9375 Chillicothe Road
Kirtland, OH 44094-8501

T (440) 256-6500

www.sme-usa.com

May 24, 2017

David Lastovka, P.E.
ODOT District 12 Transportation Engineer
Ohio Department of Transportation
5500 Transportation Boulevard
Garfield Heights, Ohio 44125-5396

E-mail to: *Dave.Lastovka@dot.state.oh.us*

Re: April 25, 26, 27, and 28, 2017 Monthly Readings
CUY-90-15.24 Slope Monitoring
PID 96504
SME Project No. 069032.00

Dear Mr. Lastovka:

Monthly instrument readings at the I-90 west slope taken on April 25, 26, 27, and 28, 2017 are presented in this report. Monthly readings currently include instruments at I/P-001-13, I/P-002-13, I/P-003-10, P-003-13, I/P-004-13, I-008-10, I/P-009-13, B-101, B-102, B-105A, B-05-02, B-05-04, B-05-A-11, P-1, P-9N. Changes reported for the individual instruments are for the previous four-week period unless noted otherwise.

Piezometer Readings

Pore pressure readings at P-002-13, P-003-13 and B-05-A-11 show variations in total head of less than 0.5 feet for the period.

P-001-13 – Pore pressure readings in all piezometers at this location had a net increase in total head ranging from 0.4 to 0.8 feet, with the largest increases occurring in the top five piezometers.

P-003-10 – Total head in the piezometers at this location varied over a range of about 1 foot during this period. Variation in the deepest piezometer was greater than 1 foot. Net changes for the period were less than 0.5 feet.

P-004-13 – Pore pressures in the piezometers at this location varied over a range of 2 to 2.5 feet this period. Pore pressures in the shallow piezometer had been decreasing the prior month. Then in early to mid-April there was an increase of about 2 feet followed by a gradual decrease resulting in a net increase of about 0.8 feet. Pore pressures in the deep piezometer experienced a series of downward spikes throughout this period. The greatest decrease, about 2.5 feet, occurred in early April. Each successive decrease was smaller resulting in a net decrease of about 0.2 feet.

P-009-13 – Pore pressure readings in the shallow piezometer show a decrease in total head of about 0.6 feet. Total head in the deep piezometer increased by about 0.3 feet.

B-105A – Pore pressures in the piezometers at this location varied over a range of 1 to 1.5 feet. Net changes were about 0.9 feet in the shallow piezometer and about 0.2 feet in the deep piezometer.

B-05-02 – Between March 20 and March 30, 2017, pore pressure readings indicate rapid decreases of about 5.4 feet in the shallow piezometer and about 4.2 feet in the deep piezometer. From March 30 to April 25, total head in the shallow piezometer increased by 2.6 feet. Between March 30 and April 19, total head in the deep piezometer increased by 4.6 feet, followed by a decrease of 7.7 feet between April 19 and April 21. These large changes are due to the final grading operations around this location.

B-05-A-03 – Pore pressures in the shallow piezometer at this location decreased by 2.4 feet from March 13 to April 6, 2017, followed by fluctuations of about 1 foot throughout the remainder of this period. Pore pressures in the deep piezometer increased by 2.5 feet from April 6 to April 11, followed by a decrease of 2.1 feet through the end of this period. These changes are due to the final grading operations in this area.

B-05-04 – We have temporarily removed the data loggers from this location to avoid damage or loss during final grading operations.

Inclinometer Readings

Inclinometer readings at I-001-13, I-002-13, I-003-10, I-004-13, I-008-10, I-009-13, B-101, B-102, B-105A, B-05-04, B-05-A-11, P-1, and P-9N showed virtually no movement this period. In some cases, the plots indicated displacement at the top of the casing. This is due to disturbance of the area around the casing that occurred during construction. Many of the protective covers were set in place temporarily because of the ongoing construction near those instruments. We are currently concreting these protective covers in place.

B-05-02 – The top four readings at this location are fictitious. This is being done to preserve the ability to track current movement with the historic data. The ground surface at this location is actually at -8 feet relative to the top of casing in the plots. The current plot indicates movement of the top 8 feet of casing below the ground surface (16 feet below the 0 point in the plots). Rip rap was placed around this instrument which may be the cause of this movement.

B-05-A-03 – We have added 8 feet to the inclinometer casing at this location to account for the grade being raised in this area. The attached plot shows the first reading since the new baseline was taken. Small negative A-axis displacement is shown from 128 to 138 feet. This is likely an erroneous data point. Slight displacement is also shown in the positive A and B-axis directions at 42 to 44 feet.

This concludes our report of monthly instrument readings.

Please call or email with any questions.

Very truly yours,

SME

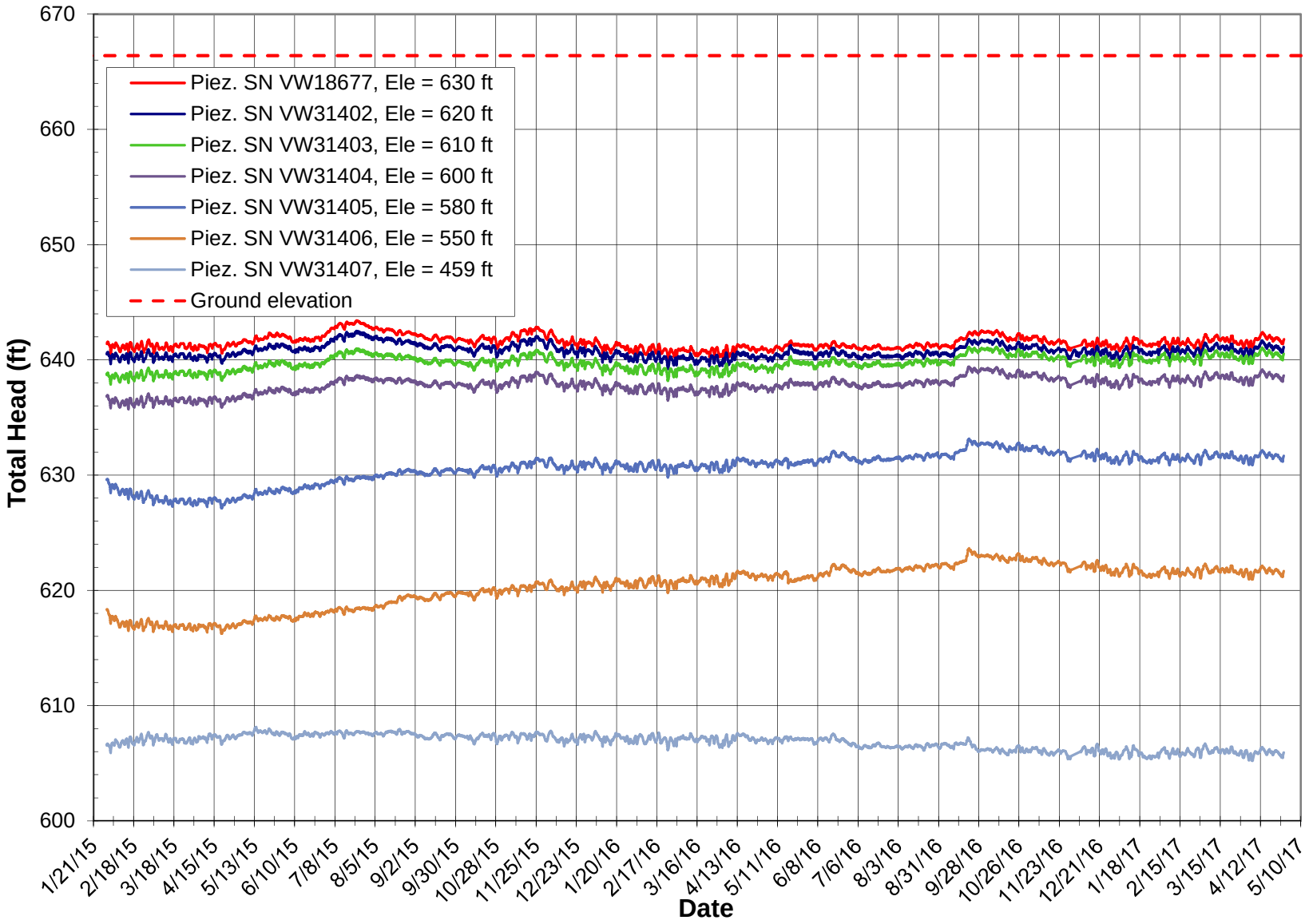
Brendan P. Lieske, P.E.
Project Engineer

Alan J. Esser, P.E., D.GE
Chief Consultant

Copies sent to distribution list.

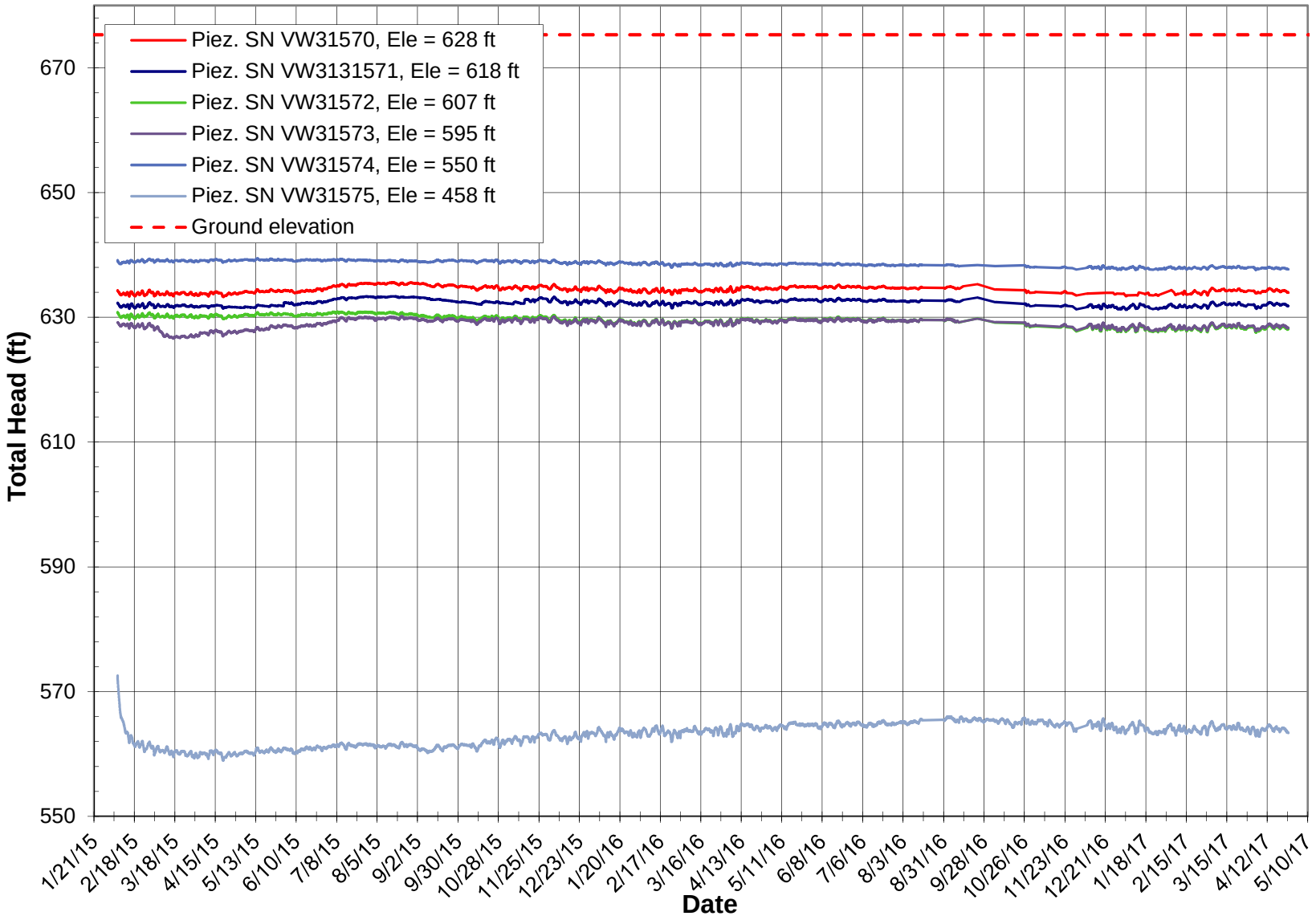
P-001-13 VW Piezometer Readings

Ground surface elevation = 666.4 ft



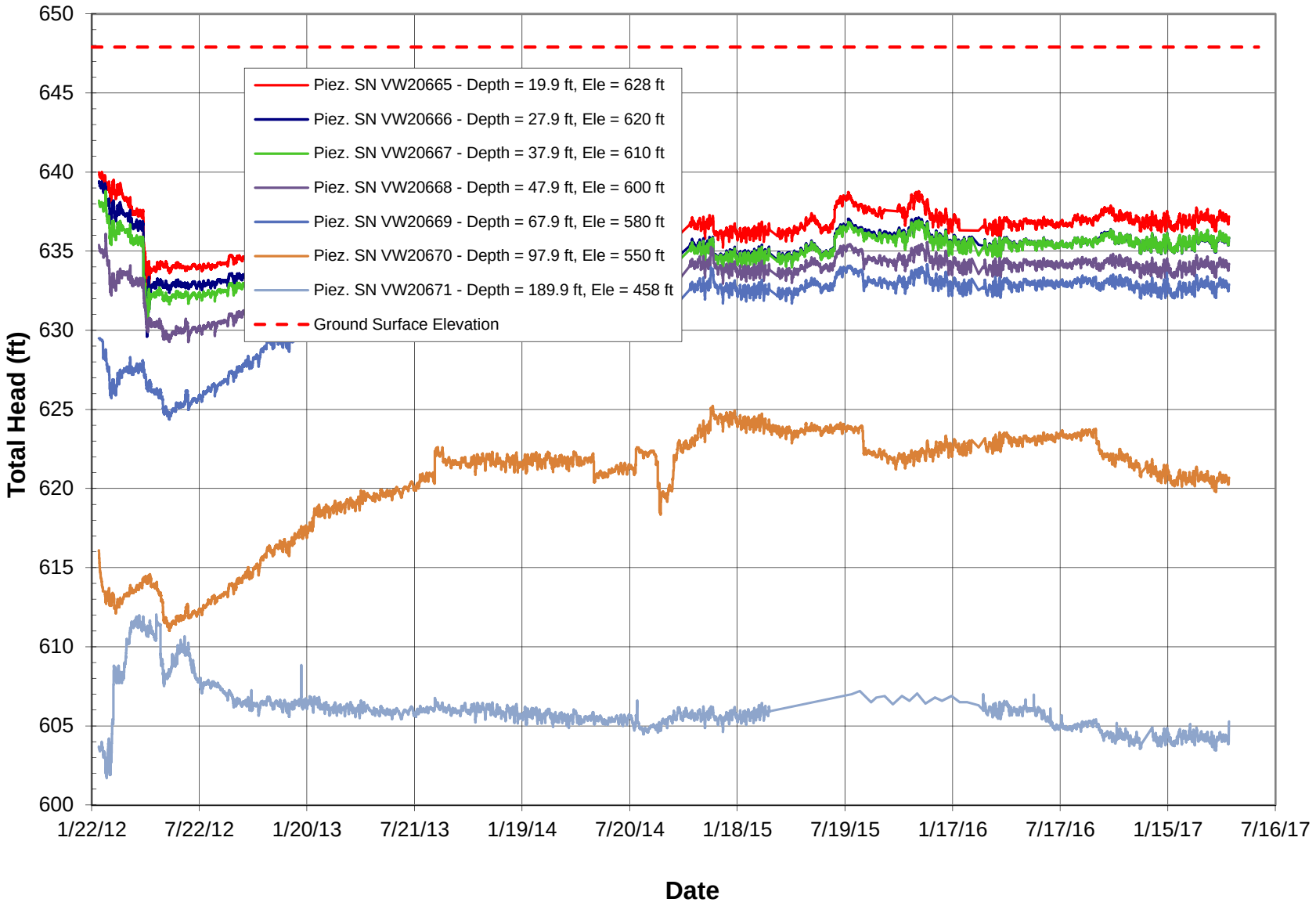
P-002-13 VW Piezometer Readings

Ground surface elevation = 675.29 ft



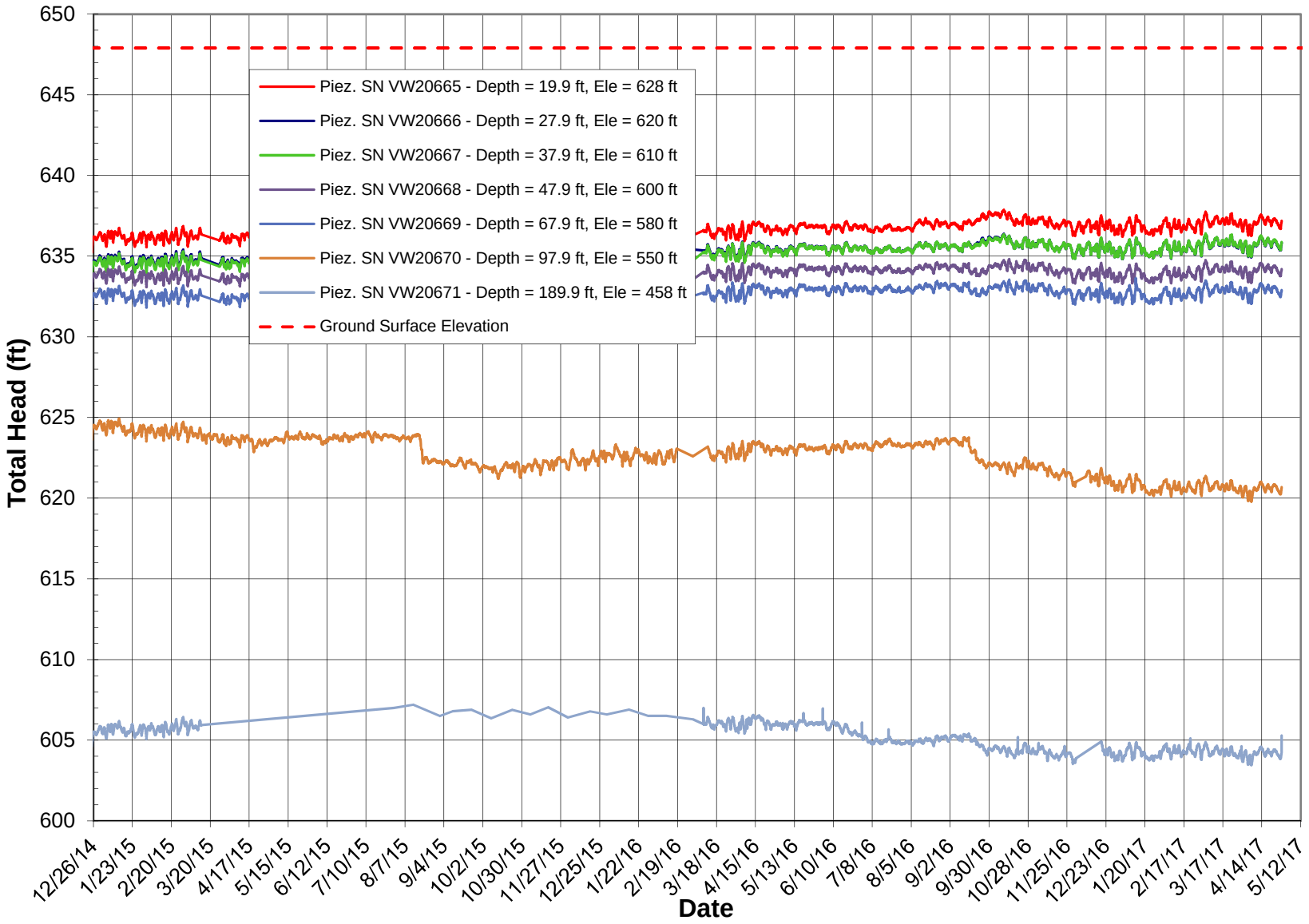
P-003-10 VW Piezometer Readings

Ground surface elevation = 647.9 ft



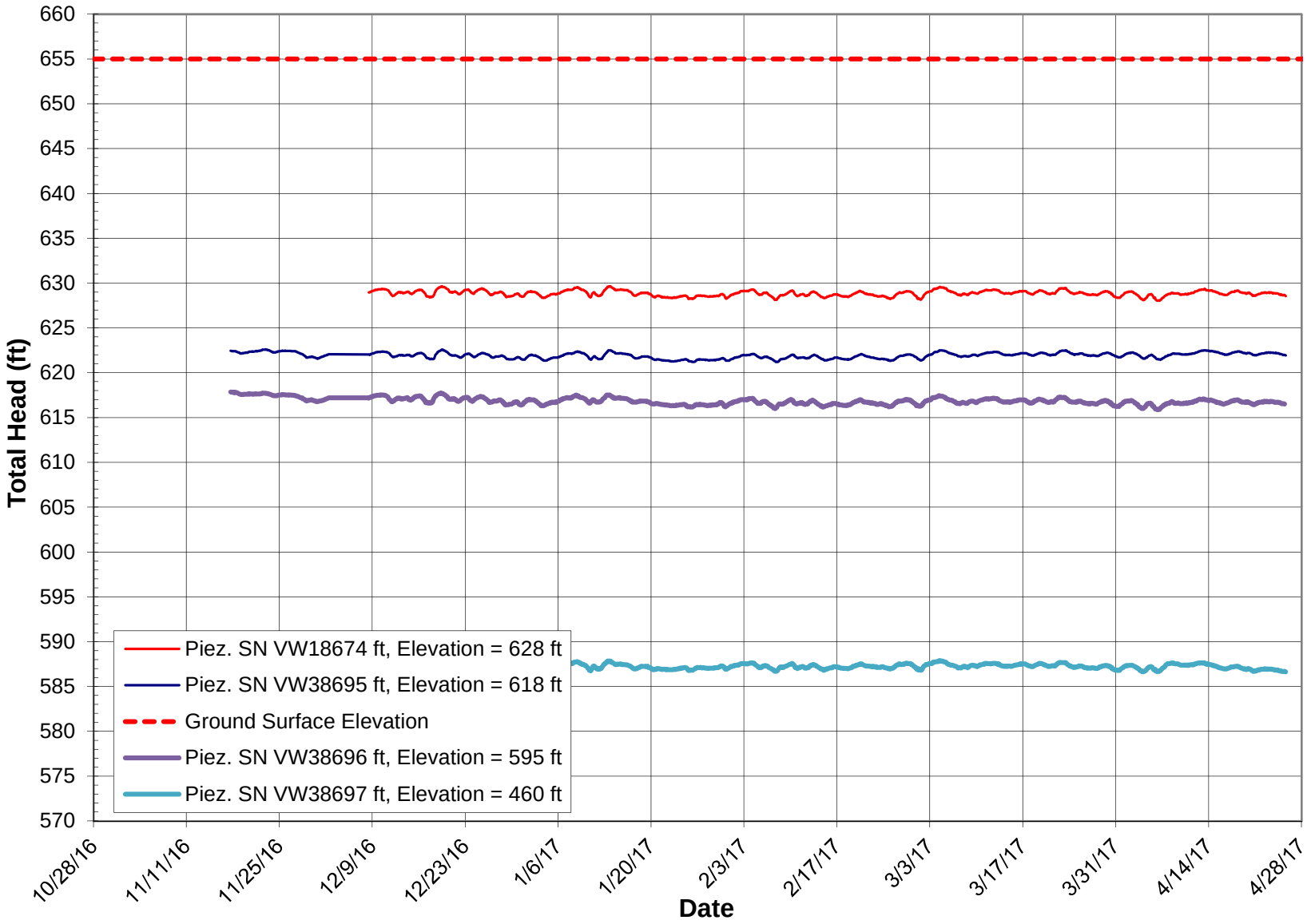
P-003-10 VW Piezometer Readings

Ground surface elevation = 647.9 ft



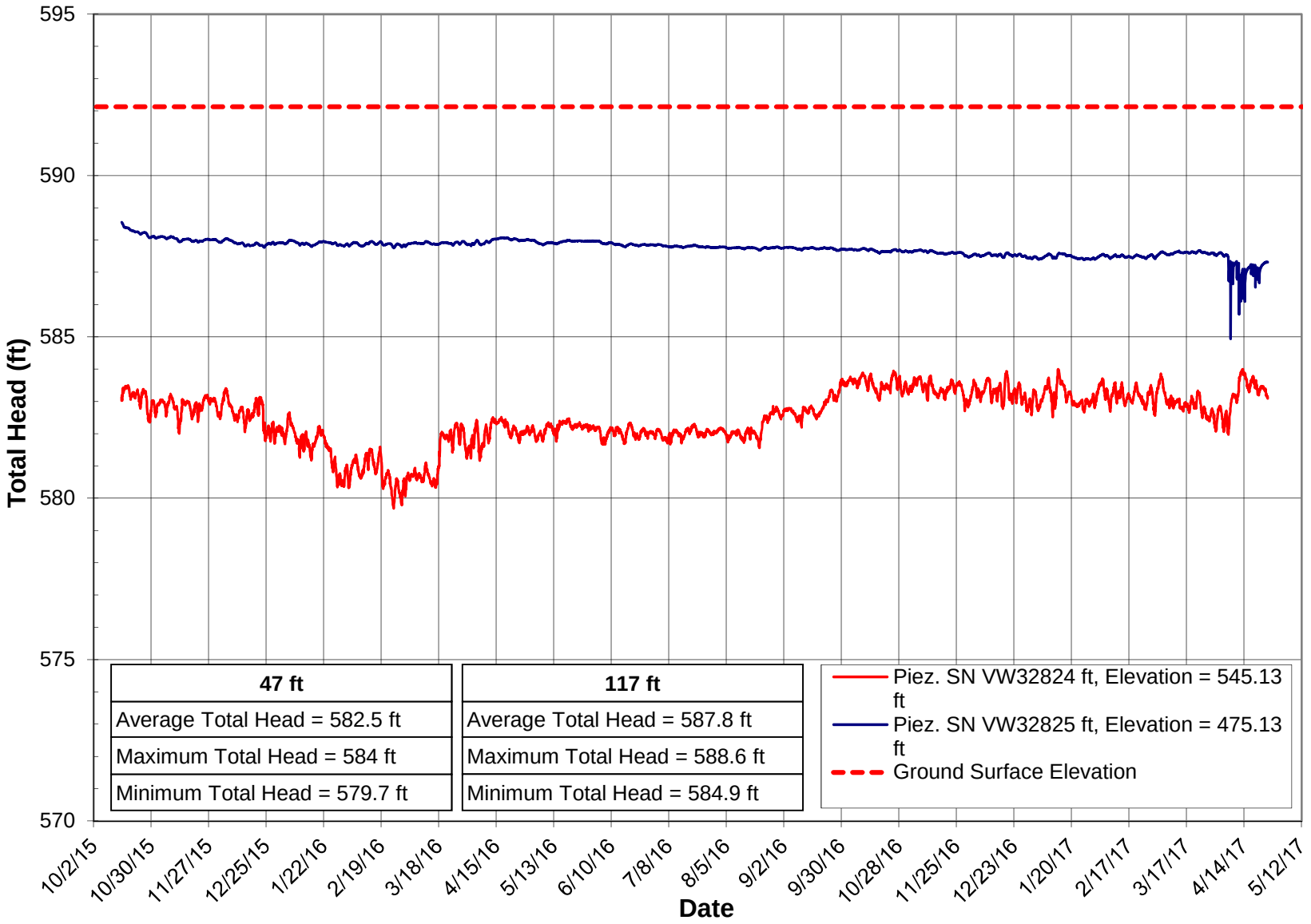
P-003-13 VW Piezometer Readings

Ground surface elevation = 655 ft



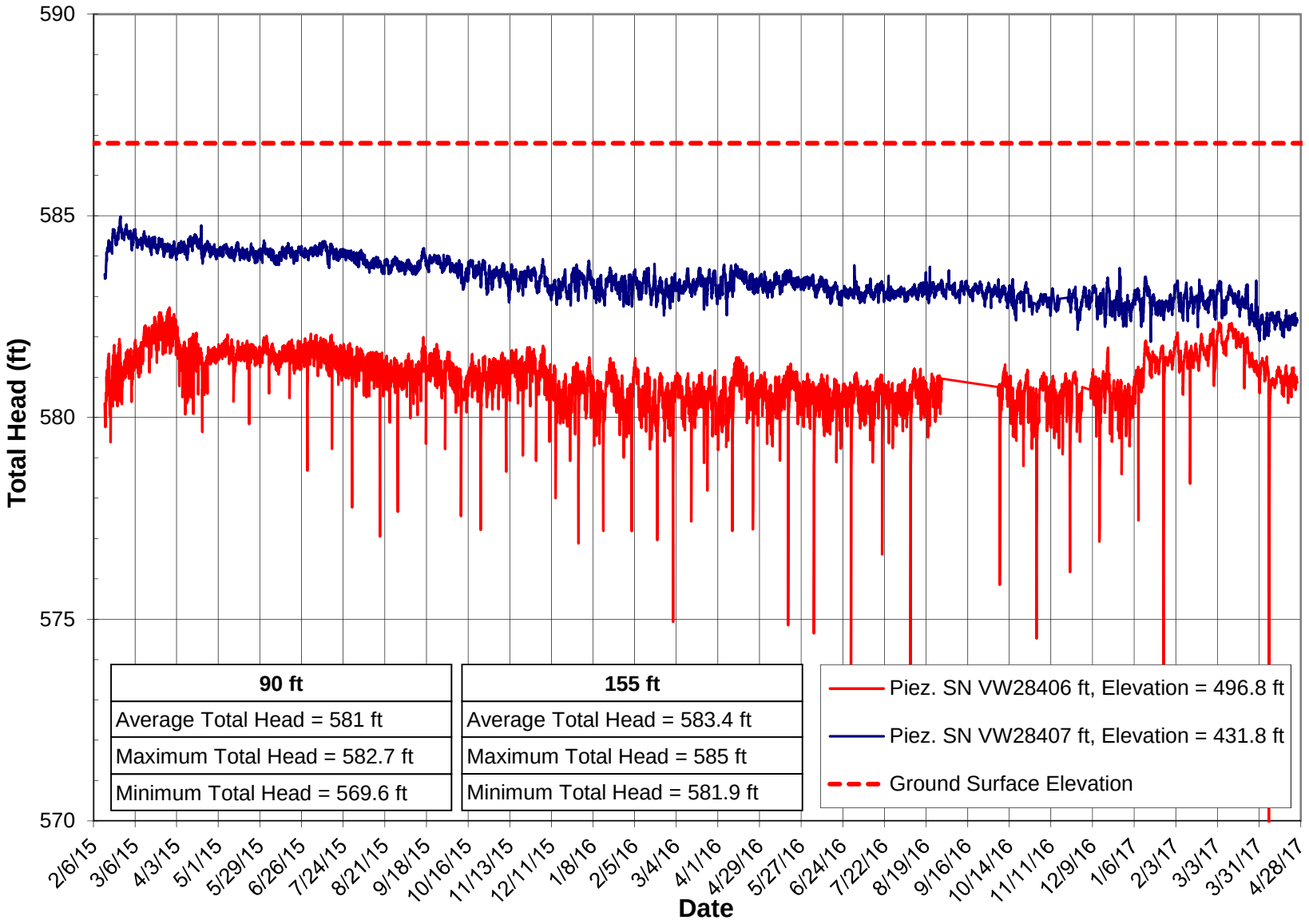
P-004-13 VW Piezometer Readings

Ground surface elevation = 592.13 ft



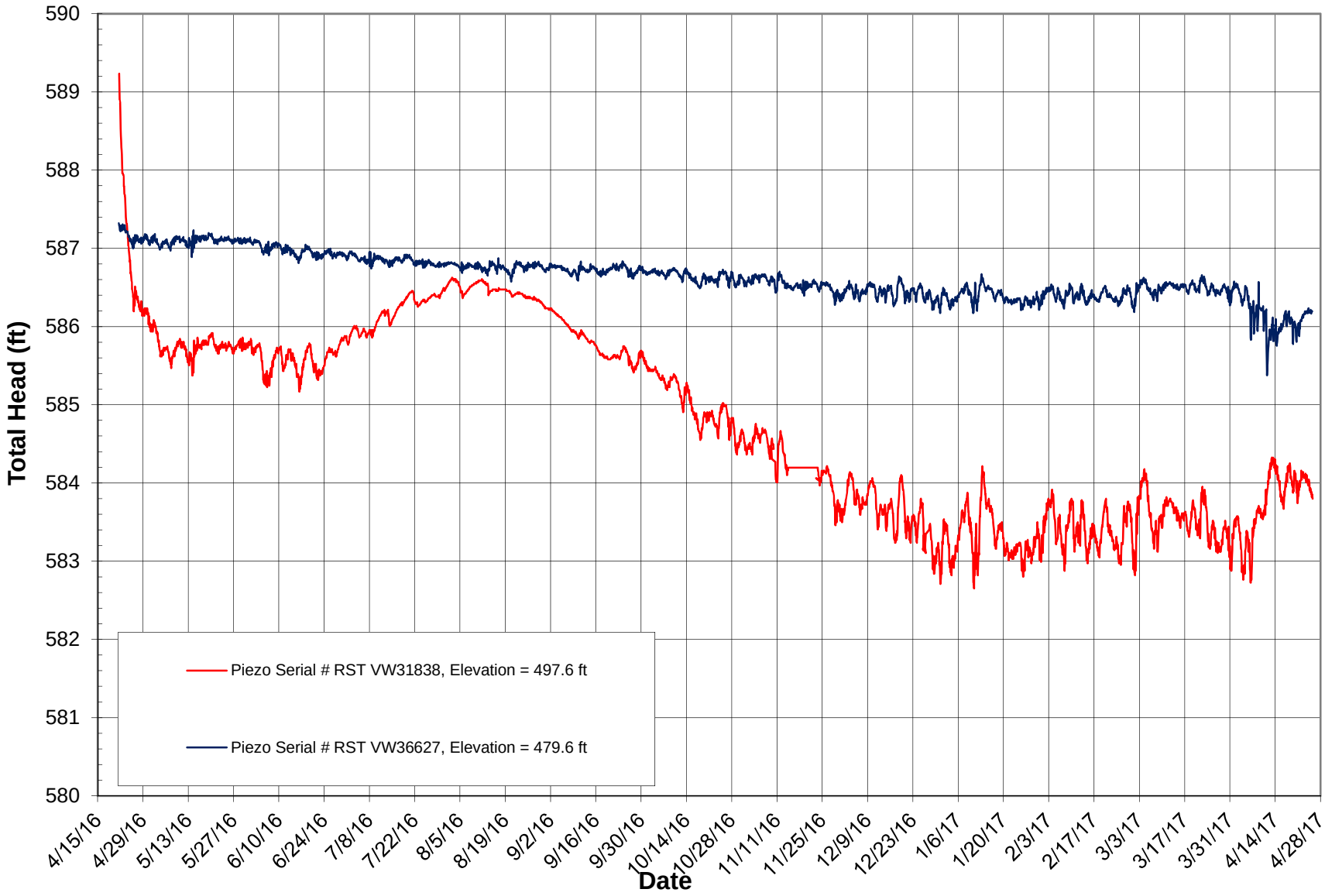
P-009-13 VW Piezometer Readings

Ground surface elevation = 586.6 ft



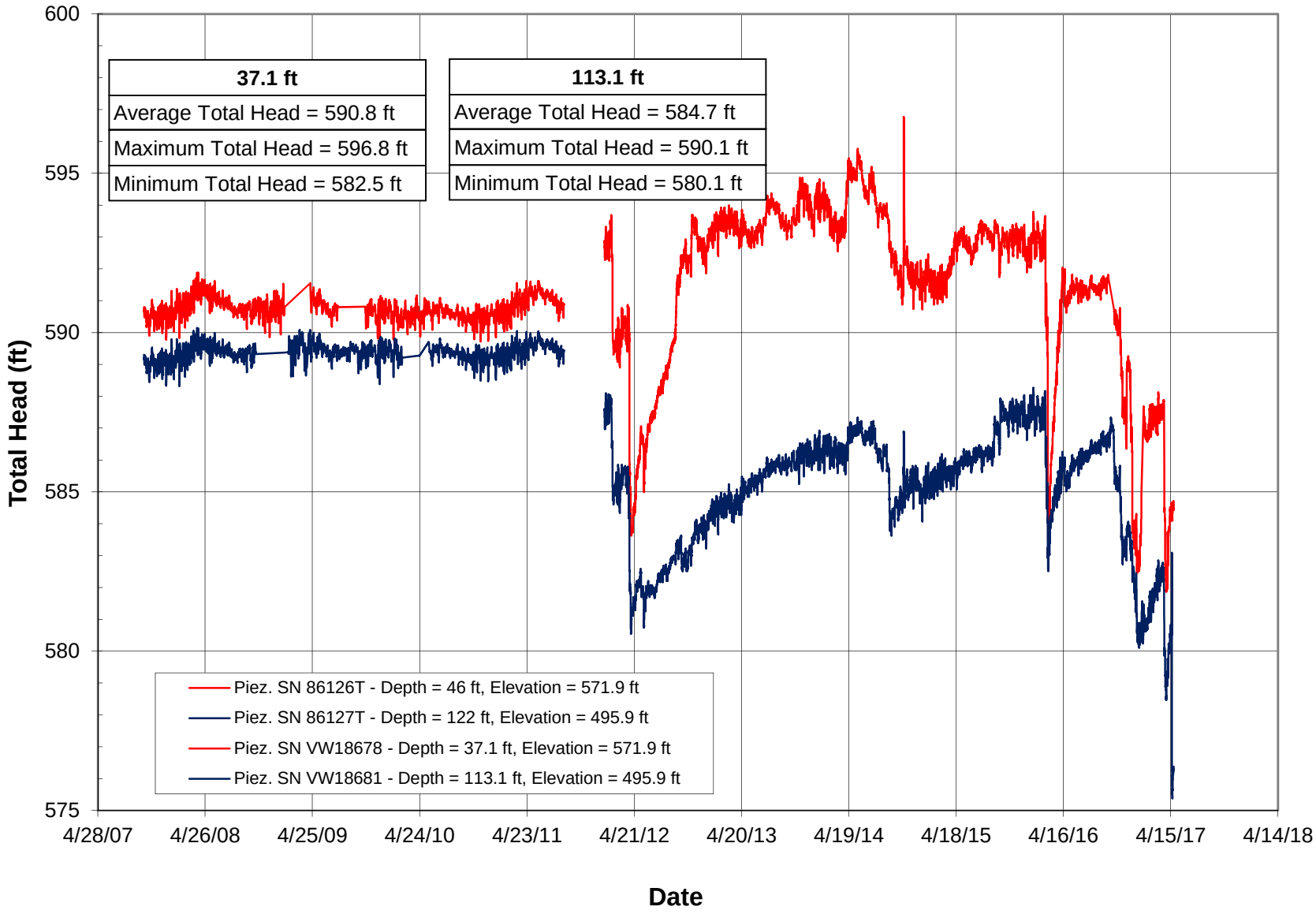
B-105A VW Piezometer Readings

Ground surface elevation = 585.6 ft



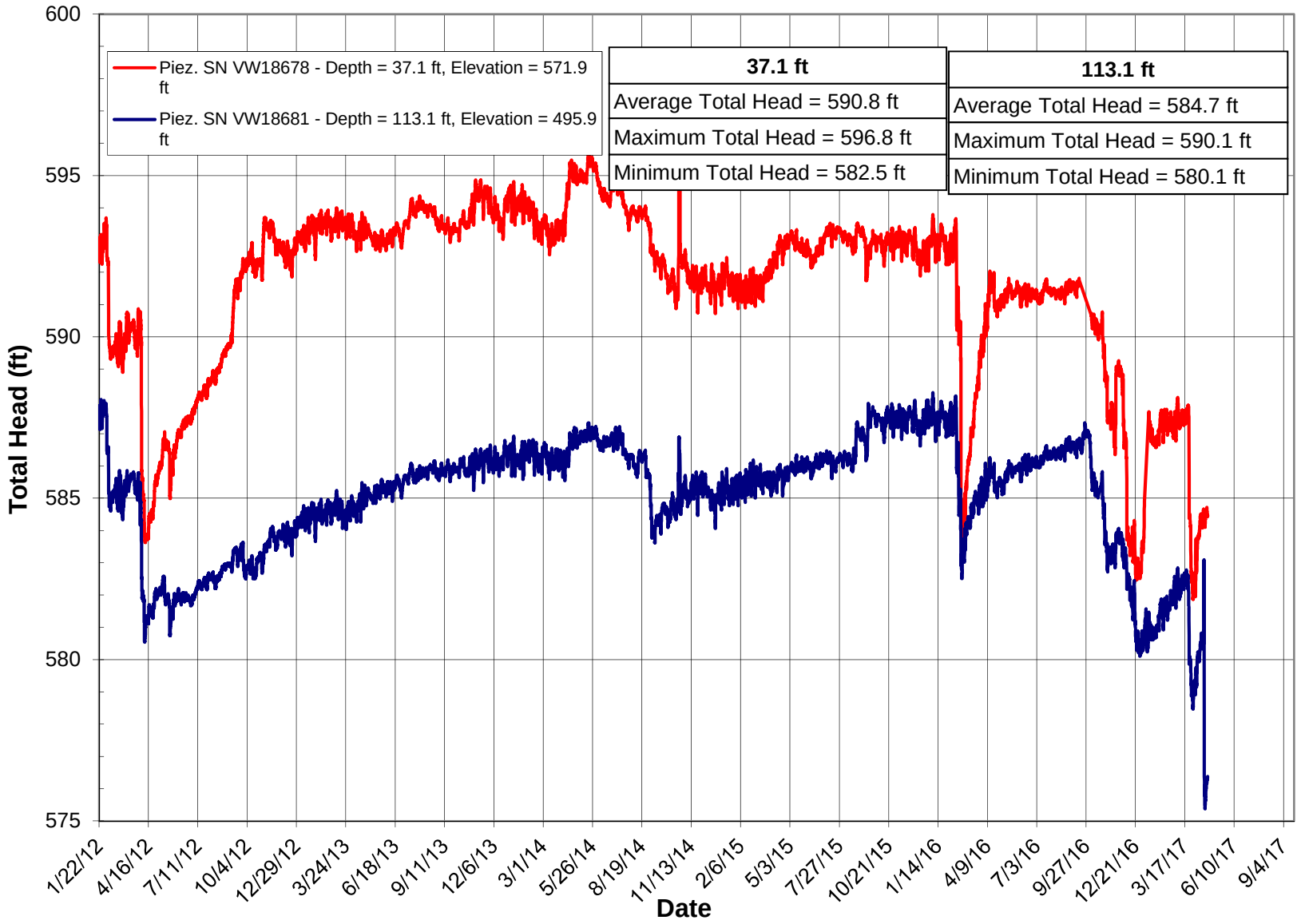
B-05-02 VW Piezometer Readings

Ground surface elevation = approx 609.0 ft



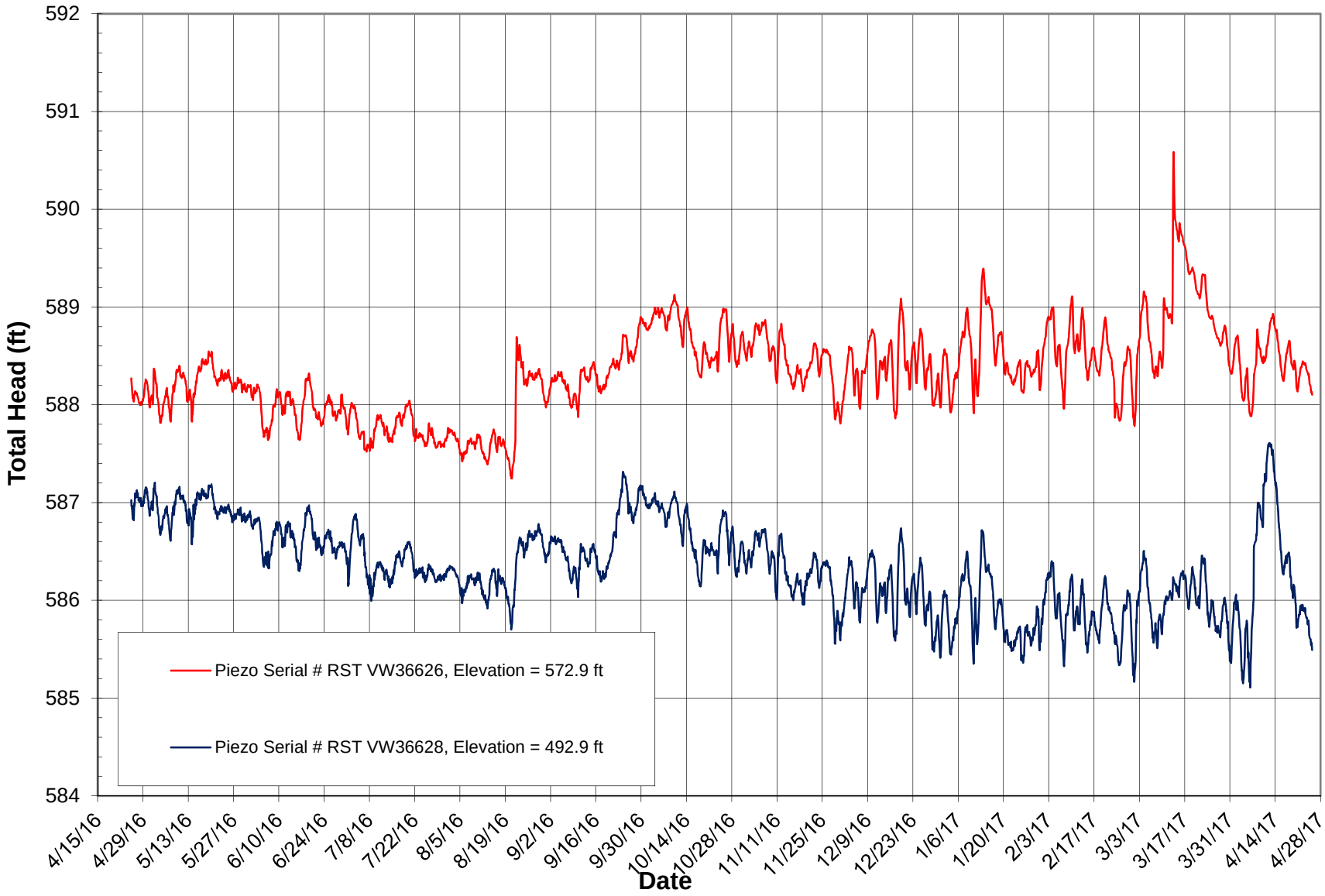
B-05-02 VW Piezometer Readings

Ground surface elevation = approx 609.0 ft



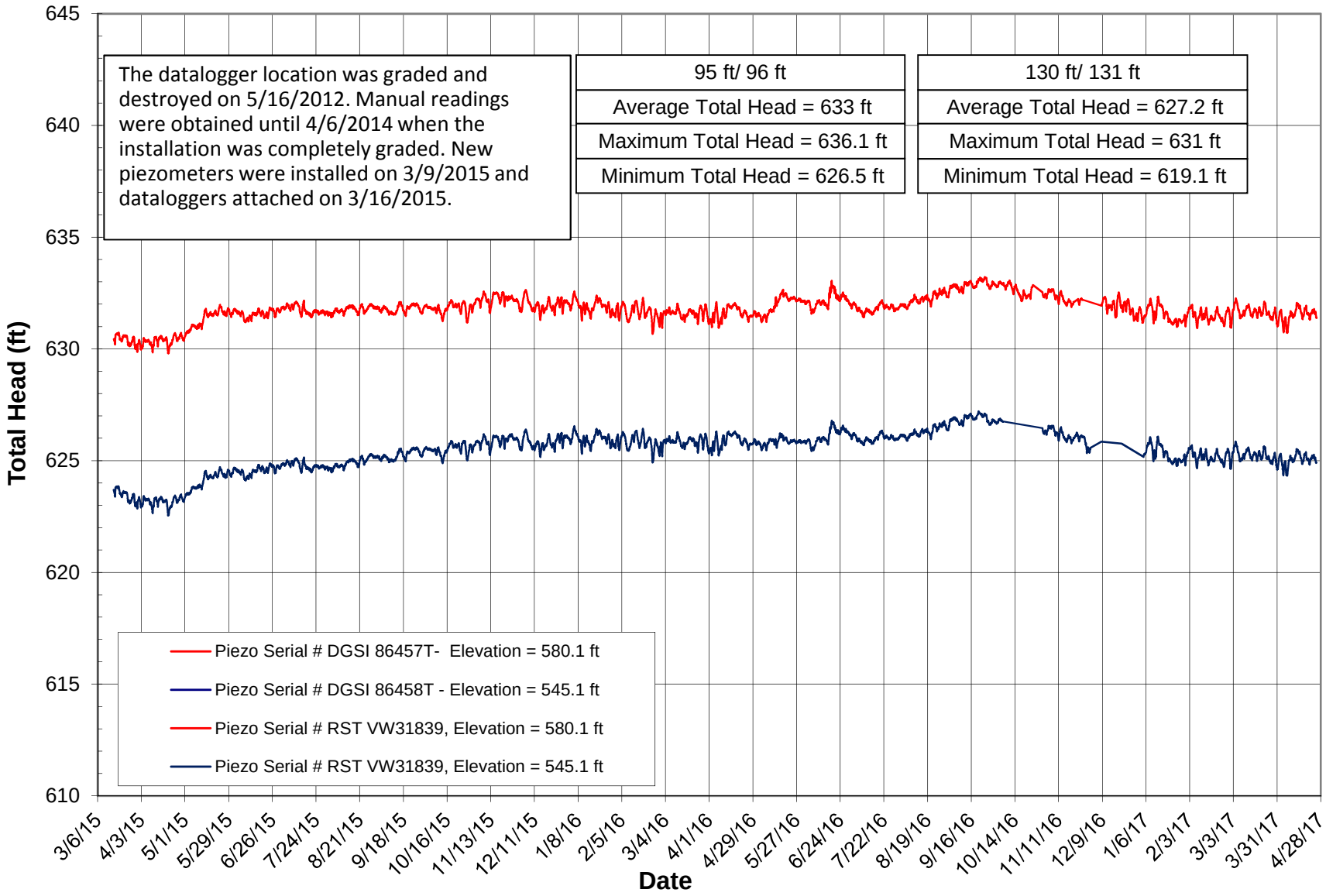
B-05-A-03 VW Piezometer Readings

Ground surface elevation = 599.9 ft



B-05-11/B-05-A-11 VW Piezometer Readings

Ground surface elevation = 675.1 ft (B-05-11) / 676.1 ft (B-05-A-11)



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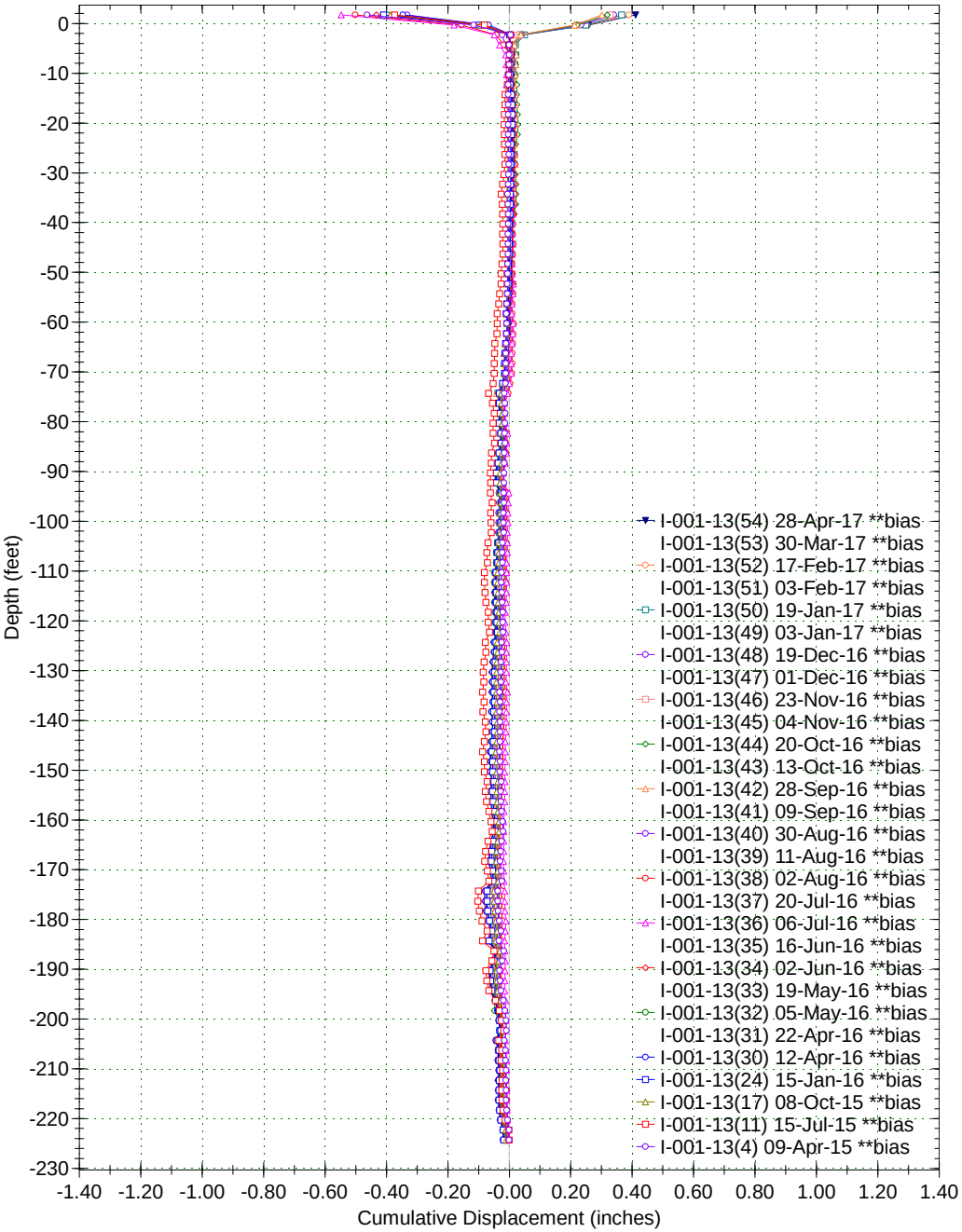
CUMULATIVE DISPLACEMENT

Inclinalysis v. 2.47.5

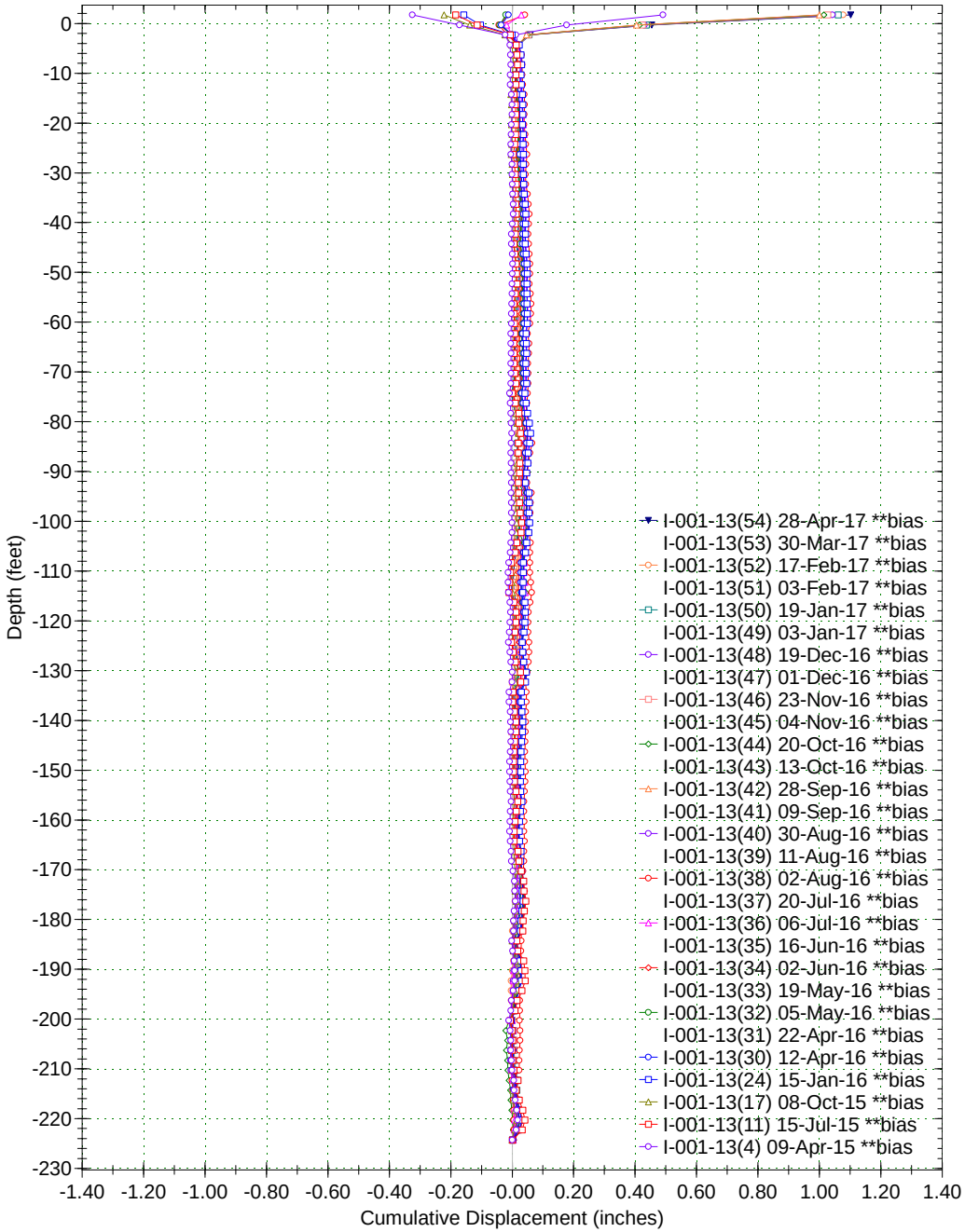
Borehole : I-001-13
Project : CUY-90-15-24
Location : Cleveland, Ohio
Northing :
Easting :
Collar :

Spiral Correction : N/A
Collar Elevation : 3.7 feet
Borehole Total Depth : 228.0 feet
A+ Groove Azimuth :
Base Reading : 2015 Mar 03 11:14
Applied Azimuth : 0.0 degrees

Axis - A



Axis - B



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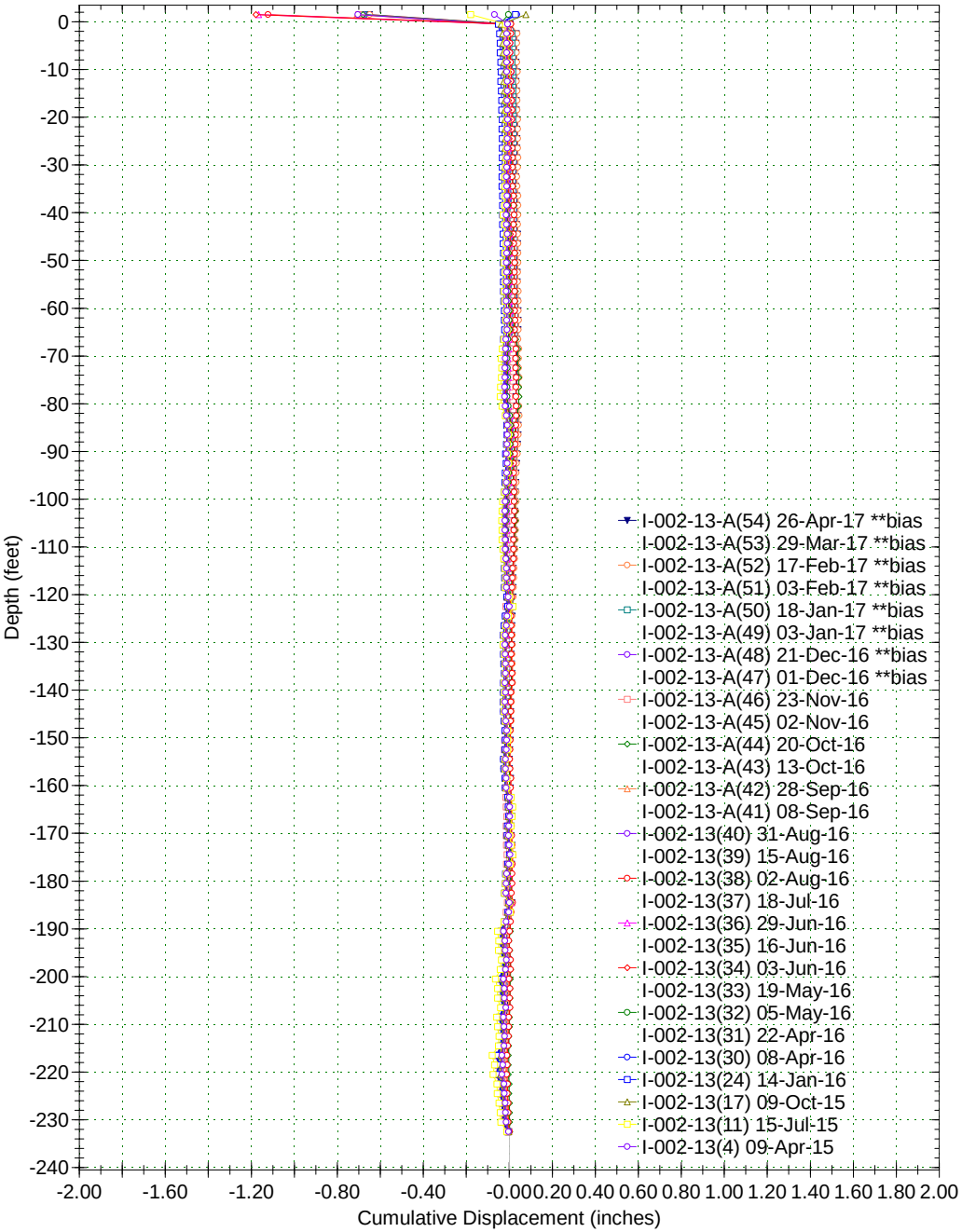
CUMULATIVE DISPLACEMENT

Inclinalysis v. 2.47.5

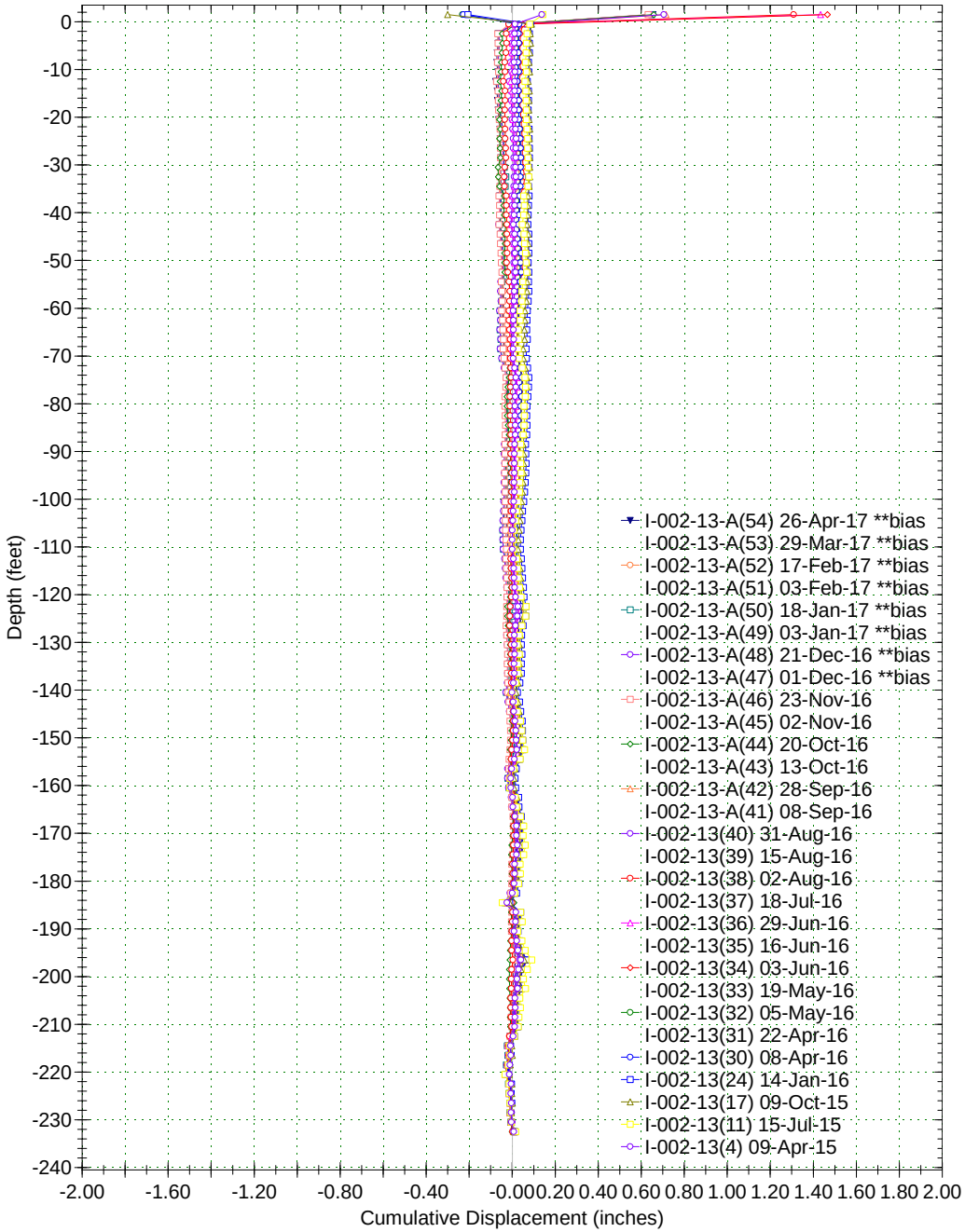
Borehole : I-002-13
Project : CUY-90-15-24
Location : Cleveland, Ohio
Northing :
Easting :
Collar :

Spiral Correction : N/A
Collar Elevation : 3.5 feet
Borehole Total Depth : 236.0 feet
A+ Groove Azimuth :
Base Reading : 2015 Mar 03 10:04
Applied Azimuth : 0.0 degrees

Axis - A



Axis - B



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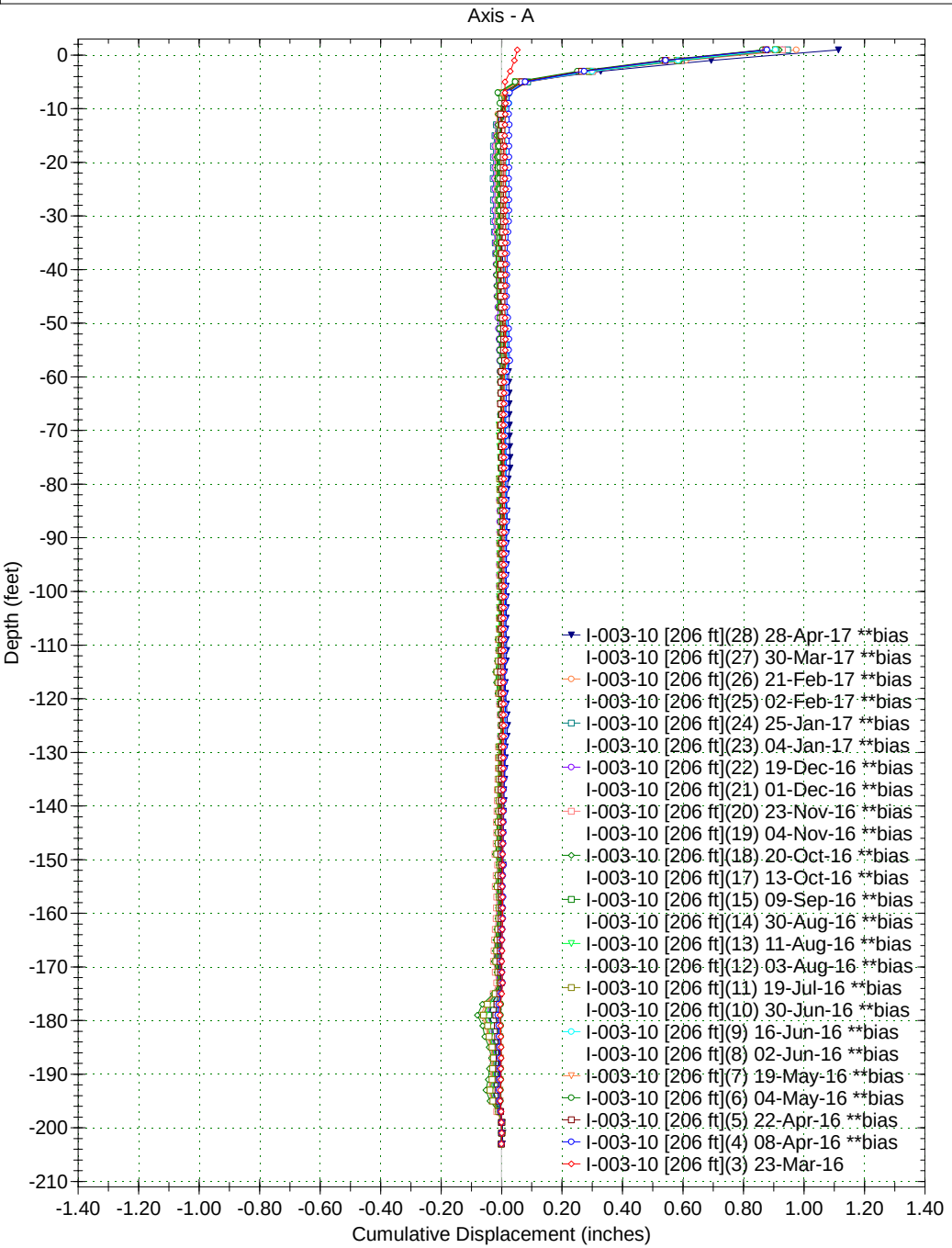
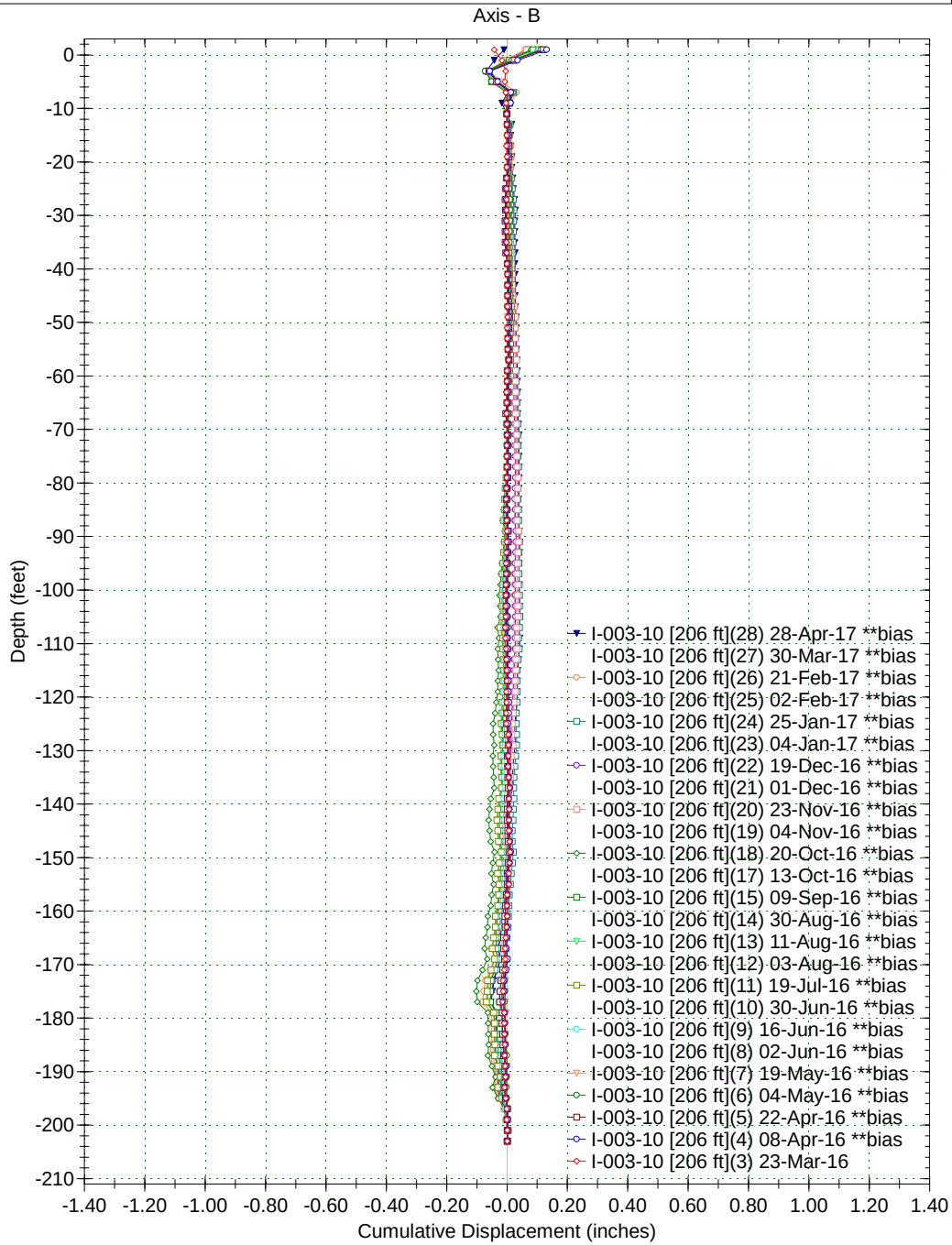
CUMULATIVE DISPLACEMENT

Inclinalysis v. 2.47.5

Borehole : I-003-10 [206 ft]
Project : CUY-90-15-24
Location :
Northing :
Easting :
Collar :

Spiral Correction : N/A
Collar Elevation : 3.0 feet
Borehole Total Depth : 206.0 feet
A+ Groove Azimuth :
Base Reading : 2016 Mar 08 15:42
Applied Azimuth : 0.0 degrees





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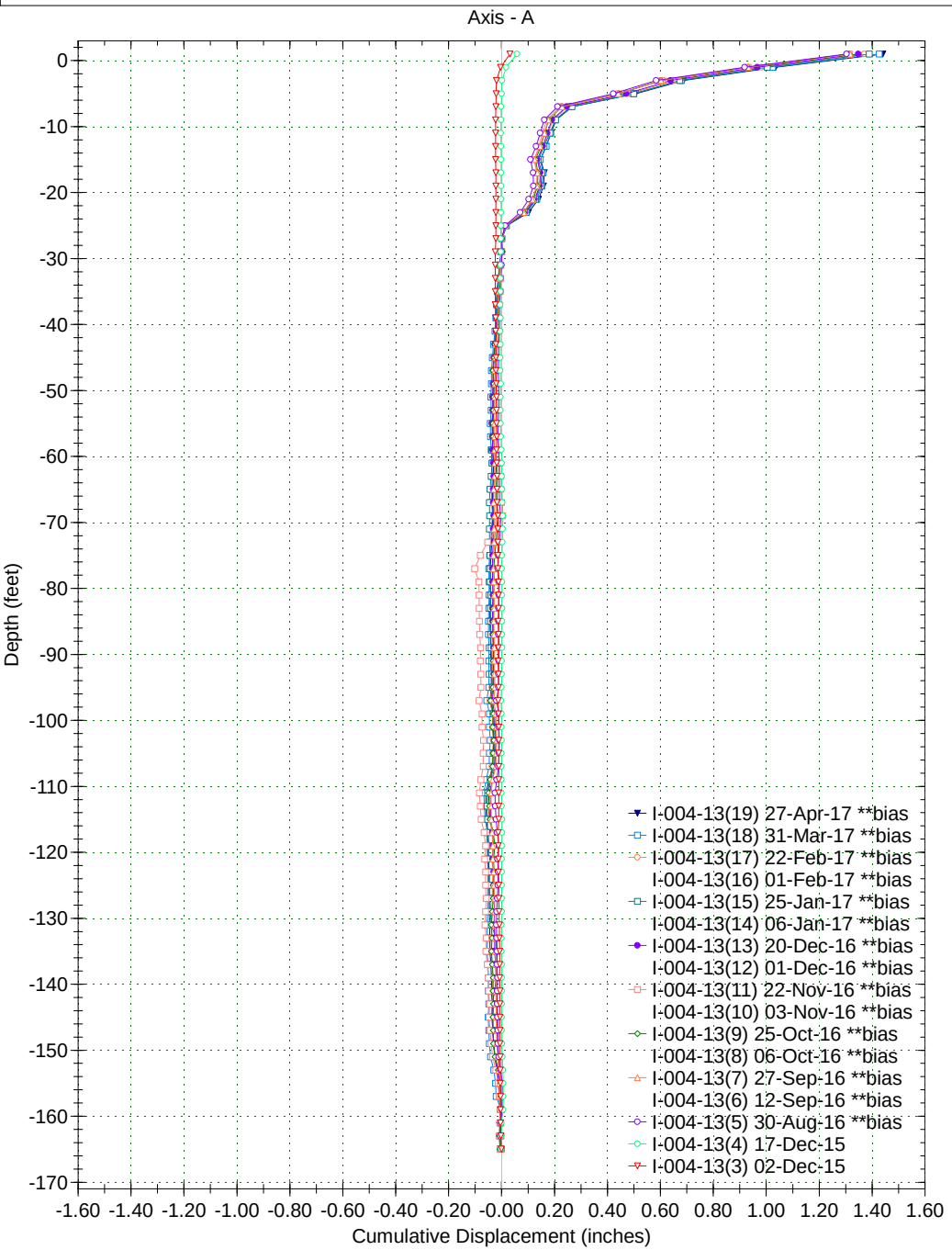
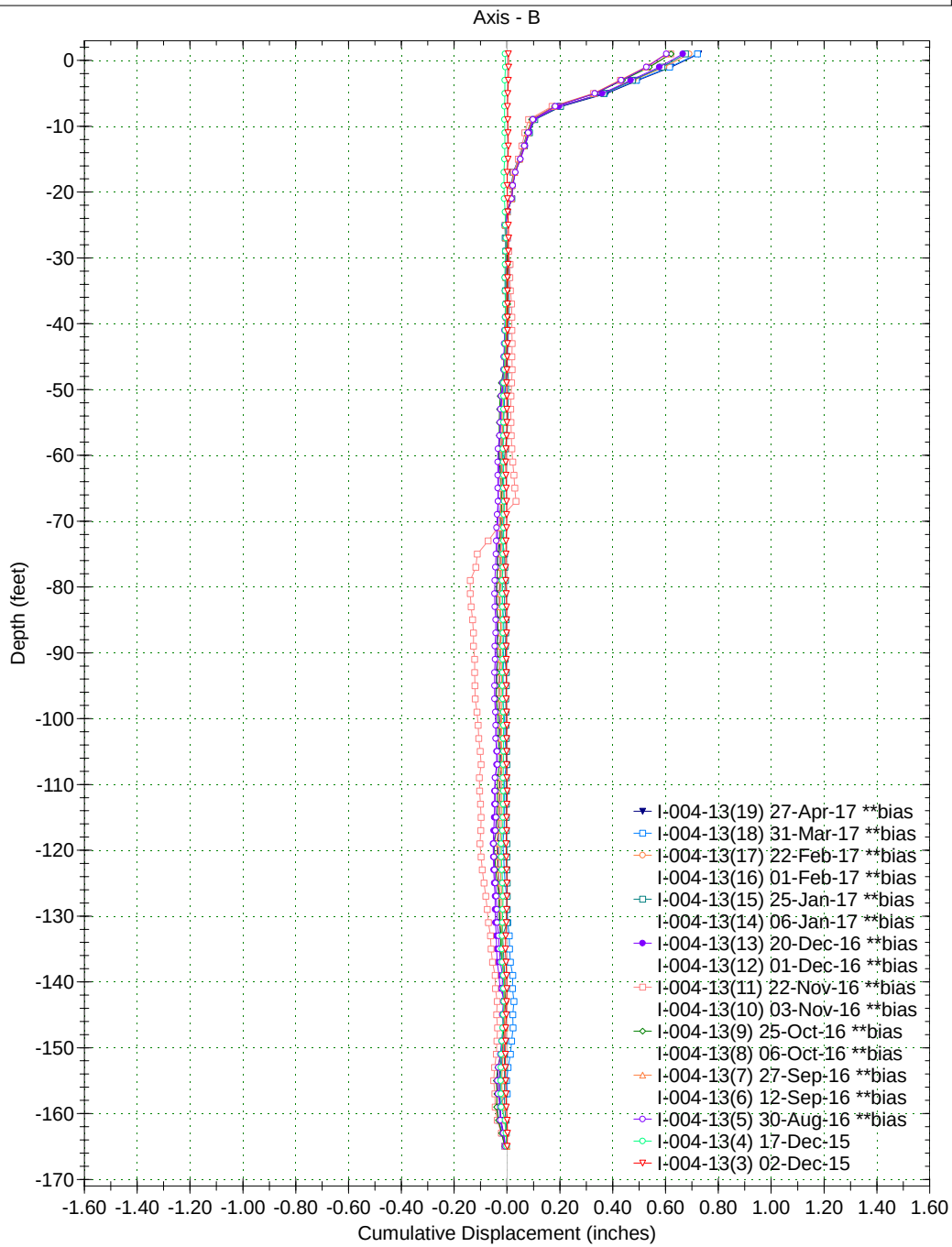
CUMULATIVE DISPLACEMENT

Inclinalysis v. 2.47.5

Borehole : I-004-13
Project : CUY-90-15-24
Location :
Northing :
Easting :
Collar :

Spiral Correction : N/A
Collar Elevation : 3.0 feet
Borehole Total Depth : 168.0 feet
A+ Groove Azimuth :
Base Reading : 2015 Nov 20 09:09
Applied Azimuth : 0.0 degrees





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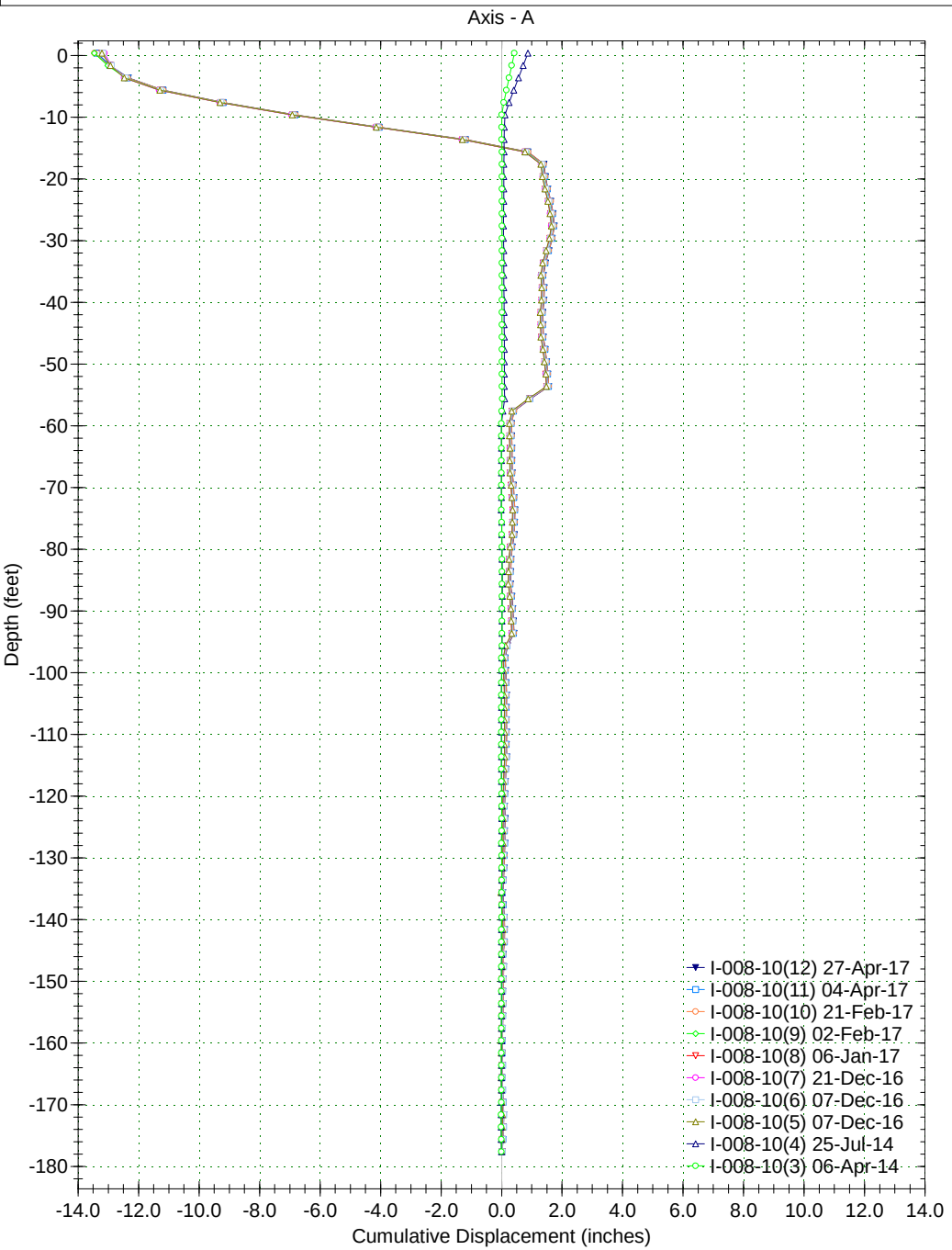
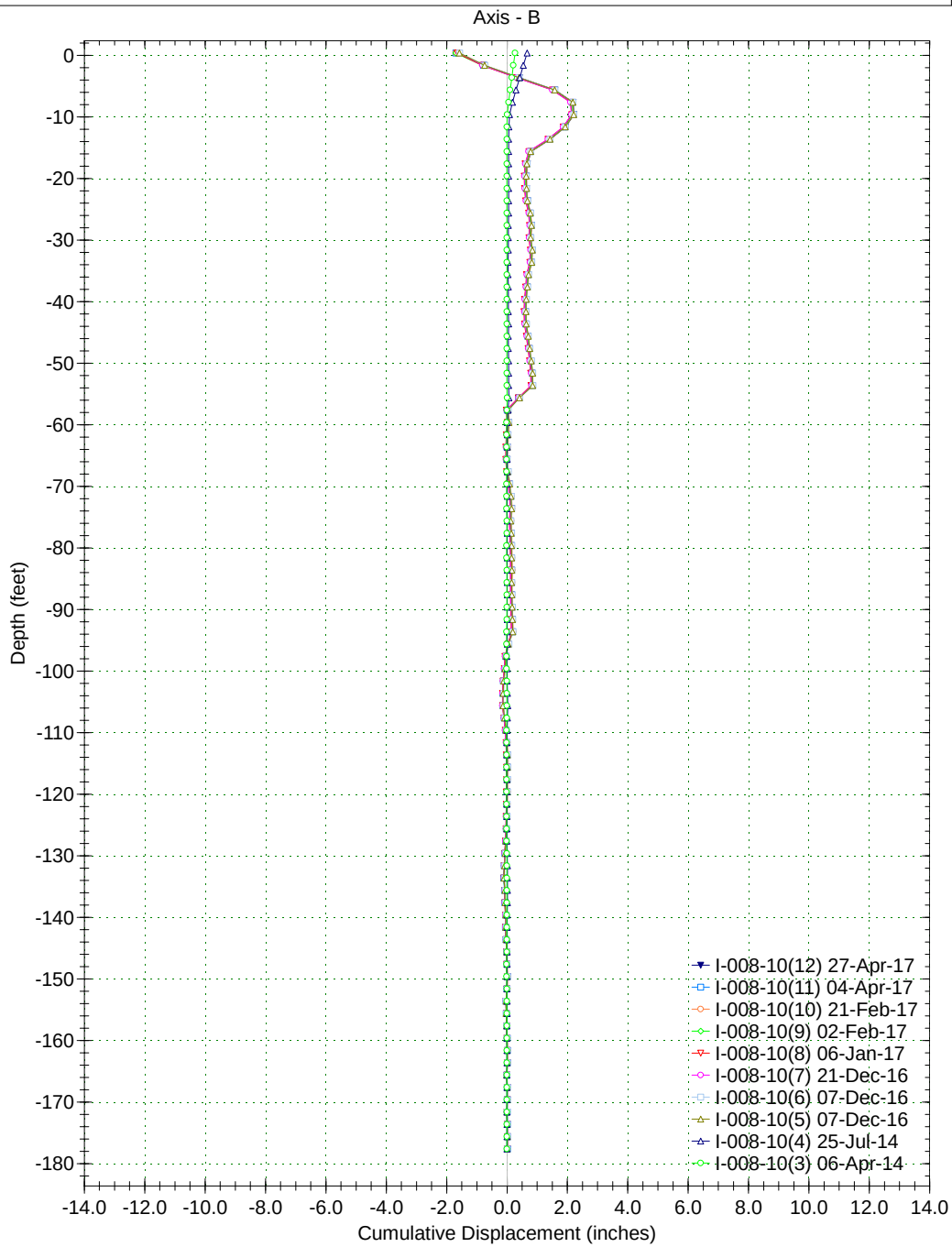
CUMULATIVE DISPLACEMENT

Inclinalysis v. 2.47.5

Borehole : I-008-10
Project : CUY-90-15-24
Location : Cleveland, Ohio
Northing :
Easting :
Collar :

Spiral Correction : N/A
Collar Elevation : 2.4 feet
Borehole Total Depth : 180.0 feet
A+ Groove Azimuth :
Base Reading : 2014 Jan 14 07:26
Applied Azimuth : 0.0 degrees





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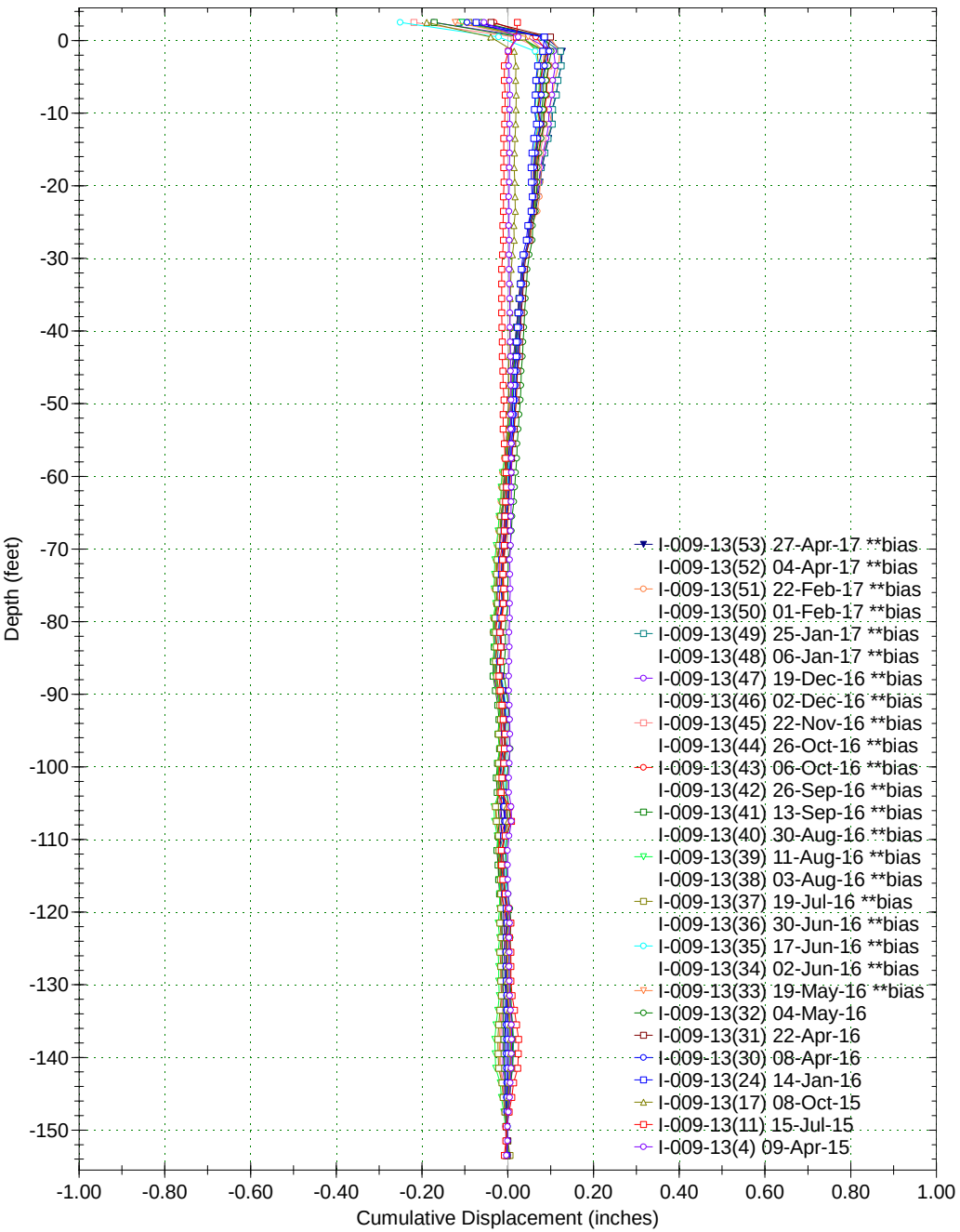
CUMULATIVE DISPLACEMENT

Inclinalysis v. 2.47.5

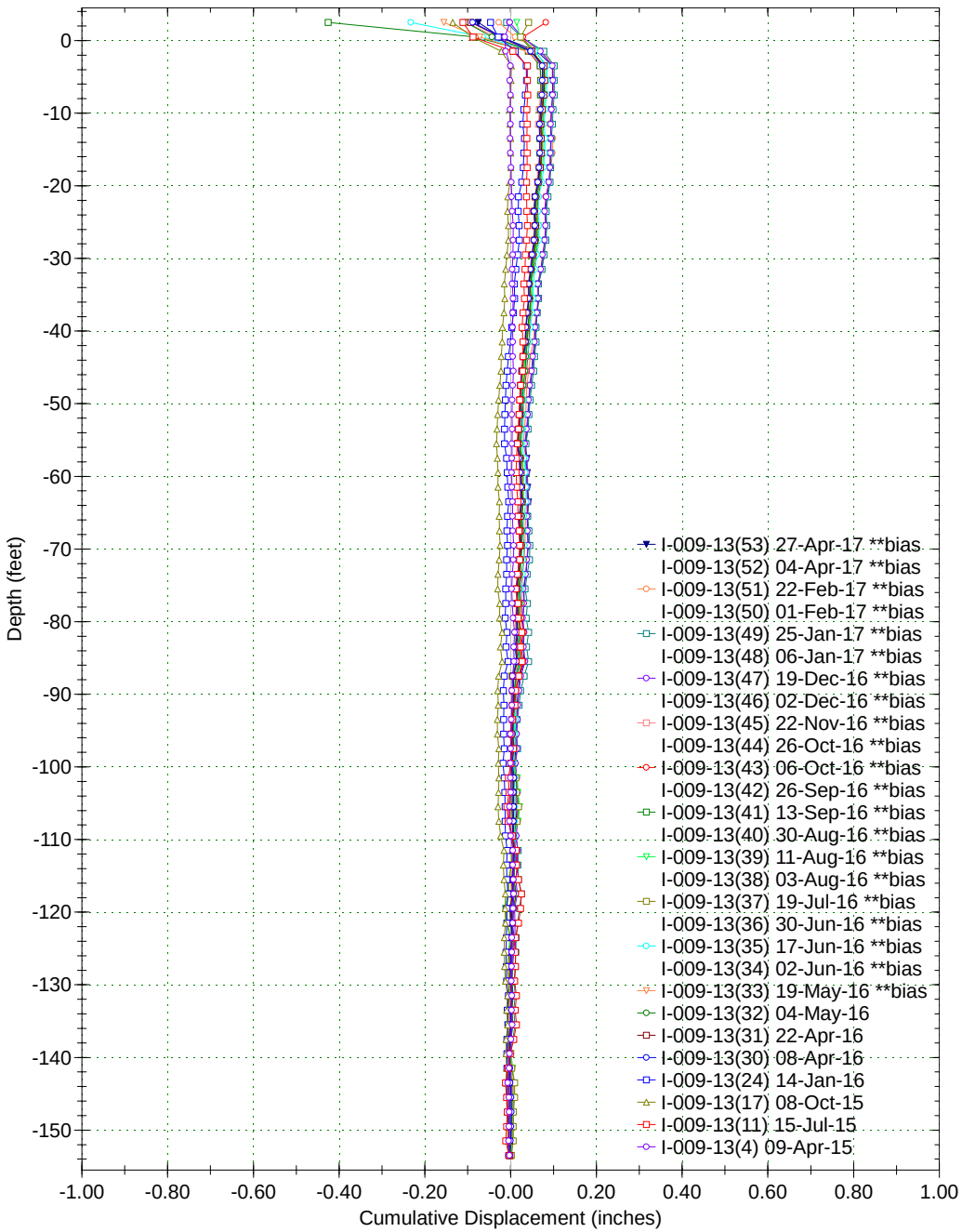
Borehole : I-009-13
Project : CUY-90-15-24
Location : Cleveland, Ohio
Northing :
Easting :
Collar :

Spiral Correction : N/A
Collar Elevation : 4.5 feet
Borehole Total Depth : 158.0 feet
A+ Groove Azimuth :
Base Reading : 2015 Mar 18 15:56
Applied Azimuth : 0.0 degrees

Axis - A



Axis - B



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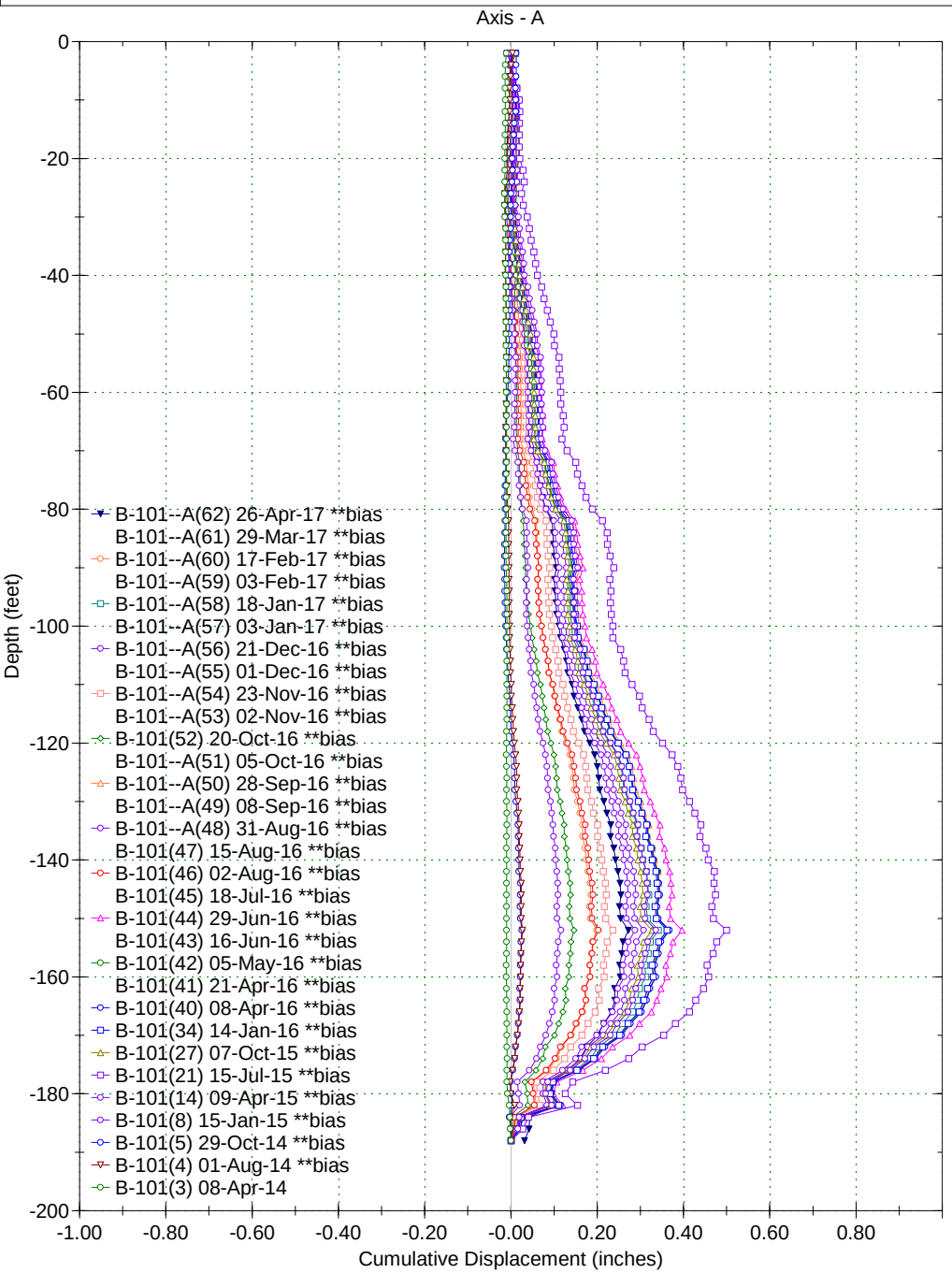
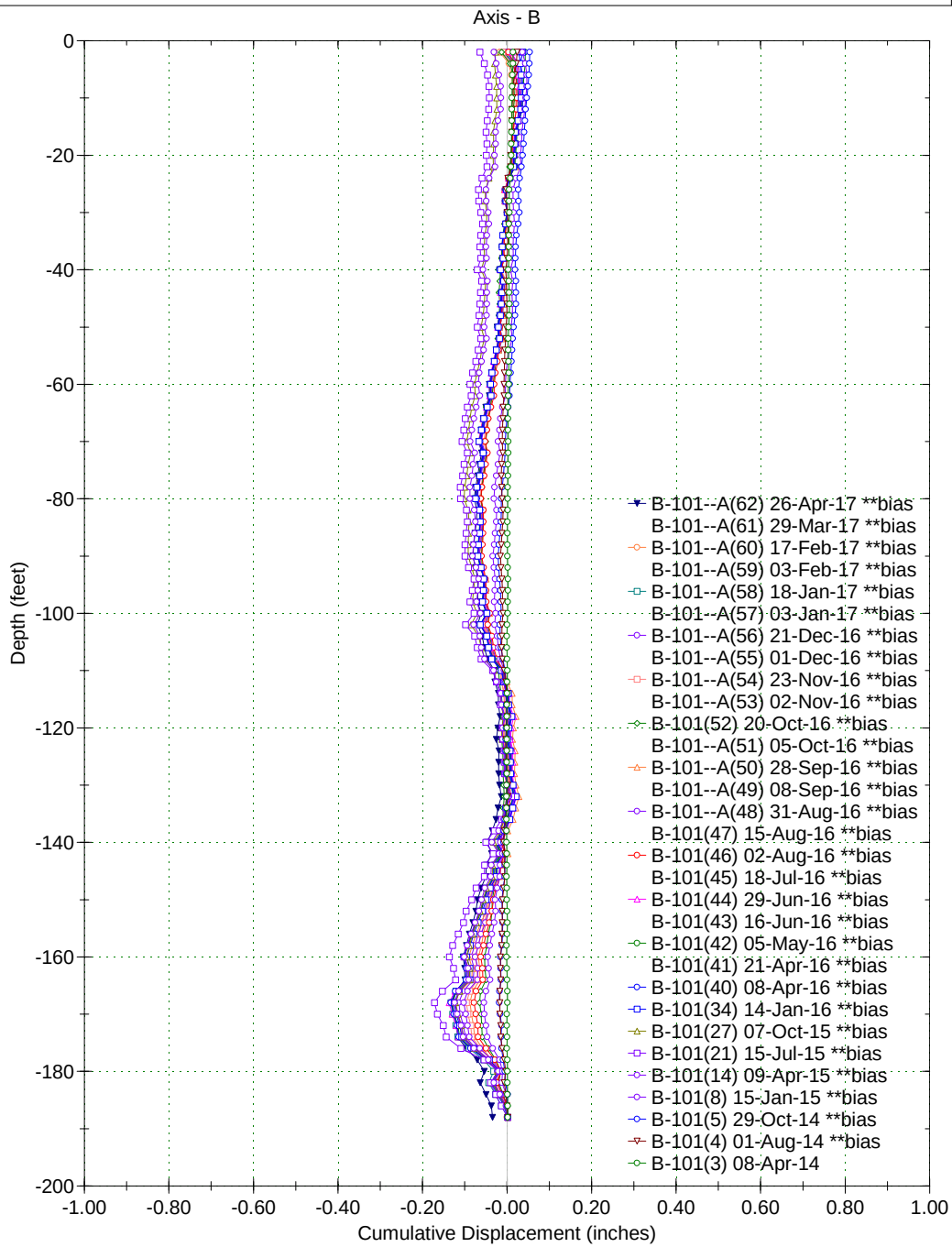
CUMULATIVE DISPLACEMENT

Inclinalysis v. 2.47.5

Borehole : B-101
Project : CUY-90-15-24
Location : Cleveland, Ohio
Northing : Sta. 15+06.50
Easting : 120.7' Rt of CL
Collar :

Spiral Correction : N/A
Collar Elevation : 0.0 feet
Borehole Total Depth : 188.0 feet
A+ Groove Azimuth :
Base Reading : 2014 Jan 22 09:01
Applied Azimuth : 0.0 degrees





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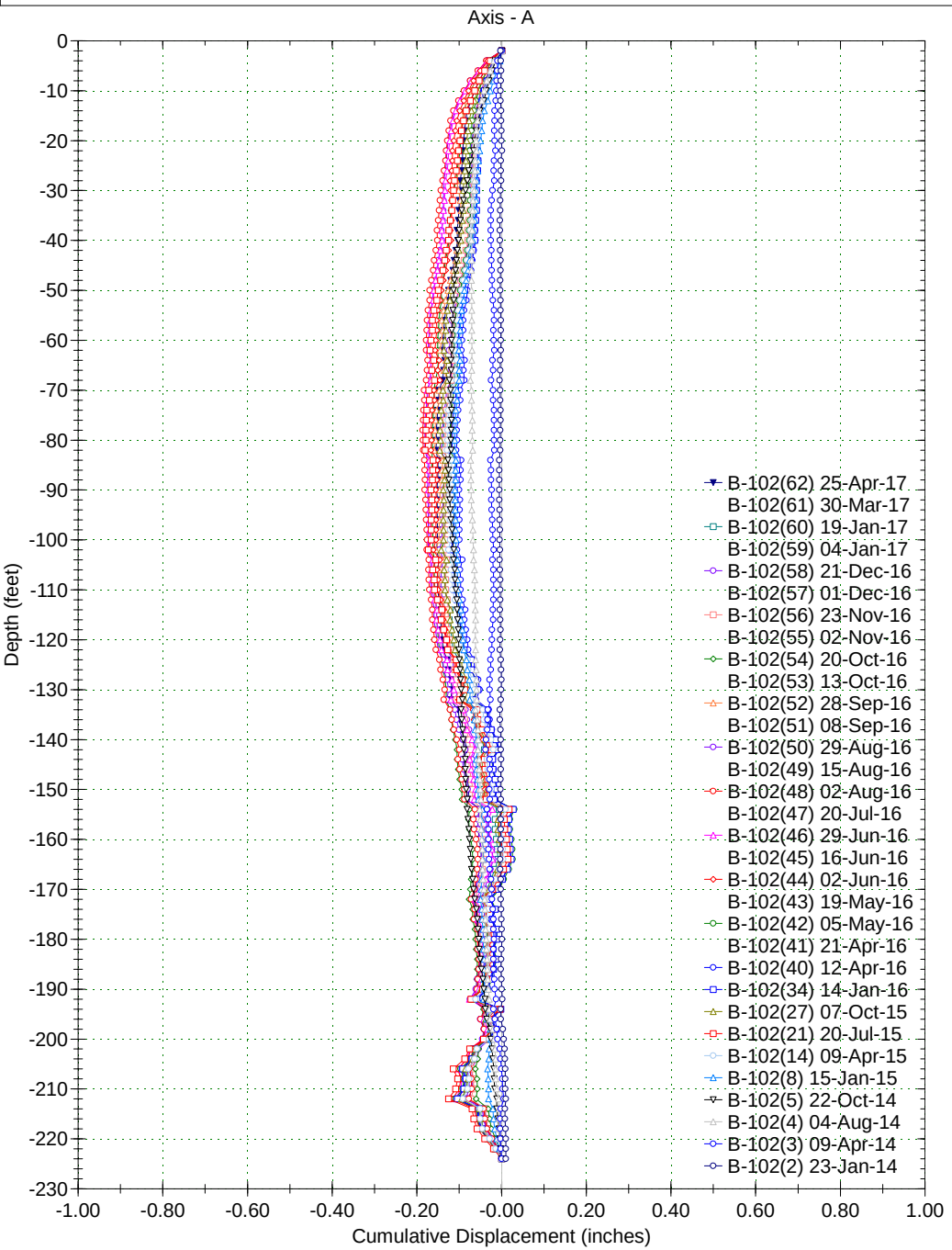
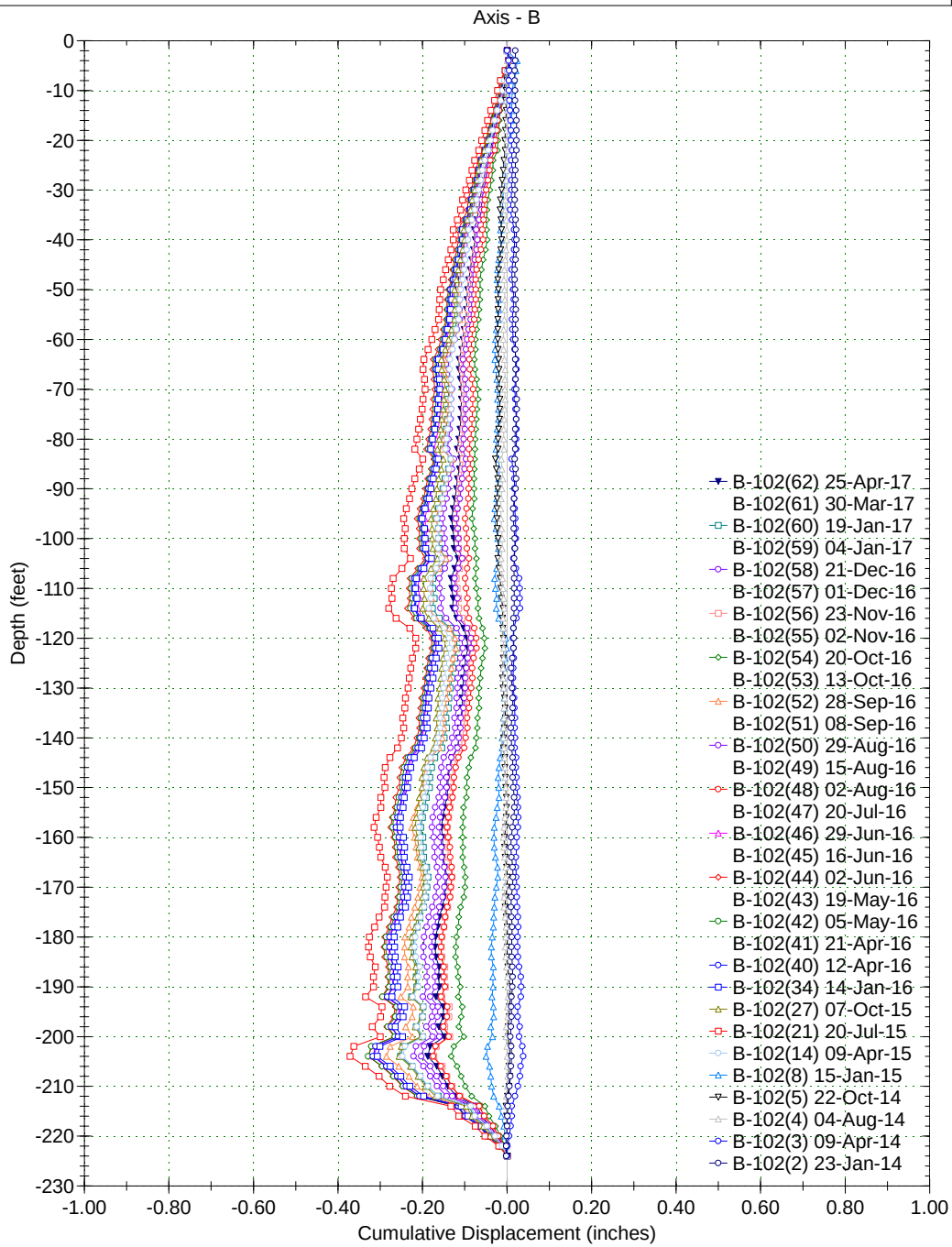
CUMULATIVE DISPLACEMENT

Inclinalysis v. 2.47.5

Borehole : B-102
Project : CUY-90-15-24
Location : Cleveland, Ohio
Northing : Sta. 15+95.34
Easting : 134.7' Rt of CL
Collar :

Spiral Correction : N/A
Collar Elevation : 0.0 feet
Borehole Total Depth : 224.0 feet
A+ Groove Azimuth :
Base Reading : 2014 Jan 23 08:21
Applied Azimuth : 0.0 degrees





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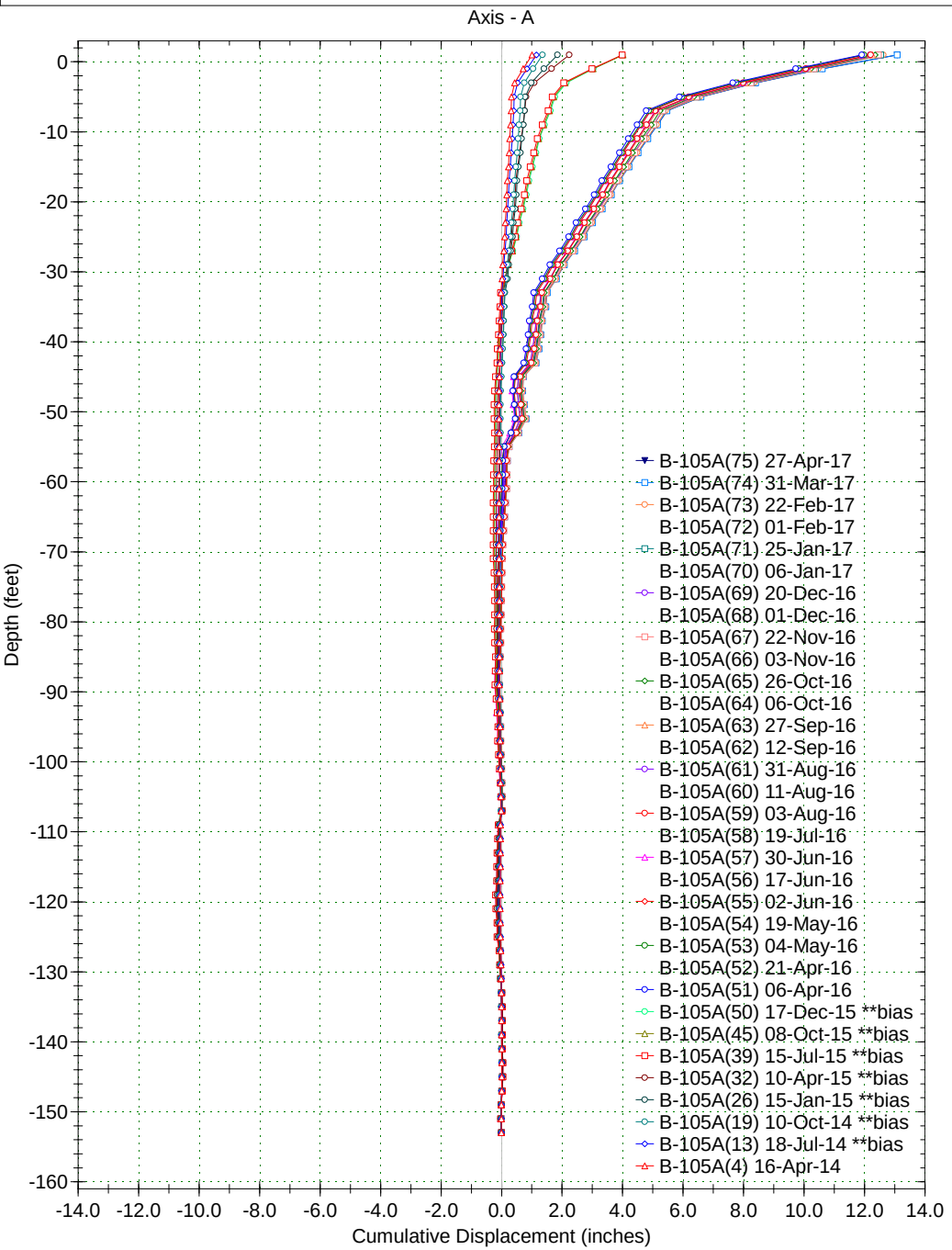
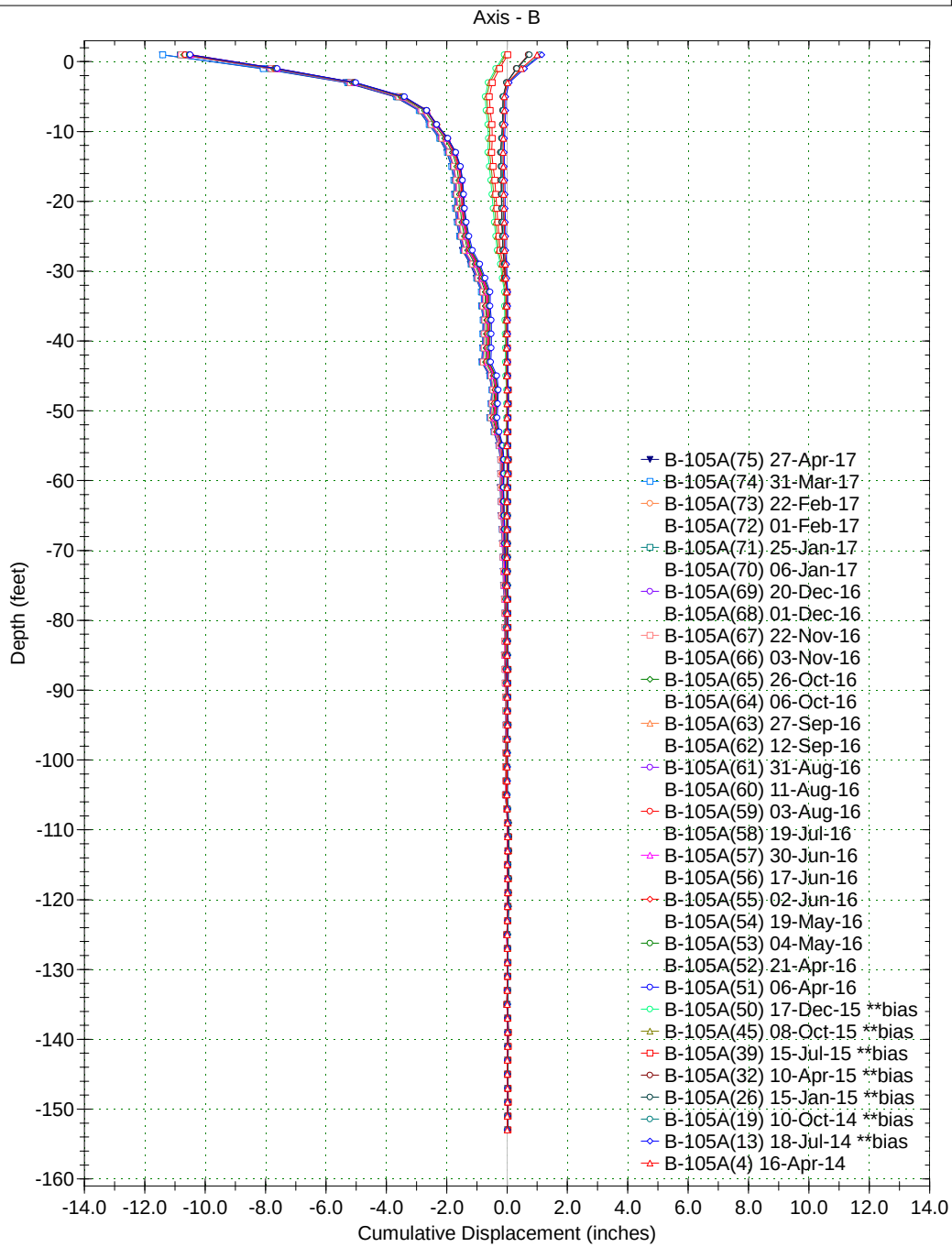
CUMULATIVE DISPLACEMENT

Inclinalysis v. 2.47.5

Borehole : B-105A
Project : CUY-90-15-24
Location : Cleveland, Ohio
Northing : Sta. 19+11.38
Easting : 90.9' Rt of CL
Collar :

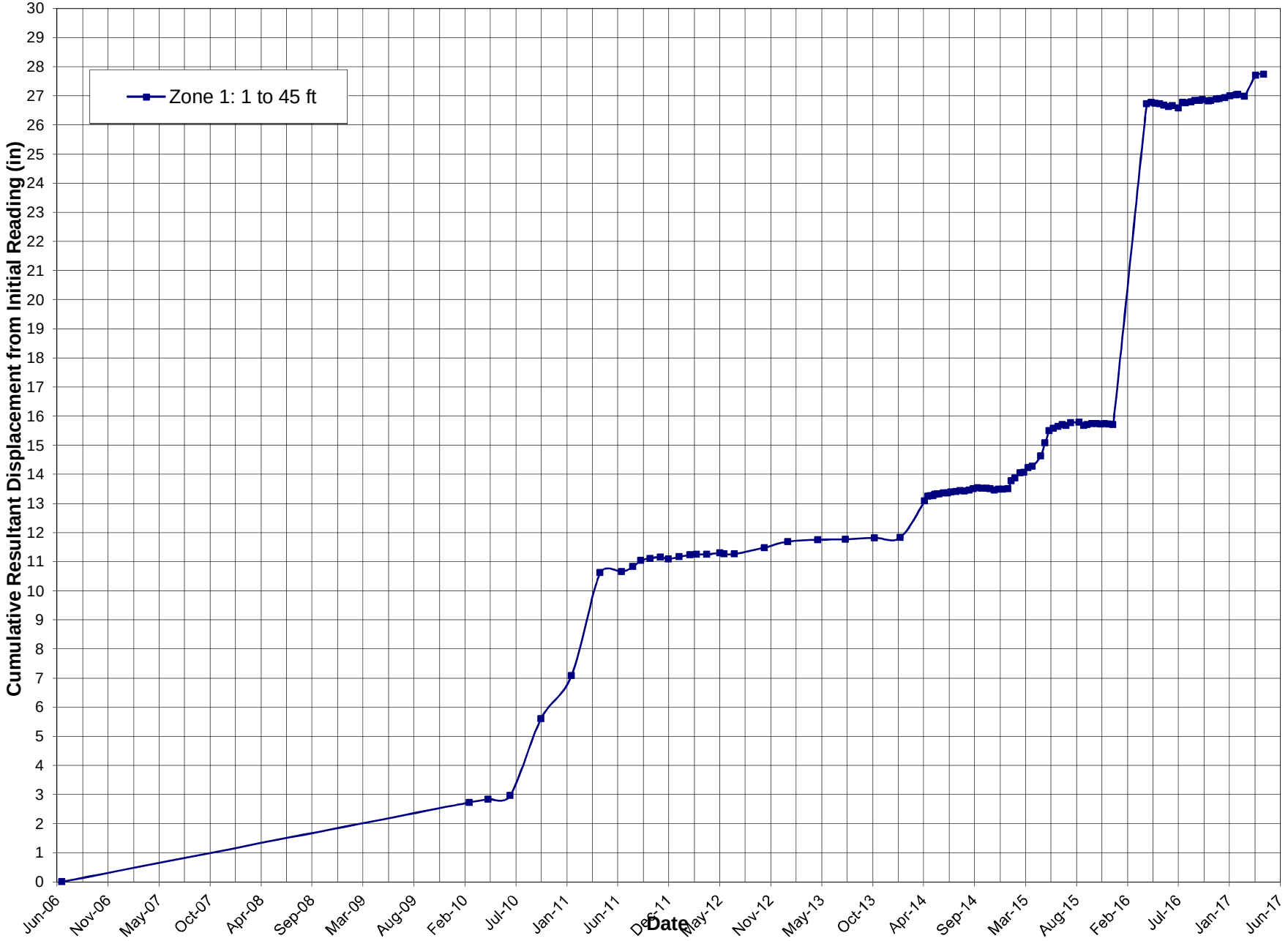
Spiral Correction : N/A
Collar Elevation : 3.0 feet
Borehole Total Depth : 156.0 feet
A+ Groove Azimuth :
Base Reading : 2014 Jan 15 09:19
Applied Azimuth : 0.0 degrees





CUY-90-15.24
PID 96504
SME Project#: 069032.00

B-105A



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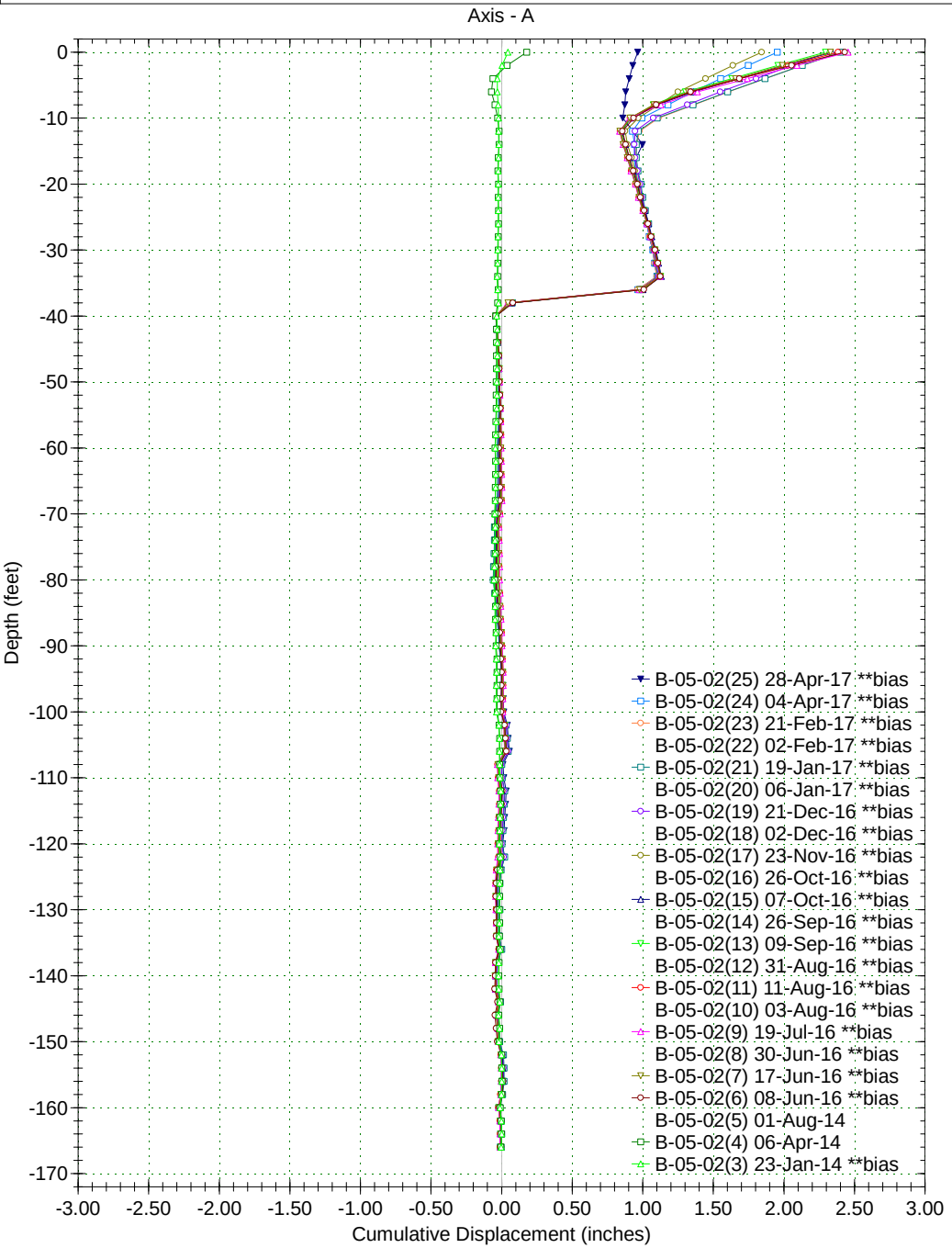
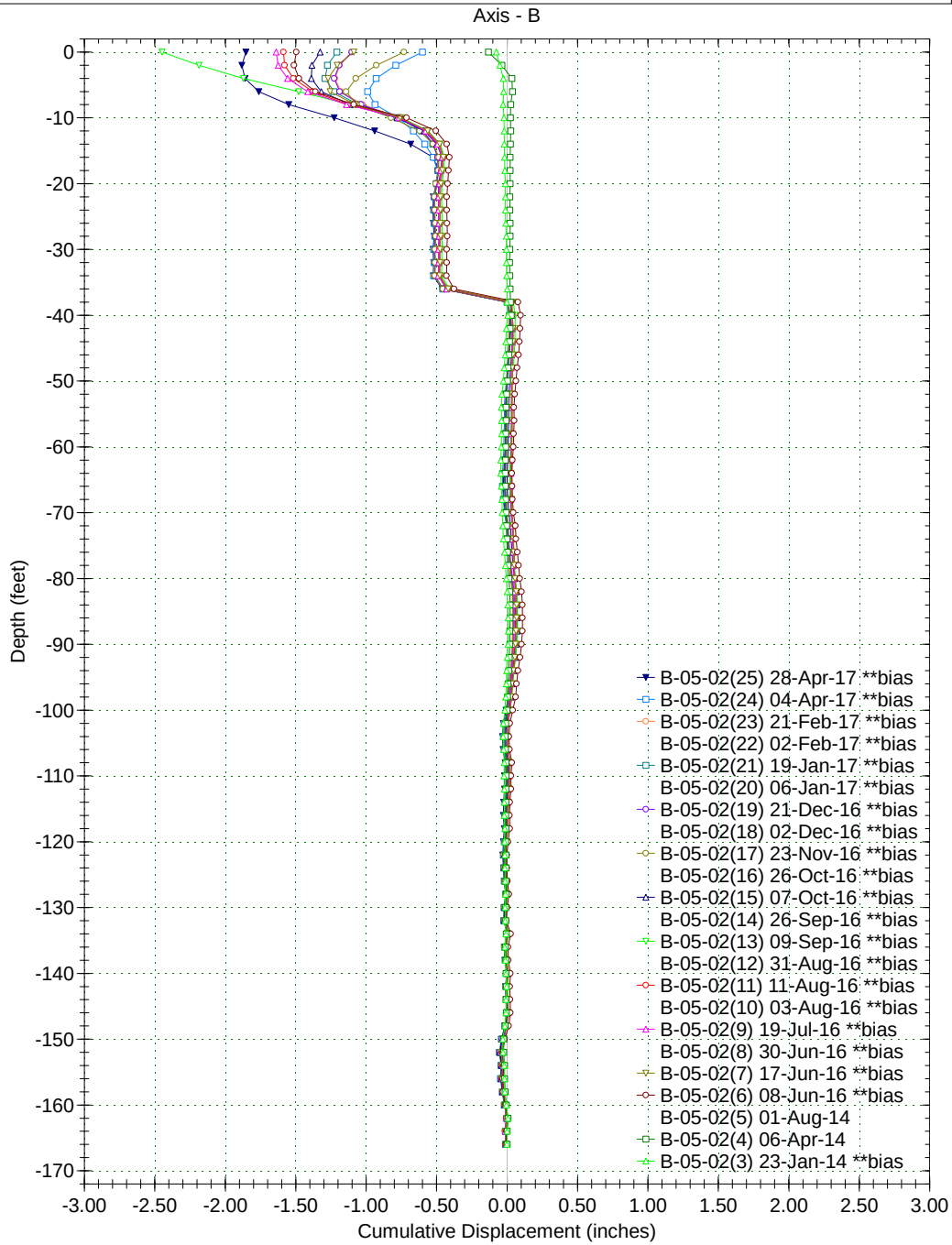
CUMULATIVE DISPLACEMENT

Inclinalysis v. 2.47.5

Borehole : B-05-02
Project : CUY-90-15-24
Location : Cleveland, Ohio
Northing : 663737.939
Easting : 2190289.081
Collar :

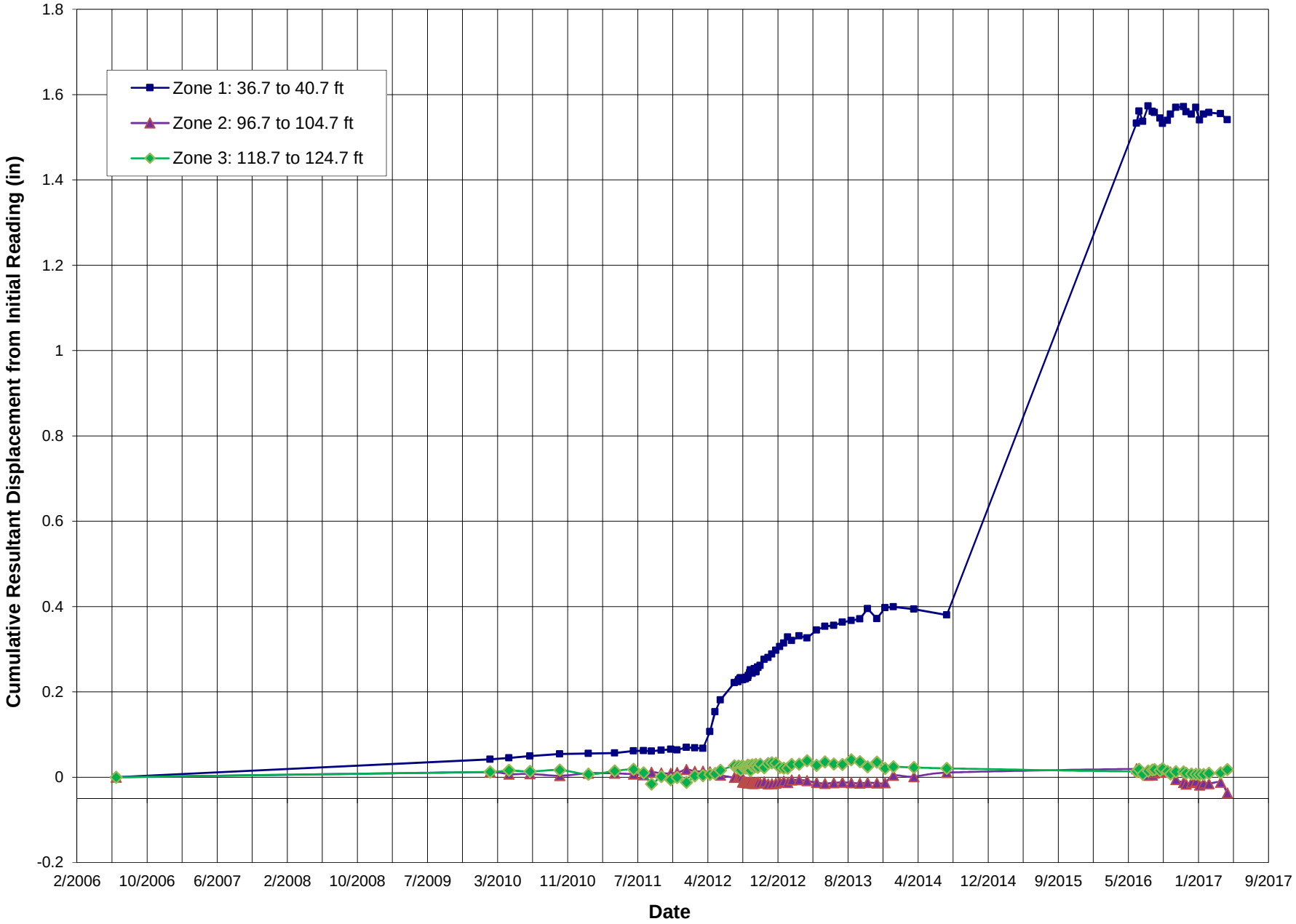
Spiral Correction : N/A
Collar Elevation : 2.0 feet
Borehole Total Depth : 168.0 feet
A+ Groove Azimuth :
Base Reading : 2013 Dec 24 11:12
Applied Azimuth : 0.0 degrees





CUY-90-15.24
PID 63504
SME Project#: 069032.00

B-05-02



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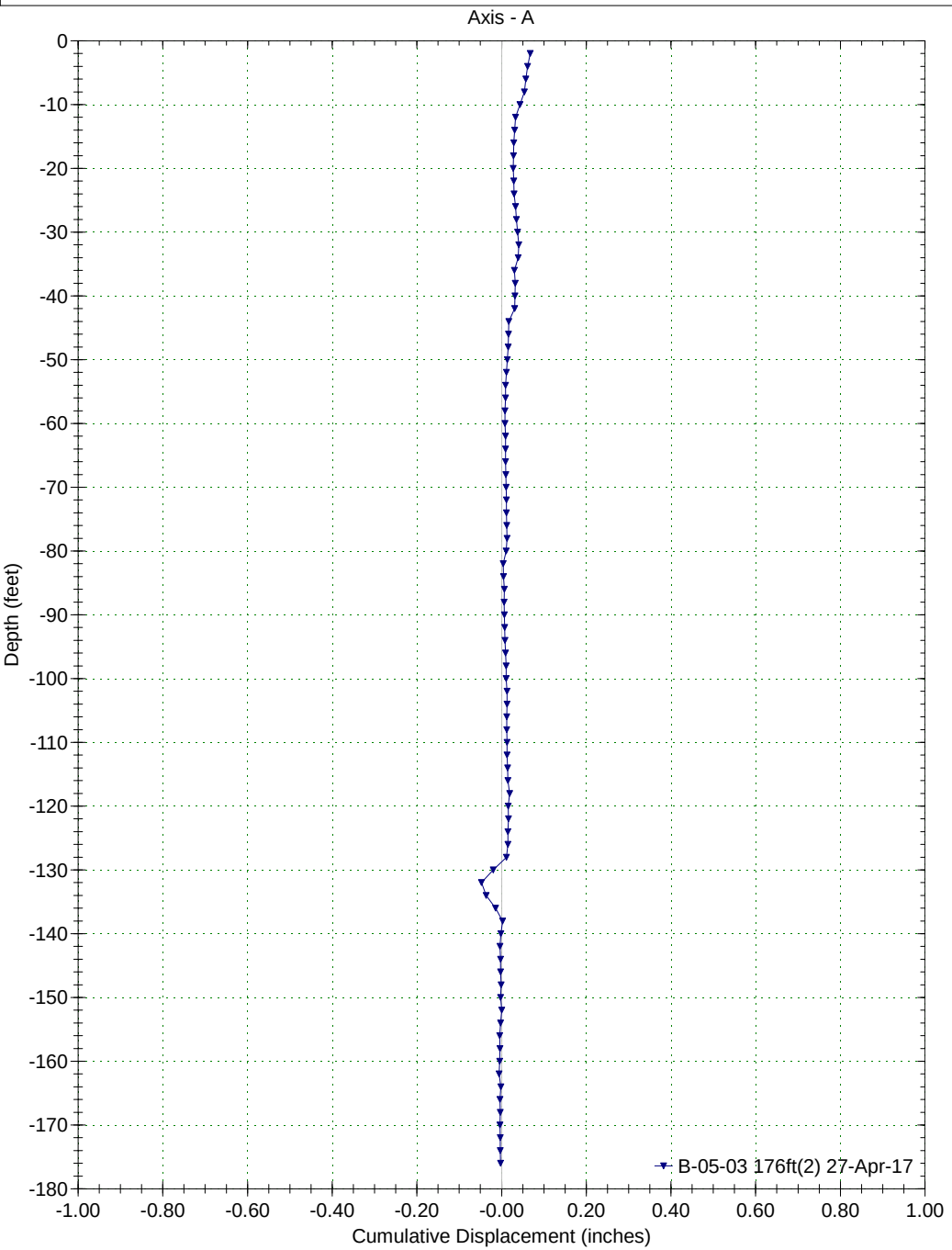
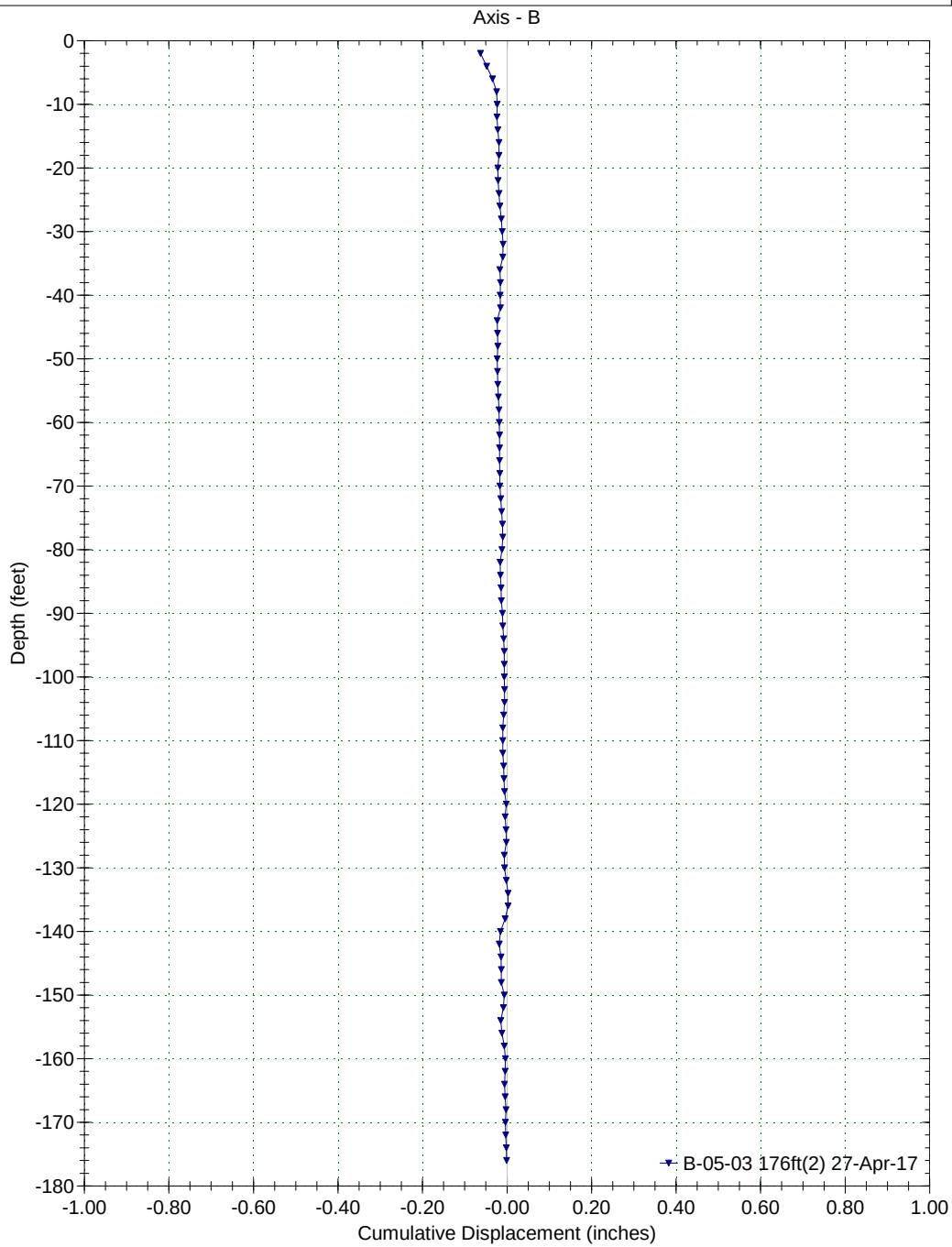
CUMULATIVE DISPLACEMENT

Inclinalysis v. 2.47.5

Borehole : B-05-03
Project : CUY-90-15-24
Location : Cleveland, Ohio
Northing :
Easting :
Collar :

Spiral Correction : N/A
Collar Elevation : 0.0 feet
Borehole Total Depth : 176.0 feet
A+ Groove Azimuth :
Base Reading : 2017 Apr 04 08:38
Applied Azimuth : 0.0 degrees





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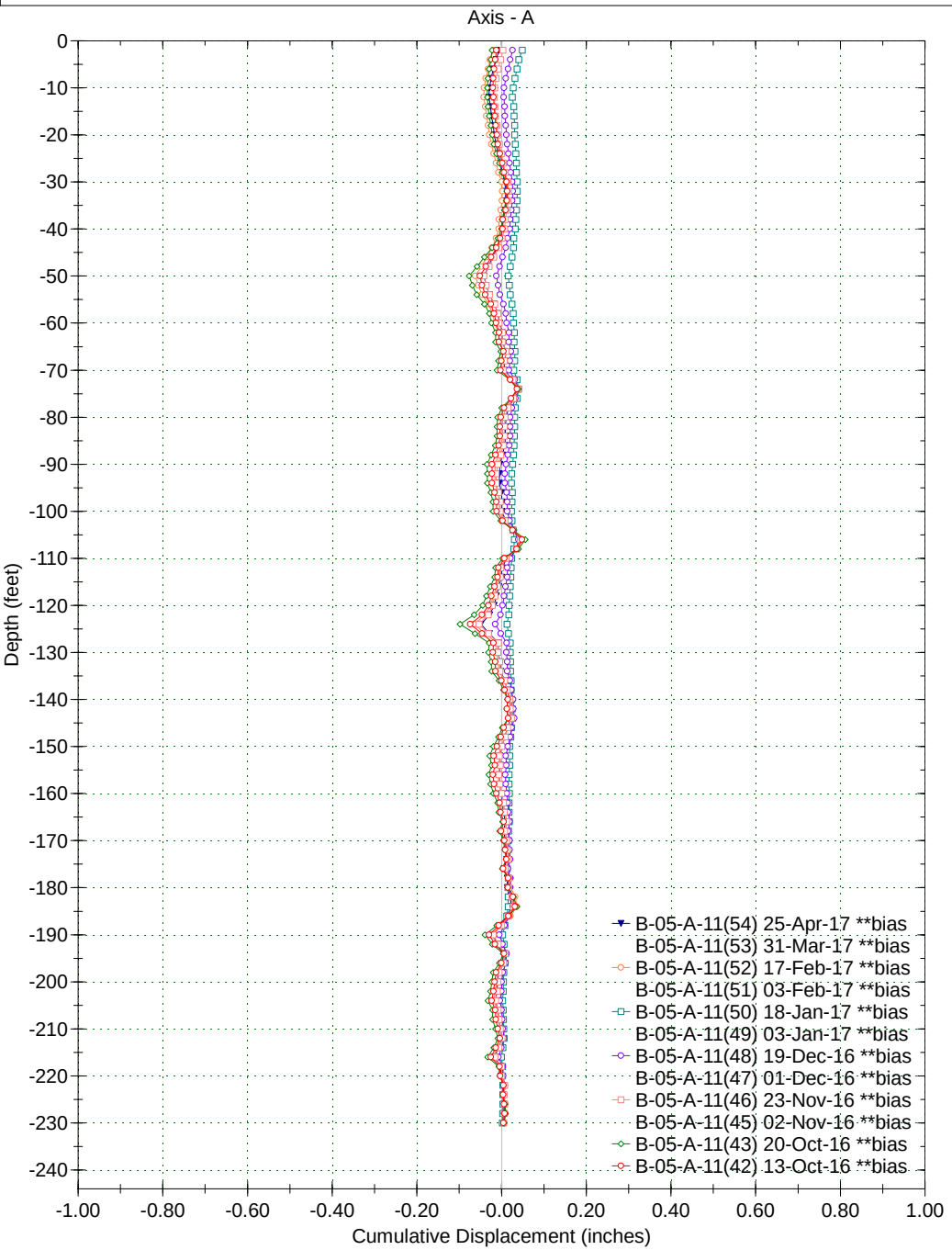
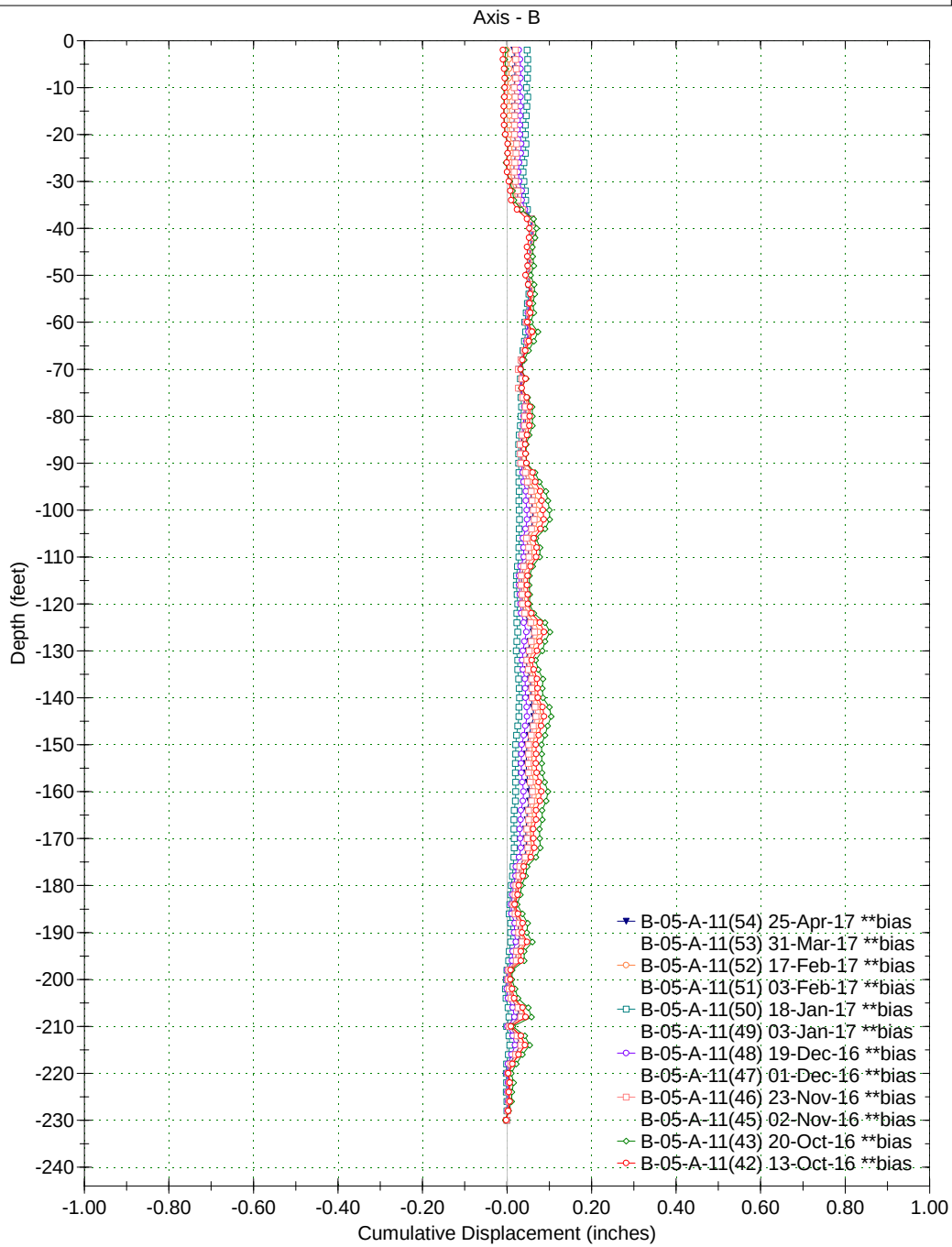
CUMULATIVE DISPLACEMENT

Inclinalysis v. 2.47.5

Borehole : B-05-A-11 230 ft
Project : CUY-90-15-24
Location :
Northing :
Easting :
Collar :

Spiral Correction : N/A
Collar Elevation : 0.0 feet
Borehole Total Depth : 230.0 feet
A+ Groove Azimuth :
Base Reading : 2016 Sep 28 08:37
Applied Azimuth : 0.0 degrees





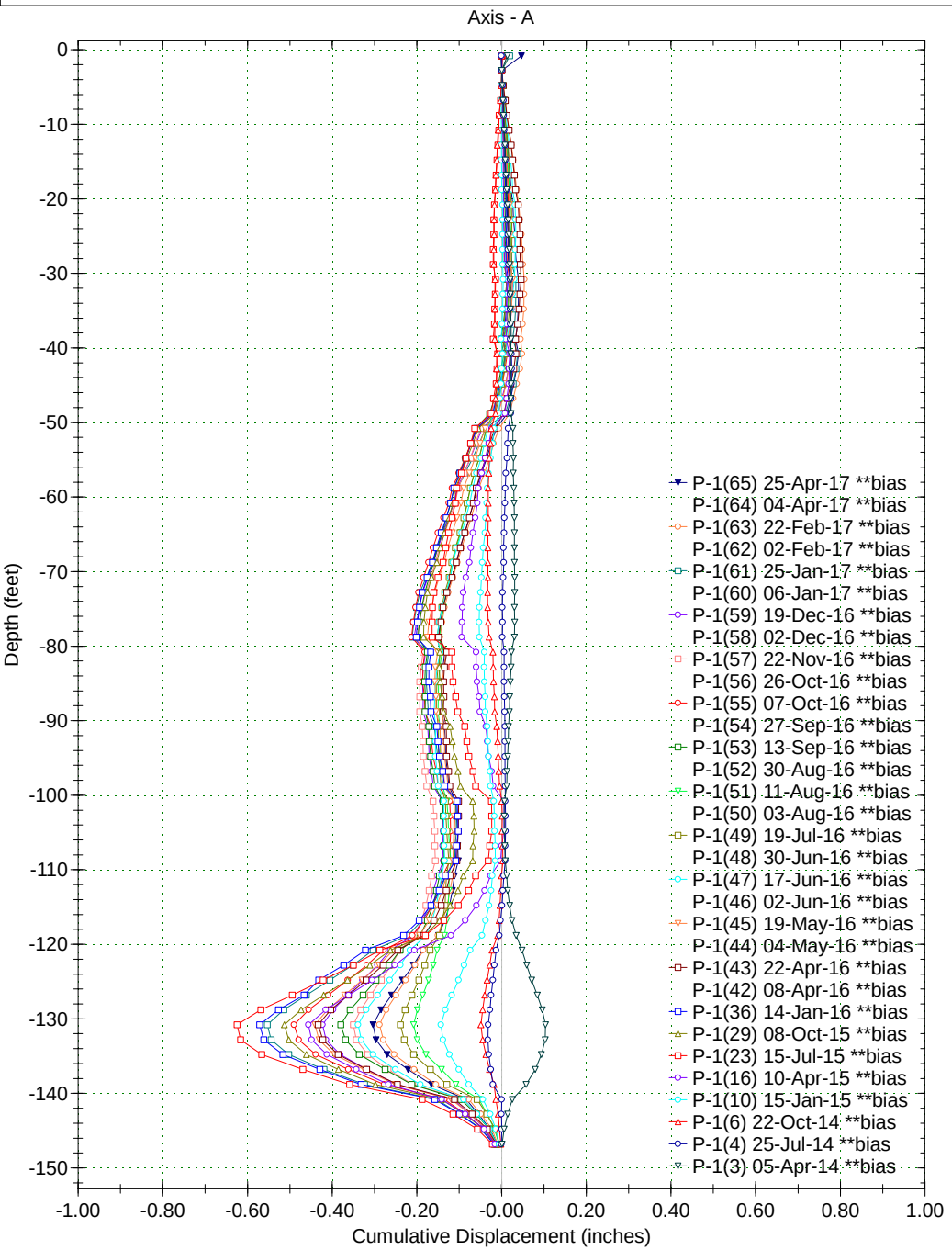
RST Instruments Ltd.

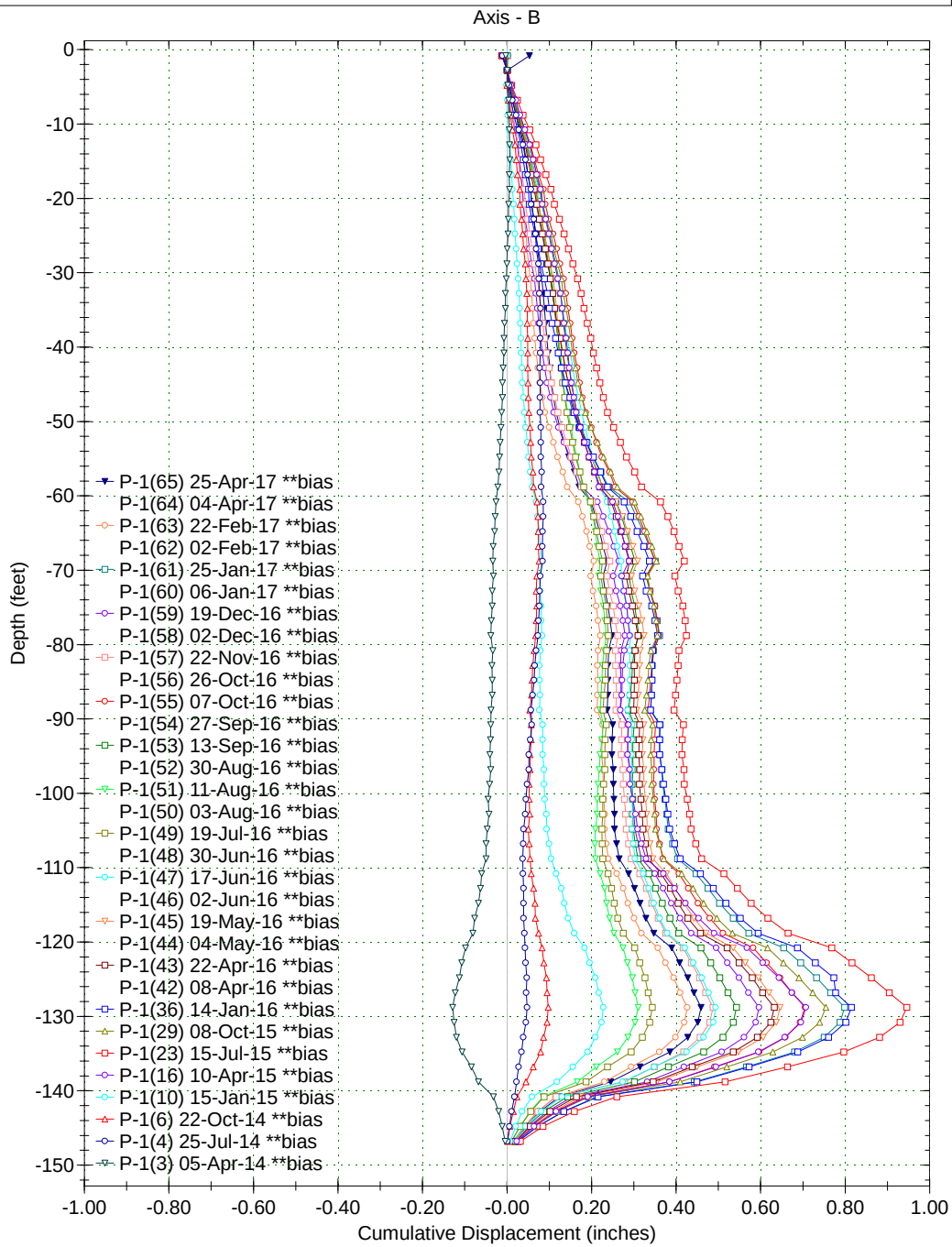
CUMULATIVE DISPLACEMENT

Inclinalysis v. 2.47.5

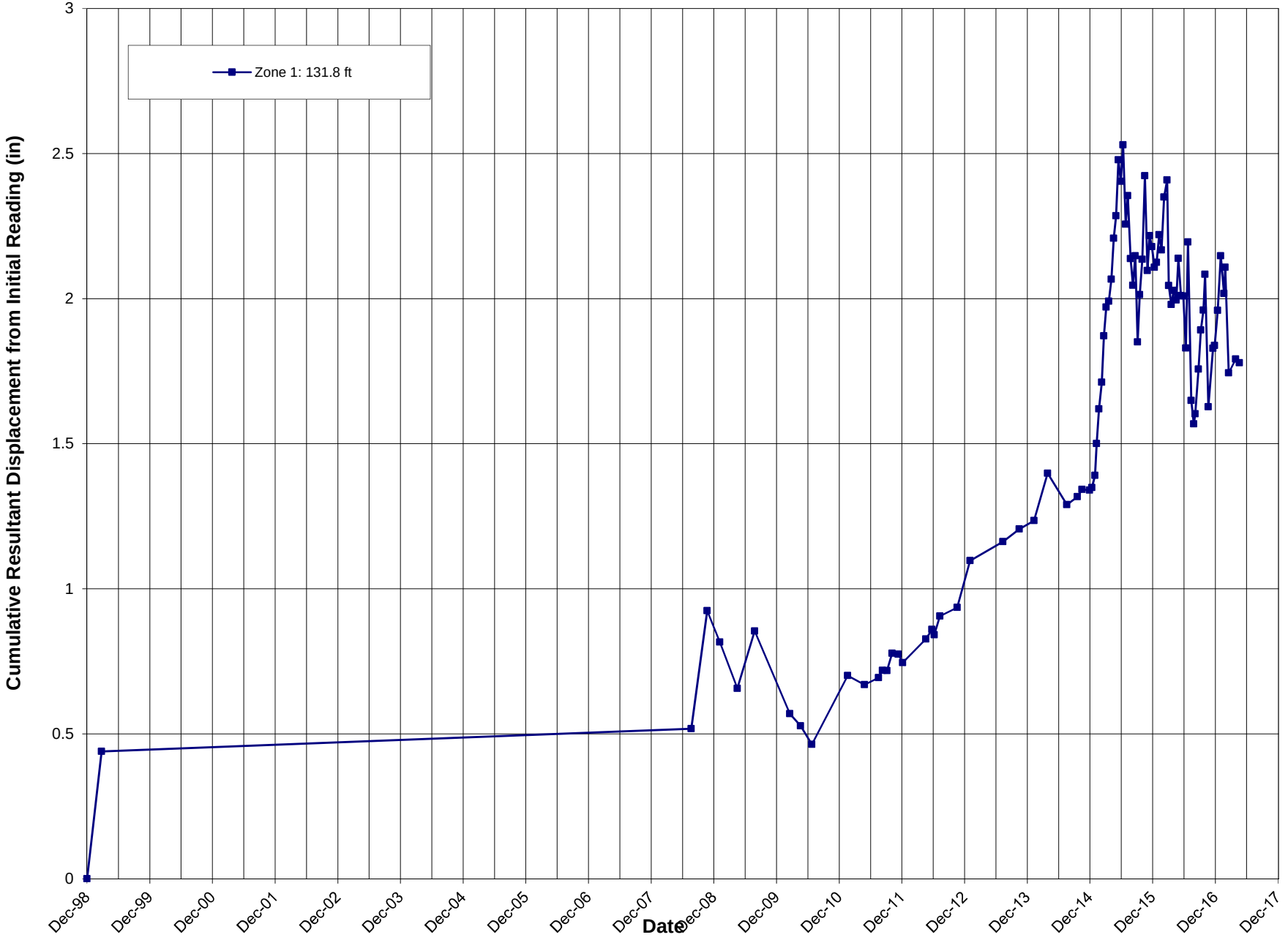
Borehole : P-1
Project : CUY-90-15-24
Location : Cleveland, Ohio
Northing :
Easting :
Collar :

Spiral Correction : N/A
Collar Elevation : 1.2 feet
Borehole Total Depth : 148.0 feet
A+ Groove Azimuth :
Base Reading : 2014 Jan 22 10:47
Applied Azimuth : 0.0 degrees





CUY-90-15.24
PID 96504
SME Project#: 069032.00



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CUMULATIVE DISPLACEMENT

Inclinalysis v. 2.47.5

Borehole : P-9N
Project : CUY-90-15-24
Location : Cleveland, Ohio
Northing :
Easting :
Collar :

Spiral Correction : N/A
Collar Elevation : 1.2 feet
Borehole Total Depth : 150.0 feet
A+ Groove Azimuth :
Base Reading : 2014 Jan 16 09:28
Applied Azimuth : 0.0 degrees