



STATE OF  
COLORADO

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

---

## Pikeview monitoring report

1 message

---

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

Mon, Oct 24, 2022 at 8:43 AM

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

Cc: Jerald Schnabel <jerald\_schnabel@castleaggregate.com>

Tim,

Please find attached the Pikeview monitoring report for September.

**Paul Kos** P.E., P.Eng.

Senior Geological Engineer

Mining, Minerals and Metals

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

Stantec  
[2000 South Colorado Boulevard Suite 2-300](#)  
Denver CO 80222-7933



The content of this email is the confidential property of Stantec and should not be copied, modified, retransmitted, or used for any purpose except with Stantec's written authorization. If you are not the intended recipient, please delete all copies and notify us immediately.

Please consider the environment before printing this email.



**Pikeview Monitoring Memo Sept 2022.pdf**

4656K

To: Jerald Schnabel  
Continental Materials Corp.  
From: Paul Kos  
Denver, CO 80222  
File: September 2022 Monitoring Summary  
Date: October 21, 2022

---

**Reference: September 2022 Geotechnical Monitoring Summary Pikeview Quarry**

## 1.0 INTRODUCTION

Stantec Consulting Services Inc. (Stantec) has prepared this September 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 September 2022. Continuous monitoring by the robotic survey system began in 2010 and has continued through the month September 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 September 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 <sup>3</sup> (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 September 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 September 20, 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 September.
- 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 2)
- No cracking was observed on the native granite slopes above the extents of the disturbed area. (Photo 3)
- Offsite fill was placed near the reclamation benches. 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.
- 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 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 September. 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 September 2022, multiple alarms were received from multiple prisms; in each case, there was poor weather. The subsequent readings returned to normal, and the alarms are assumed to be data errors related to weather conditions. All other alarms were determined to be caused by equipment operations blocking the prism. The alarms are listed in Table 2. Considering the large number of false alarms during inclement weather, Stantec only provides a summary of the alarms received.

**Table 2 Alarm Summary**

<b>Date(s)</b>	<b>Alarm</b>	<b>Cause/Actions taken</b>	<b>Issue Resolved</b>
6-Sep	P1 and P2 not found	Blocked by equipment operations	6-Sep
6-Sep	Communication alerts	Planned system power upgrades	6-Sep
8-Sep	Communication alerts	Power interrupted. Ongoing system upgrade.	8-Sep
9-Sep	Communication alerts	Power interrupted. Ongoing system upgrade.	9-Sep
9-Sep	P1 and P5 not found	Blocked by equipment operations	9-Sep
10-Sep to 12-Sep	Points not found and communication alerts	Rain and fog. No work being performed.	12-Sep
14-Sep	Communication alerts	Power interrupted. Continuing to upgrade system. Replaced batteries.	14-Sep
21-Sep	P1 and P5 not found	Blocked by equipment operations	21-Sep
21-Sep to 22-Sep	Points not found and communication alerts	Rain and fog. No work being performed.	22-Sep
22-Sep	Communication alerts	Power interrupted. No work being performed.	23-Sep
26-Sep	NP66 not found	Blocked by equipment operations	26-Sep
27-Sep	P69A exceedance alert	Data error. Subsequent readings were normal and within expected data scatter.	27-Sep
28-Sep	P5 not found	Blocked by equipment operations	28-Sep

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	-0.034	-0.055	0.0520	0.1108	Slope creep movements.
BR2	-0.012	-0.053	0.0349	0.0886	Slope creep movements.
CP6	0.004	-0.003	-0.0125	0.0078	
CP7	0.053	-0.003	0.0029	0.0538	
NP2	0.001	0.014	-0.0035	0.0198	
NP3	0.011	0.003	-0.0016	0.0129	
NP66	0.012	-0.039	0.0113	0.0495	Slope creep movements.
P1	-0.009	-0.012	-0.0257	0.0151	
P2	0.003	-0.004	-0.0148	0.0094	
P5	0.001	0.000	-0.0066	0.0051	
P25	-0.007	0.016	-0.0009	0.0192	
P32	-0.003	0.011	0.0037	0.0129	
P33	0.040	-0.015	-0.0106	0.1889	
P69A	0.003	-0.015	0.0307	0.1458	
P70	-0.005	-0.009	-0.0067	0.0110	

## 4.0 DRONE SURVEY

The site was flown for aerial imagery using an unmanned aircraft system (UAS or 'drone') on September 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 September topography was also compared to the August 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, Lower, and South Borrow Areas 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 September 2022. Fill was excavated from the Shop and North Borrow Areas and placed in the buttress and buffer zones. Importing fill also continued. At the start of the month, fill was placed in one-foot lifts, and in compliance with Technical Revision 21 (TR-21), fill was placed in 24-in thick lifts starting on September 7, 2022. 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 yd<sup>3</sup> placed. During September, approximately 175,000 yd<sup>3</sup> was placed and compacted. This includes approximately 19,500 yd<sup>3</sup> of imported fill. This volume placed in the buttress zone required at least 35 compaction tests. There were 87 compaction tests taken in September. As of September 30, 2022, a total 1,375,000 yd<sup>3</sup> had been placed and compacted. This required at least 275 compaction tests, and 460 tests have been taken. All tests except three in September met or exceeded the minimum compaction requirement of 90% of the optimal density as measured by a Standard Proctor Test. When these areas were recompacted and tested again, the project specifications were met. 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
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

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

## 7.0 CONCLUSIONS

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

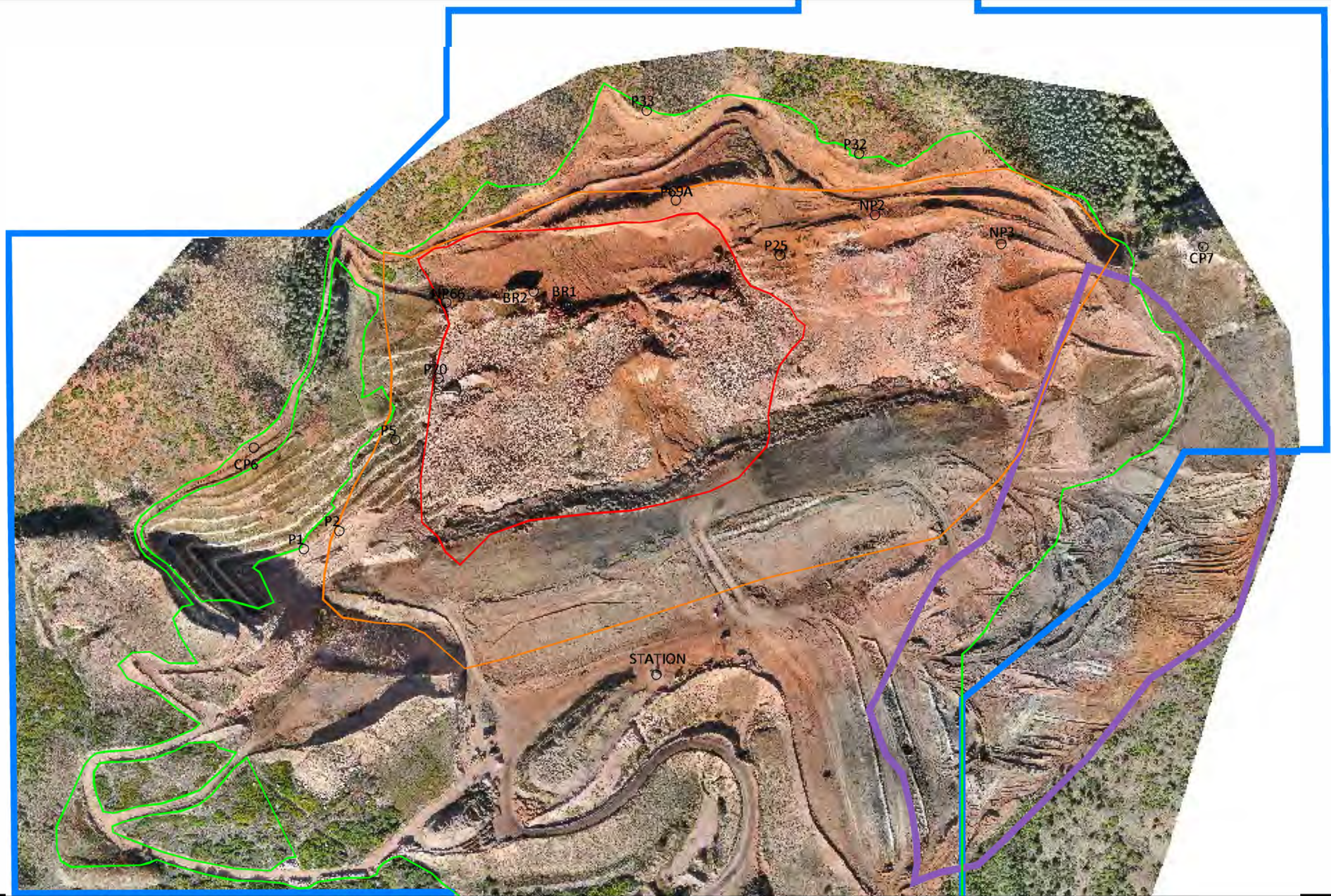
None of the data collected in September 2022 indicate evidence of any large-scale movements that increase risk to workers or to the public. The landslide area continues to show slope creep movements with slow velocities. Shallow surface erosion continues to occur requiring ongoing maintenance and cleanup.

- 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.



\\us0389-pptss01\shared\_projects\2057288200\06\_design\monitoring\2022-09\dwg\pikreview\pikreview\_10012022

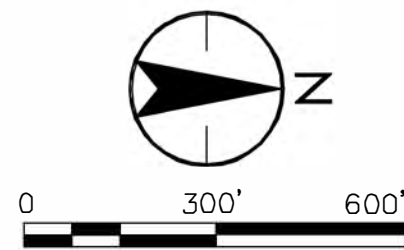
2022\_10.06 11:49:55 AM



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
- Existing Prism
- Removed Prism



Client/Project  
CONTINENTAL MATERIALS  
CORP.  
PIKEVIEW QUARRY SLOPE  
MONITORING

Project No.  
2057288200

Title  
SITE MAP

Revision  
#  
Drawn By  
PK

Date  
2022.10.21  
Figure No.  
1



# Appendix A

## Visual Inspections

**Table A-1 Summary of Daily Inspections**

<b>Date</b>	<b>Notes</b>	<b>Inspection By</b>
1-Sep-22	No movement observed. Good to proceed.	Jerald Schnabel
2-Sep-22	No movement observed. Good to proceed.	Jerald Schnabel
3-Sep-22	No work.	Not applicable
4-Sep-22	No work.	Not applicable
5-Sep-22	No work.	Not applicable
6-Sep-22	No movement observed. Good to proceed.	Jerald Schnabel
7-Sep-22	No movement observed. Good to proceed.	Jerald Schnabel
8-Sep-22	No movement observed. Good to proceed.	Jerald Schnabel
9-Sep-22	No movement observed. Good to proceed.	Jerald Schnabel
10-Sep-22	No work.	Not applicable
11-Sep-22	No work.	Not applicable
12-Sep-22	No movement observed. Good to proceed.	Jerald Schnabel
13-Sep-22	No movement observed. Good to proceed.	Jerald Schnabel
14-Sep-22	No movement observed. Good to proceed.	Jerald Schnabel
15-Sep-22	Fog and rain. No work.	Not applicable
16-Sep-22	No movement observed. Good to proceed.	Jerald Schnabel
17-Sep-22	No work.	Not applicable
18-Sep-22	No work.	Not applicable
19-Sep-22	No movement observed. Good to proceed.	Jerald Schnabel
20-Sep-22	No movement observed. Good to proceed.	Jerald Schnabel
21-Sep-22	No movement observed. Good to proceed.	Jerald Schnabel
22-Sep-22	Heavy fog and light rain limited visibility. No inspection possible. No work.	Jerald Schnabel
23-Sep-22	No movement observed. Good to proceed.	Jerald Schnabel
24-Sep-22	No movement observed. Good to proceed.	Jerald Schnabel
25-Sep-22	No work.	Not applicable
26-Sep-22	No movement observed. Good to proceed.	Jerald Schnabel
27-Sep-22	No movement observed. Good to proceed.	Jerald Schnabel
28-Sep-22	No movement observed. Good to proceed.	Tim Culberson
29-Sep-22	No movement observed. Good to proceed.	Tim Culberson
30-Sep-22	No movement observed. Good to proceed.	Tim Culberson



2022.10.06 11:49:27 AM \\us0389-ppfs01\shared\_projects\2057288200\06\_design\monitoring\2022-09\dwg\pkreview\pkreview\_1001.2022



6. View to the south of the pit floor.



5. Dry above culvert.

NOTE 1:  
NO CRACKS

NOTE 1:  
NO CRACKS



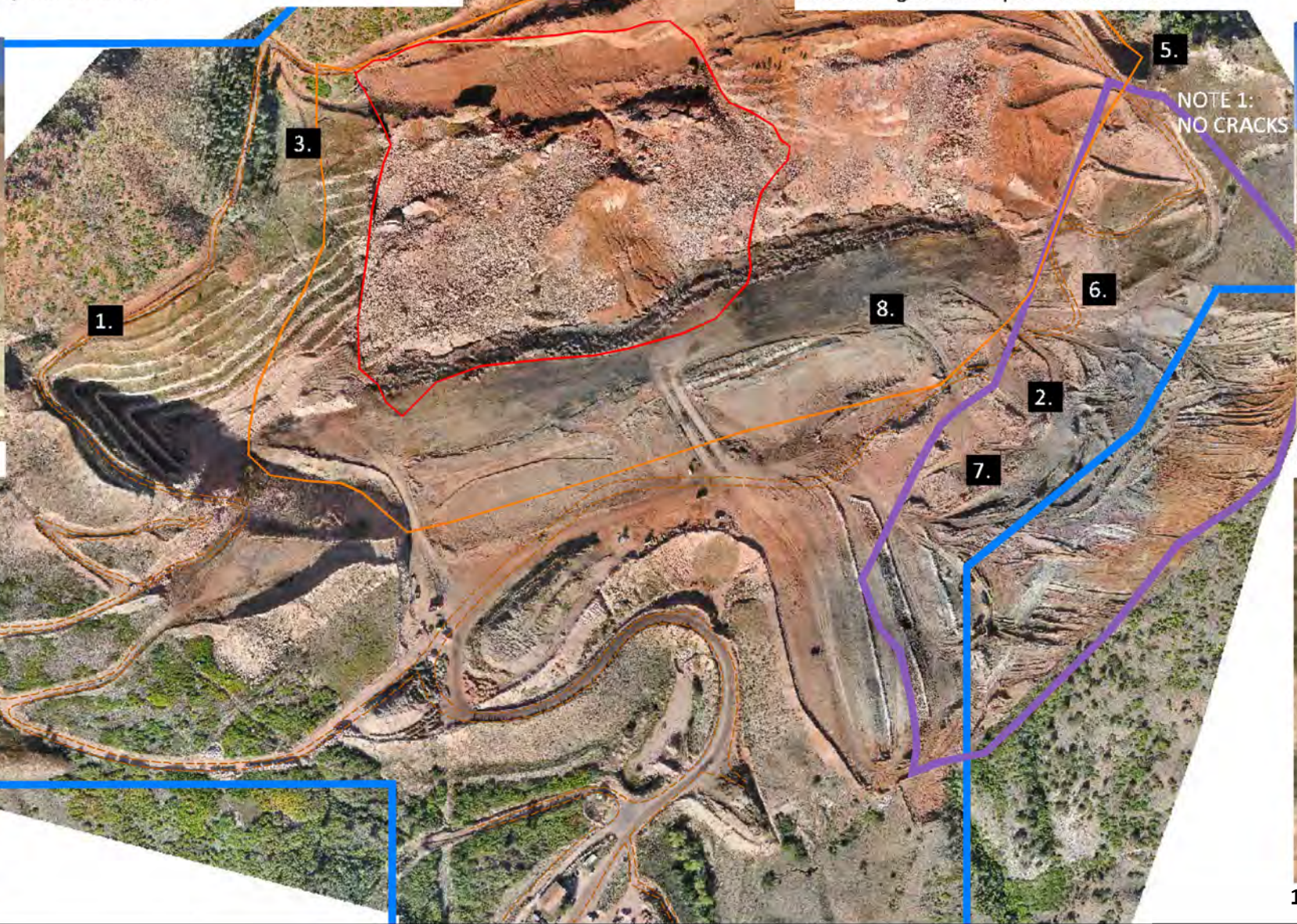
4. Stable granite slopes above landslide.



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



7. Excavator loads haul trucks at north borrow area.



2. North borrow area on the north end of the site.



8. Placing and compacting fill.



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



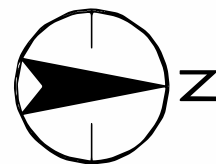
Stantec Consulting Services Inc.  
2000 South Colorado Boulevard Suite 2.300  
Denver CO 80222-7933  
Tel: (303) 758-4058  
www.stantec.com

LEGEND

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

NOTES

- NO CRACKS OBSERVED IN THIS AREA.
- ALL PHOTOS TAKEN SEPTEMBER 20, 2022.



0 400' 800'

Client/Project

CONTINENTAL MATERIALS  
CORP.  
PIKEVIEW QUARRY SLOPE  
MONITORING

Project No.  
2057288200

Title

OBSERVATIONS FROM  
SEPTEMBER INSPECTION

Revision  
#

Drawn By  
PK

Date  
2022.10.21

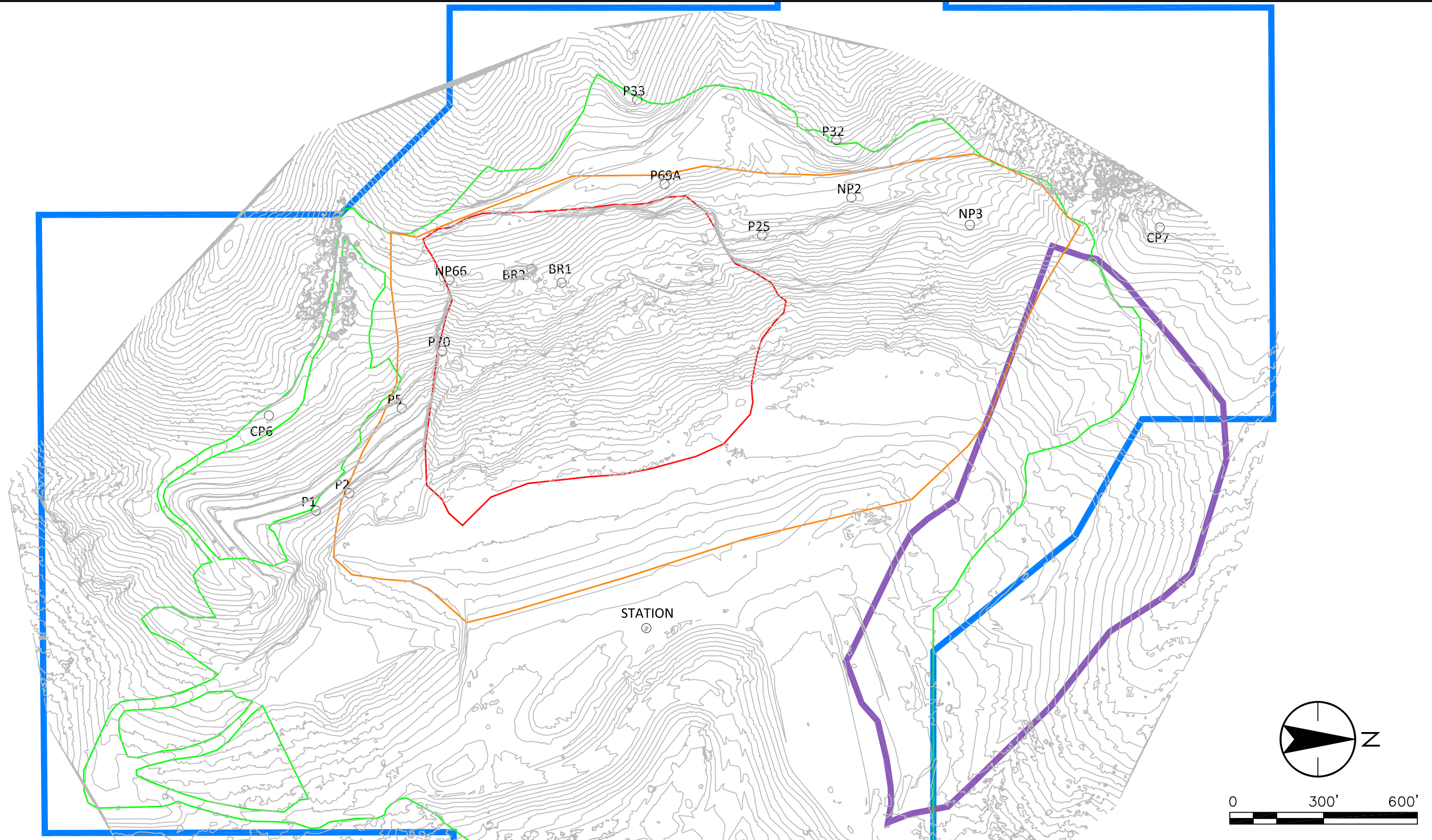
Figure No.  
2



# Appendix B

## Prism Survey

2022.10.18 8:33:27 AM \\us0389-ppfss01\shared\_projects\2057288200\06\_design\monitoring\2022-09\dwg\pikeview prisms\_1001.2022



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
- 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 SEPTEMBER 28, 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

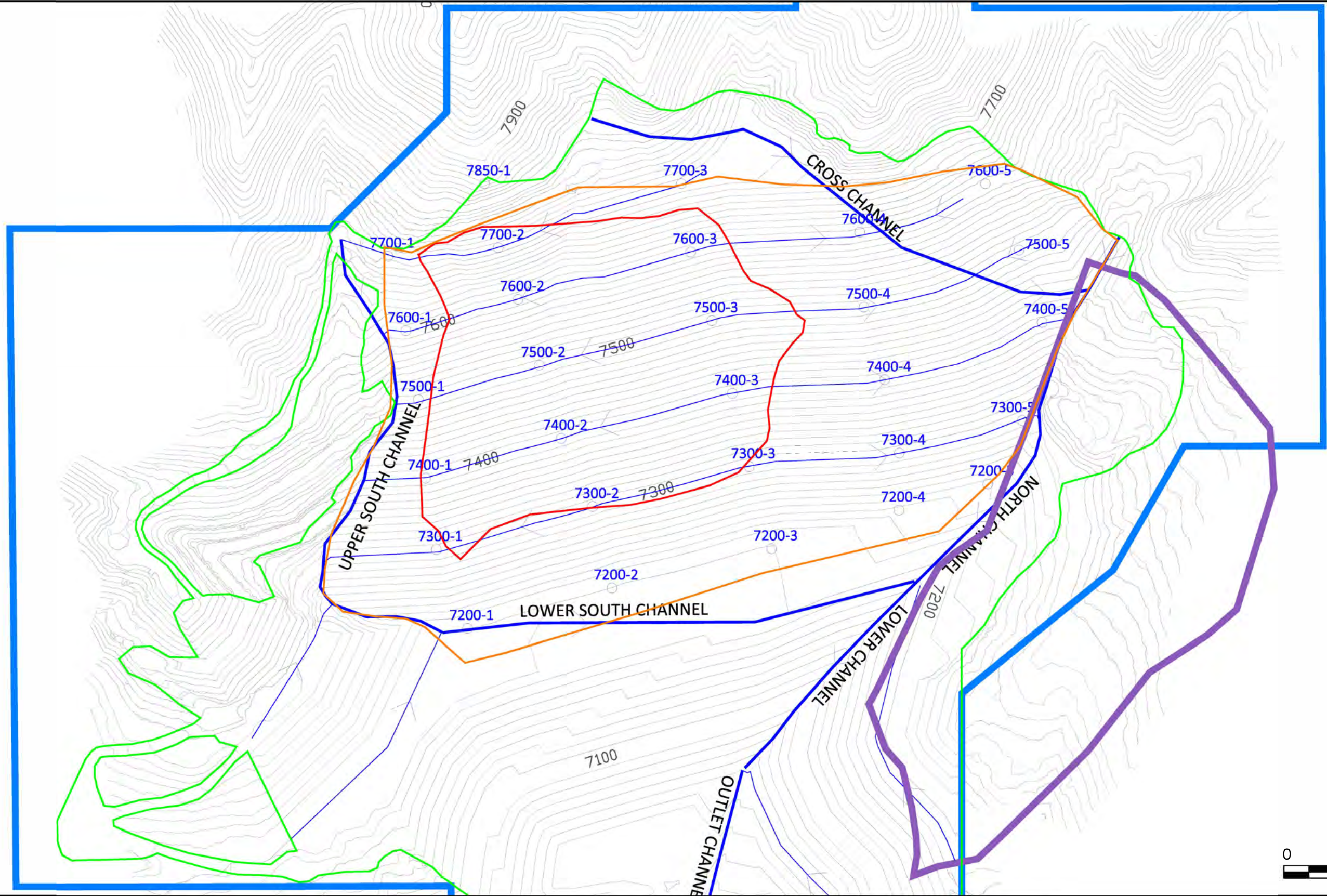
Date  
2022.10.31

Figure No.  
3



\\us0321-pptfss01\workgroup\2274\active\227419041\disc\monitoring\2022\2022-03\dwg\pikeview prisms\_04132022

2022.04.13 8:37:50 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
- 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 #

Drawn By  
PK

#### Date

2022.10.21

#### Figure No.

4

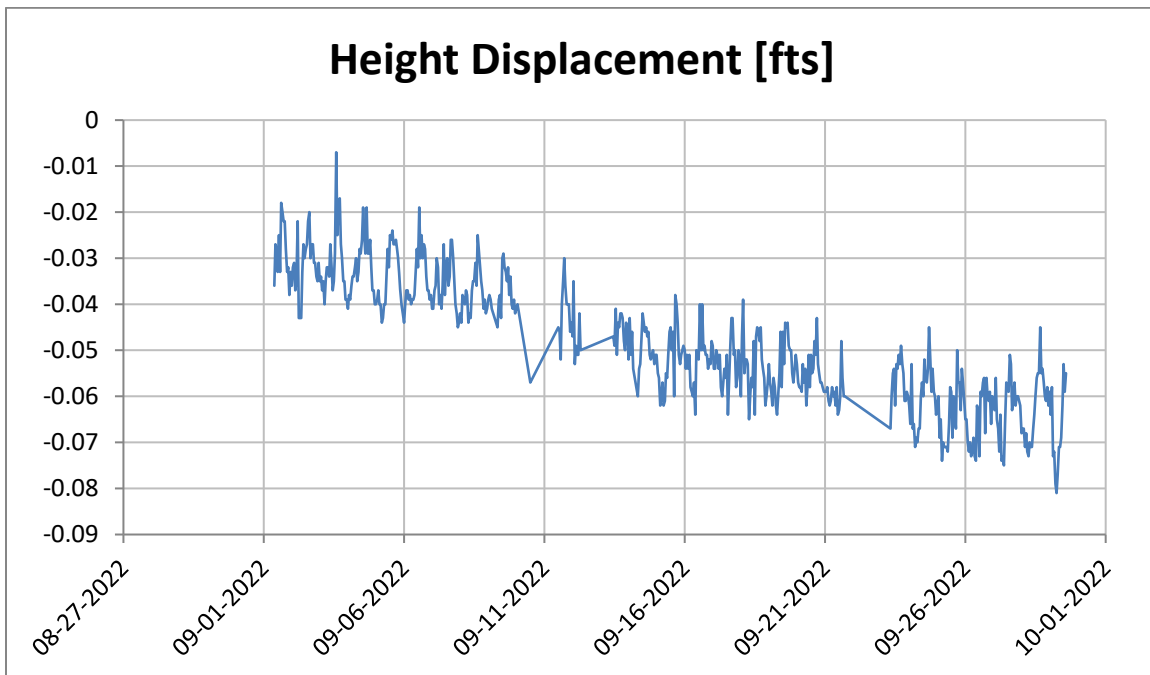
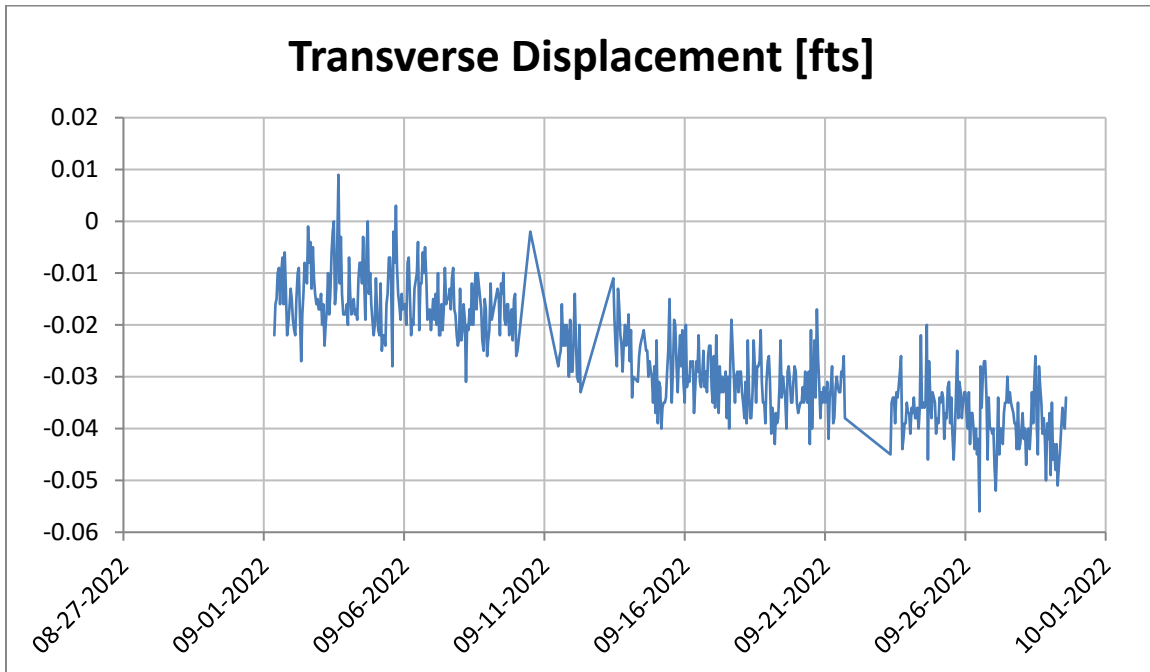


## Prism Log

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.



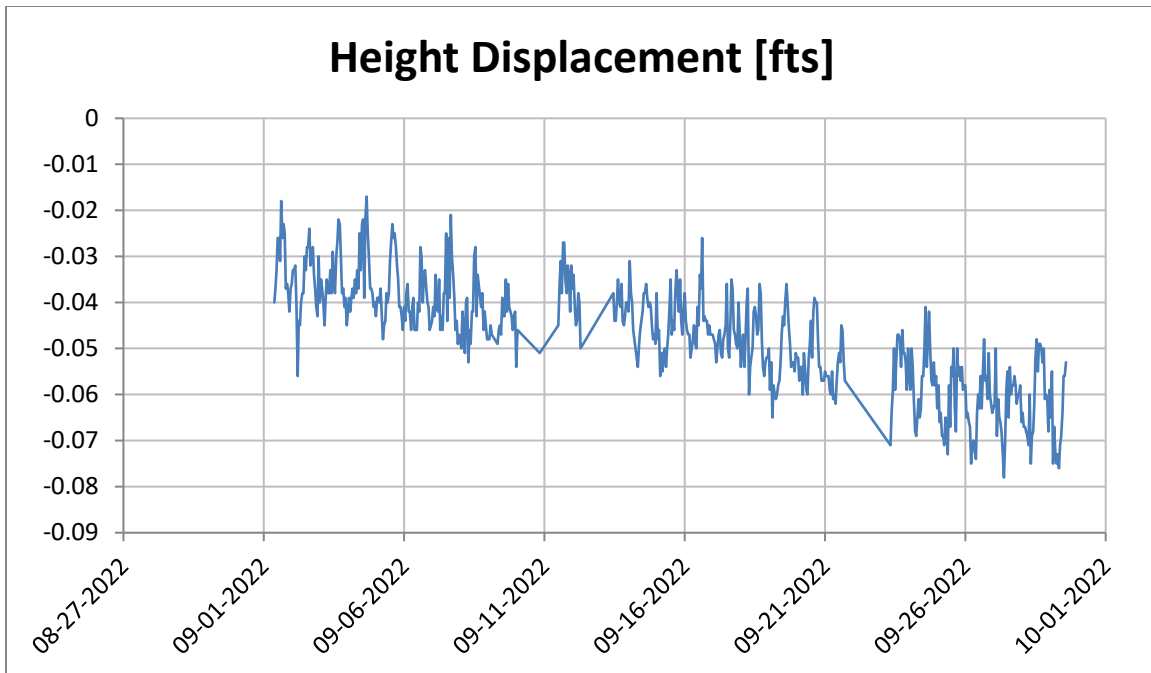
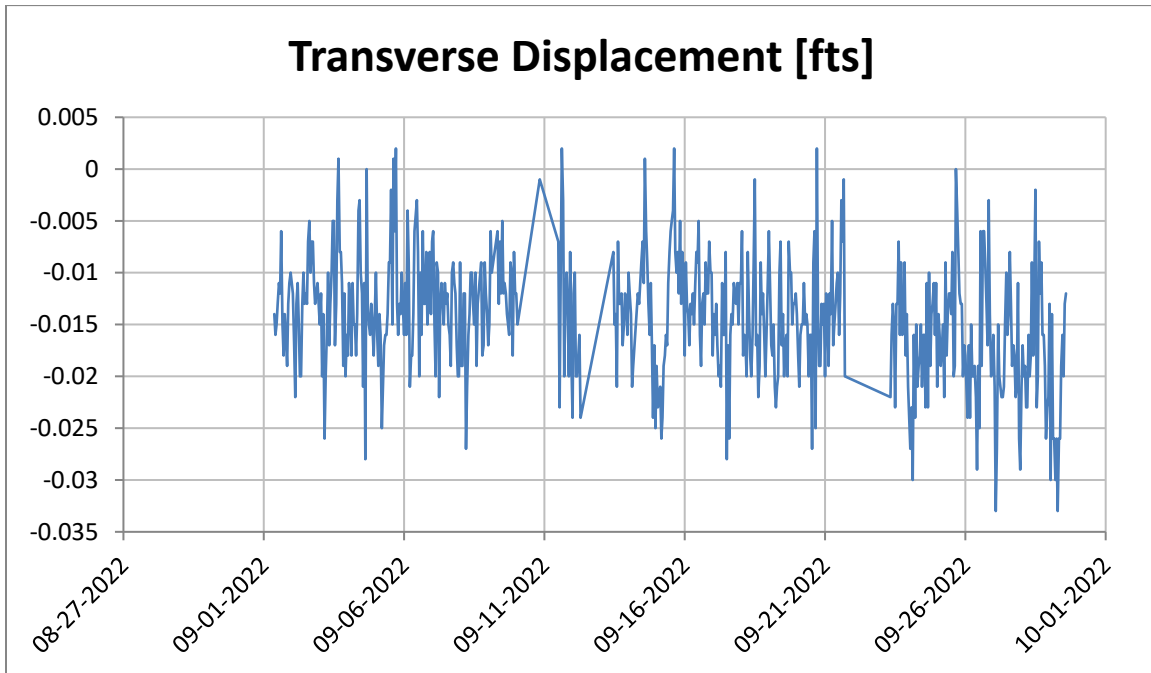
## Prism BR1



**Notes:**

1. Survey accuracy is  $\pm 0.016$  feet.
2. Alarm threshold is  $\pm 0.35$  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.

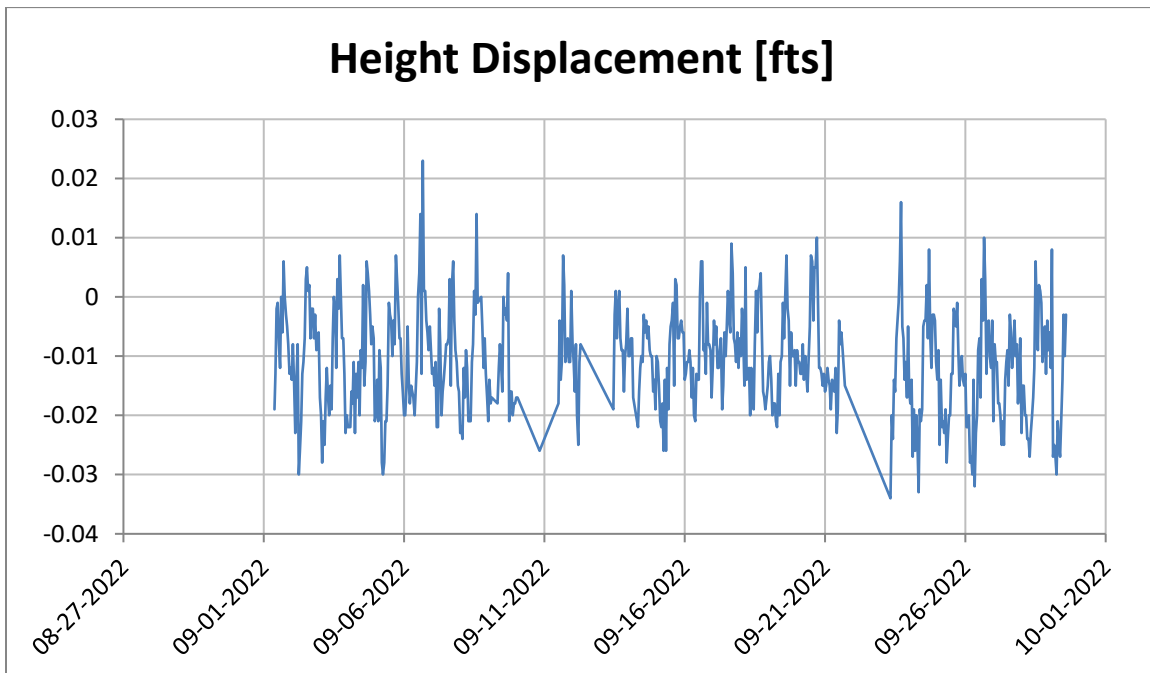
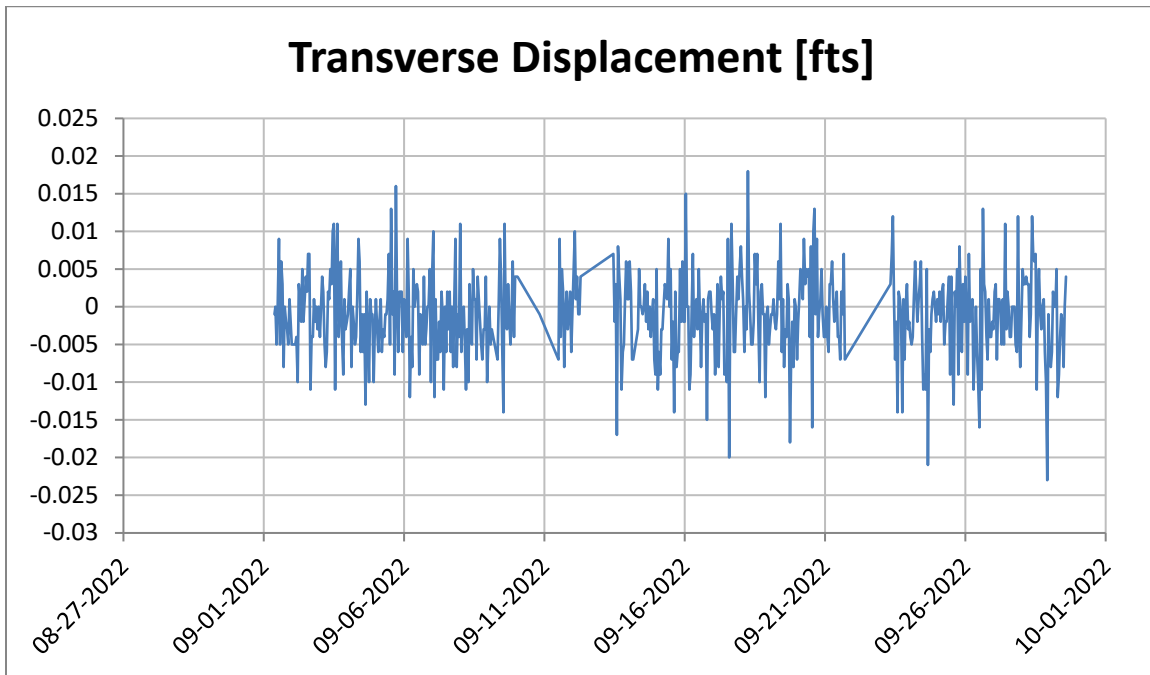
## Prism BR2



#### 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.

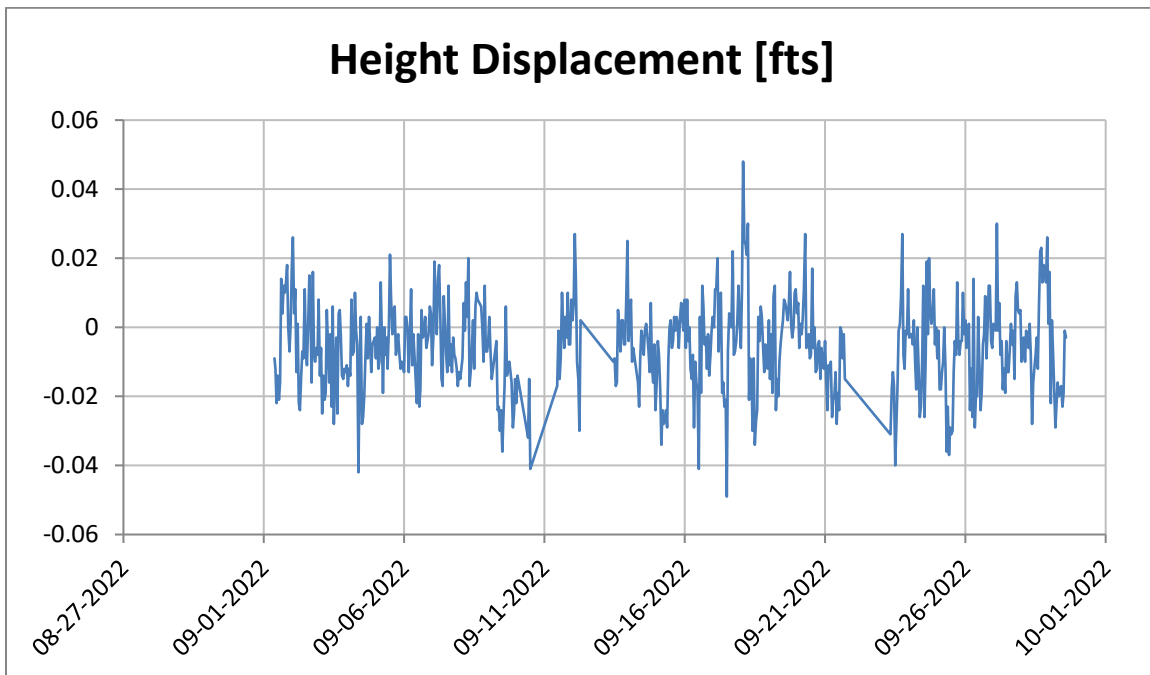
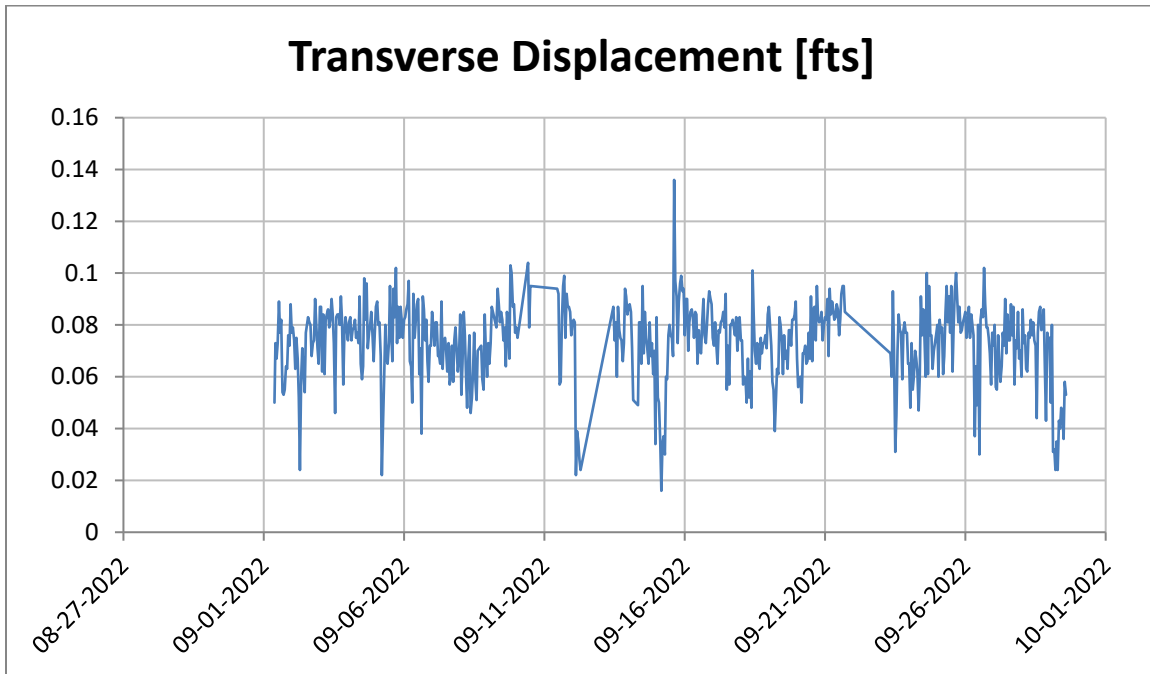
## Prism CP6



#### 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.

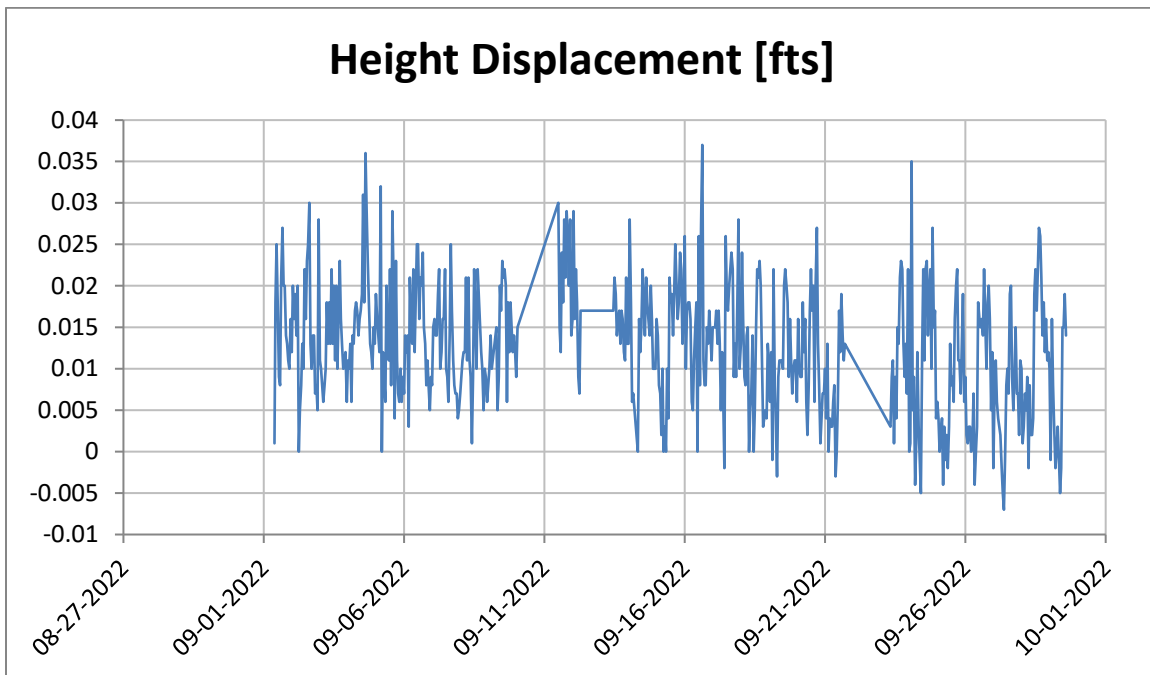
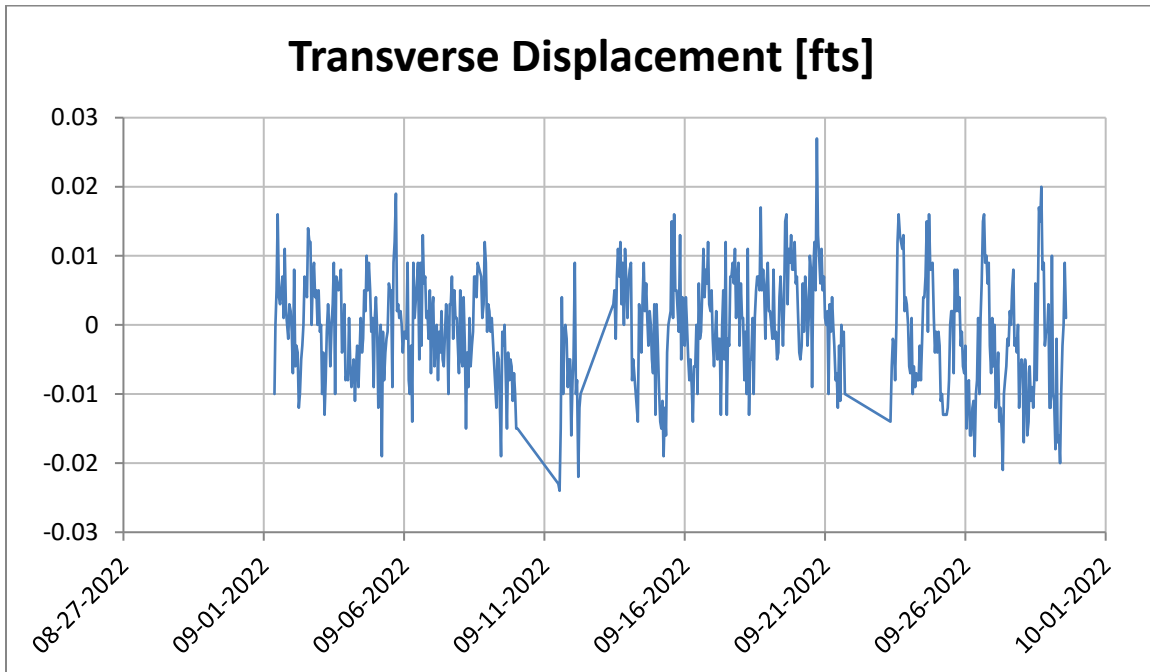
## Prism CP7



**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.

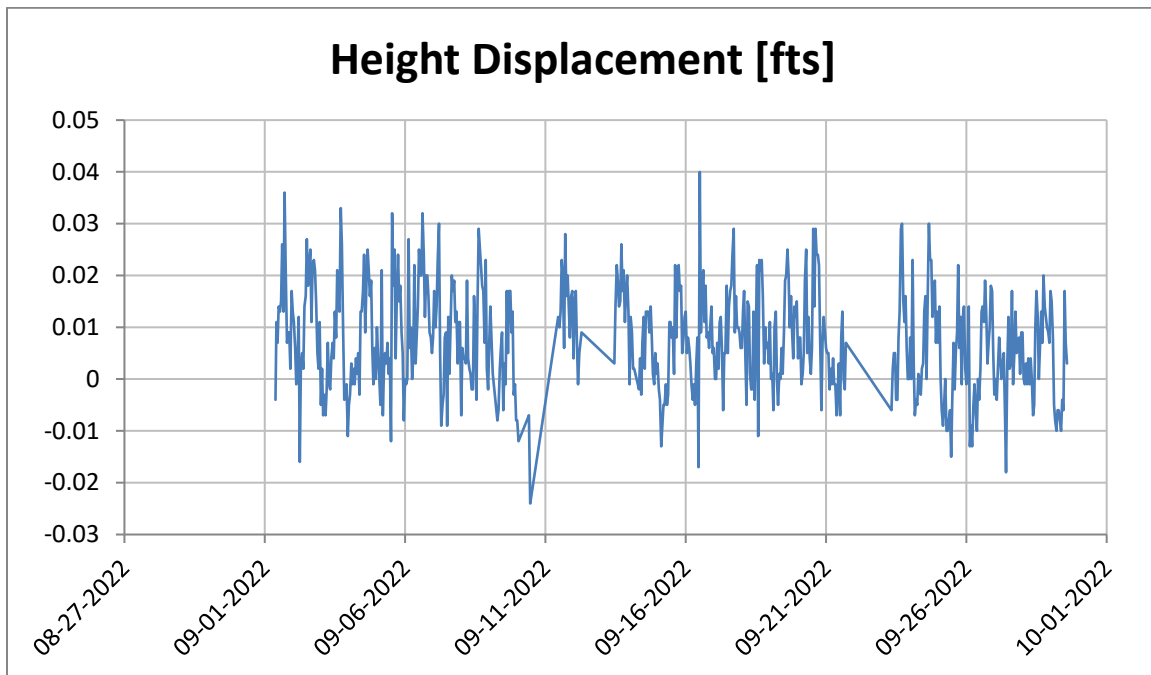
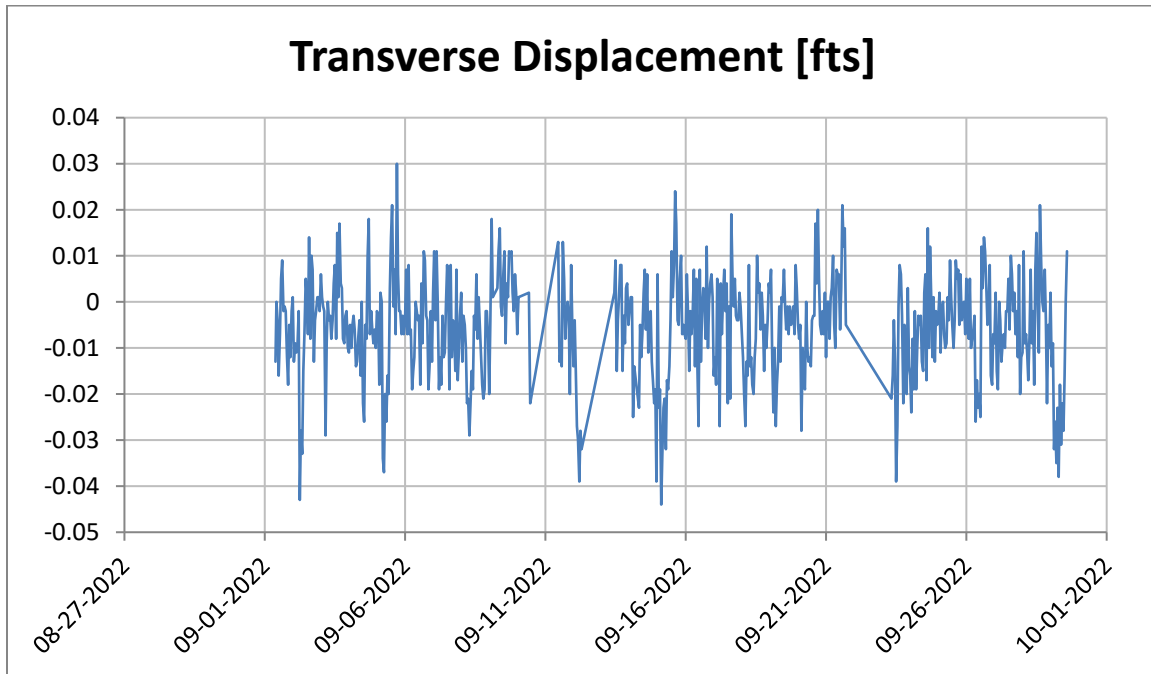
## Prism NP2



#### Notes:

1. Survey accuracy is  $\pm 0.016$  feet.
2. Alarm threshold is  $\pm 0.35$  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.

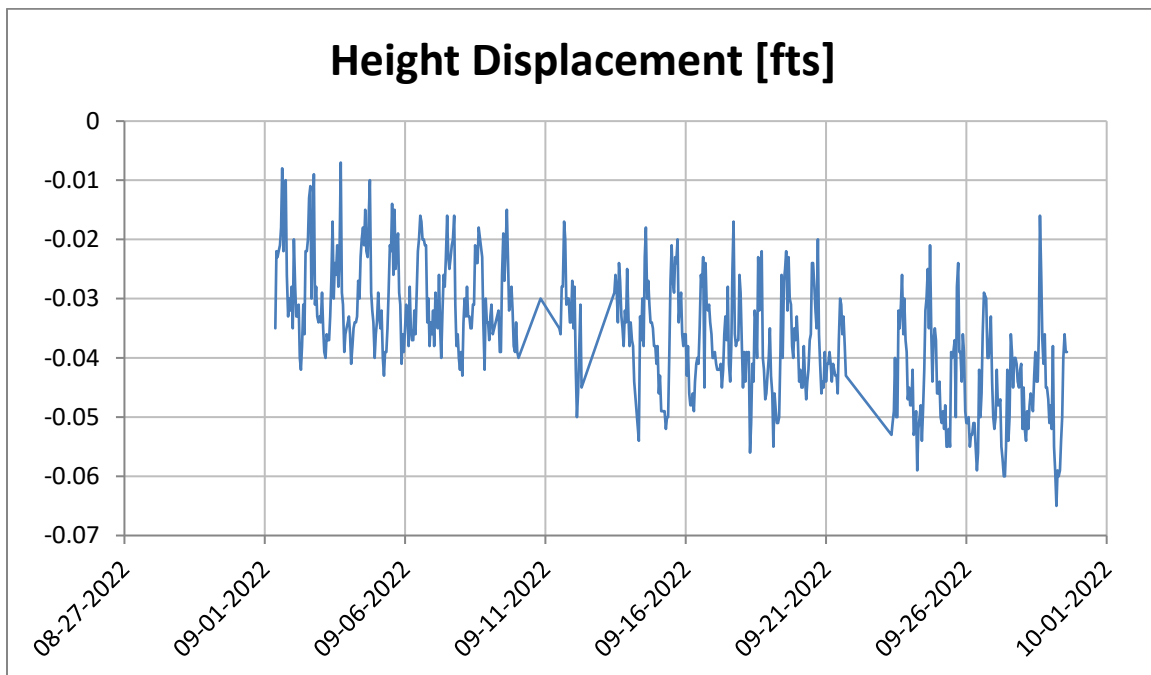
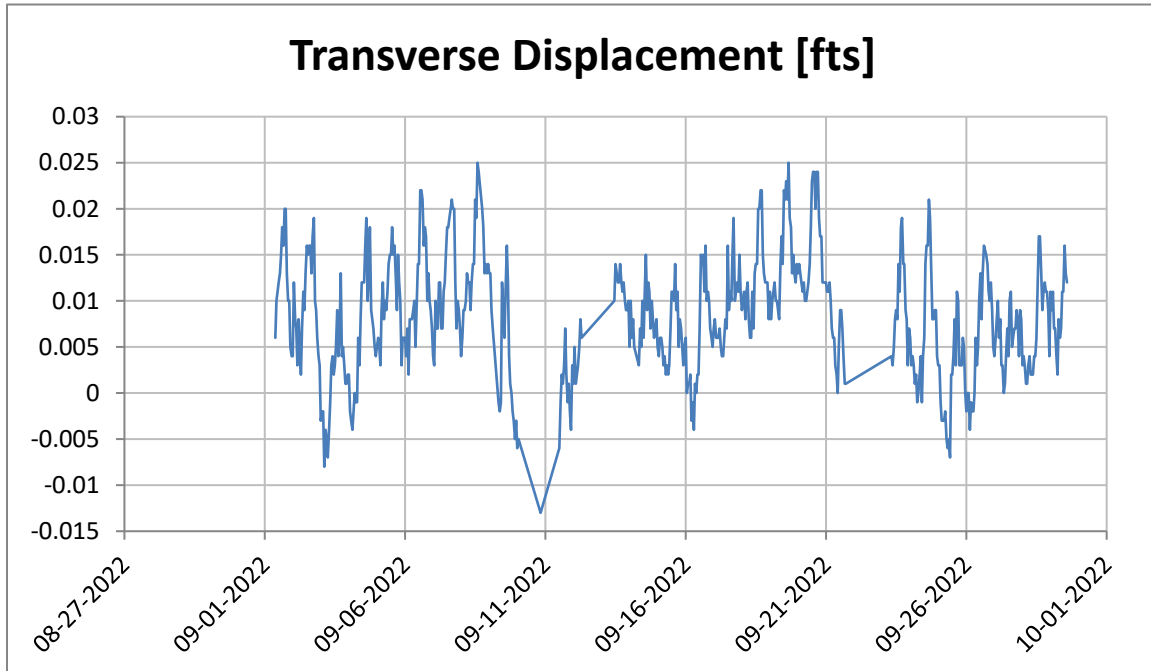
## Prism NP3



#### 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.

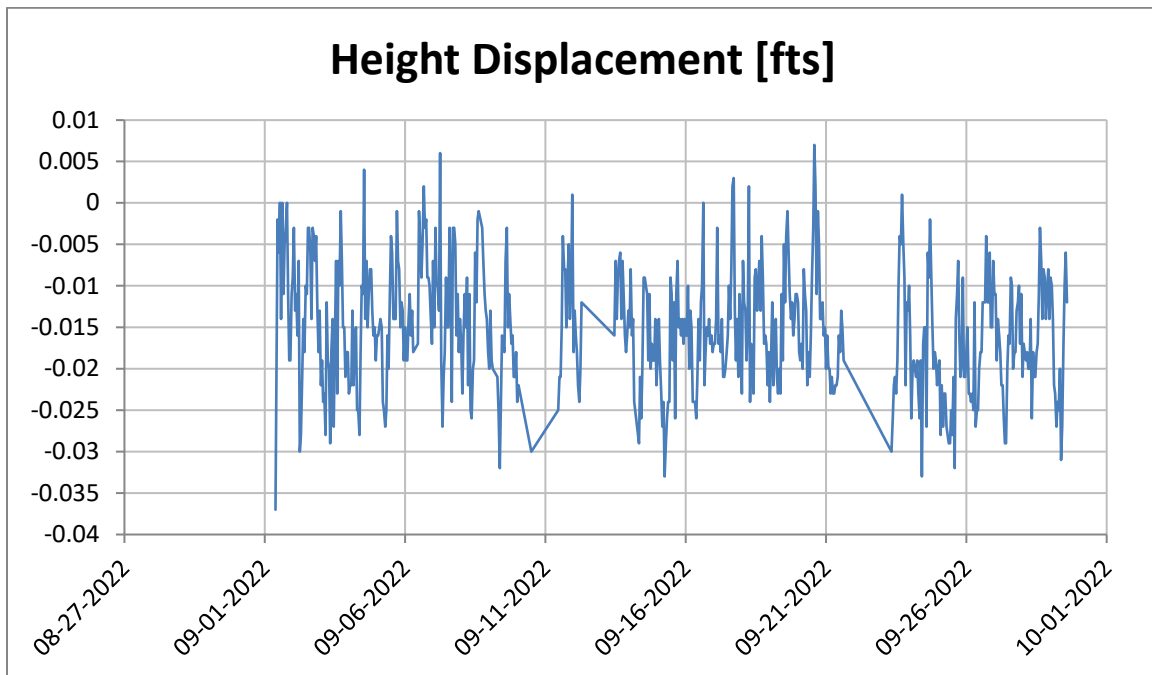
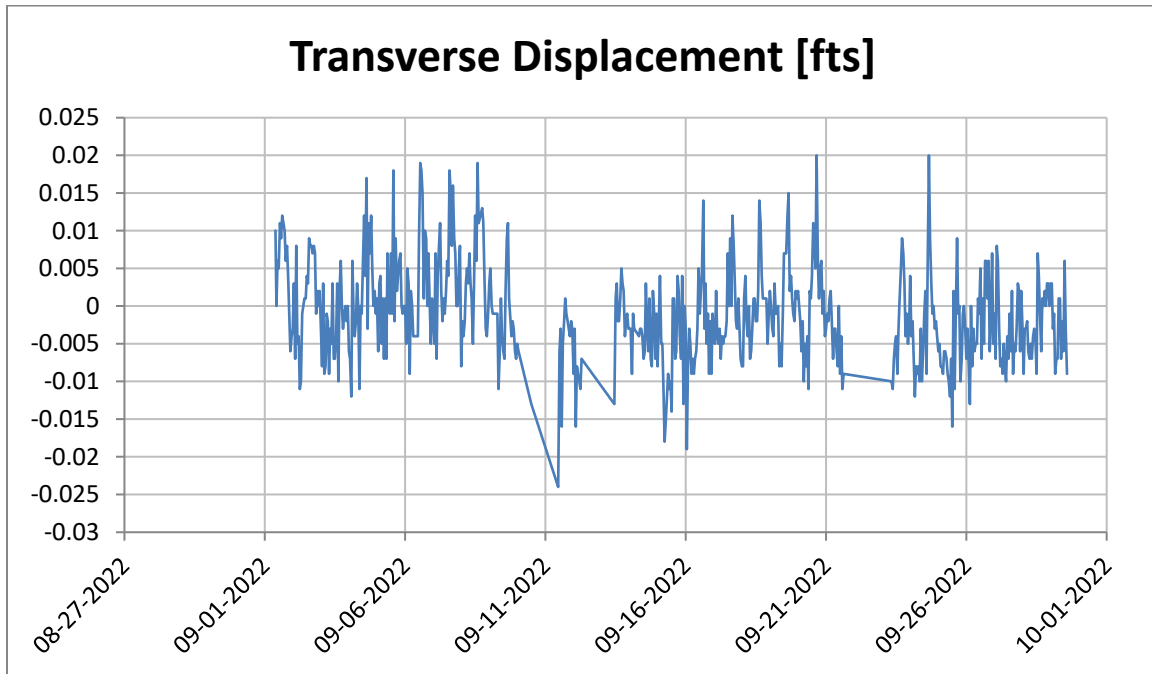
## Prism NP66



#### Notes:

1. Survey accuracy is  $\pm 0.016$  feet.
2. Alarm threshold is  $\pm 0.35$  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

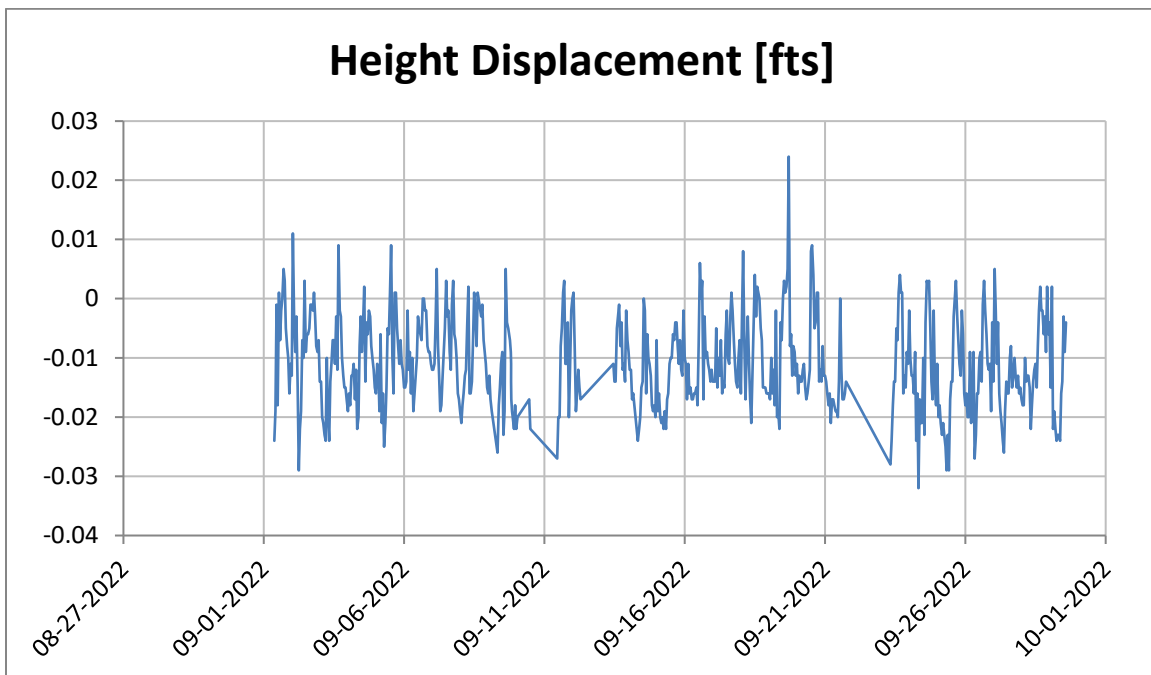
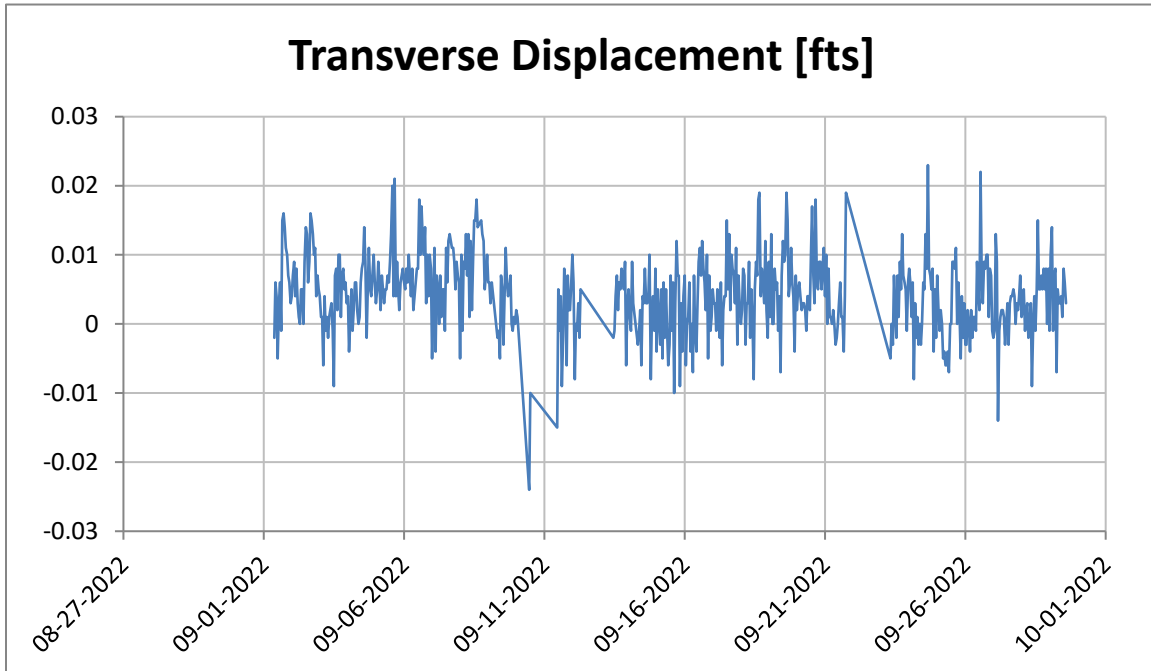


#### Notes:

1. Survey accuracy is  $\pm 0.016$  feet.
2. Alarm threshold is  $\pm 0.35$  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.



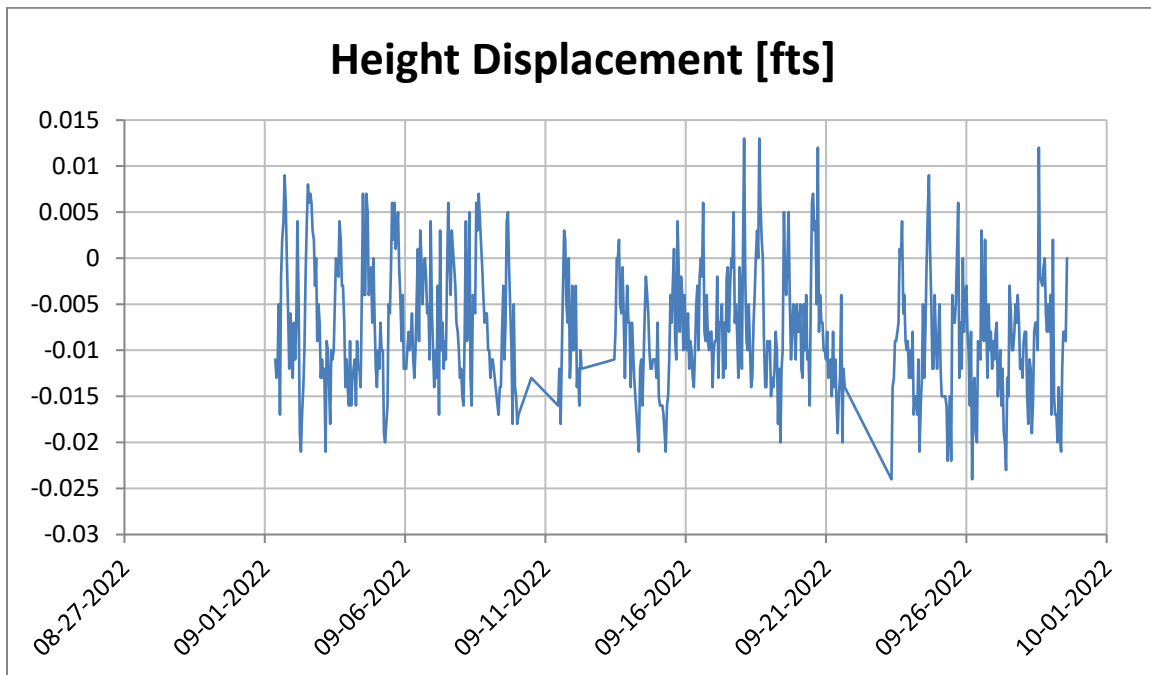
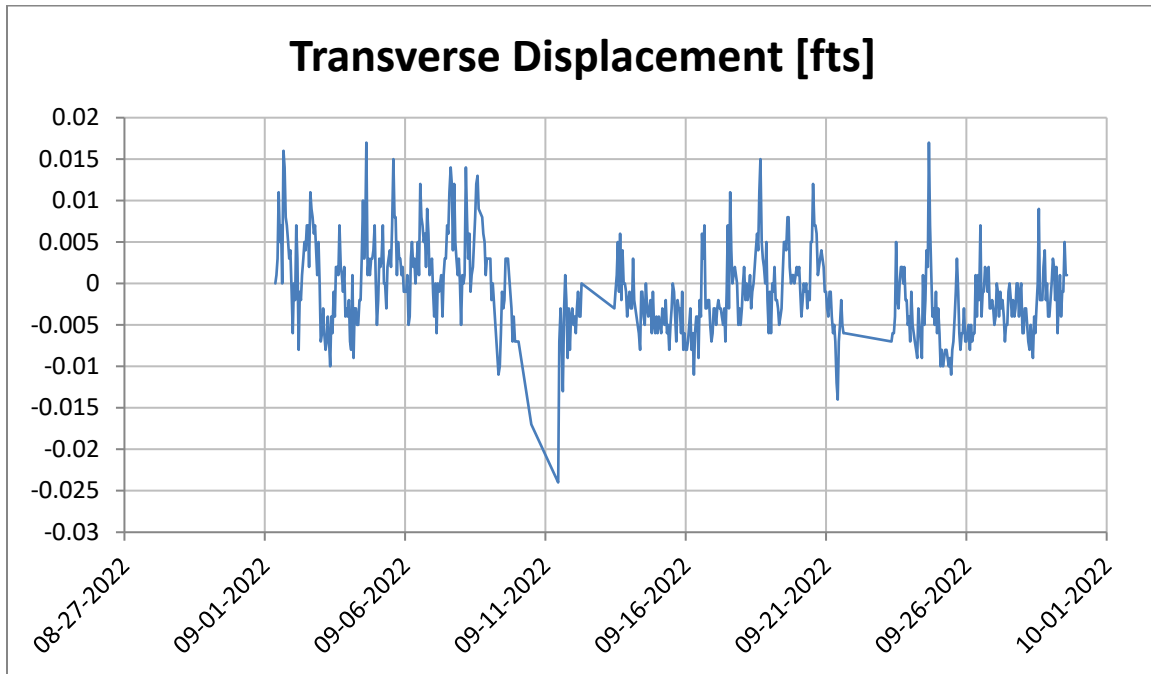
## Prism P2



#### 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.

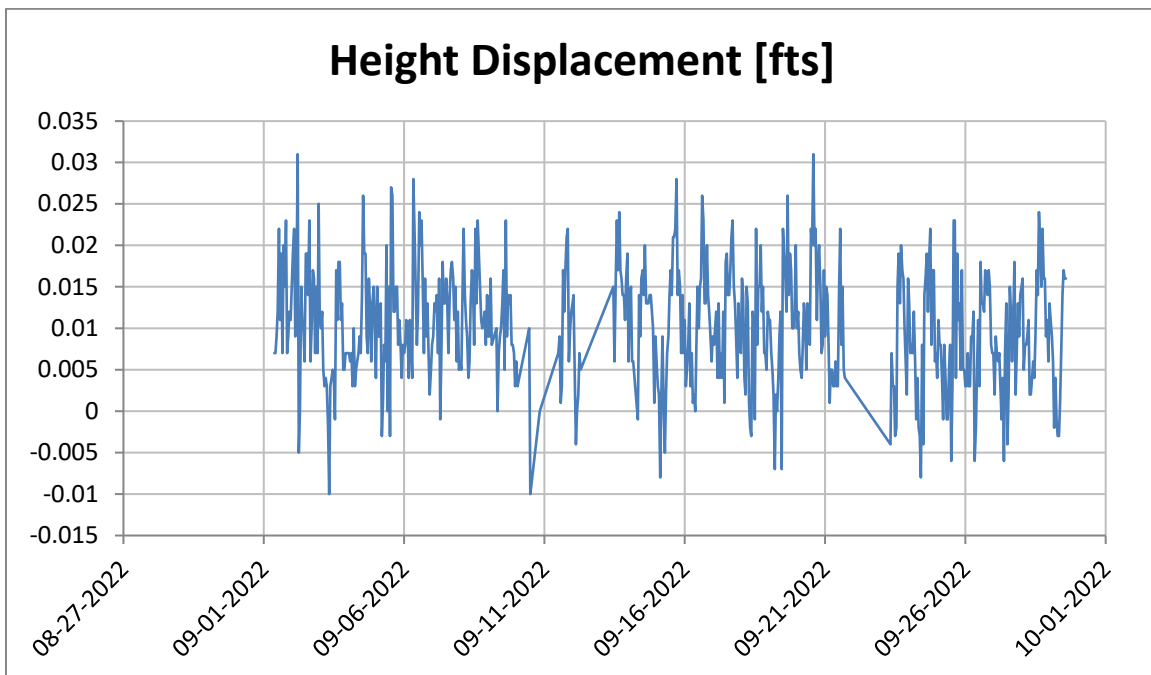
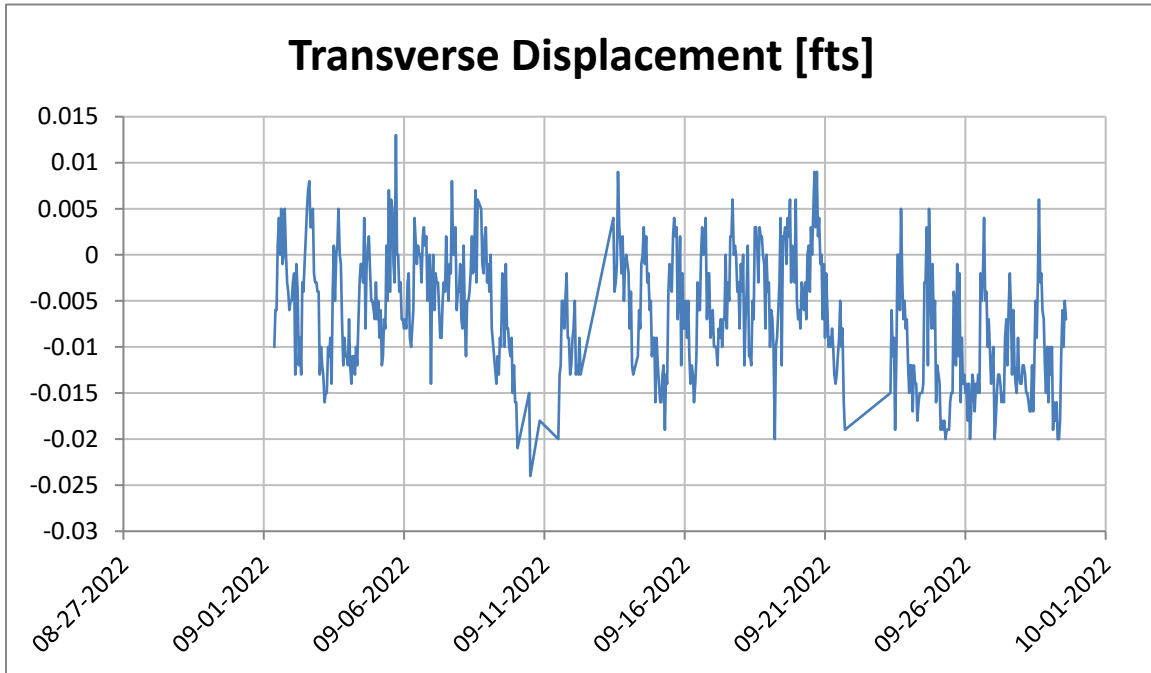
## Prism P5



#### 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.

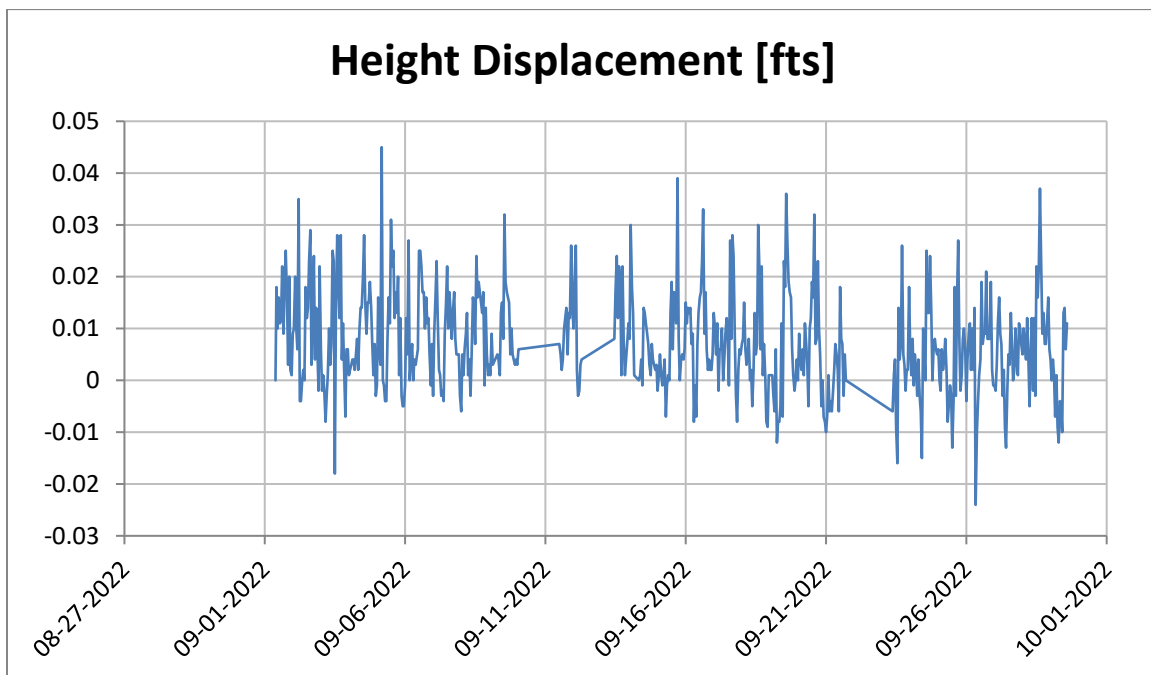
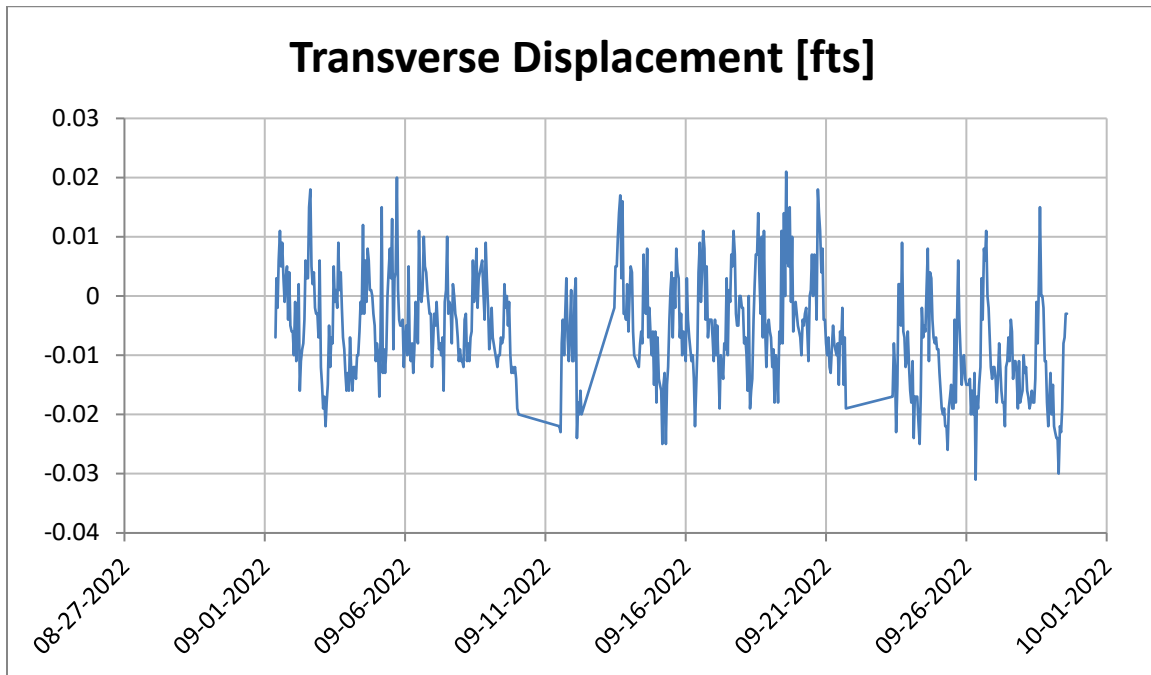
## Prism P25



#### Notes:

1. Survey accuracy is  $\pm 0.016$  feet.
2. Alarm threshold is  $\pm 0.35$  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.

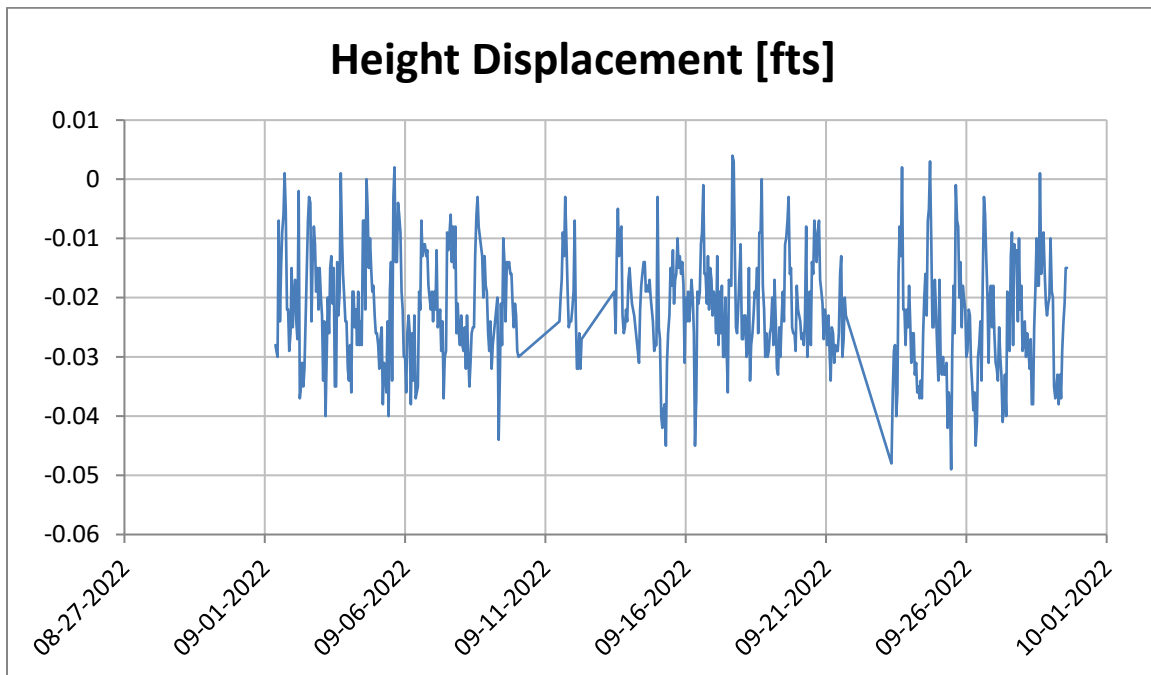
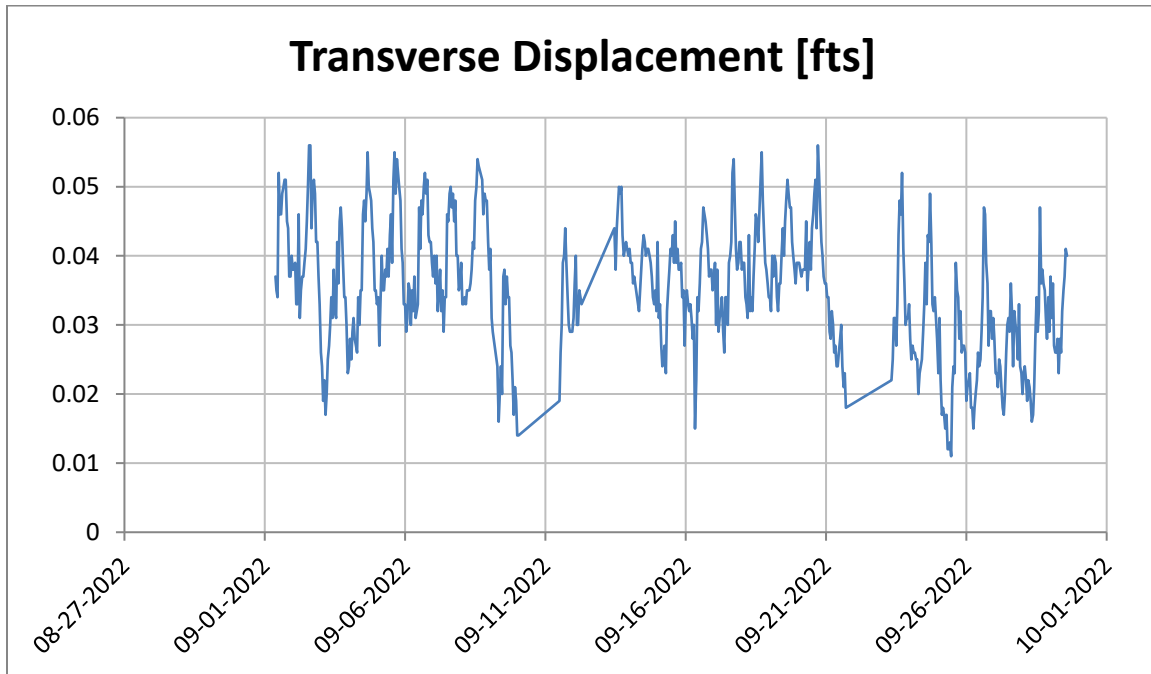
## Prism P32



#### Notes:

1. Survey accuracy is  $\pm 0.016$  feet.
2. Alarm threshold is  $\pm 0.35$  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.

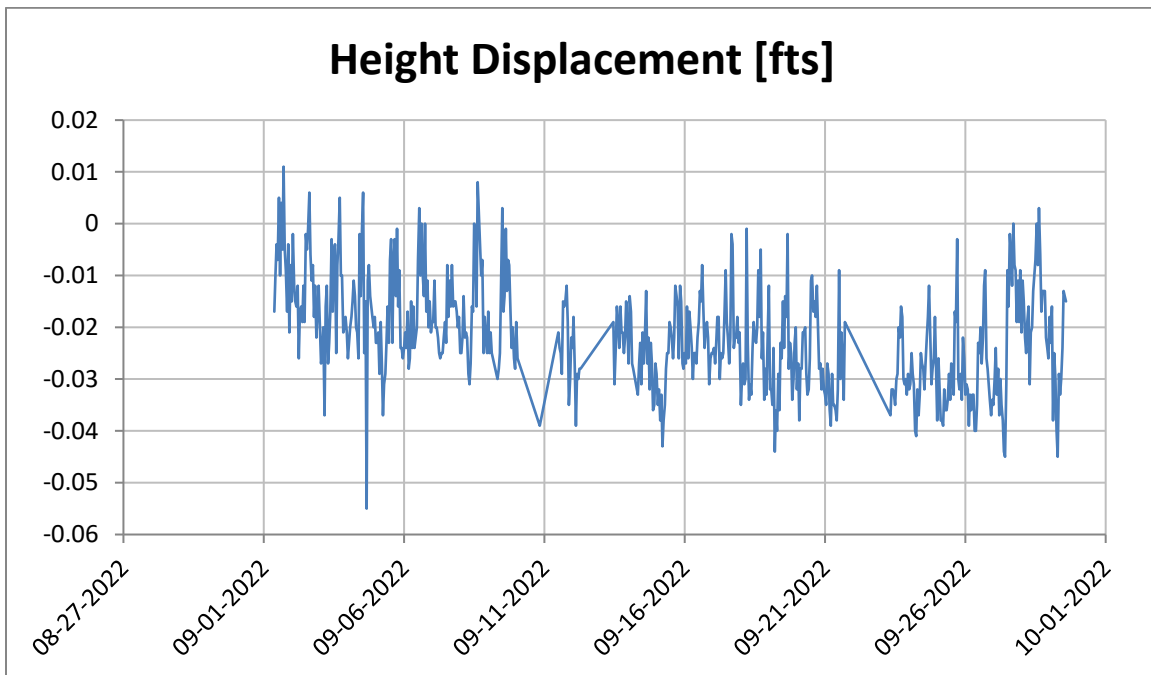
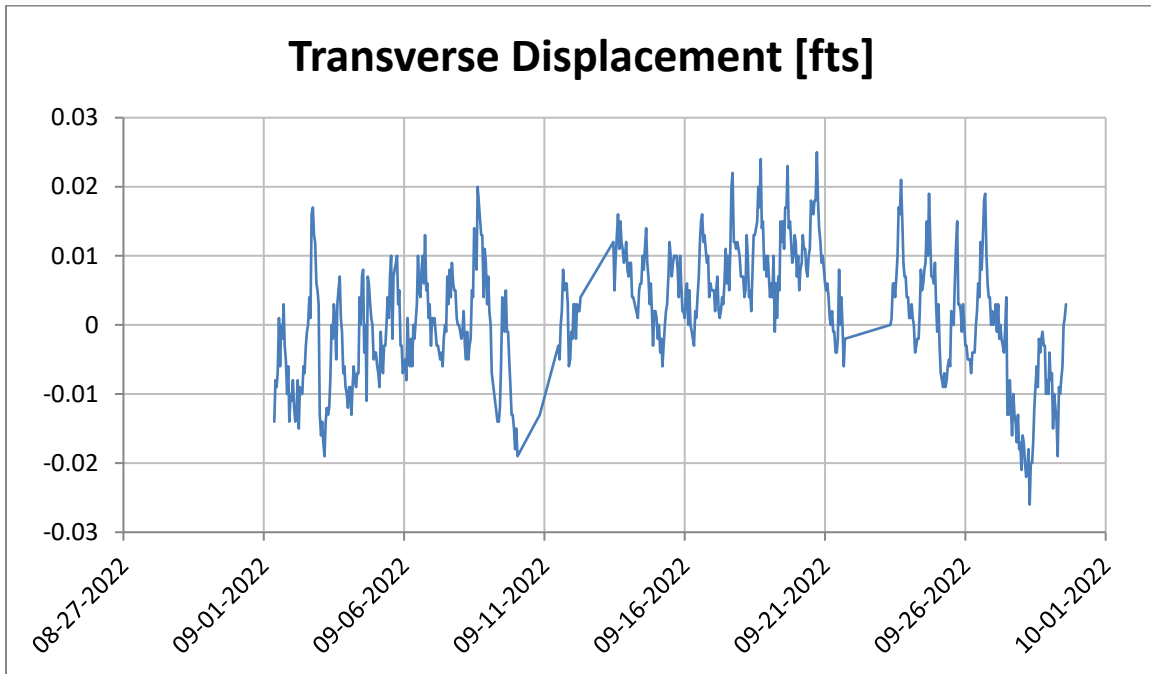
## Prism P33



**Notes:**

1. Survey accuracy is  $\pm 0.016$  feet.
2. Alarm threshold is  $\pm 0.35$  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.

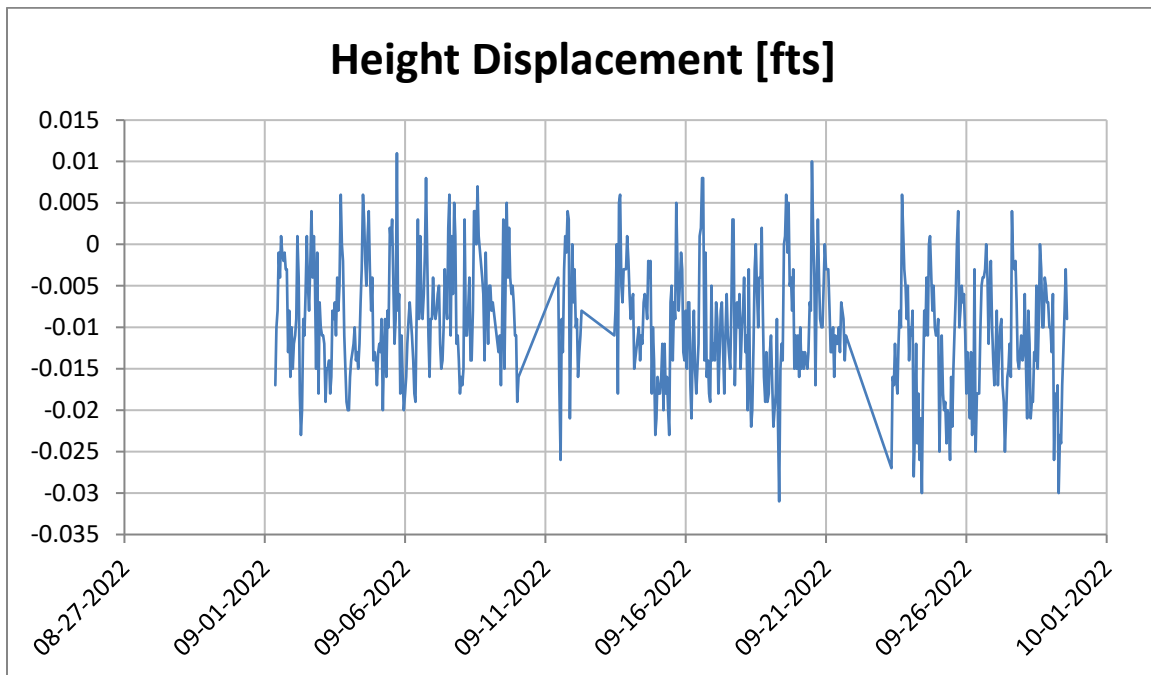
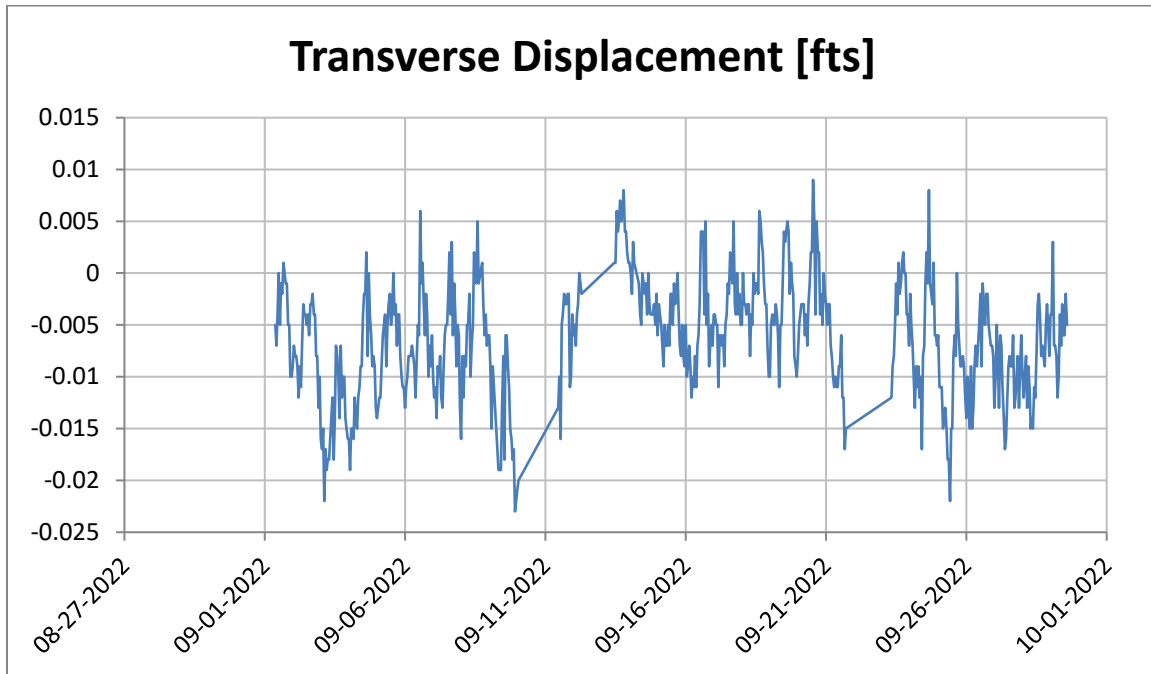
## Prism P69A



#### Notes:

1. Survey accuracy is  $\pm 0.016$  feet.
2. Alarm threshold is  $\pm 0.35$  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 alert were received on 9/27.

## 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.

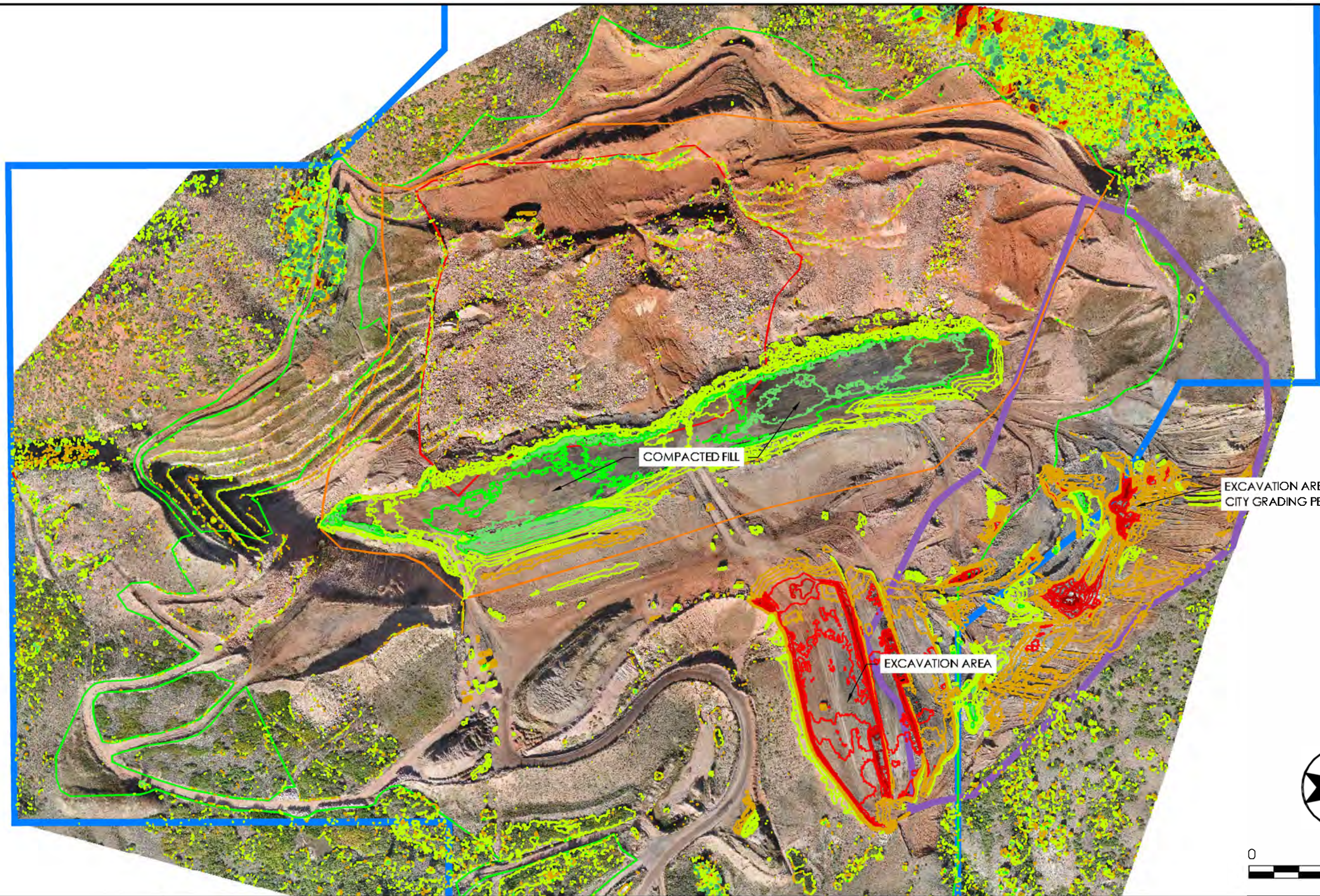
# Appendix C

## Drone Survey



\\usc389-ppfs01\shared\_projects\2057288200\06\_design\monitoring\2022-09\dwg\pkreview\pkreview\_10012022

2022.10.06 11:51:47 AM



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 09/01/2022 to 09/28/2022.

Client/Project  
CONTINENTAL MATERIALS  
CORP.  
PIKEVIEW QUARRY SLOPE  
MONITORING

Project No.  
2057288200

Title  
EXISTING PRISMS WITH  
CURRENT SURFACE

Revision #	Date
PK	2022.10.21
Drawn By	Figure No.
PK	5



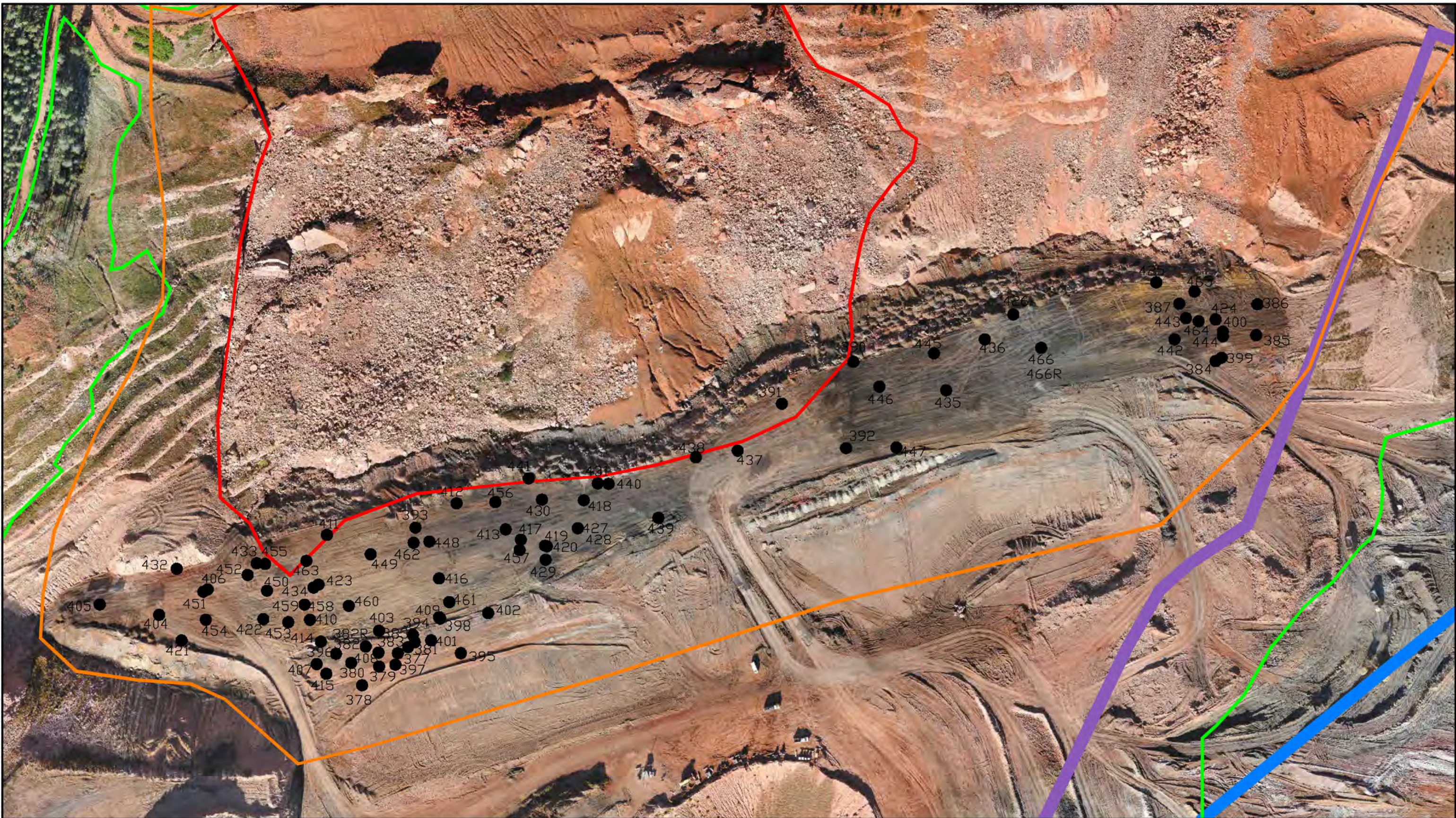
# Appendix D

## Compaction Testing Results



\\us0389-pptss01\shared\_projects\2057288200\06\_design\monitoring\2022-09\dwg\pkreview\pkreview\_10012022

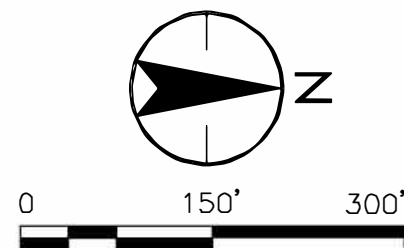
2022.10.06 1:33:39 PM



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
- Compaction Test Location



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

Project No.  
2057288200

Title  
**COMPACTION TEST  
LOCATIONS**

Revision #	Date 2022.10.21
Drawn By PK	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 Y19	#377	1-Sep	7224	1401325	3173599	121.7	8.1	112.5	91
Test Y20	#378	1-Sep	7224	1401266	3173652	125	9.9	113.7	96
Test Z23	#379	6-Sep	7223	1401294	3173621	129.9	12	116	94
Test Z24	#380	6-Sep	7224	1401248	3173615	122.9	10.3	111.4	90
Test Z25	#381	6-Sep	7224	1401353	3173581	118.3	5.5	112.1	91
Test AA13	#382	7-Sep	7226	1401272	3173588	115.5	13.3	101.9	82
Re-Test AA13	#382R	8-Sep	7226	1401272	3173588	125.4	7.1	117.1	95
Test AA14	#383	7-Sep	7226	1401342	3173589	117.2	11.1	105.5	85
Re-Test AA14	#383R	8-Sep	7226	1401342	3173589	119.6	6	112.9	91
Test EE3	#384	8-Sep	7263	1402675	3173118	130.3	4.6	124.6	100
Test EE4	#385	8-Sep	7263	1402742	3173075	128.2	5.3	121.8	99
Test EE5	#386	8-Sep	7263	1402744	3173024	116.5	3.4	112.7	91
Test EE6	#387	8-Sep	7262	1402615	3173023	122.2	5.1	116.3	94
Test EE7	#390	9-Sep	7253	1402077	3173119	119.6	8.3	110.5	90
Test EE8	#391	9-Sep	7252	1401959	3173188	119.9	7.6	111.4	90
Test EE9	#392	9-Sep	7250	1402065	3173261	119.9	4.4	114.8	93
Test EE10	#393	9-Sep	7243	1401354	3173392	129.8	9.1	119	96
Test BB16	#394	9-Sep	7226	1401350	3173569	129.7	3.4	125.5	100
Test BB17	#395	9-Sep	7227	1401429	3173599	120.1	2.6	117.1	95
Test CC13	#396	12-Sep	7229	1401223	3173600	124.9	1.8	122.8	100
Test CC14	#397	12-Sep	7229	1401321	3173618	118	2.4	115.3	93
Test CC15	#398	12-Sep	7229	1401395	3173542	117.6	2	115.2	93
Test FF1	#399	12-Sep	7261	1402685	3173112	119.2	1	118	96
Test FF2	#400	12-Sep	7262	1402687	3173069	122.4	6.7	114.7	93
Test DD12	#401	13-Sep	7231	1401380	3173578	140.3	6.2	132.1	100
Test DD13	#402	13-Sep	7231	1401474	3173533	133.9	4.3	128.4	100
Test DD14	#403	13-Sep	7231	1401294	3173562	134.2	5.5	127.3	100
Test FF3	#404	13-Sep	7245	1400931	3173536	125.6	6.6	117.8	95
Test FF4	#405	13-Sep	7246	1400833	3173519	128.8	7.6	119.7	97
Test FF5	#406	13-Sep	7246	1401011	3173494	124.4	8.7	114.4	93
Test EE11	#407	14-Sep	7233	1401191	3173617	128.9	6	121.6	99
Test EE12	#408	14-Sep	7233	1401293	3173598	146.2	5.3	138.8	100
Test EE13	#409	14-Sep	7234	1401393	3173540	126.7	8.4	116.8	95
Test FF6	#410	14-Sep	7240	1401180	3173544	130.4	4.2	125.1	100
Test FF7	#411	14-Sep	7245	1401208	3173404	125.8	8	116.5	94
Test FF8	#412	14-Sep	7244	1401422	3173352	133.5	5.8	126.1	100
Test FF9	#413	14-Sep	7243	1401503	3173395	129.5	4.2	124.3	100

BCC Test	Test No.	Date	Elevation (ft)	Northing (ft)	Easting (ft)	Wet Density (pcf)	Moisture Content (%)	Dry Density (pcf)	Compaction (%)
Test FF10	#414	15-Sep	7237	1401198	3173580	131.1	4.4	125.6	100
Test FF11	#415	15-Sep	7238	1401207	3173633	127.9	3.3	123.8	100
Test FF12	#416	15-Sep	7243	1401393	3173476	139.9	5.1	133.1	100
Test FF13	#417	15-Sep	7243	1401528	3173412	127.7	3.7	123.1	100
Test FF14	#418	15-Sep	7245	1401632	3173347	126.7	8.3	117.1	95
Test FF15 (12in)	#419	16-Sep	7241	1401571	3173423	125.9	7.5	125.9	100
Test FF16 (12in)	#420	16-Sep	7242	1401568	3173422	129.2	2.7	129.2	100
Test GG1	#421	16-Sep	7247	1400968	3173578	124.8	3.8	124.8	100
Test GG2	#422	16-Sep	7245	1401103	3173543	136.9	5.7	136.9	100
Test GG3	#423	16-Sep	7245	1401194	3173486	128.7	7.8	128.7	100
Test GG4	#424	16-Sep	7268	1402675	3173049	125.7	4.1	120.7	95
Test GG5	#425	16-Sep	7268	1402577	3172988	152.3	6.4	143.1	100
Test GG6	#426	16-Sep	7267	1402341	3173041	127.8	4.2	122.7	99
Test GG7 (12in)	#427	19-Sep	7243	1401622	3173393	121.4	9.6	110.7	90
Test GG8	#428	19-Sep	7244	1401622	3173393	125	9	114.7	93
Test GG9	#429	19-Sep	7244	1401569	3173445	124	10.2	112.5	91
Test GG10	#430	19-Sep	7246	1401563	3173346	123.5	9.7	112.6	91
Test GG11	#431	19-Sep	7246	1401655	3173319	130.5	9.8	118.9	96
Test HH1	#432	20-Sep	7249	1400960	3173460	144.9	5.9	136.9	100
Test HH2	#433	20-Sep	7249	1401092	3173451	142.4	7.1	132.9	100
Test HH3	#434	20-Sep	7248	1401186	3173491	131.2	5.3	124.6	100
Test HH4	#435	20-Sep	7263	1402230	3173166	124	8.1	114.7	93
Test HH5	#436	20-Sep	7265	1402294	3173082	120.2	7.2	112.1	91
Test HH6	#437	21-Sep	7252	1401886	3173265	129.5	4.5	124	100
Test HH7	#438	21-Sep	7252	1401817	3173276	133.5	4.5	127.8	100
Test HH8	#439	21-Sep	7250	1401755	3173376	127	9.4	116.2	94
Test HH9	#440	21-Sep	7250	1401673	3173320	134.8	8.6	124.1	100
Test HH10	#441	21-Sep	7250	1401541	3173311	123.3	5.8	116.6	94
Test II1	#442	23-Sep	7270	1402607	3173082	126.6	13.7	111.3	91
Test II2	#443	23-Sep	7270	1402626	3173047	128	10.8	115.5	94
Test II3	#444	23-Sep	7270	1402687	3173077	127.6	9.4	116.7	95
Test II4	#445	23-Sep	7264	1402210	3173105	128.4	11.3	115.3	94
Test II5	#446	23-Sep	7263	1402120	3173160	124.8	5.8	118	96
Test II6	#447	23-Sep	7260	1402148	3173260	127.9	3.8	123.2	100
Test II7	#448	26-Sep	7249	1401377	3173415	123.1	4.4	117.9	96
Test II8	#449	26-Sep	7249	1401280	3173436	121.5	2.8	118.2	96
Test II9	#450	26-Sep	7249	1401109	3173496	123.9	2	121.4	98
Test II10	#451	26-Sep	7250	1401004	3173498	125.2	2.8	121.8	99

BCC Test	Test No.	Date	Elevation (ft)	Northing (ft)	Easting (ft)	Wet Density (pcf)	Moisture Content (%)	Dry Density (pcf)	Compaction (%)
Test II11 (12in)	#452	26-Sep	7249	1401077	3173470	139.9	8.8	128.6	100
Test JJ1	#453	27-Sep	7248	1401144	3173548	126.6	10.8	114.3	93
Test JJ2	#454	27-Sep	7250	1401008	3173544	121.7	4	117	95
Test JJ3	#455	27-Sep	7250	1401106	3173452	130.6	11.8	116.8	95
Test JJ4	#456	27-Sep	7251	1401486	3173350	126	9.5	115	93
Test JJ5	#457	27-Sep	7250	1401526	3173429	124.3	9	114.1	92
Test JJ6 (12in)	#458	28-Sep	7247	1401171	3173519	122.2	7.6	113.5	92
Test JJ7	#459	28-Sep	7248	1401171	3173519	131.5	7.2	122.7	99
Test JJ8	#460	28-Sep	7247	1401244	3173521	138.1	8.3	127.5	100
Test JJ9	#461	28-Sep	7247	1401410	3173515	123.6	10	112.4	91
Test JJ10	#462	28-Sep	7251	1401351	3173417	126.8	8.2	117.2	95
Test JJ11	#463	28-Sep	7251	1401174	3173447	124.6	10.9	112.4	91
Test KK1	#464	28-Sep	7274	1402647	3173052	119.7	7.8	111.1	90
Test KK2	#465	28-Sep	7275	1402640	3173003	140.4	8.2	129.8	100
Test KK3	#466	28-Sep	7270	1402387	3173096	118.3	10.2	107.4	87
Re-Test KK3	#466R	3-Oct	7270	1402387	3173096	130	3.5	125.6	100

**Notes:**

1. As of September 30, 2022, a total 1,375,000 yd3 had been placed and compacted. This requires 275 compaction tests, and 460 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.