Stantec

To:	Jerald Schnabel	From:	Paul Kos
	Riverbend Industries Inc.		Denver, CO 80222
File:	March 2023 Monitoring Summary	Date:	April 28, 2023

Reference: March 2023 Geotechnical Monitoring Summary Pikeview Quarry

1.0 INTRODUCTION

Stantec Consulting Services Inc. (Stantec) has prepared this March 2023 Geotechnical Monitoring Summary for the Pikeview Quarry. The Pikeview Quarry is situated along the foothills of the Rocky Mountains, northwest of Colorado Springs, Colorado. Riverbend Industries Inc. (Riverbend, formerly Continental Materials Corp.) operates the quarry, which is currently closed and undergoing reclamation. A geotechnical monitoring program was established to monitor reclamation activities which will affect the geotechnical performance of the existing and reclaimed slopes during and following reclamation grading. This report presents the geotechnical monitoring results for the slope reclamation activities at the site through the month of March 2023. Continuous monitoring by the robotic survey system began in 2010 and has continued through the month of March 2023. Visual inspections of the slopes were performed by Riverbend employees and Stantec engineers.

1.1 PURPOSE

The purpose of this report is to summarize the March 2023 geotechnical monitoring results and verify the geotechnical performance of the existing and reclaimed slopes with respect to the historical performance record. The goals of the geotechnical instrumentation monitoring program can be described as:

- Meet corporate risk management requirements,
- Provide ongoing slope monitoring and advance warning of any changed conditions that could pose a hazard to workers or to the public,
- Document the geotechnical performance of the slope, and
- Document monthly site grading activities and construction quality assurance.

1.2 MONITORING SUMMARY

Major components of the instrumentation monitoring program are listed in Table 1 and shown on Figure 1.

Table 1 Monitoring Frequency

Monitoring Type	Frequency
Visual inspection	Daily (Riverbend or Stantec) and Monthly (Stantec)
Robotic theodolite/prism	Continuous
Drone inspection	Monthly
Compaction testing	Every 5,000 yd^3 (min.)

2.0 VISUAL INSPECTIONS

Inspections are completed daily by site personnel and monthly by Stantec personnel to document visual observations of slope conditions, including conditions of instability (i.e., cracking, slumping, over-steepened slopes, seeps, perched boulders, rock falls, erosion, and areas undercut by construction or maintenance activities). Certain areas of the landslide have been designated as safety exclusion zones, and these areas are inspected from adjacent locations.

On working days, site operators inspect their work areas for signs of instability daily before starting work per site safety rules and regulations. The daily inspection starts by reviewing any prism alerts/alarms and inspecting those areas before work begins in that area. The daily inspection also includes visual observations of the quarry walls and floor for any changes. No changes to the quarry conditions were identified during daily inspections in March 2023. The notes from the daily inspections are included in Table A-1 in Appendix A.

Stantec conducted visual inspections of the Pikeview Quarry slopes on March 20, 2023. The engineering inspections were conducted by traversing each area of the mine and observing the uphill slope and the downhill slope for signs of instability, and areas in need of maintenance. Slopes that have been graded and are 2 horizontal (H):1 vertical (V) or shallower are also traversed on foot. The findings are listed below, and photographs of notable observations are included on Figure 2 in Appendix A.

- Reclamation grading began in February 2022 and continued throughout March 2023.
- Operators continue to place compacted material in the buttress zone. Material is excavated from the North and South Borrow Areas. Material is initially excavated in benches for the majority of the excavation to efficiently remove the material; these benches are removed for final grading to create the reclamation surface (Photo 1 & 2).
- Compaction testing continues at the rate of at least one test per 5,000 cubic yards of fill placed in the buttress area (Photo 3).
- No cracking was observed on the native granite slopes above the extents of the disturbed area (Photo 4).
- Known cracks were monitored for changes. Currently the cracks are not growing in any of the areas on the slopes of the site. The hummocky field in the area immediately above the southern extent of the slide shows evidence of previous cracking, but they are not fresh or active. No new or open cracks were found immediately inside or next to the slide area (Photo 5).
- The slope below the first bench has been placed to the final grade, and this slope was traversed on foot and examined for cracks or signs of instability by Stantec engineers. No cracks or signs of instability were identified (Photo 6 & 7).
- A safety buffer zone is being kept between the active work areas and the toe of the slide to stop any rocks that might come loose during grading operations. Compacted fill is placed in the buffer zone as the buttress fill is placed (Photo 8).
- Offsite topsoil was stockpiled at the base of the buttress area with the additional topsoil and growth medium. This stockpile location is preparation for spreading topsoil and revegetating the lower slopes of the buttress area, which is planned for Spring 2023. The topsoil stockpiles contain a sufficient volume of material to place cover on all disturbed areas of the mine. Topsoil imports will continue, and any excess topsoil may be placed at increased thickness so that all topsoil is used in reclaiming the mine.
- The culvert remains cleared but mostly blocked inside. Riverbend has partially cleared the debris, but access limitations and supports within the culvert inhibit clearing all the debris. Riverbend has procured a pump and will begin pumping operations if any water collects behind the culvert. Riverbend inspects the

culvert for ponded water following rain events, and should any water be observed, it will be removed using pumps. To date, no ponding has been observed.

- Visual inspections of the Pikeview Quarry did not reveal any evidence of large-scale instability outside of the landslide areas previously identified. No bulging, rippling, over-steepening, depressions, slumps, or dry slip-offs were observed in areas that have been graded and/or reclaimed.

3.0 PRISM SURVEY

A Leica Robotic station is used to continuously survey the prisms onsite to document slope movements. The station records the location of each prism every hour. There are currently 15 active prisms; 2 prisms were control points located outside the slope movement area and 13 prisms were located on the slopes surrounding the landslide area. As the slope is backfilled and graded, the existing prisms will be removed, and additional prisms will be installed. No prisms were removed in March. A log of prism removals and installations is included in Appendix B. The prism locations are shown on the current topography in Figure 3, and the proposed prism locations are shown on the reclamation topography in Figure 4. Both figures are included in Appendix B.

The monitoring software, GeoMos, has been programed to provide automatic alarms if there is a movement recorded that is greater than 0.35 feet, if a prism cannot be located, or if there are communication errors. Following each alarm, Riverbend clears the area of concern until the data can be reviewed and the slope can be inspected. Riverbend made sure that there were no workers in the area before inspecting the slope. No alarms for potential movement were received in March 2023. All previous alarms for potential movement have been attributed to weather or animal activity, and no alarms have been associated with slope movements. Other alarms were determined to be caused by a power outage, equipment operations blocking the prism, weather conditions, or sun glare. The alarms are listed in Table 2.

Table 2 Alarm Summary

Date(s)	Alarm	Cause/Actions taken	Issue Resolved
Mar 4	Points not found	Fog. No work being performed at time of alerts.	Mar 4
Mar 5 to Mar 6	Communication errors	Power outages related to fog. Most alerts received when no work was being performed. Single set of readings impacted during work before power was restored again.	Mar 6
Mar 6	CP7 not found	Believed to be related to equipment blocking prism.	Mar 7
Mar 7	Points not found	Fog. Limited work with extra spotters.	Mar 7
Mar 7 to Mar 8	Communication errors	Power outages related to fog. Most alerts received when no work was being performed.	Mar 8
Mar 8 to Mar 9	Points not found	Fog. Limited work with extra spotters.	Mar 9
Mar 12	Points not found	Snow and fog. No work being performed at time of alerts.	Mar 13
Mar 16 to Mar 17	Points not found	Snow and fog. Work shut down during alerts.	Mar 17
Mar 21	CP7 not found	Equipment blocking prism.	Mar 21
Mar 27	Points not found	Snow and fog. No work being performed at time of alerts.	Mar 27
Mar 28	P2 and CP6 not found	Equipment blocking prism.	Mar 28

The prism monitoring results for transverse and height displacements, monthly change, and cumulative change are summarized in Table 3 below. The transverse displacement measures the change in the horizontal distance from the robotic station to the prism; positive displacements indicate less distance between the station and prism (movement towards the total station). The height displacement measures the change in the vertical distance from the robotic station to the prism; positive displacements indicate upward movement. The values for the last reading in the month are included in Table 3. The monthly delta is the most recent reading cumulative delta displacement (horizontal, lateral, and vertical) subtracted from the last reading from the previous month. The cumulative delta values are a total displacement and are not associated with a direction. The transverse, height, and cumulative delta displacements are the total displacement over the life of the monitoring, which was reset when the Leica station was moved in July 2022. According to Leica documentation, the survey accuracy is +/-4 mm+1.5 ppm for prisms located greater than 500m from the station; these equates to an accuracy of +/-0.016 ft.

The data show stable conditions with no movement for all 15 prisms with recorded displacements limited to data scatter and not actual movements. Prisms BR1, BR2, and NP66 are located above the landslide, and these prisms previously recorded slope creep movements at slow velocity. This settlement was likely related to the landslide material consolidating under its own weight. The data suggest that the creep movements have essentially been halted by the placement of the buttress. New prisms are placed in areas where slope creep movements are likely to be recorded; therefore, slope creep movements being recorded at more locations is expected to occur. Plots of the transverse and height displacements for each prism are included in Appendix B.

Table 3 Prism Summary

Prism ID	Cumulative Transverse Displacement (ft)	Cumulative Height Displacement (ft)	Monthly Delta (ft)	Cumulative Delta (ft)	Notes / Recommendations
BR1	-0.070	-0.137	0.0126	0.2241	Previous slope creep movements.
BR2	-0.035	-0.158	0.0121	0.2428	Previous slope creep movements.
CP6	-0.003	-0.022	-0.0024	0.0350	
CP7	0.073	-0.014	-0.0195	0.0849	
NP2	0.037	-0.001	-0.0045	0.0509	
NP3	0.023	-0.007	-0.0110	0.0294	
NP66	0.020	-0.106	0.0076	0.1173	Previous slope creep movements.
P1	-0.012	-0.025	-0.0037	0.0342	
P2	-0.009	-0.024	-0.0055	0.0338	
P5	-0.016	-0.016	-0.0026	0.0256	
P25	-0.028	0.005	-0.0041	0.0285	
P32	-0.035	0.002	-0.0047	0.0371	
P33	-0.003	-0.023	-0.0018	0.1419	
P69A	0.056	-0.060	-0.0154	0.1870	
P70	-0.022	0.003	-0.0093	0.0257	

4.0 DRONE SURVEY

The site was flown for aerial imagery using an unmanned aircraft system (UAS or 'drone') on April 3, 2023. The imagery was inspected for signs of instability and used to supplement the onsite visual inspections. Features noted in the aerial imagery review were inspected during Stantec's engineering inspection and are summarized in Section 2 above. The imagery was also used to create site topography.

The March topography was also compared to the February topography to identify changes in the site topography. Comparison of the two surveys showed the placement of the fill material at the toe of the landslide. Fill material is excavated from the Shop Borrow Area or imported from offsite projects, including the North Borrow Area. No slope movements or other changes in topography were identified. The current imagery and topography are included in Figures 1 and 3, and the comparison surface is included as Figure 5 in Appendix C.

As previously reported in the September 2020 monitoring report, there are limitations with the method of comparing drone surveys from different months. The drone data indicate changes in the slopes along each of the reclamation benches, buildings, and areas with trees or shrubs. These areas are stable, and the changes are the result of survey limitations on or near vertical slopes.

5.0 COMPACTION TESTING

Fill placement started on February 25, 2022 and continued throughout March 2023. Fill was excavated from the Shop and North Borrow Areas and placed in the buttress and buffer zones. Importing fill also continued. All fill is moisture conditioned as necessary and then compacted. Compaction testing began March 2022 and occurs at the rate of at least one test per 5,000 yd^3 placed. During March, approximately 206,000 yd^3 was placed and compacted. This does not include approximately 1,460 yd^3 of imported topsoil. Topsoil imports have decreased now that enough topsoil is available to complete the reclamation. This volume placed in the buttress zone required at least 42 compaction tests. There were 83 compaction tests taken in March. As of March 31, 2022, a total of approximately 2,306,000 yd^3 had been placed and compacted. This required at least 462 compaction tests, and 801 tests have been taken. Three tests in March did not meet the minimum compaction requirement of 90%. These areas were recompacted and the subsequent tests met the project requirements. The compaction testing results are summarized in Appendix D, and the testing locations are shown on Figure 6.

6.0 RECLAMATION PROGRESS

Riverbend has initiated reclamation grading at the Pikeview Quarry and has contracted with Stantec to provide EPCM services through completion. As an updated feature of our monthly report, we will provide progress of activities, anticipated milestone schedule and a one month look ahead to better communicate project objectives. A phased or 'gated" approach will be used to complete the reclamation process going forward (See milestone schedule below)

Phase 1 - Value Engineering and issue RFP to qualified contractors

Phase 2 - Commercial negotiations with successful contractor

Phase 3 - Execution planning and Contractor readiness review

Phase 4 - Site Construction execution

Phase 5 - Final revegetation (season 2)

Task/Milestone	Estimated Dates
Phase 1 – Issue RFP to Bidders	Completed June 2021
Phase 1 – RFP Evaluation & Recommendation	Completed July 2021
Phase 2 – Constructor Contract Award	Completed January 2022
Phase 3 – Project Kick-off with successful Contractor	Completed February 4, 2022
Phase 4 – Contractor Mobilization to Site	Completed February 2022
Phase 4 – Reclamation Grading	February 2022 to present
Phase 4 – Contractor Demobilize from Site	Fall 2023
Phase 5 – Final Revegetation season 2 Begins	2023 until acceptance

Progress of activities this month:

- Contractor continued earth moving activities
- Quality assurance testing continued
- Importing topsoil material continued, but at a decreased rate
- Processing of riprap continued
- Geotechnical monitoring continued
- Ongoing coordination with USFS and the City of Colorado Springs to obtain approval to excavate the remaining material from USFS land

Work planned for next month includes:

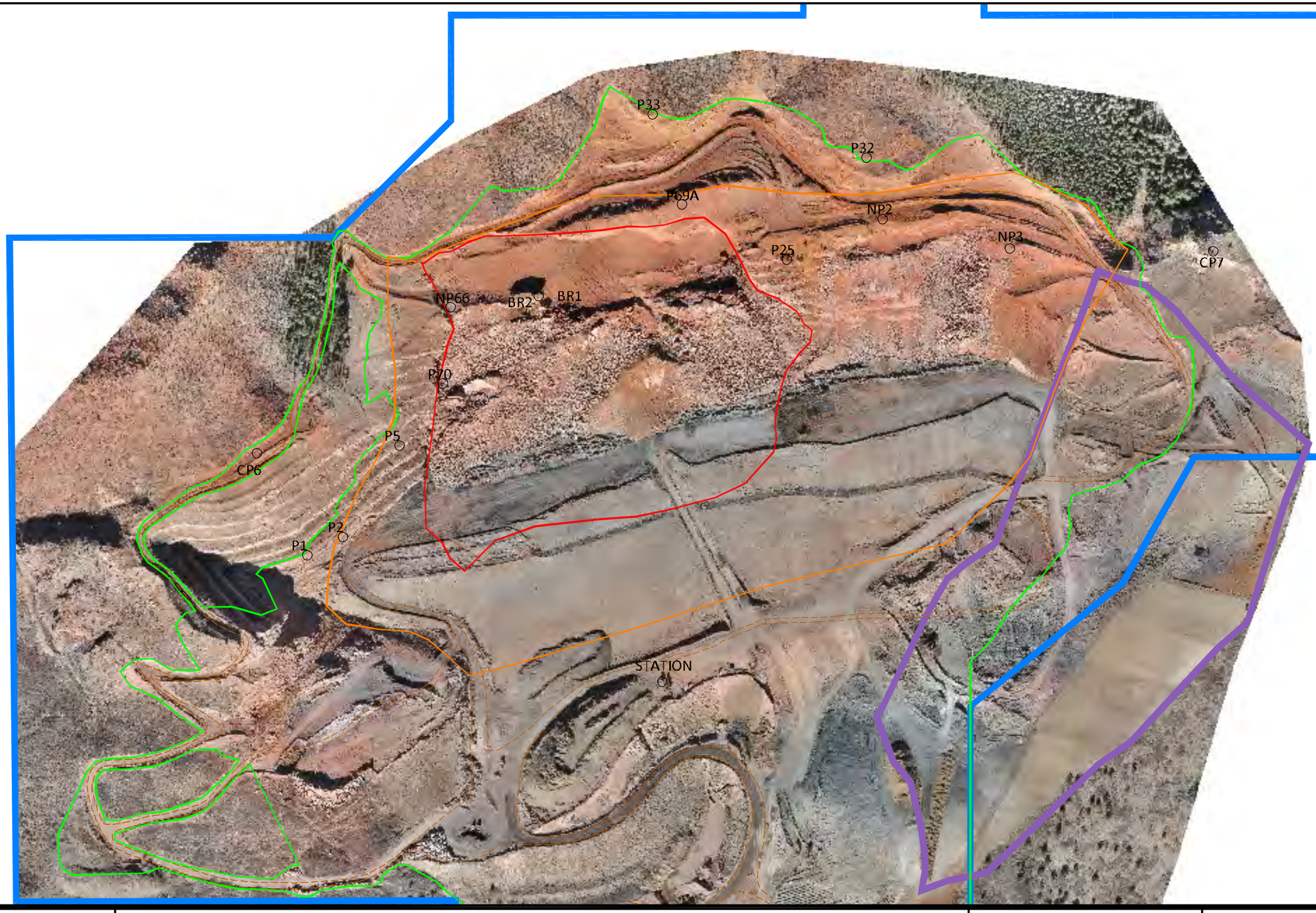
- Continue reclamation grading
- Continue importing topsoil material
- Continue processing riprap
- Continue geotechnical monitoring
- Planning for placing topsoil and revegetation of areas that have reached the final grade. This is mostly the area below the lowest terrace.
- Continue removing and replacing prisms on an as-needed basis. Prisms along the lowest terrace are being planned for installation following the placement of topsoil and revegetation.
- Continue working with USFS and the City of Colorado Springs to obtain approval to excavate the remaining material from USFS land.

7.0 CONCLUSIONS

The data collected in March 2023 demonstrate compliance with the reclamation grading plan. The buttress fill is being placed and compacted as intended and specified.

None of the data collected in March 2023 indicate evidence of any large-scale movements that increase risk to workers or to the public. The landslide area continues to show slope creep movements with slow velocities. Shallow surface erosion continues to occur requiring ongoing maintenance and cleanup.

- Restricted access to the ungraded landslide slopes should continue.
- All monitoring should continue at current frequencies.
- All alarms shall continue to be taken seriously even if data errors are suspected.



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LEGEND

- Permit/Affected Lands Boundary
- City Grading Permit Boundary
- Proposed Disturbance Limit
- Landslide Extent
- Buttress Fill Extent
- Existing Prism
- Removed Prism

N

0 300' 600'

Client/Project
RIVERBEND INDUSTRIES INC.

PIKEVIEW QUARRY SLOPE MONITORING

Project No.
2057288200

Title
SITE MAP

Revision
#

Date
2023.04.28

Drawn By
PK

Figure No.
1

Appendix A

Visual Inspections

6. Slope at final grade leading up to first bench

5. Cracks monitored on slopes

4.View north of Pit Floor and NBA benches

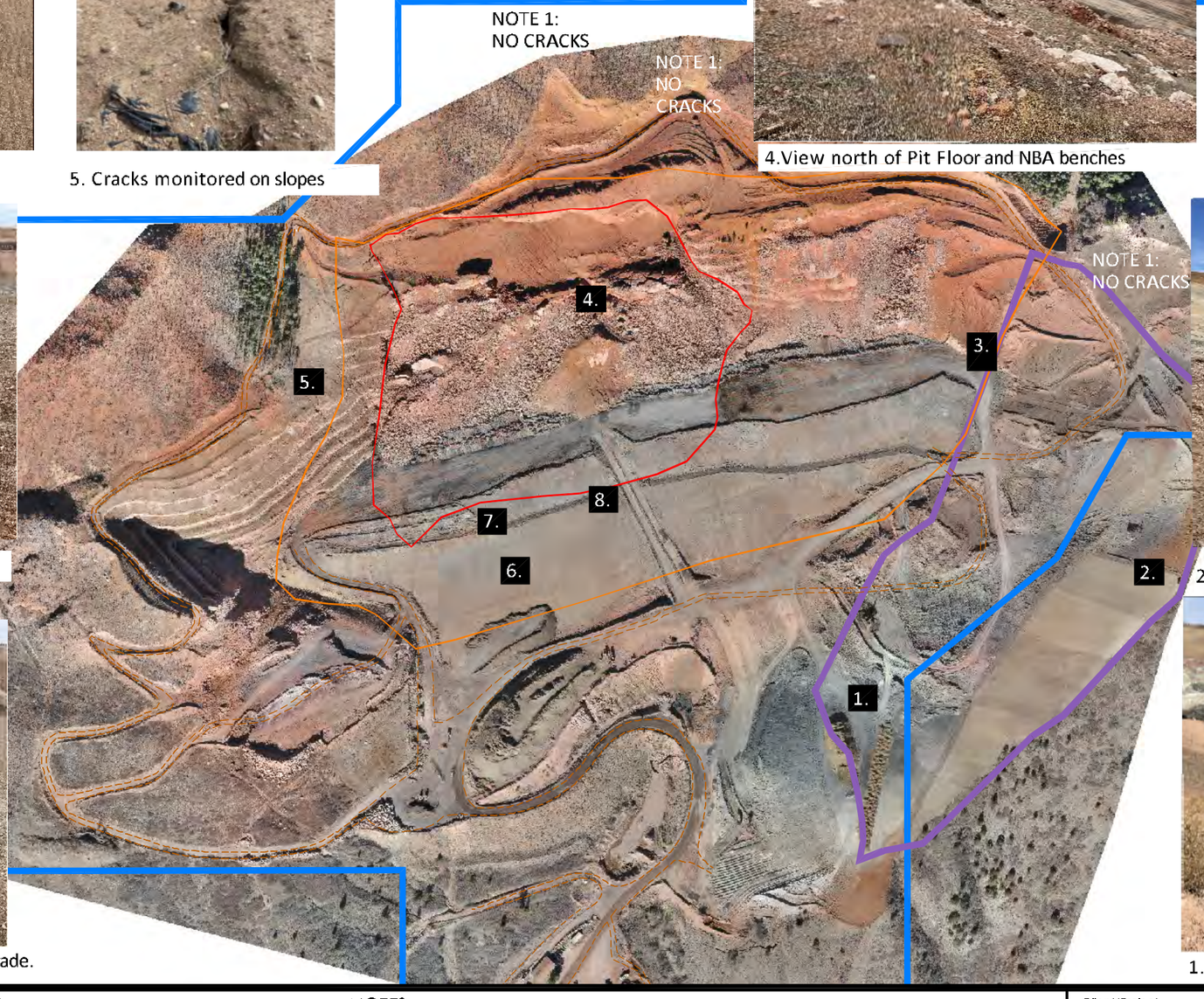
3. View of compaction area and first bench.

7. View south onto pit floor from first bench

2. Erosion blanket on slope in North Borrow Area.

8. Lowest terrace bench. Slope below is at final grade.

1. View north of benches in North Borrow Area



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LEGEND

- Permit/Affected Lands Boundary
- City Grading Permit Boundary
- Proposed Disturbance Limit
- Landslide Extent
- Buttress Fill Extent
- Observed Crack

NOTES

1. NO CRACKS OBSERVED IN THIS AREA.
2. ALL PHOTOS TAKEN MARCH 20, 2023.

N

0 400' 800'

Client/Project
RIVERBEND INDUSTRIES INC.

PIKEVIEW QUARRY SLOPE MONITORING

Project No.
2057288200

Title
OBSERVATIONS FROM MARCH INSPECTION

Revision	Date
#	2023.04.28
Drawn By	Figure No.
PK	2

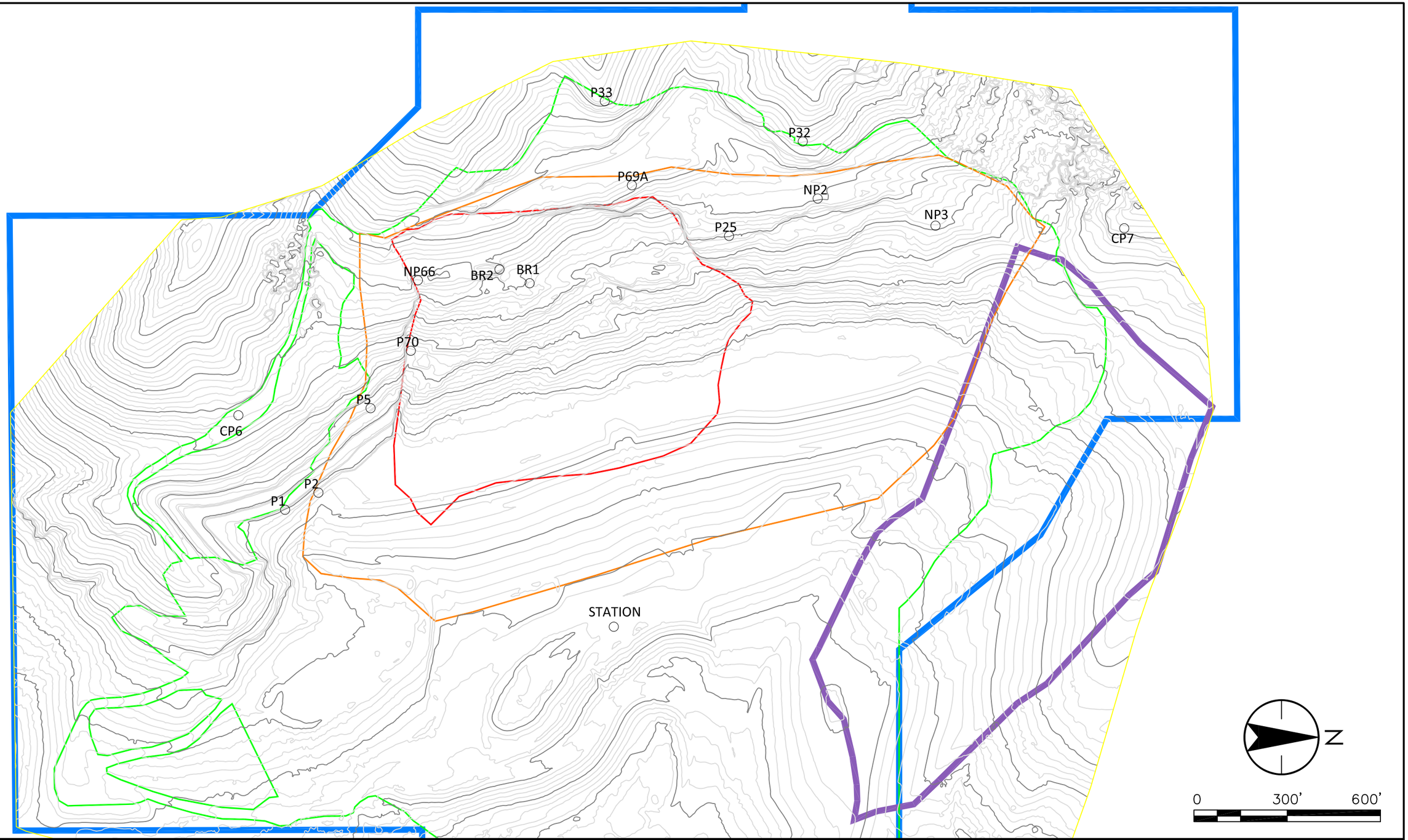
Stantec

Table A-1 Summary of Daily Inspections

Date	Notes	Inspection By
1-Mar-23	No movement observed. Good to proceed.	Jerald Schnabel
2-Mar-23	No movement observed. Good to proceed.	Jerald Schnabel
3-Mar-23	No movement observed. Good to proceed.	Jerald Schnabel
4-Mar-23	No movement observed. Good to proceed. Observations limited by fog.	Jerald Schnabel
5-Mar-23	No work.	Not applicable
6-Mar-23	No movement observed. Good to proceed.	Jerald Schnabel
7-Mar-23	No movement observed. Good to proceed. Observations limited by fog.	Jerald Schnabel
8-Mar-23	No movement observed. Good to proceed. Observations limited by fog.	Jerald Schnabel
9-Mar-23	No movement observed. Good to proceed.	Jerald Schnabel
10-Mar-23	No movement observed. Good to proceed.	Jerald Schnabel
11-Mar-23	No movement observed. Good to proceed.	Jerald Schnabel
12-Mar-23	No work.	Not applicable
13-Mar-23	No movement observed. Good to proceed.	Jerald Schnabel
14-Mar-23	No movement observed. Good to proceed.	Jerald Schnabel
15-Mar-23	No movement observed. Observations limited by snow. No work.	Jerald Schnabel
16-Mar-23	No movement observed. Observations limited by snow. No work.	Jerald Schnabel
17-Mar-23	No movement observed. Observations limited by snow. No work.	Jerald Schnabel
18-Mar-23	No work.	Not applicable
19-Mar-23	No work.	Not applicable
20-Mar-23	No movement observed. Good to proceed.	Jerald Schnabel
21-Mar-23	No movement observed. Good to proceed.	Jerald Schnabel
22-Mar-23	No movement observed. Good to proceed.	Jerald Schnabel
23-Mar-23	No movement observed. Good to proceed.	Jerald Schnabel
24-Mar-23	No movement observed. Good to proceed.	Jerald Schnabel
25-Mar-23	No movement observed. Good to proceed.	Jerald Schnabel
26-Mar-23	No work.	Not applicable
27-Mar-23	No movement observed. Good to proceed.	Jerald Schnabel
28-Mar-23	No movement observed. Good to proceed.	Jerald Schnabel
29-Mar-23	No movement observed. Good to proceed.	Jerald Schnabel
30-Mar-23	No movement observed. Good to proceed.	Jerald Schnabel
31-Mar-23	No movement observed. Good to proceed.	Jerald Schnabel

Appendix B

Prism Survey



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LEGEND

- Permit/Affected Lands Boundary
- City Grading Permit Boundary
- Proposed Disturbance Limit
- Landslide Extent
- Buttress Fill Extent
- Existing Prism
- Removed Prism

1. PRISMS WILL BE INSTALLED AS EACH BENCH IS FINISHED.
2. ALL PRISMS WILL BE RETAINED AS LONG AS POSSIBLE.
3. TOPOGRAPHY FROM APRIL 3, 2023 DRONE SURVEY.
4. CONTOUR INTERVAL IS 10 FEET

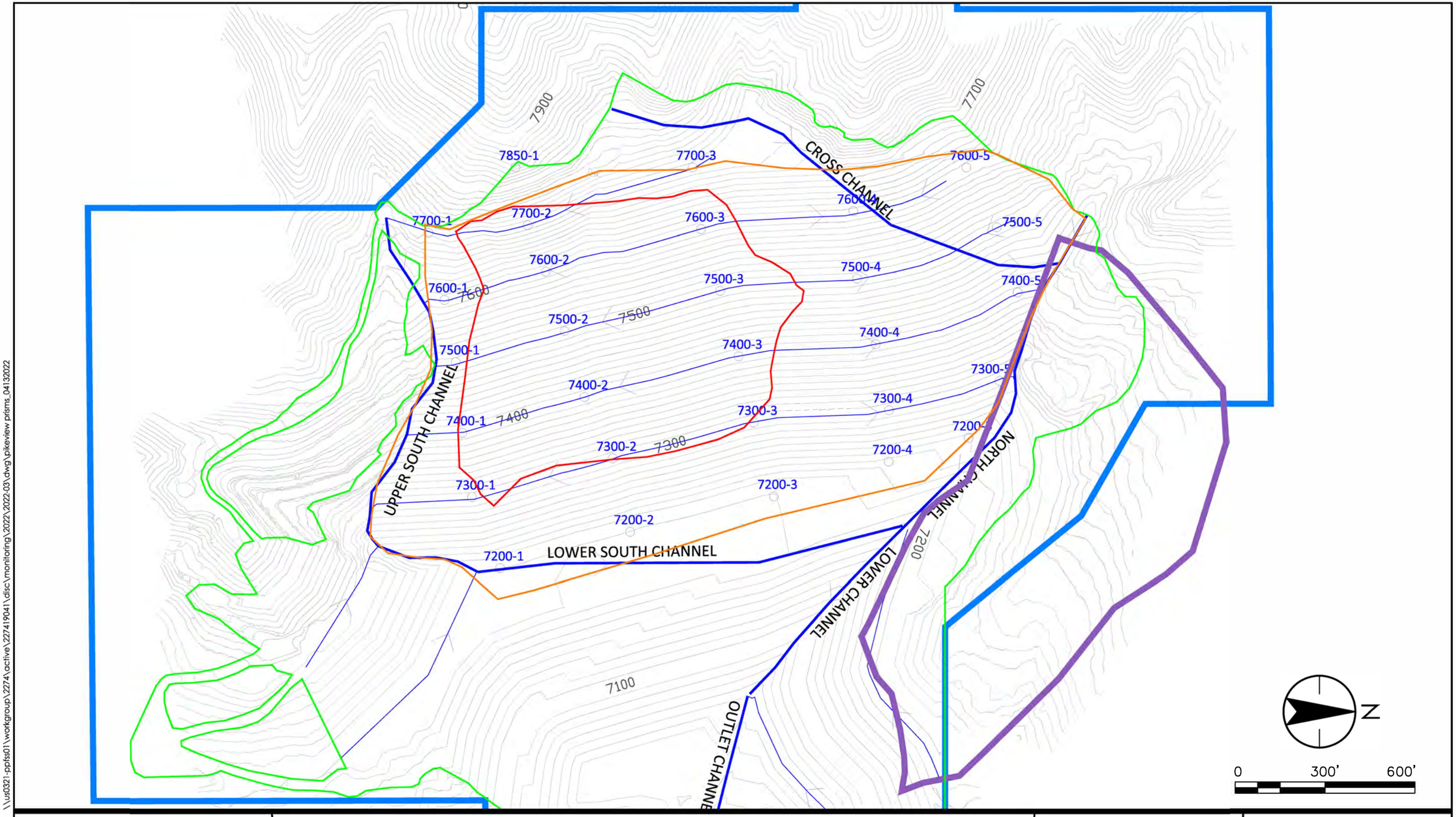
Client/Project
RIVERBEND INDUSTRIES INC.

PIKEVIEW QUARRY SLOPE MONITORING

Project No.
2057288200

Title
EXISTING PRISMS WITH CURRENT SURFACE

Revision	Date
#	2023.04.28
Drawn By	Figure No.
PK	3



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LEGEND

- Permit/Affected Lands Boundary
- City Grading Permit Boundary
- Proposed Disturbance Limit
- Landslide Extent
- Buttress Fill Extent
- Proposed Prism

NOTES

1. PRISMS WILL BE INSTALLED AS EACH BENCH IS FINISHED.
2. ALL PRISMS WILL BE RETAINED AS LONG AS POSSIBLE.

Client/Project
RIVERBEND INDUSTRIES INC.
PIKEVIEW QUARRY SLOPE MONITORING

Project No.
2057288200

Title
PROPOSED PRISMS WITH RECLAMATION SURFACE

Revision	Date
#	2023.04.28
Drawn By	Figure No.
PK	4

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Prism Log

Prism	Date	Action	Comment
CP2	11-Mar-22	Prism Removed	Reclamation grading to affect prism in near future
CP3	11-Mar-22	Prism Removed	Reclamation grading to affect prism in near future
NP1	11-Mar-22	Prism Removed	Reclamation grading to affect prism in near future
TOE2	11-Mar-22	Prism Removed	Reclamation grading to affect prism in near future
CP4	11-Mar-22	Prism Added	Control Point Replacement
CP5	11-Mar-22	Prism Added	Control Point Replacement
TS1	12-Mar-22	Prism Added	New Prism Added
TOE3	30-Mar-22	Prism Removed	Reclamation grading to affect buffer filling activities
TOE4	8-Apr-22	Prism Added	New Prism Added
TOE5	8-Apr-22	Prism Added	New Prism Added
BR1	8-Apr-22	Prism Added	New Prism Added
BR2	8-Apr-22	Prism Added	New Prism Added
NP1	22-Apr-22	Prism Removed	Originally NP1. Prism re-set in same spot and is now NP3
NP3	22-Apr-22	Prism Added	
TOE3	22-Apr-22	Prism Removed	Originally TOE3. Prism moved to a higher elevation and is now TOE6
TOE6	22-Apr-22	Prism Added	
TOE1	22-Apr-22	Prism Removed	Reclamation grading to affect buffer filling activities
P4	17-Jun-22	Prism Removed	Prism removed due to rock deterioration
P69	20-Jul-22	Prism Removed	Prism was originally P69. It has been re-set to Higher Elevation and is now P69A. Related to base station relocation.
P69A	20-Jul-22	Prism Added	
P35	20-Jul-22	Prism Renamed	Prism was originally P35. It has been re-set to Higher Elevation and is now CP6. Related to base station relocation.
CP6	20-Jul-22	Prism Added	
CP5	20-Jul-22	Prism Renamed	Prism was originally CP5. It has been re-set to Higher Elevation and is now CP7. Related to base station relocation.
CP7	20-Jul-22	Prism Added	
CP1	20-Jul-22	Prism Removed	Not in line of sight of new base station.
CP4	20-Jul-22	Prism Removed	Not in line of sight of new base station.
TOE4	20-Jul-22	Prism Removed	Not in line of sight of new base station.
TOE6	20-Jul-22	Prism Removed	Not in line of sight of new base station.
TOE5	4-Aug-2022	Prism Removed	Out of line of sight of base station.
P63	15-Aug-2022	Prism Removed	Out of line of sight of base station.

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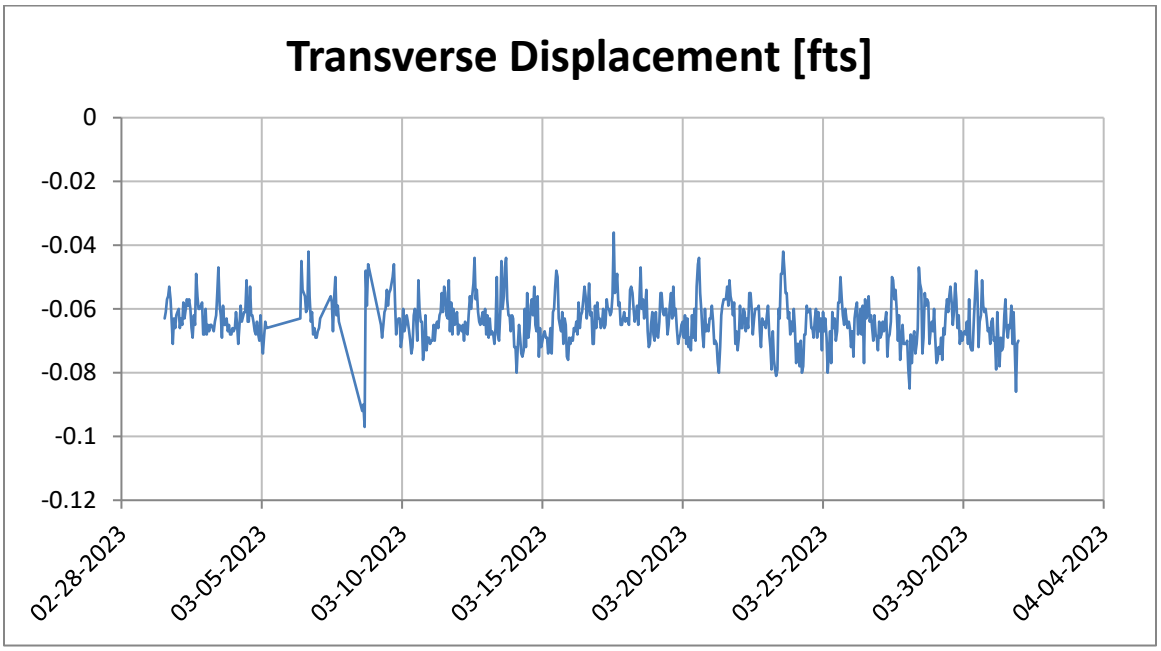
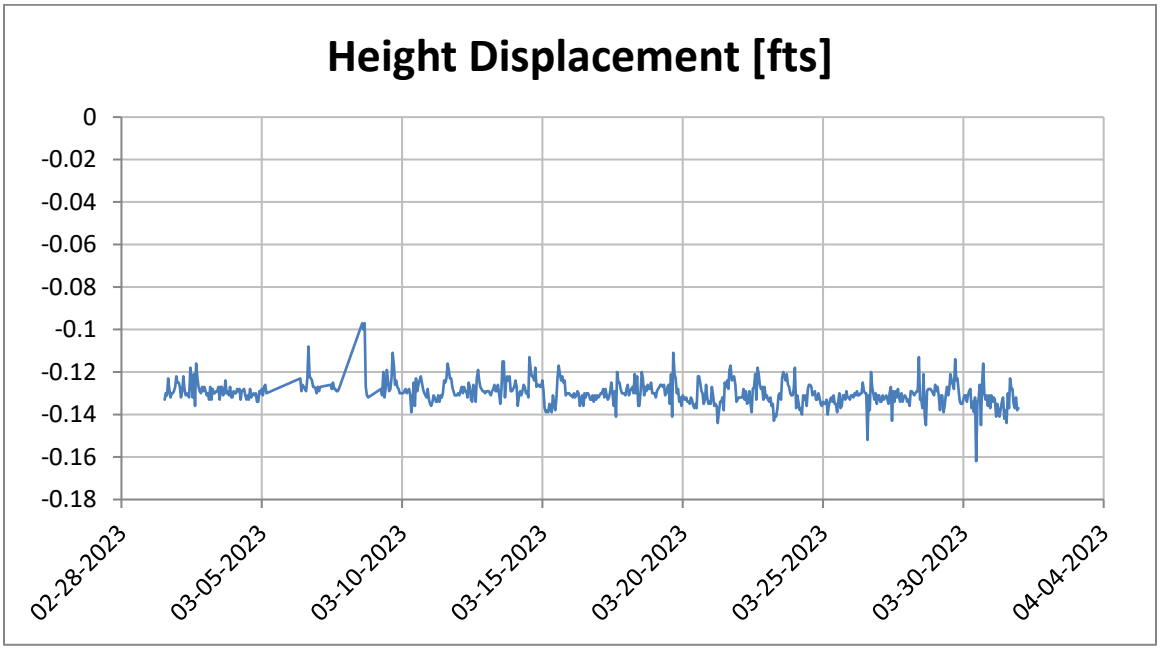
Prism BR1





Notes:

1. Survey accuracy is +/-0.016 feet.
2. Alarm threshold is +/-0.35 feet.
3. Transverse displacement is in the horizontal direction. Positive direction means closer to the robotic station.
4. Height displacement is in the vertical direction. Positive direction means higher in elevation.
5. Prism previously recorded slope creep movements with slow velocity.

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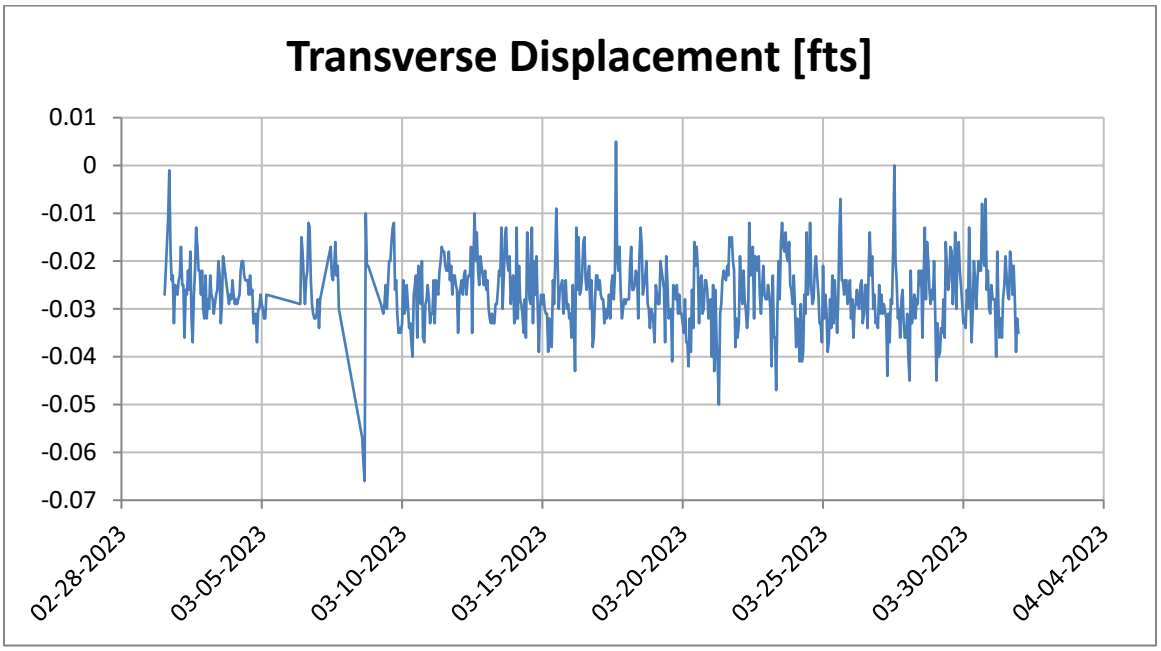
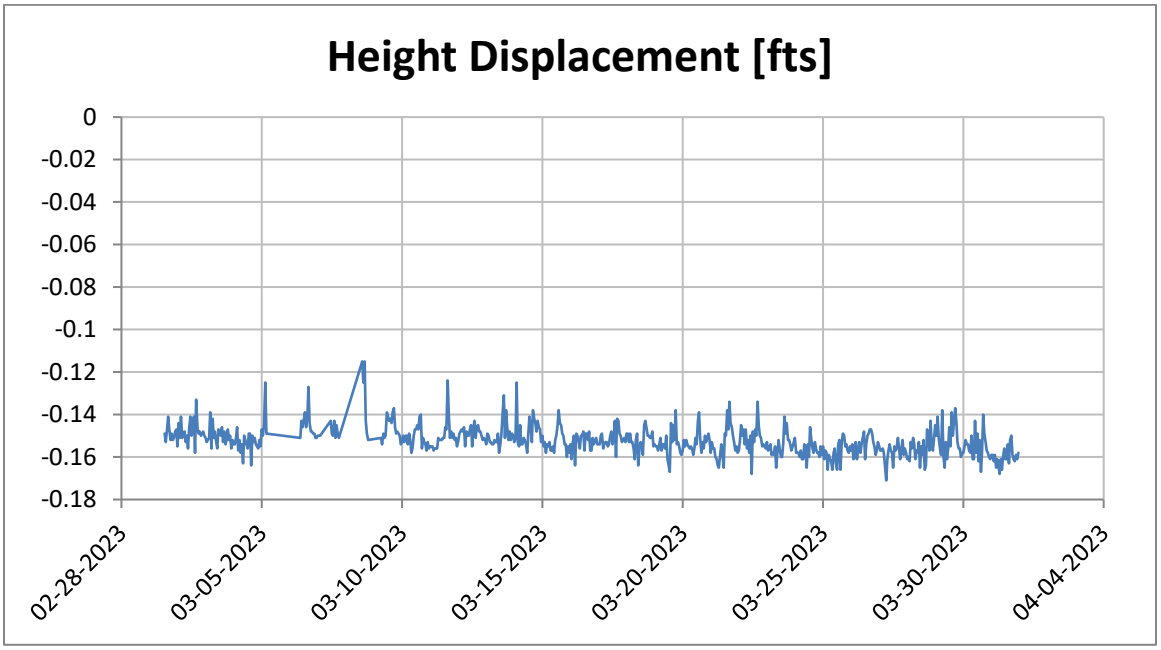
Prism BR2





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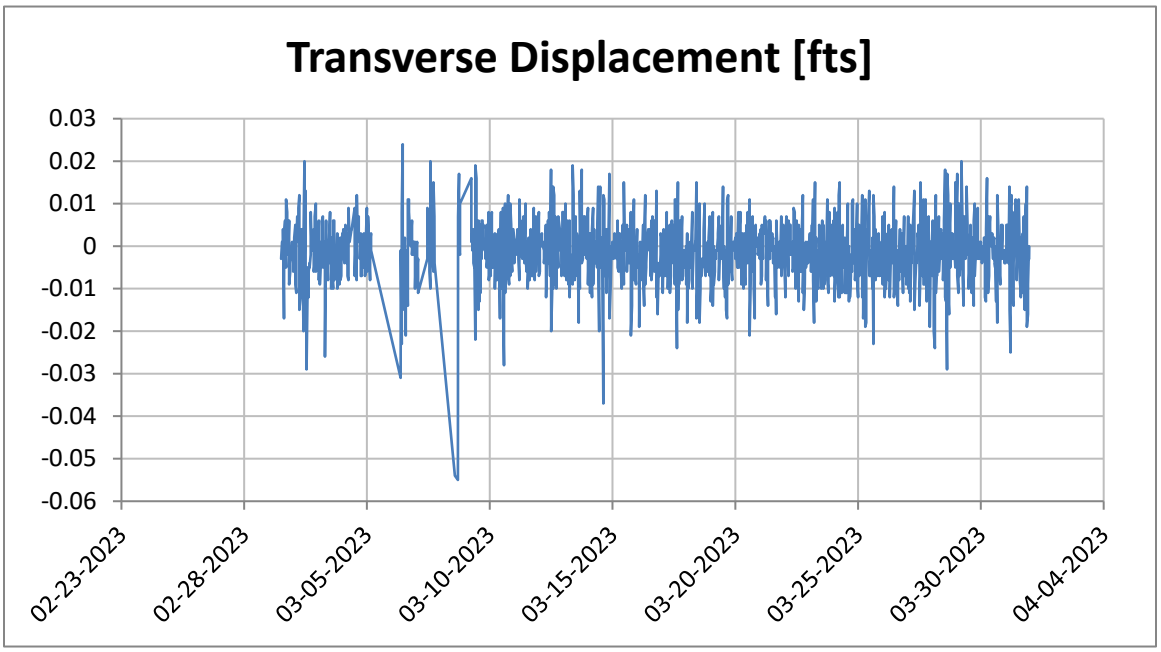
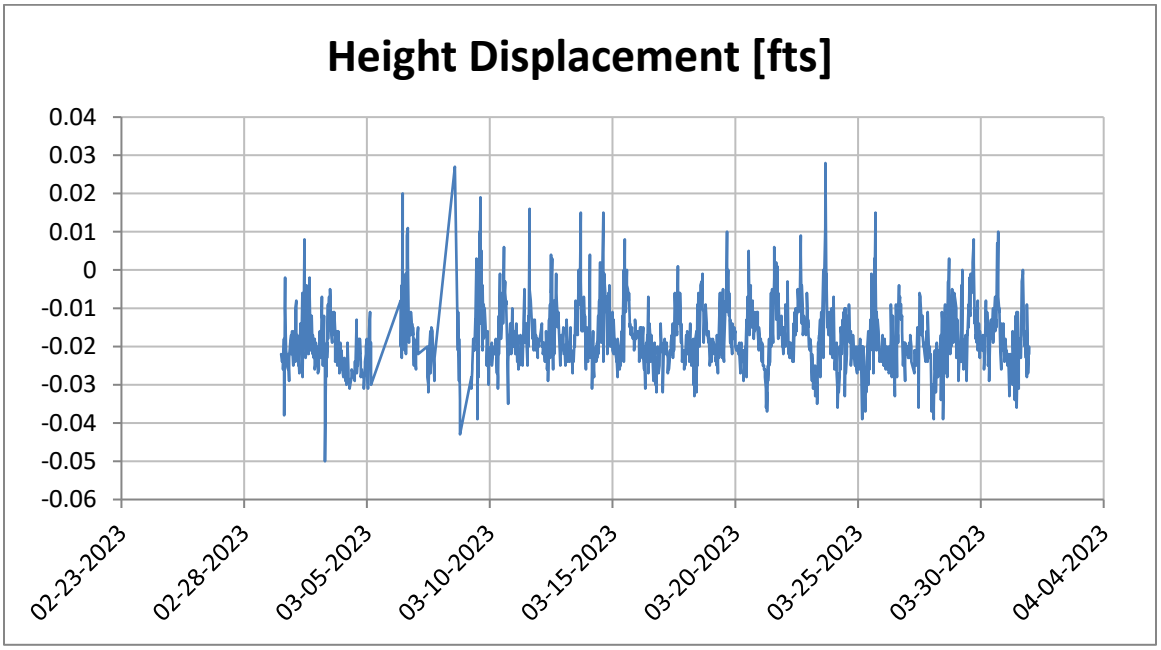
Prism CP6



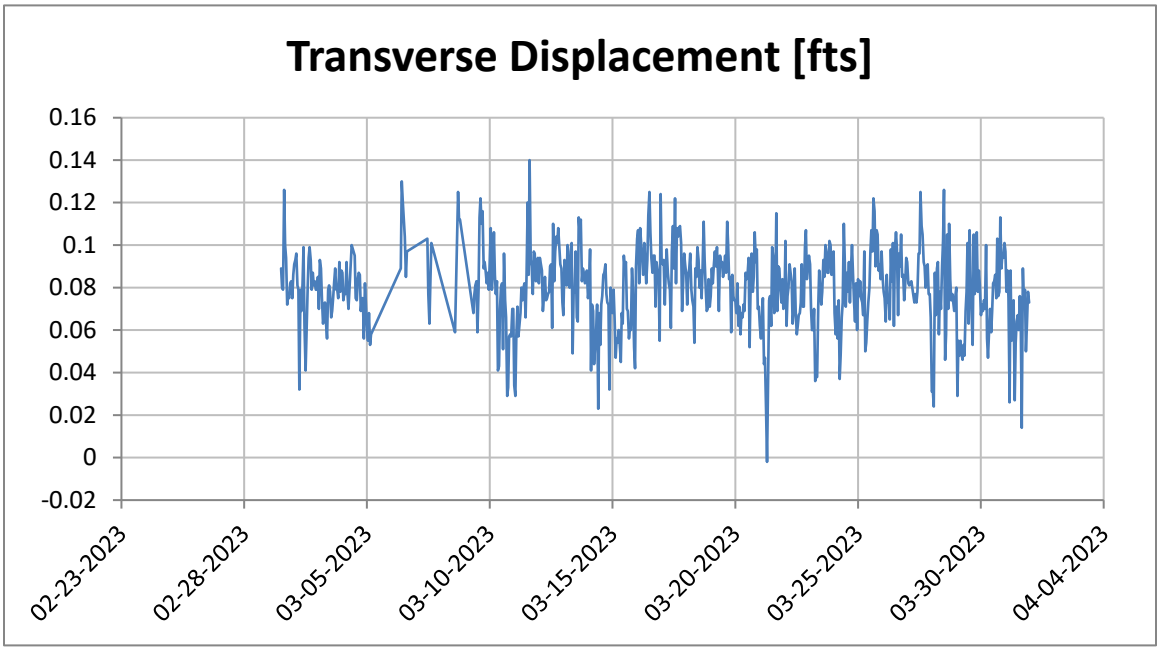


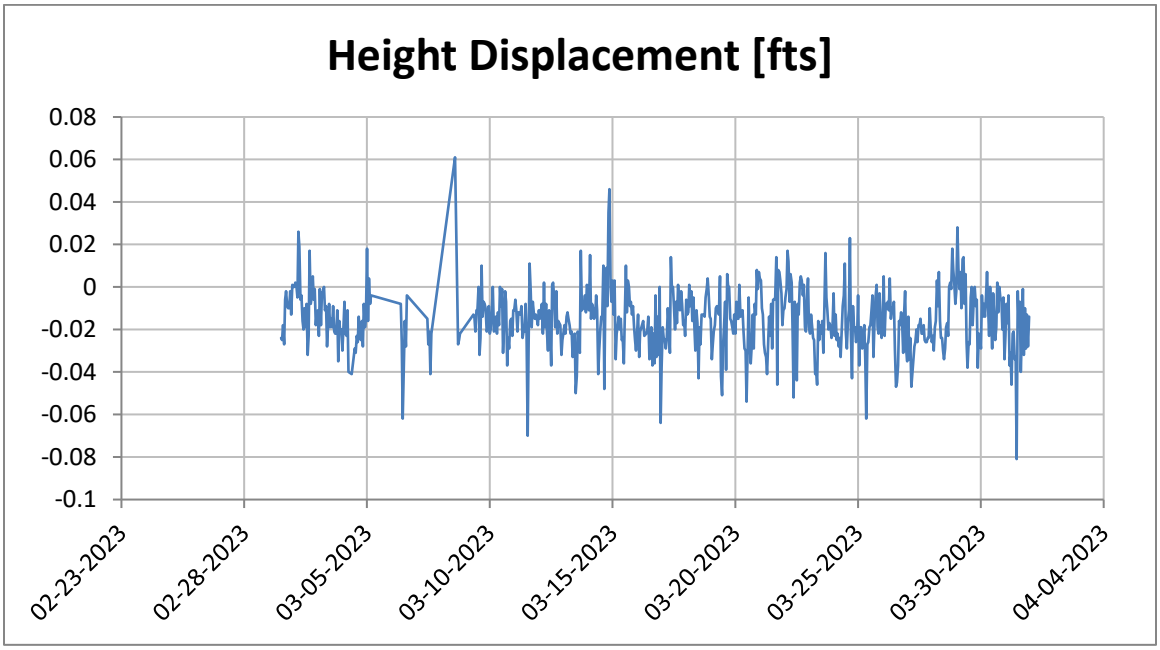
Notes:

1. Survey accuracy is +/-0.016 feet.
2. Alarm threshold is +/-0.35 feet.
3. Transverse displacement is in the horizontal direction. Positive direction means closer to the robotic station.
4. Height displacement is in the vertical direction. Positive direction means higher in elevation.

Stantec

Prism CP7



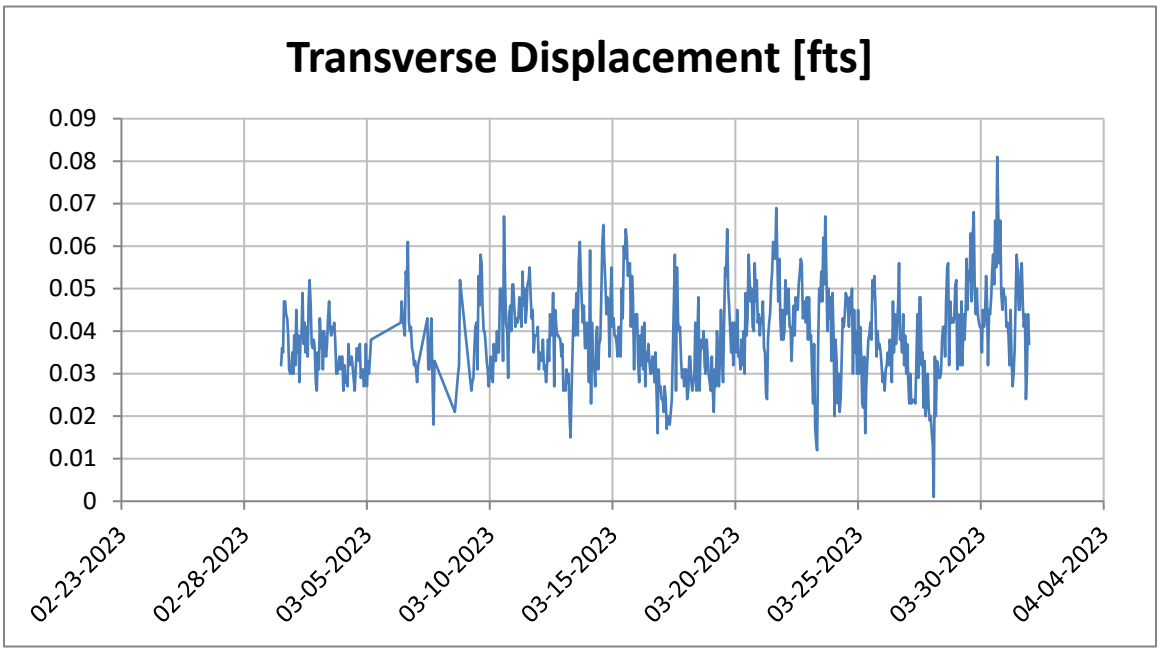


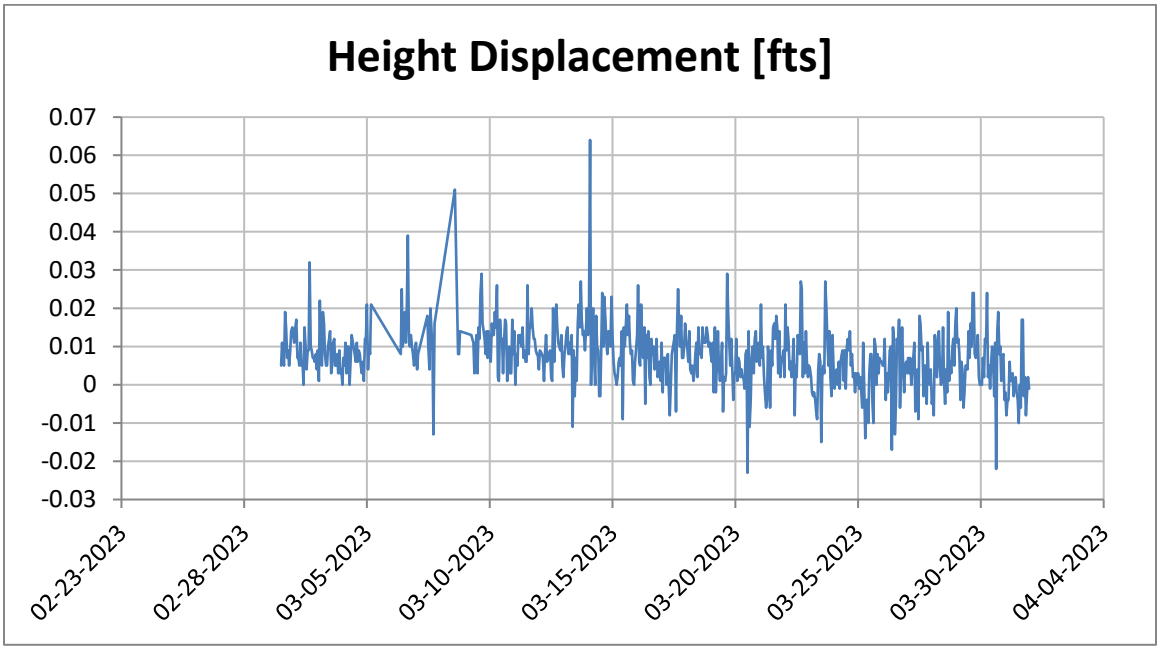
Notes:

1. Survey accuracy is +/-0.016 feet.
2. Alarm threshold is +/-0.35 feet.
3. Transverse displacement is in the horizontal direction. Positive direction means closer to the robotic station.
4. Height displacement is in the vertical direction. Positive direction means higher in elevation.

Stantec

Prism NP2



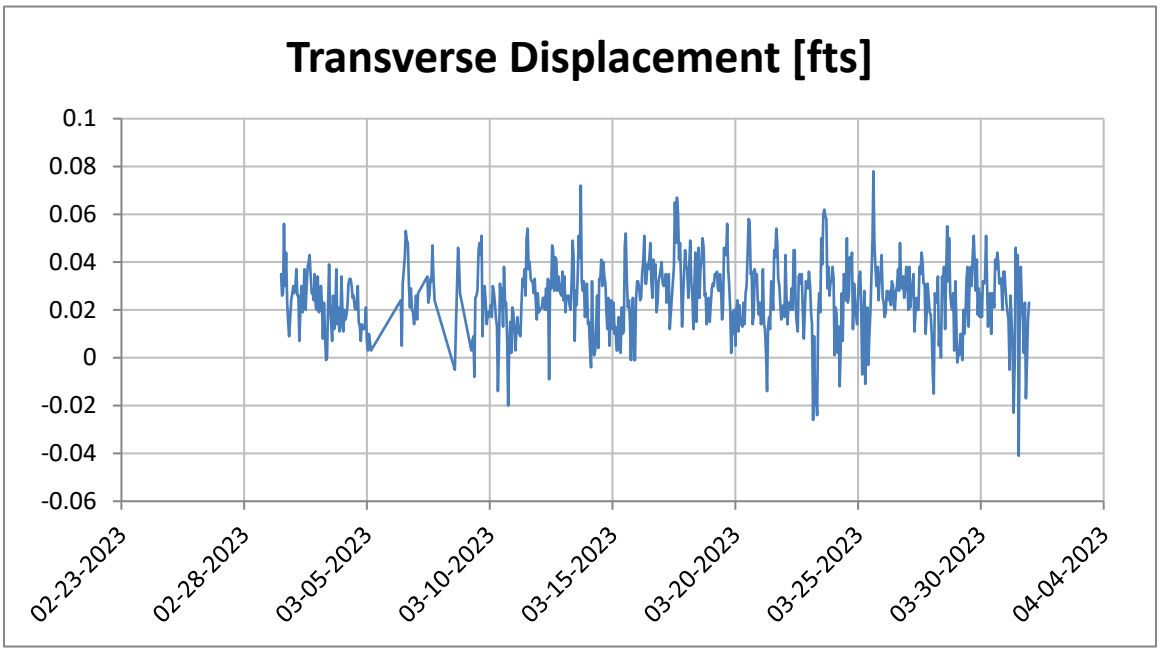


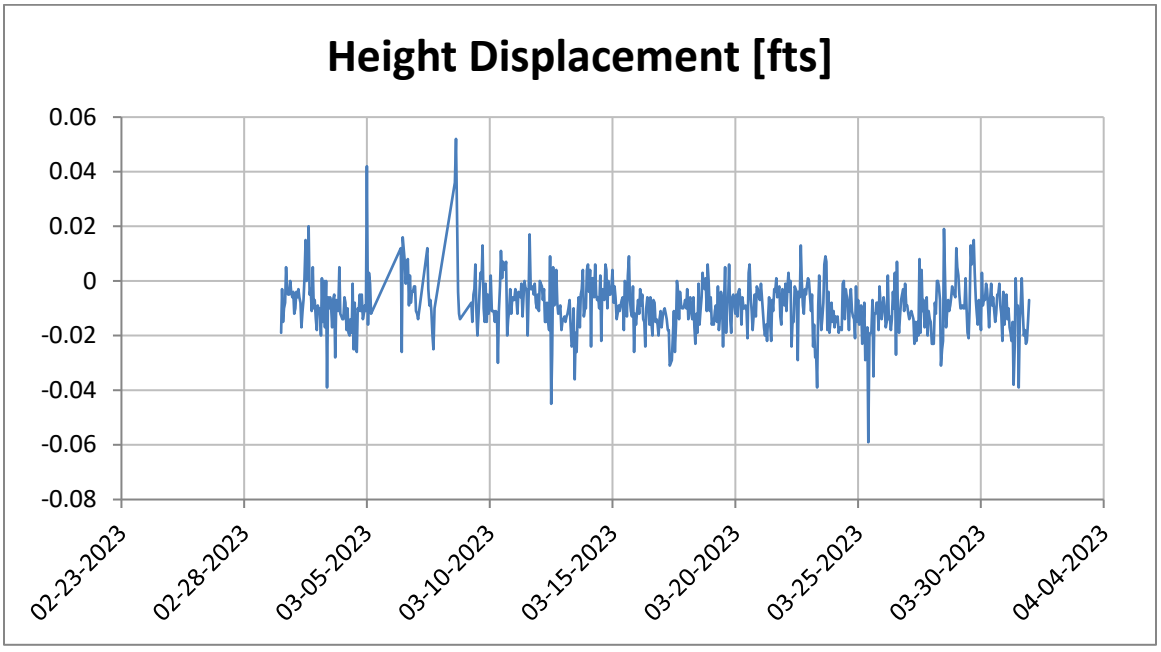
Notes:

1. Survey accuracy is +/-0.016 feet.
2. Alarm threshold is +/-0.35 feet.
3. Transverse displacement is in the horizontal direction. Positive direction means closer to the robotic station.
4. Height displacement is in the vertical direction. Positive direction means higher in elevation.

Stantec

Prism NP3





Notes:

1. Survey accuracy is +/-0.016 feet.
2. Alarm threshold is +/-0.35 feet.
3. Transverse displacement is in the horizontal direction. Positive direction means closer to the robotic station.
4. Height displacement is in the vertical direction. Positive direction means higher in elevation.

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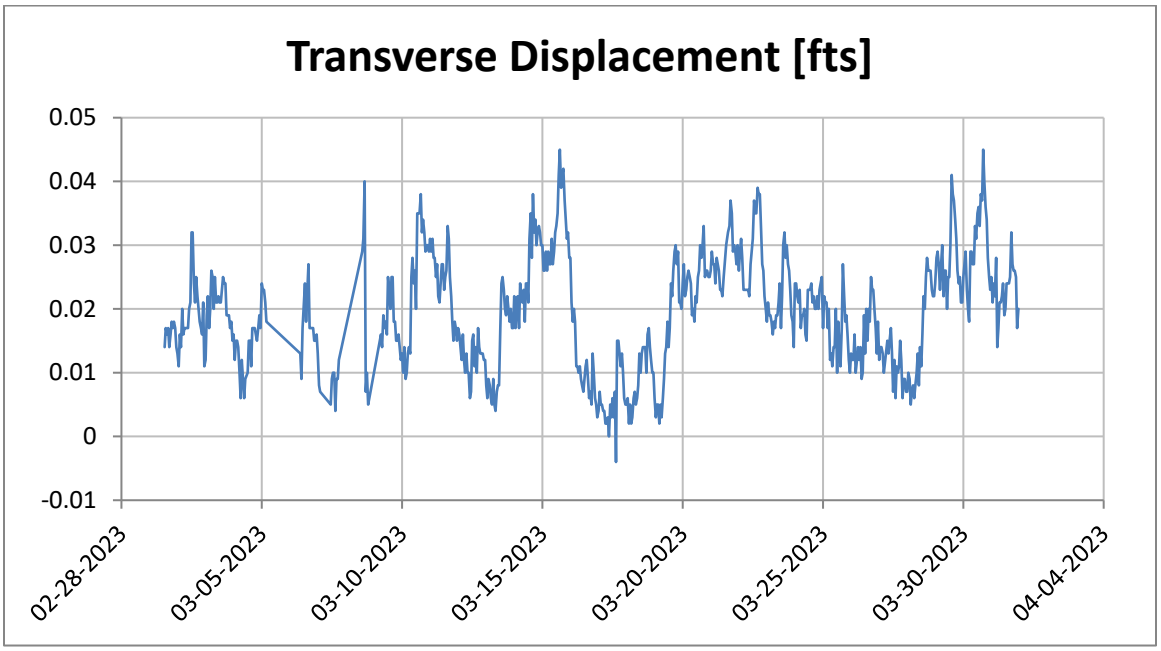
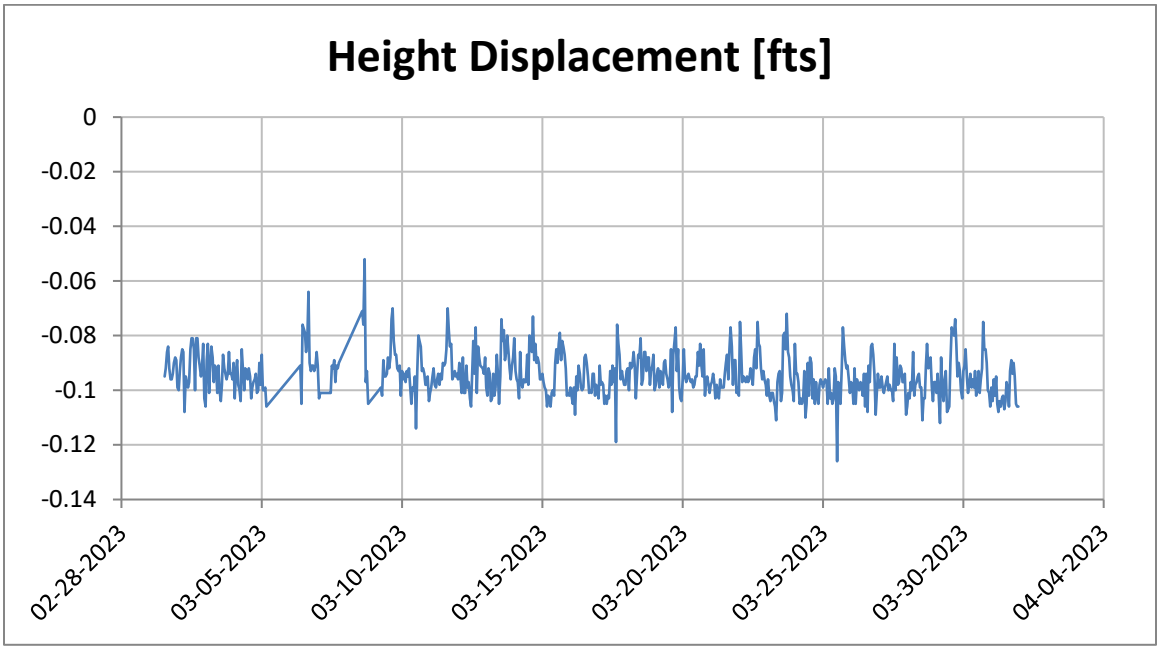
Prism NP66





Notes:

1. Survey accuracy is +/-0.016 feet.
2. Alarm threshold is +/-0.35 feet.
3. Transverse displacement is in the horizontal direction. Positive direction means closer to the robotic station.
4. Height displacement is in the vertical direction. Positive direction means higher in elevation.
5. Prism previously recorded slope creep movements with slow velocity.

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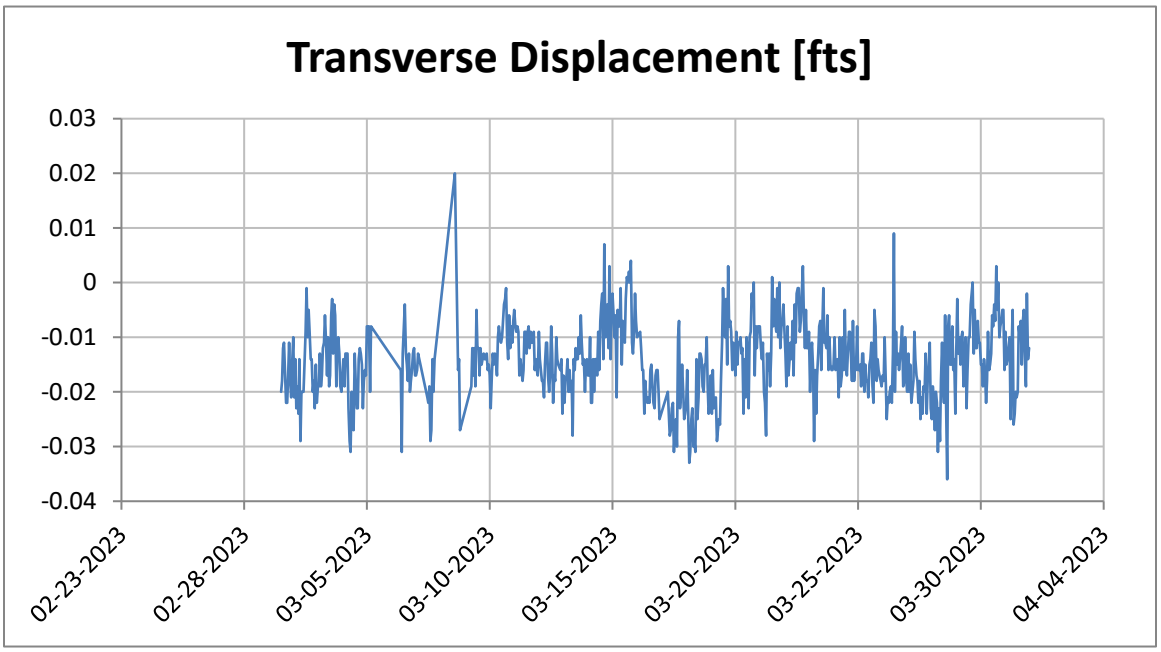
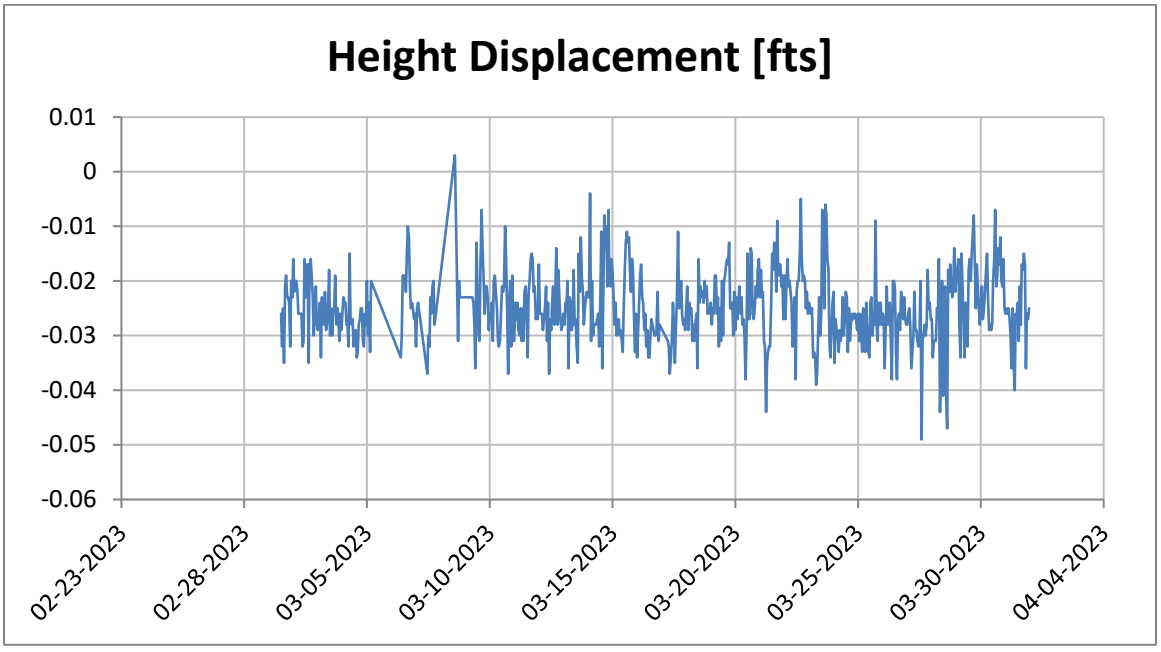
Prism P1



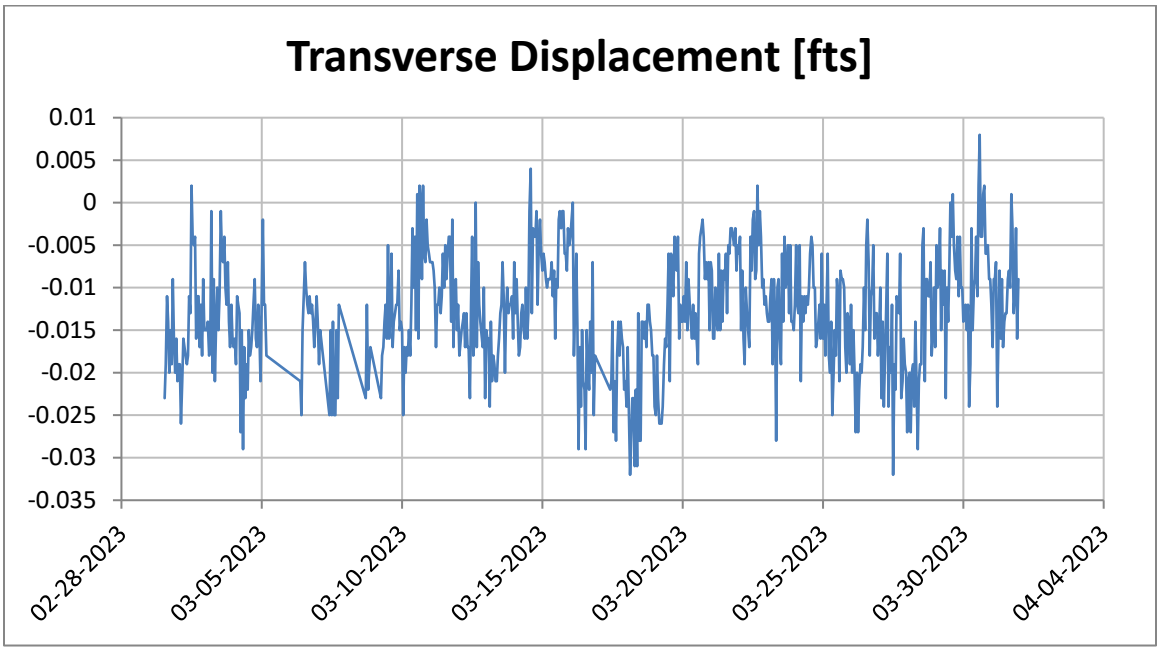


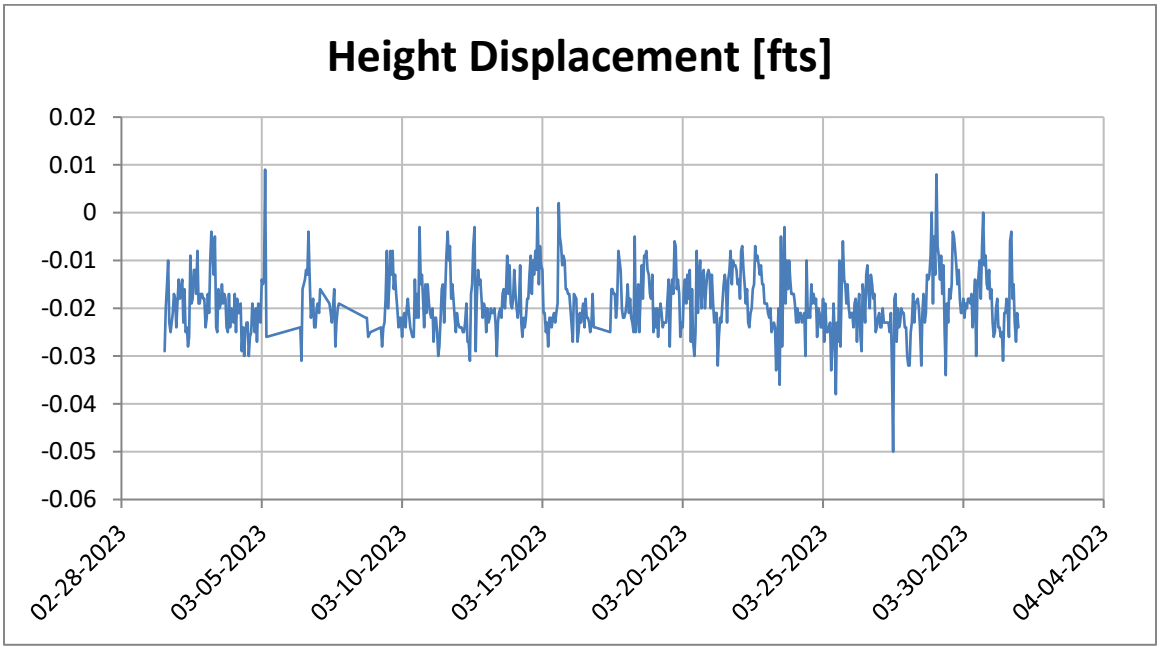
Notes:

1. Survey accuracy is +/-0.016 feet.
2. Alarm threshold is +/-0.35 feet.
3. Transverse displacement is in the horizontal direction. Positive direction means closer to the robotic station.
4. Height displacement is in the vertical direction. Positive direction means higher in elevation.

Stantec

Prism P2





Notes:

1. Survey accuracy is +/-0.016 feet.
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4. Height displacement is in the vertical direction. Positive direction means higher in elevation.

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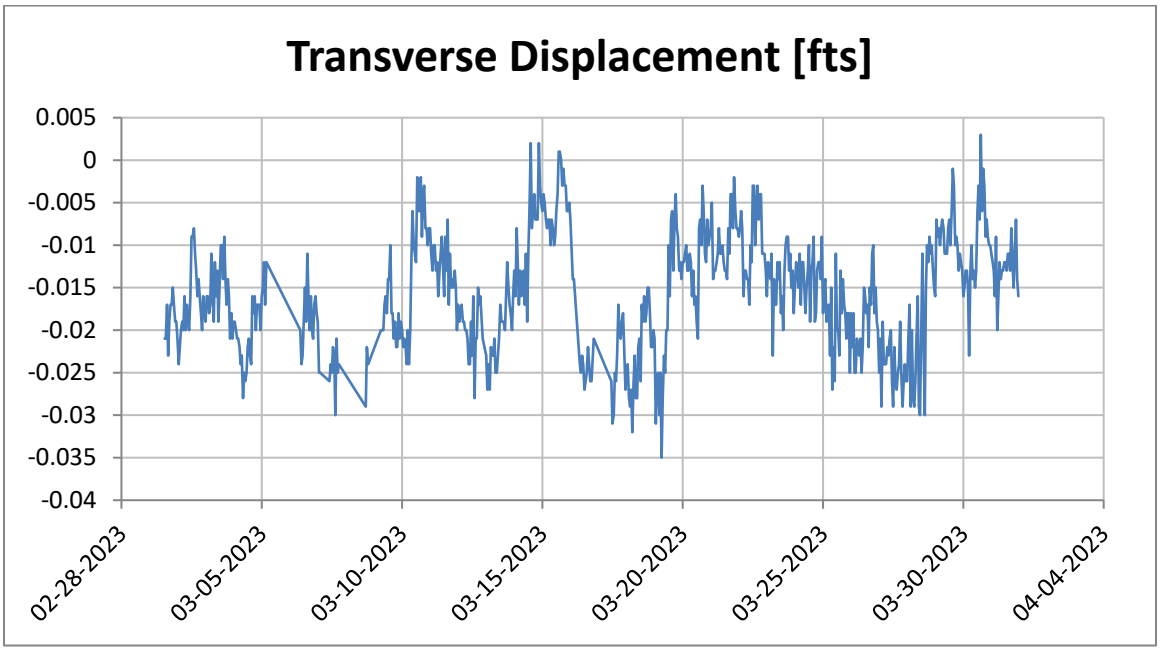
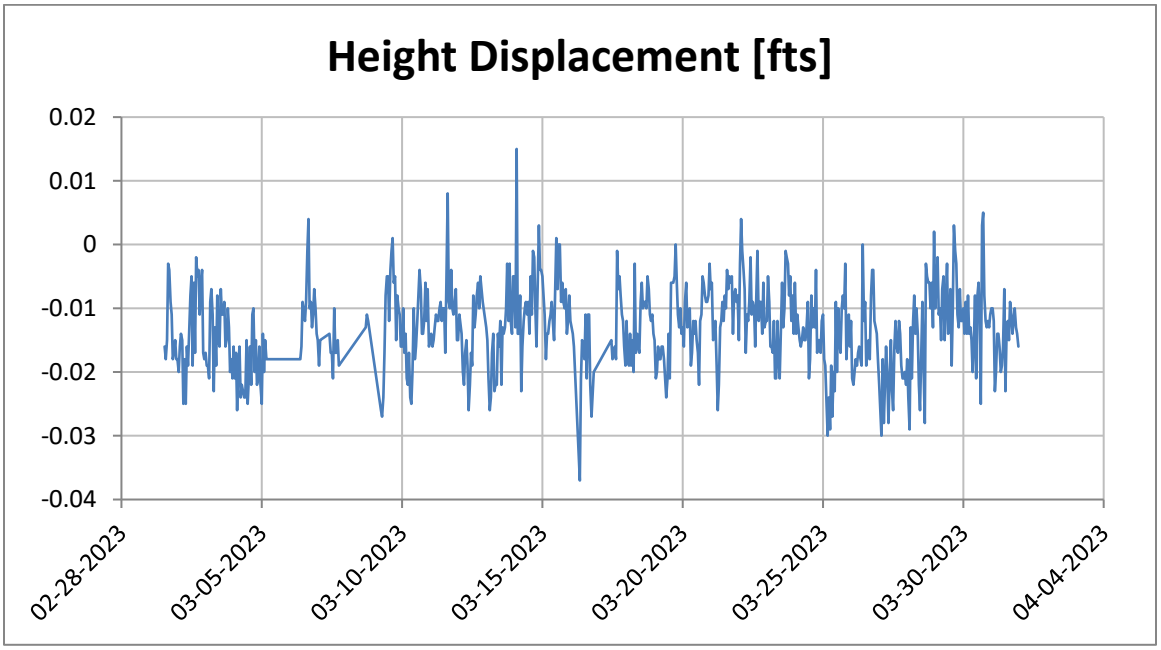
Prism P5





Notes:

1. Survey accuracy is +/-0.016 feet.
2. Alarm threshold is +/-0.35 feet.
3. Transverse displacement is in the horizontal direction. Positive direction means closer to the robotic station.
4. Height displacement is in the vertical direction. Positive direction means higher in elevation.

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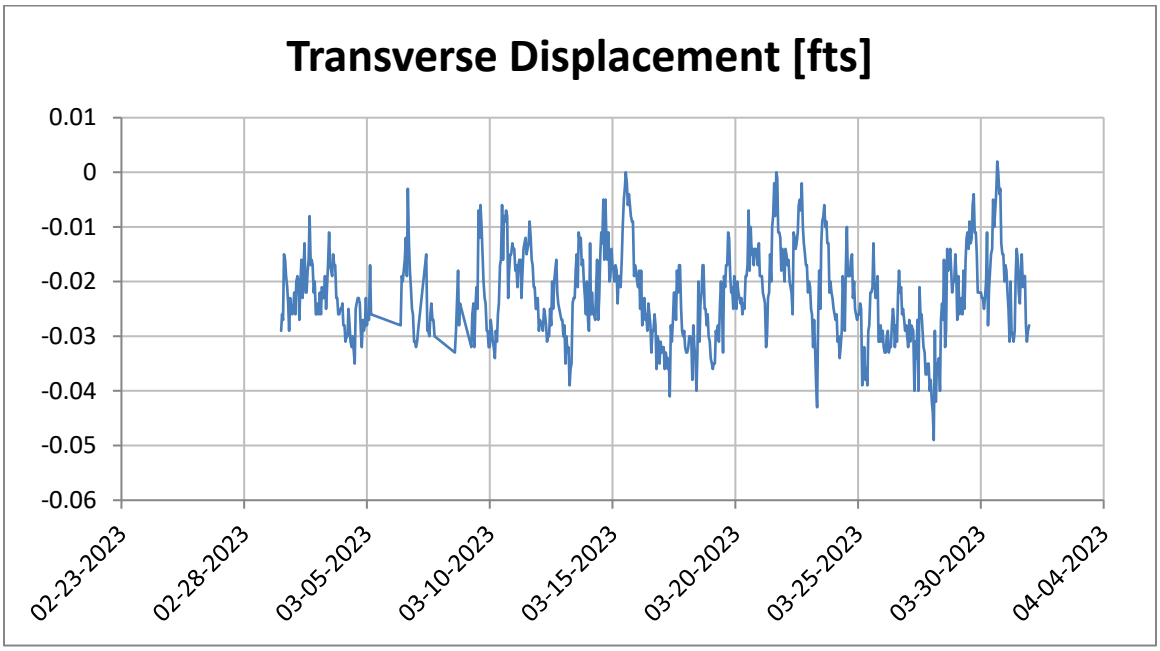
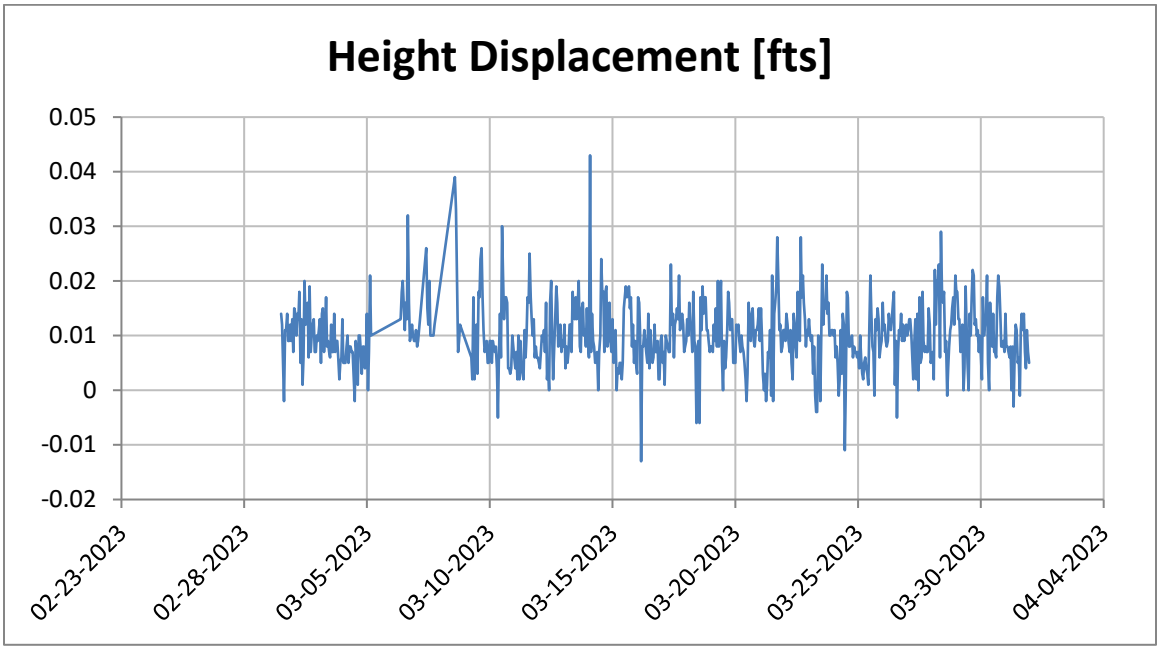
Prism P25





Notes:

1. Survey accuracy is +/-0.016 feet.
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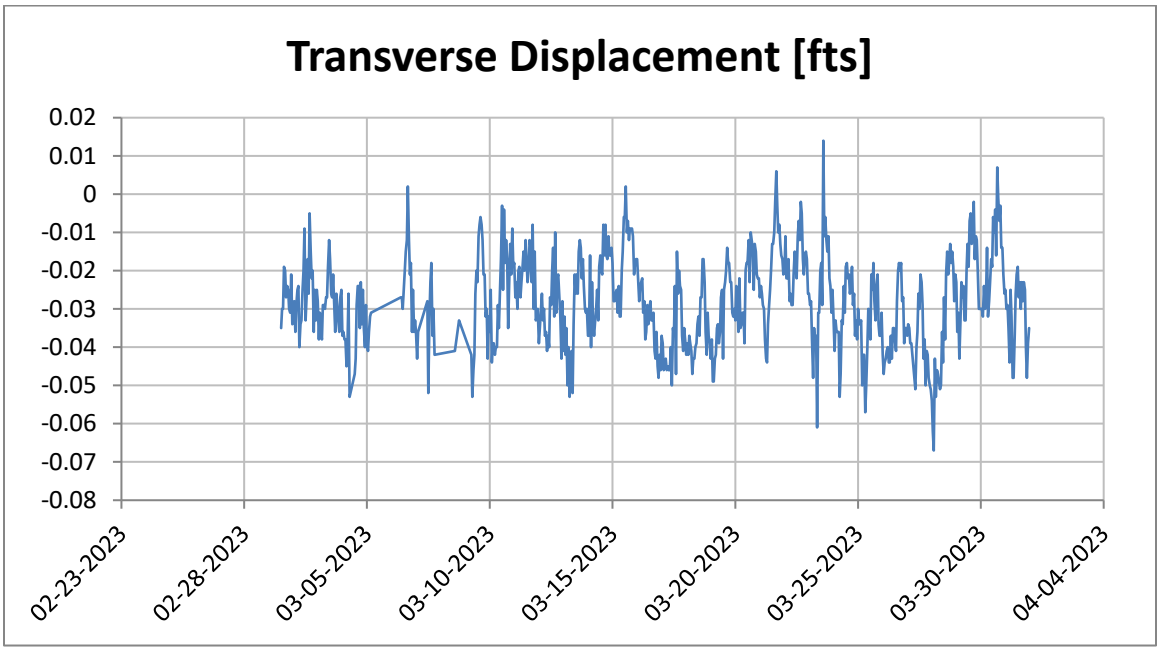
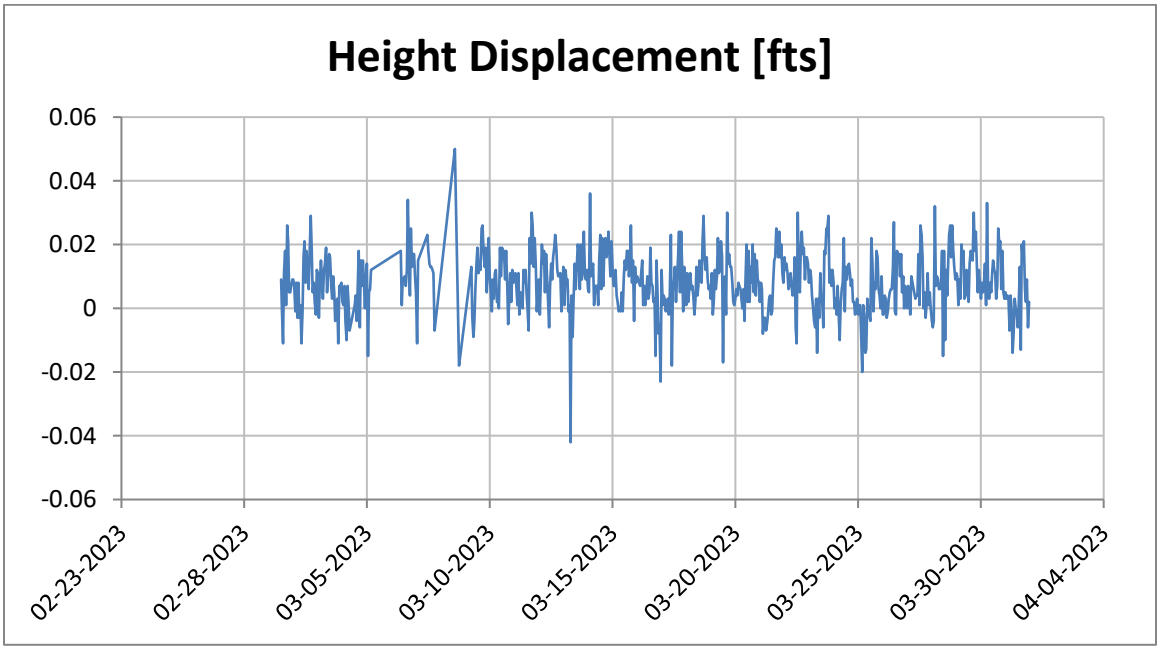
Prism P32





Notes:

1. Survey accuracy is +/-0.016 feet.
2. Alarm threshold is +/-0.35 feet.
3. Transverse displacement is in the horizontal direction. Positive direction means closer to the robotic station.
4. Height displacement is in the vertical direction. Positive direction means higher in elevation.

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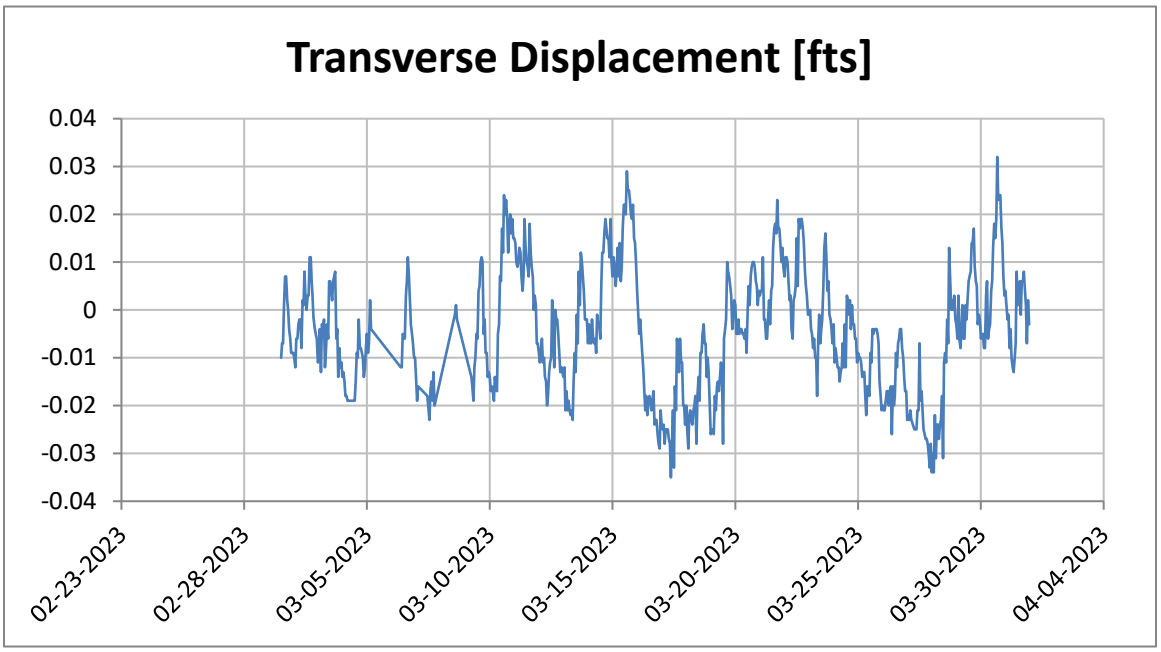
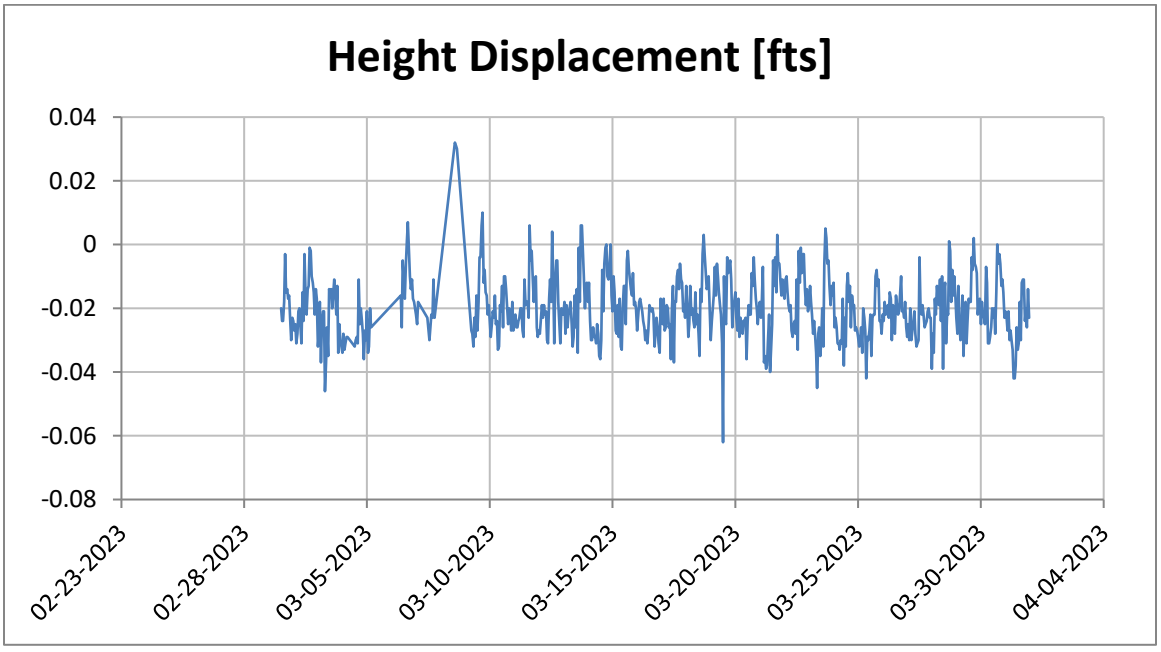
Prism P33





Notes:

1. Survey accuracy is +/-0.016 feet.
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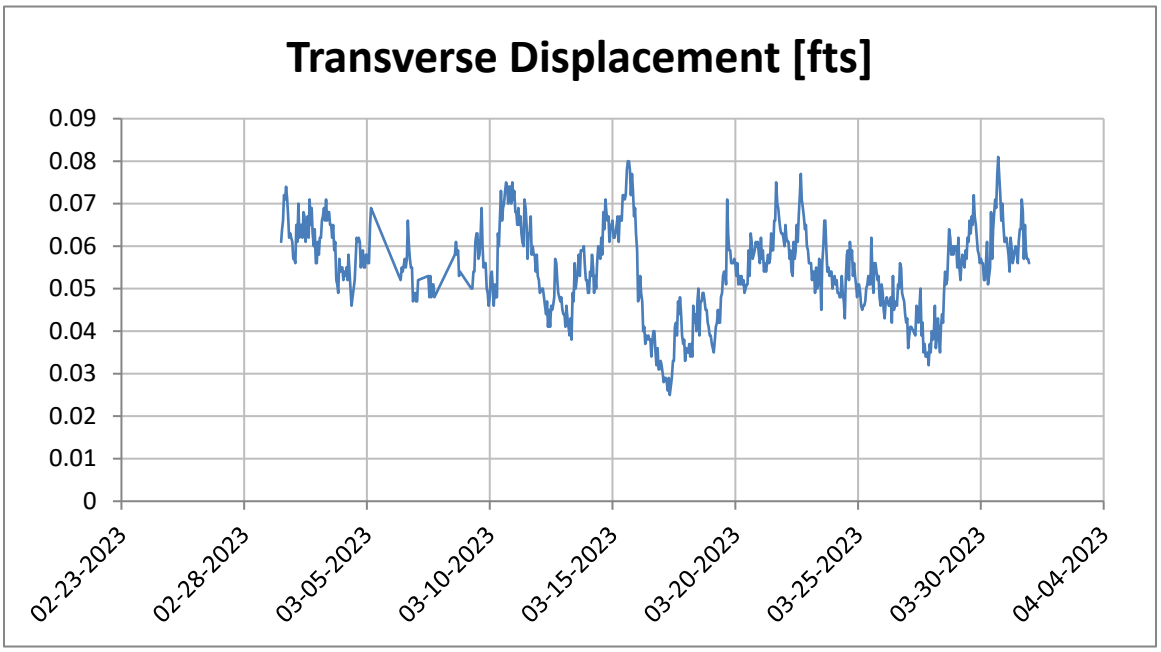
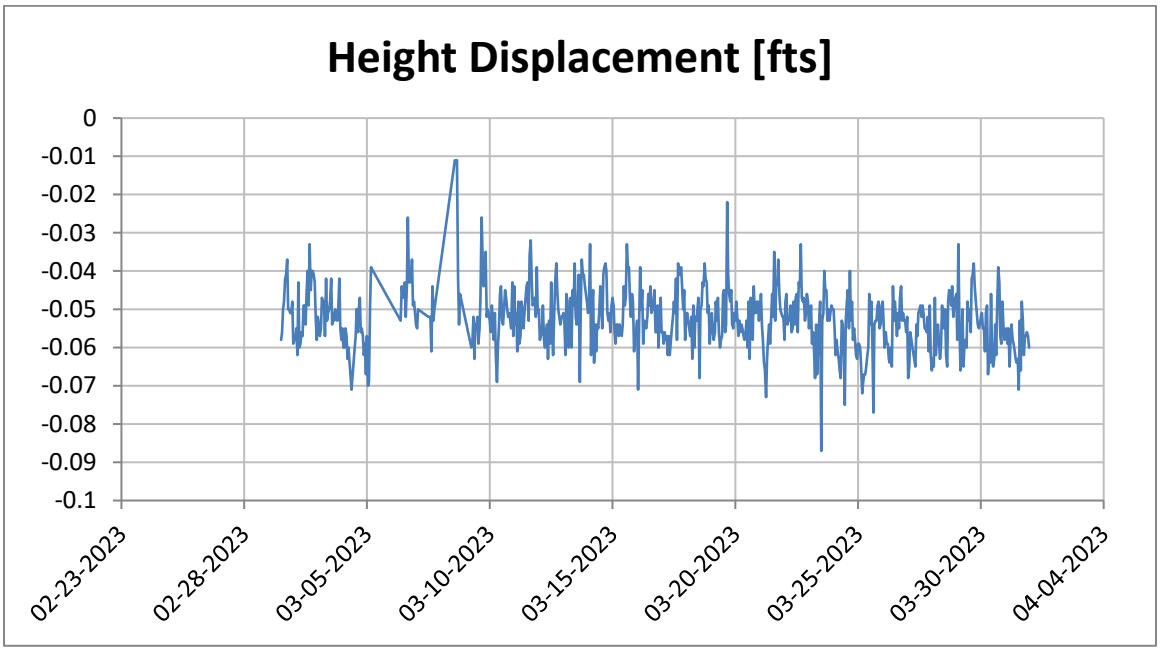
Prism P69A





Notes:

1. Survey accuracy is +/-0.016 feet.
2. Alarm threshold is +/-0.35 feet.
3. Transverse displacement is in the horizontal direction. Positive direction means closer to the robotic station.
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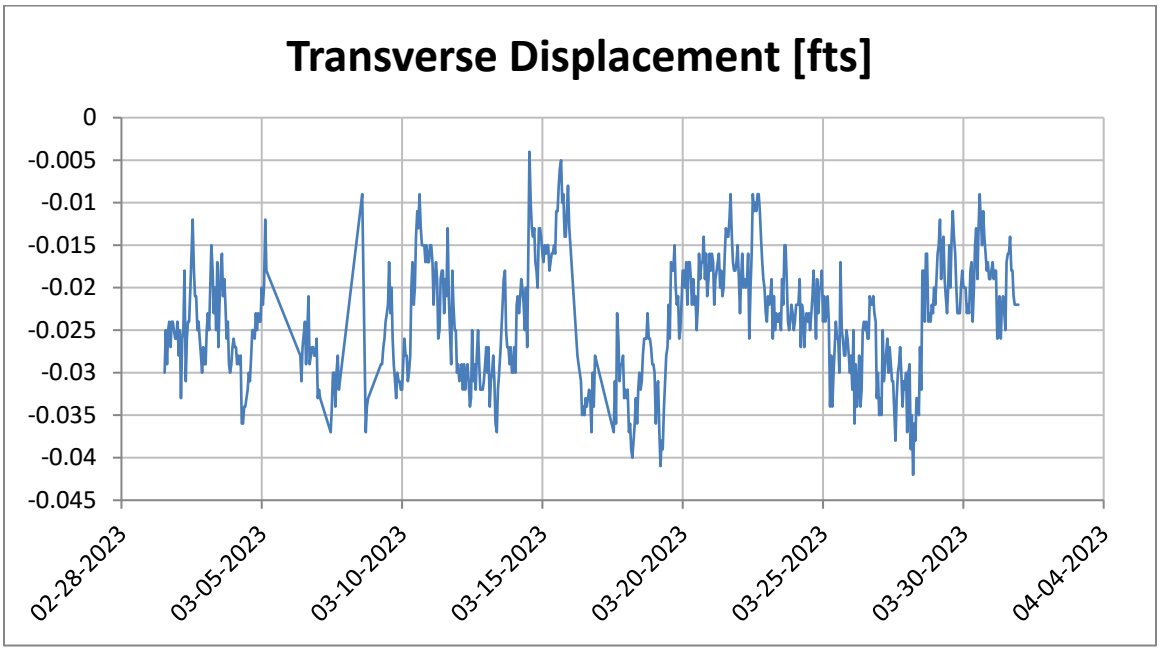
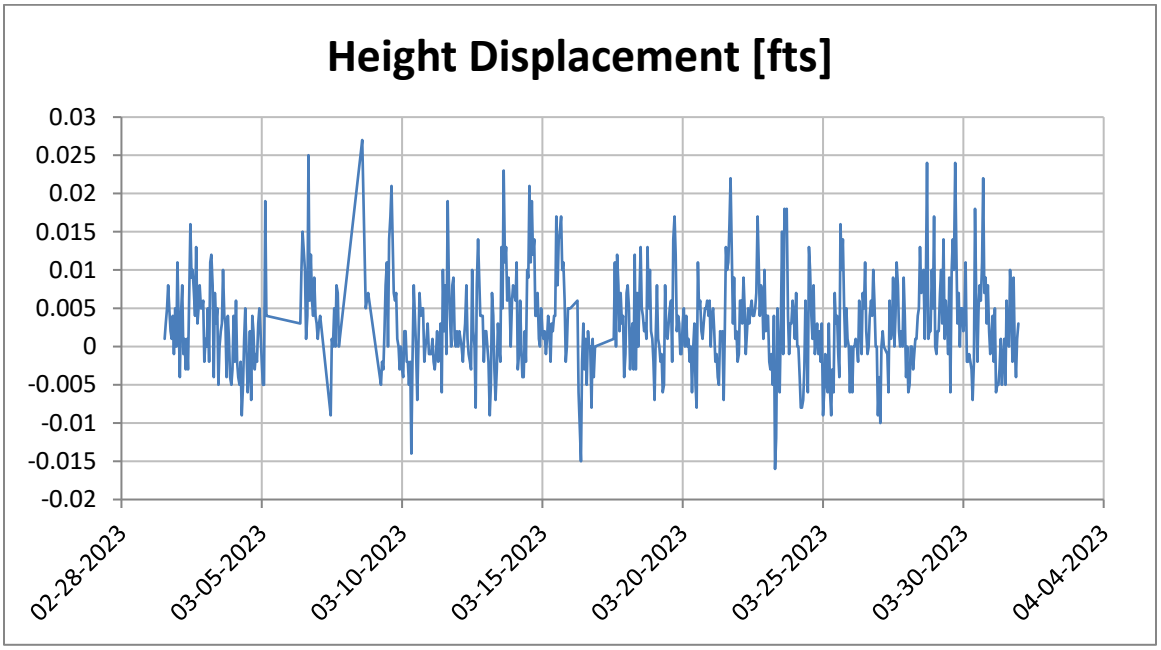
Prism P70





Notes:

1. Survey accuracy is +/-0.016 feet.
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3. Transverse displacement is in the horizontal direction. Positive direction means closer to the robotic station.
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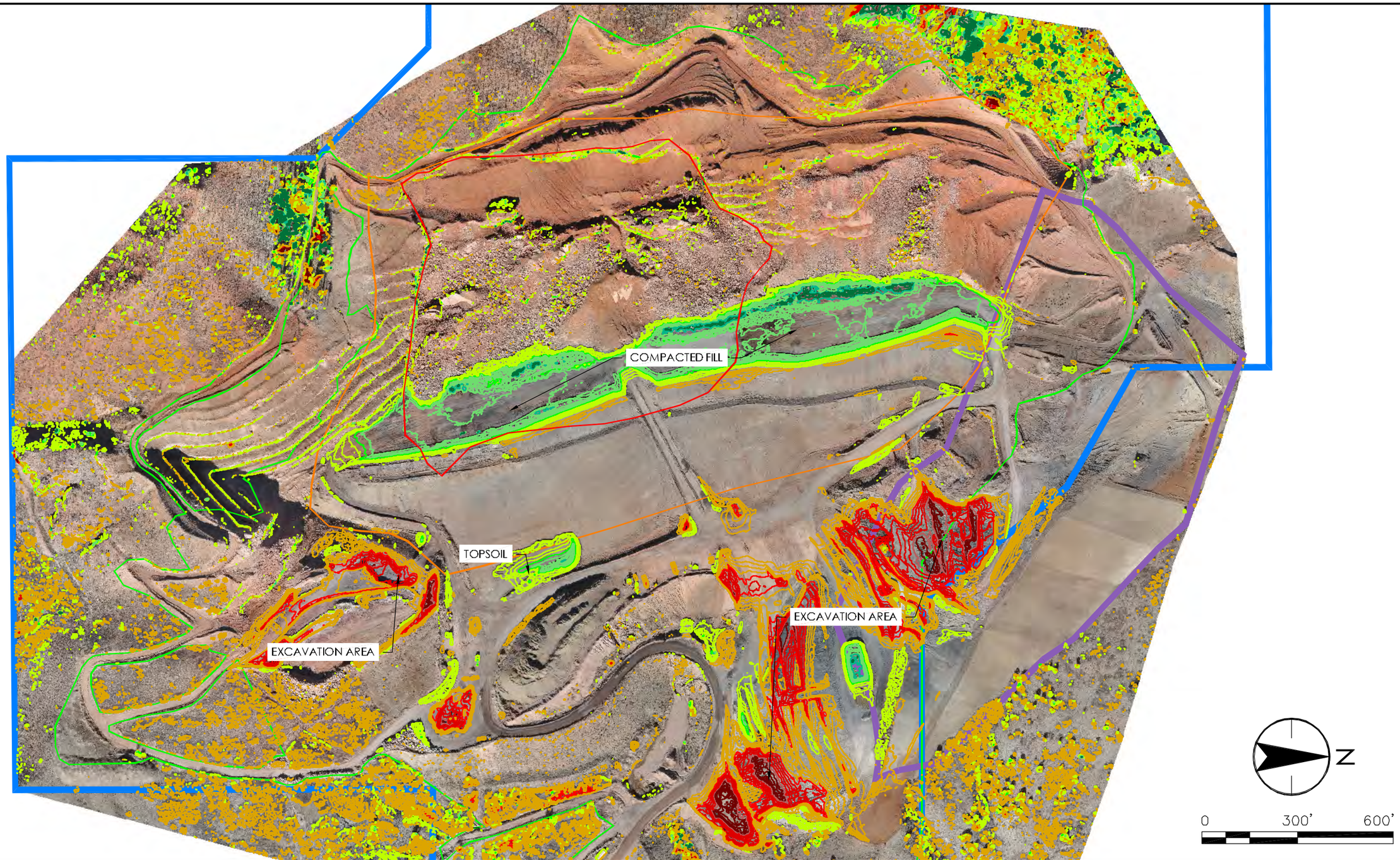
md \\us0387-ppfss03\shared_projects\2057288200\06_design\Monitoring

Appendix C

Drone Survey



Stantec

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2000 South Colorado Boulevard Suite 2-300
Denver CO 80222-7933
Tel (303) 758-4058
www.stantec.com

LEGEND

- Permit/Affected Lands Boundary
- City Grading Permit Boundary
- Proposed Disturbance Limit
- Landslide Extent
- Buttress Fill Extent
- Comparison Contour. Increase in elevation. (CI=2')
- Comparison Contour. Decrease in elevation. (CI=2')

1. COMPARISON OF DRONE FLIGHTS FROM 02/27/2023 to 04/03/2023.

Client/Project
RIVERBEND INDUSTRIES INC.

PIKEVIEW QUARRY SLOPE MONITORING

Project No.
2057288200

Title
EXISTING PRISMS WITH CURRENT SURFACE

Revision
#

Date
2023.04.28

Drawn By
PK

Figure No.
5

Appendix D

Compaction Testing Results

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Compaction Testing Log

BCC Test	Test No.	Date	Elevation (ft)	Northing (ft)	Easting (ft)	Wet Density (pcf)	Moisture Content (%)	Dry Density (pcf)	Compaction (%)
Test NNN6	#496	2-Mar	7314	1401639	3173181	130.8	11.3	119.5	99
Test NNN7	#497	2-Mar	7314	1401516	3173191	131.2	11.5	119.7	99
Test NNN8	#498	2-Mar	7313	1401423	3173255	139.4	9.8	129.5	100
Test NNN9	#499	2-Mar	7312	1401221	3173242	132.6	13.1	119.4	99
Test NNN10	#500	2-Mar	7311	1400984	3173326	129.9	10.9	119	99
Test OOO1	#501	3-Mar	7317	1402658	3172965	134.6	11.9	122.7	100
Test OOO2	#502	3-Mar	7314	1402522	3173026	122.8	11	111.8	91
Test OOO3	#503	3-Mar	7315	1402327	3172971	128.7	18.1	110.6	90
Test OOO4	#504	3-Mar	7315	1402233	3173031	138.4	13.9	124.4	100
Test OOO5	#505	3-Mar	7314	1402029	3173036	124	11	113	93
Test OOO6	#506	3-Mar	7314	1401783	3173105	128	9.5	118.5	98
Test OOO7	#507	6-Mar	7311	1401199	3173324	126.5	9.8	116.7	95
Test OOO8	#508	6-Mar	7315	1401362	3173212	127.1	13	114.1	93
Test OOO9	#509	6-Mar	7315	1401497	3173199	122.4	8.7	115.7	92
Test OOO10	#510	6-Mar	7315	1401599	3173192	121.6	10.9	110.7	90
Test PPP1	#511	6-Mar	7318	1402566	3172963	125.6	13.1	112.5	91
Test PPP2	#512	6-Mar	7316	1402386	3173025	121.4	9	112.4	91
Test PPP3	#513	6-Mar	7316	1402269	3172973	117.9	13.9	104	83
Re-Test PPP3	#515	8-Mar				130.5	8.9	121.6	99
Test PPP4	#516	8-Mar	7315	1402294	3173055	127	11	116	95
Test PPP5	#517	8-Mar	7316	1402130	3173083	141.3	6.6	134.7	100
Test PPP6	#518	8-Mar	7316	1401812	3173080	129.5	10.3	119.1	98
Test PPP7	#519	8-Mar	7317	1401597	3173164	124.3	13.2	111.1	90
Test PPP8	#520	9-Mar	7313	1401206	3173307	130.3	6	124.3	100
Test PPP9	#521	9-Mar	7313	1401156	3173336	135.5	9.2	131.3	100
Test PPP10	#522	9-Mar	7314	1401093	3173288	129.8	7.8	122.4	100
Test QQQ1	#523	9-Mar	7318	1402455	3173029	120.5	6	114.5	93
Test QQQ2	#524	9-Mar	7318	1402499	3173002	118.8	5.4	113.3	92
Test QQQ3	#525	10-Mar	7317	1402082	3173094	124.8	11.7	113.1	92
Test QQQ4	#526	10-Mar	7318	1402028	3173056	137.1	12.2	124.9	100
Test QQQ5	#527	10-Mar	7318	1401917	3173050	126.7	9.9	116.8	95
Test QQQ6	#528	13-Mar	7320	1401591	3173155	135.5	110.4	125.1	100
Test QQQ7	#529	13-Mar	7319	1401508	3173204	130	14.5	115.4	94
Test QQQ8	#530	13-Mar	7317	1401362	3173281	124.3	5.1	119.2	98
Test QQQ9	#531	13-Mar	7316	1401187	3173299	118.5	15.2	103.3	82
Re-Test QQQ9	#533	14-Mar				124.6	9.7	114.9	93

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BCC Test	Test No.	Date	Elevation (ft)	Northing (ft)	Easting (ft)	Wet Density (pcf)	Moisture Content (%)	Dry Density (pcf)	Compaction (%)
Test QQQ10	#532	13-Mar	7316	1401079	3173601	119.4	15.7	103.6	82
Re-Test QQQ10	#534	14-Mar				121.2	7.2	114	93
Test RRR1	#535	14-Mar	7320	1402650	3172981	122.9	11.6	111.3	90
Test RRR2	#536	14-Mar	7322	1402546	3172917	127.5	9.7	117.8	96
Test RRR3	#537	14-Mar	7320	1402468	3173021	145.3	9.5	135.8	100
Test RRR4	#538	15-Mar	7319	1402271	3173029	125.1	12.7	112.5	91
Test RRR5	#539	15-Mar	7318	1402129	3173086	132.4	12.4	120	99
Test RRR6	#540	15-Mar	7318	1401961	3173068	136.2	7.7	128.4	100
Test RRR7	#541	15-Mar	7320	1401812	3173062	127.4	6.3	121.1	100
Test RRR8	#542	20-Mar	7319	1401256	3173229	132.9	14.2	116.3	94
Test RRR9	#543	20-Mar	7318	1401225	3173279	129	12.8	114.4	93
Test RRR10	#544	21-Mar	7317	1401002	3173333	131.6	8.9	120.9	98
Test SSS1	#545	21-Mar	7323	1402720	3172950	127.9	12.1	114.1	93
Test SSS2	#546	21-Mar	7324	1402586	3172907	122.2	8.7	112.4	92
Test SSS3	#547	21-Mar	7322	1402424	3172982	133.9	9.2	122.6	100
Test SSS4	#548	22-Mar	7320	1402370	3173042	148.2	9.7	138.5	100
Test SSS5	#549	22-Mar	7321	1402227	3173033	129.9	8.3	121.6	99
Test SSS6	#550	22-Mar	7322	1401943	3173041	133.6	7.2	126.4	100
Test SSS7	#551	22-Mar	7322	1401494	3173176	132.3	9.9	122.4	100
Test SSS8	#552	23-Mar	7321	1401286	3173251	127.6	15.7	111.9	91
Test SSS9	#553	23-Mar	7321	1401108	3173283	128.3	7.6	120.7	99
Test SSS10	#554	23-Mar	7320	1401022	3173252	119	5.6	113.3	92
Test TTT1	#555	24-Mar	7325	1402728	3172928	132.4	5.6	125.5	100
Test TTT2	#556	24-Mar	7324	1402520	3172988	124	8	114.8	93
Test TTT3	#557	24-Mar	7323	1402357	3172988	118.9	5.4	112.8	92
Test TTT4	#558	24-Mar	7323	1402201	3172987	125.1	4.9	120.2	98
Test TTT5	#559	27-Mar	7323	1401309	3173130	147.4	7.8	139.7	100
Test TTT6	#560	27-Mar	7323	1401507	3173203	134.8	7.2	127.5	100
Test TTT7	#561	27-Mar	7323	1401336	3173248	130.1	6	124	100
Test TTT8	#562	28-Mar	7322	1401325	3173288	142.4	8.6	133.8	100
Test TTT9	#563	28-Mar	7322	1401174	3173303	142.3	8.1	134.2	100
Test TTT10	#564	28-Mar	7321	1401027	3173302	132.4	10.3	122.1	100
Test UUU1	#565	28-Mar	7325	1402610	3172973	135.3	6.6	128.7	100
Test UUU2	#566	28-Mar	7327	1402733	3172890	128.4	4.6	123.9	100
Test UUU3	#567	29-Mar	7324	1402377	3172975	136.2	12.1	124.1	100
Test UUU4	#568	29-Mar	7323	1402260	3173033	121.3	9	112.3	91
Test UUU5	#569	29-Mar	7325	1402062	3173010	135.3	9.7	125.6	100
Test UUU6	#570	29-Mar	7324	1401869	3173070	138.5	11.7	126.1	100

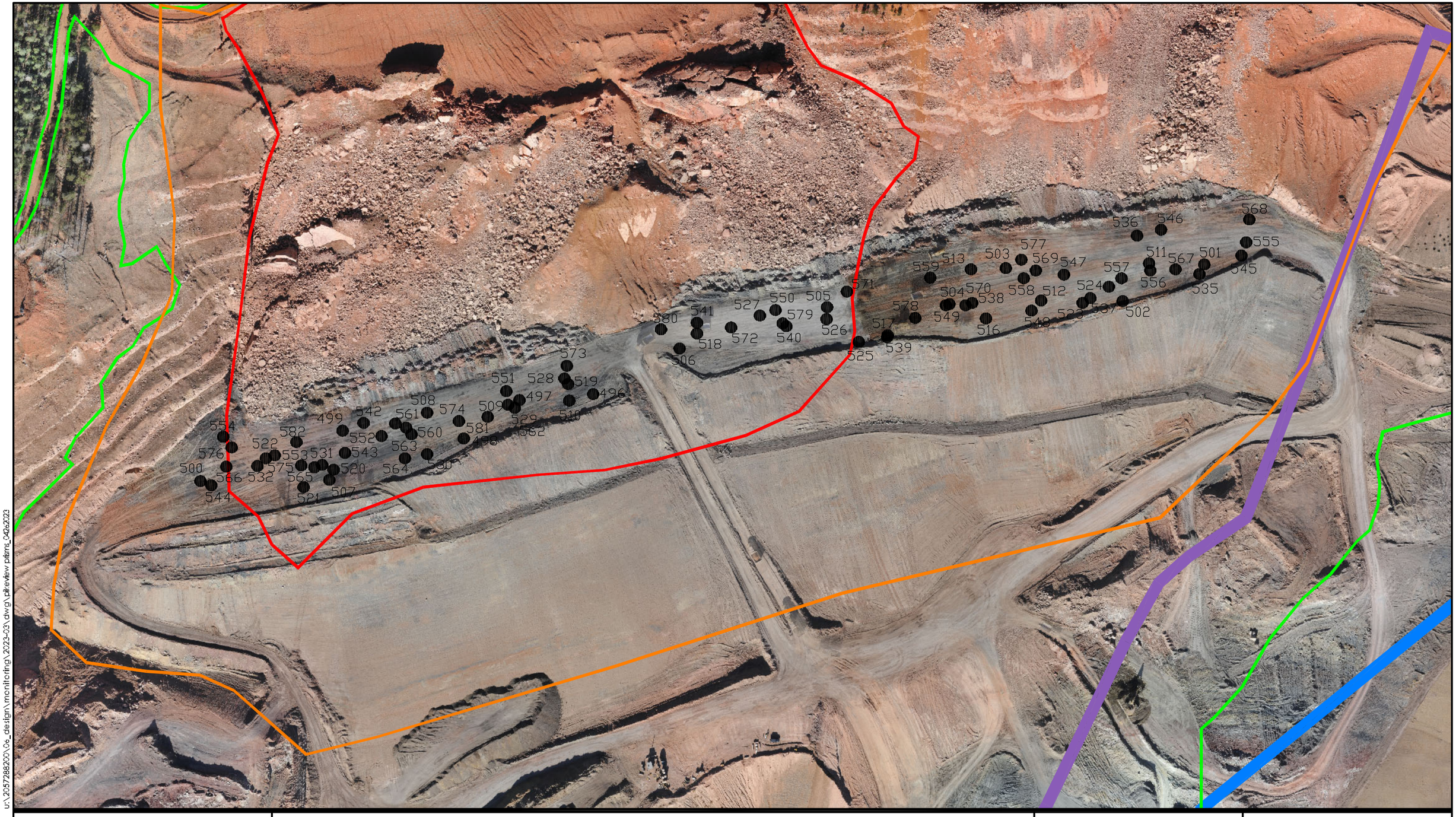
BCC Test	Test No.	Date	Elevation (ft)	Northing (ft)	Easting (ft)	Wet Density (pcf)	Moisture Content (%)	Dry Density (pcf)	Compaction (%)
Test UUU7	#571	29-Mar	7324	1401595	3173134	126.7	5.4	121.3	99
Test UUU8	#572	30-Mar	7325	1401415	3173226	128.9	11	117.9	96
Test UUU9	#573	30-Mar	7324	1401152	3173300	125.2	8.4	116.7	95
Test UUU10	#574	30-Mar	7323	1401036	3173270	119.5	7.3	112.2	91
Test VVV1	#575	31-Mar	7327	1402568	3172975	123.3	10.2	113.1	92
Test VVV2	#576	31-Mar	7326	1402353	3172957	127.1	9.4	117.7	96
Test VVV3	#577	31-Mar	7324	1402176	3173054	125.8	12.3	113.6	92
Test VVV4	#578	31-Mar	7325	1401955	3173063	121.8	10.8	111.1	90
Test VVV5	#579	31-Mar	7326	1401752	3173073	124.4	8.5	115.9	94
Test VVV6	#580	31-Mar	7326	1401463	3173219	124	10.9	113.1	92
Test VVV7	#581	31-Mar	7326	1401327	3173237	120.4	6.6	113.8	92
Test VVV8	#582	31-Mar	7326	1401144	3173261	134.9	6.6	128.3	100

Notes:

1. As of March 28, 2022, a total 2,306,000 yd3 had been placed and compacted. This requires at least 462 compaction tests, and 801 tests have been taken.

2. There is no test #514.

3. Tests #515, #533, and #534 are retests and were not included in the total number of tests.



Stantec

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LEGEND

- Permit/Affected Lands Boundary
- City Grading Permit Boundary
- Proposed Disturbance Limit
- Landslide Extent
- Buttress Fill Extent
- Compaction Test Location

N

0 150' 300'

Client/Project
RIVERBEND INDUSTRIES INC.

PIKEVIEW QUARRY SLOPE MONITORING

Project No.
2057288200

Title
COMPACTION TEST LOCATIONS

Revision	Date
#	2023.04.28

Drawn By	Figure No.
PK	6

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