Stantec

To:	Jerald Schnabel	From:	Paul Kos
	Castle Aggregate		Denver, CO 80202
File:	December 2023 Monitoring Summary	Date:	January 31, 2024

Reference: December 2023 Geotechnical Monitoring Summary Pikeview Quarry

1.0 INTRODUCTION

Stantec Consulting Services Inc. (Stantec) has prepared this December 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 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 December 2023. Continuous monitoring by the robotic survey system began in 2010 and has continued through the month of December 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 December 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 engineers to document visual observations of slope conditions, including signs 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 December 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 December 5, 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 December 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 placed in lifts and compacted.
- The fault between the granite and sedimentary rocks has been partially exposed. It is generally located farther east than originally thought; and the larger amount of granitic material reduces the driving force on the reclamation buttress and remaining sedimentary material. Castle Aggregate and Stantec are evaluating the fault location and the excavation quantities required in the upper, west portions of the quarry. Also, competent granitic rock has been encountered in multiple areas of the Upper Borrow Area, and these areas may require blasting, or they may be left as natural outcrops. If any design changes are required, Castle Aggregate will submit a Technical Revision.
- 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.
- Topsoil was placed on areas at final grade.
- 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 19 prisms active in December; 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 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 December, 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 multiple times due to power outages and system updates. These outages typically occurred at night when no work was being performed. Reduced work, slope inspections, and spotters were used to monitor the slopes for movements when the monitoring system was not operating but construction was occurring. System upgrades are planned for January 2024 to reduce the number of outages. The alerts are listed in Table 2.

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Table 2 Alert Summary

Date(s)	Alert	Cause/Actions taken	Resolved
1-Dec	Points not found	Snow and fog. Spotter monitoring construction activities.	1-Dec
3-Dec to 4-Dec	Points not found and communication error alerts	Snow and fog followed by power outage. No work being performed at time of alerts.	4-Dec
8-Dec to 9-Dec	Points not found	Snow and fog. Reduced work being performed at time of alerts. Spotter monitoring construction activities.	9-Dec
9-Dec to 11-Dec	Points not found and communication error alerts	Power outage. No work being performed at time of alerts.	11-Dec
12-Dec to 13-Dec	Points not found and communication error alerts	Snow and fog followed by power outage. No work being performed at time of alerts or work occurred after site inspection.	13-Dec
13-Dec to 15-Dec	Points not found and communication error alerts	Snow and fog followed by power outage. No work or limited work being performed at time of alerts.	15-Dec
23-Dec to 24-Dec	Points not found	Snow and fog. No work being performed at time of alerts.	24-Dec
26-Dec to 27-Dec	Communication error alerts	Power outage. No work being performed at time of alerts.	27-Dec
28-Dec	B7300-0 not found	Frost on prism. No work being performed at time of alert.	28-Dec
29-Dec	Communication error alerts	Power outage. No work being performed at time of alerts.	29-Dec
29-Dec	B7300-0 not found	Frost on prism. No work being performed at time of alert.	29-Dec
30-Dec	B7300-0 not found	Frost on prism. No work being performed at time of alert.	30-Dec

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	-0.008	-0.419	0.0121	0.7827	Slope creep movements
BR3	-0.031	-0.087	0.0004	0.0933	Slope creep movements
CP6	0.003	-0.018	-0.0133	0.0263	
CP7	0.113	0.010	-0.0223	0.1228	
P2	-0.024	-0.022	-0.0037	0.0358	
P25	-0.010	0.033	0.0079	0.0347	
P32R	-0.012	0.013	-0.0199	0.0331	
P33	0.073	-0.003	0.0079	0.0965	
P5	-0.023	-0.016	-0.0099	0.0281	
P70	0.003	-0.025	0.0031	0.0560	
NP4	0.034	-0.053	0.0147	0.1010	
B7200-1	-0.022	0.005	0.0014	0.0251	
B7200-2	0.010	-0.019	0.0007	0.0411	
B7200-3	0.148	-0.061	0.0146	0.1959	
B7300-0	-0.060	-0.090	0.0070	0.1112	
B7300-1	-0.100	-0.121	0.0216	0.2336	
B7300-2	0.001	-0.100	0.0246	0.1585	
B7300-3	0.090	-0.090	0.0358	0.1669	
B7300-4	0.072	-0.035	0.0572	0.0848	

The data show stable conditions with no movements at 17 of 19 prisms with recorded displacements limited to data scatter and not actual movements. Prisms BR1 and BR3 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 December 29, 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 December topography was also compared to the November 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 Upper Borrow Area 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 primarily from the Upper Borrow Area and placed in the Buttress Area. All fill is moisture conditioned as necessary and then compacted. During December 2023, approximately 79,000 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 16 compaction tests. There were 48 compaction tests taken in December. As of December 29, 2023, when the site was surveyed, a total of approximately 2,854,000 yd^3 had been placed and compacted. This required at least 571 compaction tests, and 1,141 tests have been taken. All tests in December 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 (est.)
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:

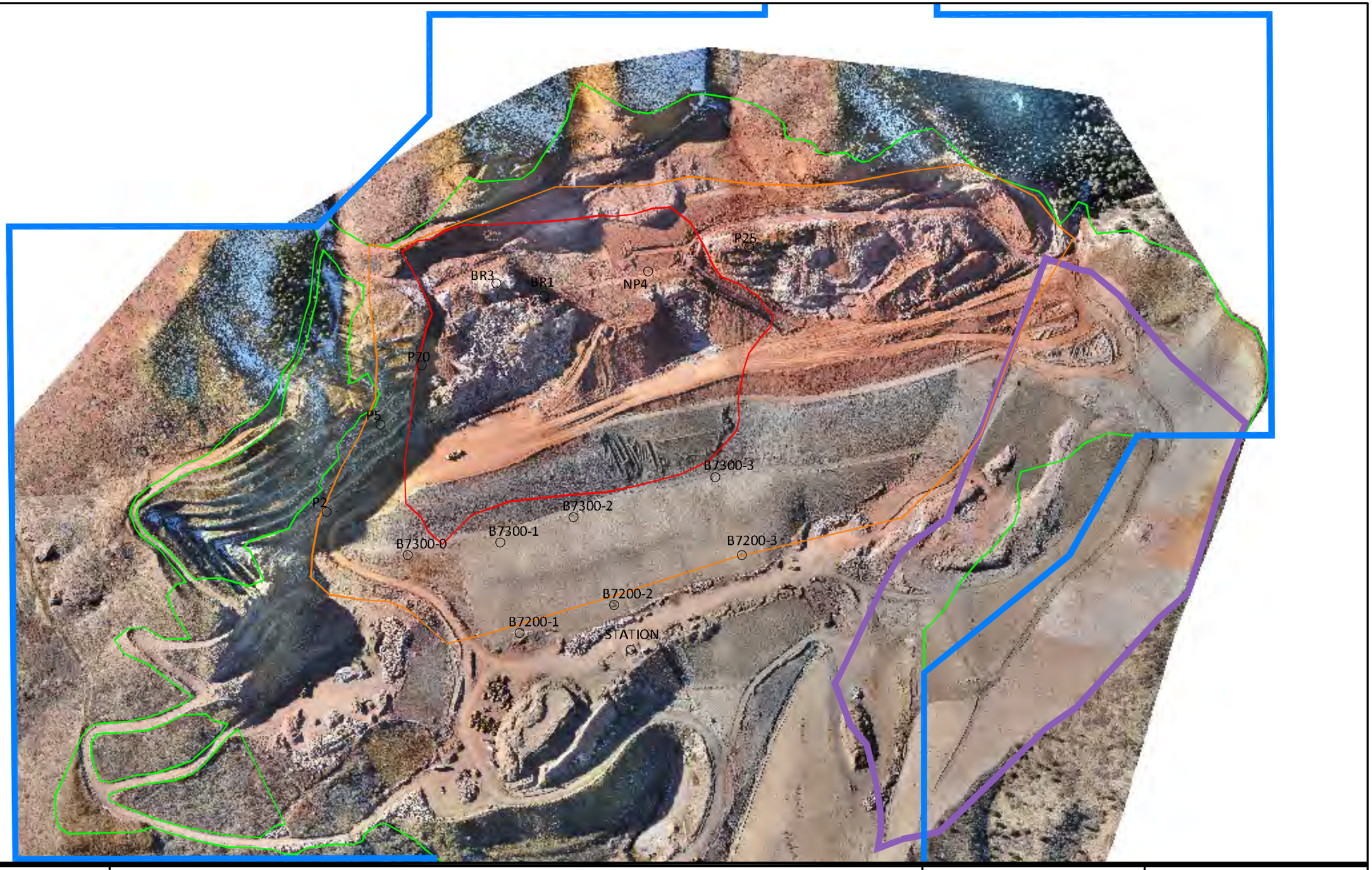
- Evaluate the fault and competent rock locations and identify design revisions (if applicable). This evaluation will be used to determine if a Technical Revision is required.
- Replace batteries to reduce or eliminate system outages.
- Continue placing compacted fill in the buttress area.
- Continue processing riprap.
- Continue placing topsoil where grading has been completed.
- Continue geotechnical monitoring.
- Continue to remove and replace prisms on an as-needed basis.

7.0 CONCLUSIONS

The data collected in December 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 December 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
2024.01.31

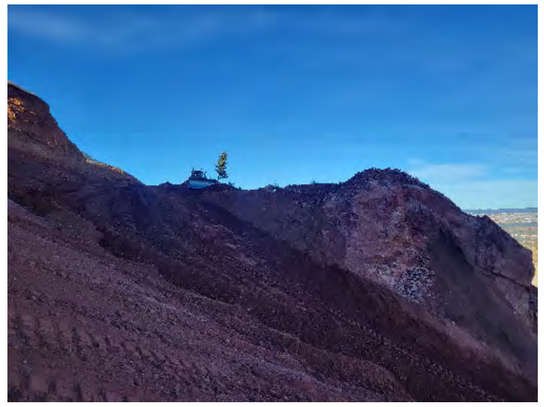
Drawn By
PK

Figure No.
1

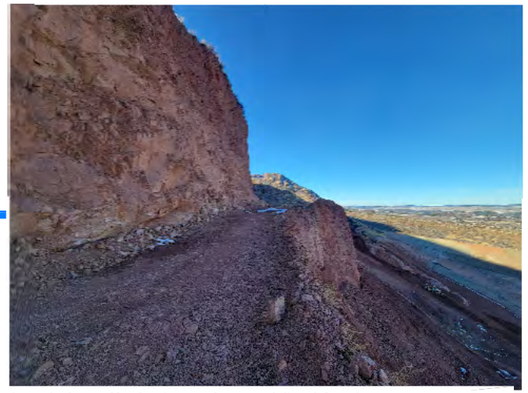
Appendix A

Visual Inspections

5. Dozers working near top of haul road.



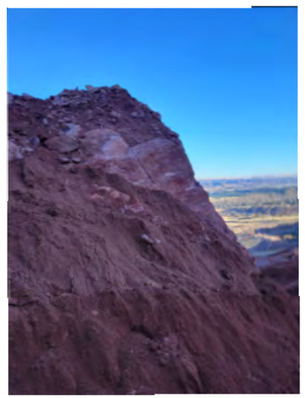
4. Dozers placing material in the "Bathtub".



3. Highwalls being planned for blasting.

6. Mapping the fault location.

2. Screened gravel stockpile.



7. Typical Upper Borrow Area material.
Mixture of soil and rock.

1. Screening 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 DECEMBER 5, 2023.

N

0 400' 800'

Client/Project
CASTLE AGGREGATE

PIKEVIEW QUARRY SLOPE MONITORING

Project No.
2057288200

Title
OBSERVATIONS FROM DECEMBER INSPECTION

Revision
#

Date
2024.01.31

Drawn By
PK

Figure No.
2

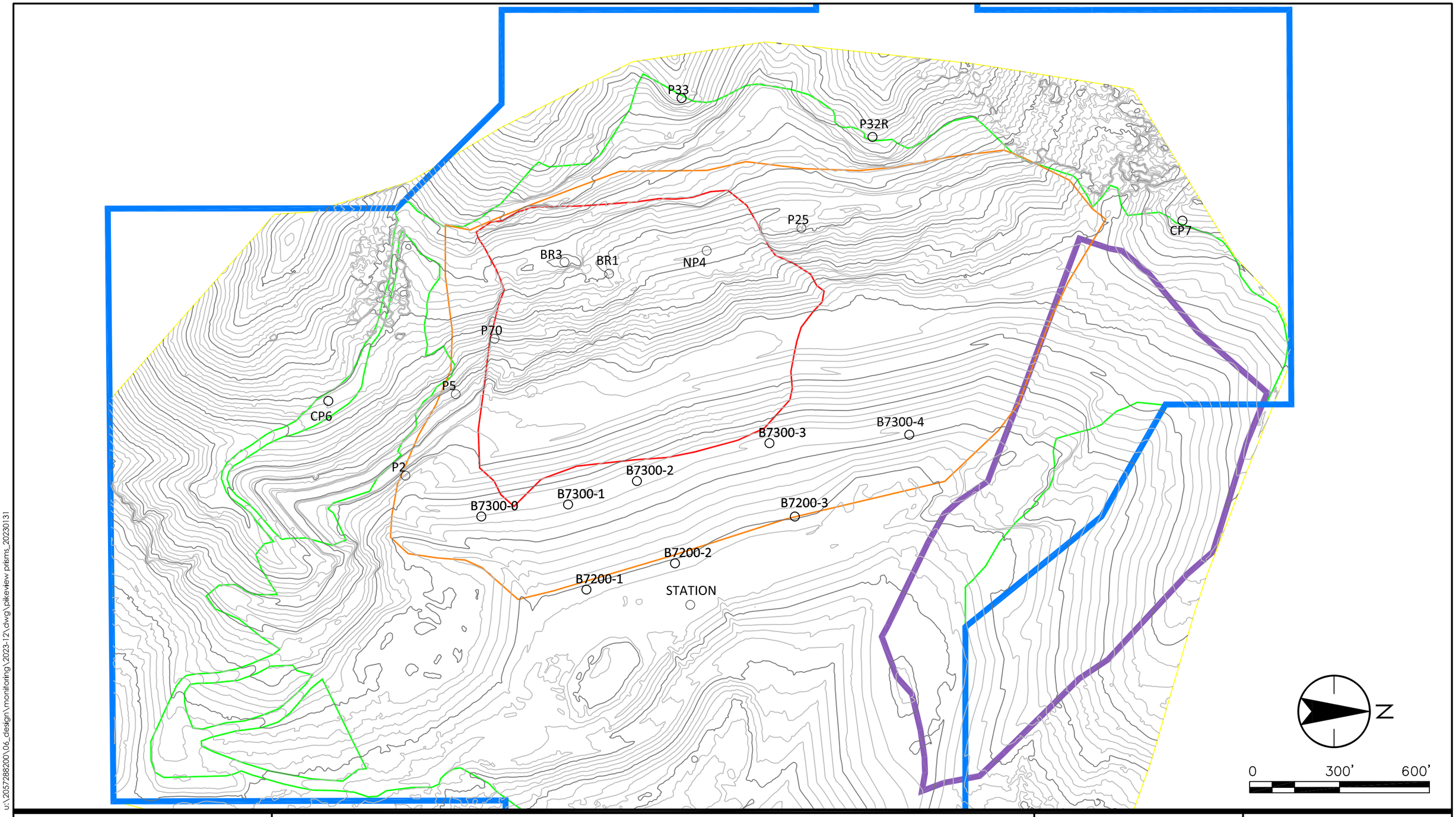
Stantec

Table A-1 Summary of Daily Inspections

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

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 DECEMBER 29, 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
#	2024.01.31
Drawn By	Figure No.
PK	3

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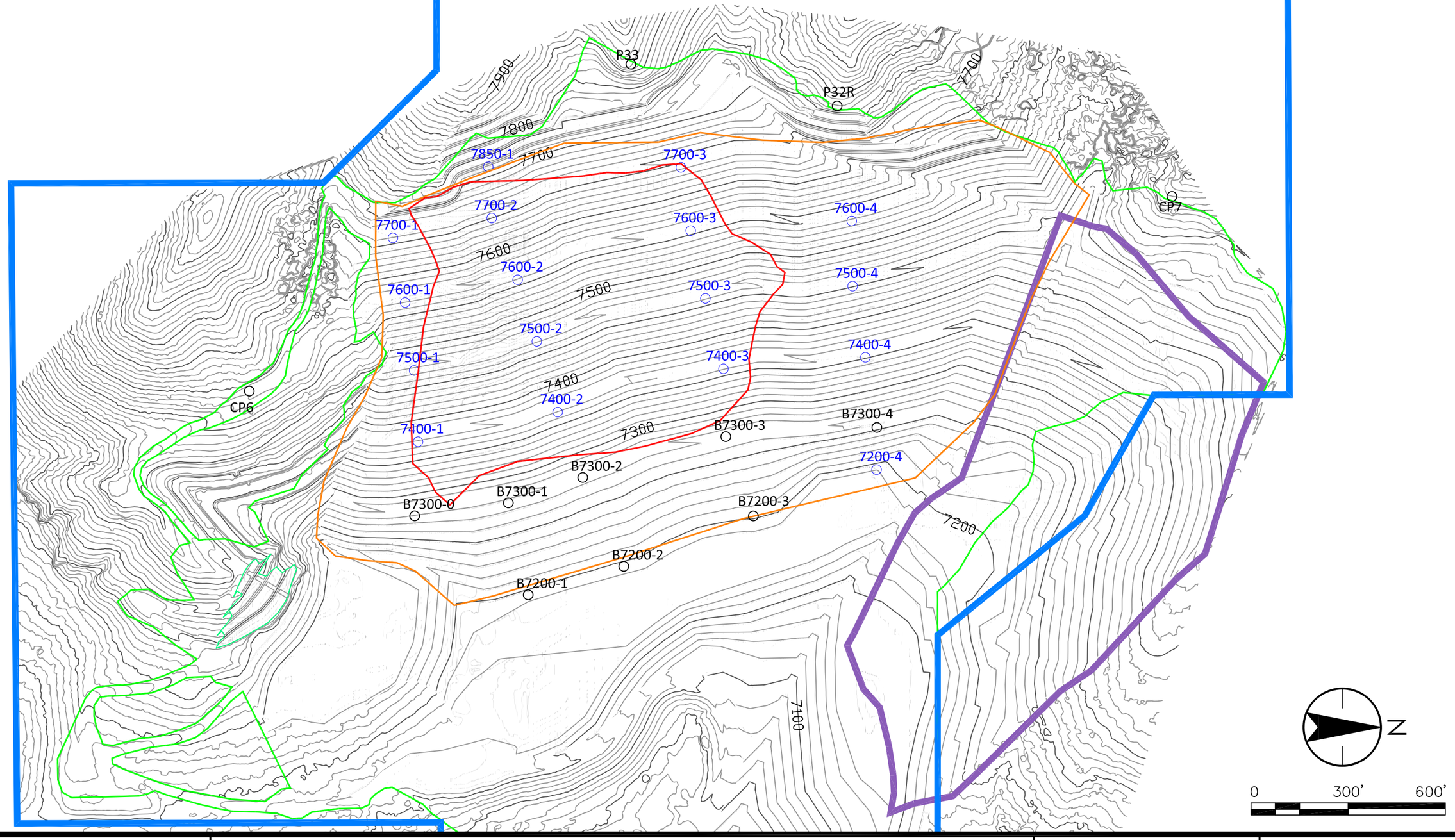

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LEGEND

- 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
2024.01.31

Drawn By
PK

Figure No.
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
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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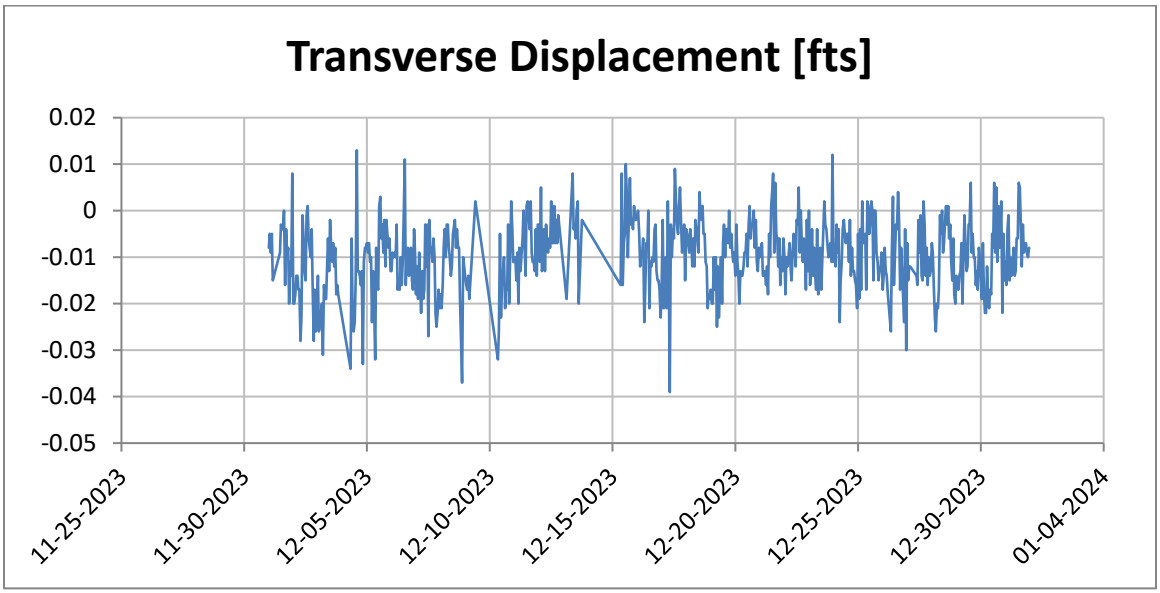
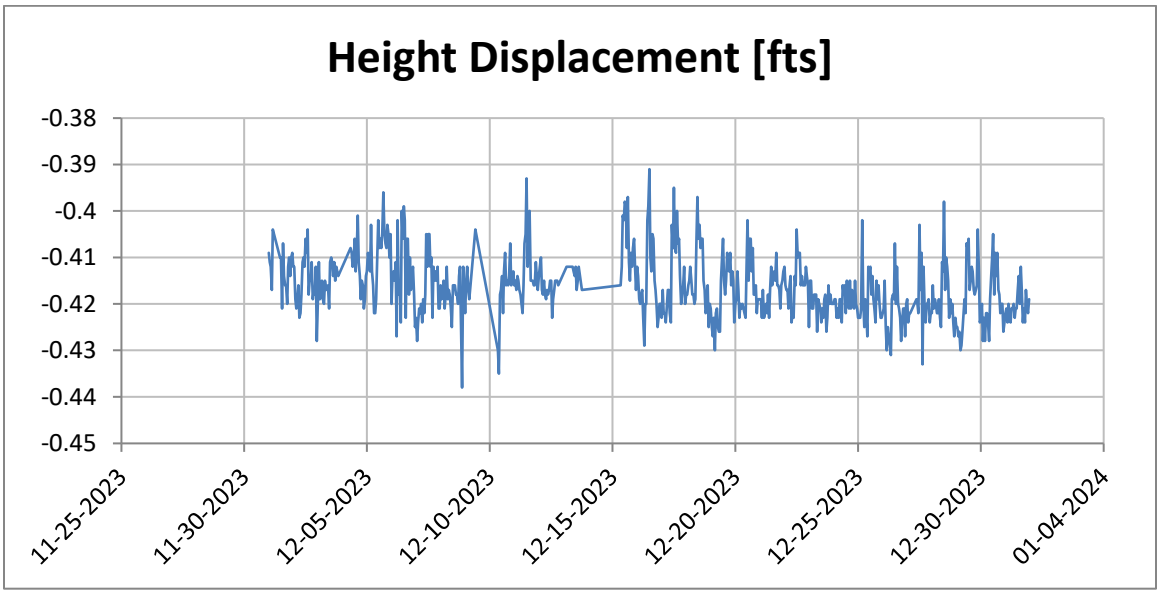
Prism BR1



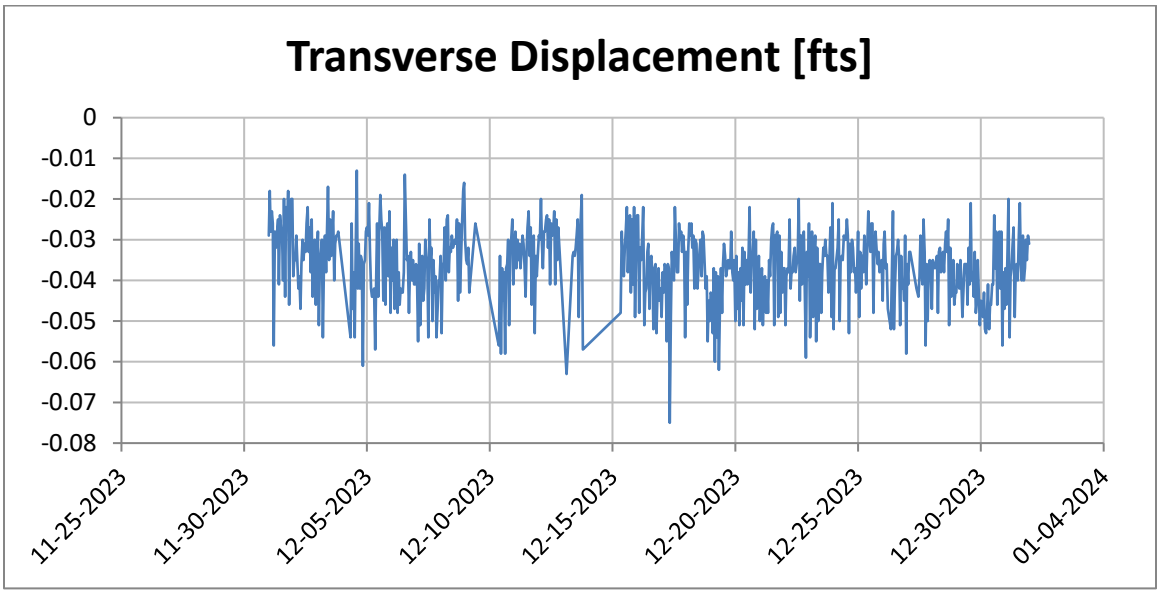


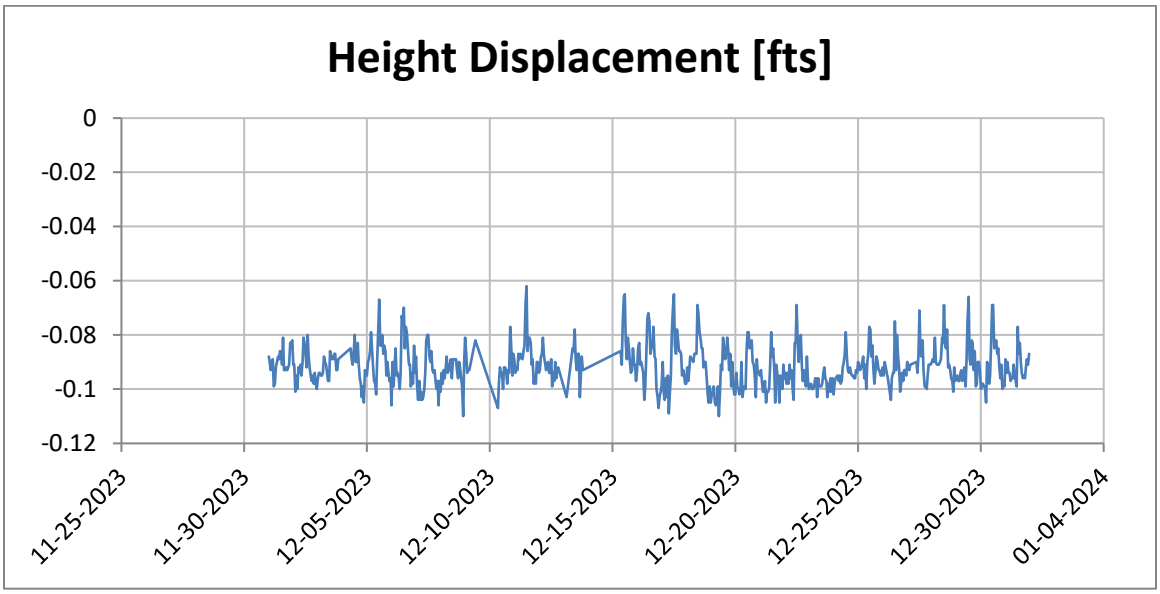
Notes:

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.

Stantec

Prism BR3



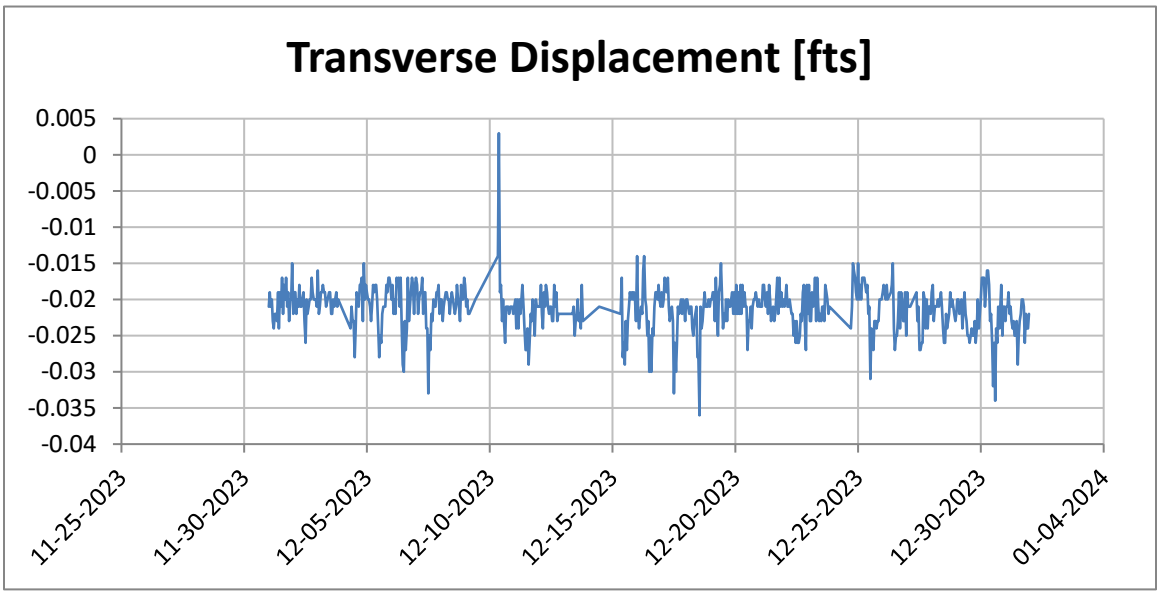


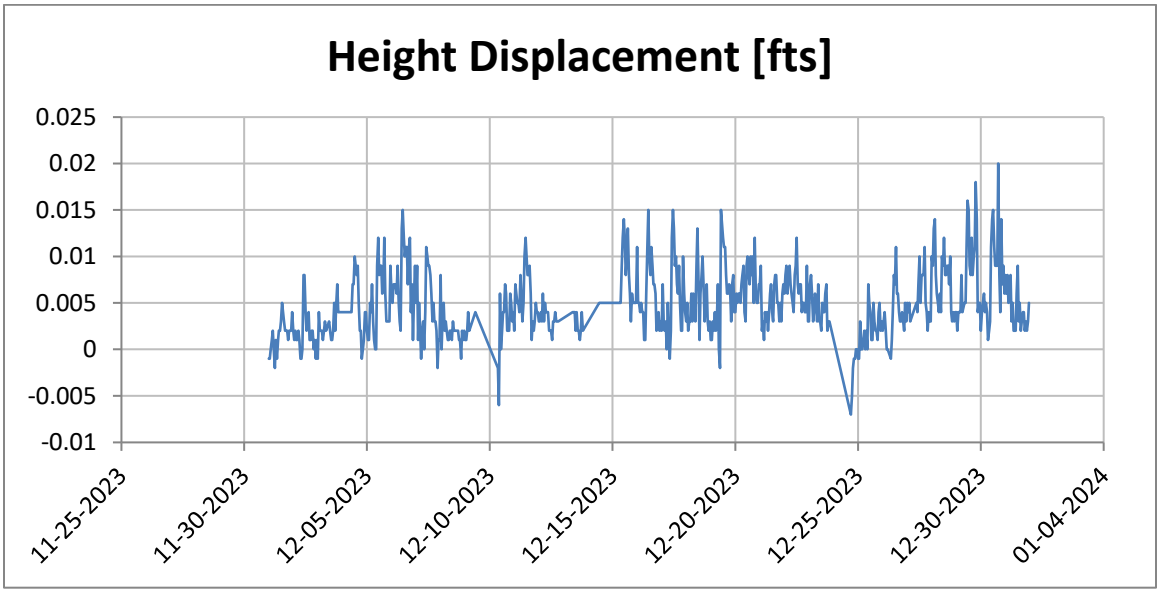
Notes:

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.
5. Prism records slope creep movements.

Stantec

Prism B7200-1



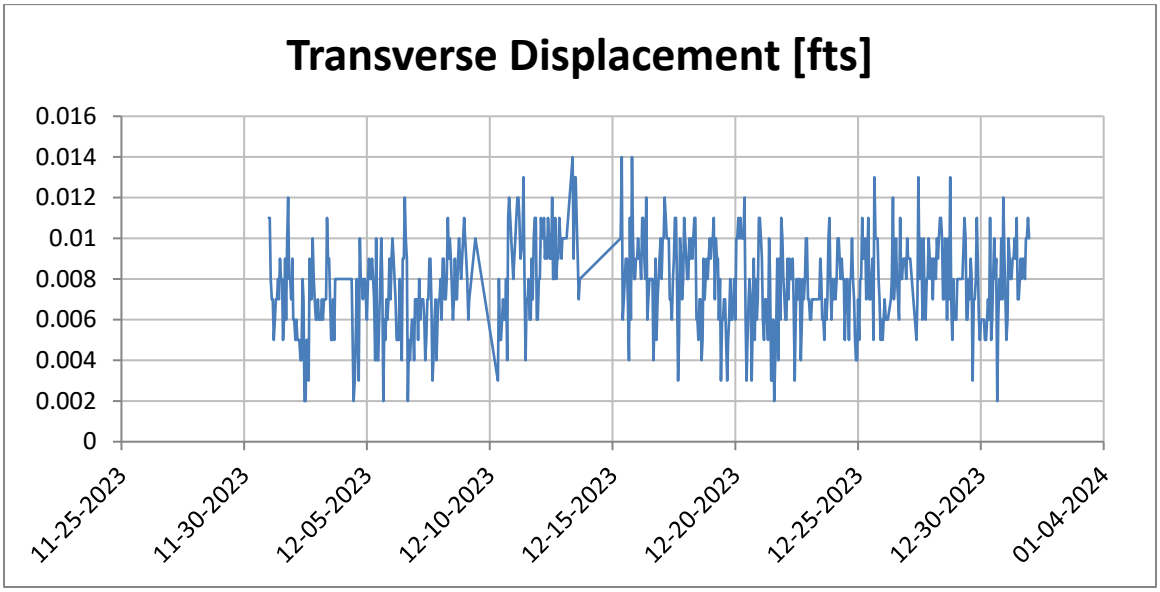


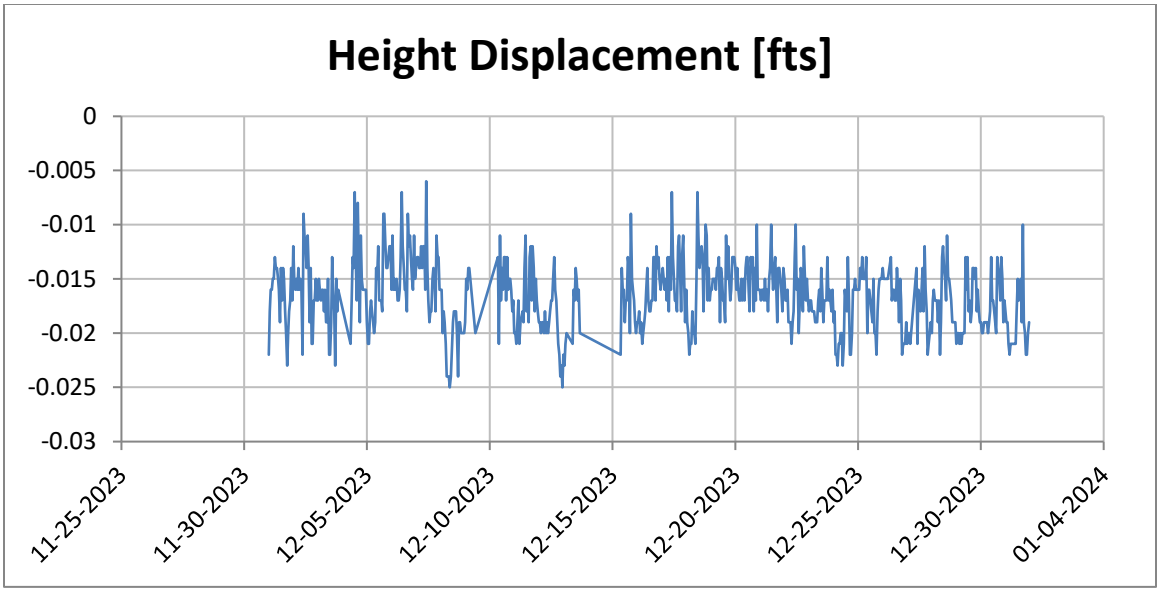
Notes:

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.

Stantec

Prism B7200-2



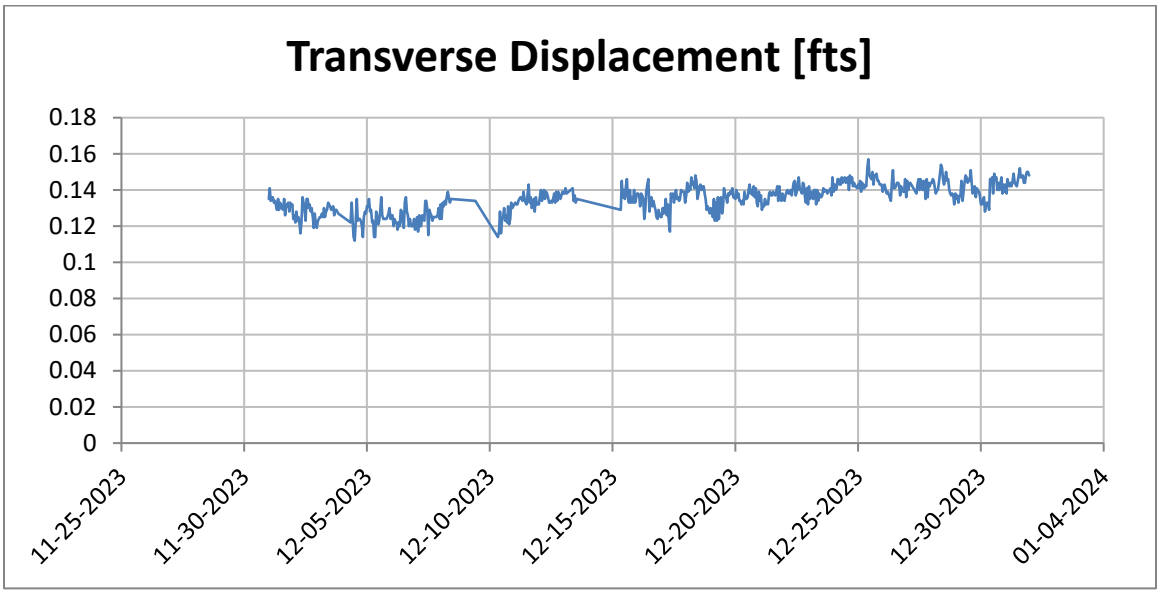


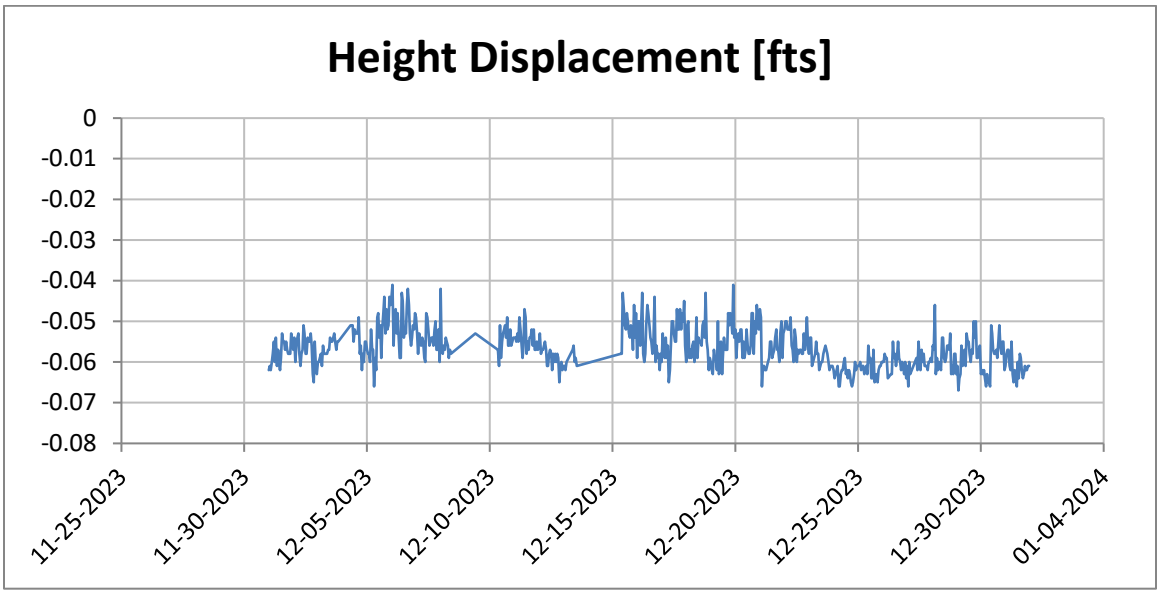
Notes:

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



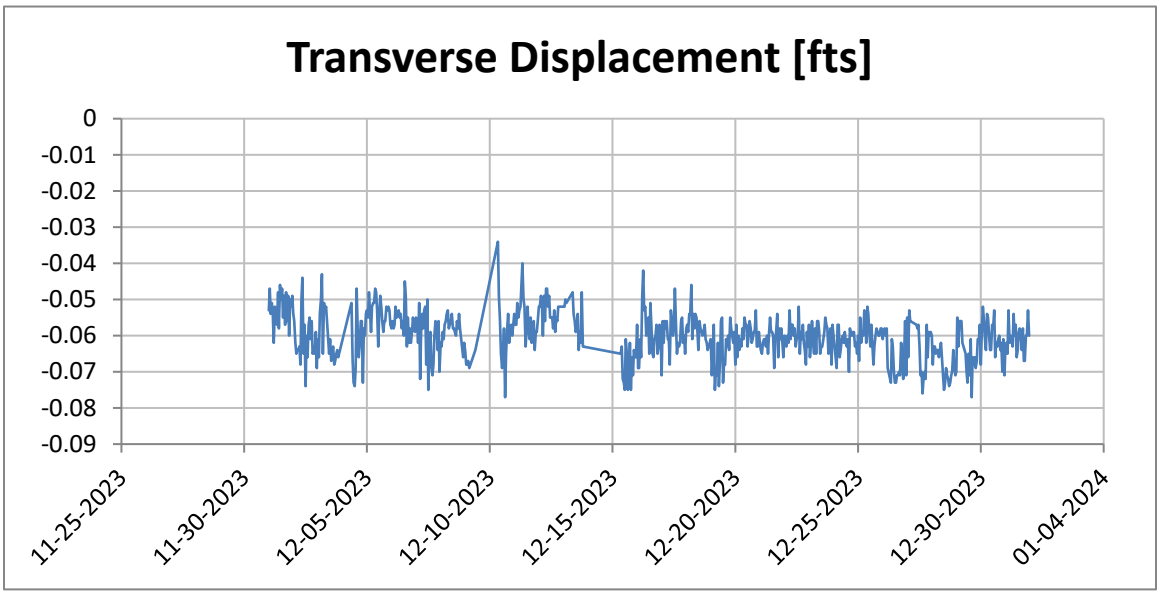


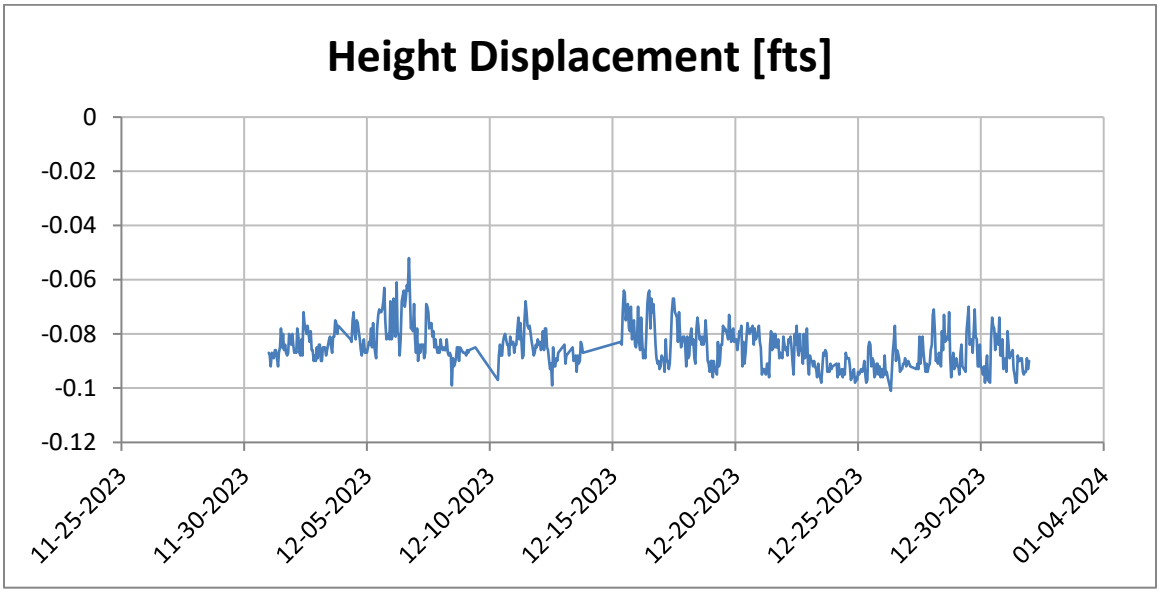
Notes:

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



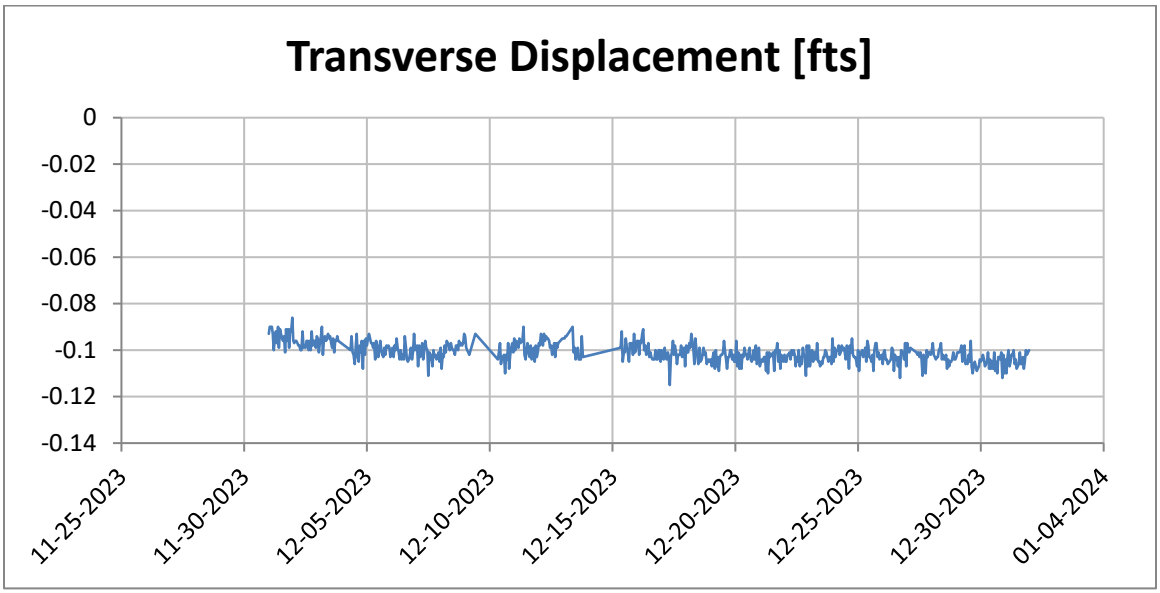


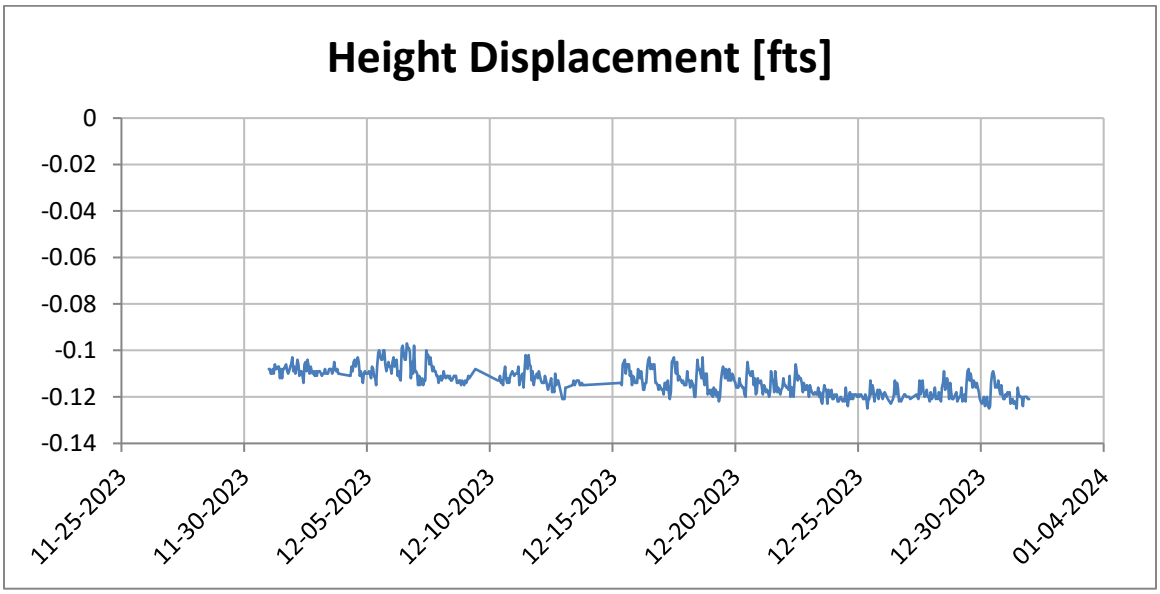
Notes:

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.

Stantec

Prism B7300-1



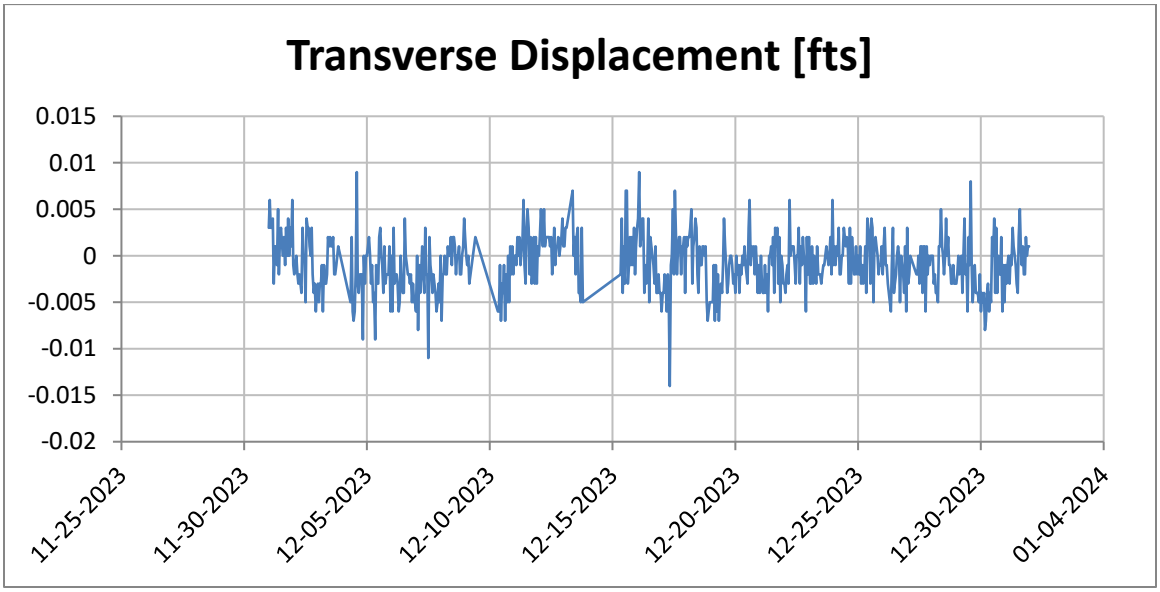


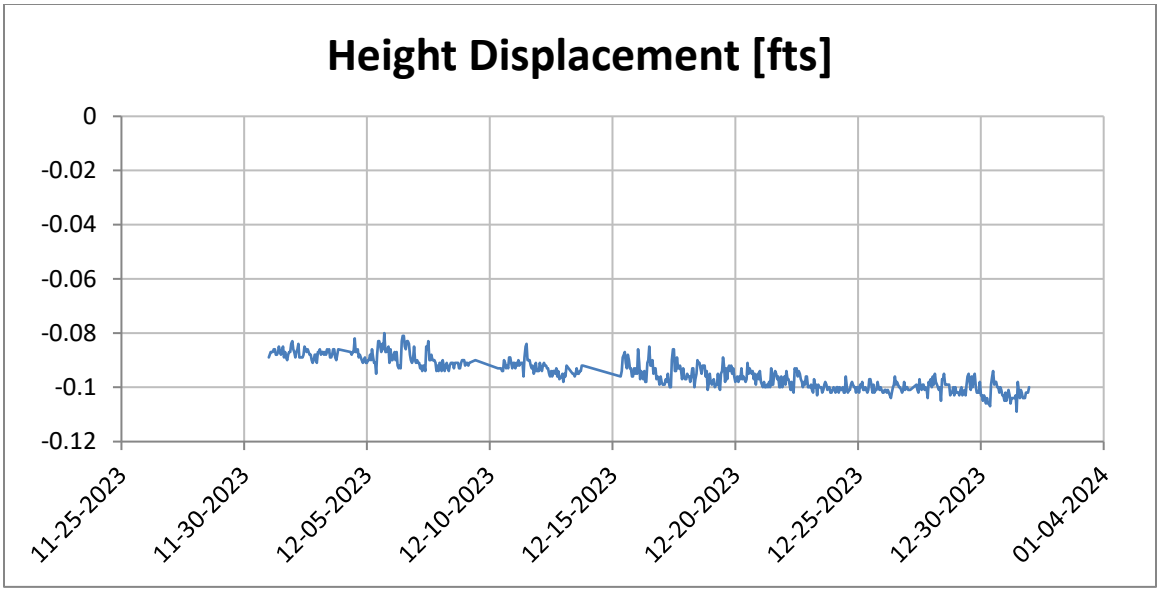
Notes:

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.

Stantec

Prism B7300-2



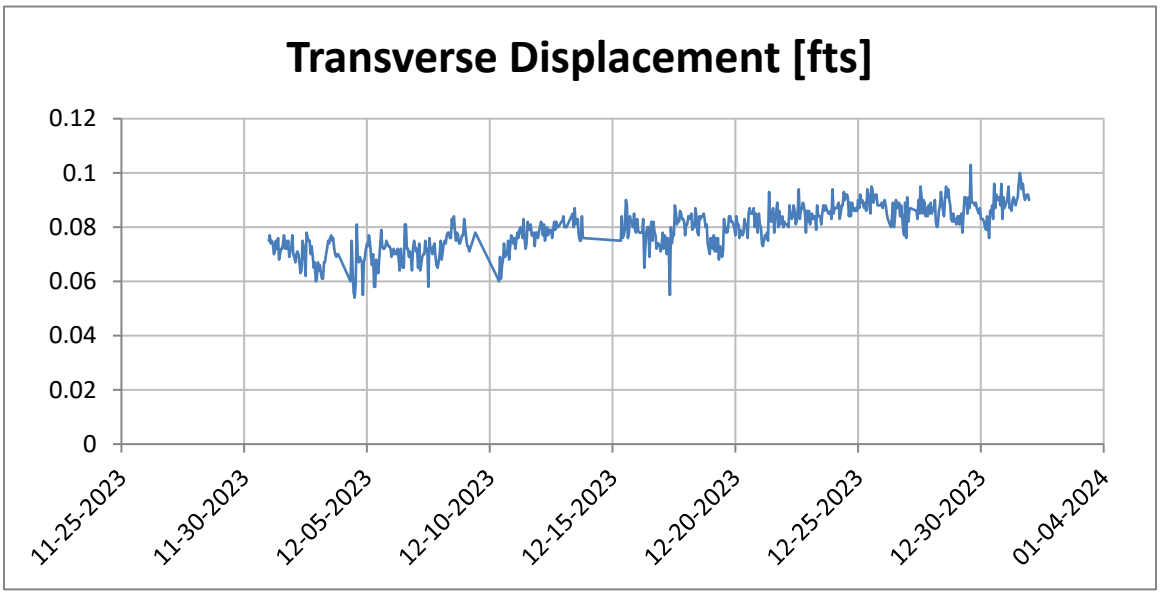


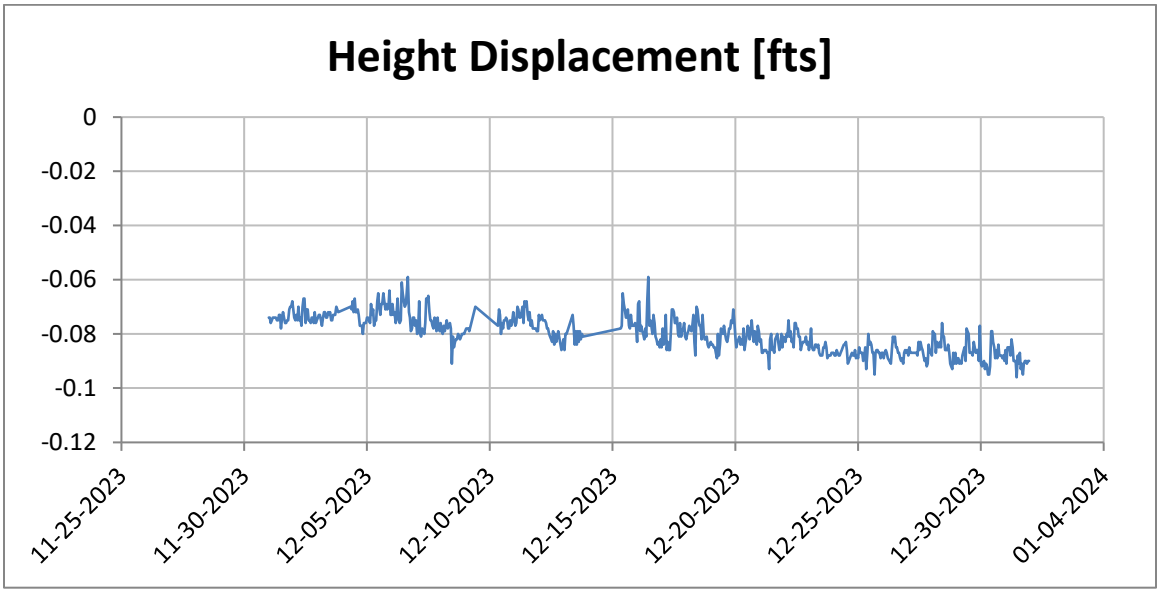
Notes:

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.

Stantec

Prism B7300-3



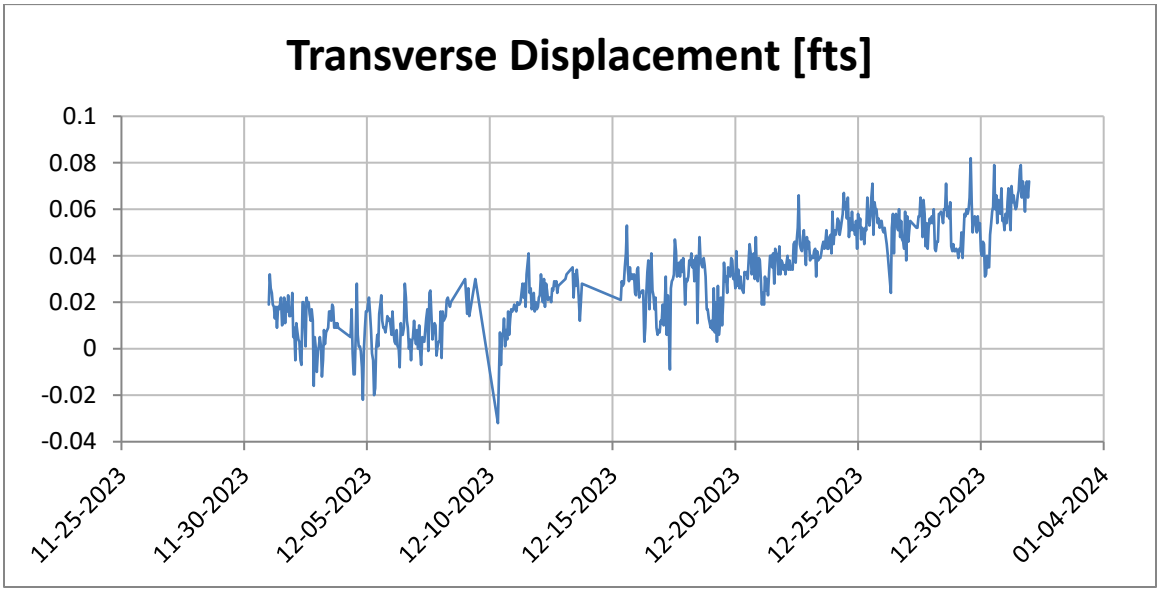


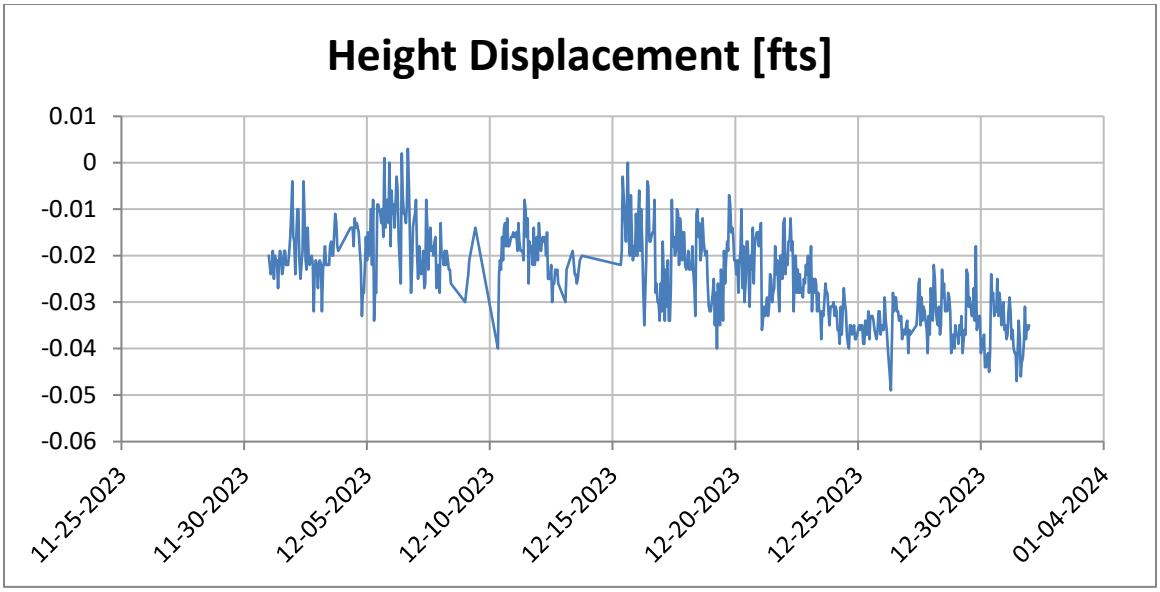
Notes:

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.

Stantec

Prism B7300-4



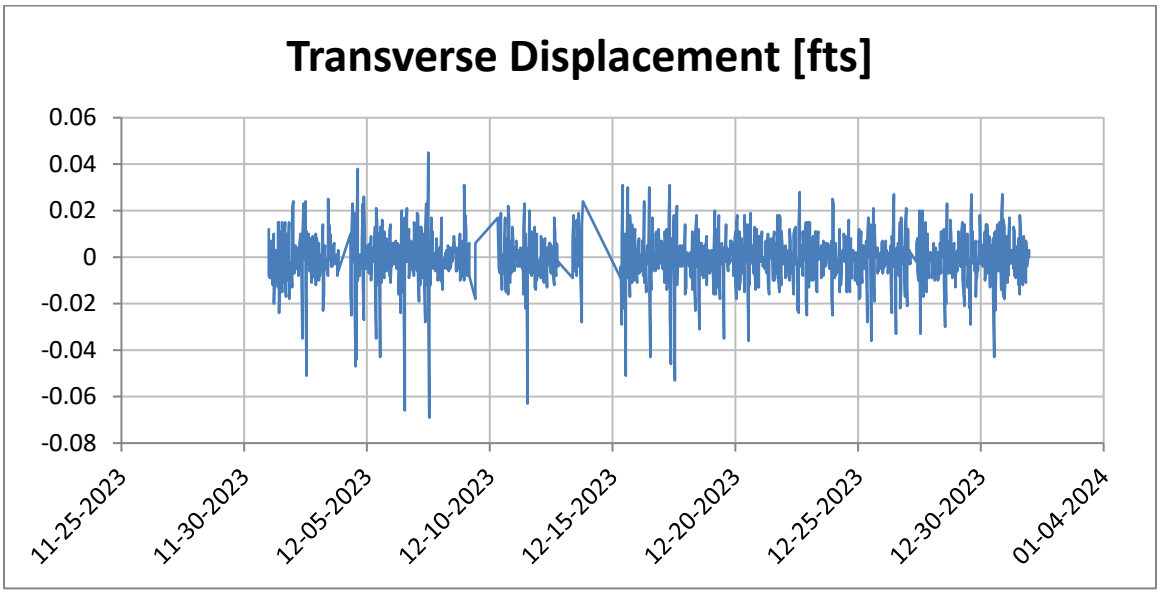


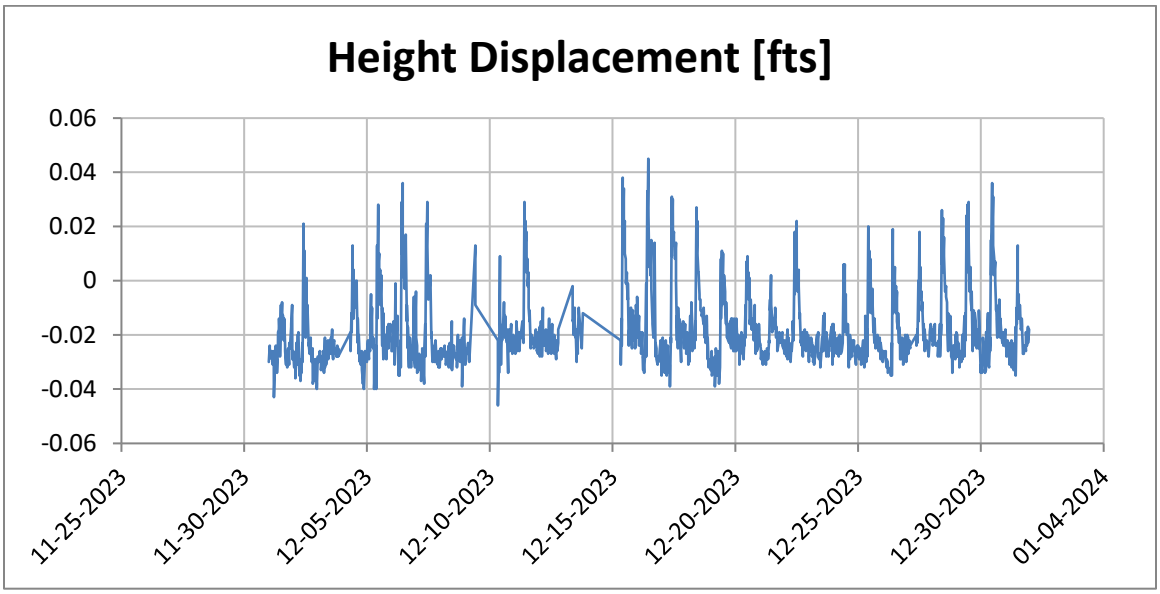
Notes:

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.

Stantec

Prism CP6



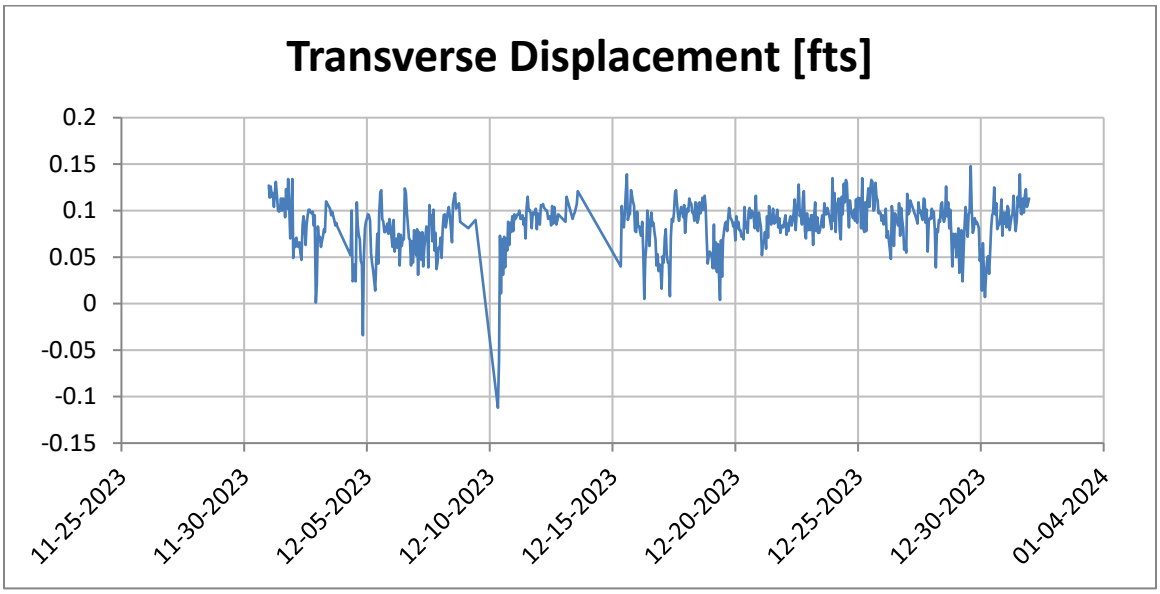


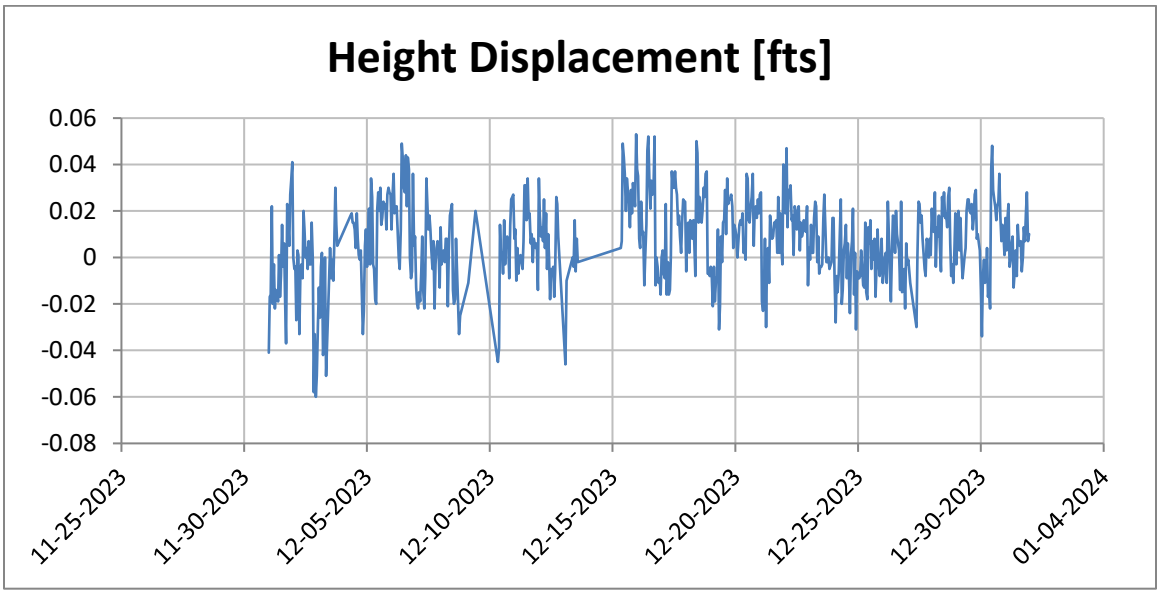
Notes:

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



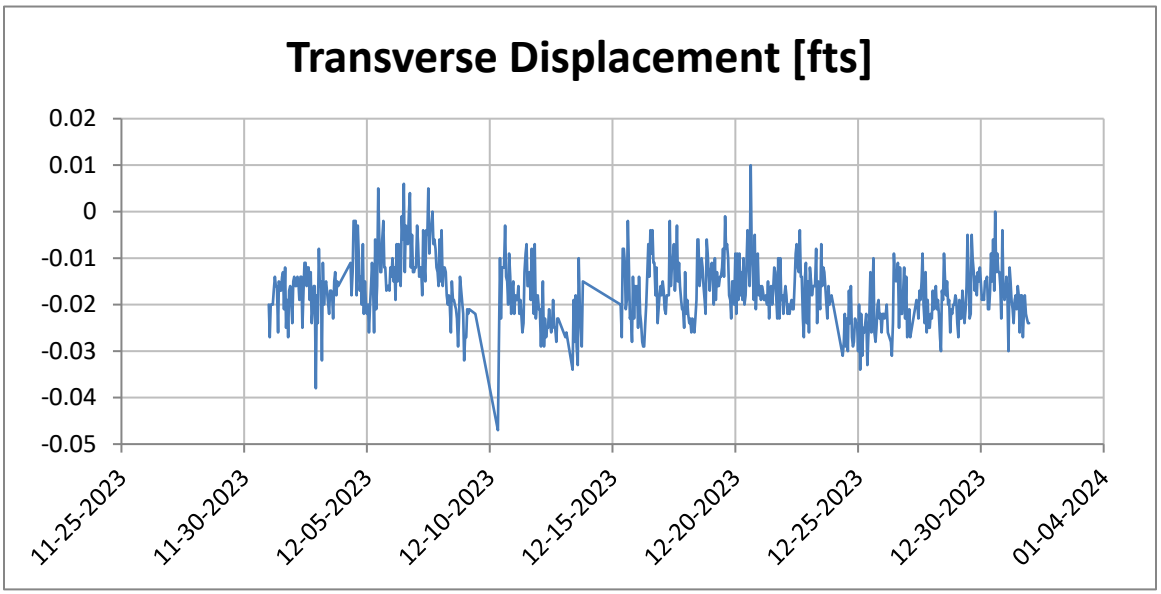


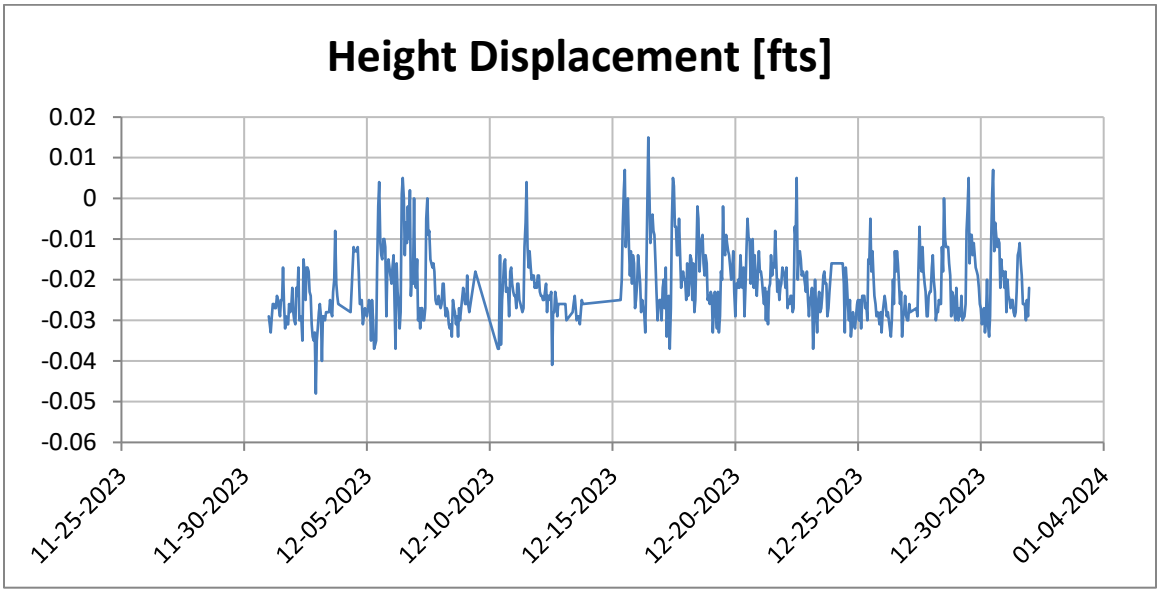
Notes:

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.

Stantec

Prism P2



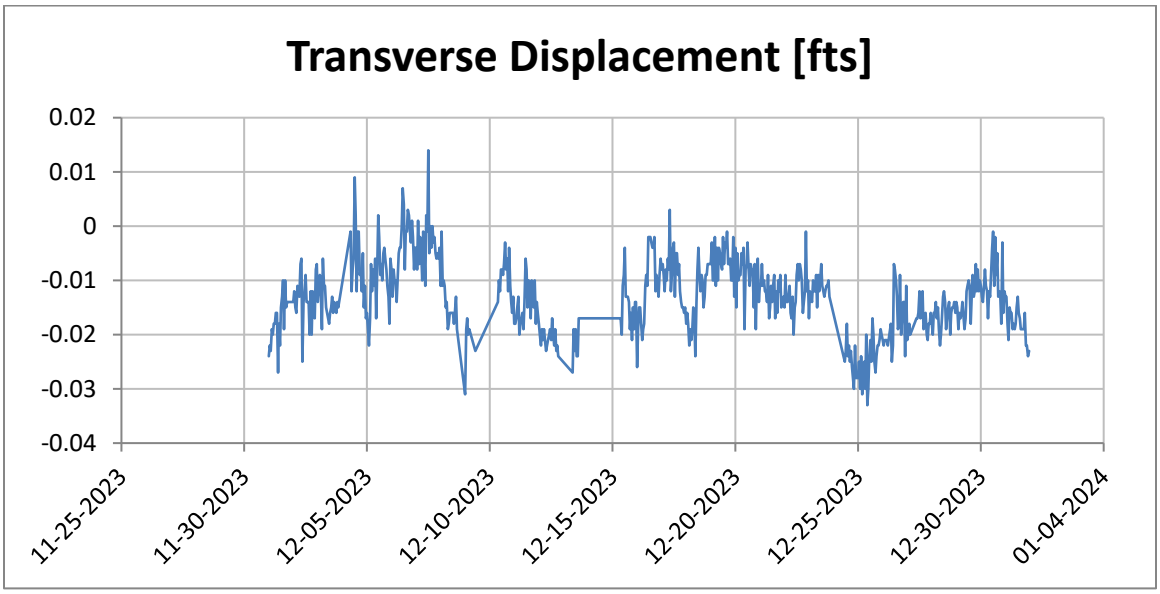


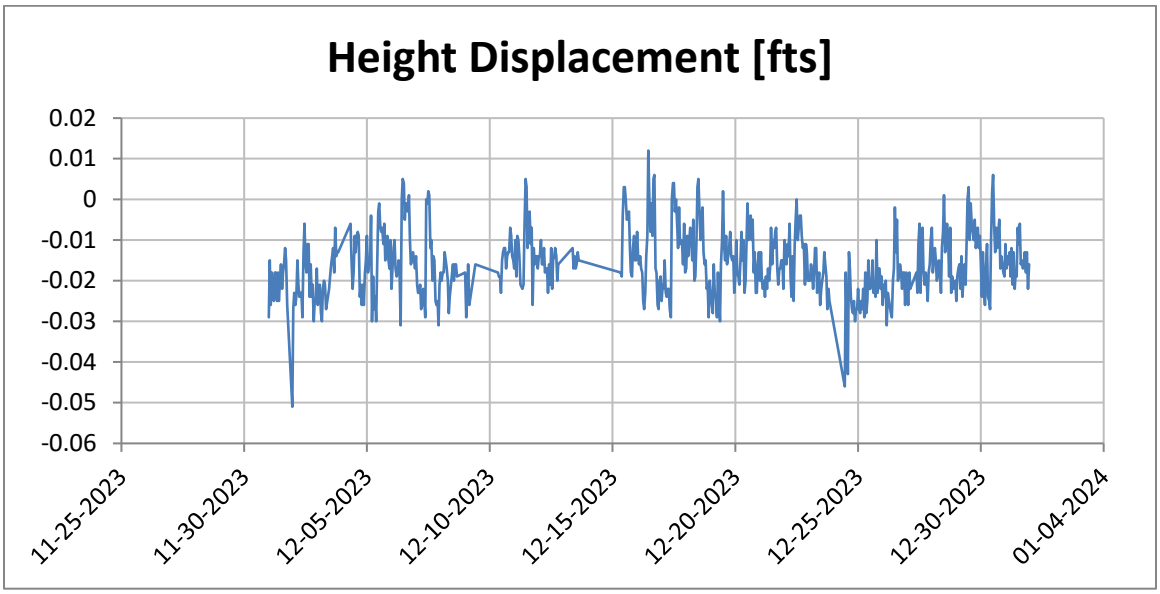
Notes:

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



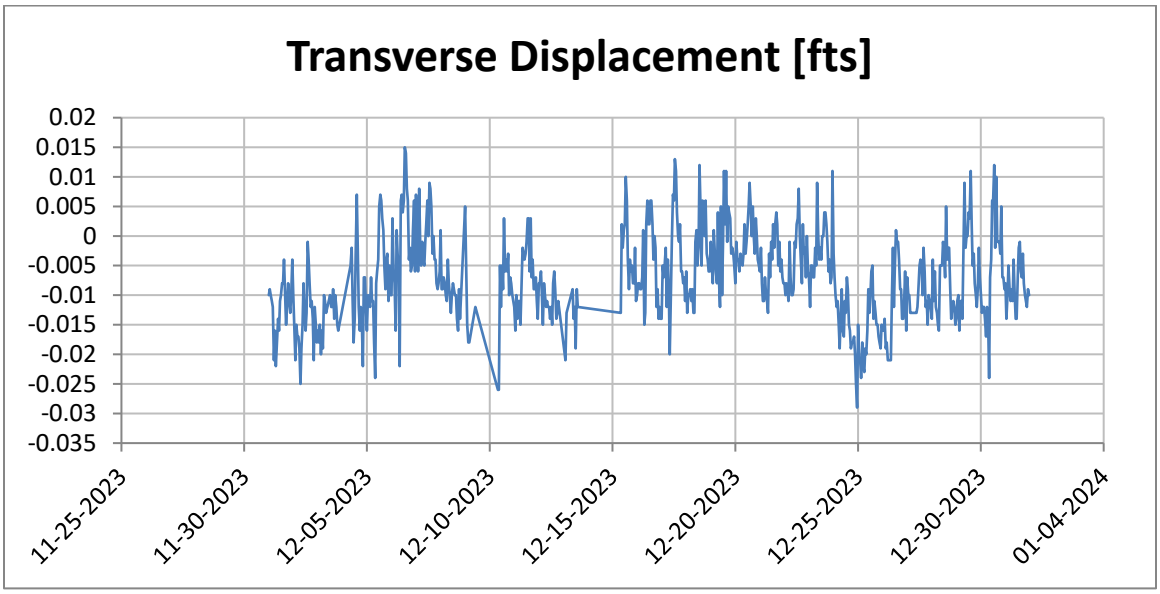


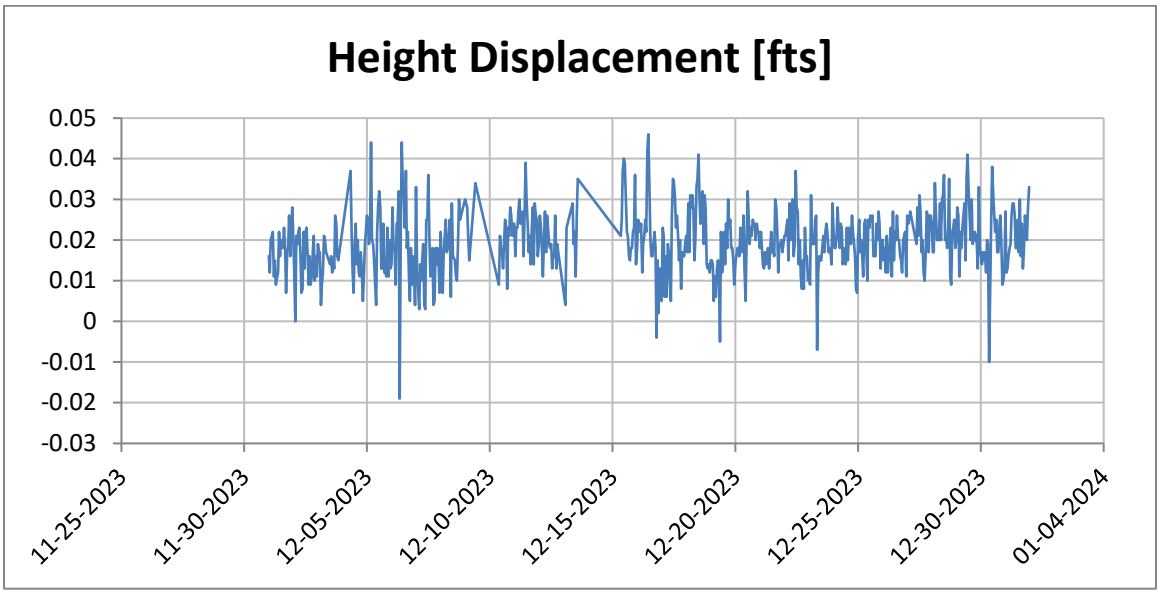
Notes:

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.

Stantec

Prism P25





Notes:

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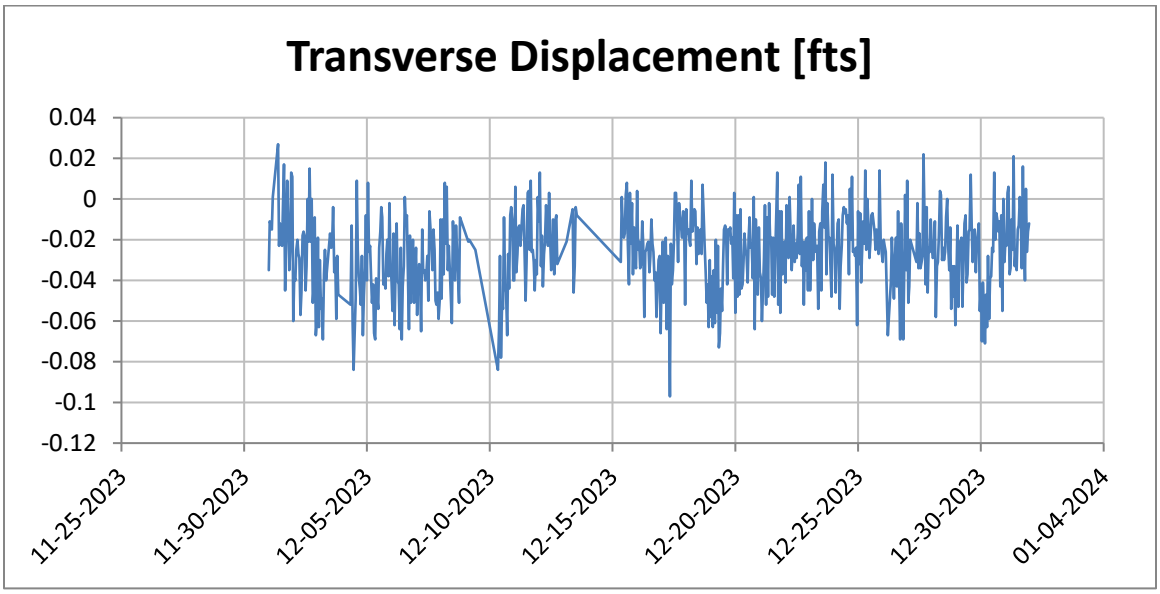
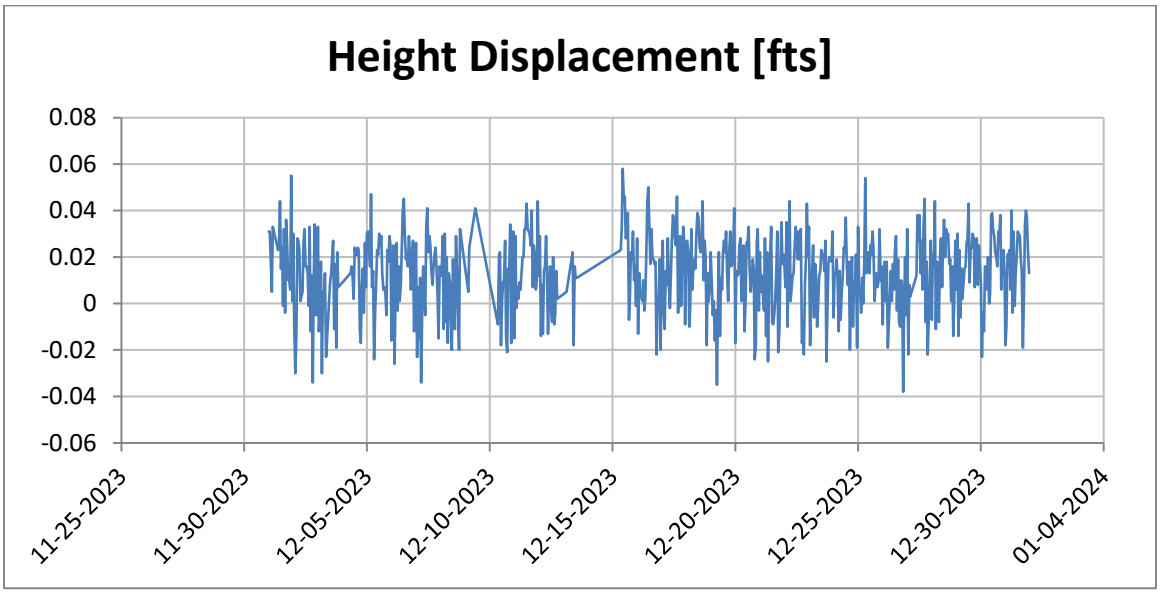
2. Alert threshold is +/-0.35 feet.
3. Transverse displacement is in the horizontal direction. Positive direction means closer to the robotic station.
4. Height displacement is in the vertical direction. Positive direction means higher in elevation.

Stantec

Prism P32R



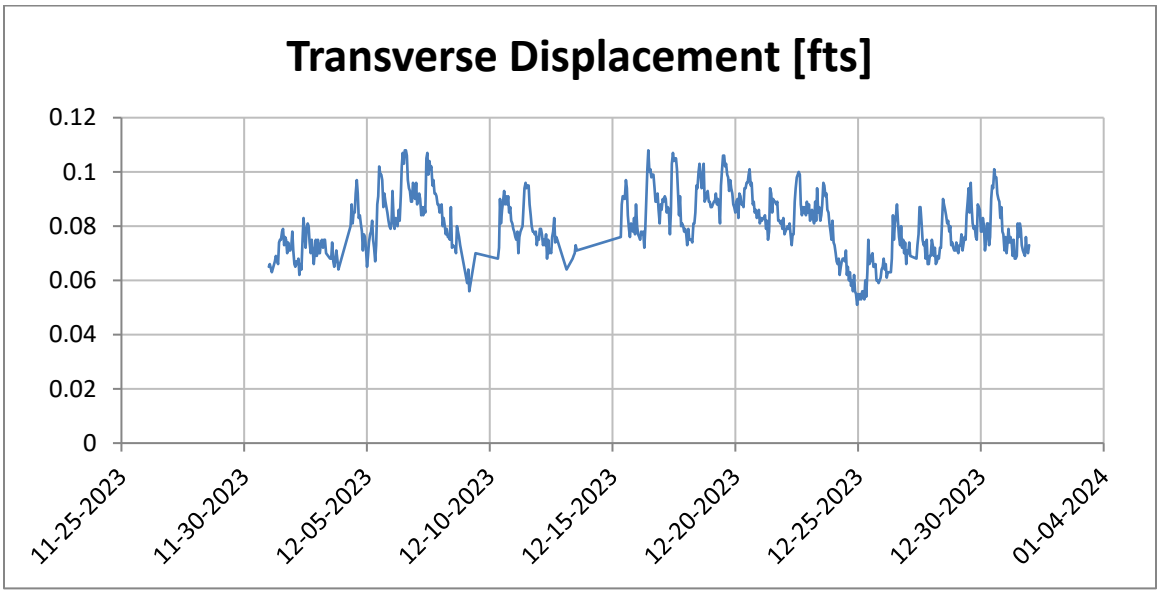


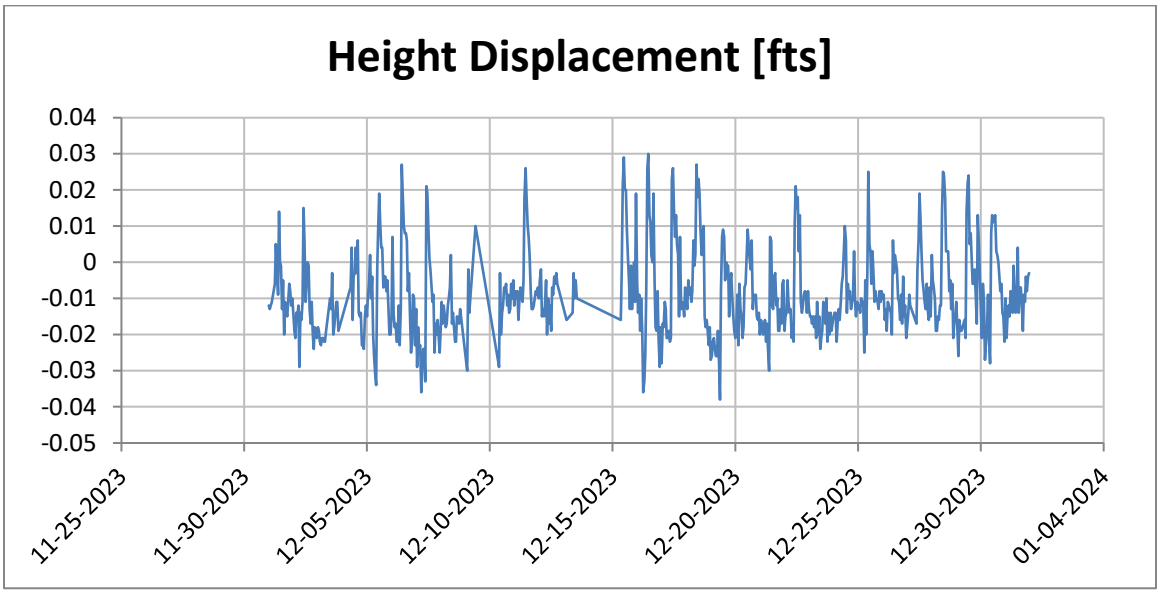
Notes:

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.

Stantec

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.
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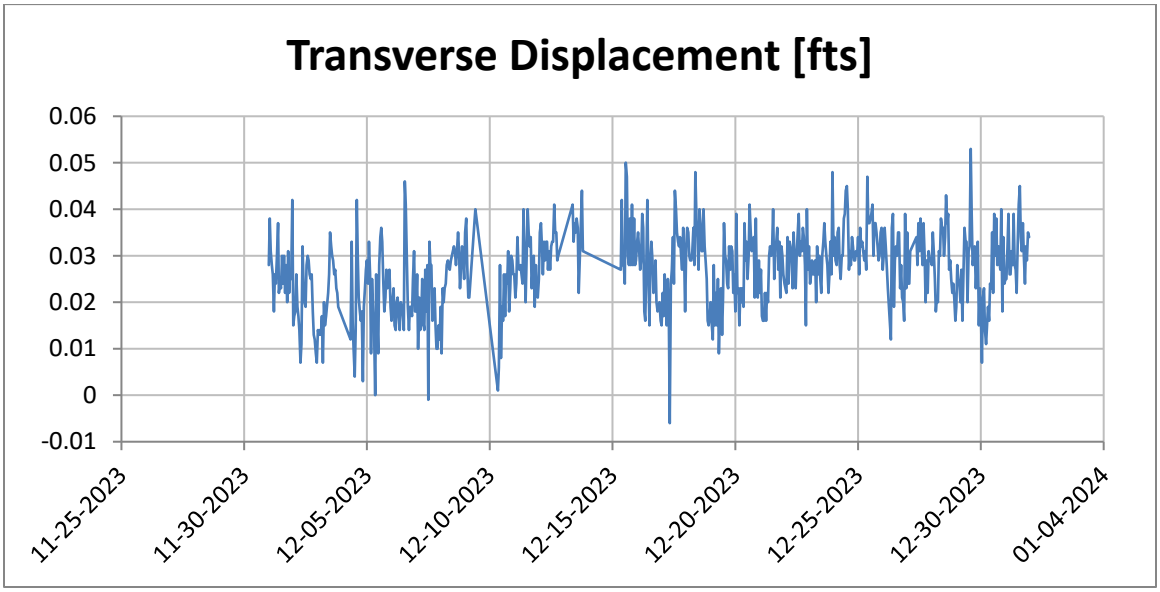
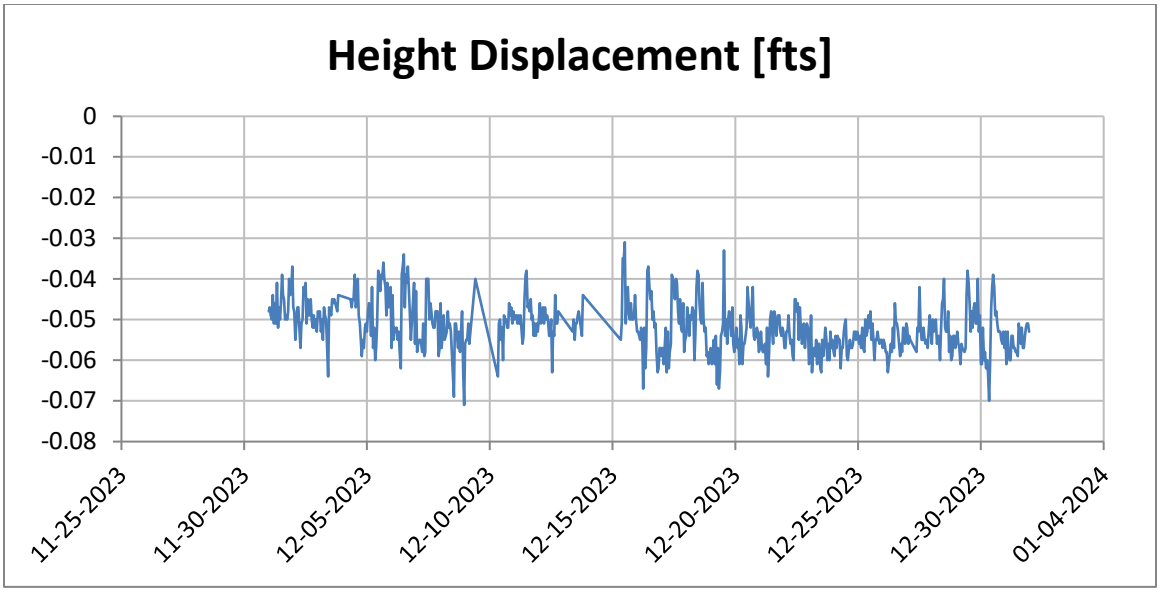
Stantec

Prism NP4



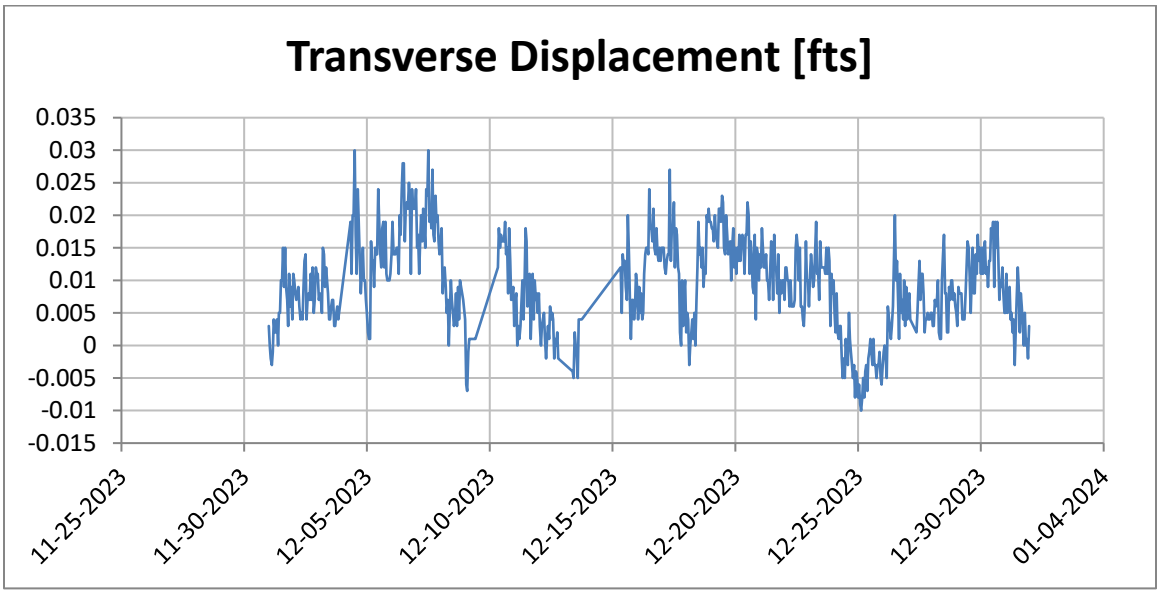


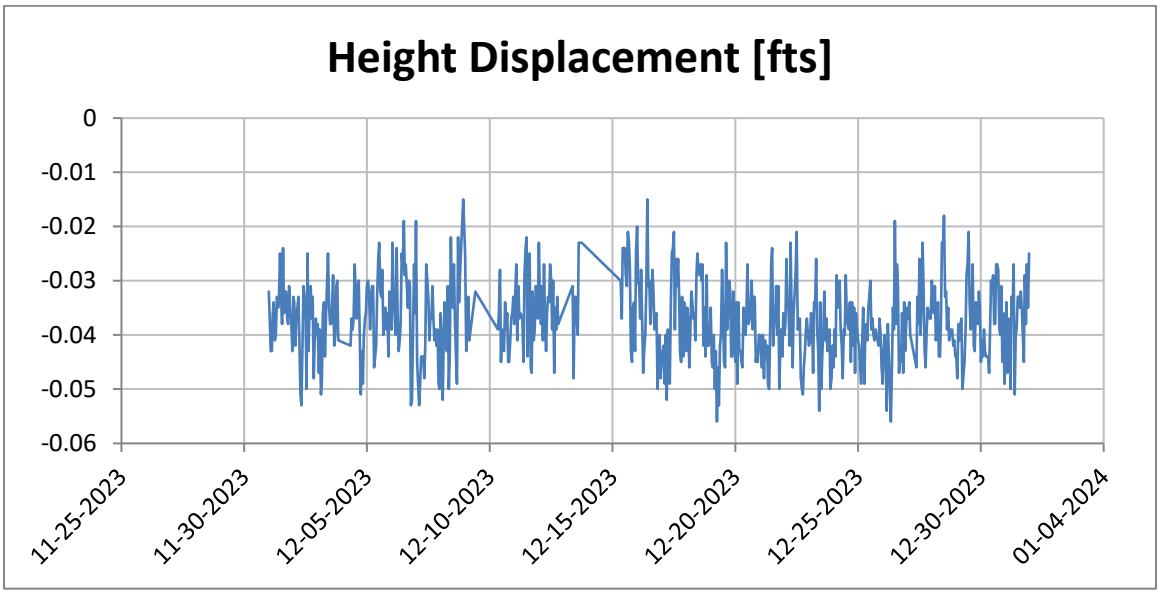
Notes:

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 P70



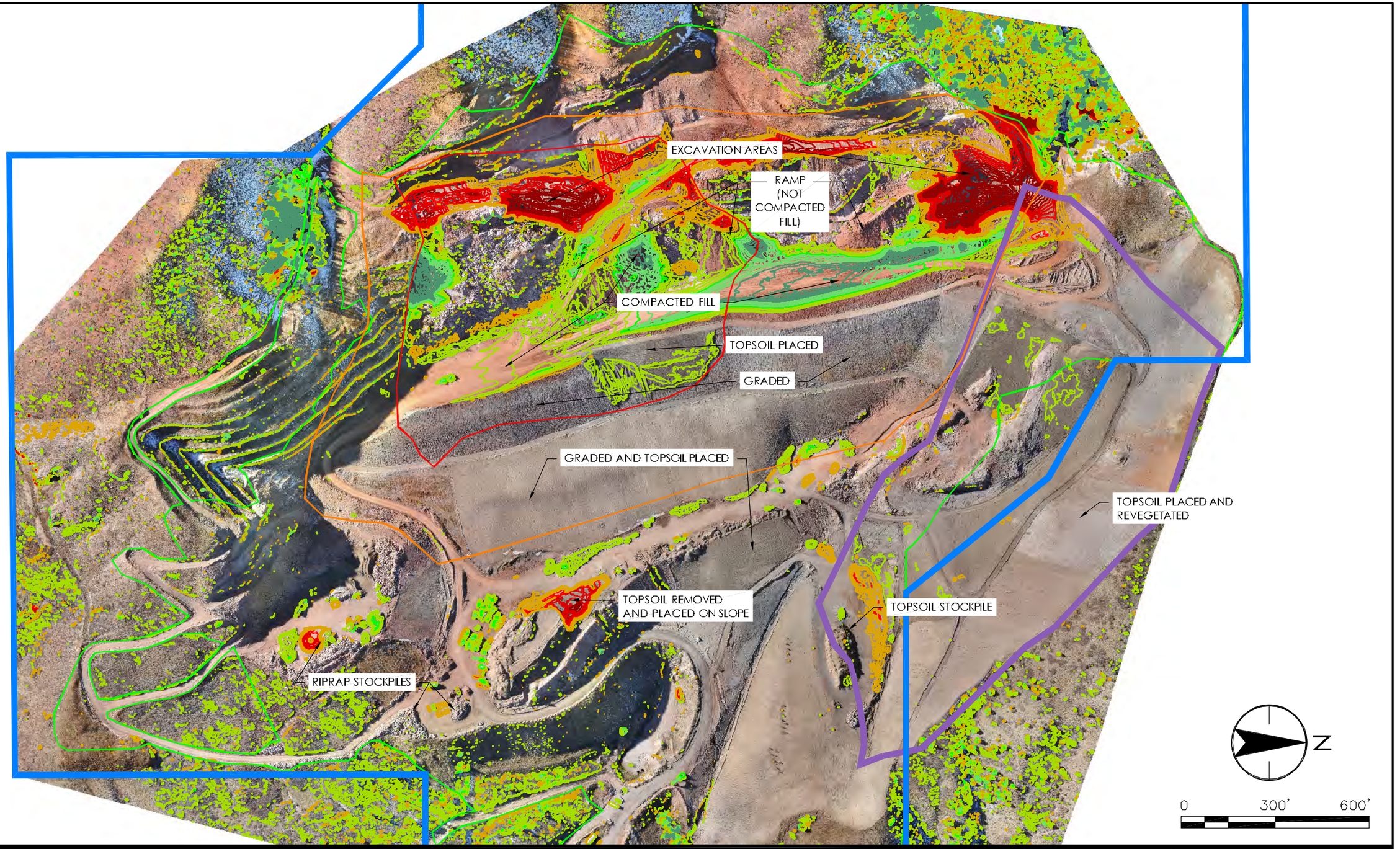


Notes:

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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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 11/30/2023 TO 12/29/2023

Client/Project
CASTLE AGGREGATE

PIKEVIEW QUARRY SLOPE MONITORING

Project No.
2057288200

Title
EXISTING PRISMS WITH CURRENT SURFACE

Revision
#

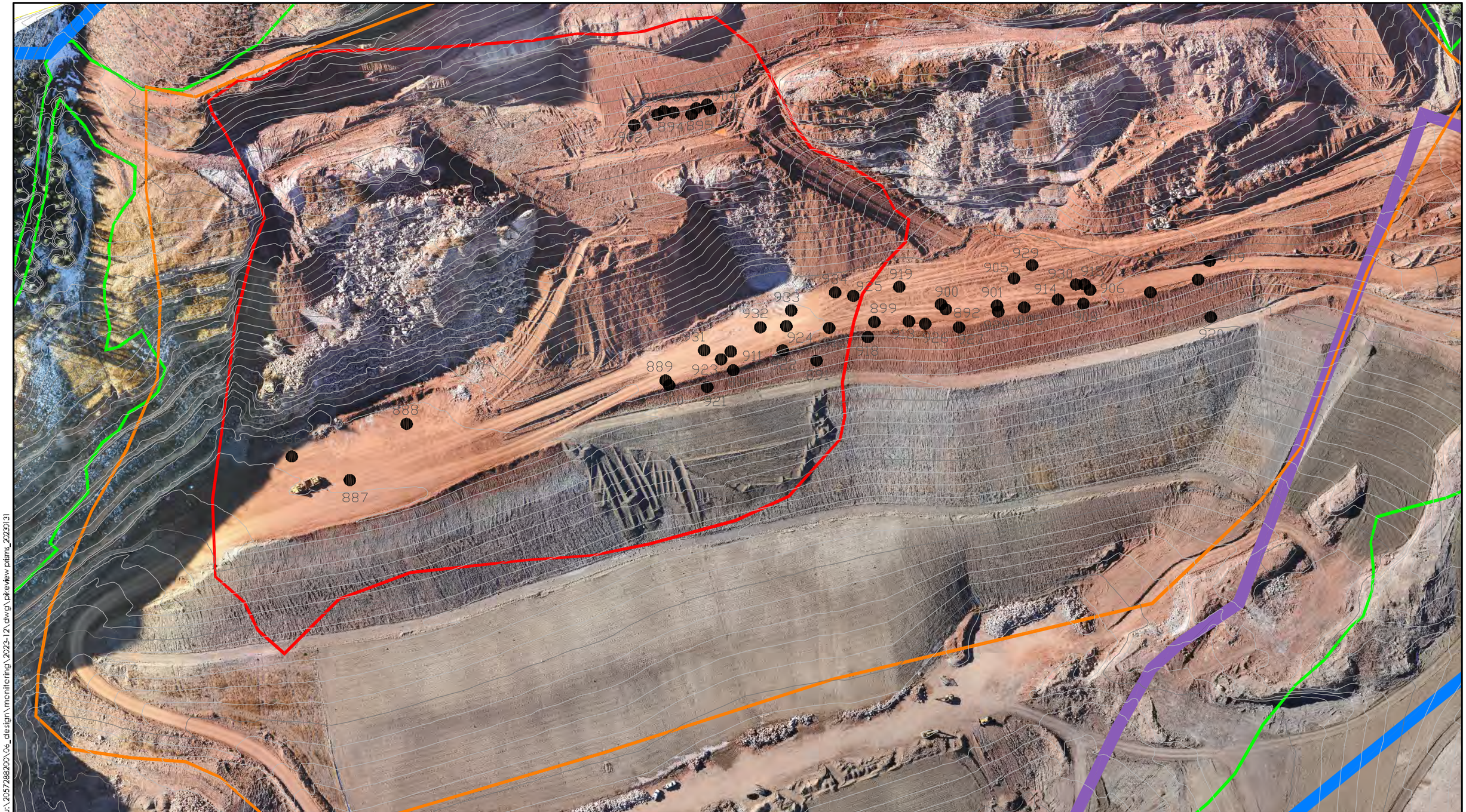
Date
2024.01.31

Drawn By
PK

Figure No.
5

Appendix D

Compaction Testing Results



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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
#	2024.01.31
Drawn By	Figure No.
PK	6

Stantec

Compaction Testing Log

Test No.	Date	Elevation (ft)	Northing (ft)	Easting (ft)	Wet Density (pcf)	Moisture Content (%)	Dry Density (pcf)	Compaction (%)
886	1-Dec-23	7371	1401159	3173144	124.4	3.8	119.9	98
887	1-Dec-23	7371	1401255	3173183	131.9	4.8	125.9	103
888	1-Dec-23	7376	1401349	3173090	123.6	4.1	118.7	97
889	1-Dec-23	7373	1401778	3173018	135.1	4.1	129.8	106
890	1-Dec-23	7372	1401890	3173001	131.1	5.6	124.2	101
891	1-Dec-23	7371	1402028	3172985	122	3.4	118	96
892	1-Dec-23	7373	1402242	3172900	134.1	4.9	127.8	104
893	1-Dec-23	7373	1402372	3172897	126.6	4.4	121.3	99
894	5-Dec-23	7578	1401791	3172574	115.8	3	112.4	92
895	5-Dec-23	7576	1401821	3172577	117.8	2.8	114.6	93
896	5-Dec-23	7573	1401852	3172570	120.2	2.8	116.9	95
897	6-Dec-23	7580	1401765	3172578	121.8	2.7	118.6	97
898	6-Dec-23	7577	1401829	3172567	118.4	6.8	110.9	90
899	6-Dec-23	7374	1402124	3172921	131.1	4.3	125.7	102
900	6-Dec-23	7374	1402234	3172892	133.5	5.2	126.9	103
901	6-Dec-23	7375	1402327	3172894	125.8	4.6	120.3	98
902	7-Dec-23	7579	1401726	3172595	119.9	2.5	117	95
903	7-Dec-23	7582	1401775	3172572	115.8	2.9	112.5	92
904	7-Dec-23	7588	1401847	3172561	116.4	2.9	113.1	92
905	7-Dec-23	7376	1402355	3172849	119.8	5.7	113.3	92
906	7-Dec-23	7376	1402481	3172868	125.6	4.5	120.2	98
908	11-Dec-23	7376	1402470	3172891	126.2	6.6	119.6	97
909	11-Dec-23	7377	1402679	3172820	124.5	8.6	133.1	100
910	12-Dec-23	7376	1401784	3173026	121.5	5.2	115.5	94
911	12-Dec-23	7376	1401886	3172970	140.3	5.1	133.6	109
912	12-Dec-23	7377	1402049	3172931	134	5.8	126.6	103
913	12-Dec-23	7378	1402181	3172920	133.4	5.6	126.2	103
914	12-Dec-23	7382	1402428	3172884	136.5	6.5	128.2	104
915	12-Dec-23	7382	1402472	3172859	134	5	127.6	104
916	12-Dec-23	7381	1402581	3172872	137.8	5.2	131	107
917	12-Dec-23	7381	1402660	3172851	138.2	5.3	131.3	107
918	13-Dec-23	7380	1402113	3172946	136.8	8	128.8	105
919	13-Dec-23	7383	1402165	3172863	130.5	5.6	124.9	102
920	13-Dec-23	7382	1402681	3172913	136.9	8.2	128.7	105
921	13-Dec-23	7376	1401847	3173029	139	9.3	129.7	106
922	13-Dec-23	7379	1401972	3172968	134.4	8	126.4	103
923	19-Dec-23	7378	1401870	3172983	135.8	6.3	127.8	104

Test No.	Date	Elevation (ft)	Northing (ft)	Easting (ft)	Wet Density (pcf)	Moisture Content (%)	Dry Density (pcf)	Compaction (%)
924	19-Dec-23	7382	1401978	3172928	131.3	4.8	125.3	102
925	19-Dec-23	7387	1402089	3172878	130.5	5.6	123.6	101
926	19-Dec-23	7384	1402208	3172924	137.2	5.6	129.9	106
927	20-Dec-23	7388	1402264	3172930	137.7	5.8	130.1	106
928	20-Dec-23	7389	1402329	3172904	128.4	5.9	121.2	99
929	20-Dec-23	7391	1402385	3172827	135.5	6.4	127.4	104
930	20-Dec-23	7390	1402458	3172859	138.6	5.2	131.8	107
931	21-Dec-23	7382	1401842	3172968	129.5	5.4	122.9	100
932	21-Dec-23	7385	1401935	3172930	134.7	6.2	126.8	103
933	22-Dec-23	7389	1401986	3172902	135	5.3	128.2	104
934	22-Dec-23	7392	1402059	3172872	128	4.8	122.1	99

Notes:

- A total 2,854,000 yd3 had been placed and compacted. This requires at least 571 compaction tests, and 1,141 tests have been taken.
- There is no test #907.