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To:	Jerald Schnabel	From:	Paul Kos
	Castle Aggregate Industries Inc.		Denver, CO 80222
File:	November 2023 Monitoring Summary	Date:	December 31, 2023

Reference: November 2023 Geotechnical Monitoring Summary Pikeview Quarry

1.0 INTRODUCTION

Stantec Consulting Services Inc. (Stantec) has prepared this November 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. Castle Aggregate Industries Inc. (Castle Aggregate) 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 November 2023. Continuous monitoring by the robotic survey system began in 2010 and has continued through the month of November 2023. Visual inspections of the slopes were performed by Castle Aggregate employees and Stantec engineers.

1.1 PURPOSE

The purpose of this report is to summarize the November 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 (Castle Aggregate 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 November 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 November 16, 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 November 2023. Site maintenance, topsoil placement and riprap production also continued throughout the month.
- Operators placed compacted material in the buttress zone. Material was primarily excavated from the Upper Borrow Area. The material was hauled down ramps to the buttress floor, and this material has not been included in the fill totals. Material was placed in lifts and compacted in a depression area above the current floor commonly called the “Bathtub”. Water was observed to be collecting in this area, and the fill will prevent future infiltration. This area was previously not accessible.
- Compaction testing continued 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.
- 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. Castle Aggregate has partially cleared the debris, but access limitations and supports within the culvert inhibit clearing all the debris. Castle Aggregate has procured a pump and will begin pumping operations if any water collects behind the culvert. Castle Aggregate 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 20 prisms active in November; two prisms were control points located outside the slope movement area, six prisms are located on the slopes surrounding the slope movement area, four prisms were located on the slopes within the landslide area, and eight 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 November, 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, Castle Aggregate clears the area of concern until the data can be reviewed and the slope can be inspected. Castle Aggregate 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 29 to November 2 and November 23 to 27 due to power outages and system updates. During these time periods, there was either no work performed, or spotters were used to monitor the slopes of movements. The alerts are listed in Table 2.

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Table 2 Alert Summary

Date(s)	Alert	Cause/Actions taken	Resolved
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
8-Nov	P33 regression limits received	Snow and fog at time of alert. Spotter monitoring construction activities.	8-Nov
8-Nov to 9-Nov	Points not found	Snow and fog. Spotter monitoring construction activities.	9-Nov
10-Nov	CP-7 not found	Single event. No work being performed at time of alert. Animals observed in vicinity of prism.	10-Nov
10-Nov to 13-Nov	B7200-1 not found	Equipment parked in front of prism over weekend.	13-Nov
15-Nov	NP66 not found	Prism removed due to grading in area.	15-Nov
17-Nov	B7200-1 not found	Equipment parked in front of prism.	17-Nov
20-Nov	Points not found	Snow and fog. Spotter monitoring construction activities.	20-Nov
23-Nov to 27-Nov	Points not found and communication error alerts	Snow and fog followed by power outage. No work being performed at time of alerts.	27-Nov
29-Nov	B7200-1 not found	Single event. Topsoil hauling operations in front of prism.	29-Nov
29-Nov	CP-6 not found	Single event. Topsoil hauling operations in front of prism.	29-Nov
30-Nov	B7200-1 not found	Single event. Topsoil hauling operations in front of prism.	30-Nov
30-Nov	P25 regression limits received	No work being performed at time of alert. No sign of movements when area was inspected. Believed to be a data error from heater in prism building.	30-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	0.000	-0.411	0.0761	0.7716	Slope creep movements
BR3	-0.011	-0.093	0.0288	0.0938	New prism
CP6	0.005	-0.030	0.0028	0.0375	
CP7	0.124	0.016	0.0883	0.1332	
P2	-0.028	-0.030	0.0097	0.0425	
P25	-0.008	0.016	0.0081	0.0268	
P32R	0.015	0.032	-0.0228	0.0422	
P33	0.069	-0.014	-0.0252	0.0825	
P5	-0.023	-0.023	0.0088	0.0325	
P70	-0.004	-0.040	0.0074	0.0649	
NP4	0.038	-0.048	0.0551	0.0915	New prism
NP66	0.768	-0.927	0.0181	1.2688	Prism removed on 11/15. Slope creep movements.
B7200-1	-0.017	0.001	0.0008	0.0208	
B7200-2	0.012	-0.022	0.0047	0.0406	
B7200-3	0.141	-0.059	0.0224	0.1854	
B7300-0	-0.048	-0.087	0.0169	0.1018	
B7300-1	-0.089	-0.108	0.0208	0.2111	
B7300-2	0.006	-0.090	0.0275	0.1347	
B7300-3	0.078	-0.075	0.0347	0.1334	
B7300-4	0.028	-0.023	0.0295	0.0362	New prism

The data show stable conditions with no movements at 18 of 20 prisms with recorded displacements limited to data scatter and not actual movements. Prisms BR1 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. Similar movements are expected at prism BR3, but the movements are not yet apparent with the limited data set. Almost off of the prism data indicate a data shift in November; these shifts have previously occurred during the colder fall and winter months are are not an indication of actual movements. 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 30, 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 November topography was also compared to the October 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 primarily excavated from the North Borrow Area and placed in the Buttress Area and to fill the "Bathtub". Ramps connecting the Upper Borrow Area and the Buttress Area were constructed; the material placed in these ramps has not been included in the fill volumes. 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 primarily from the North Borrow Area and placed in the Buttress Area. All fill is moisture conditioned as necessary and then compacted. During November 2023, approximately 100,000 yd^3 were placed and compacted. Additionally, Castle Aggregate placed 7,000 yd^3 of topsoil on the slopes that have reached final grade. 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 20 compaction tests. There were 83 compaction tests taken in November. As of November 30, 2023, when the site was surveyed, a total of approximately 2,775,000 yd^3 had been placed and compacted. This required at least 555 compaction tests, and 1,093 tests have been taken. All tests in November met the minimum compaction requirement of 90%.

6.0 RECLAMATION PROGRESS

Castle Aggregate 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 Spring 2024 (est.)
Phase 4 – Contractor Demobilize from Site	Spring 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 continued in the Upper Borrow Area
- Processing of riprap continued
- Geotechnical monitoring continued

Work planned for next month includes:

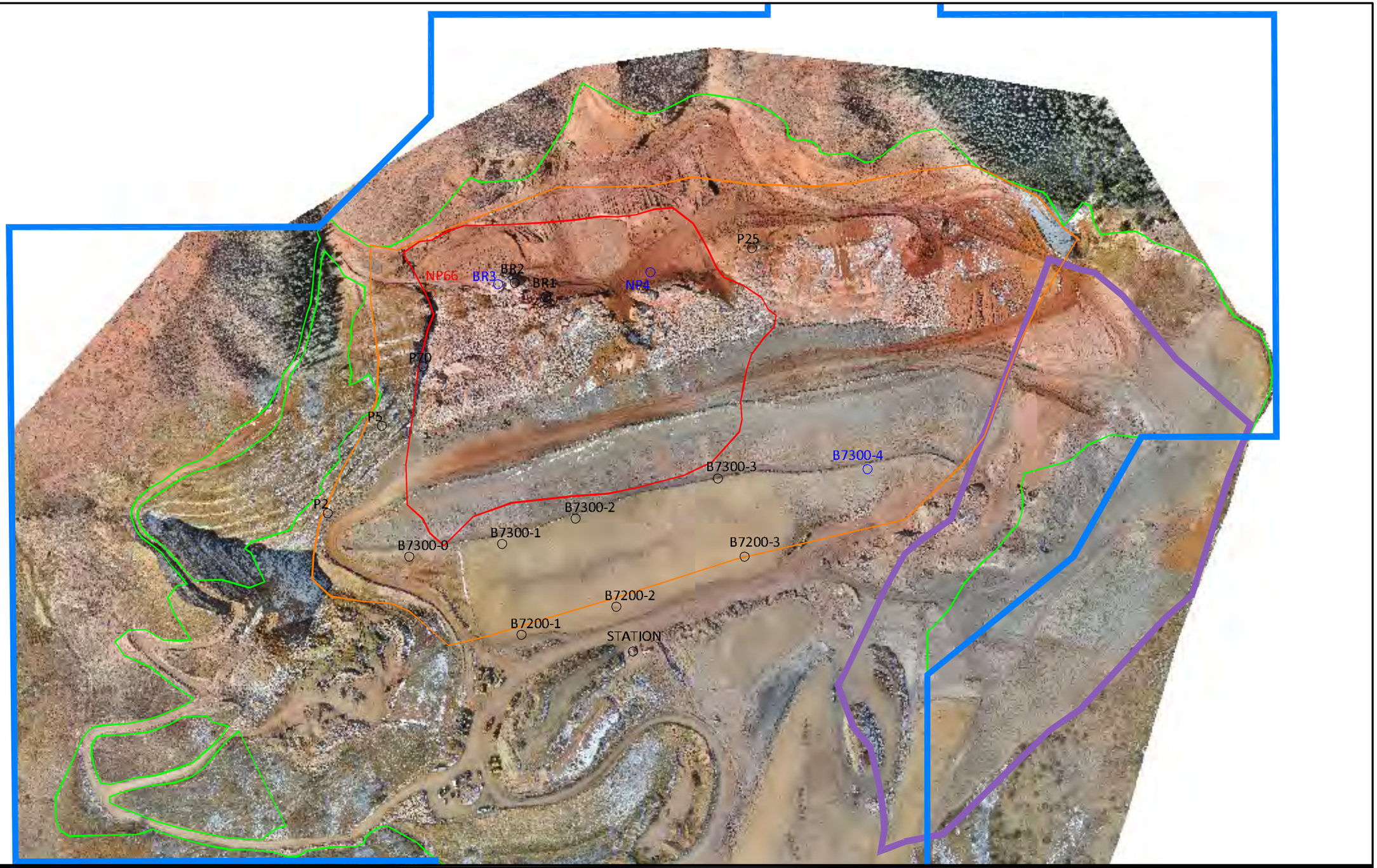
- Continue placing compacted fill in the buttress area
- Continue processing riprap
- Continue geotechnical monitoring
- Continue to remove and replace prisms on an as-needed basis.

7.0 CONCLUSIONS

The data collected in November 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 November 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
CASTLE AGGREGATE

PIKEVIEW QUARRY SLOPE MONITORING

Project No.
2057288200

Title
SITE MAP

Revision
#

Date
2023.12.31

Drawn By
PK

Figure No.
1

Appendix A

Visual Inspections

6. Dozers grading down from haul road.

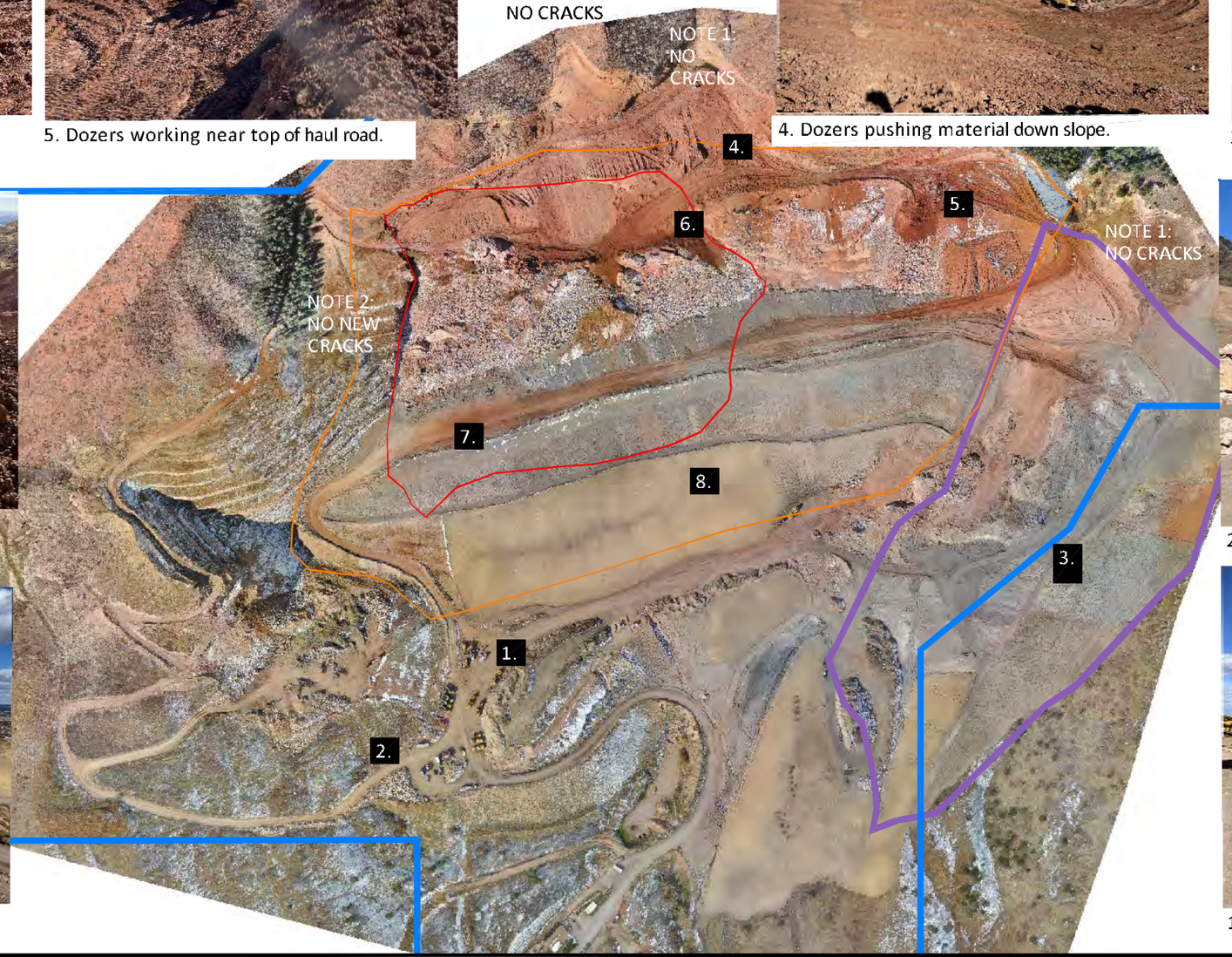
5. Dozers working near top of haul road.

4. Dozers pushing material down slope.

3. First bench seen from North Borrow Area.

7.Compacted pit floor seen from haul road .

8. North Borrow Area with growth medium.



2. Riprap stockpile.

1. Astec sorting riprap.

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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 NOVEMBER 16, 2023.

N

0 400' 800'

Client/Project
CASTLE AGGREGATE

PIKEVIEW QUARRY SLOPE MONITORING

Project No.
2057288200

Title
OBSERVATIONS FROM NOVEMBER INSPECTION

Revision
#

Date
2023.12.31

Drawn By
PK

Figure No.
2

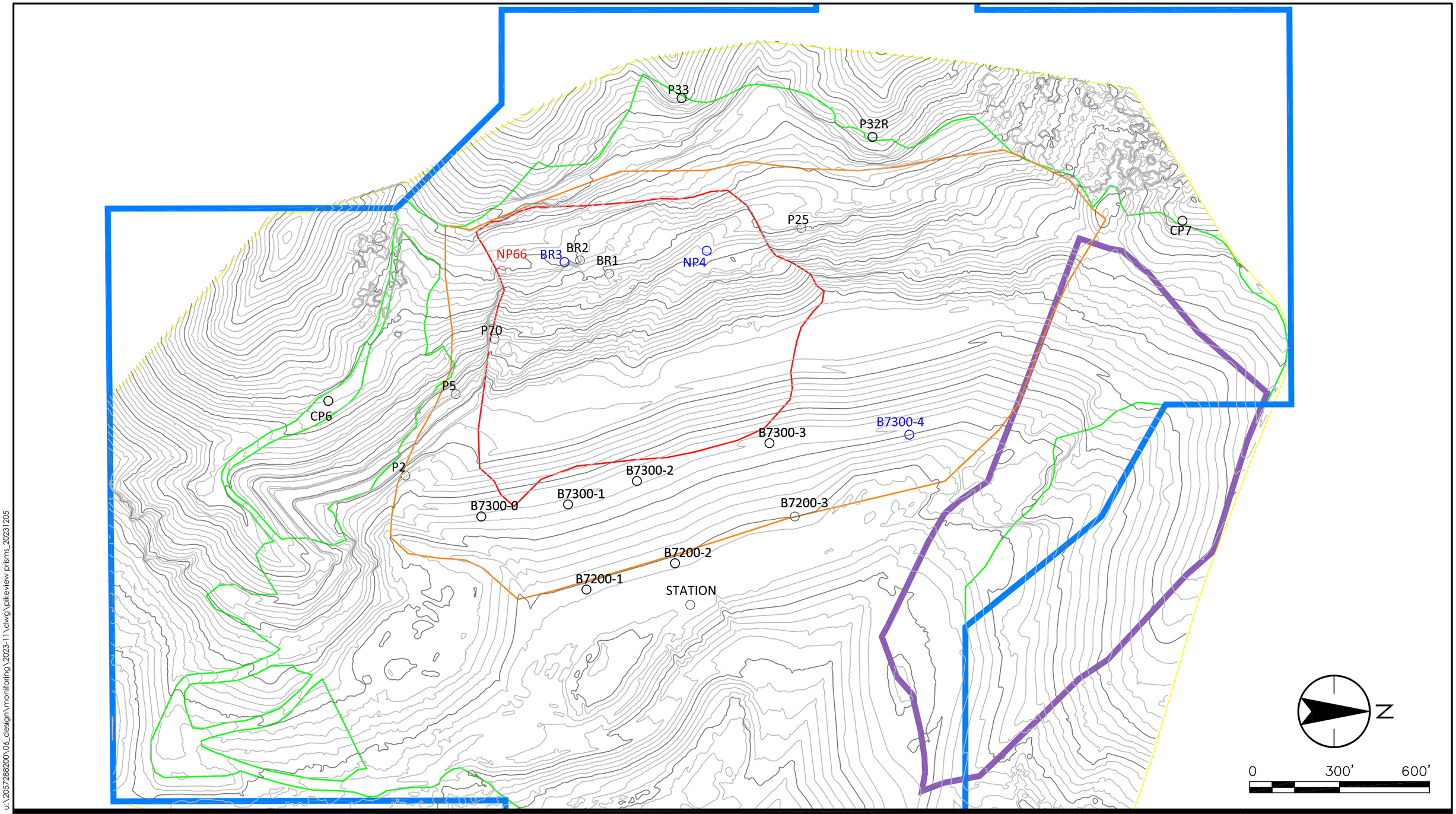
Stantec

Table A-1 Summary of Daily Inspections

Date	Notes	Inspection By
1-Nov-23	No movement observed. Good to proceed.	Jerald Schnabel
2-Nov-23	No movement observed. Good to proceed.	Jerald Schnabel
3-Nov-23	No movement observed. Good to proceed.	Jerald Schnabel
4-Nov-23	No movement observed. Good to proceed.	Jerald Schnabel
5-Nov-23	No work.	Not applicable
6-Nov-23	No movement observed. Good to proceed.	Jerald Schnabel
7-Nov-23	No movement observed. Good to proceed.	Jerald Schnabel
8-Nov-23	No movement observed. Good to proceed.	Jerald Schnabel
9-Nov-23	No movement observed. Good to proceed.	Jerald Schnabel
10-Nov-23	No movement observed. Good to proceed.	Jerald Schnabel
11-Nov-23	No work.	Not applicable
12-Nov-23	No work.	Not applicable
13-Nov-23	No movement observed. Good to proceed.	Jerald Schnabel
14-Nov-23	No movement observed. Good to proceed.	Jerald Schnabel
15-Nov-23	No movement observed. Good to proceed.	Jerald Schnabel
16-Nov-23	No movement observed. Good to proceed.	Jerald Schnabel
17-Nov-23	No movement observed. Good to proceed.	Jerald Schnabel
18-Nov-23	No work.	Not applicable
19-Nov-23	No work.	Not applicable
20-Nov-23	No movement observed. Good to proceed.	Jerald Schnabel
21-Nov-23	No movement observed. Good to proceed.	Jerald Schnabel
22-Nov-23	No movement observed. Good to proceed.	Jerald Schnabel
23-Nov-23	No work.	Not applicable
24-Nov-23	No work.	Not applicable
25-Nov-23	No work.	Not applicable
26-Nov-23	No work.	Not applicable
27-Nov-23	No movement observed. Good to proceed.	Jerald Schnabel
28-Nov-23	No movement observed. Good to proceed.	Jerald Schnabel
29-Nov-23	No movement observed. Good to proceed.	Jerald Schnabel
30-Nov-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 30, 2023 DRONE SURVEY.
4. CONTOUR INTERVAL IS 10 FEET

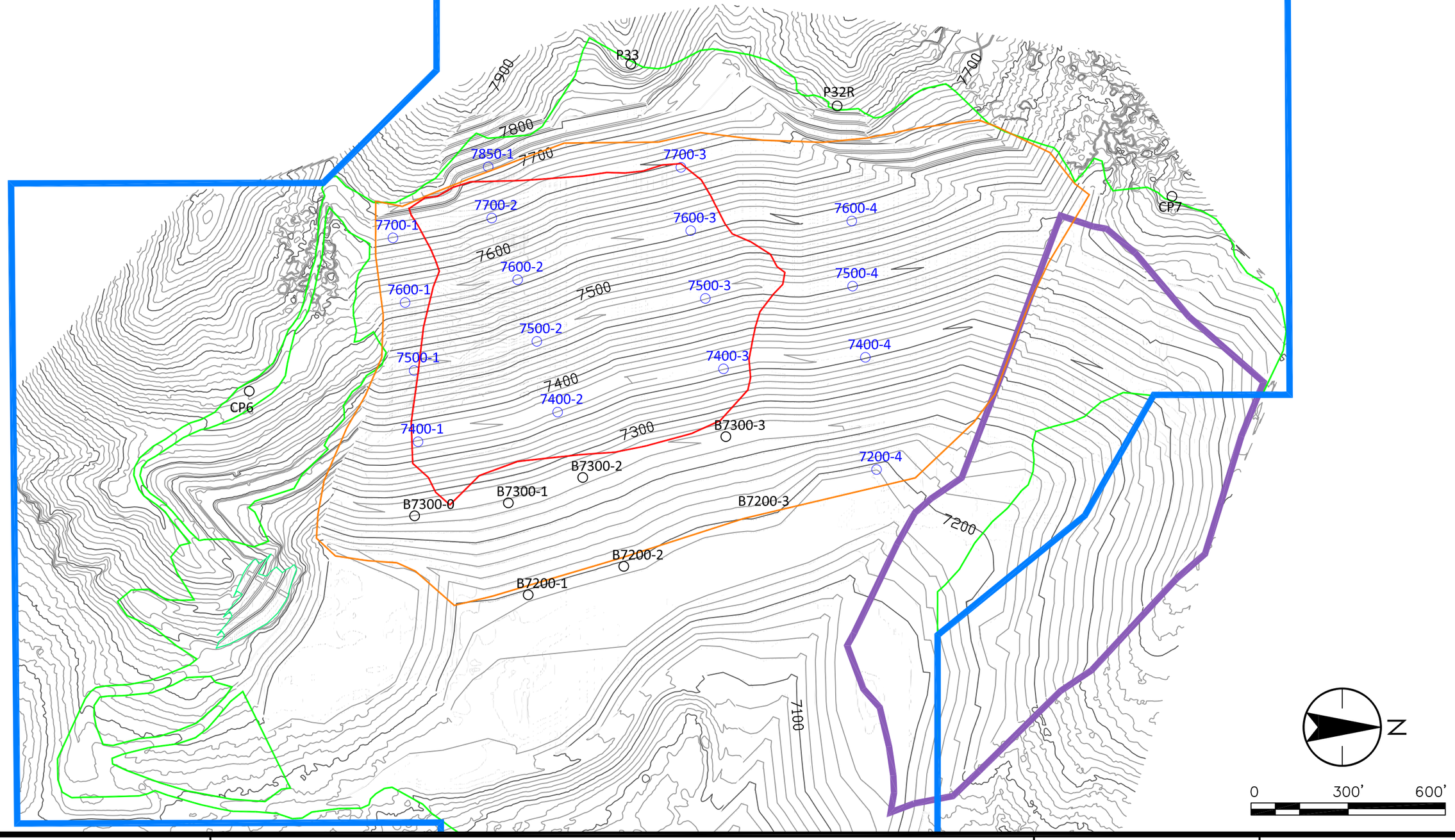
Client/Project
CASTLE AGGREGATE

PIKEVIEW QUARRY SLOPE MONITORING

Project No.
2057288200

Title
EXISTING PRISMS WITH CURRENT SURFACE

Revision	Date
#	2023.12.31
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
- 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
CASTLE AGGREGATE

PIKEVIEW QUARRY SLOPE MONITORING

Project No.
2057288200

Title
PROPOSED PRISMS WITH RECLAMATION SURFACE

Revision	Date
#	2023.12.31
Drawn By	Figure No.
PK	4

Stantec

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
BR2	20-Oct-23	Prism Removed	Reclamation grading in Upper Borrow Area affected prim
B7300-4	6-Nov-23	Prism Added	New Prism Added
NP4	6-Nov-23	Prism Added	New Prism Added
BR3	6-Nov-23	Prism Added	New Prism Added
NP66	15-Nov-23	Prism Removed	Reclamation grading to affect prism in near future

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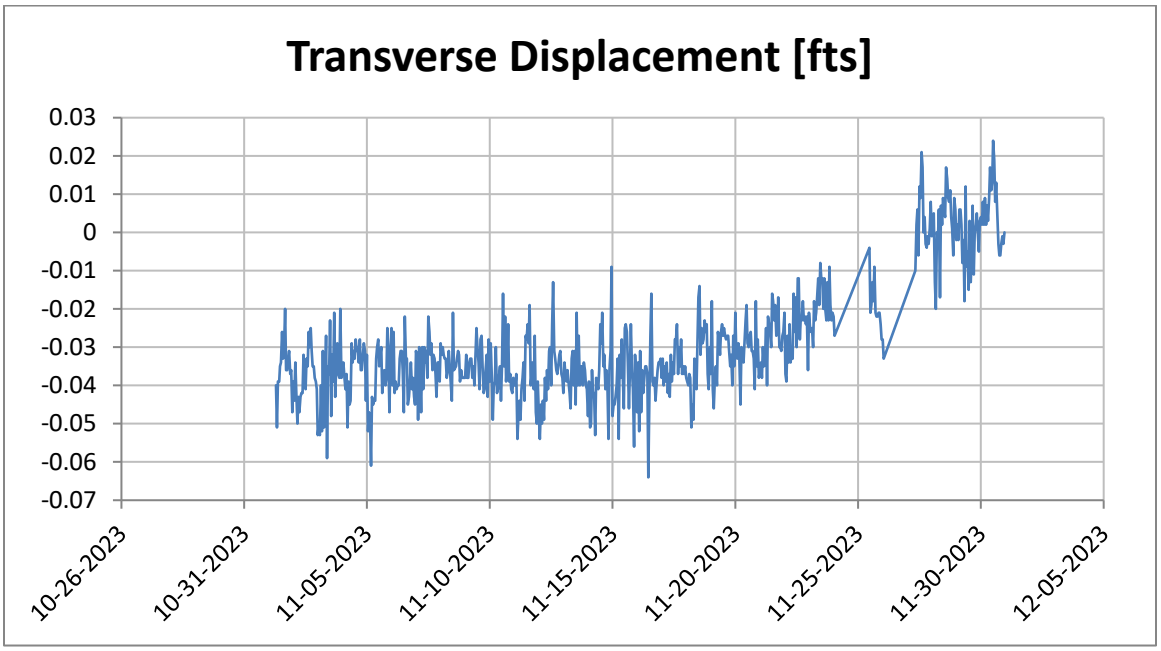
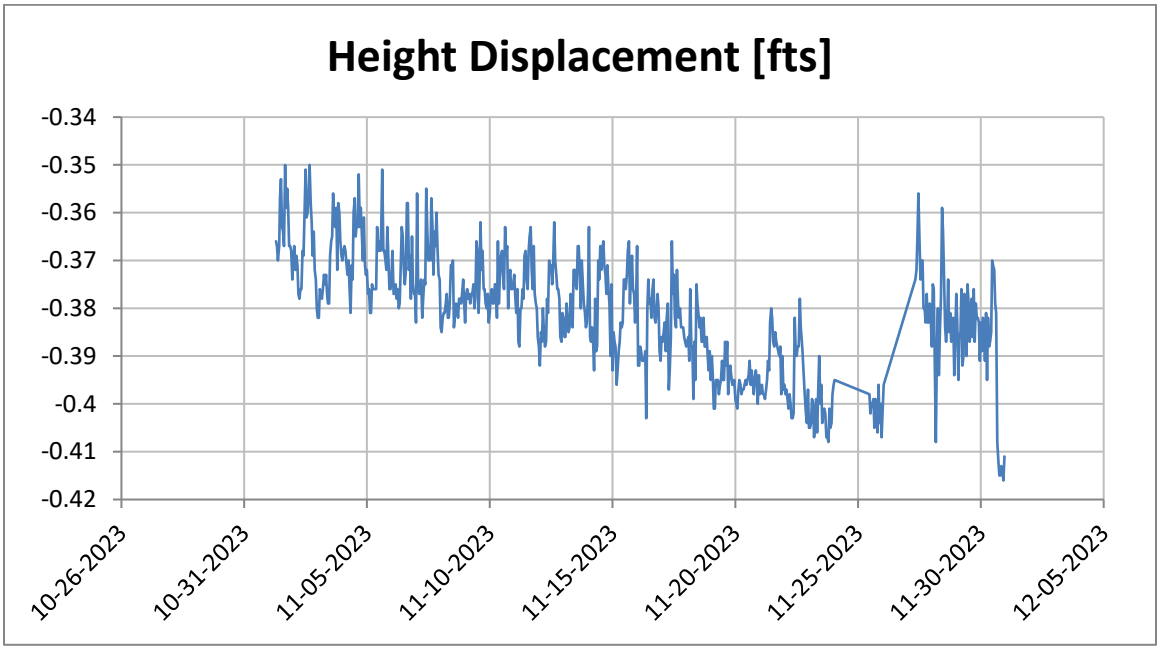
Prism BR1





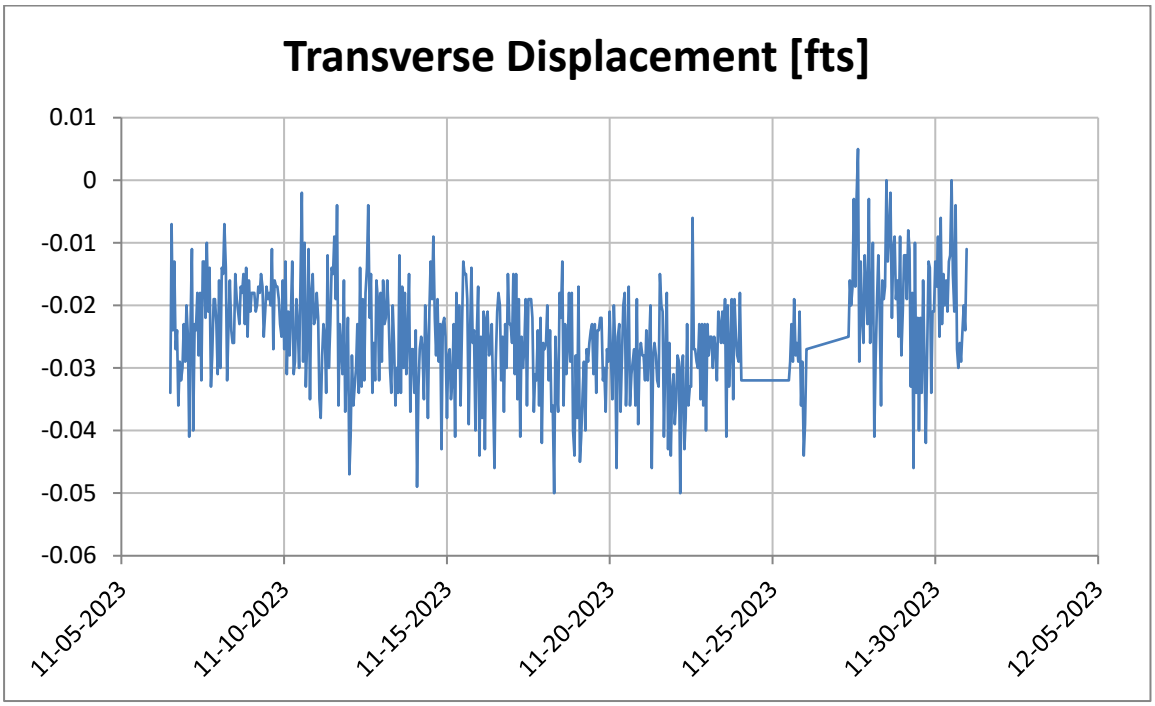
Notes:

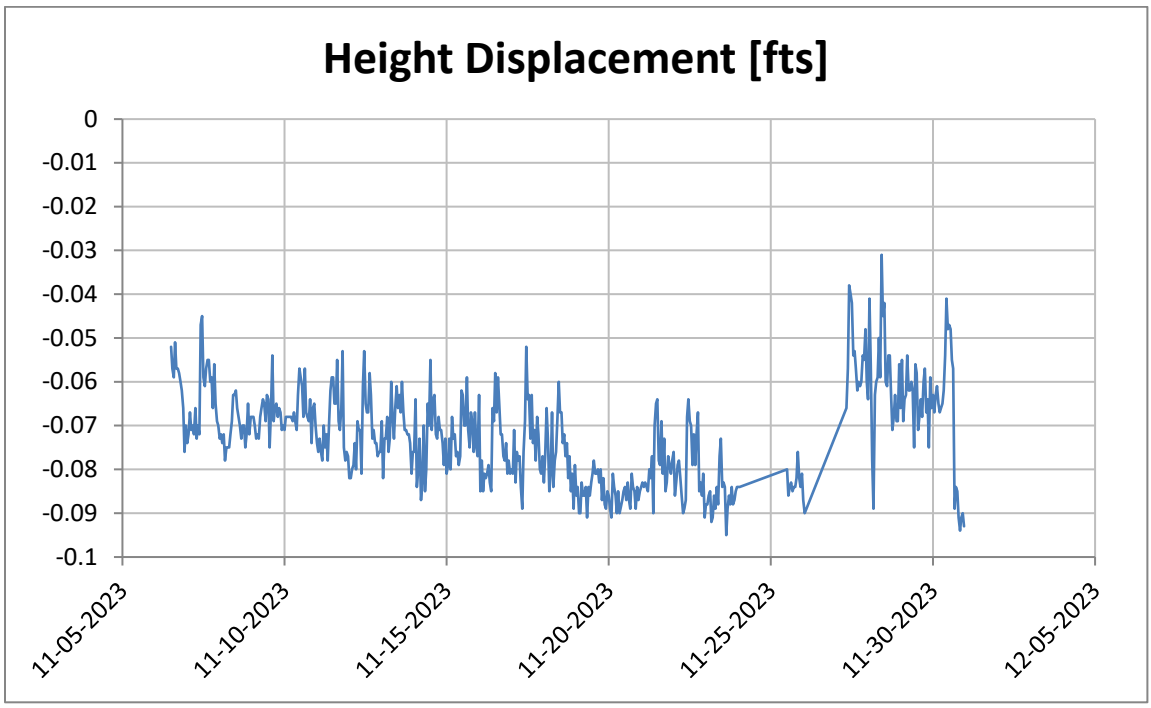
1. Survey accuracy is +/-0.016 feet.
2. Alert threshold is +/-0.35 feet.
3. Transverse displacement is in the horizontal direction. Positive direction means closer to the robotic station.
4. Height displacement is in the vertical direction. Positive direction means higher in elevation.
5. Prism records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

md \\us0387-ppfss03\shared_projects\2057288200\06_design\Monitoring

Stantec

Prism BR3





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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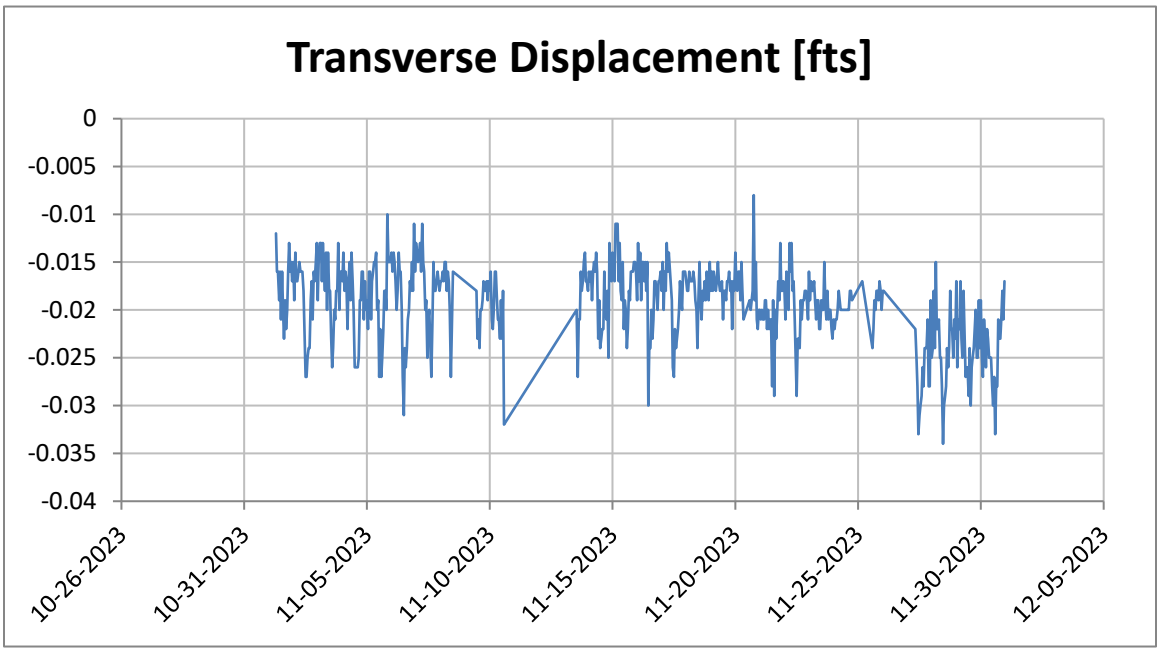
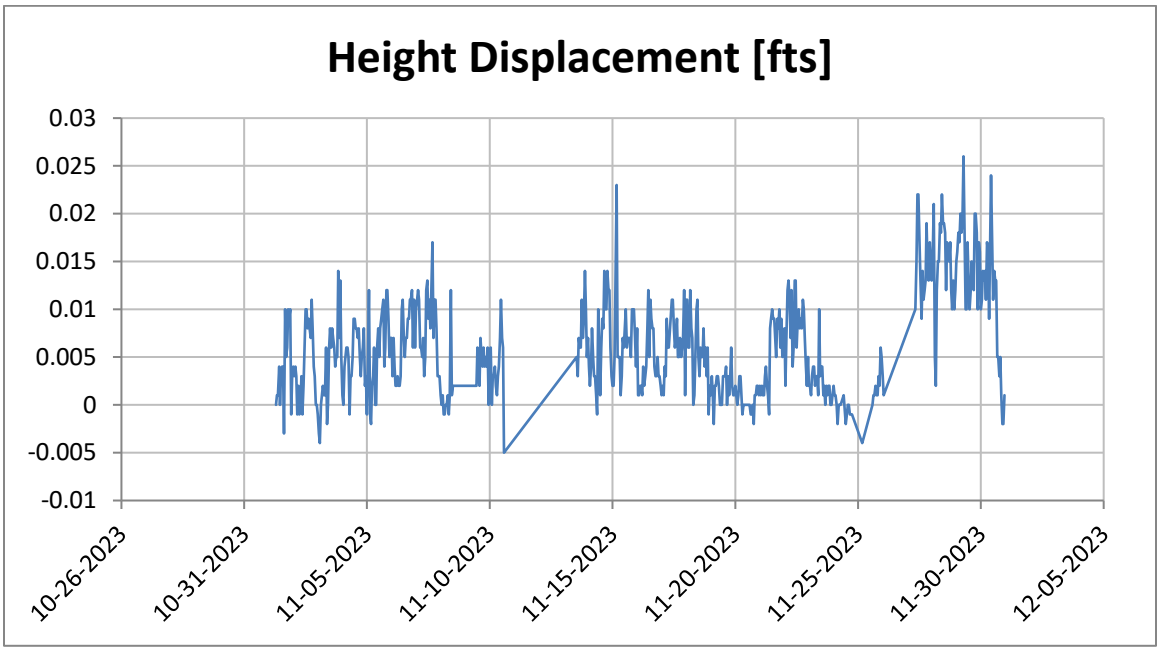
Stantec

Prism B7200-1



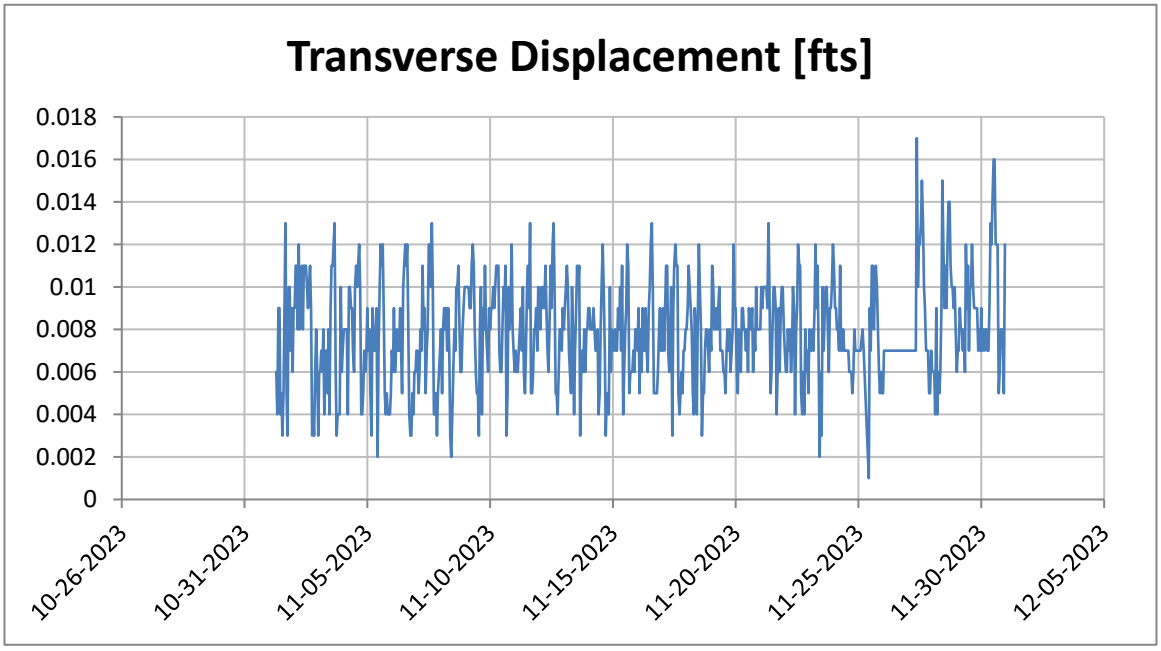


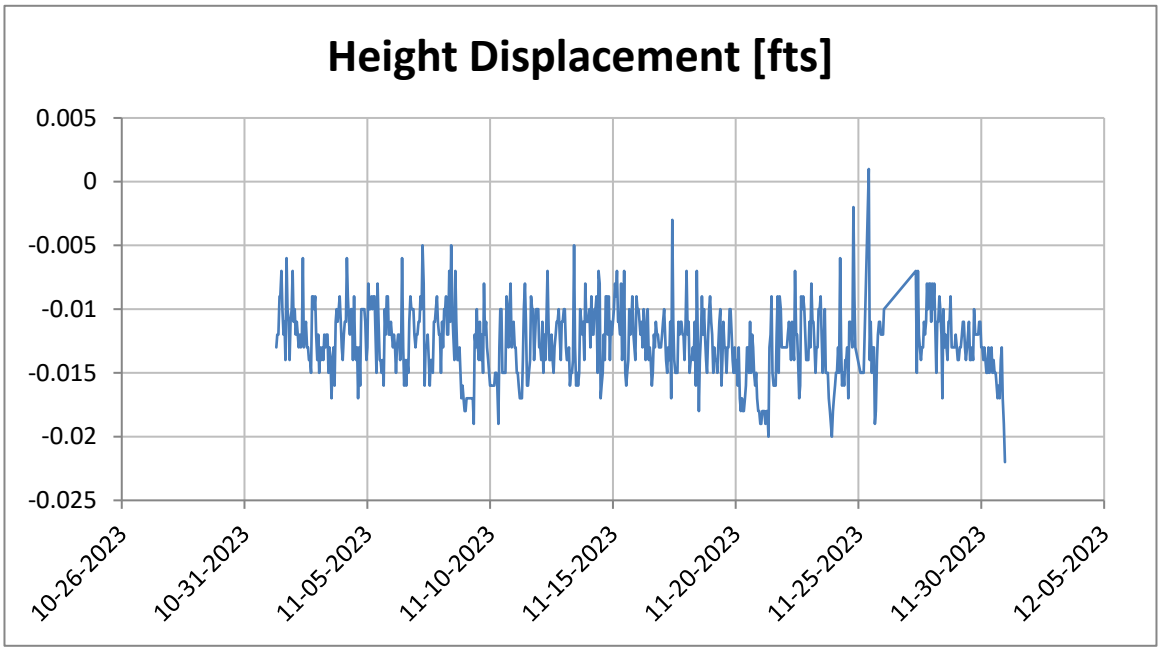
Notes:

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. Similar displacements were recorded in the control point and other prisms; data shift is not an indication of slope movements.

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.
5. Similar displacements were recorded in the control point and other prisms; data shift is not an indication of slope movements.

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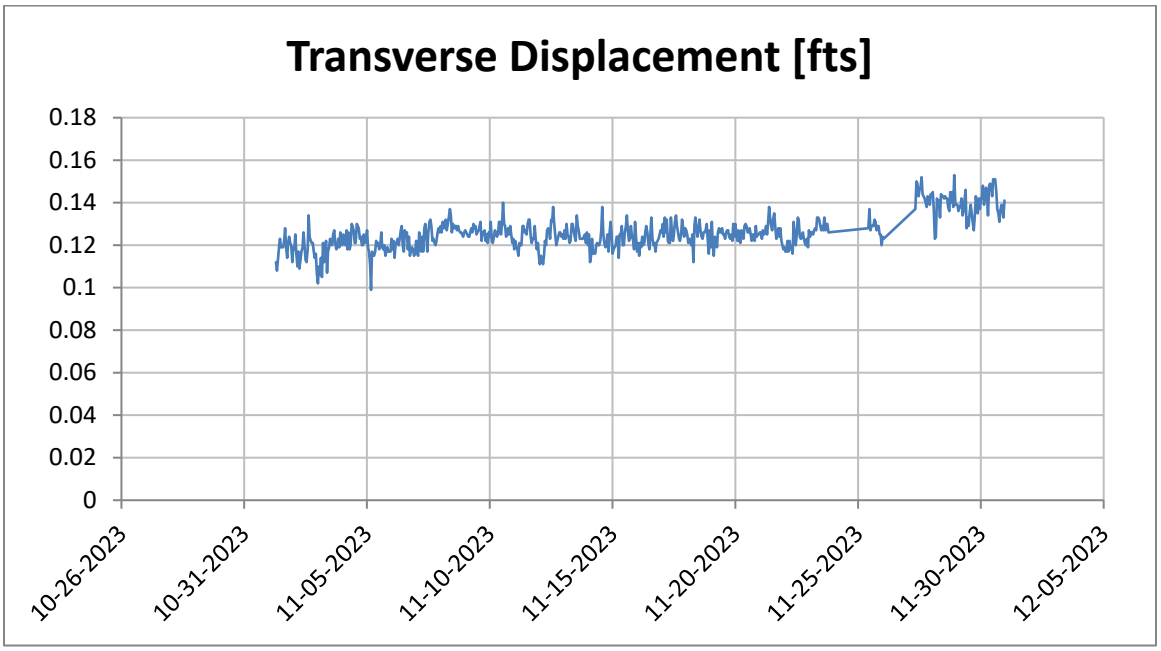
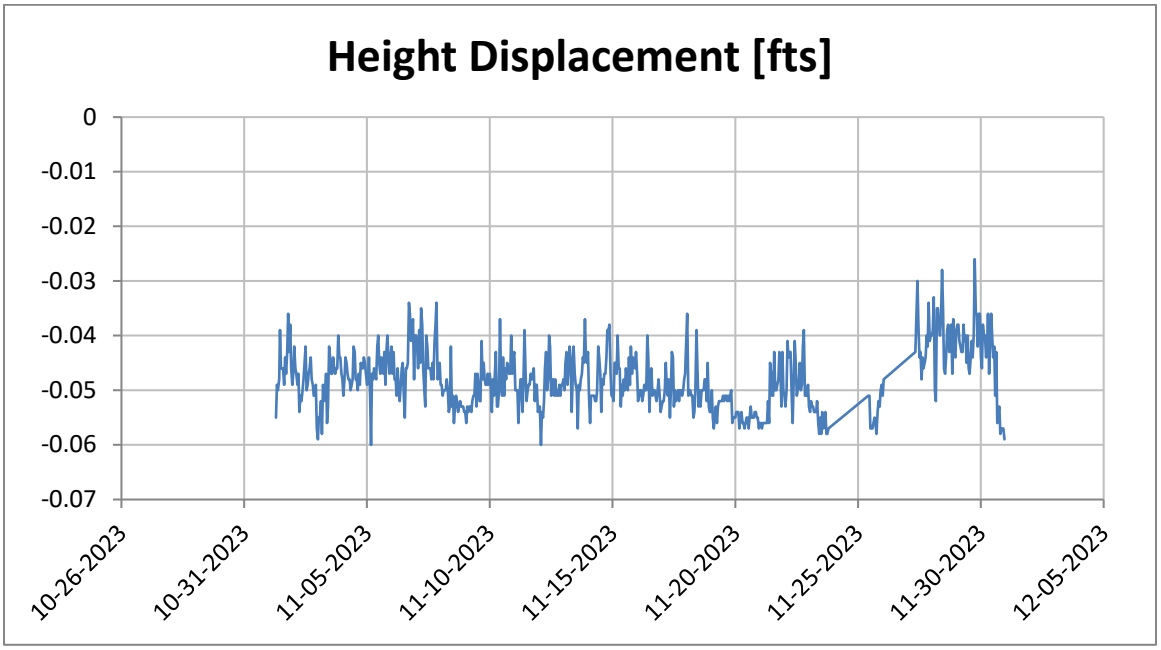
Stantec

Prism B7200-3



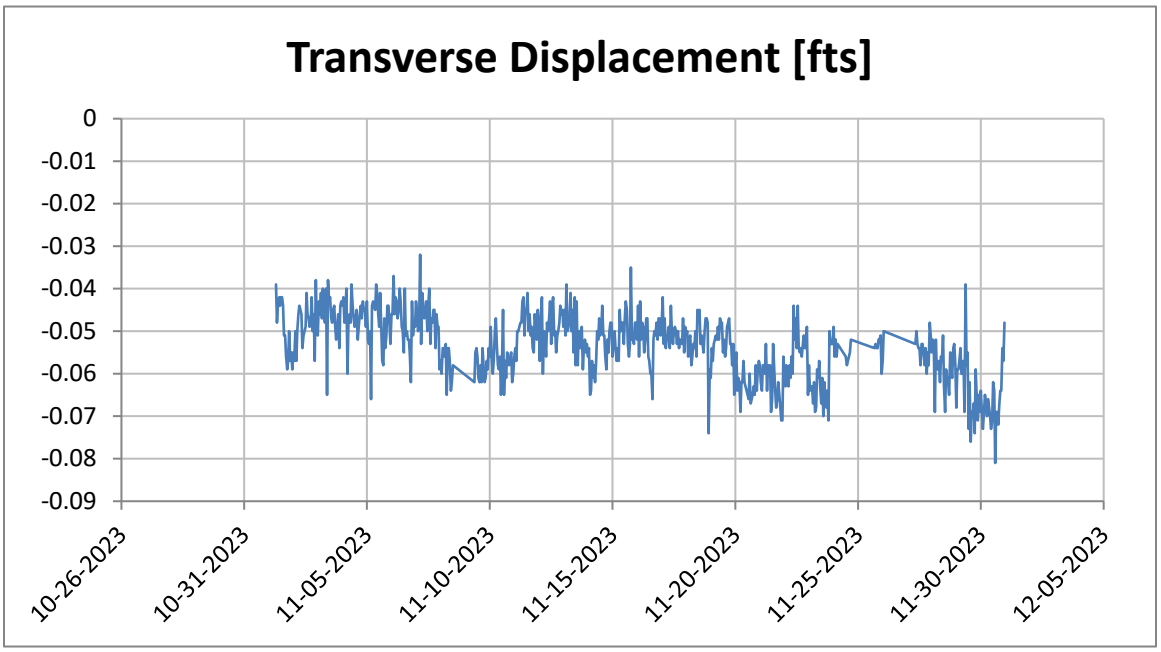


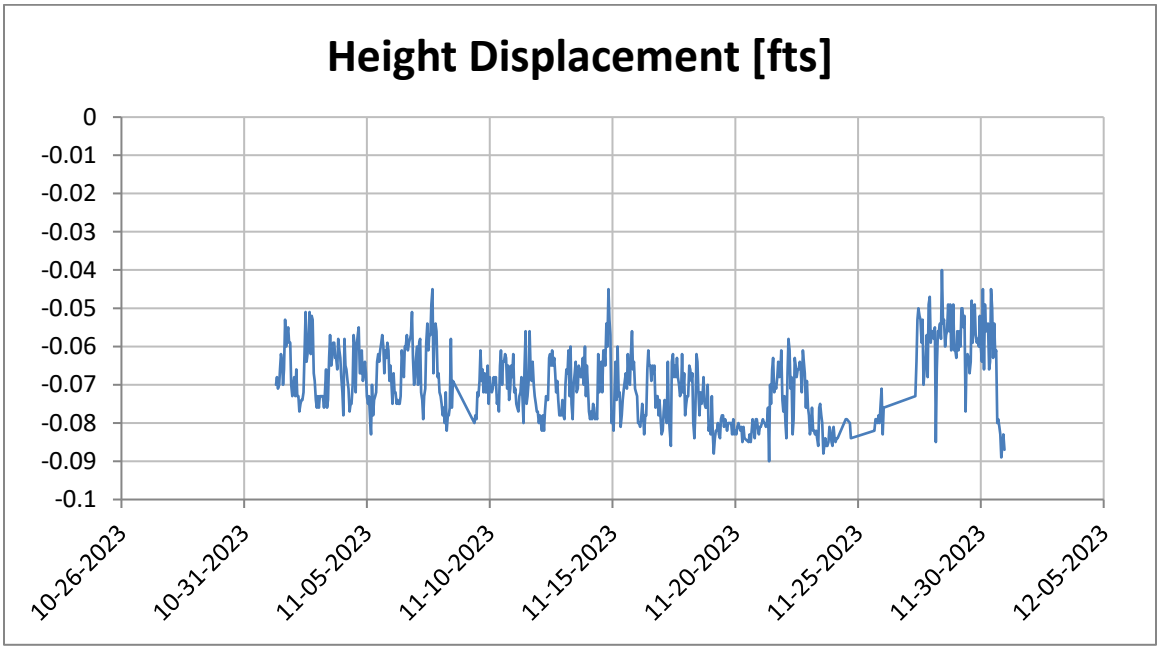
Notes:

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.
5. Similar displacements were recorded in the control point and other prisms; data shift is not an indication of slope movements.

Stantec

Prism B7300-0



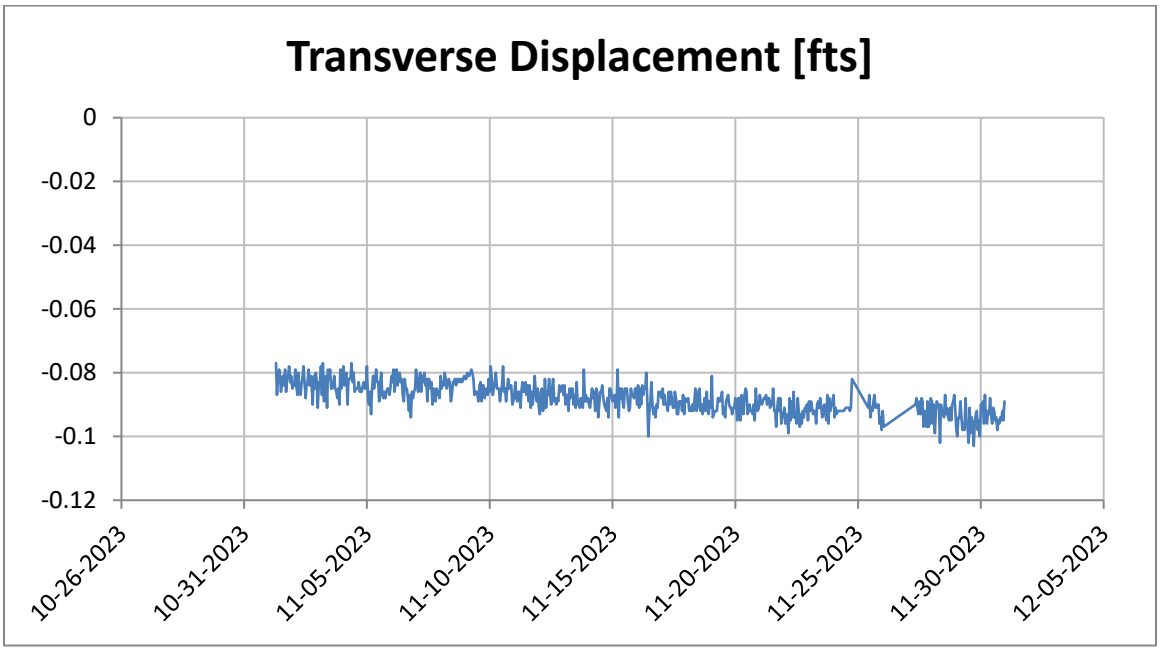


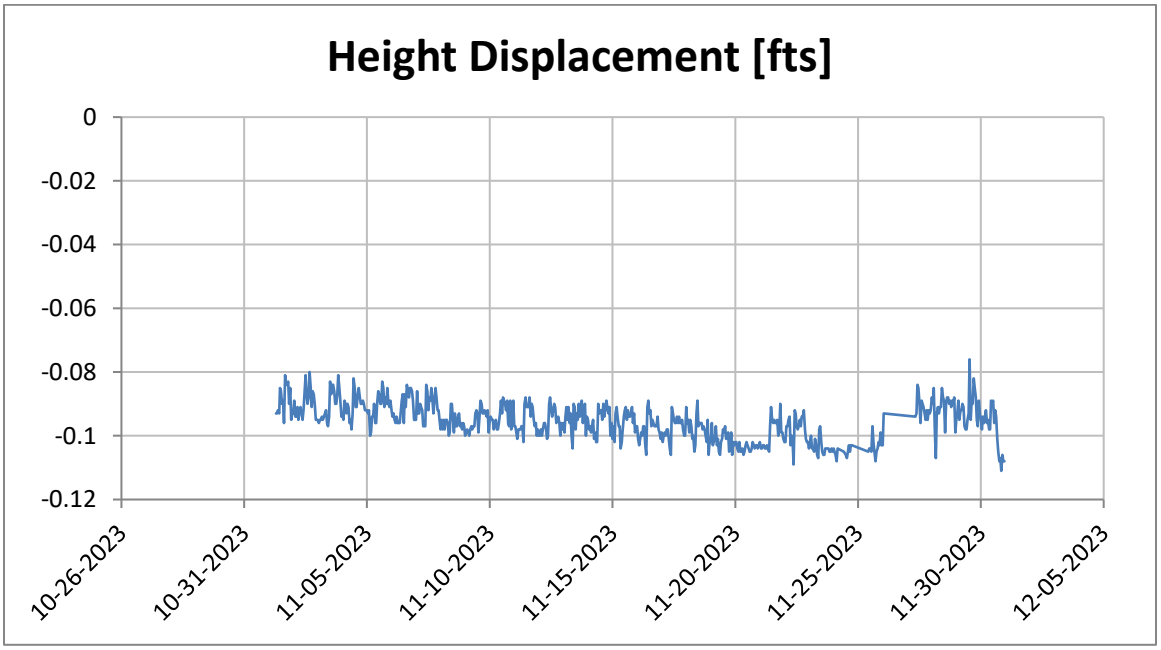
Notes:

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. Similar displacements were recorded in the control point and other prisms; data shift is not an indication of slope movements.

Stantec

Prism B7300-1



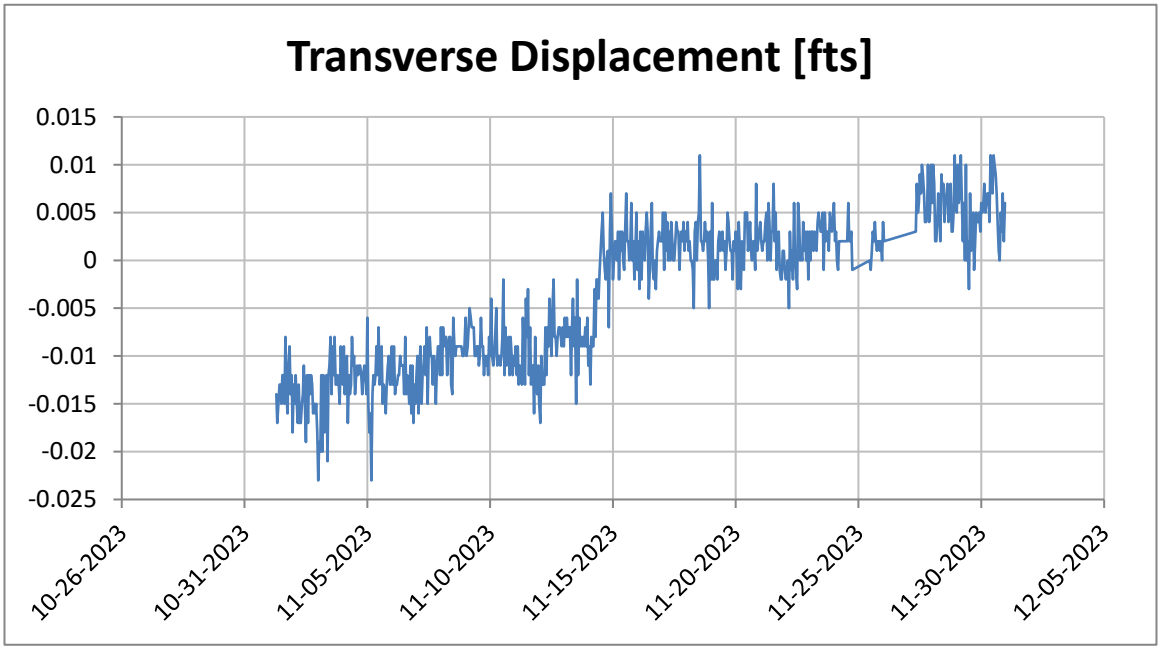


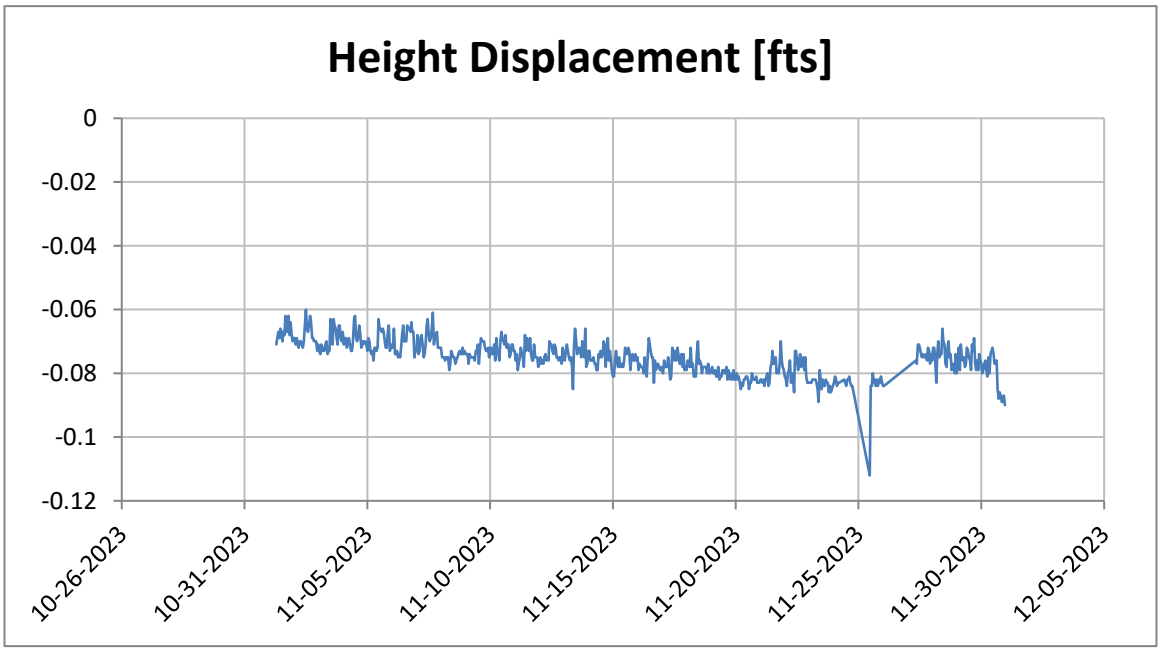
Notes:

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. Similar displacements were recorded in the control point and other prisms; data shift is not an indication of slope movements.

Stantec

Prism B7300-2



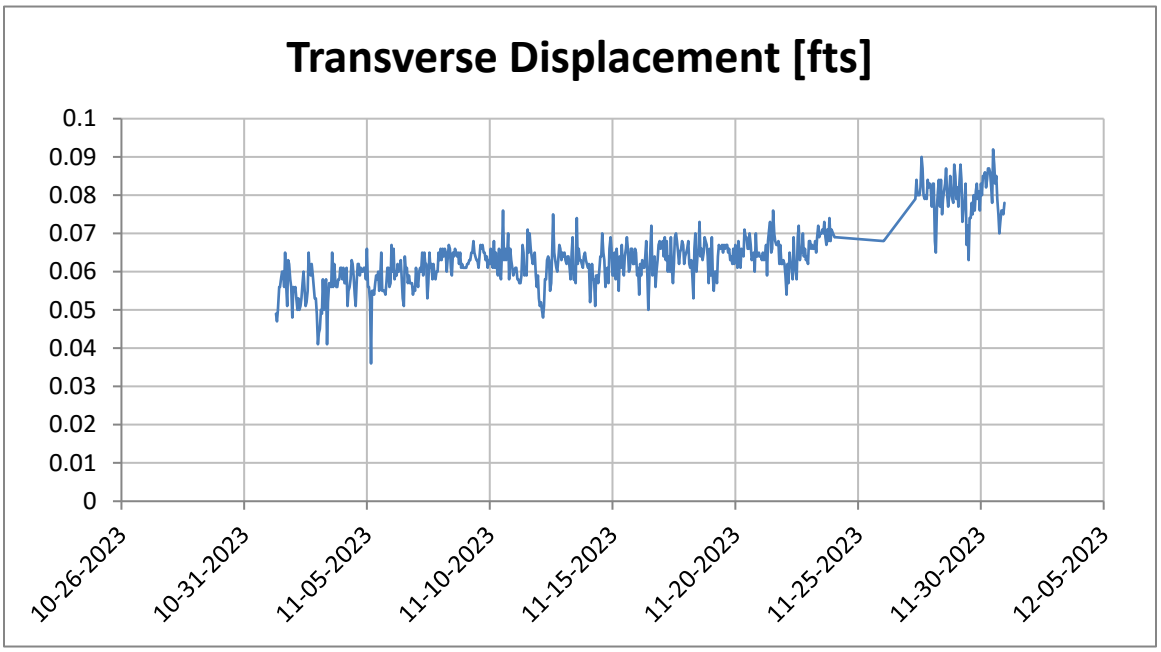


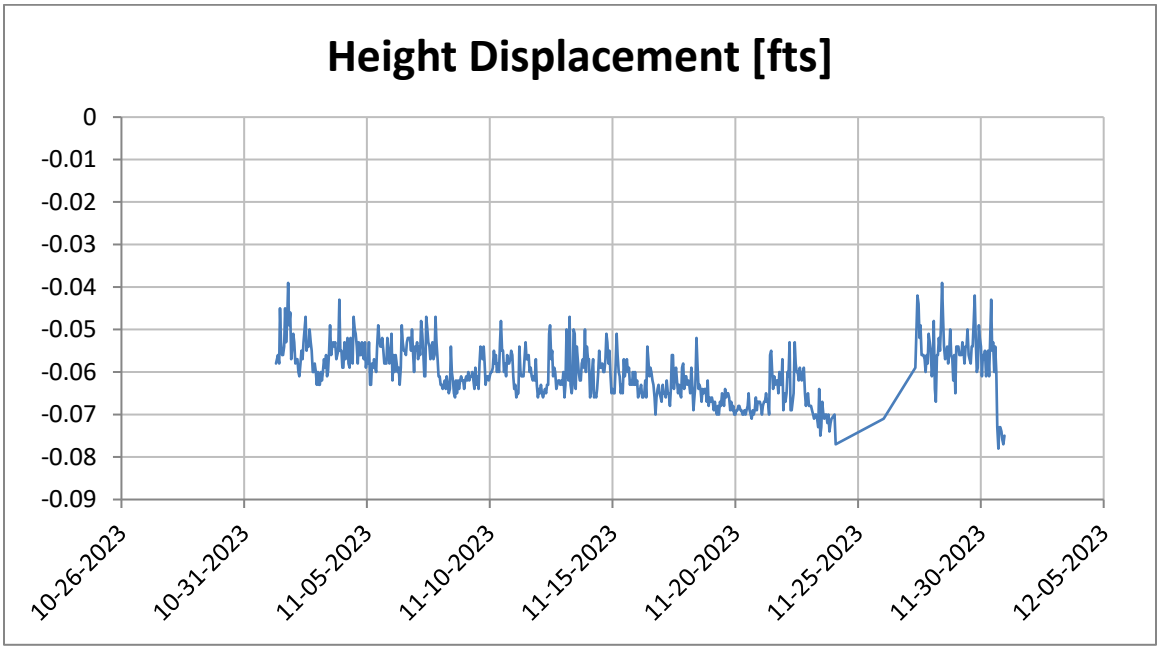
Notes:

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. Similar displacements were recorded in the control point and other prisms; data shift is not an indication of slope movements.

Stantec

Prism B7300-3



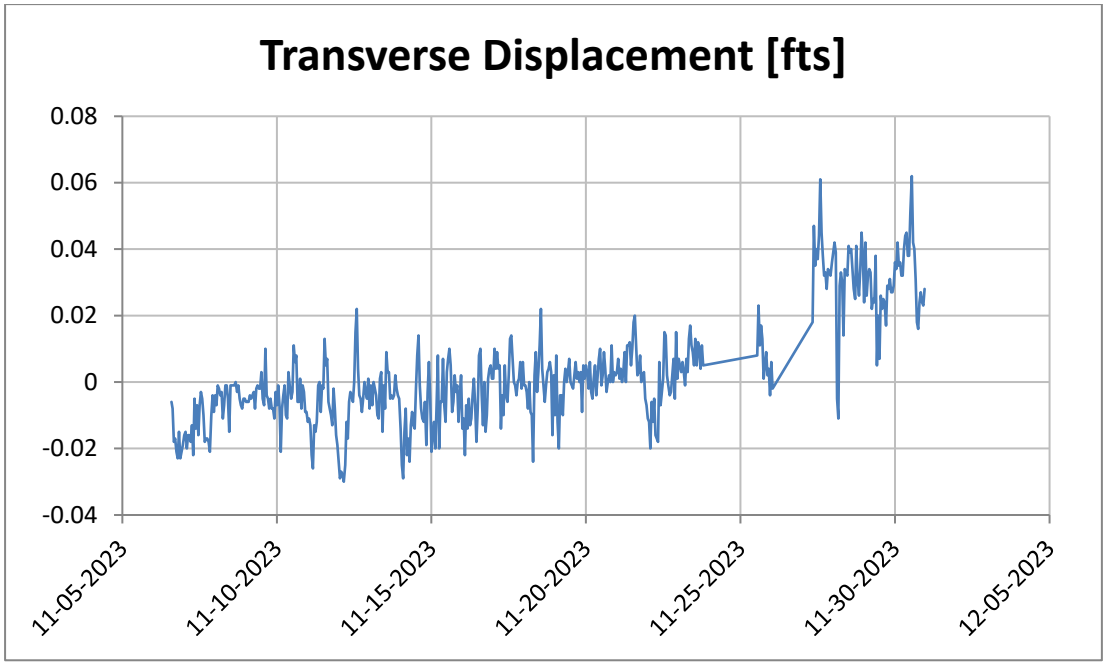


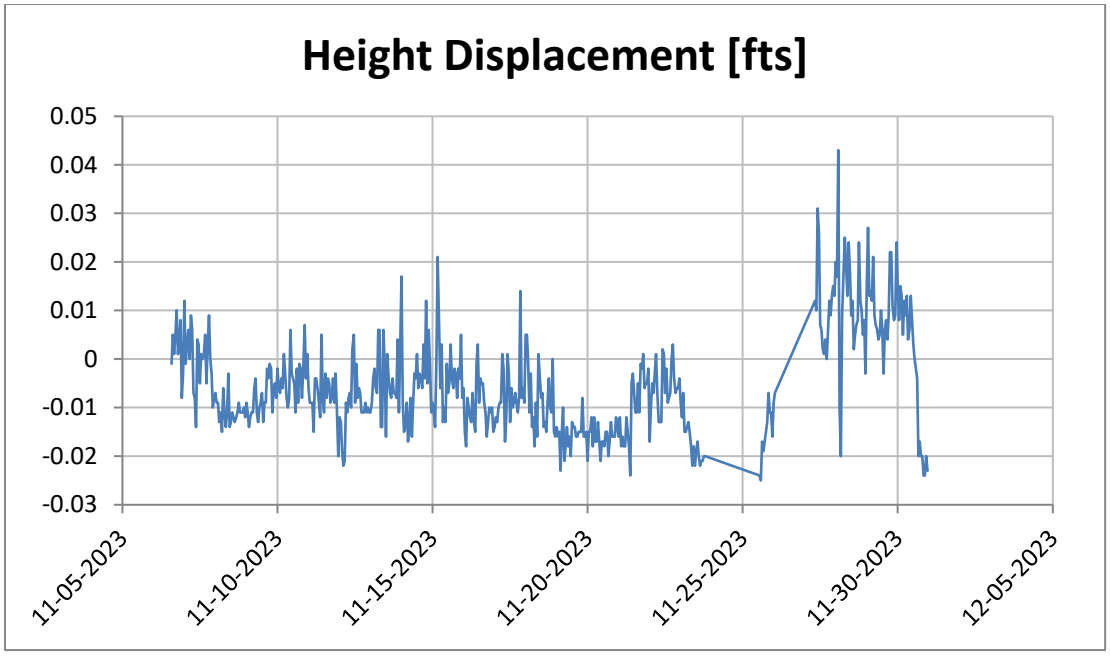
Notes:

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. Similar displacements were recorded in the control point and other prisms; data shift is not an indication of slope movements.

Stantec

Prism B7300-4





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. Similar displacements were recorded in the control point and other prisms; data shift is not an indication of slope movements.

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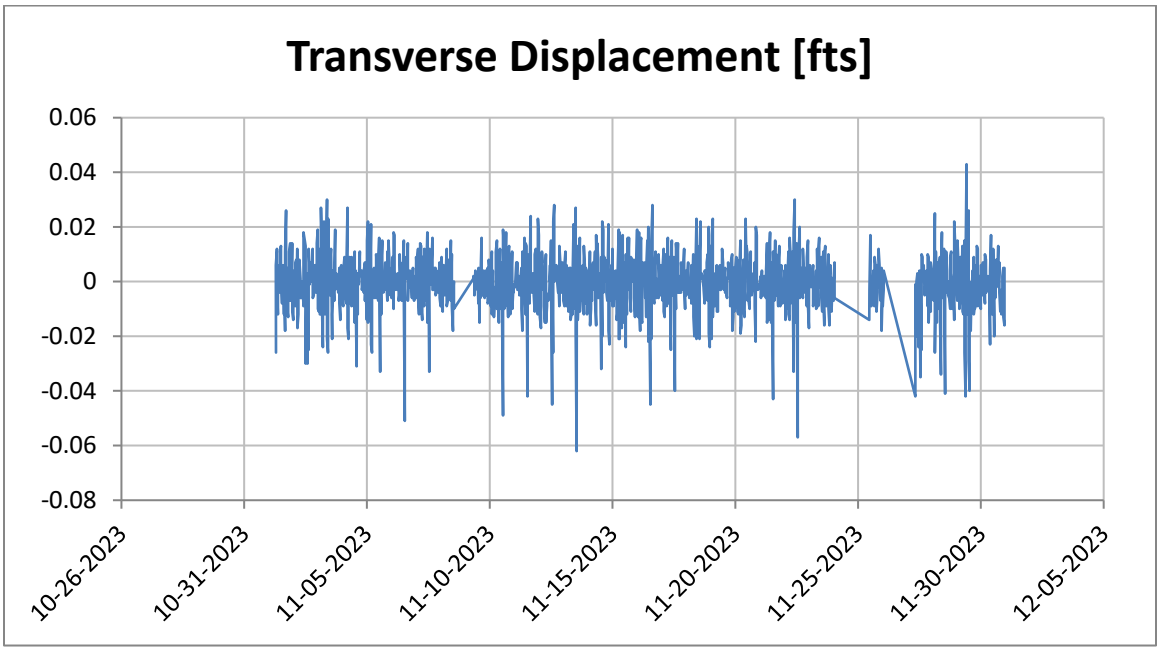
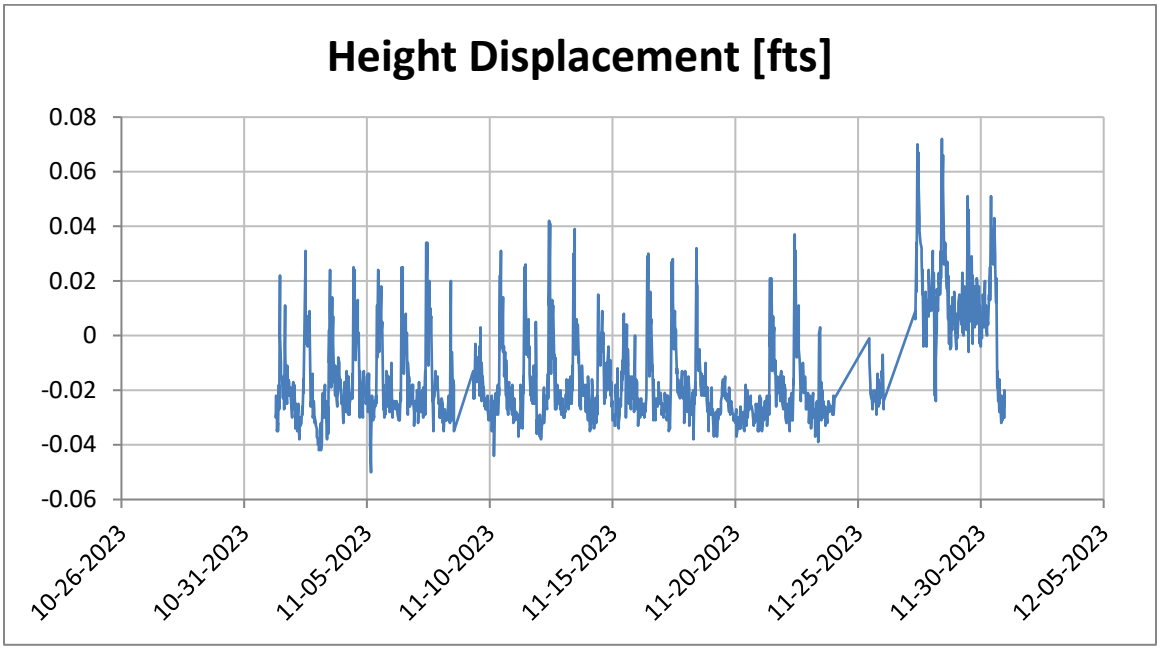
Stantec

Prism CP6



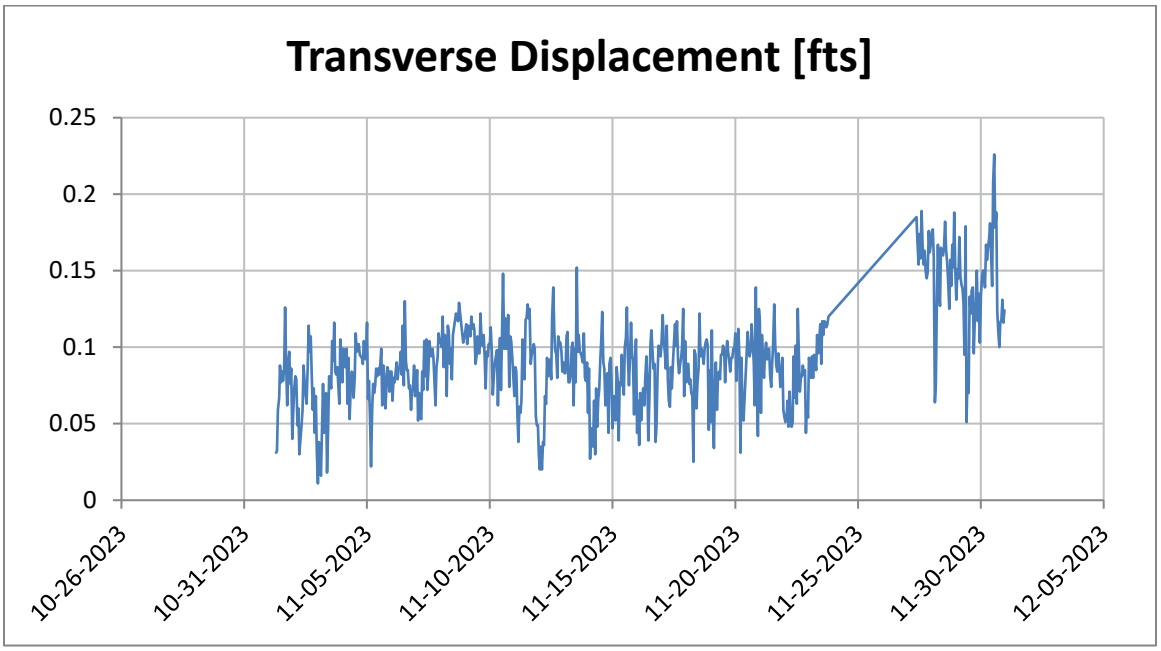


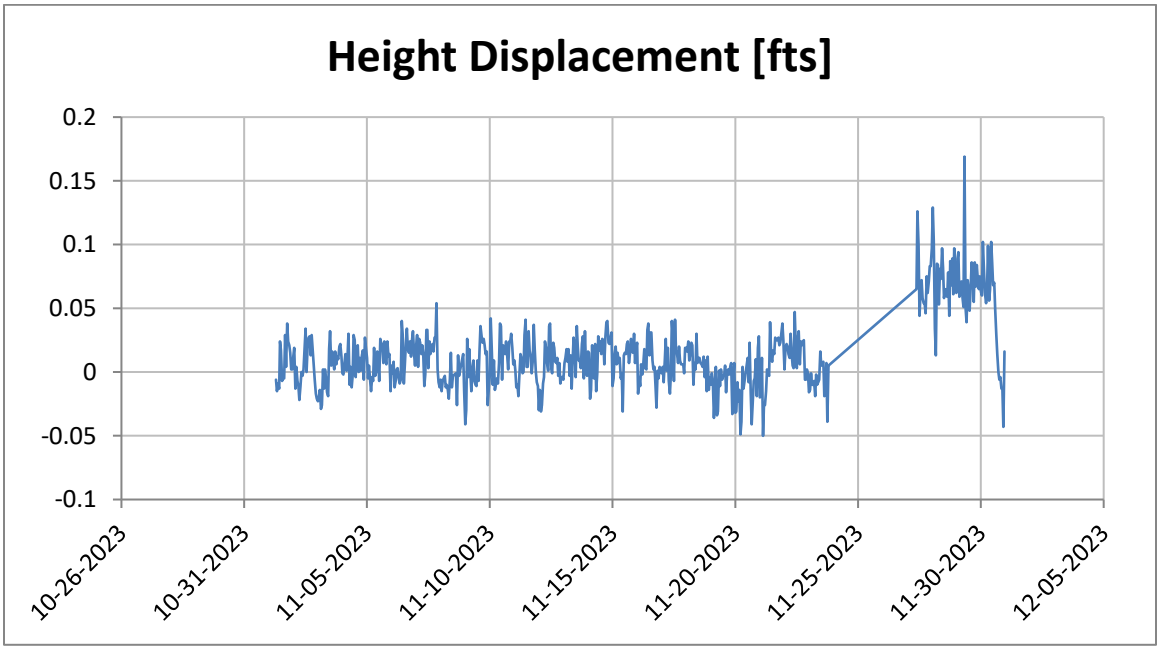
Notes:

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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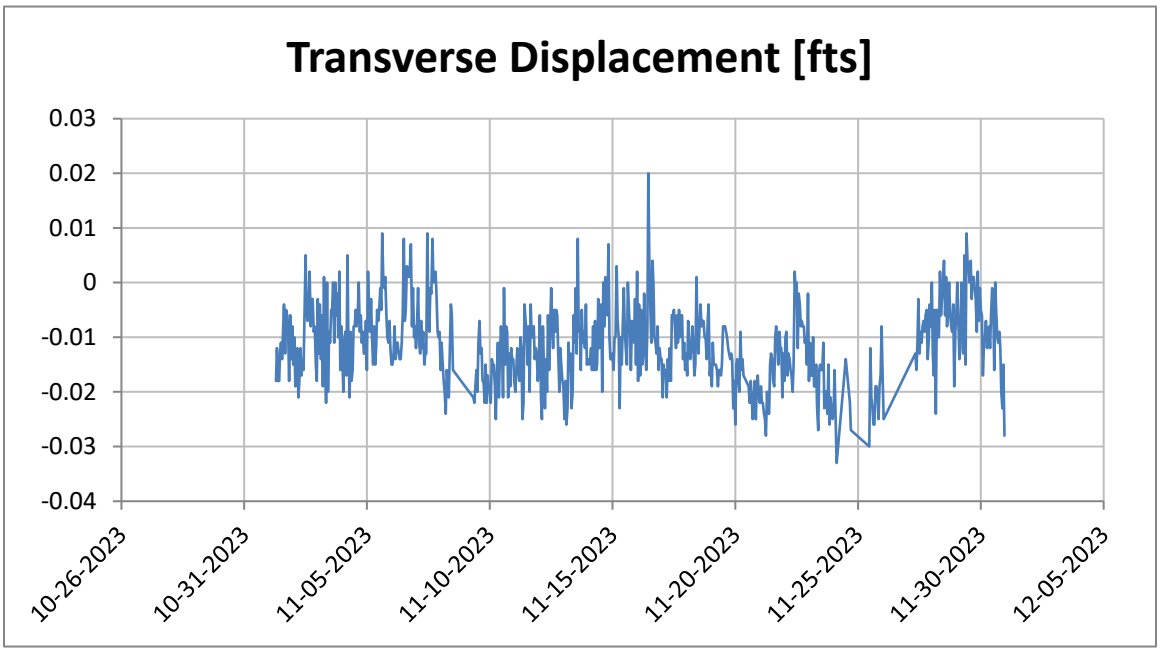
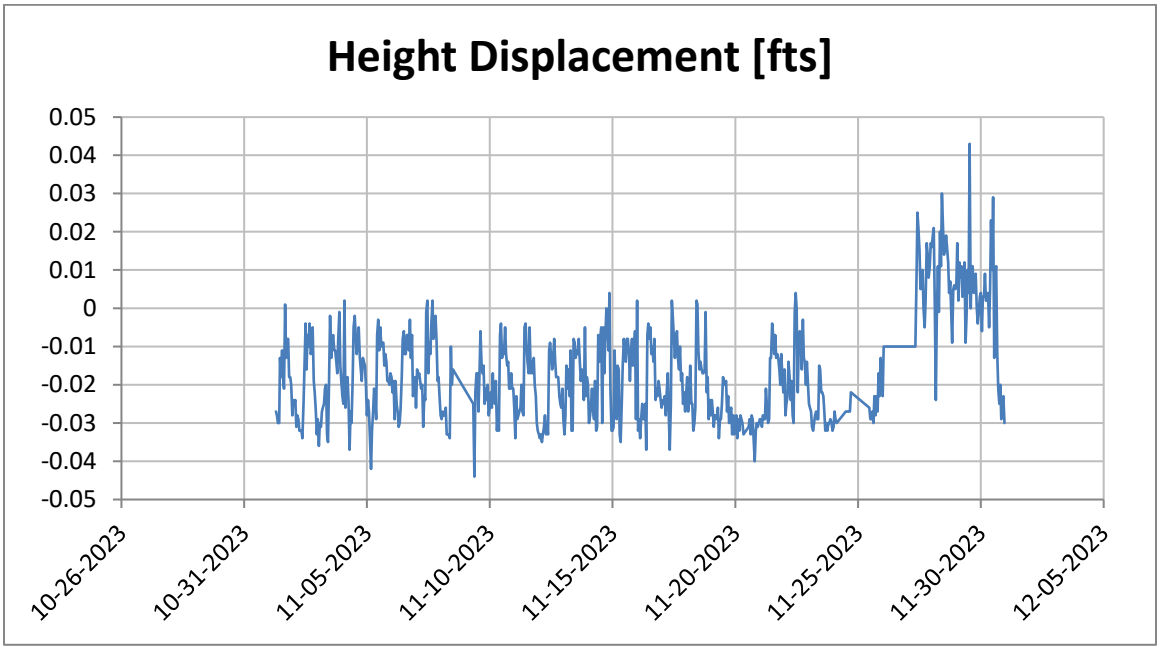
Prism P2



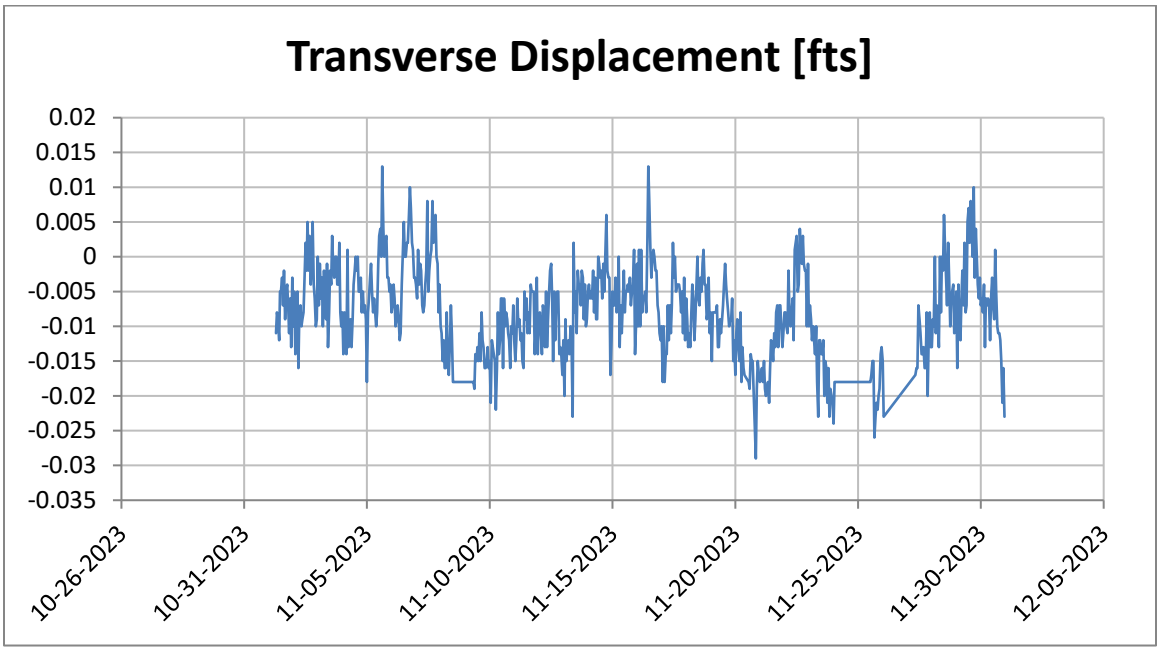


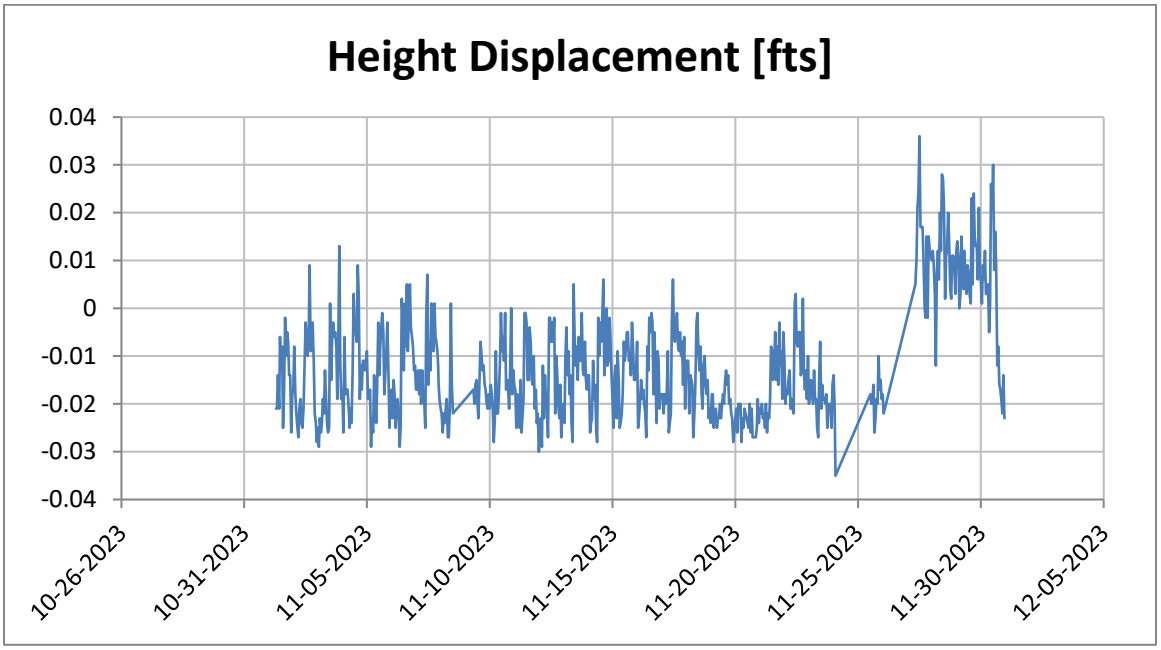
Notes:

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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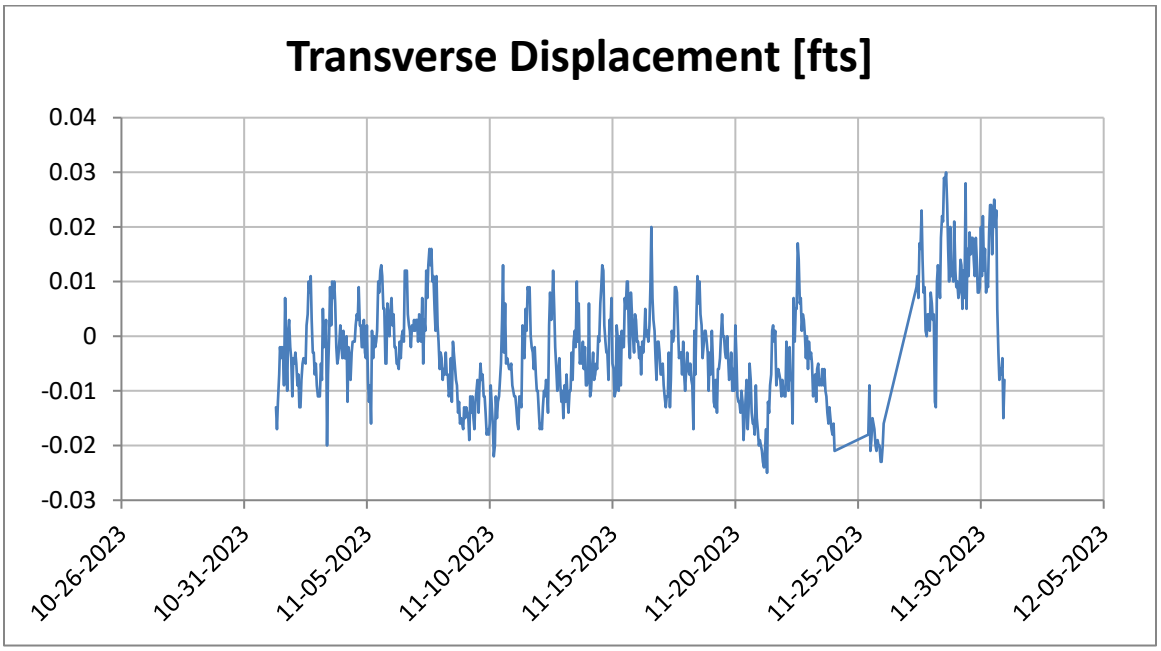
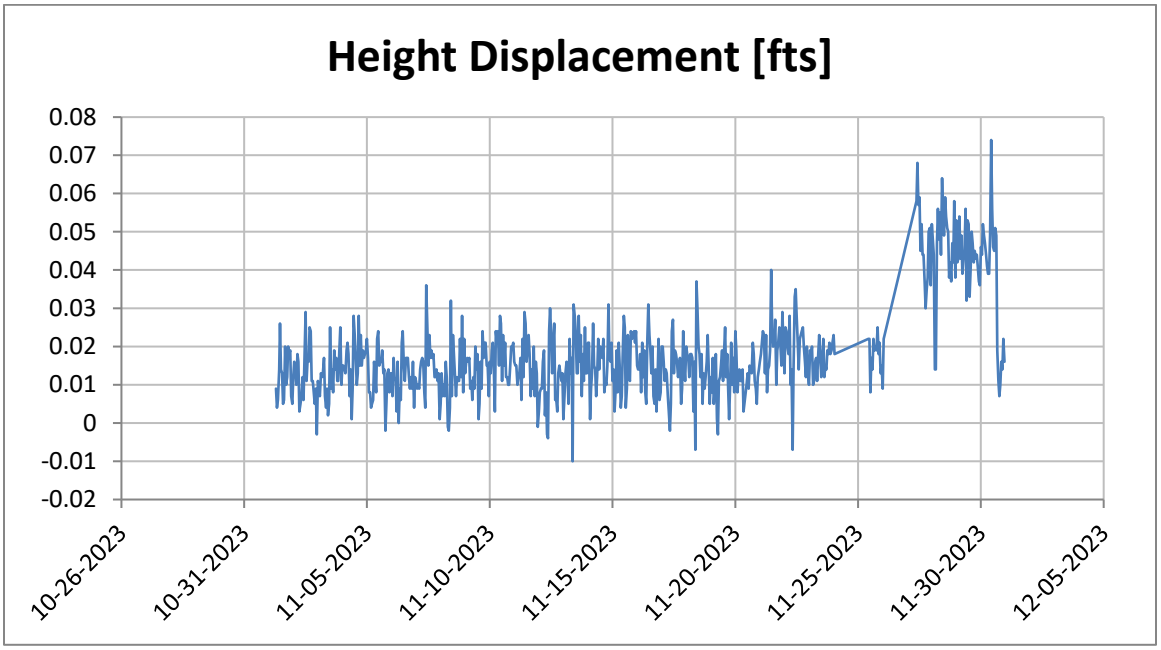
Prism P25





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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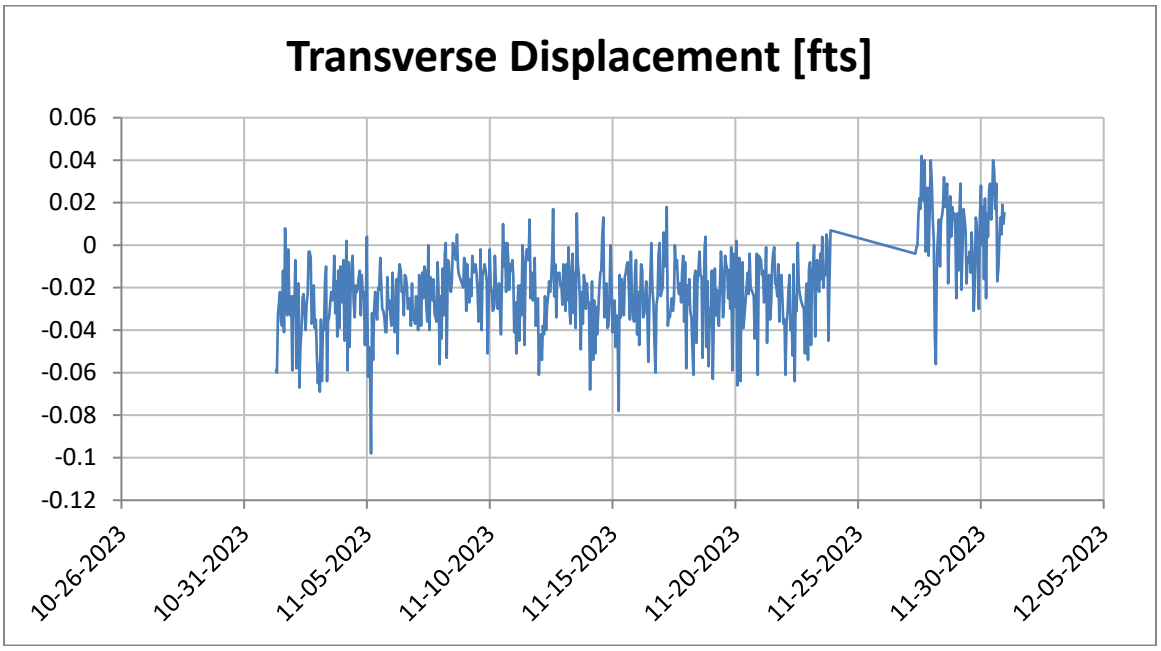
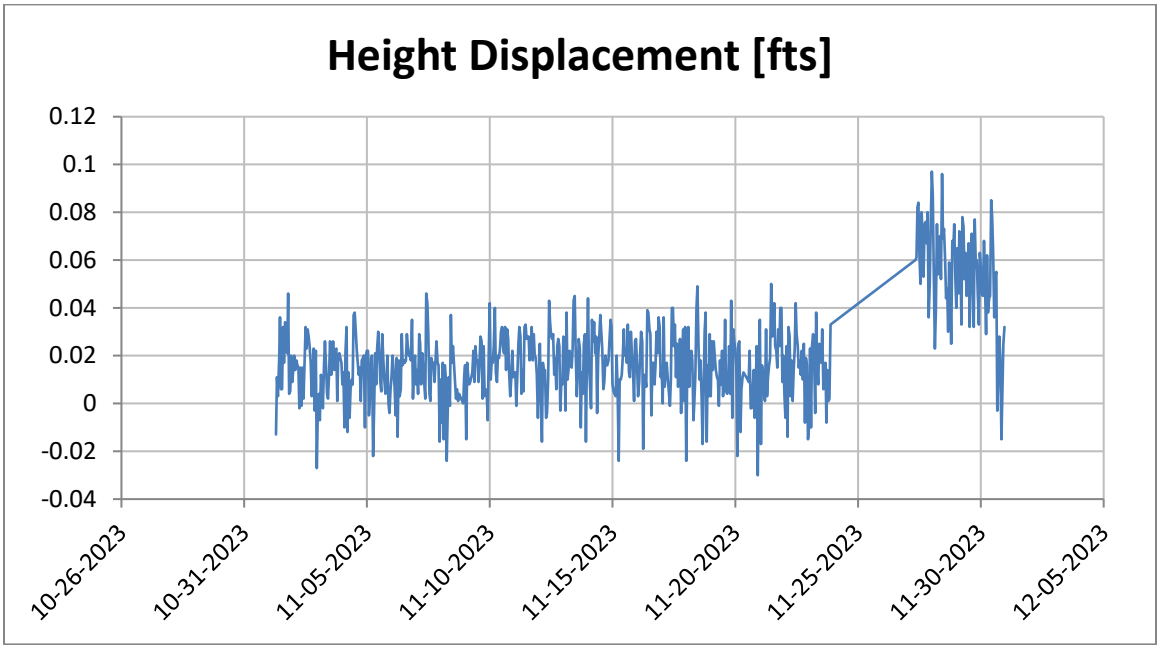
Prism P32R





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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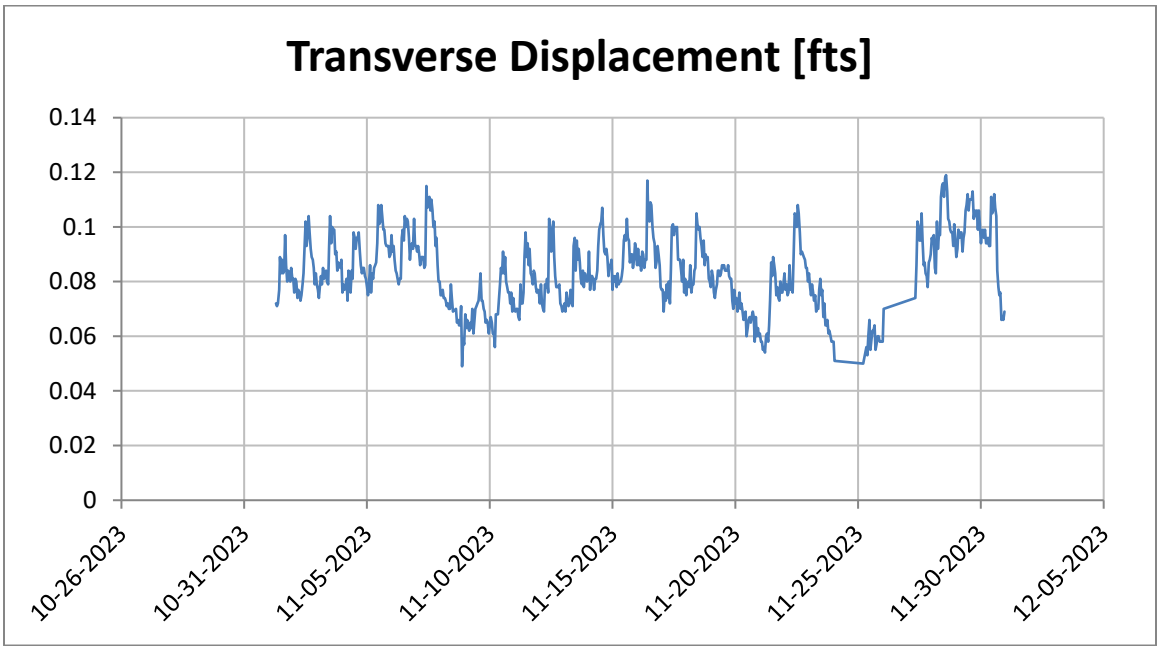
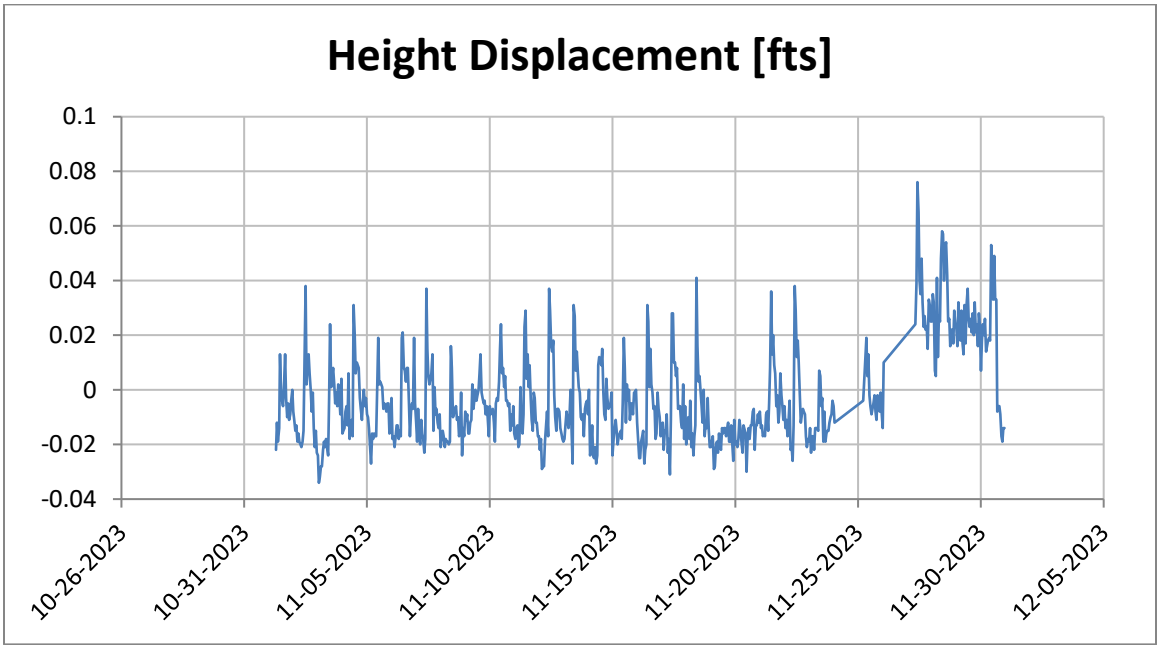
Prism P33





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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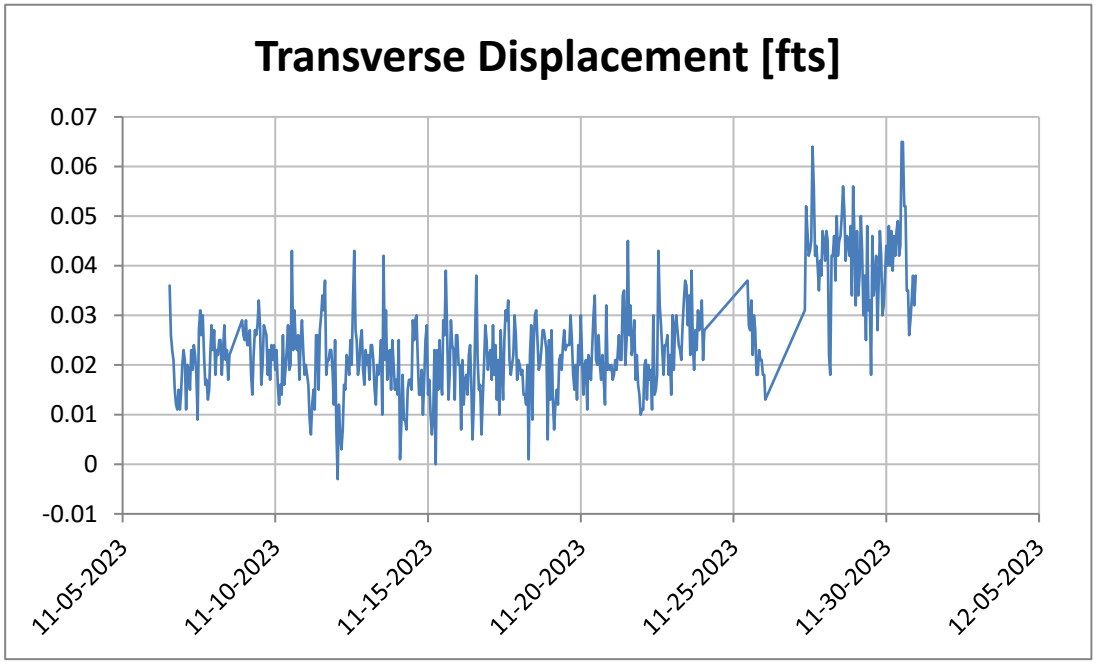
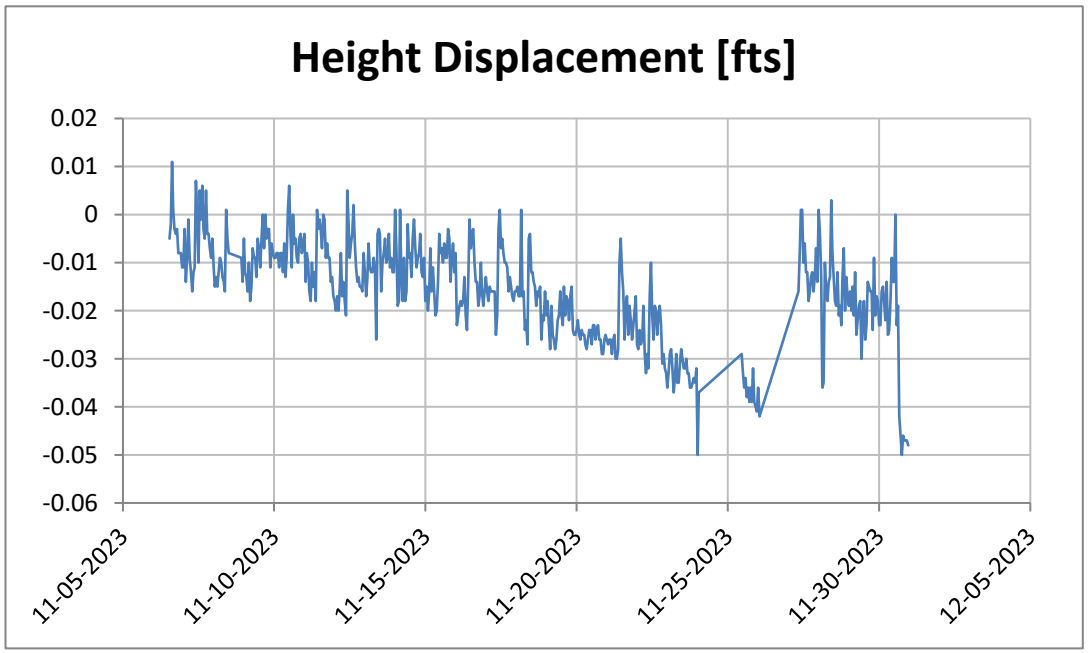
Prism NP4





Notes:

5. Survey accuracy is +/-0.016 feet.
6. Alert threshold is +/-0.35 feet.
7. Transverse displacement is in the horizontal direction. Positive direction means closer to the robotic station.
8. Height displacement is in the vertical direction. Positive direction means higher in elevation.

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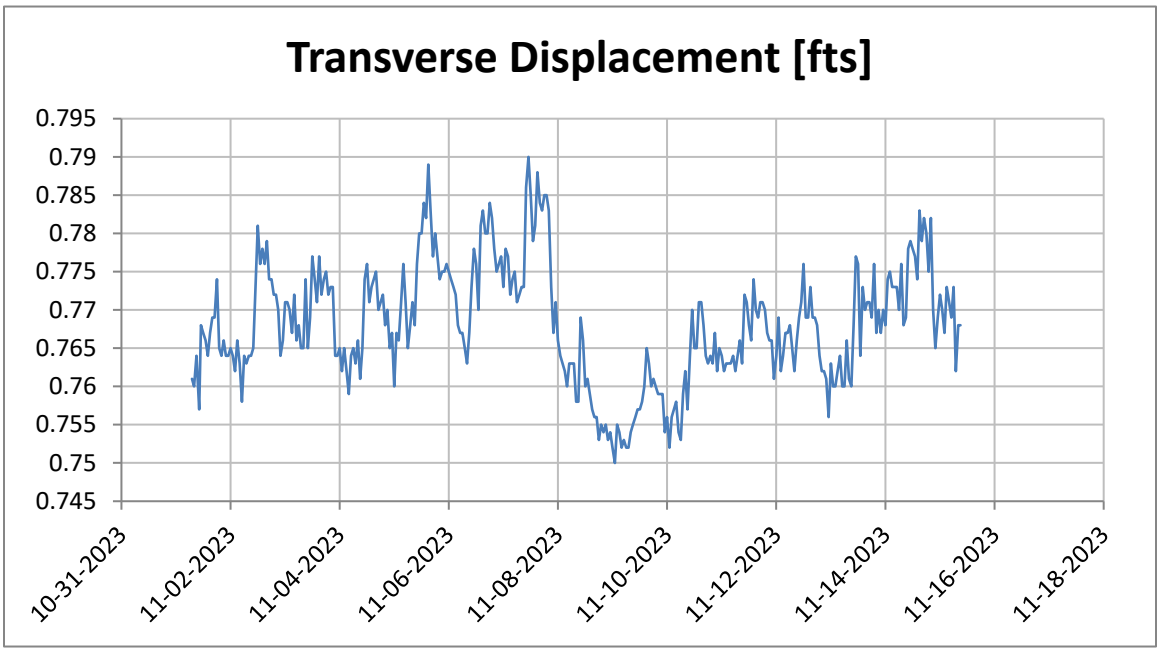
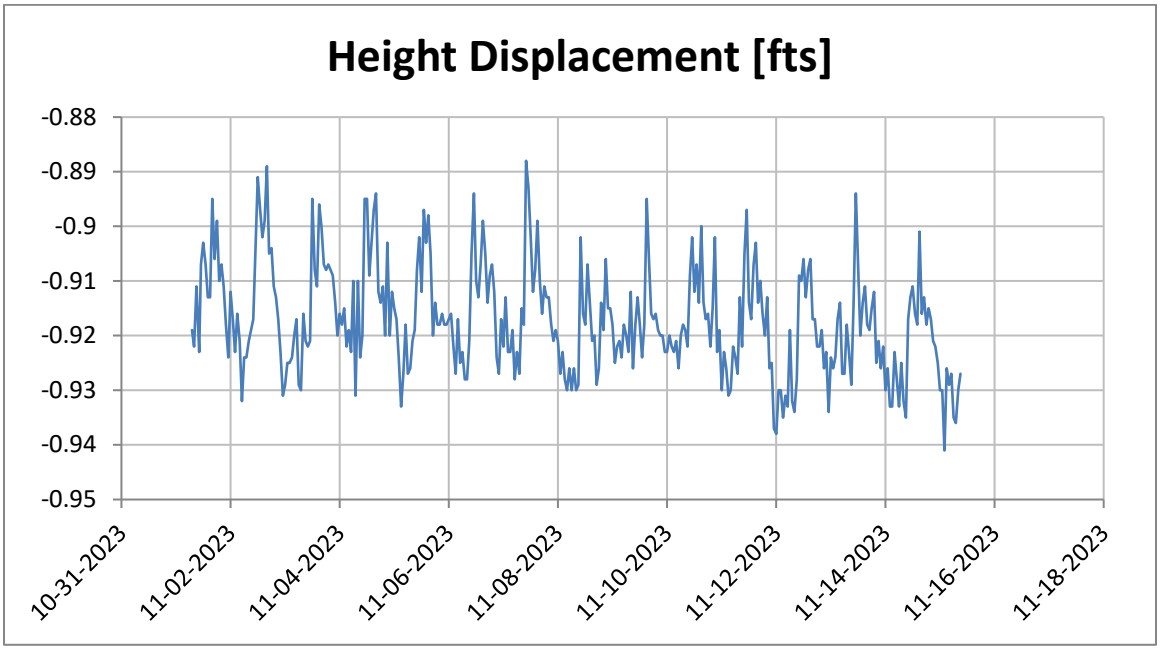
NP66





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.

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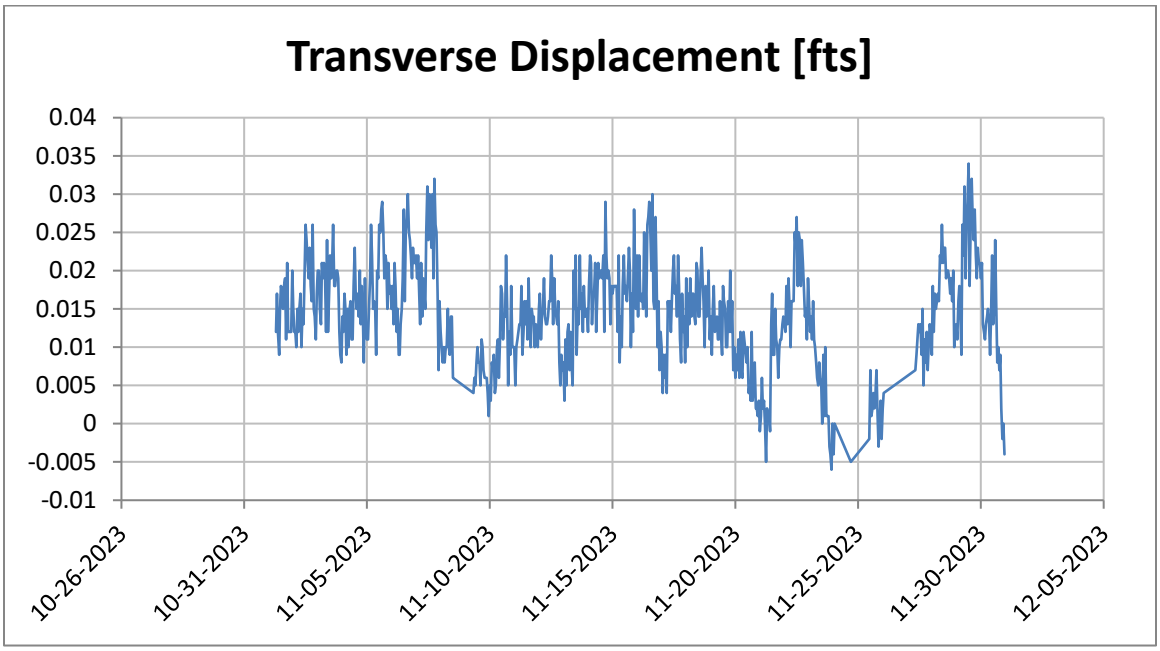
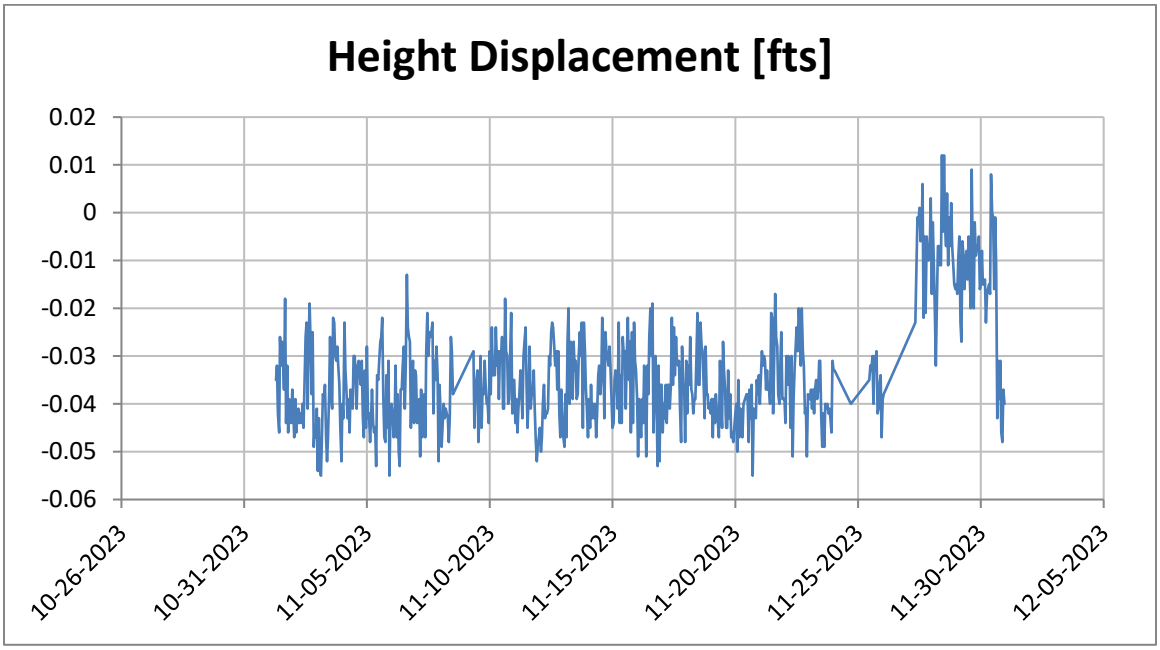
Prism P70



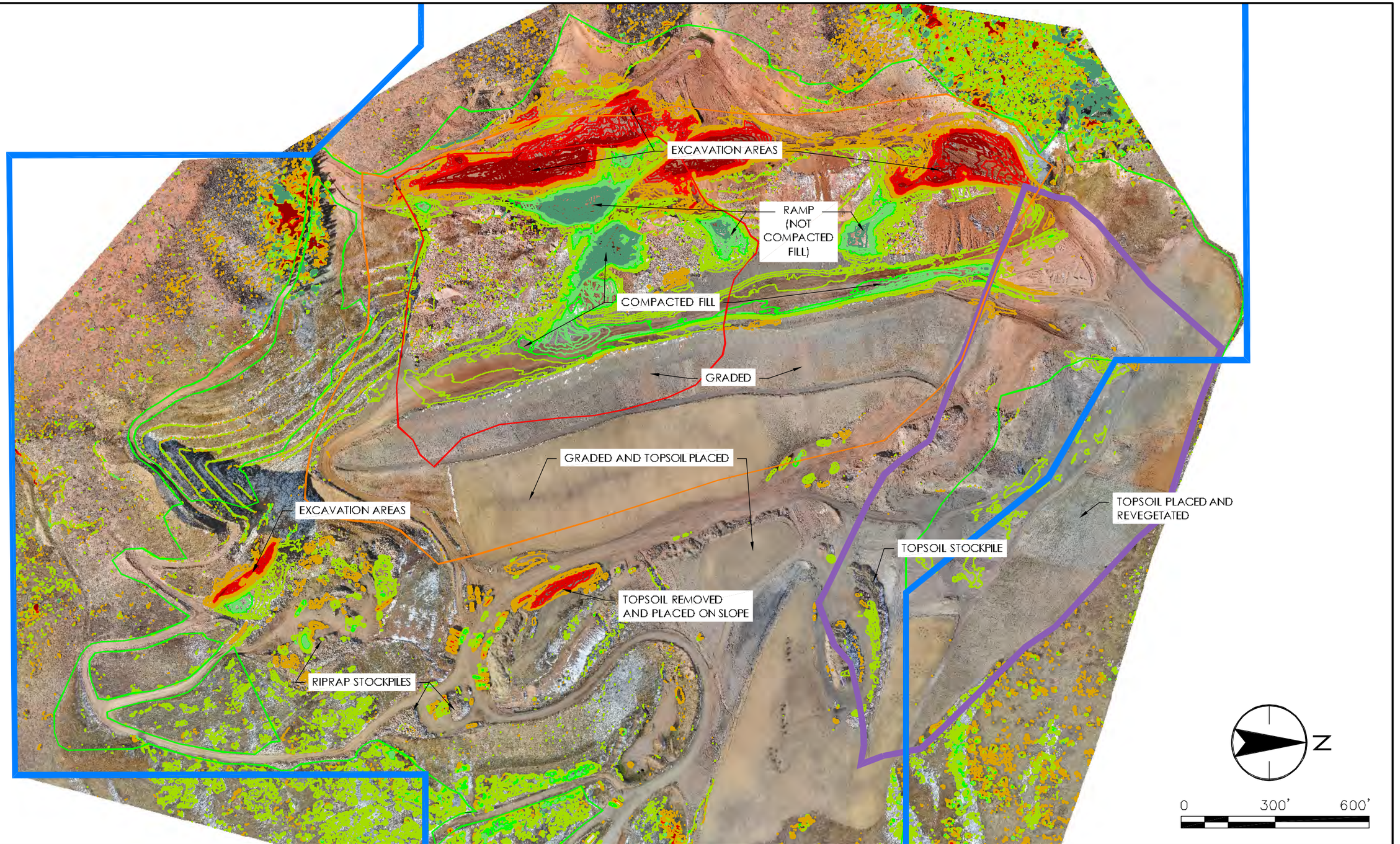


Notes:

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

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 11/01/2023 to 11/30/2023

Client/Project
CASTLE AGGREGATE

PIKEVIEW QUARRY SLOPE MONITORING

Project No.
2057288200

Title
EXISTING PRISMS WITH CURRENT SURFACE

Revision	Date
#	2023.12.31
Drawn By	Figure No.
PK	5

Appendix D

Compaction Testing Results

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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
- Compaction Test Location

N

0 150' 300'

Client/Project
CASTLE AGGREGATE

PIKEVIEW QUARRY SLOPE MONITORING

Project No.
2057288200

Title
COMPACTION TEST LOCATIONS

Revision	Date
#	2023.12.31
Drawn By	Figure No.
PK	6

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Stantec

Compaction Testing Log

Test No.	Date	Elevation (ft)	Northing (ft)	Easting (ft)	Wet Density (pcf)	Moisture Content (%)	Dry Density (pcf)	Compaction (%)
802	3-Nov	7363	1402219.3	3172990.6	136	4.5	130.2	106
803	3-Nov	7363	1402265.6	3172954.8	134.5	4.5	128.7	105
804	3-Nov	7365	1402412.2	3172876.5	131.9	4.4	126.3	103
805	7-Nov	7362	1402015.7	3173026.5	128.9	3.3	124.8	102
806	7-Nov	7364	1402072.6	3172949.9	129	3.3	124.9	102
807	7-Nov	7365	1402242.6	3172979.7	131.4	3.1	127.5	104
808	7-Nov	7366	1402359.4	3172934.5	140.5	5.9	132.7	108
809	7-Nov	7370	1402684.7	3172870.5	135.7	3.4	131.2	107
810	8-Nov	7373	1402686.5	3172847.2	140.6	3.7	135.6	110
811	8-Nov	7375	1402744.9	3172844.7	137.6	4.6	131.6	107
812	8-Nov	7378	1402792.8	3172829.6	133.6	6.4	125.6	102
813	8-Nov	7543	1401830.2	3172633.1	131.2	4.4	125.7	102
814	8-Nov	7543	1401850	3172639.3	131.9	3.5	127.4	104
815	8-Nov	7541	1401646.8	3172665.6	123.9	3.8	119.4	97
816	9-Nov	7544	1401778.5	3172637.5	116.9	4.3	112.1	91
817	9-Nov	7544	1401848.7	3172631.9	127.2	5.2	120.9	98
818	9-Nov	7543	1401655.9	3172665.2	124.1	5.0	118.2	96
819	10-Nov	7545	1401899.2	3172615.4	126.8	5.3	120.4	98
820	10-Nov	7545	1401798	3172622.6	127.8	5.6	121	99
821	10-Nov	7550	1401631.6	3172644.2	129.7	5.9	122.5	100
822	10-Nov	7552	1401633.5	3172657.3	128.3	5.6	121.5	99
823	10-Nov	7546	1401671.8	3172651.3	128.4	4.7	122.6	100
824	10-Nov	7548	1401803.4	3172636.4	123.7	3.7	119.3	97
825	10-Nov	7557	1401609.8	3172660.1	132.6	4.3	127.1	104
826	10-Nov	7552	1401651.5	3172654	129.1	4.6	123.4	100
827	10-Nov	7551	1401836.2	3172634.1	138.6	4.3	132.9	108
828	13-Nov	7555	1401644.7	3172651.2	125.2	5.8	118.3	96
829	13-Nov	7559	1401557.8	3172652.3	134	6.5	125.8	102
830	13-Nov	7561	1401584.1	3172668.1	123.5	3.0	119.9	98
831	13-Nov	7557	1401647.8	3172660.1	124.5	3.8	119.9	98
832	13-Nov	7552	1401809	3172646.2	124.3	4.7	118.7	97
833	13-Nov	7552	1401887.4	3172627.7	127.3	3.9	122.5	100
834	13-Nov	7560	1401639.9	3172658.7	118.2	2.8	115	94
835	13-Nov	7561	1401567	3172660.3	120.6	5.2	114.6	93
836	14-Nov	7557	1401874.6	3172626	130.5	4.1	125.4	102
837	14-Nov	7558	1401780	3172653.5	118.8	3.8	114.4	93
838	14-Nov	7564	1401658.7	3172611.6	124.4	2.9	120.9	98

Stantec

Test No.	Date	Elevation (ft)	Northing (ft)	Easting (ft)	Wet Density (pcf)	Moisture Content (%)	Dry Density (pcf)	Compaction (%)
839	14-Nov	7564	1401600.8	3172628.9	122.5	3.4	118.5	96
840	14-Nov	7554	1401798	3172643.8	125.3	3.1	121.5	99
841	14-Nov	7555	1401846.6	3172632.9	125.8	3.5	121.5	99
842	14-Nov	7366	1402192.8	3172907.7	126.9	4.2	121.8	99
843	14-Nov	7368	1402361.9	3172888.5	124.6	2.7	121.3	99
844	14-Nov	7565	1401657.5	3172614.1	120.6	5.1	114.7	93
845	14-Nov	7557	1401798.2	3172641.3	124.6	2.8	121.2	99
846	14-Nov	7556	1401879.3	3172625	129.5	2.8	126	103
847	15-Nov	7568	1401591.9	3172626.9	122	5.4	115.8	94
848	15-Nov	7566	1401654.2	3172611.8	128.7	3.7	124.1	101
849	15-Nov	7368	1401310.6	3173104.9	117.1	4.2	112.4	92
850	15-Nov	7366	1401174.3	3173171.5	135.5	3.2	131.3	107
851	15-Nov	7364	1401298.1	3173240.3	125.7	3.5	121.5	99
852	16-Nov	7364.8	1401419.4	3173171.6	127.4	4.4	122	99
853	16-Nov	7364.7	1401495.8	3173155.5	125.8	5.2	119.6	97
854	16-Nov	7364	1401553.8	3173137.2	129.2	4.4	123.8	101
855	17-Nov	7368.3	1401113.1	3173166.8	126.9	5.3	120.5	98
856	17-Nov	7371.7	1401253.9	3173108.5	115.4	3.8	111.5	91
857	17-Nov	7369.8	1401232.5	3173157.1	123.1	3.8	118.6	97
858	22-Nov	7367	1401673.8	3173102.8	126.4	3.4	122.3	100
859	22-Nov	7365	1401803.4	3173036.2	121.7	3.7	117.4	96
860	22-Nov	7364	1401911.4	3173040.2	127.2	3.5	122.9	100
862	29-Nov	7370	1401806.2	3173043.1	128.1	3.3	124	101
863	29-Nov	7369	1401955.2	3172988.4	117	3.4	113.1	92
864	29-Nov	7370	1402215.9	3172964.5	125.1	3.2	121.2	99
865	29-Nov	7370	1402427.5	3172878.3	120.8	4.0	116.1	95
866	29-Nov	7377	1401357.4	3173060.1	120.4	2.9	117	95
867	29-Nov	7371	1401269.8	3173136.7	132.7	4.2	127.4	104
868	29-Nov	7369	1401122.5	3173156.4	126.1	5.2	119.9	98
869	29-Nov	7360	1401100.9	3173269.7	126.3	4.4	121	99
870	29-Nov	7370	1401927.1	3172967.9	118.7	3.3	114.9	94
871	29-Nov	7370	1402004.8	3172980.5	124.4	2.7	121.1	99
872	29-Nov	7372	1402265.8	3172859.4	115.7	3.4	111.9	91
873	29-Nov	7370	1402329.8	3172894.9	129	3.7	124.4	101
874	30-Nov	7367	1401267.1	3173229.4	117.9	4.3	113	92
875	30-Nov	7367	1401311.6	3173081.3	119.8	3.0	116.3	95
876	30-Nov	7369	1401408.6	3173160.4	125.2	4.5	119.8	98
877	30-Nov	7369	1401781.2	3173075.2	120.5	3.6	116.3	95

Test No.	Date	Elevation (ft)	Northing (ft)	Easting (ft)	Wet Density (pcf)	Moisture Content (%)	Dry Density (pcf)	Compaction (%)
878	30-Nov	7371	1401707.6	3173079.2	115.9	4.2	111.2	91
879	30-Nov	7363	1401140.4	3173257.8	121.2	3.9	116.6	95
880	30-Nov	7369	1401219.5	3173202.3	132.5	4.1	127.3	104
881	30-Nov	7366	1401354.9	3173222	126	3.4	121.8	99
882	30-Nov	7373	1401764.2	3173001.7	129.4	4.9	123.3	100
883	30-Nov	7371	1401854	3172995.3	130.5	3.1	126.6	103
884	30-Nov	7372	1402226.9	3172839.5	121.6	4.0	116.9	95
885	30-Nov	7371	1402269.6	3172914.3	122.7	3.5	118.6	97

Notes:

- A total 2,775,000 yd3 had been placed and compacted. This requires at least 555 compaction tests, and 1,093 tests have been taken.

- There is no test #861.

STATE OF COLORADO

Cazier - DNR, Tim <tim.cazier@state.co.us>

Pikeview monitoring report

1 message

Kos, Paul <paul.kos@stantec.com> Thu, Dec 28, 2023 at 9:45 AM
To: "Tim Cazier, P.E. (Tim.Cazier@state.co.us)" <tim.cazier@state.co.us>
Cc: Jerald Schnabel <jerald_schnabel@castleaggregate.com>

Tim,

Please find attached the Pikeview monitoring report for November. Let me know if you have any questions.

Paul Kos P.E., P.Eng.

Senior Geological Engineer

Mobile: 303 570-9163
paul.kos@stantec.com

Stantec
2000 South Colorado Boulevard Suite 2-300
Denver CO 80222-7933

Pikeview Monitoring Memo November 2023.pdf
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