

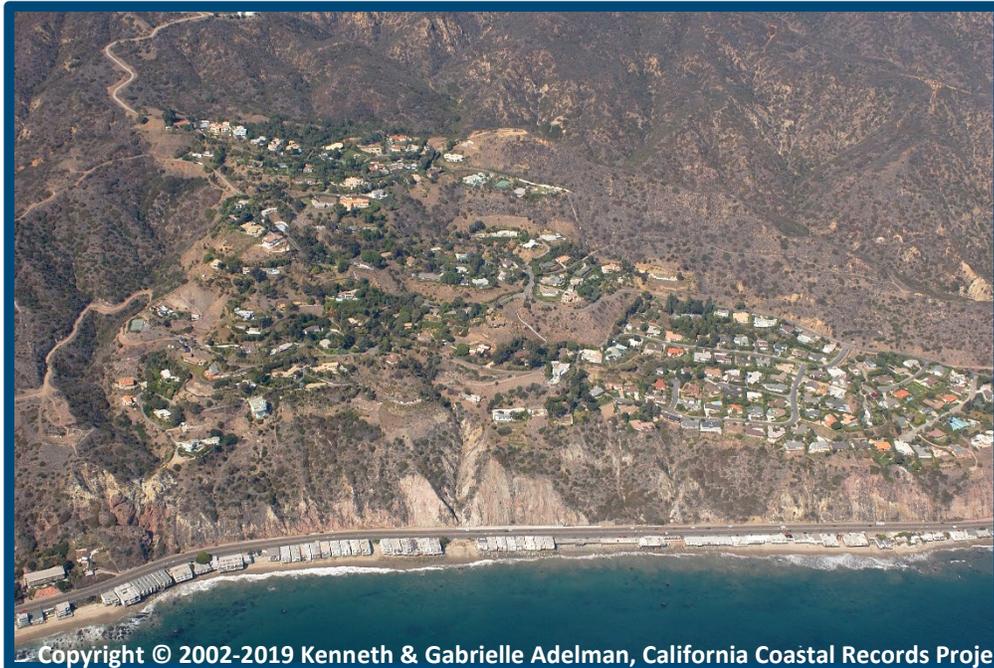
FY23/24 Maintenance and Monitoring

AD98-1, Big Rock Mesa

City of Malibu, California

Yeh Project No.: 220-276

February 25, 2025



Prepared for:

City of Malibu
23825 Stuart Ranch Rd.
Malibu, California 90265
Attn: Mr. Arthur Aladjajian

Prepared by:

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February 25, 2025

Project No. 220-276

City of Malibu
23825 Stuart Ranch Rd.
Malibu, California 90265

Attn: Mr. Arthur Aladjajian, Public Works Superintendent

Subject: Annual Monitoring and Maintenance Report FY23/24, City of Malibu Assessment District 98-1, Big Rock Mesa, Malibu, CA

Dear Mr. Aladjajian:

Yeh and Associates, Inc. is pleased to submit this monitoring and maintenance report FY23/24 City of Malibu Assessment District AD-1, Big Rock Mesa in Malibu, California. This report was prepared in accordance with our Agreement for Professional Services, dated June 22, 2020 between the City of Malibu and Yeh and Associates, Inc. and Amendment 1, dated June 25, 2024. This report provides geotechnical an annual summary of monitoring and maintenance for the project over fiscal year July 1, 2023 to June 30, 2024.

The geotechnical services consisted of monitoring and maintenance, data management, public outreach, reporting, NPDES compliance and capital improvement planning. A map showing the location of the maintenance and monitoring facilities is provided on Plate 1. Plate 2 provides a summary of maintenance activities performed during the monitoring year.

We appreciate the opportunity to be of service. Please contact Nick Simon (nsimon@yeh-eng.com) at 805-414-0991 or Loree Berry (Lberry@yeh-eng.com) at 805-440-0966 if you have any questions or require additional information.

Sincerely,
YEH AND ASSOCIATES, INC.



Nick Simon, GIT
Senior Project Geologist



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1. INTRODUCTION

Yeh and Associates (Yeh) was retained by the City of Malibu (City) to perform maintenance and monitoring of the existing geotechnical instrumentation and dewatering facilities within the City of Malibu's Big Rock Mesa Landslide Assessment District, 98-1. The project location is shown by the red polygon in Figure 1. This report presents monitoring results, a maintenance summary, and facilities status for the monitoring year July 1, 2023 through June 30, 2024 (monitoring year). Yeh monitors groundwater levels, slope inclinometers, crack gauges and tracks dewatering flow from dewatering wells and horizontal drains. During this monitoring year, Yeh acquired and reviewed satellite radar data to monitor surface deformation. Yeh also repairs and maintains the monitoring and dewatering facilities. Plate 1 is attached and shows the approximate locations of the specific assessment district monitoring facilities. Table 1 summarizes the equipment inventory and the approximate frequency of monitoring and maintenance over the monitoring year. Section 5.0 of this report provides a detailed summary of the maintenance activities performed during this monitoring year.

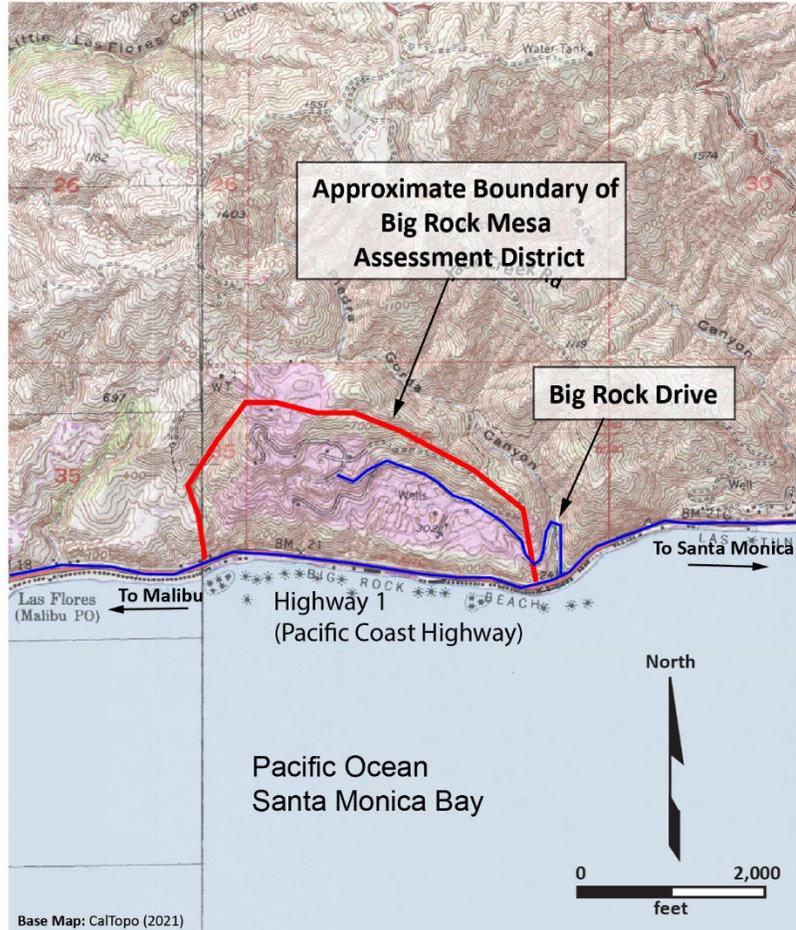


Figure 1: Project Location Map

Table 1. Summary of Annual Monitoring and Maintenance

Type of Monitoring Instrument or Dewatering Device	Number of Active Locations	Brief Description	Monitoring Frequency	Maintenance Effort ²
Standpipe monitoring wells	29 ¹	1.5-inch to 3.25-inch diameter perforated PVC, aluminum, or casing, used to measure depth to groundwater using electric sounder or by a transducer/datalogger	Monthly direct read; hourly data from pressure transducer	low
Inclinometer survey casings	23 ¹	1.5-inch to 3.25-inch diameter grooved casings made of PVC, or aluminum used to survey for shear displacement by a traversing inclinometer probe	quarterly to annually	low
Dewatering wells	24	6-inch diameter steel or PVC casings equipped with 0.5 to 3HP submersible pump and connected to electrical controls, pumped water flows through meter and into conveyance piping to discharge	monthly	high
Horizontal Drains (hydraugers)	36	1-inch to 1.5-inch perforated PVC casings drilled slightly higher than horizontal into the face of the bluff and into the slope for hundreds to thousands of feet and used to drain groundwater that intercepts the casing. Flow can be measured along PCH before it flows to discharge	monthly	high
Big Rock Master Water Meter #0138193	1	Meters imported water to Big Rock Mesa, data obtained from Los Angeles County Public Works	monthly	N/A
Big Rock Mesa Rain Gauge #1239	1	Documented Rainfall, Data obtained from Los Angeles County Public Works	monthly	N/A
PK Nail Crack Gauges	5	PK survey nails set in the pavement to straddle existing cracks within areas of previously documented landslide related distress cracking	Quarterly to annually	low
Discharge Point	10	Water quality sampling and testing in accordance with active LARWQB NPDES Compliance File CI-6893	Monthly/weekly	Low to medium
Notes:				
¹ - standpipe and inclinometer casings are same device. Some casings are no longer usable* to survey with a modern inclinometer probe but are used to collect groundwater level measurements. ² - maintenance effort (generalized): "high" – services monthly, "medium" – services quarterly, "low" – services annually *Not- usable refers to inclinometer casings that are sheared, twisted, compressed, or otherwise deformed or damaged to an extent that an inclinometer probe cannot traverse the casing or survey data is un-reliable with current standard inclinometer survey equipment.				

1.1 PHYSIOGRAPHIC SUB-REGIONS

Monitoring results are discussed with respect to the six physiographic sub-regions within the overall 1983 landslide boundary and are described by BYA (1992, 1999) and similarly by D.A. Evans (1986) as: Headscarp, Eastern, PCH, Central, Bluff and Western Extension. Figure 2 presents the approximate areas associated with the six physiographic sub-regions and they are described below. The South-Facing Slope Region is included as part of the Western Extension Region. Each is composed of



landslide blocks or complexes of landslide blocks defined by common structural, tectonic and hydrologic characteristics (BYA, 1992).

- **Headscarp Region:** delineated to the north by cracking and scarps from the 1983 landslide boundary on the steep slopes along the Northeast Ridge and North Peak down to the Central Region boundary on the south. It includes modern and paleo satellite slides including the Hansch Sub-Slide located below North Peak which activated during the main 1983 event. Small, intermittent or creep movements may still be detectable on the shallow secondary-shear plane in this area and are a priority to monitor and characterize.
- **Eastern Region:** delineated on the north and east by the 1983 landslide boundaries and separated from the Central Region to the west by the Inland Lane fault which trends approximately south-southwest just west of the Piedra Chica and Inland Lane cul-de-sacs. It is delineated on the south by the fracture zone along top of the PCH bluffs which is continuous with the fracture zone mapped across the Central-Bluff Regions boundary. The Eastern Region experienced extensive cracking prior to and during the 1983 landslide. Small intermittent or creep movements may still be detectable in this Region and are a priority to monitor and characterize.
- **Central Region:** comprised of distinct blocks that form upper and lower “Mesas,” it extends west from the Inland Lane Fault to the western boundary of the 1983 landslide. It spans from north to south, from the base of the Head Scarp Region to the fracture zone at the northern boundary of the Bluff Region. This area is mostly residentially developed.
- **Bluff Region:** delineated on its northern boundary from the Central and Eastern Regions by the fracture zone formed along the top of the PCH bluffs that extends along Roca Chica Drive east to the eastern landslide perimeter. It includes numerous, complex sub-slides mapped within the PCH bluff face down to and beneath PCH. Failures of sub-slides and global displacement along a fracture zone at the top of the bluffs caused damage to numerous homes during the late 1970’s and the main 1983 slide. Rockfalls, debris flows, and erosion off the steep, fractured slopes of the Bluff Region are routine especially during heavy rains, differentiating localized or surficial events from precursors to incipient movement is a priority.
- **Pacific Coast Highway (PCH) Region:** delineated east to west along the southern edge of the mapped landslide boundary from the base of the PCH bluffs south across PCH to the mapped toe of the 1983 landslide, where uplift/thrusting damaged numerous homes during the main 1983 landslide and where isolated bulging of the ground surface occurred during the 1990s.
- **Western Extension Region:** Located west of the 1983 landslide boundary and extends from above the upper terminus of Big Rock Drive in the north to PCH in the south. The Western Extension Region was not part of the active 1983 slide but was initially postulated to be a potential westward development of the 1983 slide; however, there is “no convincing evidence that the Western Extension has undergone mass movement” (BYA 1992).
 - **South Facing Slope Sub-Region:** The South Facing Slope Subregion is a complex of sub-slides located within the Western Extension Region. Shallow failures occurred here in the 1970s including the 1975 and 1978 Love and Kubek Slides which necessitated the abandonment of the residence at 20674 Rockpoint Way. A stability analysis was performed for the South Facing Slope Sub-Region in 1996 (BYA, 1996).

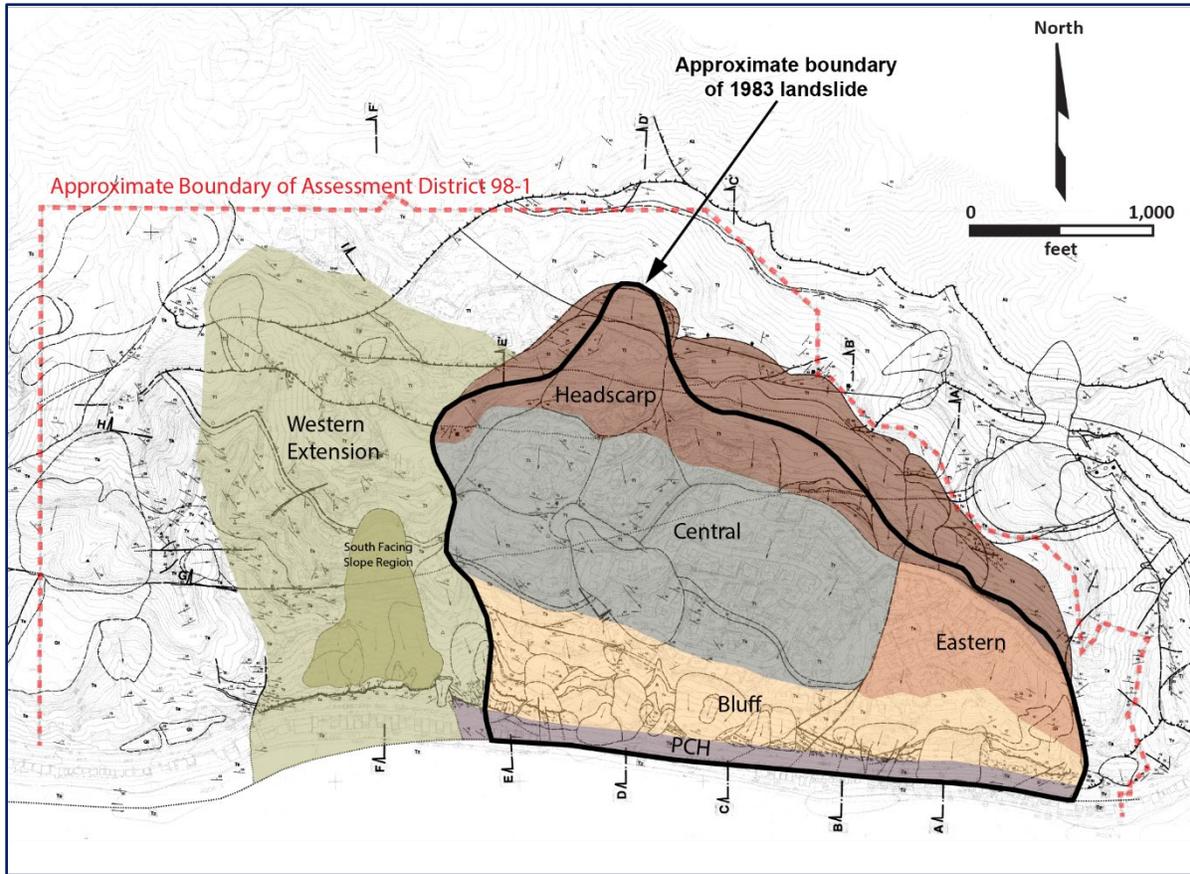


Figure 2: Approximate Boundaries of Physiographic Regions

2. MONITORING

The following sections provide monitoring results for groundwater levels, slope inclinometers, satellite imagery, and crack gauges.

2.1 GROUNDWATER LEVELS

Groundwater levels were measured approximately monthly in 29 standpipe monitoring wells and piezometers and are also measured intermittently in select abandoned dewatering wells. Groundwater levels were measured by lowering an electric probe attached to a measuring tape into the standpipes until contact with the groundwater surface. The depths to water from the top of the casing are manually recorded. When interpreting the manual groundwater data, it should be considered that many of the standpipes installed prior to 1990 were constructed as fully screened monitoring wells and generally screened by drilling ¼-inch holes at 5-foot intervals along the aluminum well casing and then backfilling the annular space between the casing and borehole with clean sand (DAE, 1986 V4). This construction allows perched and shallow water to enter the casing through the filter pack from anywhere along the casing and the ground surface. Therefore, water

levels measured in this type of standpipe may have artificially high readings for some time after rainfall depending on the geology at the specific standpipe.

Data-logging pressure transducers were installed in standpipes PC-1 and SP-3A and various dewatering wells for most of this monitoring year and programmed to record data at 24-hour, 12-hour, one-hour or one-minute intervals depending on the purpose of the transducer.

Pneumatic piezometers are mechanical sensors that were installed with some of the inclinometer casings up until 1998. They had previously been measured intermittently to evaluate perched water conditions. The majority of the existing pneumatic piezometers no longer function, or the reliability of pneumatic systems are not certain. Selected pneumatic piezometers were retested this year but data does not appear reliable. No data from the pneumatic piezometers is included in this report.

The results of the groundwater monitoring by region are discussed in the following sections. Transducer data for standpipes PC-1 and SP-3A is presented in Figures 3 and 4 with the discussion of the Eastern Region groundwater section. Appendix A includes groundwater hydrographs from historic through the end of the FY23/24 monitoring year. An inventory and status of the groundwater monitoring facilities is also included Appendix A.

2.1.1 HEADSCARP REGION

Water levels in the Headscarp Region are monitored using SP-26 only. Water levels recorded in SP-26 declined over the first part of monitoring year through the onset of rainfall in January. During the January-March rainfall, water levels rose approximately 5.8 feet and have since stabilized or declined beginning in April 2024. Groundwater levels in SP-26 have remained consistent since approximately 2006 with seasonal responses to rainfall. Manual water level monitoring will continue monthly. There are no dewatering facilities in the vicinity of SP-26.

Table 2: Headscarp Region Water Level Monitoring

Standpipe ID	Change in Groundwater Elevation between last and first measurements of monitoring year (ft)	2023-2024 Average Groundwater Elevation (ft)	Change in Average Groundwater Elevation from Prior Monitoring Year (ft)	1991-2024 Historical Mean Groundwater Elevation (ft)	2023-2024 Average Groundwater Elevation from Historical Mean Groundwater Elevation (ft)
SP-26	+3.8	558.3	+4.8	550.0	+8.3

2.1.2 EASTERN REGION

Water levels in the Eastern Region are monitored with standpipe monitoring wells SP-3, SP-3A and SP-33 and piezometer PC-1. SP-3 was not monitored this year due to lack of property access and



because it has been dry to its maximum (post-sheared off and filled in) depth since at least 2014. Groundwater levels in Standpipes PC-1 and SP-3A fluctuated over the monitoring year in response to the January-March 2024 rainfall and levels in standpipe SP-33 continued to decline since an anomalous peak in January 2017.

Figures 3 and 4 present plots of groundwater level data from recording transducers versus daily rainfall totals for PC-1 and SP-3A, respectively, over the monitoring year. Yeh’s observations of groundwater levels in the Eastern Region include:

- PC-1 water levels increased by less than 2 feet, in response to individual rain events and then dissipated over a day to a few days.
- Water levels in SP-3A appeared to rise nearly immediately in response to rainfall and then lower over the several days to a level close to the pre-storm level. It is noted that the water level within the well casing rose on the order of up to 150 feet over a few minutes with rainfall. This may be a result of surface runoff directly entering the casing. Water levels recorded in SP-3A may not represent the true water levels until surface water that entered the casing has dissipated. A transducer is currently installed in SP-3A and is logging at 1-minute intervals to continue evaluations of water levels responses.

Table 3: Eastern Region Water Level Monitoring

Standpipe ID	Change in Groundwater Elevation between last and first measurements of monitoring year (ft)	2023-2024 Average Groundwater Elevation (ft)	Change in Average Groundwater Elevation from Prior Monitoring Year (ft)	1991-2024 Historical Mean Groundwater Elevation (ft)	2023-2024 Average Groundwater Elevation from Historical Mean Groundwater Elevation (ft)
PC-1	+1.4	130.6	+1.3	137.5	-6.9
SP-3A ¹	+9.7	57.9	-0.2	66.1	-8.2
SP-33	-0.4	-44.8	-0.8	-29.9	-14.9
SP-3	Not Measured				
Notes: ¹ Recorded values may not represent true water levels until they can be observed after a period of drier weather and allow time for the additional surface water that has entered the casing to dissipate.					



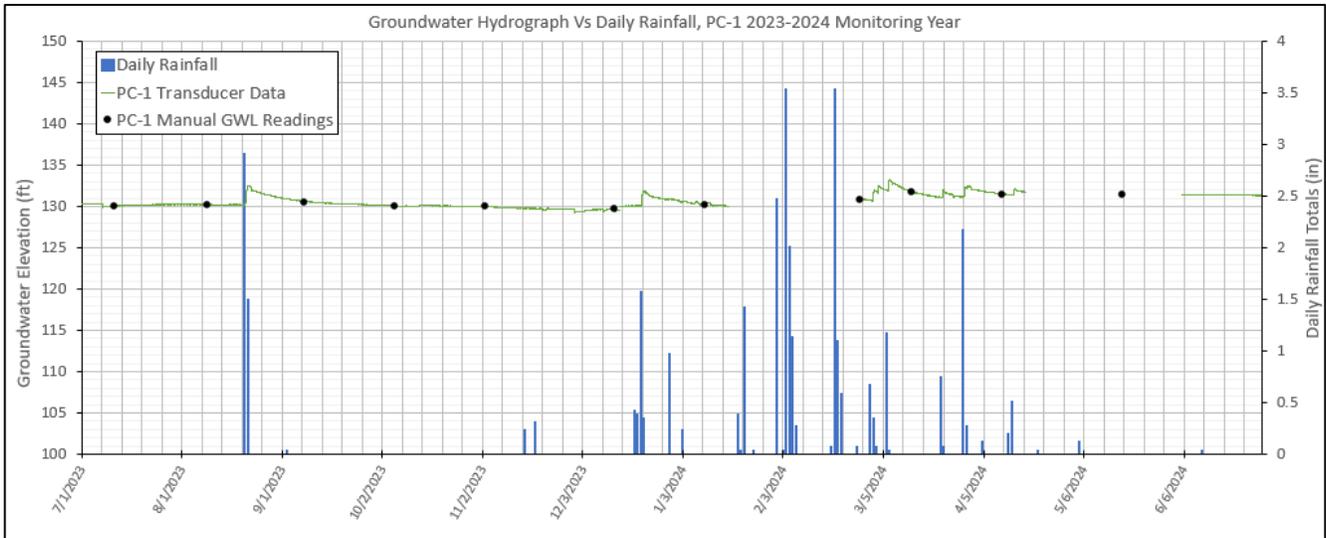


Figure 3: PC-1 transducer hydrograph vs daily rainfall, programmed to 1-hour and 1-minute

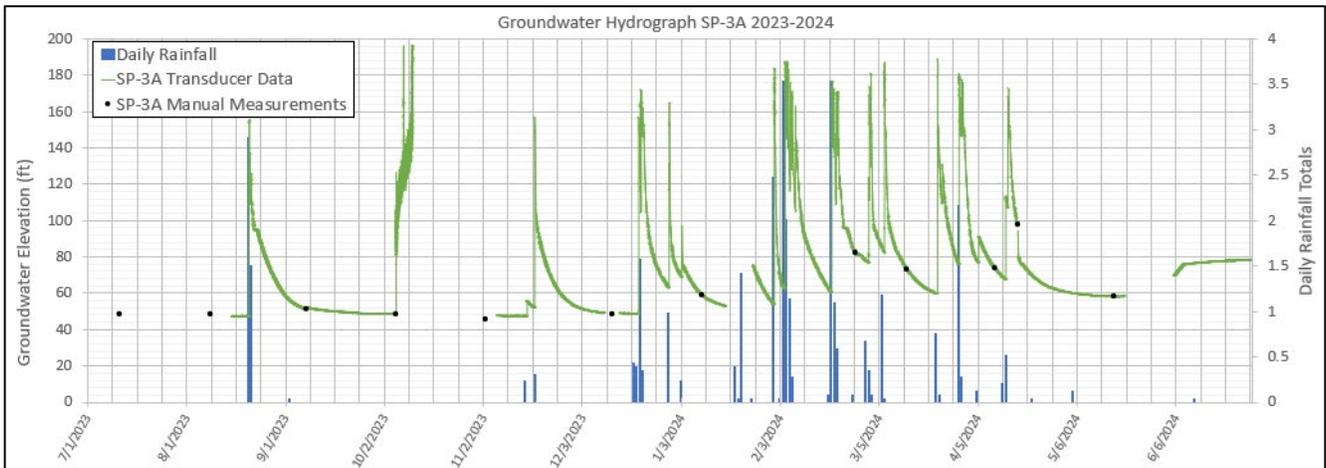


Figure 4: SP-3A transducer hydrograph vs daily rainfall, programmed to 24, 12, 1-hour and 1-minute

2.1.3 CENTRAL REGION

Water levels in the Central Region are monitored with standpipe monitoring wells SP-9A, -16, -16A, -17, -17A, and -24 and piezometers SP-35 and -36. Water levels in SP-16 and SP-16A are highly reactive to pumping rates in Dewatering Well BYA-1 and are more reflective of pumping cycles in the well at the time of measurement than actual groundwater levels. Results for previously reported SI-17B are no longer presented because records indicate it was installed without a screened section and the casing was fully grouted (Fugro, 2012a). SP-17A is documented to have similar construction as SP-17B and reported water levels from SP-17A should be considered approximate.

In general, Central Region water levels rose in response to rainfall and are stabilizing or beginning to decline by April 2024 except for in SP-17 which measured a 24.5-foot rise between the January and March 2024 readings and lowered after March. SP-17A, which is located approximately 10-feet from



SP-17 registered an increase of just 1.6-feet at the same time. It is unclear if the spike in SP-17 water levels is due to a localized groundwater level, surface runoff entering the casing or another cause. Water level monitoring will continue monthly in SP-17 and -17A.

Table 4: Central Region Water Level Monitoring

Standpipe ID	Change in Groundwater Elevation between last and first measurements of monitoring year (ft)	2023-2024 Average Groundwater Elevation (ft)	Change in Average Groundwater Elevation from Prior Monitoring Year (ft)	1991-2024 Historical Mean Groundwater Elevation (ft)	2023-2024 Average Groundwater Elevation from Historical Mean Groundwater Elevation (ft)
SP-9A	+2.77	224.6	+4.0	226.3	-1.7
SP-16	-27.61	115.1	+13.9	76.3	+38.8
SP-16A	-15.82	130.1	-3.7	138.0	-7.9
SP-17	+14.06	393.4	+10.4	386.7	+6.8
SP-17A	+5.64	373.7	+3.7	374.5	-0.8
SP-24	+3.23	50.1	+3.0	45.2	+4.9
SP-35	-0.27	84.1	+2.9	92.7	-8.6
SP-36	+0.17	190.2	+0.4	191.5	-1.4

2.1.4 BLUFF REGION

Water levels in the Bluff Region are monitored with standpipe monitoring wells SP-10, -28, -32 and Piezometer SP-34. Water levels in the Bluff Region fluctuated in response to rainfall and remain elevated between 0.6 and 3.8 feet relative to the start of the monitoring year, except for SP-32 which measured a water level rise of approximately 44.7 feet between January and March 2024 followed by an ongoing decrease of approximately 26.1 feet by May of 2024. Yeh personnel noted that measuring the exact water level in SP-32 was difficult due to water seeping into the casing at shallow depths. SP-32 has previously measured steep, temporary increases following heavy rains when other nearby standpipes did not measure such a response. This condition was previously discussed in the BYA, 1996 Annual Report and in Yeh’s 2024 Interim Report (Yeh, 2024). Water levels in SP-24 continue to lower and will be monitored monthly.

Table 5: Bluff Region water level monitoring

Standpipe ID	Change in Groundwater Elevation between last and first measurements of monitoring year (ft)	2023-2024 Average Groundwater Elevation (ft)	Change in Average Groundwater Elevation from Prior Monitoring Year (ft)	1991-2024 Historical Mean Groundwater Elevation (ft)	2023-2024 Average Groundwater Elevation from Historical Mean Groundwater Elevation (ft)
SP-10	+0.7	47.4	+1.5	44.4	+3.0
SP-28	+0.6	33.6	+0.1	33.3	+0.3



Standpipe ID	Change in Groundwater Elevation between last and first measurements of monitoring year (ft)	2023-2024 Average Groundwater Elevation (ft)	Change in Average Groundwater Elevation from Prior Monitoring Year (ft)	1991-2024 Historical Mean Groundwater Elevation (ft)	2023-2024 Average Groundwater Elevation from Historical Mean Groundwater Elevation (ft)
SP-32	+17.0	49.7	+16.9	75.4	-25.7
SP-34	+3.8	25.9	+1.9	52.5	-26.6

2.1.5 PCH REGION

Water levels in the PCH Region are monitored with standpipe monitoring wells SP-11, -12, -14, -15, -19, -27A, -29 and -30. Groundwater level change within individual standpipes located in the PCH Region fluctuated during the year in response to rainfall and tidal influence and remain between 0.2-feet below and 1.7-feet above the start of the monitoring year elevations, except for in SP-29 which remains approximately 5.0-feet above the start of year elevation. Direct surface runoff enters Standpipe SP-30 and likely also SP-29 during rainfall events. It is known that the ground surface at SP-30 is often submerged beneath an area of ponding on the PCH shoulder.

Yeh’s observations of groundwater levels in the PCH Region include:

- Water levels in SP-29 rose 6.5 feet between December 2023 and February 2024 when they peaked and have since been declining slightly.
- Water level measurements in SP-30 rose 12.4 feet from October 2023 to February 2024 when they peaked. At the peak, groundwater in the casing was only 2.2 feet below the ground surface and visible from the ground surface. Water levels in the casing have been declining since February but remain elevated above previous years’ levels. Yeh is investigating the validity of historic water level measurements for SP-30.

Table 6: PCH Region water level monitoring

Standpipe ID	Change in Groundwater Elevation between last and first measurements of monitoring year (ft)	2023-2024 Average Groundwater Elevation (ft)	Change in Average Groundwater Elevation from Prior Monitoring Year (ft)	1991-2024 Historical Mean Groundwater Elevation (ft)	2023-2024 Average Groundwater Elevation from Historical Mean Groundwater Elevation (ft)
SP-11	-0.9	5.8	+0.5	5.5	+0.3
SP-12	+0.0	5.0	+0.0	5.0	0.0
SP-14	+0.2	4.8	-0.3	4.8	0.0
SP-15	+0.9	11.7	+0.4	10.7	+1.0
SP-19	+0.0	3.8	+0.4	3.7	+0.1
SP-27A	-0.2	9.7	-0.1	9.9	-0.1
SP-29	+5.0	17.8	+2.2	16.6	+1.2



Standpipe ID	Change in Groundwater Elevation between last and first measurements of monitoring year (ft)	2023-2024 Average Groundwater Elevation (ft)	Change in Average Groundwater Elevation from Prior Monitoring Year (ft)	1991-2024 Historical Mean Groundwater Elevation (ft)	2023-2024 Average Groundwater Elevation from Historical Mean Groundwater Elevation (ft)
SP-30	+1.7	22.3	-0.2	13.7	+8.6

2.1.6 WESTERN EXTENSION REGION

Water levels in the Western Region are monitored with standpipe monitoring wells SP-20, -21, -22, -23 and abandoned dewatering well W-10. Water level measurements in standpipe casings SP-21 and -22 fluctuated in response rainfall and have stabilized or declined since April. Water measurements in standpipe casing SP-23 have generally been trending higher since approximately January 2021: they rose in response to this year’s rainfall; peaked in January 2024; and have since lowered to below pre-rainfall levels. Water level measurements in standpipe SP-20 continued to decline from a peak in May 2023.

Table 7: Western Extension Water Level Monitoring

Standpipe ID	Change in Groundwater Elevation between last and first measurements of monitoring year (ft)	2023-2024 Average Groundwater Elevation (ft)	Change in Average Groundwater Elevation from Prior Monitoring Year (ft)	1991-2024 Historical Mean Groundwater Elevation (ft)	2023-2024 Average Groundwater Elevation from Historical Mean Groundwater Elevation (ft)
SP-20	-7.6	205.8	+48.0	185.2	+20.6
SP-21	+7.3	399.1	+4.9	382.2	+16.9
SP-22	+0.0	467.9	-5.6	467.7	+0.2
SP-23	-7.4	531.7	+21.2	497.1	+34.6

2.2 SLOPE INCLINOMETERS

Yeh surveyed a total of 23 inclinometers during the monitoring year. Plate B-1 is a map that summarizes the locations and status of all known, active and abandoned inclinometers, annotated with interpreted movement for the 2023-2024 monitoring year. Inclinometers are surveyed quarterly, semi-annually, annually or on an accelerated schedule depending on the inclinometer location and the past and recent movement history. Inclinometers were surveyed using a vertical traversing probe that measures the tilt of the casing at 2-foot intervals. Inclinometer data were collected via Bluetooth onto a field tablet and processed by comparing each tilt measurement to previous surveys.



Inclinometer data processing and presentation utilized DigiPro2 software (Slope Indicator, 2014) and used a post Q1 2021 survey as a baseline (unless otherwise noted). Updated baselines are generally used following a change or repair to the cable and/or servicing of the inclinometer probe sensors and carriage. Appendix B includes plots of cumulative change and incremental change in the A and B directions for each inclinometer surveyed during the monitoring year. The plots in Appendix B also provide construction details and notes of interpreted past and current movement, as applicable. Resultant plots in the polar and profile view are attached for inclinometers that display quantifiable movement or interpreted possible movement. Of the inclinometers surveyed, SP-11 located in the eastern PCH Region measured shear displacement on the order of 0.1 inch and SP-26 in the Headscarp region measured possible displacement on the order of 0.1 inch.

A summary of the inclinometer results by region is presented below.

2.2.1 HEADSCARP REGION

SP-26 is the only usable inclinometer in the Headscarp Region and was surveyed approximately quarterly and following seismic and major rain events during the monitoring year. Possible displacement of approximately 0.1-inch occurred at between depths of 30 to 40 feet and bearing approximately 155 to 160 degrees. Most of the possible displacement occurred between the February and March 2024 surveys following a period of rainfall. The depth and bearing of potential movement appear to be consistent with previously reported movements (D.A. Evans, 1986 V5). More data needs to be acquired to validate potential measured displacement.

D.A. Evans Inc. reported that the SP-26 casing had closed off at approximately 41 foot depth by July 1984 and was later repaired by replacing the upper approximately 40 feet of casing (DAE, 1986 V4), that was reportedly backfilled with a foam product (BYA, 95-96). SP-26 continues to display sensor stabilization lag in the upper 40 feet which may indicate an issue with the backfill. The casing is also significantly tilted and/or curved at depths of 30, 40 and 80 feet.

Prior movement recorded on SP-26 occurred at approximately 40-foot depth and has been interpreted to have occurred on a shallow sub-slide and not the basal landslide shear plane. Therefore, only the top 100 feet of casing has been monitored quarterly. The entire depth of SP-26 should continue to be surveyed annually.

2.2.2 EASTERN REGION

Two inclinometers were monitored approximately quarterly within the Eastern Region: PC-1 and SP-3A. Neither SP-3A or PC-1 displayed discernable shear-type movement during the monitoring year.



Inclinometer SP-11 is located in the PCH Region directly south of the Eastern Region and near the toe of the 1983 landslide. SP-11 is considered relevant to the Eastern Region and is included in this section. Inclinometer SP-11 displayed shear-type displacement of approximately 0.1-inches between the December 2023 and April 2024 surveys at approximately 16 feet deep and bearing approximately 175 degrees. This depth and bearing are consistent with previous and historical movements reported on SP-11.

2.2.3 CENTRAL REGION

Five inclinometers were monitored approximately quarterly, or annually in the Central Region: SP-9A, SP-16A, SP-17B, SP-35 and SP-36. Inclinometer SP-9A was not surveyed during this monitoring year due to resistance within the casing when passing the initial, sacrificial probe. Yeh will re-assess the casing and re-attempt the survey during the next monitoring year. Prior deformation on this casing occurred below the currently measurable depth of the casing. Inclinometers surveyed during this monitoring year did not display discernable shear-type displacement.

2.2.4 BLUFF REGION

Two inclinometers were surveyed within the Bluff Region: SP-32 and SP-34. The inclinometers did not display discernable shear-type displacement during the monitoring year.

2.2.5 PCH REGION

Four inclinometers located in the PCH Region are surveyed approximately annually: SP-12, SP-14, SP-15 and SP-19. Four more key inclinometers: SP-11, 27A, -29, and -30 were surveyed approximately quarterly or more frequently in response to rainfall events and seismic activity. SP-19 has not been able to be surveyed as of this report because of limited access due to construction. SP-19 has no history of deformation and is located outside of the landslide perimeter. Inclinometer SP-11 recorded movement which is discussed in Section 2.2.2 Eastern Region. The other seven inclinometers did not display discernable shear-type movement during the monitoring year.

2.2.6 WESTERN EXTENSION REGION

Four inclinometers located in the Western Extension Region were surveyed approximately annually; SP-20, SP-21, SP-22 and SP-23. The inclinometers did not display discernable shear-type movement during the monitoring year.

2.3 SATELLITE COLLECTED INTERFEROMETRIC SYNTHETIC APERTURE RADAR (INSAR)

Yeh worked with SkyGeo, Inc. to obtain, process and interpret satellite InSAR data coverage for the monitoring year to compare with historic data already collected and discussed in the previous year's Monitoring Report. The historic data extends back to April 2015 and is one of several tools used to evaluate the status of the main slide over that time and to observe for potential areas of concern.



InSAR data was analyzed relative to long term trends and for time series isolated to the current monitoring year. A discussion of InSAR and interpretation of the data are presented below.

2.3.1 IN SAR OVERVIEW

InSAR data was acquired by the Sentinel-1 Satellite; for this project satellite imagery corresponding to C-band radar waves was used. With each satellite pass, the radar swath covers the full assessment district boundary and identifies and tracks natural reflectors over repeated passes. The data processing identified and utilized thirty-six thousand natural reflectors distributed throughout the subject area.

InSAR software processes reflectors into either Point Scatter (PS) pixels, which are usually a man-made object, or Distributed Scatter (DS) pixels, where multiple objects show a weaker reflection, at a relatively similar strength. PS pixels are generally more accurate than DS pixels in terms of georeferencing. Both types of pixels can be filtered, grouped and analyzed to interpret results and vertical displacements. The track of the satellite orbit is approximately parallel to the movement direction of the Big Rock Mesa Landslide which limits the ability to resolve horizontal displacements in that direction with useful accuracy.

Changes in the identified PS and DS pixels are tracked in the return phase of the radar wave signal and have single pass to pass measurement accuracies on the order of 6 to 8 millimeters (mm). With multiple passes over time, the accuracy of each pixel can be improved to approximately 1 to 2mm. InSAR is a precise tool for tracking and quantifying slow or creeping deformation. Large displacements between satellite passes can cause the phase of the return signal to be lost, whereas small changes can be more precisely tracked.

2.3.2 IN SAR PROCESSING AND INTERPRETATION

The following presents the results and our interpretation of the InSAR data that was processed for the project.

- There has been no reportable substantial gross, vertical displacement estimated within the body of the Big Rock Mesa Landslide or its subregions between April 2015 and the end of the current monitoring year.
- There has been no substantial movement estimated along the toe of the landslide. Therefore, we can infer that there is no substantial thrust or uplift along the toe of the landslide.
- Downslope movement estimates that occur on the faces of steep slopes are likely the result of shallow soil movement and can be tracked by DS pixels.

Figure 5 shows the entire Big Rock area with only high-quality PS pixels, which cover most of the developed residential areas. In Figure 6, DS pixels of the same quality are added to the PS pixel map and can be seen covering most of the undeveloped areas, slopes, landscaped areas, sidewalks and



roads. Both plots indicate below threshold movement rates for all areas not on a steep slope. Areas of shallow slope failures such as rockfall, debris flow and shallow slumps that occurred during heavy rain were filtered out by manual point quality selection or algorithm due to either lost coherence as a detectable DS pixel or lost phase tracking.

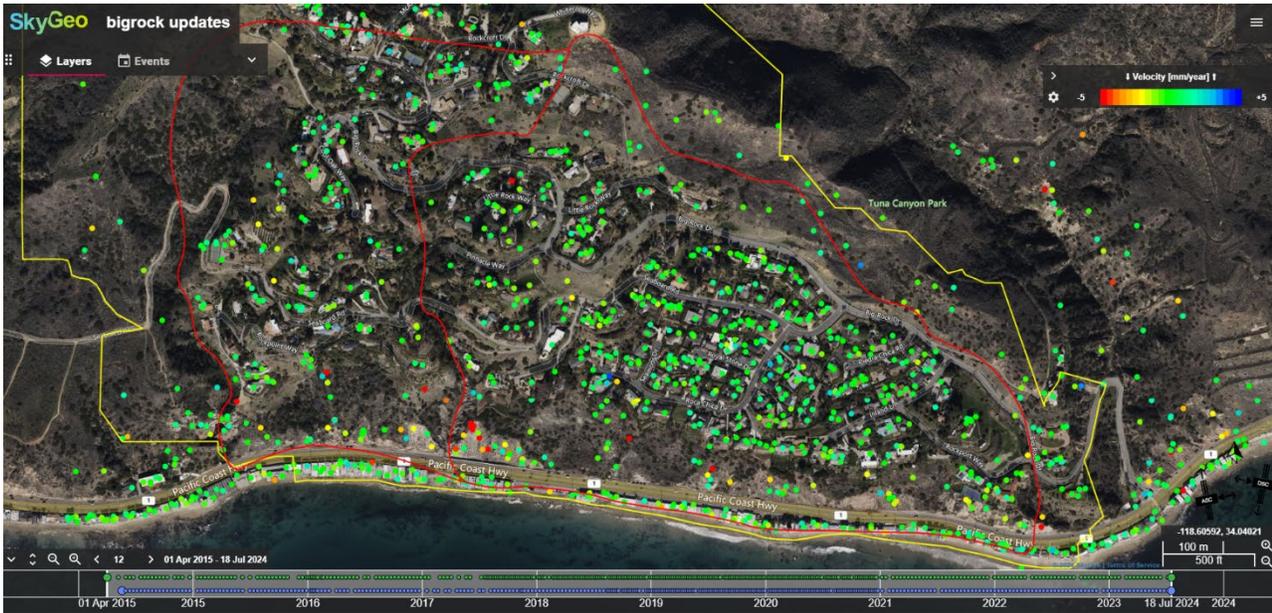


Figure 5: Highest Quality PS Pixels Only, Displacement Rate $\pm 5\text{mm/year}$

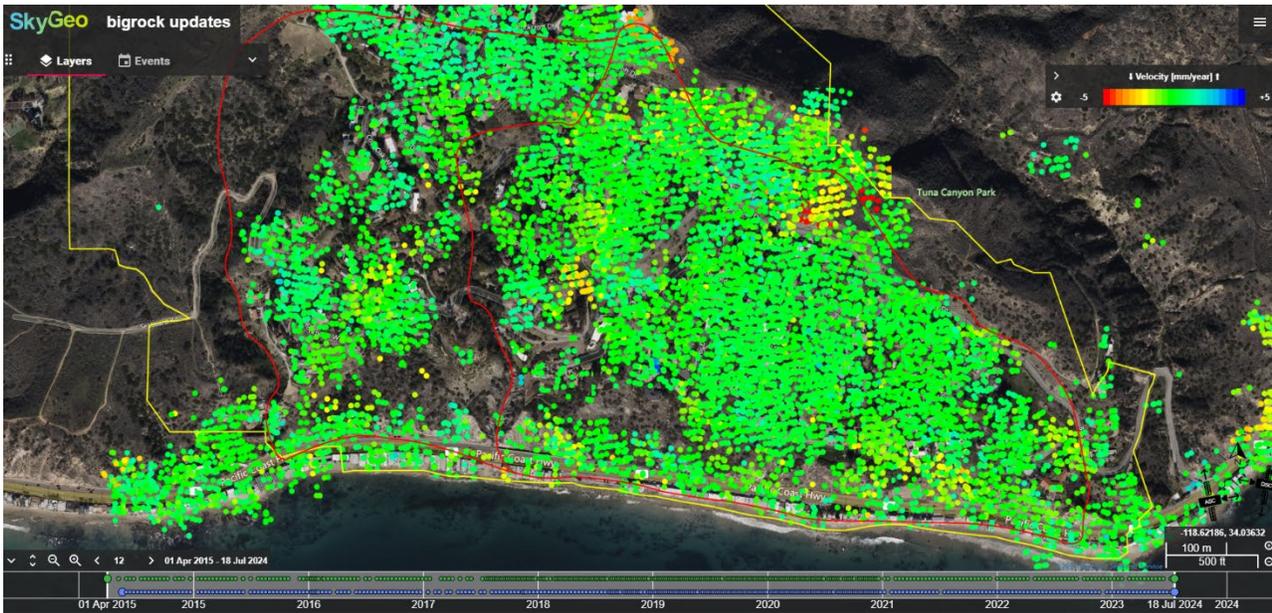


Figure 6: Highest Quality PS and DS Pixels, Displacement $\pm 5\text{mm/year}$

Figure 7 shows the results of grouping and statistics interface tool to assess PS pixels for the non-slope areas of the Eastern Region. The calculated average displacement for the area is -0.1mm/year

with no obvious trend of displacement over time and no distinct displacements at a given point. This calculated rate is below the margin of error. This process was performed for each project subregion and yielded similar results.

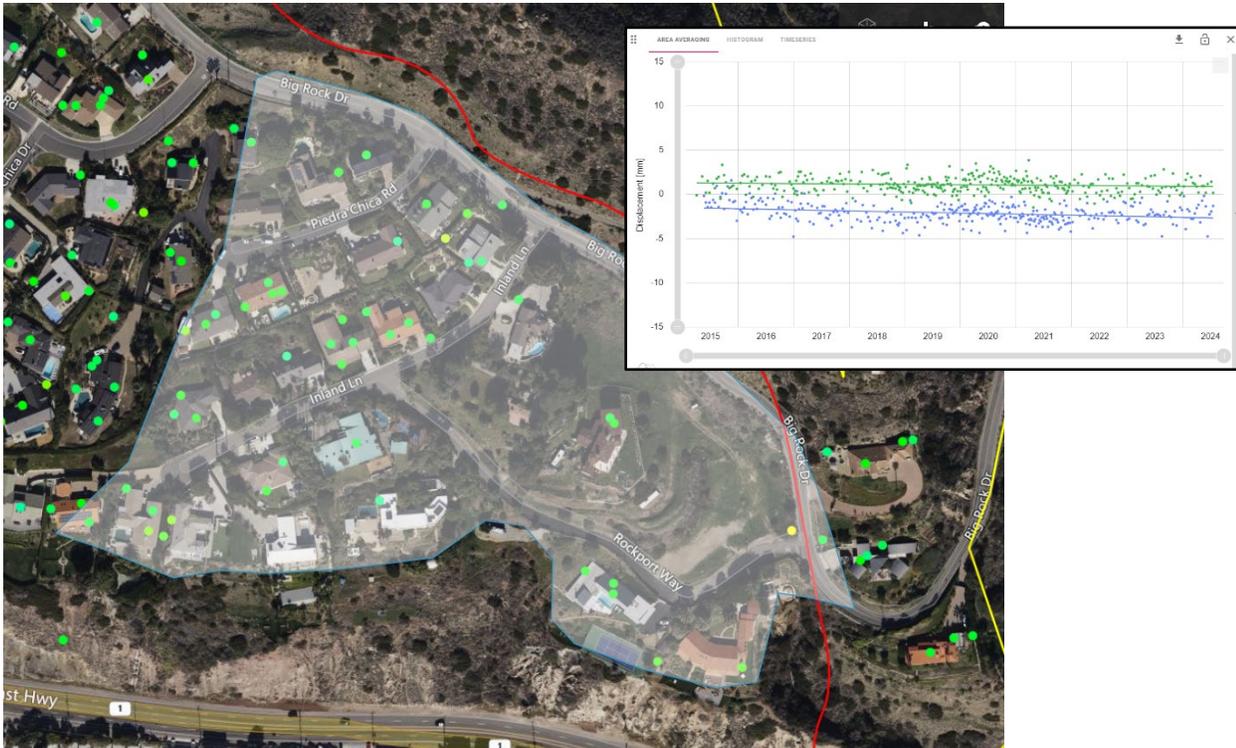


Figure 7: Eastern Region, Non-slope Area Averaging, Highest Quality PS Pixels Only area averages = -0.1 mm/year are within margin of error

2.4 CRACK MONITORING

Yeh measured five of the six PK-nail crack gauges that were installed in January 2021 at the following locations: two on Pinnacle way cul-de-sac, one at the intersection of Pinnacle Way and Big Rock Drive, one at the intersection of Big Rock Drive and Cool Oak Way, one at the hairpin turn on Big Rock Drive south of Rockport Way and one in the Seamoor Drive cul-de-sac. The crack gauge located on Lower Big Rock Drive near Rockport Way was previously damaged and was not measured. Five of the crack gauges were installed in areas where cracks in the road had been identified and are in areas where cracking had been mapped during the 1983 landslide. One crack gauge was installed on Seamoor Drive across a crack with similar morphology as other visible cracks in an area but where no previous landslide-related cracking had been mapped.

Results for the five measured crack gauges are attached in Appendix C. No measurable displacement was observed on the crack gauges since the last monitoring year. No measurable displacement has been recorded on the crack gauges since installation.

3. WATER BUDGET TRACKING

3.1 RAINFALL DATA

Yeh obtained rainfall data for the monitoring year from the Big Rock Mesa Rain Gauge #1239 operated by the Los Angeles County Department of Public Works (LADPW). Prior to 1984, rainfall data was obtained from the Carbon Canyon Rain Gauge #447C and after 1984 from the onsite Big Rock Mesa Rain Gauge #1239. For this report, a 40-year rainfall average of 16.44 inches from the Big Rock Mesa Rain Gauge is used as an annual average.

Plate 3 - Rainfall Graph displays historical monthly and water year annual rainfall for the Big Rock Mesa area from October 1968 through September 2024. Recorded rainfall for the Big Rock Mesa area over the monitoring year from July 1, 2023 to June 30, 2024 totaled 32.37 inches, which is 15.93 inches above the 40-year Big Rock Mesa Rain Gauge running average of 16.44 inches. The recorded rainfall total for the water year from October 1, 2023, to September 30, 2024 totaled 27.92 inches.

This year was the second consecutive year of above average rainfall. The monitoring year rainfall total of 32.37 inches was the most recorded since 2005. The monthly total for February 2024 of 14.88 inches was the most recorded in a month since 17.0 inches was recorded at the Carbon Canyon Rain Gauge in February of 1998.

Plate 4 – Annual and Cumulative Deviation from Mean Rainfall vs Total Dewatering Production, shows rainfall deviation from the 40-year mean and compares rainfall amounts to total dewatering output changes.

3.2 IMPORTED WATER USAGE

Yeh collected monthly water usage readings for Big Rock Mesa from the Los Angeles County Department of Public Works master water meter #138193 located at the corner of Rockport Way and Big Rock Drive and acquired monthly meter data directly from the LA Country Waterworks District 29. The average water imported to the site for the monitoring year was 118.7 thousand gallons per day (gpd). This is 2.7-percent more than the 2022-2023 monitoring year which was the lowest annual average since the 1994-1995 monitoring year. Imported water usage typically decreases in response to rainfall, most likely mostly due to reduced landscaping irrigation. A plot of monthly usage and water usage trendline is included on Plate 5 – Total Dewatering Production and Total Water Consumption.

3.3 DEWATERING

Yeh tracks dewatering production for pumping dewatering wells installed throughout the regions and horizontal gravity drains (hydraugers) installed at the base of the Bluff Region slopes. The 2023-2024 monitoring year dewatering production averaged 84,267 gpd, which is an increase of 5-percent from



the previous monitoring years' average production of 80,503 gpd and was the highest annual average dewatering production since the 2005-2006 monitoring year. Production Rates peaked in February at a monthly average production of 115,337 gpd which was the highest monthly production since April of 2005. The continuing above average production rates are a response to the high rainfall totals from December through March. Approximately 75-percent of the total dewatering production was pumped from dewatering wells and 25-percent was measured from hydraugers.

3.3.1 DEWATERING WELL PRODUCTION

Yeh performed monthly monitoring of production for the 24 active dewatering wells. Well production is measured approximately monthly for each well by reading flow totalizers that are installed along the discharge line. A summary of well production and well status is presented on Appendix C-1. A plot for historical production and a plot for monitoring year production vs daily rainfall for individual wells are included in Appendix C. A graph showing total dewatering well production since 1993 is included on Plate 5.

Average total well production for the monitoring year was 63,525 gpd which is 3-percent lower than last year's average production of 65,519 gpd, 21.4-percent more than the historical production average of 52,325 gpd calculated from 1993 to present and 6-percent less than the maximum recorded production of 69,741 gpd during the 2004-2005 monitoring year.

3.3.2 HYDRAUGER PRODUCTION

Yeh performed monthly monitoring for 36 hydraugers. Hydrauger production is measured directly from a sampling port installed on each hydrauger. A graph showing total hydrauger production since 1993 is presented on Plate 5. Production plots and status for individual hydrauger locations are included in Appendix C.

Annual average hydrauger production during the monitoring year was calculated to be 20,743 gpd which is approximately 38-percent higher than last year's average monthly production of 14,984 gpd. Hydrauger production fluctuated over the monitoring year in response to rainfall. As is typical for the hydraugers, production rate responses appear to occur sometime after rainfall with this years peak production occurring in April. The April 2024 monthly average production was the highest monthly average recorded since April 2005.

4. SEISMIC EVENTS SUMMARY

Eight earthquakes with a magnitude of 4.0 or greater were recorded within a 100-mile radius of the project area (See Figure 8). Earthquake magnitudes ranged from M4.09 to M5.08 with epicentral distances ranging from 16.6 to 79 miles. The largest event was reported as M5.08 and located 79 miles to the northwest, near Ojai, CA).



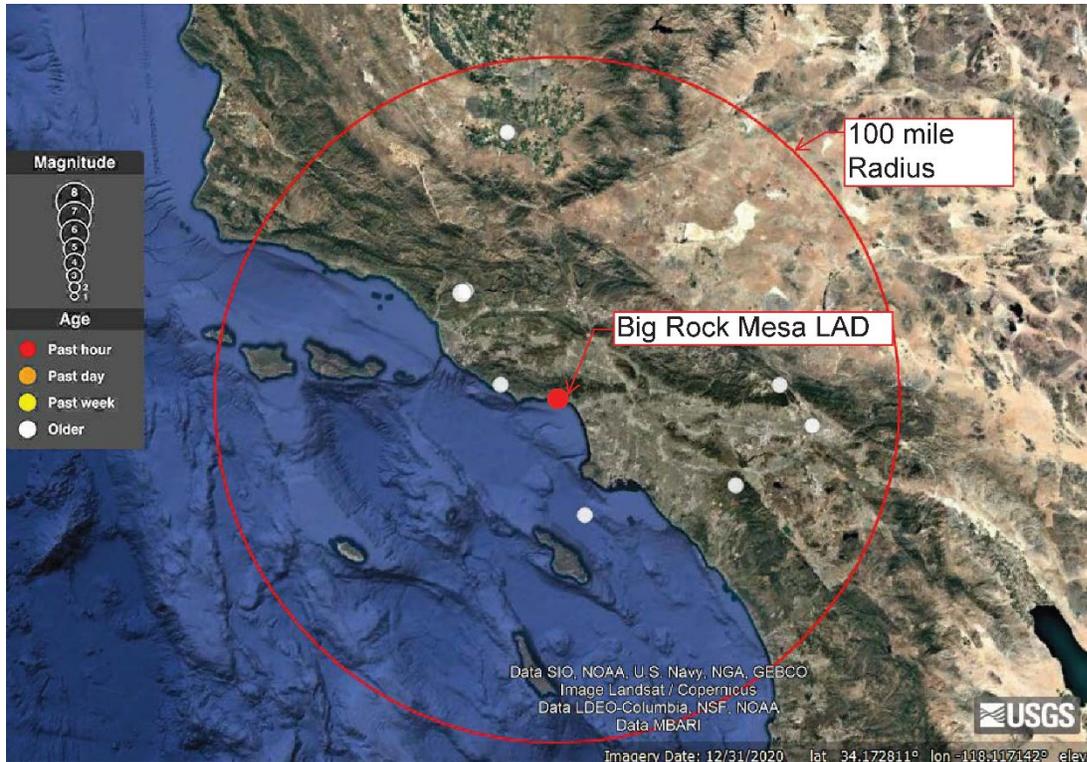


Figure 8: M4.0+ earthquakes within 100-miles of Big Rock Mesa LAD between 7/1/2023 and 6/30/2024

Yeh personnel performed post-earthquake observations and measurements that included surveying of key inclinometers and/or field observations of the ground surface made during scheduled monitoring and maintenance before and after the earthquake events. Small movement measured on inclinometer SP-11 and small possible movement on SP-26 that occurred during Q1 2024 cannot definitively be attributed to seismic activity. Yeh staff did not observe surface displacements related to any of the earthquakes and is unaware of any reports of damage local to the Big Rock Mesa Landslide AD resulting from the earthquake.

5. GROUNDWATER QUALITY MONITORING

The City of Malibu has permitted the dewatering discharge with the Los Angeles Regional Water Quality Control Board (Water Board) under the National Pollutant Discharge Elimination System (NPDES) under permit CAG994004 order number R4-2018-0125 implemented July 1, 2022. A Notice of Intent to comply with upcoming order R4-2023-0429 was delivered to the RWQCB on March 19, 2024. The new order has not yet been received from the RWQCB. Yeh and the City continue to coordinate with the Water Board regarding our test results, sampling procedures, and future effluent limits.

Yeh and Associates, Inc., as a consultant for the City, performed the NPDES monitoring and reporting for this monitoring year in general accordance with the active permit. Analyses were conducted at

certified laboratories, in accordance with current U.S. Environmental Protection Agency procedures. Analytic results of the water quality sampling for each quarter are attached in Appendix E - Quarterly Results. Quarterly Discharge Monitoring Reports were submitted the Water Board for Q3 and Q4 of 2023 and Q1 and Q2 of 2024 for 2023-2024 monitoring year.

6. ADDITIONAL OBSERVATIONS

The following additional field observations were made by Yeh staff over the monitoring year that will continue to be considered and tracked for future improvement projects.

- Following heavy rainfall in December through March, numerous shallow rockfall, soil and debris flows occurred along the PCH bluffs and on the slopes below north peak. Yeh performed on-ground and drone flight reconnaissance through the area. Where observed, the slope features appear to be the result of surface runoff causing erosion and ground saturation but are unrelated to movement of the overall Big Rock Mesa Landslide.
- Areas of seepage were identified within a few feet above road elevation along the base of the PCH bluffs in the Eastern Mesa Region between about Mile Post 42.690 and 42.711. The seeps generally appeared after January 2024 and contributed to water ponding along the shoulder of PCH. Most of the seeps have since dried up or slowed.
- Yeh continued to observe changes in the condition of two intermittent water seeps behind the existing soldier pile wall between hydraugers HD-12 and HD-10. No significant changes were observed over the monitoring year.
- Mass wasting along the PCH bluffs has buried or damaged several District hydrauger facilities. Yeh performed repairs to limit flooding on the PCH shoulder; however, some of the facilities remain buried or inaccessible. Yeh and the City are coordinating with Caltrans to excavate District facilities while they perform their normal shoulder maintenance with heavy equipment.
- Yeh continues to monitor cracking along a segment of Seaboard Road in the Western Extension Region. Cracking had displaced the outer edge of the pavement where it passes across the West Contact Channel (DAS Evans, 1986) drainage channel. The condition appears related to shallow soil and possible old fill placed during construction of the road and not related to the main landslide. The area was repaved in January 2024.

7. MAINTENANCE AND CAPITAL IMPROVEMENTS

A summary table of the maintenance and capital improvement activities performed over this monitoring year is provided on Plate 2. Typical maintenance activities to dewatering wells include evaluating, troubleshooting, and replacing or repairing dewatering well pumps, well electronics and well controls, repairs to well equipment vaults, and repairs to well discharge lines. Typical maintenance to hydraugers included PVC repairs within the PCH Region along Highway 1 or within the conveyance piping for discharge. Capital improvements include replacement and rehabilitation of existing facilities and special projects to improve the monitoring and maintenance capabilities. Yeh



performed numerous maintenance and repairs to dewatering facilities and improvements to the project assets throughout the monitoring year.

It should be noted that several hydraugers along the base of the PCH bluffs were damaged or buried by rockfall between December and March following rainfall events. Most of the damaged locations have either been repaired or have undergone temporary repairs. Some of the locations remain buried while Yeh and the City coordinate with Caltrans to excavate the facilities during their shoulder clearance maintenance work.

8. CAPITAL IMPROVEMENT AND SPECIAL PROJECTS

8.1 WORK IN PROGRESS

The following capital improvement and special projects have been estimated and are in planning and implementation phases.

- Install one, up to 350-foot-deep inclinometer in the Eastern Region along north side of Rockport Way between BYA-5 and SP-3A.
- Install one, 100-foot-deep inclinometer along PCH below Rockport Way
- Install one, 100-foot-deep inclinometer in the Headscarp Region to Replace the upper portion of SP-26
- Install non-traversing sensors in inclinometers SP-11, PC-1
- Install a grouted time-domain reflectometer cable and vibrating wire piezometer in abandoned inclinometers SP-33, SP-17A or 17, SP-16, SP-24 and SP-28.

8.2 FUTURE IMPLEMENTATION

The following improvement projects have been identified and are being tracked and planned for future consideration.

- Replace corroded well control boxes for dewatering wells BYA-7, W-17, W-2 and BYA-11.
- Continue efforts to install and implement remote transmitting or continuous datalogging flowmeters and pressure transducers for dewatering production and water levels.
- Continue efforts to design and implement well controls that better protect pumps from wear than the current pump-savers alone.
- Rehabilitate dewatering wells W-1 and BYA-9 and attempt to recover well depth by removing existing sediment at well bottom.
- Perform maintenance and implement chemical treatment schedule for iron oxide bacteria conditions in selected wells: BYA-1, W-1, BYA-9 and W-18.

- Perform maintenance and implement chemical treatment schedule for dewatering well FW-1 to improve water quality results for NPDES compliance.
- Replace dewatering wells BYA-1 and W-3 to original depths to restore/improve dewatering system capabilities.

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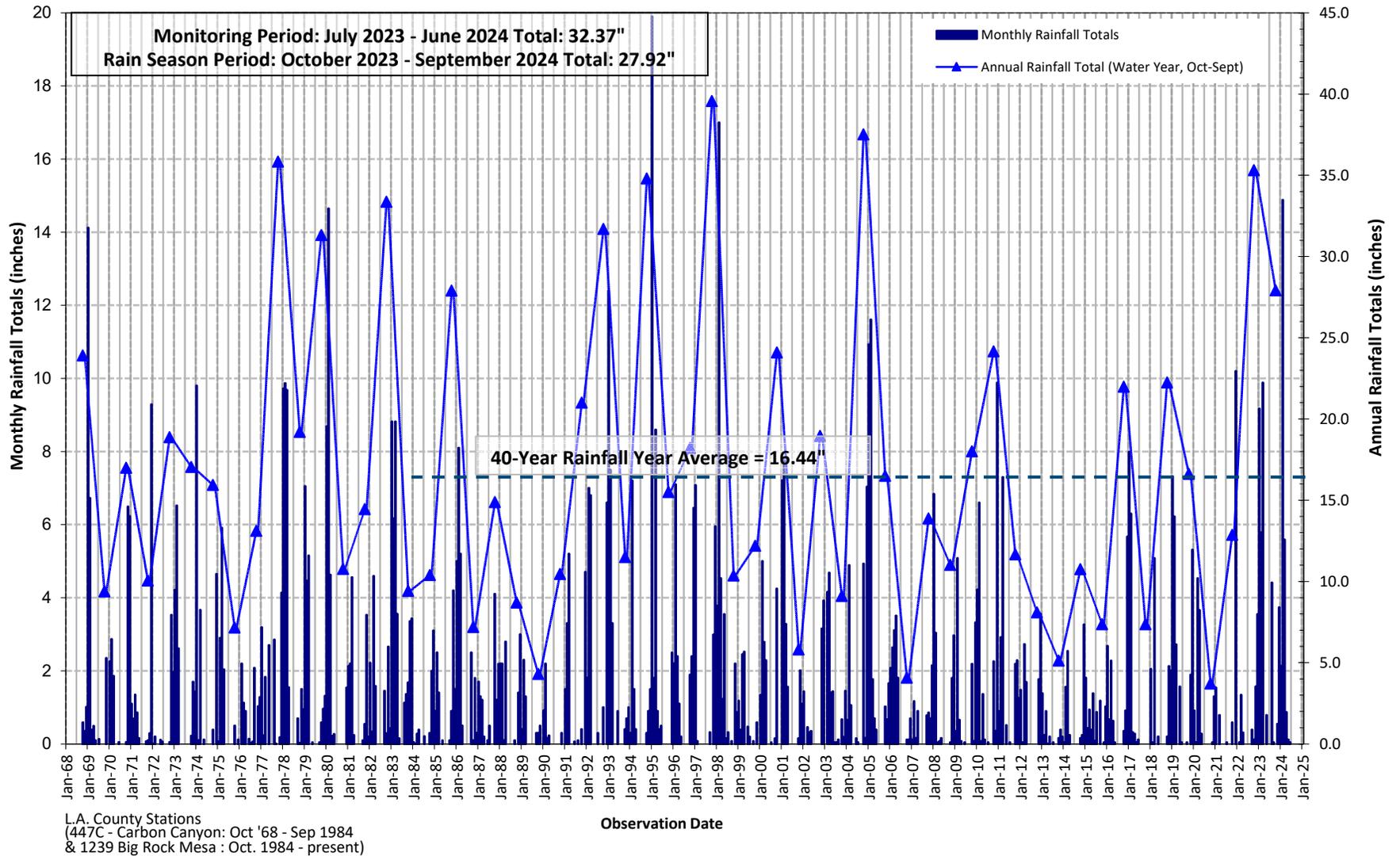
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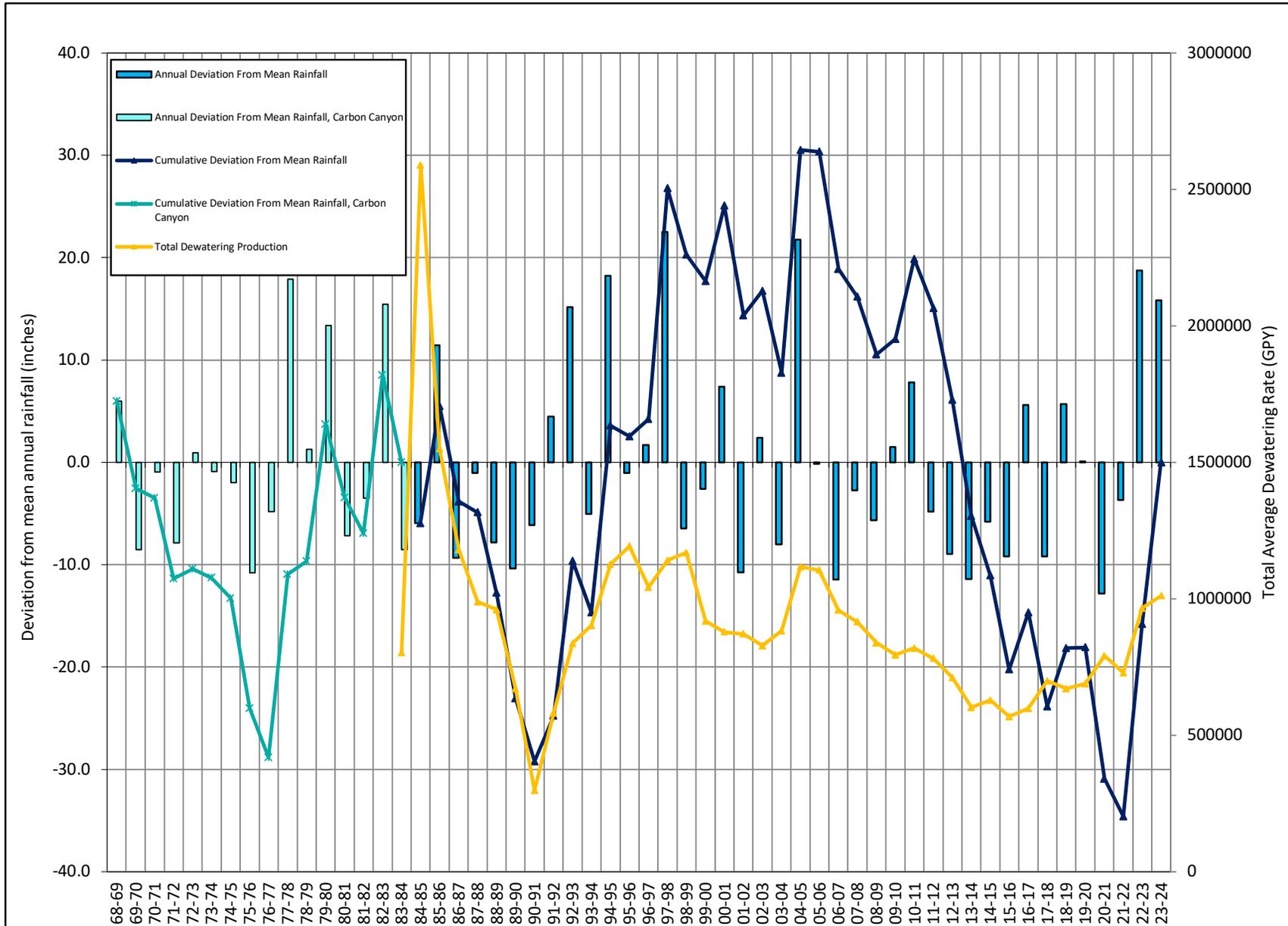
FY 2023/2024 Facilities Maintenance Log

Date Entered	Type	Facility ID	Description/Observation	Maintenance Performed and Status
2/2023	DW	BYA-1	Pump is producing below expected GPM and backpressure is creating leaks in discharge line in vaults	<ul style="list-style-type: none"> Assessed that discharge line under Royal Stone court may be partially occluded by deposits. Consulting with plumbers to have discharge line rooted. Investigating possible chemical treatment for discharge line Repairs are pending
2/2023	DW	BYA-1	Discharge is leaking at well head after new pump install and spraying into vault was previously repaired twice but new leak has started	<ul style="list-style-type: none"> 11/8/23: CP sawed discharge and removed leaking, corroded 1" valve. Leaking at new location 3/13/24: CP removed and replaced more leaking corroded fittings and repaired leak and tested for leaks. Repair complete
7/2023	DW	BYA-1	Decreasing GPM	<ul style="list-style-type: none"> Continued to check GPM and Amps. Amps continue normal and GPM continues to decrease, pump is pumping continuously and not drawing down in well. 2/7/24: Coast pump removes pump and installs new 1HP pump and 10GS10 motor. Assessed that bacterial slime on pump intake is cause of reduced GPM. Acidized and recirculated well after pump install. Well should be acidized quarterly ongoing. Repair completed.
2/2/2024	DW	W-18	Unable to measure GPM during well check, pump switches off immediately or will not start	<ul style="list-style-type: none"> 2/8/24: assessed by Yeh, one of two circuit breakers was tripped, reset pump at normal gpm an Amps. 2/22/24 and 2/23/24: Re-assessed by Yeh. Pump is getting switched off properly by pump saver and tripping breaker on restart. Reduced sensitivity on pump saver and recirculated 3 gpm of discharge to delay drawdown, well pumping continuously at 10 gpm. 2/28, 3/5, 3/13, 3/24, 4/10, 4/30 2024: Yeh continues to check on well when onsite and adjust recirculation volume and pump saver to keep well from shutting off, well pumping 9-10 gpm continuously. 4/30/24: meter failed, pump continuing to pump continuously at 9-10 gpm

Date Entered	Type	Facility ID	Description/Observation	Maintenance Performed and Status
				<ul style="list-style-type: none"> 6/6/24: Pump failed, will need to be removed/replaced. CP to remove pump in next FY. Repair Pending
4/30/24	DW	W-18	Flow meter failed	<ul style="list-style-type: none"> Will coordinate repair with other well maintenance. Pending.
11/2023	H	HD-9	Ground around hydrauger is saturated and wet	<ul style="list-style-type: none"> 11/27/2023: assessed hydrauger, no visible leaks, excavated and did not locate conveyance leak shallow enough to be easily repaired. Will repair broken hydraugers nearby and re-assess after period of no rain. Repair pending
12/2023	H	HD-22	Hydrauger leaking and ponding on PCH shoulder	<ul style="list-style-type: none"> 12/28/23: assessed hydrauger and found clog a few feet inside of conveyance, clog was cleared and flow to discharge resumed. Repair Completed.
January to March 2024	H	PCH Hydraugers	Heavy rains resulted in debris flows/rockfall that have damaged and buried hydraugers. It has Not been safe enough to assess along PCH earlier.	<ul style="list-style-type: none"> 3/12/and 3/19/24: Assess conditions of all PCH hydraugers Post winter storms Buried hydraugers include HD-43, -10, -11, -12, -24, -39 Damaged hydraugers include: HD -28, -29, -34, -33, -42, -9, -30, -5, -6
January to March 2024	H	HD-42	Broken by rockfall at slope face and at conveyance, condition of buried portion of conveyance unknown	<ul style="list-style-type: none"> Excavated hydrauger and attached flexible tubing to flow to port.
January to March 2024	H	HD-5, -6 and -23	Broken by rockfall and disconnected from conveyance, ponding water onto PCH shoulder and bike lane	<ul style="list-style-type: none"> Excavated hydrauger and established temporary connection to conveyance. HD-6 is possibly broken further in slope face.
4/23/24	H	HD-43	4/24/23: hydrauger conveyance broken and buried by rockfall during March rain	<ul style="list-style-type: none"> Hydrauger conveyance was repaired after January rain, considering options to improve position of conveyance.

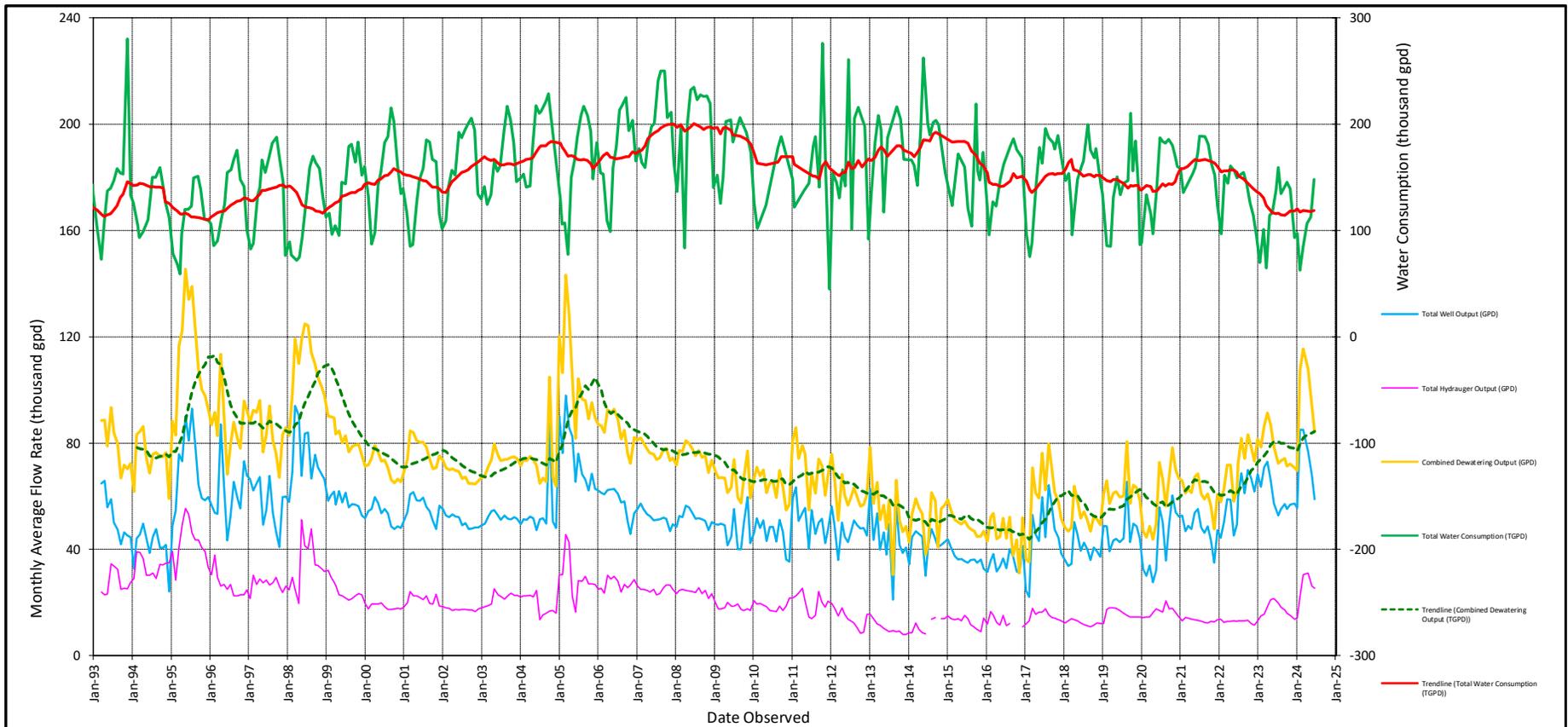


RAINFALL GRAPH
 Landslide Assessment Districts
 Malibu, California



ANNUAL AND CUMULATIVE DEVIATION FROM MEAN RAINFALL VS TOTAL DEWATERING PRODUCTION

Big Rock Mesa Landslide Assessment District
 Malibu, California



**TOTAL DEWATERING PRODUCTION AND TOTAL WATER CONSUMPTION
 Wells and Hydraugers(Combined)/Total Water Consumption
 Big Rock Mesa Landslide Assessment District
 Malibu, California**

APPENDIX A - GROUNDWATER LEVELS

Big Rock Mesa: Standpipe Monitoring Wells and Piezometer Information				
Piezometer ID	Surface Elev. (ft)	Depth (ft)	Perforation Interval Elevation (ft)	Installer
PCH Standpipe Monitoring Wells				
SP-11	27	58	Unknown	Evans
SP-12	26	40	Every 5 feet ¹	Evans
SP-14	25	30	Every 5 feet ¹	Evans
SP-15	20	82	Every 5 feet ¹	Evans
SP-19	25	82	Every 5 feet ¹	Evans
SP-27A	29	94	Every 5 feet ¹	Evans
SP-29	27	138	-111 to -106	Evans
SP-30	29	128	unknown	Evans
Bluff Standpipe Monitoring Wells				
SP-10	295	332	Every 5 feet ¹	Evans
SP-28	270	358	Every 5 feet ¹	Evans
SP-32	233	354	Every 5 feet ¹	Evans
SP-34	270	382	-112 to -107	BYA
Headscarp Standpipe Monitoring Wells				
SP-26	745	346	Every 5 feet ¹	Conv
Central Standpipe Monitoring wells and Piezometers				
SP-9A	365	300	Every 5 feet ¹	Evans
SP-16	285	240	Every 5 feet ¹	Evans
SP-16A	285	392	Every 5 feet ¹	Evans
SP-17	540	192	Every 5 feet ¹	Evans
SP-17A	540	238	Every 5 feet ¹	BYA
SP-24	370	382	Every 5 feet ¹	Conv
SP-35	345	396	-51 to -46	BYA
SP-36	380	254	120 to 125	BYA
Western Standpipe Monitoring Wells				
SP-20	430	326	Every 5 feet ¹	Conv
SP-21	660	280	Every 5 feet ¹	Evans
SP-22	780	332	Every 5 feet ¹	Conv
SP-23	860	398	Every 5 feet ¹	Conv
Eastern Standpipe Monitoring Wells and Piezometers				
PC-1	250	160	87.5 to 90	BYA
SP-3	212	132	Every 5 feet ¹	Evans
SP-3A	203	246	Every 5 feet ¹	Evans
SP-33	208	374	Every 5 feet ¹	Evans

Evans - D.A. Evans
 Converse - Converse Consultants
 BYA - Bing Yen and Associates

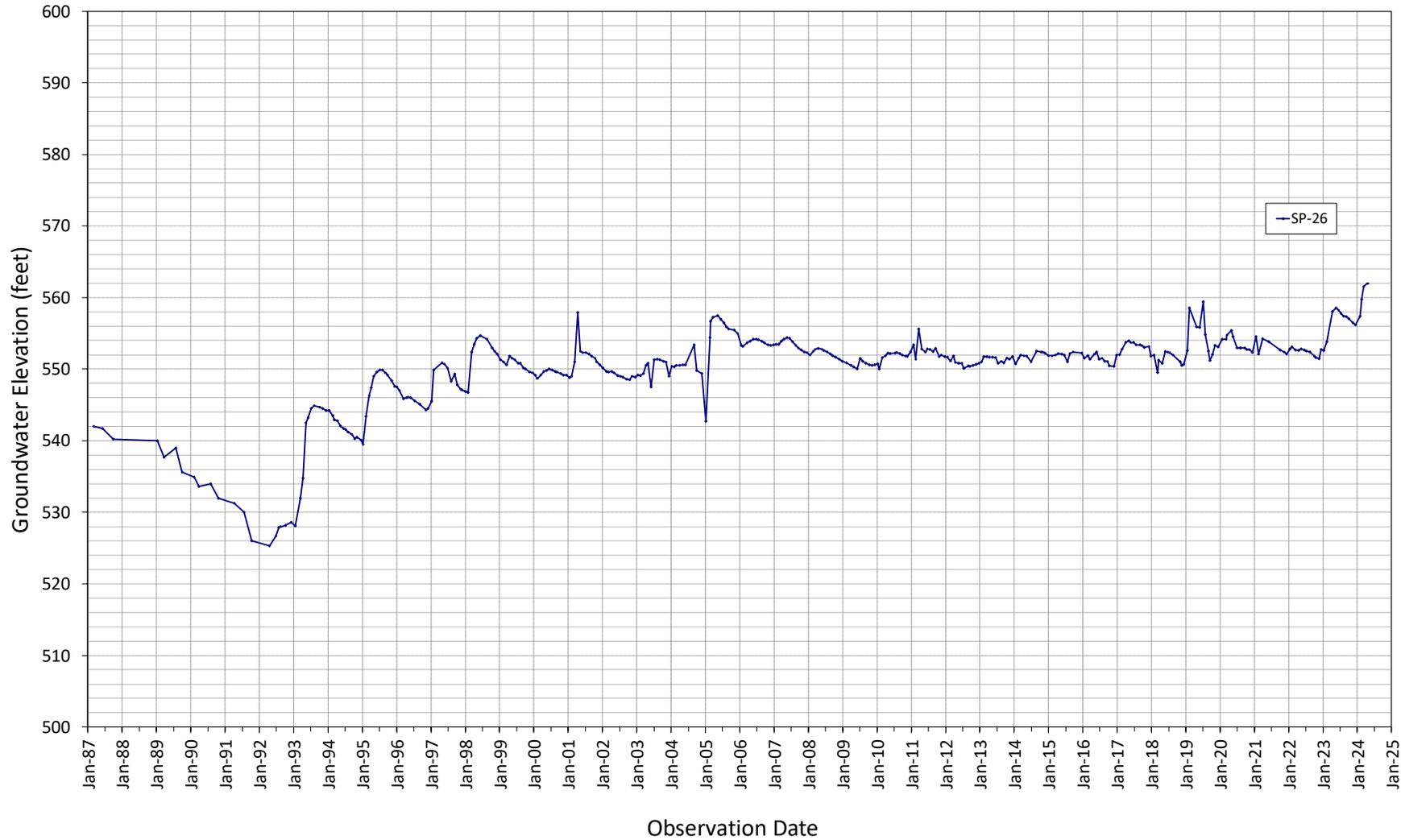
¹ 1/4" holes drilled in casing every 5' (D.A. Evans 1986)

STANDPIPE MONITORING WELL AND PIEZOMETER INFORMATION

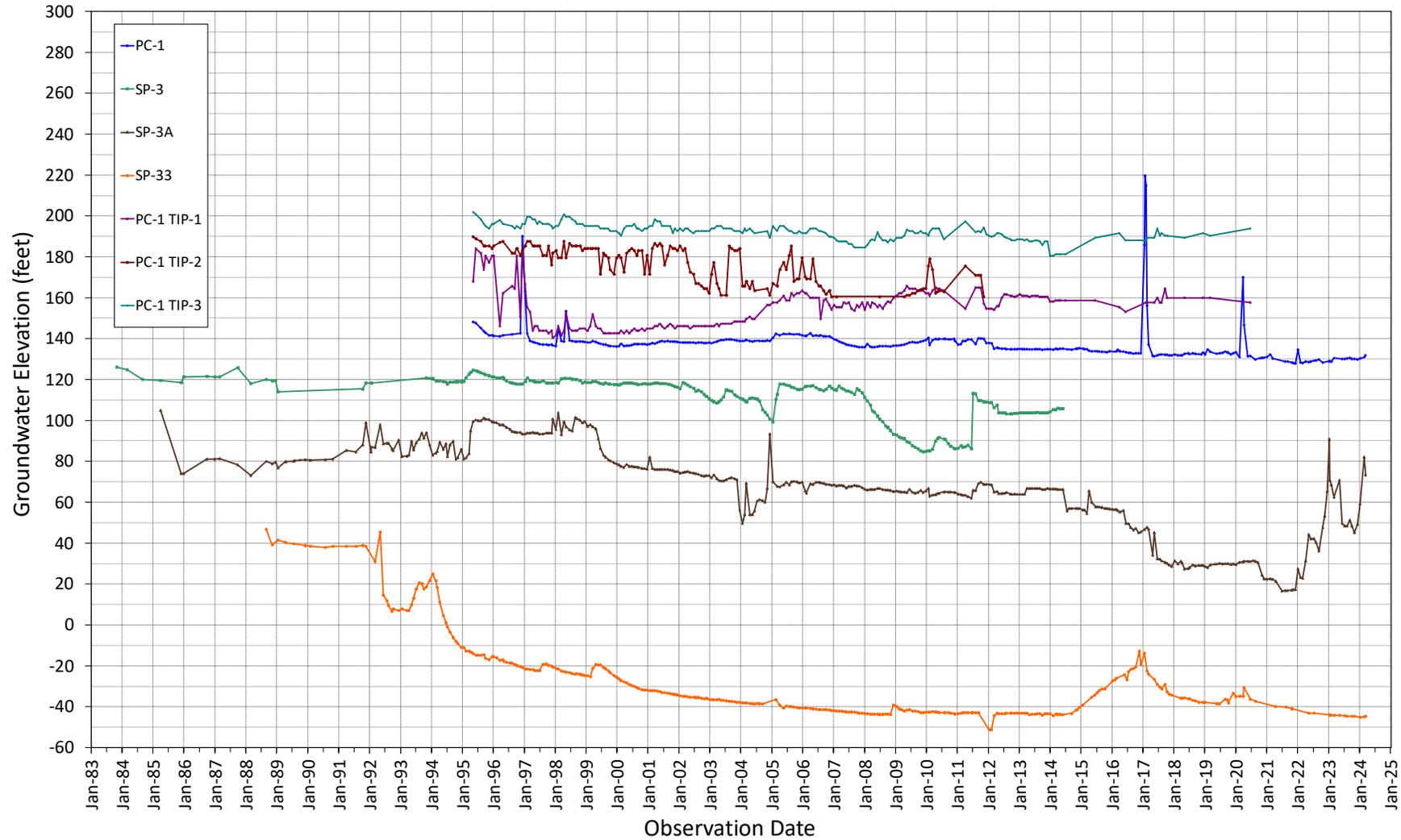
Big Rock Mesa Landslide Assessment District
 Malibu, California

PNEUMATIC PIEZOMETER INFORMATION					
Piezometer ID	Surface Elev. (ft)	Tip No.	TIP DEPTH (ft.)	INSTALL BY	STATUS
W-10**	432	230	230	BYA	Water level reported, data-logging transducer installed
W-11**	507	214	214	BYA	Air-line present, no sounder access, no data reported
W-15**	295	164	164	BYA	Air-line present, no sounder access, no data reported
PC-1	250	TIP-1	120	BYA	Functioning as of 2020, not measured during monitoring year
		TIP-2	90		0 PSI since November 2011
		TIP-3	70		Functioning as of 2020, not measured during monitoring year
		TIP-4	40		Non-Functioning, no return air flow
		TIP-5	20		Non-Functioning, no return air flow
SP-5A*	NA	TIP-1		BYA	Non-functioning - Covered by asphalt pavement
		TIP-2	NA		
		TIP-3			
SP-8A*	NA	TIP-1		BYA	Non-functioning - Covered by landslide
		TIP-2	NA		
		TIP-3			
SP-17A*	540	TIP-1	Unknown	BYA	Non-functioning, no return air flow
		TIP-2	Unknown		
		TIP-3	Unknown		
		TIP-4	Unknown		
		TIP-5	Unknown		
SP-34	270	TIP-1	381	BYA	Functioning as of 2020, not measured during monitoring year
		TIP-2	282		Functioning as of 2020, not measured during monitoring year
		TIP-3	182		Low PSI since installation, not reported
		TIP-4	82		Non-Functioning, no return air flow
SP-35	345	TIP-1	393	BYA	Functioning as of 2020, not measured during monitoring year
		TIP-2	293		Functioning as of 2020, not measured during monitoring year
		TIP-3	193		Functioning as of 2020, not measured during monitoring year
		TIP-4	98		Non-Functioning, no return air flow, not reported
SP-36	380	TIP-1	255	BYA	Functioning as of 2020, not measured during monitoring year
		TIP-2	195		Functioning as of 2020, not measured during monitoring year
		TIP-3	95		0 PSI since installation, not reported
BYA-2*	665	TIP-1	Unknown	BYA	Non-functioning, no return air flow
		TIP-2	Unknown		
		TIP-3	Unknown		
BYA-3A*	NA	TIP-1		BYA	Non-Functioning
		TIP-2			
		TIP-3	NA		
		TIP-4			
BYA-4A*	NA	TIP-1		BYA	Non-functioning, no return air flow
		TIP-2			
		TIP-3	NA		
		TIP-4			
		TIP-5			
		TIP-6			
BYA-5A*	NA	TIP-1		BYA	Non-Functioning, Paved over
		TIP-2	NA		
		TIP-3			
		TIP-4			
GEO-2 (OB-2)*	305	TIP-1		GS	Non-Functioning
		TIP-2	NA		
		TIP-3			
GEO-1*	NA	TIP-1		GS	Restricted Access (possibly malfunctioning)
		TIP-2	NA		
		TIP-3			

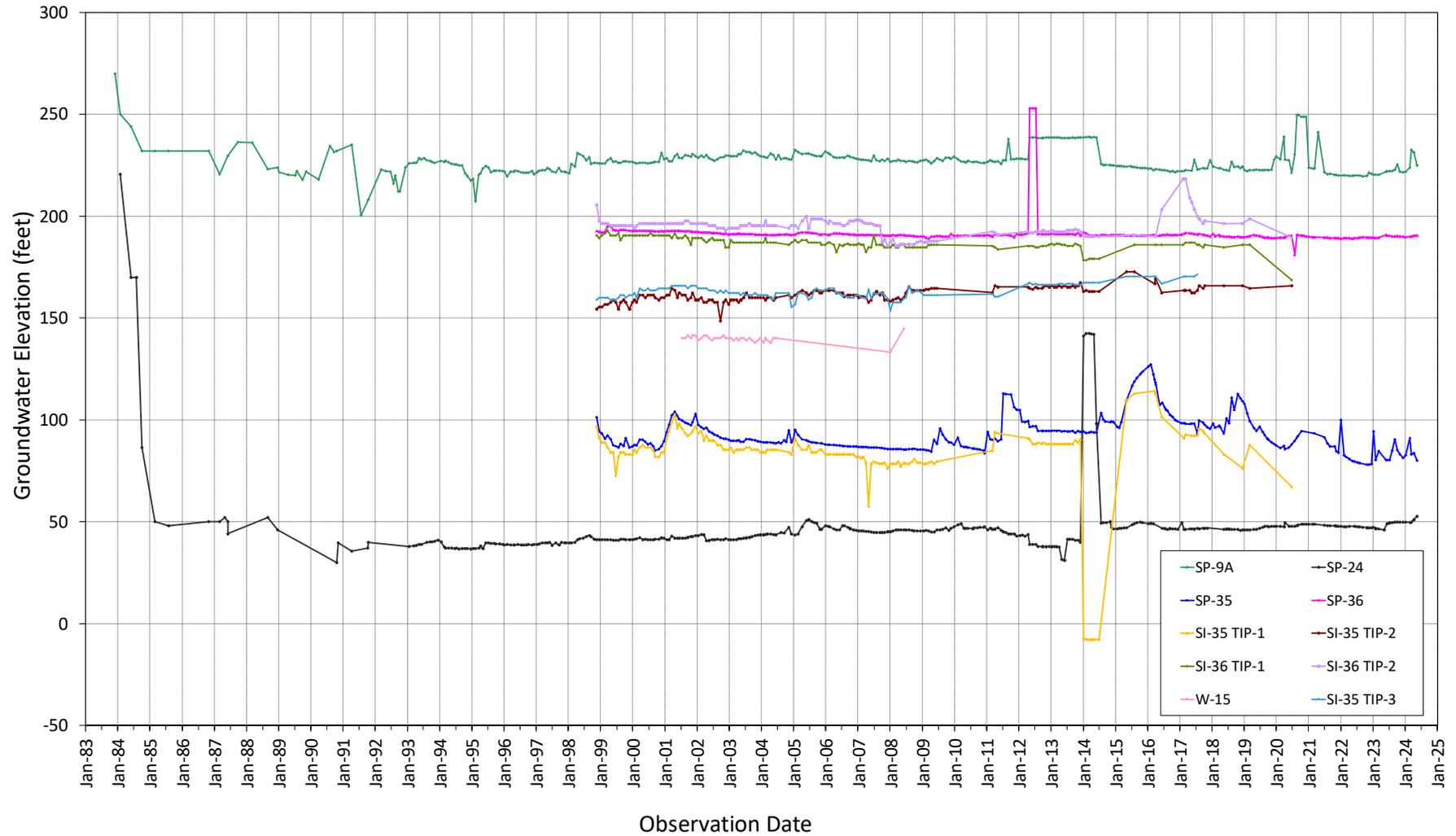
NOTE: * Not functioning or no longer monitored pneumatic piezometer
 ** Inactive dewatering well air-line



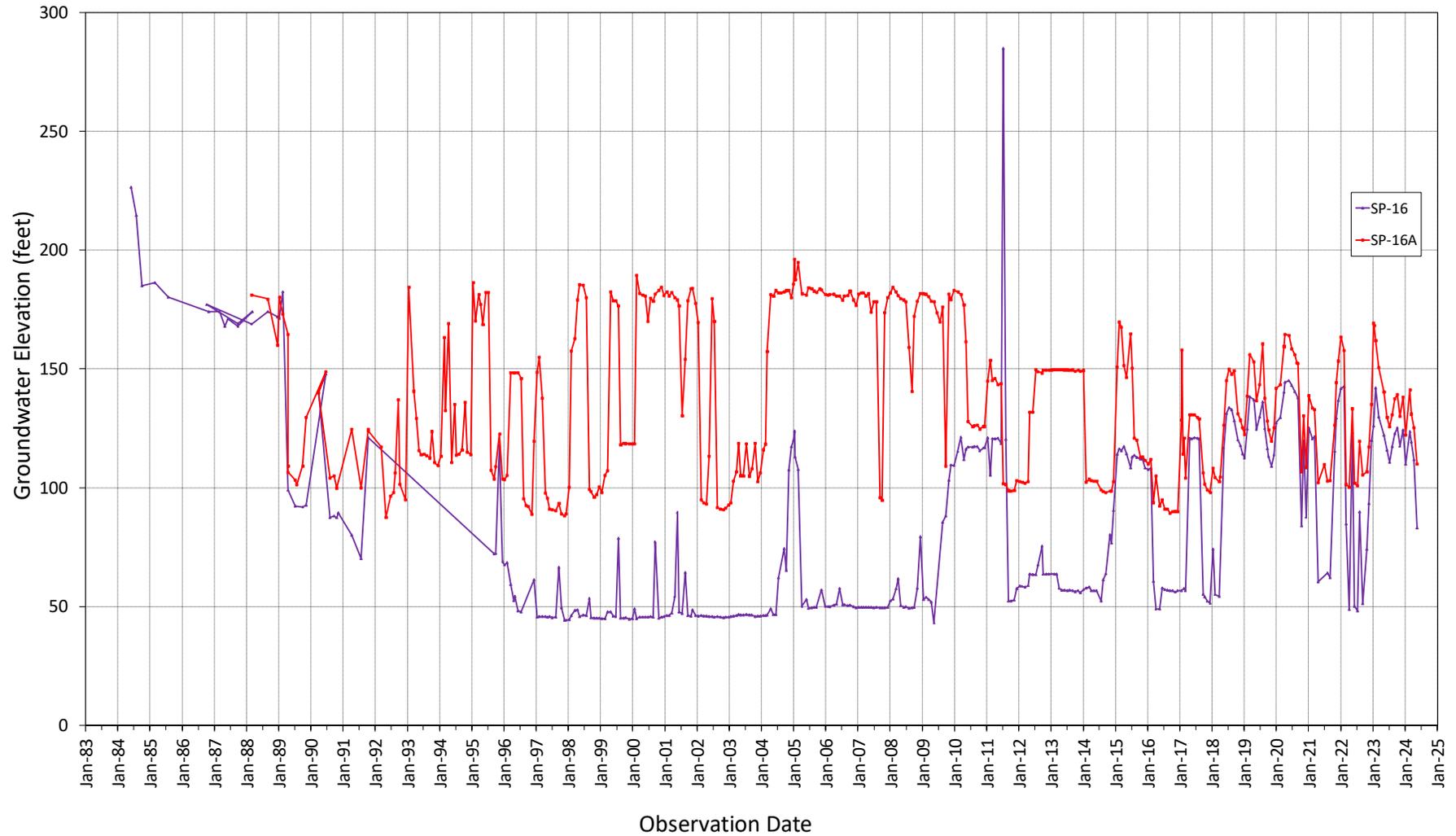
GROUNDWATER HYDROGRAPH
Headscarp Area
Big Rock Mesa Landslide Assessment District
Malibu, California



GROUNDWATER HYDROGRAPH
Eastern Mesa Region
Big Rock Mesa Landslide Assessment District
Malibu, California

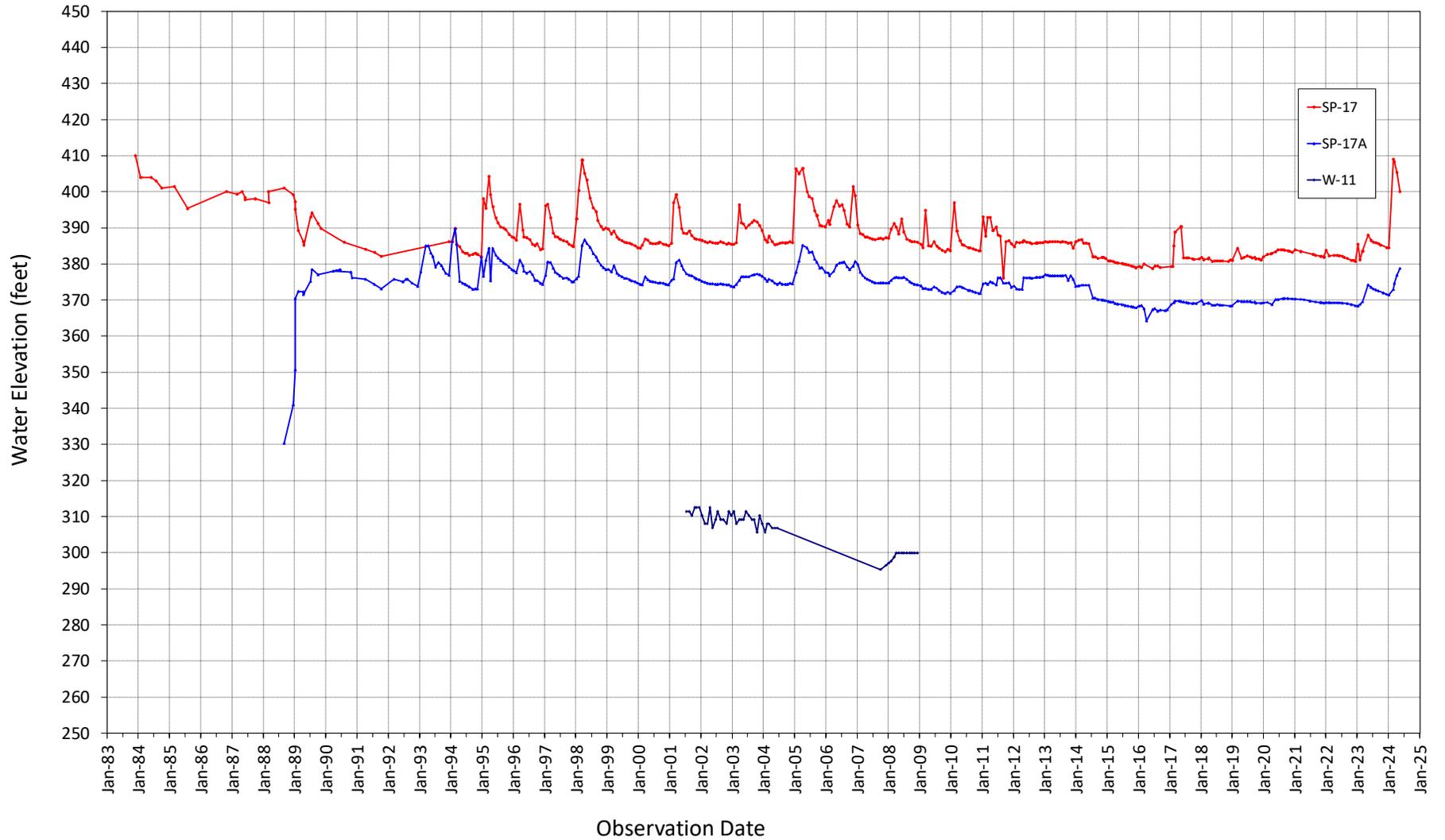


GROUNDWATER HYDROGRAPH
Central Mesa Region
 Big Rock Mesa Landslide Assessment District
 Malibu, California

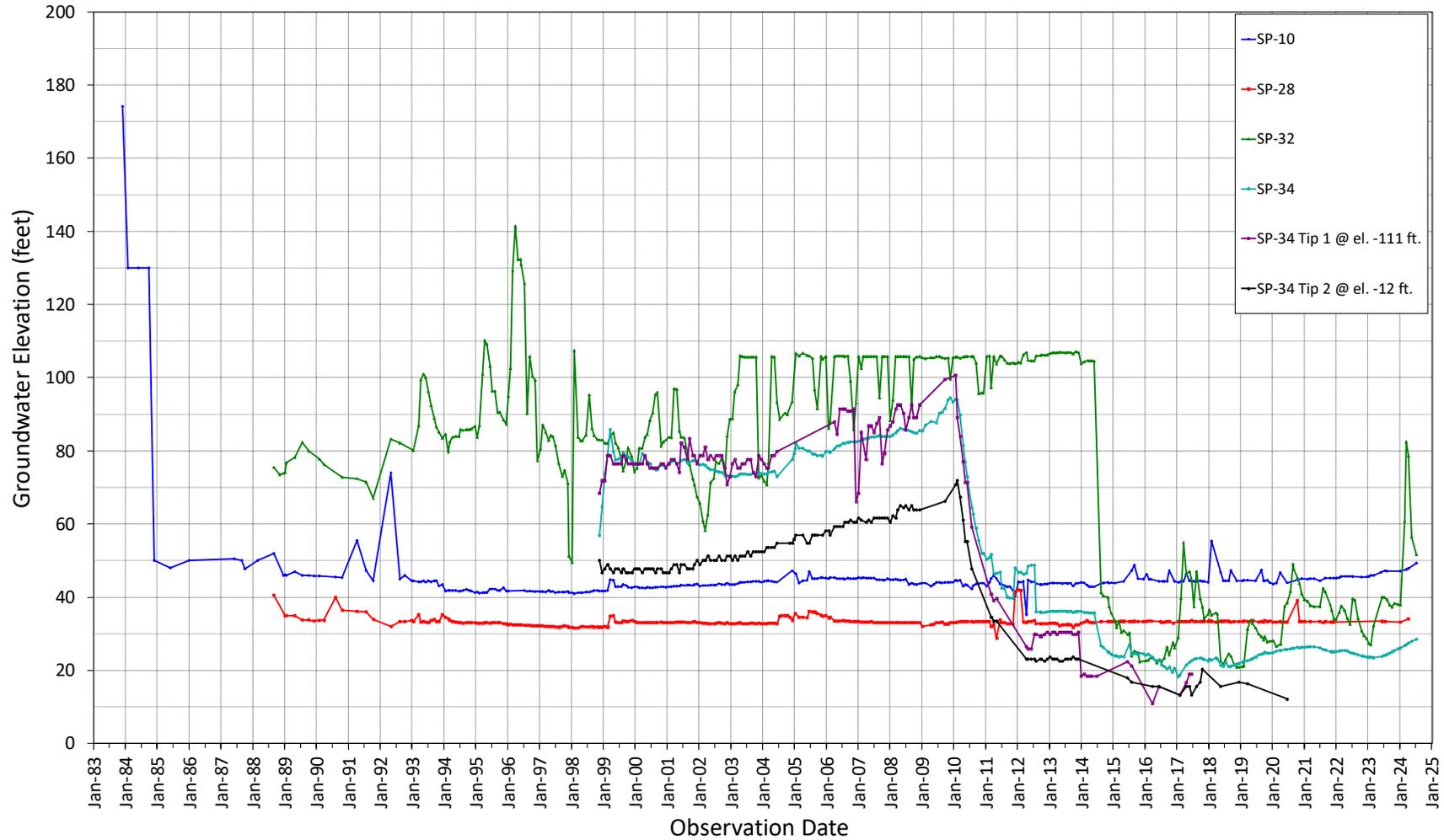


GROUNDWATER HYDROGRAPH
Central Mesa Region

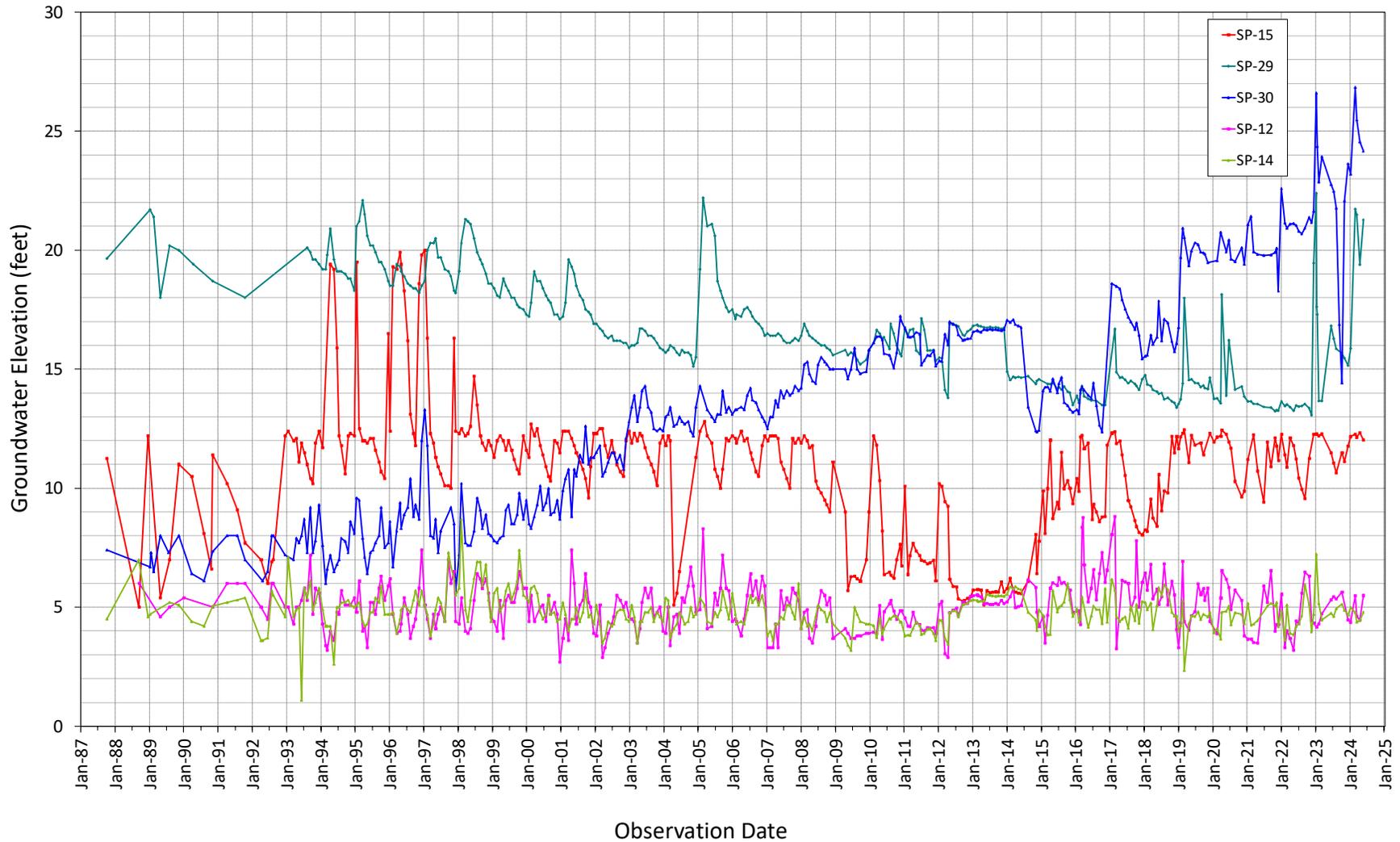
Big Rock Mesa Landslide Assessment District
Malibu, California



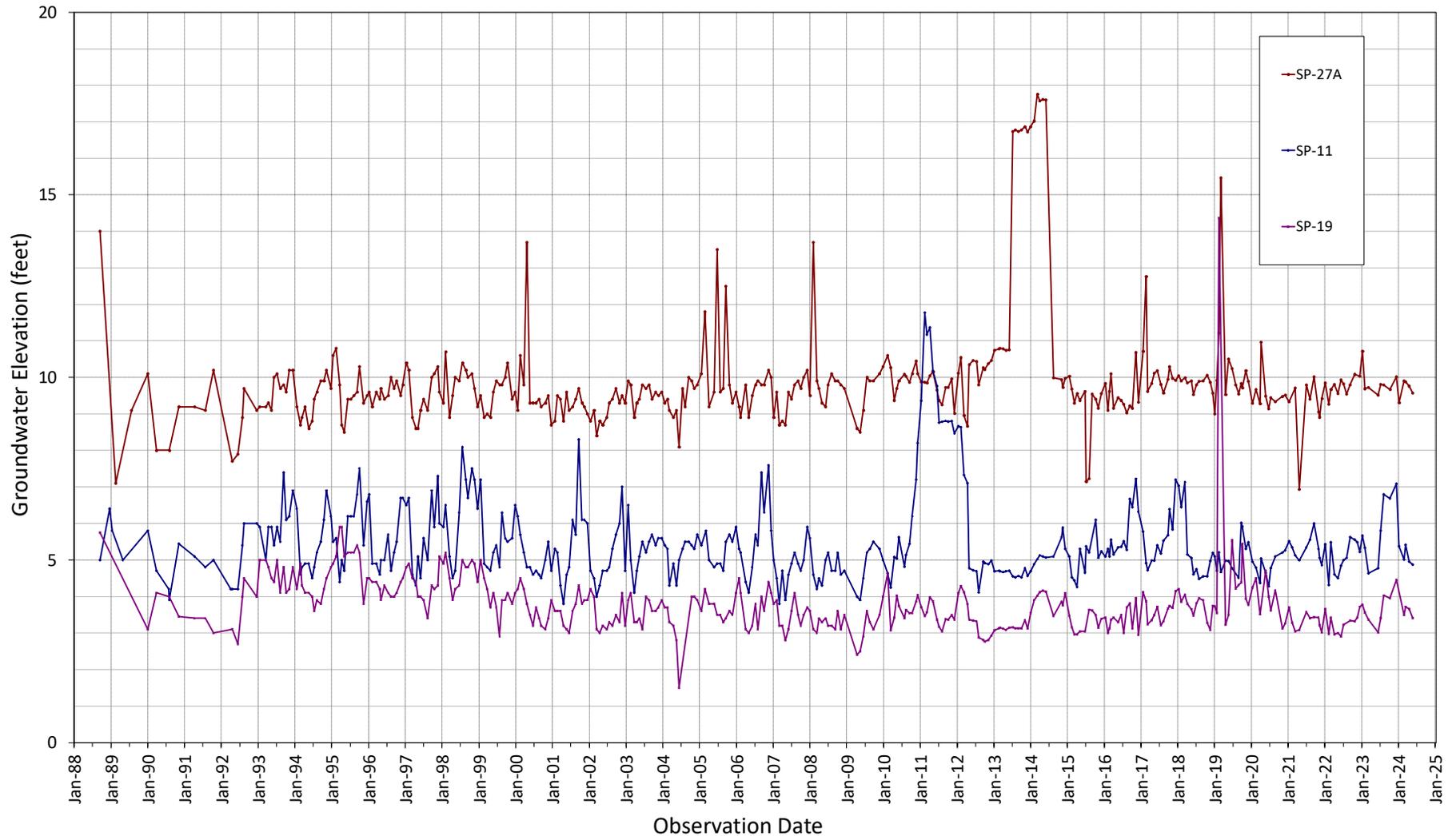
GROUNDWATER HYDROGRAPH
Central Mesa Region
Big Rock Mesa Landslide Assessment District
Malibu, California



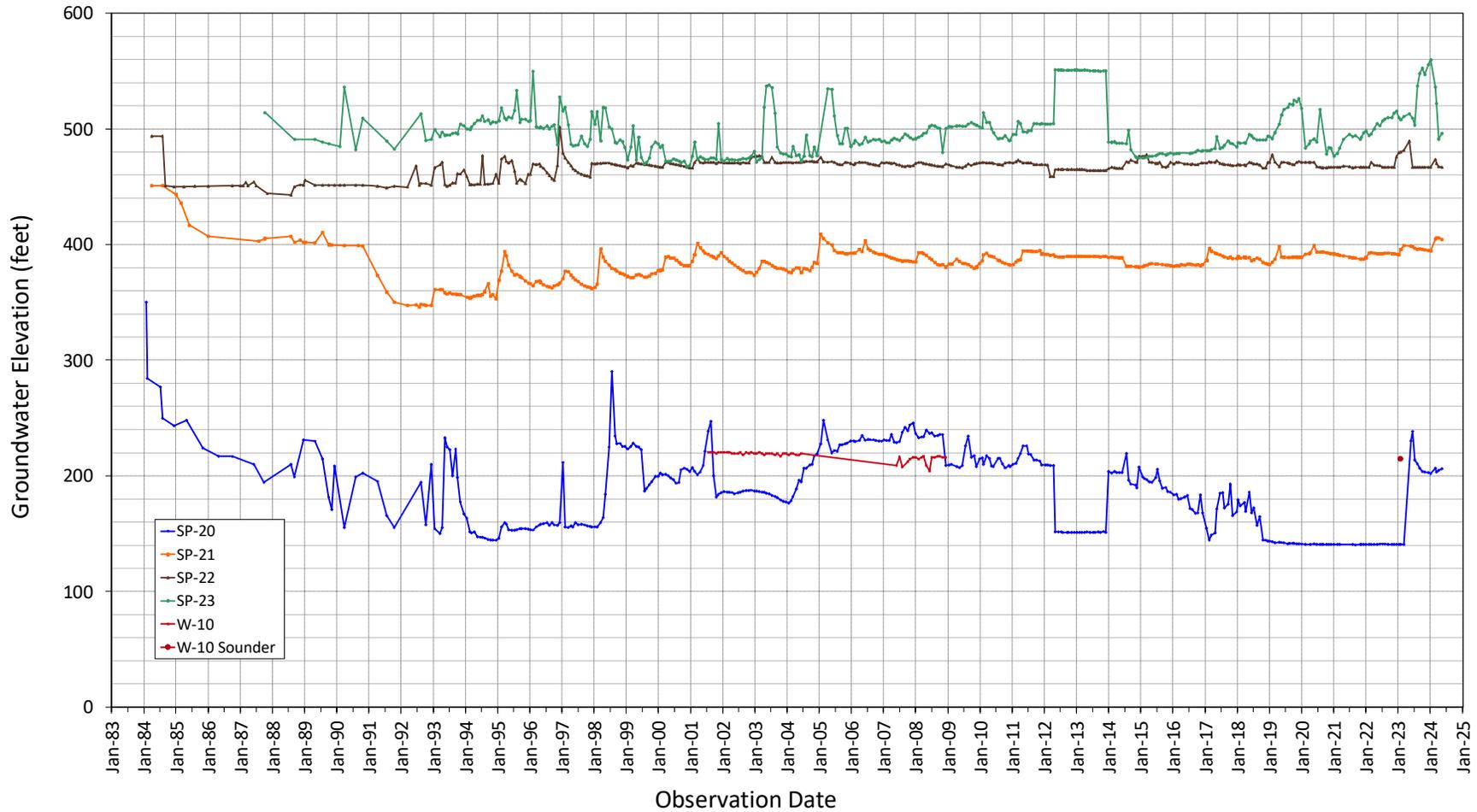
GROUNDWATER HYDROGRAPH
Bluff Region
Big Rock Mesa Landslide Assessment District
Malibu, California



GROUNDWATER HYDROGRAPH
Pacific Coast Highway (Western Half)
Big Rock Mesa Landslide Assessment District
Malibu, California



GROUNDWATER HYDROGRAPH
Pacific Coast Highway (Eastern Half)
Big Rock Mesa Landslide Assessment District
Malibu, California



GROUNDWATER HYDROGRAPH
Western Extension
Big Rock Mesa Landslide Assessment District
Malibu, California

APPENDIX B - SLOPE INCLINOMETERS

Inclinometers
Assessment District 98-1, Big Rock Mesa
City of Malibu, California

Yeh and Associates, Inc.
 Geotechnical • Geological • Construction Services



- Approximate Limits of Primary Land Movement
- - - Western Extension Boundary
- Big Rock Mesa Landslide Assessment Boundary
- Inclinometer Status**
- Abandoned or Destroyed, Other
- ⊗ SI Closure, Date and Depth of Closure (if known)
- Functioning, Penetrates Slide Plane
- Functioning, Installed Above or Outside Slide Plane
- Monitoring Above Previous Closure, Date and Depth of Closure
- ➔ Movement Bearing and Magnitude (inches)
- ➔ Potential Movement Bearing and Magnitude (inches)



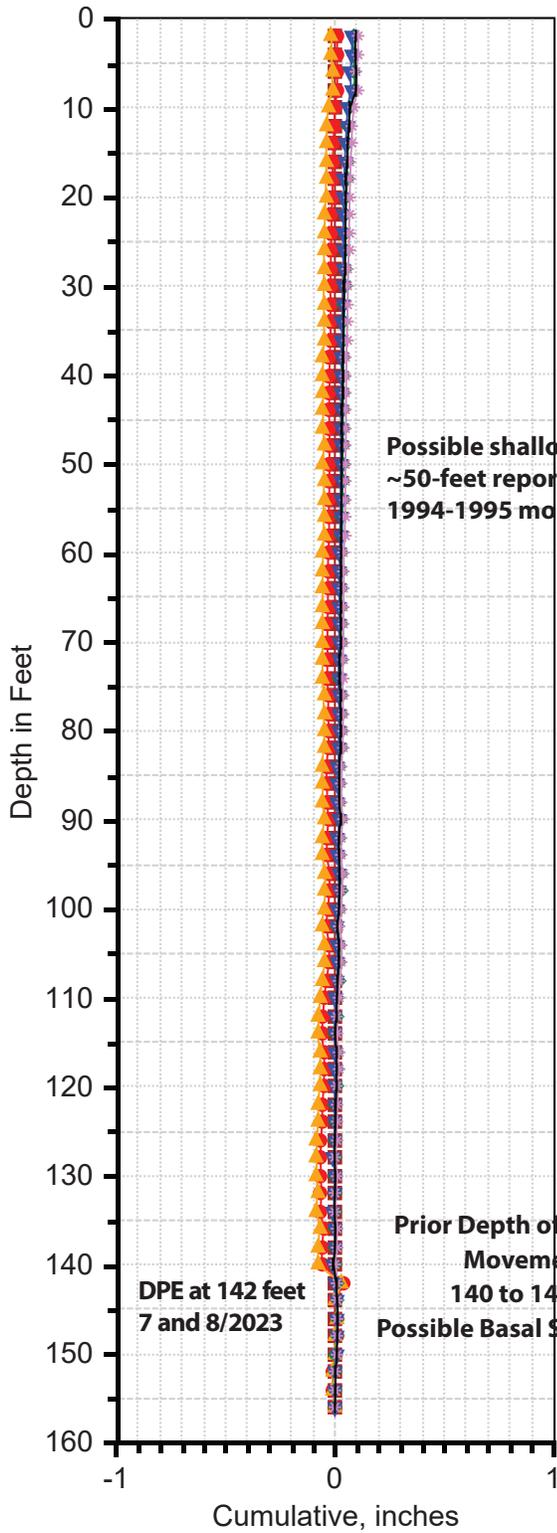
SCALE 1:2,100
 200 100 0 200 Feet

DATE:	PROJECT NUMBER:	PLATE:
October 2023	220-276	1
DRAWN BY:	APPROVED BY:	
M. Boyd	L. Berry	

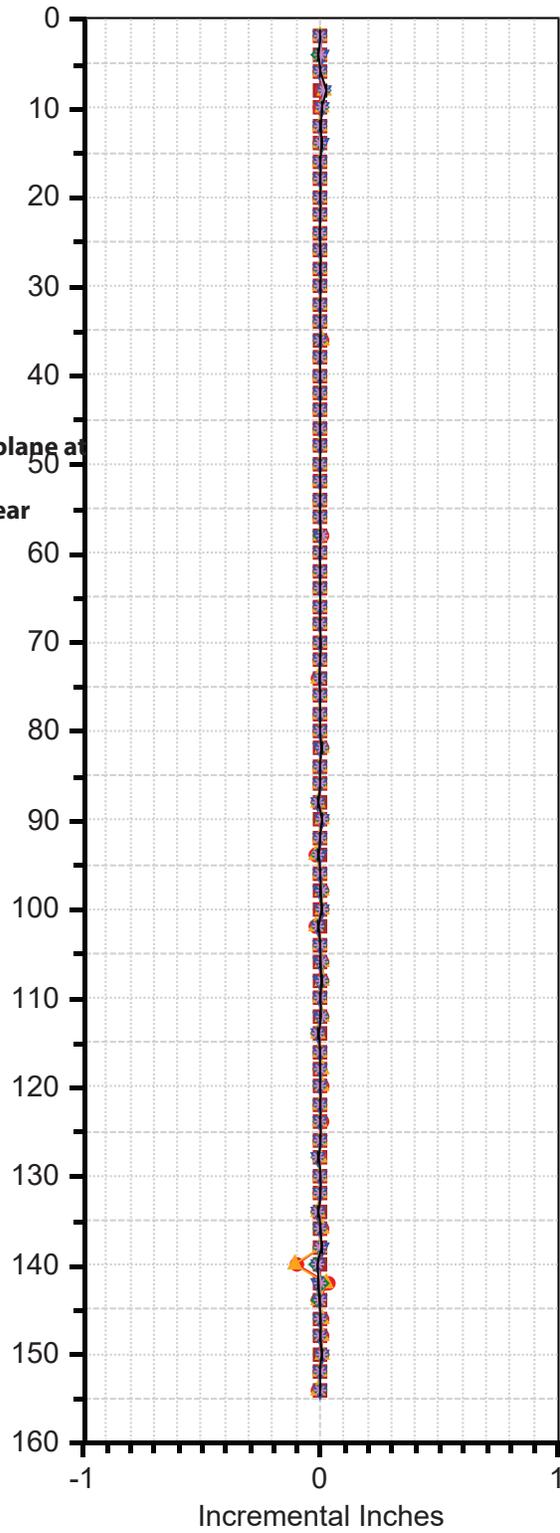
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Sources: Esri, Airbus DS, USGS, NGA, NASA, CGIAR, N Robinson, NCEAS, NLS, OS, NMA, Geotalsystrelen, Rijkswaterstaat, GSA, Geoland, FEMA, Intermap and the GIS user community

A-
10°



A+
190°



- 3/30/2021
- 7/7/2023
- ▲ 8/22/2023
- ◆ 11/30/2023
- ▼ 2/14/2024
- ✦ 3/26/2024
- + 8/13/2024

- 3/30/2021
- 7/7/2023
- ▲ 8/22/2023
- ◆ 11/30/2023
- ▼ 2/14/2024
- ✦ 3/26/2024
- + 8/13/2024

Plot of Slope Inclinometer

PC-1

Plot Type: Cumulative and Incremental

Plot Direction: A-Direction

Depth of Survey (ft): 154

Baseline Date: 3/30/2021

Corrections: None

Install Date: 6/1995

Installed Depth (ft): 160

Interpreted Movement Since Baseline (in): 0

Interpreted Movement Monitoring Year (in): 0



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PROJECT:

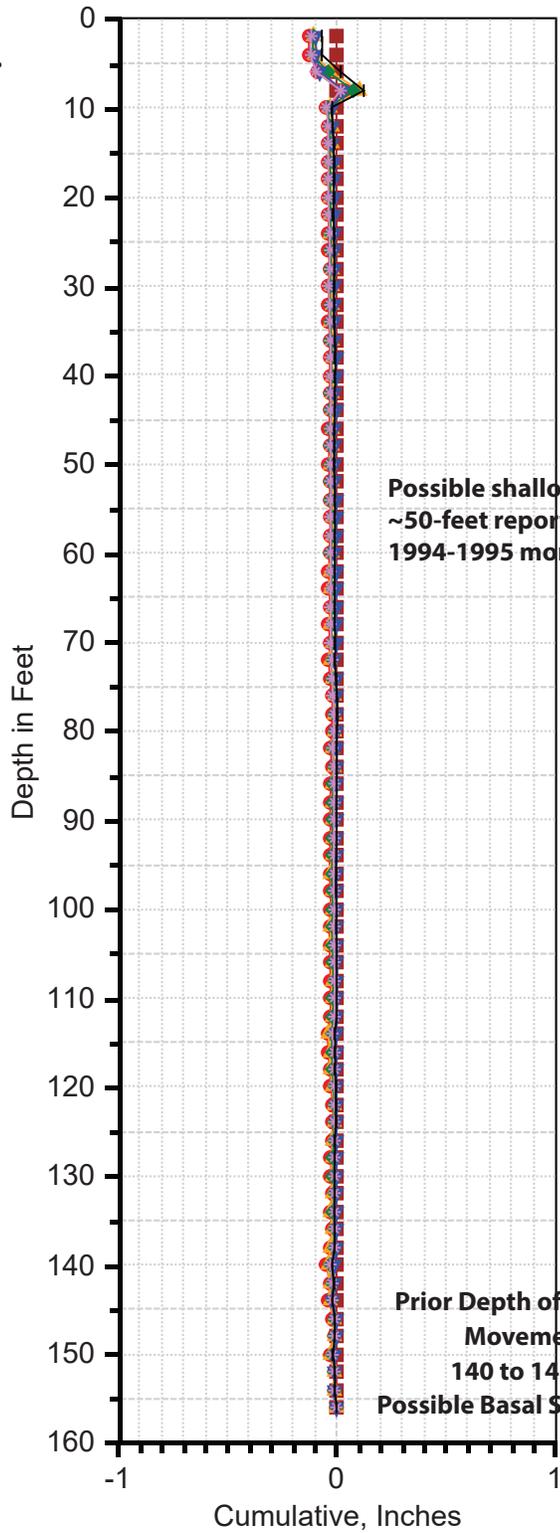
Big Rock Mesa LAD
Malibu, CA

PROJECT NUMBER:

220-276

REVISION DATE: 9/30/2024

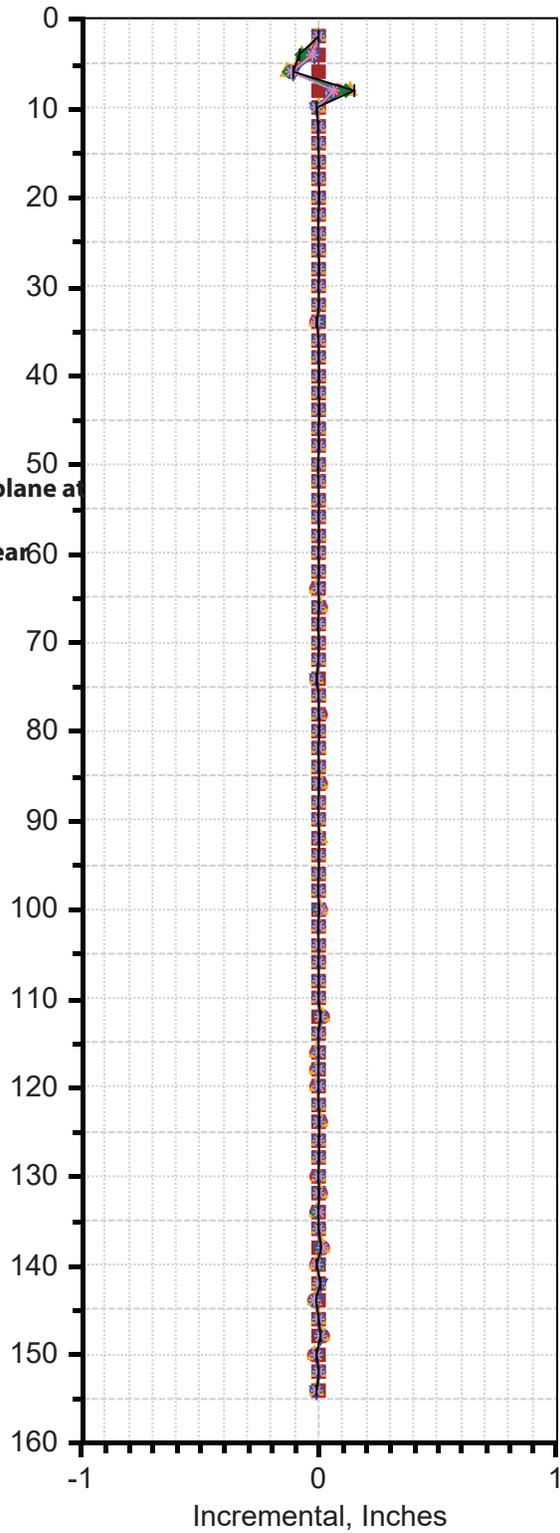
B-
100°



Possible shallower slide plane at
~50-feet reported
1994-1995 monitoring year

Prior Depth of Primary
Movement
140 to 143 ft.
Possible Basal Slide Plane

B+
280°



- 3/30/2021
- 7/7/2023
- ▲ 8/22/2023
- ◆ 11/30/2023
- ▼ 2/14/2024
- ✦ 3/26/2024
- ⊕ 8/13/2024

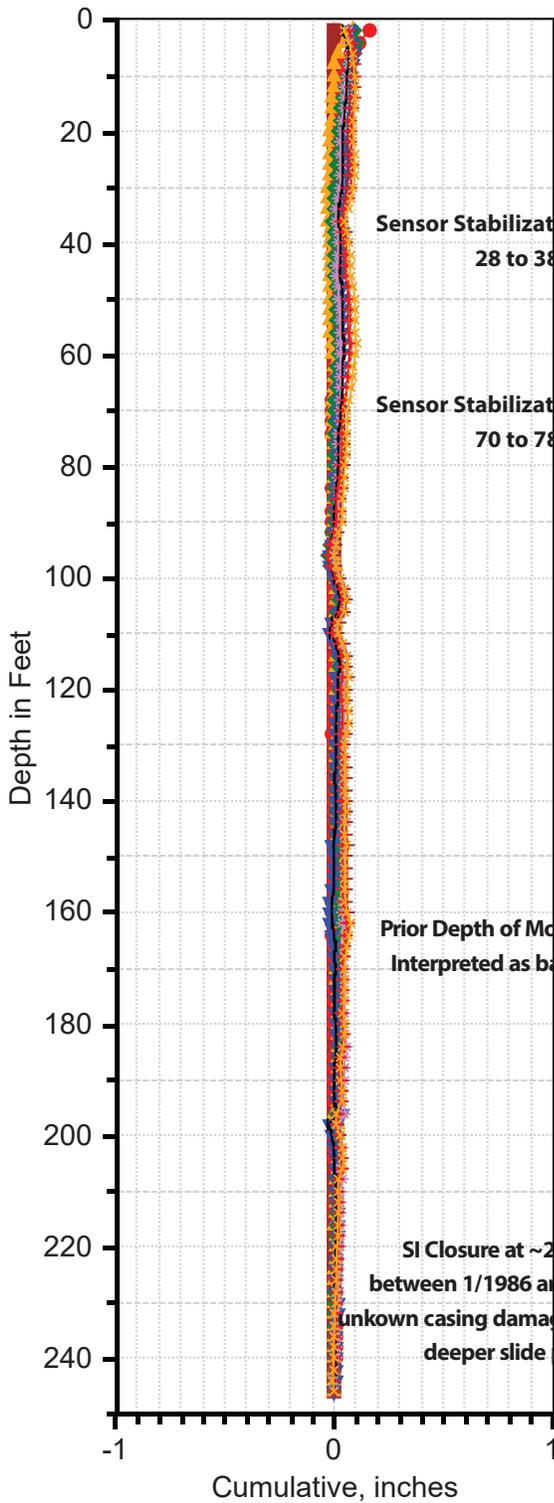
- 3/30/2021
- 7/7/2023
- ▲ 8/22/2023
- ◆ 11/30/2023
- ▼ 2/14/2024
- ✦ 3/26/2024
- ⊕ 8/13/2024

Plot of Slope Inclinometer PC-1	Plot Type: Cumulative and Incremental		Plot Direction: B-Direction
	Depth of Survey (ft):	158	Baseline Date: 3/30/2021
	Install Date: 6/1995	Installed Depth (ft): 160	Interpreted Movement Since Baseline (in): 0
			Interpreted Movement Monitoring Year (in): 0

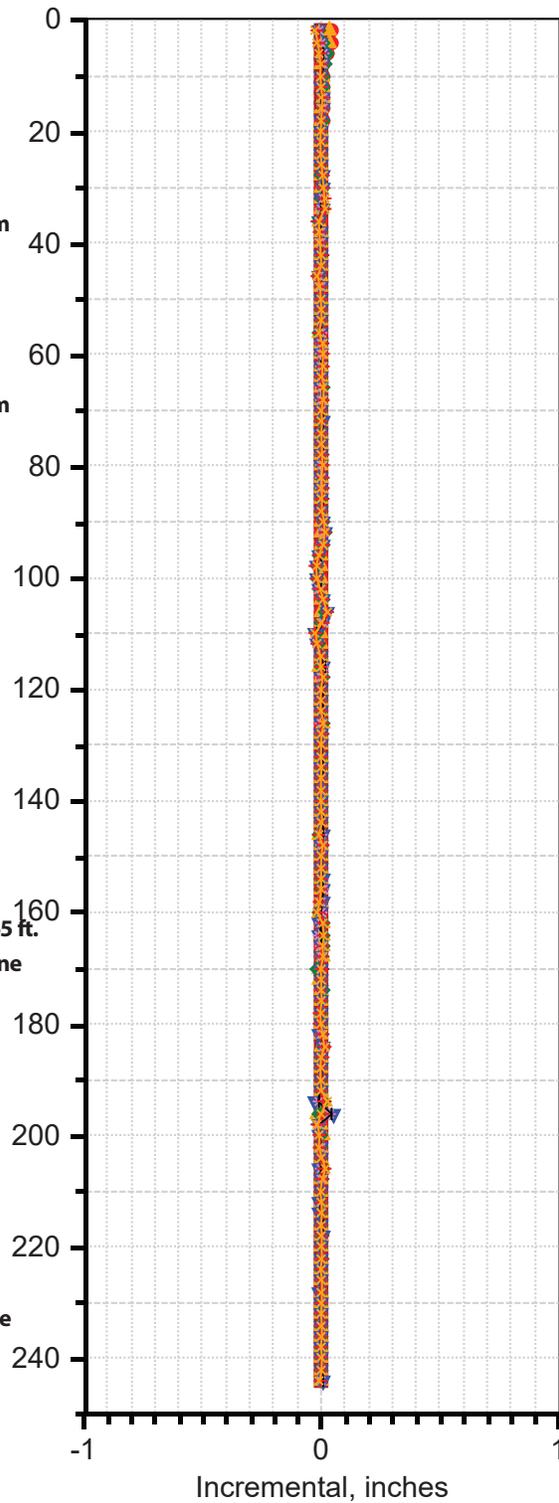


PROJECT: Big Rock Mesa LAD Malibu, CA	PROJECT NUMBER: 220-276
REVISION DATE: 9/30/2024	

A-
240°



A+
60°



- 11/30/2021
- 5/23/2022
- ▲ 11/2/2022
- ◆ 1/17/2023
- ▼ 5/30/2023
- ✦ 7/6/2023
- ⊕ 8/22/2023
- ⊖ 11/29/2023
- ⊗ 2/21/2024
- ⊙ 3/21/2024

- 11/30/2021
- 5/23/2022
- ▲ 11/2/2022
- ◆ 1/17/2023
- ▼ 5/30/2023
- ✦ 7/6/2023
- ⊕ 8/22/2023
- ⊖ 11/29/2023
- ⊗ 2/21/2024
- ⊙ 3/21/2024

Plot of Slope Inclinometer

SP-3A

Plot Type: Cumulative and Incremental

Plot Direction: A-Direction

Depth of Survey (ft):

244

Baseline Date: 11/30 /21

Corrections: None

Install Date: 4/1985

Installed Depth (ft): 295

Interpreted Movement Since Baseline (in): 0

Interpreted Movement Monitoring Year (in): 0



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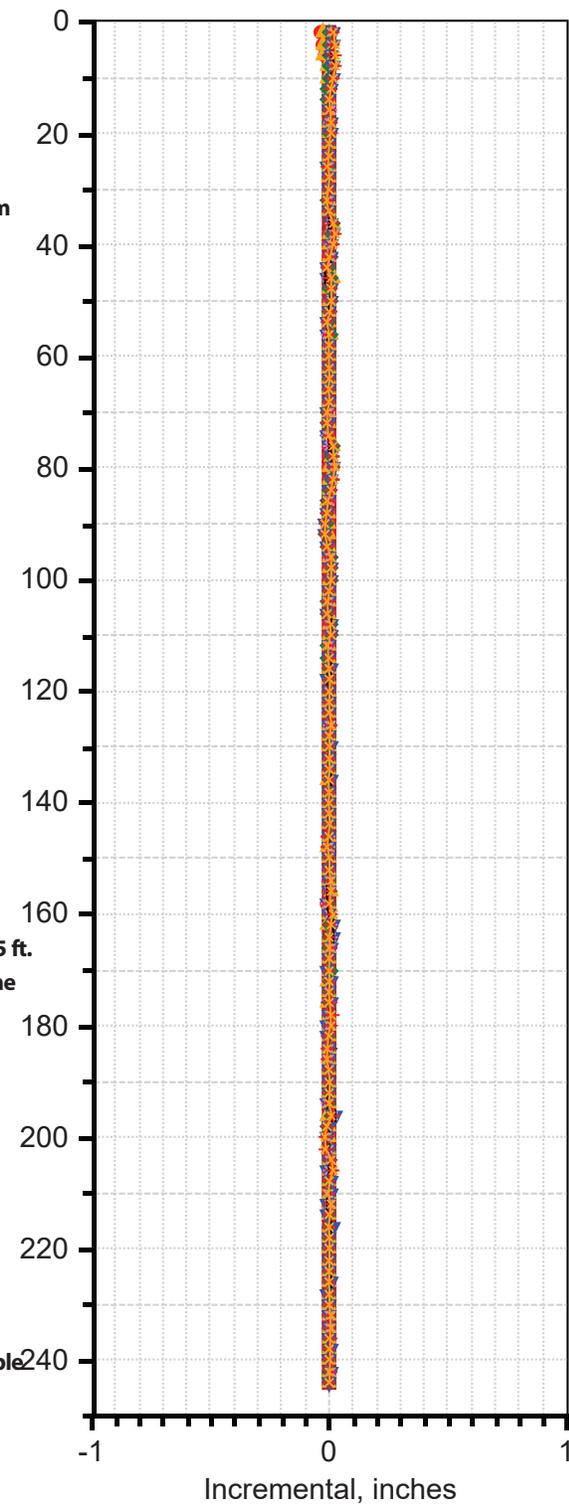
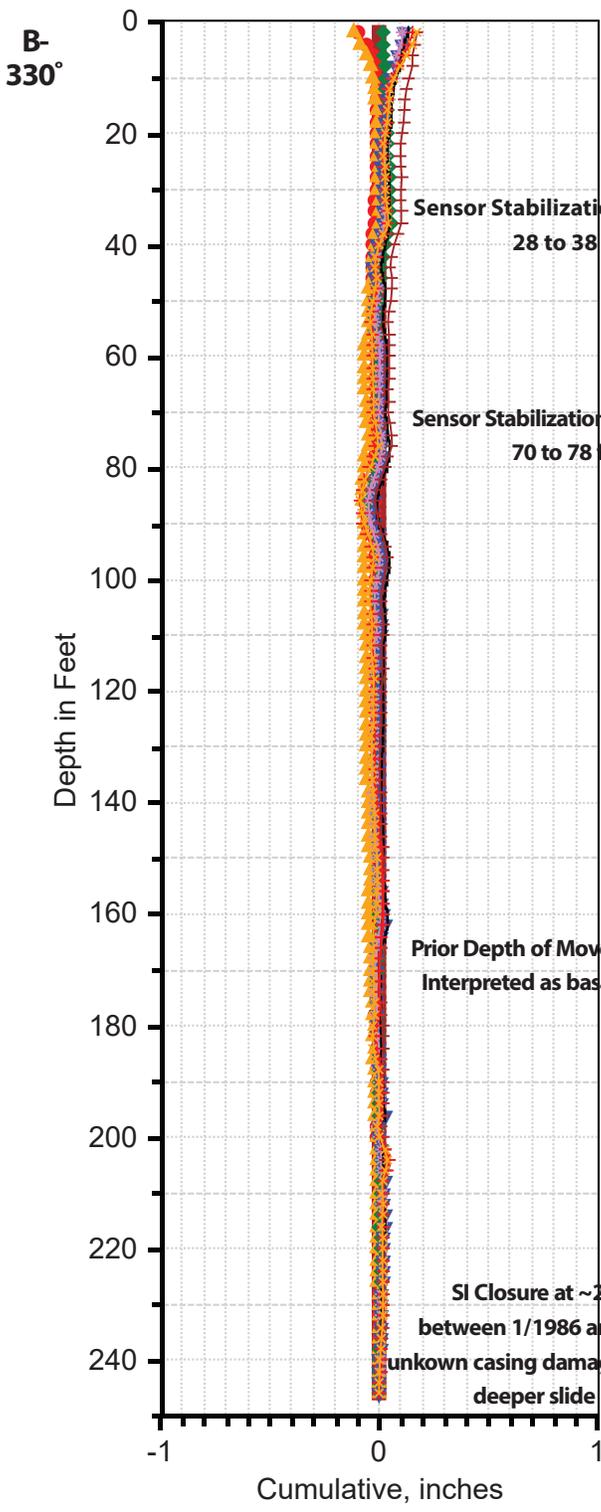
PROJECT:

Big Rock Mesa LAD
Malibu, CA

PROJECT NUMBER:

220-276

REVISION DATE: 9/30/2024



- 11/30/2021
- 5/23/2022
- ▲ 11/2/2022
- ◆ 1/17/2023
- ▼ 5/30/2023
- ✦ 7/6/2023
- ⊕ 8/22/2023
- ⊖ 11/29/2023
- ⊗ 2/21/2024
- ⊘ 3/21/2024

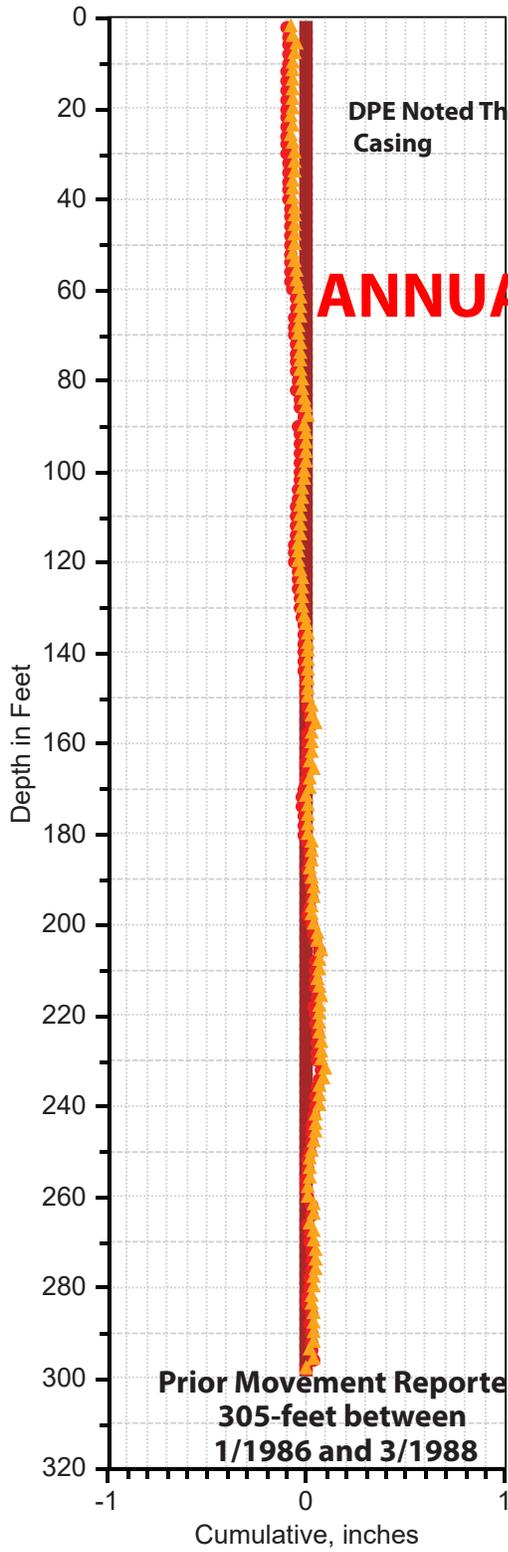
- 11/30/2021
- 5/23/2022
- ▲ 11/2/2022
- ◆ 1/17/2023
- ▼ 5/30/2023
- ✦ 7/6/2023
- ⊕ 8/22/2023
- ⊖ 11/29/2023
- ⊗ 2/21/2024
- ⊘ 3/21/2024

Plot of Slope Inclinometer SP-3A	Plot Type: Cumulative and Incremental		Plot Direction: B-Direction
	Depth of Survey (ft): 244		Baseline Date: 11/30/2021
	Install Date: 4/1985	Installed Depth (ft): 295	Interpreted Movement Since Baseline (in): 0
		Interpreted Movement Monitoring Year (in): 0	

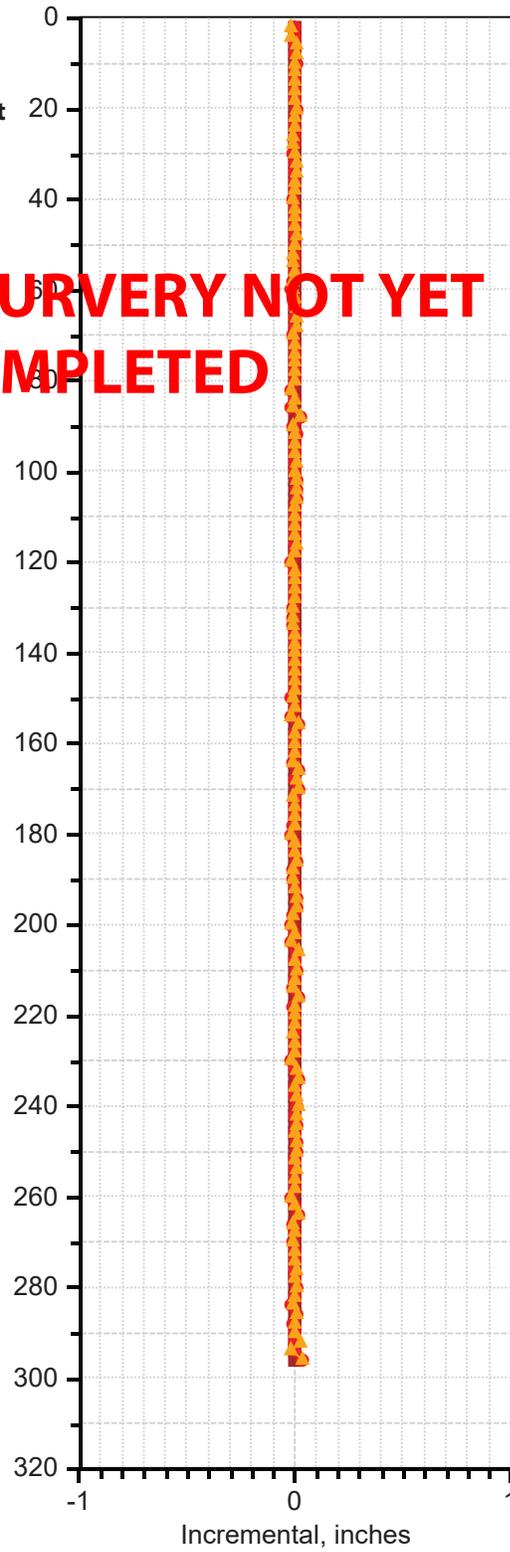
Yeh and Associates, Inc.
Geotechnical • Geological • Construction Services

PROJECT:	Big Rock Mesa LAD	PROJECT NUMBER:
	Malibu, CA	220-276
REVISION DATE:	9/30/2024	

A-160°



A+340°



ANNUAL SURVERY NOT YET COMPLETED

■ 7/29/2021 ● 6/22/2022 ▲ 5/31/2023

■ 7/29/2021 ● 6/22/2022 ▲ 5/31/2023

Plot of Slope Inclinometer

SP-9A

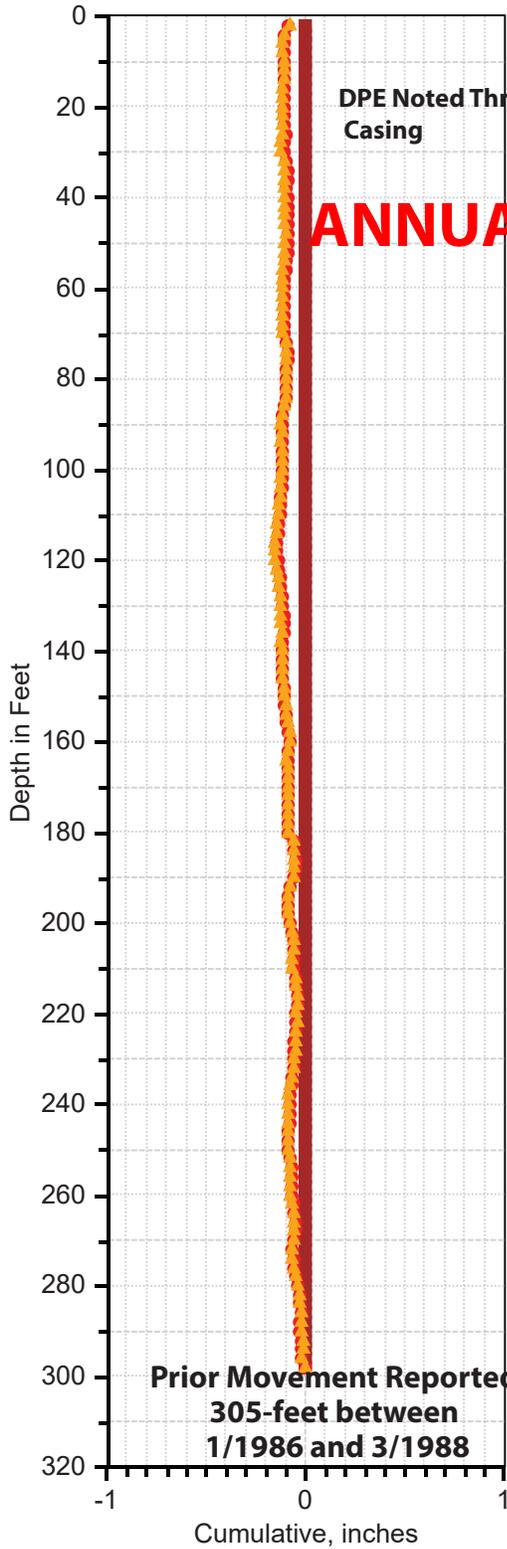
Plot Type: Cumulative and Incremental		Plot Direction: A-Direction	
Depth of Survey (ft): 298		Baseline Date: 7/29/21	
Install Date: 6/1985		Corrections: Rotation	
Installed Depth (ft): 385	Interpreted Movement Since Baseline (in): 0	Interpreted Movement Monitoring Year (in): 0	



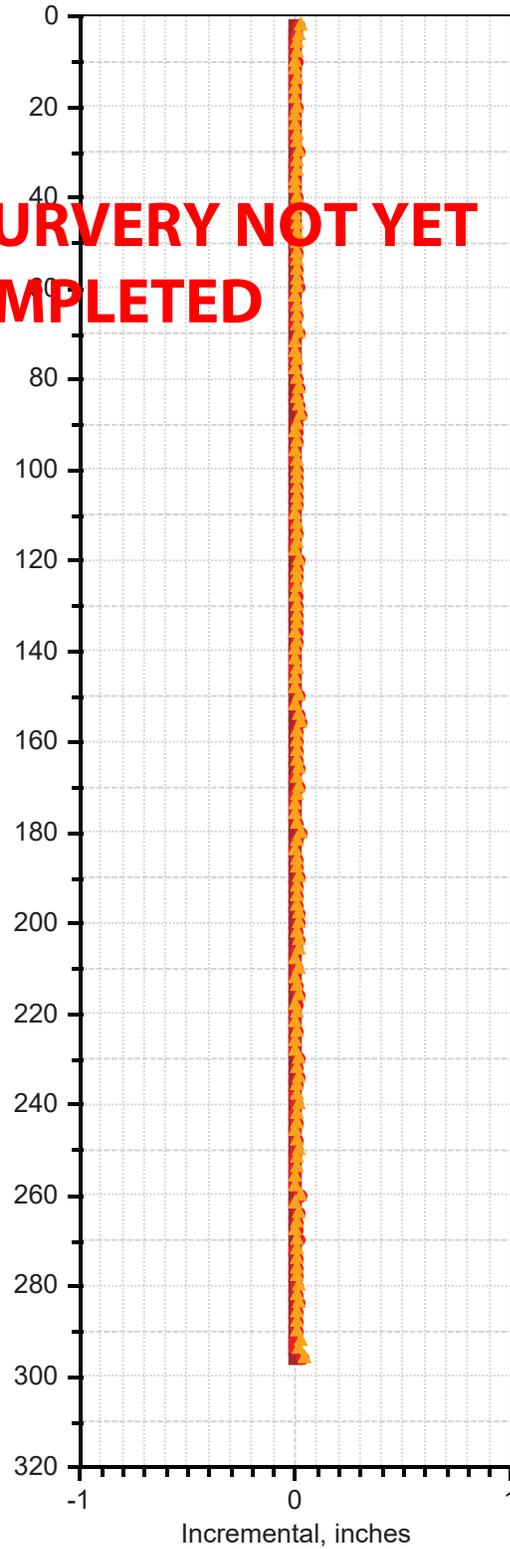
Yeh and Associates, Inc.
Geotechnical • Geological • Construction Services

PROJECT:	Big Rock Mesa LAD Malibu, CA	PROJECT NUMBER:	220-276
REVISION DATE:	9/30/2024		

B-250°



B+70°



ANNUAL SURVERY NOT YET COMPLETED

■ 7/29/2021 ● 6/22/2022 ▲ 5/31/2023

■ 7/29/2021 ● 6/22/2022 ▲ 5/31/2023

Plot of Slope Inclinometer

SP-9A

Plot Type: Cumulative and Incremental

Plot Direction: B-Direction

Depth of Survey (ft):

298

Baseline Date:

7/29/21

Corrections:

Rotation

Install Date:
6/1985

Installed Depth (ft):
385

Interpreted Movement
Since Baseline (in): 0

Interpreted Movement
Monitoring Year (in): 0



Yeh and Associates, Inc.

Geotechnical • Geological • Construction Services

PROJECT:

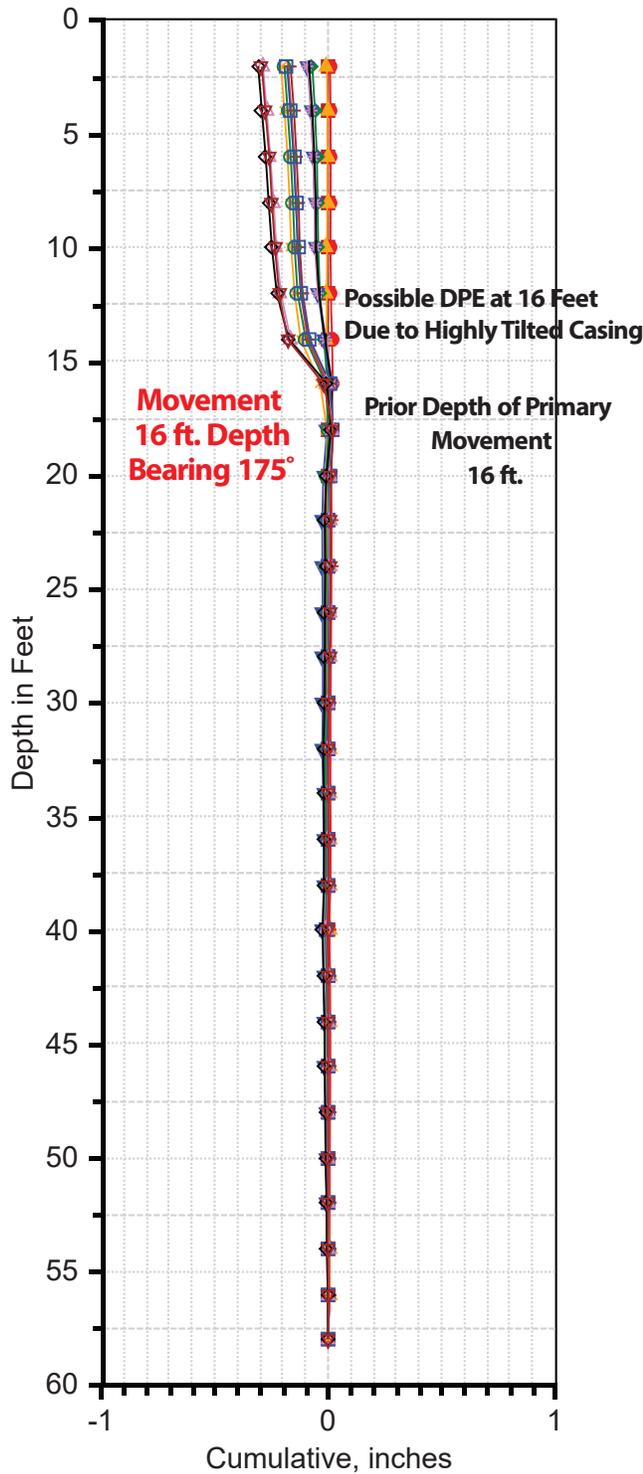
Big Rock Mesa LAD
Malibu, CA

PROJECT NUMBER:

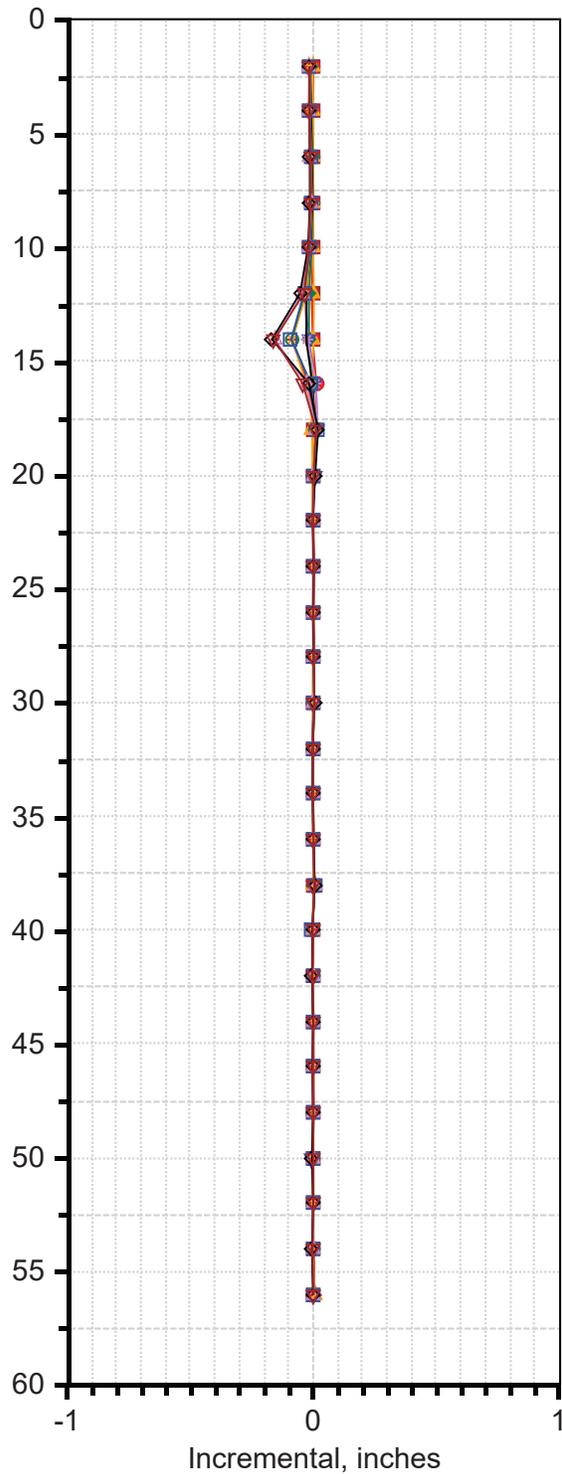
220-276

REVISION DATE: 9/30/2024

A-
205°



A+
25°



- 8/9/2021
- 9/14/2021
- ▲ 12/9/2021
- ◆ 9/28/2022
- ▼ 11/3/2022
- ✦ 1/18/2023
- + 1/27/2023
- + 6/6/2023
- + 7/6/2023
- ✦ 8/15/2023
- 8/25/2023
- 12/29/2023
- △ 4/19/2024
- ◇ 6/5/2024
- ▽ 9/10/2024

- 8/9/2021
- 9/14/2021
- ▲ 12/9/2021
- ◆ 9/28/2022
- ▼ 11/3/2022
- ✦ 1/18/2023
- + 1/27/2023
- + 6/6/2023
- + 7/6/2023
- ✦ 8/15/2023
- 8/25/2023
- 12/29/2023
- △ 4/19/2024
- ◇ 6/5/2024
- ▽ 9/10/2024

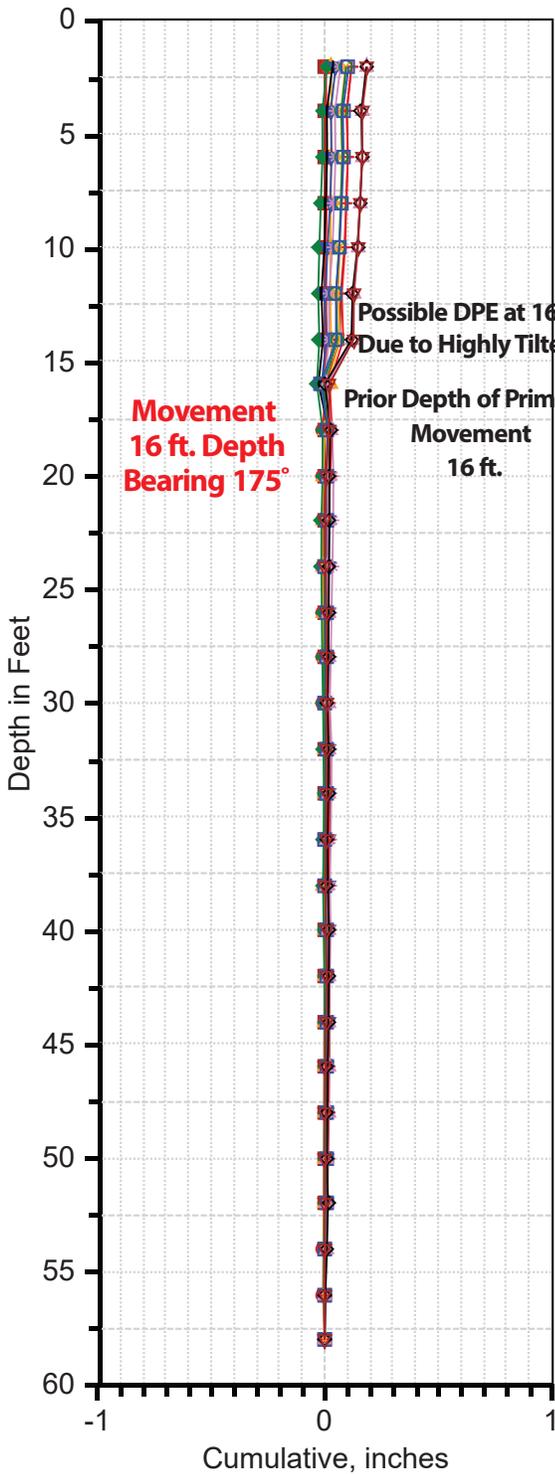
Plot of Slope Inclinometer
SP-11

Plot Type: Cumulative and Incremental		Plot Direction: A-Direction	
Depth of Survey (ft): 59		Baseline Date: 8/9/2021	
Install Date: 12/1983		Corrections: None	
Installed Depth (ft): 60	Interpreted Movement Since Baseline (in): 0.25	Interpreted Movement Monitoring Year (in): 0.10	

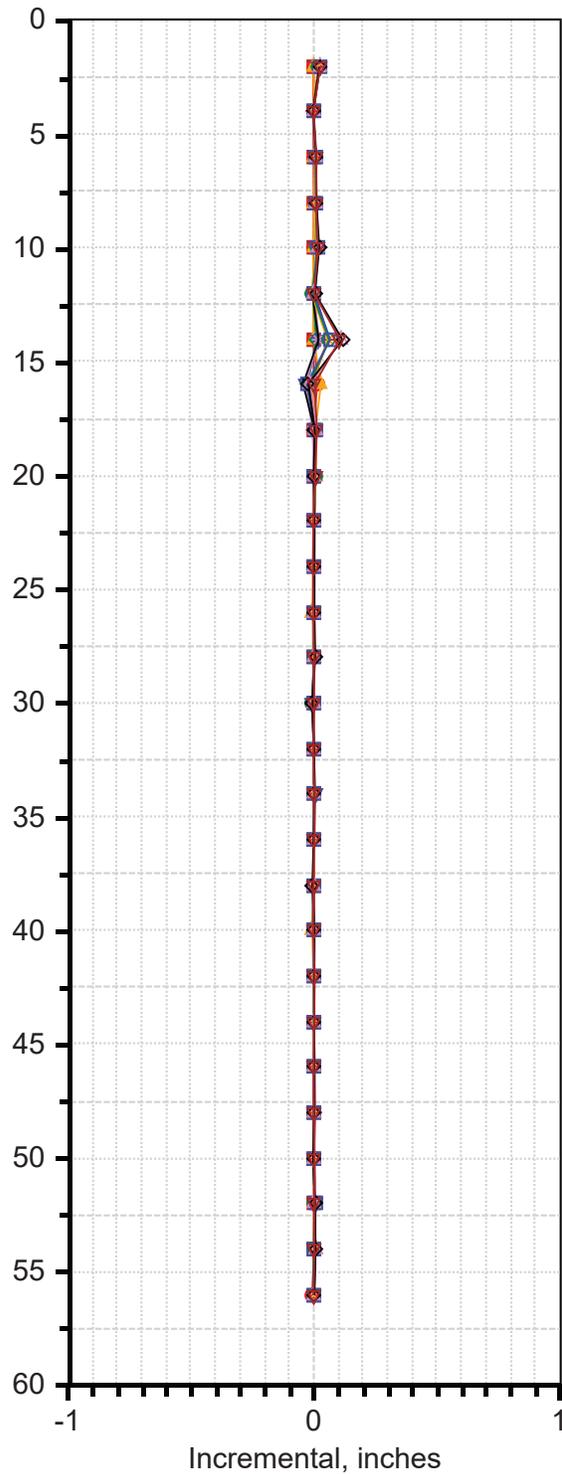


PROJECT: **Big Rock Mesa LAD** PROJECT NUMBER: **220-276**
 Malibu, CA
 REVISION DATE: 9/30/2024

B-
295°



B+
115°



- 8/9/2021
- 9/14/2021
- 12/9/2021
- 9/28/2022
- 11/3/2022
- 1/18/2023
- 1/27/2023
- 6/6/2023
- 7/6/2023
- 8/15/2023
- 8/25/2023
- 12/29/2023
- 4/19/2024
- 6/5/2024
- 9/10/2024

- 8/9/2021
- 9/14/2021
- 12/9/2021
- 9/28/2022
- 11/3/2022
- 1/18/2023
- 1/27/2023
- 6/6/2023
- 7/6/2023
- 8/15/2023
- 8/25/2023
- 12/29/2023
- 4/19/2024
- 6/5/2024
- 9/10/2024

Plot of Slope Inclinometer

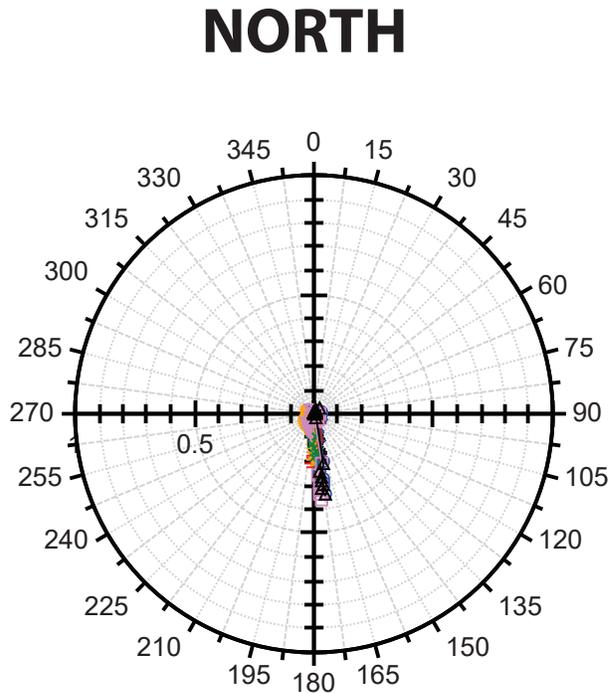
SP-11

Plot Type: Cumulative and Incremental		Plot Direction: B-Direction	
Depth of Survey (ft): 59		Baseline Date: 8/9/2021	
Install Date: 12/1983		Interpreted Movement Since Baseline (in): 0.25 @16 ft. b175°	
Installed Depth (ft): 60		Interpreted Movement Monitoring Year (in): 0.10 @16ft. b175°	

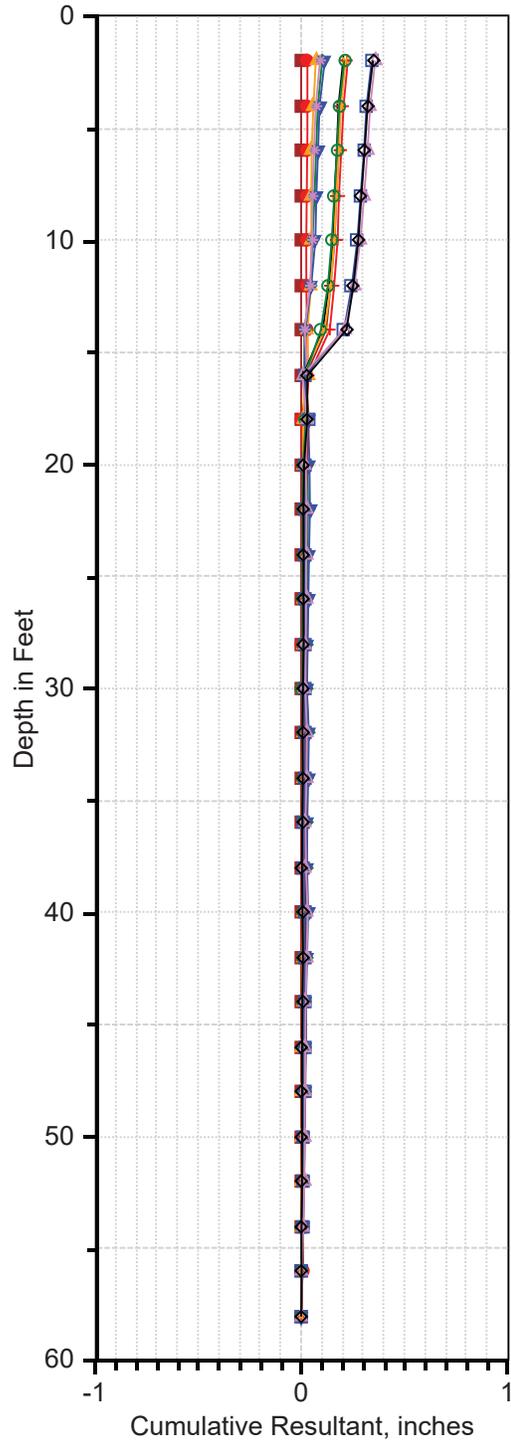


Yeh and Associates, Inc.
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PROJECT:	Big Rock Mesa LAD Malibu, CA	PROJECT NUMBER:	220-276
REVISION DATE:	9/30/2024		



Polar View
Cumulative Resultant, inches



- 12/9/2021
- 9/28/2022
- ▲ 11/3/2022
- ◆ 1/18/2023
- ▼ 1/27/2023
- + 6/6/2023
- + 7/6/2023
- + 8/15/2023
- + 8/25/2023
- + 12/29/2023
- 4/19/2024
- 6/5/2024
- ▲ 9/10/2024

- 8/9/2021
- 12/9/2021
- ▲ 9/28/2022
- ◆ 11/3/2022
- ▼ 1/18/2023
- + 1/27/2023
- + 6/6/2023
- + 7/6/2023
- + 8/15/2023
- + 8/25/2023
- 12/29/2023
- 4/19/2024
- ▲ 6/5/2024
- ◆ 9/10/2024

Plot of Slope Inclinometer
SP-11

Plot Type: Cumulative Resultant, Polar and Profile Views

Plot Direction: Resultant

Depth of Survey (ft): 59

Baseline Date: 8/9/2021

Corrections: None

Install Date: 12/1983

Installed Depth (ft): 60

Interpreted Movement Since Baseline (in): 0.15 @ 16 ft. b175°

Interpreted Movement Monitoring Year (in): 0.10 @ 16 ft. b175°



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PROJECT:

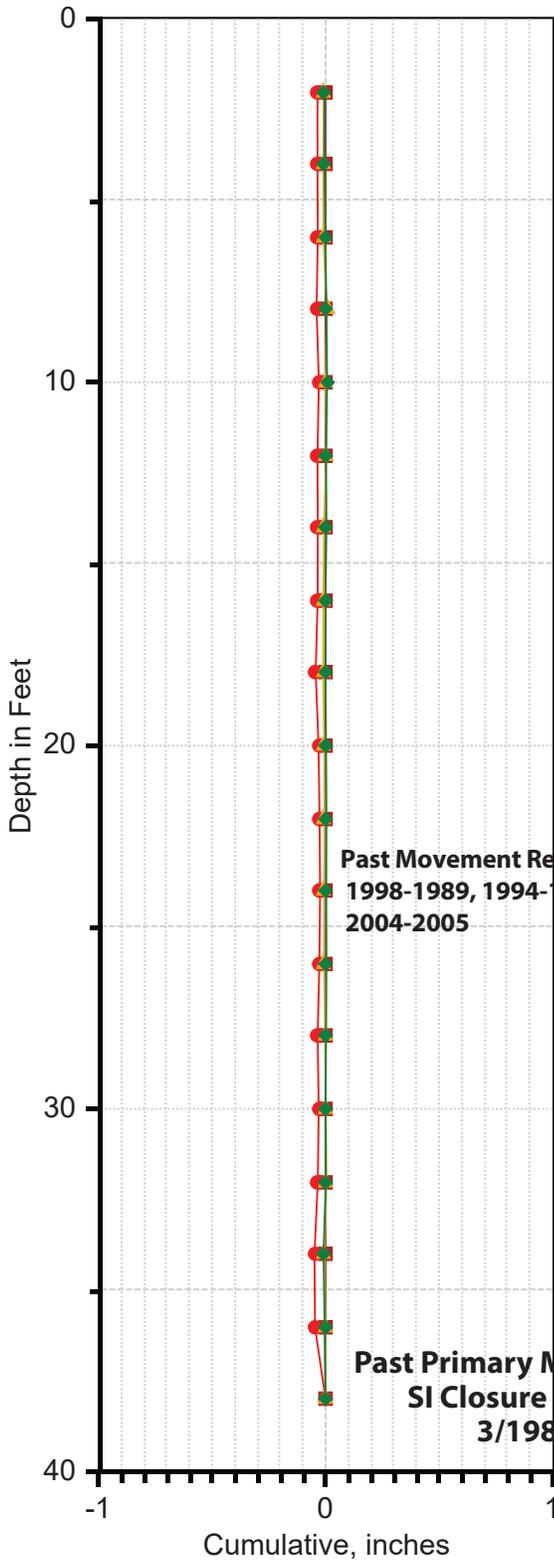
Big Rock Mesa LAD
Malibu, CA

PROJECT NUMBER:

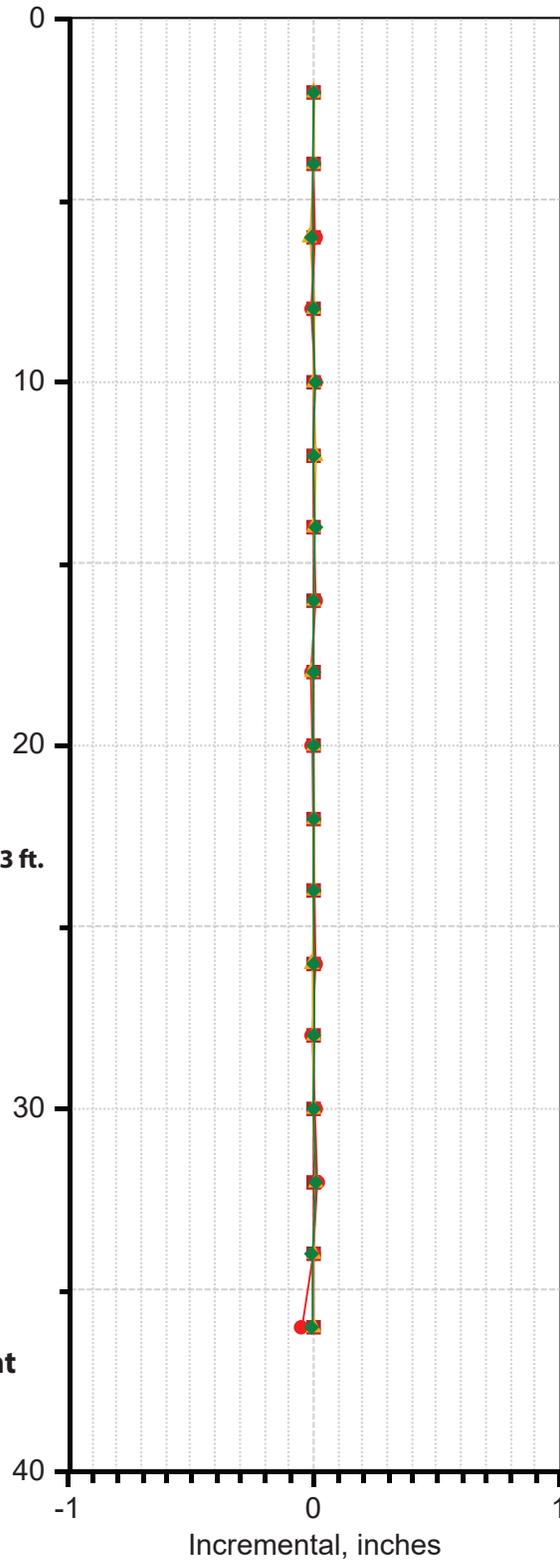
220-276

REVISION DATE: 9/30/2024

A-
224°



A+
44°



9/14/2021 6/23/2022
11/3/2022 6/6/2023

9/14/2021 6/23/2022
11/3/2022 6/6/2023

Plot of Slope Inclinometer

SP-12

Plot Type: Cumulative and Incremental

Plot Direction: A-Direction

Depth of Survey (ft):

38

Baseline Date:

9/14/2021

Corrections:

None

Install Date:
1/1984

Installed Depth (ft):
95

Interpreted Movement
Since Baseline (in): 0

Interpreted Movement
Monitoring Year (in): 0



Yeh and Associates, Inc.

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PROJECT:

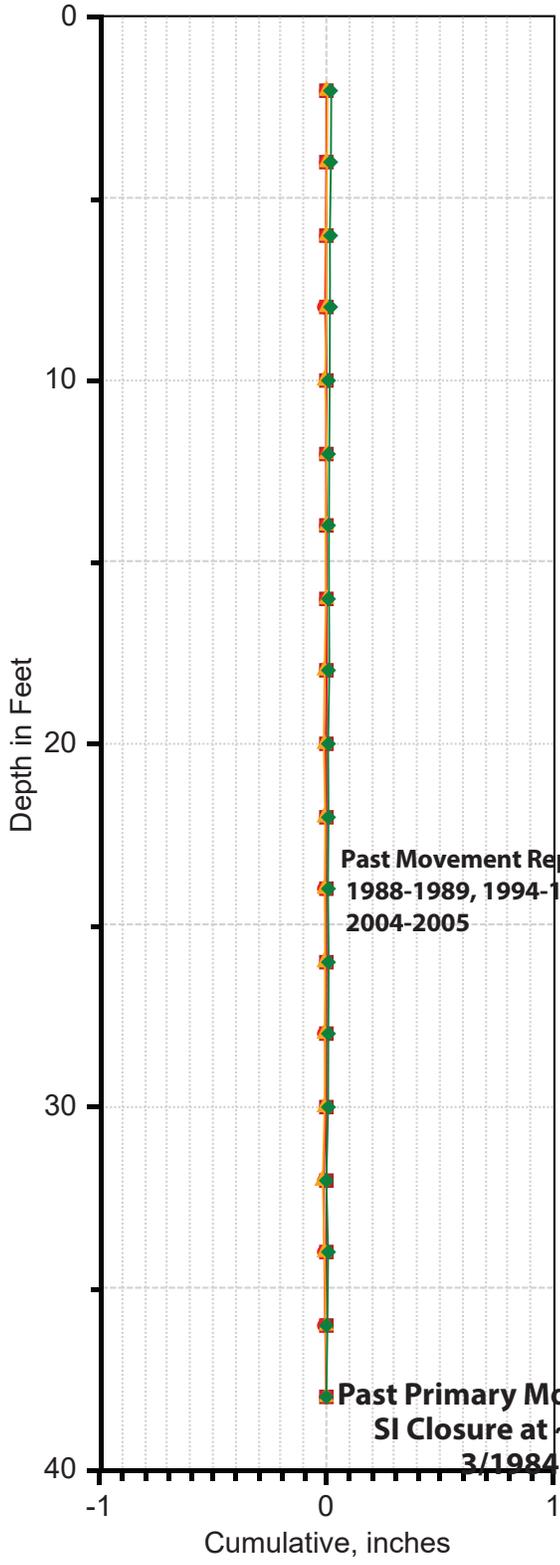
Big Rock Mesa LAD
Malibu, CA

PROJECT NUMBER:

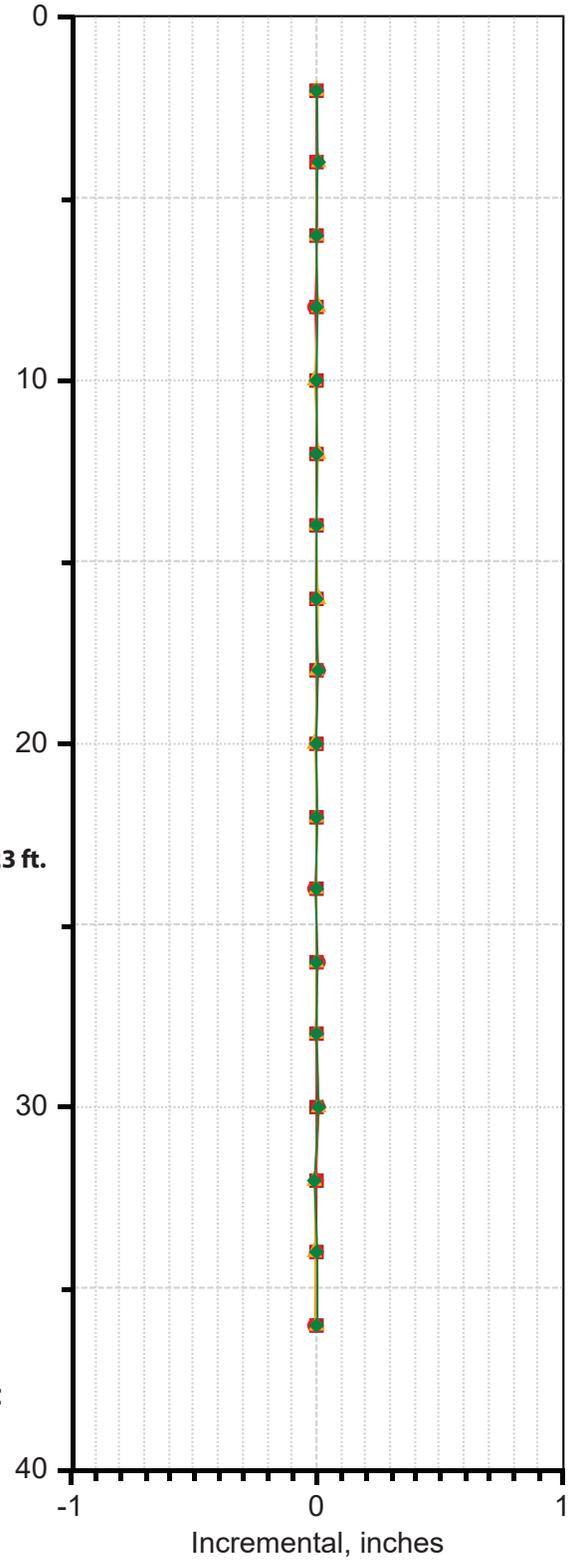
220-276

REVISION DATE: 9/30/2024

B-
314°



B+
134°



■ 9/14/2021 ● 6/23/2022
▲ 11/3/2022 ◆ 6/6/2023

■ 9/14/2021 ● 6/23/2022
▲ 11/3/2022 ◆ 6/6/2023

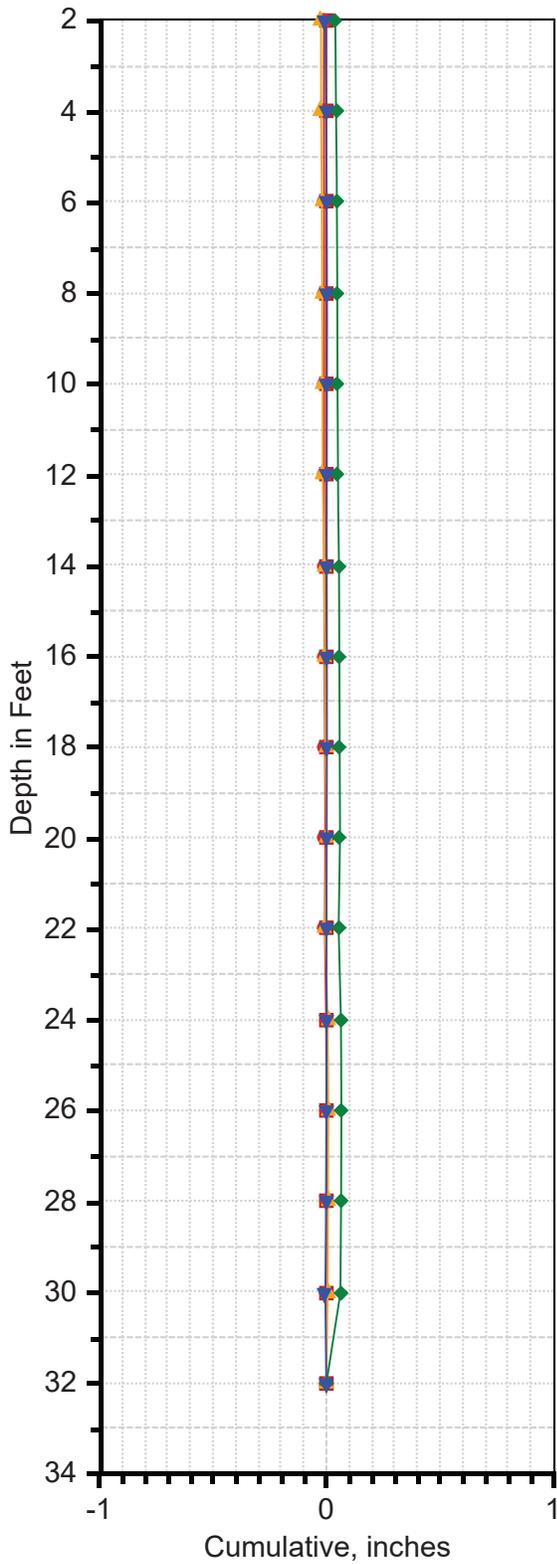
Plot of Slope Inclinometer
SP-12

Plot Type: Cumulative and Incremental		Plot Direction: B-Direction	
Depth of Survey (ft):	38	Baseline Date:	9/14/2021
Install Date:	1/1984	Installed Depth (ft):	95
Interpreted Movement Since Baseline (in): 0		Interpreted Movement Monitoring Year (in): 0	

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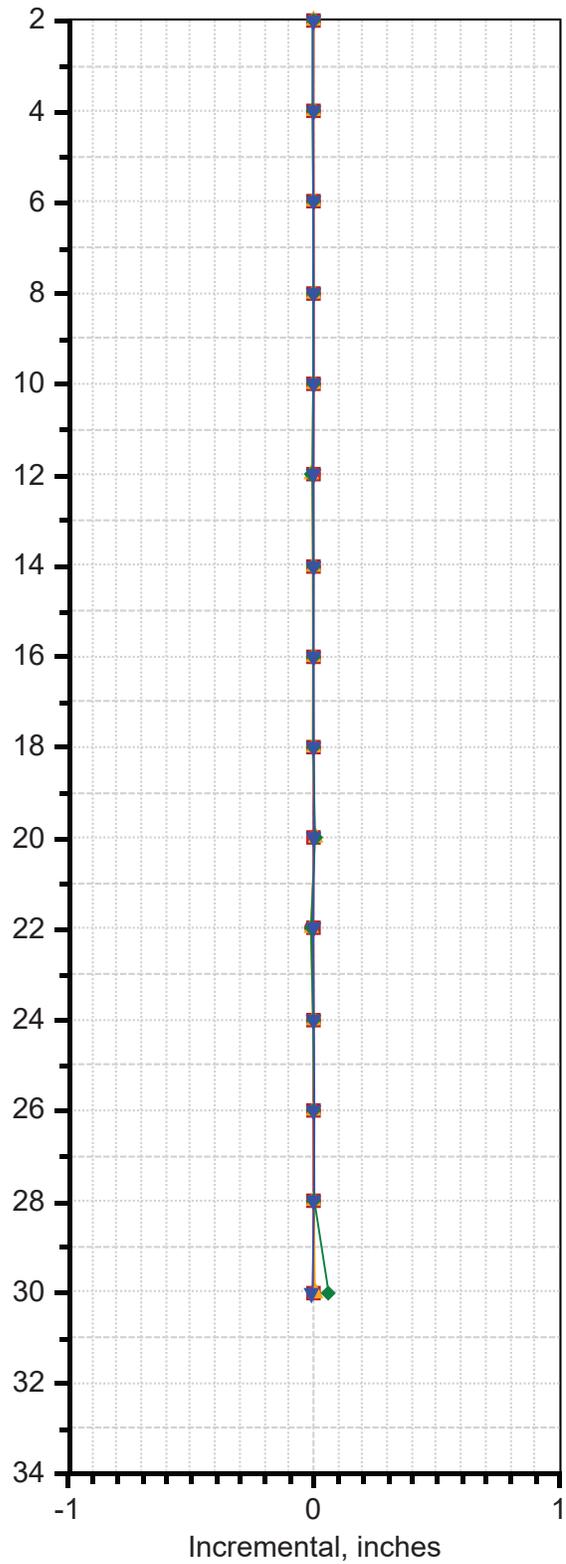
PROJECT: **Big Rock Mesa LAD** PROJECT NUMBER: **220-276**
Malibu, CA
REVISION DATE: 9/30/2024

A-
215°



■ 4/7/2021 ● 9/14/2021 ▲ 6/22/2022
◆ 6/6/2023 ▼ 9/10/2024

A+
35°



■ 4/7/2021 ● 9/14/2021 ▲ 6/22/2022
◆ 6/6/2023 ▼ 9/10/2024

Plot of Slope Inclinometer

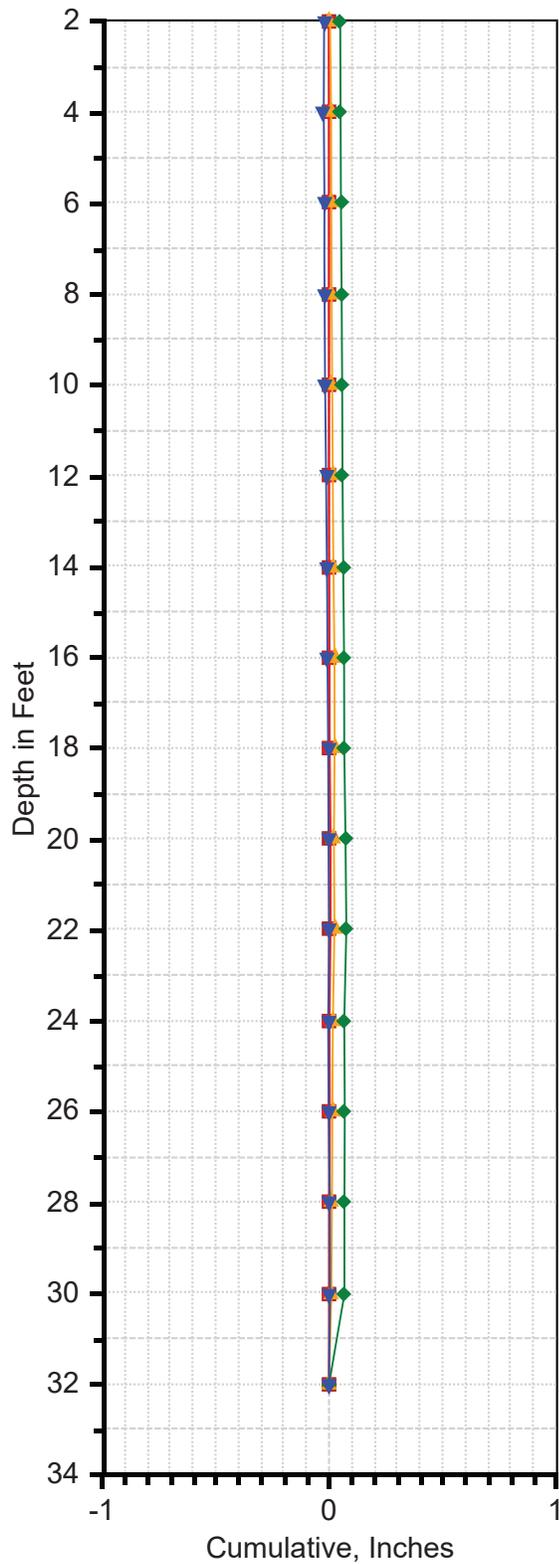
SP-14

Plot Type: Cumulative and Incremental		Plot Direction: A-Direction	
Depth of Survey (ft): 32		Baseline Date: 4/07/2021	
Install Date: 4/1984		Interpreted Movement Since Baseline (in): 0	
Installed Depth (ft): 32		Interpreted Movement Monitoring Year (in): 0	

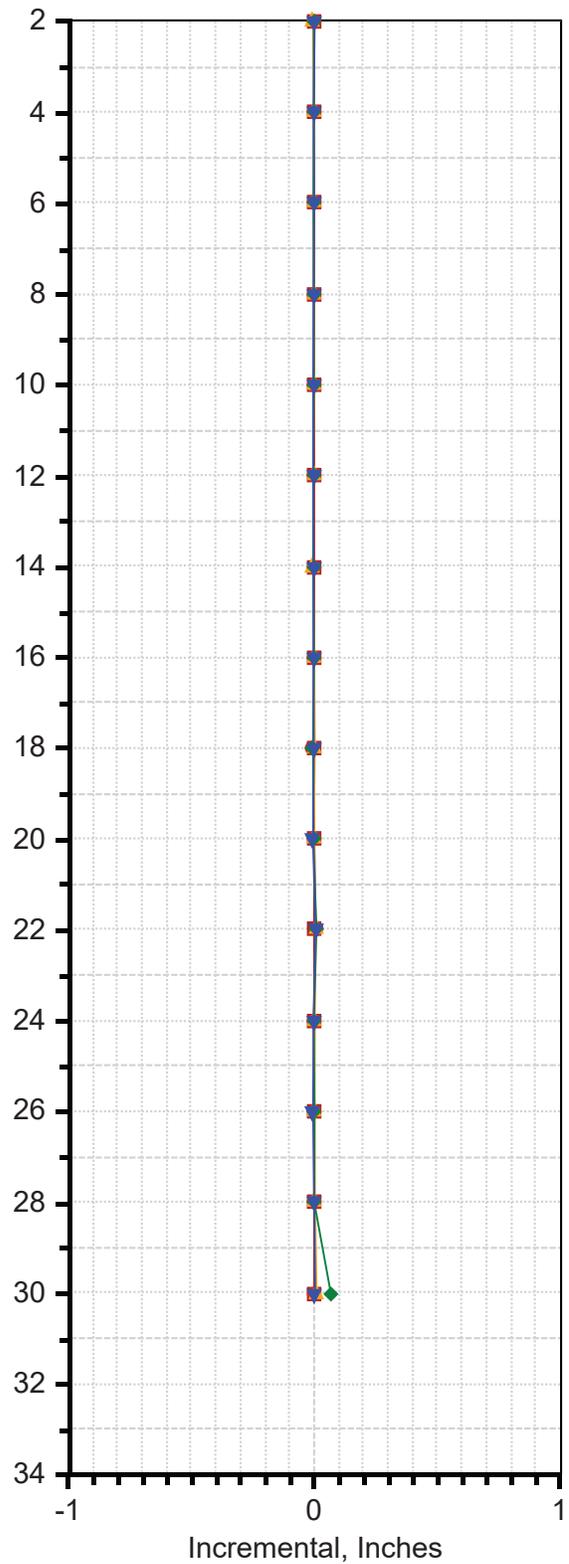

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PROJECT: **Big Rock Mesa LAD** PROJECT NUMBER: **220-276**
 Malibu, CA
 REVISION DATE: 9/30/2024

B-305°



B-125°



■ 4/7/2021 ● 9/14/2021 ▲ 6/22/2022
◆ 6/6/2023 ▼ 9/10/2024

■ 4/7/2021 ● 9/14/2021 ▲ 6/22/2022
◆ 6/6/2023 ▼ 9/10/2024

Plot of Slope Inclinometer

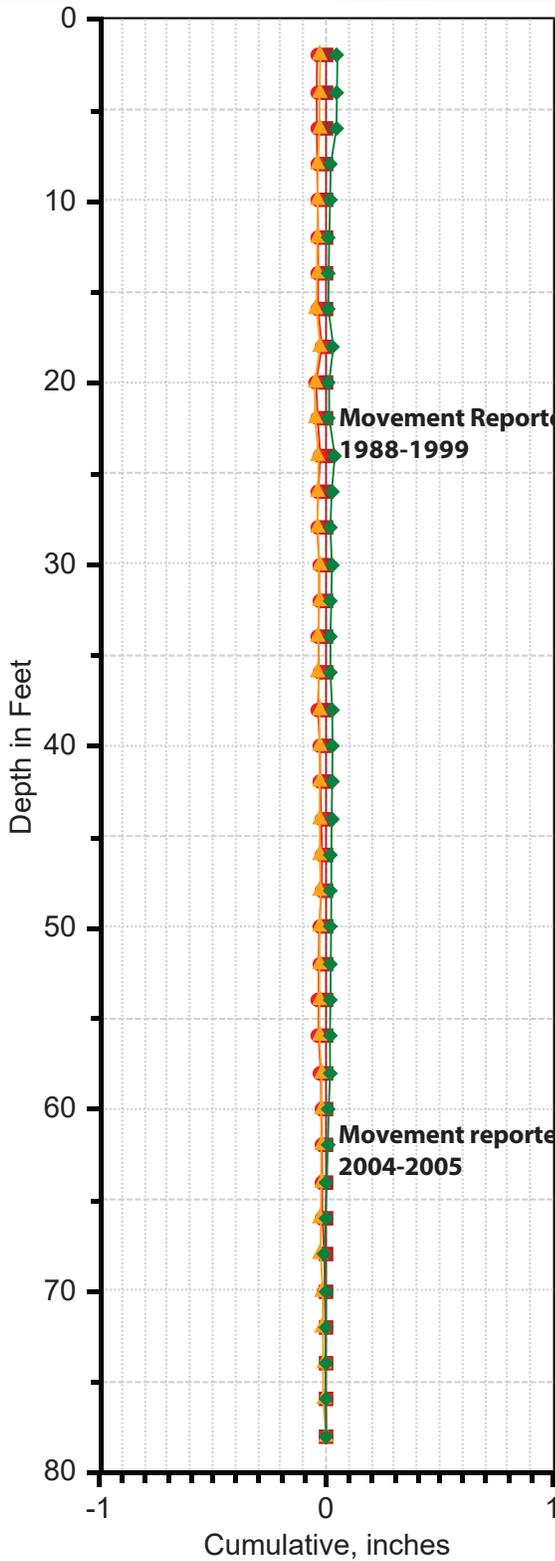
SP-14

Plot Type: Cumulative and Incremental		Plot Direction: B-Direction	
Depth of Survey (ft): 32		Baseline Date: 4/7/2021	
Install Date: 4/1984		Corrections: None	
Installed Depth (ft): 32	Interpreted Movement Since Baseline (in): 0	Interpreted Movement Monitoring Year (in): 0	



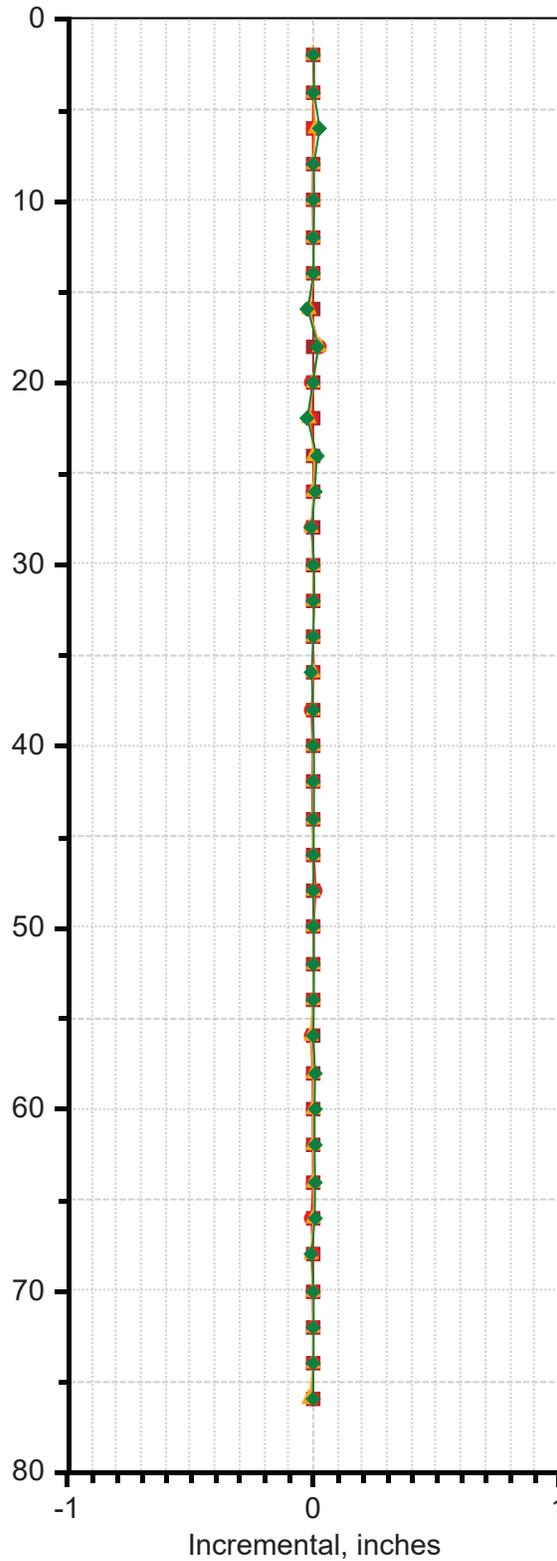
PROJECT: Big Rock Mesa LAD Malibu, CA PROJECT NUMBER: 220-276
 REVISION DATE: 9/30/2024

A-
200°



9/14/2021 6/23/2022
6/6/2023 9/24/2024

A+
20°



9/14/2021 6/23/2022
6/6/2023 9/24/2024

Plot of Slope Inclinometer

SP-15

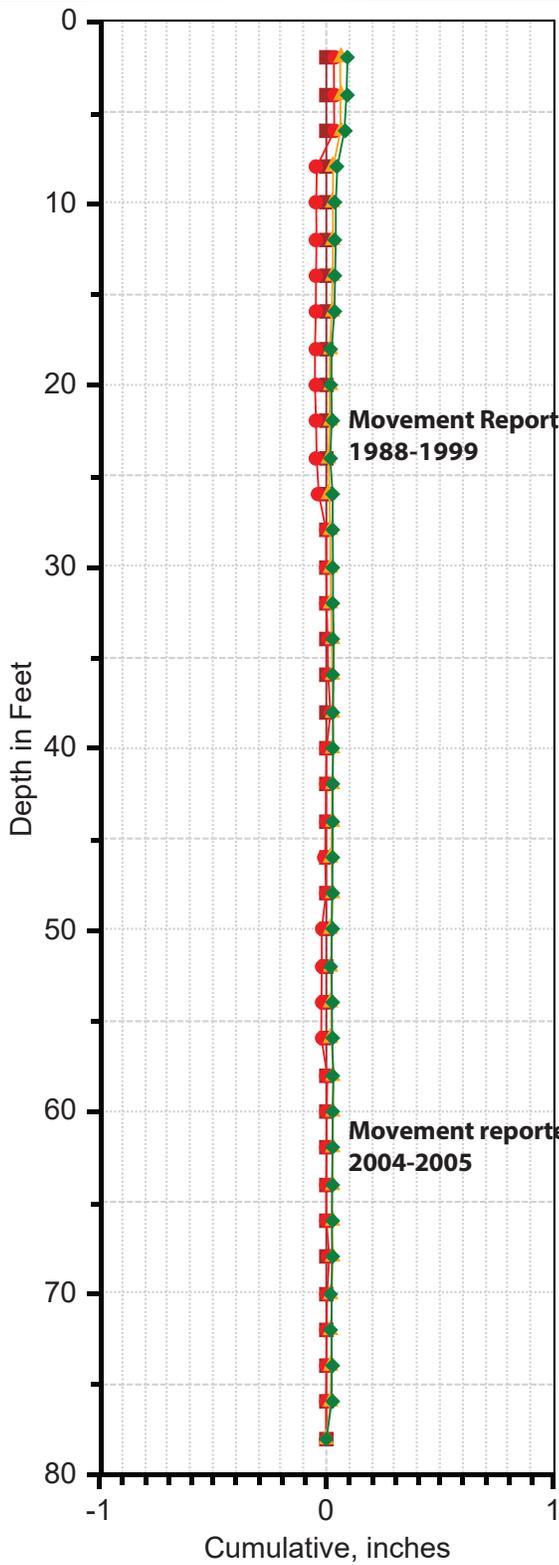
Plot Type: Cumulative and Incremental		Plot Direction: A-Direction	
Depth of Survey (ft): 78		Baseline Date: 9/14/2021	
Install Date: 3/1984		Corrections: None	
Installed Depth (ft): 88	Interpreted Movement Since Baseline (in): 0	Interpreted Movement Monitoring Year (in): 0	



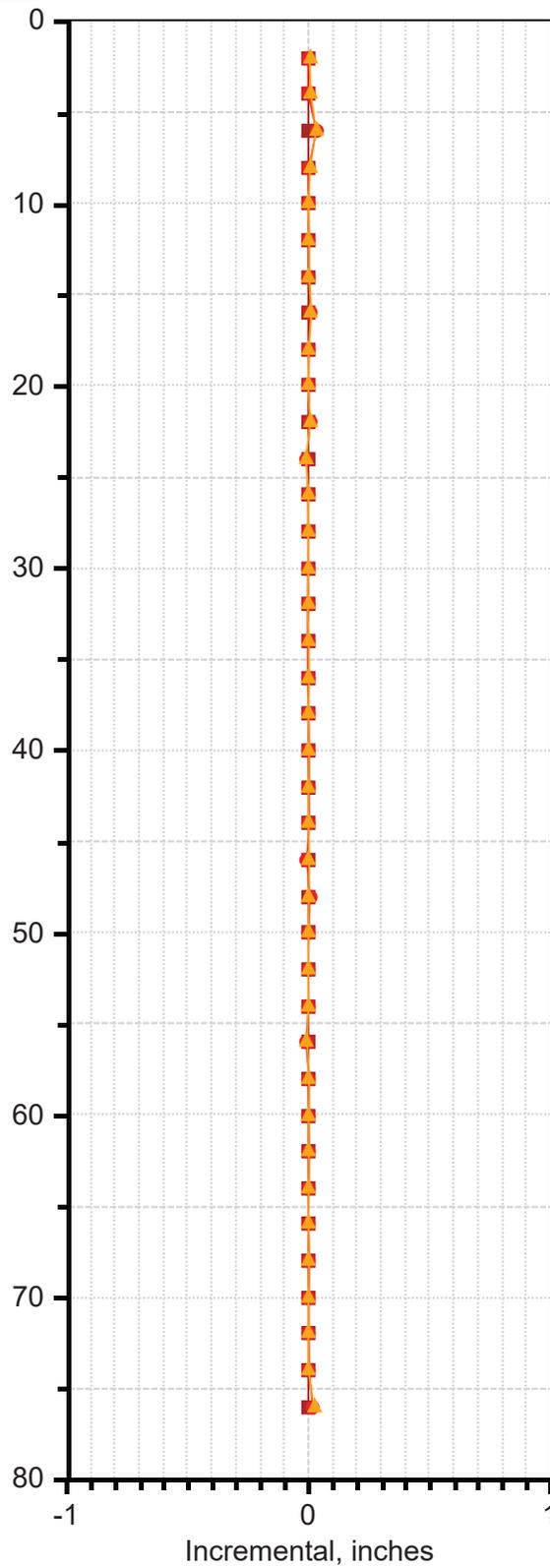
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PROJECT: Big Rock Mesa LAD Malibu, CA	PROJECT NUMBER: 220-276
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B-
290°



B+
110°



9/14/2021 6/23/2022
6/6/2023 9/24/2024

9/14/2021 6/6/2023 9/24/2024

Plot of Slope Inclinometer

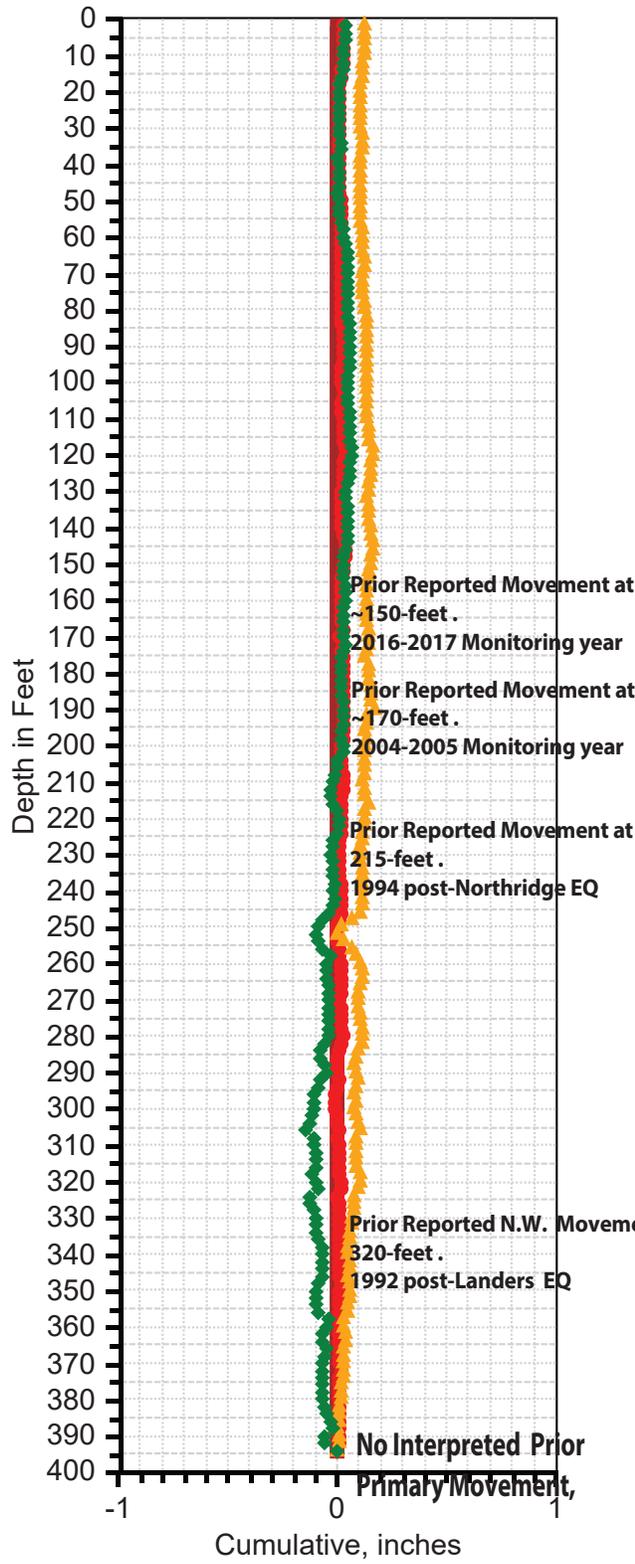
SP-15

Plot Type: Cumulative and Incremental		Plot Direction: B-Direction	
Depth of Survey (ft): 78		Baseline Date: 9/14/2021	
Install Date: 3/1984		Corrections: None	
Installed Depth (ft): 88	Interpreted Movement Since Baseline (in): 0	Interpreted Movement Monitoring Year (in): 0	

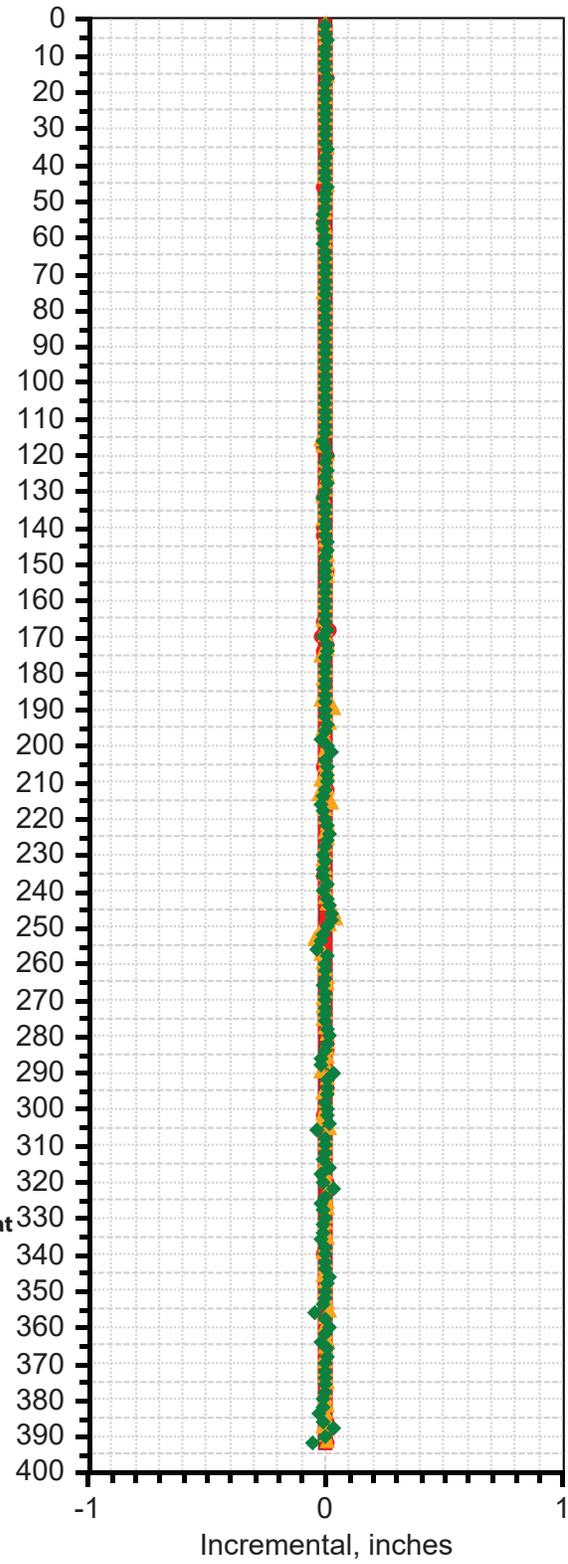


PROJECT: Big Rock Mesa LAD Malibu, CA	PROJECT NUMBER: 220-276
REVISION DATE: 9/30/2024	

A-
150°



A+
330°



7/29/2021 9/28/2022
5/31/2023 8/29/2024

7/29/2021 9/28/2022
5/31/2023 8/29/2024

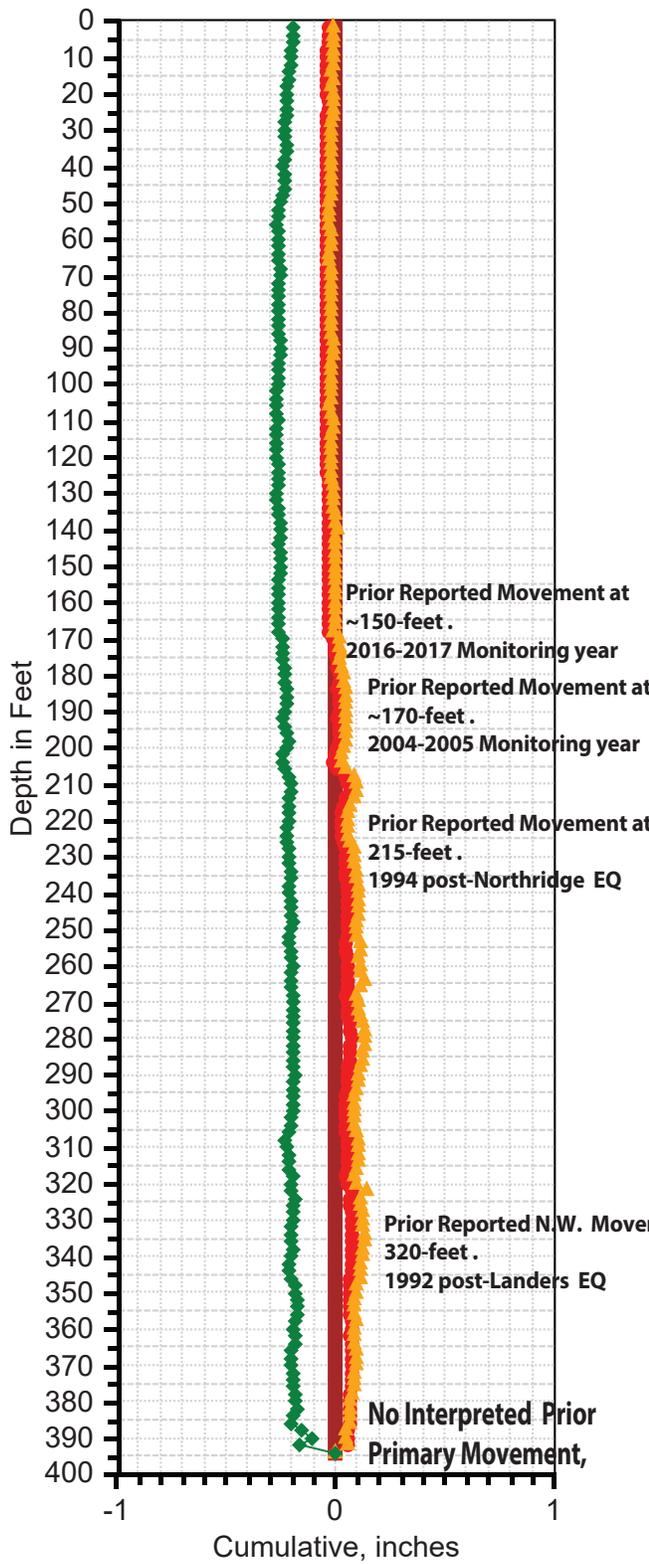
Plot of Slope Inclinometer SP-16A	Plot Type: Cumulative and Incremental		Plot Direction: A-Direction
	Depth of Survey (ft): 390	Baseline Date: 7/29/2021	Corrections: Rotation
	Install Date: 5/1985	Installed Depth (ft): 392	Interpreted Movement Since Baseline (in): 0
		Interpreted Movement Monitoring Year (in): 0	

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PROJECT: **Big Rock Mesa LAD** Malibu, CA PROJECT NUMBER: **220-276**

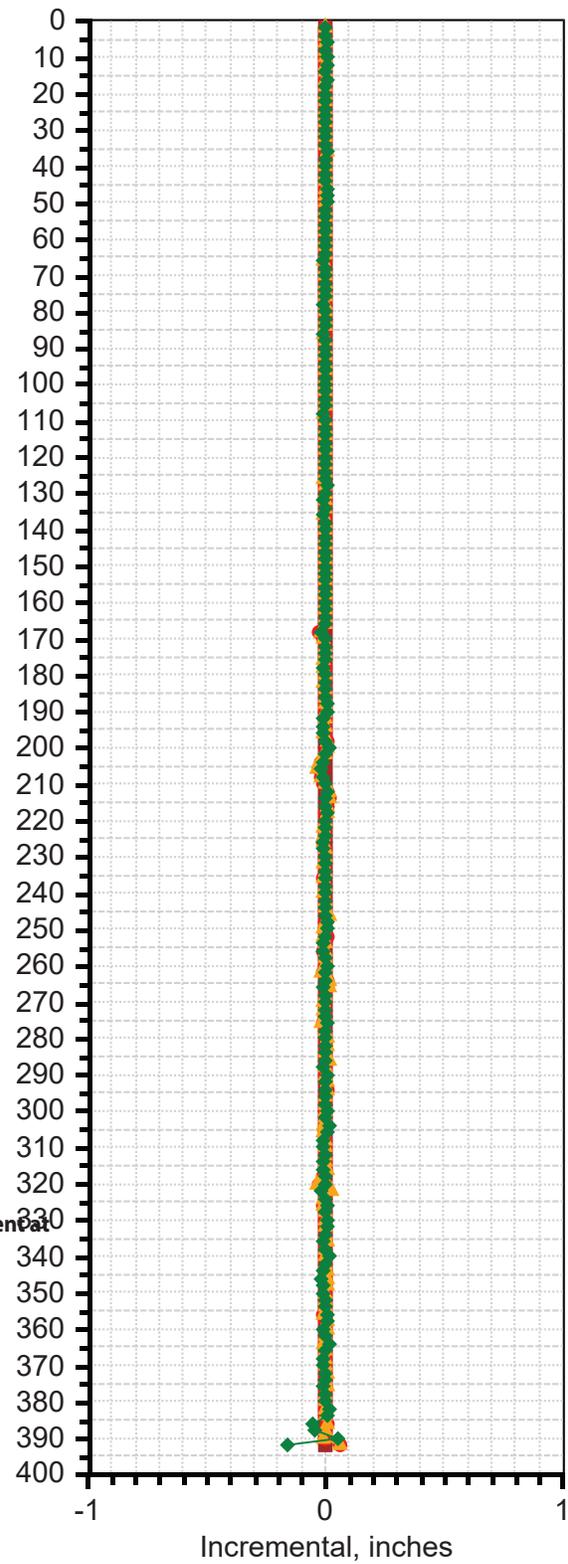
REVISION DATE: 9/30/2024

**B-
240°**



■ 7/29/2021 ● 9/28/2022
▲ 5/31/2023 ◆ 8/29/2024

**B+
60°**



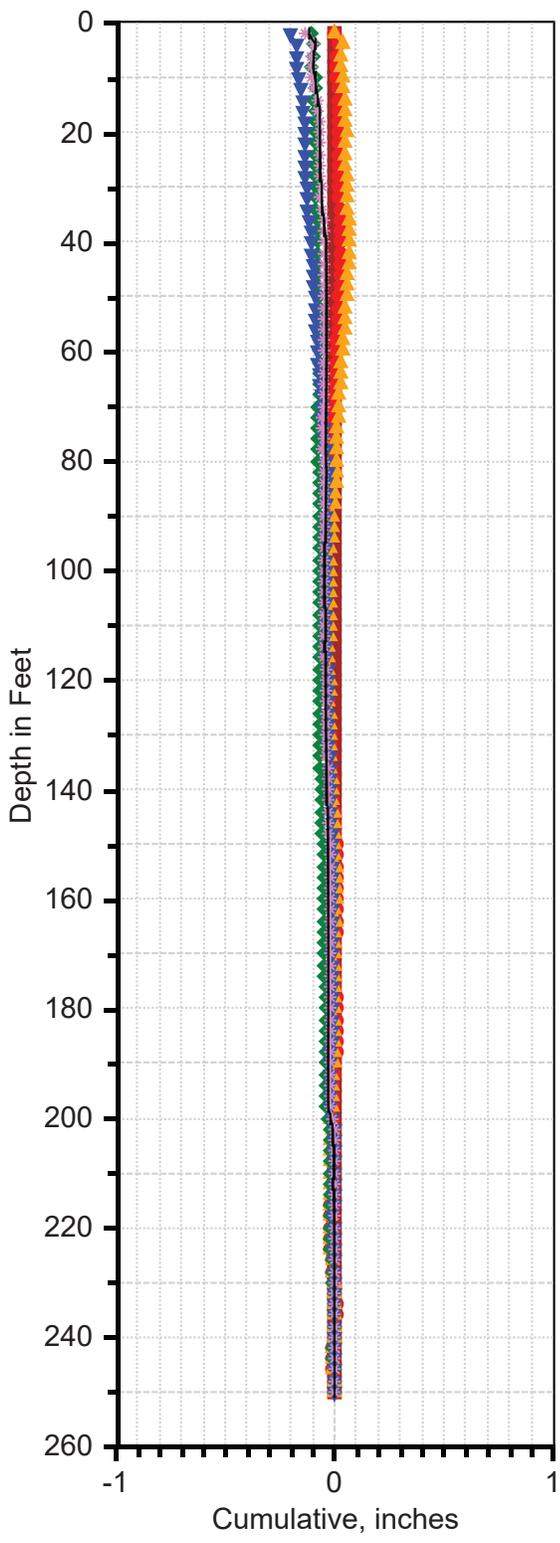
■ 7/29/2021 ● 9/28/2022
▲ 5/31/2023 ◆ 8/29/2024

Plot of Slope Inclinometer SP-16A	Plot Type: Cumulative and Incremental		Plot Direction: B-Direction
	Depth of Survey (ft): 390	Baseline Date: 7/29/2021	Corrections: None
	Install Date: 5/1985	Installed Depth (ft): 392	Interpreted Movement Since Baseline (in): 0
		Interpreted Movement Monitoring Year (in): 0	

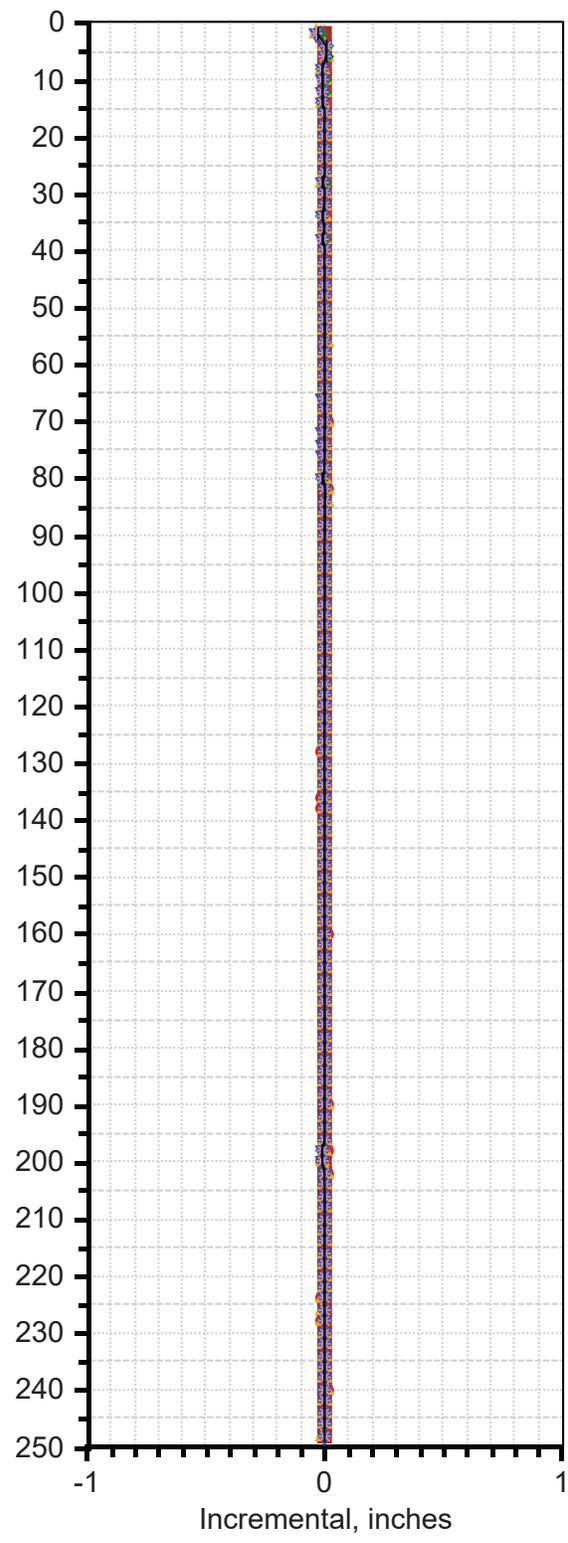
Yeh and Associates, Inc.
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PROJECT: Big Rock Mesa LAD Malibu, CA	PROJECT NUMBER: 220-276
REVISION DATE: 9/30/2024	

A-
180°



A+
0°



- 11/3/2022
- 1/26/2023
- ▲ 6/1/2023
- ◆ 11/29/2023
- ▼ 2/26/2024
- ✦ 3/26/2024
- + 8/15/2024

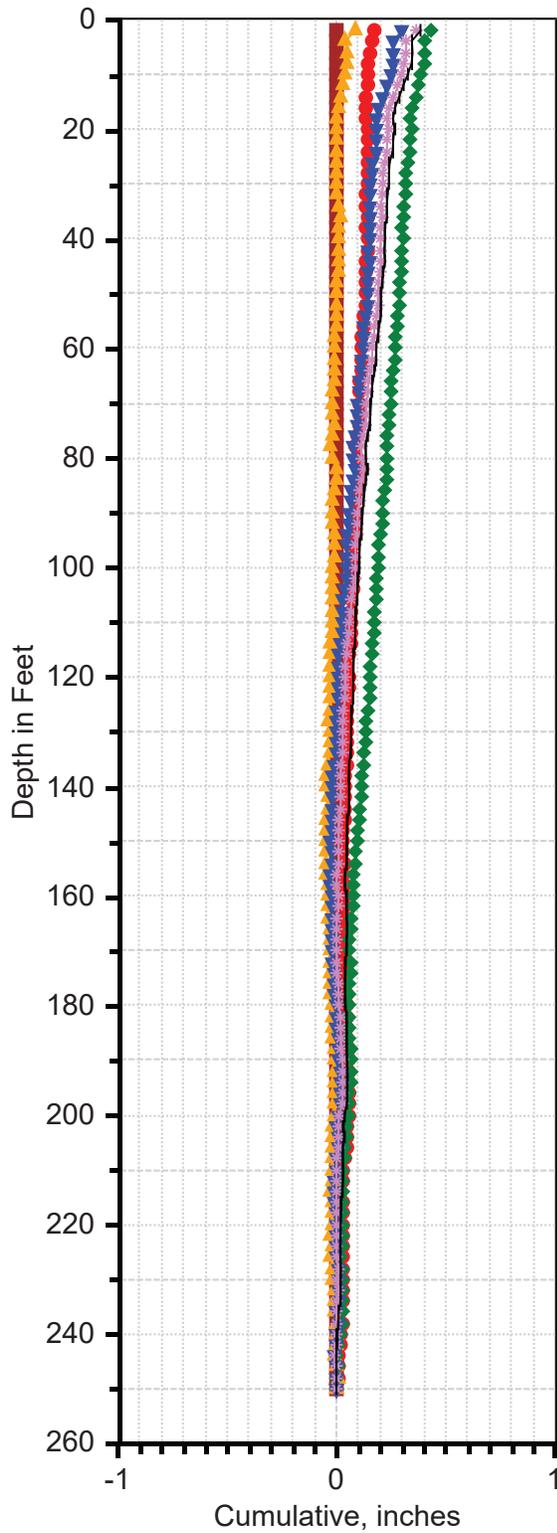
- 11/3/2022
- 1/26/2023
- ▲ 6/1/2023
- ◆ 11/29/2023
- ▼ 2/26/2024
- ✦ 3/26/2024
- + 8/15/2024

Plot of Slope Inclinometer SP-17B	Plot Type: Cumulative and Incremental		Plot Direction: A-Direction
	Depth of Survey (ft): 248	Baseline Date: 11/3/2022	
	Install Date: 11/2012	Installed Depth (ft): 250	Interpreted Movement Since Baseline (in): 0
		Interpreted Movement Monitoring Year (in): 0	Corrections: None

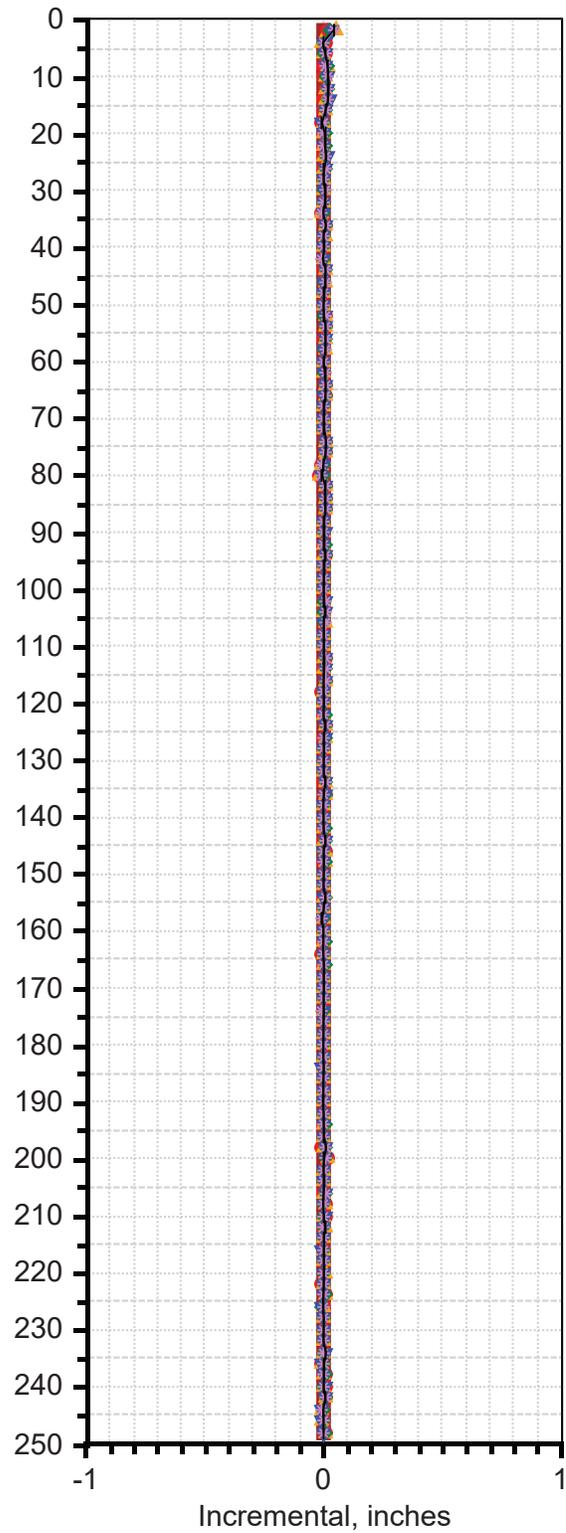
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PROJECT: **Big Rock Mesa LAD** PROJECT NUMBER: **220-276**
Malibu, CA
REVISION DATE: 9/30/2024

B-
270°



B+
90°



- 11/3/2022
- 1/26/2023
- ▲ 6/1/2023
- ◆ 11/29/2023
- ▼ 2/26/2024
- ✦ 3/26/2024
- 8/15/2024

- 11/3/2022
- 1/26/2023
- ▲ 6/1/2023
- ◆ 11/29/2023
- ▼ 2/26/2024
- ✦ 3/26/2024
- 8/15/2024

Plot of Slope Inclinometer

SP-17B

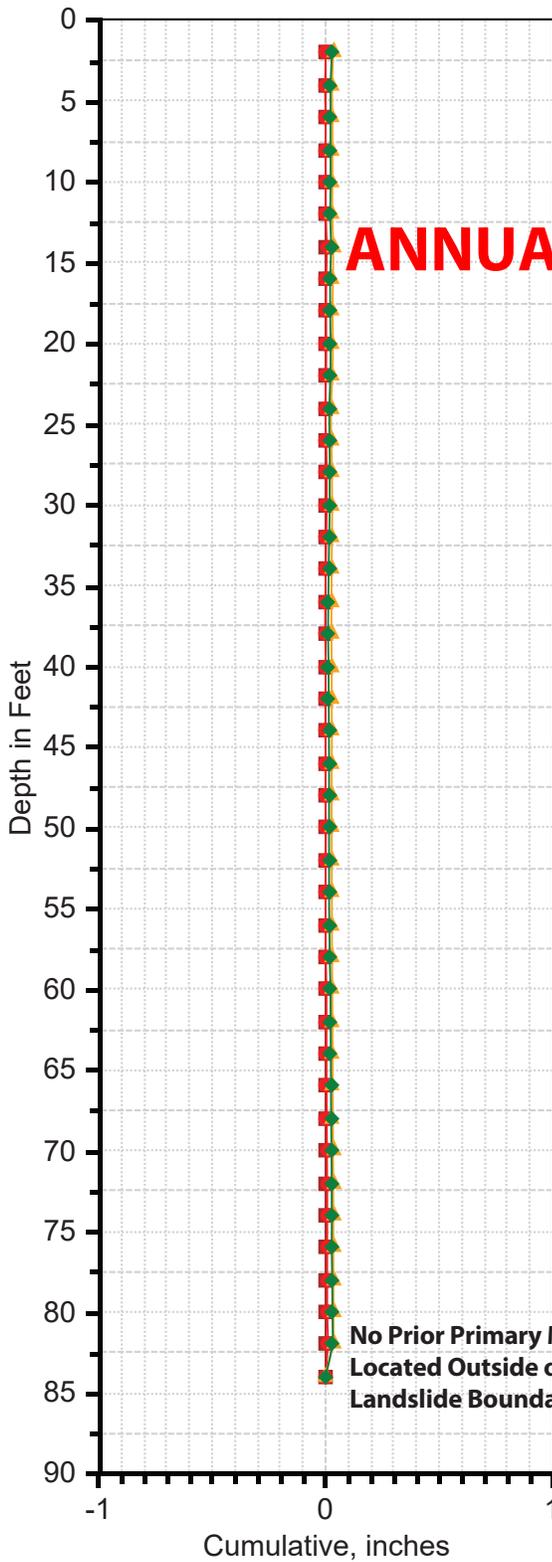
Plot Type: Cumulative and Incremental		Plot Direction: B-Direction	
Depth of Survey (ft): 248		Baseline Date: 11/3/2022	
Install Date: 11/2012		Interpreted Movement Since Baseline (in): 0	
Installed Depth (ft): 250		Interpreted Movement Monitoring Year (in): 0	



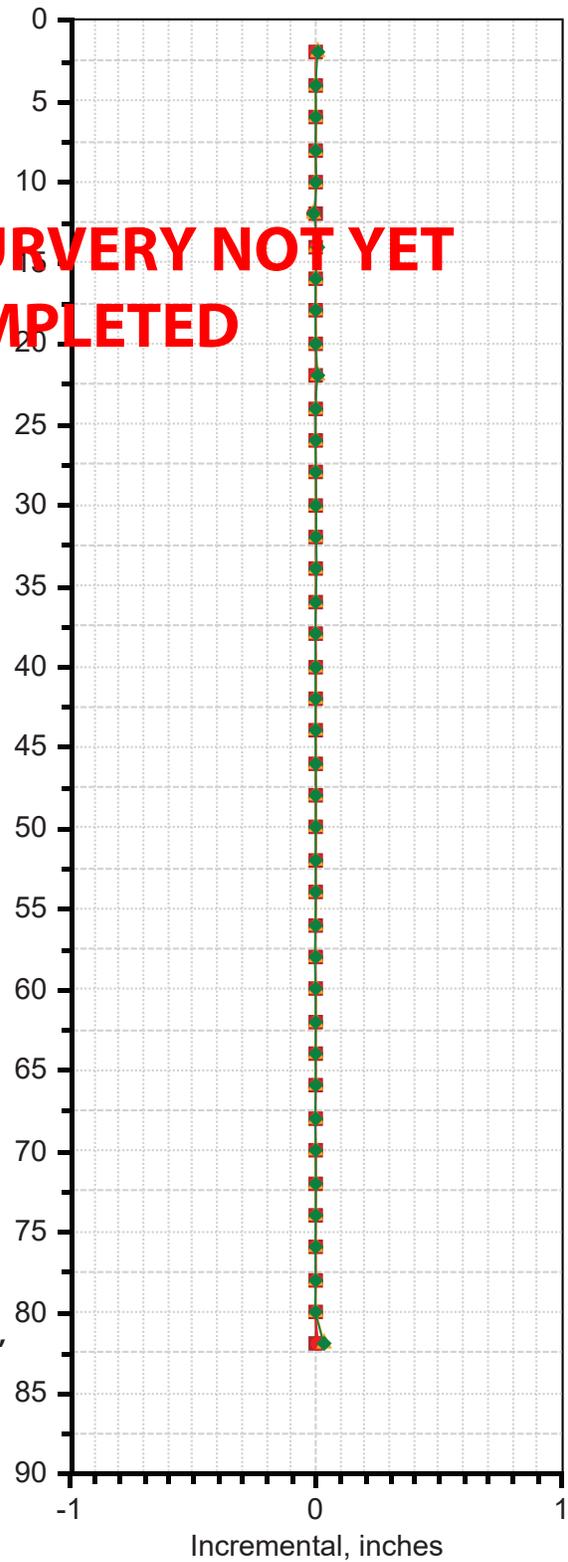
PROJECT: Big Rock Mesa LAD Malibu, CA	PROJECT NUMBER: 220-276
REVISION DATE: 9/30/2024	

A-
210°

A+
30°



ANNUAL SURVEY NOT YET COMPLETED



■ 9/14/2021 ● 5/23/2022
▲ 2/8/2023 ◆ 6/6/2023

■ 9/14/2021 ● 5/23/2022
▲ 2/8/2023 ◆ 6/6/2023

Plot of Slope Inclinometer

SP-19

Plot Type: Cumulative and Incremental

Plot Direction: A-Direction

Depth of Survey (ft):

84

Baseline Date:

9/14/2021

Corrections:

None

Install Date:
1/1984

Installed Depth (ft):
95

Interpreted Movement
Since Baseline (in): 0

Interpreted Movement
Monitoring Year (in): 0



Yeh and Associates, Inc.
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PROJECT:

Big Rock Mesa LAD
Malibu, CA

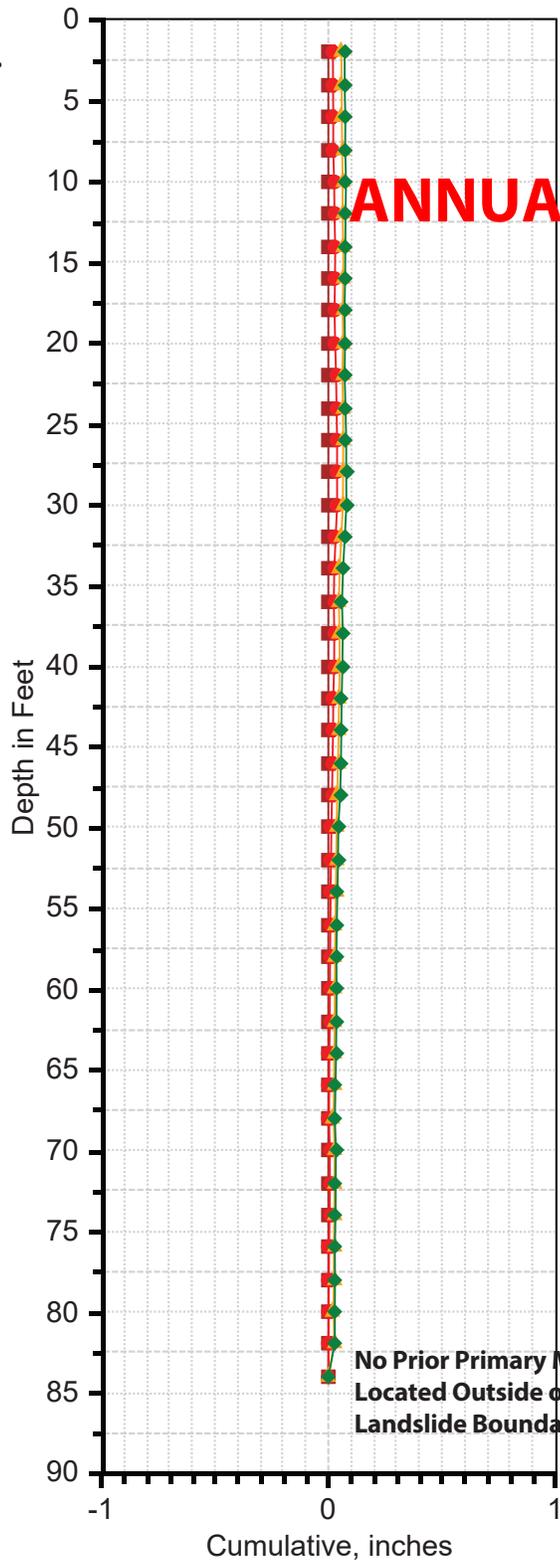
PROJECT NUMBER:

220-276

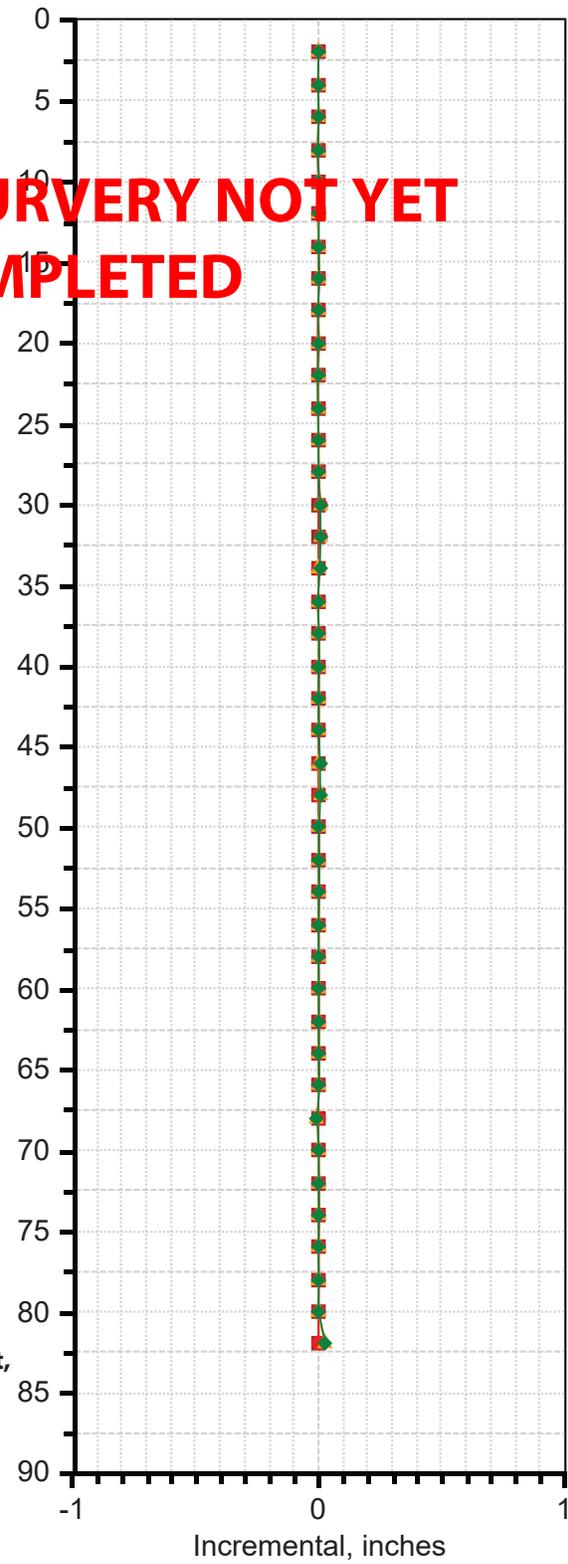
REVISION DATE: 9/30/2024

B-
300°

B+
120°



ANNUAL SURVEY NOT YET COMPLETED



■ 9/14/2021 ● 5/23/2022
▲ 2/8/2023 ◆ 6/6/2023

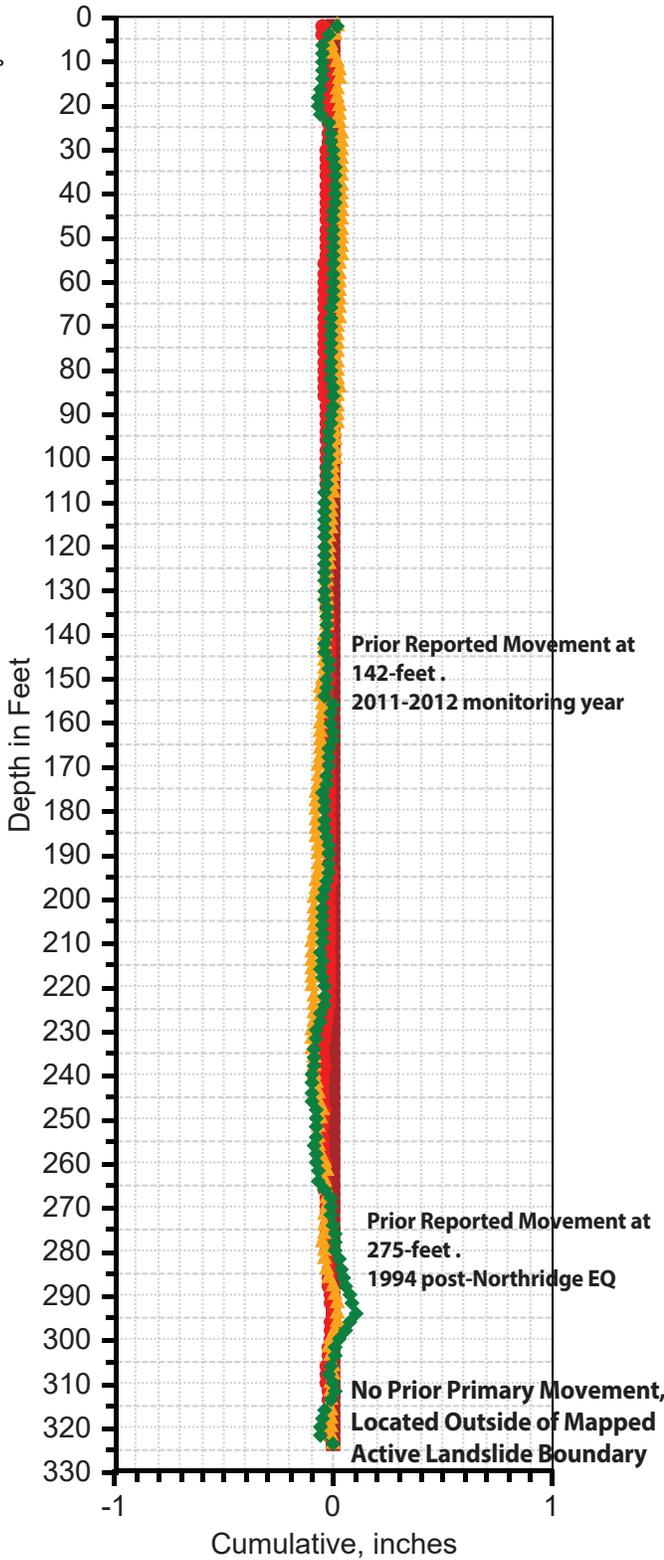
■ 9/14/2021 ● 5/23/2022
▲ 2/8/2023 ◆ 6/6/2023

Plot of Slope Inclinometer SP-19	Plot Type: Cumulative and Incremental		Plot Direction: B-Direction	
	Depth of Survey (ft): 84		Baseline Date: 9/14/2021	
	Install Date: 1/1984	Installed Depth (ft): 95	Interpreted Movement Since Baseline (in): 0	Interpreted Movement Monitoring Year (in): 0

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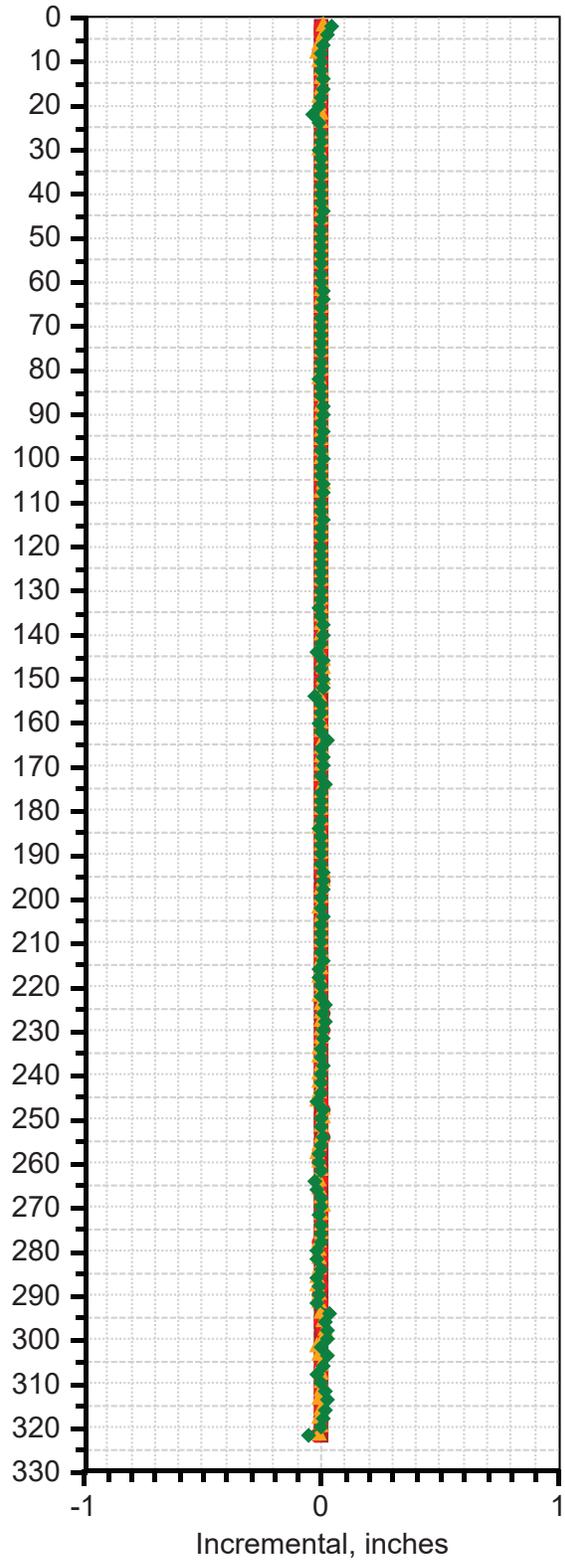
PROJECT:	Big Rock Mesa LAD Malibu, CA	PROJECT NUMBER:	220-276
REVISION DATE:	9/30/2024		

A-181°



9/13/2021 5/26/2022
6/1/2023 8/13/2024

A+1°



9/13/2021 5/26/2022
6/1/2023 8/13/2024

Plot of Slope Inclinometer

SP-20

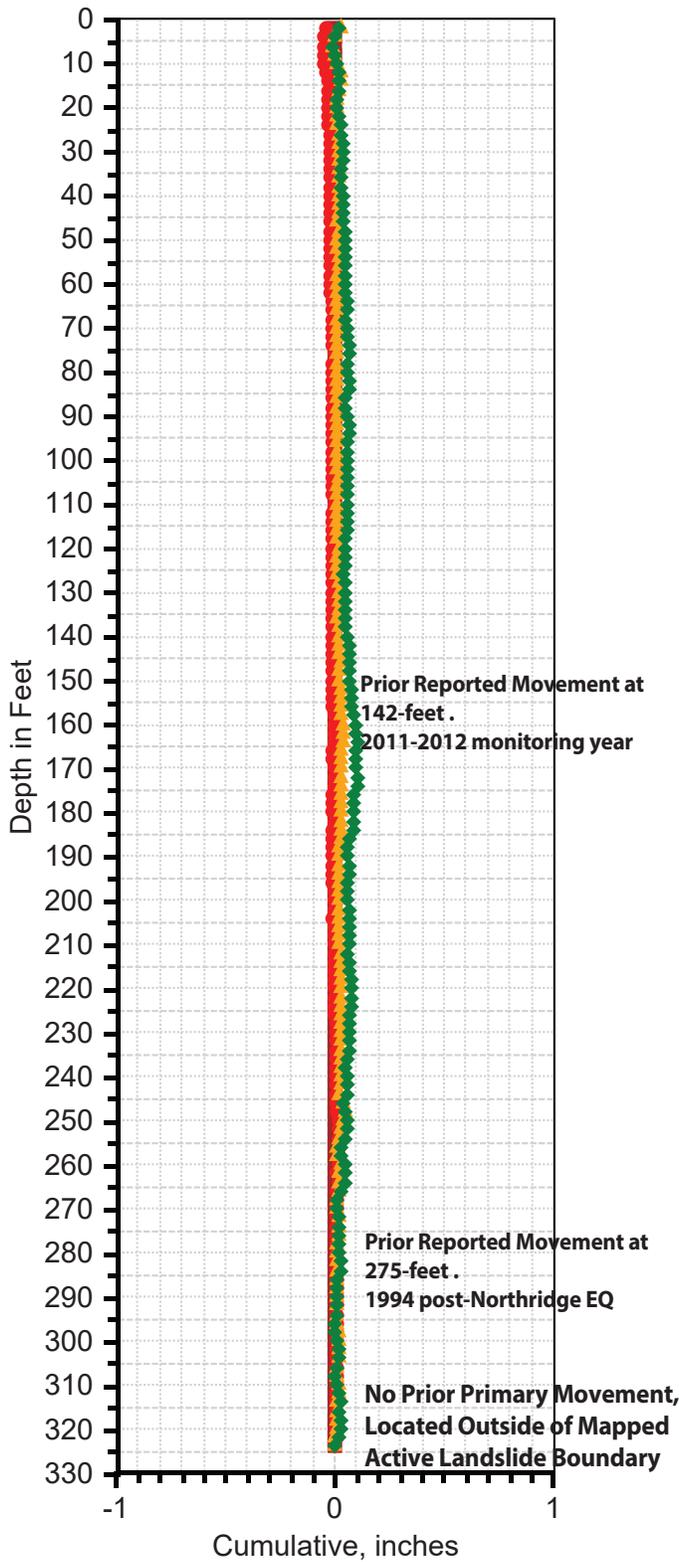
Plot Type: Cumulative and Incremental		Plot Direction: A-Direction	
Depth of Survey (ft): 322		Baseline Date: 9/13/2021	
Install Date: 3/1984		Corrections: Rotation	
Installed Depth (ft): 330	Interpreted Movement Since Baseline (in): 0	Interpreted Movement Monitoring Year (in): 0	



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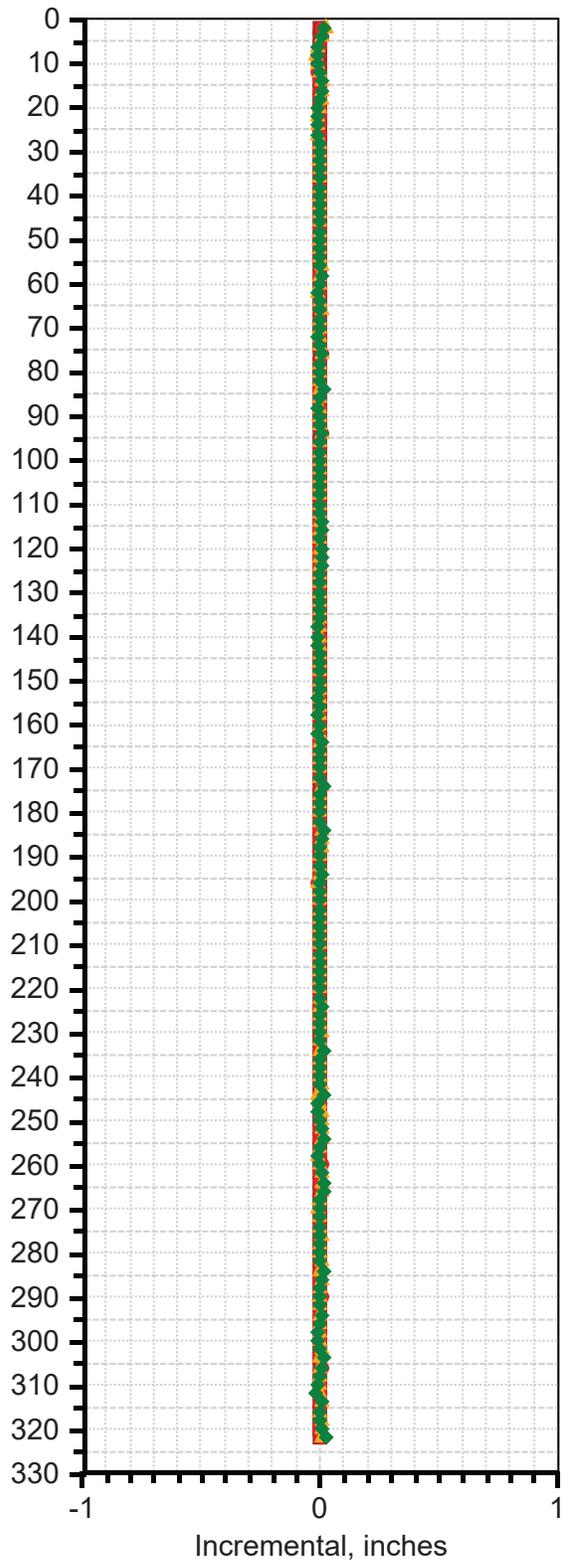
PROJECT: Big Rock Mesa LAD Malibu, CA	PROJECT NUMBER: 220-276
REVISION DATE: 9/30/2024	

**B-
271°**



9/13/2021 5/26/2022
6/1/2023 8/13/2024

**B+
91°**



9/13/2021 5/26/2022
6/1/2023 8/13/2024

Plot of Slope Inclinometer

SP-20

Plot Type: Cumulative and Incremental

Plot Direction: B-Direction

Depth of Survey (ft):

322

Baseline Date:

9/13/2021

Corrections:

Rotation

Install Date:
3/1984

Installed Depth (ft):
330

Interpreted Movement
Since Baseline (in): 0

Interpreted Movement
Monitoring Year (in): 0



Yeh and Associates, Inc.

Geotechnical • Geological • Construction Services

PROJECT:

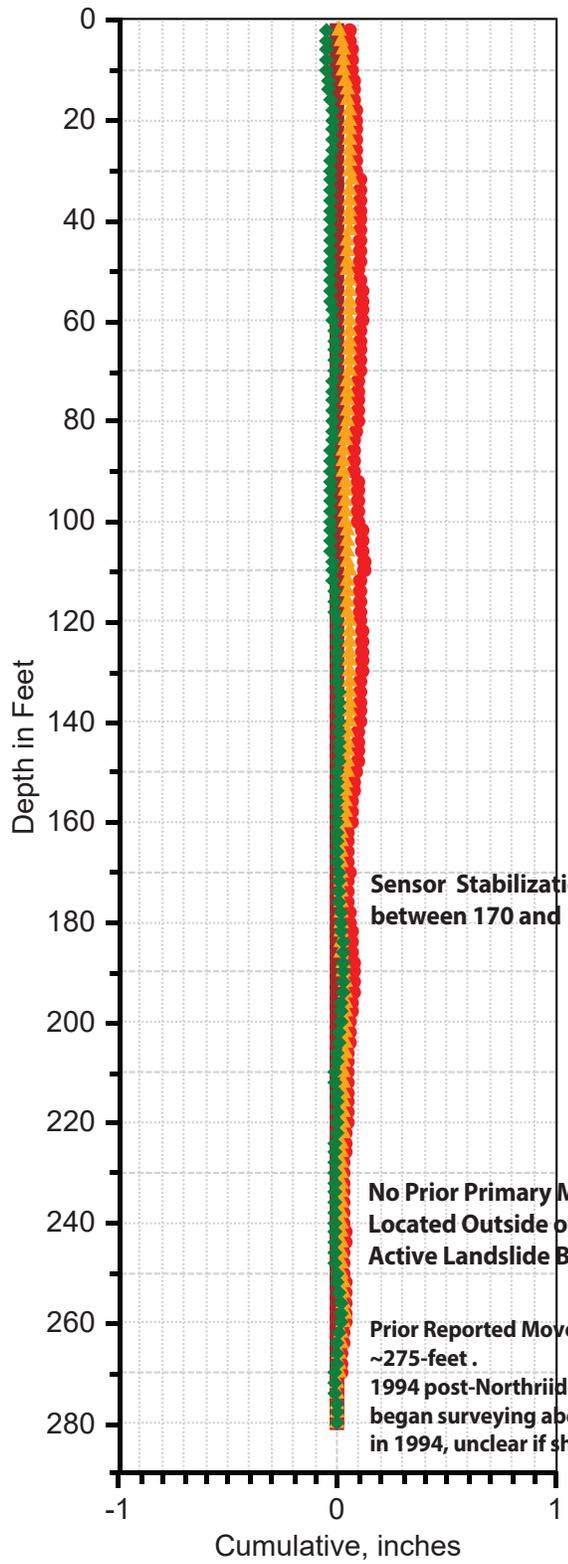
Big Rock Mesa LAD
Malibu, CA

PROJECT NUMBER:

220-276

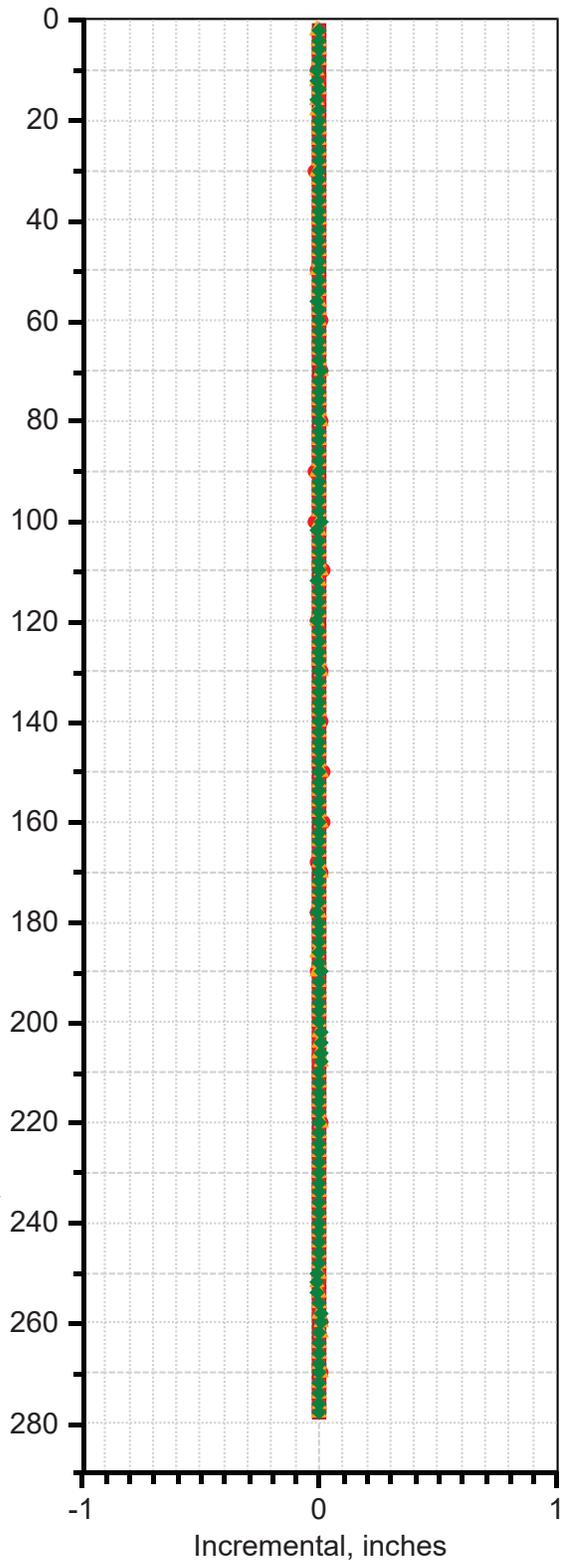
REVISION DATE: 9/30/2024

A-
120°



■ 7/30/2021 ● 6/23/2022
▲ 6/1/2023 ◆ 8/12/2024

A+
300°



■ 7/30/2021 ● 6/23/2022
▲ 6/1/2023 ◆ 8/12/2024

Plot of Slope Inclinometer
SP-21

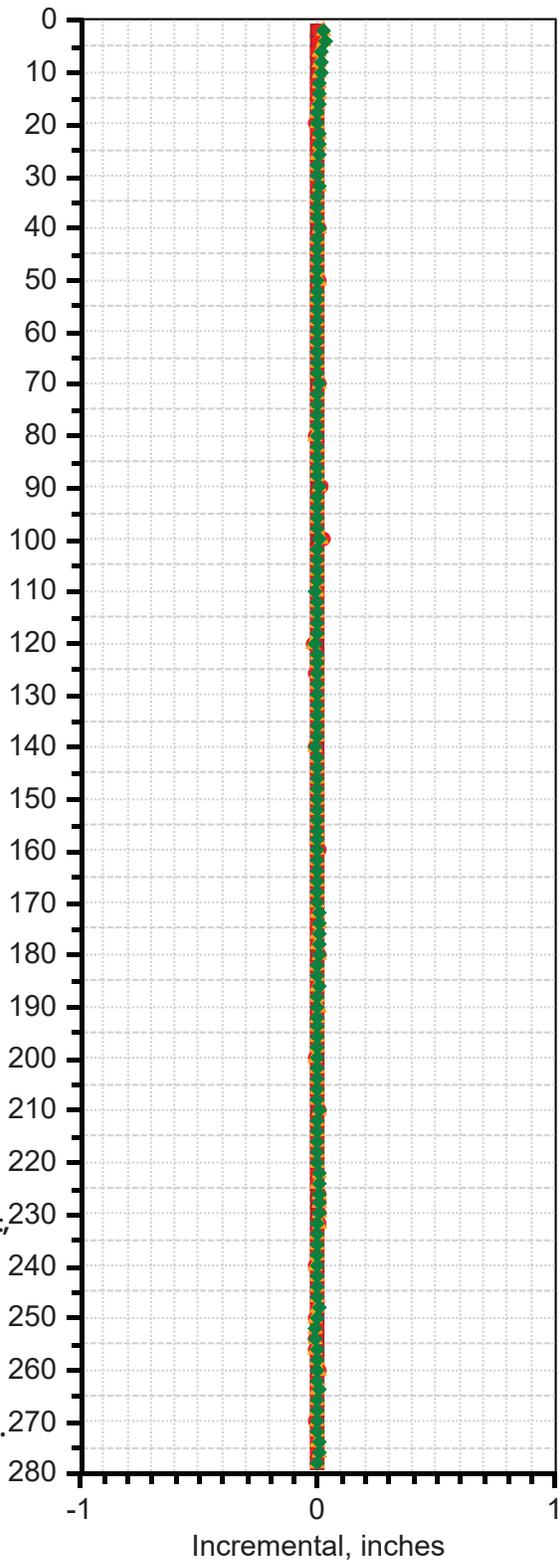
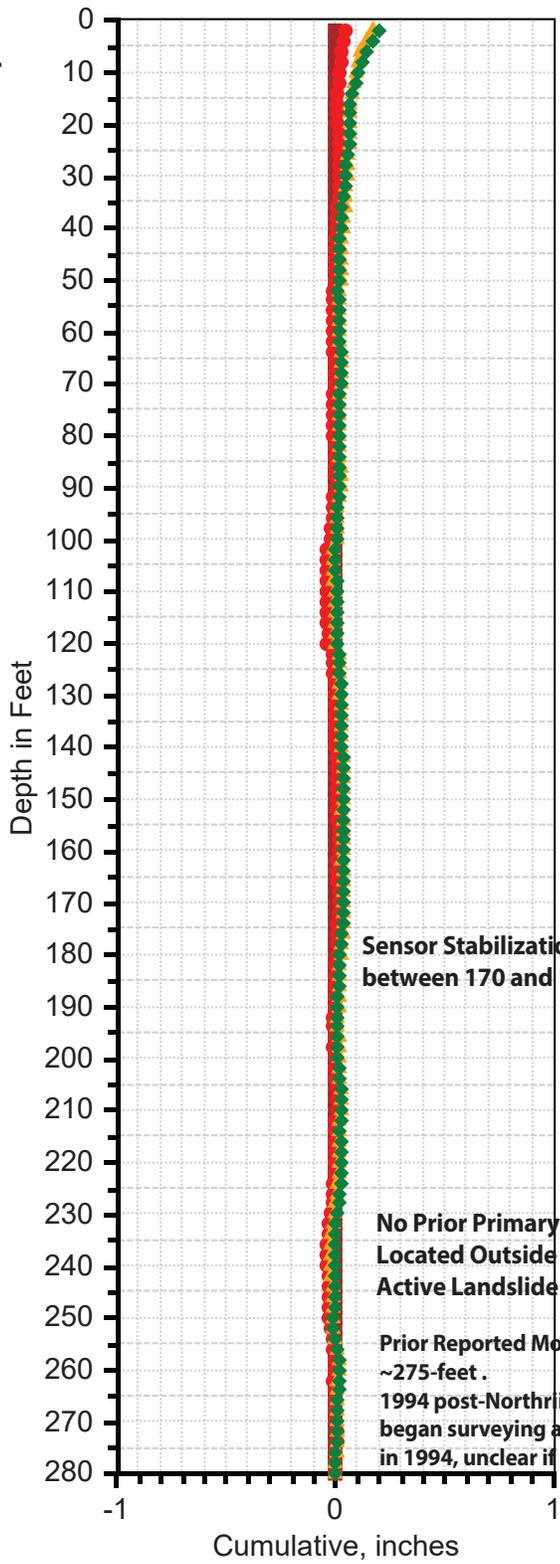
Plot Type: Cumulative and Incremental			Plot Direction: A-Direction
Depth of Survey (ft): 280		Baseline Date: 7/30/2021	Corrections: None
Install Date: 4/1984	Installed Depth (ft): 380	Interpreted Movement Since Baseline (in): 0	Interpreted Movement Monitoring Year (in): 0

Yeh and Associates, Inc.
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PROJECT: **Big Rock Mesa LAD** Malibu, CA PROJECT NUMBER: **220-276**
REVISION DATE: 9/30/2024

**B-
210°**

**B+
30°**



■ 7/30/2021 ● 6/23/2022
▲ 6/1/2023 ◆ 8/12/2024

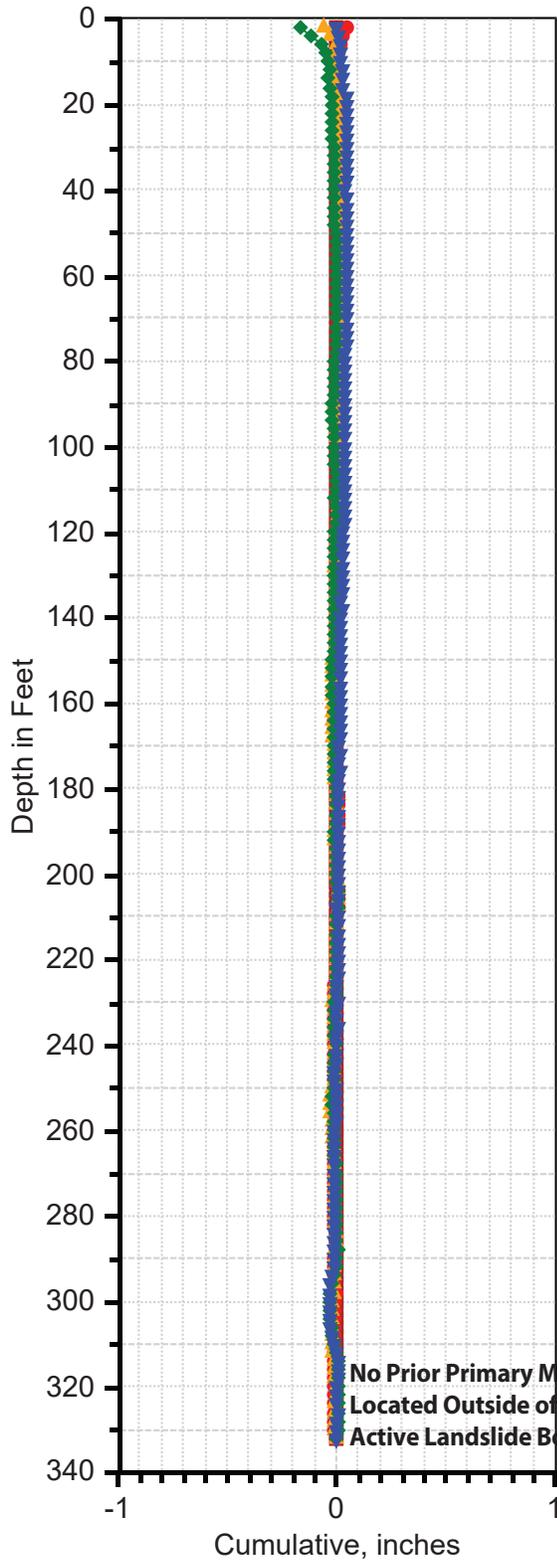
■ 7/30/2021 ● 6/23/2022
▲ 6/1/2023 ◆ 8/12/2024

Plot of Slope Inclinometer SP-21	Plot Type: Cumulative and Incremental		Plot Direction: B-Direction
	Depth of Survey (ft):	280	Baseline Date: 7/30/2021
	Install Date: 4/1984	Installed Depth (ft): 380	Interpreted Movement Since Baseline (in): 0
			Corrections: None
			Interpreted Movement Monitoring Year (in): 0

Yeh and Associates, Inc.
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PROJECT:	Big Rock Mesa LAD Malibu, CA	PROJECT NUMBER:	220-276
REVISION DATE:	9/30/2024		

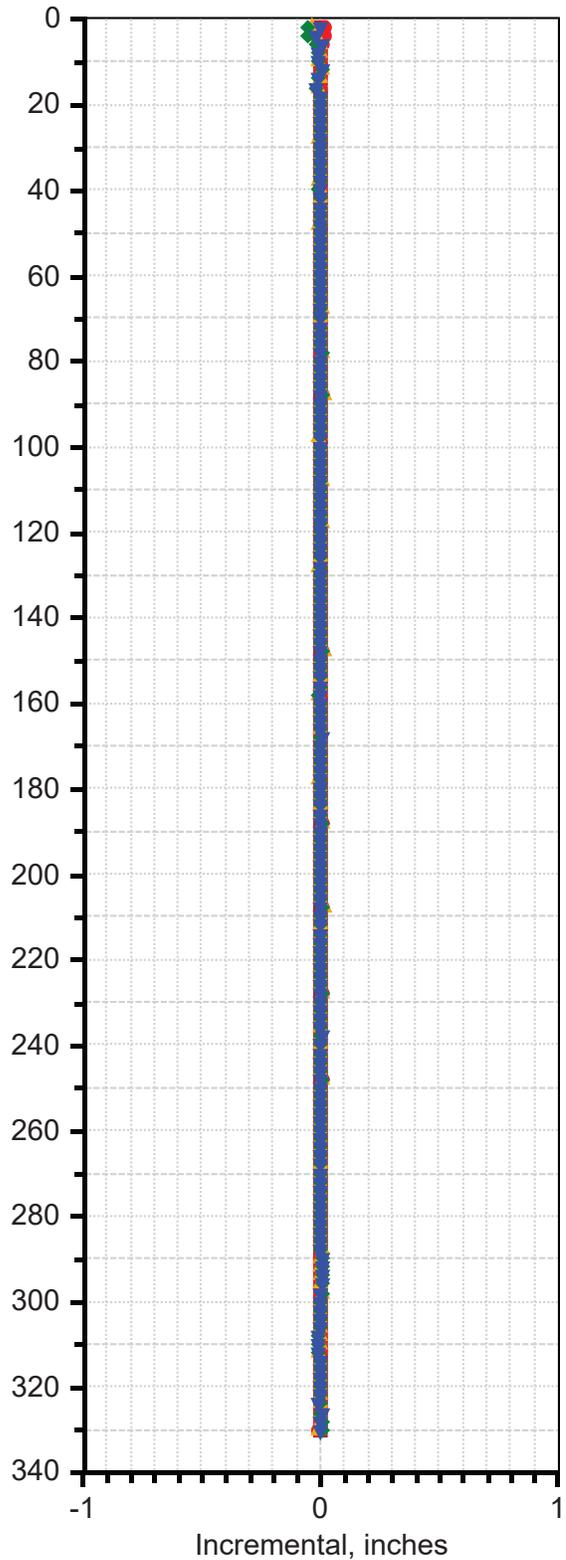
A-
165°



No Prior Primary Movement,
Located Outside of Mapped
Active Landslide Boundary

8/3/2021 9/13/2021 6/24/2022
6/2/2023 8/20/2024

A+
345°



8/3/2021 9/13/2021 6/24/2022
6/2/2023 8/20/2024

Plot of Slope Inclinometer

SP-22

Plot Type: Cumulative and Incremental		Plot Direction: A-Direction	
Depth of Survey (ft): 330		Baseline Date: 8/3/2021	
Install Date: 4/1984		Corrections: Rotation	
Installed Depth (ft): 345	Interpreted Movement Since Baseline (in): 0	Interpreted Movement Monitoring Year (in): 0	



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PROJECT:

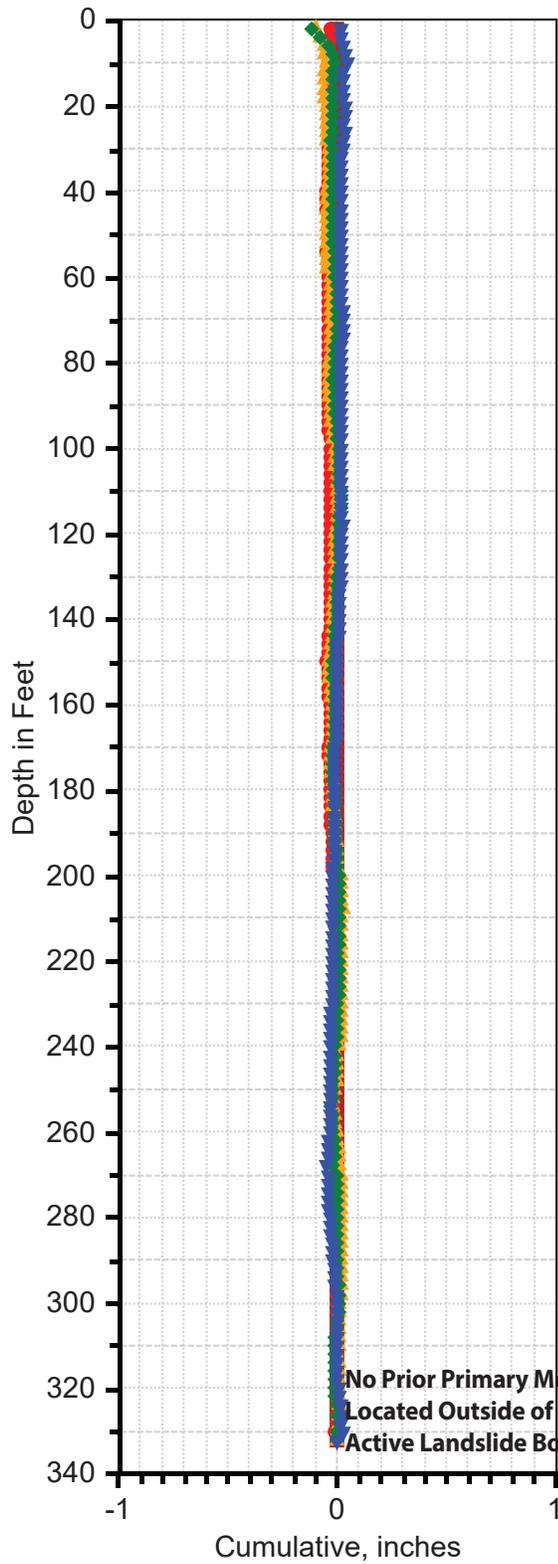
Big Rock Mesa LAD
Malibu, CA

PROJECT NUMBER:

220-276

REVISION DATE: 9/30/2024

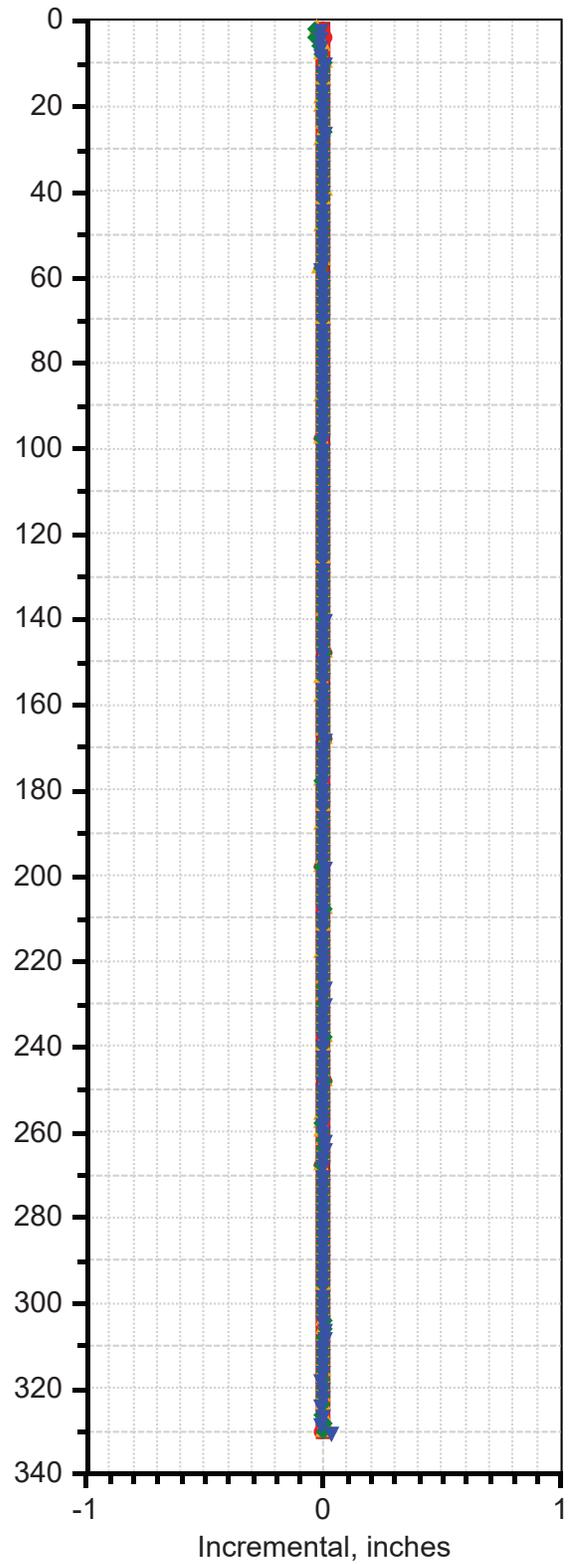
**B-
255°**



No Prior Primary Movement,
Located Outside of Mapped
Active Landslide Boundary

8/3/2021 9/13/2021 6/24/2022
6/2/2023 8/20/2024

**B+
75°**



8/3/2021 9/13/2021 6/24/2022
6/2/2023 8/20/2024

Plot of Slope Inclinometer

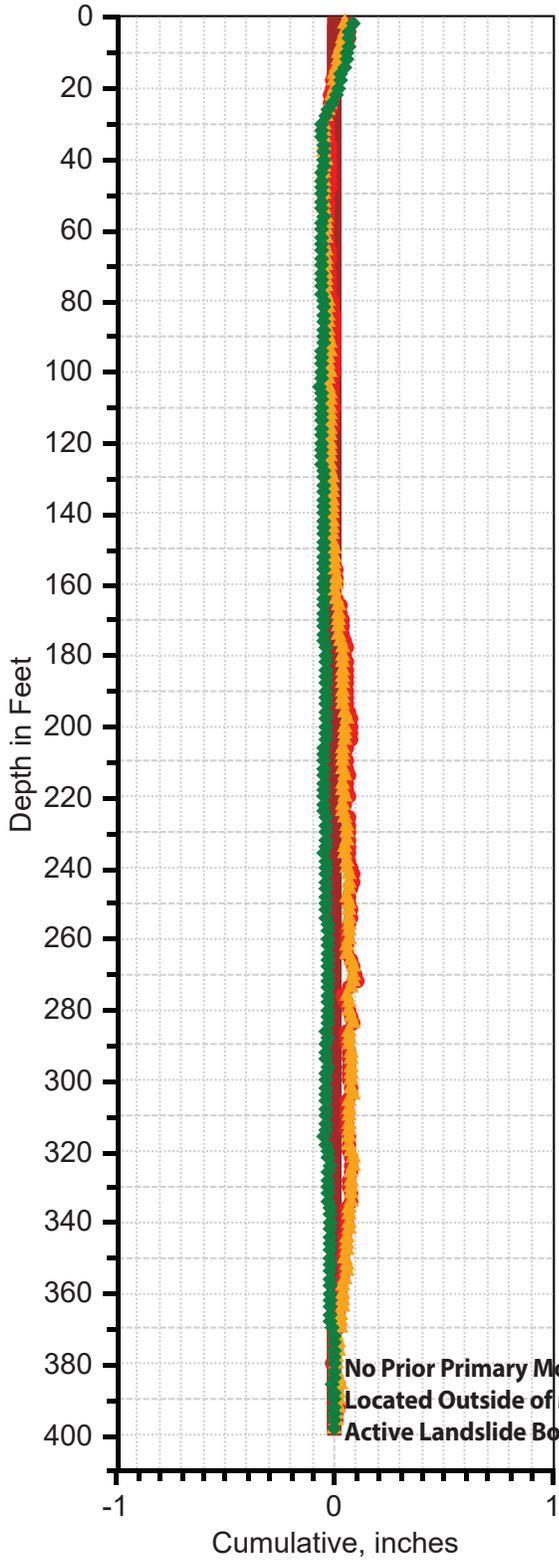
SP-22

Plot Type: Cumulative and Incremental		Plot Direction: B-Direction
Depth of Survey (ft): 330	Baseline Date: 8/3/2021	Corrections: Rotation
Install Date: 4/1984	Installed Depth (ft): 345	Interpreted Movement Since Baseline (in): 0
		Interpreted Movement Monitoring Year (in): 0

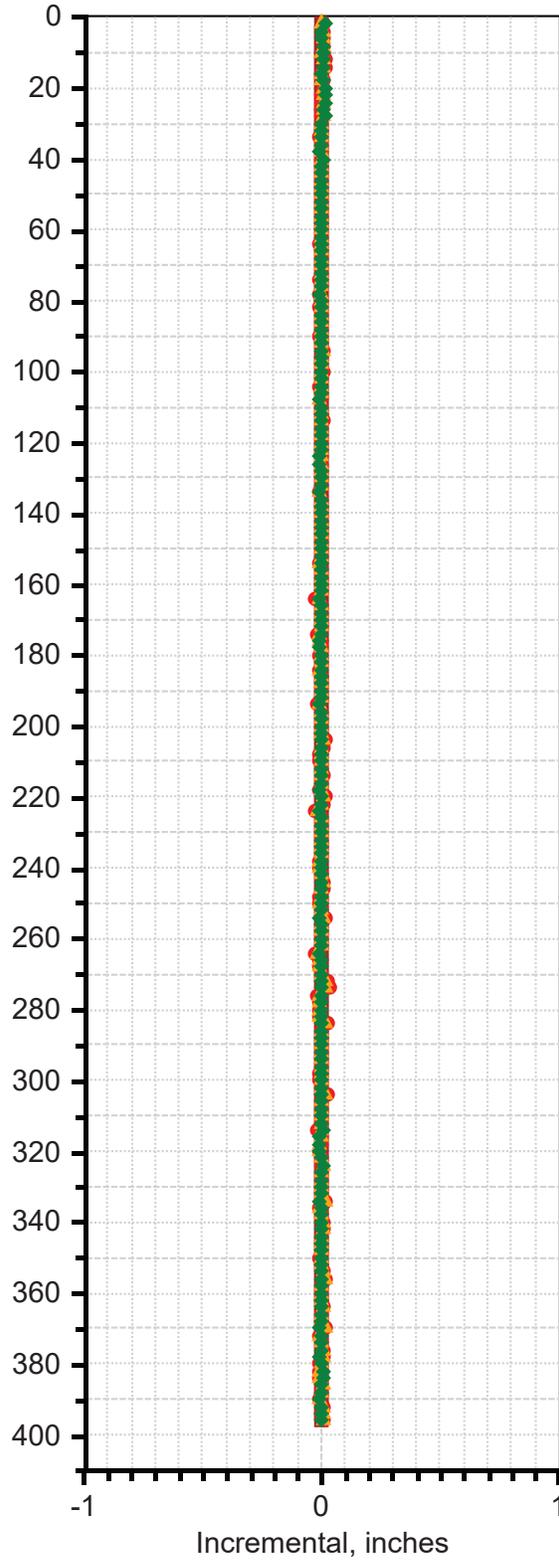
Yeh and Associates, Inc.
Geotechnical • Geological • Construction Services

PROJECT: **Big Rock Mesa LAD** PROJECT NUMBER: **220-276**
Malibu, CA
REVISION DATE: 9/30/2024

A-185°



A+5°



7/30/2021 6/23/2022
6/2/2023 8/7/2024

7/30/2021 6/23/2022
6/2/2023 8/7/2024

Plot of Slope Inclinometer

SP-23

Plot Type: Cumulative and Incremental

Plot Direction: A-Direction

Depth of Survey (ft):

396

Baseline Date:

7/30/2021

Corrections:

None

Install Date:
4/1984

Installed Depth (ft):
402

Interpreted Movement
Since Baseline (in): 0

Interpreted Movement
Monitoring Year (in): 0



Yeh and Associates, Inc.

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PROJECT:

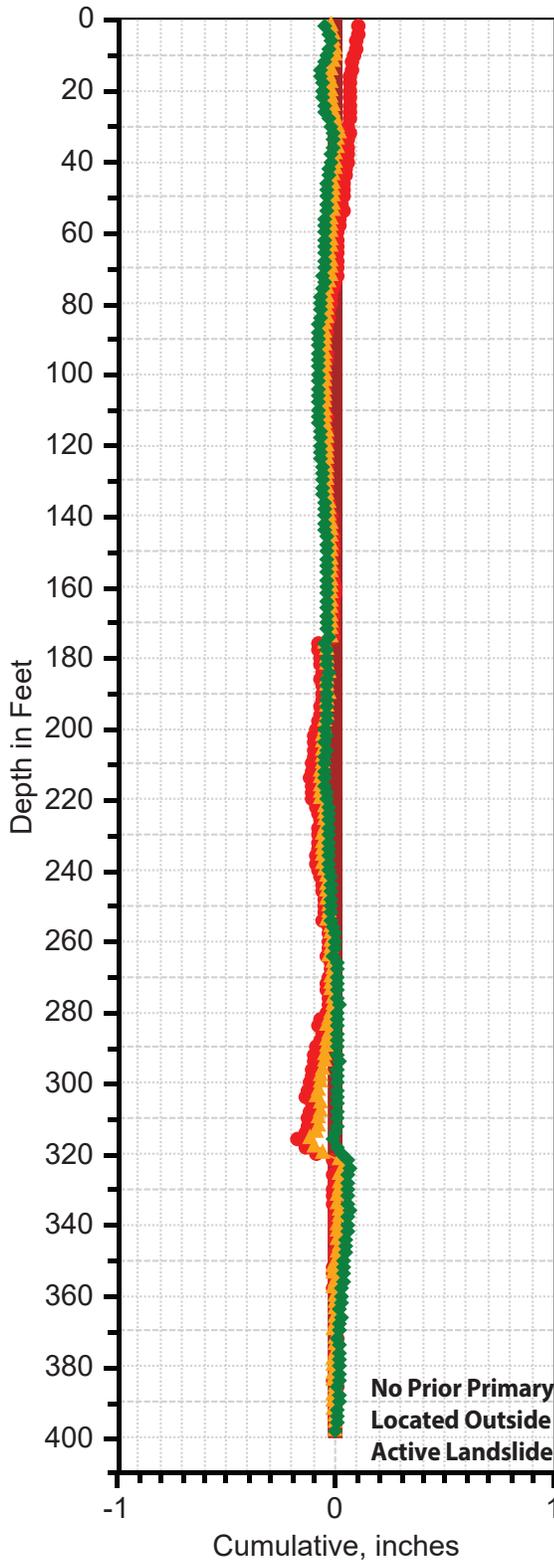
Big Rock Mesa LAD
Malibu, CA

PROJECT NUMBER:

220-276

REVISION DATE: 9/30/2024

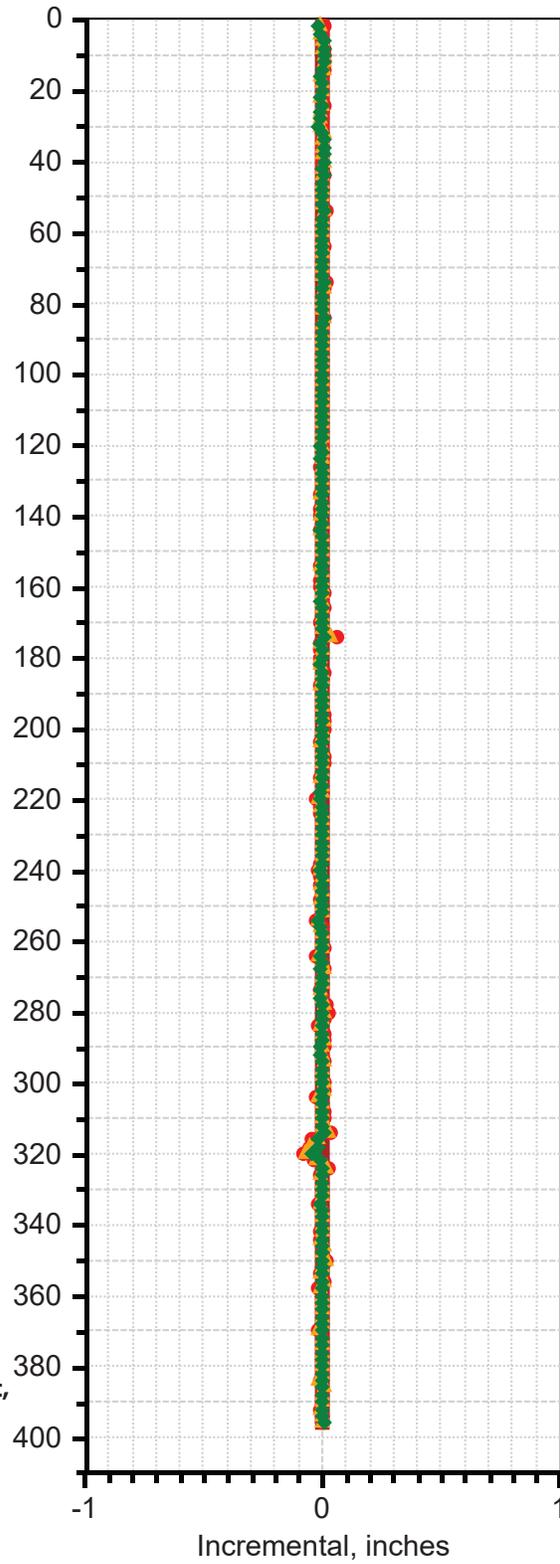
**B-
275°**



No Prior Primary Movement,
Located Outside of Mapped
Active Landslide Boundary

7/30/2021 6/23/2022
6/2/2023 8/7/2024

**B+
95°**



7/30/2021 6/23/2022
6/2/2023 8/7/2024

Plot of Slope Inclinometer

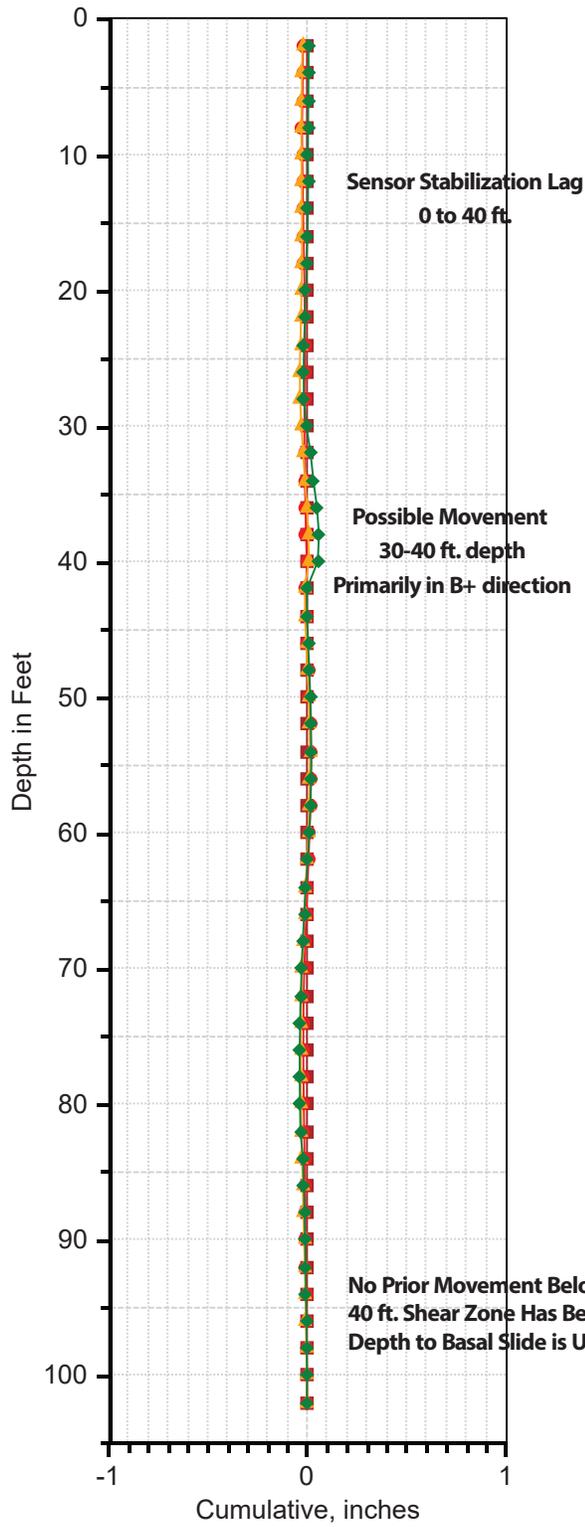
SP-23

Plot Type: Cumulative and Incremental		Plot Direction: B-Direction	
Depth of Survey (ft): 396		Baseline Date: 7/30 /2021	
Install Date: 4/1984		Corrections: None	
Installed Depth (ft): 402	Interpreted Movement Since Baseline (in): 0	Interpreted Movement Monitoring Year (in): 0	



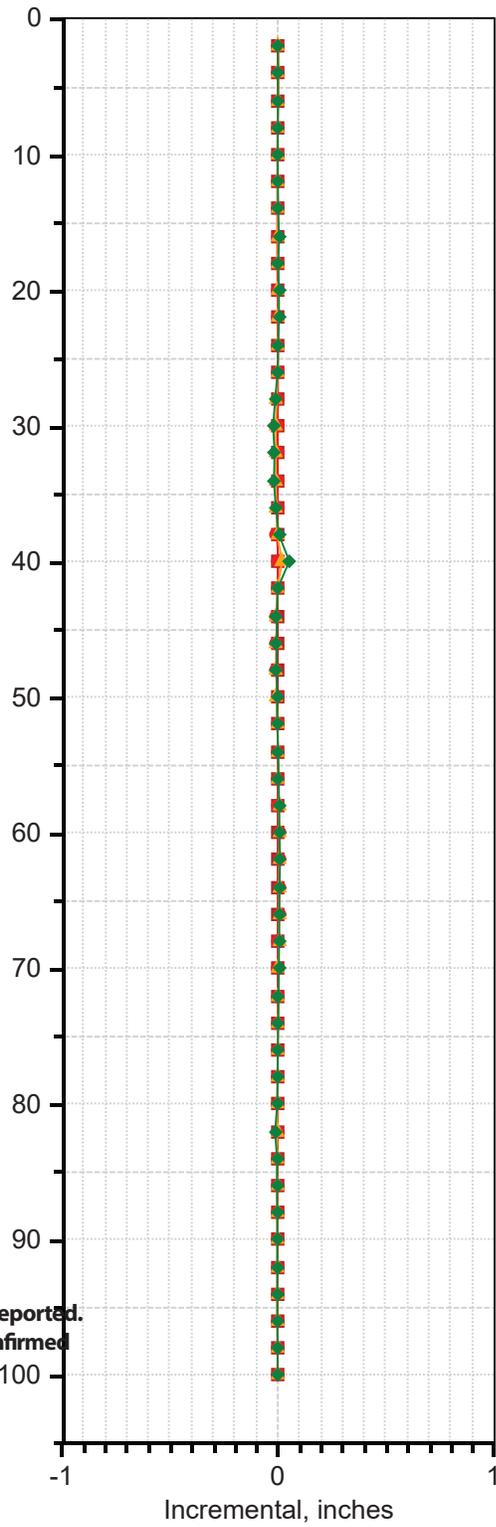
PROJECT: **Big Rock Mesa LAD** PROJECT NUMBER: **220-276**
 Malibu, CA
 REVISION DATE: 9/30/2024

A-
225°



■ 11/30/2023 ● 2/14/2024
▲ 3/22/2024 ◆ 8/7/2024

A+
45°



■ 11/30/2023 ● 2/14/2024
▲ 3/22/2024 ◆ 8/7/2024

Plot of Slope Inclinometer

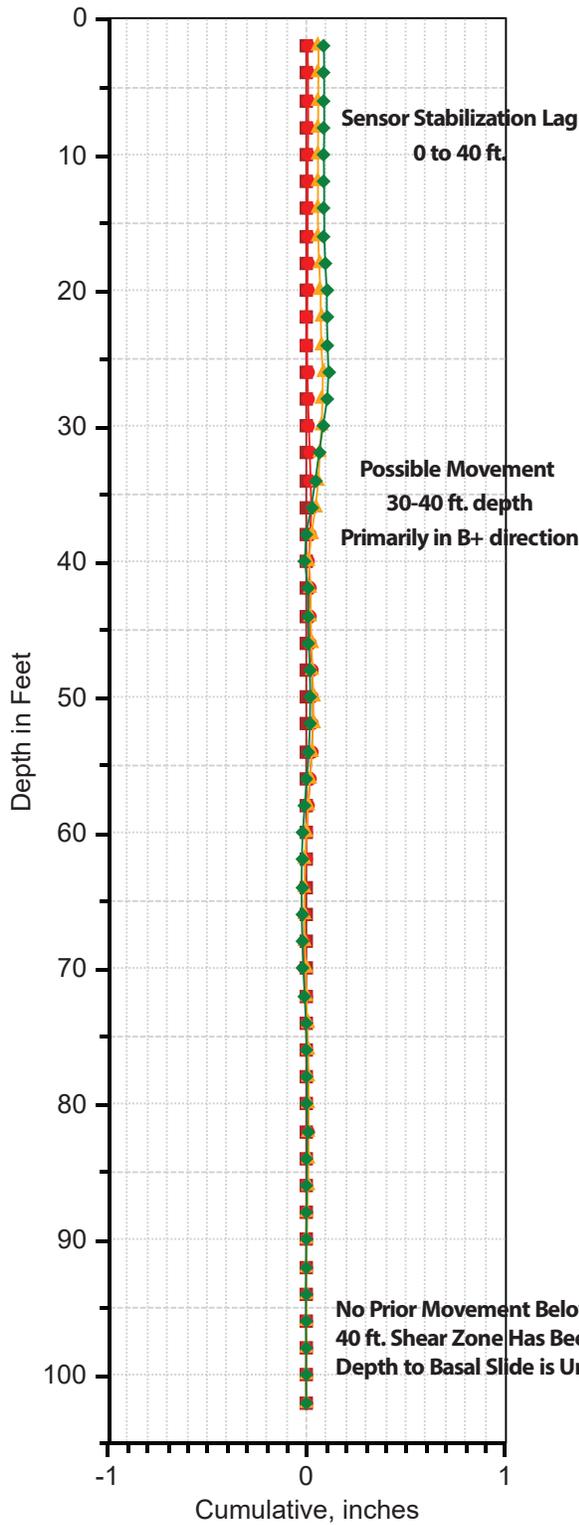
SP-26

Plot Type: Cumulative and Incremental		Plot Direction: A-Direction	
Depth of Survey (ft): 100		Baseline Date: 11/30/2023	
Install Date: 4/1984		Corrections: None	
Installed Depth (ft): 405	Interpreted Movement Since Baseline (in): 0.1 possible	Interpreted Movement Monitoring Year (in): 0.1 possible	



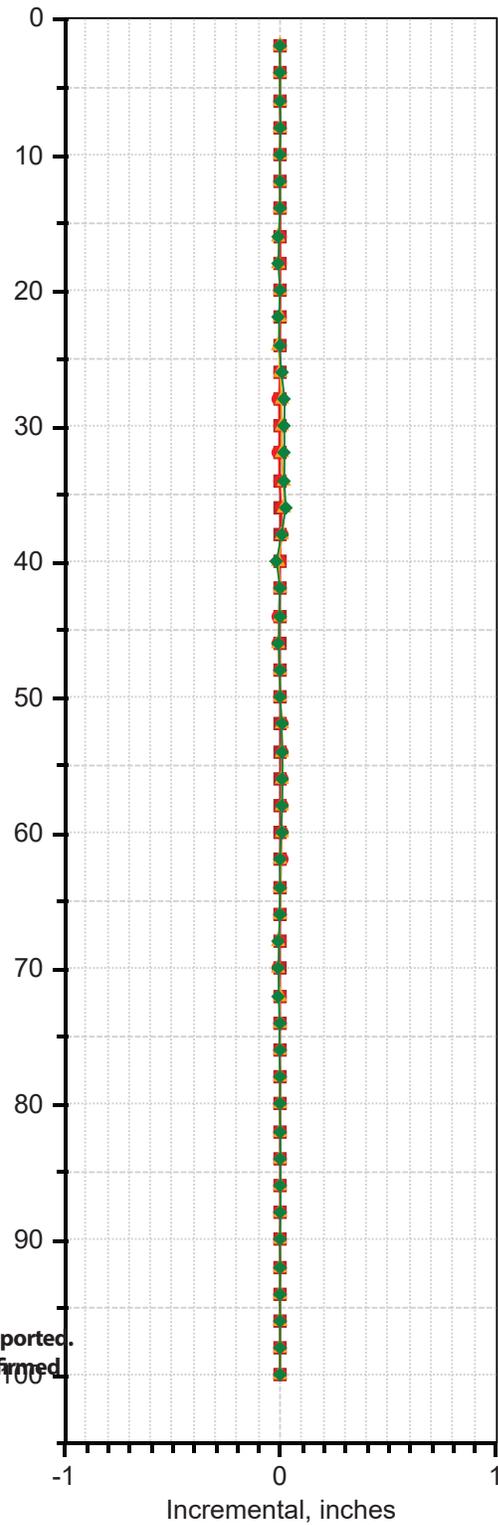
PROJECT:	Big Rock Mesa LAD Malibu, CA	PROJECT NUMBER:	220-276
REVISION DATE:	9/30/2024		

B-
315°



11/30/2023 2/14/2024
3/22/2024 8/7/2024

B+
135°

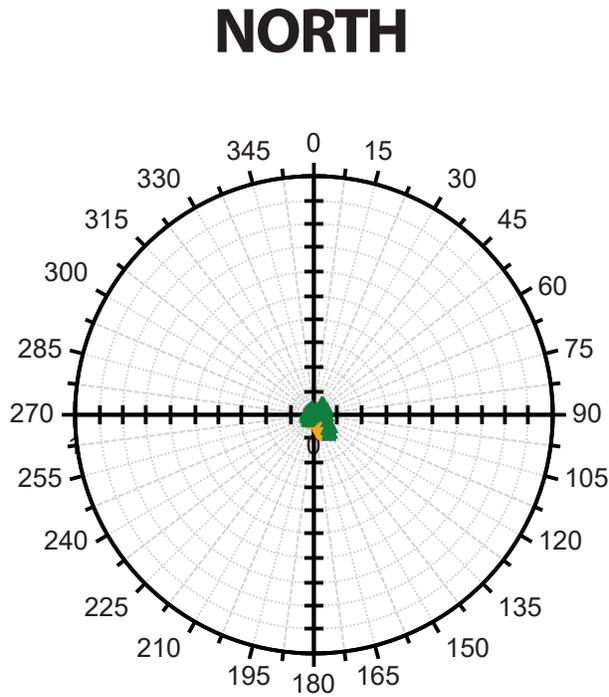


11/30/2023 2/14/2024
3/22/2024 8/7/2024

Plot of Slope Inclinometer

SP-26

Plot Type: Cumulative and Incremental		Plot Direction: B-Direction	
Depth of Survey (ft): 100		Baseline Date: 11/30/2023	
Install Date: 4/1984		Corrections: None	
Installed Depth (ft): 405	Interpreted Movement Since Baseline (in): 0.1 possible	Interpreted Movement Monitoring Year (in): 0.1 possible	



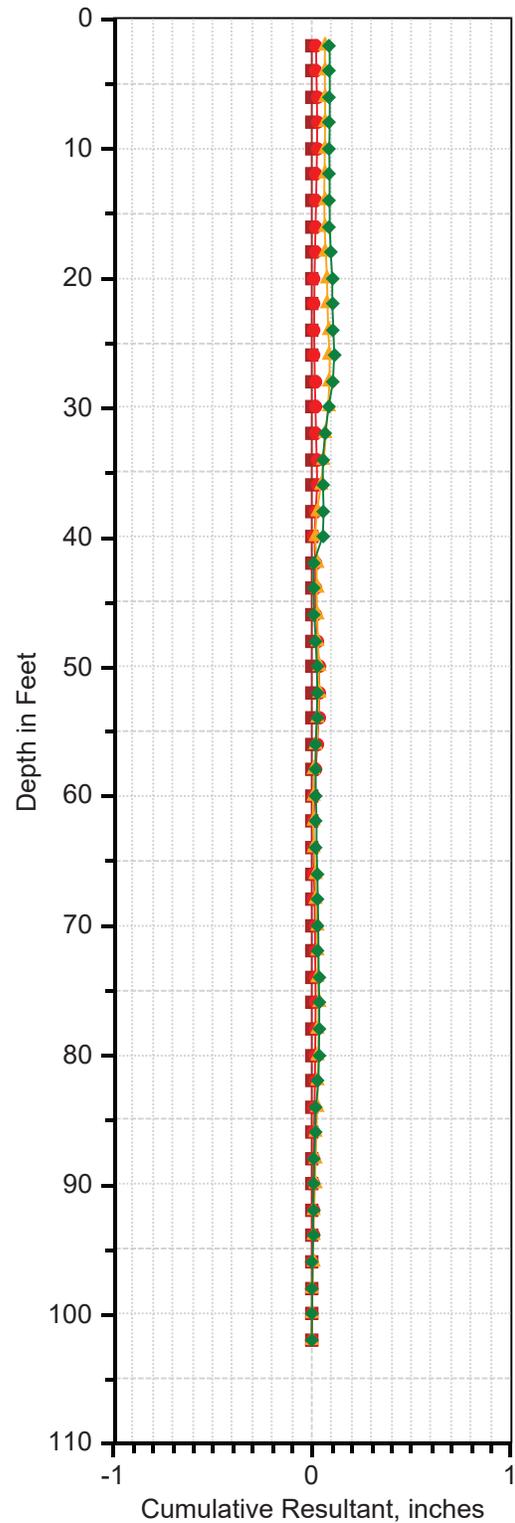
NORTH

SOUTH

Polar View

Cumulative Resultant, inches

■ 2/14/2024
 ● 3/22/2024
 ▲ 8/7/2024



■ 11/30/2023
 ● 2/14/2024
▲ 3/22/2024
 ◆ 8/7/2024

Plot of Slope Inclinometer

SP-26

Plot Type: Cumulative Resultant, Polar and Profile Views

Plot Direction: Resultant

Depth of Survey (ft): 100

Baseline Date: 11/30/2023

Corrections: None

Install Date: 4/1984

Installed Depth (ft): 405

Interpreted Movement Since Baseline (in): 0.1 possible

Interpreted Movement Monitoring Year (in): 0.1 possible



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PROJECT:

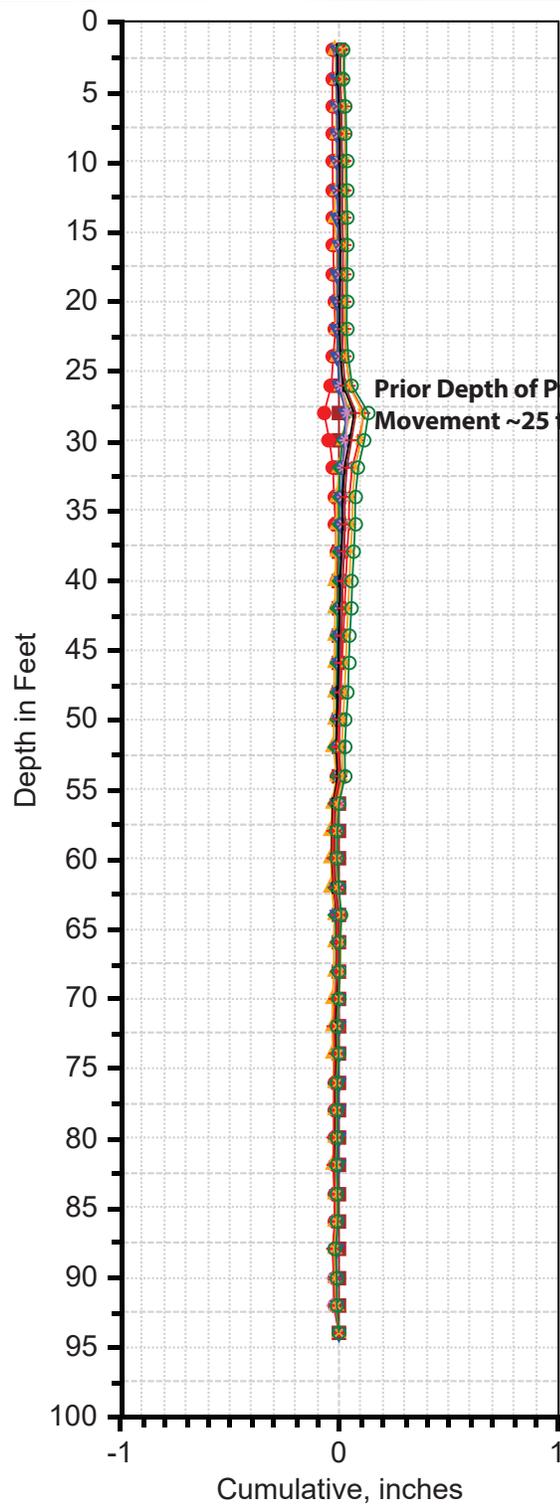
Big Rock Mesa LAD
Malibu, CA

PROJECT NUMBER:

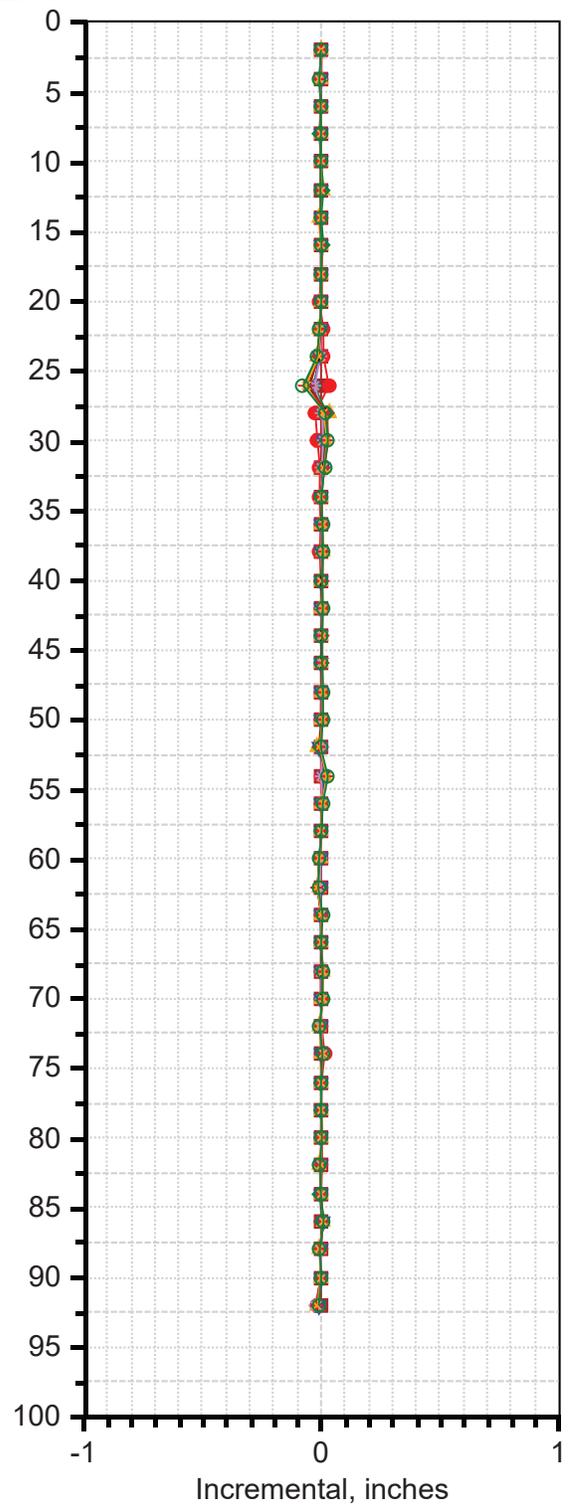
220-276

REVISION DATE: 9/30/2024

A-
170°



A+
350°



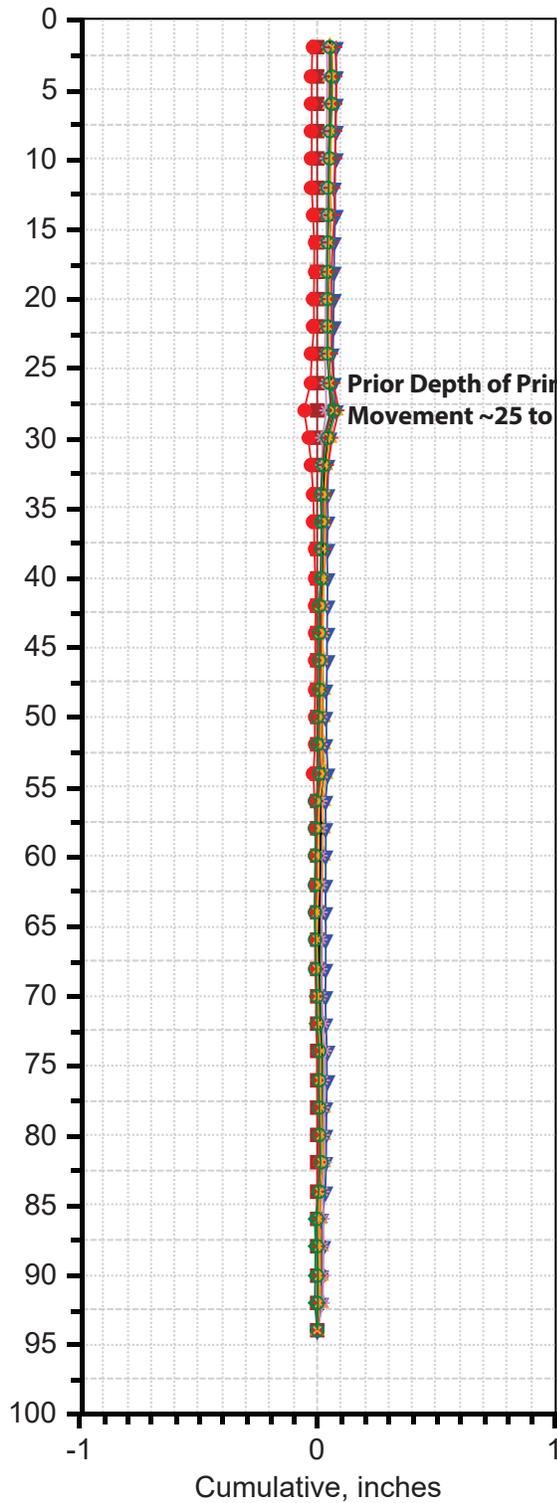
- 11/30/2021
- 6/22/2022
- ▲ 11/3/2022
- ◆ 2/8/2023
- ▼ 6/6/2023
- ✦ 7/6/2023
- ⊕ 10/13/2023
- ⊖ 11/30/2023
- ⊕ 2/21/2024
- ⊕ 3/21/2024
- 9/10/2024

- 11/30/2021
- 6/22/2022
- ▲ 11/3/2022
- ◆ 2/8/2023
- ▼ 6/6/2023
- ✦ 7/6/2023
- ⊕ 10/13/2023
- ⊖ 11/30/2023
- ⊕ 2/21/2024
- ⊕ 3/21/2024
- 9/10/2024

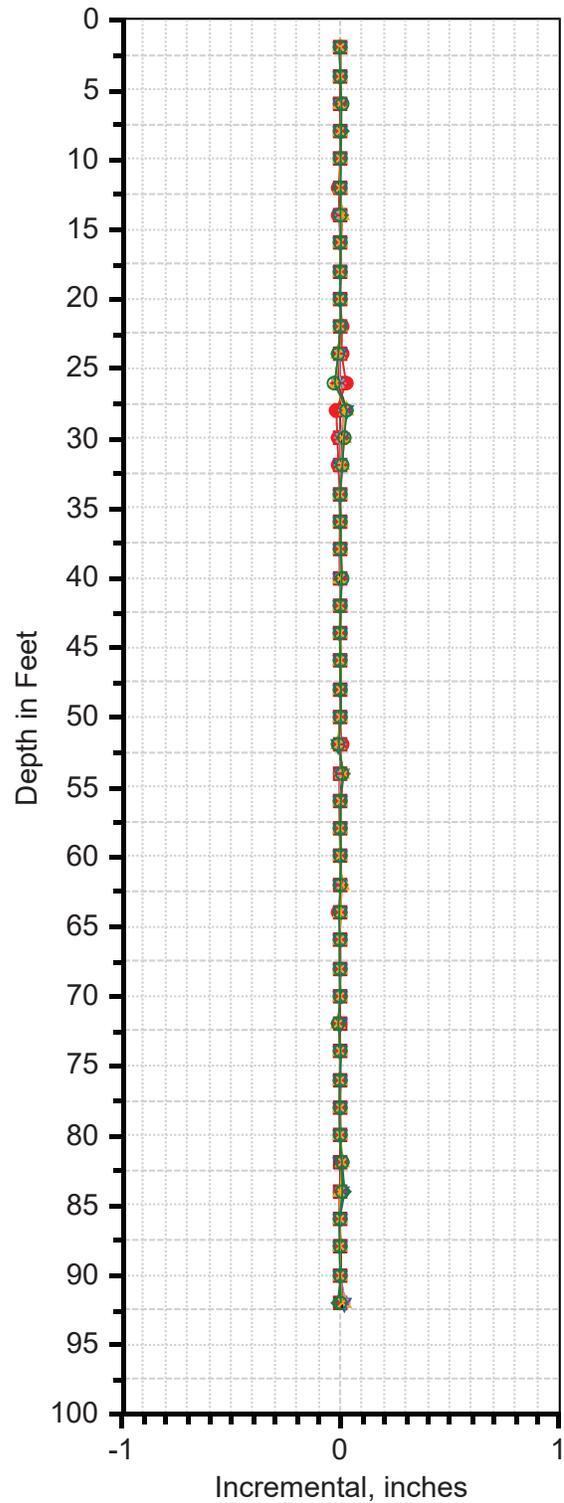
Plot of Slope Inclinometer SP-27A	Plot Type: Cumulative and Incremental		Plot Direction: A-Direction
	Depth of Survey (ft): 92		Corrections: None
	Install Date: 5/1984	Installed Depth (ft): 95	Interpreted Movement Since Baseline (in): 0

Yeh and Associates, Inc. Geotechnical • Geological • Construction Services	PROJECT: Big Rock Mesa LAD	PROJECT NUMBER: 220-276
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B-
260°



B+
80°



- 11/30/2021
- 6/22/2022
- ▲ 11/3/2022
- ◆ 2/8/2023
- ▼ 6/6/2023
- ✦ 7/6/2023
- ⊕ 10/13/2023
- ⊖ 11/30/2023
- ⊗ 2/21/2024
- ⊘ 3/21/2024
- 9/10/2024

- 11/30/2021
- 6/22/2022
- ▲ 11/3/2022
- ◆ 2/8/2023
- ▼ 6/6/2023
- ✦ 7/6/2023
- ⊕ 10/13/2023
- ⊖ 11/30/2023
- ⊗ 2/21/2024
- ⊘ 3/21/2024
- 9/10/2024

Plot of Slope Inclinometer

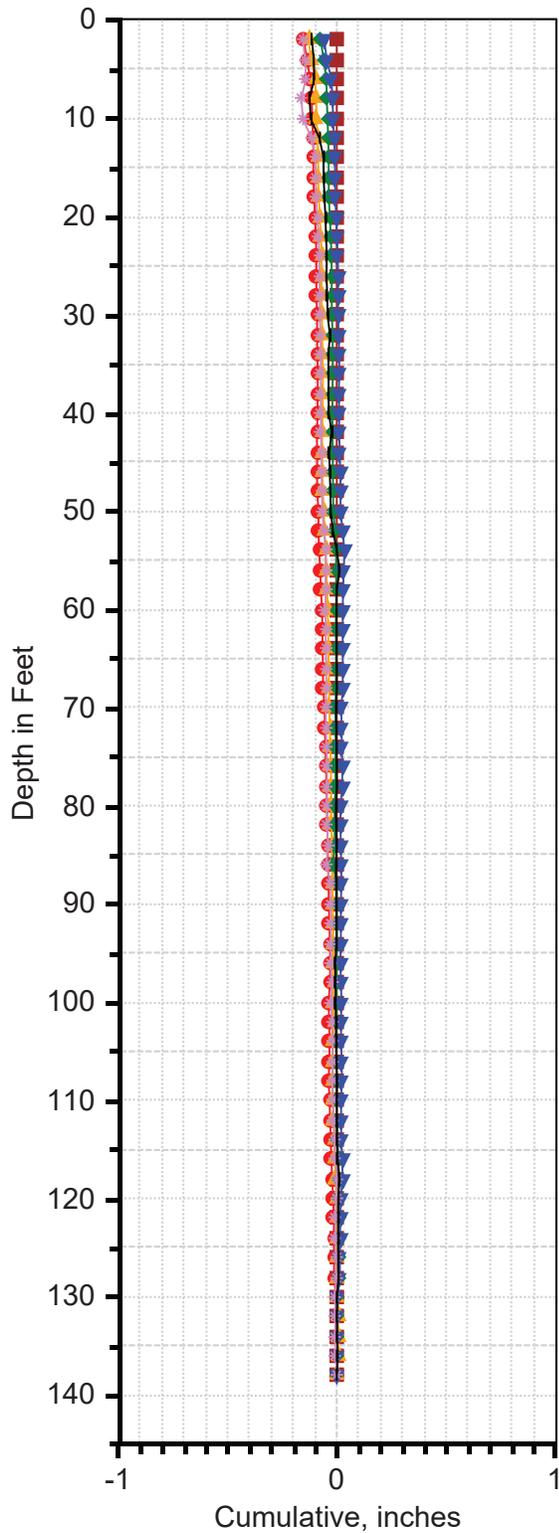
SP-27A

Plot Type: Cumulative and Incremental		Plot Direction: B-Direction	
Depth of Survey (ft): 92		Baseline Date: 11/30/2021	
Install Date: 5/1984		Corrections: None	
Installed Depth (ft): 95	Interpreted Movement Since Baseline (in): 0	Interpreted Movement Monitoring Year (in): 0	

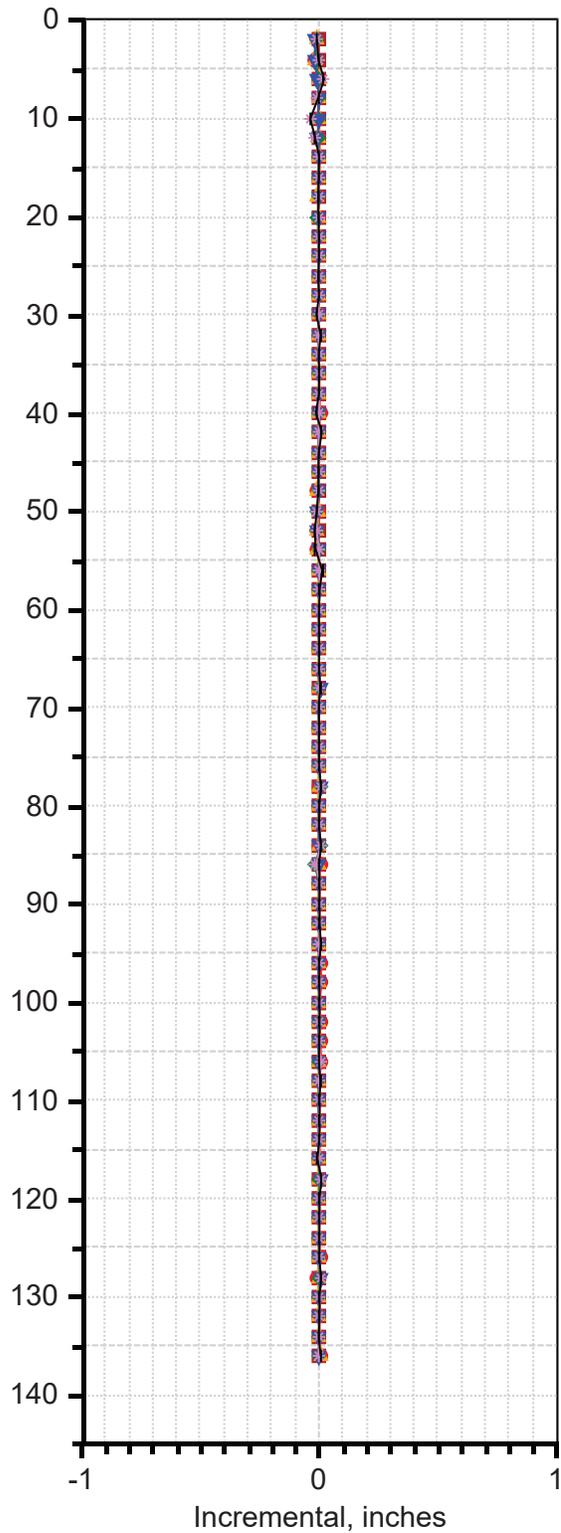


PROJECT:	Big Rock Mesa LAD Malibu, CA	PROJECT NUMBER: 220-276
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A-
244°



A+
64°



- 9/14/2021
- 7/6/2023
- ▲ 8/23/2023
- ◆ 12/14/2023
- ▼ 2/14/2024
- ✦ 3/22/2024
- + 9/10/2024

- 9/14/2021
- 7/6/2023
- ▲ 8/23/2023
- ◆ 12/14/2023
- ▼ 2/14/2024
- ✦ 3/22/2024
- + 9/10/2024

Plot of Slope Inclinometer

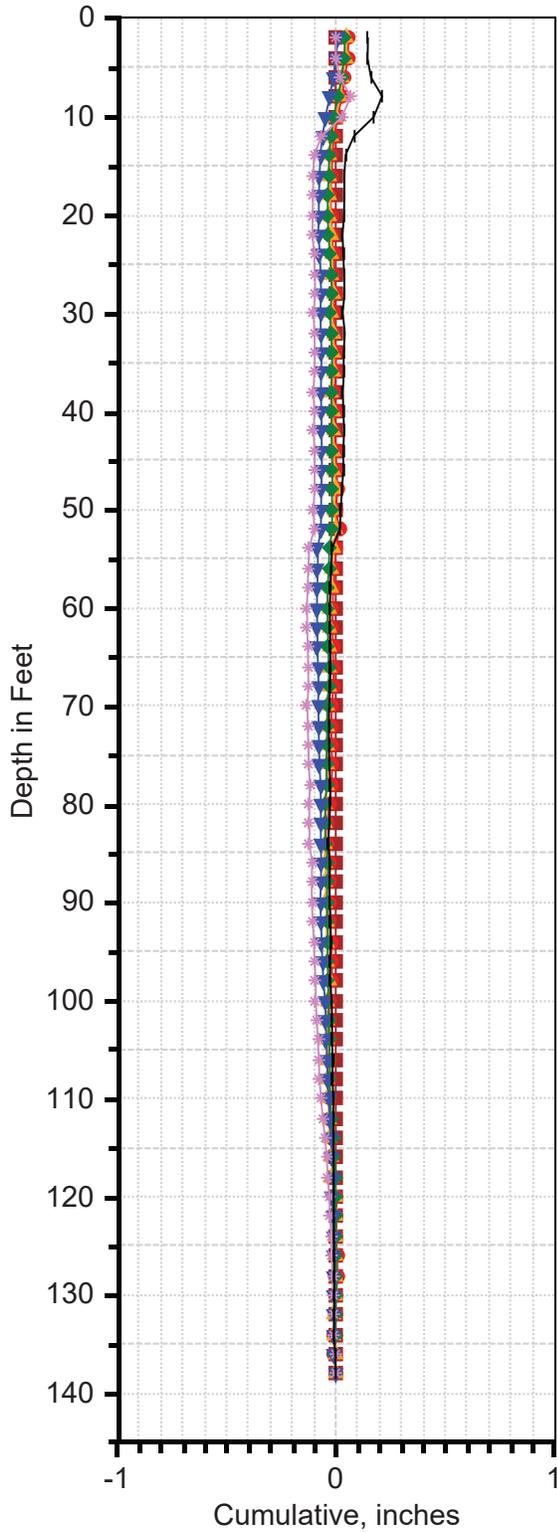
SP-29

Plot Type: Cumulative and Incremental		Plot Direction: A-Direction	
Depth of Survey (ft): 138		Baseline Date: 9/14/2021	
Install Date: 8/1984	Installed Depth (ft): 150	Interpreted Movement Since Baseline (in): 0	Interpreted Movement Monitoring Year (in): 0

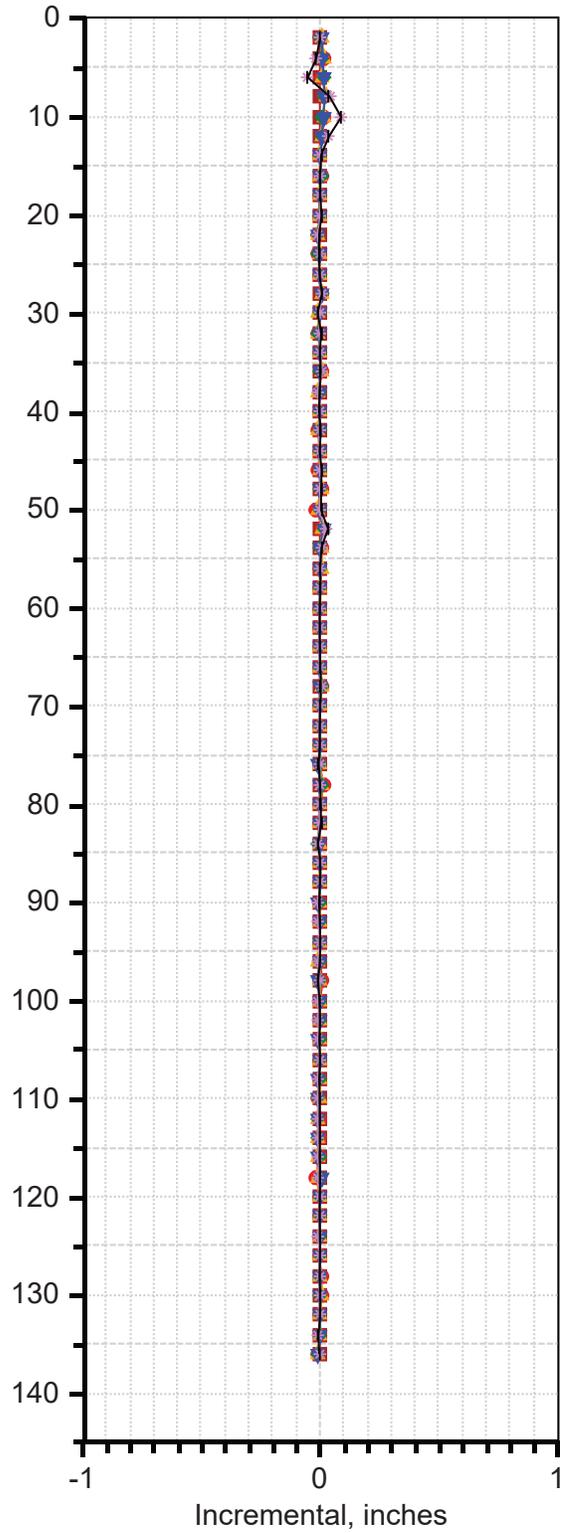


PROJECT:	Big Rock Mesa LAD Malibu, CA	PROJECT NUMBER: 220-276
REVISION DATE:	9/30/2024	

B-
334°



B+
154°



- 9/14/2021
- 7/6/2023
- ▲ 8/23/2023
- ◆ 12/14/2023
- ▼ 2/14/2024
- ✦ 3/22/2024
- 9/10/2024

- 9/14/2021
- 7/6/2023
- ▲ 8/23/2023
- ◆ 12/14/2023
- ▼ 2/14/2024
- ✦ 3/22/2024
- 9/10/2024

Plot of Slope Inclinometer

SP-29

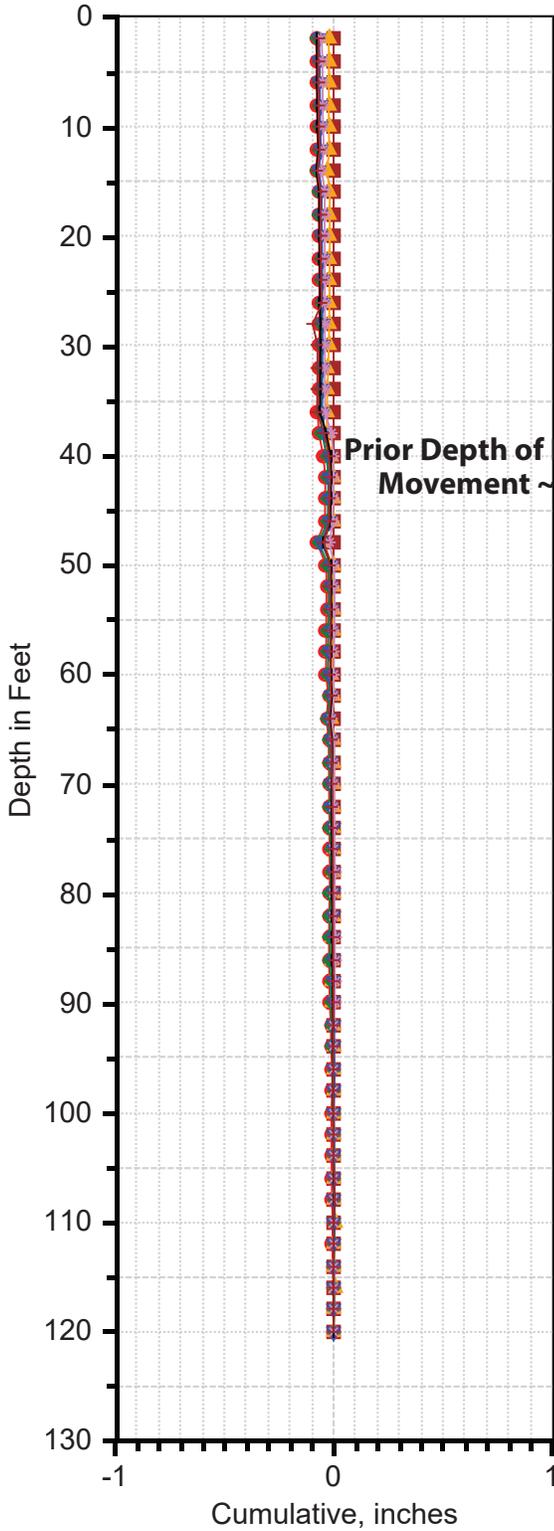
Plot Type: Cumulative and Incremental		Plot Direction: B-Direction	
Depth of Survey (ft): 138		Baseline Date: 9/14/2021	
Install Date: 8/1984		Corrections: None	
Installed Depth (ft): 150	Interpreted Movement Since Baseline (in): 0	Interpreted Movement Monitoring Year (in): 0	



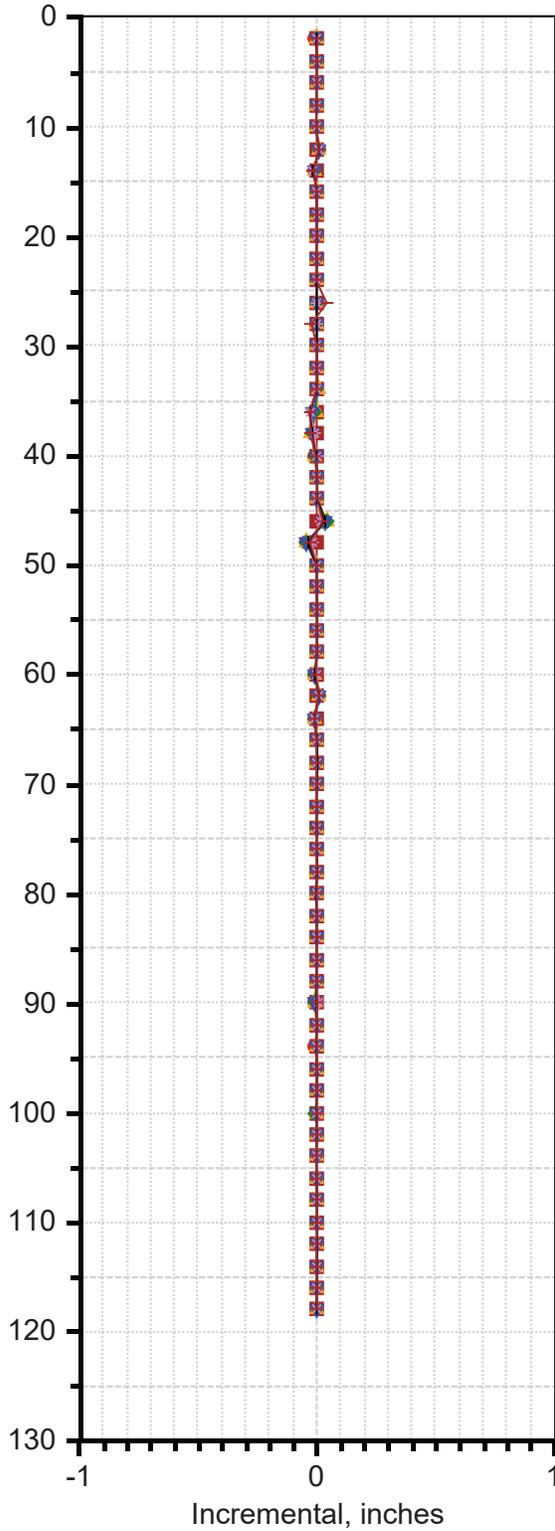
Yeh and Associates, Inc.
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PROJECT:	Big Rock Mesa LAD Malibu, CA	PROJECT NUMBER: 220-276
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A-
190°



A+
10°



- 11/3/2022
- 6/5/2023
- ▲ 7/6/2023
- ◆ 8/23/2023
- ▼ 12/29/2023
- ✦ 2/14/2024
- ⊕ 3/22/2024
- 8/15/2024

- 11/3/2022
- 6/5/2023
- ▲ 7/6/2023
- ◆ 8/23/2023
- ▼ 12/29/2023
- ✦ 2/14/2024
- ⊕ 3/22/2024
- 8/15/2024

Plot of Slope Inclinometer

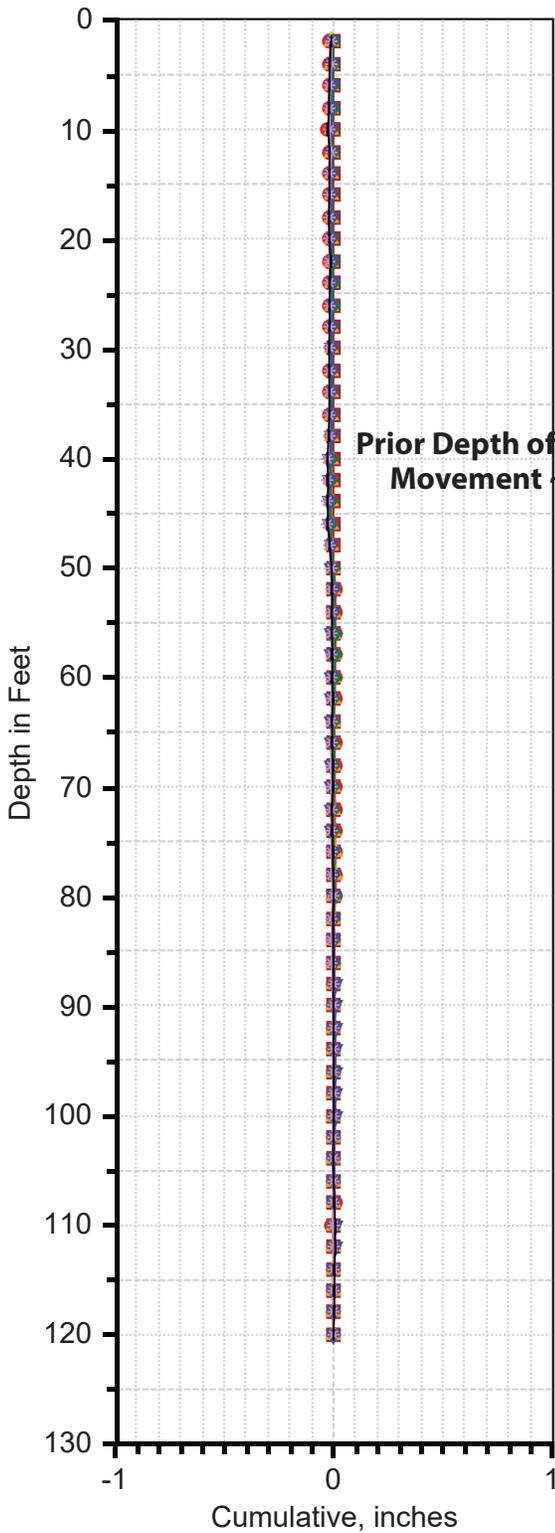
SP-30

Plot Type: Cumulative and Incremental		Plot Direction: A-Direction
Depth of Survey (ft):	120	Baseline Date: 11/3/2022
Install Date: 3/1985	Installed Depth (ft): 155	Interpreted Movement Since Baseline (in): 0
		Interpreted Movement Monitoring Year (in): 0

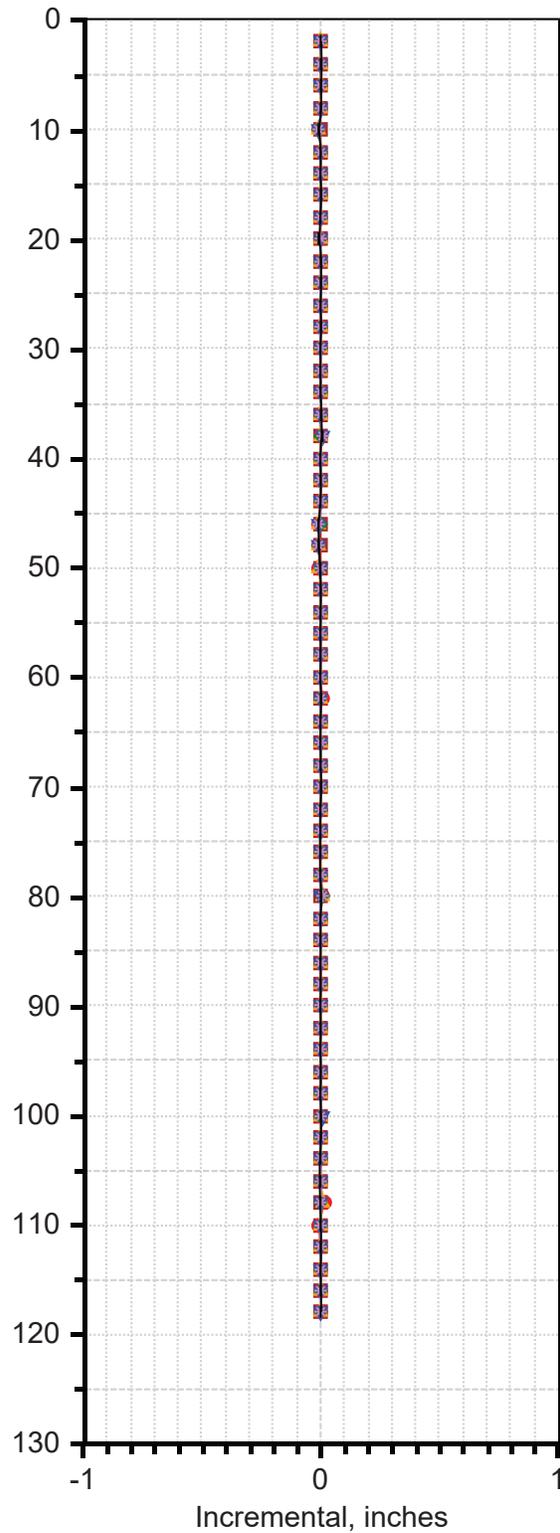


PROJECT:	Big Rock Mesa LAD Malibu, CA	PROJECT NUMBER: 220-276
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B-
280°



B+
100°



- 11/3/2022
- 7/6/2023
- ▲ 8/23/2023
- ◆ 12/29/2023
- ▼ 2/14/2024
- ✦ 3/22/2024
- ⊕ 8/15/2024

- 11/3/2022
- 7/6/2023
- ▲ 8/23/2023
- ◆ 12/29/2023
- ▼ 2/14/2024
- ✦ 3/22/2024
- ⊕ 8/15/2024

Plot of Slope Inclinometer
SP-30

Plot Type: Cumulative and Incremental			Plot Direction: B-Direction
Depth of Survey (ft): 120		Baseline Date: 11/3/2022	
Install Date: 3/1985	Installed Depth (ft): 155	Interpreted Movement Since Baseline (in): 0	Interpreted Movement Monitoring Year (in): 0

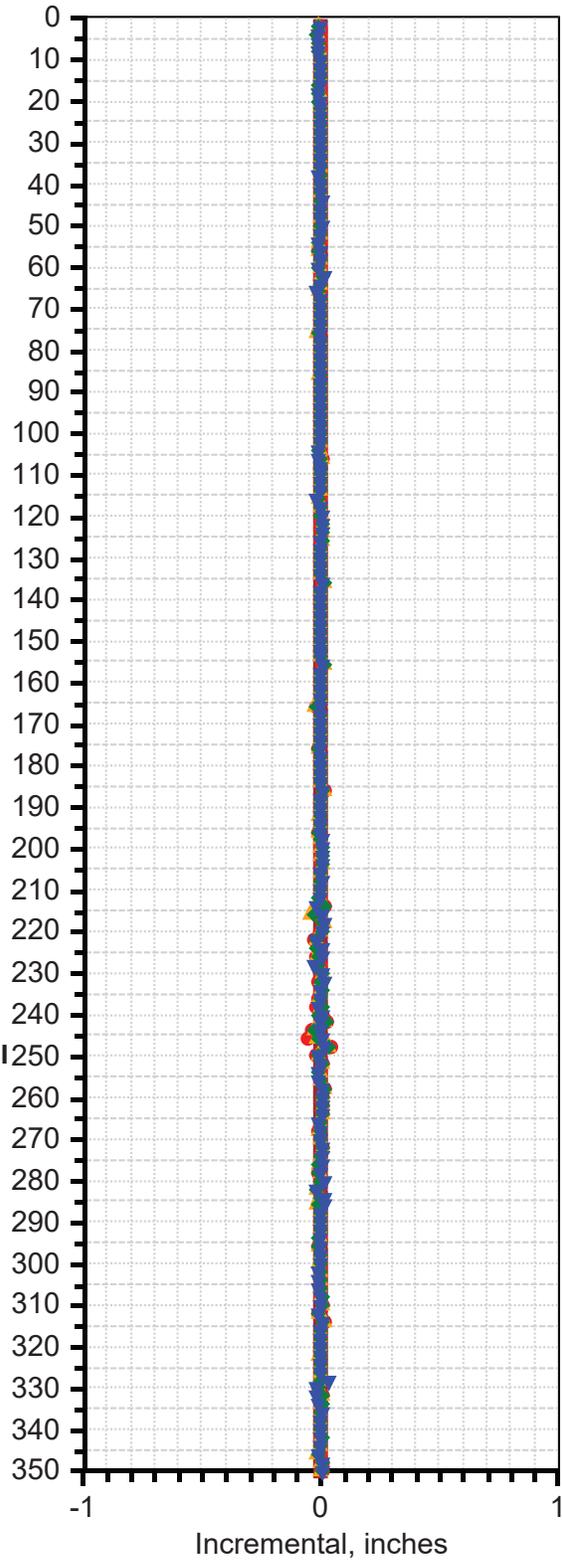
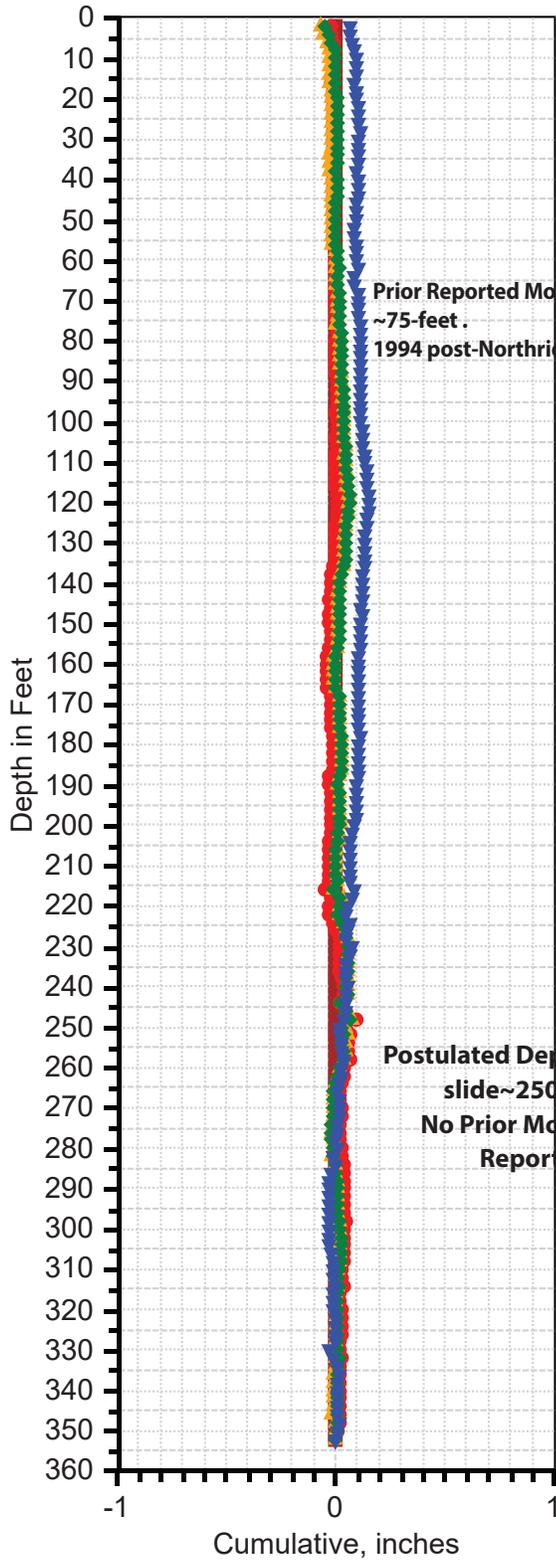
Plot Direction: B-Direction
Corrections: None
Interpreted Movement Monitoring Year (in): 0



PROJECT: Big Rock Mesa LAD Malibu, CA	PROJECT NUMBER: 220-276
REVISION DATE: 9/30/2024	

A-
198°

A+
18°



■ 7/29/2021 ● 11/30/2021 ▲ 6/23/2022
◆ 6/5/2023 ▼ 9/9/2024

■ 7/29/2021 ● 11/30/2021 ▲ 6/23/2022
◆ 6/5/2023 ▼ 9/9/2024

Plot of Slope Inclinometer

SP-32

Plot Type: Cumulative and Incremental		Plot Direction: A-Direction
Depth of Survey (ft):	350	Baseline Date: 7/29/2021
Install Date: 3/1985	Installed Depth (ft): 400	Interpreted Movement Since Baseline (in): 0
		Interpreted Movement Monitoring Year (in): 0



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PROJECT:

Big Rock Mesa LAD
Malibu, CA

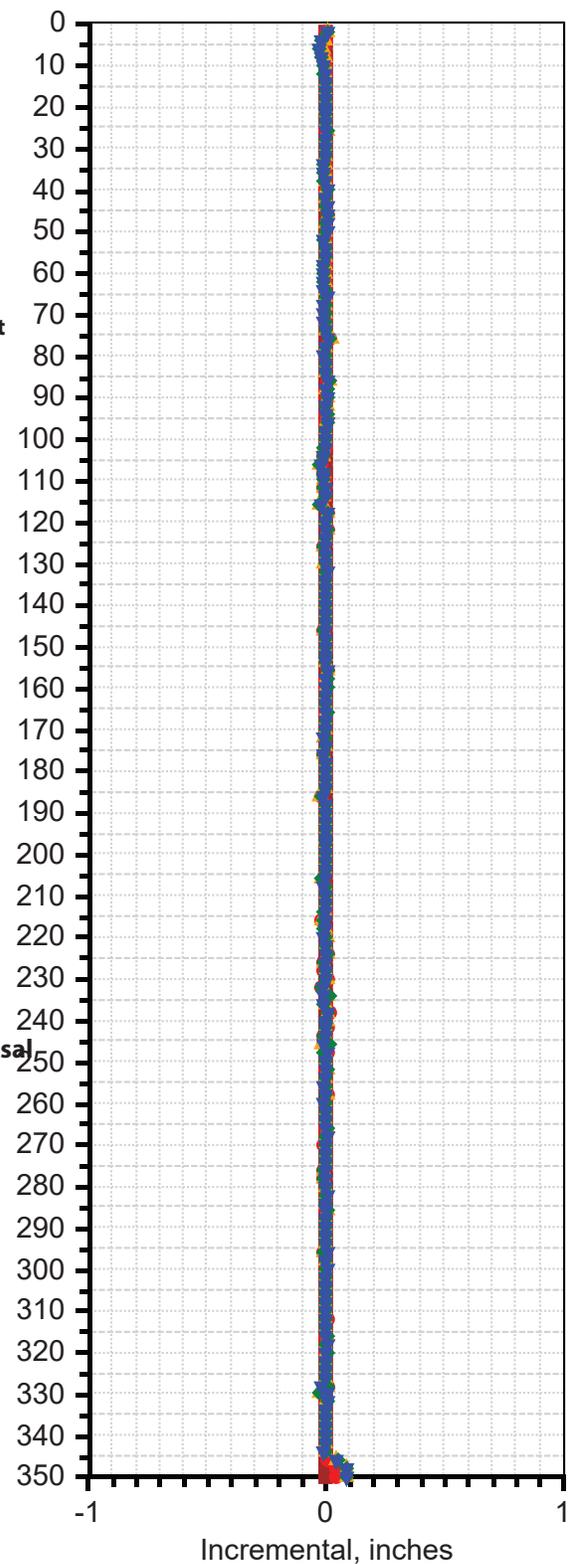
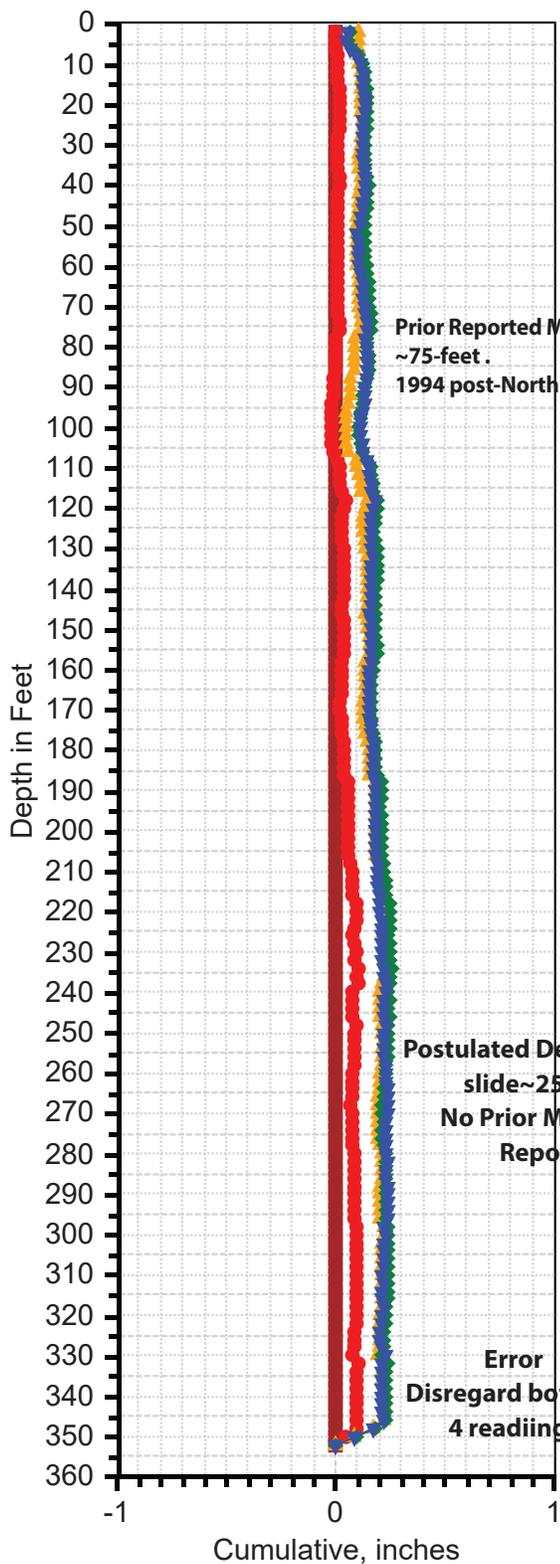
PROJECT NUMBER:

220-276

REVISION DATE: 9/30/2024

B-
288°

B+
108°



■ 7/29/2021 ● 11/30/2021 ▲ 6/23/2022
◆ 6/5/2023 ▼ 9/9/2024

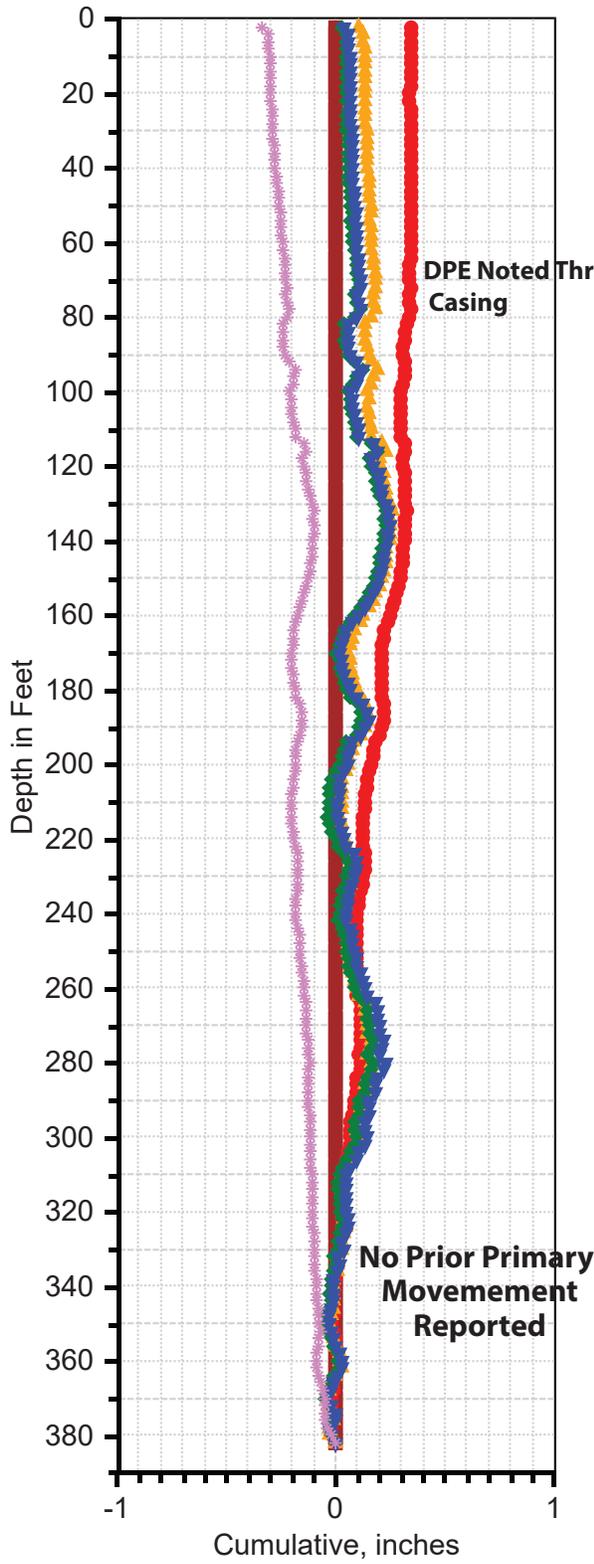
■ 7/29/2021 ● 11/30/2021 ▲ 6/23/2022
◆ 6/5/2023 ▼ 9/9/2024

Plot of Slope Inclinometer SP-32	Plot Type: Cumulative and Incremental		Plot Direction: B-Direction
	Depth of Survey (ft): 350	Baseline Date: 7/29/2021	
	Install Date: 3/1985	Installed Depth (ft): 400	Interpreted Movement Since Baseline (in): 0
		Interpreted Movement Monitoring Year (in): 0	Corrections: None

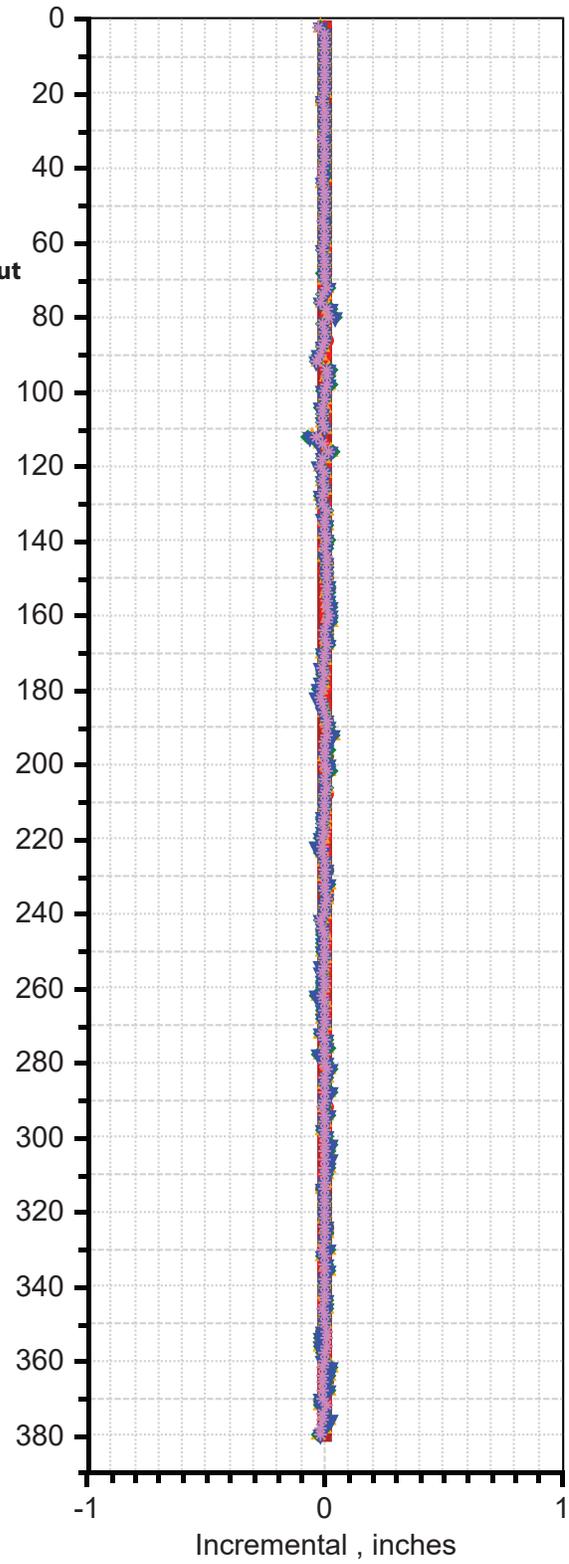
Yeh and Associates, Inc.
 Geotechnical • Geological • Construction Services

PROJECT: Big Rock Mesa LAD Malibu, CA	PROJECT NUMBER: 220-276
REVISION DATE: 9/30/2024	

A-30°



A+210°



■ 4/1/2021 ● 7/28/2021 ▲ 5/26/2022
◆ 2/7/2023 ▼ 5/30/2023 ✦ 8/29/2024

■ 4/1/2021 ● 7/28/2021 ▲ 5/26/2022
◆ 2/7/2023 ▼ 5/30/2023 ✦ 8/29/2024

Plot of Slope Inclinometer

SP-34

Plot Type: Cumulative and Incremental

Plot Direction: A-Direction

Depth of Survey (ft):

380

Baseline Date:

4/01/2021

Corrections:

None

Install Date:
2/1999

Installed Depth (ft):
382

Interpreted Movement
Since Baseline (in): 0

Interpreted Movement
Monitoring Year (in): 0



Yeh and Associates, Inc.

Geotechnical • Geological • Construction Services

PROJECT:

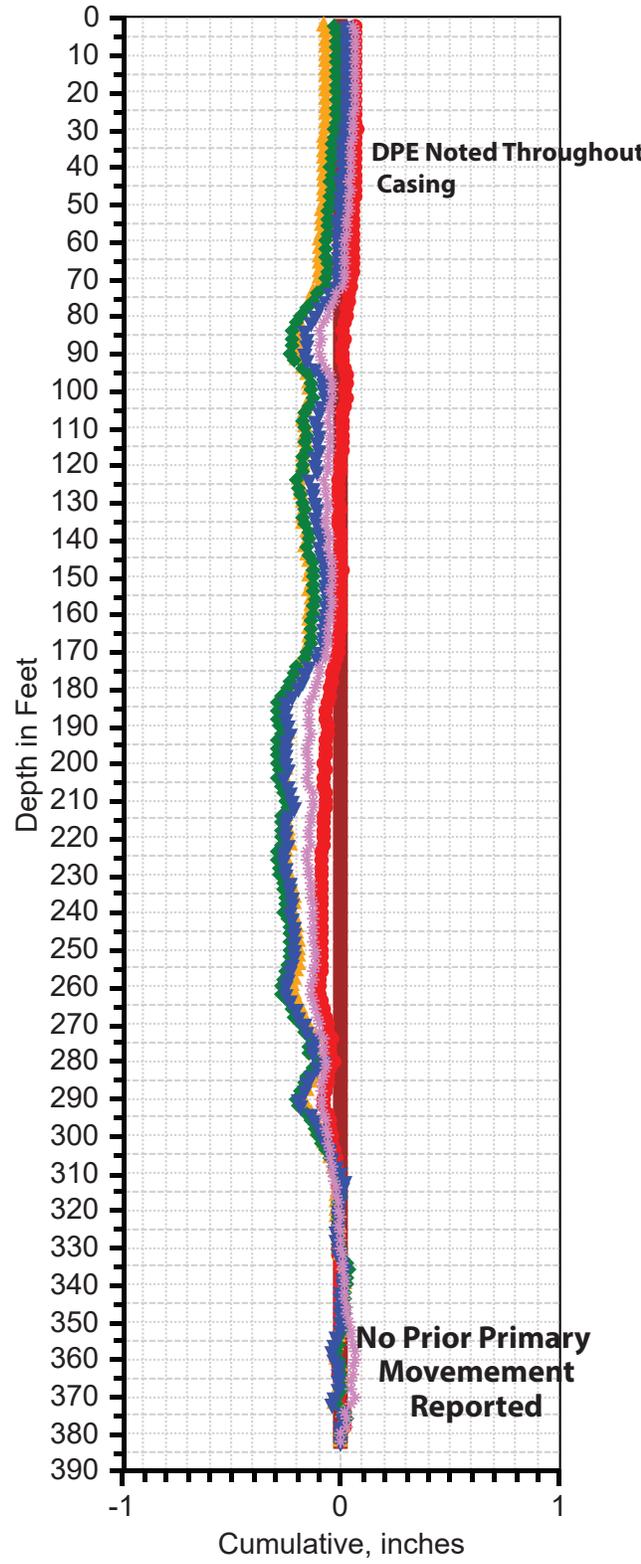
Big Rock Mesa LAD
Malibu, CA

PROJECT NUMBER:

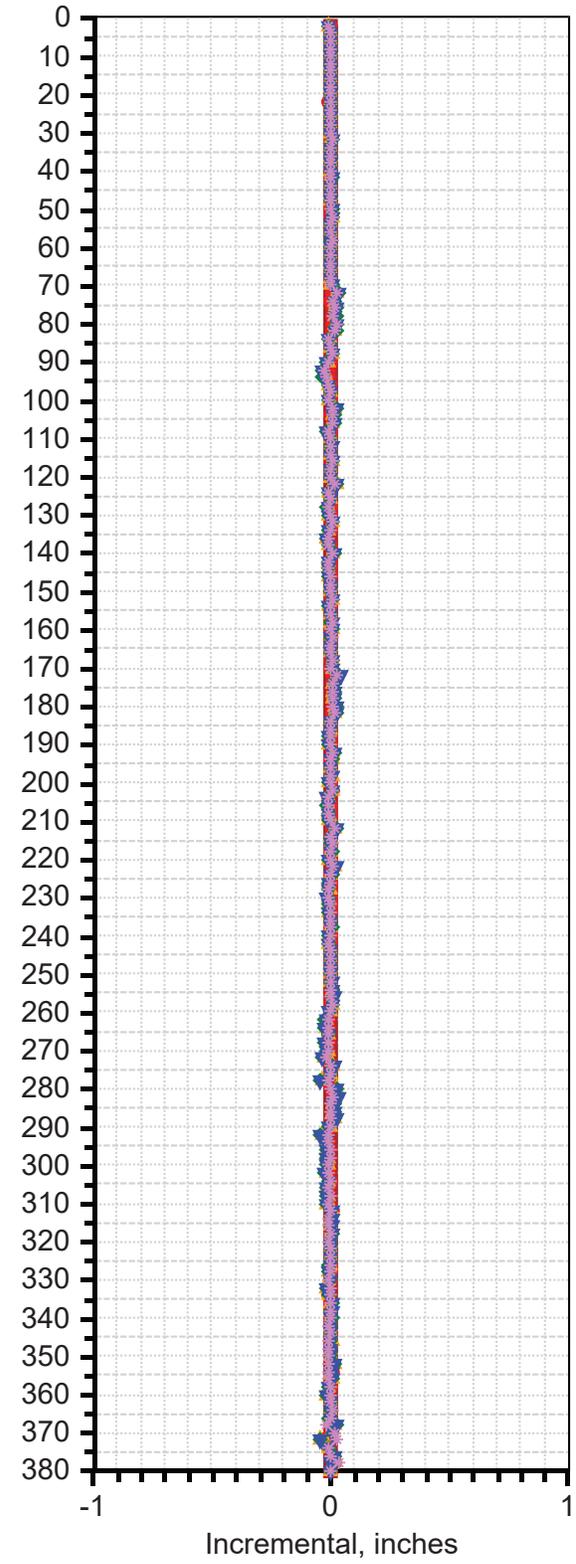
220-276

REVISION DATE: 9/30/2024

B-
120°



B+
300°



- 4/1/2021
- 7/28/2021
- ▲ 5/26/2022
- ◆ 2/7/2023
- ▼ 5/30/2023
- ✦ 8/29/2024

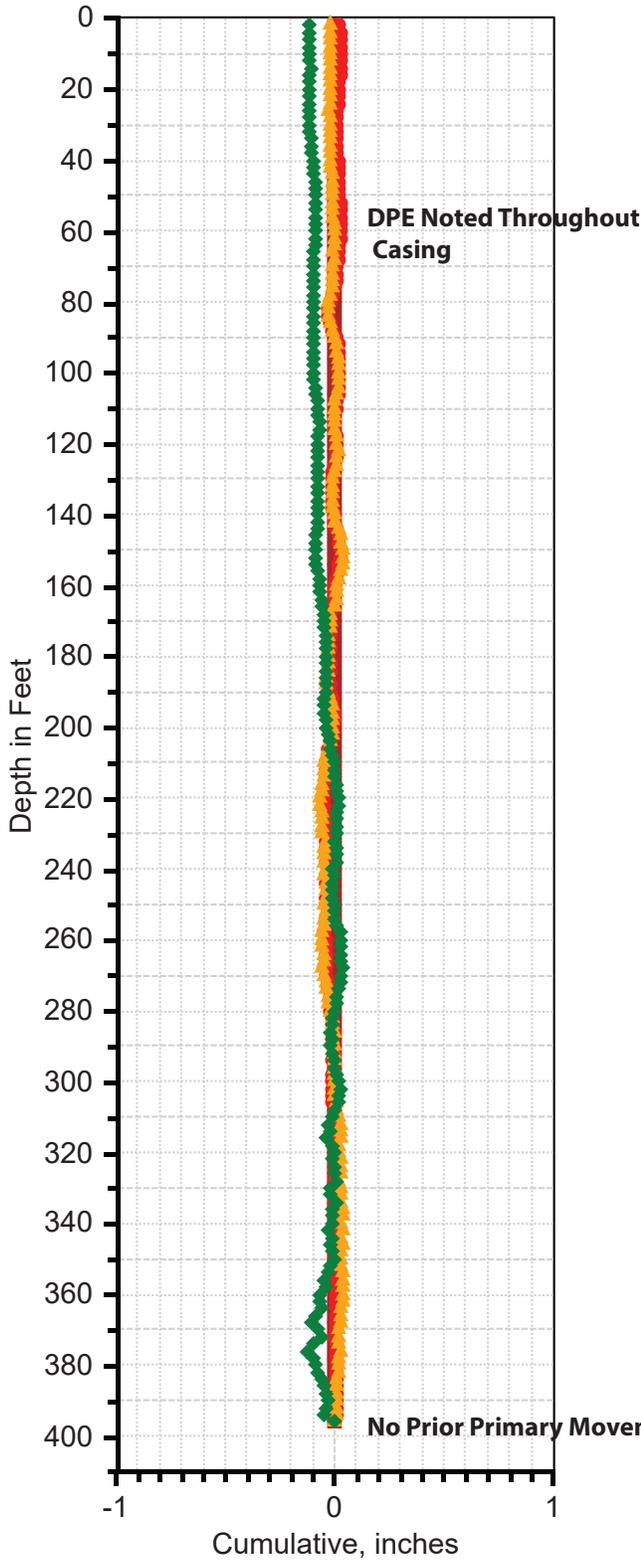
- 4/1/2021
- 7/28/2021
- ▲ 5/26/2022
- ◆ 2/7/2023
- ▼ 5/30/2023
- ✦ 8/29/2024

Plot of Slope Inclinometer SP-34	Plot Type: Cumulative and Incremental		Plot Direction: B-Direction
	Depth of Survey (ft): 380		Baseline Date: 4/1/2021
	Install Date: 2/1999	Installed Depth (ft): 382	Interpreted Movement Since Baseline (in): 0
		Interpreted Movement Monitoring Year (in): 0	

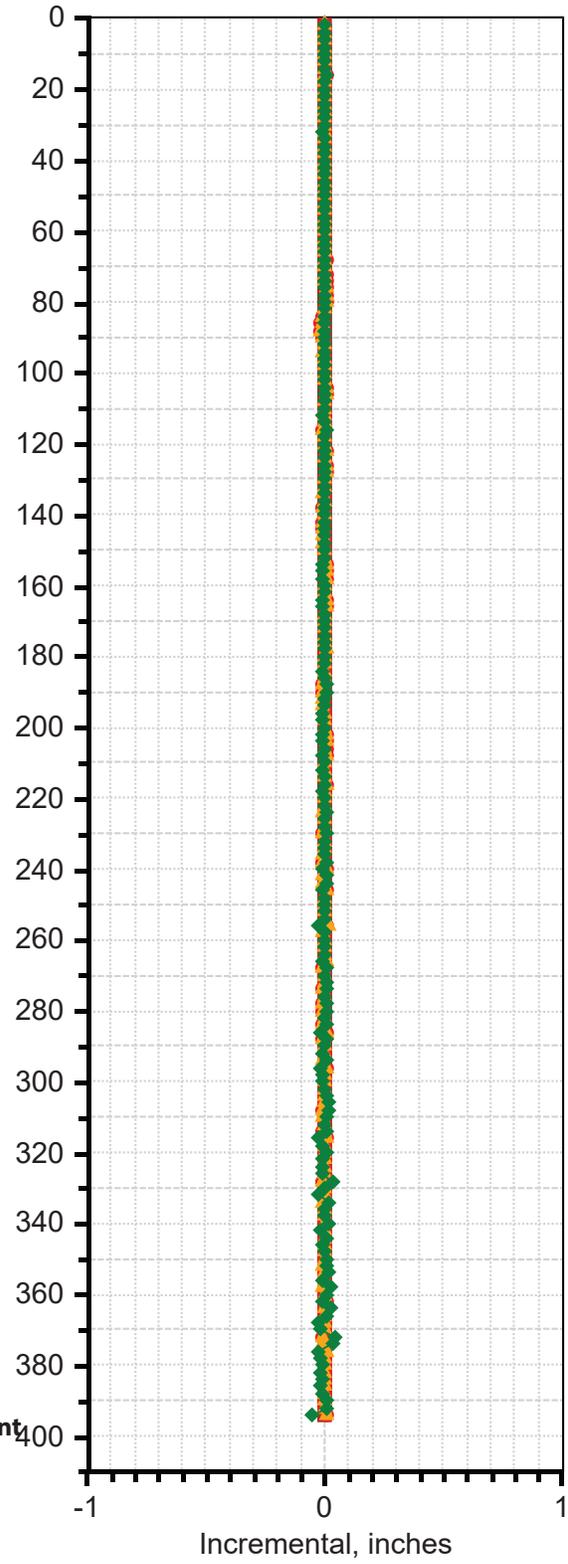
Yeh and Associates, Inc.
 Geotechnical • Geological • Construction Services

PROJECT: **Big Rock Mesa LAD** PROJECT NUMBER: **220-276**
 Malibu, CA
 REVISION DATE: 9/30/2024

A-
4°



A+
184°



■ 8/6/2021 ● 6/21/2022
▲ 5/31/2023 ◆ 9/5/2024

■ 8/6/2021 ● 6/21/2022
▲ 5/31/2023 ◆ 9/5/2024

Plot of Slope Inclinometer

SP-35

Plot Type: Cumulative and Incremental

Plot Direction: A-Direction

Depth of Survey (ft):

394

Baseline Date:

8/06/2021

Corrections:

None

Install Date:
11/1998

Installed Depth (ft):
396

Interpreted Movement
Since Baseline (in): 0

Interpreted Movement
Monitoring Year (in): 0



Yeh and Associates, Inc.

Geotechnical • Geological • Construction Services

PROJECT:

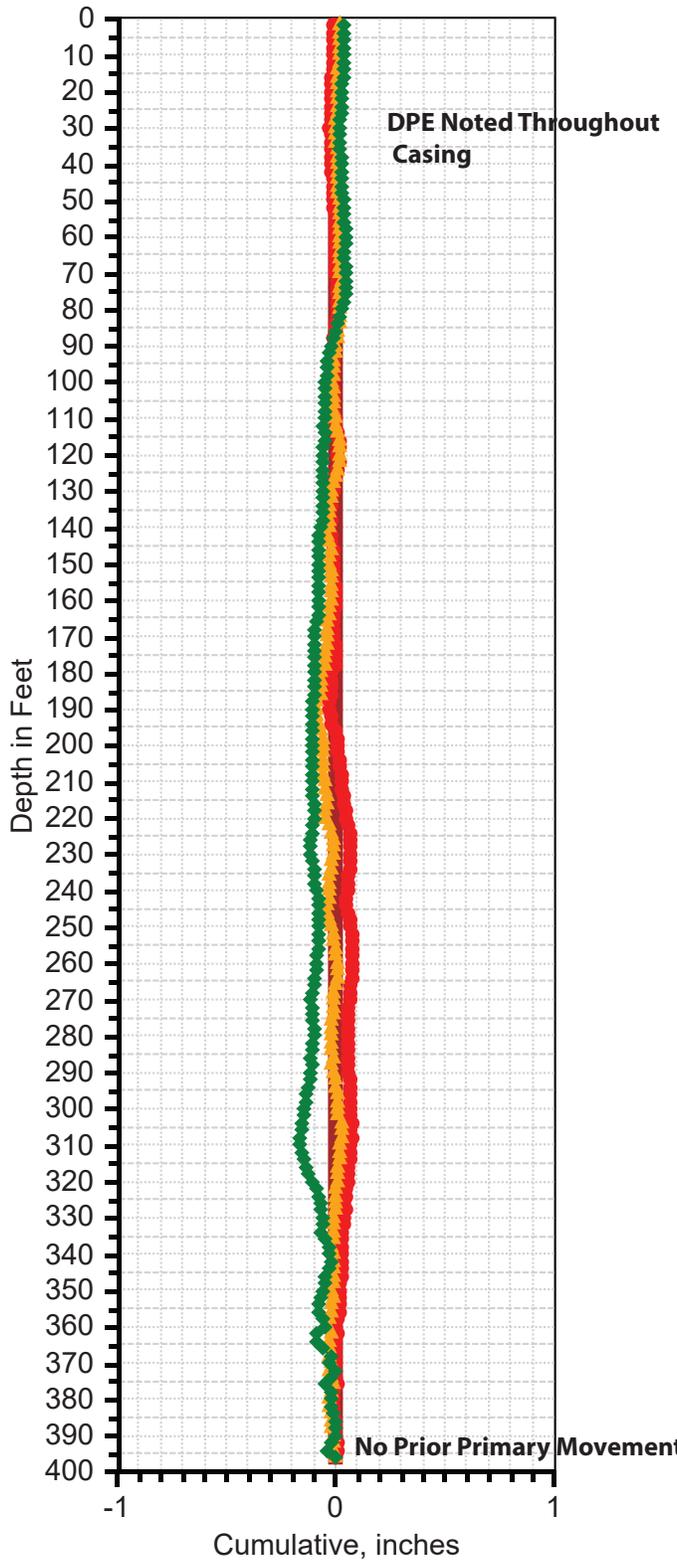
Big Rock Mesa LAD
Malibu, CA

PROJECT NUMBER:

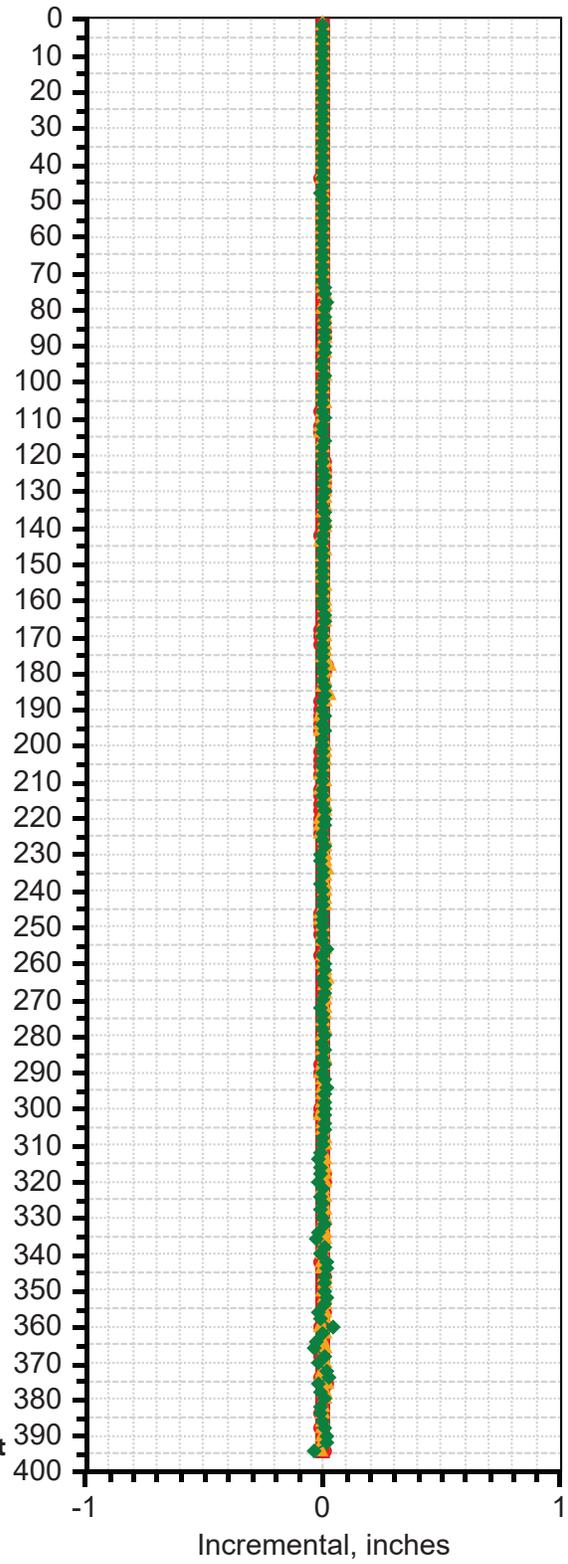
220-276

REVISION DATE: 9/30/2024

B-
94°



B+
274°



8/6/2021 8/6/2021
 5/31/2023 6/21/2022
 9/5/2024

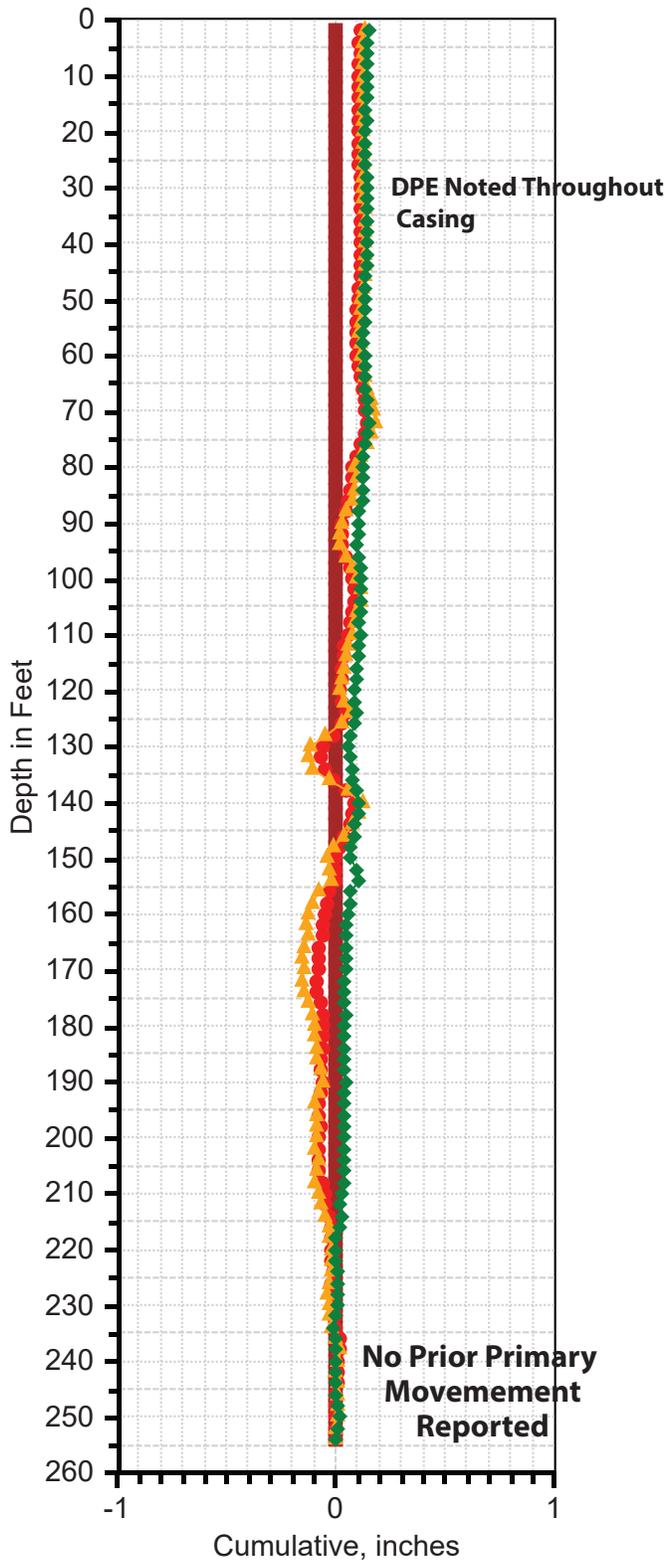
8/6/2021 8/6/2021
 5/31/2023 6/21/2022
 9/5/2024

Plot of Slope Inclinometer SP-35	Plot Type: Cumulative and Incremental		Plot Direction: B-Direction
	Depth of Survey (ft): 394	Baseline Date: 8/06/2021	Corrections: None
	Install Date: 11/1998	Installed Depth (ft): 396	Interpreted Movement Since Baseline (in): 0
			Interpreted Movement Monitoring Year (in): 0

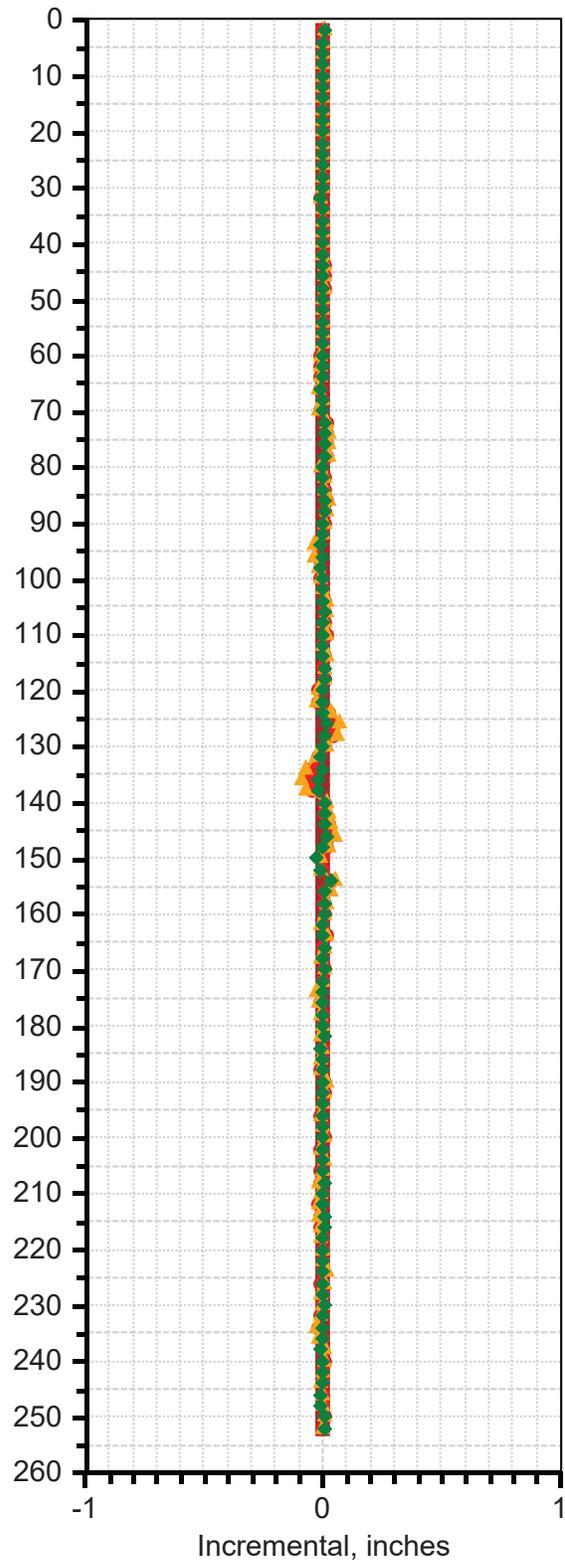
Yeh and Associates, Inc.
 Geotechnical • Geological • Construction Services

PROJECT: Big Rock Mesa LAD Malibu, CA	PROJECT NUMBER: 220-276
REVISION DATE: 9/30/2024	

A-
344°



A+
164°



7/27/2021 6/21/2022
5/30/2023 8/20/2024

7/27/2021 6/21/2022
5/30/2023 8/20/2024

Plot of Slope Inclinometer

SP-36

Plot Type: Cumulative and Incremental

Plot Direction: A-Direction

Depth of Survey (ft):

254

Baseline Date:

7/27/2021

Corrections:

None

Install Date:
11/1998

Installed Depth (ft):
255

Interpreted Movement
Since Baseline (in): 0

Interpreted Movement
Monitoring Year (in): 0



Yeh and Associates, Inc.

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PROJECT:

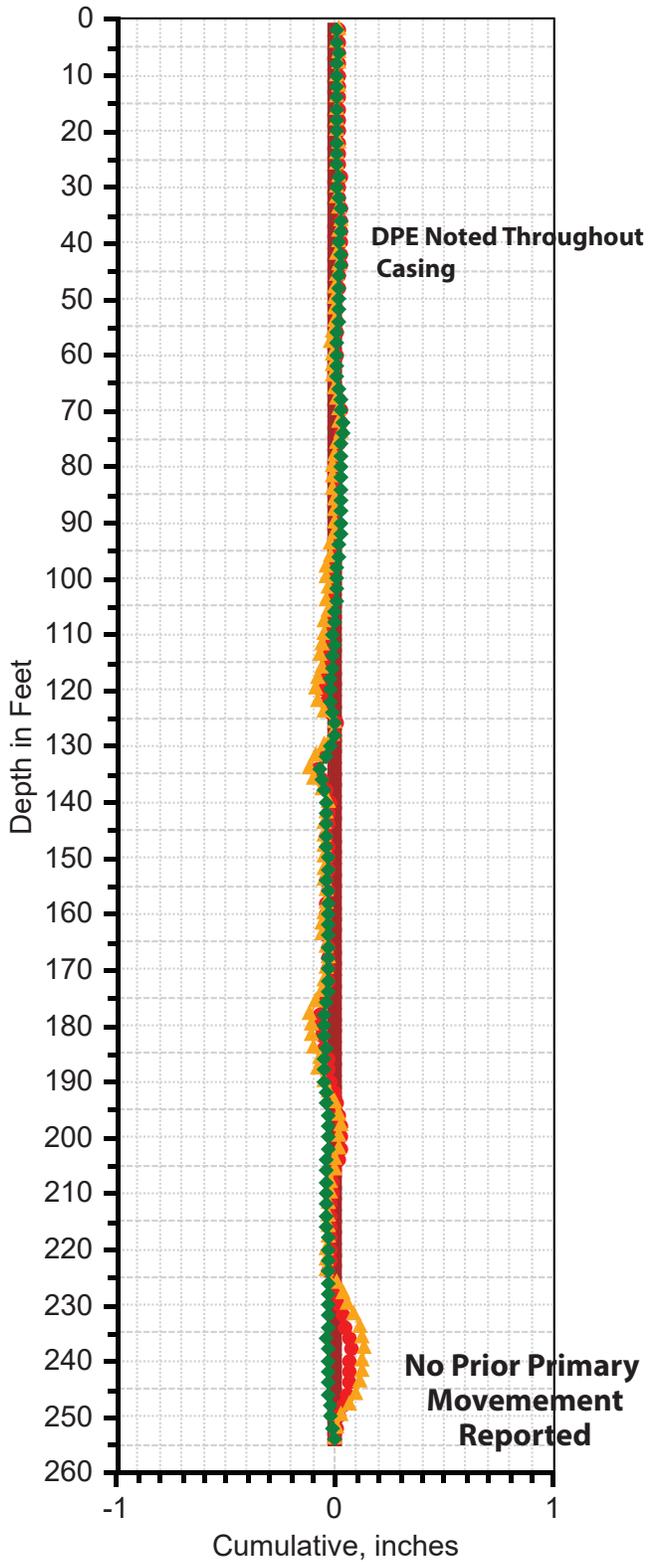
Big Rock Mesa LAD
Malibu, CA

PROJECT NUMBER:

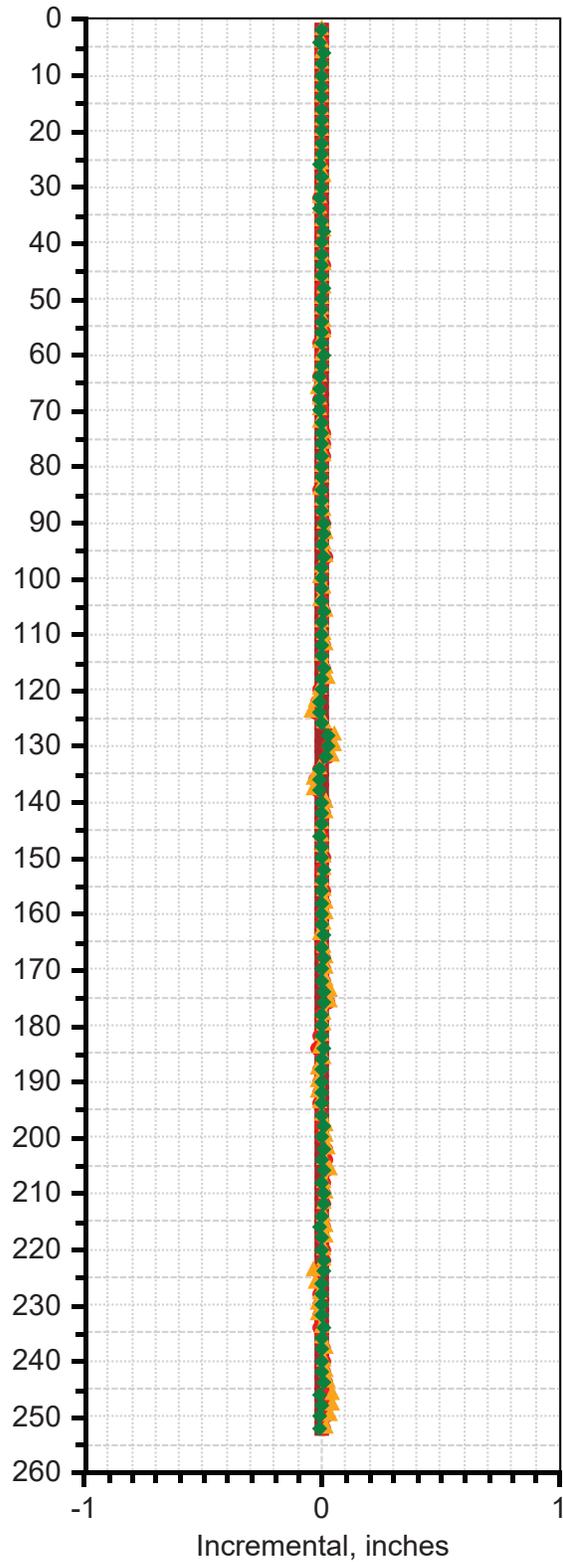
220-276

REVISION DATE: 9/30/2024

B-
74°



B+
254°



7/27/2021 6/21/2022
5/30/2023 8/20/2024

7/27/2021 6/21/2022
5/30/2023 8/20/2024

Plot of Slope Inclinometer

SP-36

Plot Type: Cumulative and Incremental

Plot Direction: B-Direction

Depth of Survey (ft):

254

Baseline Date:

7/27/2021

Corrections:

None

Install Date:
11/1998

Installed Depth (ft):
255

Interpreted Movement
Since Baseline (in): 0

Interpreted Movement
Monitoring Year (in): 0



Yeh and Associates, Inc.
Geotechnical • Geological • Construction Services

PROJECT:

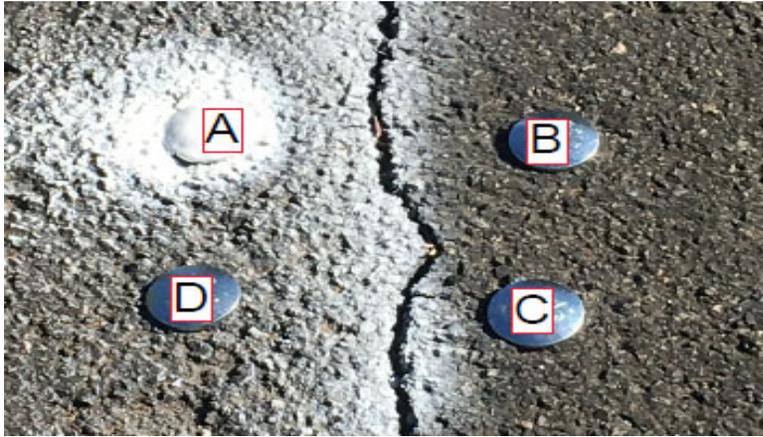
Big Rock Mesa LAD
Malibu, CA

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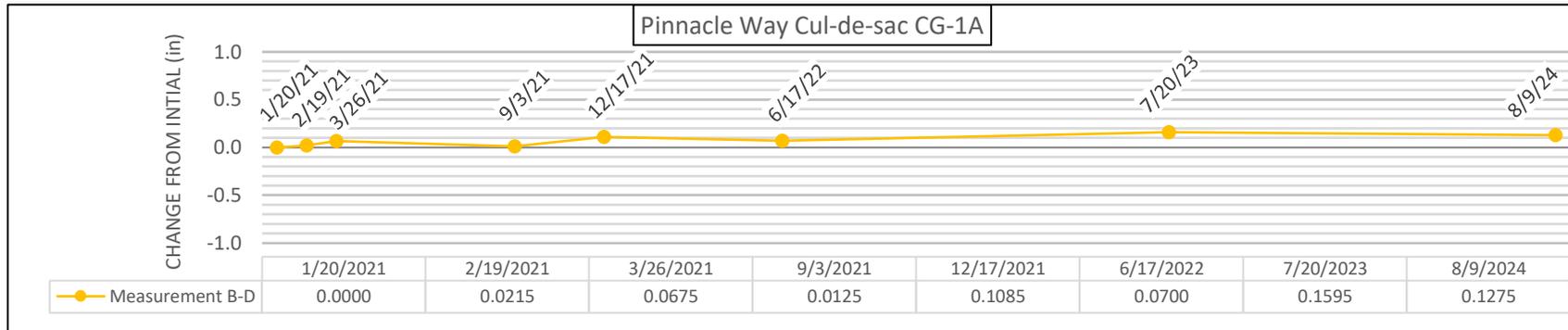
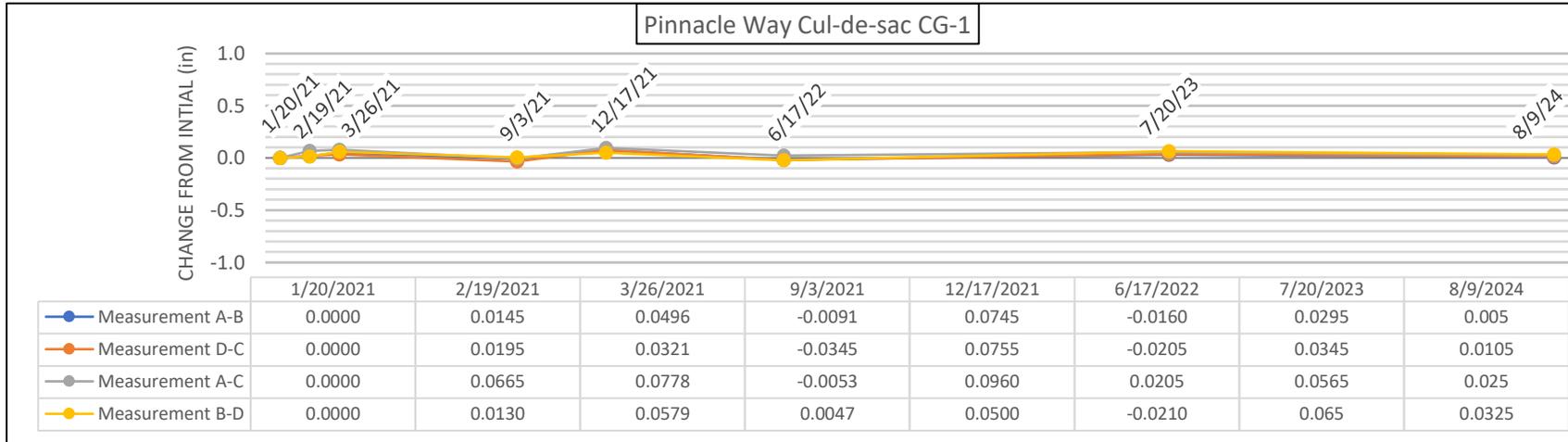
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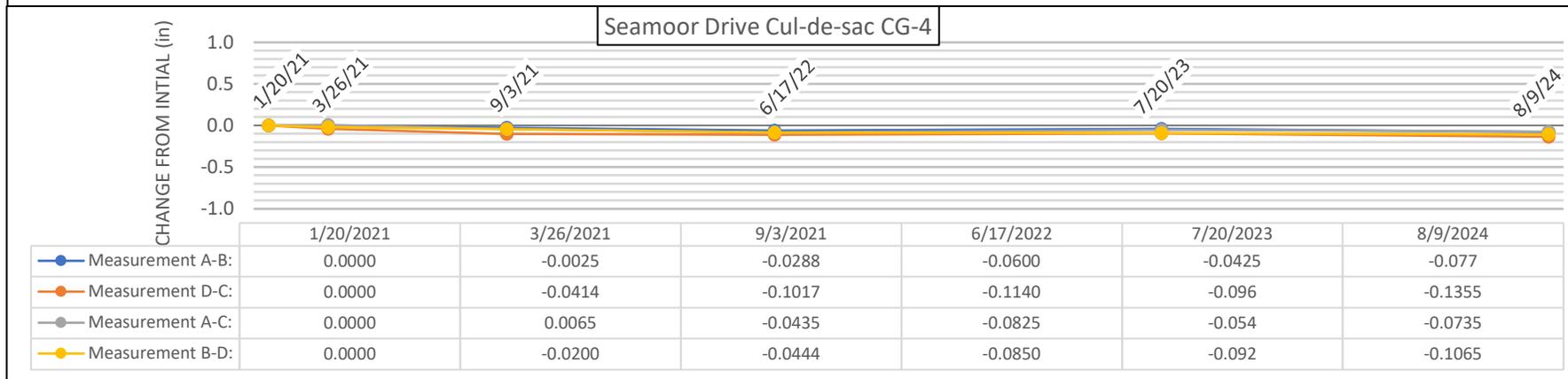
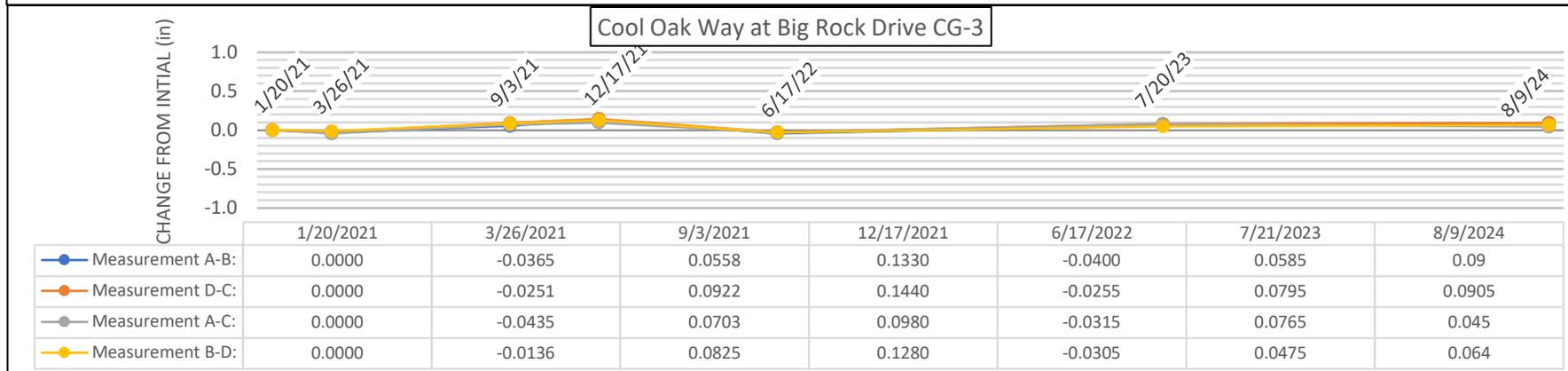
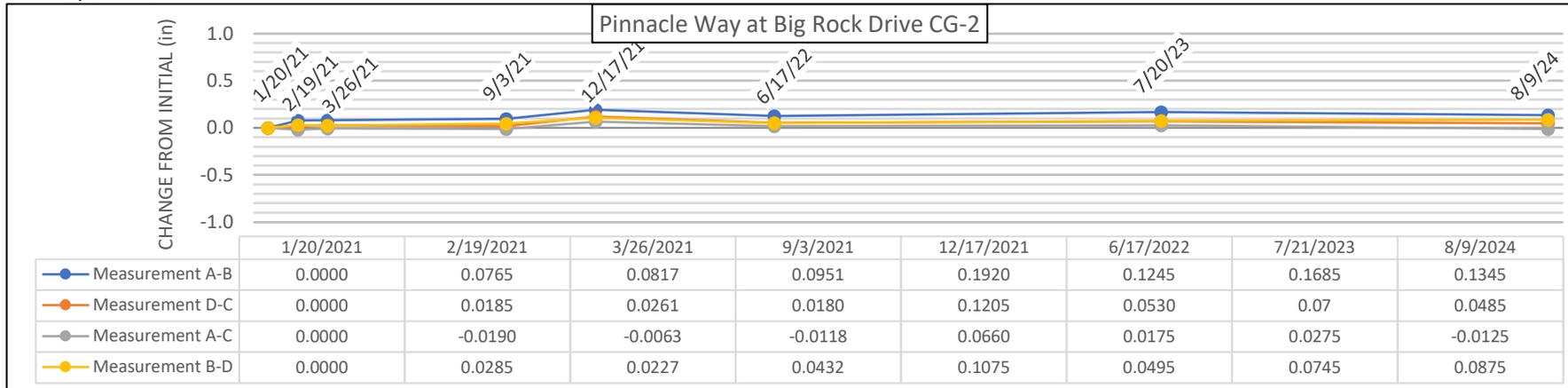
REVISION DATE: 9/30/2024

APPENDIX C – CRACK GAUGE PLOTS



Northwestern-most Corner is "A"
 Gauge
 B, C, and D proceed after in a
 clockwise rotation



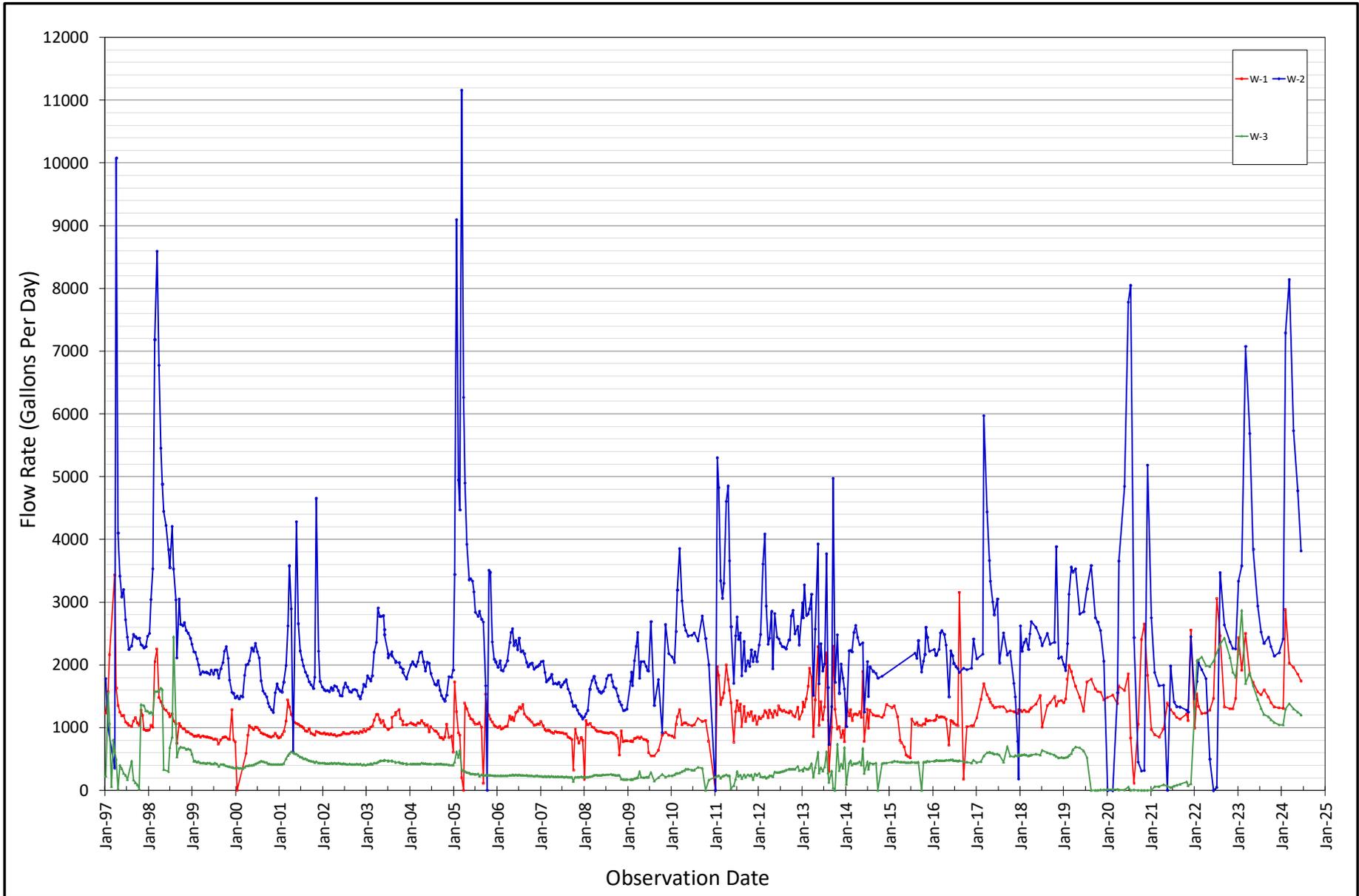


APPENDIX D - DEWATERING

SUMMARY OF DEWATERING WELL INFORMATION

Well I.D.	INSTAL L DATE	TOP ELEV. (ft.)	BOTTOM ELEV. (ft.)	PUMP ELEV. (ft.)	PUMP SIZE (HP)	2023-2024 PUMPING RATE (GPD)	% of TOTAL PRODUCTION	Rank	Drainage Port	Sounding Tube Present	Most Recent Video Log Date	COMMENT
W-1	1977	210.5	-30	14.5	1.5	1,703	3%	12	3	Yes	--	Producing
W-2	1955	219	50	45	0.5	3,843	6%	7	3	Yes	6/21/2022	Producing
W-3	1973	243.5	-9.5	65.5	0.75	1,203	2%	16	3	Yes	8/31/2020	Producing, casing damage at 65.5 feet
W-4	1973	248	-10	N/A	N/A	0	0%	25	N/A	No	--	Non-producing, casing perforations closed due to siltation (BYA 1991)
W-5	1984	280	252	N/A	N/A	0	0%	25	N/A	No	--	Capped 4/4/84 (DA Evans 1986)
W-6	1983	174	80	N/A	N/A	0	0%	25	N/A	No	--	Non-producing, static water level at bottom of casing (BYA 1991)
W-7	1983	257	171	N/A	N/A	0	0%	25	N/A	No	--	Non-producing, static water level at bottom of casing (BYA 1991)
W-8	1983	287	93	98	1	6,133	10%	4	4	No	--	Producing
W-9	1983	282	87	N/A	N/A	0	0%	25	N/A	No	--	Non-producing, static water level at bottom of casing (BYA 1991), replaced with BYA-11
W-10	1983	432	192	194	N/A	0	0%	25	N/A	No	--	Inactive, no pump
W-11	1983	507	285	292	N/A	0	0%	25	N/A	No	--	Inactive, disconnected from electrical, replaced with BYA-10
W-12	1983	375	195	N/A	N/A	0	0%	25	N/A	No	--	Non-producing, casing sheared at 185 ft.elevation (BYA 1991)
W-13	1983	361	184	193	1	3,043	5%	8	5	No	--	Producing
W-14	1984	283	131	N/A	N/A	0	0%	25	N/A		--	Non-producing, static water level at bottom of casing (BYA 1991)
W-15	1984	295	121	130	N/A	0	0%	25	N/A		--	Inactive, replaced with BYA-9
W-16	1984	325	107	113	0.75	7,133	11%	2	5	Yes	--	Producing
W-17	1984	270	41	50	0.75	3,026	5%	9	4	Yes	8/31/2020	Producing
W-18	1984	750	179	225	3	8,170	13%	1	6	No	--	Producing
BYA-1	1990	281	-164	30	1	7,098	11%	3	4	Yes	2/15/2022	Producing, casing damage at 245 feet
BYA-2	1990	665	215	242	1.5	686	1%	20	6	No	--	Producing
BYA-3	1990	510	-40	29	3	1,501	2%	13	6	No	--	Producing
BYA-4	1990	372	-68	-28	1.5	5,575	9%	5	5	No	--	Producing
BYA-5	1990	189	-231	-211	1.5	507	1%	21	1	No	--	Producing
BYA-6	1996	220	-280	-275	0.75	750	1%	19	1	No	--	Producing
BYA-7	1996	240	-120	-115	0.75	1,254	2%	14	2	No	--	Producing
BYA-9	1996	295	-105	-70	5	5,085	8%	6	5	Yes	5/20/2021	Producing, in-filled -105 to -75 feet
BYA-10	1996	510	210	215	1	768	1%	18	5A	No	--	Producing
BYA-11	1996	275	-125	-120	0.75	2,037	3%	10	5	No	--	Producing
BYA-12	1998	207	-140	-137	0.5	153	0%	23	1	No	--	Producing
BYA-13	1998	329	-14	-18	0.5	1,939	3%	11	3	No	--	Producing
BYA-14	1998	265	38	40	0.5	1,069	2%	17	1A	No	--	Producing
BYA-15	2002	429	340	300	1	4	0%	24	6	No	8/21/2014	Producing <10 GPD, water level at pump intake, airline functioning
FW-1	2008	170			1	336	1%	22	1A	No	--	Producing
FW-2	2009	270	-130	-115	1.5	1,216	2%	15	4	No	--	Producing

Note: - Not functioning or no longer monitored dewatering well

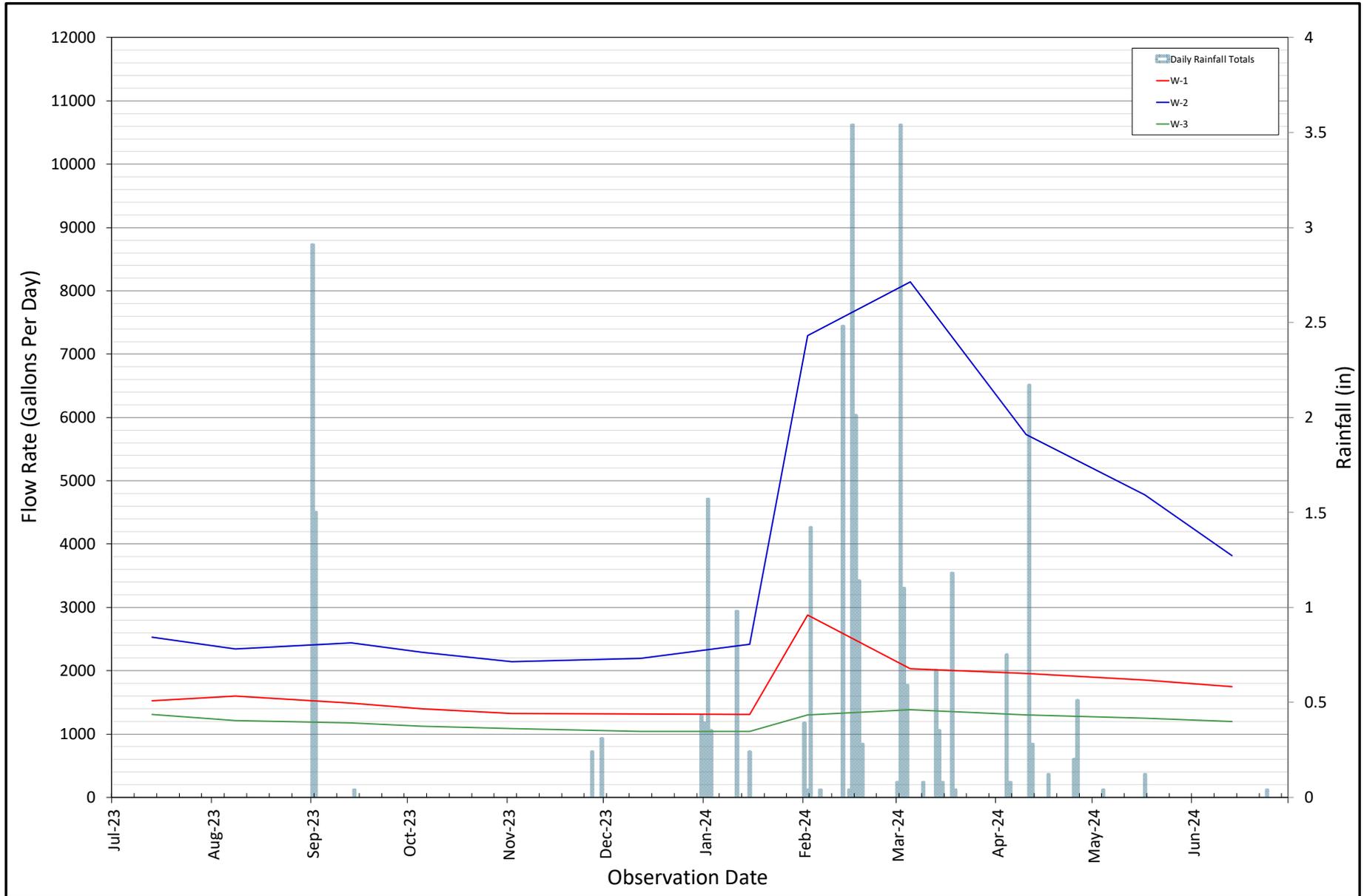


DISCHARGE RATE FOR DEWATERING WELLS (HISTORIC)

Eastern Mesa Region

Big Rock Mesa Landslide Assessment District

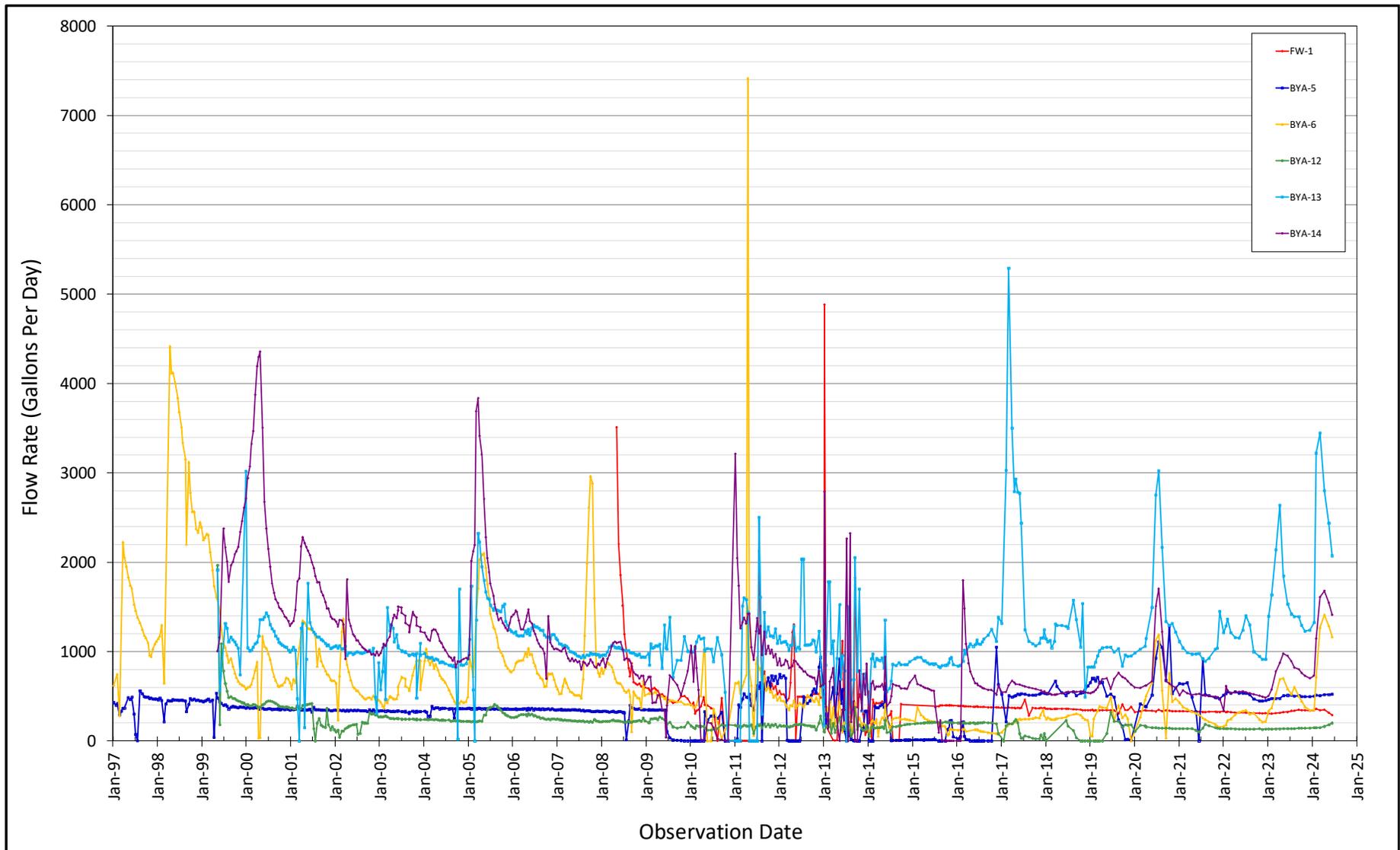
Malibu, California



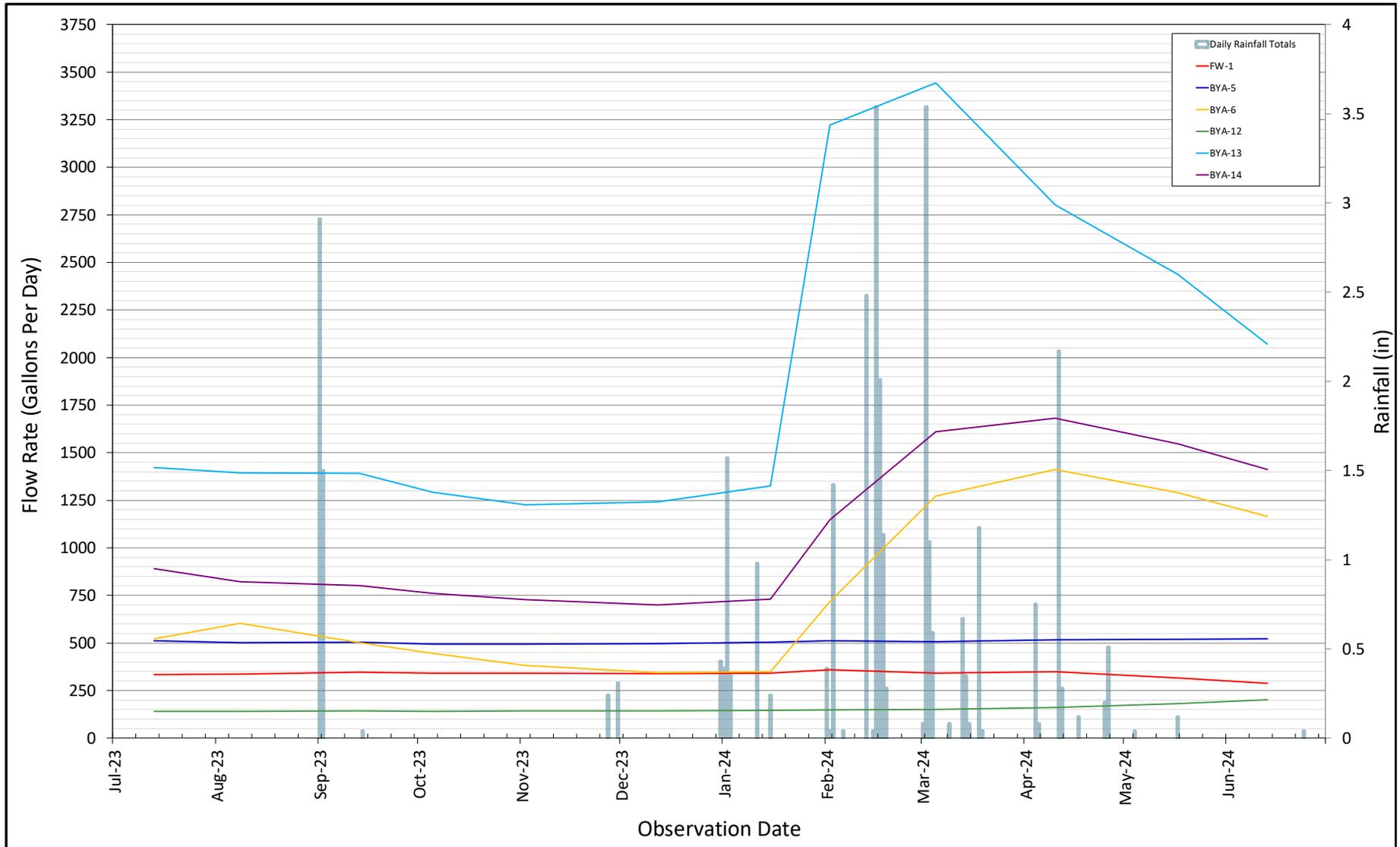
DISCHARGE RATE FOR DEWATERING WELLS (MONITORING YEAR)

Eastern Mesa Region

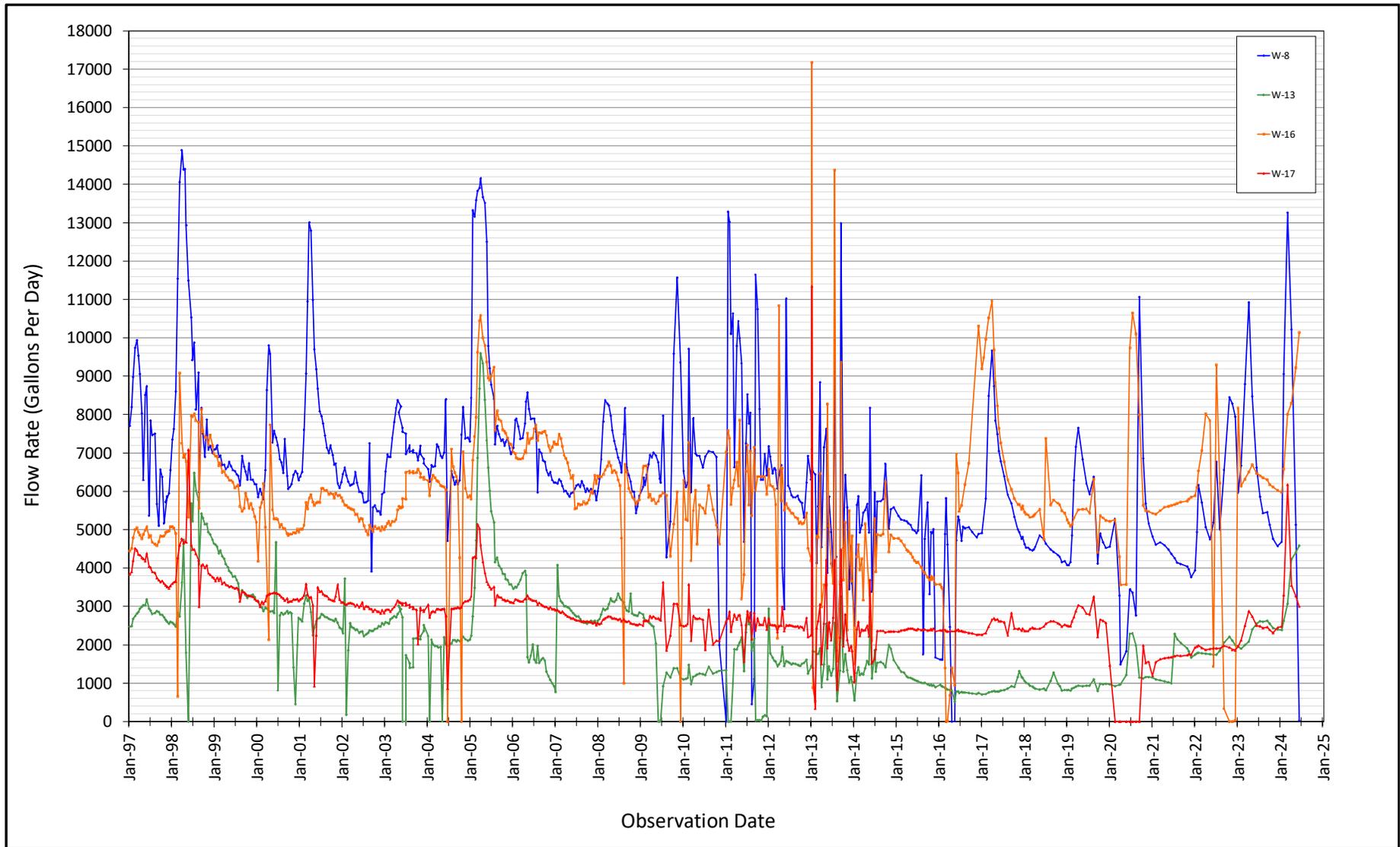
Big Rock Mesa Landslide Assessment District
 Malibu, California



DISCHARGE RATE FOR DEWATERING WELLS (HISTORIC)
Eastern Mesa Region
Big Rock Mesa Landslide Assessment District
Malibu, California



DISCHARGE RATE FOR DEWATERING WELLS (MONITORING YEAR)
Eastern Mesa Region
 Big Rock Mesa Landslide Assessment District
 Malibu, California

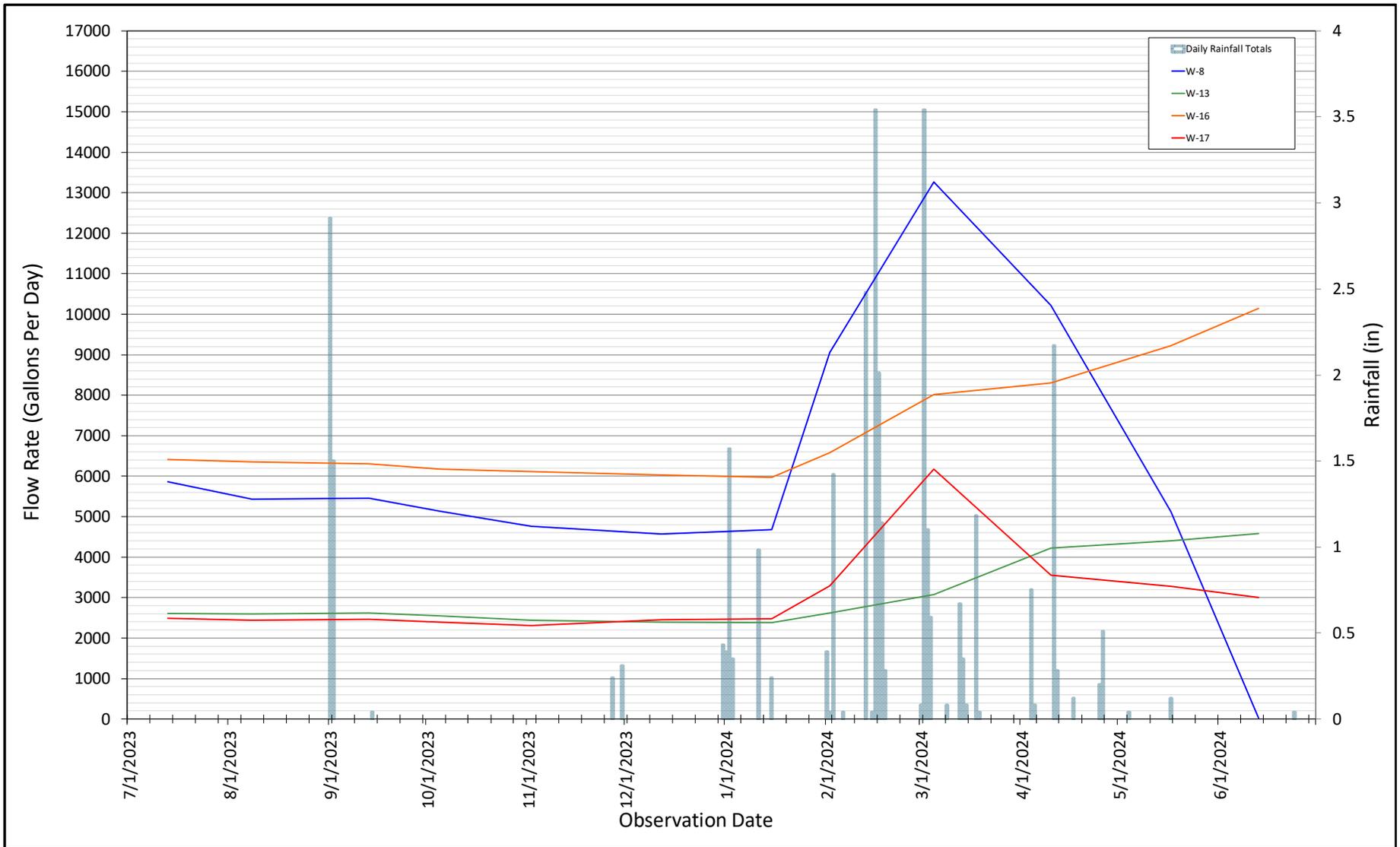


DISCHARGE RATE FOR DEWATERING WELLS (HISTORIC)

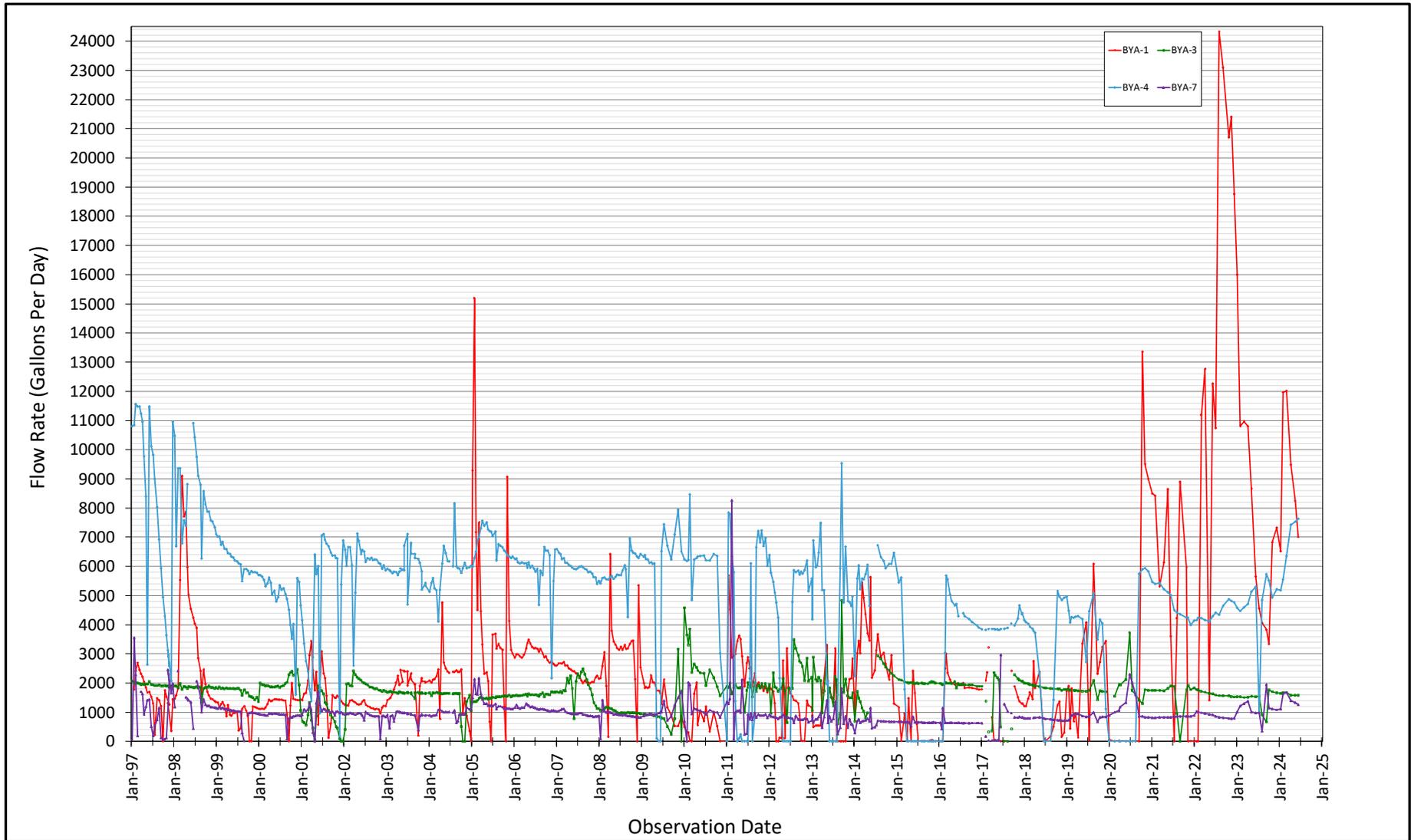
Central Mesa Region

Big Rock Mesa Landslide Assessment District

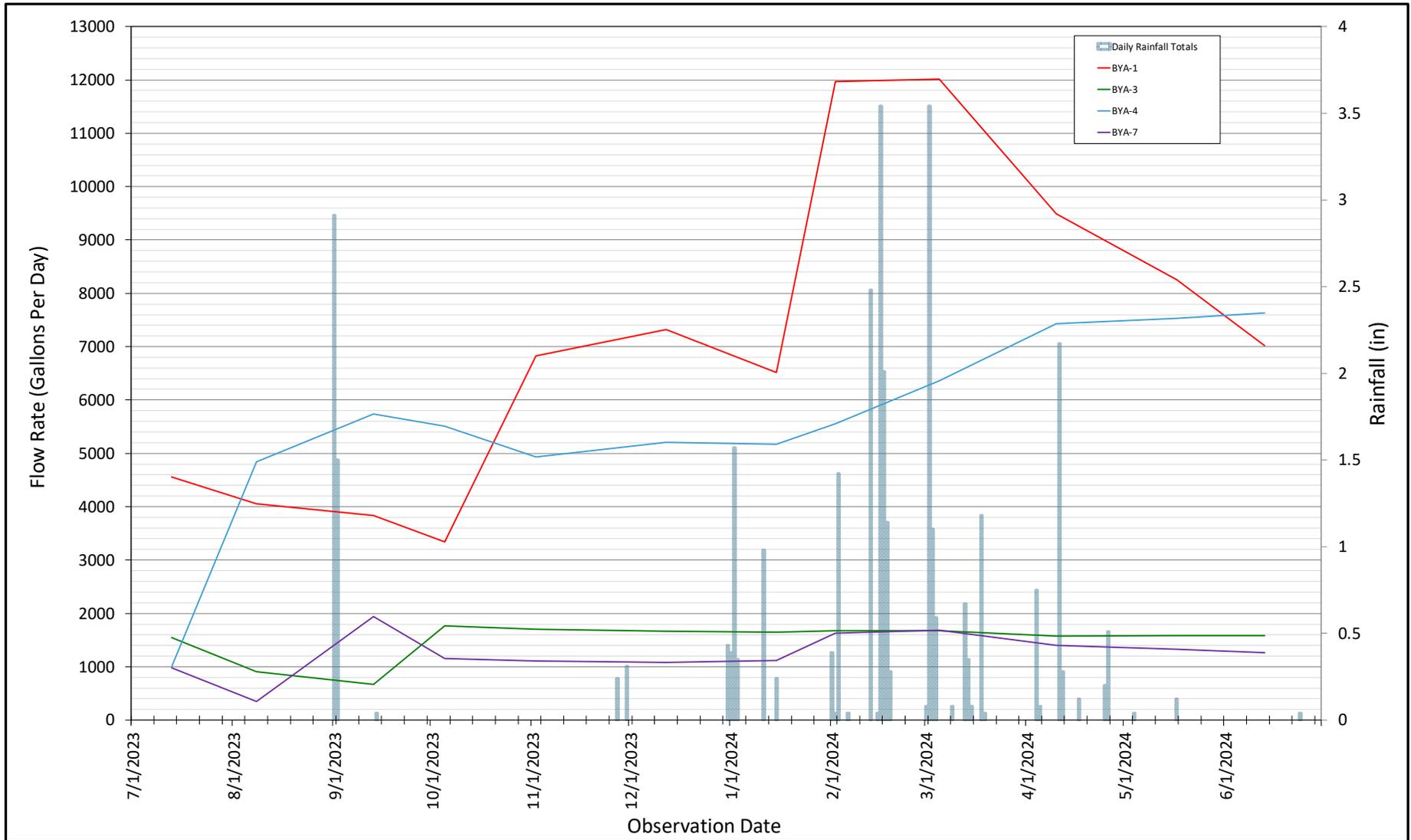
Malibu, California



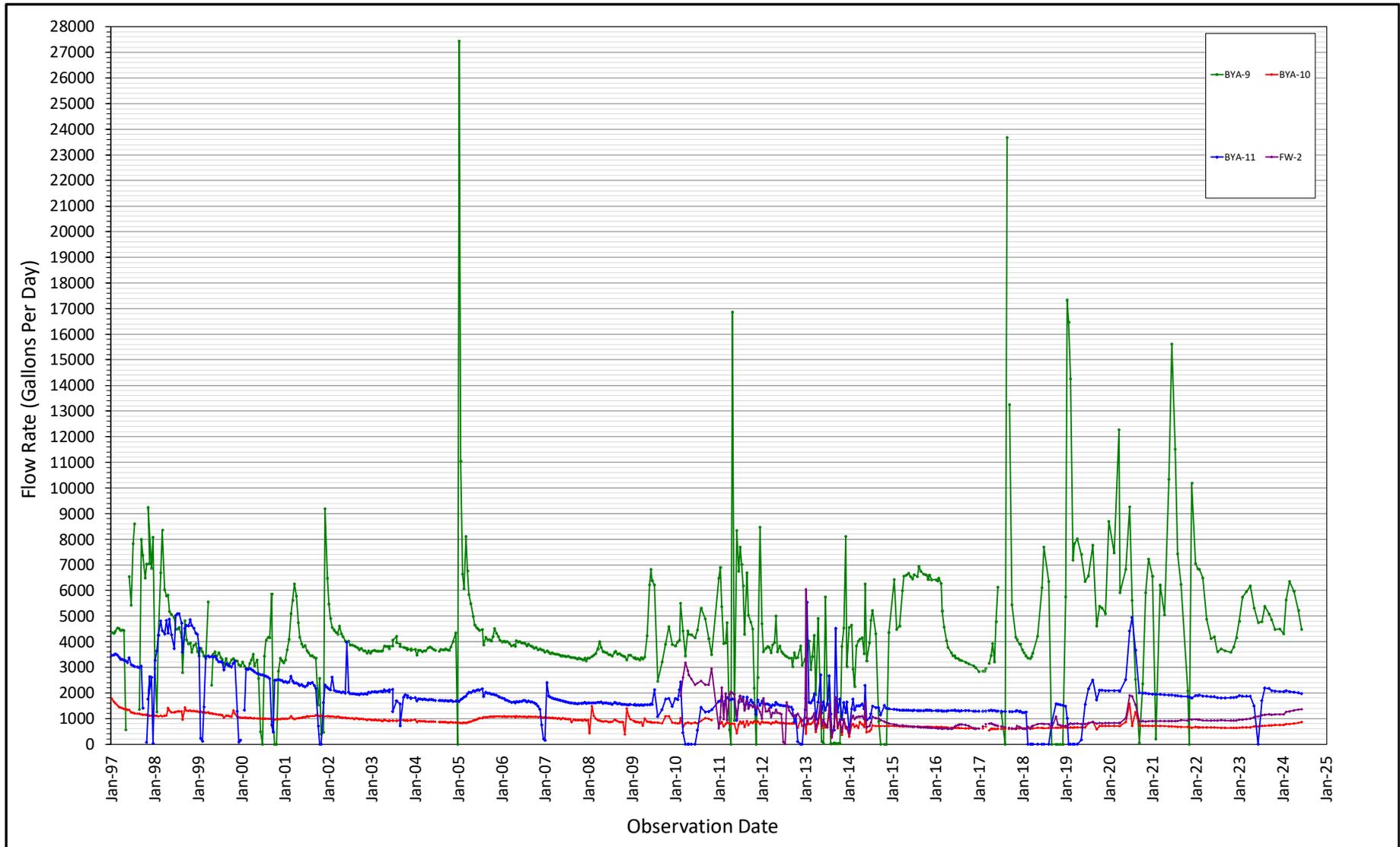
DISCHARGE RATE FOR DEWATERING WELLS (MONITORING YEAR)
Central Mesa Region
 Big Rock Mesa Landslide Assessment District
 Malibu, California



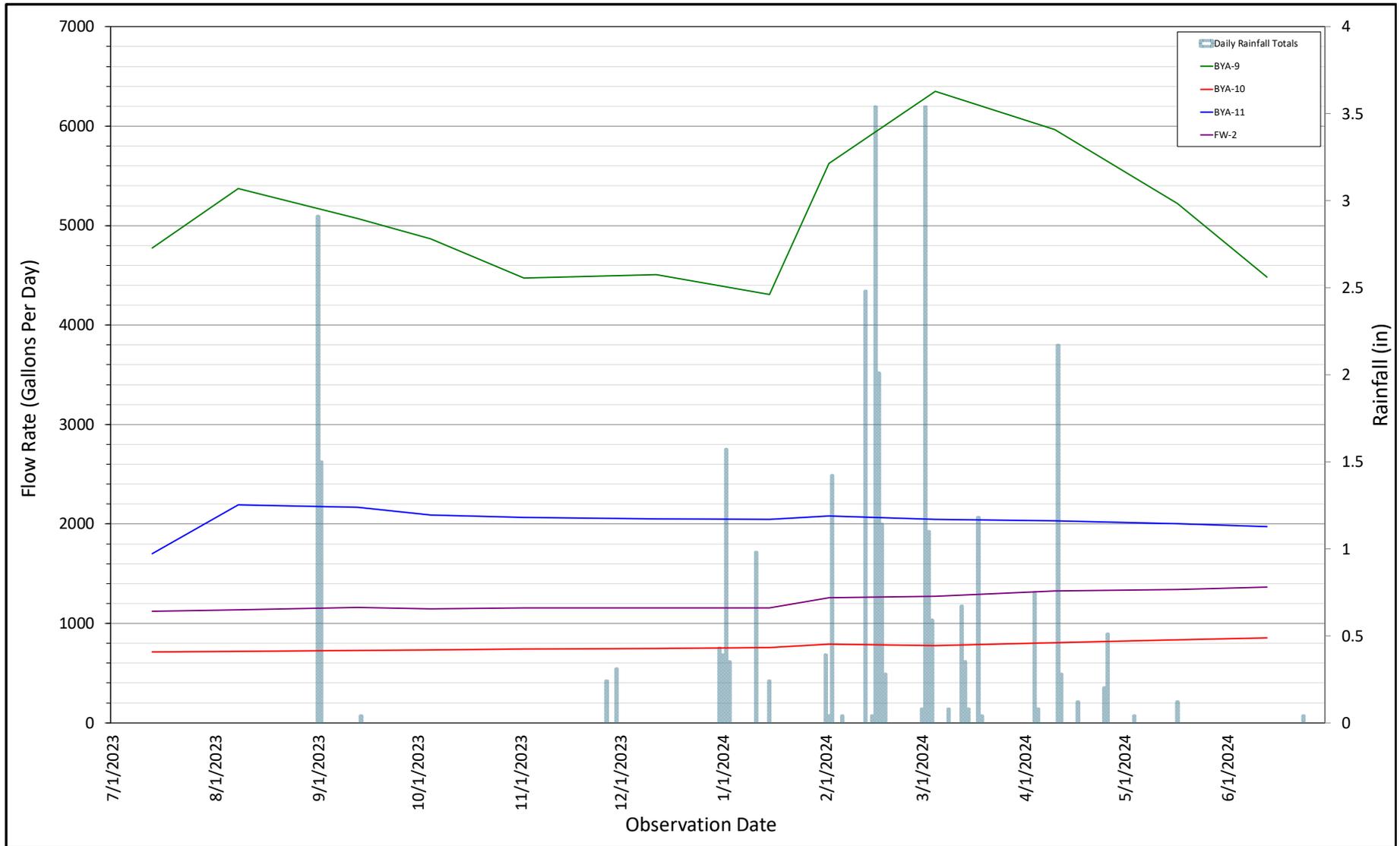
DEWATERING WELL HYDROGRAPHS (HISTORIC)
Central Mesa Region
Big Rock Mesa Landslide Assessment District
Malibu, California



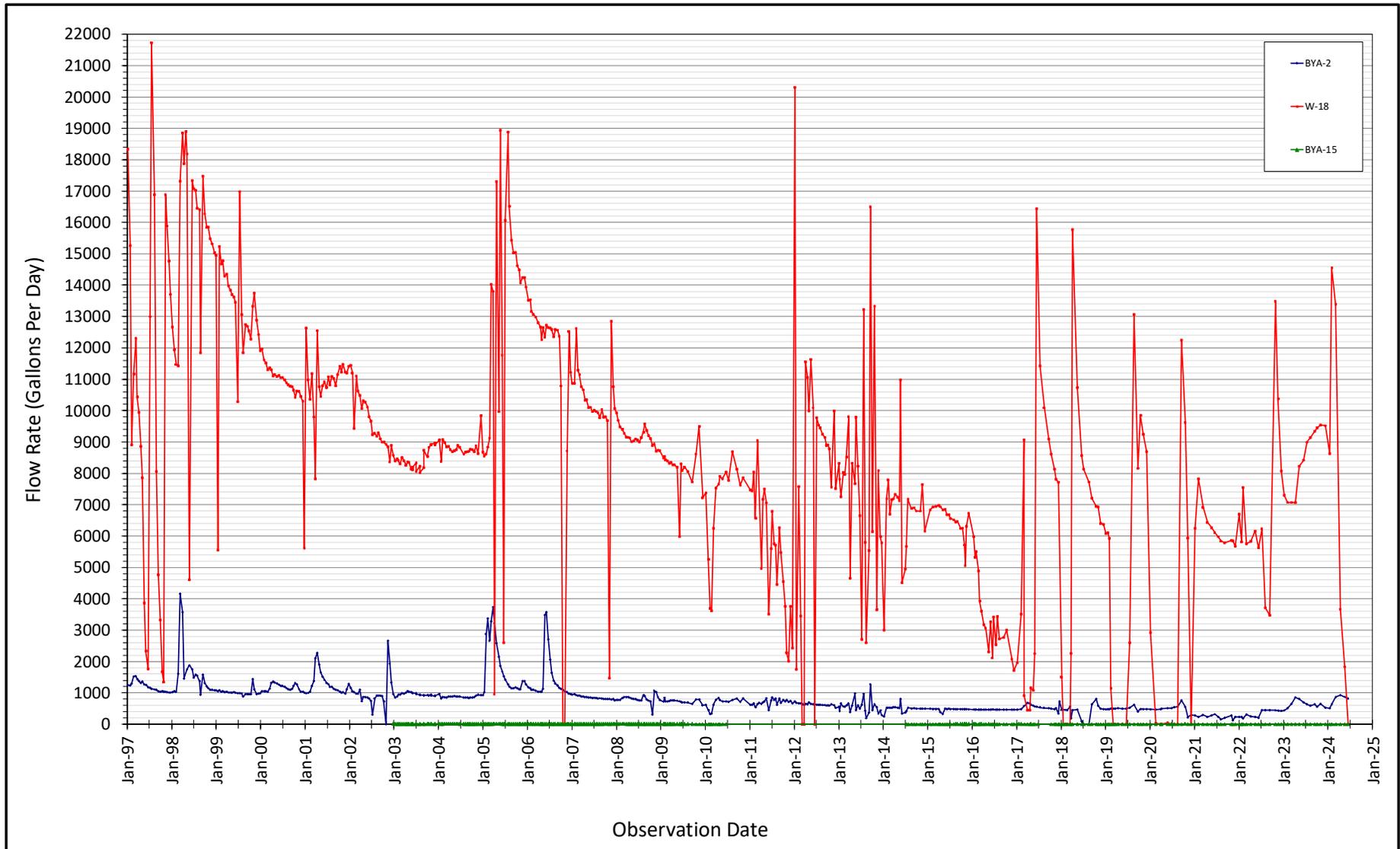
DEWATERING WELL HYDROGRAPHS (HISTORIC)
Central Mesa Region
 Big Rock Mesa Landslide Assessment District
 Malibu, California



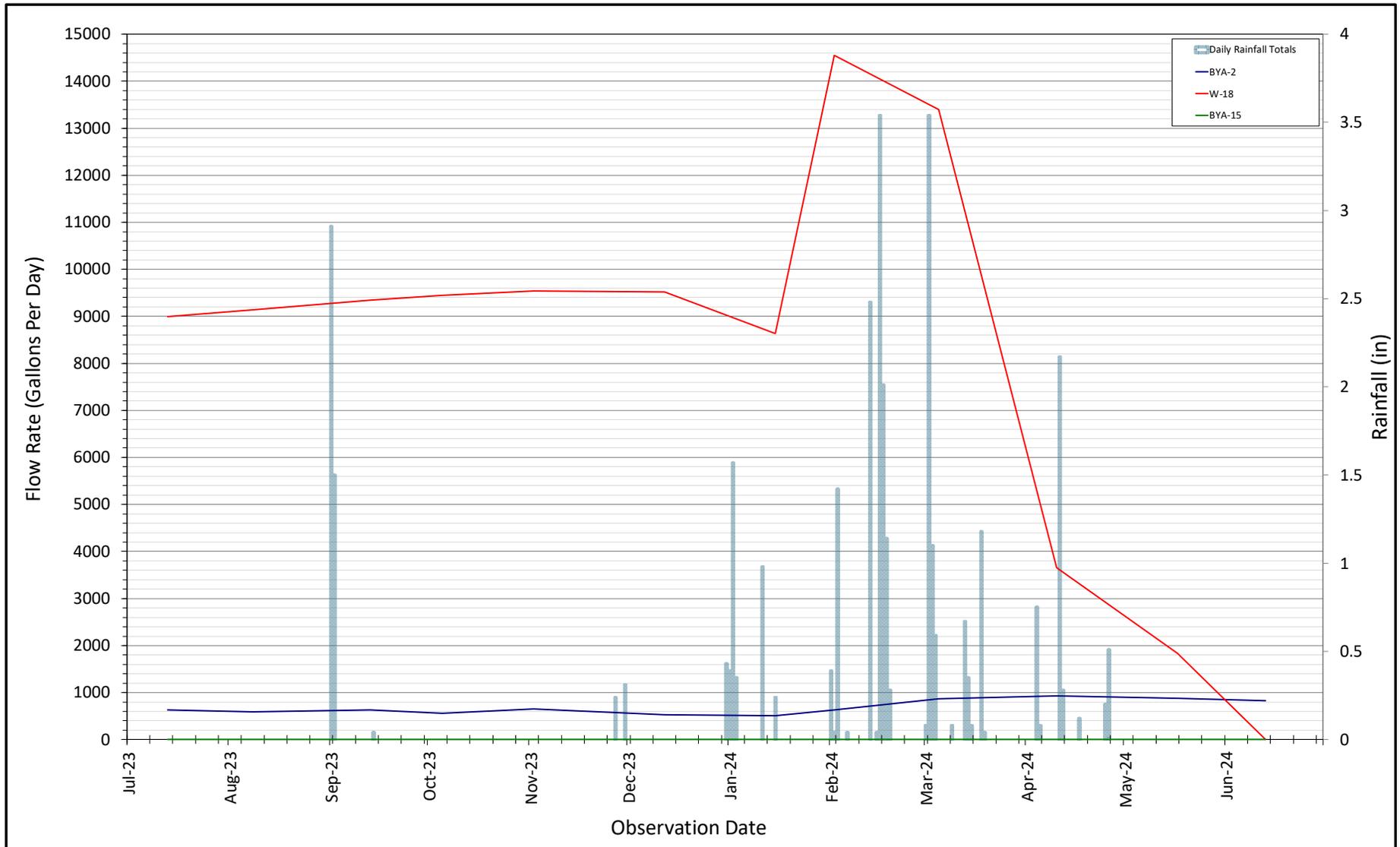
DISCHARGE RATE FOR DEWATERING WELLS (HISTORIC)
Central Mesa Region
Big Rock Mesa Landslide Assessment District
Malibu, California



DISCHARGE RATE FOR DEWATERING WELLS (MONITORING YEAR)
Central Mesa Region
 Big Rock Mesa Landslide Assessment District
 Malibu, California



DISCHARGE RATES FOR DEWATERING WELLS (HISTORIC)
Western Extension
Big Rock Mesa Landslide Assessment District
Malibu, California



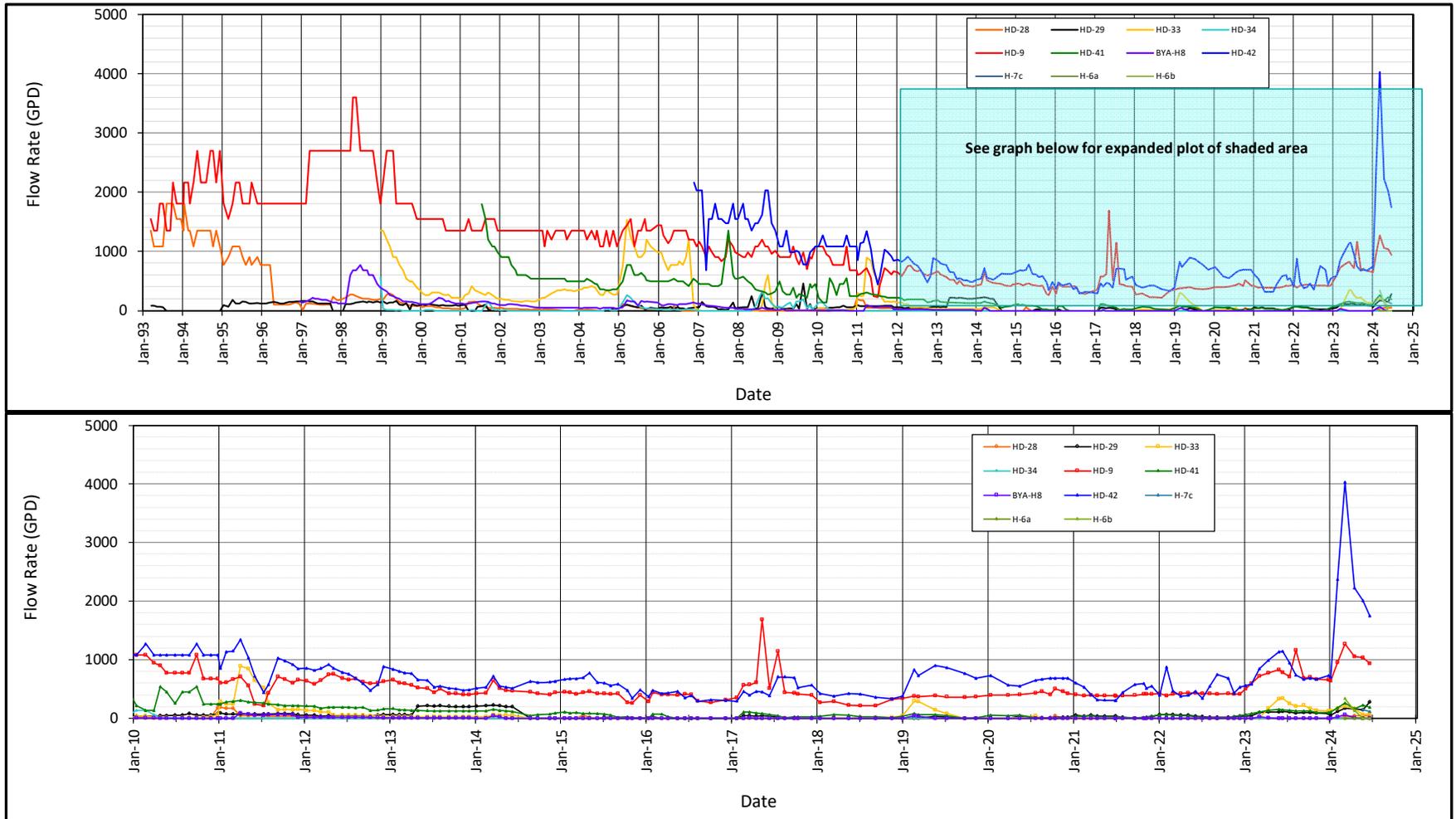
DISCHARGE RATES FOR DEWATERING WELLS (MONITORING YEAR)
Western Extension
 Big Rock Mesa Landslide Assessment District
 Malibu, California

SUMMARY OF HYDRAUGER INFORMATION							
HYDRAUGER ID	INSTALLED LENGTH (ft.)	OPEN LENGTH (ft.)**	Orientation/ Slope	2023-2024 Average Flow (GPD)	% OF TOTAL PRODUCTION	Rank	INSTALLED BY
H-1	700	210**	S115W / 3	0	--	--	MT
HD-4	760	10	-	304	1.6%	12	D.E.
HD-5	890	530**	-	501	2.6%	9	D.E.
HD-6	980	490**	-	11	0.1%	26	D.E.
HD-7	1160	420**	-	92	0.5%	19	D.E.
HD-9	205	205**	-	874	4.5%	6	D.E.
HD-10	990	170**	-	236	1.2%	13	D.E.
HD-11	540	540**	-	467	2.4%	10	D.E.
HD-12	690	385**	-	1626	8.4%	4	D.E.
HD-15	200	200**	-	538	2.8%	8	D.E.
HD-22	568	540**	-	1406	7.2%	5	D.E.
HD-23	1280	260**	-	2865	14.7%	3	D.E.
HD-24	1030	580**	-	58	0.3%	21	D.E.
HD-25	1005	360**	-	9	0.0%	27	D.E.
HD-26	1200	410**	S37W / 1	4780	24.6%	1	D.E.
HD-28	1420	595**	-	14	0.1%	25	D.E.
HD-29	1150	450**	-	125	0.6%	17	D.E.
HD-30	1040	10**	S13W / 7	4289	22.0%	2	D.E.
HD-33	340	340	S23W / 5	160	0.8%	14	BYA
HD-41	500	500	S18E / 3	154	0.8%	15	BYA
BYA-H8	500	345**	-	8	0.0%	28	BYA
BYA-H10	500	10**	-	4	0.0%	29	BYA
HD-42	700	700	-	563	2.9%	7	Fugro
HD-43	700	700	-	371	1.9%	11	Fugro
H-2*	Unknown	0	-	0	--	--	MT
H-3a*	Unknown	0	-	0	--	--	MT
H-3b*	Unknown	0	-	0	--	--	MT
H-3c*	Unknown	0	-	27	0.1%	22	MT
H-4	680	115**	-	0	--	--	MT
H-5a*	Unknown	0	-	0	--	--	MT
H-5b*	Unknown	0	-	0	--	--	MT
H-6a*	100	96	-	0	--	--	CT
H-6b*	100	96	-	120	0.6%	18	CT
H-7a*	100	100	-	0	--	--	CT
H-7b*	100	96	-	0	--	--	CT
H-7c*	50	0	-	136	0.7%	16	CT
H-8*	Unknown	0	-	0	--	--	CT
HD-1*	350	340**	-	0	--	--	D.E.
HD-2a*	70	33	-	0	--	--	D.E.
HD-2b*	Unknown	0	-	0	--	--	D.E.
HD-2c*	460	0	-	0	--	--	D.E.
HD-3	560	90**	-	0	--	--	D.E.
HD-8*	530	170**	-	0	--	--	D.E.
HD-13*	650	14	-	0	--	--	D.E.
HD-14*	130	130**	-	0	--	--	D.E.
HD-16	575	575**	-	0	--	--	D.E.
HD-17*	750	176	-	0	--	--	D.E.
HD-18*	870	285	-	0	--	--	D.E.
HD-19*	1000	182	-	0	--	--	D.E.
HD-20*	1000	446	-	0	--	--	D.E.
HD-21*	1560	147	-	0	--	--	D.E.
HD-27*	700	327	-	0	--	--	D.E.
HD-31*	140	113	-	0	--	--	D.E.
HD-32*	835	700**	-	0	--	--	D.E.
HD-34	150	150	S40W / 10	0	--	--	BYA
HD-35*	40	40	-	0	--	--	BYA
HD-36*	150	150	-	0	--	--	BYA
HD-37*	430	50	-	0	--	--	BYA
HD-38A*	140	140	S23W / 5	0	--	--	BYA
HD-38B*	140	140	S18W / 6	0	--	--	BYA
HD-39	400	400	S15E / 5	82	0.4%	20	BYA
HD-40*	595	595	S25W / 6	0	--	--	BYA
BYA-6a	350	20**	-	1	0.0%	30	BYA
BYA-6b	60	60	-	19	0.1%	24	BYA
BYA-7	400	375**	-	23	0.1%	23	BYA
BYA-H9*	550	550**	-	0	--	--	BYA
BYA-H11*	450	400**	S7E / 3	0	--	--	BYA

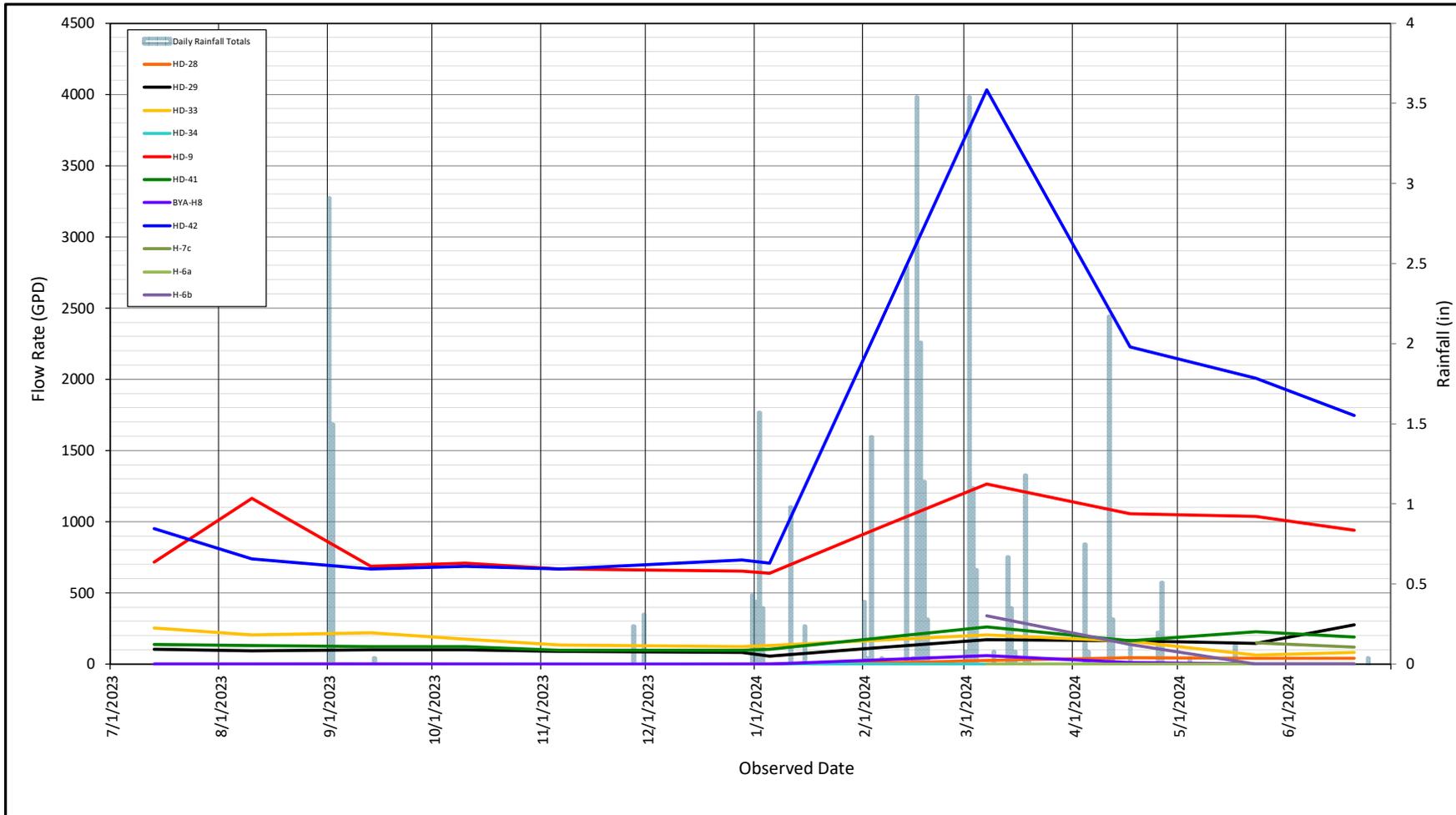
* Not functioning or no longer monitored hydrauger

** Open Length is Measured on 10-1997 by BYA

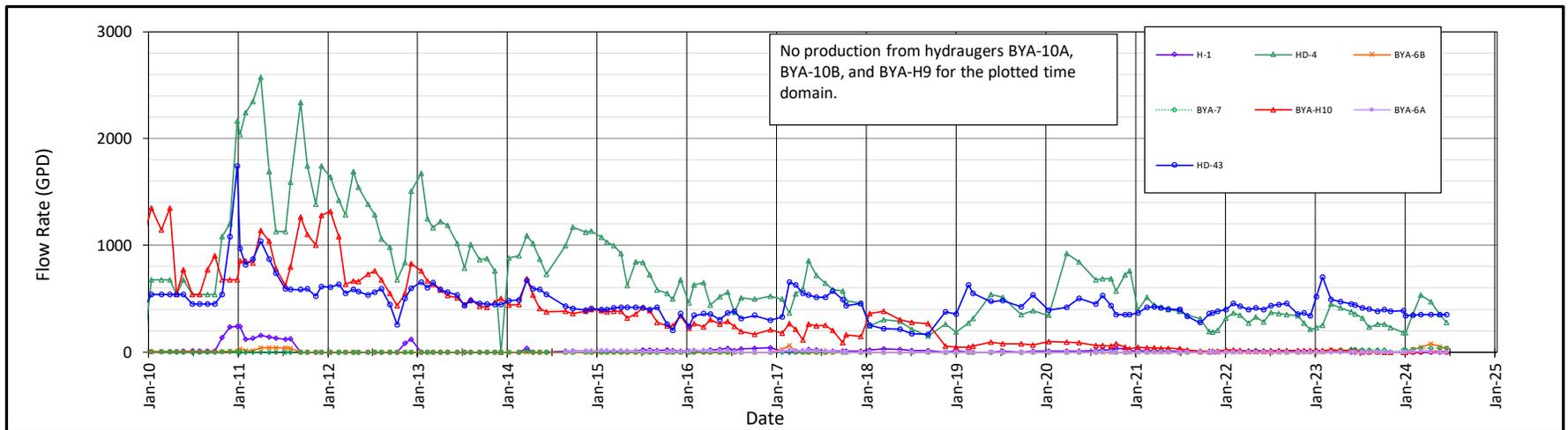
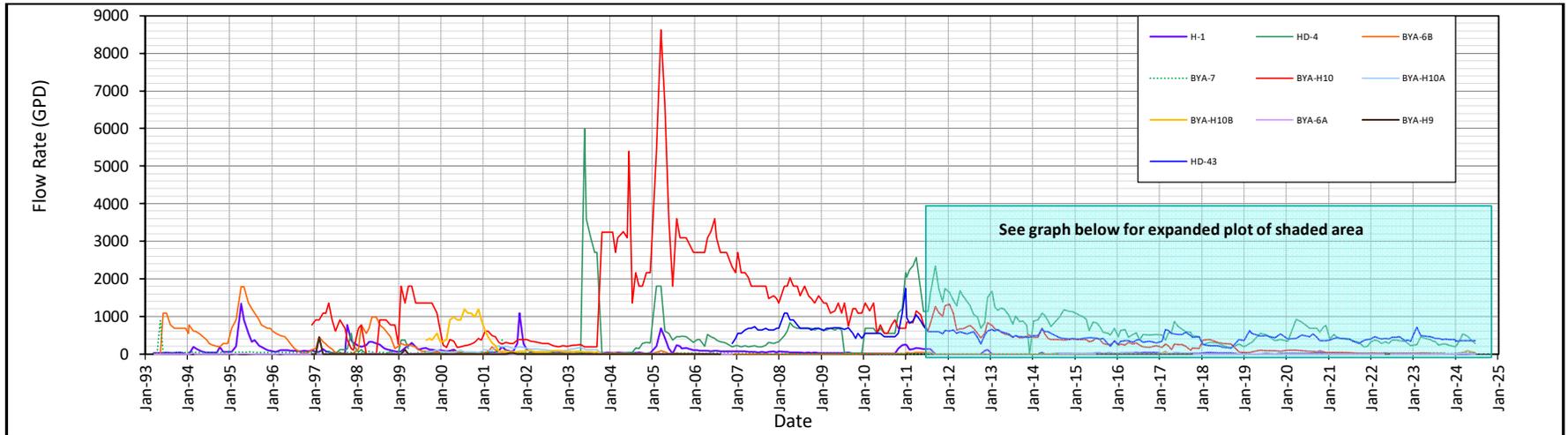
Installed by: MT = Moore & Taber; CT = Caltrans; D.E. = D.A. Evans; BYA = Bing Yen & Associates



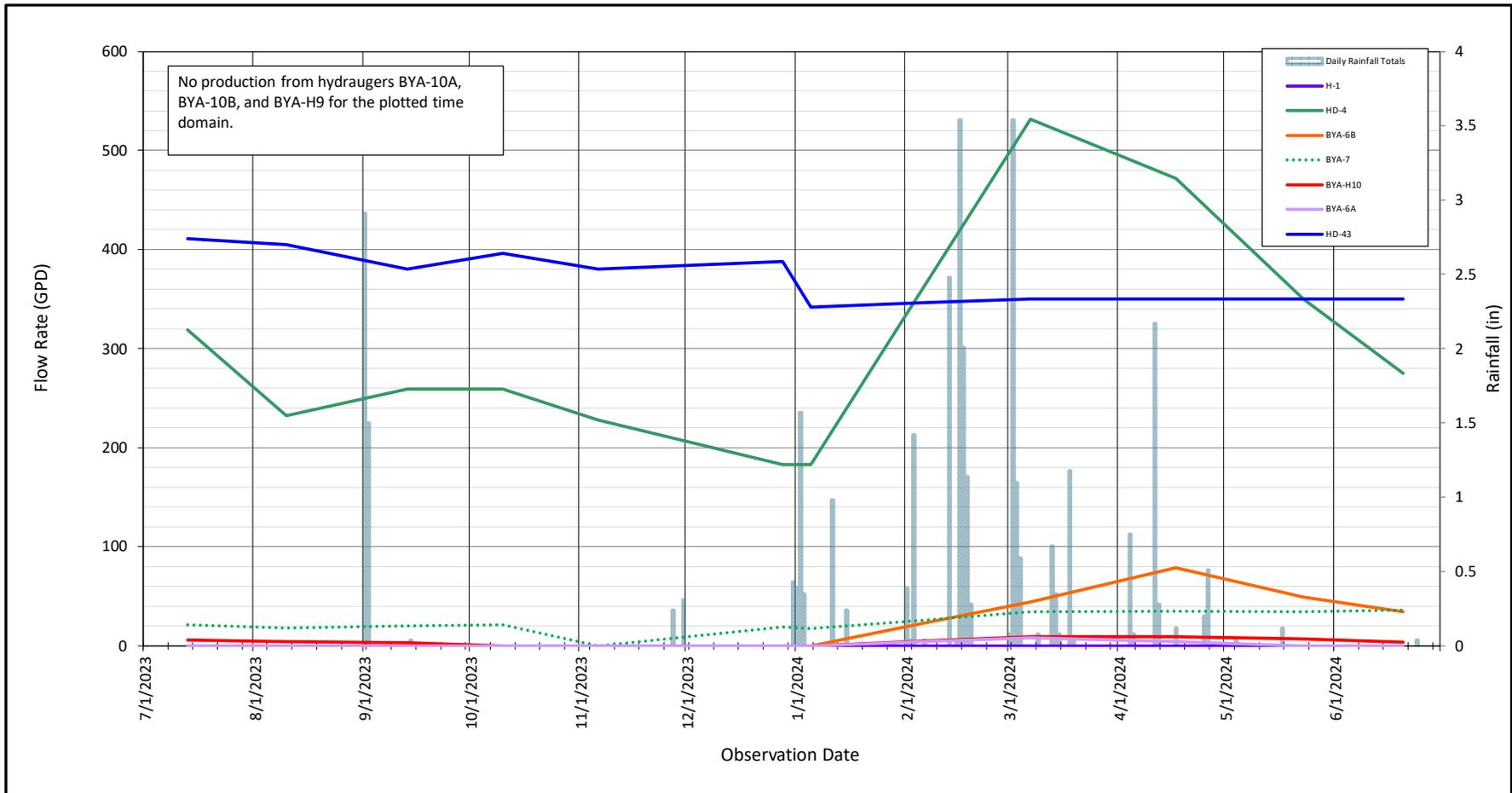
DISCHARGE RATE FOR HYDRAUGERS (HISTORIC)
Eastern Mesa Region
 Big Rock Mesa Landslide Assessment District
 Malibu, California



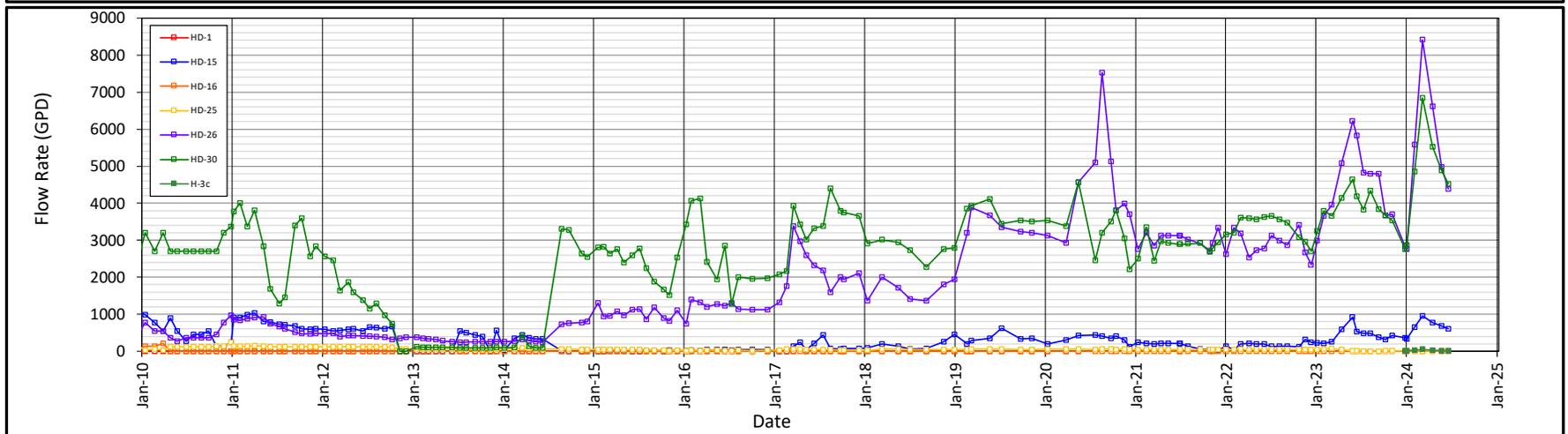
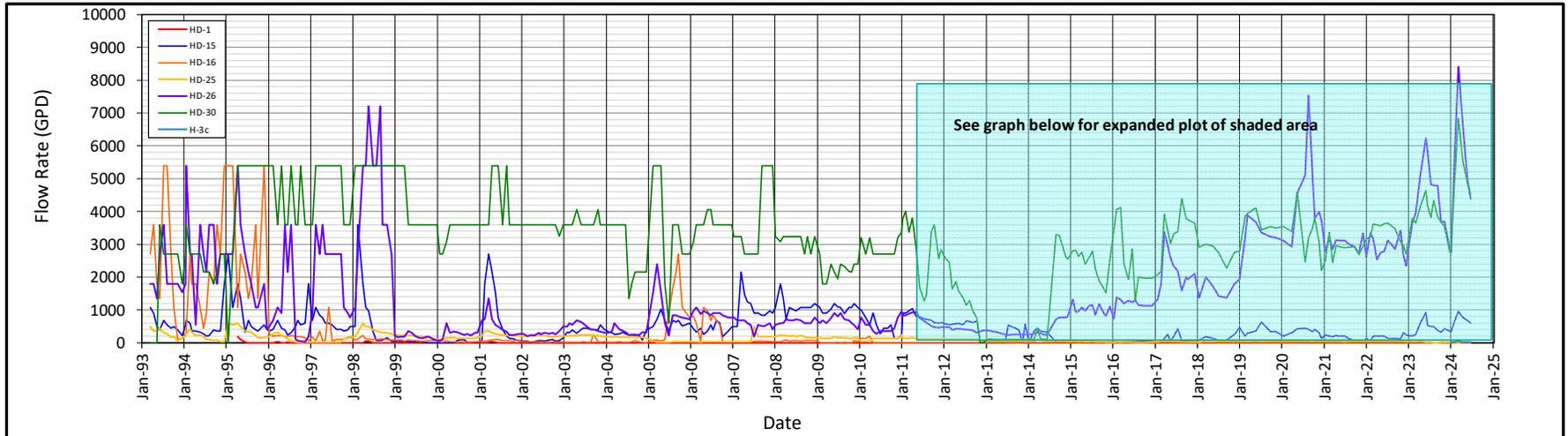
DISCHARGE RATE FOR HYDRAUGERS (MONITORING YEAR)
Eastern Mesa Region
 Big Rock Mesa Landslide Assessment District
 Malibu, California



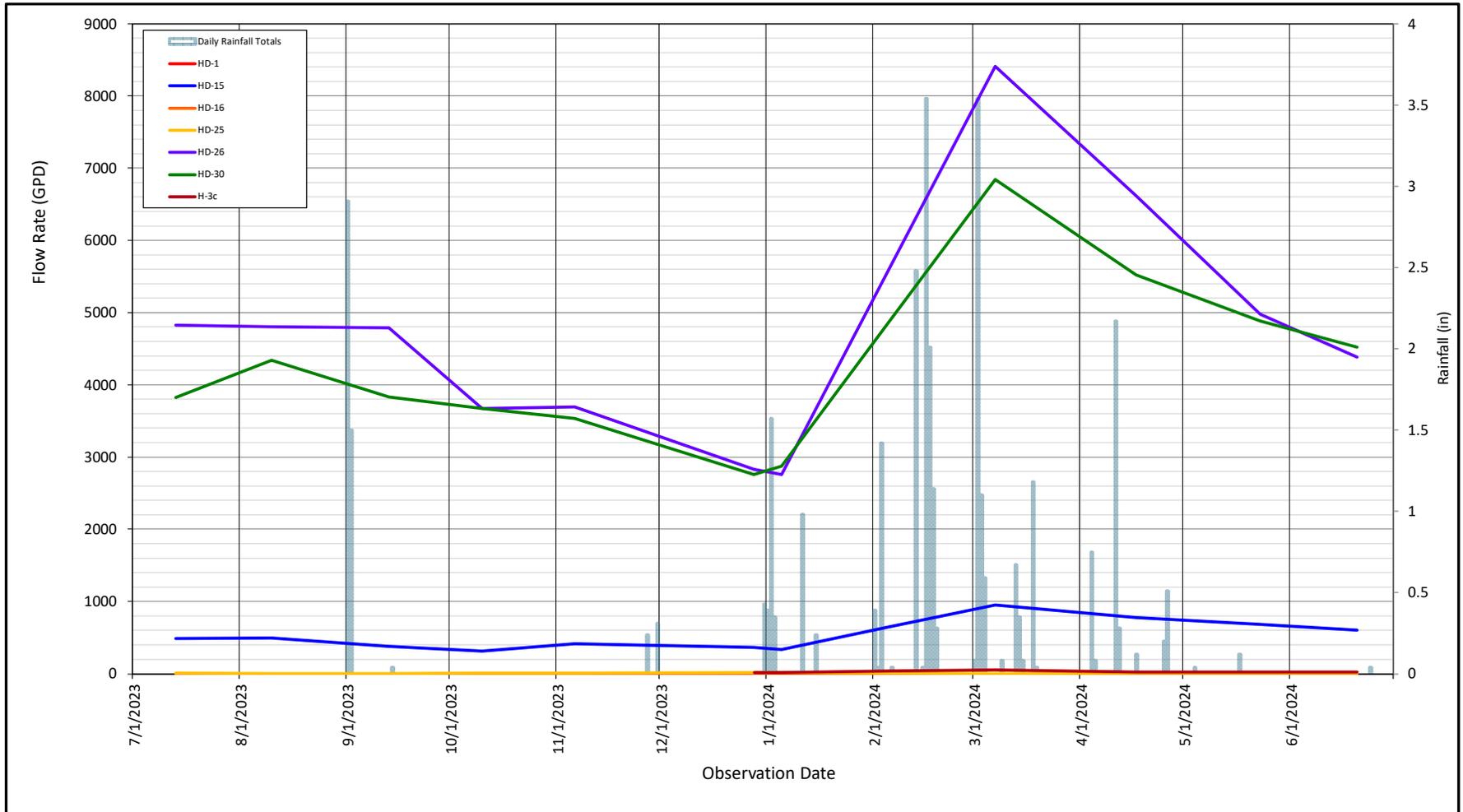
DISCHARGE RATE FOR HYDRAUGERS (HISTORIC)
Eastern Mesa Region
 Big Rock Mesa Landslide Assessment District
 Malibu, California



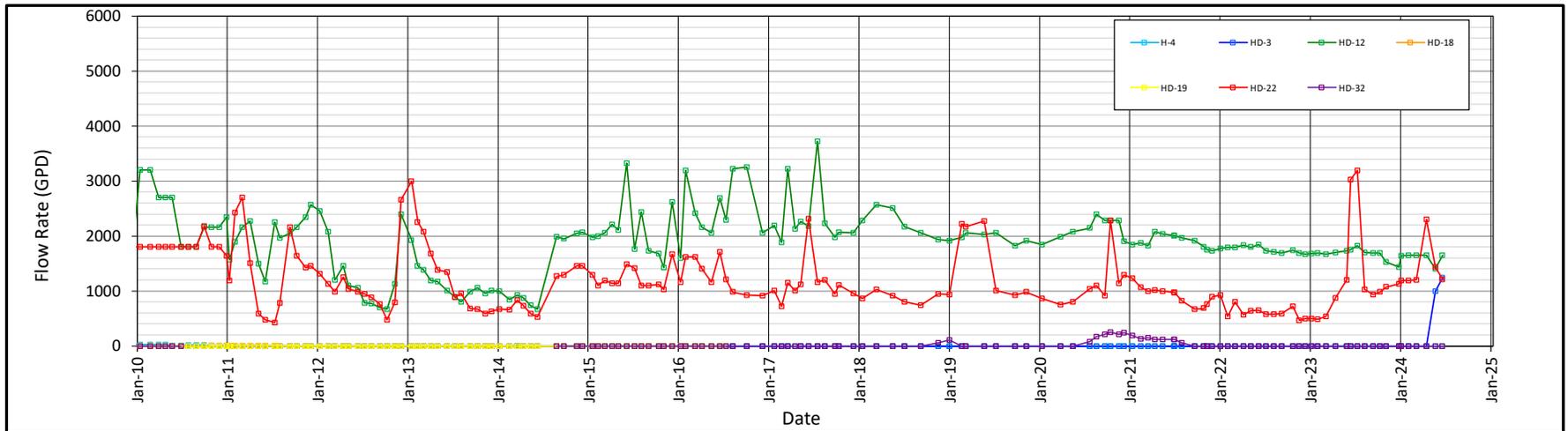
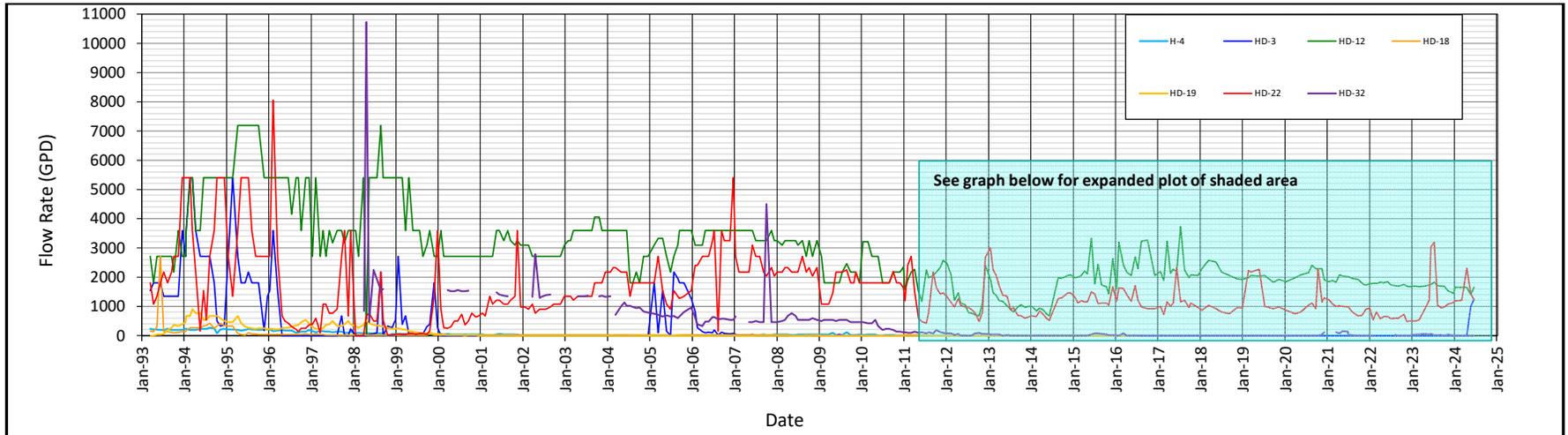
DISCHARGE RATE FOR HYDRAUGERS (MONITORING YEAR)
Eastern Mesa Region
 Big Rock Mesa Landslide Assessment District
 Malibu, California



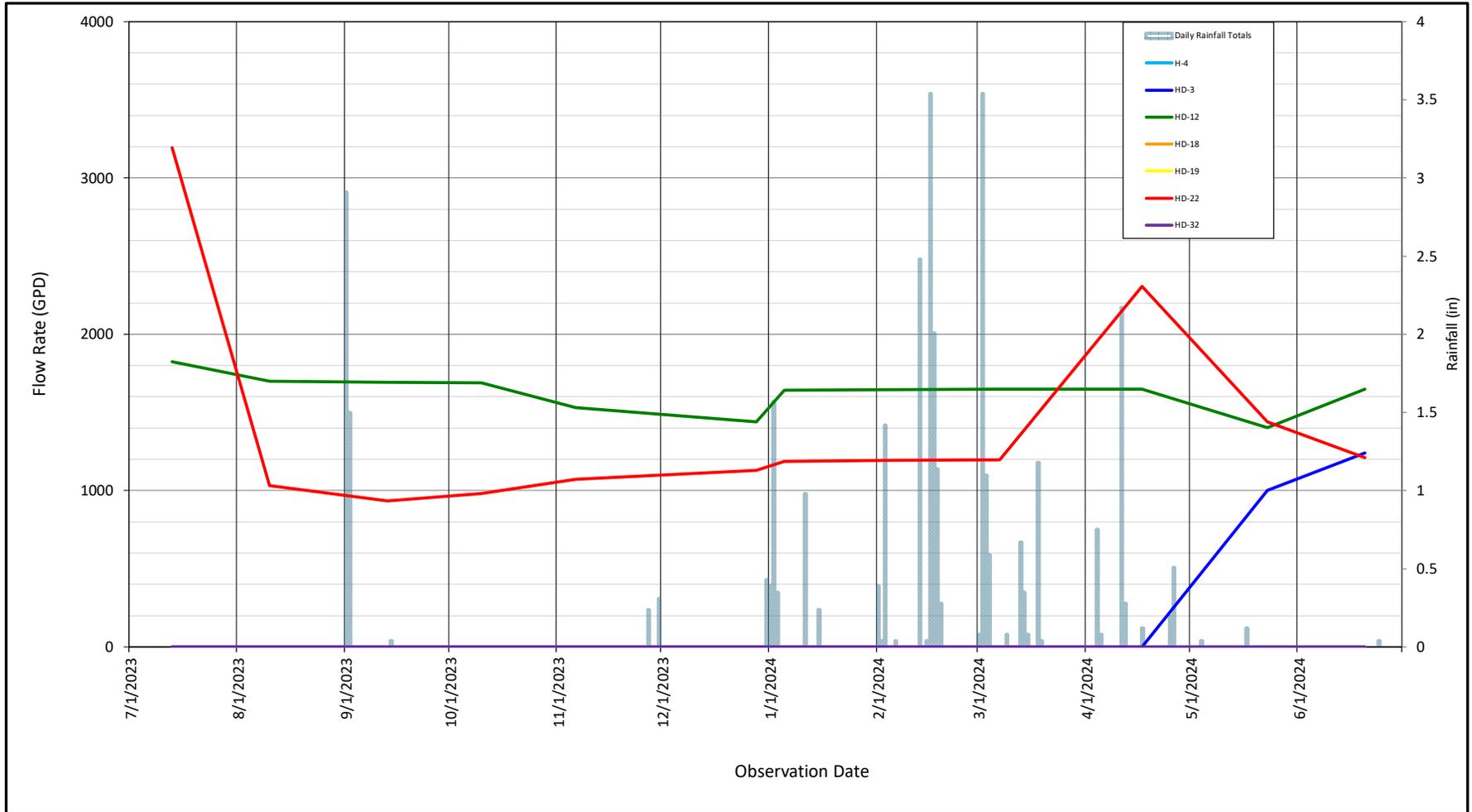
DISCHARGE RATE FOR HYDRAUGERS (HISTORIC)
Central Mesa Region
 Big Rock Mesa Landslide Assessment District
 Malibu, California



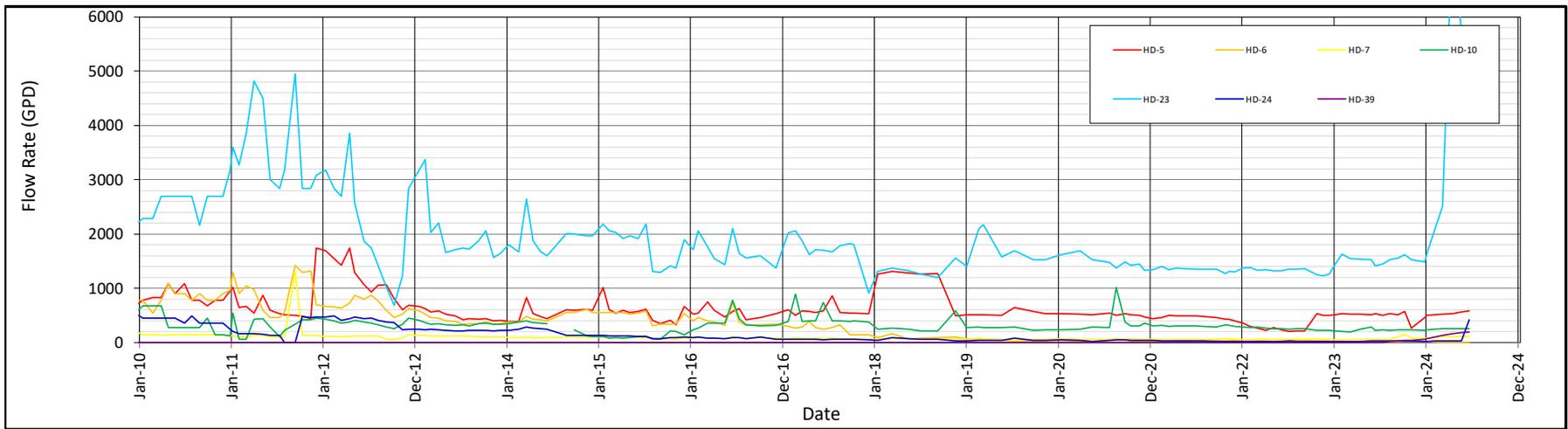
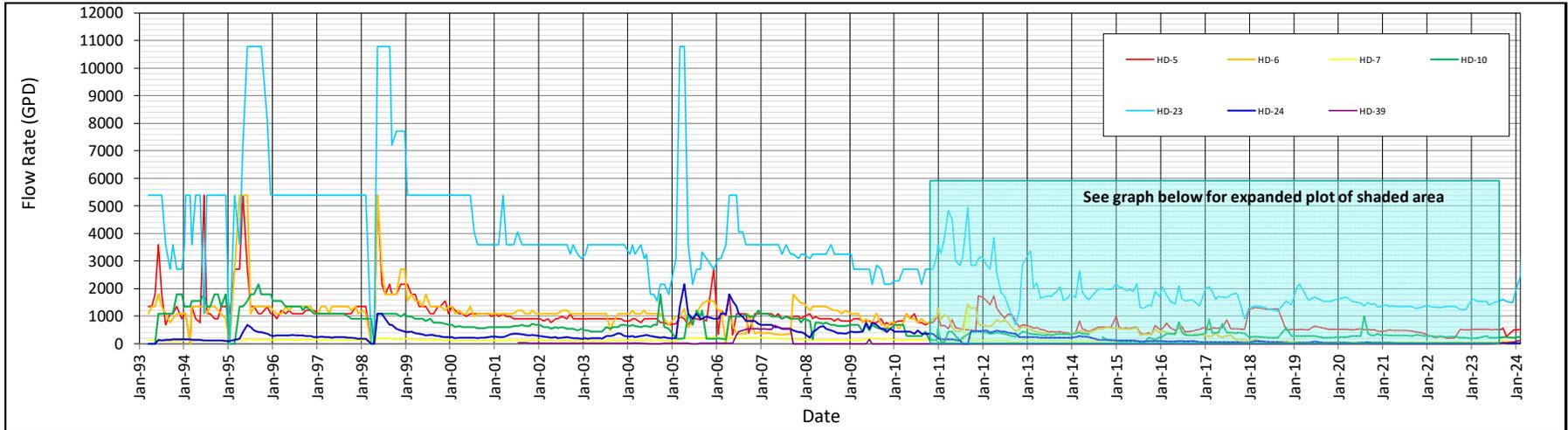
DISCHARGE RATE FOR HYDRAUGERS (MONITORING YEAR)
Central Mesa Region
 Big Rock Mesa Landslide Assessment District
 Malibu, California



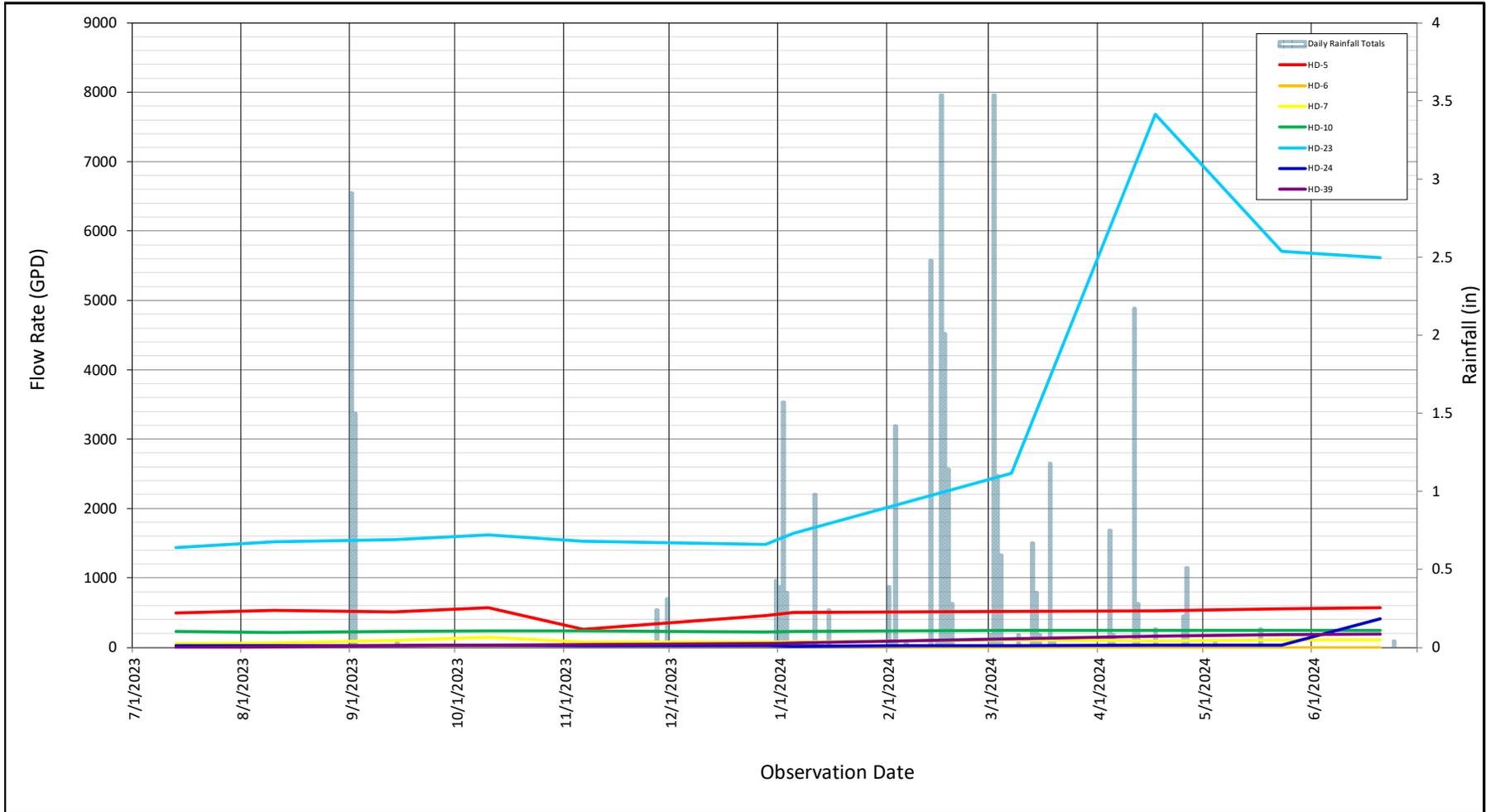
DISCHARGE RATE FOR HYDRAUGERS (HISTORIC)
Central Mesa Region
 Big Rock Mesa Landslide Assessment District
 Malibu, California



DISCHARGE RATE FOR HYDRAUGERS (MONITORING YEAR)
Central Mesa Region
 Big Rock Mesa Landslide Assessment District
 Malibu, California



DISCHARGE RATE FOR HYDRAUGERS (HISTORIC)
Western Extension
 Big Rock Mesa Landslide Assessment District
 Malibu, California



DISCHARGE RATE FOR HYDRAUGERS (MONITORING YEAR)
Western Extension
 Big Rock Mesa Landslide Assessment District
 Malibu, California

APPENDIX E - GROUNDWATER QUALITY

2023 Q3 EFFLUENT TESTING SUMMARY (Aqueous Matrix)

Date Sampled	Sample Point	Percentage of Composite Sample	pH (Field Measured)	Temperature	Biochemical Oxygen Demand	Surfactants (MBAS)	Oil & Grease	Settleable Solids	Sulfides	Phenols	Residual Chlorine (Field Measured)	Total Suspended Solids	Turbidity	Copper	Cyanide	Mercury	Nickel	Zinc	Total Coliform	Fecal Coliform	Fecal/Total Coliform >0.1?	Enterococcus	Acute Toxicity**
				° F	mg/L	mg/L	mg/L	mL/L	mg/L	mg/L	mg/L	mg/L	NTU	µg/L	µg/L	µg/L	µg/L	µg/L	MPN/100m	MPN/100ml		MPN/100ml	% Survival
Discharges to M-001 (Outfall/Port #1a)																							
7/25/2023	BYA-14 FW-1	71% 29%	7.0	75.9	5.9	0.024 J	ND	ND	1.8 A10	ND	0.00	1.1	8.4	ND	ND	ND	3.7 J	ND	--	--	--	--	--
8/3/2023	BYA-14 FW-1	71% 29%	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1600	<1.8	No	--	--
8/17/2023	BYA-14 FW-1	71% 29%	7.1	73.2	7.2	0.062 J	ND	ND	10 A10	ND A10	0.00	1.1 A10	24	ND	3.3 J	ND	3.1 J	ND	--	--	--	--	--
	Duplicate				4.9	0.052 J	ND	ND	9.4 A10	ND		2.2 A10	23	ND	ND	ND	2.7 J	ND	--	--	--	--	--
9/28/2023	BYA-14 FW-1	71% 29%	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	>1600	<1.8	No	<1	--
	Duplicate																		>1600	<1.8	No	<1	--
Discharges to M-002 (Outfall/Port #1)																							
7/25/2023	M-002 Duplicate	N/A	8.0	69.6	ND	ND	2.5 J	ND	ND	0.050	0.01	0.70	0.27	ND	ND	ND	ND	ND	--	--	--	--	--
8/3/2023	BYA-5	16%	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	BYA-6	17%																					
	BYA-12	4%																					
	HD-9	27%																					
	HD-29	3%																					
	HD-33	7%																					
	HD-42	25%																					
8/17/2023	M-002	N/A	8.0	72.5	13 S05	ND	ND	ND	ND	0.00	1.5 A10	0.25	6.7 J	ND	ND	ND	ND	ND	--	--	--	--	--
9/27/2023	BYA-5	22%	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	33	<1.8	No	686.7	--
	BYA-6	15%																					
	BYA-12	0%																					
	HD-9	29%																					
	HD-29	3%																					
	HD-33	7%																					
	HD-42	31%																					
Discharges to M-003 (Outfall/Port #2)																							
7/25/2023	HD-41	N/A	7.00	71.6	2.10	0.039 J	ND	ND	ND	ND	0.07	0.60	0.24	ND	ND	ND	ND	ND	--	--	--	--	--
8/17/2023	HD-41	N/A	7.2	69.1	ND	0.074 J, A01	ND	ND	ND	ND	0.00	0.80 A10	0.11	ND	ND	ND	ND	10 J	--	--	--	--	--
9/27/2023	BYA-7	13%	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<1.8	<1.8	N/A	<1	--
	BYA-6A	0%																					
	BYA-6B	0%																					
	HD-41	87%																					
	Duplicate	N/A																	23	<1.8	No	<1	--
Discharges to M-004 (Outfall/Port #3)																							
7/25/2023	M-004	N/A	7.6	70.9	ND	0.024 J	1.4 J	ND	ND	ND A10	0.04	2.6	2.8	ND	1.8 J	ND	ND	ND	--	--	--	--	--
8/3/2023	W-2	23%	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<1.8	<1.8	N/A	--	--
	W-1	15%																					
	BYA-13	10%																					
	W-3	17%																					
	HD-30	27%																					
	HD-4	2%																					
	HD-43	4%																					
8/17/2023	M-004	N/A	7.7	70.5	ND	0.037 J	ND	ND	ND	ND	0.00	1.1 A10	0.14	ND	2.4 J	ND	ND	ND	--	--	--	--	--
9/27/2023	W-2	23%	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1600	2	No	<1	--
	W-1	15%																					
	BYA-13	10%																					
	W-3	17%																					
	HD-30	27%																					
	HD-4	2%																					
	HD-43	4%																					
Discharges to M-005 (Outfall/Port #4)																							
7/25/2023	M-005	N/A	7.9	72.5	ND	ND	ND	ND	ND	0.022 J	0.04	0.60	0.20	ND	ND	ND	ND	ND	--	--	--	--	--
8/17/2023	M-005	N/A	7.9	71.6	1.5	0.042 J	ND	ND	ND	ND	0.01	1.5 A10	0.41	ND	ND	0.048 J	ND	ND	--	--	--	--	--
9/27/2023	W-8	28%	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	>1600	>1600	Yes	1413.6	--
	W-17	13%																					
	BYA-1	21%																					
	BYA-7	6%																					
	FW-2	6%																					
	HD-15	2%																					
	HD-26	24%																					
Discharges to M-006 (Outfall/Port #5)																							
7/25/2023	M-006	N/A	8.0	71.1	ND	0.048 J	ND	ND	ND	ND	0.02	0.50	0.24	ND	ND	0.74	ND	ND	--	--	--	--	--
8/17/2023	M-006	N/A	8.0	71.2	ND	ND	ND	ND	ND	ND	0.02	2.7 A10	0.64	ND	2.3 J	ND	ND	ND	--	--	--	--	--
9/27/2023	W-16	29%	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<1.8	<1.8	N/A	<1	--
	BYA-4	18%																					
	BYA-9	23%																					
	W-13	12%																					
	BYA-11	9%																					
	HD-22	8%																					
Discharges to M-007 (Outfall/Port #5a)																							
7/25/2023	BYA-10	100%	7.1	73.8	4.8	ND	ND	ND	ND	0.028 J	0.04	0.50	0.18	ND	ND	0.16 J	ND	ND	--	--	--	--	--
8/17/2023	BYA-10	100%	7.3	72.5	59 S05	0.024 J	ND	ND	ND	ND	0.00	1.1 A10	0.34	ND	ND	ND	ND	ND	--	--	--	--	--
9/27/2023	BYA-10	100%	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<1.8	<1.8	N/A	<1	--
Discharges to M-008 (Outfall/Port #6)																							
7/25/2023	M-008	N/A	8.0	70.3	ND	ND	ND	ND	ND	ND	0.03	1.0	0.37	ND	ND	ND	ND	ND	--	--	--	--	--
8/3/2023	W-18	69%	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3.0	--
	BYA-3	8%																					
	BYA-2	5%																					
	HD-10	2%																					
	HD-11	4%																					
	HD-12	13%																					
8/17/2023	M-008	N/A	8	69.6	ND	ND	ND	0.20	ND	ND	0.00	11 A10	1.6	ND	ND	0.048 J	ND	ND	--	--	--		

2023 Q4 EFFLUENT TESTING SUMMARY (Aqueous Matrix)																									
Date Sampled	Sample Point	Percentage of Composite Sample	pH (Field Measured)	Temperature	Biochemical Oxygen Demand	Surfactants (MBAS)	Oil & Grease	Settleable Solids	Sulfides	Phenols	Residual Chlorine (Field Measured)	Total Suspended Solids	Turbidity	Copper	Cyanide	Mercury	Nickel	Zinc	Total Coliform	Fecal Coliform	Fecal Total Coliform >0.1?	Enterococcus	Acute Toxicity**		
			°F	mg/L	mg/L	mg/L	mL/L	mg/L	mg/L	mg/L	mg/L	mg/L	NTU	µg/L	µg/L	µg/L	µg/L	µg/L	MPN/100ml	MPN/100ml	MPN/100ml	MPN/100ml	% Survival		
Discharges to M-001 (Outfall/Port #1)																									
10/26/2023	BYA-14 FW-1	71% 29%	7.4	84.7	2.3	ND	ND	ND	3.67	ND	0.00	ND	12	ND	ND	ND	2.3 J	18.4 J B	70	<1.8	No	<1	--		
11/27/2023	BYA-14 FW-1	71% 29%	7.6	71.2	ND	ND	ND	0.206	ND	0.00	ND	100	ND	ND	1.15	ND	ND	920	<1.8	No	--	--			
12/5/2023	BYA-14 FW-1	71% 29%	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	50.4	<1.8	No	<1	--			
12/7/2023	BYA-14 FW-1	71% 29%	7.4	71.6	4.61	ND	ND	ND	6.54	ND	0.00	ND	34	ND	ND	0.147 J	1.50 J	5.30 J	--	--	--	--	100		
12/14/2023	BYA-14 FW-1	71% 29%	--	--	--	--	--	--	--	--	--	--	--	ND	--	0.632	3.00 J	8.00 J	--	--	--	--	--		
12/29/2023	BYA-14 FW-1	71% 29%	--	--	--	--	--	--	--	--	--	--	--	--	--	ND	--	--	--	--	--	--	--		
Discharges to M-002 (Outfall/Port #1)																									
10/26/2023	M-002 Duplicate	N/A	8.7	73.2	ND	ND	1.46	ND	ND	ND	0.00	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	--		
11/21/2023	M-002	N/A	8.6	72.5	ND	ND	0.947 J	ND	ND	ND	0.00	ND	1.4	ND	ND	0.458	ND	ND	--	--	--	--	--		
11/27/2023	BYA-5	16%	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<1	--		
	BYA-6	17%																							
	BYA-12	4%																							
	HD-9	27%																							
	HD-29	3%																							
	HD-33	7%																							
	HD-42	25%																							
12/5/2023	BYA-5	16%	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	13	<1.8	N/A	2	--		
	BYA-6	17%																							
	BYA-12	4%																							
	HD-9	27%																							
	HD-29	3%																							
	HD-33	7%																							
	HD-42	25%																							
12/7/2023	BYA-5	20%	7.5	71.2	ND	ND	ND	0.118	ND	0.00	1.30	0.85	ND	ND	0.150 J	2.30 J	41.6 J	--	--	--	--	--	100		
	BYA-6	19%																							
	HD-9	32%																							
	HD-42	29%																							
12/29/2023	M-002	N/A	--	--	--	--	--	--	--	--	--	--	--	--	--	ND	--	--	--	--	--	--	--		
Discharges to M-003 (Outfall/Port #2)																									
10/26/2023	HD-41	N/A	7.52	77.9	ND	ND	ND	ND	ND	ND	0.00	ND	ND	ND	ND	ND	1.70 J	6.70 J B	--	--	--	--	--		
11/27/2023	HD-41	N/A	7.4	71.8	ND	ND	ND	ND	ND	ND	0.00	ND	0.20	ND	ND	1.25	ND	6.30 J	--	--	--	--	--		
12/5/2023	BYA-6A	0%	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4.5	<1.8	N/A	4.1	--		
	BYA-6B	0%																							
	HD-41	87%																							
12/7/2023	HD-41	N/A	7.2	71.1	ND	ND	ND	ND	ND	0.00	ND	0.15	ND	ND	ND	0.311	2.60 J	8.40 J	--	--	--	--	--		
12/14/2023	HD-41	N/A	--	--	--	--	--	--	--	--	--	--	--	--	--	ND	6.10 J	6.10 J	--	--	--	--	--		
12/29/2023	HD-41	N/A	--	--	--	--	--	--	--	--	--	--	--	--	--	ND	--	--	--	--	--	--	--		
Discharges to M-004 (Outfall/Port #3)																									
10/26/2023	M-004	N/A	8.2	73.2	ND	0.0729 J	ND	ND	ND	ND	0.00	ND	ND	ND	ND	ND	1.90 J	ND	--	--	--	--	--		
11/21/2023	M-004	N/A	8.18	74.8	ND	ND	ND	ND	ND	ND	0.00	ND	0.15	ND	ND	0.207	ND	ND	--	--	--	--	--		
12/5/2023	W-2	22%	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	170	2	No	--	--		
	W-1	14%																							
	BYA-13	12%																							
	W-3	11%																							
	HD-30	35%																							
	HD-4	2%																							
	HD-43	4%																							
12/7/2023	M-004	N/A	8.5	71.8	ND	ND	ND	ND	ND	0.00	ND	0.10	ND	ND	ND	ND	1.80 J	ND	--	--	--	--	100		
12/14/2023	M-004	N/A	--	--	--	--	--	--	--	--	--	--	--	--	--	ND	3.30 J	ND	--	--	--	--	--		
Discharges to M-005 (Outfall/Port #4)																									
10/26/2023	M-005	N/A	8.5	76.6	1.86 J	ND	ND	ND	ND	ND	0.00	ND	0.20	ND	ND	ND	ND	ND	>1600	350	N/A	204.6	--		
	W-8	28%																							
	W-17	13%																							
	BYA-1	21%																							
	BYA-7	6%																							
	FW-2	6%																							
	HD-15	2%																							
	HD-26	24%																							
11/21/2023	M-005	N/A	8.5	71.6	ND	0.0931 J	ND	ND	ND	ND	0.00	ND	0.15	ND	ND	ND	ND	ND	--	--	--	--	--		
	W-8	28%																							
	W-17	13%																							
	BYA-1	21%																							
	BYA-7	6%																							
	FW-2	6%																							
	HD-15	2%																							
	HD-26	24%																							
12/5/2023	W-8	28%	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--							
	W-17	13%																							
	BYA-1	21%																							
	BYA-7	6%																							
	FW-2	6%																							
	HD-15	2%																							
	HD-26	24%																							
12/7/2023	M-005	N/A	8.6	73.0	ND	ND	ND	ND	ND	0.00	5.10	3.4	ND	ND	ND	ND	ND	ND	--	--	--	--	100		
12/14/2023	M-005	N/A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
Discharges to M-006 (Outfall/Port #5)																									
10/26/2023	M-006	N/A	8.5	75.9	ND	ND	ND	ND	ND	ND	0.00	ND	0.35	ND	ND	ND	ND	ND	--	--	--	--	--		
11/21/2023	M-006	N/A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
11/21/2023	M-006	N/A	8.6	72.3	ND	ND	ND	ND	ND	ND	0.00	ND	0.15	ND	ND										

