FY21/22 Maintenance and Monitoring

AD98-2, Calle del Barco

City of Malibu, California

Yeh Project No.: 220-277

November 11, 2022

Prepared for:

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

Prepared by:

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November 11, 2022

Project No. 220-277

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

Attn: Mr. Arthur Aladjadjian, Public Works Superintendent

Subject: Annual Monitoring and Maintenance Report FY21/22, City of Malibu Assessment District 98-2, Calle del Barco, Malibu, CA

Dear Mr. Aladjadjian:

Yeh and Associates, Inc. is pleased to submit this monitoring and maintenance report FY21/22 City of Malibu Assessment District AD-2, Calle del Barco in Malibu, California. This report was prepared in accordance with our Agreement for Professional Services, dated June 22, 2020 between the City of Malibu and Yeh and Associates, Inc. This report provides a geotechnical and annual summary of monitoring and maintenance for the project over fiscal year July 1, 2021 to June 30, 2022.

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

We appreciate the opportunity to be of service. Please contact Loree Berry at 805-289-9590 x271 or Lberry@yeh-eng.com if you have questions or require additional information.

Sincerely,
YEH AND ASSOCIATES, INC.

Nick Simon
Project Geologist

Loree A. Berry, PE
Senior Project Manager

REGISTERED PROFESSIONAL ENGINEER
LOREE A. BERRY
No. 73221
Exp. 12-31-22
CIVIL
STATE OF CALIFORNIA

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1. Purpose and Scope of Study

Yeh and Associates (Yeh) was retained by the City of Malibu (City) to perform maintenance and monitoring of the existing geotechnical instrumentation and dewatering facilities within the City of Malibu's Malibu Road Landslide Assessment District, 98-2. The project location is shown by the polygon on Figure 1. This report presents monitoring results, a maintenance summary, and facilities status for the monitoring year July 2021 through July 2022 (monitoring year). Yeh monitors groundwater levels, surveys slope inclinometers, measures the dewatering flow from dewatering wells and horizontal drains. Yeh also oversees and maintains function of the monitoring and dewatering facilities. Plate 1 shows the approximate locations of the assessment district facilities. Table 1 summarizes the equipment inventory and the approximate frequency of monitoring and maintenance over the monitoring year. Plate 2 and Section 4.0 of this report and provides detailed summary of the maintenance activities performed during this monitoring period.

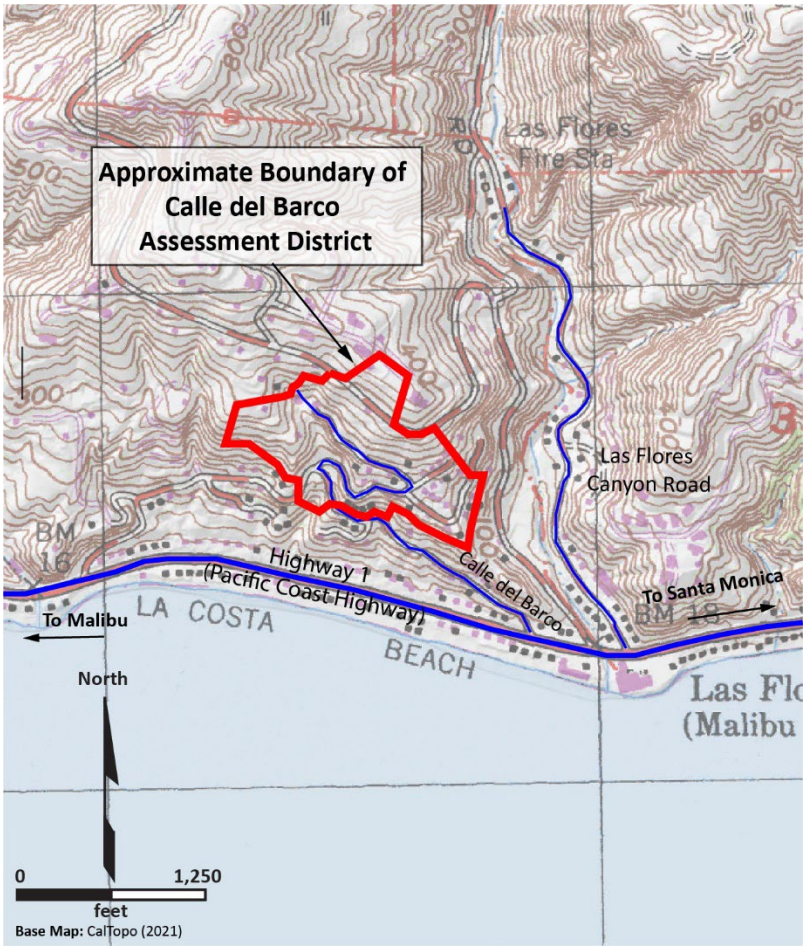

Figure 1: Project Location Map

Table 1. Summary of Annual Monitoring and Maintenance

Type of Monitoring Instrument or Dewatering Device	Number of Locations	Brief Description	Monitoring Frequency	Maintenance Effort[1]
Standpipe piezometer	8	2.75-inch perforated PVC casing used to measure depth to groundwater using electric sounder or by a transducer/datalogger	monthly; hourly data from pressure transducer	Low
Inclinometer survey casings	12	1.5-inch and 2.75-inch diameter grooved casings made of PVC, used to survey for shear displacement by an inclinometer probe	quarterly	low
Dewatering wells	11	6-inch or 12-inch diameter steel or PVC casings equipped with 0.5 to 1.5HP submersible pump and connected to electrical controls, pumped water flows through meter and into conveyance piping to discharge	monthly	high
Horizontal Drains (hydraugers)	11	1-inch to 1.5-inch perforated PVC casings drilled slightly higher than horizontal into slope through the soldier pile wall along Rambla Orienta and at the toe of the landslide below Rambla Vista. Installed hundreds to thousands of feet into the slope and used to drain groundwater that intercepts the casing. Flow can be measured from the hydraugers before it flows to discharge	monthly	medium
Big Rock Mesa Rain Gauge #1239	1	Documented Rainfall, Data obtained from Los Angeles County Public Works	monthly	N/A

Notes:
[1] - maintenance effort (generalized): "high" – services monthly, "medium" – services quarterly, "low" – services annually

2. MONITORING

The following provides the result of monitoring the water level in standpipe piezometers and the results of inclinometer surveys performed. For the purposes of discussion and context throughout the report, the monitoring results are discussed with respect to three areas within the landslide boundaries: Rambla Pacifico, Calle Del Barco and Rambla Vista:

- **Rambla Vista** - located near the southern portion of the landslide boundary, near the toe of the landslide.
- **Rambla Pacifico** - the northern most geographic region and near the headscarp portion of the lansdslide.
- **Calle del Barco** - encompasses the middle portion of the landslide boundary, along Calle Del Barco.

2.1 GROUNDWATER LEVELS

Groundwater levels were measured approximately monthly in 8 standpipe piezometers shown on Plate 1. Pneumatic piezometers were installed with some of the inclinometers up until 1998. They were measured intermittently to assess for perched water conditions. The majority

of the existing pneumatic piezometers no longer function and the reliability of some of the remaining locations are not certain. Pneumatic piezometers were not measured during the monitoring year. Appendix A includes historic pneumatic piezometer results.

Groundwater level data and hydrographs for individual standpipes are presented in Appendix A for the FY21/22 monitoring year. Water levels are acquired by lowering an electric probe into the standpipe to contact the groundwater surface and manually record the depth to water.

Table 2 summarizes the average groundwater levels over the monitoring year for standpipe water levels within each of the three subregions and their change from the prior monitoring year. Average groundwater elevations remained relatively consistent in the three subregions over the monitoring year with changes from the prior monitoring year ranging between -0.4 feet to +0.2 feet.

Table 2: Summary of Average Groundwater Elevations[1]

Area Averaged	Total No. of Standpipes Monitored	2021-2022 Average Groundwater Elevation (ft)	Change in Average Groundwater Elevation from Prior Monitoring Period (ft)	2021-2022 Average Peak Groundwater Elevation (ft)	Change in Average Peak Groundwater Elevation from Prior Monitoring Period (ft)
Rambla Vista	2	161.4	+0.2	163.4	-0.5
Calle Del Barco	4	242.2	0.0	243.9	-1.1
Rambla Pacifico	2	349.9	-0.4	350.5	-0.3
Notes: [1] Comparison between the current and prior monitoring periods for the eight standpipe piezometers measured during the current monitoring period: SI-4, SI-5, SI-7, SI-9, SI-13, SI-14, SI-15, SI-16					

2.1.1 Rambla Vista Region

Two standpipes are in use for groundwater level monitoring in the Rambla Vista Region. The average groundwater elevation for the Rambla Vista Region increased by 0.2 feet since the prior monitoring year. Annual average groundwater levels measured in SI-7 remained consistent and measurements in SI-4 continued to be variable in response to rainfall events and likely the effects of nearby dewatering wells. The average groundwater elevation in SI-7 decreased by 0.5 feet and the average groundwater elevation in SI-4 increased by 1.0 foot.

2.1.2 Calle Del Barco Region

Five standpipes are in use for groundwater level monitoring in the Calle Del Barco region; however, results from the FY21/22 monitoring year include only 4 locations as SI-8 was not able to be accessed due to private property limitations. During the FY21/22 monitoring year, the calculated average for the measured 4 locations remained unchanged since the prior

monitoring year. The peak average for the same data set decreased by 1.1 feet as compared to the prior monitoring year.

2.1.3 RAMBLA PACIFICO REGION

Two standpipes are in use for groundwater level monitoring in the Rambla Pacifico Region. Average groundwater levels within the Rambla Pacifico Region decreased by 0.4-feet since the previous monitoring year. Water levels within individual standpipes SI-13 and SI-14 had both steadily increased since approximately 2018. Standpipe SI-13 had risen approximately 4.8-feet and SI-14 had risen approximately 2.5-feet. Measurements at both locations show declining or stabilized water levels over the monitoring year and since December 2020.

2.2 SLOPE INCLINOMETERS

2.2.1 SUMMARY OF SLOPE INCLINOMETER MONITORING EVENTS

Page B-1 provides a summary of the Calle del Barco inclinometers information, status and past survey results. Appendix B provides cumulative and incremental profile change plots in the A and B axis directions for each of the inclinometers surveyed over the FY21/22 monitoring year. Inclinometers were assessed for distinct shear-type movement. Due to depth positioning errors introduced by a replacement inclinometer cable in Q1 of 2021, new baseline surveys were performed for each of the Inclinometers in April or March of 2021 except for SI-4 and SI-13 which were baseline surveyed in August 2021. Inclinometer survey results for each of the three sub-regions are summarized below:

2.2.2 RAMBLA VISTA

Three inclinometers are currently monitored within the Rambla Vista Region; SI-4, SI-7 and SI-10. Those inclinometers did not display discernable shear-type movement over the current monitoring year. Inclinometer SI-4 measured possible distributed “leaning” type displacement in the A direction of less than 0.9-inches at the ground surface beginning at approximately 30 feet deep. This is consistent with previous surveys of SI-4 since approximately 2005. Apparent movements in the B-direction in SI-4 is interpreted as depth positioning error since it appears in the December 2020 and May 2021 readings but is not recorded in March 2021 or most recently in November 2022. Inclinometer SI-4 has prior deformation of up to 2.5 inches at depths of 17 and 22 feet and is susceptible to positioning error at this depth.

2.2.3 CALLE DEL BARCO

There are seven inclinometers located in the Calle del Barco Region: SI-5, SI-8, SI-9, SI-11, SI-15 and SI-16. SI-8 was not surveyed during the FY21/22 monitoring year due to lack of access to a

private property. The six inclinometer locations surveyed over the FY21/22 monitoring year did not display discernable shear-type movement over that time.

2.2.4 RAMBLA PACIFICO

There are two inclinometers currently surveyed in the Rambla Pacifico Region; SI-13 and SI-14. Neither of the inclinometers displayed discernable shear-type displacement. SI-13 displayed up to about 0.08 inches of apparent deformation above a depth of 20 feet. This is consistent with previously noted "bowing" in the upper portion of the casing, which could be caused by backfill settlement. This type of casing deformation had been detected on SI-13 since installation in 1998. Additional survey methods would be required to exclude or identify a specific cause of the apparent deformation.

3. WATER BUDGET TRACKING

3.1 RAINFALL DATA

Yeh obtained rainfall data for the 2021-2022 monitoring year from the Big Rock Mesa Rain Gauge #1239 operated by the Los Angeles County Department of Public Works. Plate 3 - Rainfall Graph displays historical monthly and average annual rainfall for the Big Rock Mesa area from October 1968 through September 2022. Prior to 1984, rainfall data was obtained from the Carbon Canyon Rain Gauge #447C and after 1984 from the Big Rock Mesa Rain Gauge #1239. Recorded rainfall for the Calle del Barco area over monitoring year totaled 12.52 inches, which is 2.8 inches below the 54-year area average of 15.3 inches. Approximately 10.20 of the 12.52 total inches were received in a series of rain events in December 2021 with a single event on December 29 and 30 that recorded 5.71-inches. Other rainfall events included 1.34-inches of rainfall in March with all other months receiving a total of from 0 to 0.6 inches.

Plate 5 – Summary of Groundwater Levels, Dewatering and Rainfall shows annual rainfall deviation from the 54-year mean and compares rainfall amounts to total dewatering output changes.

3.2 DEWATERING

Yeh tracks dewatering production for active pumping dewatering wells installed throughout the assessment district and passive gravity flow horizontal drains (hydraugers) installed along Rambla Orienta and at the toe of the landslide. During the 2021-2022 monitoring year, dewatering production averaged 411 gpd, an increase of 14.5% from the previous monitoring years average production of 359 gpd. These values represented a decrease of 45% from the

historical annual average production of 747 gpd and 73% less than the maximum average annual production of 1,497 gpd recorded during the 1994-1995 monitoring year.

3.2.1 Dewatering Well Production

Yeh performed monthly monitoring of production for the 11 active district dewatering wells. Well production is measured approximately monthly for each well by reading flow totalizers that are installed along the discharge line. Production data and well status for individual wells is included in Page C-1 through C-3. A graph showing total well production since 1993 is included on Plate 4.

During the 2021-2022 monitoring year, the average total well production was 287 gpd which is 8% higher than last year's average production of 265 gpd and 45% less than the historical production average of 522 gpd calculated from 1992 to present. These values are 76% less than the maximum annual average production of 1,182 gpd recorded during the 2004-2005 monitoring year.

Well production typically varies in response to rainfall totals. The dewatering well production decrease over this monitoring year is consistent with the historically low rainfall totals and extended drought conditions at the project.

3.3 Hydrauger Production

Hydrauger production is measured directly from a sampling port installed on each hydrauger. Yeh performed monthly monitoring to measure flow from 11 hydraugers. Six locations have recorded consistent flow in recent years. Some of the other hydraugers flow intermittently in response to rainfall. Production data and status for individual hydraugers is included in Appendix C. A graph showing total hydrauger production since 1992 is included on Plate 4.

During the 2021-2022 monitoring year, the average monthly hydrauger production was 124 gpd which is approximately 32% more than last year's average monthly production of 94 gpd and 45% less than the historical average production calculated from 1992 to present of 225 gpd. These values are 73% less than the maximum average annual production of 455 gpd recorded during the 1996-1997 monitoring year.

Hydrauger production typically varies in response to rainfall totals. The increase in average hydrauger production over this monitoring year from the previous monitoring year is primarily due to an increase in production at HD-13 following the December rainfall events. The

historically lower production rates are consistent with the extended drought conditions at the project.

4. Maintenance and Capital Improvements

A summary table of the maintenance and capital improvement activities performed over this monitoring year is provided on Plate 2. Typical maintenance activities to dewatering wells include assessing and replacing or repairing dewatering well pumps, well electronics and well controls; Typical maintenance to hydraugers included PVC repairs within the conveyance piping and discharge locations Capital improvements include replacement and rehabilitation of existing facilities and special projects to improve the monitoring and maintenance capabilities.

5. Additional Observations and Monitoring

- Rainfall totals for the 2021-2022 monitoring year continue to be below average extending the persistent drought conditions for the area.
- Shallow soil slumps were observed throughout the district following the December rainfall events including erosion at the toe of the landslide above the lower hydrauger cluster, at the east end of the soldier pile wall on Rambla Orienta and at the western end of Calle Del Barco. Monitoring of the district equipment does not suggest a concern of landslide reactivation despite the observed erosion.
- Slope inclinometer surveys do not indicate persistent distinct shear movement movement during the monitoring period.

6. Recommendations for Maintenance and Capital Improvements

- A modern form of repeatable surface survey should be re-introduced and continued for the project as a consistent means to observe and evaluate potential land movement throughout the extent of the assessment district area and more specifically in-between inclinometer casing locations.
- Install replacement hydraugers near the toe of the landslide to replace hydraugers that are dry, degraded, damaged, and vulnerable to being buried by soil and rock debris.
- Install dewatering well near the near the headscarp in vicinity of SI-14.
- Upgrade dewatering well flow meters with near real-time data transmission capability

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CALLE DEL BARCO LANDSLIDE ASSESSMENT DISTRICT MALIBU, CALIFORNIA

MONITORING INSTRUMENTATION AND DEWATERING FACILITIES MAP

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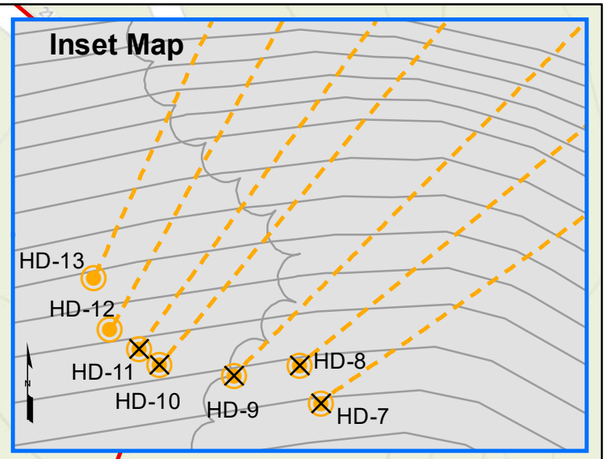

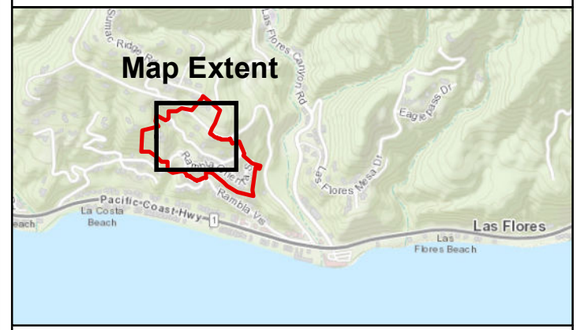

- Active Dewatering Well
- Inactive Dewatering Well
- Slope Inclinometer/Standpipe Piezometer
- Pneumatic Piezometers
- Nonproducing Hydrauger
- Producing Hydrauger
- Hydrauger Installed Length
- District Boundary
- Approximate Landslide

SCALE 1:1,000

100 50 0 100 Feet

N

DATE:	PROJECT NUMBER:	PLATE:
2/18/2022	220-277	1
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MB	NS/LB	

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FY21/22 MAINTENANCE SUMMARY

Row ID	Date Entered	Facility	Description/Observations	Status or Resolution
		DEWATERING WELLS		
1	Sep-21	W-J	W-J no production noted during monthly meter readings after recent rehab/pump replacement of 5/2021	9/10/21: assessed by Yeh. Sounding tube dry to bottom, turned off well to allow for recharge and check production. Pump cycle produces approximately 5 gallons after 30 minute recharge. 10/5/21-11/7/21: install pressure transducer to assess well recharge and drawdown, transducer indicates, pump is restarting before well recharges the water level above transducer, pump is cycling too frequently. 1/21/22: reset pump timer to 120 minutes, well producing but meter is not spinning, meter needs to be replaced (New item Row ID 2). Based on static water levels and pump depth noted during well rehab and video log on March 2021, well is likely close to dry with pump intake at 50 feet and static water level near 51 feet.
2	Jan-21	W-J	During well assessment on 1/21/22 Yeh noted flow meter not working	1/28/22: CP replaces meter, well producing approximately 25 GPD
3	Jan-22	W-J	well control box damaged by rockfall during December rainfall events	coordinating with Quest to replace well control box, panel and well controls in FY-2022-'23
		HYDRAUGERS		
4	Jul-20	Rambla Orienta	Overgrown vegetation along base of soldier pile wall, unable to access hydraugers or conveyance line	8/12/21: assessed by BP 2/17/22: vegetation cleared and removed offsite by BP
5	Jan-22	Rambla Orienta	conveyance line at base of soldier pile wall clogged somewhere west of H-1A. Water is backing up and topping out of open maintenance riser, saturating ground at base of soldier pile wall	2/17/22 repaired by Burns Pacific after clearing vegetation by flushing clog with pressurized water.
6	Jan-22	Lower hydrauger cluster HD-8 to HD-13	hydraugers were buried by soil slump after rainfall event at end of December  **1/17/22: Lower hydraugers buried by soil slump**	1/14/22: assessed by Yeh 1/17/22: further assessed by Yeh and partially excavated 1/21/22: excavated by Yeh personnel, dry hydraugers HD7 and 8 are broken and need PVC repairs  **1/21/22: Hydraugers hand-excavated**
		INCLINOMETERS		
--	--	--	--	--
		OTHER		
7	Jul-20	Rambla Orienta	Storm, drain/ drainage culvert at west end of soldier pile wall along Rambla Orienta is clogged with mineralization. This drain receives runoff and dewatering well production. It filled and overtopped during the December 2021 rainfall events.	

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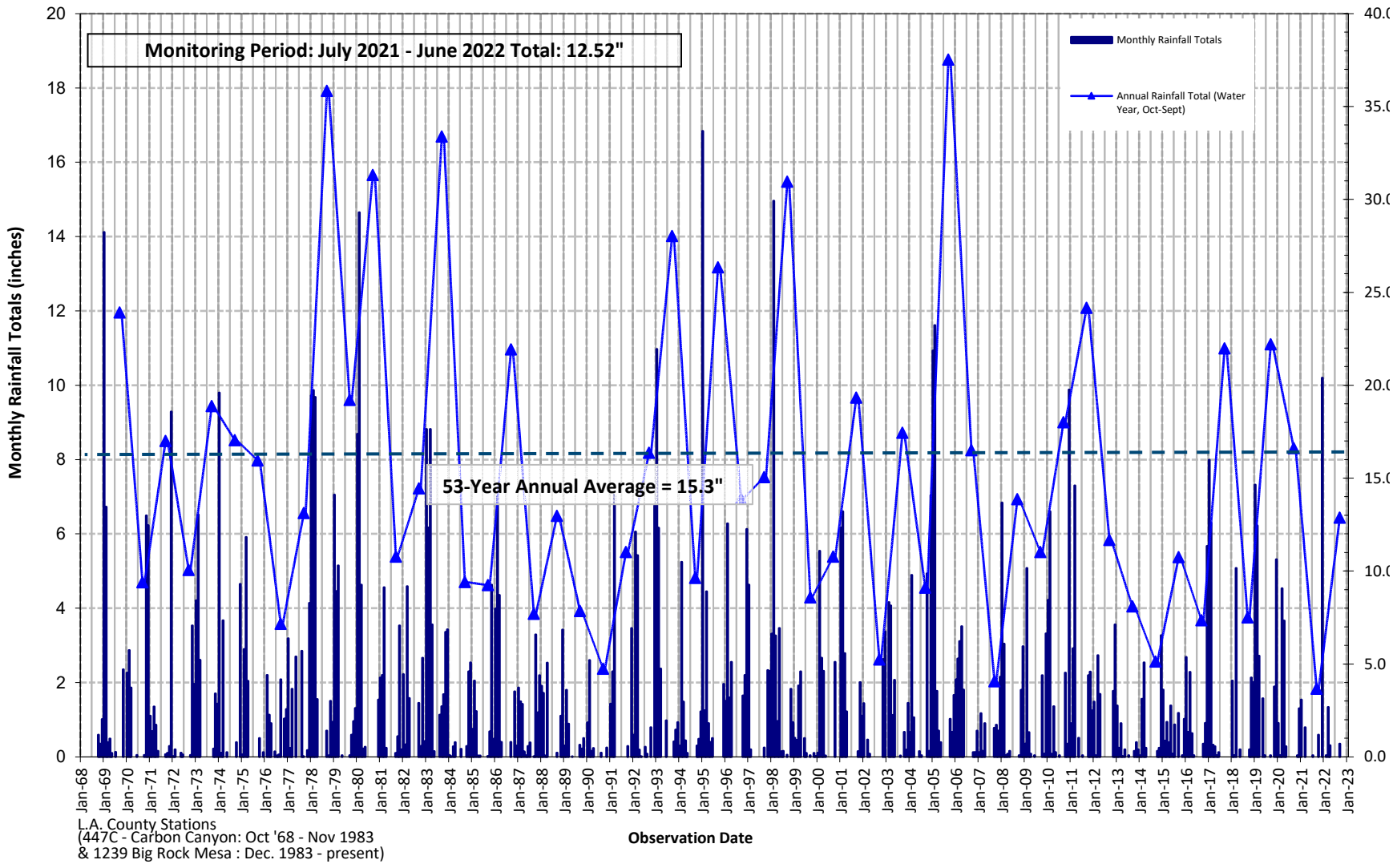

RAINFALL GRAPH
Landslide Assessment Districts
Malibu, California

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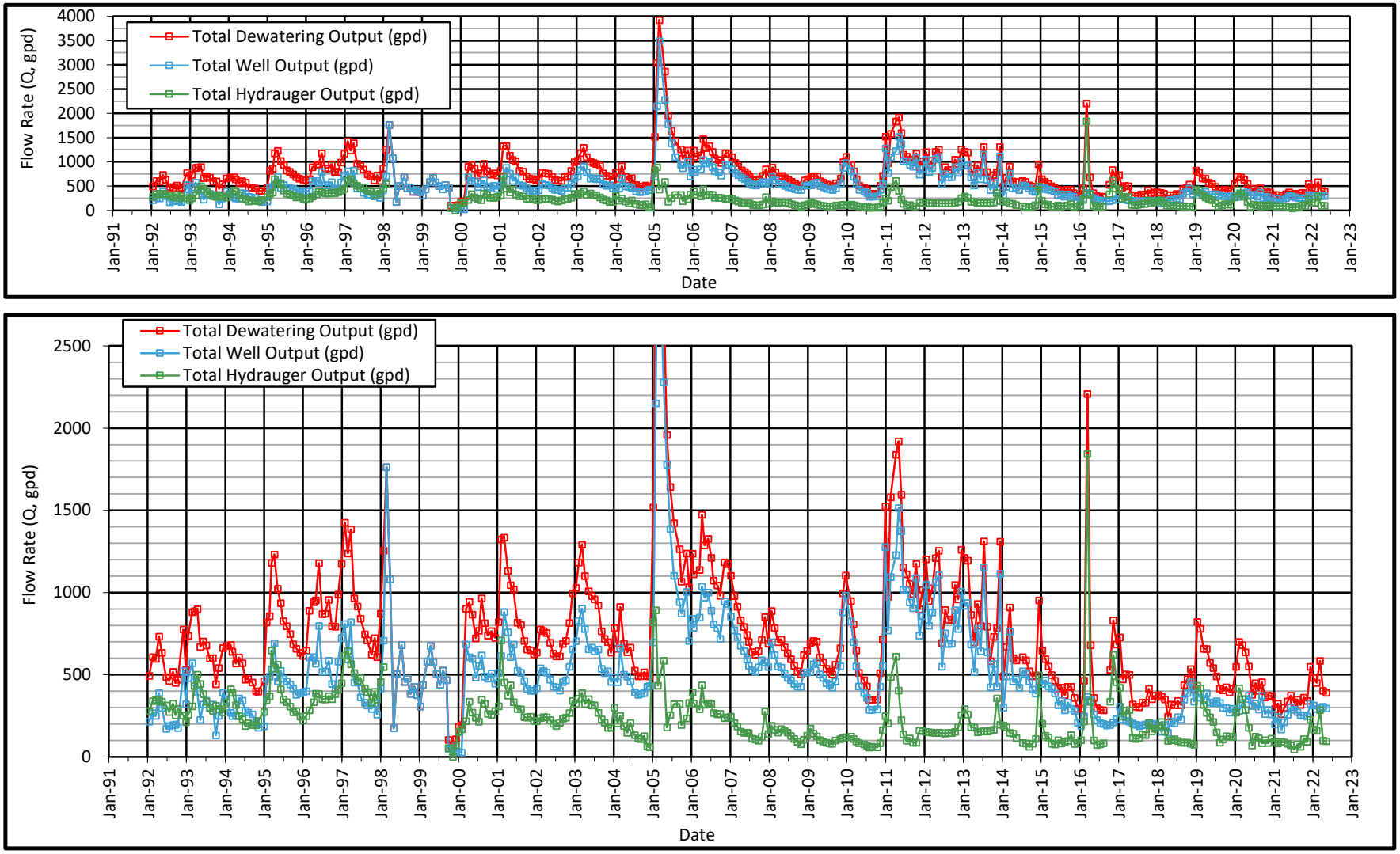

TOTAL DISCHARGE - WELLS AND HYDRAUGERS
Calle del Barco Landslide Assessment District
Malibu, California

PLATE 4

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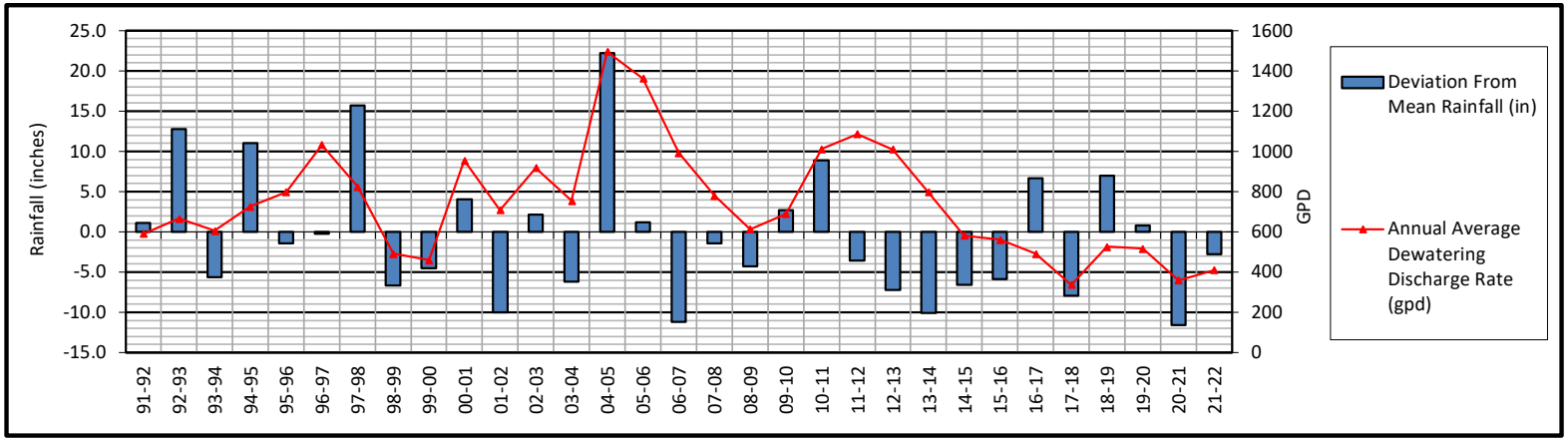

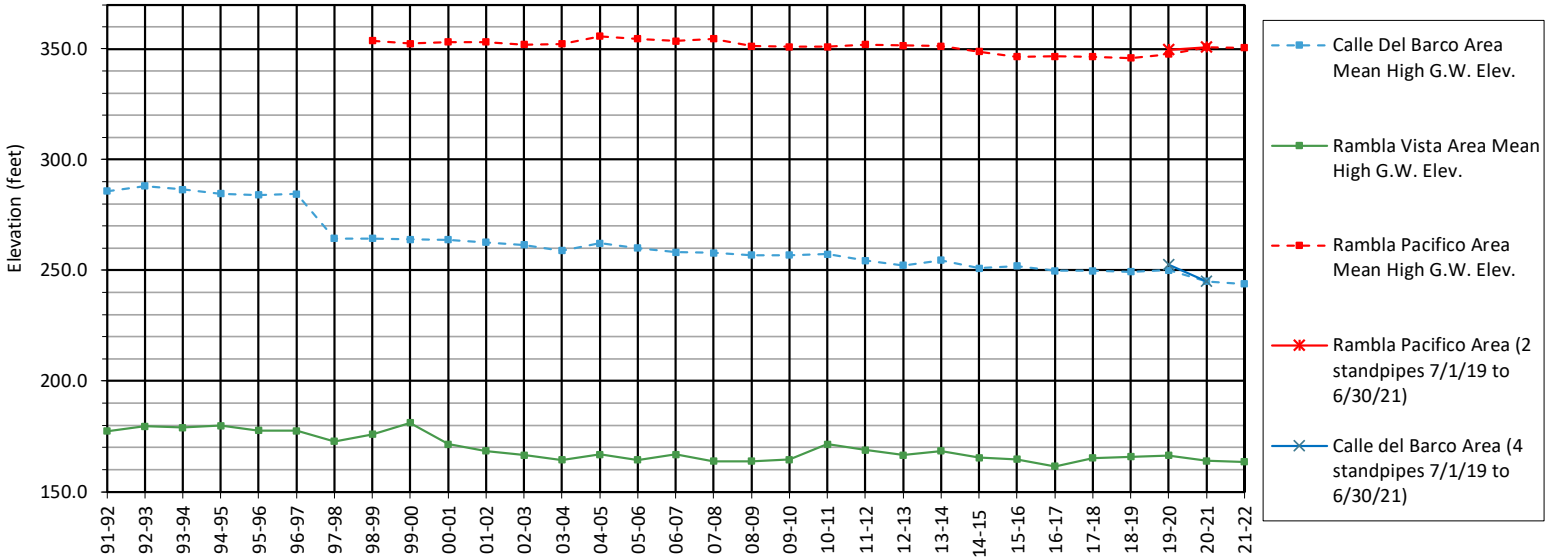

GROUNDWATER LEVELS, DEWATERING AND RAINFALL
Calle del Barco Landslide Assessment District
Malibu, California

PLATE 5

APPENDIX A - GROUNDWATER LEVELS

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CALLE DEL BARCO LAD - Standpipe Piezometer Information

Standpipe ID	Reference Elevation (ft)	Casing Depth (ft)	Perforation Interval (ft)	Installed By	Notes
SI-4	207.0	81.0	Unknown	Unknown	
SI-5	302.0	100.0	Unknown	Unknown	
SI-7	201.0	106.0	Unknown	Unknown	
SI-8	352.0	131.0	Unknown	Unknown	
SI-9	298.0	100.0	Unknown	Unknown	
SI-13	424.0	82.0	75-80	BYA	
SI-14	408.0	80.0	73-78	BYA	
SI-15	301.0	78.0	71-76	BYA	
SI-16	297.0	90.0	Unknown	Unknown	

CALLE DEL BARCO LAD - Pneumatic Piezometer Information

Piezomenter ID	Tip No.	Reference Elev. (ft)	Tip depth (ft)	Tip Elev. (ft)	Installed By	Notes
SI-9	1	298	68	230	BYA	functioning as of 2020
	2[a]		38	260	BYA	0 PSI as of 2020
SI-10	1	202	60	142	BYA	functioning as of 2020
	2*		50	152	BYA	blocked air line
	3[a]		40	162	BYA	0 PSI as of 2020
	4[a]		20	182	BYA	0 PSI a sof 2020
SI-11	1	291.5	60	231.5	BYA	functioning as of 2020
	2		50	241.5	BYA	functioning as of 2020
	3*		40	251.5	BYA	air line leak
	4*		20	271.5	BYA	blocked air line
SI-12	1	301	60	241	BYA	functioning as of 2020
	2		50	251	BYA	functioning as of 2020
	3[a]		40	261	BYA	functioning as of 2020
	4*		20	281	BYA	0 PSI as of 2020
SI-13	1[a]	424	70	354	BYA	readings <0.3PSI as of 2020
	2[a]		50	374	BYA	readings <0.3PSI as of 2020
SI-14	1	408	68	340	BYA	functioning as of 2020
	2		48	360	BYA	functioning as of 2020
SI-15	1	301	66	235	BYA	functioning as of 2020
	2*		36	265	BYA	non functioning
SI-16	1	297	70	227	BYA	functioning as of 2020
	2		40	257	BYA	functioning as of 2020

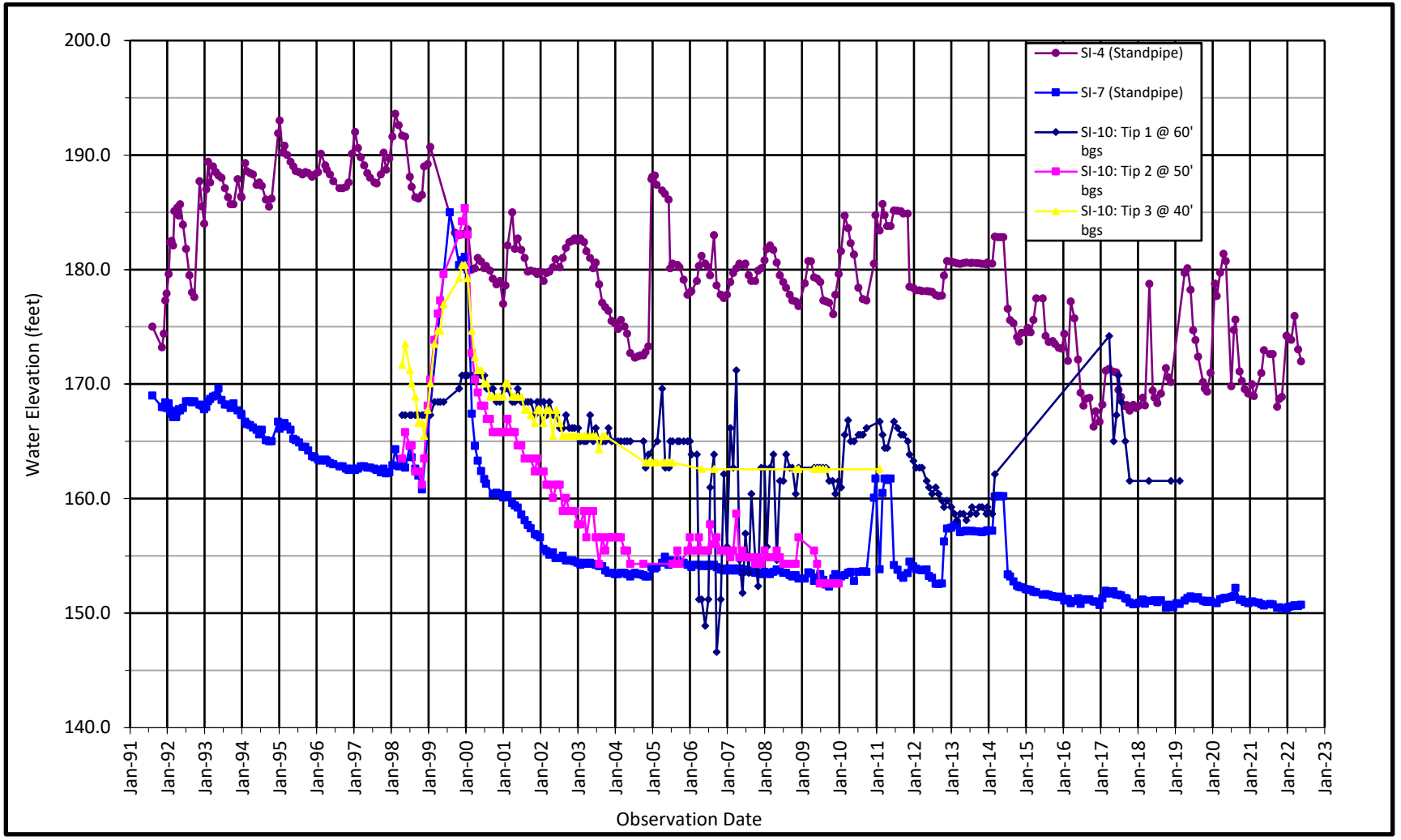
* - Piezometer not functioning
[a] - functionality not certain

CALLE DEL BARCO - SUMMARY OF GROUNDWATER DATA

Piezometer I.D.		91-92*	92-93	93-94	94-95	95-96	96-97	97-98	98-99	99-00**	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	Highest Ever Recorded	Mean '91 - '22	Stand. Dev.	21-22 vs 97-98	21-22 vs 20-21	21-22 vs Mean
Rambla Vista																																						
SI-4	Mean El.	180.9	184.9	187.3	188.9	188.6	188.8	190.1	187.9	182.0	180.4	180.1	181.8	176.1	180.5	179.6	179.5	180.4	178.7	179.8	182.0	181.1	179.6	181.3	175.2	174.2	169.0	169.3	172.9	174.9	171.2	172.2	Mar-98	180.0	5.8	-17.9	**1.0**	-7.8
	Max El.	185.7	189.4	189.3	193.0	190.1	192.0	193.6	190.7	183.5	185.0	181.7	182.7	180.6	188.2	181.2	183.0	182.1	180.7	184.7	185.7	185.2	180.7	182.9	177.5	177.5	171.3	178.8	180.1	181.4	175.6	175.9	193.6	183.5	5.4	-17.7	**0.3**	-7.6
SI-7	Mean El.	167.8	168.5	167.3	165.8	163.9	162.7	162.8	162.7	173.9	160.3	156.5	154.5	153.6	153.8	154.3	153.9	153.6	153.2	153.1	158.2	153.7	155.7	158.2	152.4	151.3	151.3	151.1	150.9	151.1	151.1	150.6	Aug-99	157.4	6.4	-12.2	-0.5	-6.8
	Max El.	169.0	169.6	168.6	166.7	165.1	163.0	164.3	164.6	185.0	161.7	158.6	155.0	154.2	154.9	154.6	154.2	153.8	153.6	153.6	161.8	154.5	157.7	160.2	153.4	151.7	151.9	151.6	151.5	151.4	152.2	150.8	185.0	158.7	7.7	-13.5	-1.4	-7.9
SI-10	Mean El.							167.3	167.7	170.6	169.3	168.1	166.0	165.2	164.5	161.2	158.2	158.5	162.4	163.0	165.5	163.9	159.3	159.3		--	168.8	165.5	161.6	--	--	--	Apr-07	164.3	3.8			
TIP-1	Max El.							167.3	168.5	170.8	170.8	168.5	167.3	166.2	169.6	165.0	171.2	163.9	163.9	166.8	166.7	166.7	161.0	162.1		--	174.2	170.8	161.6	--	--	--	174.2	167.1	3.5			
SI-10	Mean El.							164.7	168.7	177.0	166.2	162.4	158.8	155.9	154.3	155.5	156.0	154.9	154.8	152.6	--	--	--	--		--	--	--	--	--	--	--	Jan-99	160.1	7.2			
TIP-2	Max El.							165.8	179.6	185.4	168.1	164.7	161.2	156.6	154.3	156.6	158.7	155.5	156.6	152.6	--	--	--	--		--	--	--	--	--	--	--	185.4	162.7	10.0			
Area	Mean El.	174.4	176.7	177.3	177.4	176.3	175.7	171.2	171.7	175.9	169.0	166.8	165.3	162.7	163.3	162.6	161.9	161.8	162.3	162.1	168.6	166.2	164.9	166.3	163.8	162.8	160.2	160.2	161.9	163.0	161.2	161.4		166.9	5.9	-9.8	**0.2**	-5.6
Average	Max El	177.4	179.5	179.0	179.9	177.6	177.5	172.8	175.8	181.2	171.4	168.4	166.6	164.4	166.8	164.4	166.8	163.8	163.7	164.4	171.4	168.8	166.5	168.4	165.4	164.6	161.6	165.2	165.8	166.4	163.9	163.4		169.4	6.0	-9.4	-0.5	-6.1
Change	Mean El.		2.3	0.6	0.0	-1.1	-0.5	-4.5	0.5	4.1	-6.8	-2.2	-1.5	-2.6	0.6	-0.7	-0.7	-0.1	0.4	-0.1	6.4	-2.3	-1.4	1.4	-2.5	-1.0	-2.6	0.0	1.7	1.1	-1.9	0.2						
vs Prior	Max El.		2.2	-0.6	0.9	-2.3	-0.1	-4.8	3.1	5.3	-9.8	-3.0	-1.8	-2.2	2.4	-2.4	2.4	-3.0	-0.1	0.7	7.0	-2.6	-2.3	1.9	-3.0	-0.9	-2.9	3.6	0.6	0.6	-2.5	-0.5						
Calle Del Barco																																						
SI-5	Mean El.	271.9	273.5	278.9	280.1	279.9	278.8	282.6	282.6	278.9	279.1	279.9	278.8	278.8	281.2	283.9	280.6	278.7	277.2	276.5	278.1	277.1	273.3	273.1	256.1	255.7	254.9	255.9	254.4	256.0	261.7	260.6	Mar-98	272.9	10.0	-22.0	-1.1	-12.3
	Max El.	275.9	283.5	280.9	285.1	282.6	280.2	287.5	285.1	279.9	281.1	280.6	279.7	279.6	287.0	285.1	283.7	280.8	278.7	279.2	279.4	277.8	276.6	274.2	256.4	257.7	255.3	265.1	255.5	259.0	271.2	265.7	287.5	275.8	9.9	-21.8	-5.5	-10.1
SI-8	Mean El.	288.6	290.0	287.5	279.8	283.8	286.0	290.7	293.0	291.9	292.2	290.5	289.8	289.6	293.2	293.7	290.7	287.2	286.9	286.8	286.9	--	--	285.5	285.0	283.4	281.4	283.1	284.4	288.6	--	--	Apr-05	287.8	3.7			
	Max El.	295.4	292.6	292.1	284.0	285.3	288.7	296.6	294.2	295.2	295.2	292.7	291.8	291.6	297.7	294.7	293.6	288.8	287.5	286.8	286.9	--	--	286.1	286.8	289.4	284.0	284.8	289.6	292.0	--	--	297.7	290.5	4.1			
SI-9	Mean El.							228.2	225.6	228.2	228.7	226.8	225.8	225.6	226.1	227.7	226.1	224.7	224.2	224.2	224.0	224.6	223.4	223.5	221.6	221.5	221.9	221.1	220.5	222.2	221.6	221.3	Apr-98	224.4	2.5	-6.8	-0.3	-3.0
	Max El.							230.5	226.7	229.7	229.0	228.3	226.6	226.7	229.2	228.8	227.2	225.1	224.8	224.6	224.5	225.4	224.1	224.2	221.8	221.7	225.1	221.6	222.2	223.8	221.9	221.9	230.5	225.4	2.8	-8.7	0.0	-3.6
SI-15	Mean El.								261.0	263.1	263.3	264.2	264.3	264.9	265.5	266.9	266.3	265.5	264.9	264.6	265.4	265.9	265.4	265.3	264.5	263.8	262.3	262.2	261.5	261.4	261.5	262.8	Jul-05 & Aug-05	264.0	1.7		**1.3**	-1.2
	Max El.								263.7	263.3	264.2	265.2	265.2	265.3	267.7	267.8	267.3	265.8	265.5	265.8	265.9	266.4	265.9	266.0	264.8	264.3	262.9	262.9	262.9	261.8	261.9	263.3	267.8	264.8	1.7		**1.4**	-1.5
SI-16	Mean El.													229.8	231.6	232.7	230.1	228.5	227.9	227.9	227.7	228.8	227.6	227.6	224.6	224.3	224.4	224.0	224.5	225.1	223.9	224.1	Apr-05	227.1	2.8		**0.1**	-3.1
	Max El.													230.9	236.1	234.5	231.7	228.8	228.5	228.3	228.7	229.9	228.5	228.8	224.8	224.5	224.9	224.6	225.9	226.1	225.0	224.9	236.1	228.2	3.4		-0.2	-3.3
SI-9	Mean El.							244.1	246.7	248.7	245.9	243.5	242.1	242.3	245.2	244.1	242.0	236.8	235.7	237.6	240.2	239.0	235.5	235.4		238.1	238.3	236.4	236.3	239.2	--	--	Jan-Feb-00	240.6	4.1			
TIP-1	Max El.							249.6	247.3	254.2	247.3	245.0	243.8	243.8	248.4	245.0	243.8	239.2	239.8	240.8	240.9	240.9	236.3	236.3		238.1	242.7	236.9	239.2	239.2	--	--	254.2	242.6	4.7			
SI-9	Mean El.							267.8	263.8	261.2	262.9				266.5	261.2										--	--	--	--	--	--	--	--	Mar-98	263.9	2.8			
TIP-2	Max El.							274.3	266.9	261.2	263.5				270.4	261.2										--	--	--	--	--	--	--	--	274.3	266.2	5.3			
SI-11	Mean El.							235.0	234.4	237.5	236.8	236.3	235.3	235.2	240.0	235.7	235.3	235.0	234.7	234.5	235.0	234.3	240.3	240.9		234.7	235.0	235.0	233.8	233.8	--	--	Apr-05	235.8	2.1			
TIP-1	Max El.							236.1	239.6	238.4	237.3	237.3	236.1	236.1	245.3	239.6	238.2	235.5	235.5	235.0	239.0	235.5	242.4	241.9		235.0	236.1	236.1	233.8	233.8	--	--	245.3	237.4	2.9			
SI-11	Mean El.							242.7	243.7	243.8	242.8	242.8	242.7		242.9	242.7	242.7	242.8	242.9	242.5	242.1	242.1	242.1	242.3		--	--	243.6	243.8	243.2	--	--	Jan-00	242.8	0.6			
TIP-2	Max El.							242.7	245.0	246.1	243.8	243.8	242.7		245.0	243.2	243.2	243.2	243.8	242.7	242.1	242.1	242.1	243.2		--	--	245.0	245.0	243.2	--	--	246.1	243.6	1.2			
SI-12	Mean El.							273.2	269.1	268.0	266.9	266.4	264.6	264.4	264.6	268.5	268.1	266.9	265.9	265.5	264.7	263.6	260.1	260.7		265.2	257.6	256.9	257.1	264.0	--	--	May-98	264.6	4.1			
TIP-1	Max El.							275.5	269.8	268.6	267.5	267.5	265.2	265.2	268.6	269.8	269.8	268.6	267.5	266.3	265.7	265.7	261.1	262.9		268.6	258.3	257.1	257.1	264.0	--	--	275.5	265.9	4.5			
SI-12	Mean El.							275.2	273.9	272.5	270.9	268.7	266.9	267.1	267.1	269.2	266.7	266.7	265.2	264.8	264.6	263.0	258.9	259.0		268.3	257.4	257.7	257.9	255.6	--	--	Jun-98	265.3	5.6			
TIP-2	Max El.							276.3	275.2	272.9	271.7	270.6	267.1	267.1	271.7	270.6	268.3	270.6	268.8	266.5	266.5	265.4	260.2	260.8		272.9	257.9	257.9	257.9	255.6	--	--	276.3	266.9	6.1			
SI-12	Mean El.							274.2	270.8	269.8	269.7	268.3	266.4	266.1	268.8	270.7	267.9	269.9	268.9	267.9	266.6	265.6	263.9	264.4		--	263.6	262.9	263.3	262.2	--	--	Oct-07	267.2	3.1			
TIP-3	Max El.							274.8	272.5	272.5	273.7	270.2	267.9	267.9	273.7	273.7	269.1	274.8	271.9	269.1	268.5	267.3	264.5	265.0		--	264.5	263.3	263.3	262.2	--	--	274.8	269.1	4.1			
SI-15	Mean El.								271.2	270.4	270.6	271.1	271.0	271.6	274.0	273.0	271.6	271.6	270.1	270.2	271.3	269.0	264.0	263.9		266.6	267.2	266.3	264.9	262.6	--	--	Mar-05 & Apr-05	269.2	3.3			
TIP-1	Max El.								271.8	271.8	274.1	273.0	274.1	273.0	276.4	274.1	273.5	273.5	270.7	271.2	274.7	271.2	267.2	264.9		267.2	267.2	267.2	264.9	262.6	--	--	276.4	270.7	3.8			
SI-15	Mean El.								277.7	276.1	276.4	276.8	274.8	268.9	267.1	266.8	266.0	270.8	273.1	275.2	279.1	277.7	273.0	273.0		--	--	--	--	--	--	--	May-11	273.3	4.2			
TIP-2	Max El.								278.8	276.5	280.0	277.7	276.5	276.5	267.3	273.1	266.2	277.1	274.2	278.8	282.8	279.4	277.1	275.9		--	--	--	--	--	--	--	282.8	276.1	4.3			
SI-16	Mean El.													238.3	239.3	238.5	238.5	237.7	236.2	236.1	233.7	233.7	232.4	232.5		231.9	232.5	232.1	232.2	232.2	--	--	Jan-05	234.8	2.8			
TIP-1	Max El.													239.7	244.3	239.7	239.1	238.5	236.8	239.7	235.6	235.6	232.8	233.9		232.2	232.8	232.8	232.8	232.8	--	--	244.3	236.2	3.6			
SI-16	Mean El.													259.9	262.9	259.4	257.6	257.6	257.6	257.6	258.2	257.6				--	259.2	260.1	258.7	258.7	--	--	Mar-05	258.8	1.5			
TIP-2	Max El.													261.6	265.1	260.5	257.6	257.6	257.6	257.6	258.2	257.6				--	259.3	262.8	259.3	259.3	--	--	265.1	259.5	2.4			
Area	Mean El.	280.3	281.8	283.2	279.9	281.8	282.4	261.4	262.6	262.3	262.0	261.3	260.2	257.3	258.5	258.4	256.7	256.0	255.4	255.5	255.8	253.0	250.8	253.4	250.3	250.3	248.4	248.2	247.9	249.2	242.2	242.2		259.6	12.2	-19.2	**0.0**	-17.4
Average	Max El	285.7	288.1	286.5	284.6	284.0	284.5	264.4	264.3	263.9	263.7	262.6	261.4	258.9	262.1	260.1	258.1	257.9	256.8	256.8	257.3	254.3	252.2	254.6	250.9	251.9	249.7	249.7	249.3	250.0	245.0	243.9		261.7	13.1	-20.5	-1.1	-17.8
Change	Mean El.		1.5	1.4	-3.3	1.9	0.6	-21.0	1.2	-0.3	-0.3	-0.7	-1.1	-2.9	1.2	-0.1	-1.7	-0.7	-0.6	0.0	0.4	-2.8	-2.2	2.6	-3.0	0.0	-1.9	-0.2	-0.3	1.2	-7.0	0.0						
vs Prior	Max El.		2.4	-1.6	-1.9	-0.6	0.5	-20.1	0.0	-0.5	-0.2	-1.1	-1.2	-2.5	3.2	-2.0	-1.9	-0.3	-1.1	0.0	0.5	-3.0	-2.1	2.4	-3.6	1.0	-2.2	0.0	-0.5	0.8	-5.1	-1.1						
Rambla Pacifico																																						
SI-13	Mean El.								361.3	359.3	360.3	360.2	360.0	360.5	361.7	363.4	362.4	360.4	360.0	359.1	359.0	359.9	358.6	358.5	356.2	355.5	354.6	354.2	354.3	356.6	358.7	358.1	Apr-05	358.9	2.5		-0.6	-0.7
	Max El.								362.4	359.9	361.2	360.8	361.1	361.1	365.1	364.5	363.4	361.1	360.5	359.5	359.3	360.5	359.4	359.5	356.3	355.9	356.4	354.6	354.8	357.9	359.1	359.0	365.1	359.7	2.8		-0.1	-0.7
SI-13	Mean El.								362.9	361.1	362.5	362.5	361.4	361.5	361.9	363.3	362.3	361.2	359.0	358.6	359.3	359.5	357.5	357.1		--	--	--	--	--	--	--	Nov-07	360.7	2.0			
TIP-1	Max El.								363.2	362.1	363.2	363.2	363.2	362.1	365.5	364.4	364.4	367.8	360.3	359.8	359.8	360.3	359.2	359.2		--	--	--	--	--	--	--	367.8	362.3	2.5			
SI-14	Mean El.								342.0	341.6	341.7	342.2	341.7	341.8	342.8	344.1	343.6	342.8	342.8	342.1	342.4	342.5	342.1	342.3	341.0	340.8	340.4	340.6	340.2	341.2	342.0	341.7	May-05	341.9	1.0		-0.3	-0.2
	Max El.								342.2	341.7	342.3	342.5	341.9	341.9	346.3	345.8	344.3	343.1	343.0	342.5	342.9	342.8	343.2	342.8	341.1	340.9	340.7	341.3	340.8	341.7	342.4	342.0	346.3	342.5	1.4		-0.4	-0.5
SI-14	Mean El.								345.9	345.7	345.0	344.0	341.2	342.5	343.2	342.5	340.7	342.3	340.8	340.8	341.5	343.4	343.3	343.3		342.3	342.1	342.5	342.3	342.9	--	--	Nov-98	342.8	1.5			
TIP-1	Max El.								346.9	345.8	345.8	345.8	341.2	343.5	345.8	343.5	341.7	345.8	341.2	341.7	341.7	344.0	344.0	343.5		342.3	342.3	343.5	342.3	342.9	--	--	346.9	343.6	1.8			
Area	Mean El.								353.0	351.9	352.4	352.2	351.1	351.6	352.4	353.3	352.3	351.7	350.6	350.2	350.6	351.3	350.4	350.3	348.6	346.2	345.7	345.8	345.6	346.9	350.4	349.9		350.2	2.4		-0.4	-0.3
Average	Max El								353.7	352.4	353.1	353.1	351.8	352.1	355.7	354.5	353.4	354.4	351.2	350.9	350.9	351.9	351.5	351.2	348.7	346.4	346.5	346.4	346.0	347.5	350.7	350.5		351.0	2.8		-0.3	-0.5
Change	Mean El.									-1.1	0.5	-0.2	-1.1	0.5	0.9	0.9	-1.1	-0.6	-1.0	-0.5	0.4	0.8	-1.0	-0.1	-1.7	-2.4	-0.5	0.1	-0.2	1.3	3.5	-0.4						
vs Prior	Max El.									-1.3	0.8	-0.1	-1.2	0.3	3.5	-1.1	-1.1	1.0	-3.2	-0.4	0.0	1.0	-0.5	-0.2	-2.5	-2.3	0.1	0.0	-0.5	1.5	3.2	-0.3						

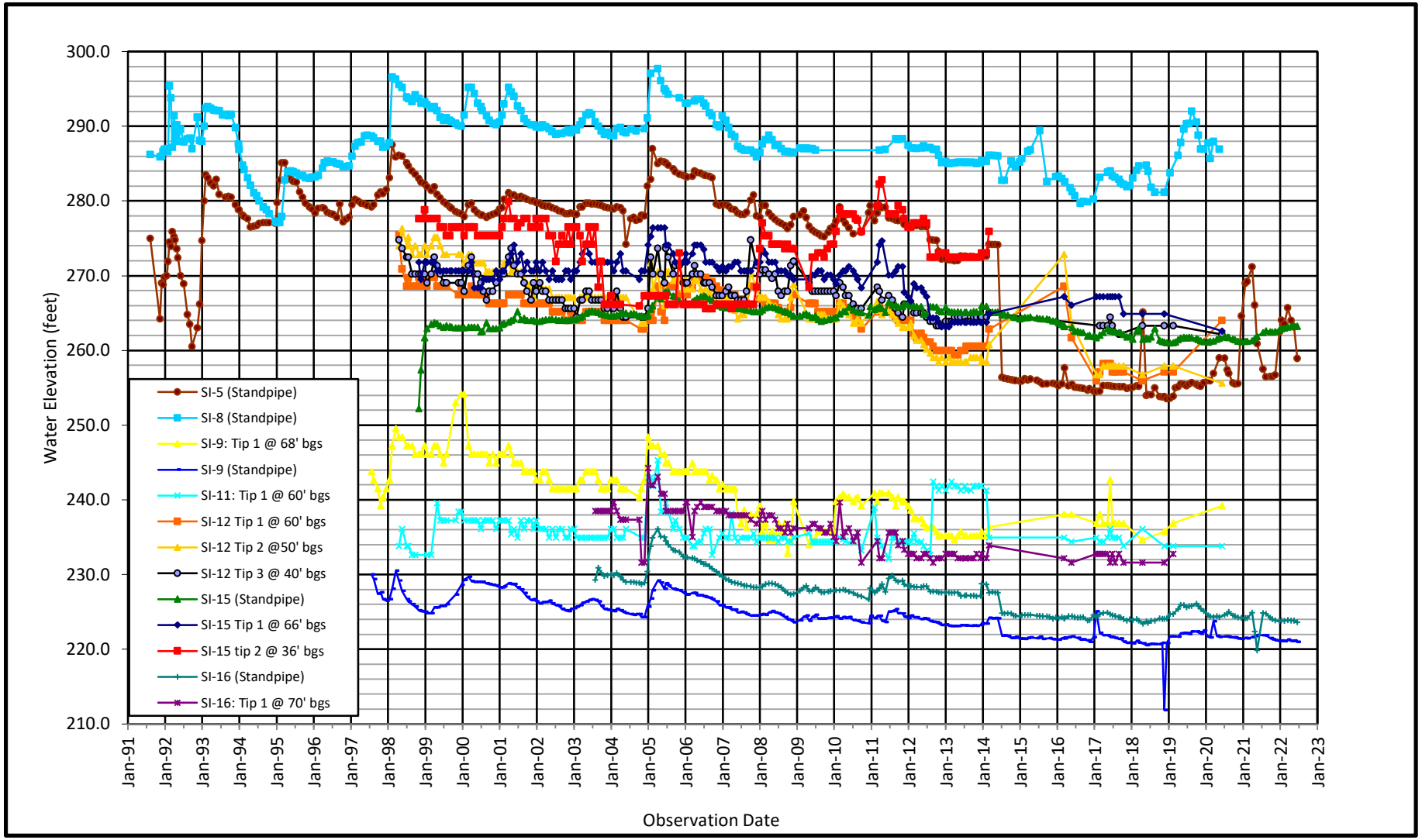
Piezometer Not Installed | No Data Recorded | -- Piezometer Not Functioning, Reading 0 PSI or Data Uncertain

SUMMARY OF GROUNDWATER DATA
Calle del Barco Landslide Assessment District
Malibu, California



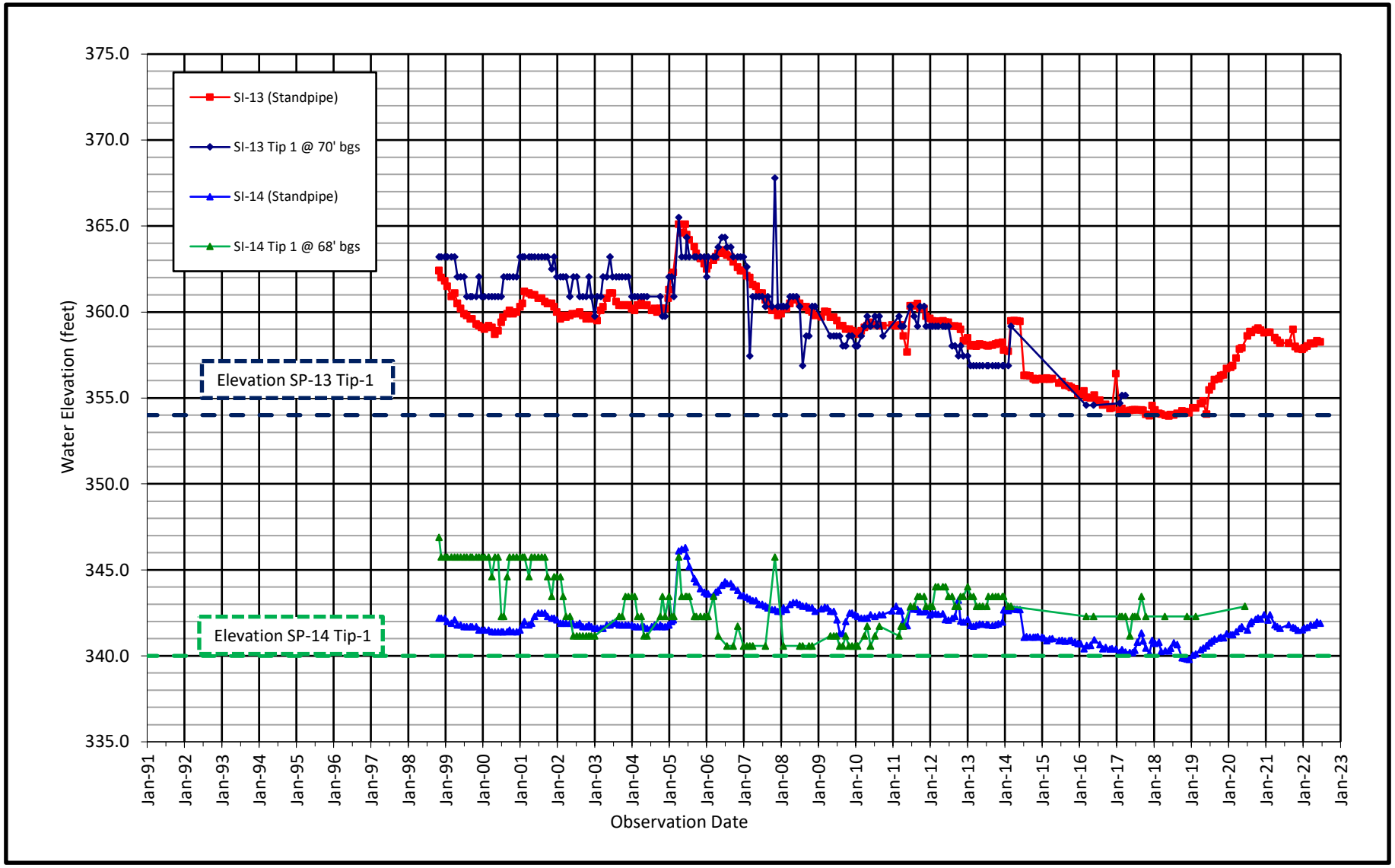
GROUNDWATER HYDROGRAPH
Rambla Vista
Calle del Barco Landslide Assessment District
Malibu, California

PLATE A-3



GROUNDWATER HYDROGRAPH
Calle del Barco
Calle del Barco Landslide Assessment District
Malibu, California

PLATE A-4



GROUNDWATER HYDROGRAPH
Rambla Pacifico
Calle del Barco Landslide Assessment District
Malibu, California

APPENDIX B - SLOPE INCLINOMETERS

Slope Inclinometer Interpretation Summary																	
	SI-1*	SI-1A	SI-2**	SI-3	SI-4	SI-5	SI-6	SI-7	SI-8	SI-9	SI-10	SI-11	SI-12	SI-13	SI-14	SI-15	SI-16
Installation Details																	
Surface Elev. (ft) 4/00	295.0	297.0	298.0	207.0	206.0	302.0	295.0	200.0	335.0	298.0	202.0	291.5	301.0	405.0	398.0	304.0	295.0
Original DEPTH (ft.)	64.0	NI	NI	NI	76.0	100.0	NI	100.0	130.0	100.0	60.0	60.0	60.0	80.0	78.0	76.0	88.0
Current DEPTH (ft.)	64.0	NI	NI	NI	78.0	96.0	NI	102.0	130.0	96.0	62.0	57.0	56.0	78.0	76.0	72.0	86.0
STATUS	D	D	D	D	F	F	D	F	F	F	F	F	F	F	F	F	F
READING INTERVAL	N/A	N/A	N/A	N/A	Semi	Semi	N/A	Semi	Semi	Qrtly	Semi	Semi	Semi	Semi	Semi	Semi	Qrtly
DATE OF INSTALLATION	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	3/13/98	3/12/98	3/12/98	9/1998	9/1998	9/1998	8/8/03
DATE FIRST BASE READING	NI	NI	NI	NI	NI	NI	NI	NI	NI	12/22/97	3/16/98	3/13/98	3/16/98	10/12/98	10/12/98	10/23/98	8/13/03
DEPTH of MOVEMENT (ft)***	NI	NI	NI	NI	17-22	0-10, 36-38	15.0	40.0	15-17	53, 44	35-38	0-55	54	0-30	8.0	0-25, 77	46, 87
A+ Axis orientation	NI	NI	NI	NI	0	38.0	NI	28.0	22.0	212.0	244.0	258.0	238.0	210.0	224.0	190.0	210 est.
Interpretation Movement (inches)																	
2021-2022	NR	NR	NR	NR	--	--	NR	--	NR	--	--	--	--	--	--	--	--
2020-2021	NR	NR	NR	NR	--	--	NR	--	NR	--	--	--	--	--	--	--	--
2019-2020	NR	NR	NR	NR	--	--	NR	--	0.1	0.2	--	--	--	--	--	--	--
2018-2019	NR	NR	NR	NR	0.1	--	NR	--	--	--	--	--	--	--	--	--	--
2017-2018	NR	NR	NR	NR	--	--	NR	--	--	--	--	--	--	--	--	--	--
2016-2017	NR	NR	NR	NR	--	--	NR	--	--	--	--	--	--	--	--	--	<0.1
2015-2016	NR	NR	NR	NR	--	<0.05	NR	--	--	0.2	--	--	--	--	--	--	--
2014-2015	NR	NR	NR	NR	--	0.1	NR	--	--	--	--	--	--	--	--	--	<0.1
2013-2014	NR	NR	NR	NR	--	0.1	NR	--	--	--	--	--	--	--	--	--	<0.1
2012-2013	NR	NR	NR	NR	--	0.1	NR	--	--	0.15	0.1	--	0.1	--	--	--	0.2
2011-2012	NR	NR	NR	NR	--	--	NR	<0.05	0.1	0.15	--	0.2	--	--	--	0.1	0.35
2010-2011	NR	NR	NR	NR	--	--	NR	<0.05	0.05	<0.05	--	--	--	--	--	--	--
2009-2010	NR	NR	NR	NR	--	--	NR	--	--	0.2	--	0.1	--	--	--	--	0.1
2008-2009	NR	NR	NR	NR	--	--	NR	NA	--	0.1	--	--	--	--	--	--	--
2007-2008	NR	NR	NR	NR	--	--	NR	--	--	0.1	--	--	--	--	--	--	--
2006-2007	NR	NR	NR	NR	--	<0.1	NR	--	--	0.2	--	--	--	--	0.2	--	0.2
2005-2006	NR	NR	NR	NR	--	--	NR	--	--	0.1	--	--	<0.1	--	0.15	--	0.1
2004-2005	NR	NR	NR	NR	--	0.45	NR	<0.1	0.1	0.5	--	<0.1	0.11	--	--	--	0.35
2003-2004	NR	NR	NR	NR	--	--	NR	--	--	--	--	--	--	--	--	--	--
2002-2003	NR	NR	NR	NR	--	--	NR	--	--	--	--	--	--	--	--	--	--
2001-2002	NR	NR	NR	NR	--	--	NR	--	--	--	--	--	--	--	--	--	--
2000-2001	NR	NR	NR	NR	--	--	NR	--	--	--	--	--	--	--	--	--	--
1999-2000	NR	NR	NR	NR	--	--	NR	--	--	--	--	--	--	--	--	--	--
1998-1999	NR	NR	NR	NR	--	0.16	NR	0.11	--	2.19	--	--	--	--	--	--	--
1997-1998	NR	NR	NR	NR	0.22	0.4	NR	0.66	0.32	13	0.22	--	--	NR	NR	NR	NR
1996-1997	NR	NR	NR	NR	NA	NA	NR	NA	NA	NR	NR	NR	NR	NR	NR	NR	NR
1995-1996	NR	NR	NR	NR	NA	NA	NR	NA	NA	NR	NR	NR	NR	NR	NR	NR	NR

KEY:

D	Destroyed
F	Functioning
B	New baseline in 1999
NI	No information
--	Shaded yellow to indicate inclinometer does penetrate basal rupture.
--	Shaded blue to indicate inclinometer does NOT penetrate basal rupture.
--	Shaded gray to indicate inclinometer is no longer monitored.
--	No clearly defined interpreted movement
NR	No reading
NA	Data not available

NOTES:

* Original SI-1 installed in 1978, and was destroyed. SI-65 (installed in 1979) was renamed to SI-1

** Original SI-2 installed in 1978, and was destroyed. SI-90 (installed in 1979) was renamed to SI-2

*** Referenced to current depth of SI (see note below)

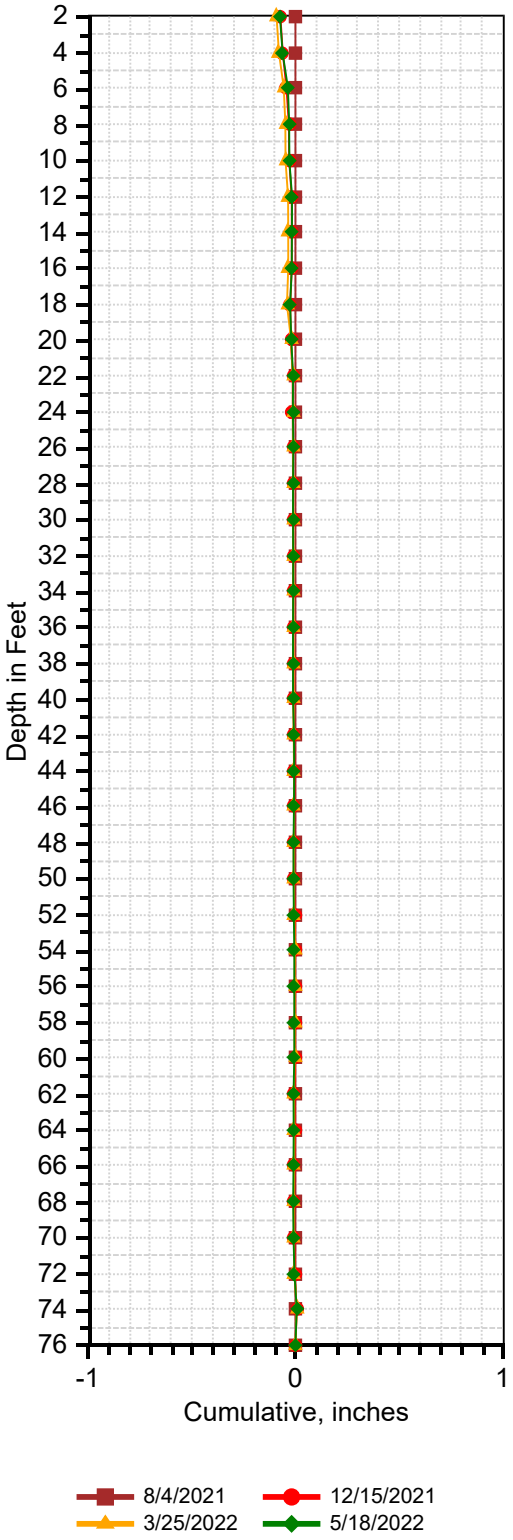
**** SI-4, SI-7, and SI-10 were extended 6 feet upwards during reconstruction of the road in 1999 and interpretations are referenced to their current depth.

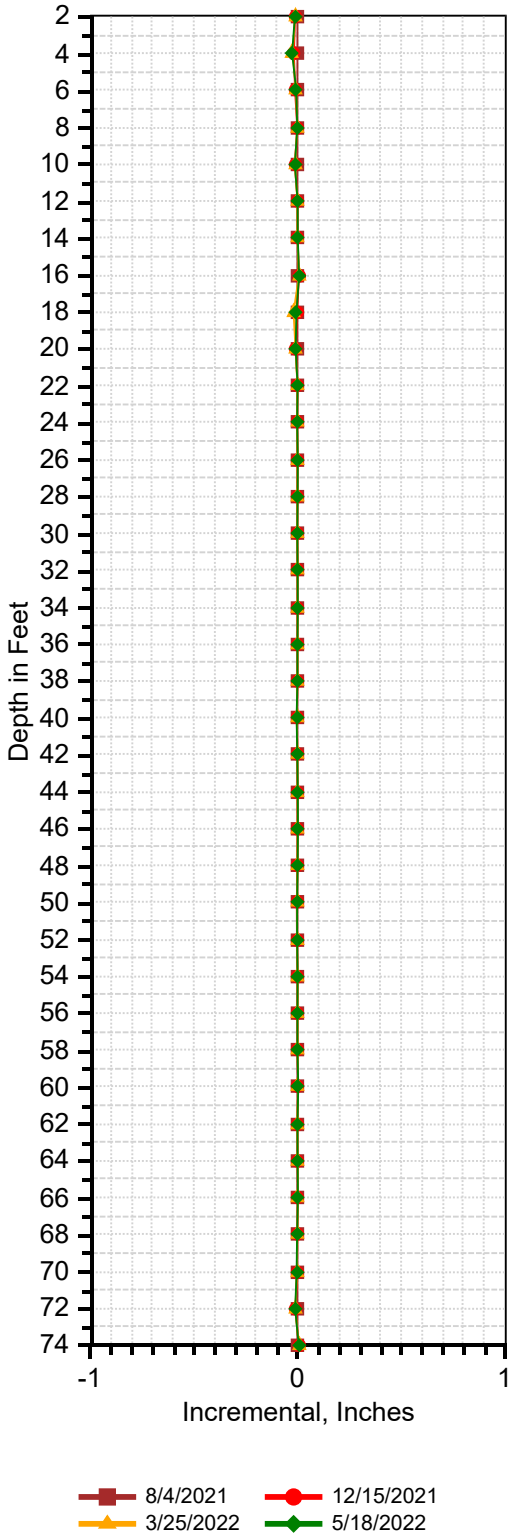
SUMMARY OF SLOPE INCLINOMETERS

Calle del Barco Landslide Assessement District

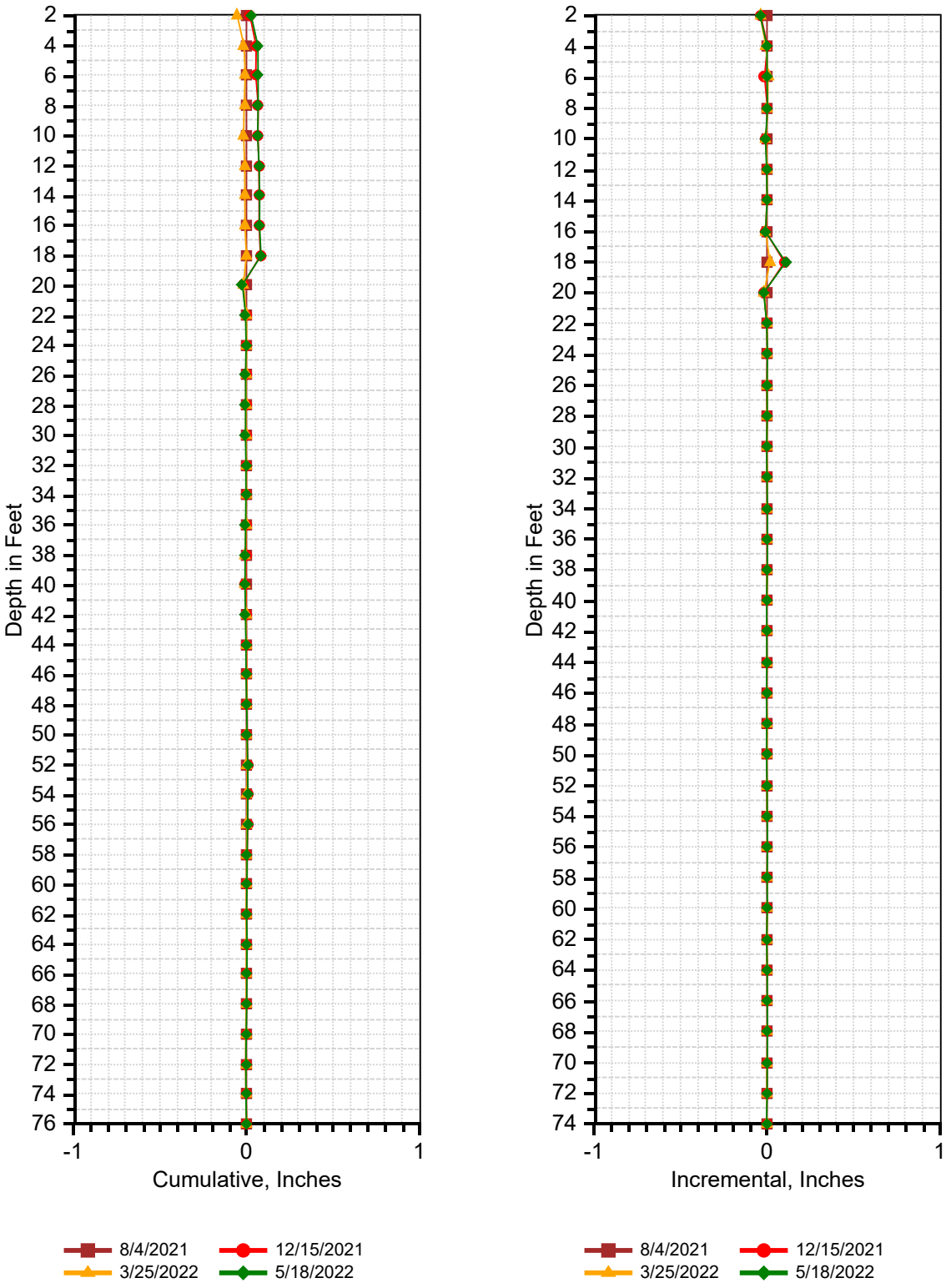
Malibu, California

SI-4 A Direction





SI-4 B Direction



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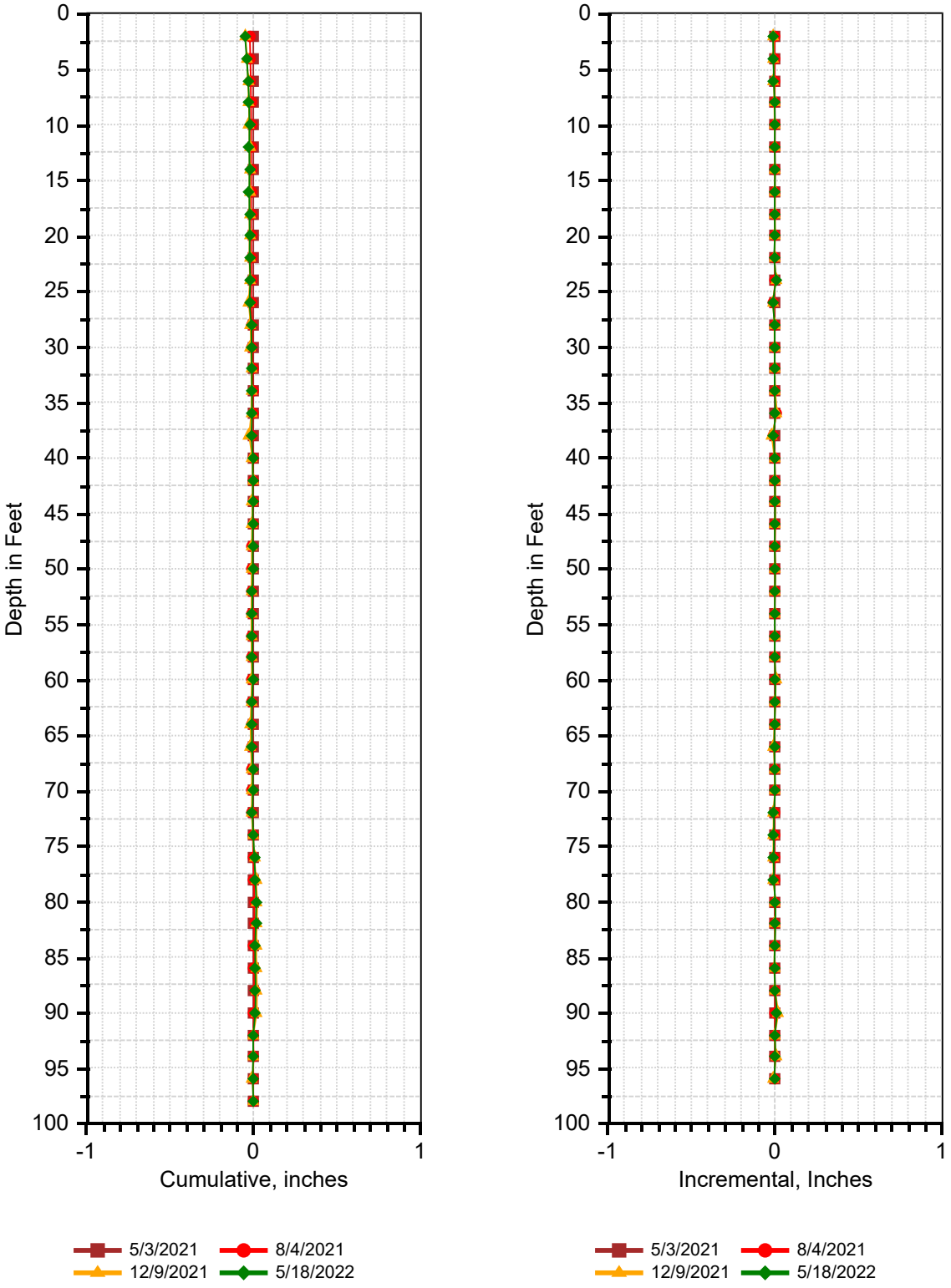
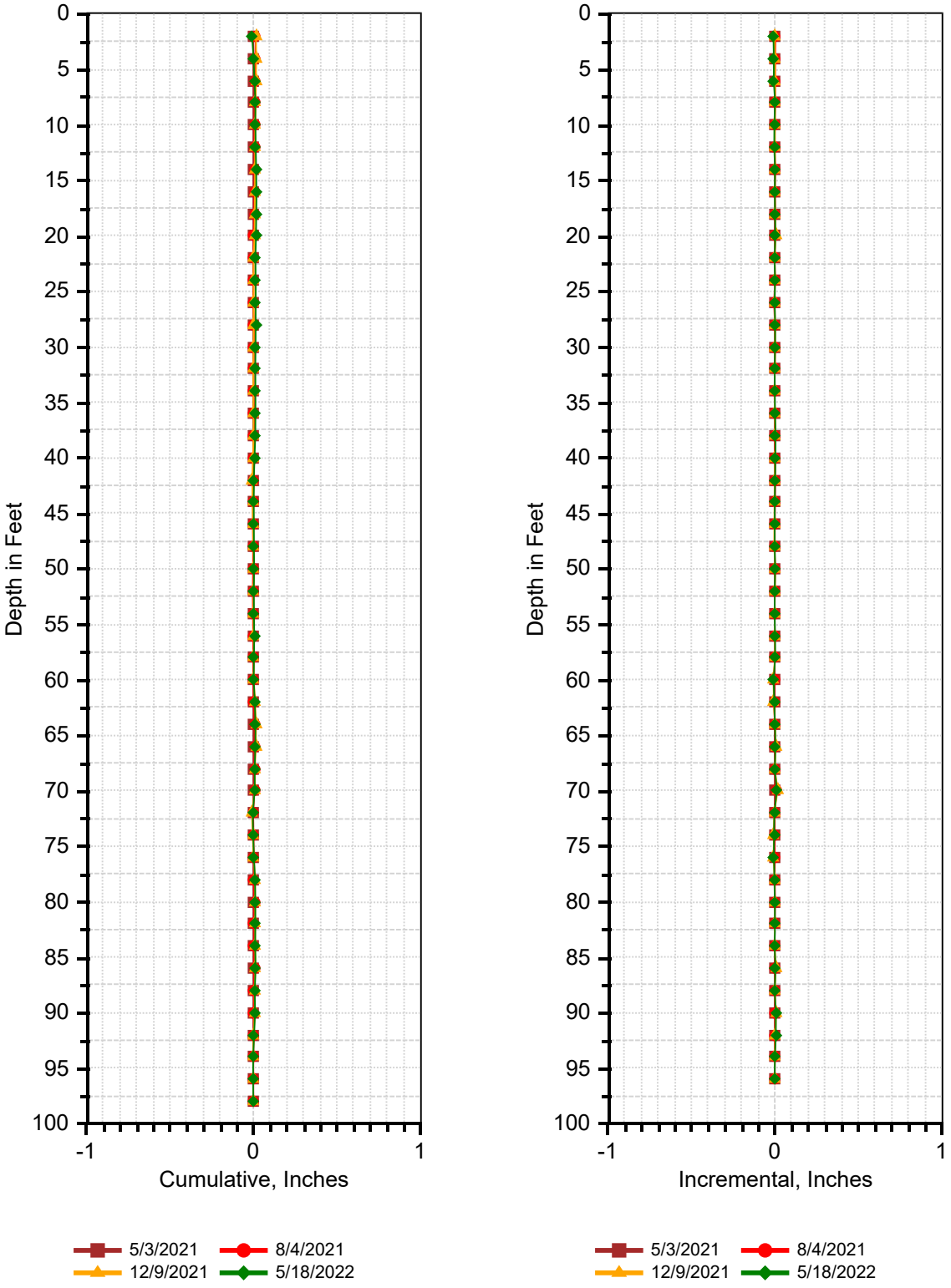


SI-5 B Direction



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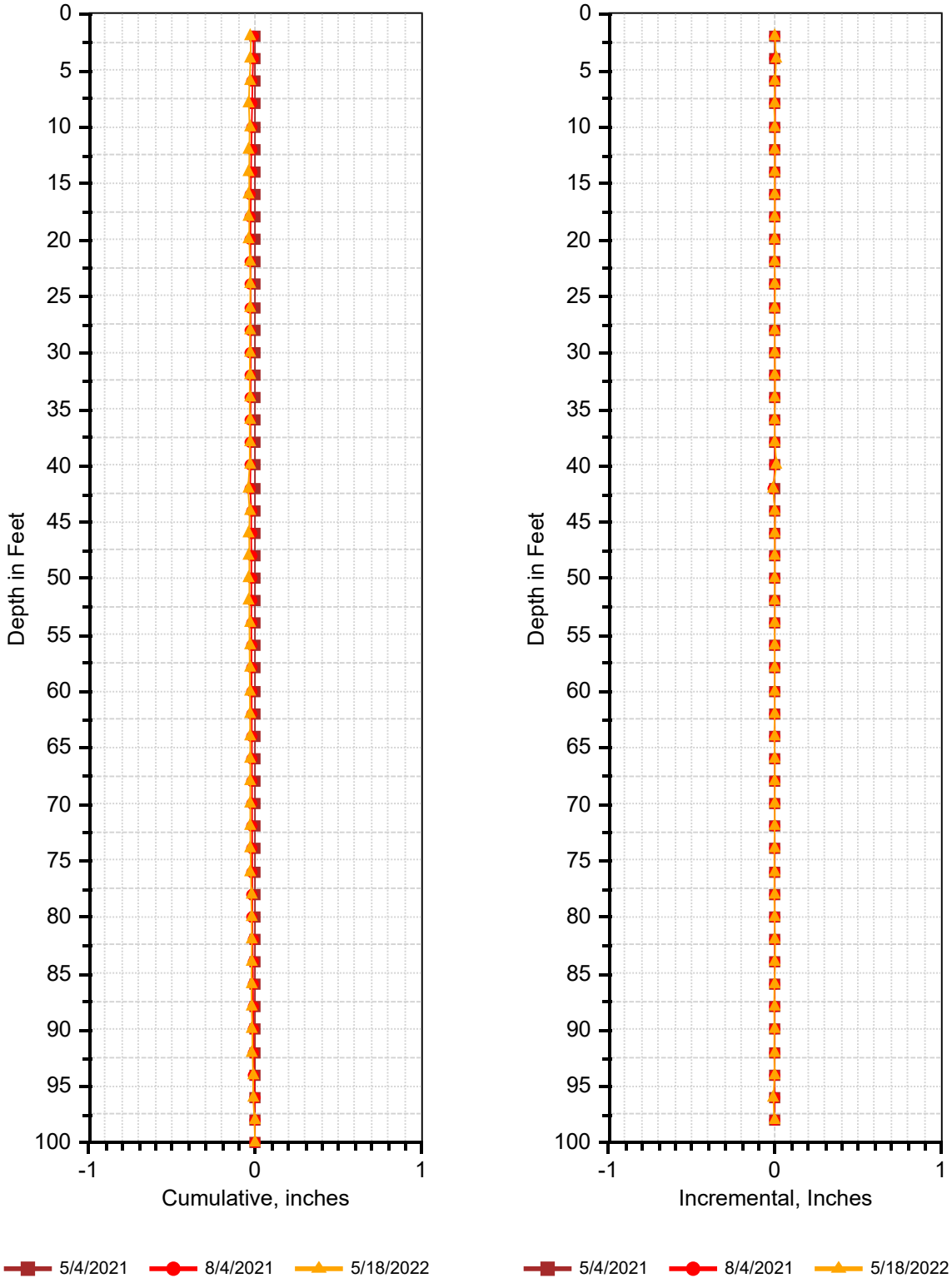
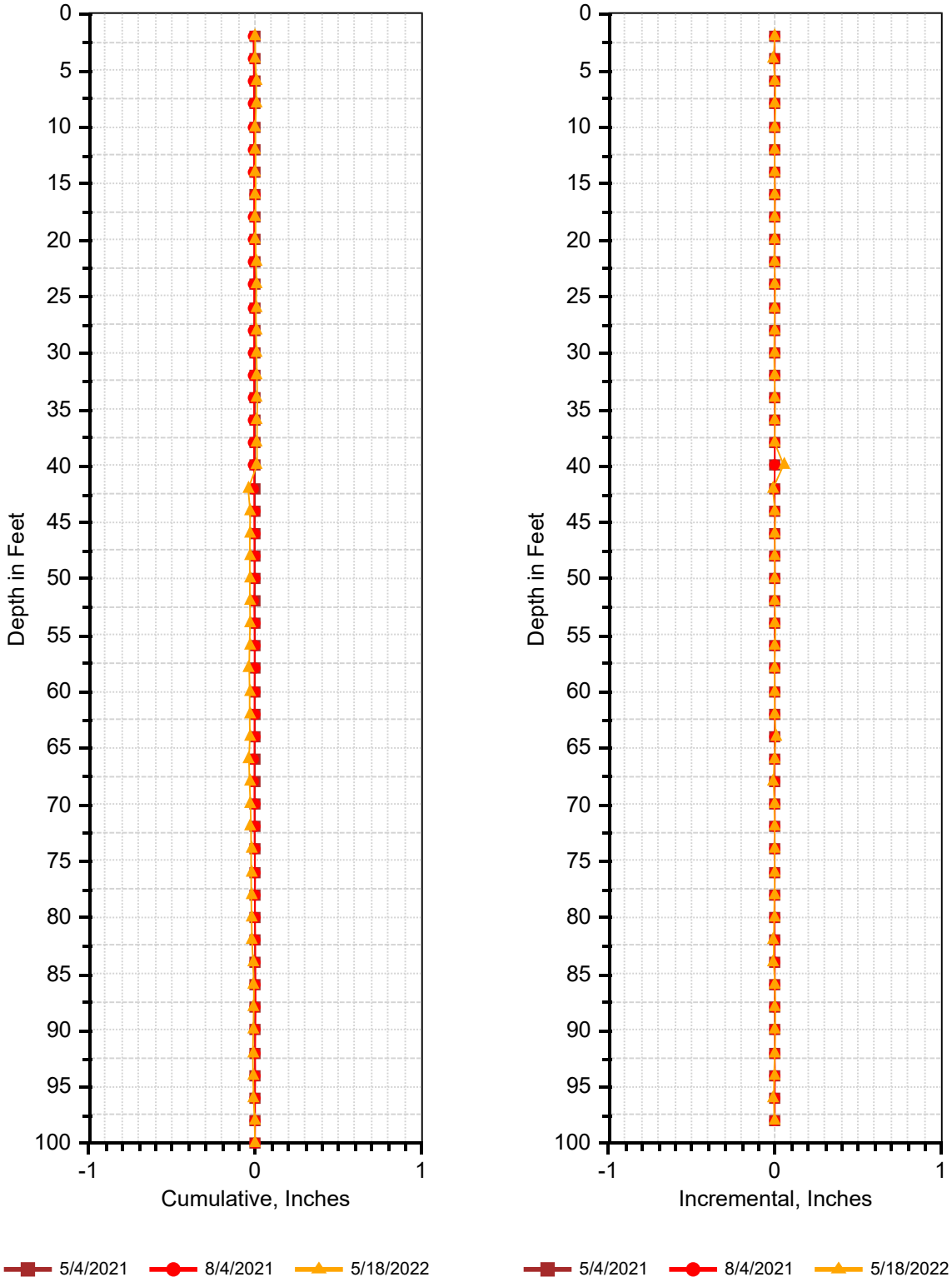
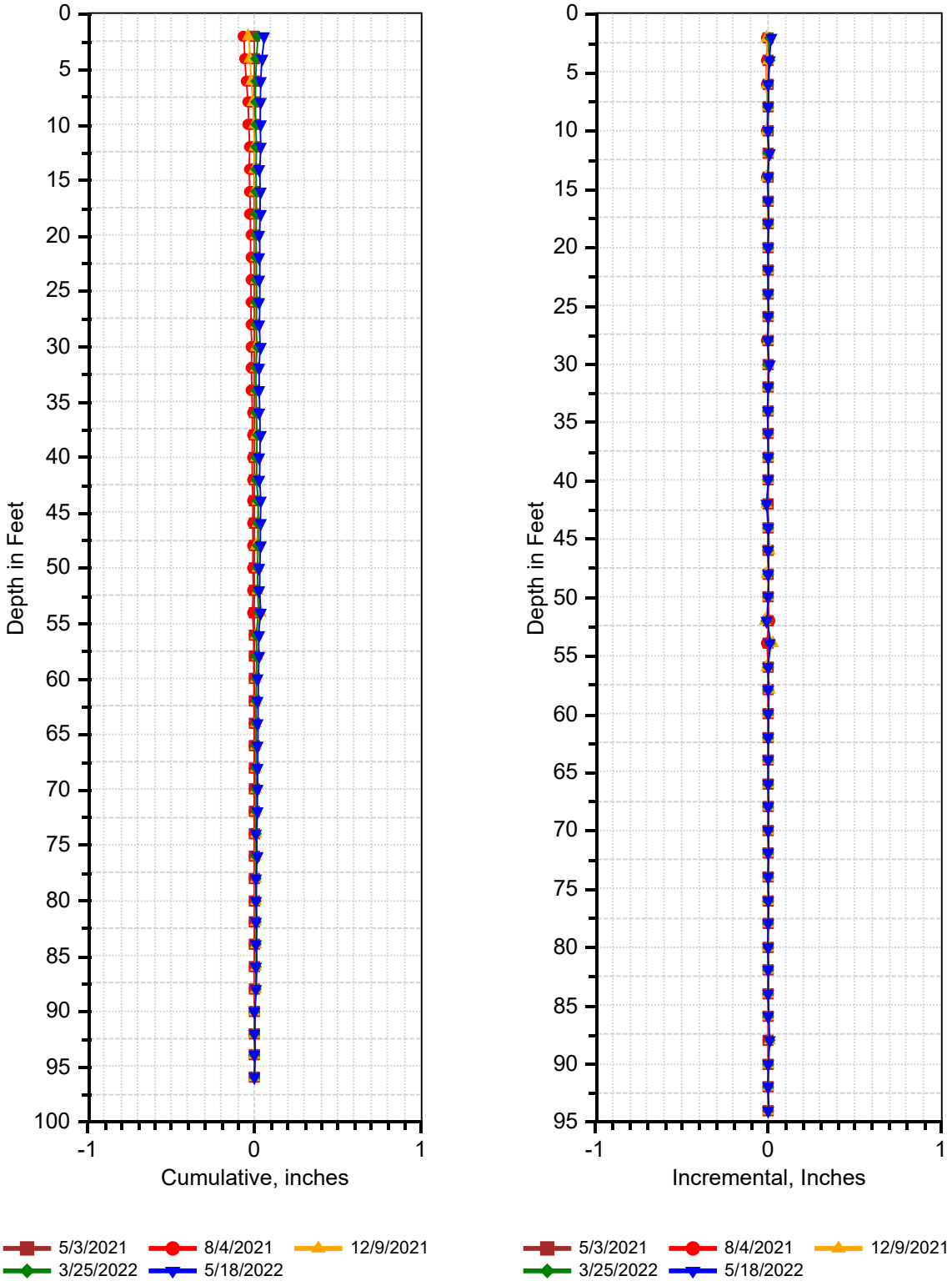


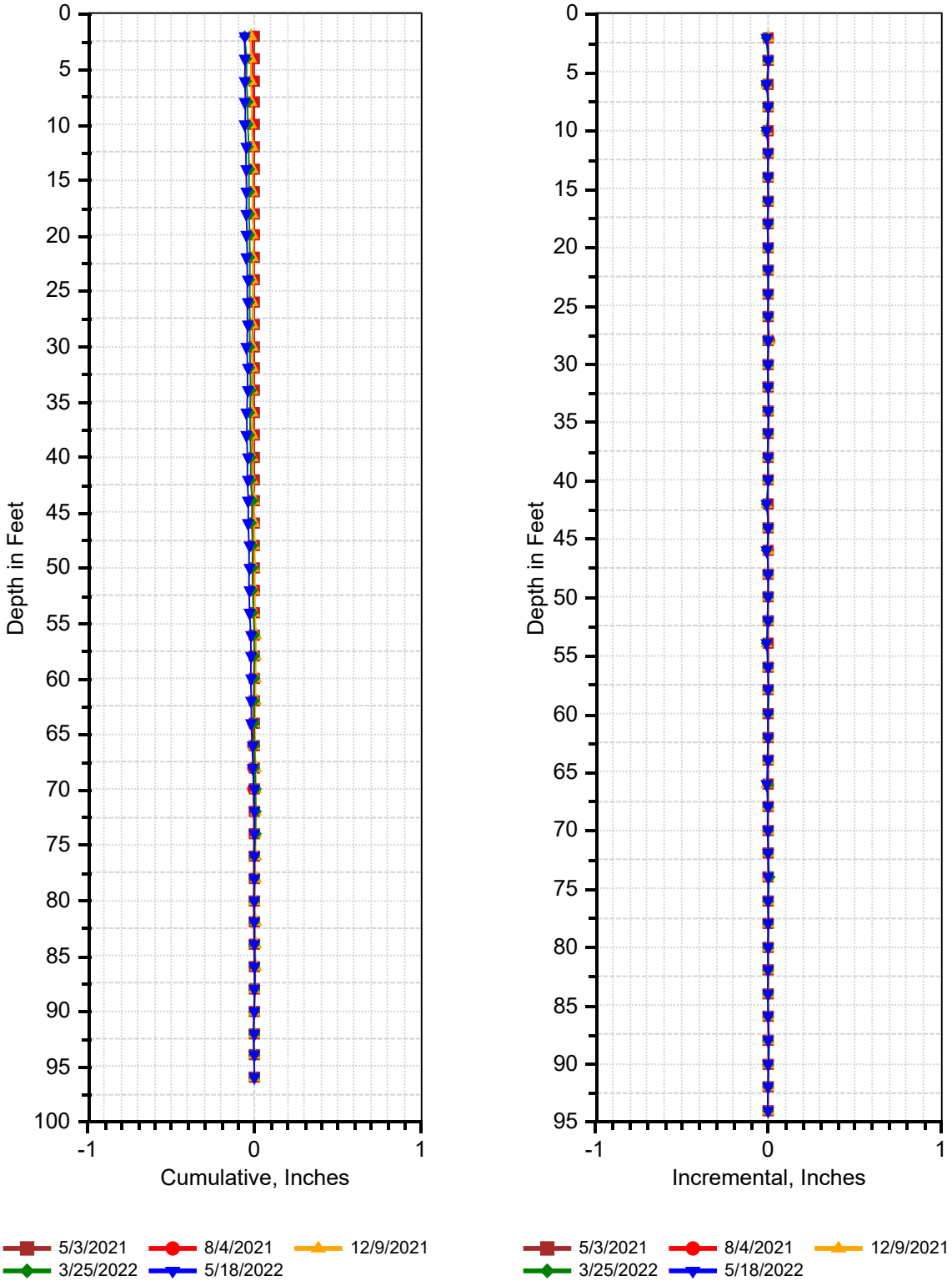
SI-7 B Direction



SI-9 A Direction



SI-9 B Direction



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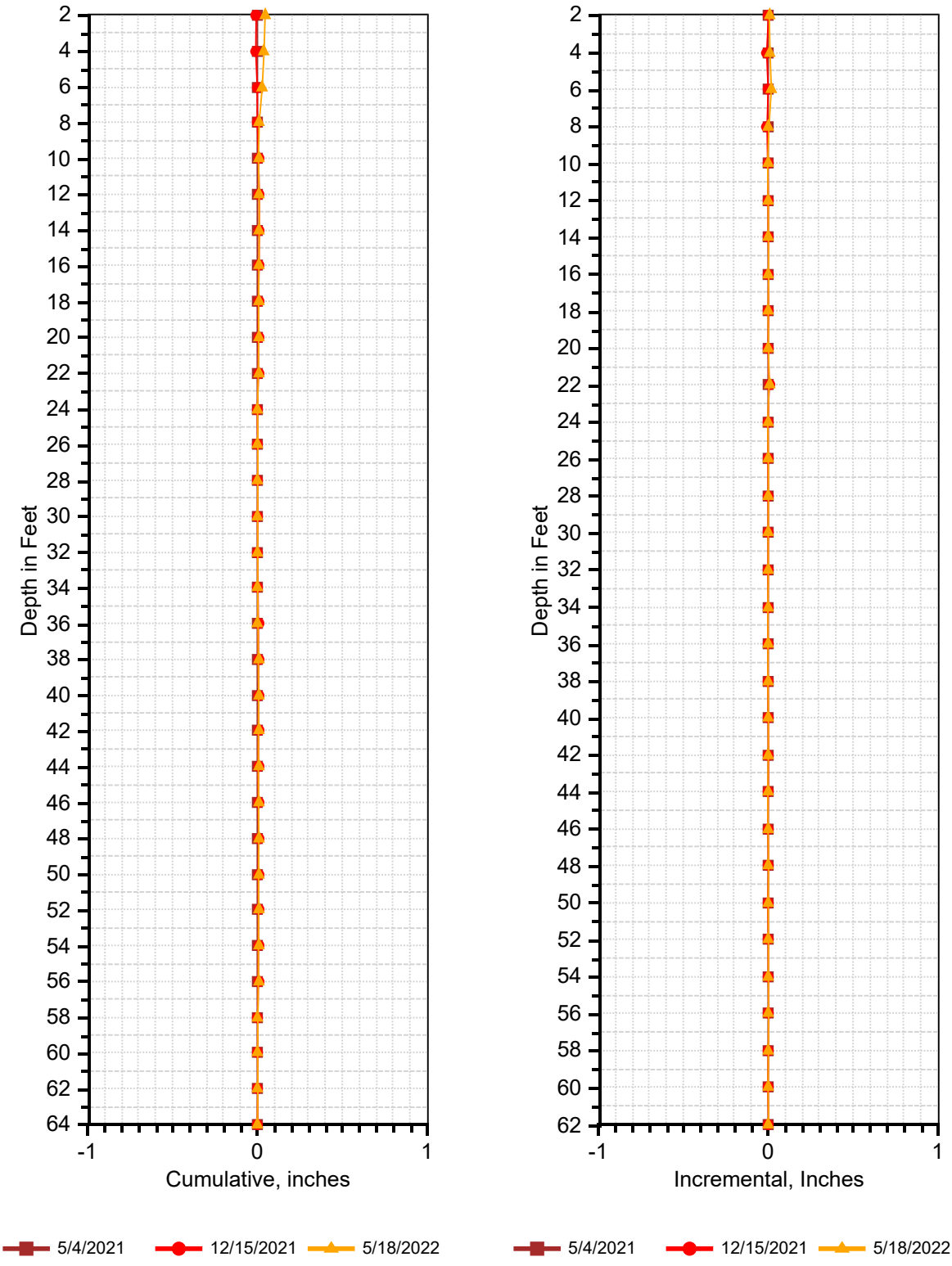

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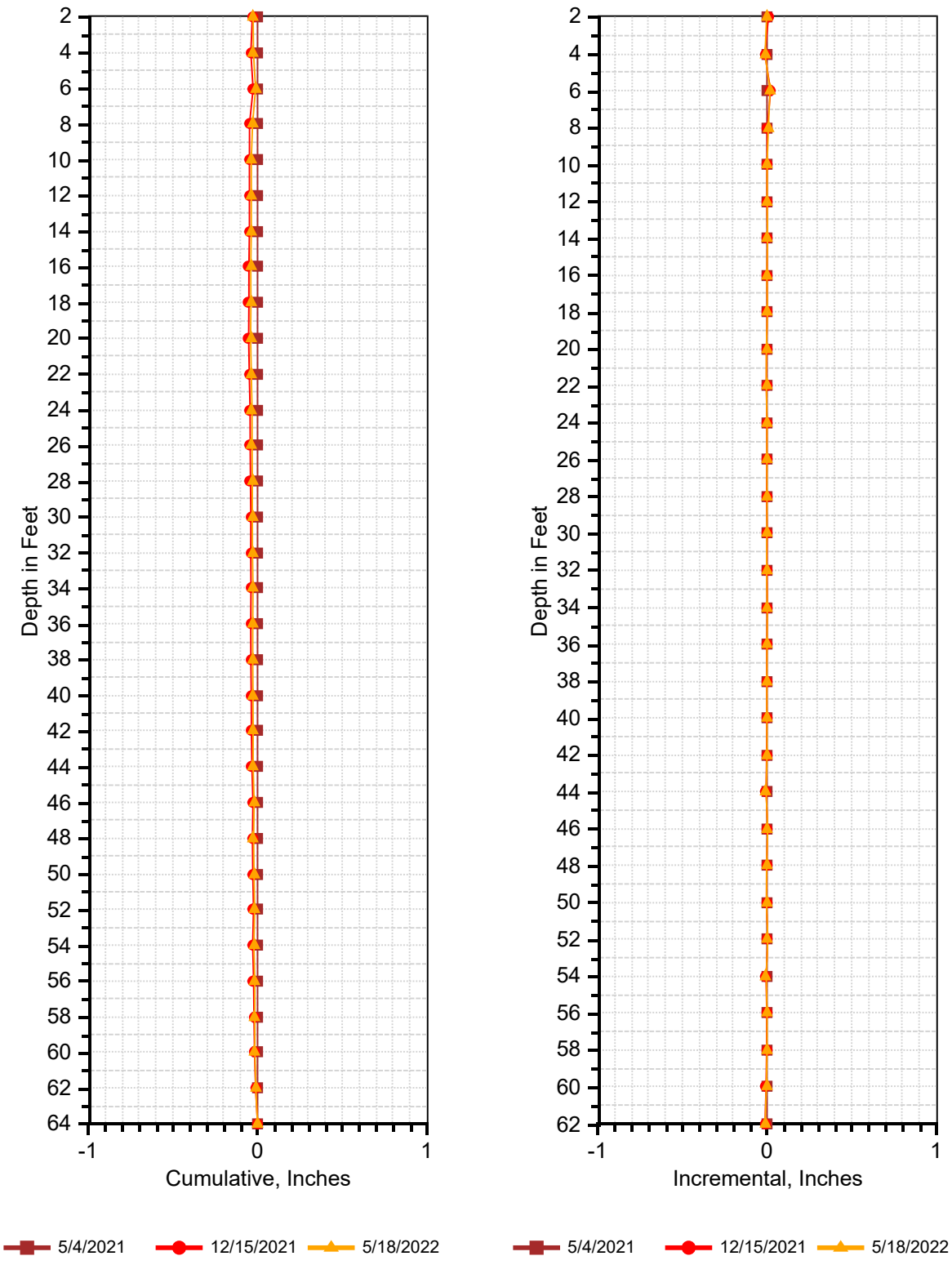

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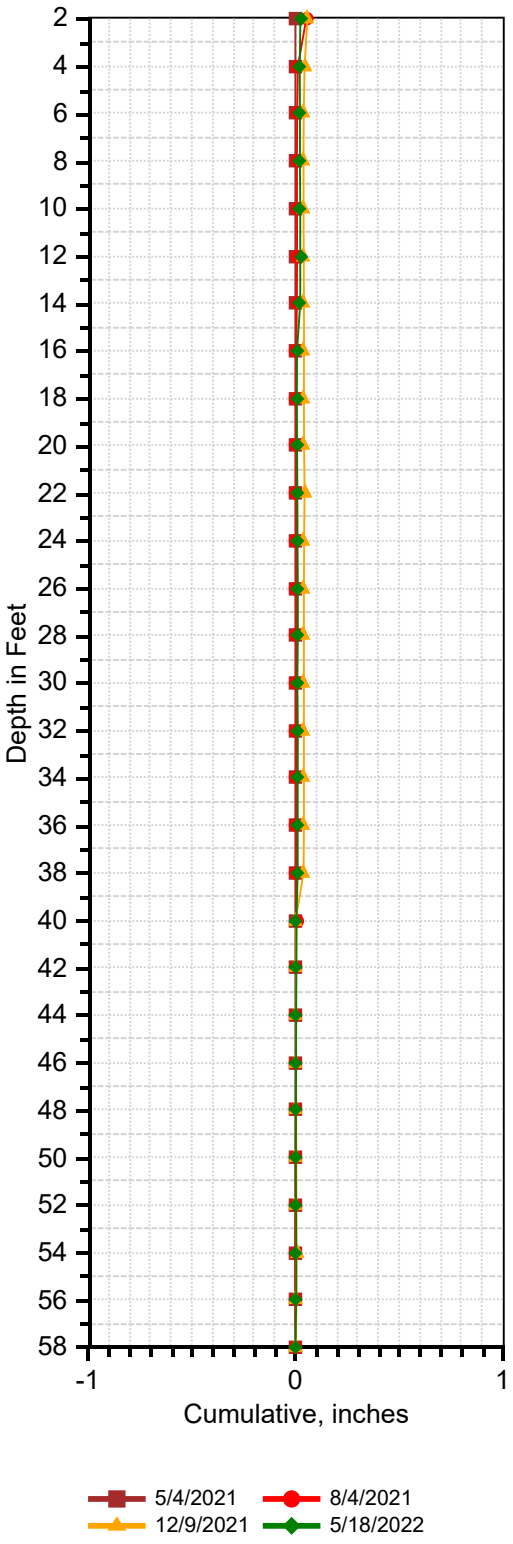

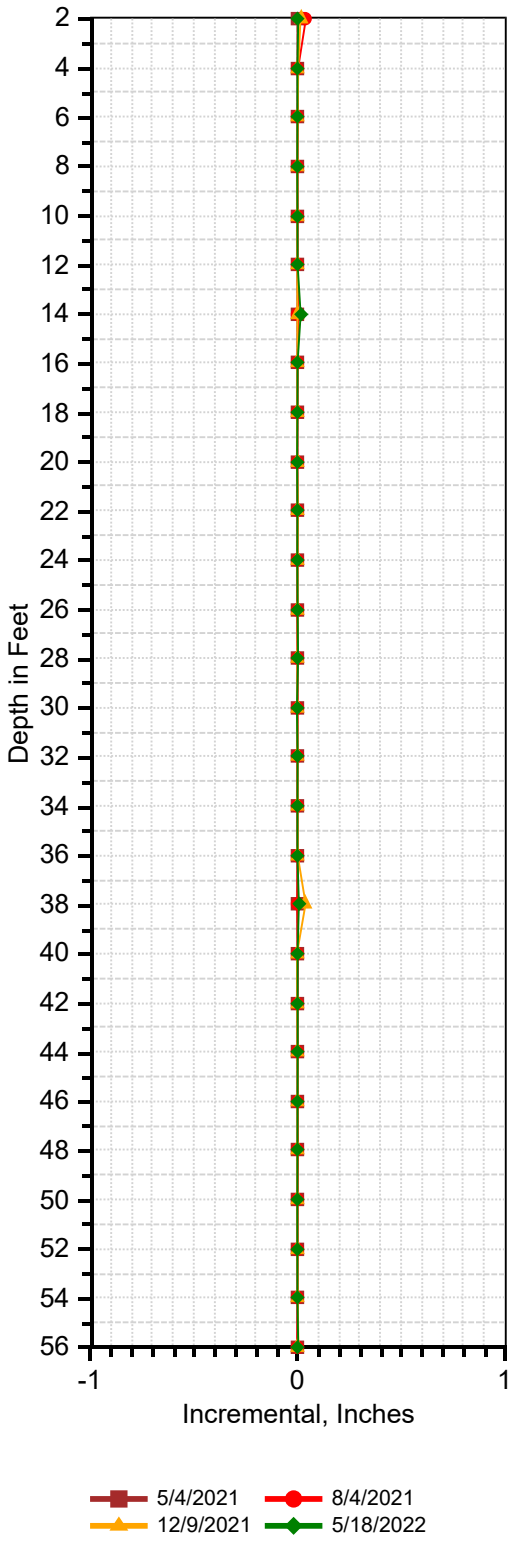

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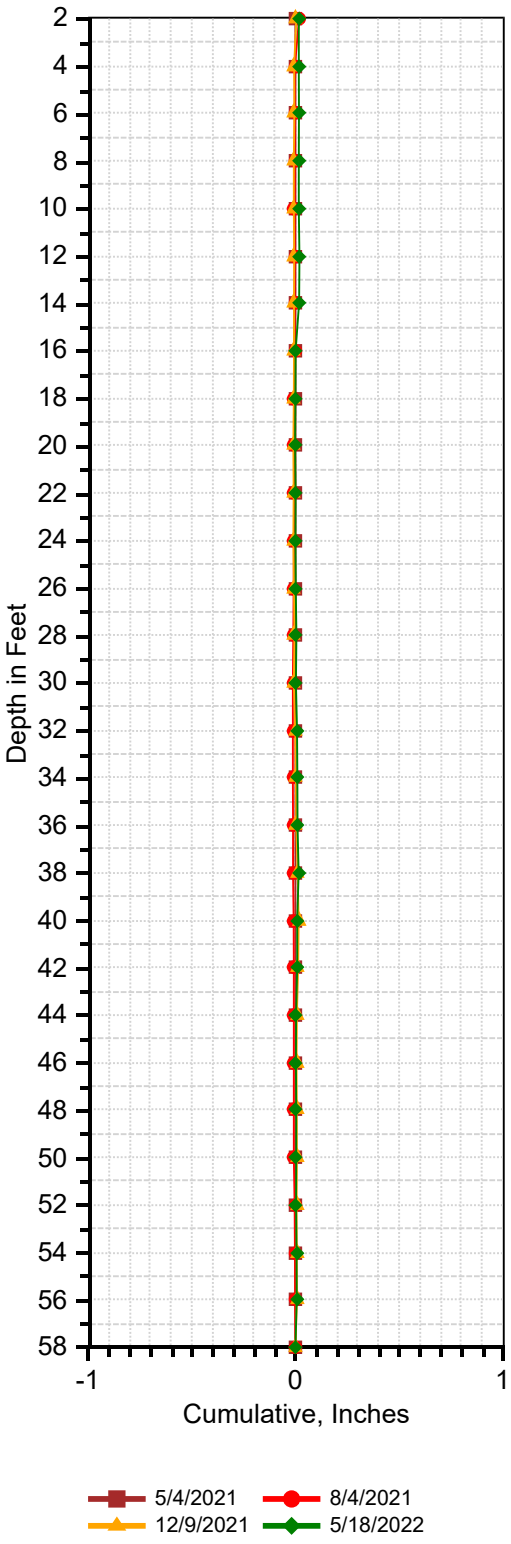

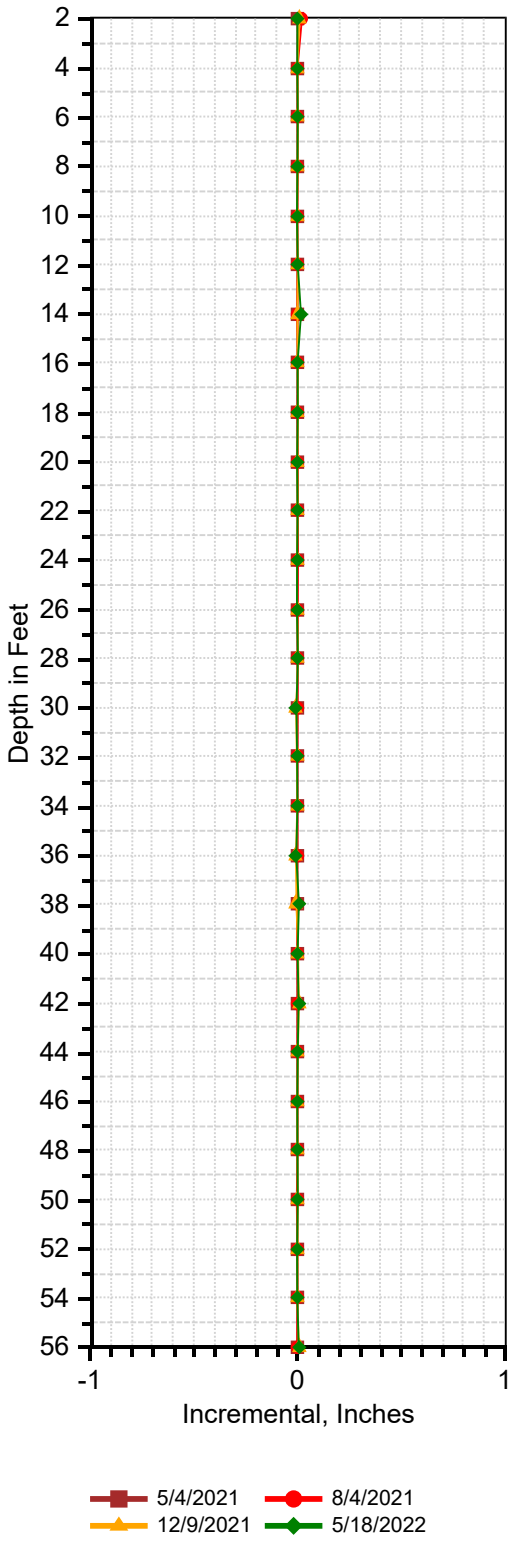

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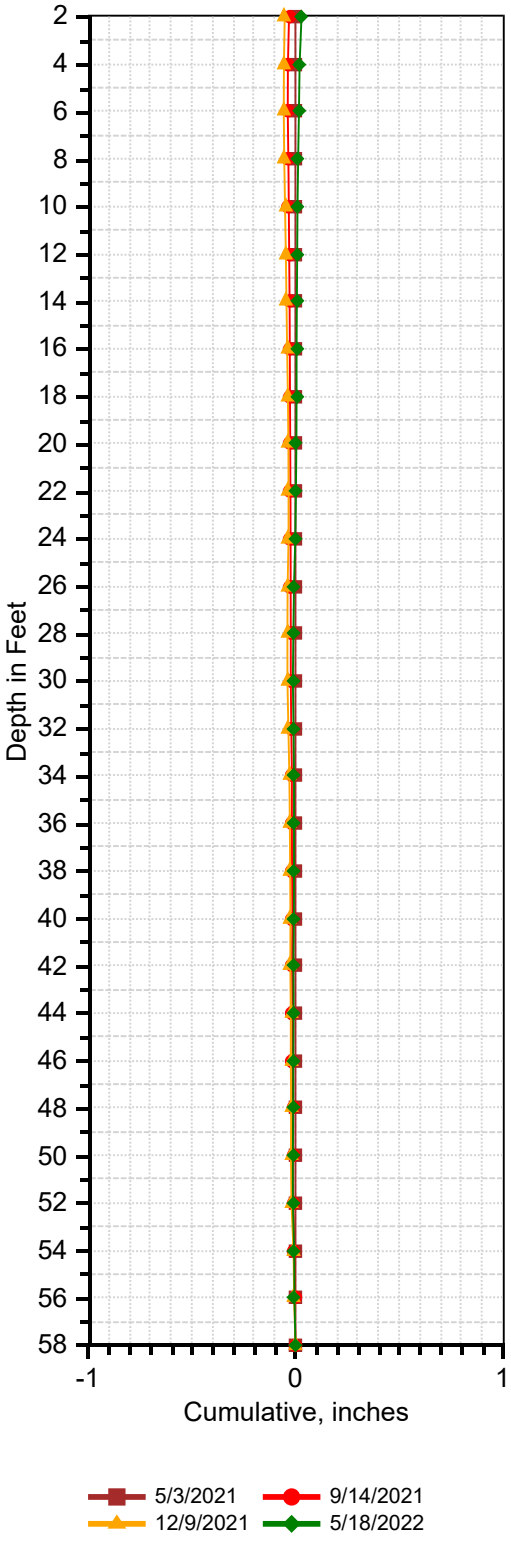
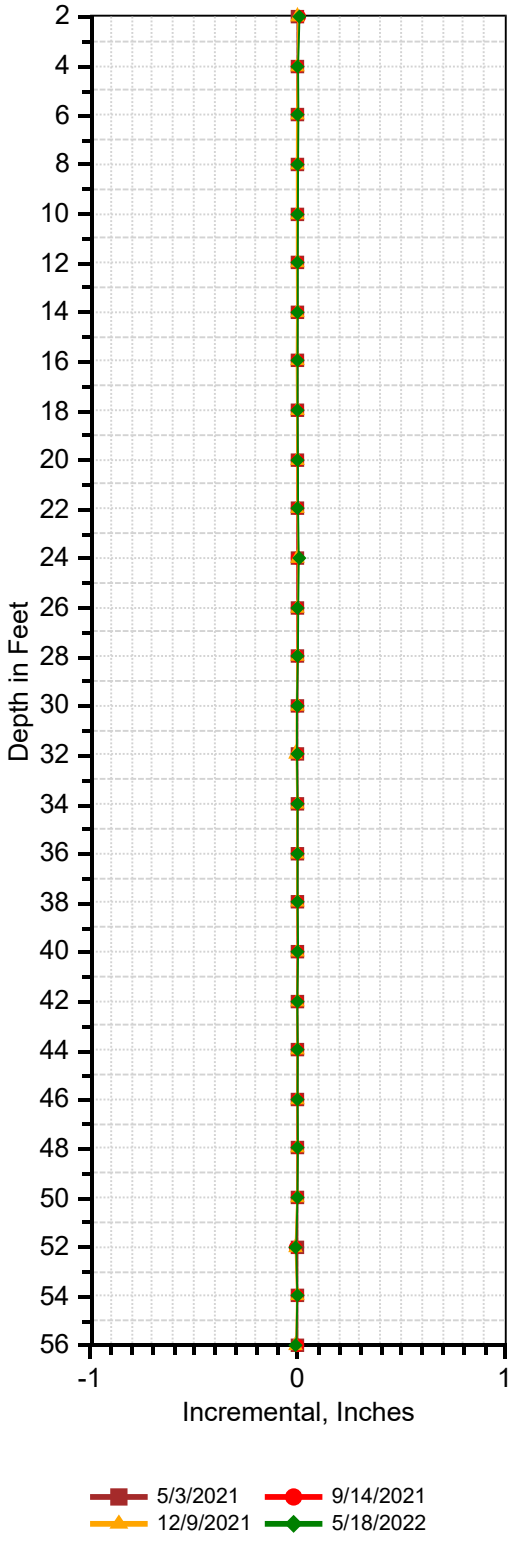
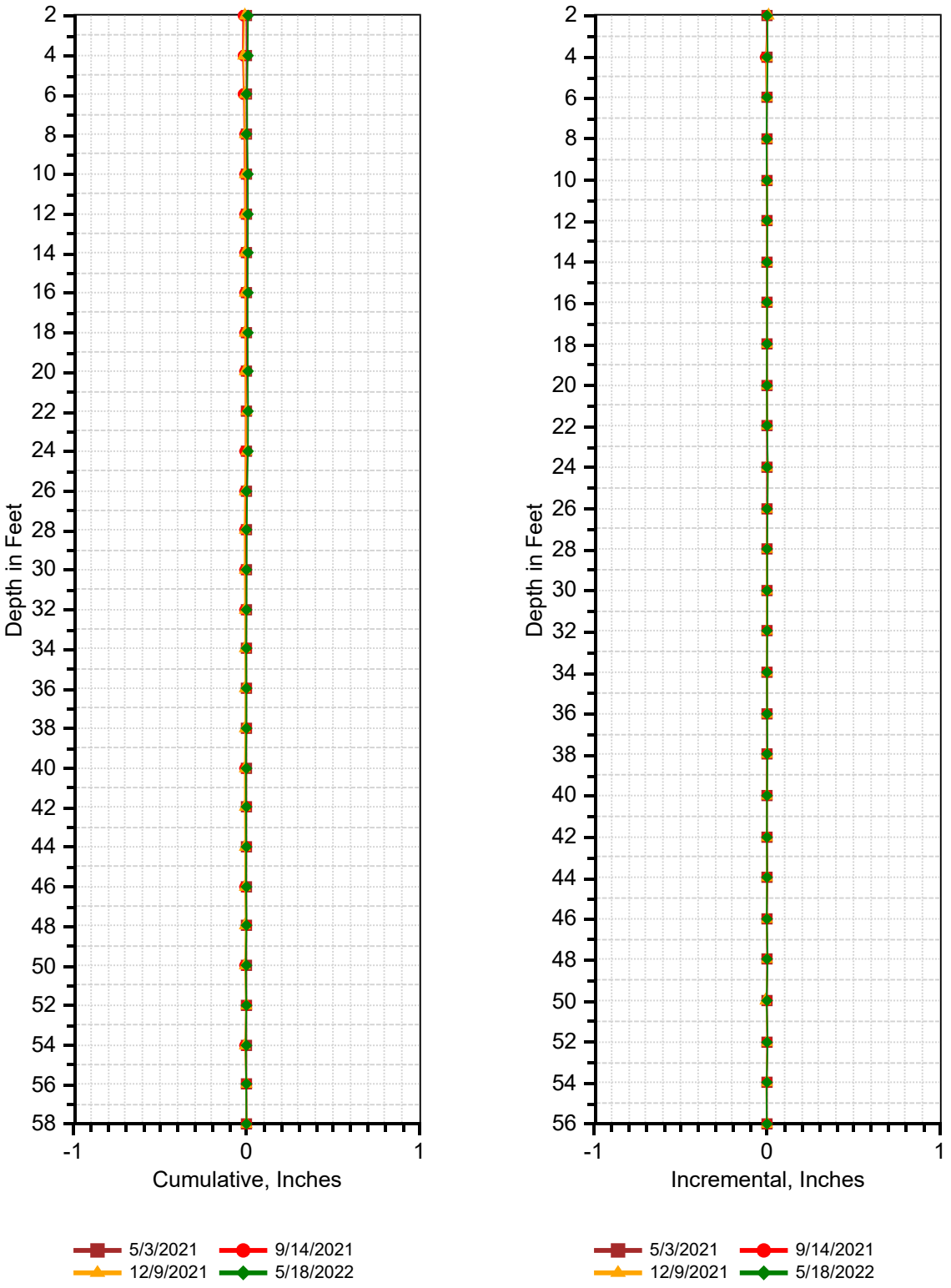




SI-12 B Direction



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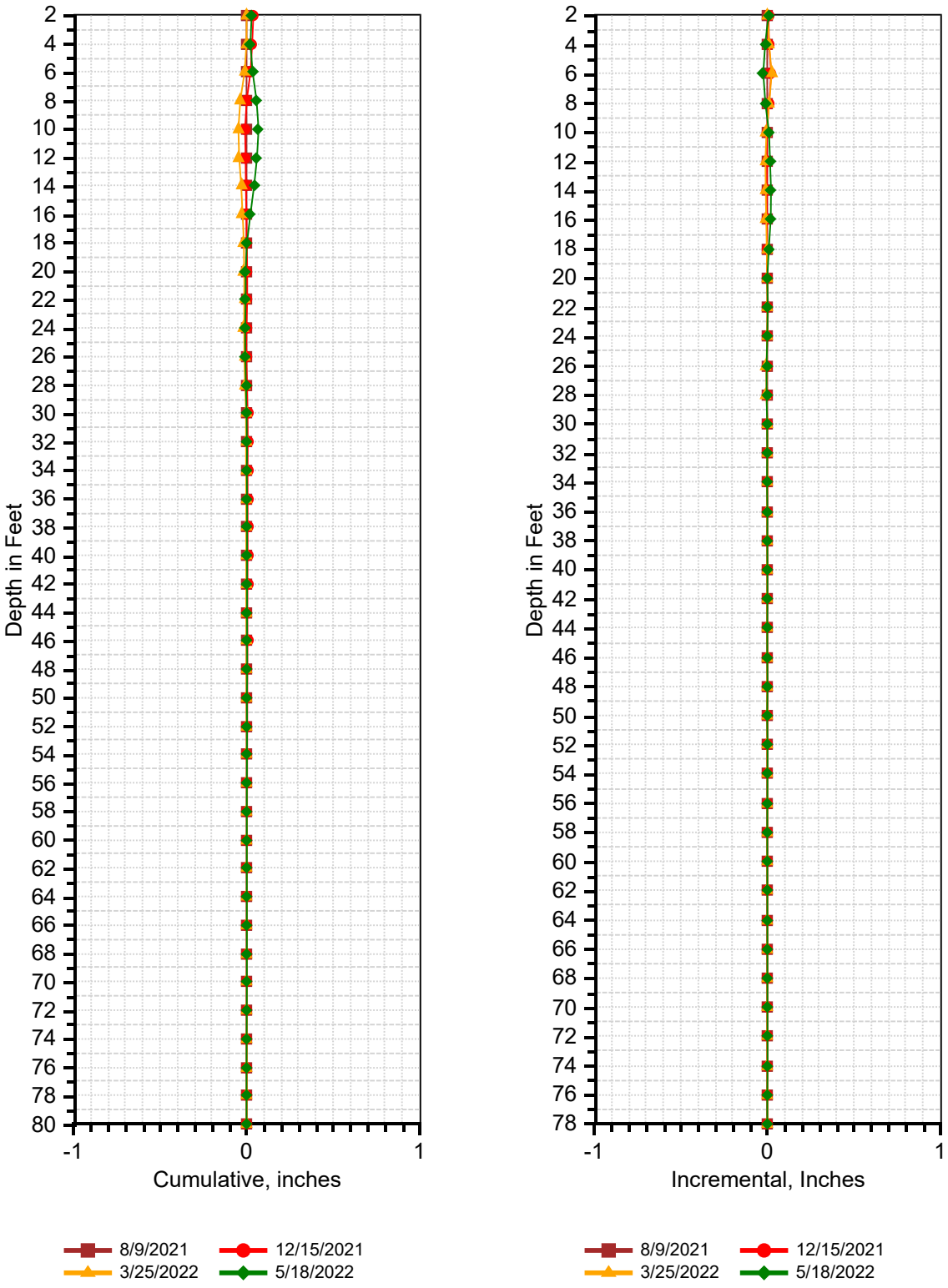

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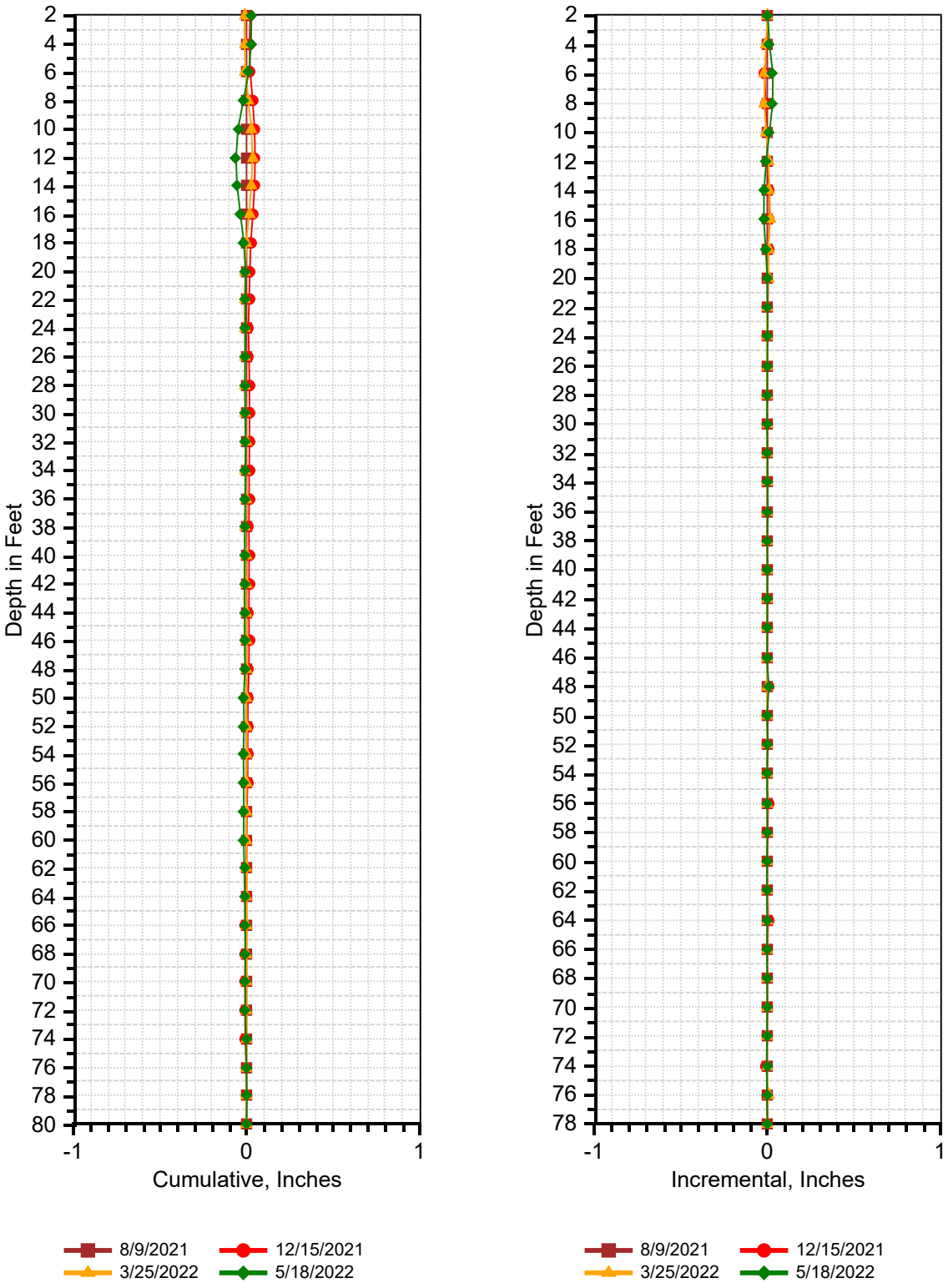
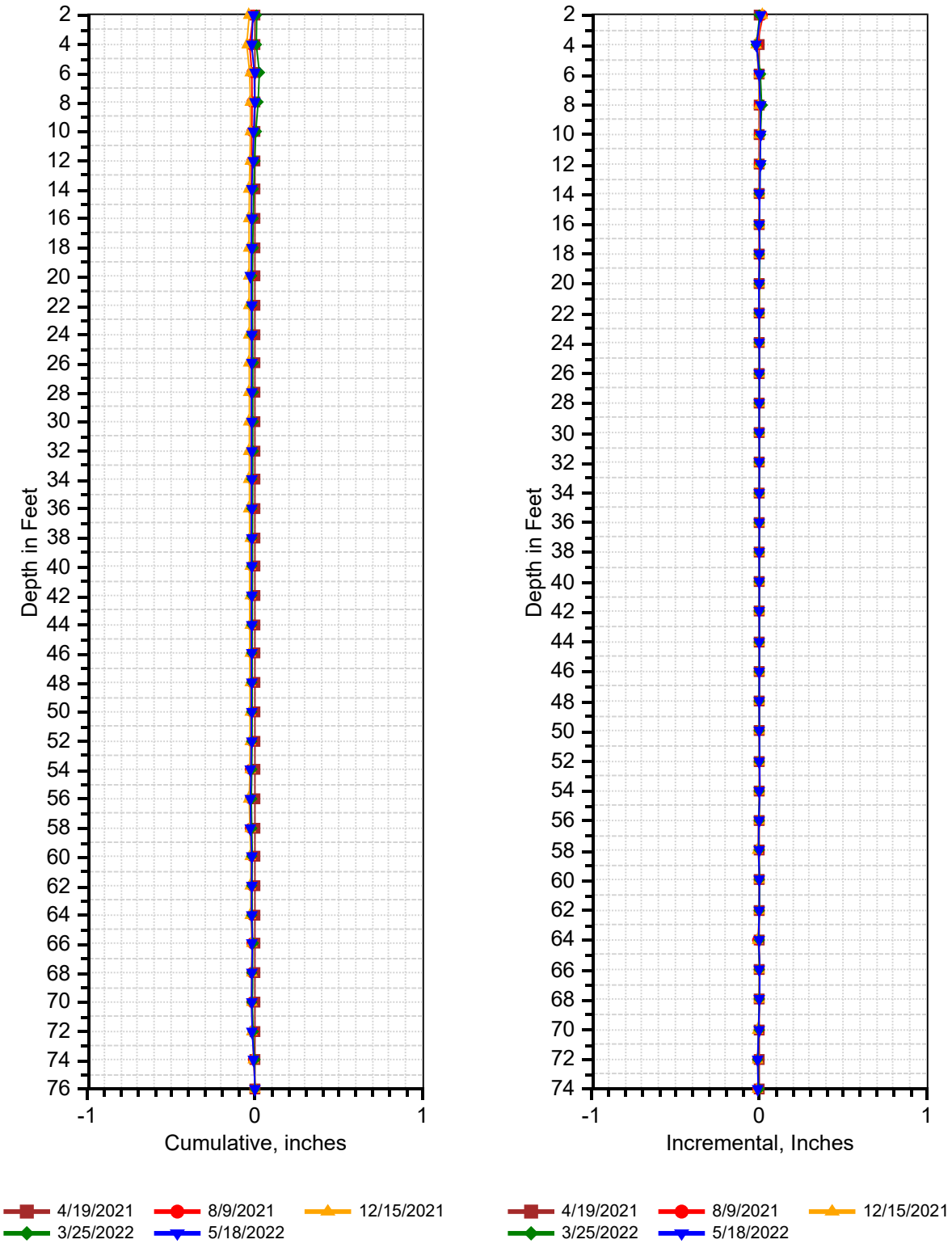


SI-14 A Direction



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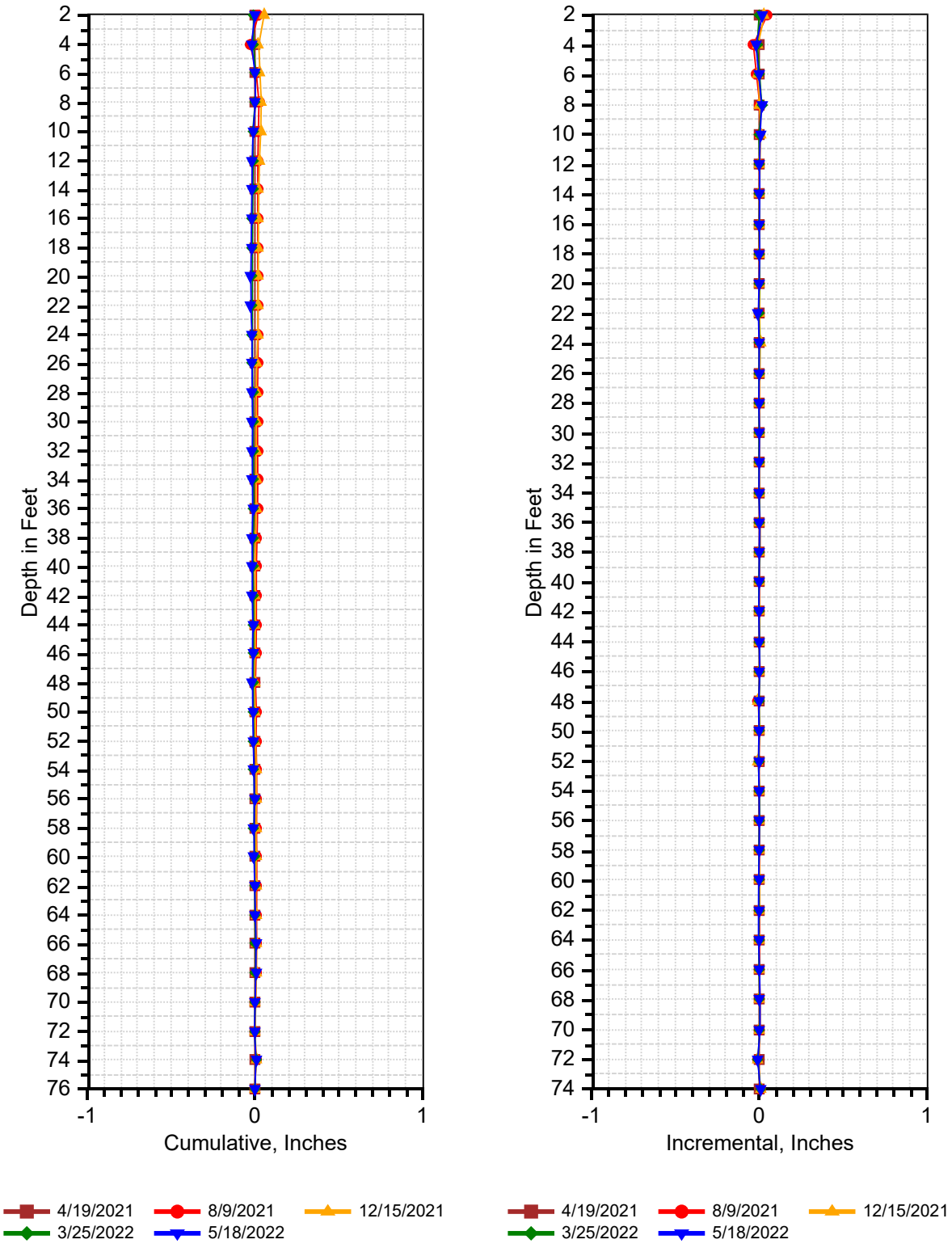
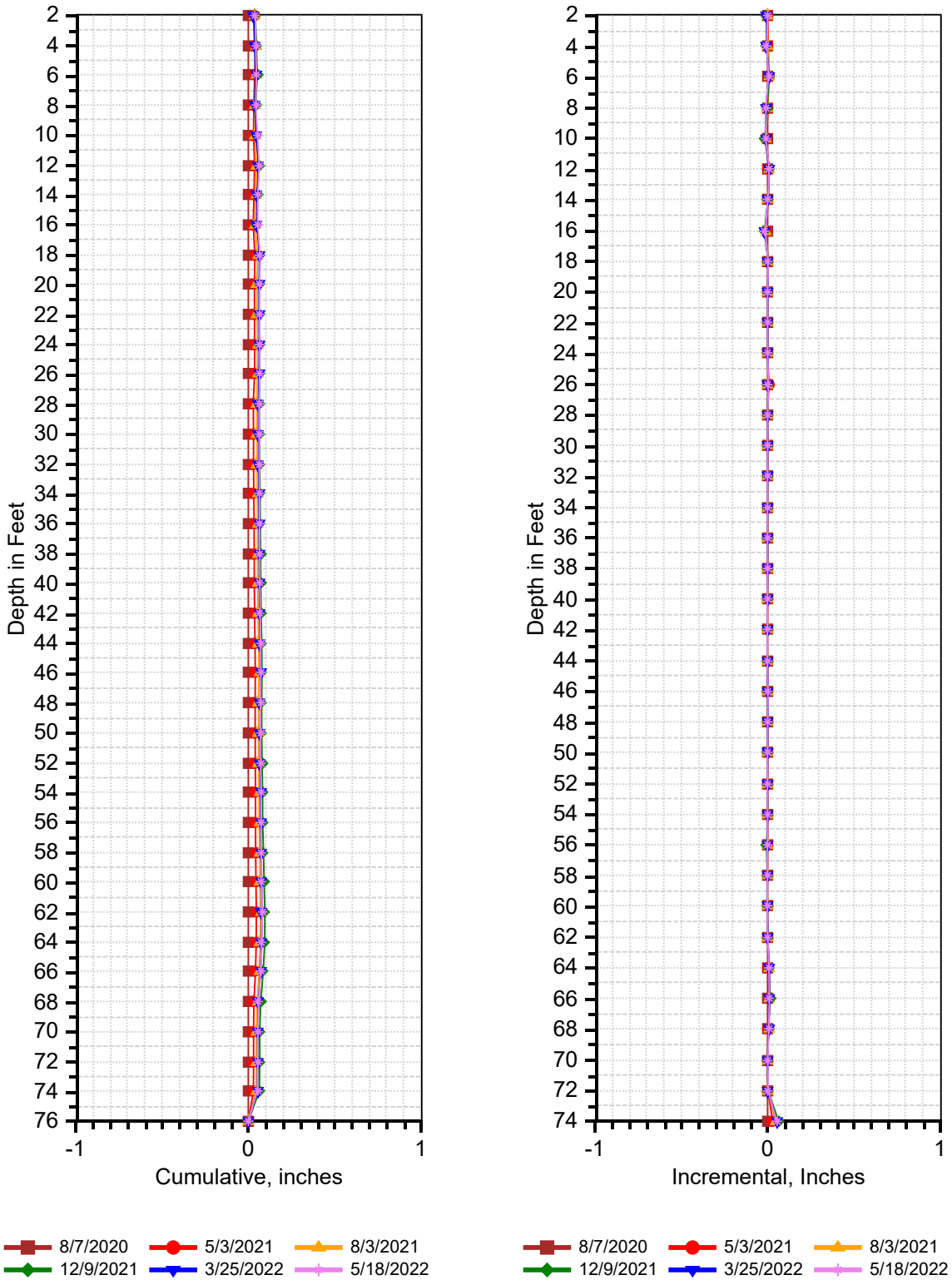
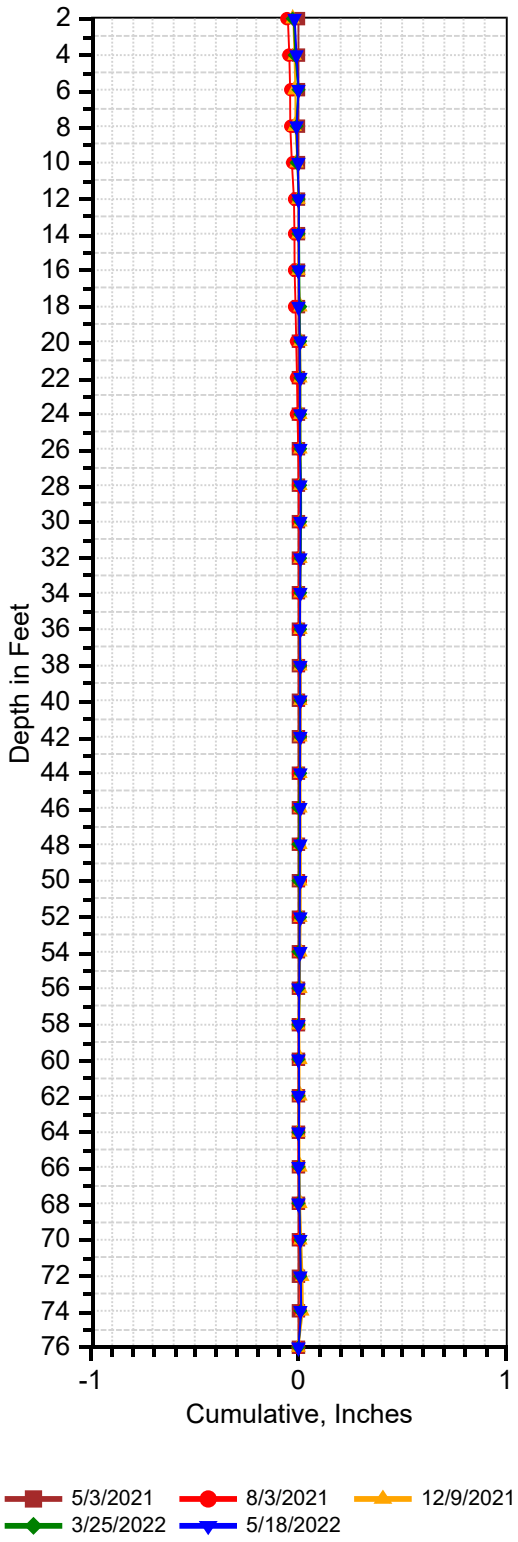
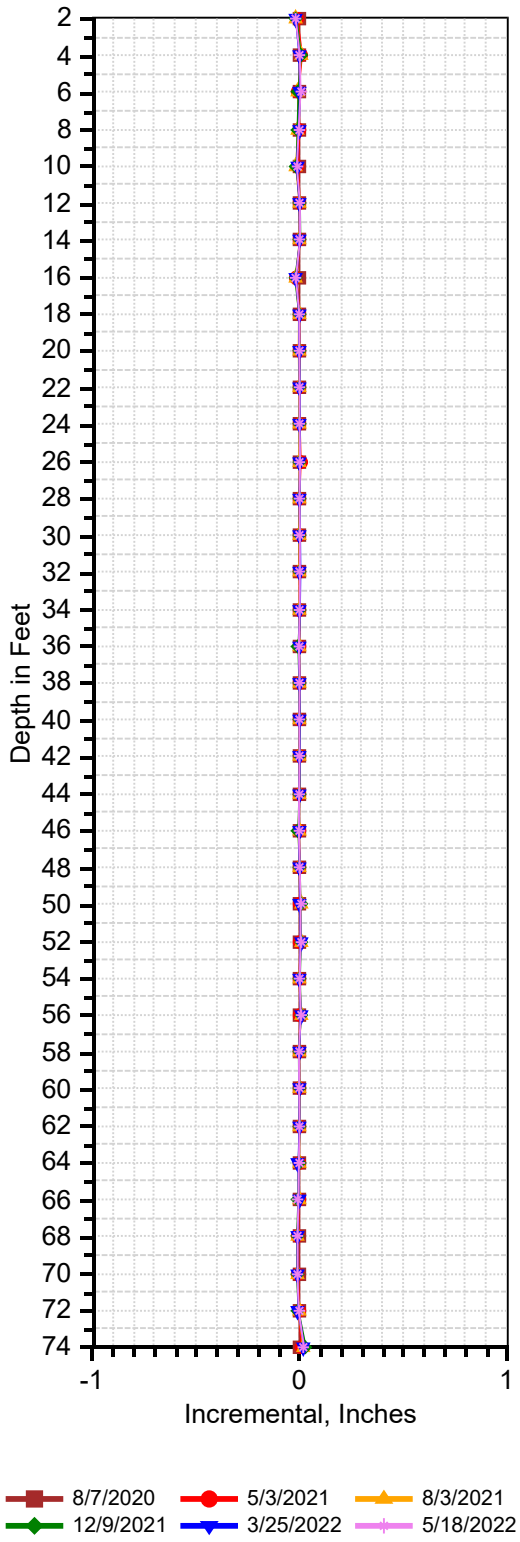


SI-15 A Direction

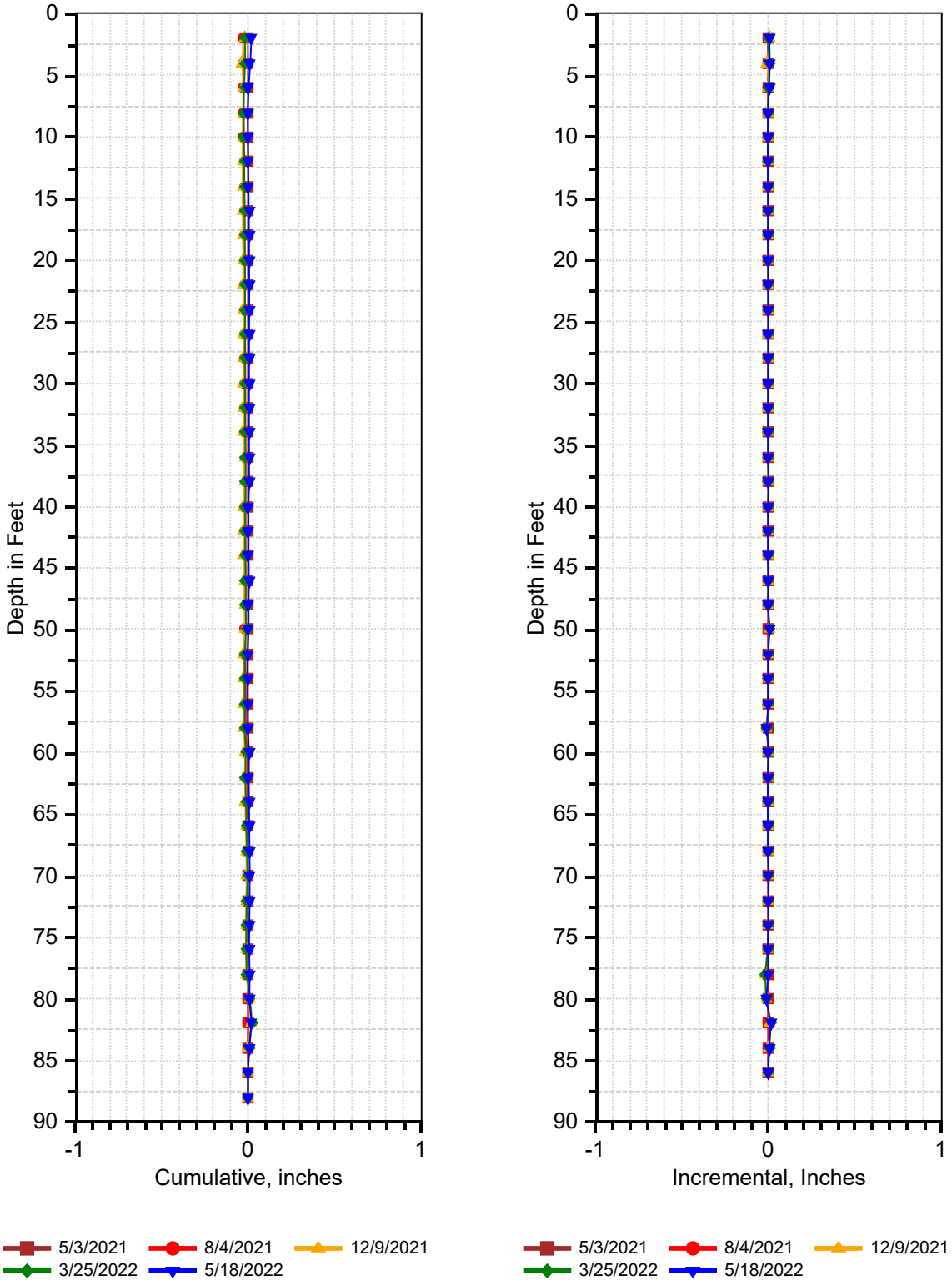


SI-15 B Direction

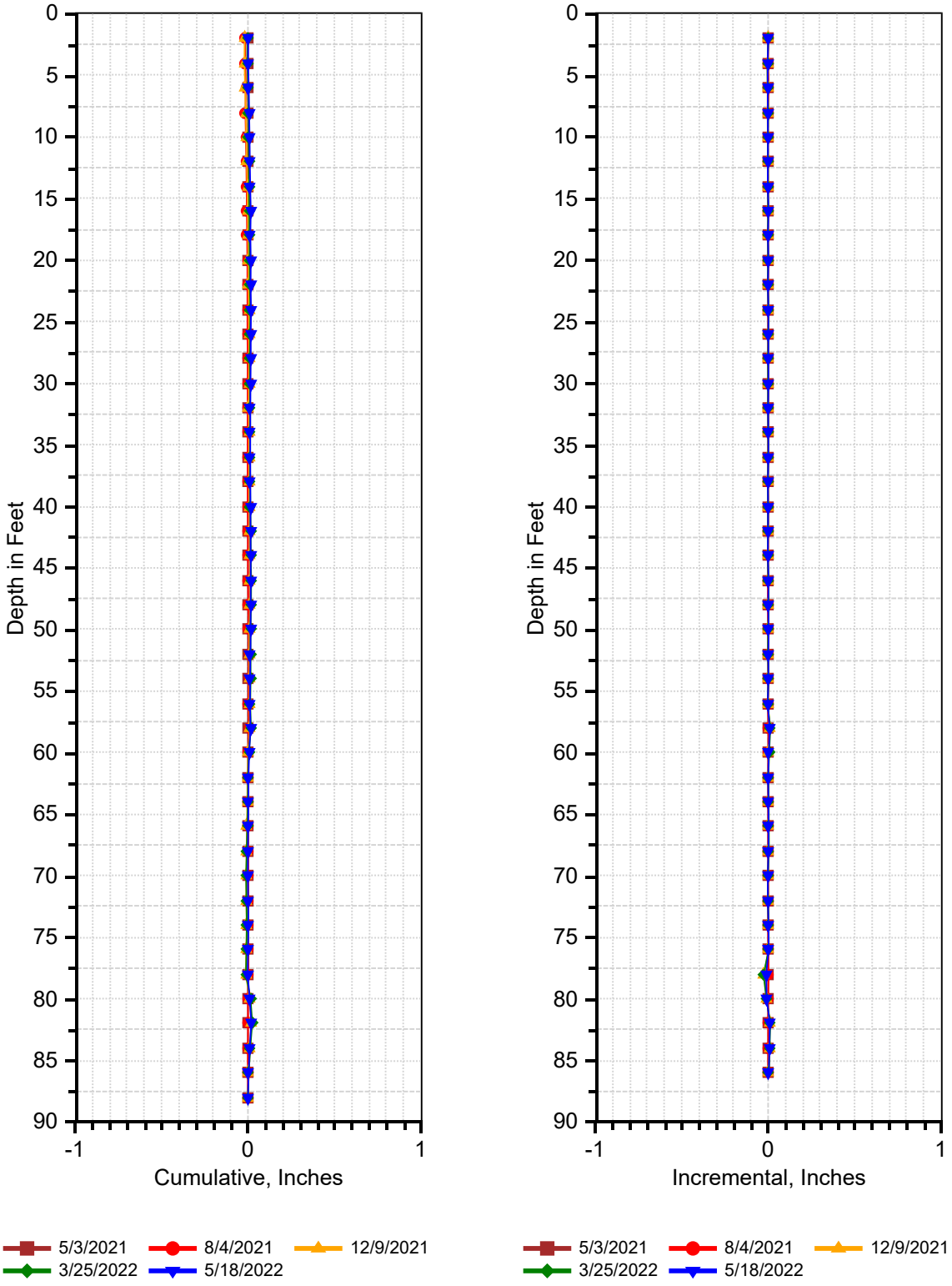




SI-16 A Direction



SI-16 B Direction



APPENDIX C - DEWATERING

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

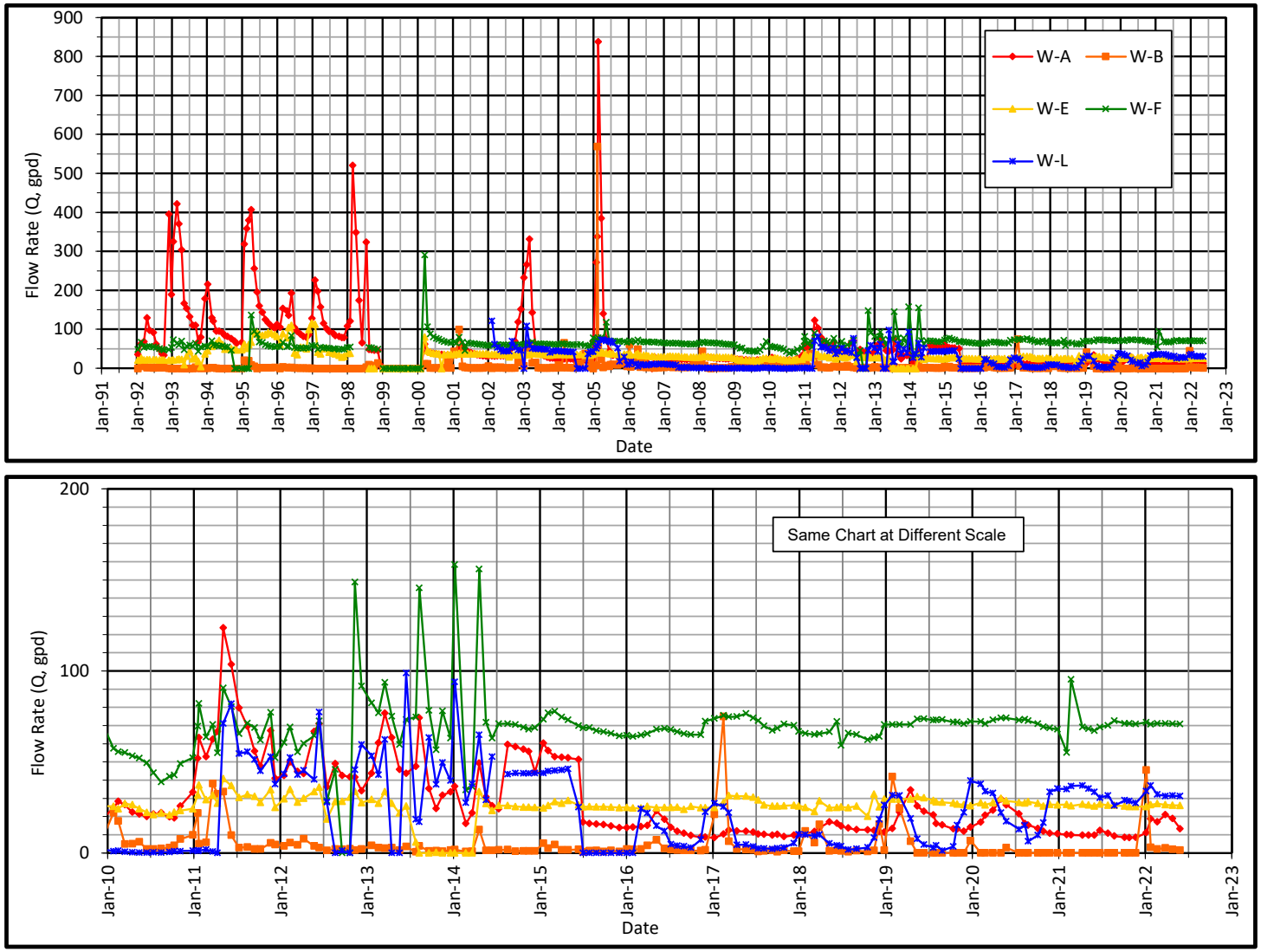
Dewatering Well Information							
Well ID	Vault Elevation (ft.)	Bottom Elevation (ft.)	Pump Elevation (ft.)	Pump Size (hp)	2021-2022 Pumping Rate (gpd)	% of Total Well Production	Comment
W-A	196.0	Unknown	45.0	1/2	13.2	5%	
W-B	204.0	169.7	173.7	1/2	4.8	2%	
W-C	295.0	233.5	237.5	1/2	47.9	17%	
W-D*	297.0	Unknown	Unknown	none	0.0	0%	Destroyed '98
W-E	215.0	Unknown	116.5	1/2	26.2	9%	
W-F	210.0	109.0	112.0	1/2	71.0	25%	
W-G*	292.0	222.0	none	none	0.0	0%	No Pump, Dry
W-H	299.5	234.5	242.5	1/3	2.4	1%	
W-I	298.0	238.0	248.0	1/3	20.9	7%	
W-J	304.0	244.0	250.0	1/3	6.4	2%	
W-K	430.0	370.0	380.0	1/3	0.0	0%	Dry
W-L	258.0	189.0	192.5	1/2	30.8	11%	
W-M	302.0	242.4	245.0	1/2	63.4	22%	

*Note: * Non-functioning Dewatering Wells*

Hydrauger Information						
Hydrauger ID	Installed Length (ft)	Functional Length (ft)	2021-2022 Flow Rate (gpd)	% of Total Production	Installed By	Comment
HD-12	93	unknown	0.0	0%	BYA	Destroyed per BYA (2000)
HD-2	127	unknown	0.0	0%	BYA	Destroyed per BYA (2000)
HD-3	155	unknown	0.0	0%	BYA	Destroyed per BYA (2000)
HD-4	80	unknown	0.0	0%	BYA	Destroyed per BYA (2000)
HD-5	65	unknown	0.0	0%	BYA	Destroyed per BYA (2000)
HD-6	97	unknown	0.0	0%	BYA	Destroyed per BYA (2000)
HD-7	227	unknown	0.0	0%	BYA	no production '21-'22
HD-8	290	unknown	0.6	0%	BYA	
HD-9	230	unknown	0.0	0%	BYA	no production '21-'22
HD-10	330	unknown	0.0	0%	BYA	no production '21-'22
HD-11	230	unknown	0.0	0%	BYA	no production '21-'22
HD-12	330	unknown	0.0	0%	BYA	no production '21-'22
HD-13	210	unknown	80.5	65%	BYA	
H-1	240	unknown	43.0	35%	LA County	
H-2	180	unknown	0.0	0%	LA County	No outlet to monitor
ROWH-1	--	unknown	0.0	0%	BYA	discharge diverted from H-2
H-3	235	unknown	0.0	0%	LA County	Destroyed 1998
H-4	140	unknown	0.0	0%	LA County	Destroyed 1998
H-5	260	unknown	0.0	0%	LA County	Destroyed 1998
H-6	140	unknown	0.0	0%	LA County	Destroyed 1998
H-7	205	unknown	0.0	0%	LA County	Destroyed 1998
H-1A	100	92	0.0	0%	Fugro	no production '21-'22
H-2A	130	125	0.0	0%	Fugro	no production '21-'22

DEWATERING WELL / HYDRAUGER INFORMATION
Calle del Barco Landslide Assessment District
Malibu, California

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



DEWATERING WELL DISCHARGE RATE GRAPH
Rambla Orienta and Slope
Calle del Barco Landslide Assessment District
Malibu, California

PLATE C-2

Yeh and Associates, Inc.
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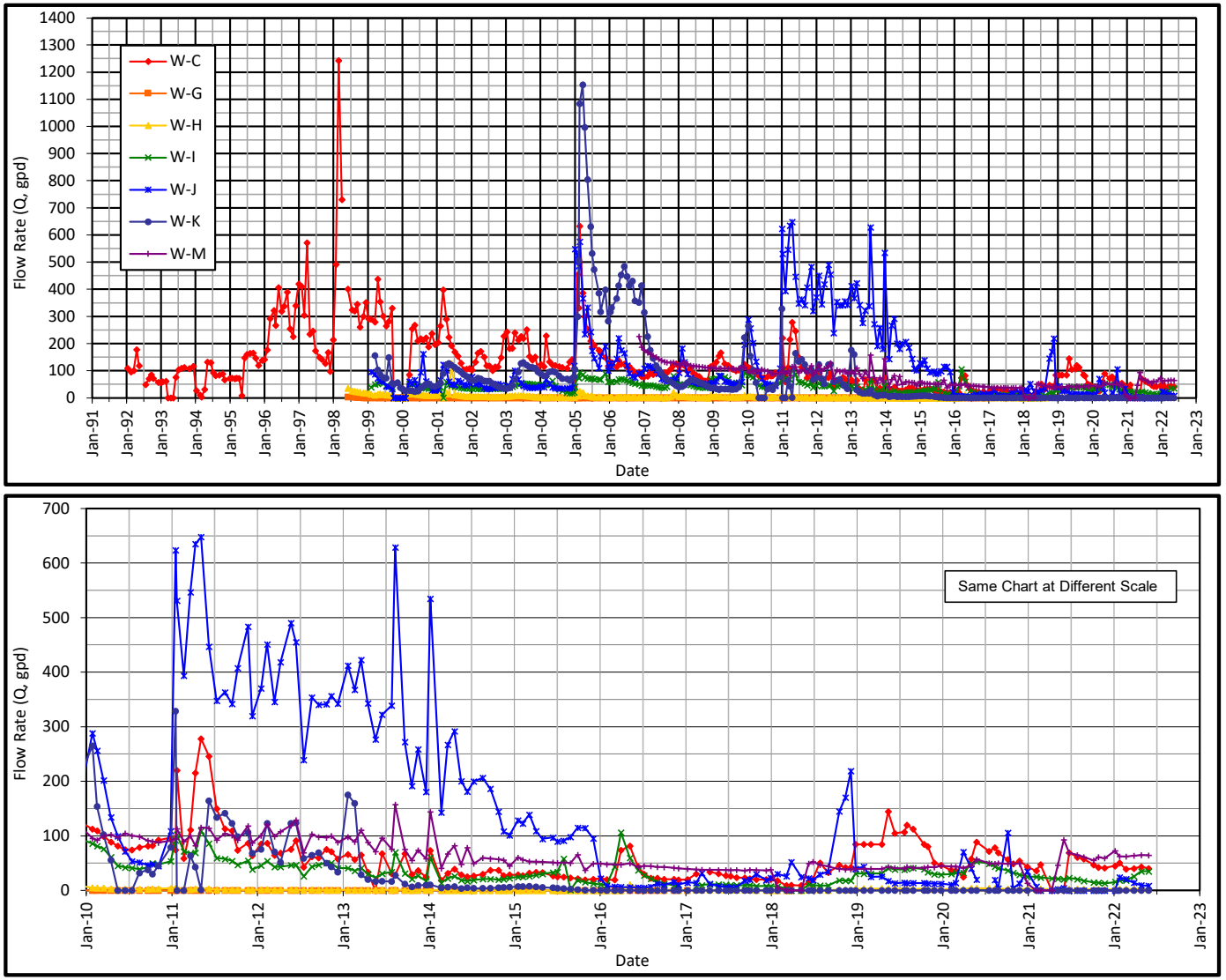

DEWATERING WELL DISCHARGE RATE GRAPH
Calle del Barco and Rambla Pacifico
Calle del Barco Landslide Assessment District
Malibu, California

Yeh and Associates, Inc.
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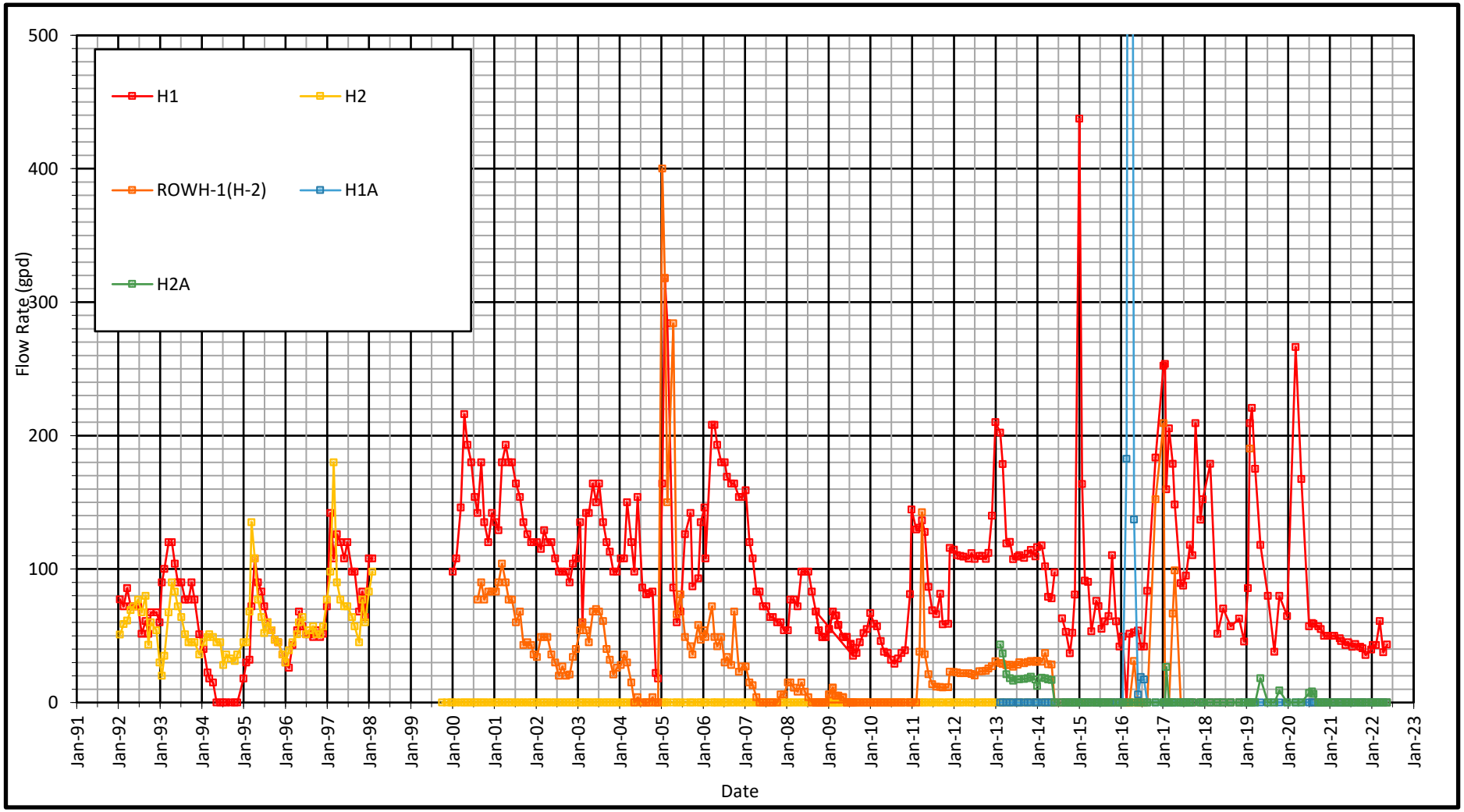

HYDRAUGER DISCHARGE RATE GRAPH
Rambla Orienta
Calle del Barco Landslide Assessment District
Malibu, California

PLATE C-4

Yeh and Associates, Inc.
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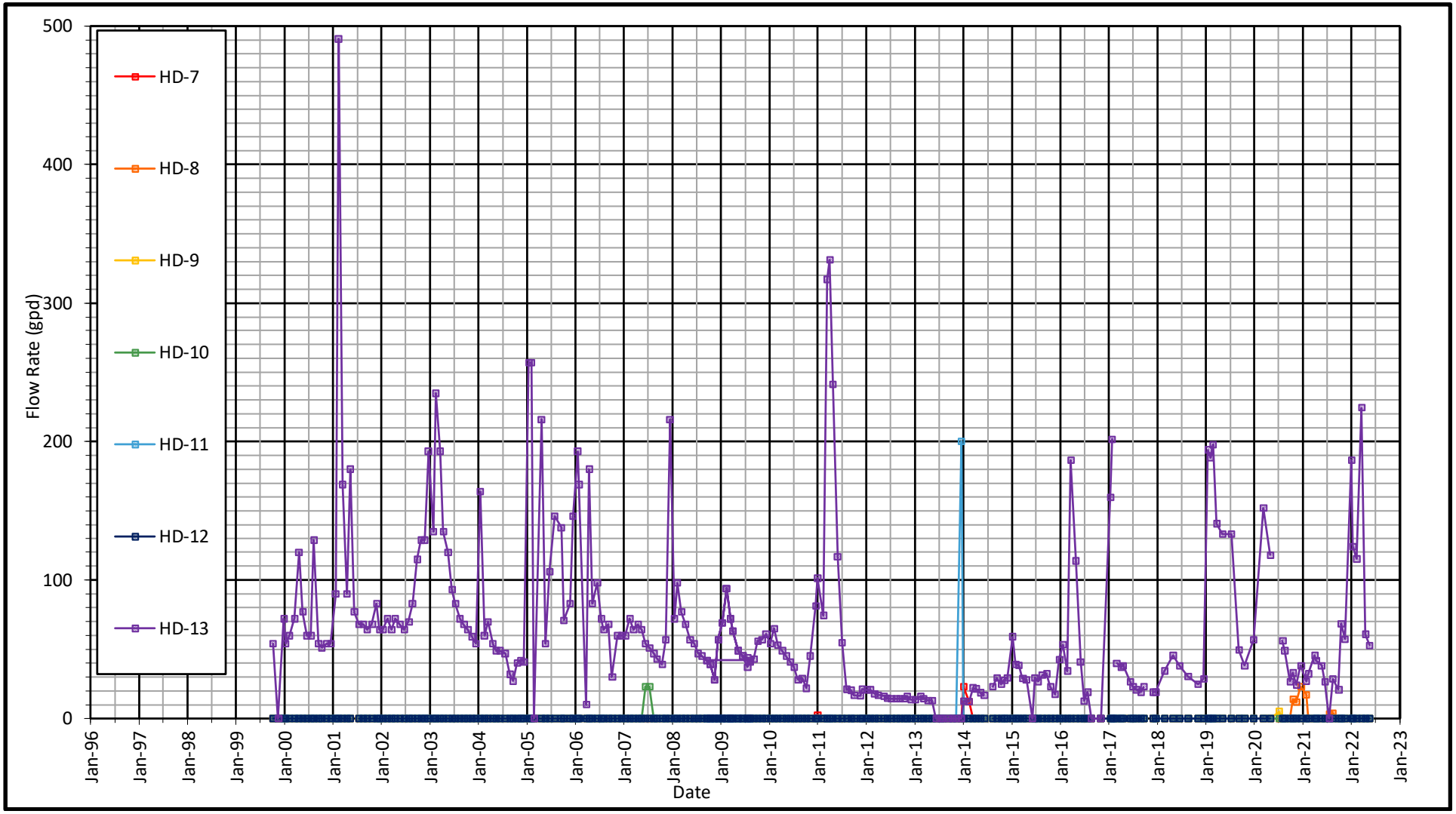

HYDRAUGER DISCHARGE RATE GRAPH
Calle del Barco and Rambla Pacifico
Calle del Barco Landslide Assessment District
Malibu, California

PLATE C-5