Stantec

To:	Jerald Schnabel	From:	Paul Kos
	Continental Materials Corp.		Denver, CO 80222
File:	January 2023 Monitoring Summary	Date:	February 28, 2023

Reference: January 2023 Geotechnical Monitoring Summary Pikeview Quarry

1.0 INTRODUCTION

Stantec Consulting Services Inc. (Stantec) has prepared this January 2023 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 January 2023. Continuous monitoring by the robotic survey system began in 2010 and has continued through the month of January 2023. 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 January 2023 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 January 2023. 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 January 24, 2023. 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 January 2023.
- No cracking was observed on the native granite slopes above the extents of the disturbed area.
- Operators continue to place compacted material in the buttress zone. Material is excavated from the North and South Borrow Areas. Material is initially excavated in benches for the majority of the excavation to efficiently remove the material; these benches are removed for final grading (Photo 1)
- The slope below the first bench has been placed to the final grade, and this slope was traversed on foot and examined for cracks or signs of instability by Stantec engineers. No cracks or signs of instability were identified. (Photo 2)
- Compaction testing continues at the rate of at least one test per 5,000 cubic yards of fill placed in the buttress area. (Photos 3 and 4)
- Offsite topsoil was stockpiled at the base of the buttress area with the additional topsoil and growth medium.
- 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 6)
- Material is being excavated from the South Borrow Area and hauled to the bench for spreading and compaction. (Photo 7)
- The culvert remains cleared but mostly blocked inside. CMC has partially cleared the debris, but access limitations and supports within the culvert inhibit clearing all the debris. CMC has procured a pump and will begin pumping operations if any water collects behind the culvert. CMC inspects the culvert for ponded water following rain events, and should any water be observed, it will be removed using pumps. To date, no ponding has been observed.

- Visual inspections of the Pikeview Quarry did not reveal any evidence of large-scale instability outside of the landslide areas previously identified. No bulging, rippling, over-steepening, depressions, slumps, or dry slip-offs were observed in areas that have been graded and/or reclaimed.

3.0 PRISM SURVEY

A Leica Robotic station is used to continuously survey the prisms onsite to document slope movements. The station records the location of each prism every hour. There are currently 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 January. 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, if a prism cannot be located, or if there are communication errors. 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. On January 16 and 19, 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 power outages. In each case the data suddenly increased and then decreased. There was no work being performed during this time, and the readings have returned to normal. Other alarms were determined to be caused by equipment operations blocking the prism, weather conditions, sun glare, or animal activity. The alarms are listed in Table 2.

Table 2 Alarm Summary

Date(s)	Alarm	Cause/Actions taken	Issue Resolved
Dec 29 to Jan 3	Communication errors	Power outage related to weather. No work being performed at time of alerts.	Jan 3
Jan 3	Points not found	Snow and fog. No work being performed at time of alerts.	Jan 4
Jan 4	NP2, NP3, and CP6 not found	Single events. Believed to be related to normal equipment operations or sun glare.	Jan 4
Jan 4 to Jan 5	Communication errors	Power outage related to cold weather. No work being performed at time of alerts.	Jan 5
Jan 5	CP6 not found	Single event. Believed to be related to sun glare.	Jan 5
Jan 7	P32 not found	Single event. Believed to be related to animal activity. No work being performed at time of alert.	Jan 7
Jan 7	Communication errors	Power outage related to cold weather. No work being performed at time of alerts.	Jan 7
Jan 7	CP6 not found	Single event. Believed to be related to sun glare.	Jan 7
Jan 11	Points not found	Snow and fog. Work shut down due to snow.	Jan 11
Jan 12	CP7 not found	Single event. Believed to be related to equipment operations.	Jan 12
Jan 15 to Jan 16	Points not found	Snow and fog. No work being performed at time of alerts.	Jan 16

Jan 16	NP2 regression limit received	Weather related data error. No work during alert.	Jan 16
Jan 17 to Jan 18	Points not found	Snow and fog. No work being performed at time of alerts.	Jan 18
Jan 19	P32, P69A, NP2 regression limits received	Weather related data errors. No work during alerts.	Jan 19
Jan 20 to Jan 21	P5 and P70 not found	Frost on prisms. No work during alerts.	Jan 21
Jan 21	Points not found	Snow and fog.	Jan 21
Jan 23	Points not found	Snow and fog.	Jan 23
Jan 23	Communication errors	Power outage related to cold weather. No work due to weather.	Jan 23
Jan 24	Points not found	Frost and fog. No work during alerts.	Jan 24
Jan 25	Points not found	Frost and fog. No work during alerts.	Jan 25
Jan 28 to Jan 30	Points not found	Snow, fog, and frost. No work being performed at time of alerts.	Jan 30
Jan 30	Communication errors	Power outage related to cold weather.	Jan 30
Jan 31	Points not found	Snow, fog, and frost.	Jan 31
Jan 31	Communication errors	Power outage related to cold weather.	Jan 31

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 +/-4 mm+1.5 ppm for prisms located greater than 500m from the station; these equates to an accuracy of +/-0.016 ft.

The data show stable conditions with no movement for 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	-0.057	-0.122	0.0144	0.1935	Slope creep movements.
BR2	-0.030	-0.131	0.0062	0.2082	Slope creep movements.
CP6	0.009	-0.020	0.0147	0.0405	
CP7	0.087	0.008	0.0023	0.1017	
NP2	0.024	0.020	-0.0009	0.0564	
NP3	0.015	-0.005	-0.0089	0.0159	
NP66	0.007	-0.081	0.0067	0.0971	Slope creep movements.
P1	-0.023	-0.027	0.0061	0.0417	
P2	-0.026	-0.020	0.0087	0.0369	
P5	-0.025	-0.008	-0.0002	0.0289	
P25	-0.029	0.011	0.0005	0.0364	
P32	-0.032	0.023	0.0034	0.0467	
P33	-0.005	-0.012	-0.0105	0.1227	
P69A	0.034	-0.042	-0.0063	0.1975	
P70	-0.037	0.004	0.0090	0.0422	

4.0 DRONE SURVEY

The site was flown for aerial imagery using an unmanned aircraft system (UAS or ‘drone’) on January 27, 2023. 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 January topography was also compared to the December 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 January 2023. 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 yd^3 placed. During January, approximately 93,000 yd^3 was placed and compacted. This does not include approximately 6,100 yd^3 of imported topsoil. This volume placed in the buttress zone required at least 19 compaction tests. There were 44 compaction tests taken in January. As of January 31, 2022, a total 1,997,000 yd^3 had been placed and compacted. This required at least 400 compaction tests, and 717 tests have been taken. All but two tests in January met or exceeded the minimum compaction requirement of 90% of the optimal density as measured by a Standard Proctor Test. These areas were recompacted and the subsequent tests met the project requirements. 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:

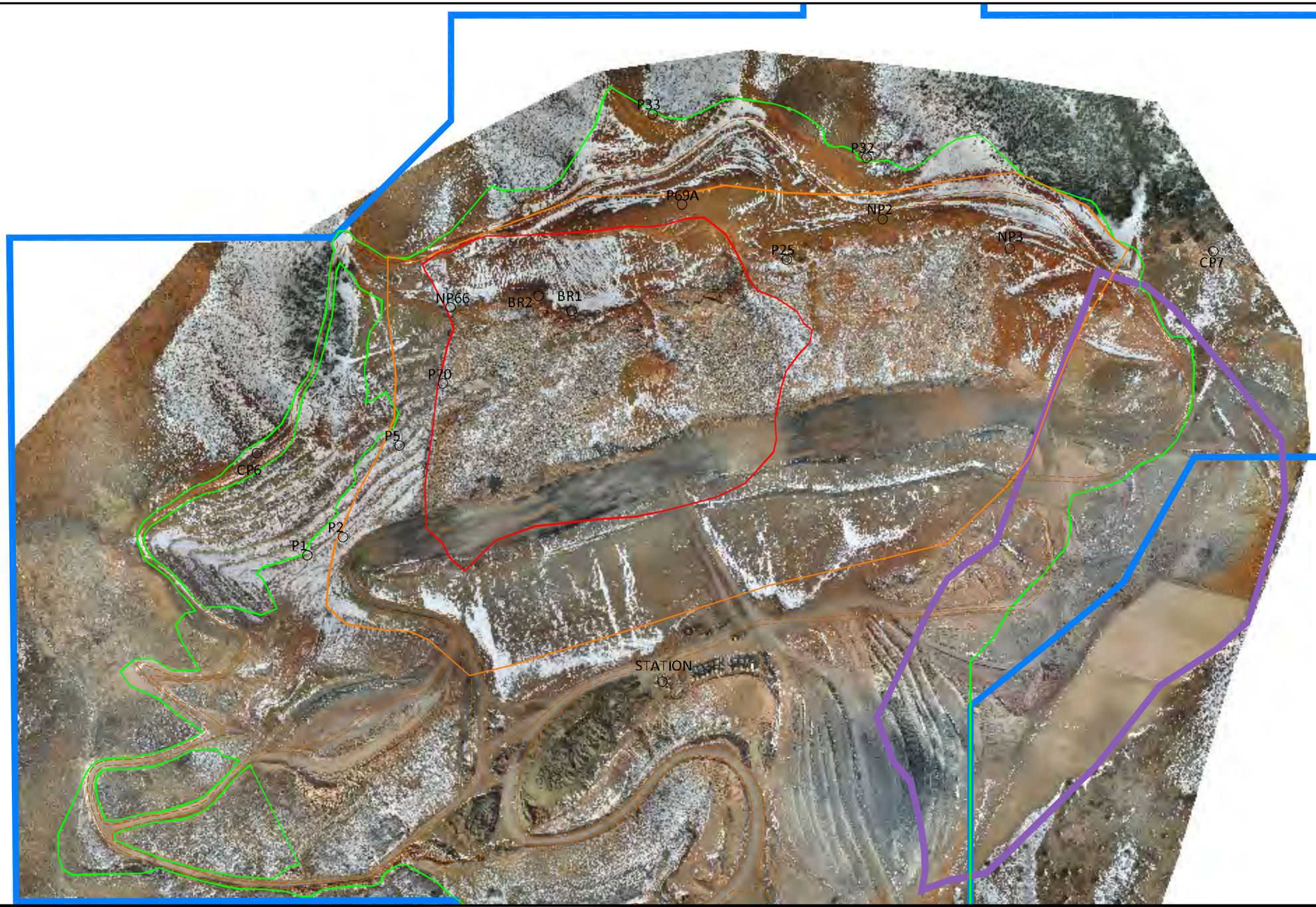
- Continue reclamation grading
- Continue importing fill material
- Continue geotechnical monitoring
- Continue removing and replacing prisms on an as-needed basis
- Continue working with USFS and the City of Colorado Springs to obtain approval to excavate the remaining material from USFS land.
- Submit change of Service Operator from Continental Materials Corp. to Riverbend Industries. This change is a “rebranding” of the same company, and the project ownership and key staff have not changed.

7.0 CONCLUSIONS

The data collected in January 2023 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 January 2023 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.



LEGEND

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

N

0 300' 600'

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Client/Project
CONTINENTAL MATERIALS CORP.
PIKEVIEW QUARRY SLOPE MONITORING

Project No.
2057288200

Title
SITE MAP

Revision
#

Date
2023.02.28

Drawn By
PK

Figure No.
1

Appendix A

Visual Inspections

6. Hummocky area on south end of the site.

5. NBA benches in the northeast from haul road

4. Material types are mixed before compaction.

3. View north from compaction area on bench.

7. Material is hauled from the SBA

2. Haul road leading to bench work area.

8. View to the north from haul road.

1. Benches in the north 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

1. NO CRACKS OBSERVED IN THIS AREA.
2. ALL PHOTOS TAKEN JANUARY 24, 2022.

N

0 400' 800'

Client/Project
CONTINENTAL MATERIALS CORP.
PIKEVIEW QUARRY SLOPE MONITORING

Project No.
2057288200

Title
OBSERVATIONS FROM JANUARY INSPECTION

Revision	Date
#	2023.02.28
Drawn By	Figure No.
PK	2

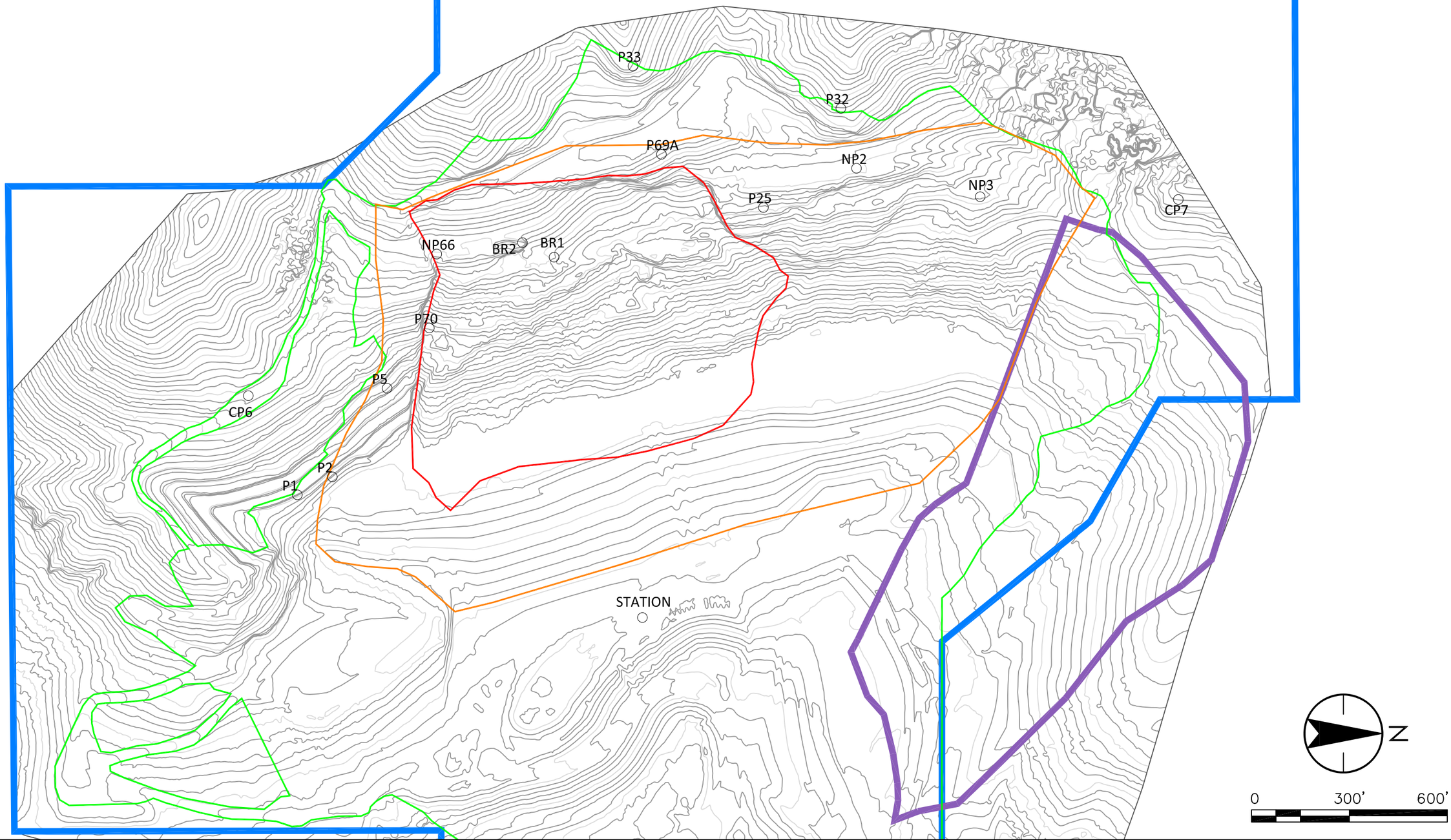
Stantec

Table A-1 Summary of Daily Inspections

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

Appendix B

Prism Survey



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LEGEND

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

1. PRISMS WILL BE INSTALLED AS EACH BENCH IS FINISHED.
2. ALL PRISMS WILL BE RETAINED AS LONG AS POSSIBLE.
3. TOPOGRAPHY FROM JANUARY 27, 2022 DRONE SURVEY.
4. CONTOUR INTERVAL IS 10 FEET

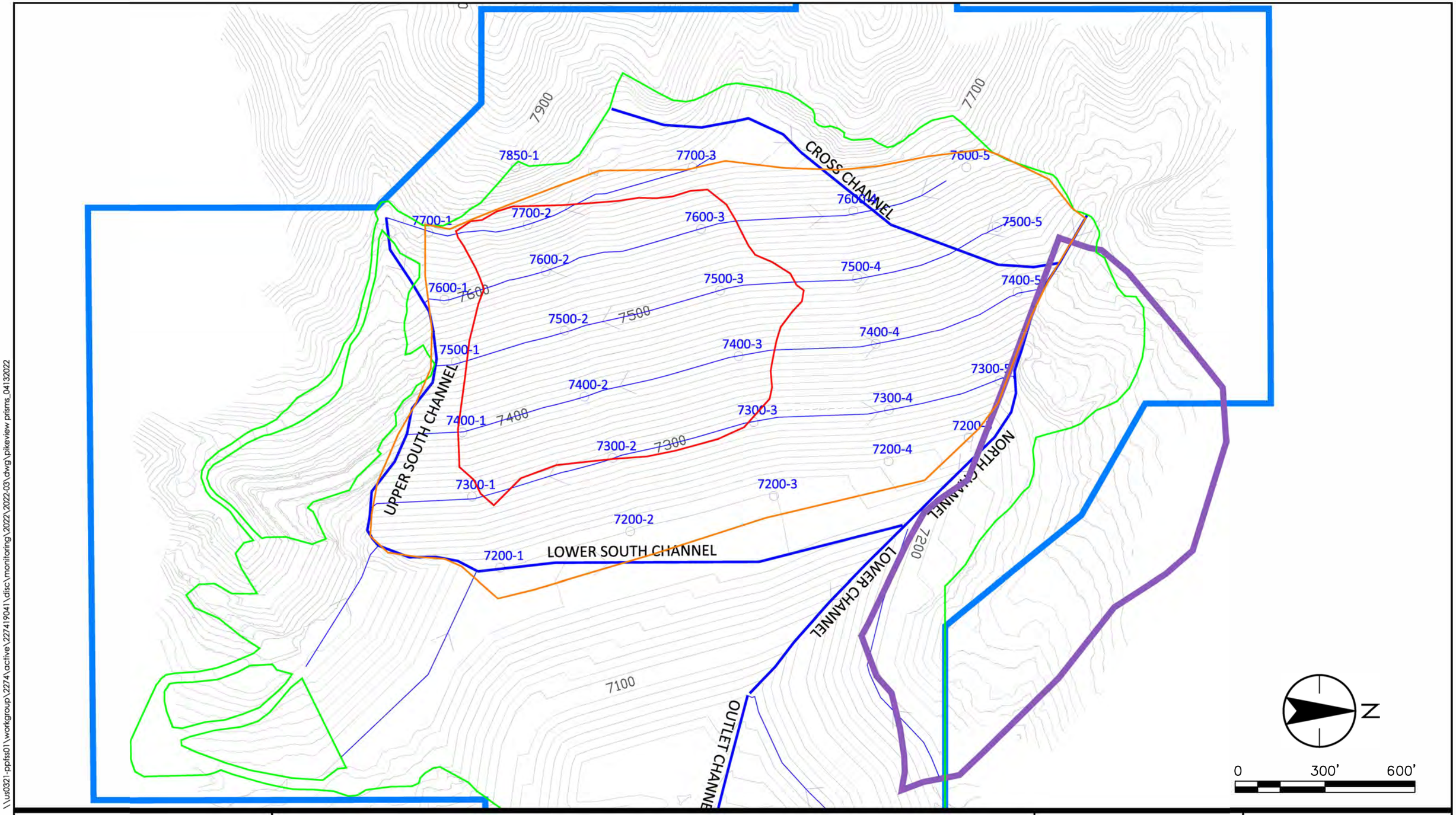
Client/Project
CONTINENTAL MATERIALS CORP.
PIKEVIEW QUARRY SLOPE MONITORING

Project No.
2057288200

Title
EXISTING PRISMS WITH CURRENT SURFACE

Revision	Date
#	2023.02.28

Drawn By	Figure No.
PK	3



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LEGEND

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

NOTES

1. 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
#	2023.02.28
Drawn By	Figure No.
PK	4

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Prism Log

Prism	Date	Action	Comment
CP2	11-Mar-22	Prism Removed	Reclamation grading to affect prism in near future
CP3	11-Mar-22	Prism Removed	Reclamation grading to affect prism in near future
NP1	11-Mar-22	Prism Removed	Reclamation grading to affect prism in near future
TOE2	11-Mar-22	Prism Removed	Reclamation grading to affect prism in near future
CP4	11-Mar-22	Prism Added	Control Point Replacement
CP5	11-Mar-22	Prism Added	Control Point Replacement
TS1	12-Mar-22	Prism Added	New Prism Added
TOE3	30-Mar-22	Prism Removed	Reclamation grading to affect buffer filling activities
TOE4	8-Apr-22	Prism Added	New Prism Added
TOE5	8-Apr-22	Prism Added	New Prism Added
BR1	8-Apr-22	Prism Added	New Prism Added
BR2	8-Apr-22	Prism Added	New Prism Added
NP1	22-Apr-22	Prism Removed	Originally NP1. Prism re-set in same spot and is now NP3
NP3	22-Apr-22	Prism Added	
TOE3	22-Apr-22	Prism Removed	Originally TOE3. Prism moved to a higher elevation and is now TOE6
TOE6	22-Apr-22	Prism Added	
TOE1	22-Apr-22	Prism Removed	Reclamation grading to affect buffer filling activities
P4	17-Jun-22	Prism Removed	Prism removed due to rock deterioration
P69	20-Jul-22	Prism Removed	Prism was originally P69. It has been re-set to Higher Elevation and is now P69A. Related to 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.

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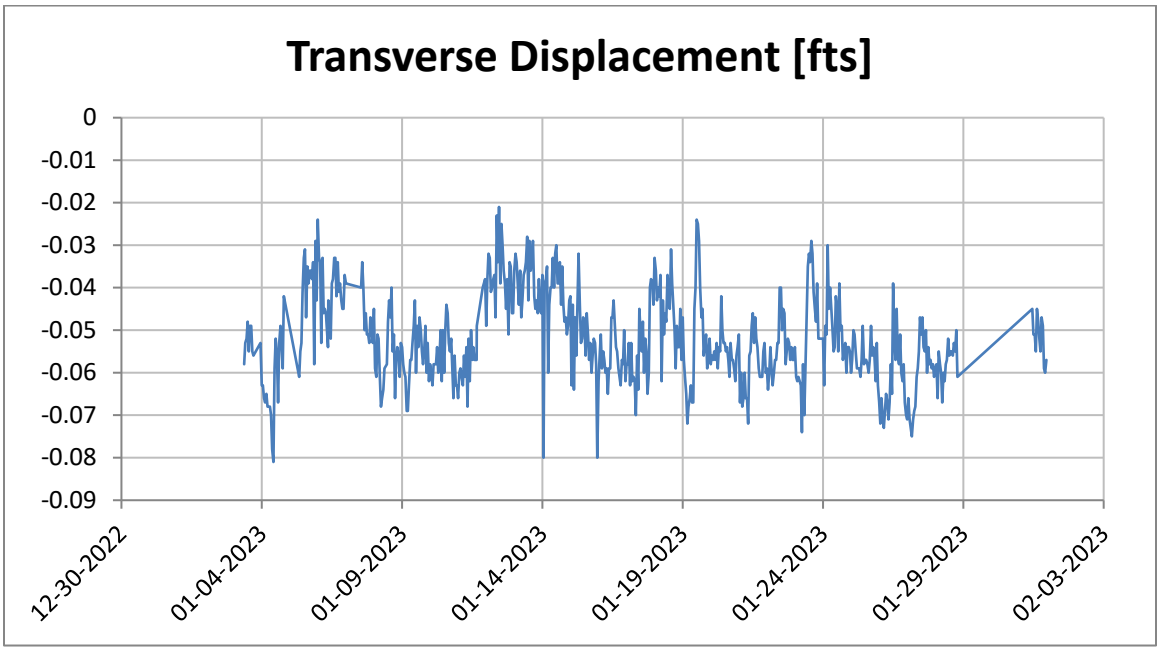
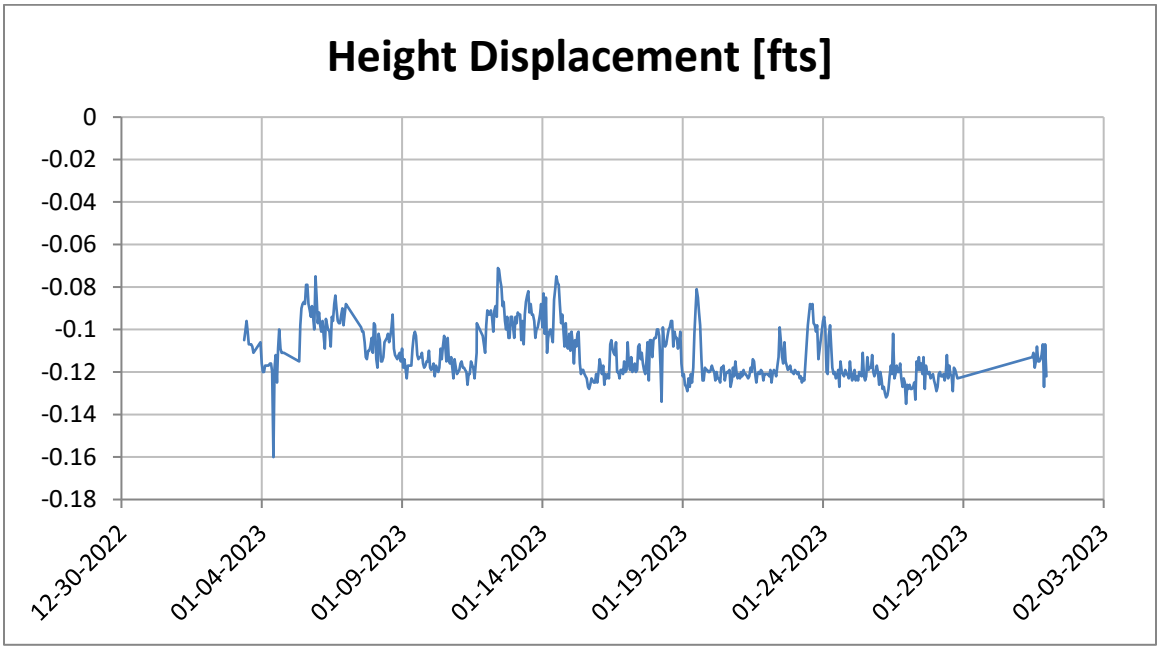
Prism BR1





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.

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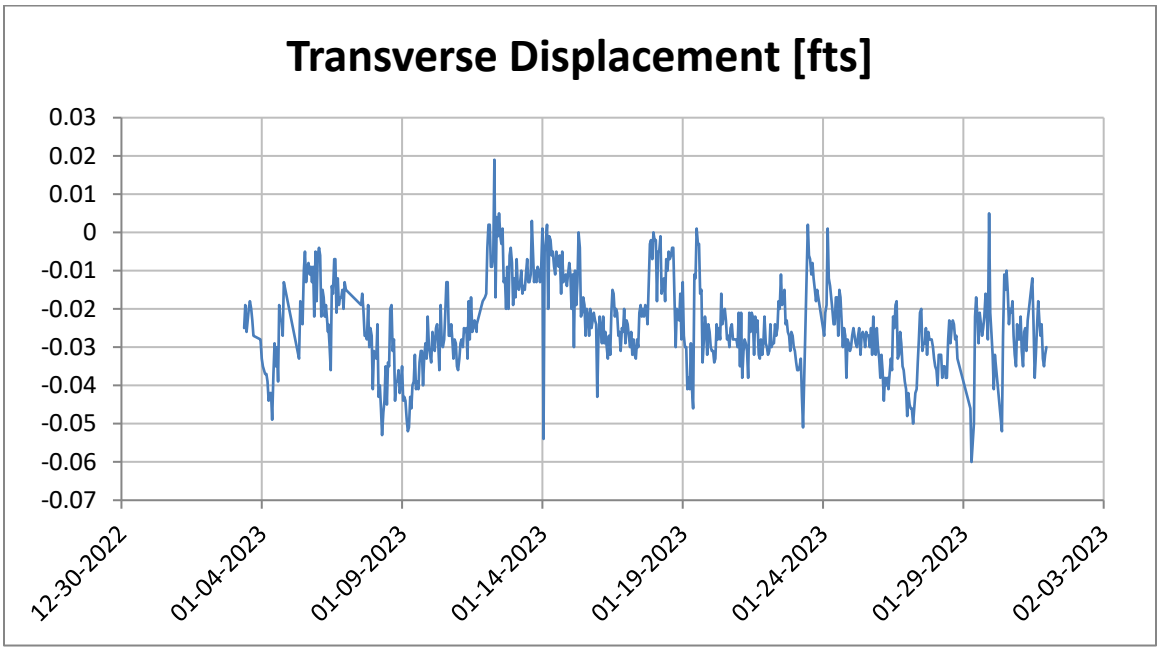
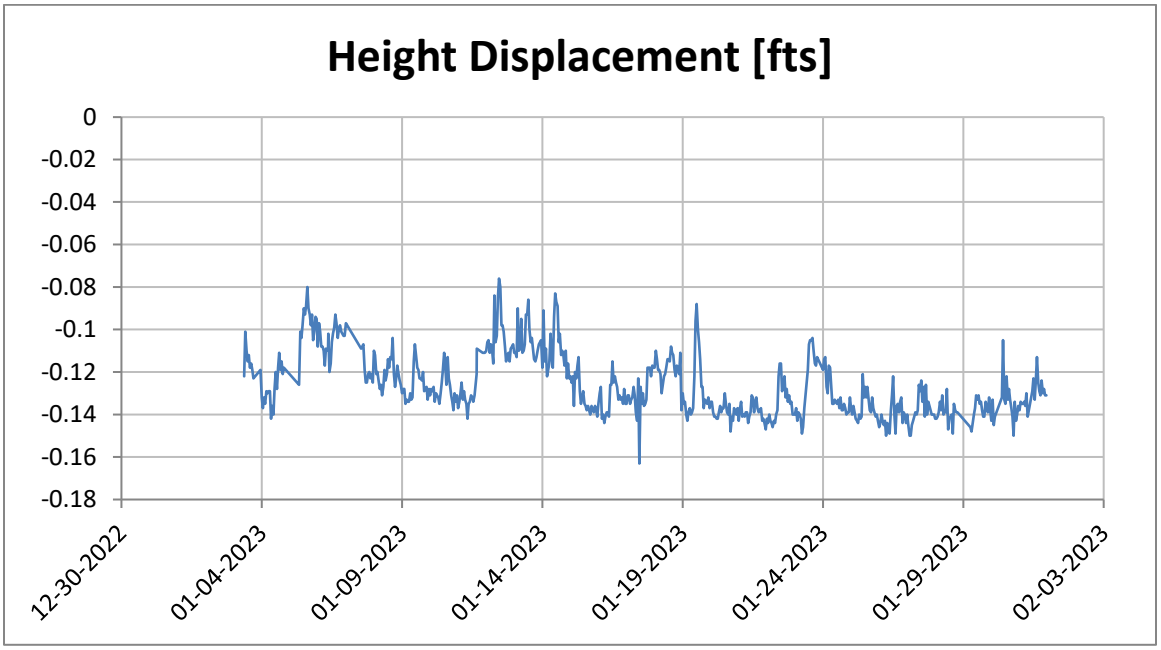
Prism BR2





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5. Prism records slope creep movements with slow velocity.

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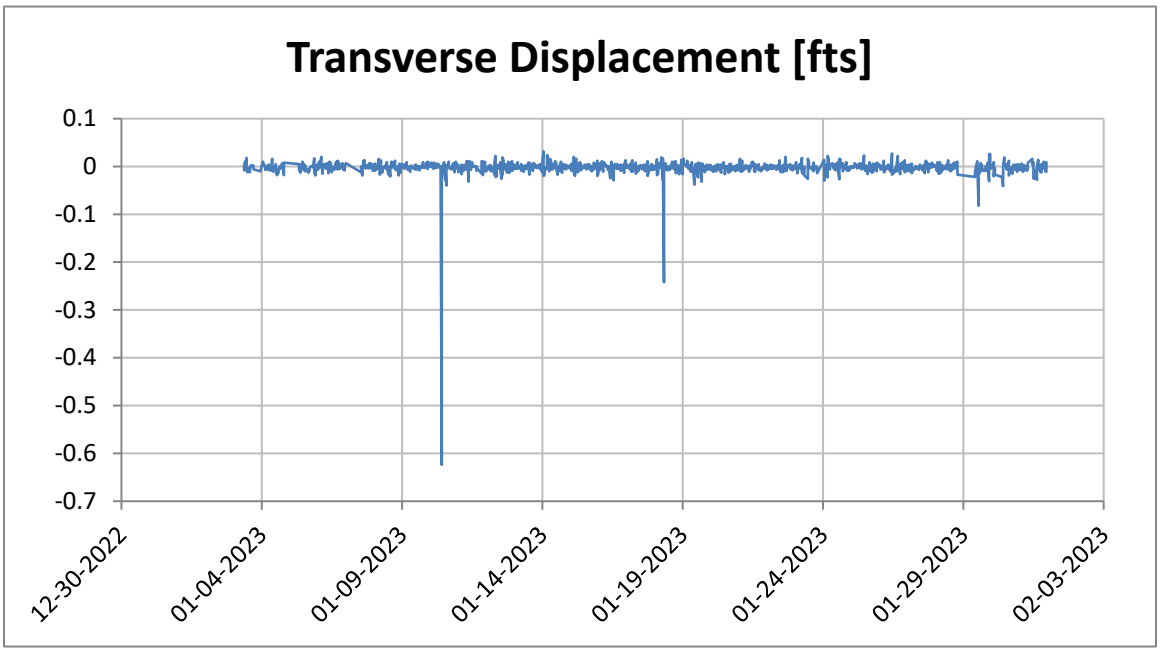
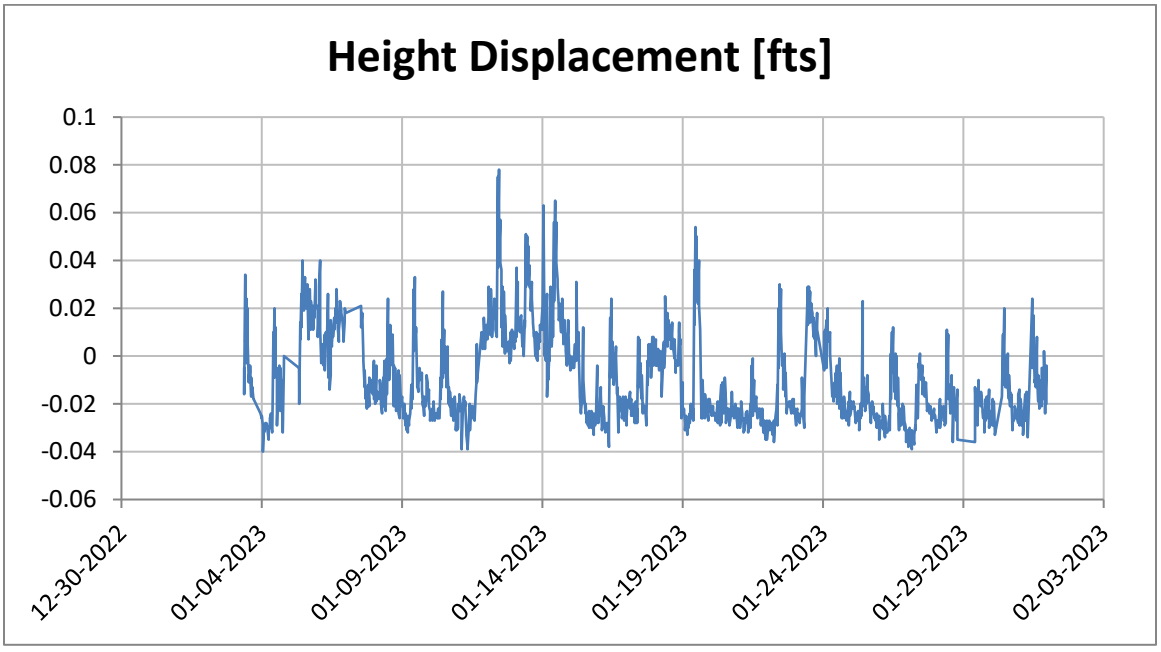
Prism CP6



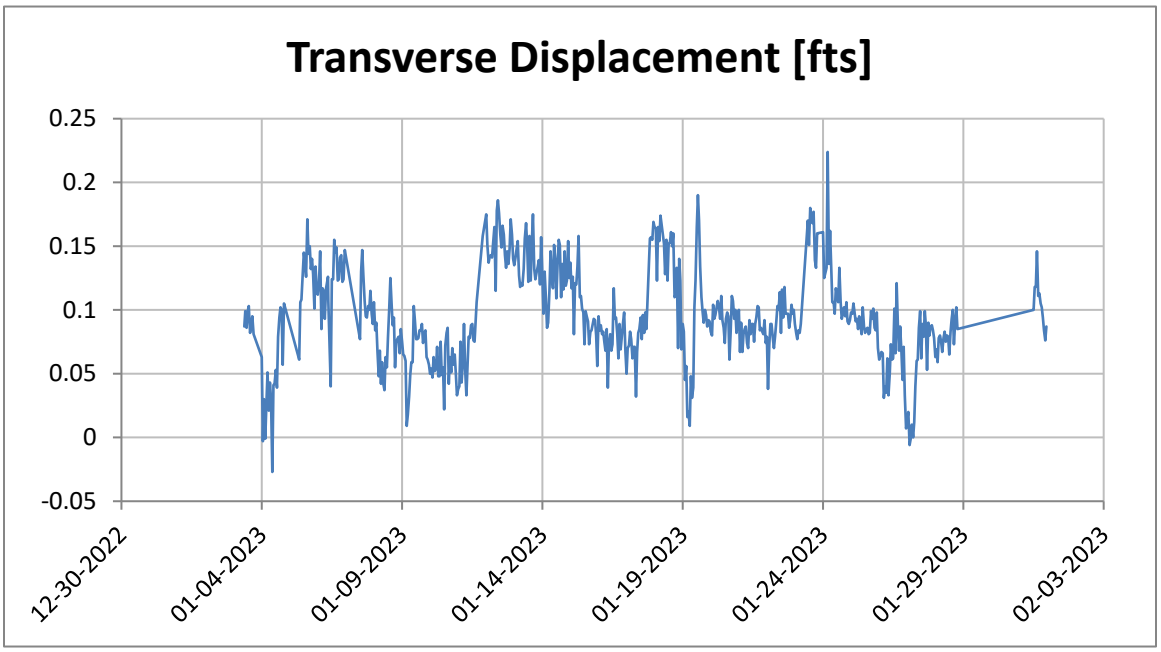


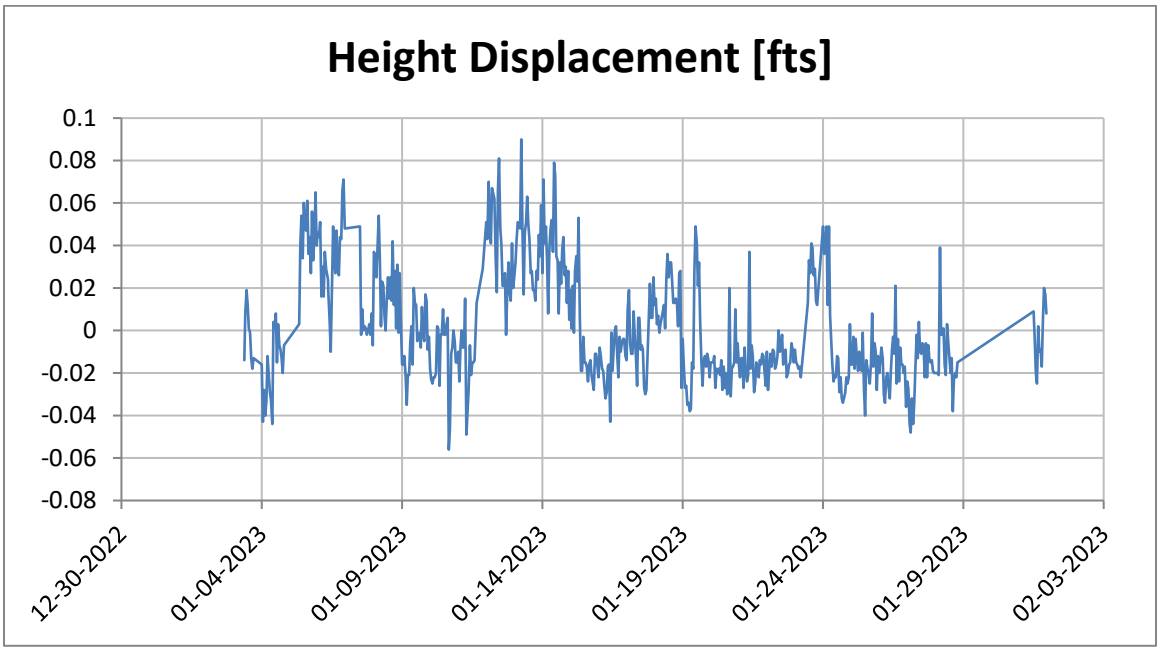
Notes:

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.

Stantec

Prism CP7



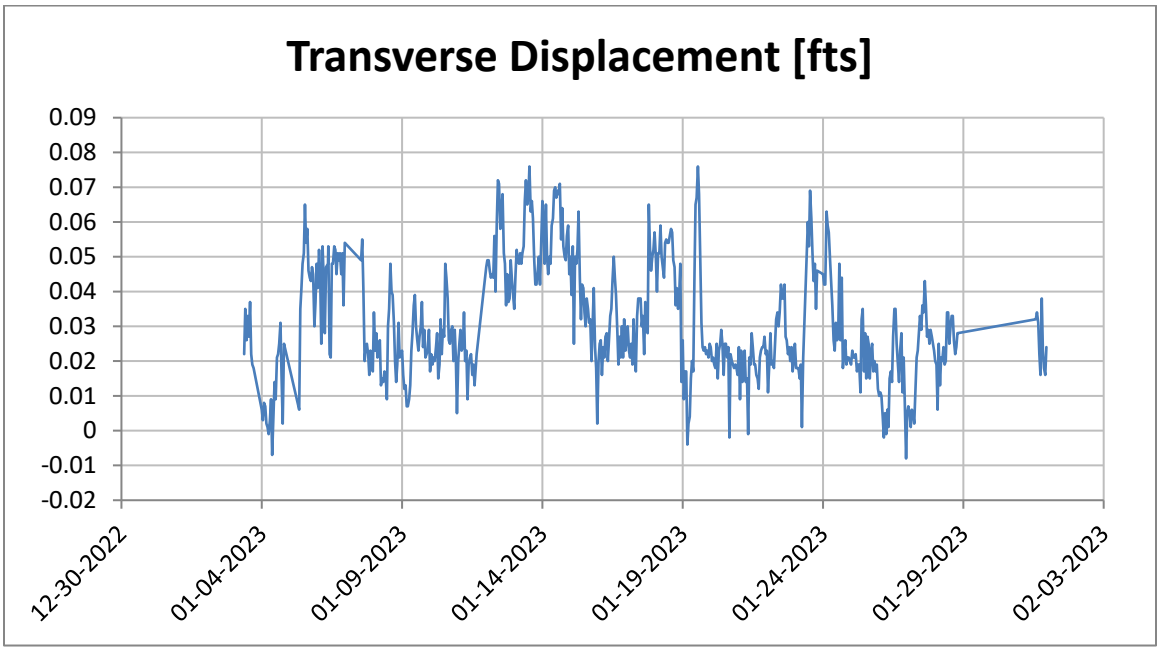


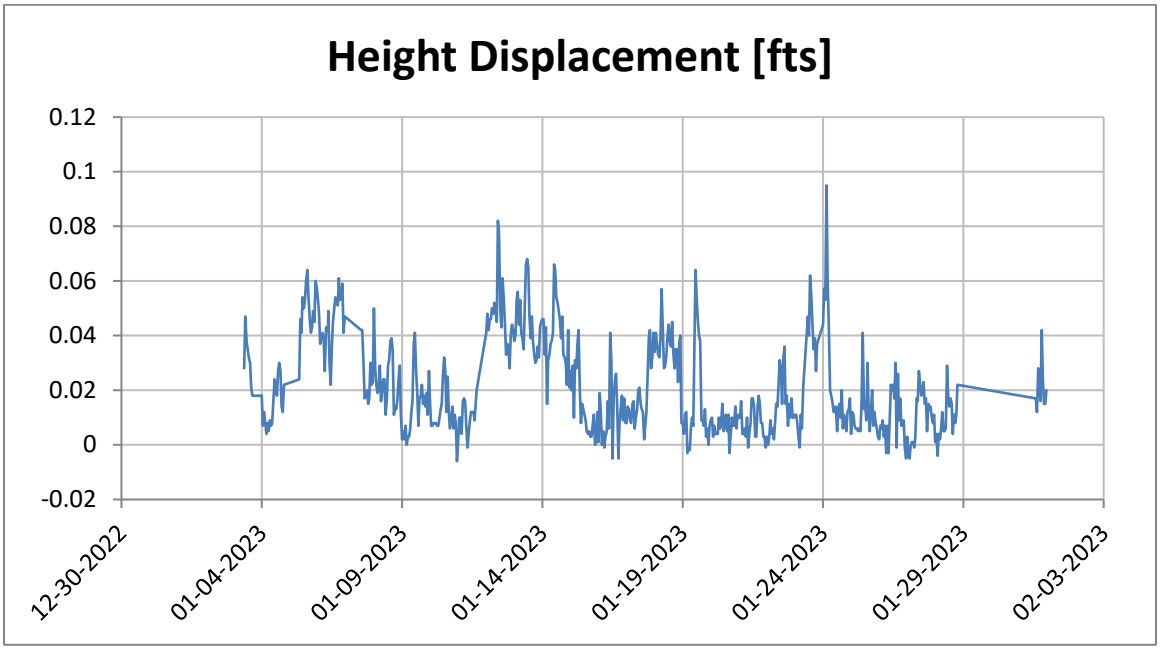
Notes:

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.

Stantec

Prism NP2



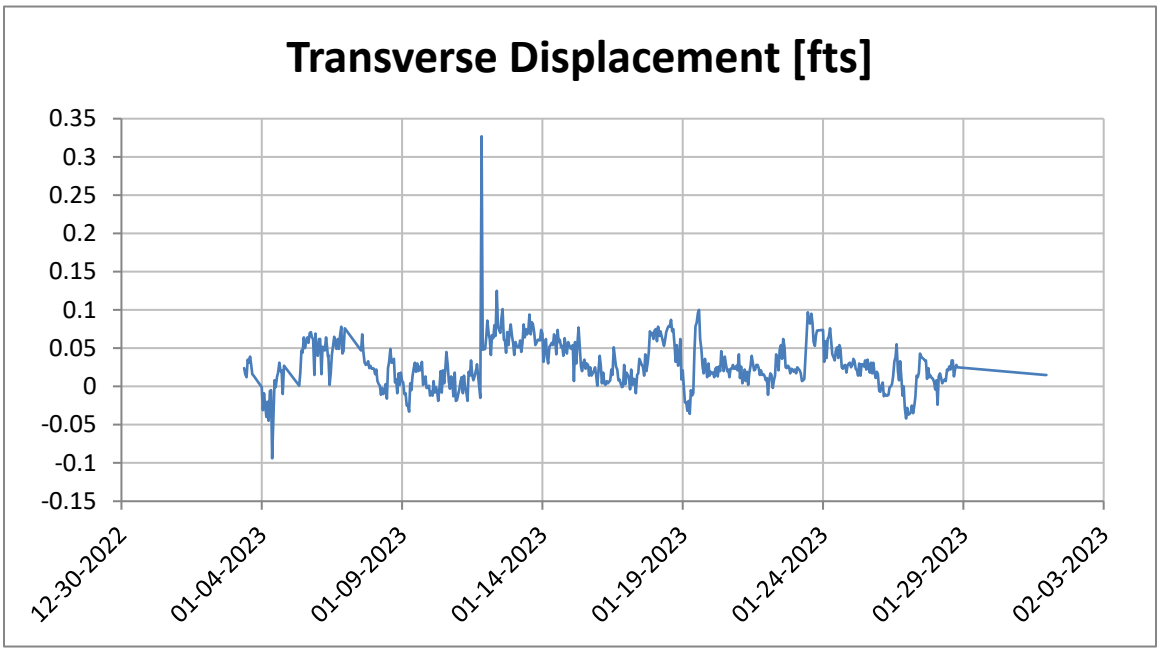


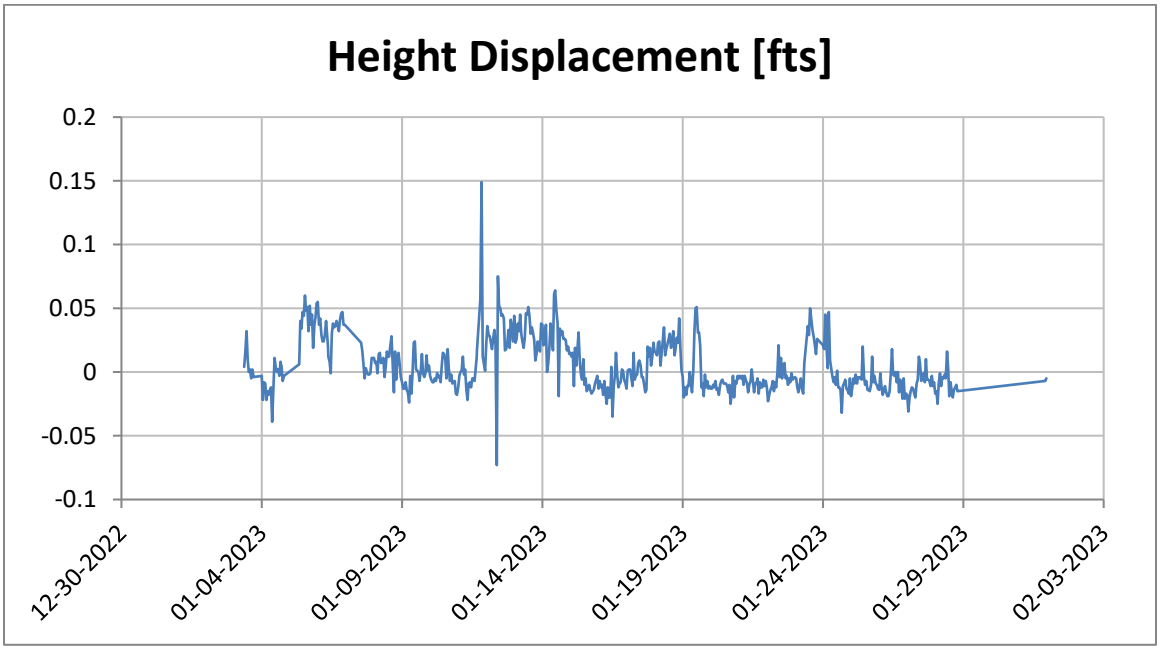
Notes:

1. Survey accuracy is +/-0.016 feet.
2. Alarm threshold is +/-0.35 feet.
3. Transverse displacement is in the horizontal direction. Positive direction means closer to the robotic station.
4. Height displacement is in the vertical direction. Positive direction means higher in elevation.
5. Exceedance alerts were received on 1/16 and 1/19.

Stantec

Prism NP3



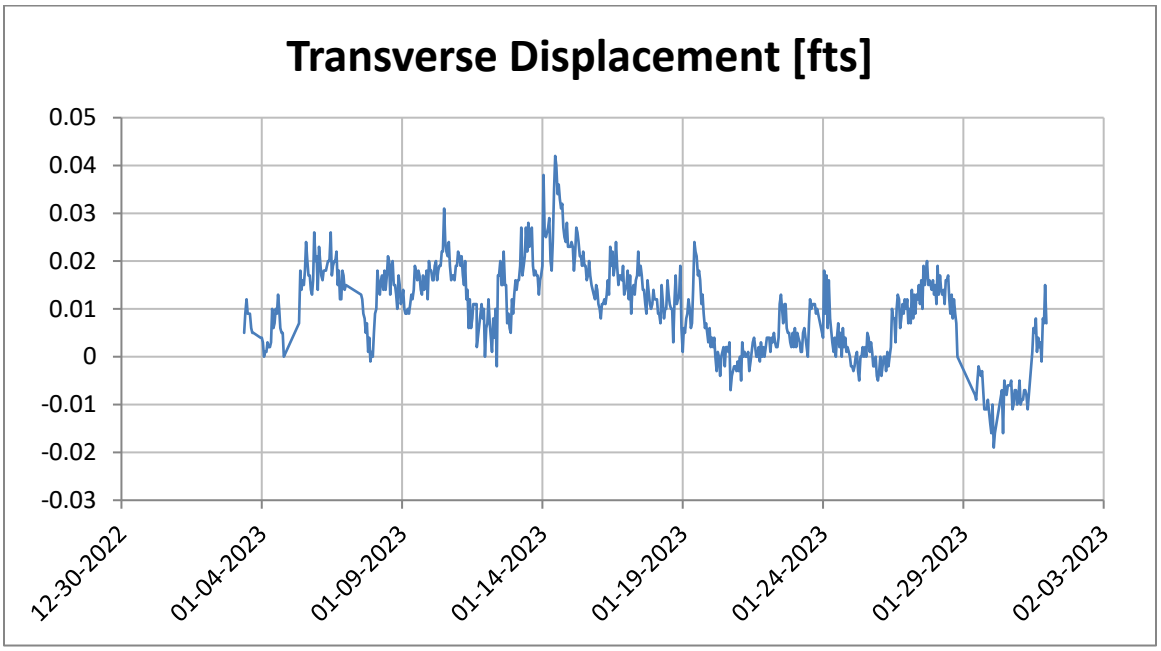


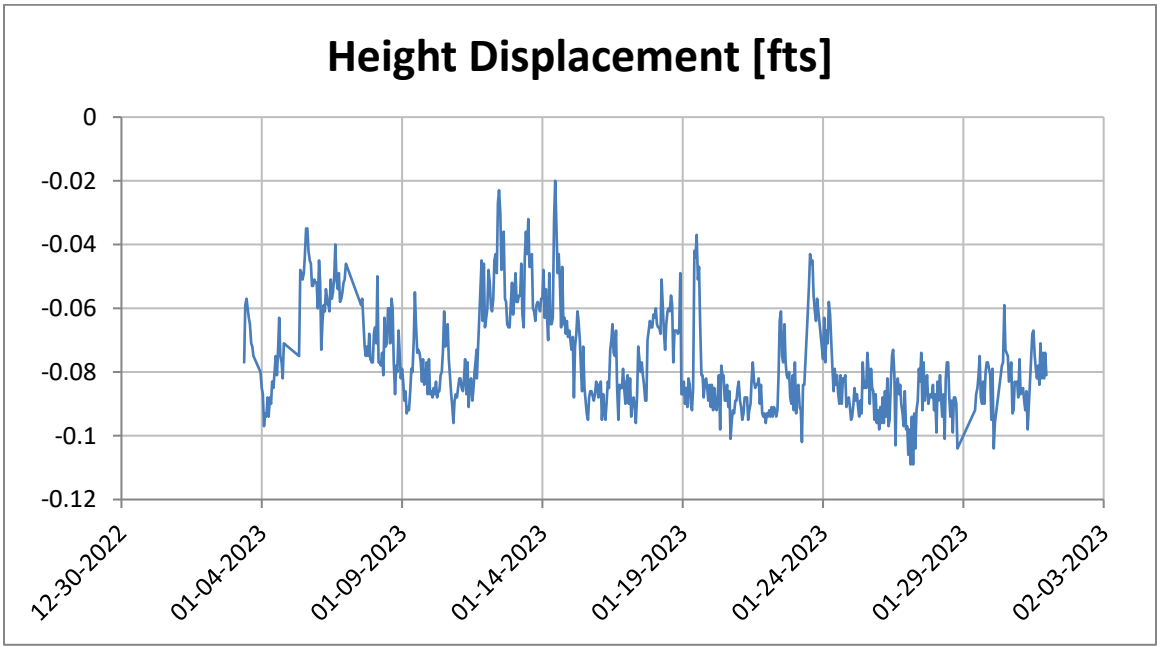
Notes:

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.

Stantec

Prism NP66



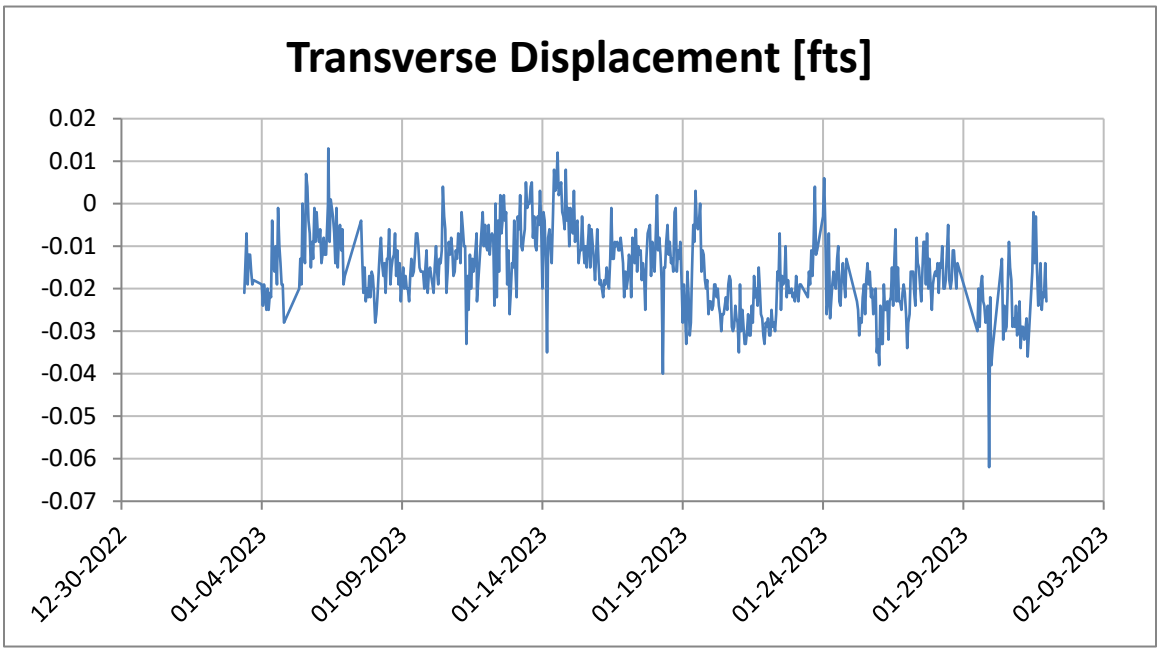


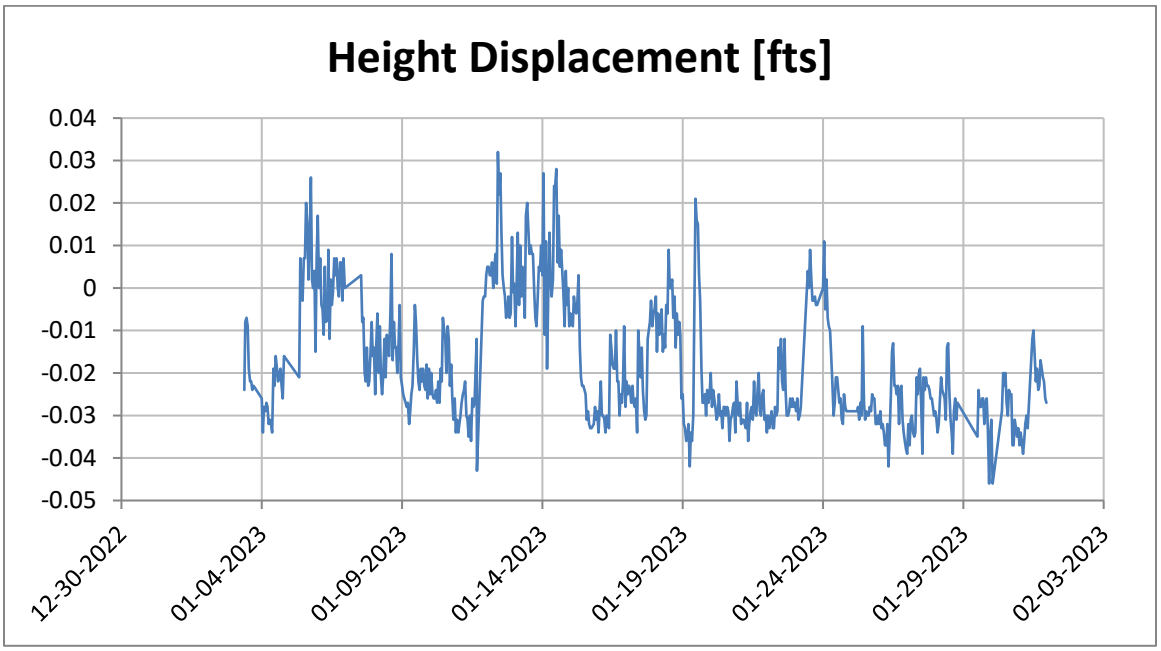
Notes:

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.

Stantec

Prism P1



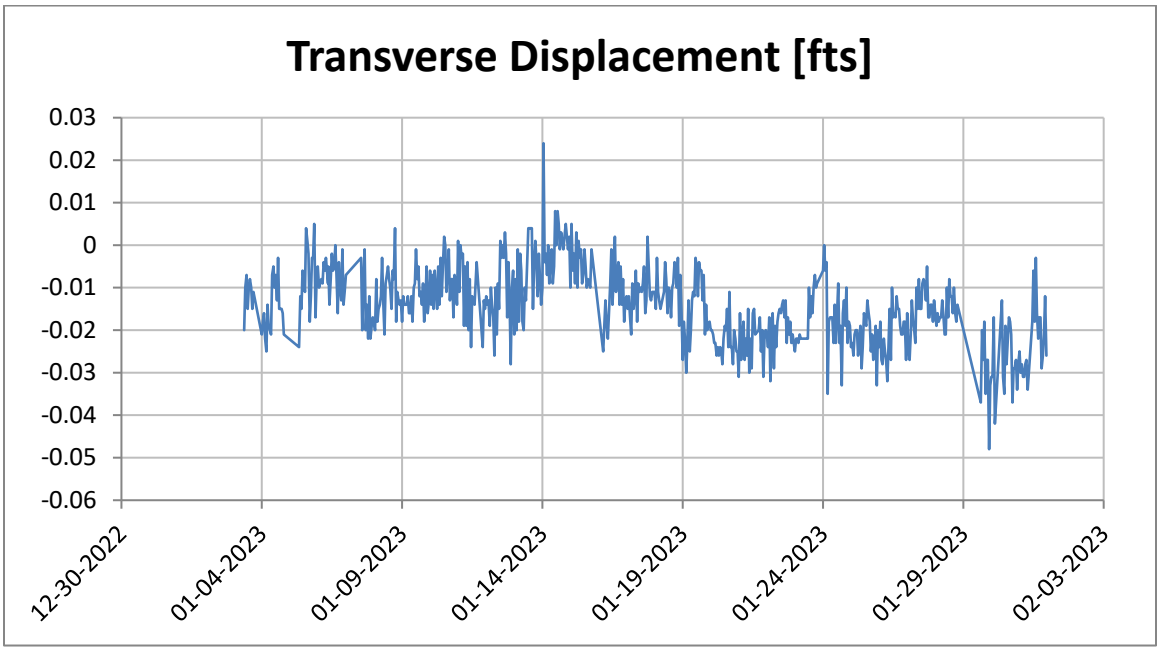


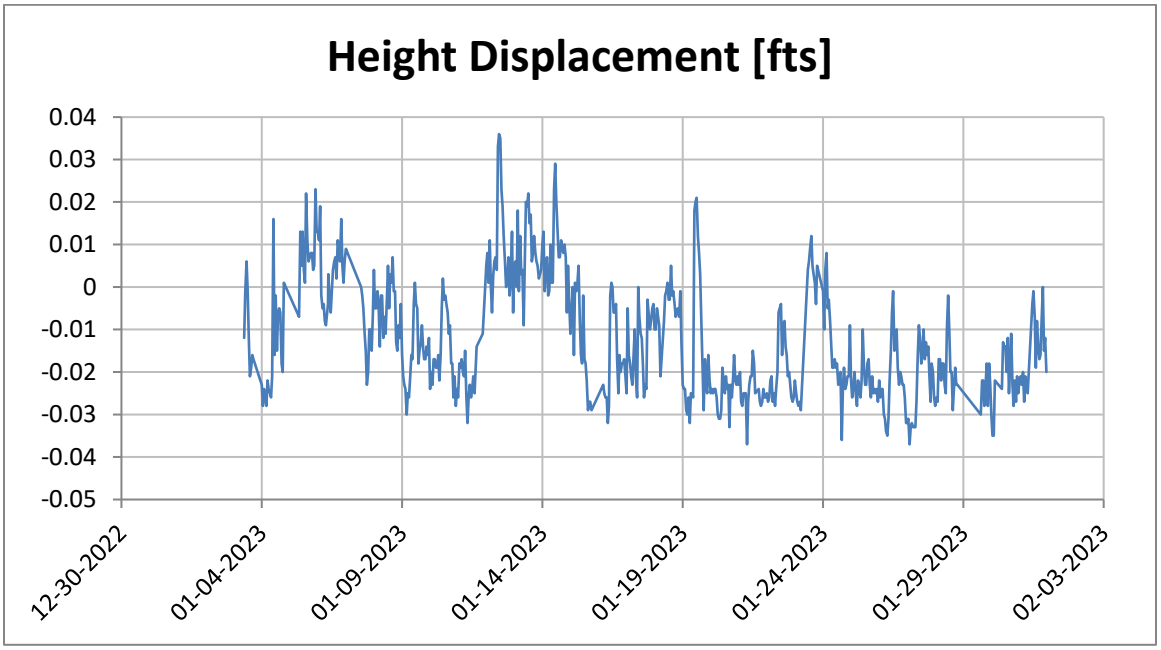
Notes:

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.

Stantec

Prism P2



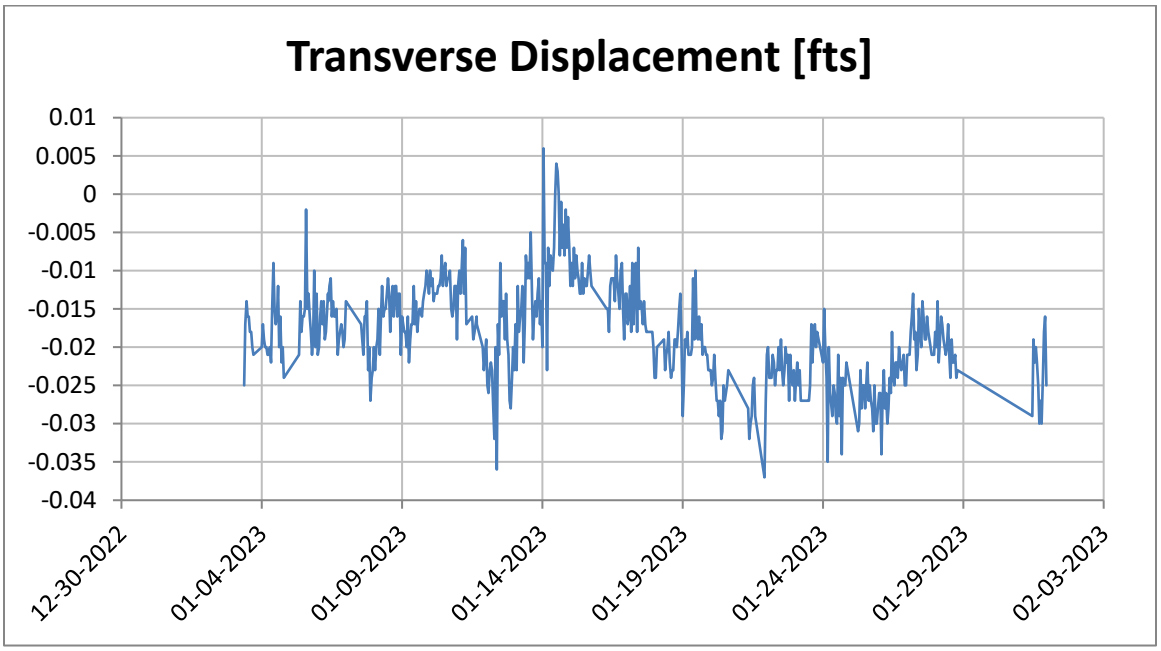


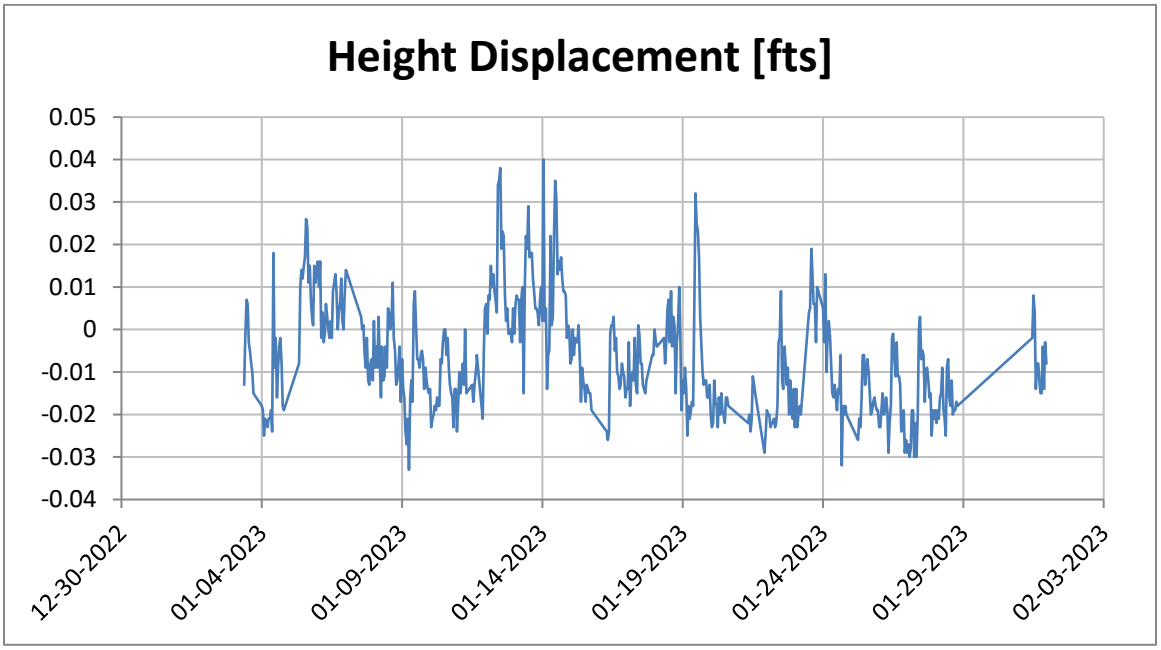
Notes:

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.

Stantec

Prism P5



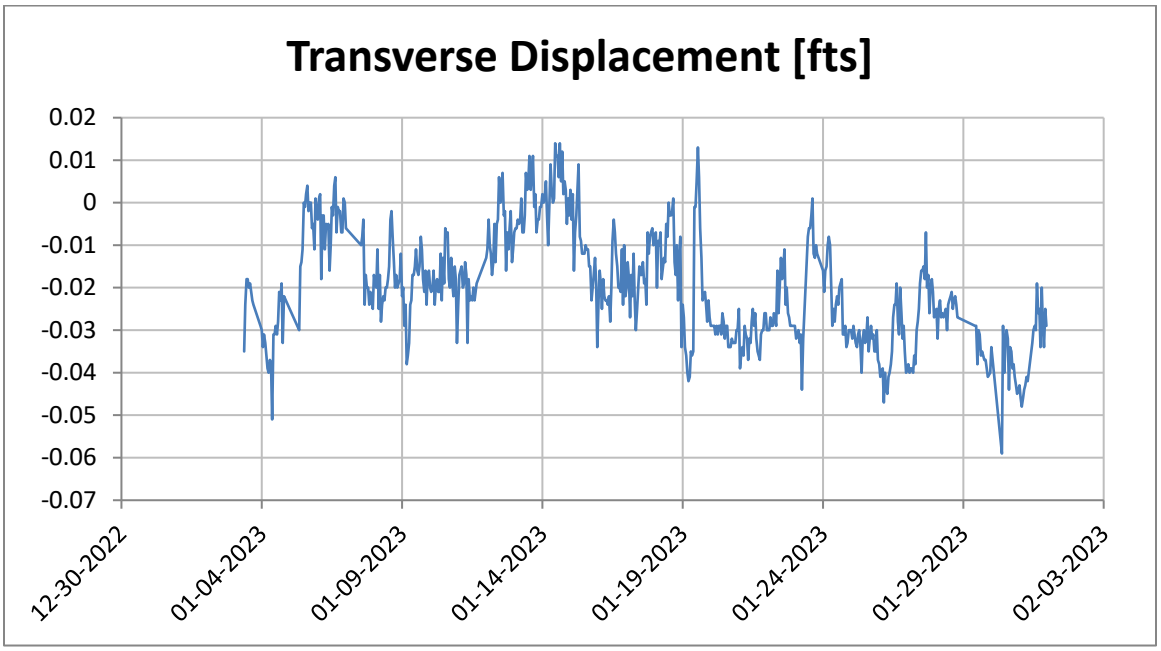


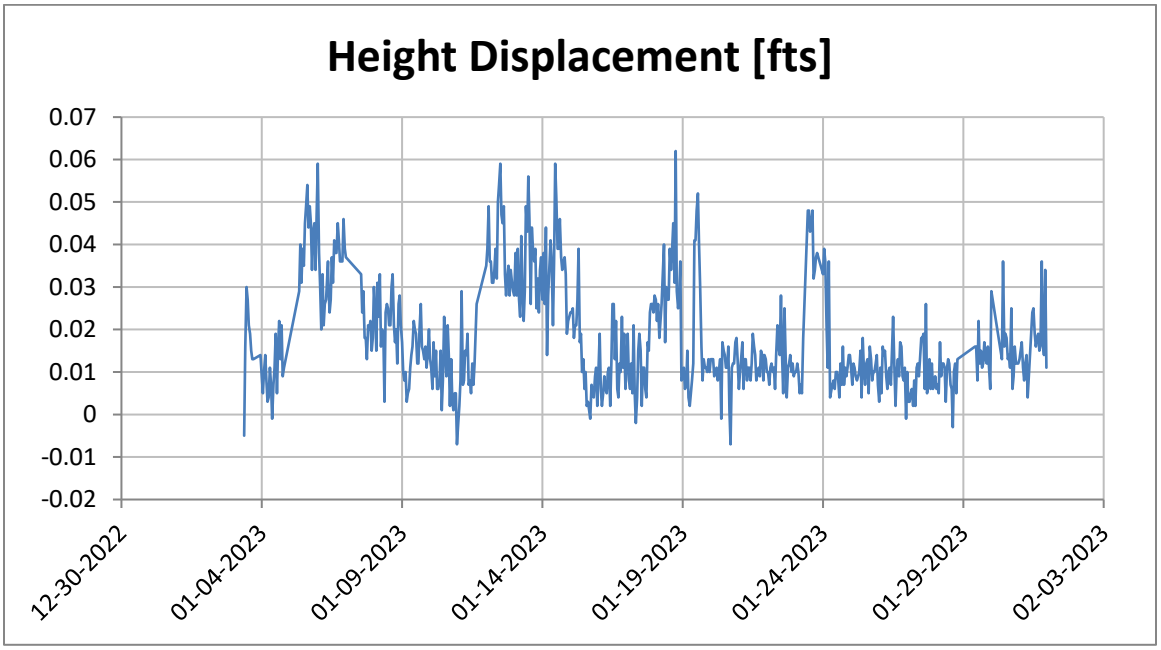
Notes:

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.

Stantec

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.

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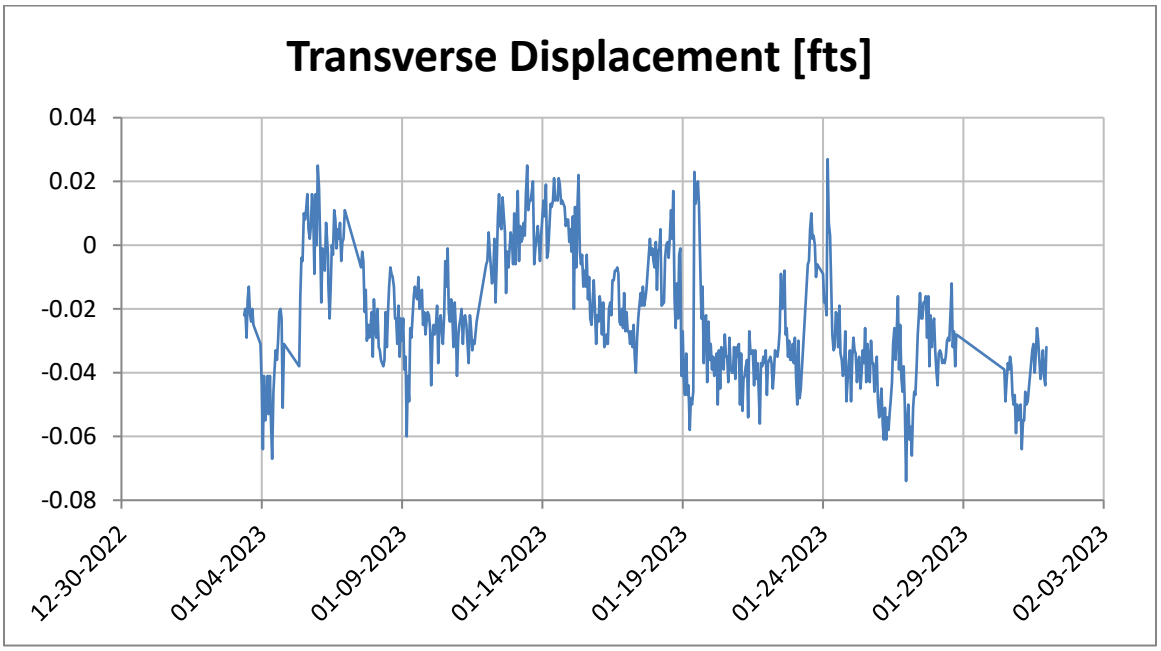
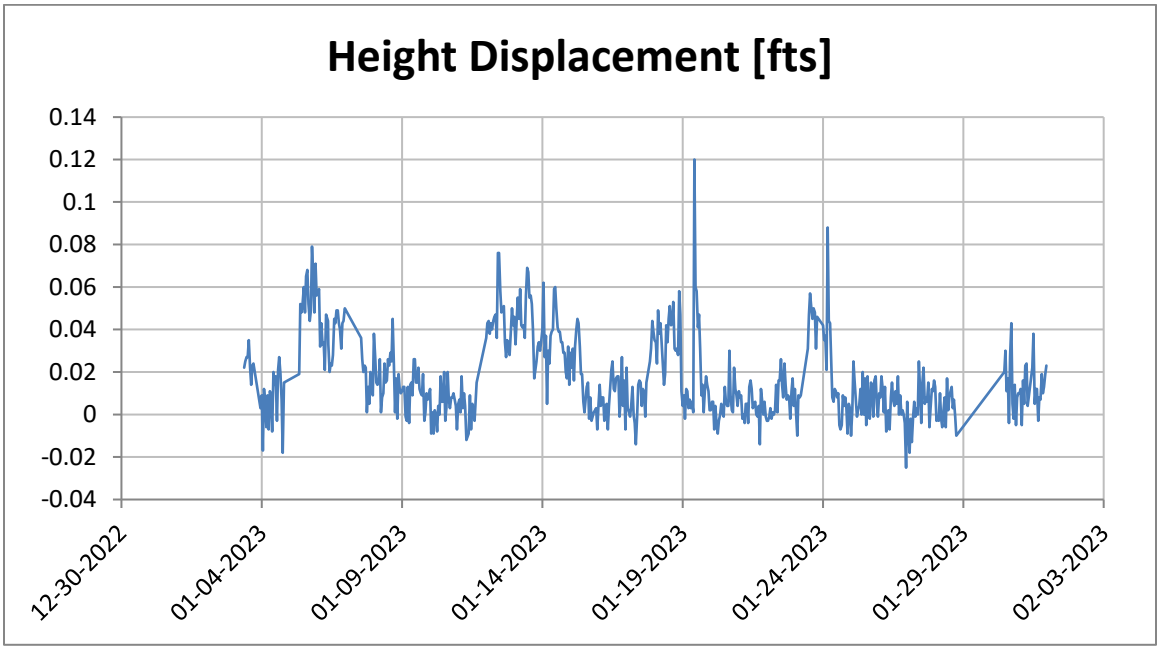
Prism P32



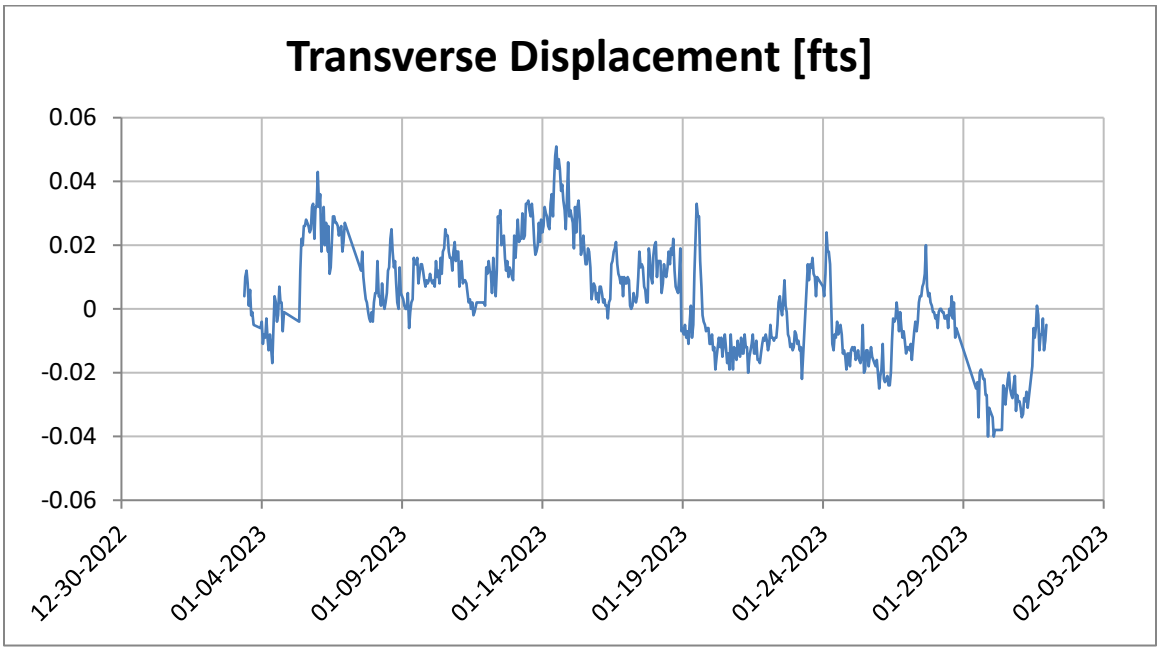


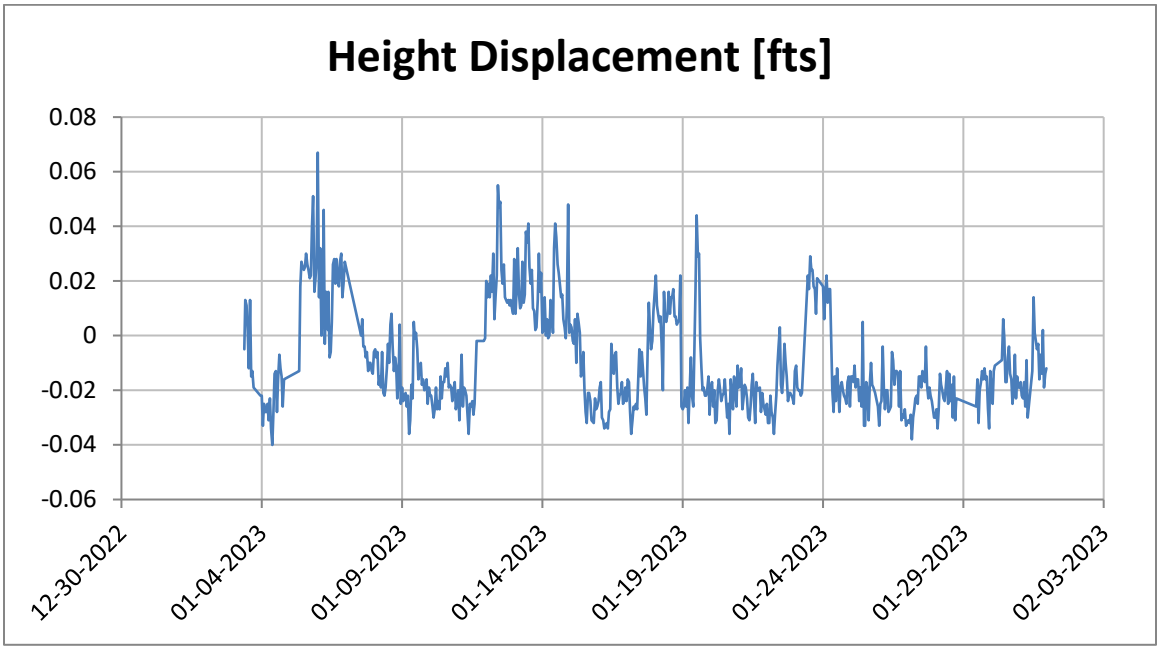
Notes:

1. Survey accuracy is +/-0.016 feet.
2. Alarm threshold is +/-0.35 feet.
3. Transverse displacement is in the horizontal direction. Positive direction means closer to the robotic station.
4. Height displacement is in the vertical direction. Positive direction means higher in elevation.
5. Exceedance alerts were received on 1/19.

Stantec

Prism P33



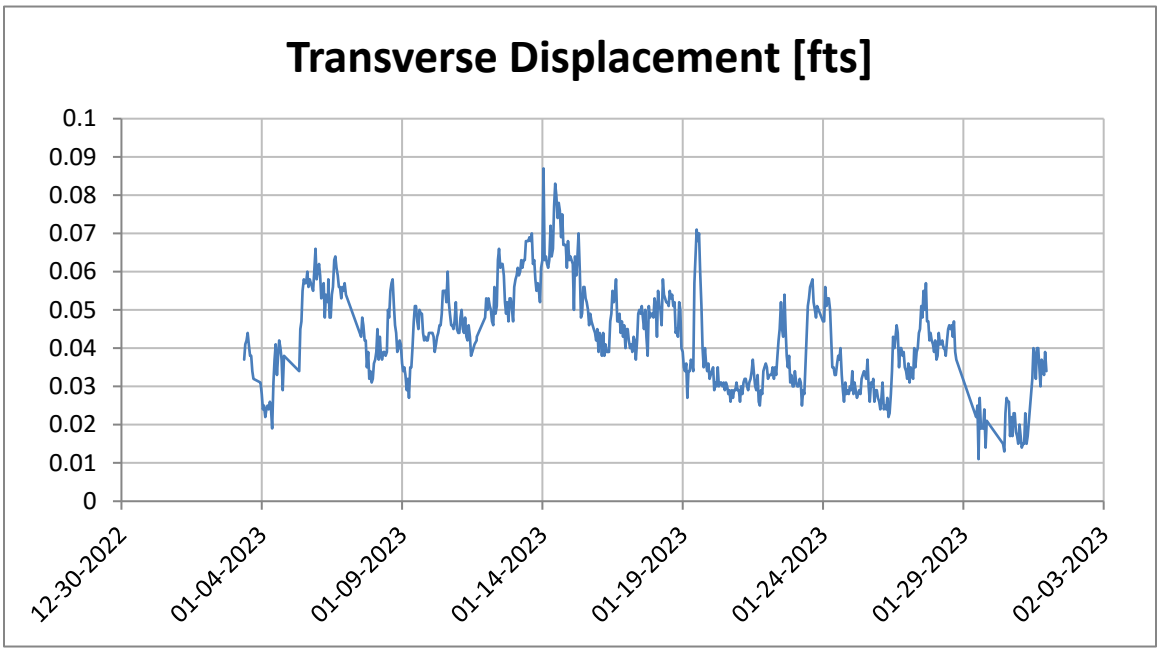


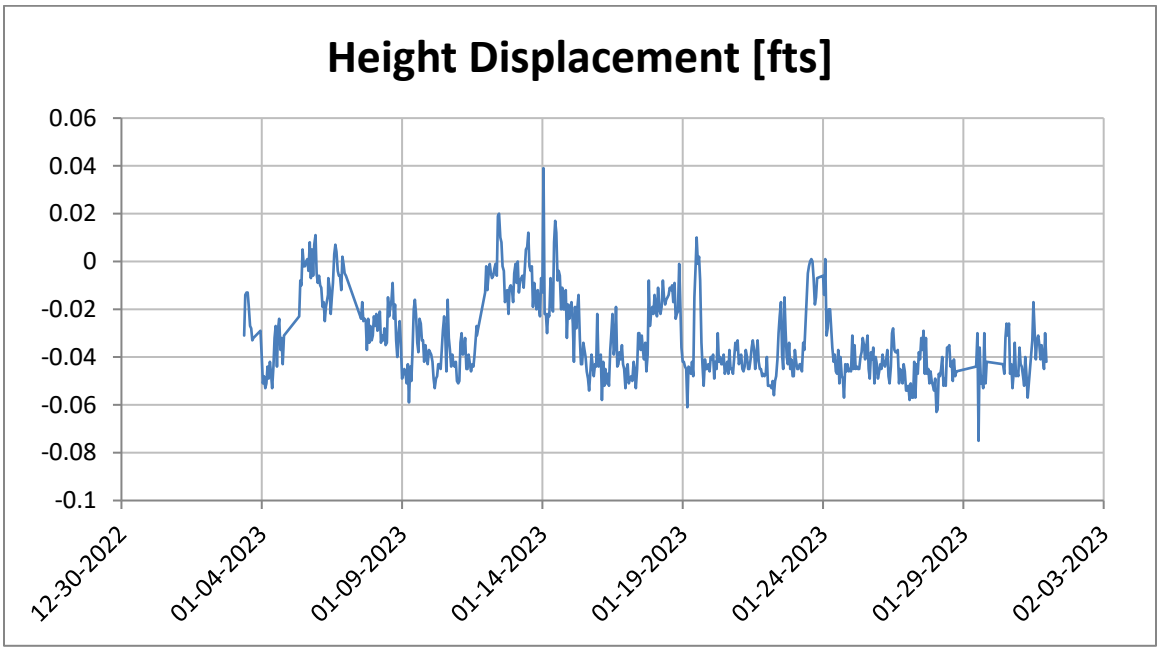
Notes:

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.

Stantec

Prism P69A



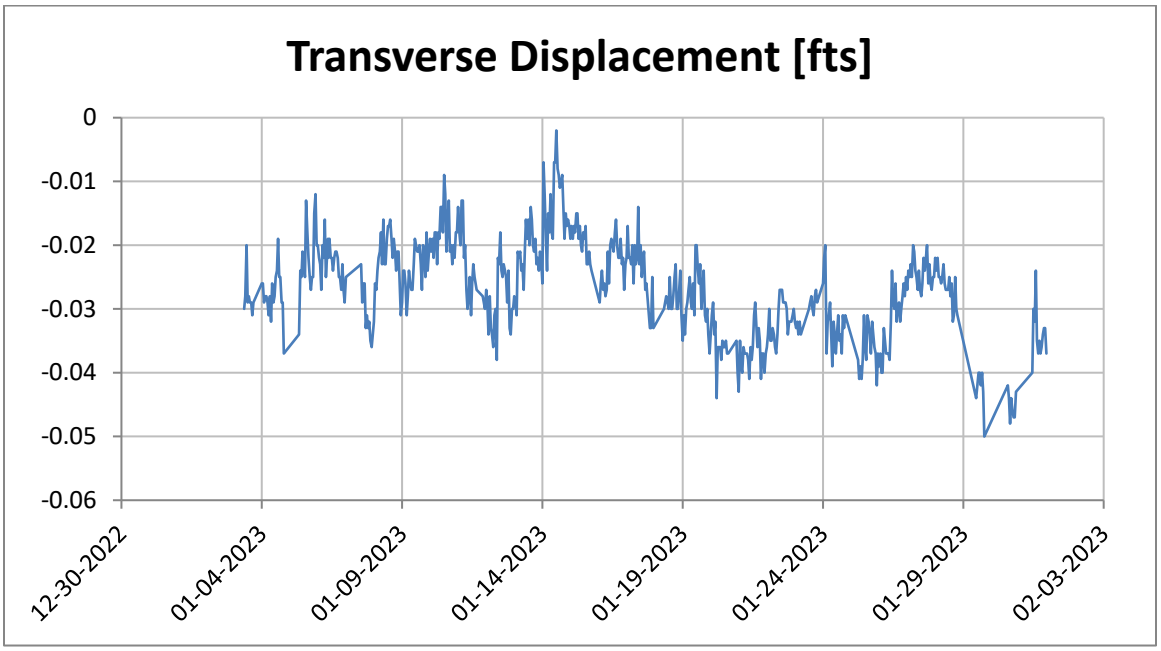


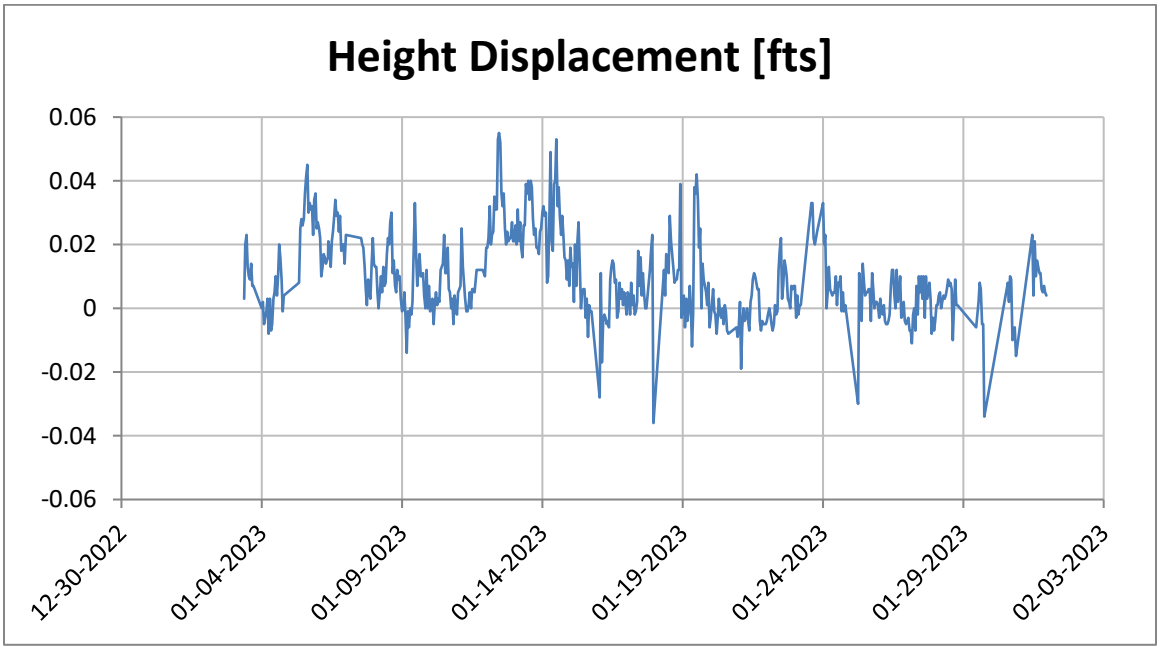
Notes:

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 1/19.

Stantec

Prism P70



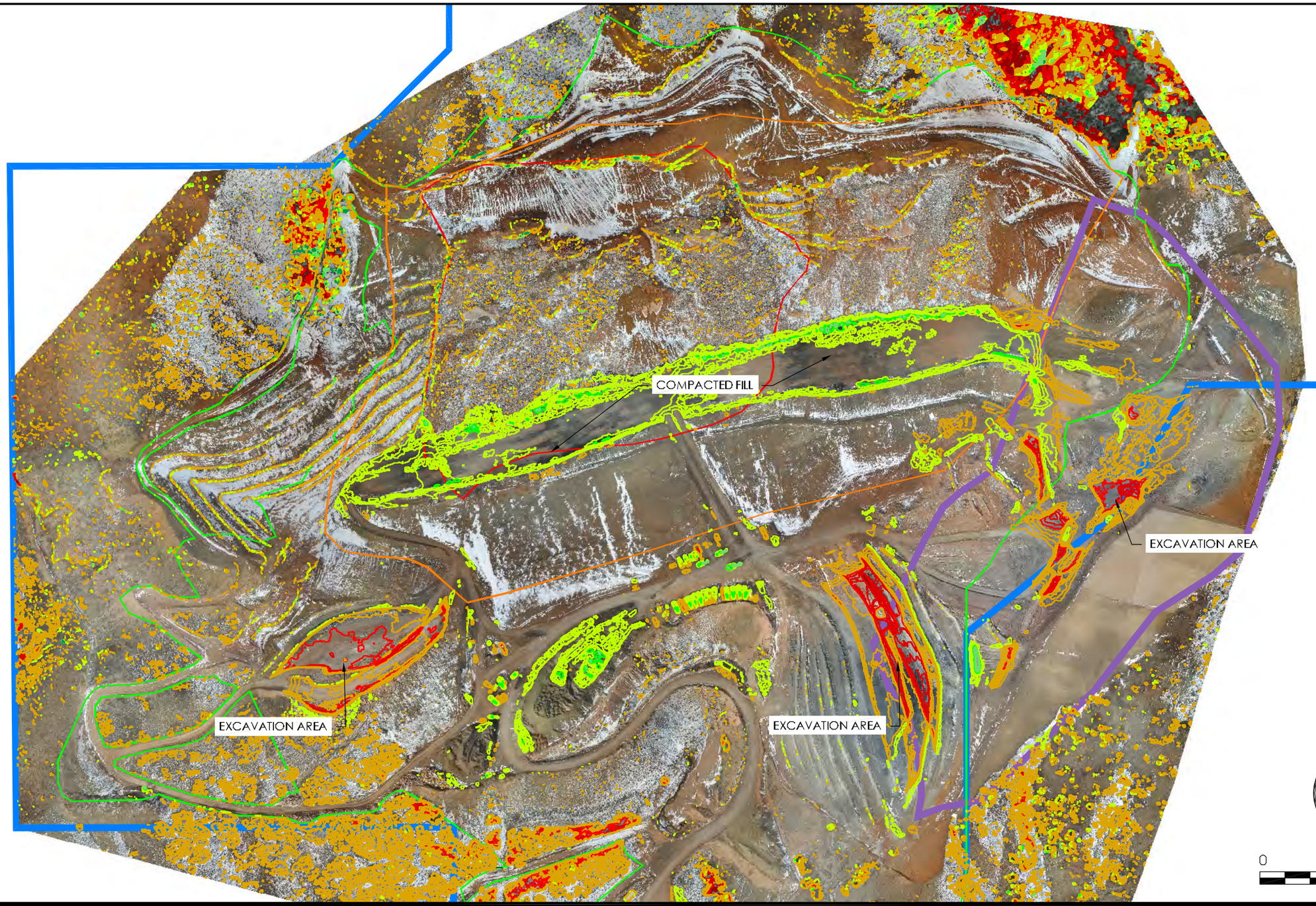


Notes:

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



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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 12/28/2022 to 01/27/2022.

Client/Project
CONTINENTAL MATERIALS CORP.
PIKEVIEW QUARRY SLOPE MONITORING

Project No.
2057288200

Title
EXISTING PRISMS WITH CURRENT SURFACE

Revision	Date
#	2023.02.28
Drawn By	Figure No.
PK	5

Appendix D

Compaction Testing Results

LEGEND

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

N

0 150' 300'

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

Client/Project
CONTINENTAL MATERIALS CORP.
PIKEVIEW QUARRY SLOPE MONITORING

Project No.
2057288200

Title
COMPACTION TEST LOCATIONS

Revision	Date
#	2023.02.28
Drawn By	Figure No.
PK	6

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2023.02.17 3:54:29 PM

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Compaction Testing Log

BCC Test	Test No.	Date	Elevation (ft)	Northing (ft)	Easting (ft)	Wet Density (pcf)	Moisture Content (%)	Dry Density (pcf)	Compaction (%)
Test EEE9	#679	5-Jan	7291	1401003	3173456	138.6	9.1	129.5	100
Test EEE10	#680	5-Jan	7292	1400924	3173405	134.9	8.8	126.1	100
Test FFF1	#681	9-Jan	7297	1402538	3172999	132.6	13.3	119.3	96
Test FFF2	#682	9-Jan	7299	1402348	3172983	131.6	13.7	118	95
Test FFF3	#683	9-Jan	7298	1402168	3173065	130.8	9.6	121.2	98
Test FFF4	#684	9-Jan	7296	1402095	3173112	127.7	8	119.7	96
Test FFF5	#685	10-Jan	7298	1401831	3173154	123.8	9.1	114.8	93
Test FFF6	#686	10-Jan	7299	1401706	3173161	124.1	12.3	111.7	94
Test FFF7	#687	10-Jan	7298	1401606	3173237	128.3	13.4	114.9	96
Test FFF8	#688	10-Jan	7298	1401498	3173239	136.3	12.6	123.7	98
Test FFF9	#689	10-Jan	7296	1401339	3173343	131.1	12.7	118.4	94
Test FFF10	#690	10-Jan	7297	1401175	3173333	124.3	9.7	114.6	93
Test GGG1	#691	12-Jan	7297	1402436	3173092	124.5	8.8	115.7	95
Test GGG2	#692	12-Jan	7299	1402504	3173018	124.3	9.1	115.2	95
Test GGG3	#693	12-Jan	7300	1402517	3172962	124.5	11.9	112.6	93
Test GGG4	#694	13-Jan	7299	1401892	3173095	125.5	12.2	111.9	91
Test GGG5	#695	13-Jan	7299	1401838	3173147	128.4	8.4	118.4	96
Test GGG6	#696	13-Jan	7301	1401707	3173160	132.2	12.7	117.3	95
Test GGG7	#697	16-Jan	7300	1401399	3173267	137.7	16.3	121.4	95
Test GGG8	#698	16-Jan	7298	1401267	3173316	134.1	16.8	117.3	93
Test GGG9	#699	16-Jan	7298	1401135	3173383	131	19.3	111.7	90
Test GGG10	#700	16-Jan	7296	1400900	3173420	140.7	7.2	133.5	100
Test HHH1	#701	17-Jan	7302	1402640	3172974	123.6	9.7	113.9	92
Test HHH2	#702	17-Jan	7302	1401805	3173111	124.6	16.6	108	88
	#702R	20-Jan				144.1	9.2	134.9	100
Test HHH3	#703	17-Jan	7300	1402533	3173063	127	16.2	110.8	90
Test HHH4	#704	17-Jan	7302	1402297	3172992	123.2	11.8	111.4	91
Test HHH5	#705	17-Jan	7300	1402157	3173097	132.8	12.1	120.7	96
Test HHH6	#706	17-Jan	7300	1401897	3173132	128.5	18	110.5	90
Test HHH7	#707	17-Jan	7302	1401633	3173197	124.1	13	111	91
Test HHH8	#708	19-Jan	7300	1401354	3173304	131.5	12.8	118.7	95
Test HHH9	#709	19-Jan	7300	1401272	3173349	131	7.2	123.8	99
Test HHH10	#710	19-Jan	7300	1401186	3173311	125	13.4	111.6	91
Test HHH11	#711	19-Jan	7299	1401131	3173391	119.3	8.4	110.9	90
Test III1	#713	20-Jan	7303	1402625	3173009	140.2	6.1	134	100

BCC Test	Test No.	Date	Elevation (ft)	Northing (ft)	Easting (ft)	Wet Density (pcf)	Moisture Content (%)	Dry Density (pcf)	Compaction (%)
Test III2	#714	20-Jan	7305	1402688	3172926	132.6	7.9	124.8	100
Test III3	#715	24-Jan	7302	1402432	3173029	124.6	7.3	117.2	95
Test III4	#716	24-Jan	7302	1402144	3173062	123.4	5.9	117.5	94
Test III5	#717	24-Jan	7303	1402035	3173049	119.7	5.6	114.1	92
Test III6	#718	24-Jan	7302	1401853	3173142	129.9	6.7	123.2	97
Test III7	#719	24-Jan	7305	1401669	3173150	133.4	12.1	121.3	96
Test III8	#720	24-Jan	7302	1402122	3173061	111.4	12.9	98.5	78
	#720R	31-Jan				122.4	8.4	114	92
Re-Test III8 (2)	#722	31-Jan	7302	1402127	3173065	122.2	7.7	114.5	92
Test III9	#723	31-Jan	7300	1401059	3173408	130.8	11	119.7	97
Test III10	#724	31-Jan	7302	1401053	3173328	124.4	7.4	117	94

Notes:

1. As of January 31, 2022, a total 1,907,000 yd3 had been placed and compacted. This requires at least 382 compaction tests, and 673 tests have been taken.

2. There are no tests 712 or 721.