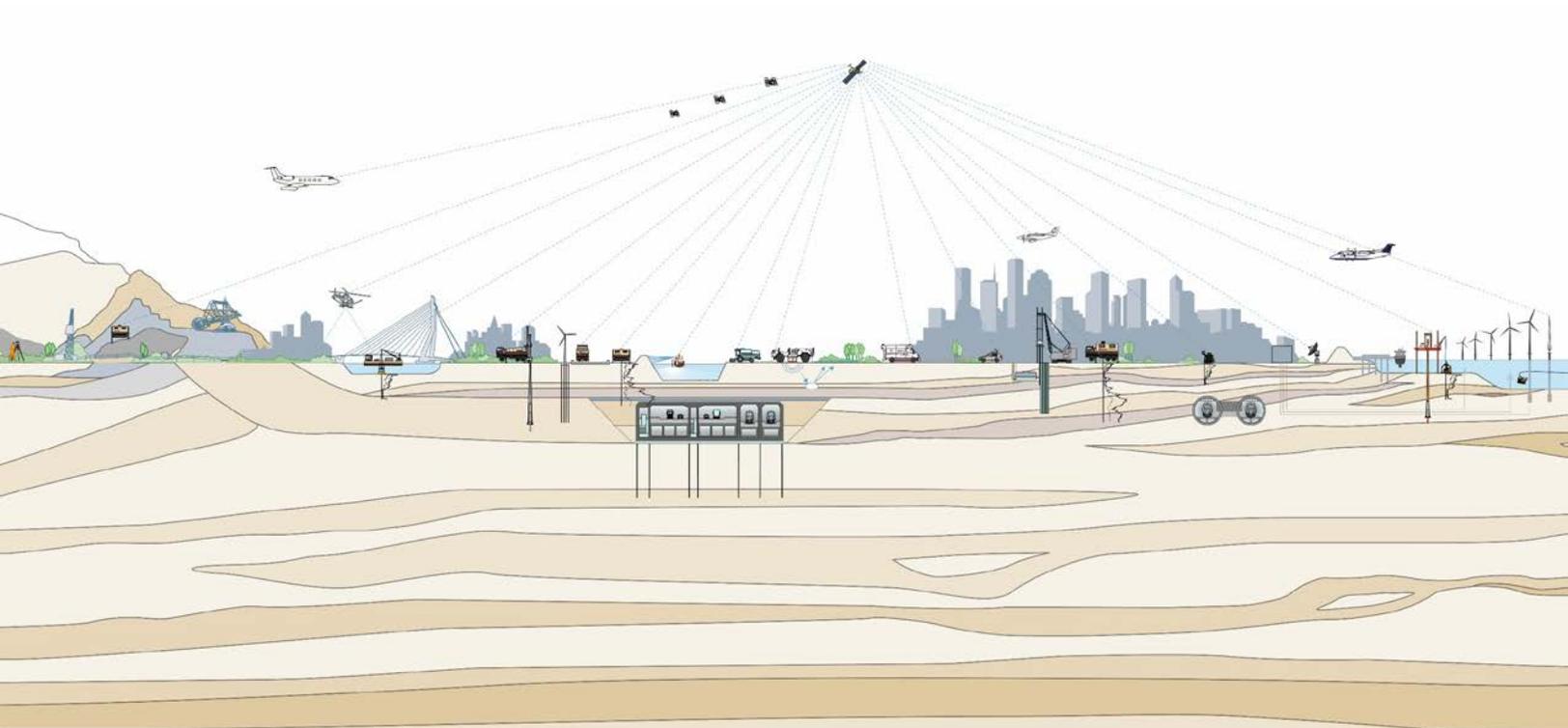


FUGRO

**ANNUAL REPORT
JULY 2016 THROUGH JUNE 2017
BIG ROCK MESA LANDSLIDE
ASSESSMENT DISTRICT
City of Malibu, California**

March 2018
Fugro Project No. 04.62160606
Document No. 04.62160606-PR-004(Rev.00)

Big Rock Mesa Landslide Assessment District





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ANNUAL REPORT JULY 2016 THROUGH JUNE 2017 BIG ROCK MESA LANDSLIDE ASSESSMENT DISTRICT City of Malibu, California

Fugro Project No. 04.62160606
Document No. 04.62160606-PR-004(Rev.00)

Prepared for: City of Malibu
Big Rock Mesa Landslide Assessment District
23825 Stuart Ranch Road
Malibu, California 90265

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Fugro Project No. 04.62160606
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March 22, 2018

Big Rock Mesa Landslide Assessment District
23825 Stuart Ranch Road
Malibu, California 90265

Attention: Mr. Rob DuBoux, Esq., P.E.

**Annual Report of Maintenance and Monitoring, July 2016 through June 2017,
Big Rock Mesa Landslide Assessment District, City of Malibu, California**

Dear Mr. DuBoux,

Fugro is pleased to present the annual report of maintenance and monitoring for the Big Rock Mesa Landslide Assessment District. This report summarizes the monitoring and maintenance activities completed during the period of July 2016 through June 2017.

Fugro appreciates this opportunity to serve the City of Malibu and the District homeowners. Please contact Loree Berry at (805) 289-3830 if you have any questions regarding this report.

Sincerely,
Fugro USA Land, Inc.


David M. Thornhill, P.E.
Senior Staff Engineer




Loree A. Berry, P.E.
Associate Engineer/Senior Project Manager



Distribution: One electronic copy to Mr. Rob DuBoux, Esq., P.E.
One electronic copy to City of Malibu Geotechnical Staff



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1. INTRODUCTION

1.1 Authorization

Fugro USA Land, Inc. (Fugro) performed the work summarized in this report in accordance with our contract with the City of Malibu (City) and consistent with the cost estimate document "Exhibit A - FY 2016-2017 Maintenance Cost Estimate" presented in the Annual Assessment Report (Taussig, 2016).

1.2 Background

Following the activation of the Big Rock Mesa landslide in 1983, the County of Los Angeles (County) established the Big Rock Mesa Landslide Assessment District (Assessment District) in 1989. The Assessment District provides permanent funding to maintain and monitor dewatering facilities with the purpose of reducing landslide movements. The County administered the Assessment District until 1991 when the City of Malibu (City) incorporated. The Assessment District was re-authorized in May 1998 under City of Malibu Resolution No. 98-030. The City has since administered the Assessment District, utilizing consultants to maintain and monitor the district facilities.

1.3 Scope of Work

This annual report summarizes the current monitoring and maintenance of the geotechnical instrumentation and dewatering facilities for the period between July 1, 2016, and June 30, 2017 (hereinafter, the "monitoring period"). Data collected during this monitoring period included the following:

- Annual Rainfall data from Big Rock Mesa rain gauge number 1239, operated by the County of Los Angeles, Department of Public Works – Water Resources Division;
- Monthly groundwater level measurements from 29 standpipes;
- Periodic groundwater measurements from 4 pneumatic piezometers;
- Monthly dewatering production readings from 24 dewatering wells;
- Monthly dewatering production readings from 32 horizontal drains (hydraugers);
- Quarterly, semi-annual, or annual ground deformation readings from 26 slope inclinometers (geotechnical instrumentation);
- Monthly readings of water usage data from the Mesa's master flow meter; and
- Water-quality sampling and analysis for National Pollution Discharge Elimination System (NPDES) compliance.

The operating condition of the instrumentation and dewatering facilities was checked during each field monitoring/observation event and by evaluating preliminary data in the office as they were received. Maintenance was performed as needed based on field observations, preliminary data evaluation, and correspondence from concerned homeowners and tenants.

The scope of our services is limited to monitoring and maintaining the Assessment District facilities. The services that are provided on an annual basis for the Assessment District do not include geologic or engineering evaluations of the stability of the landslide.



1.4 Report Organization

Monitoring data collected during the July 1, 2016 to June 30, 2017, monitoring period are provided herein. The boundary of the Assessment District is illustrated on Plate 1 – Site Location Map. Plate 2 – Dewatering Facilities Map presents the approximate locations of the geotechnical instrumentation and dewatering facilities. Monitoring data are presented in both tabular and graphical form in Appendices A through E, respectively, and as indicated in the table of contents.

1.5 Report Availability

The annual Assessment District reports are available for review at Malibu City Hall. Reports may also be viewed on the City's website at <http://www.malibucity.org>.



2. MONITORING

2.1 Rainfall Data

Plate 3 – Rainfall Graph presents the historical monthly rainfall and average annual rainfall data from October 1968 through June 30, 2017. Data between 1968 and 2004 were obtained from County of Los Angeles Department of Public Works (LADPW) Carbon Canyon Rain Station 447C. Monthly rainfall totals from 2004 to the present were obtained from LADPW Big Rock Mesa Rain Gauge 1239.

Rainfall data indicate that just under 22.0 inches of precipitation fell during the monitoring period from July 1, 2016, through June 30, 2017. The average annual rainfall from 1968 to 2017 in the “Malibu area” for the same months is approximately 15.75 inches.

However, rainfall data are usually analyzed in terms of the annual “rain season” that covers the time period between October 1 through September 30. Rainfall between October 1, 2016, through September 30, 2017, was also approximately 22.0 inches. That is approximately 40 percent higher than the average annual rainfall of 15.75 inches for the “rain seasons” between 1968 and 2017.

Plate 4 – Summary of Groundwater Levels, Dewatering, and Rainfall shows the yearly magnitude of deviation of each years’ rainfall relative to the mean annual rainfall. The graphic also shows the average annual dewatering output (gallons per day, gpd). The data illustrates that the average annual dewatering output increased with above average rainfall.

2.2 Master Water Meter

Water usage data are collected by performing monthly readings at the master water meter near the intersection of Rockport Way and Big Rock Drive. The master water meter measures all imported water supplied to the Big Rock Mesa area by Los Angeles County Waterworks District 29. Processed readings are shown as a plot of flow rate versus time on Plate 5. An evaluation of the data indicates the following.

- The recorded water usage rates are cyclic throughout the monitoring year reflecting higher levels of usage during the summer months.
- There had been a general trend of increasing water consumption from about 1995 to 2015. Following 2015, water consumption trended downwards. This change is possibly due to increased water conservation efforts.
- Periods of higher than average rainfall, such as the springs of 2005 and 2006 and the winters of 2011 and 2017 tend to lead to lower water consumption as landscaping water needs decline.
- Average monthly water usage for this monitoring year did not deviate significantly from the previous year. Average water usage during the 2016 through 2017 monitoring year was approximately 145,500 gallons per day (gpd), which is approximately 2.8 percent more than the 2015 through 2016 monitoring year average of 141,500 gpd.



2.3 Groundwater Level Monitoring

The groundwater monitoring data collected during the 2016-2017 monitoring period are summarized in Appendix A. Groundwater levels fluctuate throughout the year, and from year to year, in response to natural and man-made influences. The primary natural influence is varying precipitation. Man-made influences include:

- Infiltration from onsite wastewater treatment systems;
- Infiltration from irrigation;
- Alterations to surface drainage by grading, landscaping, storm drains, and rain gutters;
- Inadvertent water discharges from leaking utilities such as water, irrigation, sewer, storm drain lines as well as from swimming pools; and
- Dewatering activities from pumping dewatering wells and gravity-draining hydraugers.

Our staff typically measures groundwater levels in standpipe piezometers on a monthly basis and in pneumatic piezometers on a quarterly basis. Monitoring data and graphs illustrating groundwater levels recorded in monitoring wells and pneumatic piezometers for the six physiographic regions of the Big Rock Mesa landslide are presented in Appendix A. Groundwater elevation maps from May 8, 1995, and May 15, 2017, are shown on Plate 6a. A map of the changes in ground water elevation between May 1995 and May 2017 is shown on Plate 6b. A map of the changes in ground water elevation between May 2016 and May 2017 is shown on Plate 6c.

As observed from the available data, groundwater levels rise relatively quickly following significant rainfall and gradually lower after a wet season ends. Groundwater levels recorded in the Assessment District typically peaked around late-March to mid-April and have gradually declined through late September to November.

We reviewed groundwater data by evaluating changes that occurred during the monitoring period as well as changes in groundwater levels compared to historical averages (1984 through 2016). To analyze trends in seasonal groundwater fluctuations, the average (mean) annual and highest annual recorded groundwater elevation for each piezometer were calculated (Appendix A) and are summarized in Table 1. Average groundwater elevations presented in Table 1 incorporate measurements from all monitored standpipes. It is important to note that historical reports (prior to 2012) do not include SP-17B, which was installed in February 2012, but the water levels reported since 2012 and herein include, measurements from SP-17B in the area average for the Central Mesa Area. Similarly, measured tip pressures from the pneumatic piezometers located throughout the Assessment District have been excluded from the area averages due to the inconsistency and potential erroneousness of their readings.



Table 1. Summary of Average Groundwater Elevations by Area

	Total No. of Wells	2016-17 Average Groundwater Elevation (ft)	Change in Average Groundwater from Prior Monitoring Period Average (ft)	2016-2017 Average Peak Groundwater Elevation (ft)	Change in Average Peak Groundwater Elevation from Prior Monitoring Period (ft)
PCH Region	8	9.0	+0.6	10.8	+1.4
Bluff Region	4	33.3	+1.4	39.6	+4.8
Eastern Mesa	4 ¹	57.9	+4.2	85.5	+29.4
Central Mesa	9	218.2	-3.7	231.4	+1.4
Western Extension	4	376.3	-3.0	386.9	+2.1
Headscarp Region	1	552.0	+0.1	554.0	+1.5

1. Since SP-3 remains dry, the Eastern Mesa area average is based on 3 wells

A summary graph of normalized peak groundwater elevations for each of the six regions in Big Rock Mesa is presented on the bottom graph of Plate 4. The top graph on Plate 4 compares the average dewatering output (gpd) to the annual deviation from the mean annual rainfall over the same time period.

2.3.1 Pacific Coast Highway (PCH) Region

The PCH Region parallels the coastal highway at the base of the bluff, including the area between the bluff and the Pacific Ocean. The PCH Region includes the southern boundary of the 1983 landslide. The Shoreline fault and landslide rupture surface define both a zone of weakness and a groundwater barrier, extending approximately along the same alignment as the highway.

Groundwater data for the PCH Region are presented as hydrographs on Plate A-3a and A-3b. Groundwater levels in this area are monitored using standpipe piezometers SP-11, 12, 14, 15, 19, 27A, 29, and 30. In general, groundwater elevations in the PCH Region for the 2016-2017 monitoring year increased slightly. The calculated area average groundwater elevation increased by 0.6 feet when compared to the 2015-2016 monitoring period and is 0.4 feet above the mean groundwater elevation for the area for the period of record (1987 to 2017). Calculated average water elevations for individual standpipes during the 2016-2017 monitoring period varied by 1 foot or less when compared to average water elevations for the 2015-2016 monitoring year in all standpipes except SP-30, which showed an annual average increase of 2.2 feet, from 13.8 to 16.0 feet.

Average groundwater elevations in SP-30 had risen steadily from 8.5 feet in 1998 to 17 feet in 2014, before declining sharply in June 2014. During the 2016-2017 monitoring year, the average groundwater elevation in SP-30 rose by 2.2 feet when compared to the 2015-2016 monitoring year average. Groundwater elevations in SP-30 remain approximately 1 foot below the highest elevations recorded during 2014 but are still 3.9 feet above the average elevation for SP-30 for the period of record.



2.3.2 Bluff Region

The Bluff Region extends along the top of the slope immediately the north of the PCH Region, and is an area where intense ground cracking was observed during the 1983 landslide. The subsurface materials within the Bluff Region generally have a relatively high secondary permeability due to the level of fracturing that had occurred.

Groundwater data for the Bluff Region are presented as hydrographs on Plate A-4. Groundwater levels in this area are monitored using standpipe piezometers SP-10, 28, 32, and 34, and the pneumatic piezometers installed with SP-34. In general, groundwater elevations for the Bluff Region for the 2016-2017 monitoring year increased slightly. The calculated area average groundwater elevation increased 1.4 feet when compared to the 2015-2016 monitoring period and is 22.8 feet below the mean water level elevation for the area for the period of record.

Calculated average water elevations for individual standpipes for the 2016-2017 monitoring year declined in SP-10, SP-28, SP-34, and rose in SP-32. Groundwater elevations in standpipes SP-32 and SP-34 continued to decline through December 2016 in response to increased dewatering following installation of dewatering well FW-2 in 2010. From January to June 2017, groundwater levels rose, likely in response to increased rainfall during that period. Groundwater elevations in standpipe SP-10 remained static during most of the 2016-2017 monitoring period with a temporary 3-foot rise in October 2016 and a 2-foot rise in April 2017. Groundwater elevations in standpipe SP-28 remained stable with variations of 0.6 foot or less.

Pore pressures measured in SP-34 pneumatic piezometer tips 1 and 2 continue to rise and fall in approximate correlation with the standpipe water levels. Standpipe SP-34 pneumatic tip 3 continues to measure 0 PSI and tip 4 is non-functional; therefore, no data for those tips are reported.

2.3.3 Eastern Mesa Region

The Eastern Mesa Region lies between the Bluff Region and Big Rock Mesa Drive east of the Piedra Chica cul-de-sac. Groundwater in this area occurs within low permeability deposits of the Sespe Formation.

Groundwater data for the Eastern Mesa Region is presented as hydrographs on Plate A-5. Groundwater levels in this area are monitored using standpipe piezometers SP-3, -3A, -33, PC-1, and the pneumatic piezometers installed with PC-1. Overall groundwater elevations for the Eastern Mesa for the 2016-2017 monitoring year increased. The calculated area average groundwater elevation rose 4.2 feet when compared to the 2015-2016 monitoring period and is 12.1 feet below the mean water level elevation for the area for the period of record.

The most significant increase in water elevation occurred in standpipe PC-1, which experienced a temporary rise in water level of approximately 85 feet in January and February 2017 compared to the water level measured before and after those months. Groundwater elevation returned to normal levels in March 2017 and have remained stable through June 2017. As shown on Plate 6c, the groundwater elevation in May 2017 was 2.3 feet lower than that measured in May 2016.



Pore pressures measured in PC-1 pneumatic tips 1 and 3 remained steady throughout the 2016-2017 monitoring year, even while water levels measured in the standpipe temporarily increased. It is possible that the PC-1 standpipe filled with water during the increased rainfall in January and February 2017 and took a few months to equilibrate with the groundwater levels around it. Since the pneumatic tips are located outside the casing, they would not have registered an increase in water level within the standpipe. PC-1 Tip 2 has been reading a pore pressure of 0 PSI since 2011. Tips 4 and 5 five are not functional and no data is reported.

The calculate average groundwater elevation in SP-3A for the 2016-2017 monitoring year was 11.5 feet lower than the 2015-2016 monitoring year. SP-3 continued to be dry with no measurable groundwater.

Groundwater levels in SP-33 remained relatively stable over the 2016-2017 monitoring year with the exception of November 2016 and January 2017 in which groundwater elevation was measured approximately 6 to 9 feet higher than preceding or subsequent measurements. It should be noted that this report uses the pre-1999 reference elevation for SP-33 to be consistent with measured field survey data and topographical maps. Groundwater elevation data (including historical data) for SP-33 presented in this report have been adjusted accordingly.

2.3.4 Central Mesa Region

The Central Mesa Region lies between the Bluff Region and Big Rock Mesa Drive, west of the Piedra Chica cul-de-sac. Groundwater within this area generally occurs within moderately permeable landslide deposits derived from the Topanga Formation.

Groundwater data for the Central Mesa Region is presented as hydrographs on Plate A-6a and A-6b. Groundwater levels in this area are monitored using standpipe piezometers SP-9A, 16, 16A, 17, 17A, 17B, 24, 35, 36, and the pneumatic piezometers tips installed with SP-35 and 36. In general, groundwater elevations in the Central Mesa Region for the 2016-2017 monitoring year continued to decrease. The calculated area average groundwater elevation declined 4.7 feet when compared to the 2015-2016 monitoring period.

Calculated average groundwater elevations for individual standpipes in the Central Mesa Region during the 2016-2017 monitoring year declined compared to the 2015-2016 monitoring year for all standpipe piezometers except in SP-17, which increased by 3.0 feet, SP-17A, which increased by 0.7 feet and SP-36, which increased by 0.6 feet.

Groundwater levels in SP-35 have declined steadily since February 2016 when the pump saver at BYA-4 was replaced and the well returned to operation. The June 2017 reading, the last during the 2016-2017 monitoring period, was 4.48 feet higher than the average value for the period of record.

Groundwater elevations in standpipe SP-24 were relatively stable during the 2016-2017 monitoring year with variations between readings of 1 foot or less with the exception of a temporary rise of about 3 feet in January 2017. The mean groundwater elevation for SP-24 for the monitoring year remained 2.1 feet

above the long-term mean water elevation but it remains on the order of 175 feet below the pre-dewatering groundwater elevation.

Groundwater elevations in standpipes SP-16 and -16A recorded sudden increases in April 2016 as the pump in dewatering well BYA-1 began to fail. BYA-1 was replaced on June 26, 2017. It is anticipated that groundwater levels in SP-16 and -16A will decrease as BYA-1 pumps water out of the area.

Water levels in SP-36 remained relatively static during the 2016-2017 monitoring year with variations of less than 1 foot. The average water level in SP-36 during the 2016-2017 monitoring year was 0.6 feet higher than the 2015-2016 monitoring year.

Groundwater elevations in standpipe SP-9A remained steady with the exception of the June 2017 reading which was measured at 5.03 feet higher than the average for the 2016-2017 monitoring period. Initial readings during the 2017-2018 monitoring period indicate that the June 2017 reading was anomalous and not indicative of a future trend.

Pneumatic piezometer SP-35 Tips 1, 2, and 3 recorded pore pressures rose and fell, approximately correlating with the rise and decline of measured groundwater levels in standpipe SP-35. Pneumatic piezometer SP-35 Tip 4 is not functioning and no data is reported.

Pneumatic piezometer SP-36 Tip 1 remained approximately stable during most of the monitoring year corresponding to the static groundwater levels measured in standpipe SP-36. Tip 2 experienced a slight drop in pressure throughout the monitoring period. Pneumatic piezometers SP-36 Tip 3 has recorded 0 PSI since installation and no data is reported.

2.3.5 Western Extension Region

The Western Extension Region encompasses approximately 79 acres, from PCH on the south to the upper ridgeline on the north. The region is located immediately west of the active 1983 Big Rock Mesa Landslide area.

Groundwater data for the Western Extension Region is presented as hydrographs on Plate A-7. Groundwater levels in this area are monitored using standpipe piezometers SP-20, -21, -22 and -23. In general, groundwater elevations for the Western Extension Region for the 2015-2016 monitoring year continued to decrease. The calculated area average groundwater elevation declined by 3.0 feet when compared to the 2015-2016 monitoring period and was 7.4 feet below the mean groundwater elevation for the area for the period of record.

Groundwater elevations in standpipe SP-20 steadily declined 38.7 feet from June 2016 to February 2017, with the exception of November 2016 which experienced a jump of 15.7 feet from the October 2016 reading. From February to June 2017, water levels rose 40.7 feet. The average groundwater elevation for SP-20 during the 2016-2017 monitoring year was 21.7 feet lower than the 2015-2016 monitoring year.



Standpipe SP-21 remained steady between June and December 2016, rose 13.8 feet between December 2016 to February 2017, and dropped 5.5 feet between February 2017 and June 2017.

Groundwater elevations in SP-22 remained static throughout the 2016-2017 monitoring period.

Standpipe SP-23 recorded a 4.2-foot groundwater elevation increase between July 2016 and June 2017 with a temporary jump of 10 feet for the May 2017 reading.

2.3.6 Headscarp Region

The Headscarp Region borders the Central Mesa Region to the north. The ground surface elevation in the Headscarp Region is higher than other regions in Big Rock Mesa, and groundwater is relatively deep.

Groundwater data for the Headscarp Region is presented as a hydrograph on Plate A-8. Groundwater levels in this area are monitored using standpipe piezometer SP-26. In general, groundwater elevations for the Headscarp Region for the 2016-2017 monitoring year increased slightly. The calculated area average groundwater elevation increased by 0.1 feet when compared to the 2015-2016 monitoring period and was 3.0 feet above the mean groundwater elevation for the area for the period of record.

2.4 Dewatering Well Production

The total production rate for all dewatering wells from 1993 through June 2017 is depicted on Plate 5. Dewatering well information, status and production rates for individual wells are presented on Plates B-1 through B-4 (Appendix B).

The average total well production rate for the monitoring period was approximately 39,697 gpd. This is approximately 13 percent more than the previous year's monitoring period value of 35,018 gpd, and below historical average production of 52,816 gpd measured from 1993 to the present. The increase in dewatering well production correlates with above average rainfall and general increase in average and peak groundwater levels. Additionally, total dewatering well production was affected during the year as mechanical, electrical or other issues caused wells to intermittently stop or reduce production. Over the course of the 2016-2017 monitoring year, dewatering wells BYA-1, -5, and -9 had periods without production.

2.5 Hydrauger Production

The total production rate for all hydraugers from 1993 through June 2017 is depicted on Plate 5. Additional data regarding hydraugers and production rates are presented in Appendix C, Plates C-1 through C-4.

The average total hydrauger production rate over the monitoring period was approximately 13,652 gpd. That represents an approximately 9 percent increase in production relative to the previous monitoring period (12,578 gpd). The increase in hydrauger production correlates with above average rainfall and general increase in average and peak groundwater levels.



2.6 Slope Inclinometers

Fugro monitored 26 slope inclinometers on a quarterly to annual basis to check for subsurface ground deformation through June 2017.

Slope inclinometer measurement plots are presented in Appendix D. Four slope inclinometer plots are prepared for each inclinometer installation:

- The first plot shows the cumulative deflection and incremental deflection for the A-direction.
- The second plot shows the cumulative deflection and incremental deflection for the B-direction. Those two plots show approximately one curve per year from about 2006 to 2015 and also include plots for each quarter from the two most recent monitoring years.
- The third and fourth plots show displacement versus time for the same period as the first two plots (one for each direction) and the displacement time plots include intermediate readings for each of the years presented.

When reviewing and interpreting the slope inclinometer data plots, instrument limitations and movement history should be considered. Individual plots have been reviewed and interpreted with regard to movement along identified slide planes. Interpreted movement along the identified slide planes is summarized on Plate D1 in Appendix D. Some slope inclinometer plots show minor (less than 0.2 inch) amounts of displacement measured at the ground surface during the July 2016 through June 2017 monitoring period.

Interpretation of inclinometer data shows small, but definable ground movement in 2 of the 26 inclinometers monitored during the July 2016 through June 2017 monitoring period:

- SP-16A shows a change of about 0.15 inch at a depth of 150 feet; and
- SP-27A shows a change of about 0.1 inch at a depth of 30 feet.

Several inclinometers show some inconsistent changes (typically <0.1 to 0.2 inch), but the potential movement magnitude and orientation is not clear and is not within the reliable accuracy of the instrument. Some of the irregular shapes observed in the deep inclinometers can be attributed to depth position and rotation errors caused by cable length changes, local curvatures within the casings, and significant deviation from vertical during initial installation, which is common to deep inclinometers.

A brief summary of each region is presented below and is summarized on Plate D1. It is important to keep in mind the high sensitivity of the inclinometer probes and the magnitude of the interpreted movements when reviewing the inclinometer data presented in this report. Plate D1 notes the depths at which movement has been interpreted in the past, as well as whether the inclinometer penetrates the basal rupture surface. Shallower depths of historically interpreted movement above the base of the Big Rock Mesa Landslide have also been noted.



2.6.1 Pacific Coast Highway Region

The PCH Region extends along PCH in proximity of the southern boundary of the 1983 Big Rock Mesa landslide. SP-27A showed rotational movement of about 0.1 inch at a depth of approximately 30 feet. The remaining inclinometers in the region do not show quantifiable movement.

2.6.2 Bluff Region

The Bluff Region extends along the top of the slope immediately north of the PCH Region, where intense ground cracking was observed during the 1983 landslide. The inclinometers in that area are deep and show evidence of depth position and rotation errors, associated with cable stretch, casing curvature, and casing deviation from vertical. No quantifiable offsets within the inclinometers of the Bluff Region were measured during this monitoring period.

2.6.3 Eastern Mesa Region

The Eastern Mesa Region extends west to the ends of Inland Lane and the Piedra Chica cul-de-sac. This area is bordered to the north by Big Rock Drive and to the south by the Bluff Region. The inclinometers in the Eastern Mesa Region are deep and show evidence of depth position errors, as well as localized casing curvature, and casing deviation from vertical. No quantifiable offsets along identified shear planes were detected within the inclinometers of the Eastern Mesa Region during the current monitoring year.

2.6.4 Central Mesa Region

The Central Mesa Region is located between the Bluff and Big Rock Mesa Drive and to the west of the Piedra Chica cul-de-sac. The inclinometers in that region are deep and show evidence of depth position errors, probably associated with ground settlement and/or cable stretch. SP-16A showed rotational movement of 0.15 inches at approximately 150 feet deep. No other quantifiable offsets were measured within the inclinometers in the Central Mesa Region during the 2016-2017 monitoring year.

2.6.5 Western Extension Region

The Western Extension Region encompasses approximately 79 acres, from PCH on the south end to the upper ridgeline on the north, immediately west of the 1983 Big Rock Mesa landslide area. The inclinometers in that area are deep and show evidence of depth position errors, probably associated with local casing curvature and casing deviation from vertical. No quantifiable offsets within the inclinometers in the Western Extension Region were measured during the 2016-2017 monitoring year.

2.6.6 Headscarp Region

The Headscarp Region borders the Central Mesa Region to the north. SP-26 is the only inclinometer being measured in this region and, historically, has been the first to move and the last to cease movement in response to heavy rainfall within the assessment district. Inclinometer SP-26 is deep and shows evidence of depth position errors, probably associated with local casing curvatures and casing deviation from vertical. No quantifiable offsets within SP-26 were measured during the 2016-2017 monitoring year.



2.7 Water Quality Monitoring

2.7.1 Regional Board Requirements

Water quality monitoring was completed in general compliance with the NPDES permit, as required by the California Regional Water Quality Control Board (RWQCB).

On March 2, 2004, the RWQCB issued General NPDES permit CAG994004, Order No. R4-2003-011. On October 3, 2008, Order No. R4-2003-0111 was superseded by Order No. R4-2008-0032, providing revised requirements for sampling and analysis. Total chlorine was not a required element of the sampling and testing plan until the end of the second quarter 2010. A revised permit was issued to the City in October 2010 requiring all discharge points to be sampled monthly for all constituents, except for Acute Toxicity, which is to be tested annually. On June 5, 2015, order No. R4-2003-0032 was superseded by general order number R4-2013-0095 (current permit). Fugro conducted water quality monitoring during the 2016-2017 monitoring year consistent with the requirements of the RWQCB NPDES permit, No. R4-2013-0095.

Water produced by assessment district dewatering wells is pumped into the public storm drain system and water flow from the hydraugers is collected through a conveyance line system. Both the storm drain system and the conveyance line system empty into ten culverts on the north side of Pacific Coast Highway. Usually, effluent from several wells and hydraugers drain into a common culvert where they co-mingle and then flow under the PCH to a Discharge Point on the beach. The ten beach Discharge Points referred to in the permit are named M-001 through M-010. Other sources of surface water are collected by the storm-drain system including storm water runoff (during and following precipitation), irrigation runoff, domestic use surface runoff from car washing and hosing-off of driveways, illicit discharges, groundwater seepage, and other possible unidentified sources.

All samples during the 2016-2017 monitoring year were collected directly from the ten beach discharge points with two exceptions: 1) Discharge point M-009 cannot not be located and was instead sampled directly from hydrauger HD-7, which is the only assessment district dewatering source flowing into M-009; and 2) Discharge point M-003 flow was too low for sampling to be practical and, therefore water representative of M-003 was sampled directly from hydrauger HD-41, which provides the vast majority of the dewatering flow to M-003. From July to December 2016, Discharge Point M-003 and its contributing hydraugers were non-flowing and no sample was collected those months.

Representative samples from each discharge point were collected and analyzed for the entire suite of constituents listed in the permit once per month. Discharge points with analytes that were detected in concentrations exceeding permitted limits were subsequently sampled and tested for that analyte on a weekly basis. After at least three consecutive weekly follow-up samples are measured within permit limits, sampling for that analyte may return to once monthly.

All samples were collected in clean laboratory provided jars, placed in a cooler on ice and delivered to the analytic laboratory under proper chain of custody protocol within method specific holding times, with the



exception of total chlorine, pH, and temperature, which were measured in the field during sample collection. One quality control duplicate sample was collected for every monthly sampling event.

2.7.2 Water-Quality Results

Water quality data summary sheets for each quarter of the 2016-2017 monitoring period are provided as Plate E-1 through E-4 in Appendix E.

During the 2016-2017 monitoring year, samples collected from the ten Discharge Points exceeded permitted concentration limits for Settleable Solids, Total Suspended Solids, TPH, Zinc, Methylene Blue Activated Substances (MBAS), and Total Chlorine. Most of the permit exceedances occurred over a short duration while some, such as TPH at M-004 and M-006, Total Chlorine at M-008, and Zinc concentrations at Discharge Points M-001, M-005, and M-008 intermittently exceeded permit limits throughout the monitoring year.

In accordance with the permit, bacteriological testing for Total Coliform, Fecal Coliform and Enterococcus was performed once monthly at each discharge point. With the exception of M-009/HD-7 and M-003/HD-41, results of bacteriological sampling through the 2016-2017 monitoring year consistently or intermittently detected Total Coliform and Enterococcus in concentrations exceeding NPDES general permit limits at each of the Discharge Points. Fecal Coliform was intermittently detected in concentrations exceeding NPDES general permit limits from all discharge points except M-009/HD-7, M-003/HD-41 and M-010. Fugro will continue to monitor and report the results of bacteriological levels once each month in consultation with the RWQCB.

Acute toxicity testing is required once per year under the permit. Acute toxicity was performed during Quarter 4 of 2016 with the exception of M-003/HD-41, which was sampled during Quarter 1 of 2017. Those results indicate 96 to 100 percent survival rate from all discharge ports, except for M-005, which indicated a 35 percent survival rate. M-005 was subsequently sampled and re-tested for acute toxicity three times following the permit exceedance from Q4 of 2016. Each of the three subsequent tests indicated survival rates of 96 to 100 percent.

The current permit requires quarterly and annual compliance reporting to the Regional Board. Those water quality reports are more comprehensive and provide details for each sampling event and exceedance. Quarterly and annual permit compliance reports may be downloaded and viewed from the RWQCB website.



3. DEWATERING FACILITY MAINTENANCE

3.1 Capital Improvements

Capital improvement projects are those of larger scale that are budgeted for the previous year and that in most cases involve subcontracted services and/or extensive coordination with the City or other agencies to complete. During the 2016-2017 monitoring, Fugro contracted with Layne Christensen to evaluate and rehabilitate dewatering well, BYA-1. The work consisted of permit coordination, pre-and post-rehabilitation video logging of the well, brushing and bailing the well to remove roots, sediment, and scale, and replacing the pump, motor, drop pipe, and associated parts. Fugro is continuing to work with Southern California Edison and hired subcontractor, Layne Christiansen, to upgrade the replace the electrical control associated with BYA-1. That work will be completed as part of the FY2017-2018 capital improvements.

3.2 Facility Maintenance

The operating status of each dewatering well and hydrauger was checked during each monitoring event. When necessary, repair work was scheduled and undertaken as expeditiously as reasonable - typically within a matter of a few hours to a few days after identifying a problem. Generally, repairs and maintenance consisted of brush clearance, cleaning, and well pump and electrical repairs. Table 2 presents a summary of facility maintenance/repairs that were completed during the 2016-2017 monitoring year.

Table 2. Summary of Completed Facility Maintenance

Facility	Date of Repair	Repair
BYA-4	7/25/2016	Replacement of flow meter
W-8	7/25/2016	Replacement of flow meter
BYA-4, BYA-6	8/31/16	Replacement of leaking meter gaskets
HD-7, HD-8	9/19/16	Replacement of conveyance line
HD-43	1/24/17	Repair PVC and dig out material
HD-33	1/30/17	Repair PVC
BYA-1, BYA-12	1/30/17	Replacement of flow meters
HD-43	1/30/17, 1/31/17	Repair broken PVC
HD-34	2/3/2017	Repair to hydrauger after damage from rockfall
HD-43	3/1/17	Repair broken PVC
W-8	3/10/17	Replaced pump saver
HD-5, HD-6	5/24/17	Repair PVC conveyance line
BYA-6	5/25/17	Fix leak at pump
BYA-7	6/13/17	Replace pump, motor, control box, and drop pipe
BYA-13	6/14/17	Replace pump, motor, control box, and drop pipe, extensive bailing to remove roots, sediment, and scale
BYA-9	6/20/17	Pull pump
BYA-9	6/21/17	Video log
BYA-3	9/7/17	Replace pump saver and reset

4. SUMMARY AND CONCLUSIONS

4.1 Annual Summary

The general status of the Big Rock Mesa Landslide Assessment District can be summarized as follows:

- The groundwater level in the Big Rock Mesa landslide is the primary factor controlling the stability of the landslide mass. Rises in groundwater level tend to de-stabilize the landslide. Previous episodes of movement of the landslide have been directly related to high groundwater levels. Therefore, controlling the long-term average and peak groundwater levels in the landslide mass is the primary means being used to reduce future movements of the landslide. The primary factors influencing recharge of groundwater to the landslide are: 1) onsite wastewater treatment system discharge, 2) rainfall, 3) irrigation, and 4) water-line and pool leakage.
- Monitoring data related to rainfall and imported water usage indicate the following:
 - Rainfall during the 2016-2017 rain-season period (October to September) was 21.98 inches of precipitation, which is above the historical average annual rainfall during the “rain season” of 15.75 inches. Rainfall during the Malibu “monitoring period” (July 2016 to June 2017) was also 21.98 inches of precipitation and is the historical annual average of 15.58 inches per year measured between July and June from 1968 through June 2017.
 - Use of imported water increased approximately 2.8 percent from the previous monitoring year (145,500 gpd versus 141,500 gpd) and is 24 percent above the average usage in 1984 (117,400 gpd).
- Groundwater levels in 29 standpipe piezometers were measured on a monthly during the monitoring period. Average groundwater levels and/or peak groundwater levels measured during the monitoring period were more than 1 foot above long-term average groundwater levels for 12 of the 29 standpipe piezometers. The remaining 17 piezometers indicated a static or lowered groundwater level.
- Groundwater levels in the western region have been variable since 1998. That area of approximately 79 acres is dewatered by two wells and five hydraugers; however, over seventy percent of the dewatering production for the western region is provided by one well, W-18.
- The average total well production rate for the 2016-2017 monitoring period was approximately 39,697 gpd. This is a 13 percent increase when compared to the previous year’s monitoring period rate of 35,018 gpd and is below the historical average production rate of 53,387 gpd measured between 1993 and the present.
- The average total hydrauger production rate over the 2016-2017 monitoring period was approximately 13,652 gpd. That represents a 9-percent increase in production relative to the previous monitoring period (12,578 gpd).
- Interpretation of inclinometer data shows minor but quantifiable ground movement in two of the inclinometers monitored during the 2016 through 2017 monitoring period. SP-16A recorded the most movement with approximately 0.15 inches of movement. Inclinometer SP-27A measured approximately 0.1 inch of movement. The measured displacements within SP-16A and SP-27A occurred as rotation within the casing. No significant shear displacement was measured in the inclinometers during the 2016-2017 monitoring year.



- Water quality monitoring, conducted in general conformance with the requirements of the RWQCB NPDES Permit No. R4-2013-0095, which became effective June 5, 2015, indicate occasional to consistent exceedances for bacteriological analytes at each of the discharge points except for M-003/HD-7 and M-009/HD-41. It was also noted that revising sample locations from the individual facility discharge points back to the beach-side Discharge Points after March 2015 appears to have resulted in detection of exceedances that were not typically present when sampling occurred directly from the individual dewatering facilities within the District during November 2004 to March 2015.
- Routine and minor maintenance was conducted throughout the 2016-2017 monitoring year on the dewatering wells, hydraugers, and conveyance systems. Ongoing maintenance and repair work is essential to maintaining the capacity of the dewatering system.

4.2 Concluding Comments

It is important to recognize that the dewatering facilities installed over the preceding decades are aging and require increasing maintenance and regular replacement. The anticipated lifespan of an average hydrauger is measured in years, not decades. Dewatering wells may last from a few years to several decades. In order to maintain the highest possible efficiency of the existing horizontal drains, cleaning should be conducted on a regular basis.

Dewatering wells should be reviewed on an individual basis and redeveloped, repaired, or replaced as necessary in an effort to help keep groundwater levels as low as possible.

The geology throughout the Assessment District is not uniform and varies from one location to another. Areas of low permeability, such as in the Eastern Mesa Region, can limit the dewatering production of individual facilities.

Water conservation throughout the Big Rock Mesa area is essential to reduce groundwater recharge. As previously stated, rainfall and imported (household) water usage are the primary sources of groundwater recharge and are the primary factors controlling the movement of the landslide. Seasonal rainfall is beyond the control of homeowners and the City; therefore, water conservation is the most critical remaining means of controlling groundwater recharge on the Mesa.



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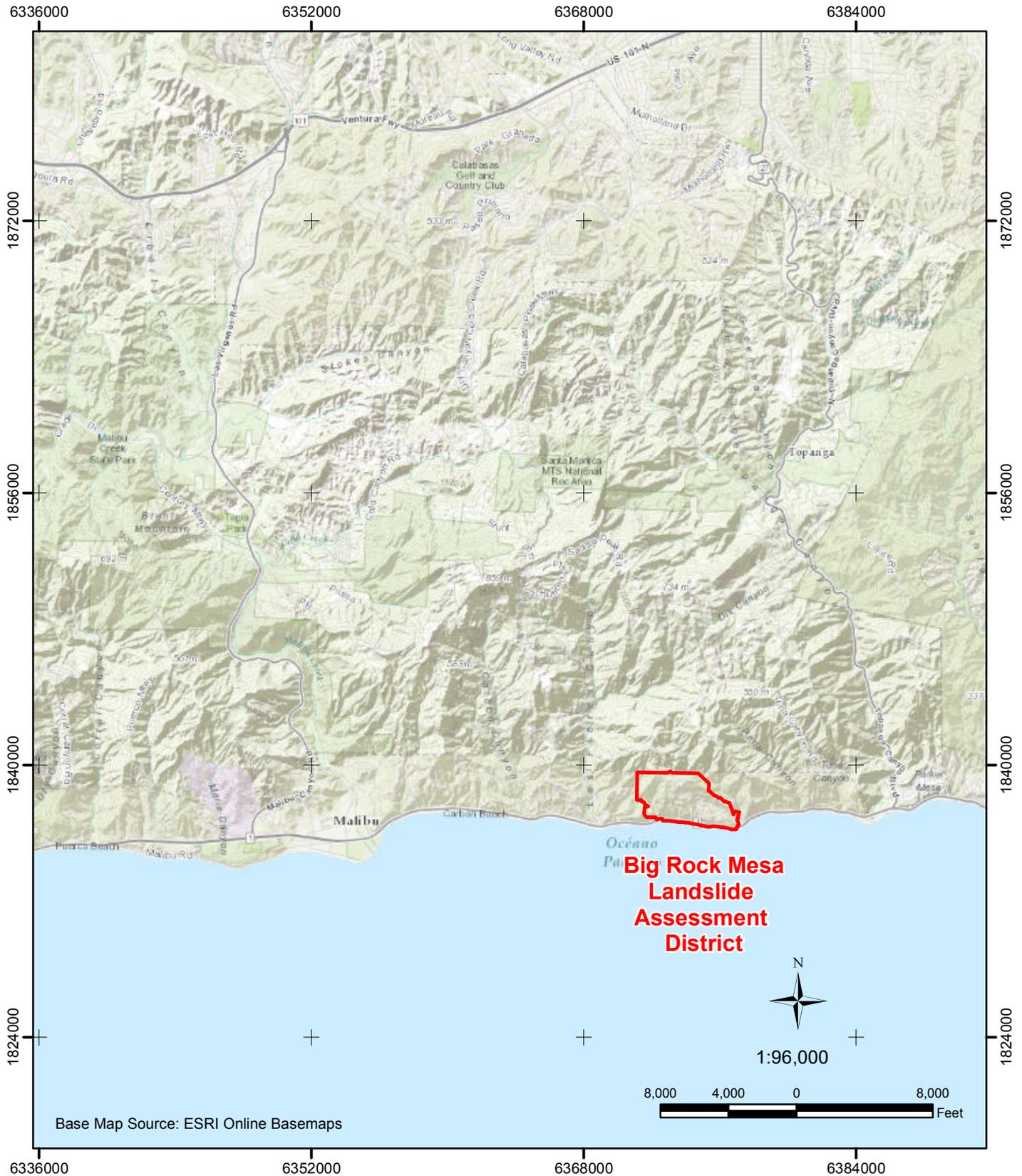


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PLATES

**BIG ROCK MESA LANDSLIDE ASSESSMENT DISTRICT
FY16-17 ANNUAL REPORT
MALIBU, CALIFORNIA**

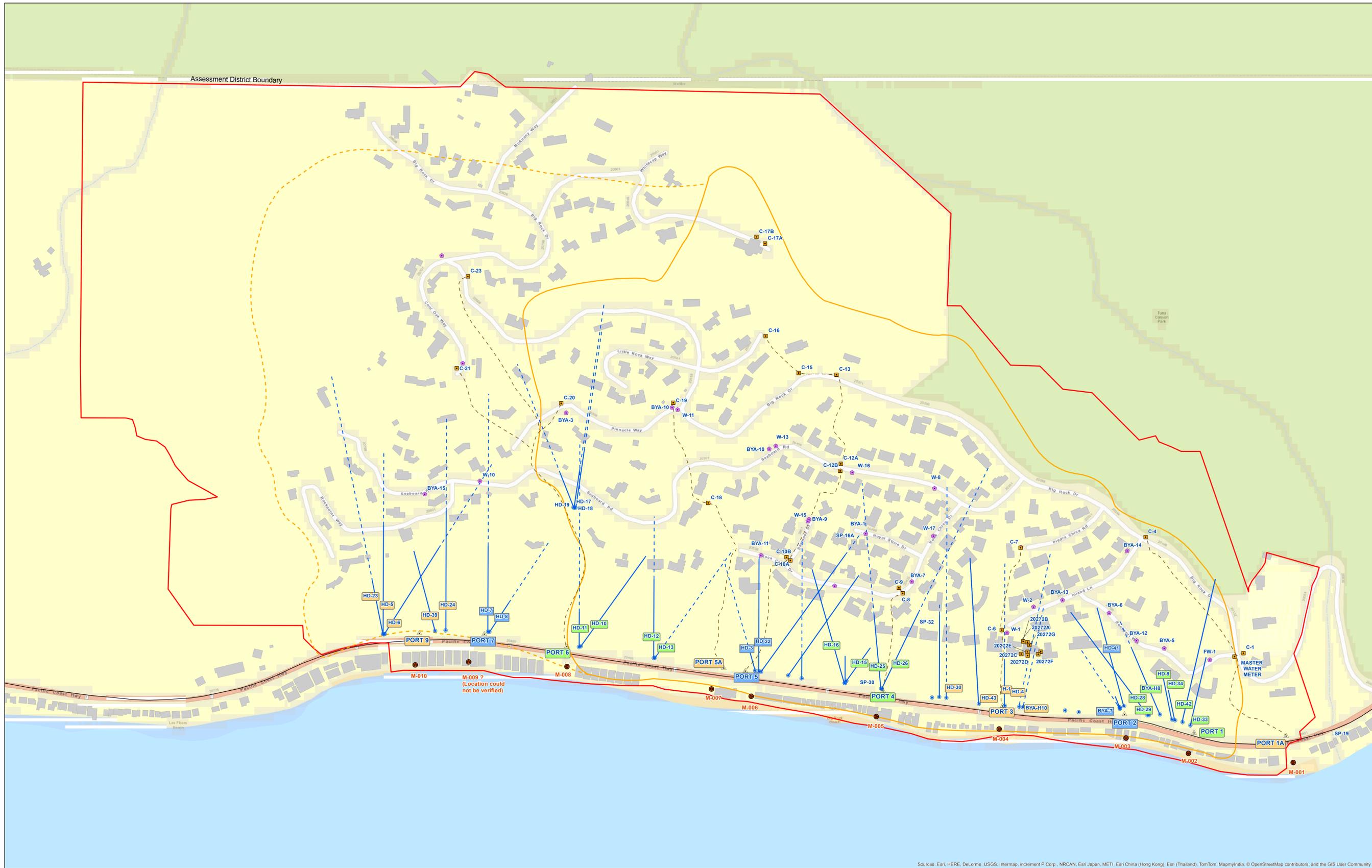


SITE LOCATION MAP
Big Rock Mesa Landslide Assessment District
Malibu, California

**BIG ROCK MESA LANDSLIDE
ASSESSMENT DISTRICT
MALIBU, CALIFORNIA**

DEWATERING FACILITIES MAP

FUGRO CONSULTANTS, INC.
4820 McGrath St., Suite 100, Ventura, California 93003
Tel: (805) 650-7000, Fax: (805) 650-7010



LEGEND

- Dewatering Well (In Service)
- Hydrauger (In Service) Color Referenced to Inferred Storm Drain Outfall
- Storm Drain Outfall
- Catch Basin
- Discharge Point
- Hydrauger
- Approximate Limits of Primary Land Movement
- Western Extension Boundary
- Big Rock Mesa Landslide Assessment District Boundary
- Storm Drain
- Trees/Bush
- Streams
- Building
- Coordinate Grid: California State Plane, Zone 7, NAD 27, Feet
Vertical Datum: NAVD88 Feet



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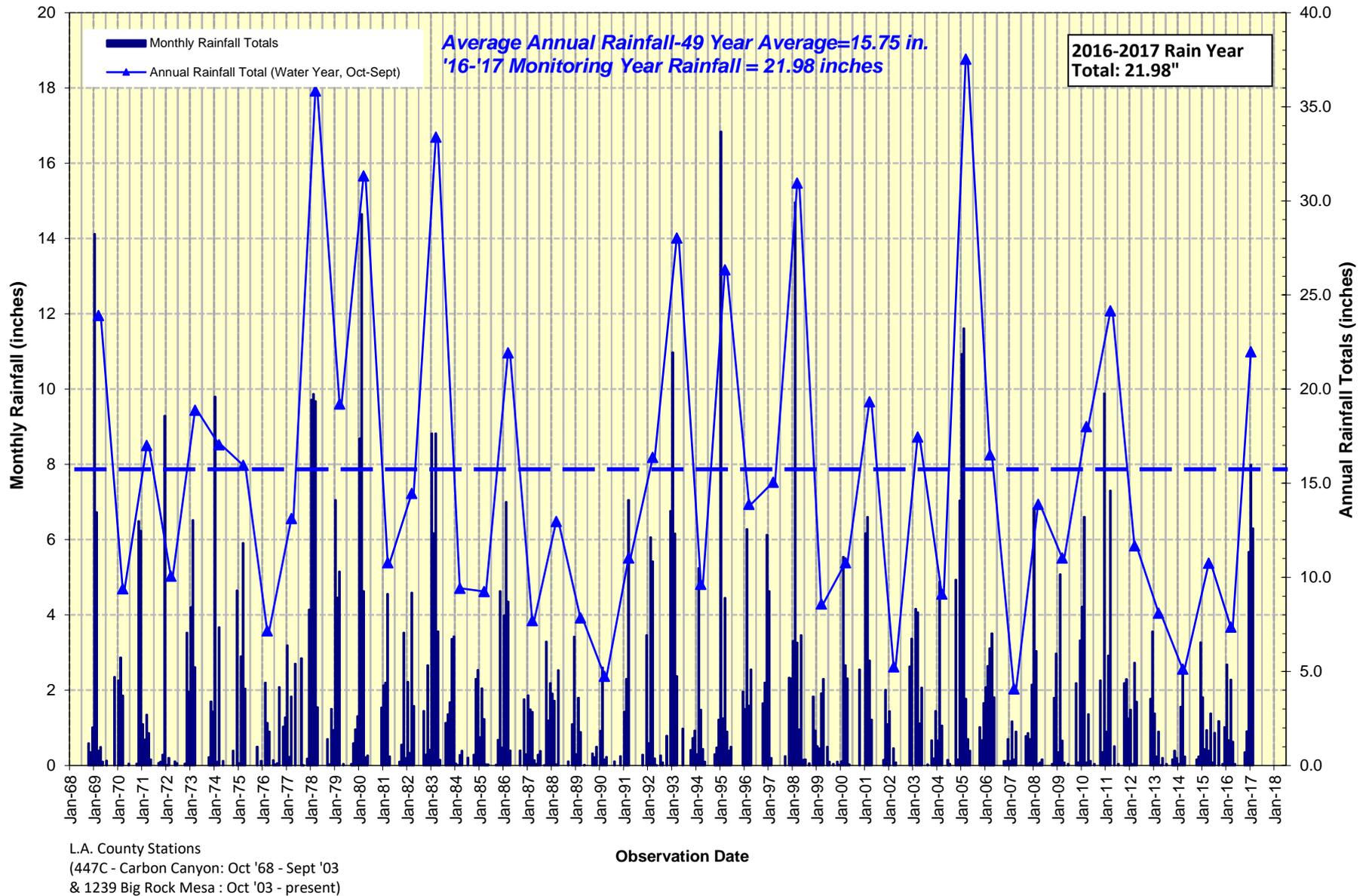
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1	5/04/15	Discharge Pts.	TN				

DATE: May 4, 2015	WORK ORDER: 04.62160606	PLATE NO.:
DRAWN BY: TN	CHECKED BY: TC	APPROVED BY: TN
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Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

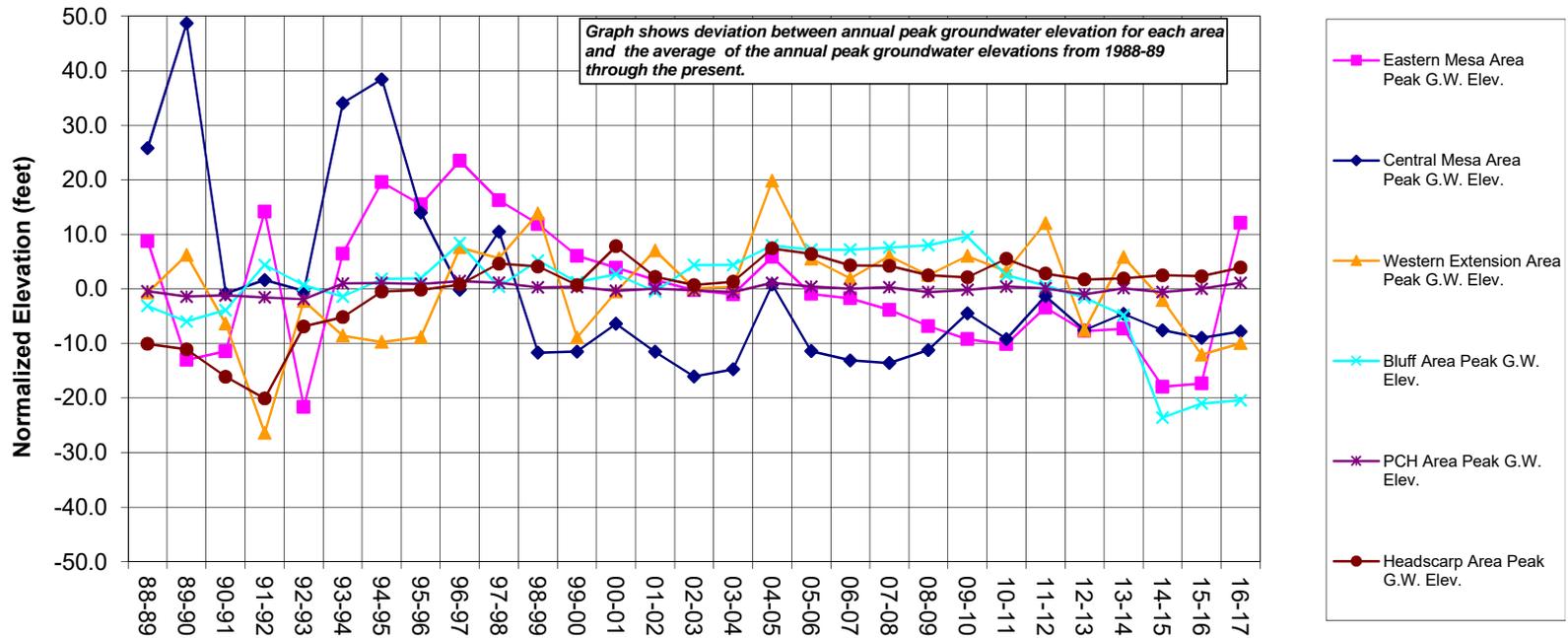
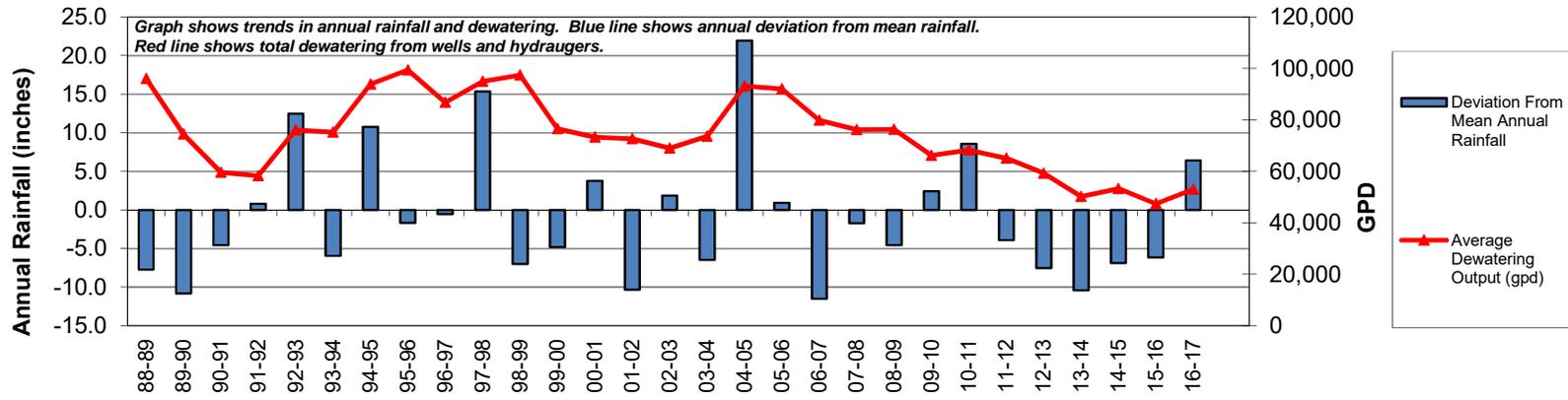
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**BIG ROCK MESA LANDSLIDE ASSESSMENT DISTRICT
 FY16-17 ANNUAL REPORT
 MALIBU, CALIFORNIA**



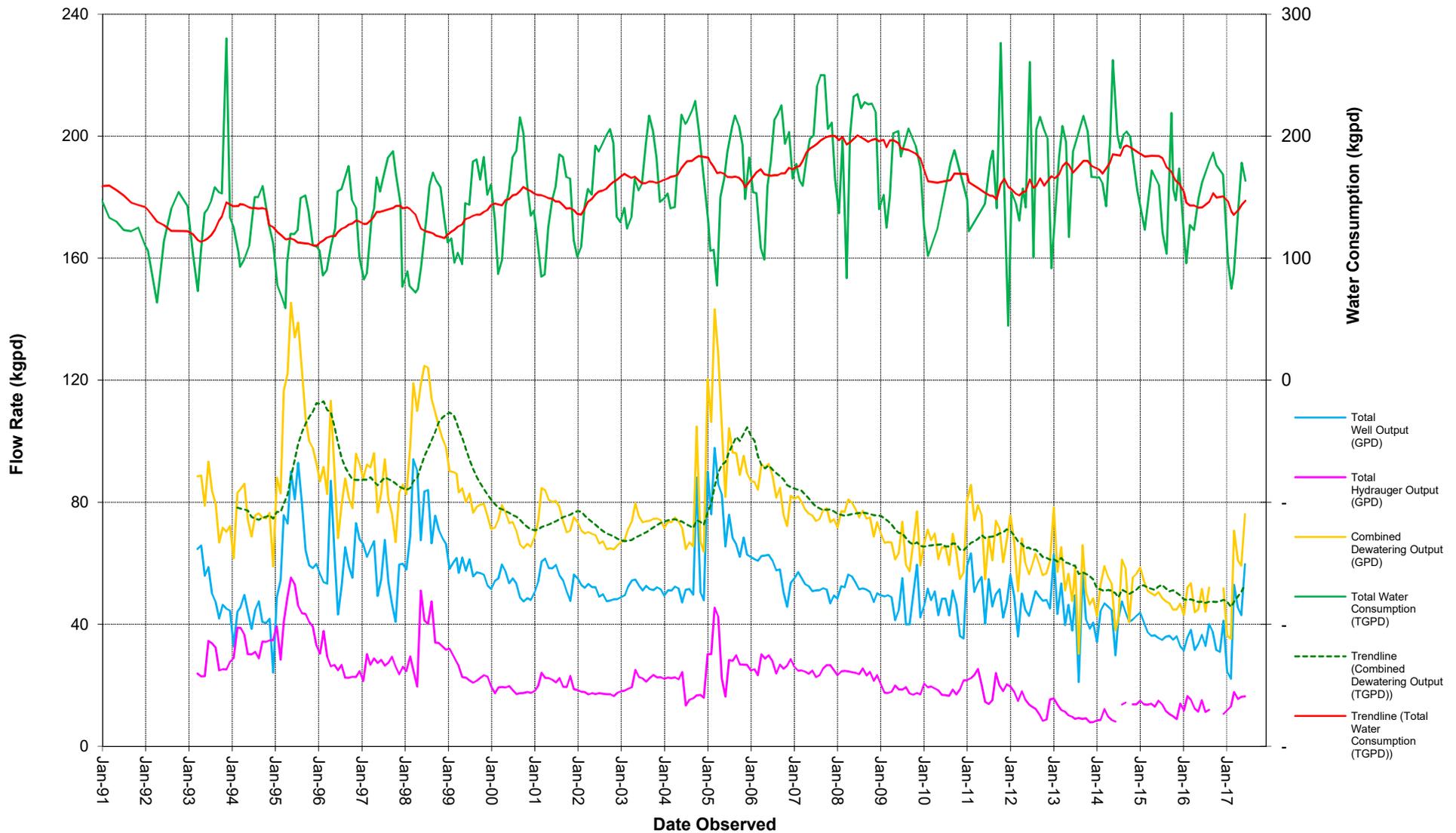
RAINFALL GRAPH
 Big Rock Mesa Landslide Assessment District
 Malibu, California

**BIG ROCK MESA LANDSLIDE ASSESSMENT DISTRICT
 FY16-17 ANNUAL REPORT
 MALIBU, CALIFORNIA**



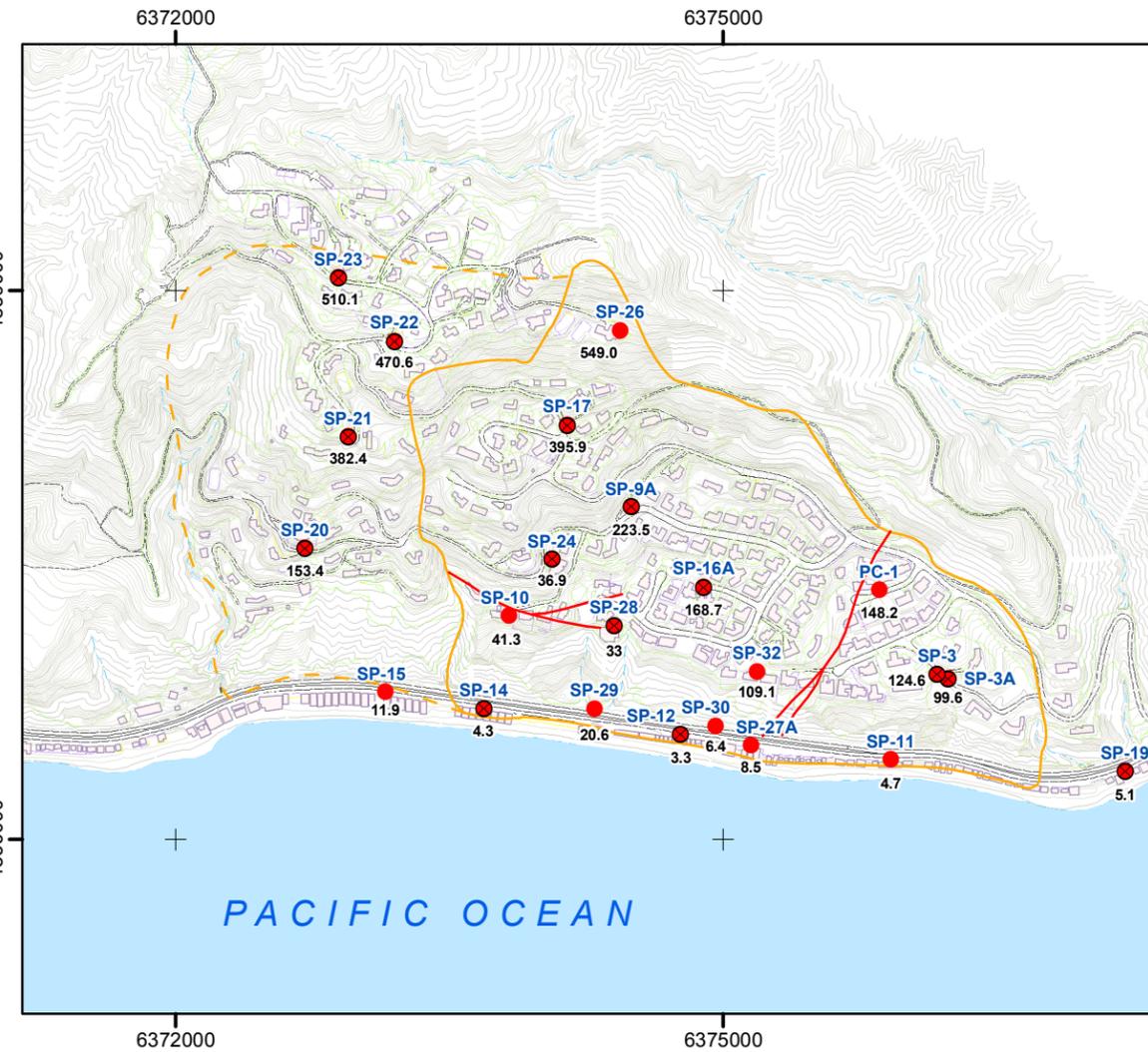
SUMMARY OF GROUNDWATER LEVELS, DEWATERING & RAINFALL
 Big Rock Mesa Landslide Assessment District
 Malibu, California

**BIG ROCK MESA LANDSLIDE ASSESSMENT DISTRICT
 FY16-17 ANNUAL REPORT
 MALIBU, CALIFORNIA**

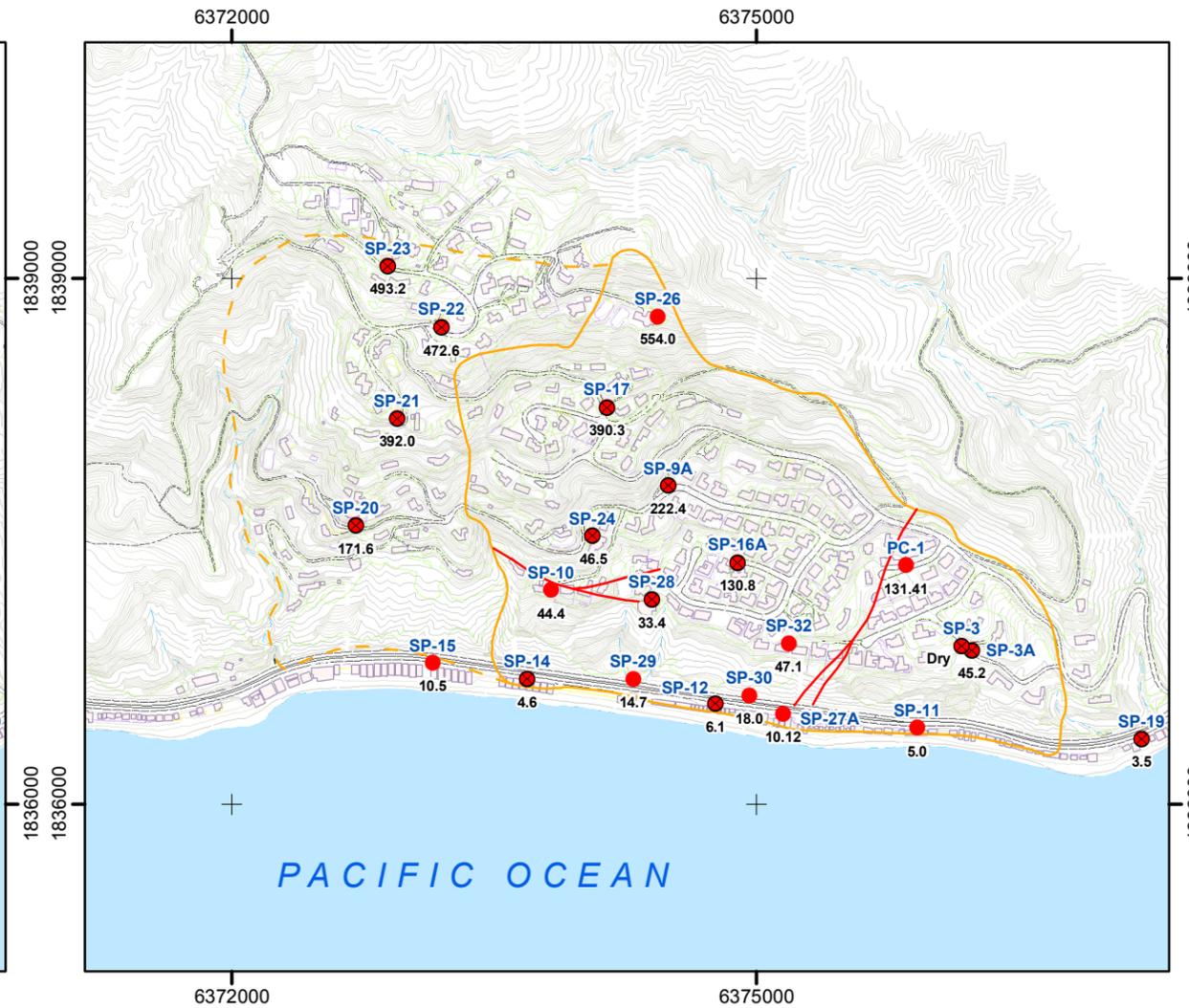


TOTAL DEWATERING PRODUCTION AND TOTAL WATER CONSUMPTION
 Wells & Hydraugers (Combined) / Total Water Consumption
 Big Rock Mesa Landslide Assessment District
 Malibu, California

Groundwater Elevation (May 8, 1995)



Groundwater Elevation (May 15, 2017)



Legend

Instrumentation

- Slope Inclinometer, does not Penetrate Rupture Surface
- Slope Inclinometer, does Penetrate Rupture Surface

SP-16 Instrument Label and Ground Water Elevation in feet
400

Site Map Features

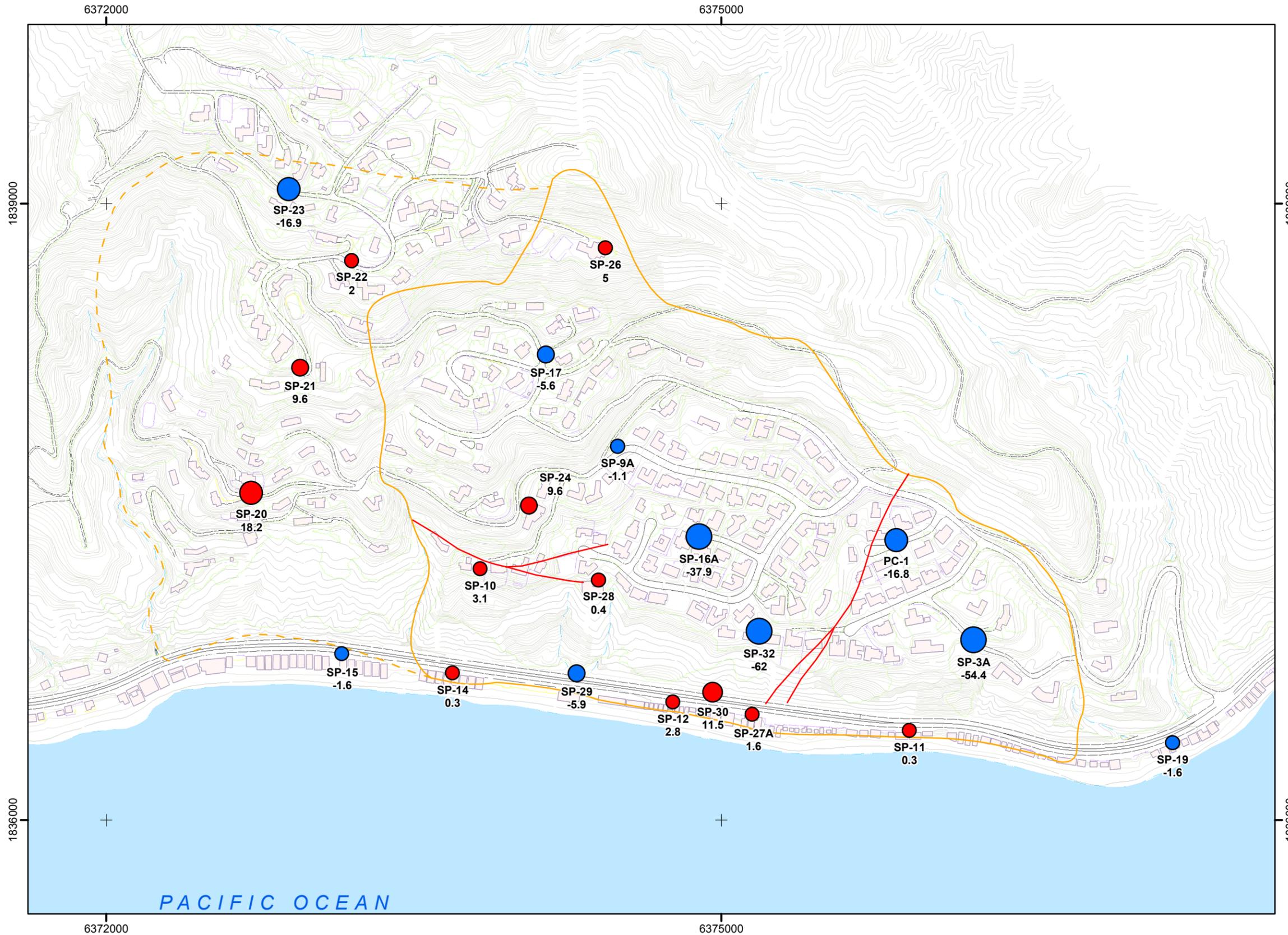
- Faults
- Approximate Landslide Limits
- Buildings



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**GROUNDWATER ELEVATION MAP
MAY 1995 AND MAY 2017**
Big Rock Mesa Landslide
Assessment District
Malibu, California



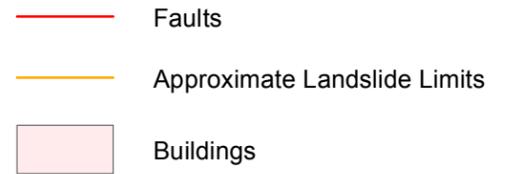
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Groundwater Elevation Change (Feet)

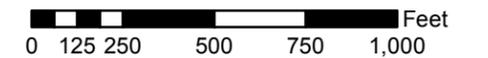


SP-16
-3.1
Instrument Label and
Ground Water Elevation
Change in feet

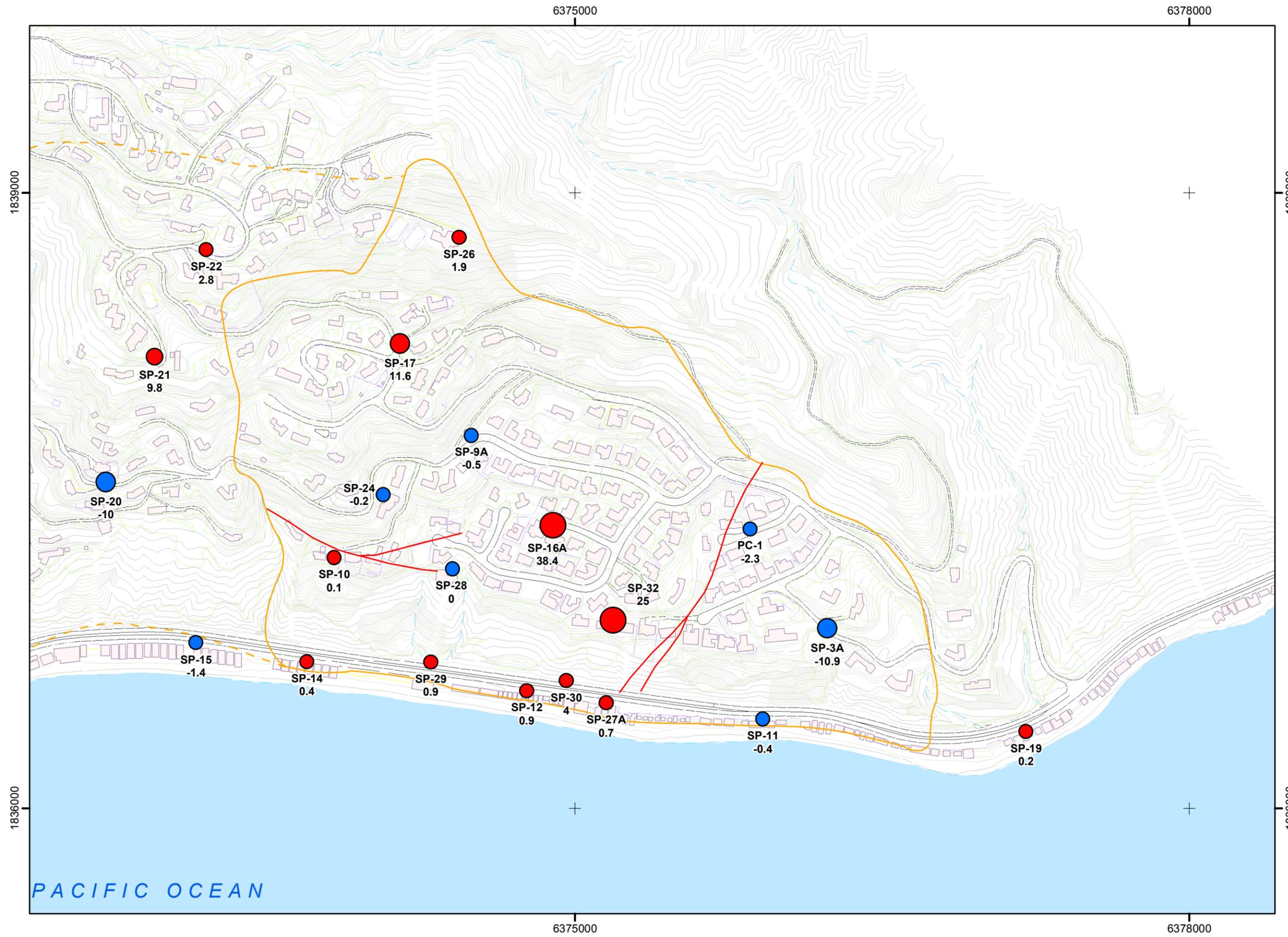
Site Map Features



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**CHANGE IN GROUNDWATER
ELEVATION MAY 1995 TO MAY 2017**
Big Rock Mesa Landslide
Assessment District
Malibu, California



Legend

Instrumentation

SP-16
3.6
Instrument Label and Ground Water Elevation Change in feet

Site Map Features

- Faults
- Approximate Landslide Limits
- Buildings

Groundwater Elevation Change (Feet)

● < -30	● 0 to 5
● -30 to -15	● 5 to 10
● -15 to -10	● 10 to 15
● -10 to -5	● 15 to 20
● -5 to 0	● > 20

N

1:6,000

0 125 250 500 750 1,000 Feet

CHANGE IN GROUNDWATER ELEVATION MAY 2016 TO MAY 2017
Big Rock Mesa Landslide Assessment District
Malibu, California

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**APPENDIX A
GROUNDWATER LEVEL DATA**



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

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



PNEUMATIC PIEZOMETER INFORMATION					
Piezometer ID	Surface Elev. (ft)	Tip No.	TIP DEPTH (ft.)	INSTALL BY	STATUS
W-10**	432	230	230	BYA	No air-line, has sounder access, no data reported
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, reported
		TIP-2	90		0 PSI since November 2011
		TIP-3	70		Functioning, reported
		TIP-4	40		Non-Functioning, no return air flow, not reported
		TIP-5	20		Non-Functioning, no return air flow, not reported
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, reported
		TIP-2	282		Functioning, reported
		TIP-3	182		Low PSI since installation, not reported
		TIP-4	82		Non-Functioning, no return air flow, not reported
SP-35	345	TIP-1	393	BYA	Functioning, reported
		TIP-2	293		Functioning, reported
		TIP-3	193		Functioning, reported
		TIP-4	98		Non-Functioning, no return air flow, not reported
SP-36	380	TIP-1	255	BYA	Functioning, reported
		TIP-2	195		Functioning, reported
		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

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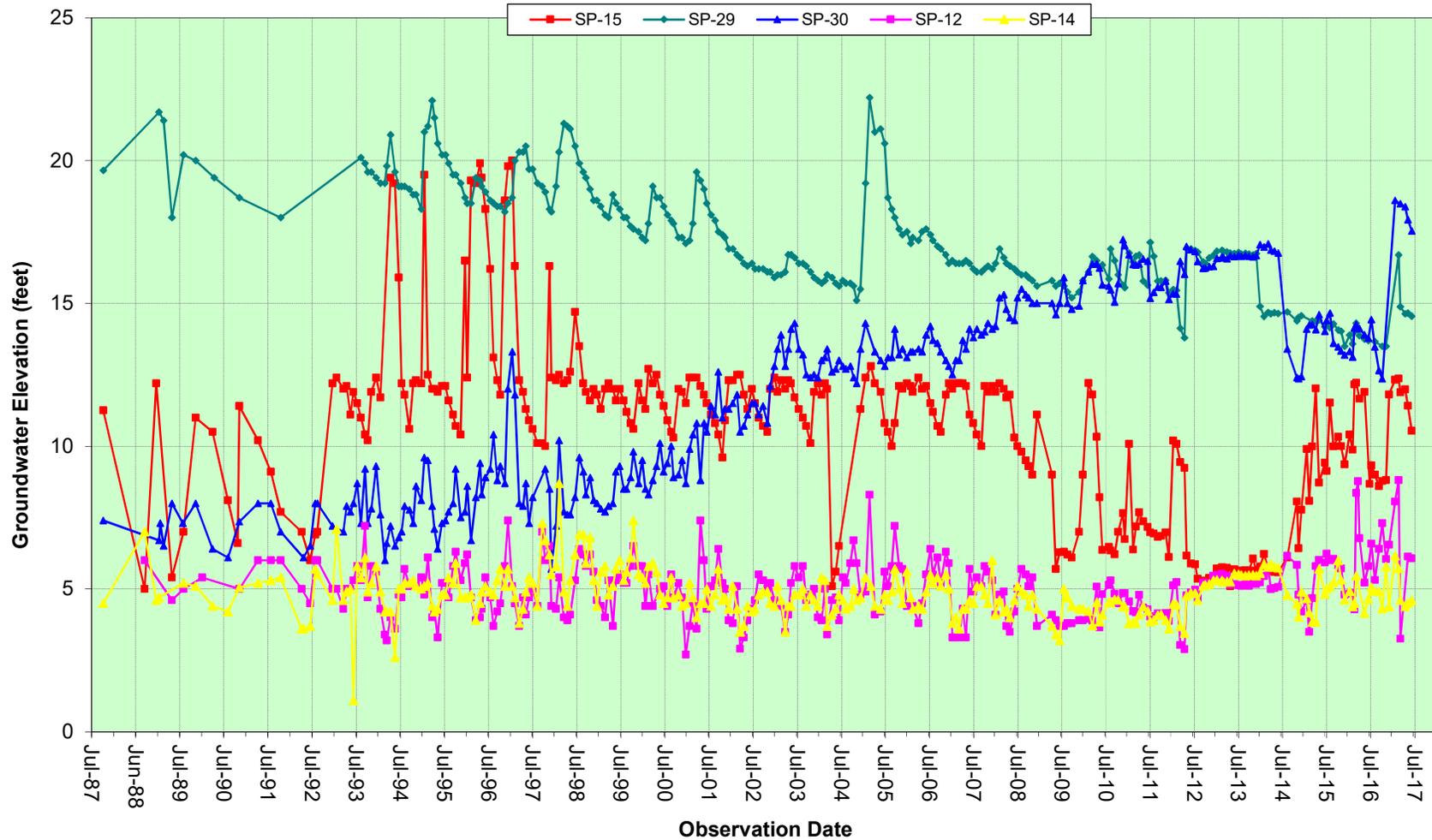


Piezometer I.D.	1983-84	1984-85	1985-86	1986-87	1987-88	1988-89	1989-90	1990-91	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	Highest Recorded	Mean '91 - '17	Stand Dev.	'16-'17 vs '97-'98	'16-'17 vs '15-'16	'16-'17 vs mean			
PCH REGION																																											
SP-11	Mean El.					5.7	5.3	4.7	4.5	5.7	5.7	5.5	5.8	5.5	5.8	6.3	5.5	4.8	5.4	5.4	5.2	5.3	5.1	5.4	4.9	4.6	5.1	8.4	7.8	4.7	4.8	5.0	5.3	5.7	Jul-16	5.5	0.9	-0.1	0.4	0.2			
	Highest El.					6.4	5.8	5.5	5.0	6.0	7.4	6.9	7.5	6.7	7.3	8.1	6.5	5.5	8.3	7.0	5.7	5.8	5.9	7.6	5.9	5.2	5.6	11.8	8.8	5.0	5.1	5.9	6.1	7.2	11.8	6.7	1.5	-0.1	1.1	0.5			
SP-12	Mean El.					4.6	5.4	5.5	5.4	5.2	4.8	4.9	5.1	4.8	5.0	5.3	5.3	4.7	4.5	4.8	4.6	5.5	5.2	4.9	4.8	4.7	4.0	4.7	4.2	5.2	5.2	5.2	6.0	6.4	Feb-17	5.0	0.5	1.4	0.4	1.4			
	Highest El.					4.6	5.4	6.0	6.0	6.0	7.2	6.1	6.3	7.4	7.0	6.4	6.5	7.4	6.4	6.4	6.4	8.3	7.2	6.4	5.8	5.7	5.1	5.3	5.2	5.5	5.8	6.2	8.8	8.8	8.81	6.5	1.0	1.8	0.0	2.3			
SP-14	Mean El.					4.5	4.7	4.4	4.8	4.3	4.8	4.9	4.9	5.0	5.9	5.8	5.6	4.7	4.5	4.6	4.6	4.7	4.8	4.7	4.7	4.3	4.3	4.3	4.1	5.2	5.6	4.5	5.1	4.9	Feb-98	4.8	0.5	-0.9	-0.1	0.1			
	Highest El.					4.5	4.7	4.4	5.2	5.4	7.1	6.1	5.3	5.9	5.7	8.7	6.9	7.4	5.4	5.7	5.1	5.4	5.4	5.7	5.5	6.0	5.1	5.0	4.6	4.9	5.5	5.5	5.7	6.0	6.2	8.7	5.8	0.9	-2.5	0.2	0.4		
SP-15	Mean El.					11.3	8.8	10.5	9.1	7.5	10.7	13.4	12.6	15.1	14.5	12.2	12.0	11.7	11.6	11.5	11.7	10.0	11.9	11.6	11.4	8.9	8.4	7.2	7.6	5.5	5.7	8.6	10.6	10.6	Jan-97	10.5	2.4	-1.6	0.0	0.0			
	Highest El.					11.3	12.2	10.5	11.4	9.1	12.4	19.4	19.5	19.9	20.0	16.3	13.5	12.7	12.4	12.5	12.4	12.2	12.8	12.4	12.2	12.2	11.1	12.2	10.1	10.2	5.9	6.2	12.0	12.2	12.4	20.0	12.9	3.6	-3.9	0.2	-0.5		
SP-19	Mean El.					3.6	3.6	3.1	4.5	4.4	4.7	4.6	4.3	4.4	4.5	3.8	3.4	3.7	3.5	3.4	3.9	3.6	3.6	3.5	3.1	3.6	3.7	3.6	3.0	3.6	3.4	3.4	3.5	Mar-95	3.7	0.5	-0.8	0.2	-0.2				
	Highest El.					4.1	4.0	3.4	5.0	5.0	5.9	5.4	4.9	5.2	5.0	4.5	3.9	4.3	4.1	4.0	4.2	4.5	4.4	4.1	3.6	4.6	4.0	4.3	3.3	4.2	4.1	3.6	4.1	5.9	4.4	0.6	-1.1	0.5	-0.3				
SP-27A	Mean El.					7.1	9.1	8.8	8.7	9.3	9.4	9.7	9.5	9.5	9.7	9.6	10.1	9.2	9.0	9.5	9.3	10.2	9.7	9.5	10.0	9.5	10.0	10.0	9.7	10.5	17.1	9.7	9.1	10.0	Jun-15	9.9	1.5	0.3	0.9	0.1			
	Highest El.					7.1	10.1	9.2	10.2	10.0	10.2	10.8	10.3	10.4	10.7	10.4	13.7	9.6	9.7	9.9	9.8	13.5	12.5	10.2	13.7	10.1	10.6	10.5	10.5	10.8	17.8	10.0	10.1	12.8	17.8	11.1	1.9	2.1	2.7	1.7			
SP-29	Mean El.					19.7	20.4	19.4	18.7	18.0		19.7	20.0	19.2	19.2	19.7	18.8	18.0	18.1	17.0	16.2	16.0	18.0	17.7	16.7	16.3	15.8	15.9	16.2	15.8	16.7	15.7	14.4	13.9	14.5	Feb-05	17.1	1.8	-5.2	0.6	-2.6		
	Highest El.					19.7	21.7	19.4	18.7	18.0		20.9	22.1	20.2	20.5	21.3	19.9	19.1	19.6	18.1	16.7	16.4	22.2	18.7	17.4	16.9	16.1	16.6	16.9	17.1	16.9	16.8	14.7	14.3	16.7	22.2	18.2	2.2	-4.6	2.4	-1.5		
SP-30	Mean El.					7.4	7.1	6.4	7.2	6.9	7.7	7.3	7.9	8.1	9.6	8.0	8.5	9.0	9.7	11.3	12.6	12.9	13.0	13.4	13.4	14.4	15.1	15.7	16.2	15.8	16.5	16.8	13.6	13.8	16.0	Jan-17	12.0	3.2	8.0	2.2	3.9		
	Highest El.					7.4	8.0	6.4	8.0	8.0	8.0	9.3	9.6	9.4	13.3	10.2	9.6	10.1	10.8	12.6	14.3	13.4	14.3	14.1	14.2	15.3	15.5	16.4	17.2	17.0	16.8	17.1	14.6	14.7	18.6	18.6	13.2	3.0	8.4	3.9	5.4		
Area Average	Mean El.					10.7	8.3	8.0	7.8	7.3	6.8	8.7	8.8	9.1	9.1	8.8	8.8	8.6	8.3	8.4	8.5	8.2	9.1	8.9	8.7	8.7	8.2	8.4	8.8	8.6	8.4	9.3	8.1	8.4	9.0		8.5	0.5	0.1	0.6	0.4		
	Highest El.					10.7	9.2	8.3	8.5	8.1	7.8	10.7	10.8	10.6	11.1	10.8	10.0	10.1	9.3	9.7	9.5	9.2	10.8	10.1	9.7	10.0	9.1	9.5	10.1	9.8	8.7	9.8	9.1	9.5	10.8		9.8	0.8	0.0	1.4	1.0		
Change vs Prior	Mean El.					-2.4	-0.3	-0.2	-0.5	-0.4	1.8	0.1	0.3	0.0	-0.2	0.0	-0.2	-0.3	0.1	0.2	-0.3	0.8	-0.2	-0.2	0.0	-0.5	0.2	0.4	-0.3	-0.1	0.9	-1.3	0.3	0.6									
	Highest El.					-1.5	-1.0	0.2	-0.4	-0.4	2.9	0.1	-0.2	0.5	-0.3	-0.9	0.1	-0.7	0.4	-0.2	-0.3	1.7	-0.7	-0.4	0.3	-0.9	0.5	0.5	-0.3	-1.0	1.1	-0.7	0.3	1.4									
BLUFF REGION																																											
SP-10	Mean El.	144.7	76.0	50.0	50.5	49.2	47.4	45.9	48.8	55.3	44.6	42.9	41.6	42.0	41.6	41.3	42.4	42.8	42.9	43.3	43.7	44.3	45.5	45.2	45.2	44.8	43.7	44.0	43.9	42.6	43.7	43.5	43.9	45.8	44.8	Dec-83	43.6	2.6	3.5	-1.0	1.2		
	Highest El.	174.2	130.0	50.0	50.5	50.0	52.0	46.0	55.5	74.0	45.9	44.4	42.2	42.6	41.9	41.6	44.8	43.4	43.3	43.6	44.1	44.4	47.2	45.4	45.4	45.2	44.9	44.6	46.0	44.7	44.1	44.0	44.3	48.7	47.3	174.2	44.6	6.0	5.7	-1.4	2.8		
SP-28	Mean El.					36.4	33.7	37.5	33.7	33.6	33.7	33.0	32.7	32.2	31.9	32.6	33.2	33.1	33.0	32.9	32.9	34.9	34.7	33.3	33.1	32.8	33.1	32.8	35.2	32.8	32.8	33.4	33.4	33.3	Jan-12	33.2	0.8	1.4	-0.1	0.1			
	Highest El.					40.5	33.8	40.0	36.0	35.2	35.2	33.1	33.1	32.4	32.2	34.9	33.6	33.2	33.3	33.0	32.9	36.1	36.0	33.6	33.1	33.1	33.4	33.8	42.0	33.7	33.6	33.4	33.5	33.6	42.0	34.0	1.9	1.4	0.1	-0.4			
SP-32	Mean El.					75.3	79.1	72.6	76.1	90.1	85.9	92.5	92.5	94.9	76.5	84.2	79.7	88.2	70.1	89.9	91.1	99.9	100.2	102.3	102.4	104.4	105.1	102.3	104.8	106.4	105.6	35.0	24.0	34.3	Apr-96	86.5	22.7	-42.2	10.3	-52.2			
	Highest El.					78.2	82.3	72.8	83.2	101.0	96.2	110.2	110.2	130.9	107.4	95.3	88.4	97.0	83.6	106.0	105.8	106.7	105.9	105.9	105.8	105.8	105.8	105.9	106.9	106.9	107.1	41.3	30.3	55.0	130.9	96.9	22.3	-52.4	24.7	-41.9			
SP-34	Mean El.															74.4	77.6	76.2	76.4	73.5	73.8	80.0	79.7	82.8	84.5	86.0	88.6	53.2	44.7	37.1	35.9	24.7	24.2	20.6	Nov-09	62.8	23.7	20.6	-3.6	-42.2			
	Highest El.															85.9	79.5	77.3	77.7	74.4	74.5	82.1	81.4	83.8	86.1	88.0	94.5	64.5	48.8	48.7	36.2	26.7	27.1	22.7	94.5	66.3	23.5	22.7	-4.4	-43.6			
Area Average	Mean El.	144.7	76.0	50.0	50.5	49.2	53.0	52.9	53.0	55.0	56.1	54.2	55.7	55.7	56.2	49.9	58.4	58.3	60.1	55.7	60.0	60.5	65.1	64.9	65.9	66.2	66.7	67.7	58.0	56.8	55.0	54.5	34.2	31.9	33.3		56.0	9.6	-16.6	1.4	-22.8		
	Highest El.	174.2	130.0	50.0	50.5	50.0	56.9	54.0	56.1	64.4	60.7	58.6	61.8	62.0	68.4	60.4	65.2	61.2	62.7	59.6	64.4	64.4	68.0	67.2	67.2	67.6	68.0	69.6	62.5	60.6	58.4	55.2	36.4	34.9	39.6		60.2	9.3	-20.8	4.8	-20.5		
Change vs Prior	Mean El.		-68.7	-26.0	0.5	-1.3	3.8	-0.2	0.1	2.0	1.1	-1.9	1.5	0.1	0.5	-6.3	8.5	-0.1	1.8	-4.4	4.3	0.5	4.6	-0.1	0.9	0.3	0.5	0.9	-9.6	-1.2	-1.8	-0.5	-20.2	-2.4	1.4								
	Highest El.		-44.2	-80.0	0.5	-0.5	6.9	-2.9	2.1	8.3	-3.7	-2.1	3.2	0.1	6.4	-8.0	4.8	-4.0	1.5	-3.2	4.8	0.0	3.6	-0.8	0.0	0.4	0.4	1.6	-7.0	-2.0	-2.2	-3.1	-18.8	-1.5	4.8								
HEADSCARP REGION																																											
SP-26	Mean El.					541.9	540.2	538.9	535.8	532.4	527.0	532.6	543.6	543.3	547.8	547.1	549.9	551.9	549.8	550.7	550.6	549.1	550.7	553.1	554.7	553.8	552.9	551.4	551.2	552.5	551.9	551.0	551.4	552.1	551.9	552.0	Apr-01	549.0	6.3	2.1	0.1	3.0	
	Highest El.					542.0	540.2	540.0	539.0	534.0	530.0	543.2	544.9	549.6	549.9	550.9	554.7	554.2	550.8	557.9	552.3	550.8	551.4	557.5	556.5	554.4	554.3	552.6	552.2	555.6	552.9	551.8	552.0	552.6	552.4	554.0	557.9	551.5	5.5	-0.7	1.5	2.4	
Change vs Prior																																											

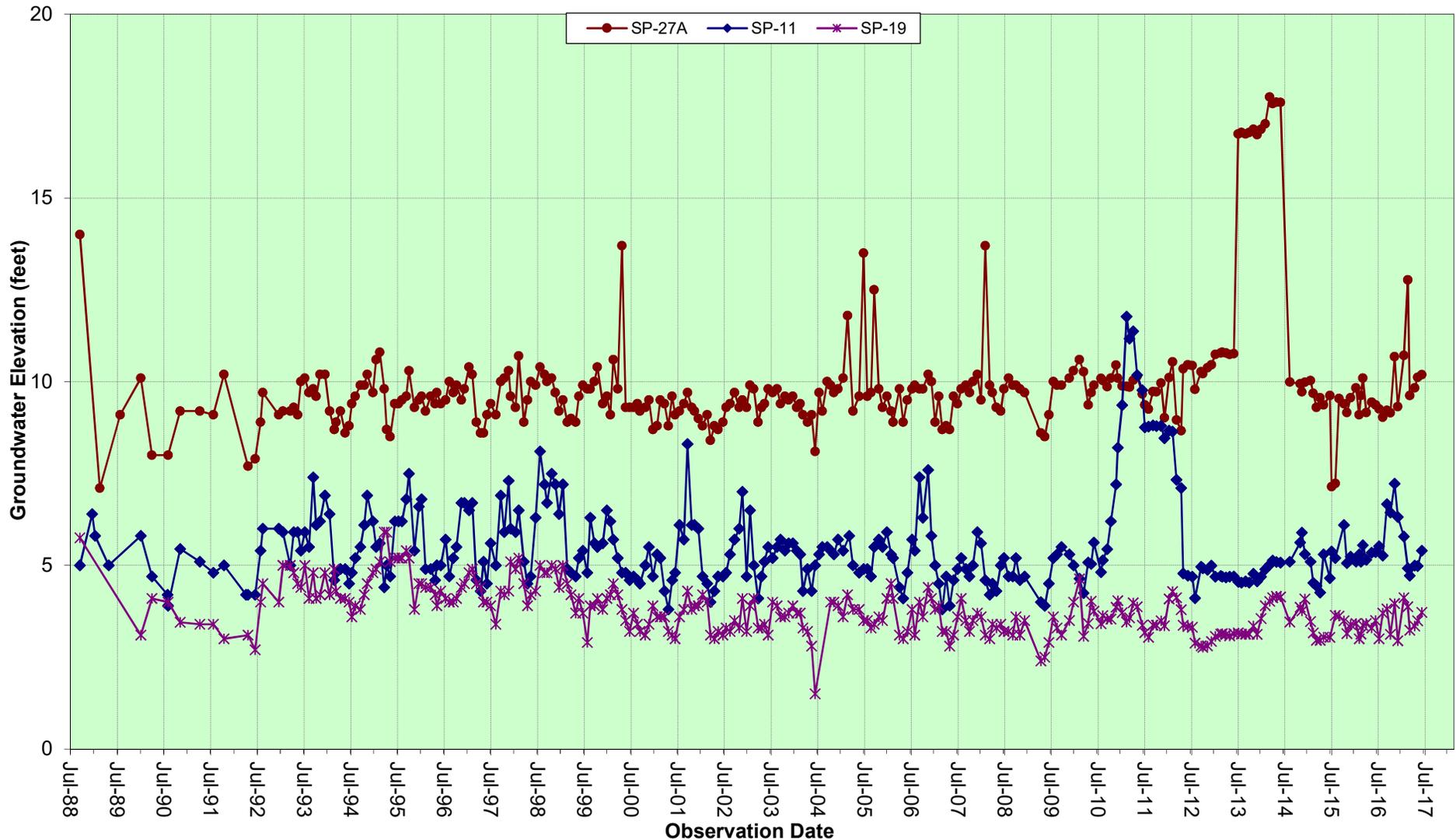
**BIG ROCK MESA LANDSLIDE ASSESSMENT DISTRICT
FY16-17 ANNUAL REPORT
CITY OF MALIBU, CALIFORNIA**



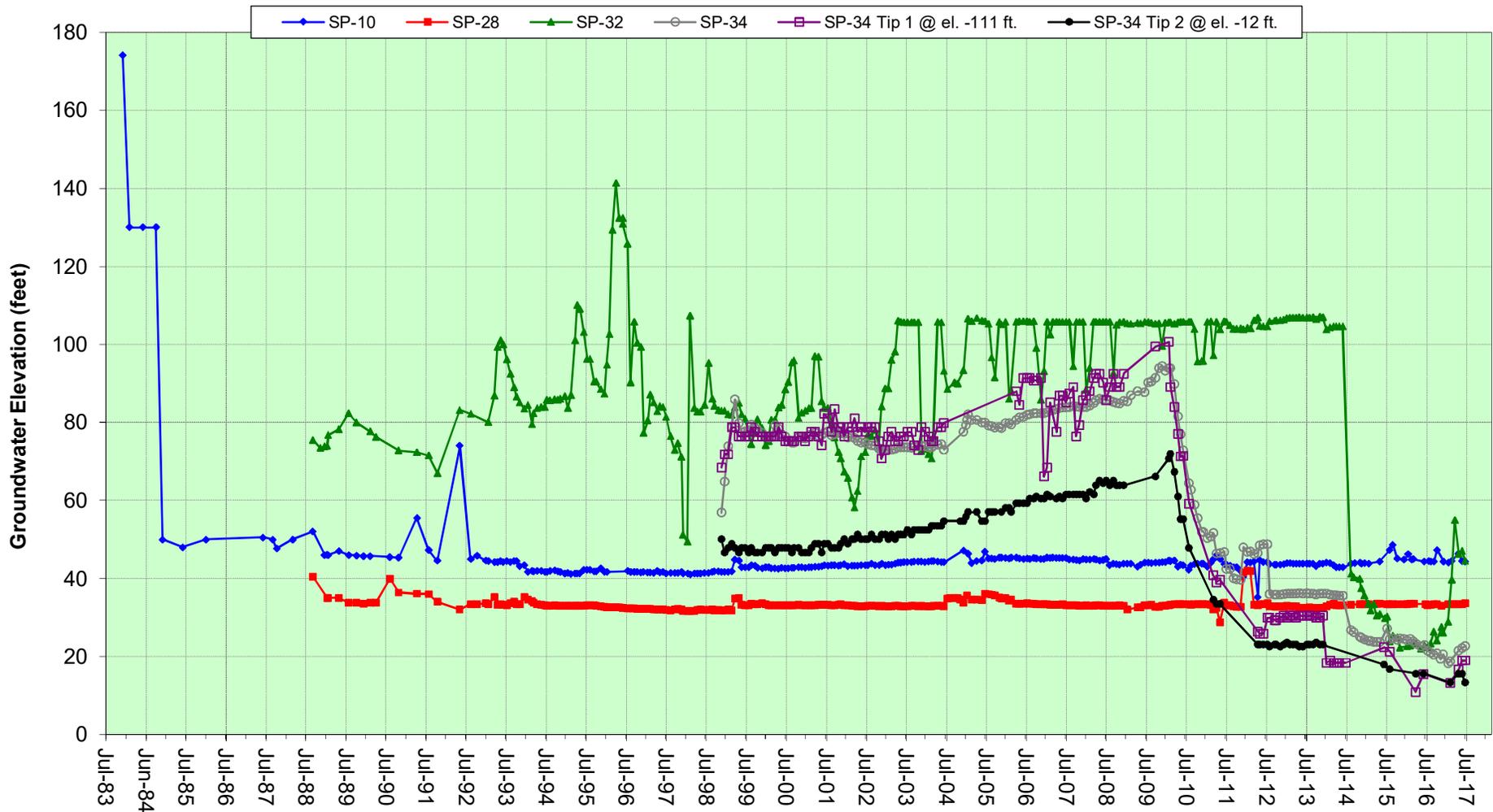
Piezometer I.D.	1983-84	1984-85	1985-86	1986-87	1987-88	1988-89	1989-90	1990-91	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	Highest Recorded	Mean '91 - '17	Stand Dev.	'16-'17 vs '97-'98	'16-'17 vs '15-'16	'16-'17 vs mean	
CENTRAL MESA																																									
SP-9A	Mean El.	254.7	232.0	232.0	227.5	236.3	222.2	220.0	233.3	215.1	221.9	226.8	220.8	222.0	222.0	224.6	226.8	226.4	228.0	229.3	229.5	230.0	229.7	229.9	228.3	227.5	227.1	227.7	226.6	230.6	230.6	238.6	224.9	223.5	222.7	Dec-83	226.6	4.4	-1.9	-0.8	-3.9
	Highest El.	270.0	232.0	232.0	232.0	236.3	224.0	222.2	235.2	222.9	228.5	228.5	225.5	223.8	223.7	231.1	229.0	226.9	231.0	230.6	232.3	231.5	232.5	231.9	229.7	229.7	228.4	229.2	227.5	238.6	238.6	238.9	225.7	224.2	227.7	270.0	229.5	4.3	-3.4	3.6	-1.8
SP-16	Mean El.	226.5	195.4	174.3	171.9	171.5	161.8	113.0	86.5	95.7				68.2	47.9	48.0	46.5	48.4	53.1	47.9	46.0	46.6	87.0	51.6	50.1	50.1	53.7	107.8	117.4	81.8	63.3	56.9	92.6	92.0	72.9	Mar-84	66.3	22.3	24.9	-19.2	6.5
	Highest El.	226.5	214.7	180.3	174.2	177.1	182.5	147.8	89.5	121.0				117.8	61.3	66.5	53.5	78.7	89.7	64.4	46.6	49.2	124.0	57.7	50.9	61.8	79.4	121.3	121.1	120.5	75.4	58.2	117.5	113.6	121.0	226.5	85.7	29.7	54.5	7.4	35.3
SP-16A	Mean El.					181.2	153.3	122.0	108.4	108.3	122.2	125.7	147.9	127.6	113.4	126.0	126.8	149.2	180.8	146.0	105.0	133.0	185.1	182.1	180.1	165.8	173.7	166.3	136.0	106.3	149.4	130.0	128.9	111.4	110.3	Jan-05	139.9	26.0	-15.7	-1.1	-29.6
	Highest El.					181.2	180.3	148.8	124.5	124.5	184.5	169.1	186.3	182.3	154.9	185.5	182.4	189.4	184.5	183.9	170.0	183.0	196.2	183.8	182.8	184.4	181.8	183.1	153.7	131.9	149.7	149.6	169.8	150.3	158.1	196.2	171.4	18.8	-27.4	7.8	-13.3
SP-17	Mean El.	406.0	401.8	395.3	399.1	398.3	393.3	392.0	385.1	382.7		385.5	390.1	389.3	388.3	393.6	390.0	385.6	389.1	386.9	387.9	388.6	393.8	393.6	391.9	388.4	386.8	386.1	387.5	385.4	386.0	385.9	381.1	379.4	382.5	Jan-84	387.4	3.7	-11.1	3.0	-5.0
	Highest El.	410.0	403.0	395.3	400.1	400.0	401.0	394.1	386.0	383.2		389.8	404.3	396.5	396.5	408.8	395.5	386.9	399.2	389.1	396.4	392.0	406.5	398.1	401.5	392.5	394.8	397.0	393.0	388.0	386.1	386.8	382.0	380.0	390.3	410.0	393.4	7.4	-18.5	10.3	-3.1
SP-17A	Mean El.						360.1	377.4	376.6	374.5	379.2	379.8	377.8	379.3	377.2	379.1	379.1	375.3	376.6	375.6	374.9	376.0	378.0	379.4	378.4	375.3	374.2	372.8	373.4	374.6	376.5	375.2	369.7	367.8	368.4	Feb-94	375.7	3.3	-10.7	0.7	-7.3
	Highest El.						372.4	378.5	377.7	375.7	385.0	389.8	384.4	381.6	380.5	386.7	382.9	376.4	381.1	377.3	376.5	377.2	385.2	383.4	380.7	376.3	376.3	373.7	375.0	376.2	377.0	376.8	370.6	368.7	369.8	389.8	378.6	5.3	-16.9	1.1	-8.9
SP-24	Mean El.	195.3	102.1	49.0	49.2		49.0		35.1	38.6	38.5	38.9	37.2	39.0	39.1	40.0	41.6	41.4	41.7	42.3	41.4	43.3	46.3	47.6	46.1	45.3	45.6	47.0	46.7	43.0	36.8	87.9	47.8	49.0	46.7	Mar-84	44.6	9.6	6.7	-2.3	2.1
	Highest El.	220.6	170.0	50.0	52.0		52.0		39.6	40.0	38.9	41.0	39.6	39.6	39.8	42.0	43.3	42.2	43.0	43.7	41.8	44.0	51.0	50.2	48.2	46.0	46.0	49.0	47.5	45.1	38.9	142.6	50.0	49.8	49.6	220.6	48.2	19.7	7.6	-0.2	1.4
SP-35	Mean El.																92.2	88.3	93.6	97.4	90.5	89.4	90.8	88.2	86.8	85.9	86.0	89.4	88.1	104.1	94.8	94.1	100.1	119.2	100.6	Feb-16	93.6	8.1		-18.6	7.0
	Highest El.																101.3	91.0	104.0	102.9	92.7	90.6	95.2	89.0	87.2	86.4	90.2	95.8	94.1	112.9	96.9	94.7	109.7	127.2	106.0	127.2	98.3	10.3		-21.2	7.7
SP-36	Mean El.																193.3	193.0	192.8	192.3	191.4	191.0	191.4	191.3	191.0	190.7	190.1	190.4	190.6	201.3	196.5	191.2	190.7	190.6	191.2	Jun-12	192.2	2.7		0.6	-1.0
	Highest El.																195.2	193.4	193.0	192.7	191.9	191.2	192.2	191.8	191.3	190.9	190.5	191.4	191.3	253.0	253.1	192.2	190.8	191.0	191.8	253.1	198.3	19.3		0.8	-6.5
Area Average	Mean El.	270.6	232.8	212.6	211.9	246.8	223.3	244.9	204.1	202.5	190.4	231.3	234.7	204.2	198.0	201.9	187.0	188.4	194.5	189.7	183.3	187.2	200.3	195.4	194.1	191.1	192.1	198.4	195.8	190.9	191.7	195.0	192.0	191.6	186.9		196.5	11.9	-15.0	-4.7	-9.6
	Highest El.	281.8	254.9	214.4	214.6	248.7	235.4	258.3	208.8	211.2	209.2	243.6	248.0	223.6	209.5	220.1	197.9	198.1	203.2	198.1	193.5	194.8	210.4	198.2	196.5	196.0	198.4	205.1	200.4	208.3	202.0	205.0	202.0	200.6	201.8		206.7	13.6	-18.3	1.2	-5.0
Change vs Prior	Mean El.		-37.8	-20.2	-0.7	34.9	-23.5	21.6	-40.8	-1.7	-12.0	40.9	3.4	-30.5	-6.2	3.9	-14.8	1.4	6.0	-4.7	-6.4	3.9	13.0	-4.8	-1.4	-3.0	1.0	6.3	-2.7	-4.9	0.8	3.2	-3.0	-0.4	-4.7						
	Highest El.		-26.9	-40.5	0.2	34.1	-13.3	22.9	-49.5	2.5	-2.0	34.4	4.4	-24.4	-14.2	10.7	-22.2	0.2	5.1	-5.1	-4.6	1.3	15.5	-12.1	-1.7	-0.5	2.4	6.6	-4.7	7.9	-6.3	3.0	-3.0	-1.4	1.2						
WESTERN EXTENSION																																									
SP-20	Mean El.	317.0	254.6	220.5	213.3	194.5	217.5	186.2	198.8	160.3	184.9	175.1	149.8	155.0	162.1	165.5	231.8	196.9	204.6	195.8	186.4	183.1	219.7	228.8	230.9	237.6	221.0	215.9	214.3	202.2	151.2	177.1	198.3	187.1	165.4	Feb-84	192.3	27.1	-0.1	-21.7	-26.9
	Highest El.	350.0	277.0	224.0	216.7	194.5	231.0	214.5	202.4	165.5	233.0	223.3	159.4	158.6	211.6	224.7	290.1	202.4	221.4	247.1	187.6	196.3	248.2	234.7	235.8	245.6	237.3	234.4	226.0	219.0	151.4	203.7	219.4	205.7	185.2	350.0	214.1	32.4	-39.5	-20.4	-28.9
SP-21	Mean El.		436.7	407.0		404.0	403.1	402.2	390.5	351.1	353.5	356.0	369.8	368.9	368.7	372.4	374.6	379.5	388.5	387.7	379.4	378.6	390.4	394.0	391.2	388.1	383.9	385.8	386.3	392.3	389.7	389.2	381.8	382.3	387.3	Apr-94	379.6	12.1	14.9	5.0	7.6
	Highest El.		450.9	407.0		405.0	407.0	410.4	399.1	358.9	361.2	358.0	393.9	374.3	377.1	396.4	379.3	389.6	401.2	393.0	385.5	381.9	408.9	403.3	396.4	393.2	387.5	392.5	394.7	395.0	389.9	389.9	383.6	383.2	396.5	450.9	387.1	12.9	0.1	13.3	9.4
SP-22	Mean El.		461.1	450.5	451.9	447.5	450.5	451.4	451.0	454.3	457.5	455.3	463.9	462.1	468.9	466.0	468.6	468.8	469.2	470.8	473.0	471.2	471.9	470.2	469.9	469.1	467.9	470.0	470.7	466.9	464.8	465.1	473.1	469.6	470.4	Dec-96	467.3	5.0	4.4	0.8	3.1
	Highest El.		493.5	450.5	454.1	450.9	455.7	451.4	451.3	468.0	471.3	464.5	477.0	469.6	501.5	470.4	470.7	471.0	474.2	471.1	476.6	475.1	475.1	471.0	470.9	470.9	469.7	470.9	472.8	470.6	465.1	466.8	477.5	471.2	472.6	501.5	472.5	6.7	2.2	1.4	0.0
SP-23	Mean El.					514.2	491.0	499.2	495.6	486.0	496.6	500.8	508.6	511.6	501.5	500.4	486.7	478.0	473.9	476.2	488.9	486.1	496.1	490.7	489.8	494.1	499.8	503.6	495.4	511.1	550.8	519.2	479.0	478.4	482.1	May-12	495.6	16.4	-18.3	3.7	-13.5
	Highest El.					514.2	491.0	536.0	509.1	489.4	513.1	507.3	518.2	549.6	527.6	518.4	502.7	488.7	488.6	504.5	538.1	535.7	534.6	500.5	492.0	502.0	503.1	514.0	506.7	551.1	551.0	550.4	498.7	479.2	493.2	551.1	513.8	22.0	-25.2	14.1	-20.6
Area Average	Mean El.	317.0	384.2	359.3	332.6	390.0	390.5	384.7	384.0	362.9	373.1	371.8	373.0	374.4	375.3	376.1	390.4	380.8	384.0	382.6	381.9	379.8	394.5	395.9	395.5	397.2	393.1	393.9	391.7	393.1	389.1	387.7	383.0	379.3	376.3		383.7	9.3	0.2	-3.0	-7.4
	Highest El.	350.0	407.1	360.5	335.4	391.2	396.2	403.1	390.5	370.5	394.7	388.3	387.1	388.0	404.5	402.5	410.7	387.9	396.4	403.9	397.0	397.3	416.7	402.4	398.8	402.9	399.4	402.9	400.1	408.9	389.3	402.7	394.8	384.8	386.9		396.9	9.7	-15.6	2.1	-10.0
Change vs Prior	Mean El.		67.2	-24.8	-26.7	57.4	0.5	-5.8	-0.8	-21.0	10.2	-1.4																													



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

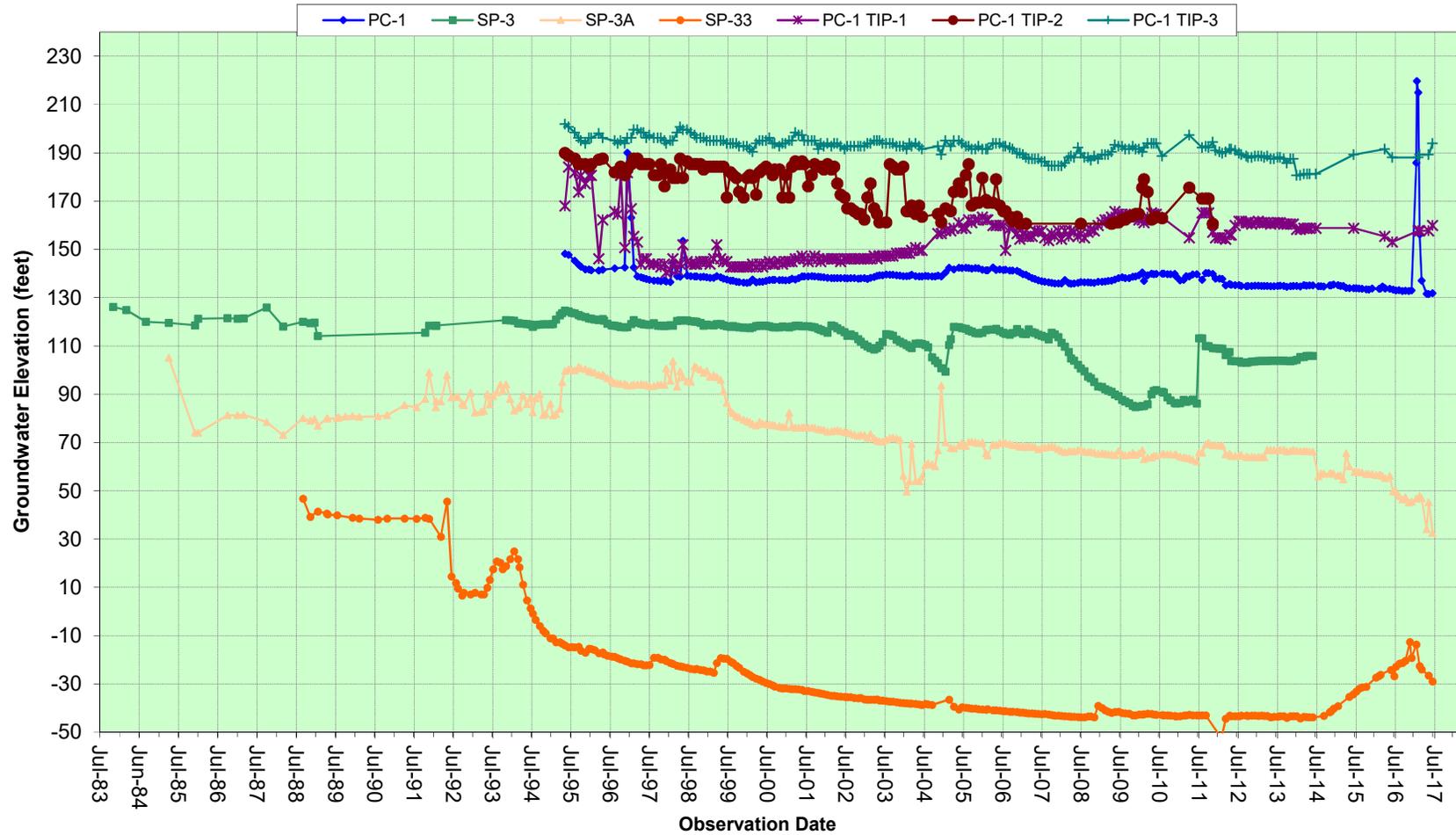


GROUNDWATER ELEVATION DATA
Pacific Coast Highway (Eastern Half)
Big Rock Mesa Landslide Assessment District
Malibu, California

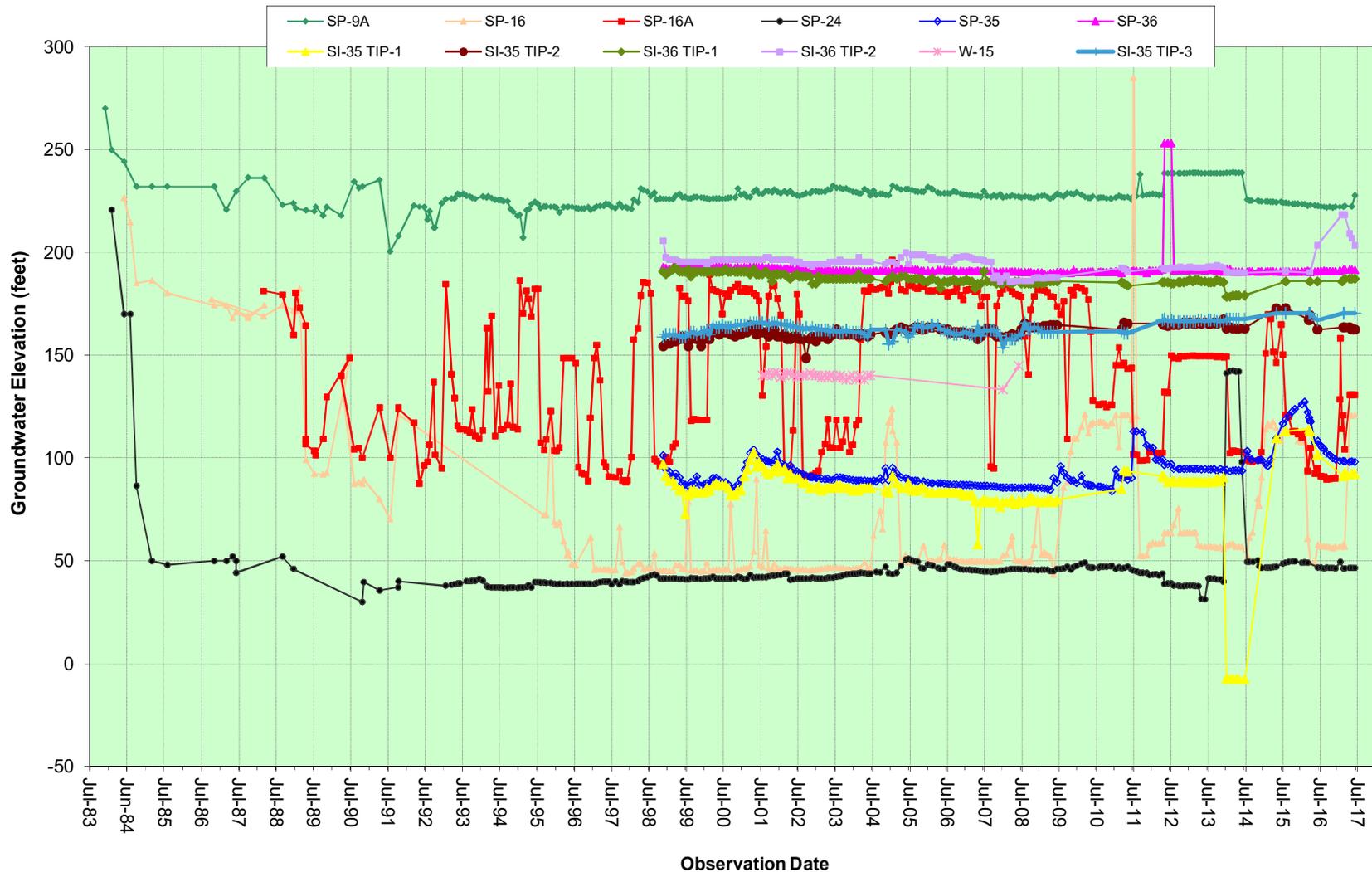


**GROUNDWATER ELEVATION DATA
 Bluff Region**

Big Rock Mesa Landslide Assessment District
 Malibu, California



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

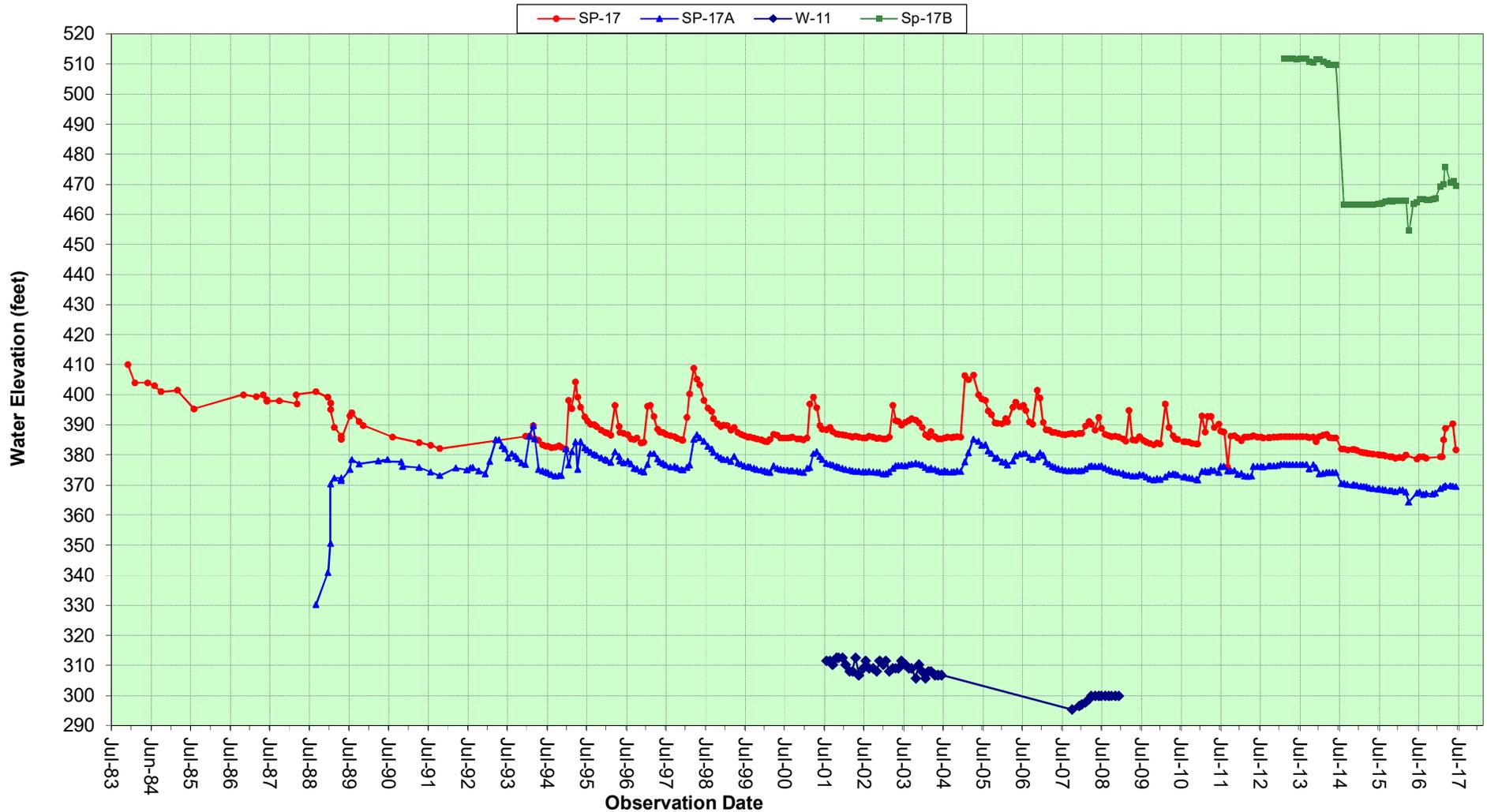


GROUNDWATER ELEVATION DATA

Central Mesa Region

Big Rock Mesa Landslide Assessment District
 Malibu, California

PLATE A-6a



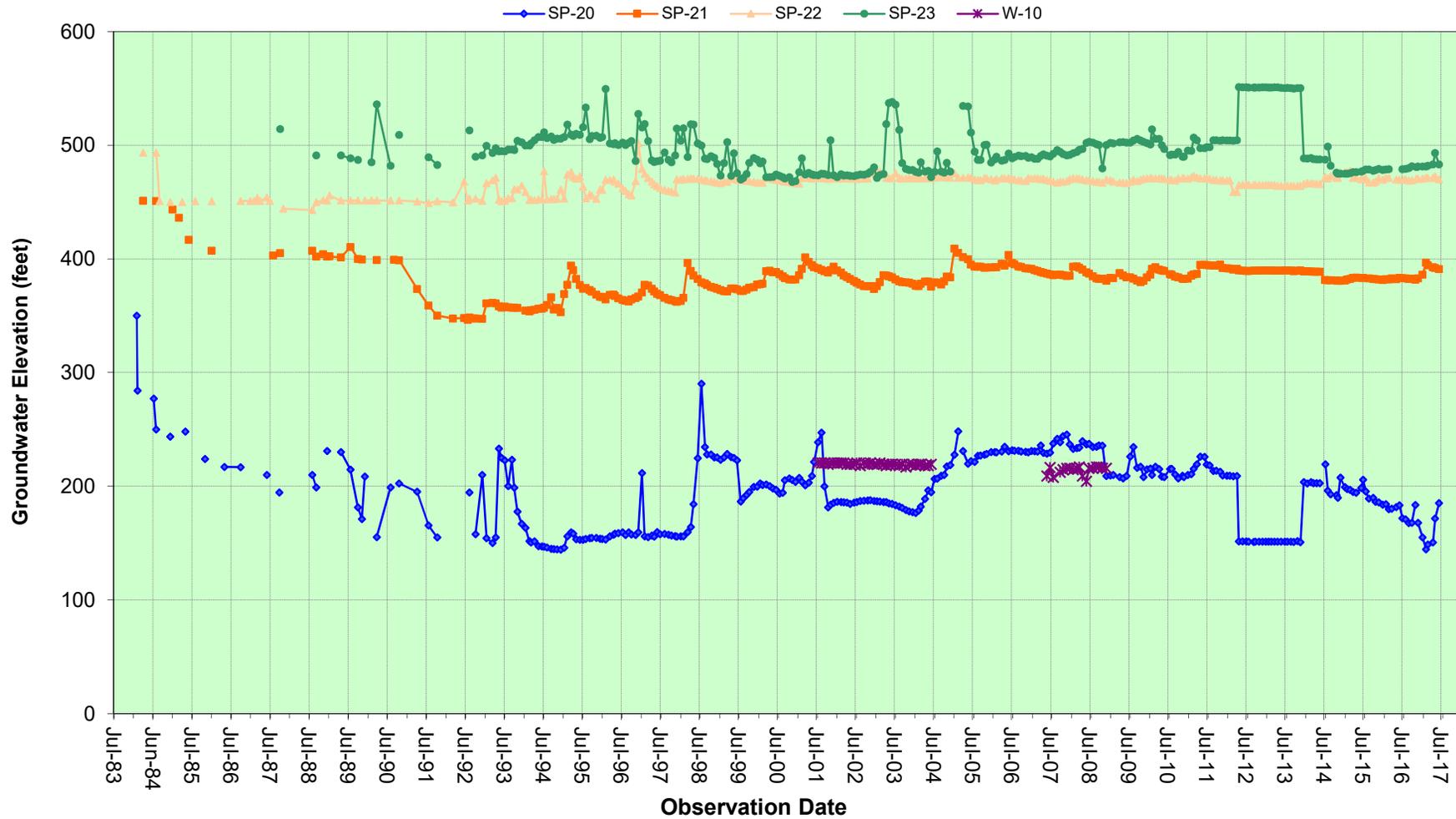
GROUNDWATER ELEVATION DATA

Central Mesa Region

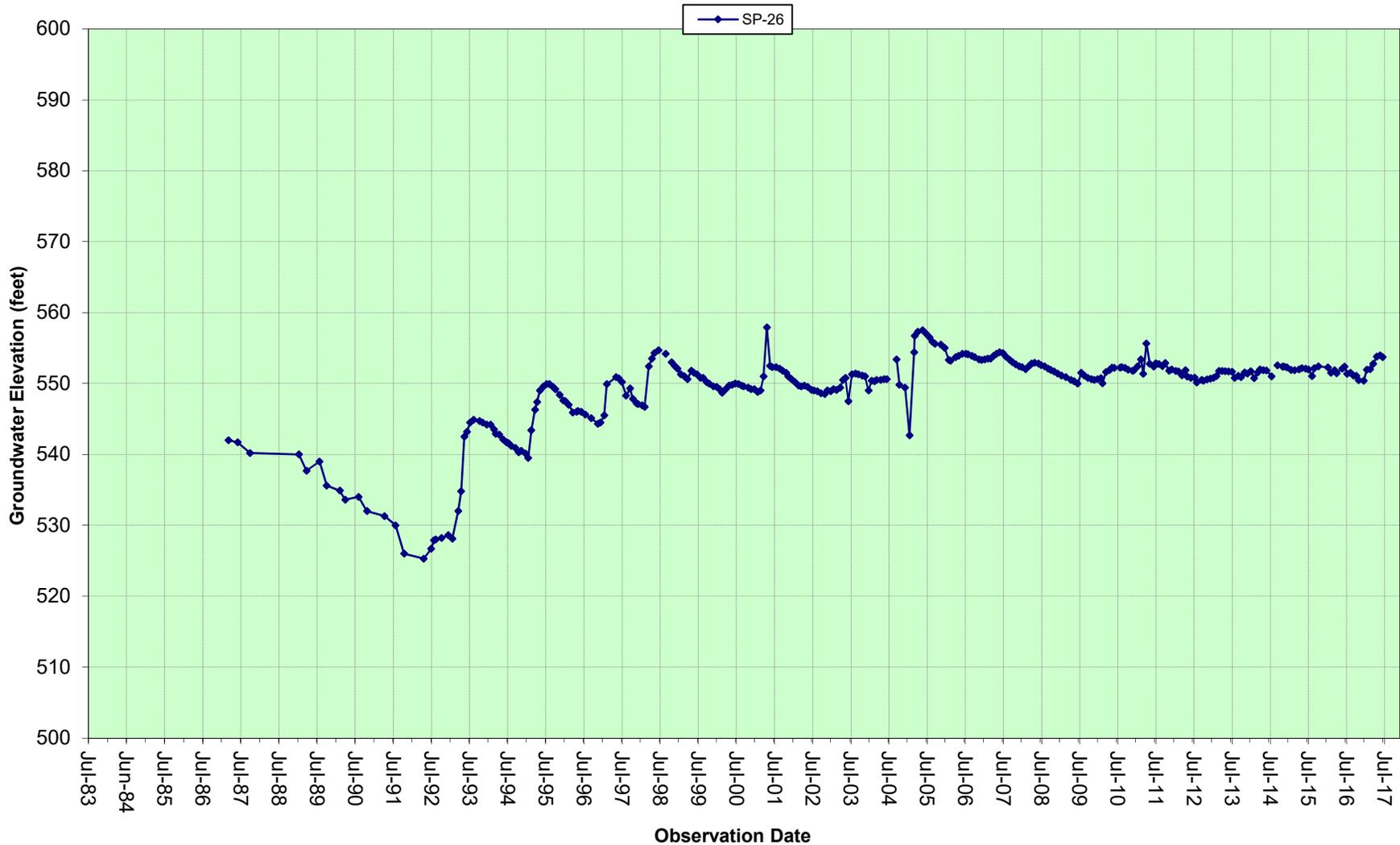
Big Rock Mesa Landslide Assessment District

Malibu, California

PLATE A-6b



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



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



**APPENDIX B
DEWATERING WELL DATA**

**BIG ROCK MESA LANDSLIDE ASSESSMENT DISTRICT
FY16-17 ANNUAL REPORT
CITY OF MALIBU, CALIFORNIA**



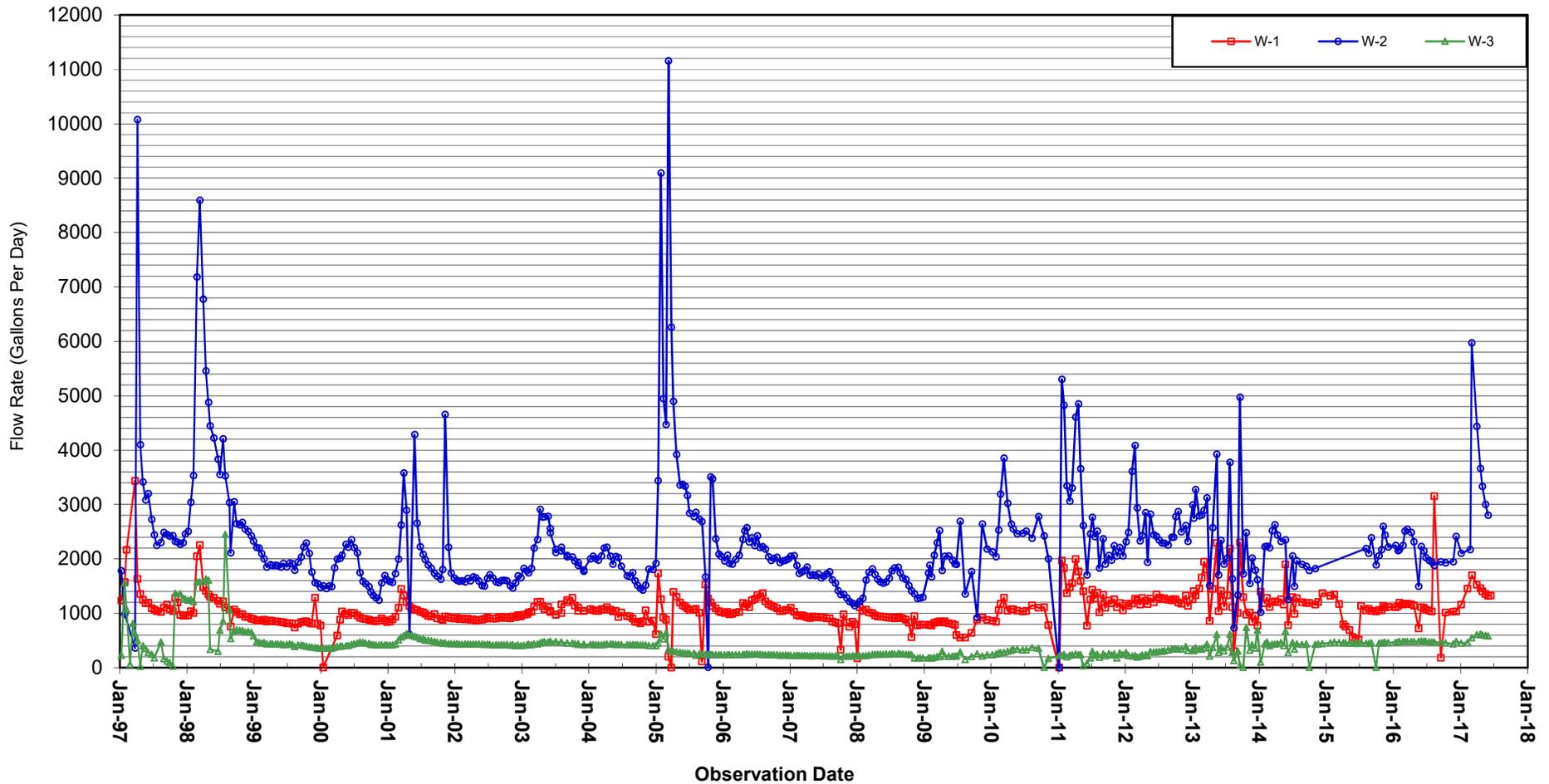
SUMMARY OF DEWATERING WELL INFORMATION										
Well I.D.	DATE COMPLETED (DA Evans 1986)	TOP ELEV. (ft.)	BOTTOM ELEV. (ft.)	PUMP ELEV. (ft.)	PUMP SIZE (HP)	2016-17 PUMPING RATE (GPD)	% of TOTAL PRODUCTION	Rank	Drainage Port	COMMENT
W-1	1977	210.5	-30	14.5	1.5	1,325	3%	11	3	Producing
W-2	1955	219	41	44	1.5	2,786	6%	6	3	Producing
W-3	1973	243.5	65.5	70.5	3/4	517	1%	19	3	Producing
W-4	1973	248	-10	N/A	N/A	0	0%	25	N/A	Non-producing, casing perforations closed due to siltation (BYA 1991)
W-5	1984	280	252	N/A	N/A	0	0%	25	N/A	Capped 4/4/84 (DA Evans 1986)
W-6	1983	174	80	N/A	N/A	0	0%	25	N/A	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	Non-producing, static water level at bottom of casing (BYA 1991)
W-8	1983	287	93	98	1	6,331	14%	2	4	Producing
W-9	1983	282	87	N/A	N/A	0	0%	25	N/A	Non-producing, static water level at bottom of casing (BYA 1991), replaced with BYA-11
W-10	1983	432	192	194	3/4	0	0%	25	N/A	Inactive, no pump
W-11	1983	507	285	292	3/4	0	0%	25	N/A	Inactive, disconnected from electrical, replaced with BYA-10
W-12	1983	375	195	N/A	N/A	0	0%	25	N/A	Non-producing, casing sheared at 185 ft.elevation (BYA 1991)
W-13	1983	361	184	193	1	759	2%	13	5	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	3/4	0	0%	25	N/A	Inactive, replaced with BYA-9
W-16	1984	325	107	113	3/4	8,615	19%	1	5	Producing
W-17	1984	270	41	50	3/4	2,445	6%	7	4	Producing
W-18	1984	750	179	225	3	3,266	7%	5	6	Producing
BYA-1	1990	281	-162	-128	3	1,558	4%	10	4	Producing
BYA-2	1990	665	215	242	1.5	527	1%	17	6	Producing
BYA-3	1990	510	-40	29	3	1,681	4%	9	6	Producing
BYA-4	1990	372	-68	-28	1.5	3,963	9%	3	5	Producing
BYA-5	1990	189	-231	-211	1.5	374	1%	20	1	Producing
BYA-6	1996	220	-280	-275	0.75	150	0%	23	1	Producing
BYA-7	1996	240	-120	-115	0.75	527	1%	18	2	Producing
BYA-9	1996	295	-105	-100	7.5(5)	3,435	8%	4	5	Producing
BYA-10	1996	510	210	215	1	610	1%	15	5A	Producing
BYA-11	1996	275	-125	-120	0.75	1,298	3%	12	5	Producing
BYA-12	1998	207	-140	-137	0.5	164	0%	22	1	Producing
BYA-13	1998	329	-14	-18	0.5	2,195	5%	8	3	Producing
BYA-14	1998	265	38	40	0.5	599	1%	16	1A	Producing
BYA-15	2002	429	340	300	1	7	0%	24	6	Producing <10 GPD
FW-1	2008	170			1	373	1%	21	1A	Producing
FW-2	2009	270	-130	-115	1.5	725	2%	14	4	Producing

Note:

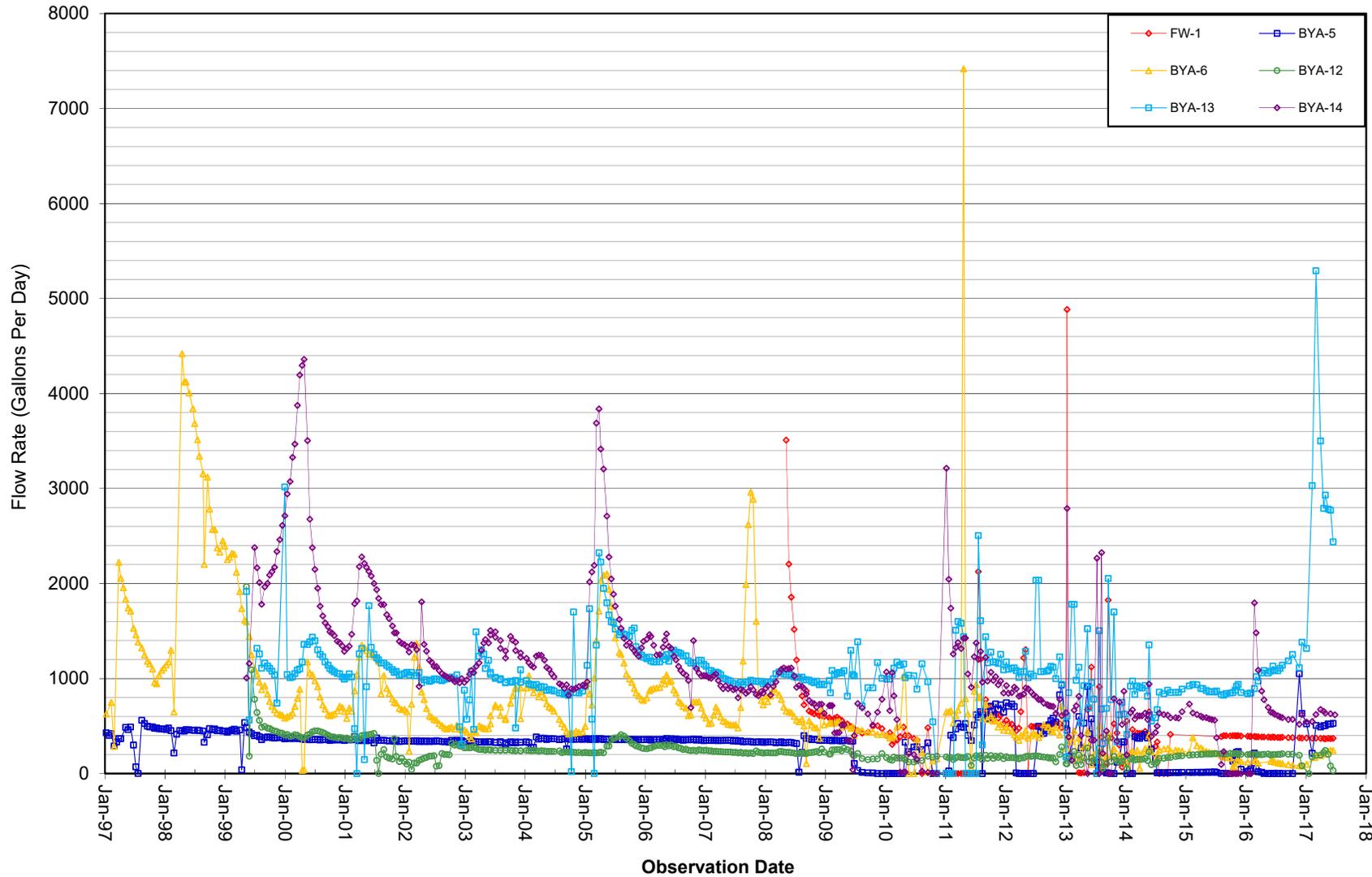
- Not functioning or no longer monitored dewatering well

DEWATERING WELL INFORMATION
Big Rock Mesa Landslide Assessment District
Malibu, California

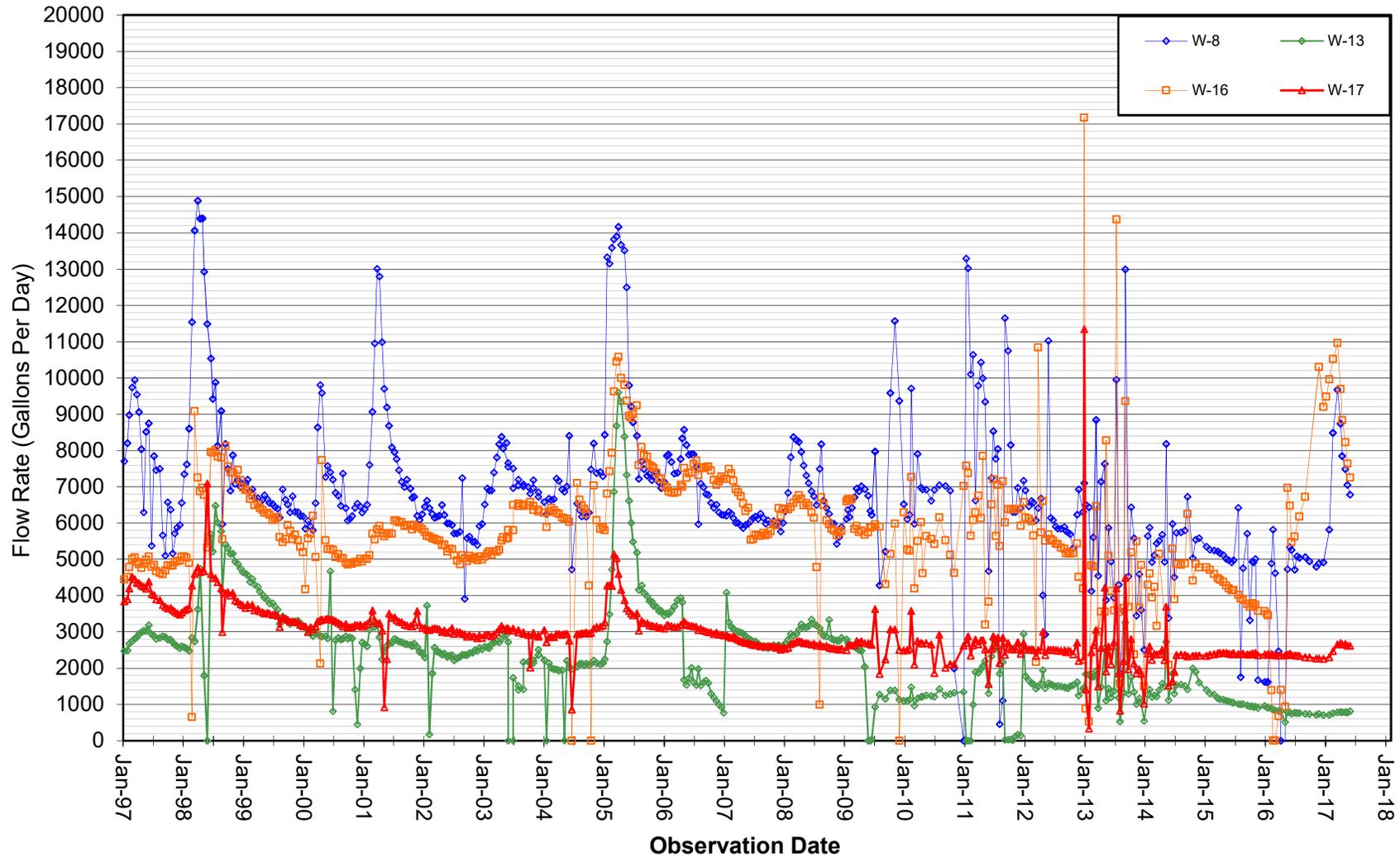
PLATE B-1



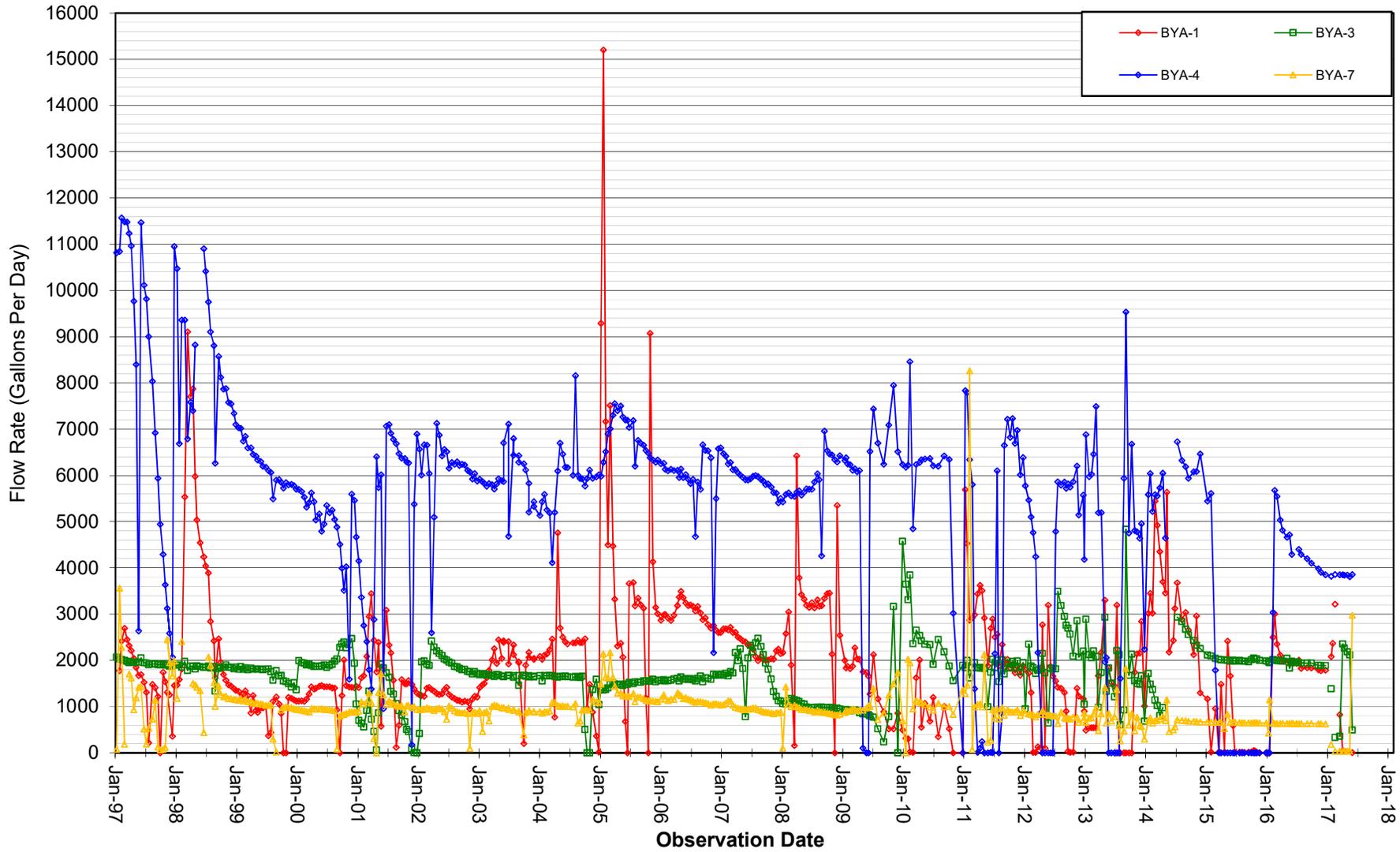
DEWATERING WELL HYDROGRAPHS
Eastern Mesa Region
Big Rock Mesa Landslide Assessment District
Malibu, California



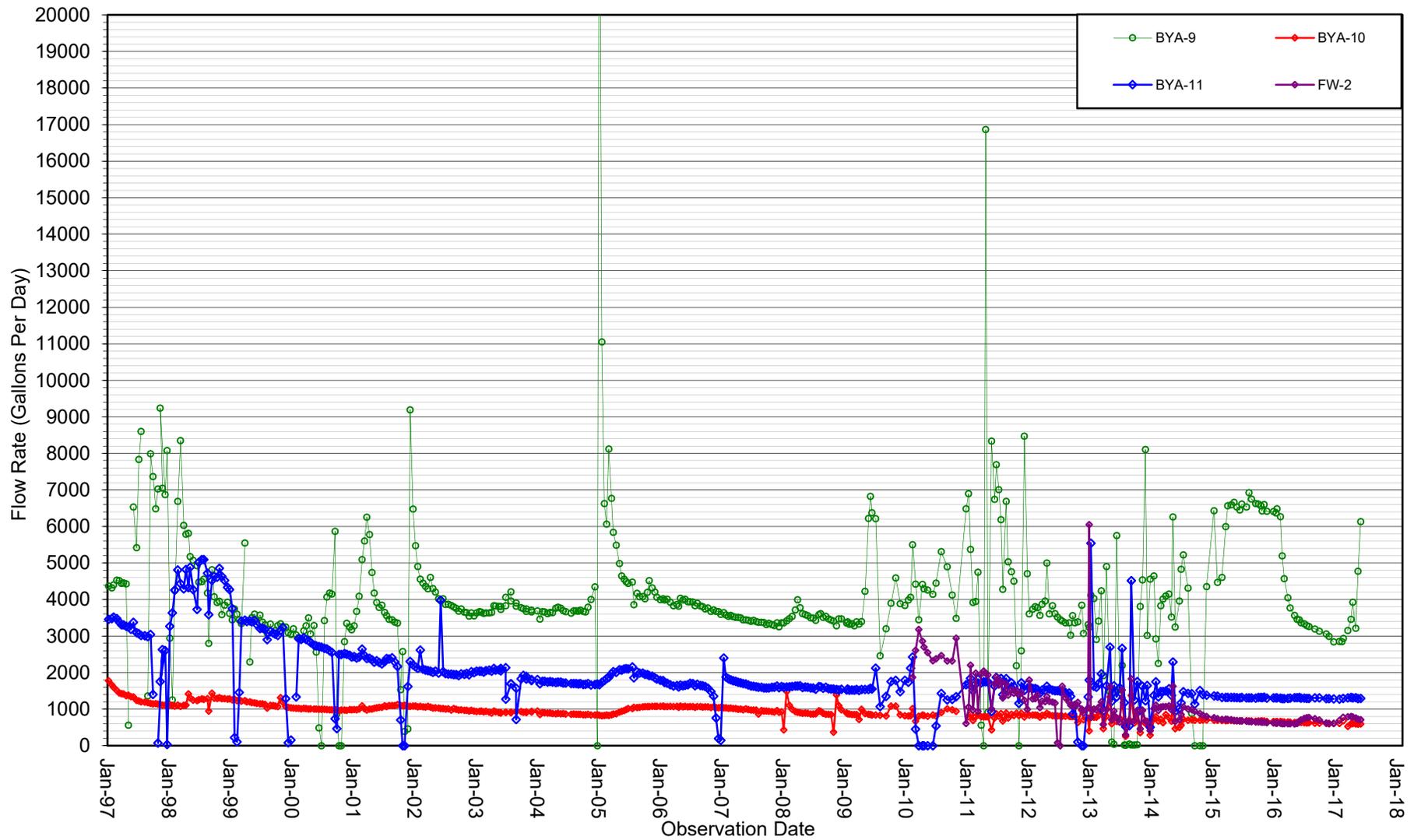
DEWATERING WELL HYDROGRAPHS
Eastern Mesa Region
Big Rock Mesa Landslide Assessment District
Malibu, California



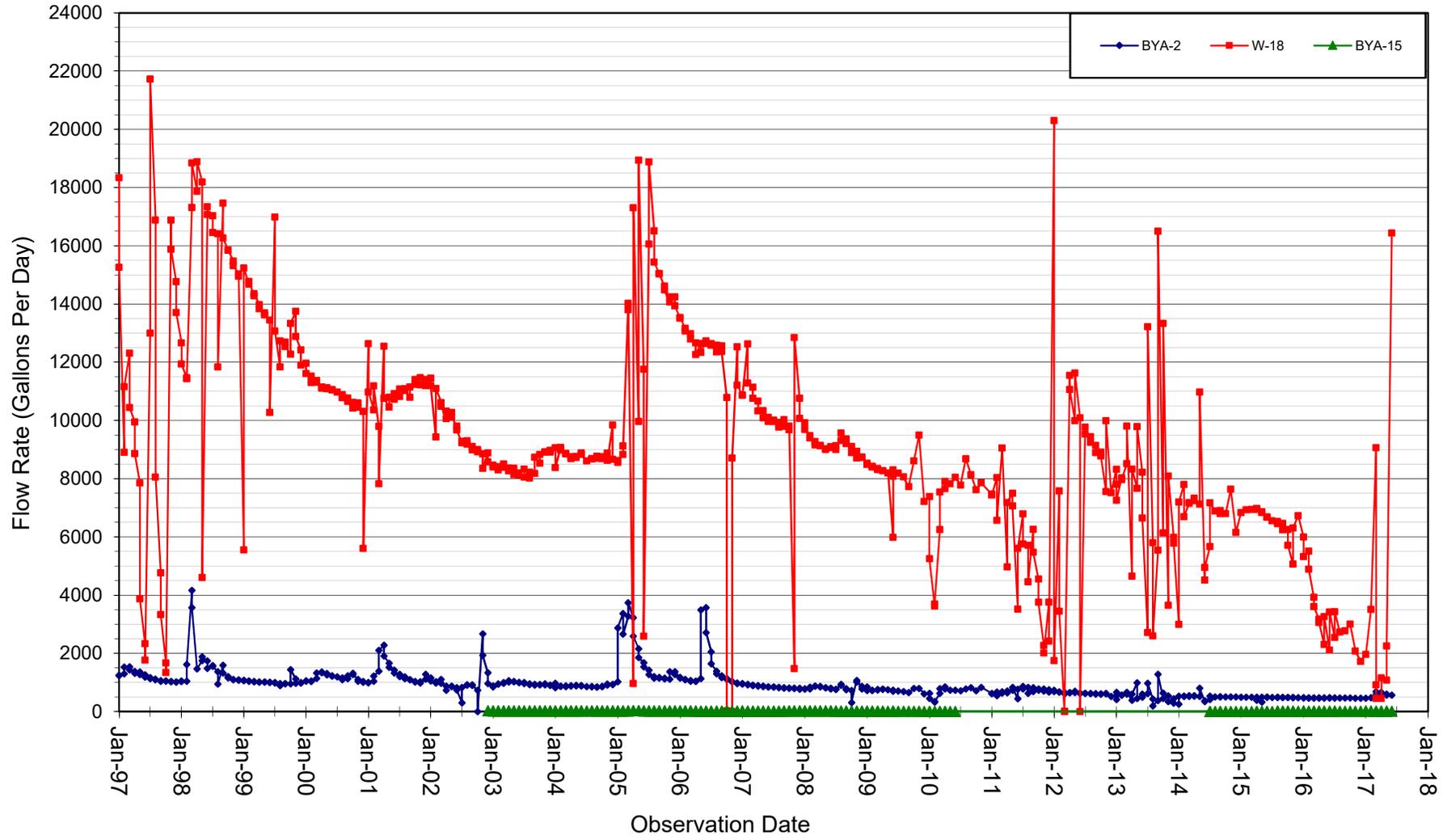
DEWATERING WELL HYDROGRAPHS
Central Mesa Region
Big Rock Mesa Landslide Assessment District
Malibu, California



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



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



**DEWATERING WELL HYDROGRAPHS
Western Extension
Big Rock Mesa Landslide Assessment District
Malibu, California**



**APPENDIX C
HYDRAUGER DATA**



SUMMARY OF HYDRAUGER INFORMATION							
HYDRAUGER ID	INSTALLED LENGTH (ft.)	OPEN LENGTH (ft.)**	Orientation/ Slope	2016-2017 Average Flow (GPD)	% OF TOTAL PRODUCTION	Rank	INSTALLED BY
H-1	700	210**	S115W / 3	19	0.1%	21	MT
HD-4	760	10	-	546	4.0%	7	D.E.
HD-5	890	530**	-	541	4.0%	8	D.E.
HD-6	980	490**	-	310	2.3%	12	D.E.
HD-7	1160	420**	-	78	0.6%	16	D.E.
HD-9	205	205**	-	561	4.1%	6	D.E.
HD-10	990	170**	-	458	3.4%	9	D.E.
HD-11	540	540**	-	101	0.7%	14	D.E.
HD-12	690	385**	-	2468	18.1%	2	D.E.
HD-15	200	200**	-	80	0.6%	15	D.E.
HD-22	568	540**	-	1135	8.3%	5	D.E.
HD-23	1280	260**	-	1714	12.6%	4	D.E.
HD-24	1030	580**	-	66	0.5%	17	D.E.
HD-25	1005	360**	-	37	0.3%	19	D.E.
HD-26	1200	410**	S37W / 1	1902	14.0%	3	D.E.
HD-28	1420	595**	-	0	--	--	D.E.
HD-29	1150	450**	-	20	0.1%	20	D.E.
HD-30	1040	10**	S13W / 7	2515	18.4%	1	D.E.
HD-33	340	340	S23W / 5	0	--	--	BYA
HD-41	500	500	S18E / 3	45	0.3%	18	BYA
BYA-H8	500	345**	-	1	0.0%	24	BYA
BYA-H10	500	10**	-	209	1.5%	13	BYA
HD-42	700	700	-	376	2.8%	11	Fugro
HD-43	700	700	-	454	3.3%	10	Fugro
H-2*	Unknown	0	-	0	--	--	MT
H-3a*	Unknown	0	-	0	--	--	MT
H-3b*	Unknown	0	-	0	--	--	MT
H-3c*	Unknown	0	-	0	--	--	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	-	0	--	--	CT
H-7a*	100	100	-	0	--	--	CT
H-7b*	100	96	-	0	--	--	CT
H-7c*	50	0	-	0	--	--	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	0	--	--	BYA
HD-40*	595	595	S25W / 6	0	--	--	BYA
BYA-6a	350	20**	-	8	0.1%	23	BYA
BYA-6b	60	60	-	9	0.1%	22	BYA
BYA-7	400	375**	-	0	--	--	BYA
BYA-H9*	550	550**	-	0	--	--	BYA
BYA-H11*	450	400**	S7E / 3	0	--	--	BYA

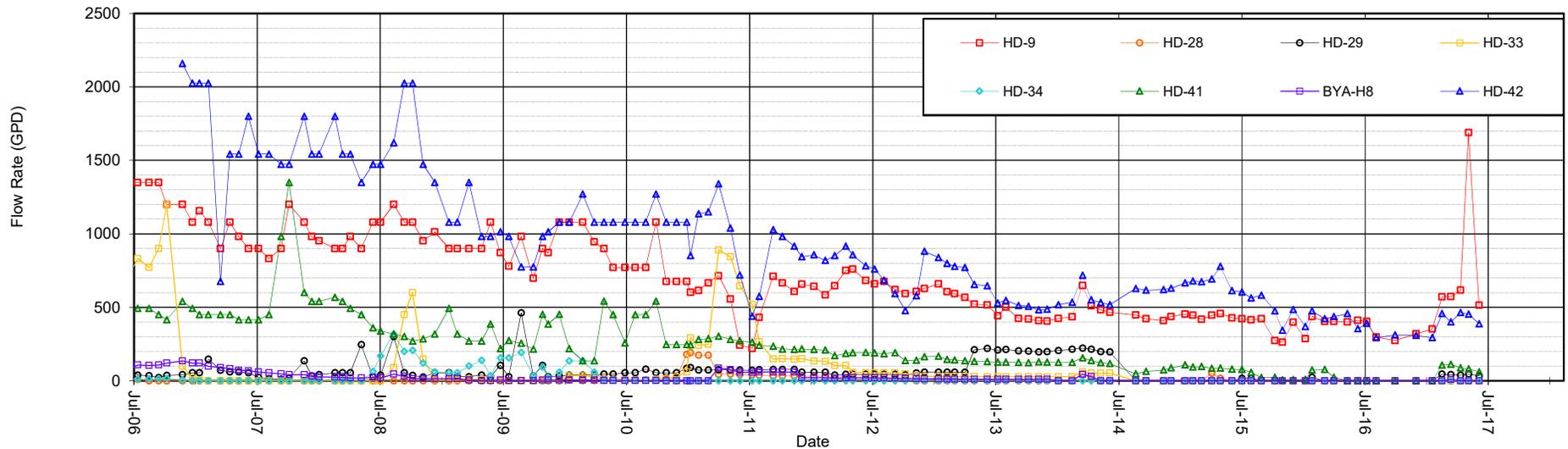
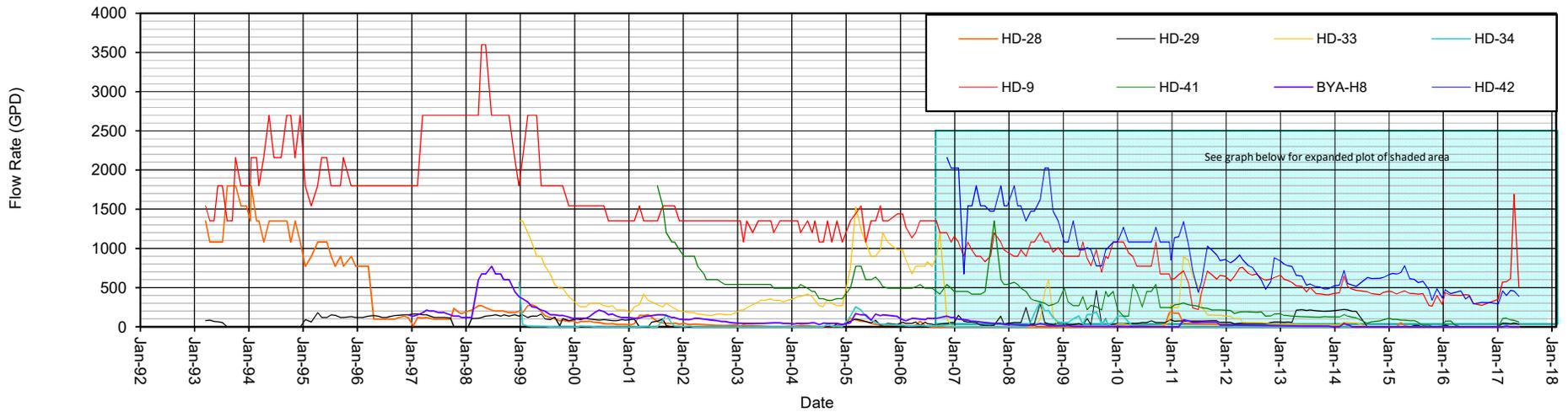
* Not functioning or no longer monitored hydrauger

** 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

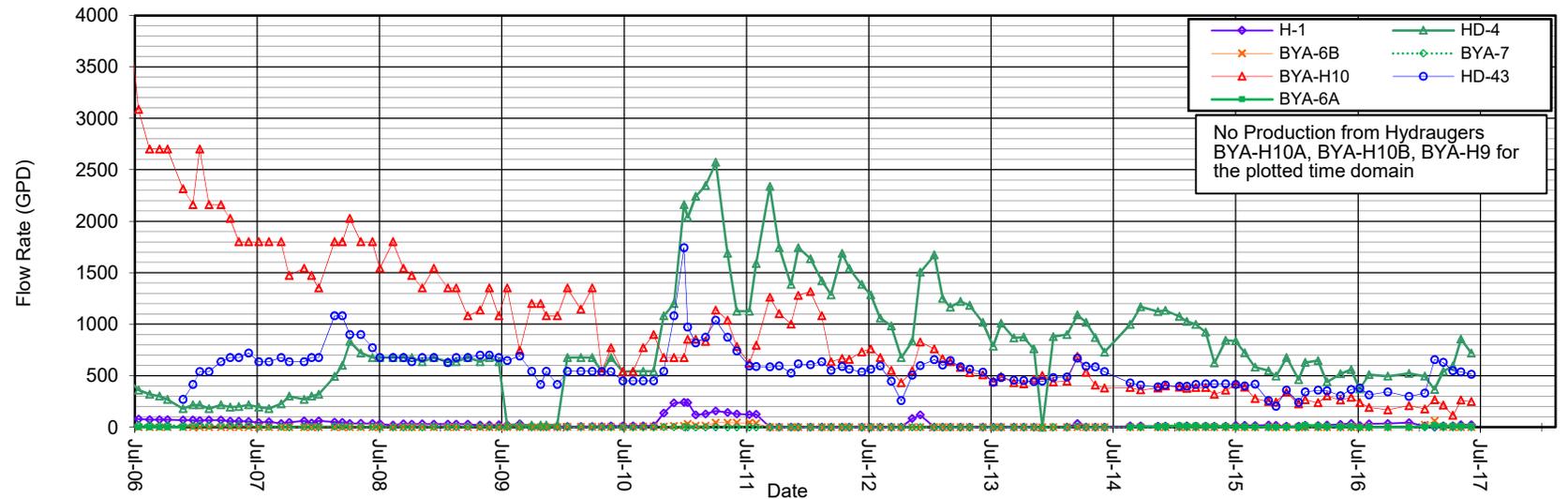
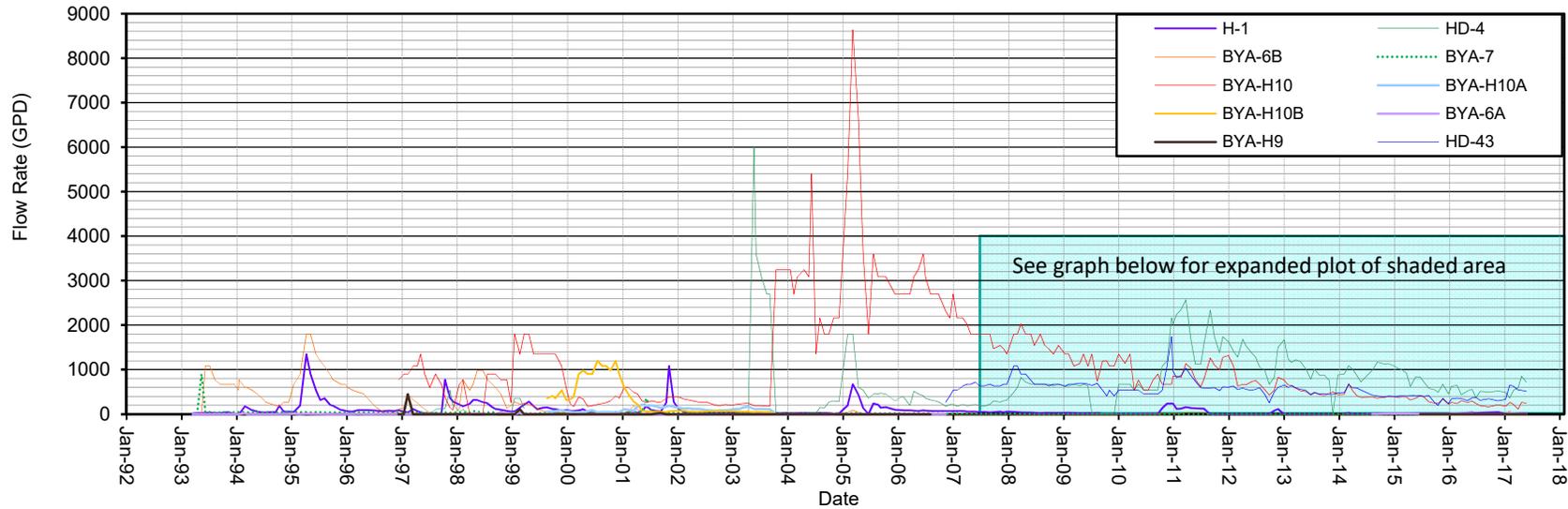
SUMMARY OF HYDRAUGER INFORMATION
 Big Rock Mesa Landside Assessment District
 Malibu, California

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 FY16-17 ANNUAL REPORT
 CITY OF MALIBU, CALIFORNIA**



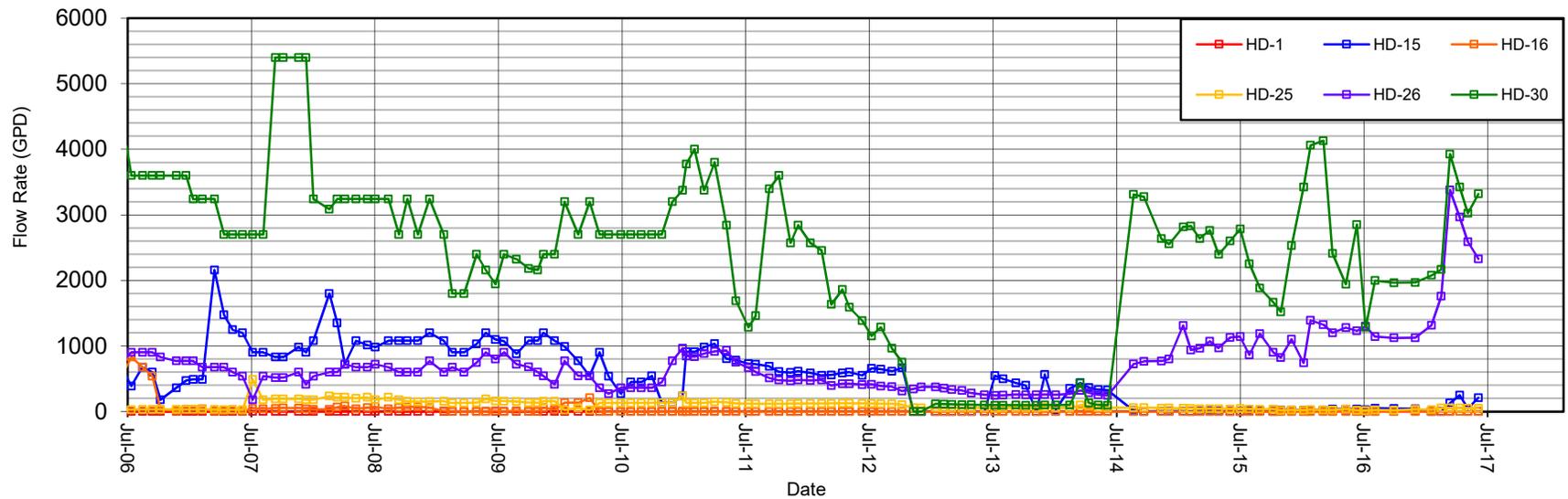
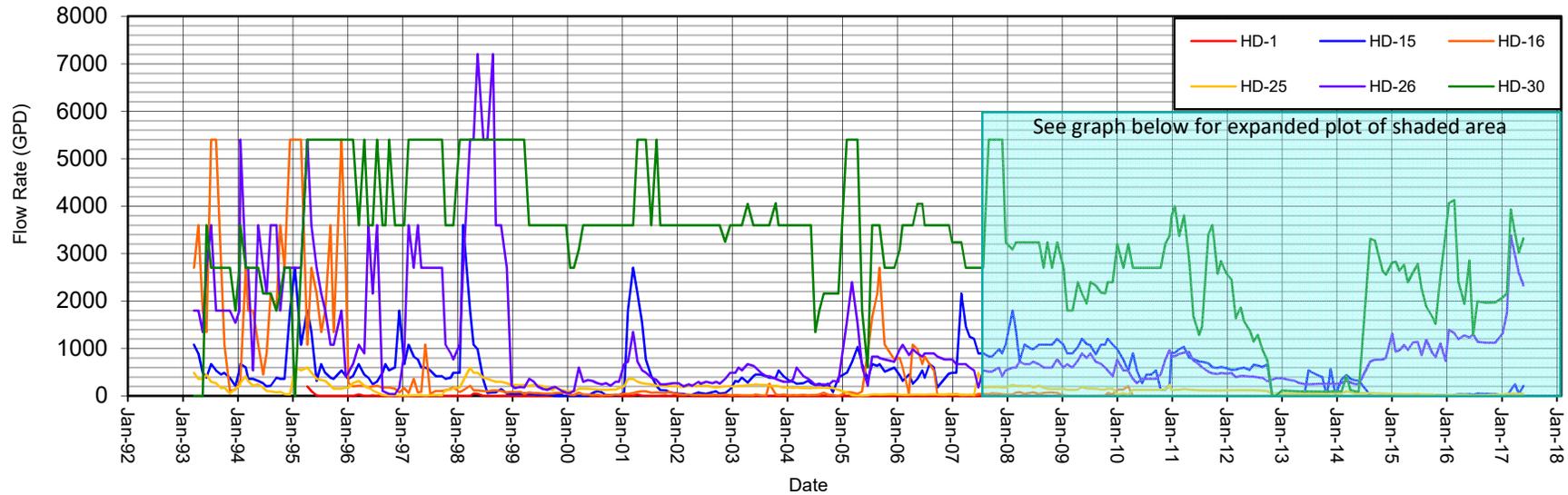
DISCHARGE RATE FOR HYDRAUGERS
Eastern Mesa Region
 Big Rock Mesa Landslide Assessment District
 Malibu, California

**BIG ROCK MESA LANDSLIDE ASSESSMENT DISTRICT
 FY16-17 ANNUAL REPORT
 CITY OF MALIBU, CALIFORNIA**



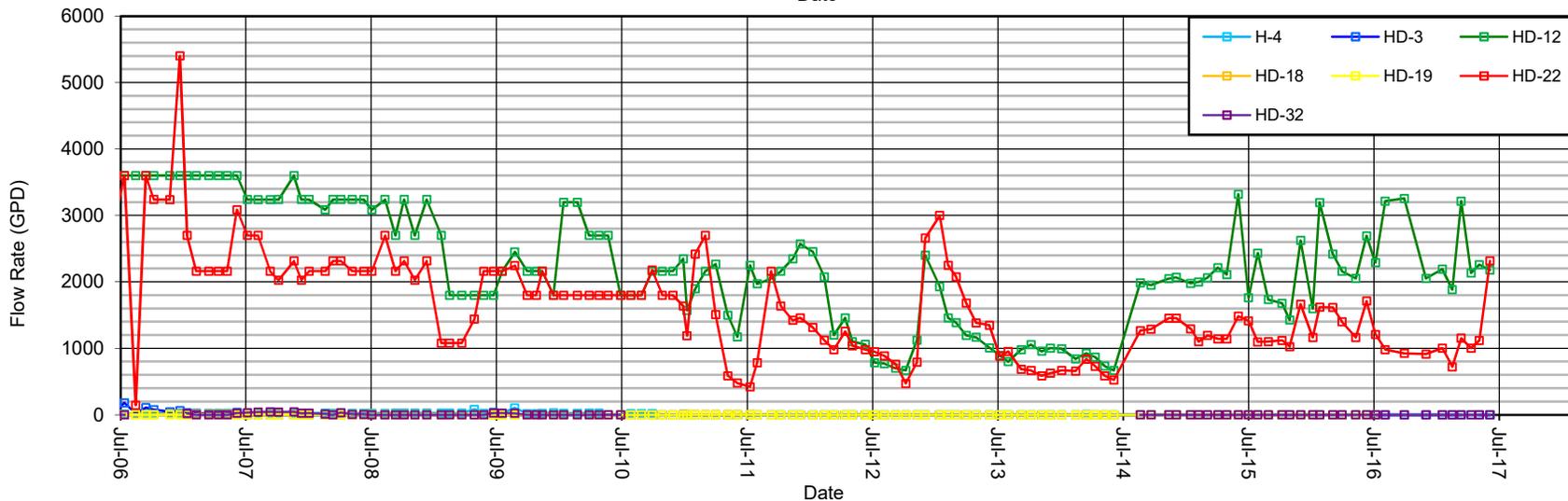
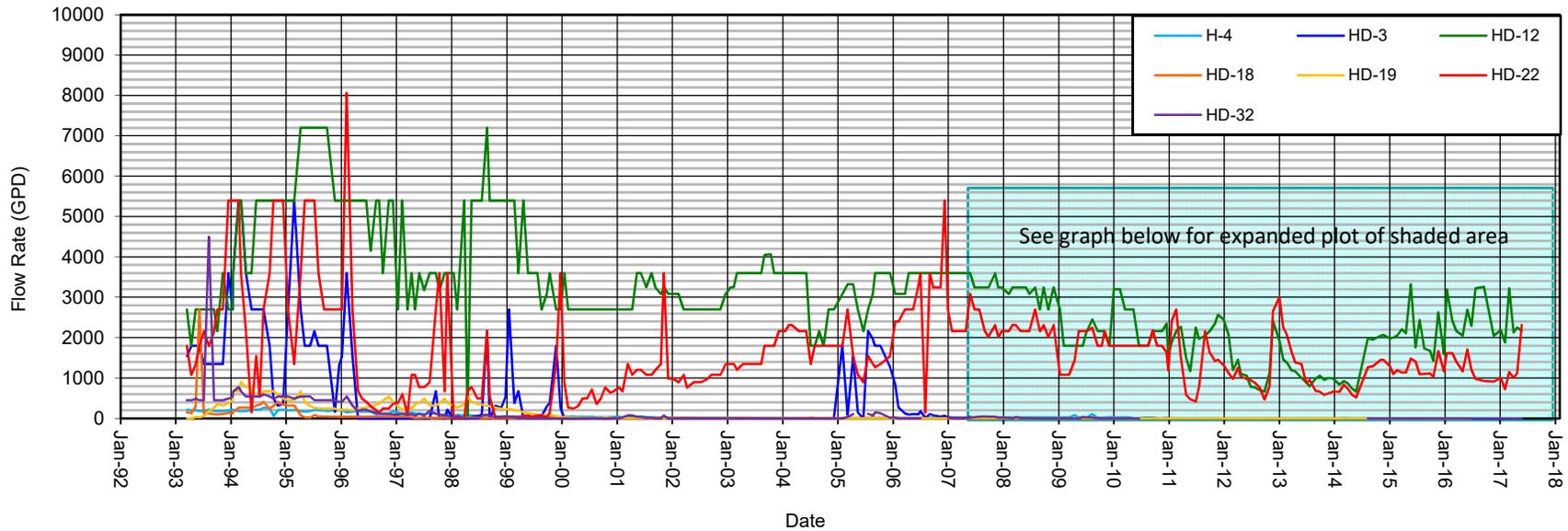
DISCHARGE RATE FOR HYDRAUGERS
Eastern Mesa Region
 Big Rock Mesa Landslide Assessment District
 Malibu, California

**BIG ROCK MESA LANDSLIDE ASSESSMENT DISTRICT
 FY16-17 ANNUAL REPORT
 CITY OF MALIBU, CALIFORNIA**



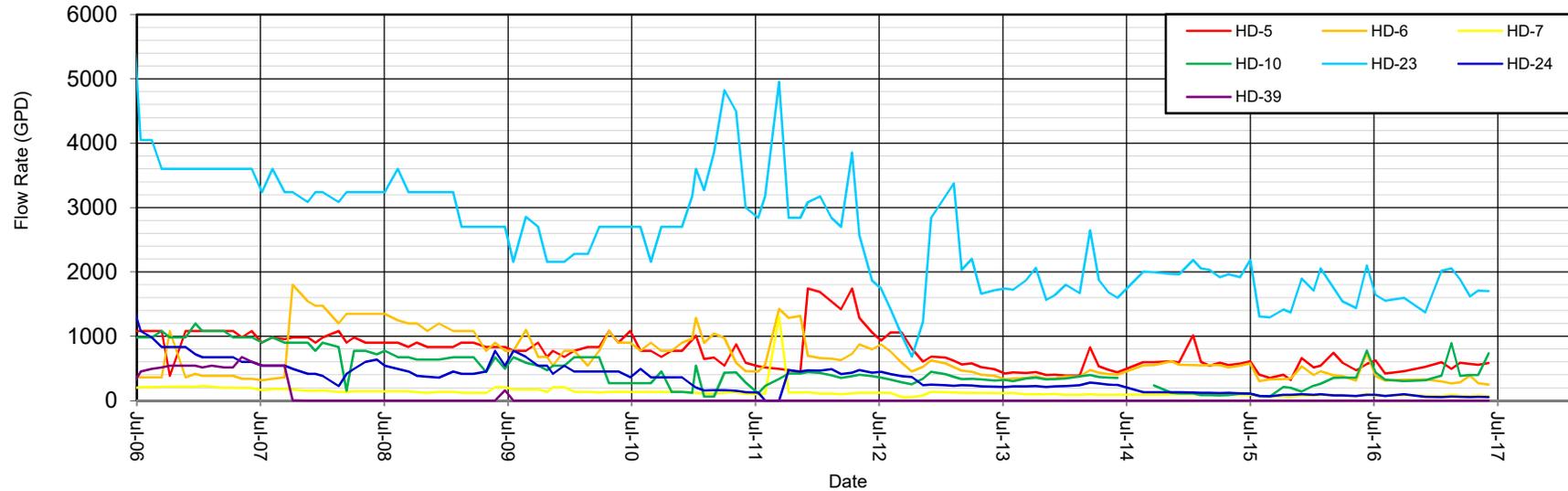
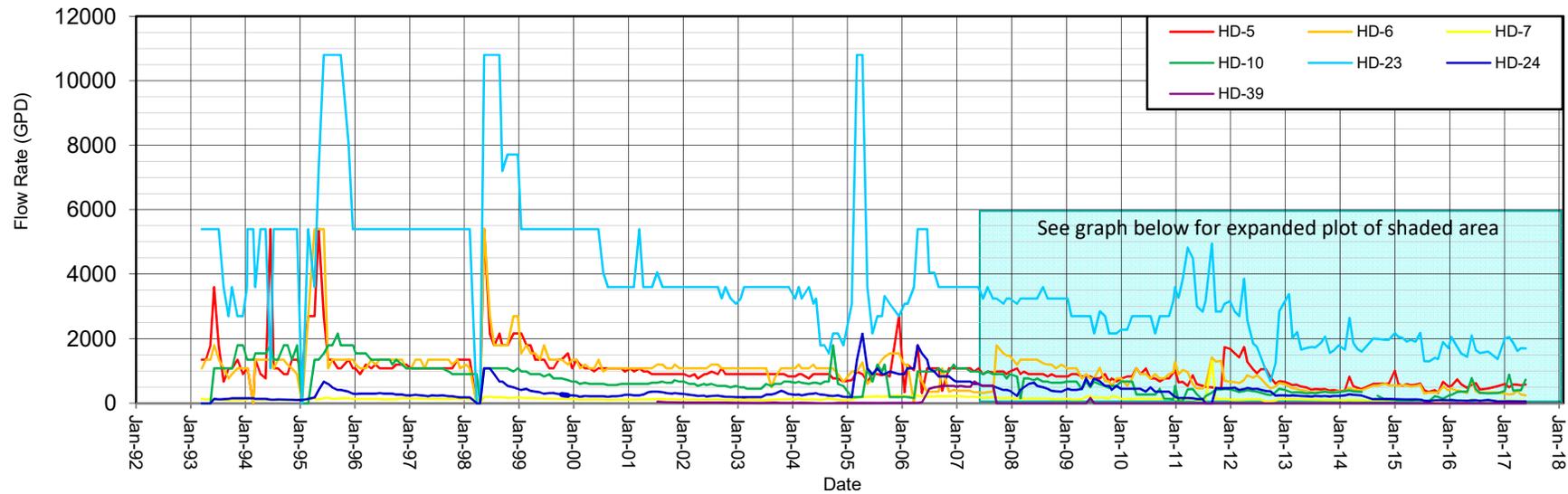
DISCHARGE RATE FOR HYDRAUGERS
Central Mesa Region
 Big Rock Mesa Landslide Assessment District
 Malibu, California

**BIG ROCK MESA LANDSLIDE ASSESSMENT DISTRICT
 FY16-17 ANNUAL REPORT
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DISCHARGE RATE FOR HYDRAUGERS
Central Mesa Region
 Big Rock Mesa Landslide Assessment District
 Malibu, California

**BIG ROCK MESA LANDSLIDE ASSESSMENT DISTRICT
 FY16-17 ANNUAL REPORT
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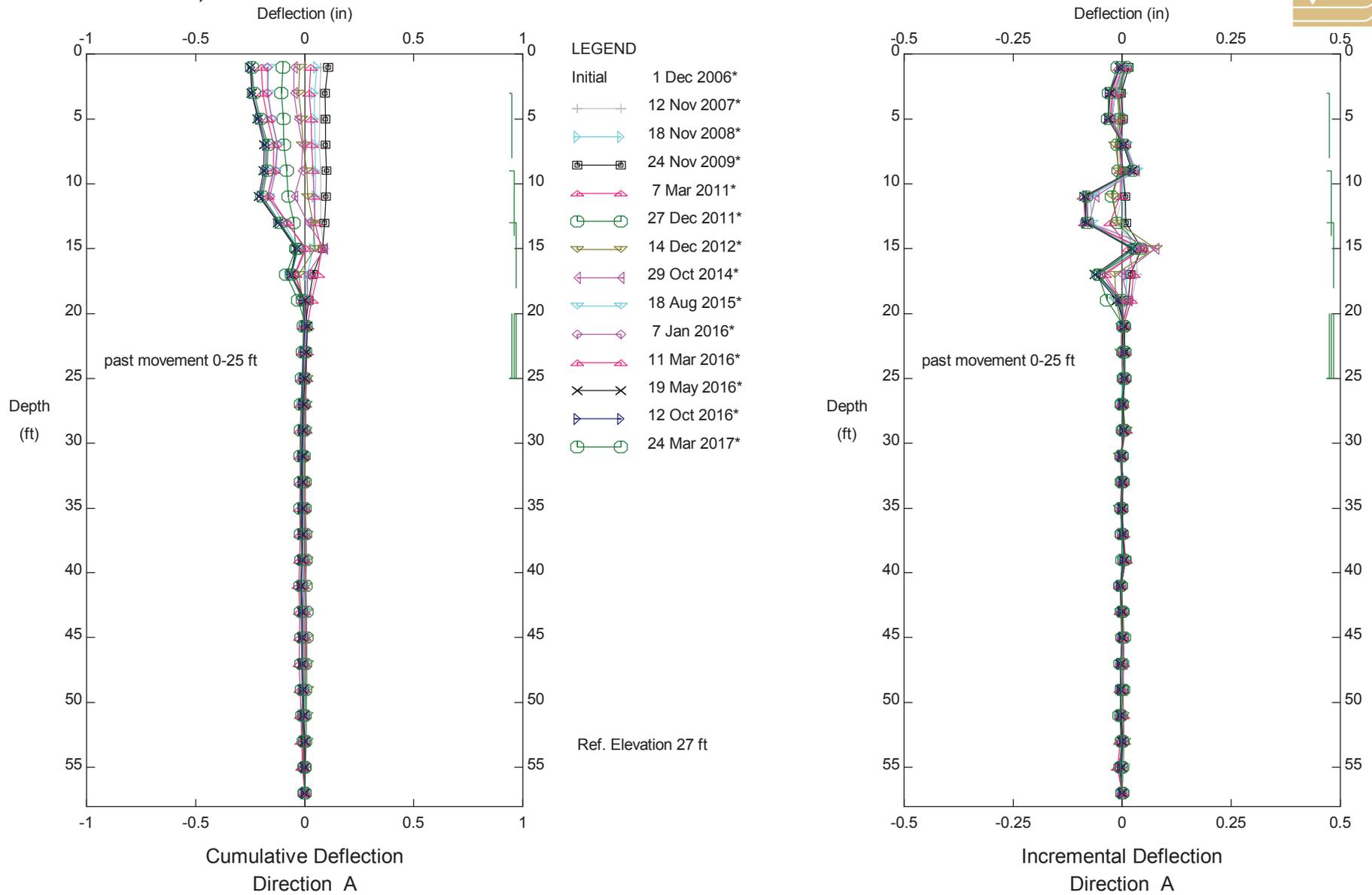
**DISCHARGE RATE FOR HYDROGAUGERS
 Western Extension
 Big Rock Mesa Landslide Assessment District
 Malibu, California**



**APPENDIX D
SLOPE INCLINOMETER PLOT/DATA**

**BIG ROCK MESA LANDSLIDE ASSESSMENT DISTRICT
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 CITY OF MALIBU, CALIFORNIA**

Fugro USA Land, Inc. - Ventura, CA

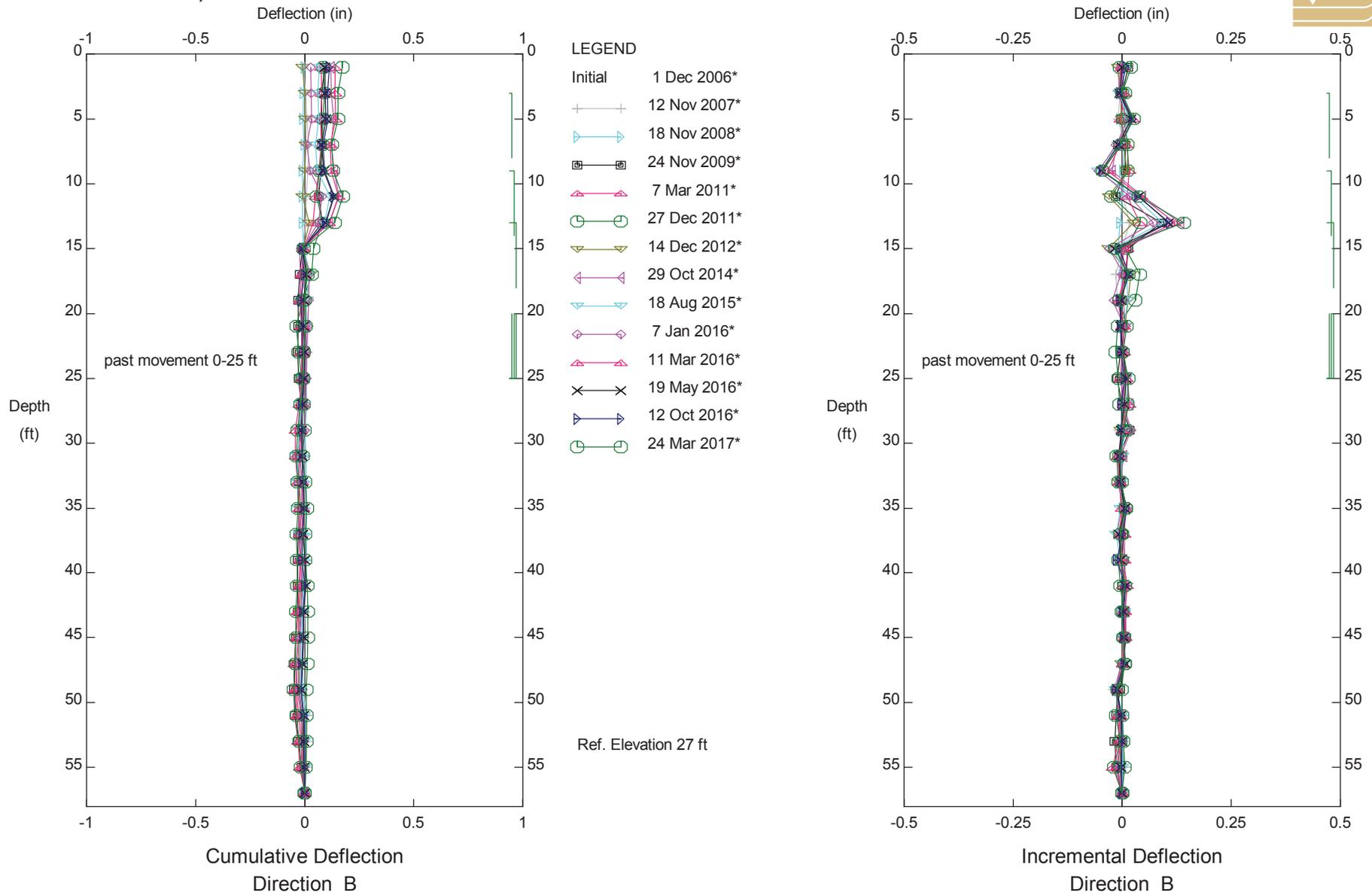


BIG ROCK MESA, Inclinometer SP-11
 PCH REGION

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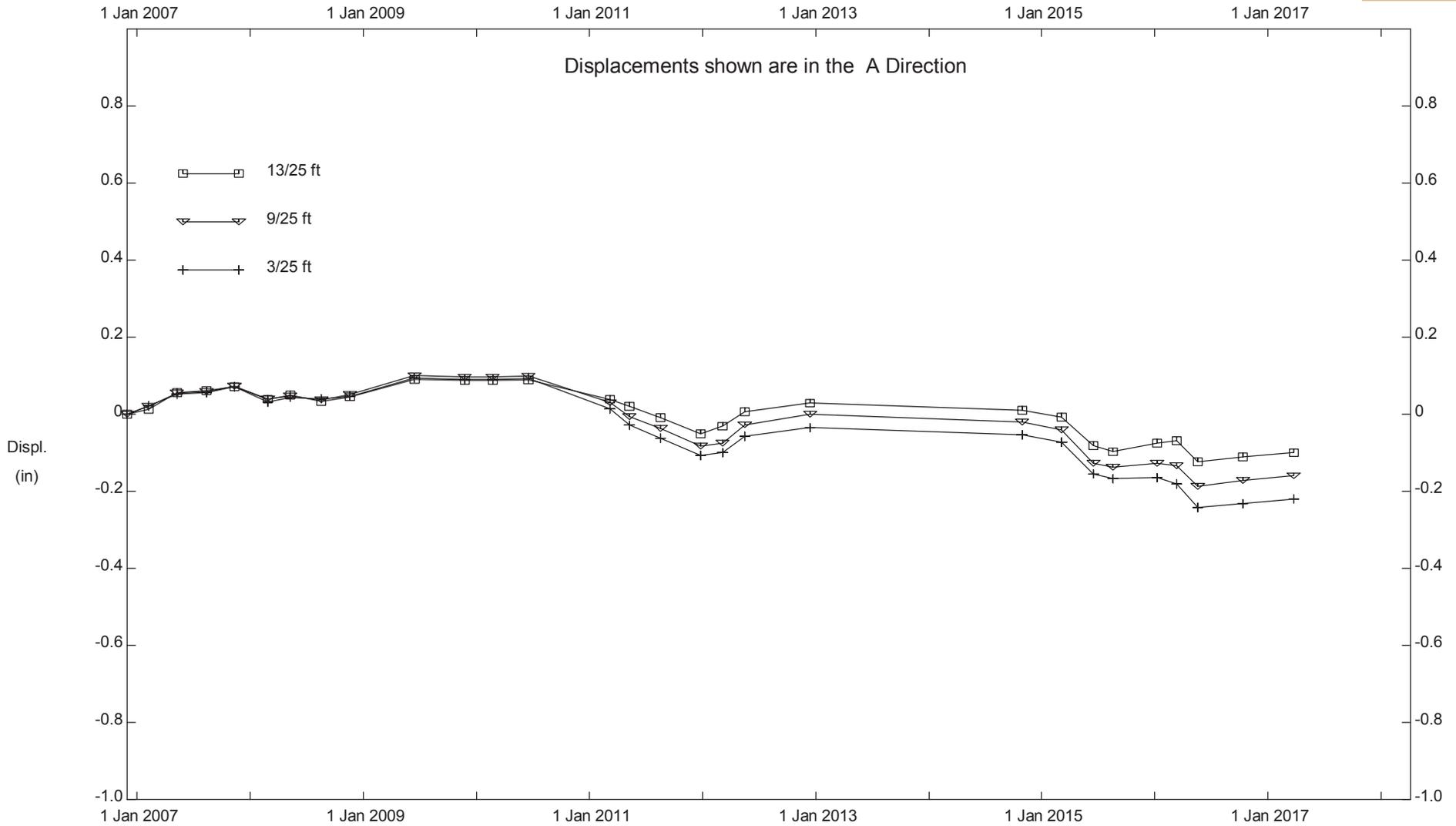
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 CITY OF MALIBU, CALIFORNIA**

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BIG ROCK MESA, Inclinometer SP-11
 PCH REGION

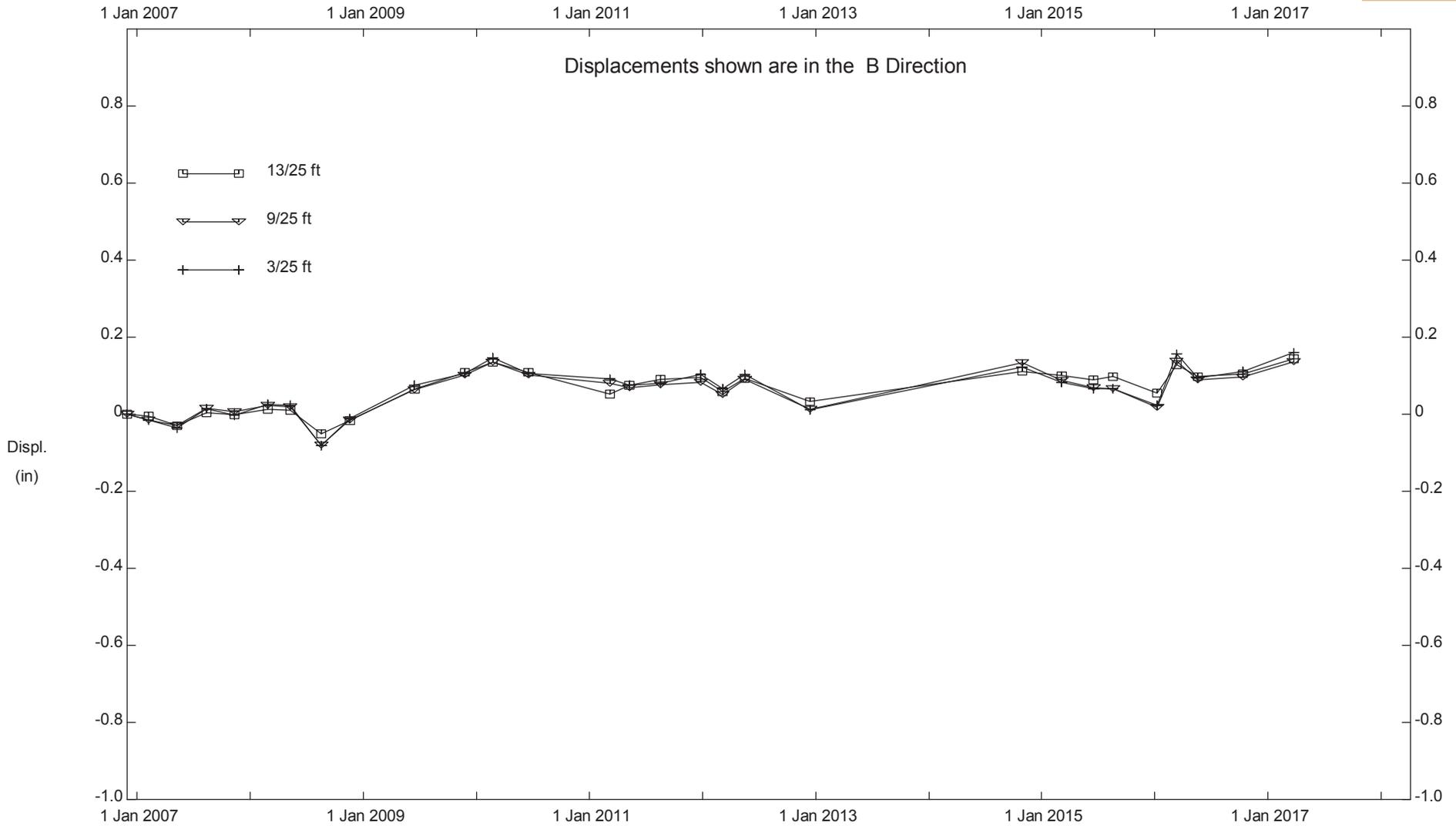
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BIG ROCK MESA, Inclinator SP-11

PCH REGION

PLATE D2-3



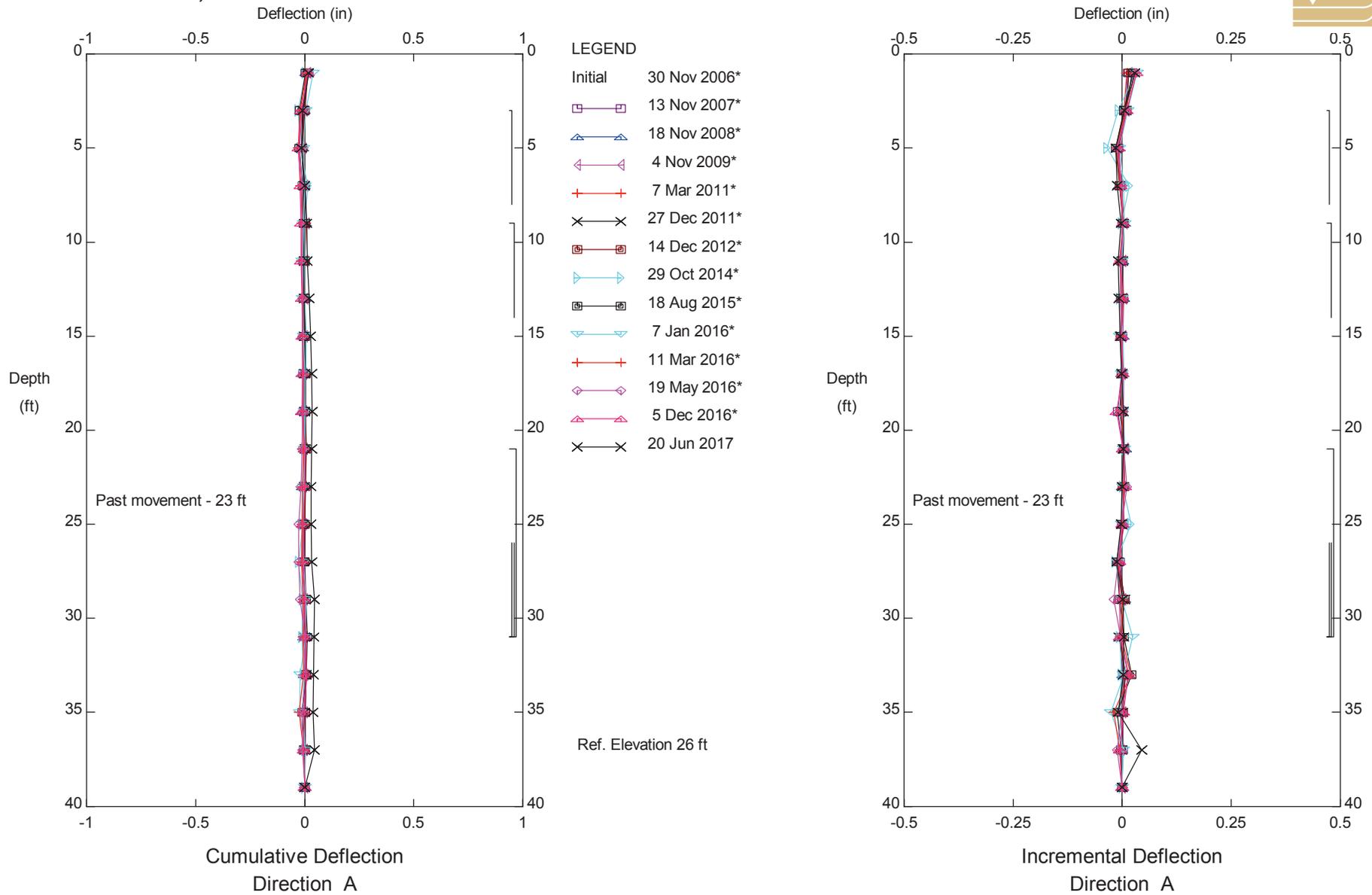
BIG ROCK MESA, Inclinator SP-11

PCH REGION

PLATE D2-4

**BIG ROCK MESA LANDSLIDE ASSESSMENT DISTRICT
 FY16-17 ANNUAL REPORT
 CITY OF MALIBU, CALIFORNIA**

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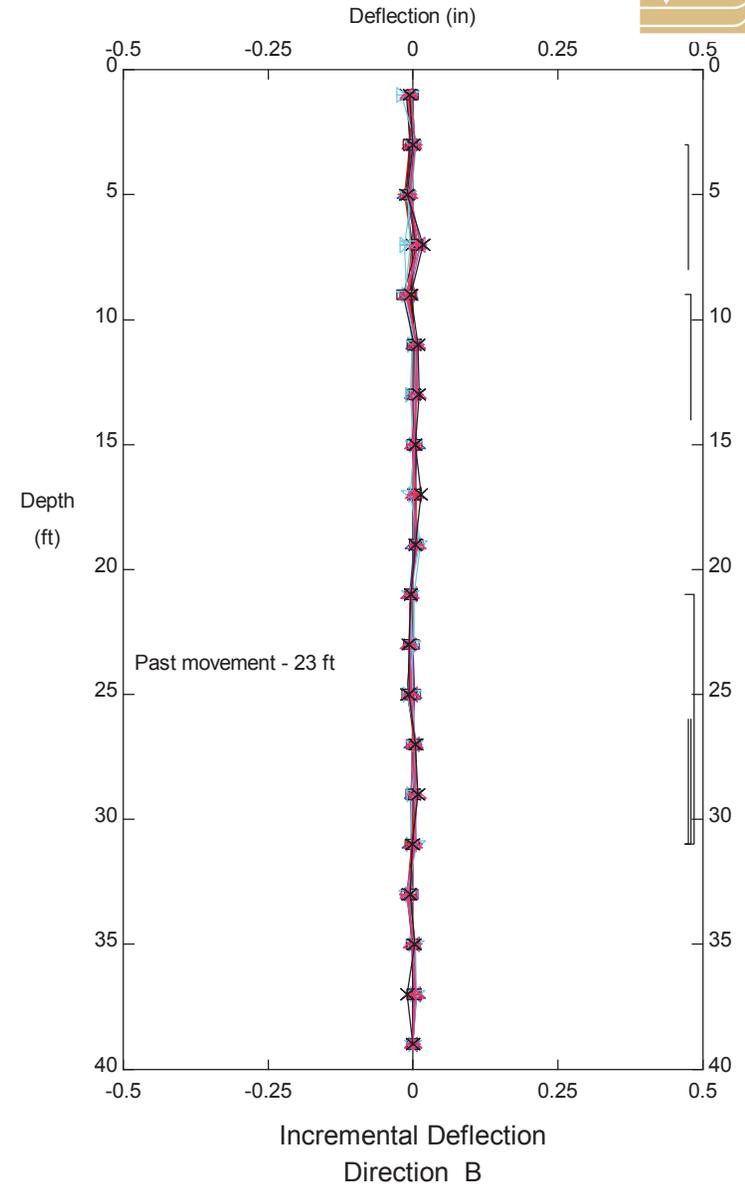
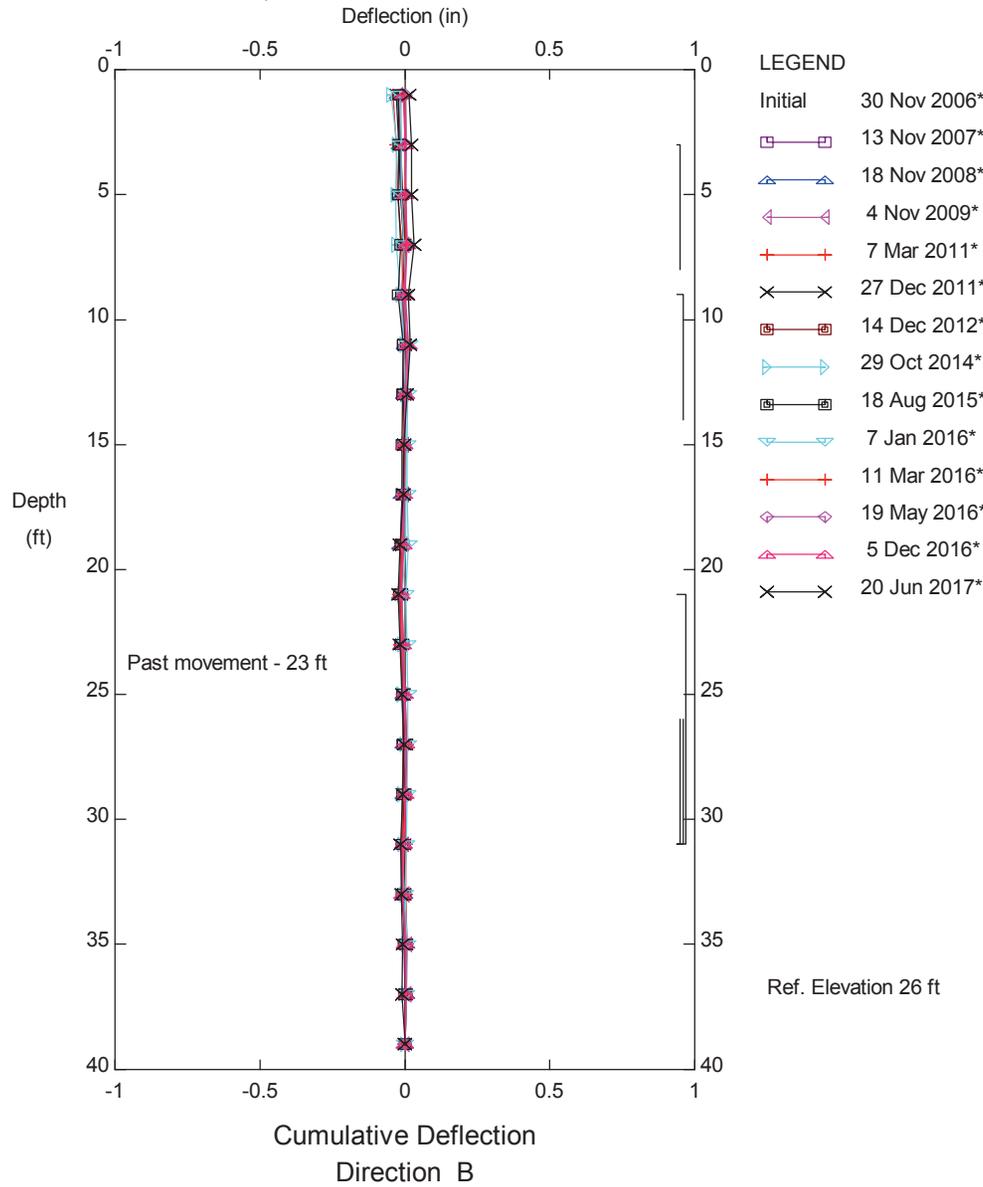


BIG ROCK MESA, Inclinometer SP-12
 PCH REGION

Sets marked * include zero shift and/or rotation corrections.

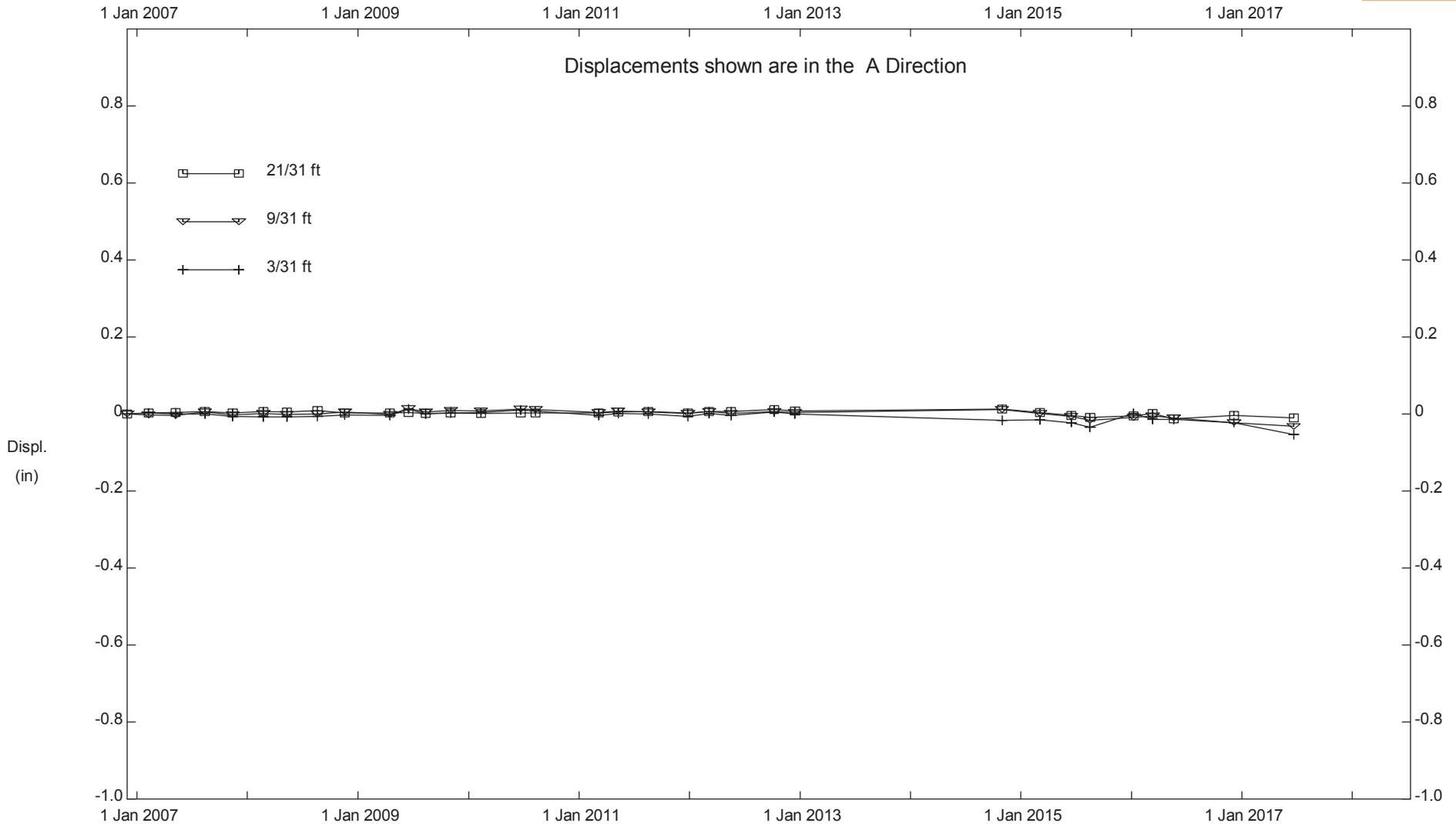
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 CITY OF MALIBU, CALIFORNIA**

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BIG ROCK MESA, Inclinator SP-12
 PCH REGION

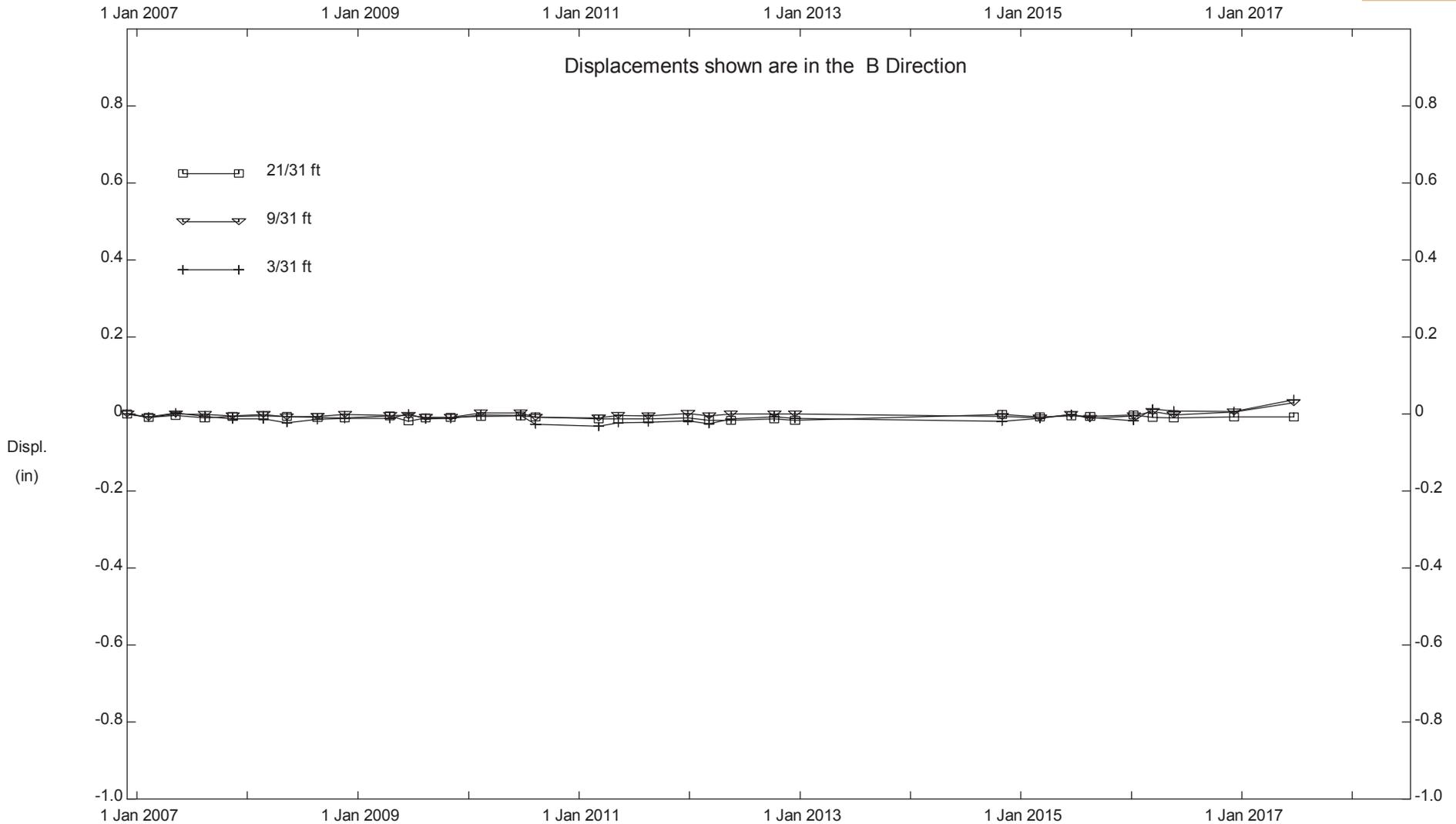
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BIG ROCK MESA, Inclinator SP-12

PCH REGION

PLATE D3-3



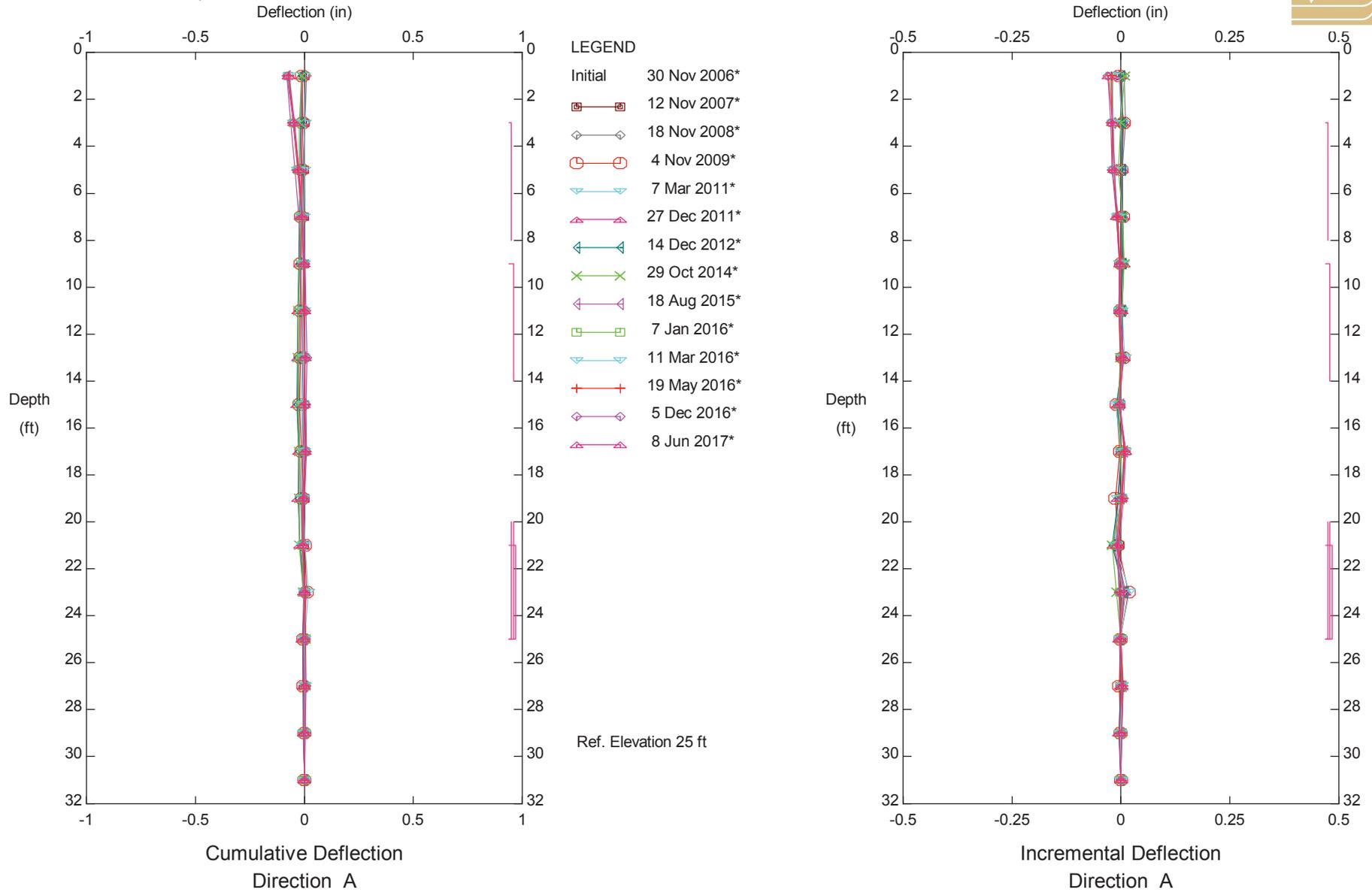
BIG ROCK MESA, Inclinator SP-12

PCH REGION

PLATE D3-4

**BIG ROCK MESA LANDSLIDE ASSESSMENT DISTRICT
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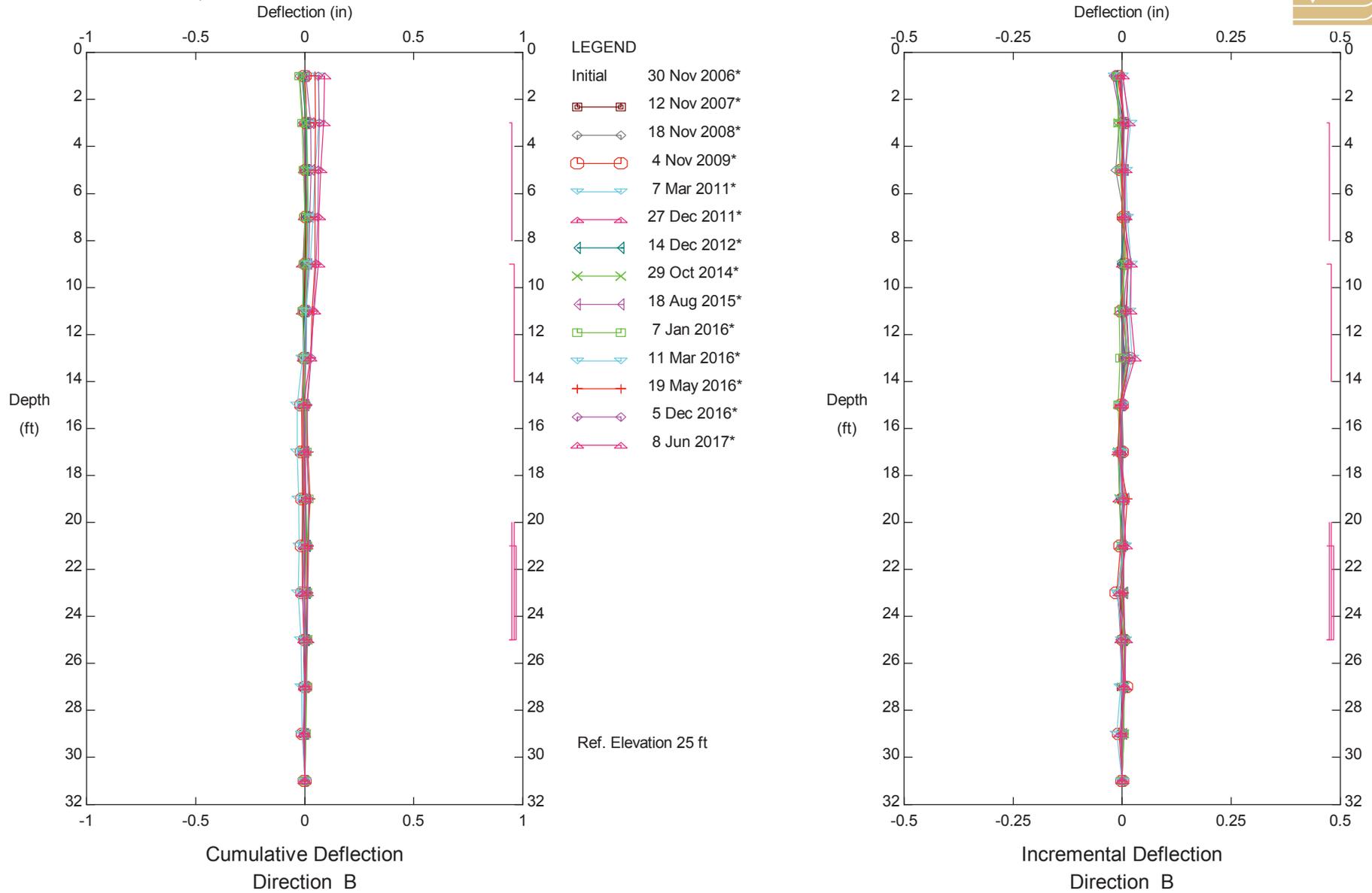


BIG ROCK MESA, Inclinometer SP-14
 PCH REGION

Sets marked * include zero shift and/or rotation corrections.

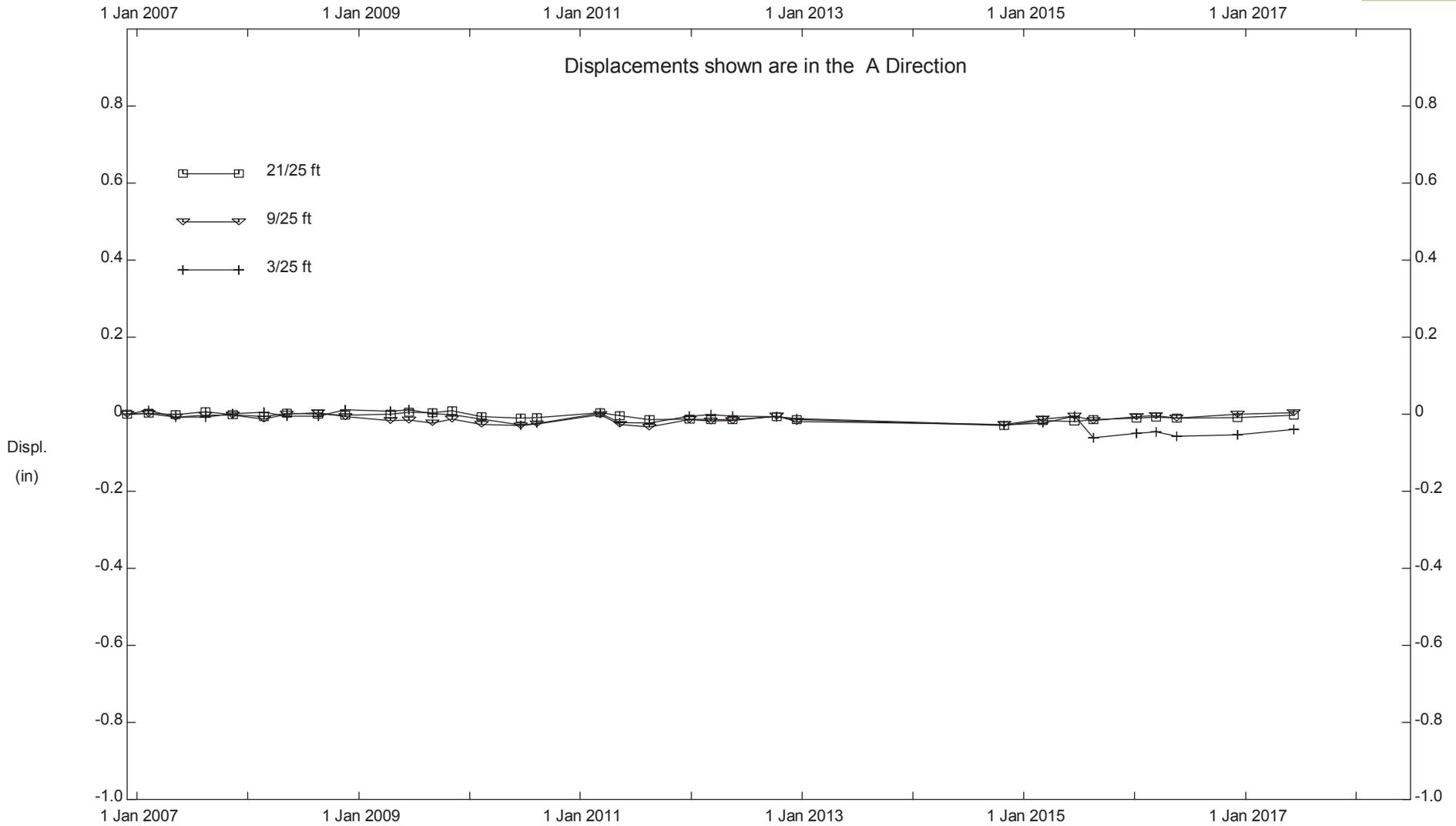
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BIG ROCK MESA, Inclinometer SP-14
 PCH REGION

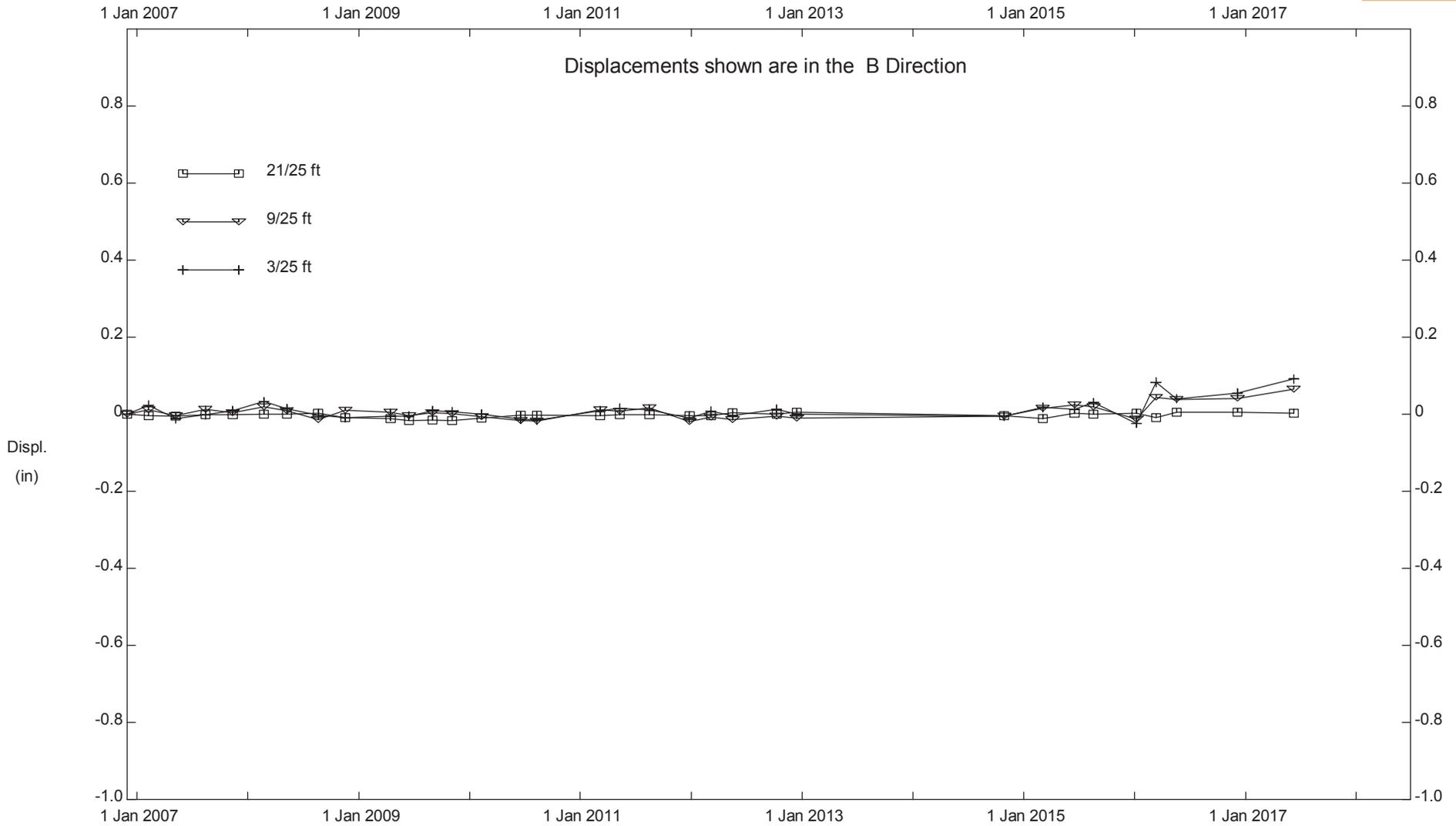
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BIG ROCK MESA, Inclinator SP-14

PCH REGION

PLATE D4-3



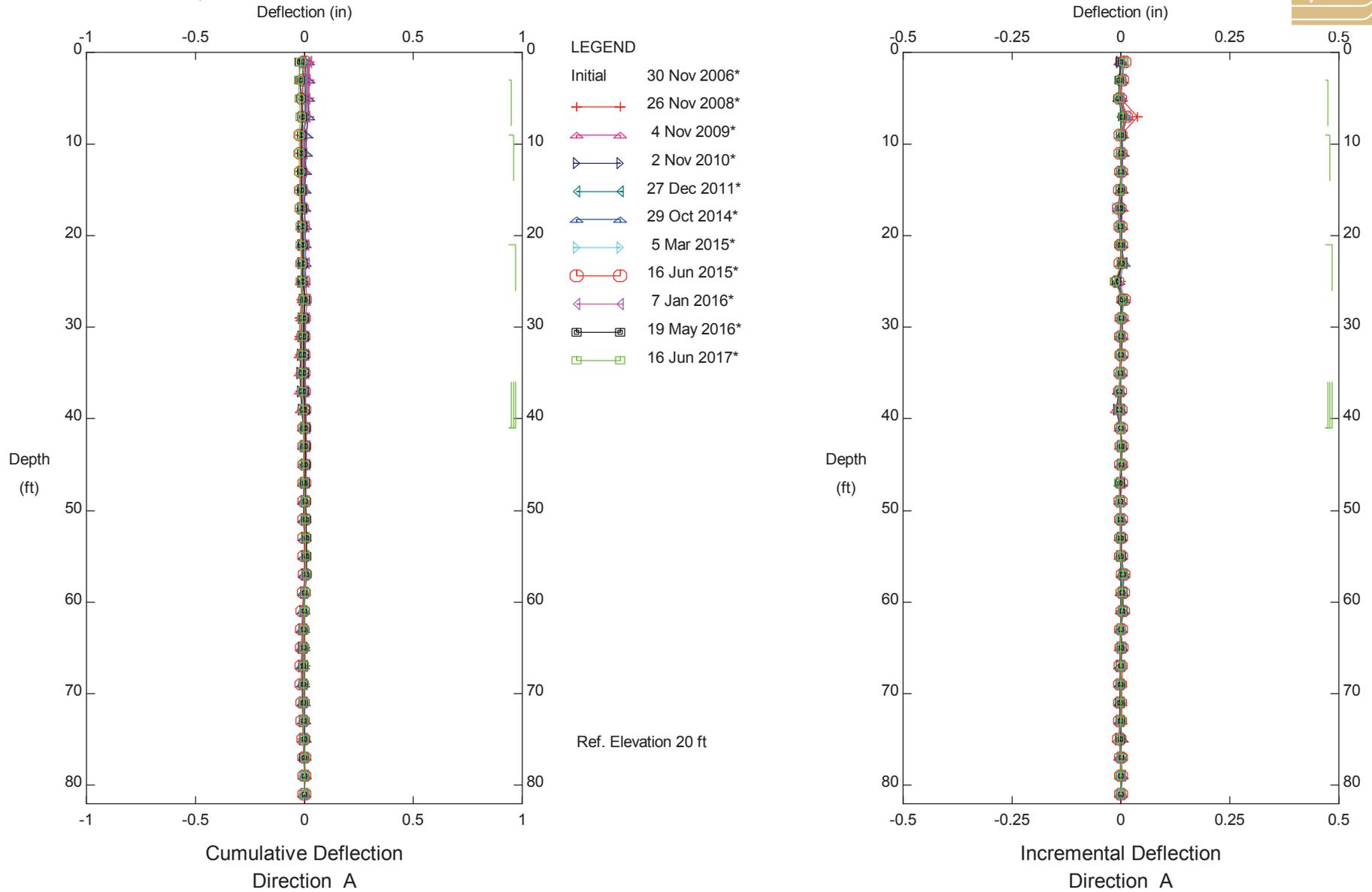
BIG ROCK MESA, Inclinator SP-14

PCH REGION

PLATE D4-4

**BIG ROCK MESA LANDSLIDE ASSESSMENT DISTRICT
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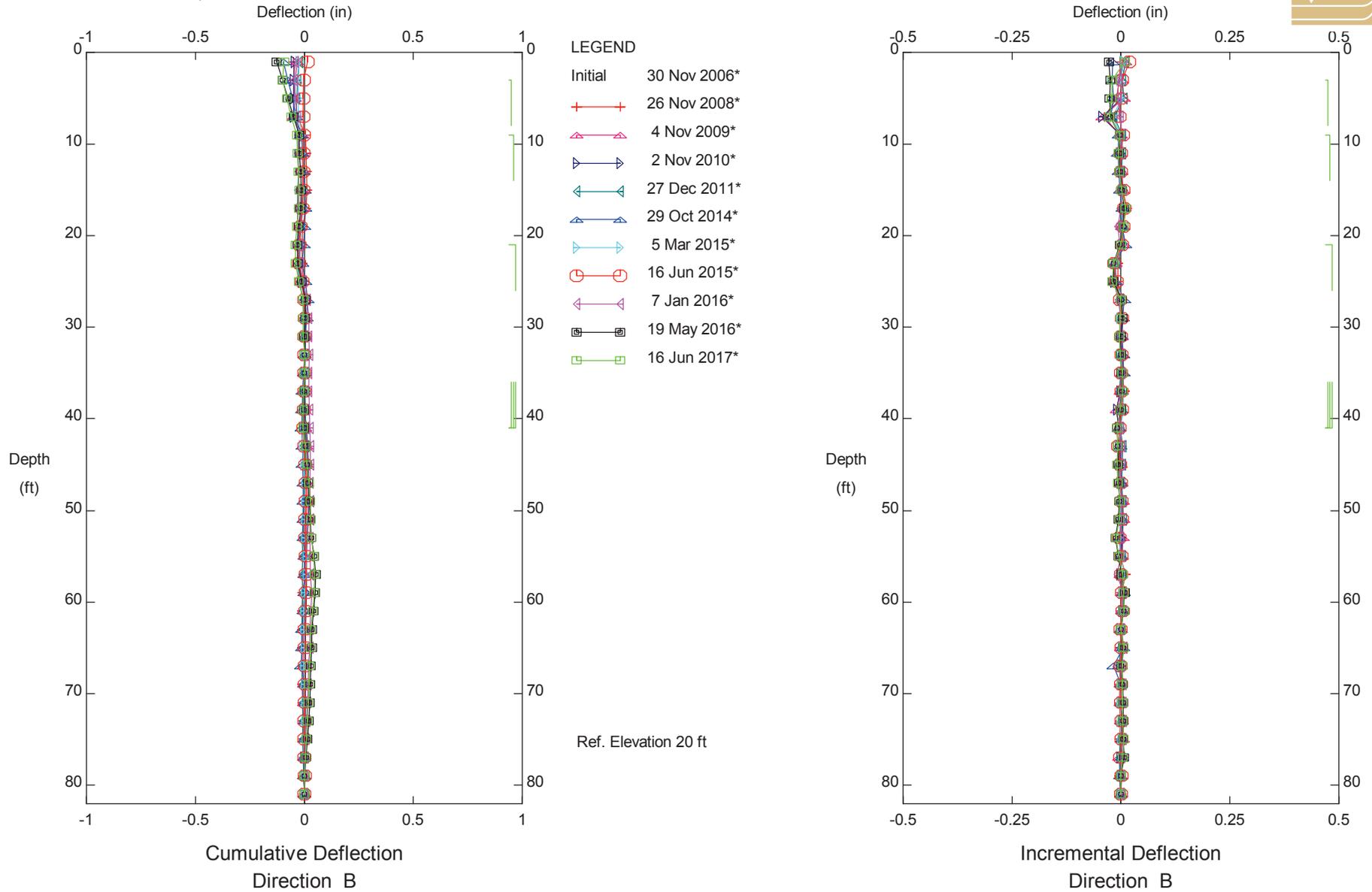


BIG ROCK MESA, Inclinometer SP-15
 PCH REGION

Sets marked * include zero shift and/or rotation corrections.

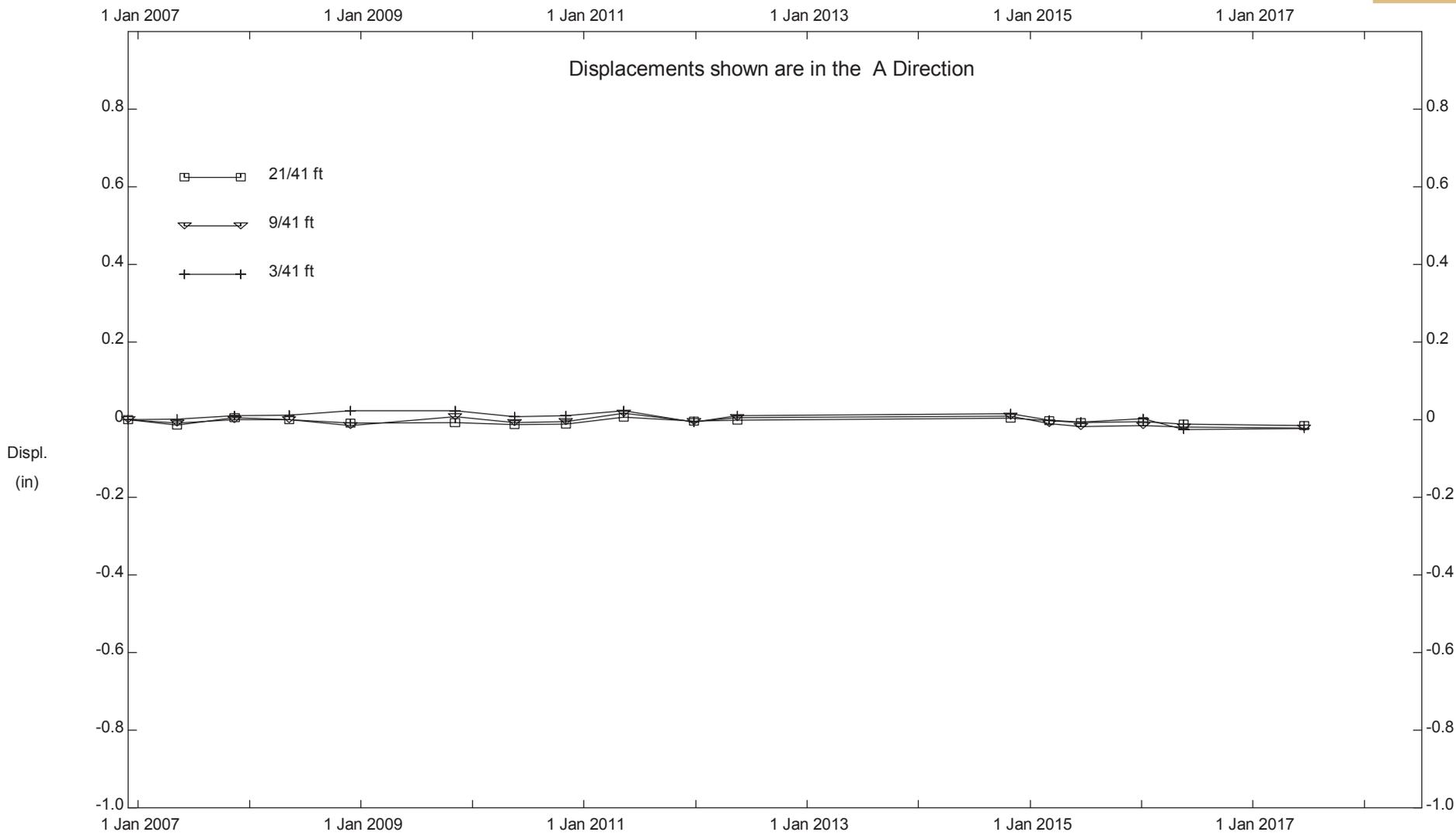
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BIG ROCK MESA, Inclinerometer SP-15
 PCH REGION

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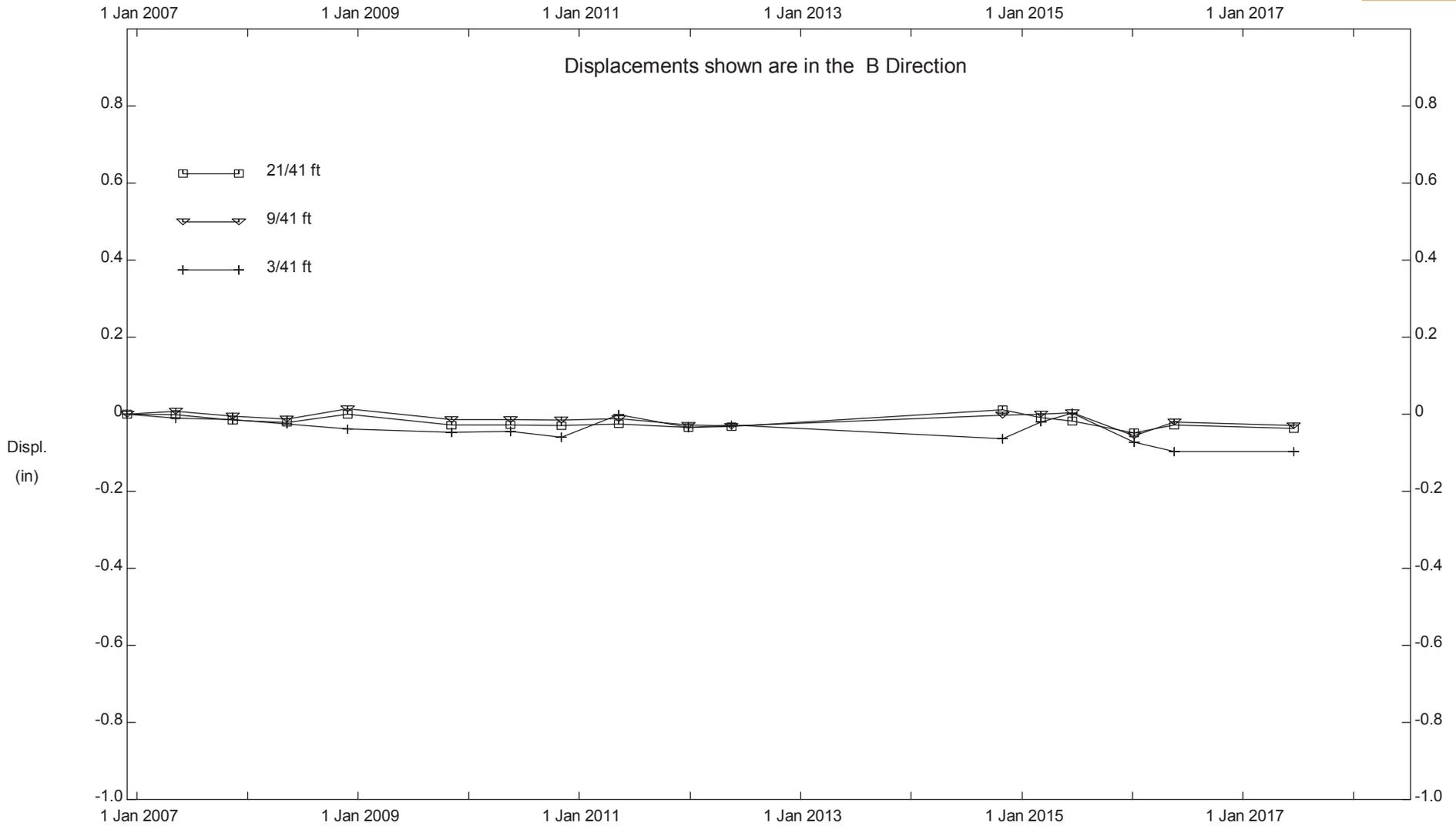
BIG ROCK MESA, Inclinator SP-15

PCH REGION

PLATE D5-3

**BIG ROCK MESA LANDSLIDE ASSESSMENT DISTRICT
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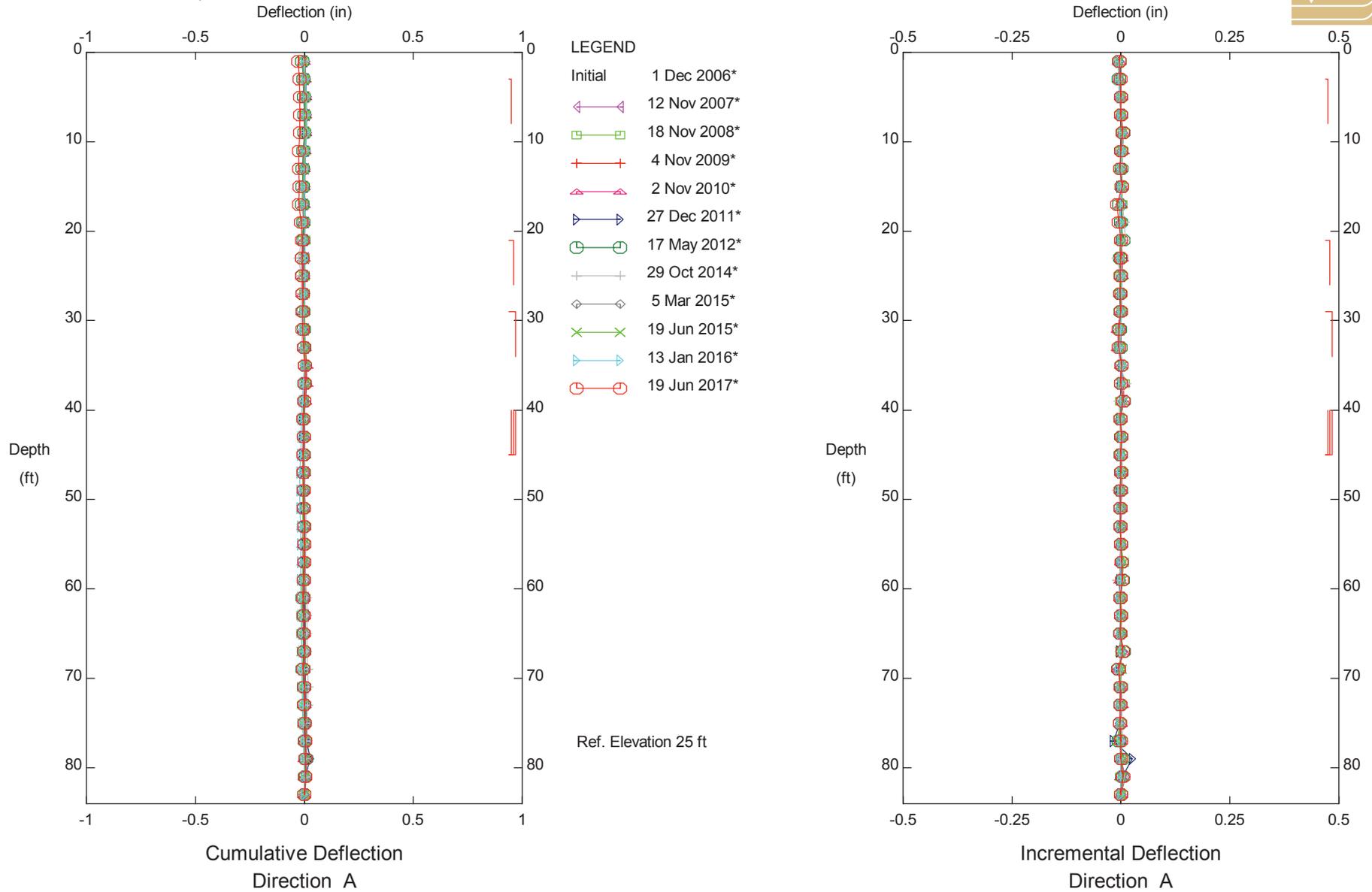
BIG ROCK MESA, Inclinator SP-15

PCH REGION

PLATE D5-4

**BIG ROCK MESA LANDSLIDE ASSESSMENT DISTRICT
 FY16-17 ANNUAL REPORT
 CITY OF MALIBU, CALIFORNIA**

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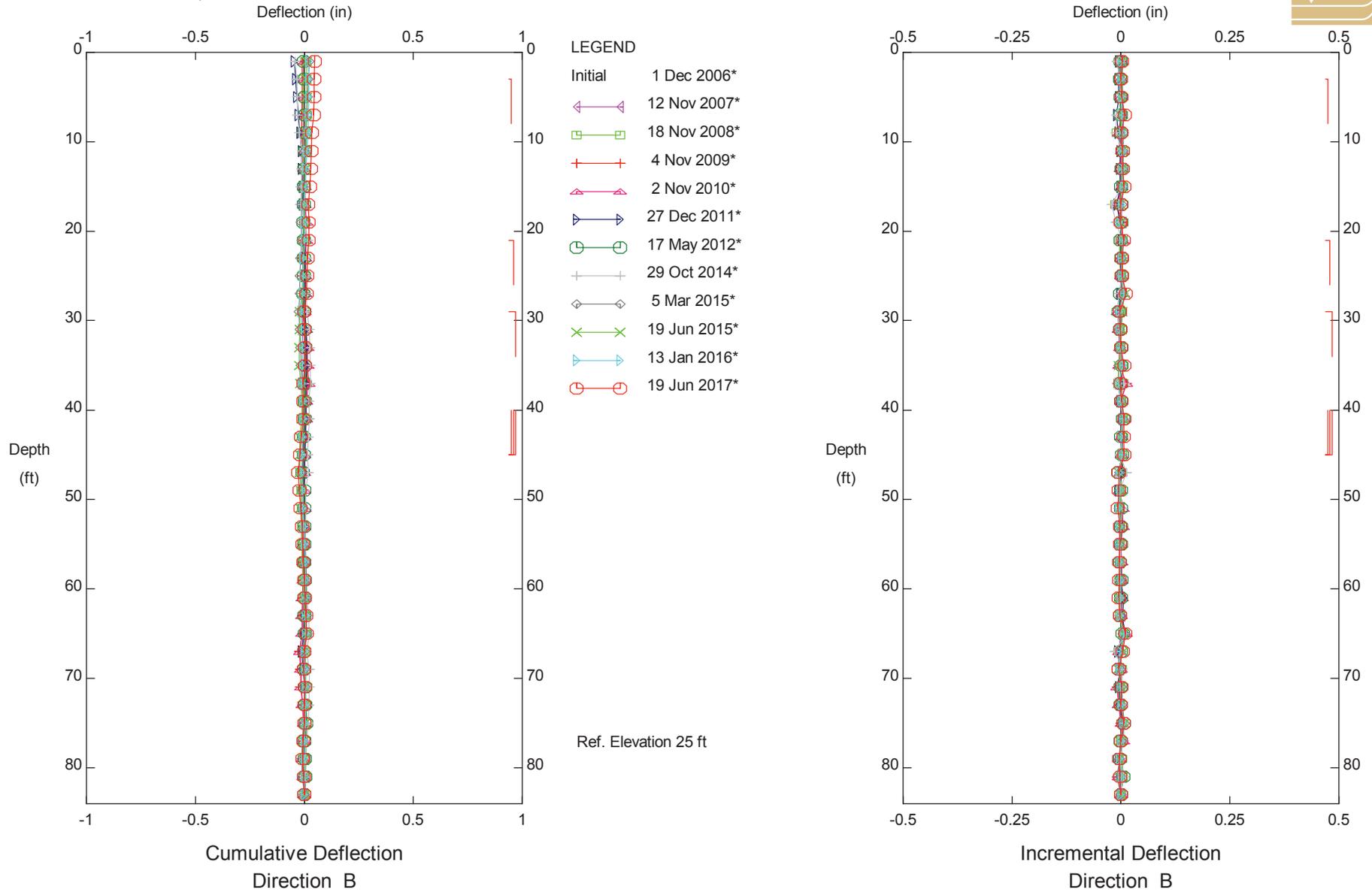


BIG ROCK MESA, Inclinometer SP-19
 PCH REGION

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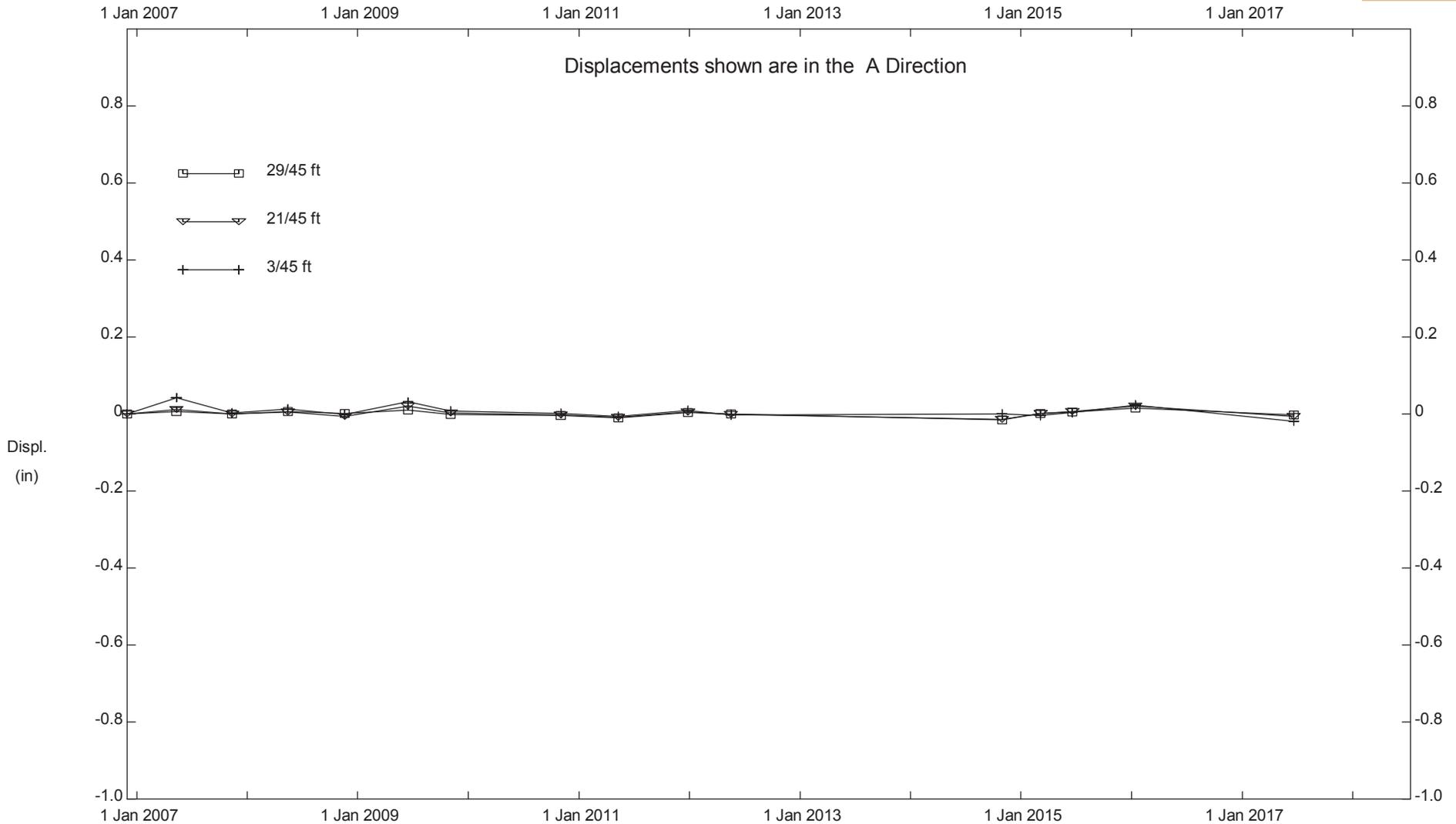
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 CITY OF MALIBU, CALIFORNIA**

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BIG ROCK MESA, Inclinerometer SP-19
 PCH REGION

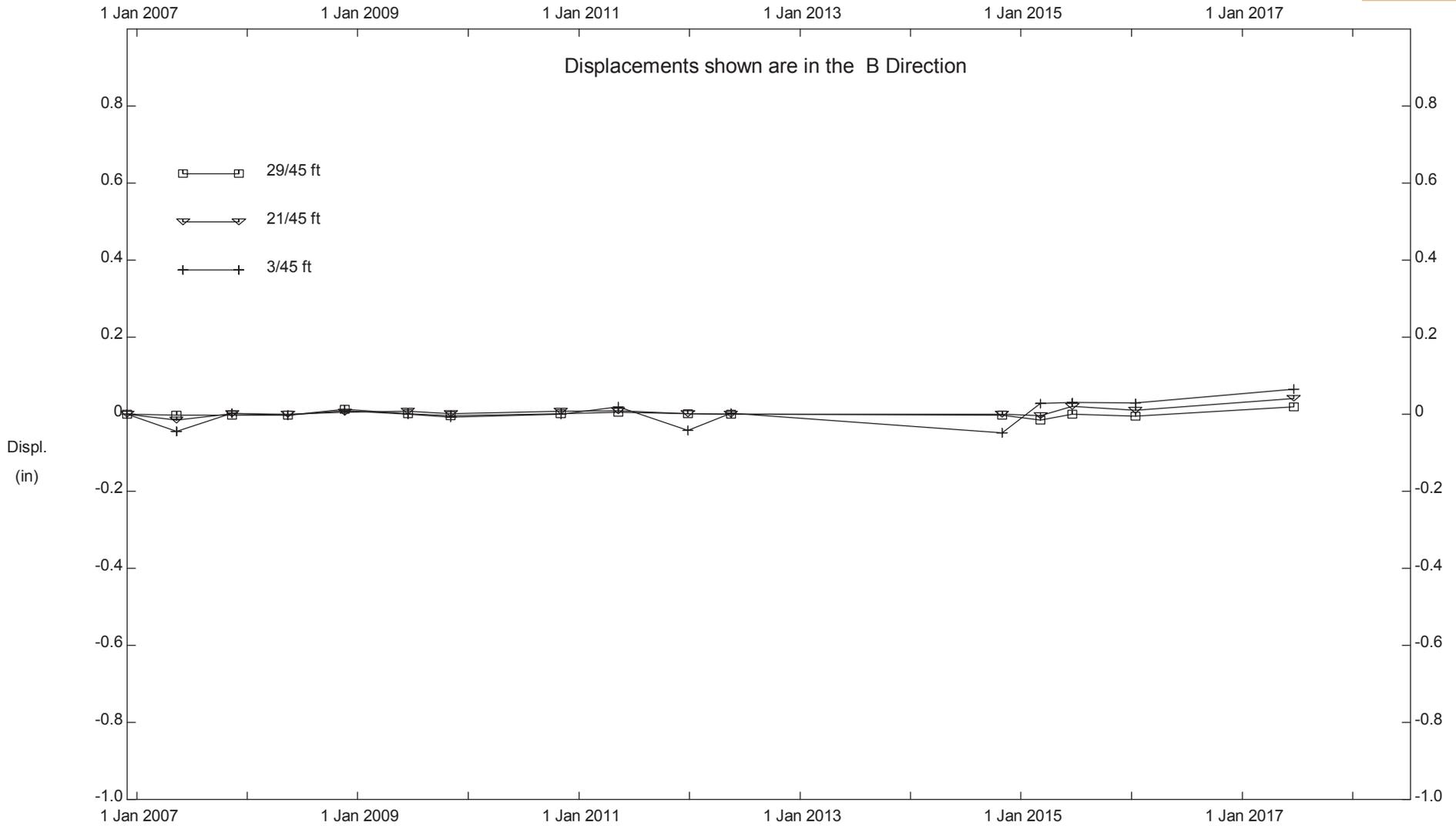
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BIG ROCK MESA, Inclinator SP-19

PCH REGION

PLATE D6-3



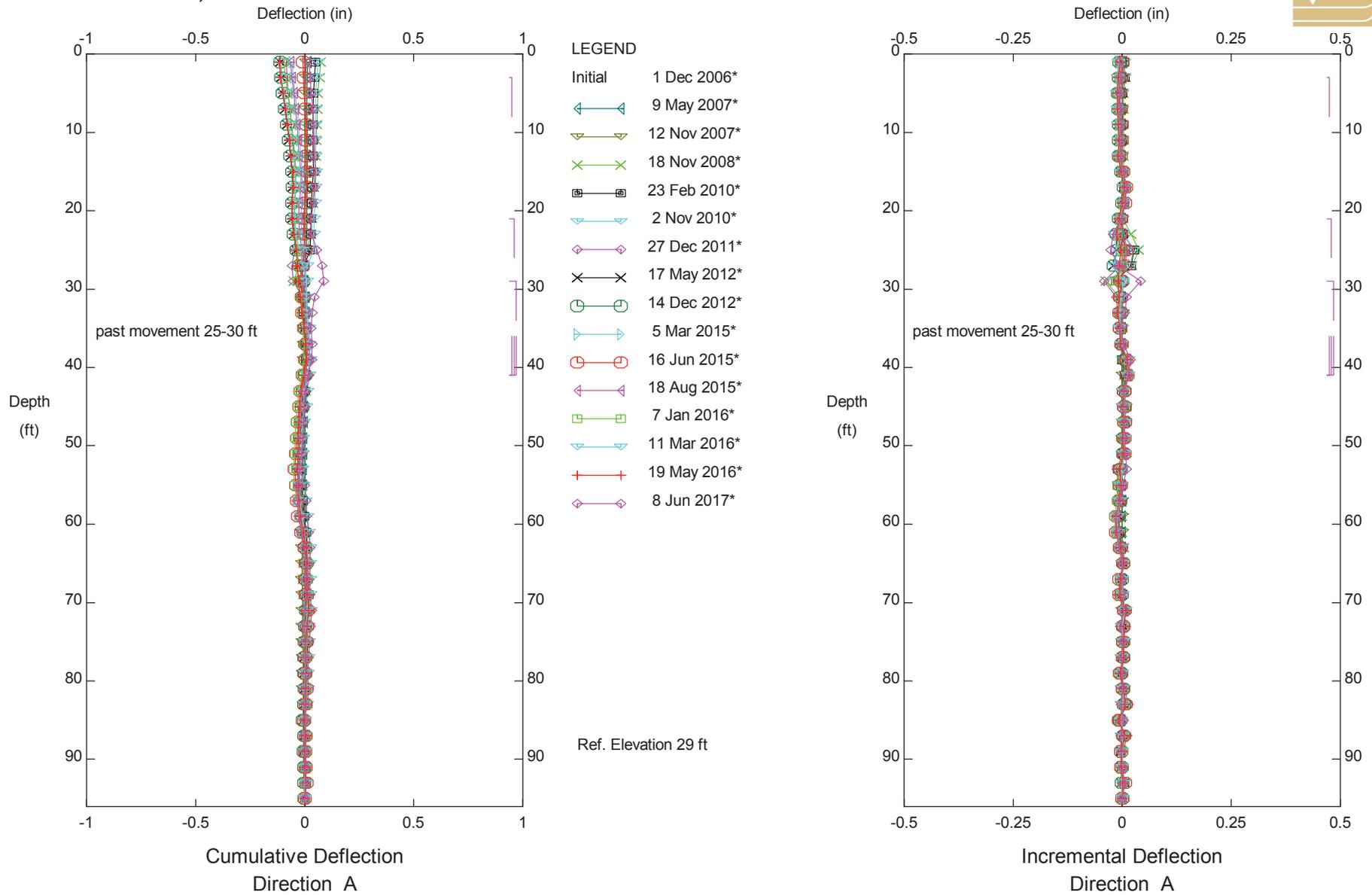
BIG ROCK MESA, Inclinator SP-19

PCH REGION

PLATE D6-4

**BIG ROCK MESA LANDSLIDE ASSESSMENT DISTRICT
 FY16-17 ANNUAL REPORT
 CITY OF MALIBU, CALIFORNIA**

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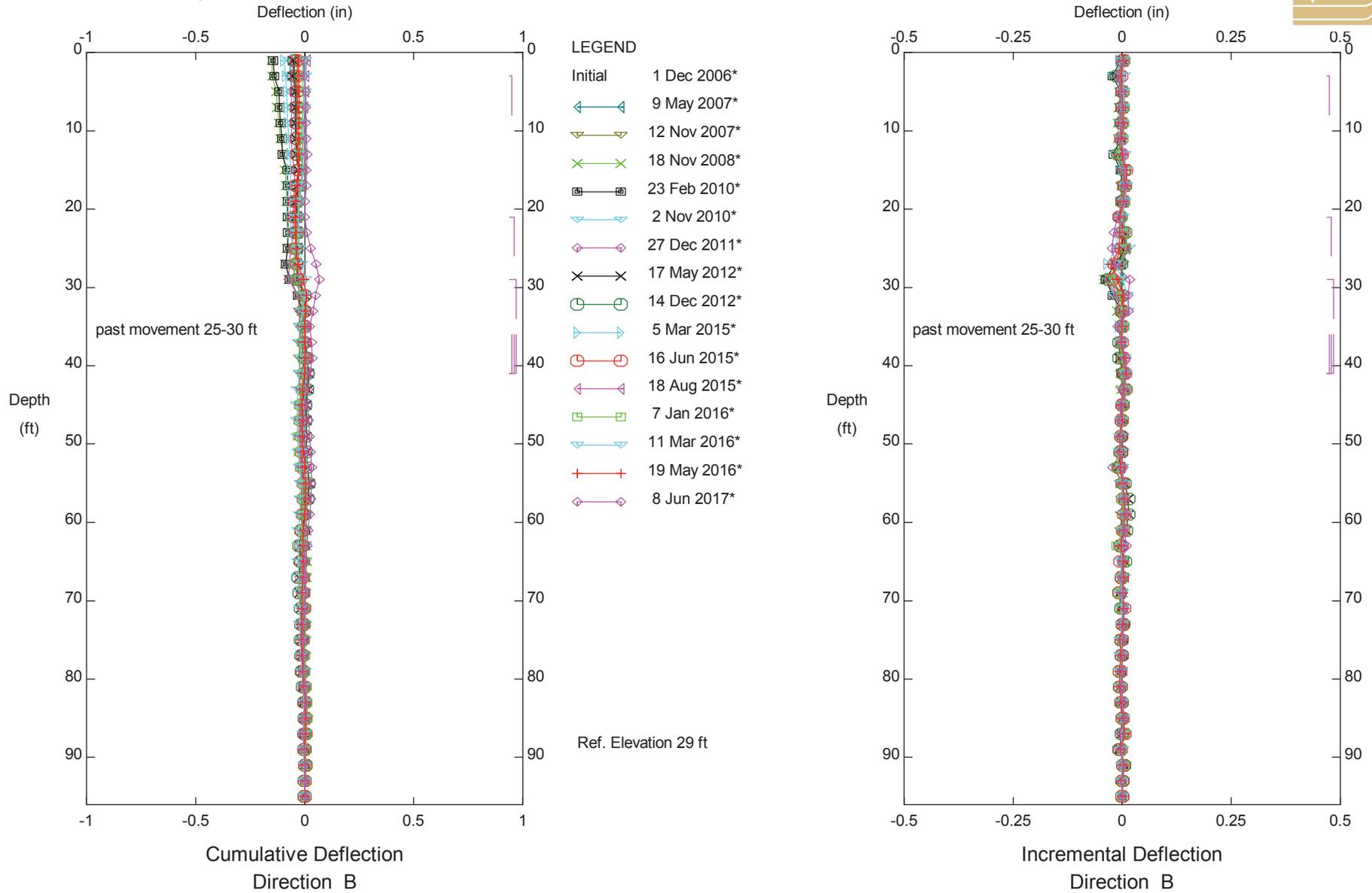


BIG ROCK MESA, Inclinometer SP-27A
 PCH REGION

Sets marked * include zero shift and/or rotation corrections.

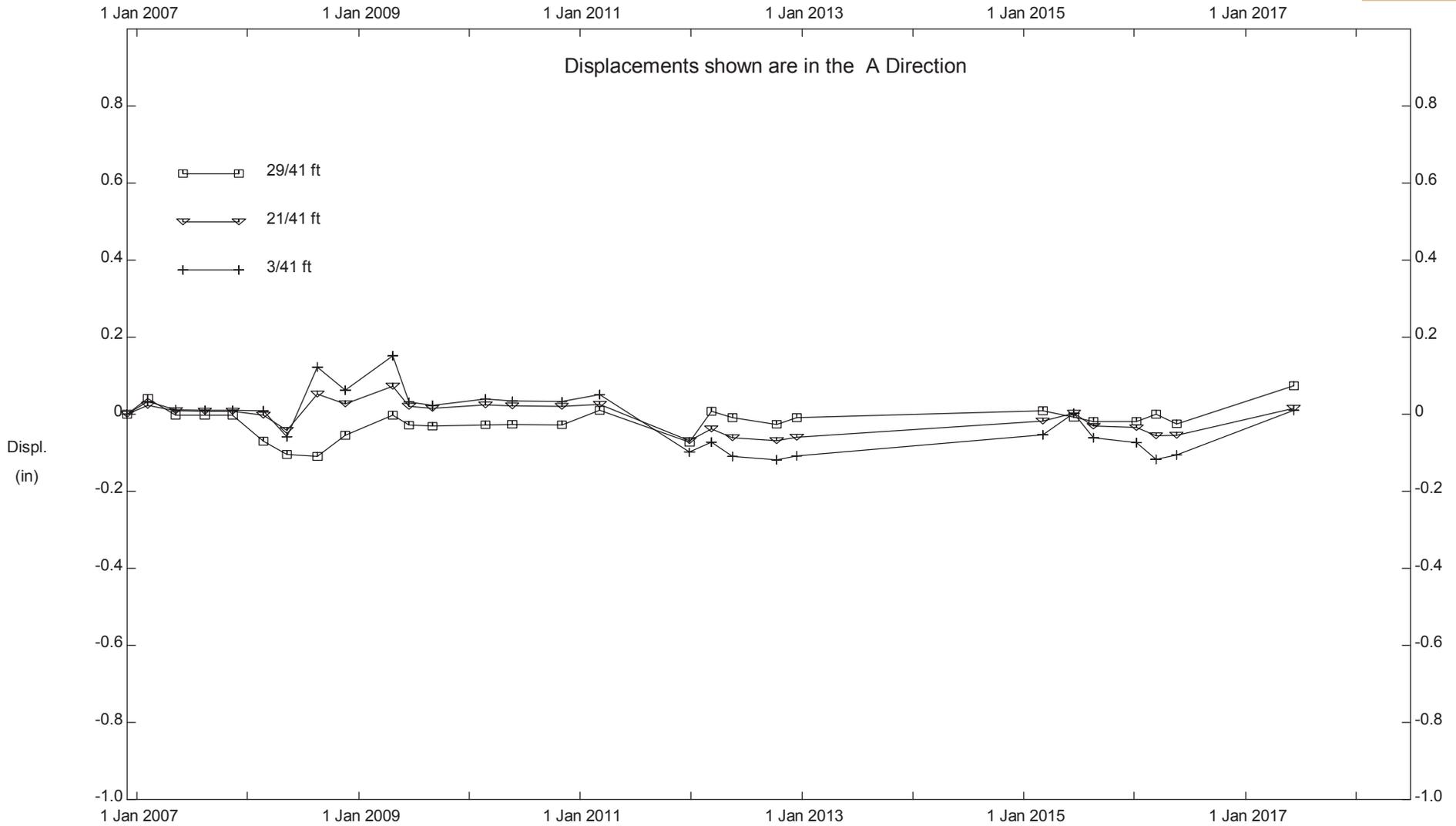
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 CITY OF MALIBU, CALIFORNIA**

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**BIG ROCK MESA, Inclinometer SP-27A
 PCH REGION**

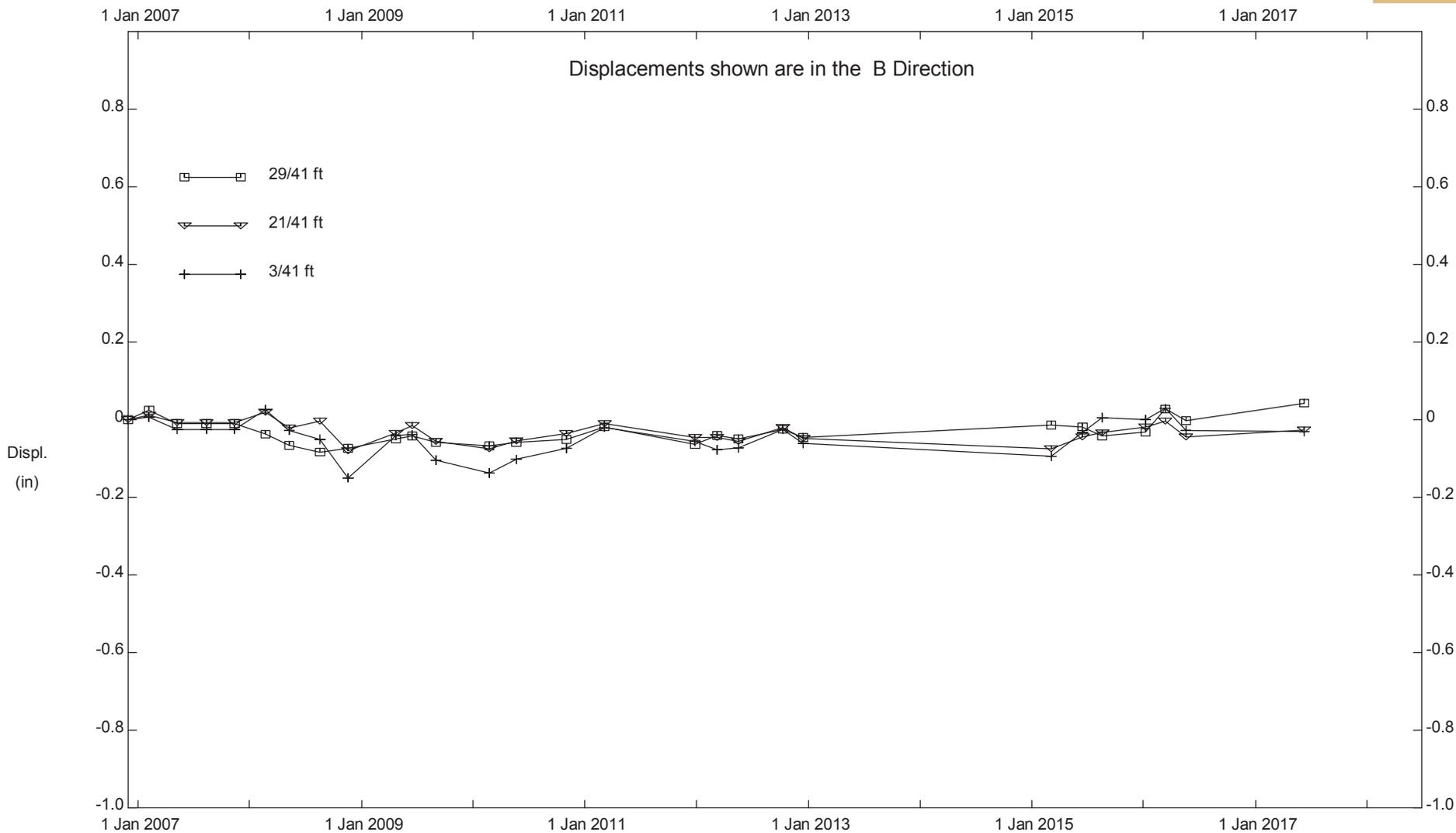
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BIG ROCK MESA, Inclinator SP-27A

PCH REGION

PLATE D7-3



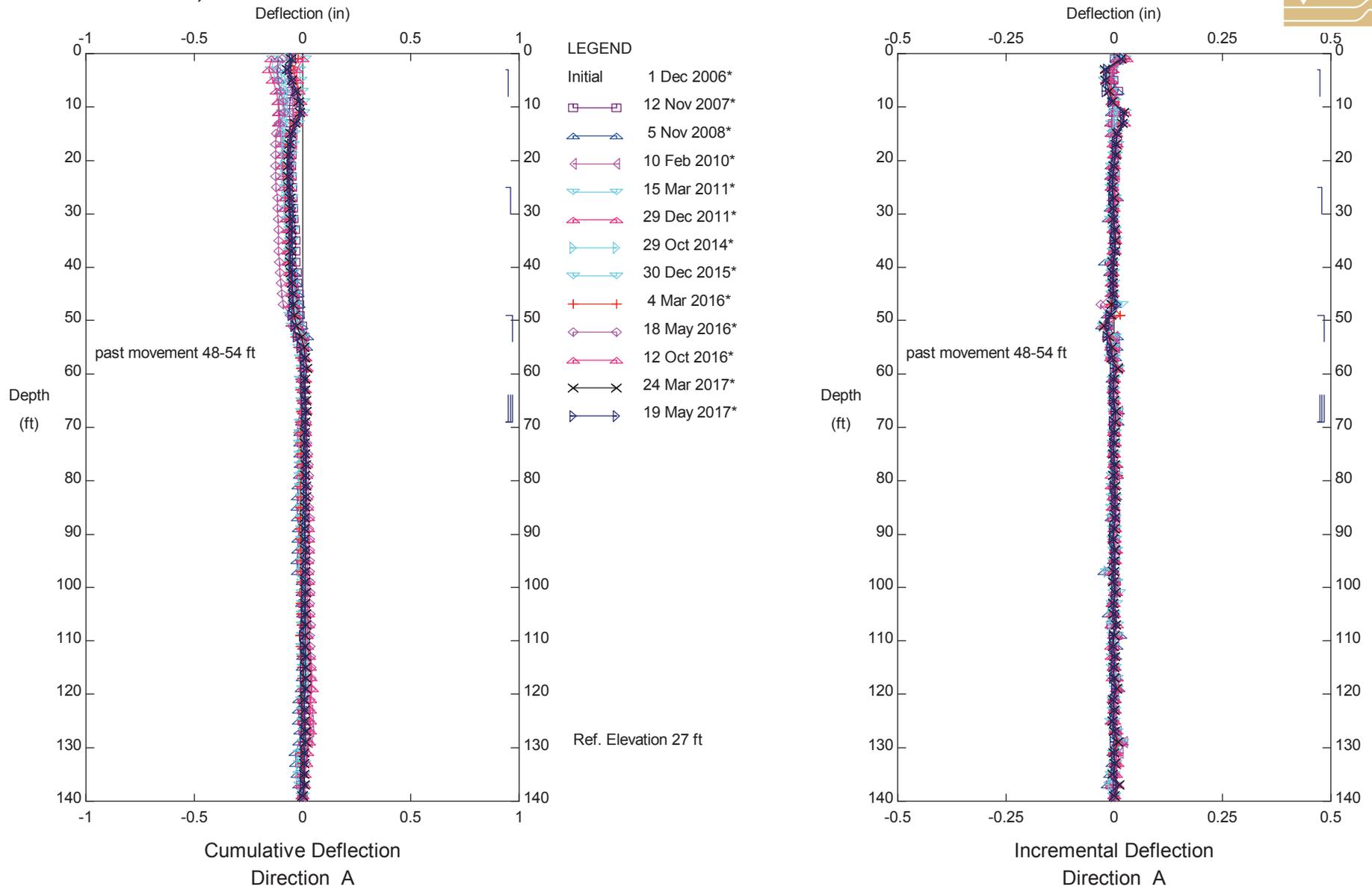
BIG ROCK MESA, Inclinator SP-27A

PCH REGION

PLATE D7-4

**BIG ROCK MESA LANDSLIDE ASSESSMENT DISTRICT
 FY16-17 ANNUAL REPORT
 CITY OF MALIBU, CALIFORNIA**

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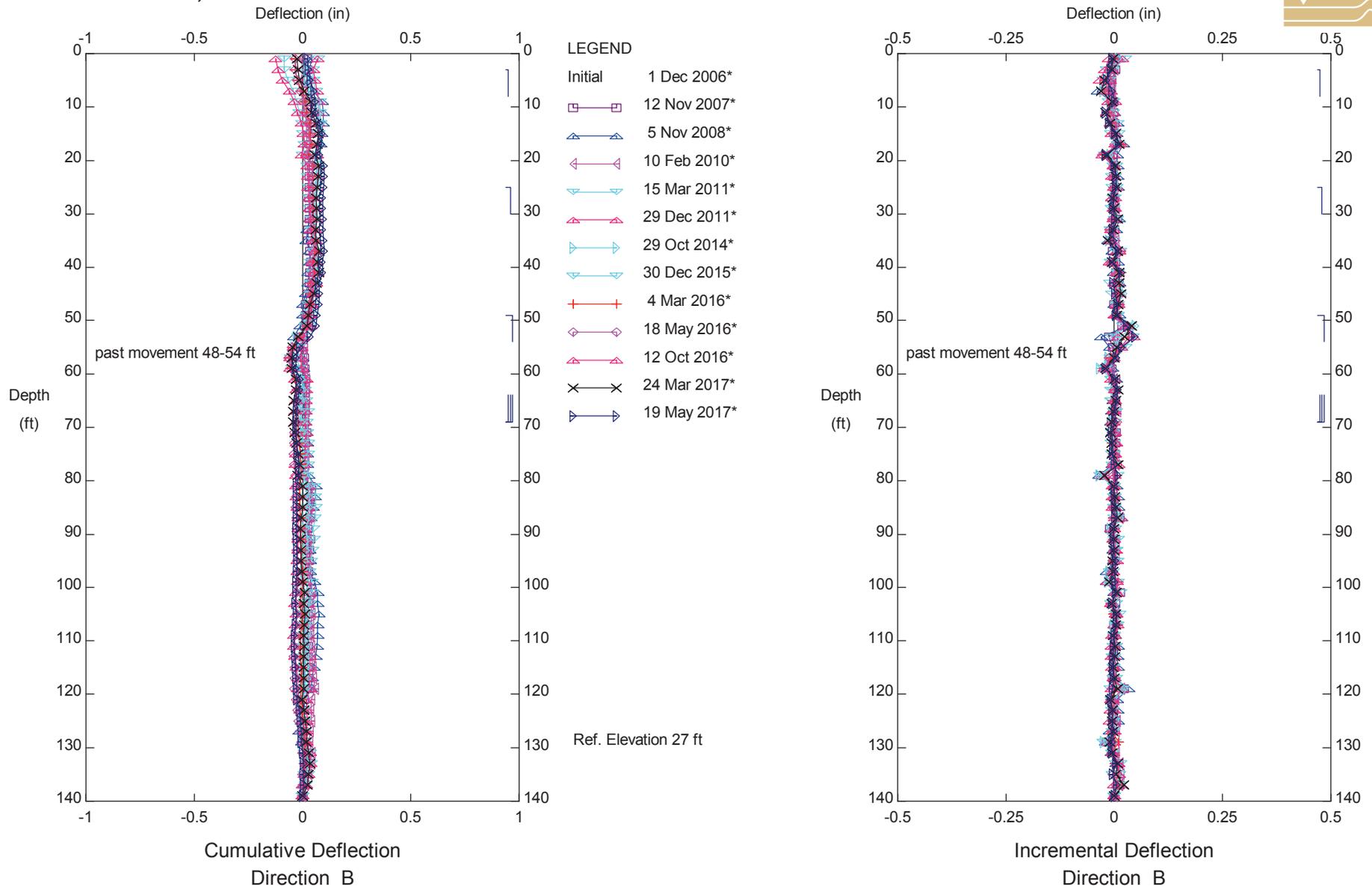


BIG ROCK MESA, Inclinometer SP-29
 PCH REGION

Sets marked * include zero shift and/or rotation corrections.

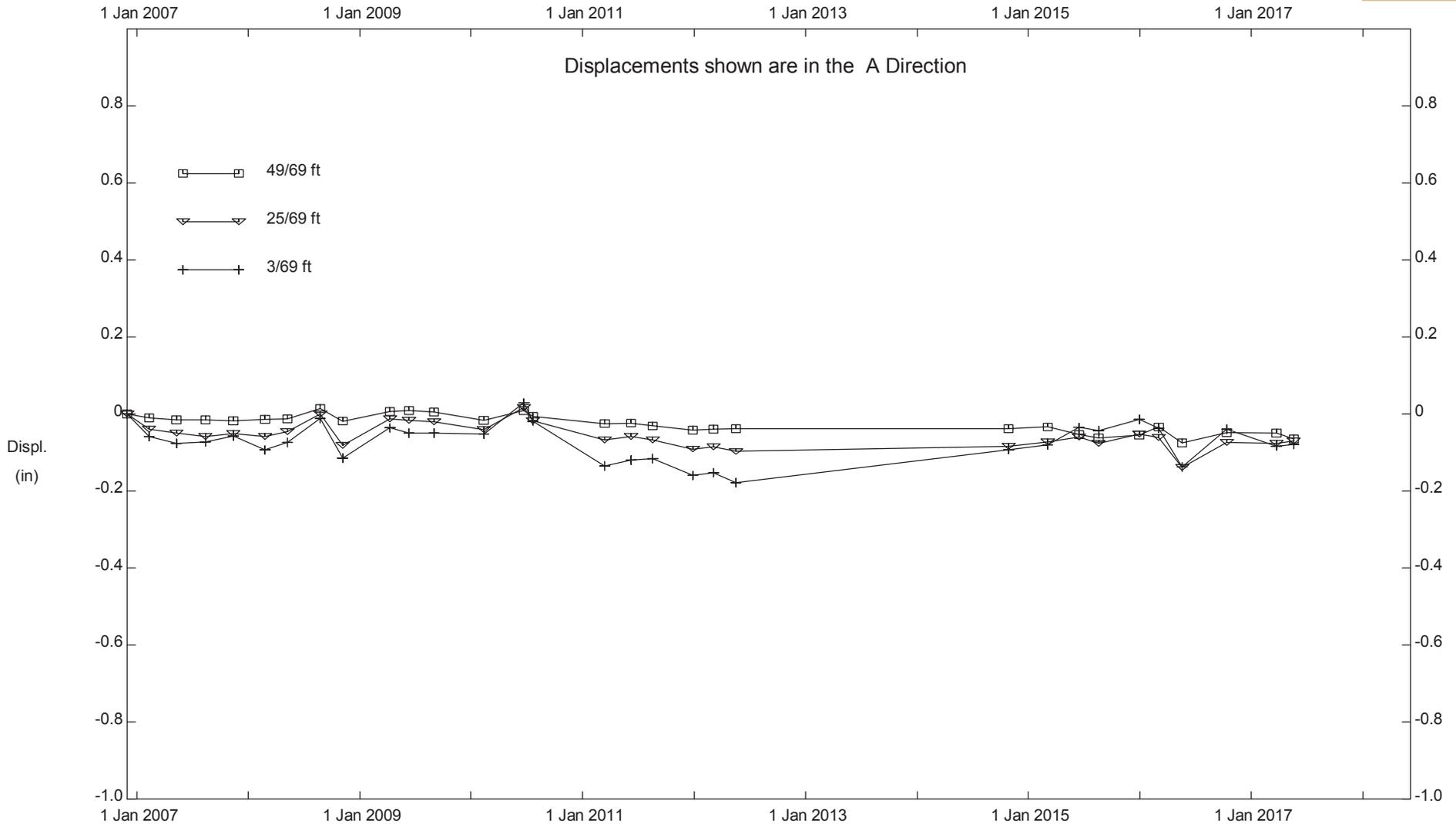
**BIG ROCK MESA LANDSLIDE ASSESSMENT DISTRICT
 FY16-17 ANNUAL REPORT
 CITY OF MALIBU, CALIFORNIA**

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BIG ROCK MESA, Inclinometer SP-29
 PCH REGION

Sets marked * include zero shift and/or rotation corrections.



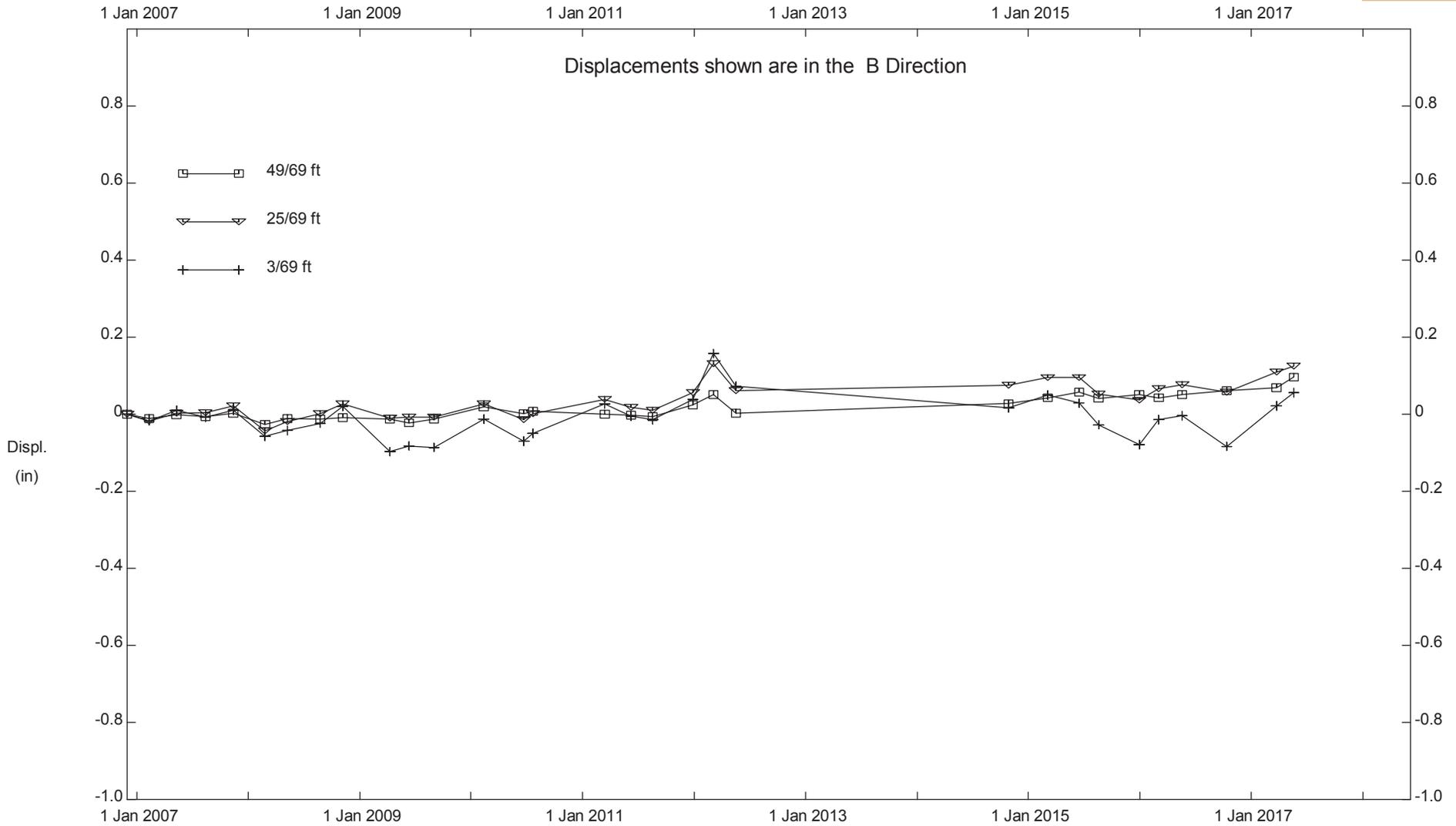
BIG ROCK MESA, Inclinator SP-29

PCH REGION

PLATE D8-3

**BIG ROCK MESA LANDSLIDE ASSESSMENT DISTRICT
FY16-17 ANNUAL REPORT
CITY OF MALIBU, CALIFORNIA**

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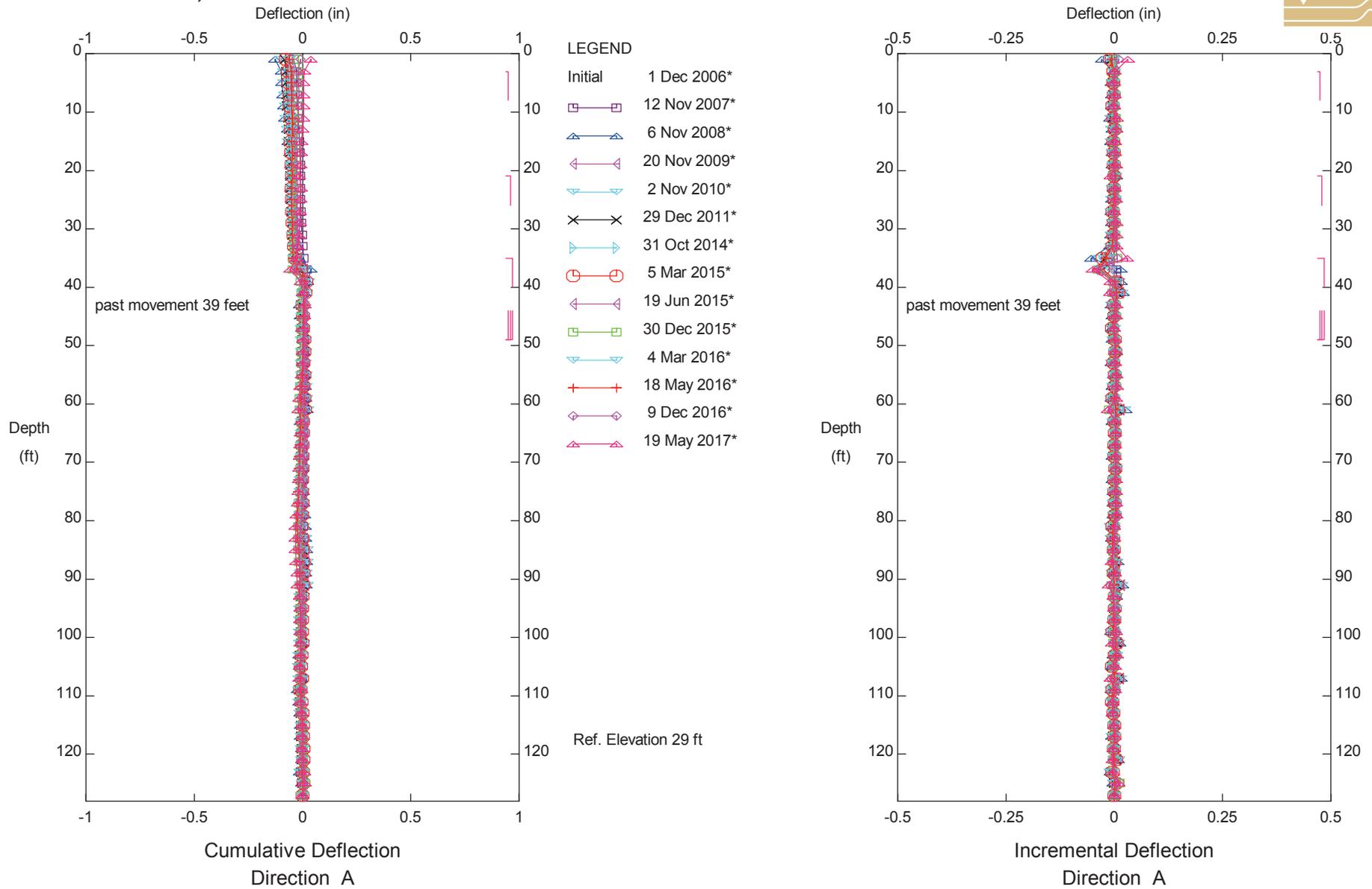
BIG ROCK MESA, Inclinometer SP-29

PCH REGION

PLATE D8-4

**BIG ROCK MESA LANDSLIDE ASSESSMENT DISTRICT
 FY16-17 ANNUAL REPORT
 CITY OF MALIBU, CALIFORNIA**

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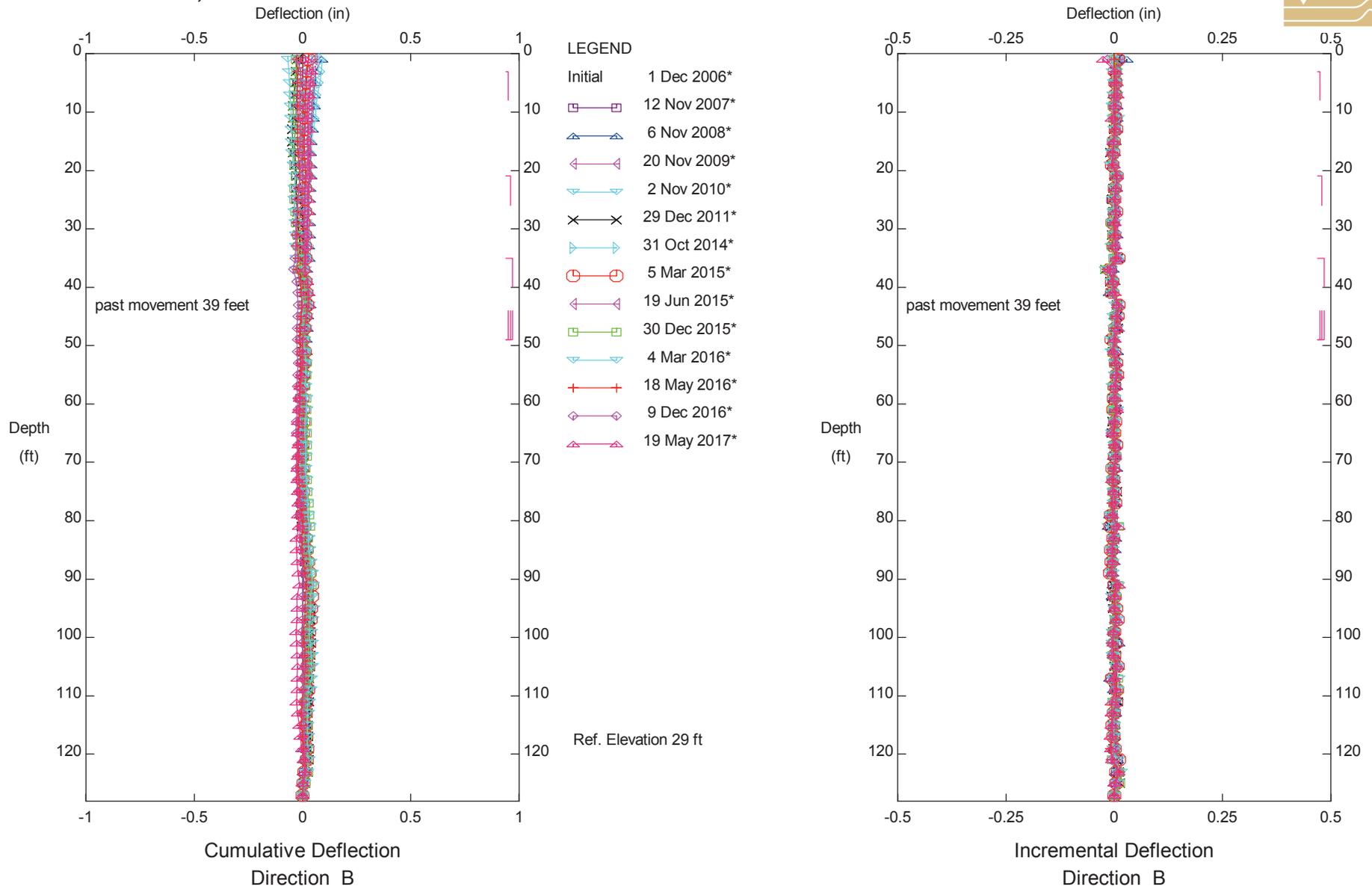


BIG ROCK MESA, Inclinator SP-30
 PCH REGION

Sets marked * include zero shift and/or rotation corrections.

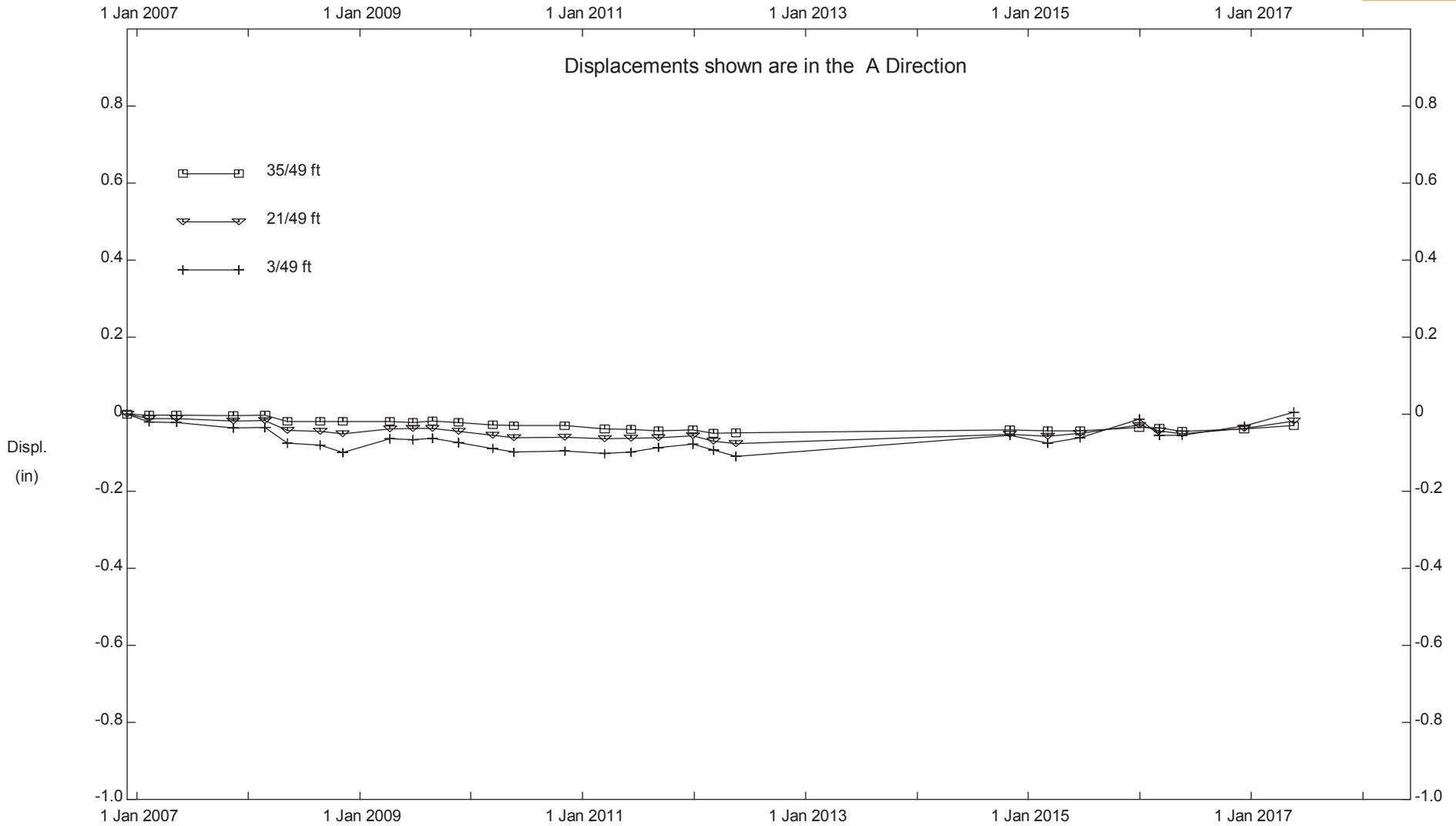
**BIG ROCK MESA LANDSLIDE ASSESSMENT DISTRICT
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BIG ROCK MESA, Inclinerometer SP-30
 PCH REGION

Sets marked * include zero shift and/or rotation corrections.



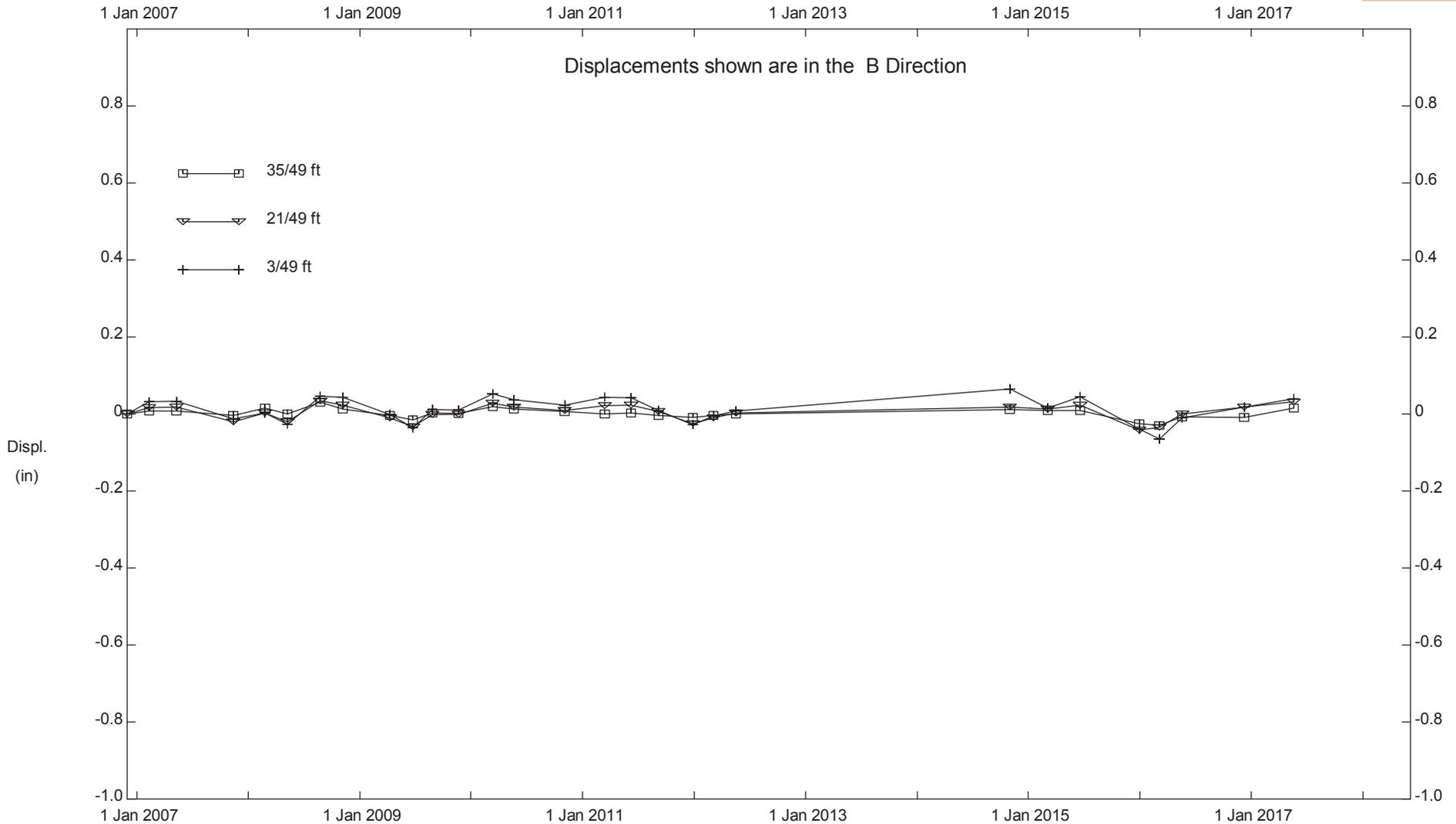
BIG ROCK MESA, Inclinometer SP-30

PCH REGION

PLATE D9-3

**BIG ROCK MESA LANDSLIDE ASSESSMENT DISTRICT
FY16-17 ANNUAL REPORT
CITY OF MALIBU, CALIFORNIA**

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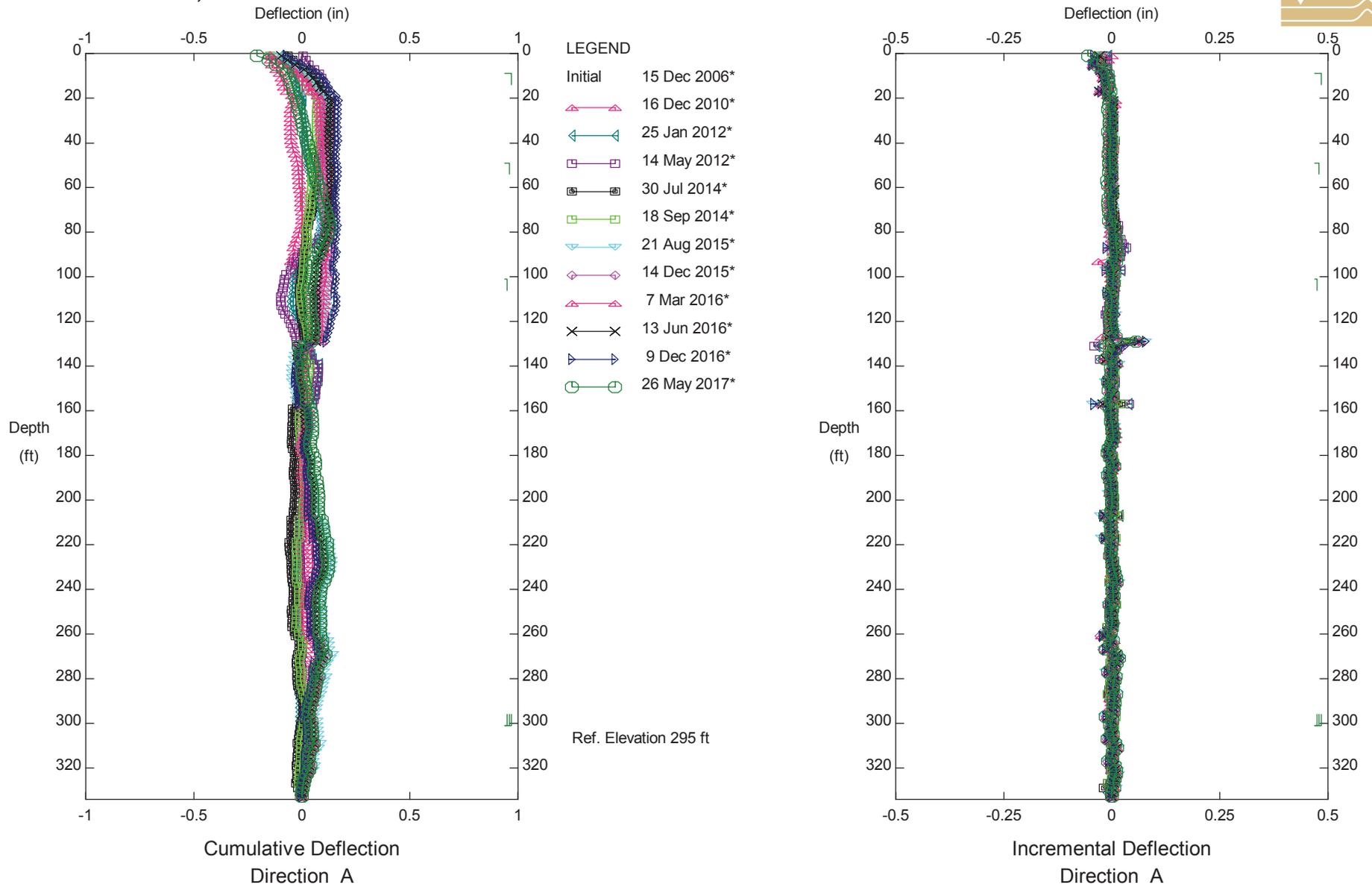
BIG ROCK MESA, Inclinometer SP-30

PCH REGION

PLATE D9-4

**BIG ROCK MESA LANDSLIDE ASSESSMENT DISTRICT
 FY16-17 ANNUAL REPORT
 CITY OF MALIBU, CALIFORNIA**

Fugro USA Land, Inc. - Ventura, CA

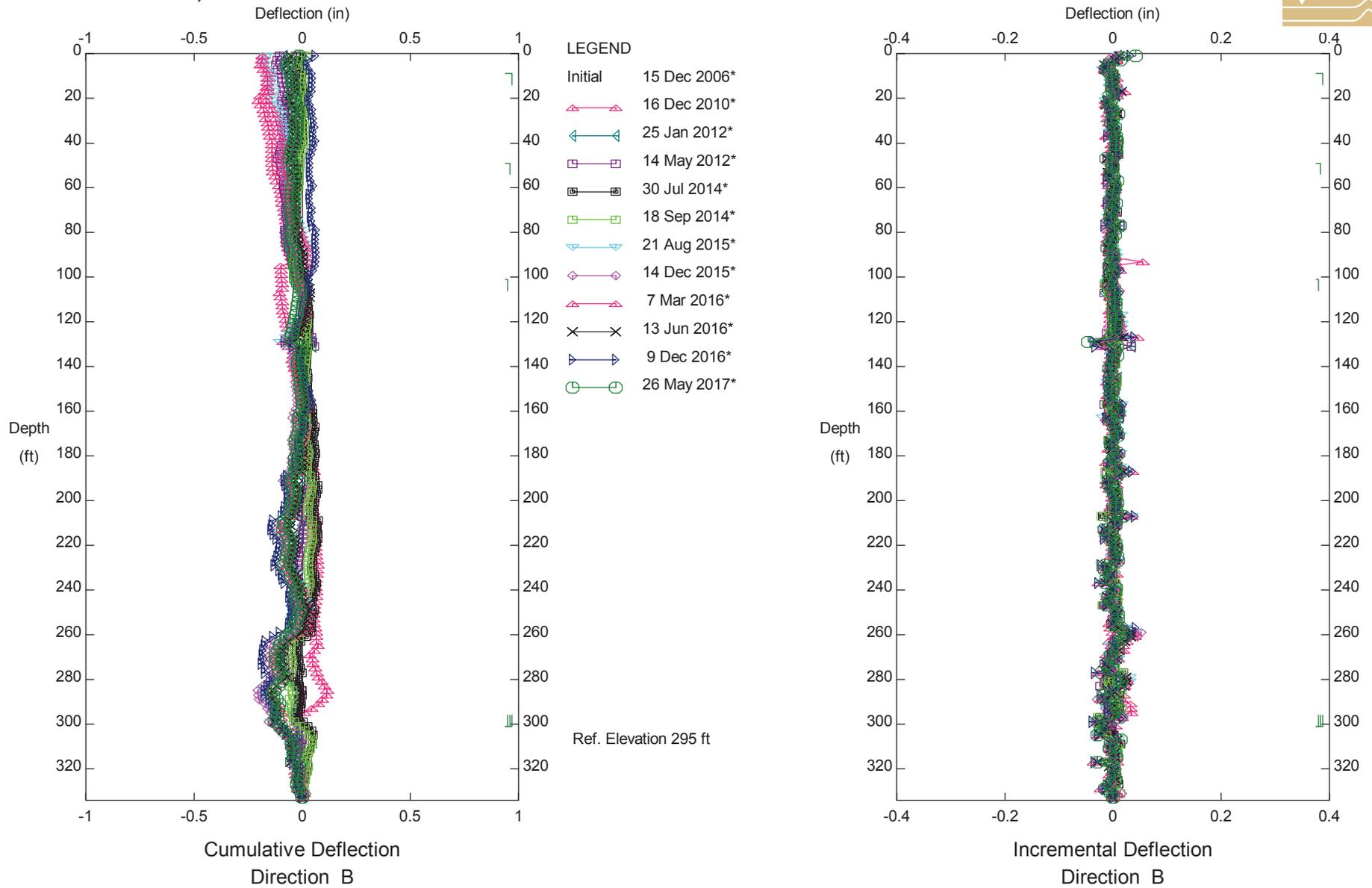


BIG ROCK MESA, Inclinometer SP-10
 BLUFF REGION

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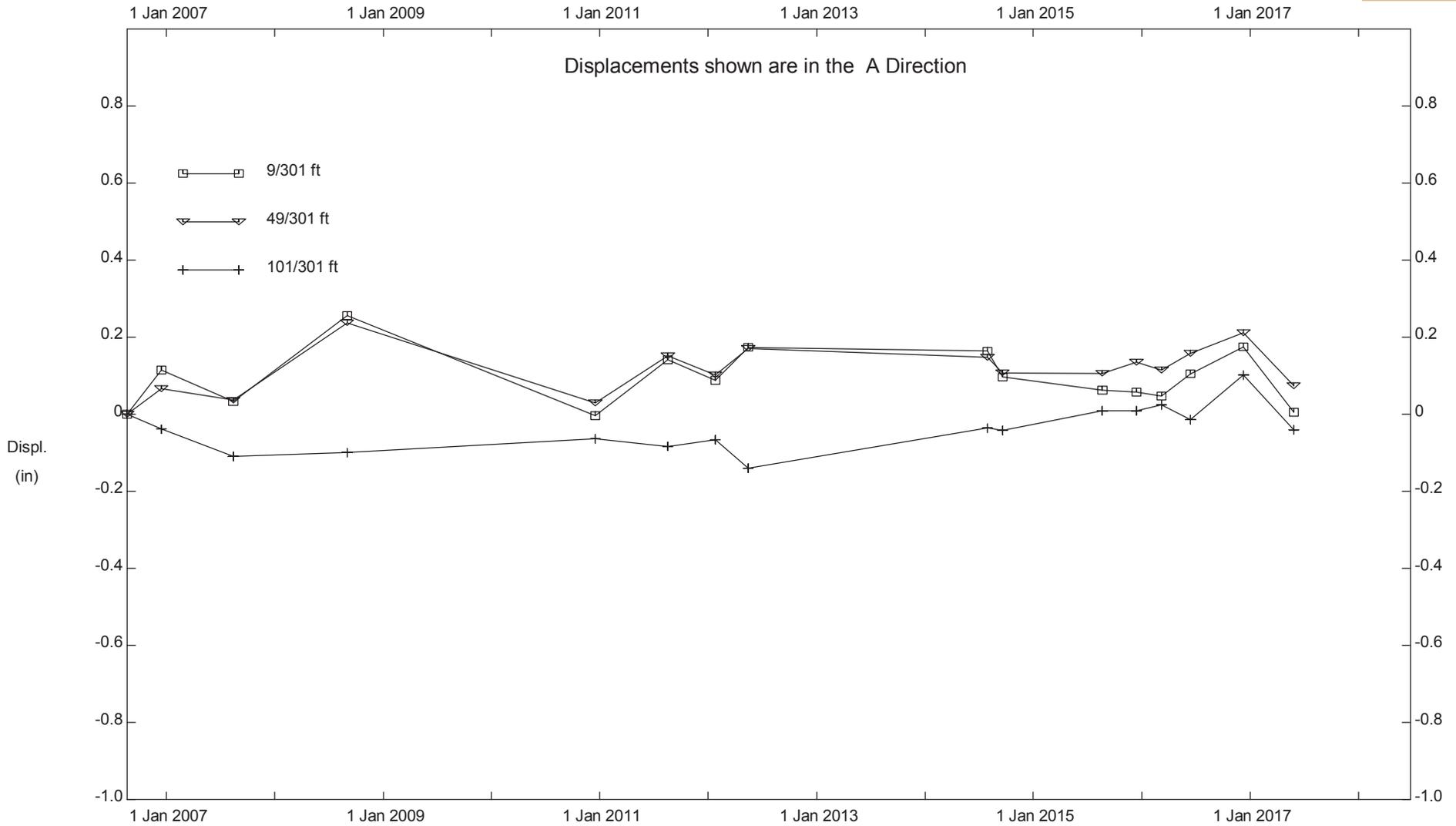
**BIG ROCK MESA LANDSLIDE ASSESSMENT DISTRICT
 FY16-17 ANNUAL REPORT
 CITY OF MALIBU, CALIFORNIA**

Fugro USA Land, Inc. - Ventura, CA



BIG ROCK MESA, Inclinometer SP-10
 BLUFF REGION

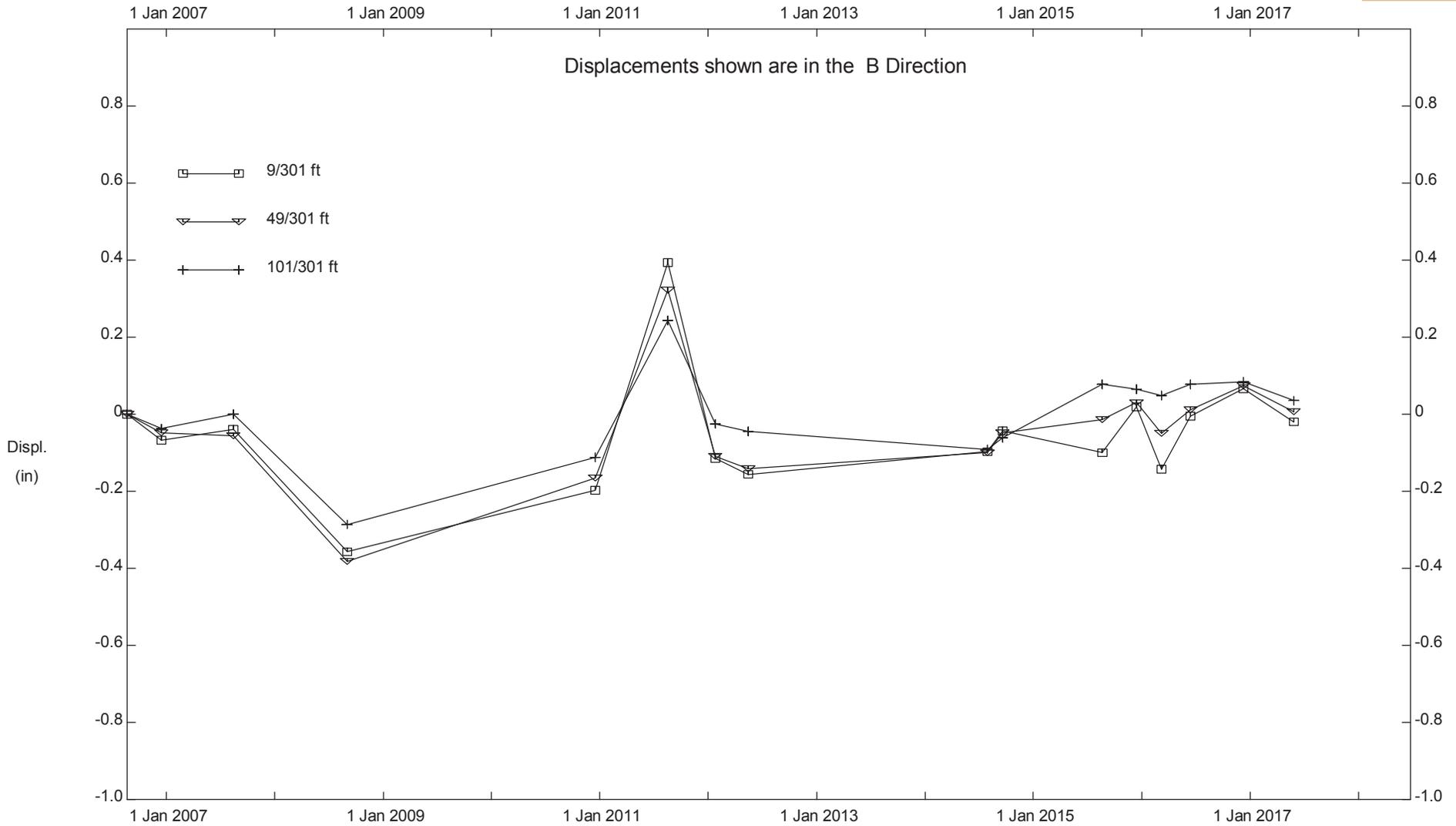
Sets marked * include zero shift and/or rotation corrections.



BIG ROCK MESA, Inclinometer SP-10

BLUFF REGION

PLATE D10-3



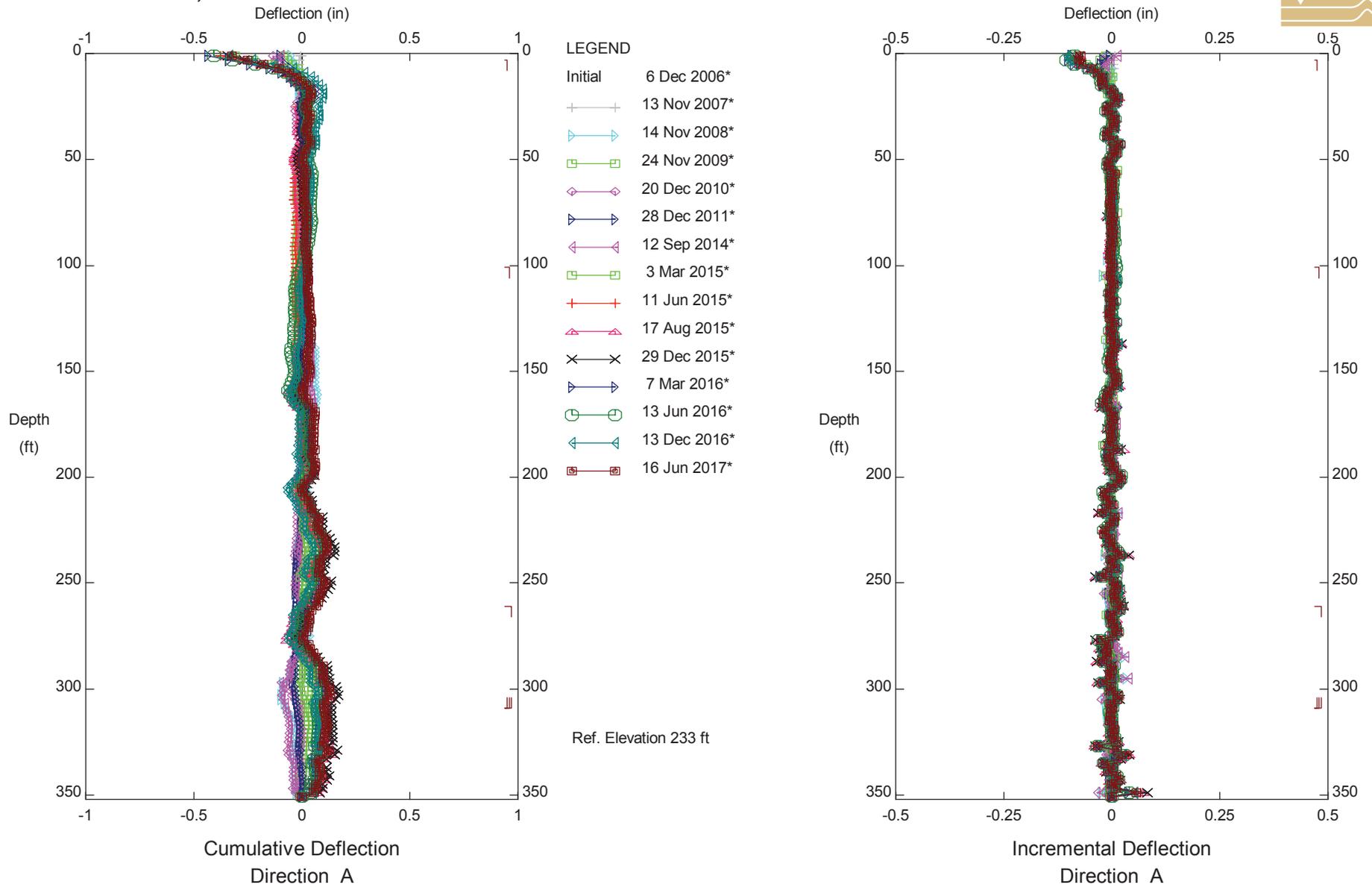
BIG ROCK MESA, Inclinometer SP-10

BLUFF REGION

PLATE D10-4

**BIG ROCK MESA LANDSLIDE ASSESSMENT DISTRICT
 FY16-17 ANNUAL REPORT
 CITY OF MALIBU, CALIFORNIA**

Fugro USA Land, Inc. - Ventura, CA

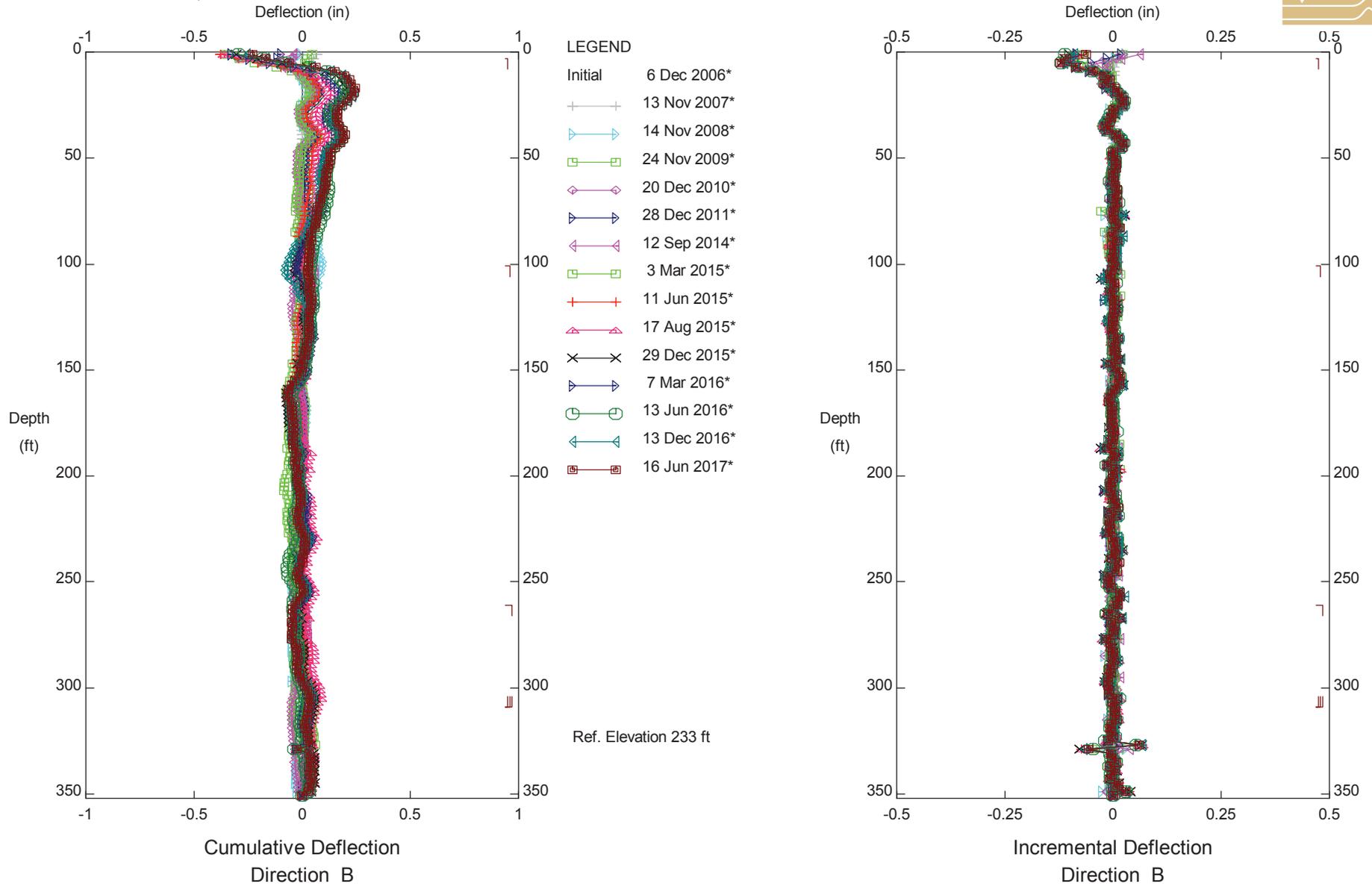


BIG ROCK MESA, Inclinometer SP-32
 BLUFF REGION

Sets marked * include zero shift and/or rotation corrections.

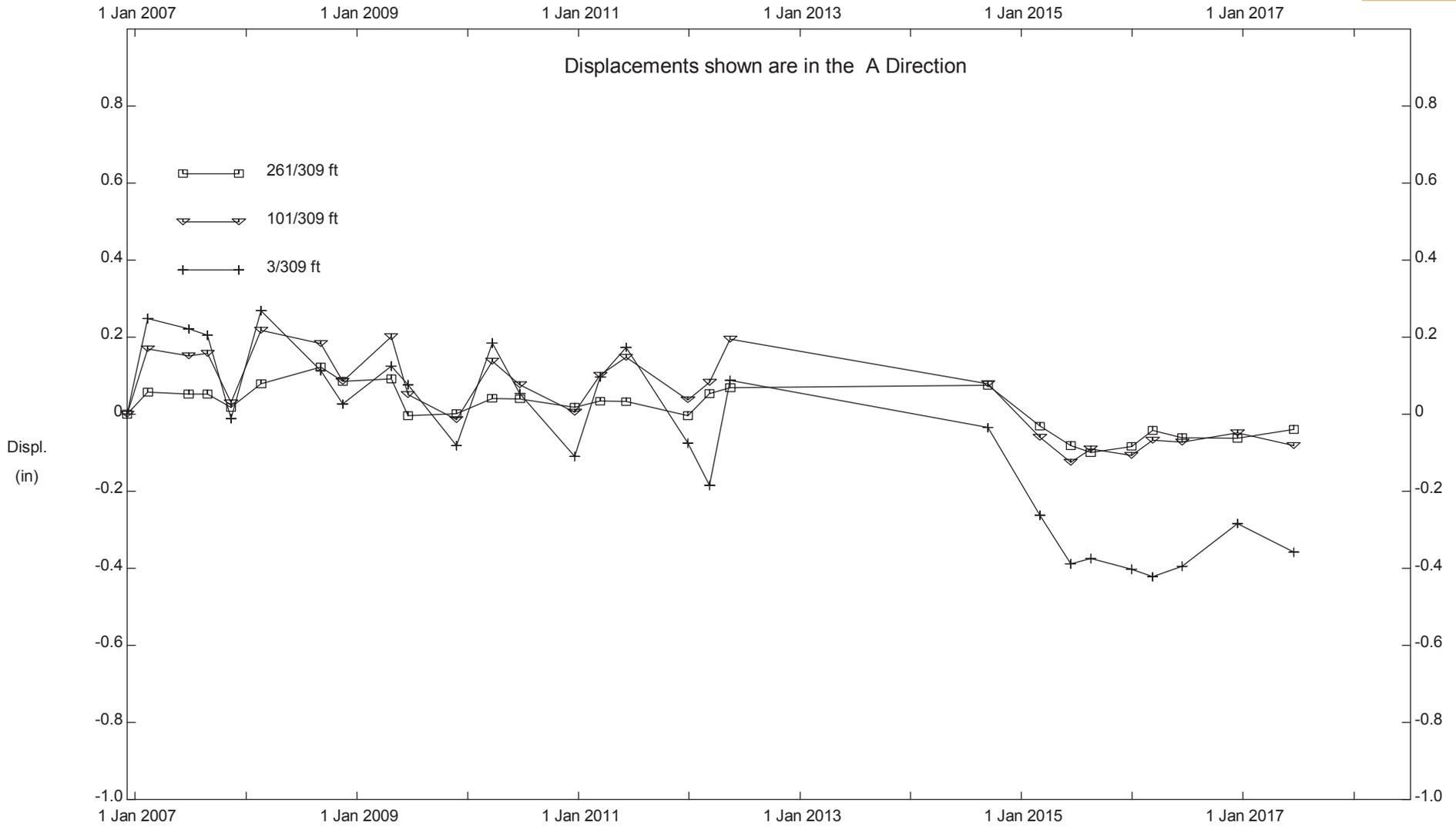
**BIG ROCK MESA LANDSLIDE ASSESSMENT DISTRICT
 FY16-17 ANNUAL REPORT
 CITY OF MALIBU, CALIFORNIA**

Fugro USA Land, Inc. - Ventura, CA



BIG ROCK MESA, Inclinometer SP-32
 BLUFF REGION

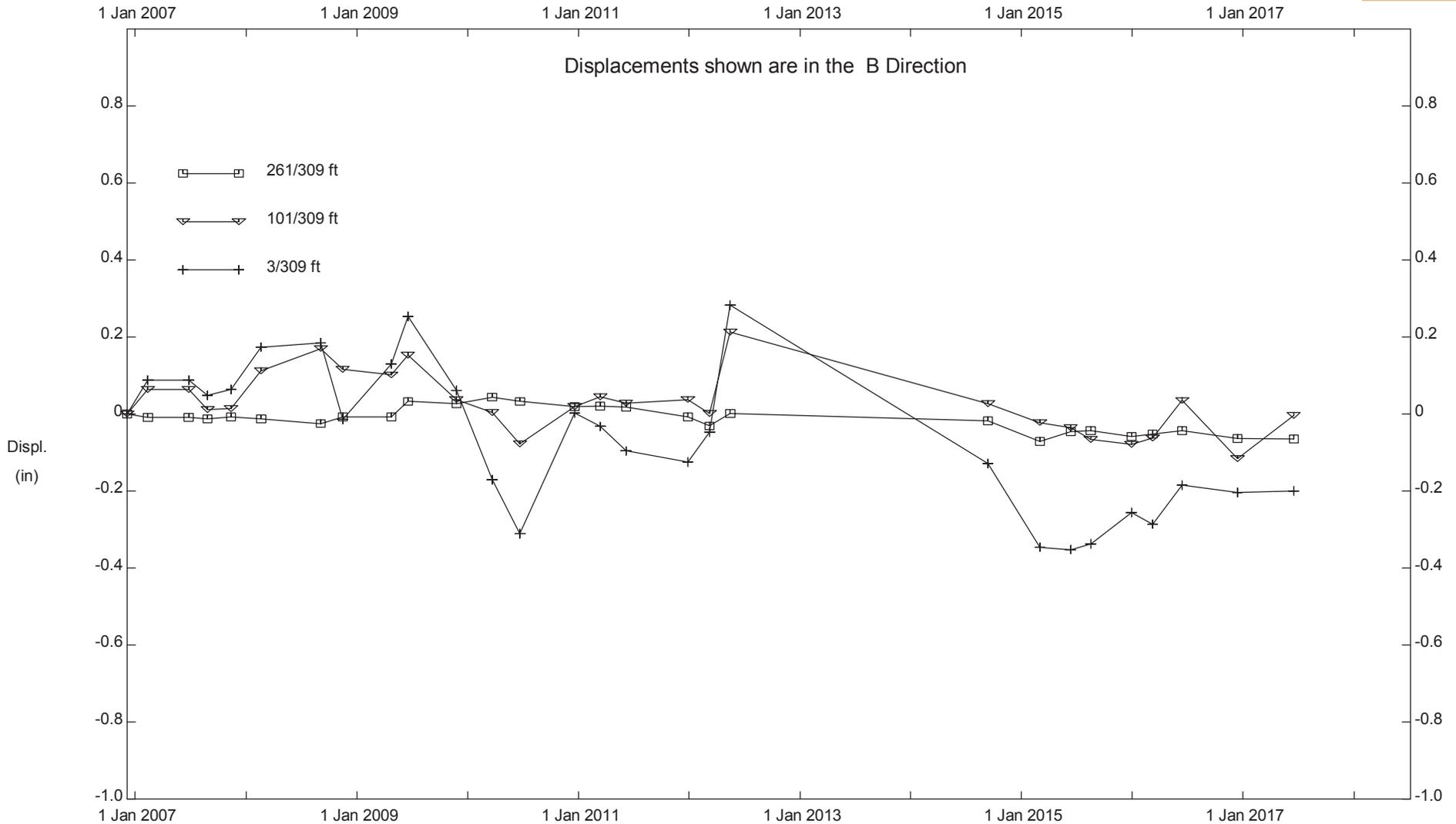
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BIG ROCK MESA, Inclinometer SP-32

BLUFF REGION

PLATE D12-3



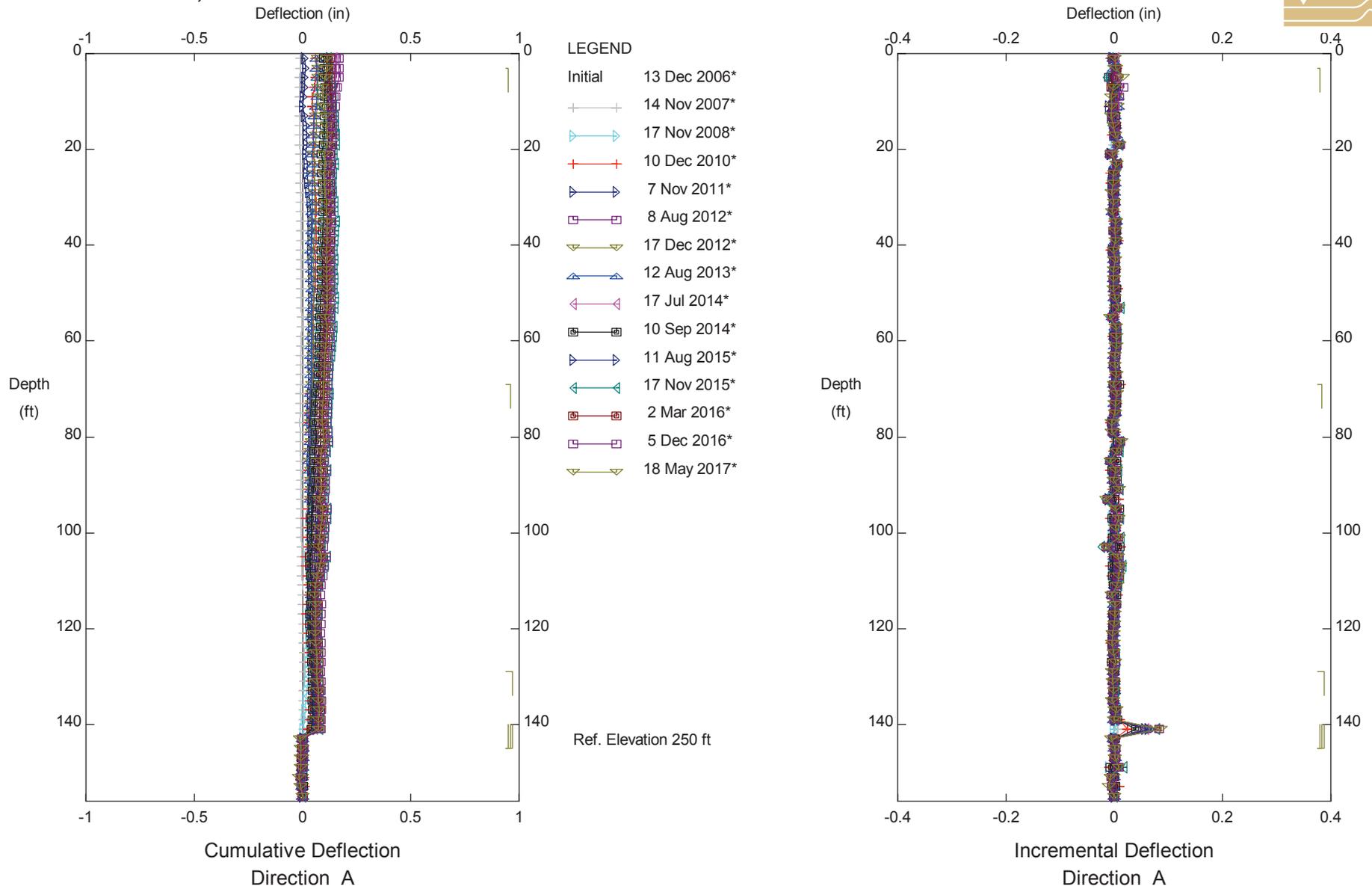
BIG ROCK MESA, Inclinometer SP-32

BLUFF REGION

PLATE D12-4

**BIG ROCK MESA LANDSLIDE ASSESSMENT DISTRICT
 FY16-17 ANNUAL REPORT
 CITY OF MALIBU, CALIFORNIA**

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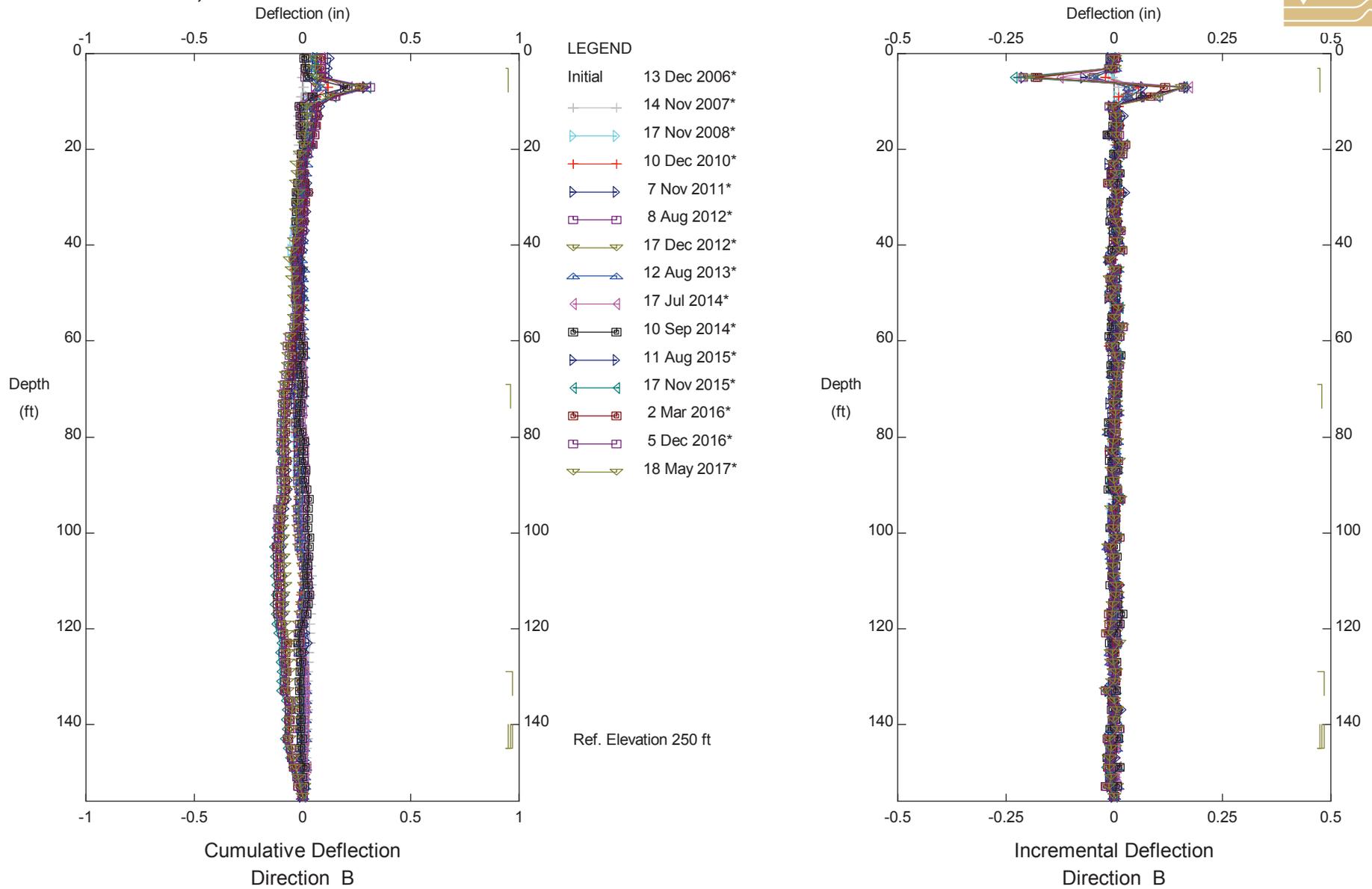


**BIG ROCK MESA, Inclinator PC-1
 EASTERN REGION**

Sets marked * include zero shift and/or rotation corrections.

**BIG ROCK MESA LANDSLIDE ASSESSMENT DISTRICT
 FY16-17 ANNUAL REPORT
 CITY OF MALIBU, CALIFORNIA**

Fugro USA Land, Inc. - Ventura, CA

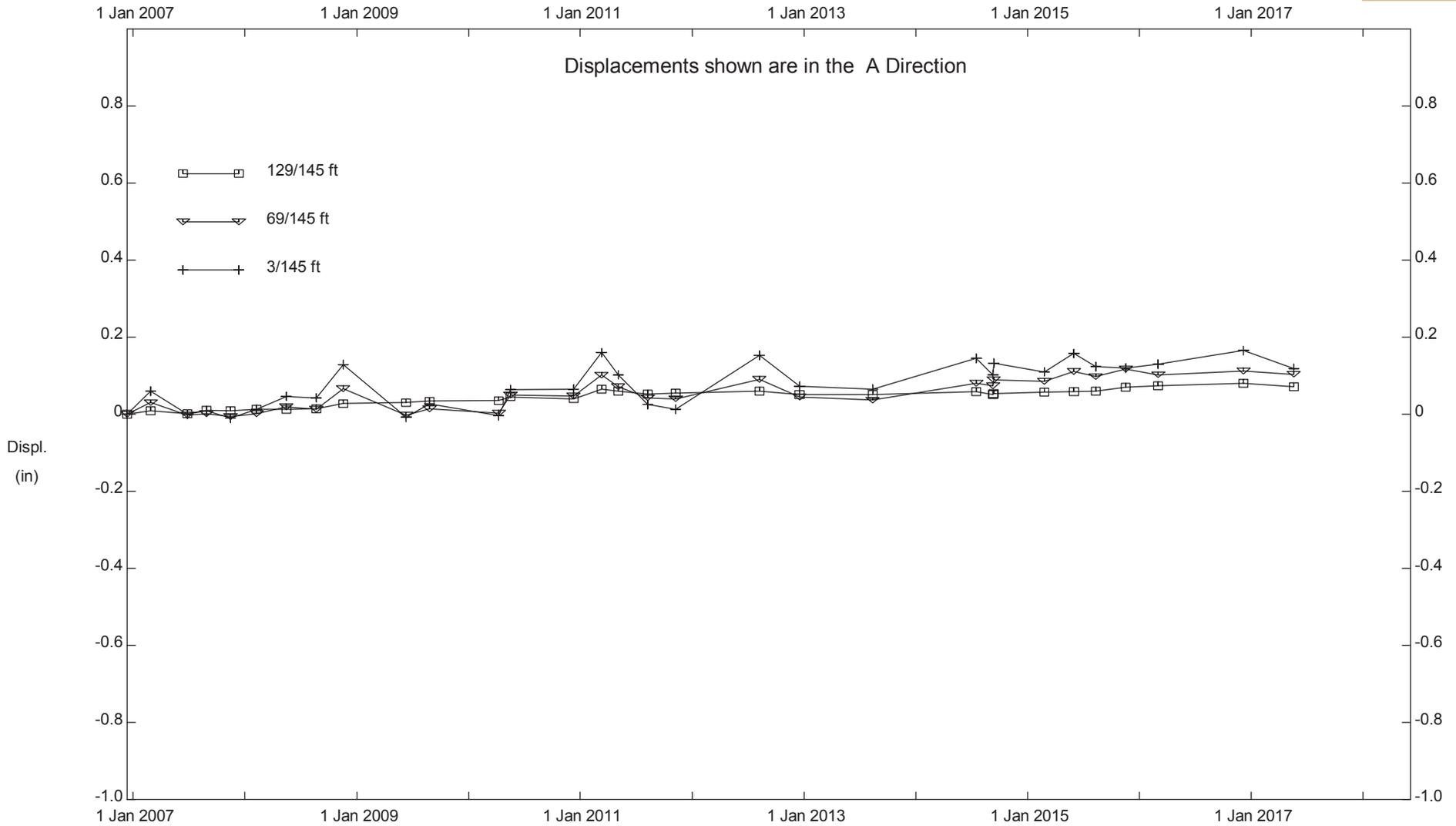


**BIG ROCK MESA, Inclinometer PC-1
 EASTERN REGION**

Sets marked * include zero shift and/or rotation corrections.

**BIG ROCK MESA LANDSLIDE ASSESSMENT DISTRICT
 FY16-17 ANNUAL REPORT
 CITY OF MALIBU, CALIFORNIA**

Fugro USA Land, Inc. - Ventura, CA



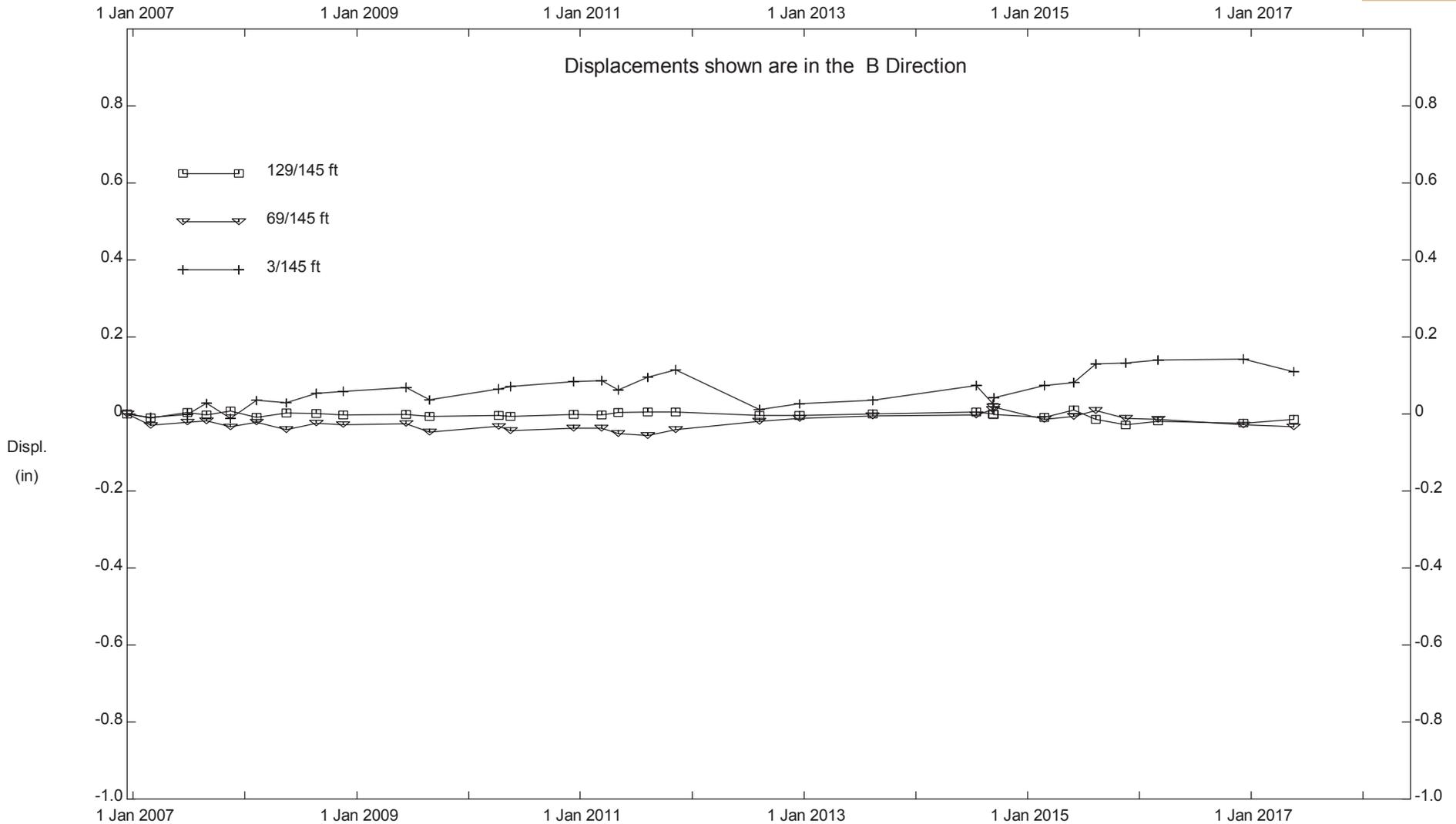
BIG ROCK MESA, Inclinometer PC-1

EASTERN REGION

PLATE D13-3

**BIG ROCK MESA LANDSLIDE ASSESSMENT DISTRICT
 FY16-17 ANNUAL REPORT
 CITY OF MALIBU, CALIFORNIA**

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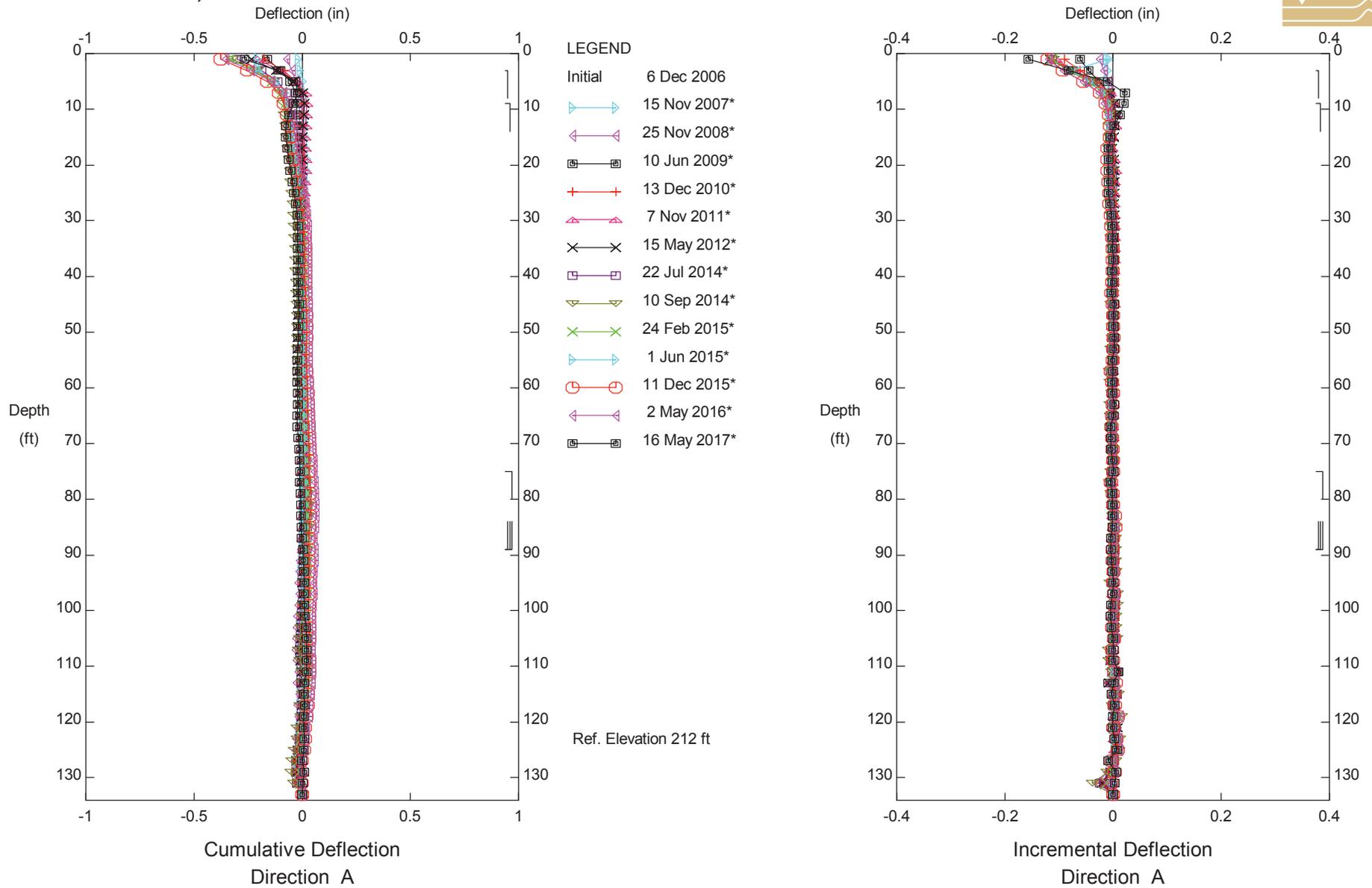
BIG ROCK MESA, Inclinometer PC-1

EASTERN REGION

PLATE D13-4

**BIG ROCK MESA LANDSLIDE ASSESSMENT DISTRICT
 FY16-17 ANNUAL REPORT
 CITY OF MALIBU, CALIFORNIA**

Fugro USA Land, Inc. - Ventura, CA

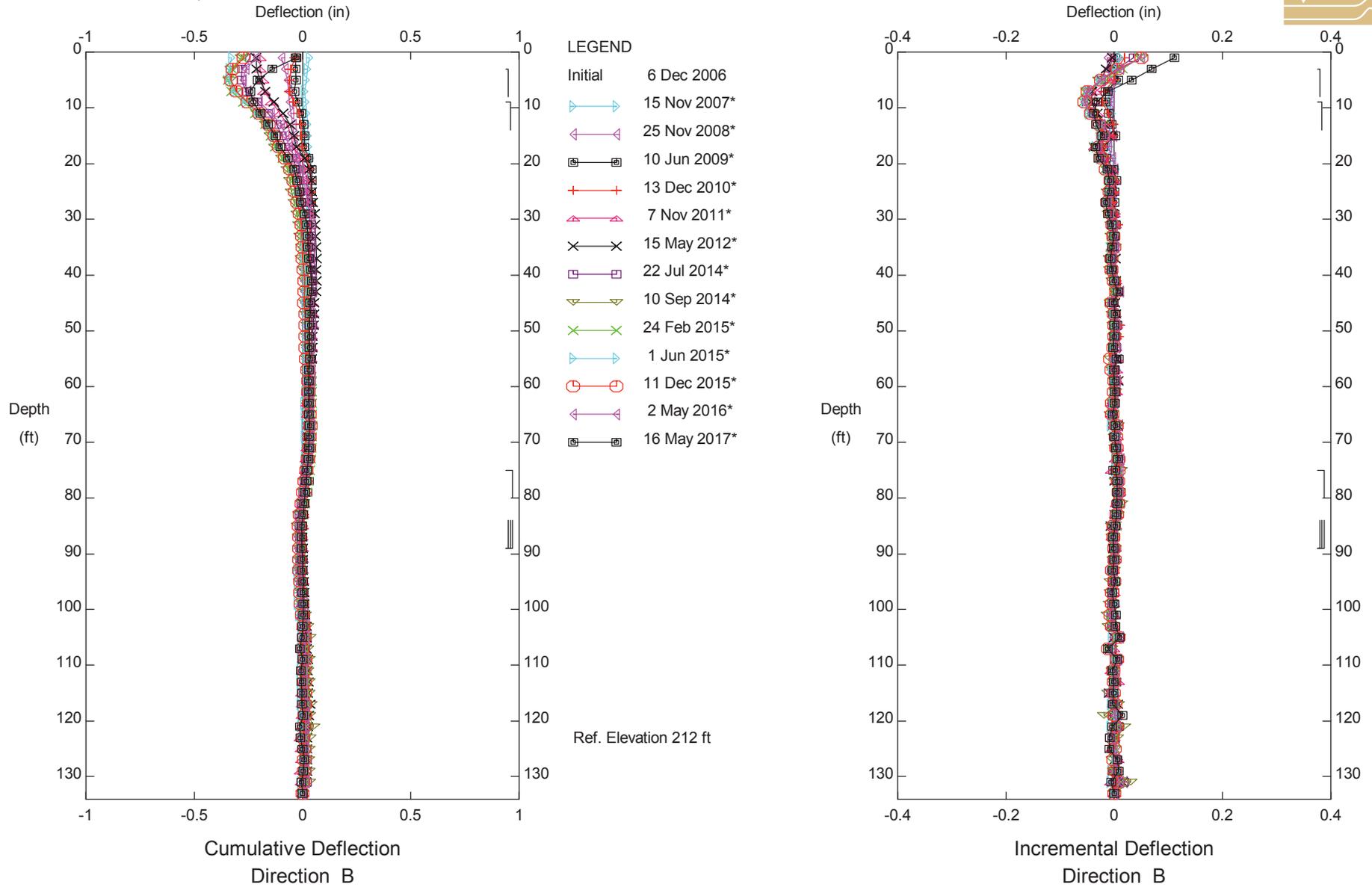


**BIG ROCK MESA, Incliner SP-3
 EASTERN REGION**

Sets marked * include zero shift and/or rotation corrections.

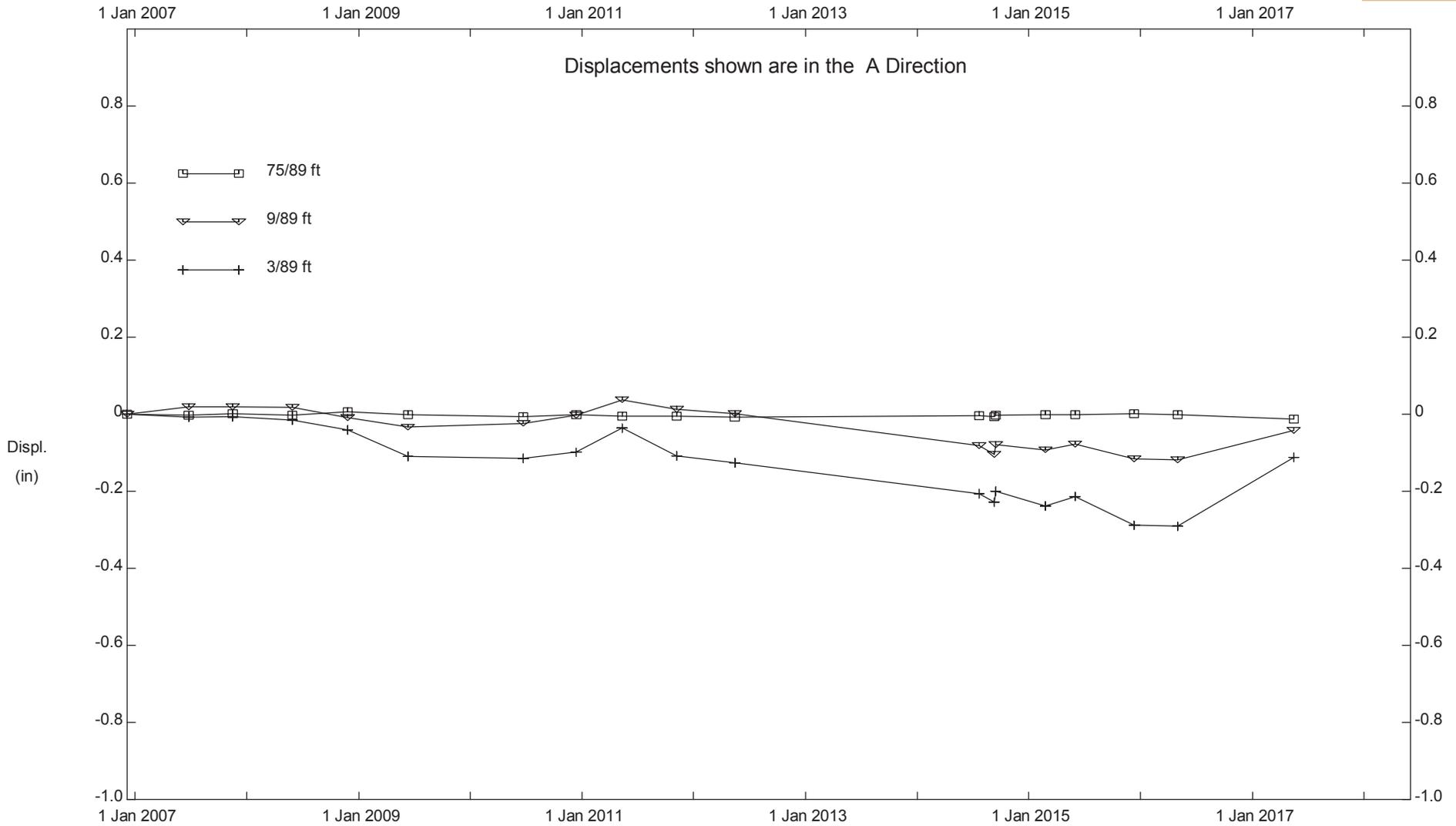
**BIG ROCK MESA LANDSLIDE ASSESSMENT DISTRICT
 FY16-17 ANNUAL REPORT
 CITY OF MALIBU, CALIFORNIA**

Fugro USA Land, Inc. - Ventura, CA



**BIG ROCK MESA, Inclinator SP-3
 EASTERN REGION**

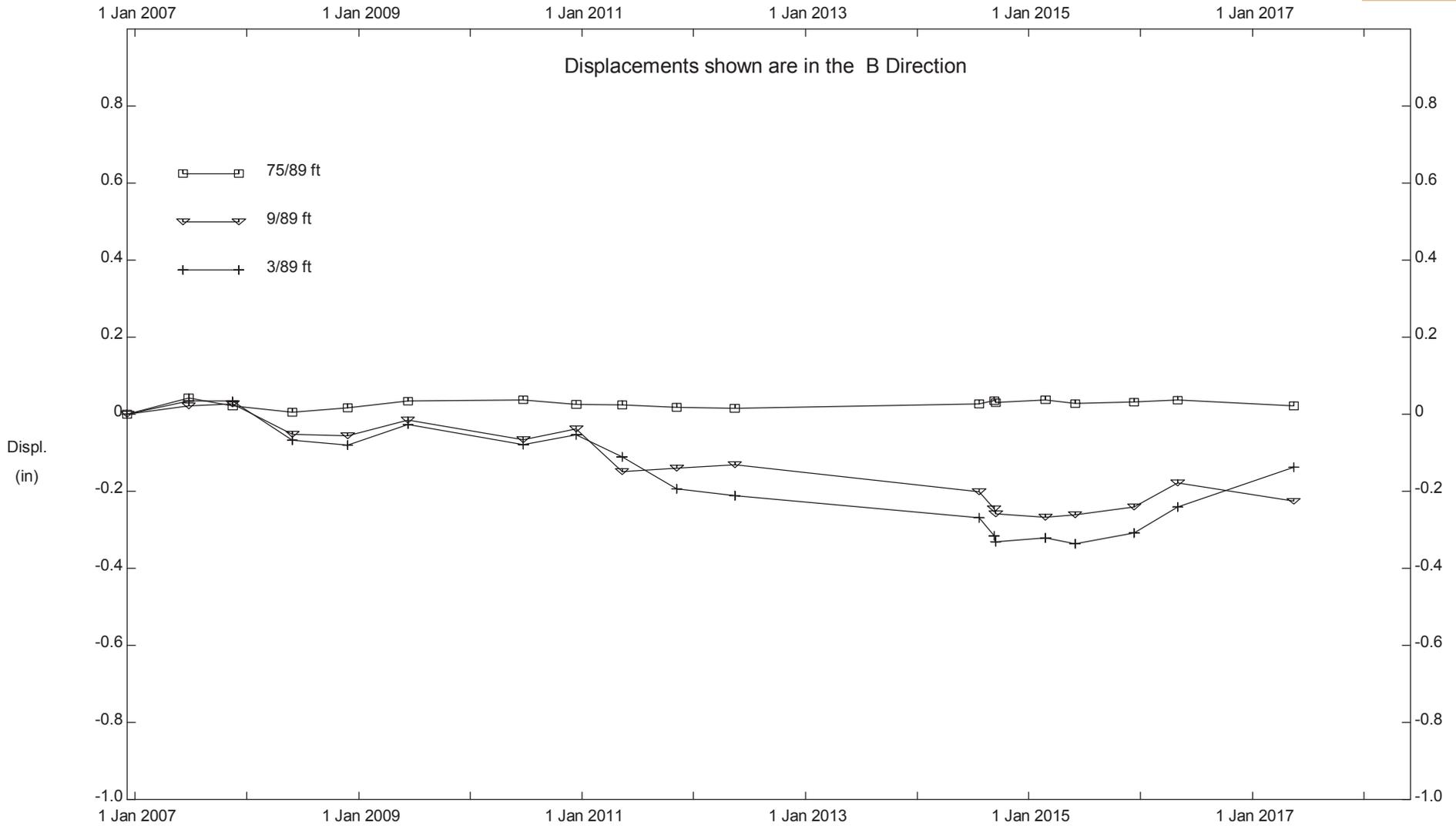
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BIG ROCK MESA, Inclinator SP-3

EASTERN REGION

PLATE D14-3



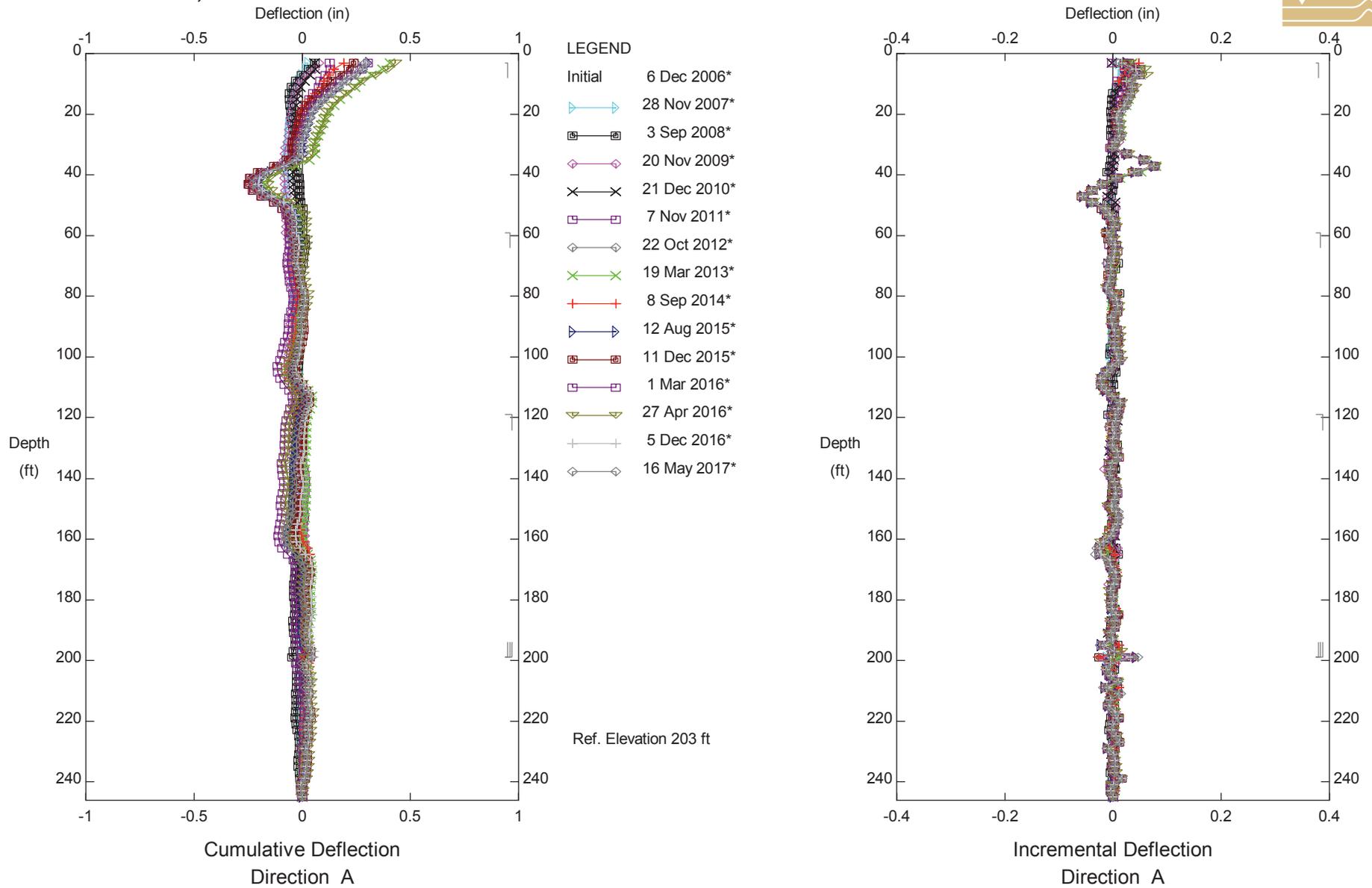
BIG ROCK MESA, Inclinator SP-3

EASTERN REGION

PLATE D14-4

**BIG ROCK MESA LANDSLIDE ASSESSMENT DISTRICT
 FY16-17 ANNUAL REPORT
 CITY OF MALIBU, CALIFORNIA**

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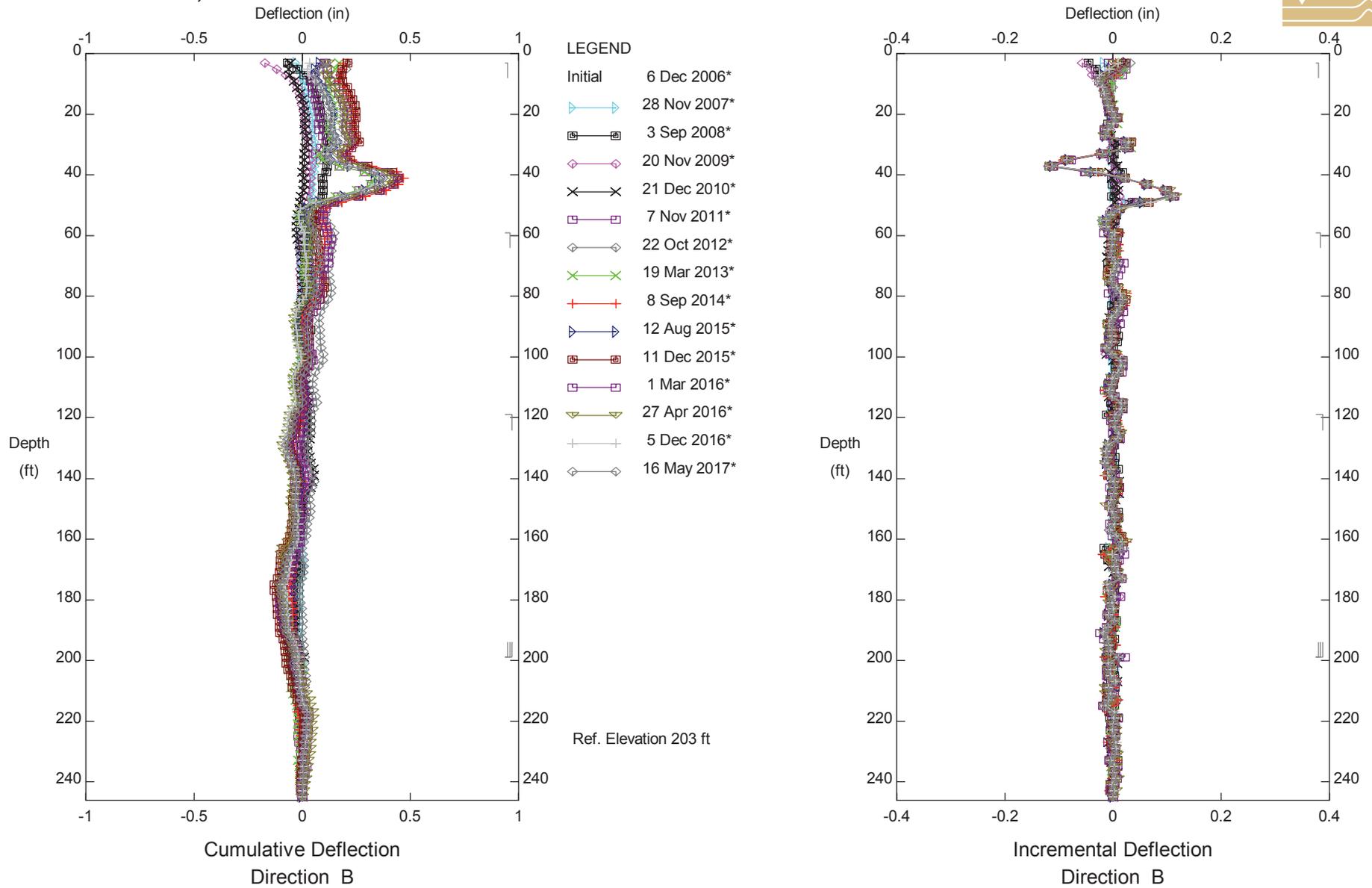


BIG ROCK MESA, Inclinometer SP-3A
 EASTERN REGION

Sets marked * include zero shift and/or rotation corrections.

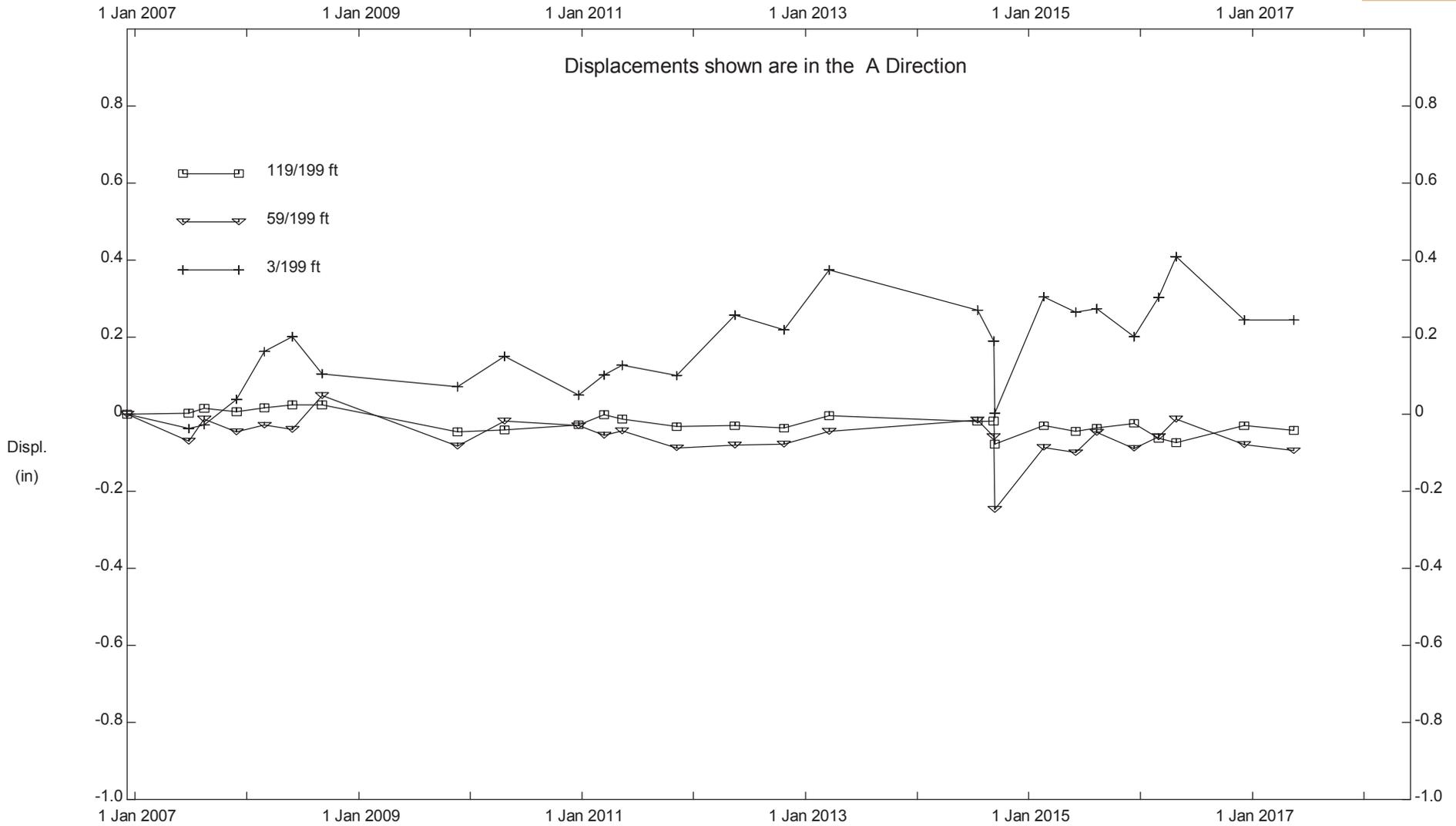
**BIG ROCK MESA LANDSLIDE ASSESSMENT DISTRICT
 FY16-17 ANNUAL REPORT
 CITY OF MALIBU, CALIFORNIA**

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BIG ROCK MESA, Inclinometer SP-3A
 EASTERN REGION

Sets marked * include zero shift and/or rotation corrections.



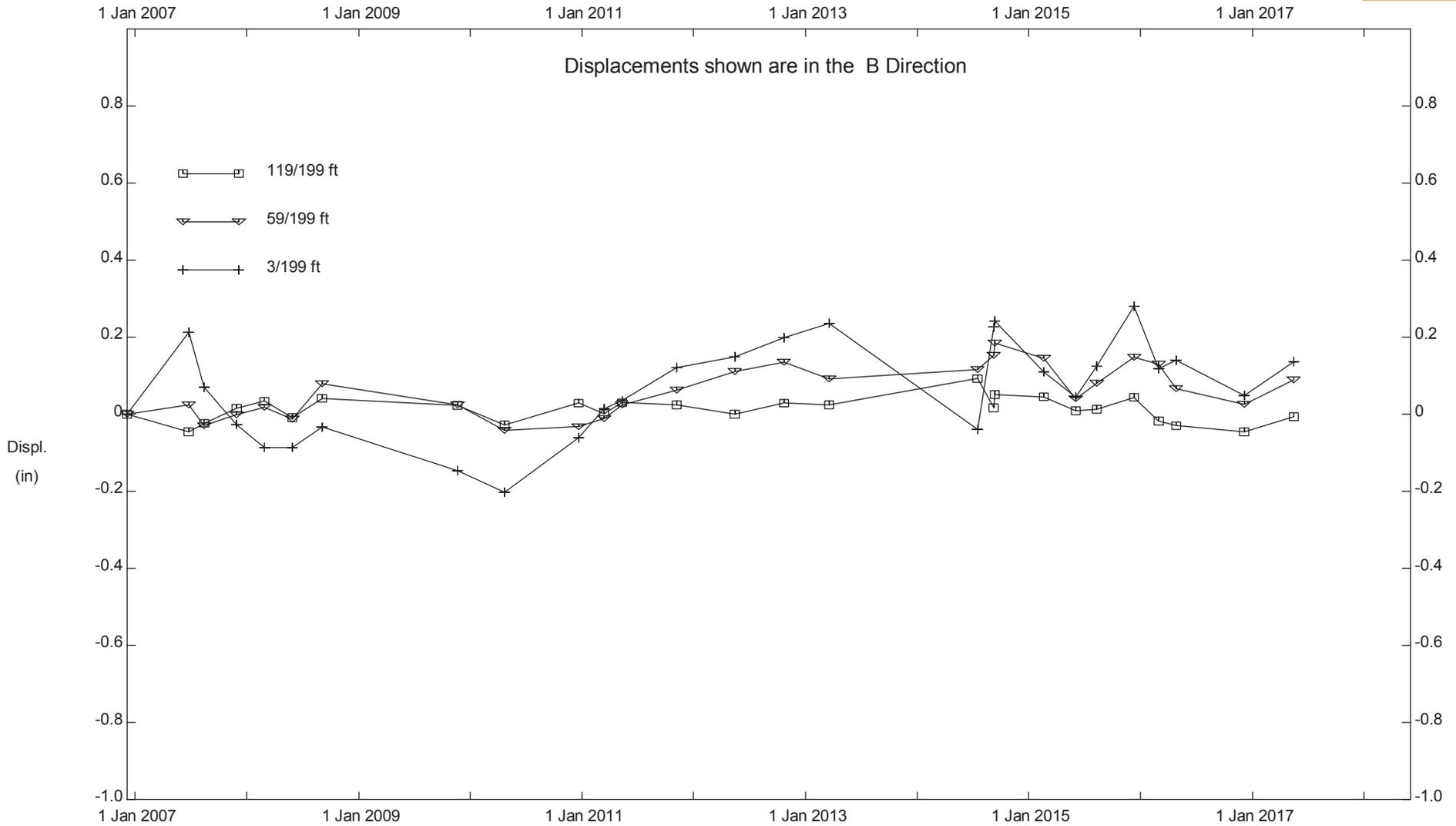
BIG ROCK MESA, Inclinometer SP-3A

EASTERN REGION

PLATE D15-3

**BIG ROCK MESA LANDSLIDE ASSESSMENT DISTRICT
 FY16-17 ANNUAL REPORT
 CITY OF MALIBU, CALIFORNIA**

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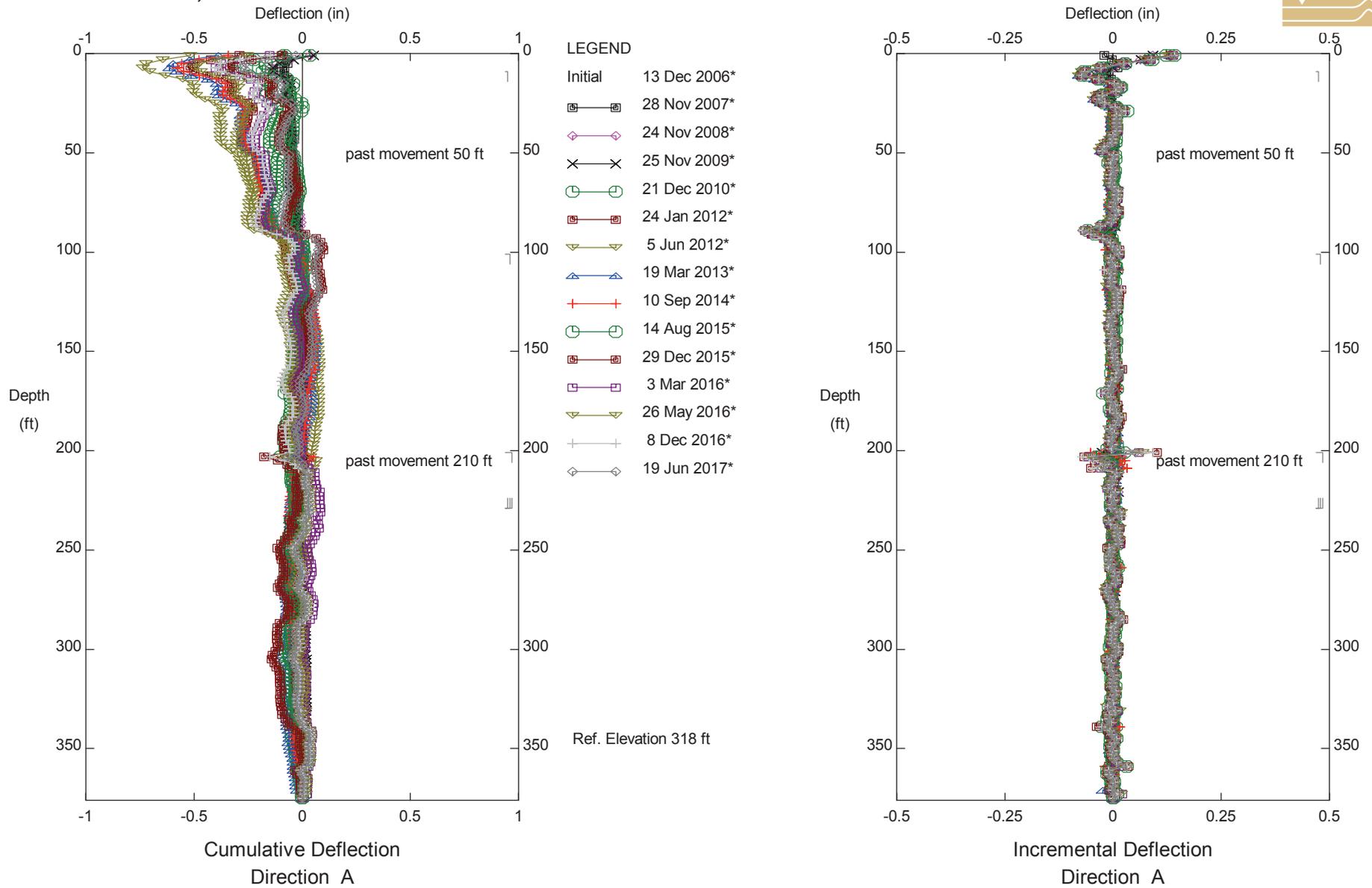
BIG ROCK MESA, Inclinometer SP-3A

EASTERN REGION

PLATE D15-4

**BIG ROCK MESA LANDSLIDE ASSESSMENT DISTRICT
 FY16-17 ANNUAL REPORT
 CITY OF MALIBU, CALIFORNIA**

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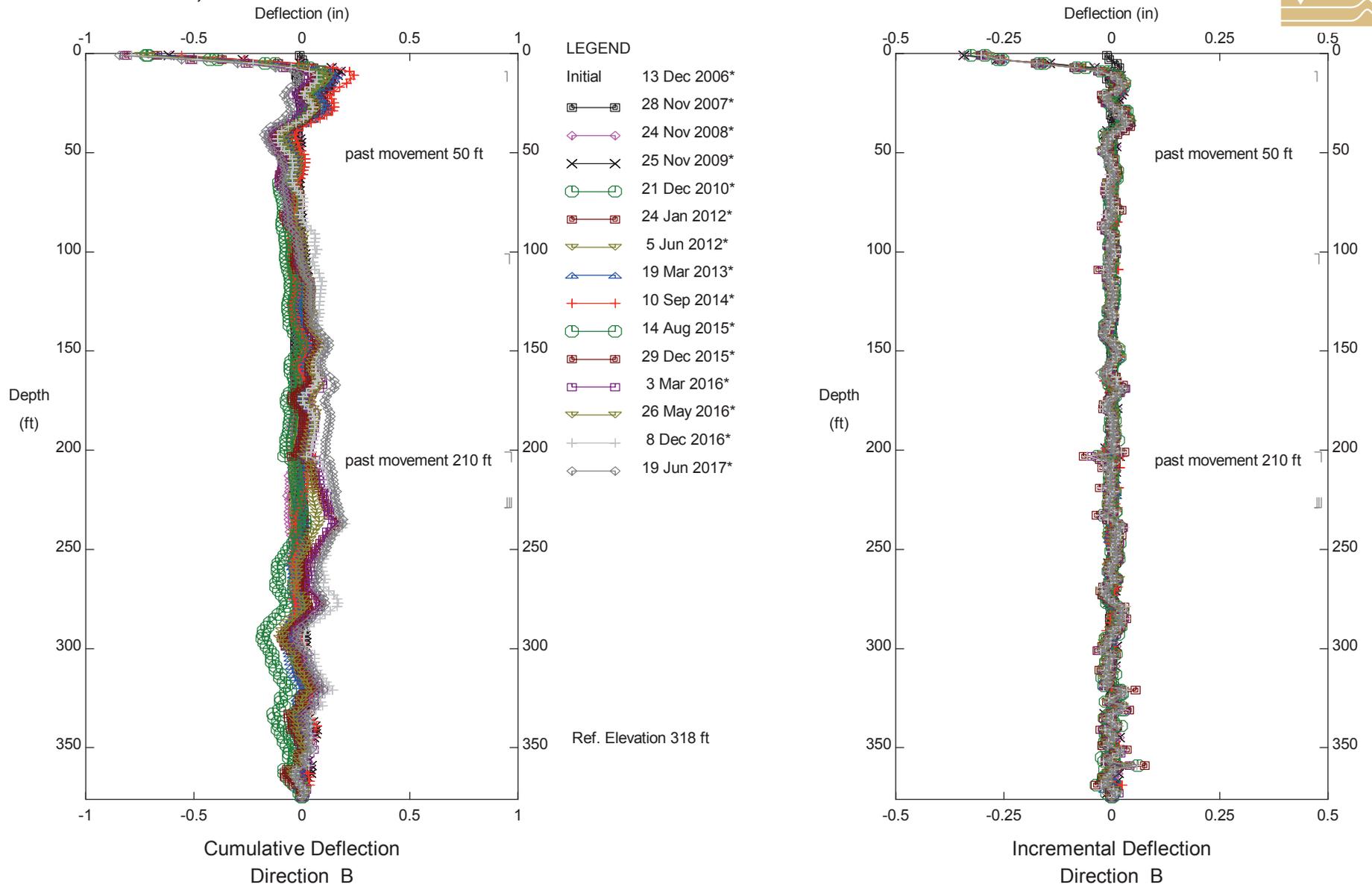


BIG ROCK MESA, Inclinometer SP-33
 EASTERN REGION

Sets marked * include zero shift and/or rotation corrections.

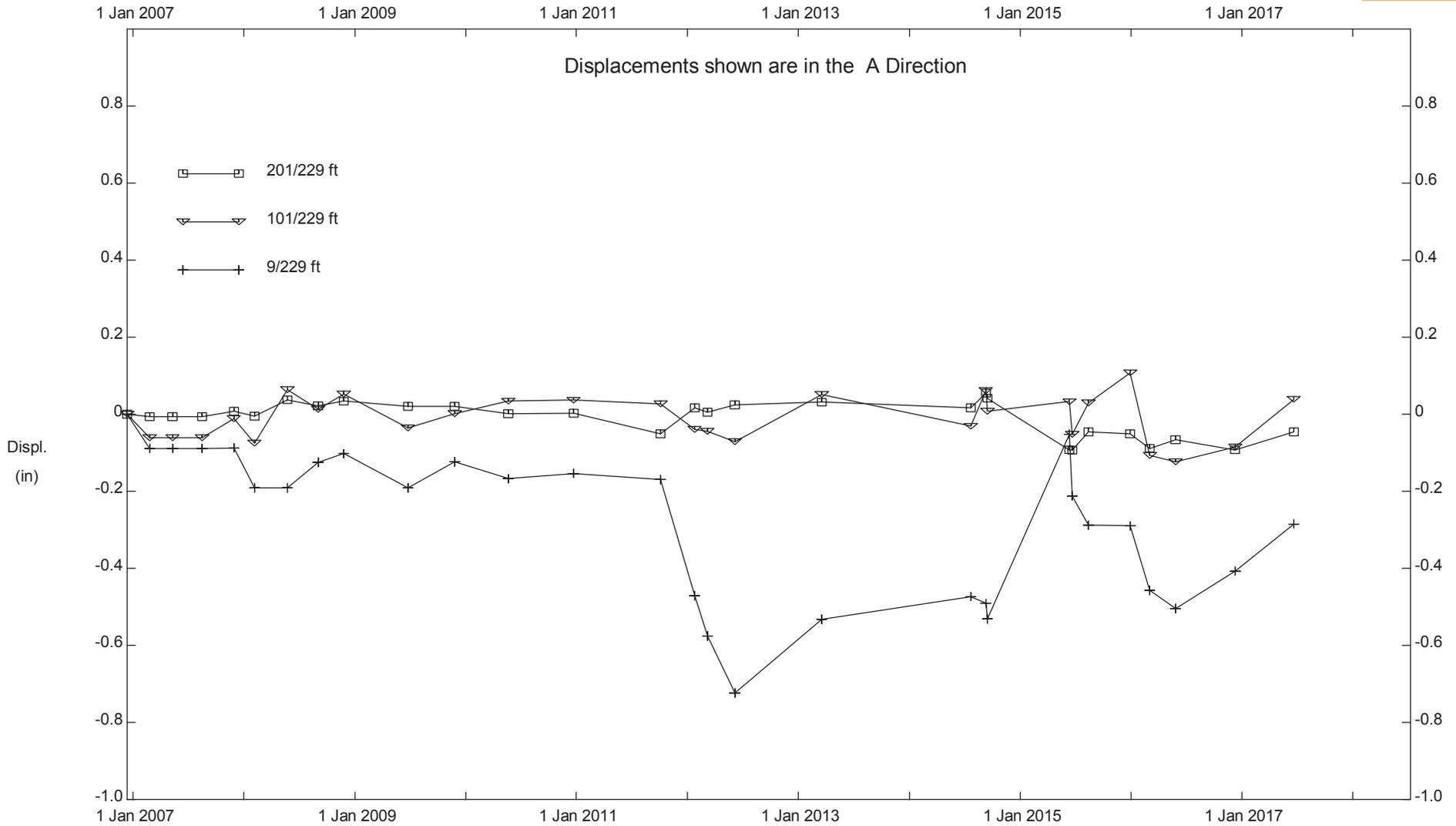
**BIG ROCK MESA LANDSLIDE ASSESSMENT DISTRICT
 FY16-17 ANNUAL REPORT
 CITY OF MALIBU, CALIFORNIA**

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BIG ROCK MESA, Inclinometer SP-33
 EASTERN REGION

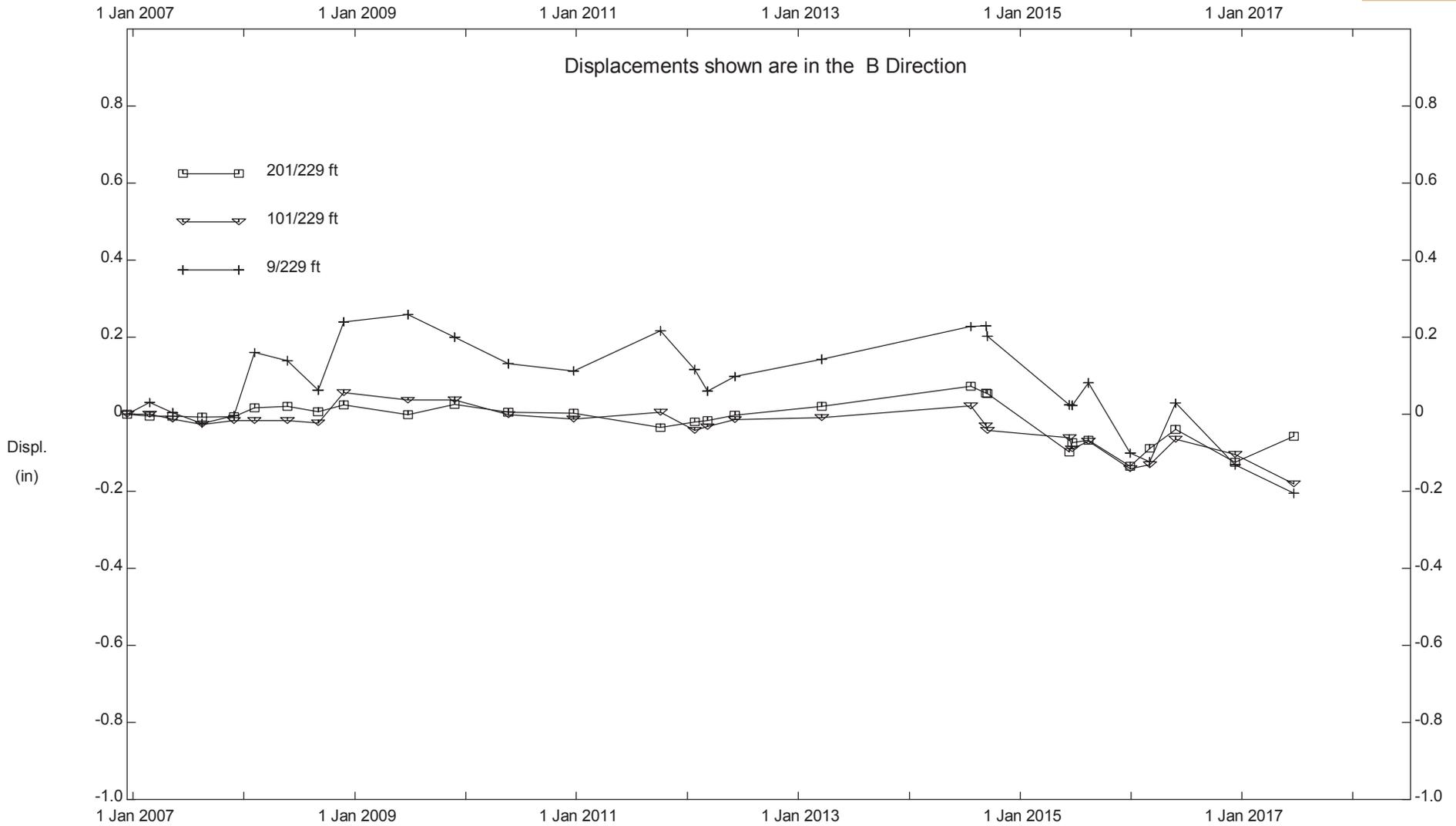
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BIG ROCK MESA, Inclinator SP-33

EASTERN REGION

PLATE D16-3



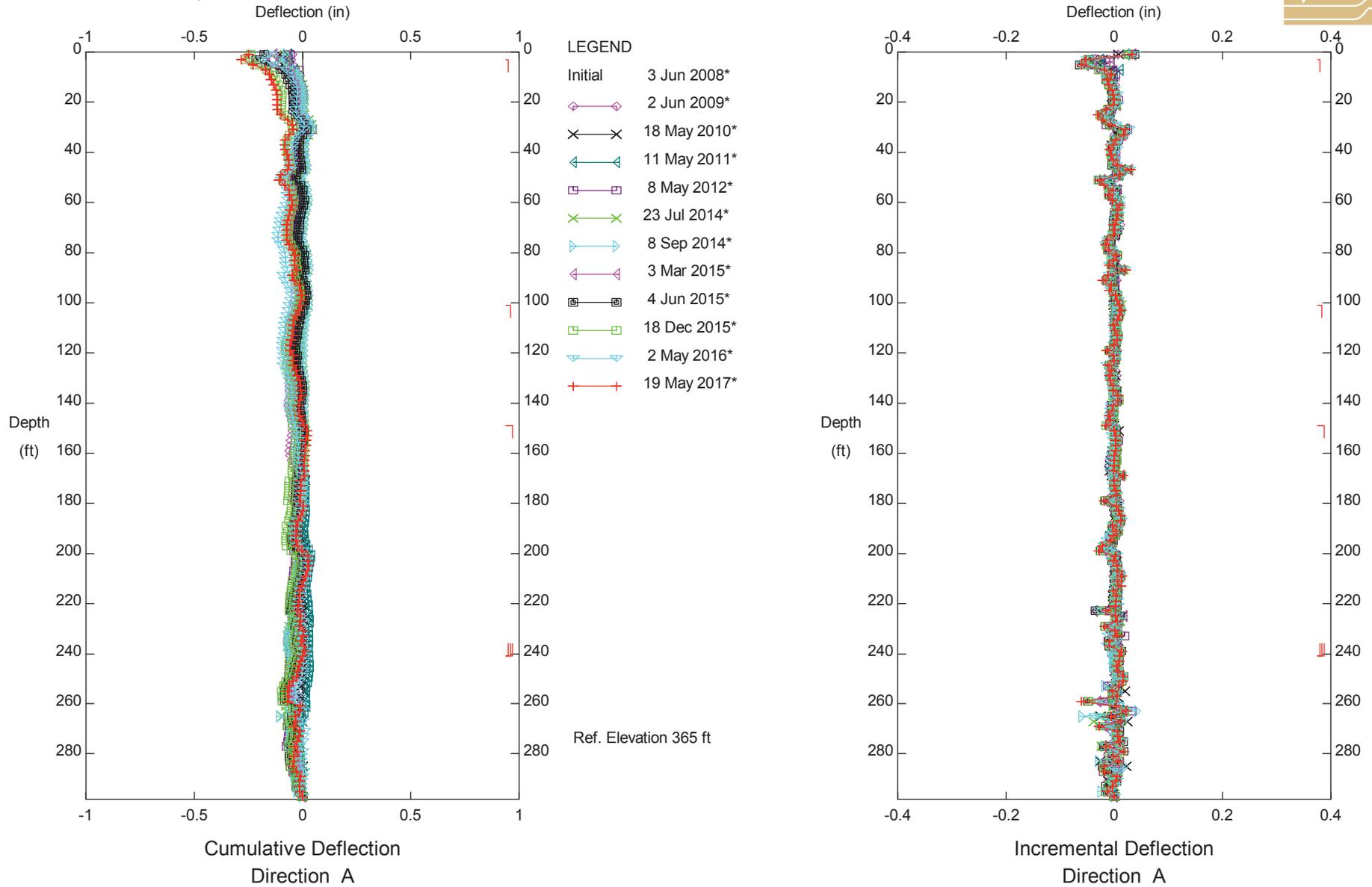
BIG ROCK MESA, Inclinometer SP-33

EASTERN REGION

PLATE D16-4

**BIG ROCK MESA LANDSLIDE ASSESSMENT DISTRICT
 FY16-17 ANNUAL REPORT
 CITY OF MALIBU, CALIFORNIA**

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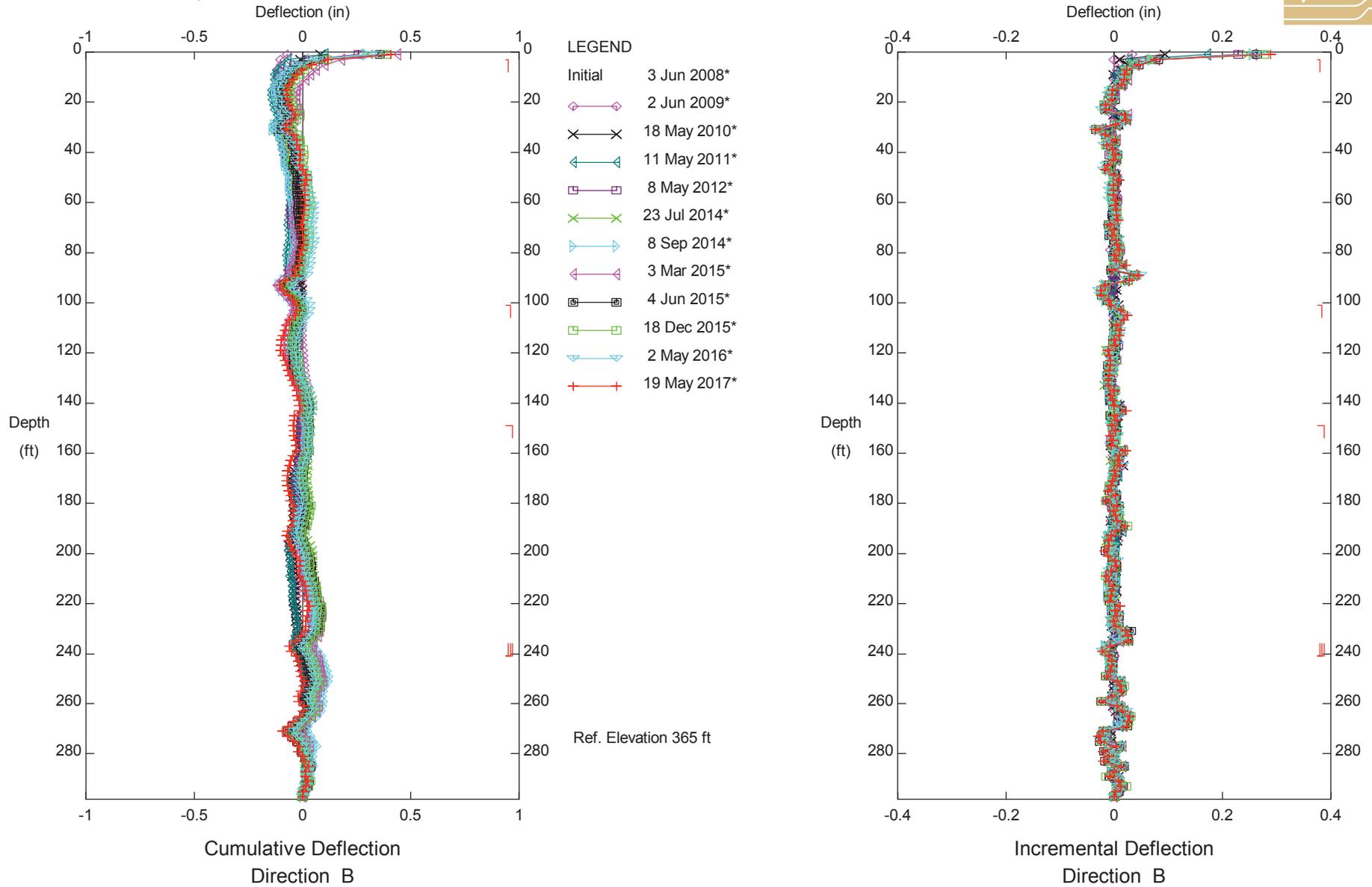


BIG ROCK MESA, Inclinator SP-9A
 CENTRAL REGION

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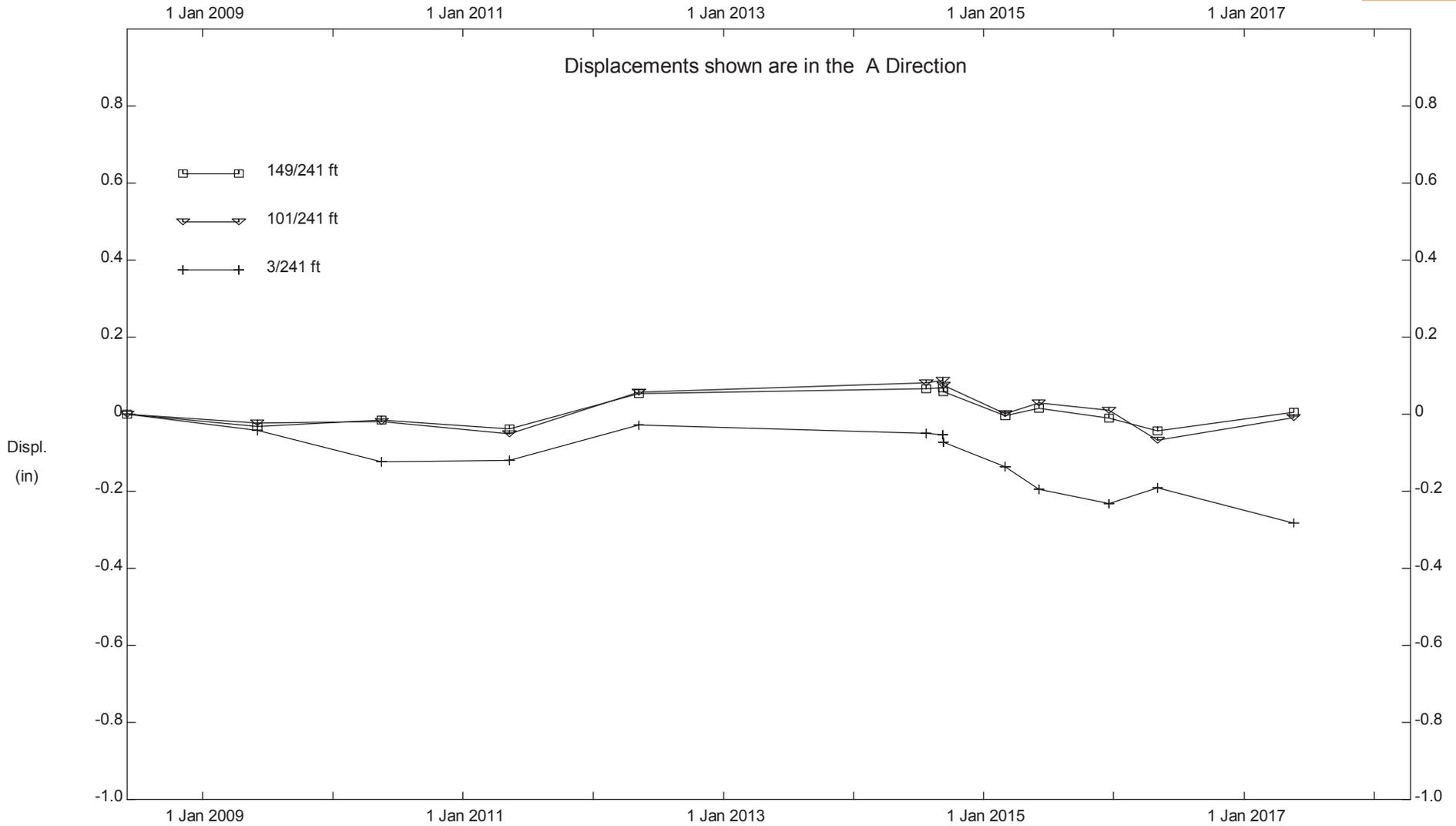
**BIG ROCK MESA LANDSLIDE ASSESSMENT DISTRICT
 FY16-17 ANNUAL REPORT
 CITY OF MALIBU, CALIFORNIA**

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BIG ROCK MESA, Inclinometer SP-9A
 CENTRAL REGION

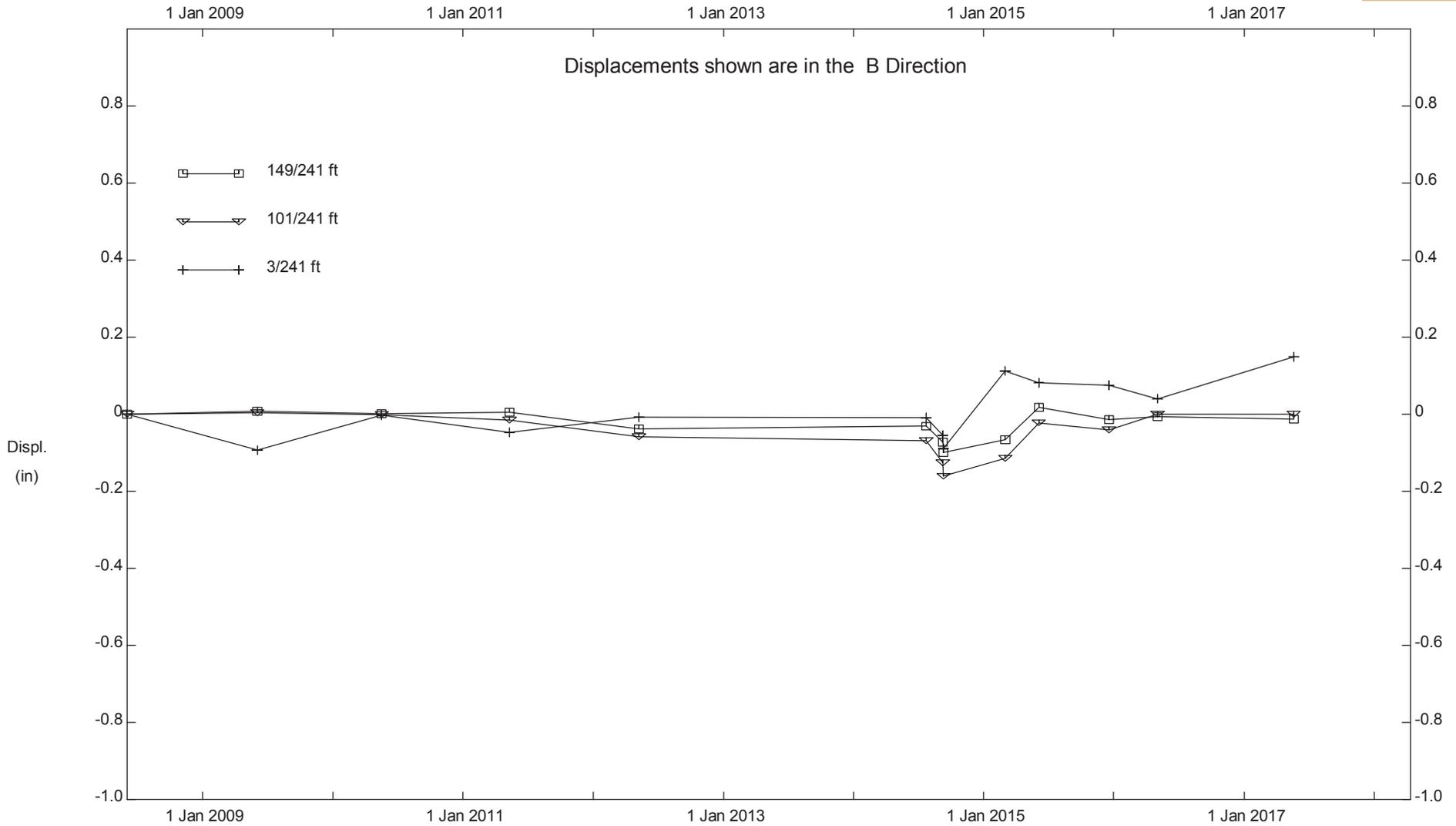
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BIG ROCK MESA, Inclinometer SP-9A

CENTRAL REGION

PLATE D17-3



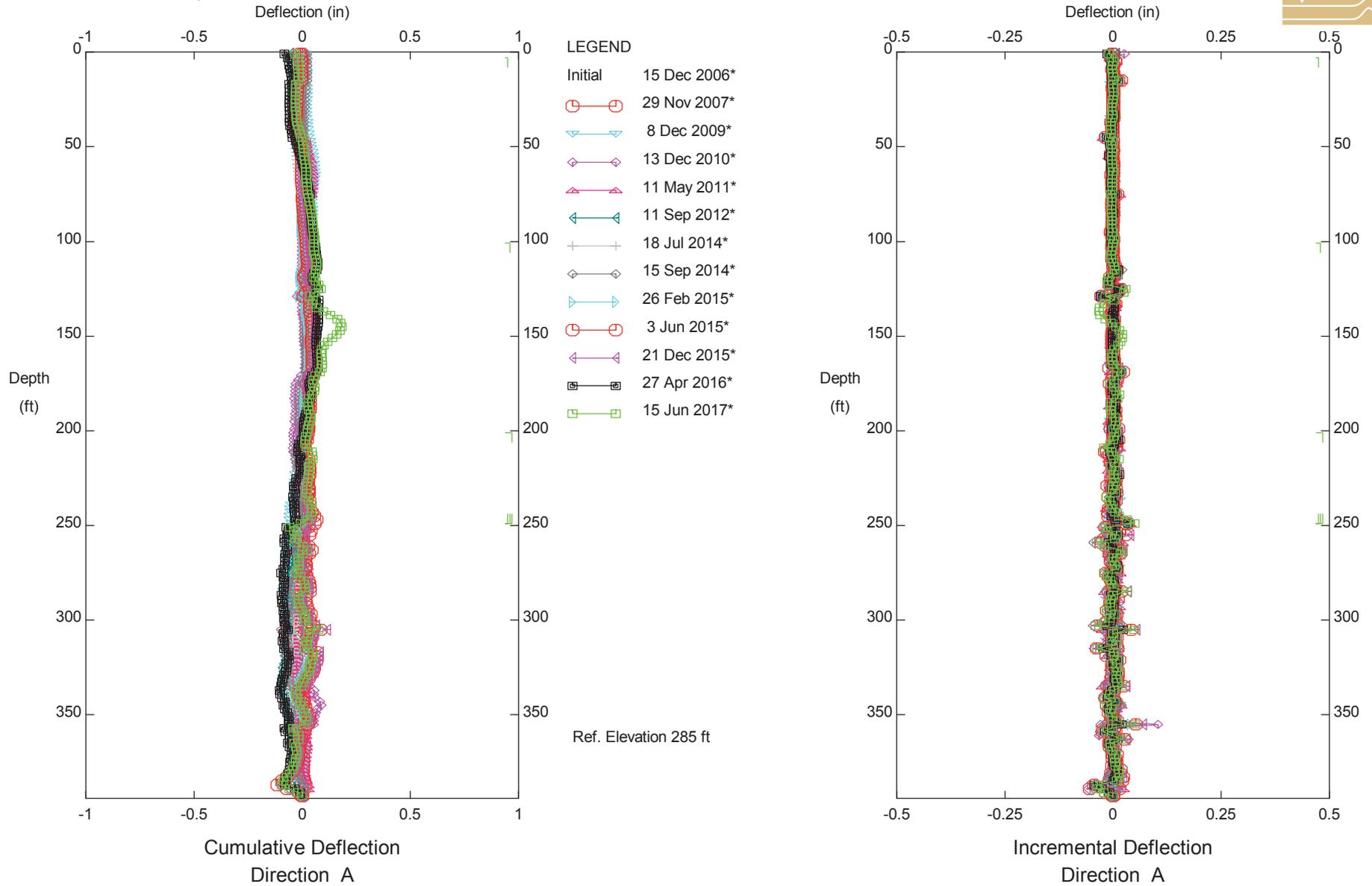
BIG ROCK MESA, Inclinometer SP-9A

CENTRAL REGION

PLATE D17-4

**BIG ROCK MESA LANDSLIDE ASSESSMENT DISTRICT
 FY16-17 ANNUAL REPORT
 CITY OF MALIBU, CALIFORNIA**

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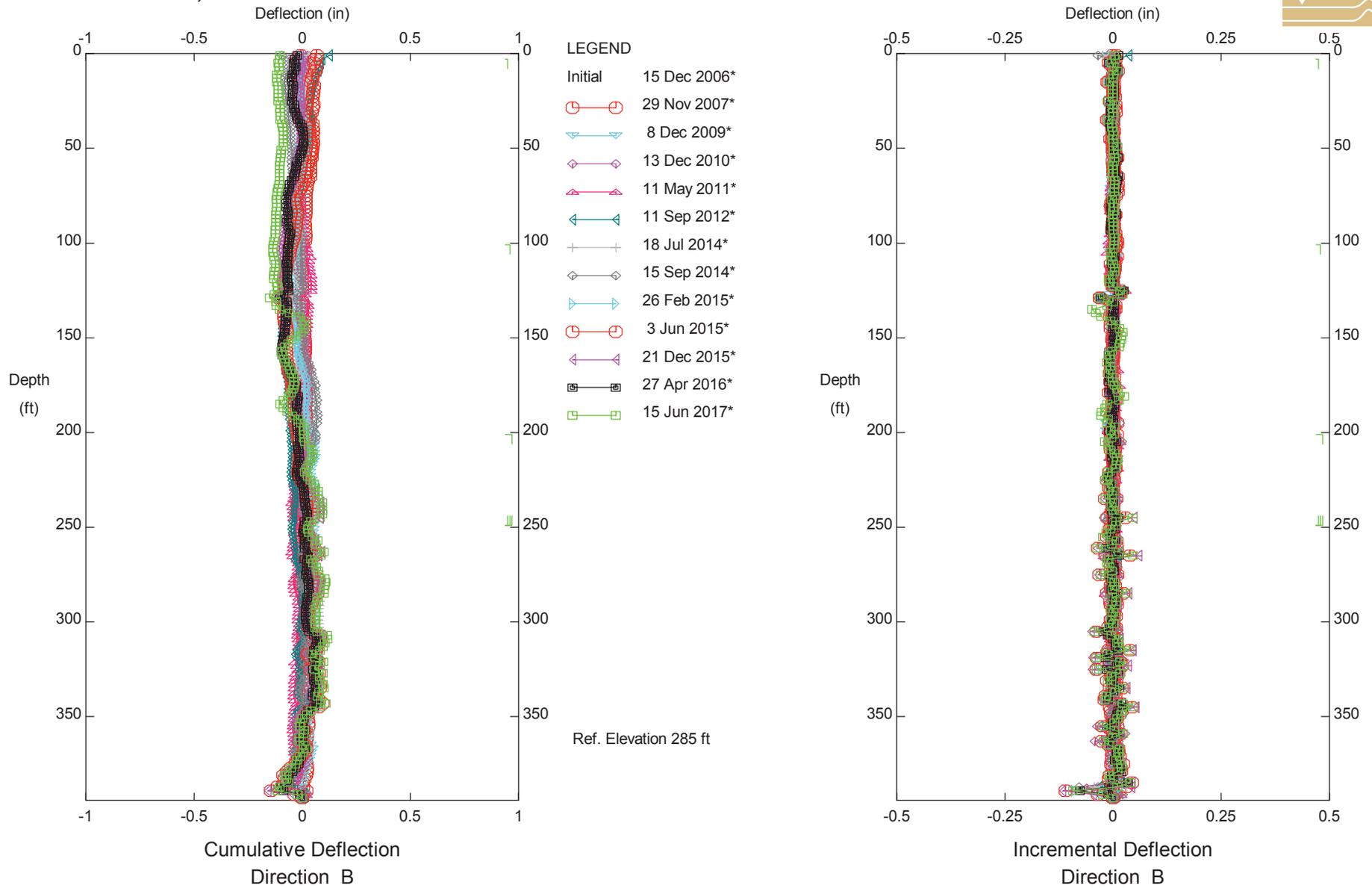


**BIG ROCK MESA, Inclinometer SP-16A
 CENTRAL REGION**

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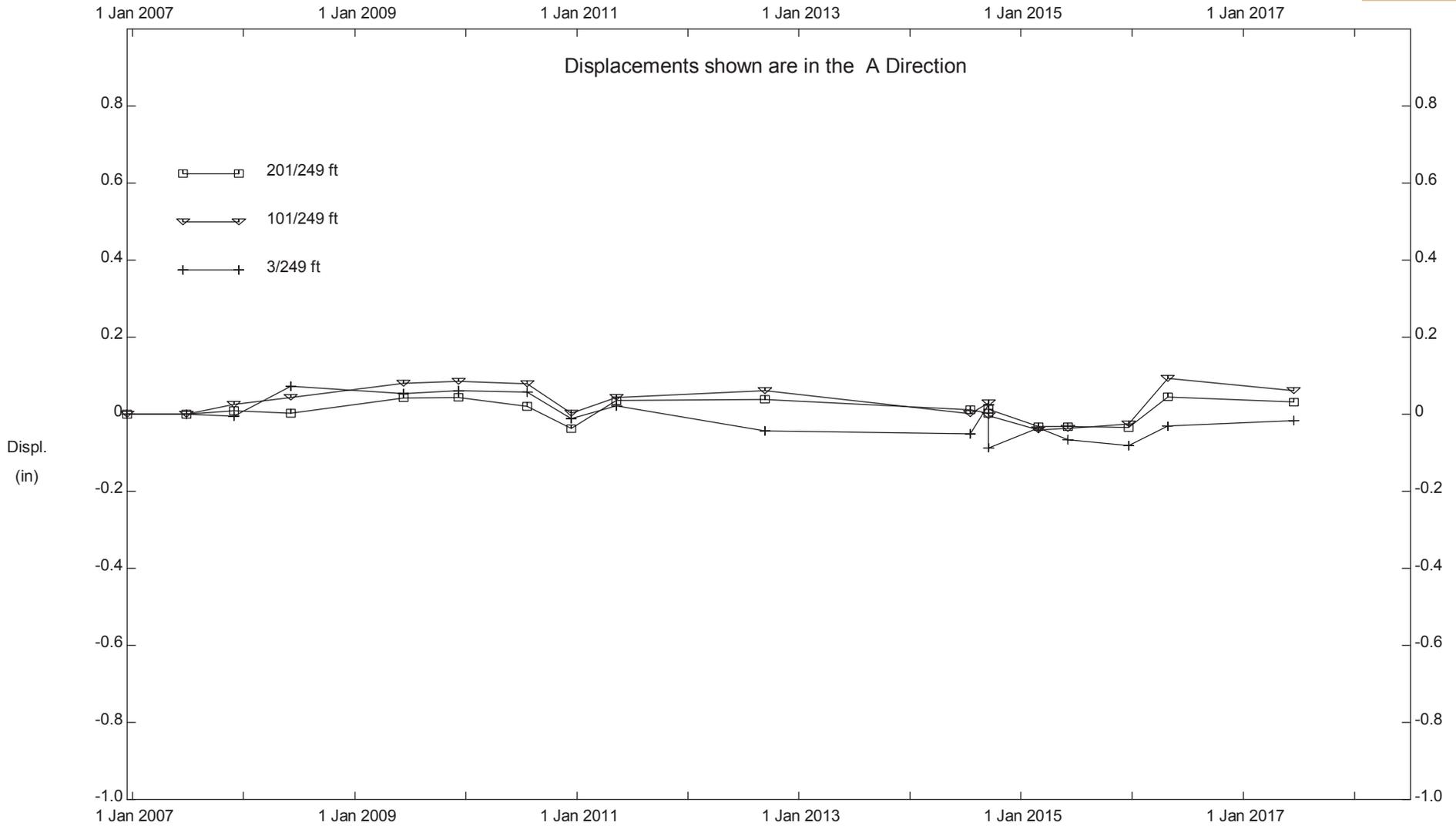
**BIG ROCK MESA LANDSLIDE ASSESSMENT DISTRICT
 FY16-17 ANNUAL REPORT
 CITY OF MALIBU, CALIFORNIA**

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**BIG ROCK MESA, Inclinometer SP-16A
 CENTRAL REGION**

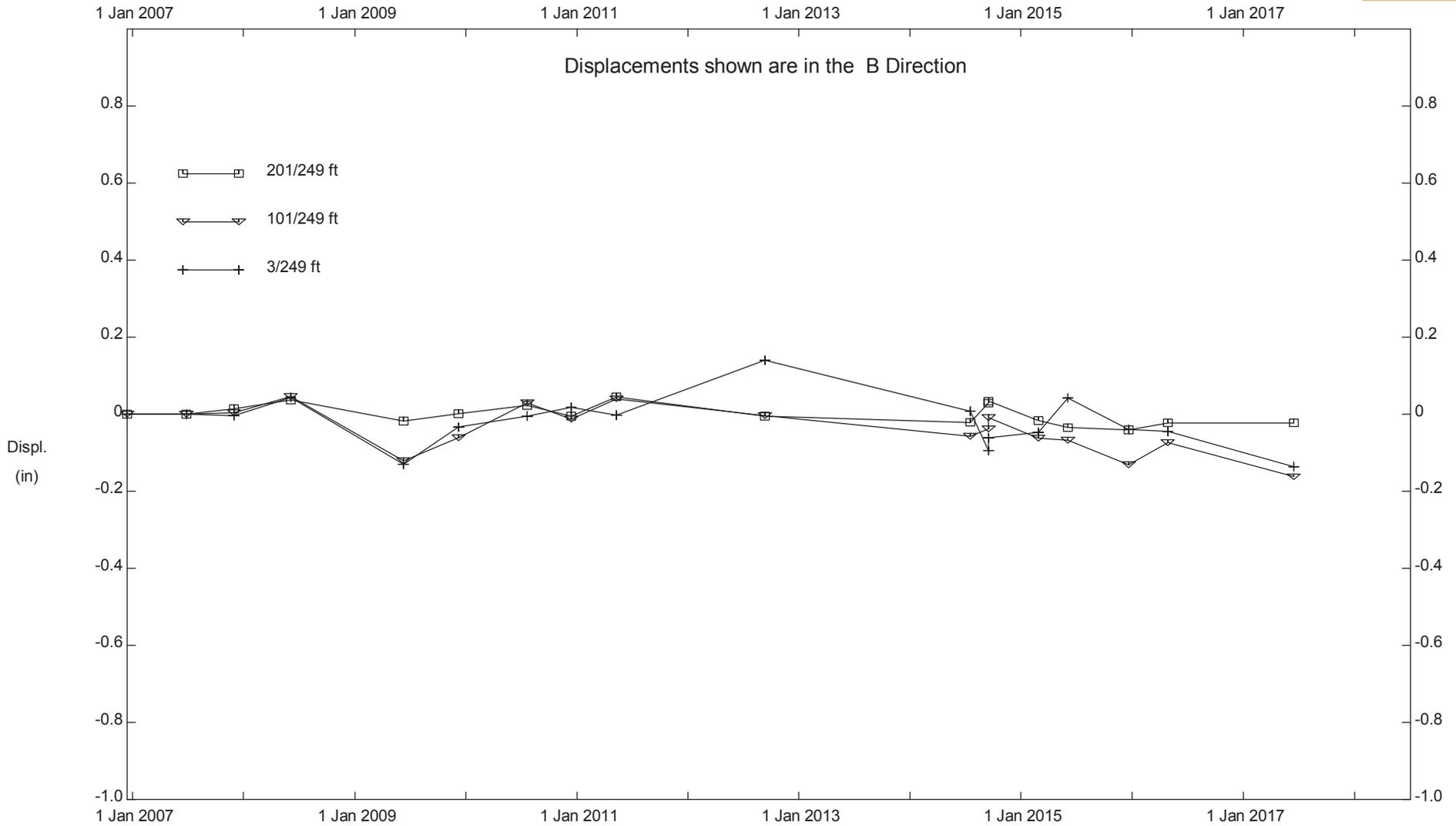
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BIG ROCK MESA, Inclinometer SP-16A

CENTRAL REGION

PLATE D18-3



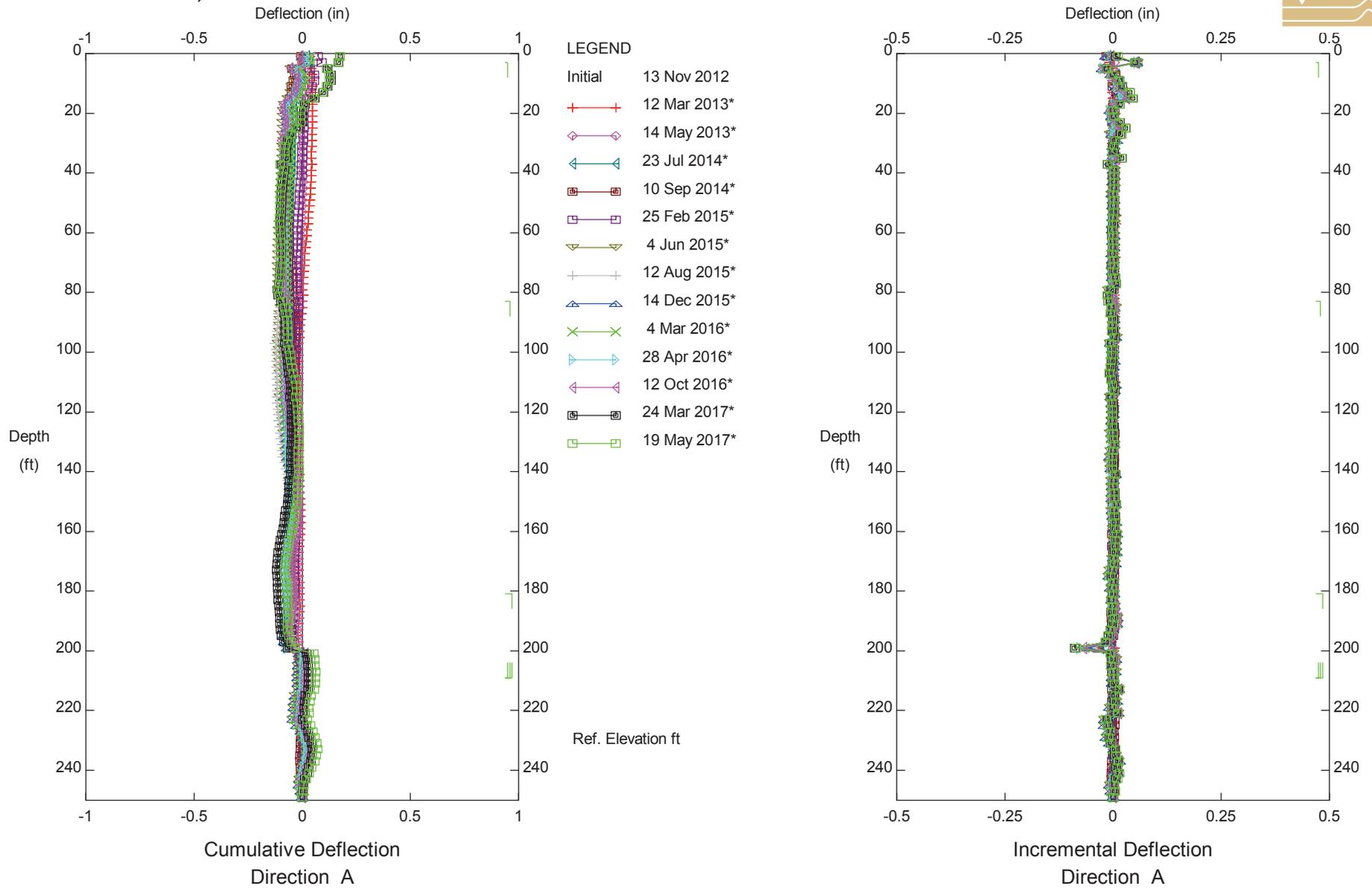
BIG ROCK MESA, Inclinometer SP-16A

CENTRAL REGION

PLATE D18-4

**BIG ROCK MESA LANDSLIDE ASSESSMENT DISTRICT
 FY16-17 ANNUAL REPORT
 CITY OF MALIBU, CALIFORNIA**

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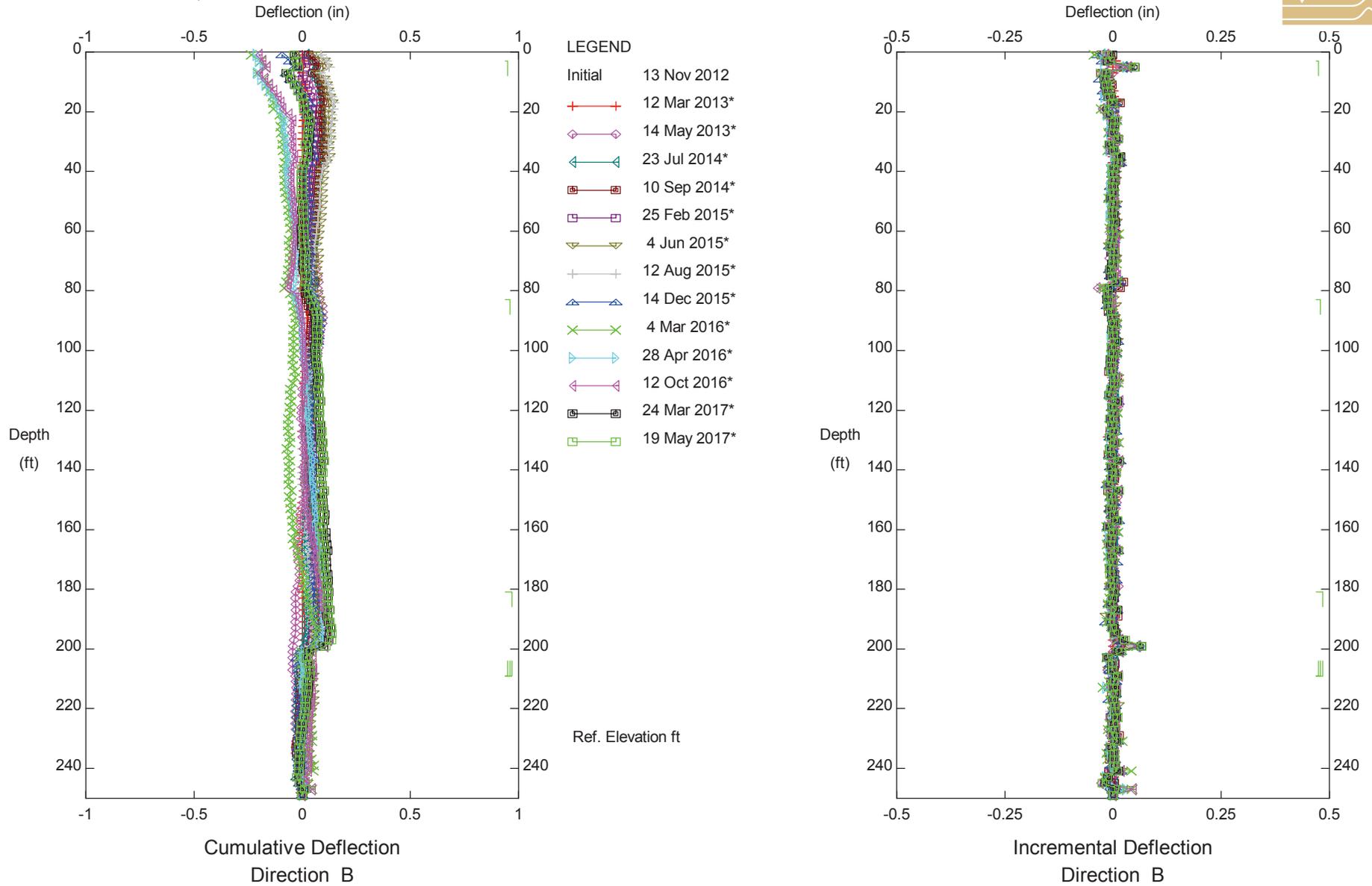


BRM, Inclinometer SP-17B

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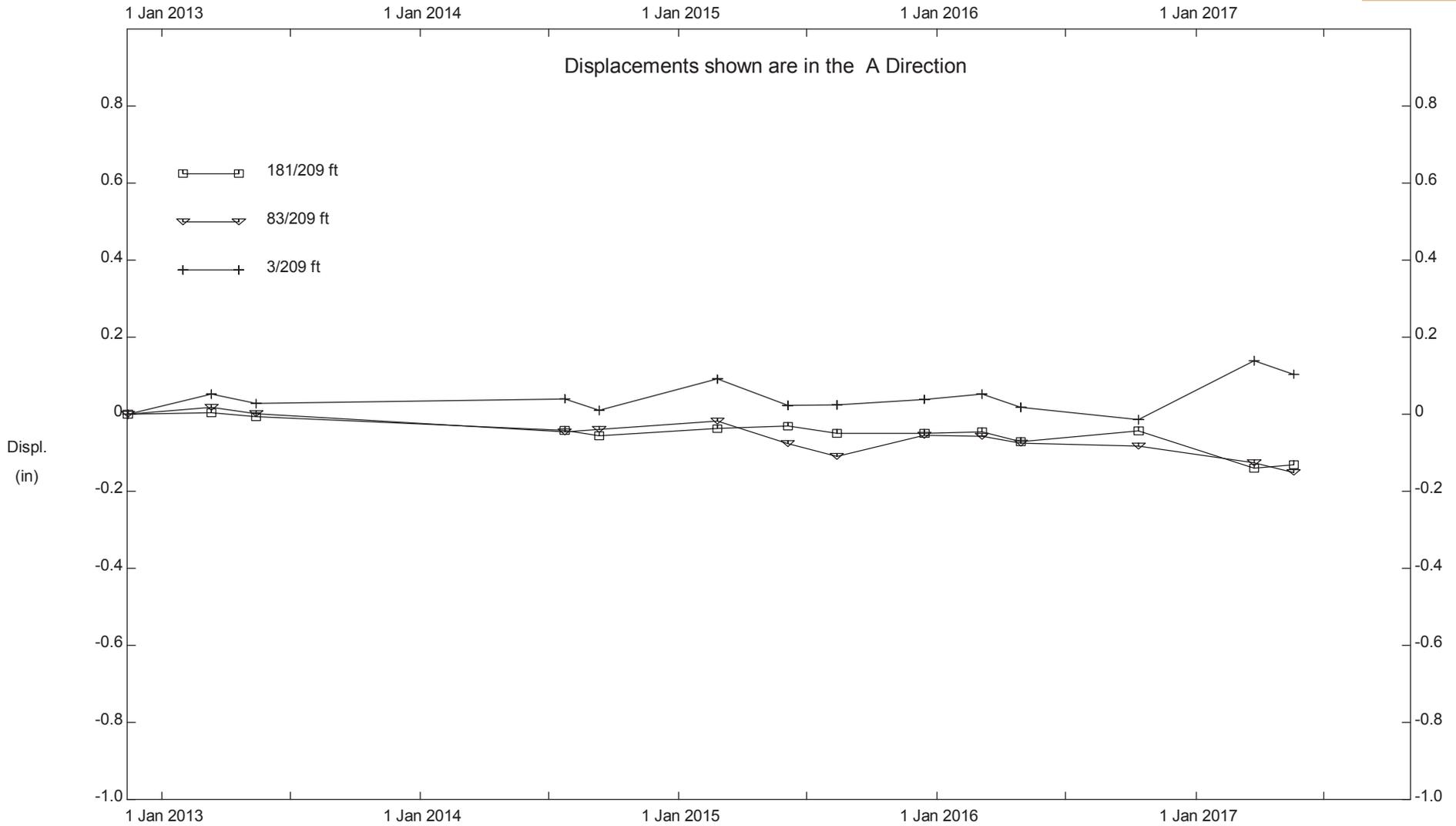
**BIG ROCK MESA LANDSLIDE ASSESSMENT DISTRICT
 FY16-17 ANNUAL REPORT
 CITY OF MALIBU, CALIFORNIA**

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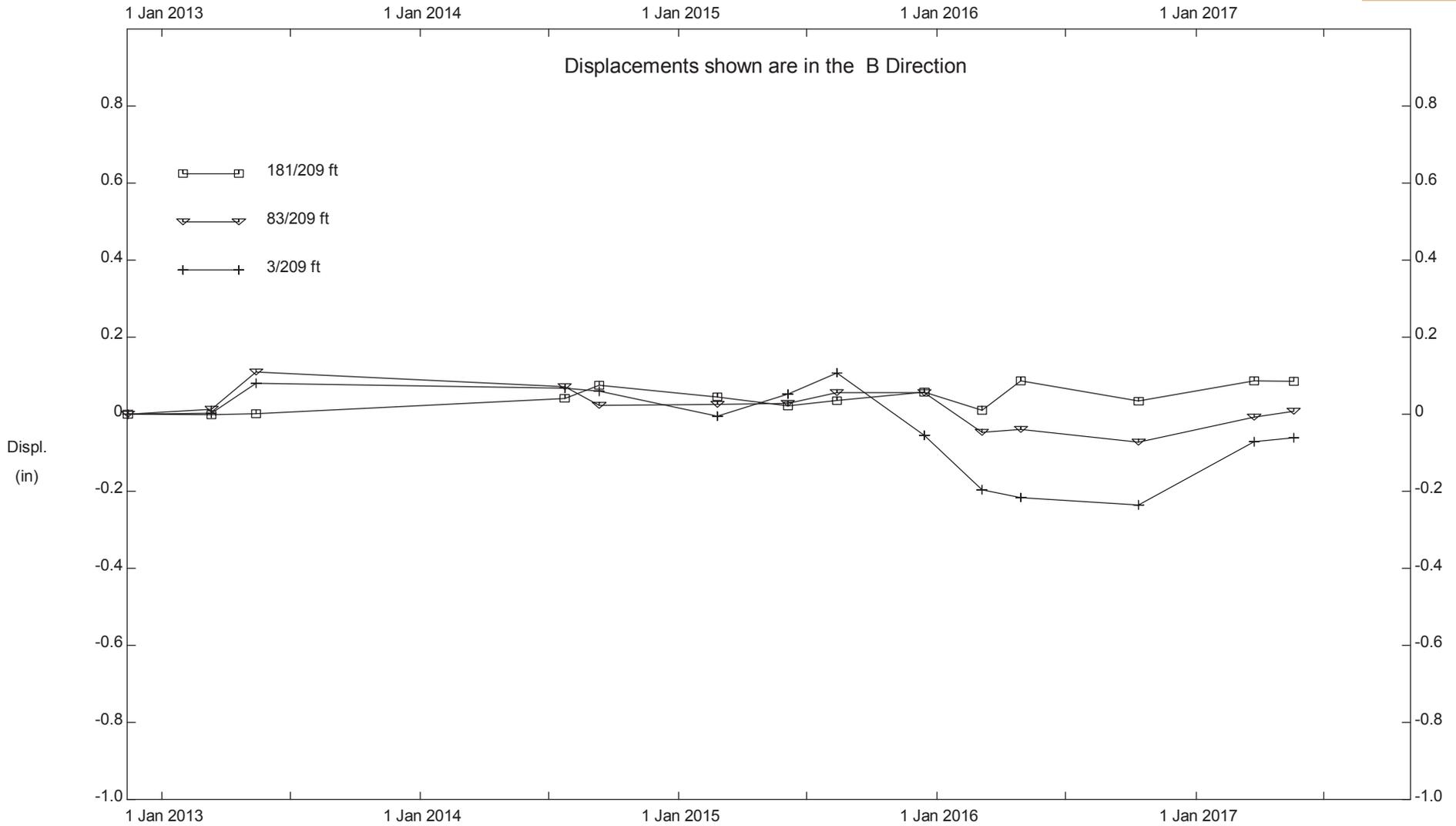


BRM, Inclinometer SP-17B

Sets marked * include zero shift and/or rotation corrections.



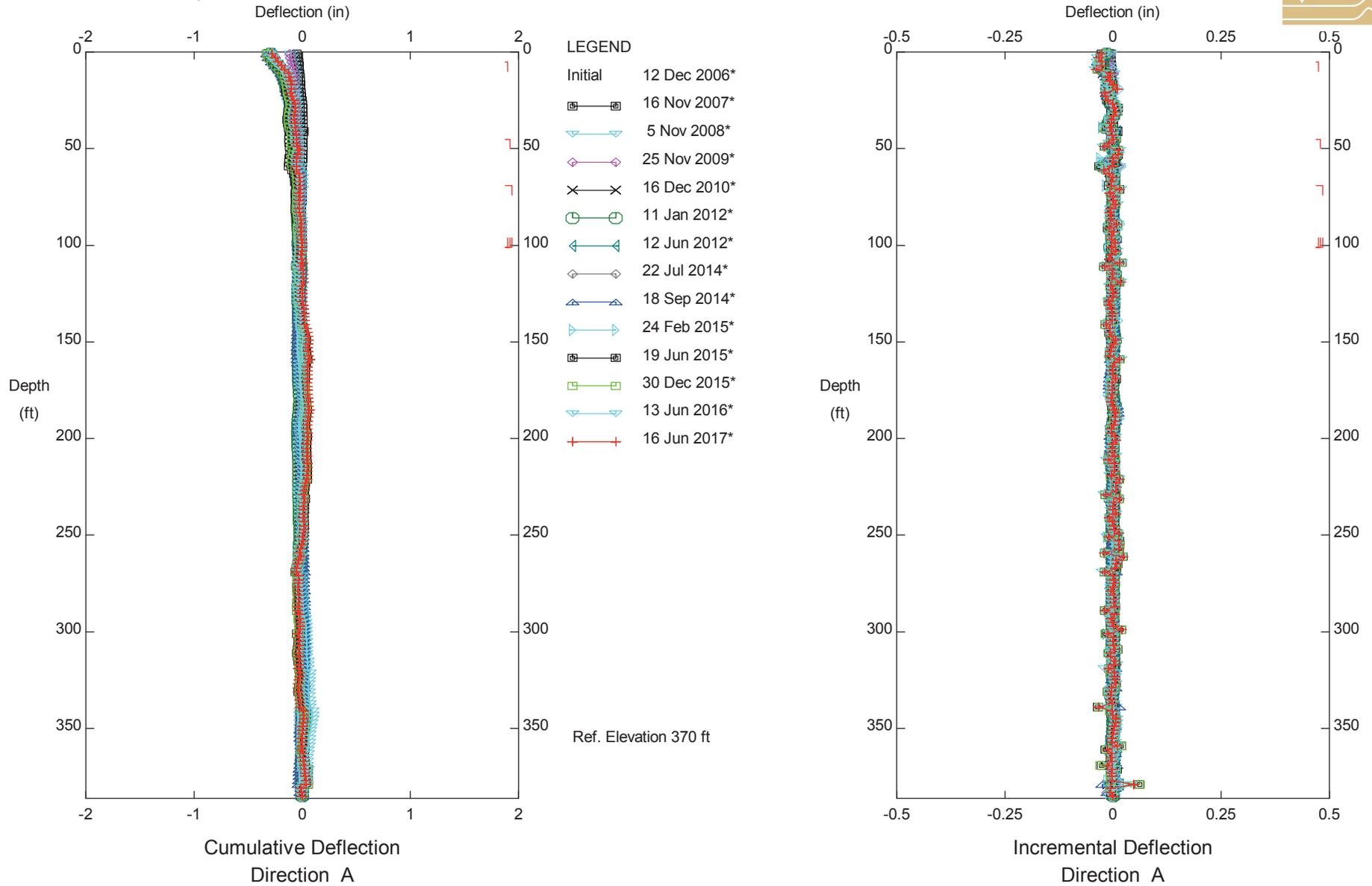
BRM, Inclinator SP-17B



BRM, Inclinator SP-17B

**BIG ROCK MESA LANDSLIDE ASSESSMENT DISTRICT
 FY16-17 ANNUAL REPORT
 CITY OF MALIBU, CALIFORNIA**

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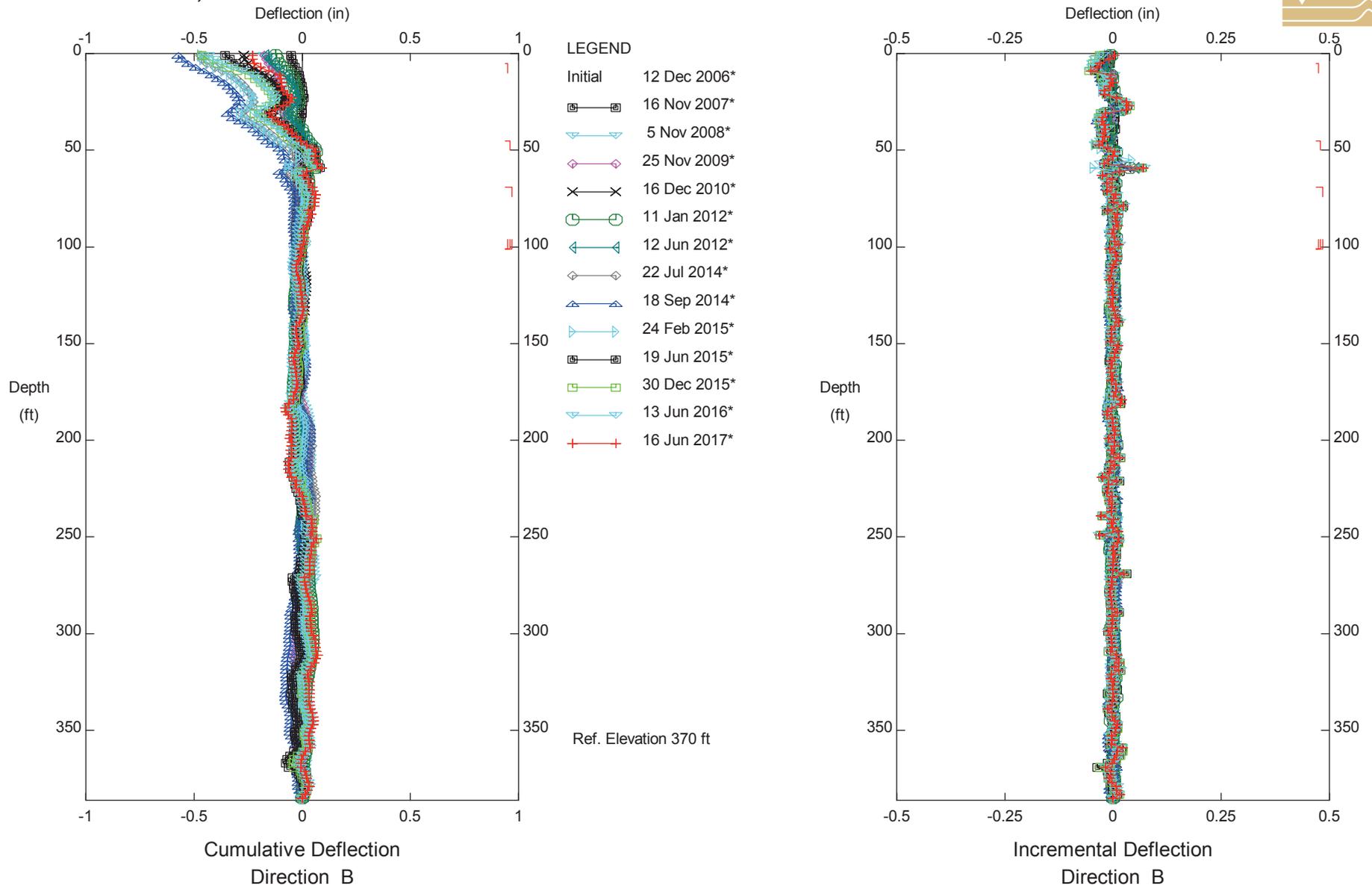


BIG ROCK MESA, Inclinometer SP-24
 CENTRAL REGION

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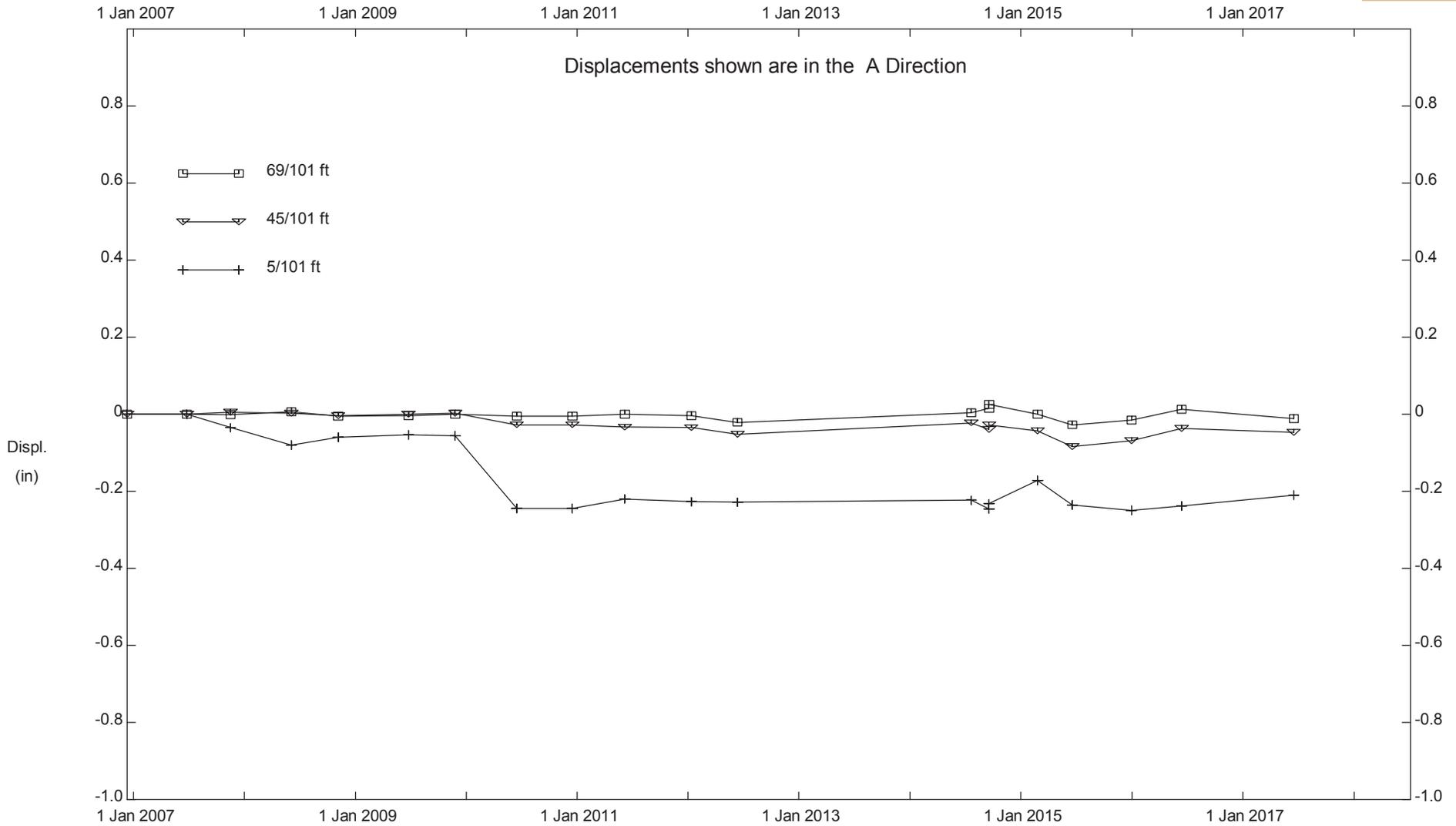
**BIG ROCK MESA LANDSLIDE ASSESSMENT DISTRICT
 FY16-17 ANNUAL REPORT
 CITY OF MALIBU, CALIFORNIA**

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BIG ROCK MESA, Inclinometer SP-24
 CENTRAL REGION

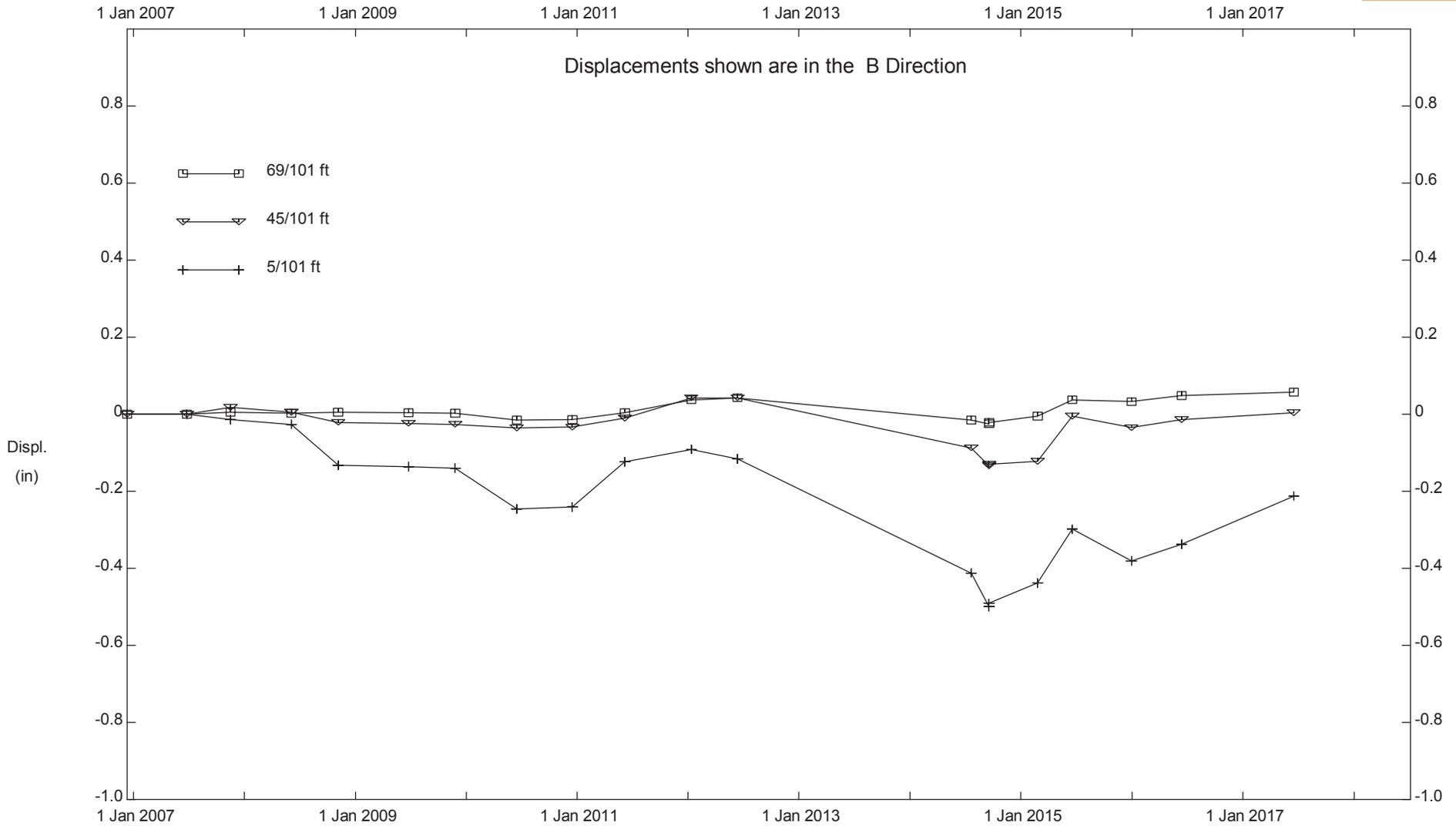
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BIG ROCK MESA, Inclinator SP-24

CENTRAL REGION

PLATE D20-3



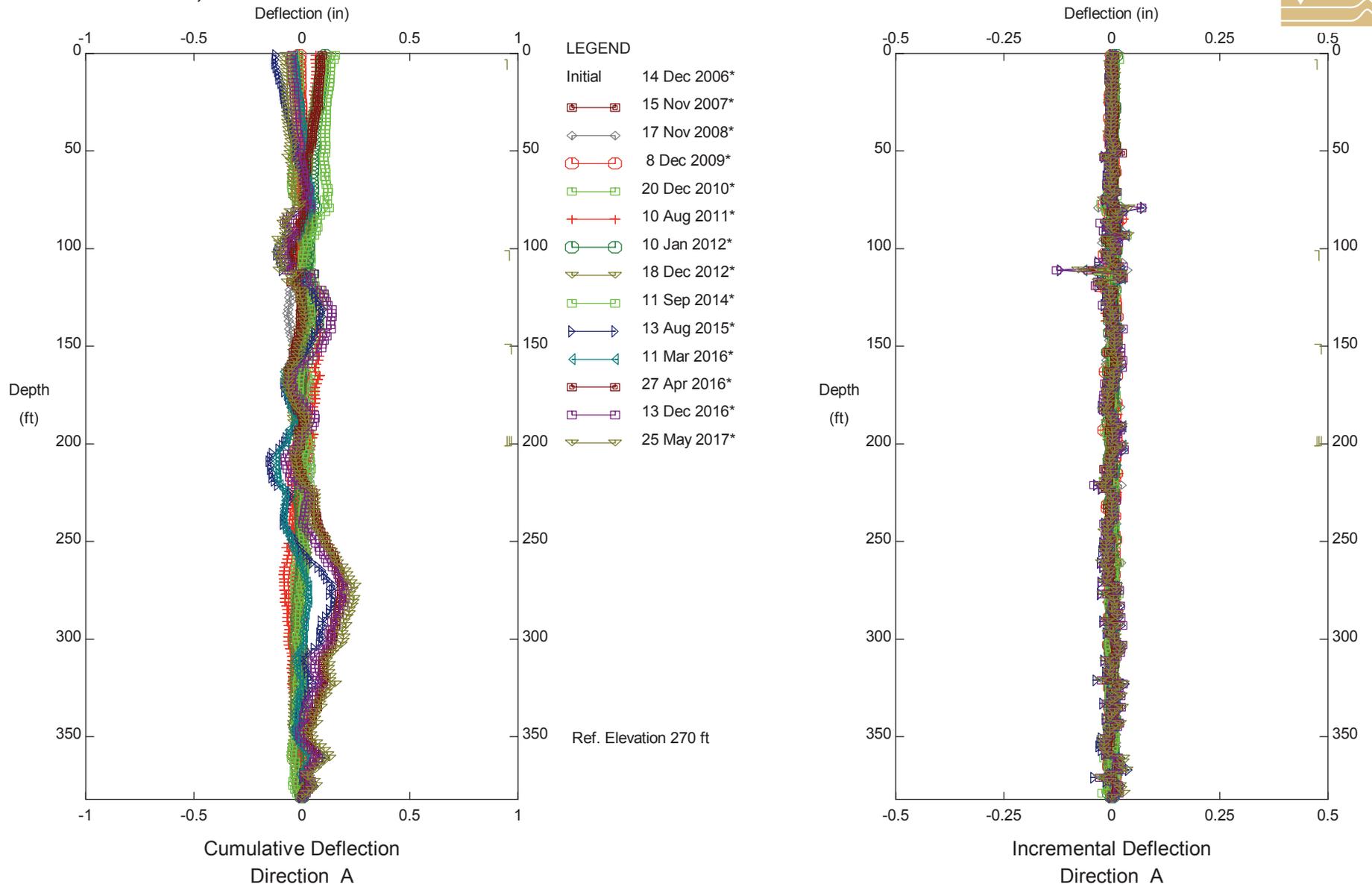
BIG ROCK MESA, Inclinometer SP-24

CENTRAL REGION

PLATE D20-4

**BIG ROCK MESA LANDSLIDE ASSESSMENT DISTRICT
 FY16-17 ANNUAL REPORT
 CITY OF MALIBU, CALIFORNIA**

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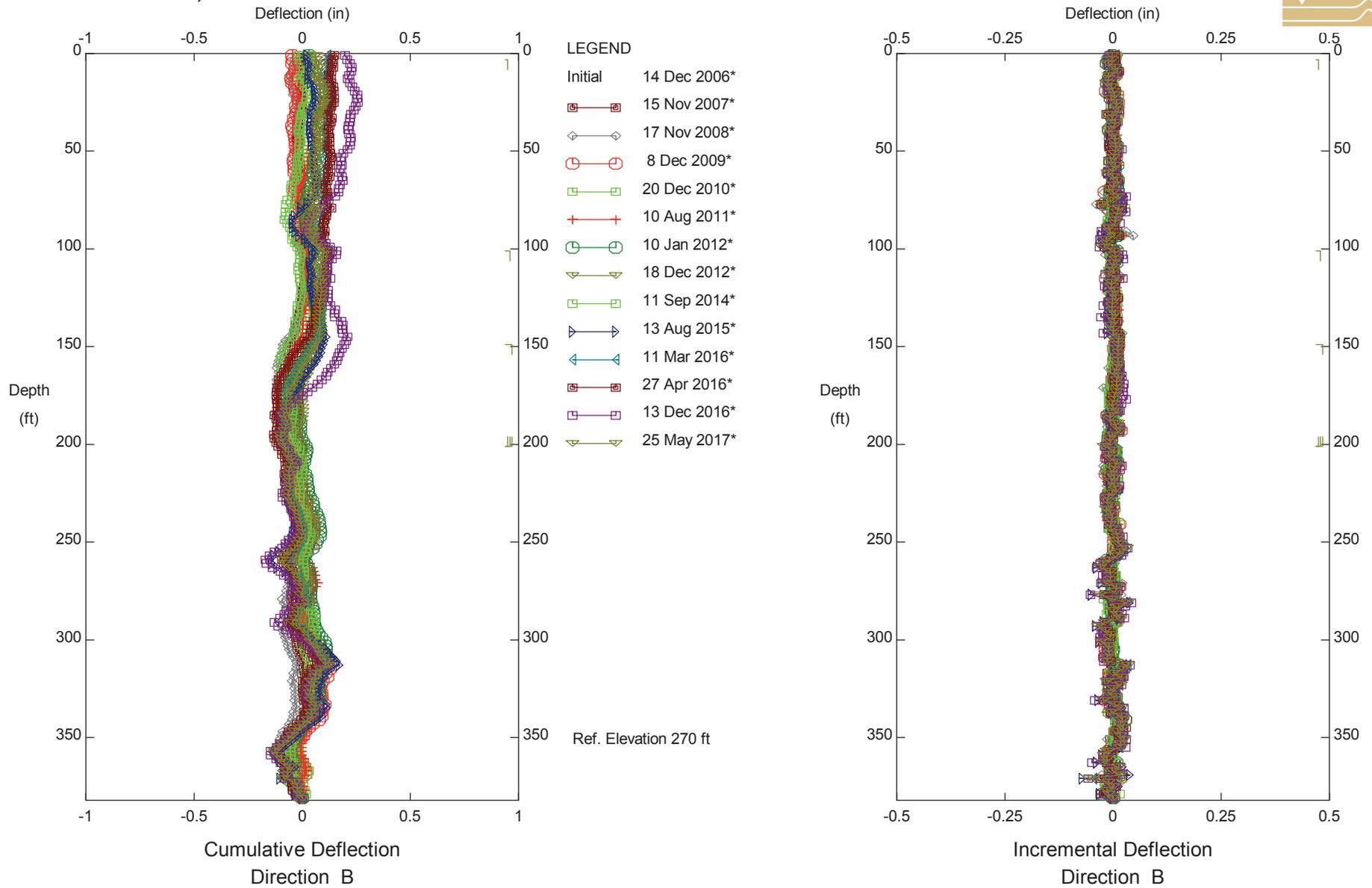


BIG ROCK MESA, Inclinometer SP-34
 CENTRAL REGION

Sets marked * include zero shift and/or rotation corrections.

**BIG ROCK MESA LANDSLIDE ASSESSMENT DISTRICT
 FY16-17 ANNUAL REPORT
 CITY OF MALIBU, CALIFORNIA**

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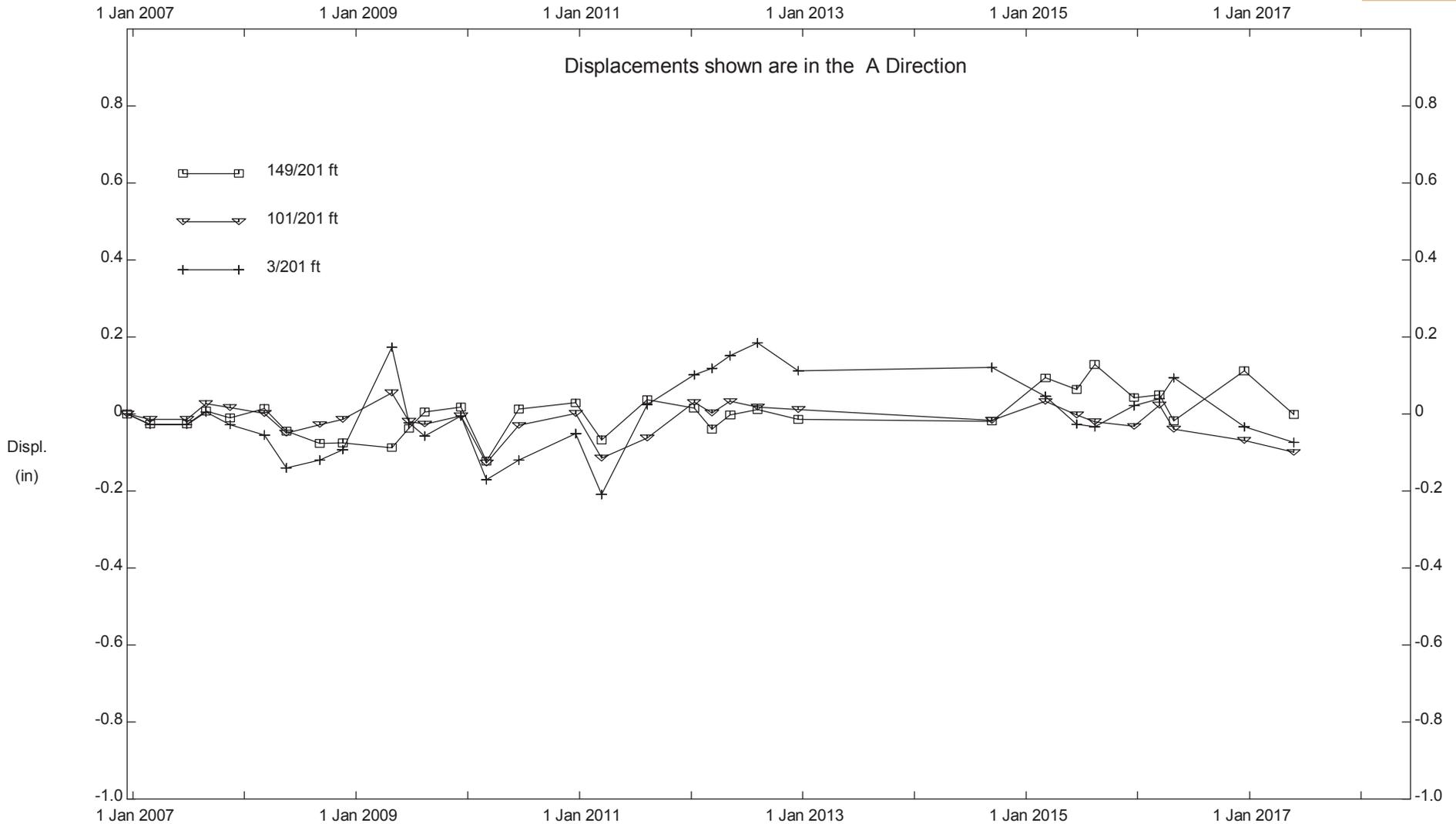


BIG ROCK MESA, Inclinometer SP-34
 CENTRAL REGION

Sets marked * include zero shift and/or rotation corrections.

**BIG ROCK MESA LANDSLIDE ASSESSMENT DISTRICT
FY16-17 ANNUAL REPORT
CITY OF MALIBU, CALIFORNIA**

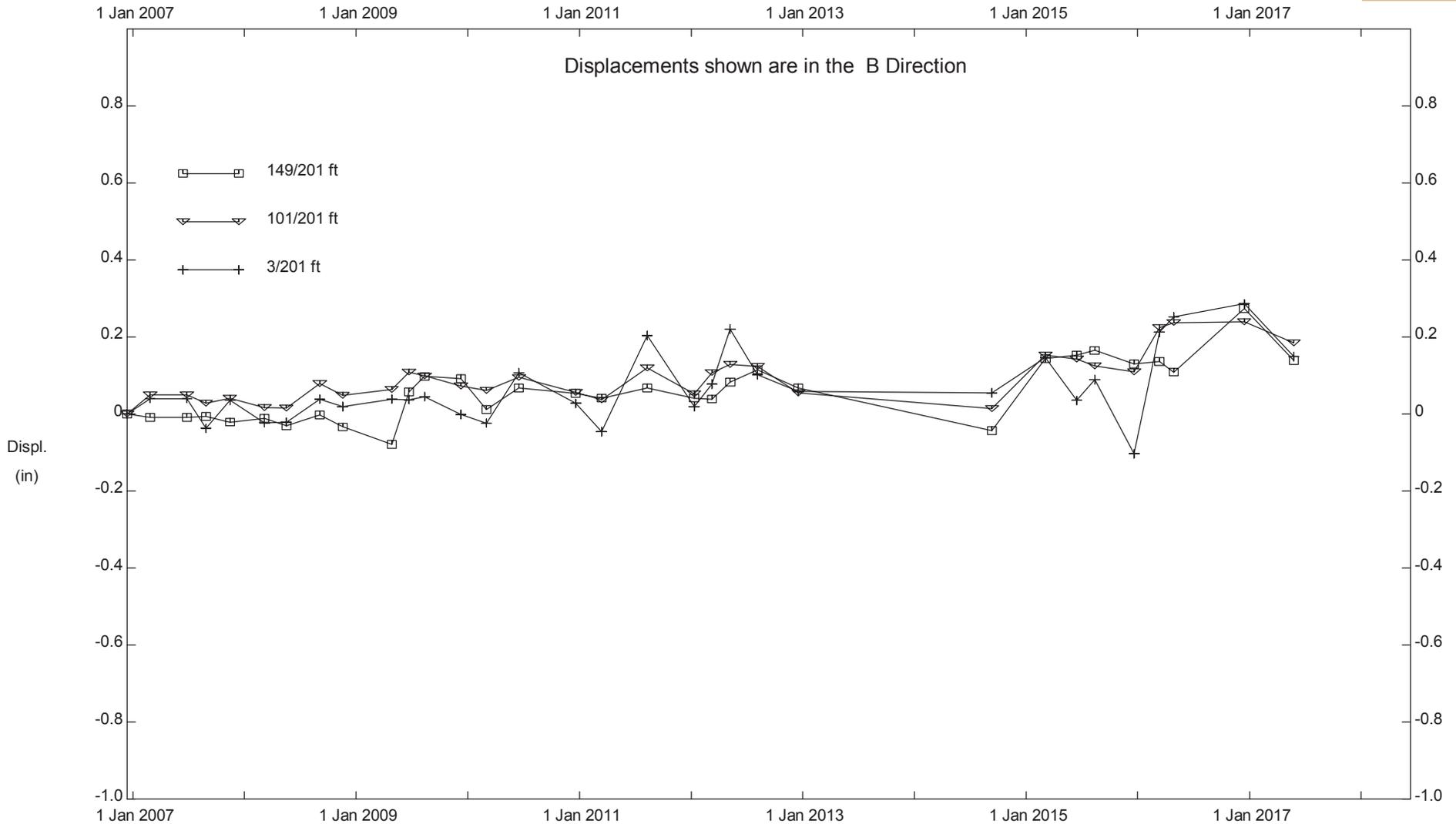
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BIG ROCK MESA, Inclinometer SP-34

CENTRAL REGION

PLATE D21-3



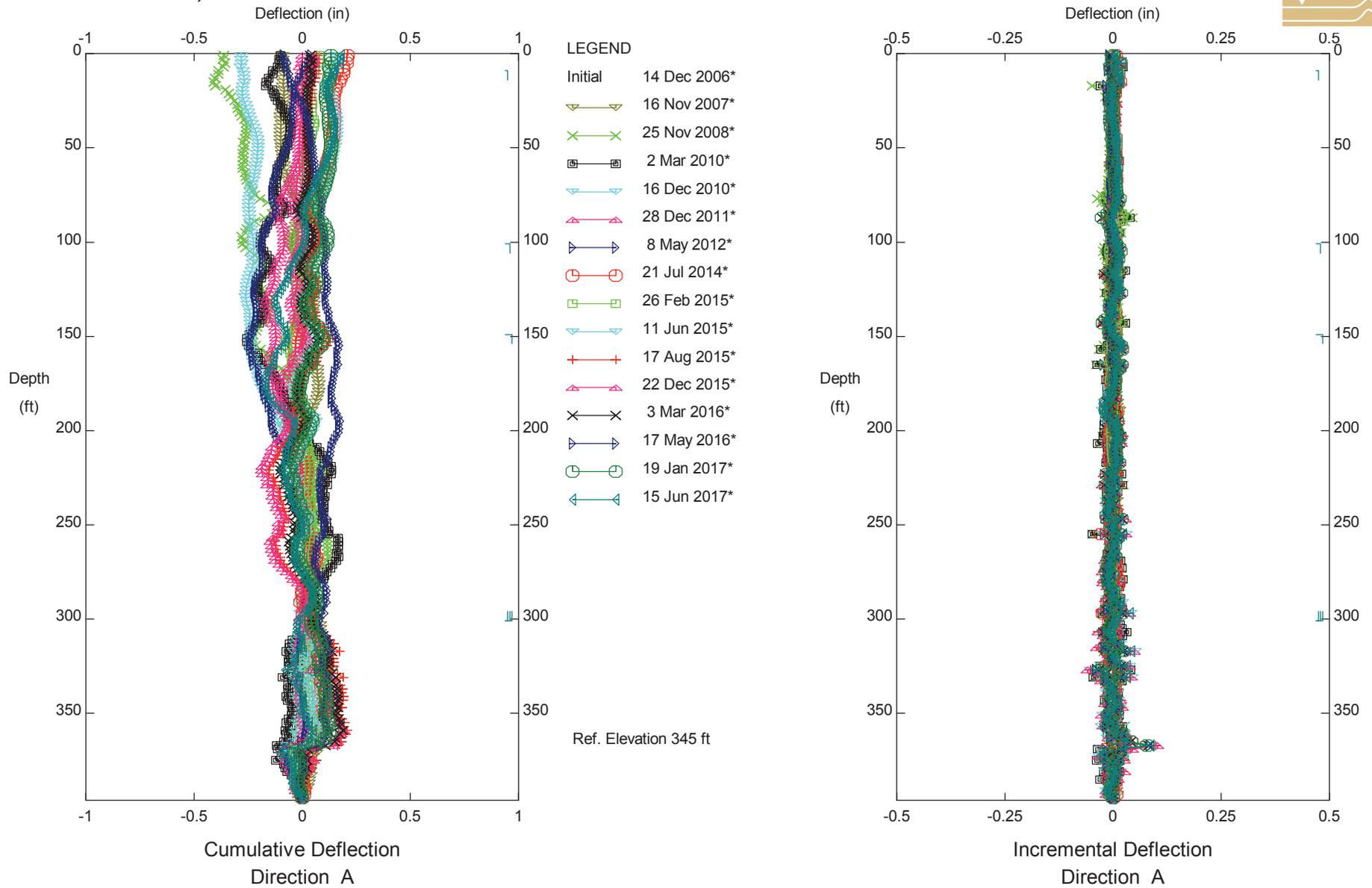
BIG ROCK MESA, Inclinometer SP-34

CENTRAL REGION

PLATE D21-4

**BIG ROCK MESA LANDSLIDE ASSESSMENT DISTRICT
 FY16-17 ANNUAL REPORT
 CITY OF MALIBU, CALIFORNIA**

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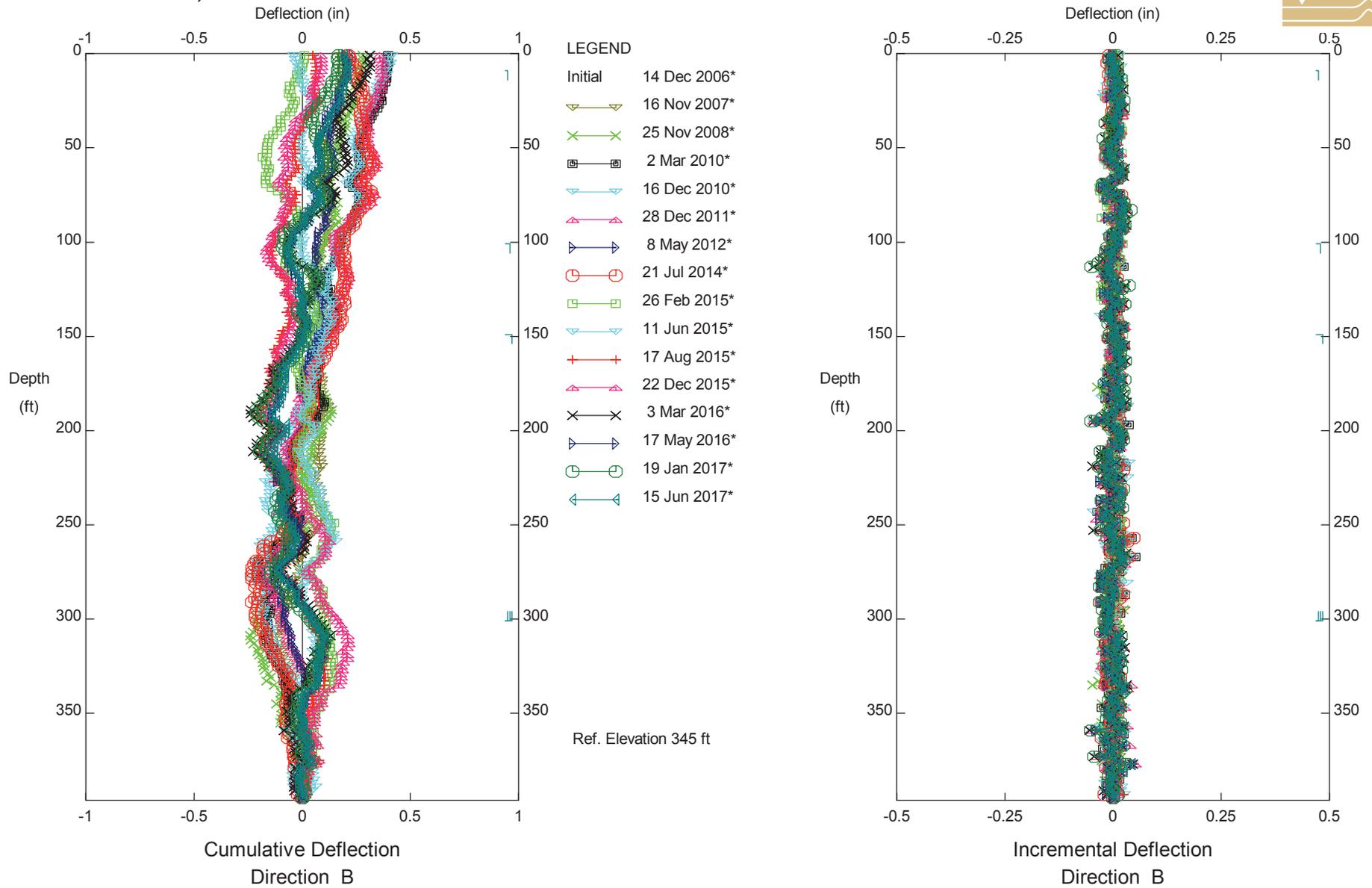


BIG ROCK MESA, Inclinometer SP-35
 CENTRAL REGION

Sets marked * include zero shift and/or rotation corrections.

**BIG ROCK MESA LANDSLIDE ASSESSMENT DISTRICT
 FY16-17 ANNUAL REPORT
 CITY OF MALIBU, CALIFORNIA**

Fugro USA Land, Inc. - Ventura, CA

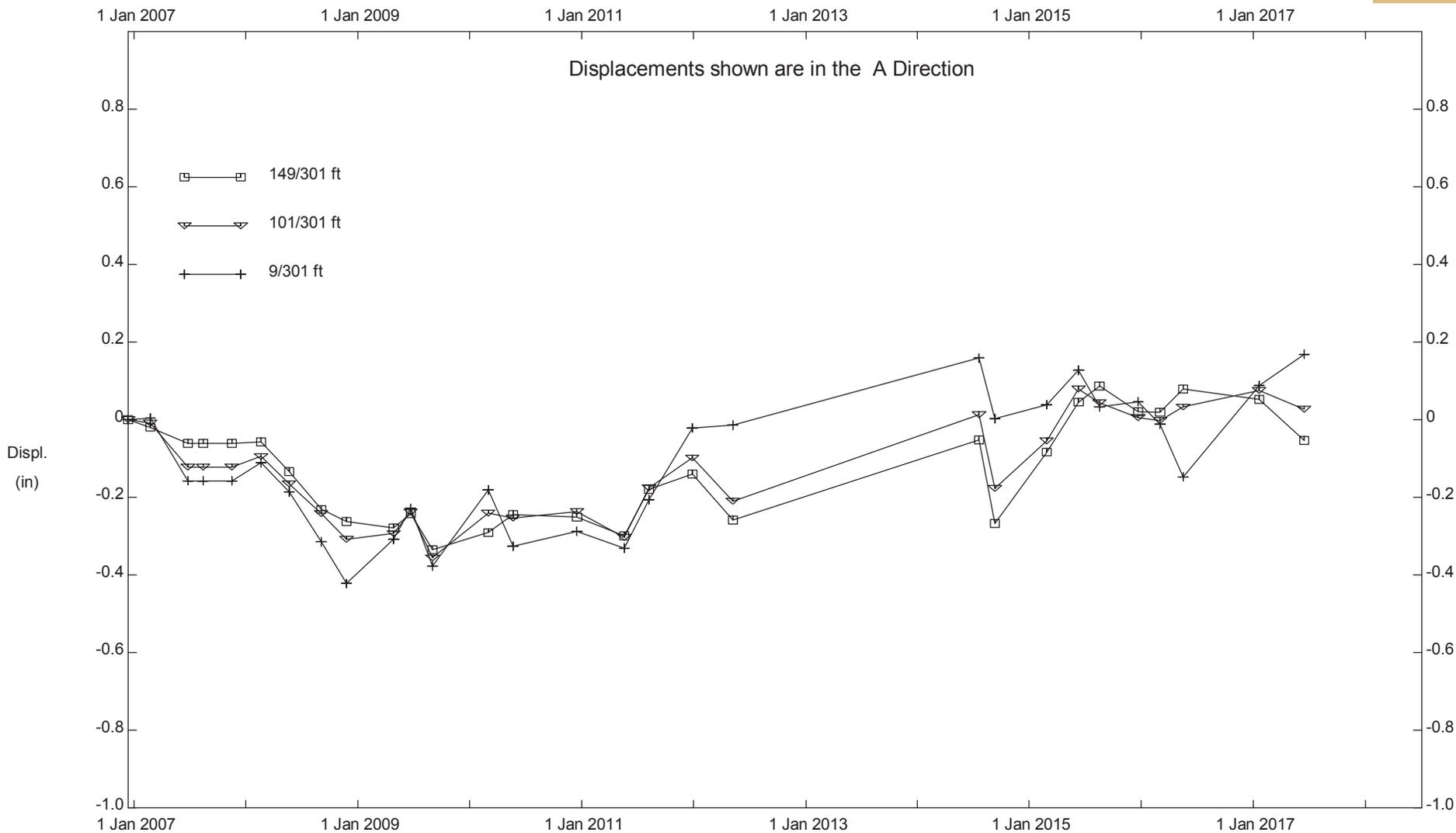


BIG ROCK MESA, Inclinometer SP-35
 CENTRAL REGION

Sets marked * include zero shift and/or rotation corrections.

**BIG ROCK MESA LANDSLIDE ASSESSMENT DISTRICT
FY16-17 ANNUAL REPORT
CITY OF MALIBU, CALIFORNIA**

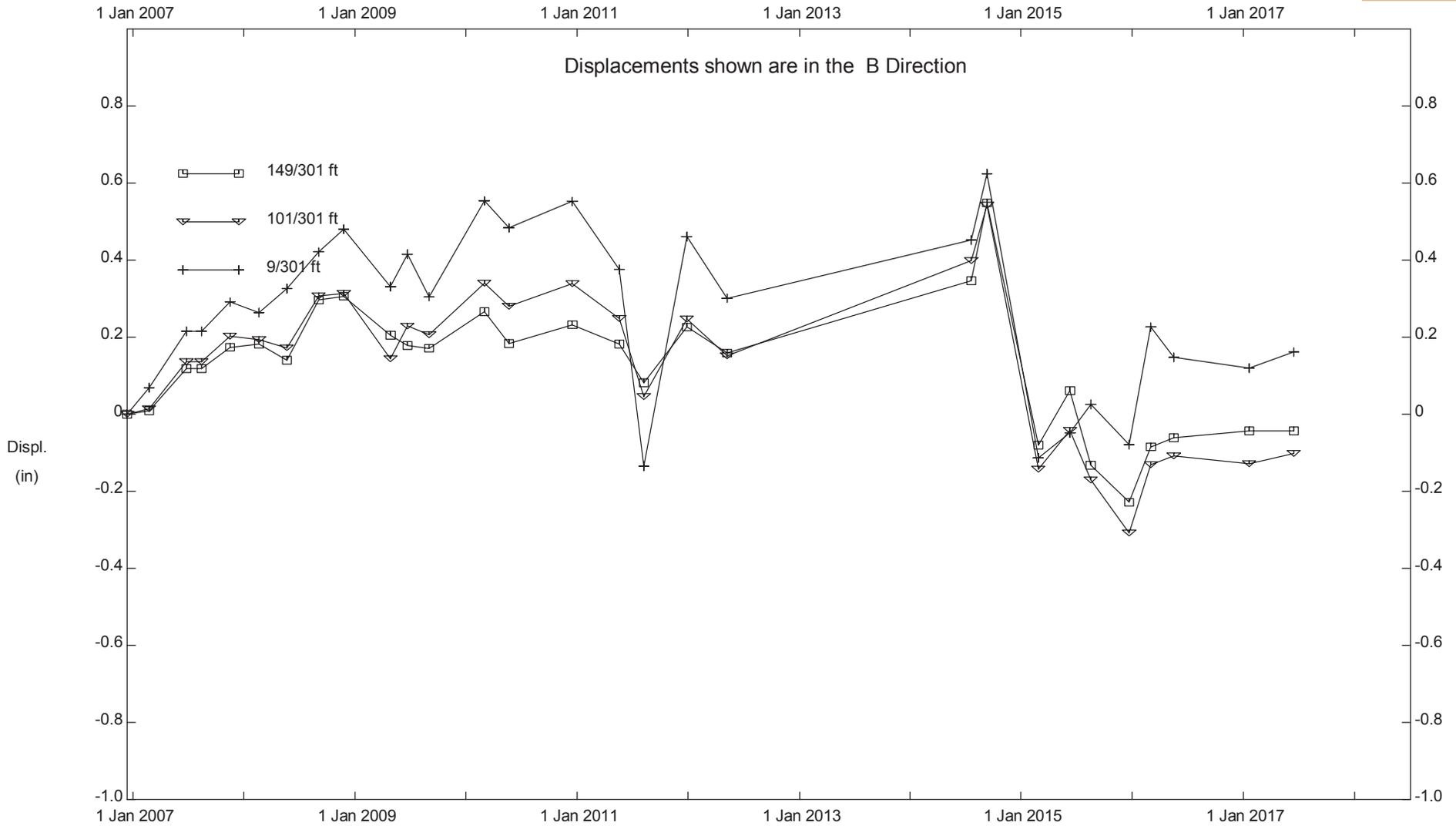
Fugro USA Land, Inc. - Ventura, CA



BIG ROCK MESA, Inclinometer SP-35

CENTRAL REGION

PLATE D22-3



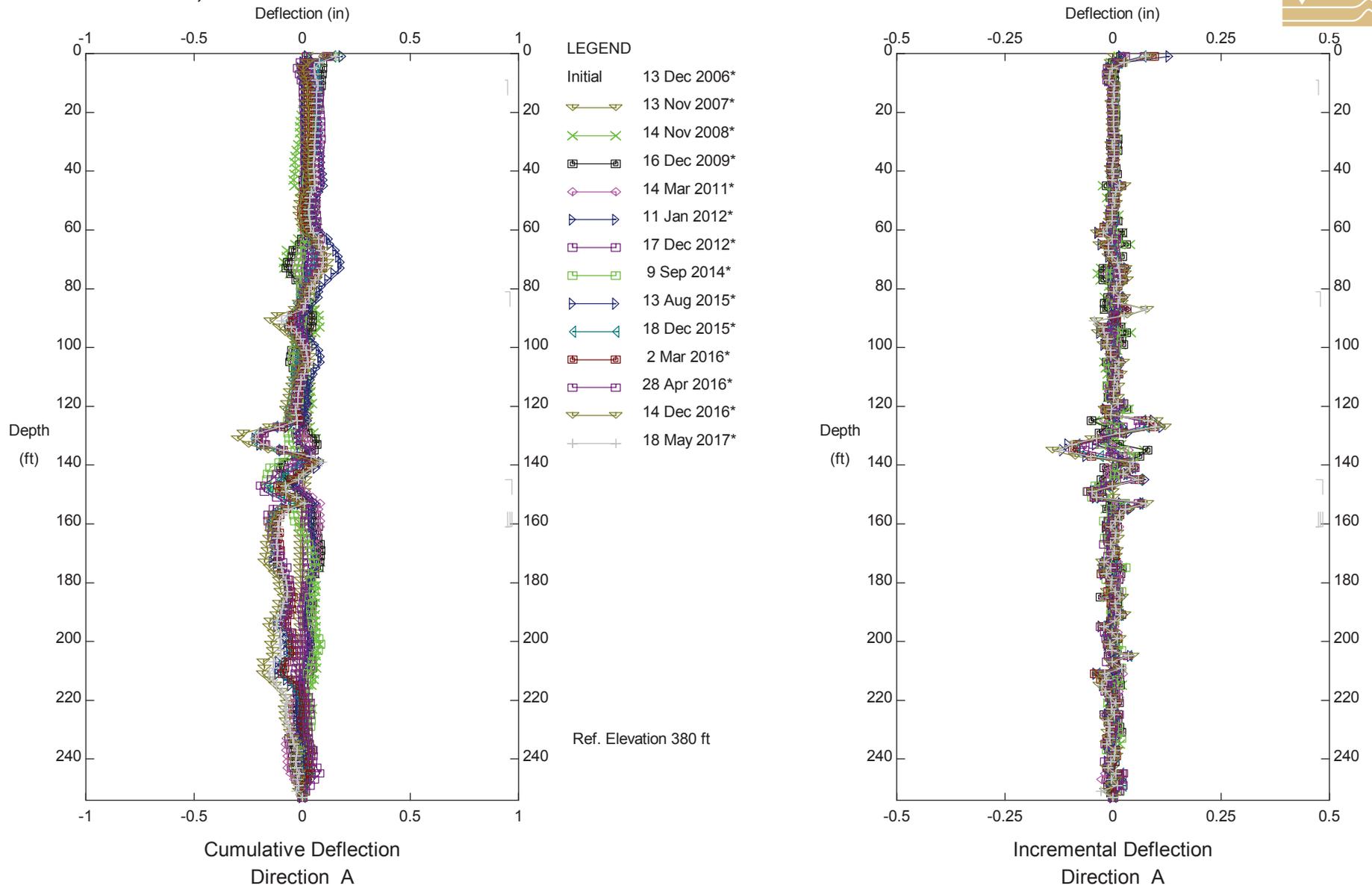
BIG ROCK MESA, Inclinometer SP-35

CENTRAL REGION

PLATE D22-4

**BIG ROCK MESA LANDSLIDE ASSESSMENT DISTRICT
 FY16-17 ANNUAL REPORT
 CITY OF MALIBU, CALIFORNIA**

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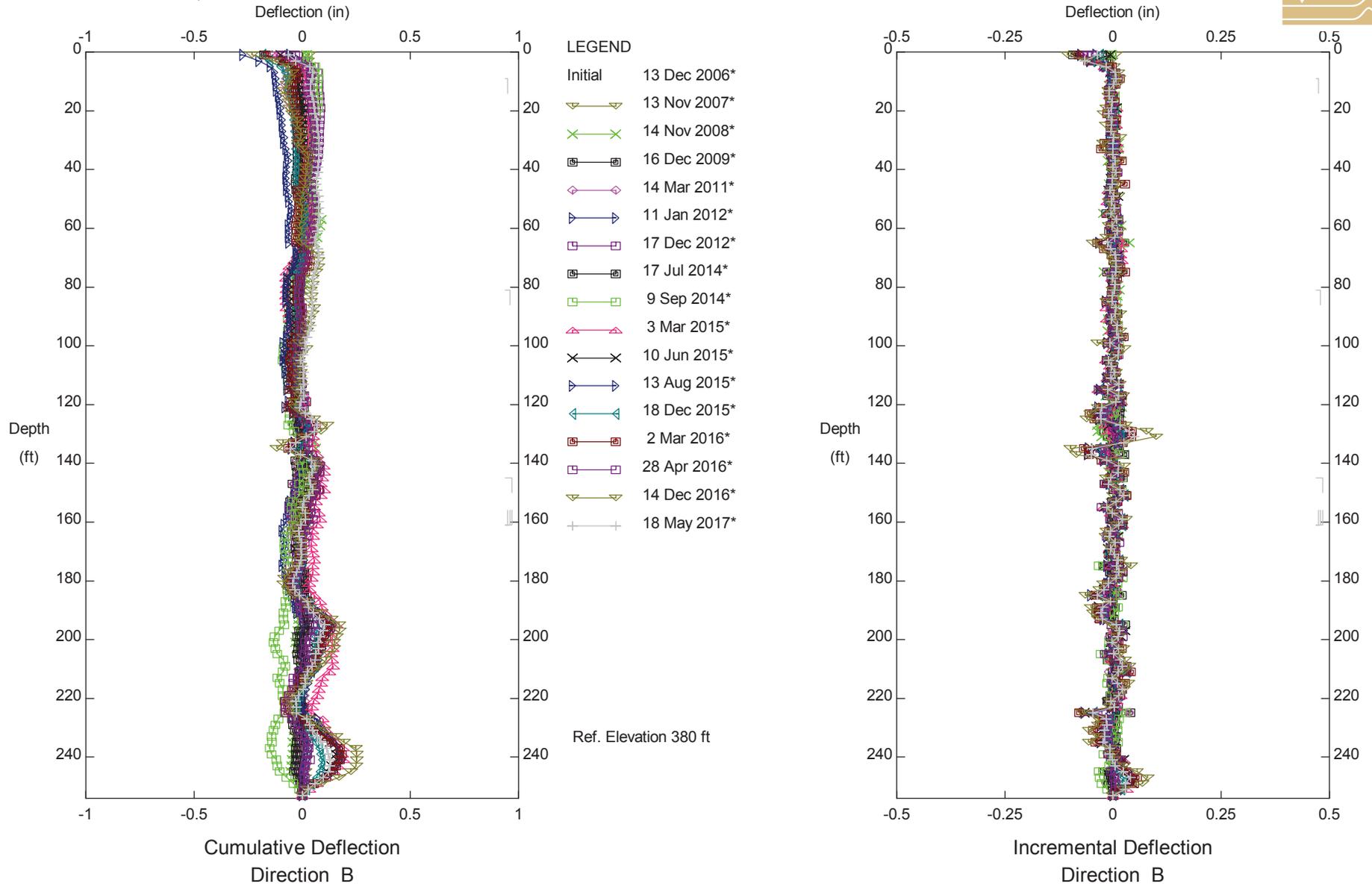


BIG ROCK MESA, Inclinometer SP-36
 CENTRAL REGION

Sets marked * include zero shift and/or rotation corrections.

**BIG ROCK MESA LANDSLIDE ASSESSMENT DISTRICT
 FY16-17 ANNUAL REPORT
 CITY OF MALIBU, CALIFORNIA**

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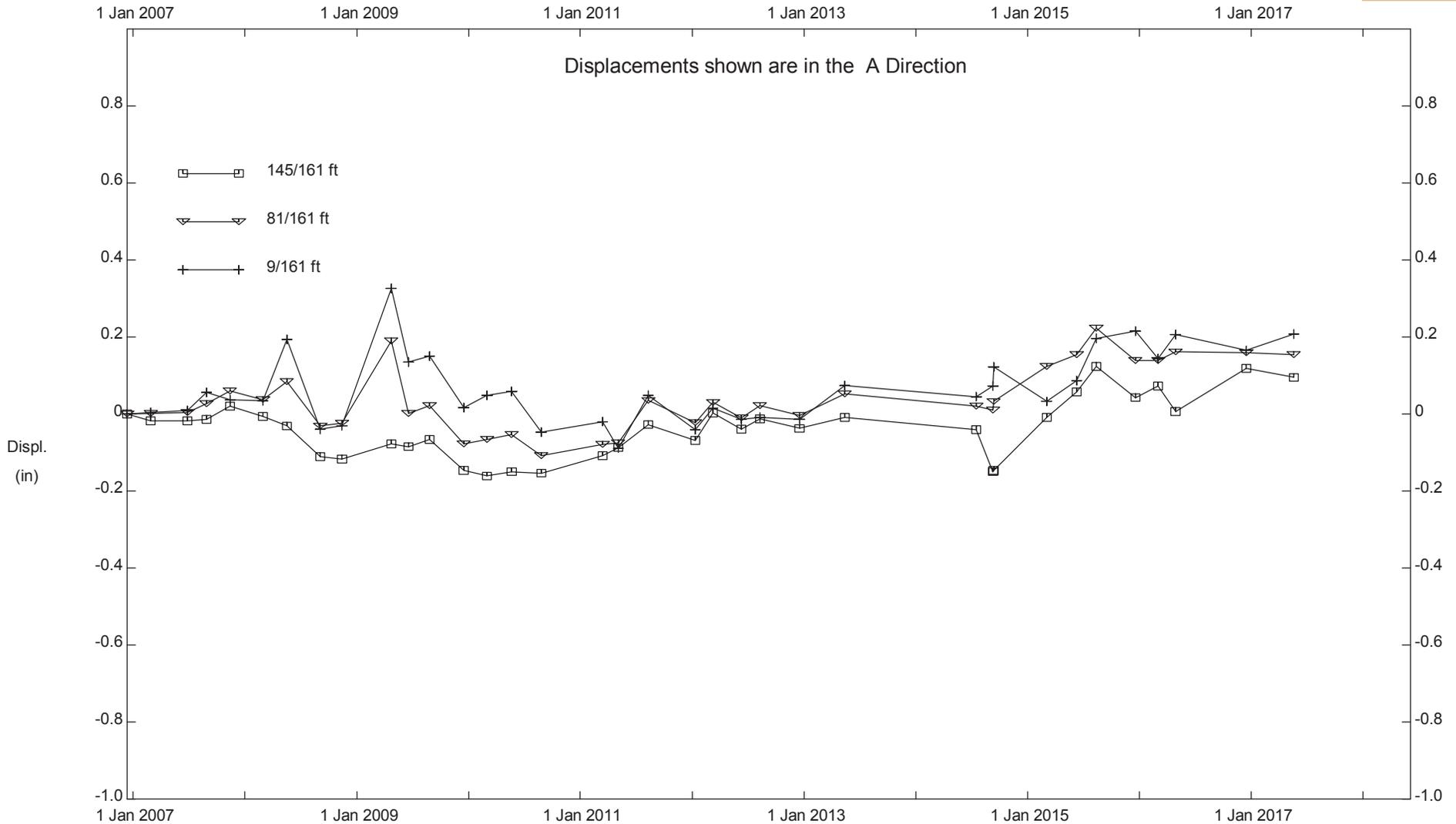


BIG ROCK MESA, Inclinometer SP-36
 CENTRAL REGION

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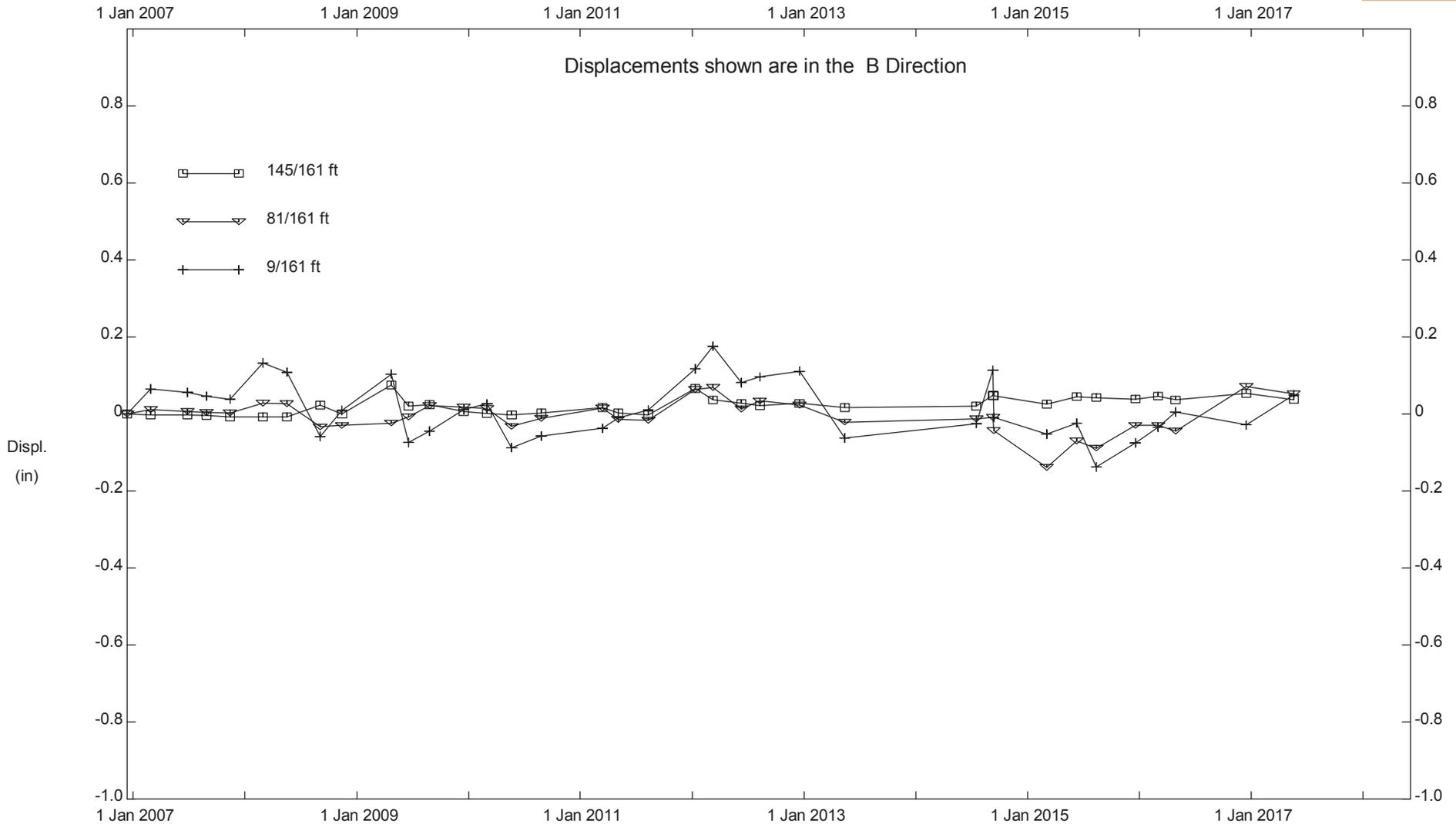
BIG ROCK MESA, Inclinator SP-36

CENTRAL REGION

PLATE D23-3

**BIG ROCK MESA LANDSLIDE ASSESSMENT DISTRICT
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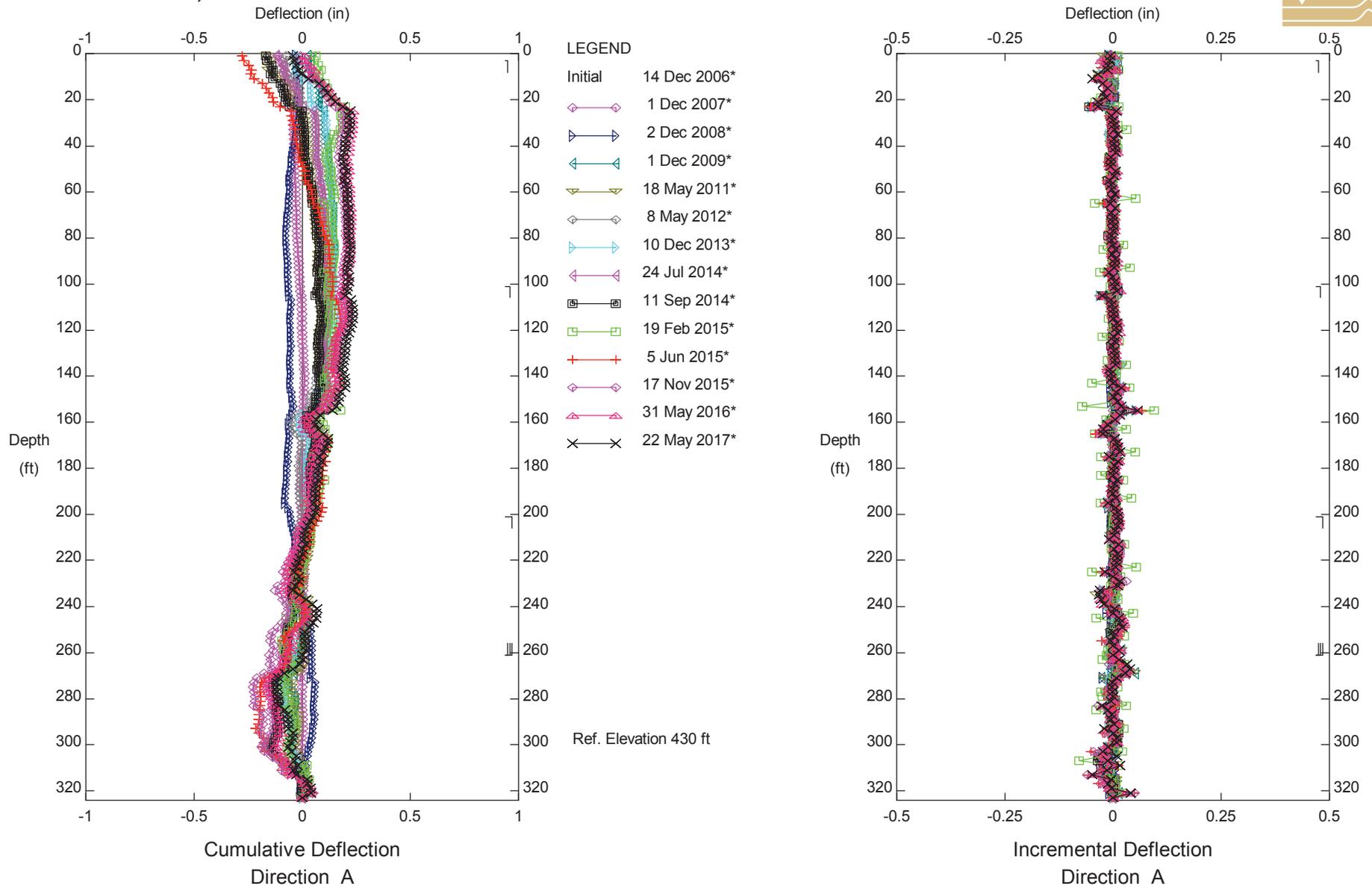
BIG ROCK MESA, Inclinometer SP-36

CENTRAL REGION

PLATE D23-4

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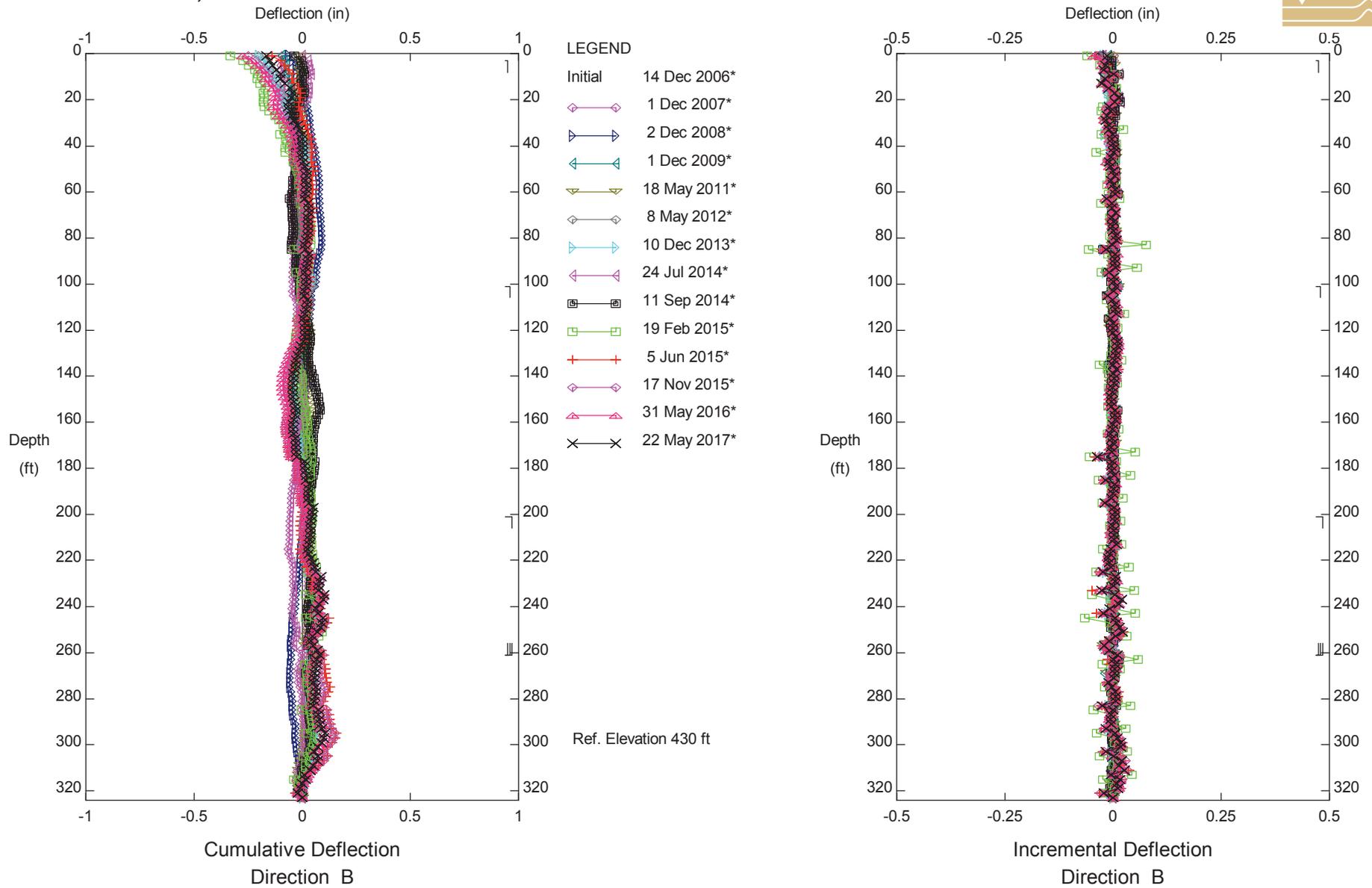


BIG ROCK MESA, Inclinometer SP-20
 WESTERN REGION

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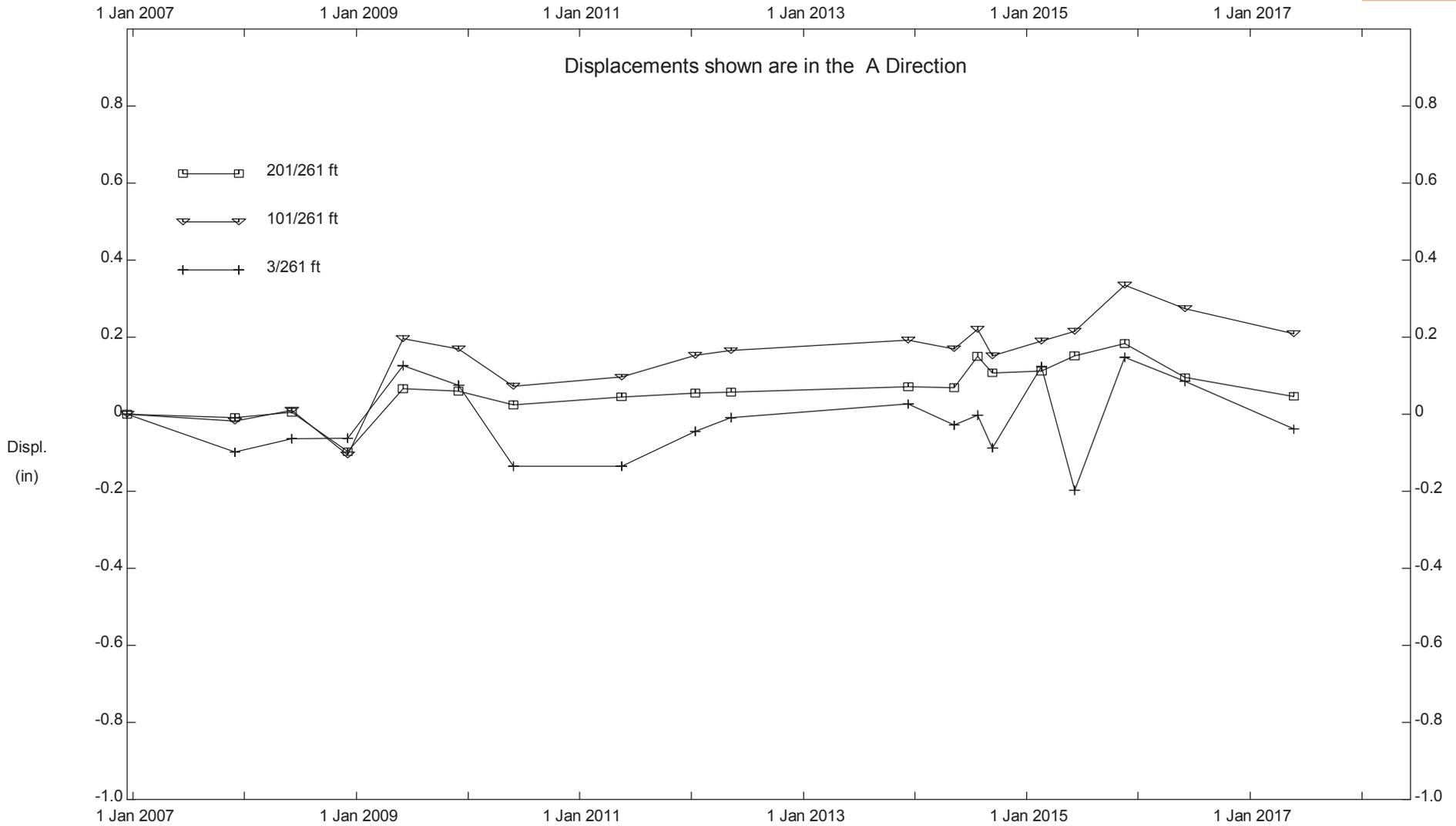


BIG ROCK MESA, Inclinometer SP-20
 WESTERN REGION

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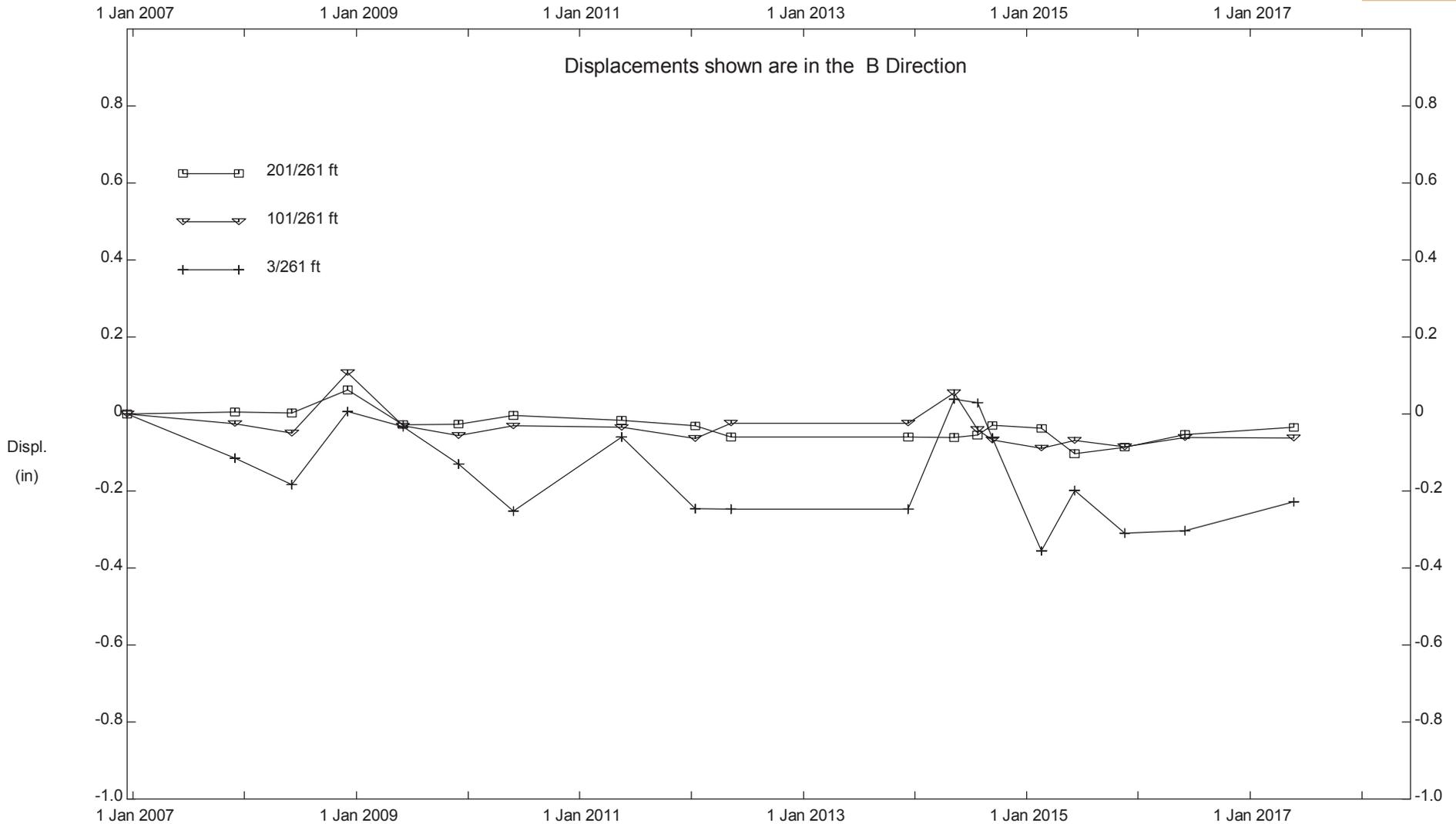
BIG ROCK MESA, Inclinometer SP-20

WESTERN REGION

PLATE D24-3

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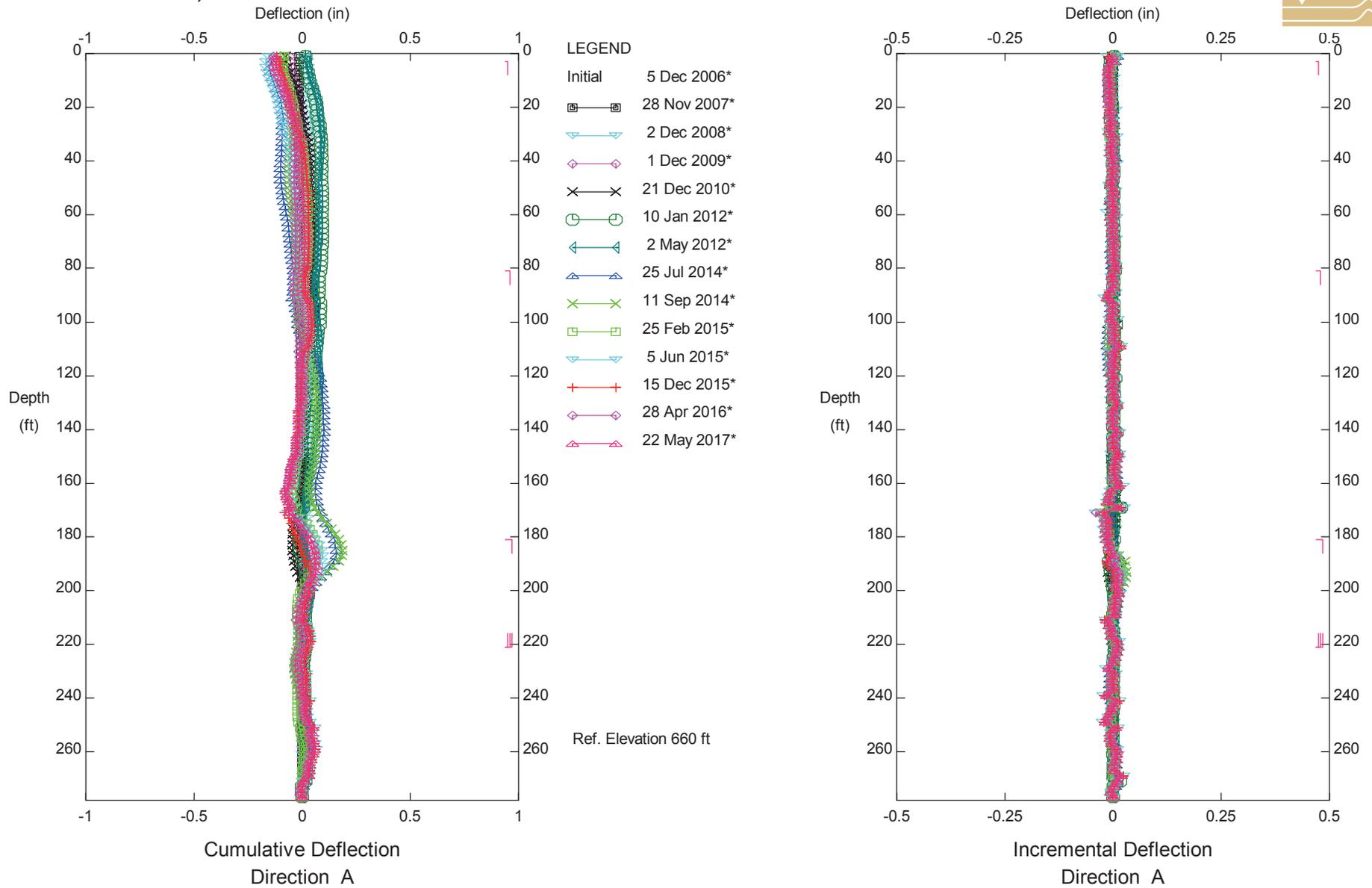
BIG ROCK MESA, Inclinometer SP-20

WESTERN REGION

PLATE D24-4

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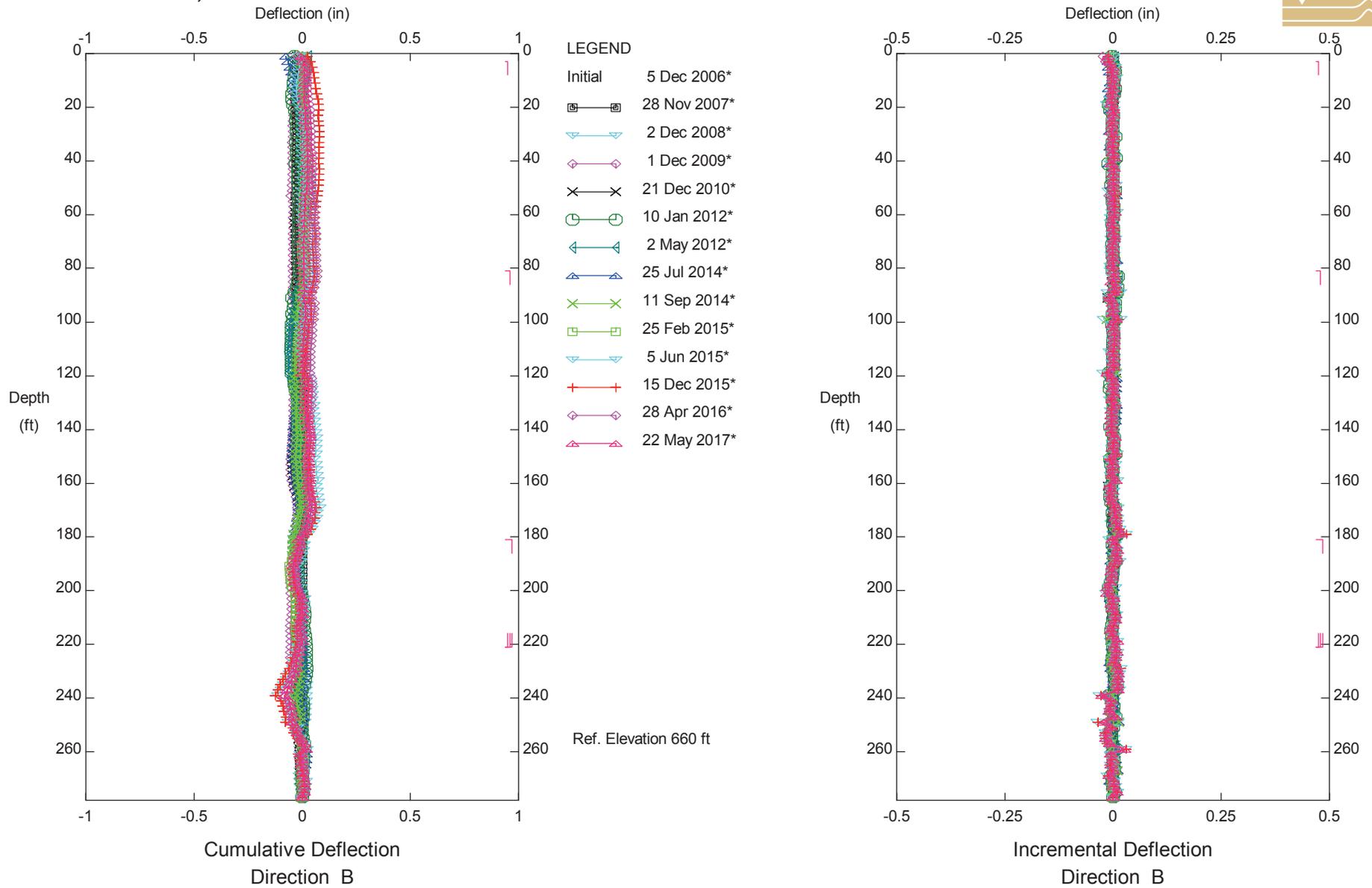


BIG ROCK MESA, Inclinometer SP-21
 WESTERN REGION

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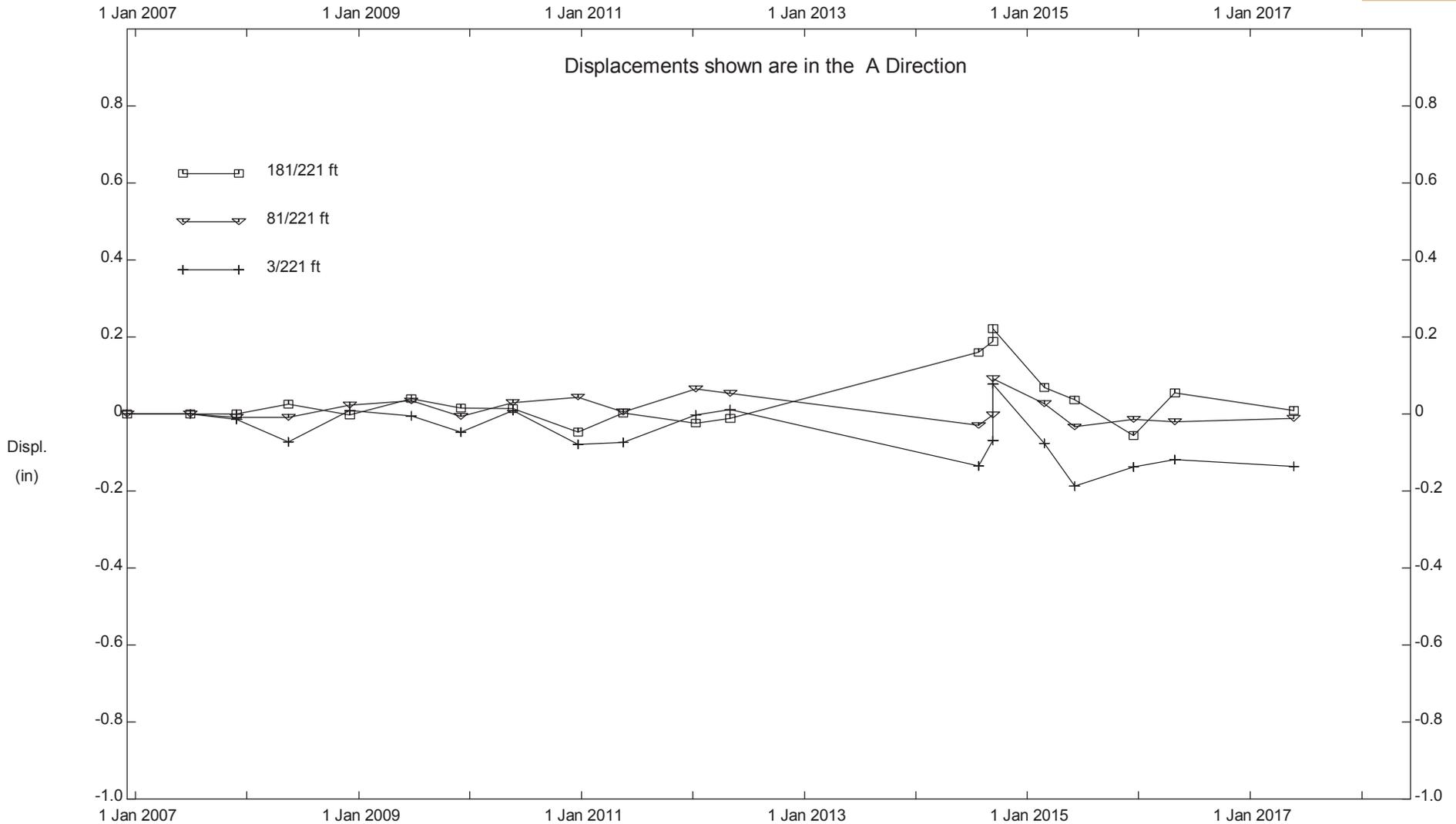


BIG ROCK MESA, Inclinator SP-21
 WESTERN REGION

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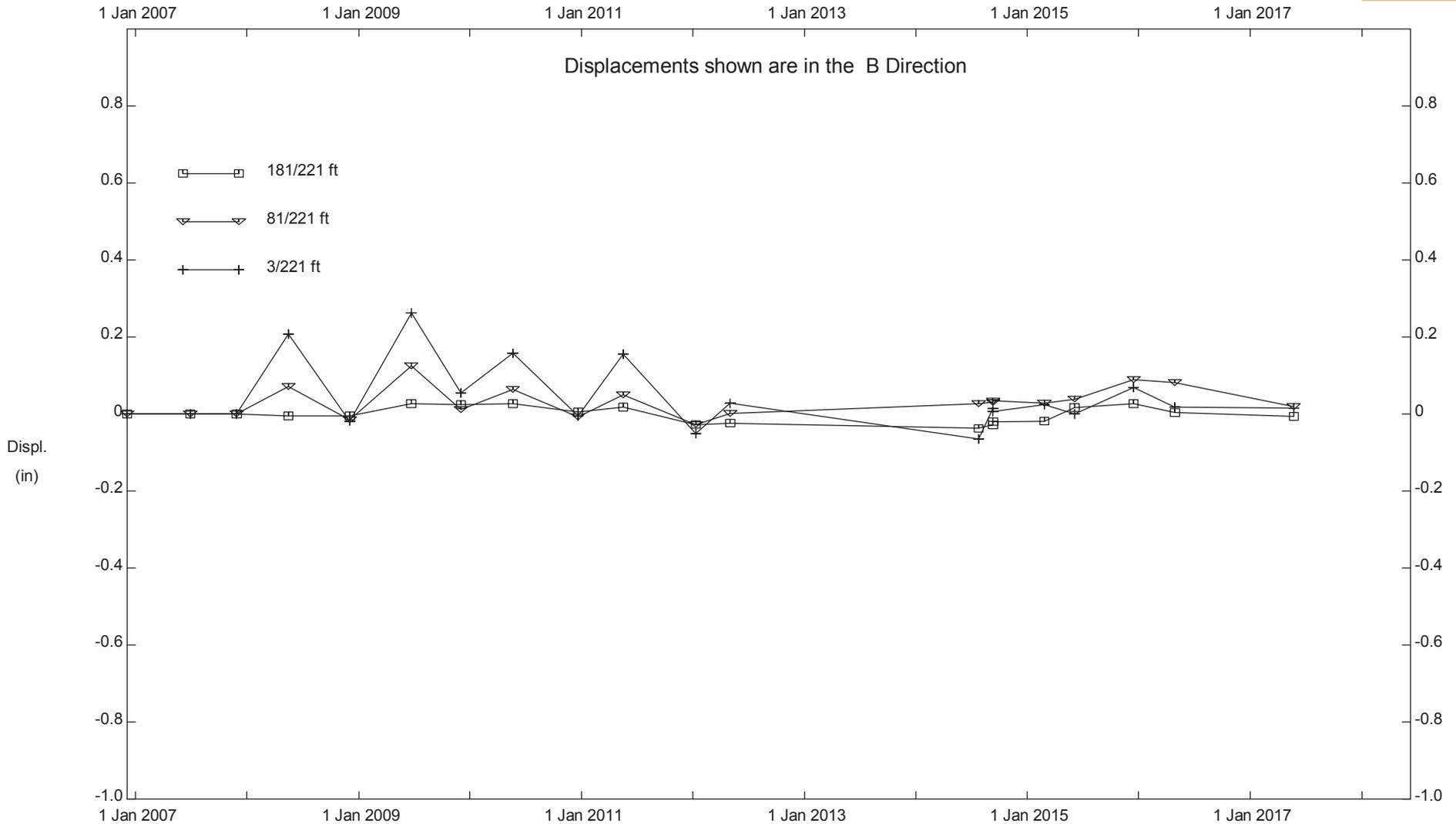
BIG ROCK MESA, Inclinometer SP-21

WESTERN REGION

PLATE D25-3

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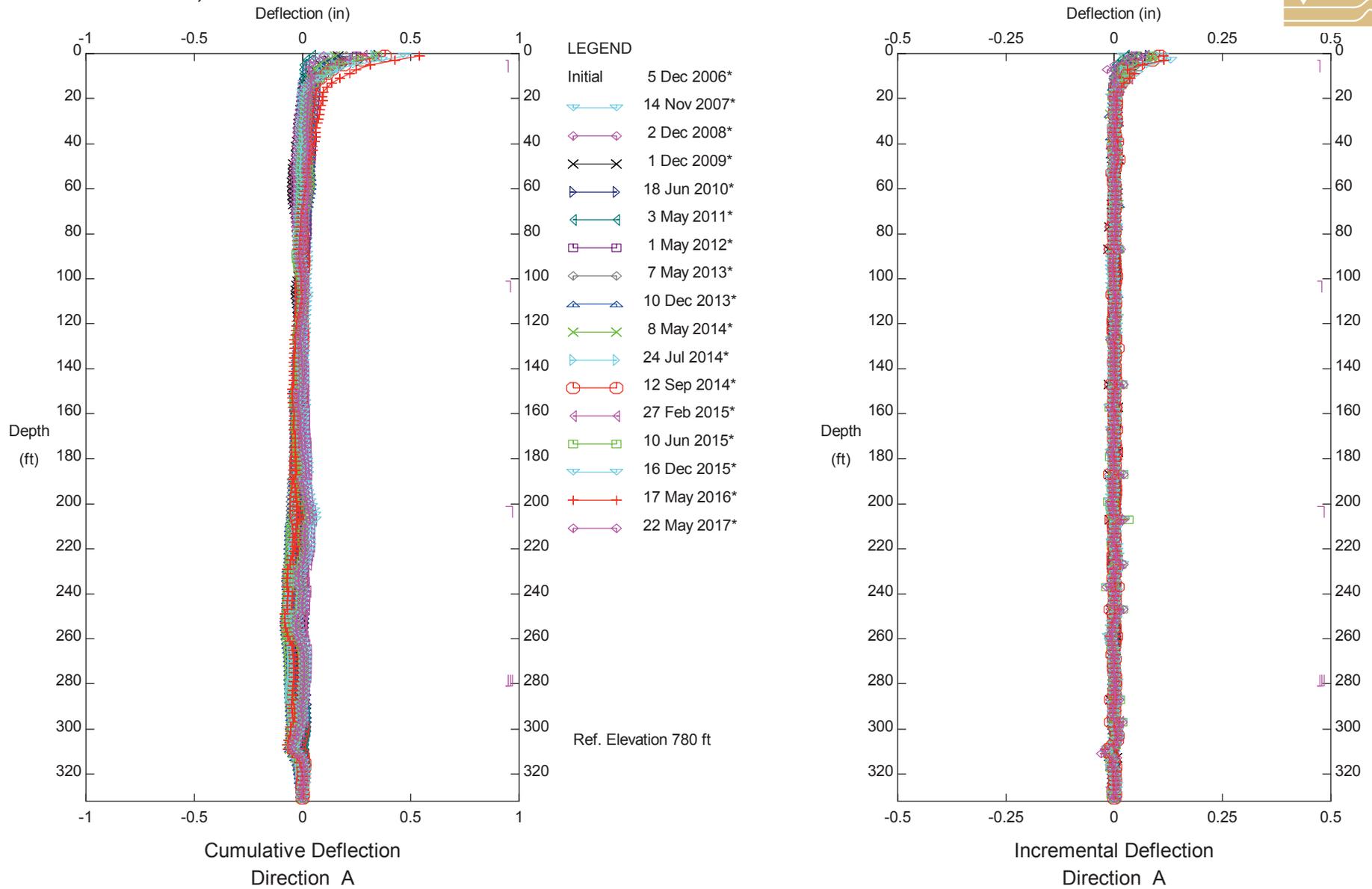
BIG ROCK MESA, Inclinometer SP-21

WESTERN REGION

PLATE D25-4

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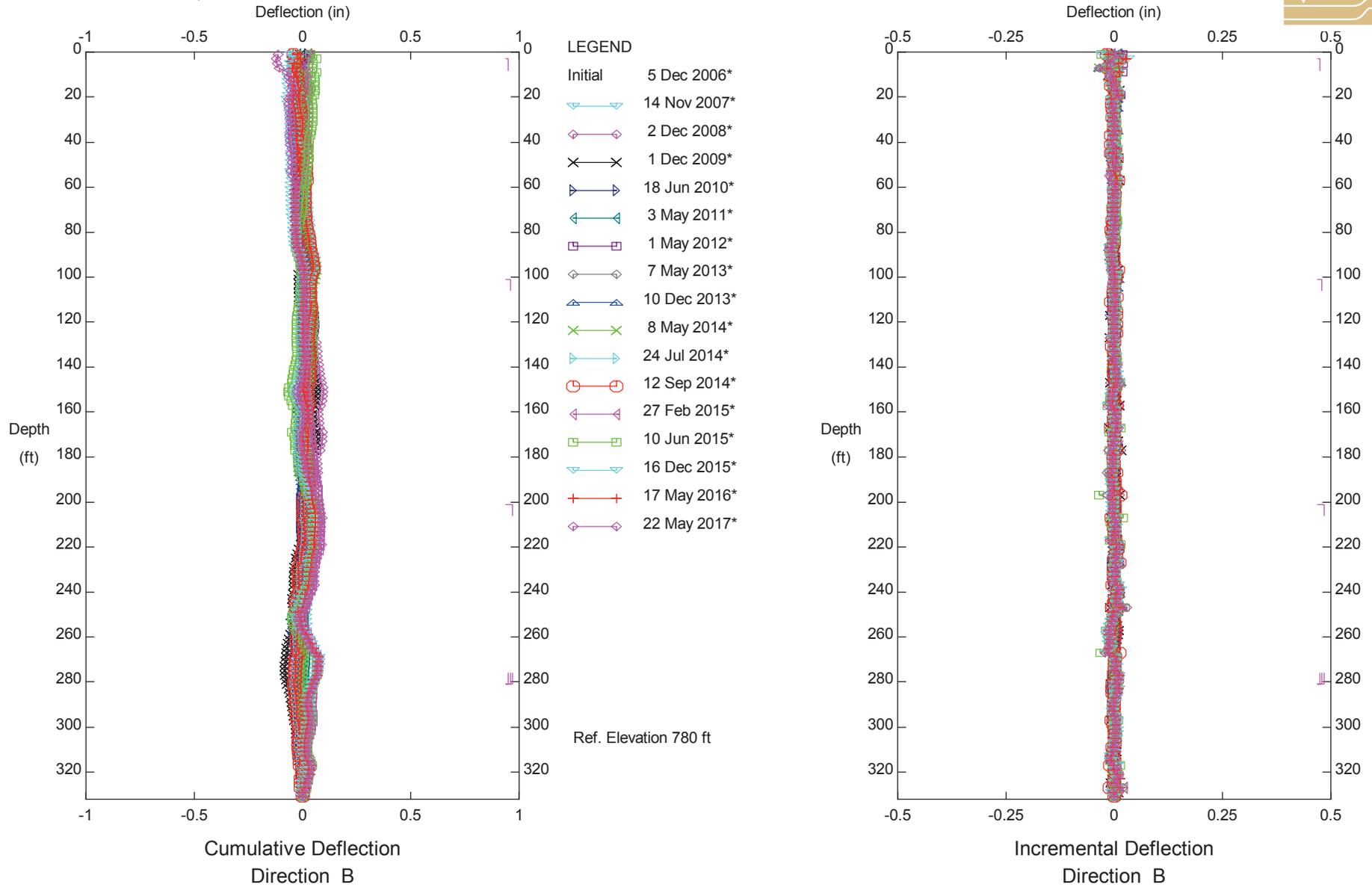


BIG ROCK MESA, Inclinometer SP-22
 WESTERN REGION

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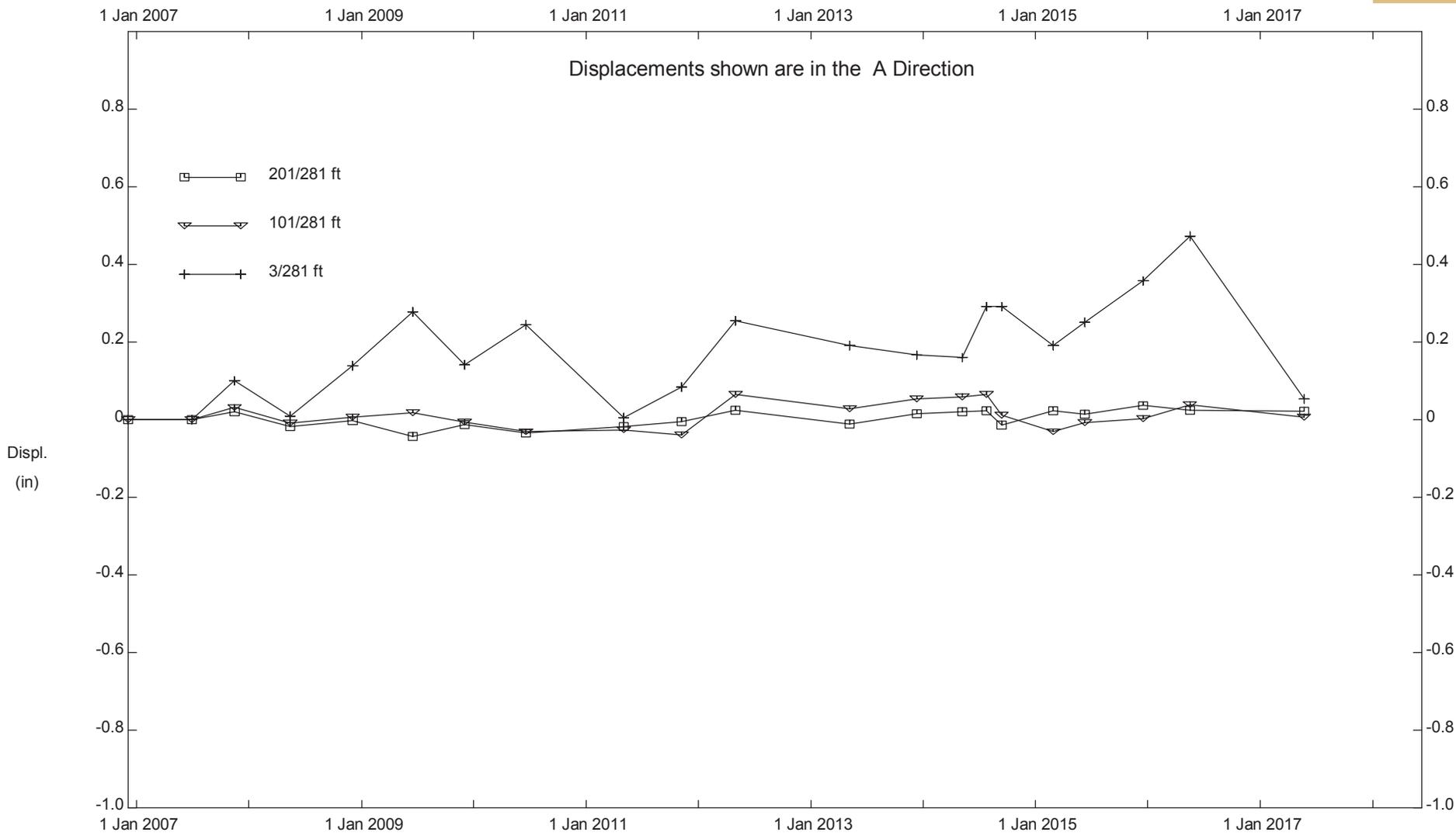


BIG ROCK MESA, Inclinometer SP-22
 WESTERN REGION

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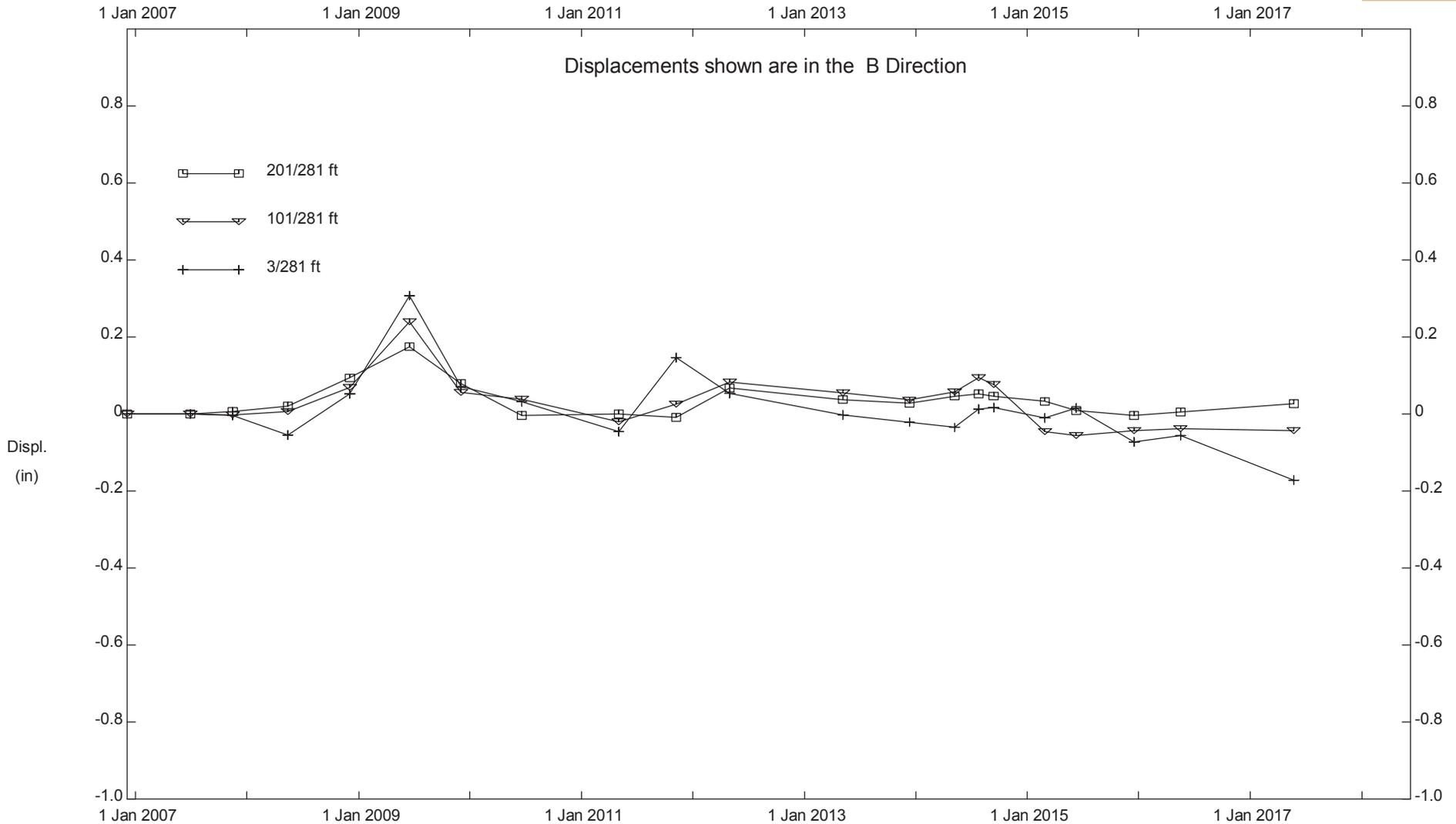
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BIG ROCK MESA, Inclinometer SP-22

WESTERN REGION

PLATE D26-3



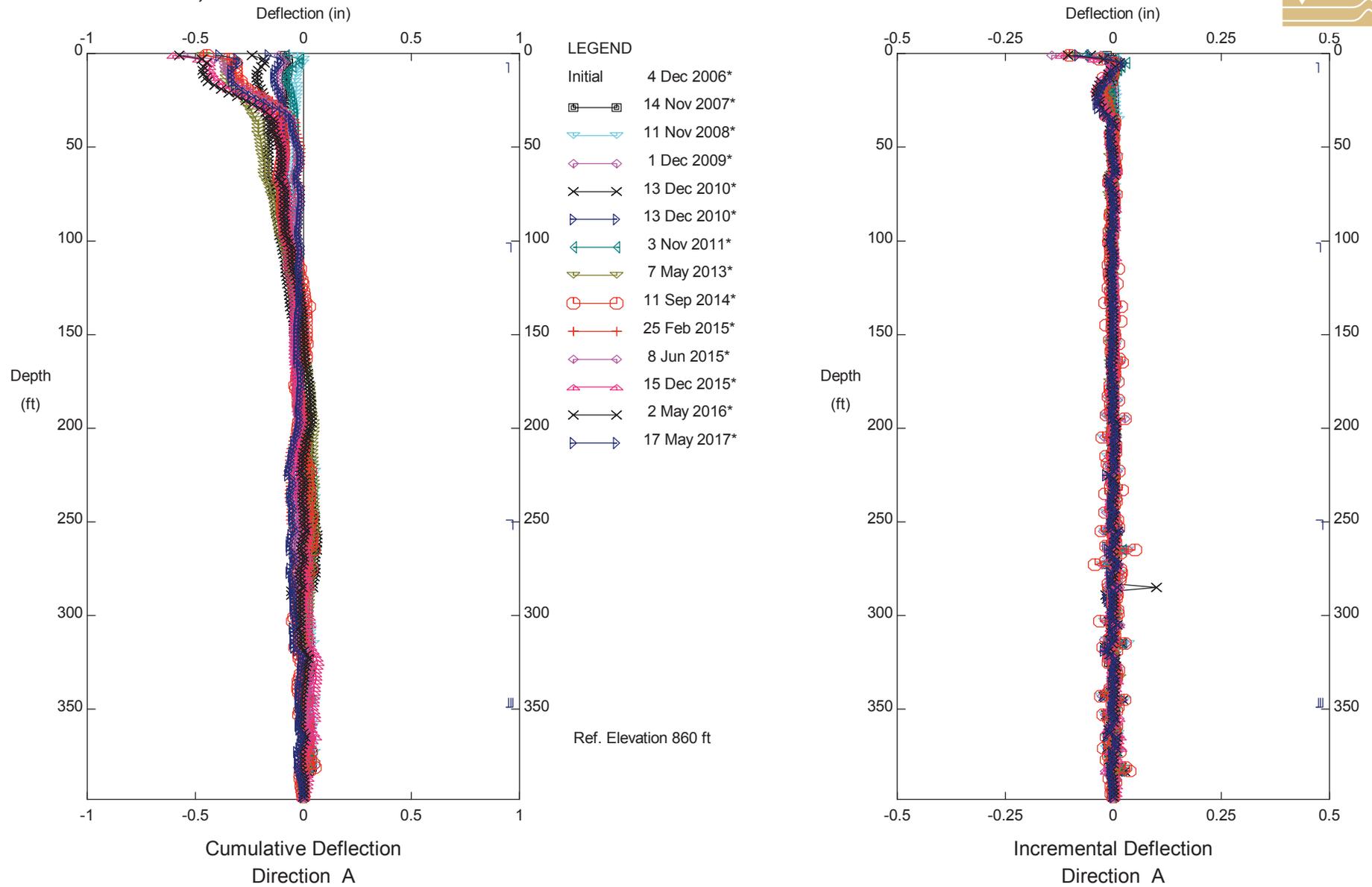
BIG ROCK MESA, Inclinometer SP-22

WESTERN REGION

PLATE D26-4

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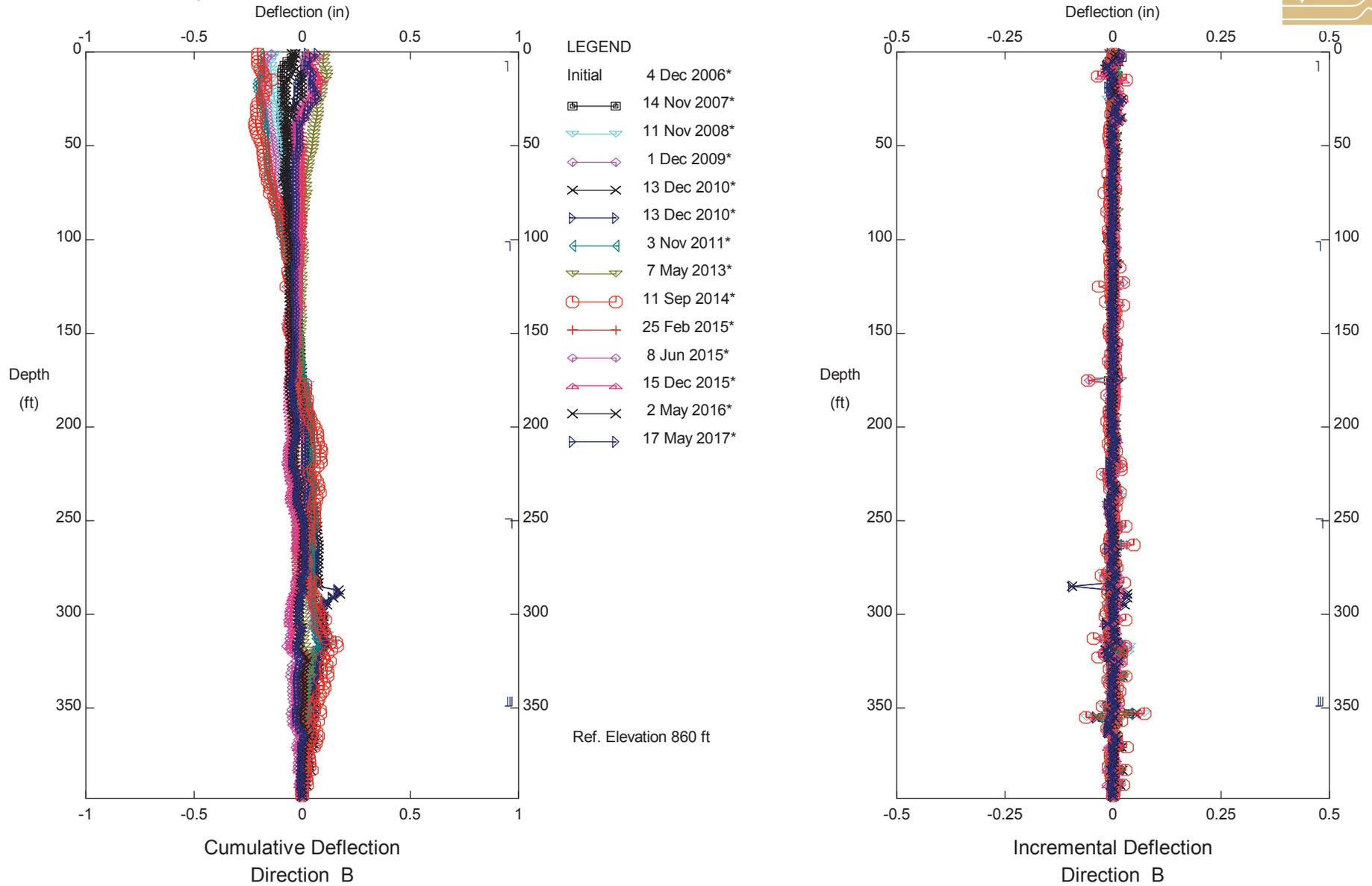


BIG ROCK MESA, Inclinometer SP-23
 WESTERN REGION

Sets marked * include zero shift and/or rotation corrections.

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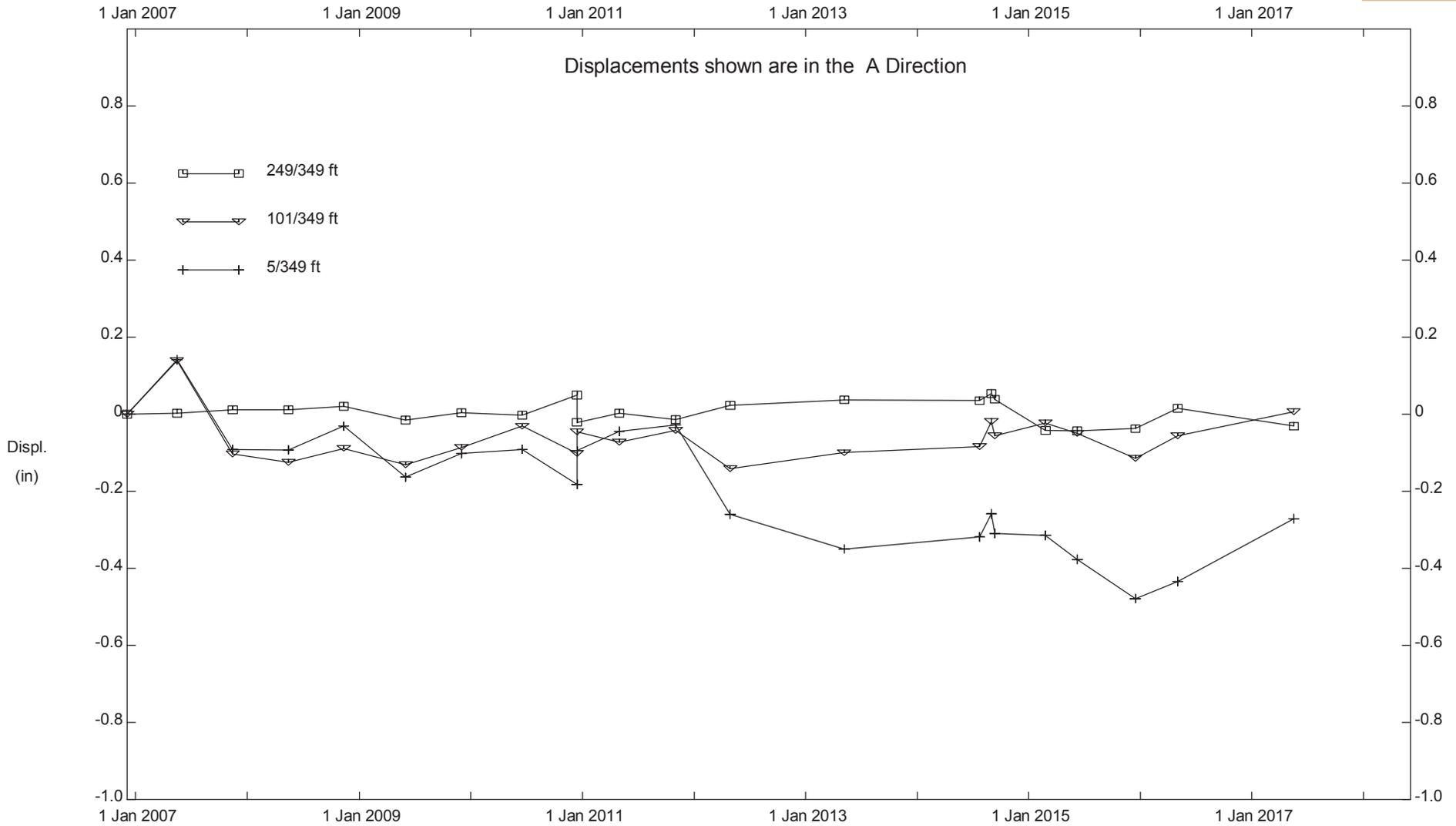


**BIG ROCK MESA, Inclinometer SP-23
 WESTERN REGION**

Sets marked * include zero shift and/or rotation corrections.

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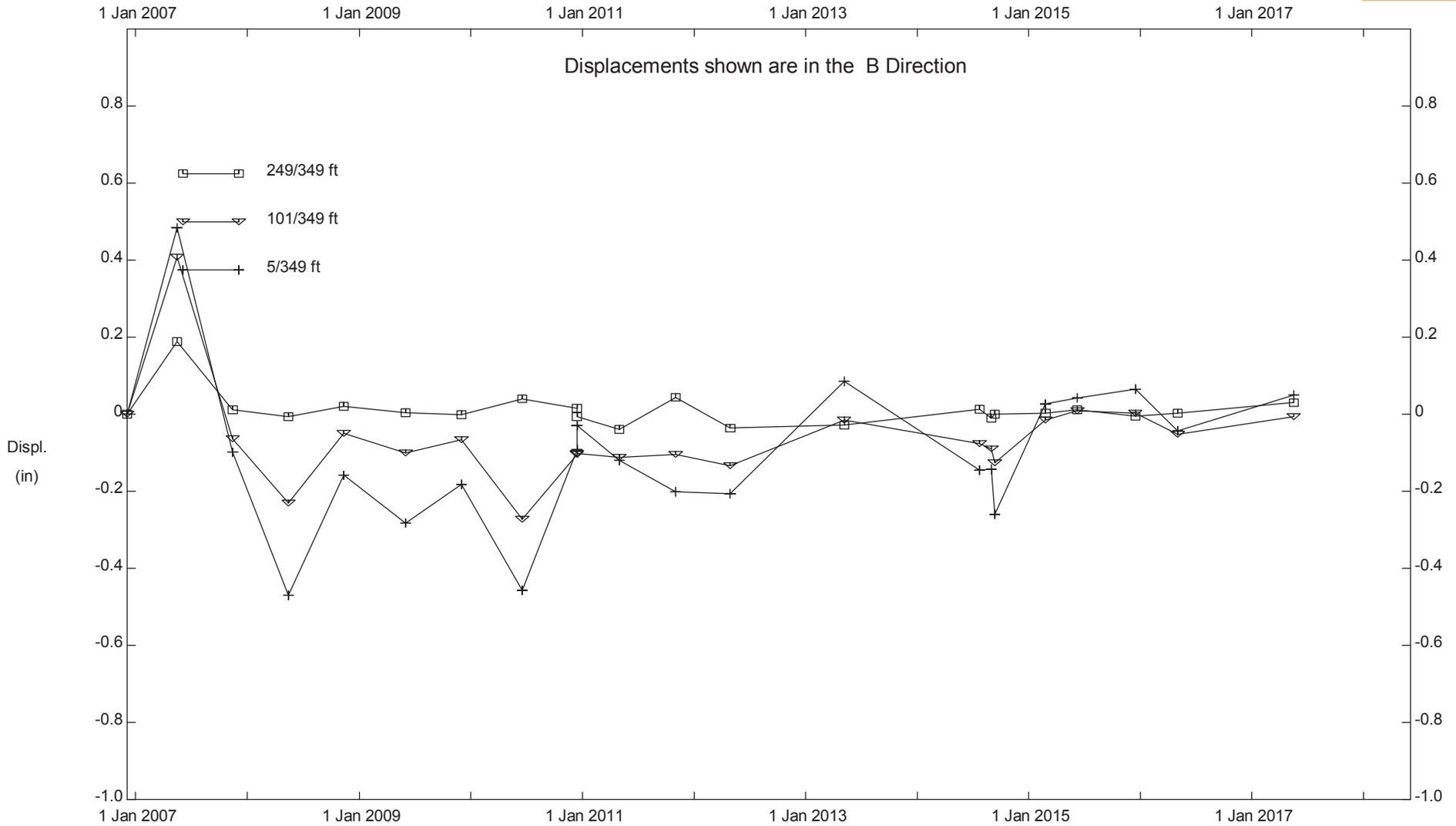
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BIG ROCK MESA, Inclinometer SP-23

WESTERN REGION

PLATE D27-3



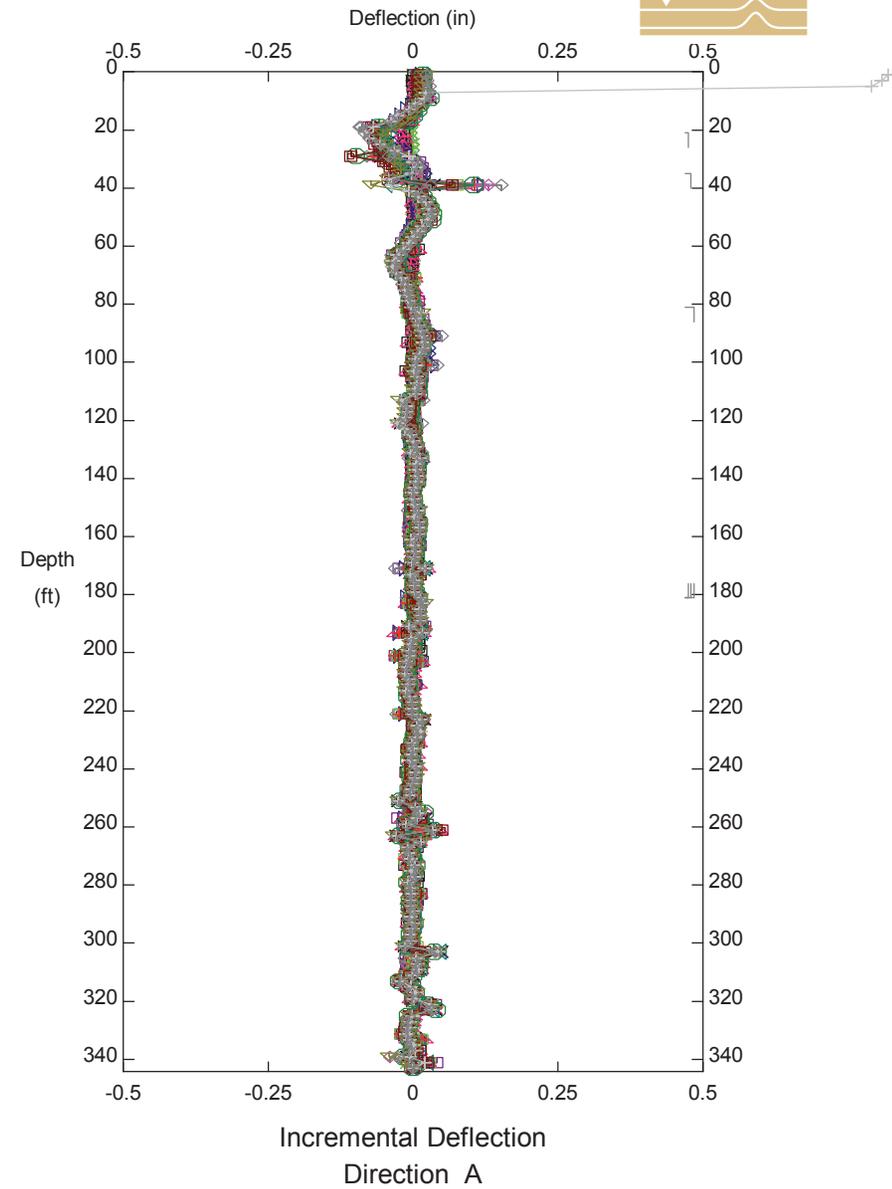
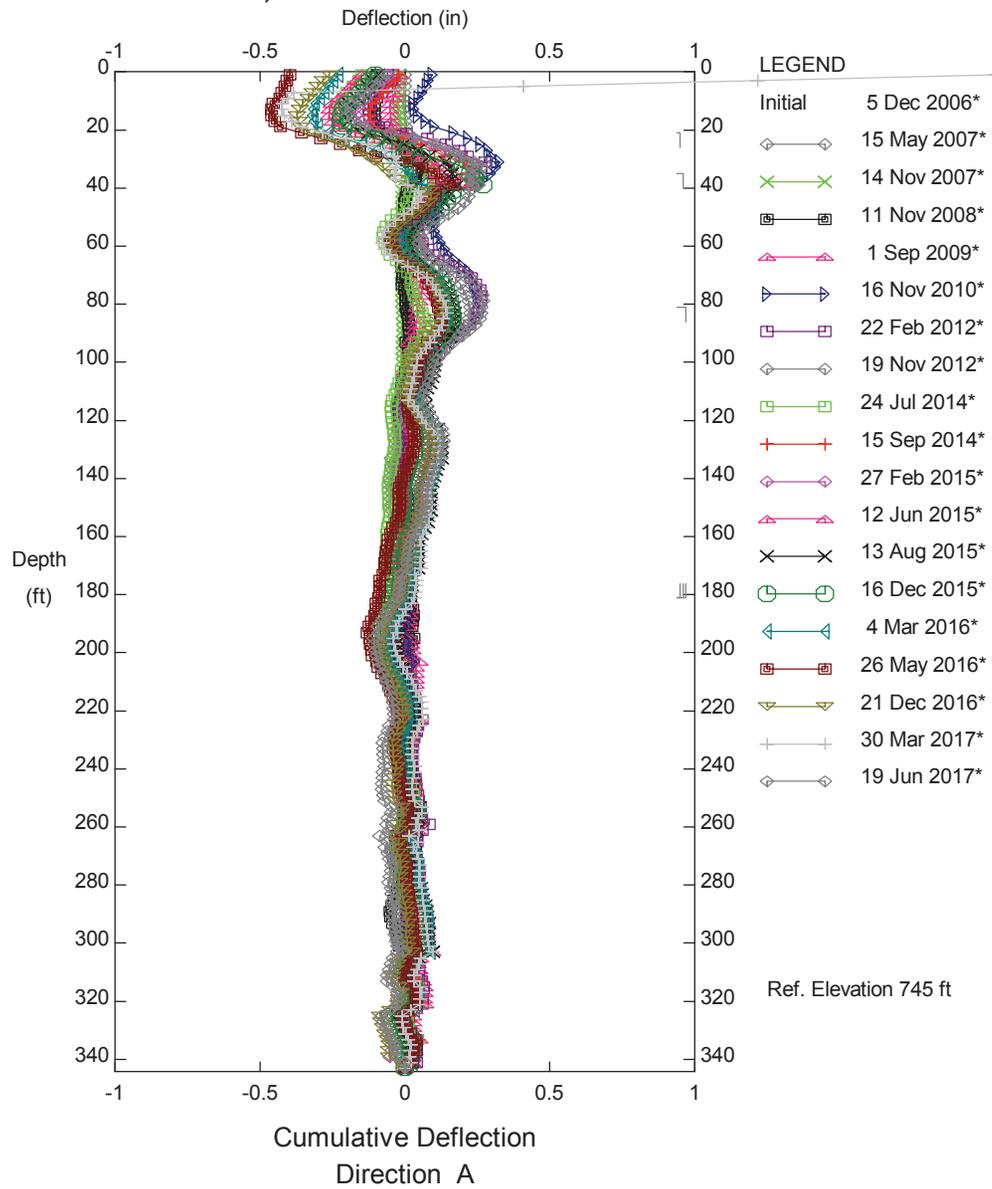
BIG ROCK MESA, Inclinometer SP-23

WESTERN REGION

PLATE D27-4

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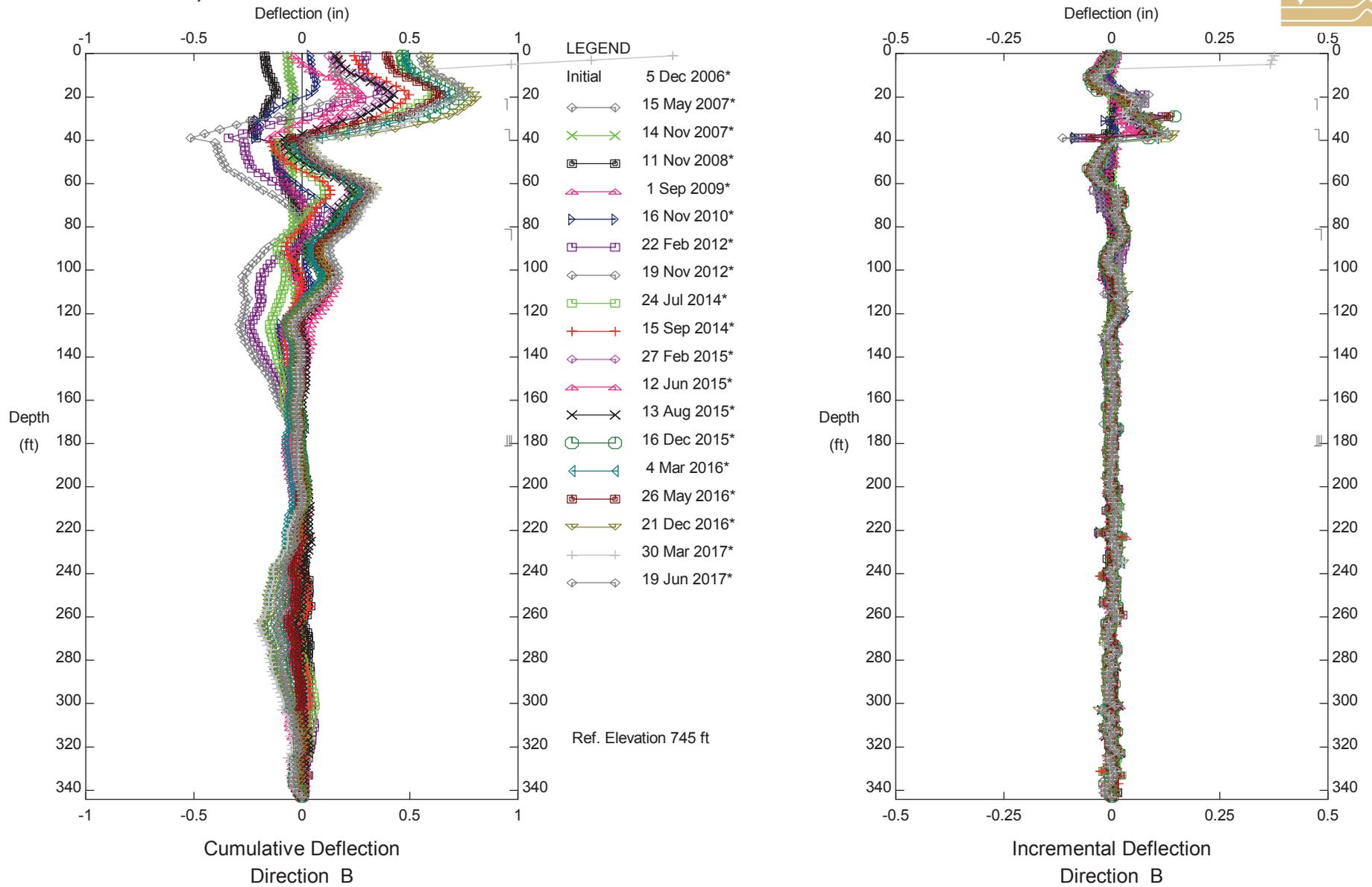


BIG ROCK MESA, Inclinator SP-26
 HEADSCARP REGION

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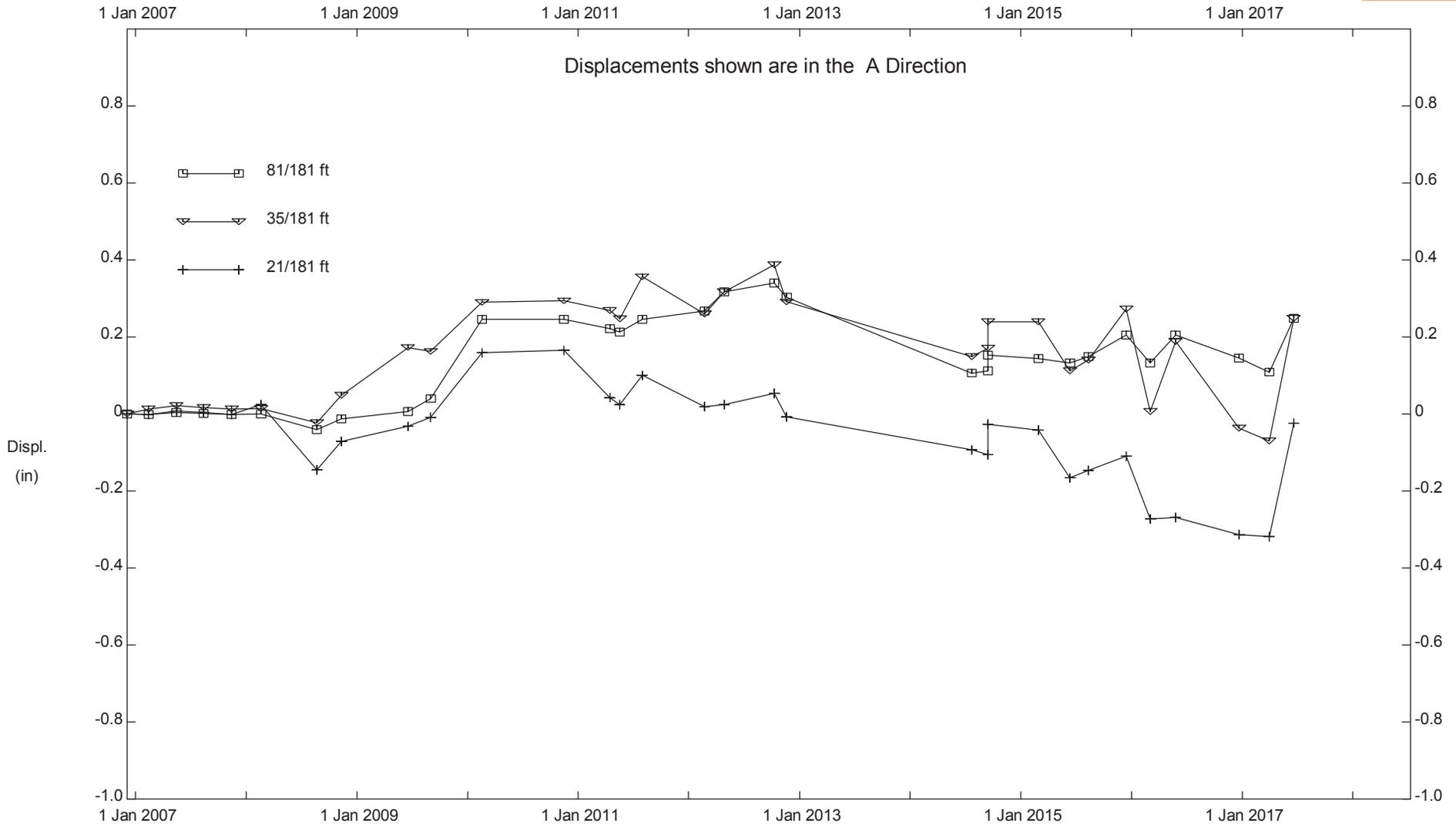


BIG ROCK MESA, Inclinometer SP-26
 HEADSCARP REGION

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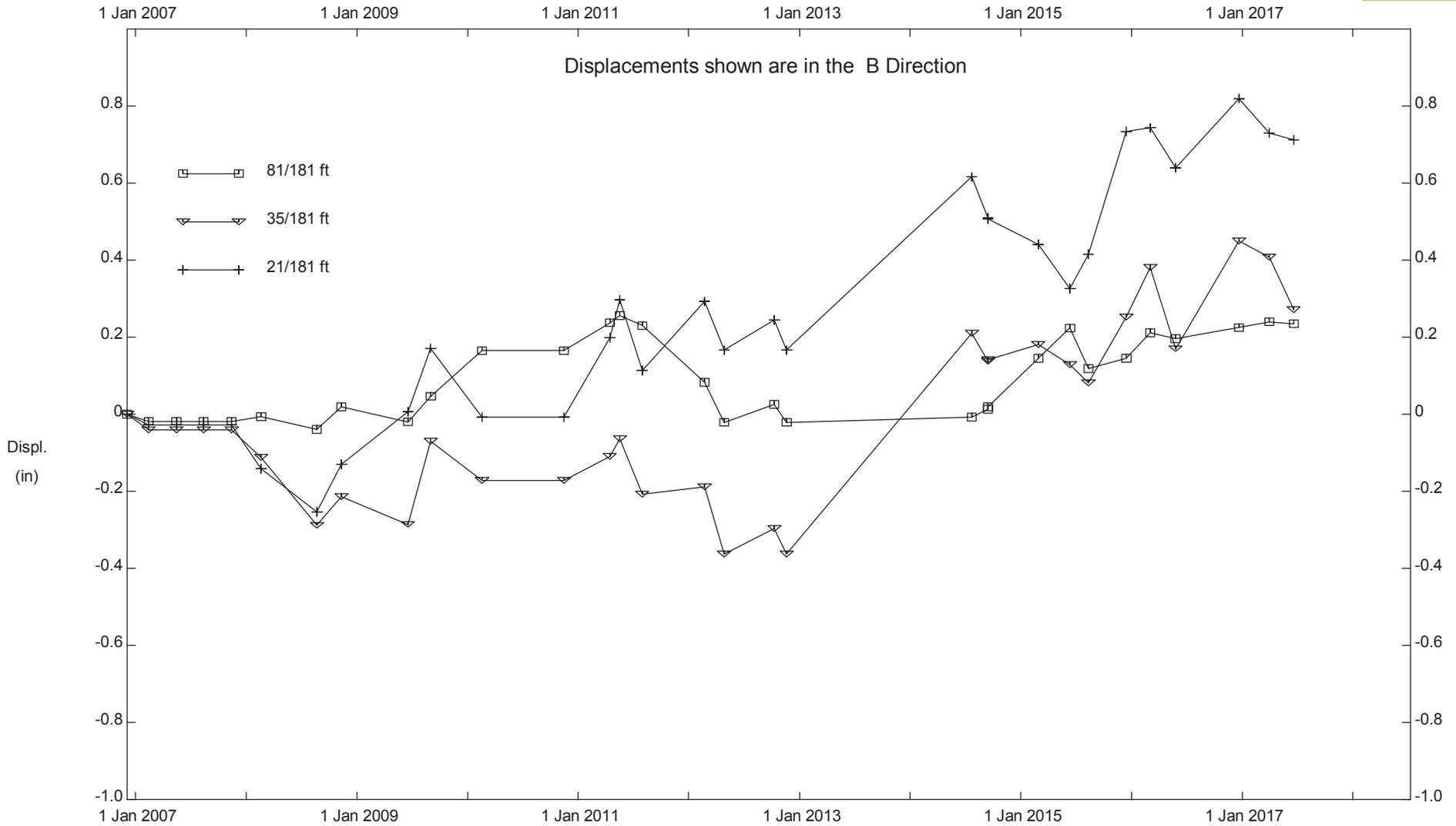
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BIG ROCK MESA, Inclinometer SP-26

HEADSCARP REGION

PLATE D28-3



BIG ROCK MESA, Inclinometer SP-26

HEADSCARP REGION

PLATE D28-4



**APPENDIX E
WATER QUALITY TESTING**

**BIG ROCK MESA LANDSLIDE ASSESSMENT DISTRICT
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Date Sampled	INORGANIC NON-METALS (Aqueous Matrix)																				
	Sample Point	pH (Field Measured)	Temperature	Biochemical Oxygen Demand	Surfactants (MBAS)	Oil & Grease	Settleable Solids	Sulfides	Phenols	Residual Chlorine (Field Measured)	Total Suspended Solids	Turbidity	TPH Diesel	TPH Motor Oil	Bis(2-Ethylhexyl) Phthalate	Zinc	Total Coliform	Fecal Coliform	Fecal/Total Coliform >0.1?	Enterococcus	Acute Toxicity***
Units:			°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	MPN/100ml	MPN/100ml		MPN/100ml	% Survival
Discharges to M-001 (Outfall/Port #1a)																					
7/7/2016	M-001	8.50	66.0	1.7	ND A07	ND	ND	ND	ND	0.00	5.6	0.92	ND	ND	ND	72	1100	110	No	184	--
7/14/2016	M-001	8.28	70.2	--	--	--	--	--	--	--	--	--	--	--	--	17 J	--	--	--	--	--
7/21/2016	M-001	8.30	69.1	--	--	--	--	--	--	--	--	--	--	--	--	25 J	--	--	--	--	--
7/27/2016	M-001	8.43	70.5	--	--	--	--	--	--	--	--	--	--	--	--	23 J	--	--	--	--	--
8/4/2016	M-001	8.27	67.3	--	--	--	--	--	--	--	--	--	--	--	--	17 J	--	--	--	--	--
8/11/2016	M-001	8.54	67.5	ND	ND	ND	ND	ND	ND	0.01	1.2	0.65	ND	ND	ND	32 J	1300	<1.8	No	15	--
9/1/2016	M-001	8.44	68.4	ND	ND A07	ND	11	ND	ND	0.00	15000	1.1	26 J,A52	ND	ND	100	330	17	No	4	--
9/15/2016	M-001	8.38	69.8	--	--	--	--	--	--	--	--	--	--	--	--	14 J	--	--	--	--	--
9/22/2016	M-001	8.38	67.8	--	--	--	--	--	--	--	--	--	--	--	--	24 J,A07	--	--	--	--	--
9/27/2016	M-001	8.50	71.6	--	--	--	--	--	--	--	--	--	--	--	--	28 J	--	--	--	--	--
Discharges to M-002 (Outfall/Port #1)																					
7/7/2016	M-002	8.31	68.0	ND	ND	ND	ND	ND	0.011 J	0.00	ND	0.26	ND	ND	ND	1.3 J	230	<1.8	No	<1	--
8/11/2016	M-002	7.88	68.7	ND	ND	ND	ND	ND	ND	0.00	ND	0.29	ND	ND	ND	5.9 J	23	<1.8	No	2	--
9/1/2016	M-002	8.29	70.0	ND	ND	ND	ND	ND	ND	0.00	ND	0.24	ND	ND	ND	1.5 J	170	2	No	<1	--
Discharges to M-003 (Outfall/Port #2)																					
7/7/2016	HD-41	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
8/11/2016	HD-41	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
9/1/2016	HD-41	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Discharges to M-004 (Outfall/Port #3)																					
7/7/2016	M-004	8.08	70.5	ND	ND	ND	ND	ND	0.011 J	0.00	0.90	0.53	ND	ND	ND	5.4 J	4900	1700	Yes	172	--
7/14/2016	M-004	7.89	72.1	--	--	--	--	--	--	--	--	--	ND	ND	--	--	--	--	--	--	--
8/11/2016	M-004	8.21	71.6	ND	0.016 J	ND	ND	ND	ND	0.03	2.1	0.49	ND	ND	ND	18 J	54000	54000	Yes	>2420	--
9/1/2016	M-004	8.18	72.7	7.2	0.34	ND	ND	ND	ND	0.05	8.6	12	200 A52	250 A57	ND	45 J	>160000	>160000	Yes	>2420	--
9/15/2016	M-004	7.75	72.0	--	--	--	--	--	--	--	--	--	62 A52	120 J, A52	--	--	--	--	--	--	--
9/22/2016	M-004	8.00	70.7	--	--	--	--	--	--	--	--	--	ND	ND	--	--	--	--	--	--	--
9/27/2016	M-004	8.20	75.2	--	--	--	--	--	--	--	--	--	42 J,A52	ND	--	--	--	--	--	--	--
Discharges to M-005 (Outfall/Port #4)																					
7/7/2016	M-005	8.27	71.8	1.6	ND	ND	ND	ND	0.014	0.00	ND	0.33	ND	ND	ND	23 J	7900	460	No	1200	--
7/14/2016	M-005	8.24	73.4	--	--	--	--	--	--	--	--	--	55 A52	370 A57	--	--	--	--	--	--	--
7/21/2016	M-005	8.43	72.0	--	--	--	--	--	--	--	--	--	ND	ND	--	--	--	--	--	--	--
7/27/2016	M-005	8.12	75.4	--	--	--	--	--	--	--	--	--	290 A52	520 A57	--	--	--	--	--	--	--
8/4/2016	M-005	8.18	71.8	--	--	--	--	--	--	--	--	--	ND	ND	--	--	--	--	--	--	--
8/11/2016	M-005	8.32	72.7	2.0	0.094 J	ND	ND	ND	ND	0.01	3.5	0.98	46 J,A52	ND	ND	59	>160000	280	No	>2420	--
8/17/2016	M-005	8.19	68.4	--	--	--	--	--	--	--	--	--	ND	ND	--	--	--	--	--	--	--
8/25/2016	M-005	8.12	73.4	--	--	--	--	--	--	--	--	--	ND	ND	--	61	--	--	--	--	--
9/1/2016	M-005	8.30	72.3	ND	ND	ND	ND	ND	ND	0.00	2.8	0.66	ND	ND	--	63	54000	220	No	613	--
9/9/2016	M-005	8.26	70.9	--	--	--	--	--	--	--	--	--	--	--	--	57	--	--	--	--	--
9/15/2016	M-005	8.27	71.4	--	--	--	--	--	--	--	--	--	--	--	--	37 J	--	--	--	--	--
9/22/2016	M-005	8.27	71.4	--	--	--	--	--	--	--	--	--	--	--	--	25 J	--	--	--	--	--
9/27/2016	M-005	8.34	75.4	--	--	--	--	--	--	--	--	--	--	--	--	39 J	--	--	--	--	--
Discharges to M-006 (Outfall/Port #5)																					
7/7/2016	M-006	8.36	73.9	ND	0.024 J	ND	ND	ND	ND	0.02	0.50	0.35	ND	ND	ND	7.3 J	1100	23	No	5	--
7/14/2016	Duplicate	8.36	73.9	ND	0.053 J	ND	ND	ND	0.013 J	0.02	0.60	0.41	ND	ND	ND	7.1 J	1100	46	No	8	--
7/21/2016	M-006	8.24	72.1	--	--	--	--	--	--	--	--	--	ND	ND	--	--	--	--	--	--	--
7/27/2016	M-006	8.18	73.2	--	--	--	--	--	--	--	--	--	ND	140 J,A57	--	--	--	--	--	--	--
8/11/2016	M-006	8.31	72.0	ND	0.025 J	ND	ND	ND	ND	0.01	2.2	0.71	ND	ND	ND	7.6 J	790	7.8	No	10	--
8/17/2016	M-006	8.12	68.7	--	--	--	--	--	--	--	--	--	ND	ND	--	--	--	--	--	--	--
8/25/2016	M-006	8.21	72.1	--	--	--	--	--	--	--	--	--	ND	ND	--	--	--	--	--	--	--
9/1/2016	M-006	8.37	75.2	ND	ND	ND	ND	ND	ND	0.00	1.3	0.27	ND	ND	ND	3.3 J	4900	230	No	13	--
Discharges to M-007 (Outfall/Port #5a)																					
7/7/2016	M-007	7.89	70.9	ND	ND	ND	ND	ND	ND	0.01	1.1	0.26	ND	ND	ND	1.6 J	1400	460	Yes	50	--
8/11/2016	M-007	8.12	72.0	ND	ND	ND	ND	ND	ND	0.00	ND	0.25	ND	ND	ND	28 J	1300	220	Yes	25	--
8/11/2016	Duplicate	8.12	72.0	ND	ND	ND	ND	ND	ND	0.00	0.95	0.24	ND	ND	ND	27 J	2200	700	Yes	32	--
9/1/2016	M-007	8.24	70.5	ND	ND	ND	0.10	ND	ND	0.00	ND	0.24	ND	ND	ND	4.0 J	700	33	No	238	--
Discharges to M-008 (Outfall/Port #6)																					
7/7/2016	M-008	--	74.3	ND	ND	ND	ND	ND	ND	0.02	5.1	0.49	ND	ND	ND	38 J	790	46	No	93	--
7/14/2016	M-008	8.37	71.2	--	--	--	--	--	--	--	--	--	--	--	--	41 J	--	--	--	--	--
7/21/2016	M-008	8.21	72.5	--	--	--	--	--	--	--	--	--	--	--	--	55	--	--	--	--	--
8/4/2016	M-008	8.33	69.4	--	--	--	--	--	--	--	--	--	--	--	--	11 J	--	--	--	--	--
8/11/2016	M-008	8.58	70.2	ND	0.022 J	ND	ND	--	--	0.02	0.74	0.29	ND	ND	ND	21 J	790	230	Yes	276	--
8/17/2016	M-008	8.48	65.8	--	--	--	--	--	--	--	--	--	--	--	--	34 J	--	--	--	--	--
8/25/2016	M-008	8.46	69.4	--	--	--	--	--	--	--	--	--	--	--	--	72	--	--	--	--	--
9/1/2016	M-008	8.46	72.1	ND	ND	ND	ND	ND	ND	0.02	1.1	1.2	ND	ND	ND	27 J	310	79	Yes	980	--
9/1/2016	Duplicate	8.46	72.1	ND	ND	ND	ND	ND	ND	0.02	3.8	1.3	ND	ND	ND	27 J	790	33	No	687	--
9/9/2016	M-008	8.06	67.5	--	--	--	--	--	--	--	--	--	--	--	--	130	--	--	--	--	--
9/15/2016	M-008	8.27	69.1	--	--	--	--	--	--	--	--	--	--	--	--	20 J	--	--	--	--	--
9/22/2016	M-008	8.48	70.0	--	--	--	--	--	--	--	--	--	--	--	--	57	--	--	--	--	--
9/27/2016	M-008	--	74.8	--	--	--	--	--	--	--	--	--	--	--	--	48 J	--	--	--	--	--
Discharges to M-009 (Outfall/Port #7)																					
7/7/2016	HD-7	7.88	75.4	ND	0.018 J	ND	ND	ND	ND	0.04	ND	0.19	ND	ND	ND	7.1 J	<1.8	<1.8	No	<1	--
7/14/2016	HD7	7.98	75.7	--	--	--	--	--	--	--	--	--	ND	ND	--	--	--	--	--	--	--
7/21/2016	HD7	7.81	76.6	--	--	--	--	--	--	--	--	--	ND	ND	--	--	--	--	--	--	--
8/11/2016	HD7	8.26	72.3	ND	ND	ND	ND	ND	ND	0.04	ND	0.21	ND	ND	ND	5.2 J	<1.8				

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Date Sampled	INORGANIC NON-METALS (Aqueous Matrix)																				
	Sample Point	pH (Field Measured)	Temperature	Biochemical Oxygen Demand	Surfactants (MBAS)	Oil & Grease	Settleable Solids	Sulfides	Phenols	Residual Chlorine (Field Measured)	Total Suspended Solids	Turbidity	TPH Diesel	TPH Motor Oil	Bis(2-Ethylhexyl) Phthalate	Zinc	Total Coliform	Fecal Coliform	Fecal/Total Coliform >0.1?	Enterococcus	Acute Toxicity**
Units:			°F	mg/L	mg/L	mg/L	mL/L	mg/L	mg/L	mg/L	NTU	µg/L	µg/L	µg/L	µg/L	MPN/100ml	MPN/100ml		MPN/100ml	% Survival	
Discharges to M-001 (Outfall/Port #1a)																					
10/4/2016	M-001	8.30	64.8	ND	0.052 J	ND	ND	ND	ND	0.06	7.5	0.62	25 J,A52	ND	ND	60	17000	4900	Yes	921	--
10/4/2016	Duplicate	8.30	64.8	ND	0.064 J	ND	ND	ND	ND	0.06	4.0	0.54	ND	ND	ND	31 J	--	--	--	--	--
10/11/2016	M-001	8.39	64.9	--	--	--	--	--	--	--	--	--	--	--	--	23 J	--	--	--	--	--
10/19/2016	M-001	--	--	--	--	--	--	--	--	--	--	--	--	--	--	97	--	--	--	--	--
10/27/2016	M-001	8.40	67.3	--	--	--	--	--	--	--	--	--	--	--	--	250	--	--	--	--	--
11/3/2016	M-001	8.48	67.6	--	--	--	--	--	--	--	--	--	--	--	--	110	--	--	--	--	--
11/9/2016	M-001	8.42	66.6	--	--	--	--	--	--	--	--	--	--	--	--	70	--	--	--	--	--
11/22/2016	M-001	8.49	61.0	2.9	0.021 J	ND	ND	ND	ND	0.02	ND	0.51	ND	ND	ND	32 J	35000	7000	Yes	>2420	100
12/2/2016	M-001	8.48	57.4	--	--	--	--	--	--	--	--	--	--	--	--	36 J	--	--	--	--	--
12/8/2016	M-001	8.62	60.6	2.0	0.056 J	ND	ND	ND	ND	0.09	0.85	0.53	ND	ND	ND	55	24000	460	No	1730	--
12/14/2016	M-001	8.28	63.3	--	--	--	--	--	--	--	--	--	--	--	--	52	--	--	--	--	--
12/21/2016	M-001	8.30	58.1	--	--	--	--	--	--	--	--	--	--	--	--	35 J	--	--	--	--	--
Discharges to M-002 (Outfall/Port #1)																					
10/4/2016	M-002	8.14	66.7	ND	0.041 J	ND	0.10	ND	0.026J	0.06	88	0.27	ND	ND	ND	33	2	No	<1	--	
10/19/2016	M-002	--	--	--	--	--	--	--	--	--	ND	--	--	--	--	--	--	--	--	--	--
10/27/2016	M-002	8.20	68.5	--	--	--	--	--	--	--	0.50	--	--	--	--	--	--	--	--	--	--
11/3/2016	M-002	8.16	68.4	--	--	--	--	--	--	--	ND	--	--	--	--	--	--	--	--	--	--
11/9/2016	M-002	8.15	71.8	--	--	--	--	--	--	--	ND	--	--	--	--	--	--	--	--	--	--
11/22/2016	M-002	8.18	64.4	2.8	ND	ND	ND	ND	ND	0.01	ND	0.25	ND	ND	ND	7.9 J	1300	130	No	62	100
12/8/2016	M-002	8.16	64.0	1.5	ND	ND	0.10	ND	ND	0.00	31	0.28	35 J,A52	ND	ND	2.0 J	2300	33	No	16	--
Discharges to M-003 (Outfall/Port #2)																					
10/1/2016	HD-41	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
11/1/2016	HD-41	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
12/1/2016	HD-41	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Discharges to M-004 (Outfall/Port #3)																					
10/4/2016	M-004	8.16	69.4	ND	0.029 J	ND	ND	ND	0.022 J	0.06	1.9	0.19	ND	ND	ND	3.7 J	330	13	No	77	--
10/11/2016	M-004	8.08	69.3	--	--	--	--	--	--	--	--	--	ND	ND	ND	--	--	--	--	--	--
11/17/2016	M-004	8.18	69.3	2.7	ND	ND	ND	ND	ND	0.03	ND	0.43	ND	ND	ND	9.0 J	3300	79	No	178	--
11/17/2016	Duplicate	8.18	69.3	3.1	ND	ND	ND	ND	ND	0.03	ND	0.38	ND	ND	ND	16 J	7000	79	No	204	--
11/22/2016	M-004	8.18	65.8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	100
12/8/2016	M-004	8.18	65.7	3.7	2.5 A07	ND	ND	ND	ND	0.00	88	0.49	120 A52	210 A57	ND	16 J	35000	330	No	119	--
12/21/2016	M-004	8.16	65.1	--	0.017 J	--	--	--	--	--	2.9	--	ND	ND	--	--	--	--	--	--	--
12/29/2016	M-004	7.89	68.0	--	1.2 A07	--	--	--	--	--	8.4	--	57 A52	ND	--	--	--	--	--	--	--
Discharges to M-005 (Outfall/Port #4)																					
10/4/2016	M-005	8.36	69.3	ND	0.041 J	ND	0.20	ND	ND	0.00	170	0.28	ND	ND	ND	59	24000	7900	Yes	206	--
10/11/2016	M-005	8.40	69.6	--	--	--	--	--	--	--	--	--	--	--	--	110	--	--	--	--	--
10/19/2016	M-005	--	--	--	--	--	--	--	--	--	ND	--	--	--	--	43 J	--	--	--	--	--
10/27/2016	M-005	8.31	70.0	--	--	--	--	--	--	--	0.60	--	--	--	--	82	--	--	--	--	--
11/3/2016	M-005	8.27	71.2	--	--	--	--	--	--	--	0.61	--	--	--	--	120	--	--	--	--	--
11/9/2016	M-005	8.20	73.0	--	--	--	--	--	--	--	6.9	--	--	--	--	140	--	--	--	--	--
11/17/2016	M-005	8.34	68.9	4.4	ND	ND	ND	ND	ND	0.00	ND	0.42	ND	ND	ND	36 J	24000	9.20	No	420	--
11/22/2016	M-005	8.40	66.7	--	--	--	--	--	--	--	--	--	--	--	--	100	--	--	--	--	35
12/2/2016	M-005	8.18	63.7	--	--	--	--	--	--	--	--	--	--	--	--	98	--	--	--	--	--
12/8/2016	M-005	8.36	67.1	2.0	0.32	ND	ND	ND	ND	0.00	2.3	1.1	40 J,A52	ND	ND	34 J	24000	490	No	2420	--
12/8/2016	Duplicate	8.26	67.1	2.4	0.19	ND	ND	ND	0.018 J	0.00	1.7	1.1	35 J,A52	ND	ND	37 J	35000	700	No	1990	--
12/14/2016	M-005	8.26	67.6	--	--	--	--	--	--	--	--	--	--	--	--	43 J	--	--	--	--	--
12/21/2016	M-005	8.27	65.3	--	--	--	--	--	--	--	--	--	--	--	--	58	--	--	--	--	100
12/29/2016	M-005	8.15	67.8	--	--	--	--	--	--	--	--	--	--	--	--	94	--	--	--	--	--
Discharges to M-006 (Outfall/Port #5)																					
10/4/2016	M-006	8.36	70.9	ND	0.053 J,A07	ND	ND	ND	0.120	0.02	10	0.29	ND	ND	ND	3.4 J	330	13	No	22	--
11/17/2016	M-006	8.36	68.5	2.9	ND	ND	ND	ND	ND	0.07	ND	0.33	ND	ND	ND	6.5 J	280	79	Yes	10	--
11/22/2016	M-006	8.38	67.3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	100
12/8/2016	M-006	8.36	67.6	2.0	0.058J	ND	ND	ND	ND	0.07	1.4	0.29	ND	ND	ND	2.6 J	4900	130	No	18	--
Discharges to M-007 (Outfall/Port #5a)																					
10/4/2016	M-007	8.28	70.3	3.2	0.14	ND	0.20	ND	ND	0.09	12	1.1	84	ND	ND	4.9 J	24000	490	No	>2420	--
10/19/2016	M-007	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
10/27/2016	M-007	8.24	70.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
11/3/2016	M-007	8.01	70.2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
11/9/2016	M-007	8.10	71.4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
11/17/2016	M-007	8.18	69.1	5.6	ND	ND	ND	ND	0.011 J	0.02	ND	0.5	ND	ND	ND	5.9 J	2200	790	Yes	411	--
11/22/2016	M-007	8.14	67.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	100
12/8/2016	M-007	8.16	67.6	9.3	0.28	1.3J	ND	ND	ND	0.02	3.1	2.4	270 A52	120 J,A57	ND	4.2 J	12000	4900	Yes	>2420	--
12/21/2016	M-007	8.12	65.7	--	--	--	--	--	--	--	--	--	32 J,A52	ND	--	--	--	--	--	--	--
12/29/2016	M-007	8.20	65.8	--	--	--	--	--	--	--	--	--	37 J,A52	ND	--	--	--	--	--	--	--
Discharges to M-008 (Outfall/Port #6)																					
10/4/2016	M-008	8.62	69.4	ND	0.041 J	ND	ND	ND	0.140	0.06	2.1	1.2	ND	ND	ND	47 J	3300	790	Yes	1990	--
10/11/2016	M-008	8.61	66.6	--	--	--	--	--	--	--	--	--	--	--	--	77	--	--	--	--	--
10/19/2016	M-008	--	--	--	--	--	--	--	--	--	--	--	--	--	--	100	--	--	--	--	--
10/27/2016	M-008	8.48	68.0	--	--	--	--	--	--	--	--	--	--	--	--	68	--	--	--	--	--
11/3/2016	M-008	8.43	68.2	--	--	--	--	--	--	--	--	--	--	--	--	97	--	--	--	--	--
11/9/2016	M-008	8.53	71.2	--	--	--	--	--	--	--	--	--	--	--	--	41 J	--	--	--	--	--
11/17/2016	M-008	8.52	64.6	2.8	ND	ND	ND	ND	ND	0.01	ND	0.28	ND	ND	ND	63	1700	33	No	69	--
11/22																					

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Date Sampled	INORGANIC NON-METALS (Aqueous Matrix)																				
	Sample Point	pH (Field Measured)	Temperature	Biochemical Oxygen Demand	Surfactants (MBAS)	Oil & Grease	Settleable Solids	Sulfides	Phenols	Residual Chlorine (Field Measured)	Total Suspended Solids	Turbidity	TPH Diesel	TPH Motor Oil	Bis(2-Ethylhexyl) Phthalate	Zinc	Total Coliform	Fecal Coliform	Fecal/Total Coliform >0.1?	Enterococcus	Acute Toxicity**
Units:			°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	MPN/100ml	MPN/100ml		MPN/100ml	% Survival
Discharges to M-001 (Outfall/Port #1a)																					
1/12/2017	M-001	7.58	59.0	--	--	--	--	--	--	0.03	0.62	0.70	ND	ND	ND	120	430	22	No	49	--
1/17/2017	M-001	8.40	57.2	ND	ND	ND	ND	ND	ND	0.03	0.62	0.70	ND	ND	ND	100	430	22	No	49	--
1/26/2017	M-001	8.09	57.7	--	--	--	--	--	--	--	--	--	--	--	--	18 J	--	--	--	--	--
2/2/2016	M-001	7.75	59.7	--	--	--	--	--	--	--	--	--	--	--	--	27 J	--	--	--	--	--
2/9/2017	M-001	8.26	59.2	--	--	--	--	--	--	--	--	--	--	--	--	110	--	--	--	--	--
2/16/2017	M-001	8.01	57.6	1.60	ND	ND	ND	ND	ND	0.03	2.30	1.40	ND	ND	ND	45 J	4900	33	No	549	--
2/23/2017	M-001	7.95	54.5	--	--	--	--	--	--	--	--	--	--	--	--	46 J	--	--	--	--	--
3/1/2017	M-001	7.87	55.2	--	--	--	--	--	--	--	--	--	--	--	--	24 J	--	--	--	--	--
3/9/2017	M-001	8.43	63.1	ND	ND	ND	ND	ND	ND	0.00	1.30	0.87	ND	ND	ND	40 J	1400	17	No	49.6	--
Discharges to M-002 (Outfall/Port #1)																					
1/17/2017	M-002	8.19	64.0	ND	ND	ND	ND	ND	ND	0.02	ND	0.20	ND	ND	ND	3.3 J	63	<1.8	No	<1	--
2/16/2017	M-002	7.99	61.2	ND	ND	ND	ND	ND	ND	0.02	1.0	0.32	ND	ND	ND	3.6 J	790	13	No	9	--
3/9/2017	M-002	8.17	62.8	ND	ND	ND	ND	ND	0.016 J	0.01	ND	0.18	ND	ND	ND	5.5 J	130	<1.8	No	1	--
Discharges to M-003 (Outfall/Port #2)																					
1/17/2017	HD-41	7.29	71.6	ND	ND	ND	ND	ND	ND	--	ND	0.18	ND	ND	ND	9.7 J	<1.8	<1.8	N/A	<1	--
1/26/2017	HD-41	6.94	67.5	--	--	--	--	--	--	0.02	--	--	--	--	--	--	--	--	--	--	100
2/16/2017	HD-41	7.88	70.5	ND	ND	ND	ND	ND	ND	0.00	ND	0.27	ND	ND	ND	15 J	<1.8	<1.8	N/A	<1	--
3/9/2017	HD-41	6.60	67.8	ND	ND	ND	ND	ND	ND	0.00	ND	0.19	ND	ND	ND	12 J	<1.8	<1.8	N/A	<1	--
Discharges to M-004 (Outfall/Port #3)																					
1/4/2017	M-004	7.86	67.6	--	ND	--	--	--	--	--	1.2	--	ND	ND	--	--	--	--	--	--	--
1/12/2017	M-004	7.38	58.1	--	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1/17/2017	M-004	8.35	66.0	ND	ND	ND	ND	ND	ND	0.06	ND	0.32	ND	110 J,A57	ND	68	170	33	Yes	8	--
1/26/2017	M-004	7.99	64.6	--	25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2/2/2017	M-004	7.89	65.8	--	--	--	--	--	--	--	--	--	150 A52	330 A57	--	--	--	--	--	--	--
2/9/2017	M-004	7.70	66.0	--	--	--	--	--	--	--	--	--	1400 A01,A52	1800 A01, A57	--	--	--	--	--	--	--
2/16/2017	M-004	7.87	66.6	16	3.8 A07	1.4 J	ND	ND	ND	0.02	4.5	3.60	250 A52	350	2.2 J	70	2200	79	No	1300	--
2/23/2017	M-004	8.09	64.4	--	0.94 A07	--	--	--	--	--	--	--	61 A52	110 J,A57	--	--	--	--	--	--	--
3/1/2017	M-004	7.47	66.2	--	0.11	--	--	--	--	--	--	--	ND	ND	--	--	--	--	--	--	--
3/9/2017	M-004	7.99	68.7	11	2.4 A07	1.6 J	ND	ND	0.042 J	0.00	3.7	2.90	82 A52	ND	ND	54	92000	4900	No	>2420	--
3/15/2017	M-004	7.90	68.2	--	0.018 J	--	--	--	--	--	--	--	ND	ND	--	23 J	--	--	--	--	--
3/23/2017	M-004	7.80	65.8	--	ND	--	--	--	--	--	--	--	ND	ND	--	15 J	--	--	--	--	--
3/30/2017	M-004	8.21	62.4	--	0.077 J	--	--	--	--	--	--	--	--	--	--	9.7 J	--	--	--	--	--
Discharges to M-005 (Outfall/Port #4)																					
1/12/2017	M-005	7.62	58.1	--	--	--	--	--	--	--	--	--	--	--	--	330	--	--	--	--	--
1/17/2017	M-005	8.31	64.4	ND	ND	ND	ND	ND	ND	0.02	0.71	0.36	ND	ND	ND	22 J	3300	<1.8	No	140	--
1/26/2017	M-005	8.16	64.0	--	--	--	--	--	--	--	--	--	--	--	--	77	--	--	--	--	100
2/2/2017	M-005	8.03	64.8	--	--	--	--	--	--	--	--	--	--	--	--	50	--	--	--	--	100
2/9/2017	M-005	8.14	66.2	--	--	--	--	--	--	--	--	--	--	--	--	110	--	--	--	--	--
2/16/2017	M-005	8.04	66.7	1.5	0.028 J	ND	ND	ND	ND	0.01	ND	0.32	45 A52	ND	ND	16 J	4900	63	No	249	--
2/23/2017	M-005	7.73	64.6	--	--	--	--	--	--	--	--	--	--	--	--	38 J	--	--	--	--	--
3/1/2017	M-005	7.92	66.9	--	--	--	--	--	--	--	--	--	--	--	--	21 J	--	--	--	--	--
3/9/2017	M-005	8.08	68.0	1.60	0.029 J	ND	ND	ND	ND	0.01	0.60	1.00	ND	ND	ND	100	35000	1700	No	>2420	--
Discharges to M-006 (Outfall/Port #5)																					
1/17/2016	M-006	8.94	66.6	3.9	1.2 A07	1.8 J	ND	ND	ND	--	1.6	2.50	170 A52	360 A57	1.2 J	20 J	2800	49	No	1200	--
1/17/2017	Duplicate	8.94	66.6	3.1	1.3 A07	ND	ND	ND	ND	--	13	2.40	310 A52	790 A57	0.88 J	18 J	4900	46	No	1120	--
1/26/2017	M-006	8.10	64.6	--	--	--	--	--	--	0.02	--	--	--	--	--	--	--	--	--	--	--
2/2/2016	M-006	8.29	65.3	--	0.053 J,A07	--	--	--	--	--	--	--	ND	ND	--	--	--	--	--	--	--
2/9/2017	M-006	8.32	66.4	--	ND	--	--	--	--	--	--	--	ND	ND	--	--	--	--	--	--	--
2/16/2017	M-006	8.04	66.6	ND	0.080 J	ND	ND	ND	ND	0.00	ND	0.22	ND	ND	ND	4.1 J	13000	13000	Yes	>2420	--
2/23/2017	M-006	7.91	64.9	--	ND	--	--	--	--	--	--	--	ND	ND	--	--	--	--	--	--	--
3/9/2017	M-006	8.08	66.4	1.6	ND	ND	ND	ND	ND	0.01	4.2	7.90	ND	ND	ND	10 J	35000	63	No	328.2	--
Discharges to M-007 (Outfall/Port #5a)																					
1/4/2017	M-007	7.68	65.8	--	--	--	--	--	--	--	--	--	ND	ND	--	--	--	--	--	--	--
1/17/2017	M-007	8.98	65.7	ND	ND	ND	ND	ND	ND	--	ND	0.33	ND	ND	ND	3.6 J	2300	330	Yes	154	--
1/26/2017	M-007	7.80	62.2	--	--	--	--	--	--	0.04	--	--	--	--	--	--	--	--	--	--	--
2/16/2017	M-007	7.90	64.6	9.0	0.17	ND	ND	ND	ND	0.00	2.6	1.7	47 A52	ND	ND	3.9 J	24000	4900	Yes	461	--
2/16/2017	Duplicate	7.90	64.6	3.10	0.042 J	ND	ND	ND	ND	0.00	1.6	0.87	76 A52	ND	ND	3.8 J	7900	4900	Yes	155	--
3/9/2017	M-007	8.08	64.9	1.50	ND	ND	ND	ND	0.190	0.02	ND	0.22	ND	ND	ND	3.6 J	49	6.8	Yes	8.4	--
Discharges to M-008 (Outfall/Port #5)																					
1/4/2017	M-008	8.26	64.2	--	--	--	--	--	--	--	--	--	--	--	--	50	--	--	--	--	--
1/12/2017	M-008	7.53	58.5	--	--	--	--	--	--	--	--	--	--	--	--	94	--	--	--	--	--
1/17/2017	M-008	8.32	64.2	ND	ND	ND	ND	ND	ND	--	ND	0.23	ND	ND	ND	54	700	13	No	67	--
1/26/2017	M-008	8.28	57.7	--	--	--	--	--	--	0.02	--	--	--	--	--	51	--	--	--	--	--
2/2/2016	M-008	8.39	62.4	--	--	--	--	--	--	--	--	--	--	--	--	18 J	--	--	--	--	--
2/9/2016	M-008	8.37	66.2	--	--	--	--	--	--	--	--	--	--	--	--	44 J	--	--	--	--	--
2/16/2017	M-008	8.19	60.8	ND	0.019 J	ND	ND	ND	ND	0.22	0.60	0.59	ND	ND	ND	6.6 J	4900	4.5	No	727	--
2/23/2017	M-008	8.19	62.4	--	--	--	--	--	--	0.07	--	--	--	--	--	40 J	--	--	--	--	--
3/1/2017	M-008	8.13	64.9	--	--	--	--	--	--	0.04	--	--	--	--	--	15 J	--	--	--	--	--
3/9/2017	M-008	8.18	61.2	ND	ND	ND	ND	ND	0.190	0.12	0.71	1.1	ND	ND	ND	9.3 J	2300	14	No	42.2	--
3/9/2017	Duplicate	8.18	61.2	ND	ND	ND	ND	ND	ND	0.12	1.0	1.1	ND	ND	ND	6.2 J	13000	4.5	No	62	--
3/15/2017	M-008	7.71	63.3	--	--	--	--	--	--	0.29	--	--	--	--	--</						



Date Sampled	INORGANIC NON-METALS (Aqueous Matrix)																				
	Sample Point	pH (Field Measured)	Temperature	Biochemical Oxygen Demand	Surfactants (MBAS)	Oil & Grease	Settleable Solids	Sulfides	Phenols	Residual Chlorine (Field Measured)	Total Suspended Solids	Turbidity	TPH Diesel	TPH Motor Oil	Bis(2-Ethylhexyl) Phthalate	Zinc	Total Coliform	Fecal Coliform	Fecal/Total Coliform >0.1?	Enterococcus	Acute Toxicity**
Units:			° 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	MPN/100ml	MPN/100ml		MPN/100ml	% Survival
Discharges to M-001 (Outfall/Port #1a)																					
4/10/2017	M-001	8.51	58.1	ND	ND	ND	ND	ND	ND	0.05	1.6	0.49	ND	ND	ND	30 J	2800	110	No	158.5	--
5/8/2017	M-001	8.22	63.0	ND	0.025 J	ND	ND	ND	ND	0.04	ND	0.31	ND	ND	ND	33 J	2100	11	No	110	--
5/8/2017	Duplicate	8.22	63.0	ND	ND	0.9 J	ND	ND	ND	0.04	ND	0.30	ND	ND	ND	30 J	700	4.5	No	61.6	--
6/1/2017	M-001	8.51	62.6	2.6	ND	ND	ND	ND	ND	0.01	ND	0.46	ND	ND	ND	28 J	490	31	No	292.4	--
Discharges to M-002 (Outfall/Port #1)																					
4/10/2017	M-002	8.48	62.4	ND	ND	ND	ND	ND	ND	0.02	ND	0.18	1200 A01,A52	ND A01	ND	1.7 J	460	4.5	No	290.9	--
5/4/2017	M-002	8.45	63.5	--	--	--	--	--	--	--	--	--	ND	ND	--	--	--	--	--	--	--
5/8/2017	M-002	7.98	61.9	ND	0.019 J	ND	ND	ND	ND	0.00	ND	0.27	ND	ND	ND	11 J	13000	9.2	No	>2420	--
5/18/2017	M-002	8.34	63.5	--	--	--	--	--	--	--	--	--	ND	ND	--	--	--	--	--	--	--
5/25/2017	M-002	8.51	63.5	--	--	--	--	--	--	--	--	--	ND	ND	--	--	--	--	--	--	--
6/1/2017	M-002	8.22	65.7	ND	ND	ND	ND	ND	ND	0.02	ND	0.21	ND	ND	ND	ND	7900	1100	Yes	36.7	--
6/1/2017	Duplicate	8.22	65.7	1.9	ND	ND	ND	ND	ND	0.02	ND	0.26	ND	ND	ND	ND	1300	1300	Yes	42.2	--
Discharges to M-003 (Outfall/Port #2)																					
4/10/2017	HD-41	7.32	66.6	ND	ND	ND	ND	ND	ND	0.00	ND	0.16	ND	ND	ND	9.4 J	<1.8	<1.8	N/A	<1	--
5/8/2017	HD-41	7.02	68.4	ND	0.028 J	ND	ND	ND	ND	0.00	ND	0.16	ND	ND	ND	5.9 J	4.5	<1.8	No	<1	--
6/5/2017	HD-41	7.46	67.3	1.7	0.016 J	ND	ND	ND	ND	0.00	ND	0.20	ND	ND	ND	5.9 J	<1.8	<1.8	N/A	<1	--
Discharges to M-004 (Outfall/Port #3)																					
4/5/2017	M-004	8.14	69.1	--	ND	--	--	--	--	--	--	--	--	--	--	4.7 J	--	--	--	--	--
4/10/2017	M-004	8.05	66.2	1.6	ND	ND	ND	ND	0.004 J	0.04	ND	0.19	ND	ND	ND	10 J	160000	92000	Yes	>2420	--
5/8/2017	M-004	7.75	66.9	ND	0.016 J	ND	ND	ND	ND	0.18	ND	0.20	ND	ND	ND	8.6 J	630	13	No	71.4	--
5/25/2017	M-004	8.41	66.9	--	--	--	--	--	--	0.21	--	--	--	--	--	--	--	--	--	--	--
6/1/2017	M-004	8.02	68.2	ND	0.20	ND	ND	ND	ND	0.08	ND	0.57	ND	130 J,A57	ND	13 J	54000	3300	No	>2420	--
6/8/2017	M-004	8.04	67.5	--	--	--	--	--	--	0.08	--	--	--	--	--	--	--	--	--	--	--
6/15/2017	M-004	8.08	70.5	--	--	--	--	--	--	0.00	--	--	ND	ND	--	--	--	--	--	--	--
6/21/2017	M-004	7.56	69.3	--	--	--	--	--	--	0.01	--	--	ND	ND	--	--	--	--	--	--	--
6/26/2017	M-004	7.73	71.2	--	--	--	--	--	--	--	--	--	ND	ND	--	--	--	--	--	--	--
Discharges to M-005 (Outfall/Port #4)																					
4/5/2017	M-005	8.02	67.8	--	--	--	--	--	--	--	--	--	--	--	--	6.0 J	--	--	--	--	--
4/10/2017	M-005	8.11	65.7	1.6	ND	ND	ND	ND	ND	0.00	ND	0.34	ND	ND	ND	5.1 J	54000	54000	Yes	>2420	--
4/20/2017	M-005	8.11	67.6	--	--	--	--	--	--	--	--	--	--	--	--	7.6 J	--	--	--	--	--
4/26/2017	M-005	8.16	64.8	--	--	--	--	--	--	--	--	--	--	--	--	5.0 J	--	--	--	--	--
5/8/2017	M-005	7.88	66.0	1.7	ND	ND	ND	ND	ND	0.00	ND	0.27	ND	ND	ND	4.7 J	24000	2200	No	1119.9	--
6/1/2017	M-005	8.23	70.3	4.0	0.032 J	ND	0.10	ND	ND	0.05	24	13	ND	ND	ND	64	35000	2200	No	>2420	--
6/15/2017	M-005	8.19	73.6	--	--	--	--	--	--	--	--	--	--	--	--	31 J	--	--	--	--	--
6/21/2017	M-005	7.40	69.6	--	--	--	--	--	--	--	--	--	--	--	--	23 J	--	--	--	--	--
6/26/2017	M-005	8.18	72.7	--	--	--	--	--	--	--	--	--	--	--	--	13 J	--	--	--	--	--
Discharges to M-006 (Outfall/Port #5)																					
4/10/2017	M-006	8.57	70.0	ND	ND	ND	ND	ND	0.029 J	0.00	ND	0.26	ND	ND	ND	4.1 J	460	7.8	No	132.2	--
5/18/2017	M-006	8.44	68.7	ND	ND	ND	ND	ND	ND	0.03	ND	0.28	ND	ND	ND	4.2 J	490	49	No	17.7	--
6/1/2017	M-006	8.06	68.4	1.9	0.015 J	ND	ND	ND	ND	0.04	1.6	0.27	ND	ND	ND	1.9 J	1300	490	Yes	70.5	--
Discharges to M-007 (Outfall/Port #5a)																					
4/10/2017	M-007	8.51	66.6	1.6	ND	ND	ND	ND	ND	0.05	ND	0.19	ND	ND	ND	2.2 J	230	79	Yes	2	--
5/8/2017	M-007	7.88	67.8	1.9	0.022 J	ND	ND	ND	ND	0.01	ND	0.20	ND	ND	ND	4.2 J	430	22	No	52.1	--
6/1/2017	M-007	7.99	68.0	ND	0.018 J	ND	ND	ND	ND	0.00	ND	0.17	ND	ND	ND	2.1 J	17	<1.8	No	1	--
Discharges to M-008 (Outfall/Port #5)																					
4/5/2017	M-008	8.08	61.9	--	--	--	--	--	--	0.14	--	--	--	--	--	--	--	--	--	--	--
4/10/2017	M-008	8.74	61.2	ND	ND	ND	ND	ND	ND	0.11	ND	0.37	ND	ND	ND	91	24000	130	No	>2420	--
4/26/2017	M-008	8.22	64.4	--	--	--	--	--	--	0.10	--	--	--	--	--	--	--	--	--	--	--
5/4/2017	M-008	8.56	63.7	--	--	--	--	--	--	0.17	--	--	--	--	--	--	--	--	--	--	--
5/8/2017	M-008	8.05	66.2	2.3	0.068 J	ND	ND	ND	ND	0.16	ND	0.34	ND	ND	ND	78	7000	46	No	258.9	--
5/18/2017	M-008	8.58	63.1	--	--	--	--	--	--	0.10	--	--	--	--	--	63 J	--	--	--	--	--
5/25/2017	M-008	8.61	61.9	--	--	--	--	--	--	0.30	--	--	--	--	--	45 J	--	--	--	--	--
6/1/2017	M-008	8.41	69.1	1.5	ND A07	ND	ND	ND	ND	0.06	ND	1.2	ND	ND	ND	27 J	790	4.5	No	70.3	--
6/8/2017	M-008	8.37	68.9	--	--	--	--	--	--	0.17	--	--	--	--	--	13 J	--	--	--	--	--
6/15/2017	M-008	8.32	69.4	--	--	--	--	--	--	0.06	--	--	--	--	--	--	--	--	--	--	--
6/21/2017	M-008	8.02	68.7	--	--	--	--	--	--	0.02	--	--	--	--	--	--	--	--	--	--	--
6/26/2017	M-008	8.21	73.0	--	--	--	--	--	--	0.07	--	--	--	--	--	--	--	--	--	--	--
Discharges to M-009 (Outfall/Port #5)																					
4/10/2017	M-009	8.22	72.7	ND	ND	ND	ND	ND	ND	0.01	ND	0.21	ND	ND	ND	1.9 J	<1.8	<1.8	N/A	<1	--
5/8/2017	M-009	7.81	72.7	ND	ND	ND	ND	ND	ND	0.04	ND	0.16	ND	ND	ND	6.4 J	<1.8	<1.8	N/A	<1	--
6/5/2017	M-009	8.18	72.0	2.0	0.016 J	ND	ND	ND	ND	0.00	ND	0.21	ND	ND	ND	4.1 J	2	<1.8	No	<1	--
Discharges to M-010 (Outfall/Port #9)																					
4/10/2017	M-010	8.21	65.7	2.1	ND	ND	ND	ND	ND	0.01	ND	0.19	ND	ND	ND	2.6 J	110	<1.8	No	1	--
4/10/2017	Duplicate	8.21	65.7	ND	ND	ND	ND	ND	ND	0.01	ND	0.20	190 A52	ND	ND	240	220	<1.8	No	1	--
5/4/2017	M-010	8.33	67.3	--	--	--	--	--	--	--	--	--	120 A52	ND	--	4.6 J	--	--	--	--	--
5/8/2017	M-010	7.93	66.4	1.7	ND A07	ND	ND	ND	ND	0.08	ND	0.19	ND	ND	ND	3.3 J	490	<1.8	No	4.1	--
5/18/2017	M-010	8.43	66.6	--	--	--	--	--	--	--	--	--	ND	ND	--	3.7 J	--	--	--	--	--
5/25/2017	M-010	8.44	66.6	--	--	--	--	--	--	--	--	--	ND	ND	--	2.4 J	--	--	--	--	--
6/1/2017	M-010	8.11	68.0	ND	ND	ND	ND	ND	ND	0.01	ND	0.22	ND	ND	ND	27	<1.8	<1.8	No	155.3	--
Effluent Limit (Daily Max.)				30	0.5	15	0.3	1.0	1.0	0.1	75	150	100	100	11	95	10000	400		104	90
Effluent Limit (Daily Max. if Fecal/Total Coliform > 0.1)																				1000	
Effluent Limit (Monthly Avg.)				20		10	0.1				50	50									