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To:	Jerald Schnabel	From:	Paul Kos
	Castle Aggregate		Denver, CO 80202
File:	July 2024 Monitoring Summary	Date:	August 23, 2024

Reference: July 2024 Geotechnical Monitoring Summary Pikeview Quarry

1.0 INTRODUCTION

Stantec Consulting Services Inc. (Stantec) has prepared this July 2024 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 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 July 2024. Continuous monitoring by the robotic survey system began in 2010 and continued through the month of July 2024. 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 July 2024 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 when appropriate, 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. The notes from the daily inspections are summarized in Table A-1 in Appendix A.

Stantec conducted visual inspections of the Pikeview Quarry slopes on July 10 and 30, 2024. 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. Slopes that have been seeded are observed from adjacent areas to avoid disturbing the seed and mulch covering. The findings are listed below, and photographs of notable observations are included on Figure 2 in Appendix A.

- Cracking was previously observed on the graded slopes near the upper extents of the fill slope. These tension cracks were inspected in July and observed to be similar in nature and extent from previous inspections.
- Reclamation grading began in February 2022 and concluded in July 2024.
- Site maintenance, topsoil placement and riprap production continued throughout the month.
- Operators placed compacted material in the buttress zone. Material was excavated from the Upper Borrow Area. The material was dozed down ramps to the buttress floor and placed in lifts and compacted. Construction of the buttress was completed in July 2024.
- No cracking was observed on the native granite slopes above the extents of the disturbed area.
- No cracking was observed on the slope south of the southern scarp.
- Topsoil was placed on areas at final grade.
- 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 total station is used to continuously survey the prisms onsite to document slope movements. The robotic total station records the location of each prism every hour. There were 28 prisms active in July; two prisms were control points located outside the slope movement area, six prisms were located on the slopes surrounding the slope movement area, two prisms were located on the slopes within the landslide area, and eighteen prisms were located on the buttress fill. As the slope was backfilled and graded, the existing prisms will be removed, and additional prisms will be installed. No prisms were removed or installed in July. A log of prism removals and installations is included in

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Appendix B. The existing and proposed prism locations are shown on the current, reclamation topography in Figure 3, 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 crews also use a spotter to monitor 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. Rain and fog caused erroneous readings and regression limit alerts on two occasions during July. The alerts are listed in Table 2.

Table 2 Alert Summary

Date(s)	Alert	Cause/Actions taken	Resolved
30-Jun to 1-Jul	P5 regression limits	Rain and fog. No work being performed at time of alerts. Readings in positive and negative directions.	1-Jul
6-Jul	B7200-2 not found	Single event in morning. Prism obscured by sun glare.	6-Jul
6-Jul to 8-Jul	B7500-4 not found	Prism damaged, potentially by animals or equipment operations.	8-Jul
7-Jul	B7200-2 not found	Single event in morning. Prism obscured by sun glare.	7-Jul
9-Jul	B7200-2 not found	Single event in morning. Prism obscured by sun glare.	9-Jul
10-Jul	B7200-2 not found	Single event in morning. Prism obscured by sun glare.	10-Jul
12-Jul	P70R not found	Prism moved by wildlife.	12-Jul
12-Jul	B7300-3 not found	Single alert. Equipment operations in area.	12-Jul
15-Jul	P32 regression limit	Single event when no operations in area. P32 was replaced by P32R at the same location, and no alert was received for P32R.	15-Jul
16-Jul	Points not found	Rain and fog. No work being performed at time of alerts.	16-Jul
18-Jul	Points not found	Rain and fog. No work being performed at time of alerts.	18-Jul
19-Jul	B7300-4 not found	Isolated alerts. No work being performed at time of alerts.	19-Jul
20-Jul to 21-Jul	Points not found	Rain and fog. No work being performed at time of alerts.	21-Jul
22-Jul	B7300-4 not found	Single event. No work being performed at time of alert.	22-Jul
22-Jul	P32R not found	Single event. No work being performed at time of alert.	22-Jul
26-Jul	Points not found	Rain and fog. No work being performed at time of alerts.	26-Jul
26-Jul	B7300-1 not found	Single event. No work being performed at time of alert.	26-Jul
26-Jul to 27-Jul	B7400-1 not found	Prism moved by wildlife.	27-Jul
27-Jul	B7400-5 not found	Single event. No work being performed at time of alert.	27-Jul
29-Jul	P5 not found	Single alert. Equipment operations in area.	29-Jul

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 total station to the prism; positive displacements indicate less

distance between the robotic total station and prism (movement towards the robotic total station). The height displacement measures the change in the vertical distance from the robotic total station to the prism; positive displacements indicate upward movement. The monthly delta is the most recent reading cumulative delta displacement (horizontal, lateral, and vertical) subtracted from the first reading of the 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 robotic total 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 robotic total station; these equates to an accuracy of +/-0.016 ft.

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Table 3 Prism Summary

Prism ID	Cumulative Transverse Displacement (ft)	Cumulative Height Displacement (ft)	Monthly Delta (ft)	Cumulative Delta (ft)	Notes / Recommendations
B7200-1	-0.054	0.004	-0.004	0.062	
B7200-2	0.009	-0.026	0.002	0.068	
B7200-3	0.191	-0.093	0.002	0.270	
B7300-0	-0.940	-0.207	0.037	1.150	
B7300-1	-0.207	-0.200	0.012	0.424	
B7300-2	0.016	-0.271	0.015	0.337	
B7300-3	0.222	-0.174	0.004	0.337	
B7300-4	0.186	-0.165	0.036	0.280	
B7400-1	-0.373	-0.853	0.033	1.386	
B7400-2	-0.048	-0.556	0.023	1.118	
B7400-3	0.125	-0.407	0.023	0.544	
B7400-4	0.511	-0.360	-0.001	0.743	
B7400-5	0.770	-0.184	0.026	0.824	
B7500-1	-0.004	-0.117	0.054	0.144	
B7500-2	-0.007	-0.087	0.035	0.110	
B7500-3	0.030	-0.093	0.053	0.112	
B7500-4	0.043	-0.070	0.110	0.161	
B7500-5	0.017	-0.037	0.026	0.048	
BR4	0.009	-0.007	-0.001	0.011	
CP6	0.004	-0.017	-0.014	0.032	
CP7	0.056	-0.030	-0.029	0.065	
NP4	0.043	-0.083	0.007	0.173	
P2	0.006	-0.017	0.001	0.019	
P5	0.007	-0.013	-0.004	0.017	
P25	0.019	0.016	0.007	0.026	
P32r	-0.032	0.016	-0.014	0.037	
P33	0.102	-0.001	0.001	0.125	
P70R	-1.181	-0.494	2.043	2.068	Prism location moved by crew as part of earthworks.

The data show stable conditions with no or very small settlement movements at each the 28 prisms. Prisms on the buttress slope continued to record slow and decreasing gradual movement as the fill consolidates along the benches. The fill is likely consolidating under its own weight and by the placement of topsoil. A small amount of settlement is common for newly placed compacted fill, and this is being recorded by the prisms, which were installed as the buttress was constructed. 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 and LiDAR using an unmanned aircraft system (UAS or 'drone') on August 1, 2024. The imagery and topography were 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 August 1 topography was also compared to the July 17 topography to identify changes in the site topography. Comparison of the two surveys showed the placement of the fill material in the Buttress Area, and fill material was primarily excavated from the Upper Borrow and Area and dozed down ramps to the Buttress Area. No slope movements or other changes in topography were identified. No slope movements were recorded in the area where cracking was observed. The current imagery and topography are included in Figures 1 and 3, and the comparison surface is included as Figure 4 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. The use of different surveying systems (photogrammetry and LiDAR) did not appear to change these limitations.

5.0 COMPACTION TESTING

Fill placement occurred from February 2022 through June 2023 and from September 2023 through July 2024. From July 18 to July 31, 2024 a total of 4,300 yd^3 of material was placed and compacted on the buttress floor. All this material was from the Upper West Borrow Area and was dozed down to the buttress floor. All fill was moisture conditioned as necessary and then compacted. Compaction testing occurred at the rate of at least one test per 5,000 yd^3 placed. This volume placed in the buttress zone required at least one compaction test. There were four compaction tests taken from July 18 to July 31, 2024. A total of approximately 3,456,000 yd^3 had been placed and compacted. This required at least 692 compaction tests, and 1,182 tests have been taken. Fill placement operations concluded in July 2024, and no additional compaction testing is required or planned. A summary of the July compaction test results is included in Appendix D, and the test locations are shown on Figure 5.

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 approach is being used to complete the reclamation process (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 – Reclamation Grading	Completed February 2022 to July 2024
Phase 4 – Contractor Demobilize from Site	Completed Summer 2024
Phase 4 – Reclamation Planting	August 2024 (est.)
Phase 4 – Channel Armoring	August 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 concluded. No additional compaction testing is planned or required.
- Completed dozing material from south peak of the Upper Borrow Area down to the buttress area.
- Began placing riprap.
- Processing of riprap continued.
- Geotechnical monitoring continued.
- Continued topsoil placement occurred where fill placement has been completed.
- Continued seeding, matting, tree planting, and mulching operations.

Work planned for next month includes:

- Complete placing topsoil.
- Complete seeding, tree planting, matting, and mulching operations.
- Continue processing riprap.
- Continue geotechnical monitoring.
- Continue to remove and replace prisms on an as-needed basis.
- Continue to place riprap armoring.

7.0 CONCLUSIONS

The data collected in July 2024 demonstrate compliance with the reclamation grading plan. The buttress fill was placed and compacted as intended and specified.

None of the data collected in July 2024 indicate evidence of any large-scale movements that increase risk to workers or to the public.

- 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
2024.08.31

Drawn By
PK

Figure No.
1

Appendix A

Visual Inspections

6. VEGETATION GROWING ON RECLAIMED SLOPES WITH RIPRAP STOCKPILED BELOW.

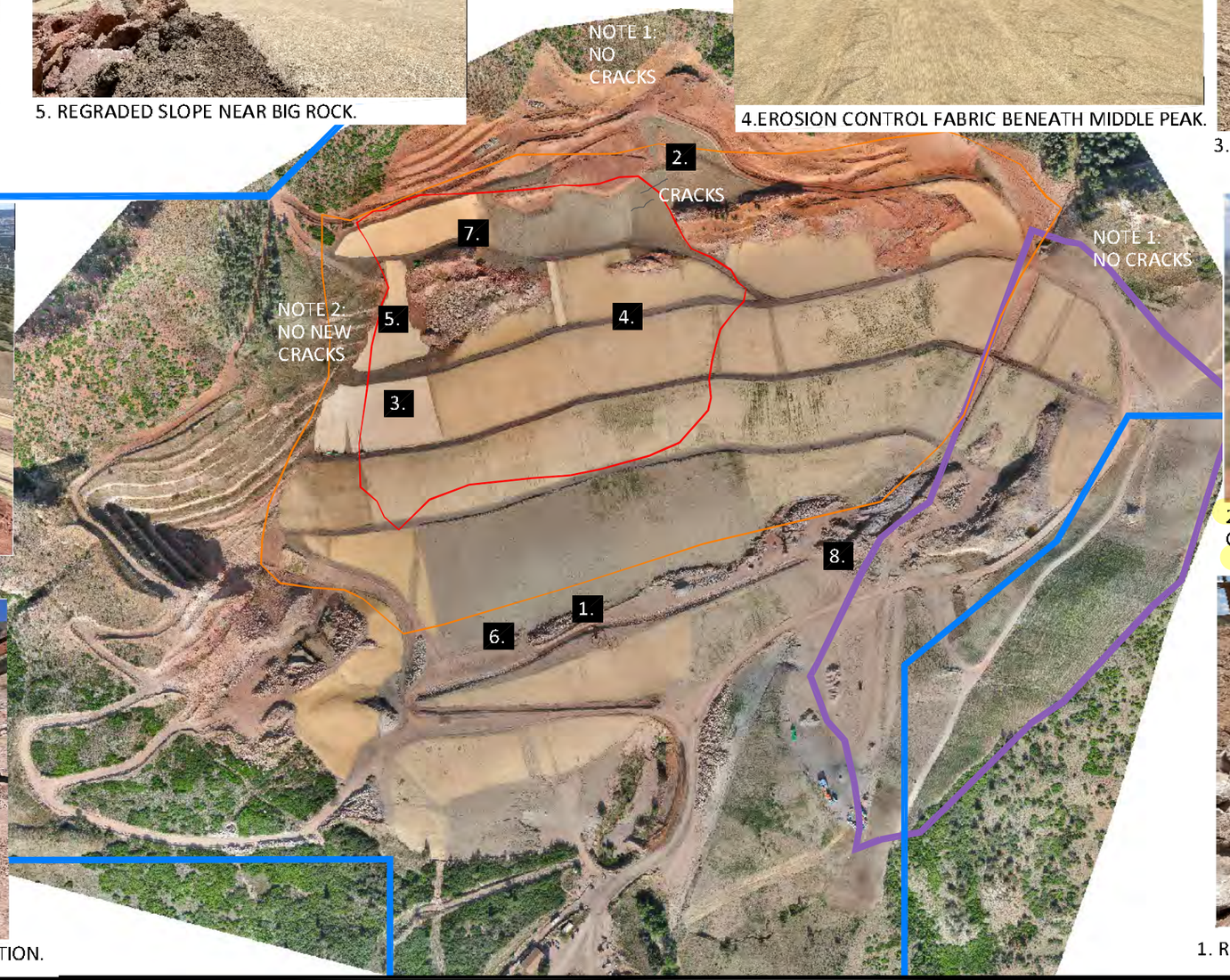
5. REGRADED SLOPE NEAR BIG ROCK.

4.EROSION CONTROL FABRIC BENEATH MIDDLE PEAK.

3. DRILL SEEDING BUTTRESS SLOPE.

7. FILL PLACED ABOVE BIG ROCK.

2. AREA WITH PREVIOUS CRACKING. NO NEW CRACKING OBSERVED.



8. RIPRAP BEING SORTED FOR CHANNEL CONSTRUCTION.

1. RIPRAP PLACED DURING CHANNEL CONSTRUCTION.

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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 JULY 10 AND 30, 2024.

N

0 400' 800'

Client/Project
CASTLE AGGREGATE

PIKEVIEW QUARRY SLOPE MONITORING

Project No.
2057288200

Title
OBSERVATIONS FROM JULY INSPECTIONS

Revision
#

Date
2024.08.31

Drawn By
PK

Figure No.
2

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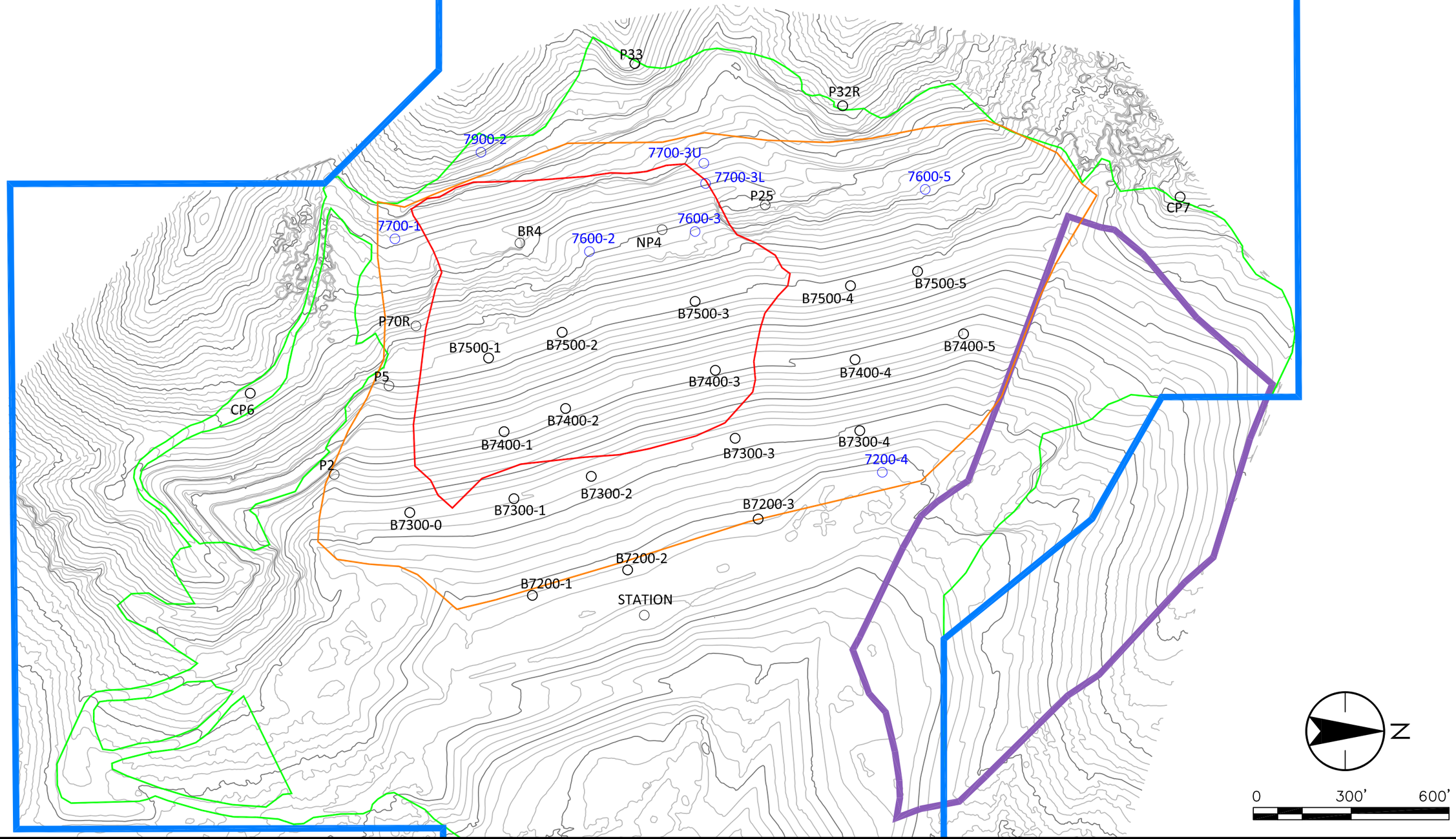
Table A-1 Summary of Daily Inspections

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

1. PRISMS WILL BE INSTALLED AS EACH BENCH IS FINISHED.
2. TOPOGRAPHY FROM AUGUST 1, 2024 DRONE SURVEY.
3. CONTOUR INTERVAL IS 10 FEET

Client/Project
CASTLE AGGREGATE

PIKEVIEW QUARRY SLOPE MONITORING

Project No.
2057288200

Title
EXISTING PRISMS WITH CURRENT SURFACE

Revision	Date
#	2024.08.31
Drawn By	Figure No.
PK	3

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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 robotic total 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 robotic total 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 robotic total station relocation.
CP7	20-Jul-22	Prism Added	
CP1	20-Jul-22	Prism Removed	Not in line of sight of robotic total station.
CP4	20-Jul-22	Prism Removed	Not in line of sight of robotic total station.
TOE4	20-Jul-22	Prism Removed	Not in line of sight of robotic total station.
TOE6	20-Jul-22	Prism Removed	Not in line of sight of robotic total station.
TOE5	4-Aug-22	Prism Removed	Out of line of sight of robotic total station.
P63	15-Aug-22	Prism Removed	Out of line of sight of robotic total 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 prism.
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.
B7400-1	24-Jan-24	Prism Added	New prism added.
B7400-2	24-Jan-24	Prism Added	New prism added.
B7400-3	24-Jan-24	Prism Added	New prism added.
B7400-4	24-Jan-24	Prism Added	New prism added.
B7400-5	24-Jan-24	Prism Added	New prism added.
B7500-1	1-Jun-24	Prism Added	New prism added.
B7500-2	1-Jun-24	Prism Added	New prism added.
B7500-3	1-Jun-24	Prism Added	New prism added.
B7500-4	1-Jun-24	Prism Added	New prism added.
B7500-5	1-Jun-24	Prism Added	New prism added.
BR3	1-Jun-24	Prism Removed	Reclamation grading to affect prism in near future.
BR1	17-Jun-24	Prism Removed	Reclamation grading to affect prism in near future.
P70	25-Jun-24	Prism Removed	Reclamation grading to affect prism in near future.
P70R	26-Jun-24	Prism Added	New prism added. Replacement for P70.
BR4	26-Jun-24	Prism Added	New prism added. Replacement for BR3.

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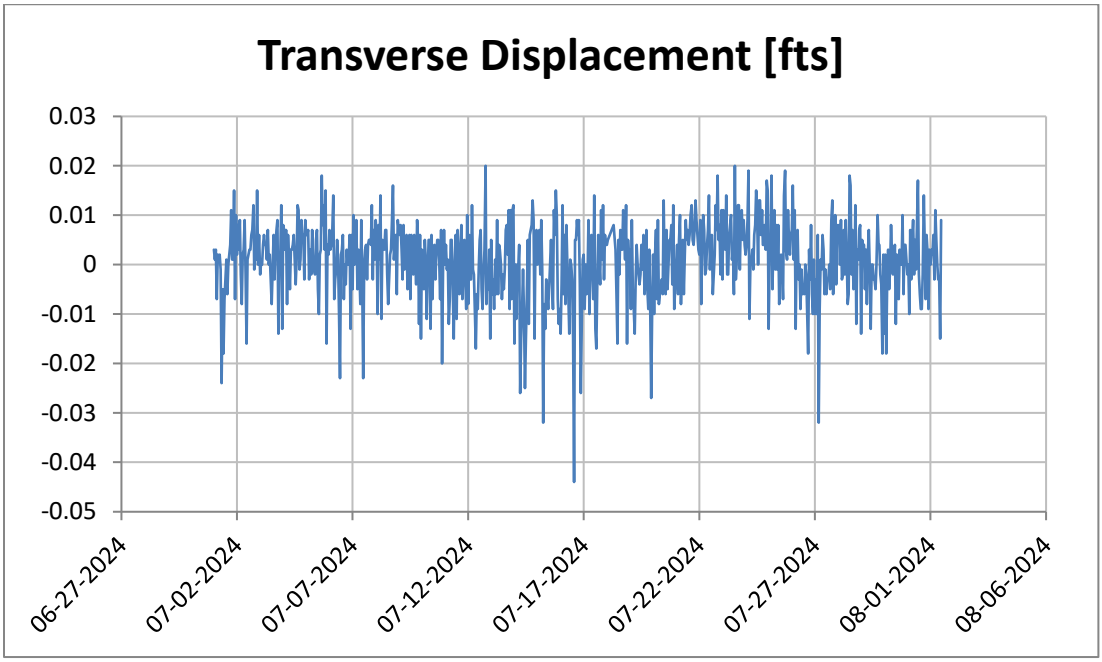
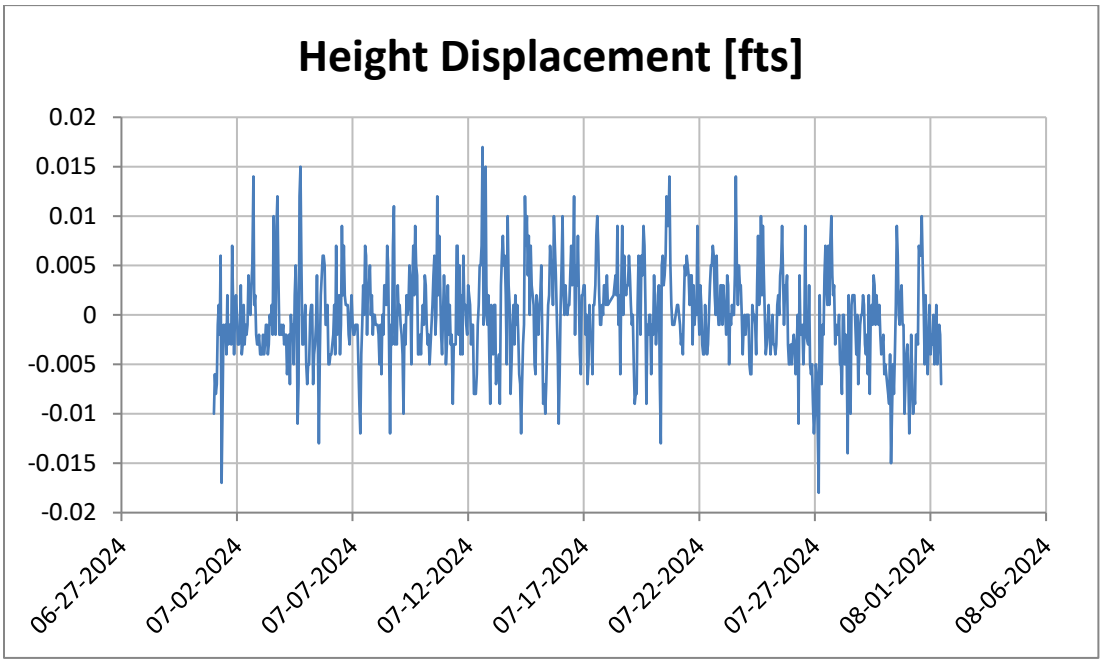
Prism BR4



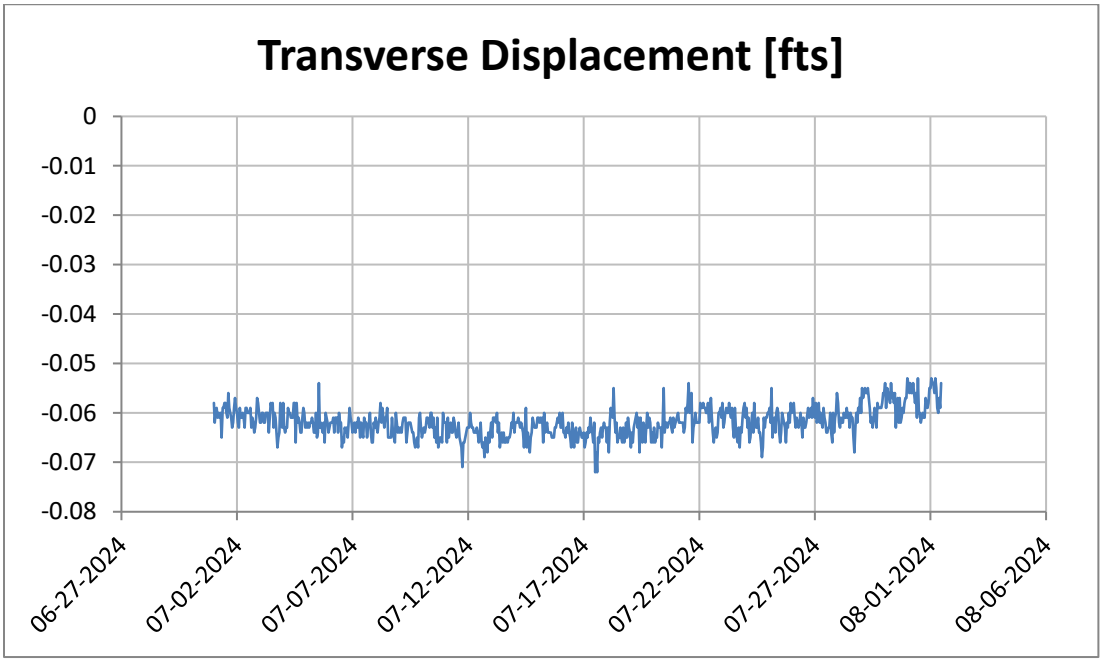


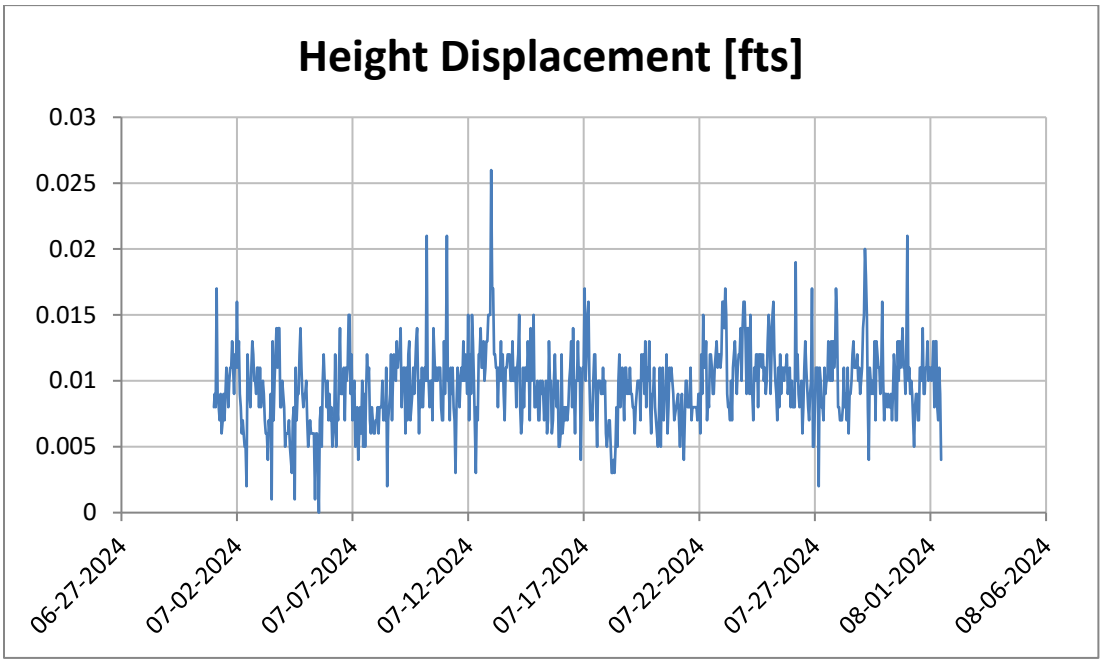
Notes:

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 total station.
4. Height displacement is in the vertical direction. Positive direction means higher in elevation.

Stantec

Prism B7200-1



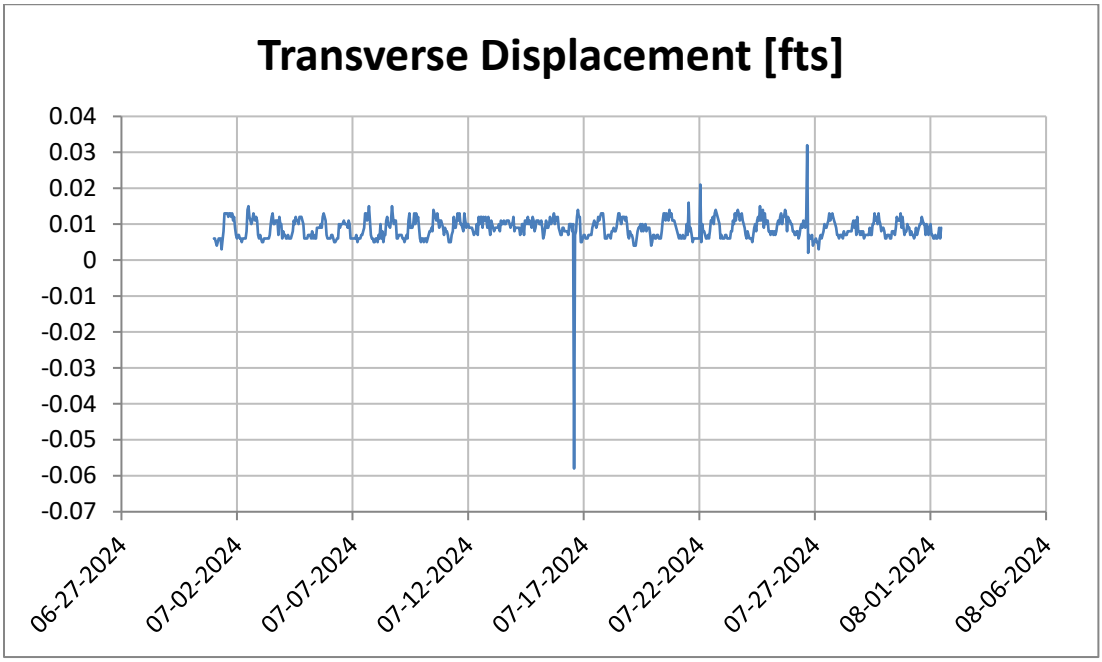


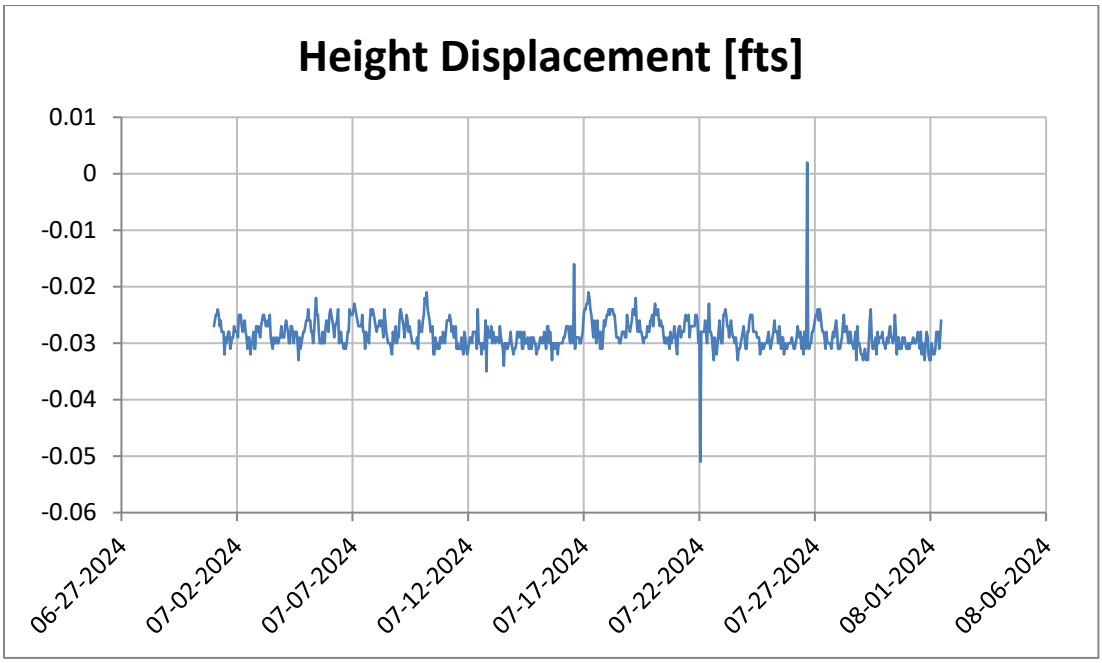
Notes:

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 total station.
4. Height displacement is in the vertical direction. Positive direction means higher in elevation.

Stantec

Prism B7200-2



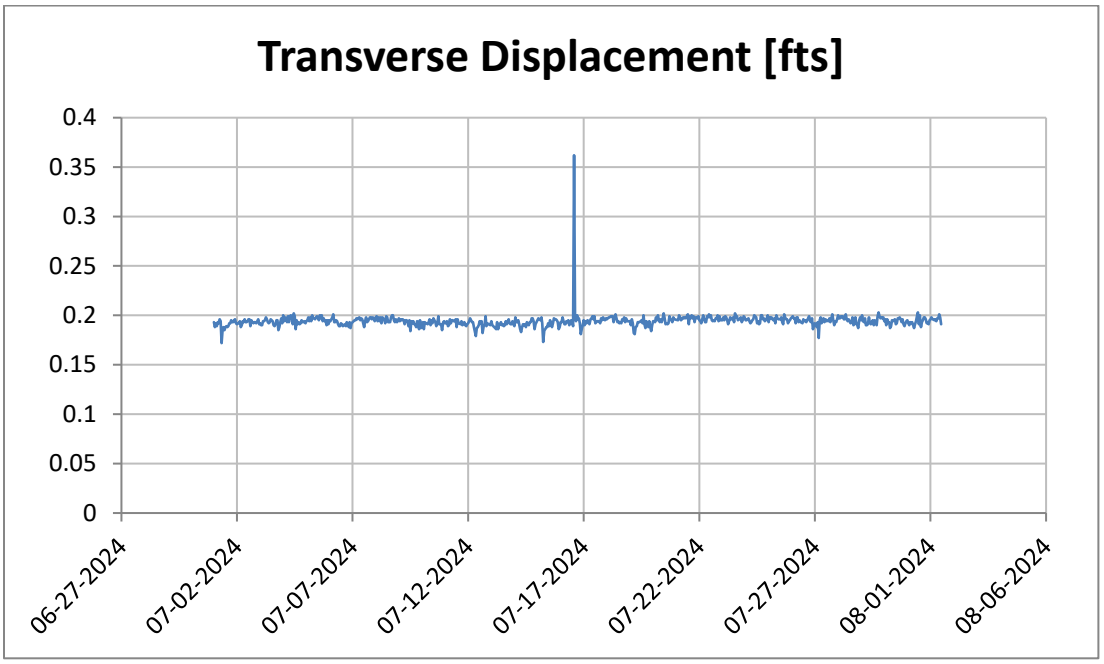


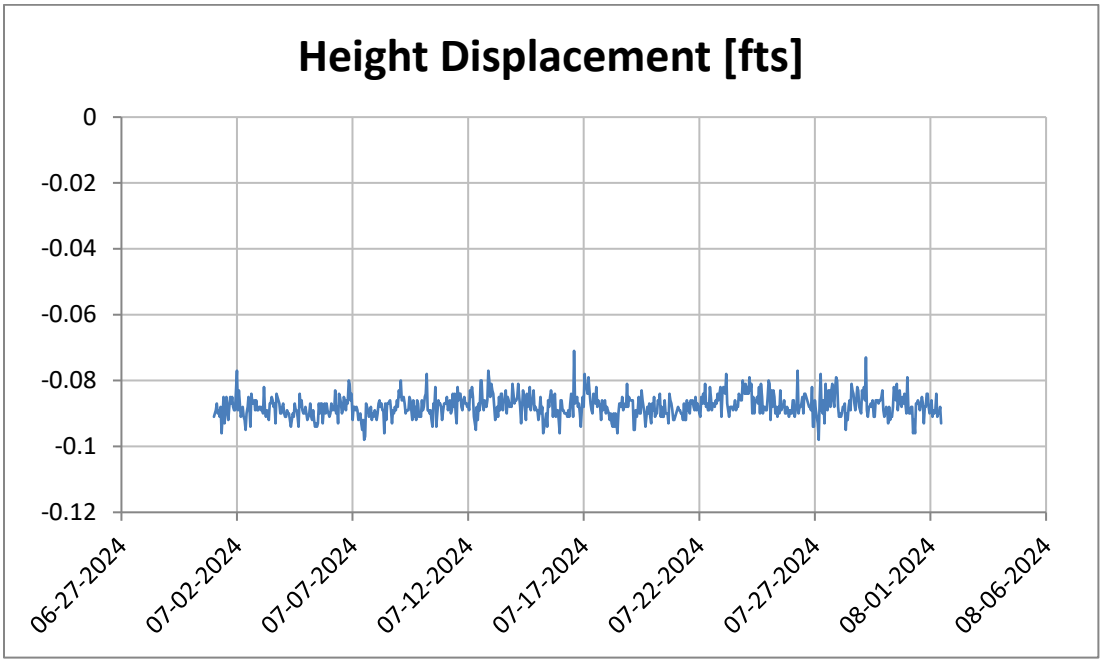
Notes:

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 total station.
4. Height displacement is in the vertical direction. Positive direction means higher in elevation.
5. Rain and fog on July 16 and 26 resulted in increased data scatter.

Stantec

Prism B7200-3



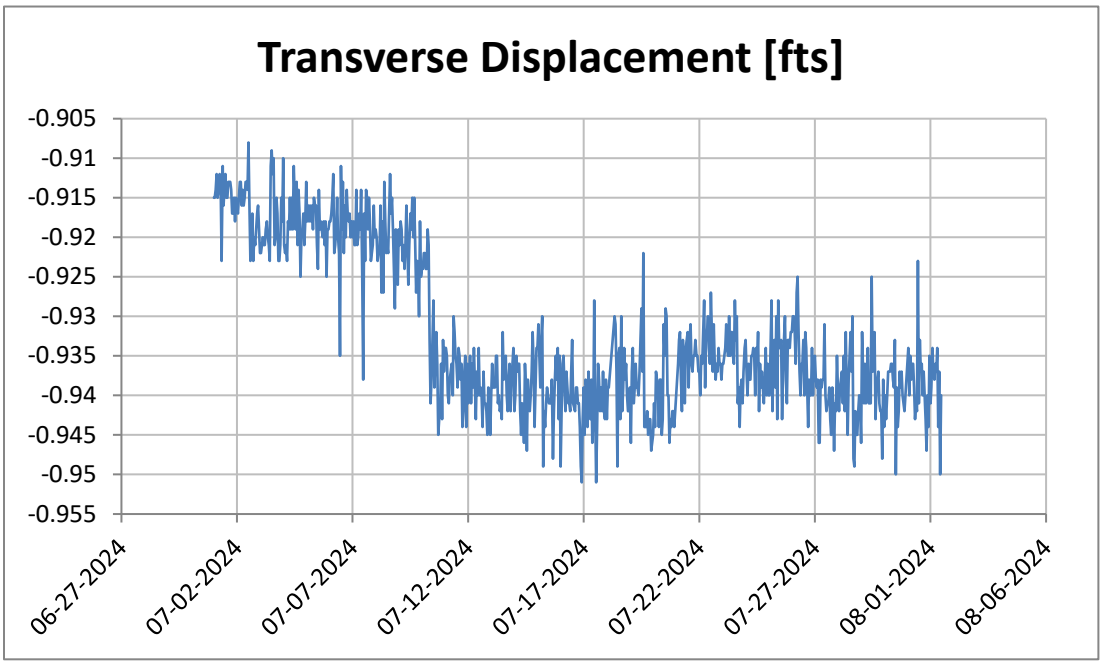


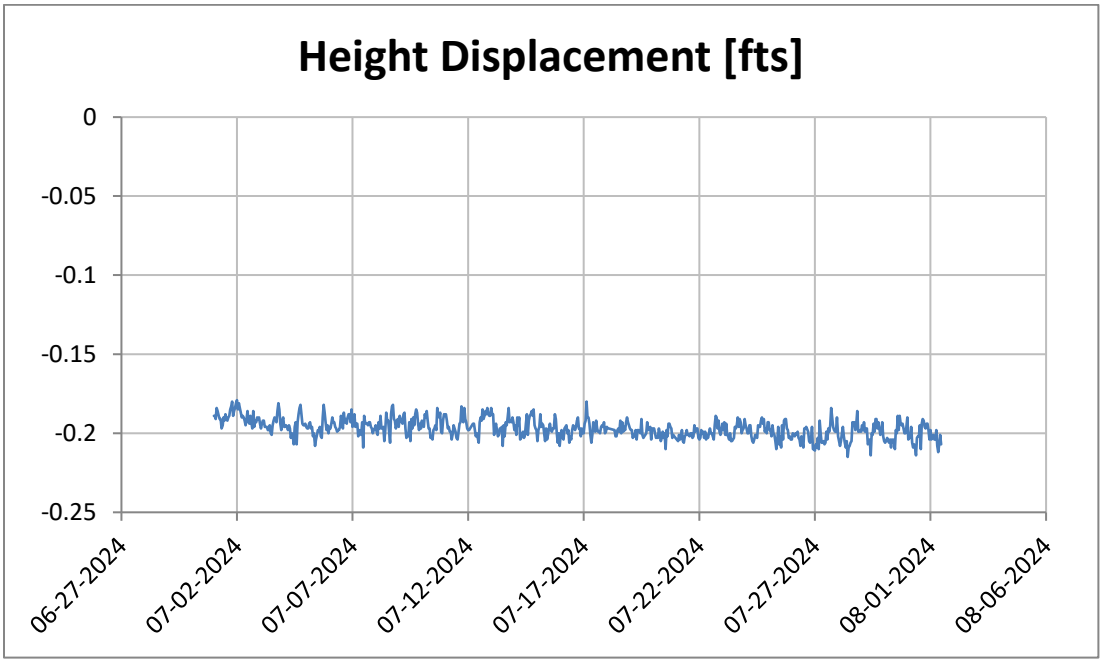
Notes:

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 total station.
4. Height displacement is in the vertical direction. Positive direction means higher in elevation.
5. Rain and fog on July 16 and 26 resulted in increased data scatter.

Stantec

Prism B7300-0



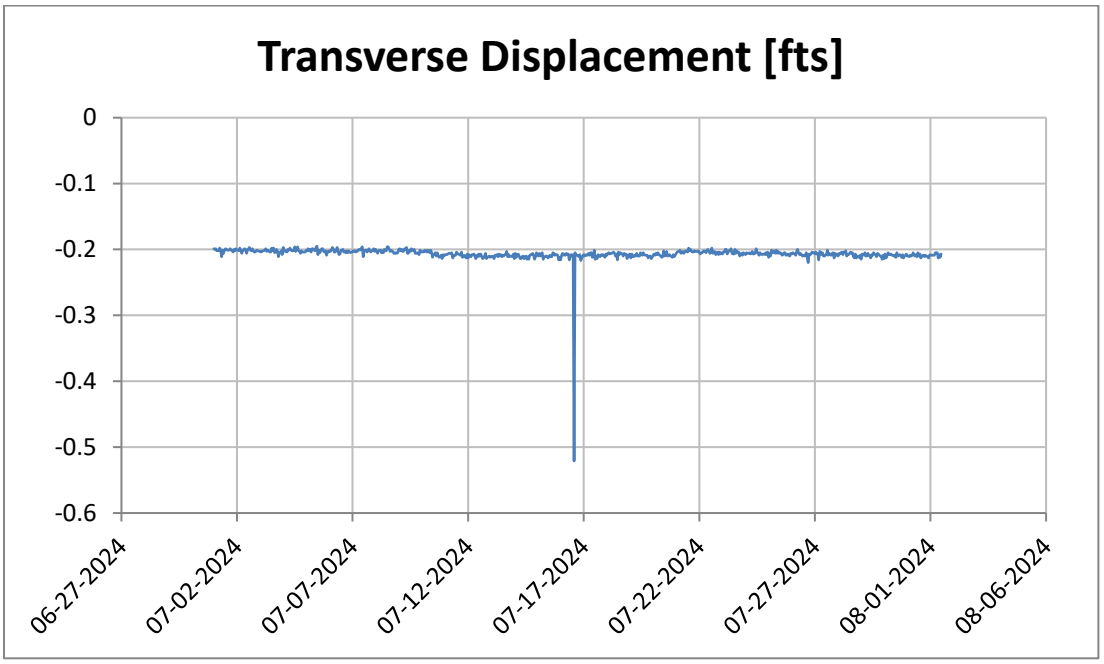


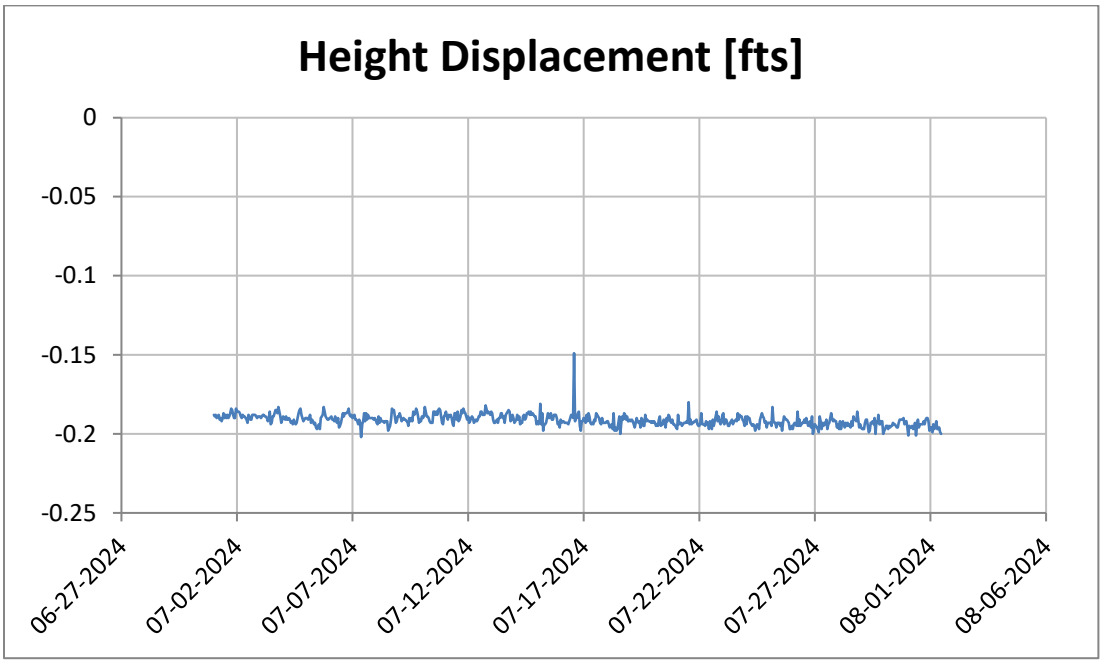
Notes:

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 total station.
4. Height displacement is in the vertical direction. Positive direction means higher in elevation.
5. Equipment operations in prism area on July 10 is likely cause for small movement recorded.

Stantec

Prism B7300-1



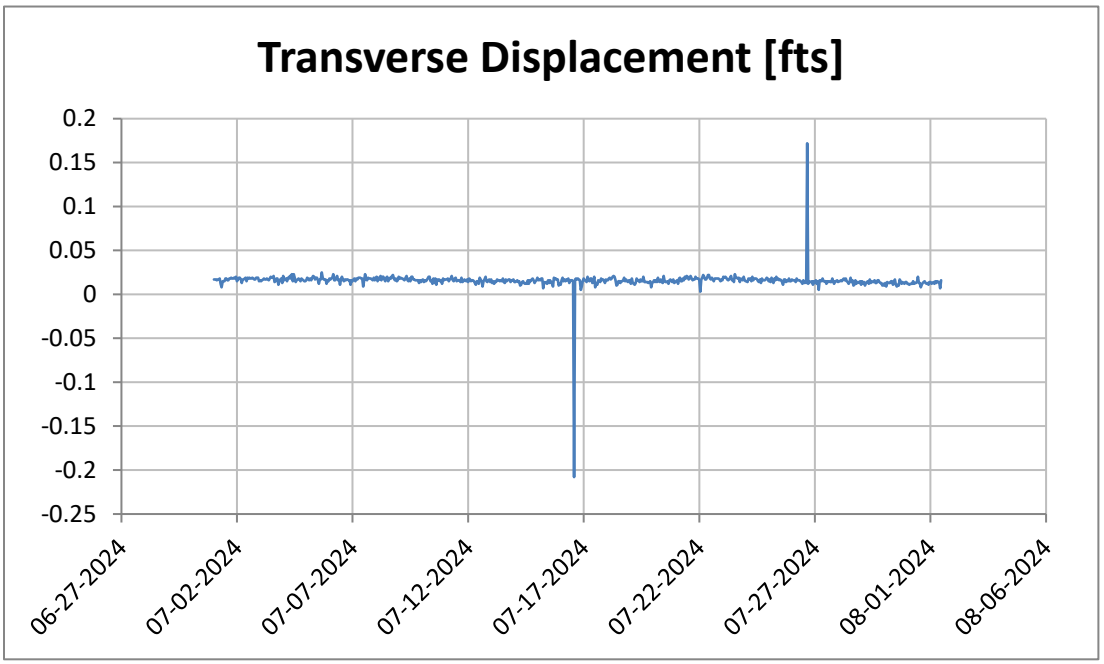


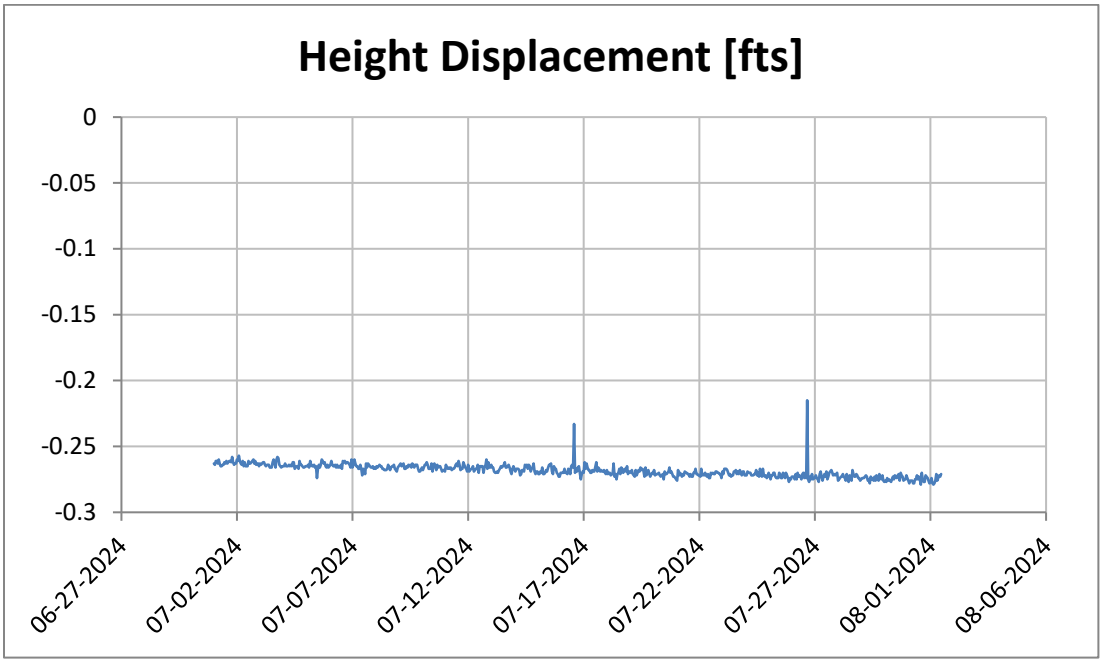
Notes:

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 total station.
4. Height displacement is in the vertical direction. Positive direction means higher in elevation.
5. Rain and fog on July 16 and 26 resulted in increased data scatter.

Stantec

Prism B7300-2



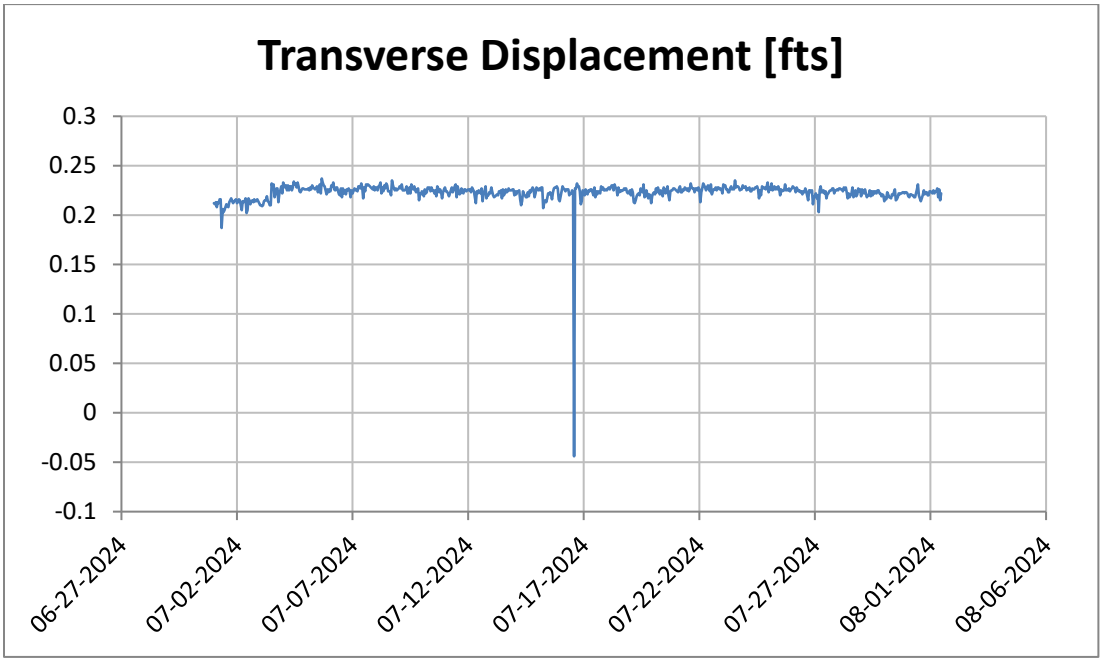


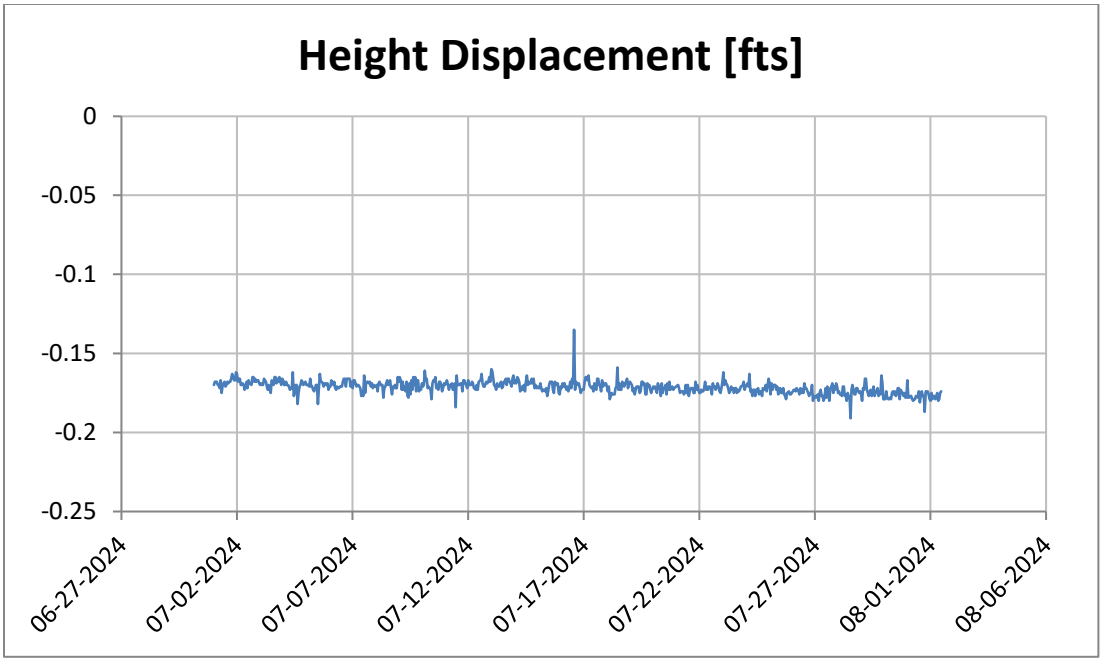
Notes:

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 total station.
4. Height displacement is in the vertical direction. Positive direction means higher in elevation.
5. Rain and fog on July 16 and 26 resulted in increased data scatter.

Stantec

Prism B7300-3



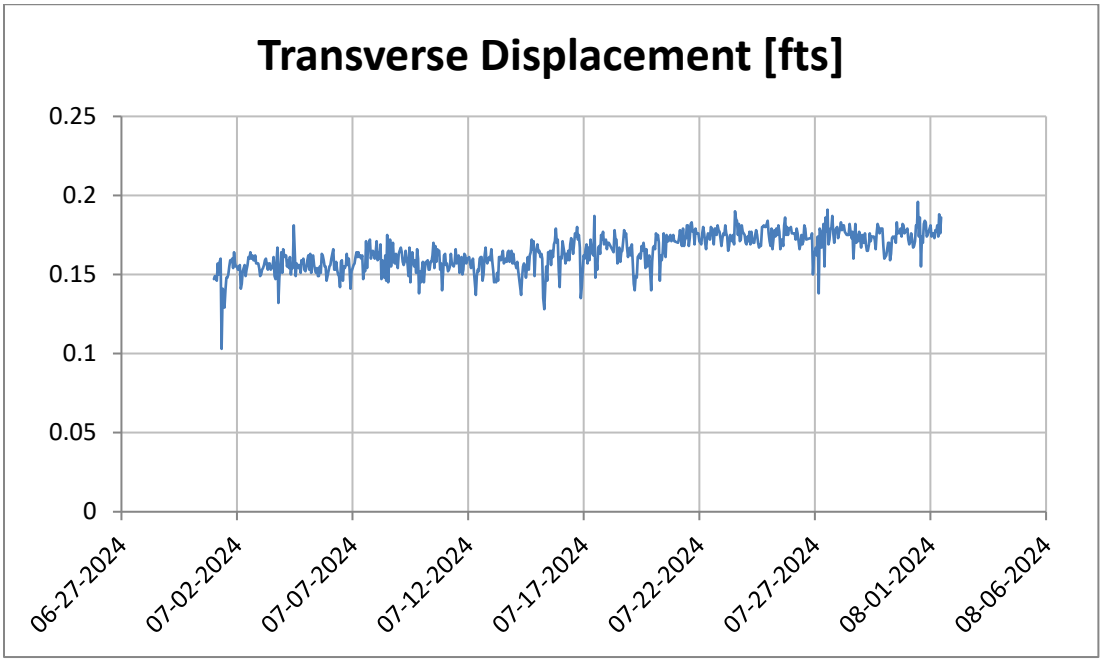


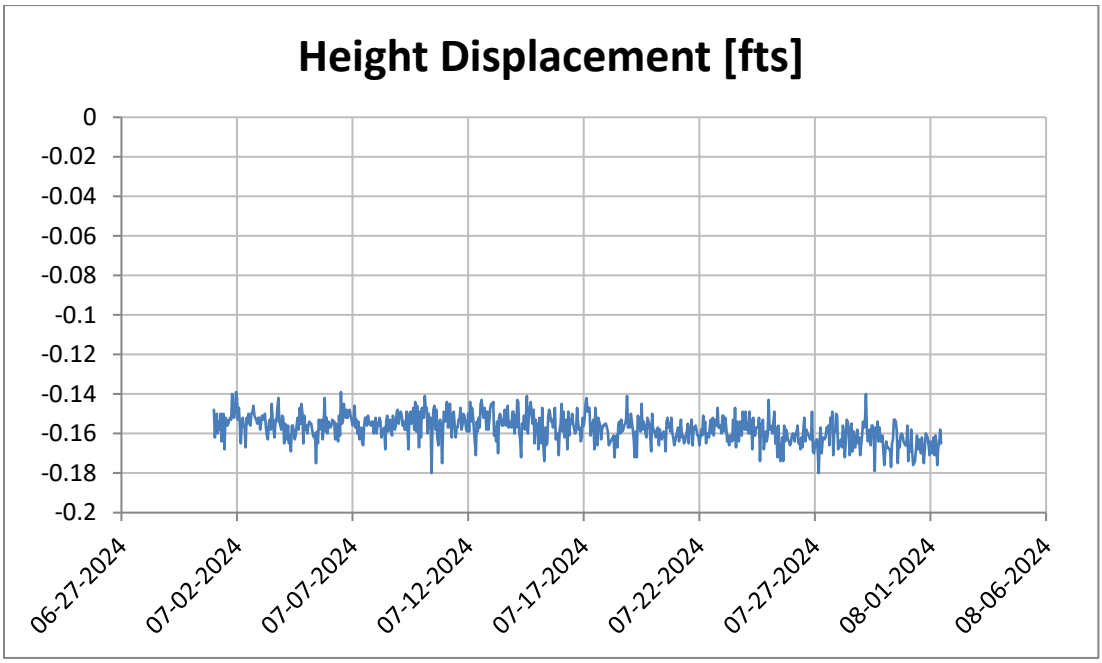
Notes:

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 total station.
4. Height displacement is in the vertical direction. Positive direction means higher in elevation.
5. Rain and fog on July 16 and 26 resulted in increased data scatter.

Stantec

Prism B7300-4



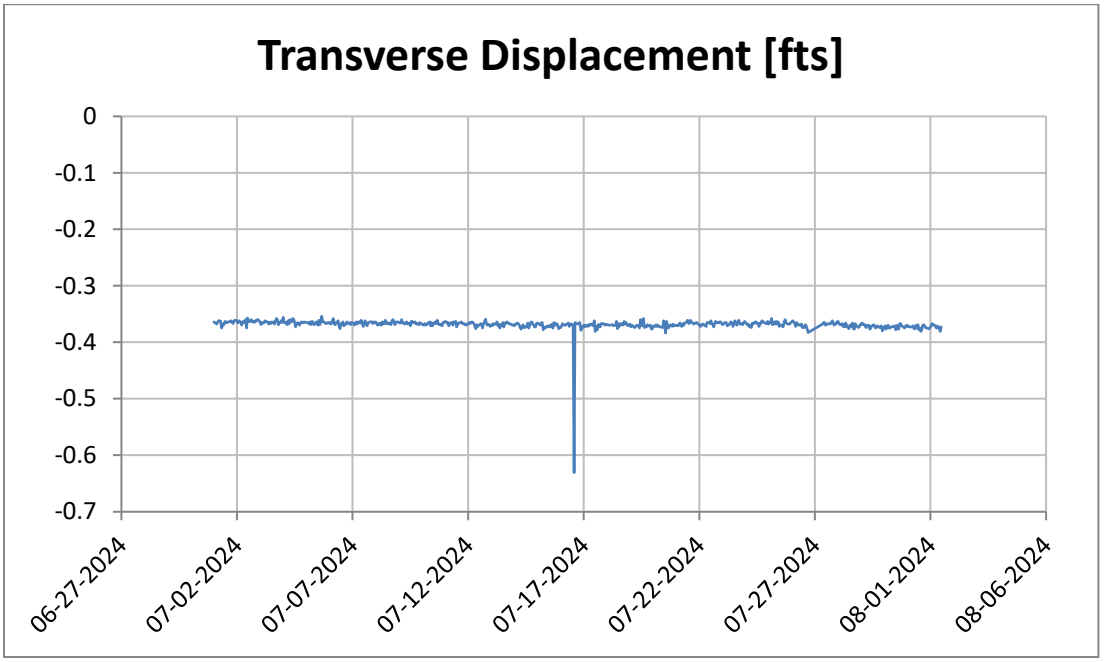


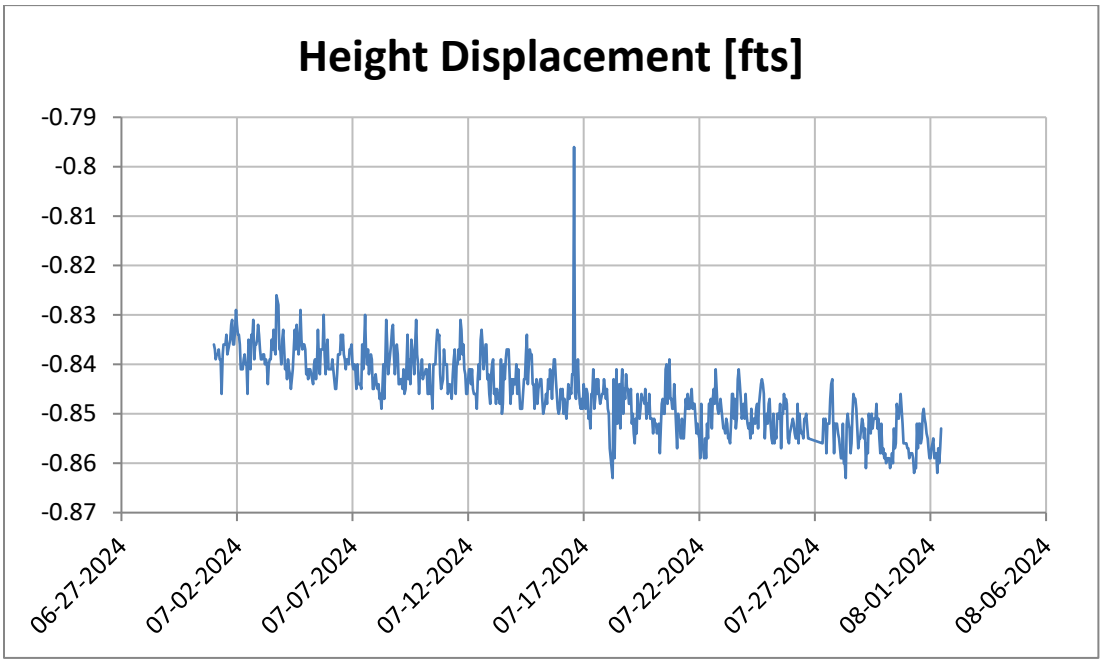
Notes:

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 total station.
4. Height displacement is in the vertical direction. Positive direction means higher in elevation.

Stantec

Prism B7400-1



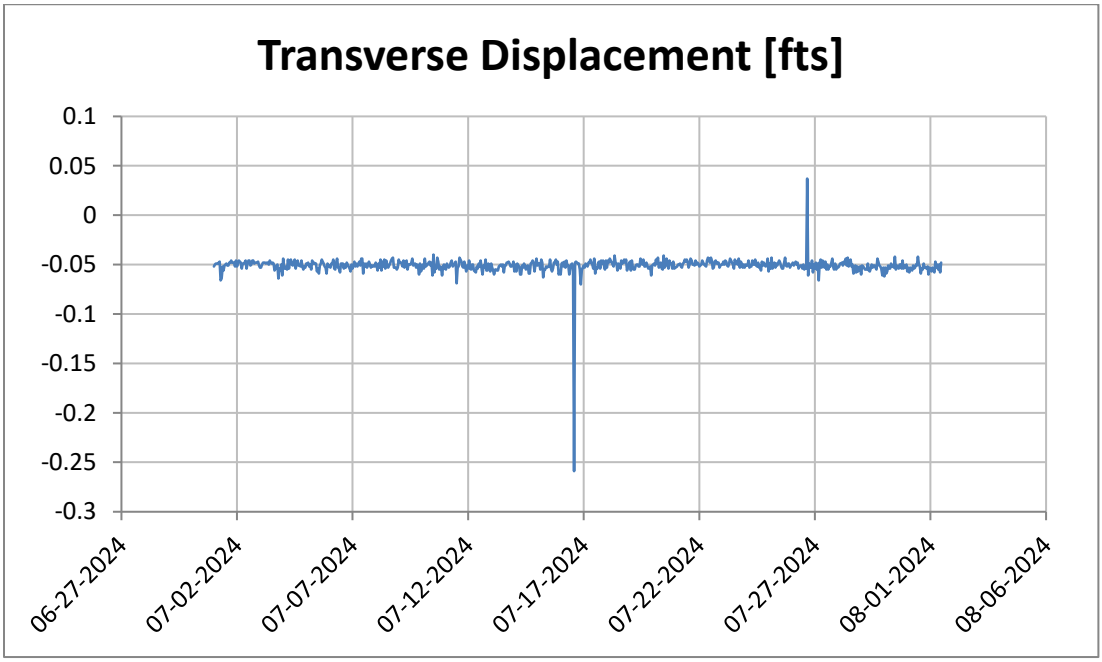


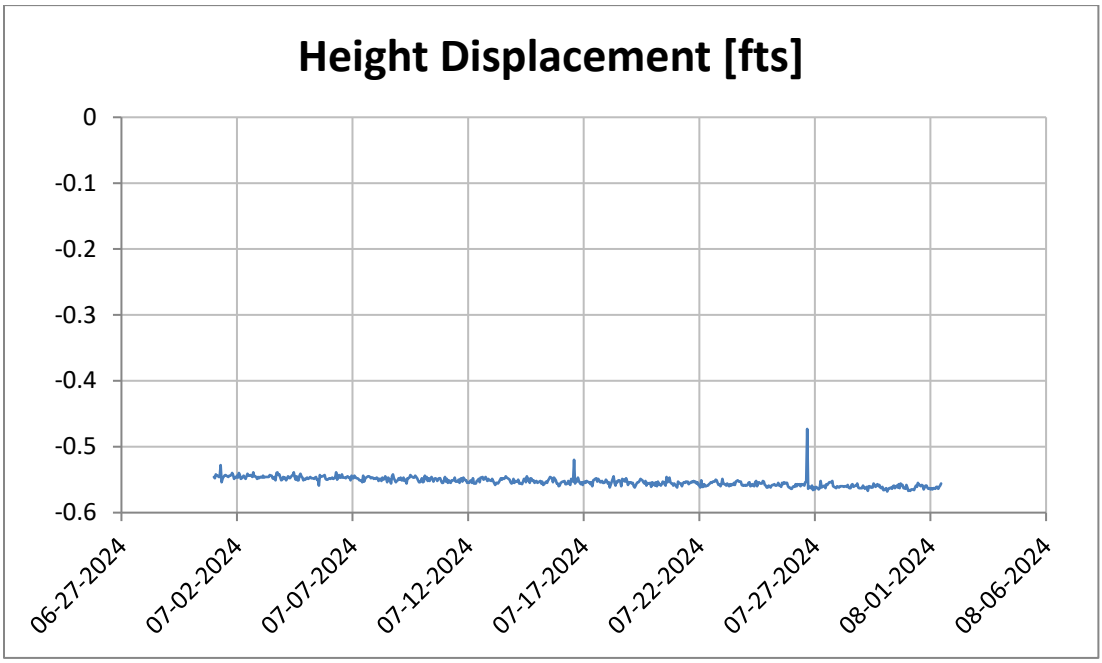
Notes:

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 total station.
4. Height displacement is in the vertical direction. Positive direction means higher in elevation.
5. Rain and fog on July 16 and 26 resulted in increased data scatter.

Stantec

Prism B7400-2



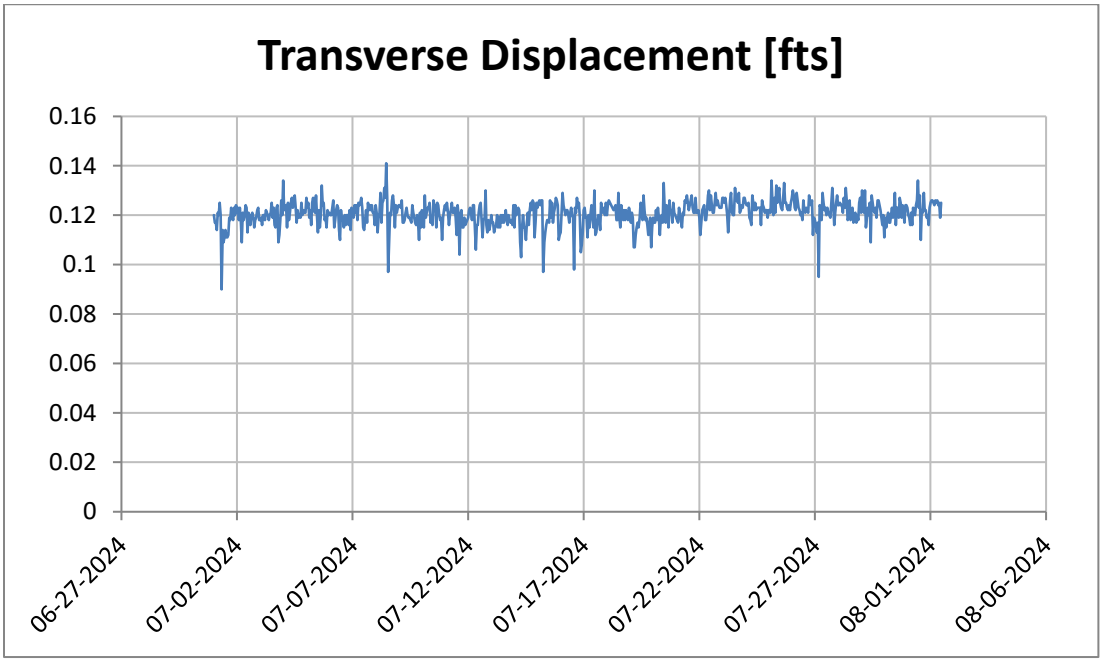


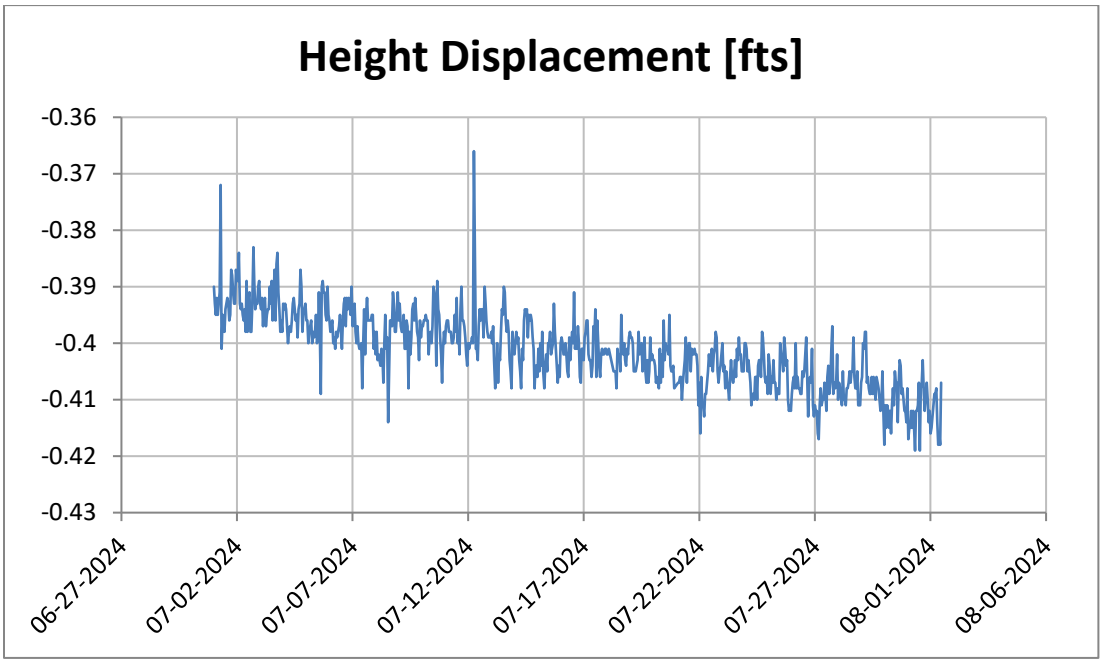
Notes:

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 total station.
4. Height displacement is in the vertical direction. Positive direction means higher in elevation.
5. Rain and fog on July 16 and 26 resulted in increased data scatter.

Stantec

Prism B7400-3



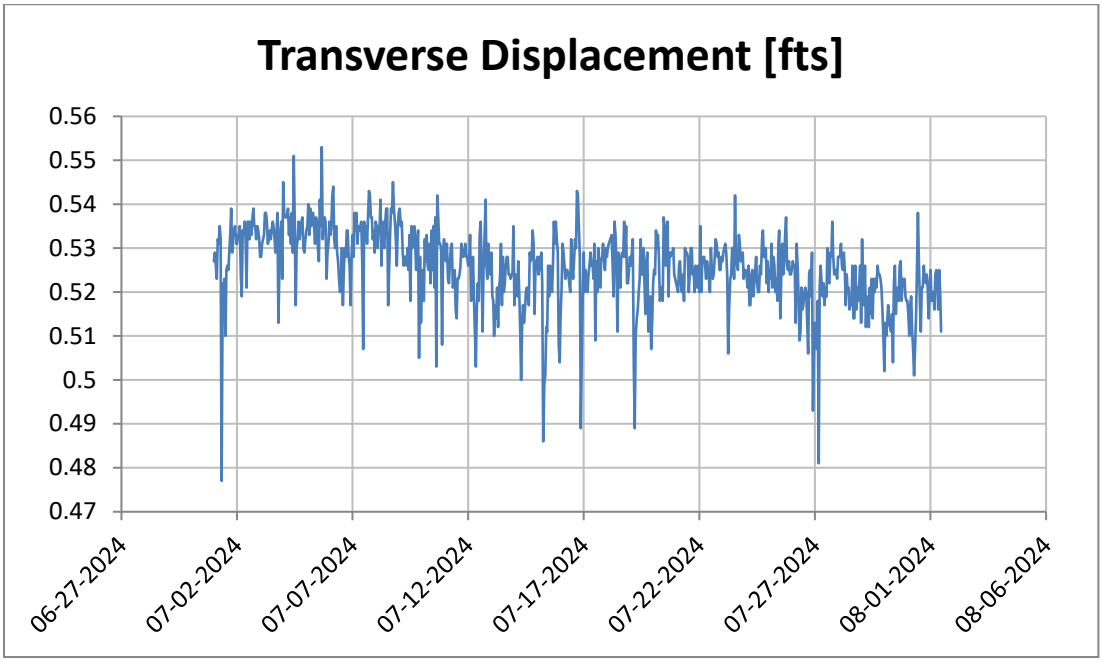


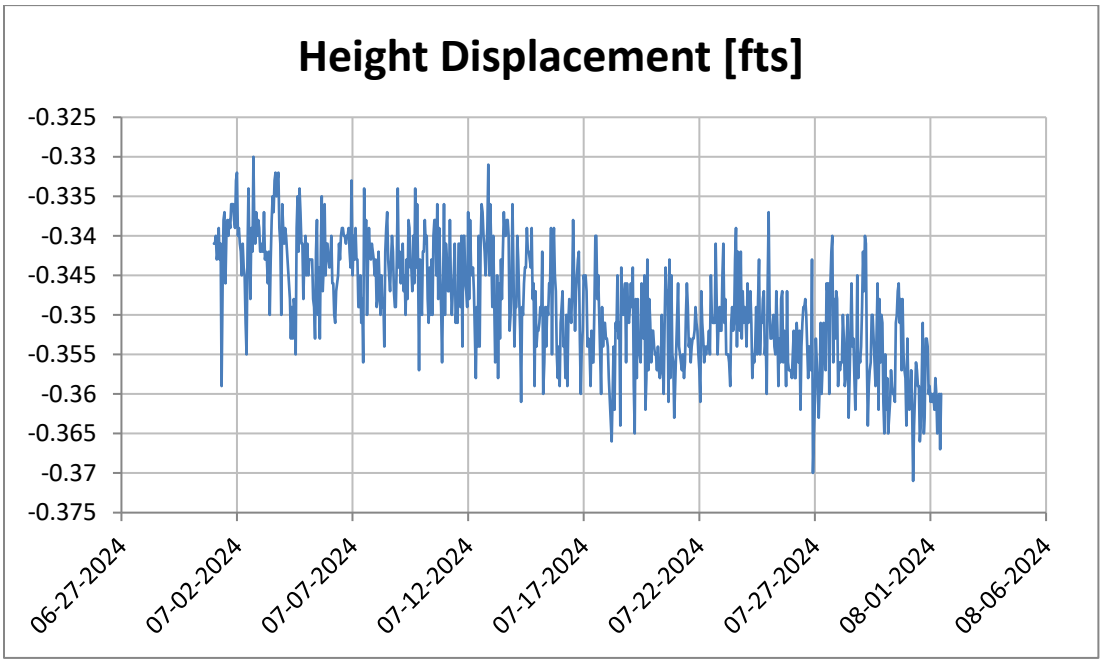
Notes:

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 total station.
4. Height displacement is in the vertical direction. Positive direction means higher in elevation.

Stantec

Prism B7400-4



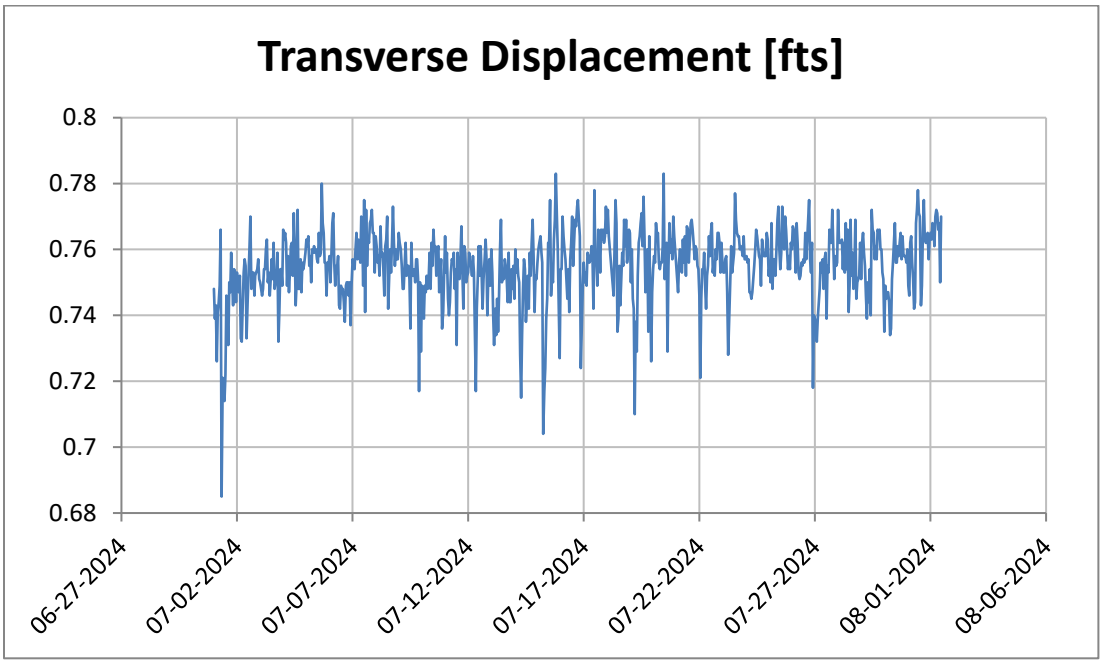


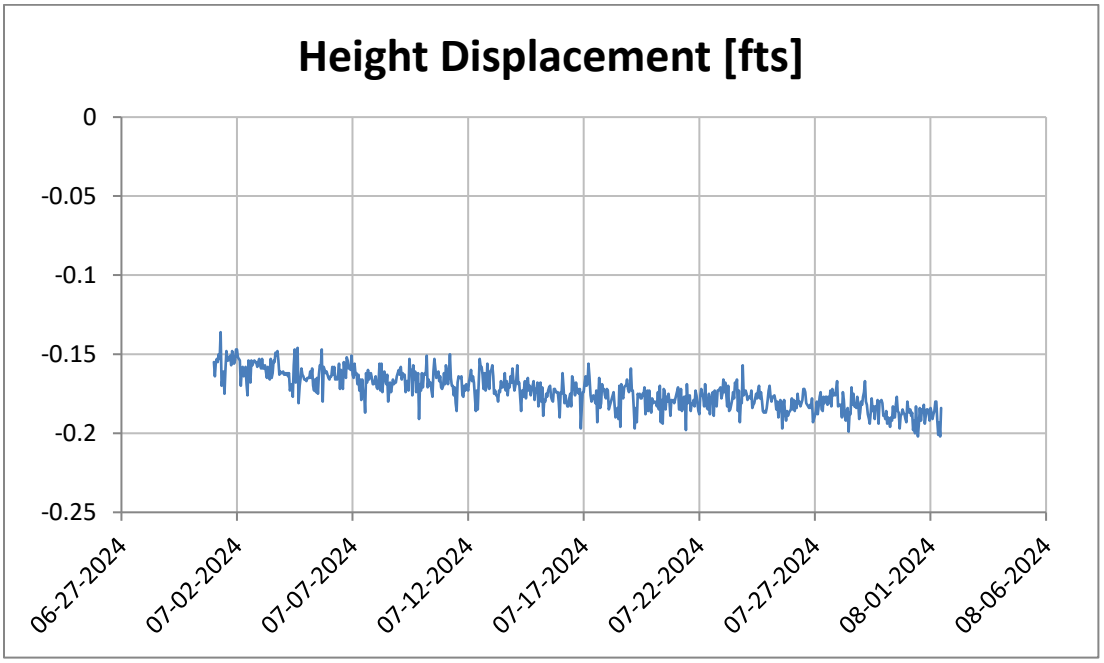
Notes:

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 total station.
4. Height displacement is in the vertical direction. Positive direction means higher in elevation.

Stantec

Prism B7400-5



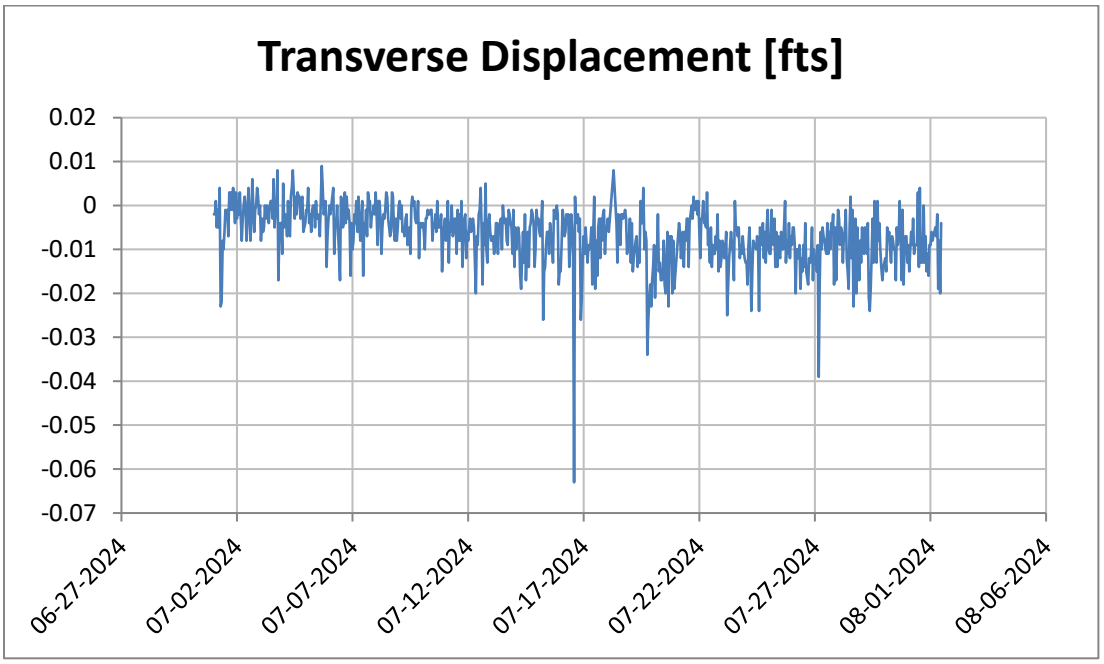


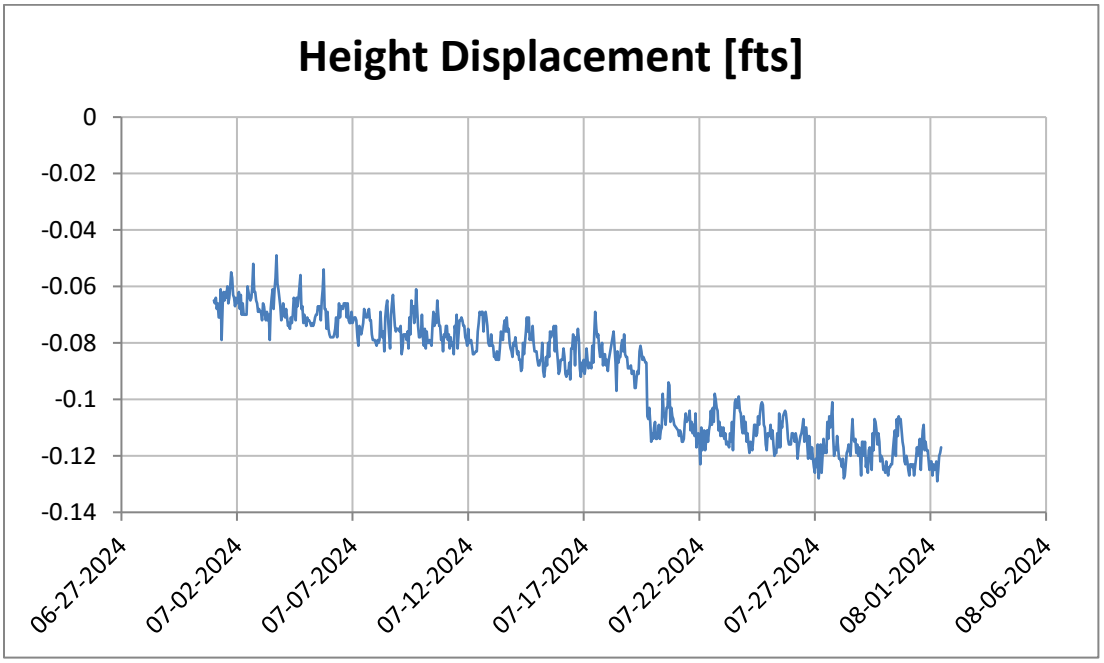
Notes:

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 total station.
4. Height displacement is in the vertical direction. Positive direction means higher in elevation.

Stantec

B7500-1





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 total station.
4. Height displacement is in the vertical direction. Positive direction means higher in elevation.
5. Animals in prism area on July 13 is likely cause for small movement recorded.
6. Rain and fog on July 16 and 26 resulted in increased data scatter.

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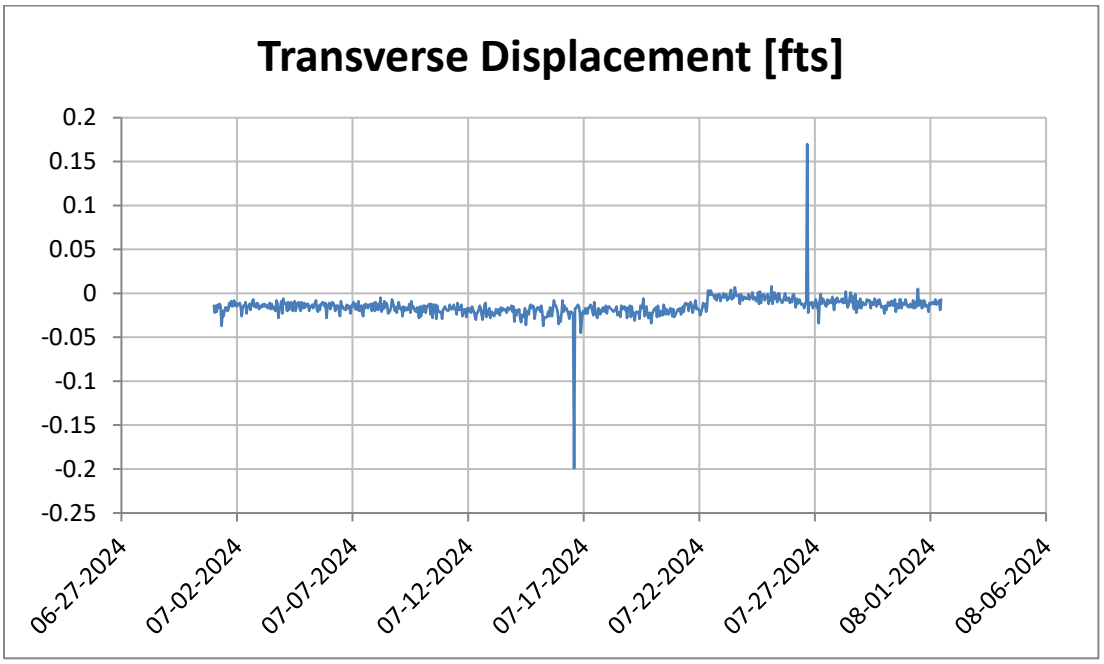
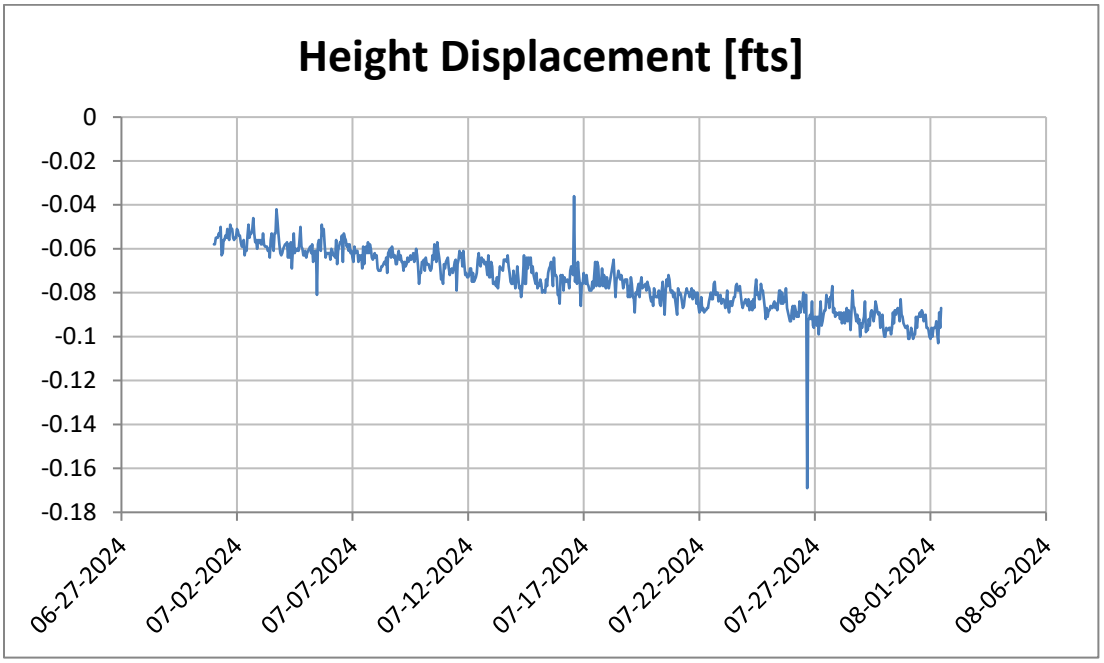
Stantec

B7500-2



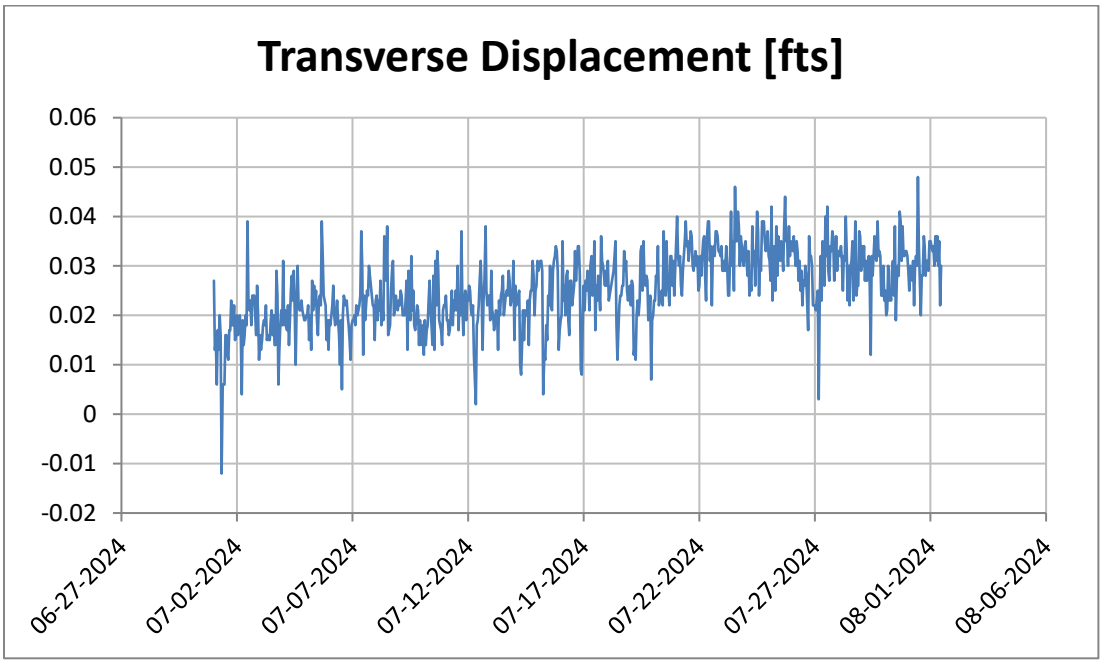


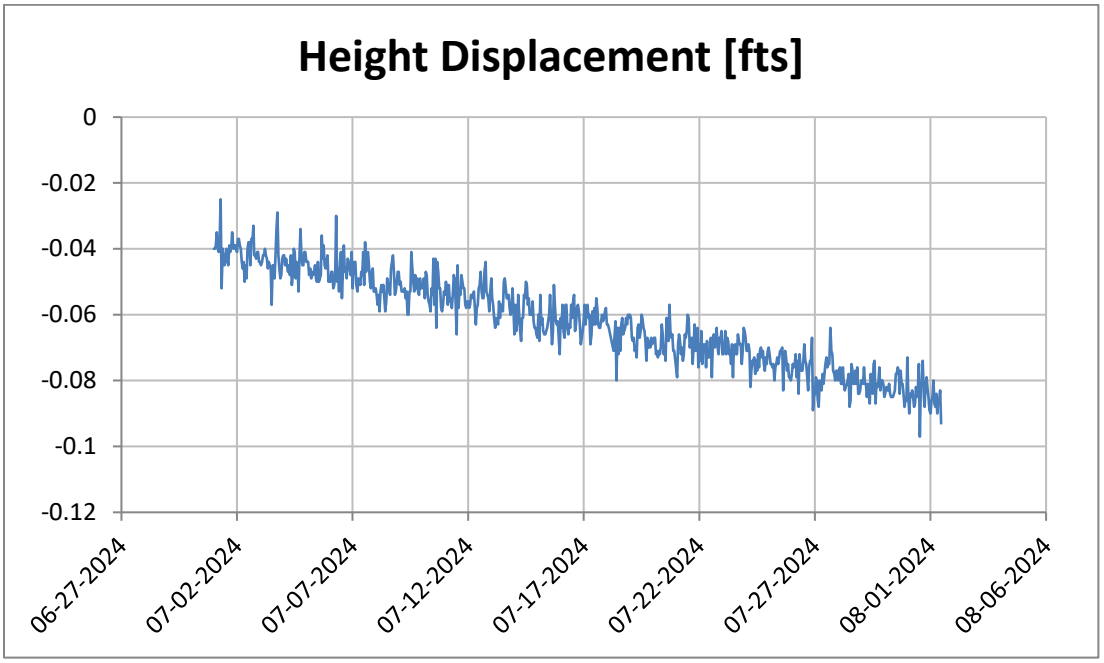
Notes:

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 total station.
4. Height displacement is in the vertical direction. Positive direction means higher in elevation.
5. Rain and fog on July 16 and 26 resulted in increased data scatter.

Stantec

B7500-3



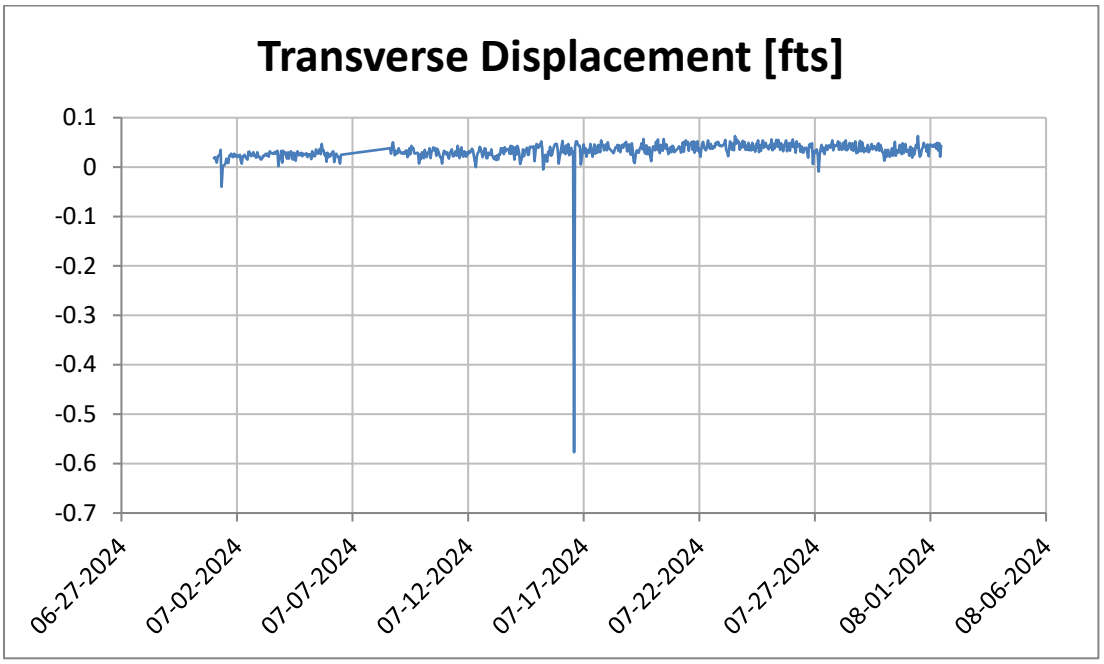


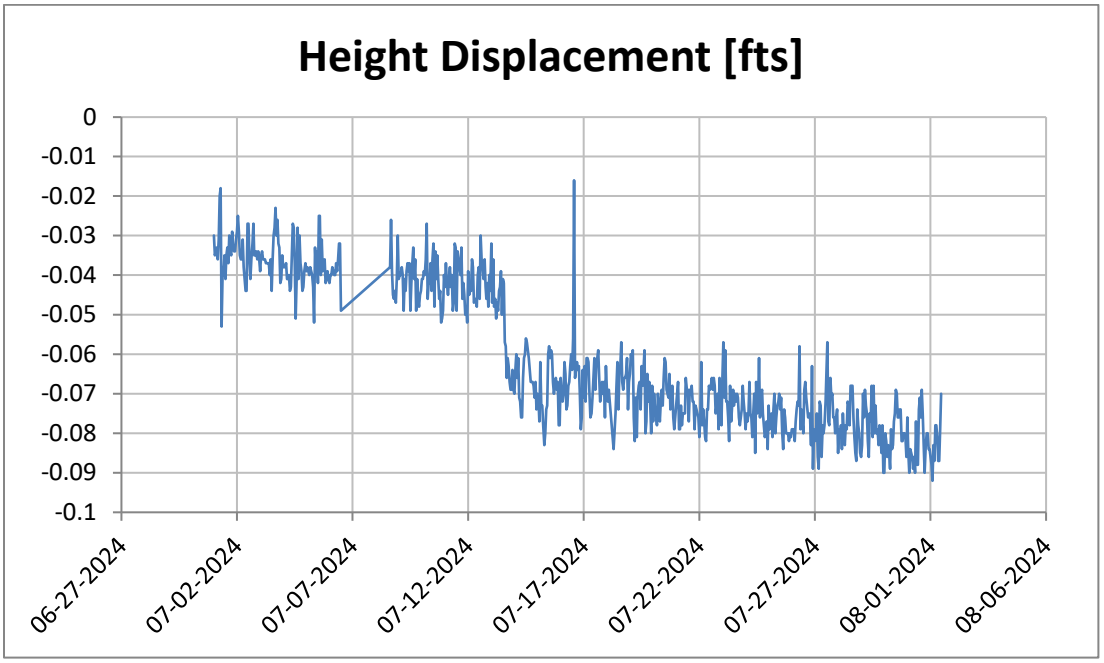
Notes:

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 total station.
4. Height displacement is in the vertical direction. Positive direction means higher in elevation.

Stantec

B7500-4



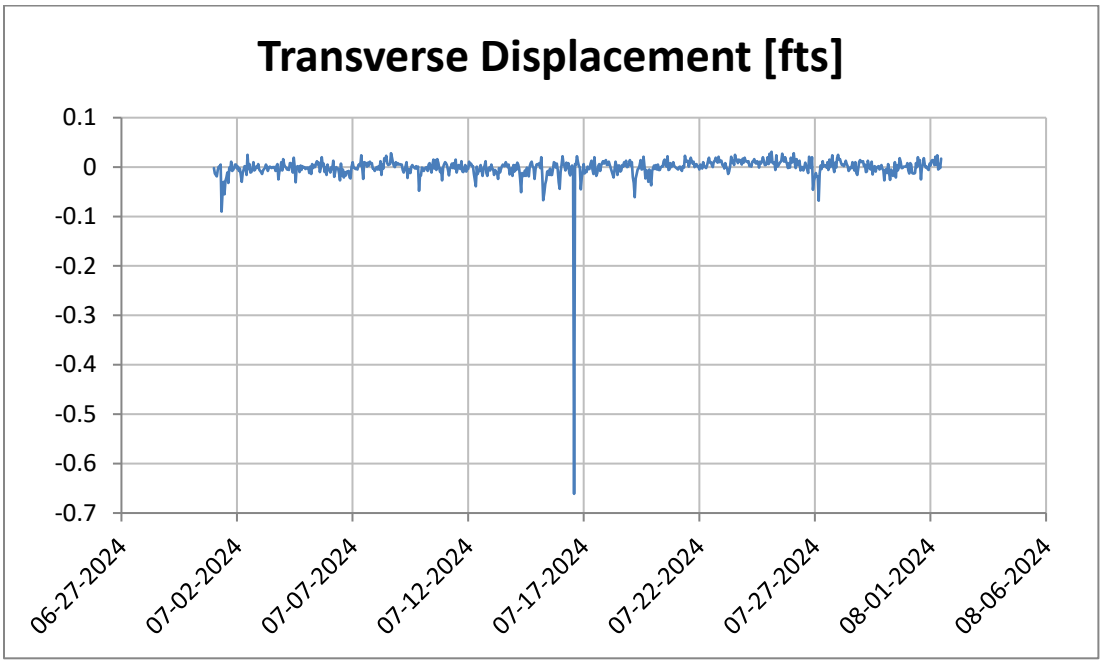


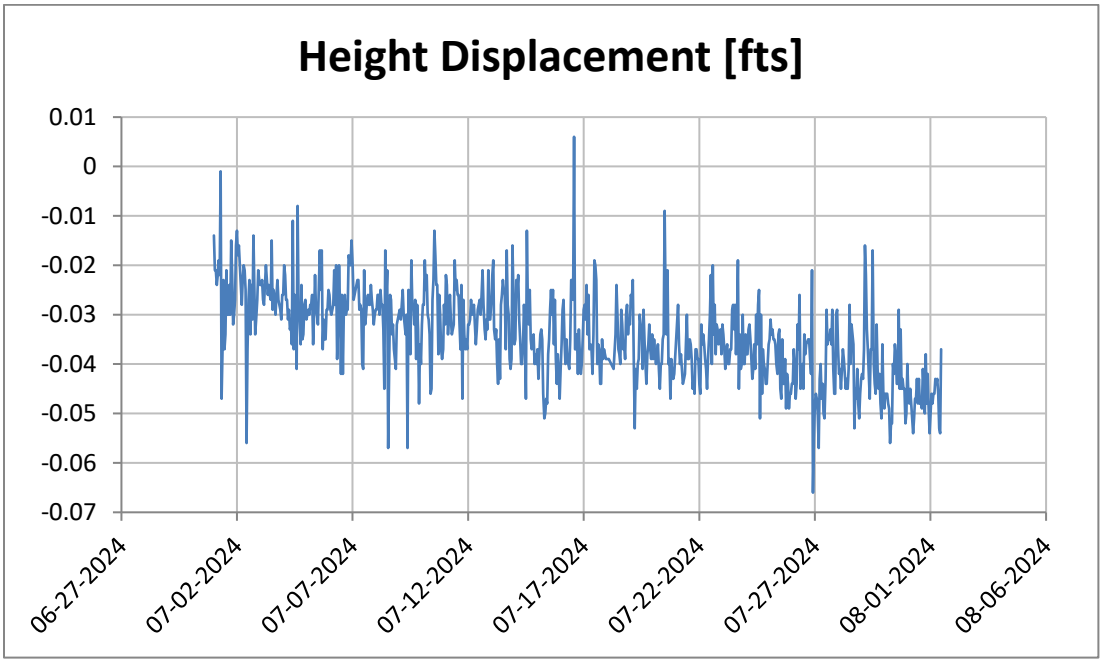
Notes:

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 total station.
4. Height displacement is in the vertical direction. Positive direction means higher in elevation.
5. Prism dislodged on July 6 potentially by animals or equipment operations.
6. Animals in prism area on July 13 is likely cause for small movement recorded.
7. Rain and fog on July 16 and 26 resulted in increased data scatter.

Stantec

B7500-5



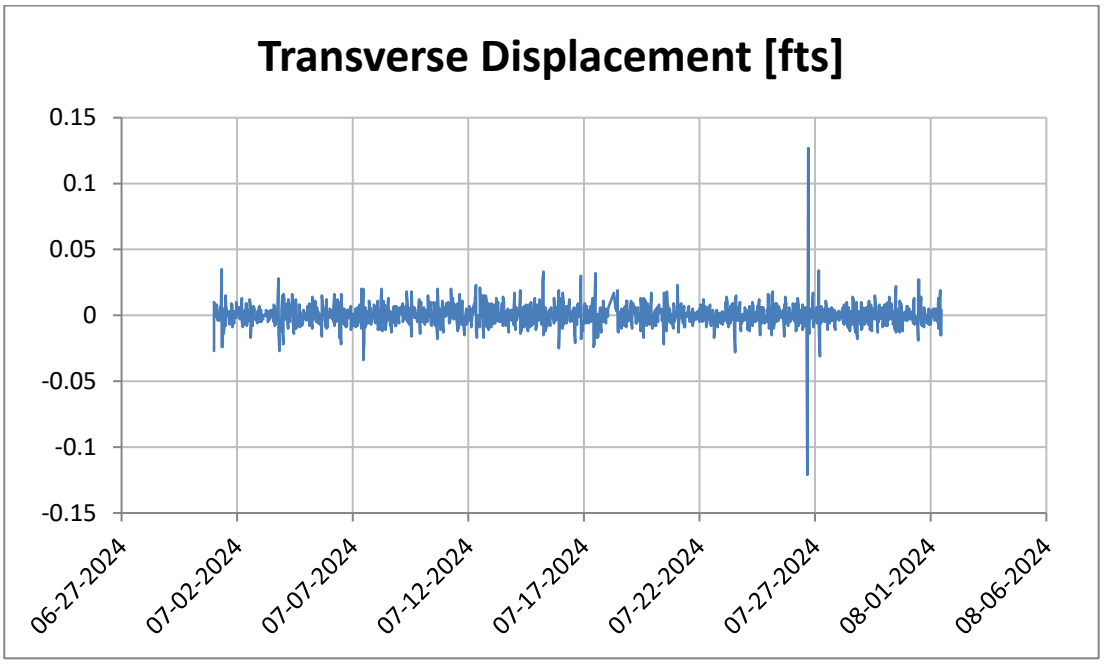


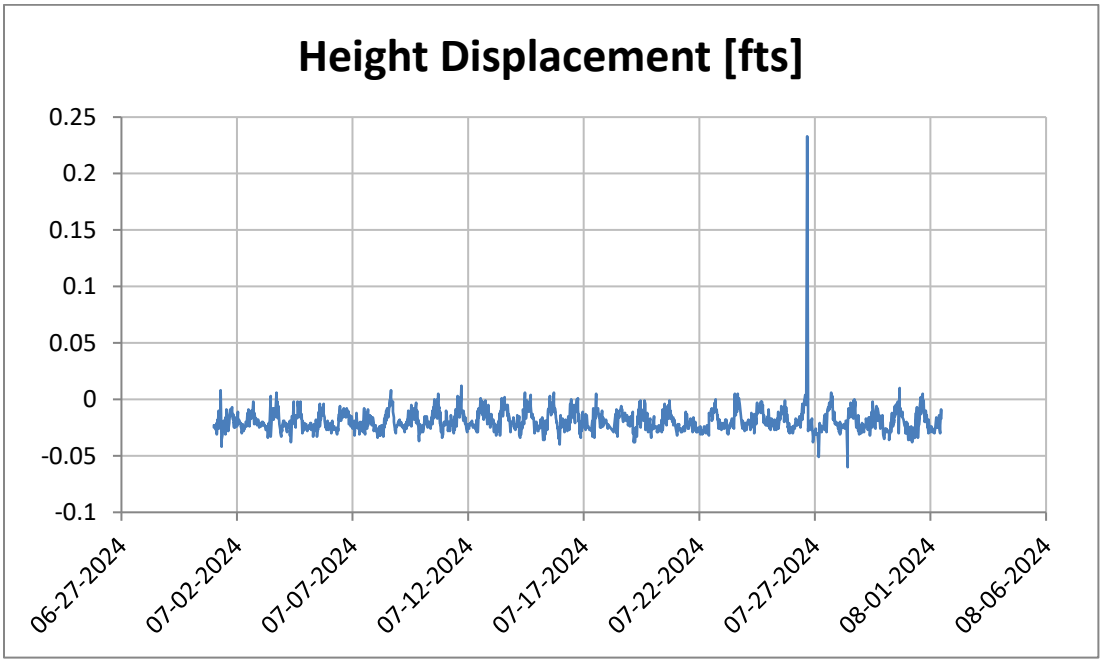
Notes:

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 total station.
4. Height displacement is in the vertical direction. Positive direction means higher in elevation.
5. Rain and fog on July 16 and 26 resulted in increased data scatter.

Stantec

Prism CP6



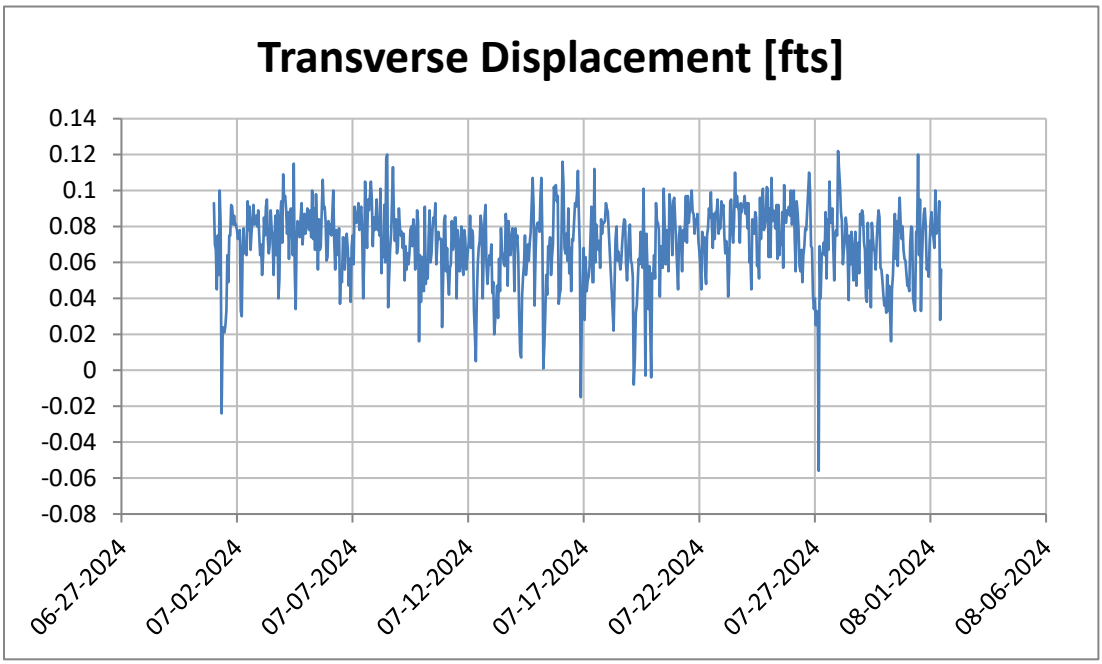


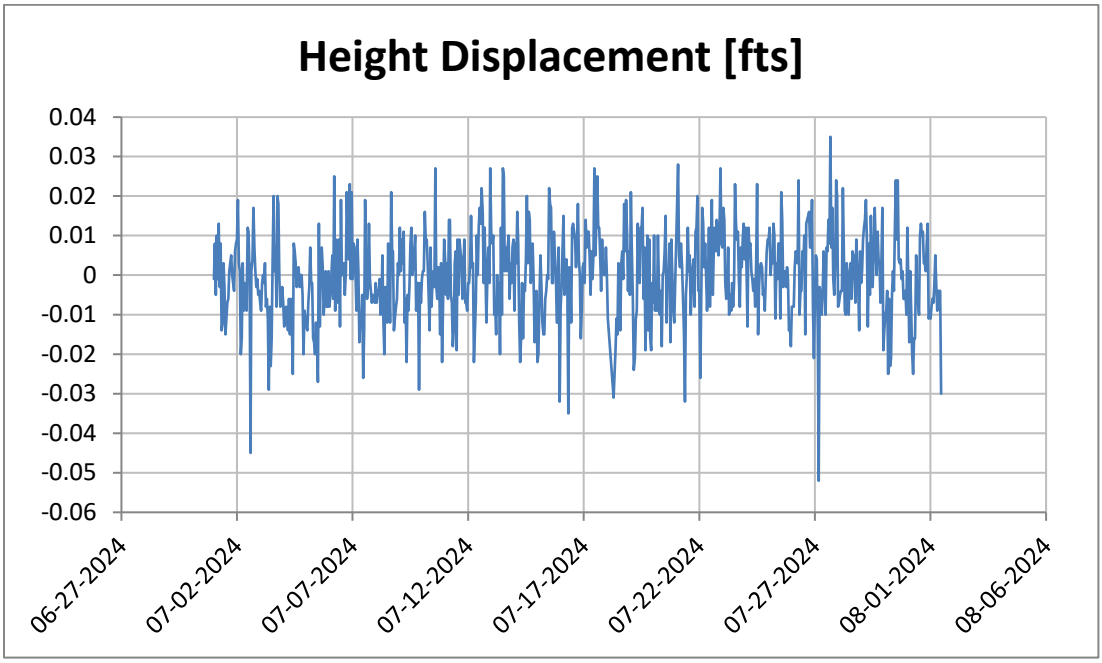
Notes:

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 total station.
4. Height displacement is in the vertical direction. Positive direction means higher in elevation.
5. Rain and fog on July 16 and 26 resulted in increased data scatter.

Stantec

Prism CP7



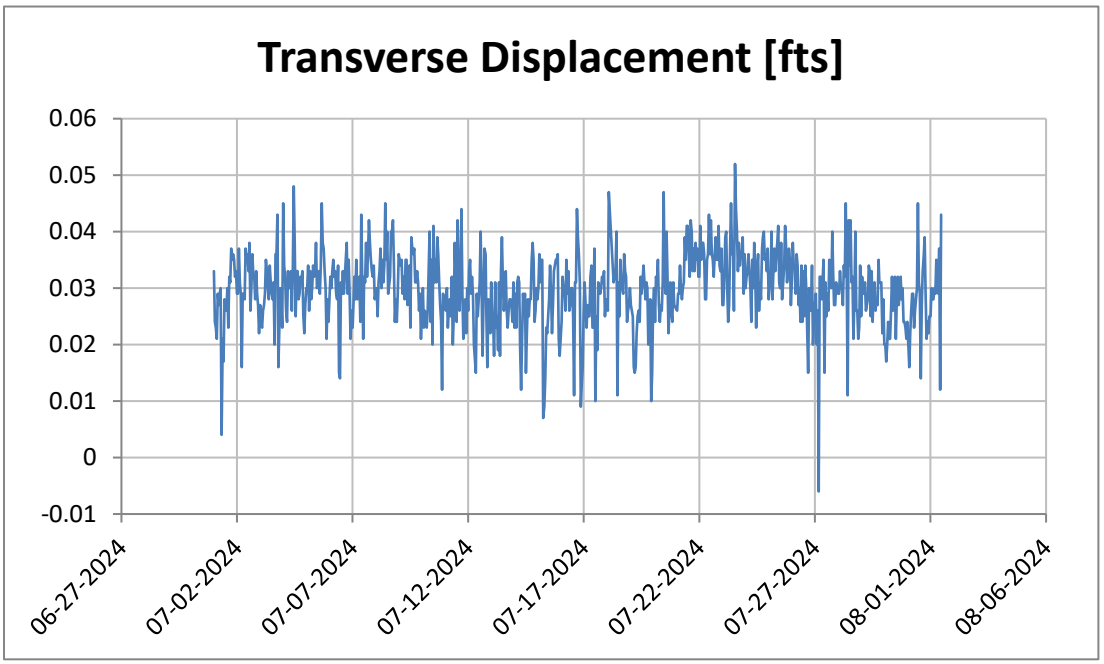


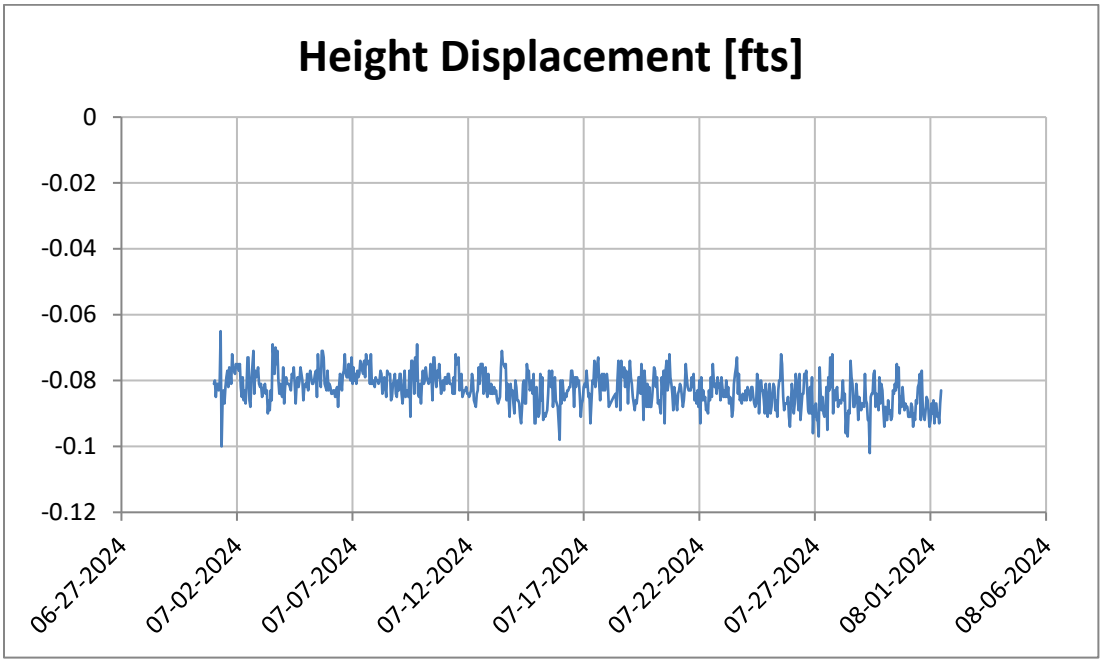
Notes:

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 total station.
4. Height displacement is in the vertical direction. Positive direction means higher in elevation.

Stantec

Prism NP4



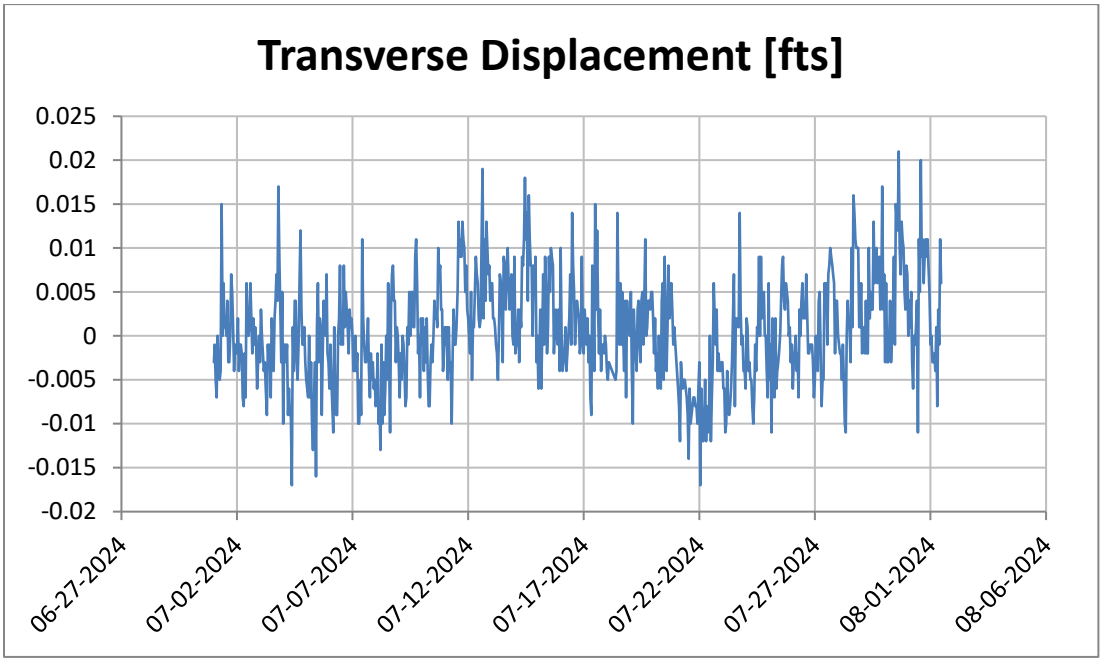


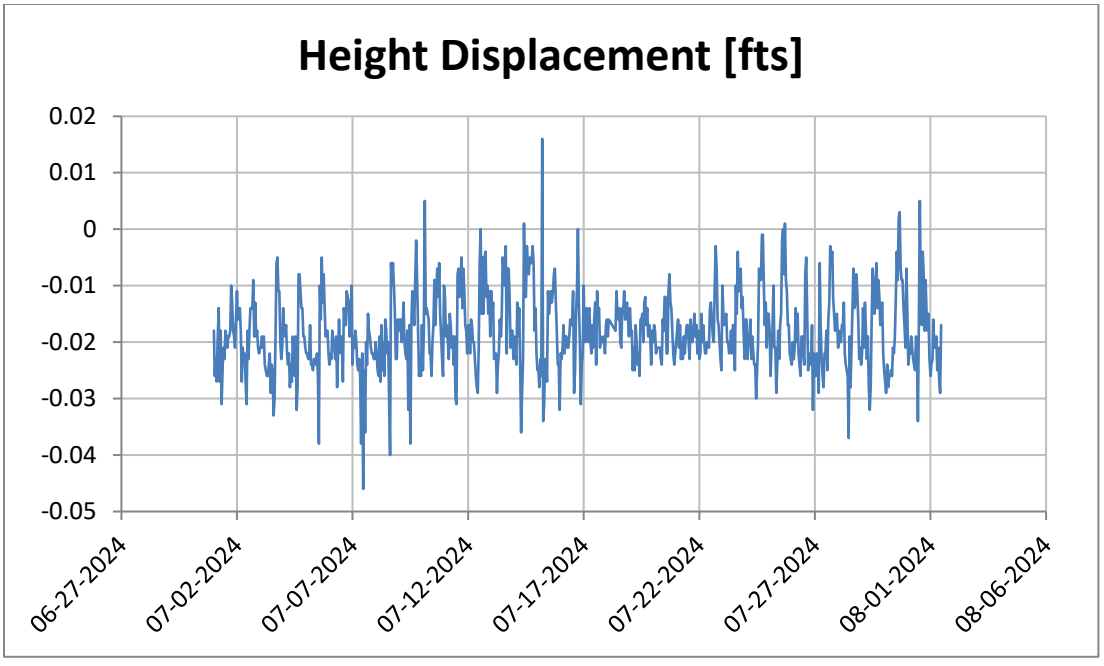
Notes:

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 total station.
4. Height displacement is in the vertical direction. Positive direction means higher in elevation.

Stantec

Prism P2



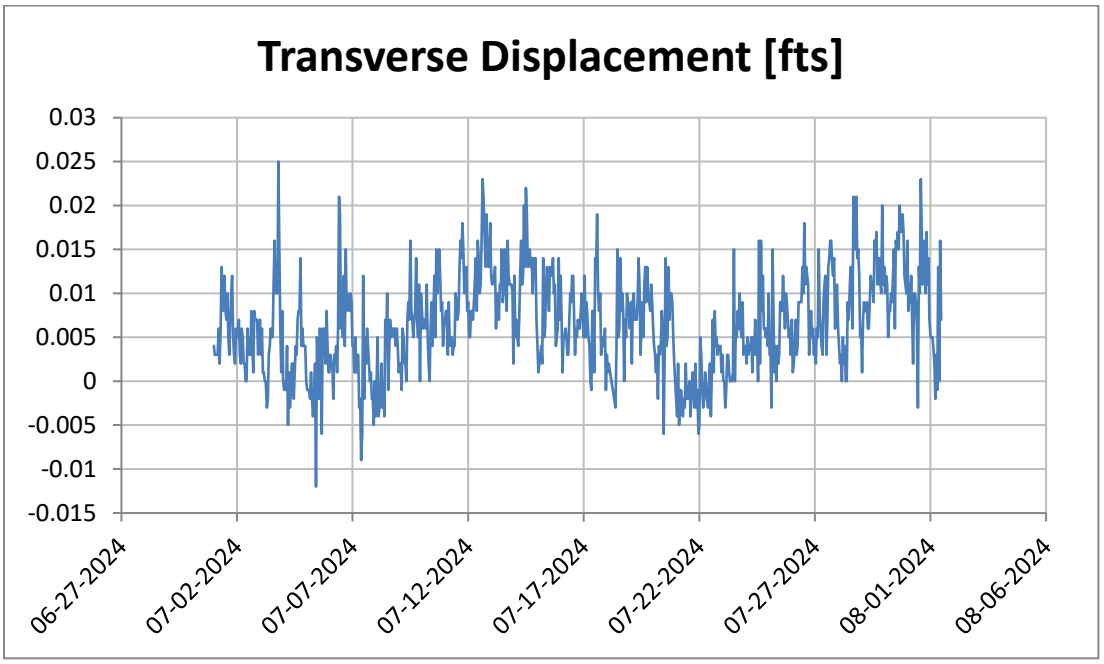


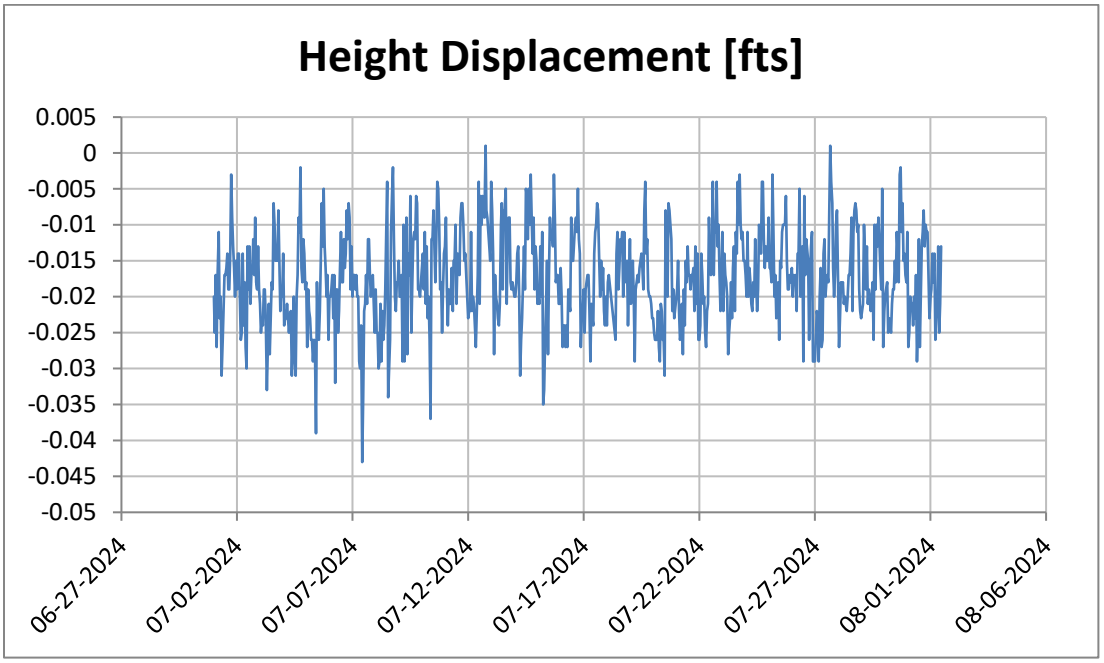
Notes:

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 total station.
4. Height displacement is in the vertical direction. Positive direction means higher in elevation.

Stantec

Prism P5



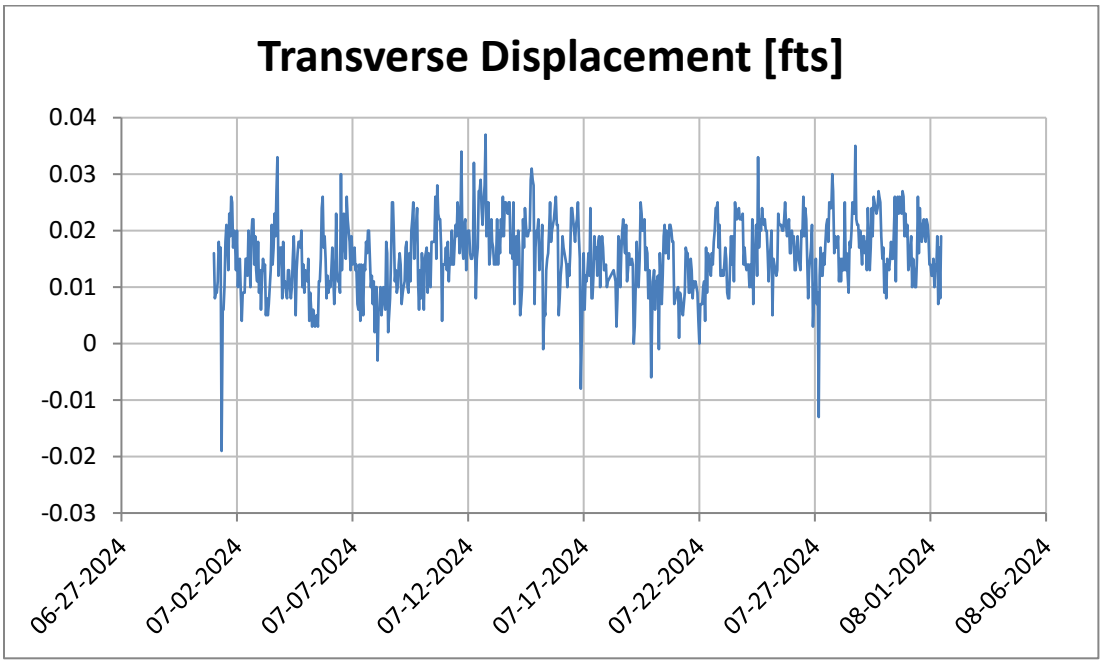


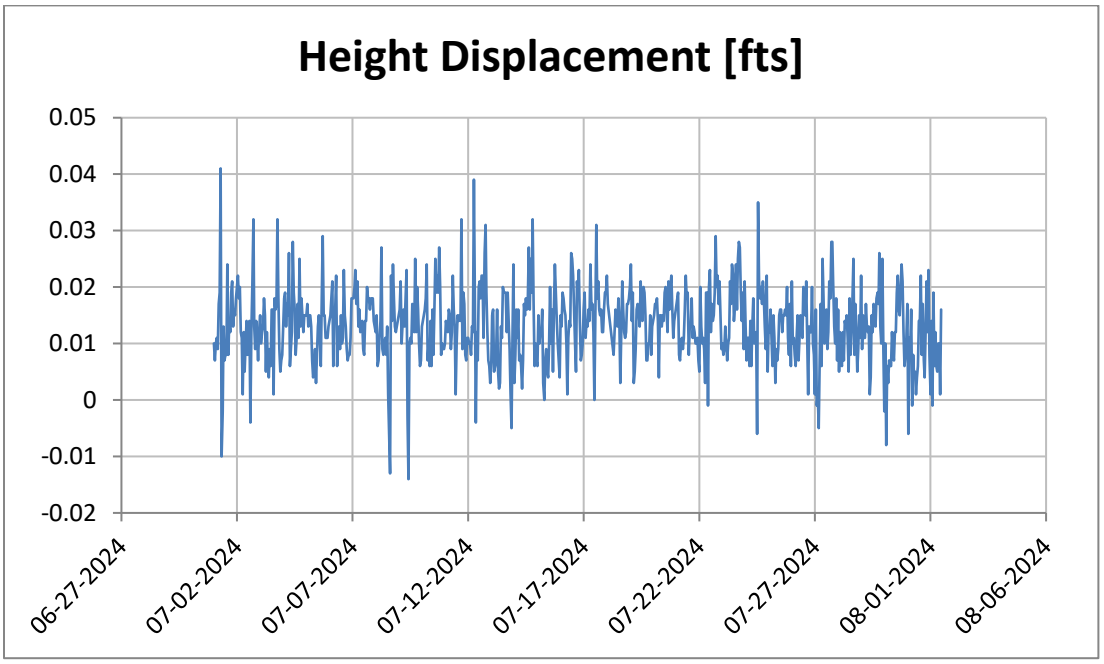
Notes:

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 total station.
4. Height displacement is in the vertical direction. Positive direction means higher in elevation.
5. Regression limit alerts received on July 1.

Stantec

Prism P25



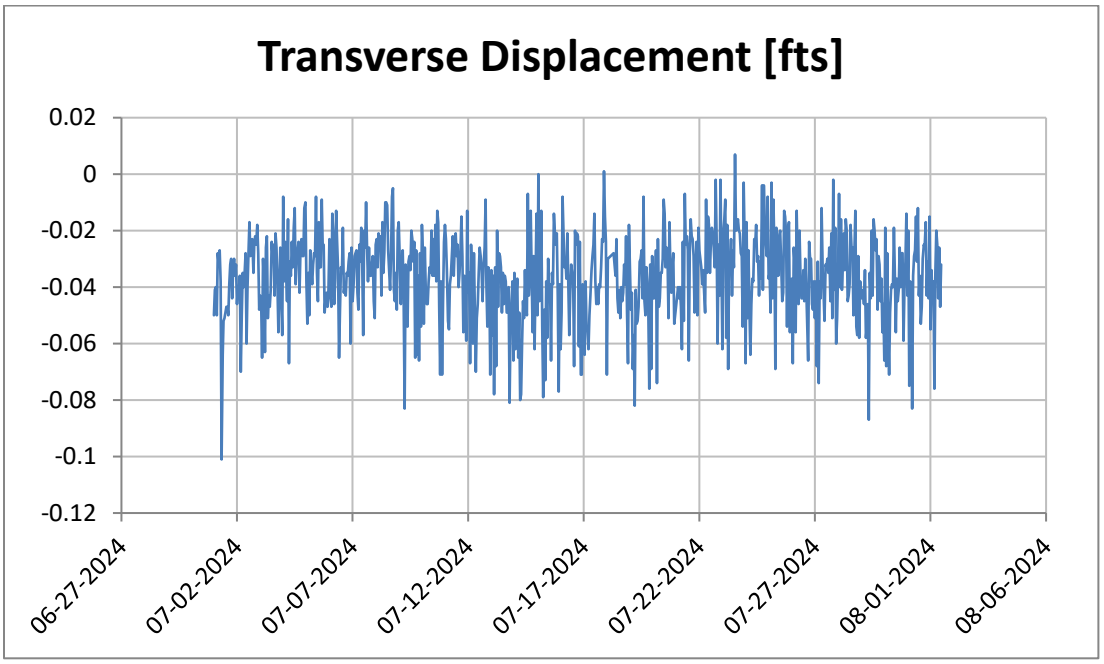


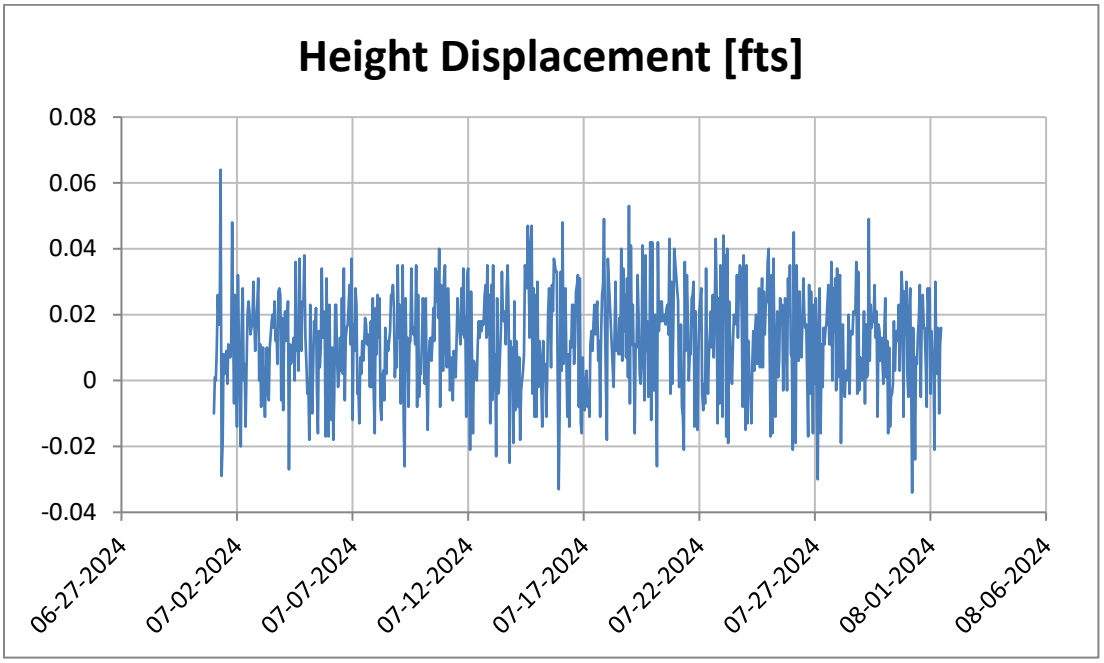
Notes:

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 total station.
4. Height displacement is in the vertical direction. Positive direction means higher in elevation.
5. Regression limit alert received on June 19.

Stantec

Prism P32R



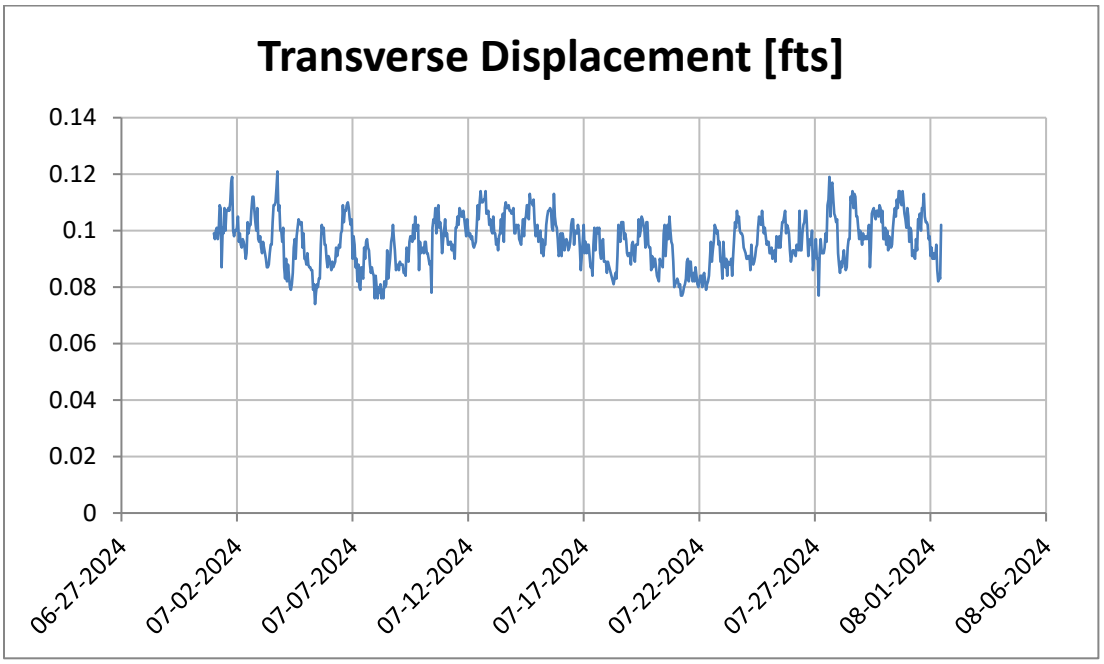


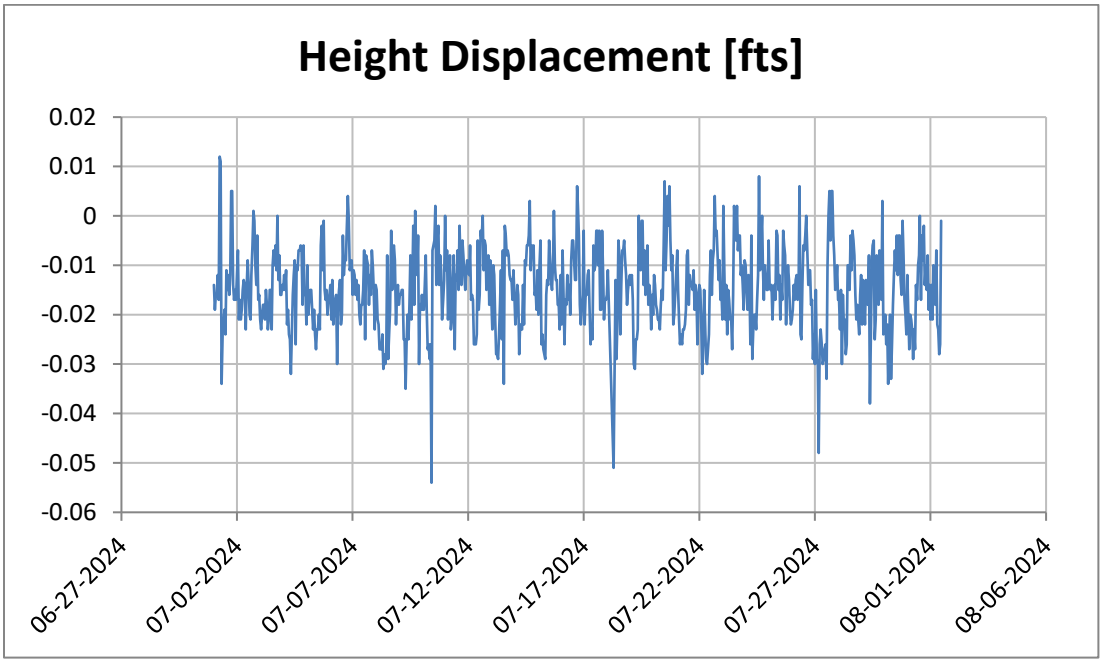
Notes:

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 total station.
4. Height displacement is in the vertical direction. Positive direction means higher in elevation.
5. Regression limit alert received for P32 on July 15. P32 was replaced by P32R, and no alert was received for P32R.

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 total station.
4. Height displacement is in the vertical direction. Positive direction means higher in elevation.

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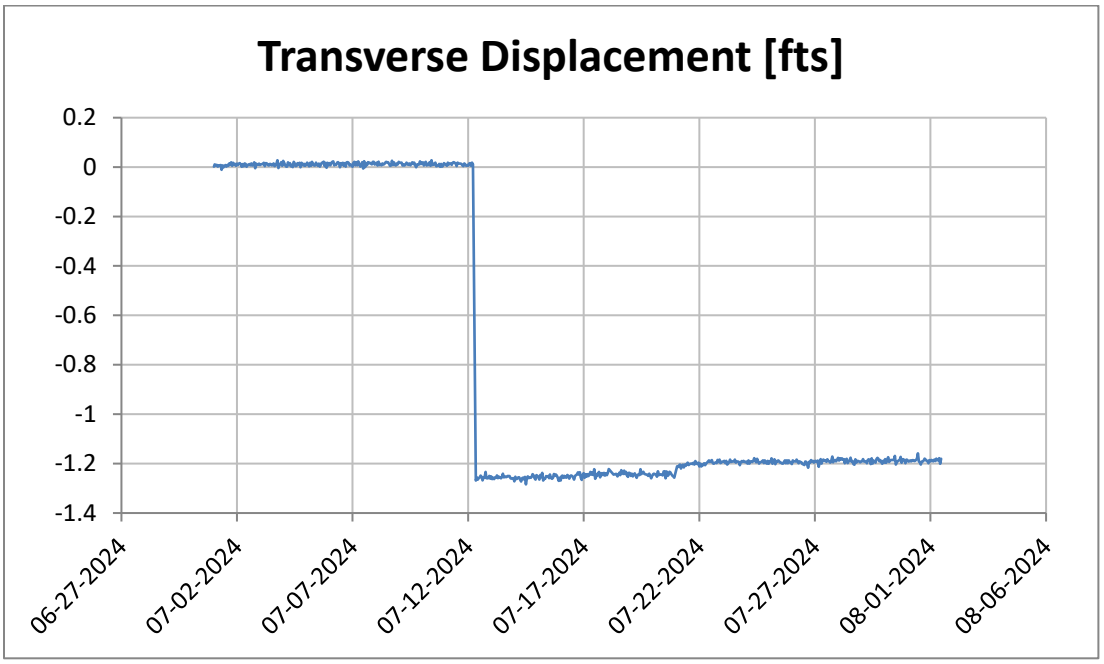
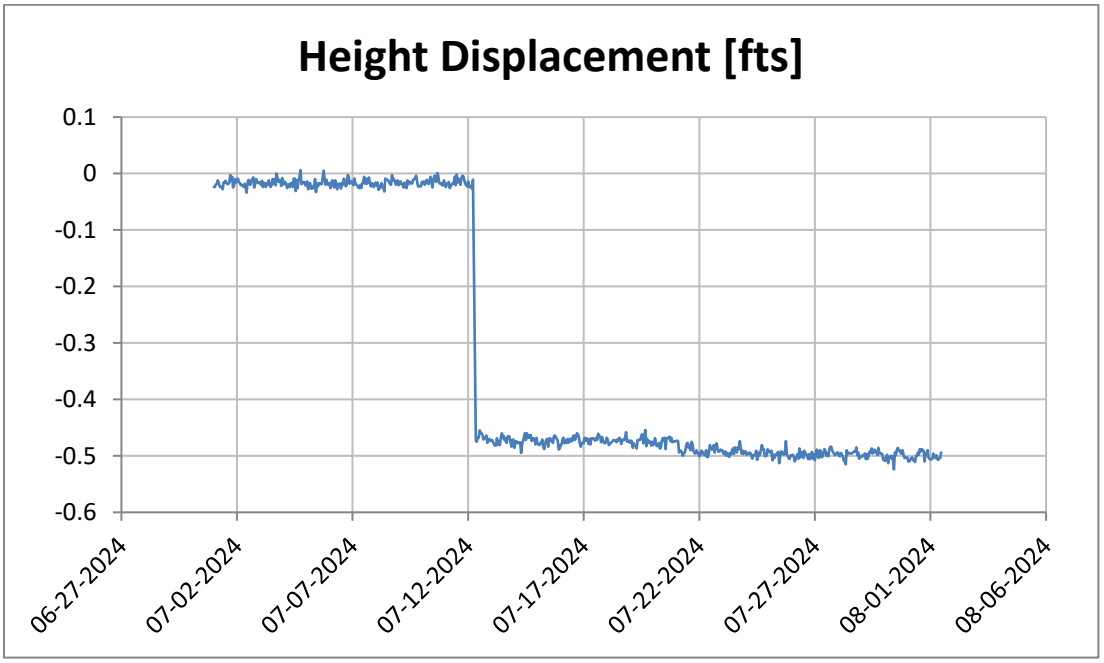
Prism P70R



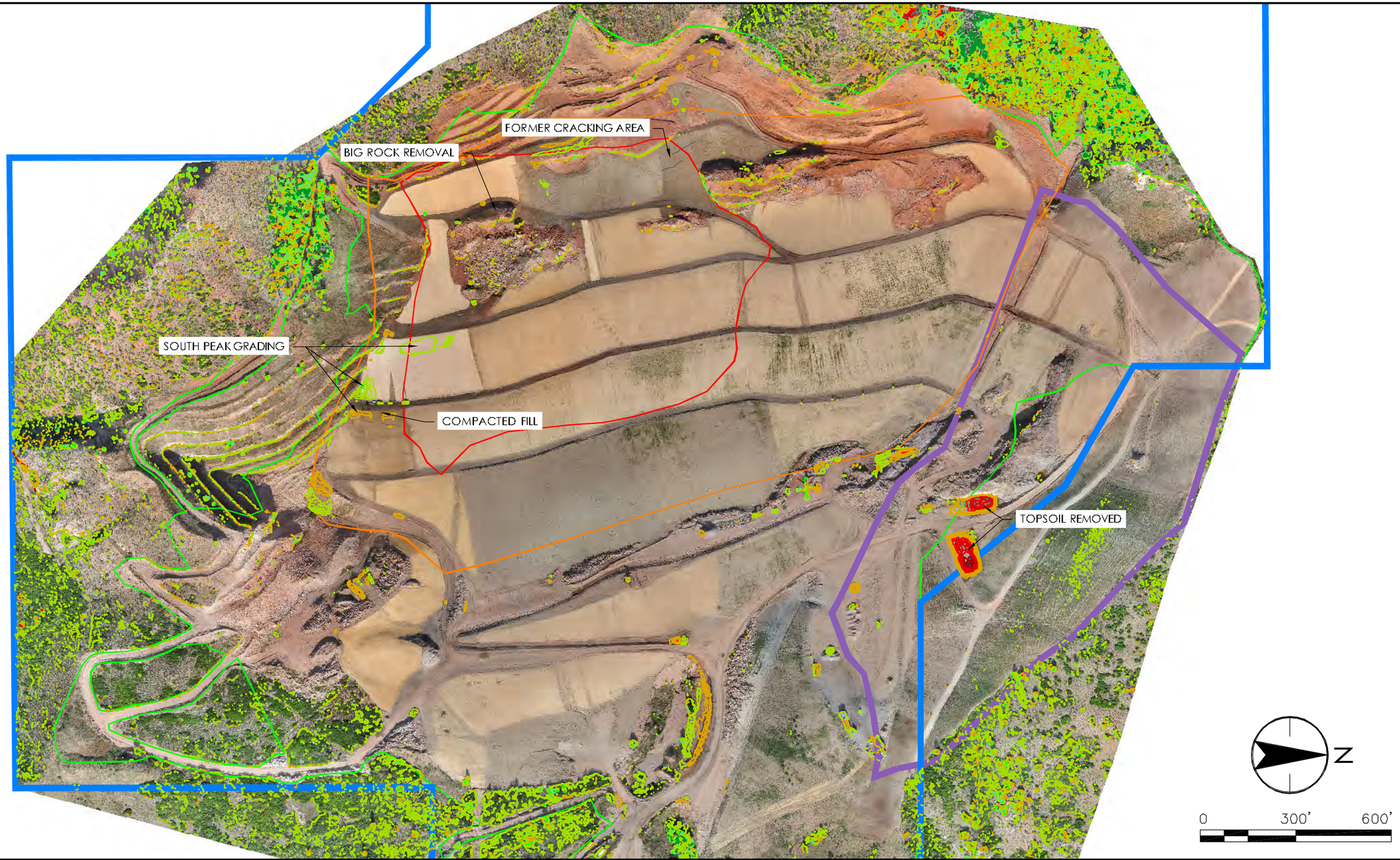


Notes:

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 total station.
4. Height displacement is in the vertical direction. Positive direction means higher in elevation.
5. Prism removed on July 12 prior to earthworks in the area and replaced in a slightly different location. It could not be found by the Leica system so there were no regression limit alerts. No slope movements identified.

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 07/17/2024 TO 08/01/2024

Client/Project
CASTLE AGGREGATE

PIKEVIEW QUARRY SLOPE MONITORING

Project No.
2057288200

Title
COMPARISON OF RECENT AND PREVIOUS SURVEYS

Revision	Date
#	2024.08.31
Drawn By	Figure No.
PK	4

2024.08.15 3:25:06 PM

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Appendix D

Compaction Testing Results

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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

1. NO ADDITIONAL COMPACTION TESTING IS PLANNED OR REQUIRED.

N

0 150' 300'

Client/Project
CASTLE AGGREGATE

PIKEVIEW QUARRY SLOPE MONITORING

Project No.
2057288200

Title
COMPACTION TEST LOCATIONS

Revision
#

Date
2024.08.31

Drawn By
PK

Figure No.
5

2024.08.15 3:24:31 PM

u:\2057288200\06_design\monitoring\2024-07.dwg\pikeview plans_20240801

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Compaction Testing Log

Test No.	Date	Elevation (ft)	Northing (ft)	Easting (ft)	Wet Density (pcf)	Moisture Content (%)	Dry Density (pcf)	Compaction (%)
1141	1-Jul-24	7482	1401074	3172993	127	1.5	125.1	102
1142	1-Jul-24	7480	1401108	3172996	128.1	3.1	124.3	101
1143	2-Jul-24	7480	1401043	3173032	129.2	2.9	125.5	102
1144	2-Jul-24	7481	1401010	3173038	118.5	5.7	112.1	91
1145	8-Jul-24	7481	1401007	3173035	134.6	1.8	132.2	108
1146	8-Jul-24	7482	1400982	3173031	121	7.2	112.9	92
1147	9-Jul-24	7478	1401157	3173021	115.9	3.2	112.3	91
1148	9-Jul-24	7477	1401216	3173021	136.4	8.9	125.3	102
1149	10-Jul-24	7481	1401014	3173035	126.9	2.1	124.3	92
1150	10-Jul-24	7482	1400975	3173036	128.5	5.6	121.7	91
1151	17-Jul-24	7503	1401072	3173015	124.7	1.8	122.5	100
1152	17-Jul-24	7506	1401036	3173045	125.2	2.2	122.5	100
1153	24-Jul-24	7478	1401202	3173013	144.1	5.3	136.9	111
1154	24-Jul-24	7477	1401228	3173009	138.4	6.1	130.5	106
1155	31-Jul-24	7508	1401236	3173004	131.4	7.1	122.7	100
1156	31-Jul-24	7507	1401257	3172941	133.3	11.4	119.7	97

Notes:

- A total 3,456,000 yd3 had been placed and compacted. This requires at least 692 compaction tests and 1,183 tests have been taken.
- Fill placement has concluded. No additional testing is planned or required.