STATE OF COLORADO

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

Pikeview monitoring report

1 message

Kos, Paul <paul.kos@stantec.com> Thu, Apr 28, 2022 at 10:06 AM
To: "Tim Cazier, P.E. (Tim.Cazier@state.co.us)" <tim.cazier@state.co.us>
Cc: "Moore, David (Houston)" <David.Moore@stantec.com>

Tim,

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

Paul Kos P.E., P.Eng.

Senior Geological Engineer

Mobile: 303 570-9163
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Stantec
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Stantec

Pikeview Monitoring Memo March2022-final.pdf
5700K

To:	Jerald Schnabel	From:	Paul Kos
	Continental Materials Corp.		Denver, CO 80222
File:	March 2022 Monitoring Summary	Date:	April 30, 2022

Reference: March 2022 Geotechnical Monitoring Summary Pikeview Quarry

1.0 INTRODUCTION

Stantec Consulting Services Inc. (Stantec) has prepared this March 2022 Geotechnical Monitoring Summary for the Pikeview Quarry. The Pikeview Quarry is situated along the foothills of the Rocky Mountains, northwest of Colorado Springs, Colorado. Continental Materials Corp. (CMC) operates the quarry, which is currently closed, pending reclamation. A geotechnical monitoring program was established to monitor reclamation activities which will affect the geotechnical performance of the existing and reclaimed slopes during and following reclamation grading. This report presents the geotechnical monitoring results for the slope reclamation activities at the site through the month of March 2022. Continuous monitoring by the robotic survey system began in 2010 and has continued through the month March 2022 uninterrupted. Visual inspections of the slopes were performed by CMC employees and Stantec engineers.

1.1 PURPOSE

The purpose of this report is to summarize the March 2022 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 (CMC) and Monthly (Stantec)
Robotic theodolite/prism	Continuous
Drone inspection	Monthly
Compaction testing	Every 5,000 yd^3 (min.)

2.0 VISUAL INSPECTIONS

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

When present, site operators inspect their work areas for signs of instability on a daily basis before starting work per site safety rules and regulations. The daily inspection starts by reviewing any prism alerts/alarms and inspecting those areas before work begins in that area. The daily inspection also includes visual observations of the quarry walls and floor for any changes. No changes to the quarry conditions were identified during daily inspections in March 2022. The notes from the daily inspections are included in Table A-1 in Appendix A.

Stantec conducted visual inspections of the Pikeview Quarry slopes on March 29, 2022. The engineering inspections were conducted by traversing each area of the mine and observing the uphill slope and the downhill slope for signs of instability, and areas in need of maintenance. Slopes that have been graded and are 2 horizontal (H):1 vertical (V) or shallower are also traversed on foot. The findings are listed below, and photographs of notable observations are included on Figure 2 in Appendix A.

- Reclamation grading began in February 2022 and continued throughout March.
- A buffer zone is being kept between the active work areas and the toe of the slide to safely stop any loose rocks that might come loose and roll down the slope during grading operations. Compacted fill is placed in the buffer zone as the buttress fill is placed, and this area is maintained approximately 5 feet lower than the working bench. (Photo 1)
- The temporary fill stockpile has been removed and placed as compacted fill. The material was spread by dozers and compacted in one-foot lifts in accordance with the project specifications. (Photo 2)
- Three excavators, five dozers and eight haul trucks are operating in a loop on the pit floor to move material from the North Borrow Area to the pit floor for compaction in one-foot lifts. Note that the North Borrow Area is a separate project associated with the City's future plans for the property; this grading was permitted by El Paso County. (Photos 3 and 4)
- Fill material continues to be delivered to the central location on the production floor where it was temporarily placed. Future fill material will not be stockpiled; it will be directly placed, spread, and compacted. (Photo 5)
- A dozer is pushing material down the slope of the south borrow area and into the pit near the reclamation benches on the south-end of the site. The fill is placed in one-foot compacted lifts. (Photo 6)
- Several prisms are being removed and new prisms are coming online as grading progresses, and the line of sight is cut-off between some of the prisms and the station. (Photo 7)
- Riprap has been produced and stockpiled at several locations on site. (Photo 8)
- No cracking was observed on the native granite slopes above the extents of the disturbed area.
- Previously Observed Cracks: Previously observed tension cracks remain on the production floor and at the crest of fill slopes. These cracks appeared the same as in previous inspections.
- Older cracks and recent cracks are being monitored for changes. Currently the cracks are not growing in any of the areas on the slopes of the site. The hummocky field in the area immediately above the

southern extent of the slide shows evidence of cracking but they are not fresh or active. No new or open cracks were found immediately inside or next to the slide area.

- The culvert remains cleared but mostly blocked inside. CMC has partially cleared the debris, but access limitations and supports within the culvert inhibit clearing all the debris. CMC has procured a pump and will begin pumping operations if any water collects behind the culvert. CMC inspects the culvert for ponded water following rain events, and should any water be observed, it will be removed using pumps. To date, no ponding has been observed.
- Visual inspections of the Pikeview Quarry did not reveal any evidence of large-scale instability outside of the landslide areas previously identified. No bulging, rippling, over-steepening, depressions, slumps, or dry slip-offs were observed in areas that have been graded and/or reclaimed.

3.0 PRISM SURVEY

A Leica Robotic station is used to continuously survey the prisms onsite to document slope movements. The station records the location of each prism every hour. There are currently 18 active prisms; 3 prisms are control points located outside the slope movement area, 13 prisms are located on the slopes surrounding the landslide area, and 2 prisms are located at the toe of the landslide. As the slope is backfilled and graded, the existing prisms will be removed, and additional prisms will be installed. In March, 5 prisms were removed because the reclamation grading was going to affect their locations. Two of the prisms were control points, and the control points were replaced with new control prisms. Prism TS1 was added in March. Prism NP1 was removed in anticipation of grading in that area; this grading has been delayed and the prism will be reinstated at its original location. A log of prism removals and installations is included in Appendix B. The prism locations are shown on the current topography in Figure 3, and the proposed prism locations are shown on the reclamation topography in Figure 4. Both figures are included in Appendix B.

The monitoring software, GeoMos, has been programed to provide automatic alarms if there is a movement recorded that is greater than 0.35 feet or if a prism cannot be located. The alarm notes and actions taken are logged, and the alarms are summarized in Table 2. Following each alarm, CMC clears the area of concern until the data can be reviewed and the slope can be inspected. CMC made sure that there were no workers in the area before inspecting the slope. During March 2022, movement alarms were received from prisms NP2, P32, and P33; however, when the prisms were inspected, there were no signs of slope movements. In each case, the subsequent readings returned to normal, and the alarm is assumed to be a data error related to weather conditions. Readings in early March could not be recorded, and this was related to the power outage that disrupted readings in late February. All other alarms were determined to be caused by weather.

Table 2 Alarm Summary

Date(s)	Alarm	Cause/Actions taken	Issue Resolved
03/01/2022-03/04/2022	Compensator out of range/no communication/no readings	Issues related to power outages	03/04/2022
03/05/2022	Several prisms could not be found on multiple scans	Fog and frost blocked prisms	03/05/2022
03/06/2022-03/08/2022	Several prisms could not be found on multiple scans	Fog and snow blocked prisms	03/08/2022
03/09/2022-03/10/2022	Several prisms could not be found on multiple scans	Snow blocked prisms. Operations halted due to snow	03/10/2022
03/09/2022	Regression limit exceeded P32	No sign of movement after inspection	03/09/2022

03/10/2022	Compensator out of range/points not found	Snow and fog blocked prisms	03/10/2022
03/11/2022	Points not found: CP2, CP3, NP1, TOE2	Prisms removed due to grading activities	03/11/2022
03/11/2022	Regression limit exceeded P32	Data error. No sign of movements after inspection. One reading was -0.391' followed by a reading of +0.382'.	03/11/2022
03/11/2022	Regression limit exceeded NP2	No sign of movements after inspection.	03/11/2022
03/14/2022	Several prisms could not be found on multiple scans	Fog and frost	03/14/2022
03/15/2022-03/16/2022	Regression limit exceeded P33	Data error. No sign of movements after inspection. One reading was -0.466 followed by a reading of +0.371	03/16/2022
03/16/2022	Regression limit exceeded P32	No sign of movements after inspection.	03/16/2022
03/17/2022	Several prisms could not be found on multiple scans	Power outage, snow, no work occurring	03/17/2022
03/18/2022	TOE3 not found	Blocked by fill placement	03/18/2022
03/21/2022	Several points not found	Fog	03/21/2022
03/22/2022	Compensator out of range/points not found	Snow and fog	03/22/2022
03/25/2022	P69 not found	Unknown cause. Single reading after work hours	03/25/2022
03/27/2022	Regression limit exceeded P33	Data error. No sign of movements after inspection. One reading was +0.371 followed by a reading of -0.372	03/27/2022
03/28/2022	TOE3 not found	Blocked by fill placement. Prism removed.	03/28/2022
03/29/2022-3/30/2022	Points not found	Snow and fog	03/30/2022

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 has been several years for all the prisms except P69. Prism P69 was moved on June 20, 2020, and the displacements included in Table 3 are the displacements since that date. According to Leica documentation, the survey accuracy is +/-4 mm+1.5 ppm for prisms located greater than 500m from the station; these equates to an accuracy of +/-0.016 ft.

The data show stable conditions with no movement for 20 of 23 prisms with recorded displacements limited to data scatter and not actual movements. Prisms P63 and TOE3 are located at the toe of the landslide, and these locations showed slope creep movements at slow velocities. Prism NP66 is located above the landslide, and this prism also recorded slope creep movements at slow velocity. This settlement is likely

related to the landslide material consolidating under its own weight. Plots of the transverse and height displacements for each prism are included in Appendix B.

Table 3 Prism Summary

Prism ID	Cumulative Transverse Displacement (ft)	Cumulative Height Displacement (ft)	Monthly Delta (ft)	Cumulative Delta (ft)	Notes / Recommendations
CP1	-0.001	-0.038	-0.0474	0.3503	
CP2	-0.060	0.018	0.0220	0.4177	Prism removed 3-11
CP3	0.297	-0.227	0.0296	0.3773	Prism removed 3-11
CP4	0.673	-0.923	0.0225	1.1436	New Prism
CP5	0.104	-0.109	0.0440	0.2070	New Prism
NP1	0.594	-0.825	0.0469	1.2423	Prism removed 3-11
NP2	0.342	-0.063	-0.0474	0.3503	
NP66	0.138	-0.041	-0.0143	0.2228	Slope creep movements.
P1	-0.013	0.025	0.0509	0.1782	
P2	-0.068	-0.091	0.0439	0.3022	
P25	-0.100	-0.061	0.0652	0.2318	
P32	0.021	-0.191	0.0204	0.4528	
P33	0.366	-0.144	-0.0138	0.4947	
P35	0.395	-0.163	-0.0020	0.6345	
P4	15.839	-6.490	0.0049	17.1174	
P5	0.004	-0.067	0.0100	0.6289	
P63	0.338	-0.340	-0.0144	0.1683	Slope creep movements.
P69	0.156	0.020	-0.0144	0.1683	
P70	0.668	-0.665	-0.0094	0.9734	
TOE1	3.679	-1.868	0.0300	4.3315	
TOE2	0.006	-0.028	-0.0074	0.0293	Prism removed 3-11
TOE3	0.025	-0.064	0.0484	0.0701	Slope creep movements. Prism removed 3-11.
TS1	0.007	-0.019	0.0207	0.0271	New Prism

4.0 DRONE SURVEY

The site was flown for aerial imagery using an unmanned aircraft system (UAS or ‘drone’) on, March 28, 2022. 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 February topography was also compared to the March topography to identify changes in the site topography. Comparison of the two surveys showed the placement of the fill material at the toe of the landslide. Fill material is excavated from the South Borrow Area or imported from offsite projects, including the North Borrow Area. No slope movements or other changes in topography were identified. The current imagery and topography are included in Figures 1 and 3, and the comparison surface is included as Figure 5 in Appendix C.

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

5.0 COMPACTION TESTING

Fill placement started on February 25, 2022 and continued throughout March. The grading commencing by spreading the temporary fill stockpile followed by transporting material from the South Borrow Area and North Borrow Area. Importing fill also continued. Fill was placed in one-foot lifts, moisture conditioned as necessary, and compacted. Compaction testing began March 2022 and will continue at the rate of at least one test per 5,000 yd^3 placed. During February and March, approximately 220,000 yd^3 had been placed and compacted. This required at least 44 compaction tests, and 64 compaction tests were recorded. All tests met or exceeded the minimum compaction requirement of 90% of the optimal density as measured by a Standard Proctor Test. The compaction testing results are summarized in Appendix D, and the testing locations are shown on Figure 6.

6.0 RECLAMATION PROGRESS

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

Phase 1 - Value Engineering and issue RFP to qualified Contractors

Phase 2 - Commercial negotiations with successful contractor

Phase 3 - Execution planning and Contractor readiness review

Phase 4 - Site Construction execution

Phase 5 - Final revegetation (season 2)

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

Progress of activities this month:

- Contractor continued earth moving activities
- Quality assurance testing initiated
- Importing fill material continued
- Geotechnical monitoring continued
- Begin removal of existing prisms and replacement with new prisms.

Work planned for next month includes:

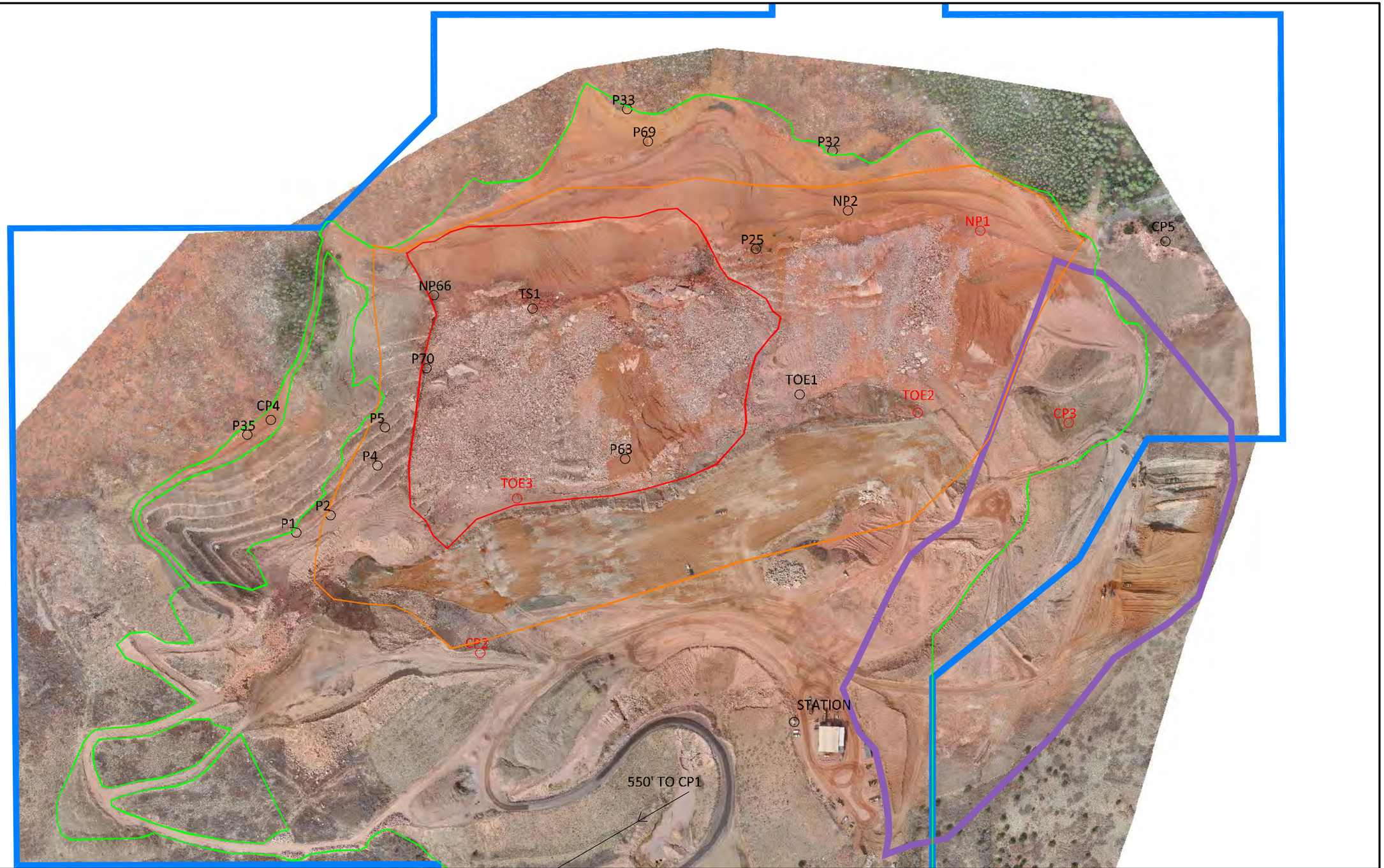
- Continue reclamation grading
- Continue importing fill material
- Continue geotechnical monitoring
- Continue quality assurance testing
- Continue removing and replacing prisms on an as-needed basis

7.0 CONCLUSIONS

The data collected in March 2022 demonstrate compliance with the reclamation grading plan. The buttress fill is being placed as intended and specified; this includes one-foot-thick compacted lifts.

None of the data collected in March 2022 indicate evidence of any large-scale movements that increase risk to workers or to the public. The landslide area continues to show slope creep movements with slow velocities. Shallow surface erosion continues to occur requiring ongoing maintenance and cleanup.

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



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LEGEND

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

N

0 300' 600'

Client/Project
CONTINENTAL MATERIALS CORP.
PIKEVIEW QUARRY SLOPE MONITORING

Project No.
2057288200

Title
SITE MAP

Revision
#

Date
2022.04.30

Drawn By
PK

Figure No.
1

Appendix A

Visual Inspections

Table A-1 Summary of Daily Inspecitons

Date	Notes	Inspection By
March 1, 2022	Power failure at Leica. No movements detected.	Jerald Schnabel
March 2, 2022	Power failure at Leica. No movements detected.	Jerald Schnabel
March 3, 2022	Power failure at Leica. No movements detected.	Jerald Schnabel
March 4, 2022	Power failure at Leica. No movements detected.	Jerald Schnabel
March 5, 2022	No Movement observed. Good to proceed.	Jerald Schnabel
March 6, 2022	Snow and Fog. No movements detected.	Jerald Schnabel
March 7, 2022	Fog Conditions. No movements detected.	Jerald Schnabel
March 8, 2022	Snow. No movements detected.	Jerald Schnabel
March 9, 2022	Snow and Fog. No movements detected.	Jerald Schnabel
March 10, 2022	No Movement observed. Good to proceed.	Jerald Schnabel
March 11, 2022	No Movement observed. Good to proceed.	Jerald Schnabel
March 12, 2022	No Movement observed. Good to proceed.	Jerald Schnabel
March 13, 2022	No Movement observed. Good to proceed.	Jerald Schnabel
March 14, 2022	Snow. No movements detected.	Jerald Schnabel
March 15, 2022	No Movement observed. Good to proceed.	Jerald Schnabel
March 16, 2022	No Movement observed. Good to proceed.	Jerald Schnabel
March 17, 2022	No Movement observed. Good to proceed.	Jerald Schnabel
March 18, 2022	No Movement observed. Good to proceed.	Jerald Schnabel
March 19, 2022	No Movement observed. Good to proceed.	Jerald Schnabel
March 20, 2022	No Movement observed. Good to proceed.	Jerald Schnabel
March 21, 2022	No Movement observed. Good to proceed.	Jerald Schnabel
March 22, 2022	No Movement observed. Good to proceed.	Jerald Schnabel
March 23, 2022	No Movement observed. Good to proceed.	Jerald Schnabel
March 24, 2022	No Movement observed. Good to proceed.	Jerald Schnabel
March 25, 2022	No Movement observed. Good to proceed.	Jerald Schnabel
March 26, 2022	No Movement observed. Good to proceed.	Jerald Schnabel
March 27, 2022	No Movement observed. Good to proceed.	Jerald Schnabel
March 28, 2022	No Movement observed. Good to proceed.	Jerald Schnabel
March 29, 2022	No Movement observed. Good to proceed.	Jerald Schnabel
March 30, 2022	Snow. No movements detected.	Jerald Schnabel
March 31, 2022	Snow and Fog. No movements detected.	Jerald Schnabel

6. Dozer pushing material at south borrow area.

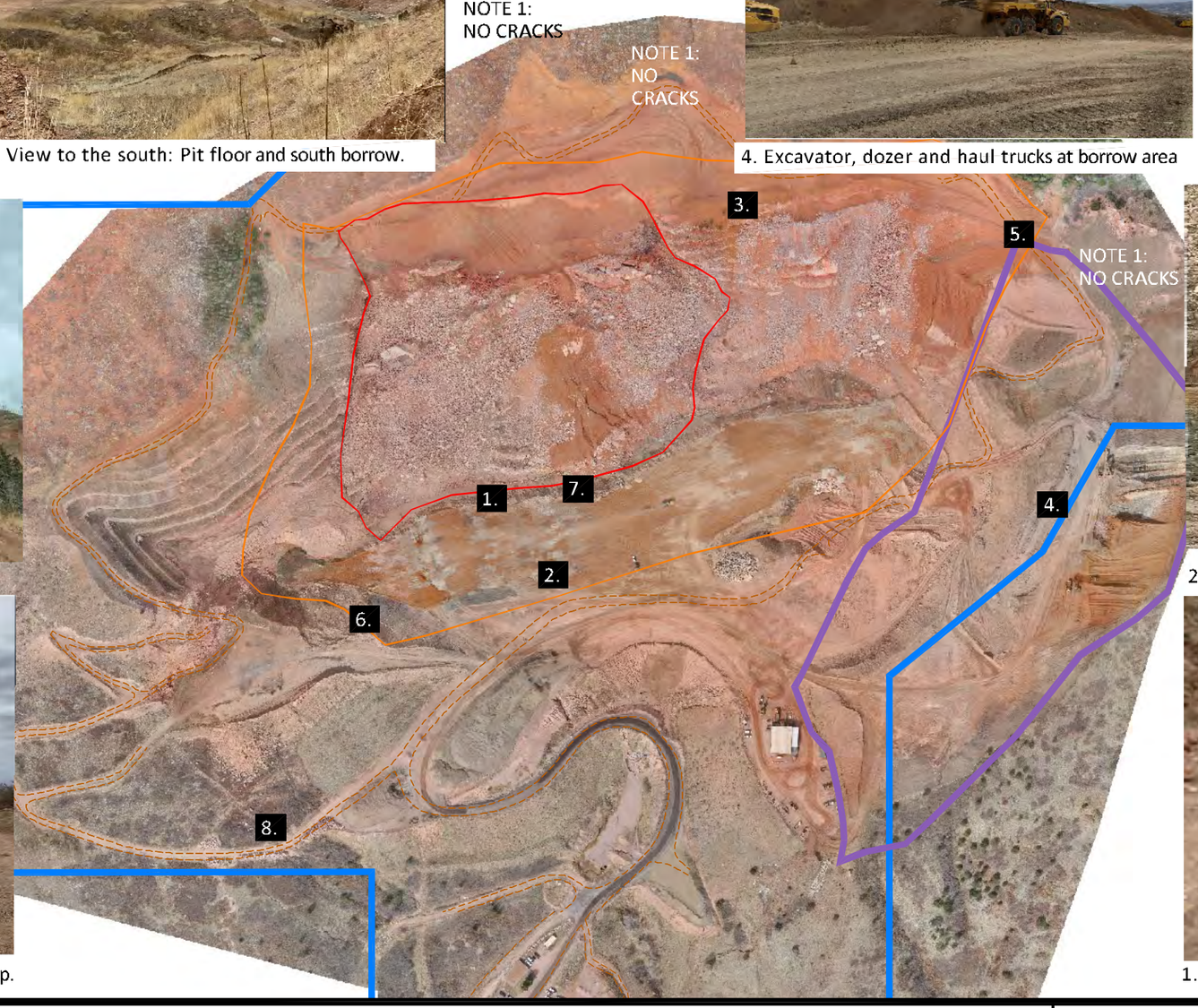
5. View to the south: Pit floor and south borrow.

4. Excavator, dozer and haul trucks at borrow area

3. View of the north borrow area to the northeast.

7. TOE-3 Prism removed as pit floor rises.

8. Riprap stockpiled at the south-end near top of ramp.



2. Sheeps foot compactor in the pit area.

1. Safety buffer between toe of slope and work area.

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LEGEND

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

NOTES

1. NO CRACKS OBSERVED IN THIS AREA.
2. ALL PHOTOS TAKEN MARCH 29, 2021.

N

0 400' 800'

Client/Project
CONTINENTAL MATERIALS CORP.
PIKEVIEW QUARRY SLOPE MONITORING

Project No.
2057288200

Title
OBSERVATIONS FROM MARCH INSPECTION

Revision
#

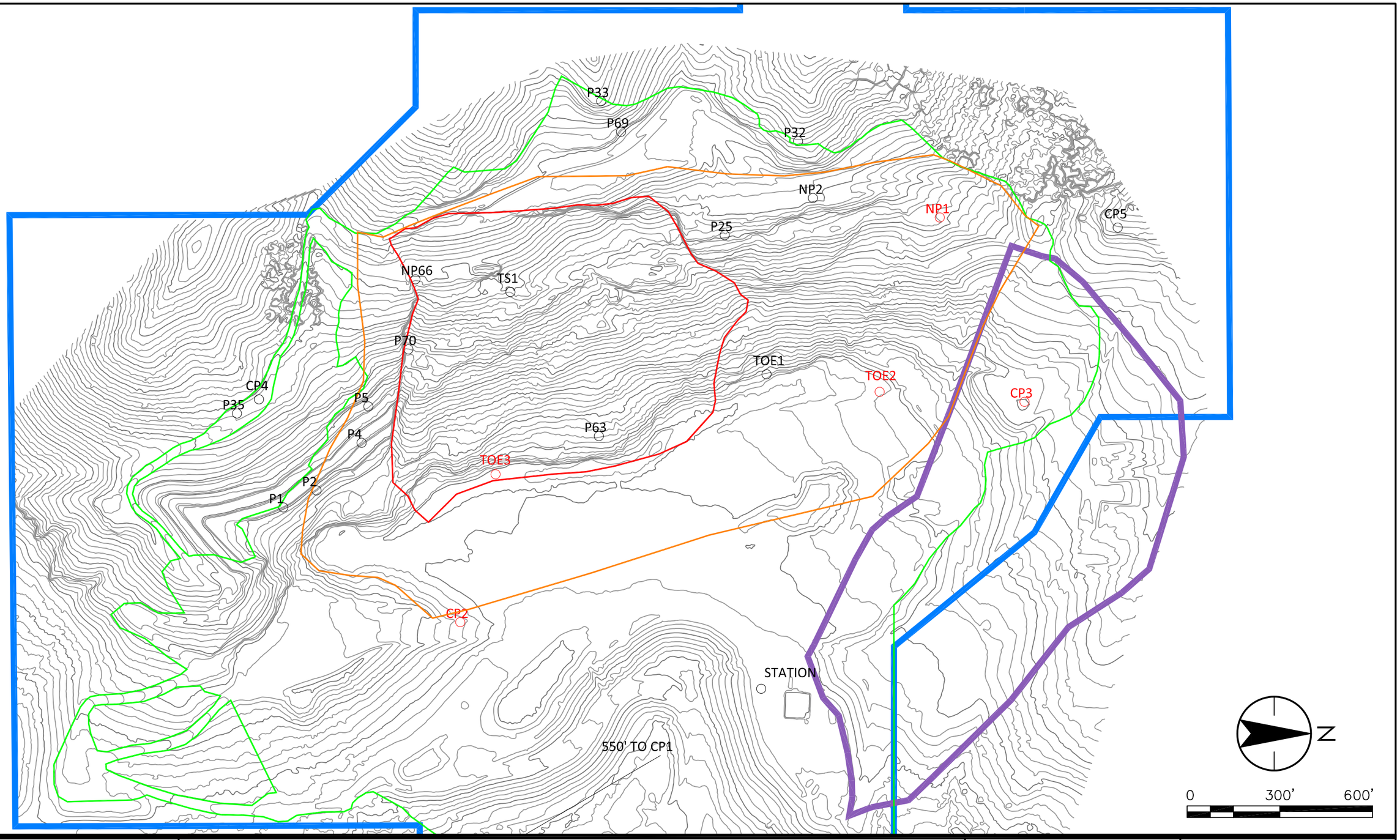
Date
2022.04.30

Drawn By
PK

Figure No.
2

Appendix B

Prism Survey



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LEGEND

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

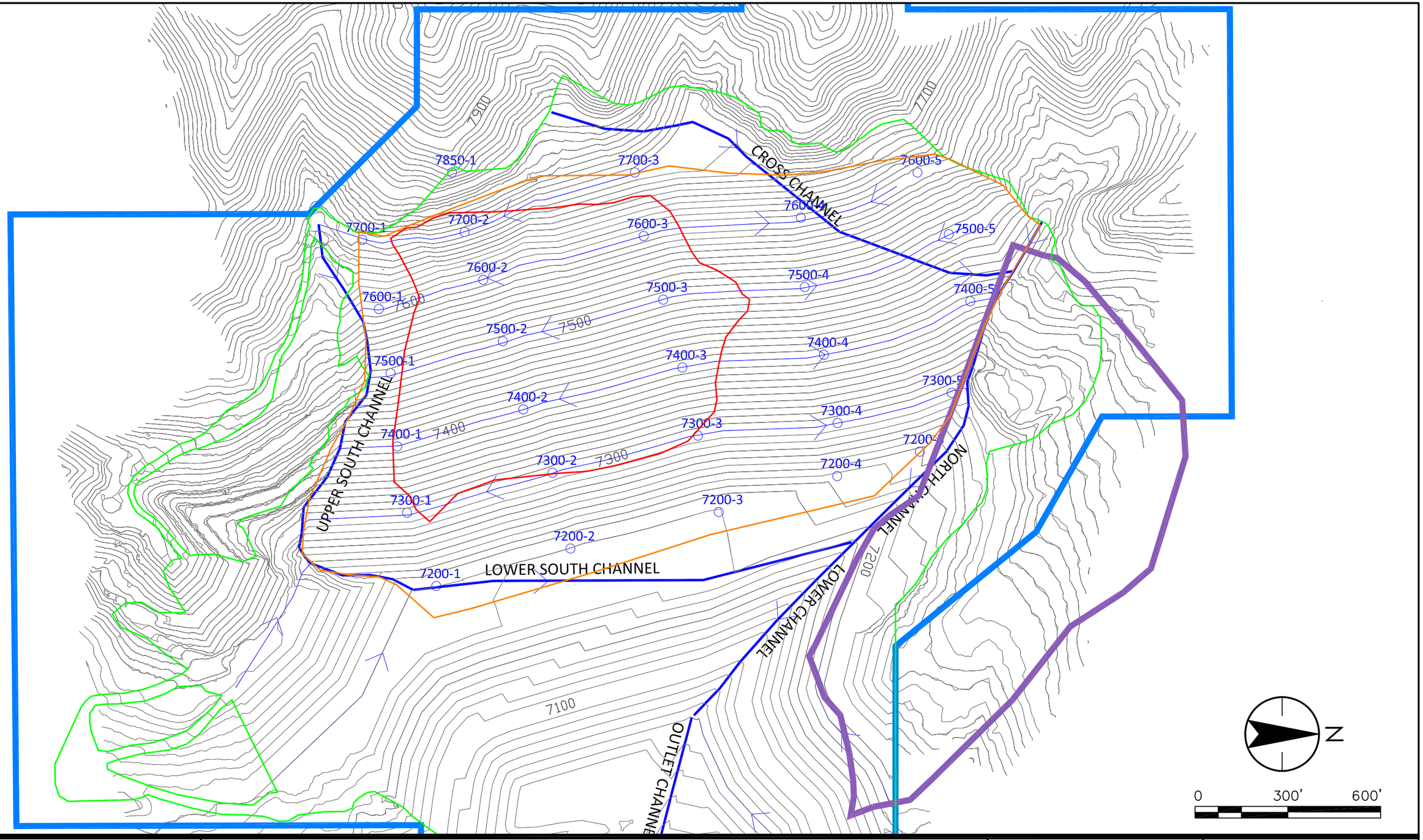
1. GRADING AND MOVEMENT OF STATION WILL BE EXTENDED AS LONG AS POSSIBLE.
2. PRISMS WILL BE INSTALLED AS EACH BENCH IS FINISHED.
3. ALL PRISMS WILL BE RETAINED AS LONG AS POSSIBLE.
4. TOPOGRAPHY FROM MARCH 28, 2022 DRONE SURVEY.
5. CONTOUR INTERVAL IS 10 FEET

Client/Project
CONTINENTAL MATERIALS CORP.
PIKEVIEW QUARRY SLOPE MONITORING

Project No.
2057288200

Title
EXISTING PRISMS WITH CURRENT SURFACE

Revision	Date
#	2022.04.30
Drawn By	Figure No.
PK	3



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LEGEND

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

NOTES

1. GRADING AND MOVEMENT OF STATION WILL BE EXTENDED AS LONG AS POSSIBLE.
2. PRISMS WILL BE INSTALLED AS EACH BENCH IS FINISHED.
3. ALL PRISMS WILL BE RETAINED AS LONG AS POSSIBLE.

Client/Project
CONTINENTAL MATERIALS CORP.
PIKEVIEW QUARRY SLOPE MONITORING

Project No.
2057288200

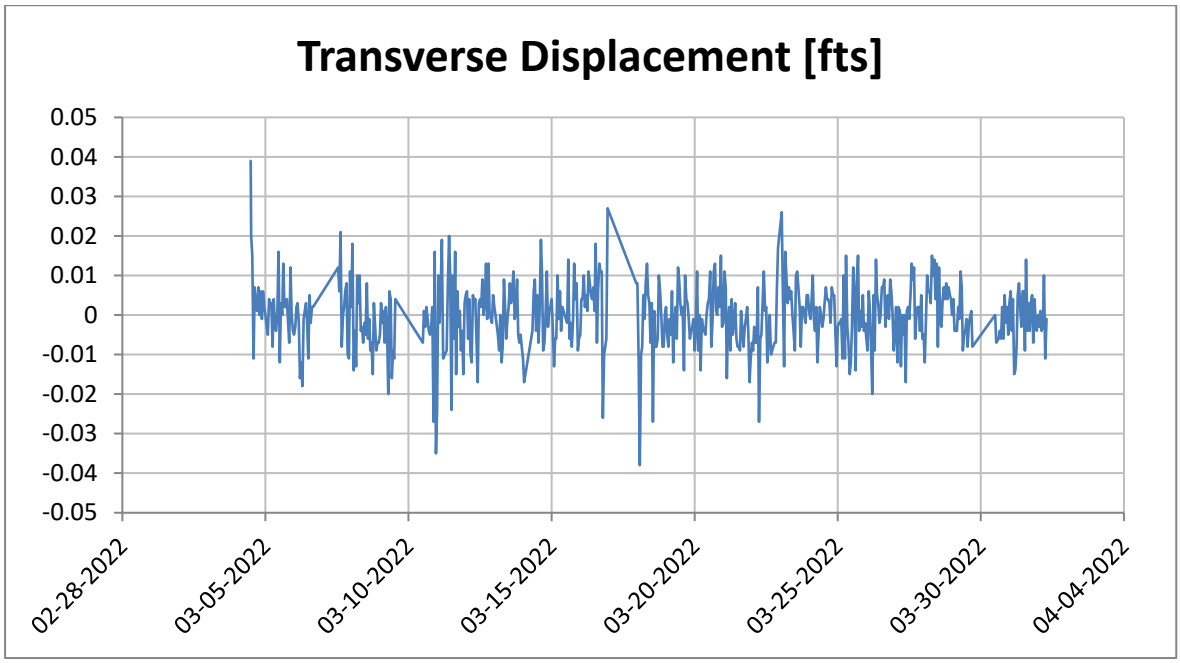
Title
PROPOSED PRISMS WITH RECLAMATION SURFACE

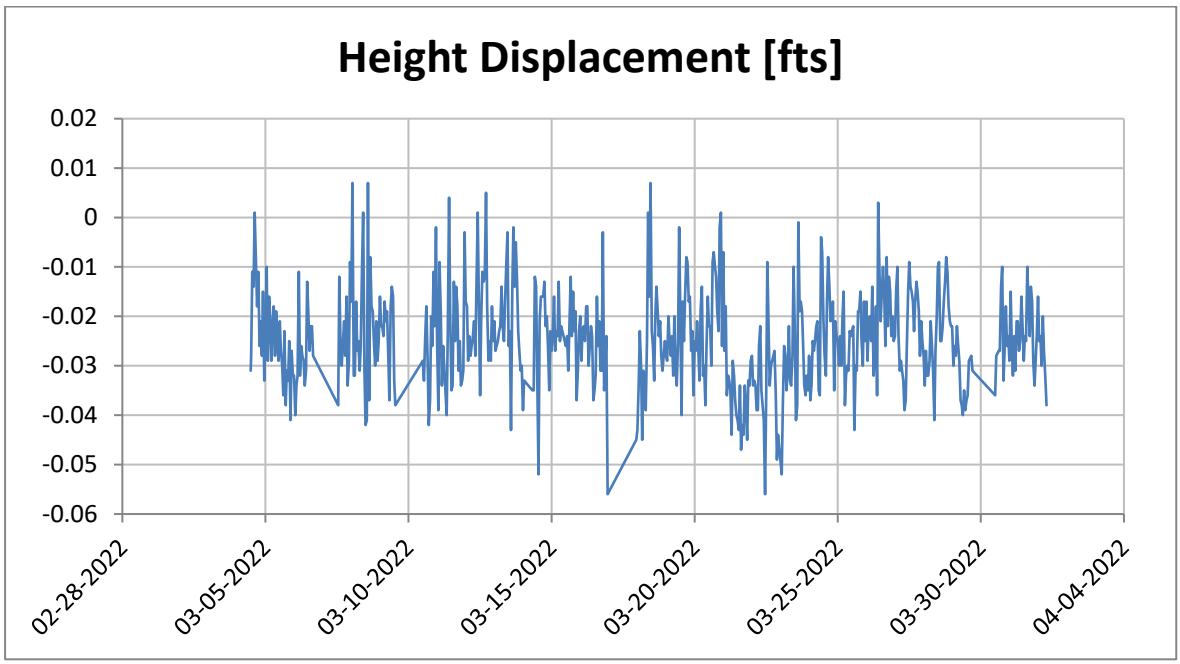
Revision	Date
#	2022.04.30
Drawn By	Figure No.
PK	4

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

Prism CP1

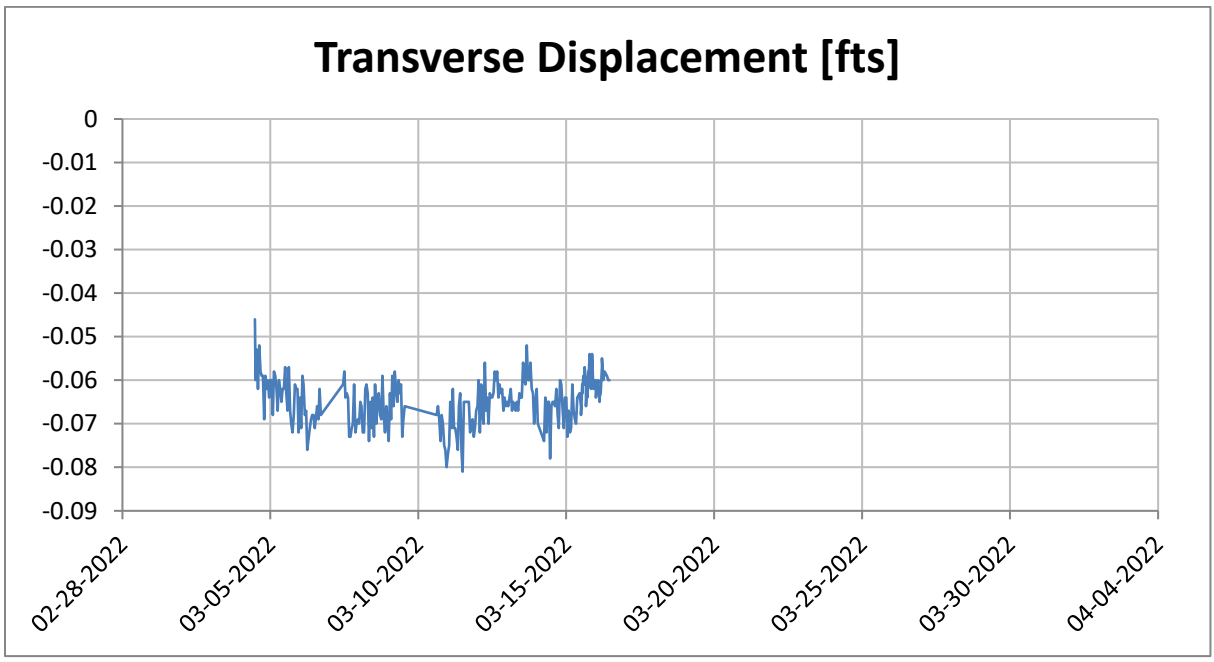


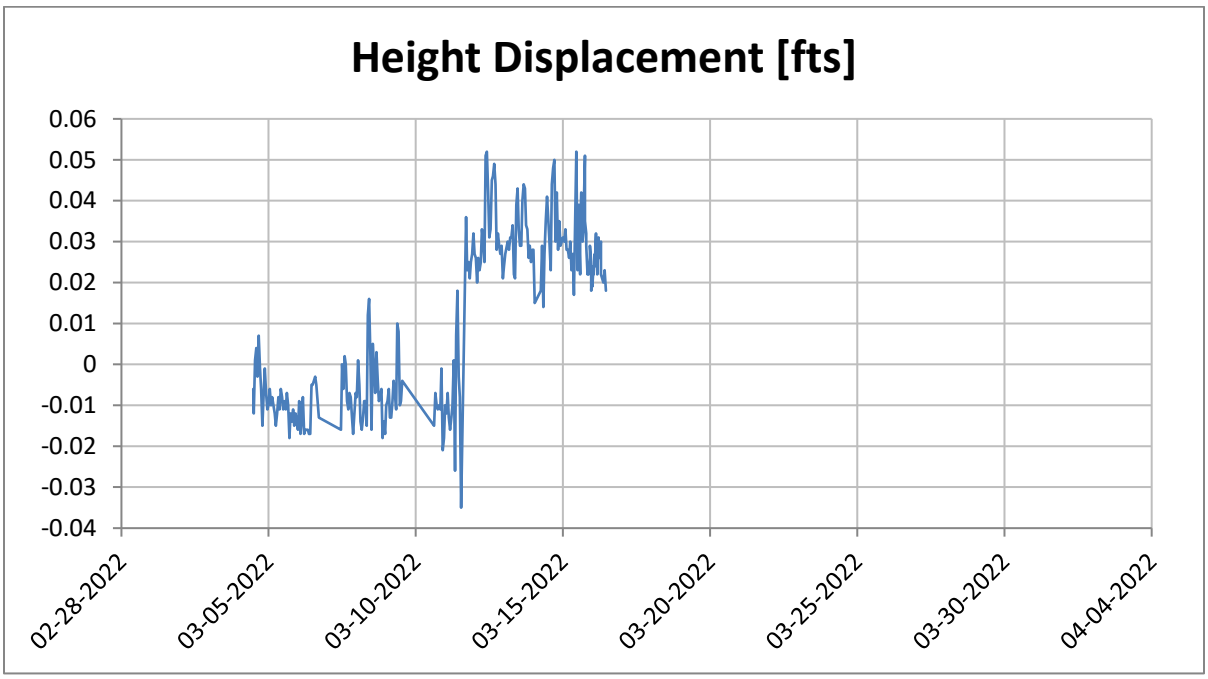


Notes:

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

Prism CP2

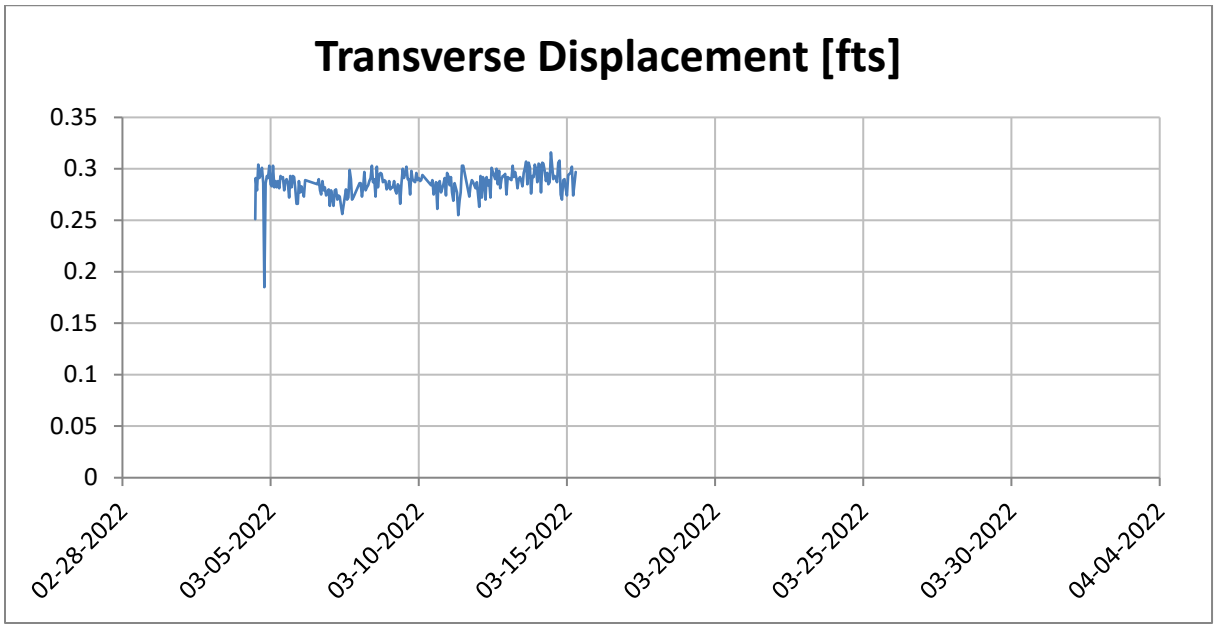


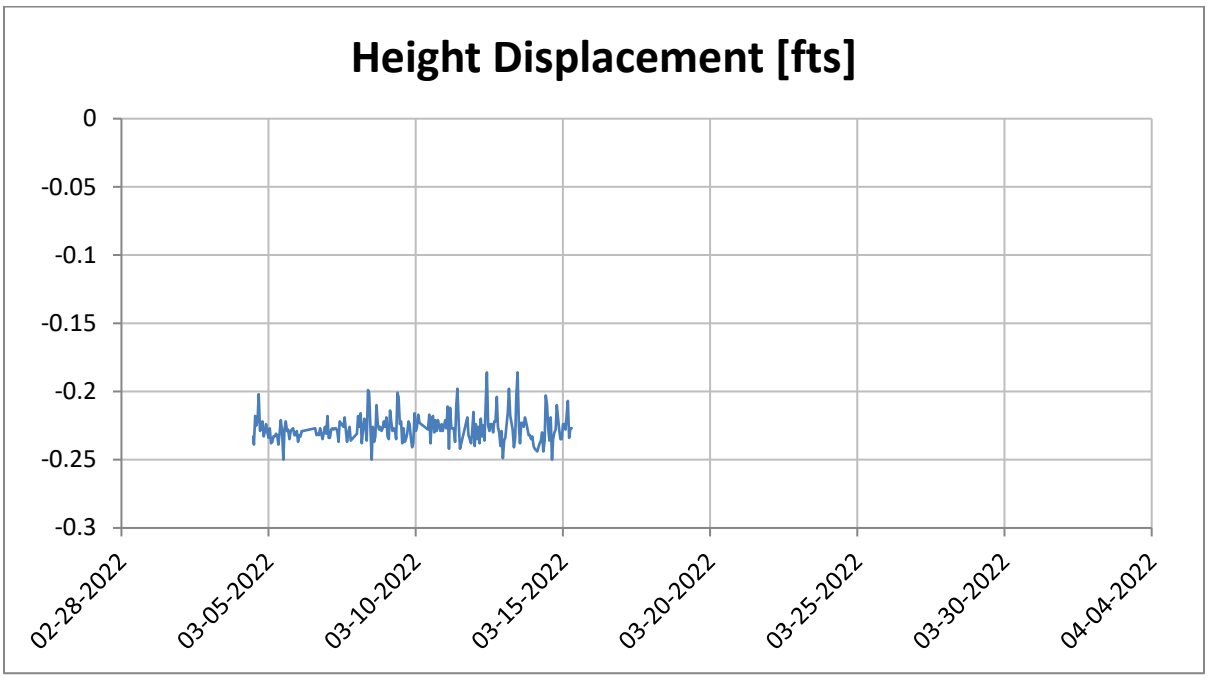


Notes:

1. Survey accuracy is +/-0.016 feet.
2. Alarm threshold is +/-0.35 feet.
3. Transverse displacement is in the horizontal direction. Positive direction means closer to the robotic station.
4. Height displacement is in the vertical direction. Positive direction means higher in elevation.
5. Prism removed March 11, 2022 but reinstalled until March 16 when CP4 and CP5 could replace the control prism. The height displacement recorded is the result of the prism being removed and then replaced.

Prism CP3

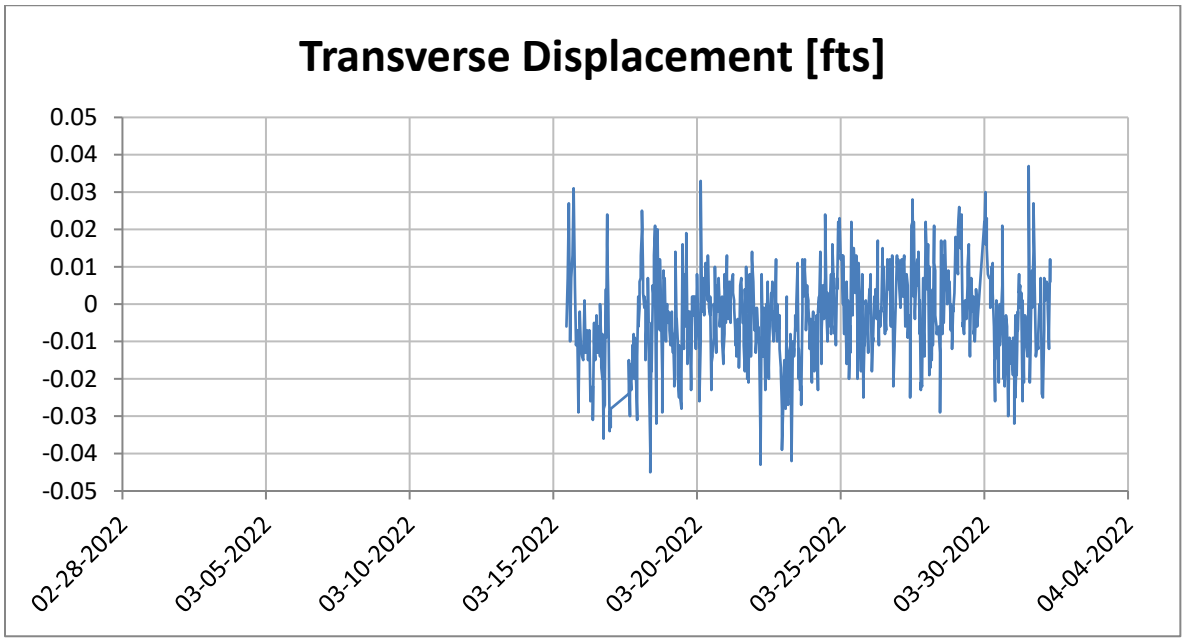


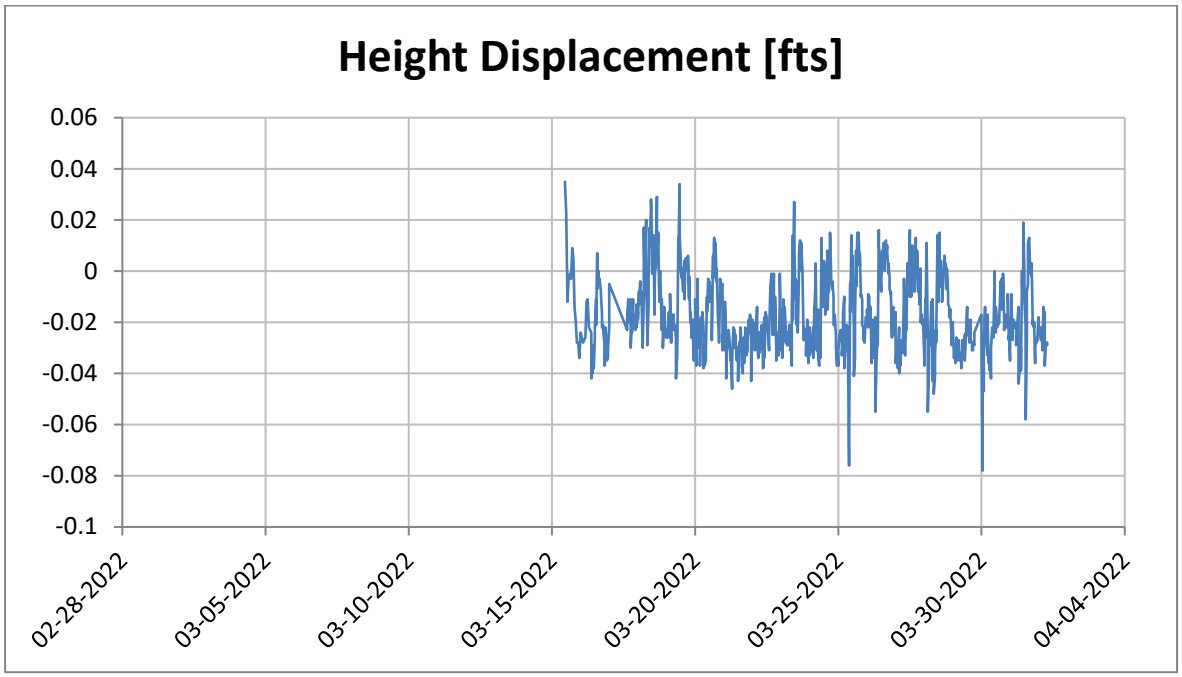


Notes:

1. Survey accuracy is +/-0.016 feet.
2. Alarm threshold is +/-0.35 feet.
3. Transverse displacement is in the horizontal direction. Positive direction means closer to the robotic station.
4. Height displacement is in the vertical direction. Positive direction means higher in elevation.
5. Prism removed March 11, 2022.

Prism CP4

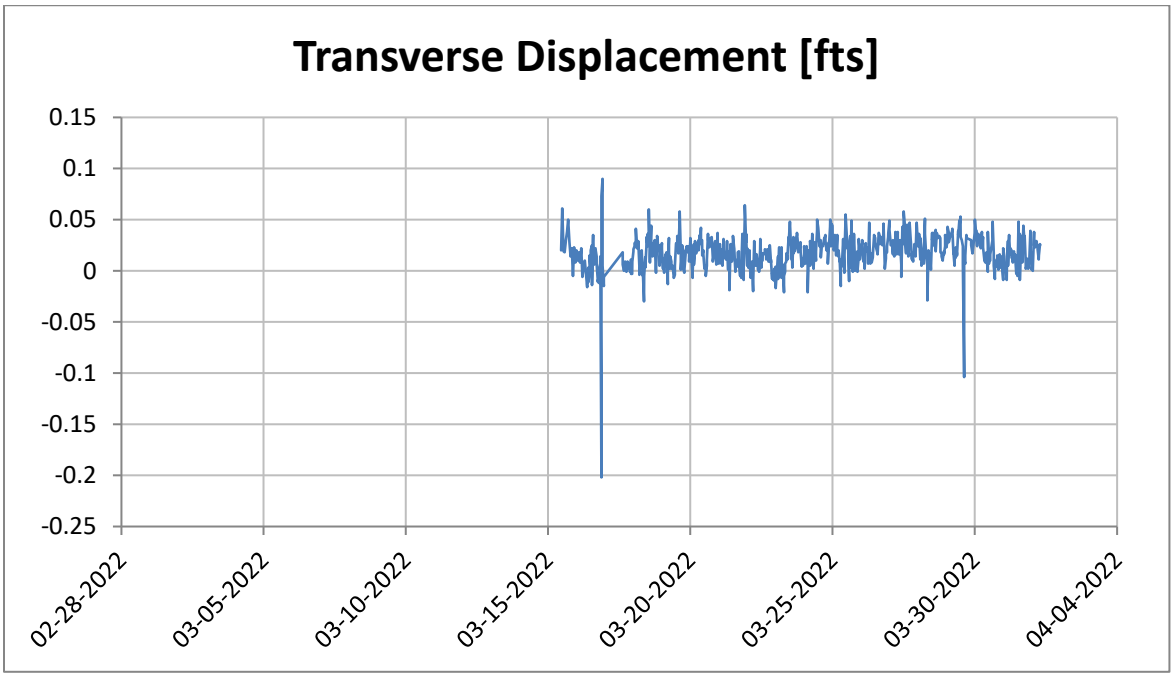


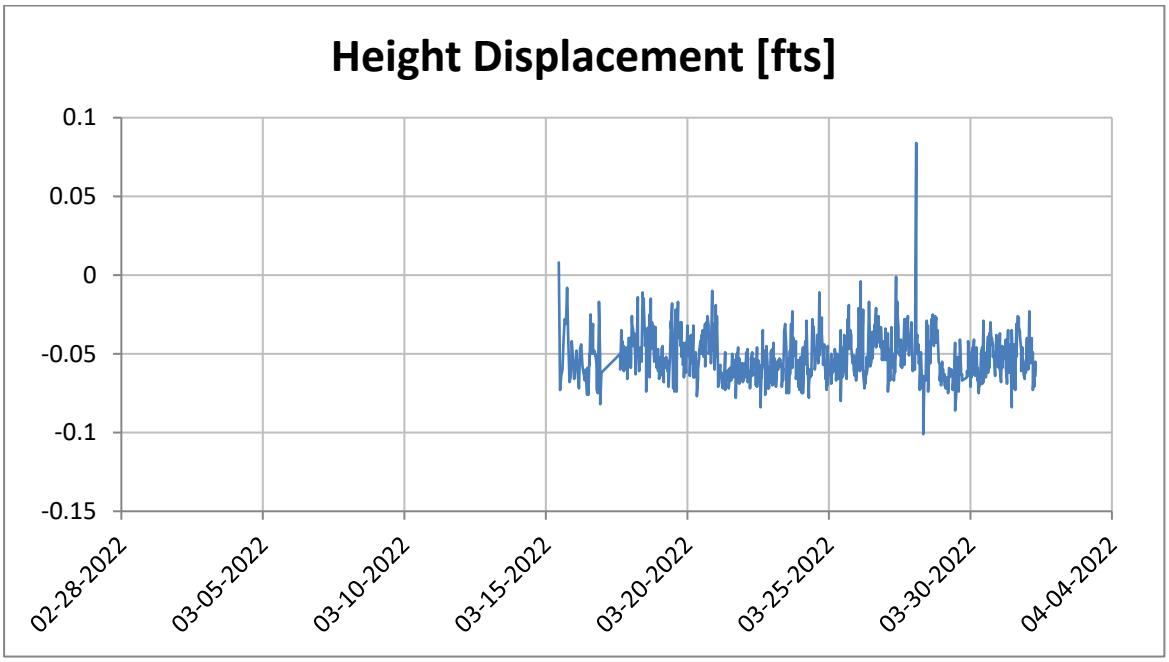


Notes:

1. Survey accuracy is +/-0.016 feet.
2. Alarm threshold is +/-0.35 feet.
3. Transverse displacement is in the horizontal direction. Positive direction means closer to the robotic station.
4. Height displacement is in the vertical direction. Positive direction means higher in elevation.
5. Prism installed March 11, 2022.

Prism CP5

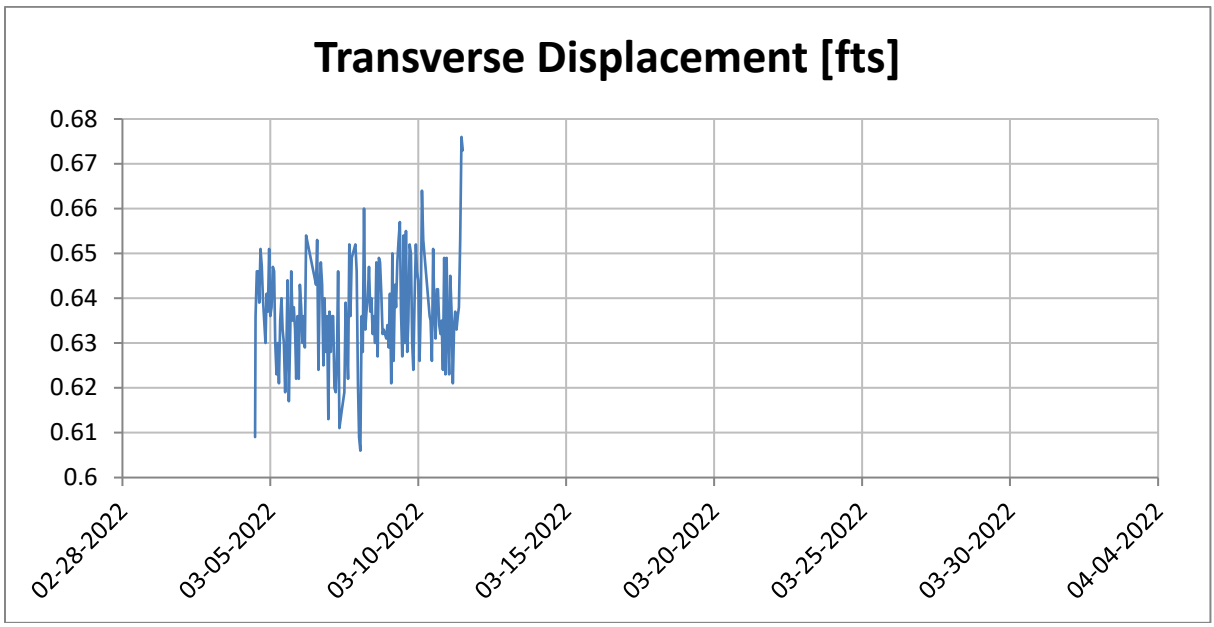


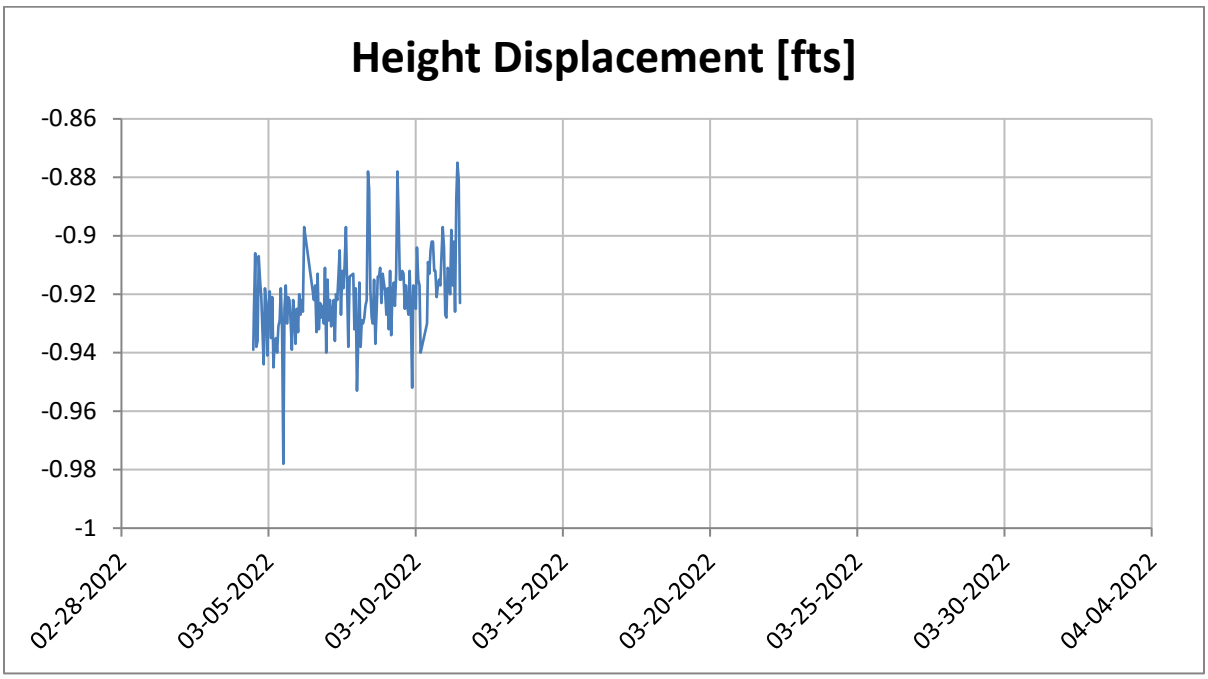


Notes:

1. Survey accuracy is +/-0.016 feet.
2. Alarm threshold is +/-0.35 feet.
3. Transverse displacement is in the horizontal direction. Positive direction means closer to the robotic station.
4. Height displacement is in the vertical direction. Positive direction means higher in elevation.
5. Prism installed March 11, 2022.

Prism NP1

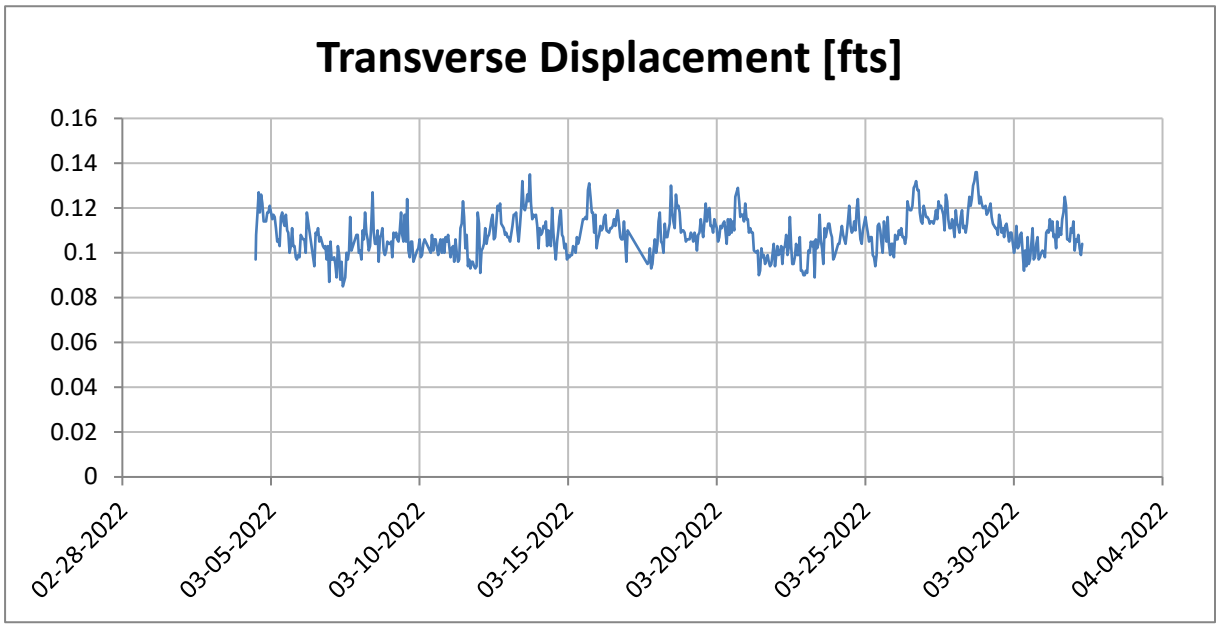


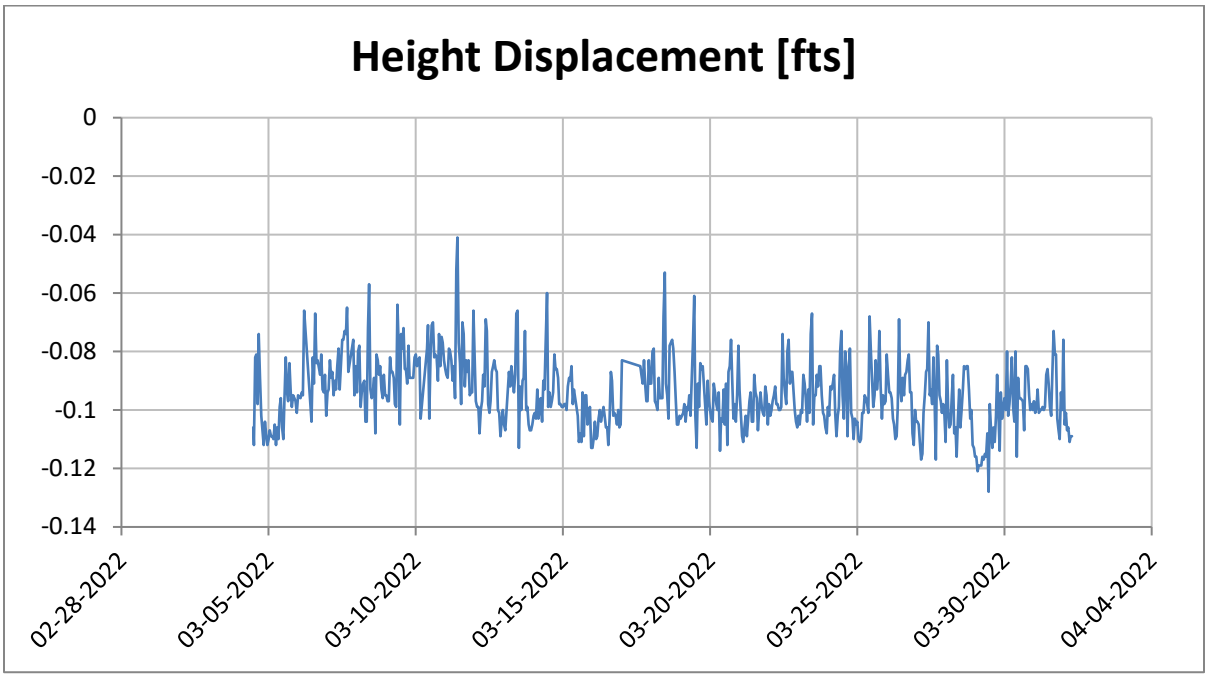


Notes:

1. Survey accuracy is +/-0.016 feet.
2. Alarm threshold is +/-0.35 feet.
3. Transverse displacement is in the horizontal direction. Positive direction means closer to the robotic station.
4. Height displacement is in the vertical direction. Positive direction means higher in elevation.
5. Prism removed March 11, 2022.

Prism NP2

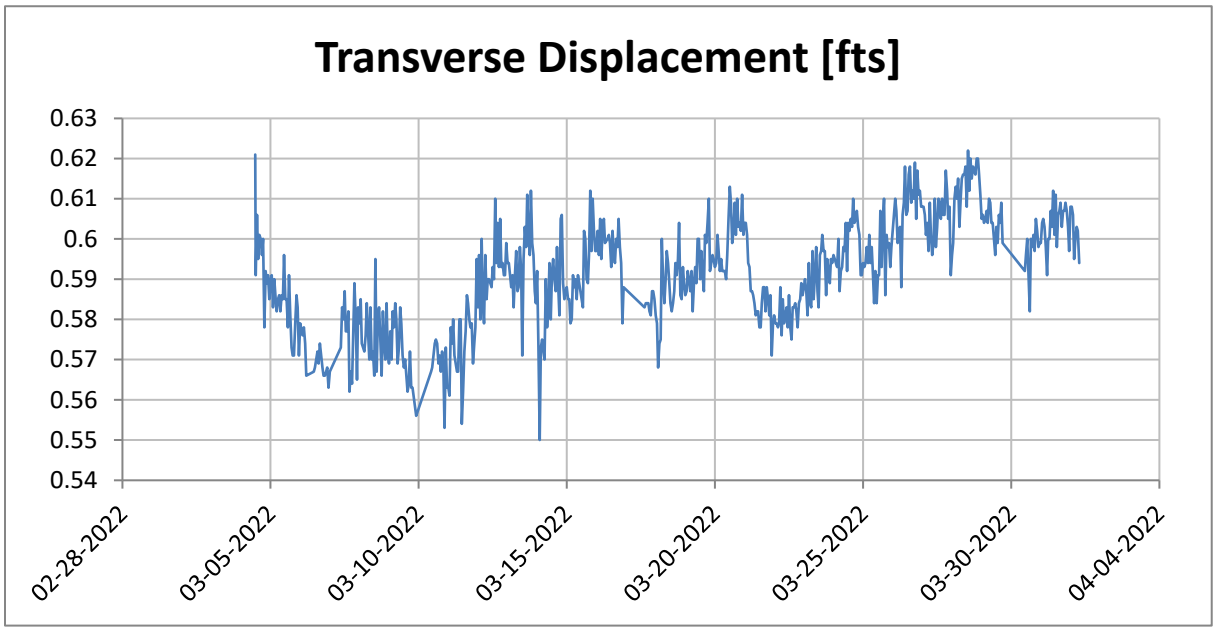


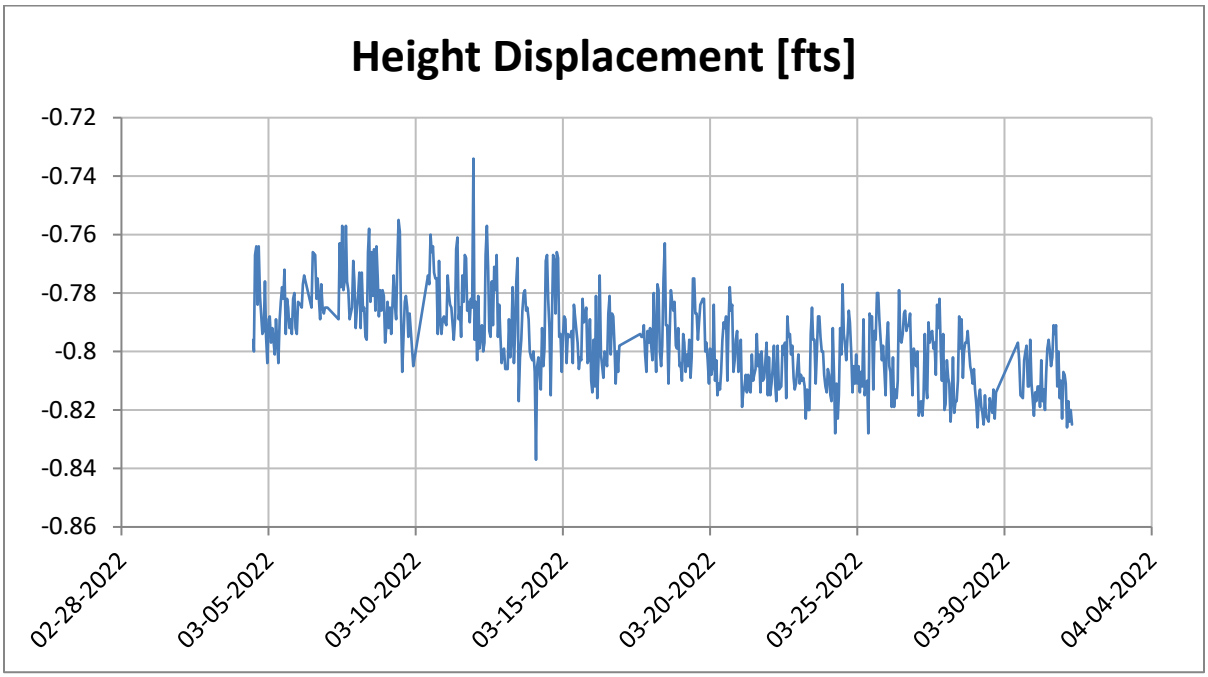


Notes:

1. Survey accuracy is +/-0.016 feet.
2. Alarm threshold is +/-0.35 feet.
3. Transverse displacement is in the horizontal direction. Positive direction means closer to the robotic station.
4. Height displacement is in the vertical direction. Positive direction means higher in elevation.
5. A regression limit alarm was received on March 11.

Prism NP66

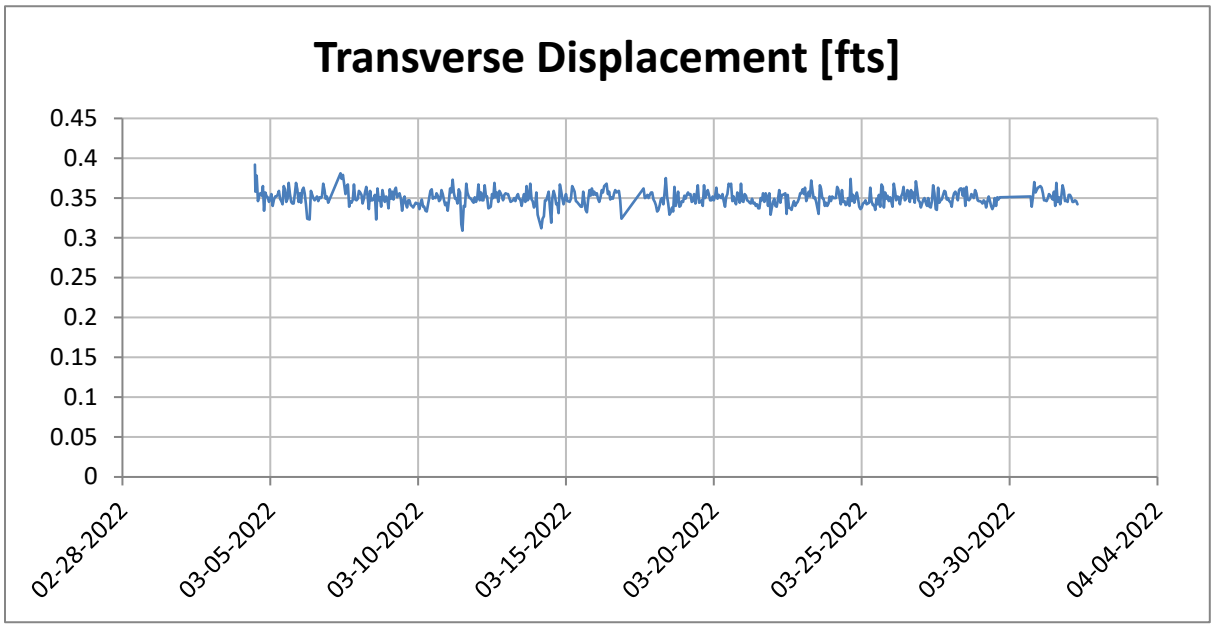


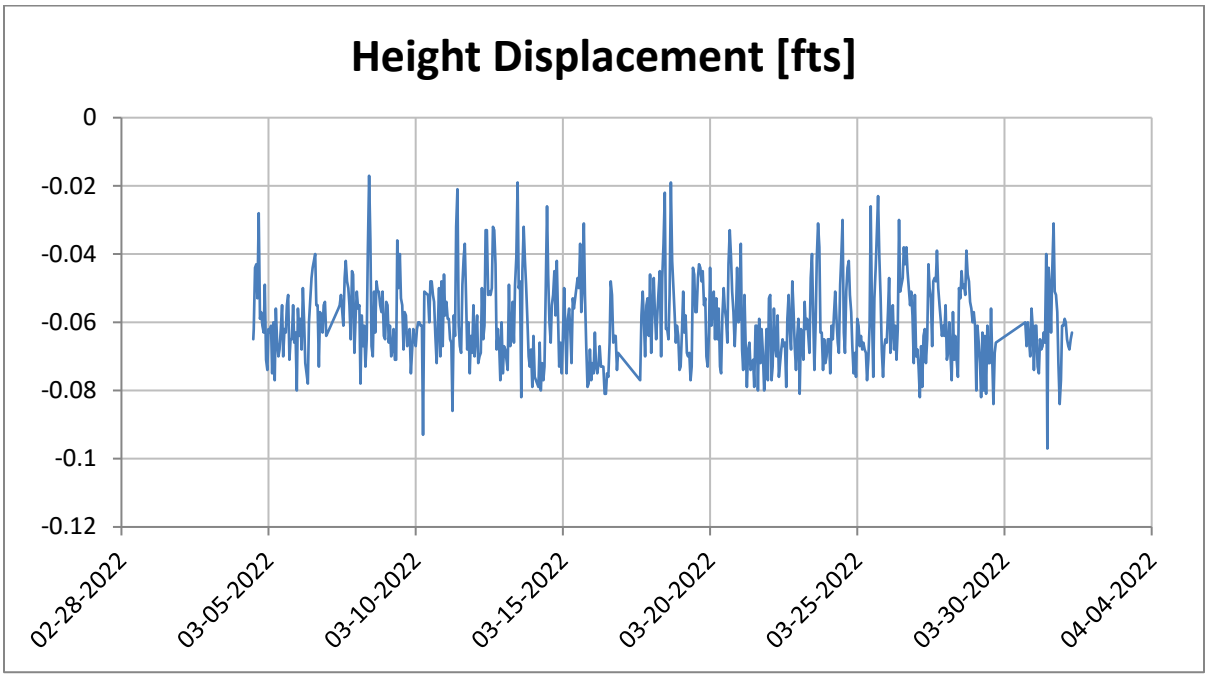


Notes:

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

Prism P1

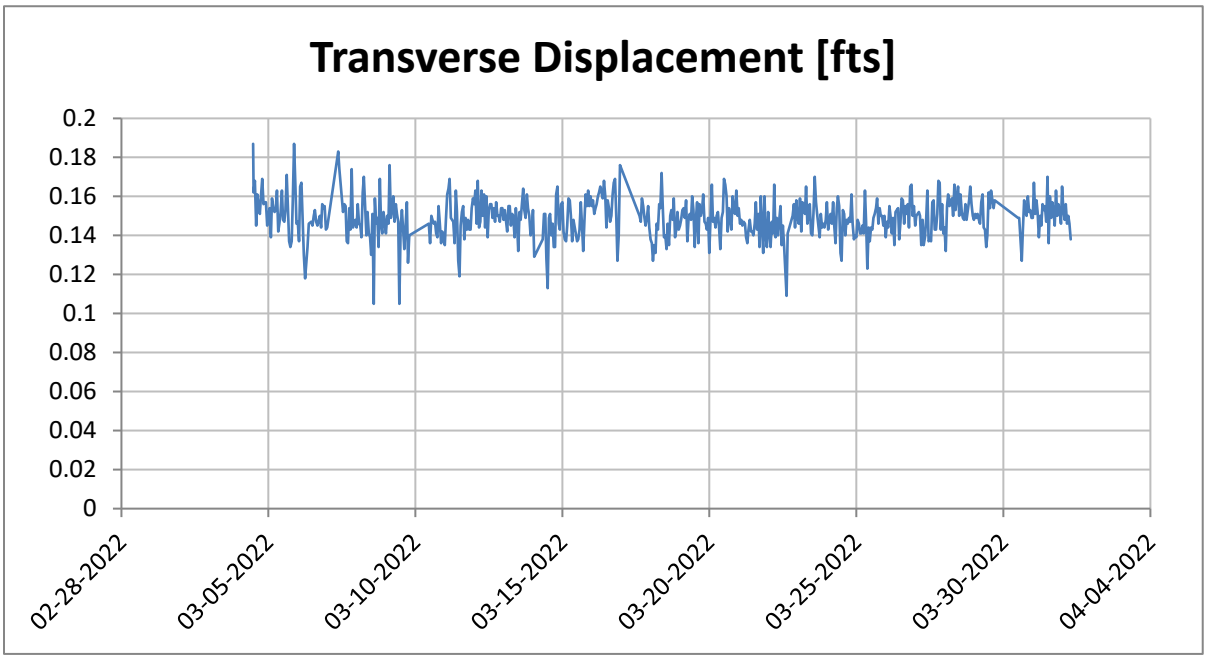


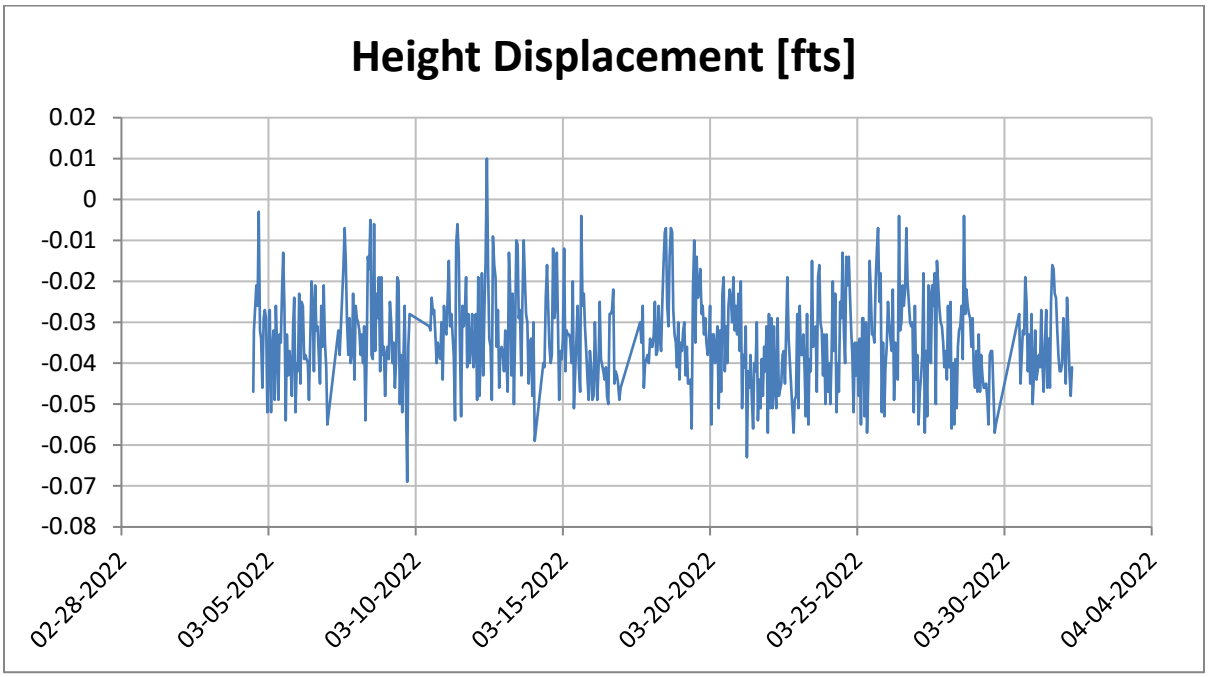


Notes:

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

Prism P2

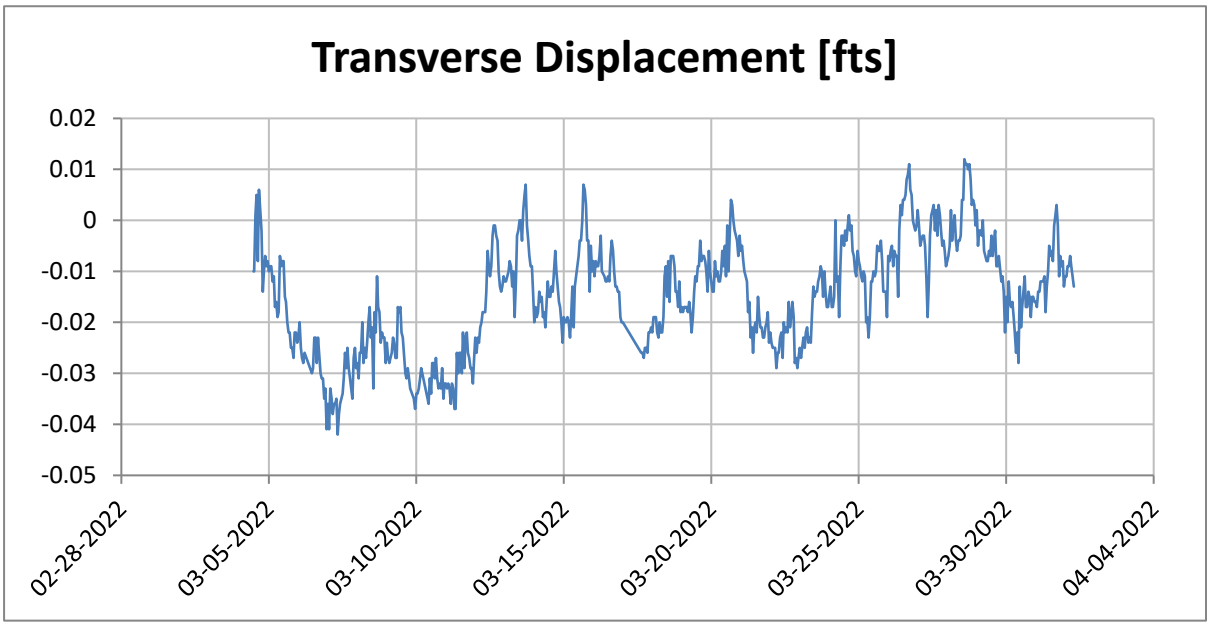


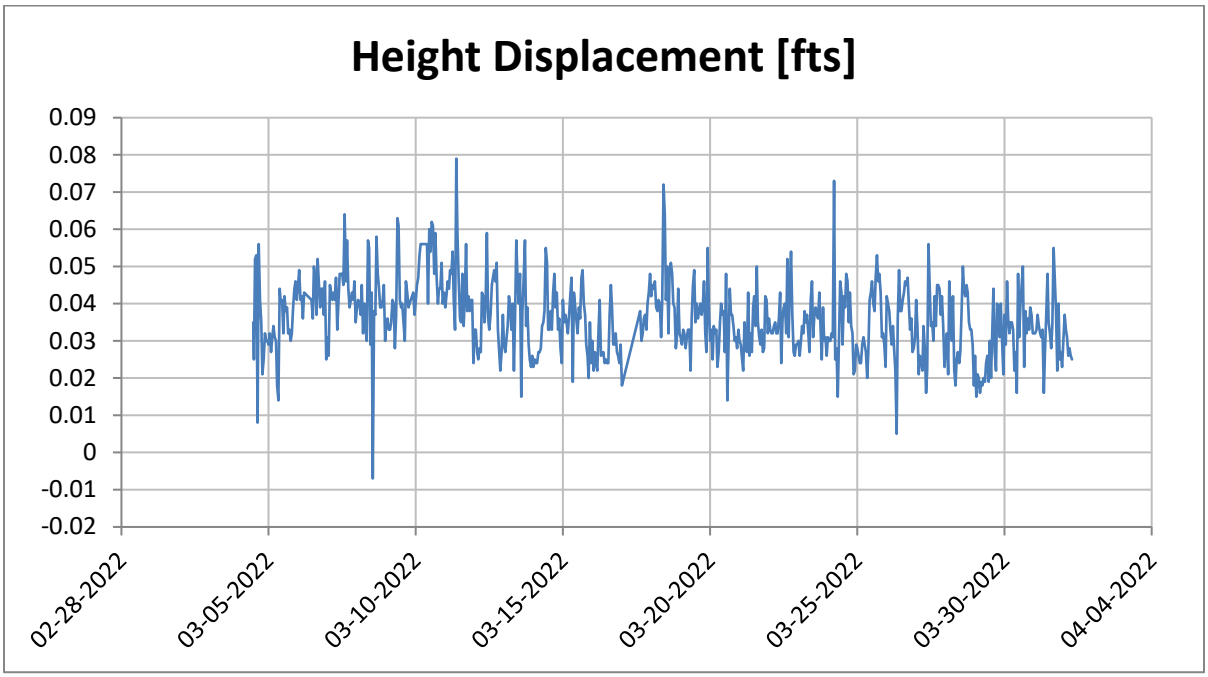


Notes:

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

Prism P25

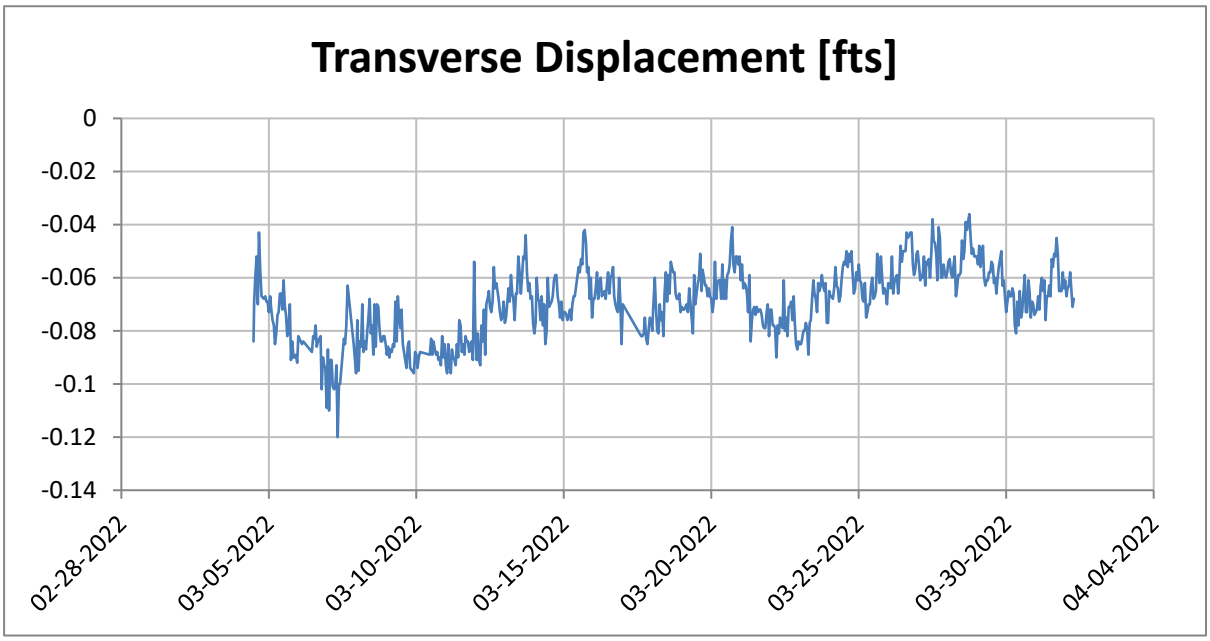


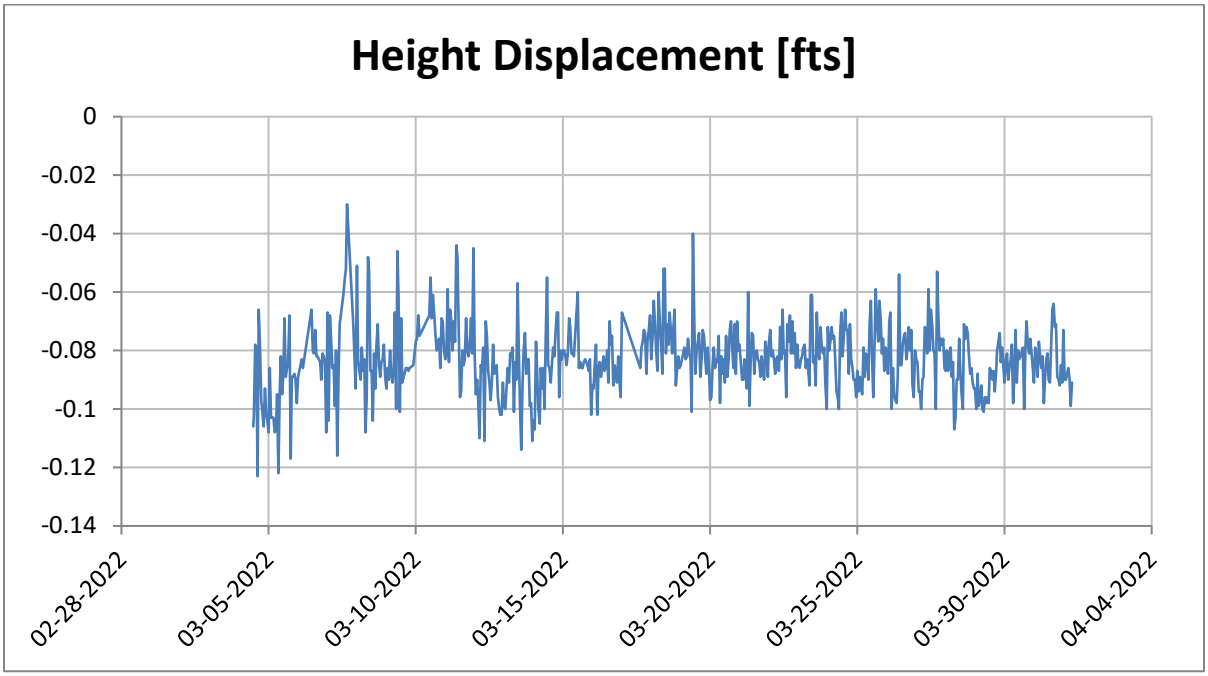


Notes:

1. Survey accuracy is +/-0.016 feet.
2. Alarm threshold is +/-0.35 feet.
3. Transverse displacement is in the horizontal direction. Positive direction means closer to the robotic station.
4. Height displacement is in the vertical direction. Positive direction means higher in elevation.
5. Alarm recorded on February 13, 2022. Attributed to wildlife in the area.

Prism P32

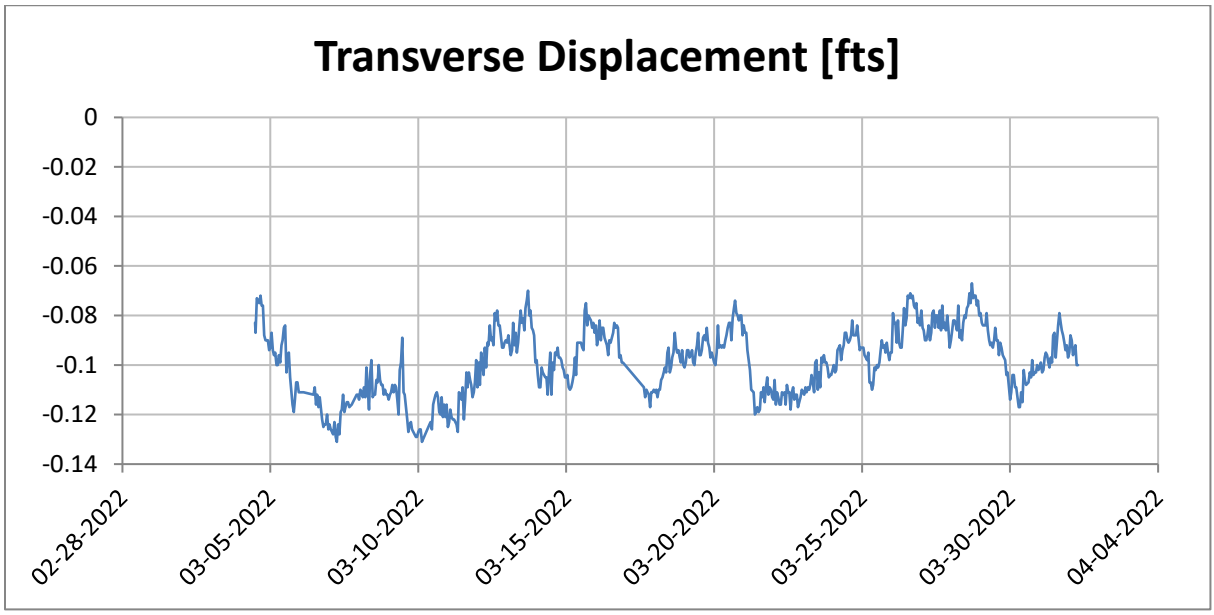


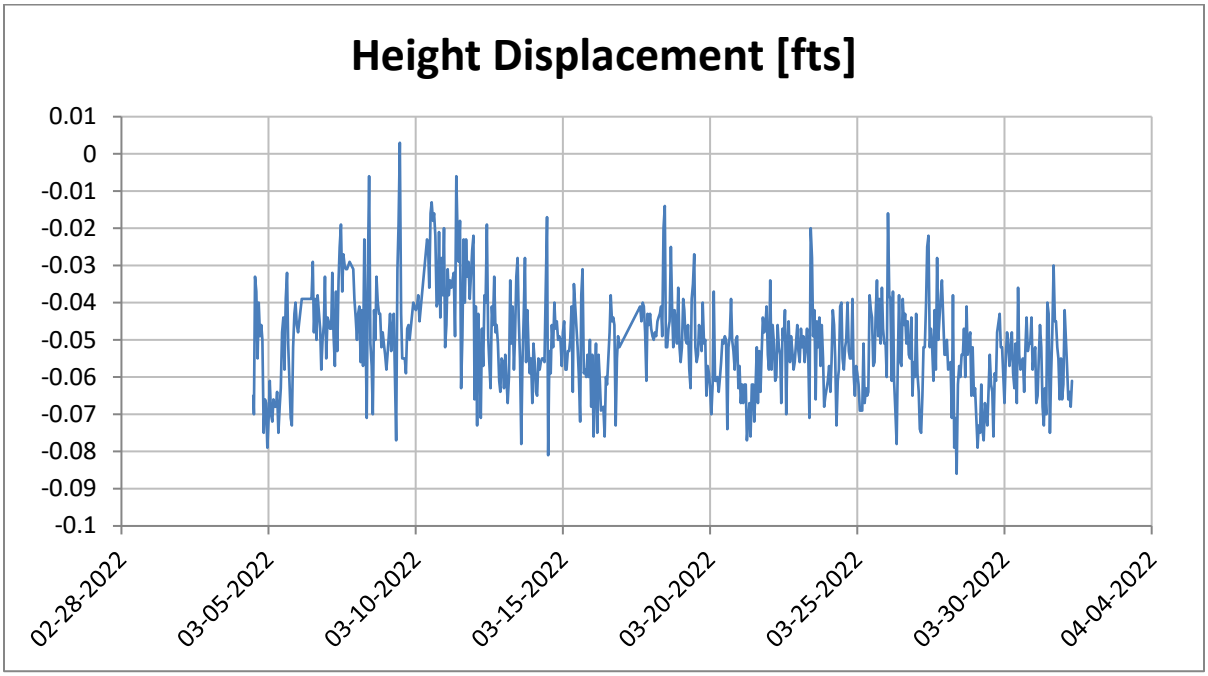


Notes:

1. Survey accuracy is +/-0.016 feet.
2. Alarm threshold is +/-0.35 feet.
3. Transverse displacement is in the horizontal direction. Positive direction means closer to the robotic station.
4. Height displacement is in the vertical direction. Positive direction means higher in elevation.
5. Alarm recorded on February 10, 2022. Assumed to be data error from inclement weather.
6. Regression limit alarms were received on March 9, 11, and 17.

Prism P33

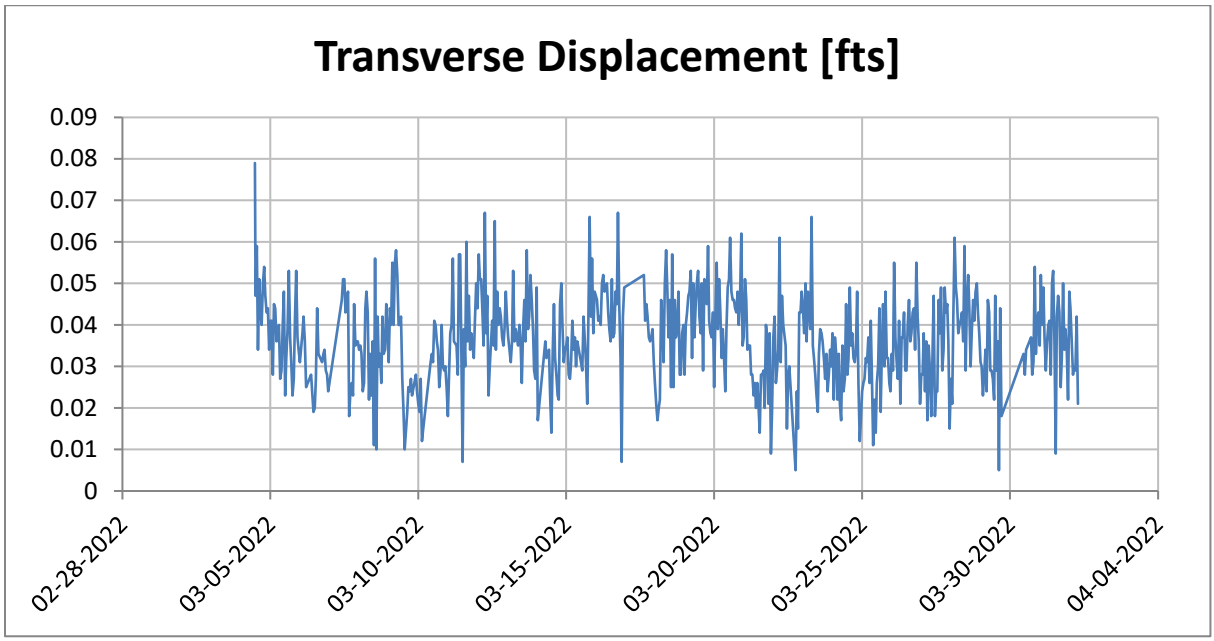


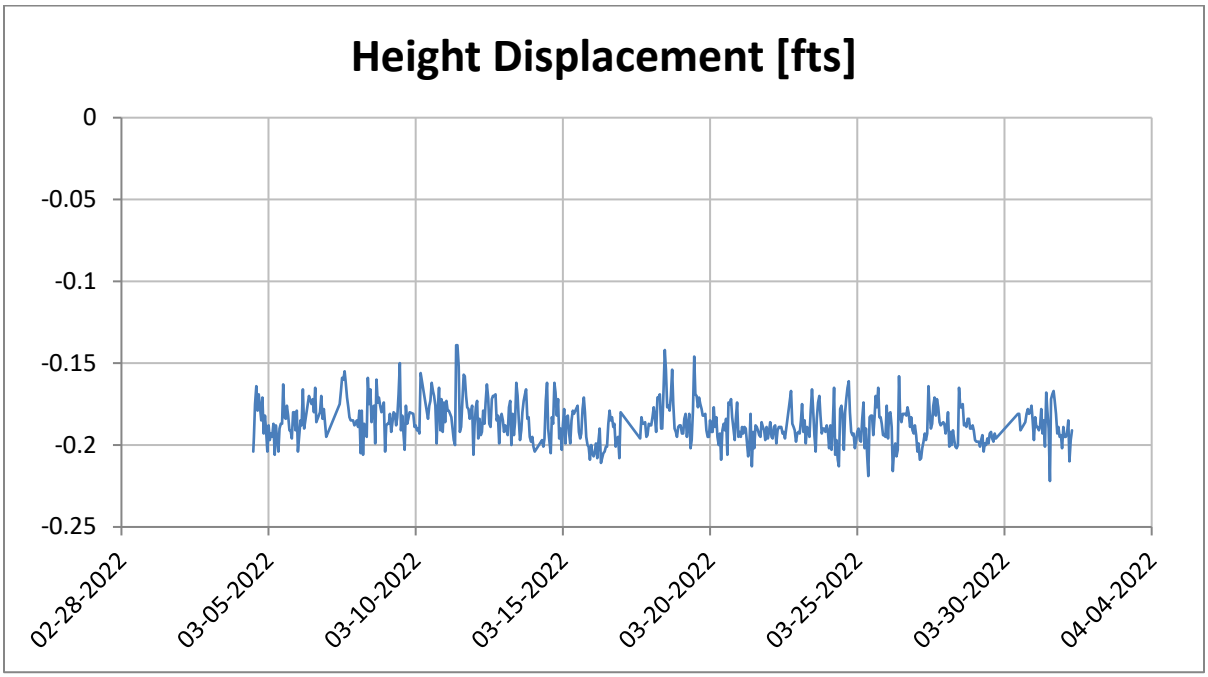


Notes:

1. Survey accuracy is +/-0.016 feet.
2. Alarm threshold is +/-0.35 feet.
3. Transverse displacement is in the horizontal direction. Positive direction means closer to the robotic station.
4. Height displacement is in the vertical direction. Positive direction means higher in elevation.
5. Regression limit alarms were received on March 16 and 27.

Prism P35

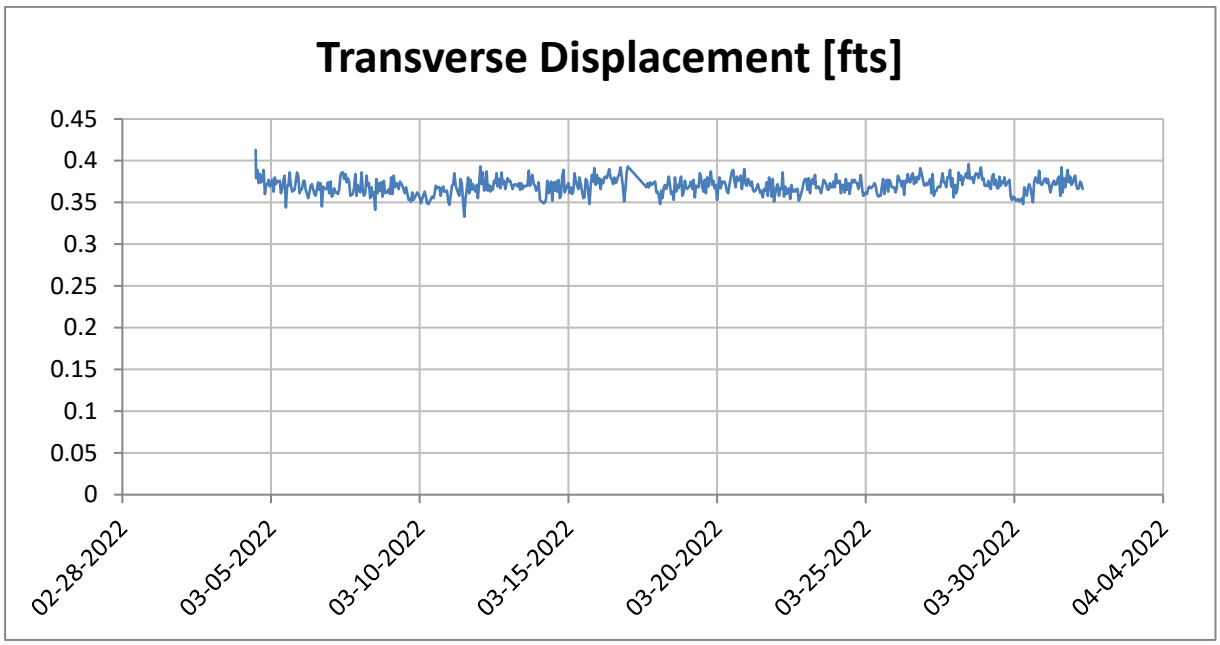


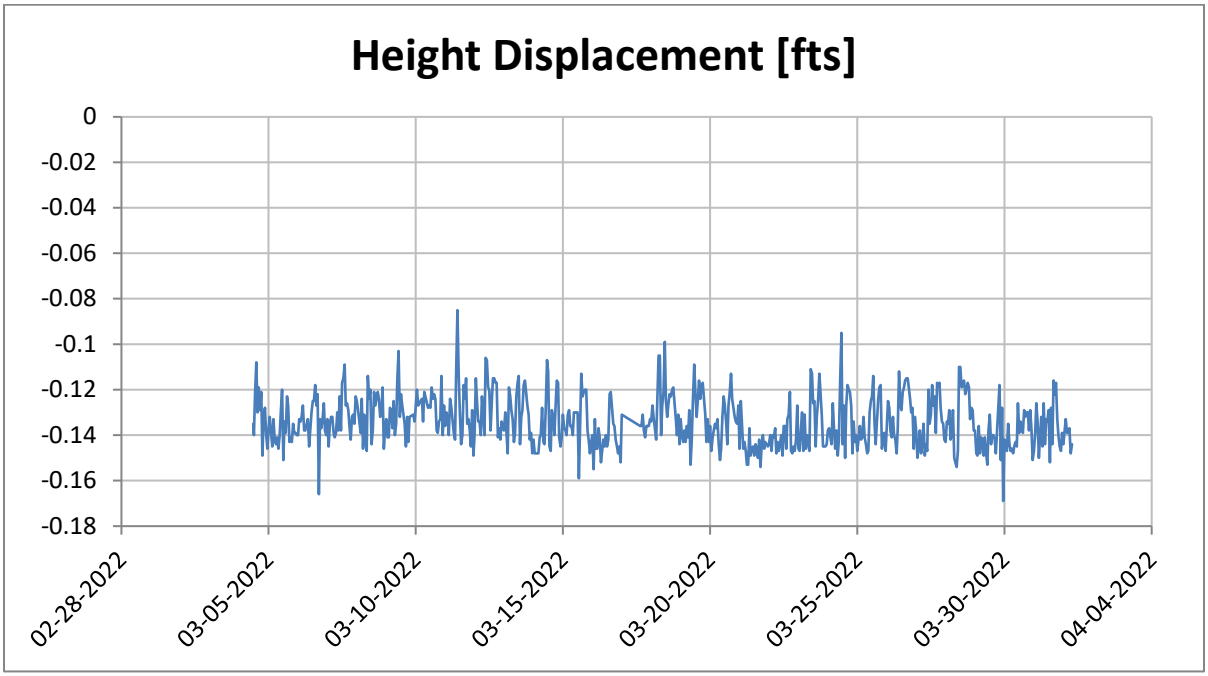


Notes:

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

Prism P4

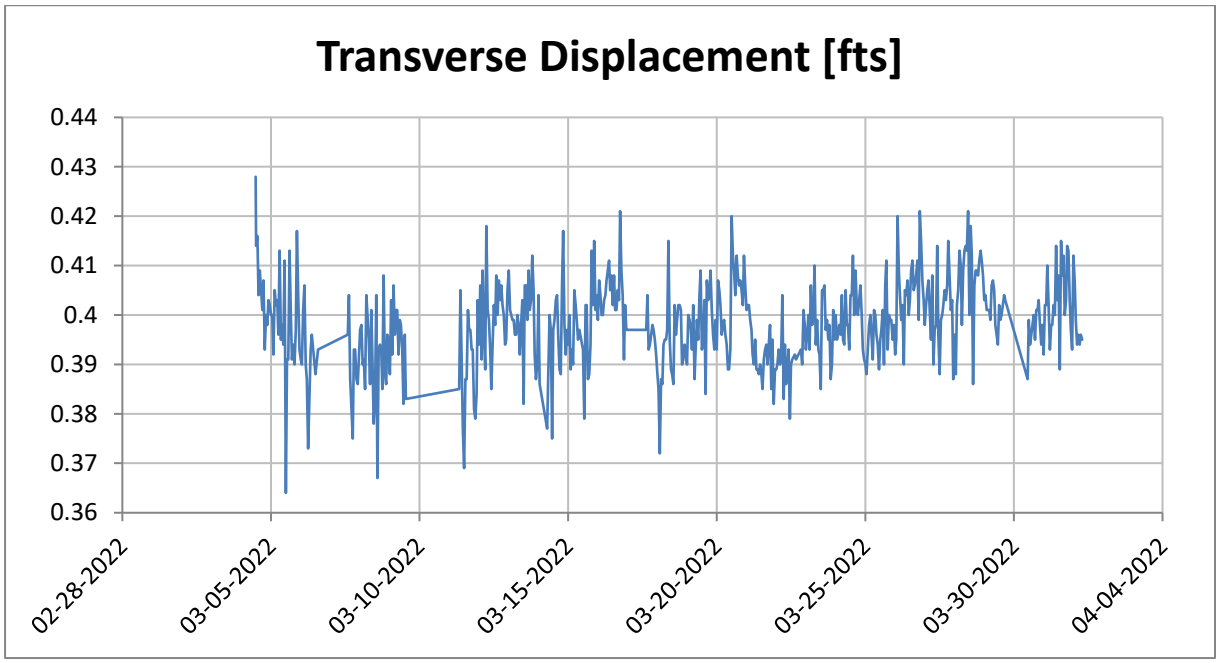


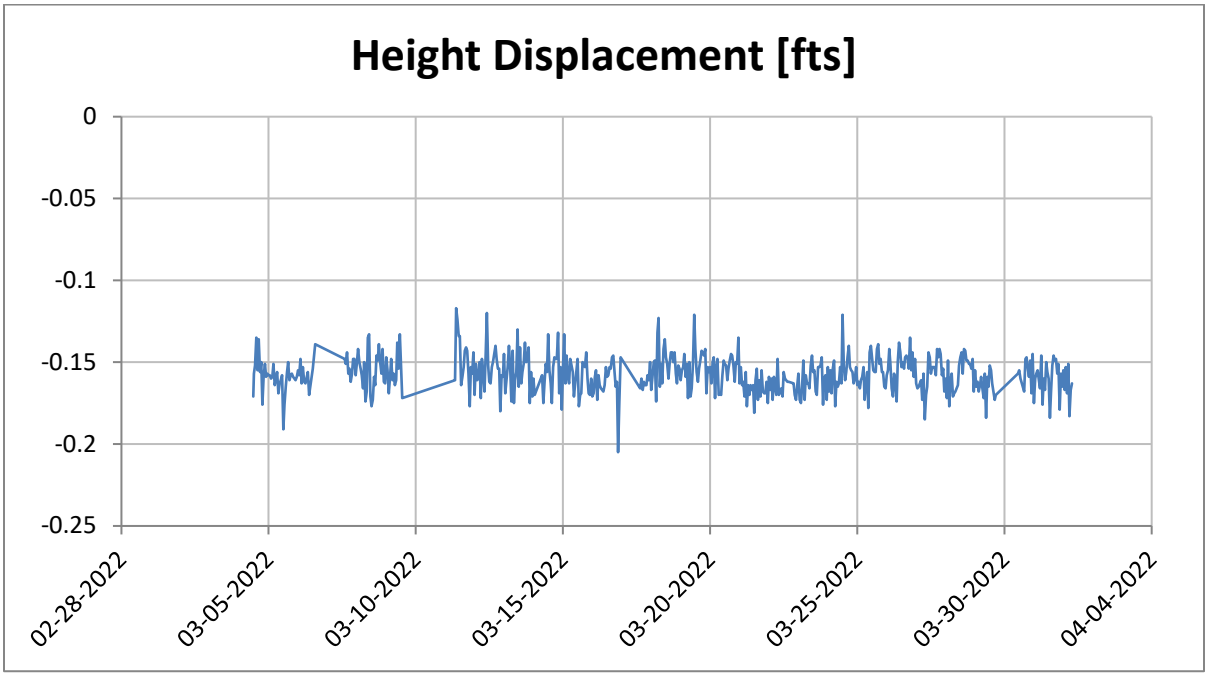


Notes:

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

Prism P5

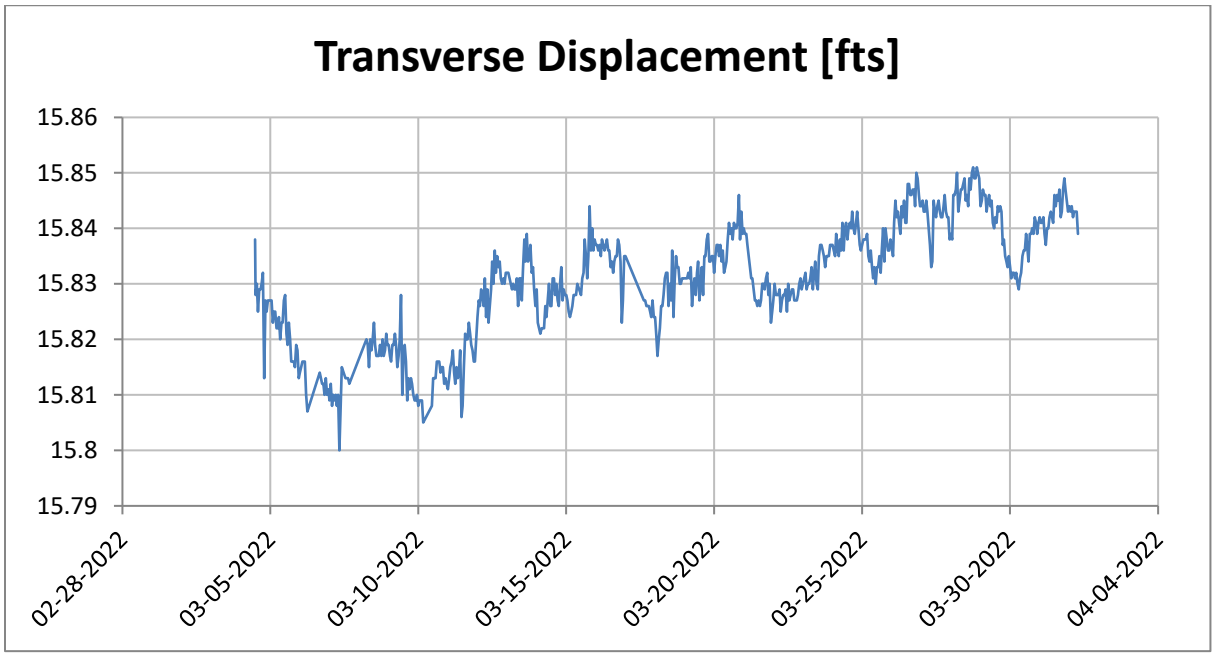


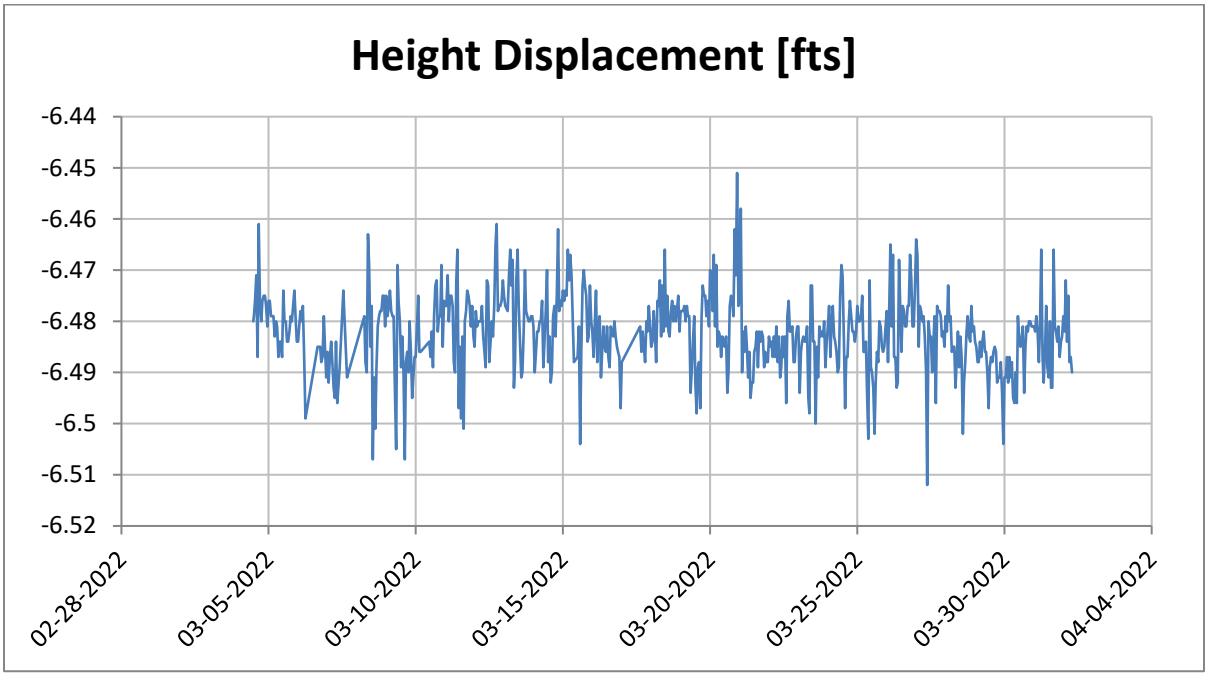


Notes:

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

Prism P63

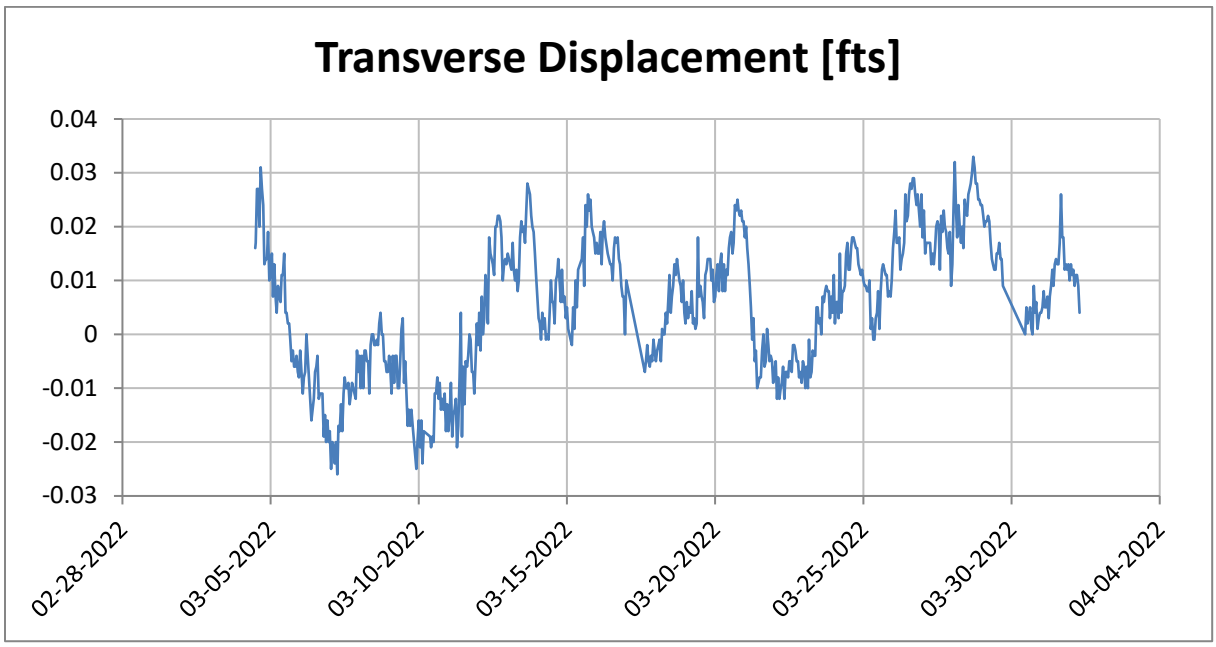


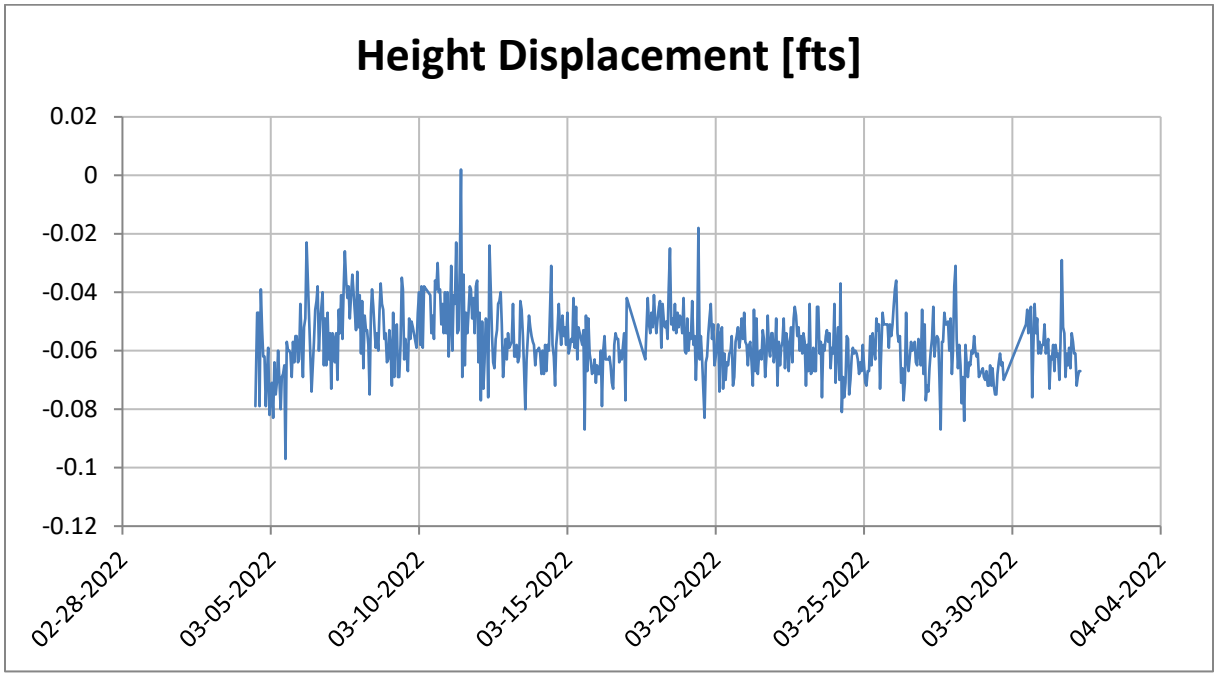


Notes:

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

Prism P69

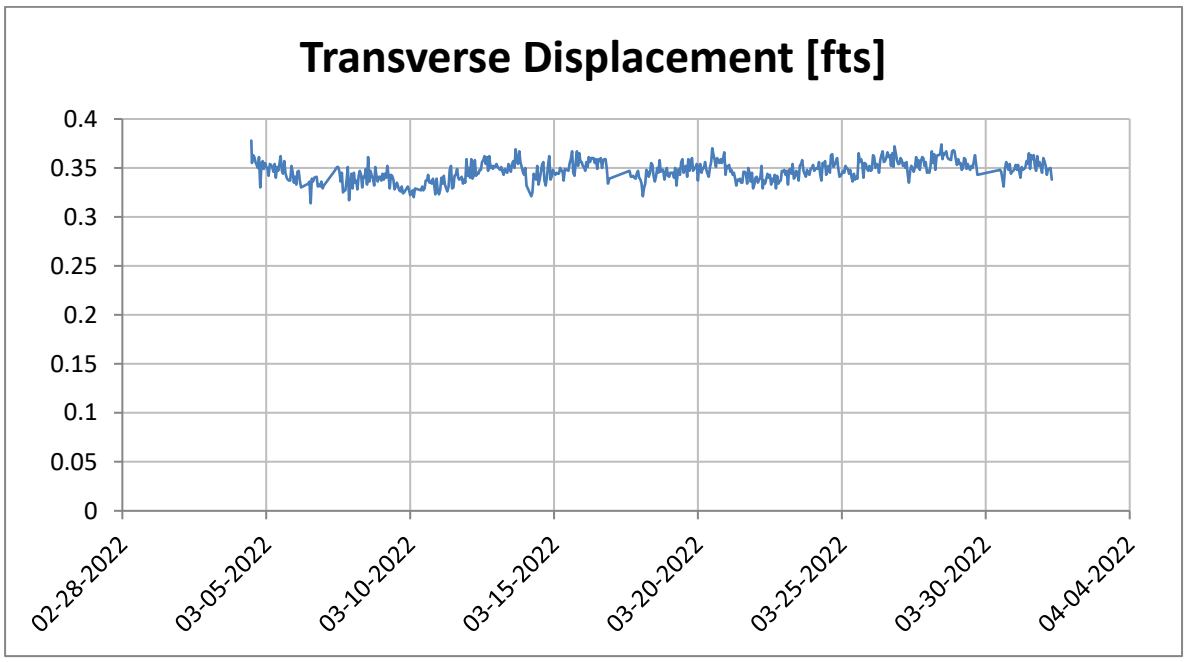


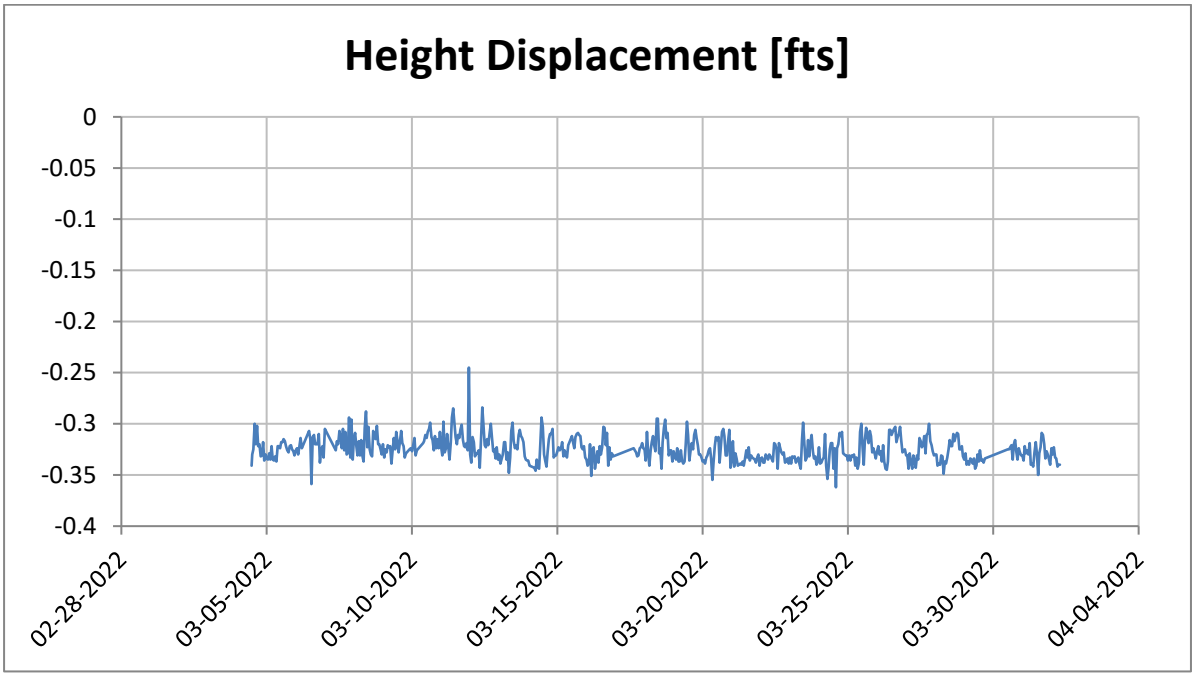


Notes:

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

Prism P70

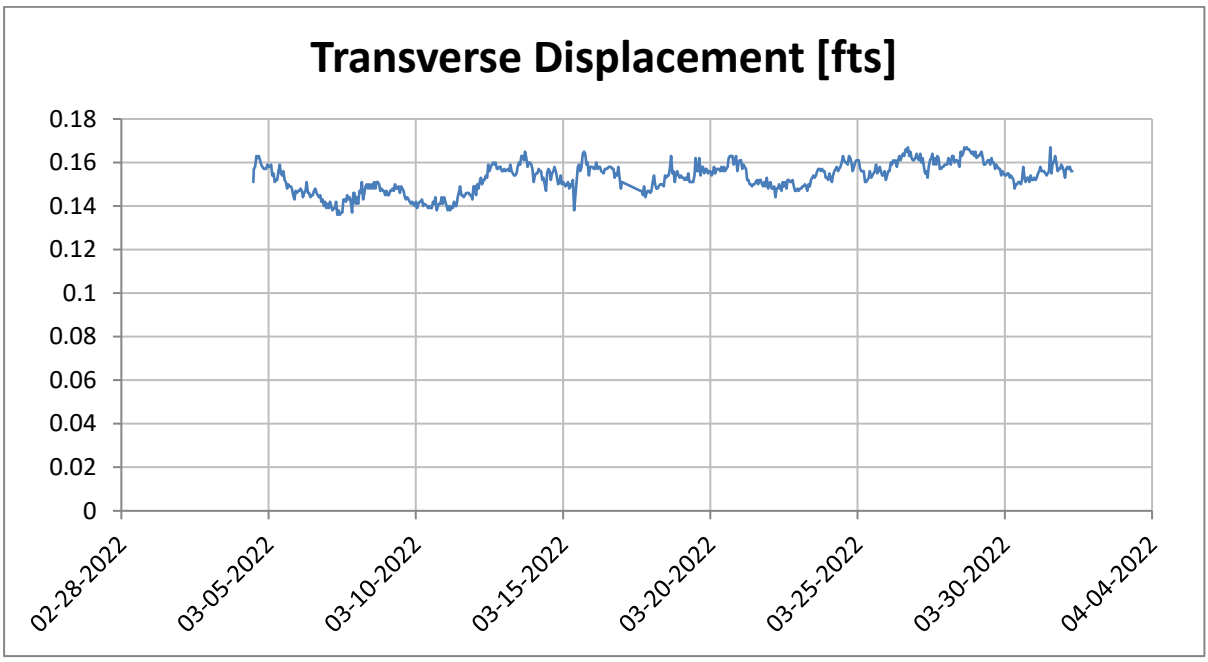


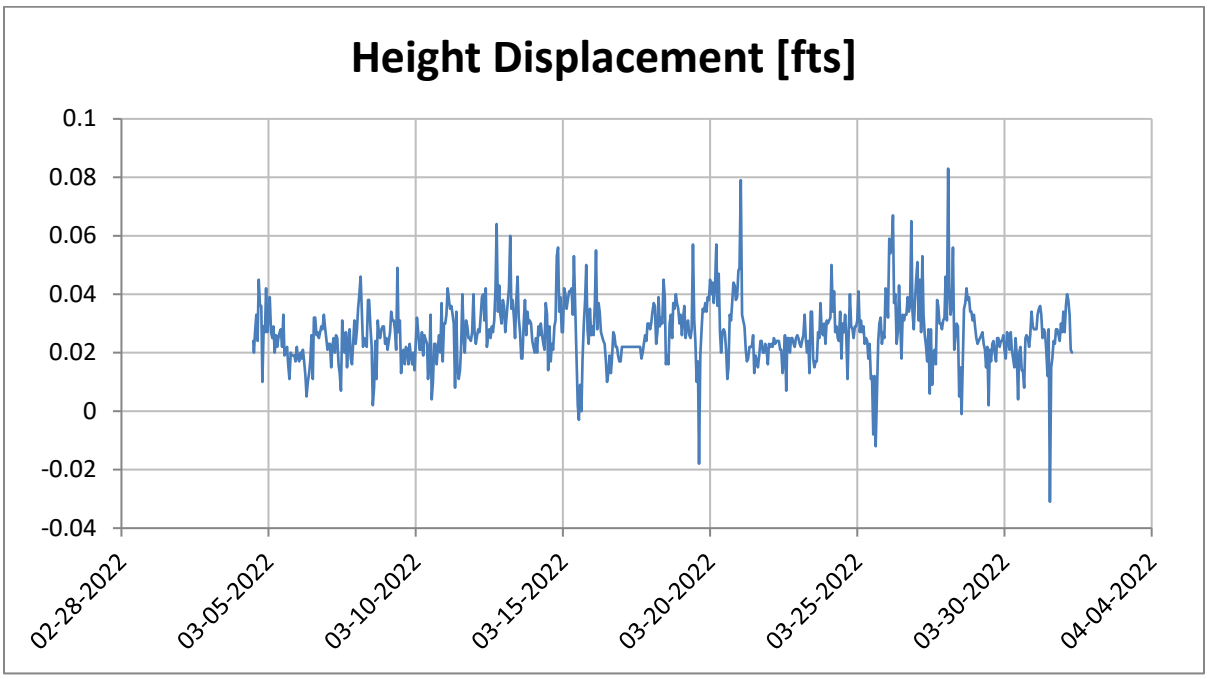


Notes:

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

Prism TOE1

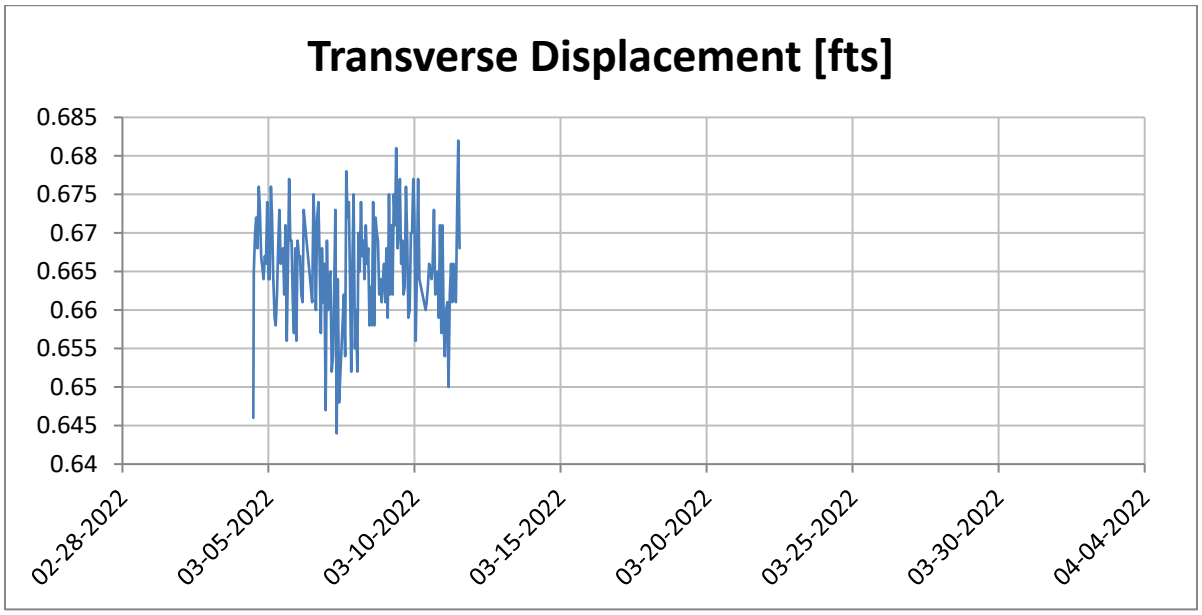


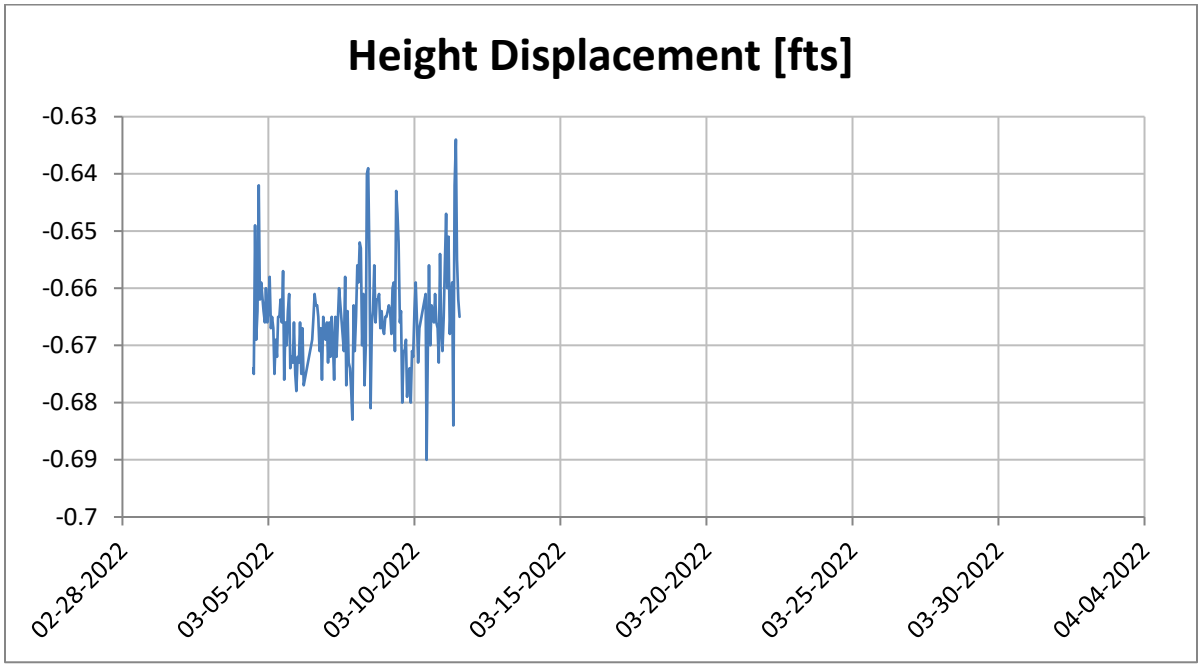


Notes:

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

Prism TOE2

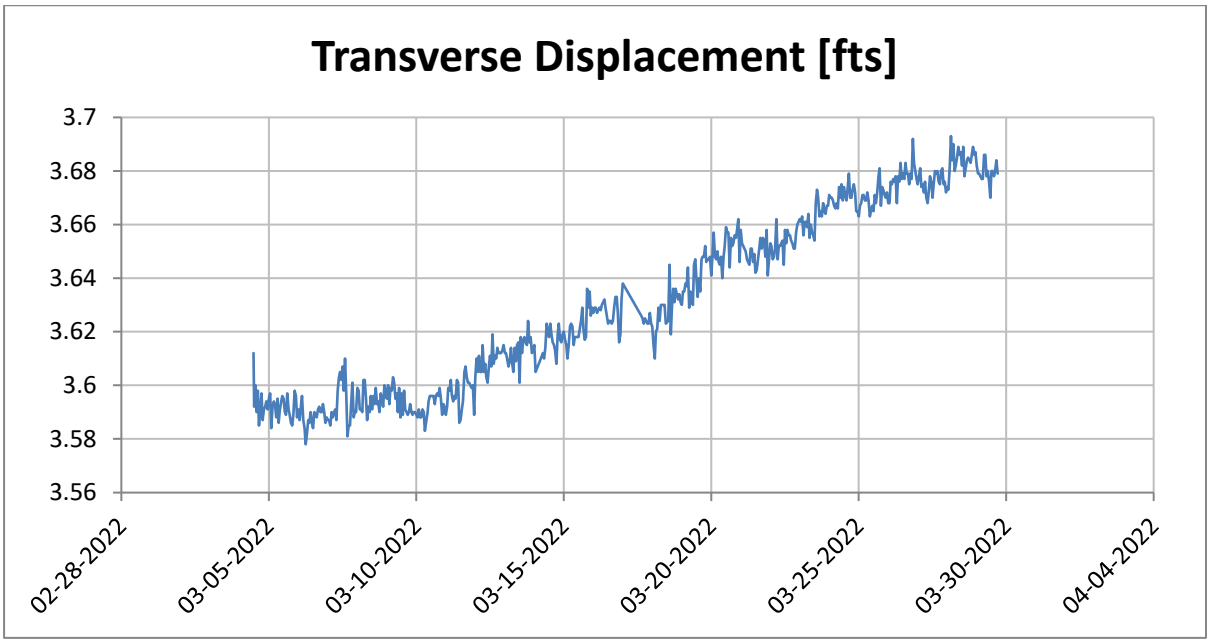


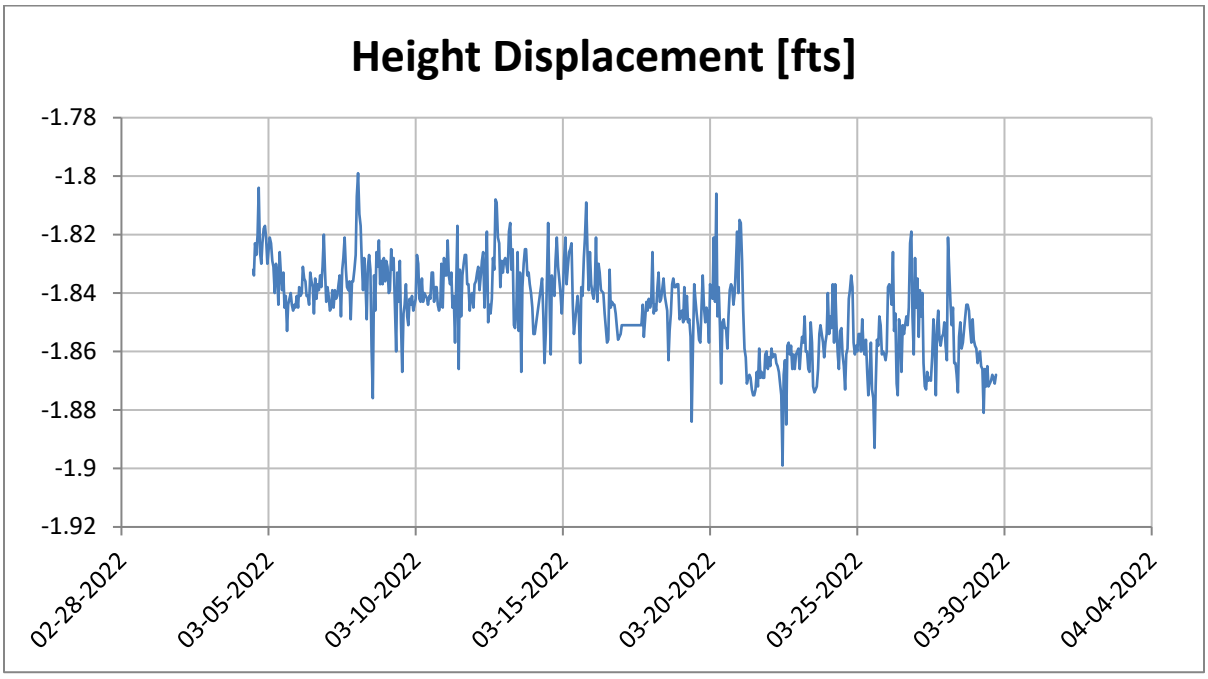


Notes:

1. Survey accuracy is +/-0.016 feet.
2. Alarm threshold is +/-0.35 feet.
3. Transverse displacement is in the horizontal direction. Positive direction means closer to the robotic station.
4. Height displacement is in the vertical direction. Positive direction means higher in elevation.
5. Prism removed March 11, 2022.

Prism TOE3

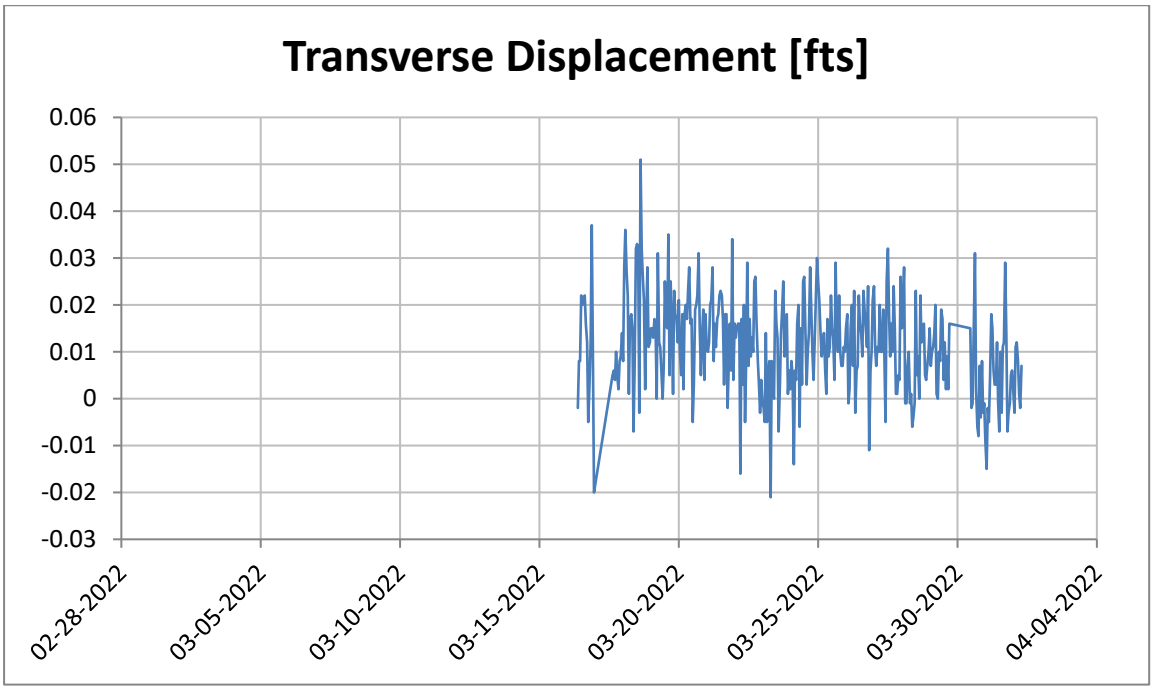


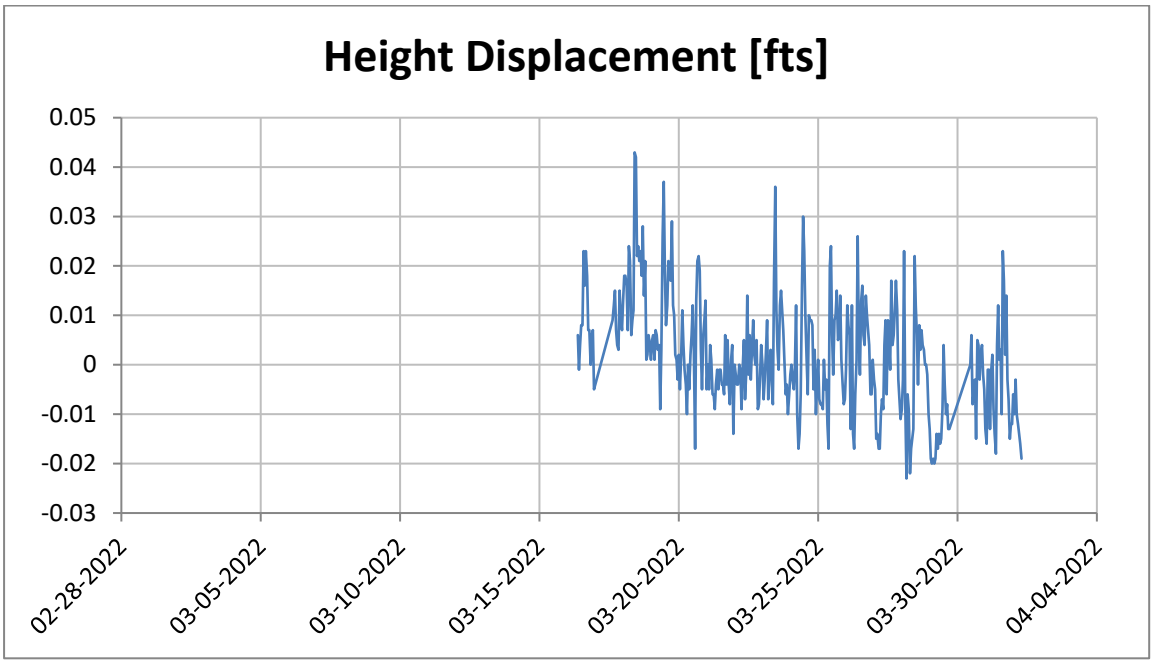


Notes:

1. Survey accuracy is +/-0.016 feet.
2. Alarm threshold is +/-0.35 feet.
3. Transverse displacement is in the horizontal direction. Positive direction means closer to the robotic station.
4. Height displacement is in the vertical direction. Positive direction means higher in elevation.
5. Prism located at toe of slide where ongoing slope creep movements at slow velocity are expected.
6. Prism removed March 30.

Prism TS1



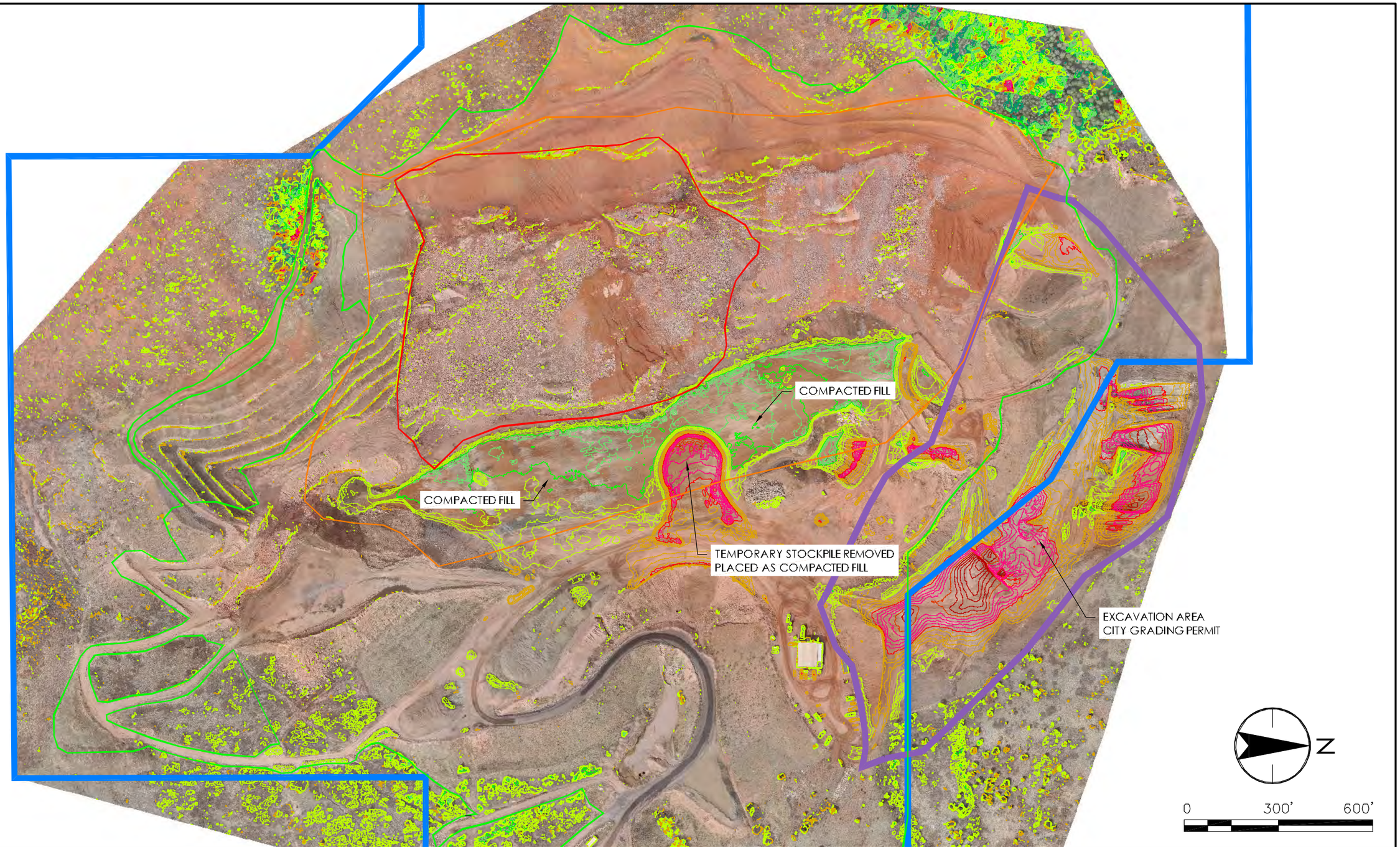


Notes:

1. Survey accuracy is +/-0.016 feet.
2. Alarm threshold is +/-0.35 feet.
3. Transverse displacement is in the horizontal direction. Positive direction means closer to the robotic station.
4. Height displacement is in the vertical direction. Positive direction means higher in elevation.
5. Prism installed March 12, 2022.

Appendix C

Drone Survey



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2022.04.13 8:38:23 PM

Stantec

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Denver CO 80222-7933
Tel: (303) 758-4055
www.stantec.com

LEGEND

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

1. COMPARISON OF DRONE FLIGHTS FROM 02/15/2022 and 03/28/2022.

Client/Project
CONTINENTAL MATERIALS CORP.
PIKEVIEW QUARRY SLOPE MONITORING

Project No.
2057288200

Title
EXISTING PRISMS WITH CURRENT SURFACE

Revision	Date
#	2022.04.30
Drawn By	Figure No.
PK	5

Appendix D

Compaction Testing Results

Compaction Testing Log

BCC Test	CTL Test	Date	Elevation (ft)	Northing (ft)	Easting (ft)	Wet Density (pcf)	Moisture Content (%)	Dry Density (pcf)	Compaction (%)
Test A1	#1	1-Mar	-	-	-	122	10.5	110.4	90
Test A2	#2	1-Mar	-	-	-	126.5	7.1	118.1	90
Test A3	#3	1-Mar	-	-	-	122.9	7.6	114.2	93
Test A4	#4	1-Mar	-	-	-	120.4	7.9	111.6	91
Test A5	#5	1-Mar	-	-	-	122.8	8.7	113	92
Test A6	#6	1-Mar	-	-	-	121.4	8.4	112	91
Test A7	#7	1-Mar	-	-	-	121.5	10.3	110.2	90
Test A8	#8	1-Mar	-	-	-	130.6	7.9	121	92
Test B1	#9	2-Mar	-	-	-	106.5	11.5	95.5	99
Test B2	#10	2-Mar	-	-	-	123.1	6.9	115.2	94
Test B3	#11	2-Mar	-	-	-	124	4.1	119.1	91
Test B4	#12	2-Mar	-	-	-	119.3	7.4	111.1	90
Test B5	#13	2-Mar	-	-	-	102.7	7.2	112.6	92
Test B6	#14	2-Mar	-	-	-	106.4	11.8	95.2	99
Test B7	#15	2-Mar	-	-	-	102.8	14.7	89.6	93
Test B8	#16	2-Mar	-	-	-	119.6	8.3	110.4	90
Test C1	#17	4-Mar	7192	1401242	3173593	120.5	6.9	113.7	93
Test C2	#18	4-Mar	7192	1401347	3173422	115.2	8.2	107	100
Test C3	#19	4-Mar	7190	1401585	3173529	115.7	13.8	101.8	96
Test C4	#20	4-Mar	7191	1401780	3173529	122.1	7.7	114.4	93
Test C5	#21	4-Mar	7192	1401873	3173410	119.2	7.4	111.8	91
Test D1	#22	8-Mar	7190	1401501	3173679	120.8	11.2	108.6	90
Test D2	#23	8-Mar	7190	1401622	3173642	119.2	7.9	111.3	91
Test D3	#24	8-Mar	7190	1401718	3173630	119.6	11	108.6	90
Test D4	#25	8-Mar	7195	1402062	3173332	115.8	11.5	104.3	99
Test D5	#26	8-Mar	7200	1402142	3173278	119.2	11.4	107.8	90
Test E1	#27	11-Mar	7194	1401297	3173501	133.5	14	119.5	98
Test E2	#28	11-Mar	7193	1401396	3173475	133.1	12.4	120.7	99
Test E3	#29	11-Mar	7193	1401497	3173439	124.3	8.9	115.4	94
Test E4	#30	11-Mar	7193	1401739	3173412	126.4	9.9	116.5	95
Test E5	#31	11-Mar	7195	1401944	3173344	117.6	7.4	109.4	90
Test E6	#32	11-Mar	7199	1402110	3173290	133.33	7.6	124.1	94
Test F1	#33	18-Mar	7195	1401333	3173159	121.8	7.9	113.9	93
Test F2	#34	18-Mar	7195	1401507	3173474	122.5	9.2	112.2	93
Test F3	#35	18-Mar	7194	1401688	3173470	123.8	114.1	108.5	90
Test F4	#36	18-Mar	7194	1401799	3173406	123.6	6.6	117	96
Test F5	#37	18-Mar	7202	1402147	3173263	116.8	8.9	107.9	99

BCC Test	CTL Test	Date	Elevation (ft)	Northing (ft)	Easting (ft)	Wet Density (pcf)	Moisture Content (%)	Dry Density (pcf)	Compaction (%)
Test F6	#38	18-Mar	7211	1402295	3173205	119.7	5.4	114.3	93
Test G1	#39	21-Mar	7193	1401416	3173681	123.4	8.2	115.2	94
Test G2	#40	21-Mar	7197	1401580	3173437	121.8	11.6	110.2	91
Test H1	#41	22-Mar	7196	1401682	3173479	118.1	11.5	106.5	93
Test H2	#42	22-Mar	7198	1401820	3173365	126.5	8	118.9	97
Test H3	#43	22-Mar	7199	1401976	3173343	118.6	8.1	110.5	90
Test H4	#44	23-Mar	7205	1402175	3173256	119.3	5.5	113.8	93
Test H5	#45	23-Mar	7213	1402290	3173211	115.5	6.2	109.4	90
Test H6	#46	23-Mar	7220	1402388	3173183	120.6	2.5	118.1	97
Test I1	#47	25-Mar	7203	1400919	3173558	121.1	1.9	119.3	97
Test I2	#48	25-Mar	7200	1401110	3173535	116.4	2.4	114	93
Test I3	#49	25-Mar	7200	1401334	3173455	113.4	3.2	110.2	90
Test I4	#50	25-Mar	7198	1401465	3173500	116.9	2.8	114.1	91
Test I5	#51	25-Mar	7198	1401668	3173485	115.2	2.5	112.7	92
Test I6	#52	25-Mar	7197	1401818	3173436	118.1	2.5	115.5	95
Test I7	#53	25-Mar	7200	1402018	3173361	118.5	1.6	116.9	90
Test I8	#54	25-Mar	7203	1402105	3173323	115.7	5.6	110.1	95
Test I9	#55	25-Mar	7173	1402367	3173434	130.1	6.2	122.3	100
Test J1	#56	28-Mar	7200	1401155	3173580	115.5	2.6	112.8	92
Test J2	#57	28-Mar	7203	1400966	3173543	122.9	11.7	111.2	91
Test J3	#58	28-Mar	7202	1401256	3173484	115.3	2.6	112.6	92
Test J4	#59	28-Mar	7201	1401371	3173517	113.2	1.5	111.7	91
Test J5	#60	31-Mar	7200	1401645	3173478	126.2	15.4	110.8	91
Test J6	#61	31-Mar	7201	1401815	3173367	128	6.3	121.7	99
Test J7	#62	31-Mar	7205	1401996	3173286	124.6	3.8	120.8	97
Test J8	#63	31-Mar	7201	1402083	3173400	120.5	3.3	117.6	95
Test J9	#64	31-Mar	7202	1402083	3173400	124	4.7	119.3	96

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LEGEND

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

1. TESTS #1 THROUGH #16 WERE NOT SURVEYED
2. TESTS PERFORMED ON 10 SEPARATE LIFTS.

N

0 150' 300'

Client/Project
CONTINENTAL MATERIALS CORP.
PIKEVIEW QUARRY SLOPE MONITORING

Project No.
2057288200

Title
COMPACTION TEST LOCATIONS

Revision
#

Date
2022.04.30

Drawn By
PK

Figure No.
6