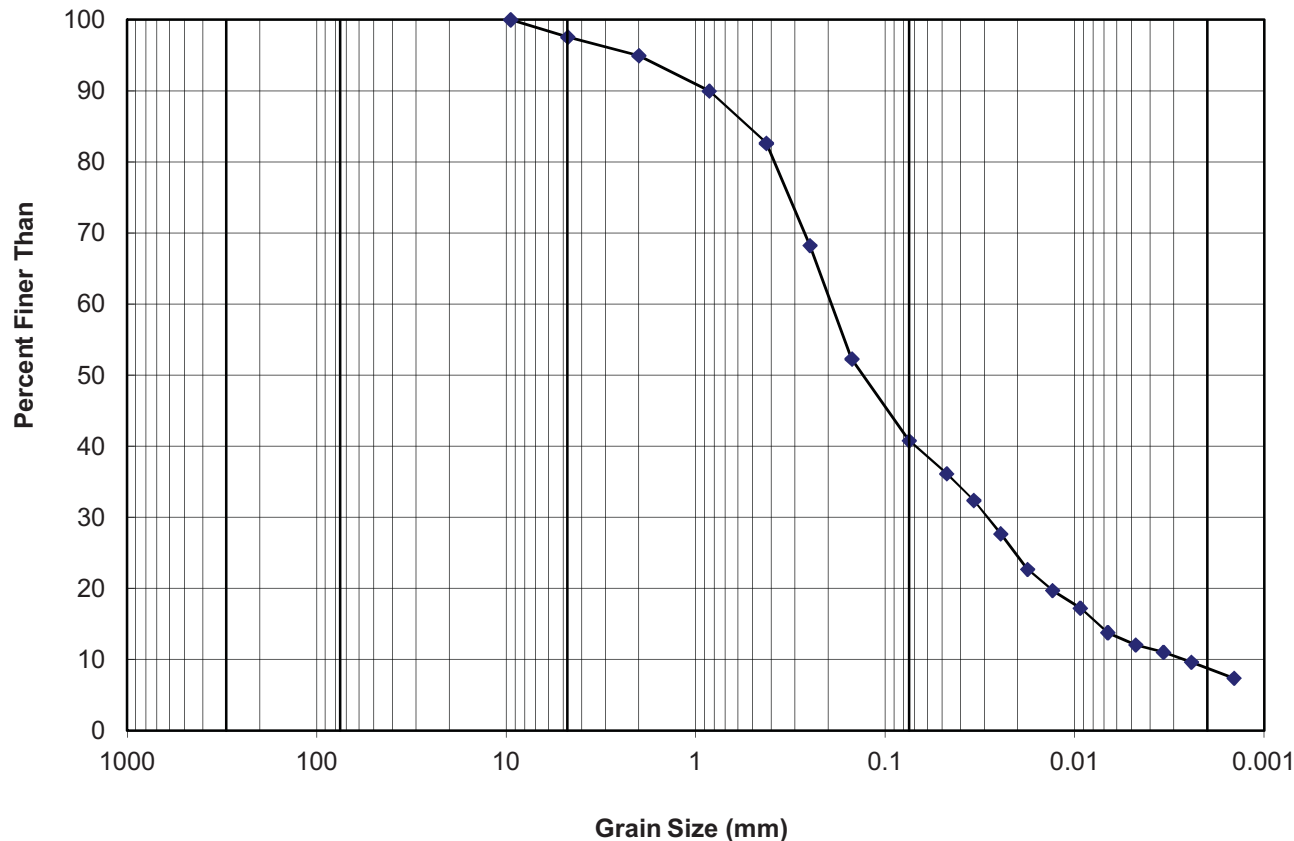
Project #: 11-1362-0057
 Short Title: COS East Riverbank / Cherry Lane - Geotech Investigation / Saskatoon, SK
 Tested by: S.E.
 Borehole #: COS-13-006 Sample #: 006-13
 Source:
 Date Sample Received: September 3, 2013

Phase: 5100 / 4000
 Date: September 16, 2013

Grain Size Analysis Results:

Opening (mm)	Percent Passing (%)
152	100
76	100
38	100
19	100
9.5	100
4.75	98
2.00	95
0.850	90
0.425	83
0.250	68
0.150	52
0.075	41
0.047	36
0.034	32
0.025	28
0.018	23
0.013	20
0.009	17
0.007	14
0.005	12
0.003	11
0.002	9.6
0.001	7.4

Graphical Analysis



BOULDERS	COBBLES	GRAVEL		SAND			SILT / CLAY
		Coarse	Fine	Coarse	Medium	Fine	

Comments:

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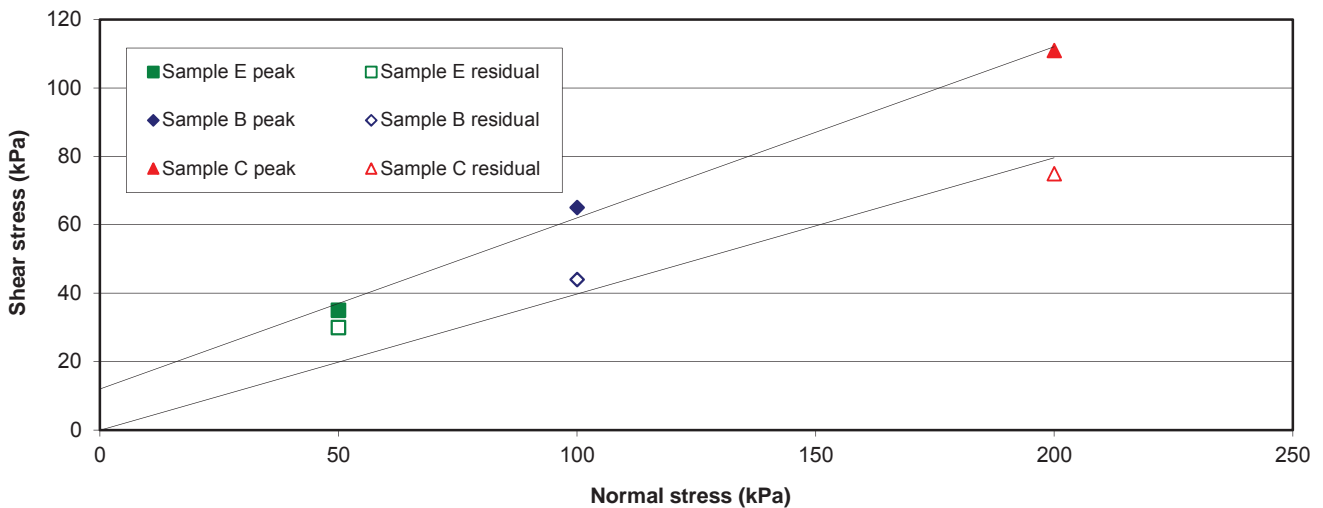
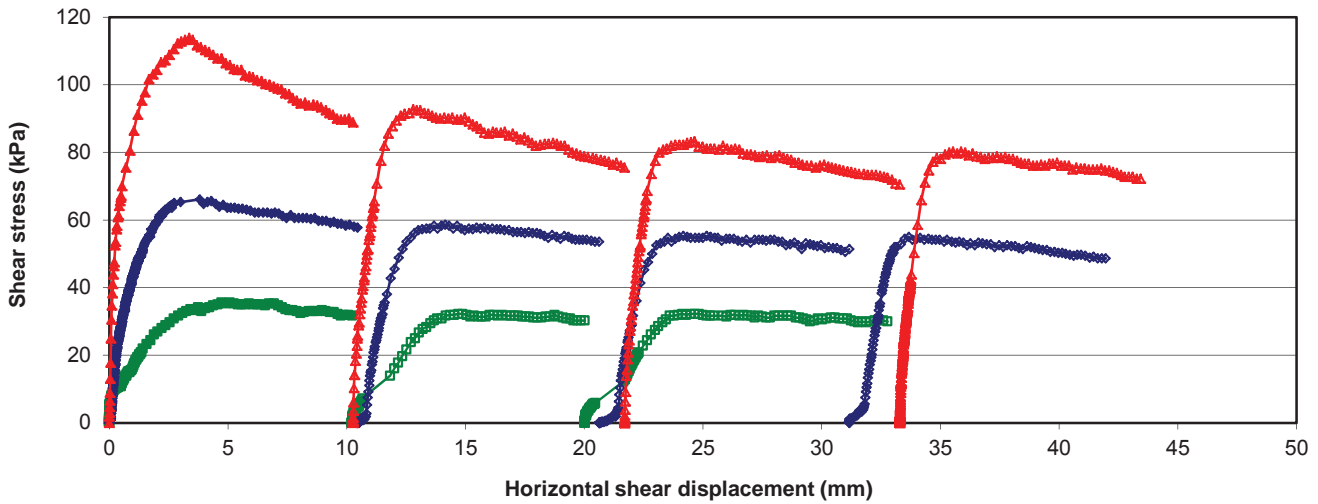


CONSOLIDATED DRAINED DIRECT SHEAR TEST-SUMMARY

Project #: 11-1362-0057	Phase: 5100
Short Title: COS East Riverbank / Cherry Lane - Geotech Investigation Saskatoon, SK	
Tested By: B.Y. / D.B.	Date: August 29, 2013

Sample	Normal Stress (kPa)	Shear Stress Peak (kPa)	Shear Stress Residual (kPa)
COS-13-001B 001B-1	50	35	30
	100	65	44
	200	111	75

Friction angle (degrees):	Peak	Residual
cohesion (kPa):	26.6	21.7
	12	0



Comments:

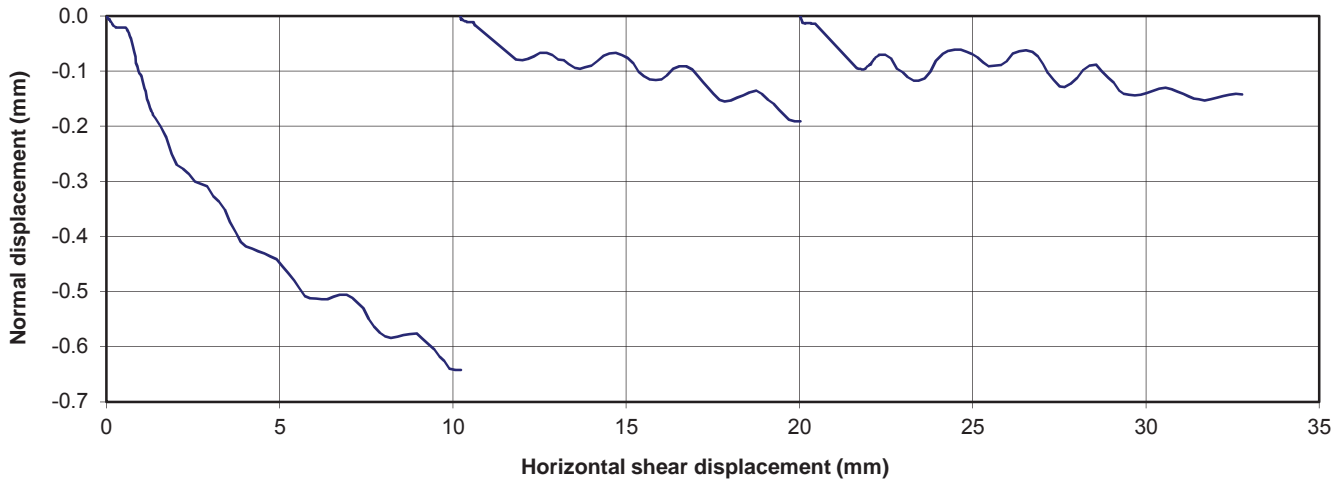
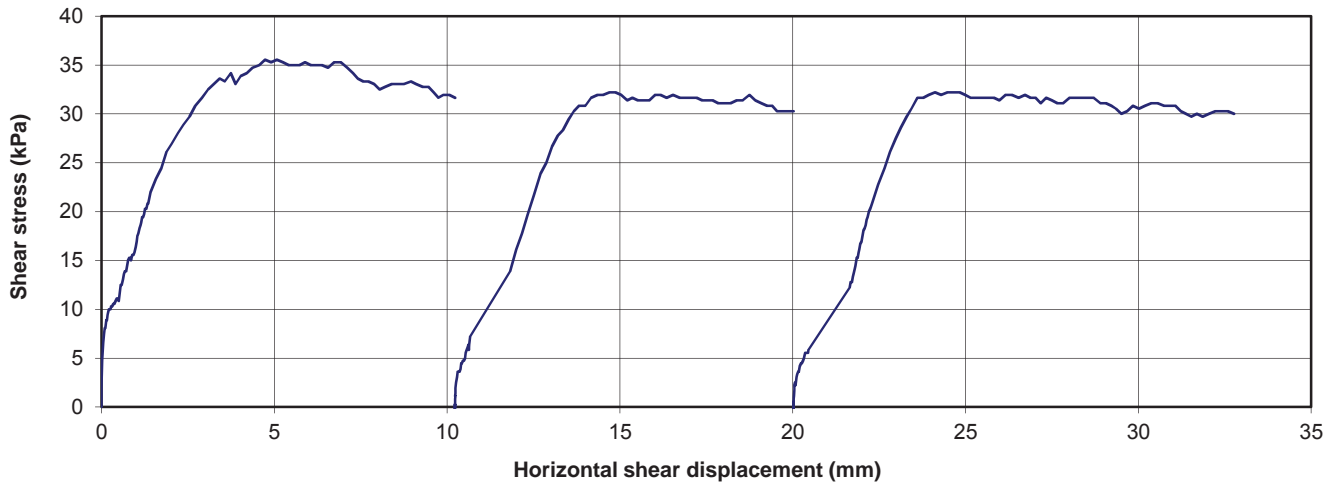
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CONSOLIDATED DRAINED DIRECT SHEAR TEST

Project #: 11-1362-0057 Phase: 5100
 Short Title: COS East Riverbank / Cherry Lane - Geotech Investigation Saskatoon, SK
 Tested By: B.Y. / D.B. Date: August 29, 2013
 Sample: COS-13-001B 001B-1 (REDO#2)

Effective Stress:	50	kPa	Peak Shear Stress:	35	kPa
			Residual Shear Stress	30	kPa
Sample Data:			Comments:		
Sample Length:	60.0	mm			
Initial Height:	20.0	mm			
Initial Water Content:	35.4	%			
Initial Dry Density:	1319	kg/m ³			
Final Water Content:	42.6	%			



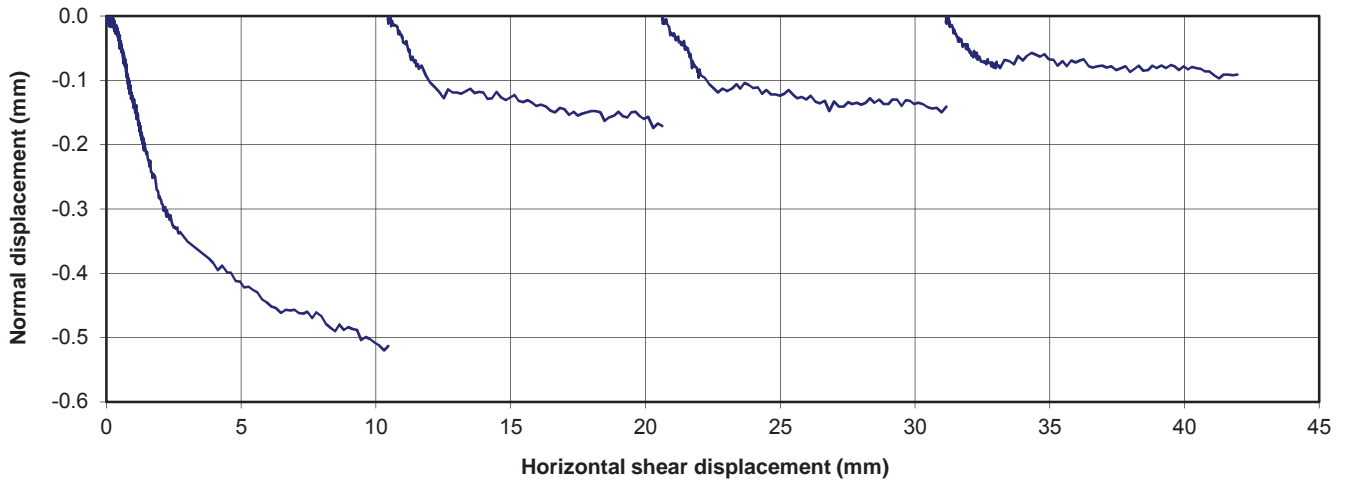
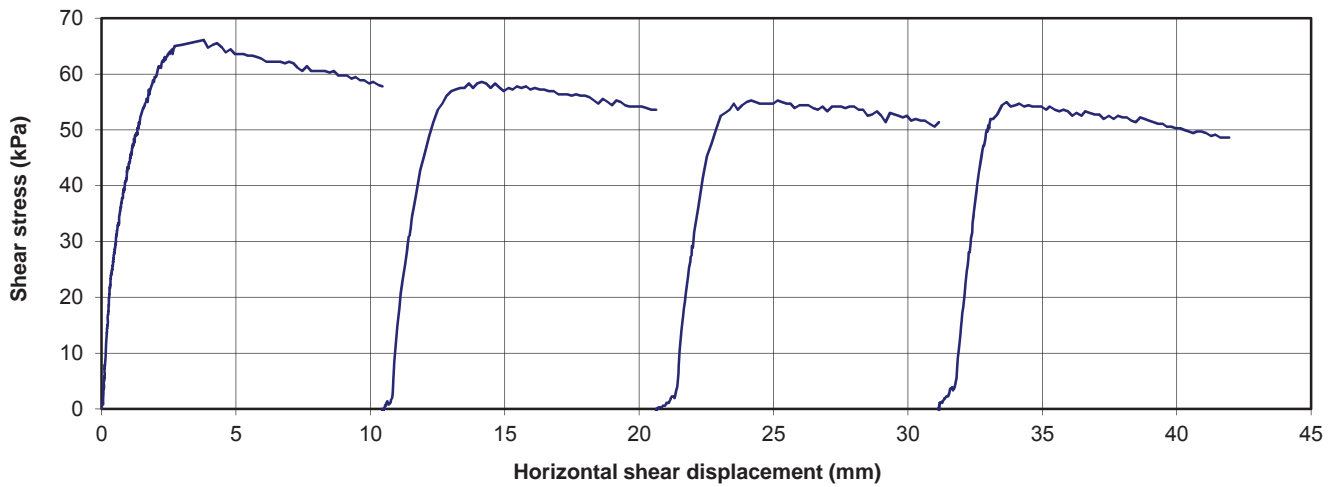
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CONSOLIDATED DRAINED DIRECT SHEAR TEST

Project #: 11-1362-0057	Phase: 5100
Short Title: COS East Riverbank / Cherry Lane - Geotech Investigation Saskatoon, SK	
Tested By: B.Y. / D.B.	Date: August 29, 2013
Sample: COS-13-001B 001B-1	

Effective Stress: 100 kPa	Peak Shear Stress: 65 kPa
	Residual Shear Stress: 44 kPa
Sample Data:	Comments:
Sample Length: 60.0 mm	
Initial Height: 20.0 mm	
Initial Water Content: 35.0 %	
Initial Dry Density: 1349 kg/m ³	
Final Water Content: 40.5 %	



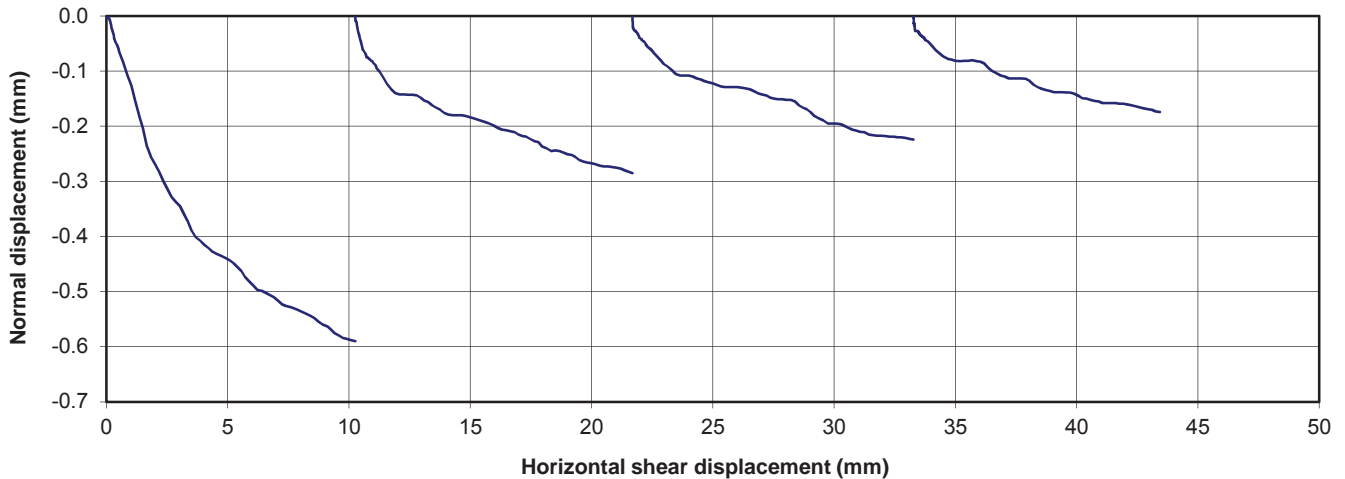
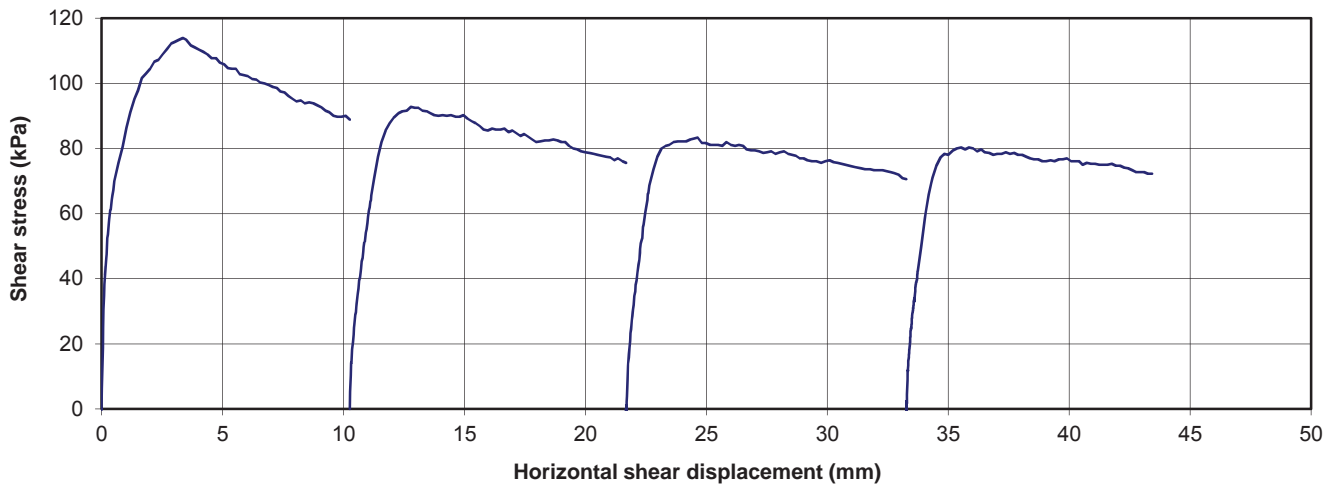
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CONSOLIDATED DRAINED DIRECT SHEAR TEST

Project #: 11-1362-0057 Phase: 5100
 Short Title: COS East Riverbank / Cherry Lane - Geotech Investigation Saskatoon, SK
 Tested By: B.Y. / D.B. Date: August 29, 2013
 Sample: COS-13-001B 001B-1

Effective Stress:	200	kPa	Peak Shear Stress:	111	kPa
			Residual Shear Stress	75	kPa
Sample Data:			Comments:		
Sample Length:	60.0	mm			
Initial Height:	20.0	mm			
Initial Water Content:	36.4	%			
Initial Dry Density:	1337	kg/m ³			
Final Water Content:	35.0	%			



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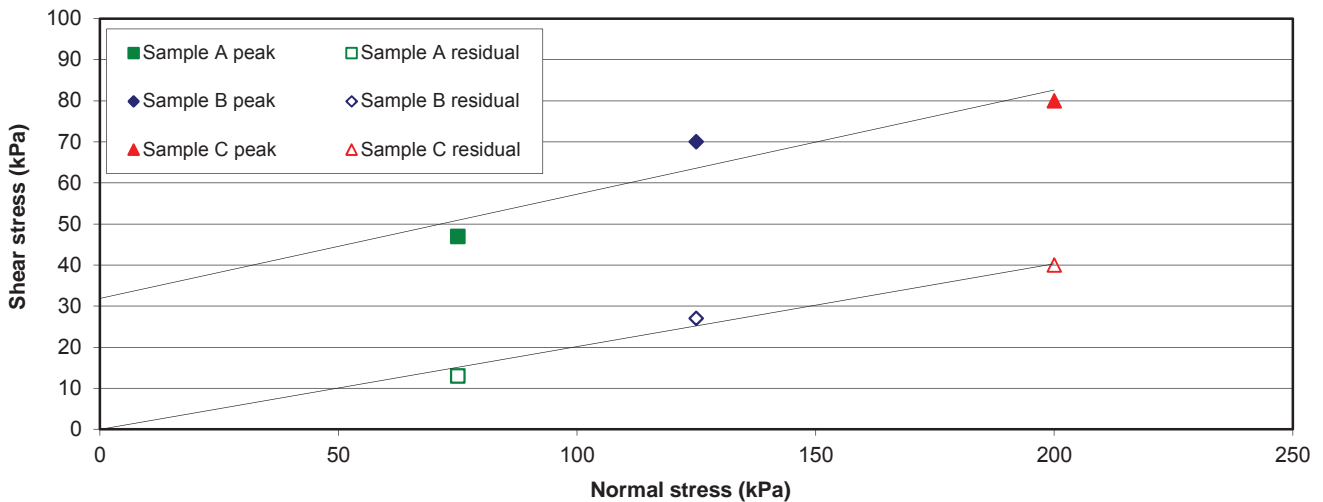
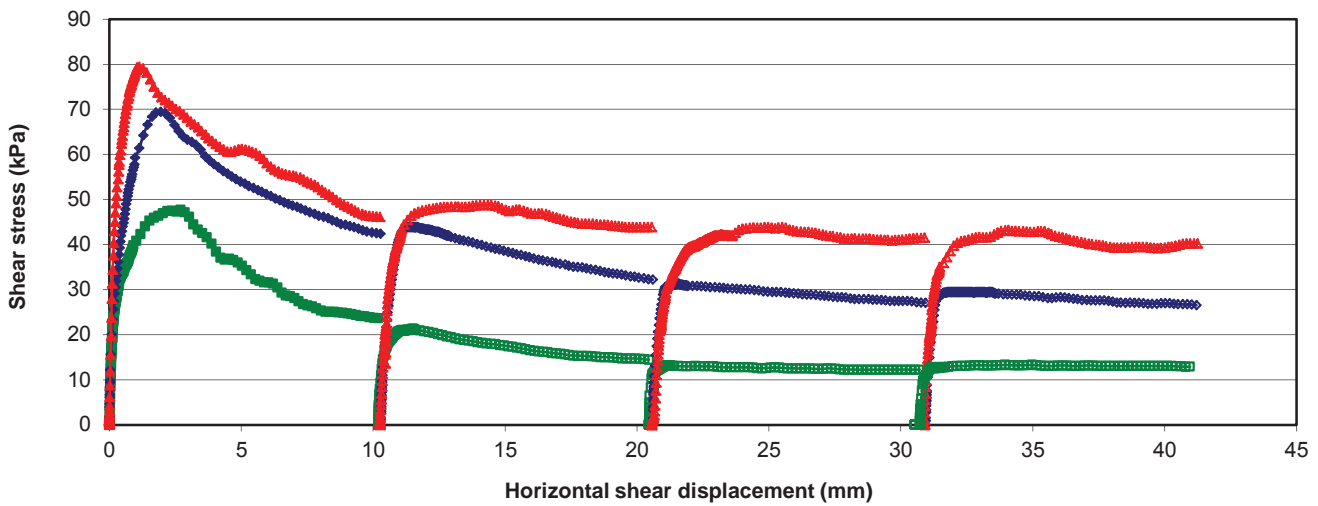


CONSOLIDATED DRAINED DIRECT SHEAR TEST-SUMMARY

Project #: 11-1362-0057 Phase: 5100 / 4000
 Short Title: COS East Riverbank / Cherry Lane - Geotech Investigation / Saskatoon, SK
 Tested By: B.Y. / D.B. Date: November 10, 2013

Sample	Normal Stress	Shear Stress	
	(kPa)	Peak (kPa)	Residual (kPa)
COS-13-004 004-8 7.01-7.62 m depth	75	47	13
	125	70	27
	200	80	40

	Peak	Residual
Friction angle (degrees):	14.2	11.4
cohesion (kPa):	32	0



Comments:

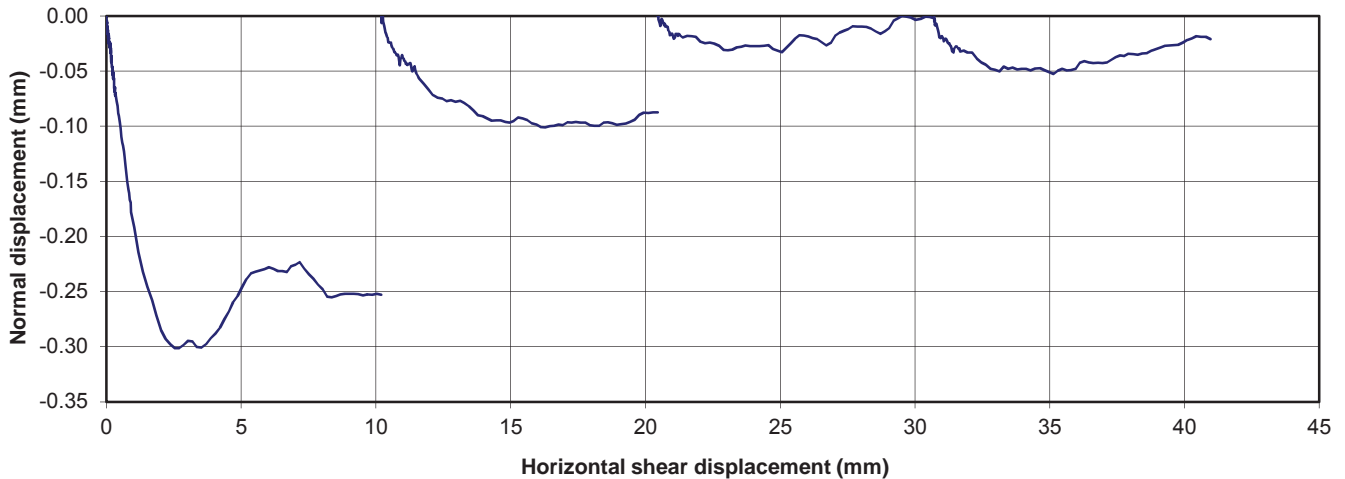
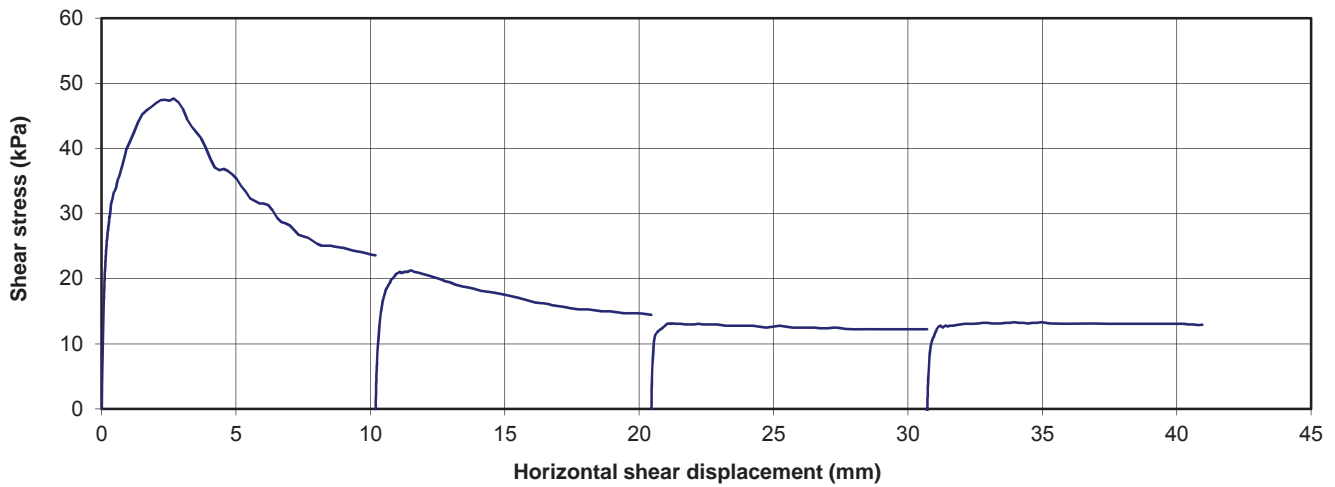
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CONSOLIDATED DRAINED DIRECT SHEAR TEST

Project #: 11-1362-0057 Phase: 5100 / 4000
 Short Title: COS East Riverbank / Cherry Lane - Geotech Investigation / Saskatoon, SK
 Tested By: B.Y. / D.B. Date: November 10, 2013
 Sample: COS-13-004 004-8 7.01-7.62 m depth

Effective Stress:	75	kPa	Peak Shear Stress:	47	kPa
			Residual Shear Stress	13	kPa
Sample Data:			Comments:		
Sample Length:	60.0	mm			
Initial Height:	20.0	mm			
Initial Water Content:	36.8	%			
Initial Dry Density:	1329	kg/m ³			
Final Water Content:	43.6	%			



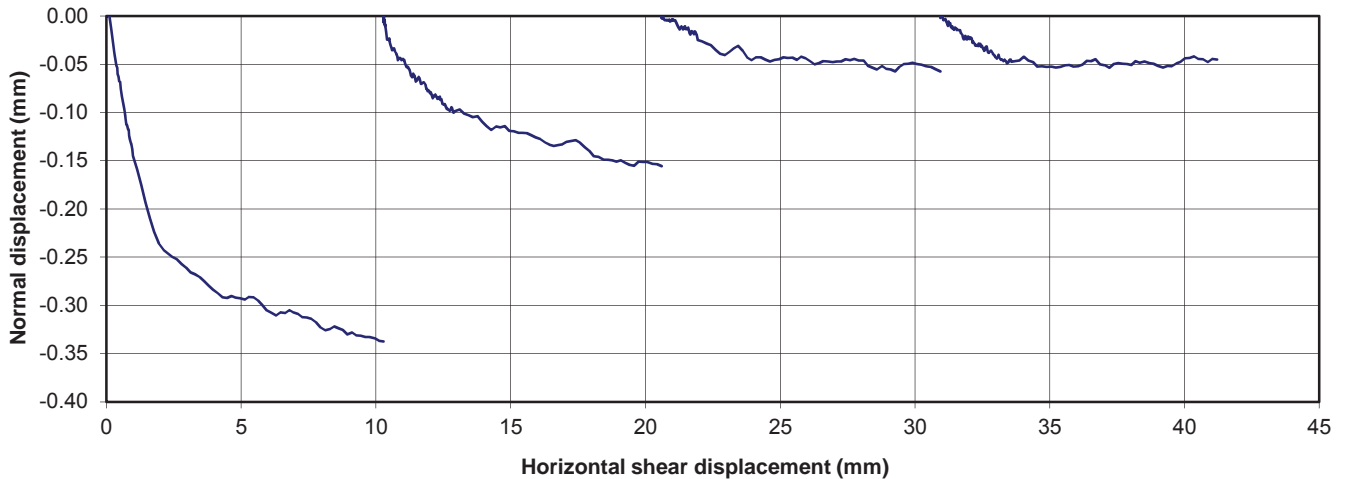
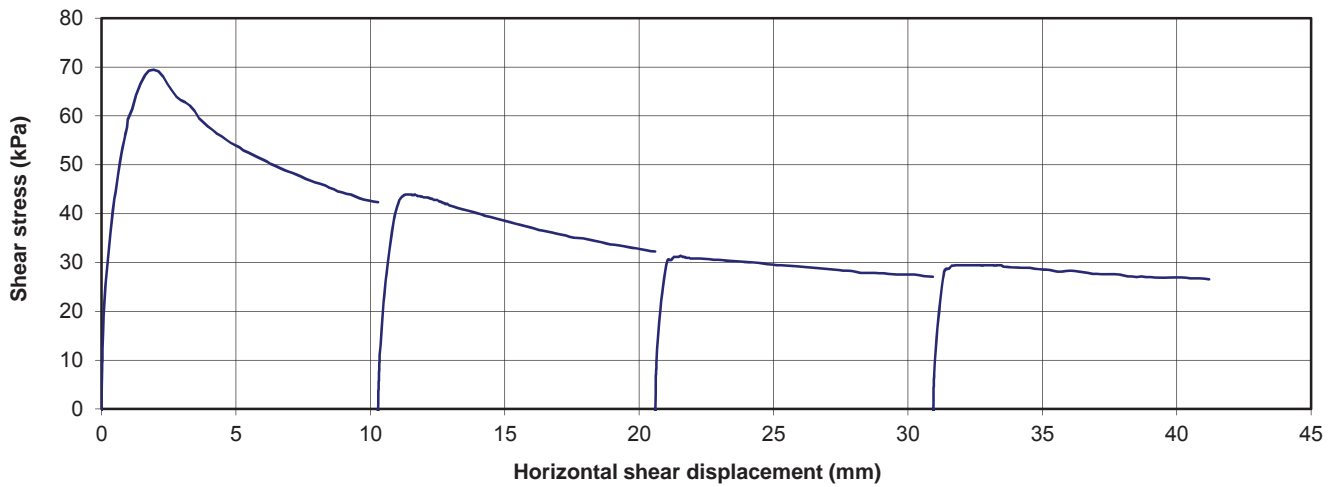
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CONSOLIDATED DRAINED DIRECT SHEAR TEST

Project #: 11-1362-0057 Phase: 5100 / 4000
 Short Title: COS East Riverbank / Cherry Lane - Geotech Investigation / Saskatoon, SK
 Tested By: B.Y. / D.B. Date: November 10, 2013
 Sample: COS-13-004 004-8 7.01-7.62 m depth

Effective Stress:	125	kPa	Peak Shear Stress:	70	kPa
			Residual Shear Stress	27	kPa
Sample Data:			Comments:		
Sample Length:	60.0	mm			
Initial Height:	20.0	mm			
Initial Water Content:	35.0	%			
Initial Dry Density:	1368	kg/m ³			
Final Water Content:	38.6	%			



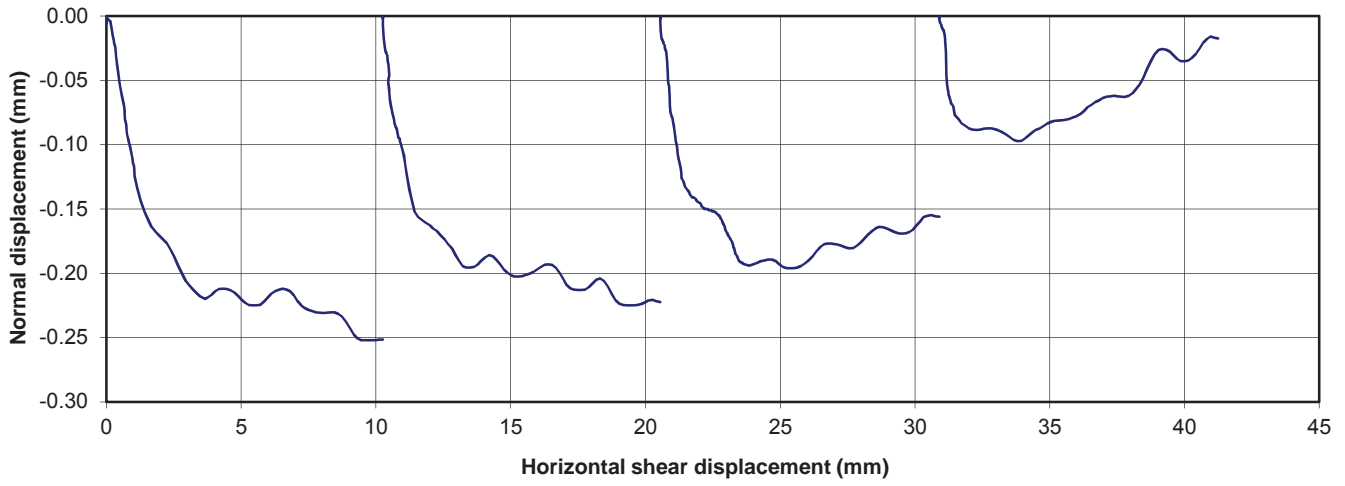
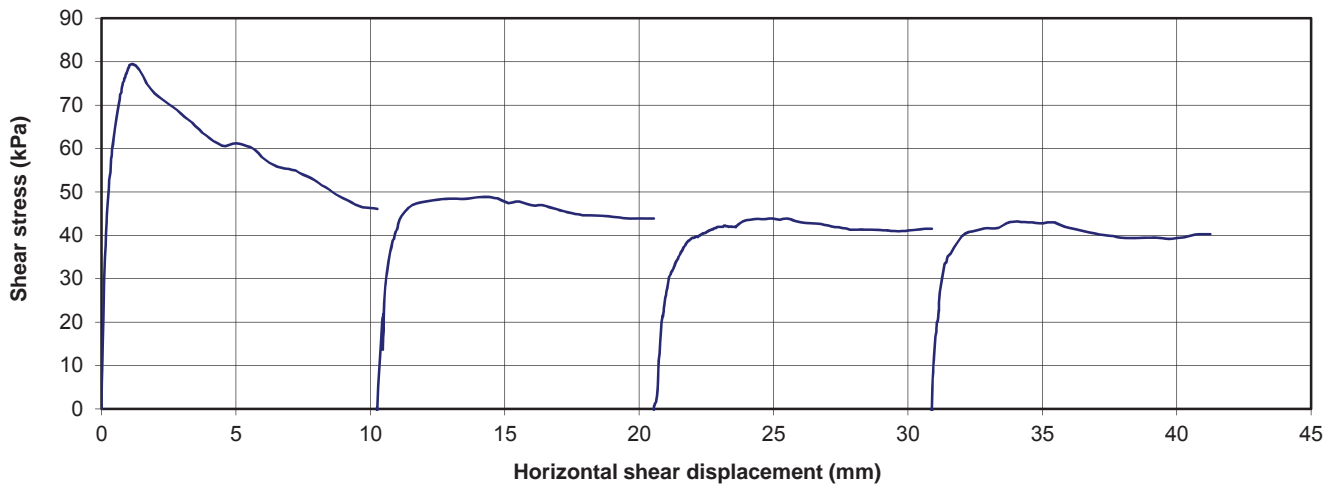
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CONSOLIDATED DRAINED DIRECT SHEAR TEST

Project #: 11-1362-0057 Phase: 5100 / 4000
 Short Title: COS East Riverbank / Cherry Lane - Geotech Investigation / Saskatoon, SK
 Tested By: B.Y. / D.B. Date: November 10, 2013
 Sample: COS-13-004 004-8 7.01-7.62 m depth

Effective Stress:	200	kPa	Peak Shear Stress:	80	kPa
			Residual Shear Stress	40	kPa
Sample Data:			Comments:		
Sample Length:	60.0	mm			
Initial Height:	20.0	mm			
Initial Water Content:	36.8	%			
Initial Dry Density:	1356	kg/m ³			
Final Water Content:	39.0	%			



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CONSOLIDATED DRAINED DIRECT SHEAR TEST-SUMMARY

Project #: 11-1362-0057

Phase: 5100 / 4000

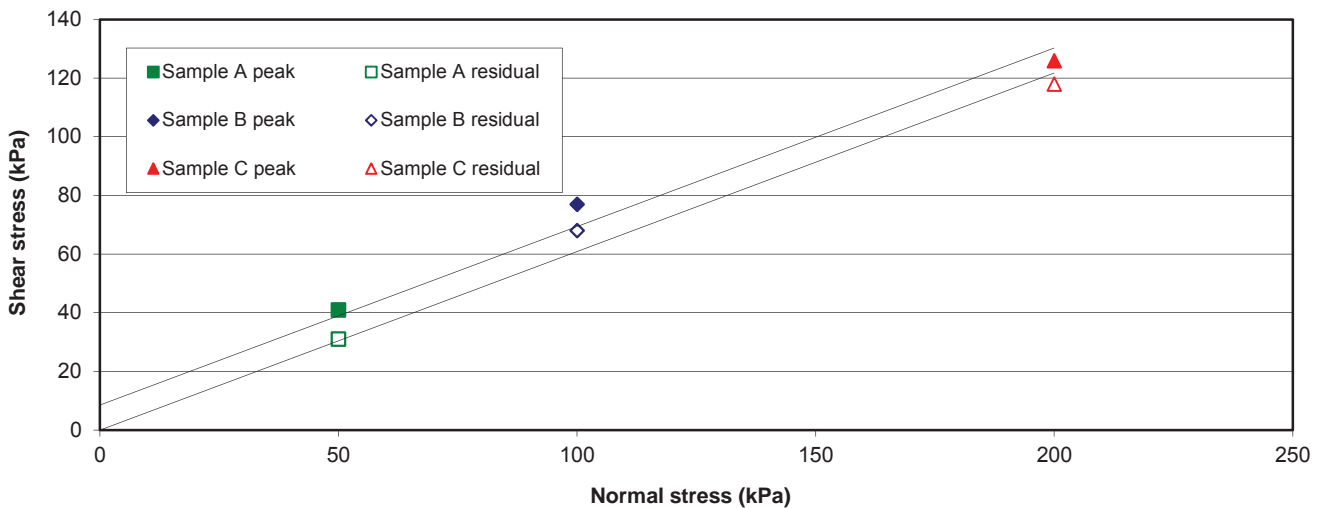
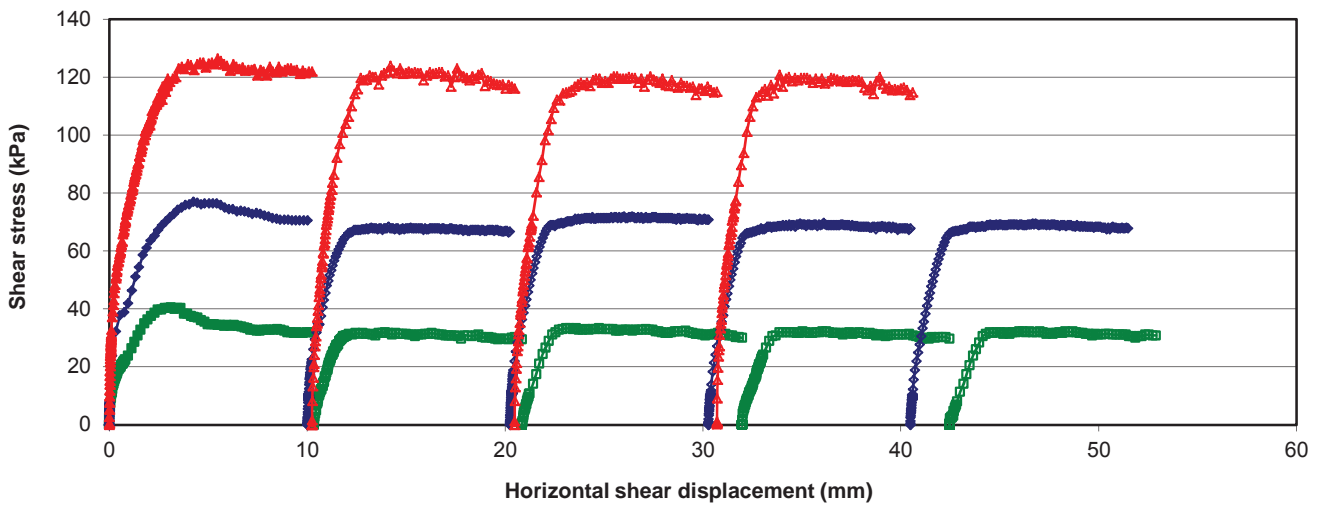
Short Title: COS East Riverbank / Cherry Lane - Geotech Investigation / Saskatoon, SK

Tested By: B.Y. / D.B.

Date: October 22, 2013

Sample	Normal Stress		Shear Stress	
	(kPa)	(kPa)	Peak (kPa)	Residual (kPa)
COS-13-005 005-13 11.43-12.04 m depth	50	41	31	31
	100	77	68	68
	200	126	118	118

	Peak	Residual
Friction angle (degrees):	31.3	31.3
cohesion (kPa):	9	0



Comments:

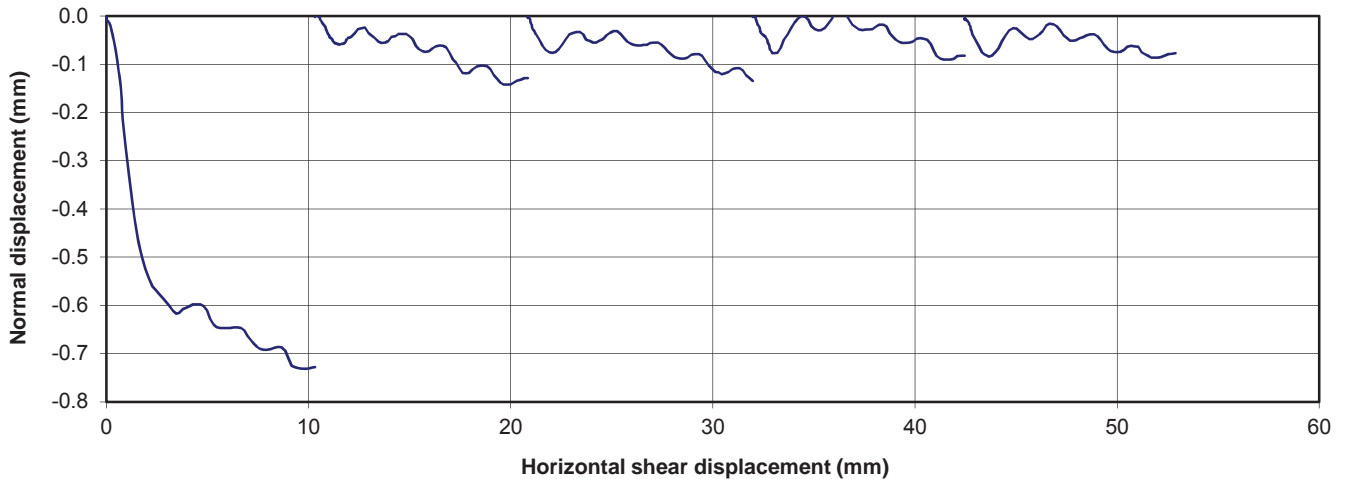
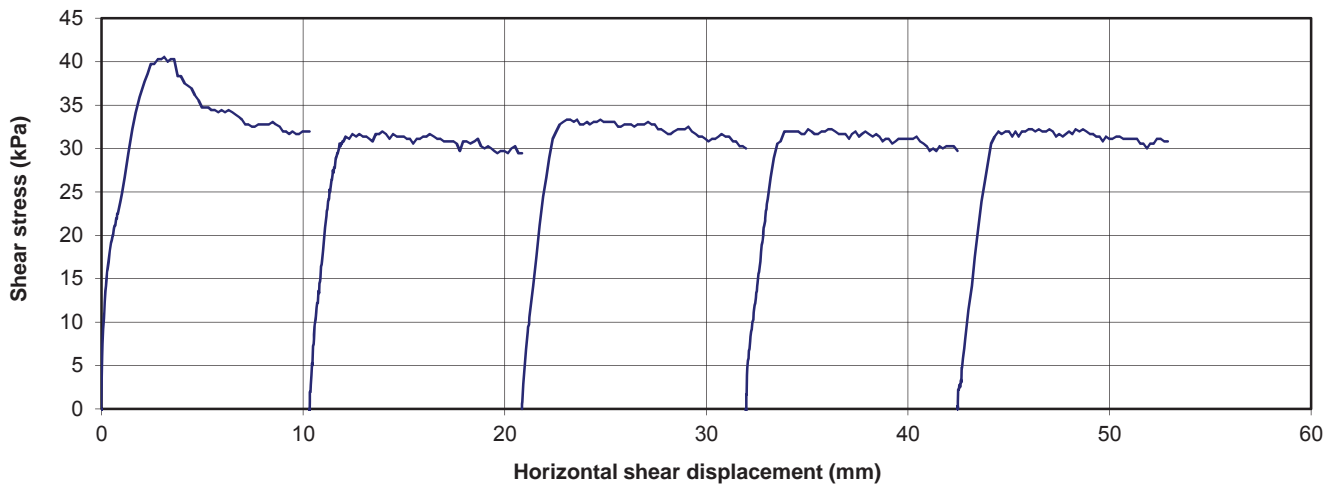
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CONSOLIDATED DRAINED DIRECT SHEAR TEST

Project #: 11-1362-0057 Phase: 5100 / 4000
 Short Title: COS East Riverbank / Cherry Lane - Geotech Investigation / Saskatoon, SK
 Tested By: B.Y. / D.B. Date: October 22, 2013
 Sample: COS-13-005 005-13 11.43-12.04 m depth

Effective Stress:	50	kPa	Peak Shear Stress:	41	kPa
			Residual Shear Stress	31	kPa
Sample Data:			Comments:		
Sample Length:	60.0	mm			
Initial Height:	20.0	mm			
Initial Water Content:	26.2	%			
Initial Dry Density:	1512	kg/m ³			
Final Water Content:	30.9	%			



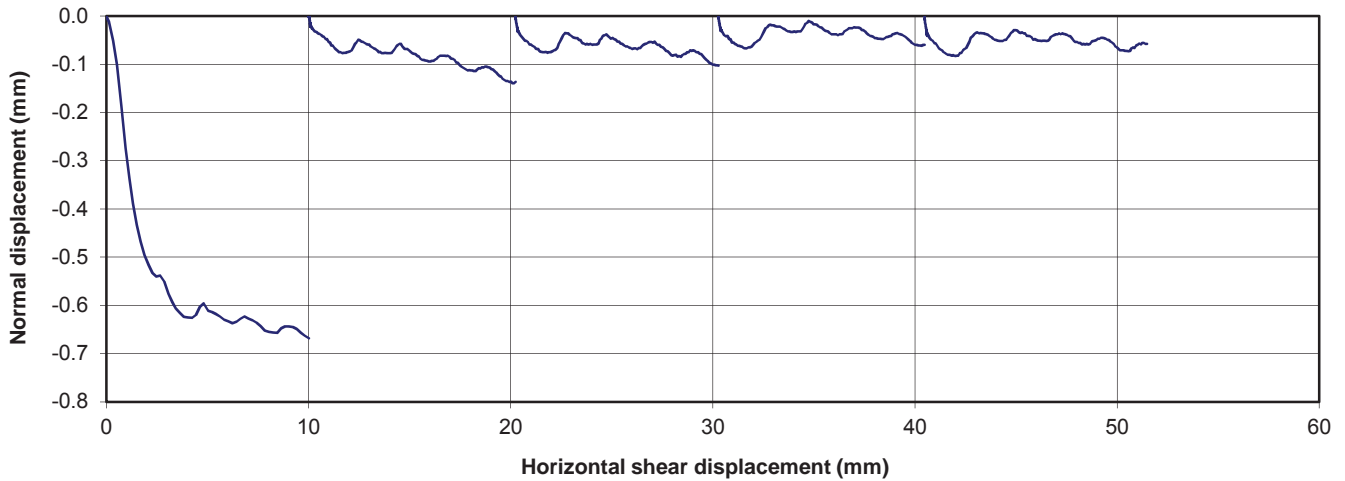
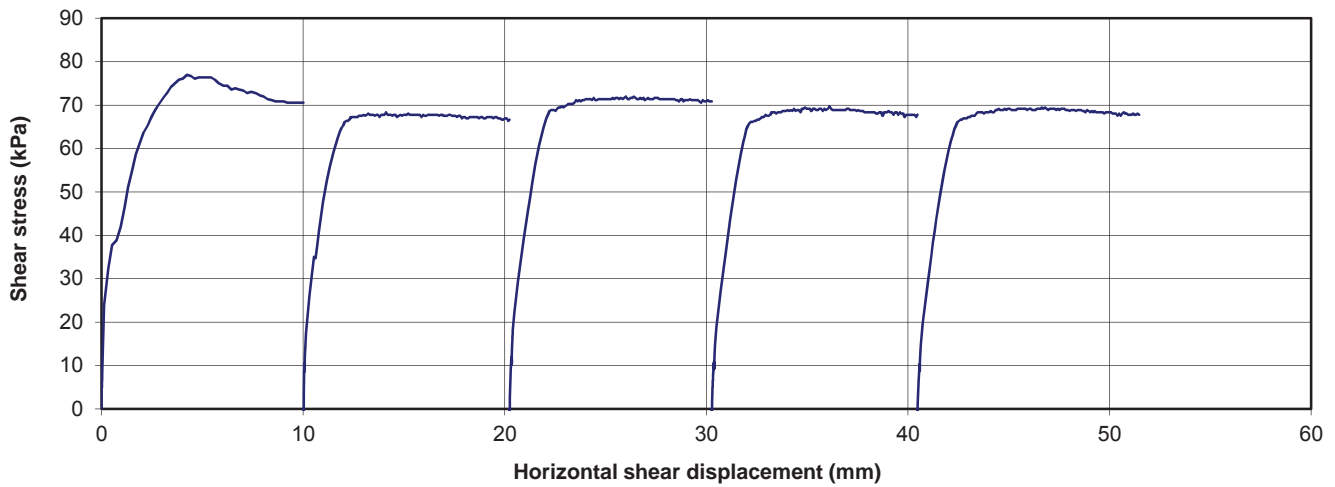
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CONSOLIDATED DRAINED DIRECT SHEAR TEST

Project #: 11-1362-0057 Phase: 5100 / 4000
 Short Title: COS East Riverbank / Cherry Lane - Geotech Investigation / Saskatoon, SK
 Tested By: B.Y. / D.B. Date: October 22, 2013
 Sample: COS-13-005 005-13 11.43-12.04 m depth

Effective Stress:	100	kPa	Peak Shear Stress:	77	kPa
			Residual Shear Stress	68	kPa
Sample Data:			Comments:		
Sample Length:	60.0	mm			
Initial Height:	20.0	mm			
Initial Water Content:	27.2	%			
Initial Dry Density:	1507	kg/m ³			
Final Water Content:	30.2	%			



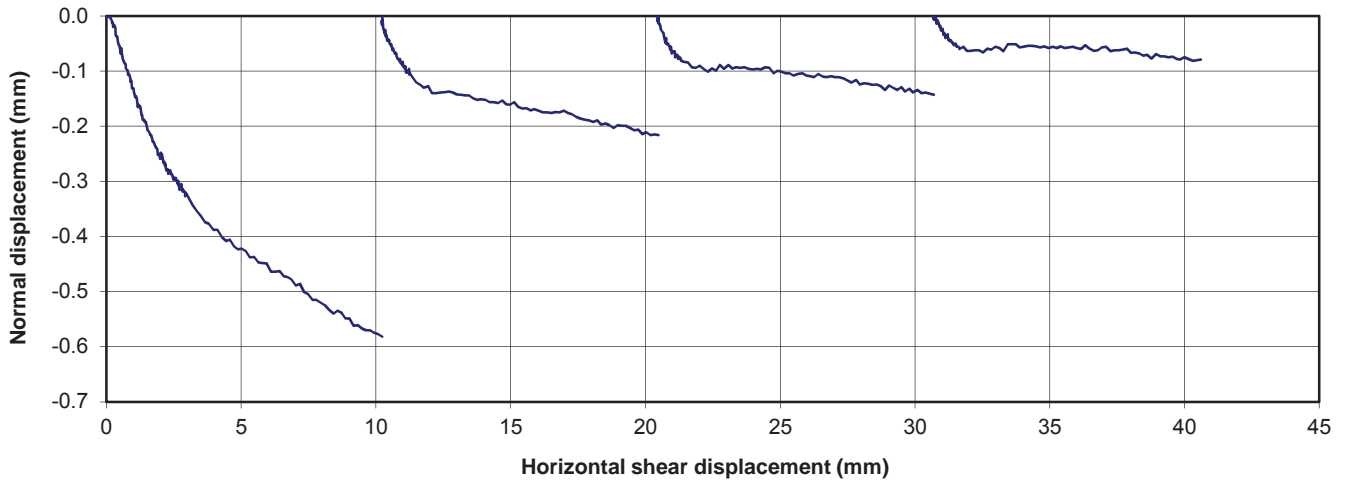
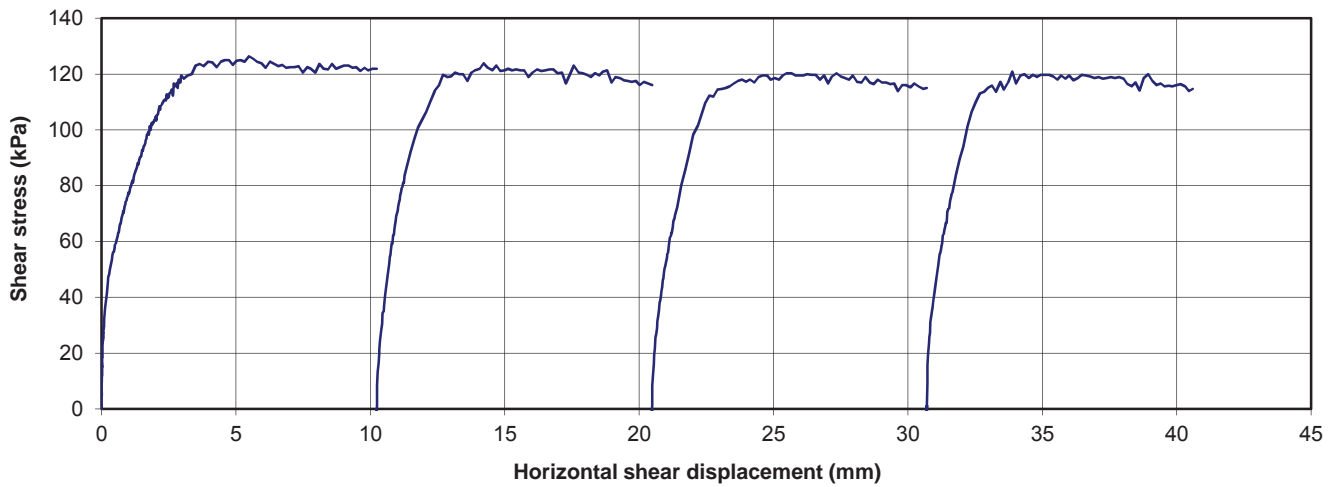
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CONSOLIDATED DRAINED DIRECT SHEAR TEST

Project #: 11-1362-0057	Phase: 5100 / 4000
Short Title: COS East Riverbank / Cherry Lane - Geotech Investigation / Saskatoon, SK	
Tested By: B.Y. / D.B.	Date: October 22, 2013
Sample: COS-13-005 005-13 11.43-12.04 m depth	

Effective Stress: 200 kPa	Peak Shear Stress: 126 kPa	Residual Shear Stress: 118 kPa
Sample Data:	Comments:	
Sample Length: 60.0 mm		
Initial Height: 20.0 mm		
Initial Water Content: 26.4 %		
Initial Dry Density: 1507 kg/m ³		
Final Water Content: 28.5 %		



The testing services reported herein have been performed in accordance with the indicated recognized standard, or in accordance with local industry practice. This report is for the sole use of the designated client. This report constitutes a testing service only and does not represent any results interpretation or opinion regarding specification compliance or material suitability. Engineering interpretation can be provided by Golder Associates Ltd. upon request.



APPENDIX H

Cost Estimates for Conceptual Remediation Options

Conceptual Option	Description	Estimated Cost	Engineering (5-10%)	Monitoring (5%)	Contingency (50%)	Estimated Total Cost	Estimate Assumption (Average Dimensions)	Estimate Basis
1	Do Nothing							
2A	Dewatering - 11th St	\$ 1,760,000	\$ 180,000	\$ 90,000	\$ 880,000	\$ 2,910,000	150 m long x 10 m deep	COS 17th Street (2013) ~\$325K for drainage trench and street repairs, 80 m long x 4 m deep
2B	Dewatering - Cherry Lane	\$ 880,000	\$ 90,000	\$ 50,000	\$ 440,000	\$ 1,460,000	150 m long x 5 m deep	COS 17th Street (2013) ~\$325K for drainage trench and street repairs, 80 m long x 4 m deep
3	Slope Re-grading w/ drainage	\$ 4,000,000	\$ 200,000	\$ 200,000	\$ 2,000,000	\$ 6,400,000	135 m long x 40 m ²	COS 17th Street (2013) ~\$880K for selective site demolition, 2 drainage trenches, landscaping, excavation, 80 m long x 4 m deep x 15 m wide. Does not include purchase or demolition of residential property
4A	Shear Zone Modification - CSM w/ drainage	\$ 5,810,000	\$ 300,000	\$ 300,000	\$ 2,905,000	\$ 9,315,000	10 m long x 6 m deep x 4 m wide; 50 m long x 5 m deep x 13 m wide; 60 m long x 7 m deep x 4 m wide	CSM Slurry Wall ~\$250/m ² or \$2.5M/km (0.9 m wide trench), assume cement cost is 1.8:1 for bentonite, not including platform construction. COS 17th Street (2013) ~\$580K selective site demo, drainage systems and landscaping.
4B	Shear Zone Modification - Shear Key w/drainage	\$ 6,520,000	\$ 330,000	\$ 330,000	\$ 3,260,000	\$ 10,440,000	10 m long x 6 m deep x 4 m wide; 50 m long x 5 m deep x 13 m wide; 60 m long x 7 m deep x 4 m wide	Cosmo Park (2009) ~\$2M for shear key construction, 150 m long x 5 m deep x 6 m wide, assume 7% inflation. COS 17th Street (2013) ~\$500K for 2 drainage systems. Assume \$1.35M for temporary shoring

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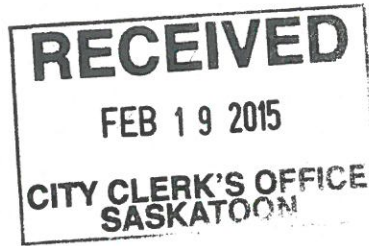
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4250-1



February 19, 2015

Ms. Joanne Sproule
City Clerk
City of Saskatoon
222 3rd Avenue North
Saskatoon, Saskatchewan S7K 0J5

Dear Ms. Sproule:

Re: Saskatoon North Partnership for Growth – 2014 Annual Report

At the February 12, 2015 meeting of the Regional Oversight Committee (ROC) for the Saskatoon North Partnership for Growth (P4G), the ROC passed a resolution as follows:

That the P4G 2014 Annual Report attached as Appendix I be forwarded to the Cities of Warman, Martensville and Saskatoon, the Town of Osler, and the Rural Municipality of Corman Park as well as the Ministry of Government Relations for information.

A copy of the P4G 2014 Annual Report has been attached for your information.

Thank you.

Christine Gutmann
Project Manager, P4G Regional Plan
Saskatoon North Partnership for Growth (P4G)
Phone: 306-986-9734
E-Mail: Christine.Gutmann@saskatoon.ca

Attachment: 2014 P4G Annual Report

cc. Randy Grauer, General Manager, Community Services Department, City of Saskatoon



**SASKATOON NORTH
PARTNERSHIP FOR GROWTH
(P4G)**

2014 Annual Report



www.partnershipforgrowth.ca

ABOUT THE SASKATOON NORTH PARTNERSHIP FOR GROWTH (P4G)

The Saskatoon North Partnership for Growth (P4G) is a collaborative which includes political and administrative representation from the partnering municipalities. The partnering municipalities are the Cities of Warman, Martensville and Saskatoon, the Rural Municipality of Corman Park and the Town of Osler, as well as an advisory representative from the Saskatoon Regional Economic Development Authority (SREDA).

The Work Plan for the P4G consists of the development of a Regional Plan by June 2016.

For information about the P4G, please contact: Christine Gutmann, Project Manager, Regional Plan at christine.gutmann@saskatoon.ca or by phone at (306) 986-9734.

P4G Membership

The P4G membership is comprised of two committees: a P4G Regional Oversight Committee (ROC) and a P4G Planning & Administration Committee (PAC).

The Regional Oversight Committee (ROC)

The ROC provides direction on matters of regional importance, particularly those involving a financial commitment and for setting priorities for the P4G. The ROC consists of political representatives and senior management from each of the P4G member municipalities.

The voting members of the ROC consist of three (3) Council members from each of the participating municipalities, one of which is Reeve or Mayor. The ROC operates as a simple majority with each participating municipality receiving one vote. As of December 2014, the voting members of the ROC, listed in alphabetical order by last name, were:

Mayor Donald Atchison (Saskatoon)	Reeve Judy Harwood (Corman Park)
Councillor Richard Beck (Warman)	Councillor Terry Kostyna (Martensville)
Councillor Bob Blackwell (Martensville)	Mayor Kent Muench (Martensville)
Councillor Susan Braun (Osler)	Councillor Eric Olauson (Saskatoon)
Mayor Ben Buhler (Osler)	Councillor Gary Philipchuk (Warman)
Councillor Randy Donauer (Saskatoon)	Councillor Abe Quiring (Osler)
Councillor Bas Froese-Kooijenga (Corman Park)	Mayor Sheryl Spence (Warman)
Councillor John Germs (Corman Park)	

The independent chair of the ROC is Mr. Alex Fallon, President and CEO, SREDA.

For the 2015 year, ROC meetings will be held on February 12, April 30, September 10 and November 19. Further information about these meetings is available on the Regional Plan project website at www.partnershipforgrowth.ca.

The Planning and Administration Committee (PAC)

With its focus on the growth and promotion of strong regional planning, the PAC is comprised of up to three (3) administration representatives from each of the participating municipalities, as well as a SREDA advisory representative. The PAC operates on a consensus basis. In the case where a consensus is not obtained, an item may be referred to the ROC for a decision. As of December 2014, the members of the PAC, listed in alphabetical order by last name, were:

Joe Doxey (Martensville)	Rebecca Row (Corman Park)
Bonnie Gorelitz (Martensville)	Brad Toth (Warman)
Laura Hartney (Saskatoon)	Kelby Unseth (Corman Park)
Dana Kripki (Saskatoon)	Nicole Vassos-Hustej (SREDA)
Sandra MacArthur (Osler)	

DEVELOPMENT OF A REGIONAL PLAN

Why a Regional Plan?

The latest projections show the Saskatoon region nearing a population of 500,000 in the next 20 years. Given the economic climate, we anticipate the Saskatoon region could achieve a population of one million in the next 60 years.

We want our region to be ready for growth, to enable economic prosperity for everyone, and support the quality of life that we enjoy. This has reinforced the need for a more coordinated approach to regional planning and servicing. To this end, the P4G partnering municipalities are developing a long term plan for land use and servicing that is regional in scope. The Regional Plan is anticipated to be complete by June 2016.

Project Overview

The Regional Plan will establish a coordinated approach to matters related to the physical, social, or economic circumstances of the Saskatoon region that may affect the development of the region as a whole, such as land use, population, transportation, utilities, services and finances.

On October 23, 2014, the P4G announced that O2 Planning + Design Inc. from Calgary, Alberta has been selected to complete the Regional Plan. The project will be completed in three phases:

Phase 1 – Vision Development and Background Report (November 2014 – April 2015)

This phase involves the development of a vision and guiding principles for the Regional Plan. A background report for the Region will also be completed during this phase.

Phase 2 – Interim Development Strategy, Draft Regional Plan (February 2015 – February 2016)

This phase involves the development of a concept for regional land use. An interim development strategy will provide guidance to municipalities on potential long-term land uses while the Regional Plan is in development. This strategy will be used as a basis for a more refined Regional Land Use Map and supporting policies in the draft Regional Plan. A Servicing Strategy will also be developed.

Phase 3 – Implementation Plan for Regional Growth Accommodation (January 2016 – June 2016)

During this phase, the draft Regional Plan will be refined based on feedback received and a strategy will be created to identify how the plan should be implemented and managed over the long term.

2014 ACHIEVEMENTS

The P4G has attained a number of major achievements during the 2014 year. These achievements included:

Endorsement of the P4G Foundational Documents on April 24, 2014

The ROC endorsed the P4G Foundational Documents on April 24th, 2014. The Foundational Documents set the foundation for P4G and provide the framework for the development of the Regional Plan for the Saskatoon region. The documents were subsequently endorsed by each of the five member municipal Councils in May and June 2014.

Consultant Selection for the Development of a Regional Plan and Hiring of a Dedicated Project Manager for P4G

On October 2, 2014, the ROC selected O2 Planning + Design Inc. for the development of the Regional Plan. A press conference announcing the hiring of O2 Planning + Design Inc. was held on October 23, 2014 at the RM of Corman Park Administrative Offices. In addition, in July 2014, the P4G hired a dedicated project manager for the development of the Regional Plan.

Regional Plan Visioning Workshop with O2 Planning + Design Inc. on December 17, 2014

On December 17, 2014, the P4G members participated in a Regional Plan Visioning Workshop with O2 Planning + Design Inc. The intent of the workshop was to develop a regional vision, guiding principles and objectives to guide the Regional Plan. The finalized vision and guiding principles will be available in February 2015.

ANTICIPATED MILESTONES FOR 2015

A number of major milestones are anticipated during the 2015 year including:

1. Finalized Regional Plan Vision and Guiding Principles – February 2015
2. Background Report – February / March 2015
3. Interim Development Strategy – April / May 2015
4. Draft Regional Land Use Map, Regional Servicing Strategy and Development Policies – November 2015

REGIONAL PLAN PROJECT FINANCIALS

PROJECT FUNDING

Funding for the development of the Regional Plan was endorsed by each of the partner municipalities as follows:

MUNICIPALITY	2014 FUNDING CONTRIBUTION	2015 FUNDING CONTRIBUTION	2016 FUNDING CONTRIBUTION	TOTAL FUNDING CONTRIBUTION
Saskatoon	\$206,000	\$60,000	\$30,000	\$296,000
Corman Park	\$100,000	\$50,000	\$50,000	\$200,000
Warman	\$50,000	\$75,000	\$75,000	\$200,000
Martensville	\$50,000	\$75,000	\$75,000	\$200,000
Osler	\$10,000	\$10,000	\$10,000	\$30,000
TOTAL	\$416,000	\$270,000	\$240,000	\$926,000

*Assumes no funding from Province of Saskatchewan

**Project funding provides for the Regional Plan Consultant and a dedicated Project Manager

PROJECT COSTS

Proposed Project Budget endorsed as part of Foundational Documents

ITEM	ESTIMATED TOTAL PROJECT COST
Consultant for the Development of the Regional Plan	\$686,000
Dedicated Project Manager	\$240,000
TOTAL	\$926,000

* Costs to not include any in-kind costs contributed by P4G or the participating municipalities.

O2 Planning + Design Inc. Project Pricing

ITEM	TIMELINE	COST
Project Management	November 2014 – June 2016	\$39,400
Phase 1	November 2014 – April 2015	\$125,120
Phase 2	February 2015 – February 2016	\$300,760
Phase 3	January 2016 – June 2016	\$125,540
Disbursements	November 2014 – June 2016	\$59,082
	TOTAL	\$649,902

2014 PROJECT COSTS

ITEM	COST
O2 Planning + Design Consulting Fees –December 2014	\$39,430.05
Project Manager	\$43,354.06
TOTAL	\$82,784.11

*Consulting Fees noted do not include GST

TO: Executive Committee; City Council
FROM: Executive Director/CEO, AGS (Remai Modern)
DATE: March 9, 2015
SUBJECT: Remai Modern – Business Plan 2015 -2019

RECOMMENDATION: 1) that the Remai Modern Business Plan: 2015 to 2019 be received as information;
2) that the approval and phased implementation of The Remai Modern Business Plan: 2015 to 2019 occur on an annual basis through the Corporate Business Plan and Budget review process;

Introduction

In March of 2014, MNP LLP (“MNP”) was engaged by Remai Modern to work with staff to complete a revision and update of its business plan to ensure valid and updated financial and operating assumptions, which incorporate the Gallery’s brand and vision, are articulated in one document. The MNP plan was delivered in May 2014. The Gallery then went through a rigorous process of checking figures in the budgets, with the aim of finding significant cost reductions, driven partly by pressures in the City’s proposed funding plan for the years 2015 to 2018. More than \$3,000,000 of savings was made over the 2015 – 2016 operating budgets from the MNP plan. Our budget projections now align with the City’s proposed funding plan. The Board of Remai Modern approved the Business Plan and financial projections at its September, 2014 meeting. The 2015 Remai Modern budget was approved by City Council in December 2014.

The attached Business Plan incorporates the MNP report and is solely focused on the operations of Remai Modern. It does not include the cost of operating the Mendel Art Gallery in 2015, the year when the accounts for Remai Modern and Mendel Art Gallery were split. The total City contribution to funding both Mendel Art Gallery and Remai Modern is \$3,661,099 in 2015 and \$5,038,800 in 2016.

REMAI MODERN is becoming... Business Plan 2015 -2019

“The Remai Modern Art Gallery of Saskatchewan will help shape the destiny of this fine city and play a definitive role in the province’s image and character. This impressive facility will be a flagship in our cultural tourism assets and I am certain widespread benefits will be realized.”

– Mary Taylor-Ash, CEO, Tourism Saskatchewan

Remai Modern is becoming...

- the civic heart of a revitalized River Landing
- a reflection of a vibrant, modern Canadian city
- a driver of increased economic activity, improved quality of life and enhanced community engagement

The Remail Modern brand was officially launched in June 2014. As the brand and related vision impact all operational aspects of the Gallery, a new business plan that both reflects the brand promise and articulates its impacts was required. In March of 2014 MNP LLP (“MNP”) was engaged to complete a revision of the business plan to ensure valid and updated assumptions, which incorporate the Gallery’s brand and vision, are articulated in one document. A critical factor in their assessment was the scale of Remail Modern, at close to 5 times the size of the Mendel Art Gallery, and its relation to running costs. The Remail Modern Business Plan is based on extensive research and is a comprehensive and fully integrated 5-year plan based on principles of best business practice.

Key Points

1. The plan has been developed to maximize revenues, while providing sufficient operating funds to ensure success. Through investment in staff and promotion of the gallery and its programs from 2015, Remail Modern is expected to raise 42% of its annual operating costs from fundraising and earned revenues by 2019, up from 23% in 2015
2. All budgets in the MNP approved Business Plan were rigorously checked by the gallery CEO and Director of Finance, with a view to reducing costs. Importantly the forecast City contribution reduces in percentage terms of annual budget to 58% by 2019. This compares favourably with 2015, where the City contribution is 77% of annual budget
3. MNP were tasked with researching and independently validating all assumptions, costs and revenues in the plan. As part of the process they undertook a Human Resources audit, to determine appropriate staffing levels and costs. Where possible new staff positions were deferred, so that the recommended 49.55 FTE staff count is not reached until 2018. The projected FTE count at opening is 46.55
4. The Remail Modern staffing and organizational structure recommendations have been developed through a conservative approach, both respecting the realities of publically funded organizations and ensuring that recommended staff levels can deliver the Remail Modern vision. The resulting staffing proposal is a reflection of what is required at a base level to operate the Remail Modern as outlined in the Business Plan. Compared to other galleries the projected salaries, as a percentage of operating budget, are conservative, being 36% for the Remail Modern as opposed to 45.6% average for similar galleries in Canada
5. With the support of the Marketing department self-generated revenue, increases from \$526,000 in 2014 by six times to \$3,000,000 in 2019. The

majority of these projected revenues will result from the establishment of an ongoing Development Department. The increase has been validated by MNP and results from food services, events and admission revenue, donor programs, legacy gifts, sponsorships, memberships and grants

6. It is important that Remai Modern generates revenues to support and sustain operations and a modest admission charge to parts of the Gallery supports this goal. The charge compares favorably to other facility charges in Saskatoon and other galleries across Canada. In addition to generating revenue, an admission charge also drives other important initiatives for Remai Modern. For example, an admission charge will provide a quantifiable and tangible reason for Saskatoon individuals and families to purchase an annual membership to Remai Modern. An admission charge also provides Remai Modern with a valuable marketing tool, especially related to children's attendance, and will be a key component to drive sponsorships and build links between the gallery, business, and the community. An admission charge indicates a quantifiable value that can be linked to many tourism initiatives. National and international tour-operators work on the basis of charging a percentage of the admission cost to venues. As this is an important component of their revenues they do not organize tours to free facilities
7. Free admission will be provided to the entire ground floor, including atrium, large ground floor exhibition gallery, store, restaurant, washrooms, patio and sculpture garden. The ground floor will also provide access to the Parkade and Persephone Theatre
8. \$645,000 of 2019 revenues are projected to come from general admission charges based on a framework as follows:
 - (a) Securing sponsorships to provide free admission to exhibitions for children less than 13 years of age and free admission to exhibitions one evening a week for everyone.
 - (b) A general admission charge of \$12 and \$10 for students and seniors
9. While MNP have projected an annual attendance of 220,000 visitors to Remai Modern, the general charge will only apply to 30,000 visitors. It is important to note that the percentage of visitors who will be charged general admission is only 13.6%. The rest are covered through free admission, memberships, and facility users who will pay by other means, such as event bookings and attendance at concerts, lectures and classes.
10. Anticipated operating hours at Remai Modern are 10 a.m. – 6 p.m. Sunday, Tuesday and Thursday and 11:00 a.m. – 8:00 p.m. Wednesday, Friday and Saturday. When compared against Canadian galleries, Remai Modern will be open more hours per week than the average.

Remai Modern Brand Plan.

Remai Modern, through its brand, will deliver an exceptional and unprecedented level of service to the Saskatoon community and will add significantly to the brand capital of Saskatoon and Saskatchewan. The Gallery will be recognized as one of the top art galleries in Canada and will be a major driver of the Saskatoon tourism market and as such a catalyst for economic growth in the city.

The business plan identifies Tourism Saskatoon and Tourism Saskatchewan as major partners. Tourists are expected to contribute significantly to earned revenues, therefore a strong marketing plan and effective execution of the plan will be key success factors for the new Gallery. By 2019 the Marketing budget as a percentage of total annual expenses is projected to be 7.5%. As MNP note this “is in alignment with marketing budgets of other facilities of this stature across the country.” Such facilities include the Art Gallery of Ontario – 7%; Winnipeg Art Gallery – 8%; Vancouver Art Gallery – 19% and Toronto Zoo – 7%.

The Remai Modern is slated to be the largest new tourism product to launch in Canada in 2016, according to the Canadian Tourism Commission. Promoting the Gallery across Saskatoon, Saskatchewan, Canada, and broader tourism markets will be a necessary exercise to ensure a wide audience is aware of the opening of the Remai Modern. The Gallery can expect to get a once-in-a-lifetime substantial national and international media exposure during the opening period. It is, therefore, vital that the marketing plan is executed well in advance of opening in order to capitalize on this unique opportunity.

The Gallery will market itself “THE” place to visit in Saskatoon. The linkages to other City amenities are endless – River Landing, the University of Saskatchewan, the Forestry Farm Park and Zoo, and others. No visit to the City will be complete without a day or an afternoon at the Gallery. The Remai Modern will be marketed as more than an art gallery. The Remai Modern will be a gathering place for major life events; it will be the place to have dinner before an evening of live theatre, the symphony and concerts and a place to meet friends for coffee or lunch. It will be a prominent education venue for all ages. The retail store will support marketing efforts and will carry Remai Modern branded items as well as publications developed to support exhibitions.

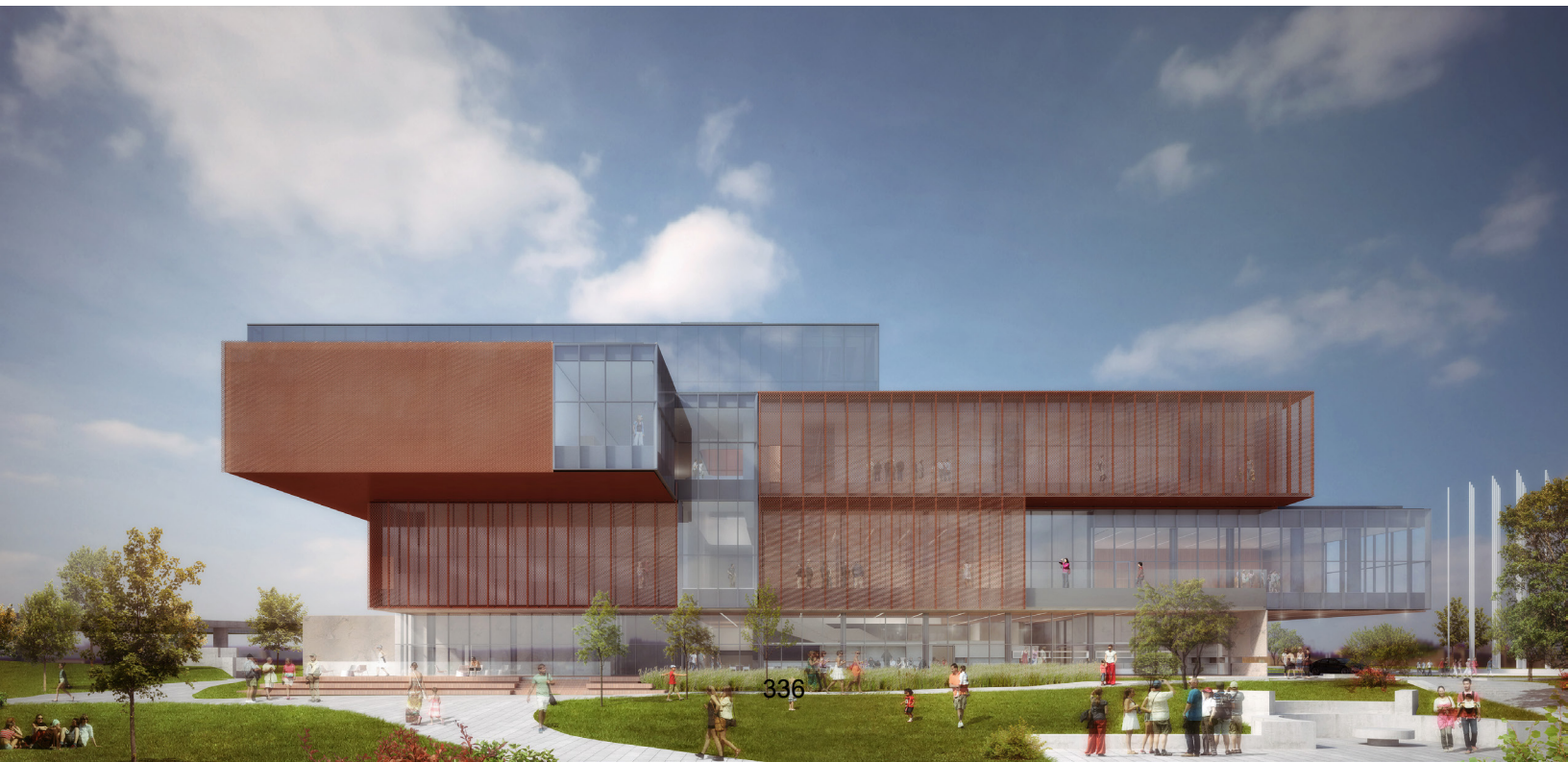
Supporters and donors are expecting “big things” from the Gallery and this promise must be delivered. This is of critical importance to the Gallery. There is momentum around economic growth and “pride of place” in the City of Saskatoon at this time and this will be used to drive the new brand forward with key return on investment (ROI) metrics for stakeholders. This energy will be leveraged to position the Remai Modern as the face of the new Saskatoon.

REMAI MODERN

ART GALLERY OF SASKATCHEWAN

is becoming...

Business and Operations Plan
(2015 – 2019)



LETTER OF INTRODUCTION:



The following Rемаi Modern Business and Operations Plan 2015 – 2019 was developed in 2014, with the support of chartered accountancy and business advisory firm MNP LLP (“MNP”). The business and operational projections in this plan are subject to revision and will be updated annually.

The plan follows an intensive strategic brand development process that was launched in 2013 with the contract support of ReBoot Consulting Group. Following the delivery of the strategic brand development report, in March of 2014 we engaged MNP to complete a revision and update of our business plan to ensure valid and updated assumptions, which incorporate the Gallery’s brand and vision, are articulated in one document. MNP undertook substantial research and jurisdictional analysis to validate the assumptions and projections in the plan. As part of that and feeding into their report MNP provided a human resources report and plan developed through in-depth analysis and reference to primary and secondary research findings.

Following delivery of their final report in May 2014, Rемаi Modern management rigorously analyzed the findings and recommendations. A final set of financial projections that aligned with the City of Saskatoon long-term funding plan was approved by the Rемаi Modern board in September 2014. From September to December 2014 further work was undertaken by Rемаi Modern management to further refine operational and financial projections. These refinements do not deviate from the resource principles outlined in the MNP report.

On behalf of the Rемаi Modern board and staff, we look forward to bringing this business plan to a reality.

A handwritten signature in black ink, appearing to read 'G. Burke', with a long horizontal flourish extending to the right.

*Gregory Burke
Executive Director and CEO
Remai Modern*

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1. EXECUTIVE SUMMARY

As part of the City of Saskatoon's plans to revitalize its south downtown, in 2009 civic leaders approved plans to build a new art gallery on the riverfront of the South Saskatchewan. Rемаi Modern Art Gallery of Saskatchewan ("Remai Modern" or "the Gallery") will open at River Landing in Saskatoon's south downtown in 2016.

An initial business plan for the project was completed in March 2012. Rемаi Modern has now developed a strong strategic brand and vision for the new Gallery, which was not reflected in the initial business plan and other studies. Rемаi Modern, through its brand, will be recognized across Canada as a bold direction-setting museum and one of the top art galleries in Canada. Principal patron Ellen Rемаi, who gave \$30 million toward construction and international program support and who further donated the world's most comprehensive collection of Picasso linocuts, set a foundation for the vision. Writing in *Artforum*, the world's leading art magazine, Maxwell Anderson, the Director of the Dallas Museum of Art, described the donation of the Picasso linocuts as "transformative", and as "a gift substantial enough to bring [Remai Modern] to the attention of the international art world".

The Rемаi Modern brand and vision will add significantly to the brand capital of both Saskatoon and Saskatchewan. The Gallery is anticipated to be a major driver of the Saskatoon tourism market and as such will be a catalyst for economic growth in the city. As the brand and vision impact all operational aspects of the Gallery, a new business plan that reflects the brand promise and articulates its impacts was required. In March of 2014, MNP was engaged by Rемаi Modern to complete a revision and update of its business plan to ensure valid and updated assumptions, which incorporate the Gallery's brand and vision, are articulated in one document. The business plan outlines a responsible and sustainable approach to managing the Gallery based on the concept that was initially conceived by Rемаi Modern's board and management and approved by the City of Saskatoon.

The Rемаi Modern business plan is solely focused on the operations of the new Gallery. It is based on the assumption that the accounts for Rемаi Modern and Mendel Art Gallery will be split from 2015 onward. As a result, a separate plan has been prepared for the Mendel Art Gallery as it winds down operations.

Supporters and donors are expecting “big things” from the Gallery and this promise must be delivered. This is of critical importance to the Gallery. There is momentum around economic growth and “pride of place” in the city of Saskatoon at this time and this will be used to drive the new brand forward with key return on investment metrics for stakeholders. With this momentum, there is interest in Saskatoon for new ventures, gathering places, and the River Landing project. This energy will be leveraged and Remai Modern will be the “face” of the new “2.0 Saskatoon”.

Remai Modern has undertaken an intensive strategic brand development process, which has led to the development of a revised vision statement for Remai Modern:

Remai Modern Art Gallery of Saskatchewan

Remai Modern is a thought leader and direction setting modern art gallery that boldly develops, collects, presents and interprets the art of our time.

Our mandate is to provide transformative experiences by connecting art with local and global communities.

This brand promise and vision will inform and guide many of the consumer-facing decisions for the Gallery. It should influence all decisions for the art and design store, restaurant, marketing and communications, programs and exhibitions, events and catering, and community outreach. If the initiatives do not ladder up to the vision, they should not be launched. The vision and brand promise provide a simple and disciplined framework for building this new legacy brand for the city, province and also the country.

The human resources plan and proposed staffing components required to operate Remai Modern were developed through in-depth analysis and discussions about primary and secondary research findings. The goal was to obtain best practice information, and to better understand how various galleries structure their organization. As well, the research and analysis was undertaken to provide additional insight into the staffing requirements of art galleries – positions required, levels of management etc. It is important to note that it is not the intention of Remai Modern to simply replicate the organizational structure or staffing levels of any individual gallery, rather it was a learning process to see how other established galleries have structured their successful operations.

The Remai Modern staffing and organizational structure recommendations have been developed through a conservative approach, both respecting the realities of publically funded organizations and ensuring that the recommended staff levels can deliver the Remai Modern vision. The resulting budget for staffing is a reflection of what is required at a base level to operate Remai Modern as outlined in the business plan and brand plan. Compared to three other galleries (two of which have asked for their information to remain confidential) the projected salaries as a percentage of operating budget (as of 2019, full-established operations) are conservative in comparison:

	Remai Modern	Art Gallery of Alberta¹	Confidential Gallery "A"²	Confidential Gallery "B"³
Staffing Costs as a Percentage of Operating Budget	36%	42%	45%	50%

The Remai Modern human resource plan has been developed with an overarching goal of ensuring a responsible, practical budget while ensuring the ability to successfully implement the bold vision of the gallery.

Remai Modern's purpose and core public commitment incorporates an integrated, three-pillar approach that links exhibitions, public and outreach programs, and the development of its permanent collection. Remai Modern will present and interpret modern and contemporary art from both an international and local perspective. Programming activities will provide visitors with access to major international exhibitions while establishing a balance between relevance to Saskatchewan and situating the art making of the region in a national and international context.

A strong marketing plan and effective execution of the plan are key success factors for the new Gallery. Remai Modern is slated to be the largest new tourism product to launch in Canada in 2016. Communication of the Gallery across Saskatoon, Saskatchewan, Canada, and broader tourism markets is a necessary exercise to ensure a wide audience hears of the opening of Remai Modern. The Gallery will market itself "THE" place to visit in Saskatoon. The linkages to other Saskatoon amenities are endless – River Landing, the University of Saskatchewan, the Forestry Farm Park and Zoo, and others. No visit to the city will be complete without a day or an afternoon at the Gallery.

Remai Modern will be marketed as more than an art gallery. Remai Modern will be a gathering place for major life events; it will be the place to have dinner before an evening of live theatre. The art and design store will support these various marketing efforts and will carry Remai Modern branded items as well as publications developed to support exhibitions.

¹ <http://issuu.com/your-aga/docs/aga-annualreport-2013>

² MNP Primary Research

³ MNP Primary Research

Remai Modern will be the key attraction in Saskatoon. Along with the River Landing development, the Gallery will be a destination for locals and tourists alike. A marketing strategy has been developed by Remai Modern management in partnership with ReBoot (who also led the brand development process), and is designed to support and drive attendance projections. The expected annual visitation for Remai Modern is 220,000. The breakdown of projected visitation by 2019 is as follows:

Remai Modern Destination or Reason for Visiting	Annual Visitation
General admission (adults, students and seniors)	30,000
Sponsored free admission (children under 12 & one evening per month for all ages)	40,000
Member visitation – free admission with membership	15,000
Ground floor and Yuel Gallery – no admission charge	30,000
Sculpture garden – no admission charge	30,000
Retail store	15,000
Private events and facility rentals	30,000
Restaurant visitors	30,000
TOTAL Annual Visitation	220,000

It is important to note that while annual Remai Modern visitation is projected to be 220,000 visitors, the percentage of visitors charged general admission is only 13.6%; the majority of visitation to the Gallery will be through free admission, admission via private events and facility rentals, or via membership admission.

It is important that Remai Modern generate revenues to support and sustain operations into the future. As such a decision has been made to implement a modest admission charge to the Gallery. In addition to generating revenue, an admission charge also drives a number of important initiatives for Remai Modern. For example, an admission charge will provide a quantifiable and tangible reason for Saskatoon individuals and families to purchase an annual membership to Remai Modern. An admission charge also provides Remai Modern with a valuable marketing tool, especially related to children’s attendance, and will be a key component to drive sponsorships. An admission charge also indicates a quantifiable value that can be linked to many tourism initiatives.

The admission structure for the Gallery is as follows:

Admission Category	General Admission	Special Exhibitions Admission
General/Adult (13 years and over)	\$12.00	\$16.00
Students and seniors	\$10.00	\$14.00
Children 12 and under	Free	Free

Membership levels are projected to grow as Remai Modern entrenches itself into the city of Saskatoon. It is anticipated that the implementation of an admission fee will provide additional incentive for Saskatoon residents to become members of Remai Modern. As such it is projected that by 2019 Remai Modern will have 2,200 members annually.

Remai Modern will self generate a significant amount of revenue annually to support the operations of the Gallery. This will occur through a variety of revenue streams with the key items including general admissions, event admissions, memberships, retail sales, event partnerships, facility rentals, and food services commissions. In addition significant annual revenue is projected from fundraising, sponsorship and government grants.

Annual projected revenue, from these various streams is as follows:

	2015	2016	2017	2018	2019
Self-Generated Revenue					
Admissions - Annual	\$0	\$150,000	\$330,000	\$330,000	\$330,000
Admissions - Special Exhibitions	\$0	\$40,000	\$80,000	\$80,000	\$80,000
Annual Donation Box	\$0	\$1,000	\$2,000	\$2,000	\$2,000
Program Revenue	\$18,500	\$39,000	\$54,000	\$54,000	\$54,000
Private Functions & Rentals	\$0	\$86,750	\$260,000	\$260,000	\$255,050
Food Services Commission	\$0	\$52,800	\$143,280	\$143,280	\$143,280
Remai Modern Gift Shop Sales	\$0	\$390,000	\$650,000	\$650,000	\$650,000
River Landing Rental Fee	\$0	\$73,333	\$220,000	\$220,000	\$220,000
	\$18,500	\$832,883	\$1,739,280	\$1,739,280	\$1,734,330
Development Revenue					
Annual Fundraising/Development	\$0	\$340,000	\$755,000	\$970,000	\$1,185,000
Annual Memberships	\$0	\$60,000	\$108,500	\$139,500	\$170,500
Federal Annual Funding	\$0	\$160,000	\$160,000	\$160,000	\$160,000
Provincial Annual Funding	\$0	\$418,500	\$418,500	\$418,500	\$418,500
Other Grants/Funding	\$0	\$170,394	\$42,180	\$69,056	\$89,057
	\$0	\$1,148,894	\$1,484,180	\$1,757,056	\$2,023,057
Restricted Funding	\$0	\$542,655	\$787,655	\$787,657	\$787,655
City of Saskatoon Operating Subsidy	\$2,196,051	\$4,631,937	\$5,490,700	\$6,082,600	\$6,476,900
Total Revenue	\$2,214,551	\$7,156,369	\$9,501,815	\$10,366,593	\$11,021,942

A snap shot of projected annual operating expenses outlines an annual operating budget of \$11.02 million annually by 2019.

	2015	2016	2017	2018	2019
Operating Expenses					
Salaries & Benefits	\$1,320,915	\$3,087,246	\$3,627,856	\$3,892,027	\$3,933,127
Facilities & Equipment	\$42,245	\$1,081,520	\$2,230,521	\$2,233,321	\$2,233,321
General Exhibitions	\$42,999	\$615,158	\$678,922	\$766,704	\$877,500
Administration	\$273,567	\$402,100	\$362,200	\$410,800	\$430,900
Marketing & Communications	\$350,000	\$656,700	\$615,400	\$660,700	\$680,700
Public Programs	\$65,900	\$181,100	\$278,400	\$288,400	\$318,400
Staffing Expenditures	\$41,300	\$65,000	\$65,000	\$66,000	\$71,000
Fundraising	\$62,500	\$105,600	\$117,600	\$132,100	\$146,100
Gift Shop	\$1,500	\$15,910	\$20,850	\$20,850	\$20,850
Gift Shop - Cost of Goods Sold and Freight	\$0	\$223,080	\$371,800	\$371,800	\$371,800
Collection Maintenance	\$0	\$41,250	\$39,250	\$39,250	\$48,657
Board & Committees	\$5,625	\$14,050	\$14,100	\$14,150	\$14,150
Library	\$8,000	\$8,000	\$8,000	\$8,000	\$8,000
Facility Rentals & Catering Loan Expense	\$0	\$0	\$172,261	\$172,261	\$172,261
Admissions Computer Expense	\$0	\$2,000	\$2,000	\$2,000	\$2,000
	\$2,214,551	\$6,498,714	\$8,604,160	\$9,078,362	\$9,328,766
Transfers					
Transfer to Capital Replacement Reserve	\$0	\$0	\$0	\$370,574	\$522,226
Transfer to Equipment Replacement Reserve	\$0	\$70,000	\$65,000	\$65,000	\$100,000
Transfer to Facility/Catering Capital Reserve	\$0	\$0	\$0	\$0	\$218,295
Transfer to Permanent Collection Fund	\$0	\$87,655	\$87,655	\$107,655	\$107,655
Transfer to Remai Exhibition Fund	\$0	\$500,000	\$500,000	\$500,000	\$500,000
Transfer to Museums Assistance Program	\$0	\$0	\$245,000	\$245,002	\$245,000
	\$0	\$657,655	\$897,655	\$1,288,231	\$1,693,176
Total Expenses and Transfers	\$2,214,551	\$7,156,369	\$9,501,815	\$10,366,593	\$11,021,942
	99.16%	64.72%	57.79%	58.68%	58.76%

The business plan outlines the human resource requirements, budget and supports that will be required to implement the Remai Modern vision. The implementation of this vision, as outlined is required to ensure a successful and sustainable art gallery for Saskatoon and Saskatchewan's future generations.

2. PROJECT INTRODUCTION

As part of the City of Saskatoon's plans to revitalize its south downtown, civic leaders approved plans to build a new art gallery on the riverfront of the South Saskatchewan. Rемаi Modern Art Gallery of Saskatchewan ("Remai Modern" or "the Gallery") will open at River Landing in Saskatoon's south downtown in 2016. An initial business plan for the project was completed in March 2012. Rемаi Modern has now developed a strong brand and vision for the new Gallery, which was not reflected in the initial business plan and other studies. In addition, earlier studies were completed before the extraordinarily important donation by Mrs. Rемаi of the Picasso linocuts. Writing in *Artforum*, the world's leading art magazine, Maxwell Anderson, the Director of the Dallas Museum of Art, described the donation of the Picasso linocuts as "transformative", and as "a gift substantial enough to bring the... [Remai Modern] to the attention of the international art world". This donation has helped to set the aspirations for the development of a new brand and a new vision.

Remai Modern, through its brand, will be recognized across Canada as one of the top art galleries in the country. The Rемаi Modern brand and vision will add significantly to the brand capital of both Saskatoon and Saskatchewan. The Gallery is anticipated to be a major driver of the Saskatoon tourism market and as such will be a catalyst for economic growth in the city. As the brand and vision impact all operational aspects of the Gallery, a new business plan that reflects the brand promise and articulates its impacts was required. In March of 2014 MNP LLP ("MNP") was engaged by Rемаi Modern to complete a revision and update of its business plan to ensure valid and updated assumptions, which incorporate the Gallery's brand and vision are articulated in one document. Following this process, Rемаi Modern management worked rigorously with the City of Saskatoon to refine financial projections and the human resource plan. This document is the result of that research, analysis and collaboration.

2.1 PROJECT HISTORY AND BACKGROUND

The Saskatoon Art Gallery and Civic Conservatory, more commonly referred to as the Mendel Art Gallery (the legal name of the Mendel Art Gallery is the Saskatoon Art Gallery and Civic Conservatory) officially opened on October 16, 1964. It was built on the initiative of the Saskatoon Arts Centre and Fred Mendel who initially contributed \$175,000 towards the construction of the Gallery. The following year, Mr. Mendel and his family donated

13 paintings including works by the Group of Seven, which today form a significant part of the Mendel Art Gallery's permanent collection. In 1967, the City of Saskatoon assumed ownership and responsibility for the Gallery, providing it with operational funding.

During the 1960s and 1970s, the Mendel Art Gallery established itself as a gathering place for Saskatoon's art community: visual artists and artisans exhibited their work; the Camera Club met at the Gallery regularly; classical, jazz, and pop musicians performed; readings were held; films were shown; and since 1964, more than 450,000 school students from Saskatoon and Saskatchewan have participated in Gallery programs. Over the past half-century the Gallery has earned an exceptional reputation, locally and nationally, for its high level of engagement with its community, excellence in exhibitions, significant permanent collection, and notable level of public programming. With over 160,000 visitors in 2011, the Mendel has enjoyed some of the highest per capita attendance rates in Canada.

In 2006, market research conducted by Saskatoon-based Fast Consulting showed a majority of key stakeholders viewed the Gallery as a prime tourist attraction, but felt it was not positioned or promoted as such. The majority of residents felt the Gallery should expand if it wanted to attract more people. Internally, staff and the board of trustees recognized the current facility was not large enough to accommodate significant national and international exhibitions, impeding the Gallery's presentation mandate and its ability to enhance public understanding and appreciation of art. The Gallery's permanent collection had grown to a size where offsite storage was required, space for public programs was limited, preparation areas for exhibitions were inadequate, and administrative space was extremely tight.

Initially, renovations to the existing facility were investigated and a \$21.5M expansion was proposed. While the City and Province made financial commitments to the project, further support was tepid with the quiet phase of a capital campaign raising less than \$1M of a \$6M target. No funding was forthcoming from the Federal Government.

In early 2009, the Gallery's Board Chair and CEO/Executive Director initiated discussions with City leaders about exploring a River Landing location for the Gallery. On April 3, 2009, the Art Gallery of Saskatchewan gained momentum when Saskatoon's City Council announced that, with commitments from the Federal and Provincial Governments, it intended to build a purpose-built gallery that would also serve as a destination centre in the city's south downtown, at River Landing. Some controversy around the relocation of the Gallery and the loss of the Mendel name followed the announcement. Since this initial reaction concerns have been addressed and the controversy has subsided.

On April 26, 2010, the functional program plan for the Gallery was approved by City Council. The schematic design concept for (Remai Modern) Art Gallery of Saskatchewan, designed by KPMB Architects of Toronto in association with Smith Carter Architects and Engineers of Winnipeg, was approved May 30, 2011, by City Council. Under the Building Canada Infrastructure Program, the three levels of government have committed a total of \$51 million for construction of the new Gallery. The remainder of capital costs are being raised through a private sector fundraising campaign.

On June 3, 2011, Saskatoon philanthropist Ellen Rемаi announced a donation of \$30 million to the Art Gallery of Saskatchewan on behalf of the Frank and Ellen Rемаi Foundation. The gift provides for \$15 million toward the construction costs of Rемаi Modern, and \$500,000 annually for 30 years for enhanced exhibition programming.

The arrival of Rемаi Modern alongside Persephone Theatre at River Landing will make the site a centre of arts and culture that defines the City's identity for the future.

3. BUSINESS PLAN OVERVIEW AND KEY ASSUMPTIONS

The 2012 business plan for Remail Modern was based on research studies conducted specifically to validate assumptions and provide recommendations for the plan. Since that time a number of changes have occurred including design, scale, and staffing. As such, this revised business plan has re-evaluated these studies and has validated or updated the assumptions as appropriate. The original studies were developed with support from the City of Saskatoon and included the following reports: (Copies of the reports are available by request)

- Fast Consulting – Market Assessment
- fsSTRATEGY – Food and Beverage Opportunity Assessment and Management Strategy
- DCG Philanthropic Services Inc. – Annual Fundraising Strategy
- Professional Computer Services – IT Study

Since the 2012 report additional studies have been conducted to support the development of Remail Modern. These studies have included:

- fsSTRATEGY – Retail Food & Beverage Options Analysis
- TCI Management Consultants – Remail Art Gallery of Saskatchewan Admission Fee Study
- Concentric Risk and Security Management Inc. – Security Requirement Study
- ReBoot – Remail Modern Art Gallery Brand Development
- Human Resources Study – MNP LLP

This updated business plan has been developed based on best-practice research and has been based on findings from specialized business planning experts, plus insights from an experienced management team. Further details related to the determination and validation of these key assumptions are included within the report. This section provides the reader with a basis of understanding related to the planned operations of Remail Modern.

3.1 MENDEL ART GALLERY

The Remai Modern Business Plan is solely focused on the operations of the new Gallery. The financial accounts for Remai Modern and Mendel Art Gallery will be split from 2015 onward. As a result, a separate plan has been prepared for the Mendel Art Gallery as it winds down operations.

Allocations of staff time have been estimated and allocated between the two galleries and costs related to the Mendel Art Gallery are listed in the separate plan, as are costs for the remaining operations, programs, and services of the Mendel Art Gallery. This business plan also includes details of one-off, non-operational project costs to cover transition to the new Gallery.

3.2 OPERATING HOURS

The operating hours for Remai Modern are anticipated to be:

- 10 a.m. – 6 p.m. on Sunday, Tuesday, and Thursday
- 11 a.m. – 8 p.m. on Wednesday, Friday, and Saturday

The Gallery will be closed on Mondays and December 25. The Remai Modern store will be open the same hours as the Gallery. The operating hours will be reviewed in future years and may be adjusted as required based on demand.

3.3 SELF-GENERATED REVENUE

Remai Modern will self generate a significant amount of revenue annually to support the operations of the Gallery. This will occur through a variety of revenue streams with the key items including admissions, memberships, retail sales, facility rentals, and food services commissions. Remai Modern will begin operations in 2015, generating Remai Modern specific operating expenses; however, the Gallery doors will not be open until 2016. Self-generated revenues have been projected accordingly as follows.

	2015	2016	2017	2018	2019
Admissions - Annual	\$0	\$150,000	\$330,000	\$330,000	\$330,000
Admissions - Special Exhibitions	\$0	\$40,000	\$80,000	\$80,000	\$80,000
Annual Donation Box	\$0	\$1,000	\$2,000	\$2,000	\$2,000
Program Revenue	\$18,500	\$39,000	\$54,000	\$54,000	\$54,000
Private Functions & Rentals	\$0	\$86,750	\$260,000	\$260,000	\$255,050
Food Services Commission*	\$0	\$52,800	\$143,280	\$143,280	\$143,280
Remai Modern Gift Shop Sales	\$0	\$390,000	\$650,000	\$650,000	\$650,000
River Landing Rental Fee	\$0	\$73,333	\$220,000	\$220,000	\$220,000
	\$18,500	\$832,883	\$1,739,280	\$1,739,280	\$1,734,330

Note: Food services commission includes revenue generated by the restaurant commission and catering commissions.

3.4 ATTENDANCE

Remai Modern will be the key attraction in Saskatoon. Along with the River Landing development, the Gallery will be a destination for locals and tourists alike. The marketing strategy was developed in partnership ReBoot, and is designed to support and drive the attendance projections. The expected annual visitation for Remai Modern is 220,000. The breakdown of visitation by 2019 is as follows:

Remai Modern Destination or Reason for Visiting	Annual Visitation
General admission (adults, students and seniors)	30,000
Sponsored free admission (children under 12 & one evening per month for all ages)	40,000
Member visitation – free admission with membership	15,000
Ground floor and Yuel Gallery – no admission charge	30,000
Sculpture garden – no admission charge	30,000
Retail store	15,000
Private events and facility rentals	30,000
Restaurant visitors	30,000
TOTAL Annual Visitation	220,000

Assuming Remai Modern is open approximately 300 days per year (less Mondays, holidays, and other closings), the Gallery will host an average of 730 visitors per day for the various uses of the facility. Among these 730 daily visitors will be 100 general admission visitors. The assumed daily visitation does not account for seasonality and will increase and decrease depending on a number of influences. However, the amount provides some clarity on the potential demand for the full Remai Modern facility.

It is important to note that while annual Remai Modern visitation is projected to be 220,000 visitors, the percentage of visitors charged general admission is only 13.6%; the majority of visitation to the Gallery will be through free admission, or via membership admission.

3.5 ADMISSION CHARGE

It is important that Remai Modern generate revenues to support and sustain operations into the future. As such a decision has been made to implement a modest admission charge to the Gallery. In addition to generating revenue, an admission charge also drives a number of important initiatives for Remai Modern. For example, an admission charge will provide a quantifiable and tangible reason for Saskatoon individuals and families to purchase an annual membership to Remai Modern. An admission charge also provides Remai Modern with a valuable marketing tool, especially related to children’s attendance, and will be a key component to drive sponsorships. An admission charge also indicates a quantifiable value that can be linked to many tourism initiatives. For example, the current Tourism Saskatoon “Saskatoon Experience Pass” is available at 20 Saskatoon hotels. The pass allows guests staying at one of the hotels to choose from a number of “experiences”, which include attending an event (e.g. Eight food and beverage tokens to Taste of Saskatchewan) or an attraction (e.g. One family pass to Wanuskewin Heritage Park and a \$15 gift card to the Park’s restaurant). All of the events and attractions included in the promotion have admission fees which allow for the stated value. This partnership and cross promotion will be important for Remai Modern in tourist attraction efforts. Without an admission charge the Gallery would not be included.

The admission structure for the Gallery is as follows:

Admission Category	General Admission	Special Exhibitions Admission
General/Adult (13 years and over)	\$12.00	\$16.00
Students and seniors	\$10.00	\$14.00
Children 12 and under	Free	Free

The business plan has not proposed a family admission category as it is anticipated that children under 12 will be a free sponsored admission.

3.6 MEMBERSHIPS

Membership levels are projected to grow as Remai Modern entrenches itself into the city of Saskatoon. The pricing for annual memberships is assumed to be as follows:

Membership Category	Annual Membership Fee
Individual	\$65
Dual / Family	\$90

The total number of members is projected to grow each year:

	2015	2016	2017	2018	2019
Membership	0	1,000	1,400	1,800	2,200

4. GOVERNANCE

Remai Modern was incorporated as a living trust in 2012 before the development of the strategic brand and vision. This resulted from the need to be able to issue tax receipts for the first phase of the fundraising campaign.

Remai Modern is a new organization and as such a governance review is required. The Remai Modern governance structure needs to follow best practices for like galleries and ensure that it is well placed to support the revenue generating and operational needs of Remai Modern. In association with the governance structure it is anticipated that the Mendel Foundation will be wound up and that a new foundation that supports the fundraising goals of Remai Modern be established. Accountabilities of this new foundation to Remai Modern will need to be established. Accordingly, the Remai Modern board has resolved that a governance review will take place in 2015 and will include:

1. Review of the current governance model;
2. Jurisdictional research on best practice governance models for similar galleries;
3. Liaison with the CEO and board as to governance issues relevant to the governance model;
4. Liaison with the City of Saskatoon as to governance issues relevant to the governance model;
5. Recommendation of a governance model to the Remai Modern board;
6. Recommendation of a foundation governance model to the Remai Modern board;
7. Recommendation of a governance model to the City of Saskatoon; and
8. Recommendation to ensure the Remai Modern governance model meets best practice and has the tools and resources to ensure the Remai Modern vision is implemented and supported.

5. BRAND PLAN

5.1 WHY THE ARTS ARE VITAL TO A COMMUNITY

The following is a summary of the key findings and recommendations that were developed by Canadian Brand Strategist Kerry Harris for Remai Modern. A full copy of the brand plan is available by request.

Arts and cultural activities are at the heart of communities – they make communities more attractive places to live, they help bring a community to life, they define a community's unique characteristics, they attract tourists and they help communities compete economically around the world.

- The Canada Council for the Arts

Public-private partnerships are well developed in the arts and culture sector. Public sector support of the arts leverages private sector support in many instances. The direct benefits are generated through ticket sales, concessions, employment, etc. The indirect benefits have the potential to generate even higher returns through the economic impact they generate through tourism, for example.

Initial public support can decrease over time as the organizations mature. There can be a shift from public funding to private support as the facility entrenches itself in the community and as the organization matures and is able to generate its own source revenue.

Arts and cultural activities can draw crowds from within and around the community. Increasing the number of visitors, as well as enhancing resident participation helps build economic and social capital. Community planners can make deliberate connections between the arts and culture sector and other sectors, such as tourism and manufacturing, to improve economic outcomes by capitalizing on local assets. Arts & Economic Prosperity IV demonstrated that America's arts industry is not only resilient in times of economic uncertainty, but is also a key component to economic recovery and future prosperity. Across the United States, the industry generated \$135.2 billion of economic activity—\$61.1 billion by non-profit arts and culture organizations in addition to \$74.1 billion in event-related expenditures by their audiences. The arts support 4.1 million full-time jobs in the United States.⁴

⁴ Remai Modern Brand Plan, ReBoot 2014

The typical arts attendee spends \$24.60 per person⁵, per event, beyond the cost of admission. A community that draws cultural tourists experiences an additional boost of economic activity. Arts tourists stay longer and spend more than the average traveler.

The message is clear: a vibrant arts community not only keeps residents and their discretionary spending close to home, but it also attracts visitors who spend money and help local businesses thrive.

5.2 THE BRAND DEVELOPMENT PROCESS

Formal brand planning for the new Remai Modern was introduced in August of 2013 with a presentation to the board of a two-phase, comprehensive proposal and work plan created by Canadian brand strategist Kerry Harris. Phase one consisted of the discovery phase (extensive consultation with government at all levels, the community at large, key influencers, artists, and other stakeholders in the city and also at the provincial level).

This was followed by phase two, which included the creation of the marketing plans for pre-launch, launch, and post launch of the new Gallery.

The board accepted the brand strategy proposal and work commenced in September with a comprehensive series of workshops and meetings held in Saskatoon, Regina, and Toronto. The critical questions discussed at these workshops and meetings were: “What is the new Gallery’s brand promise?” and “What does the Gallery have to ‘be’ in order to ensure its success now and into the future?” In order to determine the answers to these questions, a 360 degree look at the brand possibilities was conducted.

Phase one took the process through to the end of November; the findings were consistent and also supported by independent research in the areas of: category/competition/ company/customer (potential sponsors and partners) and consumer (visitors and users of the Gallery). Phase one findings were presented to the board in early January 2014.

⁵ Remai Modern Brand Plan, ReBoot 2014

One overwhelming theme was noted throughout the process and is best articulated by Peter Stoicheff, Remai Modern board member and the Dean, Arts & Science at the University of Saskatchewan:

“The city is on the edge of a monumental shift in thinking and perception and Remai Modern will be the physical manifestation of that movement forward”

- Peter Stoicheff

Additional factors supported the direction of the brand planning. These factors also figured largely into the creation of the new brand building blocks and should be considered the fundamental “framework” for the Gallery in regards to all marketing and communication activities going forward.

As a result of the discovery work conducted in Phase one, a vision for the new Gallery was struck, and the brand building blocks were created. One other key decision was also made by the board and has been endorsed by the City and Mrs. Remai: to create a new brand name for the Gallery – Remai Modern.

5.3 REMAI MODERN BRAND PROMISE

The Remai Modern brand promise is to provide an “OMG” moment in a stunning setting, on the river, in a city that is redefining what it means to be “on the Prairies”.

This brand promise will inform and guide many of the consumer-facing decisions for the Gallery. It should influence all decisions for the gift shop, restaurant, marketing and communications, programs and exhibits, events and catering, and community outreach. If the initiatives do not ladder up to the vision, they should not be launched. The vision and brand promise provide a simple and disciplined framework for building this new legacy brand for the city, province and also the country.

5.4 THE REMAI MODERN BRAND

Supporters and donors are expecting “big things” from the Gallery and the brand promise must be delivered. This is of critical importance to the Gallery. There is momentum around economic growth and “pride of place” in the city of Saskatoon at this time and this will be used to drive the new brand forward with key return on investment metrics for stakeholders.

With this momentum, there is interest in Saskatoon for new ventures, gathering places, and the River Landing project. This energy will be leveraged and Remail Modern will be the “face” of the new “2.0 Saskatoon”.

Remail Modern will be the largest tourism product launch in Canada in 2015-2016 and this opportunity must be marketed throughout Saskatchewan, Canada, and internationally.

There are many early adopters in Saskatoon and they can be leveraged into effective and efficient brand ambassadors. The key is to ensure that the messaging architecture is consistent, innovative, and authentic.

5.5 BRAND BUILDING BLOCKS

5.5.1 UNIQUE SELLING PROPOSITION

It is important to communicate the Unique Selling Proposition (USP) that Remail Modern embodies. In other words, communications should outline and confirm what Remail Modern does better than anyone else:

- Remail Modern collects, curates, interprets, engages with, and exhibits dynamic modern and contemporary world art from a Saskatchewan point of view
- That point of view encompasses our prairie roots and “small town” way of life within an expanding international mindset – providing an experience that is subjective, disruptive, and highly personal in a disconnected world
- Trades on the new macro trend of “glocalisation” – global vision layered over informed, authentic local category interpretation

5.5.2 CONSUMER VALUE PROPOSITION

The Consumer Value Proposition (CVP) must communicate what the consumer/visitor receives from Remail Modern, both functionally and emotionally.

- Functionally: leading edge exhibitions and programs in a well-managed, beautiful, modern, well constructed, yet “of the river” setting
- Emotionally: an “OMG” moment – that experience that leaves you wanting more, yet a bit overwhelmed by the subject matter, content, and setting – a “must tell/must share” experience

5.6 REMAI MODERN VISION STATEMENT

The brand development process led to the development of a revised vision statement for Rемаi Modern:

Remai Modern Art Gallery of Saskatchewan

Remai Modern is a thought leader and direction setting modern art gallery that boldly develops, collects, presents and interprets the art of our time.

Our mandate is to provide transformative experiences by connecting art with local and global communities.

5.7 ORGANIZATIONAL PRIORITIES

Remai Modern's organizational priorities are, in essence, its strategic focus and the underpinning of its strategic plan. These priorities help shape the various programs, tactics and the Gallery's overall service plan.

Remai Modern's organizational priorities include:

- **Advocating Art** – Art plays a powerful role in society and everything we do is to elevate the importance of art and create understanding both locally and globally
- **Exceptional Customer Service** – Our artists, visitors, members, donors, partners and stakeholders are the focus of our efforts
- **Responsible Financial Management** – We demonstrate a solid return on investment from our funding partners and focus on sustainable, strong self-generated revenues
- **Engaged, High-performing Employees** – We provide rewarding opportunities, an exciting workplace and a respectful environment for a talented and committed team

5.8 BRAND VALUES

Brand values help build and direct an organization's brand strategy and provide a focus for its look, feel, actions and behaviours.

Remai Modern's brand values include:

- **Live:** Remai Modern has a lively pulse and pace. We offer access to the most dynamic, stimulating and important art and art experiences. You can have a unique experience each time because it's not the same place twice.
- **Current:** Remai Modern is "of the now" and future-oriented. We seek to answer tomorrow's questions. Everything has flow. Your visit should be fully charged.
- **Multi-Dimensional:** Remai Modern is expansive and is engaging in every sense. We push beyond. Your visit should broaden your perspective and change your outlook on life - even if just by a little.
- **Intimate / Interactive:** Remai Modern offers large experiences in a small city. We get to know our visitors and deliver customized and unexpected service. Each experience is carefully crafted and should have an impact on you.

5.9 PERFORMANCE MEASURES

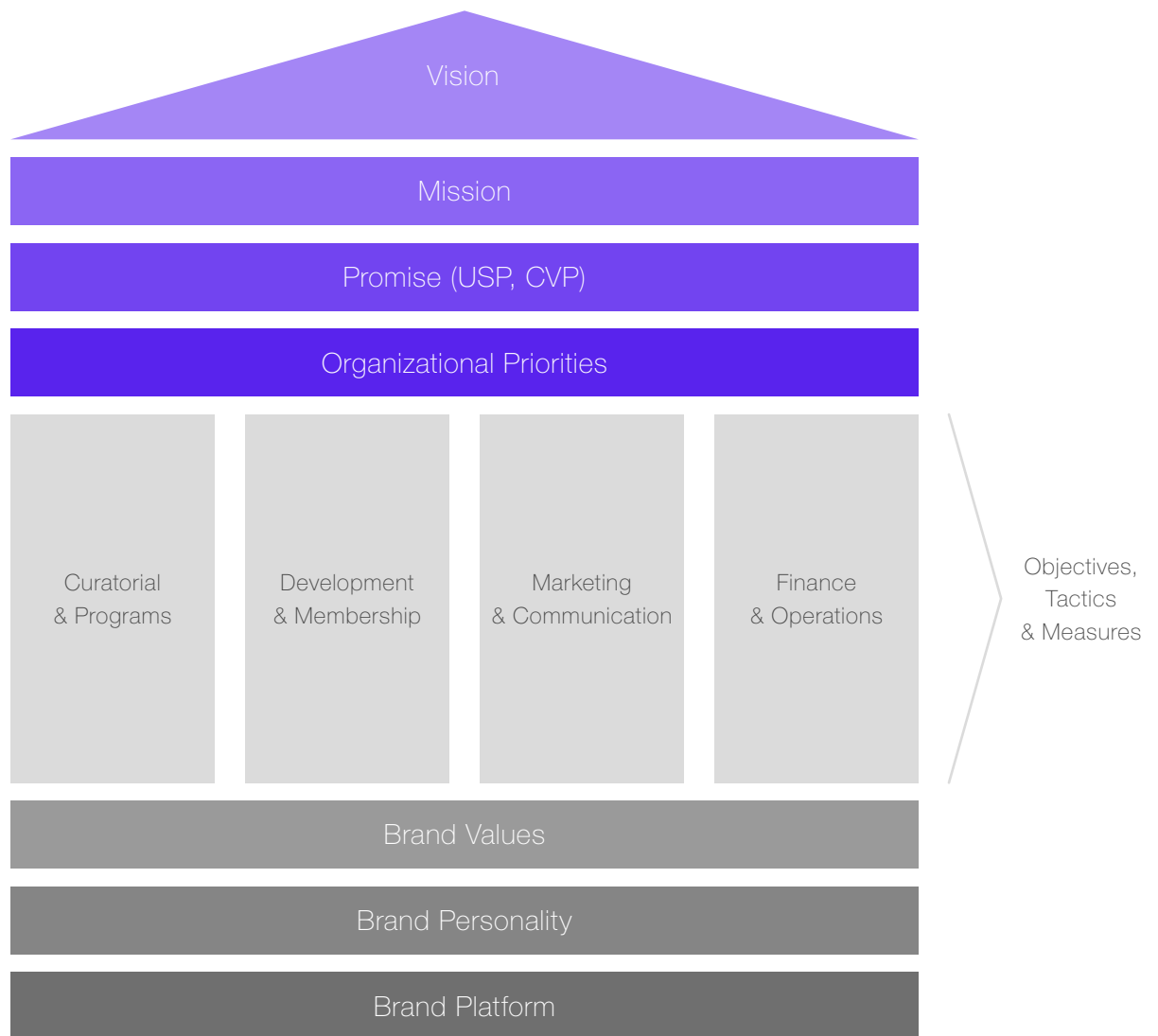
To determine the success of the brand development, the following key performance measures were identified. These measures will be tracked and reported on as the Gallery opens and operates into the future. The statements identify how the Gallery will determine its success in its efforts to implement a brand awareness campaign:

- Remai Modern will be recognized by our peers and critics as thought leaders in terms of the future of galleries internationally.
- Remai Modern will be recognized for the vision, innovation, and excellence of our programs.
- Remai Modern will be recognized as one of the world's leading "off center" galleries by our peers.
- Remai Modern will be recognized for our ability to connect local and global influencers.
- Remai Modern will be recognized by local, national, and international media as presenting a bold new vision for the visual arts in Canada.
- Remai Modern will be compared favorably by international media with the most forward-thinking galleries in the world.
- Remai Modern will have received an 85% overall satisfaction rating from our visitors and stakeholders.
- In the first two years, 60% of the population of Saskatoon will have visited Remai Modern.

- Rемаi Modern will be recognized across Saskatchewan for our significant cultural, economic, and community impact.
- Rемаi Modern will be noted in the local community as a bold, exciting, challenging, engaging institution that is future focused.

5.10 STRATEGIC TEMPLE

Our vision, mission, promise and priorities set the overall direction for each business unit's objectives, tactics and measures. Our brand values, personality and platform (currently in development), help to define our character, look, feel and differentiation strategy.



6. REMAI MODERN PROGRAMS

6.1 CORE PROGRAMS

Remai Modern's purpose and core public commitment incorporates an integrated, three-pillar approach that links exhibitions, public and outreach programs, and the development of the permanent collection. Remai Modern will present and interpret modern and contemporary art from both an international and local perspective. Programming activities will provide visitors with access to major international exhibitions, while establishing a balance between relevance to Saskatchewan and situating the art making of the region in a national and international context.

Remai Modern intends to provide programming in an immersive environment, where people of diverse backgrounds can connect with visual art through a multitude of activities and resources that are sensitive to a broad range of engagement approaches and learning styles. Facilitated learning programs will be offered to a wide range of school children, while hands on learning programs will be offered to small groups of adults and children. Free-guided tours will be held every Sunday, while private guided tours can be arranged any time for any group size. The Gallery will also offer a regular schedule of public lectures, artists' talks, symposia, and a variety of family and kid-friendly hands-on educational programs. Research conducted to inform the 2012 business plan found that almost one quarter (24%) of Saskatoon residents, who were surveyed, say they will participate in programs offered at the Gallery, and three out of ten (30%) residents say they would be willing to pay for an art class or workshop at the Gallery.

Free admission will be offered on the ground floor, to both the atrium and ground floor gallery. This gallery program titled "Connect" will center around a flexible and dynamic space that will provide a platform for a wide range of activities, including exhibitions, performances, talks, and artist residencies. The atrium will also be programmed and feature commissioned artworks, performances, and concerts. Potential partners include the Saskatoon Symphony Orchestra, Saskatoon Opera, and others. This "Live" programming will intersect with programs in the ground floor gallery, as well as other spaces in the building including the theatre. Partnerships will also be formed with arts and educational institutions to ensure that the theatre is programmed on a frequent basis.

The second floor collection gallery will present and interpret highlights from the collection from a variety of perspectives. It is envisaged that the gallery will be switched out in sections with the full gallery completing a change cycle over the course of one year. The third floor will feature the Picasso gallery focused on the presentation of the Picasso linocuts and ceramics collections and their interpretation. Adjacent to the Picasso gallery, the Feature Gallery will host feature exhibitions that will include large multidisciplinary installations, solo artist exhibitions and group thematic exhibitions, some of which will relate to international modernism and its history

The third floor will also feature a large temporary exhibitions gallery, known as the Marquee Gallery. This gallery will present three to four curated group exhibitions focusing on topical themes in the visual arts. Many of these will be touring exhibitions assembled by other national and international museums. Many of the exhibitions organized in house will also be made available for tour.

At least one major international special exhibition will be presented each year. With the unprecedented and generous support of the Frank and Ellen Remai Foundation, Remai Modern will receive a \$500,000 contribution annually for 30 years to enhance the Gallery's programs of national and international significance. This enhanced programming and consequent special exhibitions would not be possible without this support. The exhibitions are intended to be of a calibre the Mendel Art Gallery has not been able to attract due to physical limitations and/or lack of financial capacity.

The summer has been determined as the best time to present these special exhibitions, so as to attract the greatest number of tourists. In addition, research conducted to inform the business plan found that 73% of Saskatoon residents surveyed would visit Remai Modern if there were more exhibitions of the Gallery's collection and 71% would visit if there were more touring exhibitions.

In addition to these galleries, there will be significant amounts of internal transitional space available for programming and smaller exhibits. There will also be an external sculpture garden with a changing display.

Remai Modern will also initiate programs to engage with multiple groups and communities beyond its walls. Programs will be web-based, as well as offsite. Examples include the "Art Caravan", schools and university based programs, offsite seniors programs, and programs within Aboriginal communities. The Gallery will develop strategic partnerships with other organizations in the community, regionally and internationally, to create a meaningful dialogue amongst citizens of all backgrounds.

6.2 SPECIAL EVENTS (FOR FEE)

Remai Modern will present a lively range of additional charged events annually. These will include:

- Art workshops
- Fundraising galas and dinners
- Lectures
- Performances
- Concerts
- Packaged events for businesses and community groups
- Occasional themed dinners and “club nights”

6.3 OTHER EVENTS

A range of other events will be offered that will not be directly charged for, but will be focused on offering hospitality as a benefit for corporate and donor support. Such events will include member’s openings, VIP openings for donors and sponsors, and donor recognition events.

7. MARKETING PLAN

A strong marketing plan and effective execution of the plan will be key success factors for the new Gallery. Remai Modern is slated to be the largest new tourism product in Canada in 2016. Communication of the Gallery across Saskatoon, Saskatchewan, Canada, and broader tourism markets will be a necessary exercise to ensure a wide audience hears of the opening of Remai Modern. The Gallery will market itself “THE” place to visit in Saskatoon. The linkages to other city amenities are endless – River Landing, the University of Saskatchewan, the Forestry Farm Park and Zoo, and others. No visit to the city will be complete without a day or an afternoon at the Gallery.

Remai Modern will be marketed as more than an art gallery. Remai Modern will be a gathering place for major life events; it will be the place to have dinner before an evening of live theatre. The retail store will support these various marketing efforts and will carry Remai Modern branded items as well as publications developed to support exhibitions.

To properly market Remai Modern, a Director of Marketing position has been established to ensure the plan is developed and ready to implement ahead of opening. Relationship building, communication, and raising the profile of Remai Modern will be key tasks of this position.

7.1 BRAND STRATEGY LINKAGES

The following insights were generated during the brand strategy process and have a direct bearing on the development of the strategic implementation plan (marketing plan) for Remai Modern.

These insights factor into the tactical overview for the pre-launch/launch and post launch phases of the Gallery and have provided the critical thinking/rationale for key tactics, as well as the narrative for the brand building blocks and subsequent messaging architecture.

Key insights:

- Globally, art galleries have moved from being places for the “elite” to inclusive gathering places for individuals and families.
- If the early adopters in the community embrace the Gallery, studies show that the rest of the community will follow.
- There is a disconnect from a perception point of view, in that consumers generally do not know what they do not know; trial is the best method of ensuring consumer/ community engagement on a long-term basis.
- “Pride of place” will override most issues that non-users have with the Gallery – i.e. they will take visitors to the most popular venue even if they do not embrace it themselves.
- The category is vibrant and fluid and the lines between contemporary art, modern art, old and new are constantly shifting and changing.
- The impact of a vibrant arts and culture scene to a city is immense – from economic growth, to “pride of place”, to city “brand” building, the contribution cannot be ignored.
- The descriptors given of the new Remai Modern by multiple stakeholder groups are consistent and all describe a dynamic, disruptive, innovative, beautiful, controversial, and thought-provoking contemporary art gallery.
- The competitive set is limited in the city and province and there is ample room for the Gallery to establish itself as the leading brand in the arts and culture scene.
- The competitive set for Remai Modern nationally and internationally is well populated and well established with very high standards. There are many options for the gallery enthusiast to visit and many of them are sophisticated marketers who understand the demand drivers of this target audience.
- The competition demonstrates a high level of sophistication when it comes to brand building and marketing programs. Best practices are very evident in much of the marketing material reviewed.
- There are multiple stakeholder groups that must be cultivated in order for the brand to grow and flourish. They range from brand ambassadors in the government (all levels) to existing and potential donors.
- Tourism Saskatchewan is undergoing a major brand makeover during the next 12 months providing an opportunity for a once in a lifetime partnership, with the timing perfectly coinciding with the launch of Remai Modern.
- For the most part, the community as a whole, including many key influencers, are very excited about the new brand.

7.2 THE SASKATOON TOURISM MARKET

Data provided by Tourism Saskatoon indicates that the average visitor to Saskatoon stays for approximately 2.8 days, visits two to three sites in the city and dines at a restaurant at least once. Saskatoon visitors are usually here to visit friends or family, or are in town for a conference or business-related purpose. Saskatoon hosts approximately 1.9 million visitors per year, of which 60% are from within the Province, 15% are from Alberta and Manitoba and another 8% are from the United States and other international locations.

Given the data from Tourism Saskatoon, if half of the total projected visitors to Rемаi Modern (110,000 visitors) were from places outside of Saskatoon, the Gallery would only be capturing less than 6% of the annual tourism market that visits Saskatoon. There is significant potential in attracting additional visits from this tourist market. To enable this, the marketing for Rемаi Modern must be high caliber, bold, different, and attract the attention of visitors who are only here for a short time.

Rемаi Modern will be an attraction that will enable tourism marketers – Tourism Saskatoon and Tourism Saskatchewan – to encourage visitors to add another day to their planned visit. The Gallery will partner with Tourism Saskatoon on initiatives such as the “Saskatoon Experience Pass”; this will directly link Rемаi Modern with potential visitors to the city. A key component of the “Saskatoon Experience Pass” is the value that visitors receive for the pass; facilities that offer free admission are not included in this pass. As a result, free admission facilities are also not included in the specific marketing efforts that are part of this initiative (ex. hotel websites). The “Saskatoon Experience Pass” was a new program as of 2013. In this first year 450 summer passes and 735 winter passes were obtained by visitors to the city. In addition to the “Saskatoon Experience Pass”, Rемаi Modern will have many other cross-marketing opportunities available to it as a result of its admission charge.

7.3 MARKETING ASSUMPTIONS

As part of the brand development process, a number of marketing assumptions were developed for Rемаi Modern. A Director of Marketing for Rемаi Modern has been hired and it will be the responsibility of this person to implement the plan as developed.

Key assumptions include:

- The visual identity for Rемаi Modern is fully developed by mid 2015.
- There is agreement across all departments to utilize the graphics standards in all

stakeholder touch points, no exceptions.

- The marketing toolbox is fully created and functional by mid 2015 and includes, at minimum, a robust website, brand film, persuasive presentation, and corporate brochure.
- There are committed resources and staff to administer all marketing programs during the pre-launch phase and beyond.
- There is agreement that all marketing activities flow through the Director of Marketing who also owns the balance sheet in this area.
- Marketing will function as an “in-house agency” or shared service for the rest of the organization and report to the CEO.
- Marketing also controls the café, gift shop, membership services, and sales and catering marketing needs.
- Marketing will align with and support the stated benchmarks noted in the interim timeline with regards to the closure of the Mendel and the launch of Remai Modern brand.
- Marketing will not support the Mendel brand but rather focus on the pre-launch and launch of the new Remai Modern brand.

7.4 MARKETING BUDGET

The annual marketing activities budget was developed in conjunction with Kerry Harris and other marketing professionals. The budget, included in the financial projections which can be reviewed in Appendix A following this report, is in alignment with marketing budgets of other facilities of this stature across the country. A review of the marketing budgets of other facilities indicated the following:

Organization	Marketing \$ as % of total expenses
Remai Modern	6.2% (As of 2019)
Art Gallery of Ontario	7%
Royal Ontario Museum	7%
Art Gallery of Nova Scotia	6%
Vancouver Art Gallery	19%
Winnipeg Art Gallery	8%
Toronto Zoo	7%

The budget presents what is required to implement the brand plan and vision for Remai Modern.

8. OPERATIONS PLAN

8.1 OPERATING HOURS

The operating hours for Remai Modern are anticipated to be:

- 10 a.m. – 6 p.m. on Sunday, Tuesday, and Thursday
- 11 a.m. – 8 p.m. on Wednesday, Friday, and Saturday

The Gallery will be closed on Mondays, and annual statutory holidays. The Remai Modern store will be open the same hours as the main gallery.

The initial operating hours are based on an understanding of art gallery visitation patterns and the anticipated course of action from the “typical” gallery visitor. The 51 hours of operation per week are more than what is typically offered by other galleries operating across Canada and the United States. Some examples of this from Canadian galleries are provided in the table below.

Hours of Operation	Vancouver Art Gallery	Art Gallery of Greater Victoria	National Gallery of Canada	Art Gallery of Ontario	Winnipeg Art Gallery
Monday	10 a.m. – 5 p.m.	Closed (during winter)	Closed (during winter)	Closed	Closed
Tuesday	10 a.m. – 9 p.m.	10 a.m. – 5 p.m.	10 a.m. – 5 p.m.	10 a.m. – 5:30 p.m.	11 a.m. – 5 p.m.
Wednesday	10 a.m. – 5 p.m.	10 a.m. – 5 p.m.	10 a.m. – 5 p.m.	10 a.m. – 8:30 p.m.	11 a.m. – 5 p.m.
Thursday	10 a.m. – 5 p.m.	10 a.m. – 9 p.m.	10 a.m. – 8 p.m.	10 a.m. – 5:30 p.m.	11 a.m. – 5 p.m.
Friday	10 a.m. – 5 p.m.	10 a.m. – 5 p.m.	10 a.m. – 5 p.m.	10 a.m. – 5:30 p.m.	11 a.m. – 9 p.m.
Saturday	10 a.m. – 5 p.m.	10 a.m. – 5 p.m.	10 a.m. – 5 p.m.	10 a.m. – 5:30 p.m.	11 a.m. – 5 p.m.
Sunday	10 a.m. – 5 p.m.	12 p.m. – 5 p.m.	10 a.m. – 5 p.m.	10 a.m. – 5:30 p.m.	11 a.m. – 5 p.m.
Holidays		12 p.m. – 5 p.m.			
Total	53	44	45	48	40

The operating hours are fewer than those of the Mendel Gallery, but more than other galleries in order to address demand from the Saskatoon market. The management team will monitor demand and visitation patterns closely upon opening to ensure that the hours of operation are meeting the needs of the community. The operating hours will be reviewed in future years and may be adjusted as required based on demand. There will also be the opportunity to extend hours based on special exhibits and seasonal needs. However, for the purposes of this business plan the standard hours have been utilized throughout the analysis.

8.2 REMAI MODERN ADMISSIONS AND ATTENDANCE

8.2.1 BENCHMARK DATA

There are a number of factors that impact and influence attendance for an art gallery. Through reviewing the Council for Business and the Arts in Canada (CBAC) survey data for 2009-2010, a few highlights were noted.

The data confirms that there are substantial differences between galleries across Canada and as such there is not one clear best practice or direction to follow. There are many variables that influence a gallery's operation and results including years of operation, quality of exhibitions, location in the community, size of the community, etc. This has meant that there is no one industry best practice or benchmark that can be used for determination of projected attendance. As such, the analysis considered all information, including previous prepared studies, to arrive at the projected attendance levels.

8.2.2 ADMISSION FEE ANALYSIS

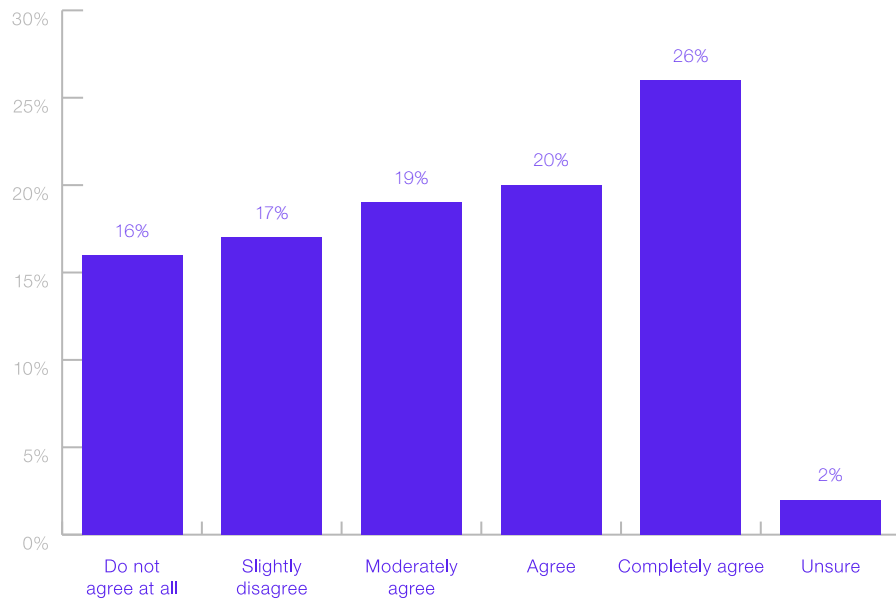
Over the years, there have been many discussions regarding the potential charging of admission for Remai Modern. The board and management have decided that it is important for the Gallery to be as self sufficient as possible and as such a modest admission charge is required. The charging of an admission fee for the Gallery is an important mechanism – both as a revenue generator and as a marketing tool. An admission fee should also result in an increase in the number of memberships purchased for Remai Modern. The admission charge provides substantial incentive to purchase a membership that allows individuals or families the ability to visit Remai Modern at a fixed one-time annual charge, multiple times per year.

A study was completed in 2011 by Fast Consulting on potential admission for the new Gallery. Some residents who were surveyed as part of the study stated that they would be in favour of an admission charge. It is important to note that this study was completed at a point in time where the public was unaware of “what” Remai Modern would be and before the donation of the Picasso exhibit by Mrs. Remai. As the Gallery plans have evolved and the Saskatoon constituency has learned more about Remai Modern, the acceptance of a general admission charge has likely grown as well.

A key finding from the Fast Consulting report was the desire of Saskatoon residents to see the Gallery become as self sufficient as possible. As part of this important goal, a modest admission fee will be implemented.

Under the topic of admissions, the Fast Consulting Study asked respondents:

Q. *Do you agree the gallery should continue to offer free admission to the public for all exhibitions at all times?*



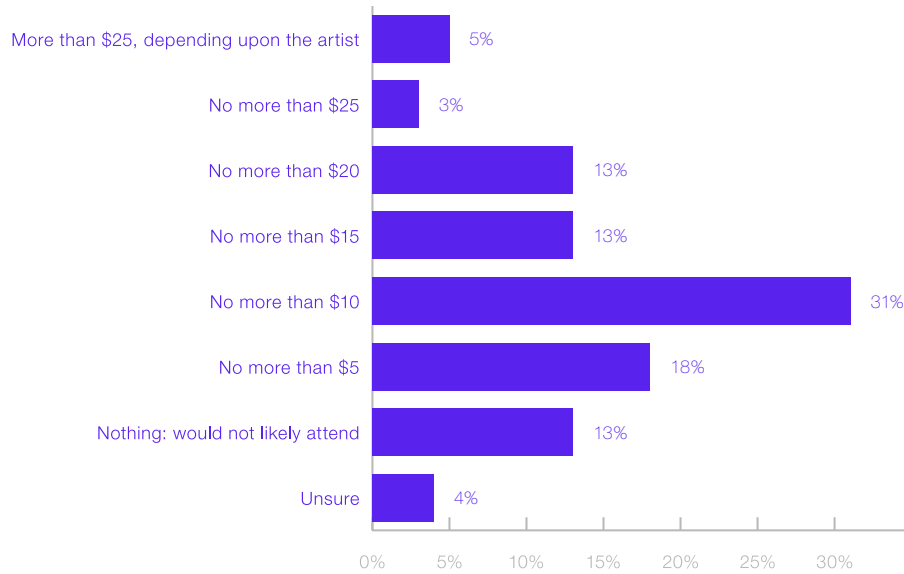
Source: *Remai Art Gallery of Saskatchewan Public Opinion Survey Report, November 2011 – Fast Consulting*

Based on the responses 33% of those surveyed did not agree that the new Gallery should continue to offer free admission. Furthermore, 52% of respondents only moderately agreed, slightly disagreed, or did not agree at all with the continuance of free admission. This indicates that there is an appreciation for the value that Remai Modern will provide to the visitor and that value can be realized through an admission fee.

In light of the current plan for Remai Modern and the donation of the Picasso linocuts, the study's results for the following question confirm support for an admission fee that is in line with what is actually being implemented.

Even if access to the permanent collection is free, there may be occasions when a major special exhibition of an artist(s) of international renown (e.g., Picasso) or national stature (e.g., Group of Seven) needs to charge a special admission fee in order to cover the costs of bringing the exhibition to Saskatoon.

Q. What is the maximum you would be willing to pay for an individual adult admission to the gallery in such a scenario (assuming the artist was of great interest to you)?



Source: Remai Art Gallery of Saskatchewan Public Opinion Survey Report, November 2011 – Fast Consulting

An affordable admission rate of \$12 for general (adult) admission and \$10 for students and seniors is well within the stated “acceptable” range for an admission fee.

A comparison to other Saskatoon facilities confirms that the proposed admission charge is a reasonable amount for the facility:

	Western Development Museum	Saskatoon Facility Day Pass	Forestry Farm and Zoo	Wanuskewin Heritage Park	Ukrainian Museum
Adult admission	\$9.00	\$9.30	\$9.50	\$8.50	\$4.00
Younger child admission	Free	Free	Free	Free	Free
Older child admission	\$2.50	\$5.60	\$5.75	\$4.00	\$2.00
Family admission	\$20.00	\$18.60	\$19.00	\$21.00	\$10.00

In comparison to the admission charged at many Canadian galleries, Remai Modern's admission charge is very reasonable. Some examples are shown below:

	Vancouver Art Gallery	Art Gallery of Greater Victoria	National Gallery of Canada	Art Gallery of Ontario	Winnipeg Art Gallery
Adult Admission	\$20.00	\$13.00	\$12.00	\$19.50	\$12.00
Senior	\$15.00	\$11.00	\$10.00	\$16.00	\$8.00
Student	\$15.00	\$11.00	\$10.00	\$11.00	\$8.00
Youth	\$6.00	\$2.50	\$6.00	\$11.00	\$8.00
Child	Free	Free	Free	Free	Free
Family	\$50.00	\$28.00	\$24.00	\$49.00	\$25.00

To further analyze the potential impacts a charged admission would have on Remai Modern, a study was prepared by TCI Management Consultants in 2011. The study reviewed a number of different admission fee scenarios and the impact on attendance. Each scenario was developed using a baseline of 200,000 annual visitors to the new Gallery. The TCI study indicated that if an admission charge was implemented, a 47% to 53% reduction in visitation levels may occur.

The original business plan developed a base case for attendance analysis using the information provided in the TCI study:

- Year 1 – 300,000
- Year 2 – 250,000
- Year 3 – 200,000

The TCI study stated that as a result of the advantages of the new Gallery, it was reasonable to expect a new level of attendance compared to what the average Mendel Art Gallery visitation was in the past. It is important to note that the Mendel Art Gallery visitation numbers have been based on external door counters. These counters do not count or track what area a visitor accessed – the Civic Conservatory, the retail store, the coffee shop, or the Gallery itself.

Therefore, adjusting the visitation projection based on charging an admission fee is likely a more conservative process. As the Fast Consulting study indicated that an admission charge may decrease visitation to the areas of the Gallery that are fee for admission, the revised admission fee revenue assumptions are as follows. They have been developed in consideration of the previous work, the benchmark data, and management's estimates:

Admission Category	Price per Admission
General (13 years and over)	\$12.00
Students and seniors	\$10.00
Special exhibitions	\$4.00
Children 12 and under	Free

It is assumed that in the first fiscal year of operations, which will only be half a year, the number of paid general, student, and senior admissions will be 20,000. This is greater than half the annual projected attendance as a result of the excitement and interest there will be to first experience Remai Modern. In the second year (the first full year of operations), the paid attendance will be 30,000. The projection has conservatively kept this attendance level for future years. This will generate approximately \$220,000 in the first year, and \$330,000 in year two and subsequent years. The special exhibitions in full operating years are expected to attract 20,000 visitors each year. This will generate \$80,000 per year in special exhibit revenue.

8.2.3 ATTENDANCE

Using the data compiled in previous studies for the 2012 business plan, as well as management experience and expertise, the following assumptions regarding Remai Modern attendance have been developed. The visitation estimate shows attendance based on the area of Remai Modern the person is actually there to see – gallery, sculpture garden, restaurant, etc. The marketing strategy developed with gallery management and ReBoot is designed to support and drive the attendance projections. The expected annual visitation for Remai Modern is 220,000. The breakdown of visitation by 2019 is as follows:

Remai Modern Destination or Reason for Visiting	Annual Visitation
General admission (adults, students and seniors)	30,000
Sponsored free admission (children under 12 & one evening per month for all ages)	40,000
Member visitation – free admission with membership	15,000
Ground floor and Yuel Gallery – no admission charge	30,000
Sculpture garden – no admission charge	30,000
Retail store	15,000
Private events and facility rentals	30,000
Restaurant visitors	30,000
TOTAL Annual Visitation	220,000

A 2009-2010 Council for Business and the Arts Canada study indicated an average of 4.13 visitors per square foot of exhibition space when analyzing visitation for 39 public art galleries across Canada. In comparison to this benchmark data, Remai Modern visitation (calculated using Gallery space including the Atrium space and 115,000 annual Remai Modern gallery-specific visitors) shows a visitor per square foot of exhibition space ratio of 4.32, which aligns with the study's average.

8.3 MEMBERSHIP

The admission charge will increase the appeal of obtaining a membership to Remai Modern. Memberships are an important way of engaging the public to support and maintain buy in for galleries. As such, the attraction of members is more than simply a revenue generator. Additional benefits beyond admission are anticipated to include a discount at the retail store, reciprocal benefits at selected Canadian art museums, and invitations to special exhibit openings and others. The full membership program is in development and will be aligned to the overall brand and vision. A Remai Modern membership will be considered an essential membership for Saskatoon and area.

The anticipated pricing for memberships is projected to be \$65 for an individual annual membership and \$90 for a dual/family membership. This compares closely to the previous pricing structure of the Mendel Art Gallery and the pricing structures of other facilities in Saskatoon which range from \$40 to \$70 for individual and family memberships respectively. The membership level is projected to increase in each year of operations. It is the Gallery's goal to grow the membership to 3,000 members.

	2015	2016	2017	2018	2019
Membership	0	1,000	1,400	1,800	2,200

A key driver for memberships will be the admission charge. Without a general admission charge the incentive to purchase a membership is limited.

8.4 REMAI MODERN STORE

Remai Modern will operate a retail store to complement the Gallery's core mandate. The store will support the Gallery's vision and commitment to modern art by developing and distributing unique products created with artists and designers, exposing a broad

audience to new and exciting work from the modern art world. Proceeds from the retail store sales will support exhibitions, programs, and ongoing collection development.

The store will support the overall brand of the Gallery and be a self-sustaining operation within the overall Gallery organization. To support a successful launch of the new retail space within Remai Modern, MNP, as part of their work on the business plan, reviewed the practices of a number of successful gallery stores throughout the world, including:

- Museum of Contemporary Art Store (<http://mocastore.org>)
- Museum of Modern Art Store (<http://www.momastore.org>)
- Museum of Contemporary Art Australia (<http://store.mca.com.au>)
- Los Angeles County Museum of Art Store (<http://thelacmastore.org>)
- Museum of Contemporary Art Chicago Store (<http://www.mcachicagostore.org>)
- Tate (<http://shop.tate.org.uk>)
- Walker Shop (<http://shop.walkerart.org>)
- Guggenheim Store (<http://www.guggenheimstore.org>)

Each store was contacted individually for further discussion and where possible questionnaires were emailed. One interview was held with Michele Tobin from the Walker Art Center.

In addition to the interview and store reviews, the Museum Store Association's 2009 Retail Industry Report was obtained and key findings and applicable metrics were used to support any assumptions.

The Museum Store Association (MSA) is a nonprofit, international organization dedicated to advancing the success of cultural commerce and the professionals engaged in it, by encouraging high standards of professional competence and conduct. To further benefit and assist this specialized community, MSA undertakes a retail industry study every few years to provide insightful and valued information used to benchmark store performance including financial, operations, and salary information, as well as recommended marketing and growth strategies to help readers make sound business decisions.⁶

The information that was shared through data collection, research, and the interview can be considered key success factors from galleries who have "been there, done that". As the final design and inventory selection is completed for the Remai Modern store it is recommended that the following considerations be reviewed as part of the decision making process.

⁶ 2009 MSA Retail Industry Report

8.4.1 KEY CONSIDERATIONS AND SUCCESS FACTORS

It is not uncommon in the industry for a smaller museum or gallery store to operate at a loss. The function of the store is to support the brand of the gallery. The scale of the store relative to the gallery dictates many choices, especially in the not-for-profit sector. However, galleries are beginning to revisit retail operations and are making changes in an attempt to have a profitable operation to support the galleries.

A gallery retail shop or store is no different from any other retail operation – there is seasonality to the business. This must be understood and planned for in the business model. Key drivers of sales include special exhibitions (blockbusters) and Christmas. As with traditional retail operations, labour costs are a significant portion of the operational expenses. The gallery's opening hours will impact the sales of the retail operation; when special exhibitions are on and hours are extended, the retail hours may need to be extended as well. Special events such as cocktail opening receptions, etc. may require the Retail Modern shop to be open hours outside the normal operations. This creates the need for a significant amount of part-time labour. It is important for the gallery store to operate as lean as possible staff wise to support a successful operation.

It is going to take time to fully understand the interest, needs, and desires of the customer. It will be important to analyze sales in terms of price point, products, and items of interest to the customer in the first three years. As there will be a learning curve for the first years, and initial spikes in sales compared to sales that the Mendel Art Gallery store generated, it will be important to manage inventory and ordering.

The physical design of the store is of critical importance. The space must be functional, fluid, and designed in a way to support the needs of the Gallery and the retail store. A modular design is ideal in that it can be changed over and over to suit the needs of the store through various seasons and exhibitions. Flexible counter and cabinet space will allow the store manager to find creative ways to display product or store items within the retail space rather than in the small office/storage area that has been allocated for the retail operation. The lighting design will also impact sales. Movable lighting that can highlight higher-end products, such as jewelry, entices customers to buy. The lighting helps catch visitors' attention and draws people to the items. A beautiful display space with accent lighting will support and help grow sales. Lack of attention to these details will hinder sales.

8.4.2 BEST PRACTICES

An article published by the Guardian in 2012 listed advice and best practices for operating a retail museum shop.⁷ The tips were shared by a panel of museum retail experts, which included Sara Ley, Baltic Centre for Contemporary Art; Jeremy Ensor, Ashmolean Museum; Sara Sevier, Victoria and Albert Museum; Sue Shave, Chiltern Open Air Museum; and Meghan Cole, Shakespeare's Globe. These concepts should be considered for implementation as the Remai Modern retail shop is designed and operated.

- Promote retail offerings throughout the facility. For example, have prints in the restaurant and homeware in the cafe. It is important to explore all options and remind visitors throughout their visit that the retail shop exists.
- Place products to tap into human behaviour. Ensure the products near the entrance to the shop reference the current exhibitions. Depending on the season, Christmas for example, ensure related products are in a prime location. Consider staging products for children in the centre of the store to entice families in.
- The sales counter is an ideal location for smaller pick-up items and gift books.
- Engage with the customers – the shop sales will give Remai Modern the best indication of what works and what visitors expect. Ensure there is continued communications with customers as the Gallery matures to define who the customers are and where they come from. This can be executed through exit and online surveys and customer focus groups.
- A strong social media presence is a key tool for customer engagement – Twitter, Instagram, Facebook, etc. are all important tools to share information about products, sales, etc.
- Track data internally to be able to know how many families, school parties, older adults, etc. visit the store. This data can be used to assist the store manager with product selections.
- Tourism visitors and others will want to purchase items that remind them of their visit (to Saskatoon and Remai Modern). From there, price structure needs to be thought of to ensure the store has products at price points that appeal to each audience.
- The standard of customer service will be vitally important as it is likely that the last interaction the visitor has will be with a member of the Gallery staff. This interaction may be their lasting impression of Remai Modern. Smiling, enquiring if visitors enjoyed their time at the Gallery, asking what their favourite part of the Gallery was, etc. are all things that staff can do to help this process and leave a positive memory. Training of staff will be a key success factor for the retail operation.
- Plan for the next season of sale through internal data analysis. Base inventory and

⁷ <http://www.theguardian.com/culture-professionals-network/culture-professionals-blog/2012/oct/18/top-tips-museum-shop-retail>

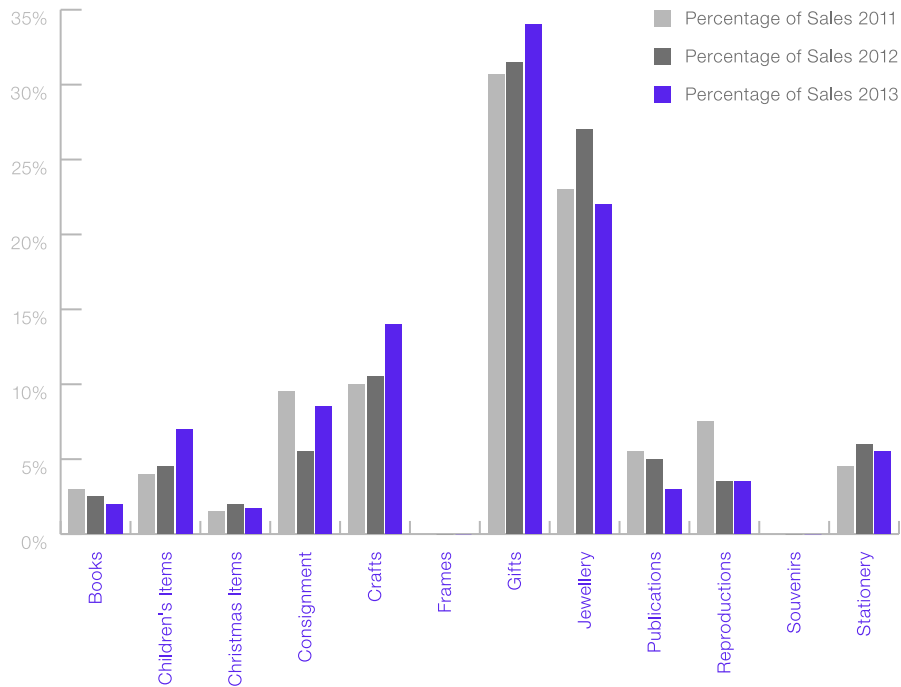
purchase decisions on previous sales data to avoid being swayed by lower prices of products in unrealistic quantities.

- Museum shops are part of the whole visitor experience and should be treated as such. The store manager will need to ensure the products in the store relate to the uniqueness of the Gallery collection and help to promote the Gallery.
- Invest in full-time staff members – understand that the sales team should be an important part of the overall Remail Modern staff complement. The sales team should be highly trained and have knowledge not only about what they are selling, but about the site and surroundings. If volunteers are to be used to support the sales staff, understand that a considerable investment in time may need to be made to keep a volunteer up to speed with an ever-changing product file.

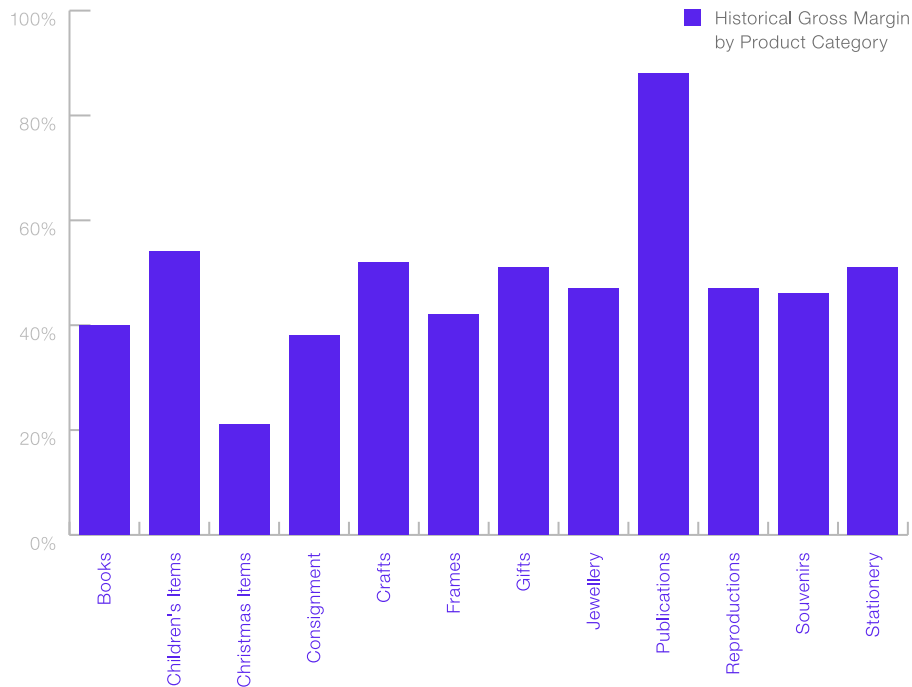
8.4.3 PRODUCT MIX AND INVENTORY

As the store will be a small store, it will be important to manage inventory. Turnover and product mix relative to price must be closely monitored to ensure products are not sitting for too long. The Mendel Art Gallery store was not as aggressively marketed as the Remail Modern store will be; however, the buying patterns are a reasonable starting point for the development of the product mix plan.

The following graph confirms that the buying patterns over the past three years at the Mendel Art Gallery store have been fairly consistent as it relates to product purchases:



Items classified as gifts and jewelry have cumulatively accounted for over 50% of the sales volume consistently over the past three years, with gift items being the top seller in the store. Review of the Mendel Art Gallery store indicates that a varied approach has been taken; some products generate higher return than others.



One category that likely will not follow the previous sales trends are the products related to souvenirs. Initial high sales for Remai Modern in this category will likely be experienced, but this will drop over the first few years and level off as Gallery matures.

8.4.4 ONLINE SALES

The intention is to offer online retail shopping. This decision has been made as an effort to increase gift shop sales and to support the marketing efforts of the Gallery. Management of the website and online orders will be a key role for the store manager. As the Remai Modern store establishes itself in the marketplace, increased demand may require the need for additional dedicated e-commerce staff.

The online presence must also support the brand and vision. The web design and products that are showcased must align to the brand.

8.4.5 PROJECTED DEMAND

The November 2011 Fast Consulting report surveyed Saskatoon residents about the potential interest in a new gift store at the Gallery. The study found that approximately 45% of Mendel Art Gallery visitors make a purchase in the gift shop on at least one visit a year, including 29% who make a purchase once or twice a year and 15% who make a purchase three to five times a year. The Remai Modern store will have vastly different product offerings from the Mendel Art Gallery store; however, this data provides initial baseline benchmarks to use as a predictor of visitor sales.

Roughly four out of every ten Saskatoon residents (42%) say they would purchase items from a gift shop located at the Remai Modern. These residents would like to see a variety of items in the Gallery gift shop, including high quality craft products, art reproductions, art-related products aimed at children, handcrafted jewellery, art-related books, giftware and designer giftware, and stationery.⁸

Spend per Visit (Low)		
15% Spend less than \$25	\$5	\$11,250
30% Spend between \$25 – \$49	\$25	\$112,500
32% Spend between \$50 – \$99	\$50	\$240,000
10% Spend \$100 or more	\$100	\$150,000
Annual Remai Modern Store Sales (Low Projection)		\$513,750

⁸ Remai Art Gallery of Saskatchewan Public Opinion Survey Report, Fast Consulting, November 2011

Spend per Visit (Median)		
15% Spend less than \$25	\$15	\$33,750
30% Spend between \$25 – \$49	\$37	\$166,500
32% Spend between \$50 – \$99	\$74.50	\$357,600
10% Spend \$100 or more	\$150	\$225,000
Annual Remail Modern Store Sales (Mid Projection)		\$782,850

Spend per Visit (High)		
15% Spend less than \$25	\$25	\$56,250
30% Spend between \$25 – \$49	\$49	\$220,500
32% Spend between \$50 – \$99	\$99	\$475,200
10% Spend \$100 or more	\$200	\$300,000
Annual Remail Modern Store Sales (High Projection)		\$1,051,950

Among those who indicated that they would purchase items from the Remail Modern store, 32% think they would spend between \$50–\$99 on a typical visit, 30% think they would spend between \$25–\$49, and 10% think they would spend \$100 or more on a visit to the Remail Modern store.

If it is assumed that the 15,000 per year store-specific visitors followed this pattern of spending, the annual sales for these visitors would be:

	Overall Total	Less than \$35,000	\$35,000 – \$89,999	\$90,000 – \$199,999	\$200,000 – \$499,999	\$500,000 or More
Median Number of Hours Store is Open per Week ⁹	46.0	35.0	41.5	45.0	47.0	50.5

Applying the Fast Consulting survey findings to the visitation projections for the Remail Modern store indicates the potential for significant store sales. This analysis does not include potential purchases made by visitors to other areas of the Gallery, which is likely going to increase sales.

The MSA Retail Industry report indicated that there is an unsurprisingly positive correlation between the number of hours a store is open per week and gross store sales. As the number of hours a store is open increases, so does the amount of gross sales.¹⁰

The Remail Modern store will be open 51 hours per week, not including special sale events. These operating hours should support annual gross sales of over \$500,000 per year. The MSA report also provided the following metrics for a store with annual gross sales of over \$500,000 per year (the median values of the study have been used where applicable):

⁹ 2009 MSA Retail Industry Report

¹⁰ Ibid.

- 23% of the stores with annual gross sales of over \$500,000 per year are between 900 – 1,599 square feet
- 67% of the stores with annual gross sales of over \$500,000 per year are 1,600 square feet or more
- 42% offer a discount to select store customers of 16% - 20%
- 94% offer admission-free access to the store
- Annual visitation to the art galleries surveyed is 300,000 (median value)
- Median Net Sales (Gross Sales Less Returns and Allowances) \$1,145,355
- Median Cost of Goods Sold 47%

The Remail Modern store will create additional sales floor space by placing movable racks and shelving into the atrium areas. This increased sales floor space should translate into greater sales based on the findings of the MSA Retail Industry report.

Based on this analysis completed for the purposes of this business plan, the projected annual sales for the Remail Modern store are as follows:

	2015	2016	2017	2018	2019
Annual Sales	\$0	\$390,000	\$650,000	\$650,000	\$650,000

As the Remail Modern store will open in 2016, a portion of annual projected sales was used for 2016. There is an expectation of increased demand in this first year of operations for special “Opening of Remail Modern” products. The projected annual sales have been determined using the data from Fast Consulting and are supported by the MSA report.

8.5 FOOD SERVICES

Remail Modern’s location will be a destination not only for those wanting to experience the art and exhibitions, but also for those looking for a dining destination. In 2013, fsSTRATEGY developed an updated Retail Food & Beverage Options Analysis study for Remail Modern. This study analyzed a number of food services options. The full report is available upon request. Based on the findings, a larger food service outlet with a full kitchen (supported by the second floor main kitchen) and licensed seating outside the security perimeter of the Gallery (so that it is capable of being operated after regular Gallery hours) was the preferred business model for food services.

Food service operations will be subcontracted and the Gallery will provide the equipment

necessary for the food service provider to begin operations. In turn, the Gallery will collect a commission of the provider's gross revenues. For the purposes of the projection, base levels of \$92,580 for restaurant commissions and \$50,700 for catering commissions (facility rental functions) have been used. These amounts, including the commission, may change depending on the arrangement made with the food service provider, who at this time is unknown.

As part of the contract, the third-party provider will ensure that the restaurant offerings – food, atmosphere, and service – all align with Remai Modern's brand.

8.6 FACILITY RENTALS

In 2011, fsSTRATEGY Inc. prepared the Mendel Art Gallery Food and Beverage Opportunity Assessment and Management Strategy report. This study reviewed the demand and market for event rental spaces in Saskatoon and assessed the potential revenue that could be generated for Remai Modern. The findings of this study have been carried forward in this updated business plan as they remain relevant and appropriate for the Remai Modern operations plan. A full copy of the report is available by request.

Six spaces at the Gallery are appropriate for catered events:

- Multipurpose Room – 3,046 square foot
- Boardroom – 904 square foot
- Meeting Room – 323 square foot
- Roof Top Terrace (seasonal) – 1,500 square foot
- Lecture Theatre – 150 seats, 1,830 square foot
- Atrium – 4,090 square feet

The three primary rental spaces at Remai Modern (the 3,046 square foot Multipurpose Room, the 323 square foot Meeting Room and the 904 square foot Boardroom) will offer unique views of the South Saskatchewan River. Few other Saskatoon venues have the ability to provide event space with this appealing view. This will help ensure that the facility rental spaces are considered top tier or premium locations for events in Saskatoon. In addition, these three Gallery event spaces are expected to be relatively well appointed.

As such, these spaces should be able to command a premium, as well as be in relatively high demand, especially by groups that do not require hotel rooms for their events or do not

desire to have the guest rooms and meeting rooms in one facility.

The 1,830 square foot, 150-seat Lecture Theatre will be a relatively unique events space as it will have graded, fixed seating. This events space will cater to a limited number of potential events including film screening and community events. In addition, the Gallery will be able to accommodate events for 70 to 80 people on the Rooftop Terrace. The 4,090 square foot Atrium, with the Gallery and Persephone Theatre, will comprise the “destination centre”. Although this area will not generally be available for rent to the general public, this space will be used for municipal or other government events.

The coordination and booking of the Remail Modern spaces will be facilitated by an “in-house” staff member in coordination with the third-party food service provider. This will ensure consistent service levels and adequate onsite staff coordination as required (i.e. security).

Based on the market analysis prepared by fsSTRATEGY, the following room rental rates have been assumed for Remail Modern:

- Multipurpose Room - \$1,000
- Boardroom - \$250
- Meeting Room - \$150
- Roof Top Terrace - \$1,000
- Lecture Theatre - \$250

The rental rate per square foot for the Multipurpose Room is \$0.33; this is consistent with the average rental rate for comparable ballroom facilities in Saskatoon. Rental rates for the Meeting Room and Boardroom are also consistent with comparable venues in Saskatoon.

It is anticipated that the rental of these spaces will generate annual revenue of approximately \$260,000, using the base case scenario developed by fsStrategy (an average of \$5,000 per week of bookings; combination of all Remail Modern rental options available). In the first year of operations, this amount will be reduced by approximately two thirds - \$86,750 is projected for year one rental revenue as Remail Modern will be open for less than the full year and it is not expected that the full demand for bookings will take place until the Gallery has been open for a few months.

8.7 DEVELOPMENT (FUNDRAISING)

In 2013, the board recommitted to the sustainable development of the fundraising program at Remai Modern. This recommitment was focused on fulfilling the promise of the initial campaign and developing ongoing annual fundraising programs designed to meet annual operating costs.

The fundraising program is focused on developing three core business areas: development infrastructure, stakeholder engagement, and financial investment. Together, these three core business areas and their attending strategies and tactics constitute an integrated and comprehensive approach to development activity that supports both capital and ongoing operational requirements of Remai Modern over the life of the business plan.

All three core-business areas will be actively developed in each phase of the brand launch. It is crucial that investment in the development plan begins now - in the pre-launch phase - and continues through the launch and post-launch phases in order to achieve the revenue targets identified in the plan. This means that the development department team's resources will not be focused solely on the deferred items within the campaign. Considerable effort will be given to donor relations, stewardship activities, and solicitation to secure investment when the Gallery opens in 2016 and beyond.

8.7.1 SUCCESS FACTORS

Success for this area is defined by more than the dollars raised for Remai Modern, the development activities that define success will include:

- Research-based strategy for campaign and development revenue goals.
- Implement and maintain new software program for improved fundraising management.
- Develop a strategic prospect and donor management (SPDM) system focused on the ongoing identification, cultivation, solicitation, and stewardship of new and existing prospects and donors.
- Develop a compelling case for support document that is consistent with the Remai Modern brand, supports the updated business plan, and is approved by the board.
- Create Remai Modern branded marketing materials and an updated interim website.
- Achieve a strong reputation and profile of Remai Modern on local, national, and international levels through marketing and communications activities.
- Develop a donor recognition program that is approved by the board.

- Increase levels of board and staff participation in fund development work, such as giving, cultivation of donors, solicitations, and project ambassadorship.
- Foster a collaborative and integrated relationship between the various departments and program areas of the Gallery, including marketing and communications and public programming.
- Foster a culture of giving and philanthropy among all of the Remail Modern staff and board.

8.7.2 DEVELOPMENT RESULTS

The additional staff and focus on development activities for Remail Modern are expected to result in annual revenues of:

	2015	2016	2017	2018	2019
Annual Development Revenue	\$0	\$1,148,894	\$1,484,180	\$1,757,056	\$2,023,057

8.8 SECURITY

The security of the building and the art exhibited throughout Remail Modern is a critical day-to-day operational detail. To ensure adequate security was planned for, a study was prepared by Concentric Risk and Security Management Inc., which examined the following:

- Specific requirements to create, implement, and manage a safe and secure environment for Remail Modern.
- Primary and secondary programs which define the Security Master Plan. The primary program addresses day-to-day security operation. The Secondary programs define and address the security required for special events.
- Physical/procedural security for standard operation, events, and emergency conditions.
- Emergency, crisis, and disaster management programs.
- Contingency planning and preparation.

A full copy of the report is available by request.

The implementation of the Security Master Plan will be the responsibility of the Security and Facilities Manager, in coordination with the Remai Modern CEO.

A third-party security company will be contracted to provide the onsite security staff as required. This staff will work under the direction of the Security and Facilities Manager.

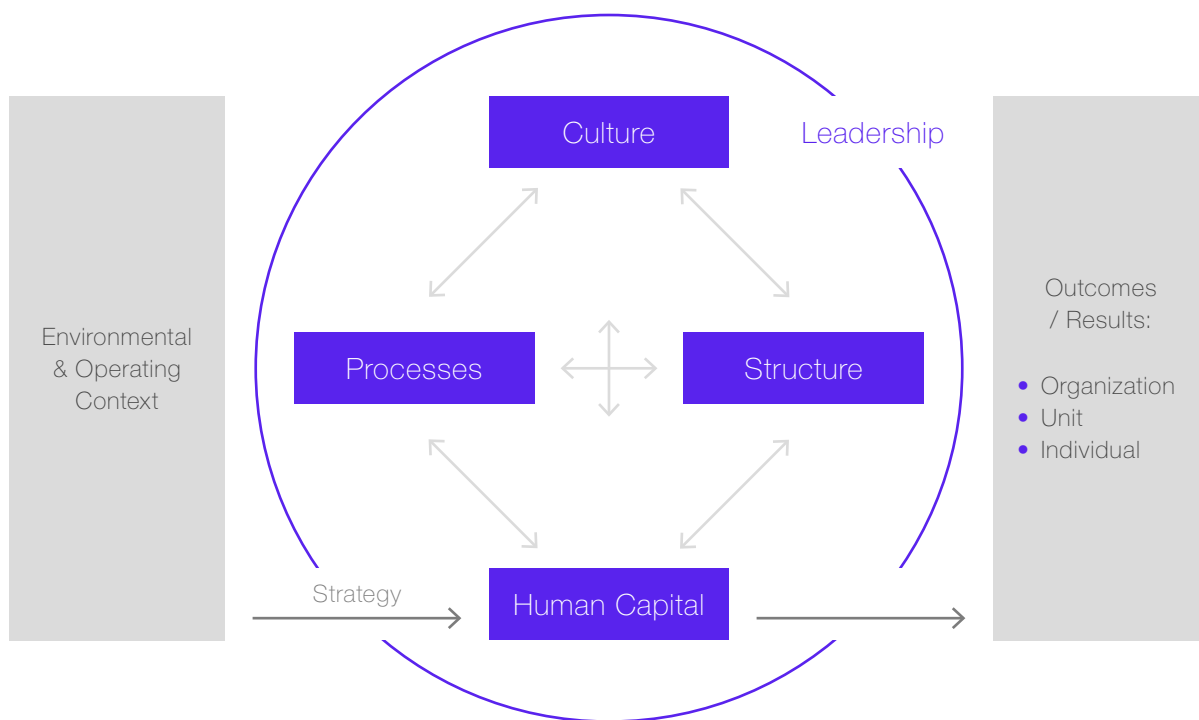
The annual expenditure related to security is projected to be \$521,966 annually. This will ensure 24-7 security onsite in the following capacity:

- 5 daytime security officers (Gallery opening hours)
- 1 afterhours security officer

9. HUMAN RESOURCES PLAN

9.1 APPROACH

A Human Resource Staffing Plan Report was developed by MNP as part of the business planning process. The industry research and interviews conducted by the MNP project team had multiple purposes. This included obtaining best practice information in order to better understand how various galleries structure their organization. As well, the research and analysis provided additional insight into the staffing requirements of successful art galleries including positions required, hierarchy, levels of management, reporting structure, staffing levels, etc.



The Gallery does not plan to replicate the organizational structure or staffing levels of any individual gallery, rather it was a learning process to gain an understanding of how other established and successful galleries have structured their operations.

The staffing and organizational structure recommendations have been developed using a conservative approach respecting the realities of publicly funded organizations, and

ensuring that the recommended staffing levels can deliver the vision. The resulting budget for staffing is a reflection of what is required at a base level to operate Remai Modern as outlined in the business plan and brand studies. In comparison to three other galleries (two which have asked for their information to remain confidential) the projected salaries for Remai Modern as a percentage of operating budget are conservative:¹¹

	Remai Modern	Art Gallery of Alberta¹²	Confidential Gallery "A"¹³	Confidential Gallery "B"¹⁴
Staffing Costs as a Percentage of Operating Budget	36%	42%	45%	50%

The Remai Modern Human Resource Plan has been developed with an overarching goal of ensuring a responsible, practical budget while ensuring the ability to successfully implement the bold vision of the gallery.

The overarching goal of the report is to define the staffing needs of the Gallery to ensure effective operations. Key components of the project included:

- Confirm the current state of the Gallery including positions, structure, practices, funding model and other relevant information.
- Confirm the future state service delivery model of the Gallery including the high-level vision, supporting business units and key strategic goals.
- Identify organization structure recommendations and optimal staffing levels based on the desired future state, industry research and human resource best practice.
- Provide associated staffing cost estimates in consideration of the relationship to the City of Saskatoon, human resource policies and procedures and the unionized environment.

The purpose of defining staffing levels through the appropriate organizational structure is to ensure that the key components of the organization are operating effectively and efficiently and are aligned with the strategic objectives of the organization.

The approach encompassed multiple elements:

- Accountability – understanding clear delineation of roles and responsibilities in achieving results;

¹¹ As of 2019, fully established operations

¹² <http://issuu.com/your-aga/docs/aga-annualreport-2013>

¹³ MNP Primary Research

¹⁴ MNP Primary Research

- Effectiveness – the extent to which the business units attain their goals and objectives to support the overall strategic imperatives of the organization;
- Efficiency & Value – whether the output and quality of results meets expectations given the available resources, target service levels and quality, and reflects improved methods of service delivery; and
- Stakeholder Focus – ensuring that services and programs are responsive to stakeholder needs and expectations.

9.2 BACKGROUND DATA

9.2.1 MANAGEMENT INTERVIEWS

As part of the human resources planning, MNP conducted interviews with the Executive Director/CEO and the Director of Finance and Operations to confirm human resources assumptions and gather current and future state organizational design and structure data. Research findings from management interviews were used to support the identification of the design principles and resulting organizational structure.

The Remai Modern vision and mandate is critical to the success of the new Gallery. To be recognized provincially, nationally and internationally the Gallery will require dedicated staff who are committed to delivering on the brand and customer promise each time, every time. This will require a focused effort on the attraction, orientation, development and retention of staff, ensuring each employee is accountable for providing their best to ensure the objectives of the Gallery are met. Clear lines of authority, communication and performance management, as well as a supportive workplace culture are key success factors in achieving the Remai Modern's vision. The customer service expectation of all Gallery staff will increase to ensure staff are there to provide a world-class experience for the customer.

Specifically, to support the success of Remai Modern's new organizational structure, the following functional areas were viewed as critical:

- Retail - Gift shop
- Administration
- Visitor Services / Admissions
- Financial
- Building Operations
- Curatorial

- Public Programs and Education
- Conservation
- Marketing
- Theatre Programming
- Public Programming
- Human Resources
- Collections Development
- Registration
- Exhibitions
- Development (fundraising, grants, sponsorship)
- Membership
- Facility Rentals (event services)
- Food and Services (contract)
- Security (contract)
- Information Technology (contract)
- Preparator (Prepping art work and installations)

In addition to the functional areas mentioned above, the following should be taken into consideration when developing the organizational structure:

- Effective and efficient design of the administrative team (which includes the Executive Office, Finance and Operations, Security, IT) is required. Currently there can be gaps in the amount of administrative support provided to the Executive Director/CEO as the Executive Assistant position also manages volunteer services. When the Executive Assistant is away, there is no other administrative support within the Gallery.
- The Remail Modern brand is paramount to the Gallery's success and as such the decision has been made to bring all marketing in-house. This will allow Remail Modern to control its brand and ensure its image is effectively communicated.
- The scale of event bookings and management will be new to the Gallery. The organizational structure must be able to support both bookings and event management during business hours and after hours. Special events and rentals will be a revenue generator for the Gallery.
- The Gallery will be open to the general public six days a week for 51 hours.
- A comprehensive public programming strategy will be developed within the next six months, which may affect staffing levels.
- Art galleries commonly encounter challenges with the funding of positions; it is imperative positions have clear lines of authority and role clarity.

9.2.2 INDUSTRY RESEARCH

The intent of the industry research was to provide additional insight into the staffing requirements of art galleries. Primary research was compiled from galleries through an organizational structure and design market survey. Based on the limited number of survey participants, secondary data was sourced from an additional seven galleries. MNP worked with Remai Modern to identify comparable galleries for the industry research. Galleries identified to be included within the research included:

- Armand Hammer Museum of Art and Culture Center – Los Angeles
- Art Gallery of Alberta
- Art Gallery of Hamilton
- Art Gallery of Ontario
- Montréal Museum of Fine Arts
- Museum of Contemporary Art – Los Angeles
- Museum of Contemporary Art – Chicago
- National Gallery of Canada – Ottawa
- Vancouver Art Gallery
- Whitney Museum of American Art – New York
- Winnipeg Art Gallery

The survey format was designed to collect information based on the project objectives and included:

- Organization name
- Contact information
- Number of employees
- Organizational chart
- Total operating budget
- Revenues
- Funding arrangements
- Salary information
- Contractor services
- Organizational structure effectiveness

From the primary and secondary research, it was observed that each gallery is unique in its operations; therefore, standardized staffing levels and metrics were not apparent. Operating budgets, revenue targets, staffing levels, the percentage of salaries as a portion of the

operating budget and the quantity of volunteers varied among galleries. In addition, when considering detail such as gallery exhibition square footage per staff count, total building square footage per staff count, number of collections per curatorial staff and average number of marketing and development staff, standardized ratios could not be calculated as each gallery utilizes its space and collections differently. As a result, it is difficult to identify specific ratios upon which to base staffing levels.

Notwithstanding the above, there appears to be a consistent breakdown of functional areas which are grouped into specific departments:

- Administration
- Marketing / Communications
- Development / Fundraising / Capital Campaigns / Membership
- Programming
- Curatorial / Registration / Conservation / Preparation
- Gallery Store
- Guest Services (typically within Development or Marketing)
- Volunteer Services (typically additional duties of a position)

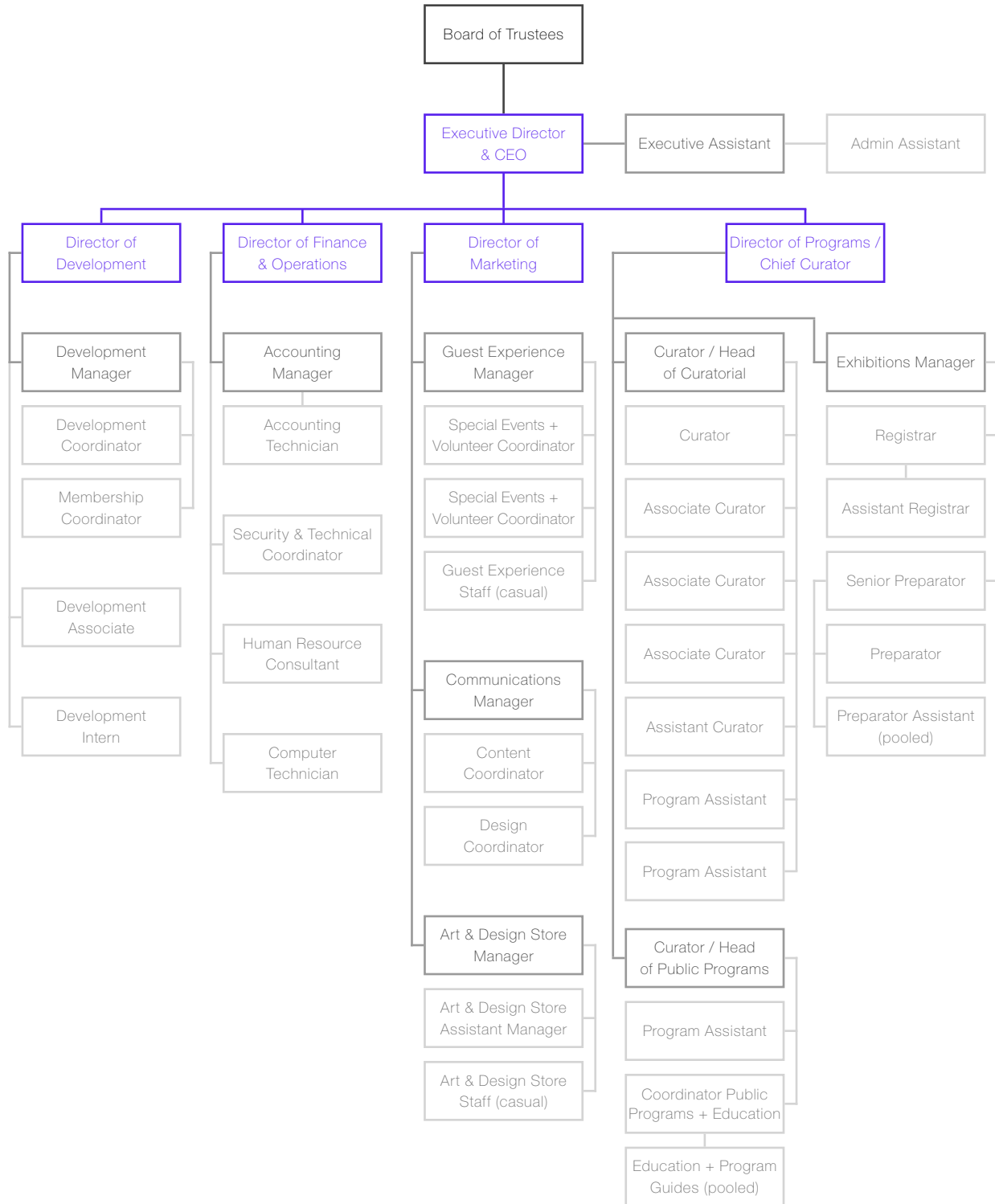
It was also observed within gallery annual reports that volunteers play a key role in the success of galleries and may support any and all aspects of a gallery.

9.3 ORGANIZATIONAL STRUCTURE

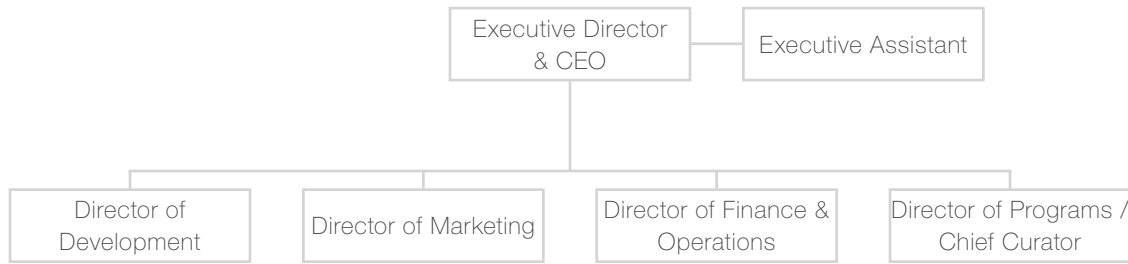
Based on the information collected through the primary and secondary research activities and taking into consideration best practice research, a number of organizational design principles were identified. The identified principles indicated that the organizational structure must:

- Align with and contribute to the organization's vision and core objectives;
- Be flexible and have the ability to quickly adapt to change;
- Encourage teamwork and reinforce collaboration;
- Provide for clear lines of accountability;
- Make use of multi-skilled jobs (wide range of activities or entire work processes);
- Provide opportunities for employee growth, upward mobility and empowerment;
- Focus on client service, rather than process and procedure; and
- Allow for the appropriate span of control.

The graphic below outlines the proposed organizational chart for Remai Modern Art Gallery of Saskatchewan followed by the rationale for the development of each department.

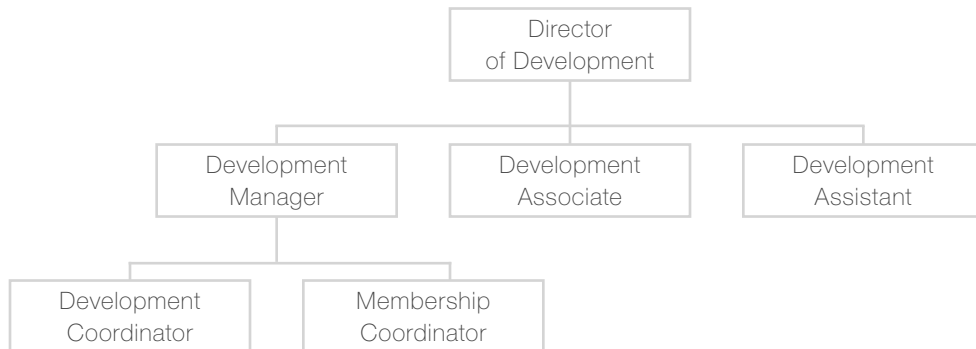


SENIOR MANAGEMENT TEAM



A skilled Senior Management Team is required to make strategic decisions in guiding the Gallery towards its vision. The CEO and the Board of Trustees require dedicated senior-level administrative support to handle private and sensitive matters and ensure efficient operations, while the directors and their departments require an intermediate level of administrative support to ensure efficient operations. It was identified that a gap existed in coverage for the Executive Assistant and succession planning was a concern for the role.

DEVELOPMENT TEAM



Expectations are high for Remai Modern to generate funds and revenue through membership and donations / giving / fundraising initiatives and efforts. In alignment with the recommendations of the DCG Future Development Report and the Remai Modern Development Plan 2015 – 2016, the Gallery has begun a robust development and fundraising campaign, which will further intensify in 2015. Remai Modern must generate both short-term and long-term funds for the Gallery including a focused \$10-million campaign to generate additional operating funds.

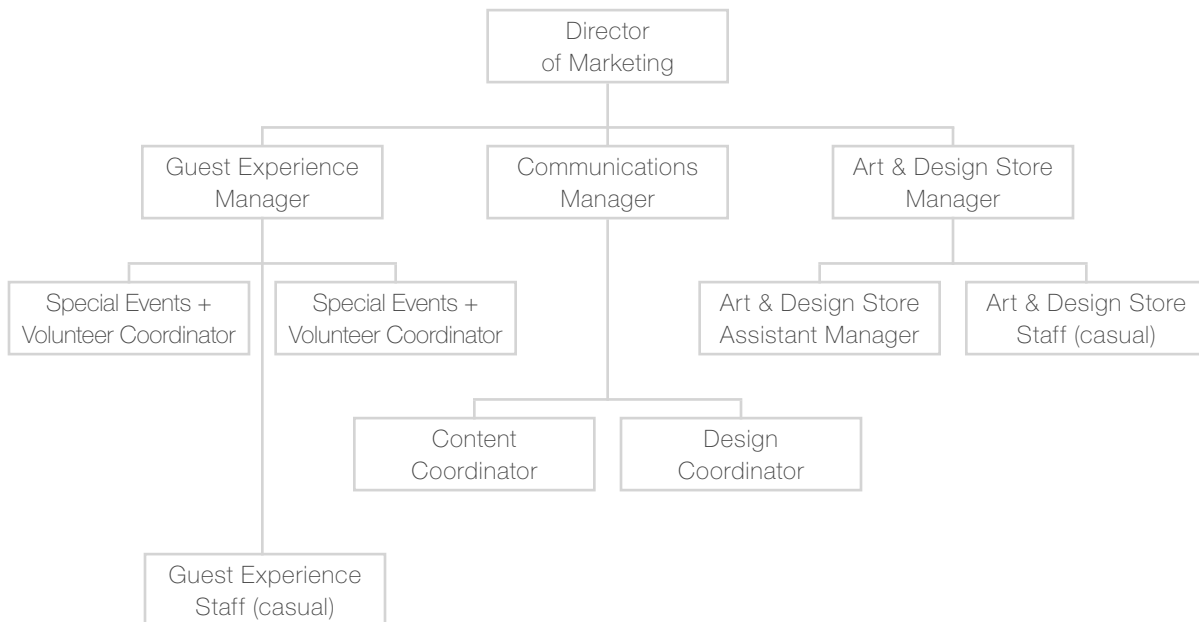
For the development team to be successful it requires:

- Senior leadership to set strategy and court philanthropists;
- Senior-level decision makers within business and key political and community figures; and
- Intermediary staff to support the courting process, attend key events, plan and attend a series of Gallery events aimed at raising funds and ensure donor and membership information is captured and maximized within the proposed Raisers Edge fundraising database.

The team is also responsible for executing donor and member benefits, which may take place during or outside of regularly scheduled business hours.

The Gallery will be placing a large focus on selling memberships and the resulting benefits to individuals and families as a source of revenue generation. Conservatively, the Gallery is targeting the sale of 1,000 memberships in 2016 with that target increasing to 2,200 members in 2019.

MARKETING AND COMMUNICATIONS TEAM



To achieve the Remail Modern's vision, and align with the Reboot marketing presentation, Remail Modern has made the decision to produce the majority of its marketing and promotion materials in-house to control and drive the Gallery's brand and image. In doing

so, the Gallery requires technical writing, social media, media and public relations, marketing and web and graphic design competencies. Initial marketing resources will be leveraged to further refine and implement the marketing strategy and develop the overall branding collateral for the Gallery. Once complete, ongoing marketing activities will be driven for all areas of the Gallery to ensure programming, exhibitions, development, the Remail Modern store and general marketing initiatives are being tied to the brand and are communicated as per the strategy.

Remail Modern will accept rental bookings for six different venues within the Gallery and will coordinate the delivery of events by ensuring the venues are prepared for specific events. Private functions and rentals/bookings have been identified as a source of revenue generation in the amount of \$260,000 by 2017 not including catering costs. Given that the Gallery will accept bookings during and outside of regular visiting hours, flexibility is required to both accept bookings and coordinate events. As the Remail Modern is keen on controlling and driving its brand, a Remail Modern staff member will be present at each event to ensure the logistics of the event run seamlessly, further driving the Gallery's reputation and subsequently increasing the potential for future bookings.

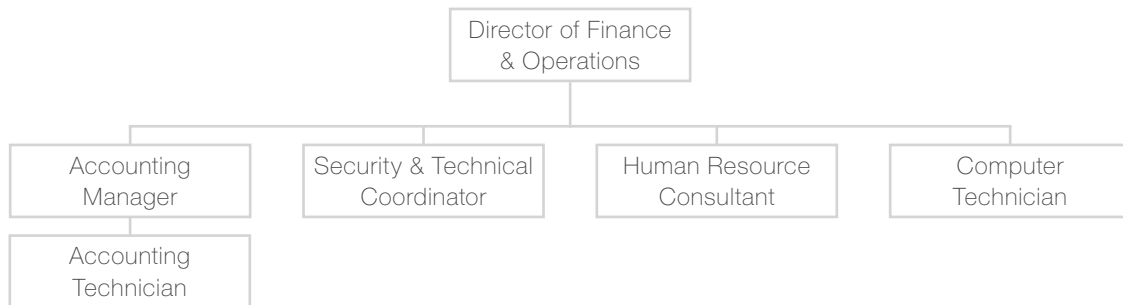
The Gallery is contracting a third-party vendor to operate the food and beverage services unit. As recommended in the fsSTRATEGY Food and Beverage Services Report, a Remail Modern staff member is required to liaise between the third-party vendor and the Gallery to ensure effective operations.

The Gallery will rely on the efforts of dedicated volunteers to successfully manage events and programming put on by the Gallery. To align events and programming to the capacity requirements of volunteers, the decision has been made to have guest services manage the logistics surrounding volunteerism.

The Gallery will own and operate a retail store with the strategy of generating revenue and increasing and reinforcing the brand awareness of the Gallery. The store will be open during visitor hours, which are 51 hours per week. For the store to be successful, it is imperative that it stocks items for purchase that are either exclusive to the Gallery or aligned to the brand or exhibit offerings (i.e. Picasso scarves). This requires resources to continuously be evaluating merchandise offerings and procuring new items for purchase. In addition to operating a physical store location, the Gallery will also operate an online store.

Annual sales of \$650,000 are anticipated from the store. According to the MSA (Museum Store Association) Retail Industry Report 2009, the majority of stores (77%) with sales of \$500,000 or greater staff a Retail Store Manager and a Buyer. Art Museum stores also reported a median of six full-time, year round staff and five part-time, year round staff. Management stressed that the success of the store is tied to its ability to earn a profit and has requested the store be staffed as lean as possible.

FINANCE AND OPERATIONS TEAM



The finance and operations team will be tasked with ensuring effective and efficient operations of the Gallery. Areas falling under finance and operations include accounting, security, information technology and database management and human resources.

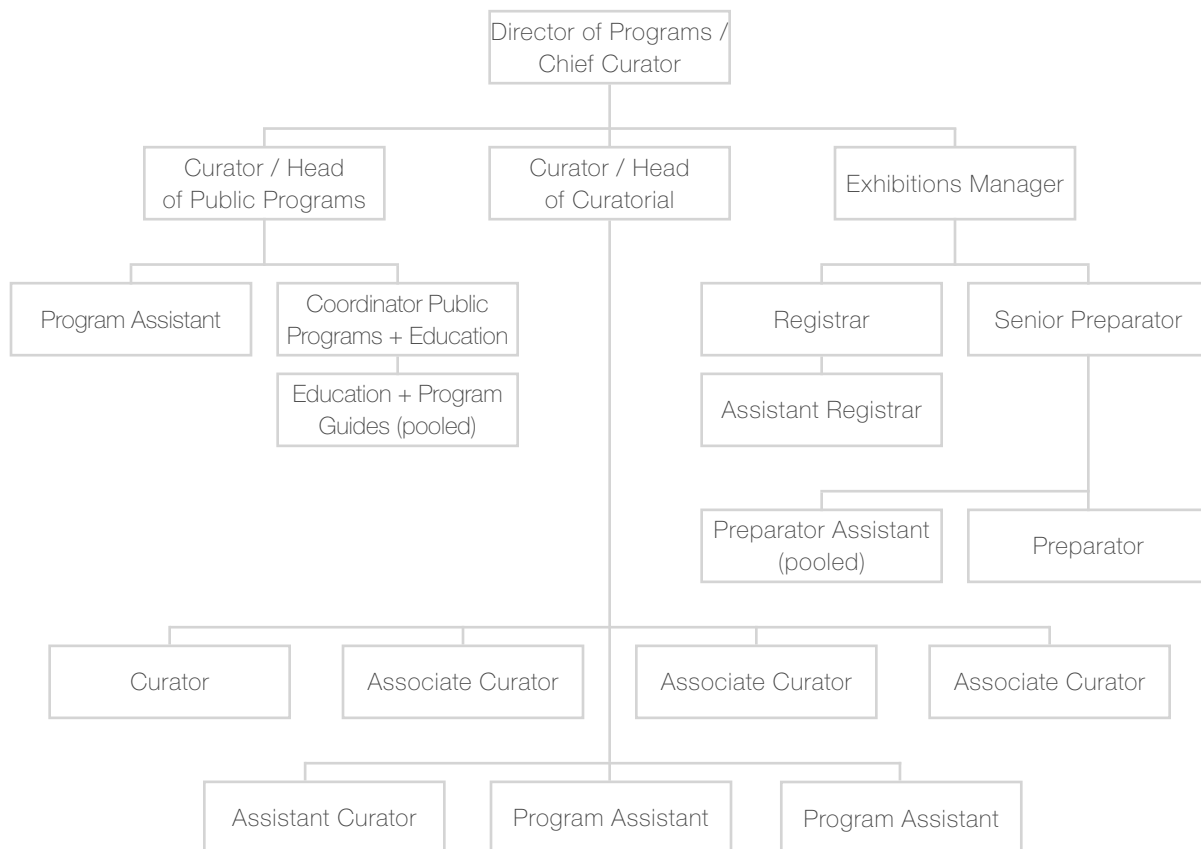
Responsible financial management is paramount. With many new funding sources and self-generated revenue opportunities, the complexity of Gallery operations will increase. The accounting area will provide direction to all areas of the Gallery related to financial planning, budgeting, accountability, processes and systems to ensure fiscal responsibility.

Based on the assumptions within the Security Report – Final Report, a security coordinator is required to ensure Remai Modern is secure from threats and to liaise with the third-party security vendor. In addition to building security, the security coordinator will ensure security is entrenched into all information technology endeavors.

Although the Gallery contracts out day-to-day computer maintenance, it does require an onsite professional to troubleshoot on-the-spot basic computer, technology, audio and visual issues. All technology needs to function seamlessly, whether it be visual and audio at events, database management or audio and visual within the Gallery's exhibit space to deliver an exceptional customer and visitor experience.

The effectiveness of the Remai Modern human resources function will be critical to the success of the Gallery. To achieve the vision the Gallery will need to effectively manage employee performance, time and attendance; ensure all staff are held accountable to both technical and behavioral accountabilities; ensure the attraction, on-boarding and retention of top talent; and create a client-centric environment. The City of Saskatoon has human resources policies to support the management of this function; however, Remai Modern has a unique culture separate from the City. Therefore, to achieve the Gallery's vision and become an employer of choice, a focused approach must be taken to Gallery human resource management.

PROGRAMMING AND CURATORIAL TEAM



The planning, preparation, delivery and evaluation of gallery and exhibition space, coupled with programming, is at the core of a gallery's success. Based on discussions with management, the Gallery will have an active and transient gallery/exhibit space that is anticipated to turnover once a year. The Gallery will also hold three to four large-scale, temporary exhibitions a year, which will require planning up to three years in advance. As both the permanent collection and temporary collection of the Gallery is increasing,

additional workload is placed on curatorial, preparation, registration, conservation, interpretive, exhibition and programming staff to manage these pieces and spaces (in and outside of the Gallery).

Remai Modern will provide immersive programming where people of diverse backgrounds can connect with visual art through a broad range of active ties and resources. Art education will be offered to small groups of adults and children. Free-guided tours and private guided tours can be arranged any time for any group size. The Gallery will offer a regular schedule of public lectures, artists' talks, symposia and a variety of family and kid-friendly hands-on educational programs. In addition, Remai Modern will manage and program a 150-seat theater, which can be used for film screening and community events.

Although specific programming strategies and plans will be established over the next six months, management provided an estimate of the resources required to successfully deliver programming. Specifically, the Head of Public Programs/Education position is based on the assumption Remai Modern will continue to provide and manage public programming during 2015 and develop a public programming strategy for the future in an increased gallery space and with a larger presence within the community. The senior curator function will support and manage all aspects of curatorial and preparator services, and will work closely with the Director of Programs/Chief Curator to implement the Gallery's strategy.

9.4 SALARY COST ESTIMATES

The Human Resource Staffing Plan Draft Report estimated salary costs over the next five years (2015 – 2019). Based on the organizational chart and staffing assumptions defined through the organizational design process, MNP conducted research on annual base salaries for all management and in-scope positions.

Secondary research was the primary method of collecting salary information. Research sources and background data collection activities were identified in consultation with the Gallery's senior management. This allowed the project team to determine what information was readily available and in what format to ensure the data collection tools developed identified appropriate information. Through this process the following data sources were identified:

- Association of Art Museum Directors Salary Survey 2013
- Economic Research Institute Salary Assessor

- CUPE 59 Collective Bargaining Agreement – Pay Grade 2013 – 2016
- Memorandum of Agreement Between the City of Saskatoon and Saskatoon Exempt Staff, Inc. (Pay Grades 2010 – 2012)

MNP developed a database format to manage the collection and tabulation of annual base salary. The format was designed to document information in a consistent manner for comparison.

MNP consolidated the information and prepared our analysis and assumptions. Market data were combined using a weighted average calculation based upon the number of contributing organizations and data were aged to 2014 using Conference Board of Canada actual salary budget increases to 2013 and projected increases to 2014 where necessary.

9.4.1 COMPENSATION PHILOSOPHY

Based on direction from the Executive Director/CEO it is assumed the Gallery's philosophy on pay practices will include wage rates set at market rates, or the 50th percentile of market survey data.

9.4.2 DATA CONSIDERATIONS

The following should be considered when reviewing the data provided within the report:

- Economic Research Institute salary data:
 - › Management salaries are based on Canadian data – all industries
 - › In-scope positions are based on Saskatchewan data – art industry
- Base salary information should not be considered in isolation of other types of compensation as organizations use several different direct and indirect total rewards to attract and retain individuals. Incentives such as bonuses, expanded benefits packages and indirect benefits such as flexible hours of work, developmental opportunities and supportive work environments can increase competitiveness in the external market.
- Market data provides information to support external equity but does not address issues related to internal equity. Internal equity refers to employees' perception of their responsibilities, conditions, and compensation compared to other employees in similar positions in the same organization. The most effective compensation programs strive to ensure fairness in comparison to the internal and external market.

- MNP, with the assistance of the Executive Director/CEO and the Director of Finance and Operations, placed all new positions within the existing City of Saskatoon and CUPE 56 pay grades; however, all new positions require evaluation from the City of Saskatoon's job evaluation process to determine internal equity.
 - › Note: The Gallery should consider conducting a job evaluation or job classification process once all positions have been finalized to ensure internal equity.

9.4.3 KEY ASSUMPTIONS

Salary cost estimates assume the following:

- All salary information is based on 2014 levels and inflation is not projected into subsequent year salary figures
- 2014 salaries of current Mendel Art Gallery positions with similar job titles and job functions to those positions identified within the Remai Modern staffing plan will be used
- The classification level, salaries and scope (unionized or management) of positions will be approved as is for implementation
- Positions requiring reclassification will have a 5% reclassification increase applied to their 2015 salaries
- Management positions will receive an annual increment of 5% a year until the maximum of the salary range is reached
- In-scope positions will progress through the three step increments as defined in the collective bargaining agreement
- All new positions will be filled at the salary range minimums

10. FINANCIAL PLAN

Revenue for Remail Modern is anticipated to be generated by four distinct revenue streams – self generated revenue, development revenue, restricted funds (directed grants) and grant(s) required to cover the operating shortfall as required annually.

A key component or principle that has been discussed in reference to the new Gallery for many years is the desire for the new Gallery to generate its own source revenues and funds. This will occur through the following revenue sources:

- Admissions
- Memberships
- Facility rentals
- Food service commissions
- Retail shop sales
- Development

10.1 ADMISSIONS

The admission charge assumption for the business plan assumes a general admission charge of \$12 and a student/senior admission charge of \$10. It is assumed that Remail Modern will attract over 200,000 visitors each year. These visitors will be a combination of general admissions, members, retail shop visits, and facility rental users.

For the purposes of the financial analysis, an average admission rate of \$11 per paying visitor (those who would have paid a general admission fee) was used. It is anticipated that in the first years of operations Remail Modern will generate the following in admission revenues. It is important to note that 2016 only represents six months, assuming Remail Modern opens its doors 2016.

	2016	2017	2018	2019
Special exhibition revenue (Base on an average rate of \$11)	\$150,000	\$330,000	\$330,000	\$330,000
Annual number of paid general admission visits	16,636	30,000	30,000	30,000

Remai Modern will also curate eight (8) special exhibits each year. These blockbuster exhibitions require significant resources to develop and show; as such, an additional \$4 will be added to the price of admission during these special exhibitions, bringing the total admission fee with the special exhibit to \$16 for adults. The gross annual revenues anticipated to be generated via these special exhibitions are as follows:

	2016	2017	2018	2019
Special exhibition revenue	\$40,000	\$80,000	\$80,000	\$80,000
Annual number of special exhibition admission visits	10,000	20,000	20,000	20,000

10.2 REMAI MODERN STORE

As outlined in section 8.4 the Remai Modern store has projected annual sales based on the data from Fast Consulting, which are supported by the MSA report. The Remai Modern store will be operated by a Retail Store Manager (1 FTE) and be supported by a Retail Store Assistant Manager (0.80 FTE) and Retail Store Clerks (1.5 FTE). The resulting projected financial performance for the Remai Modern store is as follows:

	2015	2016	2017	2018	2019
Remai Modern shop Sales	\$0	\$390,000	\$650,000	\$650,000	\$650,000
Less:					
Cost of Goods Sold (55% of Sales)	\$0	\$214,500	\$357,500	\$357,500	\$357,500
Freight (4% of CSG)	\$0	\$8,580	\$14,300	\$14,300	\$14,300
Gross profit	\$0	\$166,920	\$278,200	\$278,200	\$278,200
Less Expenses:					
Wages and Benefits	\$0	\$161,300	\$224,434	\$228,976	\$233,746
Credit card charges (1.9% of sales)	\$0	\$7,410	\$12,350	\$12,350	\$12,350
Purchasing related travel	\$0	\$4,500	\$4,500	\$4,500	\$4,500
Shop Supplies	\$0	\$4,000	\$4,000	\$4,000	\$4,000
Annual Gift Shop Expenses	\$0	\$177,210	\$245,284	\$249,826	\$254,596
Net Profit (Loss)	\$0	(\$10,290)	\$32,916	\$28,374	\$23,604

10.3 FACILITY RENTALS

Based on the market analysis prepared by fsSTRATEGY the following room rental rates have been assumed for Remail Modern:

- Multipurpose Room - \$1,000
- Boardroom - \$250
- Meeting Room - \$150
- Roof Top Terrace - \$1,000
- Lecture Theatre - \$250

It is anticipated that the rental of these spaces will generate annual revenue of approximately \$260,000, using the base case scenario developed by fsStrategy (an average of \$5,000 per week of bookings; combination of all Remail Modern rental options available). In the first year of operations, this amount will be reduced by approximately by two thirds - \$86,750 is projected for year one rental revenue as Remail Modern will be open for less than the full year and it is not expected that the full demand for bookings will take place until the Gallery has been open for a few months. The facility rentals will be managed by the Guest Services Manager (1 FTE) and will be supported by the Special Events and Volunteer Coordinators (2 FTE).

	2015	2016	2017	2018	2019
Facility Rentals	\$0	\$86,750	\$260,000	\$260,000	\$255,050

10.4 FOOD SERVICE COMMISSIONS

Remail Modern will collect a commission of gross revenues from the food services provider. The commission may change depending on the arrangement made with the food service provider, who at this time is unknown.

There are no direct expenses related to this function, as the third-party provider will be responsible for all activities related to operating food services. When a private event requires catering, it will be coordinated by the Special Events and Volunteer Coordinator in conjunction with the third-party provider. The wage costs associated with the Special Events and Volunteer Coordinator position have been allocated to the facility rentals business unit.

	2015	2016	2017	2018	2019
Restaurant Revenue	\$0	\$40,000	\$92,580	\$92,580	\$92,580
Private event Commissions	\$0	\$12,800	\$50,700	\$50,700	\$50,700
Net Profit (Loss)	\$0	\$52,800	\$143,280	\$143,280	\$143,280

10.5 DEVELOPMENT

The following budget was created to support the development plan outlined in this business plan. The projected financial results specific to development activities are as follows:

	2015	2016	2017	2018	2019
Development Revenue					
Annual Fundraising/Development	\$0	\$340,000	\$755,000	\$970,000	\$1,185,000
Annual Memberships	\$0	\$60,000	\$108,500	\$139,500	\$170,500
Federal Annual Funding	\$0	\$160,000	\$160,000	\$160,000	\$160,000
Provincial Annual Funding	\$0	\$418,500	\$418,500	\$418,500	\$418,500
Other Grants/Funding	\$0	\$170,394	\$42,180	\$69,056	\$89,057
Annual Development Revenue	\$0	\$1,148,894	\$1,484,180	\$1,757,056	\$2,023,057
Less Expenses:					
Salaries and Benefits	\$0	\$422,924	\$473,398	\$473,398	\$473,398
Professional Development	\$16,000	\$7,000	\$7,000	\$10,000	\$10,000
Stewardship	\$15,000	\$25,000	\$33,000	\$38,000	\$45,000
Printing	\$25,000	\$30,000	\$13,000	\$13,000	\$19,000
Special Events	\$0	\$25,000	\$31,000	\$32,000	\$32,000
Memberships	\$6,000	\$8,000	\$15,000	\$16,000	\$17,000
Donor Programs	\$0	\$10,000	\$18,000	\$22,500	\$22,500
Supplies	\$500	\$600	\$600	\$600	\$600
Annual Development Expenses	\$62,500	\$528,524	\$590,998	\$605,498	\$619,498
Net Profit (Loss)	(\$62,500)	\$620,370	\$893,182	\$1,151,558	\$1,403,559

10.5.1 MEMBERSHIP REVENUE CALCULATION

It is projected that Remai Modern will maintain a similar level of memberships that the Mendel Art Gallery attracted in the first year of operations and continually grow and build the membership base as Remai Modern grows in popularity in the city. The anticipated membership levels have been projected as follows:

	2015	2016	2017	2018	2019
# of memberships	0	1,000	1,400	1,800	2,200
Average revenue per membership	\$77.50	\$77.50	\$77.50	\$77.50	\$77.50
Annual membership revenue	\$0	\$77,500	\$108,500	\$139,500	\$170,500

10.6 PUBLIC PROGRAMMING

Annual public programming revenues and related expenses have been projected based on the 2012 business plan and discussions with management as the programming of Remai Modern is still in development.

Annual program revenue generated from circulation fees, Art Caravan fees, and other public/professional program fees are projected as follows:

	2015	2016	2017	2018	2019
Public Programs Revenue					
Art Caravan Revenue	\$1,000	\$2,000	\$2,000	\$2,000	\$2,000
Art studio program revenue	\$8,500	\$17,000	\$17,000	\$17,000	\$17,000
Tours and workshops	\$2,000	\$5,000	\$5,000	\$5,000	\$5,000
Public/professional program	\$7,000	\$15,000	\$30,000	\$30,000	\$30,000
Annual public Program Revenue	\$18,500	\$39,000	\$54,000	\$54,000	\$54,000
Less Expenses:					
Presentation	\$12,500	\$25,000	\$32,300	\$32,300	\$32,300
Program Costs	\$50,000	\$105,000	\$140,000	\$150,000	\$180,000
Research	\$3,400	\$6,100	\$6,100	\$6,100	\$6,100
Theatre Programming Costs	\$0	\$45,000	\$100,000	\$100,000	\$100,000
Annual Public Program Expenses	\$65,900	\$181,100	\$278,400	\$288,400	\$318,400
Net Profit (Loss)	(\$47,400)	(\$142,100)	(\$224,400)	(\$234,400)	(\$264,400)

10.7 RIVER LANDING RENTAL FEE

The City of Saskatoon will have office space in Remai Modern for the management of River Landing. An annual rent of \$220,000 is projected to be paid to Remai Modern for this space.

10.8 CITY OF SASKATOON OPERATING CONTRIBUTION (PROJECTED)

The annual operating shortfall that remains to be funded for Remai Modern has been calculated to as follow:

	2015	2016	2017	2018	2019
City of Saskatoon Operating	\$2,196,051	\$4,631,937	\$5,490,700	\$6,082,600	\$6,476,900
% of Total Revenue/Income	99.16%	64.72%	57.79%	58.68%	58.76%

This amount is the City's projected contribution which has been balanced with City Finance to the City's long-term funding plan. This business plan has outlined what is required in terms of human resources and other inputs to deliver on the brand promise and vision of Remai Modern.

10.9 NO ADMISSION FEE ANALYSIS

As discussed Remai Modern's intention to charge a general admission fee is a key assumption throughout this business plan. If an admission fee is not charged there are many impacts. There will be significant decreases to membership levels, sponsorships and other development activities, resulting in a significant increase to the annual support required by the City of Saskatoon. The anticipated impacts include:

- Reducing membership level to 800 per year
- Reducing membership dues to \$40 per member
- Reducing sponsorships by \$100,000 per year
- Eliminating admissions revenue – both general and special exhibit
- Increased donation box revenues, increasing to \$5,000 annually

	2015	2016	2017	2018	2019
No Admission Charge					
City of Saskatoon Operating Subsidy	\$2,196,051	\$4,969,937	\$6,074,200	\$6,697,100	\$7,122,400
Percentage of Total Revenue/Income	99.16%	69.45%	63.93%	64.60%	64.62%

In comparison to when an admission is charged:

	2015	2016	2017	2018	2019
With an Admission Charge					
City of Saskatoon Operating Subsidy	\$2,196,051	\$4,631,937	\$5,490,700	\$6,082,600	\$6,476,900
Percentage of Total Revenue/Income	99.16%	64.72%	57.79%	58.68%	58.76%

It is projected that if no admission fee is charged the overall impact to revenue would be as follows:

	2015	2016	2017	2018	2019
Self-Generated Revenue					
Admissions - Annual	\$0	\$0	\$0	\$0	\$0
Admissions - Special Exhibitions	\$0	\$0	\$0	\$0	\$0
Annual donation box	\$0	\$5,000	\$5,000	\$5,000	\$5,000
Program revenue	\$18,500	\$39,000	\$54,000	\$54,000	\$54,000
Private Functions & Rentals	\$0	\$86,750	\$260,000	\$260,000	\$255,050
Food Services Commission	\$0	\$52,800	\$143,280	\$143,280	\$143,280
Remai Modern Gift Shop Sales	\$0	\$390,000	\$650,000	\$650,000	\$650,000
River Landing Rental Fee	\$0	\$73,333	\$220,000	\$220,000	\$220,000
	\$18,500	\$646,883	\$1,332,280	\$1,332,280	\$1,327,330
Development Revenue					
Annual Fundraising/Development	\$0	\$240,000	\$655,000	\$870,000	\$1,085,000
Annual Memberships	\$0	\$8,000	\$32,000	\$32,000	\$32,000
Federal Annual Funding	\$0	\$160,000	\$160,000	\$160,000	\$160,000
Provincial Annual Funding	\$0	\$418,500	\$418,500	\$418,500	\$418,500
Other Grants/Funding	\$0	\$170,394	\$42,180	\$69,056	\$89,057
	\$0	\$996,894	\$1,307,680	\$1,549,556	\$1,784,557
Restricted Funding					
	\$0	\$542,655	\$787,655	\$787,657	\$787,655
City of Saskatoon Operating Grant					
	\$2,196,051	\$4,969,937	\$6,074,200	\$6,697,100	\$7,122,400
Total Revenue	\$2,214,551	\$7,156,369	\$9,501,815	\$10,366,593	\$11,021,942

Operating Expenses

Salaries & Benefits	\$1,320,915	\$3,087,246	\$3,627,856	\$3,892,027	\$3,933,127
Facilities & Equipment	\$42,245	\$1,081,520	\$2,230,521	\$2,233,321	\$2,233,321
General Exhibitions	\$42,999	\$615,158	\$678,922	\$766,704	\$877,500

Administration	\$273,567	\$402,100	\$362,200	\$410,800	\$430,900
Marketing & Communications	\$350,000	\$656,700	\$615,400	\$660,700	\$680,700
Public Programs	\$65,900	\$181,100	\$278,400	\$288,400	\$318,400
Staffing Expenditures	\$41,300	\$65,000	\$65,000	\$66,000	\$71,000
Fundraising	\$62,500	\$105,600	\$117,600	\$132,100	\$146,100
Gift Shop	\$1,500	\$15,910	\$20,850	\$20,850	\$20,850
Gift Shop - CGS & Freight	\$0	\$223,080	\$371,800	\$371,800	\$371,800
Collection Maintenance	\$0	\$41,250	\$39,250	\$39,250	\$48,657
Board & Committees	\$5,625	\$14,050	\$14,100	\$14,150	\$14,150
Library	\$8,000	\$8,000	\$8,000	\$8,000	\$8,000
Facility Rentals & Catering loan expense	\$0	\$0	\$172,261	\$172,261	\$172,261
Admissions computer expense	\$0	\$2,000	\$2,000	\$2,000	\$2,000
	\$2,214,551	\$6,498,714	\$8,604,160	\$9,078,362	\$9,328,766

Transfers to:

Capital Replacement Reserve	\$0	\$0	\$0	\$370,574	\$522,226
Equipment Replacement Reserve	\$0	\$70,000	\$65,000	\$65,000	\$100,000
Facility/Catering Capital Reserve	\$0	\$0	\$0	\$0	\$218,295
Permanent Collection Fund	\$0	\$87,655	\$87,655	\$107,655	\$107,655
Remai Exhibition Fund	\$0	\$500,000	\$500,000	\$500,000	\$500,000
Museums Assistance Program	\$0	\$0	\$245,000	\$245,002	\$245,000
	\$0	\$657,655	\$897,655	\$1,288,231	\$1,693,176

Total Expenses/Transfers	\$2,214,551	\$7,156,369	\$9,501,815	\$10,366,593	\$11,021,942
	99.16%	69.45%	63.93%	64.60%	64.62%

A key finding from the Fast Consulting report was the desire of Saskatoon residents to see Remai Modern become as self sufficient as possible. The implementation of an admission fee is an important tool, not only to meet this goal of self-sufficiency, but also it is also an important element to assist in the ongoing, long-term sustainability of the Gallery.

11. CONCLUSION

The business plan has outlined the human resource requirements, budget and marketing supports that will be required to implement the Rемаi Modern vision. The implementation of this vision, as outlined, is required to ensure a successful and sustainable art gallery for Saskatoon and Saskatchewan's future generations.

The introduction of a modest admission fee structure will highlight for potential funders (government and/or industry) that Rемаi Modern understands the value of money and has taken a "business-like" and pragmatic approach to operations without alienating the public with an admission fee that is not affordable. It is this balance that must be maintained as Rемаi Modern is established in Saskatoon. As it has been stated, the vision and brand promise provide a simple and disciplined framework for building this new legacy brand - Rемаi Modern - for the city, province and also the country.

The Gallery supporters and early donors are expecting "big things" and the brand promise must be delivered. Currently, there is momentum around economic growth and "pride of place" in the City of Saskatoon and this will be used to drive the new brand forward with key Return on Investment metrics for stakeholders. With this momentum there is interest in Saskatoon for new ventures, gathering places, and the River Landing project. This energy will be leveraged and Rемаi Modern will be the "face" of the new "2.0 Saskatoon".

Rемаi Modern will be the largest tourism product launch in Canada in 2015-2016. This opportunity must be marketed throughout Saskatchewan, Canada, and internationally. Without committed funding to support the marketing, staffing and vision, it will be not be possible to implement the plan to the projected levels of success promised to the community.

Remai Modern is becoming...

- a thought leader and direction-setting modern art gallery.
- the civic heart of a revitalized River Landing.
- a stage on which globally circulating knowledge is infused with locally relevant perspectives.
- an architectural landmark, organic in design & environmental in operation.
- a reflection of a vibrant, modern Canadian city.
- home to an enviable permanent collection, including the most comprehensive collection of Picasso linocuts.
- a centre of discourse for the Canadian perspective on global art movements.
- a home for internationally-renowned exhibitions of contemporary art.
- accessible, unexpected, challenging and disruptive.
- a platform for rethinking the role of a 21st century art museum.
- an engine for exploring new art territories and their role in shaping the future of art and society.
- a venue with a modern art & design store and an outstanding restaurant.
- a driver of increased economic activity, improved quality of life and enhanced community engagement.
- a hub for live and interdisciplinary programs that respond to transformational developments in art and culture.
- a leader in developing new models for sharing knowledge and engaging diverse communities.
- a base for programmes that embrace schools, children, youth, families, adults and seniors.
- defined by architectural excellence in a stunning riverside locale.
- social and inclusive.
- a setting for breathtaking indoor and open air events.
- a museum interpreting the idea of 'modern' - from multiple cultural, historical and contemporary perspectives.
- a forum for affirming the powerful role that art and artists play in questioning, interpreting and defining the modern era.
- a gallery that respects Canada's First Nations and reflects their cultures.

REMAI MODERN
ART GALLERY OF SASKATCHEWAN
is becoming...

Opening 2016

APPENDIX A: FINANCIAL PROJECTIONS

Remai Modern Art Gallery of Saskatchewan
Five Year Financial Projection
For the Years Ending December 31, 2015 - 2019

	2015	2016	2017	2018	2019
Self-Generated Revenue (Note 3)					
Admissions - Annual	\$0	\$150,000	\$330,000	\$330,000	\$330,000
Admissions - Special Exhibitions	\$0	\$40,000	\$80,000	\$80,000	\$80,000
Annual donation box	\$0	\$1,000	\$2,000	\$2,000	\$2,000
Program revenue	\$18,500	\$39,000	\$54,000	\$54,000	\$54,000
Private Functions & Rentals	\$0	\$86,750	\$260,000	\$260,000	\$255,050
Food Services Commission	\$0	\$52,800	\$143,280	\$143,280	\$143,280
Remai Modern Gift Shop Sales	\$0	\$390,000	\$650,000	\$650,000	\$650,000
River Landing Rental Fee	\$0	\$73,333	\$220,000	\$220,000	\$220,000
	\$18,500	\$832,883	\$1,739,280	\$1,739,280	\$1,734,330
Development Revenue (Note 4)					
Annual Fundraising/Development	\$0	\$340,000	\$755,000	\$970,000	\$1,185,000
Annual Memberships	\$0	\$60,000	\$108,500	\$139,500	\$170,500
Federal Annual Funding	\$0	\$160,000	\$160,000	\$160,000	\$160,000
Provincial Annual Funding	\$0	\$418,500	\$418,500	\$418,500	\$418,500
Other Grants/Funding	\$0	\$170,394	\$42,180	\$69,056	\$89,057
	\$0	\$1,148,894	\$1,484,180	\$1,757,056	\$2,023,057
Restricted Funding (Note 5)	\$0	\$542,655	\$787,655	\$787,657	\$787,655
City of Saskatoon Operating Subsidy (Note 6)	\$2,196,051	\$4,631,937	\$5,490,700	\$6,082,600	\$6,476,900
Total Revenue	\$2,214,551	\$7,156,369	\$9,501,815	\$10,366,593	\$11,021,942
Remai Modern Gift Shop					
Cost of Goods Sold (Note 7)	\$0	\$214,500	\$357,500	\$357,500	\$357,500
Freight	\$0	\$8,580	\$14,300	\$14,300	\$14,300
	\$0	\$223,080	\$371,800	\$371,800	\$371,800
Operating Expenses (Note 8)					
Salaries & Benefits	\$1,320,915	\$3,087,246	\$3,627,856	\$3,892,027	\$3,933,127
Facilities & Equipment	\$42,245	\$1,081,520	\$2,230,521	\$2,233,321	\$2,233,321
General Exhibitions	\$42,999	\$615,158	\$678,922	\$766,704	\$877,500

Administration	\$273,567	\$402,100	\$362,200	\$410,800	\$430,900
Marketing & Communications	\$350,000	\$656,700	\$615,400	\$660,700	\$680,700
Public Programs	\$65,900	\$181,100	\$278,400	\$288,400	\$318,400
Staffing Expenditures	\$41,300	\$65,000	\$65,000	\$66,000	\$71,000
Fundraising	\$62,500	\$105,600	\$117,600	\$132,100	\$146,100
Remai Modern Gift Shop	\$1,500	\$15,910	\$20,850	\$20,850	\$20,850
Collection Maintenance	\$0	\$41,250	\$39,250	\$39,250	\$48,657
Board & Committees	\$5,625	\$14,050	\$14,100	\$14,150	\$14,150
Library	\$8,000	\$8,000	\$8,000	\$8,000	\$8,000
Facility Rentals & Catering loan	\$0	\$0	\$172,261	\$172,261	\$172,261
Admissions computer	\$0	\$2,000	\$2,000	\$2,000	\$2,000
	\$2,214,551	\$6,275,634	\$8,232,360	\$8,706,562	\$8,956,966

Transfers (Note 9)

Capital Replacement Reserve	\$0	\$0	\$0	\$370,574	\$522,226
Equipment Replacement Reserve	\$0	\$70,000	\$65,000	\$65,000	\$100,000
Facility/Catering Capital Reserve	\$0	\$0	\$0	\$0	\$218,295
Permanent Collection Fund	\$0	\$87,655	\$87,655	\$107,655	\$107,655
Remai Exhibition Fund	\$0	\$500,000	\$500,000	\$500,000	\$500,000
Museums Assistance Program	\$0	\$0	\$245,000	\$245,002	\$245,000
	\$0	\$657,655	\$897,655	\$1,288,231	\$1,693,176

Total COGS, Expenses & Transfers	\$2,214,551	\$7,156,369	\$9,501,815	\$10,366,593	\$11,021,942
	99.16%	64.72%	57.79%	58.68%	58.76%

1. NATURE OF PRESENTATION

This financial projection presents, to the best of management's knowledge and belief, Rемаi Modern Art Gallery of Saskatchewan's (Remai Modern) expected results of operation for the projected years. Accordingly, the projection reflects management's judgment, as of May 1, 2014 of the expected conditions and their expected course of action.

2. HYPOTHESIS

The accompanying projection assumes that Rемаi Modern begins operations as a separate entity in 2015. Rемаi Modern will begin to incur expenses in 2015 as the Mendel Art Gallery winds down operations and Rемаi Modern ramps up. Rемаi Modern will begin full operations in 2016, as such revenue and expenses have been projected assuming a half year of operations. The Mendel Art Gallery Transition Plan outlines the transition of activities to Rемаi Modern, including details regarding expense and revenue allocation. The 2017 year will be the first full year of operations for Rемаi Modern.

Any assets and liabilities associated with Rемаi Modern are not presented in this projection.

3. SELF-GENERATED REVENUE

Revenues have been established on management's best estimates and attendance and admissions studies prepared for Rемаi Modern.

	2015	2016	2017	2018	2019
General Admission					
Number of visitors	0	13,636	30,000	30,000	30,000
Average admission charge (\$)	\$11.00	\$11.00	\$11.00	\$11.00	\$11.00
Annual General Admission (\$)	\$0	\$150,000	\$330,000	\$330,000	\$330,000
Admissions - Average Special Exhibitions					
Number of visitors	0	10,000	20,000	20,000	20,000
Special admission charge (\$)	\$4.00	\$4.00	\$4.00	\$4.00	\$4.00
Special Exhibitions Admission (\$)	\$0	\$40,000	\$80,000	\$80,000	\$80,000
Donation Box					
Annual donation box	\$0	\$1,000	\$2,000	\$2,000	\$2,000
Public Programs Revenue					

Art Caravan Revenue	\$1,000	\$2,000	\$2,000	\$2,000	\$2,000
Art studio program revenue	\$8,500	\$17,000	\$17,000	\$17,000	\$17,000
Tours and workshops	\$2,000	\$5,000	\$5,000	\$5,000	\$5,000
Public/professional program	\$7,000	\$15,000	\$30,000	\$30,000	\$30,000
Annual public Program	\$18,500	\$39,000	\$54,000	\$54,000	\$54,000
Private Functions & Rentals					
Average based on the fs Strategy Report	\$0	\$0	\$0	\$0	\$0
Private functions and rentals	\$0	\$86,750	\$260,000	\$260,000	\$255,050
Food Service Commission					
Annual payment based on the fs Strategy Report	\$0	\$0	\$0	\$0	\$0
Restaurant Revenue	\$0	\$40,000	\$92,580	\$92,580	\$92,580
Private event Commissions	\$0	\$12,800	\$50,700	\$50,700	\$50,700
Food Service Commission	\$0	\$52,800	\$143,280	\$143,280	\$143,280
Remai Modern Gift Shop Sales					
Annual Instore sales	\$0	\$273,000	\$455,000	\$455,000	\$455,000
Annual Online sales	\$0	\$117,000	\$195,000	\$195,000	\$195,000
	\$0	\$390,000	\$650,000	\$650,000	\$650,000
Annual River Landing Rental Fee					
Annual River landing Office	\$0	\$73,333	\$220,000	\$220,000	\$220,000
	\$18,500	\$832,883	\$1,739,280	\$1,739,280	\$1,734,330

4. DEVELOPMENT REVENUE

Development Revenue encompasses all annual fundraising efforts which include annual government grants and funding. The revenue is based on anticipated need and has been developed based on the new organization and new organizational structure. Revenues related to donations have been projected based on development studies prepared for Remai Modern. This also includes restricted funding that has been allocated to specific gallery initiatives, all income related to restricted funding must to directly allocated to the expense it was proved for, and therefore cannot be used for general operations or development activities. These amounts have been expensed in the transfers below, as outlined in Note 9.

	2015	2016	2017	2018	2019
Development Revenue					
Individual Donations	\$0	\$20,000	\$40,000	\$67,500	\$95,000
Corporate Donations	\$0	\$10,000	\$15,000	\$17,500	\$20,000
Major Gifts	\$0	\$150,000	\$300,000	\$450,000	\$600,000
Sponsorships - Programs, Spaces, Exhibitions	\$0	\$100,000	\$300,000	\$325,000	\$350,000
Special Events	\$0	\$60,000	\$100,000	\$110,000	\$120,000
Annual Fundraising Development	\$0	\$340,000	\$755,000	\$970,000	\$1,185,000
Memberships					
# of memberships	0	774	1,400	1,800	2,200
average revenue per membership \$	\$0	\$78	\$78	\$78	\$78
Annual membership \$	\$0	\$60,000	\$108,500	\$139,500	\$170,500
Province of Saskatchewan					
Saskatchewan Arts Board	\$0	\$250,000	\$250,000	\$250,000	\$250,000
Sask Lotteries	\$0	\$168,500	\$168,500	\$168,500	\$168,500
Grants/Foundations	\$0	\$170,394	\$42,180	\$69,056	\$89,057
Federal Government					
Canada Council for the Arts	\$0	\$160,000	\$160,000	\$160,000	\$160,000
Federal annual funding	\$0	\$613,500	\$623,500	\$638,500	\$658,500
Total Fundraising Revenue	\$0	\$1,148,894	\$1,487,180	\$1,757,056	\$2,023,057

5. RESTRICTED FUNDS REVENUE

Restricted funding revenues are funds that have been raised for a specific purpose ie. Exhibition, as such these revenues are not part of general operational funding and are fully expended each fiscal year.

	2015	2016	2017	2018	2019
Canada Council - Art Acquisitions Grant	\$0	\$30,000	\$30,000	\$30,000	\$30,000
Permanent Collection Fundraising	\$0	\$12,655	\$12,655	\$12,655	\$12,655
Remai Foundation Exhibition Grant	\$0	\$500,000	\$500,000	\$500,000	\$500,000
Museums Assistance Program Grant	\$0	\$0	\$245,000	\$245,000	\$245,000
Restricted Funds Revenue	\$0	\$542,655	\$787,655	\$787,655	\$787,655

6. CITY OF SASKATOON SUBSIDY

The City Subsidy is funding provided by the City of Saskatoon to cover basic operating costs. The City and the gallery have worked towards alignment of funding that is available

from the City to match the operational needs required by the gallery.

	2015	2016	2017	2018	2019
City of Saskatoon Operating	\$2,196,051	\$4,631,937	\$5,490,700	\$6,082,600	\$6,476,900

7. REMAINING MODERN STORE COST OF GOODS SOLD

Average cost of sales have been projected based on the average cost of sales for the previously experienced with the Mendel Gallery gift shop and management's best estimates in conjunction with the relevant Statistics Canada Small Business Profiles. As the actual costs of goods sold will vary by product category an average of 55% has been used for the purposes of this projection. Freight costs, 4% of costs of goods sold have been projected based on historical results for the Mendel Art Gallery retail store.

	2015	2016	2017	2018	2019
Cost of Goods Sold (55% of Sales)	\$0	\$214,500	\$357,500	\$357,500	\$357,500
Freight (4% of CSG)	\$0	\$8,580	\$14,300	\$14,300	\$14,300
Gross profit	\$0	\$223,080	\$371,800	\$371,800	\$371,800

8. OPERATING EXPENSES

Expenses have been projected based on management's best estimates, estimates provided by building constructors and other reports and studies as appropriate.

8.1. FACILITIES & EQUIPMENT

Appropriate facilities and equipment have been projected for 2015 and 2016 based on the Mendel Art Gallery transition plan.

	2015	2016	2017	2018	2019
Insurance - Building	\$0	\$17,764	\$35,528	\$38,328	\$38,328
Insurance - Equipment	\$2,745	\$2,800	\$2,800	\$2,800	\$2,800
Maintenance Agreement Fee	\$0	\$784,873	\$1,605,127	\$1,605,127	\$1,605,127
Small Equipment Purchases	\$6,200	\$12,500	\$12,500	\$12,500	\$12,500
Repairs	\$5,300	\$10,600	\$10,600	\$10,600	\$10,600
Server/Computer Maintenance Agreement	\$28,000	\$42,000	\$42,000	\$42,000	\$42,000
Guard Contract Fees	\$0	\$210,983	\$521,966	\$521,966	\$521,966
Total Facilities & Equipment Expenditures	\$42,245	\$1,081,520	\$2,230,521	\$2,233,321	\$2,233,321

8.2. ADMISSIONS COMPUTERS/SUPPLIES

To support the charging of an admission fee the Remai Modern will require equipment and supplies including a POS and tickets.

	2015	2016	2017	2018	2019
Admissions Computer/Supplies	\$0	\$2,000	\$2,000	\$2,000	\$2,000

8.3. GENERAL EXHIBITIONS

	2015	2016	2017	2018	2019
Exhibition Circulation	\$0	\$20,000	\$35,000	\$39,000	\$42,500
Presentation	\$0	\$380,000	\$390,000	\$438,782	\$480,000
Publication	\$22,999	\$105,000	\$123,922	\$135,000	\$180,000
Public/Professional	\$0	\$85,000	\$105,000	\$123,922	\$140,000
Research	\$20,000	\$25,158	\$25,000	\$30,000	\$35,000
General Exhibitions	\$42,999	\$615,158	\$678,922	\$766,704	\$877,500

8.4. PUBLIC PROGRAMS

	2015	2016	2017	2018	2019
Presentation	\$12,500	\$25,000	\$32,300	\$32,300	\$32,300
Program Costs	\$50,000	\$105,000	\$140,000	\$150,000	\$180,000
Research	\$3,400	\$6,100	\$6,100	\$6,100	\$6,100
Theatre Programming Costs	\$0	\$45,000	\$100,000	\$100,000	\$100,000
Public Programs	\$65,900	\$181,100	\$278,400	\$288,400	\$318,400

8.5. ADMINISTRATION

Administrative expenditures related to Remai Modern are projected to begin in 2015. As per the Mendel Art Gallery Transition plan, a portion (50%) of the annual expenditures, except where noted, related to these activities is anticipated to be incurred by Remai Modern in 2015. It is anticipated that 80% of the Director's annual expenditures will be allocated to Remai Modern in 2015. The Research expenditures will be fully allocated to Remai Modern in 2015.

	2015	2016	2017	2018	2019
Director's Expenditures	\$24,480	\$32,600	\$32,700	\$34,700	\$34,700
Research Expenditures	\$31,700	\$31,700	\$20,000	\$20,000	\$20,000
Courier	\$4,700	\$9,500	\$9,500	\$10,000	\$10,000
Car Allowance	\$5,200	\$6,500	\$6,500	\$6,500	\$6,500
Parking Costs	\$0	\$10,000	\$15,000	\$15,000	\$15,000
Meeting Costs	\$500	\$1,000	\$1,000	\$1,500	\$1,500
Photocopying	\$5,000	\$10,000	\$10,500	\$16,000	\$16,000
Postage	\$10,200	\$25,400	\$25,500	\$46,000	\$46,000
Printing	\$2,050	\$4,100	\$4,200	\$6,300	\$6,400
Software	\$10,350	\$32,000	\$34,000	\$51,000	\$56,000
Supplies	\$6,150	\$12,500	\$12,500	\$13,000	\$13,000
Telephone & Fax	\$16,250	\$49,000	\$60,000	\$60,000	\$60,000
Affiliation/membership Fees	\$7,500	\$18,000	\$25,000	\$25,000	\$25,000
Audit Fees	\$22,500	\$45,000	\$45,000	\$45,000	\$45,000
Bank Charges	\$2,750	\$6,500	\$7,500	\$7,500	\$7,500
Legal Fees	\$36,100	\$37,300	\$2,300	\$2,300	\$2,300
Strategic Planning	\$25,000	\$15,000	\$20,000	\$20,000	\$35,000
Business Planning	\$25,000	\$15,000	\$25,000	\$25,000	\$25,000
Professional Services Fees	\$38,137	\$41,000	\$6,000	\$6,000	\$6,000
Administration	\$273,567	\$402,100	\$362,200	\$410,800	\$430,900

8.6. COLLECTIONS MAINTENANCE

It is not anticipated that any expenditures related to collections maintenance will be incurred by Remai Modern in 2015.

	2015	2016	2017	2018	2019
Fee & Honoraria	\$0	\$1,000	\$1,000	\$1,000	\$1,000
Insurance	\$0	\$15,000	\$15,000	\$15,000	\$15,000
Restoration Fees	\$0	\$9,000	\$8,000	\$8,000	\$13,907
Inventory Count Fees	\$0	\$1,000	\$1,000	\$1,000	\$1,000
Supplies	\$0	\$15,000	\$14,000	\$14,000	\$17,500
Photography	\$0	\$250	\$250	\$250	\$250
Total Collection Maintenance Expenditures	\$0	\$41,250	\$39,250	\$39,250	\$48,657

8.7. LIBRARY

It is projected that Remai Modern will begin developing library resources in 2015.

	2015	2016	2017	2018	2019
Supplies	\$8,000	\$8,000	\$8,000	\$8,000	\$8,000
Library	\$8,000	\$8,000	\$8,000	\$8,000	\$8,000

8.8. BOARD AND VOLUNTEERS

It is projected that Remai Modern Board and committees will begin activities in 2015.

	2015	2016	2017	2018	2019
Supplies and printing	\$500	\$1,050	\$1,000	\$1,050	\$1,050
Meeting Costs/Hosting	\$3,375	\$6,800	\$6,800	\$6,800	\$6,800
Travel/Board retreat	\$1,750	\$4,200	\$4,300	\$4,300	\$4,300
Board and Committees	\$5,250	\$11,300	\$11,400	\$11,400	\$11,400

8.9. VOLUNTEERS

It is projected that volunteer related expenses and activities will begin in 2016.

	2015	2016	2017	2018	2019
Hosting	\$0	\$2,000	\$2,000	\$2,000	\$2,000
Volunteers	\$0	\$2,000	\$2,000	\$2,000	\$2,000

8.10. DEVELOPMENT/FUNDRAISING

It is projected that Remai Modern development programs will be established by 2015 and will be ongoing.

	2015	2016	2017	2018	2019
Professional Development	\$16,000	\$7,000	\$7,000	\$10,000	\$10,000
Stewardship	\$15,000	\$25,000	\$33,000	\$38,000	\$45,000
Printing	\$25,000	\$30,000	\$13,000	\$13,000	\$19,000
Special Events	\$0	\$25,000	\$31,000	\$32,000	\$32,000
Memberships	\$6,000	\$8,000	\$15,000	\$16,000	\$17,000
Donor Programs	\$0	\$10,000	\$18,000	\$22,500	\$22,500
Supplies	\$500	\$600	\$600	\$600	\$600
Development/Fundraising	\$62,500	\$105,600	\$117,600	\$132,100	\$146,100

8.11. MARKETING

Marketing expenses have been projected based on information provided by Kerry Harris and management's best estimate. Advertising includes all activities related to promoting Remai Modern and its facilities including exhibitions, programs, tours, facility rentals, retail store, etc.

	2015	2016	2017	2018	2019
Advertising	\$200,000	\$620,000	\$515,000	\$520,000	\$525,000
Hosting	\$0	\$8,000	\$1,500	\$1,500	\$1,500
Photography	\$0	\$2,000	\$2,200	\$27,500	\$27,500
Printing	\$150,000	\$25,000	\$85,000	\$100,000	\$115,000
Supplies	\$0	\$1,700	\$1,700	\$1,700	\$1,700
Website	\$0	\$0	\$10,000	\$10,000	\$10,000
Marketing	\$350,000	\$656,700	\$615,400	\$660,700	\$680,700

8.12. REMAI MODERN RETAIL

It is projected that Remai Modern Store will open when the full gallery opens in 2016. Applicable expenditures have been projected as a percentage of sales as noted below.

	2015	2016	2017	2018	2019
Credit card charges (1.9% of sales)	\$0	\$7,410	\$12,350	\$12,350	\$12,350
Purchasing related travel	\$1,500	\$4,500	\$4,500	\$4,500	\$4,500
Shop Supplies	\$0	\$4,000	\$4,000	\$4,000	\$4,000
Annual Gift Shop Expenses	\$1,500	\$15,910	\$20,850	\$20,850	\$20,850

8.13. FOOD SERVICES LOAN REPAYMENT

As food services will be the responsibility of a third party provider there are not operational expenses other than salaries related to the delivery of food services or facility rentals at Remai Modern, with the exception of the repayment of a five year loan to the City of Saskatoon for the purchase of the commercial kitchen equipment. The amount listed reflects the annual interest and principle repayment. The loan will be repaid over five years beginning in 2017 with an interest rate of 4.5%.

	2015	2016	2017	2018	2019
Food Service Repayment Loan	\$0	\$0	\$172,261	\$172,261	\$172,261

8.14. STAFFING EXPENDITURES

It is projected that gallery staff will have expenditures related to professional development and recruitment in 2015 as these functions transition from the Mendel Gallery to Remai Modern.

	2015	2016	2017	2018	2019
Registration/Course Fees	\$5,150	\$11,000	\$11,000	\$11,000	\$11,000
Travel	\$1,350	\$2,700	\$2,700	\$2,700	\$2,700
Staff Safety	\$0	\$1,500	\$1,500	\$1,500	\$1,500
Training	\$30,000	\$45,000	\$45,000	\$45,000	\$50,000
Meeting Costs	\$1,000	\$1,000	\$1,000	\$2,000	\$2,000
Travel	\$3,800	\$3,800	\$3,800	\$3,800	\$3,800
Staffing Expenditures	\$41,300	\$65,000	\$65,000	\$66,000	\$71,000

8.15. SALARIES AND BENEFITS

Salaries and benefits have been estimated based on the current Collective Bargaining Agreement (CBA) and the Human Resource study that was developed by MNP for Remail Modern. The positions and annual total salaries and benefits are as follows:

Executive Director and CEO
 Executive Assistant
 Administrative Assistant
 Director Of Development
 Development Manager
 Development Associate
 Development Coordinator
 Development Intern
 Membership Coordinator
 Director Of Marketing
 Communications Manager
 Content Coordinator
 Design Coordinator
 Guest Experience Manager
 Special Events & Volunteer Coordinator
 Special Events & Volunteer Coordinator
 Guest Experience Staff (2.75)
 Art & Design Store Manager
 Art & Design Store Assistant Manager
 Art & Design Store Staff (casual)
 Director, Finance & Operations
 Human Resource Consultant
 Security and Technical Coordinator
 Accounting Manager
 Accounting Technician
 Computer Technician
 Director of Programs / Chief Curator
 Curator / Head of Curatorial
 Exhibitions Manager
 Curator / Head Of Public Programs

Curator
 Associate Curator
 Associate Curator
 Associate Curator
 Public Programs And Education Coordinator
 Program Assistant Education Guides (Pooled)
 Assistant Curator
 Program Assistant
 Program Assistant (2)
 Registrar
 Assistant Registrar
 Senior Preparator
 Preparator
 Preparator Assistants (Pooled)

	2015	2016	2017	2018	2019
Salaries	\$1,130,920	\$2,643,190	\$3,106,041	\$3,332,215	\$3,367,403
Benefits	\$189,995	\$444,056	\$521,815	\$559,812	\$565,724
Salaries and Benefits	\$1,320,915	\$3,087,246	\$3,627,856	\$3,892,027	\$3,933,127

9. TRANSFERS

Transfers have been calculated as per agreement with the City Manager and Remain Modern policies regarding sustainability planning. The City of Saskatoon loan repayment is a \$770,000 loan towards kitchen equipment and is repayable to the City of Saskatoon at 4.5% over 5 years.

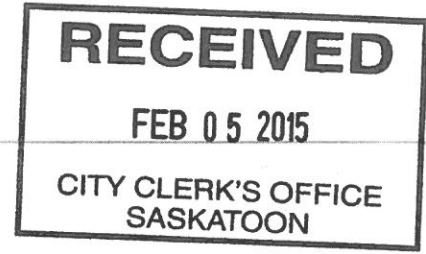
	2015	2016	2017	2018	2019
Transfer to:					
Capital Replacement Reserve	\$0	\$0	\$0	\$370,574	\$522,226
Equipment Replacement Reserve	\$0	\$70,000	\$65,000	\$65,000	\$100,000
Facility/Catering Capital Reserve	\$0	\$0	\$0	\$0	\$218,295
Permanent Collection Fund	\$0	\$87,655	\$87,655	\$107,655	\$107,655
Remain Exhibition Fund	\$0	\$500,000	\$500,000	\$500,000	\$500,000
Museums Assistance Program	\$0	\$0	\$245,000	\$245,002	\$245,000
Transfers	\$0	\$657,655	\$897,655	\$1,288,231	\$1,693,176

10. INFLATION

Inflation has not been considered in this projection.

255-1

To: Sproule, Joanne (Clerks)
Subject: RE: Leave of Absence

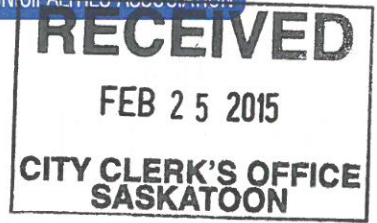


From: Donauer, Randy (City Councillor)
Sent: Thursday, February 05, 2015 10:45 AM
To: Sproule, Joanne (Clerks)
Subject: Leave of Absence

Joanne:

This is to formally advise you that I will be taking an "unpaid leave of absence" for the period of the writ, during the Federal Election this year.

- Randy



February 15, 2015

City of Saskatoon
222 – 3rd Ave. N.
Saskatoon, SK S7K 0J5

Dear Mayor and Council,

SUMA is the Voice of Saskatchewan’s Urban Governments, and has been since 1905. Saskatchewan’s villages, towns, resort villages, cities, and northern municipalities have stood united and strong through membership in SUMA, and in turn we have promoted and defended your interests. We represent the collective strength of nearly 450 urban governments. Things have changed a lot since our inception more than a century ago, and SUMA’s work has continued to evolve. In 2015, what we do falls into three core functions.

Advocacy – We Represent Your Interests

SUMA serves as the collective unified voice of urban government, ensuring your interests are represented to the provincial and federal governments. In 2014, we promoted and defended your interests by participating in a number of new and ongoing initiatives regarding changes to the Local Government Elections Act, development of draft boundary alteration compensation guidelines; establishing effective alternative enforcement options for local governments and ensuring the Ministry of Justice submits to government a proposal to put in place a fine revenue distribution model based on the percentage of policing costs a municipality pays.

We are already hard at work on another year of serving our members and advancing your interests. SUMA will continue to protect the municipal revenue sharing program, focus on the implementation of a Multi-Material Recycling Program, communicating the concerns of members using fact based evidence on the cost of upgrading landfills to proposed Environmental Code standards, ensuring fair compensation rates from SGI for services provided by municipal fire services at motor vehicle accidents and exploring ways to expand the revenue sources available to urban governments.

“The Voice of Saskatchewan Cities, Towns and Villages”



SUMA staff and Board members also sit on a wide range of boards, committees, and working groups to represent the urban perspective. From the Municipal Employees' Pension Commission (more than half of the pension plan's employers are urban governments) to the Saskatchewan Assessment Management Agency, which determines the way you collect taxes.

When you're a member of SUMA, you have more than just us working on your behalf. We make partnerships wherever we can. SUMA works with like-minded organizations like the Saskatchewan Parks and Recreation Association and the Urban Municipal Administrators Association of Saskatchewan, and participate in programs like the Municipal Leadership Development Program and the Saskatchewan Municipal Awards. The Saskatchewan Seniors Mechanism is our newest partner and we look forward to working with them to improve public policy related to older adults and local governments.

Group Programs – *We Help You Save Money*

SUMA offers group benefits, insurance services, and purchasing programs that can reduce the costs of municipal government operations. Through the SUMA Advantage purchasing program, you have access to more than 25 pre-screened suppliers with guaranteed price advantages for you and financial support for SUMA. There was also a lot of work in 2014 on expanding your opportunities to save on products and services, as we established the Central Municipal Procurement Services project. This brings access to savings on things like paratransit vehicles and breathing apparatuses for firefighters. Chemicals for water treatment plans, line paint, and safety equipment are other products that may be available through this program as it grows.

You can also save on group benefits and insurance services when you are a SUMA member. There are health, dental and vision benefits, and an employee and family assistance plan. You have access to insurance programs for your employees, and for your volunteer firefighters, first responders, and ambulance crews. Getting these benefits through SUMA not only saves you money, but also time. We review and renegotiate your rates, manage the administration of your programs, and offer employee support services – leaving your employees free to focus on their many other important duties. Membership with SUMA also gives you access to SUMAssure – you can save money on municipal property and liability insurance, and as part owner of an insurance reciprocal, benefit from the company profits.

Capacity Building – We Give You Access to Resources

SUMA provides information, connections, training, and tools to make you more effective. We provide one of the largest conventions in the province, and coordinate regional meetings around the province. We've facilitated a policing forum, and built Canada's first Mayors Summer School. Our quarterly magazine, Urban Voice, and email newsletter, Urban Update, help you stay informed.

We are especially proud of our work on giving you access to resources in 2014, as we introduced SUMA's Legal Services program. Our Policy and Legal Advisor, Steven Dribnenki, provides resources to help you with legal issues and keep you up to date on decisions and trends in municipal law. You have access to a call-in service, and legal materials and resources.

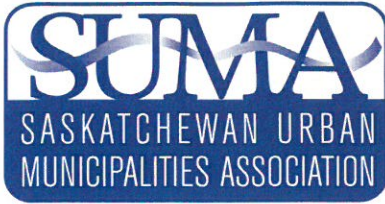
As you can see from the length of this letter, SUMA works hard with your membership dollars, and we appreciate your support. Should you have any questions or concerns about your membership with SUMA, contact our CEO, Laurent Mougeot, at ceo@suma.org or 306-525-3727.

Sincerely,



Mayor Debra Button
President

(Invoice and brochures enclosed)



200 - 2222 13th Avenue
 Regina, SK S4P 3M7
 Phone: (306) 525-3727
 Fax: (306) 525-4373
 E-mail: membership@suma.org

Invoice	
Number:	INV-000064673
Page:	1
Date:	01/01/2015
Customer #:	M SASKATOON

City of Saskatoon 2nd Floor, 222 - 3rd Avenue N. Saskatoon, SK S7K 0J5	FOR: 2015 Membership Fee
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2015 Membership Fee - January 1, 2015 to December 31, 2015

City of Saskatoon	POPULATION - 222189
	VOTING DELEGATES - 11
Description	Total Fee
Membership - \$508.03 per Voting Delegate	5,588.33
Membership - \$0.55 per Capita	55,000.00
Membership - \$0.275 per Capita Over 100,000	33,601.98
Advocacy - \$250.00 per Voting Delegate	2,750.00
Advocacy - \$0.05 per Capita	5,000.00
Advocacy - \$0.025 per Capita Over 100,000	3,054.73

Sub-Total	104,995.04
GST#10795 6419	5,249.75
Total Membership Fee:	\$110,244.79

PAYMENT DUE BY MARCH 31, 2015

IMPORTANT: Payment not received in full by March 31, 2015, may result in termination of coverage for group benefits, SUMAdvantage, SUMAssure and other programs offered with SUMA membership.

Please return this portion with payment to:

Sk.Urban Municipalities Assoc.
 200 - 2222 13th Ave
 Regina, SK S4P 3M7

City of Saskatoon

Customer ID: M SASKATOON
 Number: INV-000064673
 Date: 01/01/2015
 Amount Due: **110,244.79**

Invoice



SASKATOON'S
ARTS & CONVENTION
CENTRE



February 12, 2015

To: City Council

Re: Notice of Meeting

The Annual General Meeting of the Saskatoon Centennial Auditorium & Convention Centre **Corporation** Membership will be held on Thursday April 30, 2015 at 12:00 noon at TCU Place.

The Annual General Meeting of the Saskatoon Centennial Auditorium **Foundation** Membership will be held on Thursday April 30, 2015 at 12:15 pm at TCU Place.

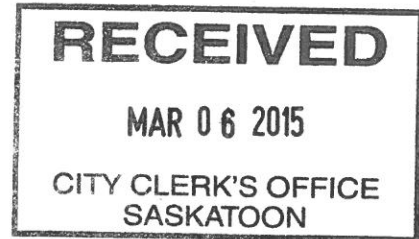
Sincerely,

Pam Kilgour

Director of Finance
TCU Place – Saskatoon's Arts & Convention Centre
pkilgour@tcuplace.com
306.975.7778



175-31



6 March 2015

*His Worship the Mayor & City Council
City Clerk's Office
City Hall
222 3rd Avenue North
Saskatoon SK S7K 0J5*

Dear Sirs/Mesdames:

***NOTICE OF ANNUAL MEMBER'S MEETING
SASKATCHEWAN PLACE ASSOCIATION INC.***

Please take note of the following meeting of the above-mentioned committee:

DATE: WEDNESDAY, MAY 6, 2015

TIME: 5:30 P.M.

LOCATION: SASKTEL CENTRE BOARDROOM

Please confirm your attendance with Heather Hails by email, phone, facsimile, or mail.

Thank you.

Best regards,

A simple handwritten signature consisting of three vertical lines of varying heights and a horizontal line across the top.

*Heather Hails, Recording Secretary
SaskTel Centre*

***Cc: Will Lofdahl, Chief Executive Officer
Sheryl McRorie, Director of Finance & Ticketing
Members of the Board of Directors, SaskTel Centre
Betty Harmon, Meyers Norris Penny***

***Enclosures: Agenda
Minutes of May 7, 2014 Annual General Meeting***

SASKATCHEWAN PLACE ASSOCIATION INC.

ANNUAL MEMBER'S MEETING

WEDNESDAY, MAY 6, 2015

5:30 P.M.

- 1. Reading of the Notice of Meeting*
- 2. Call to Order*
- 3. Approval of Agenda*
- 4. Proxies*
- 5. Minutes of Previous Meeting*
- 6. Business Arising*
- 7. Chair's Report*
- 8. Treasurer's Report*
- 9. Approval of Auditor's Report*
- 10. Resignation of Directors*
- 11. Appointment of Directors for 2015*
- 12. Appointment of Auditor*
- 13. Appointment of Solicitor*
- 14. Ratification of Board of Directors' Actions*
- 15. Other Business*
- 16. Motion for Adjournment*

ANNUAL GENERAL MEETING MINUTES

Present: Councillor Darren Hill, Proxy
Ian Sutherland
Trent Sereda
Candice Augustyn
Councillor Troy Davies
Gary Gullickson
Adele Buettner
Ron New
Will Lofdahl, Chief Executive Officer
Scott Ford, Executive Director
Sheryl McRorie, Director of Finance & Ticketing
John Howden, Director of Business Development
Heather Hails, Recording Secretary

Regrets: Mayor Don Atchison
Derek Bachman

1. The meeting was called to order at 6:00 p.m.
2. The reading of the notice of the annual member's meeting was moved and seconded and approved.
3. The approval of the agenda was moved and seconded and approved.
4. We did have to exercise the proxy for this meeting so Councillor Hill read it, moved acceptance of it, seconded it, and approved it.
5. The minutes of the May 1, 2013 meeting were moved and seconded and approved.
6. There is no business arising from the minutes.
7. The Board Chair's report was previously circulated. Councillor Hill moved that the report be received as information and, seconded, and approved it.
8. The Treasurer's report was previously circulated. Councillor Hill moved that the report be received as information and, seconded, and approved it.
9. The auditor's report was moved received as information, seconded, and approved.
10. There are no resignations or appointments of Directors.
11. The reappointment of MNP as Auditor was moved, seconded, and approved.
12. The reappointment of City Solicitor's as Solicitor for CUC was moved, seconded, and approved.
13. The ratification of the Board of Directors actions - moves that all actions taken be sanctioned, seconded, and approved.
14. Other Business (none)
15. Move to adjourn at 6:03 p.m.

Mayor Don Atchison, Chairperson
or his Proxy

SREDA Bonus Payment - 2014

Recommendation

That the Executive Committee recommend to City Council that a bonus payment in the amount of \$110,000 to the Saskatoon Regional Economic Development Authority Inc. be approved.

Topic and Purpose

This report provides the results of the 2014 performance measures for the Saskatoon Regional Economic Development Authority Inc. (SREDA). This is consistent with the reporting requirements outlined in the Funding Agreement between the City of Saskatoon (City) and SREDA.

Report Highlights

1. Based on the performance measure targets, SREDA's bonus payment for 2014 is \$110,000.

Strategic Goal

As identified in the Funding Agreement, the services performed by SREDA are required to be consistent with both the City's Strategic Plan, in particular, the Strategic Goal of Economic Diversity and Prosperity, as well as SREDA's Strategic Goals.

Background

On October 7, 2013, City Council approved a revised Funding Agreement with SREDA and the performance measures and targets developed by SREDA.

In addition, SREDA shall report on its achievement of the agreed-upon performance measures. If the City and SREDA agree that SREDA has met the performance measures, a bonus payment shall be provided.

At its meeting on May 20, 2014, City Council adopted SREDA's 2014 Draft Performance Targets.

As per the Funding Agreement, SREDA will also table its annual report containing audited financial statements to City Council by no later than May 31.

Report

Attachment 1 is a copy of the 2014 SREDA Key Performance Indicators Scorecard which outlines the approved performance measures, targets, results, and ratings. The ratings are calculated by pro-rating the weighting based on actual results. The total for 2014 is 88%.

The Funding Agreement provides for a bonus payment of up to \$125,000 annually, based on the successful achievement of the agreed-upon annual performance measure

targets. Accordingly, the bonus payment to SREDA for 2014 is \$110,000 (88% of the maximum bonus). The funding source is from industrial property sale proceeds that reside within the Property Realized Reserve.

Options to the Recommendation

There are no options related to the bonus payment to SREDA, as this is outlined within the Funding Agreement.

Policy Implications

The recommendation is consistent with the Funding Agreement between the City and SREDA.

Financial Implications

Funding for the bonus payment exists within the Property Realized Reserve.

Other Considerations/Implications

There are no environmental, privacy, or CPTED implications or considerations. There is no public and or stakeholder involvement, and a communication plan is not required.

Due Date for Follow-up and/or Project Completion

There is no due date or follow-up required.

Public Notice

Public Notice pursuant to Section 3 of Policy No. C01-021, Public Notice Policy, is not required.

Attachment

1. SREDA 2014 Key Performance Indicators Scorecard

Report Approval

Written by: Kerry Tarasoff, CFO/General Manager, Asset & Financial Management
Department

Approved by: Jeff Jorgenson, Acting City Manager

2014 SREDA KEY PERFORMANCE INDICATORS SCORECARD

Strategic Goal	Objective	Measure	Target	Result	Adj. Rating %	Weighting	Final Score
Business Attraction - Create a sustainable economy for Saskatoon and region (40%)	Attract business and investment to the Saskatoon region (Direct SREDA Involvement)	# of businesses attracted to the Saskatoon region 434 in 2013	50 qualified leads	47	94%	20%	18.8
		Dollar value of investment	\$7,500,000	\$12,800,000	110%	20%	22
Business Retention & Expansion - Ensure opportunities to expand our business base are not missed (50%)	Actively support the business community with knowledge expertise and services to help them grow and expand	# of businesses expanded, utilizing the incentives/tax abatement program	3 new in 2014	1	33%	15%	5
		New building permits 5 year average: 918,009,400	0.3% growth over the 5 year average (920,763,428)	878,200,000	95%	5%	4.8
		# of business licences 1,328 in 2013	1% growth (1,341)	1,250	93%	15%	14
		Net jobs created	Target 8,000 in 2014	8,000	100%	15%	15
Organizational Effectiveness (10%)	Build support for SREDA's mandate through key stakeholders	Support the business community by representing SREDA at public forums and sector specific initiatives	55 formal requests/presentations	41	75%	5%	3.7
		Set yearly employee goals and objectives in individual performance plans	85% average completion rate on employee performance plans	80%	94%	5%	4.7

TOTAL: 88 / 100

Municipal Governance and Public Accountability

Recommendation

That the information be received.
That the processes for *in camera* matters be amended as outlined in this report.
That the City Solicitor provide any required bylaw amendments to Council for consideration.

Topic and Purpose

This report discusses meetings of City Council, notice and *in camera* matters. It is also addresses the following inquiry made by Councillor Clark at the meeting of City Council held on December 15, 2014:

Would the Administration undertake a review of our current policies and practices, and current best practices for both determination of what items are discussed in camera vs. in public and how information pertaining to in camera discussion is released to the public.

Report Highlights

1. This report provides an explanation of the meaning of a “Meeting” of City Council.
2. This report discusses when notice of a meeting must be given and the process for providing notice.
3. This report discusses in what circumstances additional public notice requirements apply.
4. This report outlines when a meeting may or may not be held *in camera*, including the current process to determine whether a matter is to be considered *in camera* and recommends certain amendments to the process.
5. Finally, this report highlights the current process for reporting *in camera* meetings and items to members of the public and recommends amendments to this process.

Strategic Goal(s)

This report supports the Strategic Goal of Continuous Improvement because it recommends ways in which Council may increase its public transparency.

Report

Introduction

A fundamental principle of municipal government is that it conduct its business in public.

Municipalities are creatures of provincial statute. Municipalities have no independent constitutional standing.

Public accountability rules for cities in Saskatchewan are found within the provisions of *The Cities Act* (the “CA”).

The CA says an act or proceeding of City Council or a Council Committee is not effective unless adopted at a duly constituted public meeting. Everyone has the right to be present at Council and Council Committee meetings.

The CA says Council and Council Committee meetings are required to be conducted in public. A Council or Committee meeting may only be closed to the public if a specific exemption applies (see Attachment No. 1).

Issue #1 – What is a “Meeting” of City Council?

The CA does not define the term “meeting”.

The cases which have considered the issue tell us the following:

- a meeting is a gathering to which all members of Council or the Committee are invited;
OR
- a meeting is a gathering of the Mayor, Councillors and civic Administration;
AND
- a meeting takes place when Council/Committee discuss matters within Council’s/Committee’s jurisdiction;
- a meeting takes place when Council/Committee discuss, “in a structured way”, matters which would ordinarily be the subject of Council/Committee business; or
- a meeting takes place when Council/Committee discuss matters, in such a way, as to:
 - make decisions;
 - to materially move a matter along in the overall spectrum of Council’s/Committee’s decision making; or,
 - to decide the “heart of the matter”.

Therefore, a fair articulation of the definition of “meeting” is:

“A meeting takes place when Council/Committee is gathered together to discuss a matter within its jurisdiction and makes a decision or materially moves the decision-making along by giving direction or deciding ‘the heart of the matter’.”

Examples:

- regularly scheduled Council and Committee meetings;
- special Council and Committee meetings;
- City Council strategic or long-range planning sessions;
- City Council strategic or long-range planning sessions held with councils of other municipalities, other local authorities, or the like;
- Council or Committee briefing sessions held with civic Administration, boards of the City's controlled corporations, other civic boards or commissions, or other third party entities or boards.

Issue #2 – When Must Notice of a Meeting be Given?

The basic concept is that notice of regular and special meetings of Council and Committee must be given to all members of Council and to the public.

The CA says that Council and Committee may establish regular meetings on specified dates, times and places. Notice of regularly scheduled meetings need not be given. However, if the date, time or place of a regularly scheduled meeting changes, at least 24 hours' notice must be given to members of Council and to the public.

Members of Council and the public must be given at least 24 hours' notice of special meetings of City Council and Committees. The notice must include the purpose of the meeting and the date, time and place at which the meeting is to be held.

The exception is that for a special Council or Committee meeting, the 24 hours' notice may be dispensed with if all members of Council agree to do so, in writing, immediately before the beginning of the meeting. Written consent may be provided in an electronic format.

Process for Providing Notice

Notice for both scheduled public and *in camera* Council and Committee meetings is included on the City Page of the Star Phoenix (the Saturday edition prior to the meeting week and the Sunday edition).

Notice of any special meetings, either public or *in camera* is also included on the City Page of the Star Phoenix, if the special meeting has been determined well enough in advance to meet the newspaper submission deadlines.

Notices of ALL meetings are included on the City's website and posted on the public bulletin board in the main lobby of City Hall. While not required, every attempt is made to include those notices of meetings which are held with less than 24 hours' notice.

Notice of ALL meetings is emailed to members of Council and the Administration. Recently, the City Clerk's Office has also undertaken to send an email to all media

groups advising them of a special public meeting, if the meeting was not called in time to be advertised in the newspaper.

All public agendas are posted on the City's website in advance of the meeting.

Issue #3 – When do Additional Public Notice Requirements Apply?

There are additional public notice requirements for certain matters considered by City Council (see Attachment No. 2).

City Council has passed a Public Notice Policy, and for the matters listed in Attachment No. 2, additional public notice is provided in accordance with the City's Public Notice Policy.

Issue #4 – When May a Meeting be Held In Camera?

A Council/Committee may close all or part of the meeting if:

- the matter to be discussed is within an exemption listed in Part III of *The Local Authority Freedom of Information and Protection of Privacy Act* ("LAFOIPPA") (see Attachment No. 1);
- the Committee is a body established by Council for the sole purpose of hearing quasi-judicial appeals; or
- Council is meeting for the purpose of long-range or strategic planning – no business may be transacted.

When a meeting is closed to the public, no bylaws may be passed.

Current Process to Determine Whether a Matter is to be Considered *In Camera*

Currently, a set of guidelines for submitting reports to *in camera* meetings exists. The list has been formulated based on the exemptions in Part III of LAFOIPPA. It contains a summarized list of exemptions along with a description of each. The Administration chooses the applicable exemption from the list and identifies the exemption on the first page of its report intended for an *in camera* meeting.

At the beginning of each *in camera* Committee meeting, the Committee considers a motion to confirm that the matters included on the *in camera* agenda be dealt with *in camera*. If the Committee decides that it is not satisfied that the agenda item merits consideration *in camera*, the matter will be placed on the next public agenda of the Committee (or Council).

Recommended Amendments to Process

The application of exemptions by the "Head" when considering access requests under LAFOIPPA require an analysis of clear and identifiable harm versus the public's right to the information. This is a balancing test. In keeping with this general principle,

it is being recommended that the City Clerk's Office apply this balancing test and that the default will be that reports are submitted to a public meeting unless there is a clear and identifiable harm to the City when balanced with the public's right to the information and the City's duty to conduct its business in public. The anticipated harm must be genuine and conceivable; cause damage or detriment, not just be a hindrance or interference; and cannot be imaginary or contrived harm.

The following process is being proposed:

1. When Administration submits a report to the City Clerk for inclusion on an *in camera* agenda, it is reviewed by the City Clerk and if it is a matter that falls within one of the following exemptions, it will be considered *in camera*:
 - Solicitor/Client Privilege, Legal Advice (both oral and written) (Section 21 LAFOIPPA)
 - Labour/Personnel Matters (Section 16(1)(c) and (d) LAFOIPPA)
 - Negotiations (Section 16(1)(c) LAFOIPPA)
 - Land Sales (Section 17(1)(d) and (e) LAFOIPPA)
 - Personal Information (Section 16(1)(d) and 28 of LAFOIPPA)
 - Information from Other Governments Provided on a Confidential Basis (Section 13 LAFOIPPA)
 - Third Party Information (Section 18 LAFOIPPA)
2. The application of the above exemptions does not preclude the use of any other exemptions identified under LAFOIPPA. Other exemptions could still be applied; however, the general principle of a clear and identifiable harm to the City would still need to apply. For those matters not within an exemption outlined in paragraph 1 above, the City Clerk will perform the balancing test.
3. If the balancing test fails, the City Clerk will communicate with Administration to obtain any further clarification or justification as to why the matter was designated as *in camera*.
4. If, after consultation with the Administration, the City Clerk is of the opinion that the report passes the balancing test, it will be placed on the appropriate *in camera* agenda.
5. If the report does not pass the balancing test, it is returned to the Administration. The Administration may choose to resubmit the report to a public meeting.

Issue #5 – What are the Requirements for Reporting In Camera Meetings/Items to the Public?

Again, the rule is that no act or proceeding of Council/Committee is effective unless it is authorized or adopted by bylaw or resolution at a duly constituted public meeting.

So, while matters as described may be discussed *in camera*, no decision may be made or is effective unless considered and decided at a public meeting. Therefore, all matters discussed *in camera* under one exemption or another, which require a decision of Council or Committee, must be reported out, considered and decided upon at a public Council/Committee meeting.

There are a few matters which do not require a decision of Council and so are not ever made public. Examples include particulars of land purchase negotiations, collective bargaining mandates which instruct negotiations (the ultimate agreement reached is brought to Council for approval), performance reviews of the City Manager, City Clerk and City Solicitor, particulars of applications for municipal boards and commissions, legal advice, confidential information received from other levels of government and other “personal information” as defined by LAFOIPPA.

Current Process for Reporting Out of *In Camera* Meetings/Matters

Topics to be discussed at *in camera* meetings of Executive Committee and the Standing Policy Committee meetings are posted on the City’s website. In cases where the subject itself is confidential, the subject line is changed to be more generic. (For example, a subject regarding the possible purchase of an identified piece of property would be changed to “Possible Property Purchase”). Matters requiring a decision of Council or Committee are reported out at a public meeting of Council or Committee.

The processes for dealing with *in camera* matters in other cities is outlined in Attachment No. 3.

Recommended Amendments to Process

Matters discussed at an *in camera* meeting under one of the exemptions which require a decision of Council/Committee must still be reported out to a public meeting of Council/Committee.

It is recommended that a listing of those matters considered *in camera* and currently posted on the City’s website, form part of the public committee agenda (at the end of the agenda) and the required motion to consider the matters *in camera* be made during the public meeting of the Committee. If the Committee does not support any item being considered *in camera*, the item could be “pulled” from the *in camera* agenda and considered while still in a public forum. Both the Cities of Calgary and Edmonton undertake a similar process; however, the reporting out of any matters is done at the same meeting. In other words, during the public portion of the meeting, the Committee convenes in private for consideration of the private matters and then reconvenes publicly to consider and determine the matter(s) publicly.

Consideration of matters during an *in camera* session would have one of the following three outcomes:

1. the matter remains *in camera* and no further action is taken;
2. the matter is reported out to a subsequent public meeting of the Committee; or
3. that matter is reported out at the same meeting. The Committee would rise and report publicly during the same session.

Policy Implications

This report recommends changes to policy/process as outlined.

Public Notice

Public Notice pursuant to Section 3 of Policy No. C01-021, Public Notice Policy, is not required.

Attachment(s)

1. Attachment No. 1 – Mandatory and Permissive Exemptions under LAFOIPPA
2. Attachment No. 2 – Matters Which Require Additional Public Notice
3. Attachment No. 3 – Information From Other Cities, Consideration of In Camera Matters/Private Sessions
4. Attachment No. 4 – Council and Committee Reports Procedures, In Camera Headings and Descriptions

Report Approval

Written by: Patricia Warwick, City Solicitor
Joanne Sproule, City Clerk
Mike Jordan, Government Relations,
City Manager's Office

Approved by: Patricia Warwick, City Solicitor
Joanne Sproule, City Clerk

Mandatory and Permissive Exemptions under LAFOIPPA

Mandatory Exemptions:

- information contained in a record obtained in confidence from the Government of Canada or a province or territory or foreign government (s. 13(1));
- trade secrets of a third party (s. 18(1)(a));
- financial, commercial, scientific, technical or labour relations information that is supplied in confidence by a third party (s. 18(1)(b));
- information which could reasonably be expected to result in financial loss or gain to a third party (s. 18(1)(c)(i));
- information which could reasonably be expected to prejudice the competitive position of a third party (s. 18(1)(c)(ii));
- information which could reasonably be expected to interfere with the contractual or other negotiations of a third party (s. 18(1)(c)(iii));
- a statement of a financial account relating to a third party (s. 18(1)(d)); and
- personal information (s. 28) (not contained in Part III of LAFOIPPA, but City prohibited from disclosing).

Permissive Exemptions:

- information contained in a record obtained in confidence from another local authority or similar body in another province or territory (s. 13(2));
- a record which contains information which could prejudice the investigation or prosecution of an offence or terrorist activity; which could be injurious to the enforcement of a law (including a bylaw); which could be injurious to the local authority in the conduct of legal proceedings; which could reveal investigative techniques; which could reveal the identity of a confidential source, etc. (s. 14(1));

- a record which contains a draft resolution or bylaw or which discloses the agendas or deliberations of *in camera* meetings (s. 15(1)) unless the record has been in existence for 25 years or more;
- a record which contains advice or proposals developed for or by the local authority; which contains consultations or deliberations involving employees of the local authority; which contains positions, plans, procedures, etc. developed for the purpose of contractual or other negotiations; which contains plans that relate to the management of personnel or administration which have not been made public; and, which could be reasonably expected to result in disclosure of a pending policy or budgetary decision (s. 16(1));
- a record which could reasonably be expected to disclose trade secrets; financial, commercial, scientific, technical or other information in which the local authority has a proprietary interest or a right to use and has monetary value; information gained through research by an employee which may deprive the employee of priority of publication; which could reasonably be expected to interfere with contractual or other negotiations of the local authority; positions developed for the purpose of negotiations; prejudice the economic interest of the local authority; result in an undue benefit or loss to a person (s. 17(1));
- a record that contains information relating to testing or audit procedures or specific tests or audits if the disclosure could be expected to prejudice the use or results of the tests or audits (s. 19);
- a record if the disclosure could threaten the safety or the physical or mental health of an individual (s. 20); and
- a solicitor-client record or record which contains legal advice (s. 21).

Attachment No. 2

Matters Which Require Additional Public Notice

In accordance with *The Cities Act*, *The Planning and Development Act, 2007*, and The City of Saskatoon's Public Notice Policy, additional notice is required when Council is considering the following matters:

- prohibiting or limiting the number of businesses of a particular type in an area of the City or specifying separation distances between businesses of a particular type;
- permanently closing or blocking off a street, lane or walkway;
- permanently modifying an intersection with the use of physical barriers;
- permanently closing or creating a median opening;
- borrowing money;
- lending money to a non-profit organization or to one of the City's controlled corporations or to a business improvement district established by the City, regardless whether the source or sources of money to be loaned is internal or external;
- guaranteeing the repayment of a loan between a lender and a non-profit organization or one of the City's controlled corporations or a business improvement district established by the City;
- moving capital moneys to an operating budget or reserve;
- imposing a special tax or determining the use to which excess revenue from a special tax is to be put;
- establishing an investment policy;
- selling or leasing land for less than fair market value and without a public offering;
- selling or leasing park lands and dedicated lands except where the land is covered by public notice provisions in *The Planning and Development Act, 2007*;
- establishing a purchasing policy;

- establishing a business improvement district;
- setting remuneration for Council or Committee members;
- increasing or decreasing the number of councillors on Council;
- appointing a wards commission and dividing the City into wards;
- amending or repealing a bylaw for which public notice was a requirement at the time the bylaw was passed;
- any matter where holding a public hearing is required under *The Cities Act* or any other Act except where the Act contains its own public notice provisions;
- discussing a matter at a public meeting held as a result of a petition signed by the required number of electors; and
- the amendment or repeal of a bylaw or resolution when the resolution or bylaw was passed as a result of a vote of the electors.
- the adoption, amendment or repeal of a bylaw for a development plan or zoning bylaw;
- an application for discretionary use approval or the amendment of a discretionary use approval;
- the adoption, amendment or repeal of a bylaw authorizing the sale of a buffer strip or municipal reserve;
- the voiding of a rezoning agreement;
- the adoption, amendment or repeal of an interim development control bylaw; and
- the passing of a resolution to adopt or amend a concept plan.

**Information From Other Cities
Consideration of In Camera Matters/Private Sessions**

City of Regina

1. Private Sessions are private meetings with the Administration present:
 - an agenda is prepared and minutes are kept;
 - the agenda/minutes are not made available to the public;
 - the agenda/minutes may be requested via LAFOIPPA; and
 - if a recommendation is made in a private session, an edited version of the report, with any confidential information excluded, is presented at a Council meeting for decision.

2. *In Camera*:
 - during a Council meeting, a councillor may request the meeting go *in camera*;
 - the meeting minutes will indicate that there was a request to move *in camera*, that the councillors left the room, what time they returned and what time the public meeting was reconvened; and
 - the report that was the subject of discussion when the request to go *in camera* was made is really the only information available - no explanation of the request to move *in camera* is required and the discussions during the *in camera* portion of the meeting are not recorded.

City of Calgary

1. “Drop In” sessions:
 - briefing sessions in which the City Manager and Leadership Team are available (usually prior to a Council meeting) to answer councillors’ questions; and
 - drop-in sessions are not viewed as meetings of Council because the Administration is driving the meeting. It does not appear that the sessions are recorded or that any of the discussions are reported upon.

2. *In Camera*:
 - during a Council meeting, Council may move into the Committee of the Whole, *in camera*;
 - the minutes of the Council meeting will note the motion to move into the Committee of the Whole, *in camera*, and the motion that the Committee of the Whole rise and report to Council; and
 - *in camera* portions of the meeting are not recorded.

City of Edmonton

General Procedure:

- during a Council meeting, a councillor may move that certain matters be discussed in private;
- the minutes of the meeting will indicate the meeting went in private. In private portions of the meeting are not recorded;
- any reports presented in private will remain private unless the motion to go in private specifies that the report will be made public at a specified time or after the matter is no longer of a sensitive nature;
- as much information as possible is included in the minutes of the meeting. For example, if a report contains confidential information in a schedule, the report is typically included with the minutes, but the schedule that includes the sensitive information is not; and
- there is no formal reporting of matters discussed in private.

City of Winnipeg

General Procedure:

- the City of Winnipeg has enacted the *In Camera Bylaw*. Under the bylaw, only the Executive Policy Committee, Standing Policy Committees, and other specified committees may consider matters *in camera*;
- the matters that may be considered *in camera* are as specified in the *In Camera Bylaw*, and include reports concerning personnel matters, contractual negotiations, solicitor-client privilege, and other information, the disclosure of which would violate *The Freedom of Information and Protection of Privacy Act*;
- provincial legislation mandates that the reason for considering a matter *in camera* must be recorded in the meeting minutes;
- generally, *in camera* discussions are not made public; and
- some *in camera* matters may become public if they exceed the delegated authority of a Standing Policy Committee or involve funds that are not already set aside for a given purpose (ie. expropriation of land having a value in excess of what the Standing Policy Committee is authorized to approve or where monies are not currently set aside will go to the Executive Policy Committee and Council as public matters).

City of Vancouver

General Procedure:

- holds *in camera* Council meetings;
- reports presented at *in camera* Council meetings include the rationale as to why the matter is to be heard *in camera* (ie. the report deals with personnel matters);
- decisions and supporting reports from *in camera* meetings are made public throughout the year when the information is determined no longer to be sensitive or confidential; and
- some reports may be redacted in accordance with legislation.



**COUNCIL AND COMMITTEE REPORTS PROCEDURES
IN CAMERA HEADINGS AND DESCRIPTIONS
March 2015**

Council/Committee may close all or part of its meeting to the public if the matter to be discussed is within one of the exemptions in Part III of *The Local Authority Freedom of Information and Protection of Privacy Act* (LAFOIPP). The default is that reports are submitted to a public meeting unless there is a clear and identifiable harm to the City. The anticipated harm must be genuine and conceivable; cause damage or detriment, not just be a hindrance or interference; and cannot be imaginary or contrived harm.

Council/Committee may hold meetings closed to the public for the purpose of long-range or strategic planning, but no business may be transacted at those meetings.

The following are instances where a report may be considered In Camera:

HEADINGS	DESCRIPTION
Solicitor/Client Privilege Legal Advice or Legal Services (Section 21 LAFOIPP)	May use for written and verbal reports and updates from the City Solicitor's Office
Economic/Financial –Land (Section 17(1)(d) and (e) LAFOIPP)	May use this if the report deals with purchase of lands or property matters.
Labour/Personnel Matters (Sections 16(1)(c) and (d) LAFOIPP)	Must use this if report deals with labour-relations matters, including negotiations. May use if report deals with plans relating to the management of personnel or the administration.
Negotiations (Section 16(1)(c) LAFOIPP)	May use this if report deals with contractual or other negotiations on behalf of the City.
Information From Other Governments (Section 13 of LAFOIPP)	Must use this if the report contains information that was obtained in confidence, implicitly or explicitly, from the Provincial or Federal Governments, or its agencies, Crown corporations or other institutions, unless the government or institution consents to the disclosure or makes the information public. May use this if the report contains information that was obtained in confidence, implicitly or explicitly, from another local authority or a similar body in another province or territory in Canada.
Personal Information (Section 28 and Section 16(1)(b) and (d) of LAFOIPP)	Must use this if the report contains personal information of identifiable individuals who are not employees of the City, and who have not given their consent for the release of the information. May be used for discussion and consideration of matters such as appointments to Boards and Committees

Third Party Information (Section 18 LAFOIPP)	Must use this if the report contains trade secrets of a third party; financial, commercial, scientific, technical or labour relations information that is supplied in implicit or explicit confidence from the third party; statement of a financial account relating to a third party with respect to the provision of routine services from the City; or information which, if disclosed could result in financial loss or gain, prejudice the competitive position of, or interfere with the contractual or other negotiations of a third party.
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The following exemptions set out in Part III of *The Local Authority Freedom of Information and Protection of Privacy Act (LAFOIPP)* are to be used ONLY when the consideration of the information publicly would result in clear and identifiable harm to the City

Audits and Tests (Section 19 LAFOIPP)	May use this for testing or auditing procedures or techniques, or details of specific tests or audits to be conducted, where disclosure could prejudice their use or results.
Danger to Health or Safety (Section 20 LAFOIPP)	May use this if the disclosure could threaten the safety or the physical or mental health of an individual.
Economic/Financial and Other Interests (Section 17 LAFOIPP)	May use this if the report contains information which, if disclosed could prejudice the economic interest of the City, or result in an undue benefit or loss to a person. It also includes reports relating to contractual or other negotiations on behalf of the City. Other uses: <ul style="list-style-type: none"> • Financial, commercial, scientific, technical or other information in which the City has a proprietary interest or a right of use, and that has monetary value or is likely to have monetary value; • Scientific or technical information obtained through research by a City employee, which if disclosed could deprive the employee or priority of publication.
Policy Options/Advice (Section 16(1)(a) LAFOIPP)	May use this if the report deals with advice, proposals, recommendations, analyses or policy options.
Budget Matters (Section 16(1)(e) LAFOIPP)	May use this if the report provides information regarding an upcoming budgetary decision. May not be used to debate budget decisions in private.
Draft Bylaw or Resolution (Section 15(1)(a) of LAFOIPP)	May use this if the report contains a draft of a resolution or bylaw. Would normally apply to a draft bylaw which Council is receiving legal advice about.
Consultations/Deliberations (Section 16(1)(b) of LAFOIPP)	May be used for review and determination of awards, grants, etc., such as for the Public Art Advisory Committee or for consultations with a Committee.
Law Enforcement or Investigation (Section 14 of LAFOIPP)	May use this if the report contains information, the release of which could prejudice, interfere with or adversely affect an investigation or prosecution of an offence; be injurious to the

	enforcement of a resolution or bylaw; be injurious in the conduct of existing or anticipated legal proceedings; or reveal investigative techniques or procedures or a security risk.

Save/Council and Committee Reports Procedures/In Camera Headings and Descriptions.doc

The Adult Services Licensing Bylaw, 2012 – Implications of Criminal Code Amendments

Recommendation

That the Committee recommend to City Council that *The Adult Services Licensing Bylaw, 2012* be amended by:

1. inserting a “whereas” clause at the commencement of *The Adult Services Licensing Bylaw, 2012*; and
2. amending the definition of “adult service agency” to remove any reference to advertising.

Topic and Purpose

The purpose of this Report is to provide to Executive Committee:

- (a) information regarding recent amendments to the *Criminal Code* which affect the licensing of adult services as required by *The Adult Services Licensing Bylaw, 2012* (the “Bylaw”); and
- (b) a recommendation regarding amendments to the Bylaw required as a result of the changes to the *Criminal Code*.

Report Highlights

1. Identify the recent amendments to the *Criminal Code* which affect the City’s adult services licensing scheme as provided for in the Bylaw.
2. Identify the necessary amendments to the Bylaw resulting from the *Criminal Code* amendments.

Strategic Goal

This Report is brought under the Strategic Goal of Quality of Life.

Background

At its meeting held on January 19, 2015, Executive Committee considered a report from our Office advising that the prostitution provisions of the *Criminal Code* had recently been amended and that such amendments could have an impact on the City’s licensing of adult services. Our Office has undertaken a more thorough review of the *Criminal Code* amendments and the Bylaw. The purpose of this Report is to identify the

implications of the *Criminal Code* amendments on the Bylaw and make a recommendation for changes to the Bylaw to ensure that the City's licensing scheme is not offside the criminal legislation.

Representatives of our Office participated in consultations with the City's Planning & Development Division, the Saskatoon Police Service and Public Prosecutions prior to preparation of this Report. In the meantime, the City suspended the issuance of all licenses under the Bylaw to ensure that it was not licensing illegal activity.

Report

Recent Amendments to the *Criminal Code*

As previously reported, there are a number of recent amendments to the *Criminal Code* which have changed how prostitution is regulated. A number of those amendments either do or have the potential to affect the licensing scheme for adult services provided for in the Bylaw.

The term "prostitution" no longer appears in the *Criminal Code*. Offences now relate to "offering, providing or obtaining sexual services for consideration". The term "sexual services" is not defined.

One of the most significant amendments makes it an offence, in any place, to purchase or attempt to purchase sexual services. By virtue of this amendment, prostitution is illegal for the first time in Canadian history.

Also brand new is an offence for knowingly advertising an offer to provide sexual services for consideration. However, no person shall be prosecuted for advertising their own sexual services.

Finally, as a result of the amendments, anyone who receives a financial or other material benefit, knowing that it is obtained or derived directly or indirectly from the sale of sexual services, is guilty of an offence. The *Criminal Code* does provide for exceptions. No offence will be found to have been committed where the person receiving the benefit:

- (a) is the person engaged in the sale of their own sexual services;
- (b) is in a "legitimate living arrangement" with the person providing the sexual services;
- (c) is receiving the benefit as a result of a legal or moral obligation owed by the person providing the sexual services;
- (d) also offers the good or service for which the benefit is being received to the general public; and
- (e) also informally, offers the good or services for fair value.

The purpose of this amendment is to allow the person who is offering the sexual services to enter into legitimate family, business and other relationships without those with whom those relationships are entered into being accused of "living off the avails of

prostitution”. In other words, legitimate family relationships and legitimate business relationships with accountants, receptionists, body guards and the like who receive a benefit from the sale of sexual services from the provider of those services are protected from prosecution under the exceptions.

However, those entitled to rely on the exceptions become disentitled where violence is used, threatened or attempted, where the relationship involves an abuse of power or trust, where intoxicating substances are used to encourage the sale of sexual services, where there is conduct that amounts to procuring the sale of sexual services, or where the benefit is received in the context of a commercial enterprise.

In summary, the amendments to the *Criminal Code* do not prohibit individuals from the sale of their own sexual services or from advertising their own sexual services. However, it is now an offence for others to advertise sexual services or, with limited exceptions, to receive a financial or other material benefit from the sale of sexual services.

Proposed Amendments to *The Adult Services Licensing Bylaw, 2012*

Sexual Services

There is the potential that “adult services” as defined in the Bylaw and “sexual services” as defined in the *Criminal Code* may overlap, and therefore the Bylaw could potentially provide for the licensure of persons to participate in activities that are contrary to the *Criminal Code*. However, prostitution was previously defined by reference to the performance of sexual services and therefore we anticipate that the same activities that the Court has concluded constitute prostitution would also constitute “sexual services” under the new provisions. Accordingly, although there may be some overlap, we expect such overlap would not be any more so than the previous overlap between “adult services” and prostitution and therefore we do not recommend amending the definition of “adult services” at this time.

However, in order to make the City’s intention not to regulate “sexual services” as contemplated by the *Criminal Code* clearer, we would recommend inserting a “whereas” clause at the commencement of the Bylaw.

Adult Service Agencies

In its current form, the Bylaw requires persons to obtain licenses prior to engaging in the operation of an adult service agency; an independent adult service agency; or carrying on business as an adult service performer, transient adult service performer or adult service worker. By definition, the concept of an adult service agency contemplates the agency advertising on behalf of its performers and could therefore be considered contrary to the *Criminal Code*. While it might be argued that “sexual services” are not being advertised, we would recommend changes to the definition which can be done without compromising the licensing scheme for adult service agencies. Advertising is not contemplated in the definition of any other group licensed under the Bylaw.

The Adult Services Licensing Bylaw, 2012 – Implications of Criminal Code Amendments

The remainder of the City's licensing scheme with respect to independent adult service agencies, adult service performers, transient adult service performers and adult service workers would remain acceptable and unchanged unless and until the Court defines "sexual services" as an activity outside the scope of what we anticipate. At that time, further analysis and recommendations would be forthcoming.

Once the proposed amendments are approved by City Council, licensing activity under the Bylaw will resume.

Other Considerations/Implications

There are no options to the recommendation, and no policy, financial, environmental, Privacy, or CPTED implications or considerations.

Due Date for Follow-up and/or Project Completion

Our Office will undertake the required amendments promptly upon receiving instructions from City Council to proceed. Should Executive Committee wish the amendments discussed in this Report to come forward for consideration at the March 23, 2015 City Council meeting, our Office would undertake to provide the Bylaw amendments with this Executive Committee Report for City Council's March 23, 2015 meeting.

Public Notice

Public Notice pursuant to Section 3 of Policy No. C01-021, Public Notice Policy, is not required.

Report Approval

Written by: Christine G. Bogad, Solicitor, Director of Administrative Law
Approved by: Patricia Warwick, City Solicitor

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