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Continental Materials Corp. Denver, CO 80222
File: March 31, 2021 Monitoring Summary Date: April 30, 2021

Reference: March 2021 Geotechnical Monitoring Summary Pikeview Quarry

1.0 INTRODUCTION

Stantec Consulting Services Inc. (Stantec) has prepared this March 2021 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. 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 2021.

It is important to note that there is currently little activity at the Pikeview Quarry. Operations are limited to importing fill and preparing the growth medium, and no fill is being placed on the slopes. Continuous monitoring by the robotic survey system began in 2010 and has continued through the month of March 2021 uninterrupted. Visual inspections of the slopes were performed by Stantec engineers.

1.1 PURPOSE

The purpose of this report is to summarize the March 2021 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/Monthly
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 MSHA rules and regulations. The limited work performed in March 2021 resulted in the operator visual inspections being limited to stockpiles.

Stantec conducted visual inspections of the Pikeview Quarry slopes on March 19, 2021. 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.

- The previously observed crack on the road on the north side of the quarry remains with no visible change. The crack runs parallel to a fill slope and is likely the result of loose fill settling. The crack is not in the vicinity of the landslide and runs perpendicular to the landslide; therefore, it is not related to the landslide. (Note 2)
- The area upstream of the culvert has been excavated to clear the pipe for storm water. (Note 1)
- Survey Station: Based on the survey data, the total station is in operating condition.
- Prisms: Several prisms were passed along the walking route and appeared to be in their original position and operating normally. Control points are permanently cemented into the ground while some of the monitoring points are cemented into 5-gal buckets to be portable as needed.
- Gullies and Rills: Gullies and rills have formed on the slopes above the slide area as well as in the burn areas above the quarry. (Note 8)
- Open Cracks: An open crack was observed during this visit. This feature is in an area where cracking is expected to occur as a result of ongoing slope settlement and relaxation. The edges of the crack have eroded suggesting it is not a new feature. (Note 7)
- Healed Cracks: A crack was observed on the slope adjacent to the slide where cracking had previously been observed. This crack runs parallel to the slide and appears to be “healed” and did not indicate any recent movement. (Note 7)
- Crack Free: No cracking was observed on the native granite slopes above the extents of the disturbed area. 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.
- Fill: Material is being imported and temporarily placed on the “production floor”. During the visit, different types of material including mulch and general fill were being deposited here for future placement. (Note 4)
- 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 four hours. There are currently 20 prisms; 3 prisms are control points located outside the slope movement area, 13 prisms are located on the slopes surrounding the landslide area, and 4 prisms are located at the toe of the landslide. As the slope is backfilled and graded, additional prisms will be installed. The existing 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 prism and slope can be inspected. On March 6, prisms NP2 and P25 could not be found by the total station during the 8:00am scan. The prisms were located on the subsequent scans and no action was necessary by CMC. This occurred on a Saturday, and no operators were present at the time of the missed reading. On March 17, prism TOE1 recorded movements of approximately 0.36 feet and 0.29 feet. The movements of prism TOE1 were determined to be caused by wildlife in the vicinity grazing the prism; the wildlife turned the prism and the operators had to move the prism back into place. On March 29, prism NP2 was damaged and moved back into place after repairs to the glass were made. All other alarms were determined to be caused by snow, fog, or frost. There were no alarms caused by slope movements.

Table 2 Alarm Summary

Date	Notes	Actions taken	Issue Resolved
03/04/2021	Multiple prisms missing after multiple scans	Snow	03/04/2021
03/05/2021	Multiple prisms missing after multiple scans	Snow	03/05/2021
03/06/2021	Prisms NP2 and P25 could not be found in the 8:00am scan	Cause of missed reading undetermined, but subsequent readings show no movement	03/06/2021
03/11/2021	Multiple prisms missing after multiple scans	Snow and Fog	03/11/2021
03/12/2021	Multiple prisms missing after multiple scans	Snow	03/12/2021
03/13/2021	Multiple prisms missing after multiple scans	Snow	03/13/2021
03/14/2021	Multiple prisms missing after multiple scans	Clouds and Fog	03/14/2021
03/17/2021	Multiple prisms missing after multiple scans	Clouds and Fog	03/17/2021



03/17/2021	Prism TOE1 missing after multiple scans	Sheep Moved Prism	03/18/2021
03/18/2021	Multiple prisms missing after multiple scans	Sheep Moved Prism	03/18/2021
03/18/2021	Multiple prisms missing after multiple scans	Prism Moved Back to Original Position	03/18/2021
03/21/2021	Multiple prisms missing after multiple scans	Snow	03/21/2021
03/22/2021	Multiple prisms missing after multiple scans	Snow	03/22/2021
03/23/2021	Multiple prisms missing after multiple scans	Frost	03/23/2021
03/24/2021	Multiple prisms missing after multiple scans	Snow	03/24/2021
03/29/2021	Prism NP2 missing after scan	Prism NP2 Back in Position and Glass Replaced	04/03/2021
03/30/2021	Multiple prisms missing after multiple scans	Snow	03/30/2021
03/31/2021	Multiple prisms missing after multiple scans	Snow	03/31/2021

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 $\pm 4 \text{ mm} + 1.5 \text{ ppm}$ 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 17 of 20 prisms with recorded displacements limited to data scatter and not actual movements. Prisms P63, TOE2, and TOE3 are located at the toe of the landslide, and these locations show slope creep movements at slow velocities ($< 0.001 \text{ feet per day}$). 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)	Needs / Recommendations
CP1	-0.003	-0.027	-0.0113	0.0275	
CP2	-0.067	-0.017	-0.0091	0.3941	
CP3	0.340	-0.070	0.0138	0.3475	
NP1	0.147	-0.045	0.0094	0.2073	
NP2	0.042	-0.196	0.0050	0.4296	Prism was moved to replace damaged glass
NP66	0.357	-0.140	0.0113	0.4713	
P1	0.390	-0.165	0.0096	0.6057	
P2	0.350	-0.309	0.0092	0.5817	
P25	0.138	-0.250	0.0215	0.3458	
P32	15.279	-6.264	0.0167	16.5133	
P33	-0.117	-0.057	-0.0076	0.2197	
P35	-0.049	-0.031	-0.0052	1.9838	
P4	-0.028	0.022	-0.0188	0.1406	
P5	-0.090	-0.104	-0.0053	0.2897	
P63	0.065	-0.078	0.0267	0.1195	Prism at toe of slide. Movements are within expected range.
P69	0.043	-0.018	0.0362	0.0614	
P70	0.270	-0.229	-0.0183	0.3570	
TOE1	0.298	0.041	0.4559	0.4707	Movements due to wildlife moving prism.
TOE2	0.022	-0.017	0.0262	0.0447	Prism at toe of slide. Movements are within expected range.
TOE3	0.109	-0.013	0.0716	0.1107	Prism at toe of slide. Movements are within expected range.



4.0 DRONE SURVEY

The site was flown for aerial imagery using an unmanned aircraft system (UAS or 'drone') on, March 19, 2021. 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 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 that approximately 2,255 yd³ of fill had been imported and temporarily placed. 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

No fill was permanently placed at the quarry in March. Once fill placement starts, the fill will be placed in one-foot-thick lifts, moisture conditioned as necessary, and compacted. Compaction testing will commence at the rate of at least one test per 5,000 yd³ placed.

Per CMC, imported material is being stockpiled onsite for placement at a later date. The material will be tested for compaction level and areas failing compaction testing will either be further compacted until the specification is met or removed and replaced in a compacted manner.

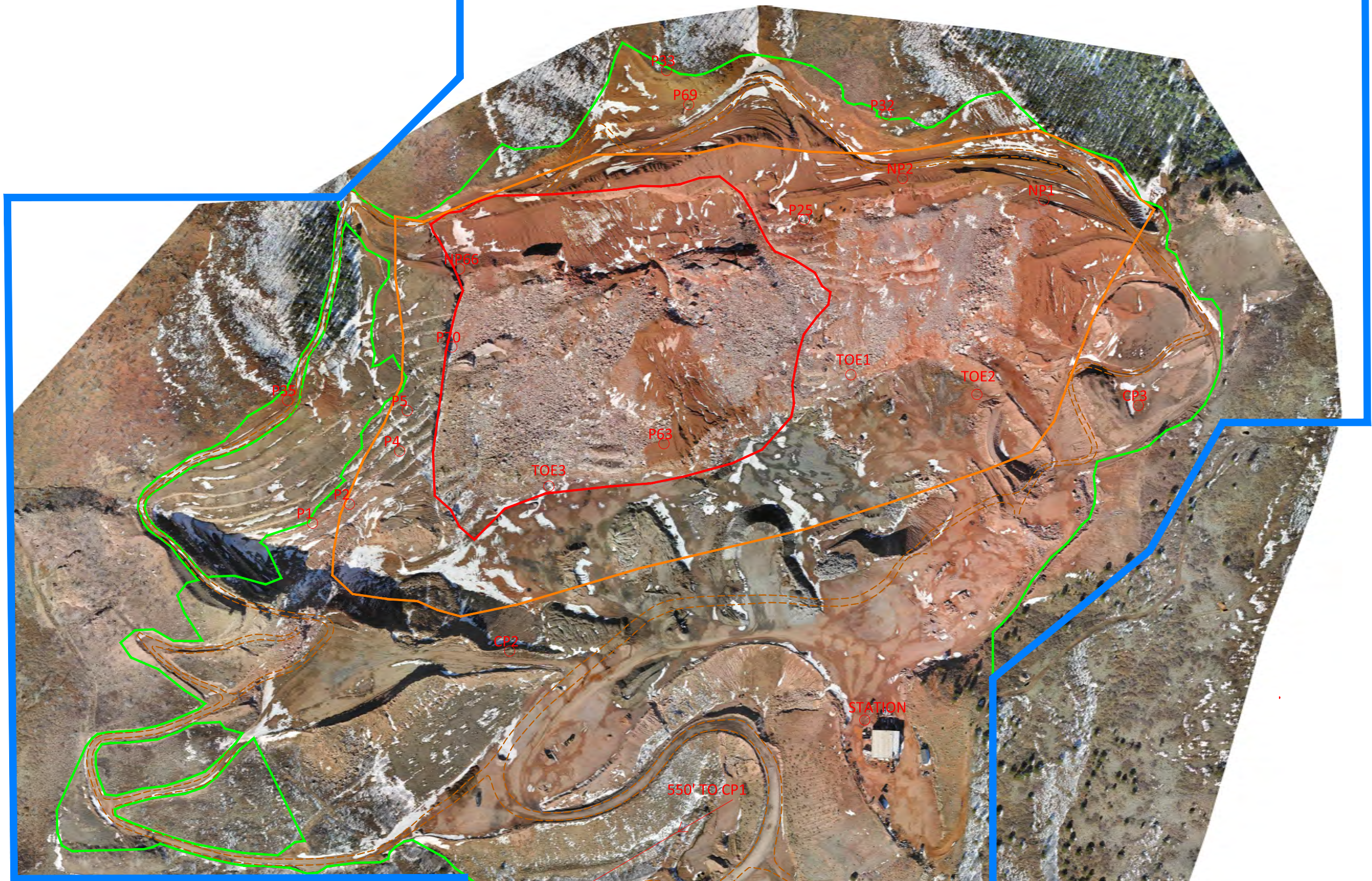
6.0 CONCLUSIONS

None of the data collected in March 2021 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.



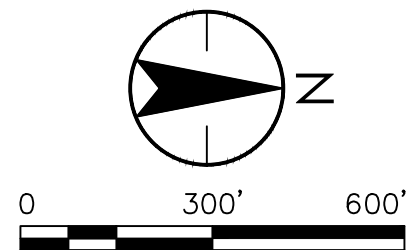
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LEGEND

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



Client/Project
CONTINENTAL MATERIALS
CORP.
PIKEVIEW QUARRY SLOPE
MONITORING

Project No.
227419041

Title
SITE MAP

Revision

Drawn By
PK

Date
2021.04.30
Figure No.
1

Appendix A

Visual Inspections



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2021.04.30 2:40:33 PM



6. AREA ABOVE THE SLIDE



5. A NEW PRISM AT THE TOE



7. HISTORIC CRACK PARALLEL TO SLIDE



8. RILLS ON SLOPE UNDER PEAK

NOTE 1:
NO CRACKS

NOTE 1:
NO CRACKS

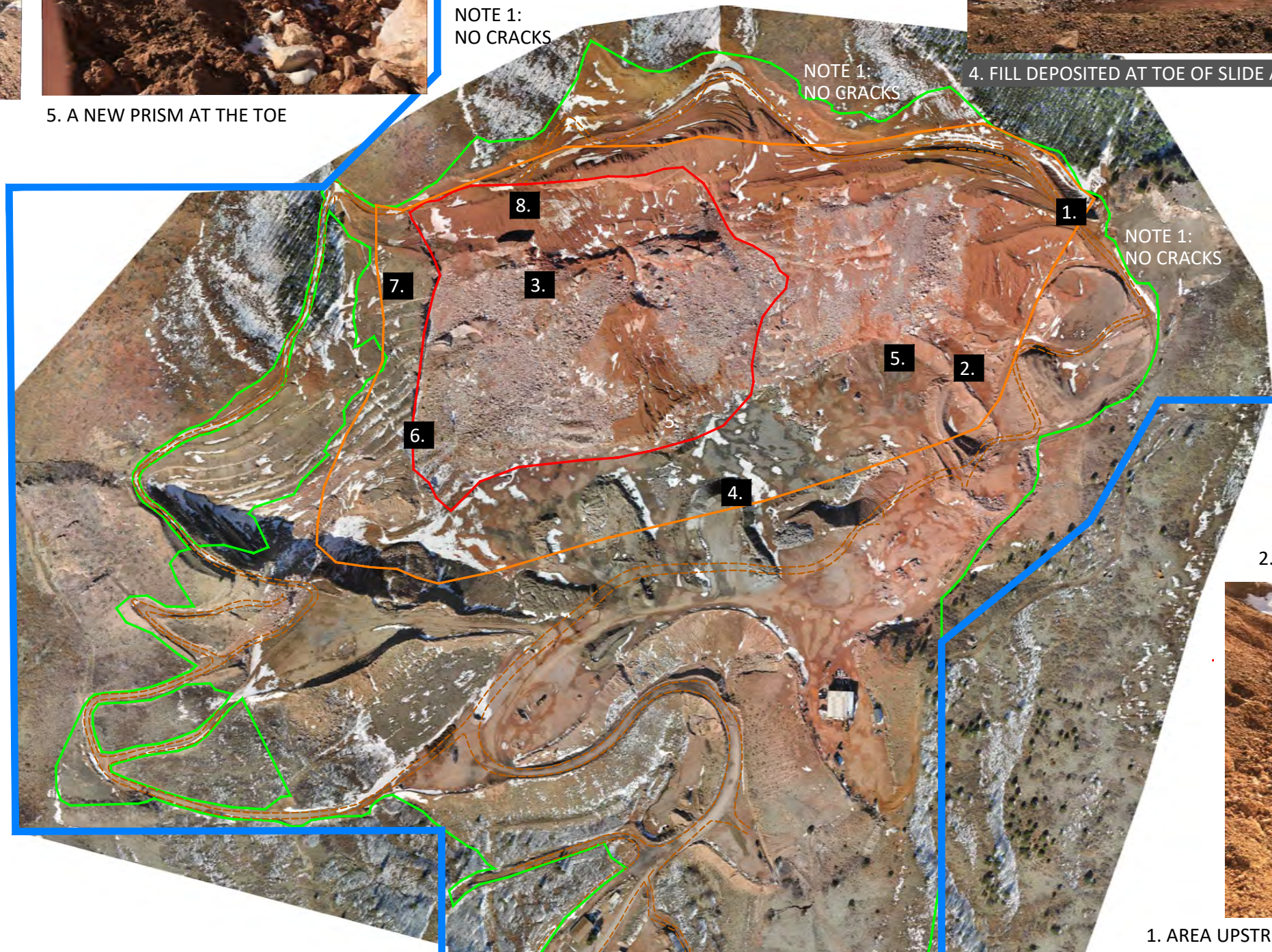
4. FILL DEPOSITED AT TOE OF SLIDE AREA

3. LARGE PIECES OF THE SLIDE BREAKING UP

NOTE 1:
NO CRACKS

2. RECENT CRACKING LIKELY FROM SETTLEMENT

1. AREA UPSTREAM OF CULVERT GETTING CLEARED OF DEBRIS



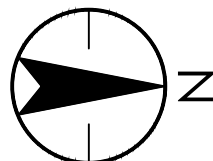
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LEGEND

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

NOTES

- NO CRACKS OBSERVED IN THIS AREA.
- ALL PHOTOS TAKEN MARCH 19, 2021.



Client/Project

CONTINENTAL MATERIALS
CORP.
PIKEVIEW QUARRY SLOPE
MONITORING

Project No.

227419041

Title

OBSERVATIONS FROM
MARCH INSPECTION

Revision
#

Drawn By
PK

Date
2021.04.30

Figure No.
2

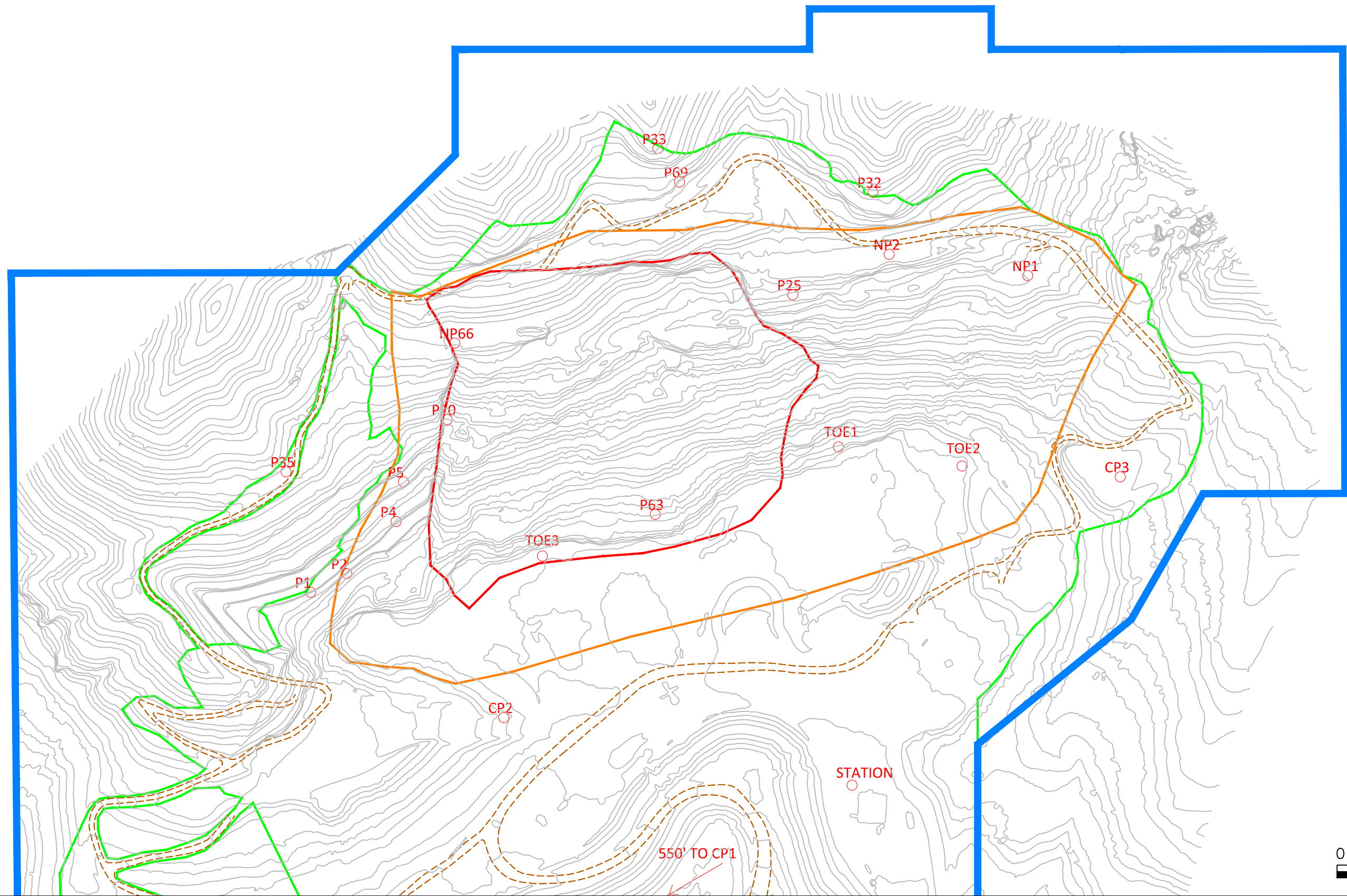
Appendix B

Prism Survey



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LEGEND

- Permit/Affected Lands Boundary
- Proposed Disturbance Limit
- Landslide Extent
- Buttress Fill Extent
- Existing Prism
- Proposed 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 19, 2021 DRONE SURVEY.
5. CONTOUR INTERVAL IS 10 FEET

Client/Project

CONTINENTAL MATERIALS
CORP.
PIKEVIEW QUARRY SLOPE
MONITORING

Project No.
227419041

Title

EXISTING PRISMS WITH
CURRENT SURFACE

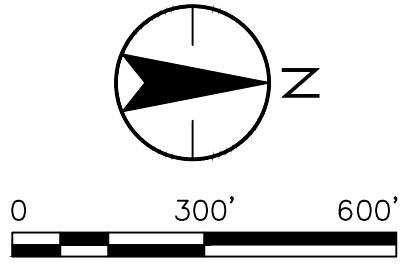
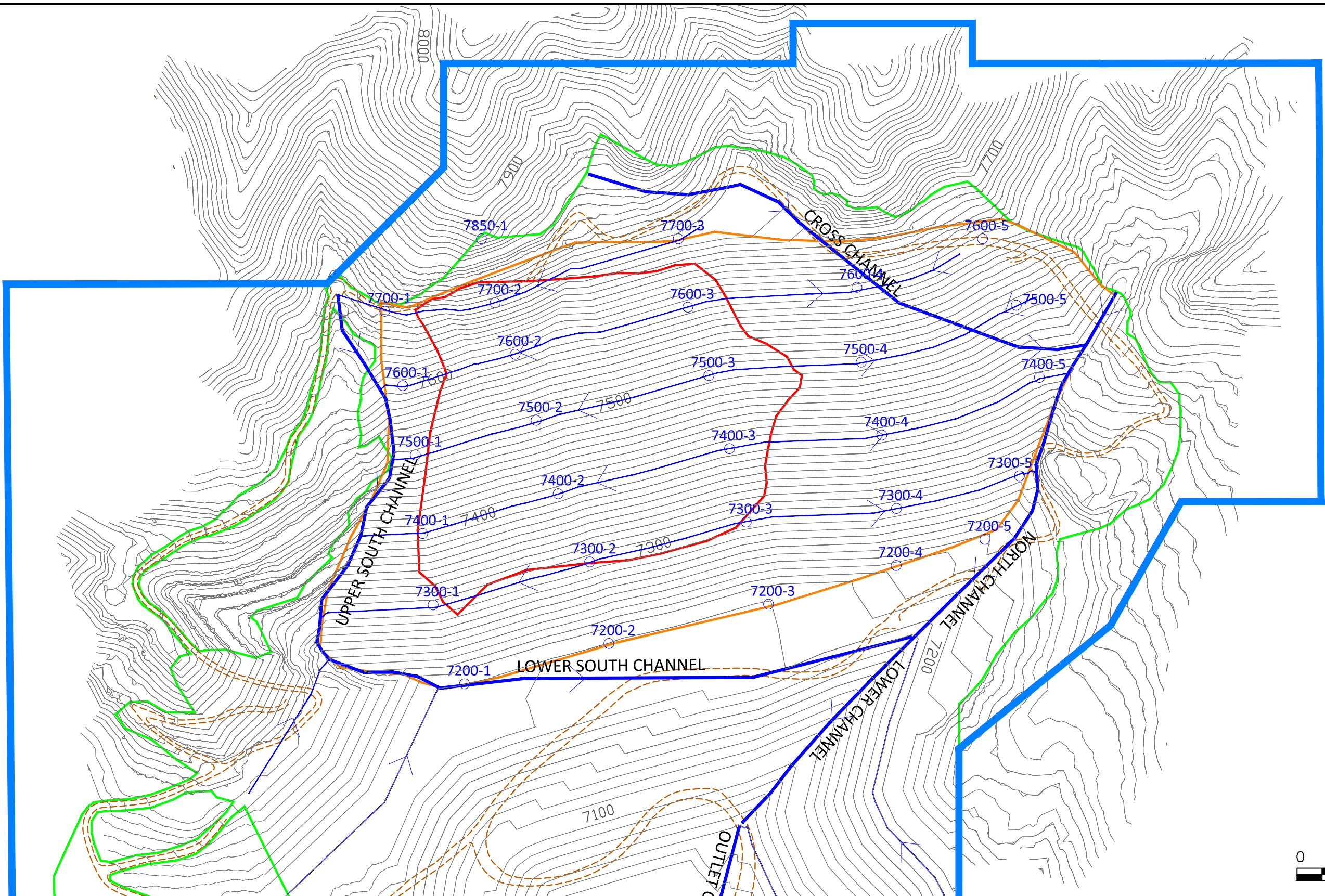
Revision
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Drawn By
PK

Date
2021.04.30

Figure No.
3

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**Stantec**

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

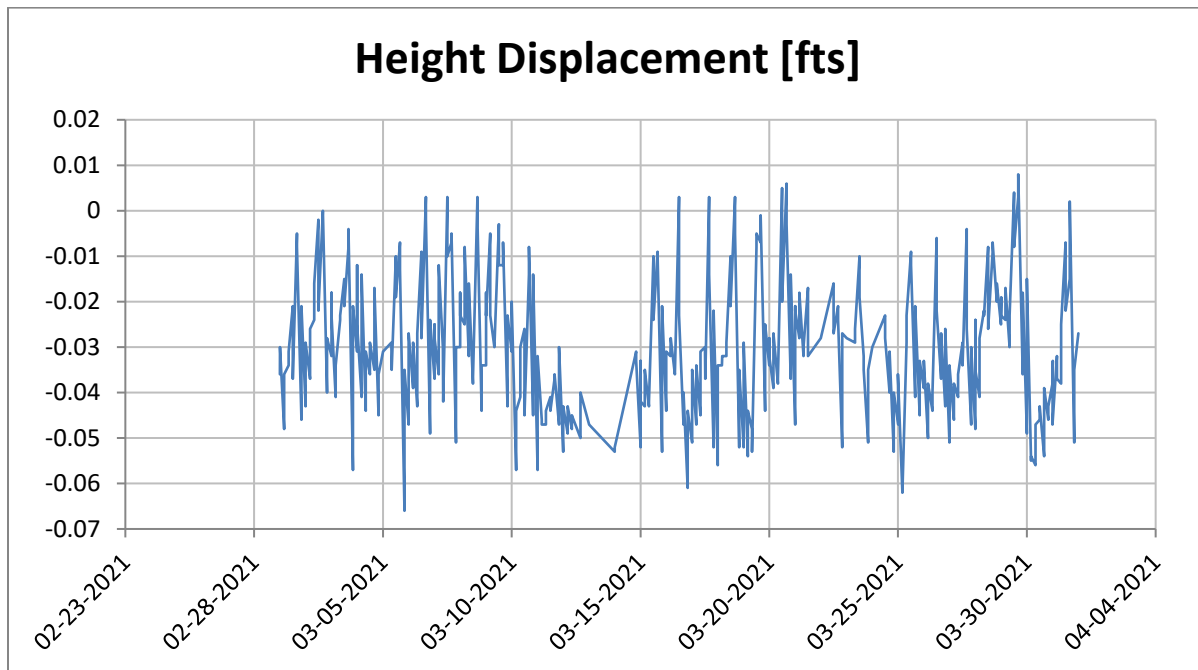
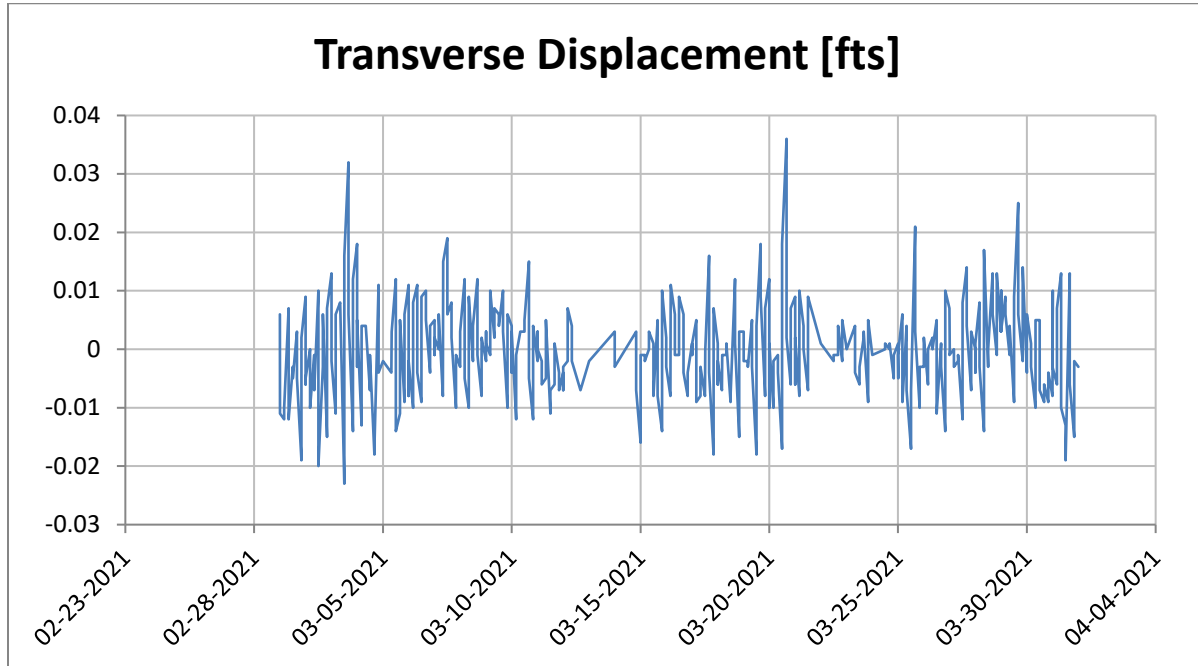
- NOTES
1. GRADING AND MOVEMENT OF STATION WILL BE EXTENDED AS LONG AS POSSIBLE.
 2. PRISMS WILL BE INSTALLED AS EACH BENCH IS FINISHED.
 3. ALL PRISMS WILL BE RETAINED AS LONG AS POSSIBLE.

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

Project No.
227419041

Title PROPOSED PRISMS WITH RECLAMATION SURFACE	
Revision #	Date 2021.04.30
Drawn By PK	Figure No. 4

Prism CP1

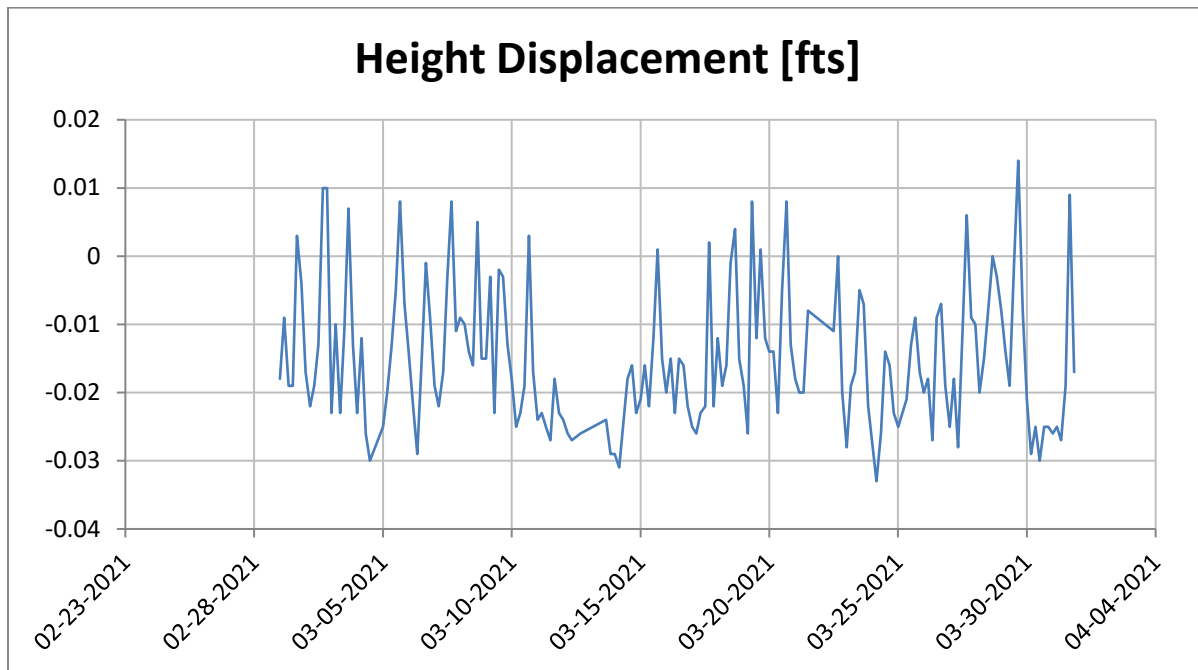
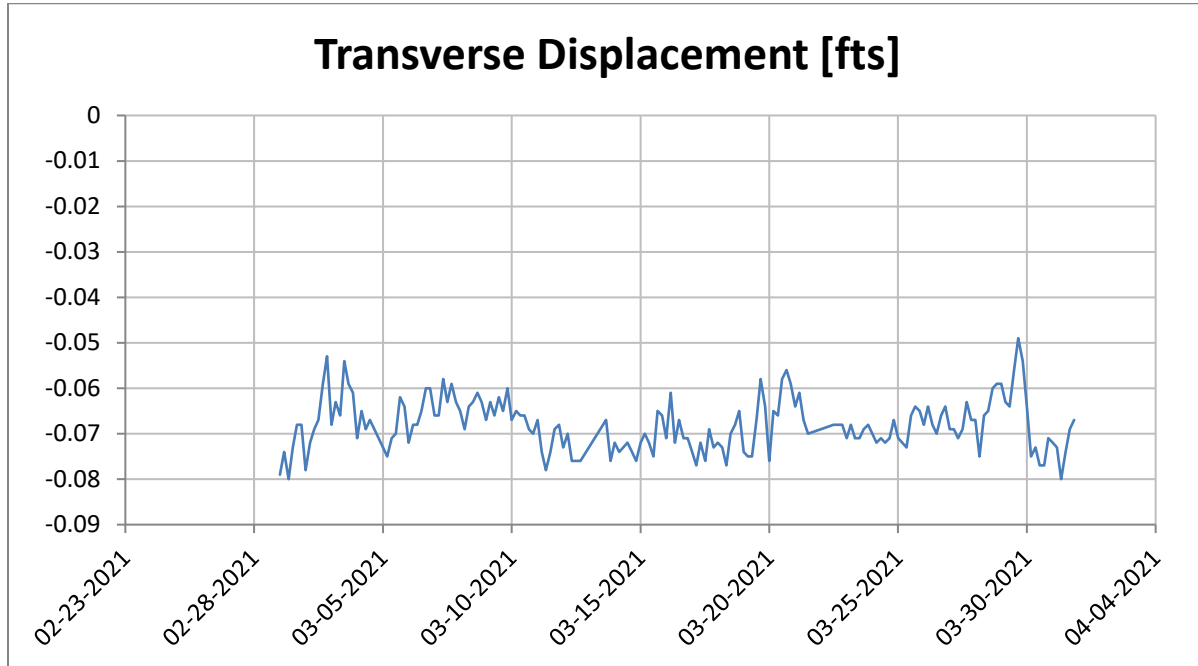


Notes:

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

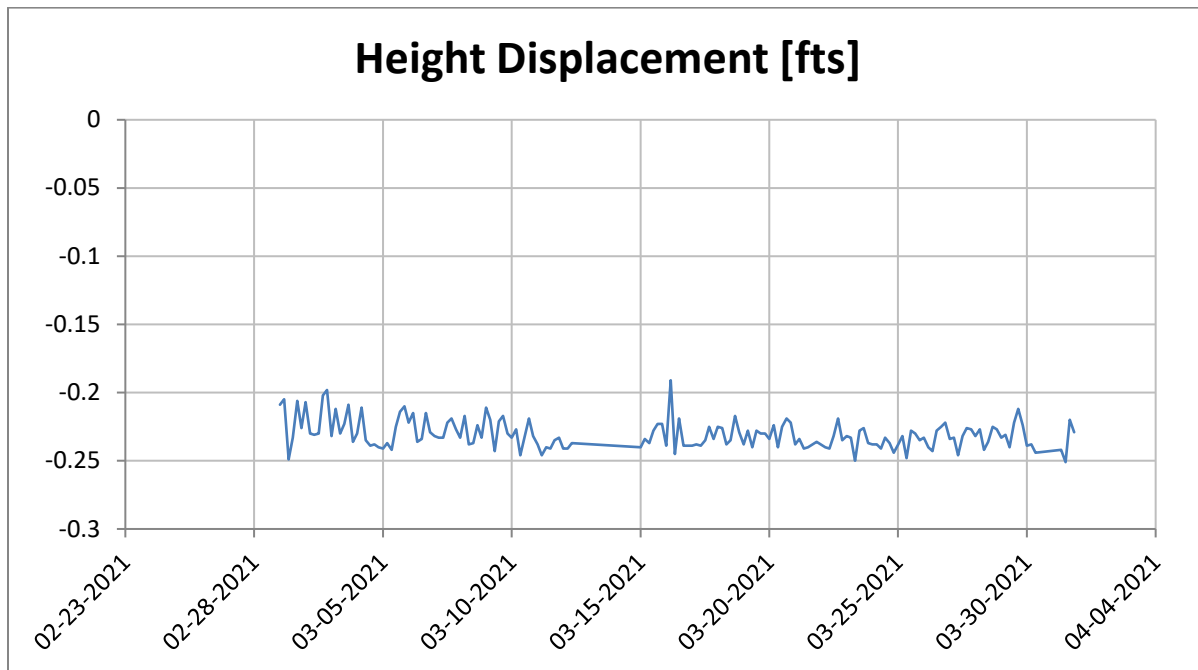
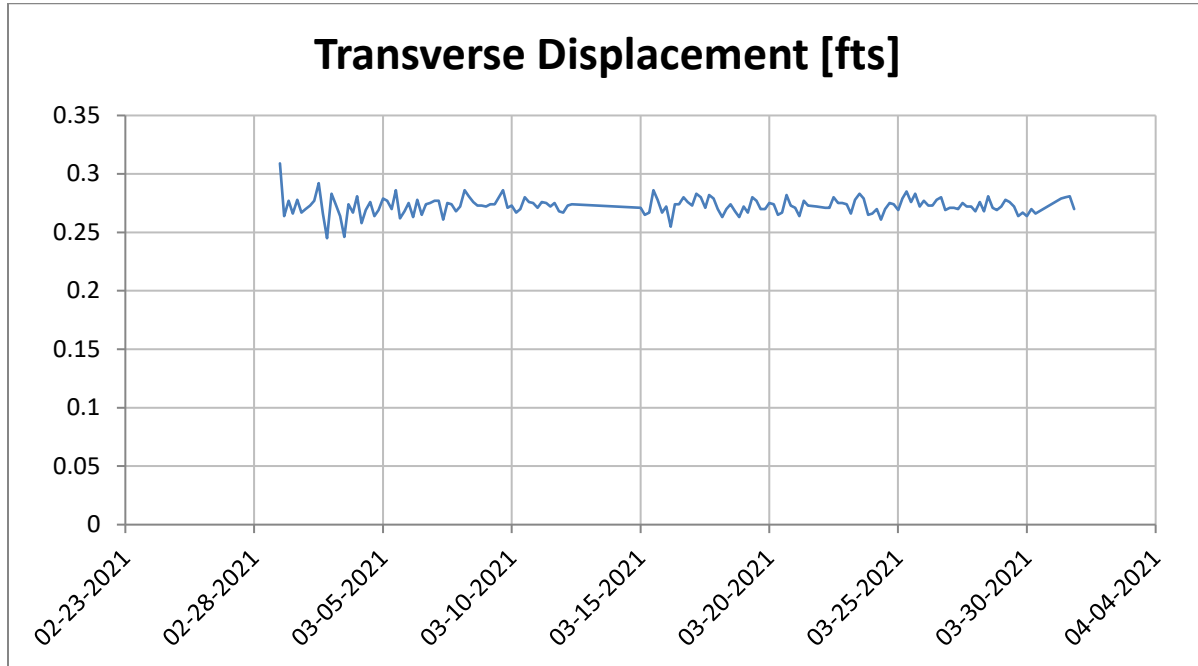


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Prism CP3

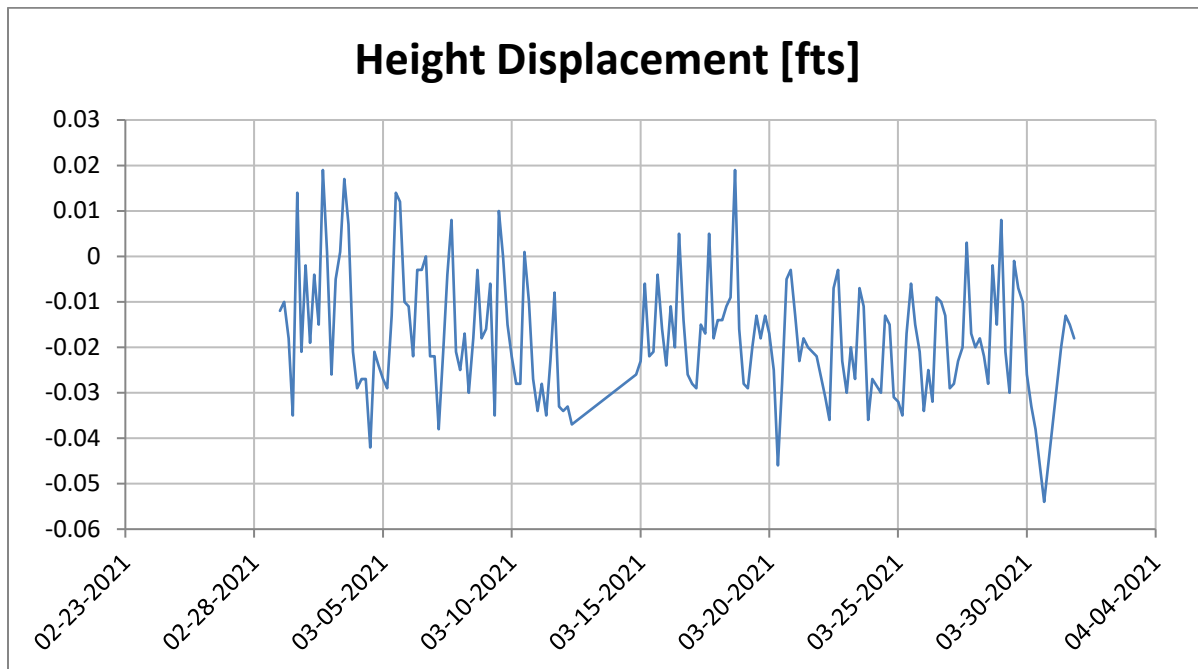
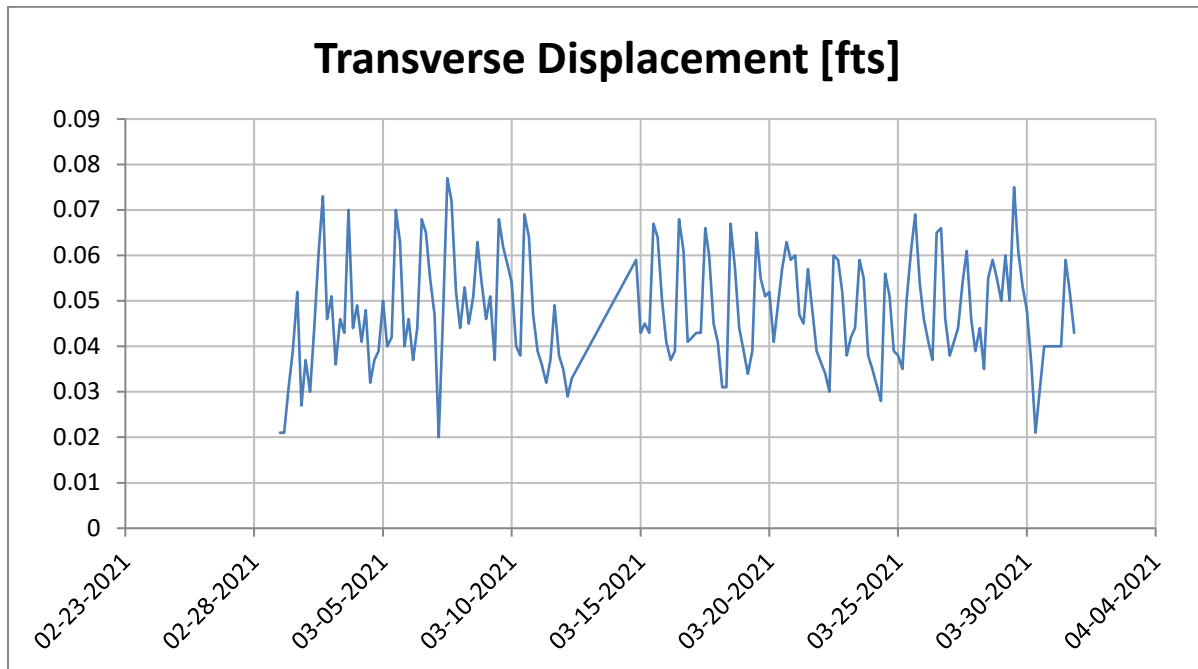


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Prism NP1

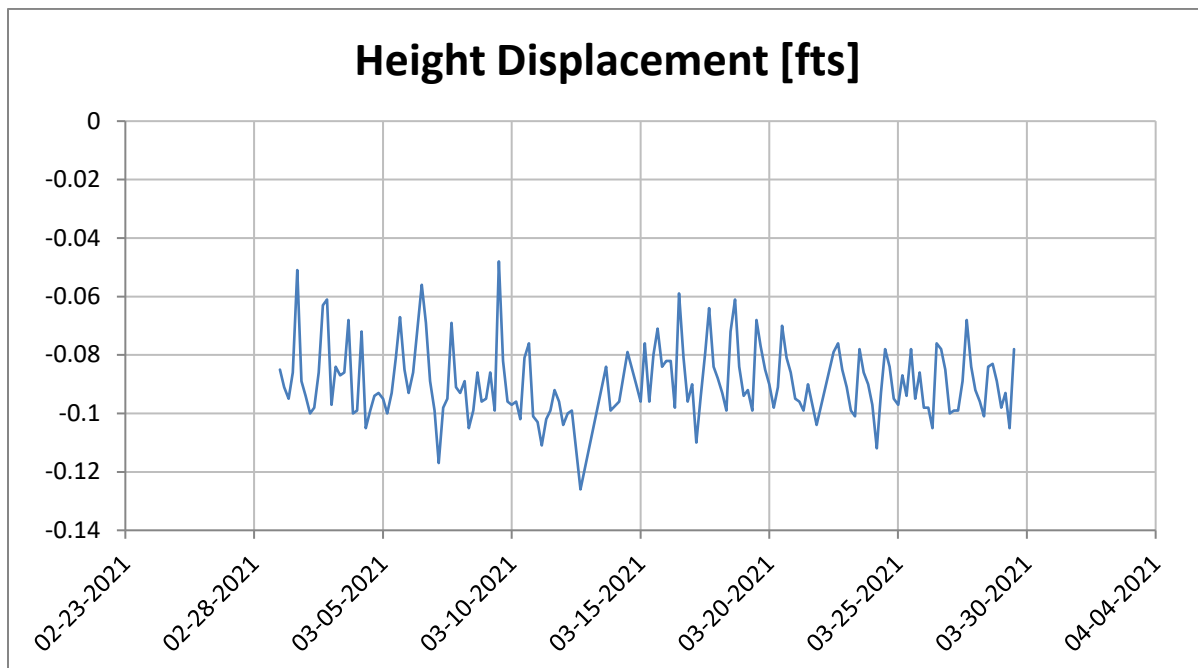
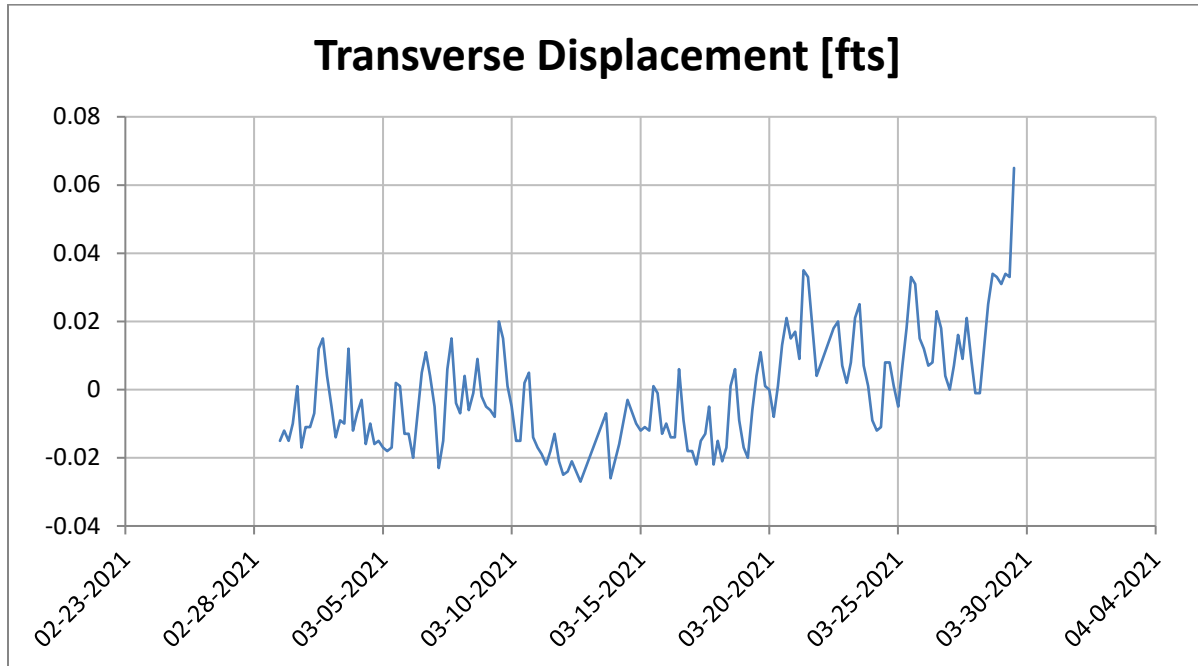


Notes:

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6. Alarm threshold is ± 0.35 feet.
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Prism NP2

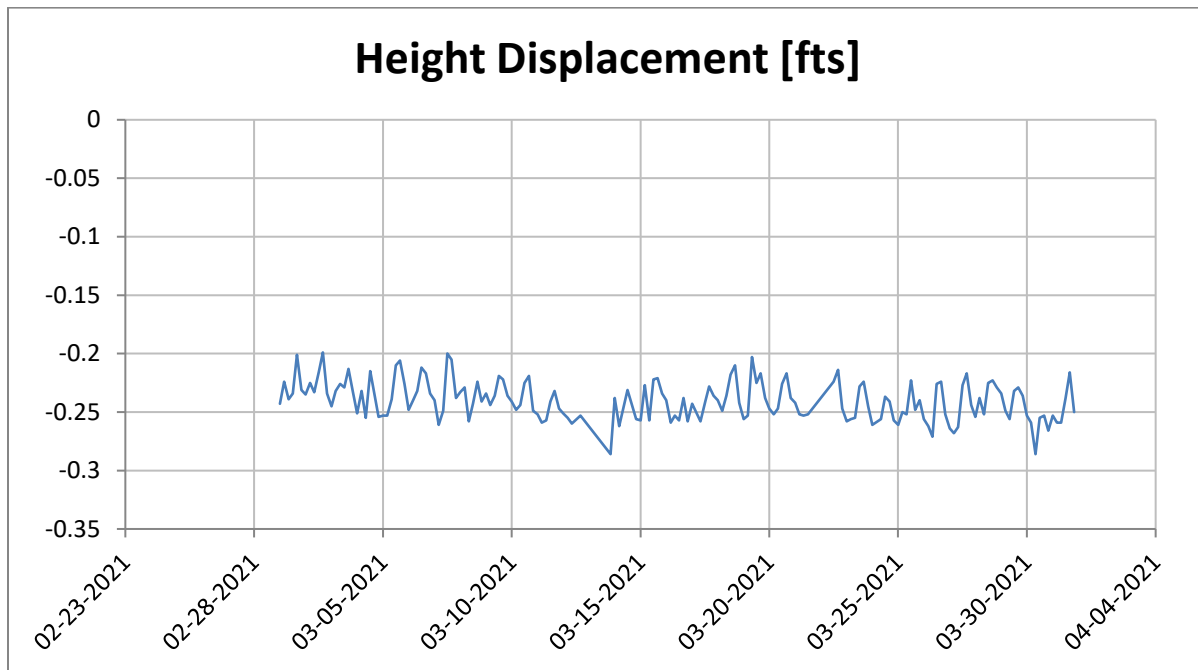
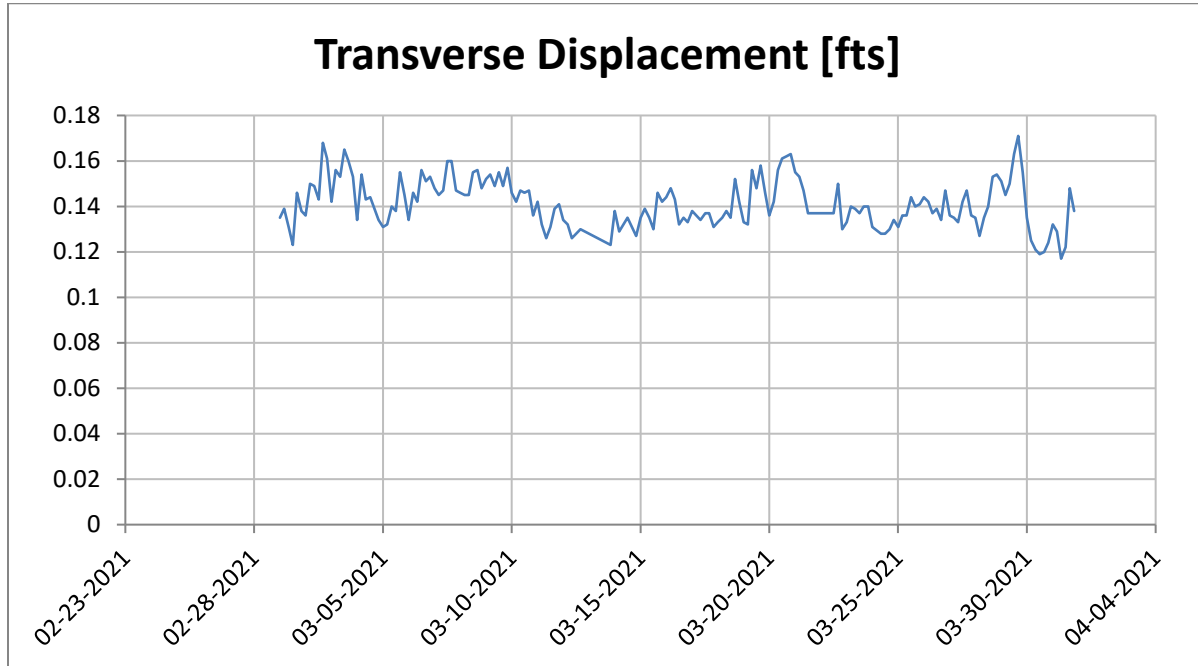


Notes:

1. Survey accuracy is +/-0.016 feet.
2. Alarm threshold is +/-0.35 feet.
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4. Height displacement is in the vertical direction. Positive direction means higher in elevation.



Prism NP66

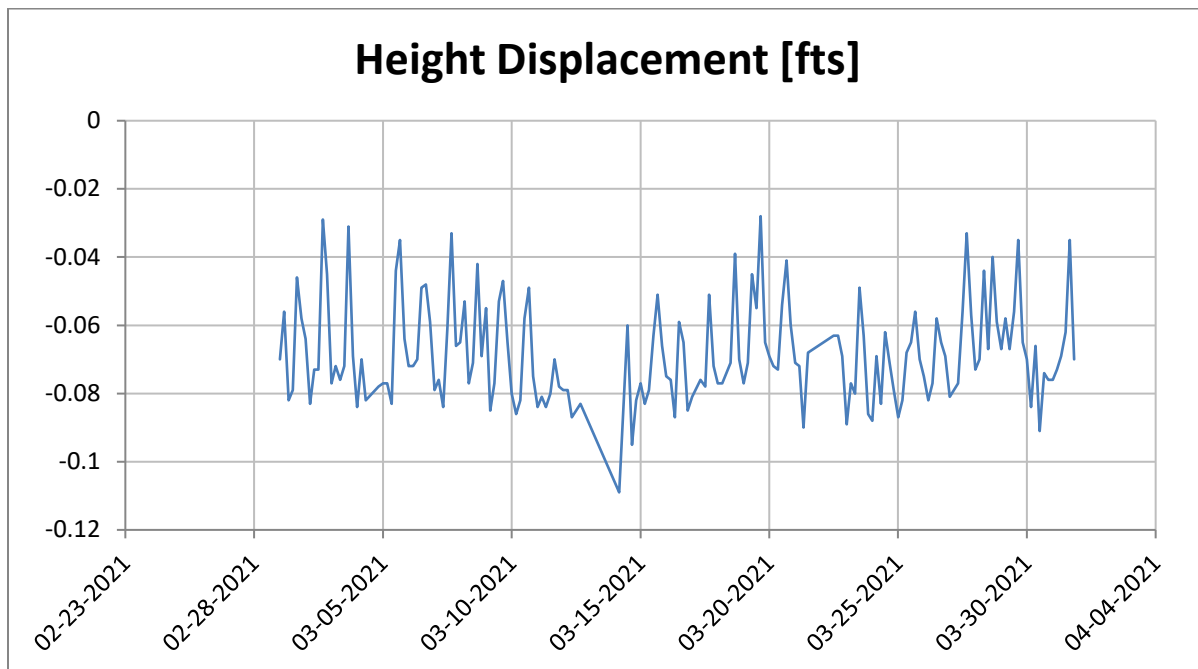
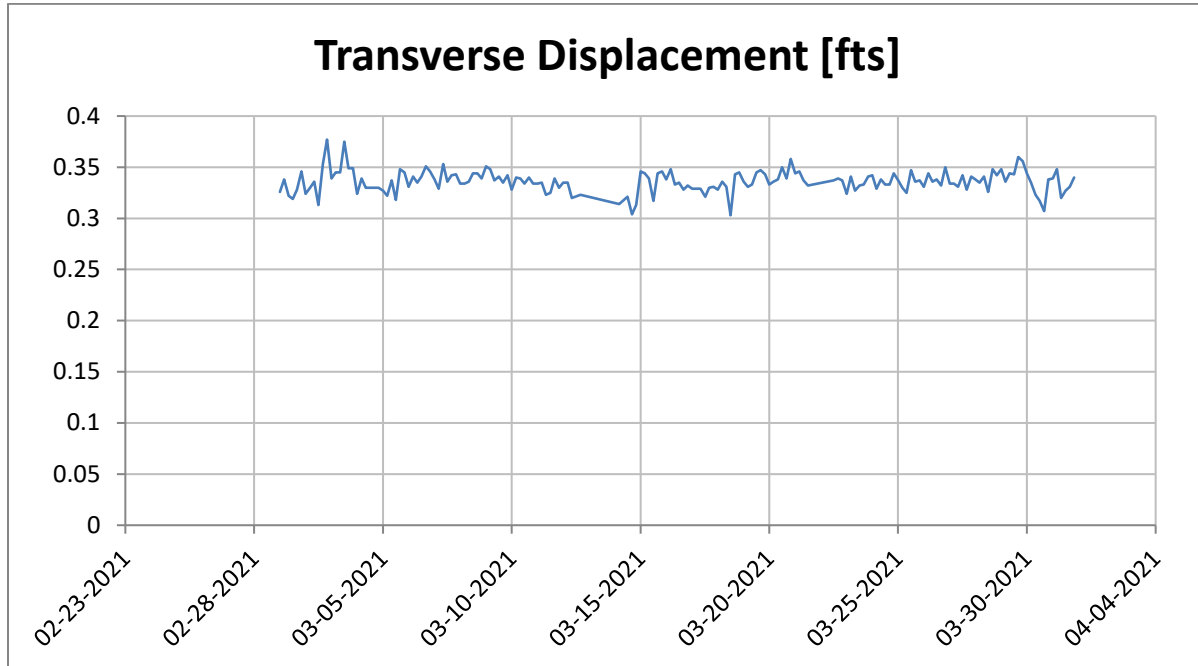


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Prism P1

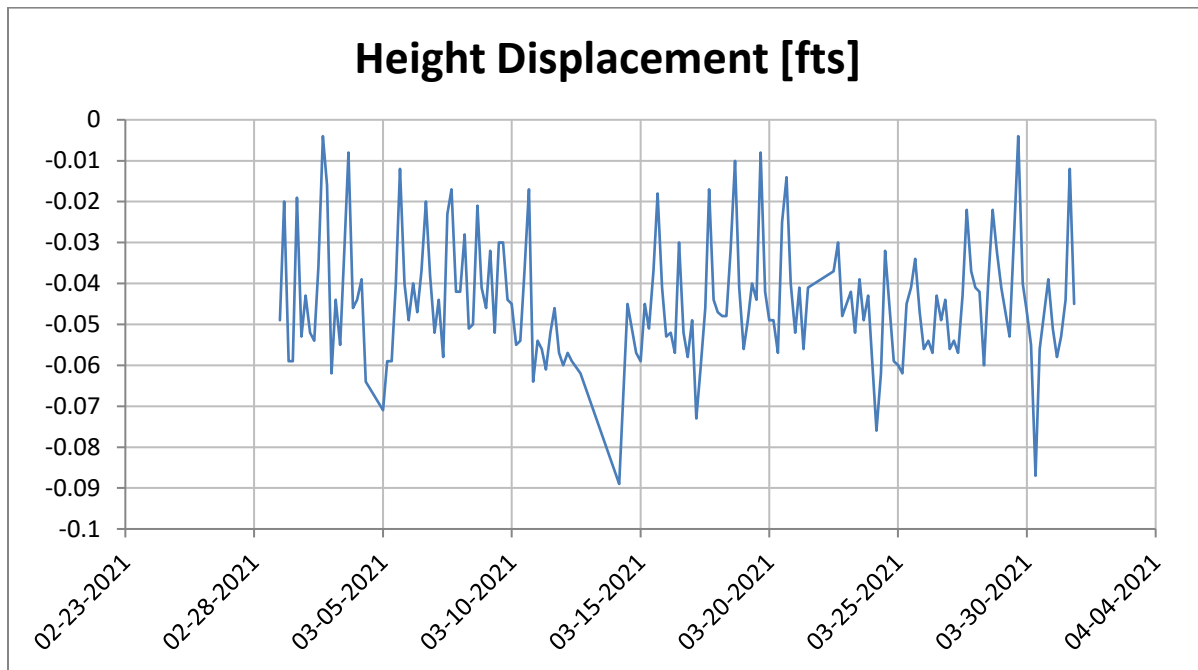
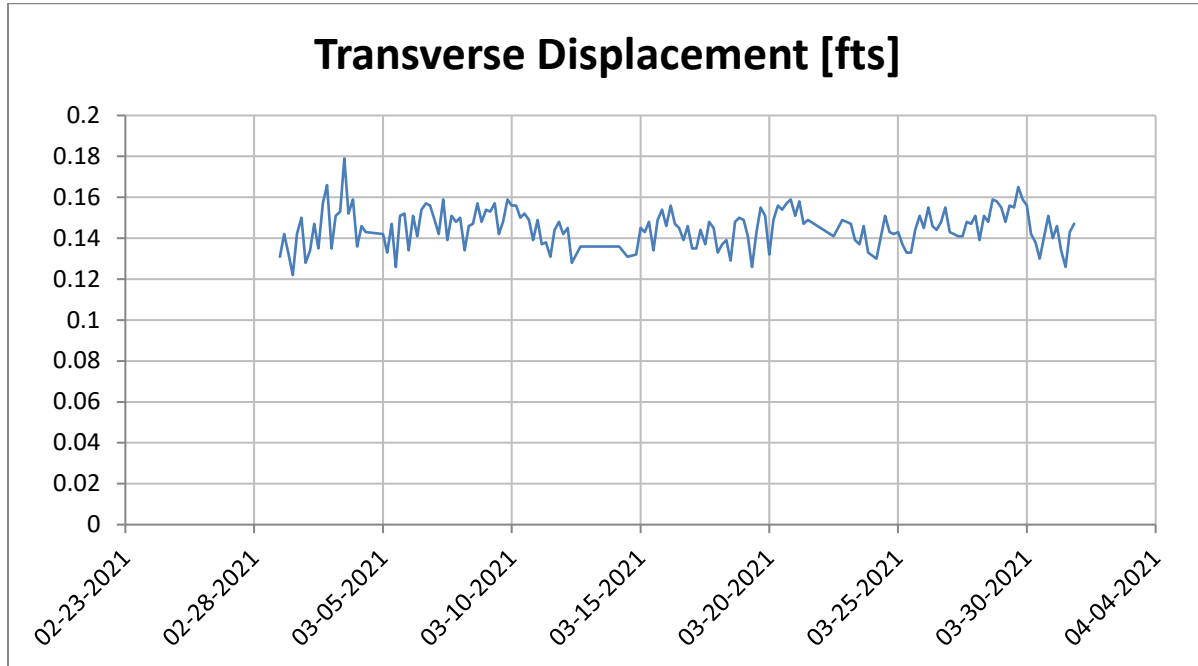


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Prism P2

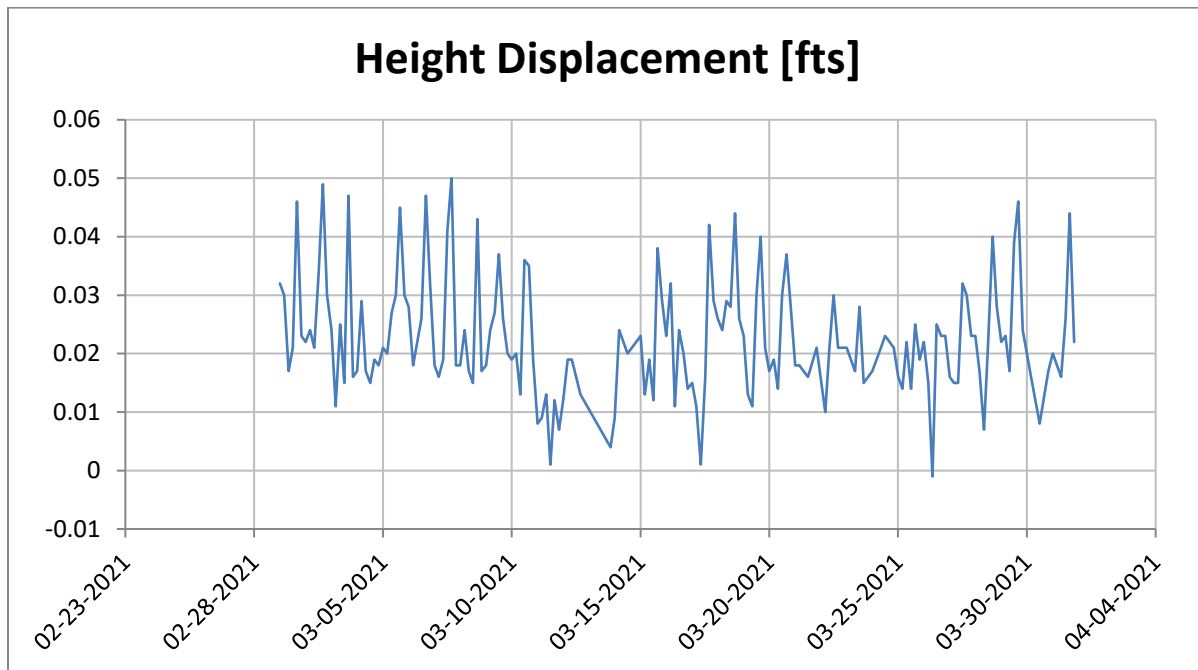
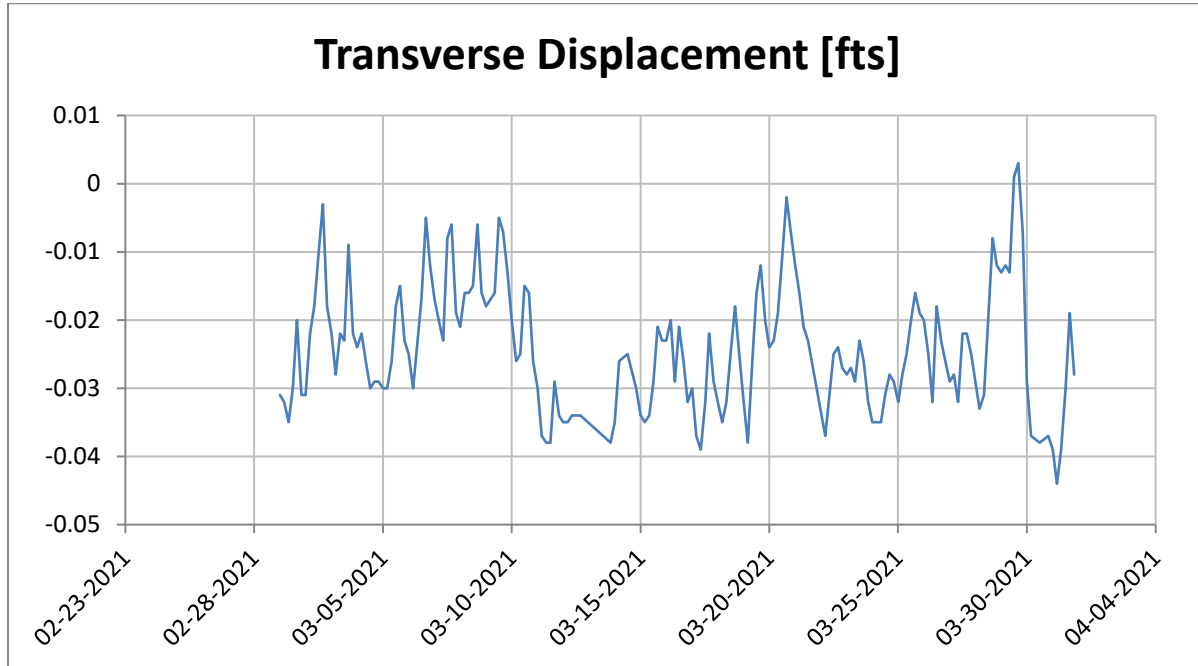


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Prism P25

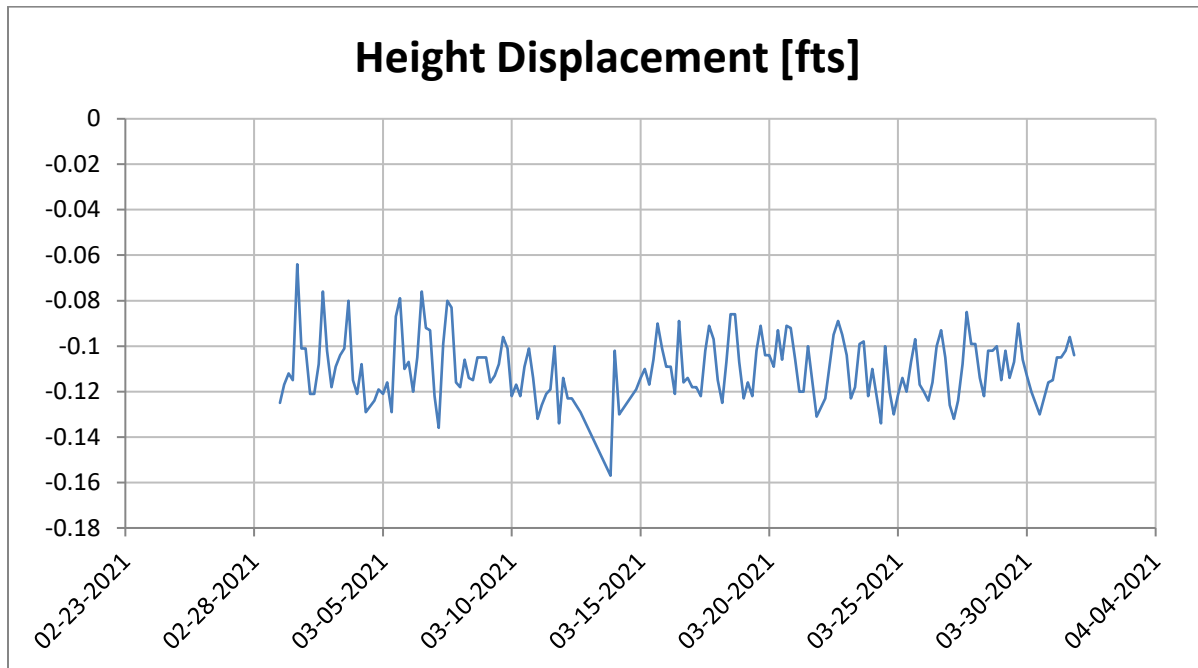
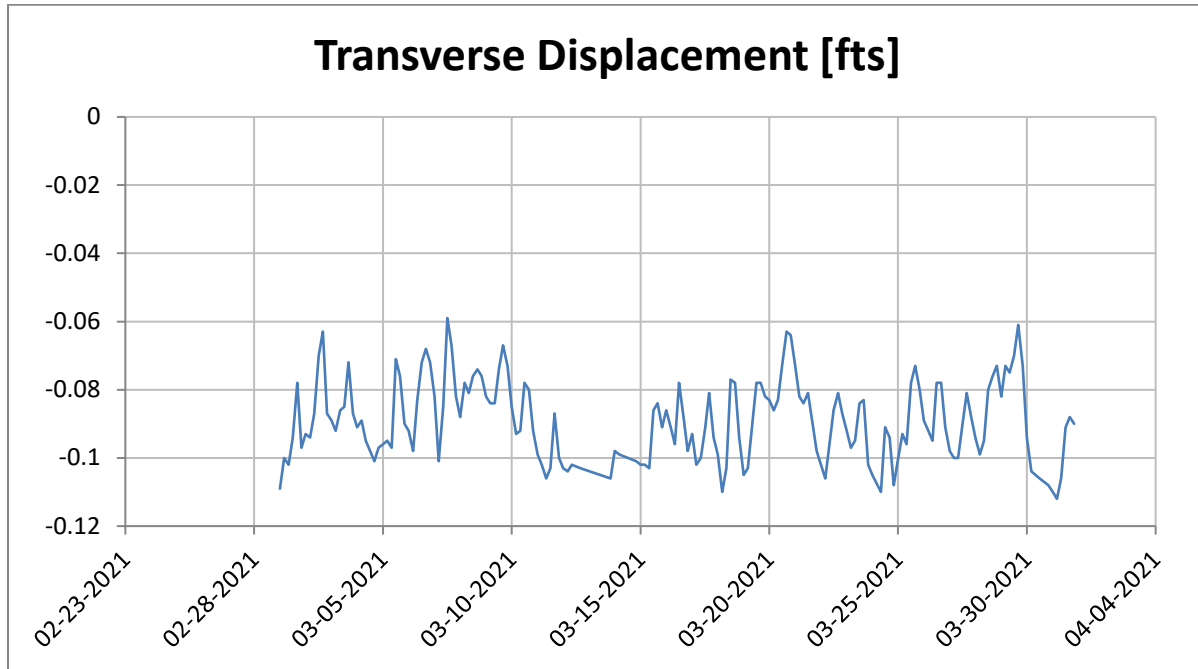


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4. Height displacement is in the vertical direction. Positive direction means higher in elevation.



Prism P32

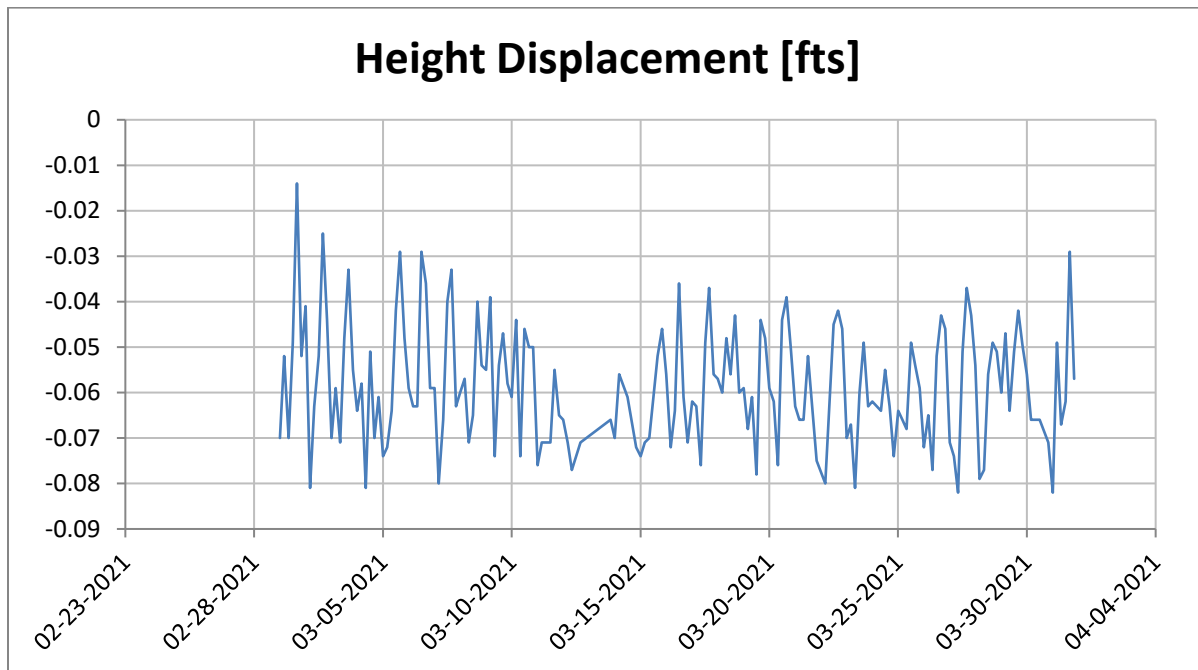
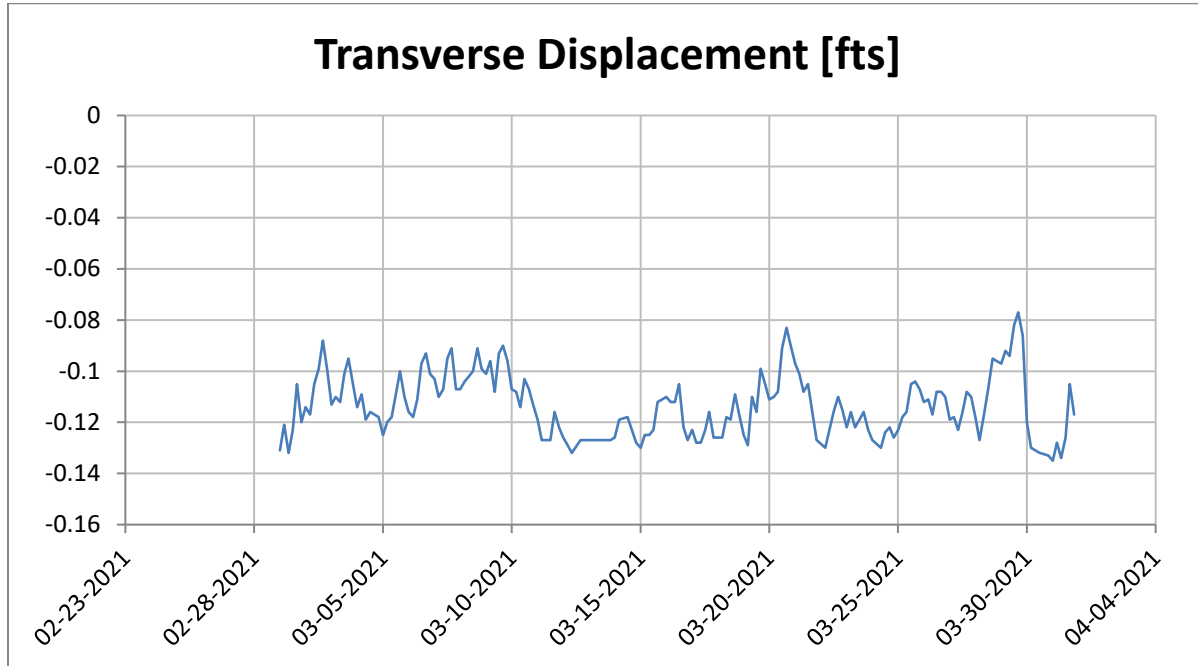


Notes:

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

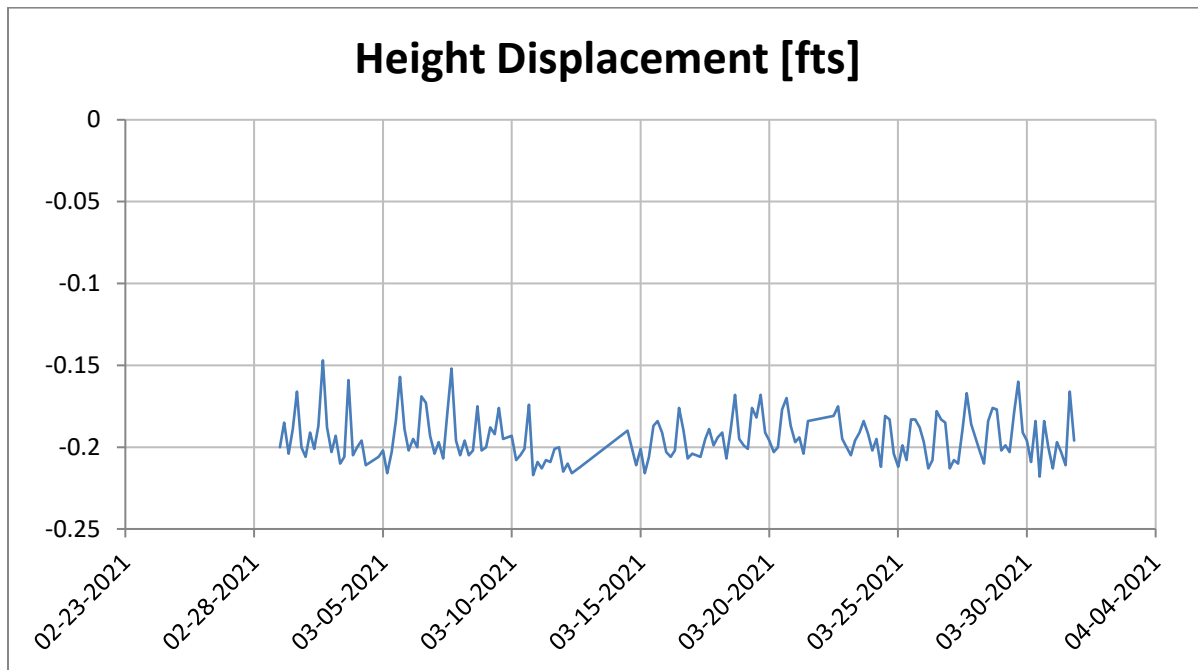
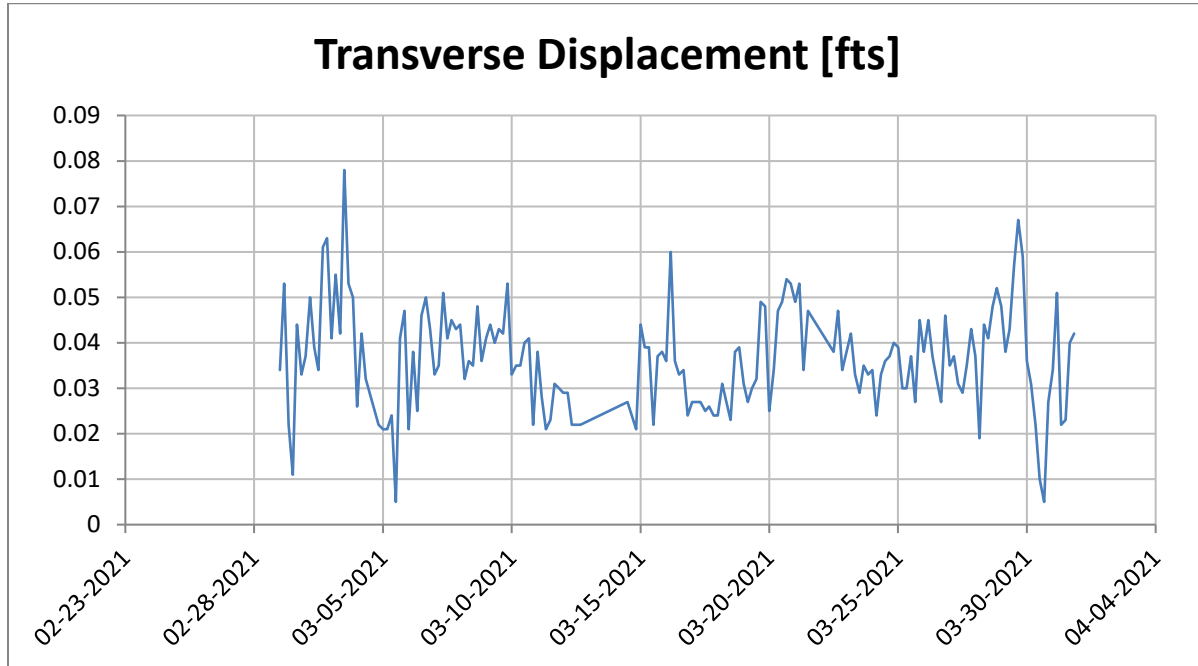


Notes:

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.



Prism P35

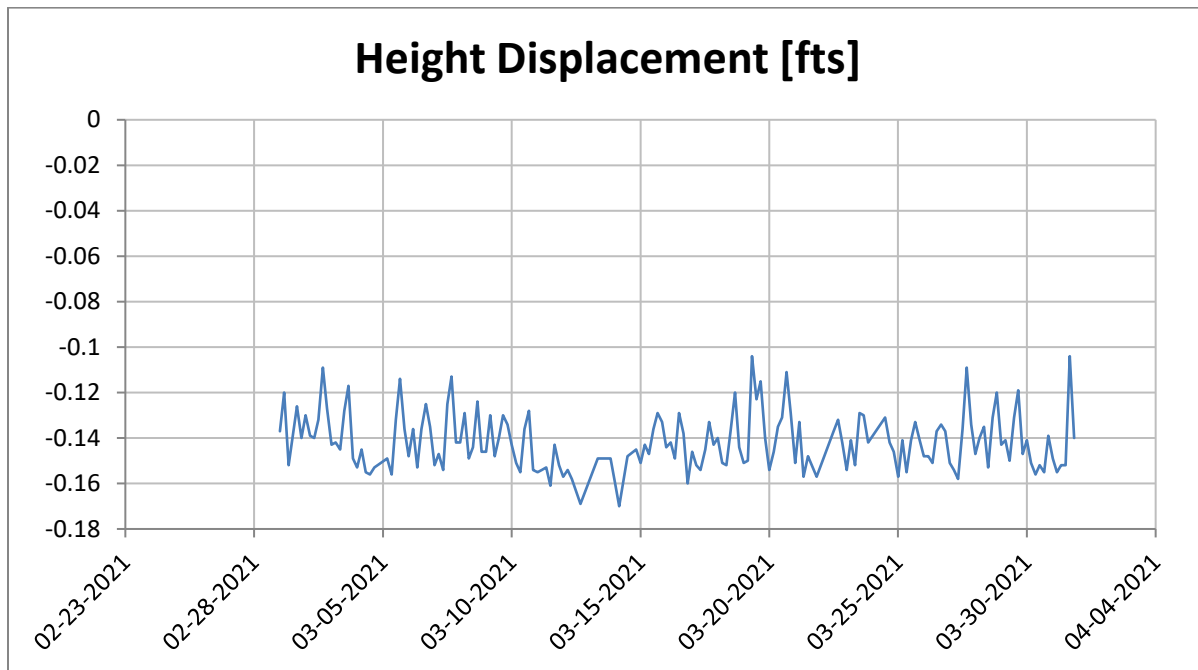
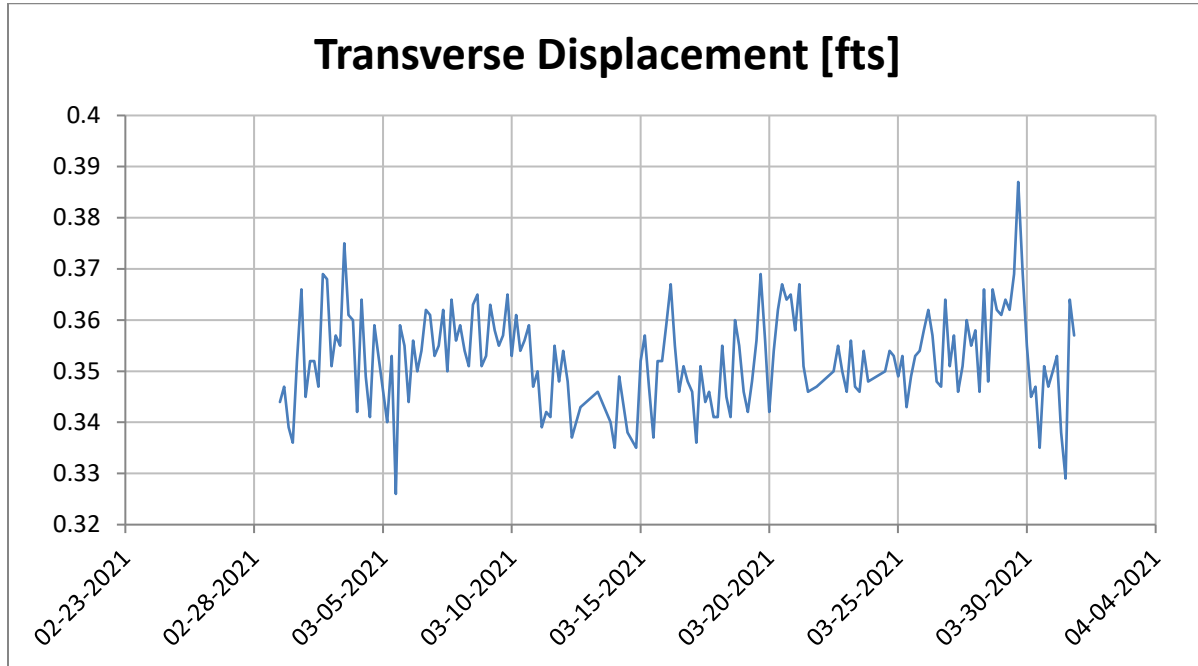


Notes:

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.



Prism P4

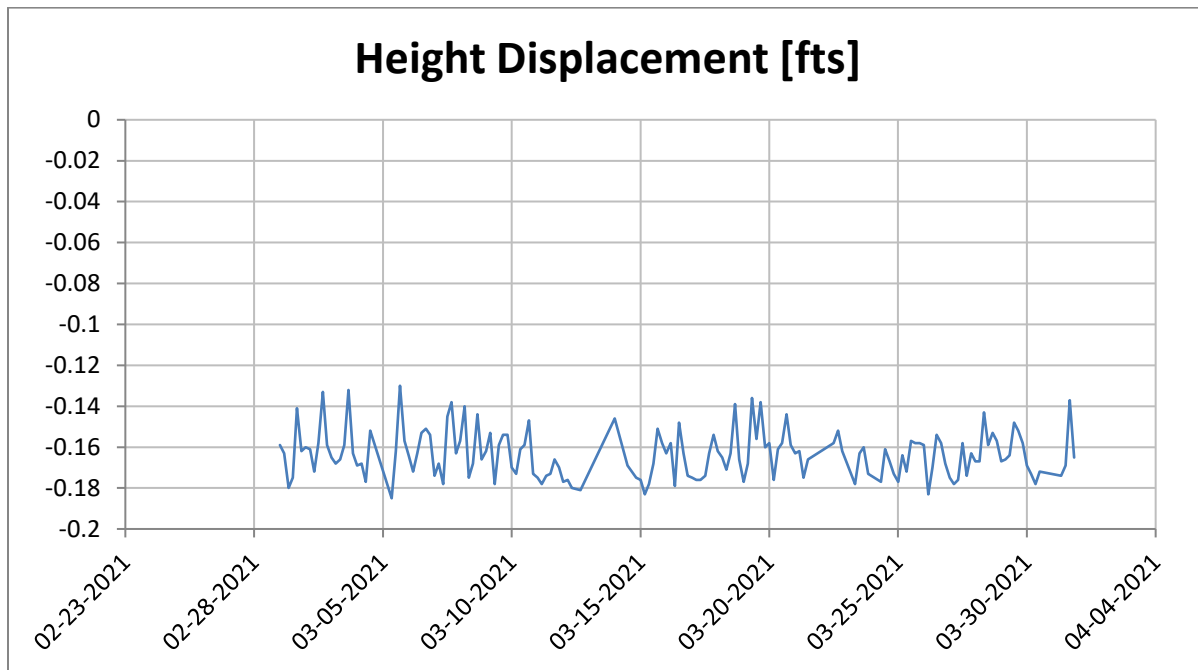
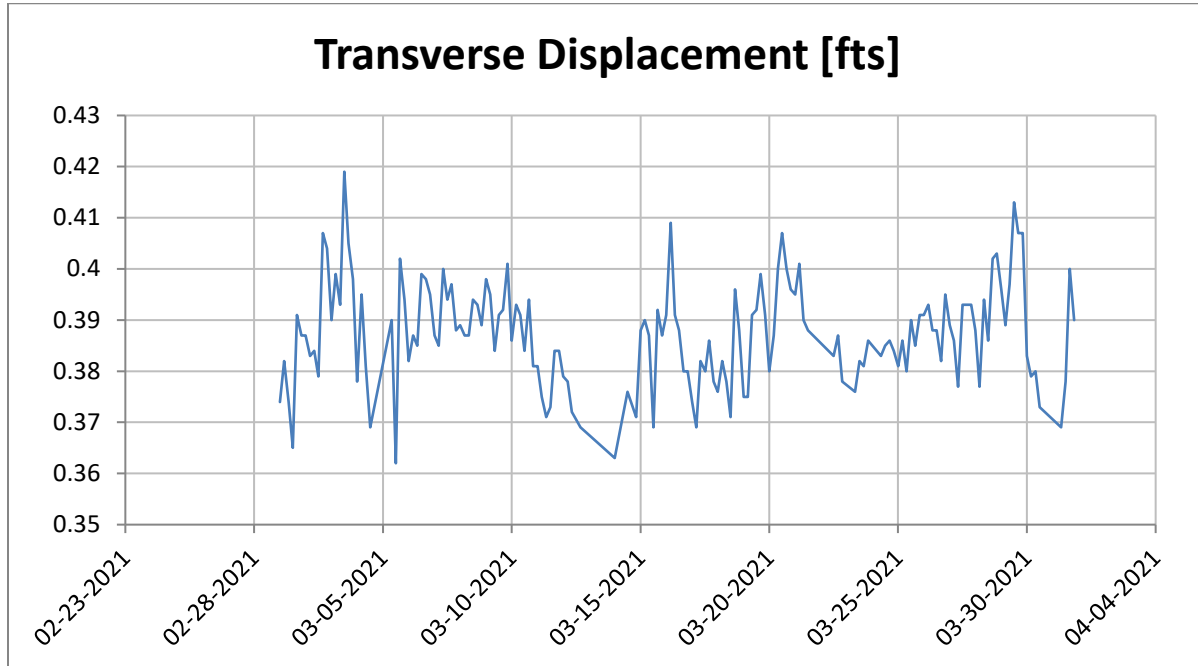


Notes:

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

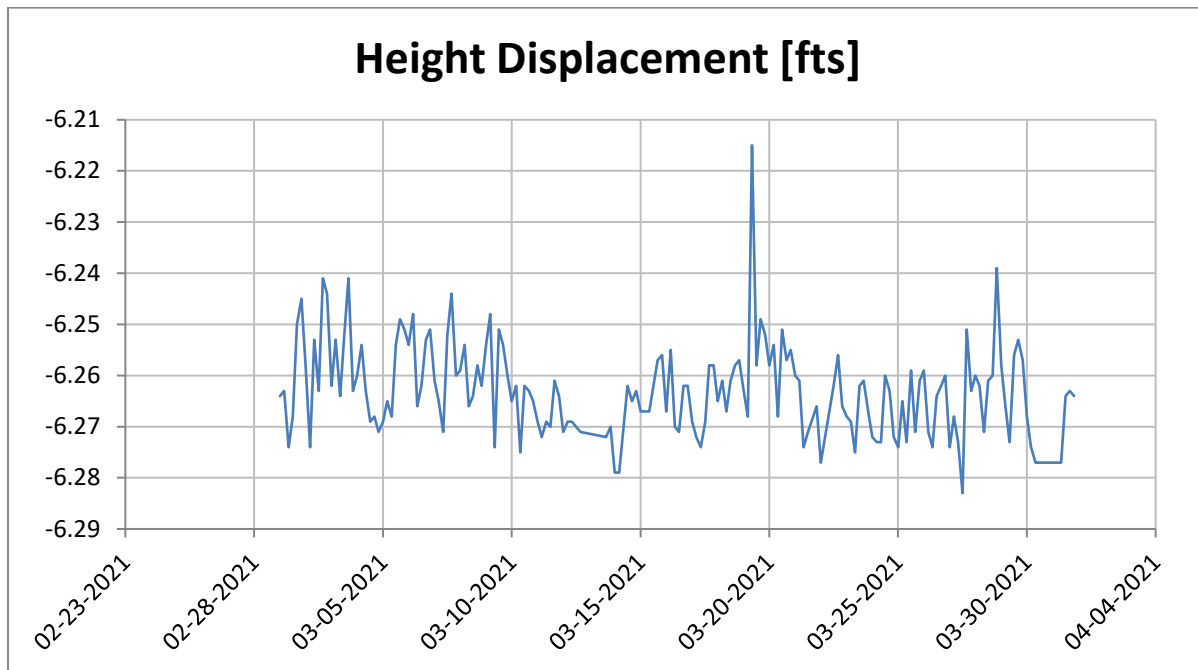
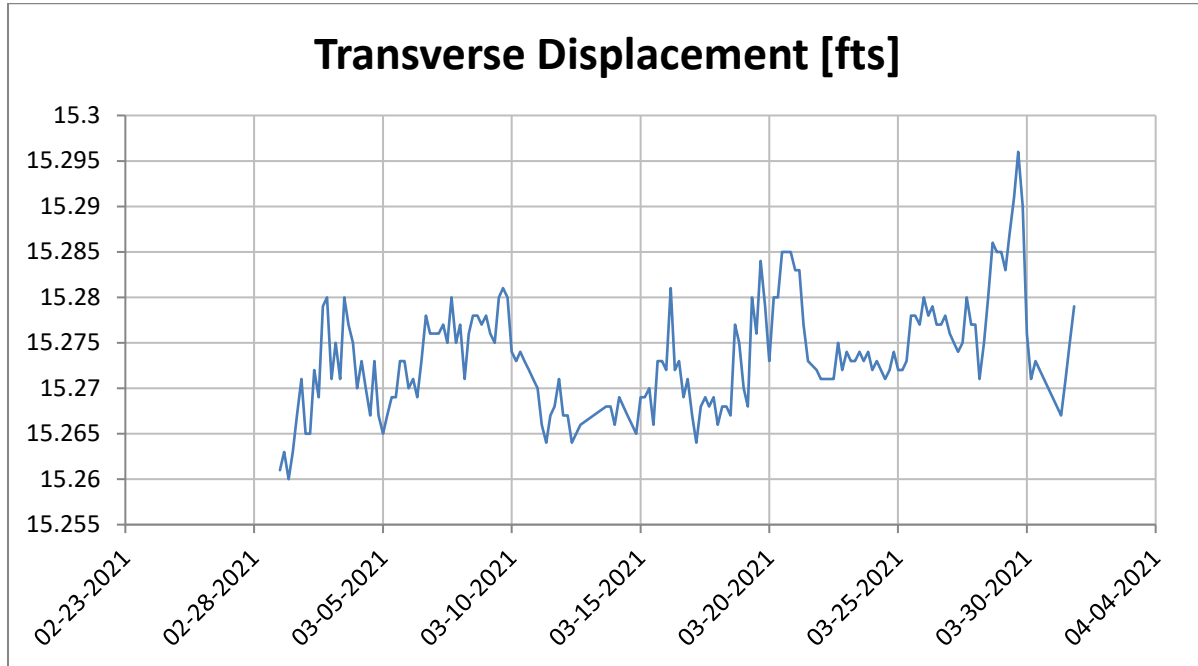


Notes:

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

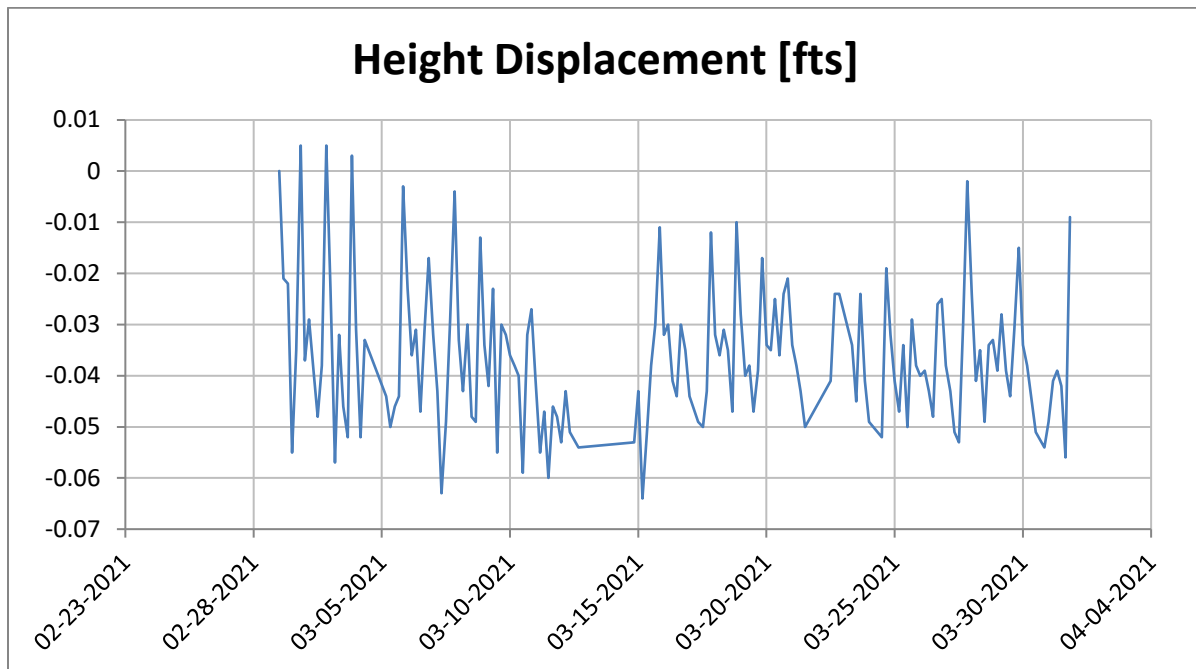
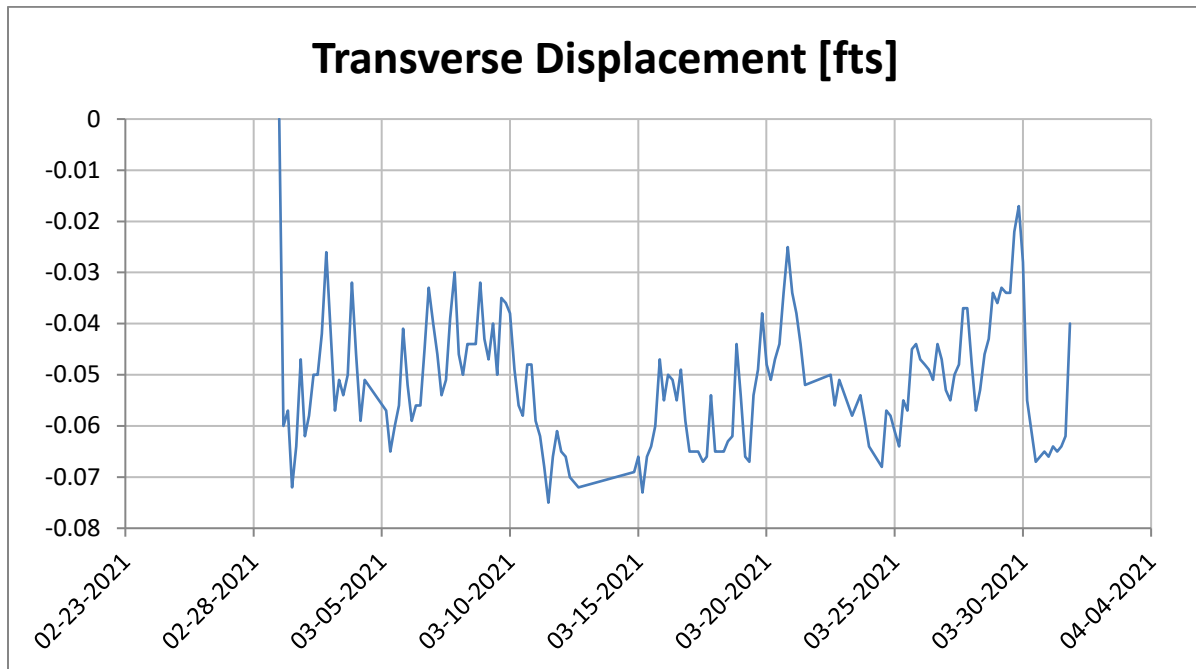


Notes:

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.



Prism P69

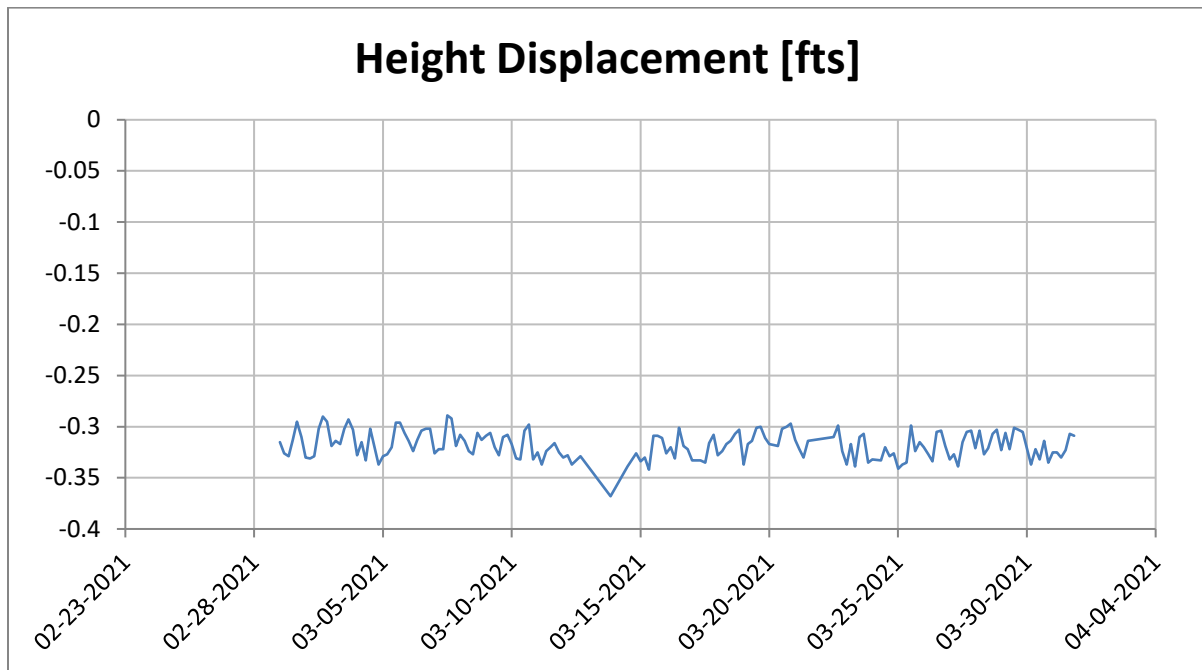
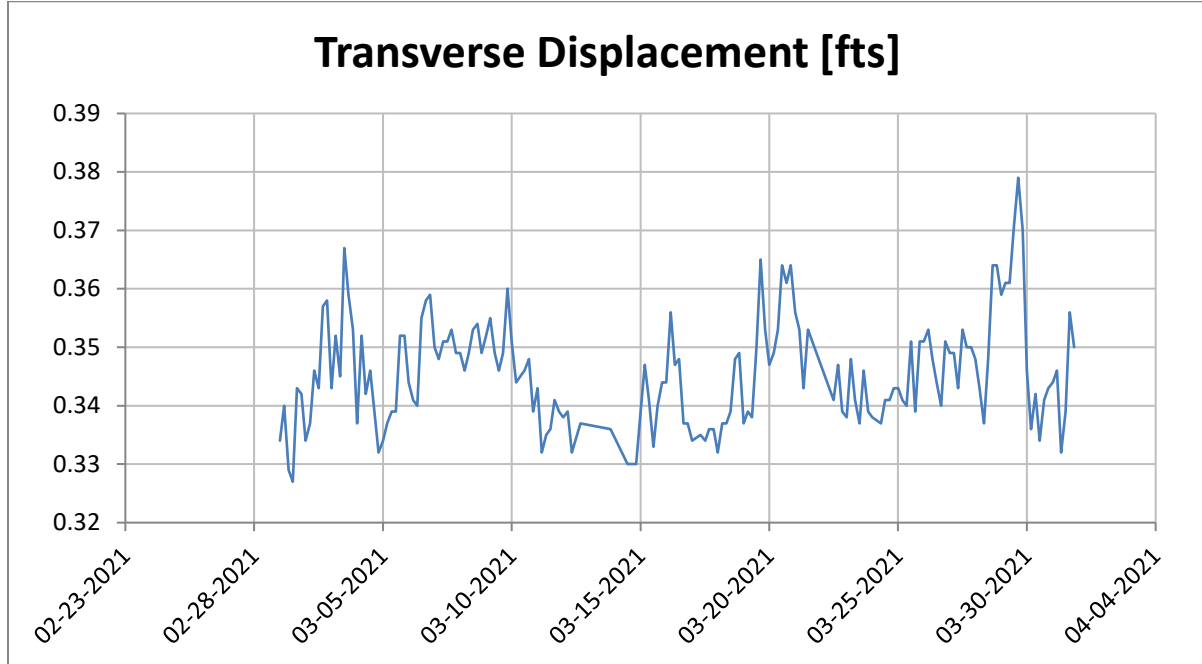


Notes:

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

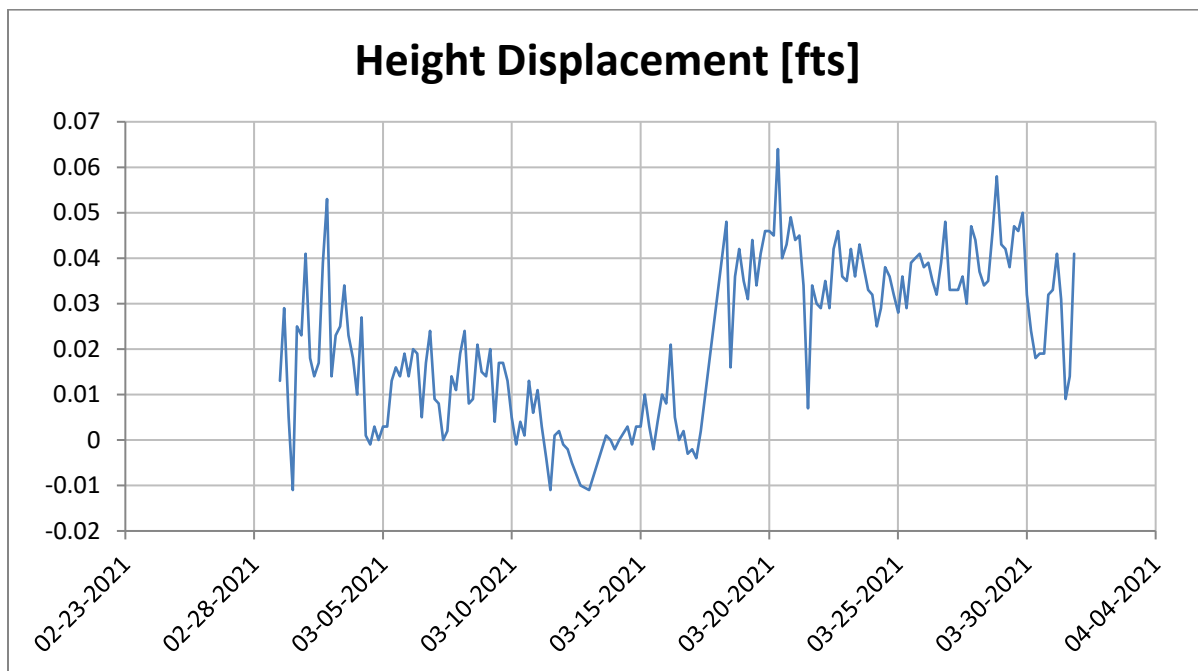
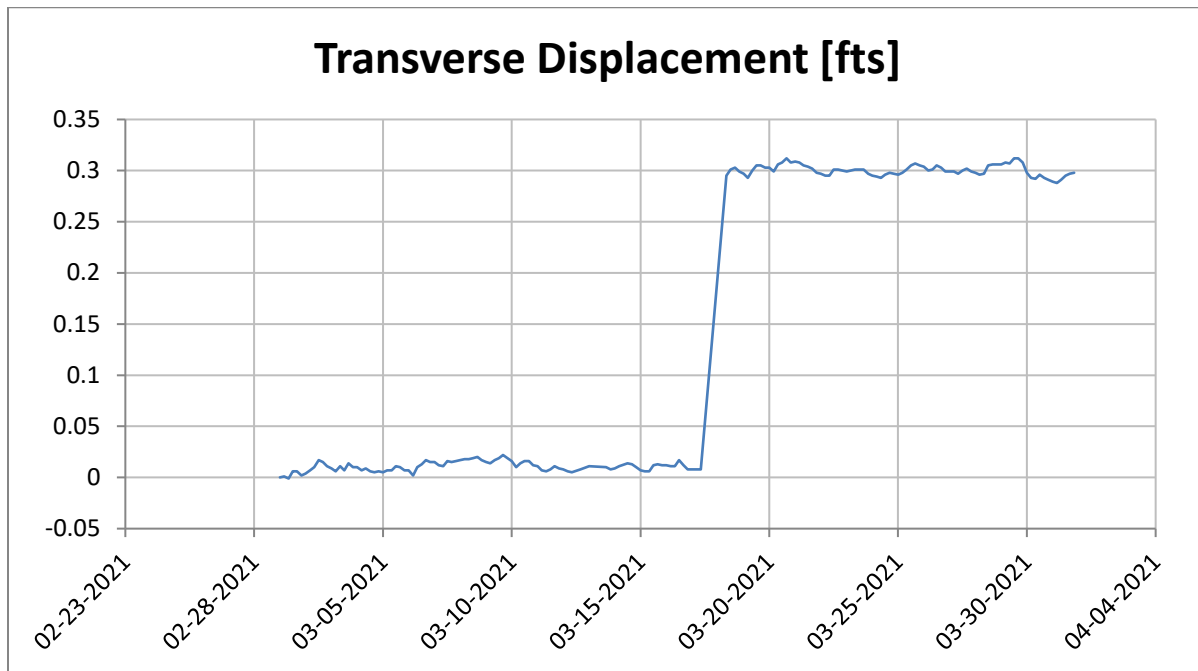


Notes:

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

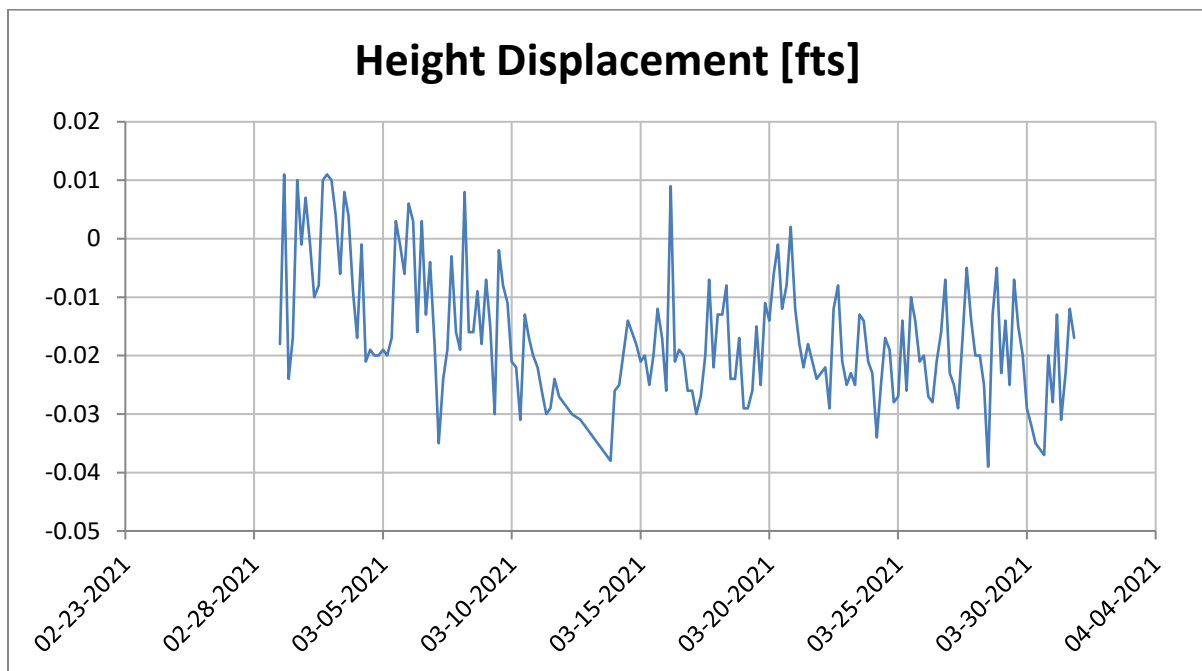
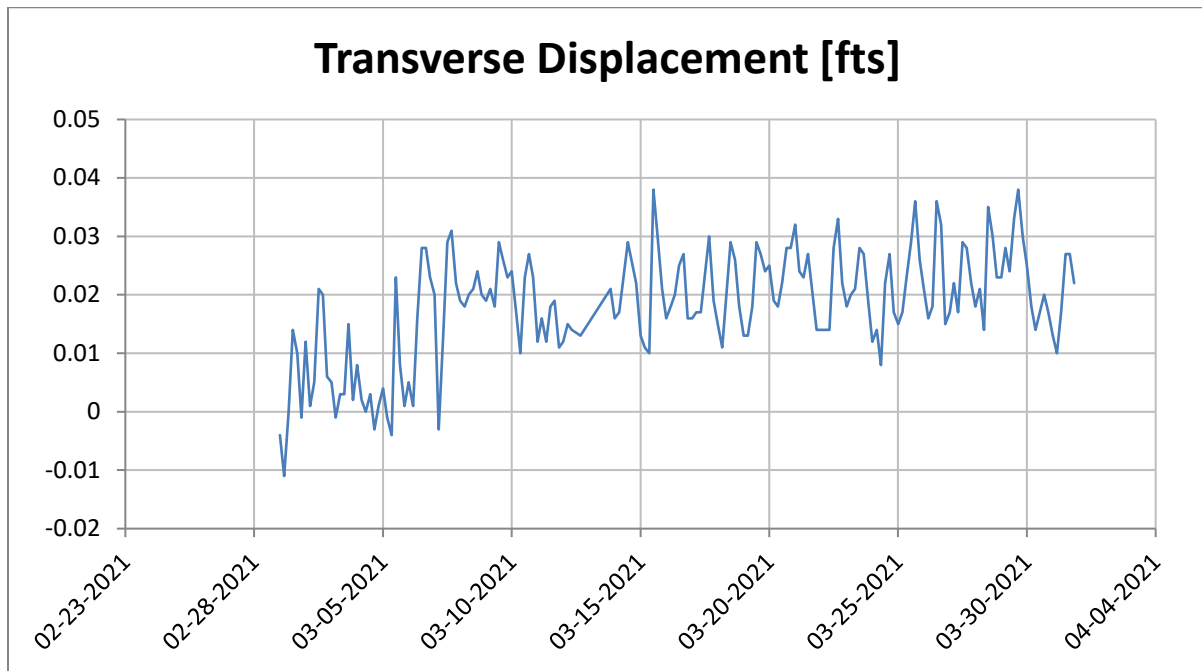


Notes:

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.
5. Prism moved by wildlife on March 17.



Prism TOE2

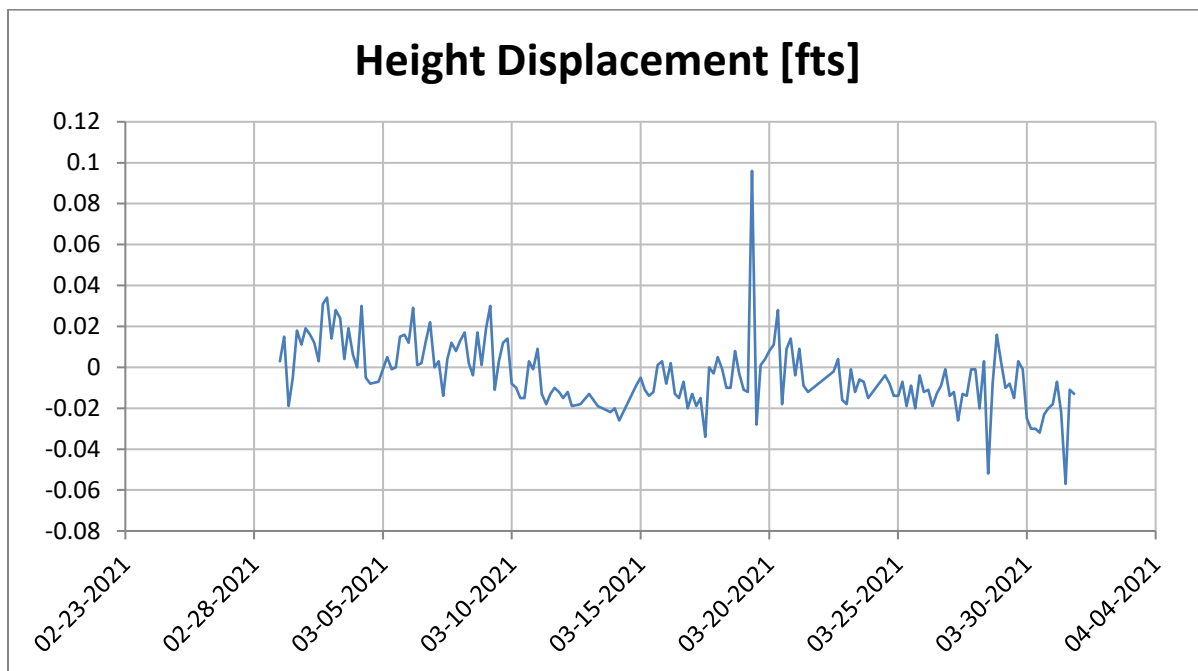
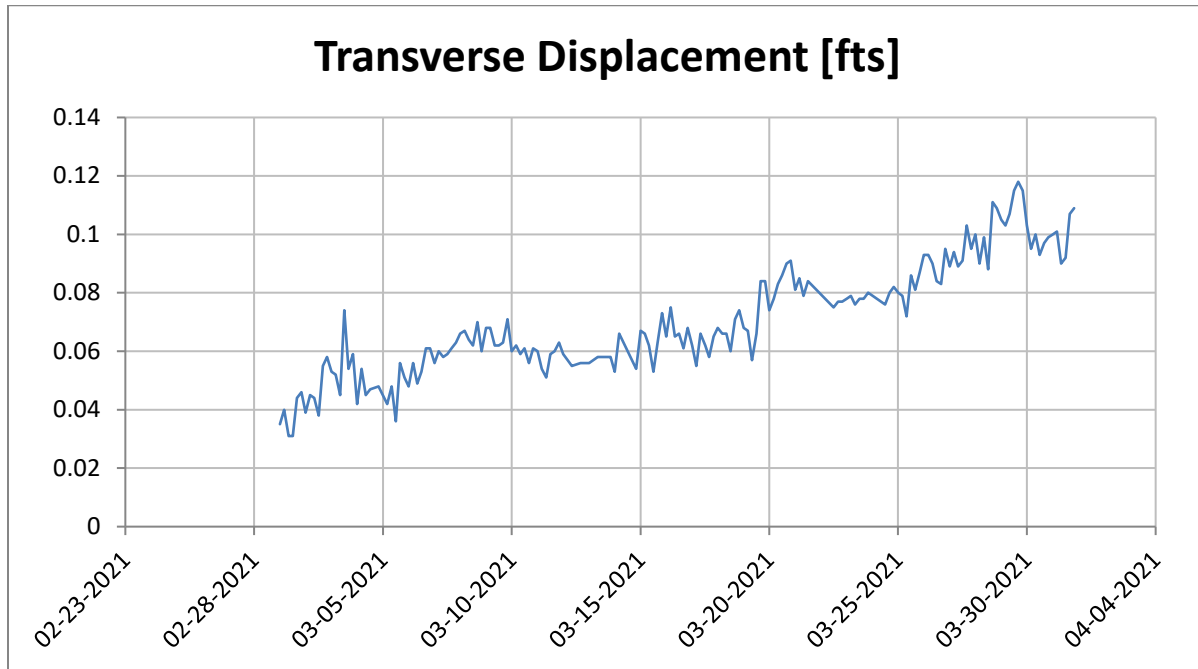


Notes:

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.



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.



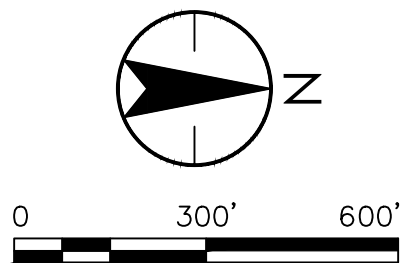
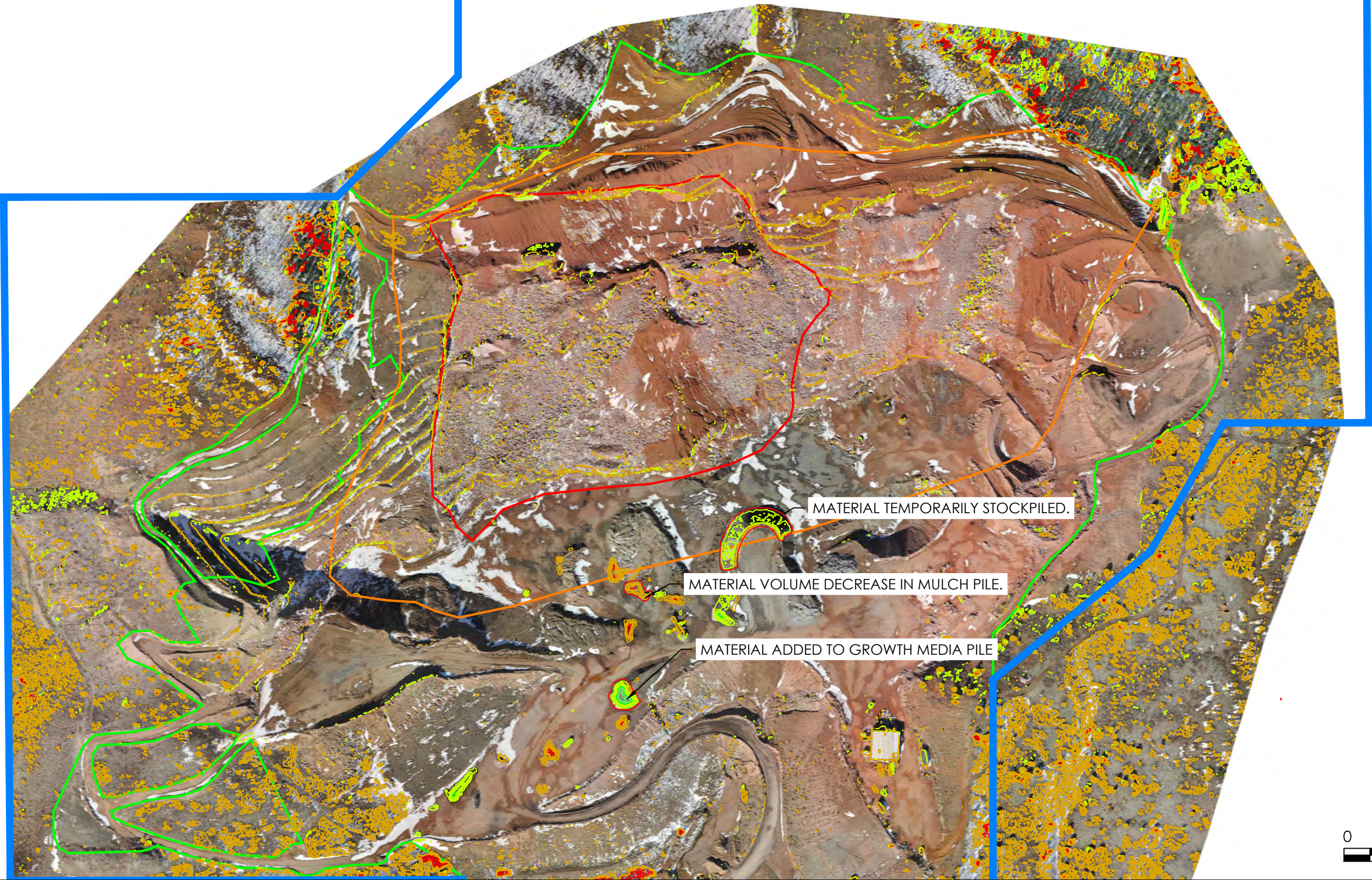
Appendix C

Drone Survey



\\us0321-ppfss01\workgroup\2274\active\227419041\disc\monitoring\2021-03\dwg\pikeview prisms_30qpr2021

2021.04.30 2:40:44 PM



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www.stantec.com

LEGEND

- Blue line: Permit/Affected Lands Boundary
- Green line: Proposed Disturbance Limit
- Red line: Landslide Extent
- Orange line: Buttress Fill Extent
- Yellow line: Comparison Contour. Increase in elevation. (CI=2')
- Red line: Comparison Contour. Decrease in elevation. (CI=2')

1. COMPARISON OF DRONE FLIGHTS FROM 02/10/21 and 03/19/2021.

Client/Project
CONTINENTAL MATERIALS
CORP.
PIKEVIEW QUARRY SLOPE
MONITORING

Project No.
227419041

Title
EXISTING PRISMS WITH
CURRENT SURFACE

Revision #	Date 2021.04.30
Drawn By PK	Figure No. 5