Stantec

To:	Jerald Schnabel	From:	Paul Kos
	Riverbend Industries Inc.		Denver, CO 80222
File:	October 2023 Monitoring Summary	Date:	November 30, 2023

Reference: October 2023 Geotechnical Monitoring Summary Pikeview Quarry

1.0 INTRODUCTION

Stantec Consulting Services Inc. (Stantec) has prepared this October 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) 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 October 2023. Continuous monitoring by the robotic survey system began in 2010 and has continued through the month of October 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 October 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 October 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 October 25, 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 October 2023. Site maintenance, topsoil placement and riprap production also continued throughout the month.
- Operators placed compacted material in the buttress zone. Material was 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. Construction on ramps from the Upper Borrow Area was started to provide access to the buttress fill area.
- Compaction testing has resumed at the rate of at least one test per 5,000 cubic yards of fill placed in the buttress area.
- No cracking was observed on the native granite slopes above the extents of the disturbed area.
- The slope below the first bench has been placed to the final grade, and the second bench is partially completed. These slopes were traversed on foot and examined for cracks or signs of instability by Stantec engineers. No cracks or signs of instability were identified.
- 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.
- Rock was being screened, sorted, and stockpiled as riprap for use as erosion protection in the channels.
- 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
- 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 were 18 prisms active in October; two prisms were control points located outside the slope movement area, six prisms are located on the slopes surrounding the slope movement area, three prisms were located on the slopes within the landslide area, and seven prisms were located on the buttress fill. As the slope is backfilled and graded, the existing prisms will be removed, and additional prisms will be installed. No prisms were installed or removed in October, and 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 alerts 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 alert, 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. The construction contractor also has a spotter monitoring the slope during construction, and they can radio the operators if there are any signs of movement or a falling rock. All alerts for potential movement have been attributed to weather, animal activity, equipment operations blocking the prism, or sun glare, and no alerts have been associated with slope movements. The monitoring system was offline from October 2 to 5 and October 29 to November 2 due to power outages and system updates. During these time periods, spotters were used to monitor the slopes of movements. The alerts are listed in Table 2.

Table 2 Alert Summary

Date(s)	Alert	Cause/Actions taken	Resolved
2-Oct	B7200-3 not found	Single event. Prism lens was obscured by hydro mulch operations and then cleaned.	2-Oct
2-Oct to 5-Oct	Leica system offline. No alerts received, but no readings taken	Leica software issues. A spotter was used to monitor the slopes during construction activities	5-Oct
7-Oct	CP-7 not found	Two overnight alerts and no work being performed at time of alerts. Believed to be weather related.	7-Oct
9-Oct to 10-Oct	B7300-2 not found	Flag blew over prism lens during night. No operations during alerts	10-Oct
17-Oct	B7200-1 not found	Single event. Likely blocked by equipment operations.	17-Oct
17-Oct	B7200-3 not found	Single event. Likely blocked by equipment operations.	17-Oct
20-Oct	BR2 not found	Prism removed due to grading in area.	20-Oct
20-Oct	B7200-1 not found	Single event. Likely blocked by equipment operations.	20-Oct
26-Oct	NP3 not found	Prism removed due to grading in area.	26-Oct
26-Oct	P70 not found	Single event. Likely blocked by equipment operations.	26-Oct
27-Oct	Points P32R and P33 not found	Fog. No work being performed at time of alerts.	27-Oct
28-Oct to 29-Oct	Points not found	Snow and fog. No work being performed at time of alerts.	30-Oct
29-Oct to 2-Nov	Leica system offline. No alerts received, but no readings taken	Leica software issues. A spotter was used to monitor the slopes during construction activities	2-Nov

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.

Table 3 Prism Summary

Prism ID	Cumulative Transverse Displacement (ft)	Cumulative Height Displacement (ft)	Monthly Delta (ft)	Cumulative Delta (ft)	Notes / Recommendations
BR1	-0.025	-0.349	0.0825	0.6603	Slope creep movements
BR2	0.125	-0.623	0.0670	1.0725	Slope creep movements
CP6	-0.005	-0.033	0.0145	0.0456	
CP7	0.127	-0.010	0.0333	0.1412	
NP66	0.741	-0.903	0.0217	1.2259	Slope creep movements
P2	-0.023	-0.020	0.0086	0.0331	
P25	-0.019	0.019	0.0227	0.0313	
P32R	-0.003	0.029	0.0238	0.0433	
P33	0.051	-0.009	-0.0230	0.0871	
P5	-0.016	-0.018	0.0062	0.0251	
P70	-0.002	-0.029	-0.0155	0.0463	
B7200-1	-0.016	0.000	-0.0031	0.0189	
B7200-2	0.007	-0.016	0.0012	0.0347	
B7200-3	0.128	-0.051	0.0152	0.1657	
B7300-0	-0.043	-0.071	0.0375	0.0852	
B7300-1	-0.081	-0.092	0.0441	0.1809	
B7300-2	-0.015	-0.076	0.0270	0.1024	
B7300-3	0.057	-0.053	0.0266	0.0936	

The data show stable conditions with no movements at 15 of 18 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 recorded slope creep movements at slow velocity. This settlement was likely related to loose fill or landslide material consolidating under its own weight. These prisms were placed in areas where slope creep movements are likely to occur; therefore, movements being recorded is expected. Plots of the transverse and height displacements for each prism are included in Appendix B.

4.0 DRONE SURVEY

The site was flown for aerial imagery using an unmanned aircraft system (UAS or 'drone') on November 1, 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 October topography was also compared to the September 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 was excavated from the North and South Borrow Areas and placed in the Buttress 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 occurred from February 2022 through June 2023 and resumed in September 2023. Fill was excavated from the North and South Borrow Areas and placed in the Buttress Area. All fill is moisture conditioned as necessary and then compacted. During October 2023, approximately 91,200 yd^3 were placed and compacted. Compaction testing occurs at the rate of at least one test per 5,000 yd^3 placed. This volume placed in the buttress zone required at least 19 compaction tests. There were 77 compaction tests taken in October. As of November 1, 2023, when the site was surveyed, a total of approximately 2,675,000 yd^3 had been placed and compacted. This required at least 535 compaction tests, and 1,010 tests have been taken. There was one test that did not meet the compaction specification in October; this area was moisture conditioned and recompacted, and the subsequent test met the compaction specification. All of other tests met the minimum compaction requirement of 90%.

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 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 August 2023
Phase 3 – Project Kick-off with successful Contractor	Completed August 2023
Phase 4 – Contractor Mobilization to Site	Completed September 2023
Phase 4 – Reclamation Grading	February 2022 to Winter 2024 (est.)
Phase 4 – Contractor Demobilize from Site	Winter 2024
Phase 5 – Final Revegetation	2024 until acceptance

Progress of activities this month:

- Earth moving activities and placement of compacted fill in the buttress area continued
- Construction activities commenced in the Upper Borrow Area
- Processing of riprap continued
- Geotechnical monitoring continued

Work planned for next month includes:

- Continue placing compacted fill in the buttress area
- Continue processing riprap
- Continue geotechnical monitoring
- Continue to remove and replace prisms on an as-needed basis.

7.0 CONCLUSIONS

The data collected in October 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 October 2023 indicate evidence of any large-scale movements that increase risk to workers or to the public. 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 alerts 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
- New Prism

N

0 300' 600'

Client/Project
RIVERBEND INDUSTRIES INC.

PIKEVIEW QUARRY SLOPE MONITORING

Project No.
2057288200

Title
SITE MAP

Revision
#

Date
2023.11.30

Drawn By
PK

Figure No.
1

Appendix A

Visual Inspections

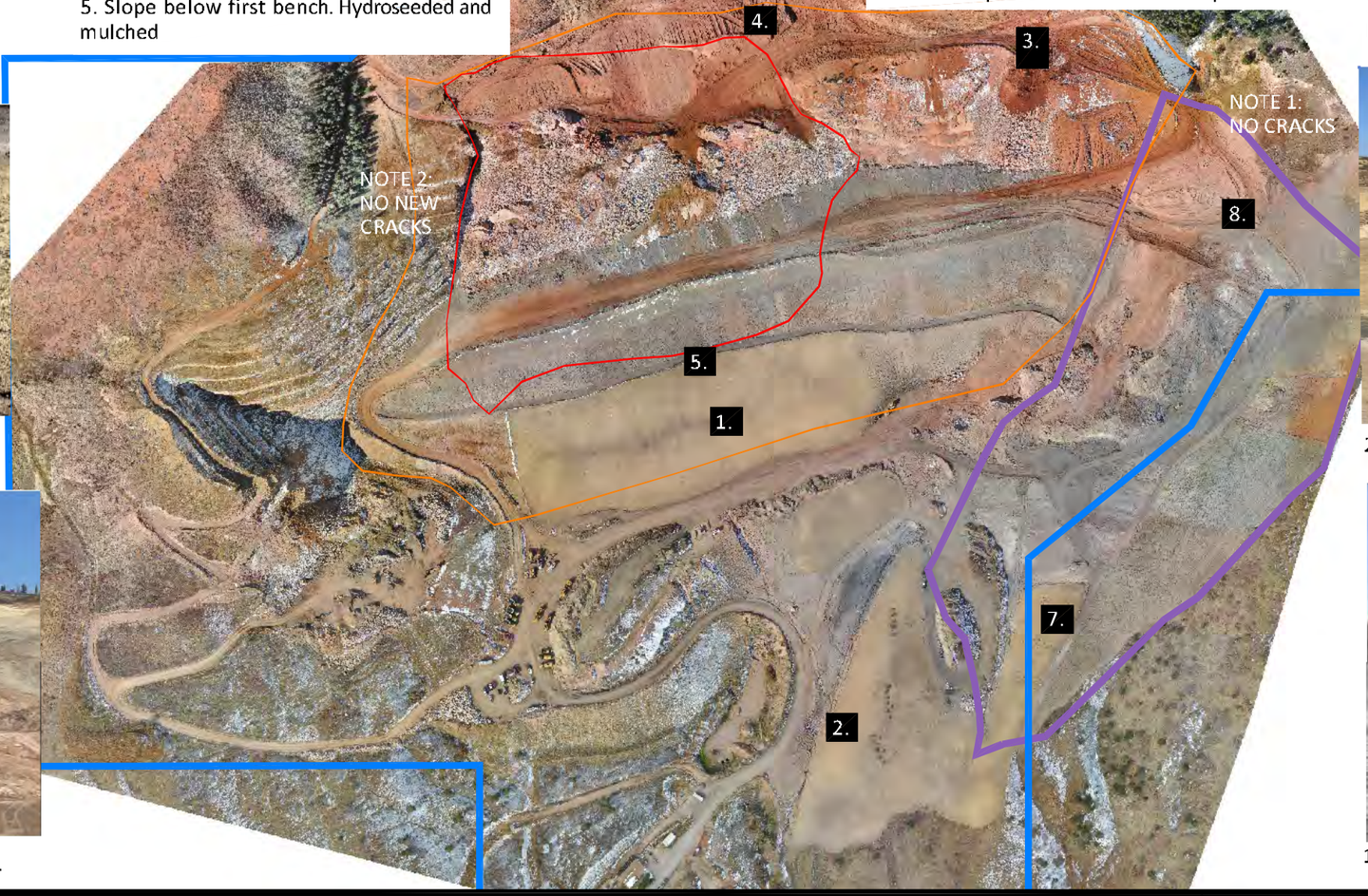
6. Access road pioneered to top of slope cut.

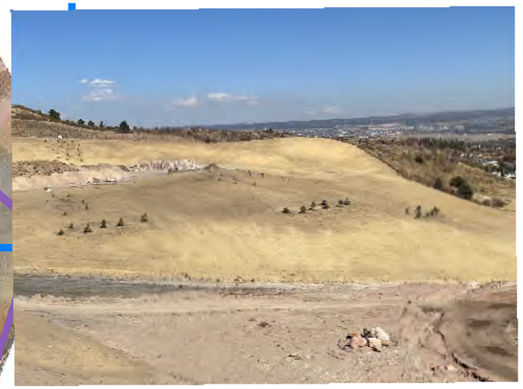
5. Slope below first bench. Hydroseeded and mulched

4. Material placed on bench for compaction.

3. Dozer pushing material down from Upper Borrow Area to create access to Buttress.

7. Trees and irrigation on the slope.





2. Graded borrow area with growth medium.

8. Excavator and haul trucks moving material.

1. Bench slope at final grade.

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

NOTES
1. NO CRACKS OBSERVED IN THIS AREA.
2. NO NEW CRACKS OBSERVED IN THIS AREA.
3. PHOTOS TAKEN ON OCTOBER 25, 2023.

N

0 400' 800'

Client/Project
RIVERBEND INDUSTRIES INC.

PIKEVIEW QUARRY SLOPE MONITORING

Project No.
2057288200

Title
OBSERVATIONS FROM OCTOBER INSPECTION

Revision
#

Date
2023.11.30

Drawn By
PK

Figure No.
2

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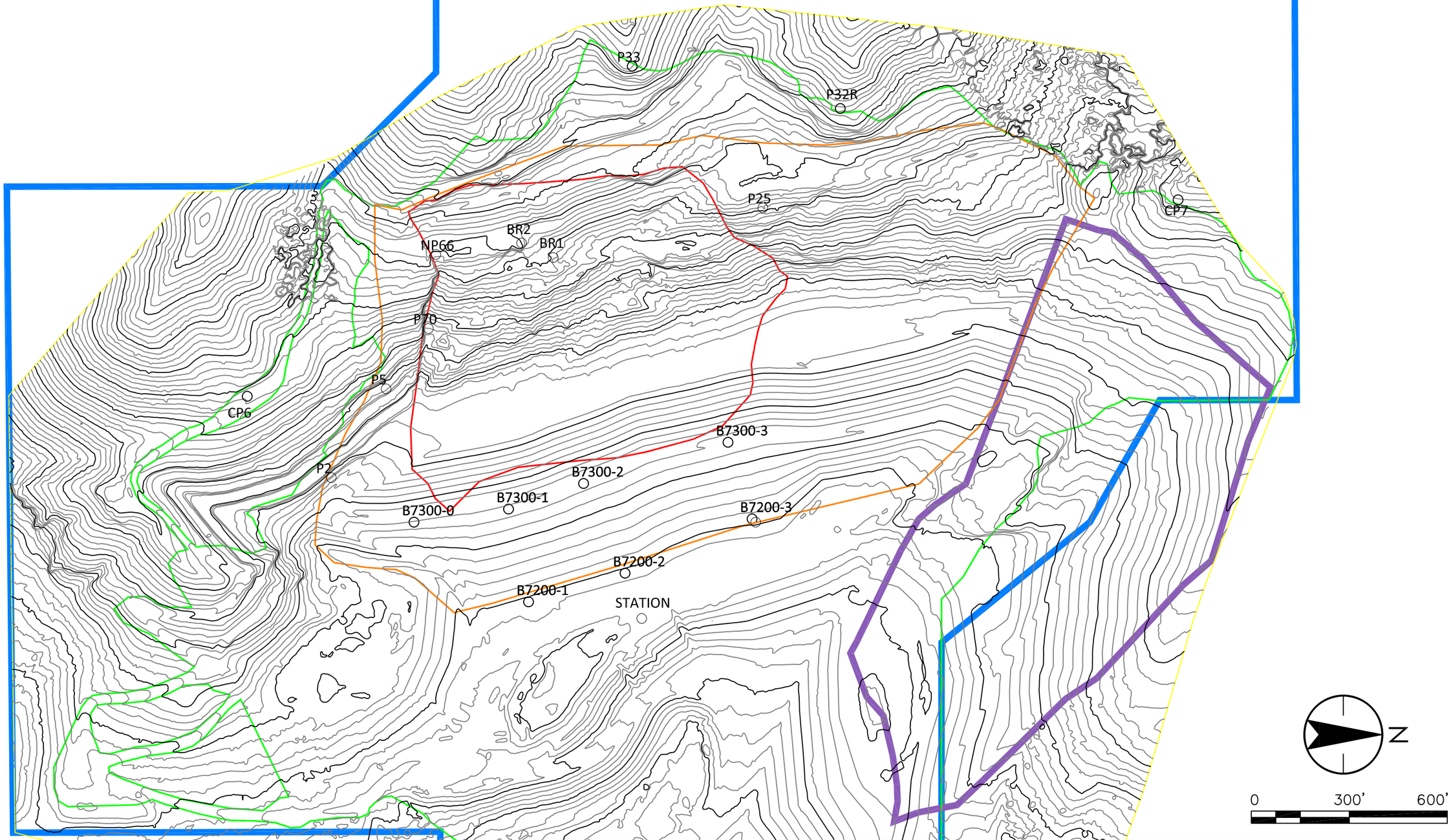
Table A-1 Summary of Daily Inspections

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

1. PRISMS WILL BE INSTALLED AS EACH BENCH IS FINISHED.
2. ALL PRISMS WILL BE RETAINED AS LONG AS POSSIBLE.
3. TOPOGRAPHY FROM NOVEMBER 1, 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
2023.11.30

Drawn By
PK

Figure No.
3

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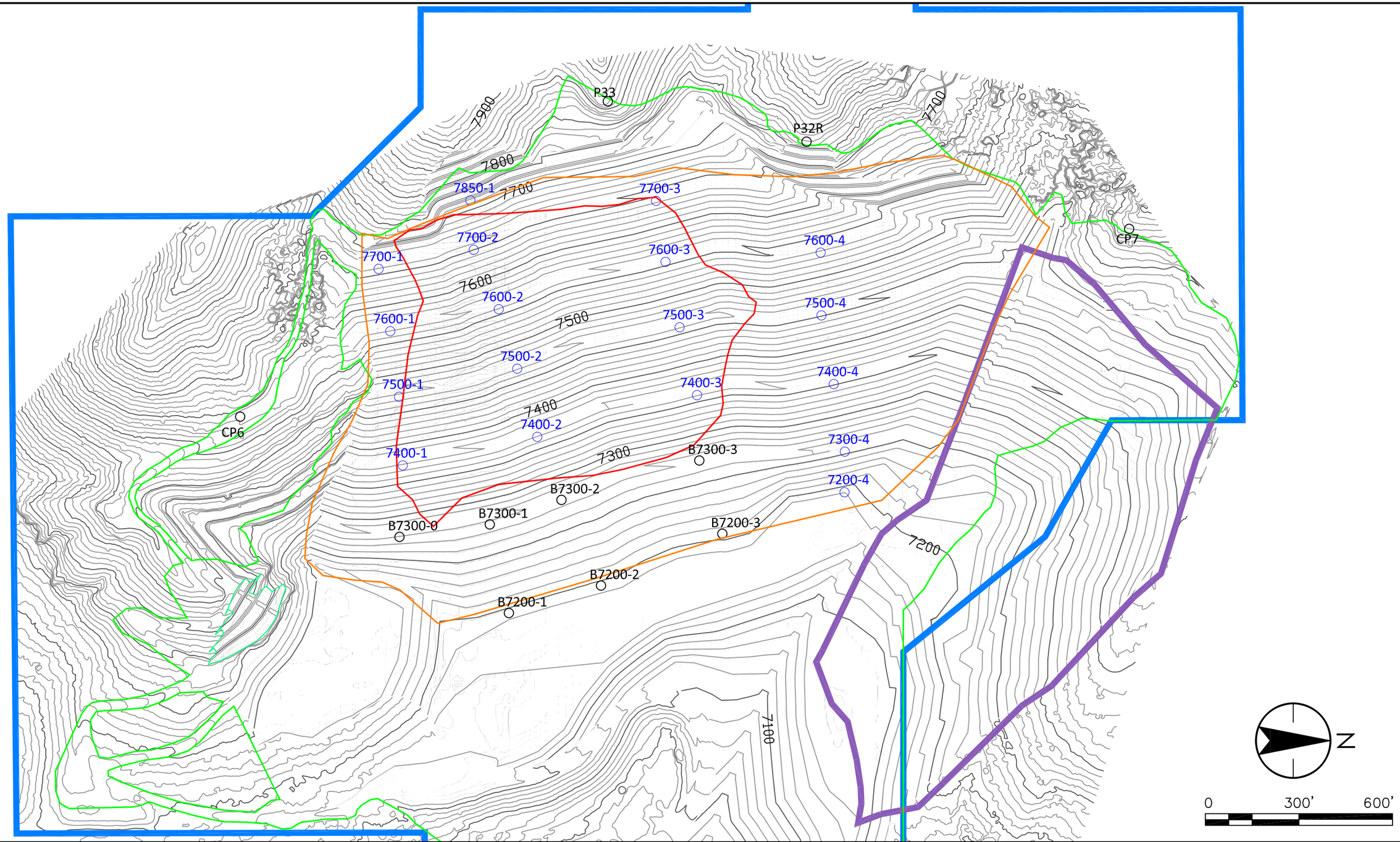

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LEGEND

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

NOTES

1. PRISMS WILL BE INSTALLED AS EACH BENCH IS FINISHED.
2. EXISTING PRISMS WILL BE RETAINED AS LONG AS POSSIBLE.
3. RECLAMATION SURFACE FROM SEPTEMBER 2023 TECHNICAL REVISION.

Client/Project
RIVERBEND INDUSTRIES INC.

PIKEVIEW QUARRY SLOPE MONITORING

Project No.
2057288200

Title
PROPOSED PRISMS WITH RECLAMATION SURFACE

Revision	Date
#	2023.11.30
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-22	Prism Removed	Out of line of sight of base station.
P63	15-Aug-22	Prism Removed	Out of line of sight of base station.
NP2	28-Apr-23	Prism Removed	Prism location eroded.
P1	12-May-23	Prism Removed	Prism hit by falling rock.
B7200-1	1-Jun-23	Prism Added	New Prism Added
B7200-2	1-Jun-23	Prism Added	New Prism Added
B7200-3	28-Jun-23	Prism Added	New Prism Added
B7300-1	28-Jun-23	Prism Added	New Prism Added
B7300-2	28-Jun-23	Prism Added	New Prism Added
B7300-3	28-Jun-23	Prism Added	New Prism Added
B7300-0	27-Jul-23	Prism Added	New Prism Added

Prism	Date	Action	Comment
P32	1-Aug-23	Prism Removed	P32 was damaged by a falling rock. P32R was installed in the same location.
P32R	1-Aug-23	Prism Added	
P69A	28-Sep-23	Prism Removed	Reclamation grading to affect prism in near future
NP3	30-Sep-23	Prism Removed	Reclamation grading to affect prism in near future

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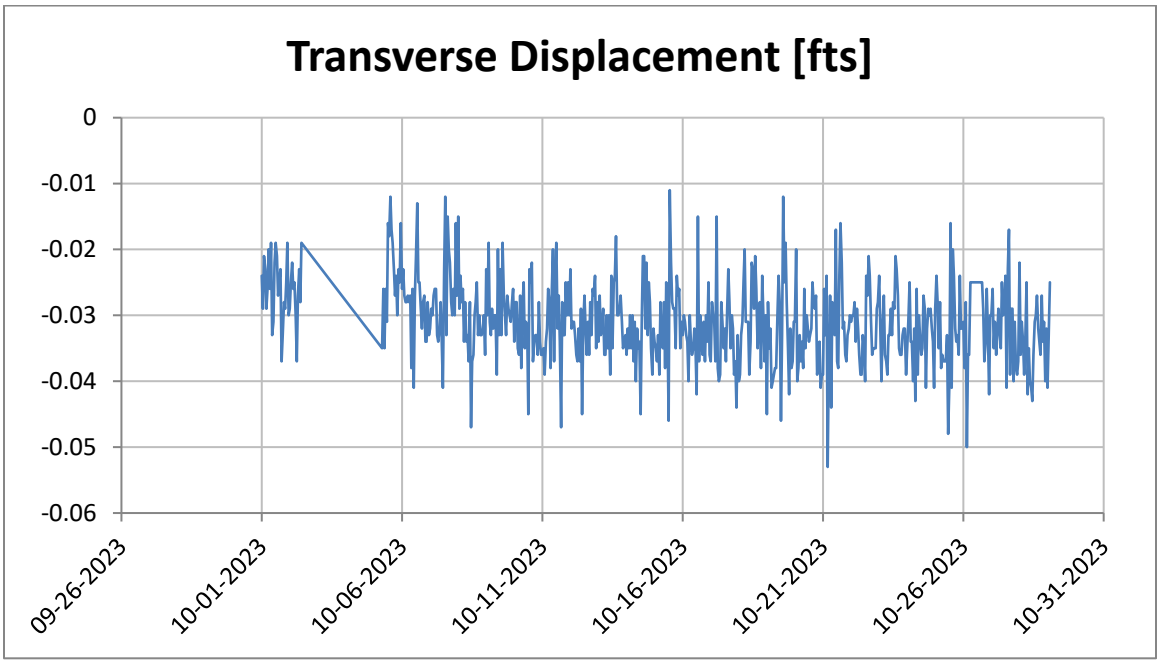
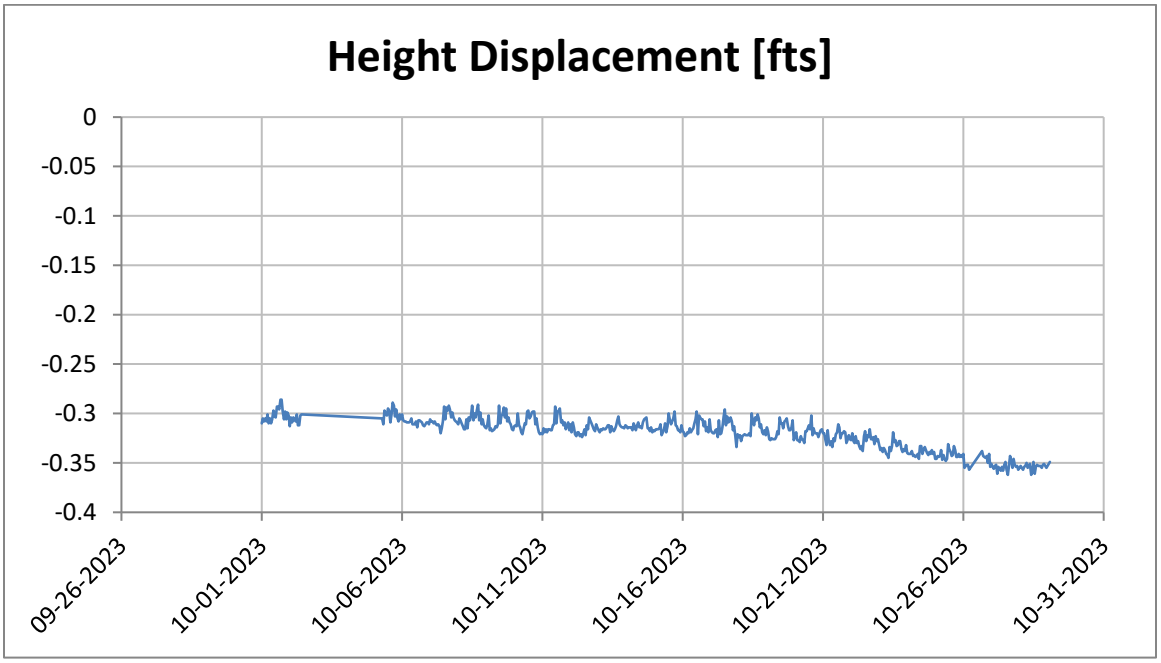
Prism BR1





Notes:

1. Survey accuracy is +/-0.016 feet.
2. Alert 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 records slope creep movements.

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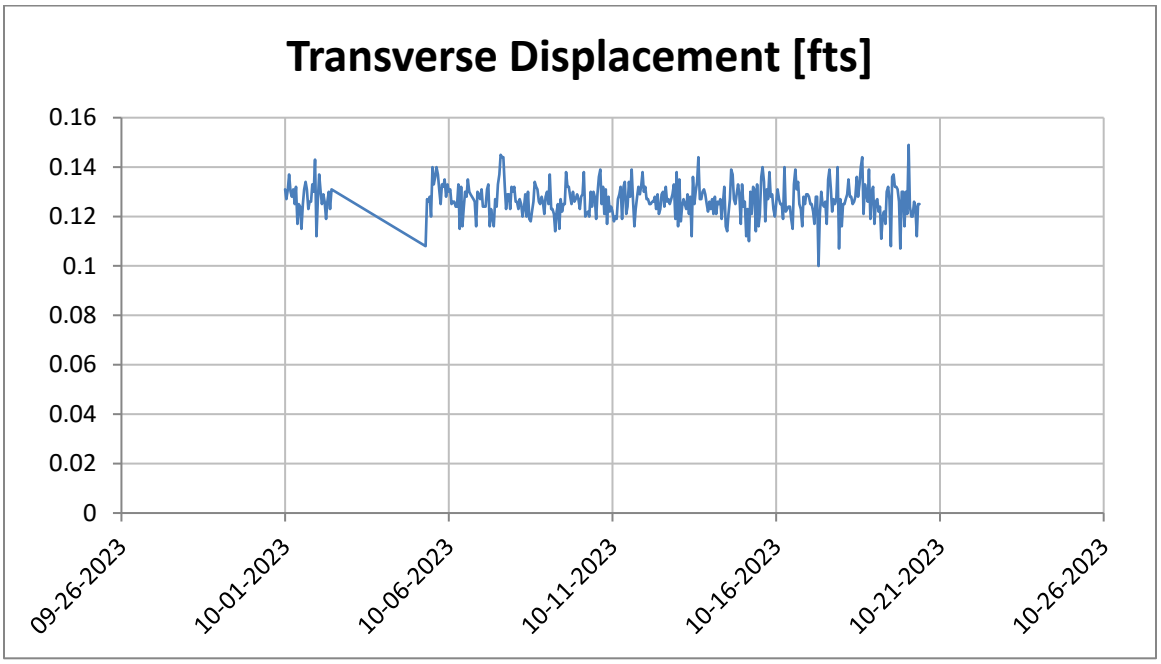
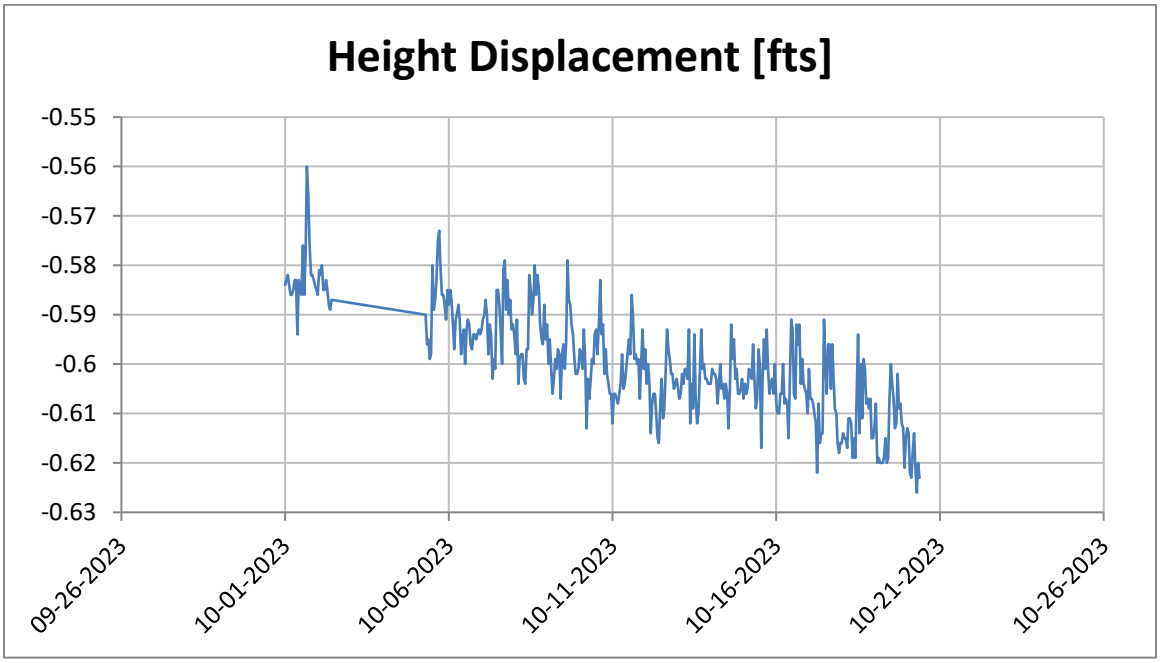
Prism BR2



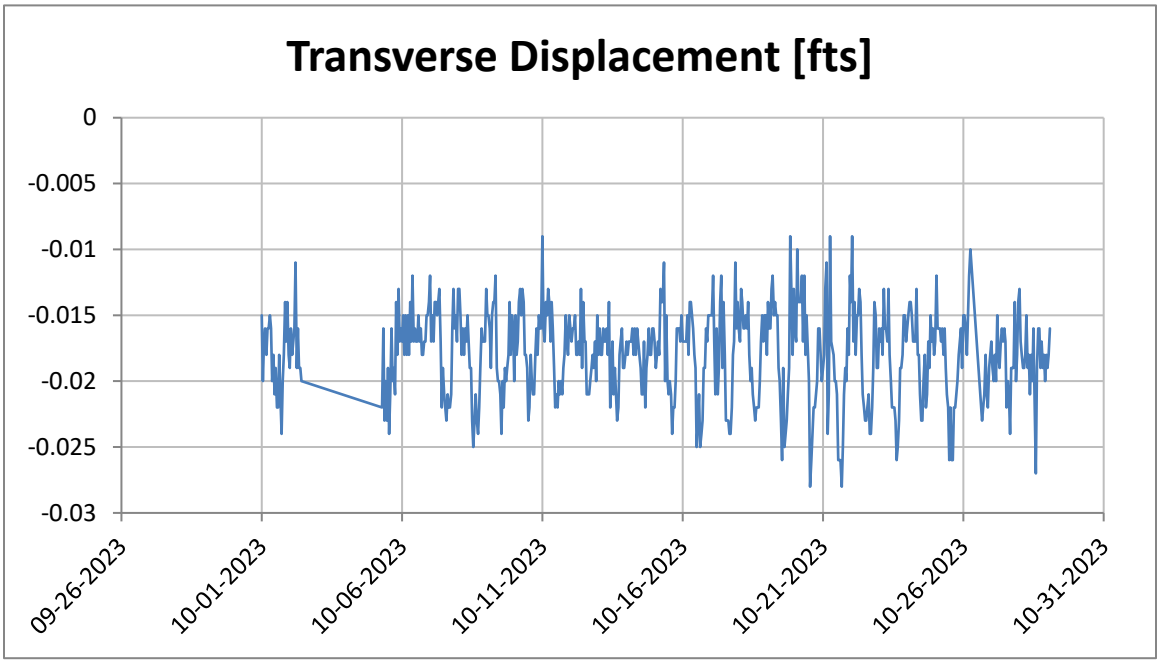


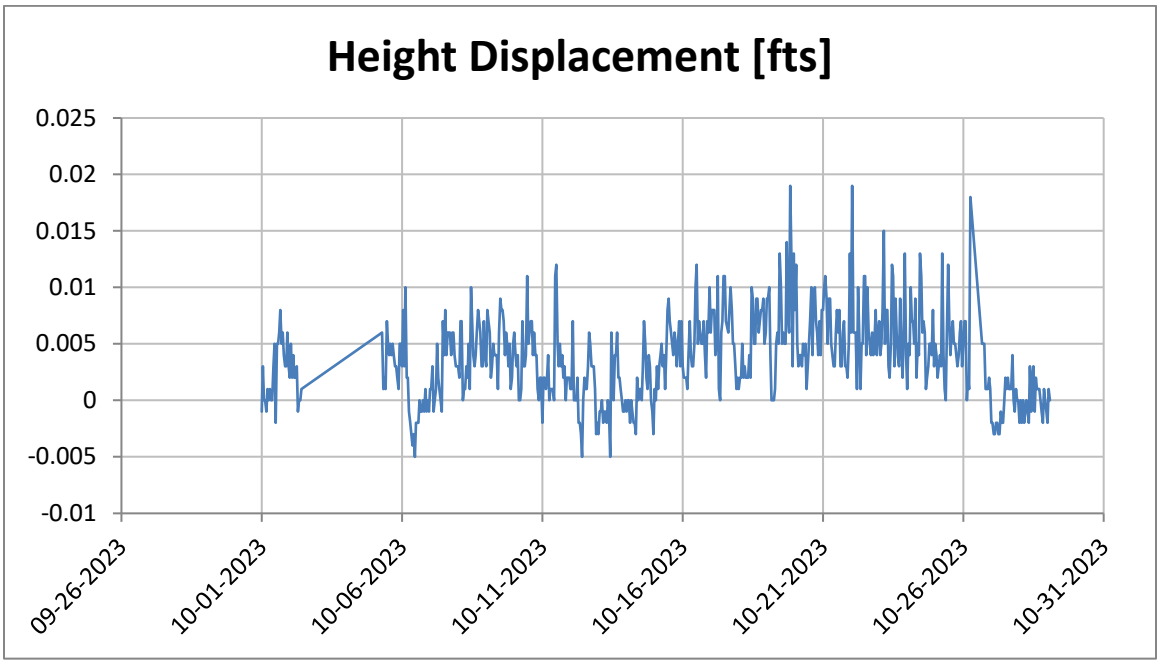
Notes:

1. Survey accuracy is +/-0.016 feet.
2. Alert 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 records slope creep movements.

Stantec

Prism B7200-1





Notes:

1. Survey accuracy is +/-0.016 feet.
2. Alert 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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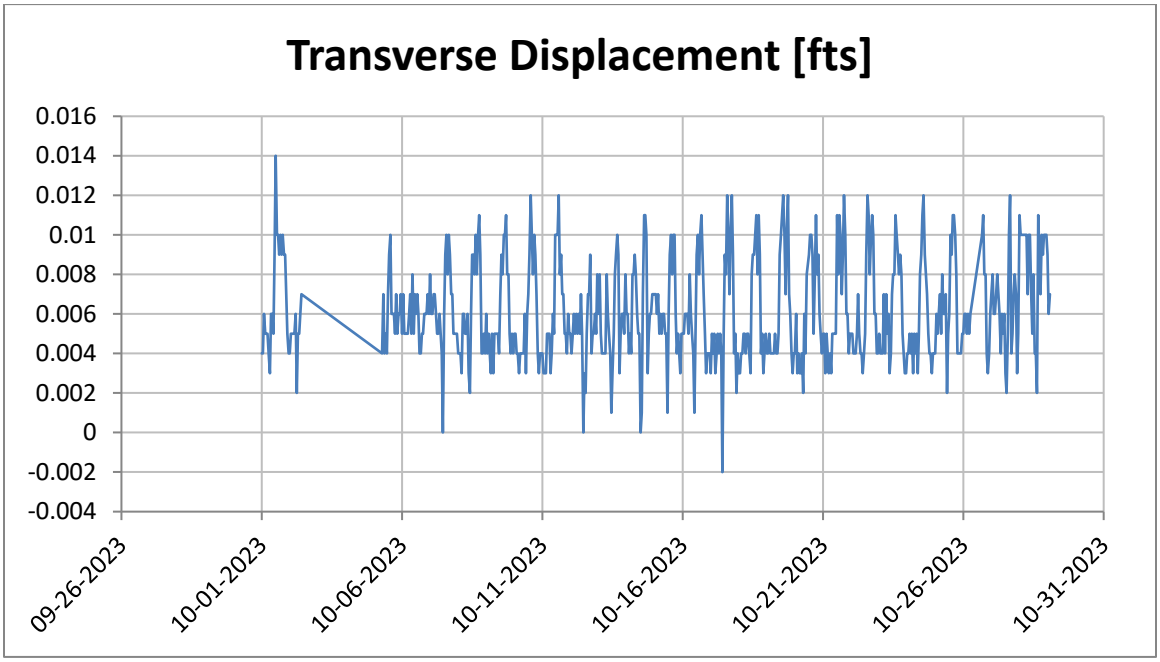
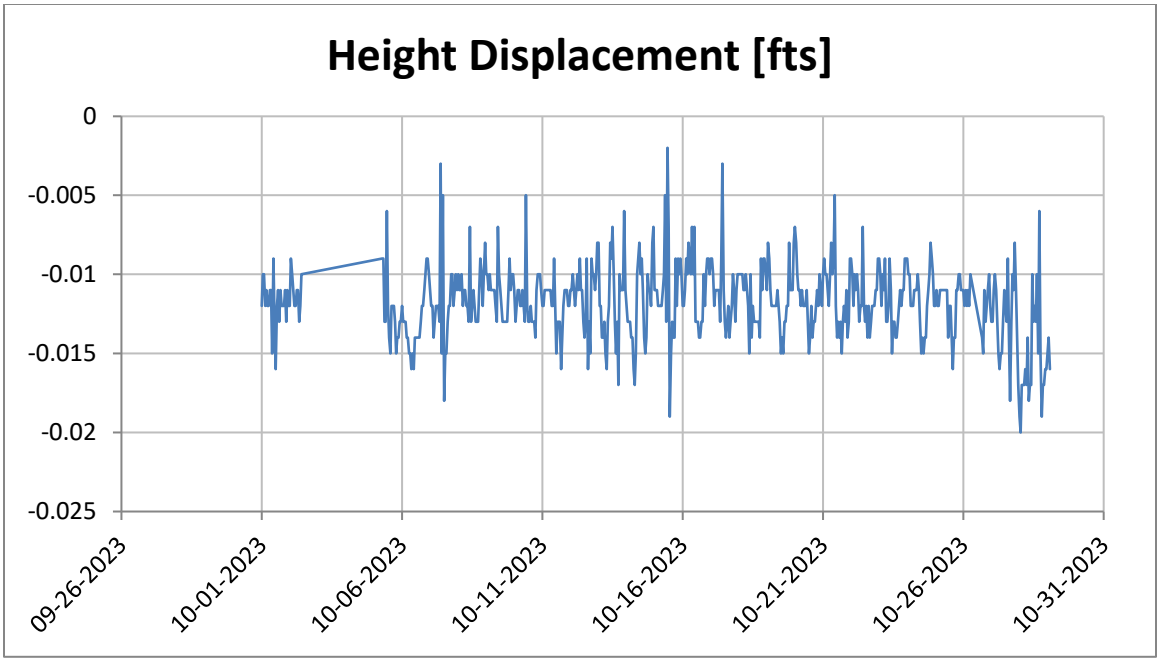
Stantec

Prism B7200-2



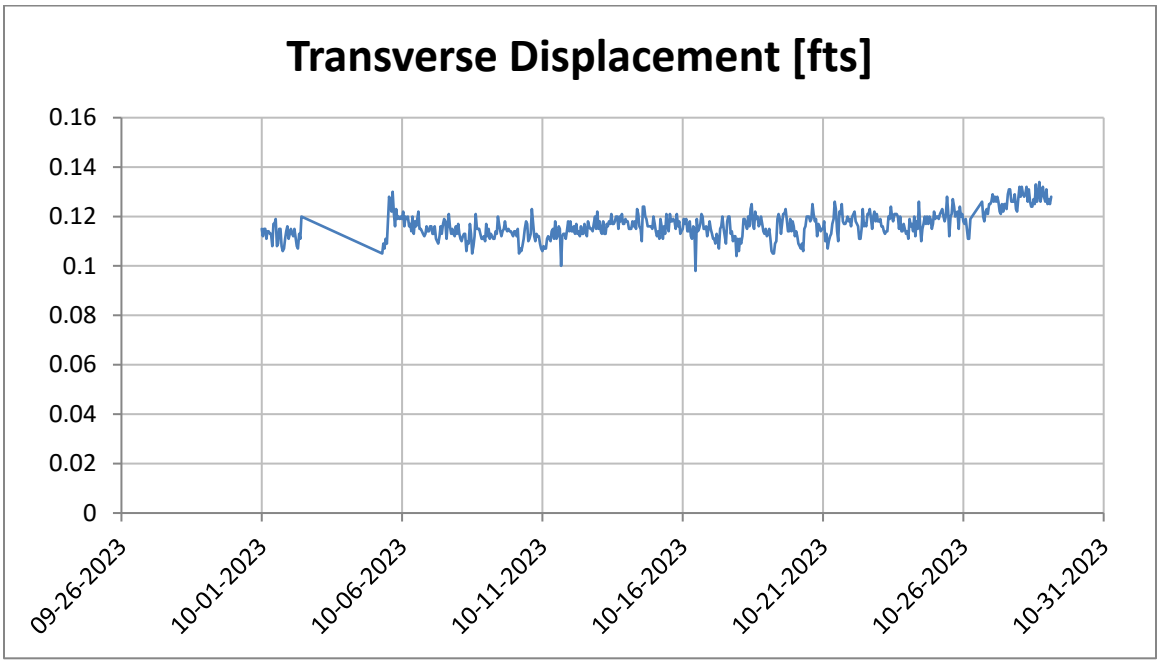


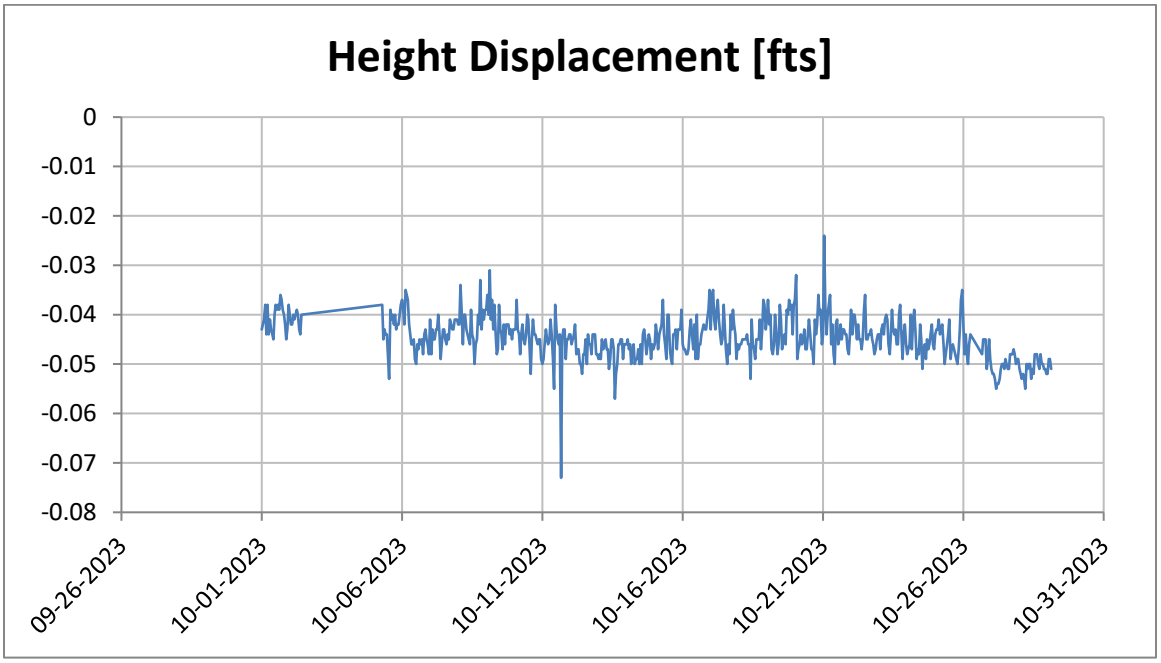
Notes:

1. Survey accuracy is +/-0.016 feet.
2. Alert 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 B7200-3



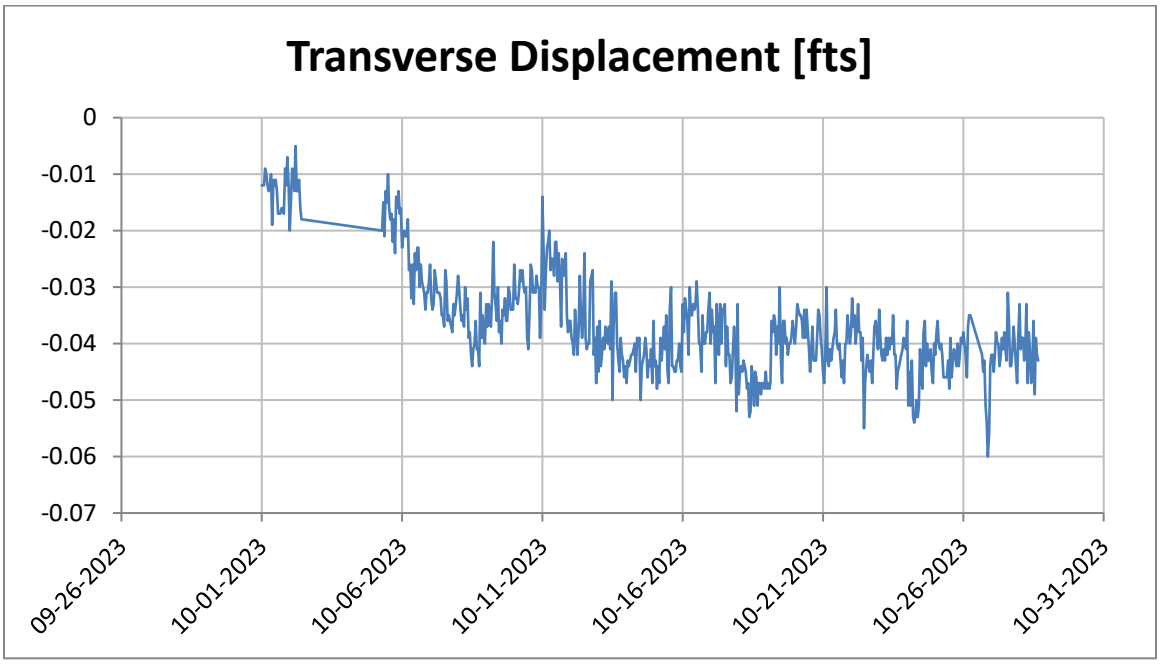


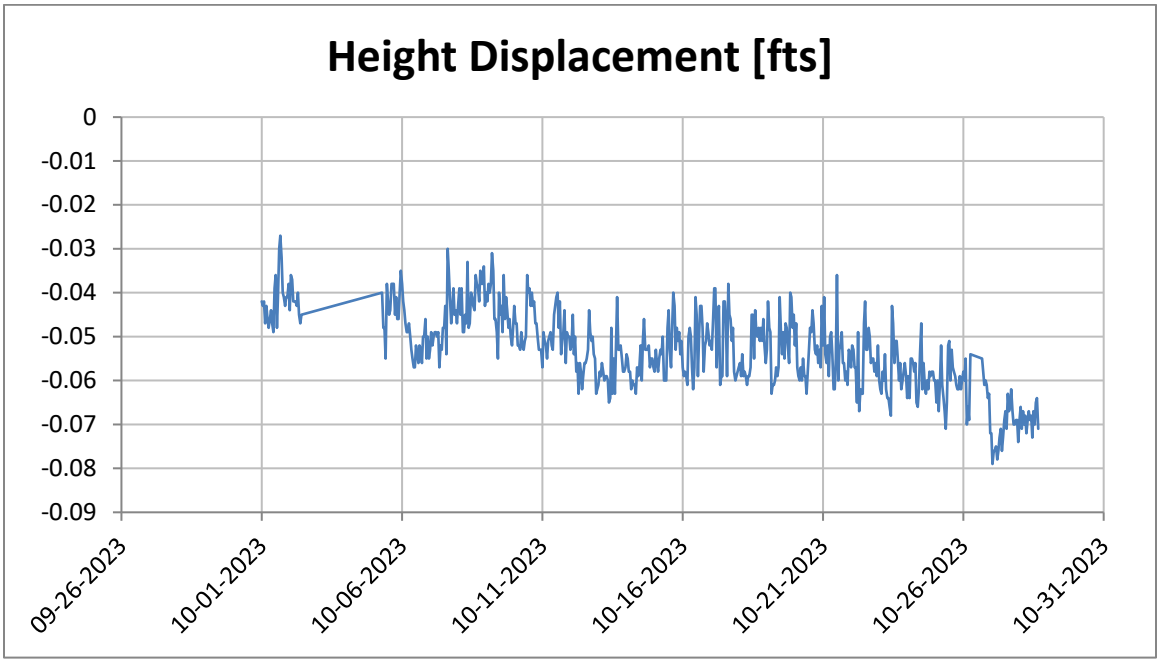
Notes:

1. Survey accuracy is +/-0.016 feet.
2. Alert 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 B7300-0



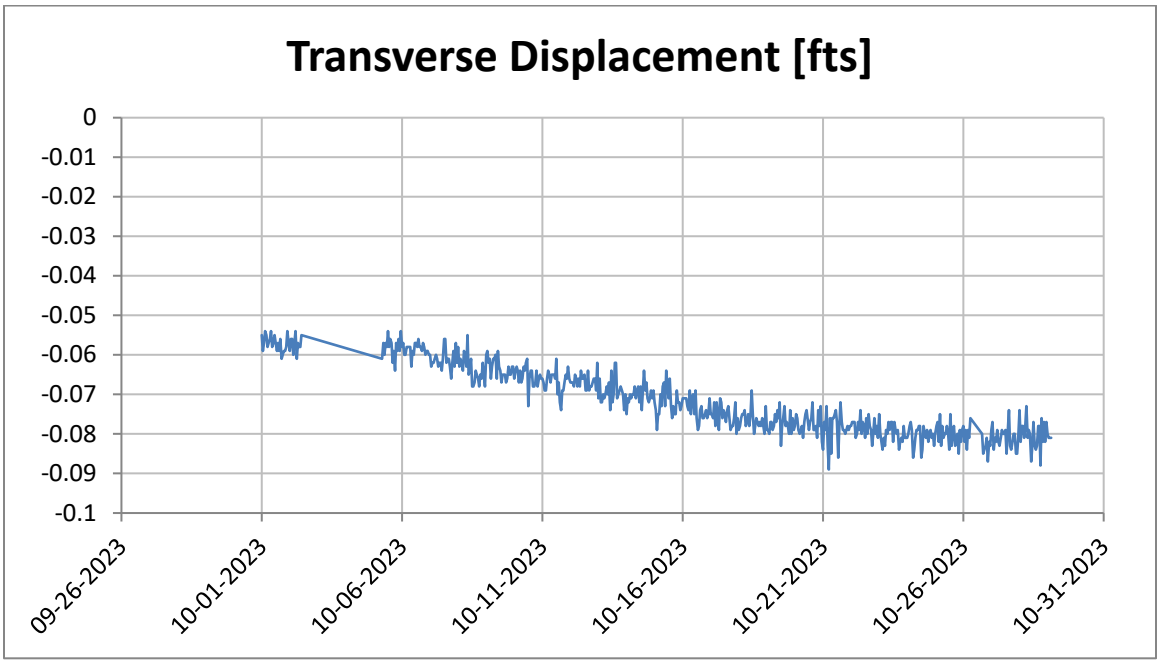


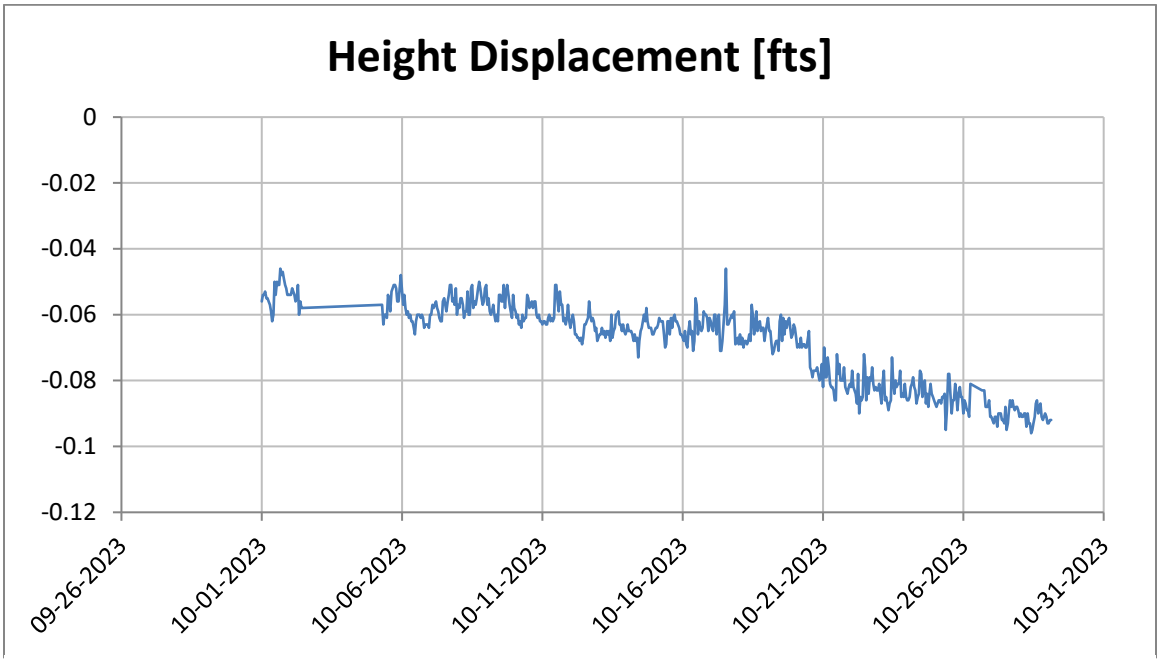
Notes:

1. Survey accuracy is +/-0.016 feet.
2. Alert 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. Apparent movements believed to be the result of topsoil placement around prism.

Stantec

Prism B7300-1



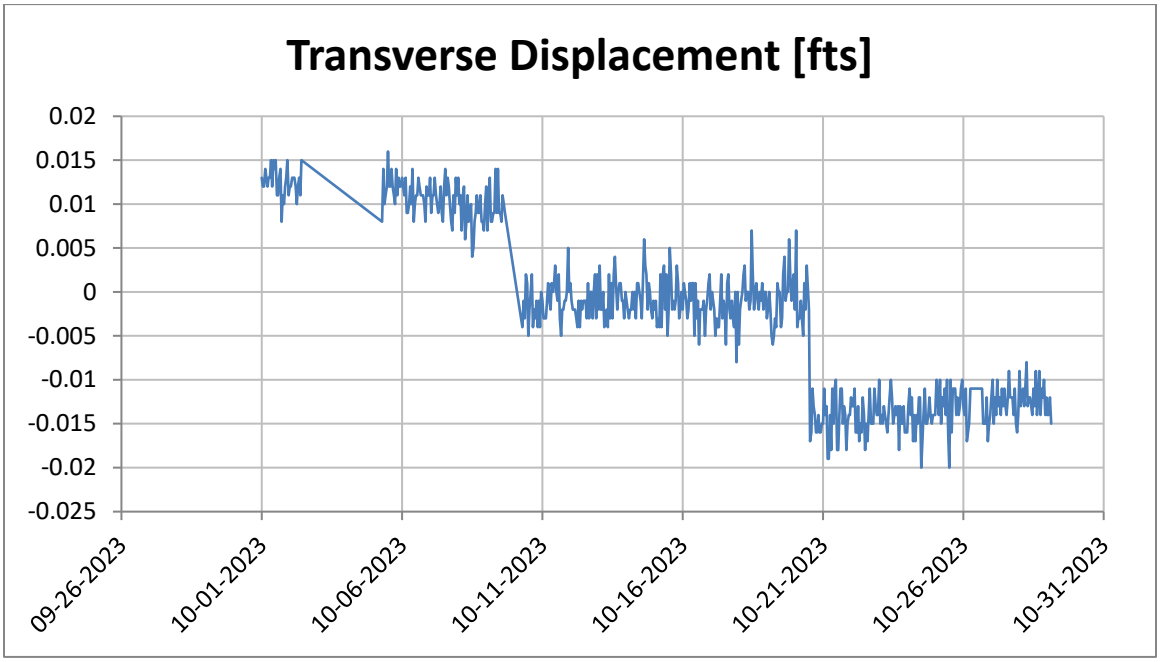


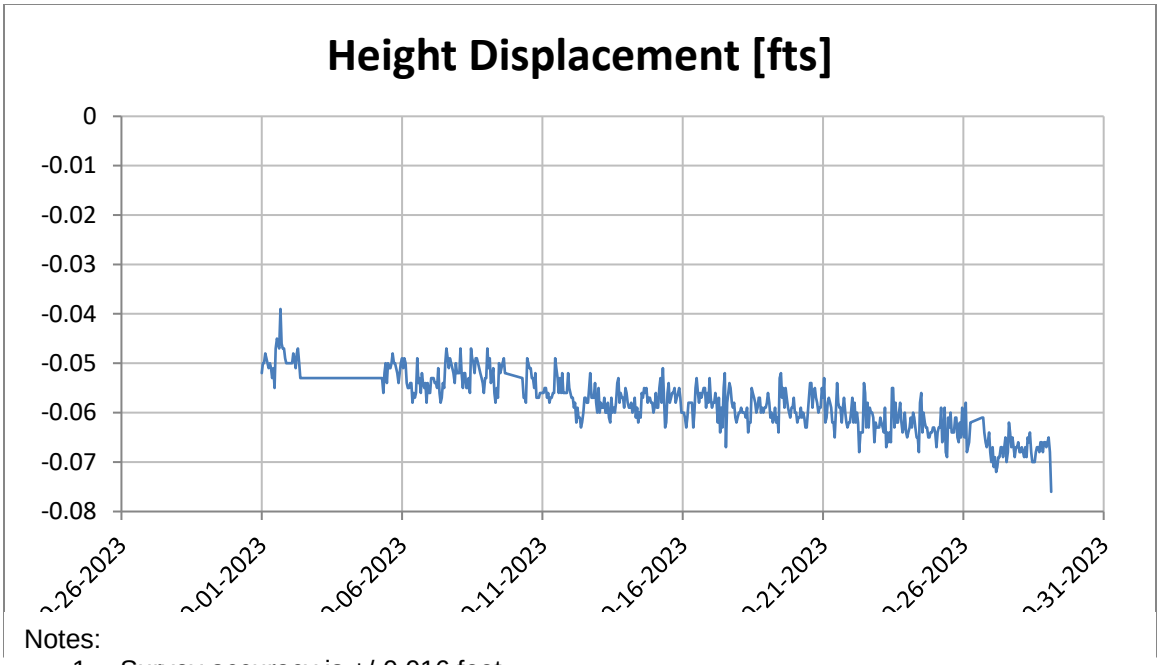
Notes:

1. Survey accuracy is +/-0.016 feet.
2. Alert 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. Apparent movements believed to be the result of topsoil placement around prism.

Stantec

Prism B7300-2



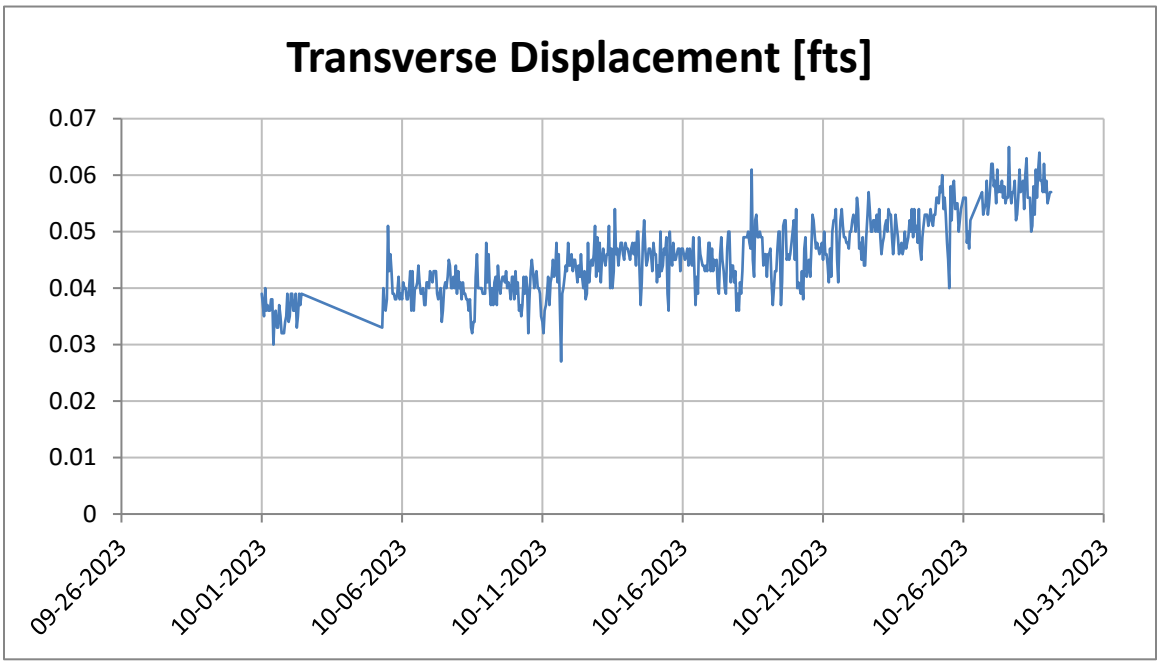


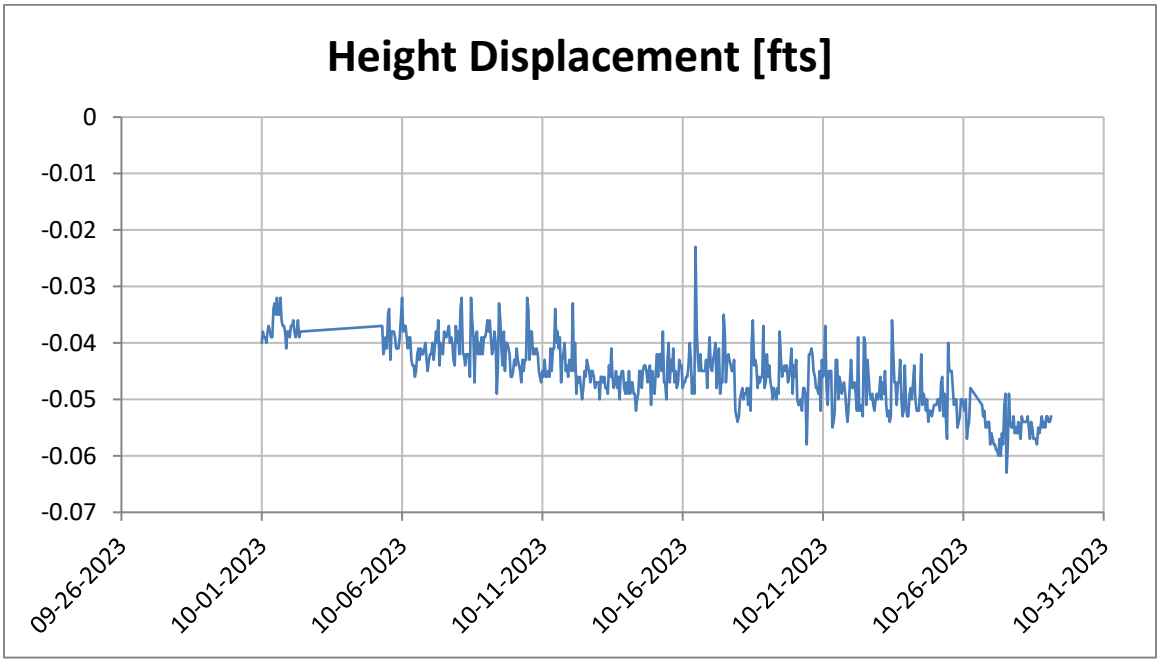
Notes:

1. Survey accuracy is +/-0.016 feet.
2. Alert 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. Apparent movements believed to be the result of topsoil placement around prism.

Stantec

Prism B7300-3



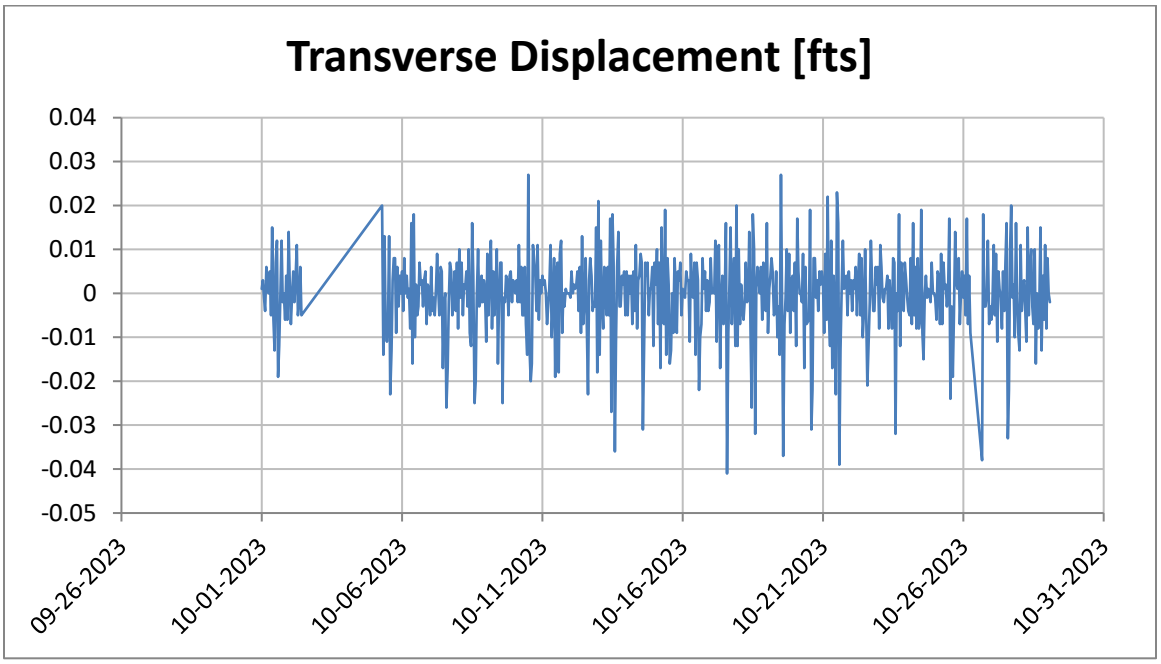


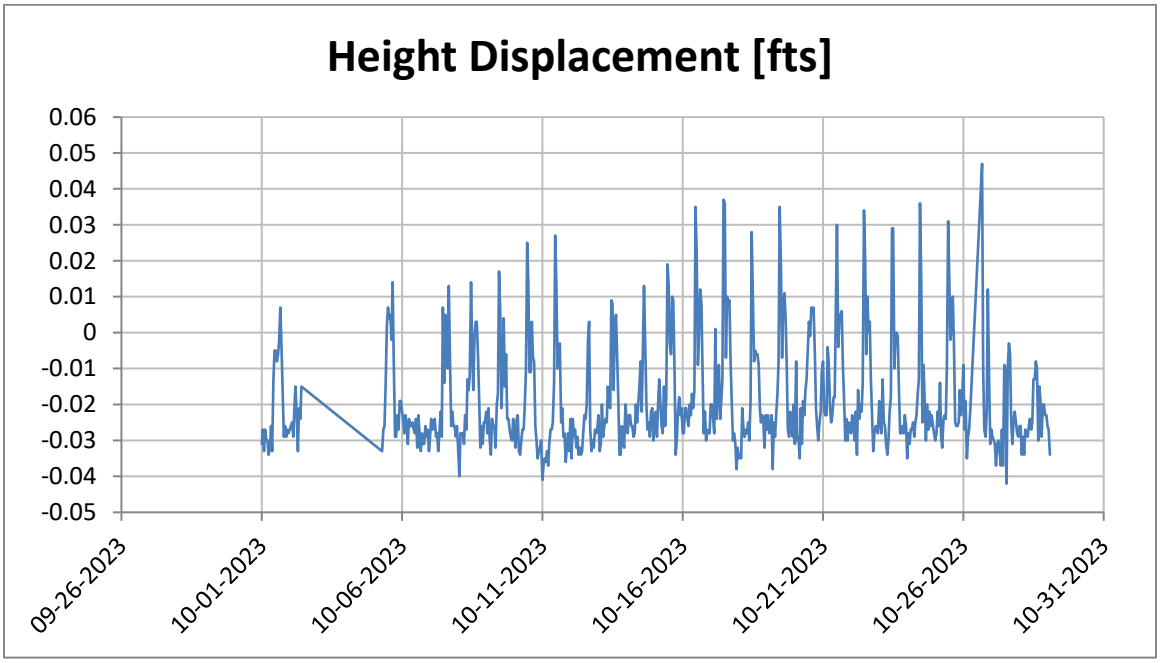
Notes:

1. Survey accuracy is +/-0.016 feet.
2. Alert 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. Apparent movements believed to be the result of topsoil placement around prism.

Stantec

Prism CP6



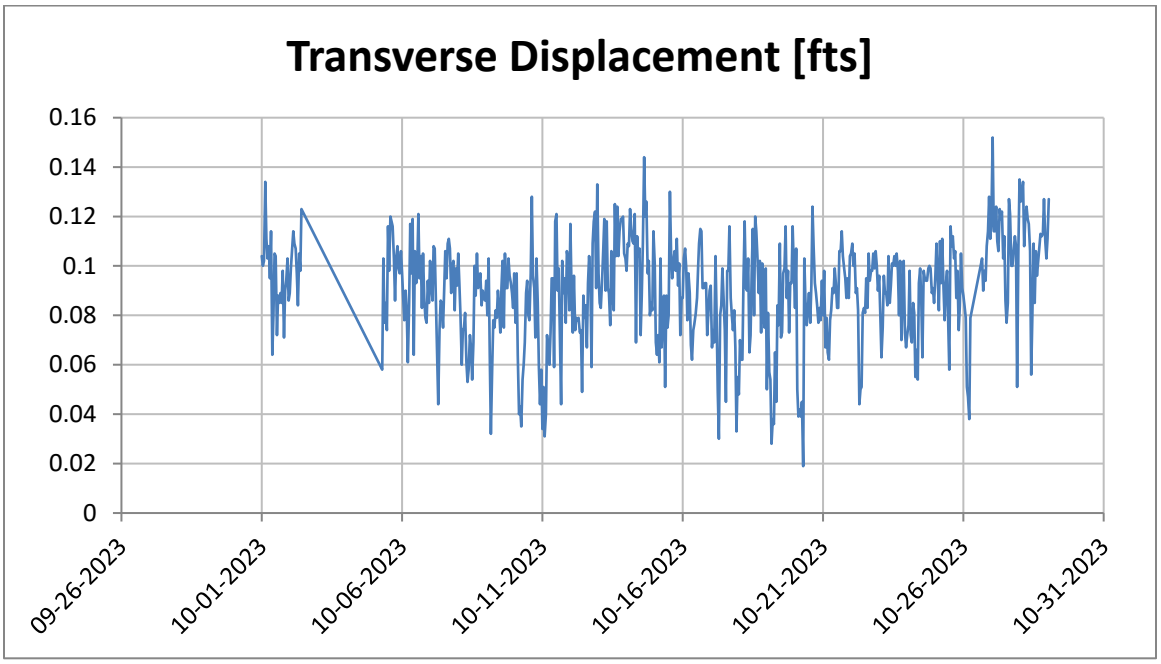


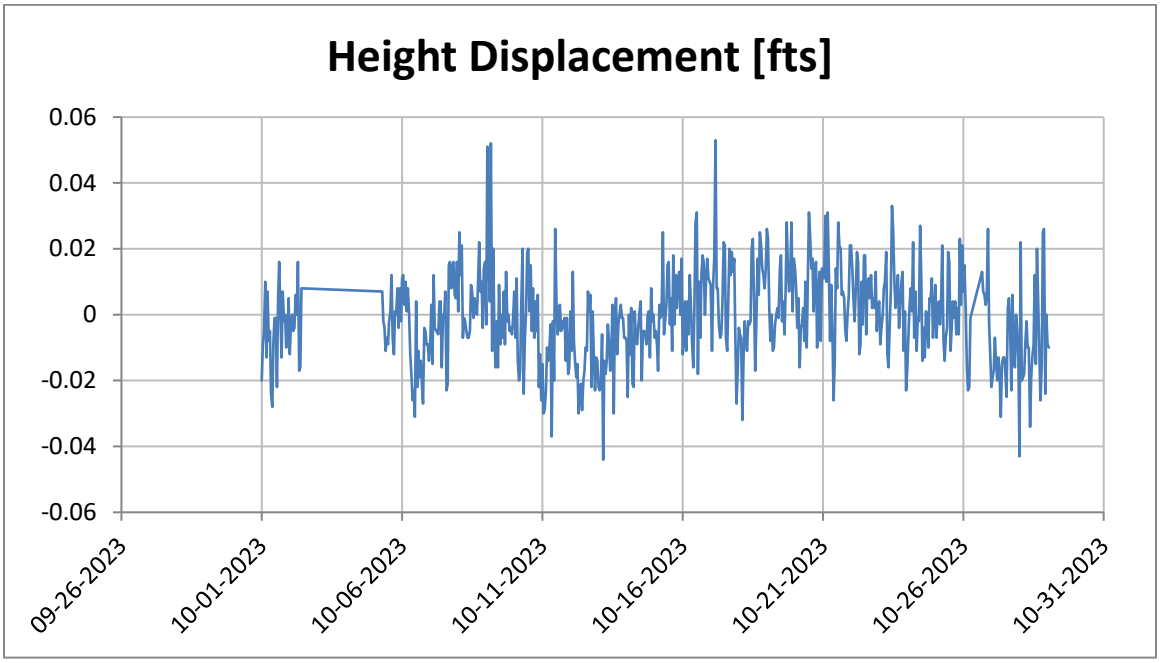
Notes:

1. Survey accuracy is +/-0.016 feet.
2. Alert 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. Alert 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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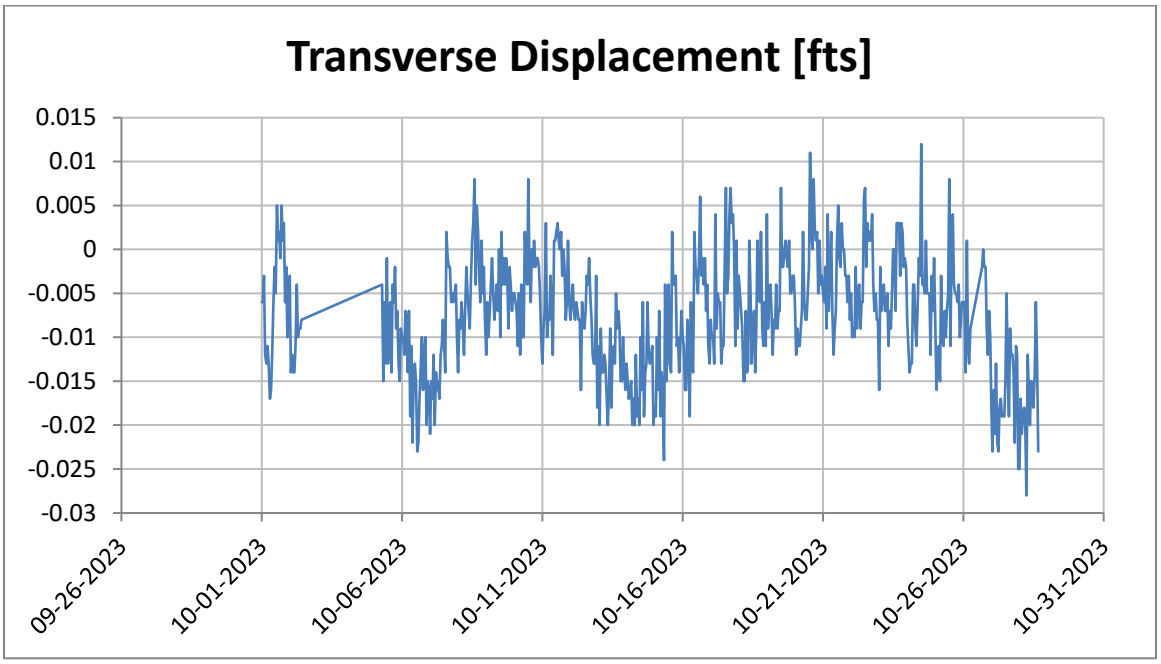
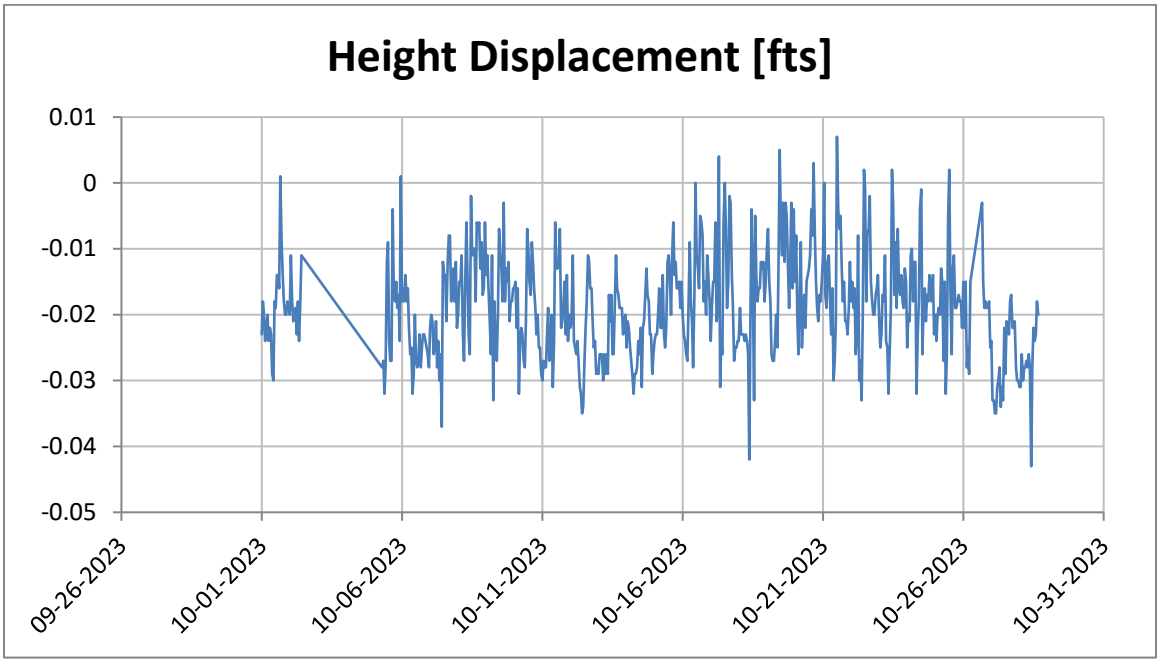
Prism P2



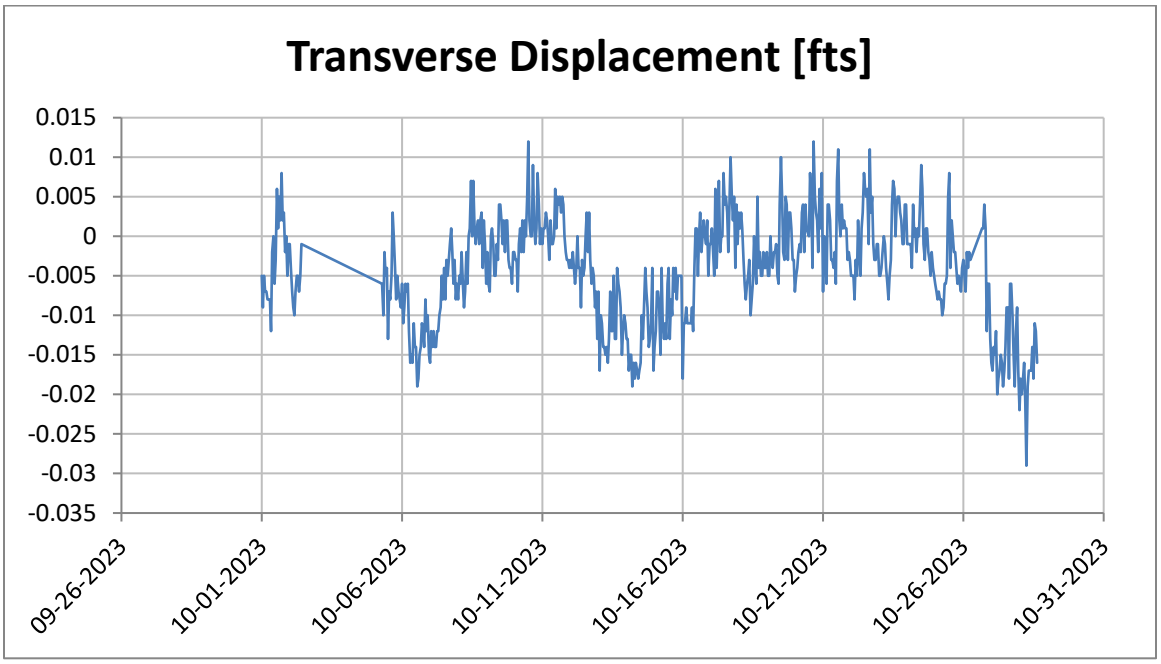


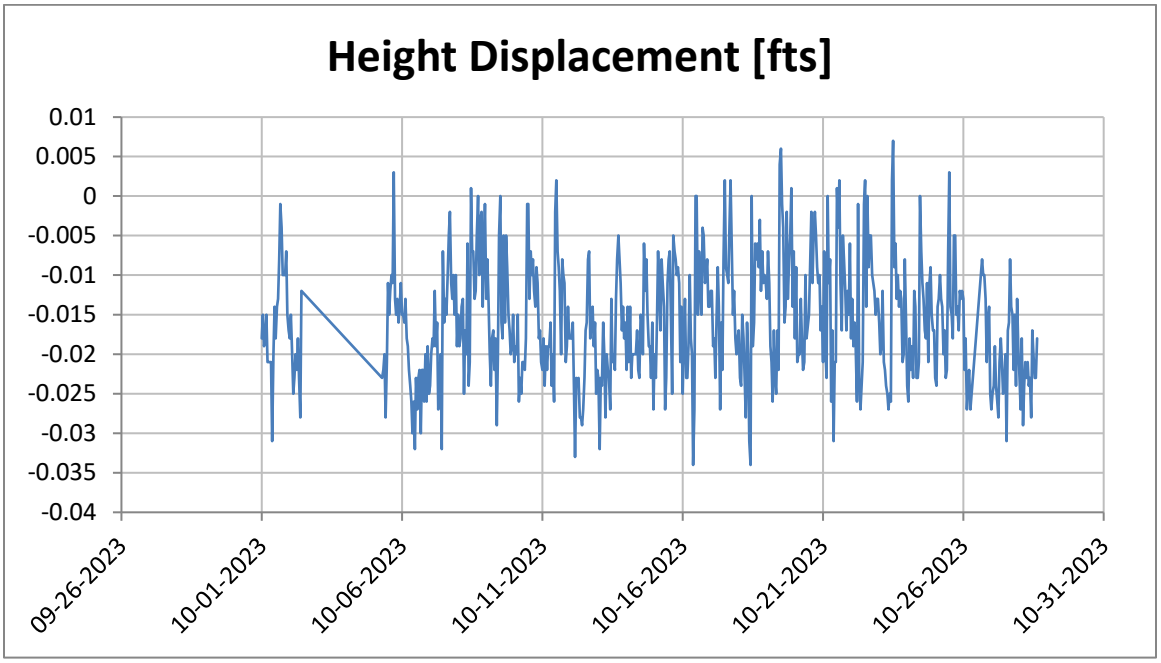
Notes:

1. Survey accuracy is +/-0.016 feet.
2. Alert 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 P5





Notes:

1. Survey accuracy is +/-0.016 feet.
2. Alert 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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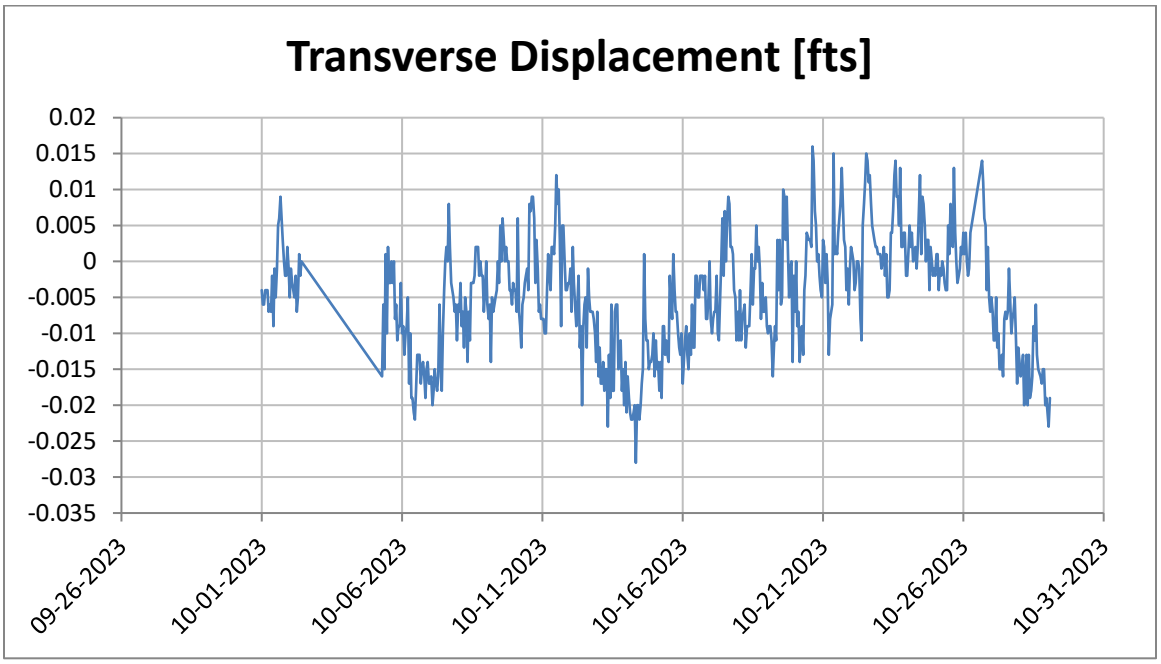
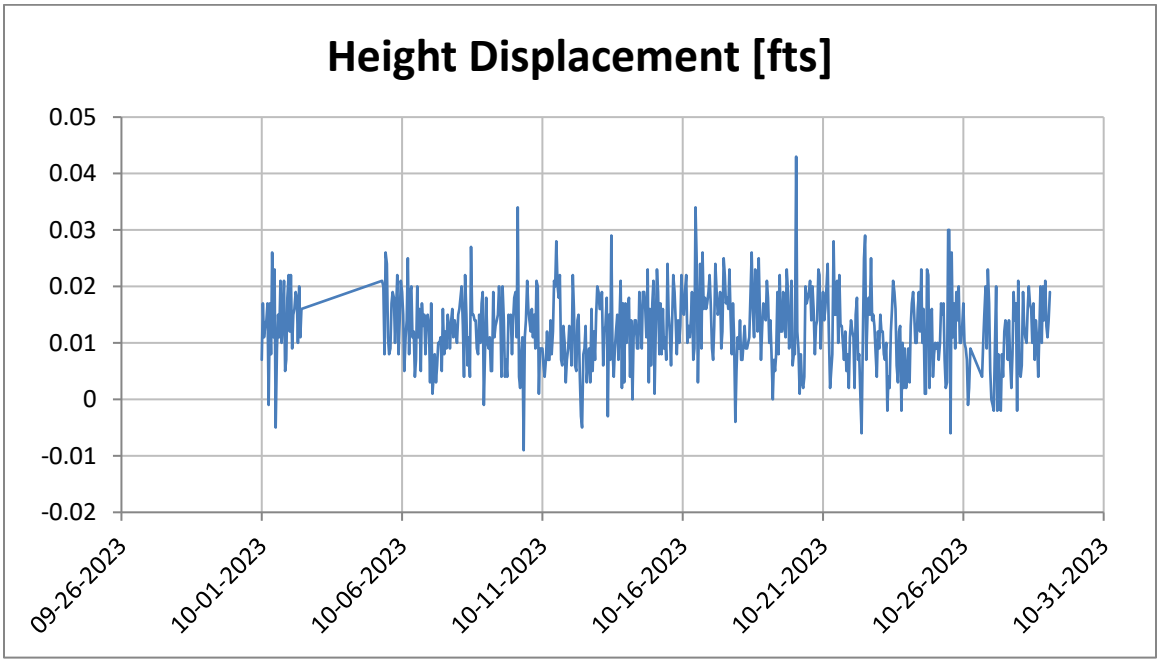
Prism P25





Notes:

1. Survey accuracy is +/-0.016 feet.
2. Alert 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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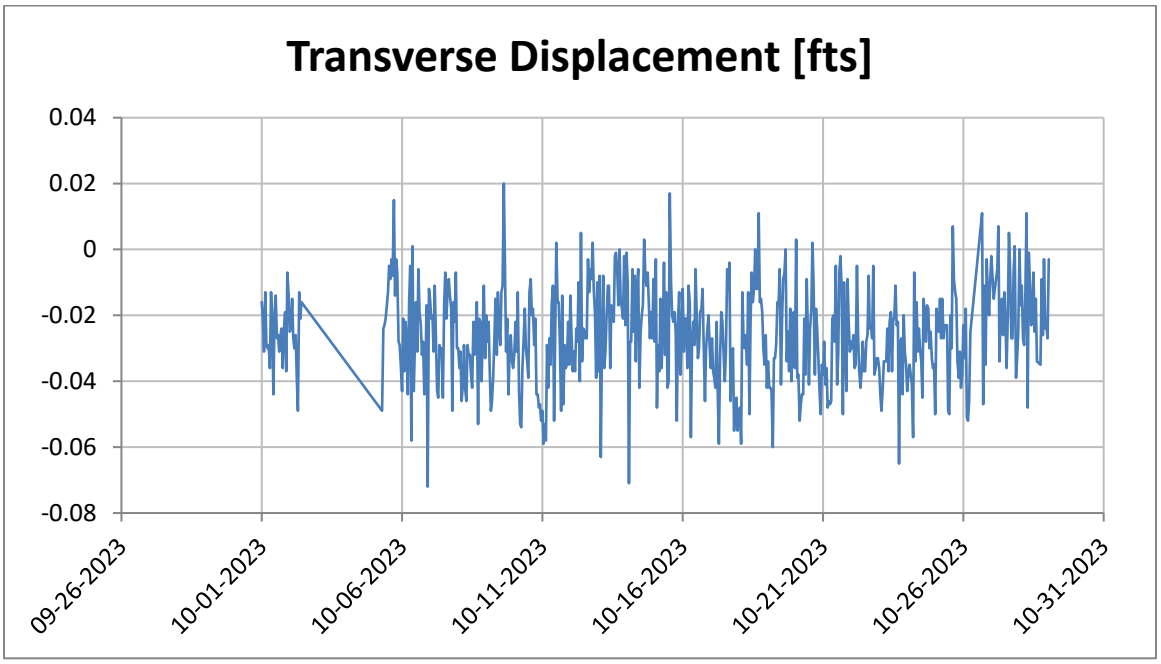
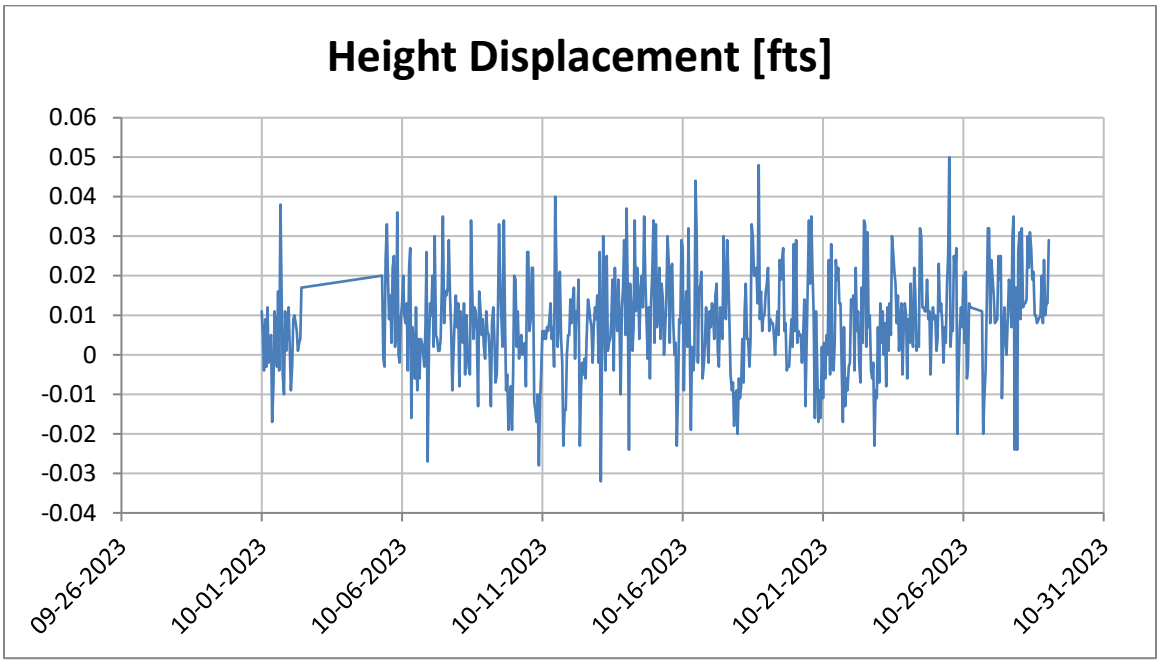
Prism P32R





Notes:

1. Survey accuracy is +/-0.016 feet.
2. Alert 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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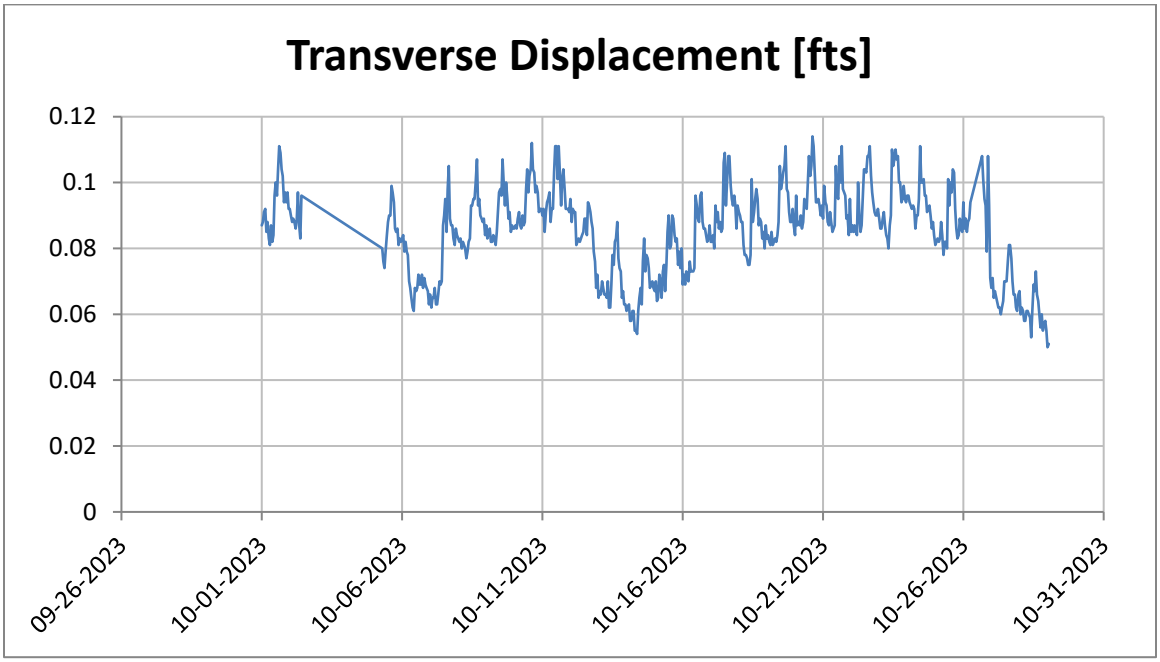
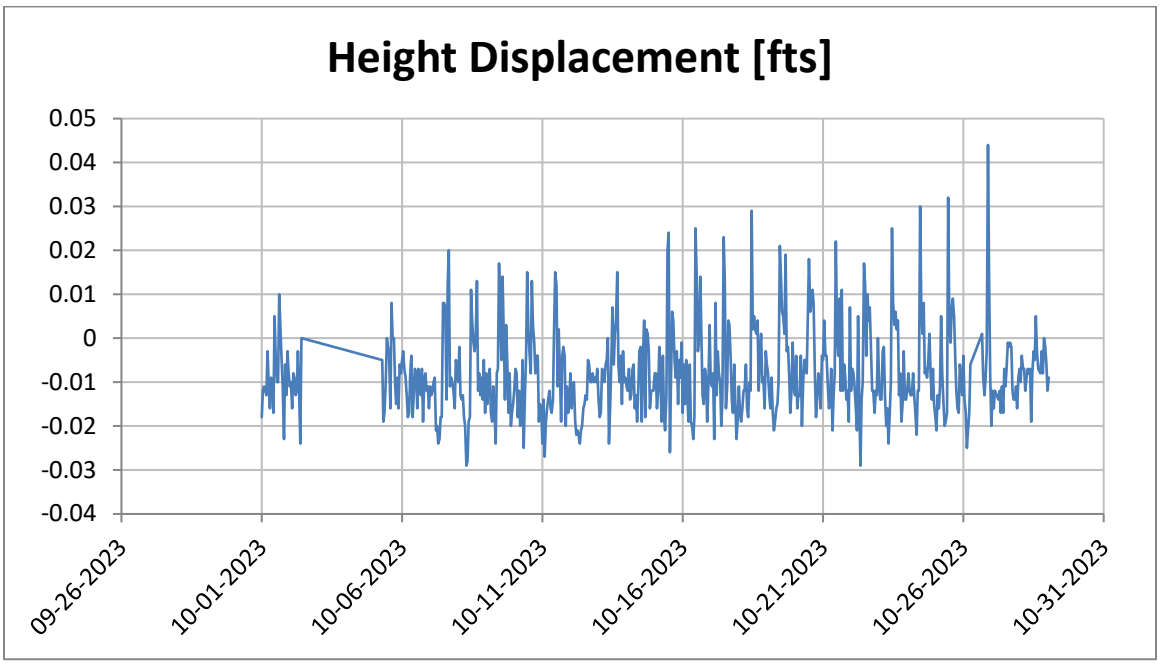
Prism P33





Notes:

1. Survey accuracy is +/-0.016 feet.
2. Alert 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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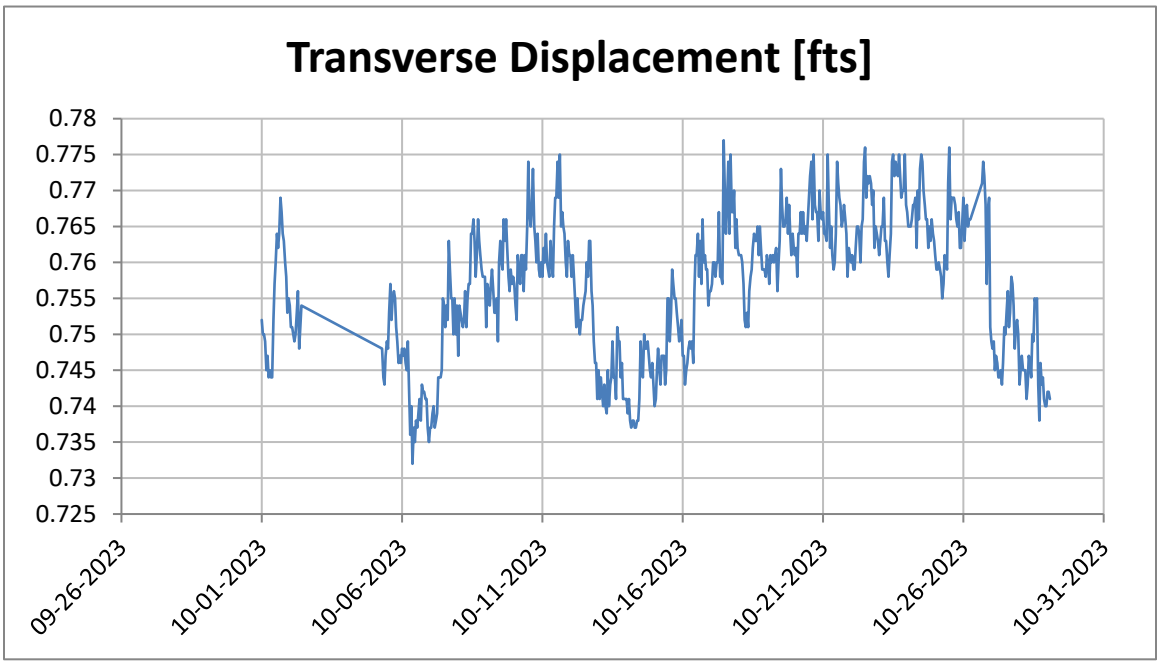
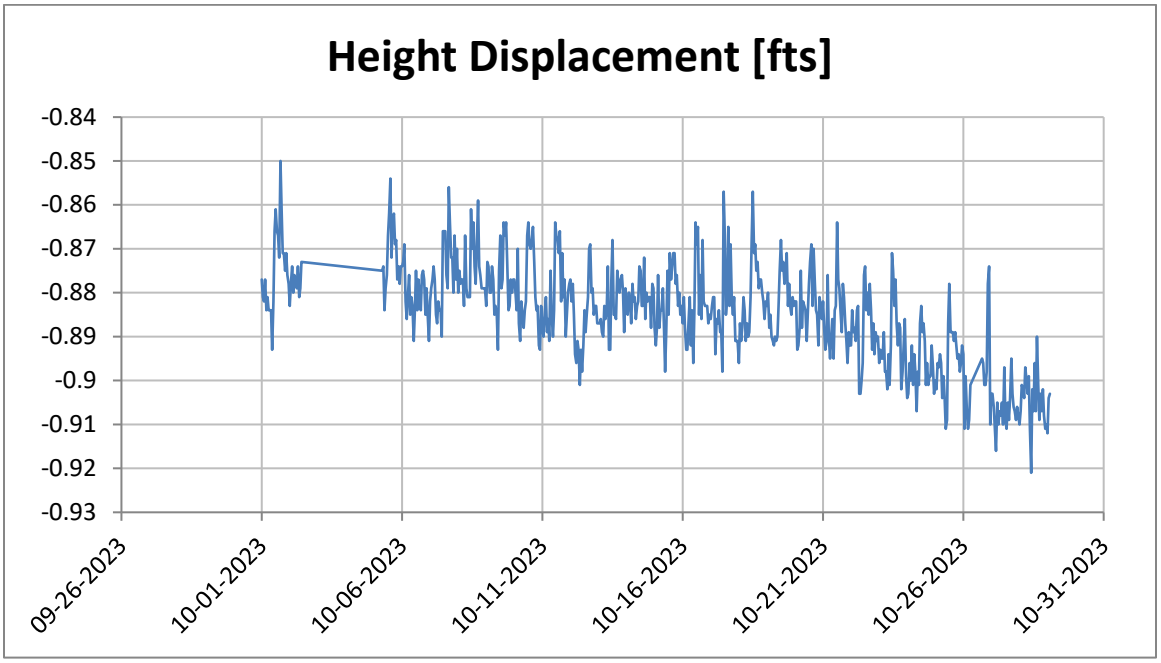
NP66



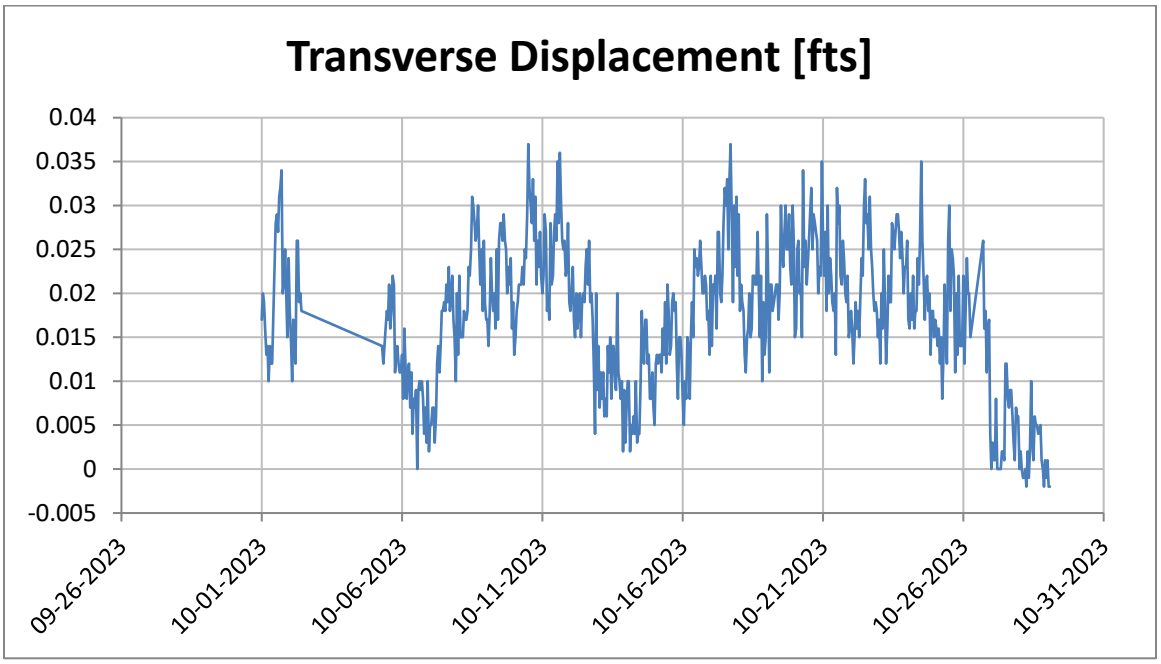


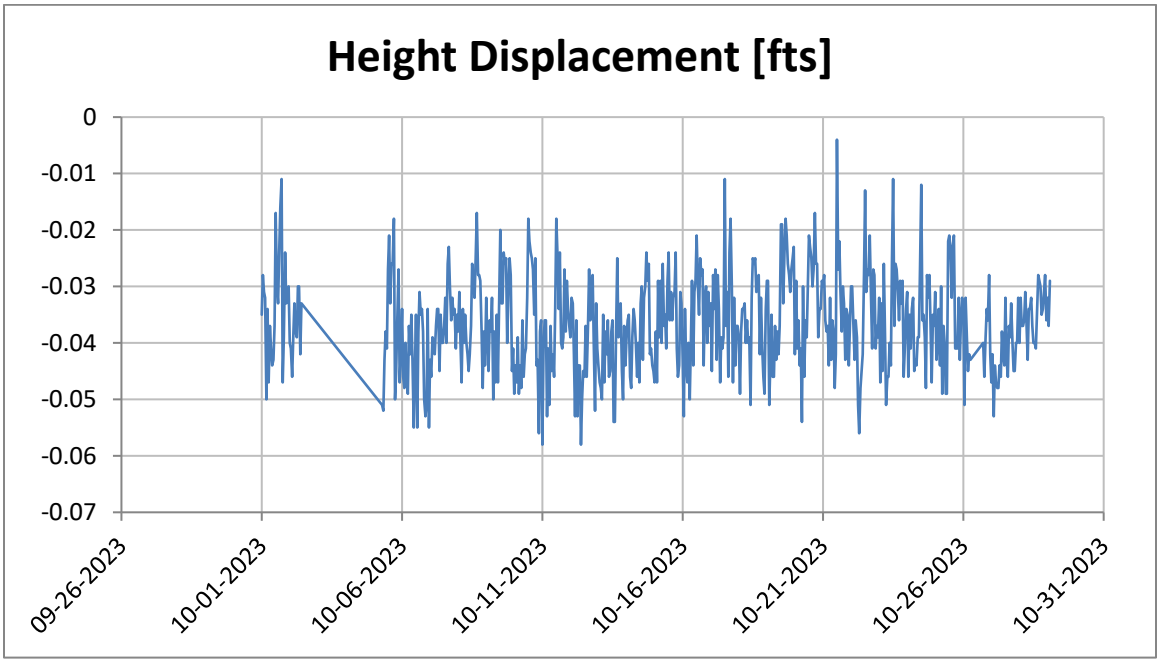
Notes:

1. Survey accuracy is +/-0.016 feet.
2. Alert 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 records slope creep movements.

Stantec

Prism P70



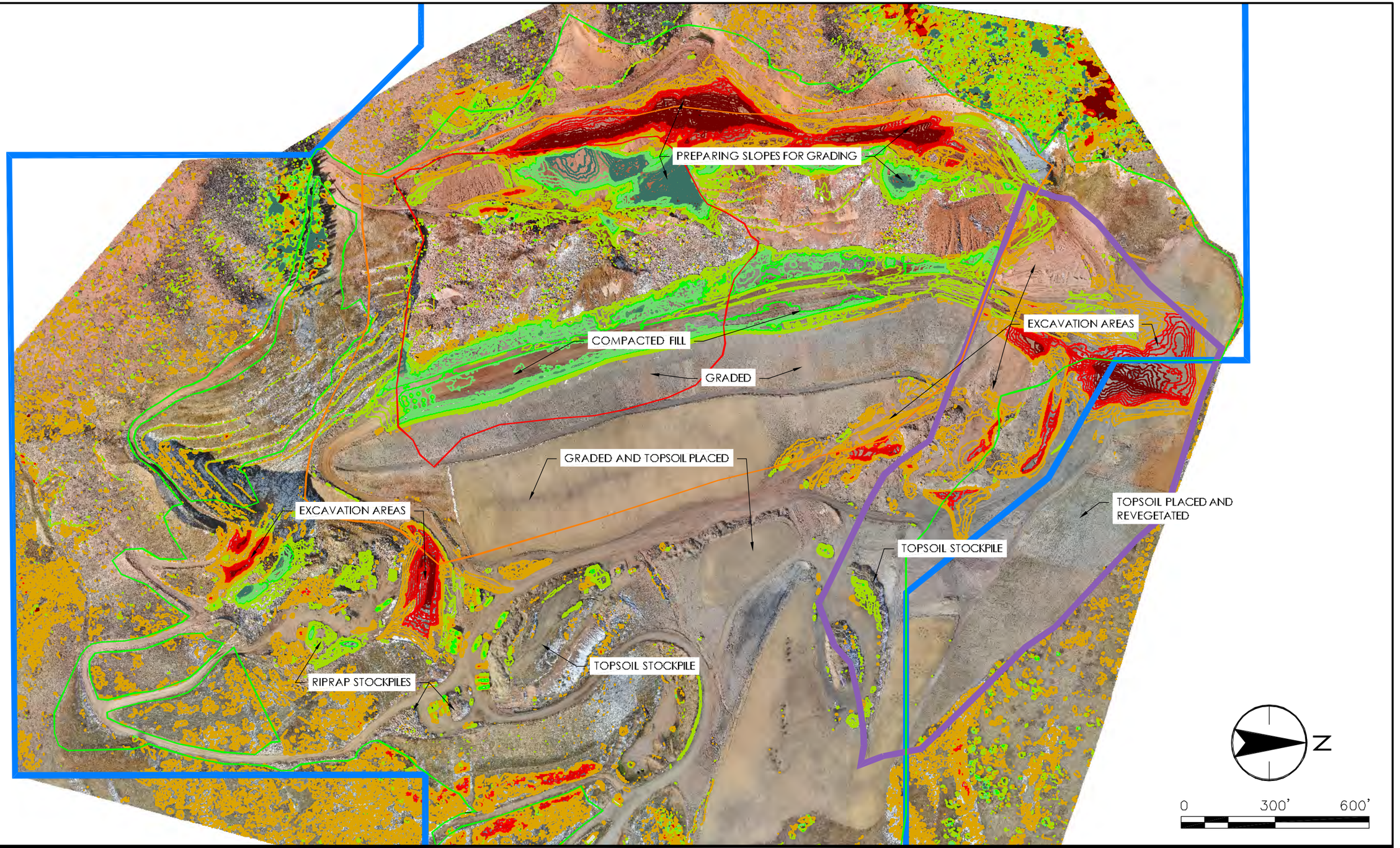


Notes:

1. Survey accuracy is +/-0.016 feet.
2. Alert 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.

Appendix C

Drone Survey



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Stantec Consulting Services Inc.
410 17th Street Suite 1400
Denver CO 80202-4427
Tel (303) 295-1717
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 09/29/2023 to 11/01/2023.

Client/Project
RIVERBEND INDUSTRIES INC.

PIKEVIEW QUARRY SLOPE MONITORING

Project No.
2057288200

Title
EXISTING PRISMS WITH CURRENT SURFACE

Revision	Date
#	2023.11.30
Drawn By	Figure No.
PK	5

Appendix D

Compaction Testing Results

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Compaction Testing Log

Test No.	Date	Elevation (ft)	Northing (ft)	Easting (ft)	Wet Density (pcf)	Moisture Content (%)	Dry Density (pcf)	Compaction (%)
724	2-Oct-23	7348	1401150.7	3173253.7	133.9	5.3	127.2	104
725	2-Oct-23	7347	1401080.6	3173253.8	133.2	6.3	125.3	102
726	2-Oct-23	7349	1401261.5	3173229.6	138.2	5.4	131.1	107
727	2-Oct-23	7351	1401434	3173154.6	139.1	4.1	133.6	109
728	3-Oct-23	7350	1401529.3	3173130.8	149.3	9.3	136.6	111
729	3-Oct-23	7346	1401672.6	3173102.4	131.4	9.3	131.4	107
730	3-Oct-23	7350	1402005.7	3173017.6	131.3	8.3	131.3	107
731	3-Oct-23	7351	1402541.3	3172937.8	127.4	8.4	127.4	104
732	4-Oct-23	7345	1401041.6	3173298.8	132.3	13.2	116.9	95
733	4-Oct-23	7352	1401226.5	3173191.8	136.2	7.1	127.2	104
734	4-Oct-23	7353	1401326.8	3173159.2	149.4	8.9	137.2	112
735	4-Oct-23	7351	1401470.5	3173150.9	145	7.1	135.4	110
736	4-Oct-23	7352	1401502.1	3173112.8	143.5	6.5	134.7	110
737	5-Oct-23	7351	1401490.2	3173175.8	133.3	13.6	117.3	96
738	5-Oct-23	7350	1401663.1	3173081.6	135.4	6.7	126.9	103
739	5-Oct-23	7349	1401877.7	3173058.2	131.8	14.7	114.9	94
740	5-Oct-23	7355	1402460.9	3172911.2	151	6.7	141.5	115
741	6-Oct-23	7349	1401150.5	3173252	140.8	8.5	129.8	106
742	6-Oct-23	7349	1401150.5	3173277.8	142.2	9.8	129.5	105
743	6-Oct-23	7353	1401298	3173177.8	142	7.7	131.8	107
744	6-Oct-23	7352	1401504	3173178.8	139.2	8.1	128.8	105
745	9-Oct-23	7352.5	1401283.2	3173217.6	126.9	10.2	115.2	94
746	9-Oct-23	7354.2	1401375.9	3173160.4	139.9	9.6	127.7	104
747	9-Oct-23	7352.4	1401465.1	3173195.1	132.4	7.9	122.7	100
748	9-Oct-23	7353.4	1401515.5	3173121	123	9.3	112.5	92
749	10-Oct-23	7351.9	1401122.6	3173270.7	133.7	5.3	127	103
750	10-Oct-23	7356	1401206.2	3173259	129.5	8.7	119.1	97
751	10-Oct-23	7352	1401288.5	3173259	130.7	4.1	125.5	102
752	10-Oct-23	7357	1401390.5	3173122.6	130.5	12.5	116	94
753	11-Oct-23	7354	1401964.3	3172990.4	122.6	97	119.6	97
754	11-Oct-23	7356	1402081.2	3172950.7	121.7	96	118.2	96
755	11-Oct-23	7359	1402281.2	3172893	124.5	98	120.3	98
756	11-Oct-23	7359	1402430.5	3172876.5	128.4	102	124.8	102
757	11-Oct-23	7359	1401318.9	3173133.4	126.1	93	114.1	93
758	11-Oct-23	7357	1401264	3173198.3	124.3	92	112.5	92
759	11-Oct-23	7359	1401172.8	3173171.7	133.4	101	123.8	101
760	12-Oct-23	7358	1401327.2	3173164.8	135.1	3.4	130.7	106

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Test No.	Date	Elevation (ft)	Northing (ft)	Easting (ft)	Wet Density (pcf)	Moisture Content (%)	Dry Density (pcf)	Compaction (%)
761	12-Oct-23	7356	1401385.7	3173194.1	133.6	7.7	124.1	101
762	12-Oct-23	7356	1401453.1	3173176.3	131.1	10.8	118.3	96
763	12-Oct-23	7357	1401468.7	3173122.4	125.5	8.7	115.5	94
764	13-Oct-23	7358	1401231.5	3173241	128.6	13.5	113.3	92
765	13-Oct-23	7360	1401256.6	3173153	139.4	8.9	128	104
766	13-Oct-23	7357	1401378.4	3173213.4	122.6	10.5	111	90
767	13-Oct-23	7360	1401437.8	3173135.5	129.4	9.8	117.9	96
768	13-Oct-23	7353	1401813.5	3173062.3	128.5	4.6	122.8	100
769	13-Oct-23	7355	1401971.8	3172990.4	123.9	3.4	119.8	98
770	16-Oct-23	7361	1401377.3	3173169.6	127.4	2.5	124.3	101
771	16-Oct-23	7359	1401438.4	3173201.1	128.4	9.1	117.7	96
772	16-Oct-23	7361	1401288	3173185.6	115.6	2.8	112.5	92
773	16-Oct-23	7358	1401141.5	3173267.9	133.2	9.4	121.7	99
774	17-Oct-23	7359	1401095.3	3173243	135.1	9.6	123.3	100
775	17-Oct-23	7361	1401167.8	3173242.5	131	9.3	119.9	98
776	17-Oct-23	7360	1401236.7	3173262.1	131.8	6.5	123.7	101
777	17-Oct-23	7363	1401251.5	3173201.2	137.9	6	130.1	106
778	17-Oct-23	7357	1401638.3	3173105.2	131.7	4.7	125.8	102
779	17-Oct-23	7357	1401816.8	3173042.2	124.5	3.8	119.9	98
780	17-Oct-23	7358	1402024.2	3172977.7	119.8	2.8	116.5	95
781	18-Oct-23	7362	1401344.1	3173201.1	129.5	10.1	117.6	96
782	18-Oct-23	7359	1401624.5	3173095.2	122.6	9.5	112	91
783	19-Oct-23	7359	1401859.8	3173031.2	129.9	4.4	124.4	101
784	19-Oct-23	7359	1402172.7	3172932.2	128.4	3	124.7	102
785	19-Oct-23	7359	1402329.8	3172942.3	130.9	3.2	126.9	103
786	19-Oct-23	7361	1402566	3172865.8	130	2.6	126.7	103
787	20-Oct-23	7364	1401367.4	3173173.2	129.5	5.4	124.6	101
788	20-Oct-23	7364	1401431.8	3173112	133.1	7.2	125.9	103
789	24-Oct-23	7361	1401686.5	3173078.2	138.6	5.7	132.9	108
790	24-Oct-23	7360	1401715.6	3173074.9	131.6	6.1	125.5	102
791	24-Oct-23	7361	1401851.1	3172986.6	134	6	128	104
792	25-Oct-23	7359	1402477.4	3172924.1	137	3.5	132.4	108
793	25-Oct-23	7362	1402372.3	3172883.4	138.2	5	131.6	107
794	25-Oct-23	7360	1402293.3	3172929.3	139.5	3.9	134.2	109
795	27-Oct-23	7361	1401108.6	3173203.1	118.1	3.1	114.5	93
796	27-Oct-23	7364	1401310.4	3173131	119	9.3	108.9	89
801 (retest of 796)	3-Nov	7364	1401310.4	3173131	125.8	9.7	114.7	93

Test No.	Date	Elevation (ft)	Northing (ft)	Easting (ft)	Wet Density (pcf)	Moisture Content (%)	Dry Density (pcf)	Compaction (%)
797	27-Oct-23	7,364	1401392.8	3173110.8	131	4.1	125.9	103
798	27-Oct-23	7361	1401591.4	3173084.5	135	4.7	128.9	105
799	27-Oct-23	7361	1401747.5	3173038.1	121.5	9	111.5	91
800	27-Oct-23	7362	1402040.9	3172959	129.1	6.6	121.1	99

Notes:

- A total 2,675,000 yd3 had been placed and compacted. This requires at least 535 compaction tests, and 1,010 tests have been taken.

- Test 801 is a retest of 796. Test 796 was not included in the compaction test count.

LEGEND

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

N

0 150' 300'

Stantec

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Client/Project
RIVERBEND INDUSTRIES INC.

PIKEVIEW QUARRY SLOPE MONITORING

Project No.
2057288200

Title
COMPACTION TEST LOCATIONS

Revision
#

Date
2023.11.30

Drawn By
PK

Figure No.
6