



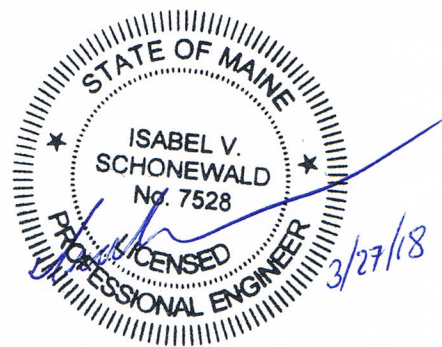
**GEOTECHNICAL DESIGN REPORT
PARSONS ROAD SLOPE FAILURE MITIGATION
PRESQUE ISLE, MAINE
MaineDOT WIN 22582.00**

PREPARED FOR:

Maine Department of Transportation
Region 5 – Highway Program
Augusta, Maine

PREPARED BY:

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March 2018

SchonewaldEA Project No. 15-118

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EXECUTIVE SUMMARY

The Maine Department of Transportation (MaineDOT) Region 5 has been evaluating the cause of an on-going slope failure along a short segment of Parsons Road in Presque Isle for the purpose of mitigating the failed zone. Commencing in October 2015, Schonewald Engineering Associates, Inc. (SchonewaldEA) has been working with Region 5 to complete supplemental geotechnical evaluations of the slope failure. The objectives of the comprehensive geotechnical evaluation were to evaluate the stability of the roadway, identify the cause of the observed movement, and develop options for mitigating the slope failure. The program included completing multiple test borings, installing and monitoring slope inclinometers and groundwater level observation wells, monitoring the horizontal and vertical movement across surface cracks in the roadway, completing geotechnical analyses, compiling and evaluating the geotechnical data in aggregate, and assessing multiple options for mitigating the failure.

The project is located on a long, straight segment of Parsons Road where it runs adjacent to the west bank of the Aroostook River. In this area, the road is approximately 30 feet higher than the river elevation, with a steep, but not excessive slope from the roadway shoulder down to the river; approximately 1.8H:1V.

An approximately 350-foot long section of Parsons Road, between house numbers 315 and 325, has undergone significant vertical displacement (feet) and horizontal displacement (inches) over several years, with the outside / east lane failing towards the river. The primary failure zone is located in front of the home at #319 Parsons Road. Anecdotal information indicates that the movement has been on-going for decades and, prior to 2000-2001 repair work, that six inches of vertical movement of the east lane of the road each Spring was more the norm than the exception.

In 2000-2001, MaineDOT Region 5 Operations undertook a repair of the failure area that included constructing a groundwater cutoff trench along the west side of the roadway and installing geogrid in the uppermost portion of the east side of the roadway. Movement of the east lane of the roadway has continued since repairs were made, but at a slower rate until Spring 2013. Slope inclinometers installed in October 2013 show distinct zones that are shearing. Deep tension cracks in the pavement, vertical displacement of the east lane, and horizontal shear at depth suggest a shallow and steep circular failure surface. Based on the data collected as part of the comprehensive geotechnical evaluation of the failure zone, the roadway is presumed to have a very low factor of safety against failure due to the observed and on-going movement (shear). "Catastrophic" failure resulting in the loss of the east lane was considered a real possibility and drove the prioritization of the project. In Spring 2017, as the mitigation design progressed to Plan Impacts Complete (PIC) phase, the east lane of the roadway failed (tension crack opened to a depth of about 12 inches and the east lane of the roadway settled) over one weekend (May 13-14, 2017). The easterly lane was permanently closed, and MaineDOT Region 5 designed and constructed a lane along the westerly side of the road to temporarily maintain two lanes of traffic until the permanent repair discussed herein could be constructed.

Three mitigation options were presented in a detailed planning-level feasibility report prepared by SchonewaldEA and dated August 25, 2016. A fourth mitigation option was subsequently vetted. In summary, four mitigation options were identified based on the geological setting, existing conditions, project history, and the findings of the geotechnical assessment. One concept was to stabilize the failed zone (Option 1) by constructing a soldier pile and lagging wall with a single level of tie-backs at the top of wall to maintain the existing alignment. Another concept was to remove and replace the failed zone (Option 2), specifically to fully excavate the failure zone and reconstruct a Reinforced Soil Slope (RSS) roadway embankment on the existing alignment. The third concept was to avoid the failed zone (Option 3) by offsetting the alignment approximately 40 feet west and away from the critical failure area, with full-depth construction of an approximate 1,200-foot-long new alignment. A fourth concept considered

maintaining the road's horizontal alignment, but dropping the existing profile 10 feet within the failure zone. Of the mitigation options identified as part of the comprehensive geotechnical program, shifting the road westerly to avoid the failed zone was determined to be the most viable and effective. The temporary lane constructed by MaineDOT in 2017 conformed to the selected mitigation concept.

INTRODUCTION

Schonewald Engineering Associates, Inc. (SchonewaldEA) has prepared this project geotechnical report for the Maine Department of Transportation (MaineDOT) to summarize the findings of the geotechnical evaluation and provide the basis for the design that was accepted by MaineDOT to mitigate the failed zone of Parsons Road located in Presque Isle, Maine. SchonewaldEA's work was completed in accordance with Contract Modification No. 2 to SchonewaldEA's project-specific Project Contract under GCA. This report is subject to the limitations contained in the Closure section of the report. A quality assurance review of the technical aspects of SchonewaldEA's work was completed by Kathleen Maguire, P.E. of the MaineDOT Highway Program.

The project area (failed zone) is located on a long, straight segment of Parsons Road where it runs adjacent to the west bank of the Aroostook River. In this area, the road is approximately 30 feet higher than the elevation of the river, with an approximately 1.8H:1V slope from the roadway shoulder to the river. An approximately 350-foot long section of Parsons Road, between house numbers 315 and 325, has undergone significant vertical displacement (feet) and horizontal displacement (inches) over several years, with the outside / east lane failing towards the river. A repair was undertaken in 2000-2001, but the movement has continued, although at a slower rate until Spring 2013. Catastrophic loss of the east lane as a result of a rotational failure was considered a real threat; a shallow and steep failure surface has been interpreted. In Spring 2017, the east lane of the roadway failed (tension crack opened to a depth of about 12 inches and the east lane of the roadway settled) over one weekend (May 13-14, 2017). The easterly lane was permanently closed, and MaineDOT Region 5 designed and constructed a lane along the westerly side of the road to temporarily maintain two lanes of traffic until the permanent repair could be constructed. A site location map is attached as Figure 1.

SchonewaldEA assessed multiple options for mitigating the failure zone. Of the options presented to MaineDOT, the concept to avoid the failed zone by offsetting the alignment approximately 40 feet to the west / away from the critical failure area and removing 8 to 10 feet of soil from the existing alignment, with full-depth construction of new roadway along a new approximately 1,200-foot long alignment was selected. This option, that will avoid the failed block by reconstructing the roadway on a new alignment, was selected based on evaluations of geotechnical risk; constructability; environmental, right-of-way, and utility impacts; and conceptual opinions of relative cost.

Parsons Road in the project area is classified as a Rural Minor Collector / Corridor Priority 4. The posted speed limit is 45 mph. The existing roadway section consists of two approximately 12-foot wide lanes with 2-foot shoulders. There are existing utility poles and overhead lines along the east side of the travel way; between the road and river. No known underground utilities or closed drainage systems exist in the failure area other than two underdrain pipes and two driveway culverts.

GEOLOGICAL SETTING

Parsons Road runs between the Aroostook River valley and the east flank of a significant topographic upland (Dennett Hill) as indicated on attached Figure 2 – Geological Setting. There is a pond and wetlands to the west of a former railroad embankment (rail trail) behind #319 and #325 Parsons Road. The residence located at #319 Parsons Road is constructed on a layer of fill, with grades dropping off at the back of the property and rising again at the former railroad embankment.

Soils underlying the project consist of alluvium that are complexly layered and interbedded. Aerial views of the area, such as that on Figure 2, show evidence of remnants of braided streams that are oriented roughly South-North and parallel to Parsons Road.

Anecdotal information includes reports that water is heard running below the basement slab of #319 Parsons Road during Spring melt. This could possibly be indicative of an old underdrain pipe for the basement or a french drain of sorts between the low area behind the back of the property and the river. However, evidence of a conduit was not observed in the test borings. Other anecdotal information includes the owner of #325 Parsons Road recalling that a significant zone of “peastone” was encountered in the excavation for the home’s (#325) basement.

SUBSURFACE INVESTIGATIONS

Multiple phases of subsurface investigations were undertaken commencing in 2013, which is when significant renewed distress of this section of Parsons Road was first noted subsequent to the before-mentioned 2000-2001 repair work. The following summarizes the three phases of subsurface explorations:

- Two test borings with subsequent slope inclinometer installations were completed in October 2013. The test borings (HB-PI-101 and -102) and slope inclinometers (I1 and I2) were located in the east lane of Parsons Road in the failure area.
- An additional test boring (SF-PI-101) was completed in the Aroostook River adjacent to failing slope in August 2014.
- Four additional test borings, with continuous sampling and groundwater level observation well installations, were completed in October 2015. These test borings (HB-PI-201 through -204) were located on a line running from the east edge of Parsons Road to the west of the garage at #319 Parsons Road. The groundwater level observation wells were read manually whenever the slope inclinometers were read and were fitted with automatic water level dataloggers that recorded water levels commencing in late Winter / early Spring 2016.

The locations of the test borings are depicted on attached Figure 3 – Boring Location Plan. Copies of the test boring logs are attached in Appendix A. The boring logs provide detailed information regarding drilling methods used, sampling and in-situ testing intervals, sample descriptions, and general observations. Logs for the 2013 and 2014 explorations were provided by MaineDOT; logs of the 2015 explorations were prepared by SchonewaldEA.

The 2013 and 2014 explorations were completed using standard cased wash boring techniques, with Standard Penetration Tests (SPTs) conducted and split-spoon samples obtained typically at five-foot intervals.

SPTs were conducted and split-spoon samples were obtained continuously (every two feet) from near the ground surface to into the top of glacial till below the interbedded alluvial deposits in most of the 2015 explorations. The purpose of continuous sampling was to better define the stratification of the alluvial deposits with the intent of capturing geotechnically “sensitive” layers, such as a saturated clean sand or very loose predominately silt layer, that could be linked to the observed slope instability. Likewise, groundwater level observation wells were installed in the 2015 explorations, including a deep and shallow couplet at the HB-PI-202 / 202A location between the road and house #319. The purpose of the observation wells was to better define long-term groundwater conditions/ fluctuations with the intent of capturing groundwater level “spikes” associated with periods when movement was observed in the slope inclinometers.

The 2013 and 2014 explorations were drilled by or under the guidance of the MaineDOT drilling crew and observed and logged by qualified MaineDOT technicians and/or geotechnical engineers. The 2015 explorations were drilled by New England Boring Contractors of Hermon, Maine as a subcontractor to SchonewaldEA and were observed and logged by a SchonewaldEA geotechnical engineer.

SOIL AND GROUNDWATER CONDITIONS

Overburden conditions encountered in the subsurface explorations consisted of a highly complex stratification (interbedding) of alluvial deposits underlain at depth by glacial till. In general, groundwater levels measured in the observations wells installed in the 200-series test borings mimicked the water level in the adjacent river. The boring locations are shown on Figure 3 - Boring Location Plan. The boring logs are provided in Appendix A – Boring Logs.

With respect to possible causes of the slope instability, we note the following regarding the subsurface soil and groundwater conditions observed in the explorations and observation wells:

- Noteworthy soil conditions were not observed in the test borings, such as defined zones having low blow counts, clean saturated soil layers, evidence of soil migration as a result of seepage, or soft or organic soils;
- There is limited continuity of soil strata from east (river) to west; consistent with a braided stream geological setting;
- Soil samples with a diagonal structure were observed in the test boring in the outer portion of the roadway (HB-PI-201) suggesting the soil had experienced some shearing;
- Long-term groundwater levels were consistent with river level;
- Groundwater was not observed in the shallow observation well located between the house at #319 and the roadway (HB-PI-202A) that is screened to 11 feet Below the Ground Surface (BGS);
- Elevated or secondary/perched groundwater levels were not observed in the test borings or the observation well couplet; and
- Artesian conditions with sustained upward flow were noted at depth in the test boring drilled in the river (SF-PI-101).

Other field observations of note included:

- Undercutting of the toe of the slope by the river was not observed;
- Seepage from the slope between the road and river has not been noted; and
- Remnants of an old CMP were observed on the slope between the road and river; the pipe was crushed and no flow observed; the inlet and heading of the pipe and the pipe's intended function are unknown.

The interpreted subsurface conditions and key findings of the field investigation are depicted on Figure 4 – Summary of Geotechnical Findings.

SLOPE STABILITY MONITORING

Slope inclinometers were installed in Fall 2013 in the boreholes of HB-PI-101 (Inclinometer I1) and -102 (Inclinometer I2) to monitor for horizontal movement (shear) at depth. Slope inclinometers consist of specialty plastic pipe (2.75-inch diameter ABS) that is installed in a borehole that extends into a firm, stable soil stratum, such as glacial till, below the possible failure plane. The annular space between the borehole wall and the inclinometer casing is tremie grouted with a material that is intended to mimic the

strength of the adjacent soil. The inclinometer pipe has four longitudinal grooves, 90-degrees apart, in which the wheels of the inclinometer monitoring probe travel. Care is used to install the inclinometer casing plumb and to orient one set of grooves in the fall direction of the slope being monitored. The inclinometer probe is a long cylindrical instrument that contains accelerometers that measure the tilt of the inclinometer at each measurement depth. The inclinometer is read by lowering the probe to the bottom of the casing and taking a measurement every two-feet as the probe is pulled up the set of grooves.

Slope inclinometers I1 and I2 were installed in Fall 2013 and initial readings were obtained to serve as a baseline to which all subsequent readings are compared. Readings were obtained commencing in Spring 2014 and continuing through Spring 2017. The slope inclinometer monitoring data is summarized on the plots attached as Appendix B. The left-hand plots show cumulative displacement, summed upwards from the inclinometer's stable base; this plot essentially shows the shape of the inclinometer casing at the time of each reading. The change in shape with time reflects horizontal displacement or shear of the soil mass in which the inclinometer is installed. The right-hand plots show incremental displacement or the displacement of each 2-foot vertical increment of the inclinometer casing. On-going displacement (horizontal shear) is depicted as a growing spike, usually over a relative short vertical distance. The incremental displacement plots provide an easy means of evaluating shear strain.

Both inclinometers showed significant shear movement at depth during late Spring/early Summer 2014 and during the same time period again in 2015 and 2016, with essentially no movement recorded between July of the same year and April of the subsequent year. Significant shear movement at depth continued again in Spring 2017 and increased until the inclinometer casing itself crimped or sheared such that the inclinometer probe could no longer be lowered across the shear zone. This occurred about the same time that the east lane of the roadway failed (tension crack opened to a depth of about 12 inches and the east lane of the roadway settled) over one weekend (May 13-14, 2017). In aggregate, the slope inclinometer data indicates that the shear zone was approximately 4 feet thick and was intercepted by slope inclinometer I1 at a depth of 18 feet BGS and by slope inclinometer I2 at a depth of 34 feet BGS. Shear strain recorded at these depths at the time of the final readings in 2017 were 8.8 percent and 7.1 percent in I1 and I2, respectively.

The deep tension crack in the pavement, vertical displacement of the east lane, and horizontal shear at depth suggest a shallow and steep circular failure surface. The interpreted failure surface is depicted on Figure 4 and was developed based on the slope inclinometer data, as well as the location of a significant tension crack in the pavement and observations of artesian pressure in the test boring in the river. As noted in the previous section, on Figure 4, and on the boring logs, the soils encountered at the depth of the shear zone would not be expected to be problematic.

GEOTECHNICAL CONCLUSIONS AND RECOMMENDATIONS

Prior to the permanent closure of the east lane in May 2017 due to excessive and abrupt lateral and vertical movement, the need to mitigate the long-term, active slope failure near 319 Parsons Road had been recognized. Based on the data collected as part of the comprehensive geotechnical evaluation of the failure zone, the roadway was presumed to have an unacceptably low factor of safety against failure due to the observed and on-going movement (shear). As part of the comprehensive geotechnical program, four mitigation options were vetted. The mitigation options were presented in a detailed planning-level feasibility report prepared by SchonewaldEA and dated August 25, 2016. Of the mitigation options vetted, shifting the road westerly to avoid the failed zone was determined to be the most viable and effective. This option was selected based on evaluations of geotechnical risk; constructability; environmental, right-of-way, and utility impacts; and conceptual opinions of relative cost. Key features of the selected option are depicted conceptually on Figure 4.

The selected option calls for maintaining the existing roadway typical and shifting the road westerly to avoid the active failure zone and removing 8 to 10 feet of soil from the existing roadway. The following geotechnical recommendations are provided for the design and construction of the road relocation:

- The alignment of Parsons Road in front of house #319 should shift approximately 40 feet to the west. The 40-foot offset is intended to move the road outside the currently interpreted failure surface, while limiting the length of reconstruction and associated property impacts. The 40-foot offset should be at least 200 feet long, centered on the driveway to house #319.
- In addition to shifting the road to the west, approximately 8 to 10 feet of soil should be removed from the existing roadway above the river along the east side of the new road. This will result in a bench between the proposed road and the river that is intended to reduce the overburden load acting on the active failure area and serve to further stabilize the new alignment. The bench should be no lower than about elevation 428 feet to maintain reasonable vertical separation with the river. Existing vegetation on the slope between the bench and river should not be removed / disturbed as a result of construction since it has a net stabilizing effect.
- A slope no steeper than 3H:1V should tie the new road to the proposed bench. This slope may be provided with a topsoil and seed surface treatment. The existing vegetation on the slope between the bench and the river should remain since it provides a net stabilizing effect.
- An underdrain should be provided along the westerly side of the proposed road. This underdrain will necessarily be relatively deep and, therefore, may require project-specific detailing. The purpose of the underdrain is to depress (springtime) high groundwater levels that, if not controlled, would be expected to have a destabilizing effect on the roadway. The depth of the underdrain is intended to be at or a couple of feet above the elevation of the bench on the easterly side of the new roadway.
- Prior to construction, the groundwater level observation wells and slope inclinometer casings located east of the new alignment should be “decommissioned” by tremie grouting with a bentonite slurry. This is to limit the potential for negative impacts related to saturated zones or preferential pathways for (flowing) water under the new roadway alignment and within the bench between the road and river. This work is typically accomplished by a test boring contractor and is a relatively common practice.
- Earthwork construction should be in accordance with MaineDOT standard requirements, including proper placement and compaction of fill materials. Waste or unsuitable materials should not be allowed in any portion of fills.
- Materials (earthen or otherwise) should not be permitted to be stockpiled to the east of the proposed alignment in the 200-foot-long area centered on house #319.
- A geotechnical engineer should be present during excavation activities for the underdrain and bench within the failure zone. This is to look for evidence of buried pipes / conduit, french drains, or other materials that went undetected by the subsurface explorations and that could have contributed to the slope failure. If encountered, these items should not be (re)buried without first consulting with senior geotechnical personnel.

CLOSURE

This report has been prepared for the use of the MaineDOT Highway Program for specific application to the mitigation of a slope failure of a section of Parsons Road in Presque Isle, Maine in accordance with generally accepted geotechnical and foundation engineering practices. No other intended use or warranty is expressed or implied.

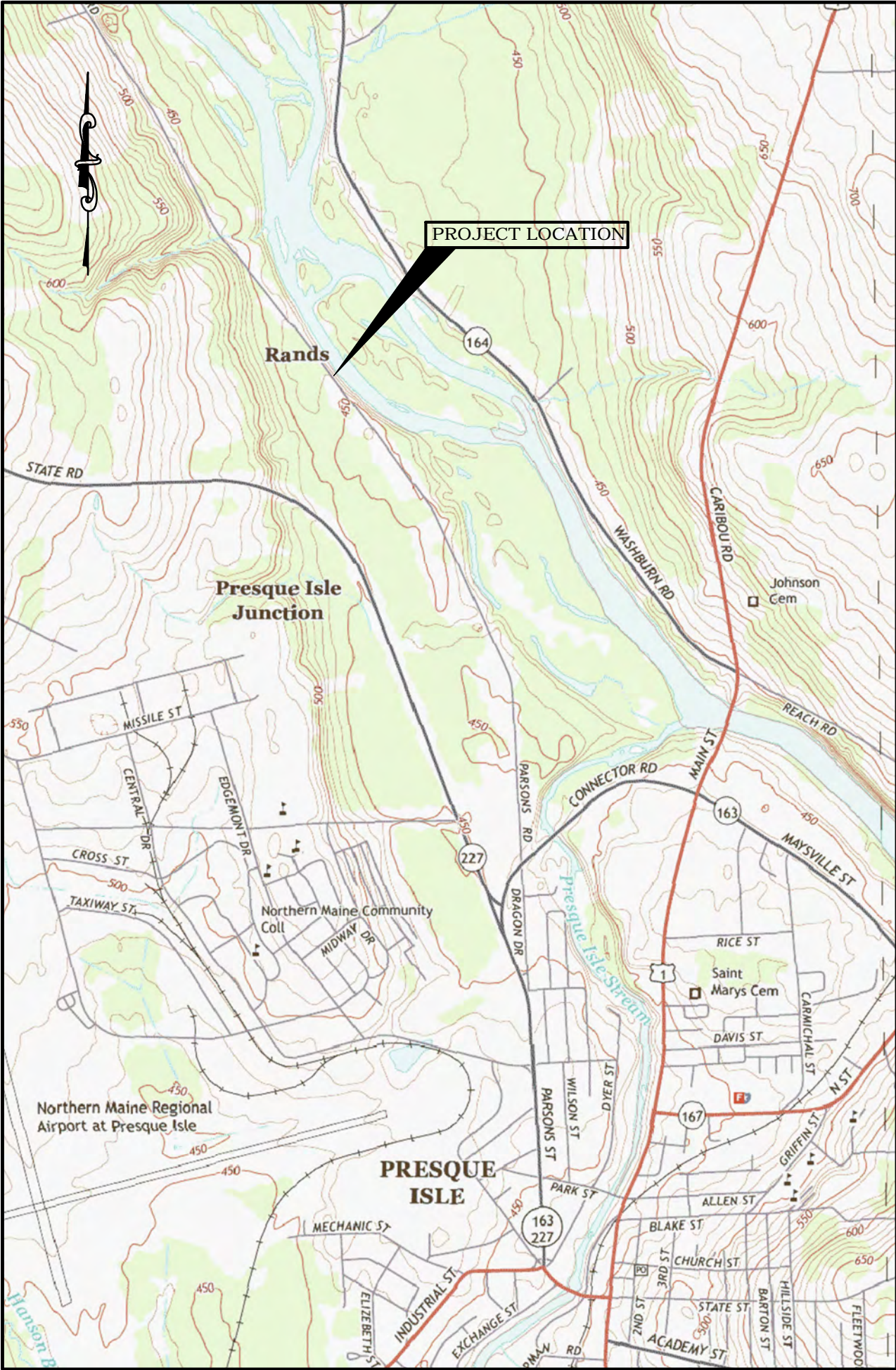
In the event that any changes in the nature, design, or location of the proposed project are planned, this report should be reviewed by a geotechnical engineer to assess the appropriateness of the conclusions and recommendations and to modify the recommendations as appropriate to reflect the changes in design. These analyses and recommendations are based in part upon a limited subsurface investigation at discrete exploratory locations completed at the site. If variations from the conditions encountered during the investigation appear evident during construction, it may also become necessary to re-evaluate the recommendations made in this report.

It is recommended that a geotechnical engineer be provided the opportunity for a review of the design and specifications in order that the earthwork and foundation recommendations and construction considerations presented in this report are properly interpreted and implemented in the design and specifications.




FIGURES

FIGURES 1 THROUGH 4



PREPARED FOR:
MAINE DEPARTMENT OF TRANSPORTATION

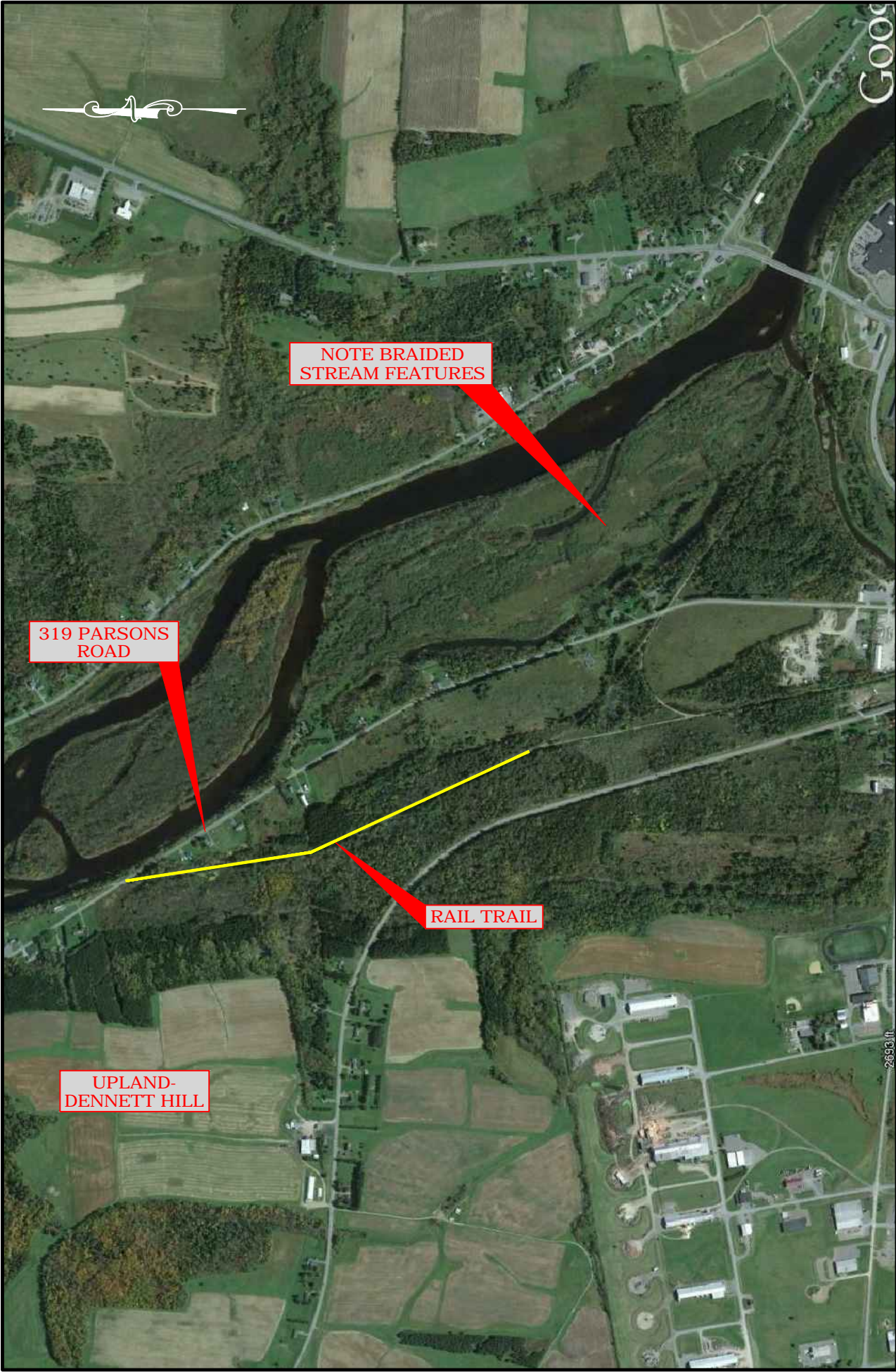
PREPARED BY:

**SCHONEWALD
ENGINEERING
ASSOCIATES, Inc.**

PROJECT NO.: 15-118
DATE: MARCH 2018
DRAWN BY: D. BURGESS
CHECKED BY: I. SCHONEWALD
SCALE: 1" = 2000'

**SITE LOCATION MAP
 PARSONS ROAD
 SLOPE FAILURE MITIGATION
 PRESQUE ISLE, MAINE
 WIN: 22582.00**

Figure No.:

1



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MAINE DEPARTMENT OF TRANSPORTATION

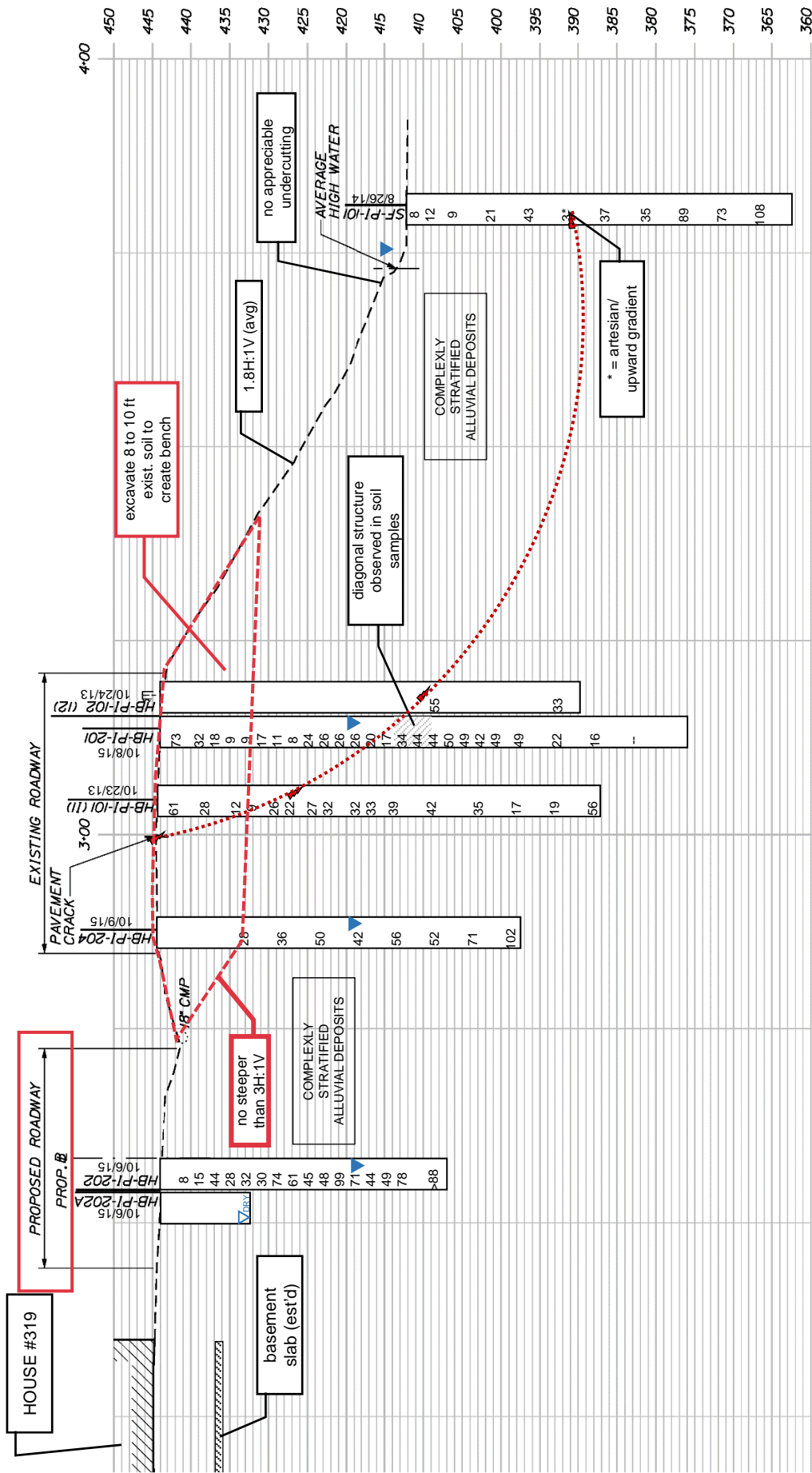
PREPARED BY:

				SCHONEWALD
				ENGINEERING
				ASSOCIATES, INC.

PROJECT NO.: 15-118
 DATE: MARCH 2018
 DRAWN BY: D. BURGESS
 CHECKED BY: I. SCHONEWALD
 SCALE: 1" = 1200'

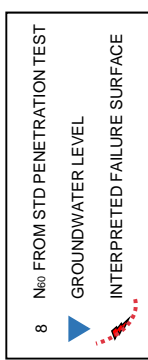
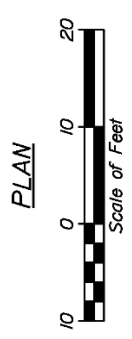
GEOLOGICAL SETTING
 PARSONS ROAD
 SLOPE FAILURE MITIGATION
 PRESQUE ISLE, MAINE
 WIN: 22582.00

Figure No.:
2



BORING PROFILE

PLAN



PREPARED FOR:
MAINE DEPARTMENT OF TRANSPORTATION

PREPARED BY:
SCHONEWALD ENGINEERING ASSOCIATES, INC.

PROJECT NO.: 15-118
 DATE: MARCH 2018
 DRAWN BY: D. BURGESS
 CHECKED BY: I. SCHONEWALD
 SCALE: 1" = 20'

**SUMMARY OF FINDINGS
 PARSONS ROAD
 SLOPE FAILURE MITIGATION
 PRESQUE ISLE, MAINE
 WIN: 22582.00**



APPENDIX A
SUBSURFACE EXPLORATION LOGS

Maine Department of Transportation Soil/Rock Exploration Log US CUSTOMARY UNITS	Project: Parsons Road Slope Failure	Boring No.: HB-PI-101 (I1)
	Location: Presque Isle, Maine	WIN: 22582.00

Driller: MaineDOT	Elevation (ft.):	Auger ID/OD: 5" Solid Stem
Operator: Giles/Daggett	Datum: NAVD88	Sampler: Standard Split Spoon
Logged By: B. Wilder	Rig Type: CME 45C	Hammer Wt./Fall: 140#/30"
Date Start/Finish: 10/22/2013-10/23/2013	Drilling Method: Cased Wash Boring	Core Barrel: N/A
Boring Location: Station 27+25, 46 ft RT	Casing ID/OD: HW	Water Level*: None Observed

Hammer Efficiency Factor: 0.867	Hammer Type: Automatic <input checked="" type="checkbox"/> Hydraulic <input type="checkbox"/> Rope & Cathead <input type="checkbox"/>
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Definitions:
 D = Split Spoon Sample
 MD = Unsuccessful Split Spoon Sample attempt
 U = Thin Wall Tube Sample
 MU = Unsuccessful Thin Wall Tube Sample attempt
 V = Insitu Vane Shear Test, PP = Pocket Penetrometer
 MV = Unsuccessful Insitu Vane Shear Test attempt

R = Rock Core Sample
 SSA = Solid Stem Auger
 HSA = Hollow Stem Auger
 RC = Roller Cone
 WOH = weight of 140lb. hammer
 WOR/C = weight of rods or casing
 WO1P = Weight of one person

S_u = Insitu Field Vane Shear Strength (psf)
 T_v = Pocket Torvane Shear Strength (psf)
 q_u = Unconfined Compressive Strength (ksf)
 N-uncorrected = Raw field SPT N-value
 Hammer Efficiency Factor = Annual Calibration Value
 N₆₀ = SPT N-uncorrected corrected for hammer efficiency
 N₆₀ = (Hammer Efficiency Factor/60%)*N-uncorrected

S_{u(lab)} = Lab Vane Shear Strength (psf)
 WC = water content, percent
 LL = Liquid Limit
 PL = Plastic Limit
 PI = Plasticity Index
 G = Grain Size Analysis
 C = Consolidation Test

Depth (ft.)	Sample Information								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/AASHTO and Unified Class.
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N ₆₀	Casing Blows					
25							41					
	10D	24/22	26.00 - 28.00	10/11/12/14	23	33	61				Olive, et, medium dense, fine SAND, some silt.	
							83					
							111					
	11D	24/24	29.00 - 31.00	10/11/16/16	27	39	69				Brown, wet, medium dense, fine to medium SAND, some silt.	
30							86					
							128					
							162					
							148					
	12D	24/24	34.00 - 36.00	13/12/17/18	29	42	28				Similar to above. Roller Coned ahead to 40.0 ft bgs.	
35							34					
							55					
							56					
							44					
							47					
40	13D	24/20	40.00 - 42.00	10/12/12/13	24	35	45				Similar to above. Roller Coned ahead to 45.0 ft bgs.	
							47					
							96					
							121					
							70					
45	14D	24/19	45.00 - 47.00	5/5/7/8	12	17	71				Brown, saturated, medium dense, fine to medium SAND, little silt. Roller Coned ahead to 50.0 ft bgs.	
							82					
							87					
							90					
50							OPEN					

Remarks:
 Grouted with: Bentonite-Benseal Granular, Type II Portland Cement.
 HB-PI-101 located 185 ft North of Pole 8/80, 5.0 ft Rt of CL.

Maine Department of Transportation Soil/Rock Exploration Log US CUSTOMARY UNITS	Project: Parsons Road Slope Failure	Boring No.: HB-PI-101 (I1)
	Location: Presque Isle, Maine	WIN: 22582.00

Driller: MaineDOT	Elevation (ft.):	Auger ID/OD: 5" Solid Stem
Operator: Giles/Daggett	Datum: NAVD88	Sampler: Standard Split Spoon
Logged By: B. Wilder	Rig Type: CME 45C	Hammer Wt./Fall: 140#/30"
Date Start/Finish: 10/22/2013-10/23/2013	Drilling Method: Cased Wash Boring	Core Barrel: N/A
Boring Location: Station 27+25, 46 ft RT	Casing ID/OD: HW	Water Level*: None Observed

Hammer Efficiency Factor: 0.867	Hammer Type: Automatic <input checked="" type="checkbox"/> Hydraulic <input type="checkbox"/> Rope & Cathead <input type="checkbox"/>
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 Hammer Efficiency Factor = Annual Calibration Value
 N₆₀ = SPT N-uncorrected corrected for hammer efficiency
 N₆₀ = (Hammer Efficiency Factor/60%)*N-uncorrected

S_{u(lab)} = Lab Vane Shear Strength (psf)
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 C = Consolidation Test

Depth (ft.)	Sample Information							Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/AASHTO and Unified Class.
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N ₆₀	Casing Blows				
50	15D	24/20	50.00 - 52.00	5/6/7/11	13	19	HOLE			Similar to above.	
55	16D	24/16	55.00 - 57.00	14/20/19/20	39	56		-54.50 -55.00		Set the bottom of Inclinator Casing at 54.5 ft bgs. Bottom of Exploration at 55.00 feet below ground surface. Olive-brown, wet, dense, fine to coarse SAND, some gravel, some silt, (Till).	
60											
65											
70											
75											

Remarks:
 Grouted with: Bentonite-Benseal Granular, Type II Portland Cement.
 HB-PI-101 located 185 ft North of Pole 8/80, 5.0 ft Rt of CL.

Maine Department of Transportation Soil/Rock Exploration Log US CUSTOMARY UNITS	Project: Parsons Road Slope Failure Location: Presque Isle, Maine	Boring No.: HB-PI-102 (I2) WIN: 22582.00
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Driller: MaineDOT	Elevation (ft.):	Auger ID/OD: 5" Solid Stem
Operator: Giles/Daggett	Datum: NAVD88	Sampler: Standard Split Spoon
Logged By: B. Wilder	Rig Type: CME 45C	Hammer Wt./Fall: 140#/30"
Date Start/Finish: 10/24/2013; 07:30-16:30	Drilling Method: Cased Wash Boring	Core Barrel: N/A
Boring Location: Station 27+25, 57 ft RT	Casing ID/OD: HW	Water Level*: None Observed

Hammer Efficiency Factor: 0.867
 Hammer Type: Automatic Hydraulic Rope & Cathead

Definitions:
 R = Rock Core Sample
 S_u = Insitu Field Vane Shear Strength (psf)
 S_{u(lab)} = Lab Vane Shear Strength (psf)
 D = Split Spoon Sample
 SSA = Solid Stem Auger
 T_v = Pocket Torvane Shear Strength (psf)
 W_C = water content, percent
 MD = Unsuccessful Split Spoon Sample attempt
 HSA = Hollow Stem Auger
 q_p = Unconfined Compressive Strength (ksf)
 LL = Liquid Limit
 U = Thin Wall Tube Sample
 RC = Roller Cone
 N-uncorrected = Raw field SPT N-value
 PL = Plastic Limit
 MU = Unsuccessful Thin Wall Tube Sample attempt
 WOH = weight of 140lb. hammer
 Hammer Efficiency Factor = Annual Calibration Value
 PI = Plasticity Index
 V = Insitu Vane Shear Test, PP = Pocket Penetrometer
 WOR/C = weight of rods or casing
 N₆₀ = SPT N-uncorrected corrected for hammer efficiency
 G = Grain Size Analysis
 MV = Unsuccessful Insitu Vane Shear Test attempt
 WO1P = Weight of one person
 N₆₀ = (Hammer Efficiency Factor/60%)*N-uncorrected
 C = Consolidation Test

Depth (ft.)	Sample Information								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N ₆₀	Casing Blows					
0									-0.42		5" PAVEMENT.	
											Drove HW Casing to 34.0 ft bgs. No descriptions given.	
5												
10												
15												
20												
25												

Remarks:

Grouted with: Water, Bentonite-Benseal Granular and Type II Portland Cement. HB-PI-102 located 185 ft North of Pole 8/80, 16.0 ft Rt of CL.

Maine Department of Transportation Soil/Rock Exploration Log US CUSTOMARY UNITS	Project: Parsons Road Slope Failure Location: Presque Isle, Maine	Boring No.: HB-PI-102 (I2) WIN: 22582.00
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Driller: MaineDOT	Elevation (ft.):	Auger ID/OD: 5" Solid Stem
Operator: Giles/Daggett	Datum: NAVD88	Sampler: Standard Split Spoon
Logged By: B. Wilder	Rig Type: CME 45C	Hammer Wt./Fall: 140#/30"
Date Start/Finish: 10/24/2013; 07:30-16:30	Drilling Method: Cased Wash Boring	Core Barrel: N/A
Boring Location: Station 27+25, 57 ft RT	Casing ID/OD: HW	Water Level*: None Observed

Hammer Efficiency Factor: 0.867 **Hammer Type:** Automatic Hydraulic Rope & Cathead

Definitions: R = Rock Core Sample S_u = Insitu Field Vane Shear Strength (psf) S_{u(lab)} = Lab Vane Shear Strength (psf)
 D = Split Spoon Sample SSA = Solid Stem Auger T_v = Pocket Torvane Shear Strength (psf) WC = water content, percent
 MD = Unsuccessful Split Spoon Sample attempt HSA = Hollow Stem Auger q_u = Unconfined Compressive Strength (ksf) LL = Liquid Limit
 U = Thin Wall Tube Sample RC = Roller Cone N-uncorrected = Raw field SPT N-value PL = Plastic Limit
 MU = Unsuccessful Thin Wall Tube Sample attempt WOH = weight of 140lb. hammer Hammer Efficiency Factor = Annual Calibration Value PI = Plasticity Index
 V = Insitu Vane Shear Test, PP = Pocket Penetrometer N₆₀ = SPT N-uncorrected corrected for hammer efficiency G = Grain Size Analysis
 MV = Unsuccessful Insitu Vane Shear Test attempt WO1P = Weight of one person N₆₀ = (Hammer Efficiency Factor/60%)*N-uncorrected C = Consolidation Test

Depth (ft.)	Sample Information								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/AASHTO and Unified Class.
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N ₆₀	Casing Blows					
25												
30												
35	1D	24/24	34.00 - 36.00	14/19/19/23	38	55		-34.00		Olive brown, dense, silty, fine SAND. Drove HW Casing to 50.0 ft bgs.		
40												
45												
50												

Remarks:
Grouted with: Water, Bentonite-Bensecal Granular and Type II Portland Cement. HB-PI-102 located 185 ft North of Pole 8/80, 16.0 ft Rt of CL.

Maine Department of Transportation Soil/Rock Exploration Log US CUSTOMARY UNITS	Project: Parsons Road Slope Failure	Boring No.: SF-PI-101
	Location: Presque Isle, Maine	WIN: 22582.00

Driller: Northern Test Boring, Inc.	Elevation (ft.): 412 (est'd - see remarks)	Auger ID/OD: 5" Solid Stem
Operator: Mike/Adam	Datum: NAVD88	Sampler: Standard Split Spoon
Logged By: B. Wilder/Daggett	Rig Type: Diedrich D-50 Track	Hammer Wt./Fall: 140#/30"
Date Start/Finish: 8/26/2014; 06:00-13:00	Drilling Method: Cased Wash Boring	Core Barrel: N/A
Boring Location: Station 27+09, 121 ft RT	Casing ID/OD: HW & NW	Water Level*: None Observed

Hammer Efficiency Factor: 0.801	Hammer Type: Automatic <input checked="" type="checkbox"/> Hydraulic <input type="checkbox"/> Rope & Cathead <input type="checkbox"/>
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Definitions:
 D = Split Spoon Sample
 MD = Unsuccessful Split Spoon Sample attempt
 U = Thin Wall Tube Sample
 MU = Unsuccessful Thin Wall Tube Sample attempt
 V = Insitu Vane Shear Test, PP = Pocket Penetrometer
 MV = Unsuccessful Insitu Vane Shear Test attempt

R = Rock Core Sample
 SSA = Solid Stem Auger
 HSA = Hollow Stem Auger
 RC = Roller Cone
 WOH = weight of 140lb. hammer
 WOR/C = weight of rods or casing
 WO1P = Weight of one person

S_u = Insitu Field Vane Shear Strength (psf)
 T_v = Pocket Torvane Shear Strength (psf)
 q_u = Unconfined Compressive Strength (ksf)
 N-uncorrected = Raw field SPT N-value
 Hammer Efficiency Factor = Annual Calibration Value
 N_{60} = SPT N-uncorrected corrected for hammer efficiency
 N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected

$S_{u(lab)}$ = Lab Vane Shear Strength (psf)
 WC = water content, percent
 LL = Liquid Limit
 PL = Plastic Limit
 PI = Plasticity Index
 G = Grain Size Analysis
 C = Consolidation Test

Depth (ft.)	Sample Information								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/AASHTO and Unified Class.
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows					
25	7D	24/24	25.00 - 27.00	11/13/15/15	28	37			383.00	29.00	Similar to above.	
30	8D	24/24	30.00 - 32.00	14/11/15/15	26	35					Brown, wet, medium dense, fine to medium SAND, little gravel. Artisan Water Pressure at 30.0 ft bgs.	
35	9D	18/17	34.50 - 36.00	25/22/45	67	89					Brown, wet, very dense, fine to coarse SAND, some gravel. Set in NW casing at 35.0 ft bgs.	
40	10D	24/18	39.50 - 41.50	49/27/28/22	55	73	98		369.00	43.00	Similar to above. Roller Coned ahead to 44.5 ftb gs, then drove casing to 44.5 ft bgs.	
45	11D	24/17	44.50 - 46.50	36/37/44/26	81	108					Grey brown, wet, very dense, gravelly, fine to coarse SAND, little silt. Roller Coned ahead to 49.8 ft bgs. Vrey heavy water flow, gravel would not wash out. Could not get spoon down, broke casing.	
50									362.20	49.80		

Remarks:
 Auto hammer #283
 Boring at Toe of Slope at River Elevation.
 GPS from Kitty's phone N 46.71649 W 68.0297

Maine Department of Transportation Soil/Rock Exploration Log US CUSTOMARY UNITS	Project: Parsons Road Slope Failure Location: Presque Isle, Maine	Boring No.: SF-PI-101 WIN: 22582.00
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Driller: Northern Test Boring, Inc.	Elevation (ft.): 412 (est'd - see remarks)	Auger ID/OD: 5" Solid Stem
Operator: Mike/Adam	Datum: NAVD88	Sampler: Standard Split Spoon
Logged By: B. Wilder/Daggett	Rig Type: Diedrich D-50 Track	Hammer Wt./Fall: 140#/30"
Date Start/Finish: 8/26/2014; 06:00-13:00	Drilling Method: Cased Wash Boring	Core Barrel: N/A
Boring Location: Station 27+09, 121 ft RT	Casing ID/OD: HW & NW	Water Level*: None Observed

Hammer Efficiency Factor: 0.801 **Hammer Type:** Automatic Hydraulic Rope & Cathead

Definitions: R = Rock Core Sample S_u = Insitu Field Vane Shear Strength (psf) S_{u(lab)} = Lab Vane Shear Strength (psf)
 D = Split Spoon Sample SSA = Solid Stem Auger T_v = Pocket Torvane Shear Strength (psf) WC = water content, percent
 MD = Unsuccessful Split Spoon Sample attempt HSA = Hollow Stem Auger q_u = Unconfined Compressive Strength (ksf) LL = Liquid Limit
 U = Thin Wall Tube Sample RC = Roller Cone N-uncorrected = Raw field SPT N-value PL = Plastic Limit
 MU = Unsuccessful Thin Wall Tube Sample attempt WOH = weight of 140lb. hammer Hammer Efficiency Factor = Annual Calibration Value PI = Plasticity Index
 V = Insitu Vane Shear Test, PP = Pocket Penetrometer WOR/C = weight of rods or casing N₆₀ = SPT N-uncorrected corrected for hammer efficiency G = Grain Size Analysis
 MV = Unsuccessful Insitu Vane Shear Test attempt WO1P = Weight of one person N₆₀ = (Hammer Efficiency Factor/60%)*N-uncorrected C = Consolidation Test

Depth (ft.)	Sample Information								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/AASHTO and Unified Class.
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N ₆₀	Casing Blows					
50											Bottom of Exploration at 49.80 feet below ground surface. Left 5.0 ft of Casing in hole.	
51												
52												
53												
54												
55												
56												
57												
58												
59												
60												
61												
62												
63												
64												
65												
66												
67												
68												
69												
70												
71												
72												
73												
74												
75												

Remarks:
 Auto hammer #283
 Boring at Toe of Slope at River Elevation.
 GPS from Kitty's phone N 46.71649 W 68.0297



**SCHONEWALD
ENGINEERING
ASSOCIATES, INC.**

PROJECT: Parsons Road Slope Failure

Boring No.: HB-PI-201

LOCATION: Presque Isle, ME

WIN: 22582.00

Driller: New England Boring Contractors	Elevation (ft.): 444.07	Core Barrel: n/a
Operator: Schaeffer / DuPuis	Datum: NAVD88	Sampler: standard split spoon
Logged By: Schonewald	Rig Type: Mobile Drill B-51 (tracked)	Hammer Wt./Fall: 140#/30"
Date Start/Finish: 10/7/15; 0800 - 10/8/15; 1145	Drilling Method: cased wash boring	Hammer Type: rope and cathead
Boring Location: Station 27+22, 54 ft RT	Casing ID/OD: 4" (HW)	Hammer Efficiency: 0.60
	Auger ID/OD: 5-1/4" SSA to 6 ft.	Water Level*: observation well installed

IN-SITU SAMPLING AND TESTING: D = Split Spoon Sample MD = Unsuccessful Split Spoon Sample attempt U = Thin Wall Tube Sample MU = Unsuccessful Thin Wall Tube Sample attempt V = Insitu Vane Shear Test MV = Unsuccessful Insitu Vane Shear Test attempt	ADDITIONAL DEFINITIONS: N-uncorrected = N value N ₆₀ = N value corrected for hammer efficiency hammer efficiency = calculated hammer efficiency S _u = Insitu Field Vane Shear Strength (psf) R = Rock Core Sample RQD = Rock Quality Designation (%)	ADDITIONAL DEFINITIONS: WOH = weight of 140lb. hammer WOR = weight of rods -- = not recorded	BOREHOLE ADVANCEMENT METHOD: SSA=solid stem auger/HSA=hollow stem auger/RC=roller cone LABORATORY TEST RESULTS: LL=Liquid Limit / PL=Plastic Limit / PI=Plasticity Index WC = water content, percent #200 = percent fines from grain size analysis UCT _{qp} = peak compressive strength of rock
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Depth (ft.)	Sample Information								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N-60	Casing Blows					
0									443.2	11" HMA		
	1D	24/17	1.0 - 3.0	27-37-36-28	73	73				1D: Brown, dry, v. dense, fine to coarse SANDY GRAVEL, trace to little Silt. GRANULAR FILL		
5	2D	24/13	4.0 - 6.0	17-14-18-18	32	32				2D: Brown, dry to damp, dense, Gravelly fine to coarse SAND, little Silt, with small pieces of woven geotextile and geogrid at approximately 5.8 ft. GRANULAR FILL		
	3D	24/6	6.0 - 8.0	16-9-9-9	18	18				3D: Brown, dry, m. dense, Gravelly fine to coarse SAND, little Silt. GRANULAR FILL Lose drill water when advance borehole to 8 ft.		
	4D	24/15	8.0 - 10.0	6-6-3-3	9	9			436.1	4D: Reddish brown, moist, loose Silty fine to medium SAND, with stone and pieces woven fabric at top of sample.		
10	5D	24/14	10.0 - 12.0	3-3-6-8	9	9				5D: Reddish brown, moist grading to wet, loose, Silty fine to medium SAND grading to fine to medium SAND, trace to little Silt.		
	6D	24/11	12.0 - 14.0	10-8-9-12	17	17				6D: Brown, wet, m. dense, fine to medium SAND, trace to little Silt;		
	7D	24/13	14.0 - 16.0	8-5-6-6	11	11			430.7	Changing at 13.4 ft to 6D-A: Brown, moist, fine to medium SANDY SILT, little Gravel (rounded), trace coarse Sand. 7D: Brown, m. dense, Silty GRAVEL (rounded), some fine Sand, trace medium to coarse Sand.		
15	8D	24/10	16.0 - 18.0	3-3-5-6	8	8				8D: Brown, loose, Silty GRAVEL, some fine to medium Sand, trace coarse Sand, with one 1-1/2-in layer fine to medium SAND, trace Silt.		
	9D	24/17	18.0 - 20.0	8-10-14-16	24	24			426.1	9D: Olive-brown, v. stiff, Clayey SILT with tightly spaced (varved) Silt partings throughout.		
20	10D	24/15	20.0 - 22.0	12-13-13-16	26	26				10D: Olive-brown, v. stiff, SILT with tightly spaced (varved) Silty very fine SAND and Clayey SILT partings throughout.		
	11D	24/14	22.0 - 24.0	10-13-13-15	26	26				11D: Grey, v. stiff, SILT with tightly spaced (varved) Clayey SILT and Silty very fine SAND partings throughout.		
25	12D	24/15	24.0 - 26.0	10-13-13-15	26	26				12D: Grey, v. stiff, Clayey SILT with tightly spaced (varved) SILT and very fine SAND partings throughout; one drop stone.		

Remarks:
 adjacent to slope inclinometer I2
 2-inch dia. PVC observation well installed upon completion of boring; slotted screen from 45 ft to 25 ft BGS, with filter sand from 45.5 ft to 24.0 ft BGS overlain by bentonite seal.



SCHONEWALD
ENGINEERING
ASSOCIATES, INC.

PROJECT: Parsons Road Slope Failure

LOCATION: Presque Isle, ME

Boring No.: HB-PI-201

WIN: 22582.00

Driller: New England Boring Contractors	Elevation (ft.): 444.07	Core Barrel: n/a
Operator: Schaeffer / DuPuis	Datum: NAVD88	Sampler: standard split spoon
Logged By: Schonewald	Rig Type: Mobile Drill B-51 (tracked)	Hammer Wt./Fall: 140#/30"
Date Start/Finish: 10/7/15; 0800 - 10/8/15; 1145	Drilling Method: cased wash boring	Hammer Type: rope and cathead
Boring Location: Station 27+22, 54 ft RT	Casing ID/OD: 4" (HW)	Hammer Efficiency: 0.60
	Auger ID/OD: 5-1/4" SSA to 6 ft.	Water Level*: observation well installed

IN-SITU SAMPLING AND TESTING: D = Split Spoon Sample MD = Unsuccessful Split Spoon Sample attempt U = Thin Wall Tube Sample MU = Unsuccessful Thin Wall Tube Sample attempt V = Insitu Vane Shear Test MV = Unsuccessful Insitu Vane Shear Test attempt	ADDITIONAL DEFINITIONS: N-uncorrected = N value N ₆₀ = N value corrected for hammer efficiency hammer efficiency = calculated hammer efficiency S _u = Insitu Field Vane Shear Strength (psf) R = Rock Core Sample RQD = Rock Quality Designation (%)	ADDITIONAL DEFINITIONS: WOH = weight of 140lb. hammer WOR = weight of rods -- = not recorded	BOREHOLE ADVANCEMENT METHOD: SSA=solid stem auger/HSA=hollow stem auger/RC=roller cone LABORATORY TEST RESULTS: LL=Liquid Limit / PL=Plastic Limit / PI=Plasticity Index WC = water content, percent #200 = percent fines from grain size analysis UCT _{qp} = peak compressive strength of rock
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Depth (ft.)	Sample Information								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N-60	Casing Blows					
25	13D	24/11	26.0 - 28.0	7-8-12-15	20	20				13D: Grey, v. stiff, Clayey SILT with SILT and very fine SAND partings and seams throughout.		
	14D	24/14	28.0 - 30.0	7-8-9-9	17	17				14D: Olive-grey, v. stiff, varved, SILT and Silty very fine SAND.		
30	15D	24/19	30.0 - 32.0	9-15-19-23	34	34		414.1		15D: Grey, hard, varved SILT and Silty very fine SAND, with one 1/4-inch diagonal seam Clayey SILT.		
	16D	24/11	32.0 - 34.0	13-20-24-25	44	44				16D: Grey, hard, varved SILT and Silty very fine SAND, with few diagonal seams and partings Clayey SILT.		
	17D	24/13	34.0 - 36.0	16-22-22-36	44	44		409.1		34.0 ft BGS - depth of maximum shear displacement in adjacent inclinometer I2. 17D: Grey, dense, very fine Sandy SILT with some diagonal structure.		
35	18D	24/11	36.0 - 38.0	21-25-25-32	50	50				18D: Grey, v. dense, Silty very fine SAND.		
	19D	24/12	38.0 - 40.0	18-23-26-36	49	49		405.1		19D: Grey, dense, very fine to fine SAND, little to some Silt.		
40	20D	24/14	40.0 - 42.0	19-22-20-23	42	42				20D: Grey, dense, very fine to fine SAND, trace to little Silt.		
	21D	24/19	42.0 - 44.0	23-23-26-29	49	49				21D: Grey, dense, fine SAND, trace to little Silt.		
45	22D	24/18	45.0 - 47.0	16-24-25-23	49	49				22D: Grey, dense, fine SAND, trace to little Silt.		
50												

Remarks:

adjacent to slope inclinometer I2

2-inch dia. PVC observation well installed upon completion of boring; slotted screen from 45 ft to 25 ft BGS, with filter sand from 45.5 ft to 24.0 ft BGS overlain by bentonite seal.

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.



SCHONEWALD
ENGINEERING
ASSOCIATES, INC.

PROJECT: Parsons Road Slope Failure

LOCATION: Presque Isle, ME

Boring No.: HB-PI-201

WIN: 22582.00

Driller: New England Boring Contractors	Elevation (ft.): 444.07	Core Barrel: n/a
Operator: Schaeffer / DuPuis	Datum: NAVD88	Sampler: standard split spoon
Logged By: Schonewald	Rig Type: Mobile Drill B-51 (tracked)	Hammer Wt./Fall: 140#/30"
Date Start/Finish: 10/7/15; 0800 - 10/8/15; 1145	Drilling Method: cased wash boring	Hammer Type: rope and cathead
Boring Location: Station 27+22, 54 ft RT	Casing ID/OD: 4" (HW)	Hammer Efficiency: 0.60
	Auger ID/OD: 5-1/4" SSA to 6 ft.	Water Level*: observation well installed

IN-SITU SAMPLING AND TESTING:
 D = Split Spoon Sample
 MD = Unsuccessful Split Spoon Sample attempt
 U = Thin Wall Tube Sample
 MU = Unsuccessful Thin Wall Tube Sample attempt
 V = Insitu Vane Shear Test
 MV = Unsuccessful Insitu Vane Shear Test attempt

ADDITIONAL DEFINITIONS:
 N-uncorrected = N value
 N₆₀ = N value corrected for hammer efficiency
 hammer efficiency = calculated hammer efficiency
 S_u = Insitu Field Vane Shear Strength (psf)
 R = Rock Core Sample
 RQD = Rock Quality Designation (%)

ADDITIONAL DEFINITIONS:
 WOH = weight of 140lb. hammer
 WOR = weight of rods
 -- = not recorded

BOREHOLE ADVANCEMENT METHOD:
 SSA=solid stem auger/HSA=hollow stem auger/RC=roller cone

LABORATORY TEST RESULTS:
 LL=Liquid Limit / PL=Plastic Limit / PI=Plasticity Index
 WC = water content, percent
 #200 = percent fines from grain size analysis
 UCT_{qp} = peak compressive strength of rock

Depth (ft.)	Sample Information								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N-60	Casing Blows					
50	23D	24/13	50.0 - 52.0	12-11-11-12	22	22				23D: Grey, m. dense, fine SAND, trace to little Silt.		
55	24D	24/20	55.0 - 57.0	4-8-8-11	16	16				24D: Grey-brown, m. dense, fine SAND, trace Silt, with two 2-inch layers fine SAND, some Silt.		
60	25D	24/21	60.0 - 62.0	5-9-49-38	--					Brown, fine to medium SAND, trace Silt;		
								382.8		Changing at 61.3 ft to 25D: Brown, fine to medium SAND, some Gravel, trace Silt, trace coarse Sand.	61.3	
										62 ft: drilling behavior suggests gravel and cobbles; losing water.		
								376.1		Bottom of Exploration at 68.0 feet below ground surface. No refusal encountered.	68.0	
75												

Remarks:
 adjacent to slope inclinometer I2
 2-inch dia. PVC observation well installed upon completion of boring; slotted screen from 45 ft to 25 ft BGS, with filter sand from 45.5 ft to 24.0 ft BGS overlain by bentonite seal.



PROJECT: Parsons Road Slope Failure

Boring No.: HB-PI-202

LOCATION: Presque Isle, ME

WIN: 22582.00

Driller: New England Boring Contractors	Elevation (ft.): 443.91	Core Barrel: n/a
Operator: Schaeffer / DuPuis	Datum: NAVD88	Sampler: standard split spoon
Logged By: Schonewald	Rig Type: Mobile Drill B-51 (tracked)	Hammer Wt./Fall: 140#/30"
Date Start/Finish: 10/5/15; 1140 - 10/6/15; 1000	Drilling Method: cased wash boring	Hammer Type: rope and cathead
Boring Location: Station 27+31, 4 ft LT	Casing ID/OD: 4" (HW)	Hammer Efficiency: 0.60
	Auger ID/OD: 5-1/4" SSA to 6 ft.	Water Level*: observation well installed

IN-SITU SAMPLING AND TESTING:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample attempt
V = Insitu Vane Shear Test
MV = Unsuccessful Insitu Vane Shear Test attempt

ADDITIONAL DEFINITIONS:
N-uncorrected = N value
N₆₀ = N value corrected for hammer efficiency
hammer efficiency = calculated hammer efficiency
S_u = Insitu Field Vane Shear Strength (psf)
R = Rock Core Sample
RQD = Rock Quality Designation (%)

ADDITIONAL DEFINITIONS:
WOH = weight of 140lb. hammer
WOR = weight of rods
-- = not recorded

BOREHOLE ADVANCEMENT METHOD:
SSA=solid stem auger/HSA=hollow stem auger/RC=roller cone

LABORATORY TEST RESULTS:
LL=Liquid Limit / PL=Plastic Limit / PI=Plasticity Index
WC = water content, percent
#200 = percent fines from grain size analysis
UCT_{qp} = peak compressive strength of rock

Depth (ft.)	Sample Information							Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N-60	Casing Blows				
0										Lawn.	
	1D	24/16	2.0 - 4.0	2-4-4-5	8	8				1D: Brown and olive-brown, somewhat layered and mottled, moist to wet, loose, fine Sandy SILT. SILTY FILL	
5	2D	24/21	4.0 - 6.0	4-4-11-23	15	15	439.9			2D: Brown, moist, m. dense, fine to coarse Sandy SILT, some Gravel (rounded); coarser material floating in fines matrix. Bottom 7 in of sample appears to be decomposed cobble.	
	3D	24/18	6.0 - 8.0	9-10-34-32	44	44				3D: Greyish brown, damp, dense, Silty fine to coarse SAND, some Gravel (rounded); coarser material floating in fines matrix.	
	4D	24/13	8.0 - 10.0	11-15-13-13	28	28	435.4			Brown, m. dense:	
10	5D	24/14	10.0 - 12.0	11-13-19-20	32	32	434.2			4D: wet, fine to medium SAND, trace to little Silt, trace coarse Sand; changing at 9.4 ft to 4D-A: moist, fine to medium SAND, some Silt, trace coarse Sand;	
	6D	24/19	12.0 - 14.0	12-12-18-19	30	30				Changing at 9.7 ft to 4D-B: damp, fine Sandy SILT. 6D: Olive-brown, hard, slightly mottled, Clayey SILT, little fine Sand.	
	7D	24/18	14.0 - 16.0	10-24-50-34	74	74				7D: Olive-brown, v. stiff, Clayey SILT, with two 1/4-in seams brown, fine to medium SAND, trace to little Silt in middle of sample; bottom 6 in of sample trace to little fine Sand. Varves and partially cemented fine sand in tip of spoon (jarred separately).	
15	8D	24/19	16.0 - 18.0	24-26-35-36	61	61	428.8			8D: Brown, damp (tight), v. dense, fine to medium SAND, little Silt.	
	9D	24/17	18.0 - 20.0	18-24-21-23	45	45				9D: Brown, damp (tight), dense, fine to medium SAND, trace to little Silt.	
20	10D	24/18	20.0 - 22.0	22-23-25-34	48	48				10D: Brown, damp (tight), dense, fine to medium SAND, trace Silt.	
	11D	24/17	22.0 - 24.0	24-48-51-45	99	99				Brown, damp (tight), v. dense, fine to medium SAND, trace to little Silt;	
25	12D	24/17	24.0 - 26.0	37-42-29-28	71	71	420.8			changing at 23.1 ft to 11D: Brown, fine to coarse SAND, some Gravel, little Silt; coarser material floating in fines matrix. 12D: Brown, damp, v. dense, layered, fine to coarse Sandy GRAVEL, trace Silt; changing at 25.4 ft to fine SAND, little Silt;	

Remarks:
front corner of house

2-inch dia. PVC observation well installed upon completion of boring; slotted screen from 28 ft to 18 ft BGS, with filter sand from 28.2 ft to 17.0 ft BGS overlain by bentonite seal.



SCHONEWALD
ENGINEERING
ASSOCIATES, INC.

PROJECT: Parsons Road Slope Failure

LOCATION: Presque Isle, ME

Boring No.: HB-PI-202

WIN: 22582.00

Driller: New England Boring Contractors	Elevation (ft.): 443.91	Core Barrel: n/a
Operator: Schaeffer / DuPuis	Datum: NAVD88	Sampler: standard split spoon
Logged By: Schonewald	Rig Type: Mobile Drill B-51 (tracked)	Hammer Wt./Fall: 140#/30"
Date Start/Finish: 10/5/15; 1140 - 10/6/15; 1000	Drilling Method: cased wash boring	Hammer Type: rope and cathead
Boring Location: Station 27+31, 4 ft LT	Casing ID/OD: 4" (HW)	Hammer Efficiency: 0.60
	Auger ID/OD: 5-1/4" SSA to 6 ft.	Water Level*: observation well installed

IN-SITU SAMPLING AND TESTING:
 D = Split Spoon Sample
 MD = Unsuccessful Split Spoon Sample attempt
 U = Thin Wall Tube Sample
 MU = Unsuccessful Thin Wall Tube Sample attempt
 V = Insitu Vane Shear Test
 MV = Unsuccessful Insitu Vane Shear Test attempt

ADDITIONAL DEFINITIONS:
 N-uncorrected = N value
 N₆₀ = N value corrected for hammer efficiency
 hammer efficiency = calculated hammer efficiency
 S_u = Insitu Field Vane Shear Strength (psf)
 R = Rock Core Sample
 RQD = Rock Quality Designation (%)

ADDITIONAL DEFINITIONS:
 WOH = weight of 140lb. hammer
 WOR = weight of rods
 -- = not recorded

BOREHOLE ADVANCEMENT METHOD:
 SSA=solid stem auger/HSA=hollow stem auger/RC=roller cone

LABORATORY TEST RESULTS:
 LL=Liquid Limit / PL=Plastic Limit / PI=Plasticity Index
 WC = water content, percent
 #200 = percent fines from grain size analysis
 UCT_{qp} = peak compressive strength of rock

Depth (ft.)	Sample Information								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N-60	Casing Blows					
25										changing at 25.5 ft to fine to medium SAND, trace Silt.		
	13D	24/17	26.0 - 28.0	22-21-23-31	44	44				13D: Brown, damp (tight), dense, fine to medium SAND, trace to little Silt, trace fine Gravel (rounded), trace coarse Sand.		
	14D	24/16	28.0 - 30.0	15-26-23-42	49	49				14D: Brown, damp (tight), dense, fine to medium SAND, some Gravel, trace to little Silt, trace coarse Sand.		
30								413.4		15D: Greyish brown, moist (tight), v. dense, fine to coarse SANDY GRAVEL, trace to little Silt.		
	15D	24/17	30.0 - 32.0	38-40-38-41	78	78				32.5 ft: Casing refusal; roller cone ahead to 35.0 ft - nested cobbles and boulders based on drilling behavior.		
35										16D: Grey-brown, v. dense, fine to coarse SANDY GRAVEL, little Silt.		
	16D	16/9	35.0 - 36.3	33-38-50/4"				407.6		Bottom of Exploration at 36.3 feet below ground surface. No refusal encountered.		
40												
45												
50												

Remarks:
 front corner of house
 2-inch dia. PVC observation well installed upon completion of boring; slotted screen from 28 ft to 18 ft BGS, with filter sand from 28.2 ft to 17.0 ft BGS overlain by bentonite seal.



**SCHONEWALD
ENGINEERING
ASSOCIATES, INC.**

PROJECT: Parsons Road Slope Failure

LOCATION: Presque Isle, ME

Boring No.: HB-PI-203

WIN: 22582.00

Driller: New England Boring Contractors	Elevation (ft.): 443.20	Core Barrel: n/a
Operator: Schaeffer / DuPuis	Datum: NAVD88	Sampler: standard split spoon
Logged By: Schonewald	Rig Type: Mobile Drill B-51 (tracked)	Hammer Wt./Fall: 140#/30"
Date Start/Finish: 10/6/15; 1140-1730 & 10/12/15 OW	Drilling Method: cased wash boring	Hammer Type: rope and cathead
Boring Location: Station 27+43, 126 ft LT	Casing ID/OD: 4" (HW)	Hammer Efficiency: 0.60
	Auger ID/OD: 5-1/4" SSA to 6 ft.	Water Level*: observation well installed

IN-SITU SAMPLING AND TESTING:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample attempt
V = Insitu Vane Shear Test
MV = Unsuccessful Insitu Vane Shear Test attempt

ADDITIONAL DEFINITIONS:
N-uncorrected = N value
N₆₀ = N value corrected for hammer efficiency
hammer efficiency = calculated hammer efficiency
S_u = Insitu Field Vane Shear Strength (psf)
R = Rock Core Sample
RQD = Rock Quality Designation (%)

ADDITIONAL DEFINITIONS:
WOH = weight of 140lb. hammer
WOR = weight of rods
-- = not recorded

BOREHOLE ADVANCEMENT METHOD:
SSA=solid stem auger/HSA=hollow stem auger/RC=roller cone

LABORATORY TEST RESULTS:
LL=Liquid Limit / PL=Plastic Limit / PI=Plasticity Index
WC = water content, percent
#200 = percent fines from grain size analysis
UCT_{qp} = peak compressive strength of rock

Depth (ft.)	Sample Information							Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N-60	Casing Blows				
0										Lawn	
	1D	24/7	2.0 - 4.0	15-17-8-4	25	25	440.2		1D: Brown, moist, m. dense, Silty GRAVEL, some fine to medium Sand, trace coarse Sand. FILL 2.8 ft: kicked off obstruction		
5	2D	24/17	4.0 - 6.0	4-4-5-6	9	9			2D: Olive grey grading to brown, somewhat mottled, moist to wet, loose, fine Sandy SILT, with one 1-inch layer fine to medium SAND, trace Silt and two 1-inch layers fine to medium SAND, little to some Silt in bottom half of sample.		
	3D	24/19	6.0 - 8.0	4-5-8-10	13	13	436.3		3D: Brown, wet, fine to medium SAND, little to some Silt;		
	4D	24/15	8.0 - 10.0	3-9-13-11	22	22	434.5		changing at 6.9 ft to 3D-A: Olive brown, mottled, damp, Clayey SILT with rusty Silt partings throughout. 4D: Grey brown, wet, m. dense, Silty GRAVEL, some fine to coarse Sand, with one pocket fine to medium SAND, trace Silt; appears to possibly be reworked by water.		
10	5D	24/18	10.0 - 12.0	10-11-18-15	29	29			5D: Grey brown, m. dense, fine to coarse Sandy GRAVEL, some Silt, with pockets of cleaner coarse material; similar to 4D.		
	6D	24/18	12.0 - 14.0	10-14-17-20	31	31			6D: Grey brown, dense, Gravelly (rounded) fine to medium SAND, some Silt, trace coarse Sand.		
15	7D	24/16	14.0 - 16.0	12-15-19-28	34	34			7D: Grey brown, dense, fine to medium Sandy GRAVEL (rounded), some Silt, trace coarse Sand.		
	8D	24/11	16.0 - 18.0	17-19-23-24	42	42			8D: Grey brown, dense, fine to medium Sandy GRAVEL (subangular), some Silt, trace coarse Sand. Bottom 4 inches of sample broken rock.		
									18.0 ft: Casing refusal; roller cone ahead.		
20	9D	24/12	20.0 - 22.0	8-10-16-19	26	26	423.5		19.7 ft: Break through boulder. 9D: Grey, damp, v. stiff, Clayey SILT, with numerous Silt partings.		
	10D	24/16	22.0 - 24.0	6-11-13-18	24	24			10D: Grey, damp, v. stiff, SILT & CLAY.		

Remarks:
rear of garage
moved off location end of day 10/6/15 after completing test boring; returned 10/12/15 to install observation well.
2-inch dia. PVC observation well installed upon completion of boring; slotted screen from 21 ft to 6 ft BGS, with filter sand from 21.5 ft to 5.0 ft BGS overlain by bentonite seal.



SCHONEWALD
ENGINEERING
ASSOCIATES, INC.

PROJECT: Parsons Road Slope Failure

Boring No.: HB-PI-203

LOCATION: Presque Isle, ME

WIN: 22582.00

Driller: New England Boring Contractors	Elevation (ft.): 443.20	Core Barrel: n/a
Operator: Schaeffer / DuPuis	Datum: NAVD88	Sampler: standard split spoon
Logged By: Schonewald	Rig Type: Mobile Drill B-51 (tracked)	Hammer Wt./Fall: 140#/30"
Date Start/Finish: 10/6/15; 1140-1730 & 10/12/15 OW	Drilling Method: cased wash boring	Hammer Type: rope and cathead
Boring Location: Station 27+43, 126 ft LT	Casing ID/OD: 4" (HW)	Hammer Efficiency: 0.60
	Auger ID/OD: 5-1/4" SSA to 6 ft.	Water Level*: observation well installed

<p>IN-SITU SAMPLING AND TESTING: D = Split Spoon Sample MD = Unsuccessful Split Spoon Sample attempt U = Thin Wall Tube Sample MU = Unsuccessful Thin Wall Tube Sample attempt V = Insitu Vane Shear Test MV = Unsuccessful Insitu Vane Shear Test attempt</p>	<p>ADDITIONAL DEFINITIONS: N-uncorrected = N value N₆₀ = N value corrected for hammer efficiency hammer efficiency = calculated hammer efficiency S_u = Insitu Field Vane Shear Strength (psf) R = Rock Core Sample RQD = Rock Quality Designation (%)</p>	<p>ADDITIONAL DEFINITIONS: WOH = weight of 140lb. hammer WOR = weight of rods -- = not recorded</p>	<p>BOREHOLE ADVANCEMENT METHOD: SSA=solid stem auger/HSA=hollow stem auger/RC=roller cone</p> <p>LABORATORY TEST RESULTS: LL=Liquid Limit / PL=Plastic Limit / PI=Plasticity Index WC = water content, percent #200 = percent fines from grain size analysis UCT_{qp} = peak compressive strength of rock</p>
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Depth (ft.)	Sample Information								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N-60	Casing Blows					
25	11D	24/16	25.0 - 27.0	11-15-16-19	31	31			415.7	11D: Grey, damp, hard, Clayey SILT with numerous very fine Sandy SILT partings throughout.		
	12D	24/16	28.0 - 30.0	22-25-25-21	50	50				12D: Dark grey, moist, v. dense, Silty fine to medium SAND, some Gravel (rounded), trace coarse Sand, with one 1-inch layer fine to medium SAND, trace Silt near bottom of sample; somewhat layered.		
30	13D	24/16	30.0 - 32.0	12-12-17-22	29	29				13D: Dark grey, moist, m. dense, fine to medium SAND, some Silt, some Gravel, trace coarse Sand.		
35	14D	24/17	35.0 - 37.0	18-23-24-25	47	47				14D: Dark grey, damp, dense, SILT, trace very fine Sand, with one 1-inch and one 4-inch seams of sandier material.		
40	15D	24/18	40.0 - 42.0	19-25-24-27	49	49			401.2	15D: Dark grey, moist, dense, fine to medium SAND, some Gravel, little Silt, trace coarse Sand with one 2-inch layer SILT at top of sample.		
										Bottom of Exploration at 42.0 feet below ground surface. No refusal encountered.		
45												
50												

Remarks:

rear of garage

moved off location end of day 10/6/15 after completing test boring; returned 10/12/15 to install observation well.

2-inch dia. PVC observation well installed upon completion of boring; slotted screen from 21 ft to 6 ft BGS, with filter sand from 21.5 ft to 5.0 ft BGS overlain by bentonite seal.



**SCHONEWALD
ENGINEERING
ASSOCIATES, INC.**

PROJECT: Parsons Road Slope Failure

LOCATION: Presque Isle, ME

Boring No.: HB-PI-204

WIN: 22582.00

Driller: New England Boring Contractors	Elevation (ft.): 444.17	Core Barrel: n/a
Operator: Schaeffer / DuPuis	Datum: NAVD88	Sampler: standard split spoon
Logged By: Schonewald	Rig Type: Mobile Drill B-51 (tracked)	Hammer Wt./Fall: 140#/30"
Date Start/Finish: 10/8/15; 1300 - 10/9/15; 1120	Drilling Method: cased wash boring	Hammer Type: rope and cathead
Boring Location: Station 27+40, 31 ft RT	Casing ID/OD: 4" (HW)	Hammer Efficiency: 0.60
	Auger ID/OD: 5-1/4" SSA to 5.5 ft.	Water Level*: observation well installed

IN-SITU SAMPLING AND TESTING: D = Split Spoon Sample MD = Unsuccessful Split Spoon Sample attempt U = Thin Wall Tube Sample MU = Unsuccessful Thin Wall Tube Sample attempt V = Insitu Vane Shear Test MV = Unsuccessful Insitu Vane Shear Test attempt	ADDITIONAL DEFINITIONS: N-uncorrected = N value N ₆₀ = N value corrected for hammer efficiency hammer efficiency = calculated hammer efficiency S _u = Insitu Field Vane Shear Strength (psf) R = Rock Core Sample RQD = Rock Quality Designation (%)	ADDITIONAL DEFINITIONS: WOH = weight of 140lb. hammer WOR = weight of rods . = - = not recorded	BOREHOLE ADVANCEMENT METHOD: SSA=solid stem auger/HSA=hollow stem auger/RC=roller cone LABORATORY TEST RESULTS: LL=Liquid Limit / PL=Plastic Limit / PI=Plasticity Index WC = water content, percent #200 = percent fines from grain size analysis UCT _{qp} = peak compressive strength of rock
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Depth (ft.)	Sample Information								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N-60	Casing Blows					
0								443.4		10 inches HMA		
										Auger cuttings: Granular Fill with pieces of geogrid.		
										3.5 ft: cobble		
5												
10	1D	24/14	10.0 - 12.0	12-11-17-17	28	28		433.0		Granular Fill;		
											Changing at 11.2 ft to 1D: olive brown, moist, very fine Sandy SILT.	
								430.7				
15	2D	24/19	15.0 - 17.0	16-19-17-21	36	36				2D: Brown, damp, dense, fine SAND, little Silt.		
20	3D	24/20	20.0 - 22.0	11-20-30-35	50	50			3D: Brown, damp to moist, v. dense, SILT, some very fine Sand grading to fine SAND, little Silt.			
25												

Remarks:

westerly edge travelway

2-inch dia. PVC observation well installed upon completion of boring; slotted screen from 45 ft to 25 ft BGS, with filter sand from 46.8 ft to 24.0 ft BGS overlain by bentonite seal.



SCHONEWALD
ENGINEERING
ASSOCIATES, INC.

PROJECT: Parsons Road Slope Failure

LOCATION: Presque Isle, ME

Boring No.: HB-PI-204

WIN: 22582.00

Driller: New England Boring Contractors	Elevation (ft.): 444.17	Core Barrel: n/a
Operator: Schaeffer / DuPuis	Datum: NAVD88	Sampler: standard split spoon
Logged By: Schonewald	Rig Type: Mobile Drill B-51 (tracked)	Hammer Wt./Fall: 140#/30"
Date Start/Finish: 10/8/15; 1300 - 10/9/15; 1120	Drilling Method: cased wash boring	Hammer Type: rope and cathead
Boring Location: Station 27+40, 31 ft RT	Casing ID/OD: 4" (HW)	Hammer Efficiency: 0.60
	Auger ID/OD: 5-1/4" SSA to 5.5 ft.	Water Level*: observation well installed

IN-SITU SAMPLING AND TESTING:
 D = Split Spoon Sample
 MD = Unsuccessful Split Spoon Sample attempt
 U = Thin Wall Tube Sample
 MU = Unsuccessful Thin Wall Tube Sample attempt
 V = Insitu Vane Shear Test
 MV = Unsuccessful Insitu Vane Shear Test attempt

ADDITIONAL DEFINITIONS:
 N-uncorrected = N value
 N₆₀ = N value corrected for hammer efficiency
 hammer efficiency = calculated hammer efficiency
 S_u = Insitu Field Vane Shear Strength (psf)
 R = Rock Core Sample
 RQD = Rock Quality Designation (%)

ADDITIONAL DEFINITIONS:
 WOH = weight of 140lb. hammer
 WOR = weight of rods
 -- = not recorded

BOREHOLE ADVANCEMENT METHOD:
 SSA=solid stem auger/HSA=hollow stem auger/RC=roller cone

LABORATORY TEST RESULTS:
 LL=Liquid Limit / PL=Plastic Limit / PI=Plasticity Index
 WC = water content, percent
 #200 = percent fines from grain size analysis
 UCT_{qp} = peak compressive strength of rock

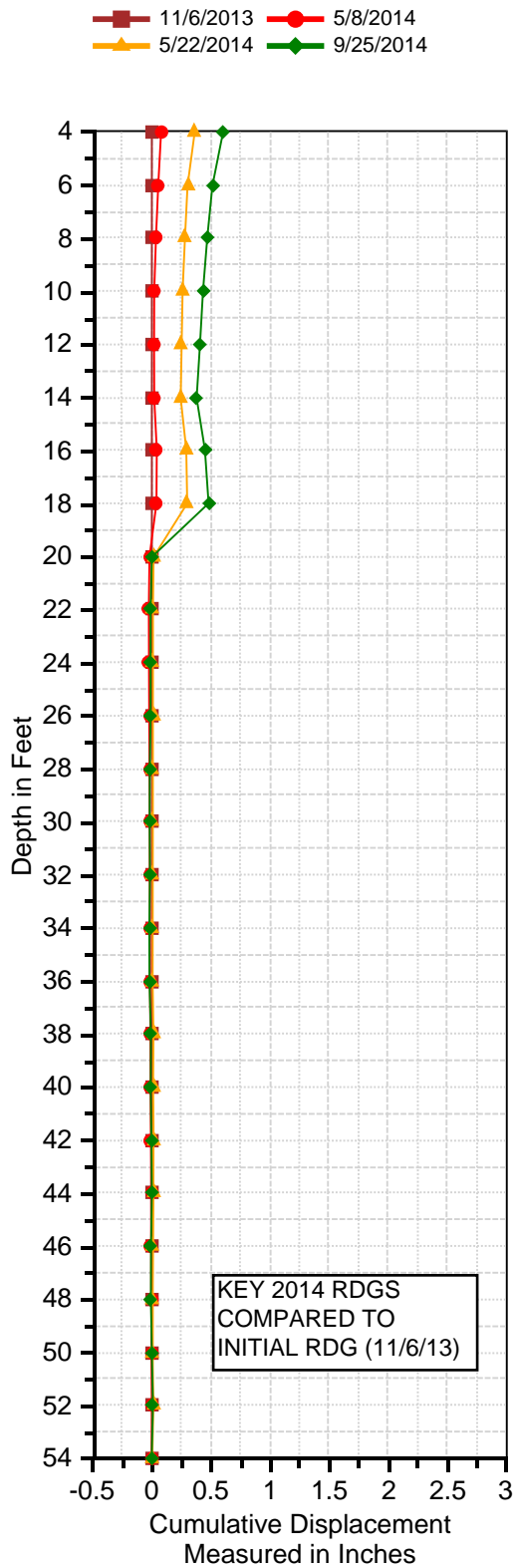
Depth (ft.)	Sample Information								Elevation (ft.)	Graphic Log	Visual Description and Remarks	Lab. Testing Results
	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N-60	Casing Blows					
25	4D	24/18	25.0 - 27.0	15-19-23-25	42	42				4D: Grey-brown, damp, dense, fine SAND, little Silt.		
30	5D	24/18	30.0 - 32.0	23-27-29-37	56	56		414.4		29.8 ft: Driller notes boney material. 5D: Grey-brown, moist, v. dense, fine to medium SAND, little fine Gravel, trace to little Silt, trace coarse Sand.		
35	6D	24/19	35.0 - 37.0	18-26-26-38	52	52				6D: Grey-brown, moist, v. dense, fine to medium SAND, trace to little Silt.		
40	7D	24/17	40.0 - 42.0	23-30-41-44	71	71				7D: Grey-brown, moist, v. dense, fine to medium SAND, trace to little Silt, trace fine Gravel, trace coarse Sand. Sand possibly partially cemented.		
45	8D	21/16	45.0 - 46.8	49-54-48-50/3"	102	102		397.4		8D: Grey-brown, moist, v. dense, fine to medium SAND, trace to little Silt, with layers of Gravelly fine to coarse SAND, trace Silt, Sand possibly partially cemented.		
50										Bottom of Exploration at 46.8 feet below ground surface. No refusal encountered.		

Remarks:
 westerly edge travelway
 2-inch dia. PVC observation well installed upon completion of boring; slotted screen from 45 ft to 25 ft BGS, with filter sand from 46.8 ft to 24.0 ft BGS overlain by bentonite seal.

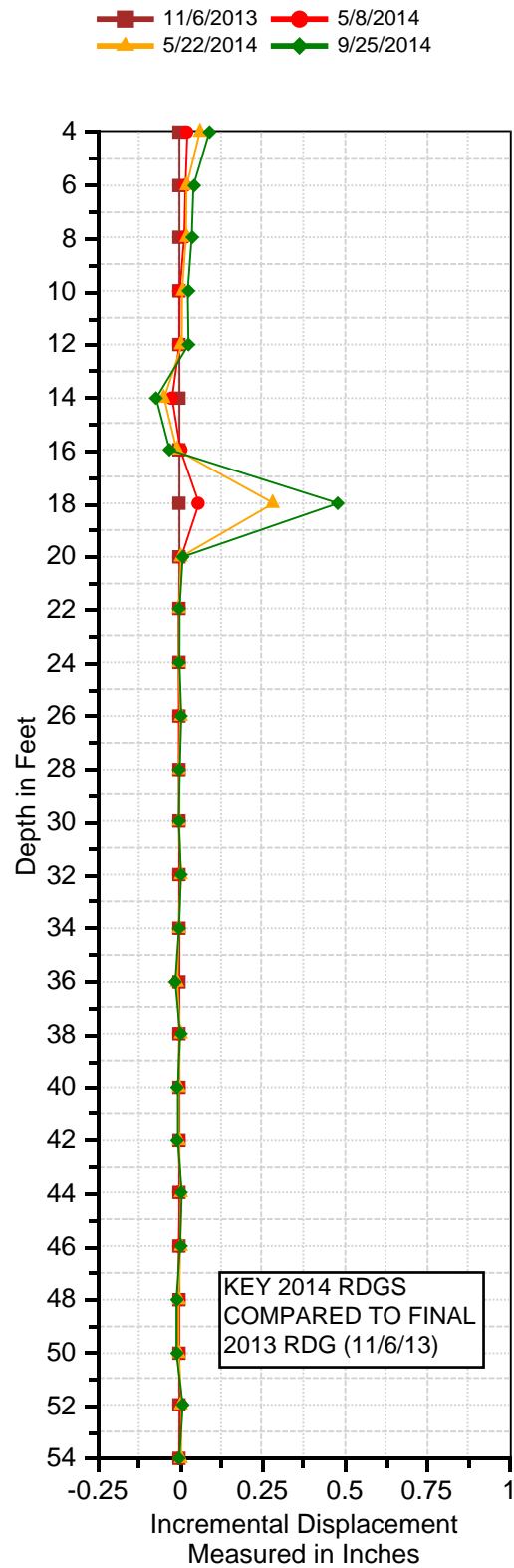


APPENDIX B
SLOPE INCLINOMETER PLOTS

2014 Parsons Road I1 A-Axis



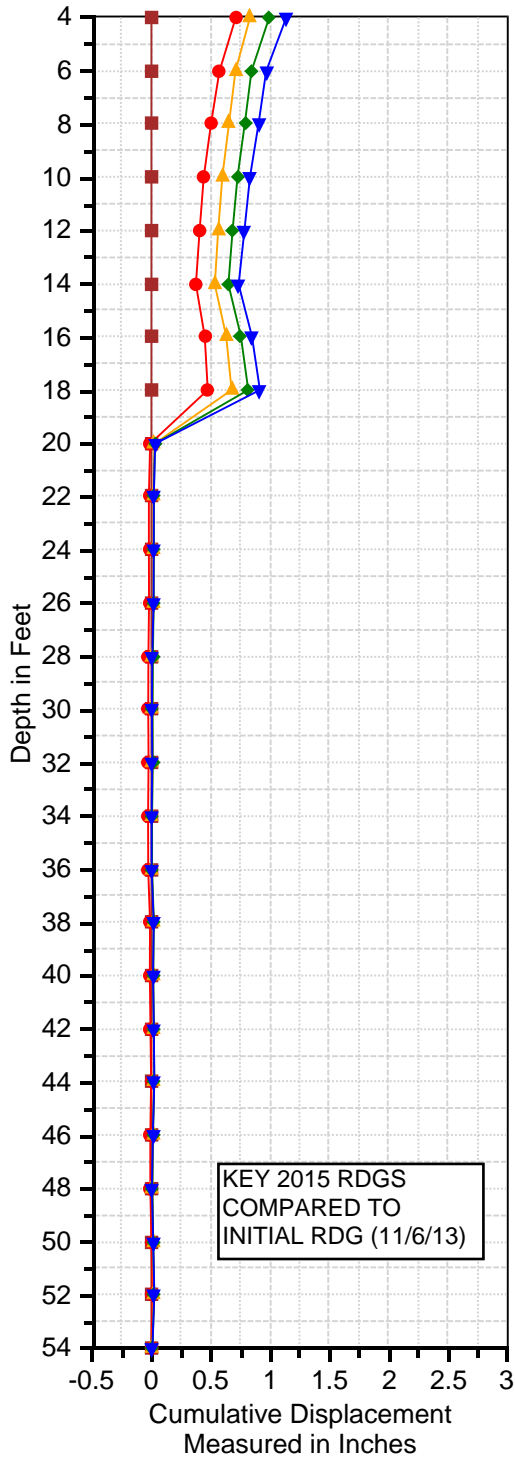
2014 Parsons Road I1 A-Axis



LEFT GRAPH = CUMULATIVE DISPLACEMENTS: KEY 2014 RDGS COMPARED TO INITIAL RDG (11/6/13)
 (DEPICTS SHAPE OF INCLINOMETER CASING AT TIME OF READING; OFFSET OF CASING IS SHEAR)
 RIGHT GRAPH = INCREMENTAL DISPLACEMENTS: KEY 2014 RDGS COMPARED TO FINAL 2013 RDG
 (DEPICTS CHANGE BETWEEN READINGS AT EACH DEPTH; MOVEMENT APPEARS AS GROWING SPIKE)

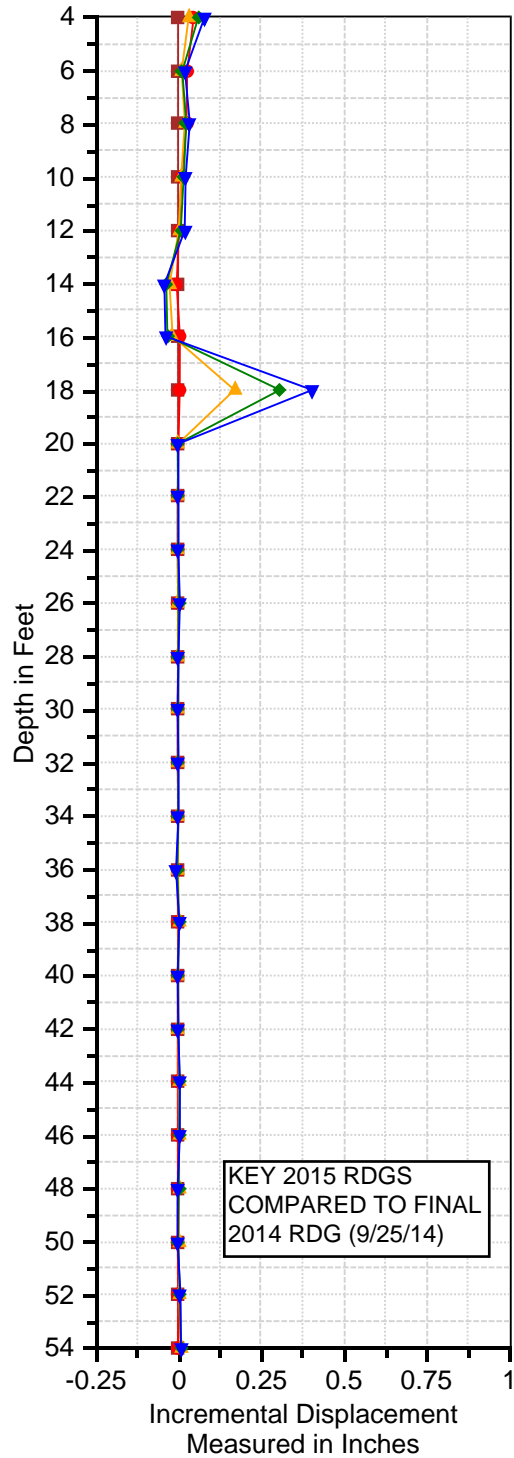
2015 Parsons Road I1 A-Axis

■ 11/6/2013 ● 4/22/2015 ▲ 5/7/2015
◆ 5/14/2015 ▼ 8/25/2015



2015 Parsons Road I1 A-Axis

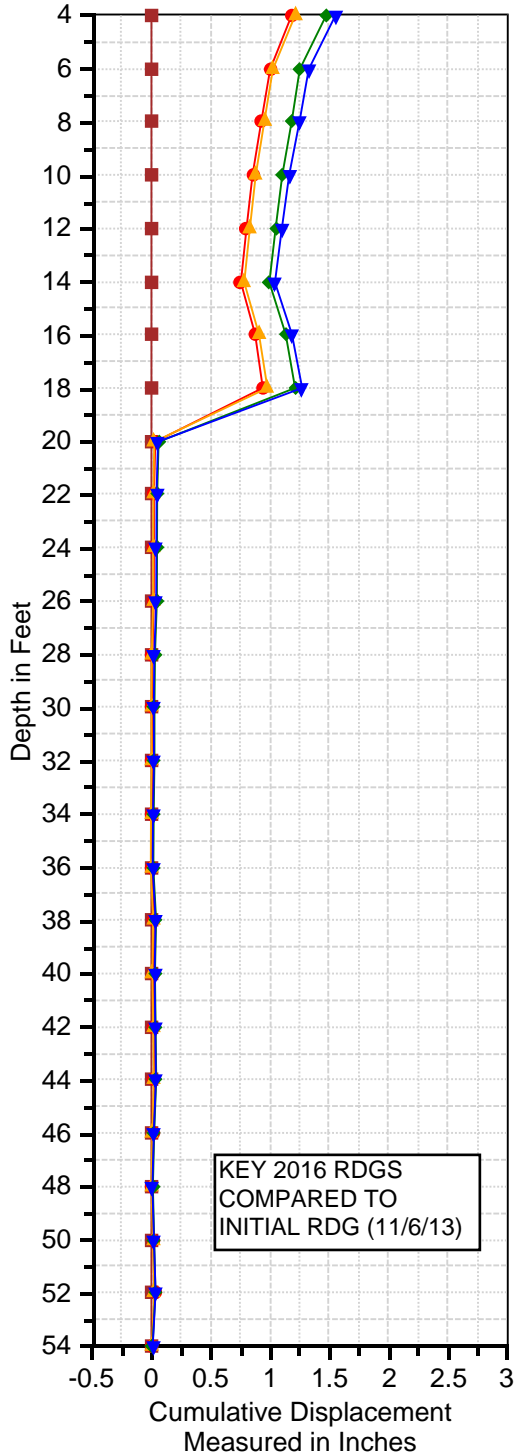
■ 9/25/2014 ● 4/22/2015 ▲ 5/7/2015
◆ 5/14/2015 ▼ 8/25/2015



LEFT GRAPH = CUMULATIVE DISPLACEMENTS: KEY 2015 RDGS COMPARED TO INITIAL RDG (11/6/13)
 (DEPICTS SHAPE OF INCLINOMETER CASING AT TIME OF READING; OFFSET OF CASING IS SHEAR)
 RIGHT GRAPH = INCREMENTAL DISPLACEMENTS: KEY 2015 RDGS COMPARED TO FINAL 2014 RDG
 (DEPICTS CHANGE BETWEEN READINGS AT EACH DEPTH; MOVEMENT APPEARS AS GROWING SPIKE)

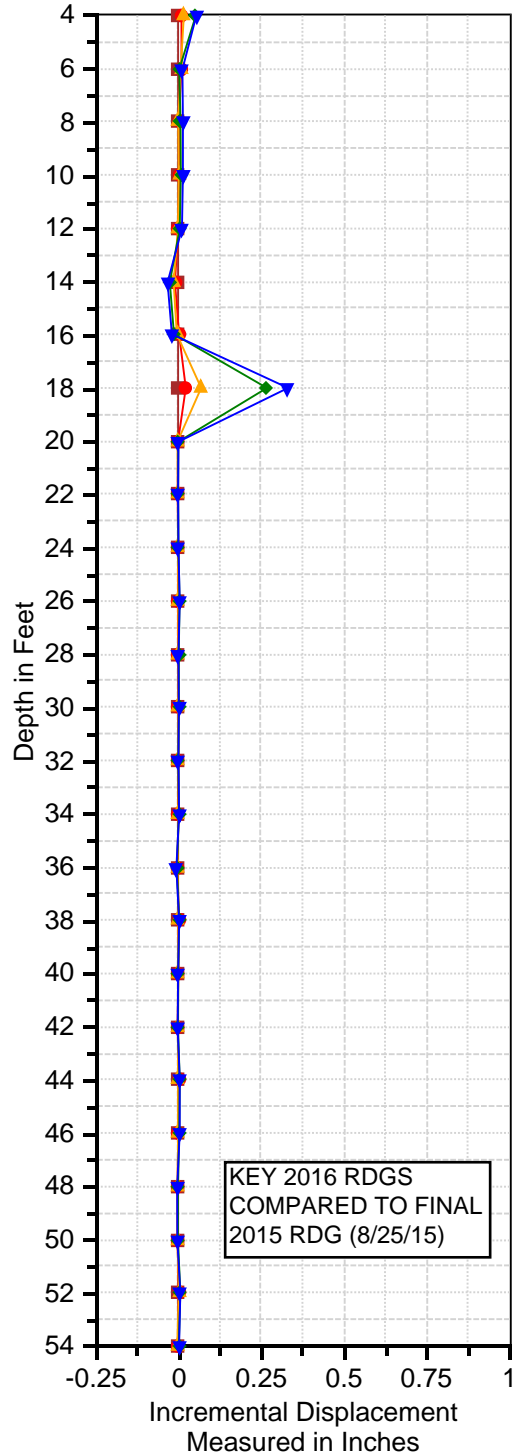
2016 Parsons Road I1 A-Axis

■ 11/6/2013 ● 4/14/2016 ▲ 4/28/2016
◆ 5/23/2016 ▼ 6/27/2016



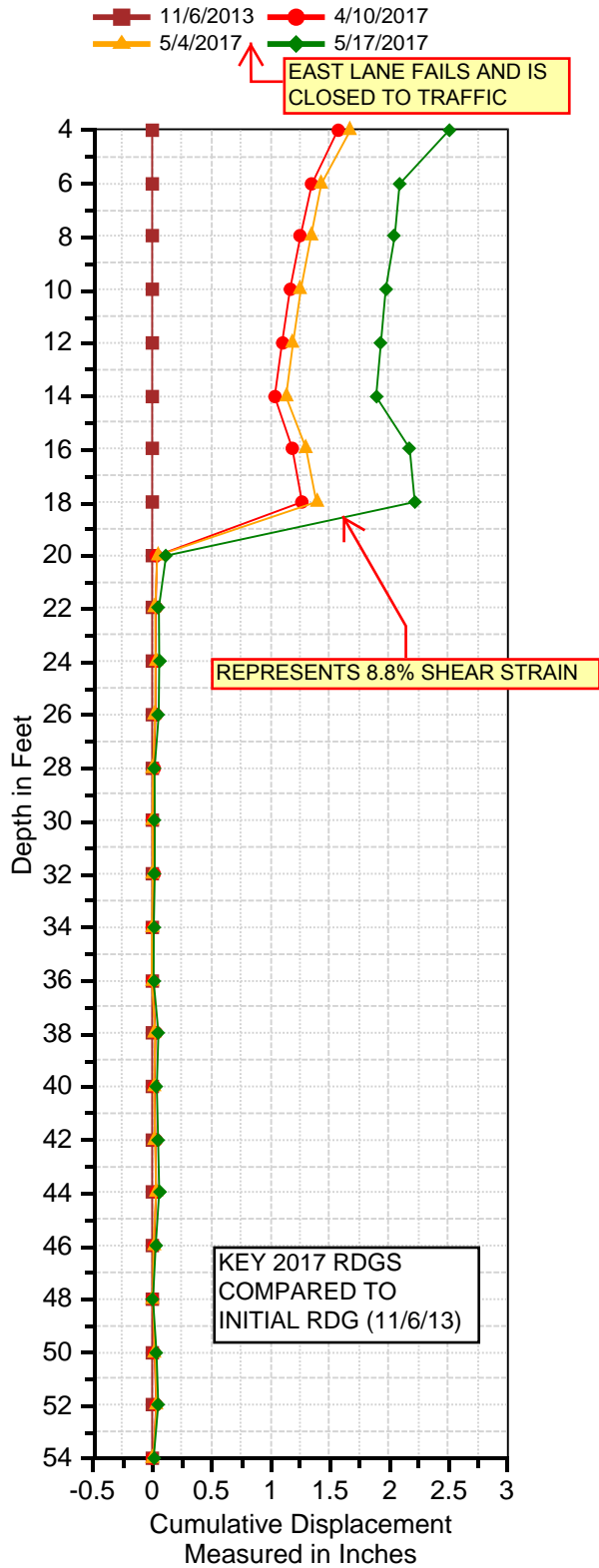
2016 Parsons Road I1 A-Axis

■ 8/25/2015 ● 4/14/2016 ▲ 4/28/2016
◆ 5/23/2016 ▼ 6/27/2016

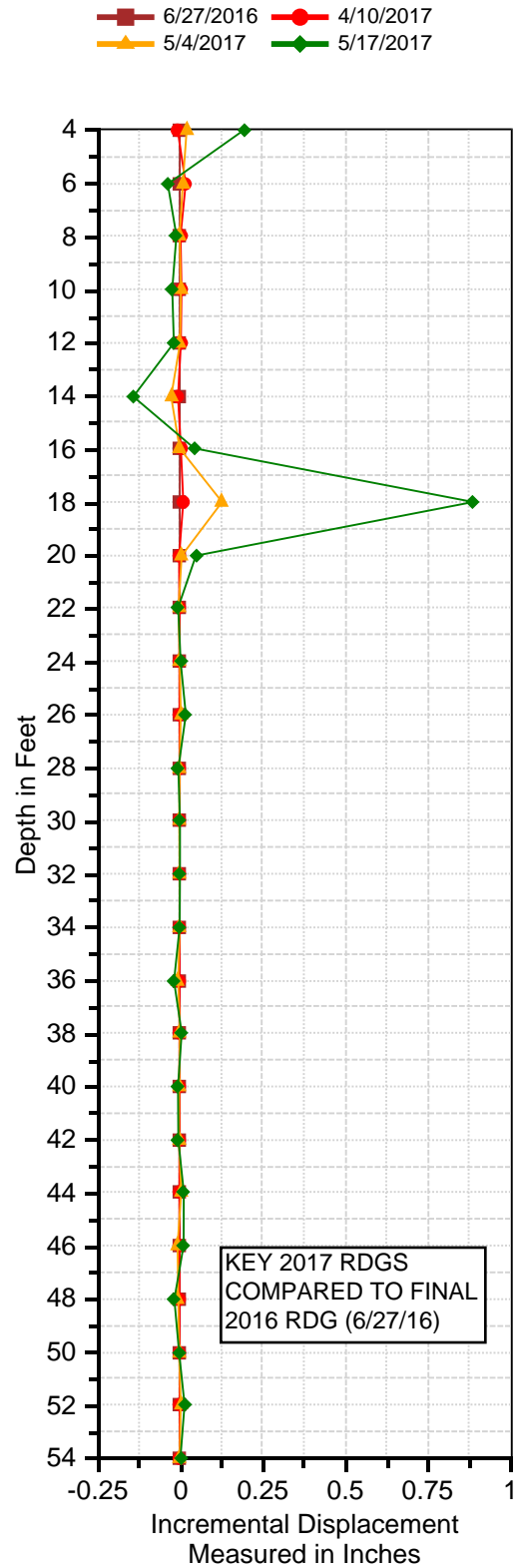


LEFT GRAPH = CUMULATIVE DISPLACEMENTS: KEY 2016 RDGS COMPARED TO INITIAL RDG (11/6/13)
 (DEPICTS SHAPE OF INCLINOMETER CASING AT TIME OF READING; OFFSET OF CASING IS SHEAR)
 RIGHT GRAPH = INCREMENTAL DISPLACEMENTS: KEY 2016 RDGS COMPARED TO FINAL 2015 RDG
 (DEPICTS CHANGE BETWEEN READINGS AT EACH DEPTH; MOVEMENT APPEARS AS GROWING SPIKE)

2017 Parsons Road I1 A-Axis

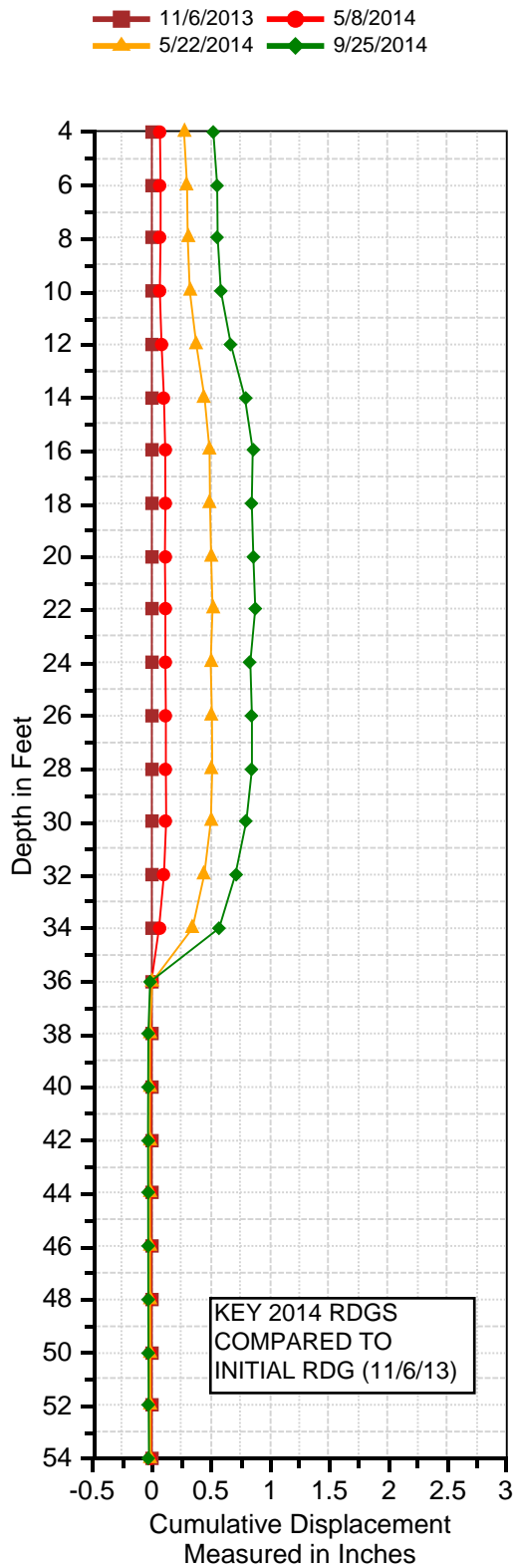


2017 Parsons Road I1 A-Axis

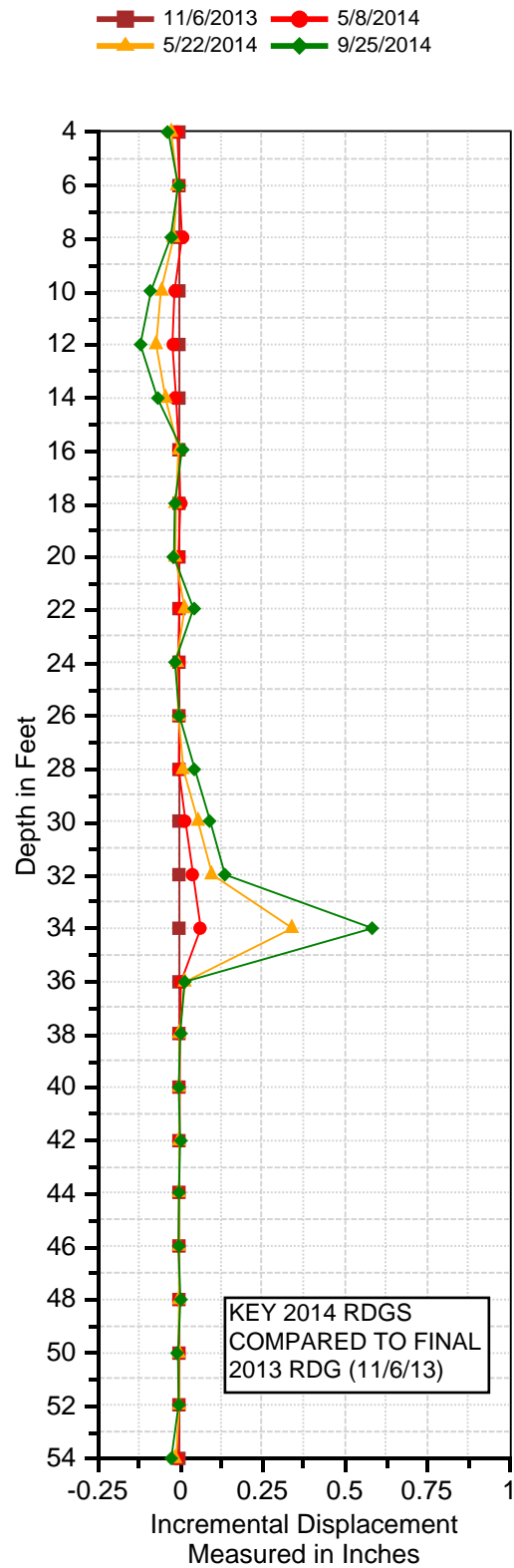


LEFT GRAPH = CUMULATIVE DISPLACEMENTS: KEY 2017 RDGS COMPARED TO INITIAL RDG (11/6/13)
 (DEPICTS SHAPE OF INCLINOMETER CASING AT TIME OF READING; OFFSET OF CASING IS SHEAR)
 RIGHT GRAPH = INCREMENTAL DISPLACEMENTS: KEY 2017 RDGS COMPARED TO FINAL 2016 RDG
 (DEPICTS CHANGE BETWEEN READINGS AT EACH DEPTH; MOVEMENT APPEARS AS GROWING SPIKE)

2014 Parsons Road I2 A-Axis



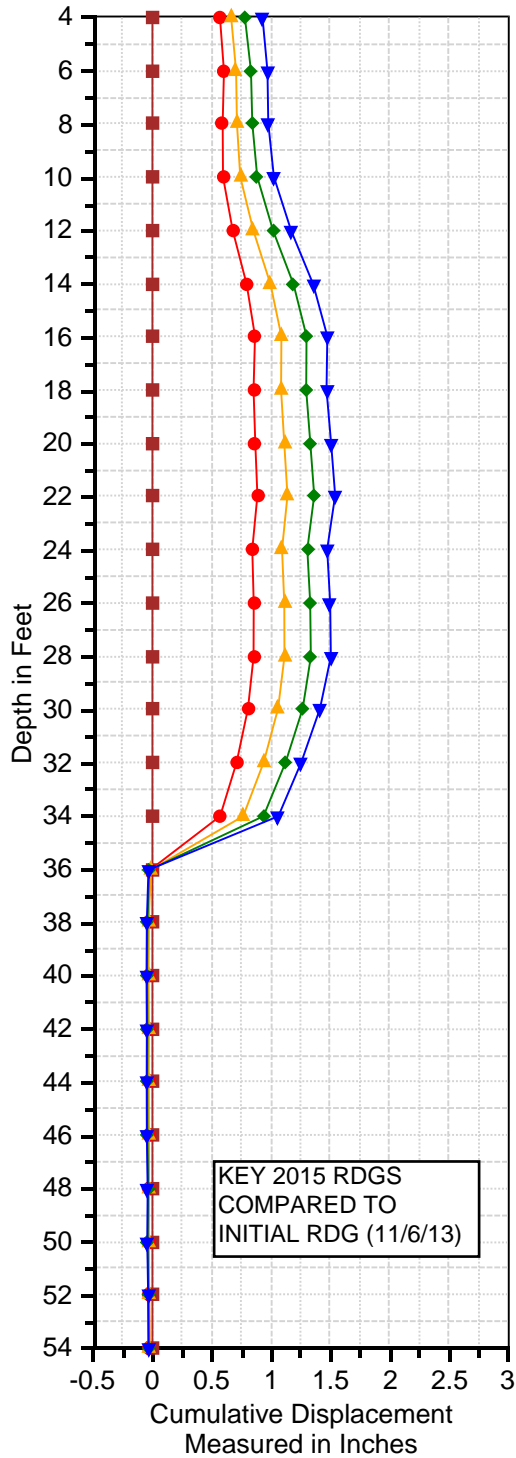
2014 Parsons Road I2 A-Axis



LEFT GRAPH = CUMULATIVE DISPLACEMENTS: KEY 2014 RDGS COMPARED TO INITIAL RDG (11/6/13)
 (DEPICTS SHAPE OF INCLINOMETER CASING AT TIME OF READING; OFFSET OF CASING IS SHEAR)
 RIGHT GRAPH = INCREMENTAL DISPLACEMENTS: KEY 2014 RDGS COMPARED TO FINAL 2013 RDG
 (DEPICTS CHANGE BETWEEN READINGS AT EACH DEPTH; MOVEMENT APPEARS AS GROWING SPIKE)

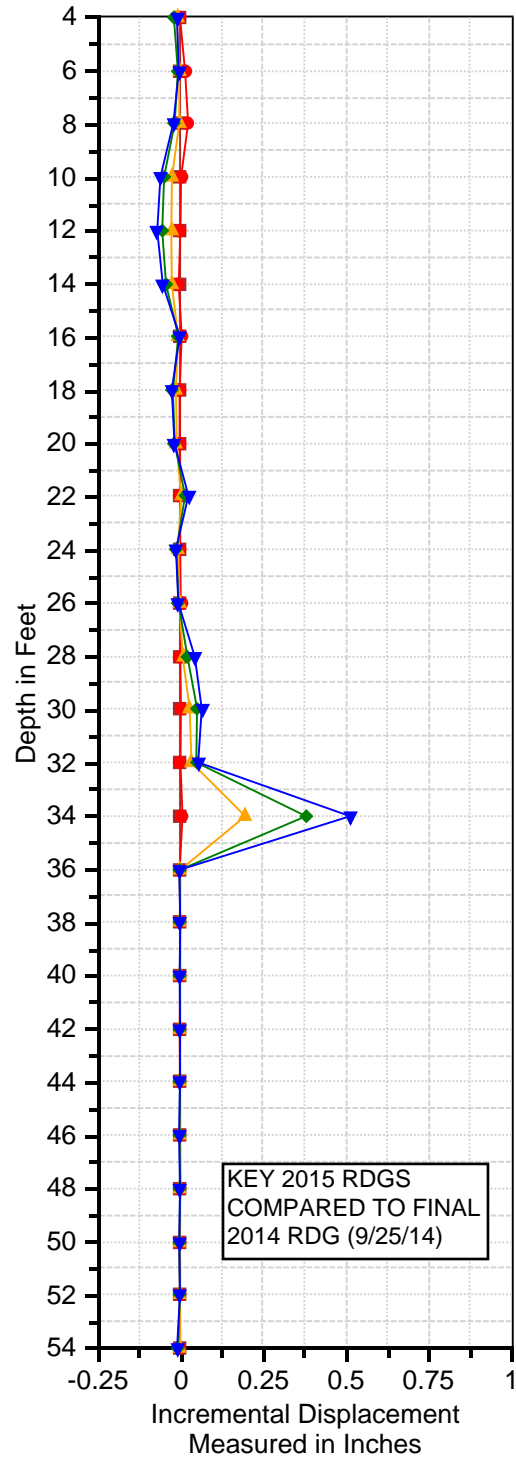
2015 Parsons Road I2 A-Axis

■ 11/6/2013 ● 4/22/2015 ▲ 5/7/2015
◆ 5/14/2015 ▼ 8/25/2015



2015 Parsons Road I2 A-Axis

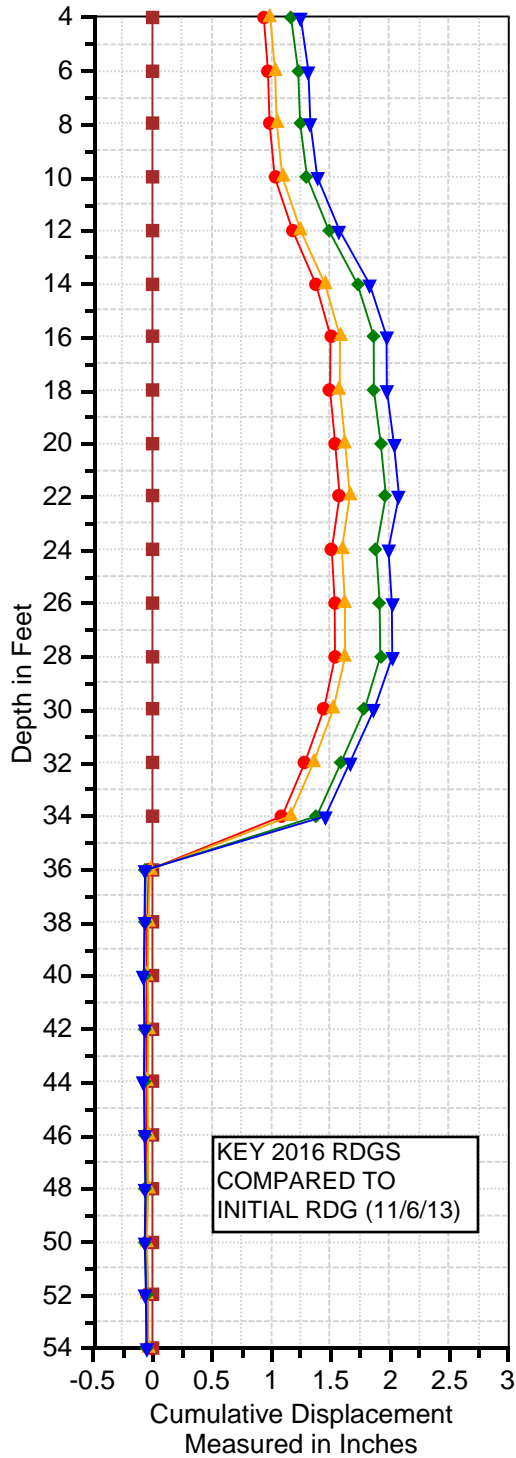
■ 9/25/2014 ● 4/22/2015 ▲ 5/7/2015
◆ 5/14/2015 ▼ 8/25/2015



LEFT GRAPH = CUMULATIVE DISPLACEMENTS: KEY 2015 RDGS COMPARED TO INITIAL RDG (11/6/13)
 (DEPICTS SHAPE OF INCLINOMETER CASING AT TIME OF READING; OFFSET OF CASING IS SHEAR)
 RIGHT GRAPH = INCREMENTAL DISPLACEMENTS: KEY 2015 RDGS COMPARED TO FINAL 2014 RDG
 (DEPICTS CHANGE BETWEEN READINGS AT EACH DEPTH; MOVEMENT APPEARS AS GROWING SPIKE)

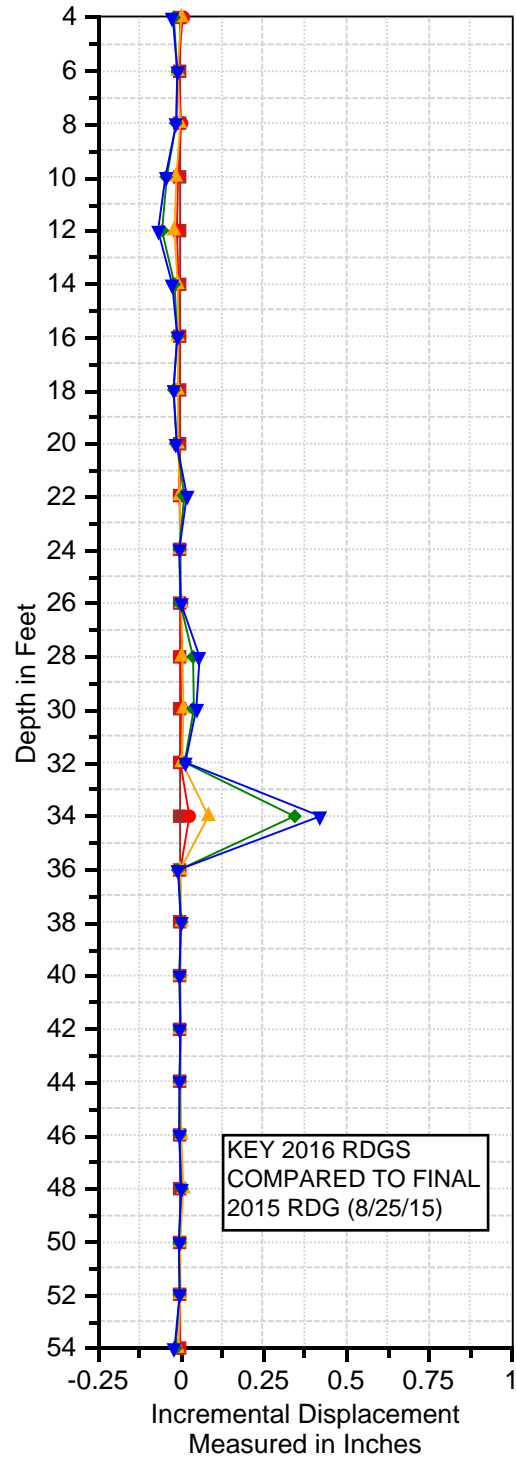
2016 Parsons Road I2 A-Axis

■ 11/6/2013 ● 4/14/2016 ▲ 4/28/2016
◆ 5/23/2016 ▼ 6/27/2016



2016 Parsons Road I2 A-Axis

■ 8/25/2015 ● 4/14/2016 ▲ 4/28/2016
◆ 5/23/2016 ▼ 6/27/2016



LEFT GRAPH = CUMULATIVE DISPLACEMENTS: KEY 2016 RDGS COMPARED TO INITIAL RDG (11/6/13)
 (DEPICTS SHAPE OF INCLINOMETER CASING AT TIME OF READING; OFFSET OF CASING IS SHEAR)
 RIGHT GRAPH = INCREMENTAL DISPLACEMENTS: KEY 2016 RDGS COMPARED TO FINAL 2015 RDG
 (DEPICTS CHANGE BETWEEN READINGS AT EACH DEPTH; MOVEMENT APPEARS AS GROWING SPIKE)

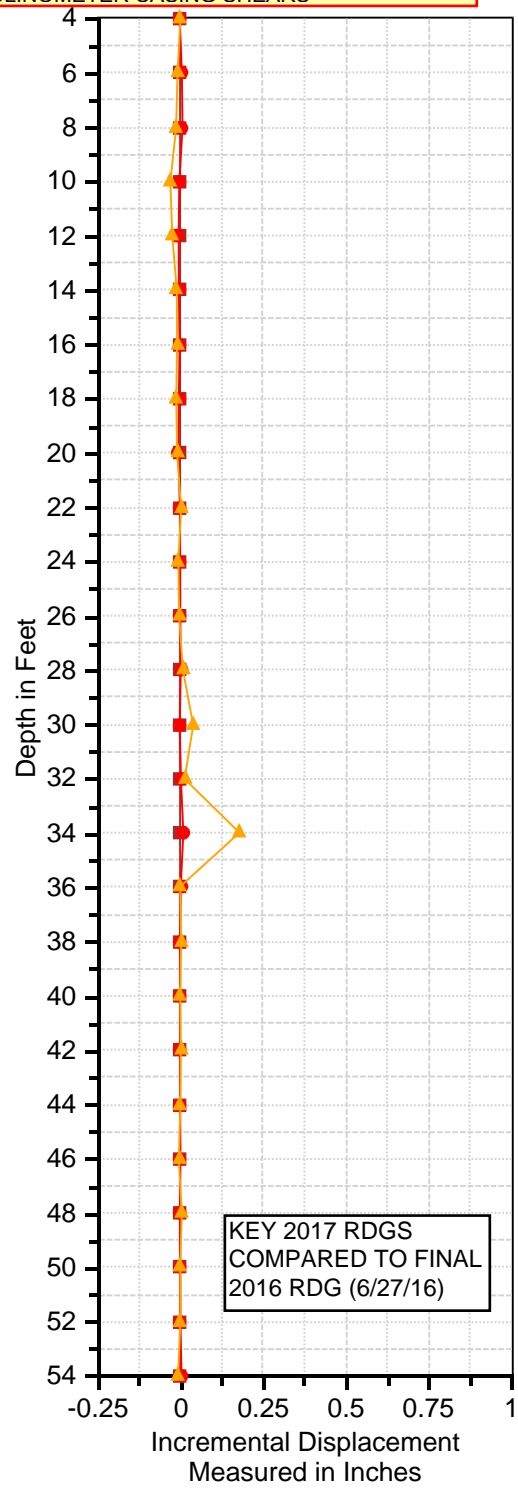
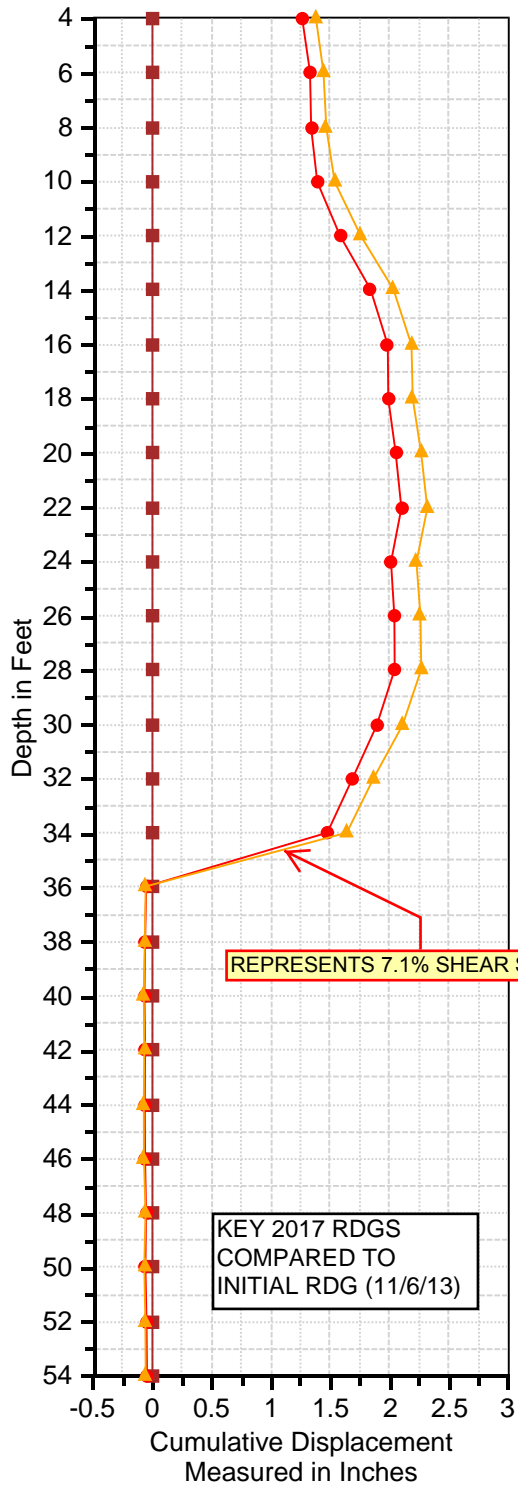
2017 Parsons Road I2 A-Axis

2017 Parsons Road I2 A-Axis

11/6/2013 4/10/2017 5/4/2017

6/27/2016 4/10/2017 5/4/2017

EAST LANE FAILS AND IS CLOSED TO TRAFFIC;
INCLINOMETER CASING SHEARS



LEFT GRAPH = CUMULATIVE DISPLACEMENTS: KEY 2017 RDGS COMPARED TO INITIAL RDG (11/6/13) (DEPICTS SHAPE OF INCLINOMETER CASING AT TIME OF READING; OFFSET OF CASING IS SHEAR)
RIGHT GRAPH = INCREMENTAL DISPLACEMENTS: KEY 2017 RDGS COMPARED TO FINAL 2016 RDG (DEPICTS CHANGE BETWEEN READINGS AT EACH DEPTH; MOVEMENT APPEARS AS GROWING SPIKE)