



STATE OF
COLORADO

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

Pikeview monitoring report

1 message

Kos, Paul <paul.kos@stantec.com>

Mon, Nov 28, 2022 at 2:18 PM

To: "Tim Cazier, P.E. (Tim.Cazier@state.co.us)" <tim.cazier@state.co.us>

Cc: Jerald Schnabel <jerald_schnabel@castleaggregate.com>

Tim,

Please find attached the Pikeview monitoring report for October.

Paul Kos P.E., P.Eng.

Senior Geological Engineer

Mining, Minerals and Metals

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Pikeview Monitoring Memo Oct 2022.pdf

6256K

To: Jerald Schnabel
Continental Materials Corp.
File: October 2022 Monitoring Summary

From: Paul Kos
Denver, CO 80222
Date: November 18, 2022

Reference: October 2022 Geotechnical Monitoring Summary Pikeview Quarry

1.0 INTRODUCTION

Stantec Consulting Services Inc. (Stantec) has prepared this October 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 and undergoing reclamation. A geotechnical monitoring program was established to monitor reclamation activities which will affect the geotechnical performance of the existing and reclaimed slopes during and following reclamation grading. This report presents the geotechnical monitoring results for the slope reclamation activities at the site through the month of October 2022. Continuous monitoring by the robotic survey system began in 2010 and has continued through the month October 2022. 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 October 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 or Stantec) and Monthly (Stantec)
Robotic theodolite/prism	Continuous
Drone inspection	Monthly
Compaction testing	Every 5,000 yd ³ (min.)

2.0 VISUAL INSPECTIONS

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

On working days, site operators inspect their work areas for signs of instability daily before starting work per site safety rules and regulations. The daily inspection starts by reviewing any prism alerts/alarms and inspecting those areas before work begins in that area. The daily inspection also includes visual observations of the quarry walls and floor for any changes. No changes to the quarry conditions were identified during daily inspections in October 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 October 13, 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 October.
- Operators continue to place compacted material in the buttress zone. The fill material was primarily excavated from the North Borrow Area and the Shop Borrow Area. Note that the North Borrow Area is a separate project associated with the City's plans for the property; this grading was permitted by El Paso County. (Photo 7)
- No cracking was observed on the native granite slopes above the extents of the disturbed area. (Photo 4)
- Offsite fill was placed near the reclamation benches on the south side of the fill area. The material was spread by dozers and compacted in accordance with the project specifications. (Photo 8)
- A safety buffer zone is being kept between the active work areas and the toe of the slide to stop any rocks that might come loose during grading operations. Compacted fill is placed in the buffer zone as the buttress fill is placed.
- Known cracks were 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. (Photo 3)
- 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. (Photo 5)
- 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.
- An area approximately 5 acres in extent in the North Borrow Area has been graded to the final grade and covered with topsoil. This area will be seeded in November 2022 and will be used as a "test plot" to demonstrate that the revegetation practices will work on the project. While the North Borrow Area is a

separate project, the revegetation for that project will occur in the same manner as the quarry revegetation.

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 currently 15 active prisms; 2 prisms were control points located outside the slope movement area and 13 prisms were located on the slopes surrounding the landslide area. As the slope is backfilled and graded, the existing prisms will be removed, and additional prisms will be installed. No prisms were removed in October. 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. 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 October 2022, multiple alarms were received from multiple prisms; in each case, the subsequent readings returned to normal, and the alarms are assumed to be data errors related to weather conditions, sun glare, or animal activity. Other alarms were determined to be caused by equipment operations blocking the prism. The alarms are listed in Table 2.

Table 2 Alarm Summary

Date(s)	Alarm	Cause/Actions taken	Issue Resolved
1-Oct	Points not found and regression limit alerts	Rain and fog. No work being performed at time of alert.	3-Oct
3-Oct	CP7 not found	Blocked by equipment operations.	3-Oct
7-Oct	Points not found	Rain and fog. No work being performed at time of alert.	7-Oct
8-Oct	Points not found	Fog.	8-Oct
18-Oct	P33 regression limit received	No signs of movement upon inspection. No work being performed at time of alert. Possibly related to sun glare.	18-Oct
19-Oct	P69A and NP2 regression limits	No signs of movement upon inspection. No work being performed at time of alerts. Possibly related to wildlife movement.	20-Oct
22-Oct	P70 not found	Blocked by equipment operations.	22-Oct
22-Oct	NP3 not found	Rain and fog. No work being performed at time of alert.	22-Oct
10/27 to 10/28	Points not found	Rain, snow, and fog.	28-Oct

The prism monitoring results for transverse and height displacements, monthly change, and cumulative change are summarized in Table 3 below. The transverse displacement measures the change in the horizontal distance from the robotic station to the prism; positive displacements indicate less distance between the station and prism (movement towards the total station). The height displacement measures the change in the vertical distance from the robotic station to the prism; positive displacements indicate upward movement. The values for the last reading in the month are included in Table 3. The monthly delta is the most

recent reading cumulative delta displacement (horizontal, lateral, and vertical) subtracted from the last reading from the previous month. The cumulative delta values are a total displacement and are not associated with a direction. The transverse, height, and cumulative delta displacements are the total displacement over the life of the monitoring, which was reset when the Leica station was moved in July 2022. According to Leica documentation, the survey accuracy is $\pm 4 \text{ mm} + 1.5 \text{ ppm}$ for prisms located greater than 500m from the station; these equates to an accuracy of $\pm 0.016 \text{ ft}$.

The data show stable conditions with no movement for 12 of 15 prisms with recorded displacements limited to data scatter and not actual movements. Prisms BR1, BR2, and NP66 are located above the landslide, and these prisms also recorded slope creep movements at slow velocity. This settlement is likely related to the landslide material consolidating under its own weight. New prisms are placed in areas where slope creep movements are likely to be recorded; therefore, slope creep movements being recorded at more locations is expected to occur. 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
BR1	-0.054	-0.084	0.0272	0.1442	Slope creep movements.
BR2	-0.019	-0.092	0.0374	0.1322	Slope creep movements.
CP6	0.001	-0.024	0.0156	0.0306	
CP7	0.083	0.012	0.0168	0.0867	
NP2	0.014	0.015	0.0367	0.0540	
NP3	0.002	0.012	-0.0003	0.0132	
NP66	0.009	-0.054	0.0181	0.0650	Slope creep movements.
P1	-0.004	-0.016	0.0093	0.0210	
P2	0.003	-0.016	0.0064	0.0258	
P5	-0.004	-0.007	0.0016	0.0162	
P25	-0.017	0.007	-0.0008	0.0185	
P32	-0.019	0.008	0.0074	0.0218	
P33	0.034	-0.021	-0.0163	0.1756	
P69A	0.021	-0.020	0.0485	0.1932	
P70	-0.020	-0.001	0.0123	0.0256	

4.0 DRONE SURVEY

The site was flown for aerial imagery using an unmanned aircraft system (UAS or 'drone') on October 31, 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 October topography was also compared to the September topography to identify changes in the site topography. Comparison of the two surveys showed the placement of the fill material at the toe of the landslide. Fill material is excavated from the Shop 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 October 2022. Fill was excavated from the Shop and North Borrow Areas and placed in the buttress and buffer zones. Importing fill also continued. All fill is moisture conditioned as necessary and then compacted. Compaction testing began March 2022 and occurs at the rate of at least one test per 5,000 yd³ placed. During October, approximately 232,000 yd³ was placed and compacted. This includes approximately 9,200 yd³ of imported fill. This volume placed in the buttress zone required at least 47 compaction tests. There were 97 compaction tests taken in October. As of October 31, 2022, a total 1,607,000 yd³ had been placed and compacted. This required at least 322 compaction tests, and 457 tests have been taken. All tests in October met or exceeded the minimum compaction requirement of 90% of the optimal density as measured by a Standard Proctor Test. CMC is monitoring the density of the lower portion of the lift by excavating approximately 12 inches of material using a mini-excavator and then testing the lower half of the lift. All the results from the lower half of the lift met the project specifications. 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

Task/Milestone	Estimated Dates
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 continued
- Importing fill material continued
- Geotechnical monitoring continued
- A potential and large source of imported fill material was rejected due to its high (90%) fines content.
- A test plot area was covered with topsoil in the adjacent North Borrow Area.

Work planned for next month includes:

- Continue reclamation grading
- Continue importing fill material
- Continue geotechnical monitoring
- Continue removing and replacing prisms on an as-needed basis
- Place seed and cover test plots in the adjacent North Borrow Area. One part of the test plot will be covered with erosion control blanket, and another part will be covered with flexible growth medium (FGM).
- Surpass the milestone of one-half of the buttress fill being placed.

7.0 CONCLUSIONS

The data collected in October 2022 demonstrate compliance with the reclamation grading plan. The buttress fill is being placed and compacted as intended and specified.

None of the data collected in October 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.

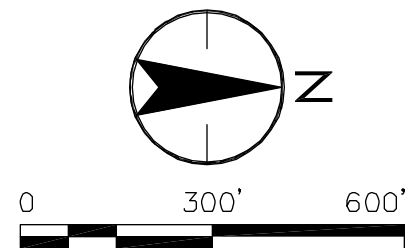
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LEGEND

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



Client/Project
**CONTINENTAL MATERIALS
CORP.
PIKEVIEW QUARRY SLOPE
MONITORING**

Project No.
2057288200

Title
SITE MAP

Revision

Drawn By
PK

Date
2022.11.18
Figure No.
1

Appendix A

Visual Inspections



6. View looking south to the buttress fill.



5. Dry above culvert. Note piping for pump if needed.

NOTE 1:
NO CRACKS

NOTE 1:
NO CRACKS



4. Stable granite slopes above landslide.



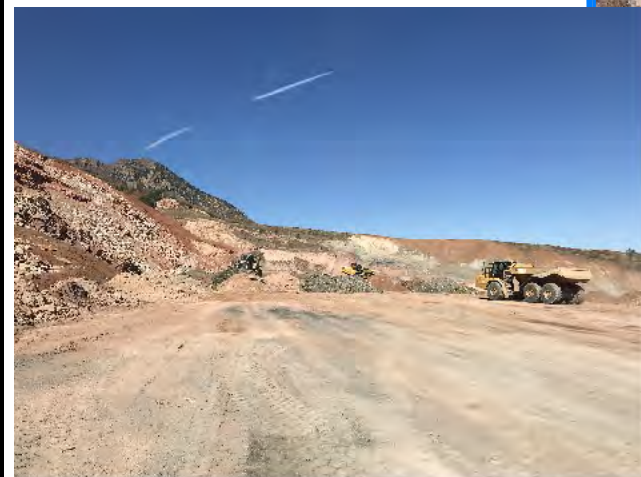
3. Hummocky area on the south side of the site remains stable without new cracks.



7. Excavator loads haul trucks at shop borrow area.



2. View looking north to the buttress fill.



8. Placing and compacting fill.



1. View to north of compaction area and borrow area.



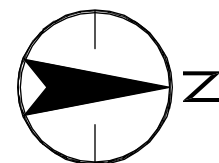
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LEGEND

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

NOTES

- NO CRACKS OBSERVED IN THIS AREA.
- ALL PHOTOS TAKEN OCTOBER 13, 2022.



Client/Project

CONTINENTAL MATERIALS
CORP.
PIKEVIEW QUARRY SLOPE
MONITORING

Project No.

2057288200

Title

OBSERVATIONS FROM
SEPTEMBER INSPECTION

Revision
#

Drawn By
PK

Date

2022.11.18

Figure No.

2

Table A-1 Summary of Daily Inspections

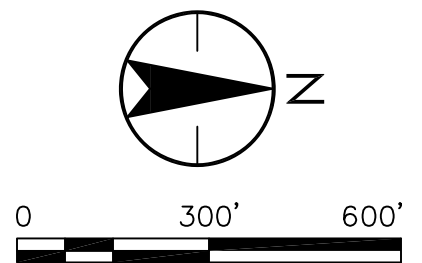
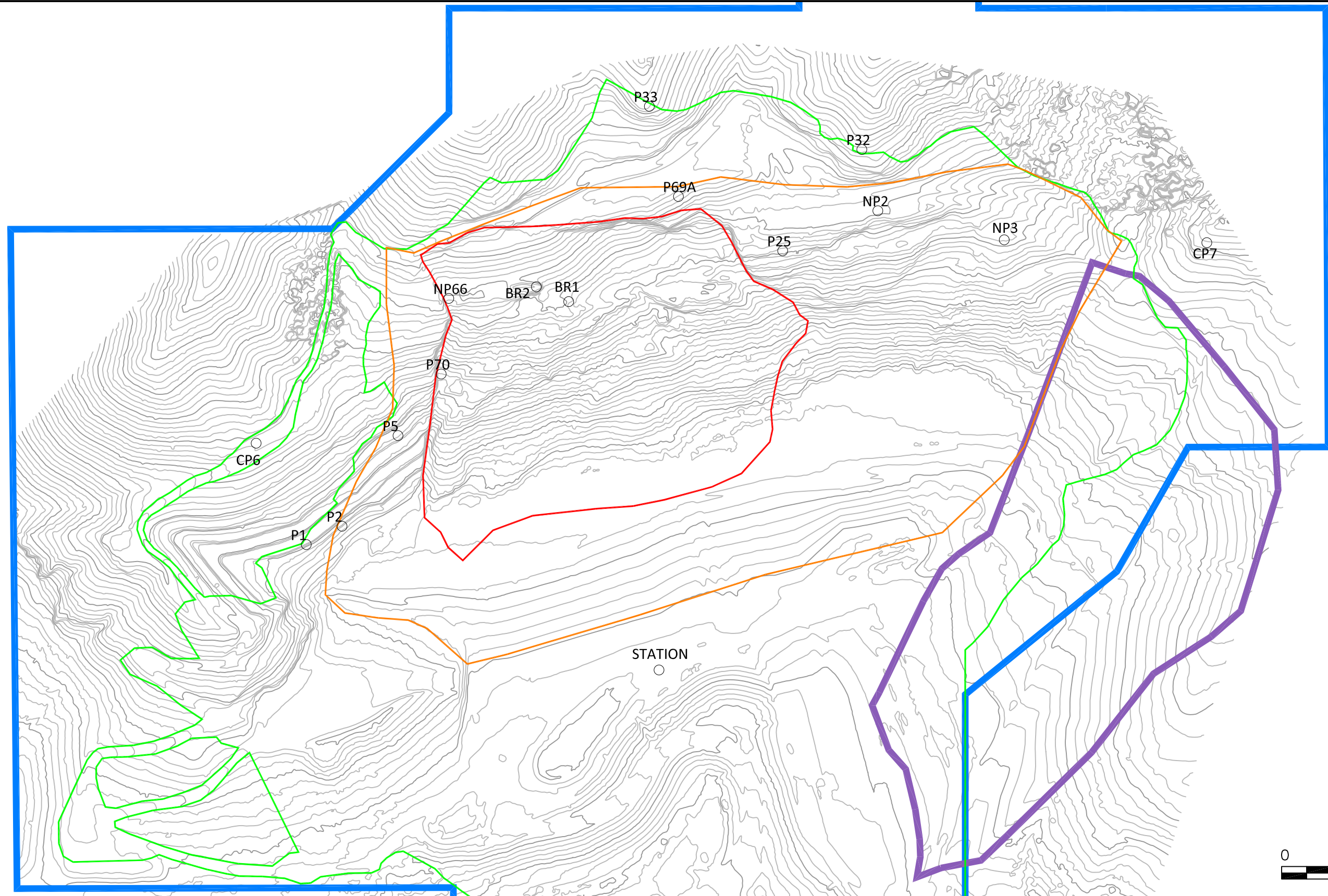
Date	Notes	Inspection By
1-Oct-22	No work.	Not applicable
2-Oct-22	No work.	Not applicable
3-Oct-22	No movement observed. Good to proceed.	Tim Culberson
4-Oct-22	No movement observed. Good to proceed.	Jerald Schnabel
5-Oct-22	No movement observed. Good to proceed.	Jerald Schnabel
6-Oct-22	No movement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

Note that Jerald Schnabel was on vacation in early October, and the observations were performed by Stantec personnel.

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. PRISMS WILL BE INSTALLED AS EACH BENCH IS FINISHED.
2. ALL PRISMS WILL BE RETAINED AS LONG AS POSSIBLE.
3. TOPOGRAPHY FROM OCTOBER 31, 2022 DRONE SURVEY.
4. CONTOUR INTERVAL IS 10 FEET

Client/Project

CONTINENTAL MATERIALS
CORP.
PIKEVIEW QUARRY SLOPE
MONITORING

Project No.

2057288200

Title

EXISTING PRISMS WITH
CURRENT SURFACE

Revision
#

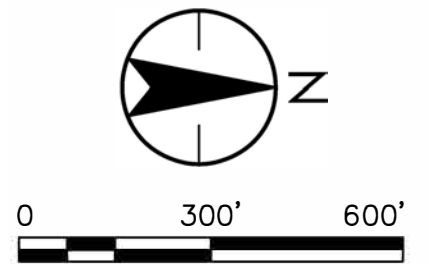
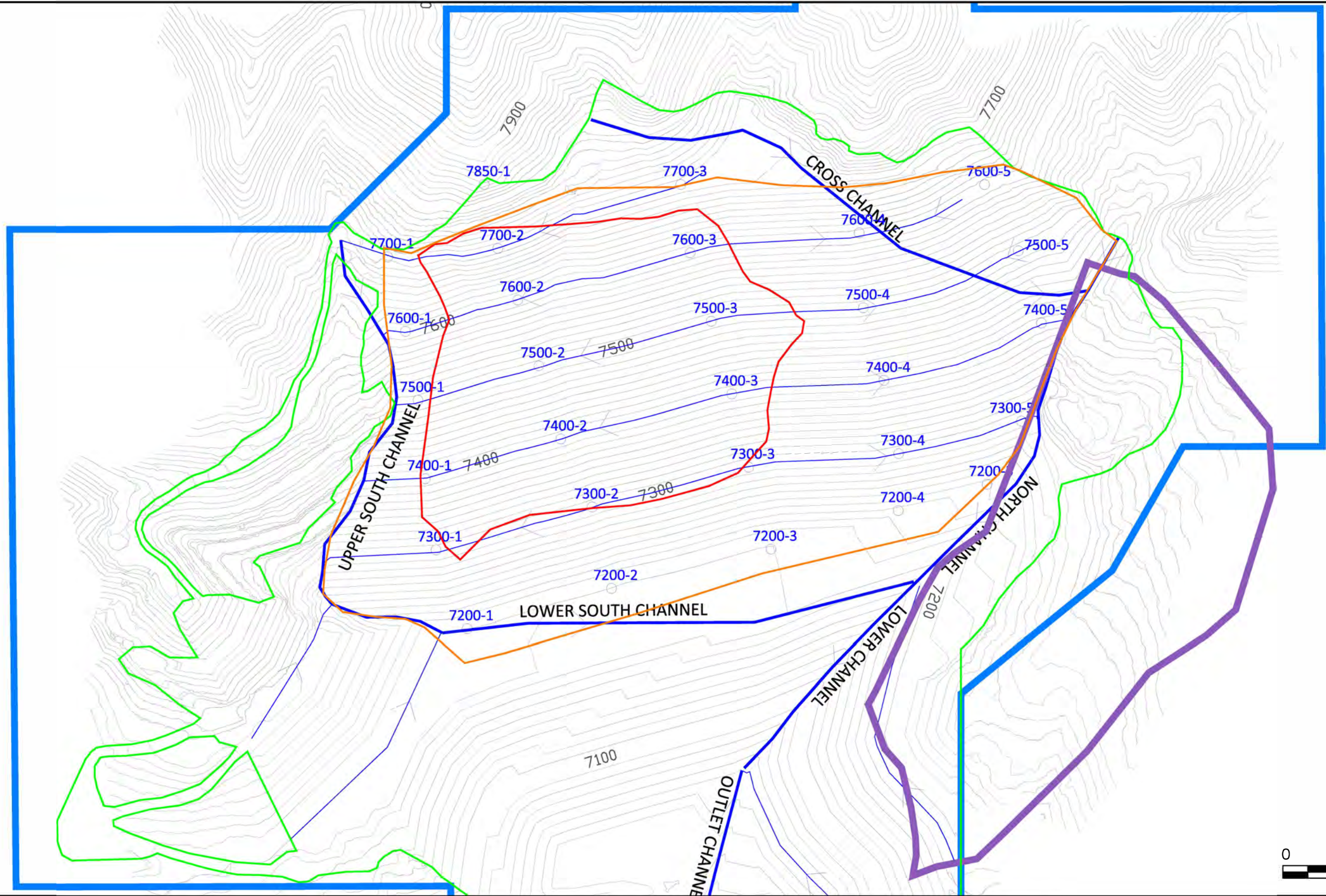
Drawn By
PK

Date
2022.11.18

Figure No.
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. PRISMS WILL BE INSTALLED AS EACH BENCH IS FINISHED.
 2. ALL PRISMS WILL BE RETAINED AS LONG AS POSSIBLE.

Client/Project
CONTINENTAL MATERIALS
CORP.
PIKEVIEW QUARRY SLOPE
MONITORING

Project No.
2057288200

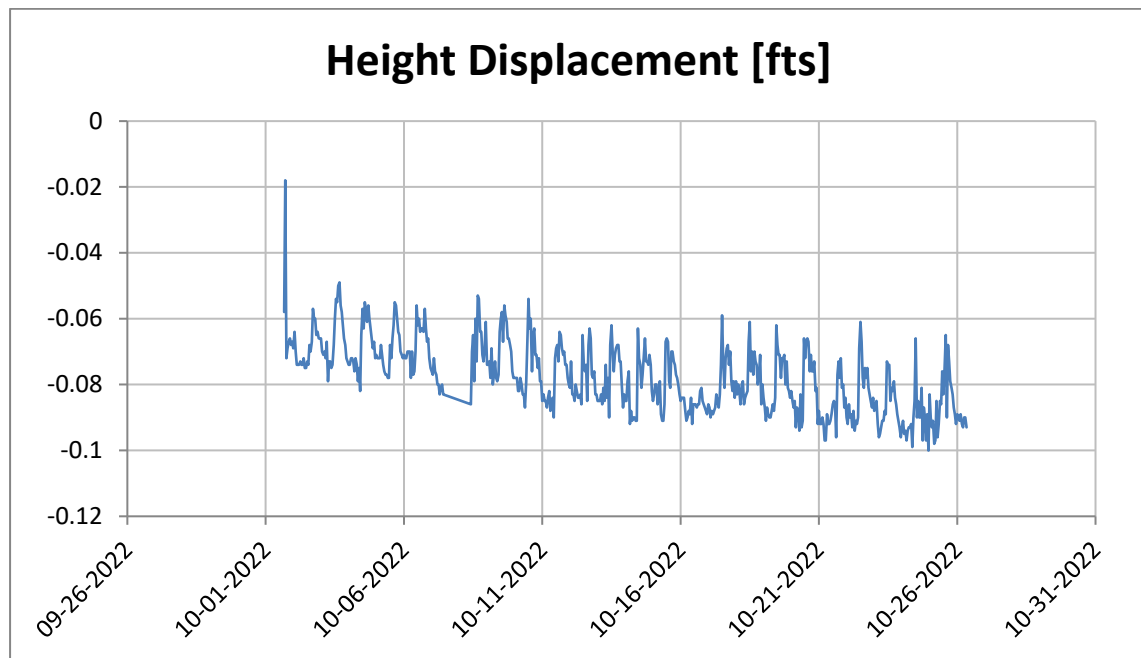
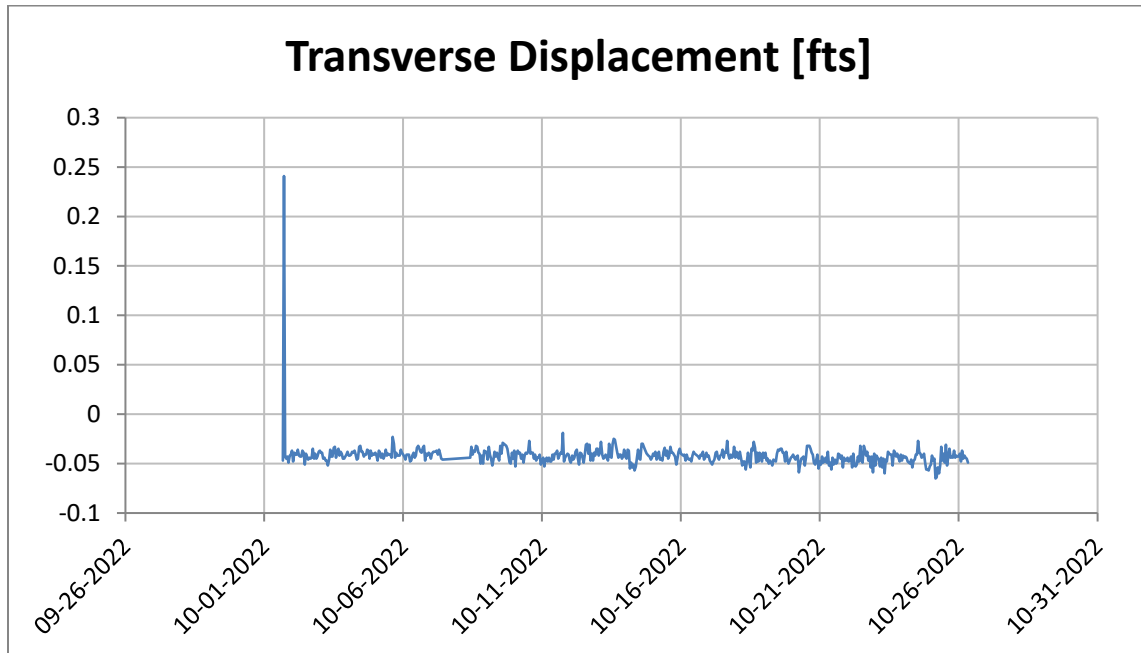
Title
PROPOSED PRISMS WITH
RECLAMATION SURFACE

Revision #	Date 2022.11.18
Drawn By PK	Figure No. 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
TOE4	8-Apr-22	Prism Added	New Prism Added
TOE5	8-Apr-22	Prism Added	New Prism Added
BR1	8-Apr-22	Prism Added	New Prism Added
BR2	8-Apr-22	Prism Added	New Prism Added
NP1	22-Apr-22	Prism Removed	Originally NP1. Prism re-set in same spot and is now NP3
NP3	22-Apr-22	Prism Added	
TOE3	22-Apr-22	Prism Removed	Originally TOE3. Prism moved to a higher elevation and is now TOE6
TOE6	22-Apr-22	Prism Added	
TOE1	22-Apr-22	Prism Removed	Reclamation grading to affect buffer filling activities
P4	17-Jun-22	Prism Removed	Prism removed due to rock deterioration
P69	20-Jul-22	Prism Removed	Prism was originally P69. It has been re-set to Higher Elevation and is now P69A. Related to base station relocation.
P69A	20-Jul-22	Prism Added	
P35	20-Jul-22	Prism Renamed	Prism was originally P35. It has been re-set to Higher Elevation and is now CP6. Related to base station relocation.
CP6	20-Jul-22	Prism Added	
CP5	20-Jul-22	Prism Renamed	Prism was originally CP5. It has been re-set to Higher Elevation and is now CP7. Related to base station relocation.
CP7	20-Jul-22	Prism Added	
CP1	20-Jul-22	Prism Removed	Not in line of sight of new base station.
CP4	20-Jul-22	Prism Removed	Not in line of sight of new base station.
TOE4	20-Jul-22	Prism Removed	Not in line of sight of new base station.
TOE6	20-Jul-22	Prism Removed	Not in line of sight of new base station.
TOE5	4-Aug-2022	Prism Removed	Out of line of sight of base station.
P63	15-Aug-2022	Prism Removed	Out of line of sight of base station.

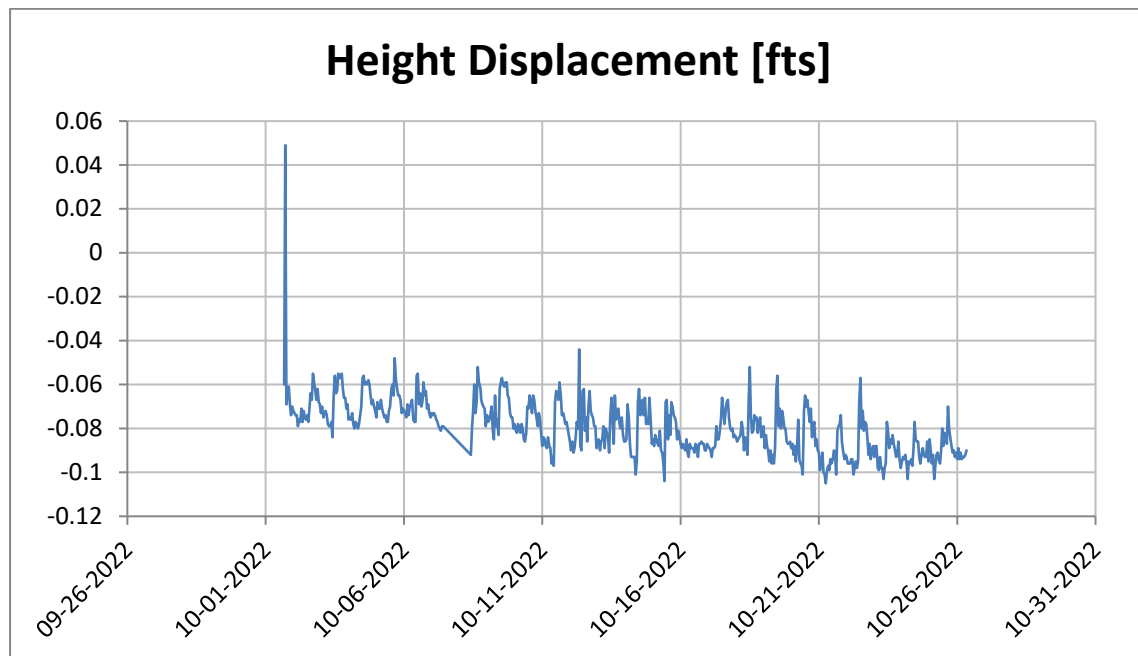
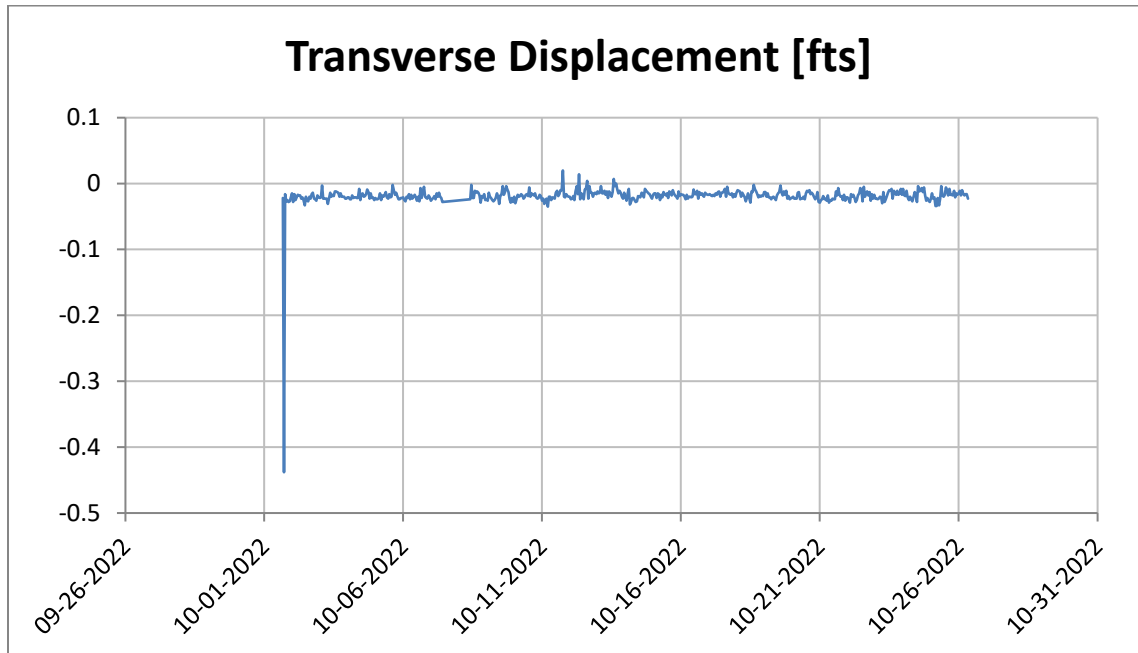
Prism BR1



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.

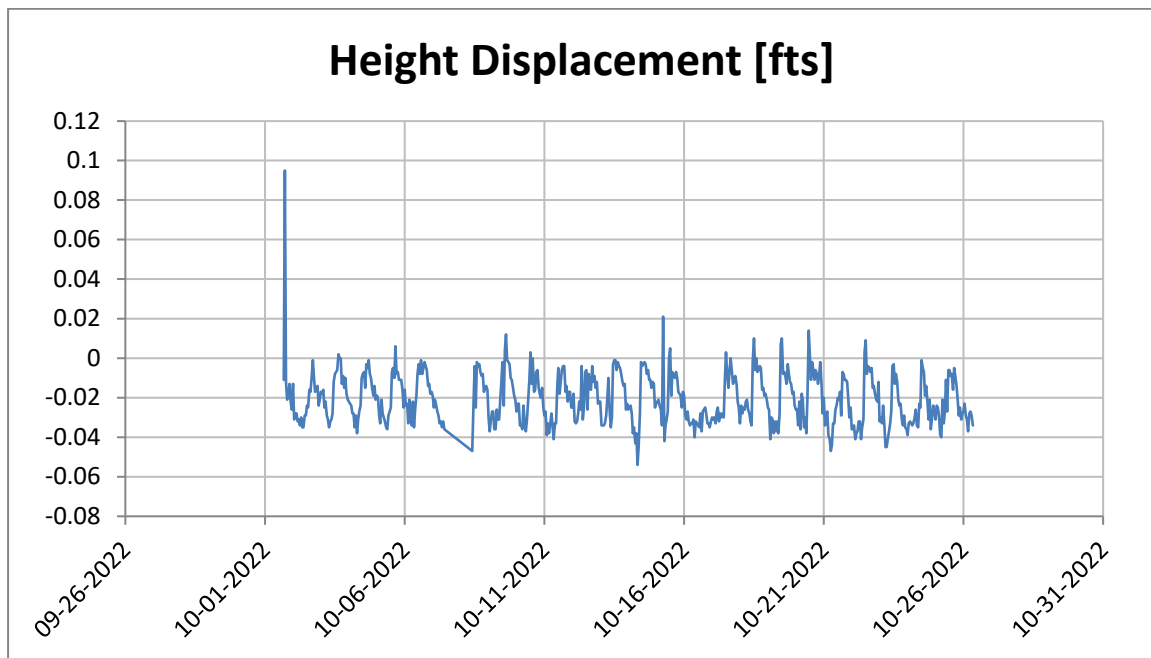
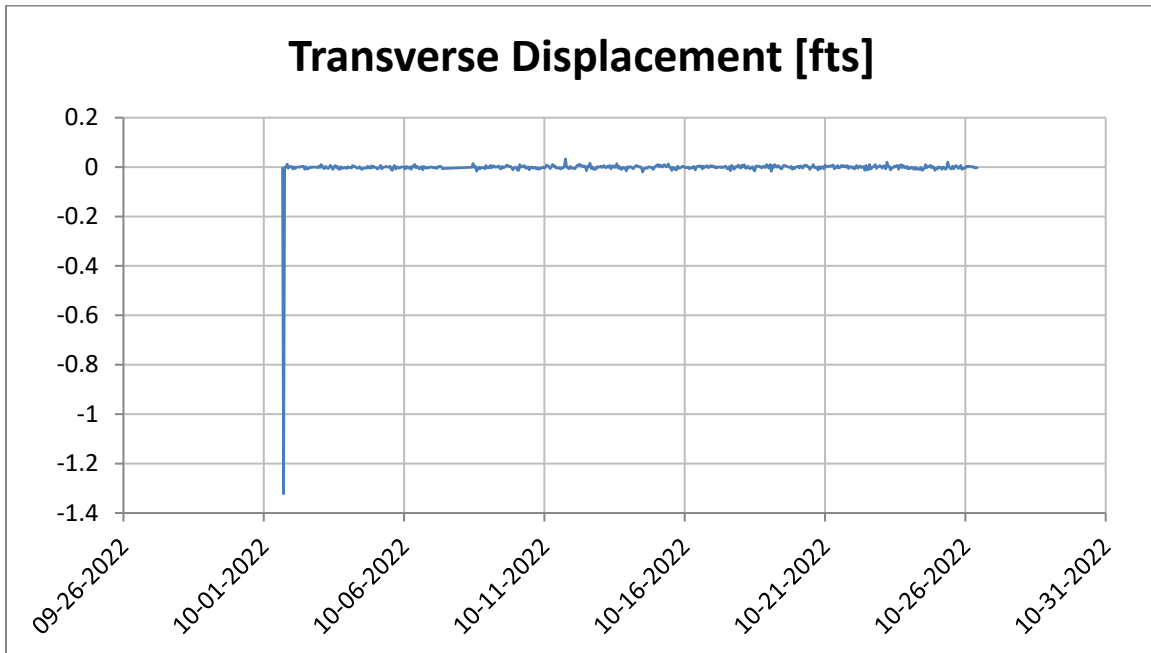
Prism BR2



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.

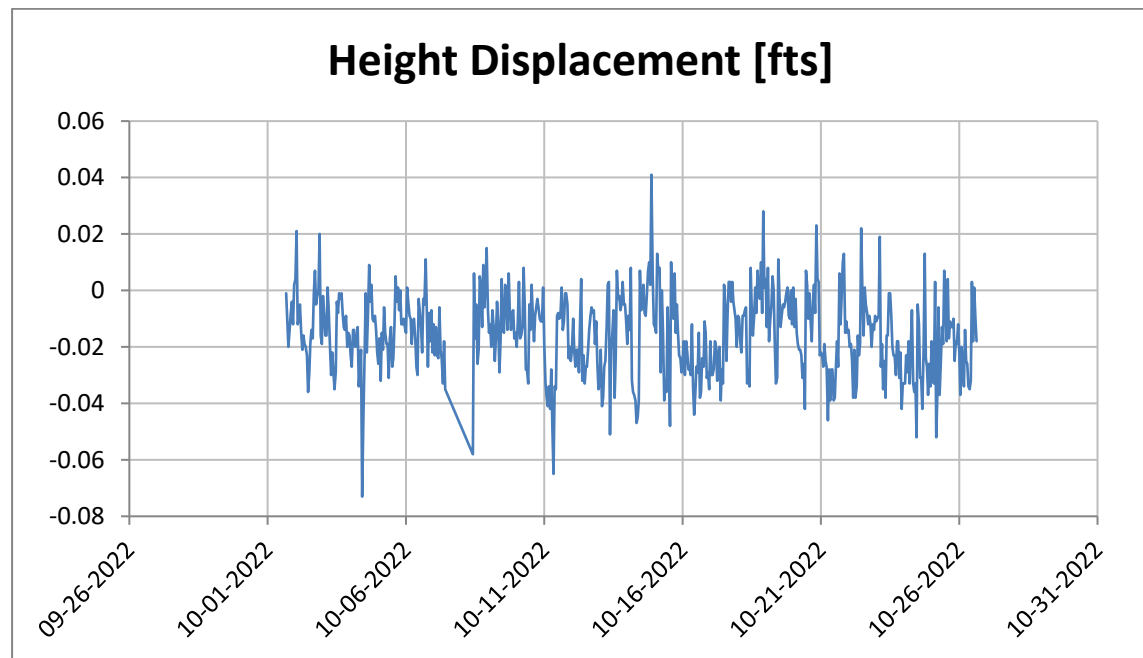
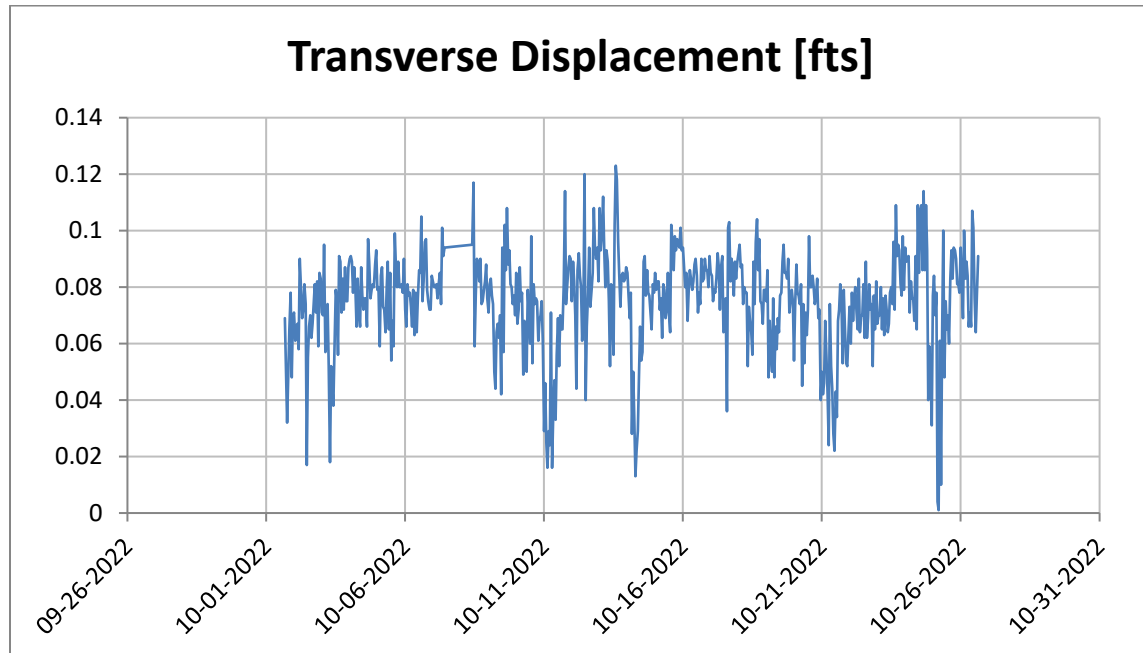
Prism CP6



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. October 1 reading is believed to be erroneous and the result of rain and fog.

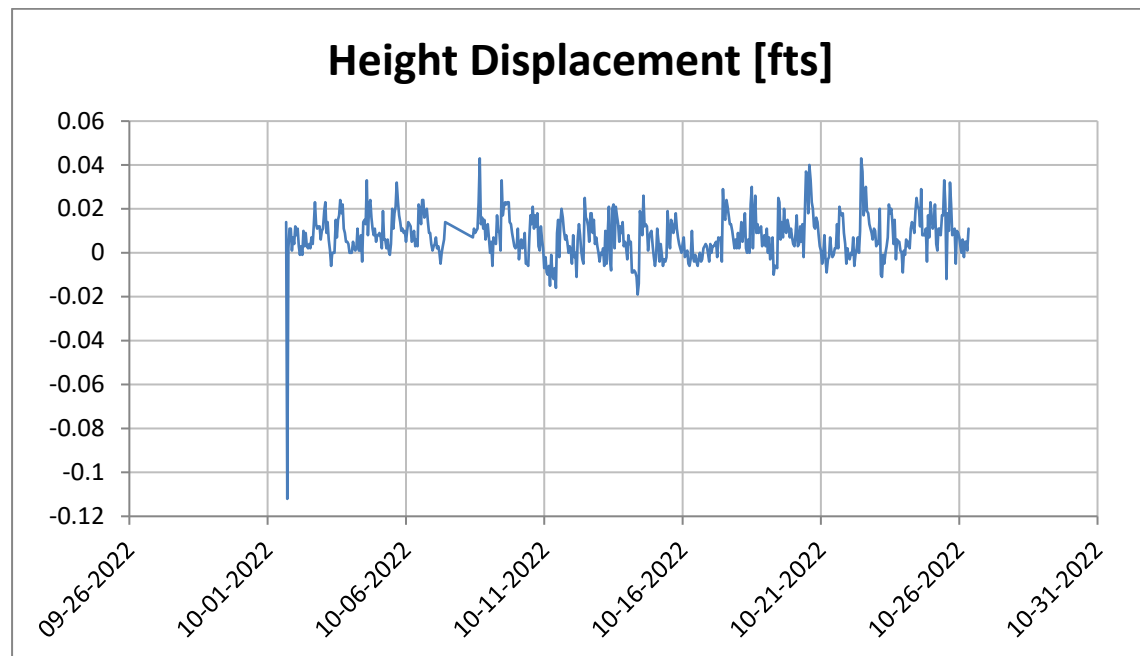
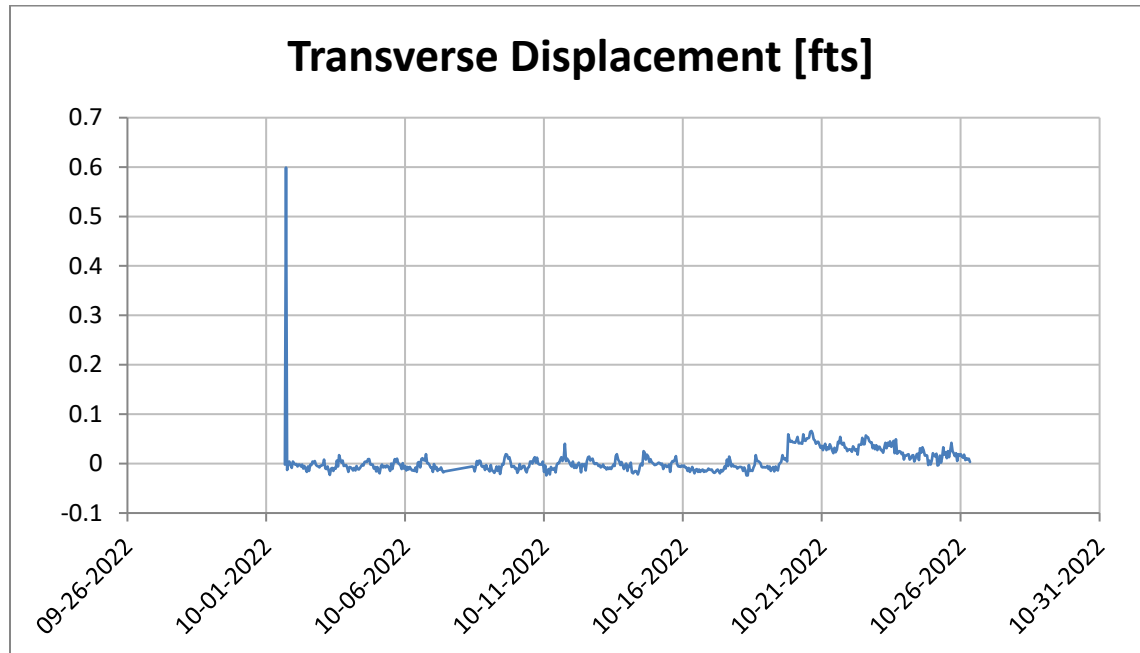
Prism CP7



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.

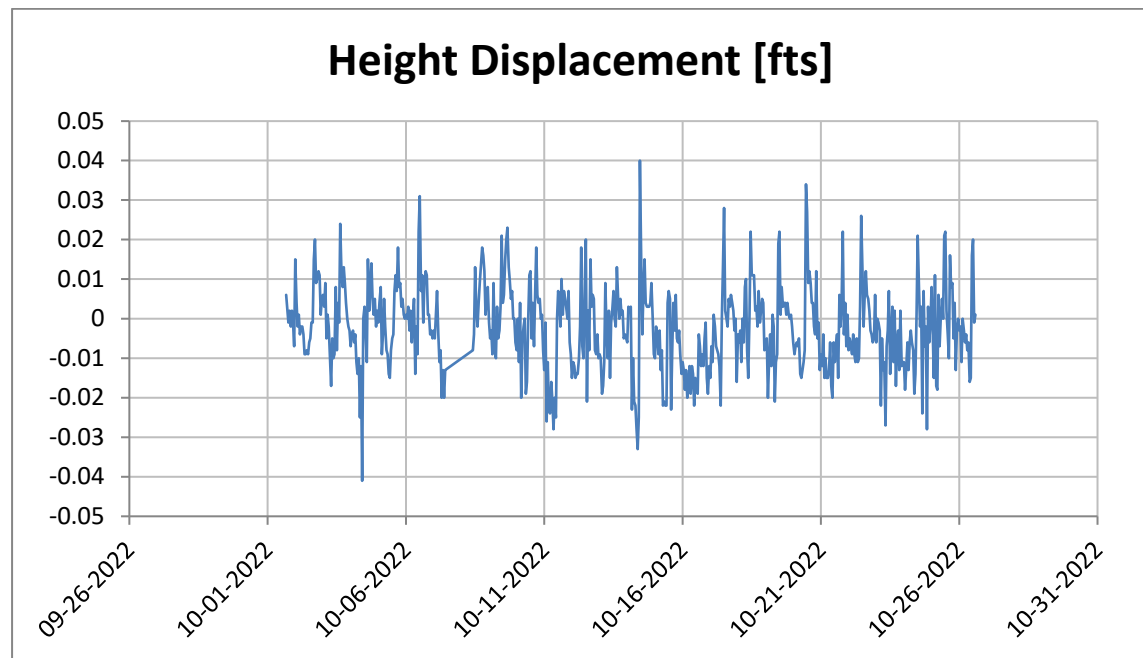
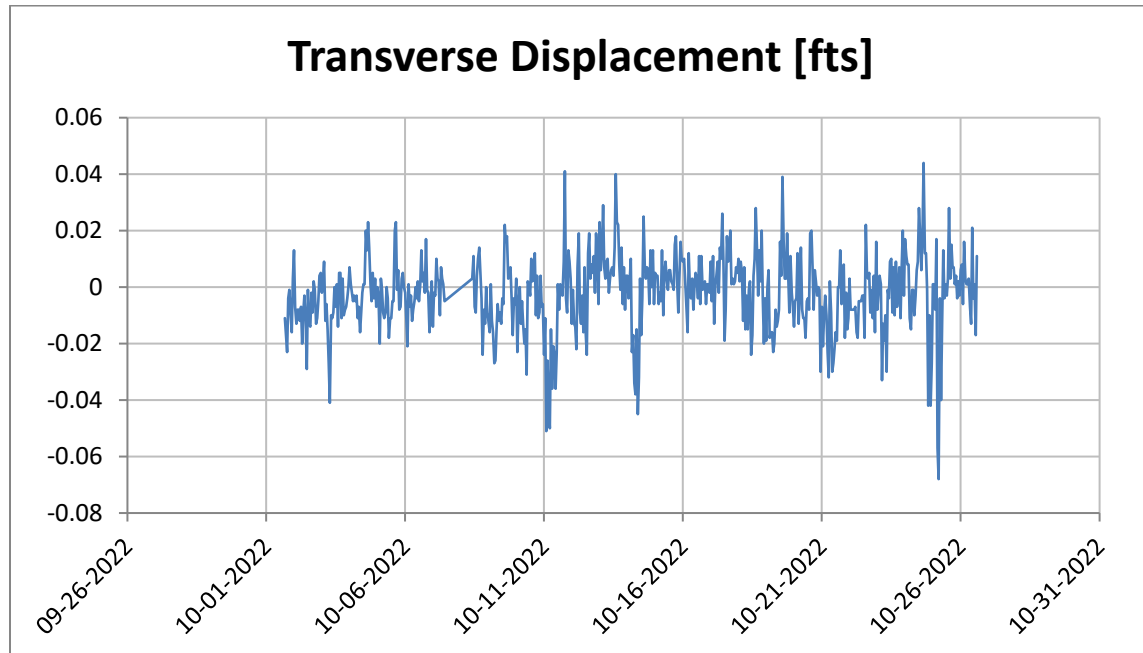
Prism NP2



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.
6. Exceedance alerts were received on 10/01 and 10/19.
7. October 1 reading is believed to be erroneous and the result of rain and fog.

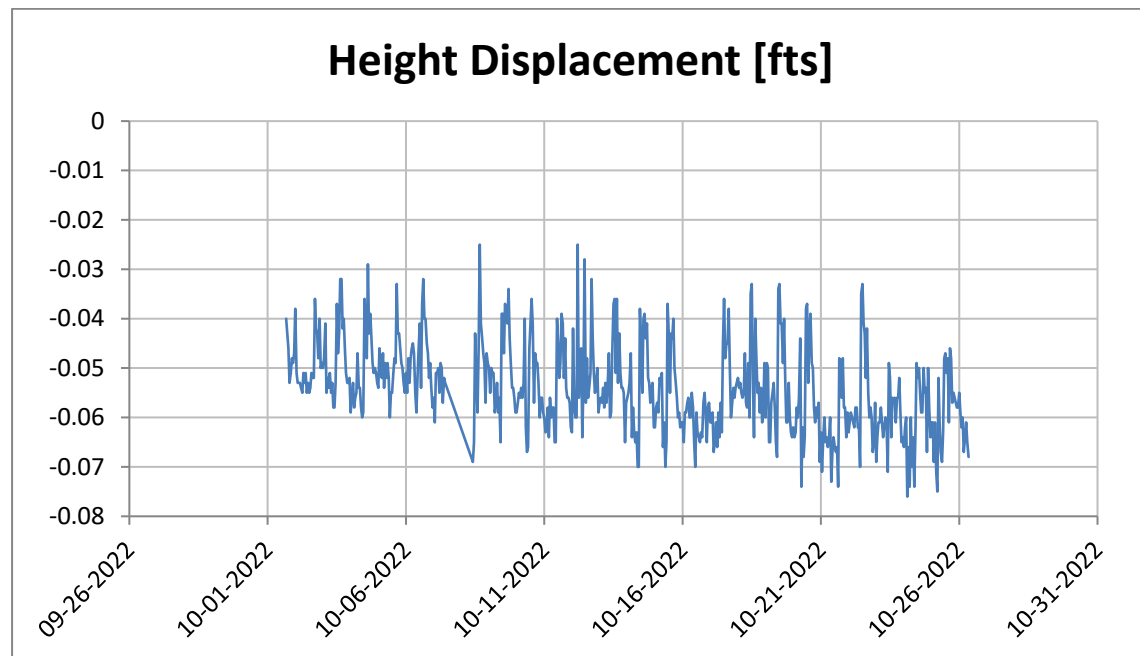
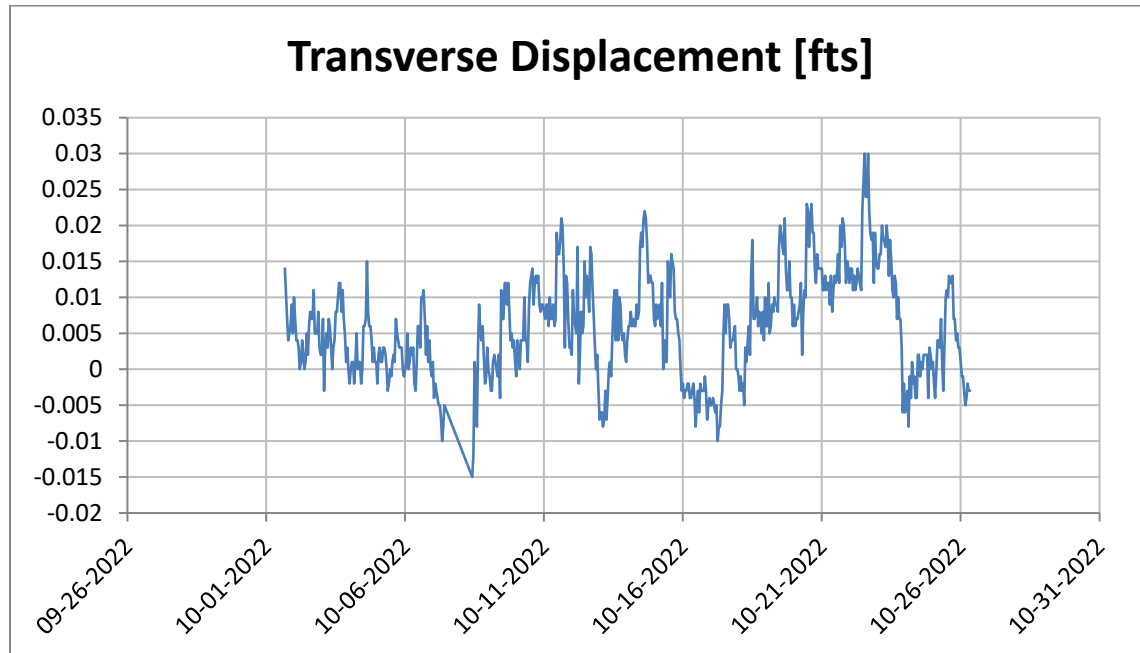
Prism NP3



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.

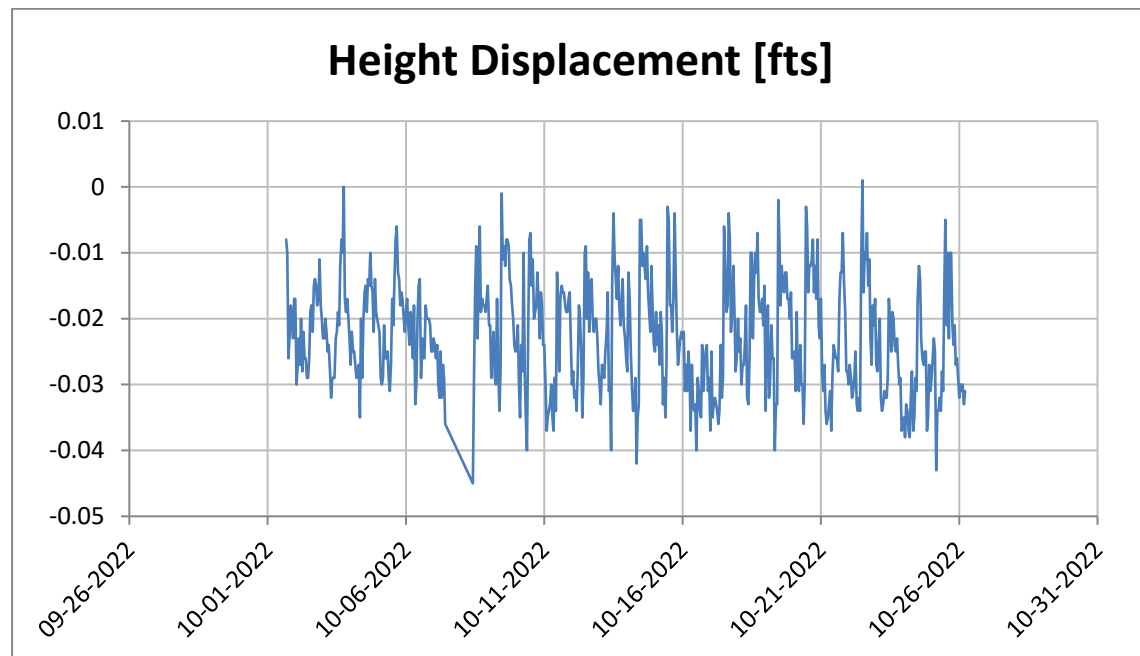
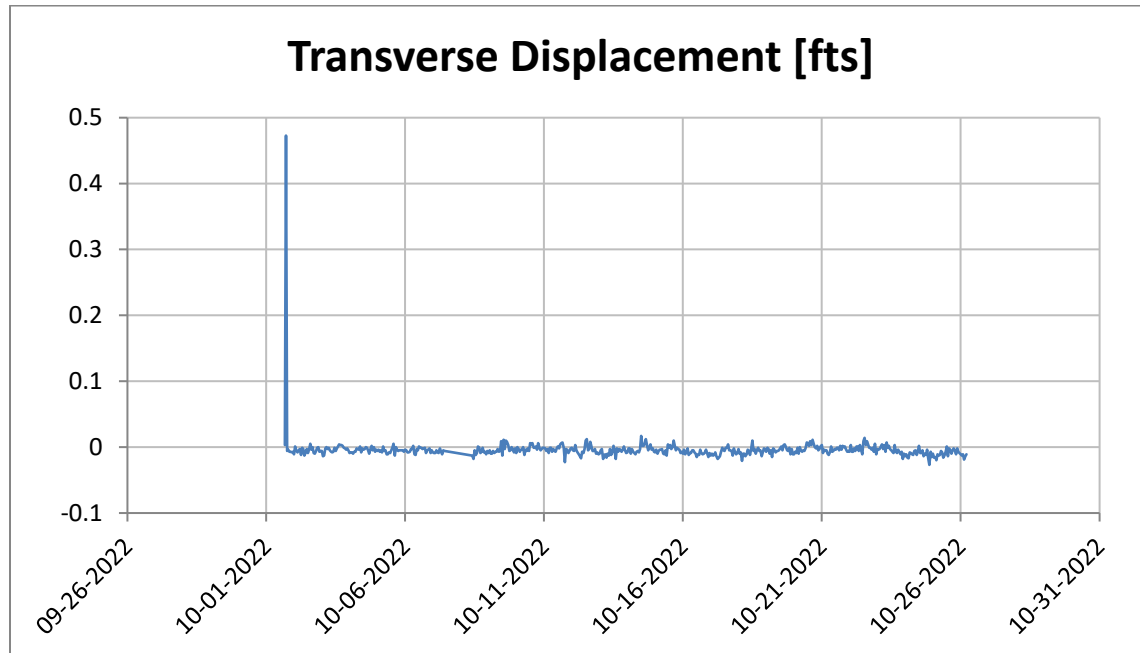
Prism NP66



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.

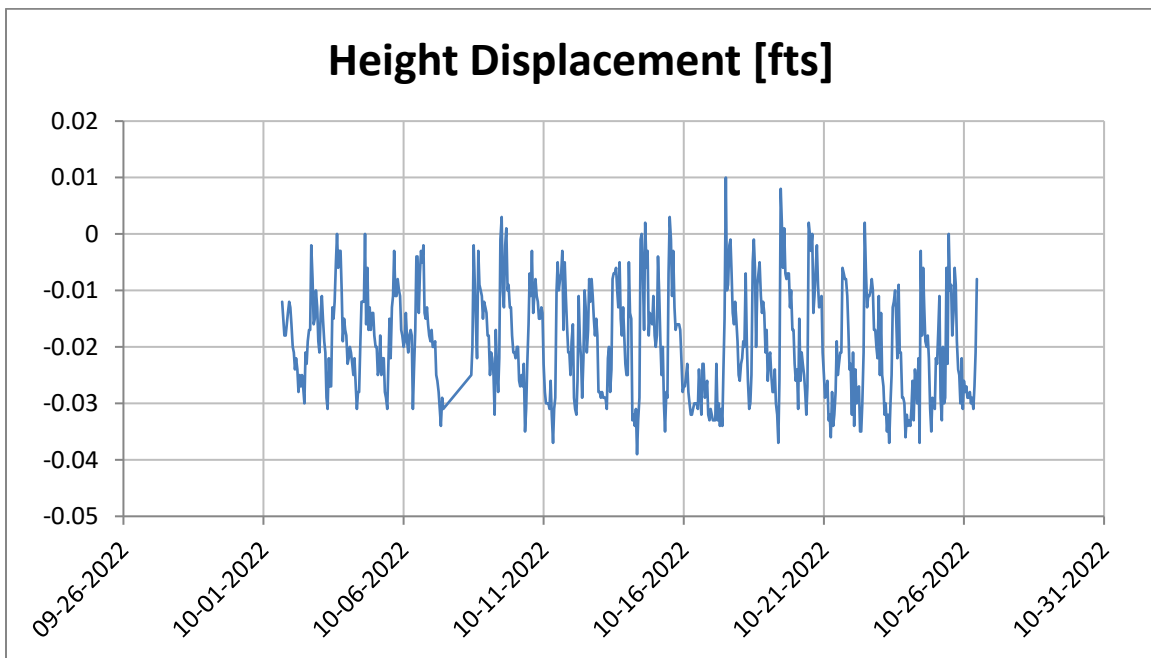
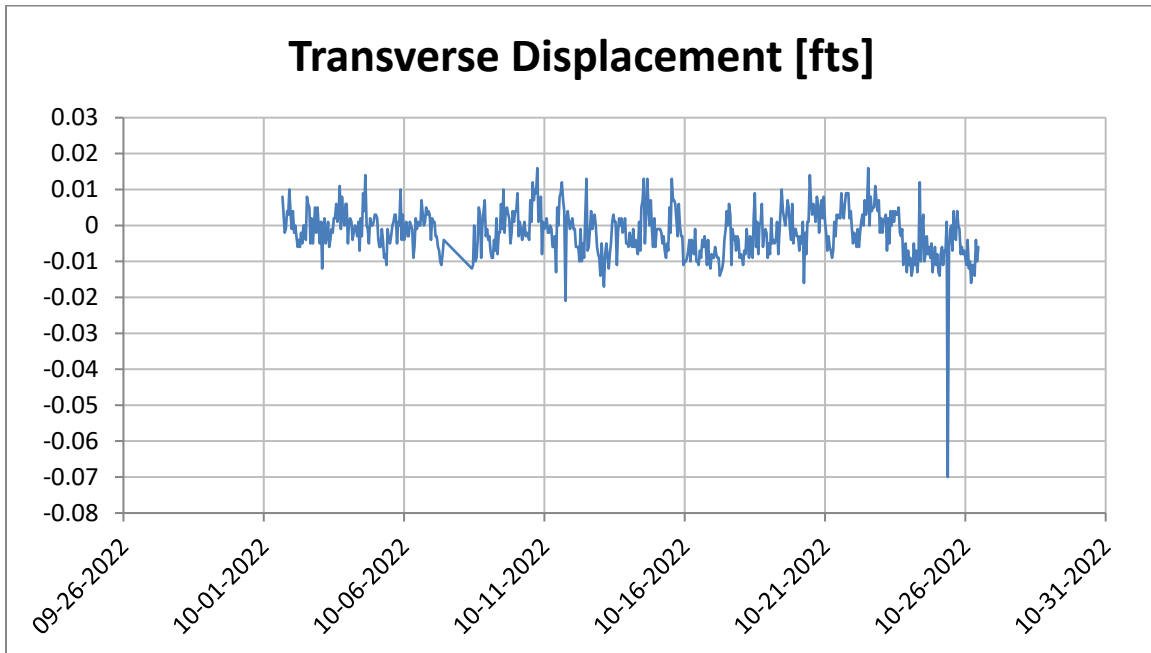
Prism P1



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.
5. Exceedance alerts were received on 10/01.
6. October 1 reading is believed to be erroneous and the result of rain and fog.

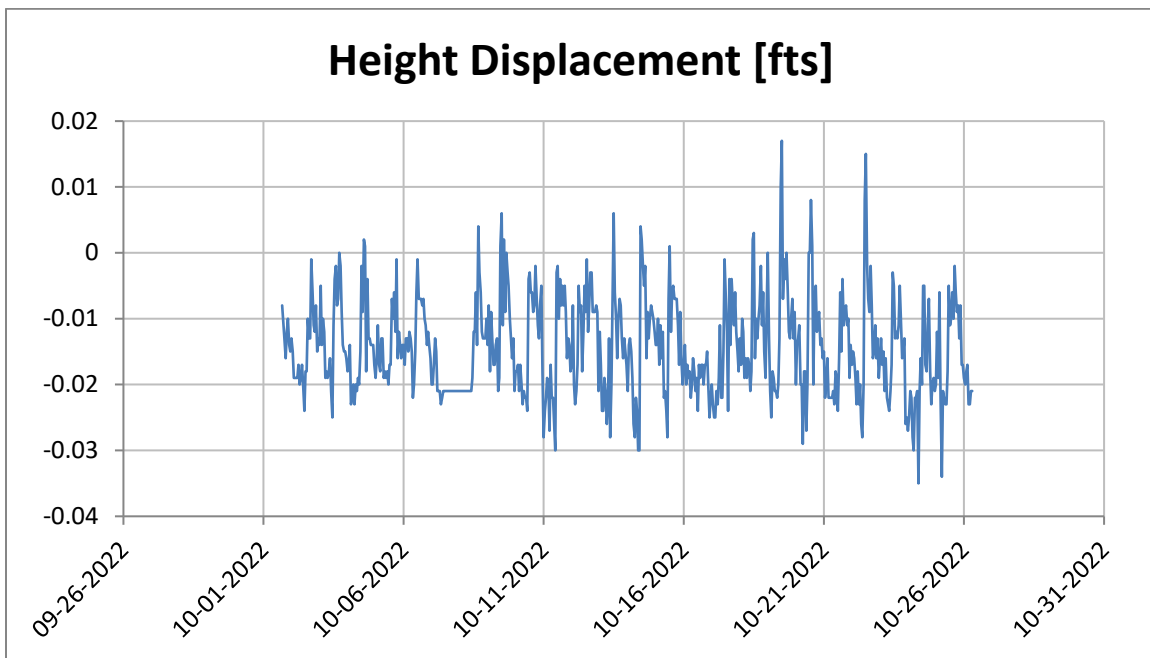
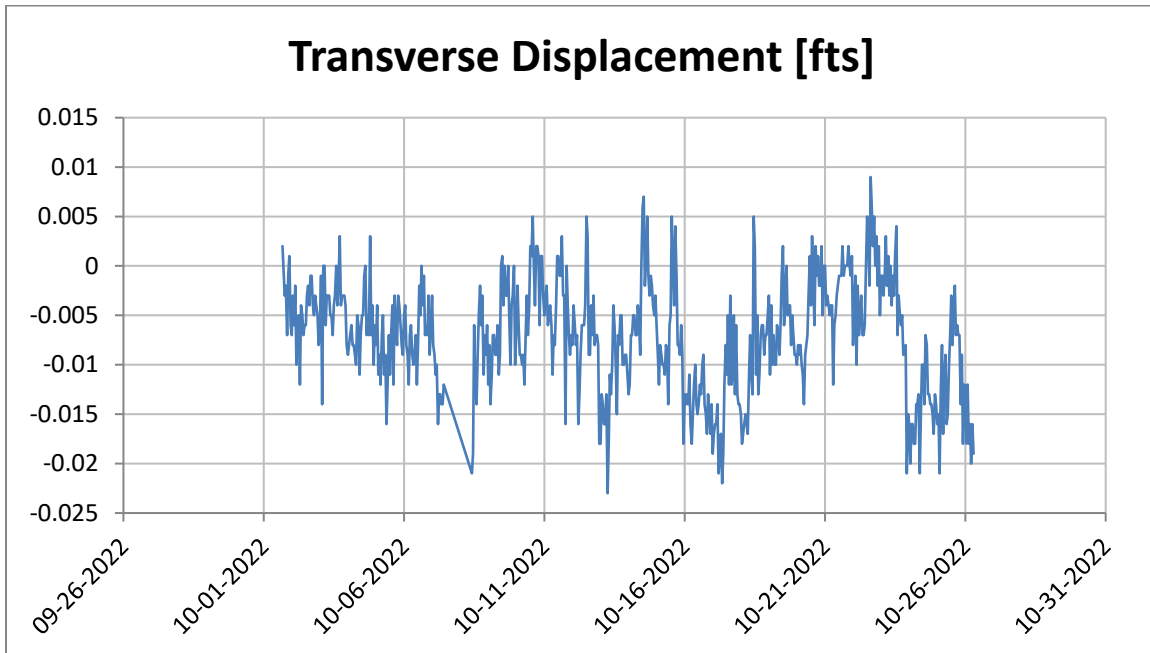
Prism P2



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.

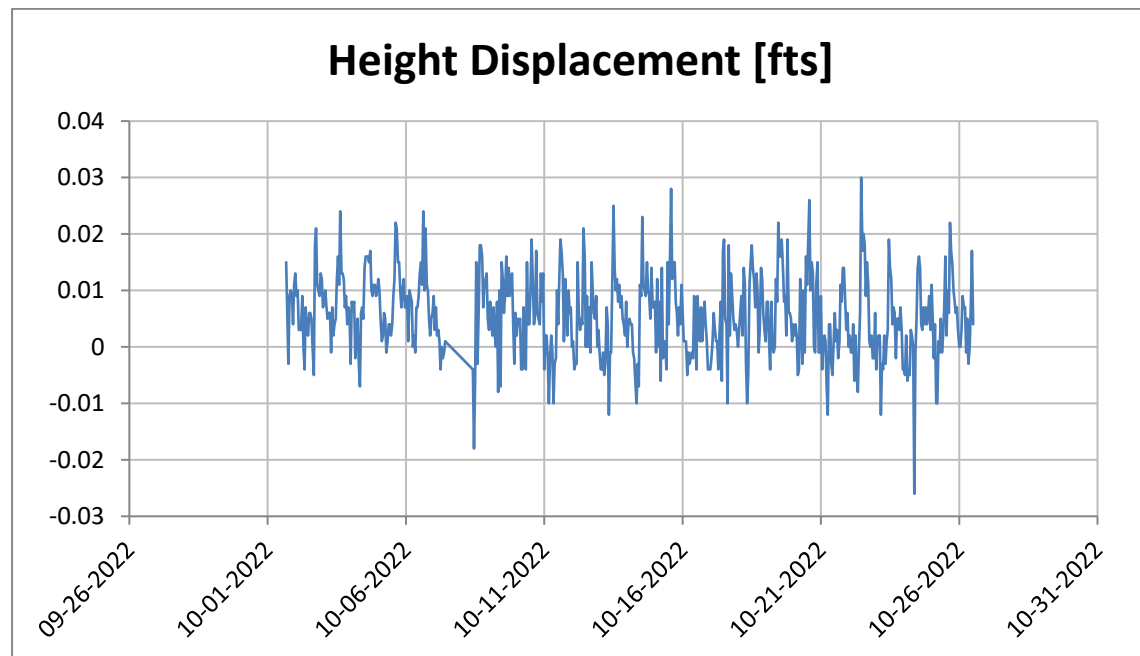
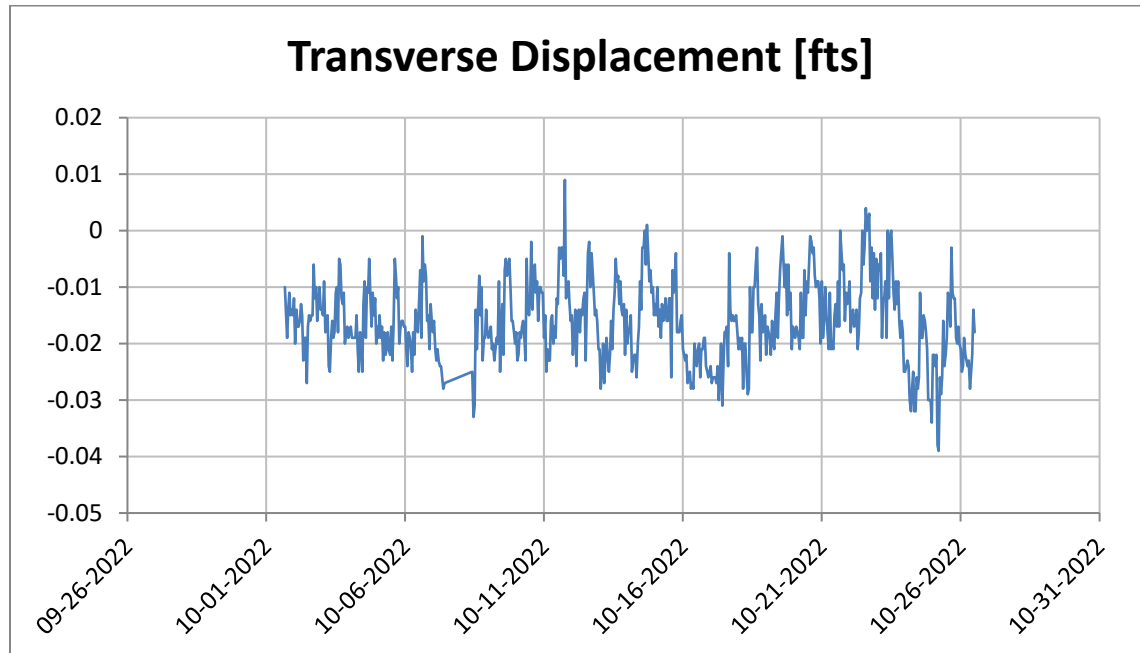
Prism P5



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.

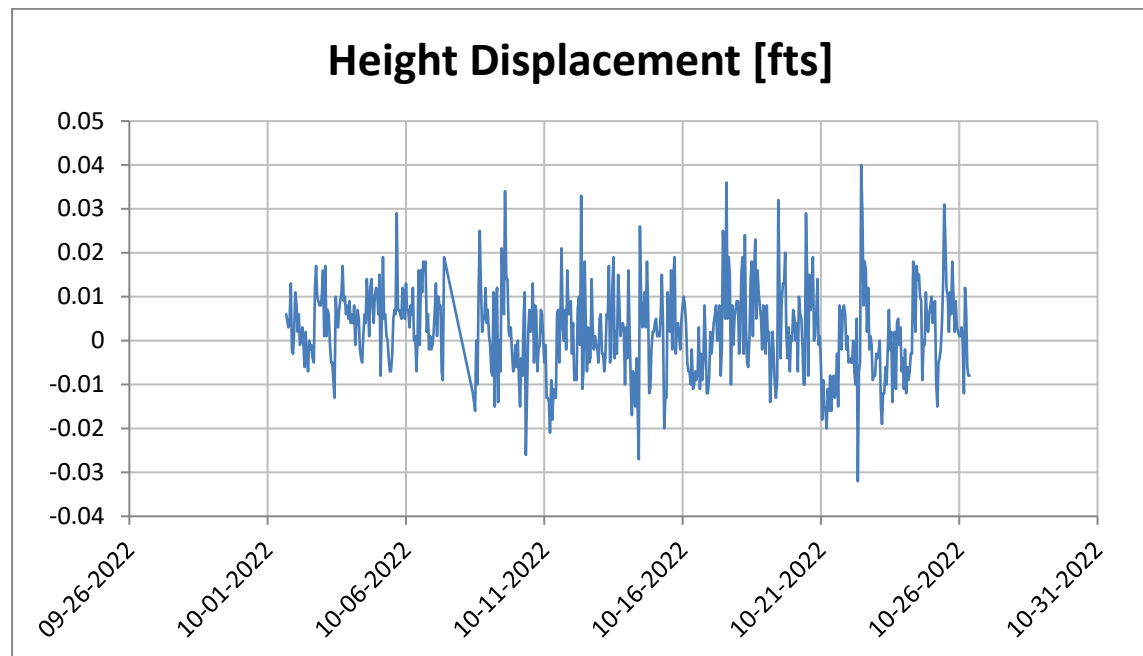
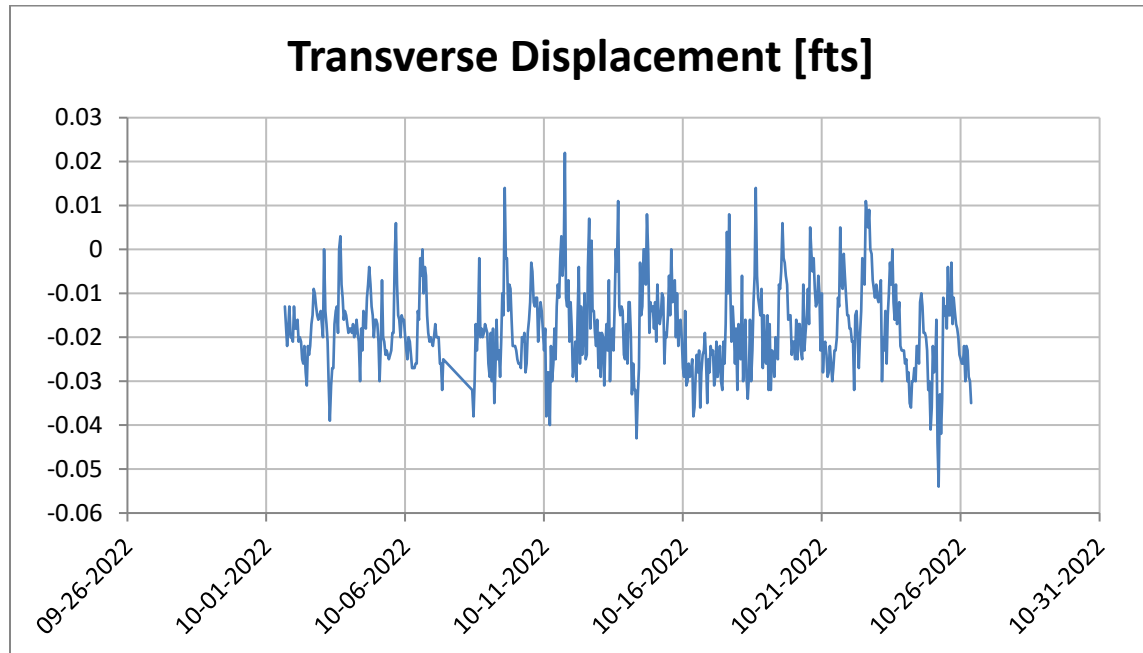
Prism P25



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.

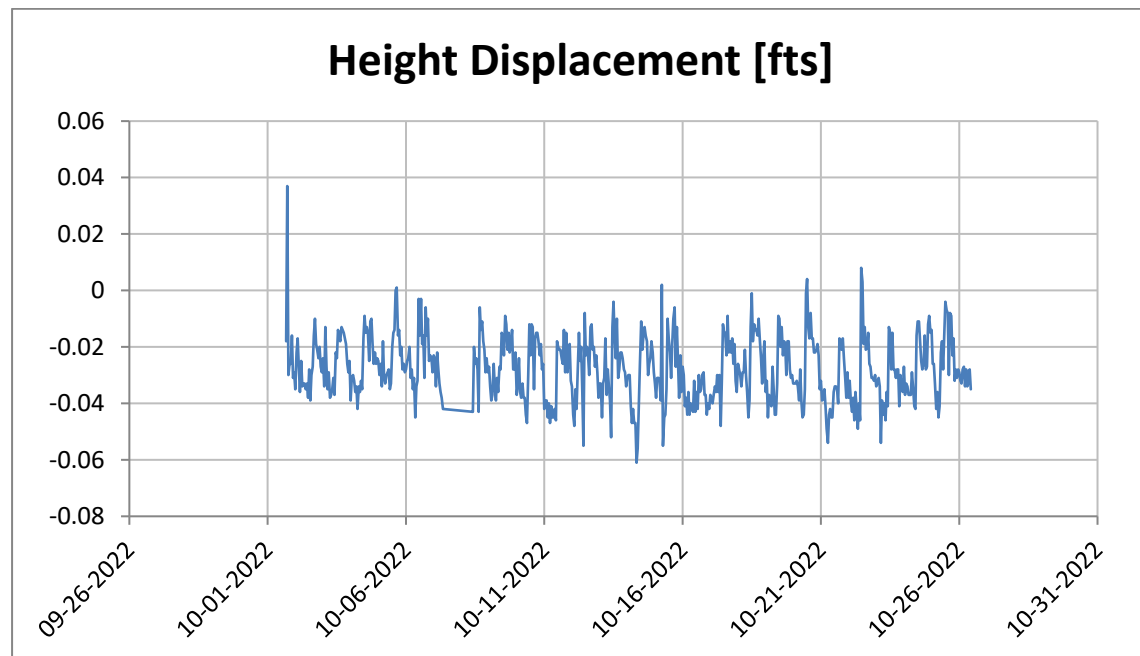
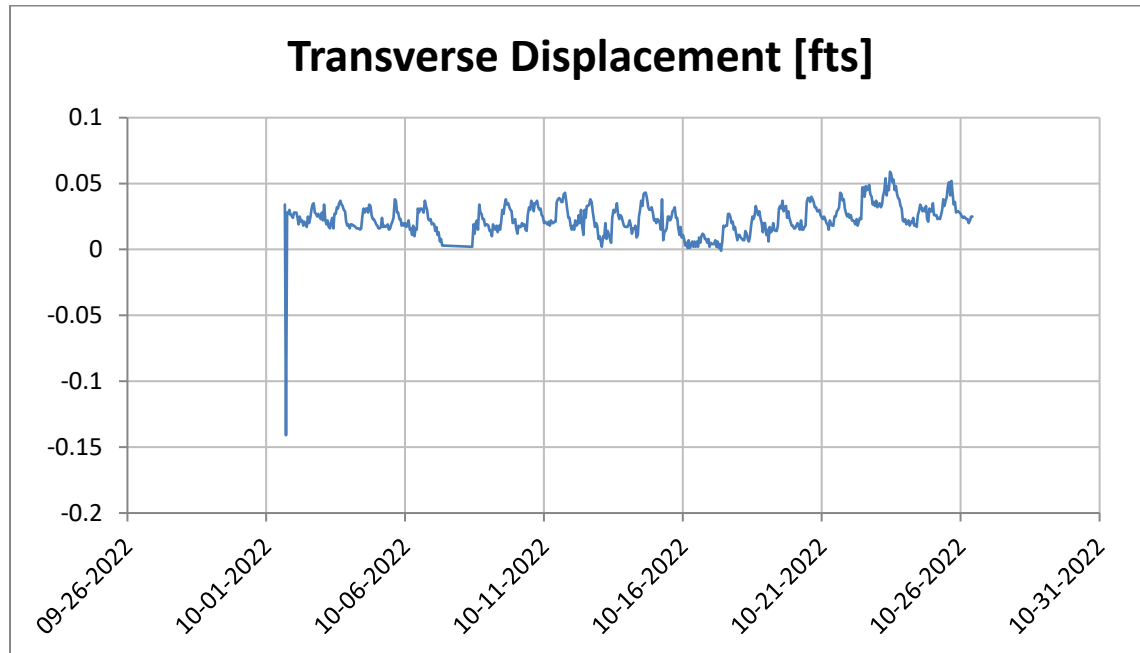
Prism P32



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.

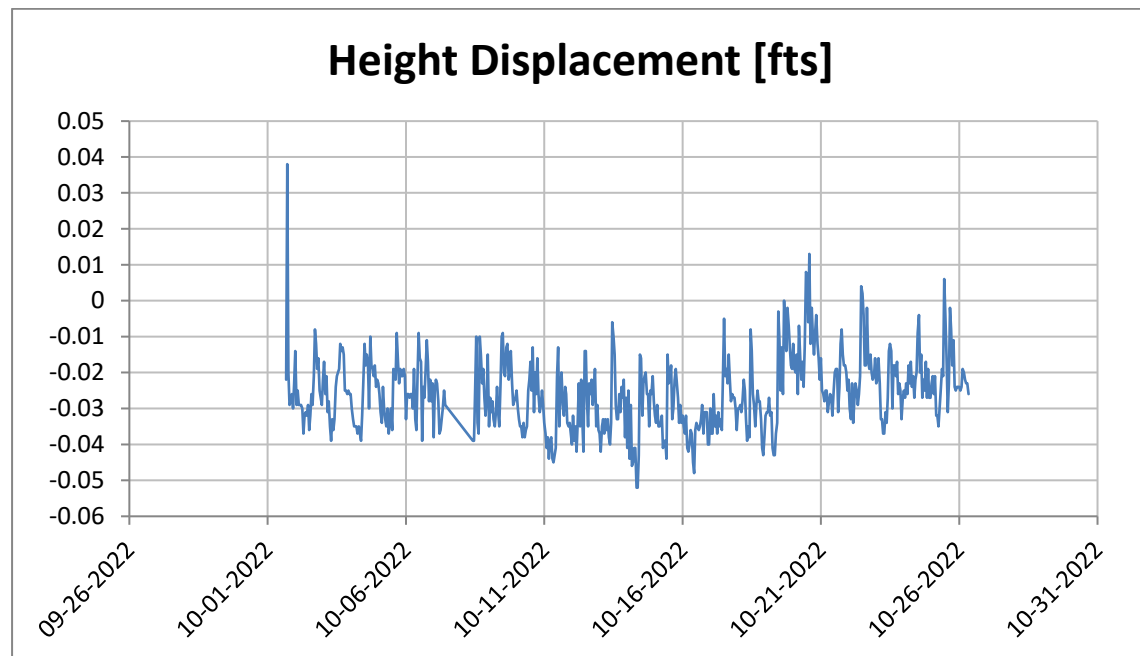
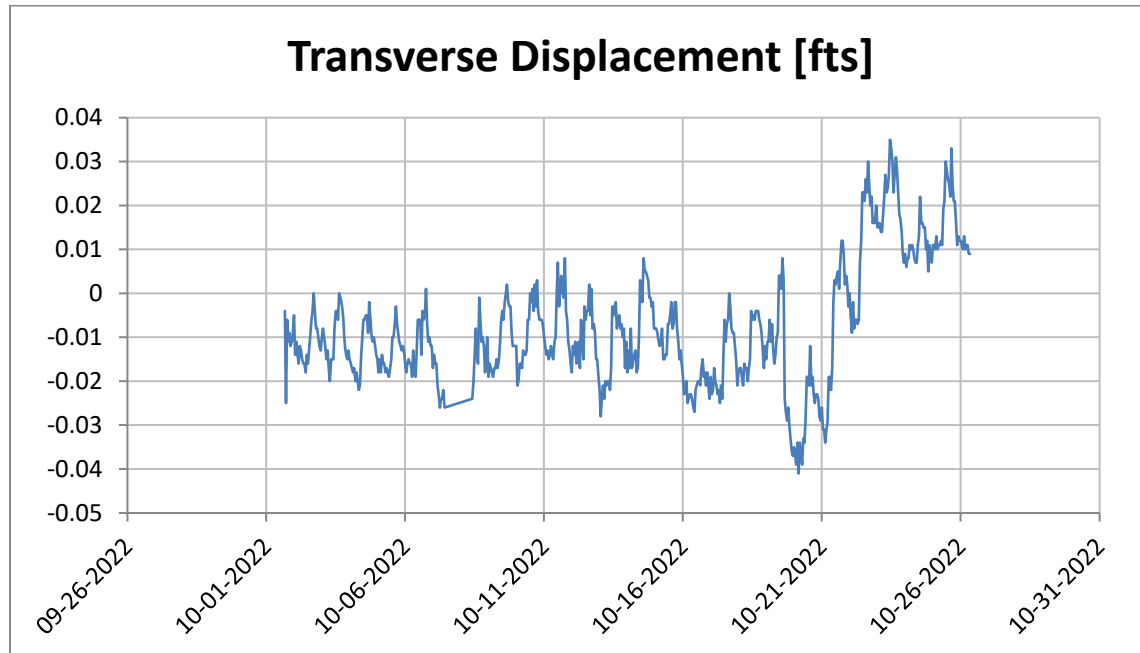
Prism P33



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. Exceedance alerts were received on 10/01 and 10/18.
6. October 1 reading is believed to be erroneous and the result of rain and fog.

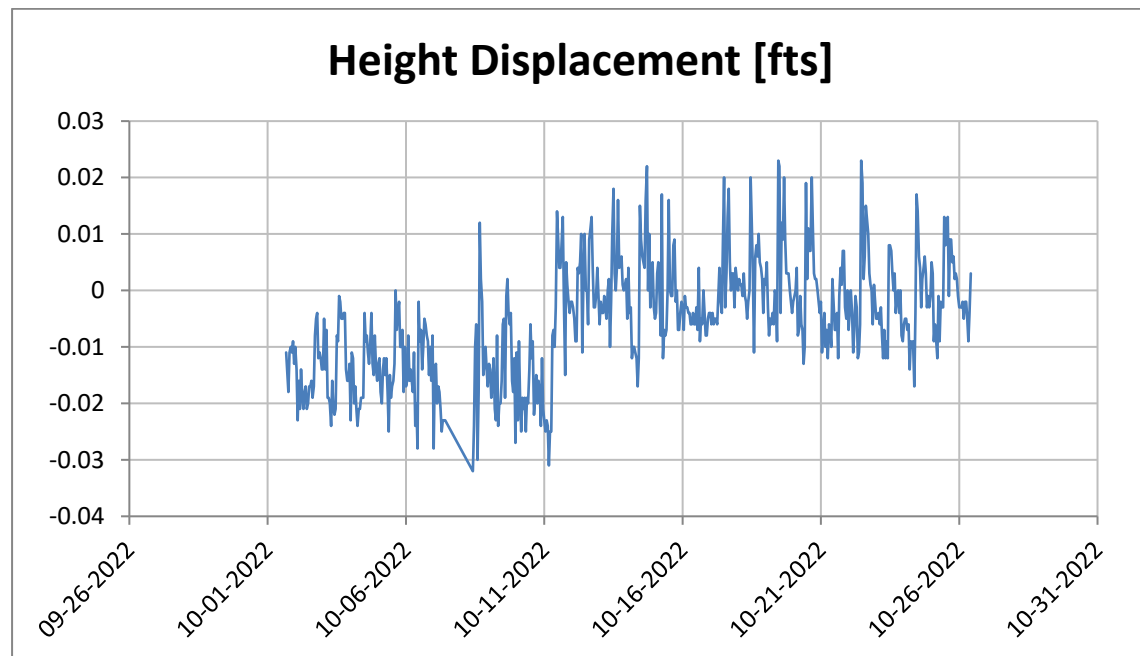
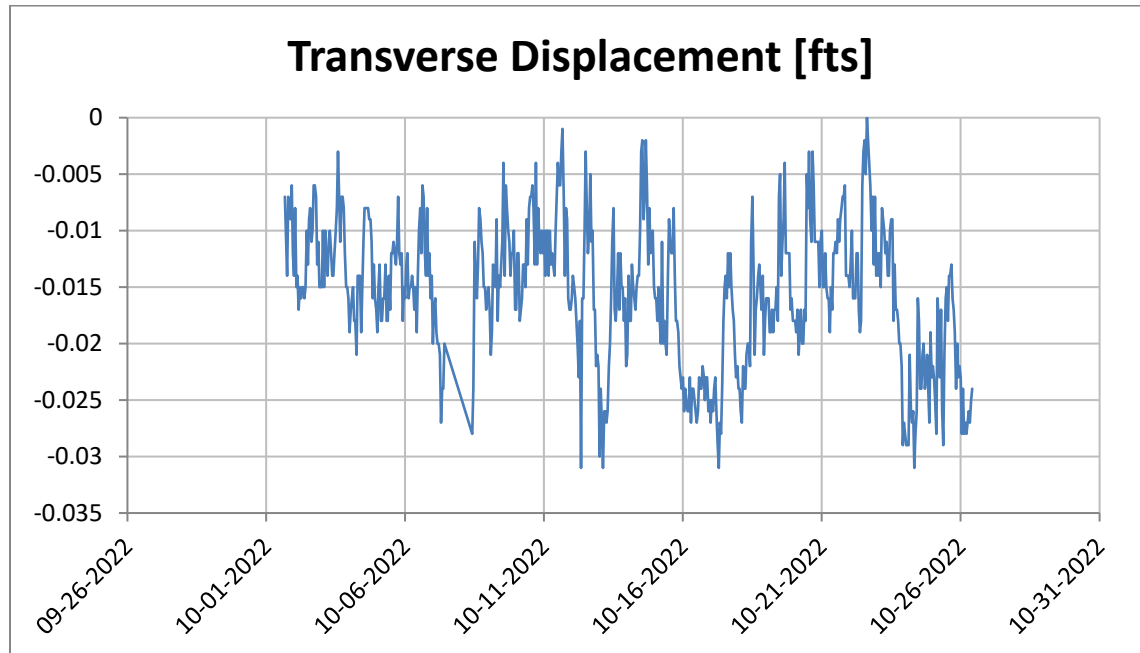
Prism P69A



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. Exceedance alerts were received on 10/01 and 10/19.
6. October 1 reading is believed to be erroneous and the result of rain and fog.

Prism P70



Notes:

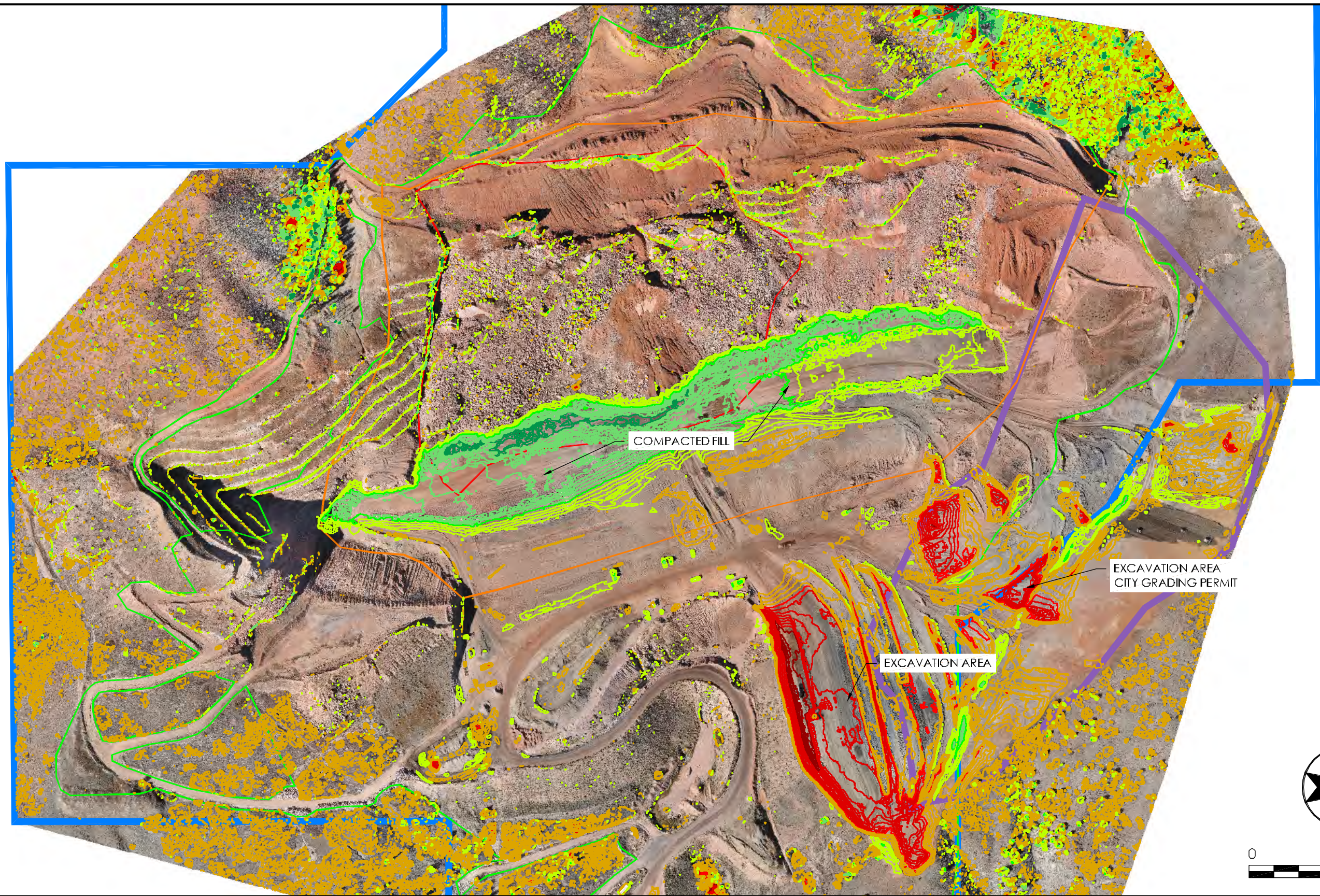
1. Survey accuracy is +/-0.016 feet.
2. Alarm threshold is +/-0.35 feet.
3. Transverse displacement is in the horizontal direction. Positive direction means closer to the robotic station.
4. Height displacement is in the vertical direction. Positive direction means higher in elevation.

Appendix C

Drone Survey

\\us0389-pptss01\shared_projects\2057288200\06_design\monitoring\2022-10\dwg\pikreview.pptms_11082022

2022.11.08 1:04:22 PM



Stantec Consulting Services Inc.
2000 South Colorado Boulevard Suite 2-300
Denver CO 80222-7933
Tel: (303) 758-4058
www.stantec.com

LEGEND

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

1. COMPARISON OF DRONE FLIGHTS FROM 09/28/2022 to 10/31/2022.

Client/Project

CONTINENTAL MATERIALS
CORP.
PIKEVIEW QUARRY SLOPE
MONITORING

Project No.
2057288200

Title

EXISTING PRISMS WITH
CURRENT SURFACE

Revision
#

Drawn By
PK

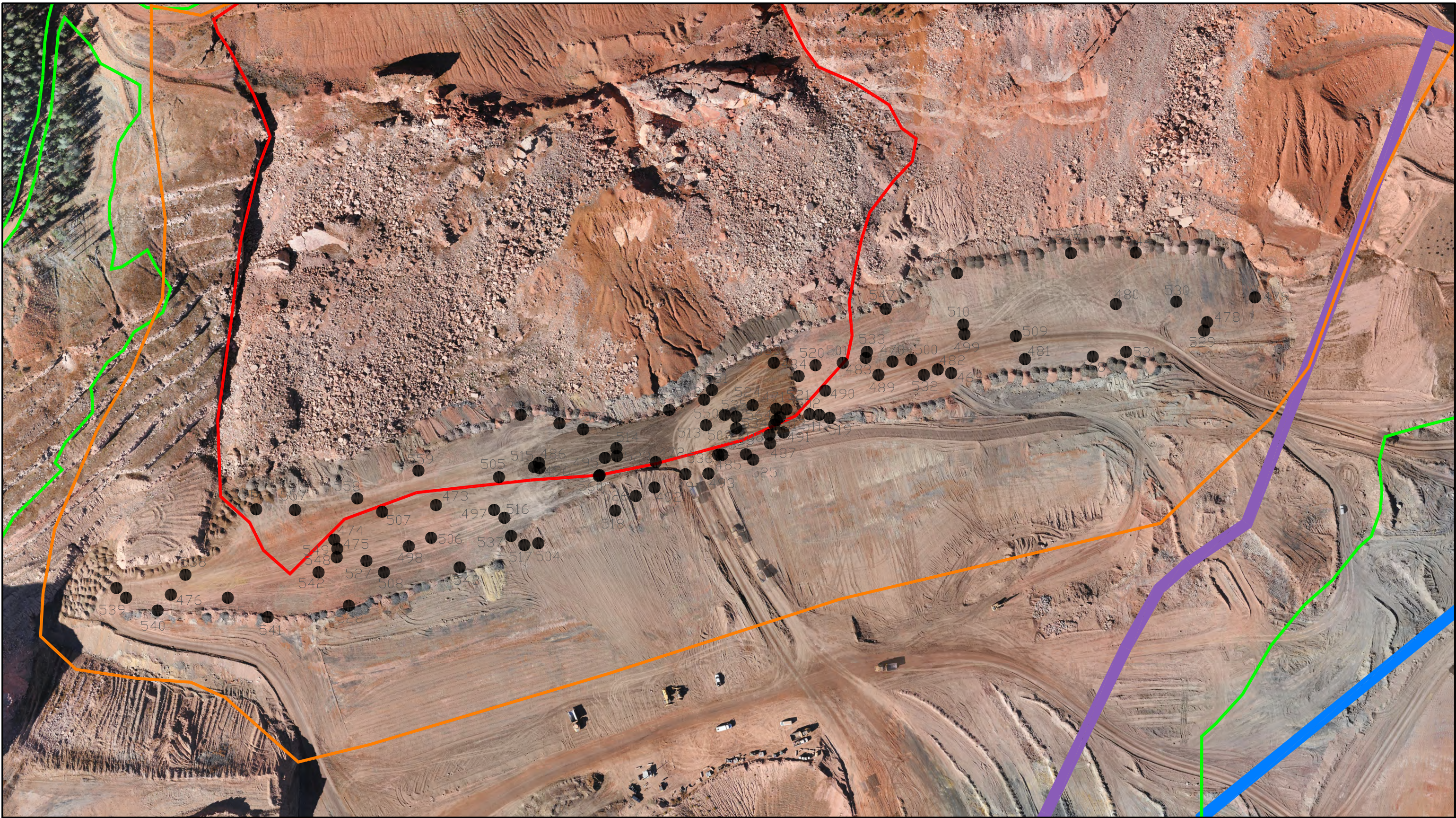
Date
2022.11.18

Figure No.
5

Appendix D

Compaction Testing Results

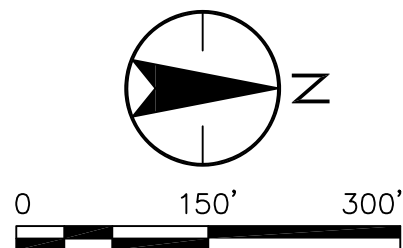
2022.11.10 3:27:55 PM \\us0389-pptss01\shared_projects\2057288200\06_design\monitoring\2022-10\dwg\pikeview\prisms_11082022



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Denver CO 80222-7933
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www.stantec.com

LEGEND

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



Client/Project

CONTINENTAL MATERIALS
CORP.
PIKEVIEW QUARRY SLOPE
MONITORING

Project No.

2057288200

Title

COMPACTION TEST
LOCATIONS

Revision
#

Drawn By
PK

Date
2022.11.18

Figure No.
6

Compaction Testing Log

BCC Test	Test No.	Date	Elevation (ft)	Northing (ft)	Easting (ft)	Wet Density (pcf)	Moisture Content (%)	Dry Density (pcf)	Compaction (%)
Test KK4	#468	3-Oct	7270	1402473	3173112	125.8	6	118.7	96
Test KK5	#469	3-Oct	7268	1402239	3173139	124.4	4.3	119.2	97
Test KK6	#470	3-Oct	7267	1402142	3173120	125.1	4.7	119.4	97
Test KK7	#471	3-Oct	7260	1401950	3173198	134	8.9	123	100
Test KK8	#472	3-Oct	7257	1401751	3173286	128.3	13.8	112.7	91
Test KK9	#473	3-Oct	7255	1401388	3173357	124.2	11.1	111.8	91
Test KK10	#474	3-Oct	7254	1401220	3173414	121.6	8.8	111.8	91
Test KK11 (12 in.)	#475	3-Oct	7253	1401225	3173429	125.6	13.2	111	90
Test KK12	#476	4-Oct	7255	1400950	3173505	123.9	97	119.6	97
Test KK13	#477	4-Oct	7255	1400860	3173494	120.9	95	117.5	95
Test LL1	#478	5-Oct	7279	1402662	3173055	118.8	5.3	112.8	91
Test LL2	#479	5-Oct	7280	1402741	3173014	125.2	2.2	120.2	99
Test LL3	#480	5-Oct	7278	1402511	3173025	118.2	2.1	115.8	94
Test LL4	#481	5-Oct	7274	1402361	3173116	120.7	2.2	118	96
Test LL5	#482	5-Oct	7271	1402217	3173133	127.4	2.1	124.8	100
Test LL6	#483	5-Oct	7268	1402098	3173114	122.3	4.1	117.5	95
Test LL7	#484	5-Oct	7265	1401987	3173144	124.8	1.9	122.5	99
Test LL8	#485	5-Oct	7259	1401861	3173274	132.1	6.5	124	100
Test LL9	#486	5-Oct	7260	1401558	3173287	125.1	1.9	122.7	99
Test LL10	#487	5-Oct	7260	1401940	3173255	127.2	3.7	122.6	99
Test LL11	#488	5-Oct	7259	1401939	3173241	128.4	12.2	114.4	93
Test MM1	#489	6-Oct	7267	1402119	3173142	129	7.1	120.4	98
Test MM2	#490	6-Oct	7267	1402031	3173168	117	3.6	112.9	91
Test MM3	#491	6-Oct	7265	1401962	3173237	119.8	3.7	115.6	94
Test MM4	#492	10-Oct	7258	1401749	3173328	141.4	7.5	131.5	100
Test MM5	#493	10-Oct	7258	1401838	3173305	135.3	4	130.1	100
Test MM6	#494	10-Oct	7258	1401800	3173306	137.5	5.4	130.4	100
Test MM7	#495	10-Oct	7260	1401667	3173279	134.4	10.3	121.9	99
Test MM8	#496	10-Oct	7260	1401559	3173296	137.7	3.7	132.9	100
Test MM9	#497	10-Oct	7259	1401484	3173365	128	1.9	125.6	100
Test MM10	#498	10-Oct	7258	1401343	3173425	134.7	4.5	128.9	100
Test NN1	#499	10-Oct	7271	1402261	3173075	126.3	7	118	96
Test NN2	#500	10-Oct	7270	1402173	3173117	132.9	6.2	125.1	100
Test NN3	#501	10-Oct	7270	1402060	3173122	142	6.1	133.8	100
Test NN4	#502	10-Oct	7268	1402005	3173207	141.3	6.8	132.2	100
Test NN5	#503	10-Oct	7268	1401884	3173230	144.4	7.9	133.8	100
Test NN6	#504	11-Oct	7258	1401557	3173420	151.5	6.3	142.5	100

BCC Test	Test No.	Date	Elevation (ft)	Northing (ft)	Easting (ft)	Wet Density (pcf)	Moisture Content (%)	Dry Density (pcf)	Compaction (%)
Test NN7	#505	11-Oct	7262	1401492	3173311	134.9	6.4	126.9	100
Test NN8	#506	11-Oct	7259	1401380	3173411	142.4	6.6	133.6	100
Test NN9	#507	11-Oct	7260	1401299	3173368	141.2	6.8	132.2	100
Test NN10	#508	11-Oct	7259	1401302	3173468	141.1	8.4	130.2	100
Test OO1	#509	12-Oct	7274	1402346	3173078	143.9	6.6	134.9	100
Test OO2	#510	12-Oct	7274	1402259	3173059	135.6	7.3	126.4	100
Test OO3	#511	12-Oct	7270	1402021	3173208	129.9	3.7	125.2	100
Test OO4	#512	12-Oct	7268	1401947	3173224	130.3	7.1	121.7	99
Test OO5	#513	12-Oct	7265	1401834	3173225	128.8	8.8	118.4	96
Test OO6	#514	12-Oct	7263	1401686	3173263	125.4	3.1	121.6	99
Test OO7	#515	12-Oct	7263	1401550	3173294	143.3	6.7	134.3	100
Test OO8	#516	12-Oct	7261	1401501	3173378	144.6	8.6	133.2	100
Test OO9	#517	12-Oct	7260	1401534	3173423	144.1	6.6	135.1	100
Test OO10	#518	12-Oct	7260	1401684	3173366	125.5	2.6	122.3	99
Test PP1	#519	13-Oct	7269	1402038	3173213	127.2	2.6	124	100
Test PP2	#520	13-Oct	7272	1402015	3173126	122.6	3.7	118.3	96
Test PP3	#521	13-Oct	7270	1401967	3173199	124.2	3.3	120.2	97
Test PP4	#522	13-Oct	7265	1401900	3173273	123.2	7.5	114.6	93
Test PP5	#523	13-Oct	7267	1401687	3173276	121.3	3.2	117.6	95
Test PP6	#524	14-Oct	7270	1401911	3173192	127.2	2.8	122.5	99
Test PP7	#525	14-Oct	7268	1401912	3173282	129.3	2.5	125	100
Test PP8	#526	14-Oct	7266	1401718	3173342	132.9	4.5	127.4	100
Test PP9	#527	14-Oct	7261	1401273	3173449	125.4	12.5	111.5	90
Test PP10	#528	14-Oct	7259	1401244	3173523	133.8	5.1	127.2	100
Test QQ1	#529	14-Oct	7276	1402657	3173069	124.9	5.6	118.3	96
Test QQ2	#530	14-Oct	7277	1402611	3173021	139.2	7.1	130	100
Test QQ3	#531	14-Oct	7275	1402528	3173104	129.5	7.1	120.9	98
Test QQ4	#532	17-Oct	7273	1402194	3173142	139.8	3.5	135	100
Test QQ5	#533	17-Oct	7273	1402100	3173104	132.6	4.4	127.1	100
Test QQ6	#534	17-Oct	7270	1401956	3173212	131.9	10.6	119.3	97
Test QQ7	#535	17-Oct	7270	1401884	3173211	121.8	10.1	110.6	90
Test QQ8	#536	17-Oct	7268	1401854	3173274	130.7	9.7	119.1	97
Test QQ9	#537	17-Oct	7264	1401512	3173408	125.1	3.1	121.3	98
Test QQ10	#538	17-Oct	7263	1400974	3173472	140.7	5.9	132.8	100
Test RR1	#539	20-Oct	7263	1400876	3173510	138.5	4.8	132.2	100
Test RR2	#540	20-Oct	7262	1400928	3173531	136.4	4.6	130.4	100
Test RR3	#541	20-Oct	7261	1401110	3173542	133.1	9.1	122	99
Test RR4	#542	20-Oct	7264	1401194	3173468	131.6	5.9	124.2	100

BCC Test	Test No.	Date	Elevation (ft)	Northing (ft)	Easting (ft)	Wet Density (pcf)	Moisture Content (%)	Dry Density (pcf)	Compaction (%)
Test RR5	#543	20-Oct	7263	1401427	3173460	133.8	6.1	126.1	100
Test QQ Buffer	#544	21-Oct	7282	1402544	3172940	123.3	11	111.1	90
Test QQ Buffer	#545	21-Oct	7282	1402437	3172941	123.9	4.8	118.3	96
Test QQ Buffer	#546	21-Oct	7279	1402249	3172974	135.4	3.7	130.5	100
Test QQ Buffer	#547	21-Oct	7276	1402131	3173033	120.1	5.4	114	92
Test RR (12 In.)	#548	21-Oct	7264	1401224	3173443	126.2	12	112.6	91
Test RR6	#549	21-Oct	7265	1401224	3173443	129.9	5.3	123.3	100
Test RR6	#550	26-Oct	7273	1401865	3173208	124.1	5.3	117.8	95
Test RR7	#551	26-Oct	7274	1401844	3173167	122.3	9.3	111.9	91
Test RR8	#552	26-Oct	7274	1401773	3173200	125.8	8.1	116.3	94
Test RR9	#553	26-Oct	7272	1401631	3173232	134.8	6.4	126.7	100
Test RR10	#554	26-Oct	7273	1401528	3173208	130.8	7.7	121.5	98
Test SS1	#555	28-Oct	7264	1401044	3173510	129.4	6.3	121.7	99
Test SS2	#556	28-Oct	7268	1401091	3173364	129.3	12.6	114.9	93
Test SS3	#557	28-Oct	7268	1401155	3173365	133.2	9.5	121.7	99
Test SS4	#558	28-Oct	7270	1401258	3173346	134	10.6	121.1	98
Test SS5	#559	28-Oct	7272	1401359	3173300	133.1	6.5	124.9	100
Test SS6	#560	31-Oct	7271	1401657	3173309	122.6	8	113.5	92
Test SS7	#561	31-Oct	7274	1401592	3173222	128.4	5.5	121.7	99
Test SS8	#562	31-Oct	7276	1401831	3173183	145.8	10.3	132.2	100
Test SS9	#563	31-Oct	7277	1401946	3173122	123.7	8.8	113.7	92
Test SS10	#564	31-Oct	7274	1401950	3173217	130.7	11.7	116.9	95

Notes:

1. As of October 31, 2022, a total 1,607,000 yd³ had been placed and compacted. This requires 322 compaction tests, and 457 tests have been taken.
2. Tests indicated by "(12in)" were measured by excavating down 12 inches to measure the density of the material placed in the lower portion of the lift.