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December 28, 2021

Ken Willson
Senior Project/Program Manager
Coastal Protection Engineering
4038 Masonboro Loop Road
Wilmington, NC 28409

RE: Letter of Attachment to the 2021 Currituck County Topographic and Hydrographic Data Acquisition Report.

Dear Mr. Willson:

During the processing of the Currituck County sounding data from June 5, 2021 (methods of collection are described in the above referenced report) elevation errors were discovered at the depth of closure when compared to multiple historic data sets. The sound velocity curves and tidal data were analyzed but did not exhibit any obvious errors. Historic data collected with the same methods were used as a comparison to derive a sounding adjustment at depth. Hypack2020's Sound Velocity Sounding Adjustment tool was used to apply the adjustment derived from historical data as shown in the table below. The adjustment was only applied to sounding data from June 5, 2021 representing profiles CM-58 to CM-87.

To Depth (Feet)	Adjustment (Feet)
0	0
5	0
10	0
15	0.5
20	0.75
25	1.25
30	1.5
50	1.5

If you have any questions, please feel free to reach out to me at 561.248.2083 or Michael.lowiec@aptim.com

Very truly yours,

Michael Lowiec, PSM
Program Manager
Aptim Environmental & Infrastructure, LLC

2021 Currituck County Topographic and Hydrographic Data Acquisition Report

Prepared for:

Currituck County

Prepared by:

**Aptim Environmental & Infrastructure, LLC
6401 Congress Avenue, Suite 140
Boca Raton, FL 33487**

September 2021

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ABSTRACT

Aptim Environmental and Infrastructure, LLC (APTIM) was contracted by Coastal Protection Engineering of North Carolina, Inc. to provide a topographic and hydrographic survey. The 2021 topographic and hydrographic survey consisted of one hundred twenty (120) profile stations spanning across Currituck County. APTIM surveyors conducted the beach and hydrographic surveys from June 01, 2021 through June 08, 2021.

The physical monitoring of Currituck County included topographic and hydrographic surveys of the beach and offshore areas. The monitoring data is necessary to observe and assess beach conditions for future construction. The scientific monitoring processes provide information necessary to plan, design, and optimize subsequent follow up projects. The information gathered may potentially reduce the need for, and cost of, unnecessary work as well as potentially reducing any environmental impacts that may have, or is expected to occur.

SURVEY METHODOLOGIES

The surveys were conducted in accordance with the Minimum Performance Standards for the U.S. Army Corps of Engineers (USACE), Engineering and Design Hydrographic Surveying Manual (EM 1110-2-1003).

This survey is in accordance with Chapter 56.1606 of the North Carolina Administrative Code (NCAC) specifications established by The North Carolina Engineering and Land Surveying Act (GS89C). In addition, all hydrographic surveying was conducted under the direct supervision of an American Congress of Surveying and Mapping (ACSM) Certified Hydrographer (CH). Included in this Hydrographic and Topographic Survey Report are twenty-seven (27) maps visualizing profiles, one (1) project location map, one (1) control data sheet, and twenty-five (25) plan view maps. The plan view maps show reduced true position elevation data collected during the survey. The location of all published control, as well as control found and used for survey purposes, is presented in the Monument Information Report provided in **Appendix 1**.

Vertical data was collected in the North American Vertical Datum of 1988 (NAVD88), GEOID 18. All Horizontal data is provided in the North Carolina State Plane Coordinate System, North American Datum of 1983(2011) (NAD 83(2011)). Profile data is presented in xyz format relative to The North American Vertical Datum of 1988 (NAVD88) in **Appendix 2** (digital format only). Profile plots are provided in **Appendix 3**. Ground digital photography obtained during the survey is provided in **Appendix 4**. Copies of all field book pages are provided in **Appendix 5** (digital format only).

The field survey and data collection activities encompassed four (4) phases. Brief descriptions of each survey phase, including methodologies and quality control/quality assurance procedures, are described below.

Phase One: Control Reconnaissance/Establishment/Verification

Prior to the start of the survey, reconnaissance of the monuments was conducted to confirm that survey control was in place and undisturbed. Real Time Kinematic Global Positioning System (RTK GPS) was used, along with RTK GPS within a virtual reference station (VRS) network, to locate and confirm survey control for this project. The North Carolina Geodetic Survey Continuously Operating Reference Station (CORS) Network stations used for this project included NCDU (Duck 3), NCCR (Creswell), NCEL (Elizabeth), LOY2 (Loyola 2), LOYZ (Loyola Z) and LS03 (Loyola LS03). The horizontal and vertical accuracy of control data meets the accuracy requirements as set forth in the Engineering and Design Hydrographic Surveying Manual (EM 1110-2-1003). In order to achieve required accuracy, the topographic and hydrographic surveys were controlled using 2nd order monuments, specifically CAFFEY,

RIDE, RUN, ADRIATIC, Q 261, and RADIO from the National Geodetic Survey (NGS). Horizontal and vertical positioning checks were conducted at the beginning and end of each day using at least two 2nd order monuments in the project area. The RTK GPS utilizes statistical methods to ensure accuracy of RTK GPS data remains within the 95% confidence interval. The control check shots were acquired using a minimum of five (5) epochs which results in a high accuracy location. Results from 2nd order control checks are displayed showing northing, easting, monument elevation, inverses, horizontal and vertical root mean square error, location description and photographs as indicated in the Monument Information Report (**Appendix 1**).

Phase Two: Beach Profiles

Upon completion of the control reconnaissance survey, beach/upland and nearshore operations were initiated. Cross-sections of the beach in the project area were surveyed using extended rod RTK GPS rovers, and standard RTK GPS rovers. Extended rod RTK GPS rovers were used to augment RTK GPS survey capability into the nearshore. The current systems allow surveyors from APTIM to collect the entire beach profile with RTK GPS technology. Incorporation of RTK GPS into monitoring surveys greatly reduces the potential for human error during data collection and reduction.

Profiles commenced from the onshore control point and extend seaward overlapping the offshore data. Nearshore portions of the profiles were surveyed by two (2) surveyors with an extended rod & Trimble R8 or R10 RTK GPS rover who entered the water wearing personal floatation devices (PFD). Trimble TSC3 data collectors are equipped with Bluetooth technology allowing wireless communication with the GPS receiver at a data exchange speed of 2.1 megabits per second. The rover system allows surveyors from APTIM to reach a maximum water depth of eleven (11) feet. The nearshore survey extended seaward to a point overlapping the offshore portion of the profiles by at least fifty (50) feet.

The upland portion of the survey commenced at the waterline and extended 250 feet landward of the dune or until an obstacle was encountered. The upland portions of the profiles were surveyed using an RTK GPS. Elevations were taken at approximately twenty-five (25) foot intervals along each profile line and at all grade breaks. To maintain online accuracy surveyors utilized the RTK GPS feature *stakeout point*. *Stakeout point* allows surveyors to maintain the profile azimuth without relying on survey lath or conventional compass bearings.

Phase Three: Nearshore/Offshore Profiles

The Nearshore/Offshore profiles were conducted at each required profile station. Profile data was collected to a minimum of 3,000 feet beyond the shoreline and the -30 NAVD88 contour. The landward limits of the nearshore profiles were based on a minimum overlap of fifty (50) feet beyond the seaward extent of beach profiles. Soundings were collected at 200kHz with

an Odom Hydrotrac II single frequency sounder connected to a centrally located, hull-mounted transducer on APTIM's twenty-eight (28) foot Parker survey vessel. These soundings were then reduced to 25' spacing, sufficient to provide an accurate depiction of the seafloor.

Data was digitally stored using HYPACK 2021 Software. A Trimble R-8 RTK GPS and a TSS DMS-25 dynamic motion sensor were used onboard the survey vessel to provide instantaneous tide corrections and attitude corrections. Manual tide readings were taken while conducting the onshore portion of the profile to verify onboard tide readings. In order to maintain the vessel navigation along the profile lines, HYPACK 2021 navigation software was used. This software provided horizontal position to the sounding data allowing real-time review of the data in plan view or cross-section format. HYPACK 2021 also provided navigation to the helm to minimize deviation from the online azimuth.

Horizontal and vertical positioning checks were conducted at the beginning and end of each day as described in phase one (1) of the survey. The sounder was calibrated via bar-checks and a sound velocity probe at the beginning and end of the day. The DIGIBAR PRO sound velocity meter offers a fast additional calibration for sound velocity as compared to the traditional bar-check. Bar-checks were performed from a depth of five (5) feet to a depth of at least twenty-five (25) feet. Analog data showing the results of the bar-check calibration was displayed on the sounder charts at five (5) foot increments during descent of the bar. Offshore data was collected within two (2) weeks of onshore data collection for each line.

Phase Four: Data Reduction/Submittals

Upon completion of the field work, data was edited and reduced with Trimble Business Center, HYPACK 2021, and APTIM's proprietary software programs. The upland and nearshore portions of the beach profile were viewed and edited in Trimble Business Center and a comma delimited XYZ file was created. The offshore raw digital data was viewed and edited in HYPACK 2021's *Single Beam Editor*. The offshore RTK GPS tide data that was collected was compared to the manually collected RTK GPS nearshore tide data, local observed, and predicted tides for data verification purposes. Tide corrected offshore data was exported and a comma delimited XYZ file was created. All overlapping profile data was compared in cross section to ensure system accuracy. The edited beach profile data and offshore profile data were merged and a representative cross-section was derived for each profile line. The cross sections were developed using proprietary APTIM plotting programs.

The final plots were edited and reviewed with comparisons to previous years; discrepancies were noted and resolved. The final approved cross-section data was prepared in the required formats for submittal (**Appendix 3**). Digital data is provided in the State required vertical datum NAVD88.

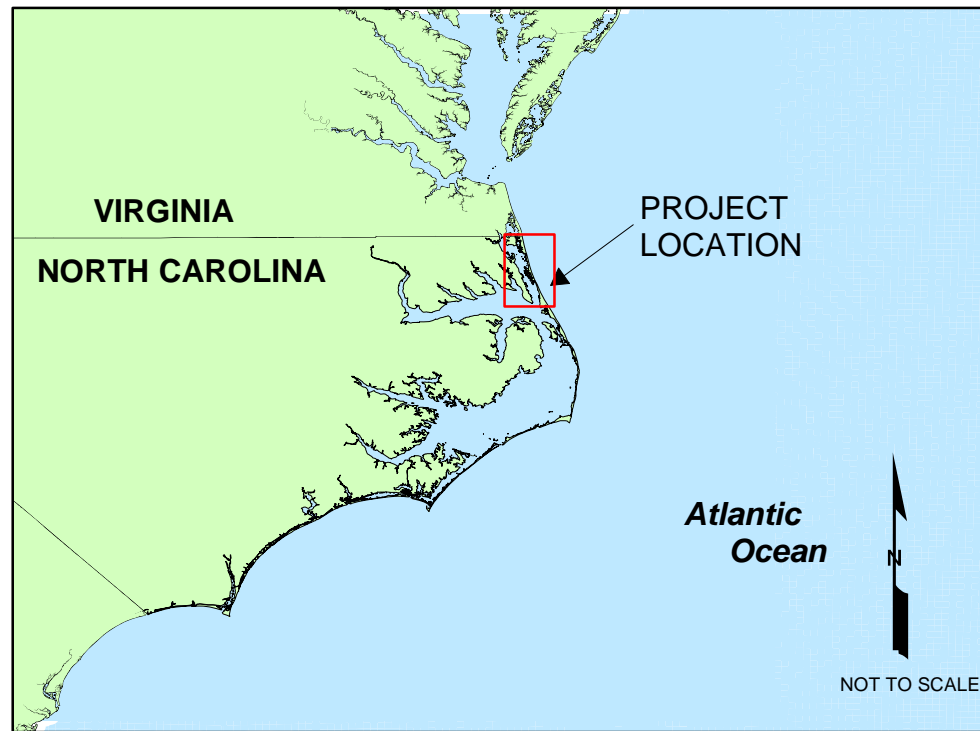
Map Preparation:

Upon completion of the surveys and data reduction, the survey maps were prepared in ArcGIS 10.7.1. In order to avoid congestion, the survey maps do not show all of collected elevations but enough to give an accurate depiction of the cross sections. The survey charts display profile data and control monument locations plotted against Esri's background aerial imagery from July 2020. (Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA FSA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community).

Ground Digital Photography:

Surveyors from APTIM collected three (3) digital photos at a mid-beach location at each profile location. The three (3) photos included one (1) in each shore-parallel direction and one (1) landward toward the monument. Wherever possible, an additional digital photo was taken of the control identification or stamping on the monument.

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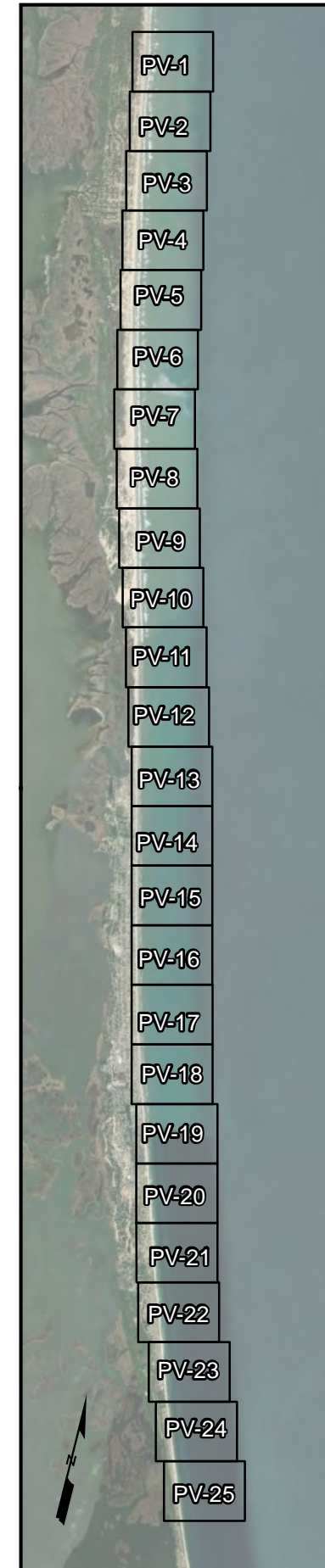


INDEX TO SHEETS

1	COVER SHEET AND PROJECT LOCATION MAP
2	CONTROL DATA SHEET
3-27	PROJECT PLAN VIEWS

LEGEND

C-001	PROFILE STATION IDENTIFICATION
MON.	MONUMENT
M. DATE	MONUMENT DATE
M.ELEV.	MONUMENT ELEVATION
AZ	AZIMUTH
JAN	JANUARY
FEB	FEBRUARY
MAR	MARCH
APR	APRIL
JUN	JUNE
AUG	AUGUST
OCT	OCTOBER
BLVD	BOULEVARD
RD	ROAD
DR	DRIVE
LN	LANE
ST	STREET
N.	NORTH
PV	PLAN VIEW
CS	COVER SHEET
CD	CONTROL DATA
NAVD	NORTH AMERICAN VERTICAL DATUM 1988
NAD	NORTH AMERICAN DATUM 1983
PH.	PHONE
COMM.	COMMISSION
NO.	NUMBER
LLC	LIMITED LIABILITY COMPANY
IRC	IRON ROD AND CAP
NC	NORTH CAROLINA
U.S.	UNITED STATES OF AMERICA
NTS	NOT TO SCALE



Designed by:	Checked by:	No.	Date
M. Lowric	M. Lowric		
Drawn by:	Reviewed by:		
F. Shanahan	R. Hart		
Date:	Submitted by:		
Jul 7 2021	M. Lowric		
Plot Scale:	Comm. No.:		
AS NOTED	631020164		

Reference Files:

2021 CURRITUCK COUNTY
TOPOGRAPHIC AND HYDROGRAPHIC
DATA ACQUISITION REPORT

COVER SHEET

2021 CURRITUCK COUNTY TOPOGRAPHIC AND HYDROGRAPHIC DATA ACQUISITION REPORT

CURRITUCK STATION INFORMATION			
June 2021			
DATUMS: NAD83(2011) / NAVD88 (U.S. SURVEY FT)			
STATION	NORTHING	EASTING	AZIMUTH
C-001	1033891.08	2919204.10	79
C-002	1032585.84	2919457.82	79
C-003	1031695.16	2919630.95	79
C-004	1030524.95	2919858.41	79
C-005	1029731.91	2920012.56	79
C-006	1028750.28	2920203.37	79
C-007	1027768.65	2920394.18	79
C-008	1027013.66	2920540.94	79
C-009	1025538.88	2920827.61	79
C-010	1024890.24	2920953.69	79
C-011	1023747.70	2921175.78	79
C-012	1022753.92	2921368.95	79
C-013	1021972.42	2921520.85	79
C-014	1020813.54	2921746.12	79
C-015	1019882.22	2921927.15	79
C-016	1018934.01	2922111.46	79
C-017	1017925.97	2922307.41	79
C-018	1016970.75	2922493.08	79
C-019	1016070.25	2922668.12	79
C-020	1014986.70	2922878.74	79
C-021	1014071.97	2923056.55	79
C-022	1013044.24	2923256.32	79
C-023	1012049.73	2923449.63	79
C-024	1011080.99	2923637.93	79
C-025	1010199.00	2923809.38	79
C-026	1009117.73	2924019.55	79
C-027	1008136.11	2924210.36	79
C-028	1007154.48	2924401.17	79
C-029	1006172.85	2924591.98	79
C-030	1005191.23	2924782.79	79

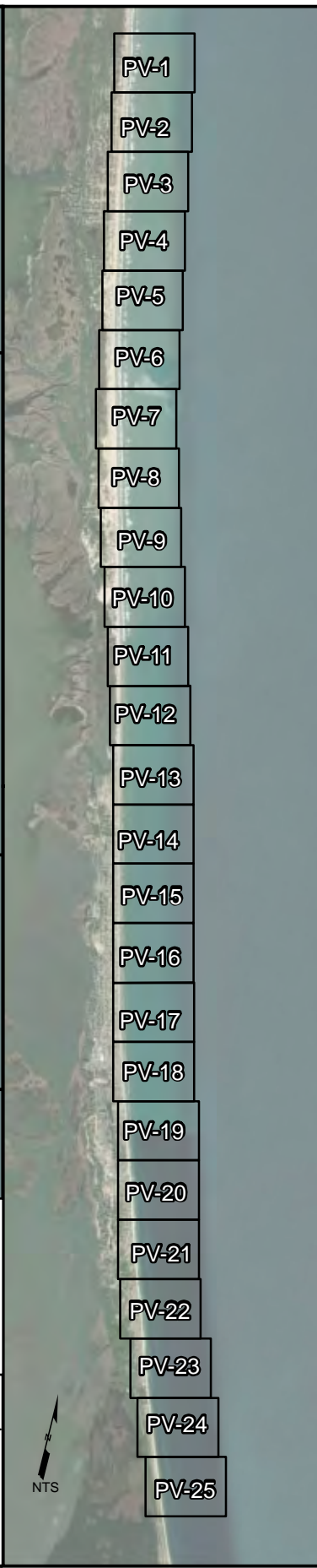
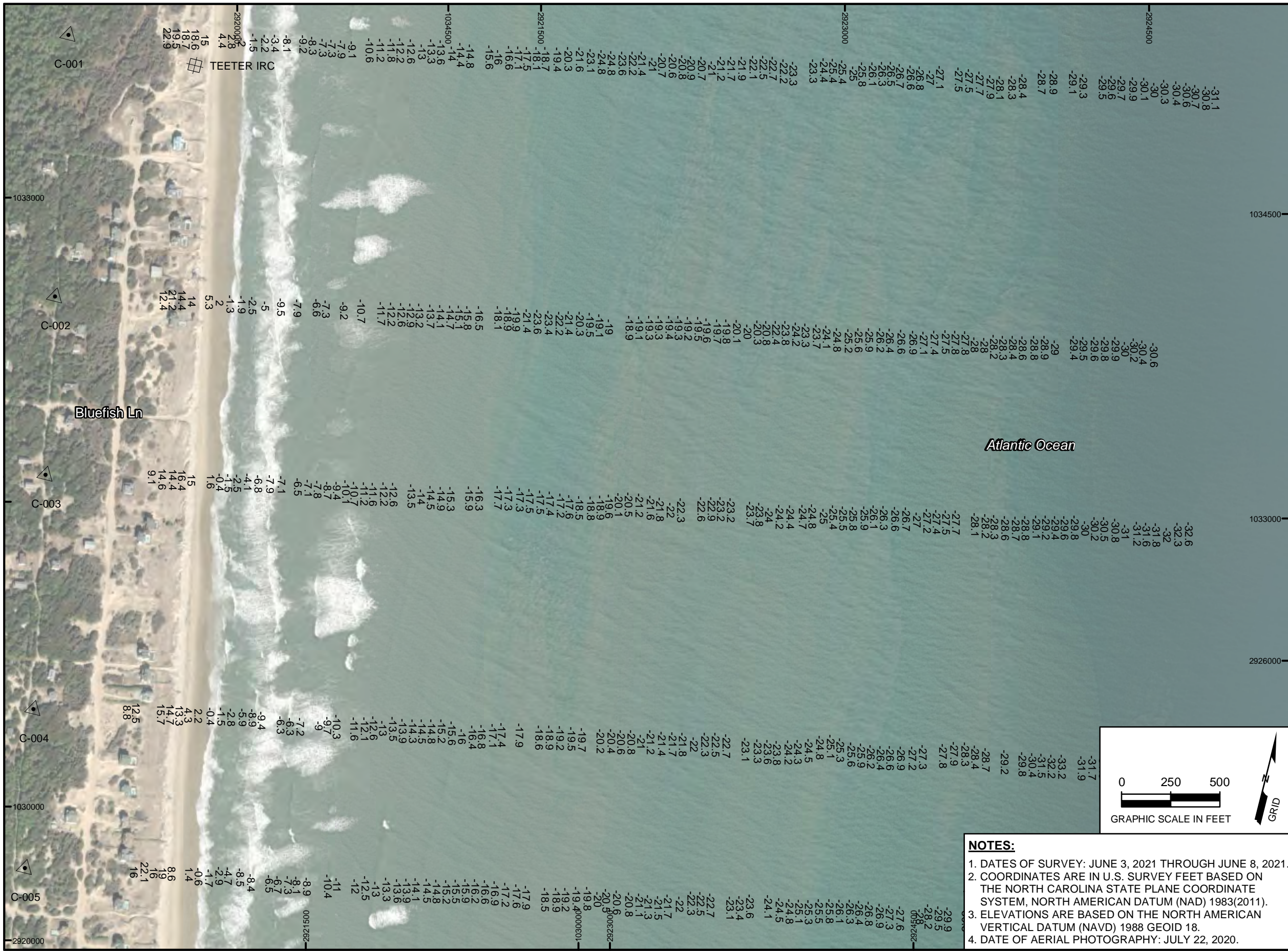
CURRITUCK STATION INFORMATION			
June 2021			
DATUMS: NAD83(2011) / NAVD88 (U.S. SURVEY FT)			
STATION	NORTHING	EASTING	AZIMUTH
C-031	1004209.60	2924973.60	79
C-032	1003227.97	2925164.41	79
C-033	1002271.66	2925456.77	75
C-034	1001315.36	2925749.14	75
C-035	1000359.05	2926041.51	75
C-036	999402.75	2926333.88	75
C-037	998510.99	2926606.52	75
C-038	997490.14	2926918.62	75
C-039	996515.53	2927216.59	75
C-040	995453.17	2927541.39	75
C-041	994621.23	2927795.74	75
C-042	993664.92	2928088.11	75
C-043	992658.07	2928395.94	75
C-044	991664.72	2928699.63	75
C-045	990796.01	2928965.23	75
C-046	989839.70	2929257.60	75
C-047	988849.49	2929560.34	75
C-048	987854.50	2929864.53	75
C-049	987063.91	2930106.24	75
C-050	986098.73	2930401.33	75
C-051	985058.18	2930719.46	75
C-052	984101.87	2931011.83	75
C-053	983145.57	2931304.20	75
C-054	982189.26	2931596.57	75
C-055	981232.96	2931888.94	75
C-056	980276.65	2932181.32	75
C-057	979320.35	2932473.69	75
C-058	978364.04	2932766.06	75
C-059	977523.89	2933022.92	75
C-060	976430.49	2933302.09	77

CURRITUCK STATION INFORMATION			
June 2021			
DATUMS: NAD83(2011) / NAVD88 (U.S. SURVEY FT)			
STATION	NORTHING	EASTING	AZIMUTH
C-061	975487.85	2933537.12	77
C-062	974518.04	2933778.92	77
C-063	973563.33	2934016.95	77
C-064	972604.58	2934256.00	77
C-065	971512.00	2934528.41	77
C-066	970567.57	2934763.88	77
C-067	969714.76	2934976.51	77
C-068	968754.46	2935215.94	77
C-069	967704.78	2935477.65	77
C-070	966698.85	2935728.46	77
C-071	965808.89	2935950.35	77
C-072	964814.75	2936198.22	77
C-073	963792.96	2936452.98	77
C-074	962853.30	2936687.26	77
C-075	961883.01	2936929.18	77
C-076	960912.71	2937171.11	77
C-077	960035.66	2937389.78	77
C-078	958951.38	2937660.12	77
C-079	957962.06	2937909.03	77
C-080	957025.33	2938195.42	73
C-081	956061.48	2938490.09	73
C-082	955096.61	2938785.08	73
C-083	954201.86	2939058.64	73
C-084	953273.03	2939342.61	73
C-085	952264.00	2939651.10	73
C-086	951276.46	2939953.02	73
C-087	950351.39	2940235.84	73
C-088	949386.41	2940530.87	73
C-089	948438.78	2940820.59	73
C-090	947482.47	2941112.96	73

CURRITUCK STATION INFORMATION			
June 2021			
DATUMS: NAD83(2011) / NAVD88 (U.S. SURVEY FT)			
STATION	NORTHING	EASTING	AZIMUTH
C-091	946526.17	2941405.33	73
C-092	945569.86	2941697.70	73
C-093	944629.37	2941985.24	73
C-094	943657.25	2942282.45	73
C-095	942700.95	2942574.82	73
C-096	941785.12	2942854.82	73
C-097	940788.34	2943159.56	70
C-098	939850.46	2943506.55	70
C-099	938912.57	2943853.55	70
C-100	937974.69	2944200.54	70
C-101	937036.81	2944547.53	70
C-102	936098.92	2944894.52	70
C-103	935161.04	2945241.51	70
C-104	934223.16	2945588.51	70
C-105	933285.28	2945935.50	70
C-106	932347.39	2946282.49	70
C-107	931409.51	2946629.48	70
C-108	930471.63	2946976.47	70
C-109	929533.74	2947323.47	70
C-110	928595.86	2947670.46	70
C-111	927657.98	2948017.45	70
C-112	926720.09	2948364.44	70
C-113	925782.21	2948711.44	70
C-114	924844.33	2949058.43	70
C-115	923906.45	2949405.42	70
C-116	922968.56	2949752.41	70
C-117	922030.68	2950099.40	70
C-118	921092.80	2950446.39	70
C-119	920149.20	2950795.50	70
C-120	919217.03	2951140.38	70

CONTROL USED BY APTIM 2021 SURVEY			
DATUMS: NAD83(2011) / NAVD88 (U.S. SURVEY FT)			
STATION	NORTHING	EASTING	AZIMUTH
Kitty	859358.84	2977205	9.17
CAFFEY	915308.87	2952084	1.99
Q261	975483.22	2933512	7.14
ADRIATIC	974203.77	2933858	6.6
RADIO	935113.175	2944087	9.219
RUN	926250.145	2947875	7.178
SHIP IRC	955355.36	2938903	23.6
RUDY IRC	934755.387	2945625	24.387
TUCKER IRC	1005574.741	2925818	26.306
BELLA IRC	1005575.658	2925822	27.926
TEETER IRC	1033886.521	2919867	17.444

Reference Files:	Checked by:	Reviewed by:	Submitted by:	Comm. No.:	No.	Date	Description
	M. Lowrie	R. Hart	M. Lowrie	631020164			
Designed by:	M. Lowrie	Drawn by:	R. Stanton	Date:	July 2021	Plot Scale:	AS NOTED



NOTES:

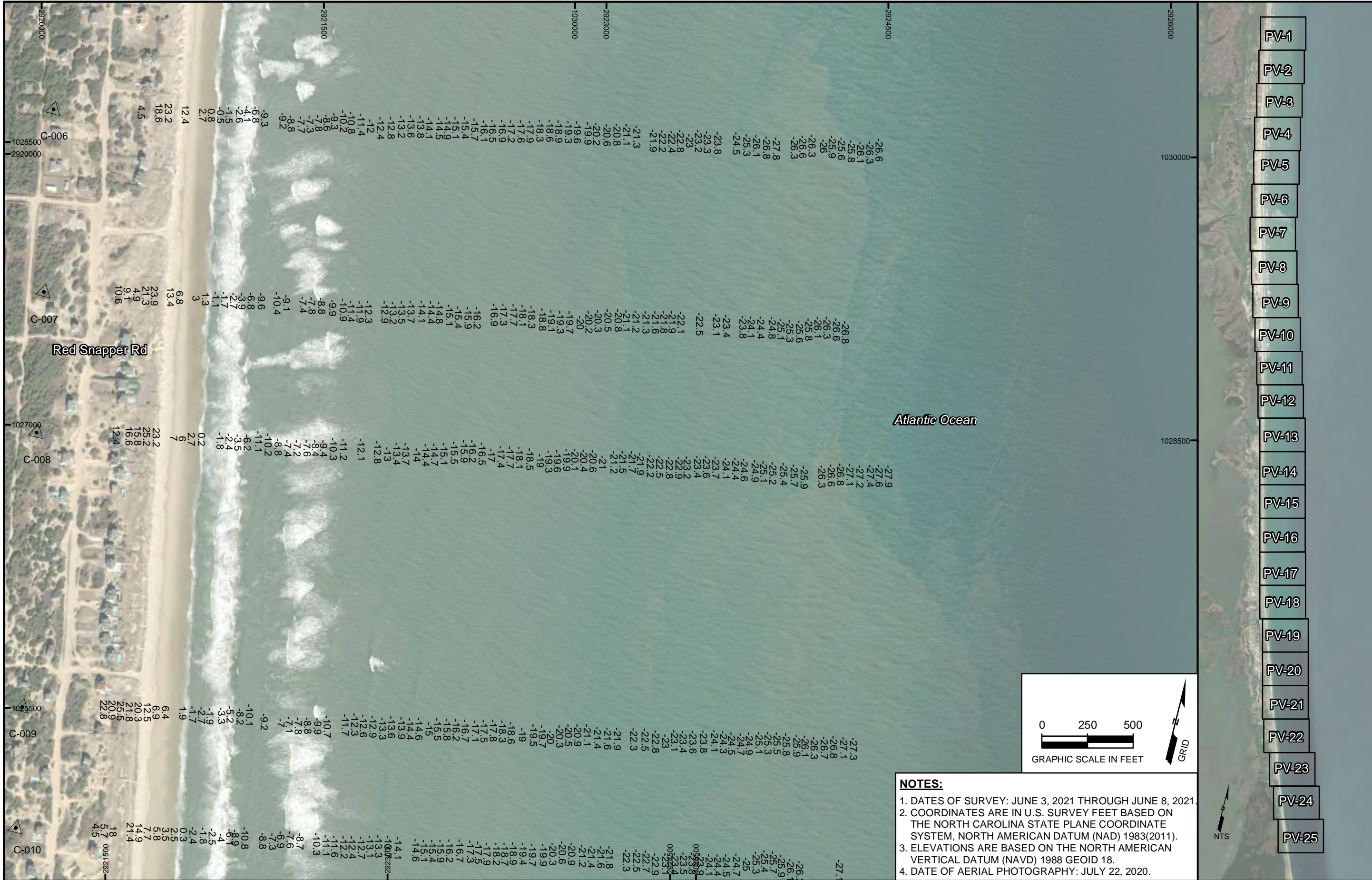
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2. COORDINATES ARE IN U.S. SURVEY FEET BASED ON THE NORTH CAROLINA STATE PLANE COORDINATE SYSTEM, NORTH AMERICAN DATUM (NAD) 1983(2011).
3. ELEVATIONS ARE BASED ON THE NORTH AMERICAN VERTICAL DATUM (NAVD) 1988 GEOID 18.
4. DATE OF AERIAL PHOTOGRAPHY: JULY 22, 2020.

Checked by:	Reviewed by:	Submitted by:	Comm. No.:
M. Lowrie	R. Hart	M. Lowrie	631020164

Reference File:
 Designed by: M. Lowrie
 Drawn by: P. Stanton
 Date: July 2021
 Plot Scale: AS NOTED

2021 CURRITUCK COUNTY
 TOPOGRAPHIC AND HYDROGRAPHIC
 DATA ACQUISITION REPORT
PLAN VIEW

DRAWING NO.
PV-1
 SHEET 3 OF 27



No.	Date	Description

Designed by: M. Lawie
 Drawn by: R. Stanton
 Date: July 2021
 Plot Scale: AS NOTED

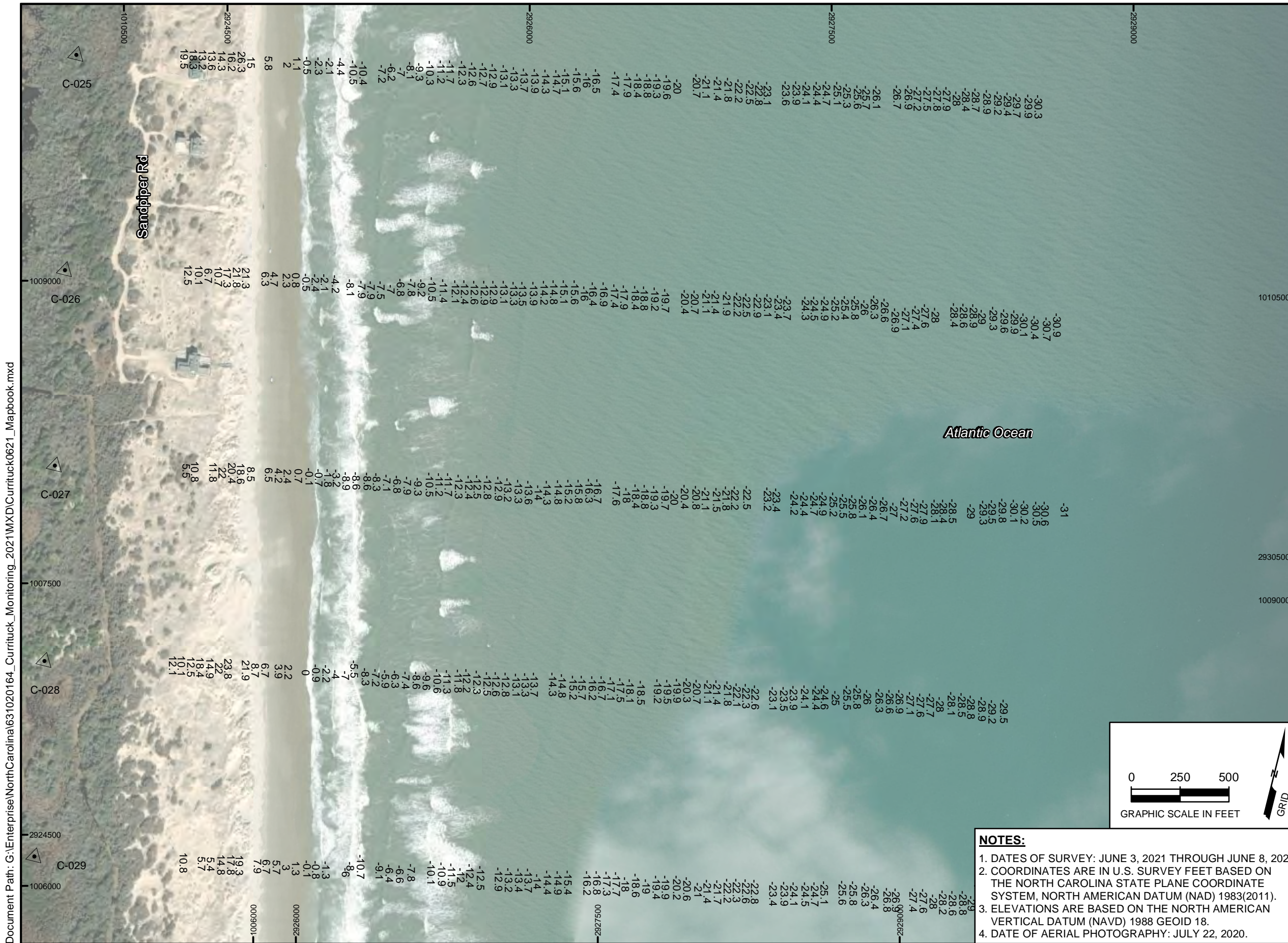
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 Comm. No.: 631020164

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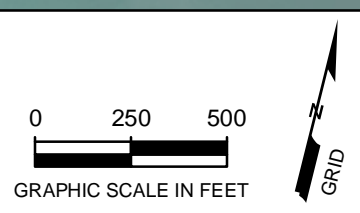
2021 CURRITUCK COUNTY TOPOGRAPHIC AND HYDROGRAPHIC DATA ACQUISITION REPORT

PLAN VIEW

DRAWING NO.



PV-1	PV-2	PV-3	PV-4	PV-5	PV-6	PV-7	PV-8	PV-9	PV-10	PV-11	PV-12	PV-13	PV-14	PV-15	PV-16	PV-17	PV-18	PV-19	PV-20	PV-21	PV-22	PV-23	PV-24	PV-25
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NOTES:

1. DATES OF SURVEY: JUNE 3, 2021 THROUGH JUNE 8, 2021.
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3. ELEVATIONS ARE BASED ON THE NORTH AMERICAN VERTICAL DATUM (NAVD) 1988 GEOID 18.
4. DATE OF AERIAL PHOTOGRAPHY: JULY 22, 2020.

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APTIM ENVIRONMENTAL & INFRASTRUCTURE, LLC

6401 CONGRESS AVENUE, SUITE 140
BOCA RATON, FL 33487

PH: (561) 391-8102
FAX: (561) 391-9111

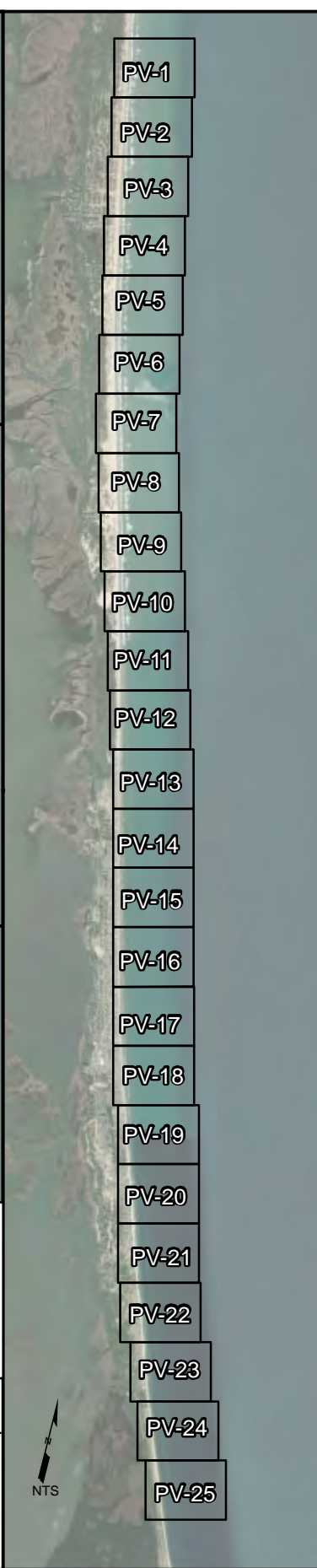
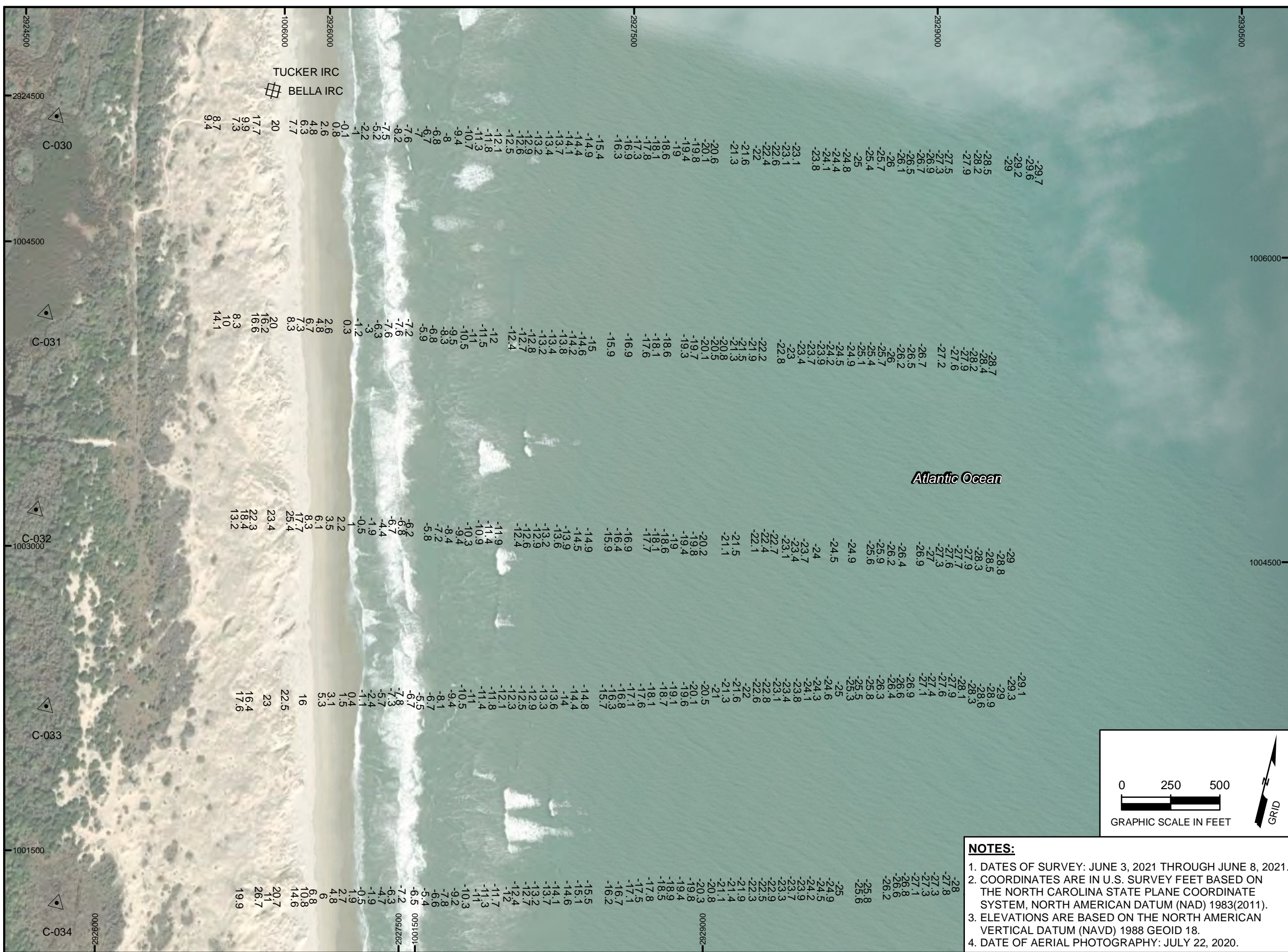
APTIM PLAN VIEW

2021 CURRITUCK COUNTY TOPOGRAPHIC AND HYDROGRAPHIC DATA ACQUISITION REPORT

Reference Files:		Designed by:		Checked by:	
		M. Lowie	M. Lowie		
		R. Hart	R. Hart		
		M. Lowie	M. Lowie		
		Comm. No.:	631020164	No.	
		Plot Scale:	AS NOTED	Date	
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				Checked by:	

DRAWING NO. **PV-6**
SHEET 8 OF 27

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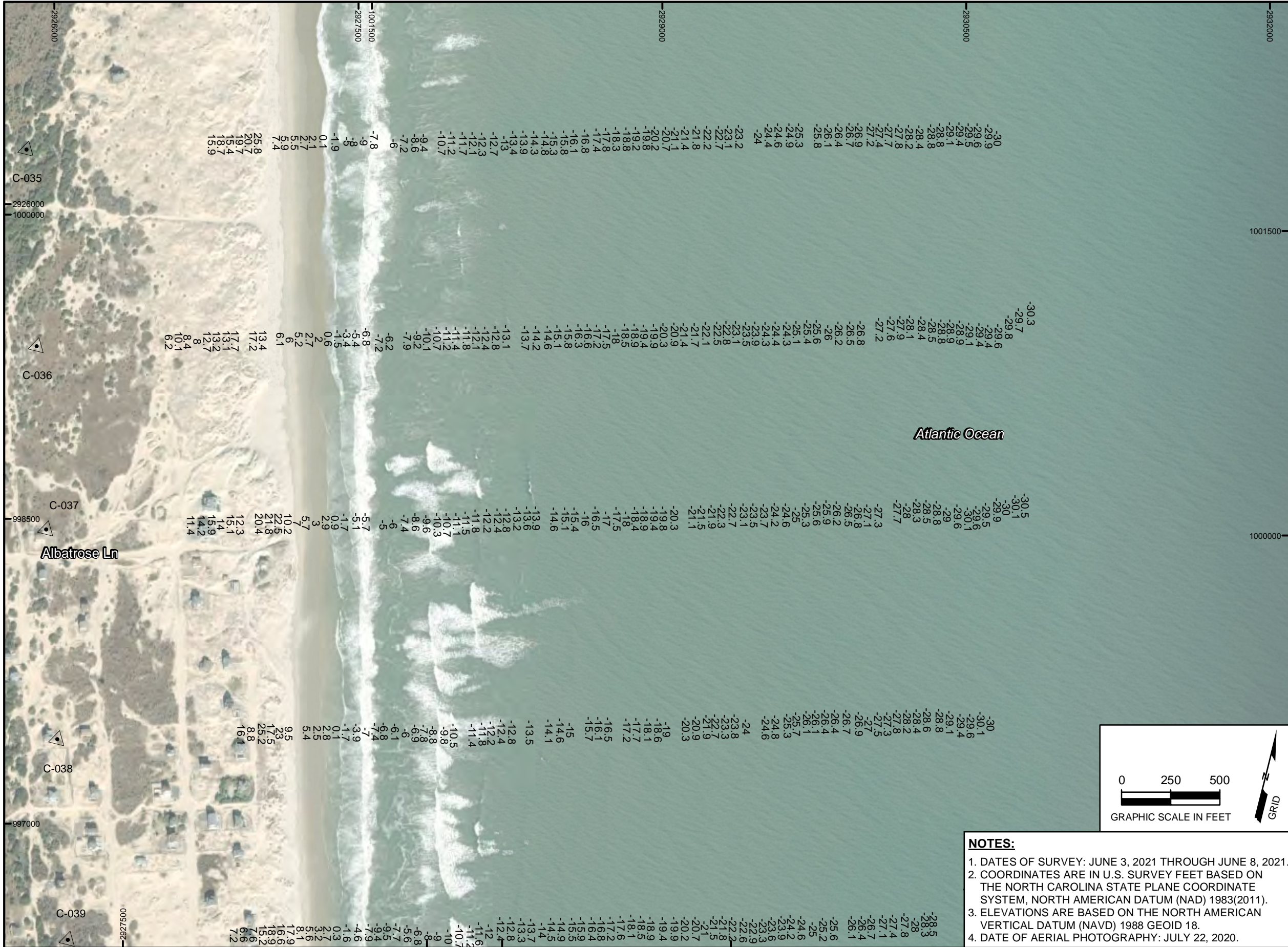


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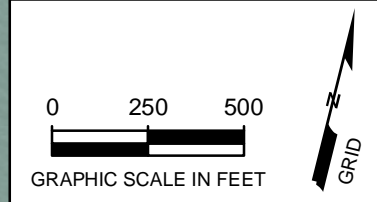
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3. ELEVATIONS ARE BASED ON THE NORTH AMERICAN VERTICAL DATUM (NAVD) 1988 GEOID 18.
4. DATE OF AERIAL PHOTOGRAPHY: JULY 22, 2020.

Checked by:	Reviewed by:	Submitted by:	Comm. No.:
M. Lowrie	R. Hart	M. Lowrie	631020164

Reference File:
 Designed by: M. Lowrie
 Drawn by: P. Stanton
 Date: July 2021
 Plot Scale: AS NOTED



- PV-1
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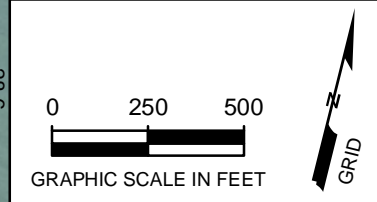
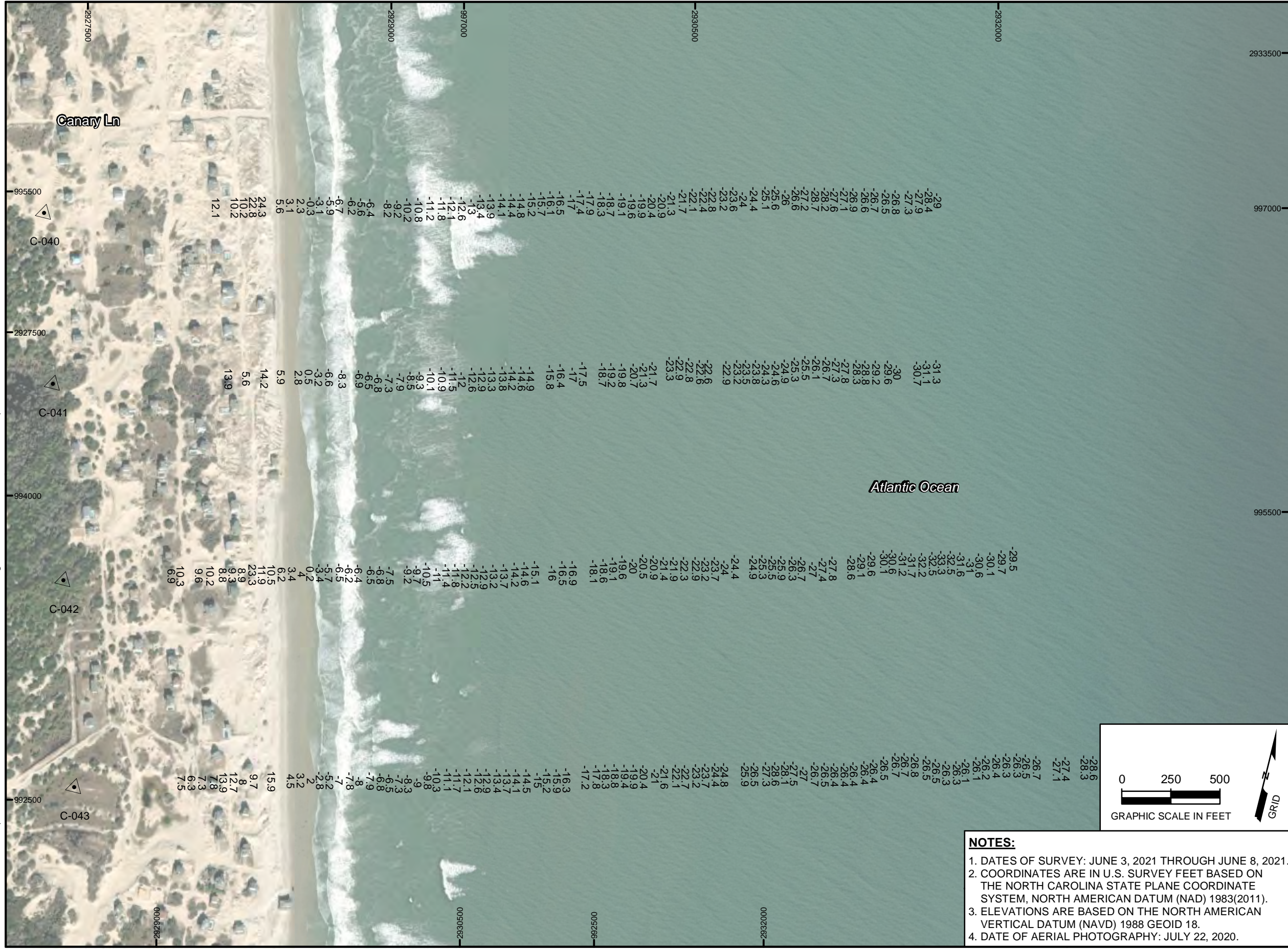
NOTES:
 1. DATES OF SURVEY: JUNE 3, 2021 THROUGH JUNE 8, 2021.
 2. COORDINATES ARE IN U.S. SURVEY FEET BASED ON THE NORTH CAROLINA STATE PLANE COORDINATE SYSTEM, NORTH AMERICAN DATUM (NAD) 1983(2011).
 3. ELEVATIONS ARE BASED ON THE NORTH AMERICAN VERTICAL DATUM (NAVD) 1988 GEOID 18.
 4. DATE OF AERIAL PHOTOGRAPHY: JULY 22, 2020.

Document Path: G:\Enterprise\NorthCarolina\631020164_Currutuck_Monitoring_2021\MXD\Currutuck0621_Mapbook.mxd

Designed by:	Checked by:	Reviewed by:	Submitted by:	Date	Description
M. Lowrie	M. Lowrie	R. Hart	M. Lowrie	7/22/21	
P. Stanton					

2021 CURRITUCK COUNTY
 TOPOGRAPHIC AND HYDROGRAPHIC
 DATA ACQUISITION REPORT
PLAN VIEW

Document Path: G:\Enterprise\NorthCarolina\631020164_Currutuck_Monitoring_2021\WXD\Currutuck0621_Mapbook.mxd



NOTES:

1. DATES OF SURVEY: JUNE 3, 2021 THROUGH JUNE 8, 2021.
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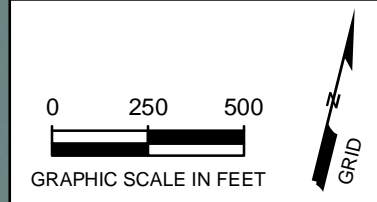
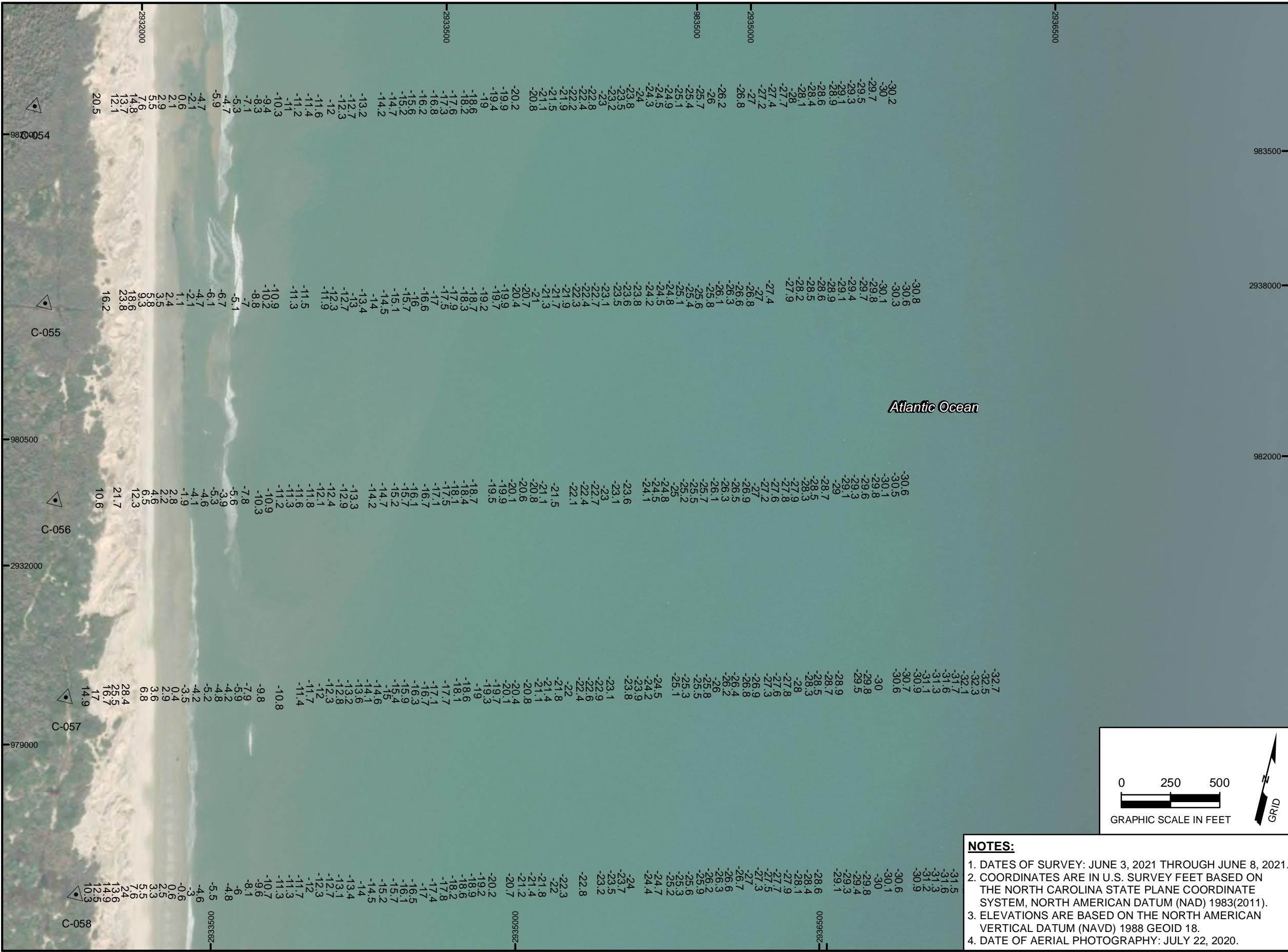
APTIM
ENVIRONMENTAL & INFRASTRUCTURE, LLC
 6401 CONGRESS AVENUE, SUITE 140
 BOCA RATON, FL 33487
 PH. (561) 391-8102
 FAX (561) 391-9116

Checked by:	Reviewed by:	Submitted by:	Comm. No.:	No.	Date	Description
M. Lowme	R. Hart	M. Lowme	631020164			

2021 CURRITUCK COUNTY
 TOPOGRAPHIC AND HYDROGRAPHIC
 DATA ACQUISITION REPORT
PLAN VIEW

DRAWING NO.
PV-9

SHEET 11 OF 27



NTS

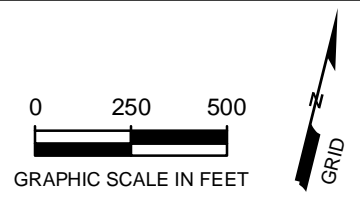
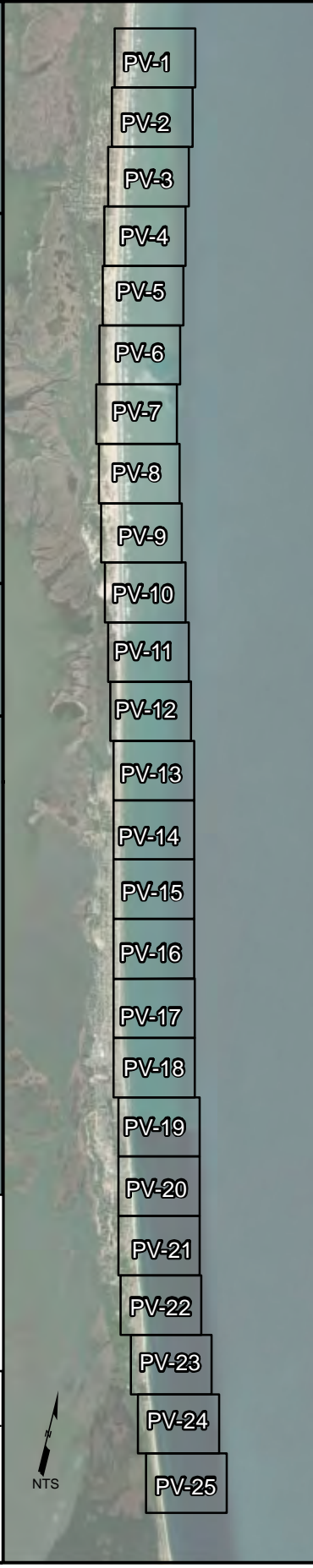
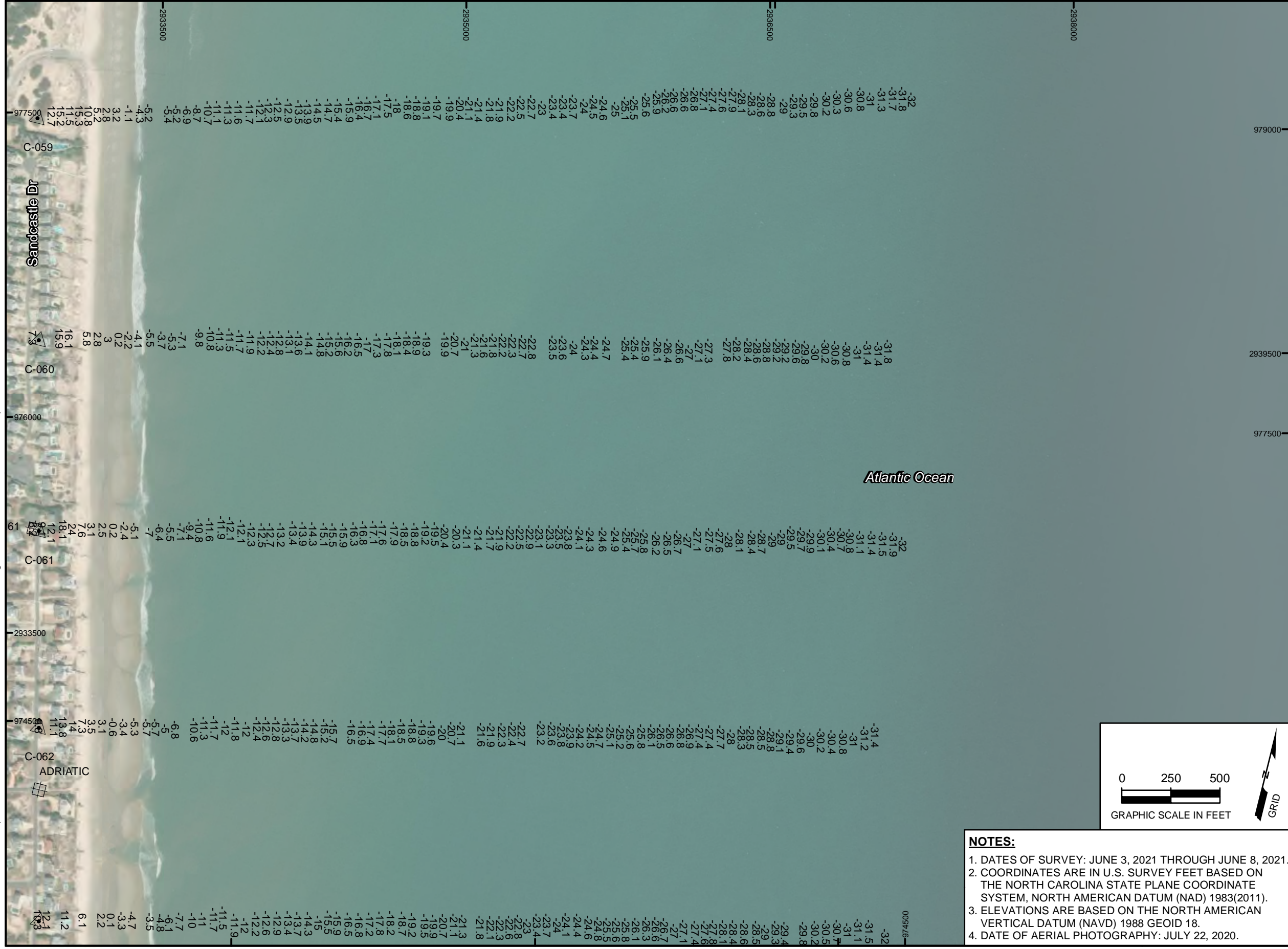
- NOTES:**
1. DATES OF SURVEY: JUNE 3, 2021 THROUGH JUNE 8, 2021.
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 4. DATE OF AERIAL PHOTOGRAPHY: JULY 22, 2020.

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Designed by:	Checked by:	No.	Date	Description
M. Lowme	M. Lowme			
R. Hatt	R. Hatt			
M. Lowme	M. Lowme			
July 2021	AS NOTED			
AS NOTED	AS NOTED			

2021 CURRITUCK COUNTY
TOPOGRAPHIC AND HYDROGRAPHIC
DATA ACQUISITION REPORT
PLAN VIEW

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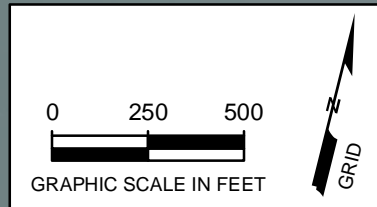
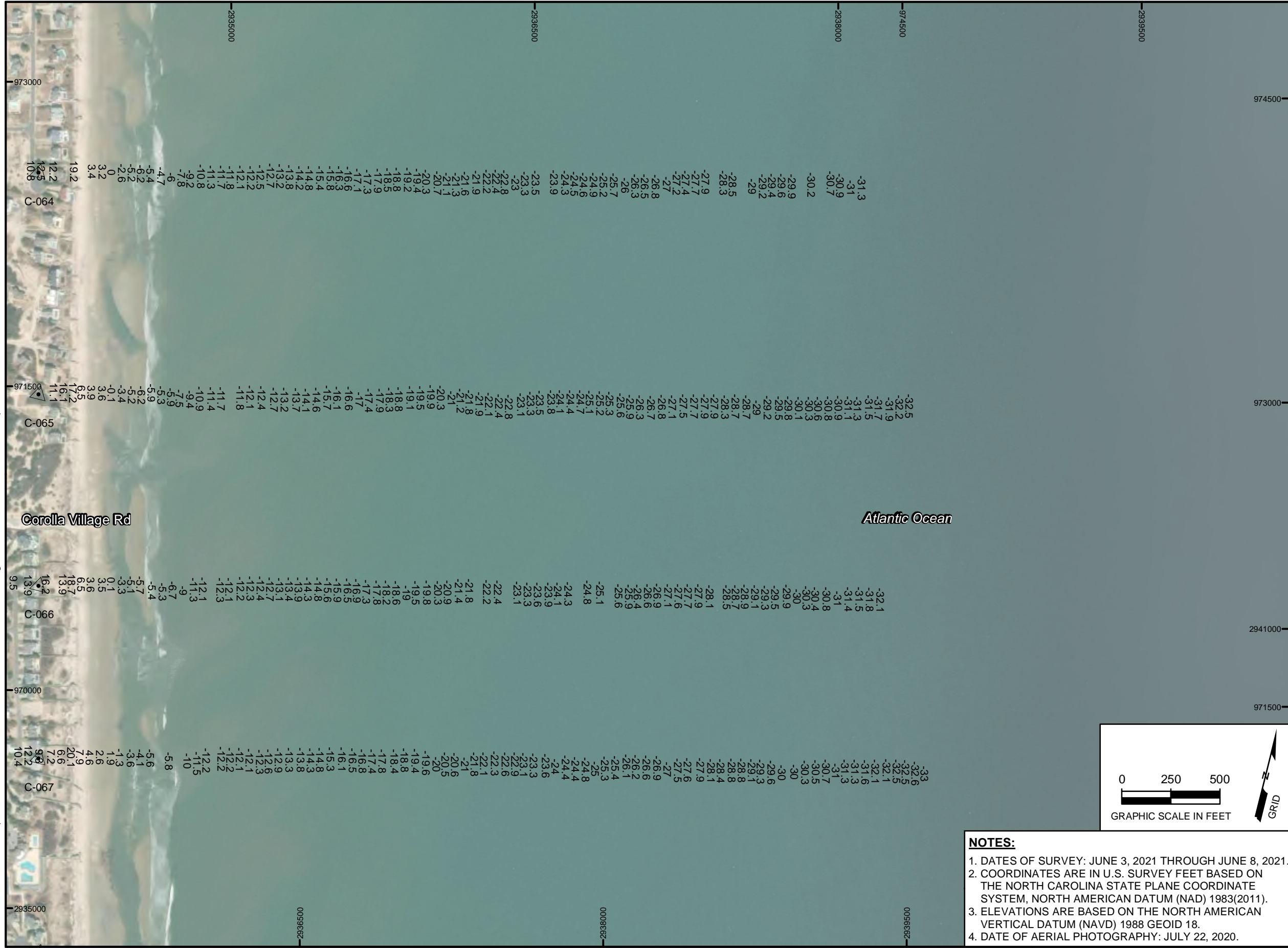
NOTES:

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3. ELEVATIONS ARE BASED ON THE NORTH AMERICAN VERTICAL DATUM (NAVD) 1988 GEOID 18.
4. DATE OF AERIAL PHOTOGRAPHY: JULY 22, 2020.

Checked by:	Designed by:	Reference File:	No.	Date	Description
M. Lowrie	M. Lowrie				
R. Hart	P. Stanton				
M. Lowrie					
631020164					
AS NOTED					

2021 CURRITUCK COUNTY
 TOPOGRAPHIC AND HYDROGRAPHIC
 DATA ACQUISITION REPORT
PLAN VIEW

Document Path: G:\Enterprise\NorthCarolina\631020164_Currituck_Monitoring_2021\WXD\Currituck0621_Mapbook.mxd



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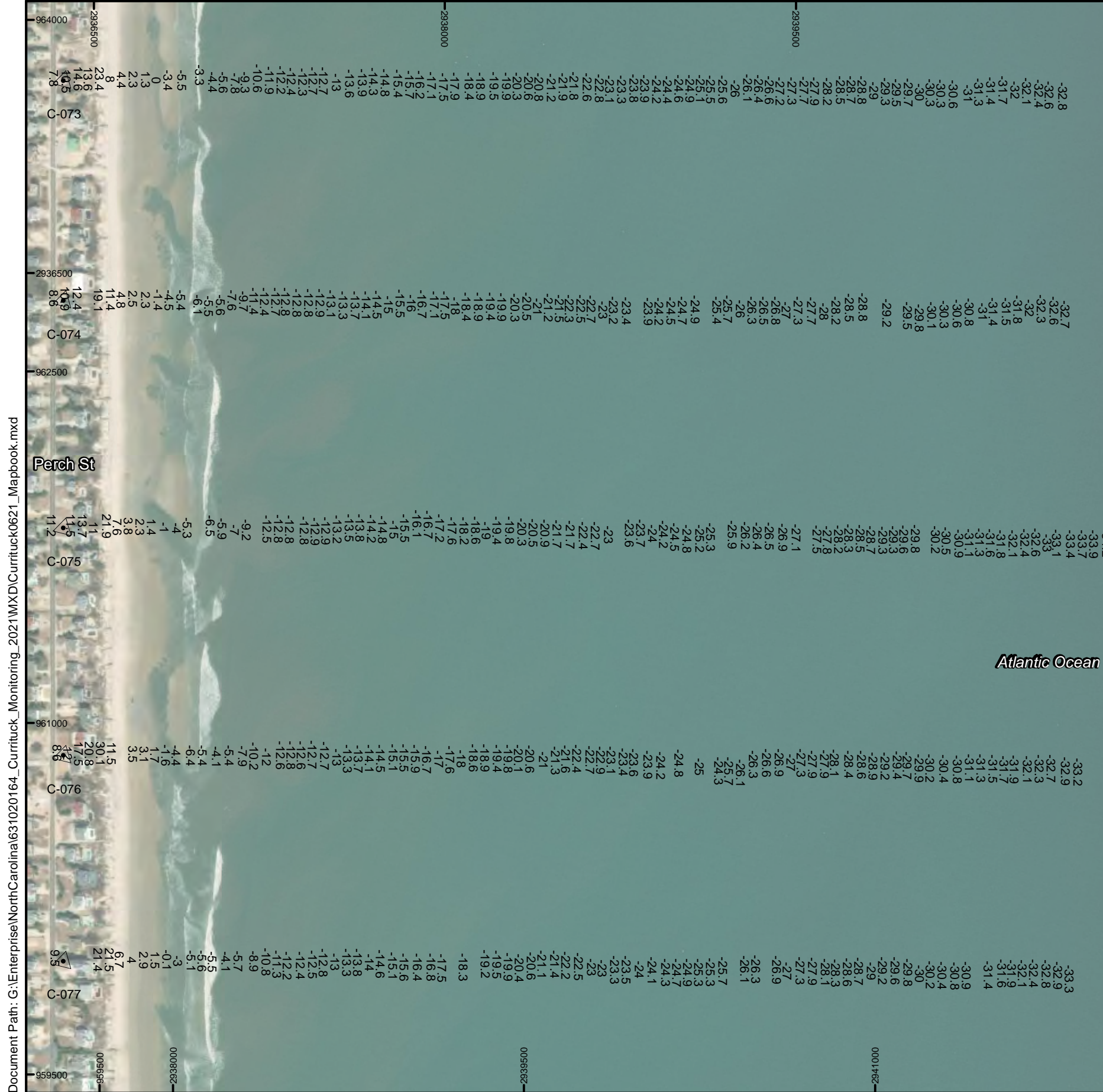
- NOTES:**
1. DATES OF SURVEY: JUNE 3, 2021 THROUGH JUNE 8, 2021.
 2. COORDINATES ARE IN U.S. SURVEY FEET BASED ON THE NORTH CAROLINA STATE PLANE COORDINATE SYSTEM, NORTH AMERICAN DATUM (NAD) 1983(2011).
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 4. DATE OF AERIAL PHOTOGRAPHY: JULY 22, 2020.

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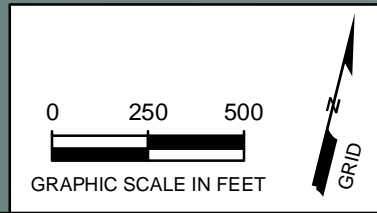
Reference File:	Designed by:	Checked by:	No.	Date	Description
	M. Lowme	M. Lowme			
	R. Hart	R. Hart			
	M. Lowme	M. Lowme			
	AS NOTED	AS NOTED			

2021 CURRITUCK COUNTY
TOPOGRAPHIC AND HYDROGRAPHIC
DATA ACQUISITION REPORT
PLAN VIEW

DRAWING NO.
PV-14



Atlantic Ocean



NTS

NOTES:

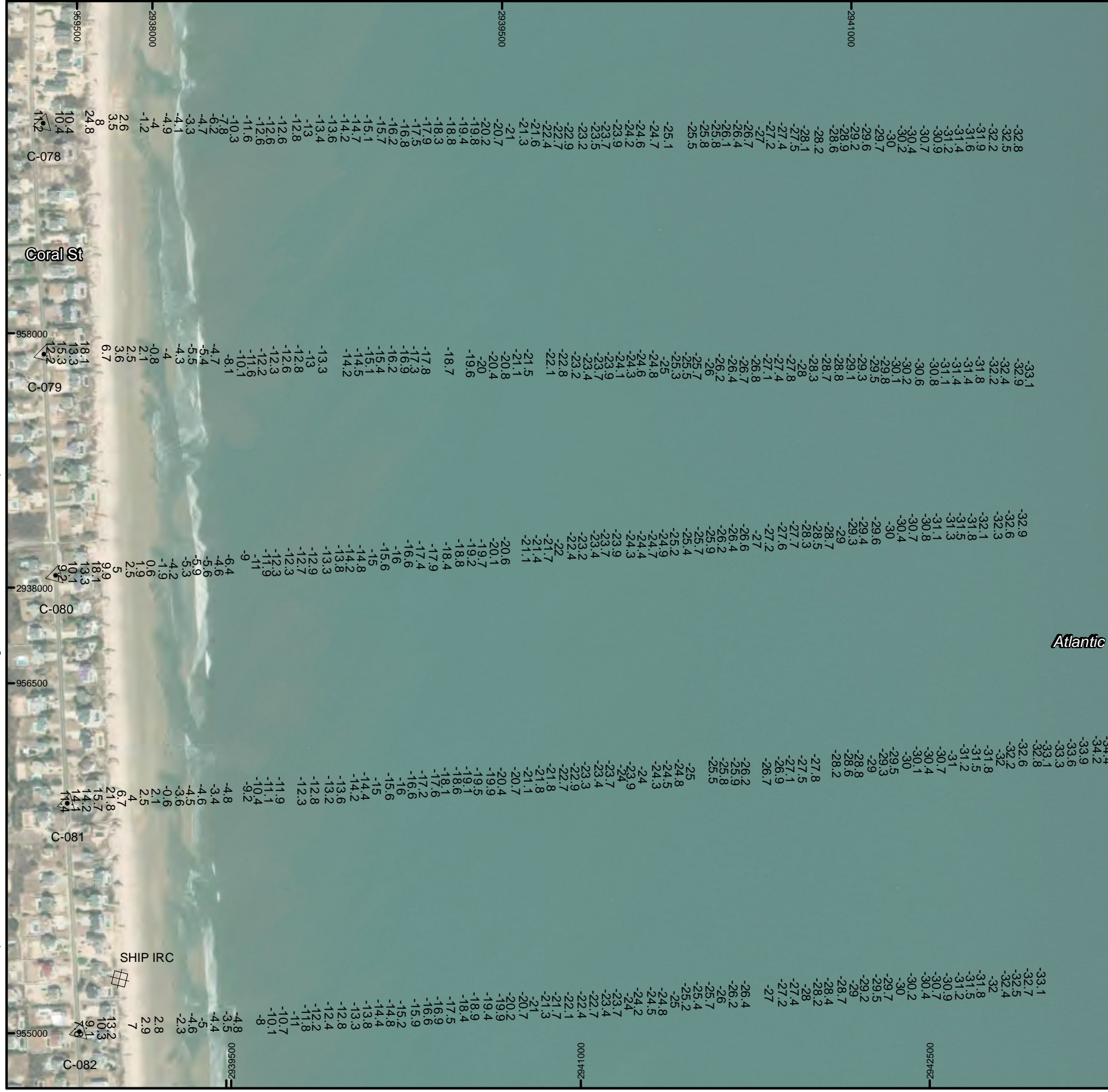
- 1. DATES OF SURVEY: JUNE 3, 2021 THROUGH JUNE 8, 2021.
- 2. COORDINATES ARE IN U.S. SURVEY FEET BASED ON THE NORTH CAROLINA STATE PLANE COORDINATE SYSTEM, NORTH AMERICAN DATUM (NAD) 1983(2011).
- 3. ELEVATIONS ARE BASED ON THE NORTH AMERICAN VERTICAL DATUM (NAVD) 1988 GEOID 18.
- 4. DATE OF AERIAL PHOTOGRAPHY: JULY 22, 2020.

No.	Date	Description

Designed by: M. Lowrie	Checked by: M. Lowrie
Drawn by: P. Stanton	Reviewed by: R. Hart
Date: July 2021	Submitted by: M. Lowrie
Plot Scale: AS NOTED	Comm. No.: 631020164

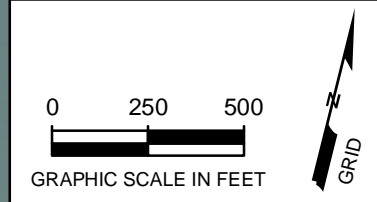
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NOTES:

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Checked by:	Reviewed by:	Submitted by:	Comm. No.:	No.	Date	Description
M. Lowrie	R. Hart	M. Lowrie	631020164			

Reference files:
 Designed by: M. Lowrie
 Drawn by: R. Shanon
 Date: July 2021
 Plot Scale: AS NOTED

2021 CURRITUCK COUNTY
 TOPOGRAPHIC AND HYDROGRAPHIC
 DATA ACQUISITION REPORT
PLAN VIEW

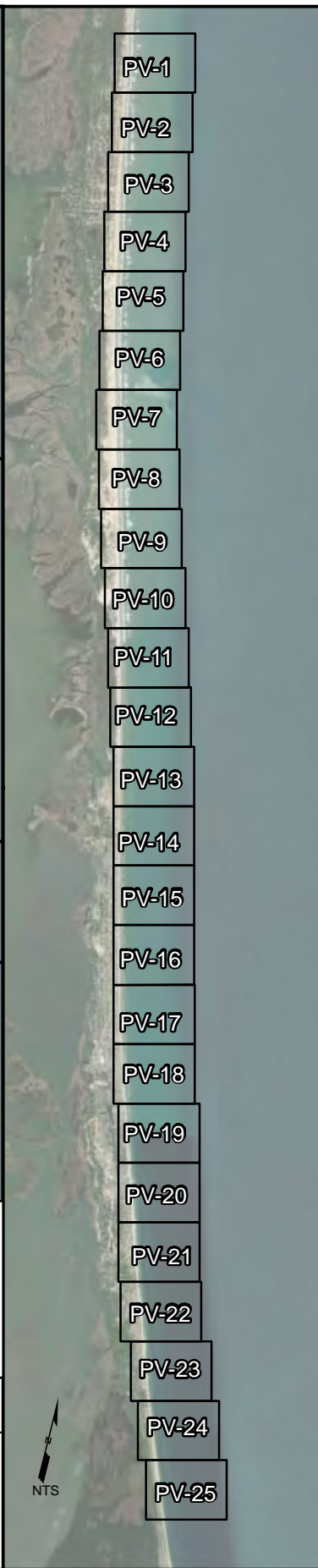
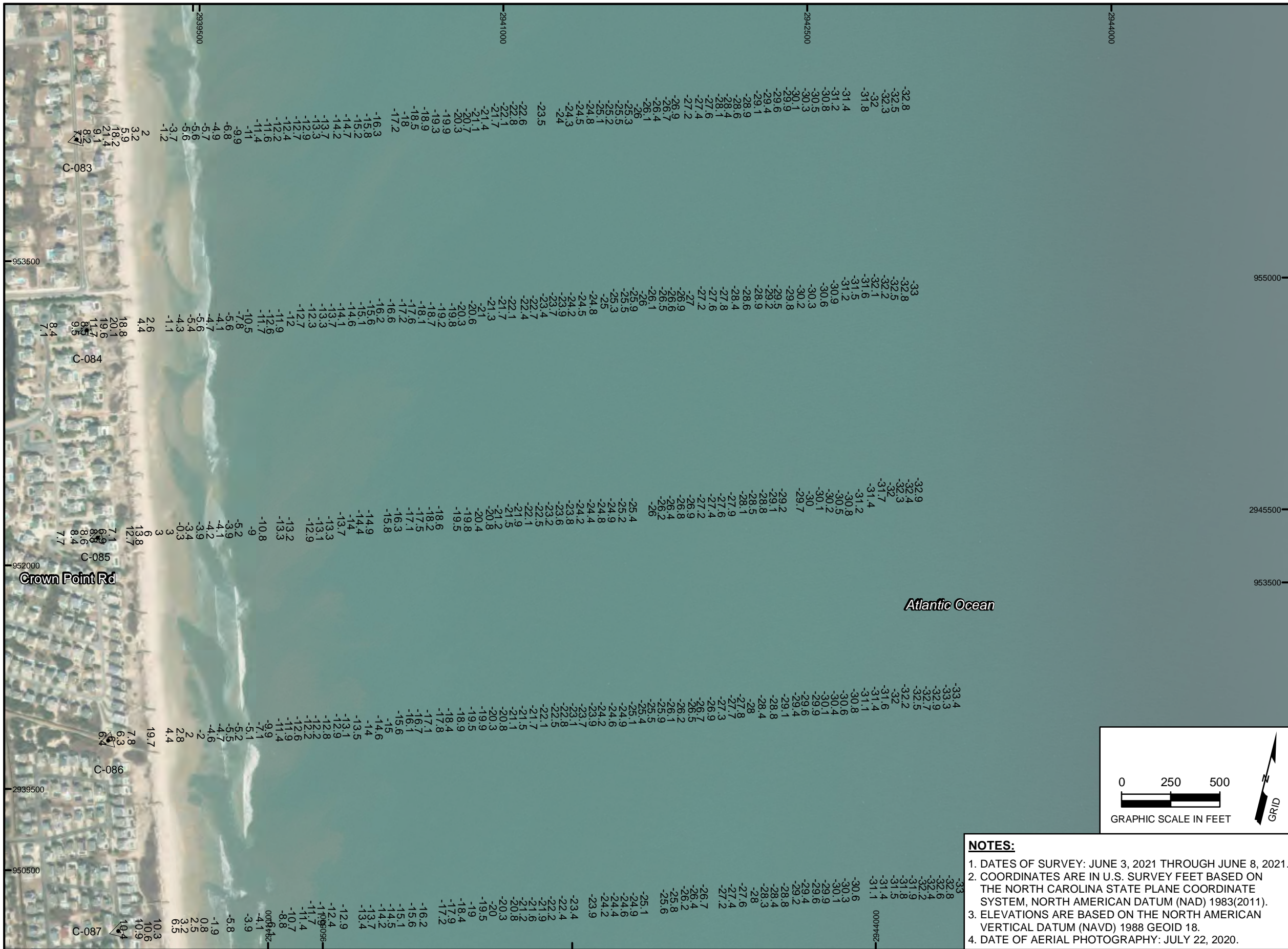
DRAWING NO.
PV-17
 SHEET 19 OF 27

APTIM
ENVIRONMENTAL & INFRASTRUCTURE, LLC

6401 CONGRESS AVENUE, SUITE 140
 BOCA RATON, FL 33487

PH. (561) 391-8102
 FAX (561) 391-9116

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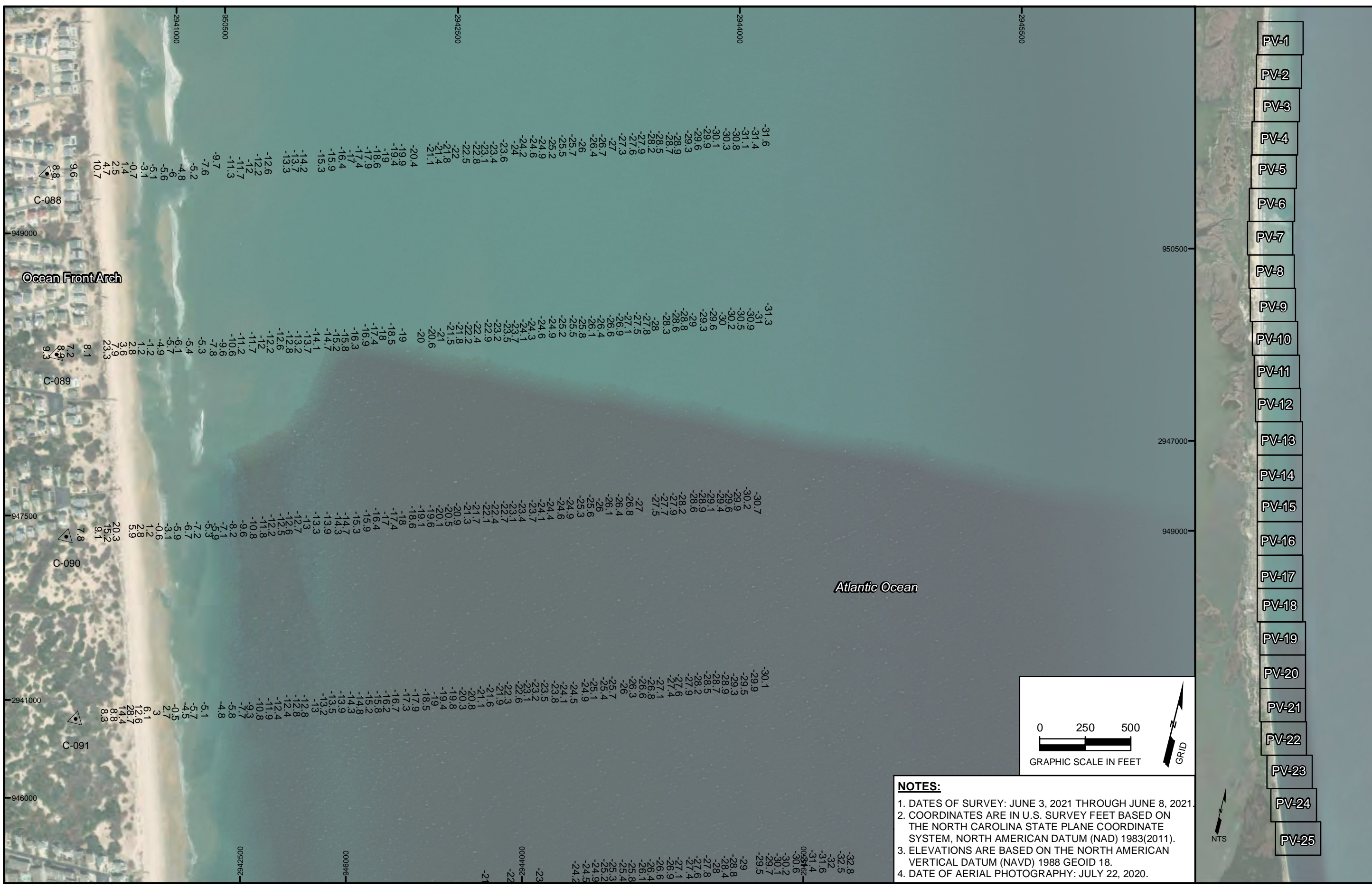


- NOTES:**
1. DATES OF SURVEY: JUNE 3, 2021 THROUGH JUNE 8, 2021.
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 4. DATE OF AERIAL PHOTOGRAPHY: JULY 22, 2020.

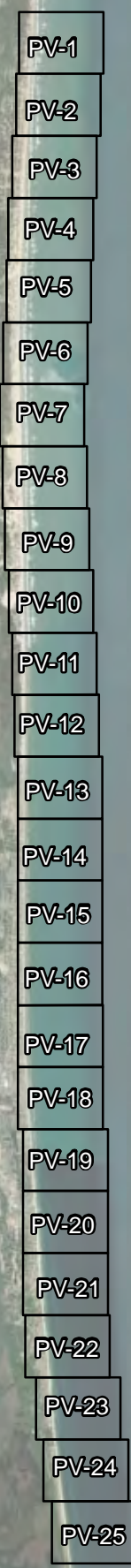
Checked by:	Reviewed by:	Submitted by:	Comm. No.:	No.	Date	Description
M. Lawrie	R. Hart	M. Lawrie	631020164			
Designed by:	Drawn by:	Date:	Plot Scale:			
M. Lawrie	P. Shanan	July 2021	AS NOTED			

2021 CURRITUCK COUNTY
 TOPOGRAPHIC AND HYDROGRAPHIC
 DATA ACQUISITION REPORT
PLAN VIEW

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- NOTES:**
- DATES OF SURVEY: JUNE 3, 2021 THROUGH JUNE 8, 2021.
 - COORDINATES ARE IN U.S. SURVEY FEET BASED ON THE NORTH CAROLINA STATE PLANE COORDINATE SYSTEM, NORTH AMERICAN DATUM (NAD) 1983(2011).
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 - DATE OF AERIAL PHOTOGRAPHY: JULY 22, 2020.



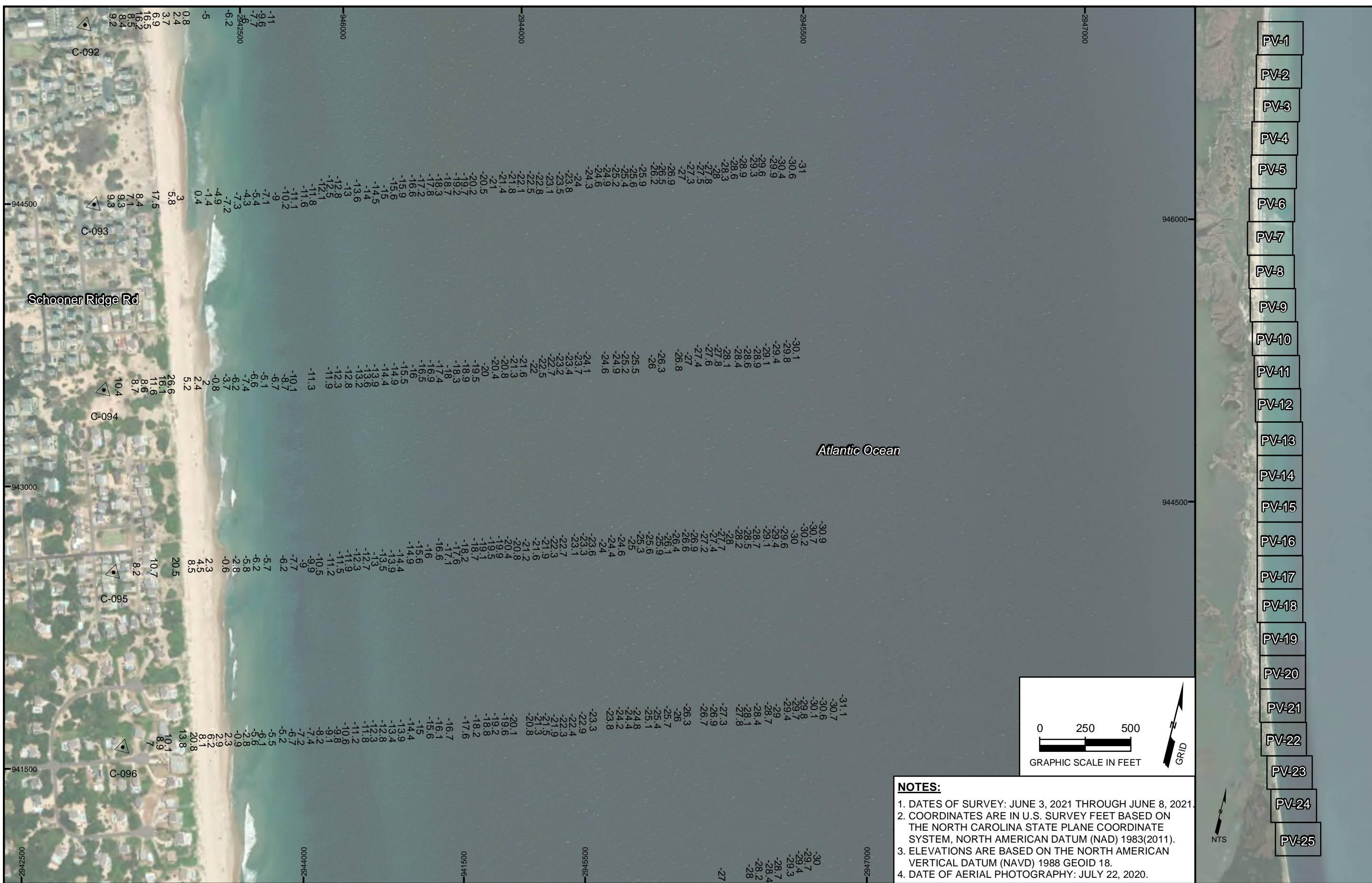
APTIM
ENVIRONMENTAL & INFRASTRUCTURE, LLC
6401 CONGRESS AVENUE, SUITE 040
BOCA RATON, FL 33487
PH: (561) 391-8102
FAX: (561) 391-9111

2021 CURRITUCK COUNTY
TOPOGRAPHIC AND HYDROGRAPHIC
DATA ACQUISITION REPORT
PLAN VIEW

DRAWING NO. **PV-19**
SHEET 21 OF 27

Description	No.	Date	Checked by:	Designed by:	Reference File:
			M. Lowie	M. Lowie	
			R. Hart	R. Stanton	
			M. Lowie	M. Lowie	
			Comm. No.: 631020164	AS NOTED	

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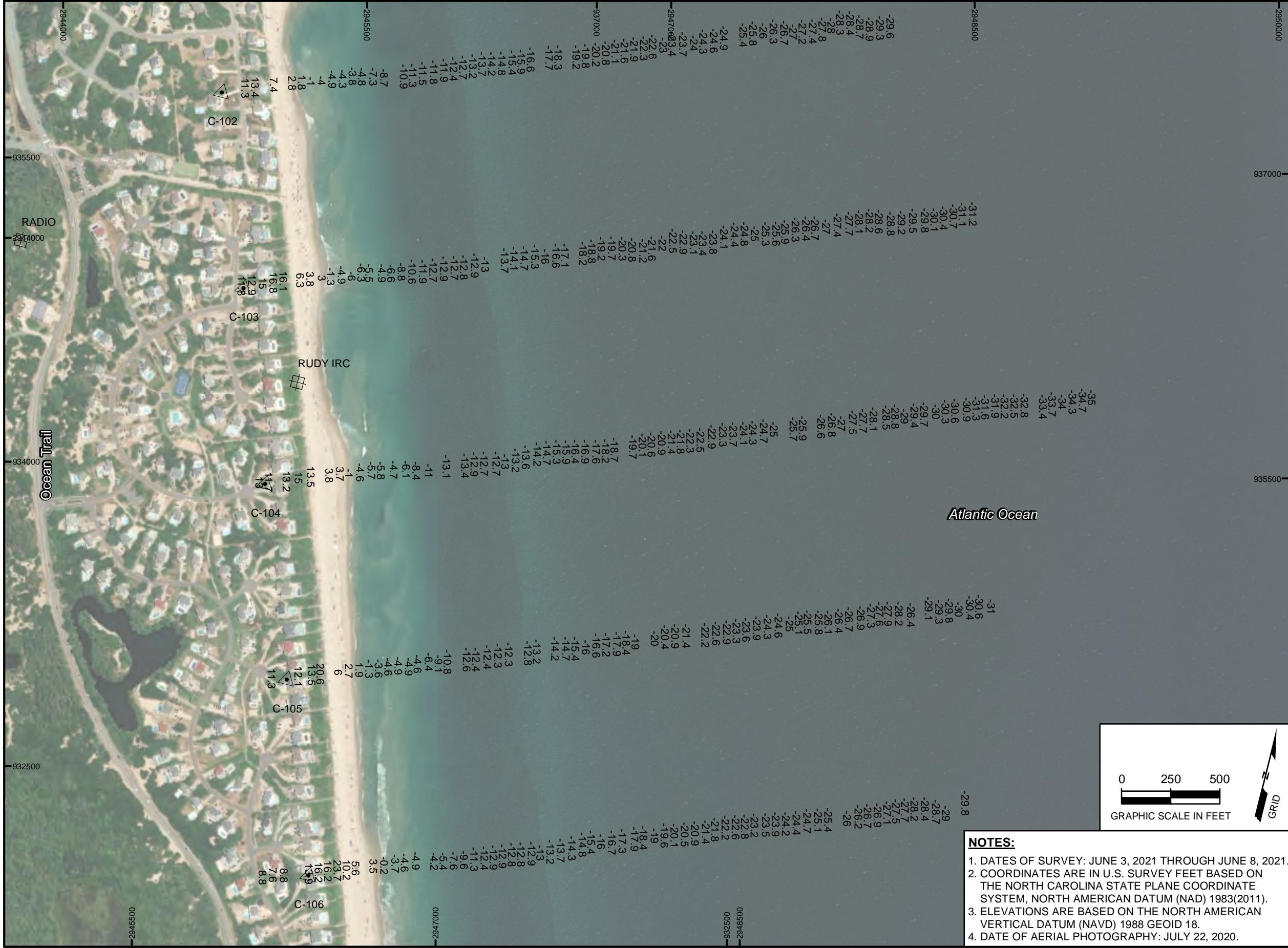


NOTES:

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4. DATE OF AERIAL PHOTOGRAPHY: JULY 22, 2020.

Checked by:	Reviewed by:	Submitted by:	Comm. No.:
M. Lowme	R. Hart	M. Lowme	631020164
AS NOTED			

2021 CURRITUCK COUNTY
 TOPOGRAPHIC AND HYDROGRAPHIC
 DATA ACQUISITION REPORT
PLAN VIEW



NOTES:

1. DATES OF SURVEY: JUNE 3, 2021 THROUGH JUNE 8, 2021.
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3. ELEVATIONS ARE BASED ON THE NORTH AMERICAN VERTICAL DATUM (NAVD) 1988 GEOID 18.
4. DATE OF AERIAL PHOTOGRAPHY: JULY 22, 2020.

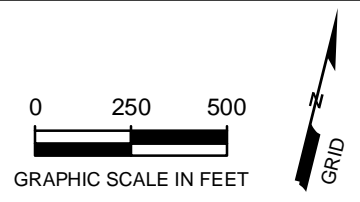
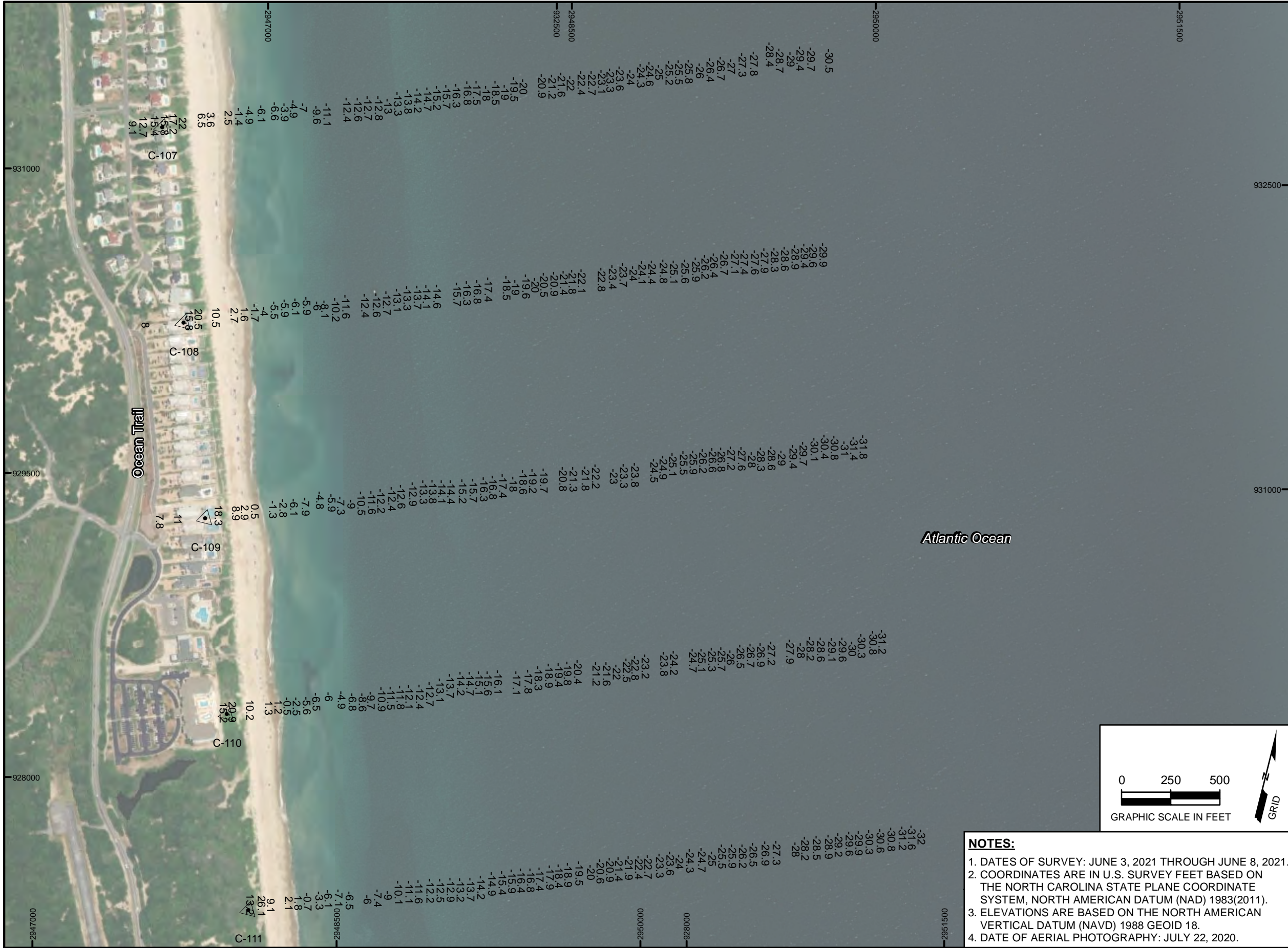
Atlantic Ocean

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APTIM ENVIRONMENTAL & INFRASTRUCTURE, LLC 6401 CONGRESS AVENUE, SUITE 140 BOCA RATON, FL 33487 PH. (561) 391-8102 FAX (561) 391-9111		
Designed by: M. Lowme	Checked by: M. Lowme	Description
Drawn by: P. Stanton	Reviewed by: R. Hart	
Date: July 2021	Submitted by: M. Lowme	
Plot Scale: AS NOTED	Comm. No.: 631020164	
Reference File: 2021 CURRITUCK COUNTY TOPOGRAPHIC AND HYDROGRAPHIC DATA ACQUISITION REPORT PLAN VIEW		
DRAWING NO. PV-22		
SHEET 24 OF 27		

MATCHLINE SHEET 23 OF 27

MATCHLINE SHEET 25 OF 27



NTS

NOTES:

1. DATES OF SURVEY: JUNE 3, 2021 THROUGH JUNE 8, 2021.
2. COORDINATES ARE IN U.S. SURVEY FEET BASED ON THE NORTH CAROLINA STATE PLANE COORDINATE SYSTEM, NORTH AMERICAN DATUM (NAD) 1983(2011).
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4. DATE OF AERIAL PHOTOGRAPHY: JULY 22, 2020.

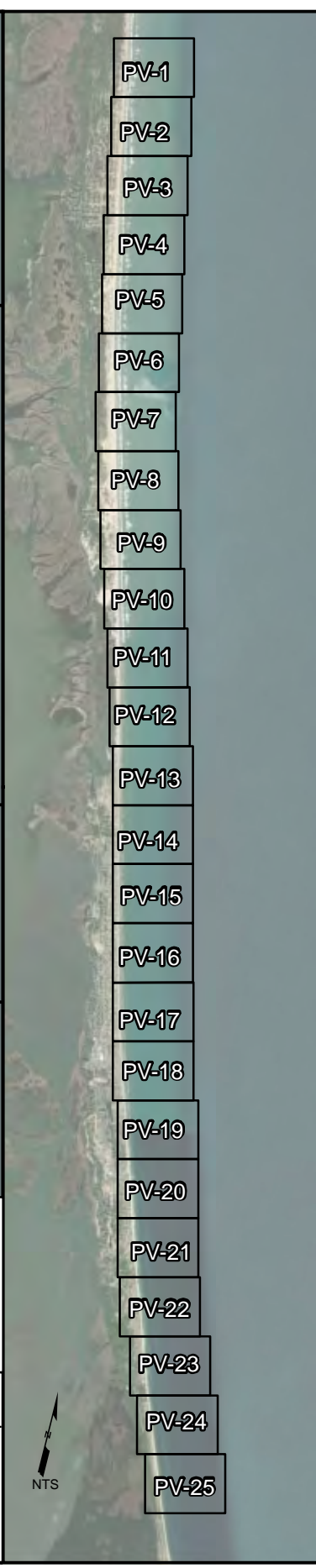
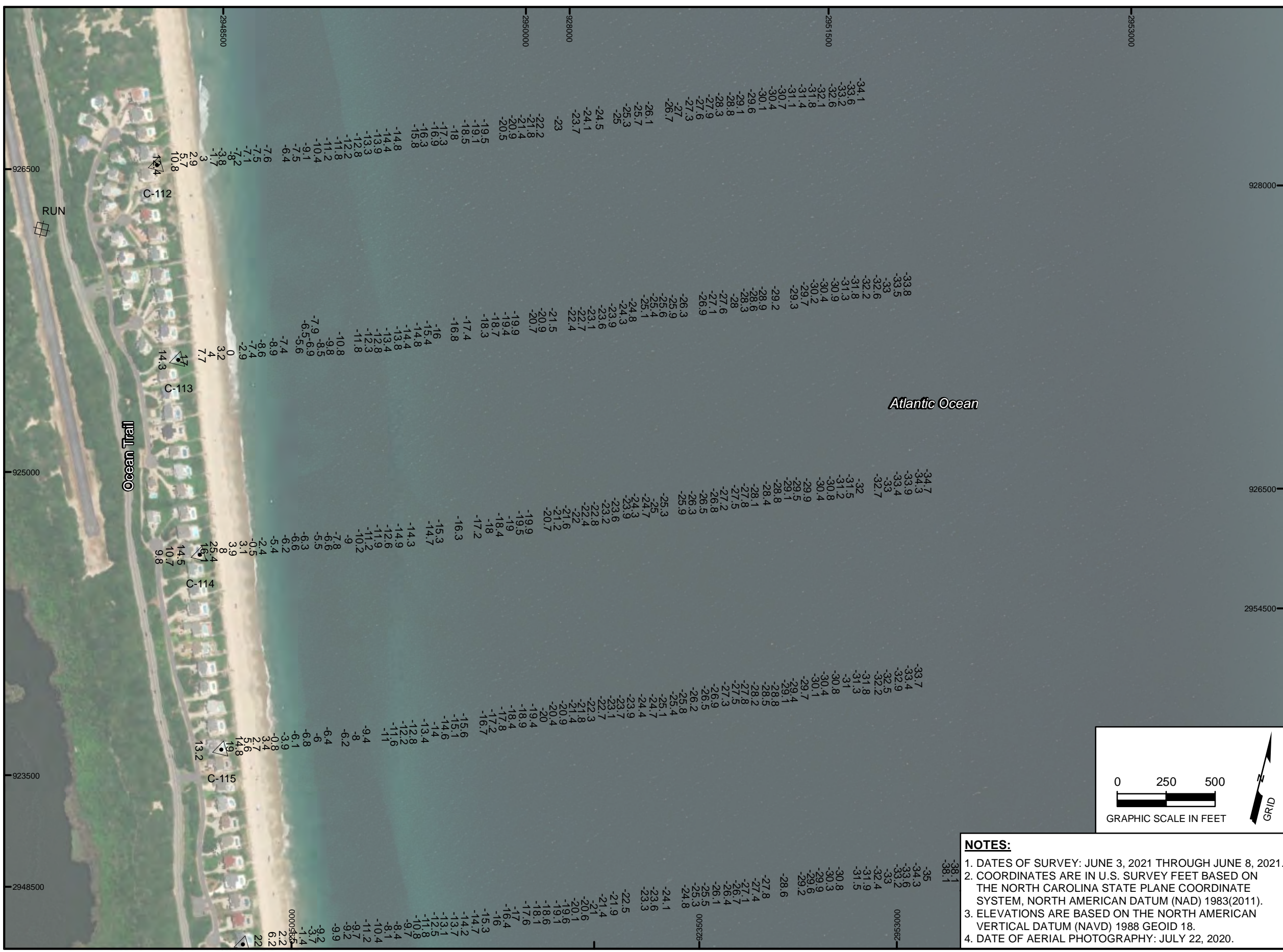
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Designed by:	Checked by:	No.	Date	Description
M. Lowrie	M. Lowrie			
R. Hart	R. Hart			
M. Lowrie	M. Lowrie			
631020164	631020164			

Reference files:
 AS NOTED
 July 2021
 AS NOTED

2021 CURRITUCK COUNTY
 TOPOGRAPHIC AND HYDROGRAPHIC
 DATA ACQUISITION REPORT
PLAN VIEW

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APTIM ENVIRONMENTAL & INFRASTRUCTURE, LLC

6401 CONGRESS AVENUE, SUITE 140
BOCA RATON, FL 33487

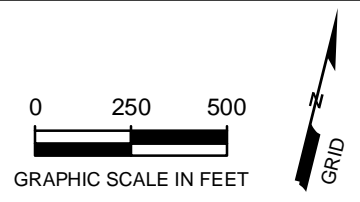
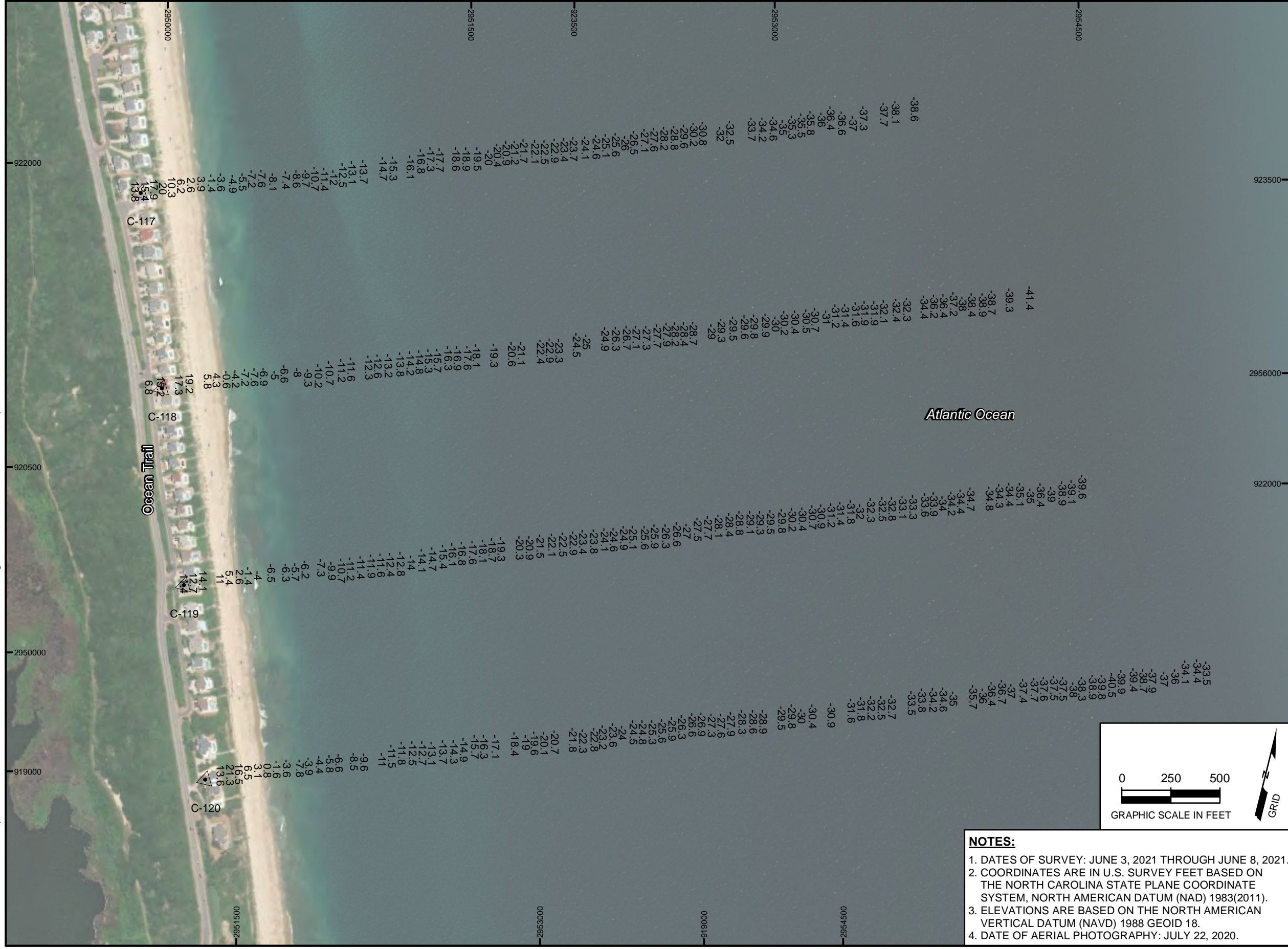
PH. (561) 391-8102
FAX (561) 391-9116

Designed by:	Checked by:	No.	Date	Description
M. Lowrie	M. Lowrie			
R. Shanahan	R. Hart			
Date: July 2021	Submitted by: M. Lowrie			
Plot Scale: AS NOTED	Comm. No.: 631020164			

2021 CURRITUCK COUNTY
TOPOGRAPHIC AND HYDROGRAPHIC
DATA ACQUISITION REPORT
PLAN VIEW

DRAWING NO.
PV-24

SHEET 26 OF 27



NOTES:

1. DATES OF SURVEY: JUNE 3, 2021 THROUGH JUNE 8, 2021.
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4. DATE OF AERIAL PHOTOGRAPHY: JULY 22, 2020.

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- PV-25

APTIM ENVIRONMENTAL & INFRASTRUCTURE, LLC
 6401 CONGRESS AVENUE, SUITE 140
 BOCA RATON, FL 33487
 PH. (561) 391-8102
 FAX (561) 391-9116

APTIM

Designed by:	Checked by:	No.	Date	Description
M. Lowrie	M. Lowrie			
R. Shanon	R. Hart			
Date: July 2021	Submitted by: M. Lowrie			
Plot Scale: AS NOTED	Comm. No.: 631020164			

2021 CURRITUCK COUNTY
 TOPOGRAPHIC AND HYDROGRAPHIC
 DATA ACQUISITION REPORT
PLAN VIEW

DRAWING NO.

PV-25

SHEET 27 OF 27

Survey Report Notes

Survey Title: 2021 Currituck County Topographic and Hydrographic Data Acquisition Report

Prepared Date: September 2021

Prepared For: Coastal Protection Engineering of North Carolina, Inc.

Prepared By: Aptim Environmental & Infrastructure, LLC

Dates of Survey: June 01, 2021 through June 08, 2021

Survey Location: Currituck County (C-001 through C-120)

Notes:

1. The survey is neither valid nor complete without both the survey report and described survey maps. Digital data files encompassing the following have also been provided in the following formats listed.
 - *Monument Information Report (Appendix 1)*
 - *ASCII file (profile xyz data. Digital only) (Appendix 2)*
 - *Profile Plots (Appendix 3)*
 - *Ground Digital Photography (Appendix 4)*
 - *Project field books (Digital Only)(Appendix 5)*
2. The information on this map represents the results of the survey on the dates indicated and can only be considered as indicating the general conditions existing at the time.
3. The coordinates shown are in US survey feet based on the vertical and horizontal data that was collected and presented relative to the North American Vertical Datum of 1988 (NAVD88) and the North Carolina State Plane Coordinate System, North American Datum of 1983(2011) (NAD 83(2011)).
4. Vertical measurements are based on second order monuments CAFFEY, RIDE, RUN, ADRIATIC, Q 261, and RADIO, per published NGS coordinates.

5. Bearings are based on a bearing of North 17° 11' 42" West between NGS second order monuments CAFFEY and ADRIATIC per published NGS coordinates.
6. Underground and subaqueous improvements and/or utilities were not located as part of this survey and should be field verified prior to any dredging or construction activities.
7. Refer to APTIM field book No. 518 & NC field book No. 252 for the nearshore and onshore segments and book No. 66 for the offshore segments.
8. Aids to navigation were not located during this survey.
9. Soundings were collected using an Odom Hydrotrac II, Single Frequency, survey grade sounder. The sounder was calibrated prior to the start of the survey following manufacturers recommended procedures.
10. This survey was conducted for Currituck County for use as a topographic and hydrographic survey.

APPENDIX OVERVIEW

1) Monument Information Report

Data collected during the survey is entered in a spreadsheet format and compared to data provided by NGS. This comparison shows differences in northings, eastings and elevation of NGS published control, what was collected in the field, and what was used during profile reduction.

2) Profile XYZ data (digital only)

Offshore survey data was converted into APTIM files. Onshore data was reduced by standard means of reduction and also entered into APTIM format and merged with the offshore data. APTIM format is used for in-house plotting, volume computations and other engineering analyses. The APTIM formatted data was converted into xyz format. The xyz data is provided in the datum collected (NAVD88) as per state standards.

3) Profile Plots

Profile plots of this survey data compared with historical profile data.

4) Ground Digital Photography

APTIM surveyors collected three (3) digital photos at a mid-beach location at each profile location. The three (3) photos included one (1) in each shore-parallel direction and one (1) landward toward the monument. In addition, wherever possible a digital photo was taken of the control identification or stamping on the monument.

5) Field Book Pages (digital only)

This appendix includes copies of the field book pages used for the survey. Refer to APTIM field book No. 518 & NC field book No. 252 for the nearshore and onshore segments and navigation field book No. 66 for the offshore survey.

APPENDIX 1

MONUMENT INFORMATION REPORT

CONTROL MONUMENT USED BY APTIM FOR 2021 CURRITUCK COUNTY TOPOGRAPHIC AND HYDROGRAPHIC DATA ACQUISITION REPORT JUNE 2021	
DATUMS: NAD83(2011)/NAVD1988 (U.S. SURVEY FEET)	
Designation	CAFFEY
Stamping	CAFFEY 1935
Northing	915308.87
Easting	2952084.11
Horizontal Root Mean Square Error	0.24
Elevation	1.99
Vertical Root Mean Square Error	0.10
Description	Station is about 350ft W of Caffey Inlet Coast Guard Station, on a small sand neck which extends into the marsh on the E shore of Currituck Sound. This neck is just S of an old can buoy lying in the marsh and is just N of a small gut which the road crosses on a small bridge. The station is about 225ft W of a flagpole at the fence line W of the coast guard station, a point in line with the S fence, and 179ft NW of the center of the bridge.



Monument: CAFFEY

Mean of Inverse Shots - Published Versus APTIM Found				
Monument	No. of Shots	ΔN	ΔE	ΔZ
CAFFEY	10	-0.05	0.02	0.04

CONTROL MONUMENT USED BY APTIM FOR 2021 CURRITUCK COUNTY TOPOGRAPHIC AND HYDROGRAPHIC DATA ACQUISITION REPORT JUNE 2021	
DATUMS: NAD83(2011) / NAVD1988 (U.S. SURVEY FEET)	
Designation	TEETER IRC
Stamping	IRON ROD AND CAP
Northing	1033886.52
Easting	2919866.55
Horizontal Root Mean Square Error	0.09
Elevation	17.44
Vertical Root Mean Square Error	0.10
Description	Station is an APITM set IRC located approximately 175ft south of the VA/NC border in dune and approximately 75ft W of the edge of vegetation, marked temporarily by a lathe with flagging.



Monument: TEETER

Location Verification: TEETER

Mean of Inverse Shots – Published Versus APTIM Found				
Monument	No. of Shots	ΔN	ΔE	ΔZ
TEETER	18	0.02	0.01	0.14

CONTROL MONUMENT USED BY APTIM FOR 2021 CURRITUCK COUNTY TOPOGRAPHIC AND HYDROGRAPHIC DATA ACQUISITION REPORT JUNE 2021	
DATUMS: NAD83(2011)/NAVD1988 (U.S. SURVEY FEET)	
Designation	RUN
Stamping	RUN 1995
Northing	926250.14
Easting	2947874.97
Horizontal Root Mean Square Error	0.12
Elevation	7.18
Vertical Root Mean Square Error	0.08
Description	Station is located about 18.6mi SE of Currituck. Along NC 12 about 1.75mi N from the Currituck/Dare county line near a private runway. Mark is level with NC 12, about 600ft NW of Station Club. It is located 2ft S of metal witness post, 4ft W of overhead wire, 26ft N of a 3x3 creosote post with high voltage tag on it, 43ft N of center of asphalt drive to runway.



Monument: RUN



Location Verification: RUN

Mean of Inverse Shots - Published Versus APTIM Found				
Monument	No. of Shots	ΔN	ΔE	ΔZ
RUN	12	0.00	0.03	-0.03

CONTROL MONUMENT USED BY APTIM FOR 2021 CURRITUCK COUNTY TOPOGRAPHIC AND HYDROGRAPHIC DATA ACQUISITION REPORT JUNE 2021	
DATUMS: NAD83(2011)/NAVD1988 (U.S. SURVEY FEET)	
Designation	ADRIATIC
Stamping	ADRIATIC 1996
Northing	974203.77
Easting	2933858.46
Horizontal Root Mean Square Error	0.11
Elevation	6.60
Vertical Root Mean Square Error	0.13
Description	Station is located about 11.3mi E-SE of Currituck and 7.6mi E-NE of Coinjock in Corolla. Proceed along NC 12 about 0.05mi N of the post office in Corolla to Coral Ln. East along Coral Lane to Atlantic Ave., then N for 0.25mi to Adriatic Ave and the station, in the shoulder at a publica access walkway. Mark is recessed about 3in located about 14.2ft E of centerline of Atlantic Ave., 6ft from the center of a wooden public beach access.



Monument: ADRIATIC



Location Verification: ADRIATIC

Mean of Inverse Shots - Published Versus APTIM Found				
Monument	No. of Shots	ΔN	ΔE	ΔZ
ADRIATIC	24	-0.01	0.06	0.10

CONTROL MONUMENT USED BY APTIM FOR 2021 CURRITUCK COUNTY TOPOGRAPHIC AND HYDROGRAPHIC DATA ACQUISITION REPORT JUNE 2021	
DATUMS: NAD83(2011)/NAVD1988 (U.S. SURVEY FEET)	
Designation	Q 261
Stamping	Q 261 1983
Northing	975483.22
Easting	2933511.61
Horizontal Root Mean Square Error	0.13
Elevation	7.14
Vertical Root Mean Square Error	0.13
Description	Station is located by proceeding along private paved rd. 0.25mi N-NW from Currituck Beach Lighthouse to intersection with Coral Lane, then E to intersection with Atlantic Ave, the 0.55mi N-NW along Atlantic to a cul-de-sac. Located in SW quadrant 24ft W of centerline of street, 13.5ft S of edge of pavement of cul-de-sac. The mark is 2.6ft E from the witness post.



Monument: Q 261



Location Verification: Q 261

Mean of Inverse Shots – Published Versus APTIM Found				
Monument	No. of Shots	ΔN	ΔE	ΔZ
Q 261	8	-0.15	-0.07	0.17

CONTROL MONUMENT USED BY APTIM FOR 2021 CURRITUCK COUNTY TOPOGRAPHIC AND HYDROGRAPHIC DATA ACQUISITION REPORT JUNE 2021	
DATUMS: NAD83(2011) / NAVD1988 (U.S. SURVEY FEET)	
Designation	RADIO
Stamping	RADIO 1962
Northing	935113.16
Easting	2944087.11
Horizontal Root Mean Square Error	0.23
Elevation	9.22
Vertical Root Mean Square Error	0.18
Description	Station is located about 7mi S of the Currituck Beach Lighthouse about 1mi N of the Pine Island Gun Club. Station is standard disk clamped to the top of a 1in copperweld pipe which is set in a 2in galvanized pipe. It is 53ft SE of an anchor cable and 0.9ft NE of an aluminum witness post with a metal sign. The mark projects 12in and is stamped RADIO 1962.



Monument: RADIO



Location Verification: RADIO

Mean of Inverse Shots – Published Versus APTIM Found				
Monument	No. of Shots	ΔN	ΔE	ΔZ
RADIO	25	-0.04	-0.01	-0.05

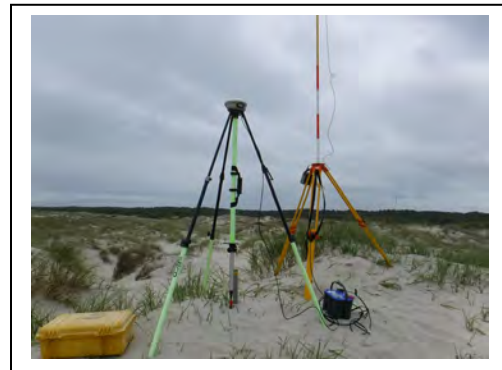
CONTROL MONUMENT USED BY APTIM FOR 2021 CURRITUCK COUNTY TOPOGRAPHIC AND HYDROGRAPHIC DATA ACQUISITION REPORT JUNE 2021	
DATUMS: NAD83(2011)/NAVD1988 (U.S. SURVEY FEET)	
Designation	RIDE
Stamping	RIDE 1995
Northing	1033737.40
Easting	2918943.12
Horizontal Root Mean Square Error	0.23
Elevation	4.44
Vertical Root Mean Square Error	0.18
Description	Station is located about 10.6 mi. NE of Currituck and 12.2 mi. north of Corolla on the Outer Banks at the NC-VA line. Go north on NC beach access for 10.8 mi. to an access through the dunes that is about 0.1 mi. south of the piles marking the state line. Mark is level with the powerline path and flush with the ground, 37.7 ft. west of a 10 inch live oak and 14.8 ft. S-SE of a witness post.

Mean of Inverse Shots - Published Versus APTIM Found				
Monument	No. of Shots	ΔN	ΔE	ΔZ
RIDE	4	-0.07	-0.20	-0.18

CONTROL MONUMENT USED BY APTIM FOR 2021 CURRITUCK COUNTY TOPOGRAPHIC AND HYDROGRAPHIC DATA ACQUISITION REPORT JUNE 2021	
DATUMS: NAD83(2011)/NAVD1988 (U.S. SURVEY FEET)	
Designation	BELLA
Stamping	IRON ROD AND CAP
Northing	1005575.66
Easting	2925821.66
Horizontal Root Mean Square Error	0.03
Elevation	27.92
Vertical Root Mean Square Error	0.11
Description	Station is an APITM set IRC located approximately 5.42 miles north of the NC beach road access. Go approx. 5.42 miles north after entering beach road access. The IRC is located at the top of the primary dune field approximately 50 ft. west of the edge of vegetation and is marked temporarily with a lathe and flagging.



Monument: BELLA



Location Verification: BELLA

Mean of Inverse Shots - Published Versus APTIM Found				
Monument	No. of Shots	ΔN	ΔE	ΔZ
BELLA	8	0.01	0.01	0.01

CURRITUCK STATION INFORMATION			
June 2021			
DATUMS: NAD83 (2011) / NAVD88 (U.S SURVEY FEET)			
STATION	NORTHING	EASTING	AZIMUTH
C-001	1033891.08	2919204.10	79
C-002	1032585.84	2919457.82	79
C-003	1031695.16	2919630.95	79
C-004	1030524.95	2919858.41	79
C-005	1029731.91	2920012.56	79
C-006	1028750.28	2920203.37	79
C-007	1027768.65	2920394.18	79
C-008	1027013.66	2920540.94	79
C-009	1025538.88	2920827.61	79
C-010	1024890.24	2920953.69	79
C-011	1023747.70	2921175.78	79
C-012	1022753.92	2921368.95	79
C-013	1021972.42	2921520.85	79
C-014	1020813.54	2921746.12	79
C-015	1019882.22	2921927.15	79
C-016	1018934.01	2922111.46	79
C-017	1017925.97	2922307.41	79
C-018	1016970.75	2922493.08	79
C-019	1016070.25	2922668.12	79
C-020	1014986.70	2922878.74	79
C-021	1014071.97	2923056.55	79
C-022	1013044.24	2923256.32	79
C-023	1012049.73	2923449.63	79
C-024	1011080.99	2923637.93	79
C-025	1010199.00	2923809.38	79
C-026	1009117.73	2924019.55	79
C-027	1008136.11	2924210.36	79
C-028	1007154.48	2924401.17	79
C-029	1006172.85	2924591.98	79
C-030	1005191.23	2924782.79	79

CURRITUCK STATION INFORMATION			
June 2021			
DATUMS: NAD83 (2011) / NAVD88 (U.S SURVEY FEET)			
STATION	NORTHING	EASTING	AZIMUTH
C-031	1004209.60	2924973.60	79
C-032	1003227.97	2925164.41	79
C-033	1002271.66	2925456.77	75
C-034	1001315.36	2925749.14	75
C-035	1000359.05	2926041.51	75
C-036	999402.75	2926333.88	75
C-037	998510.99	2926606.52	75
C-038	997490.14	2926918.62	75
C-039	996515.53	2927216.59	75
C-040	995453.17	2927541.39	75
C-041	994621.23	2927795.74	75
C-042	993664.92	2928088.11	75
C-043	992658.07	2928395.94	75
C-044	991664.72	2928699.63	75
C-045	990796.01	2928965.23	75
C-046	989839.70	2929257.60	75
C-047	988849.49	2929560.34	75
C-048	987854.50	2929864.53	75
C-049	987063.91	2930106.24	75
C-050	986098.73	2930401.33	75
C-051	985058.18	2930719.46	75
C-052	984101.87	2931011.83	75
C-053	983145.57	2931304.20	75
C-054	982189.26	2931596.57	75
C-055	981232.96	2931888.94	75
C-056	980276.65	2932181.32	75
C-057	979320.35	2932473.69	75
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C-059	977523.89	2933022.92	75
C-060	976430.49	2933302.09	77

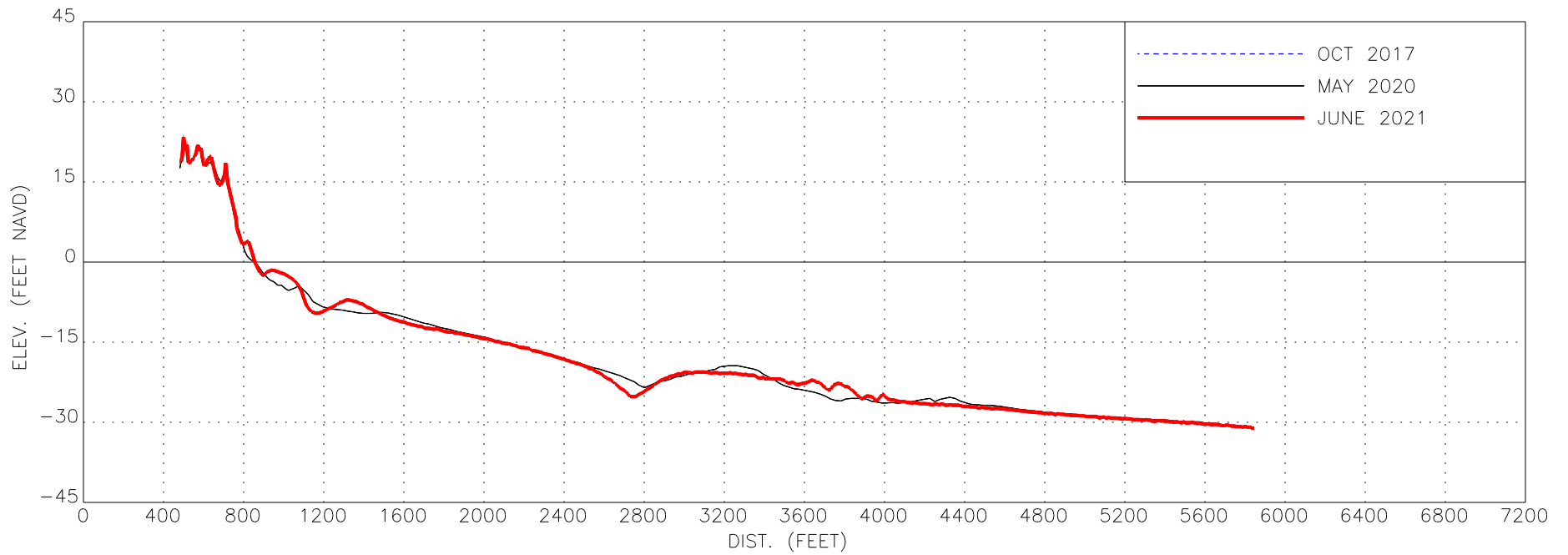
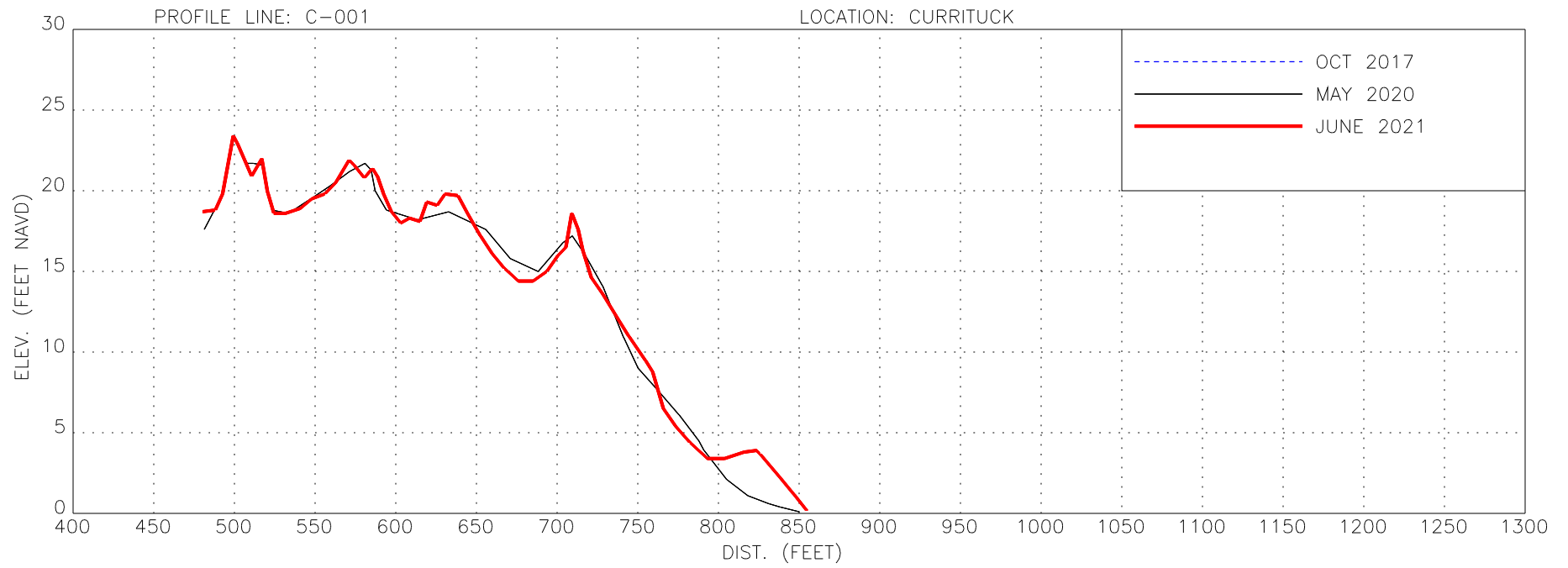
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June 2021			
DATUMS: NAD83 (2011) / NAVD88 (U.S SURVEY FEET)			
STATION	NORTHING	EASTING	AZIMUTH
C-061	975487.85	2933537.12	77
C-062	974518.04	2933778.92	77
C-063	973563.33	2934016.95	77
C-064	972604.58	2934256.00	77
C-065	971512.00	2934528.41	77
C-066	970567.57	2934763.88	77
C-067	969714.76	2934976.51	77
C-068	968754.46	2935215.94	77
C-069	967704.78	2935477.65	77
C-070	966698.85	2935728.46	77
C-071	965808.89	2935950.35	77
C-072	964814.75	2936198.22	77
C-073	963792.96	2936452.98	77
C-074	962853.30	2936687.26	77
C-075	961883.01	2936929.18	77
C-076	960912.71	2937171.11	77
C-077	960035.66	2937389.78	77
C-078	958951.38	2937660.12	77
C-079	957962.06	2937909.03	77
C-080	957025.33	2938195.42	73
C-081	956061.48	2938490.09	73
C-082	955096.61	2938785.08	73
C-083	954201.86	2939058.64	73
C-084	953273.03	2939342.61	73
C-085	952264.00	2939651.10	73
C-086	951276.46	2939953.02	73
C-087	950351.39	2940235.84	73
C-088	949386.41	2940530.87	73
C-089	948438.78	2940820.59	73
C-090	947482.47	2941112.96	73

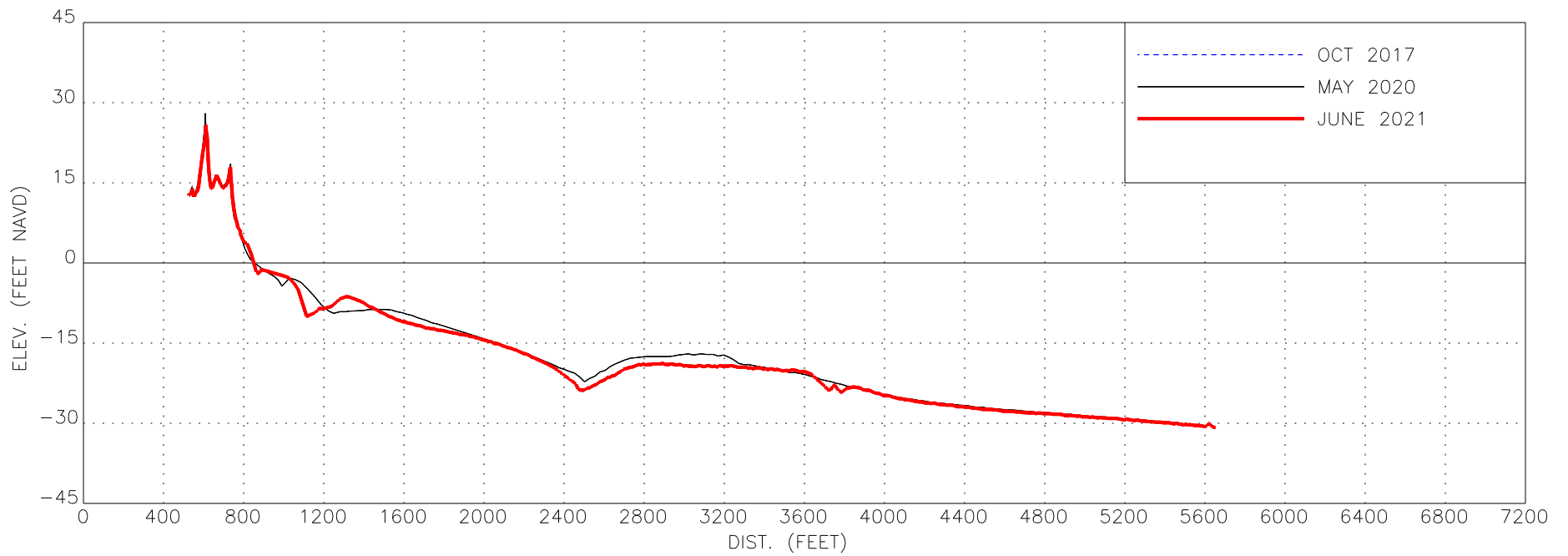
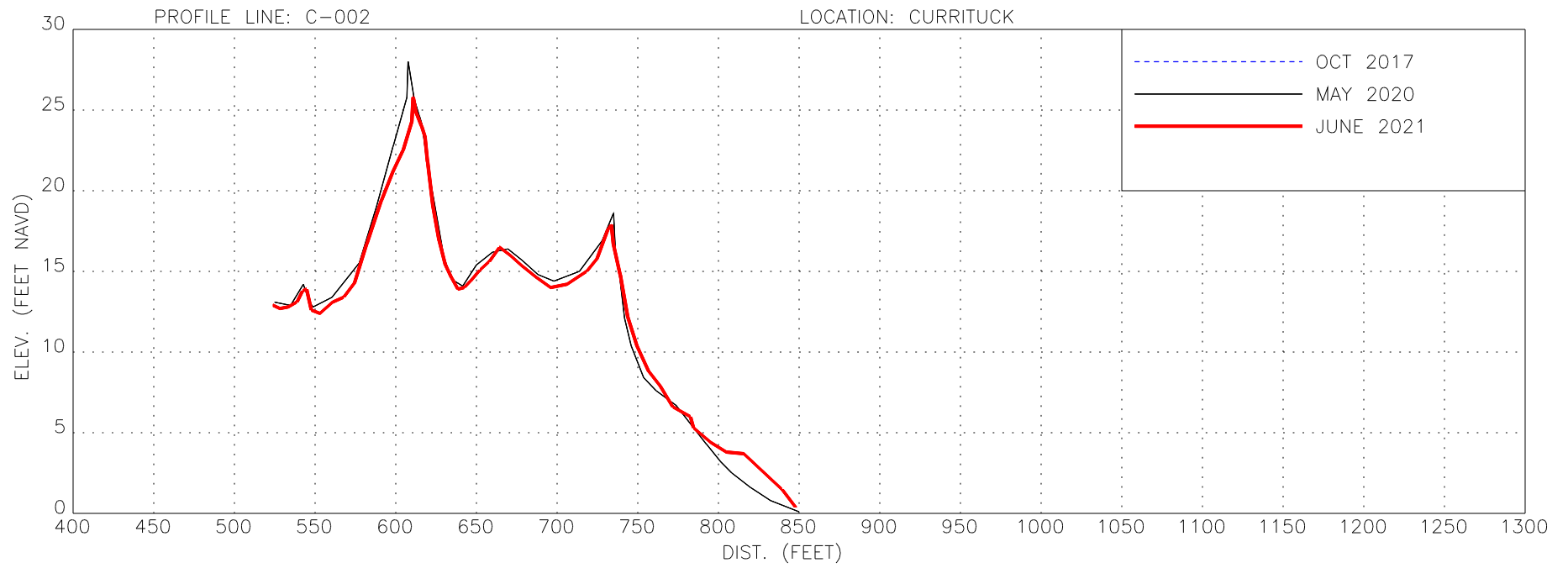
CURRITUCK STATION INFORMATION			
June 2021			
DATUMS: NAD83 (2011) / NAVD88 (U.S SURVEY FEET)			
STATION	NORTHING	EASTING	AZIMUTH
C-091	946526.17	2941405.33	73
C-092	945569.86	2941697.70	73
C-093	944629.37	2941985.24	73
C-094	943657.25	2942282.45	73
C-095	942700.95	2942574.82	73
C-096	941785.12	2942854.82	73
C-097	940788.34	2943159.56	70
C-098	939850.46	2943506.55	70
C-099	938912.57	2943853.55	70
C-100	937974.69	2944200.54	70
C-101	937036.81	2944547.53	70
C-102	936098.92	2944894.52	70
C-103	935161.04	2945241.51	70
C-104	934223.16	2945588.51	70
C-105	933285.28	2945935.50	70
C-106	932347.39	2946282.49	70
C-107	931409.51	2946629.48	70
C-108	930471.63	2946976.47	70
C-109	929533.74	2947323.47	70
C-110	928595.86	2947670.46	70
C-111	927657.98	2948017.45	70
C-112	926720.09	2948364.44	70
C-113	925782.21	2948711.44	70
C-114	924844.33	2949058.43	70
C-115	923906.45	2949405.42	70
C-116	922968.56	2949752.41	70
C-117	922030.68	2950099.40	70
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C-119	920149.20	2950795.50	70
C-120	919217.03	2951140.38	70

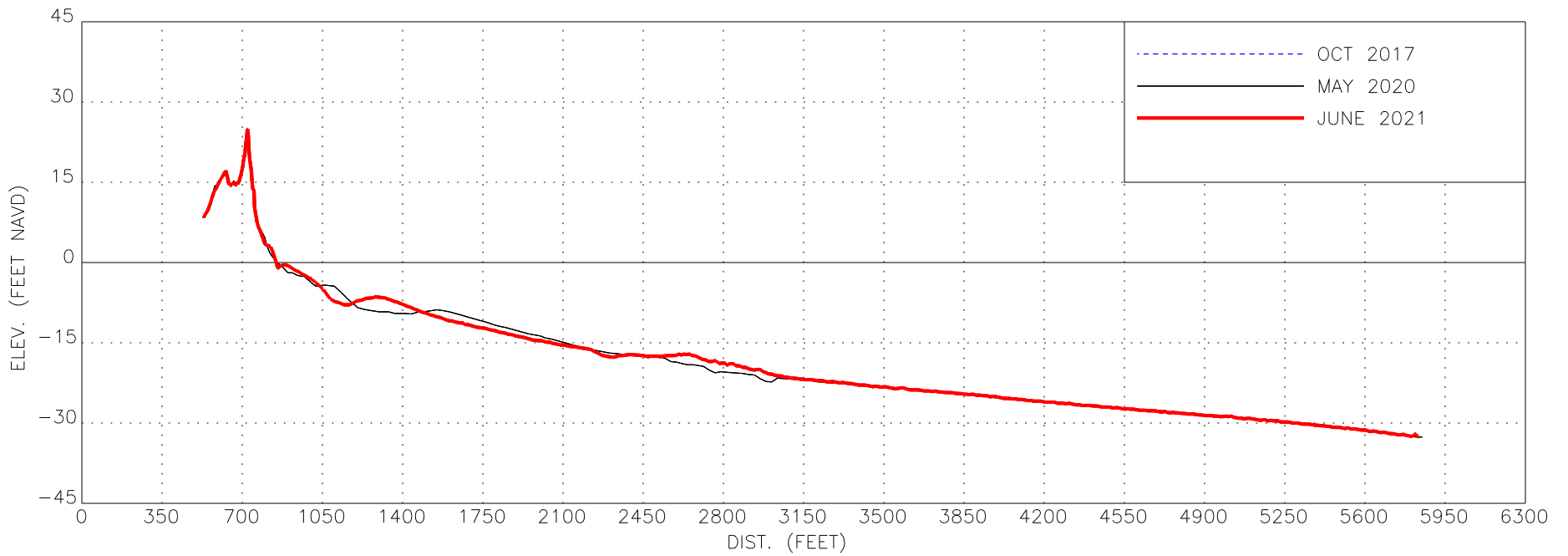
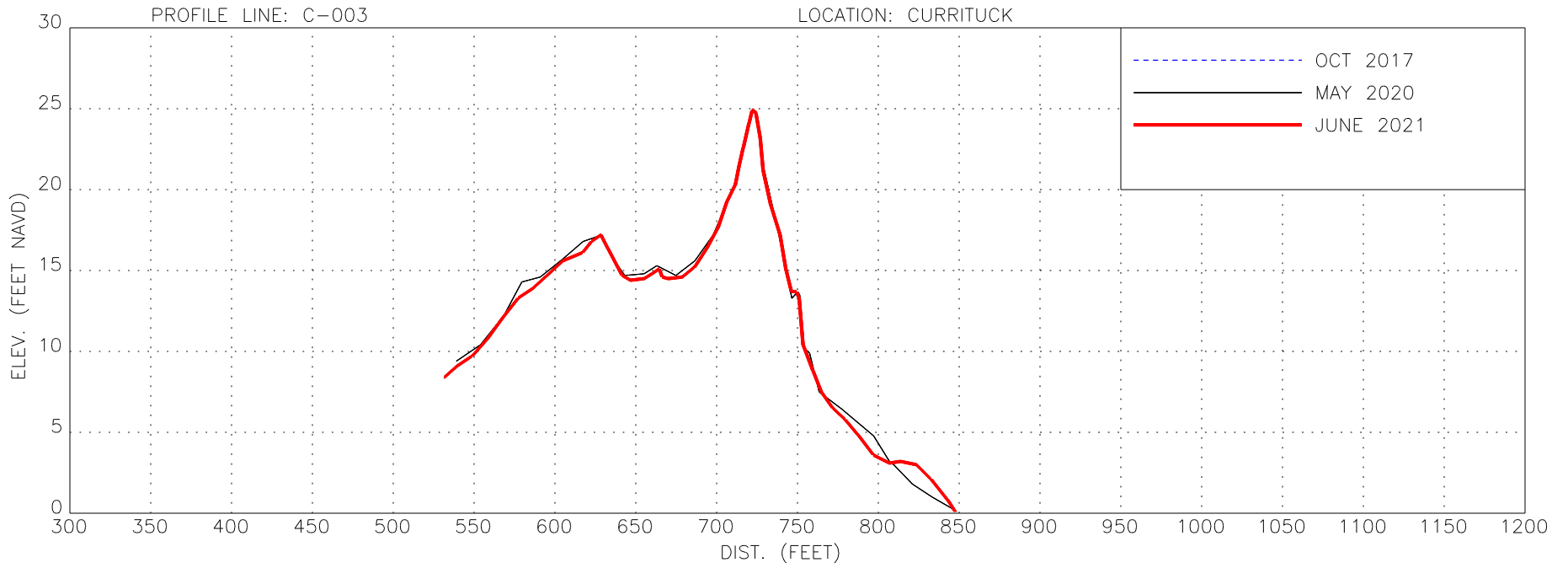
APPENDIX 2: Profile XYZ Data

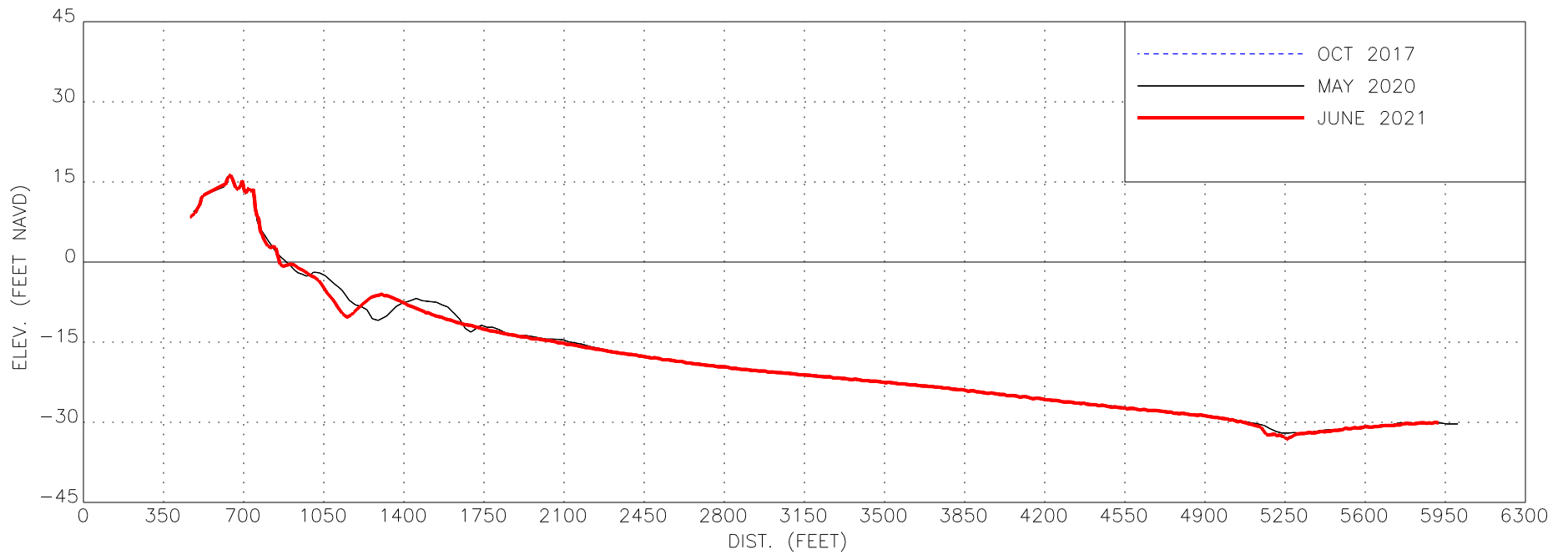
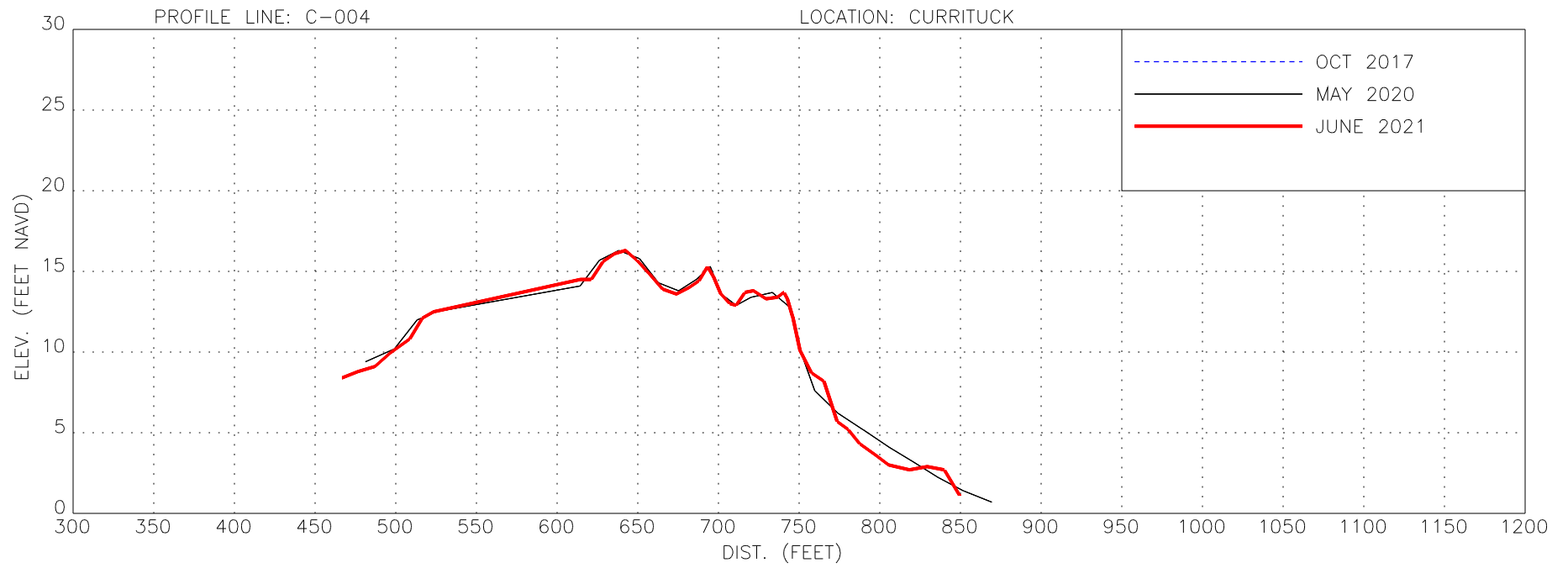
PROFILE XYZ DATA
(Available in digital format only)

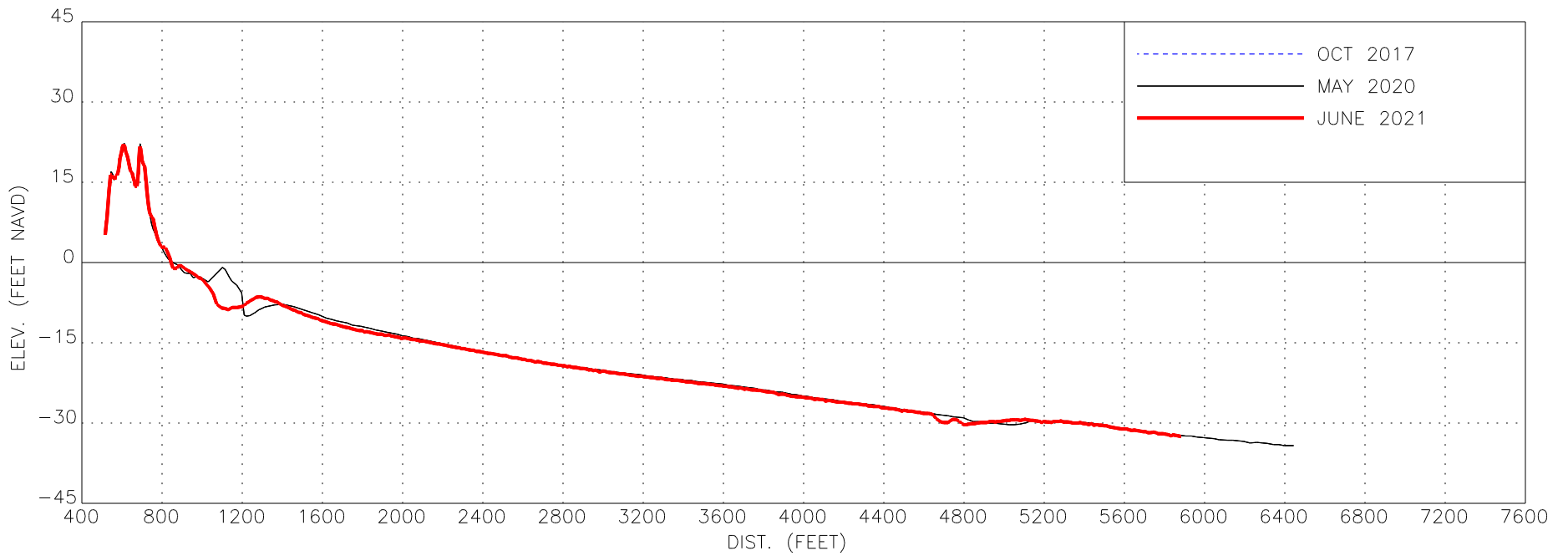
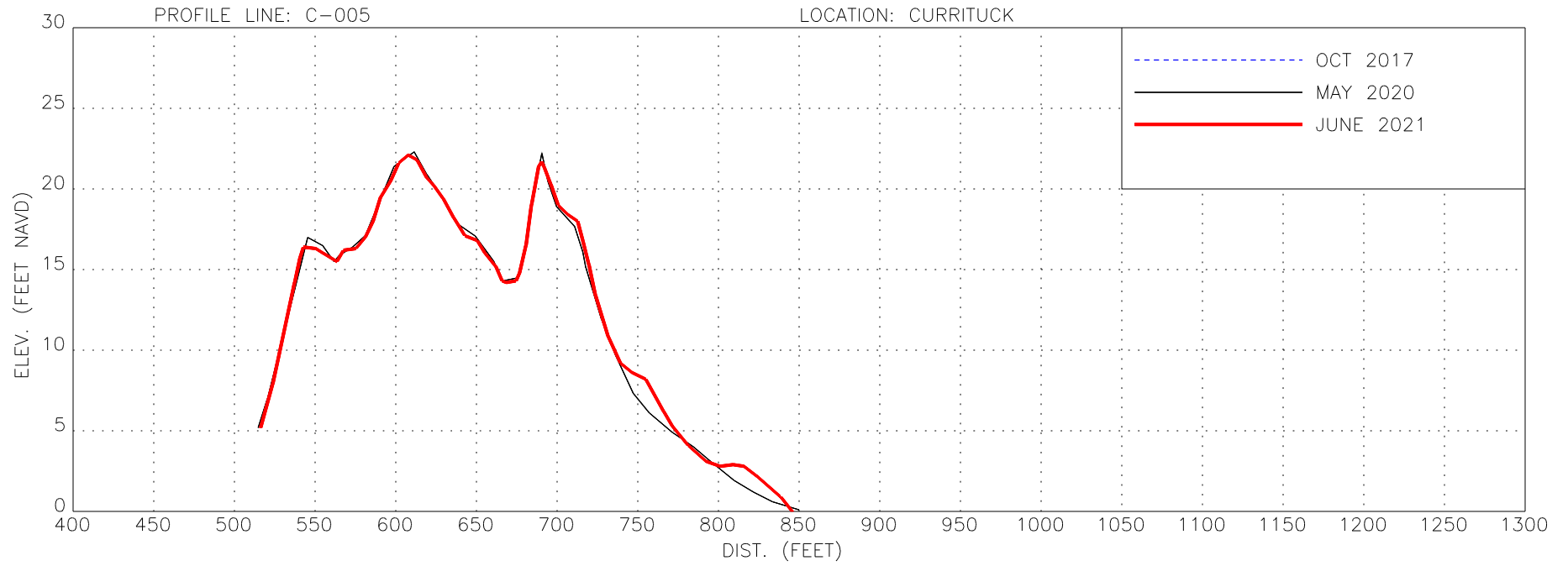
APPENDIX 3
PROFILE PLOTS

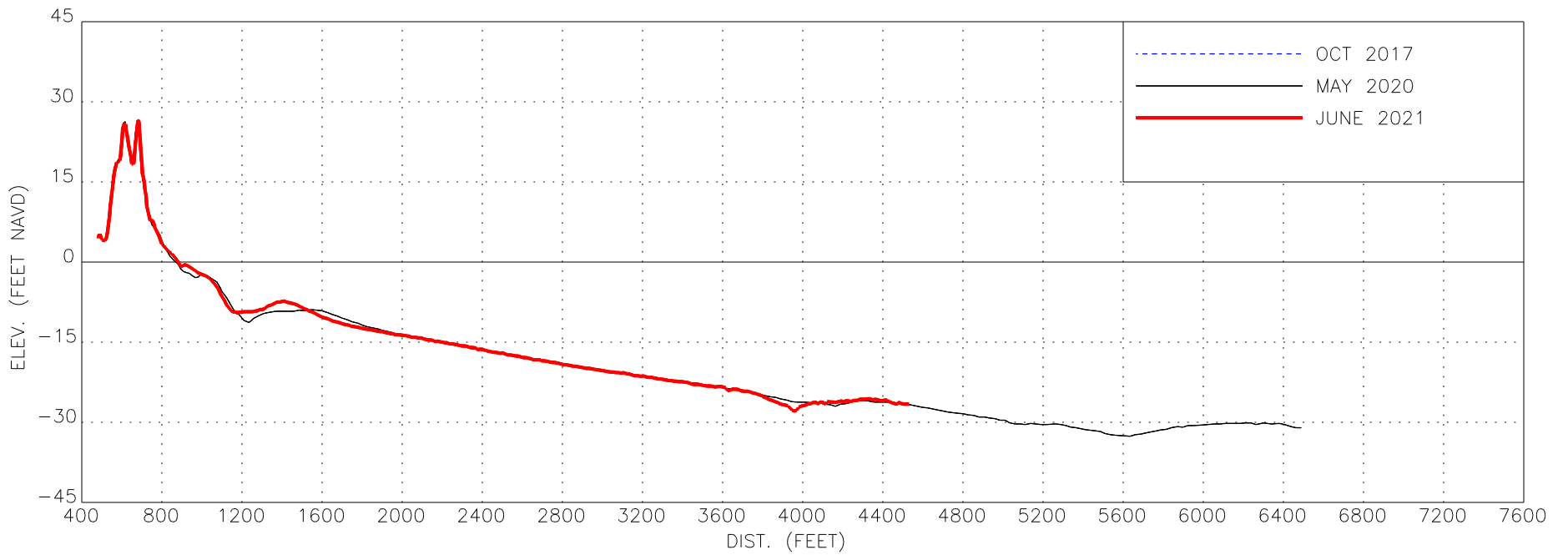
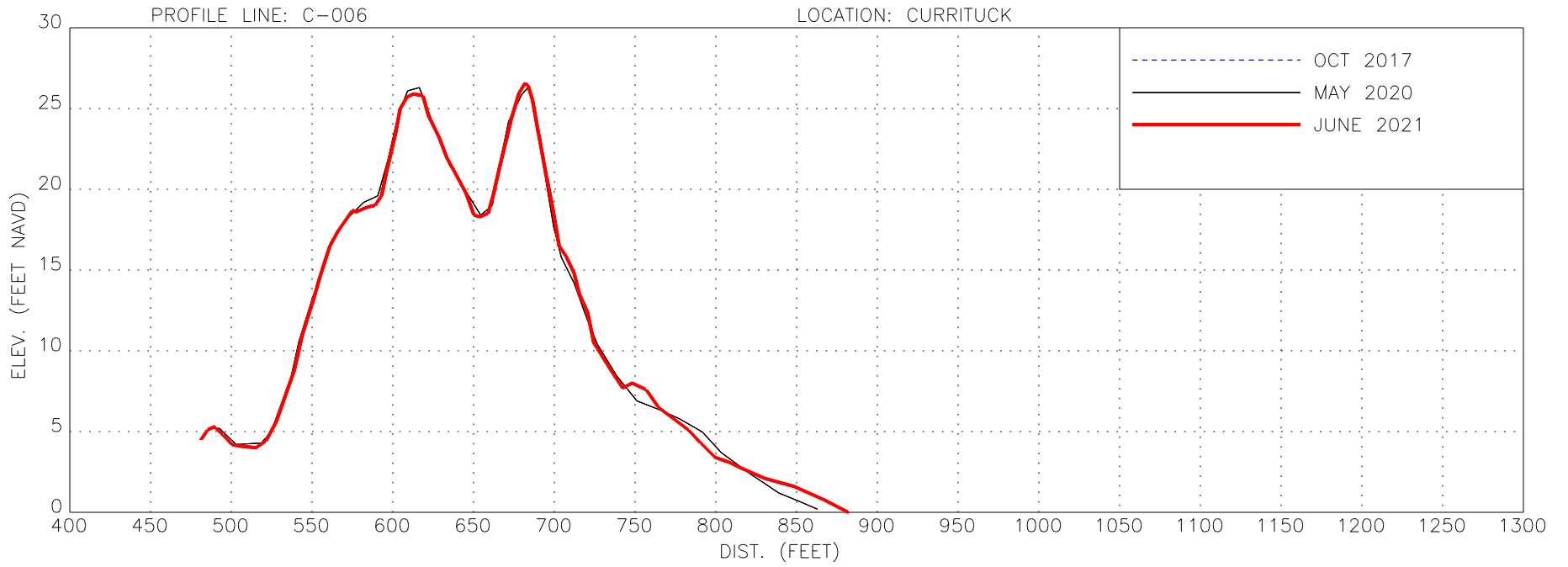


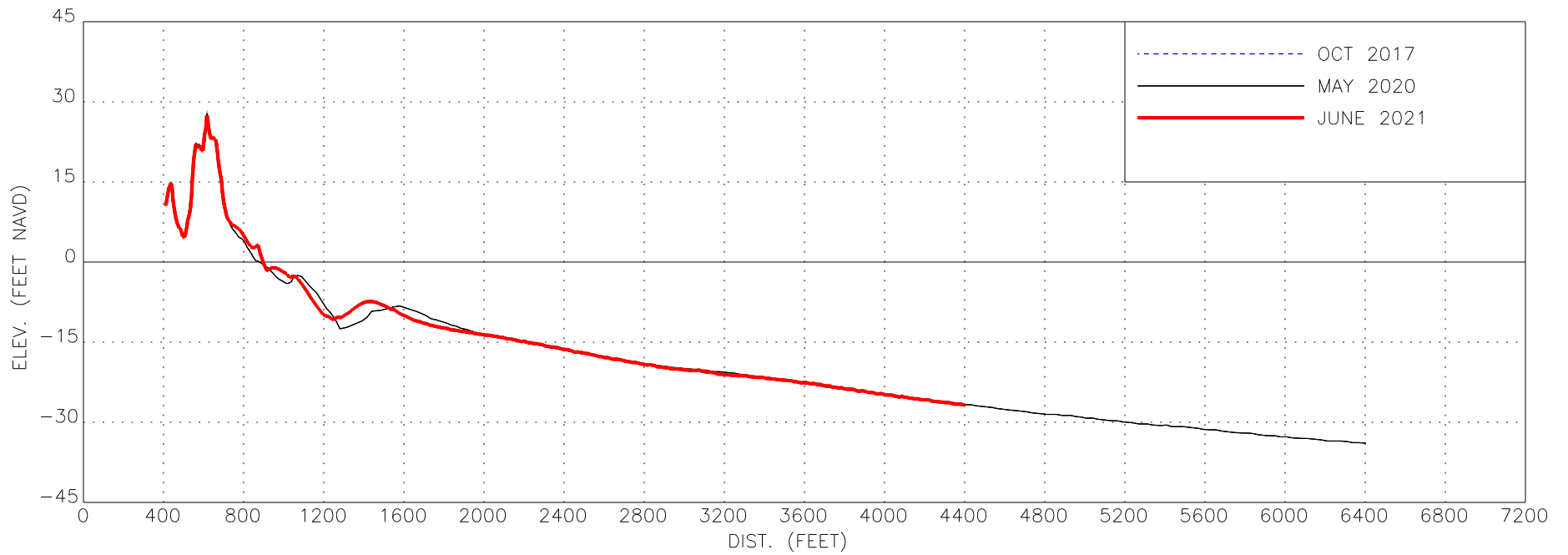
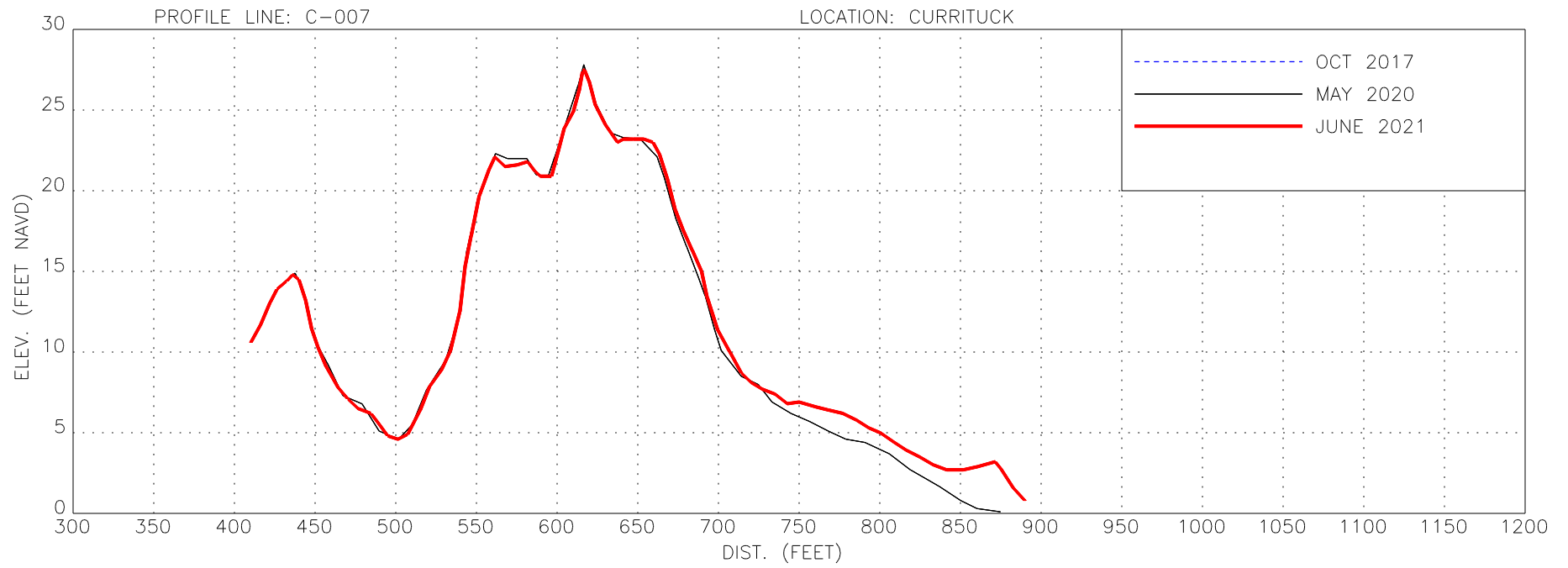


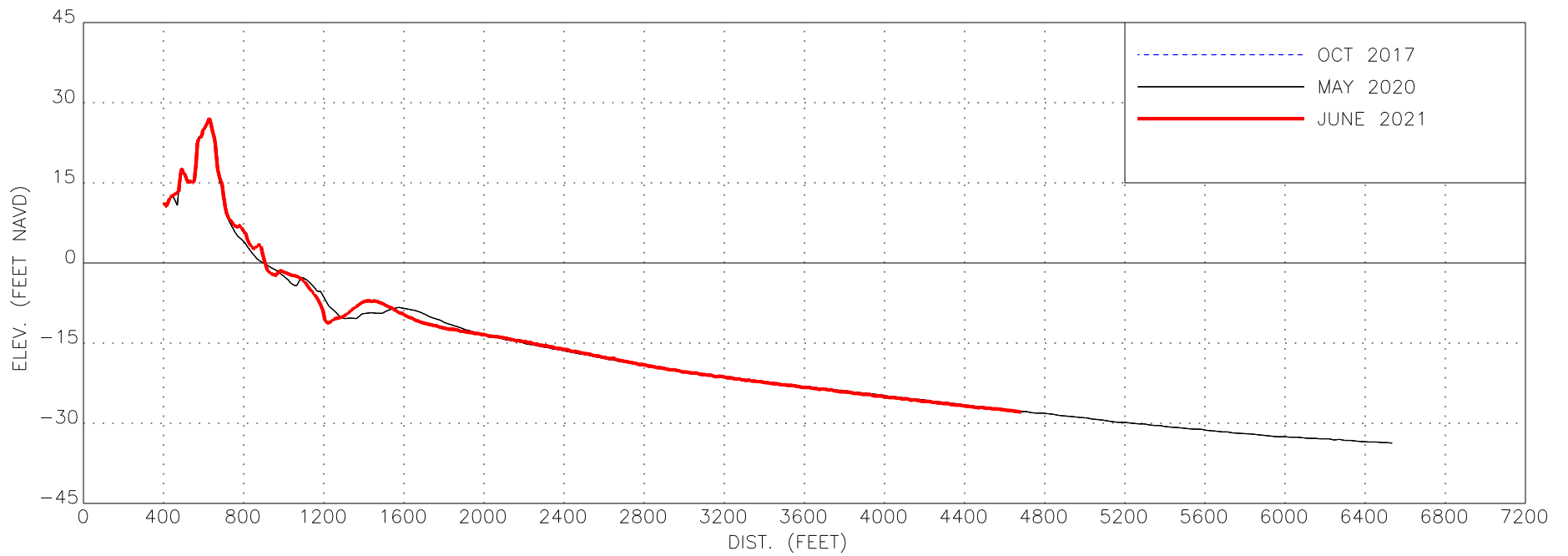
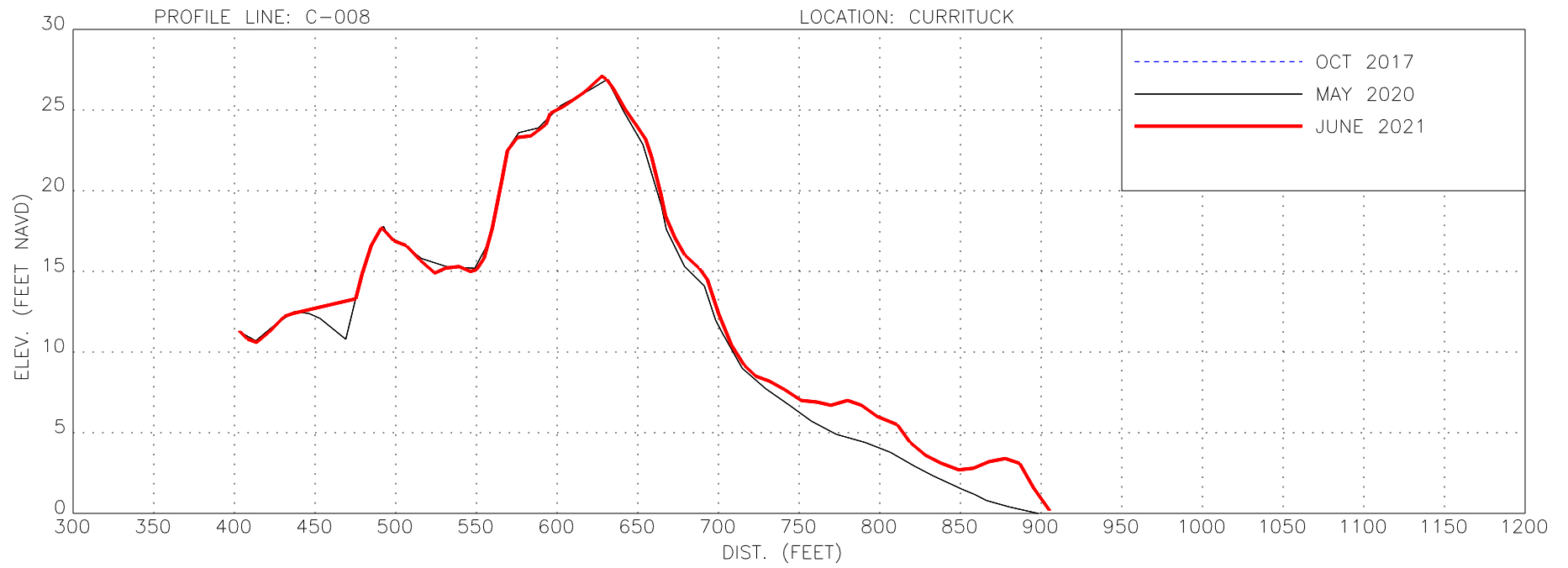


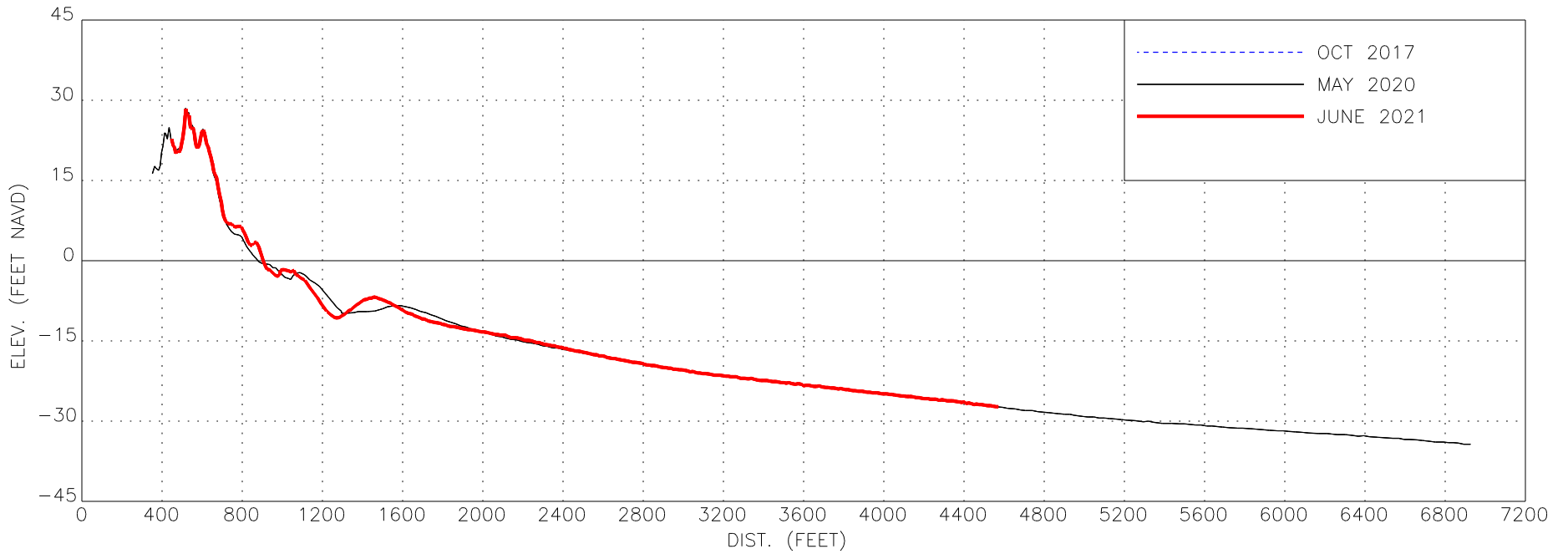
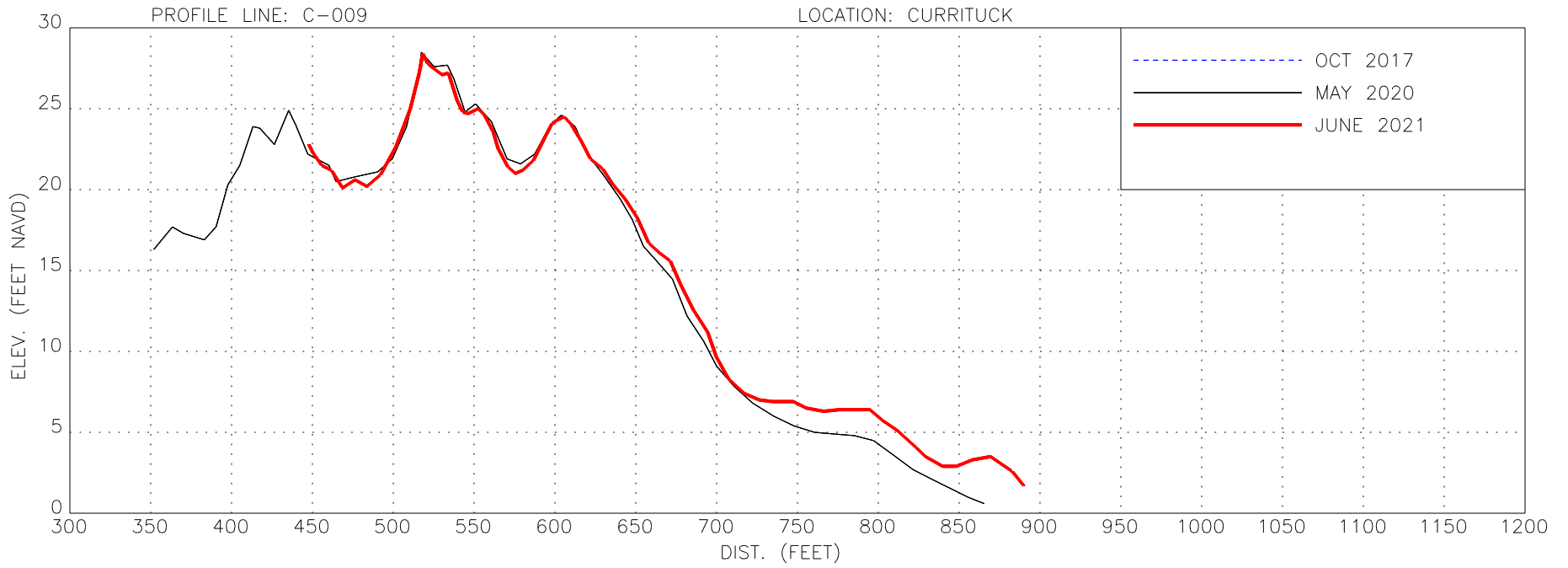


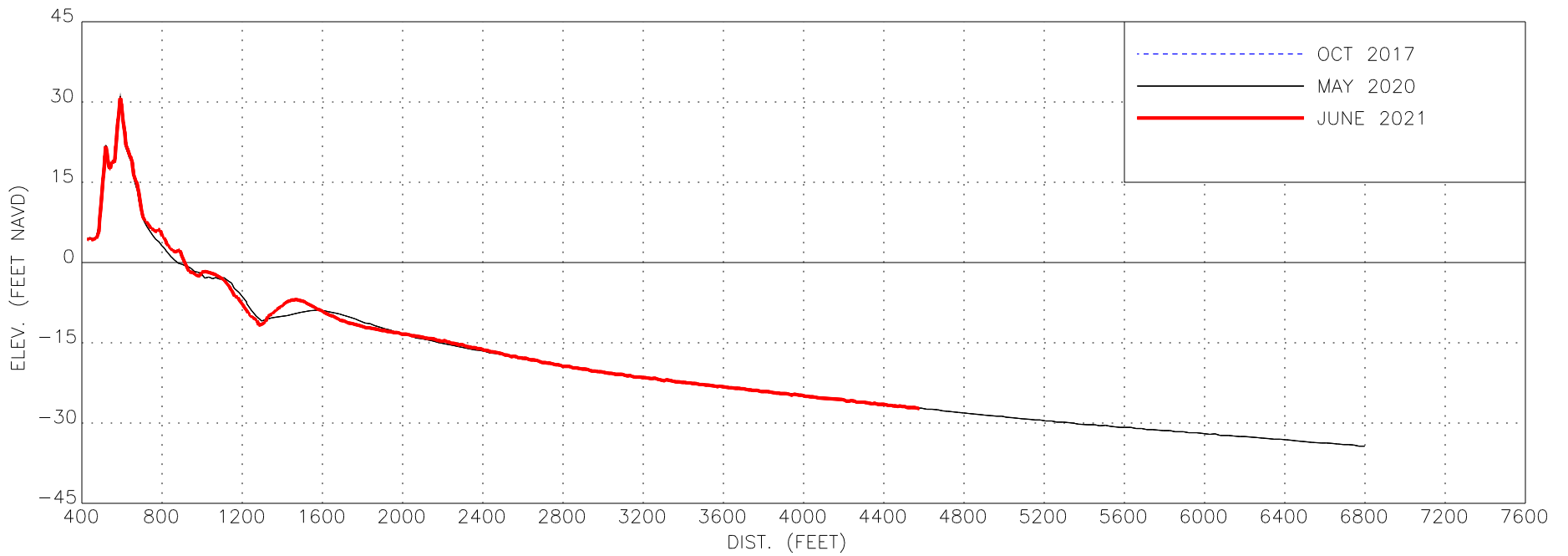
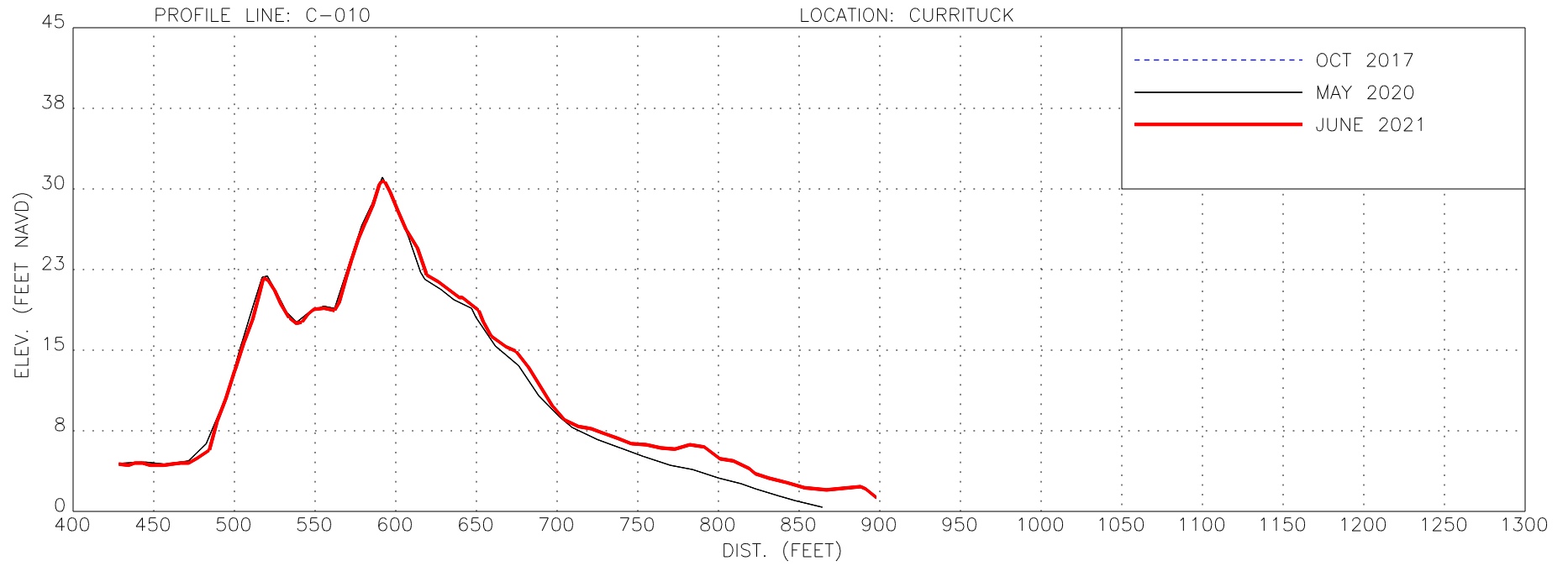


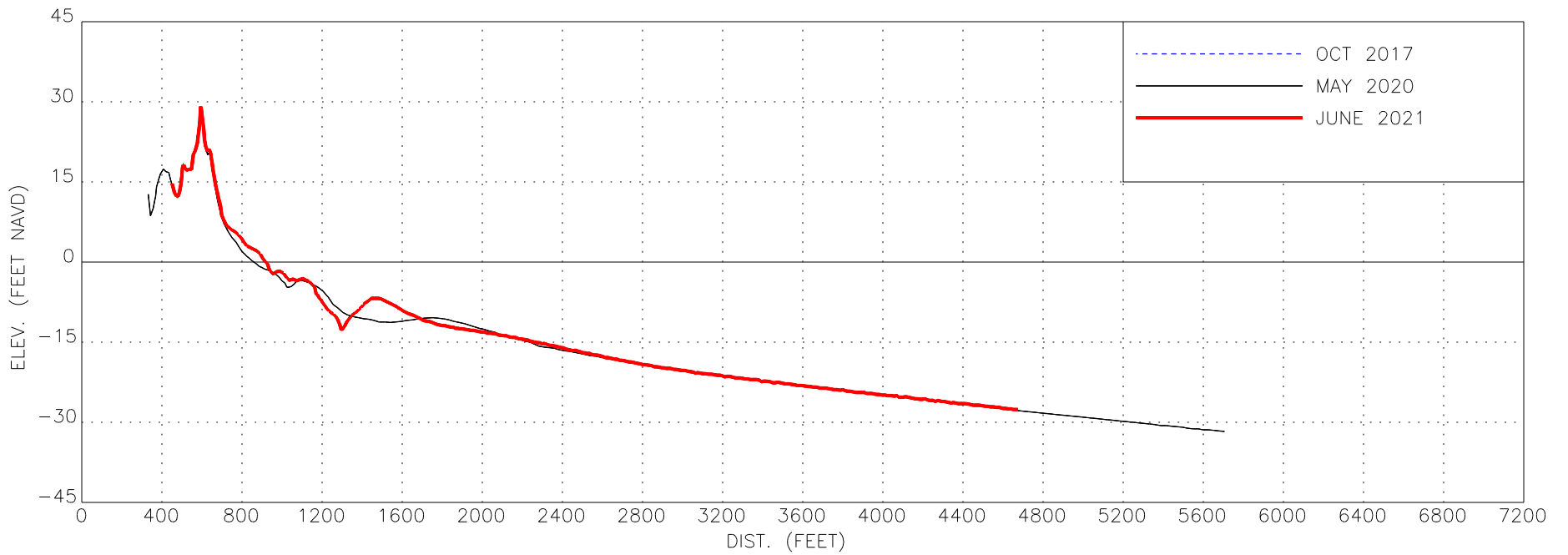
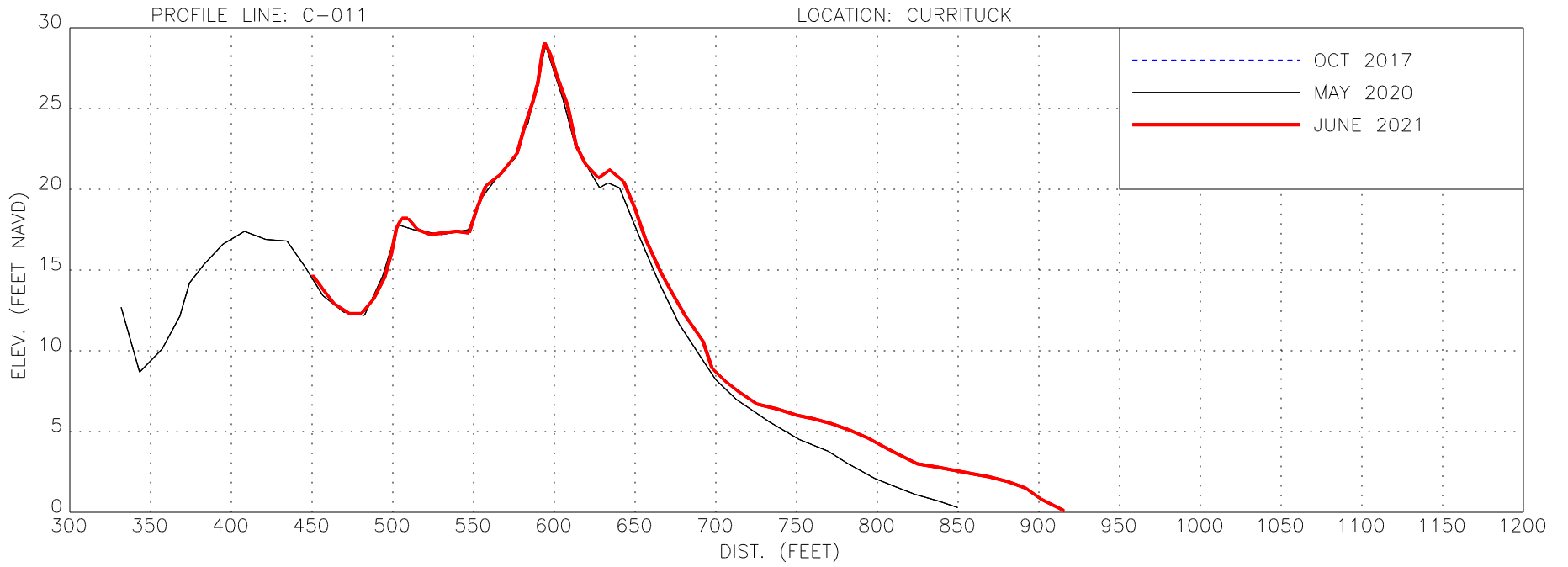


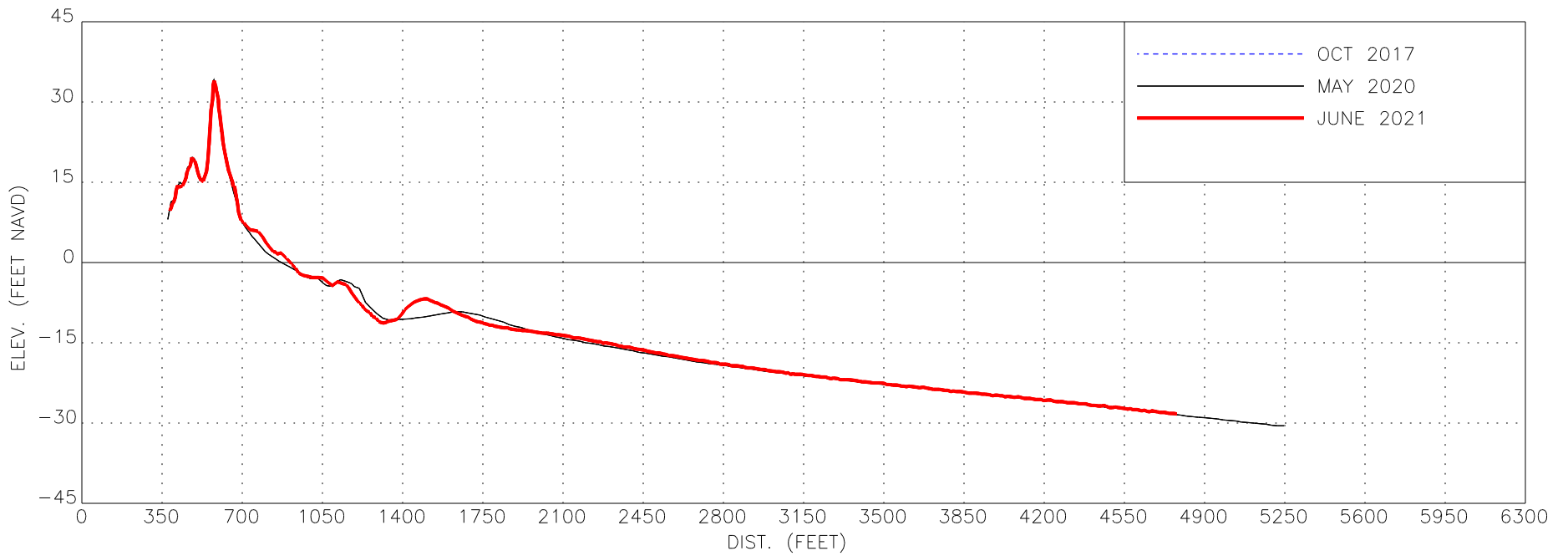
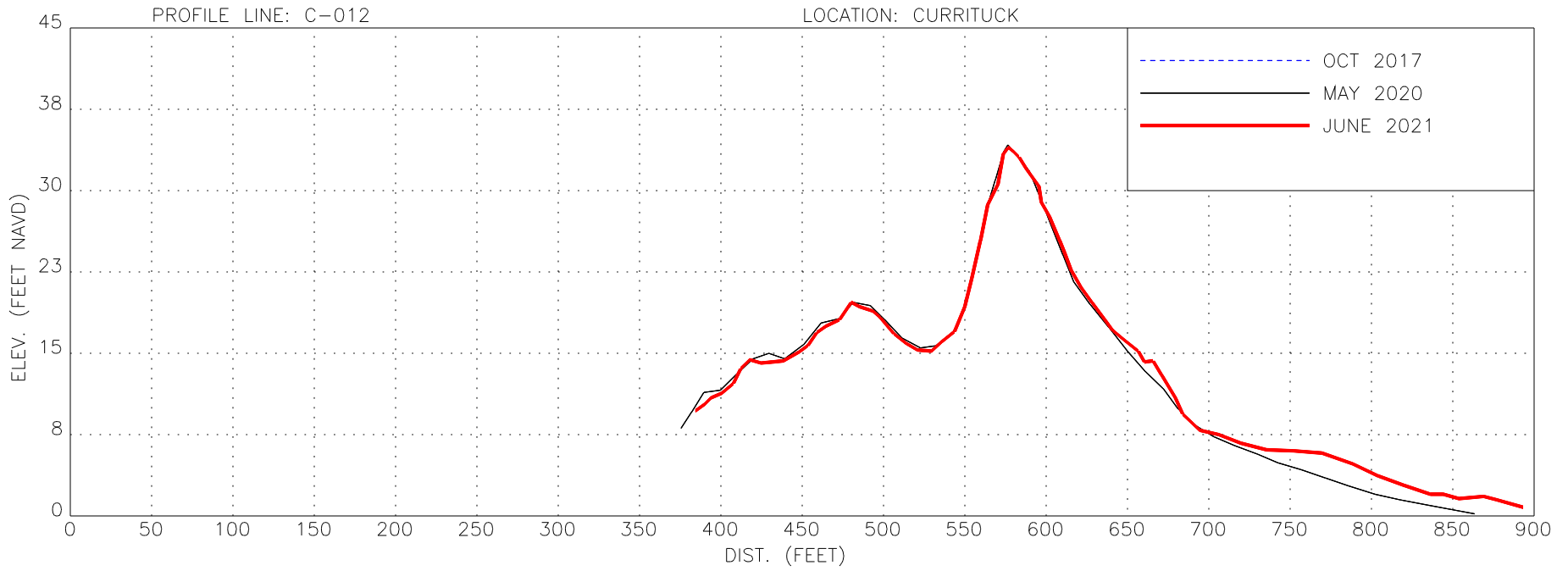


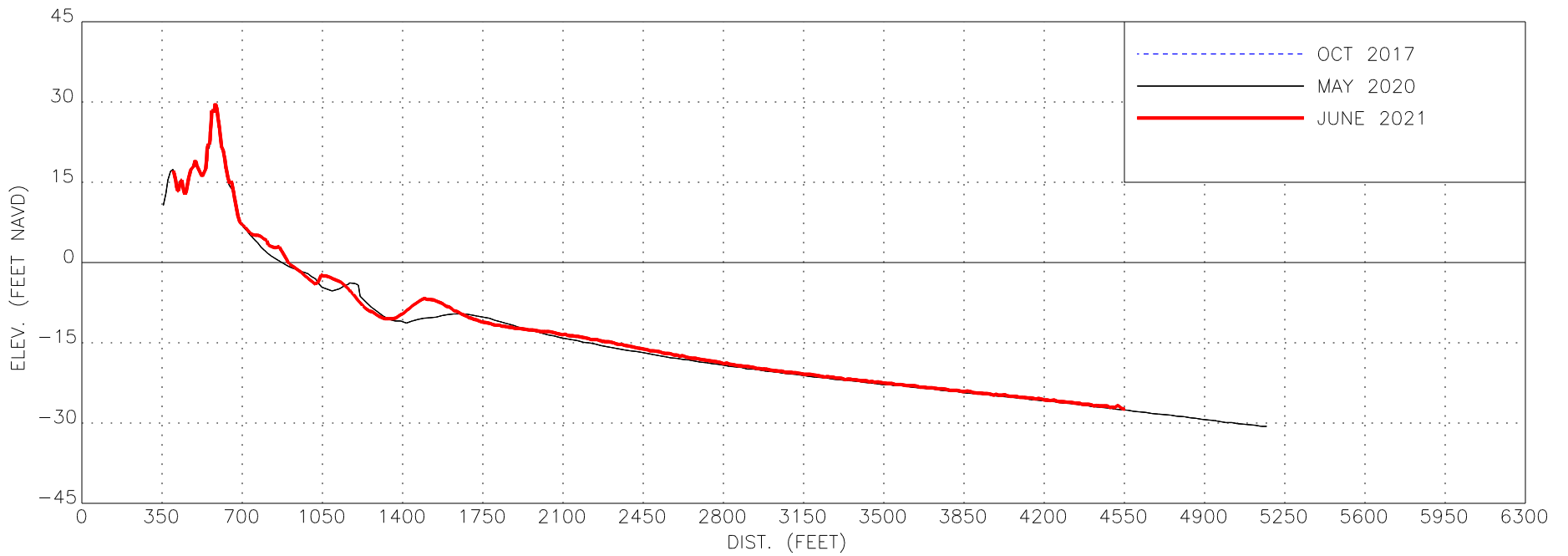
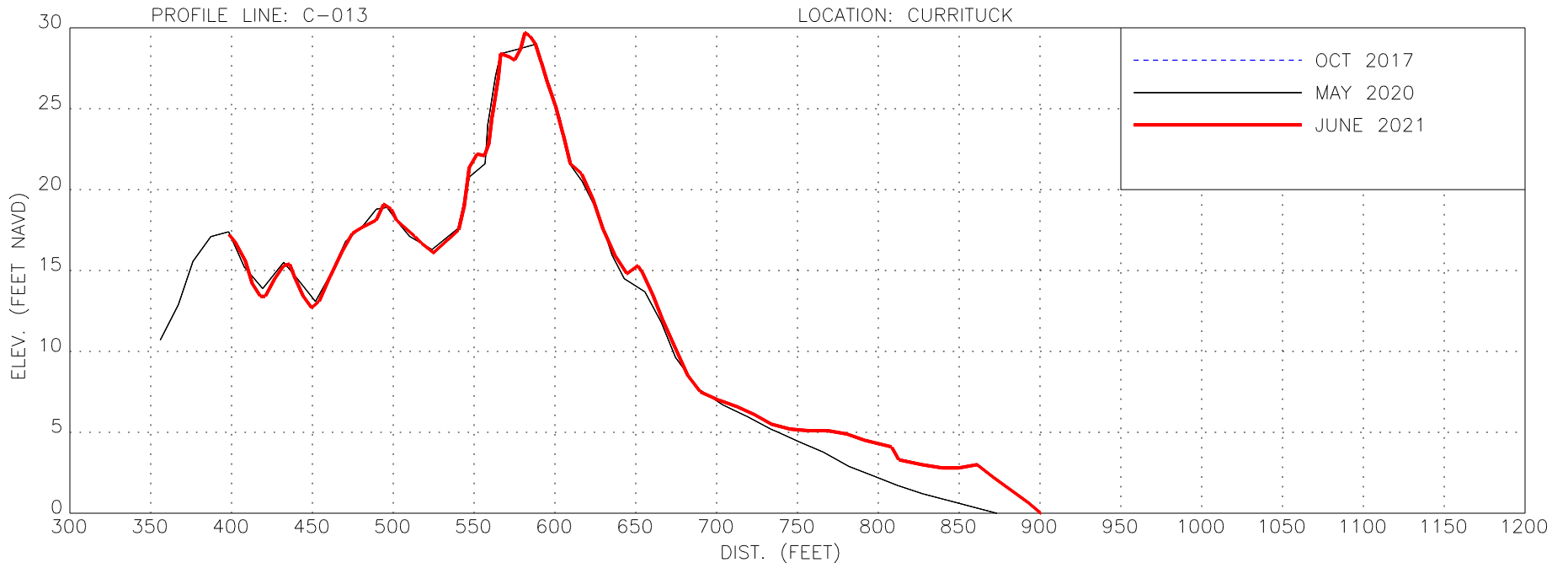


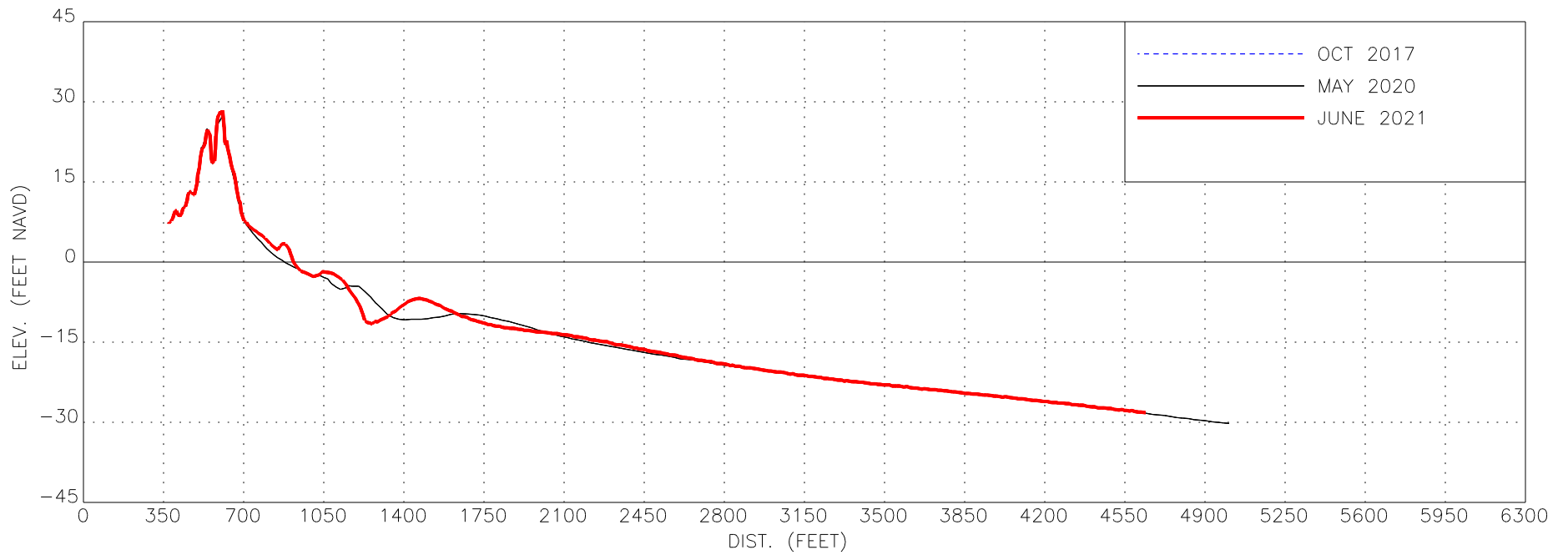
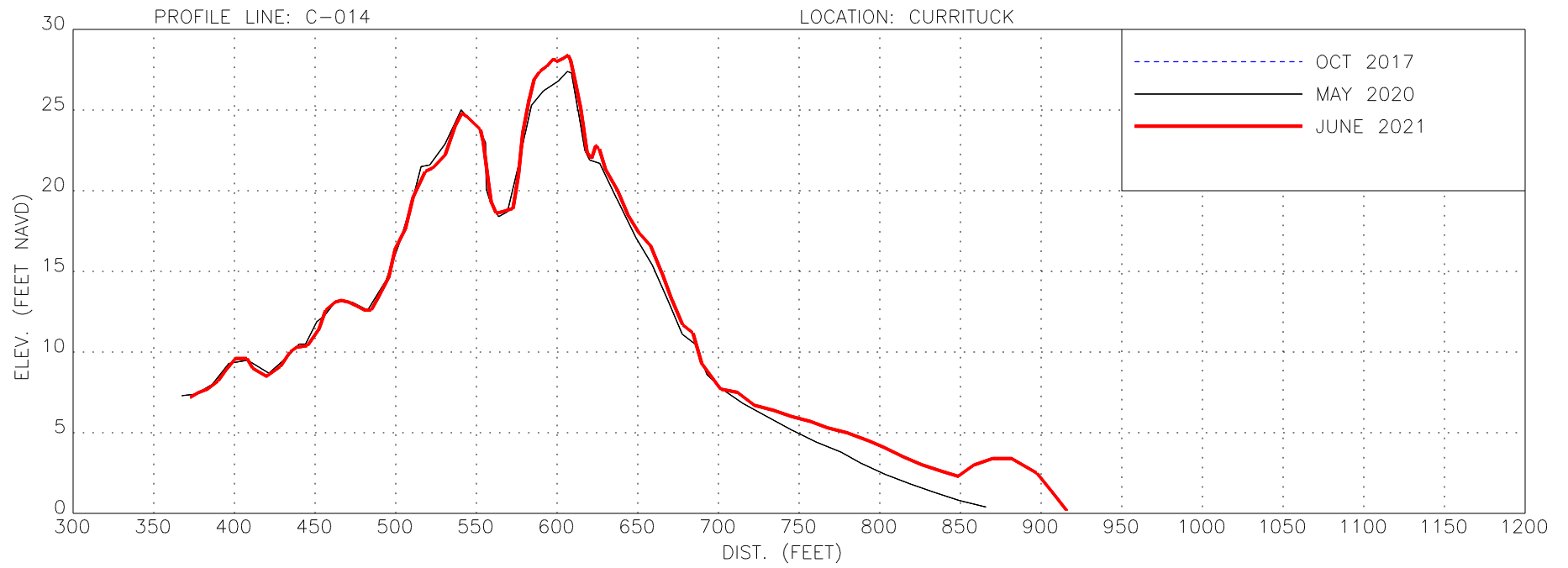


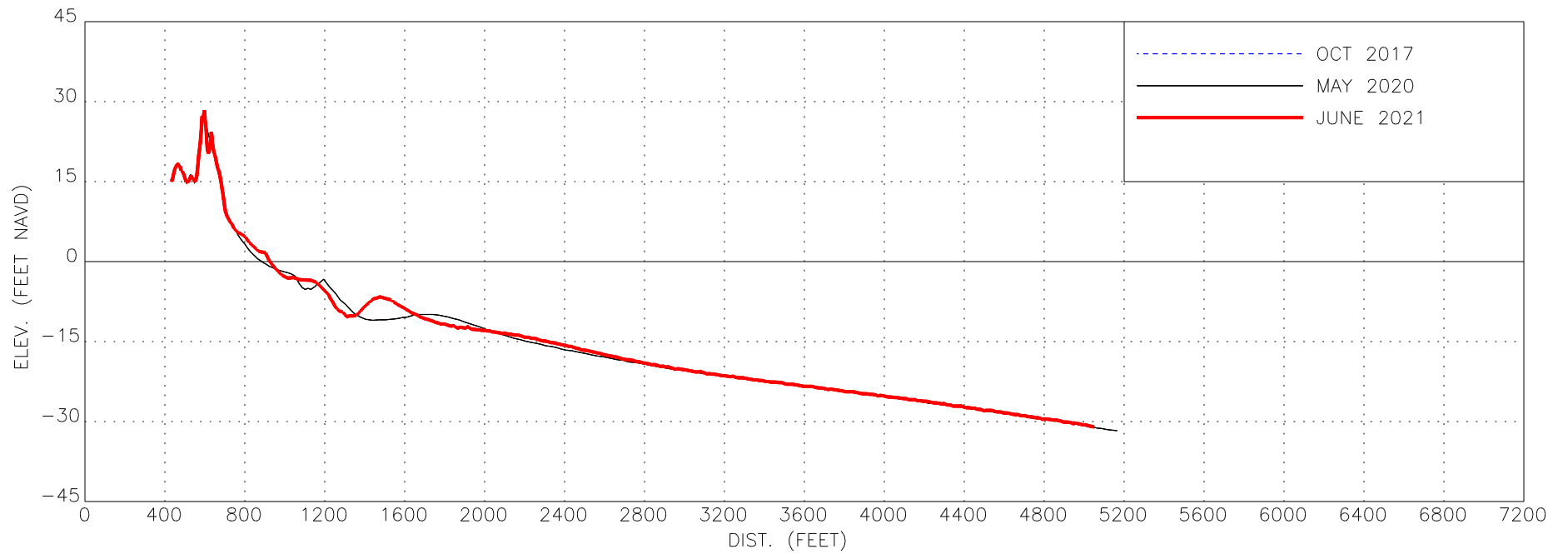
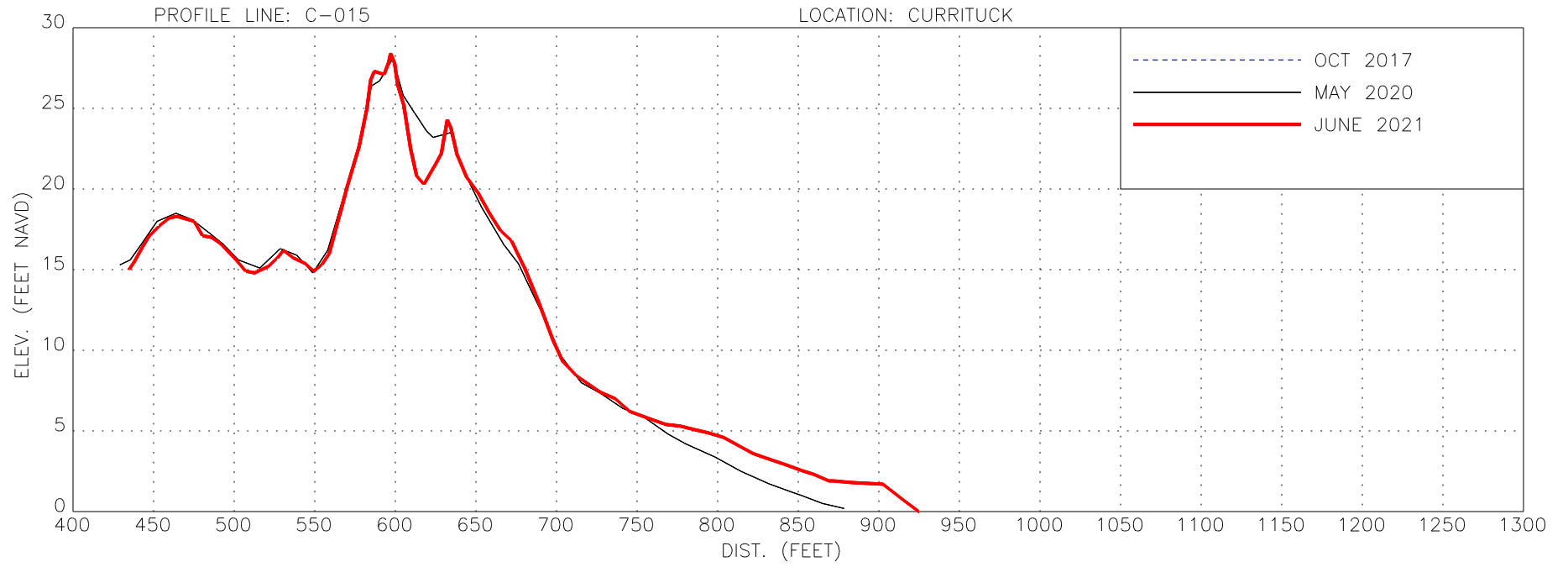


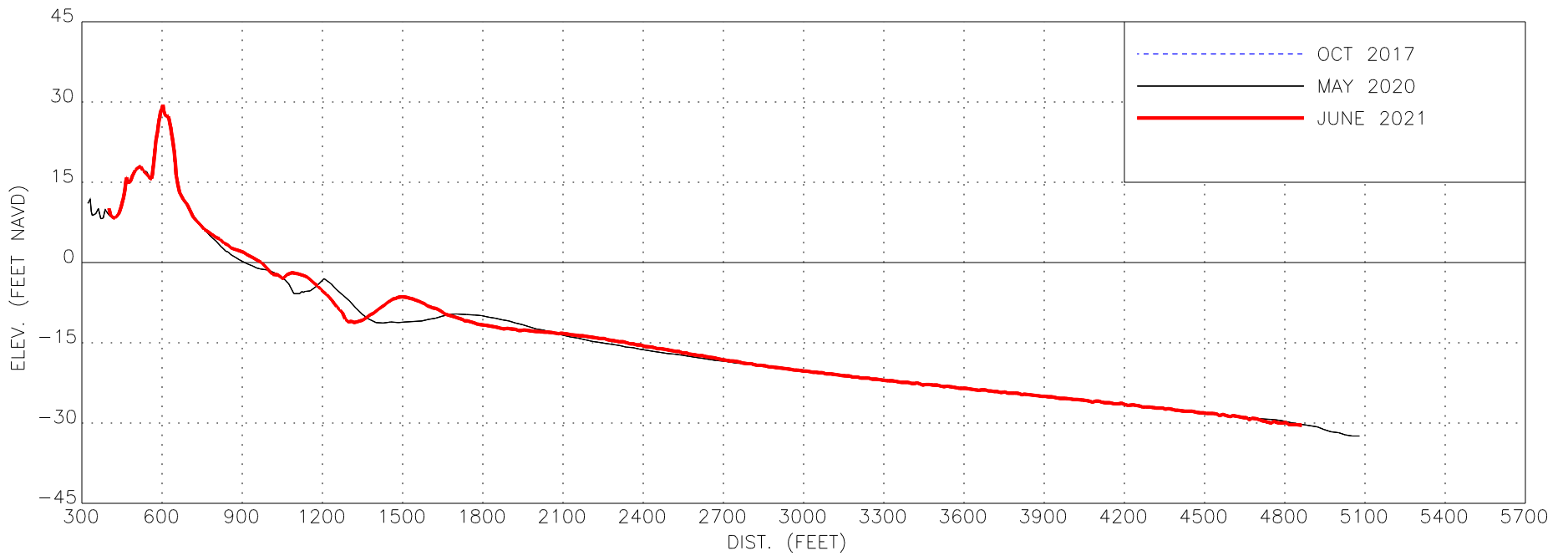
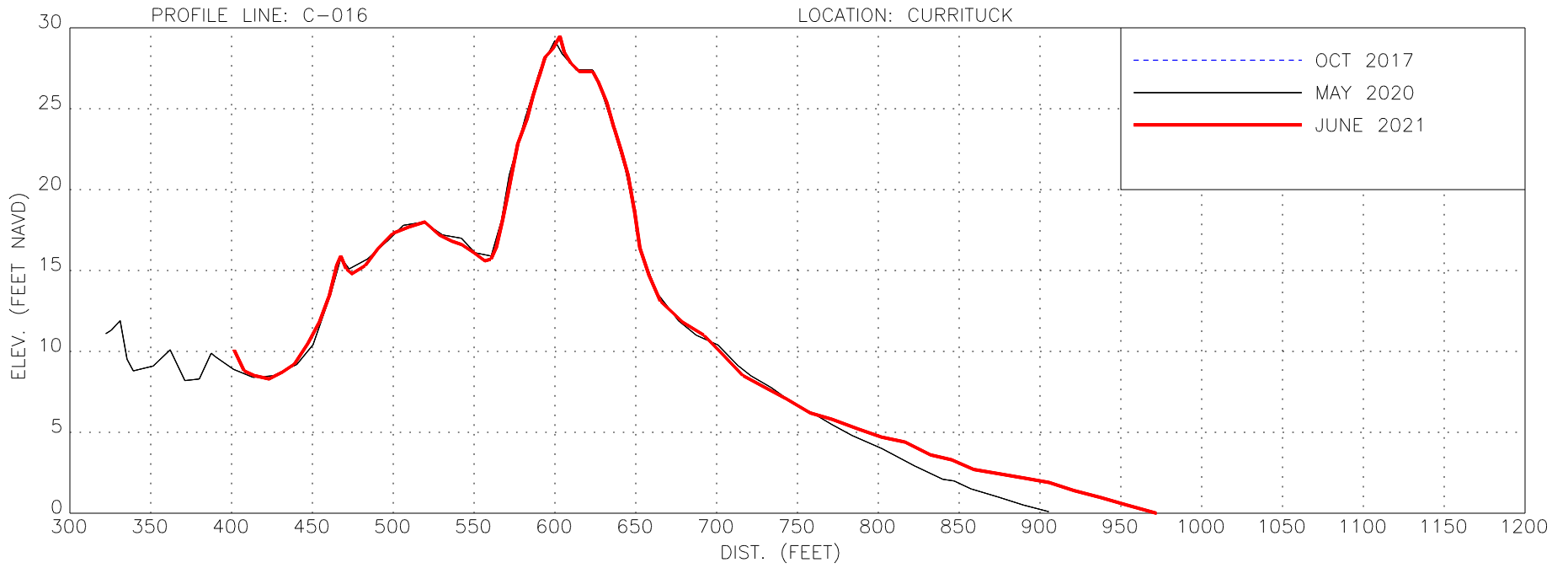


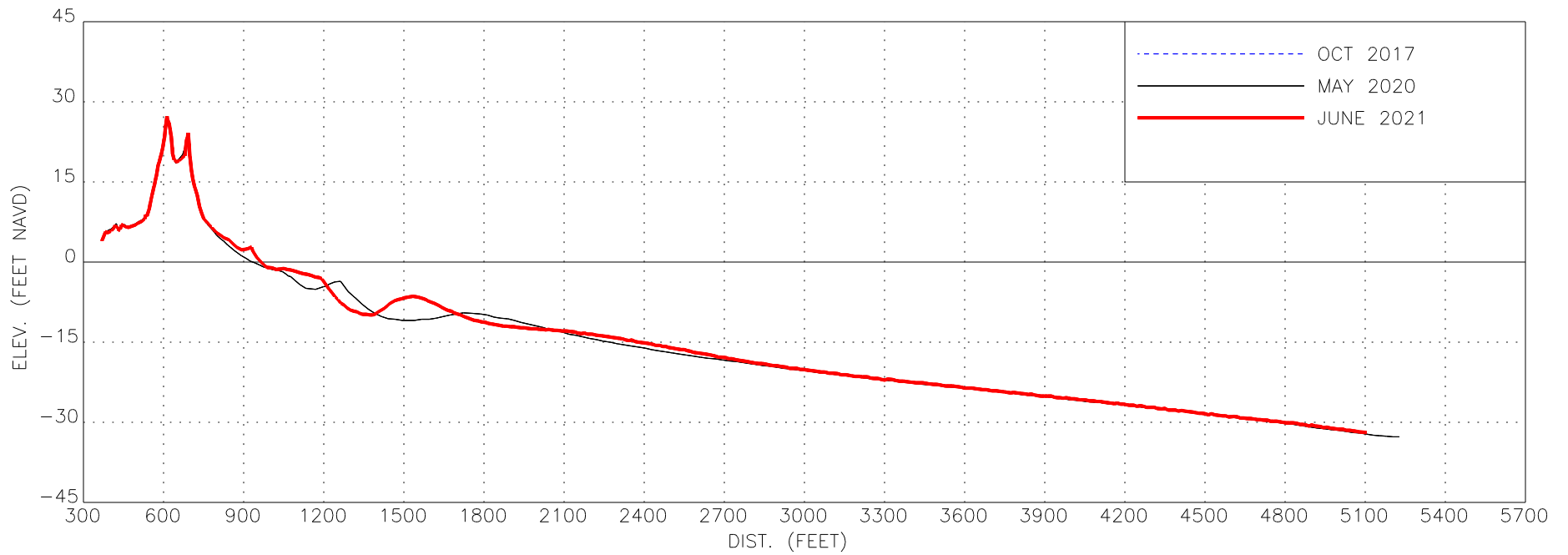
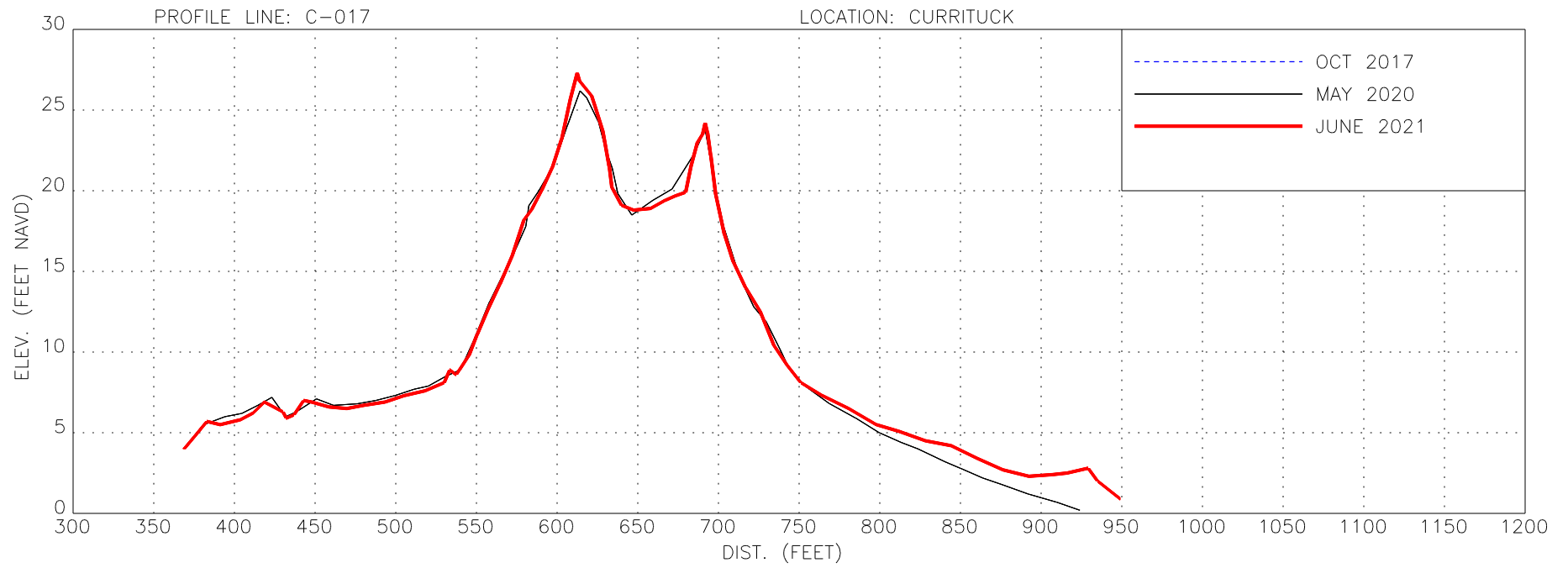


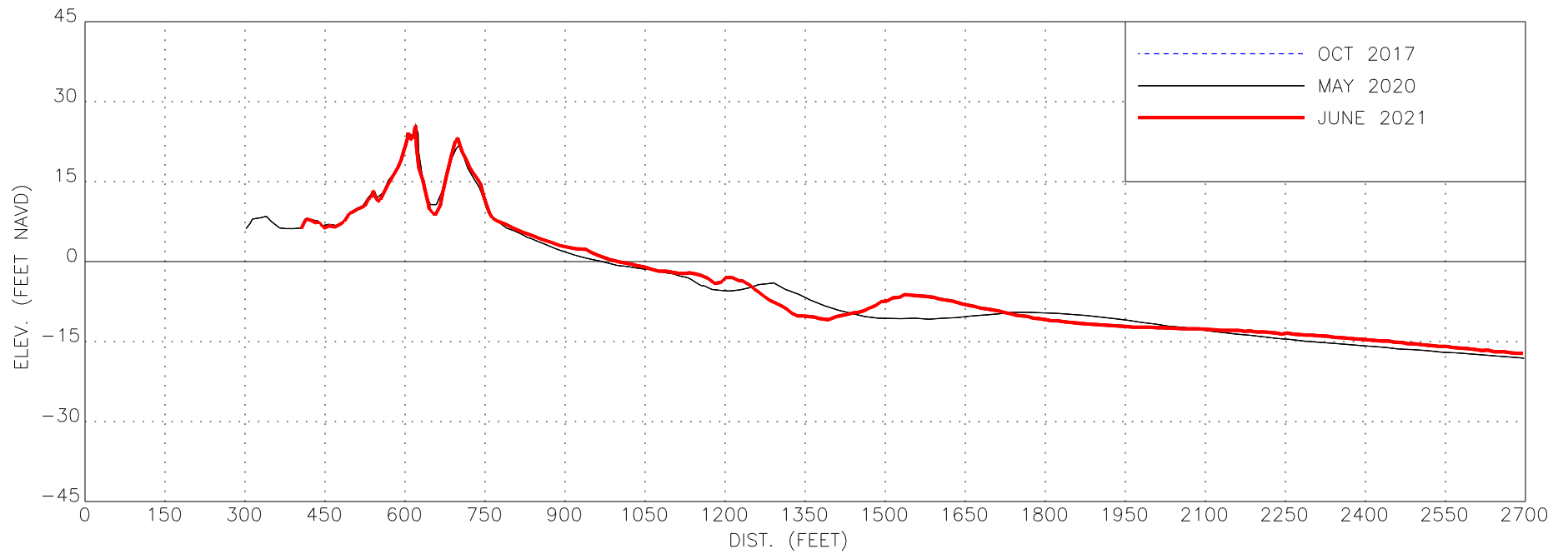
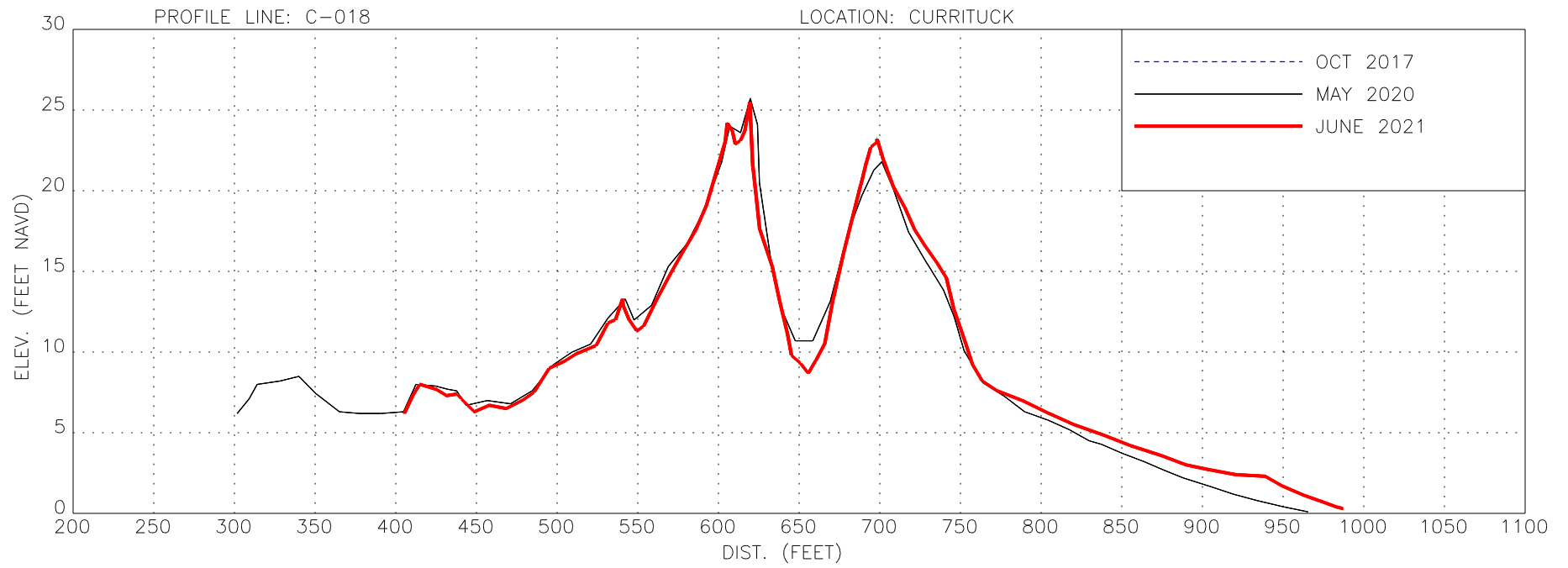


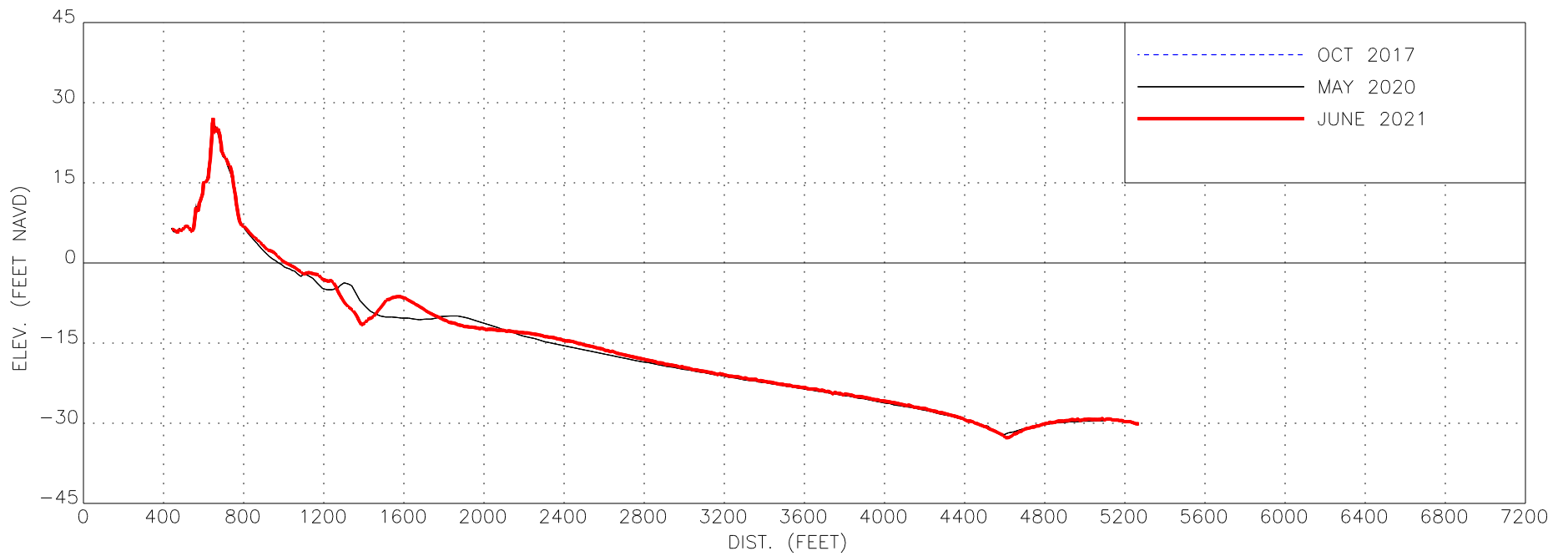
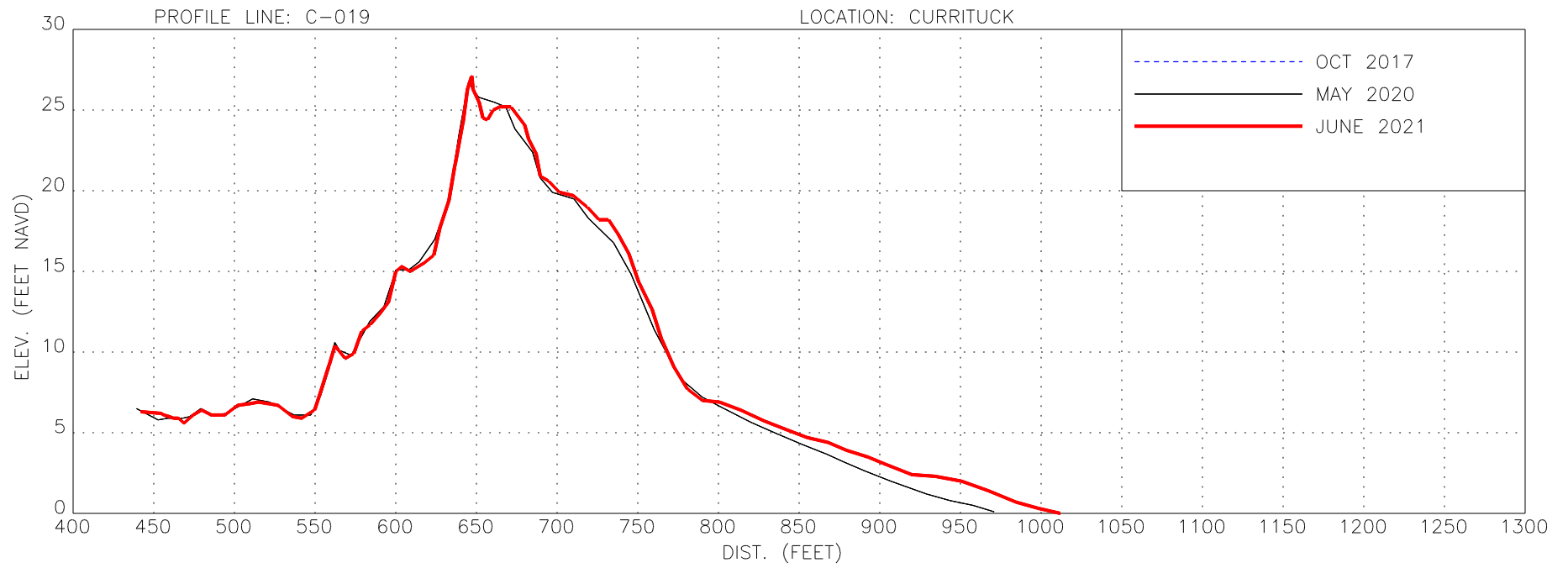


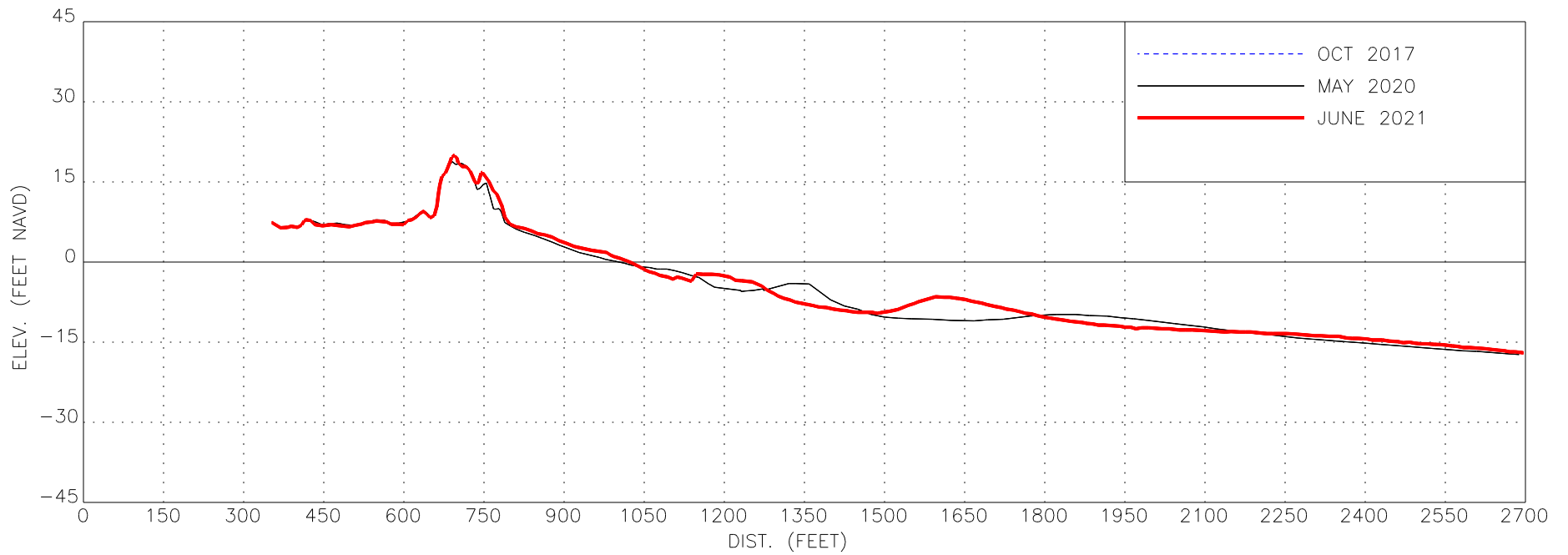
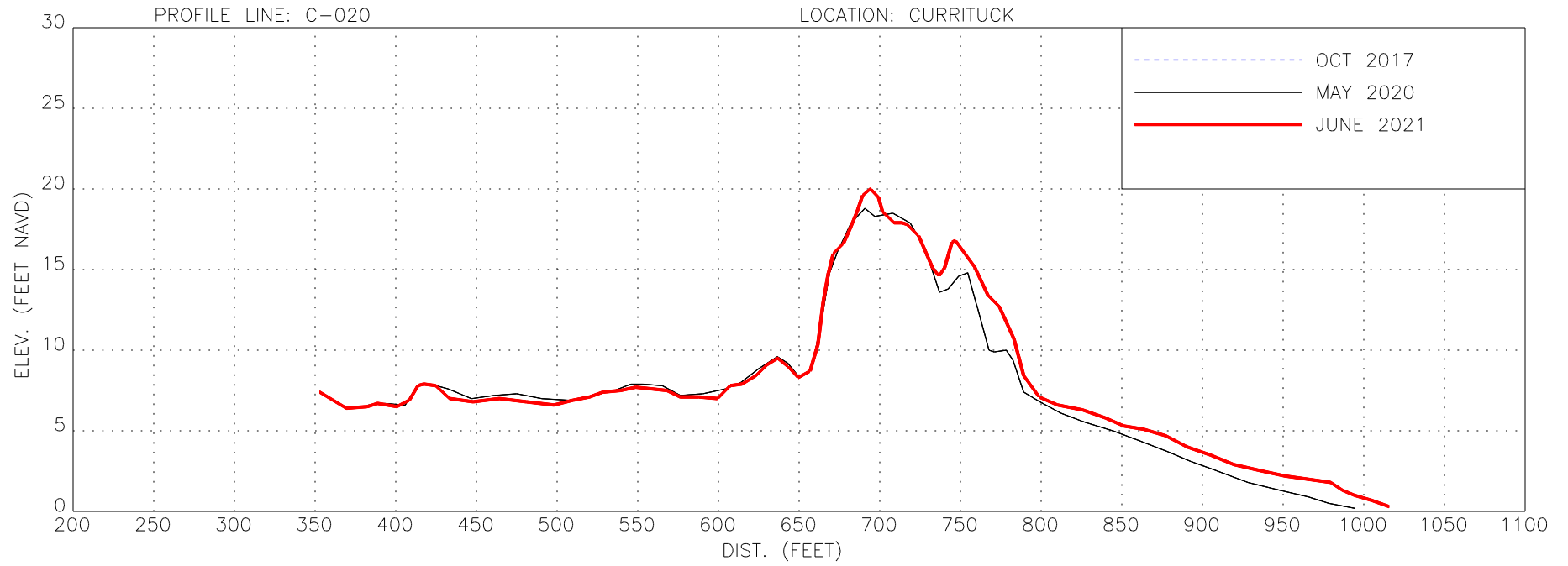


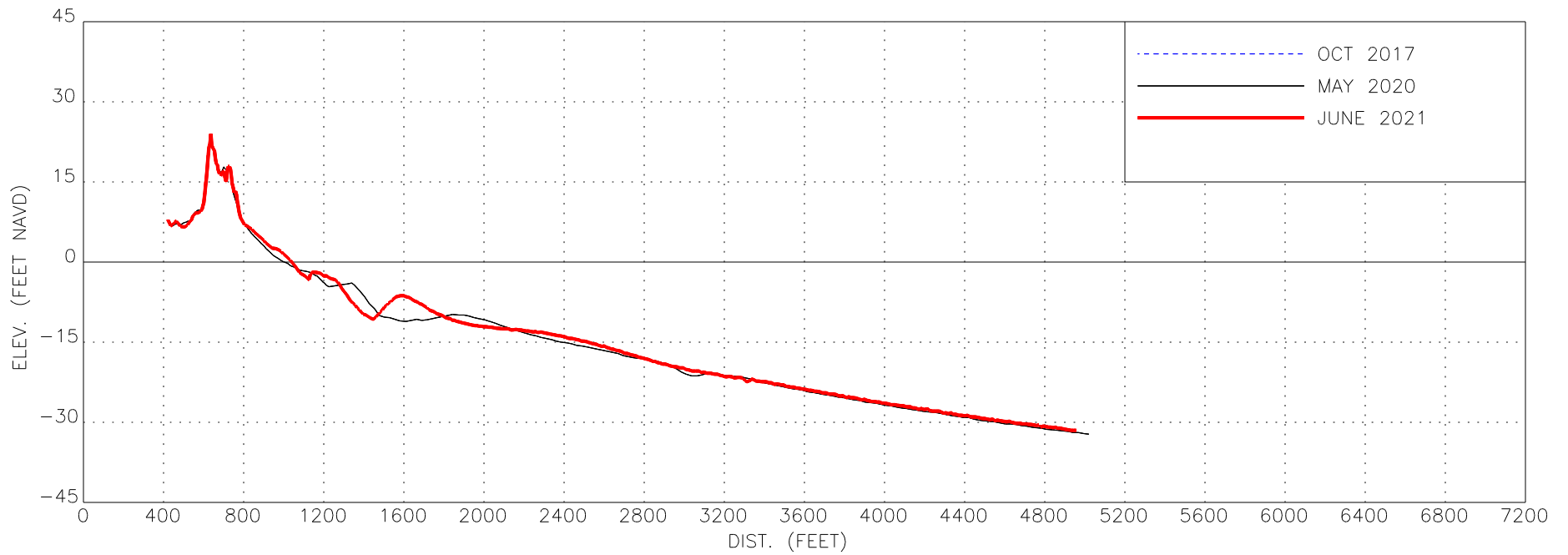
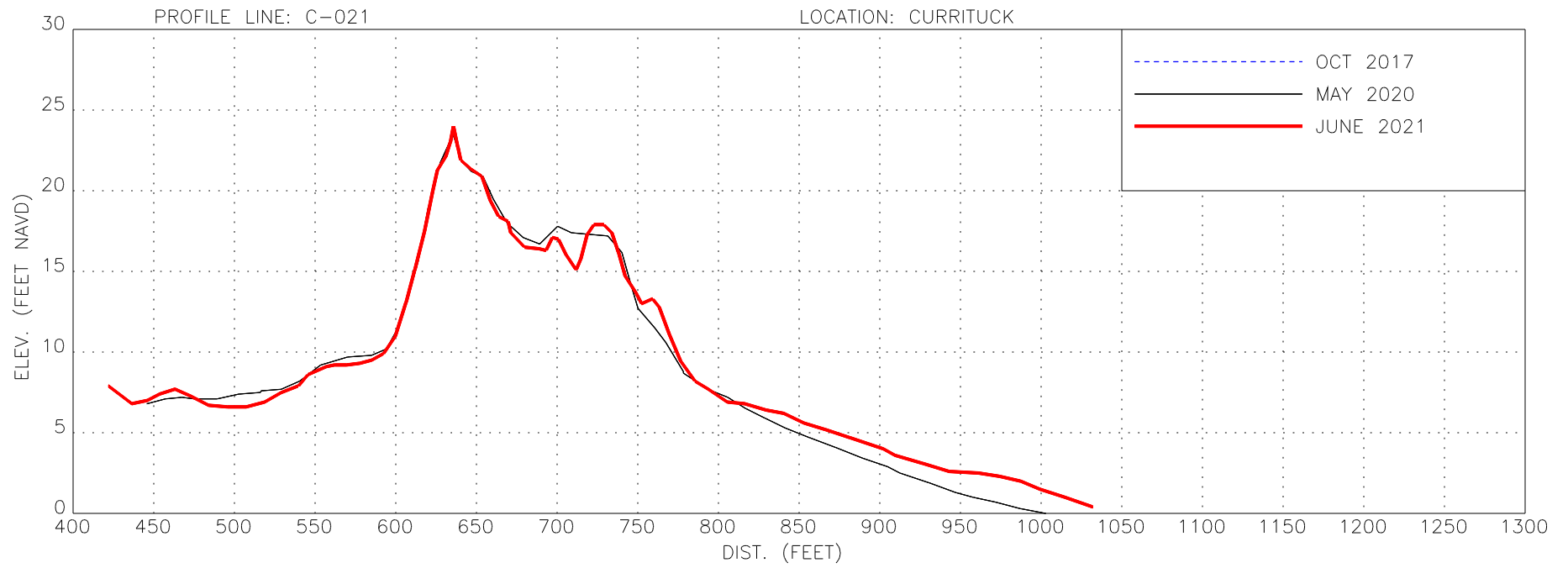


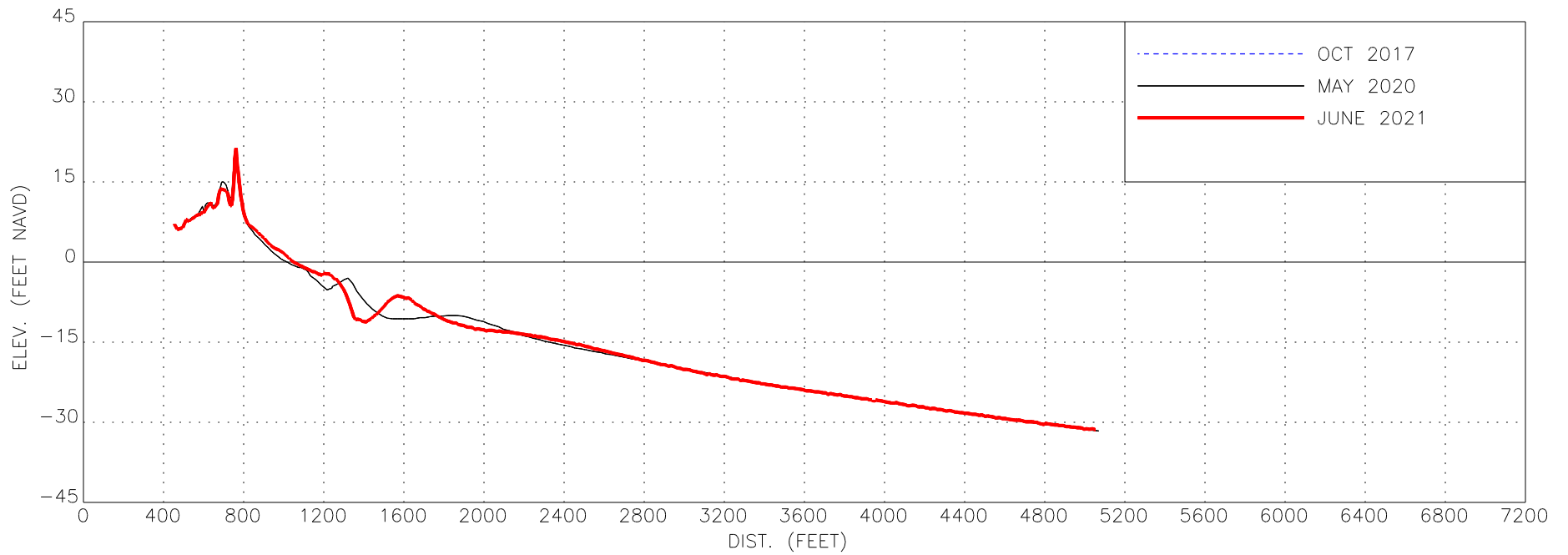
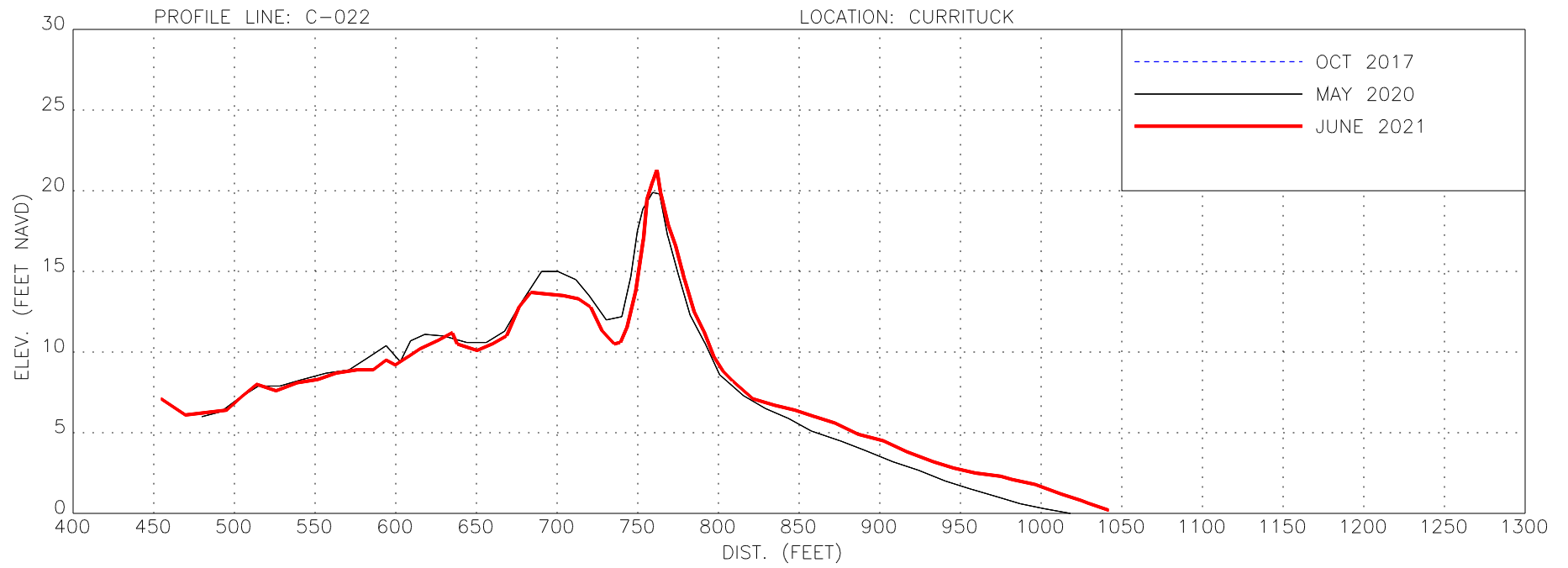


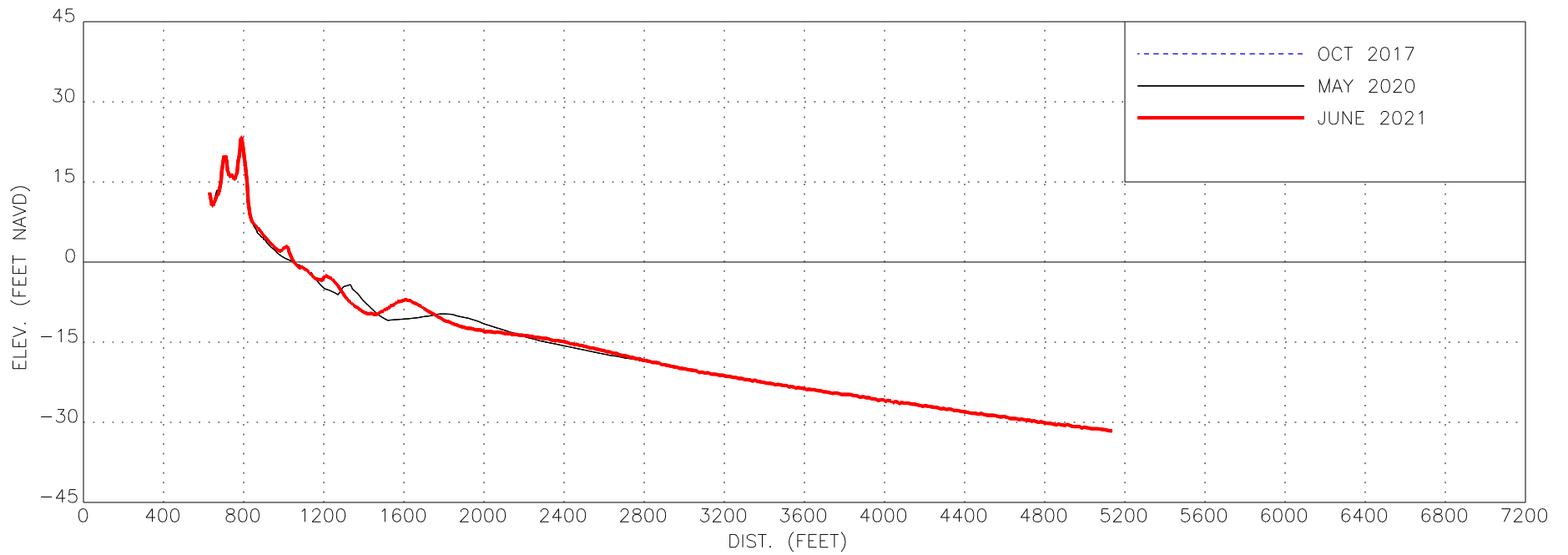
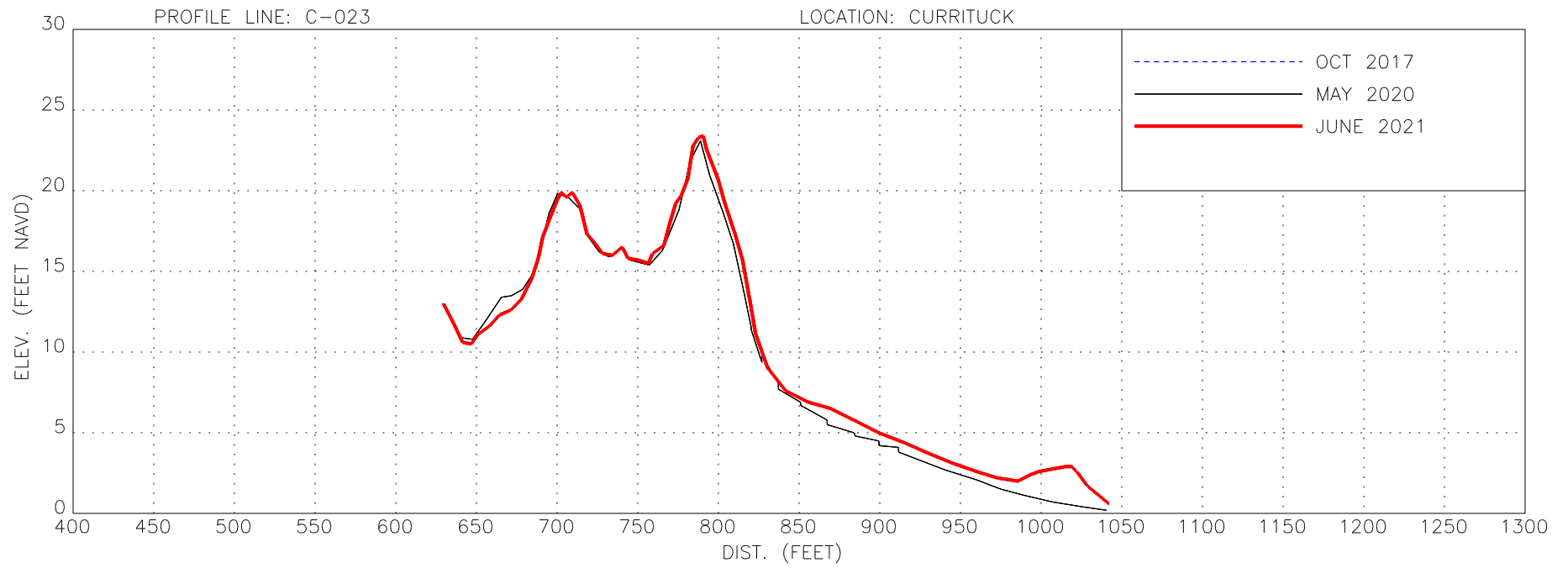


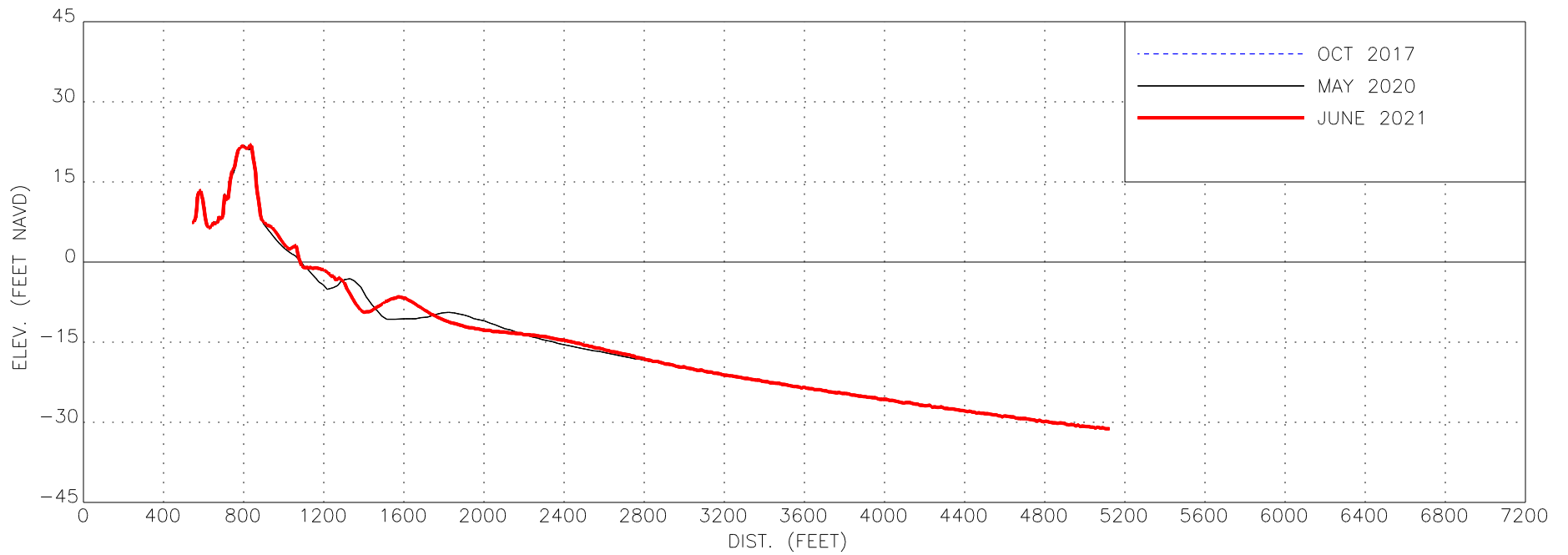
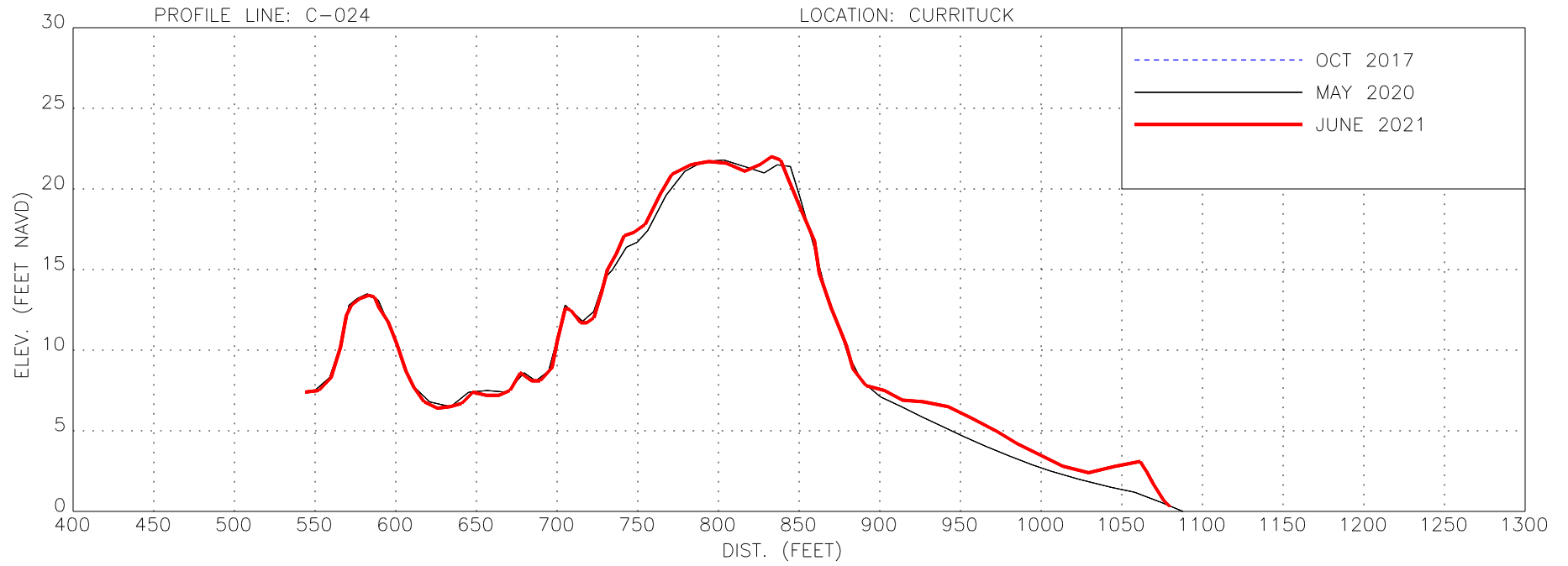


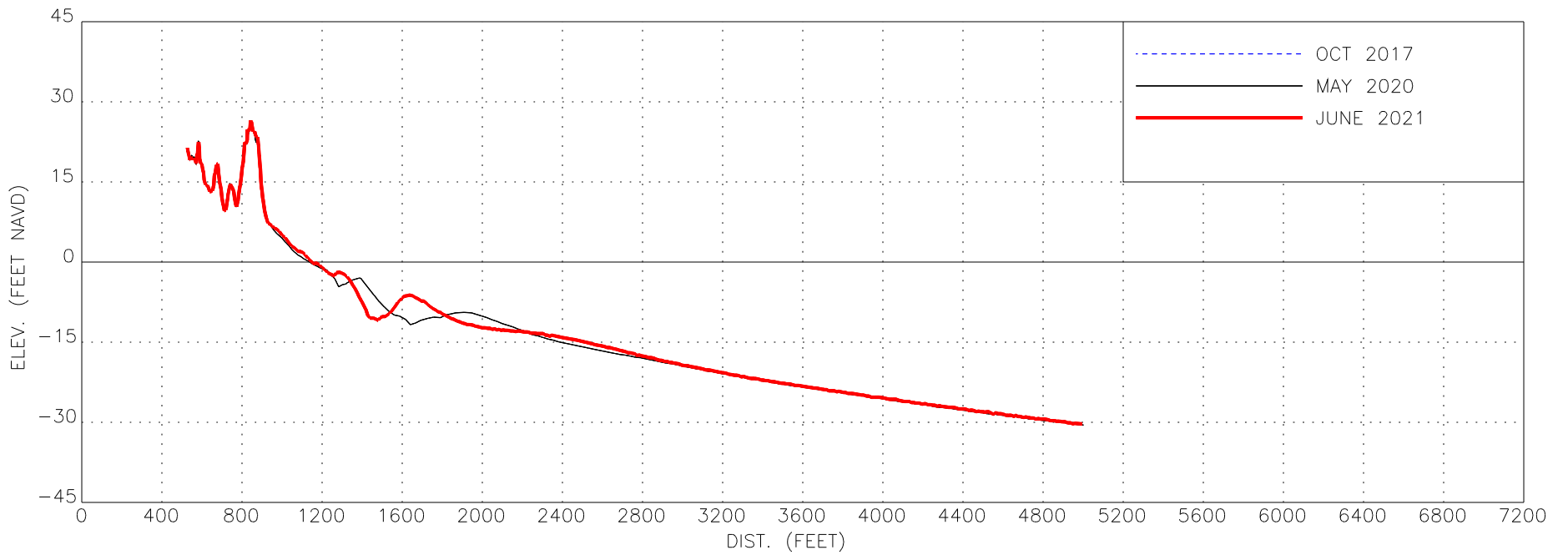
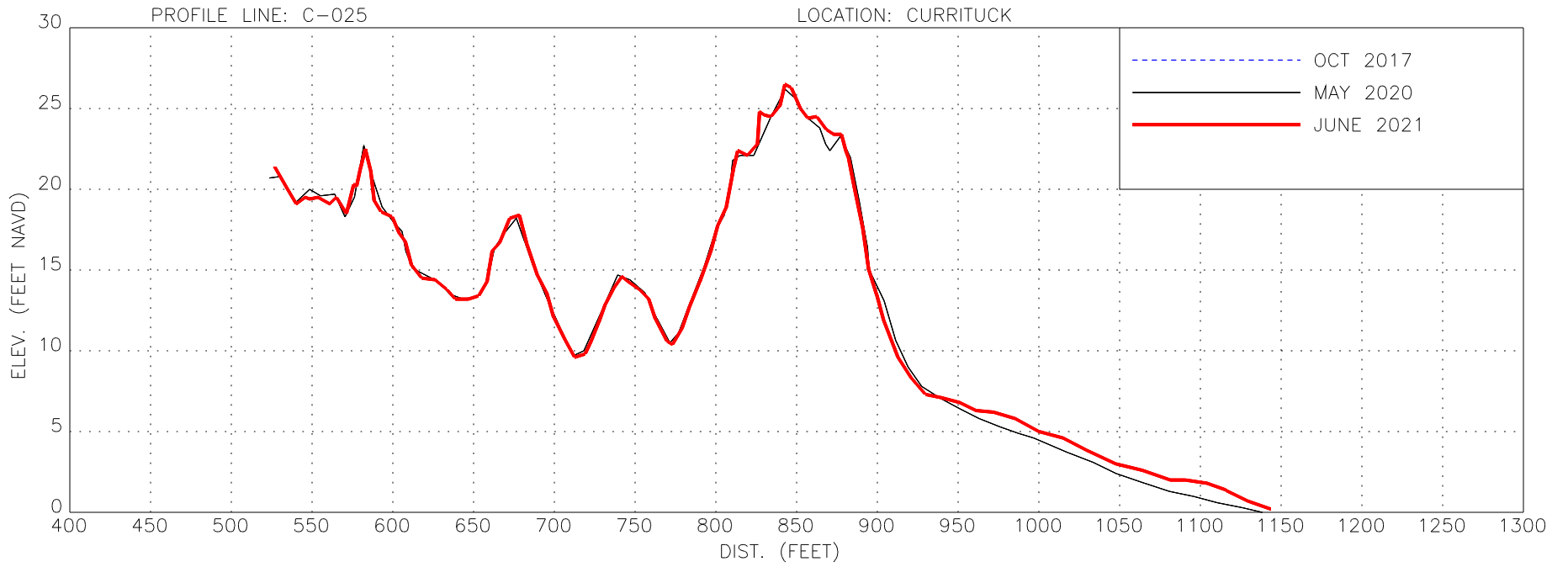


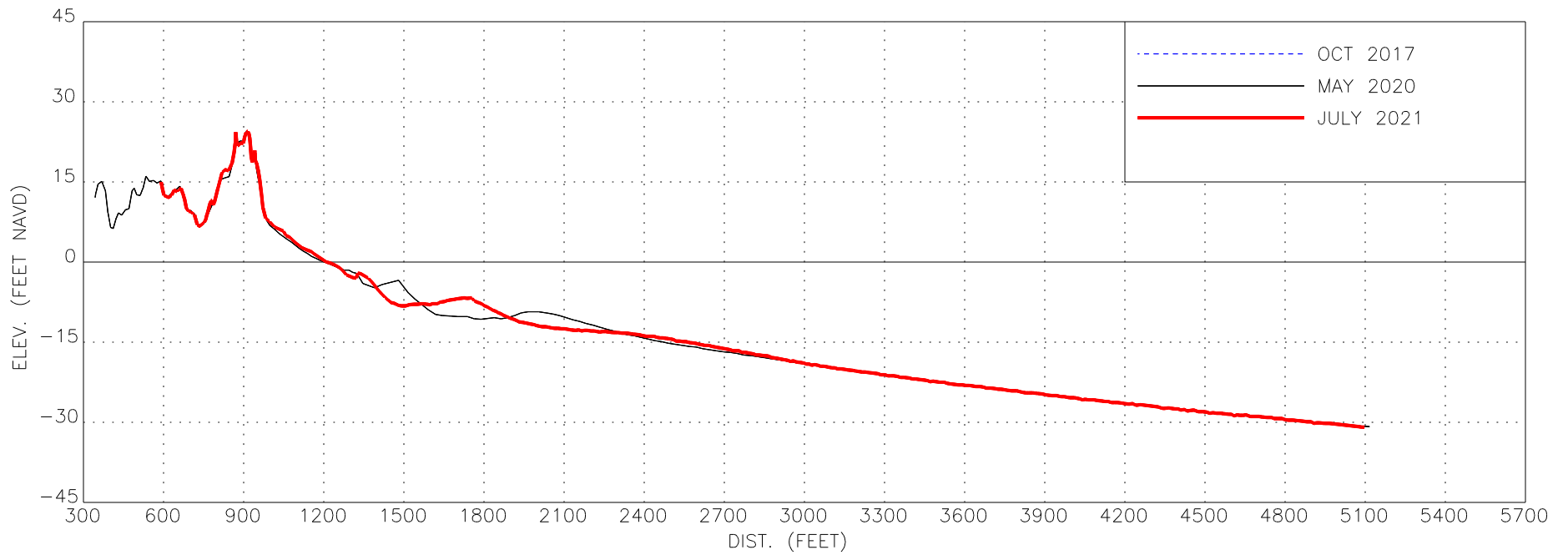
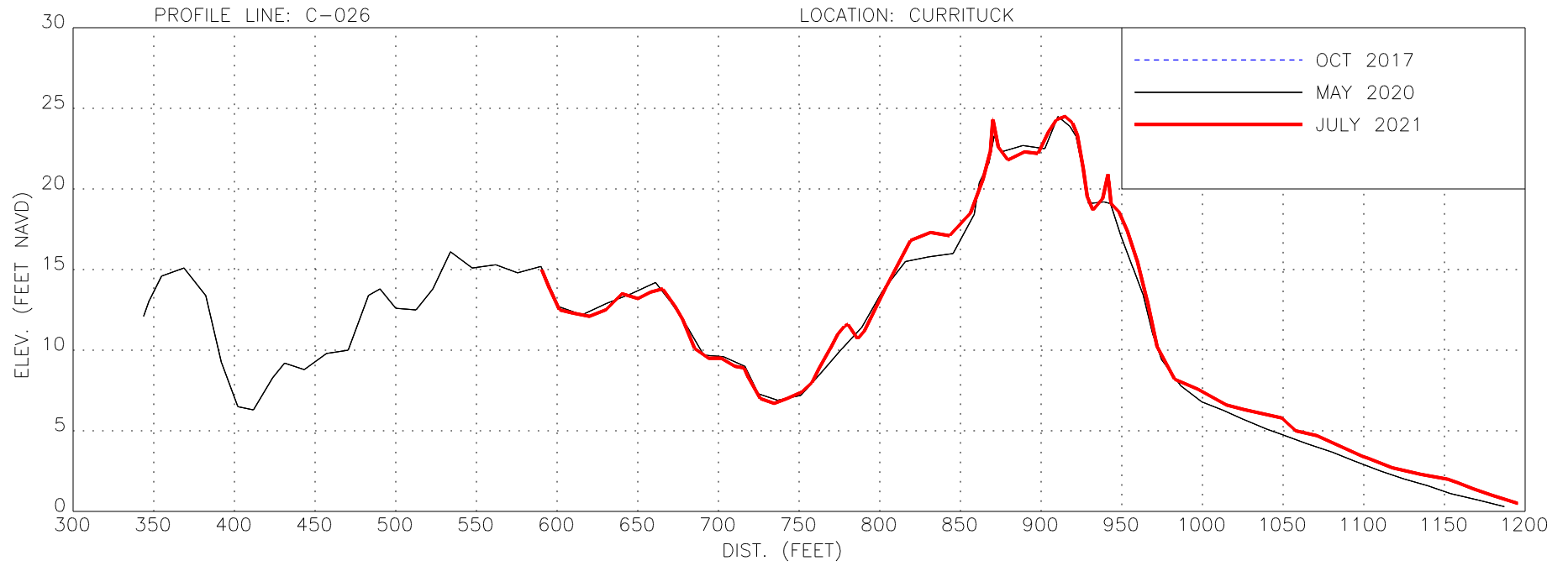


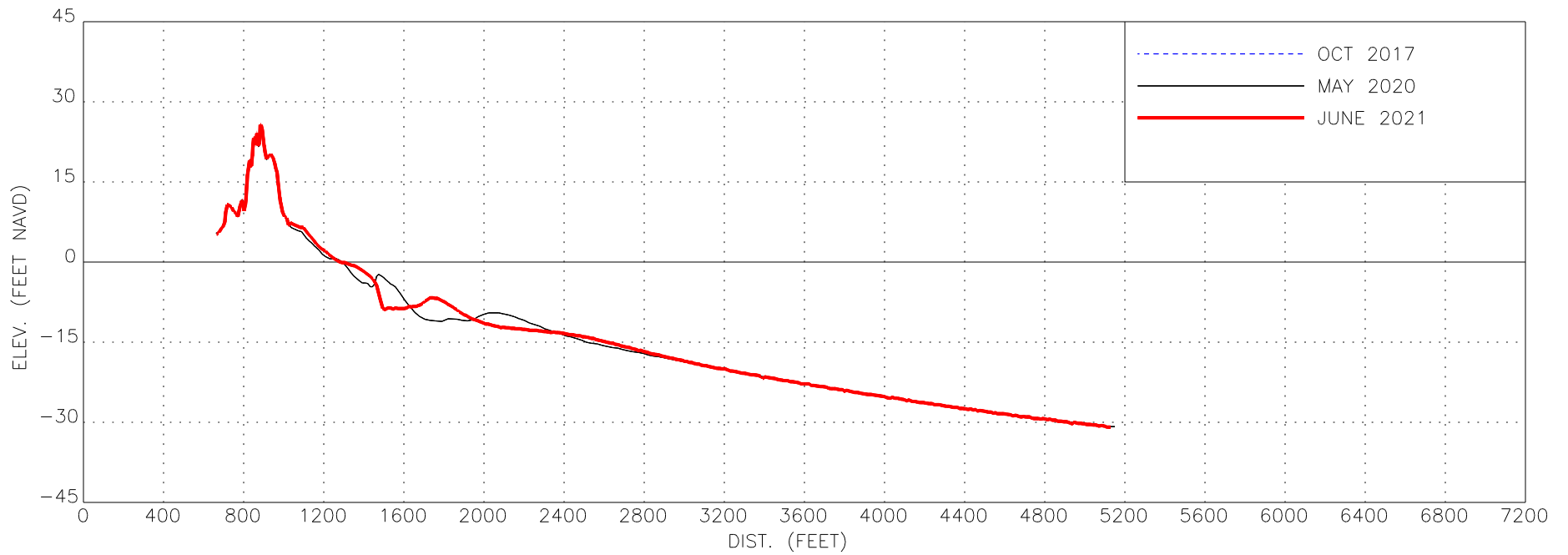
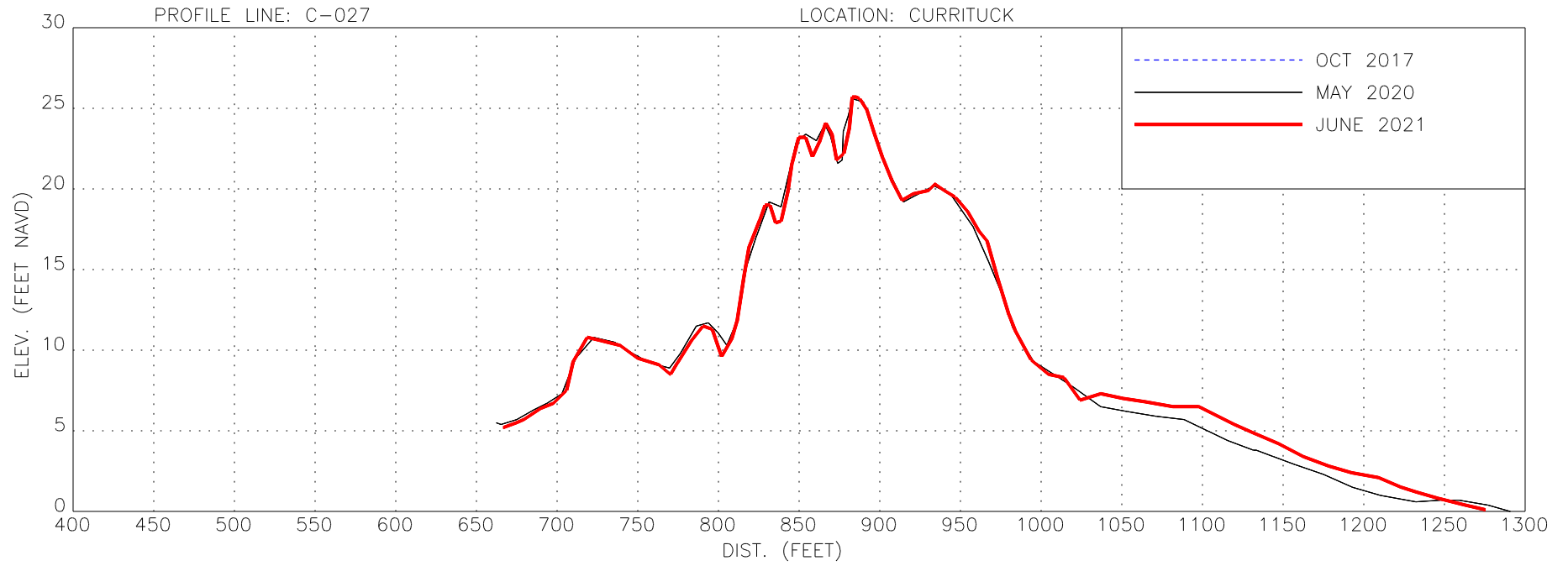


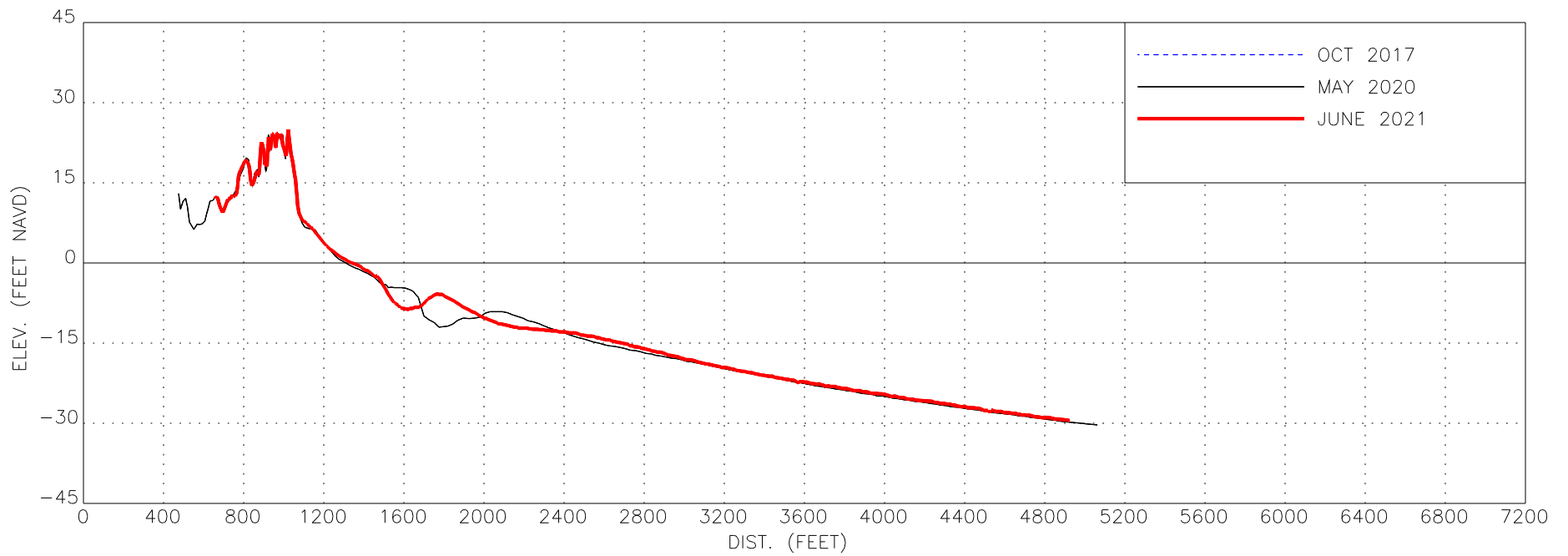
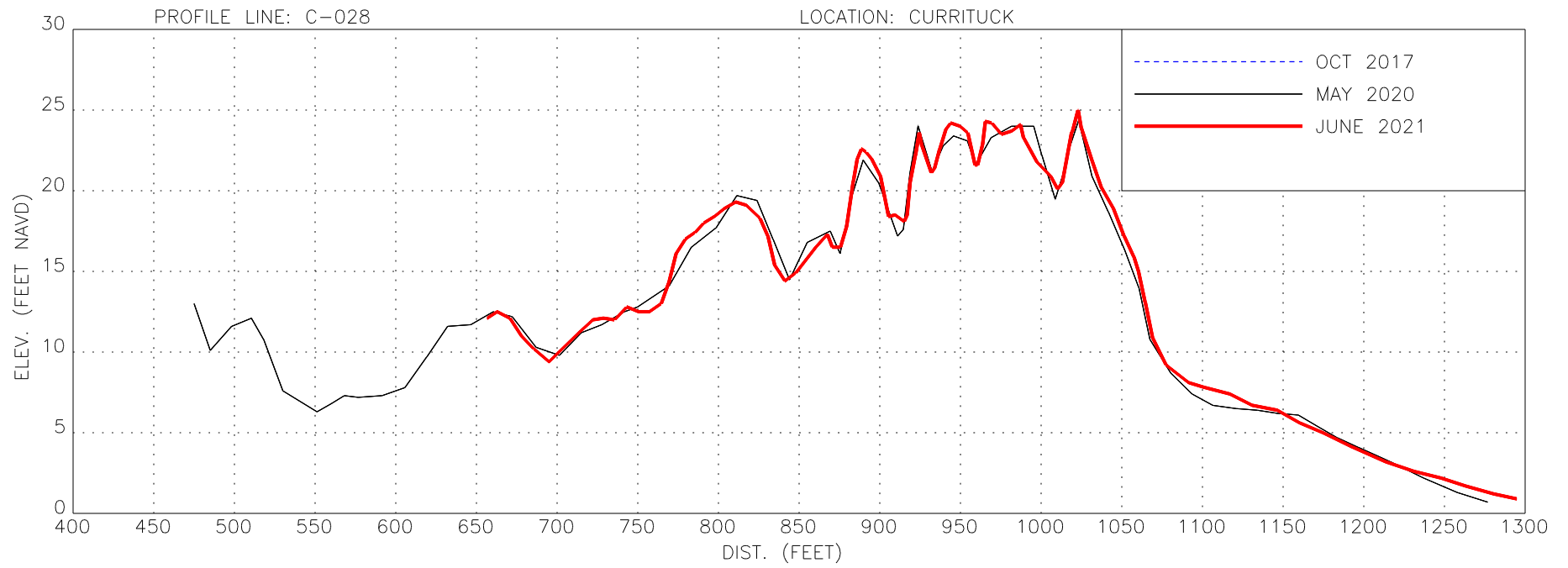


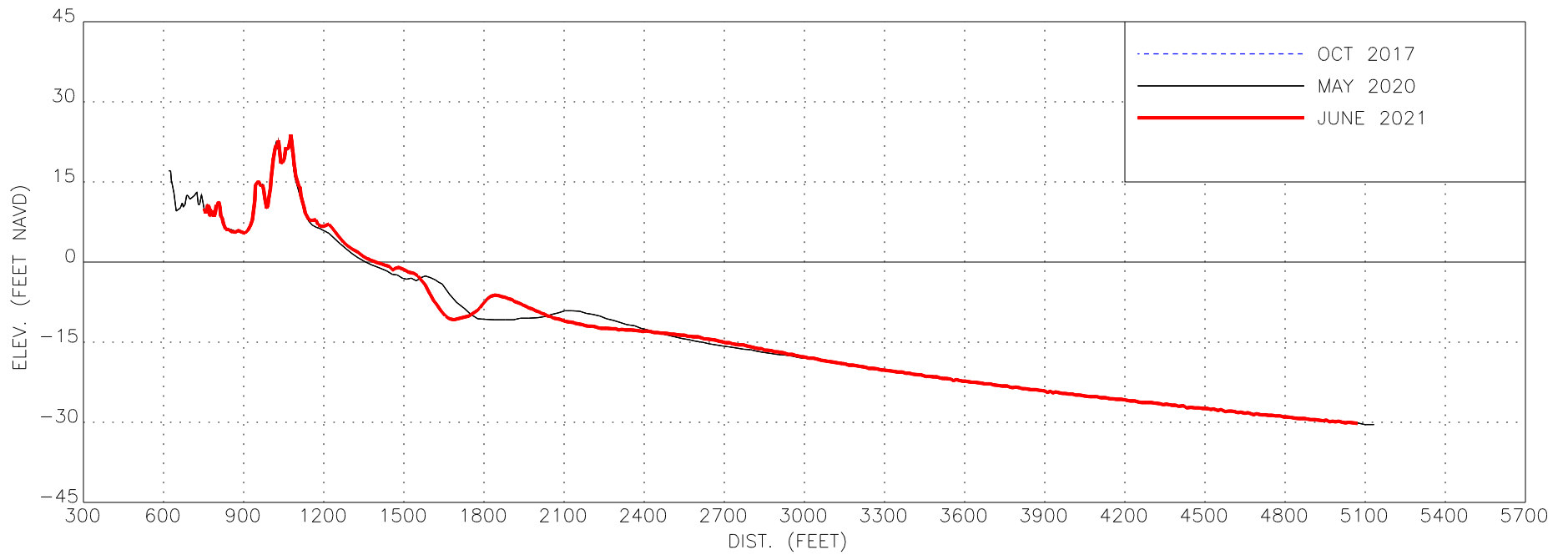
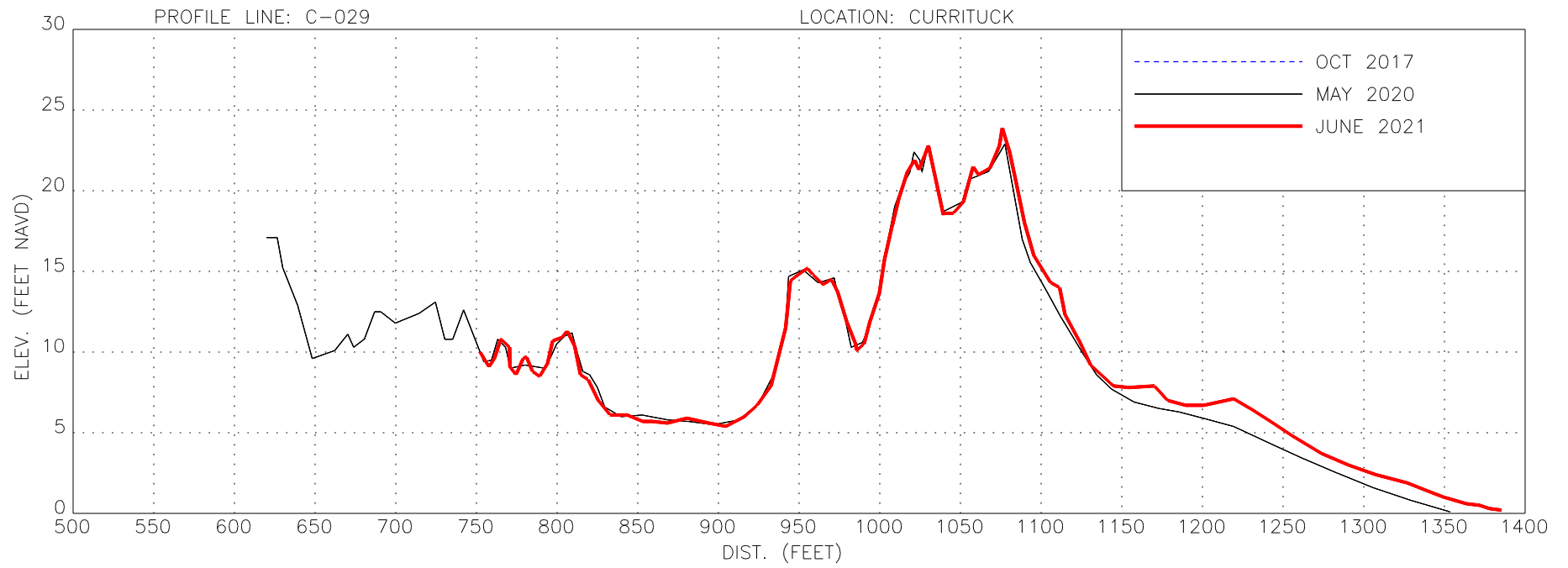


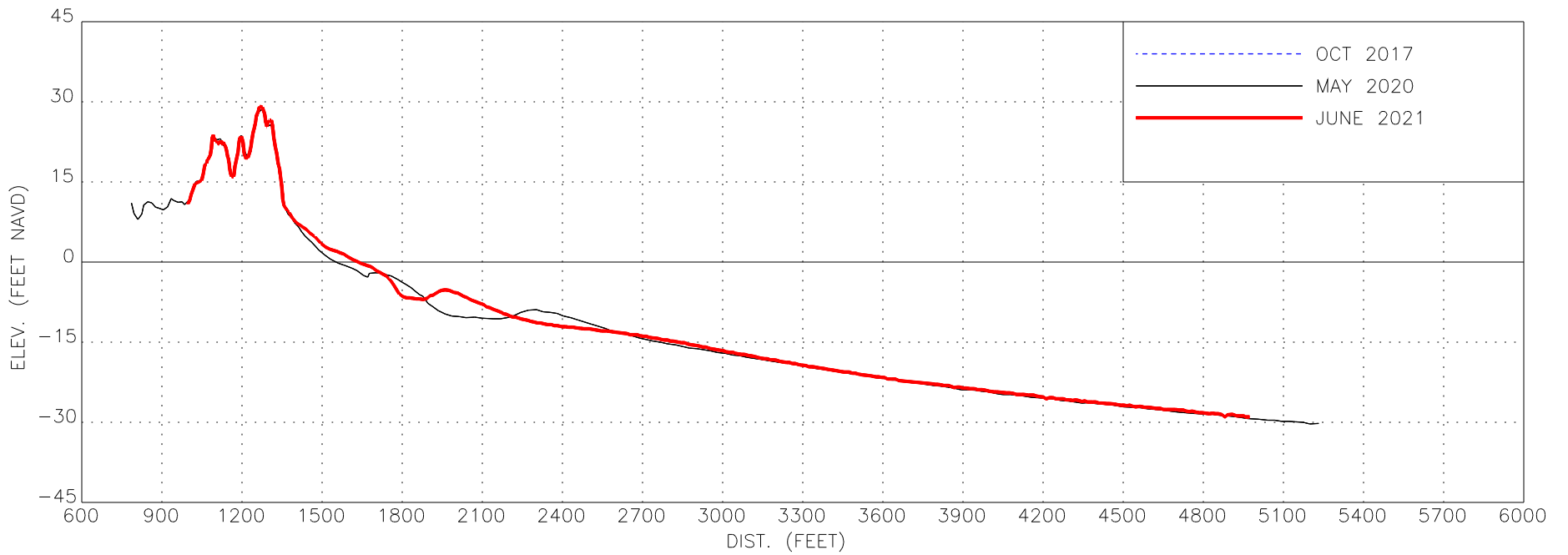
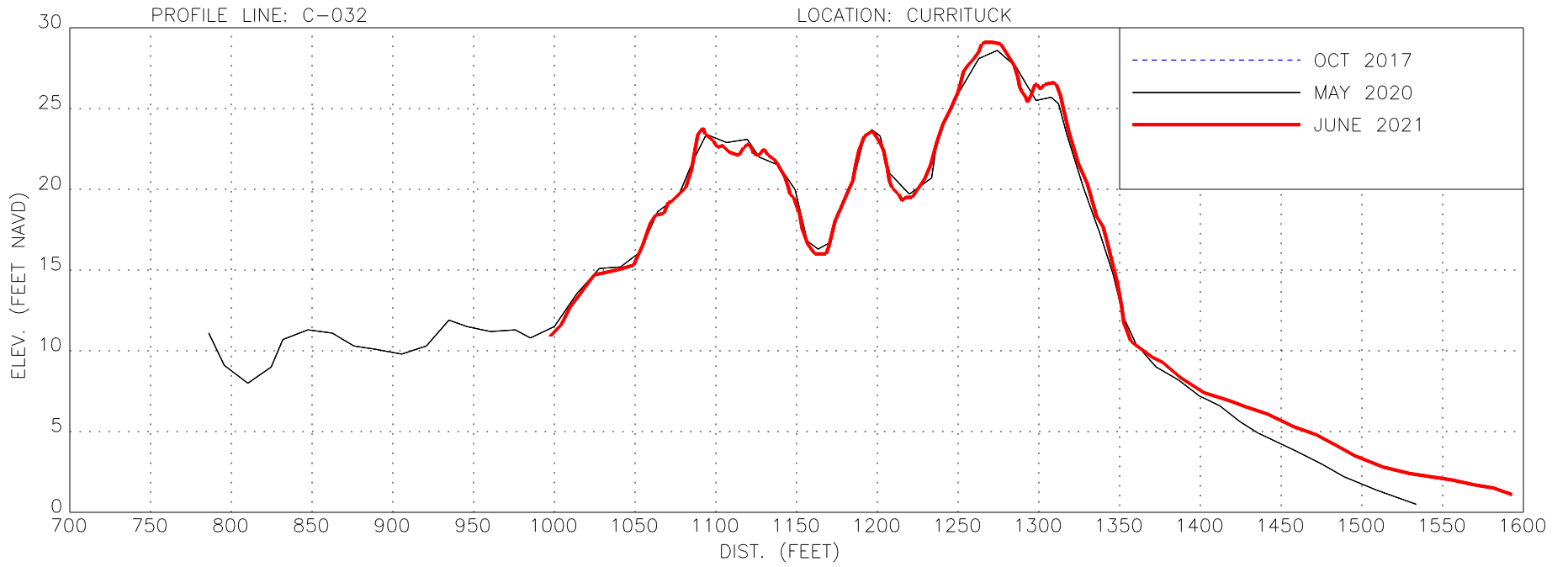


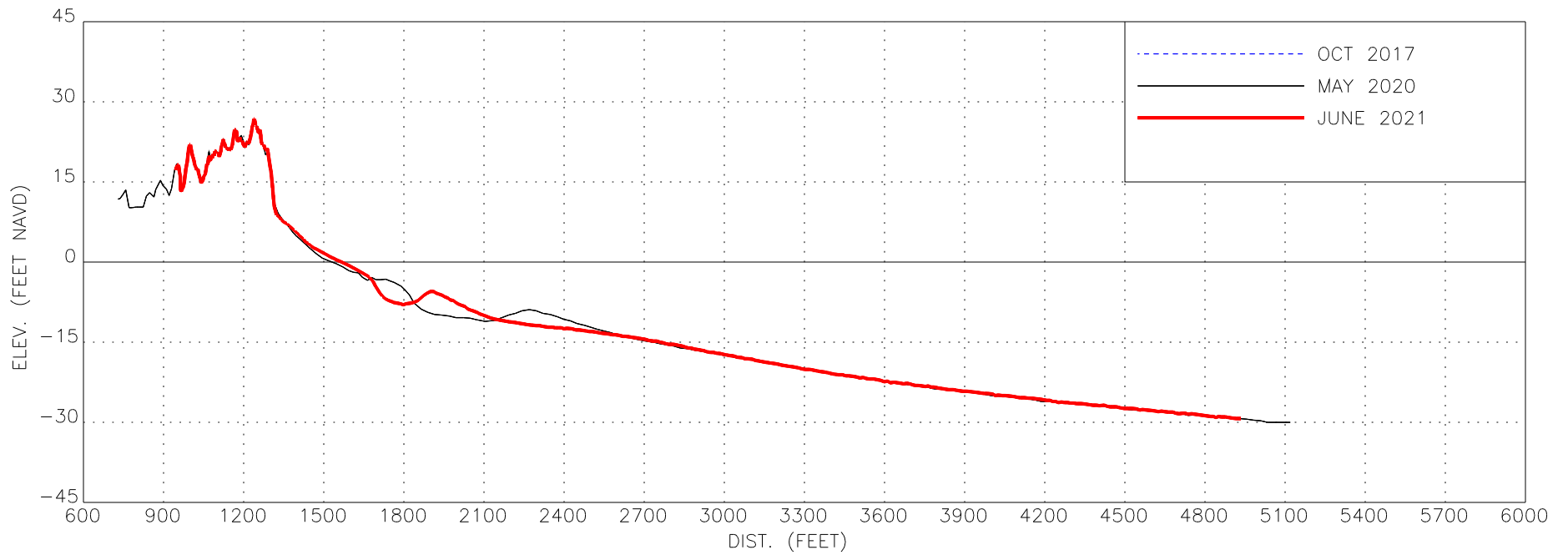
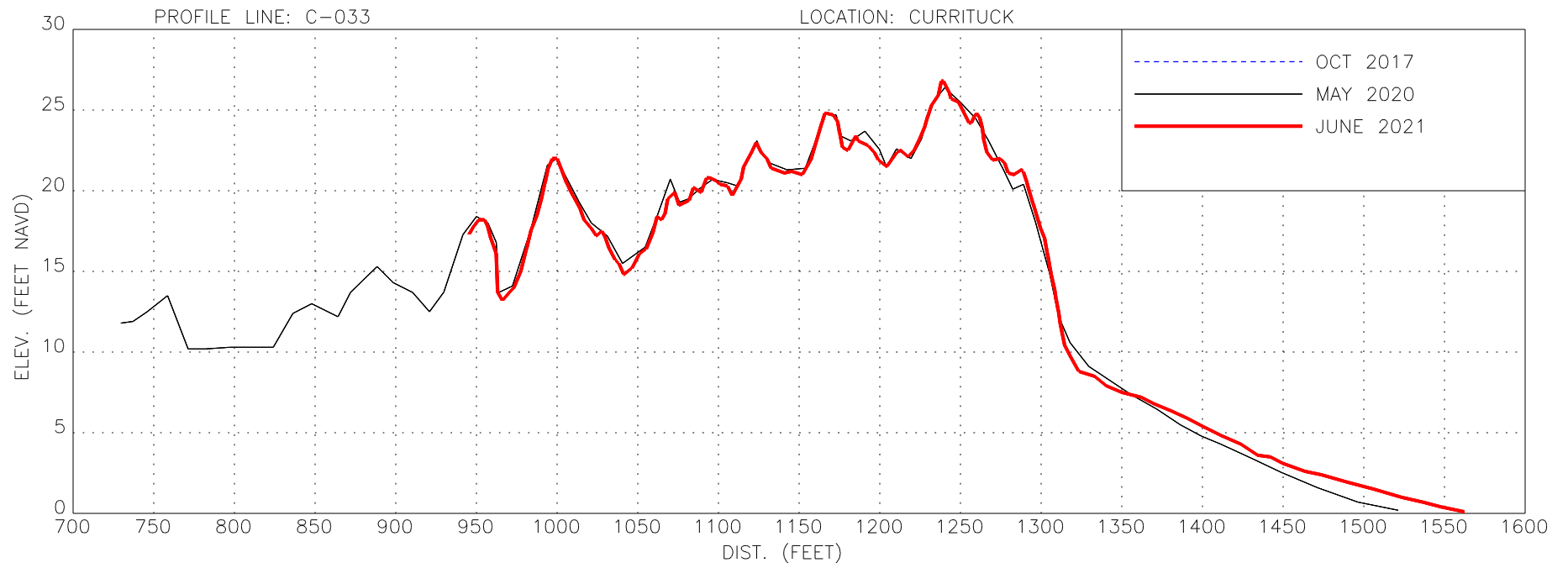


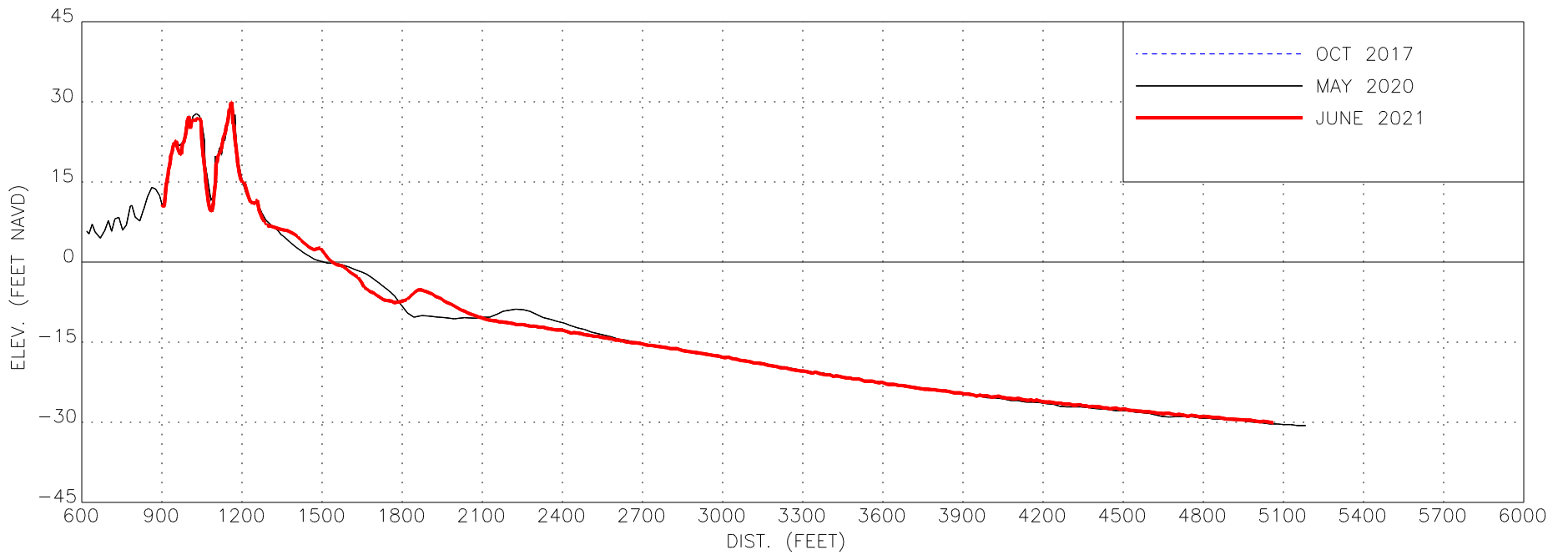
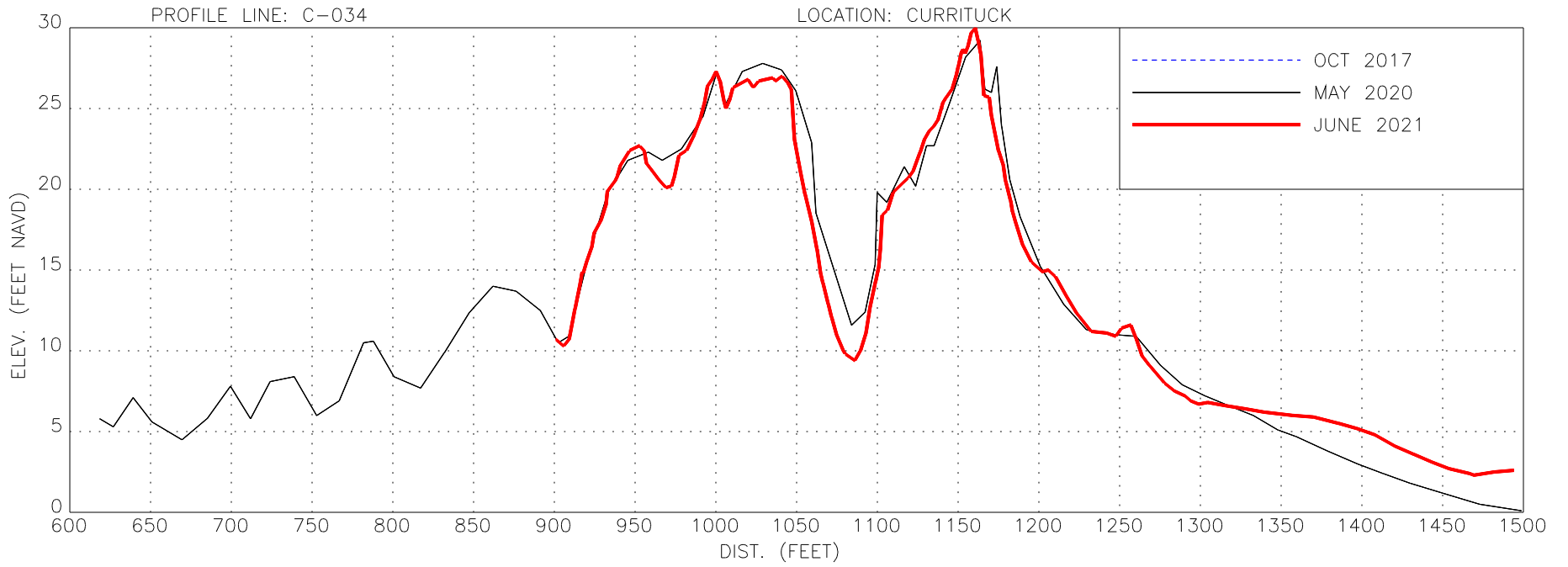


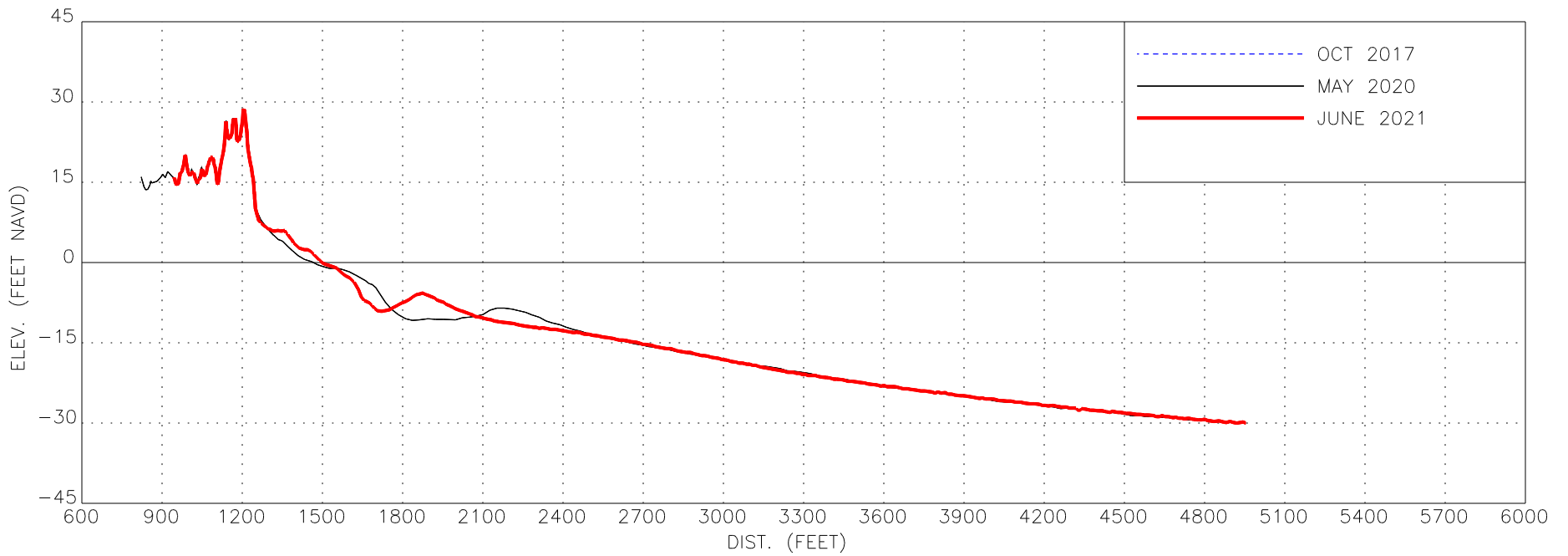
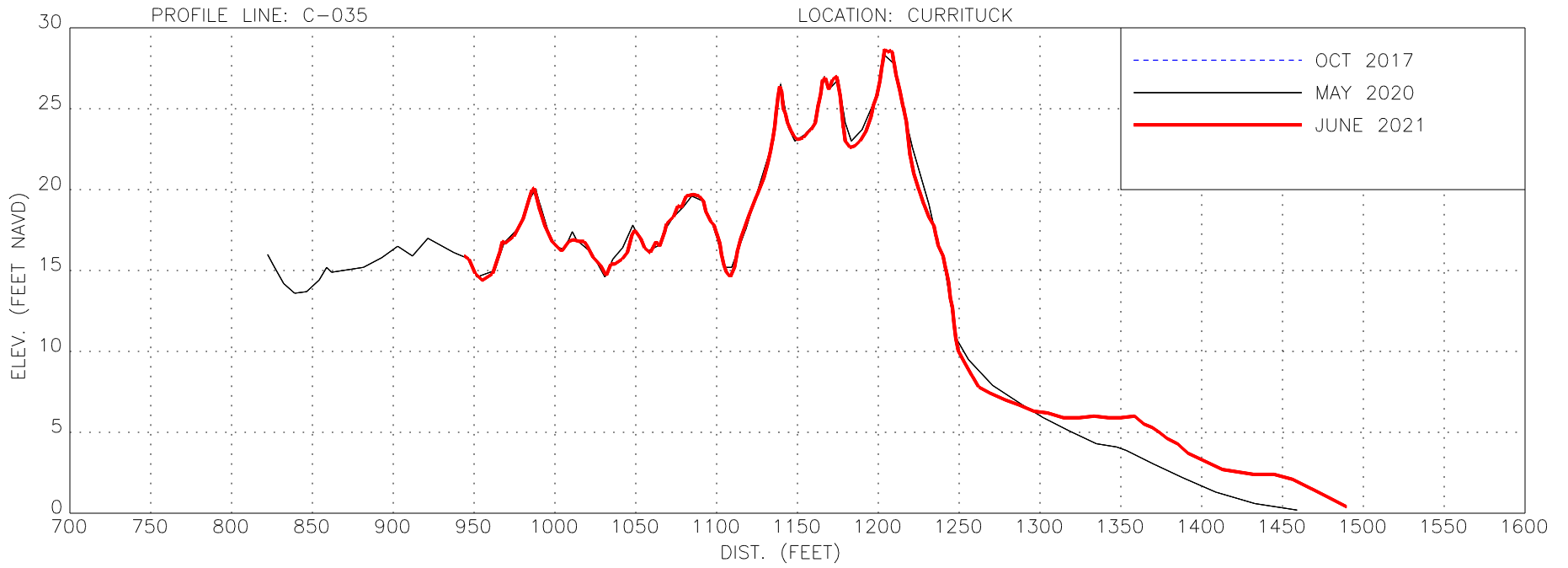


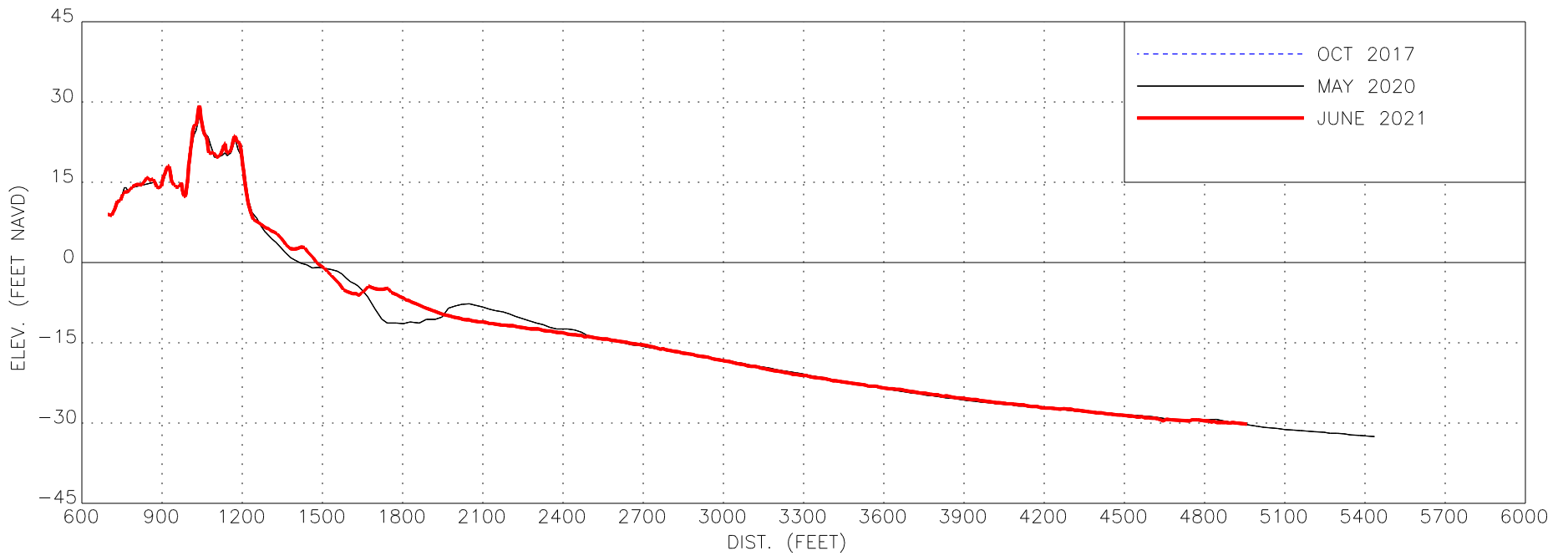
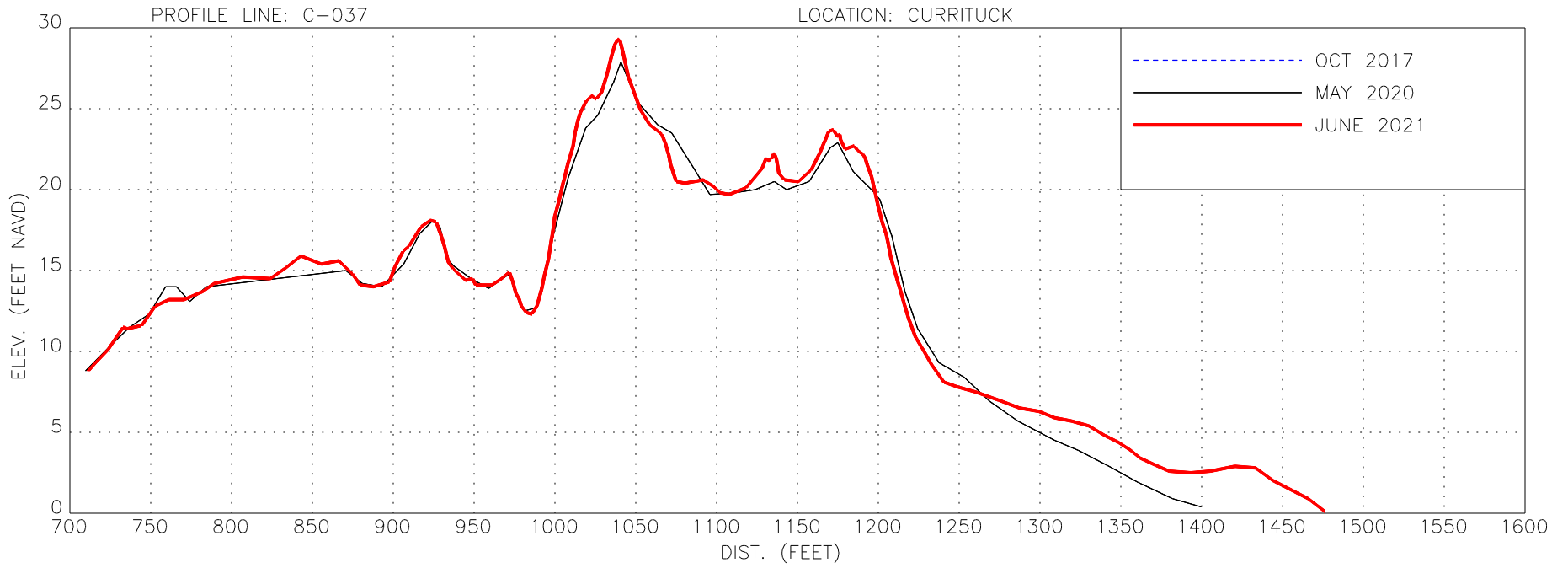


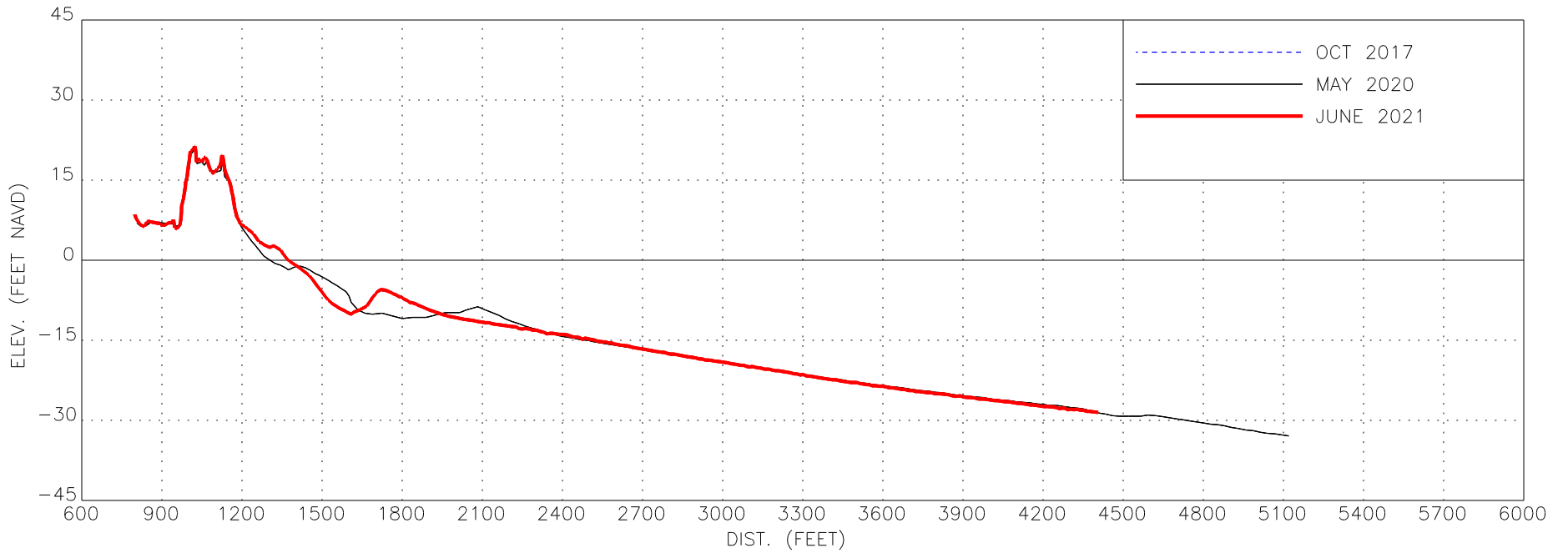
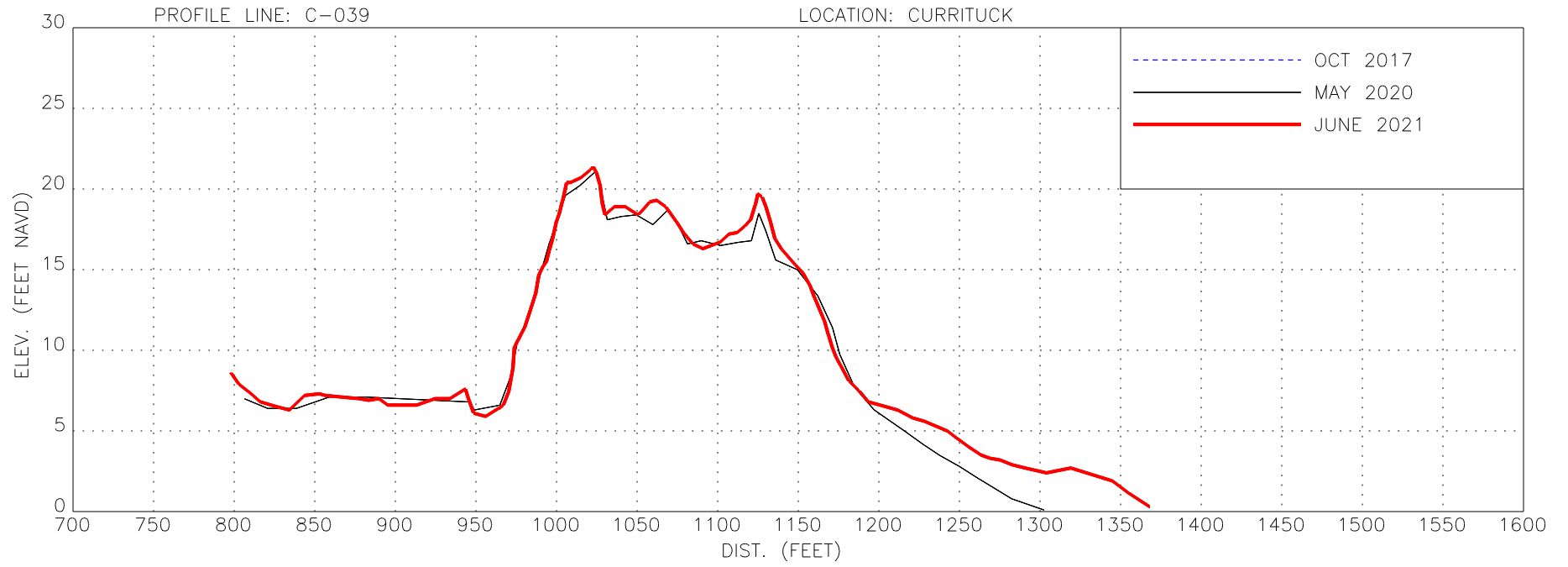


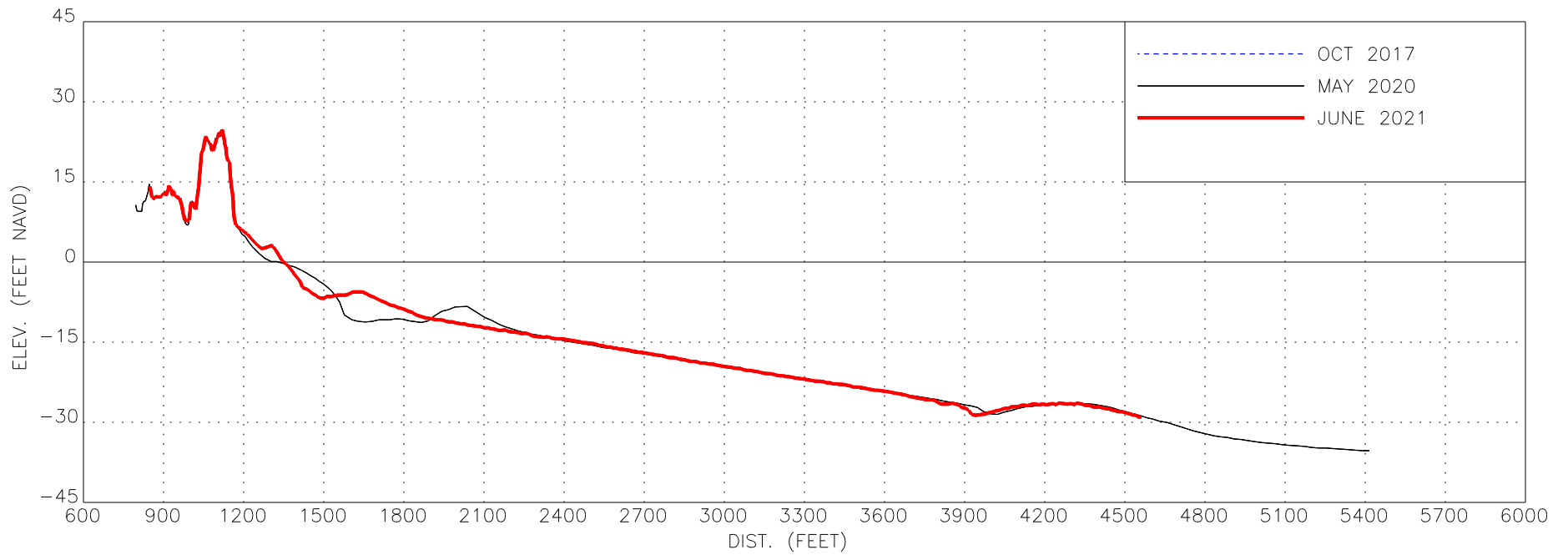
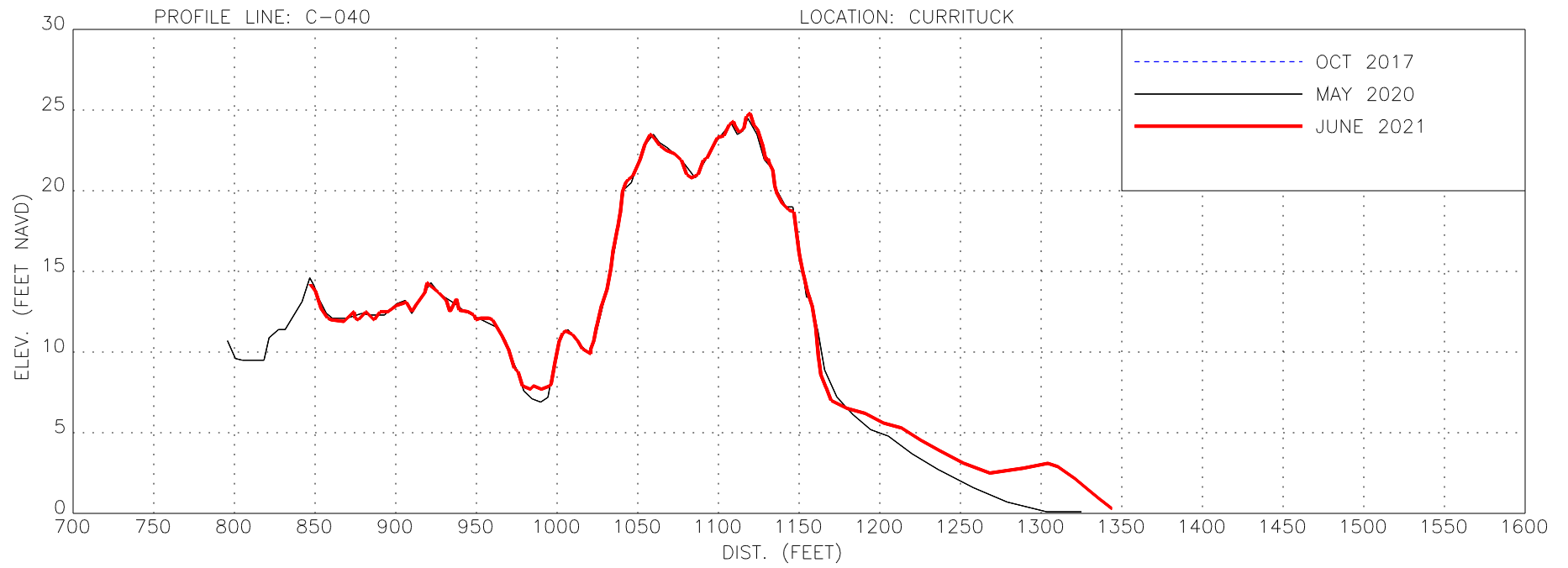






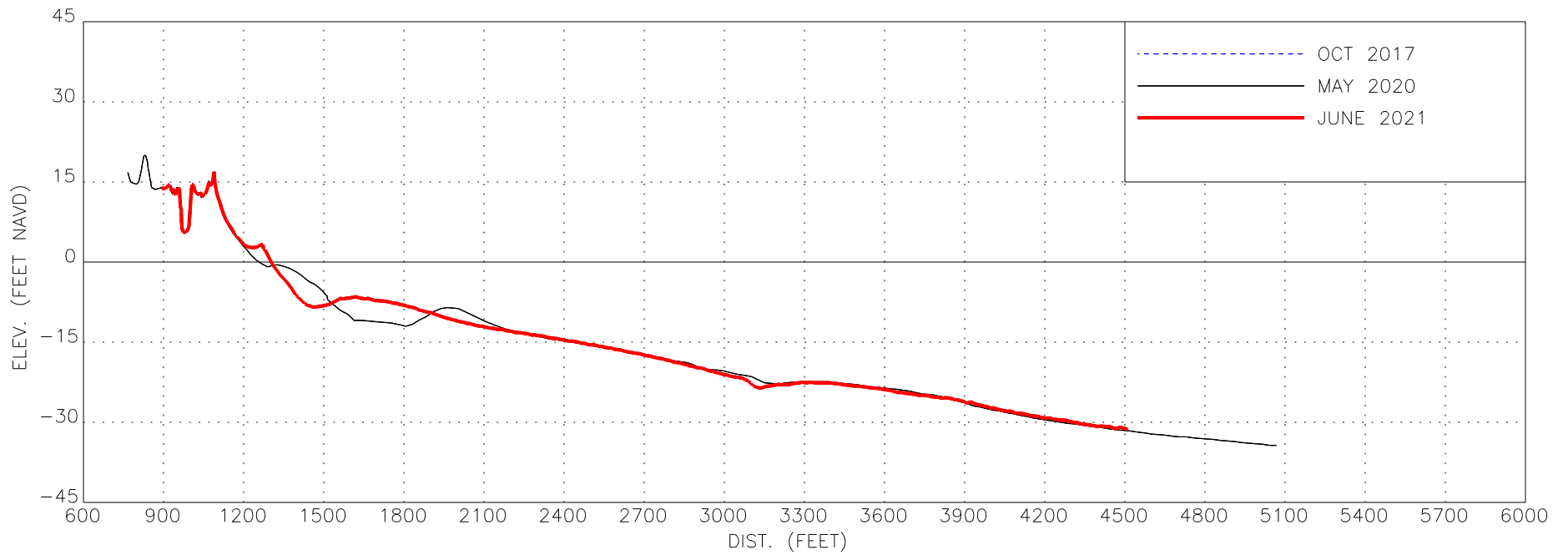
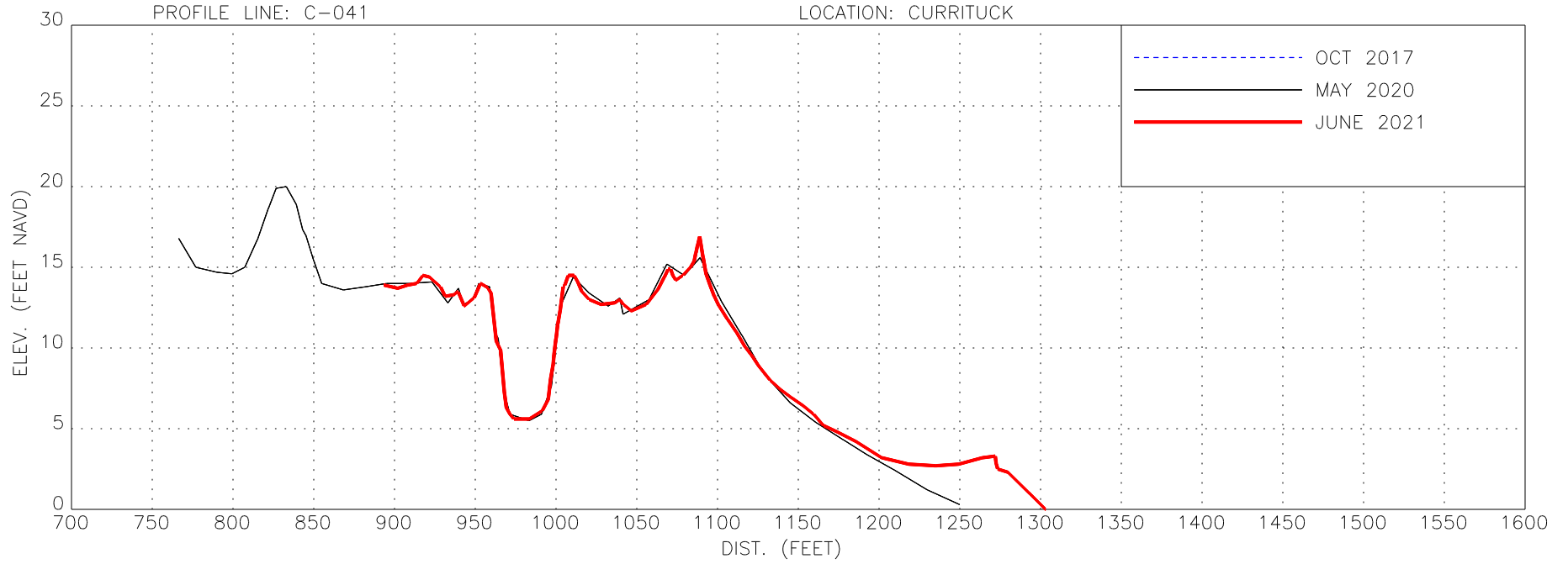


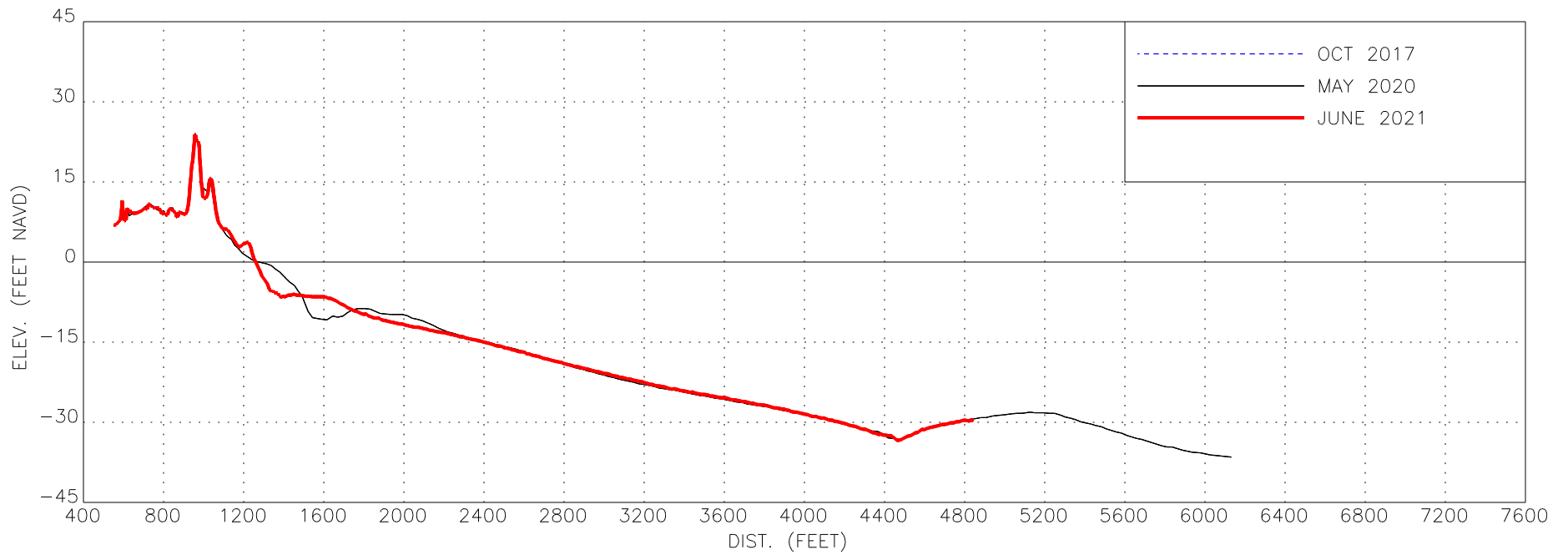
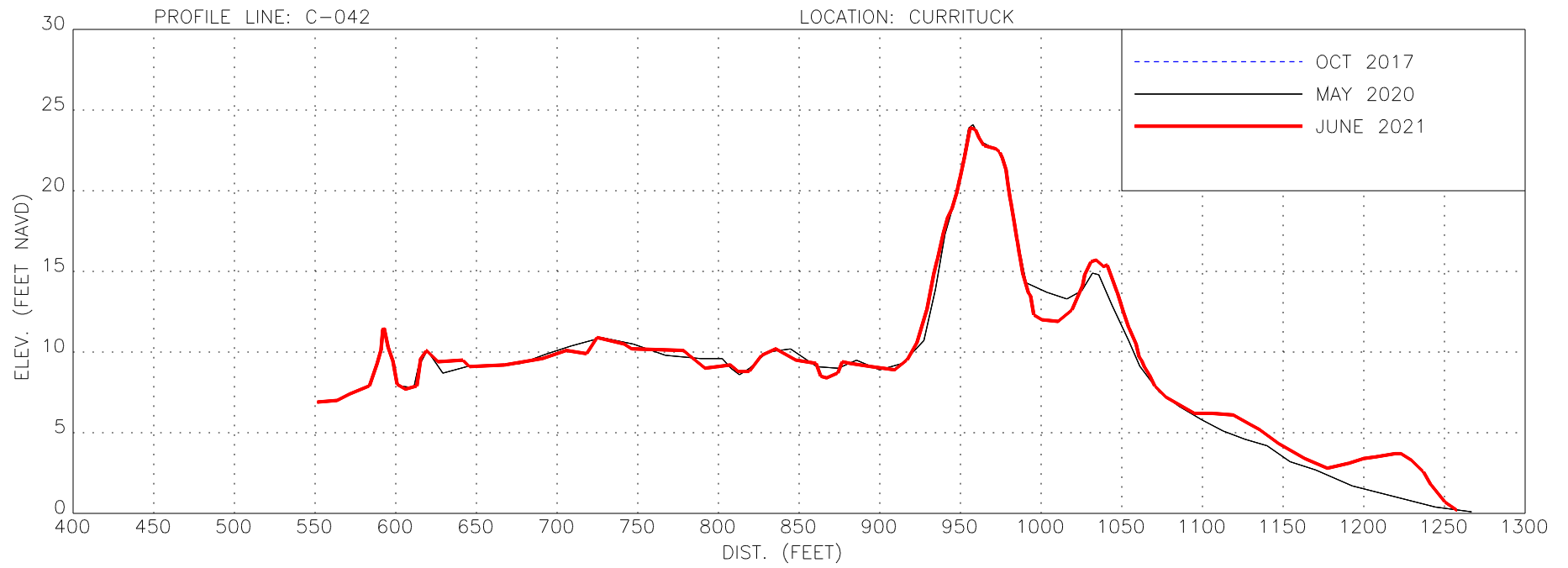


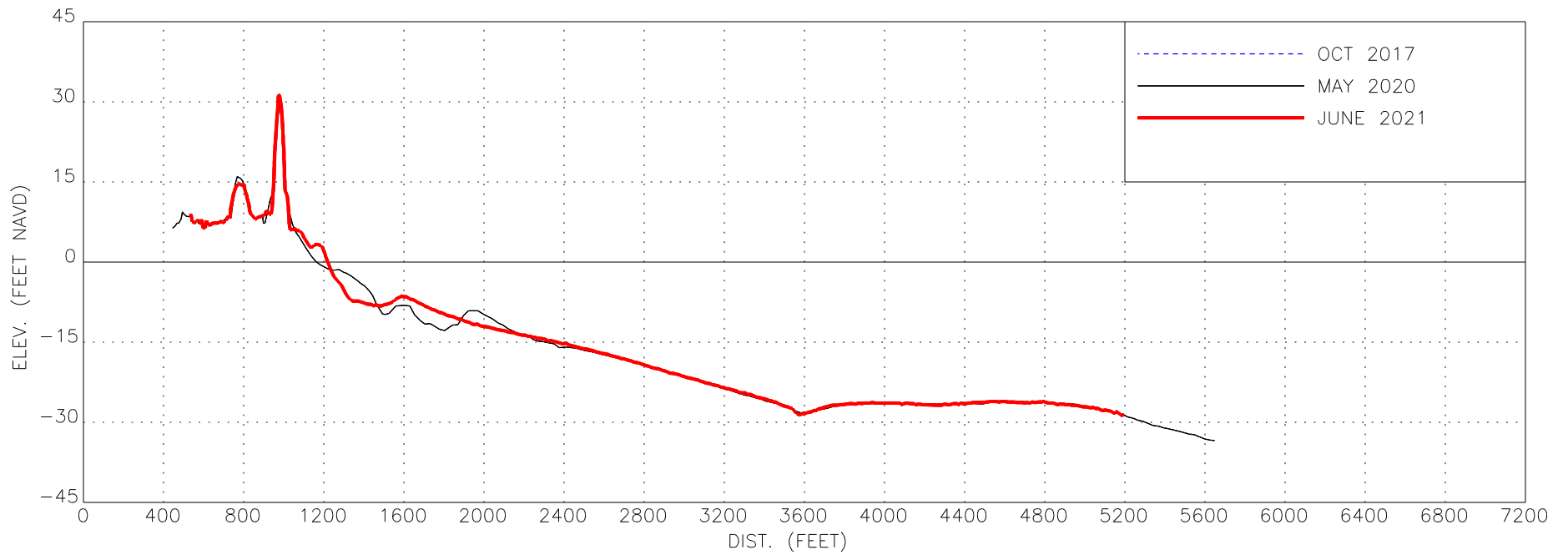
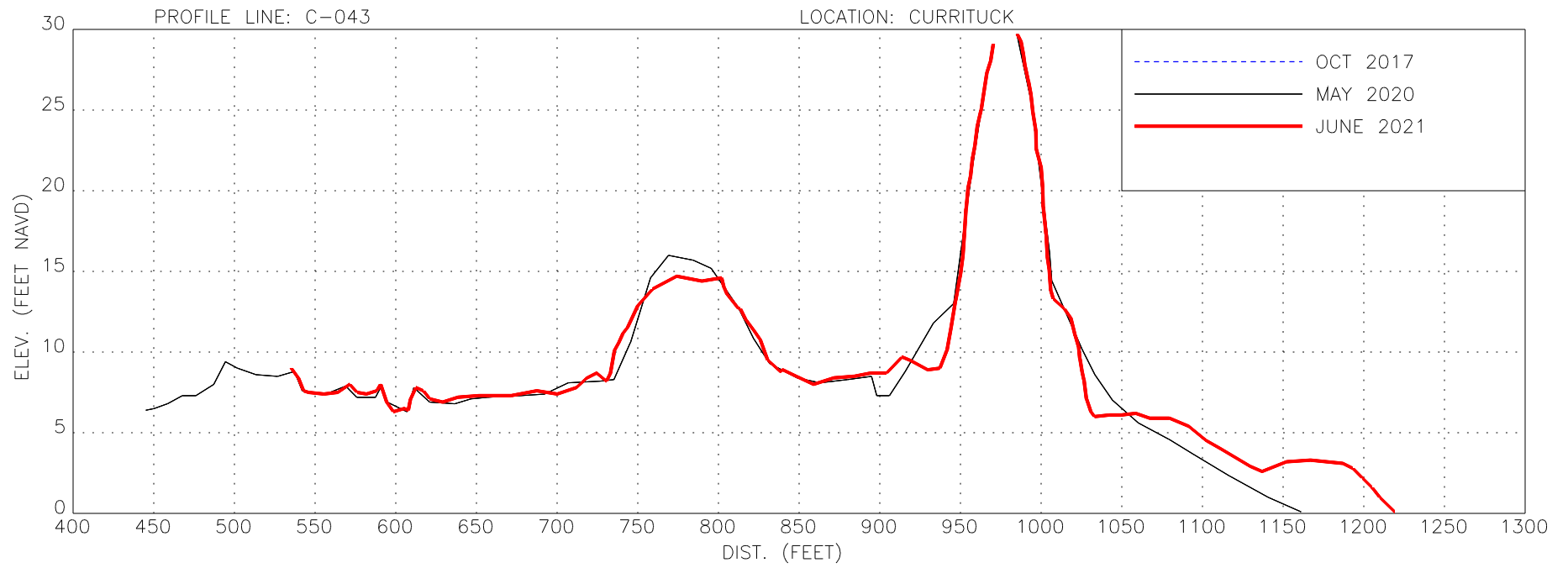


PROFILE LINE: C-041

LOCATION: CURRITUCK

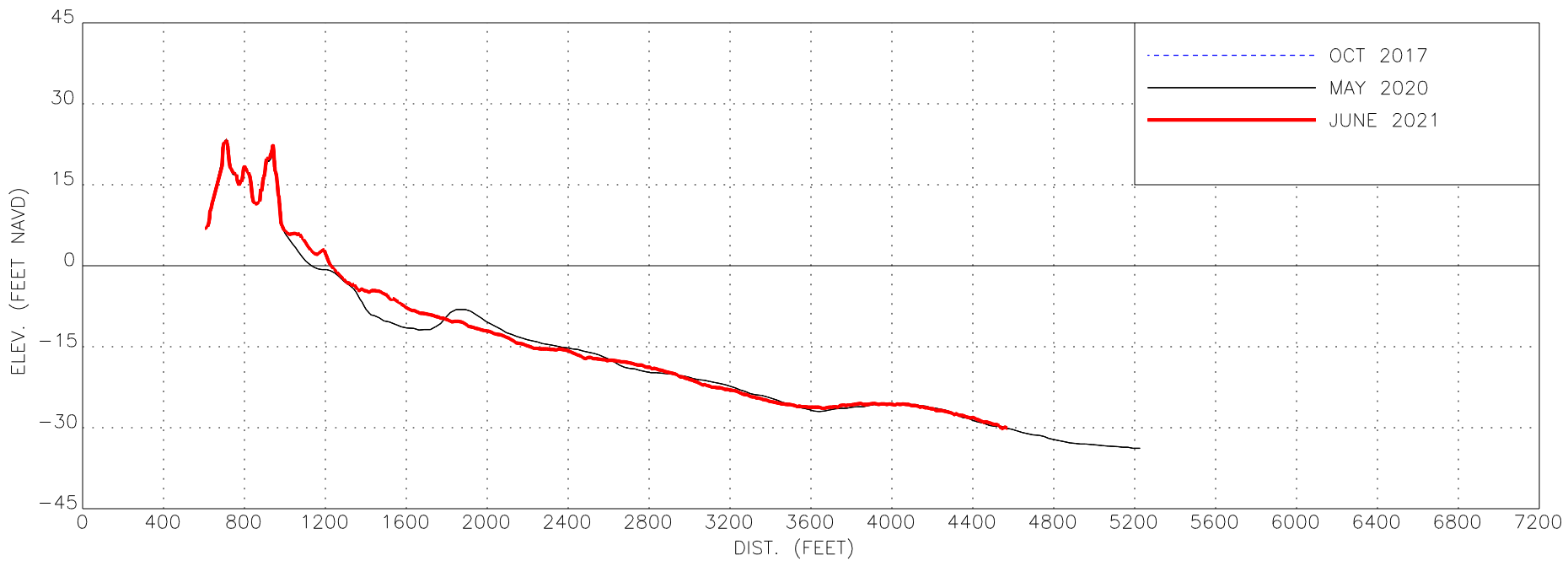
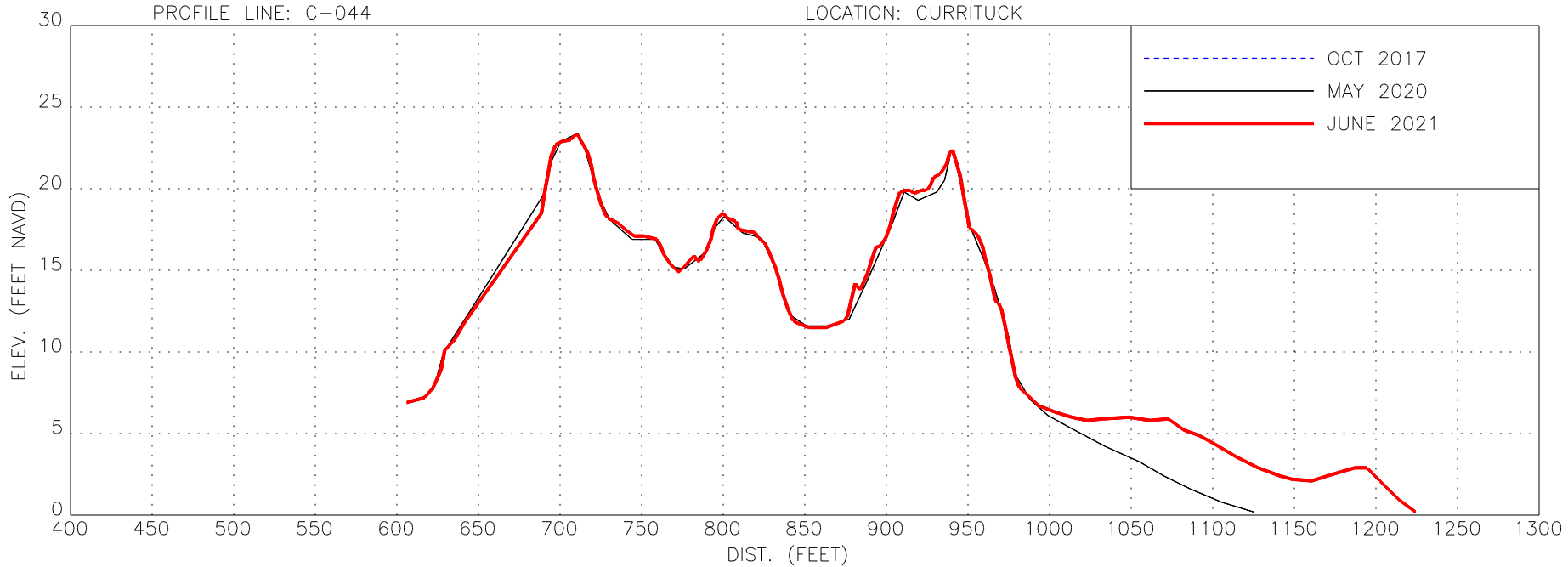






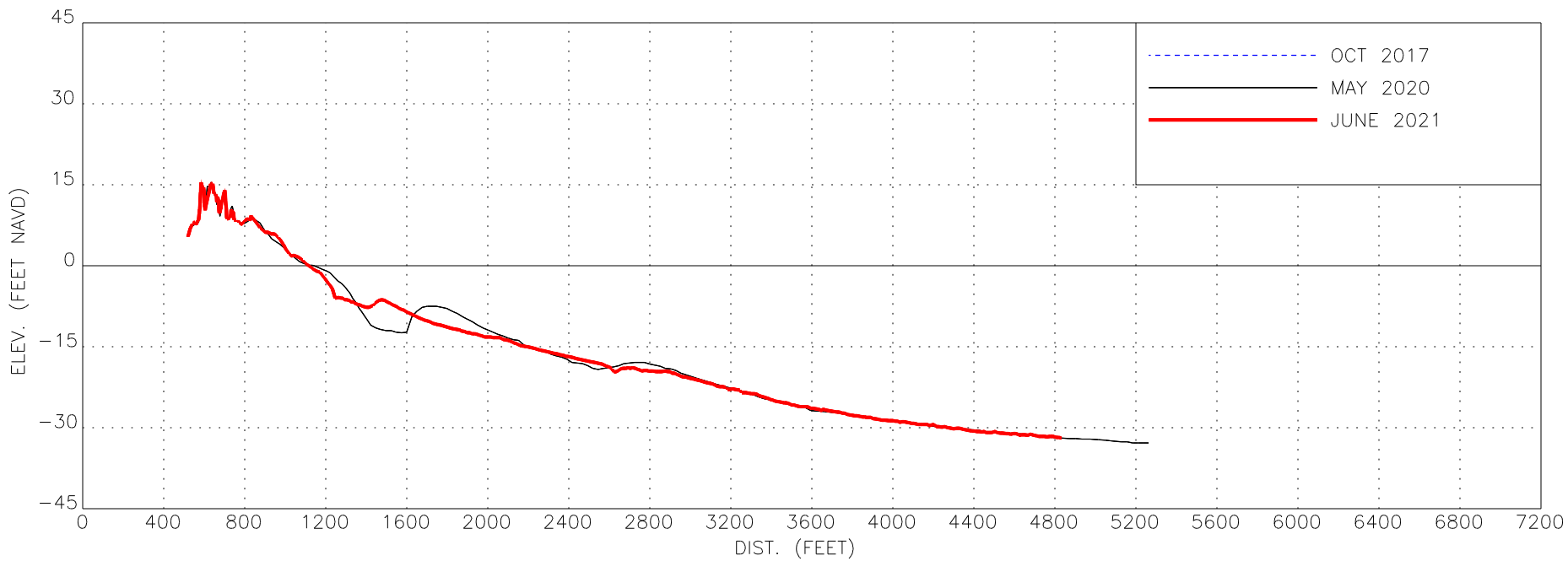
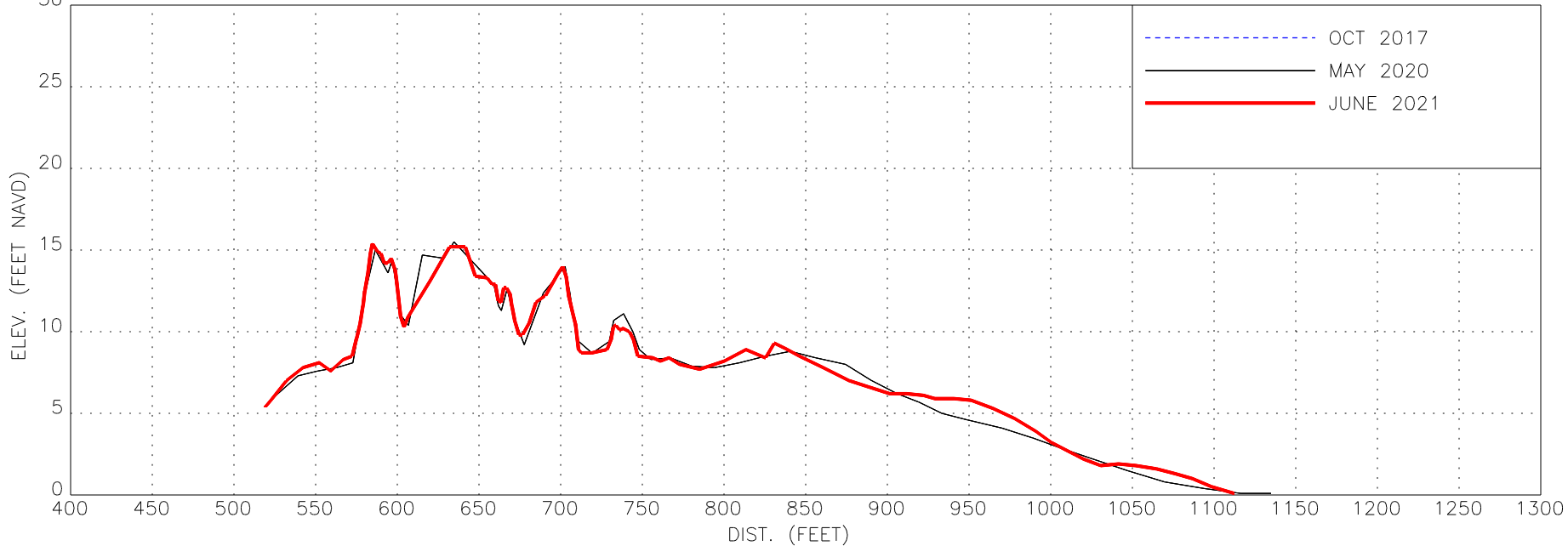
PROFILE LINE: C-044

LOCATION: CURRITUCK



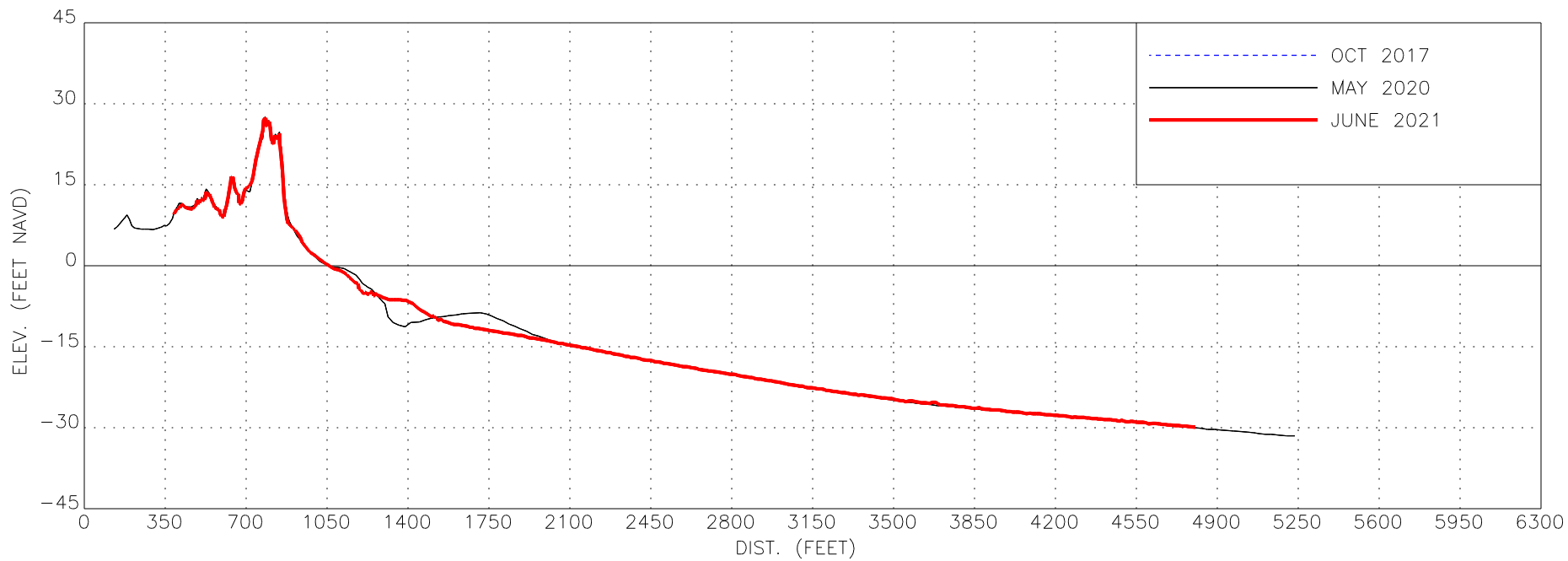
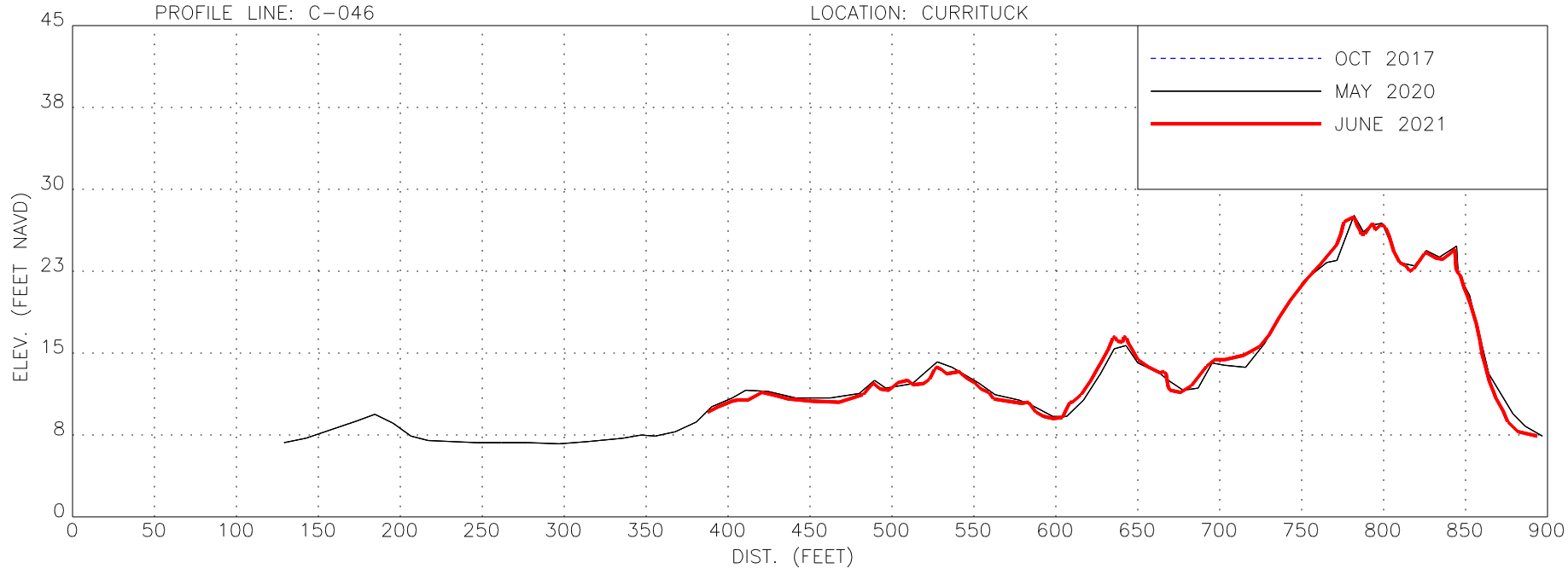
PROFILE LINE: C-045

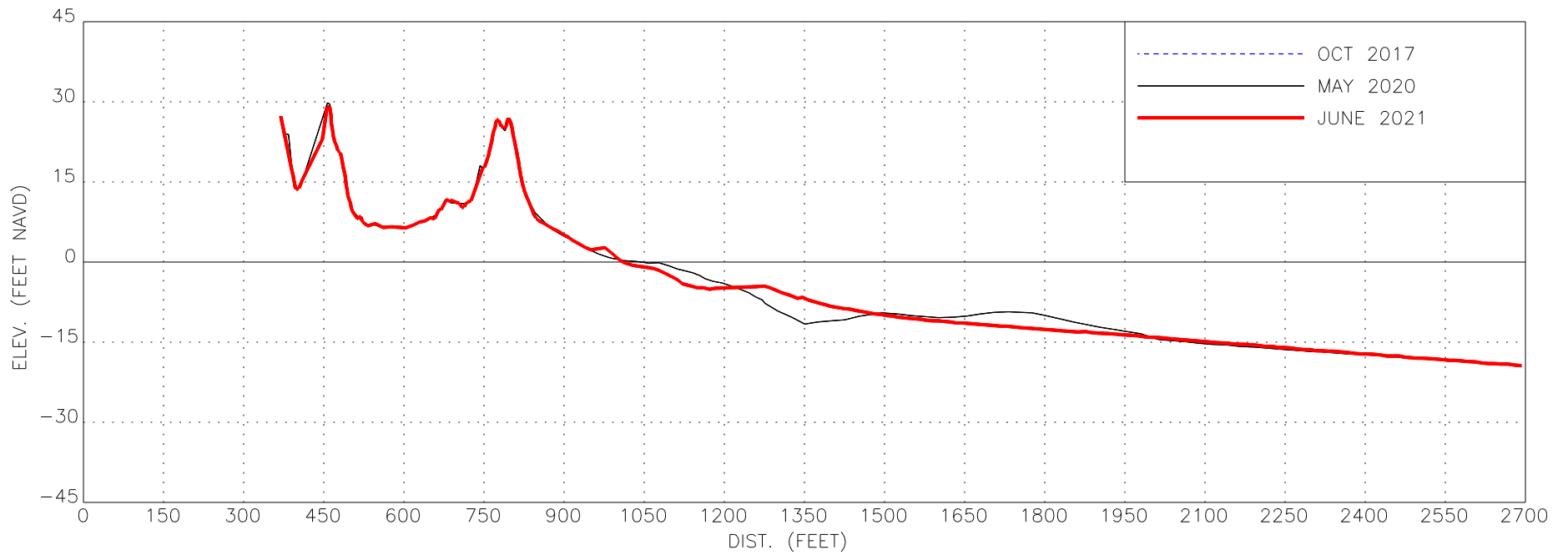
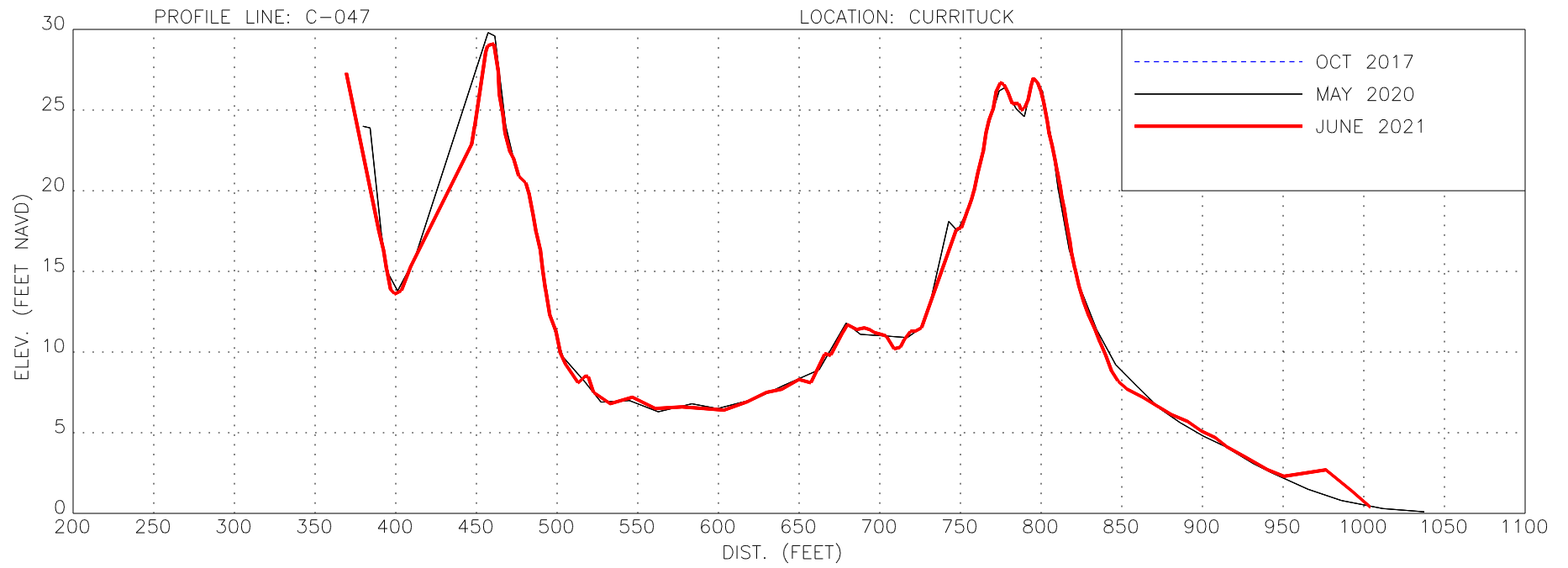
LOCATION: CURRITUCK



PROFILE LINE: C-046

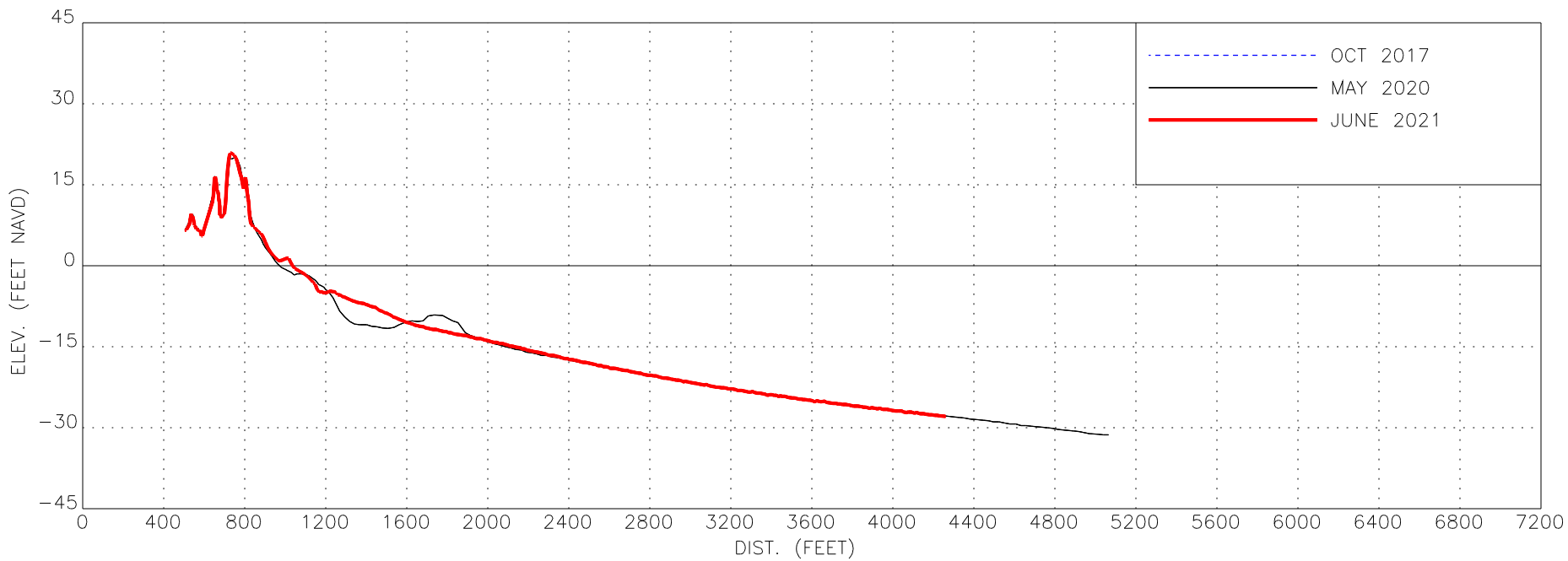
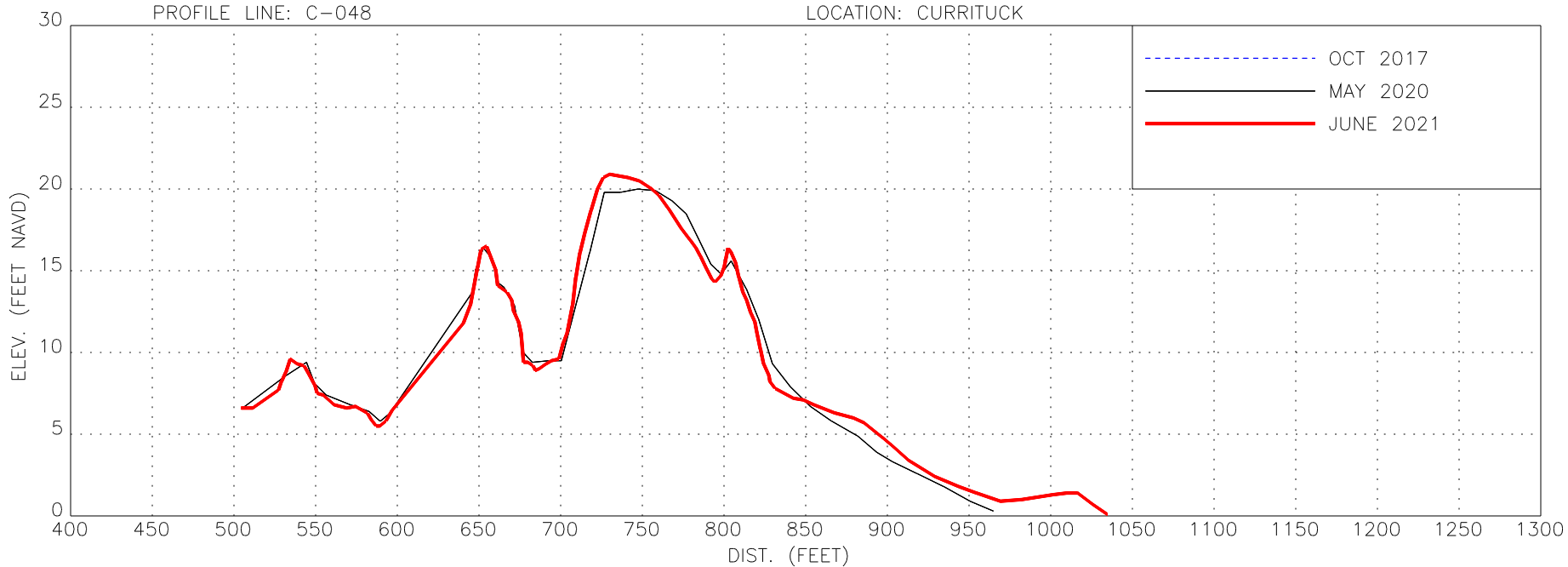
LOCATION: CURRITUCK

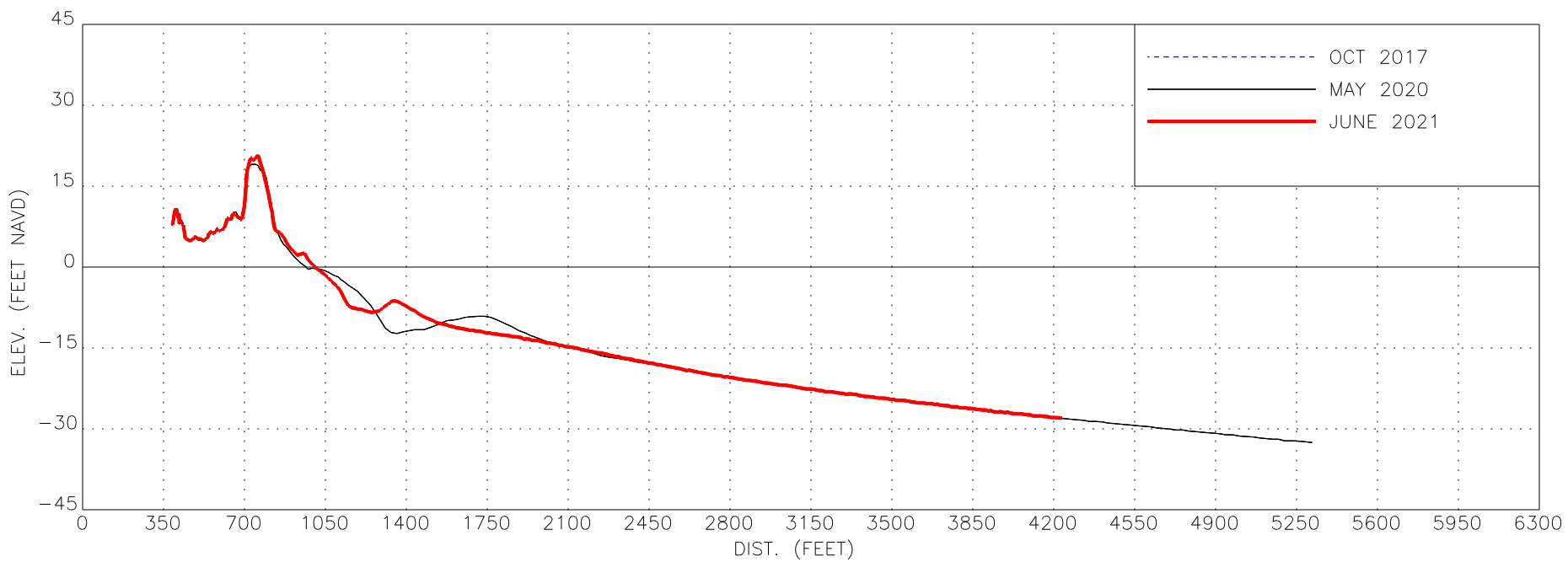
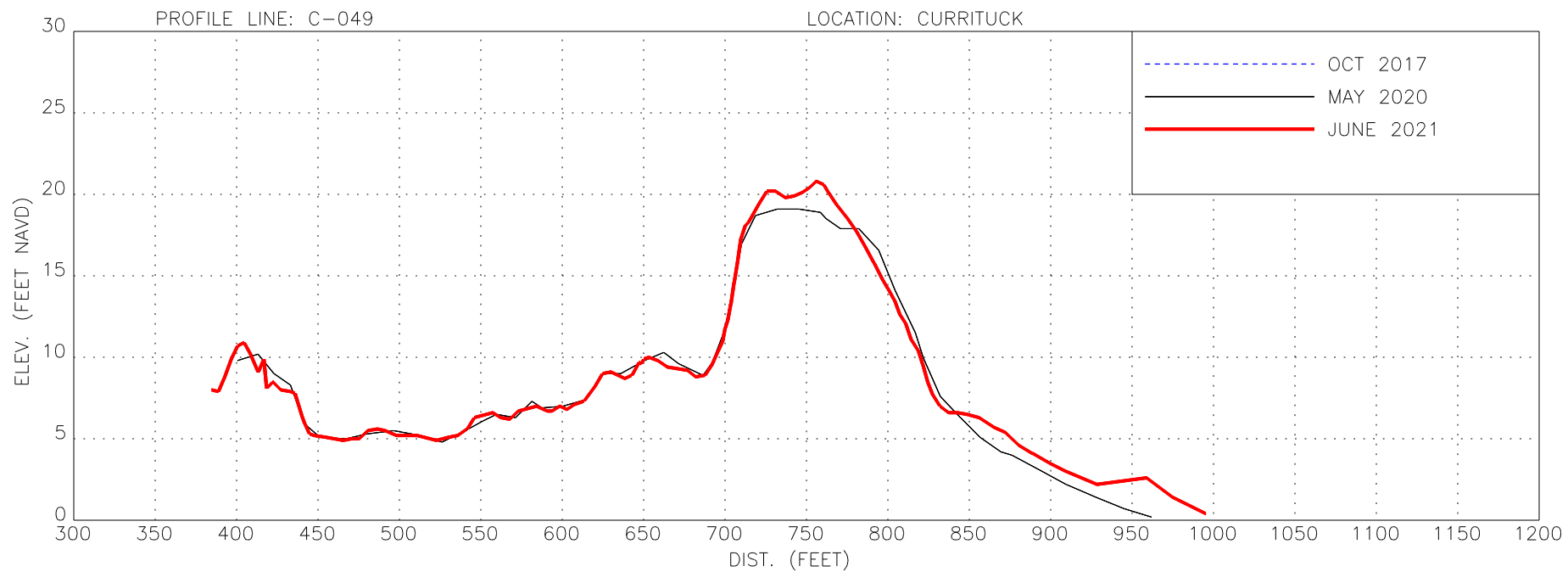


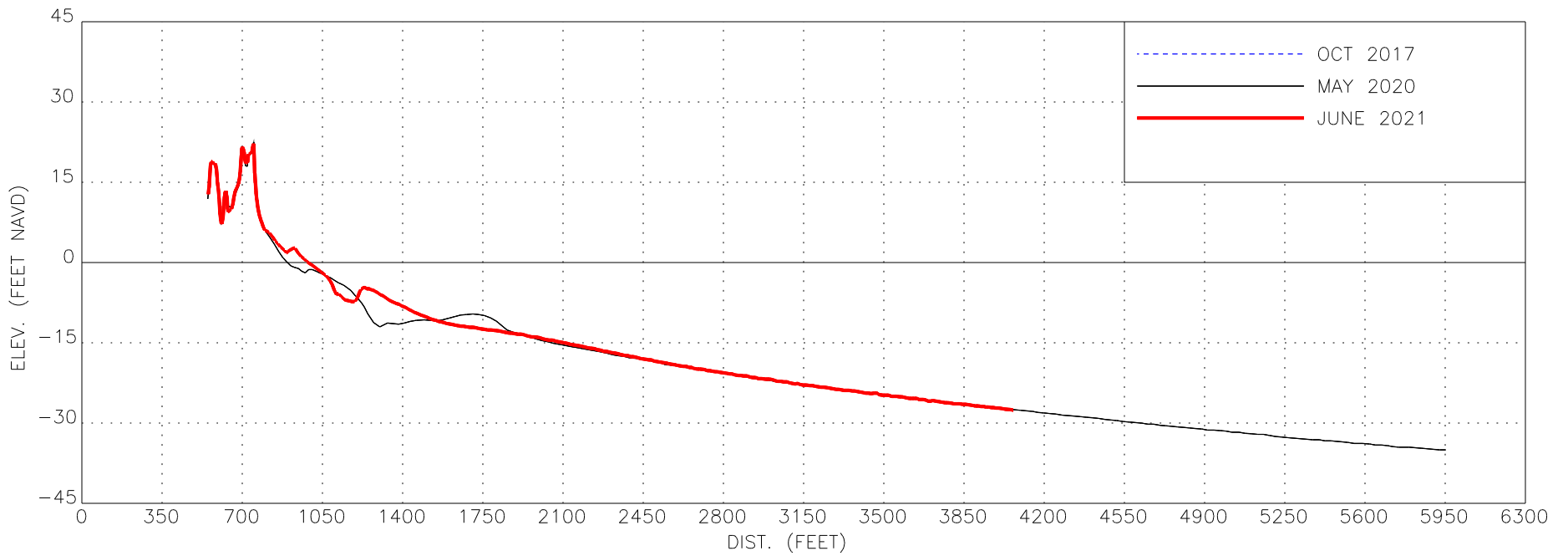
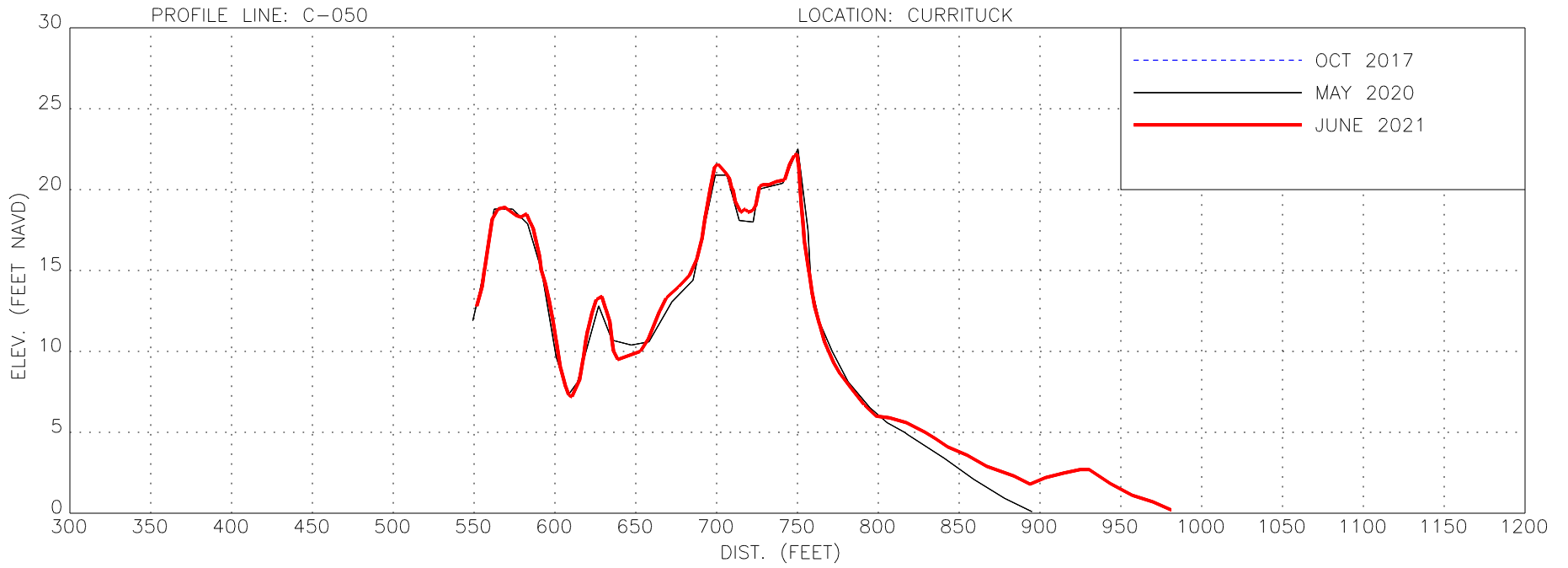


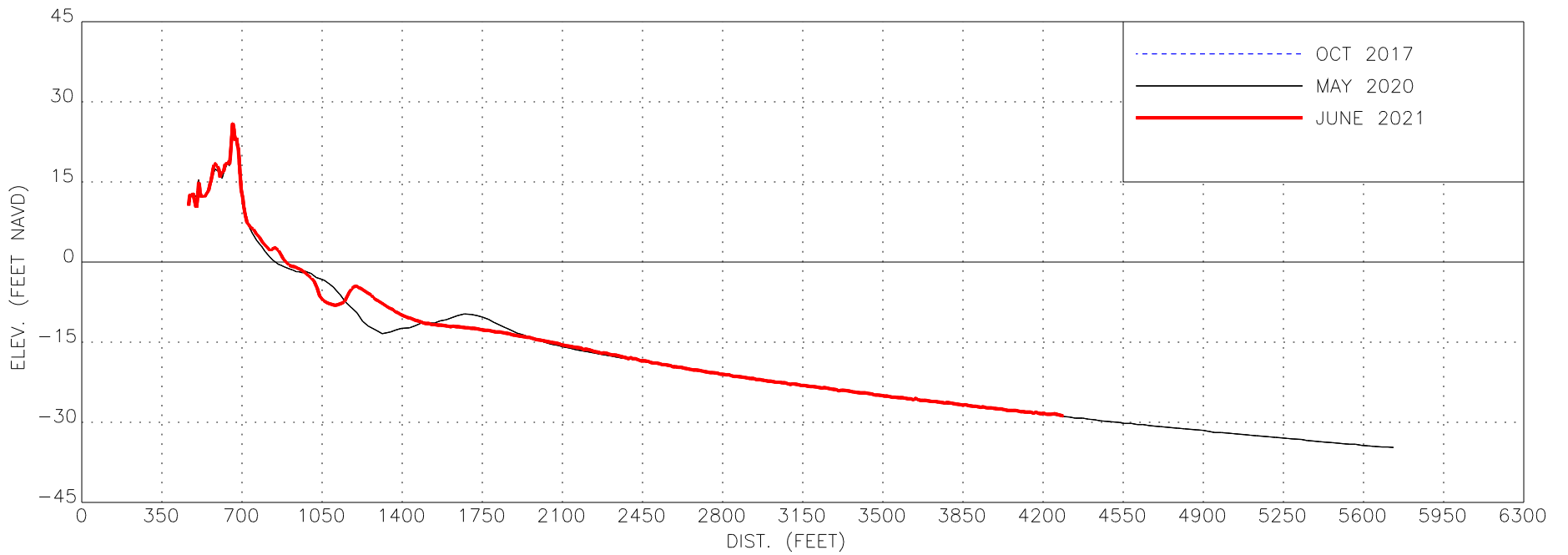
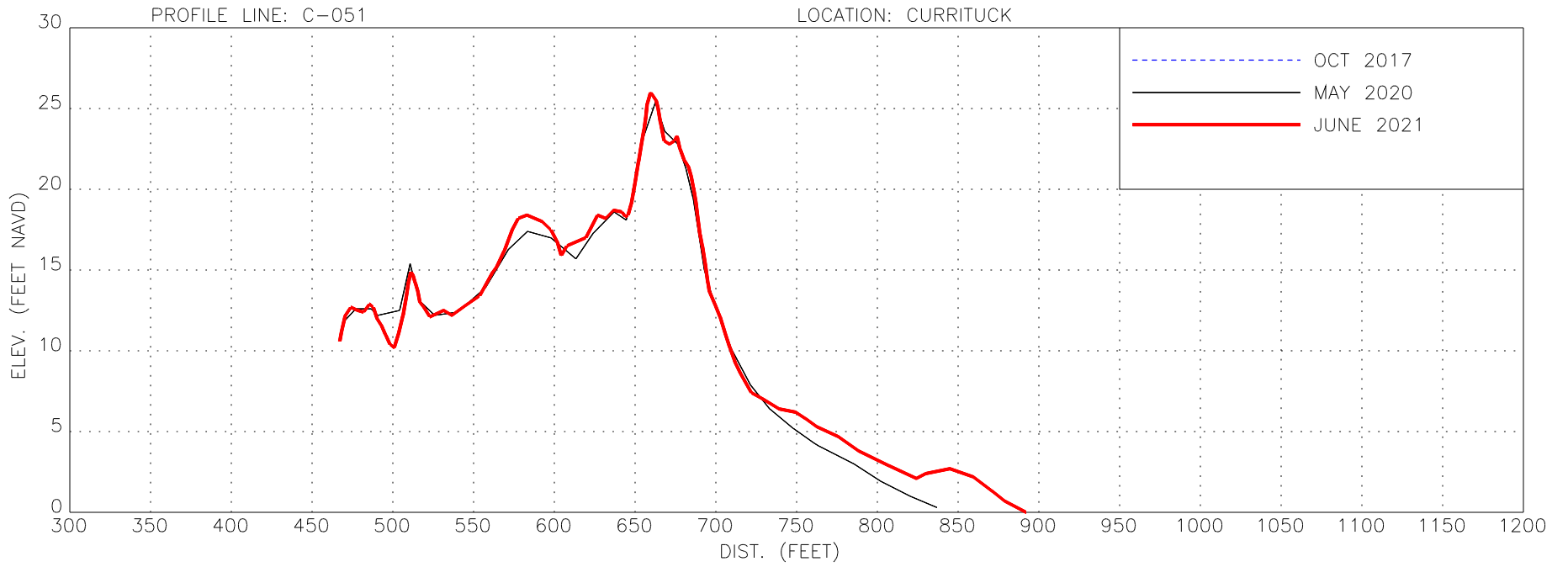
PROFILE LINE: C-048

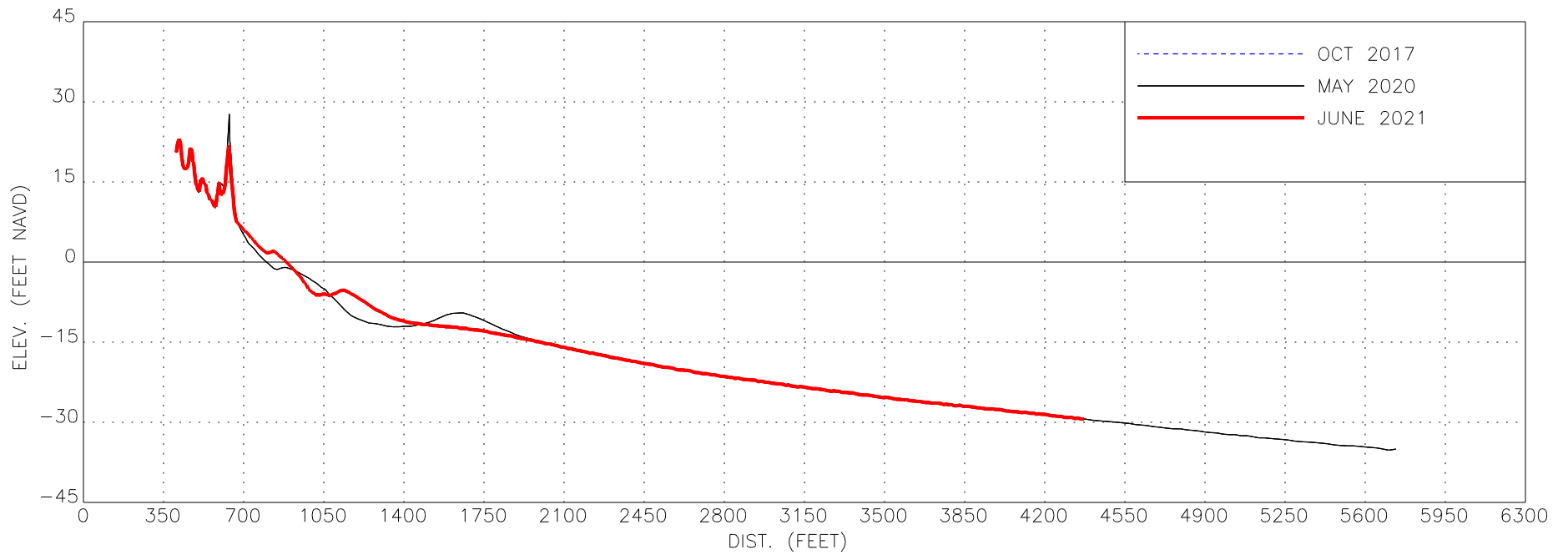
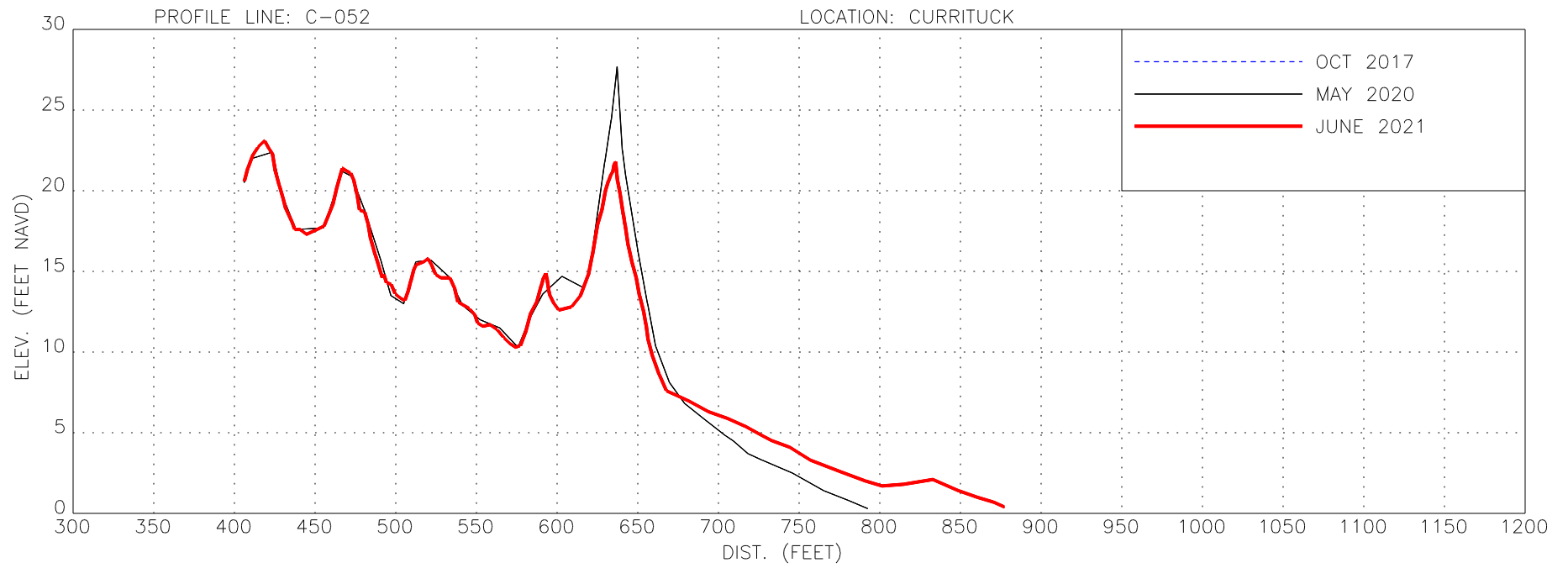
LOCATION: CURRITUCK

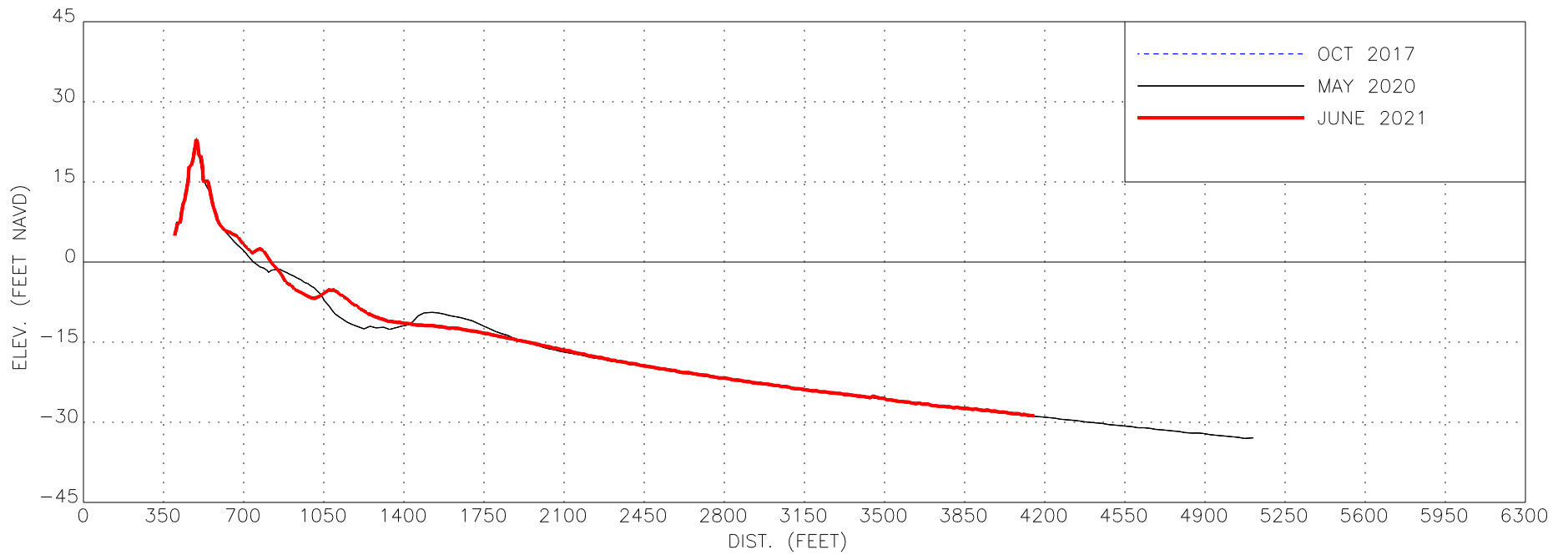
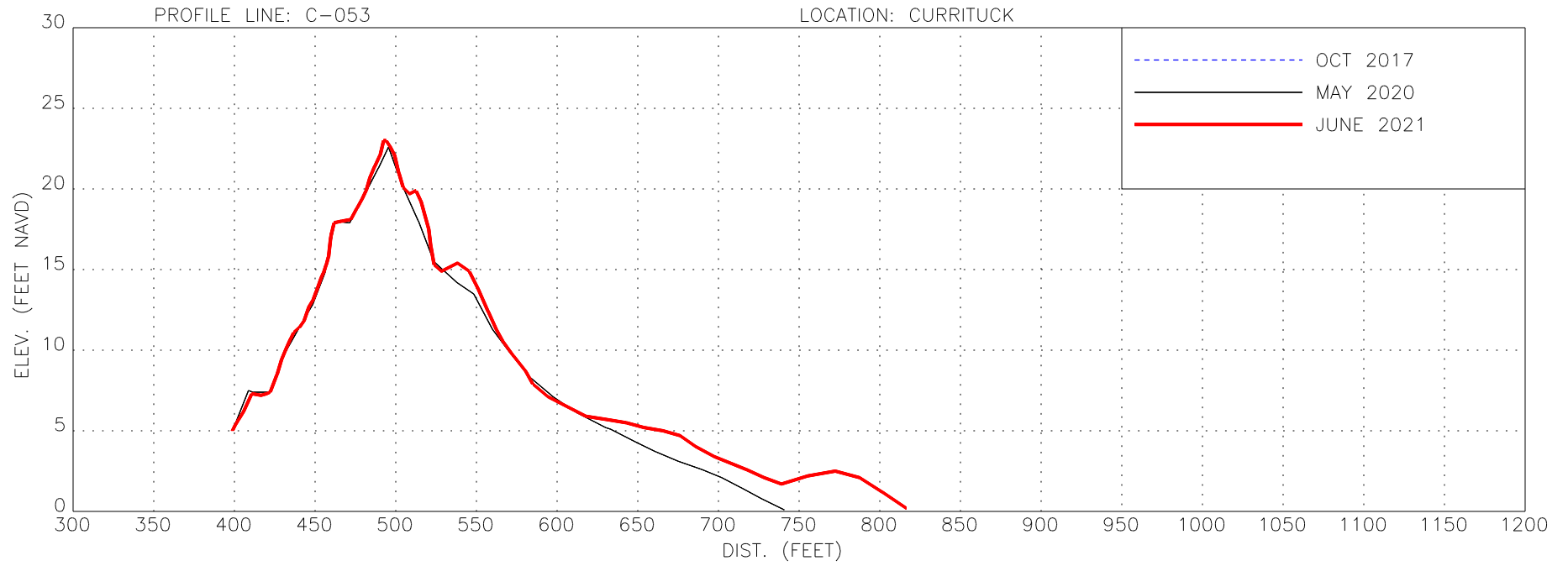


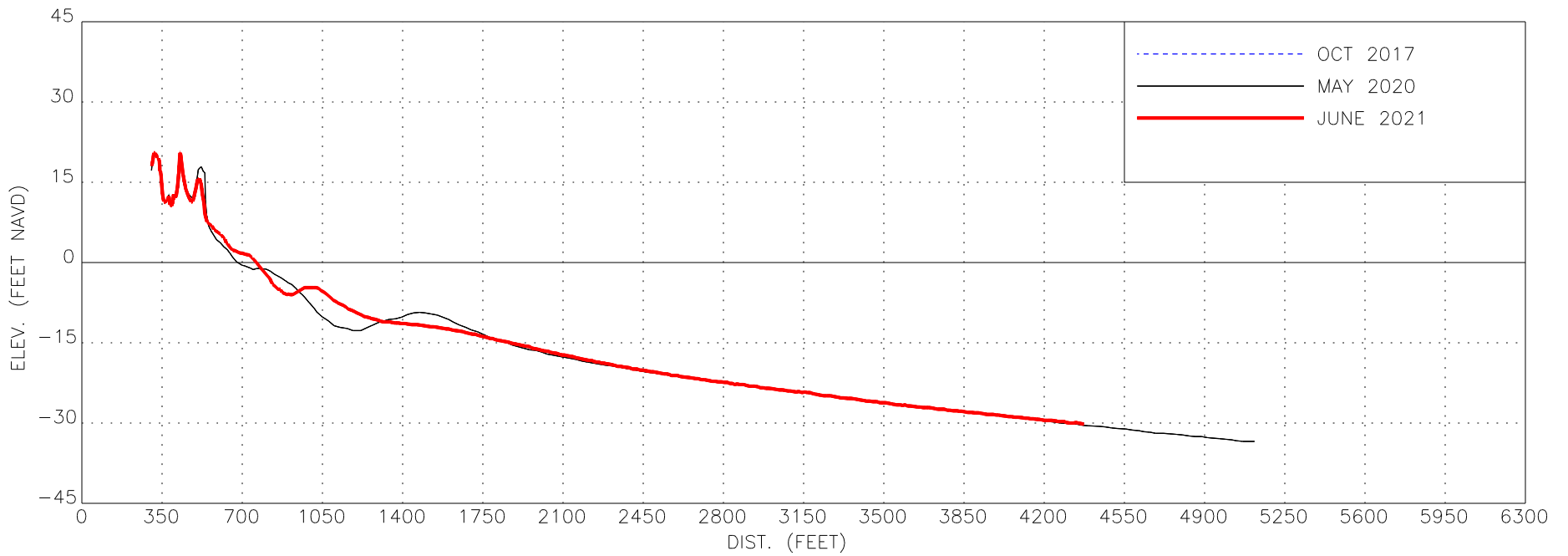
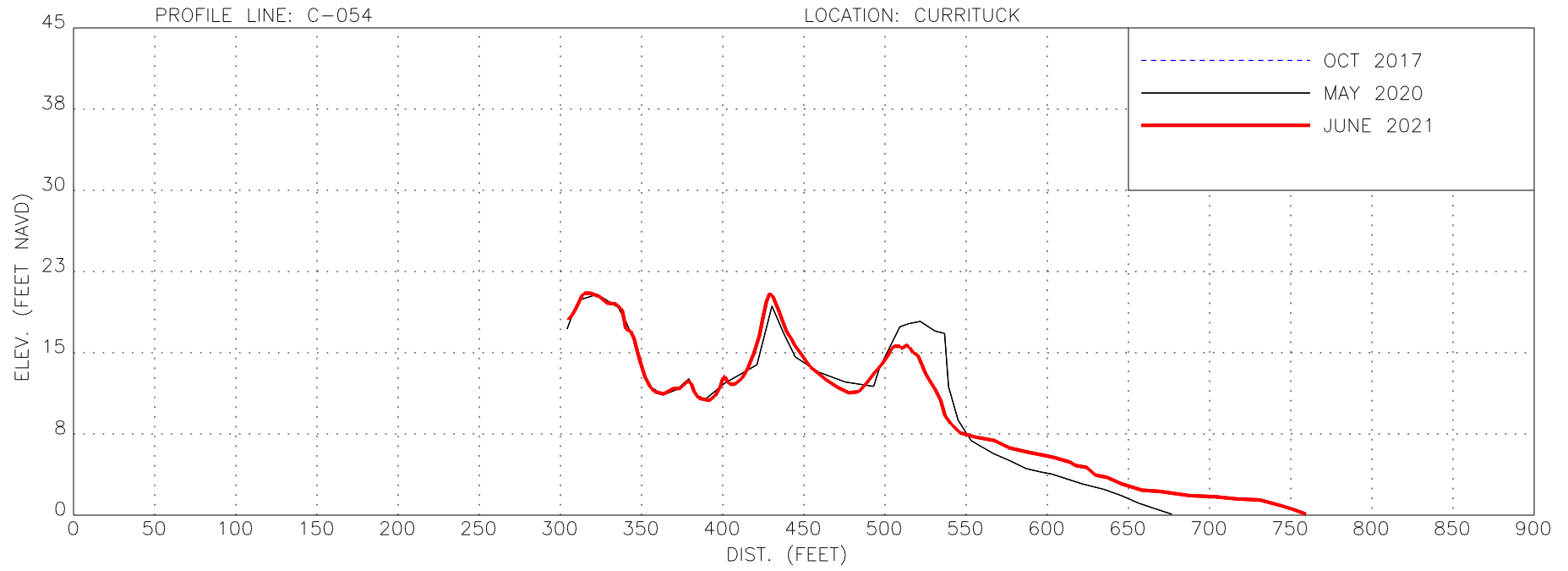






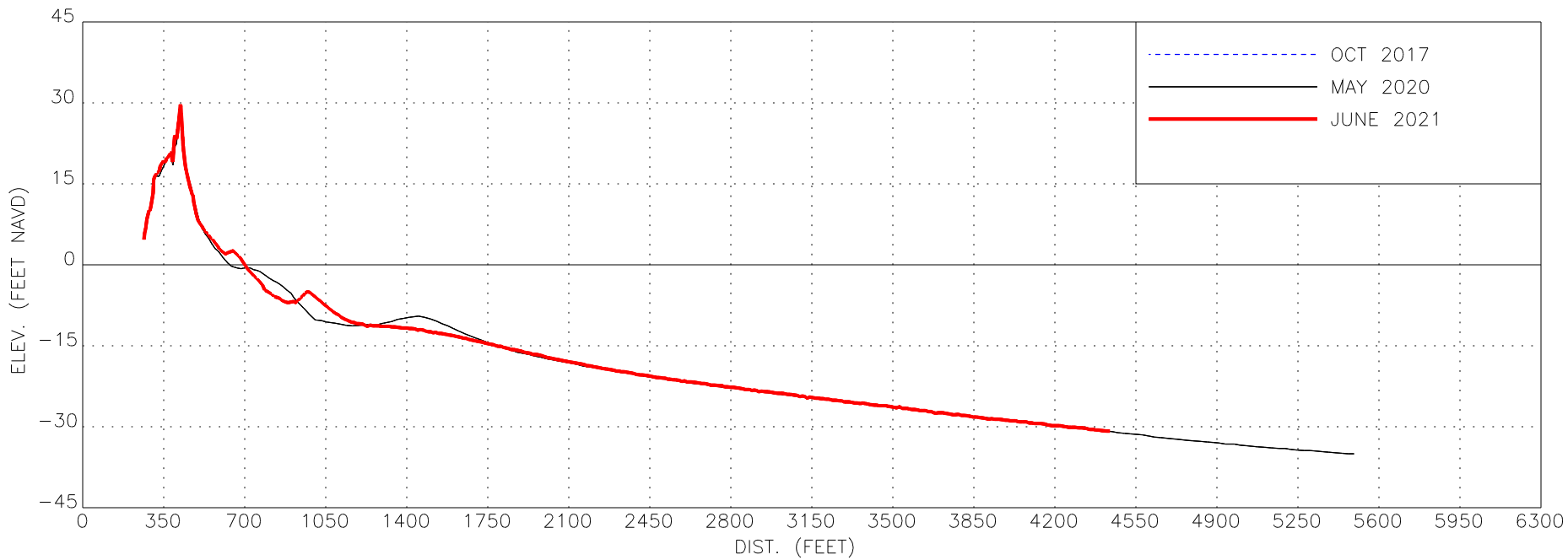
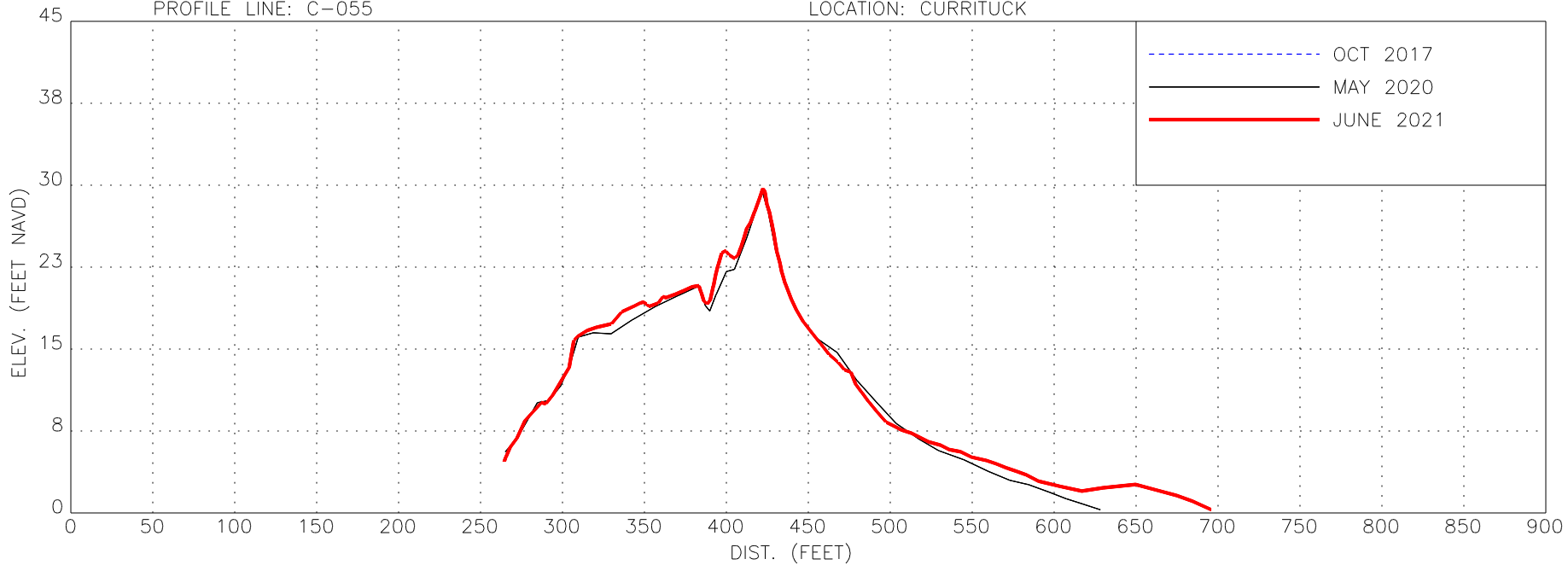






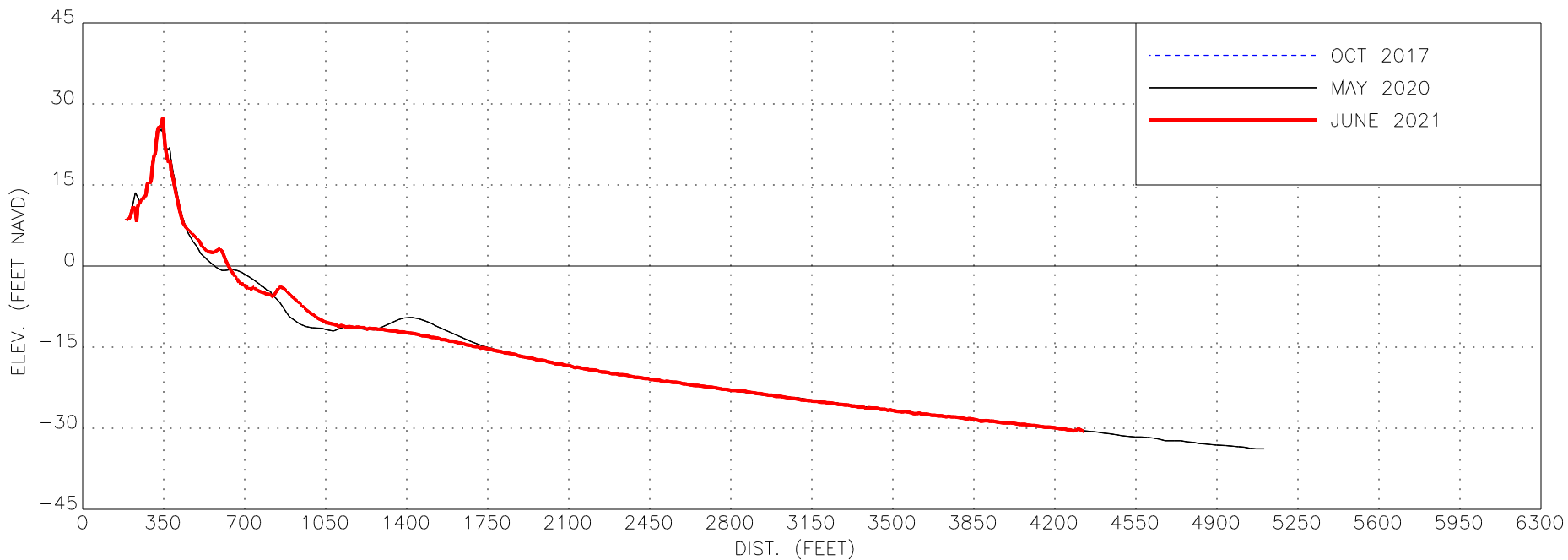
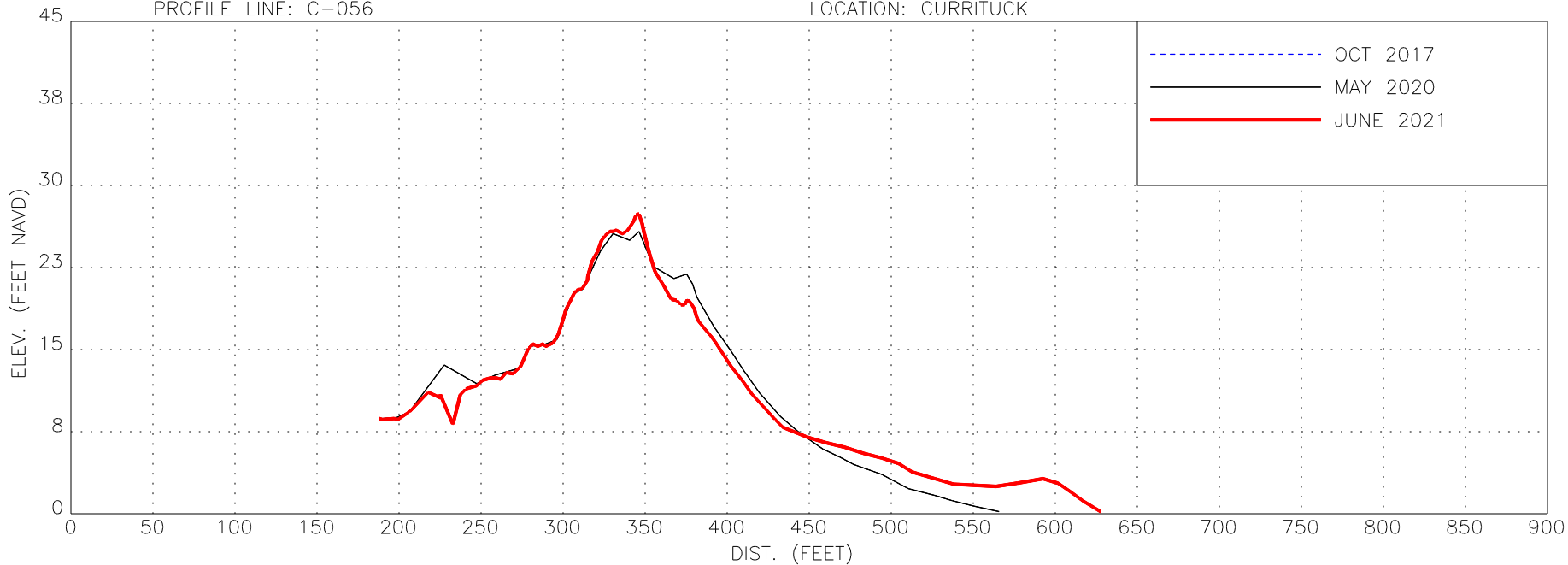
PROFILE LINE: C-055

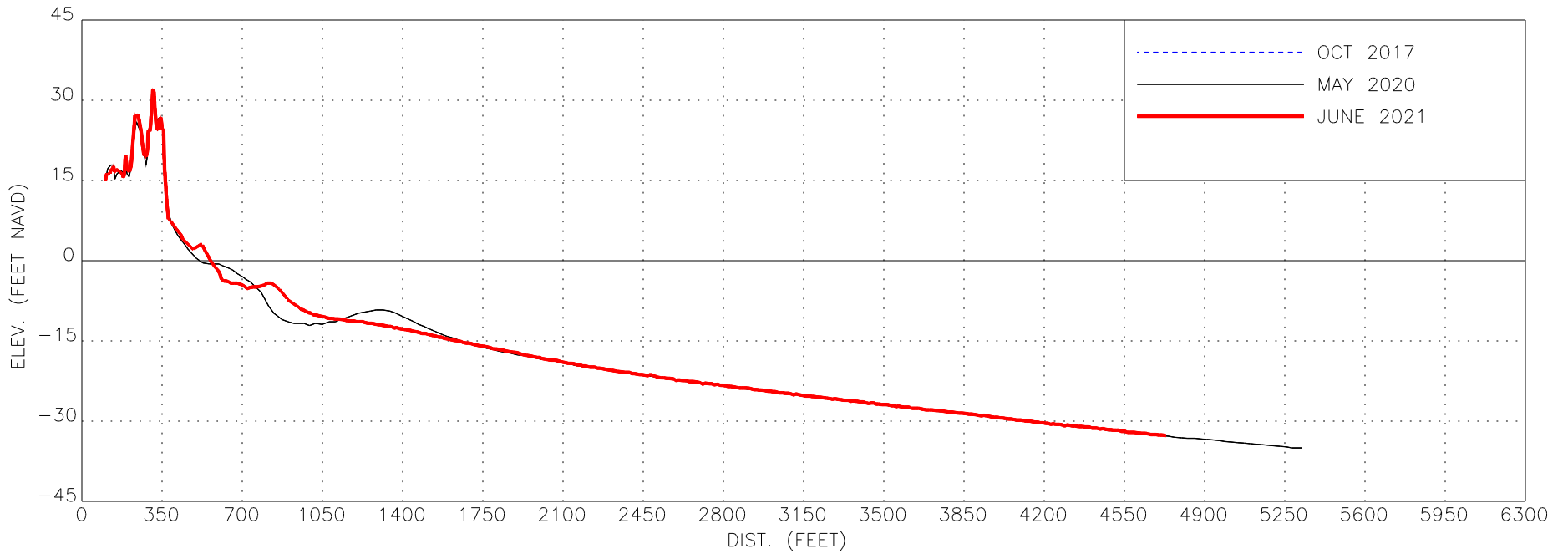
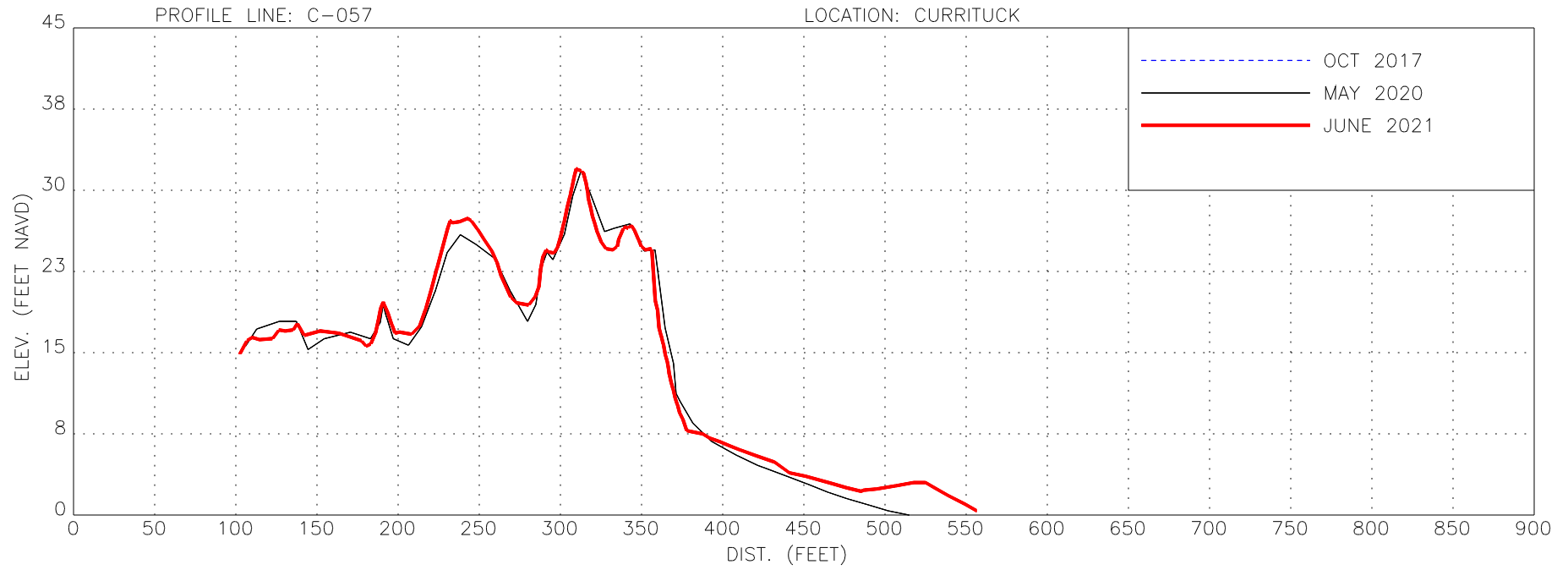
LOCATION: CURRITUCK



PROFILE LINE: C-056

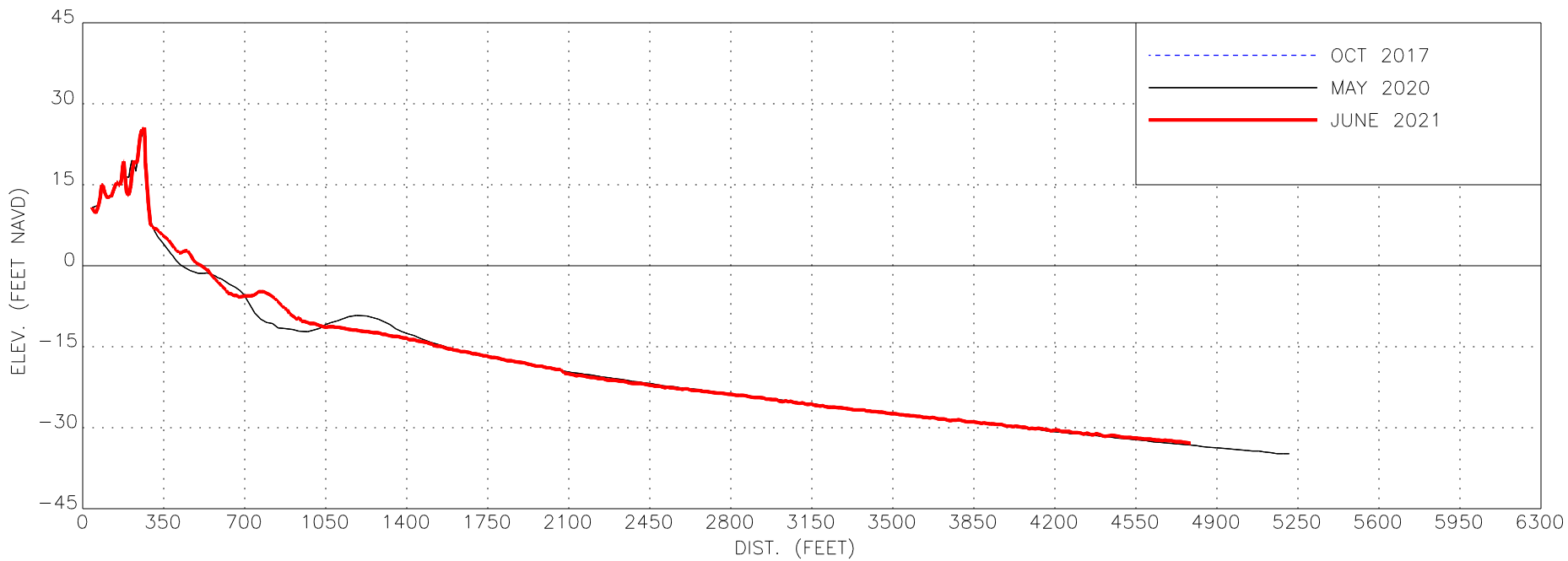
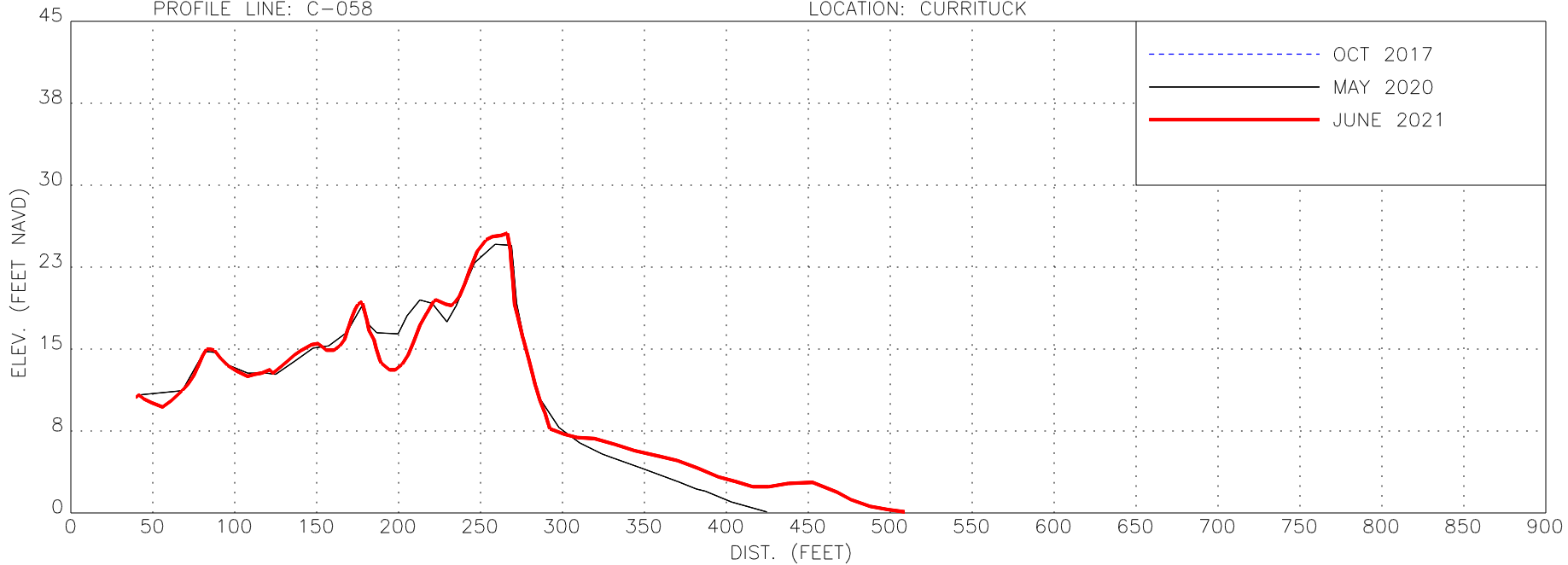
LOCATION: CURRITUCK





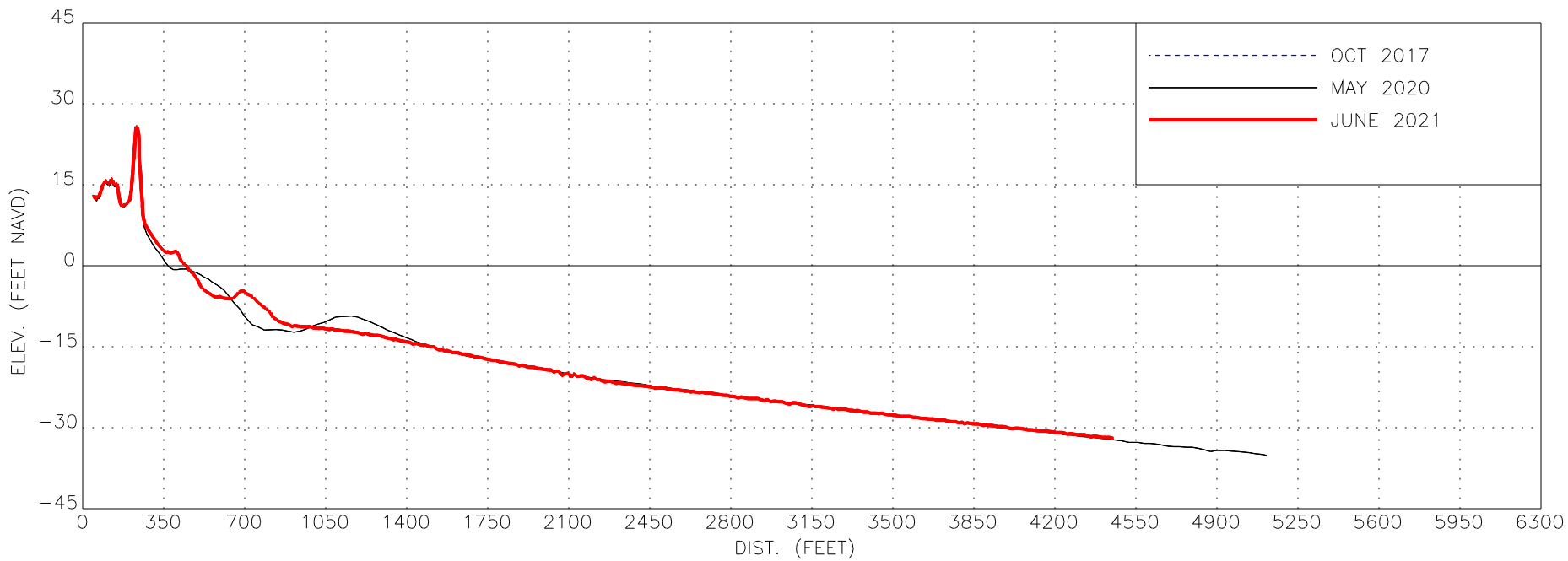
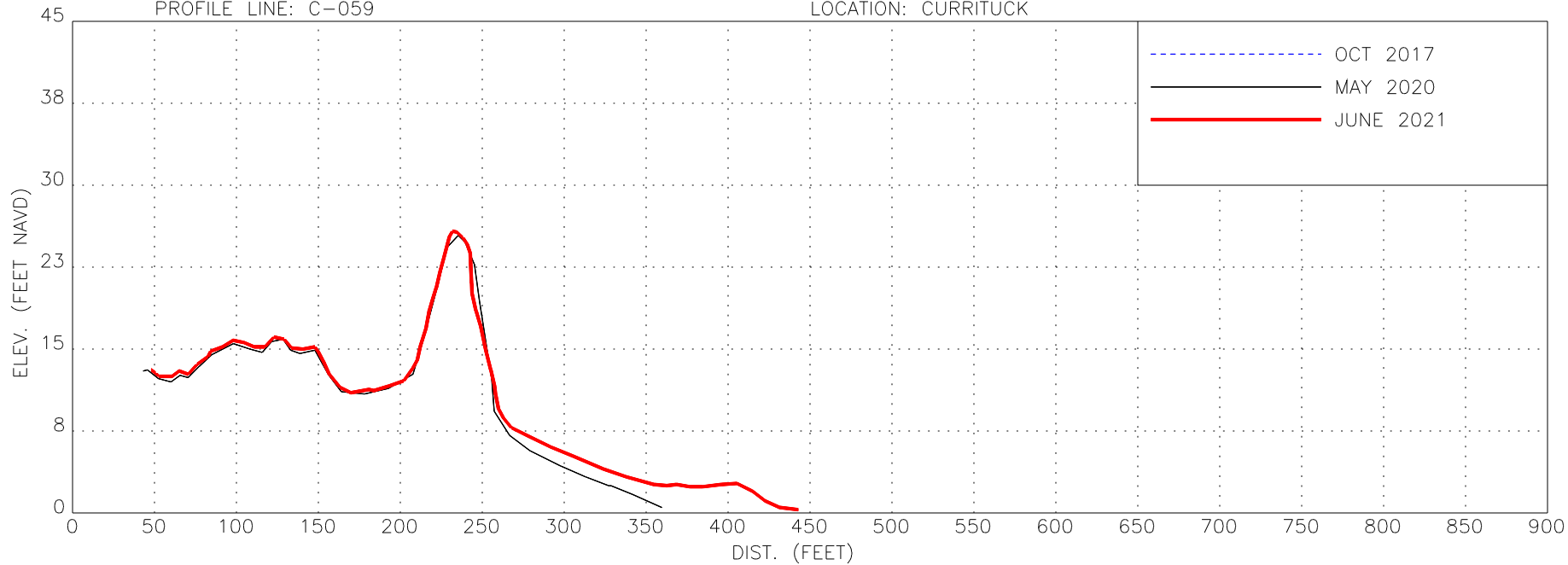
PROFILE LINE: C-058

LOCATION: CURRITUCK



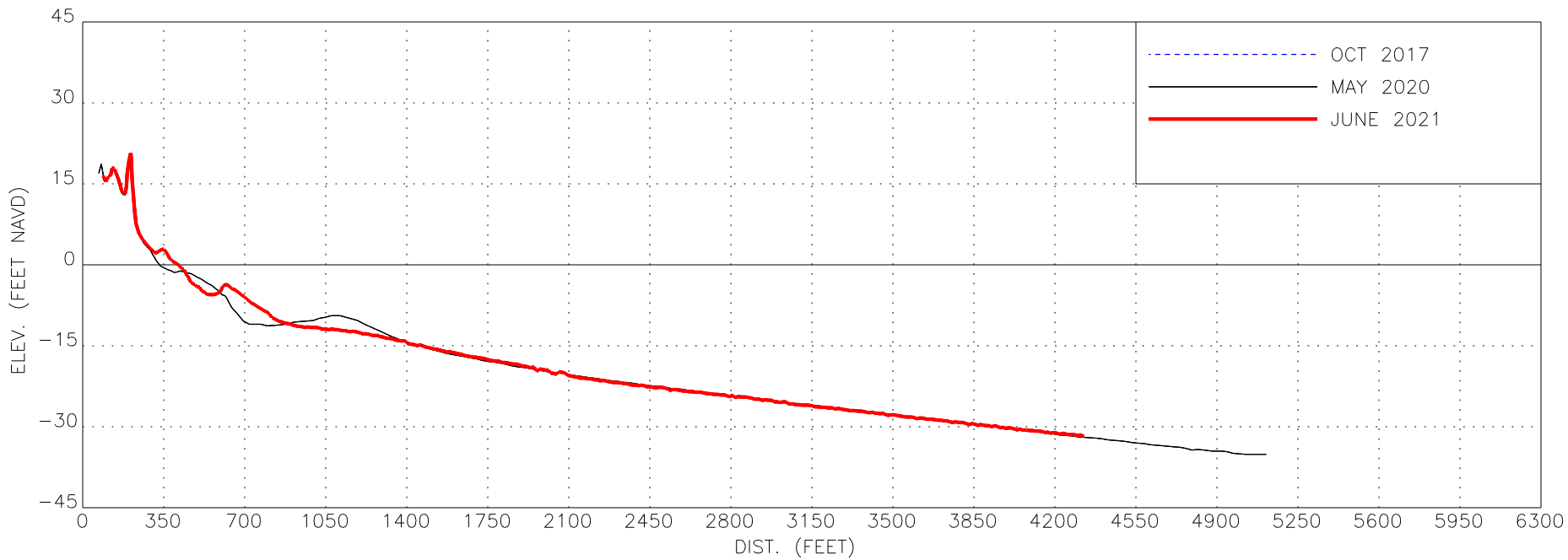
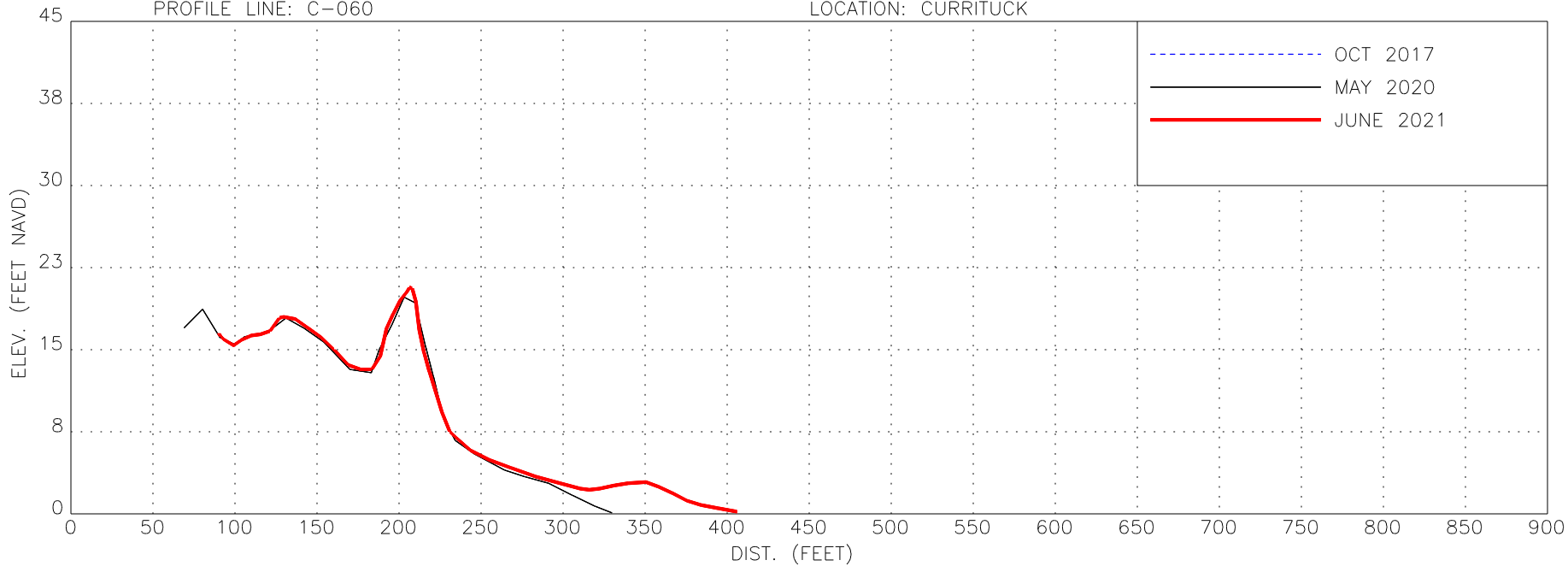
PROFILE LINE: C-059

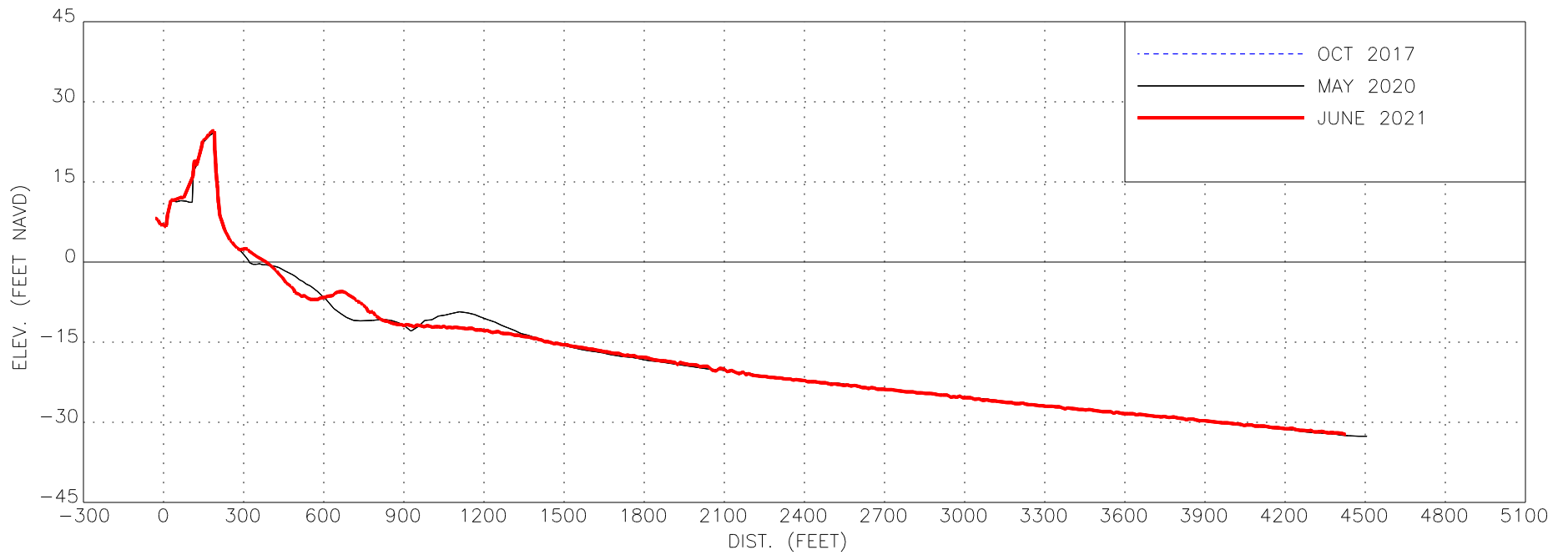
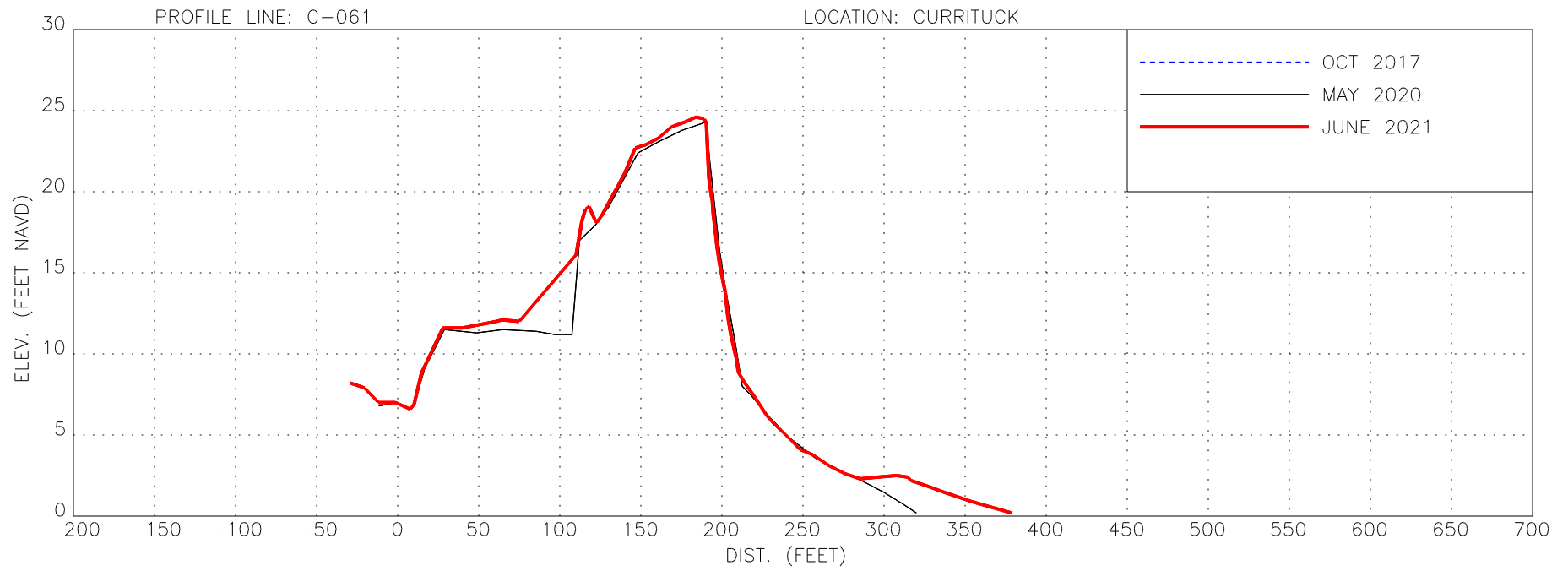
LOCATION: CURRITUCK

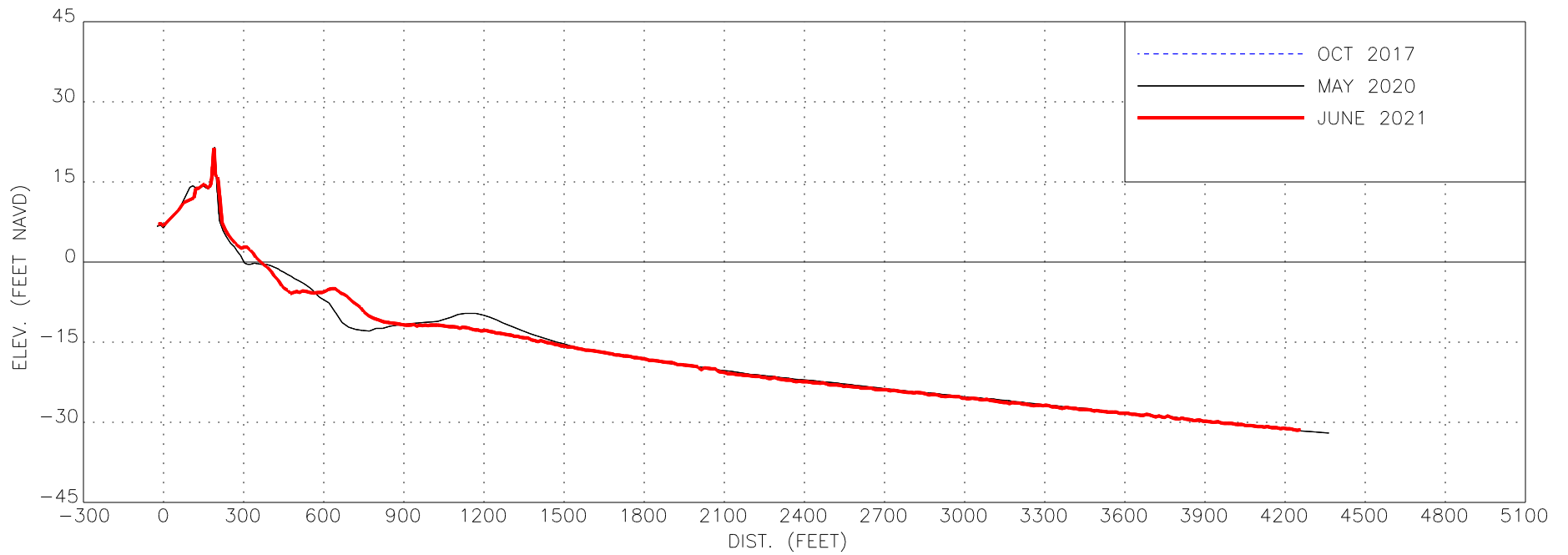
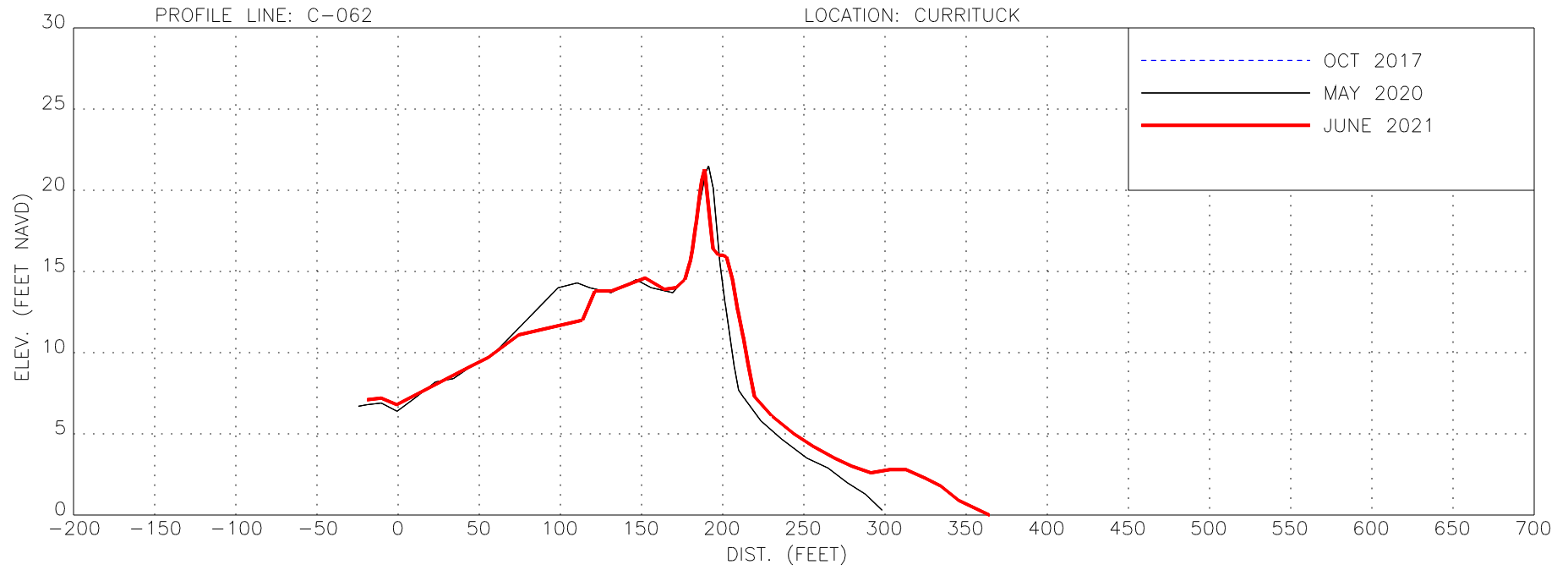


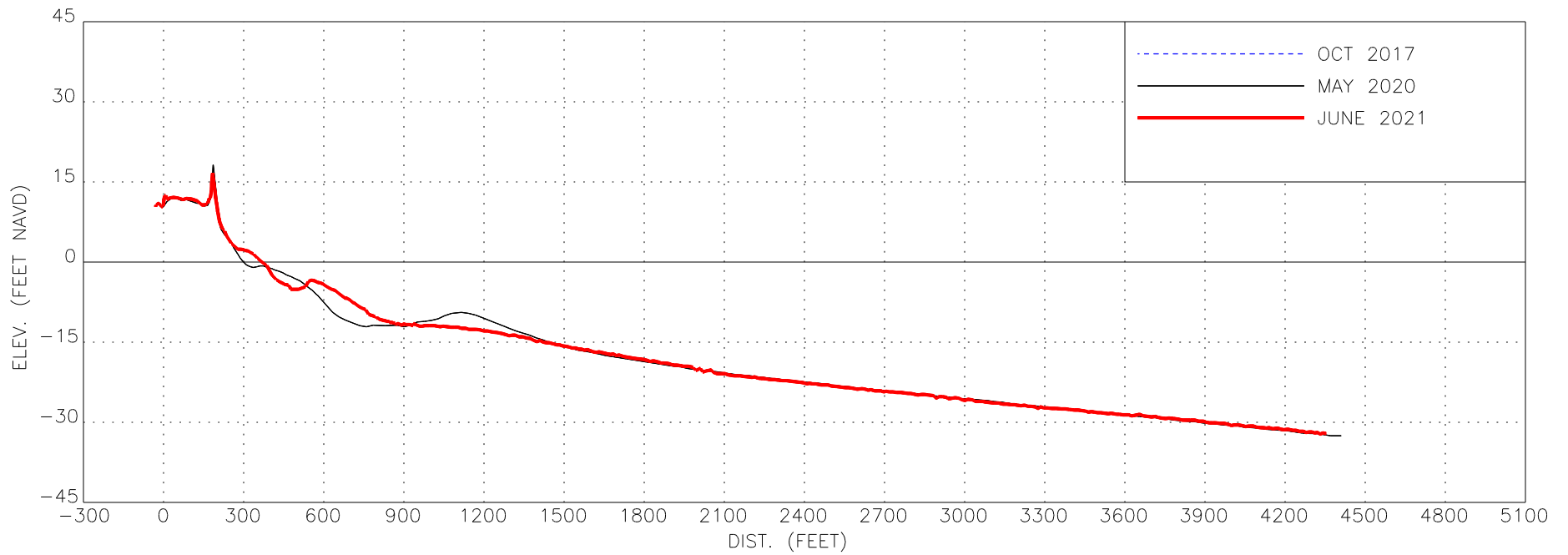
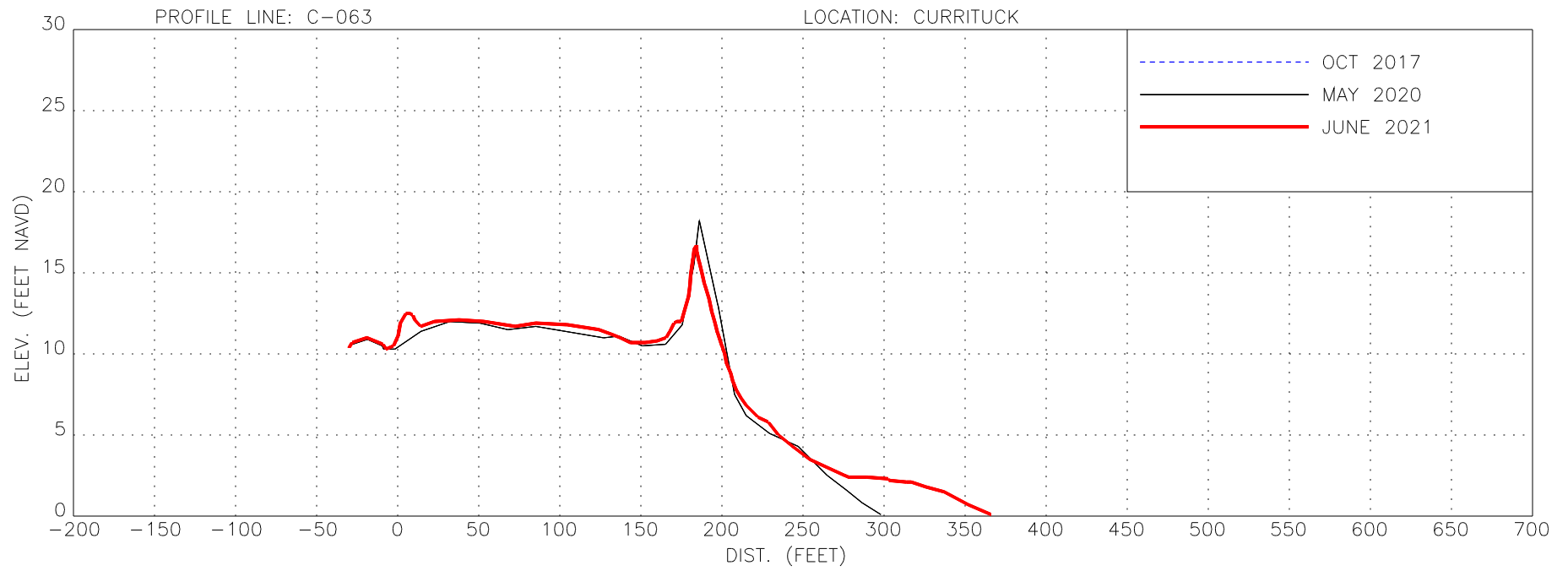
PROFILE LINE: C-060

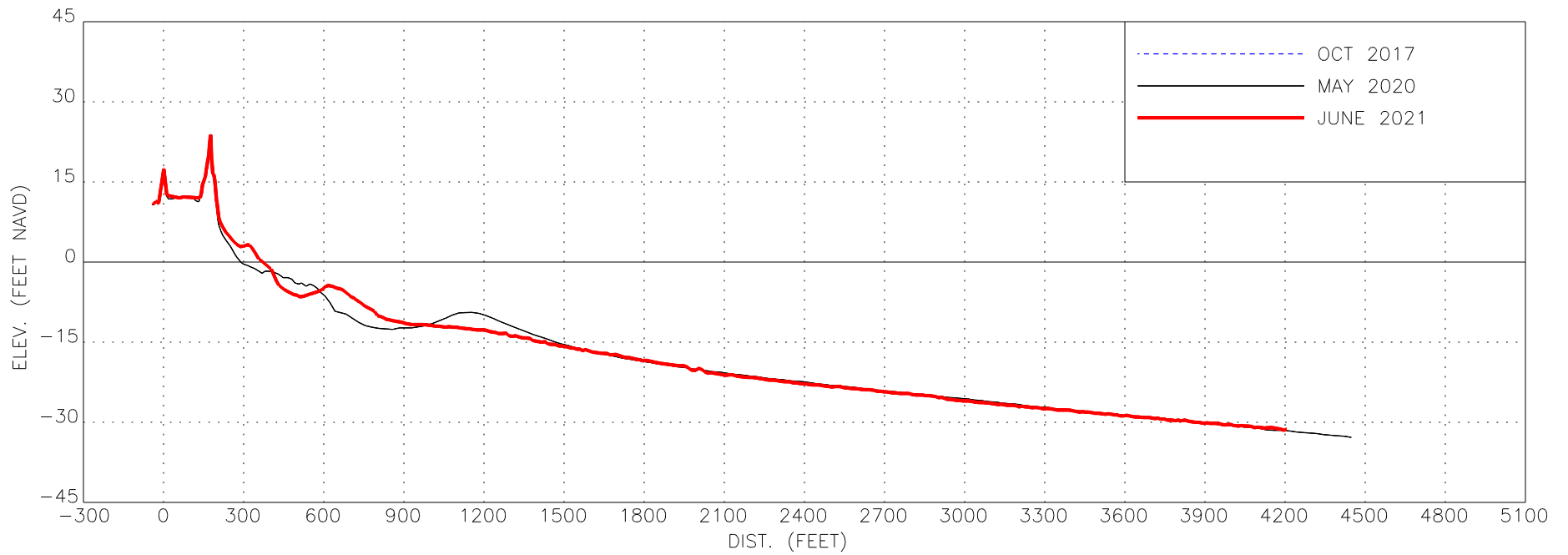
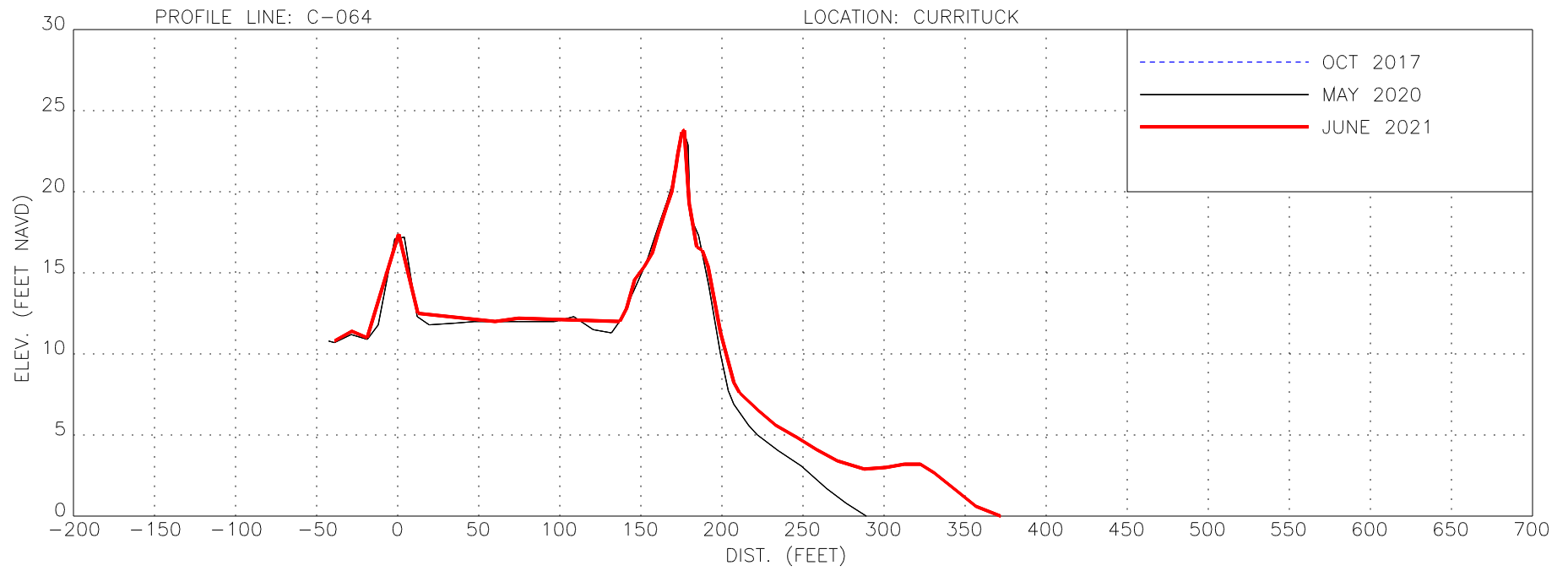
LOCATION: CURRITUCK

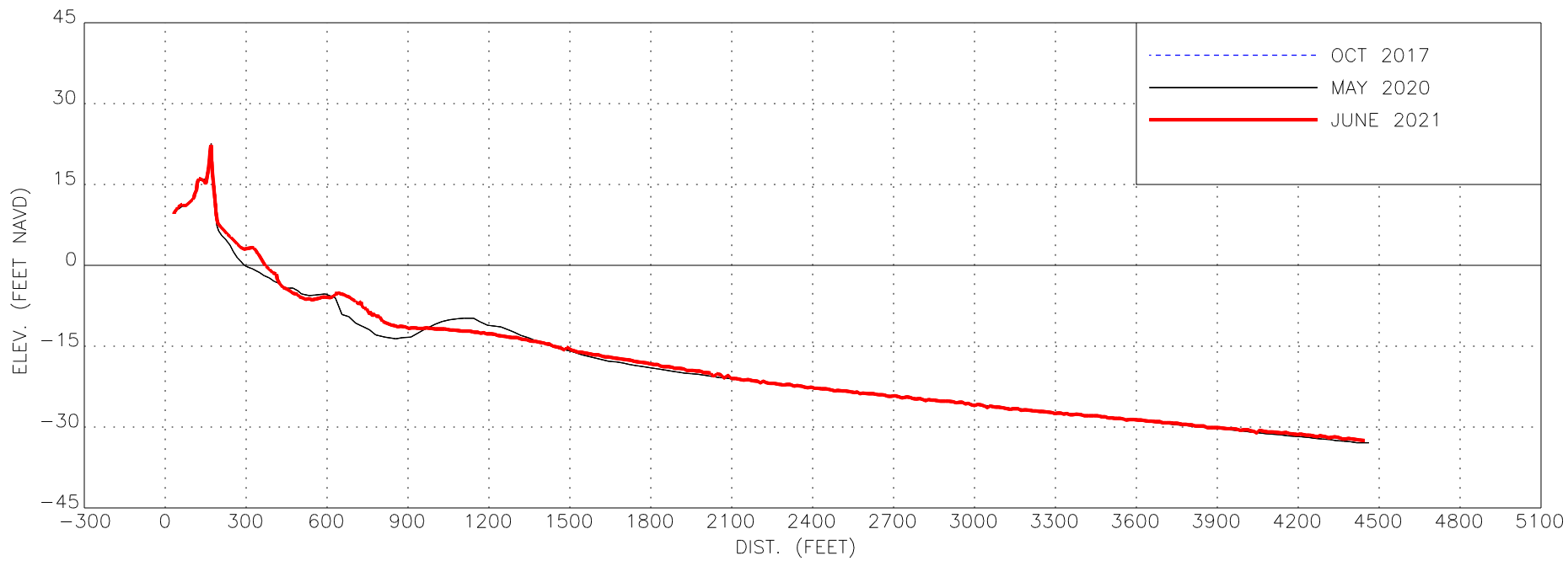
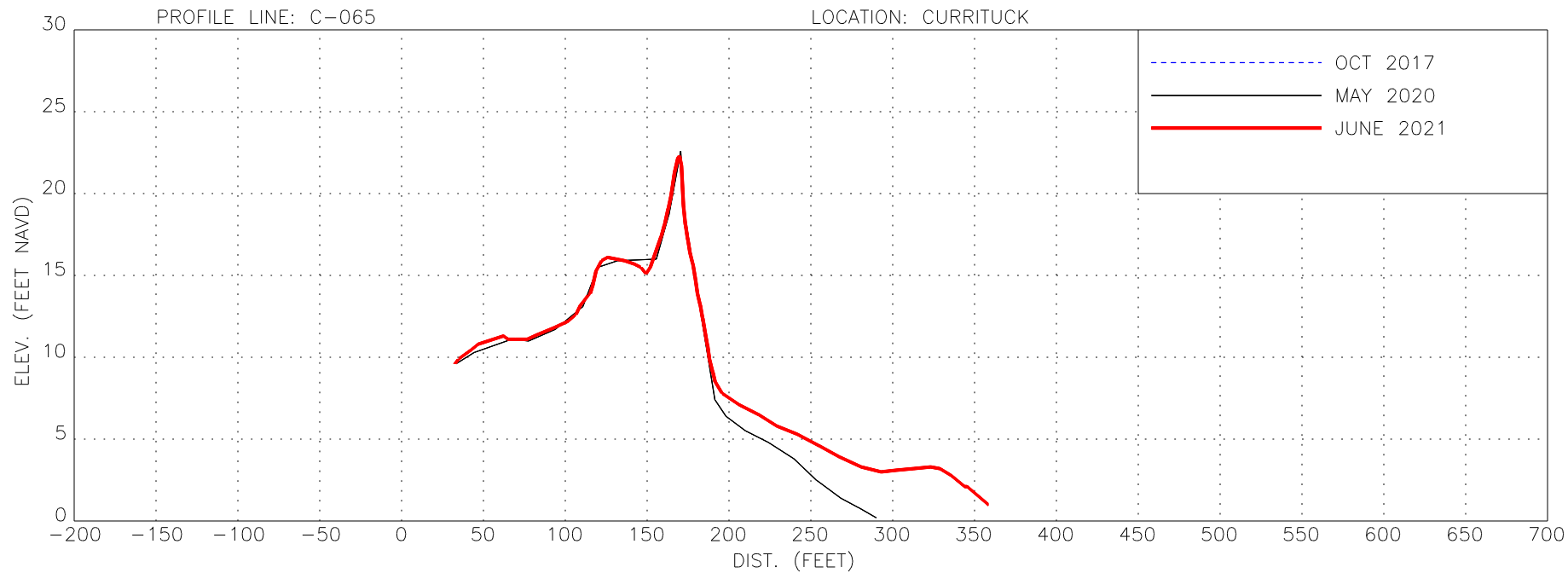


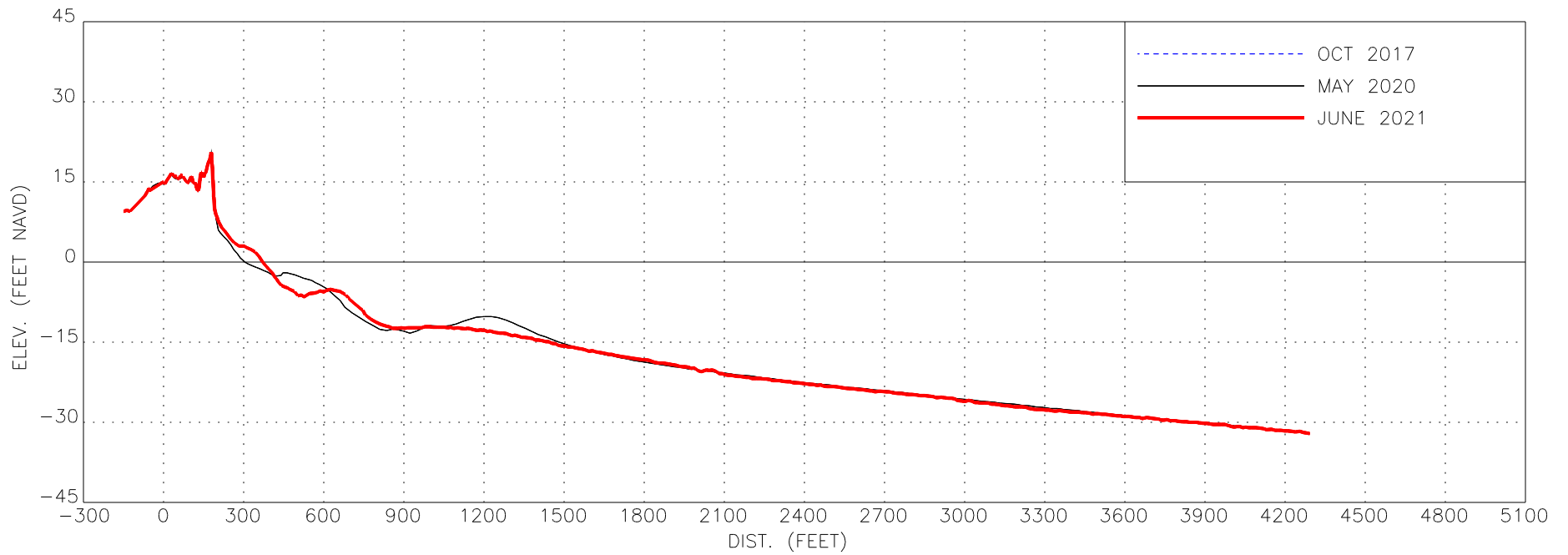
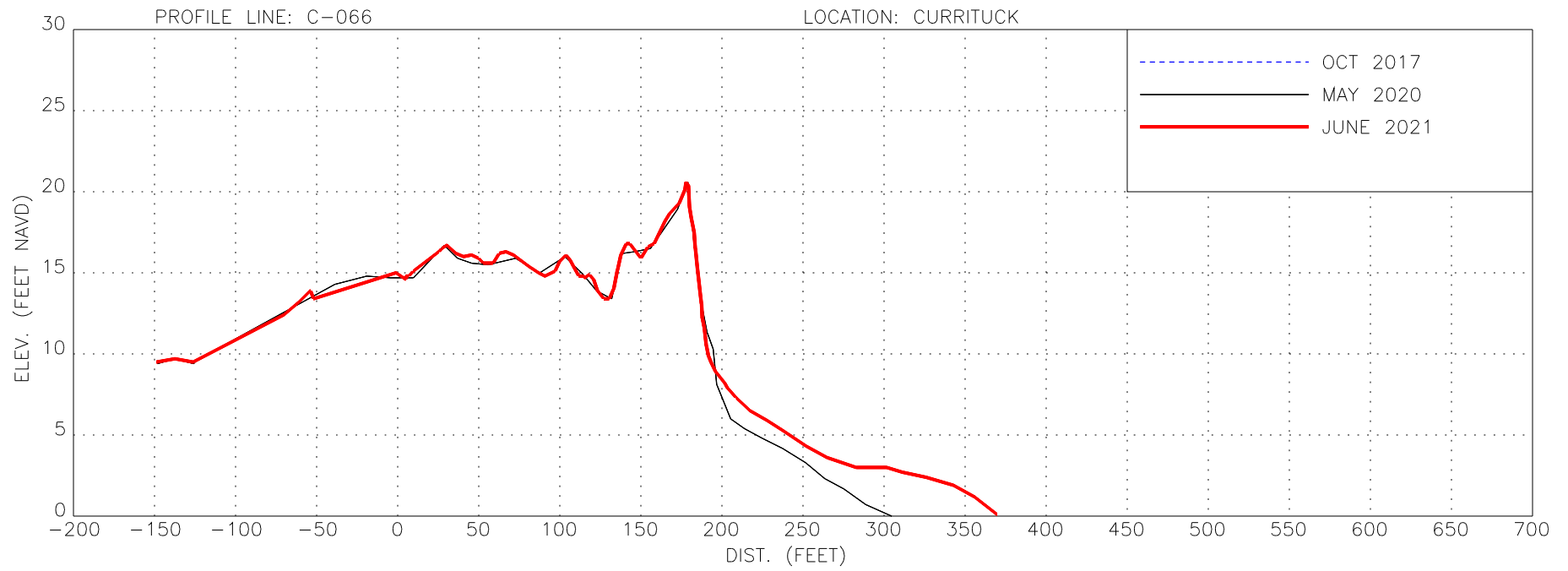


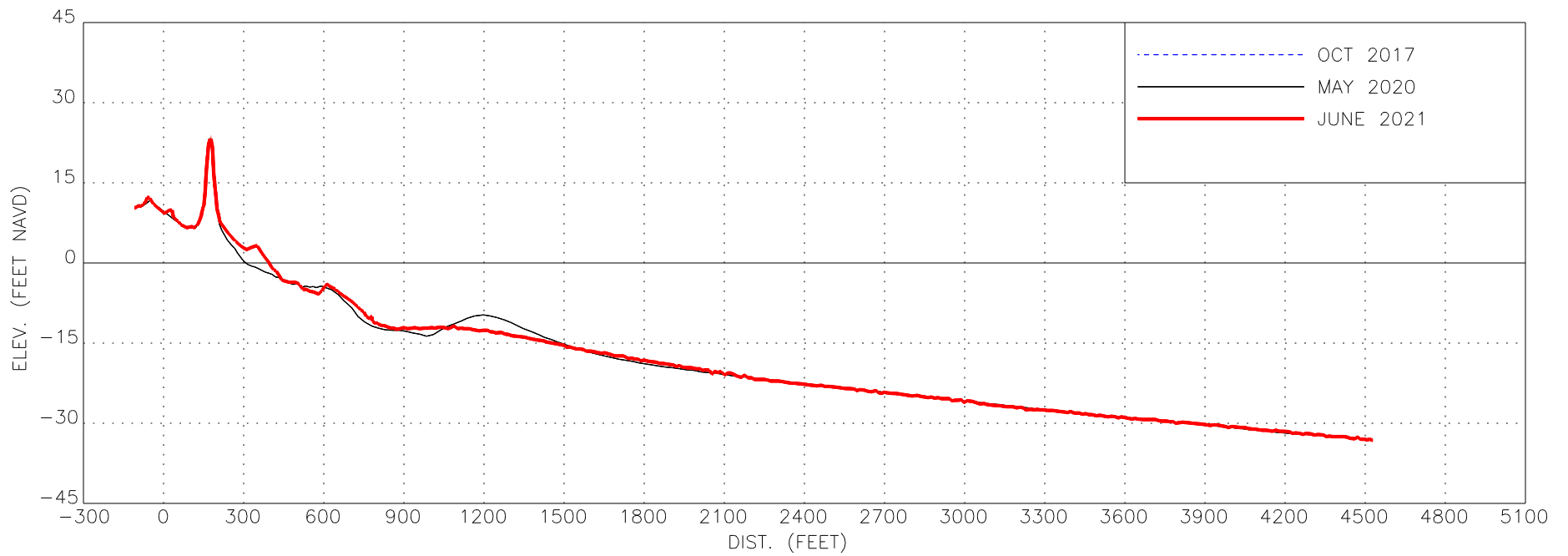
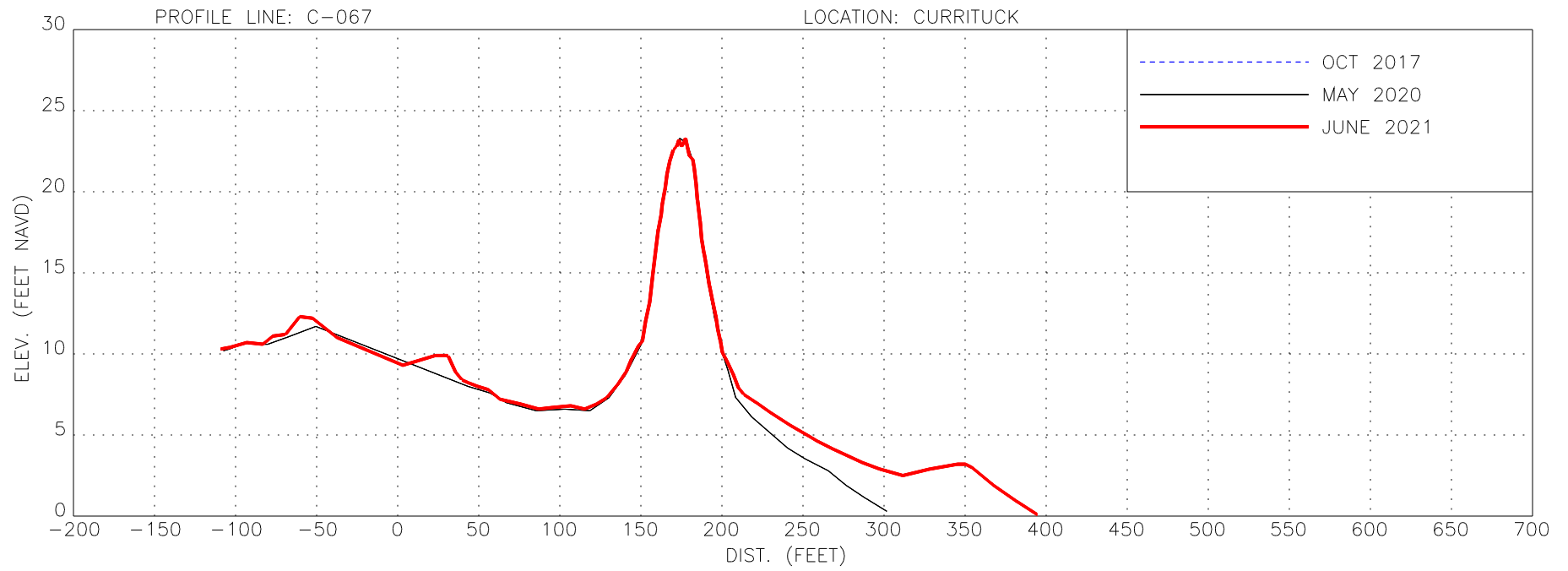


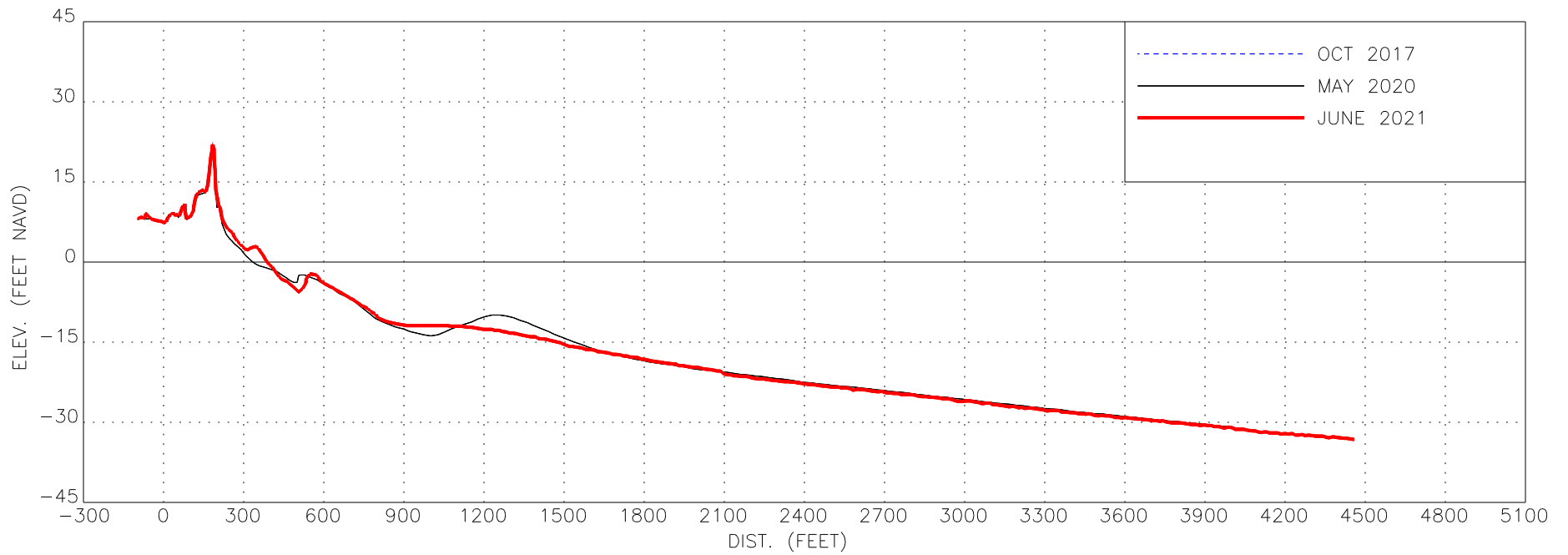
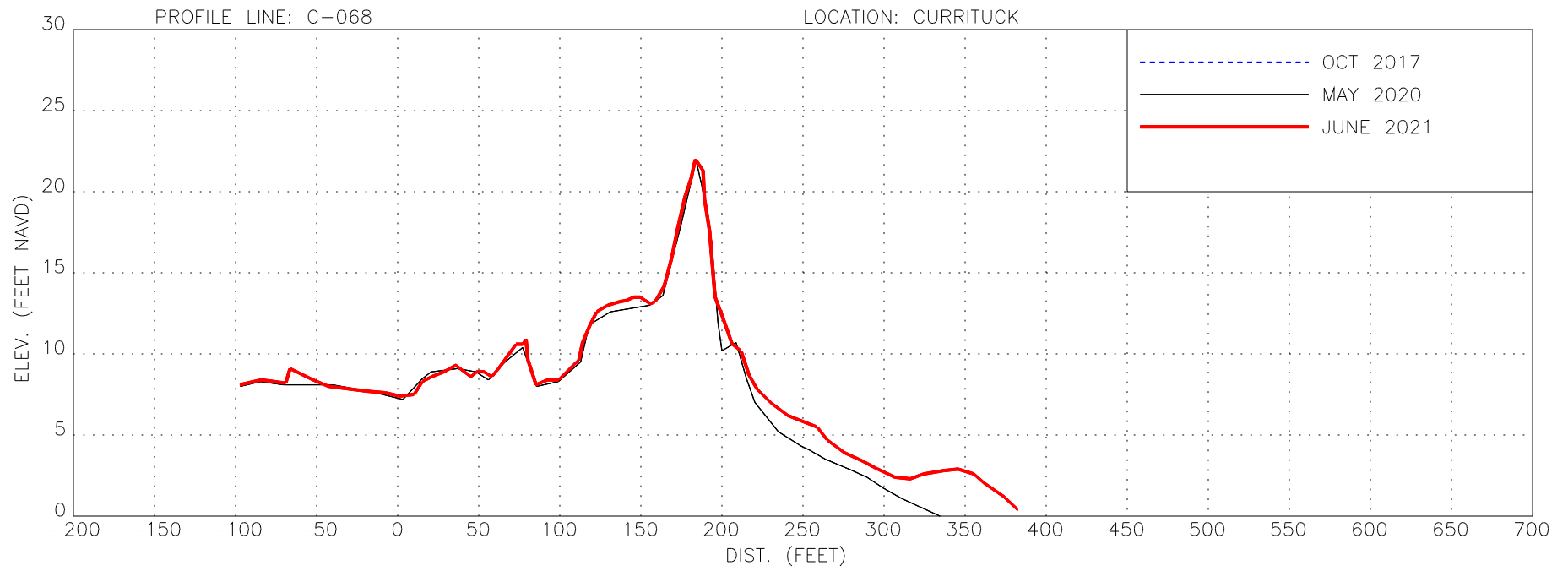


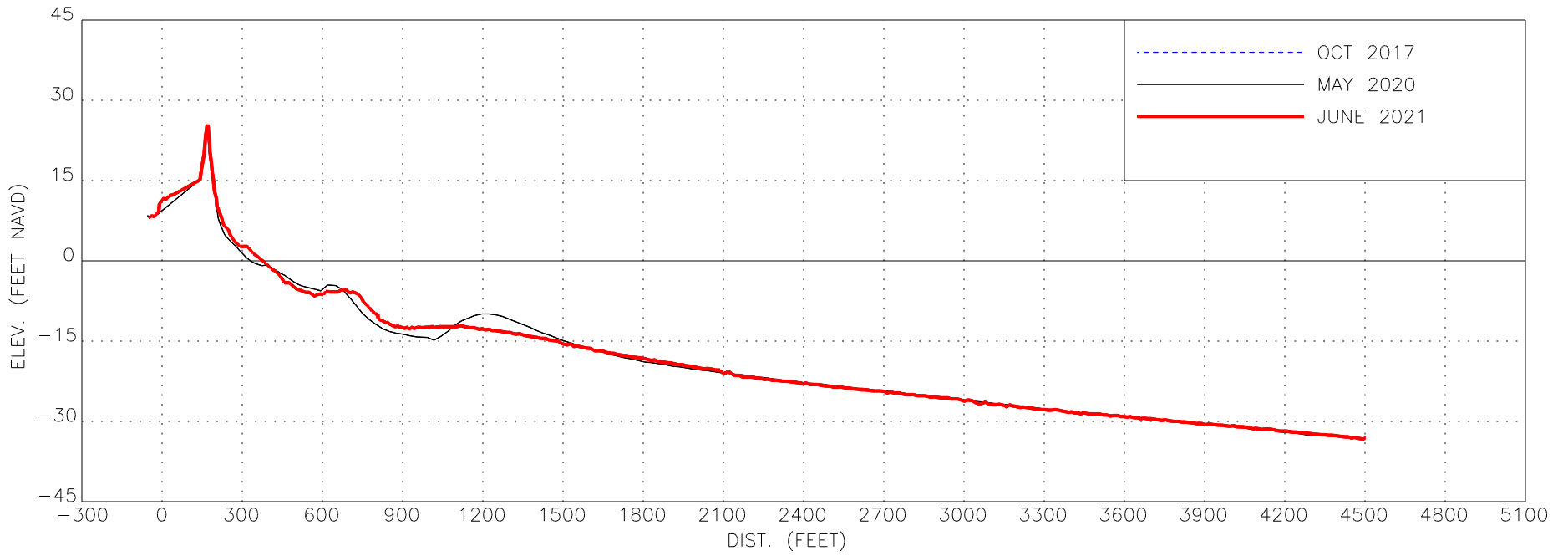
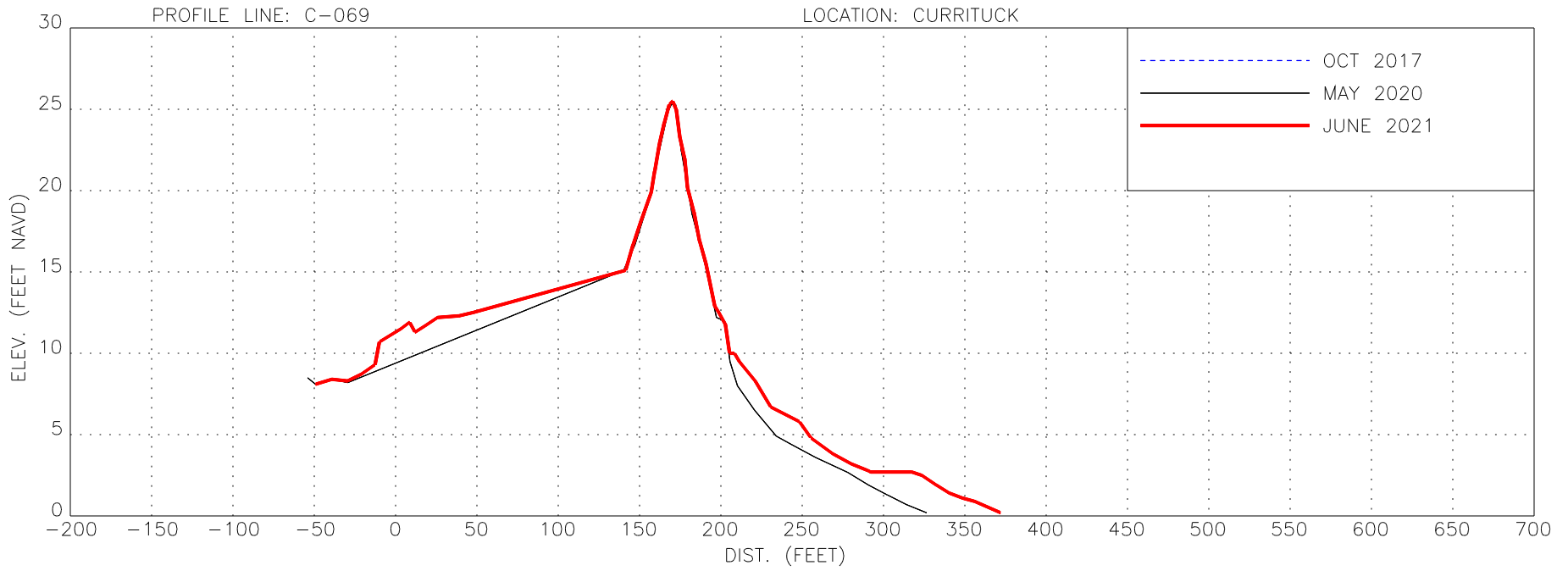


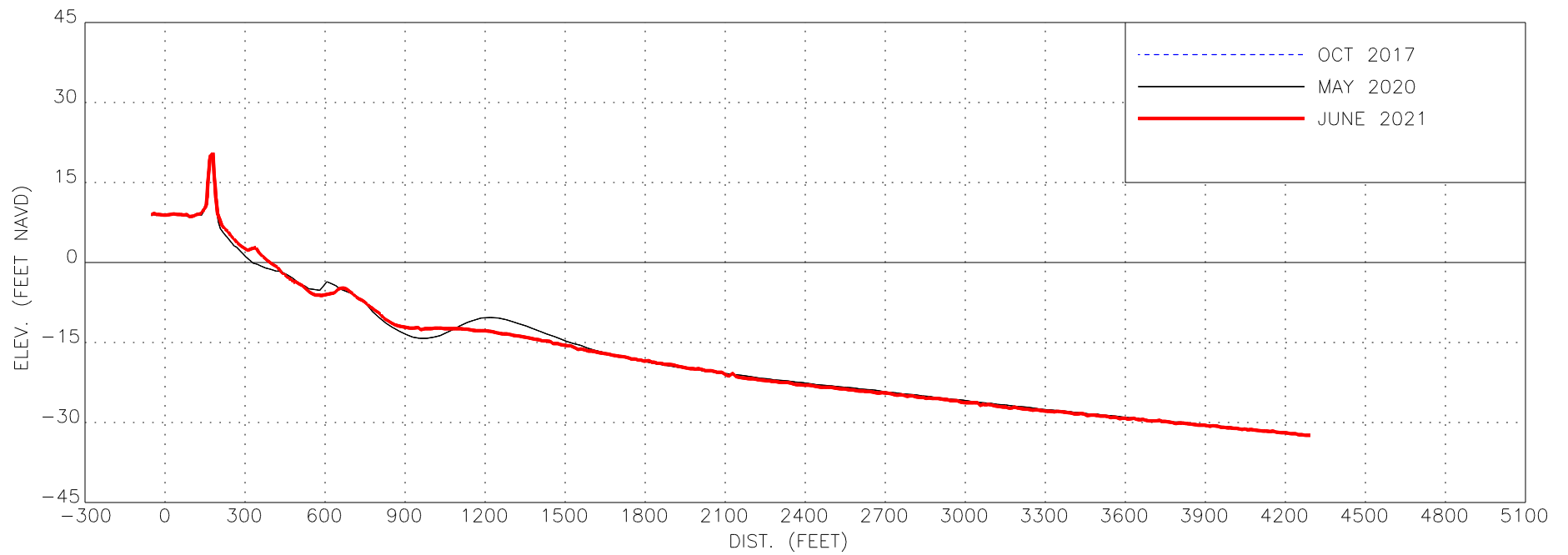
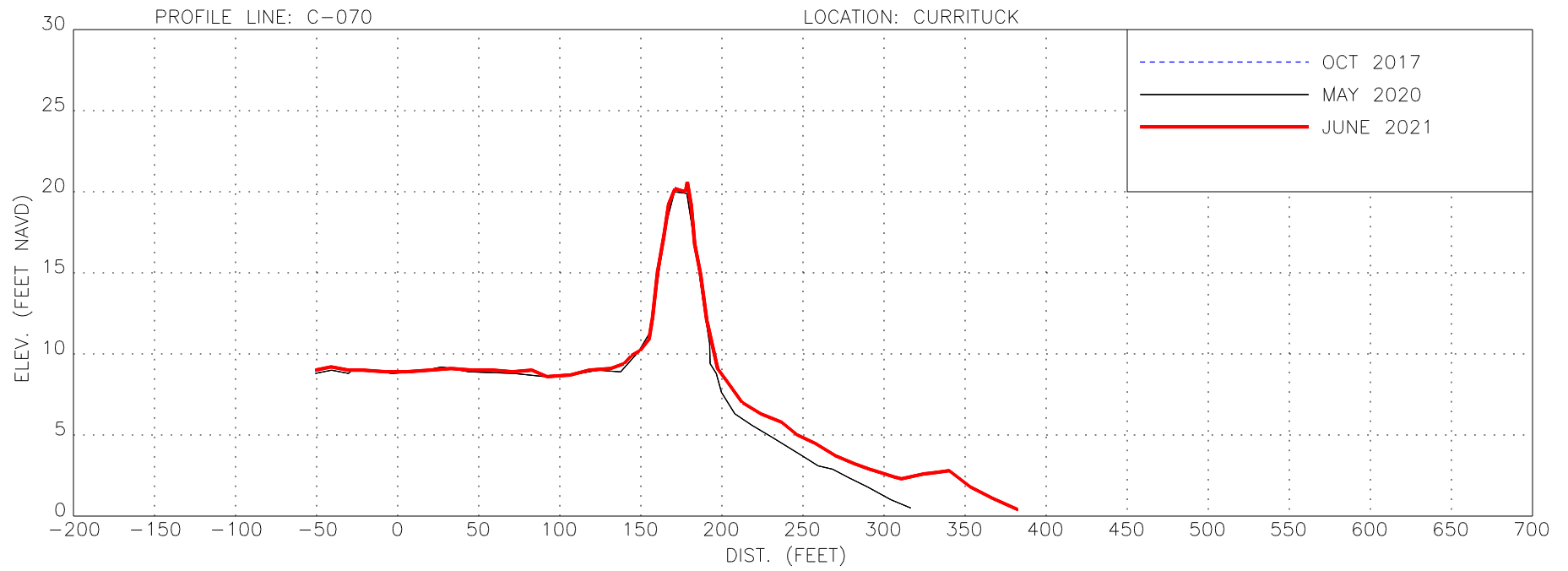


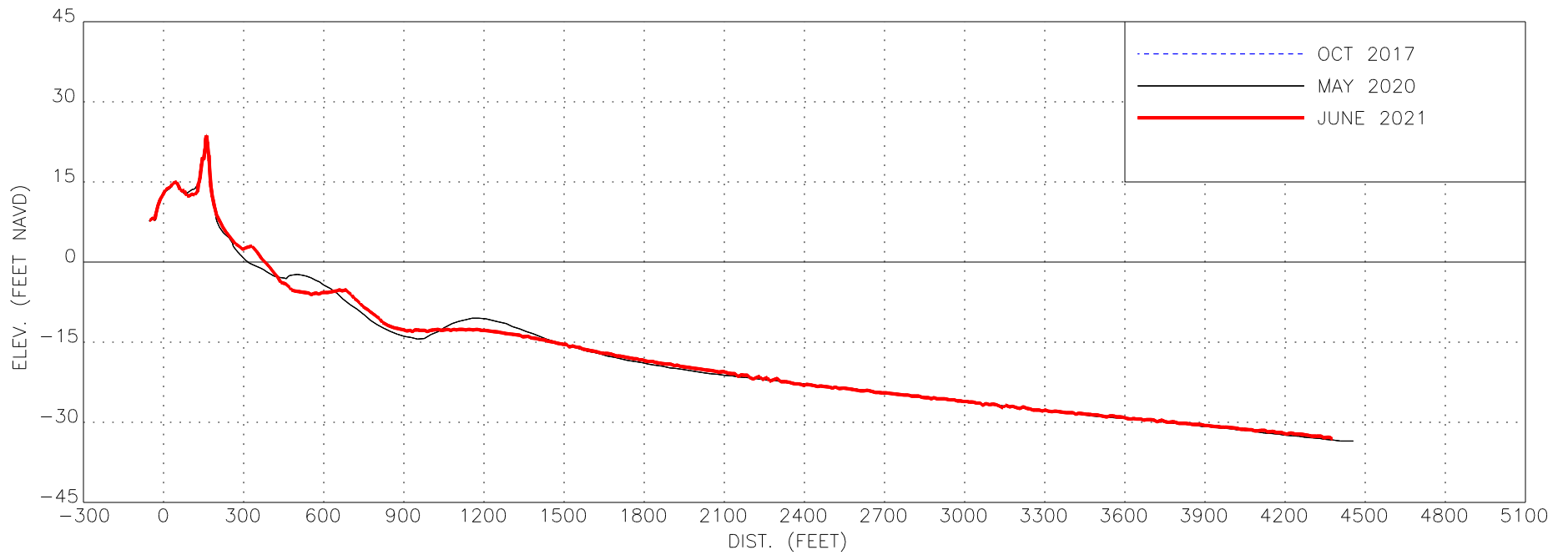
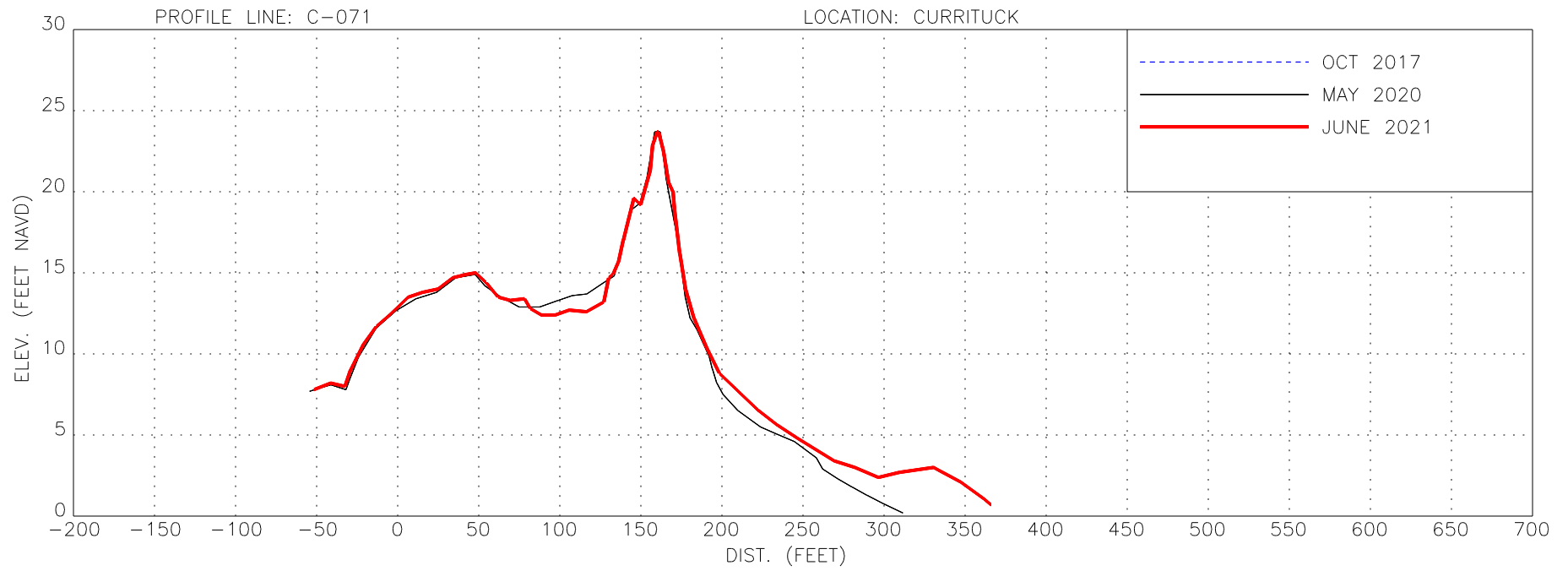


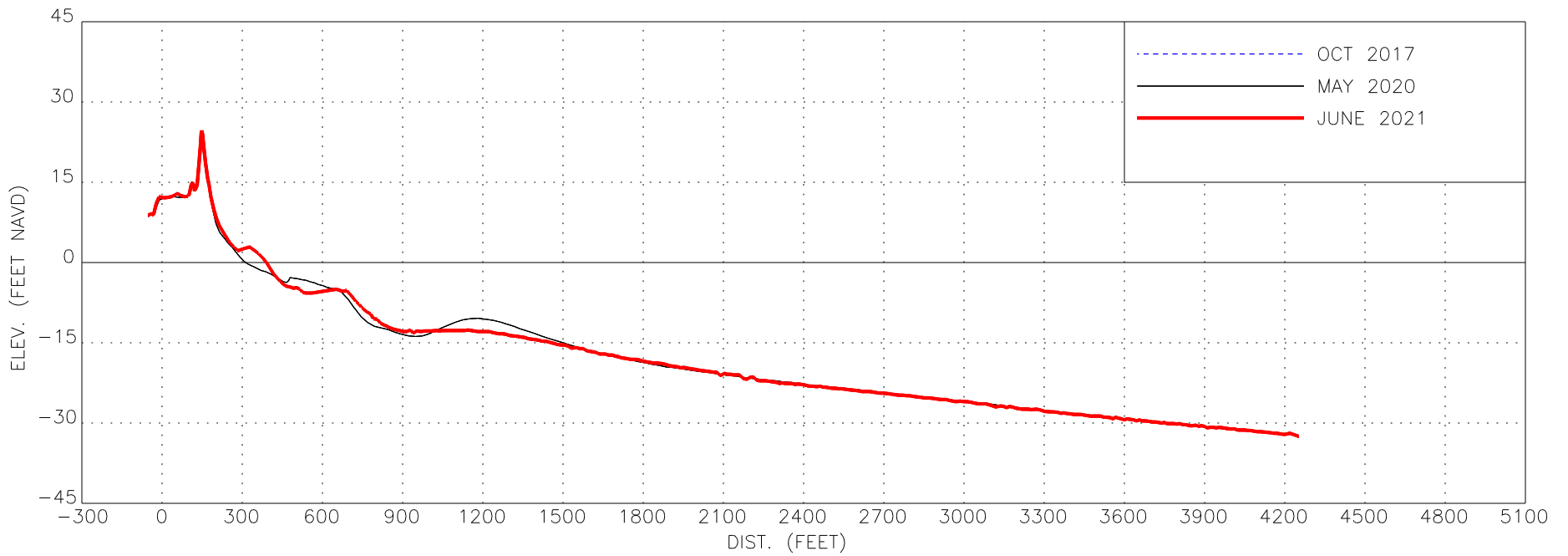
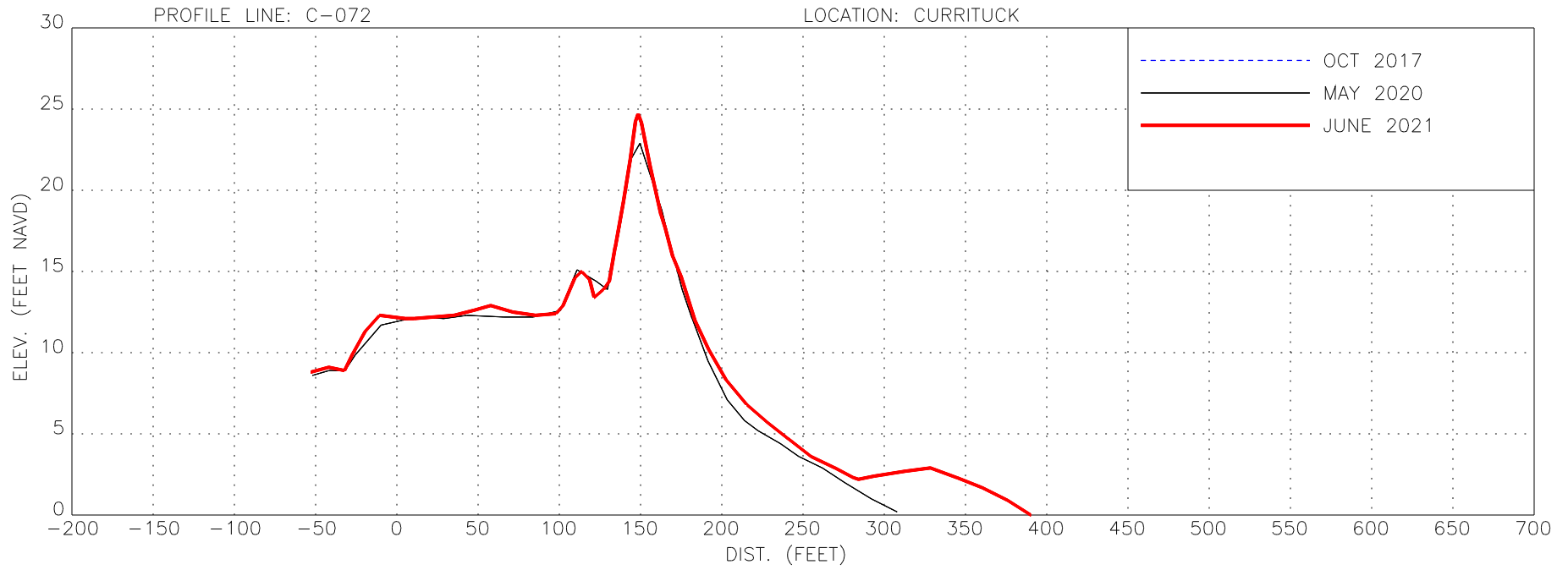


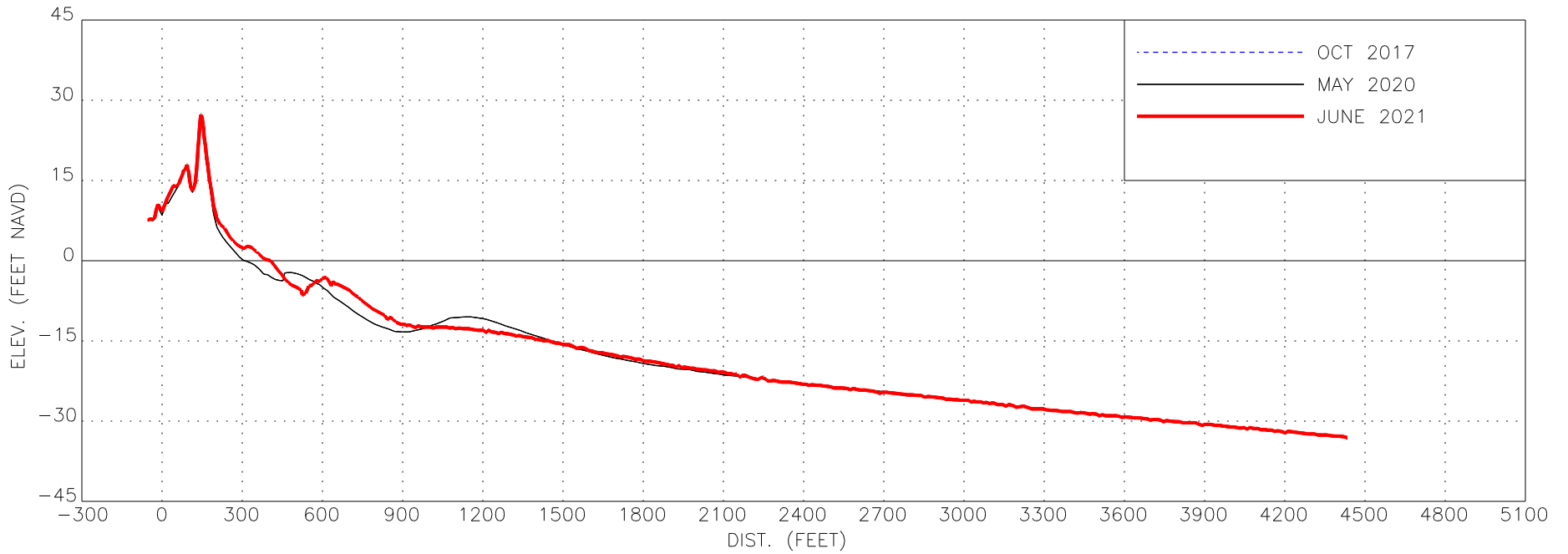
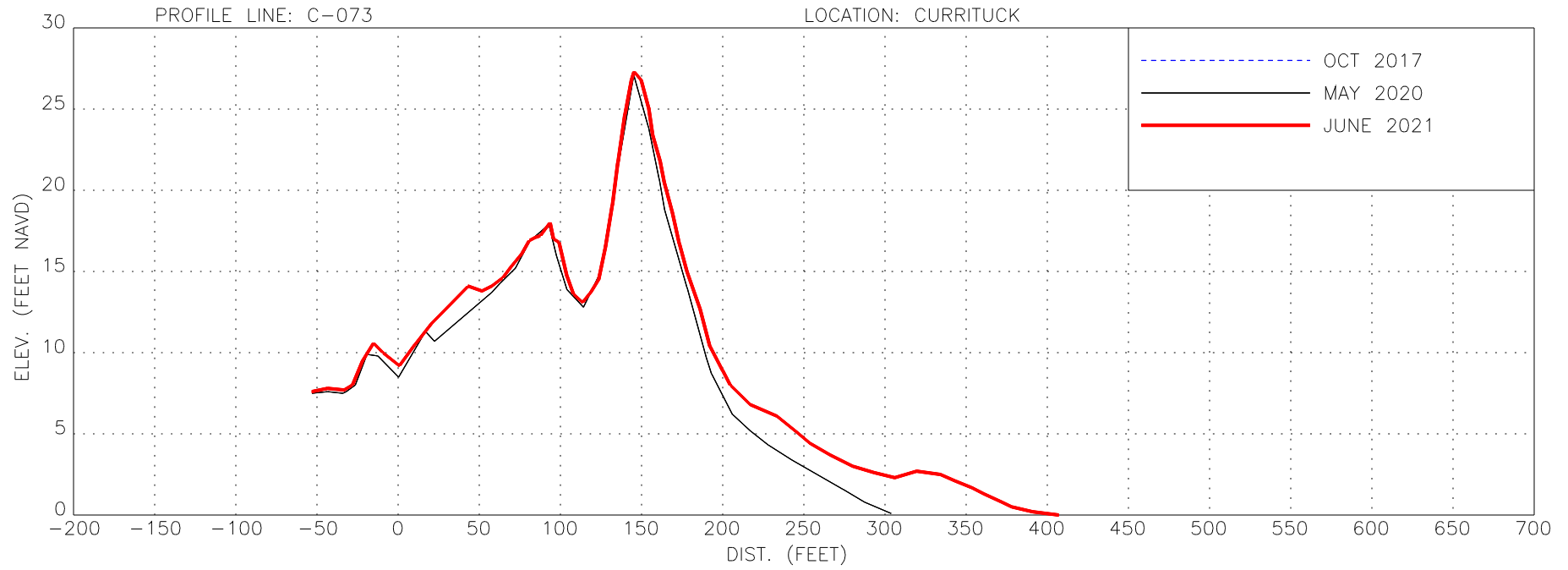


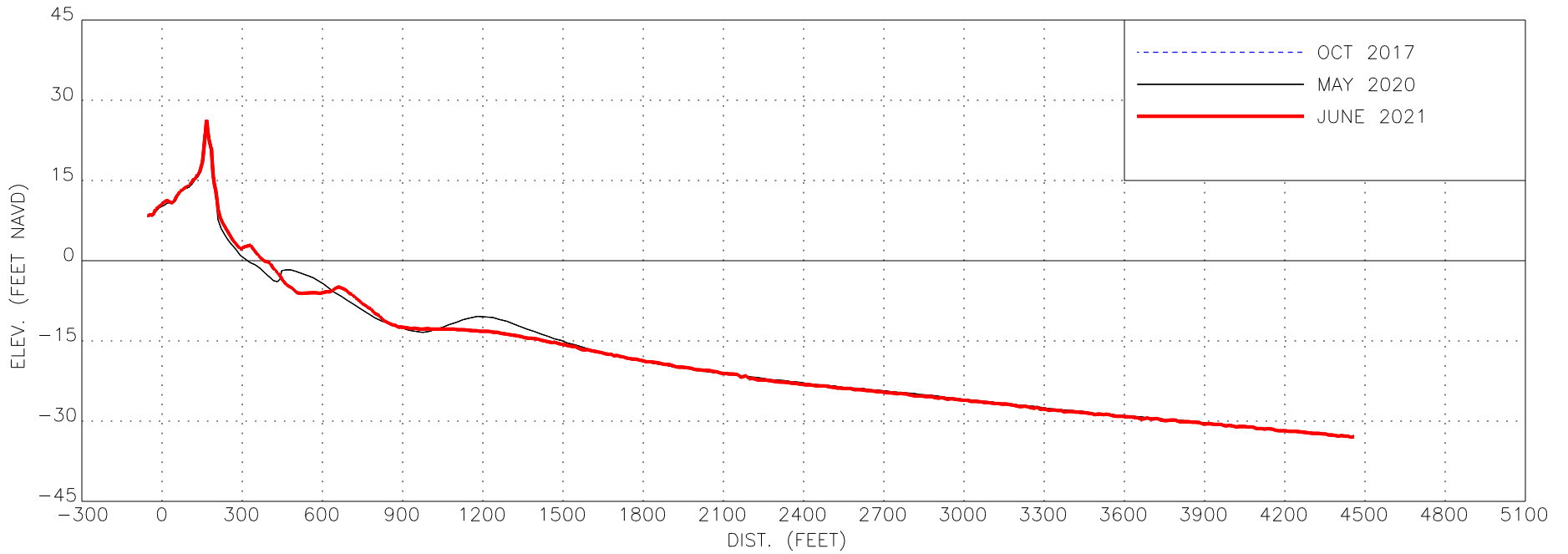
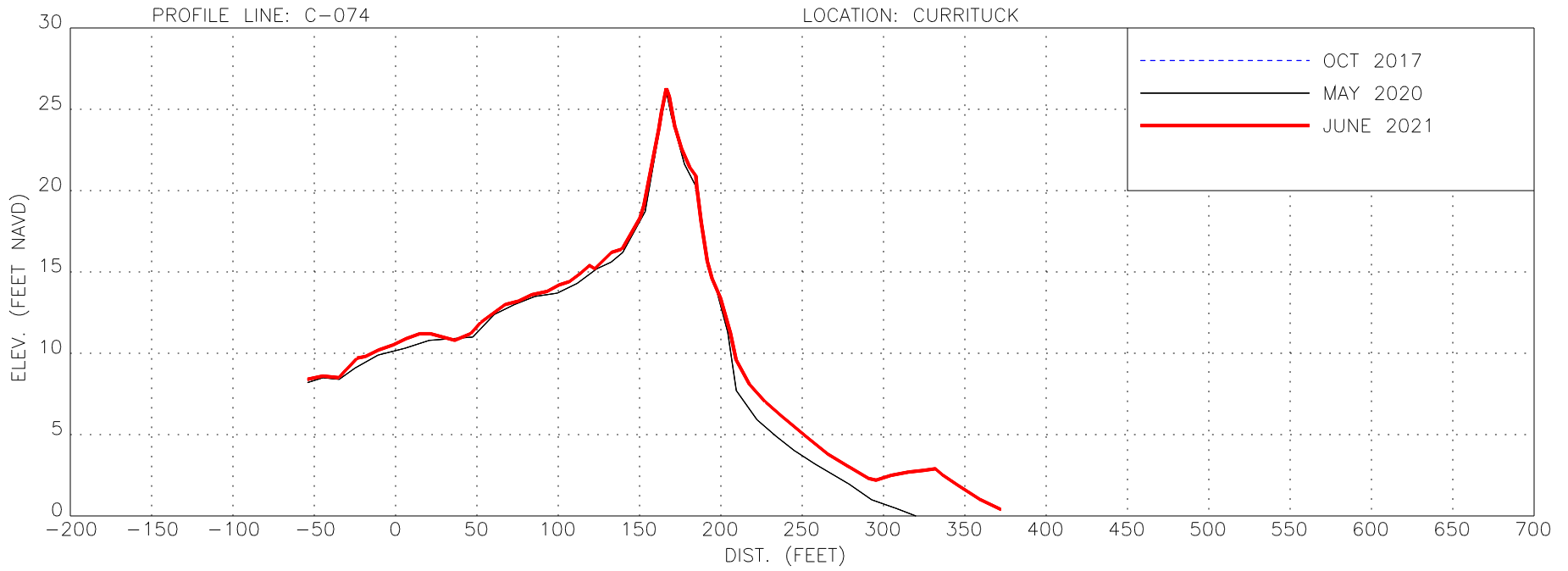


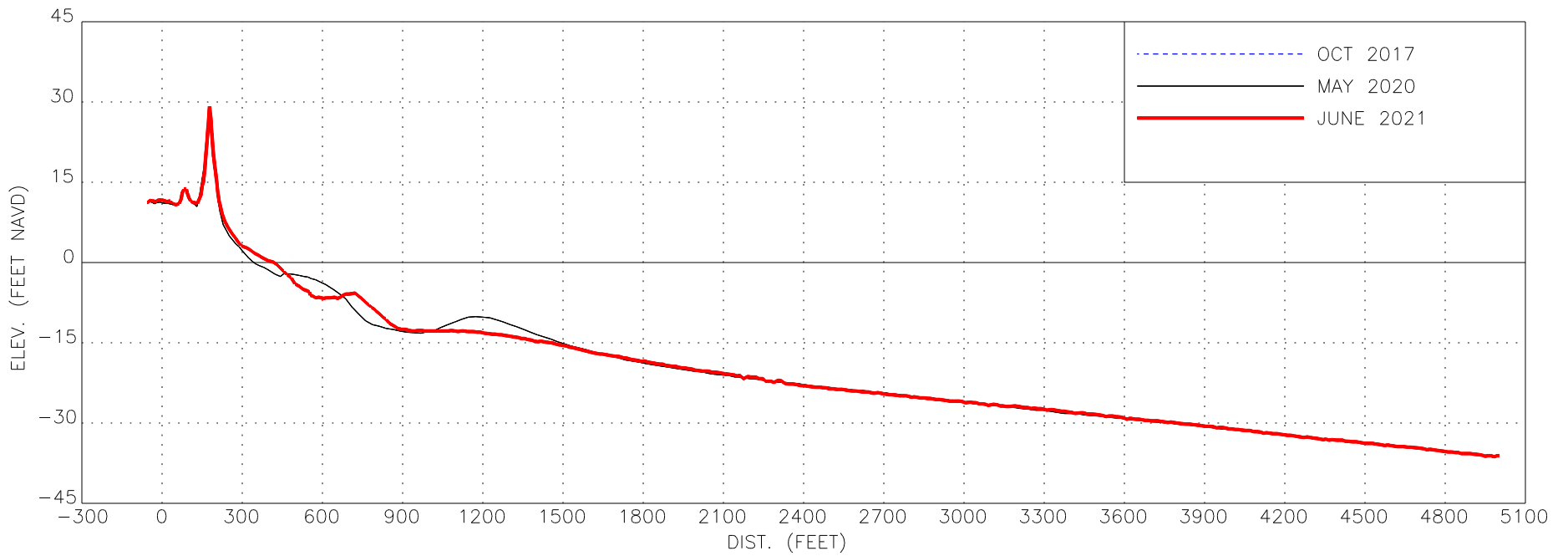
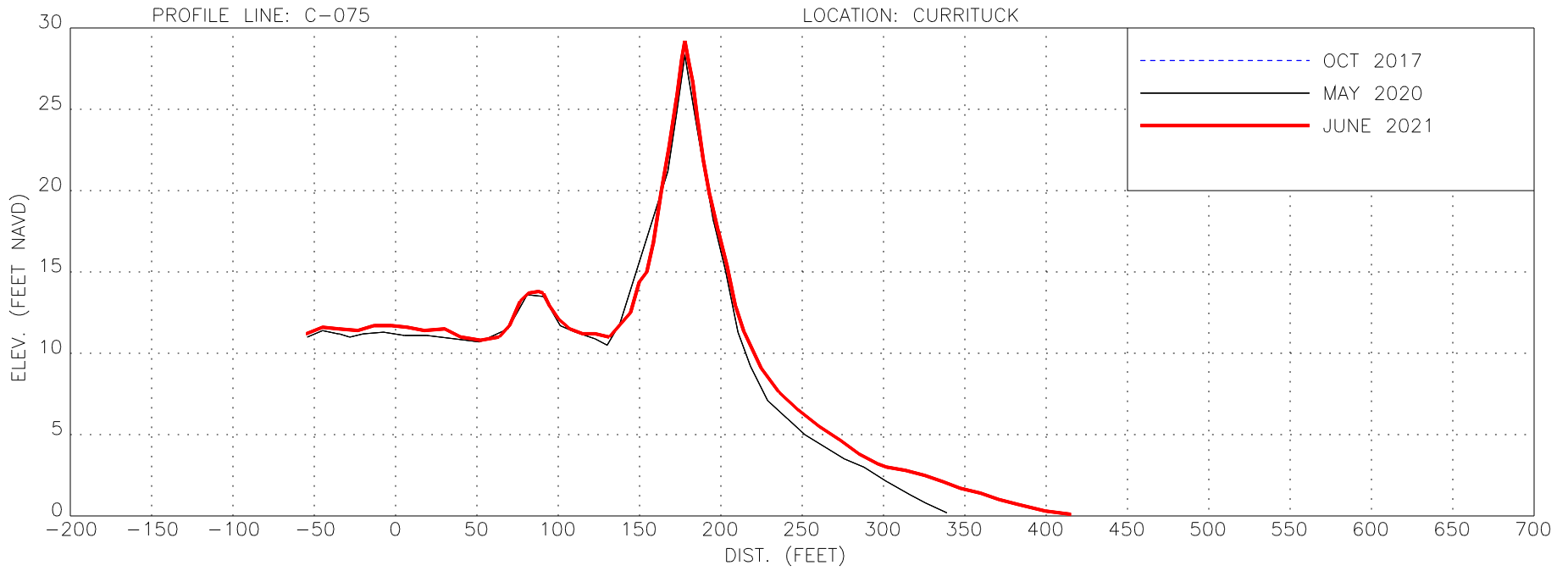


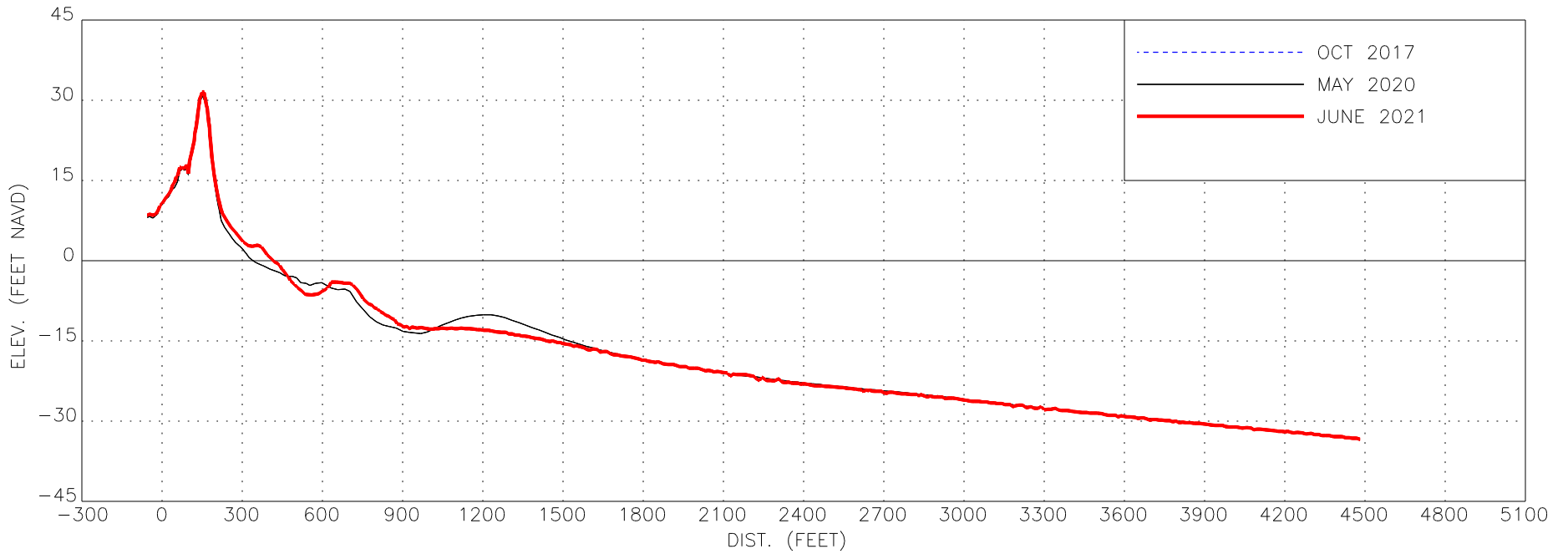
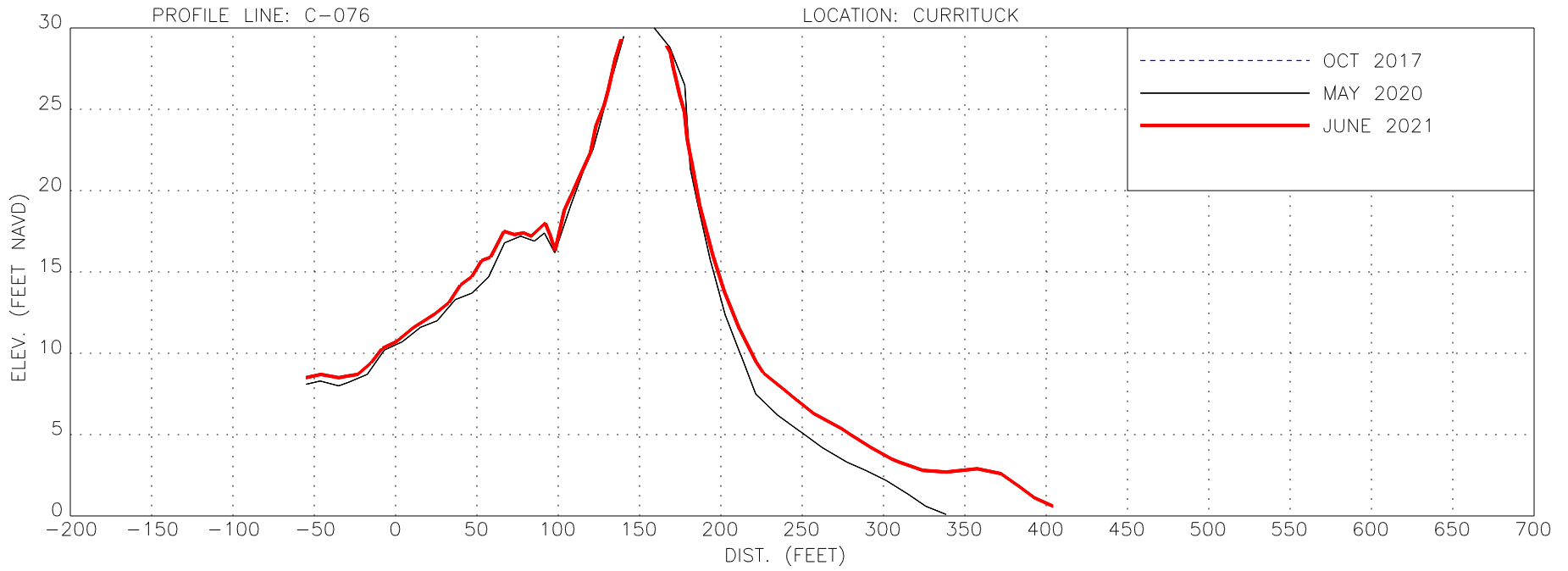


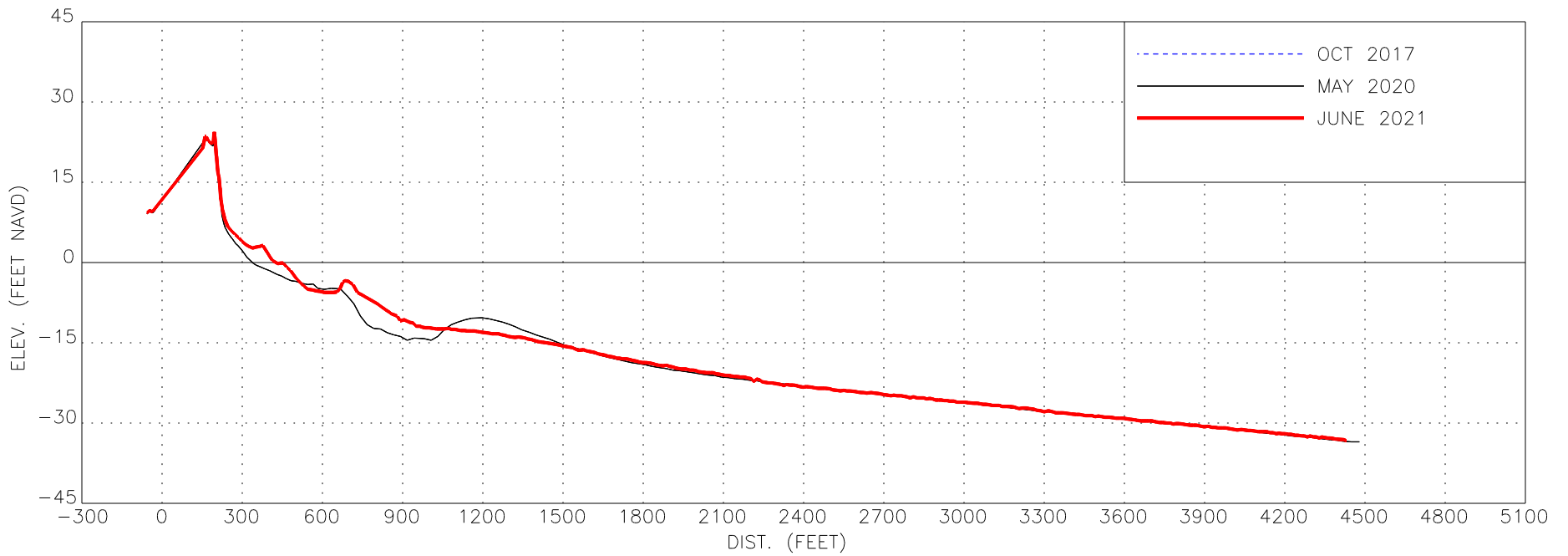
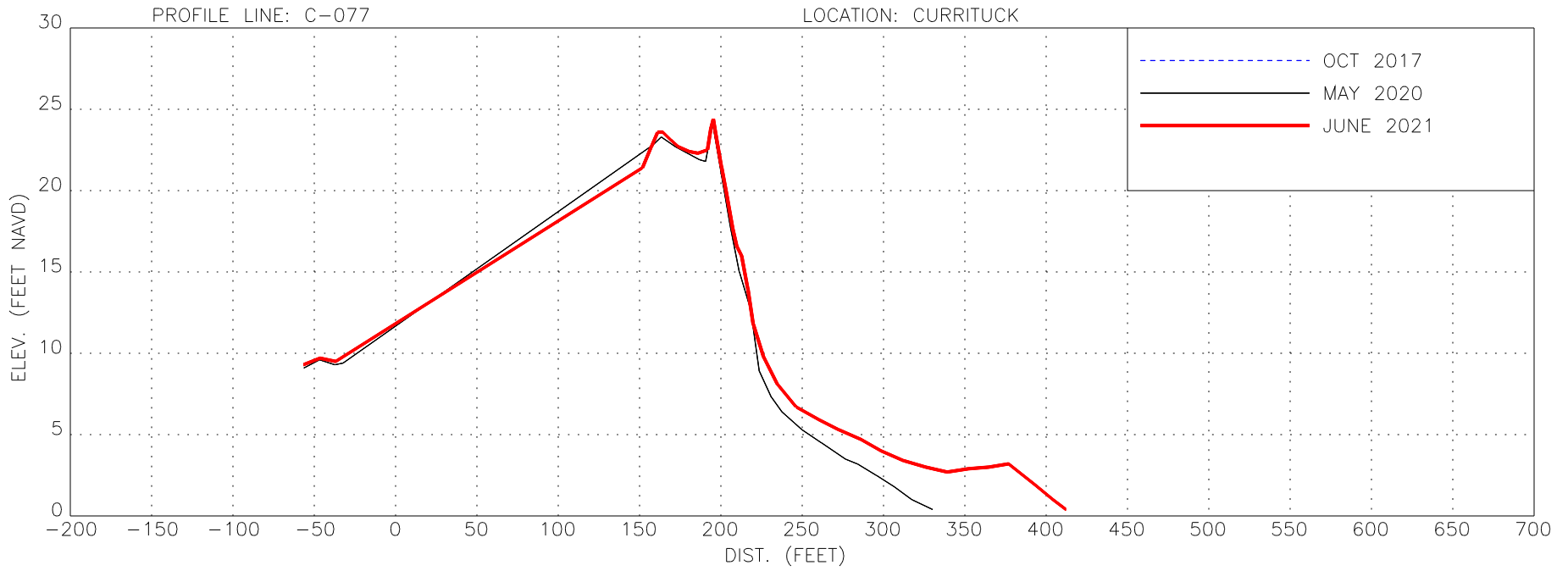


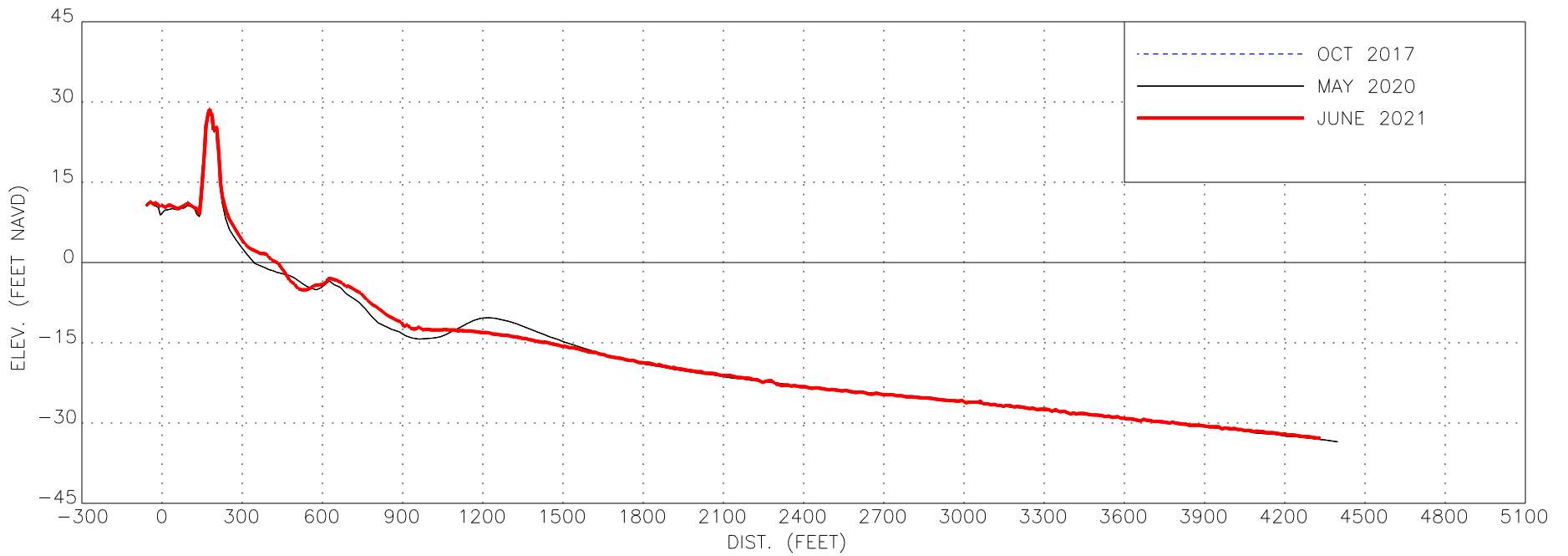
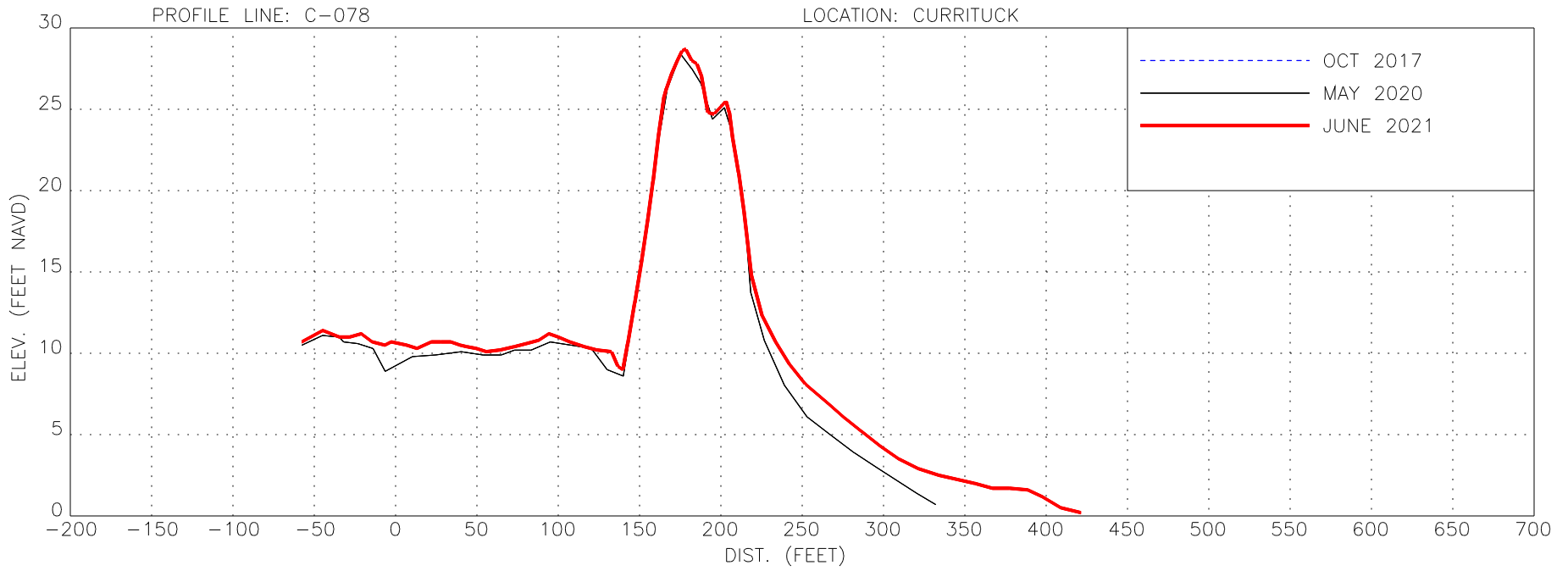


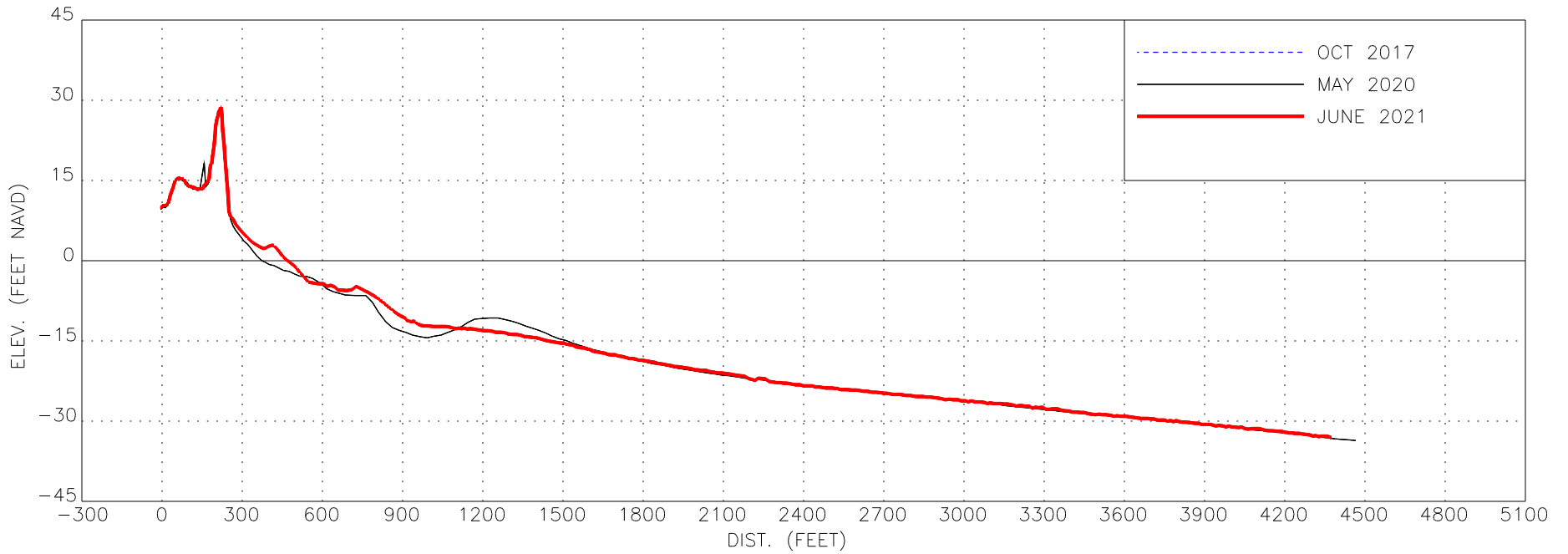
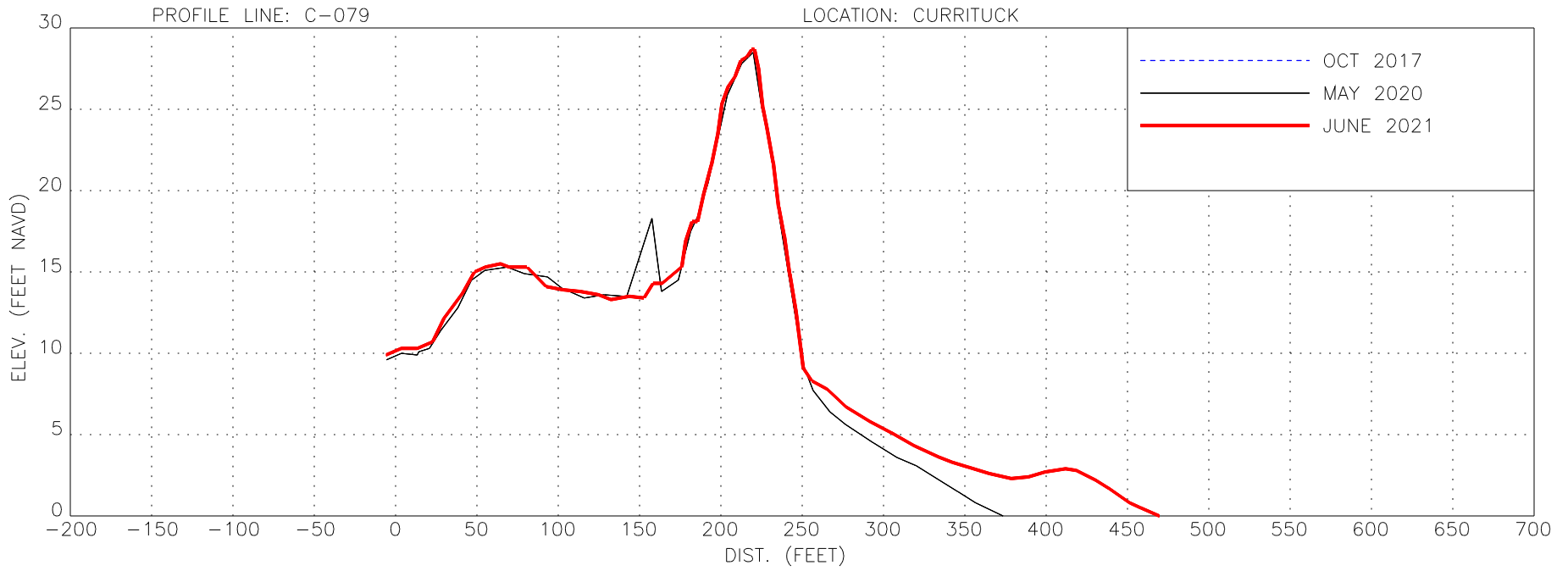


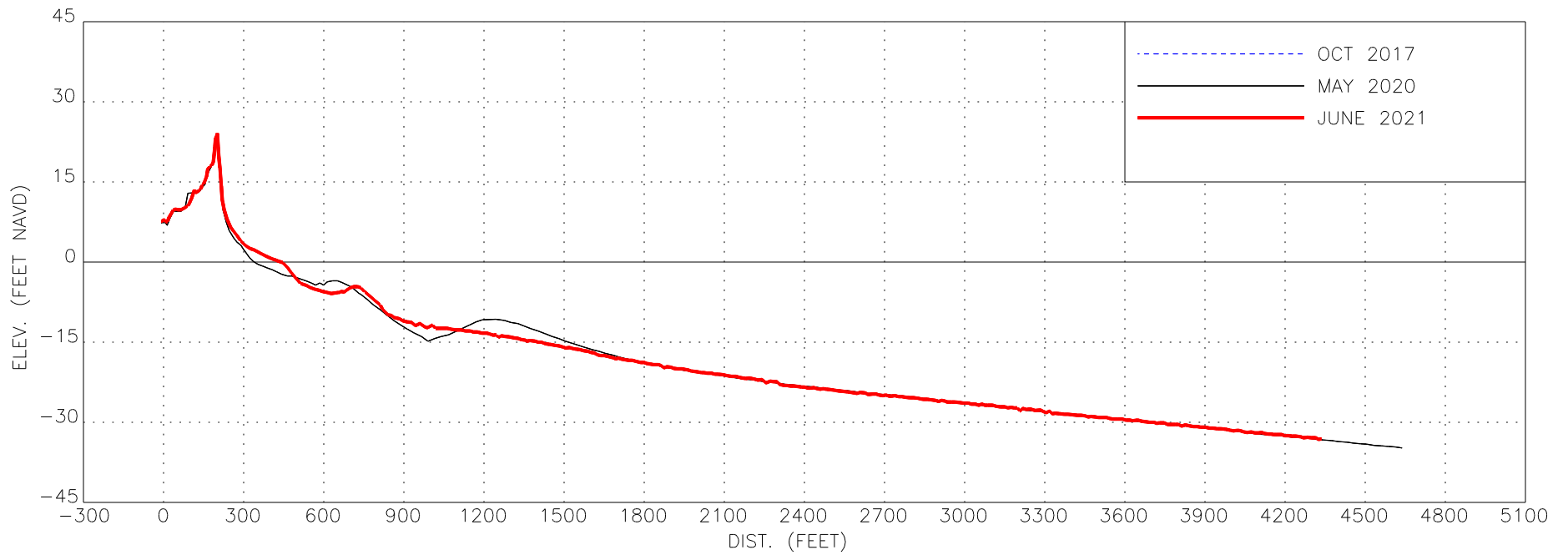
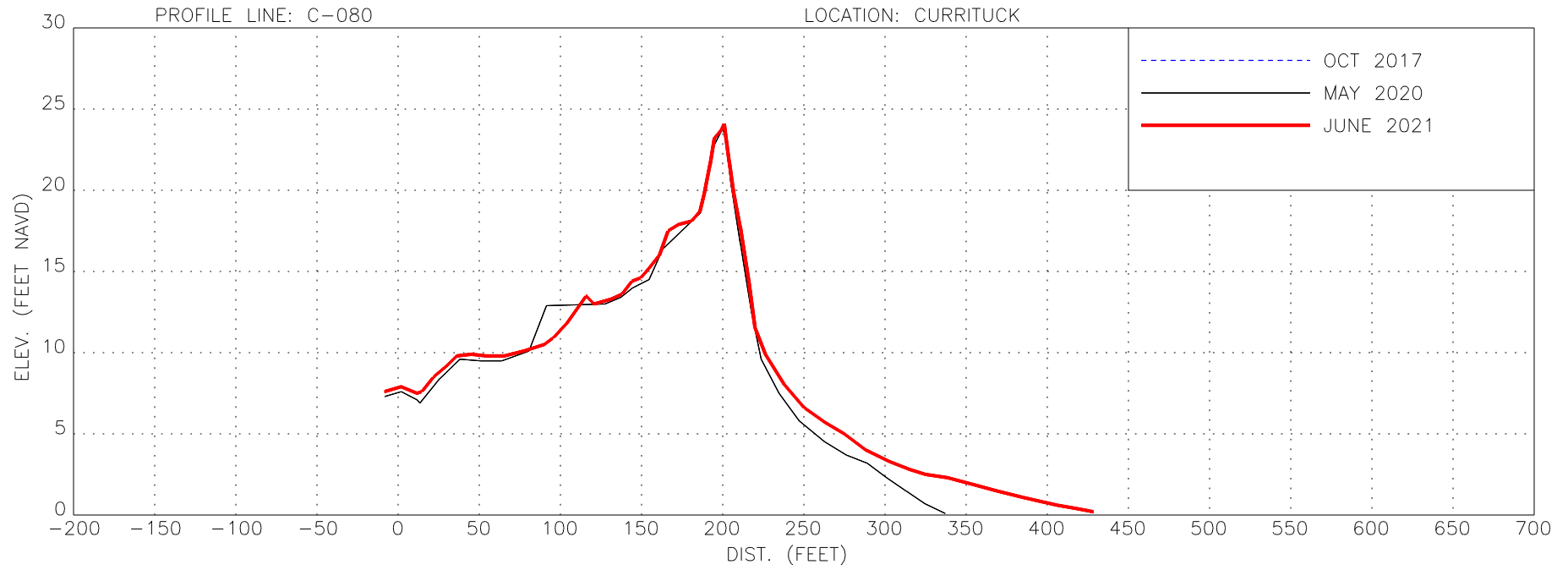


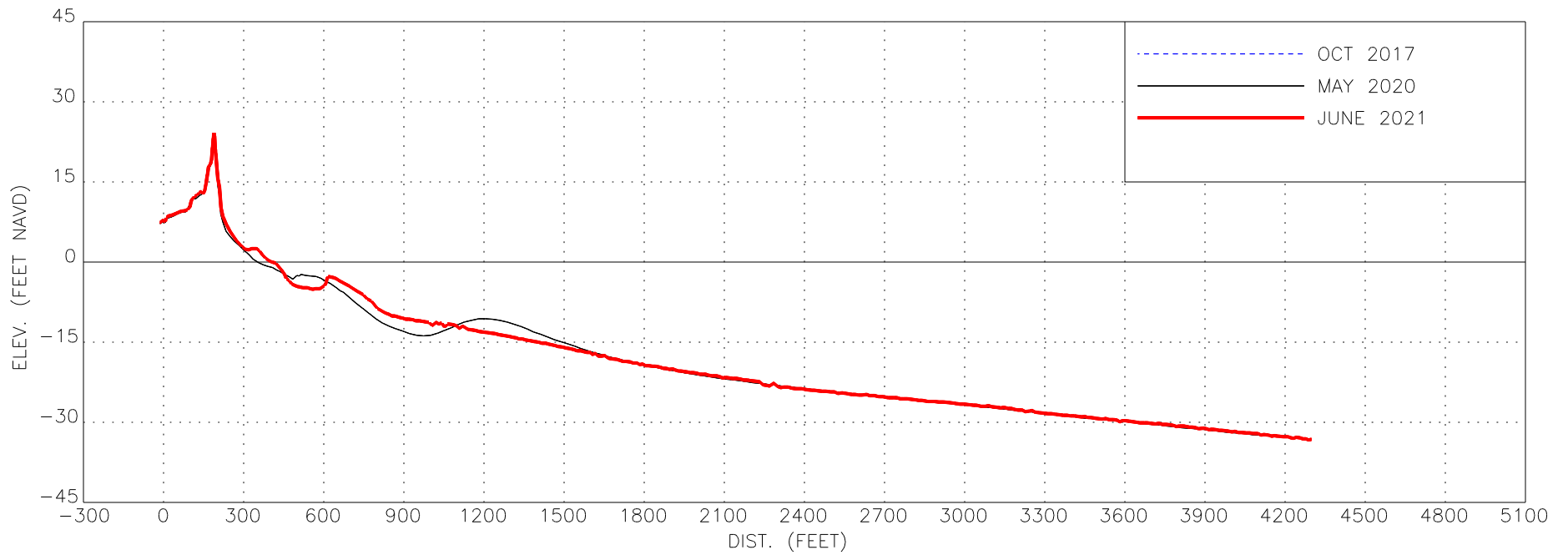
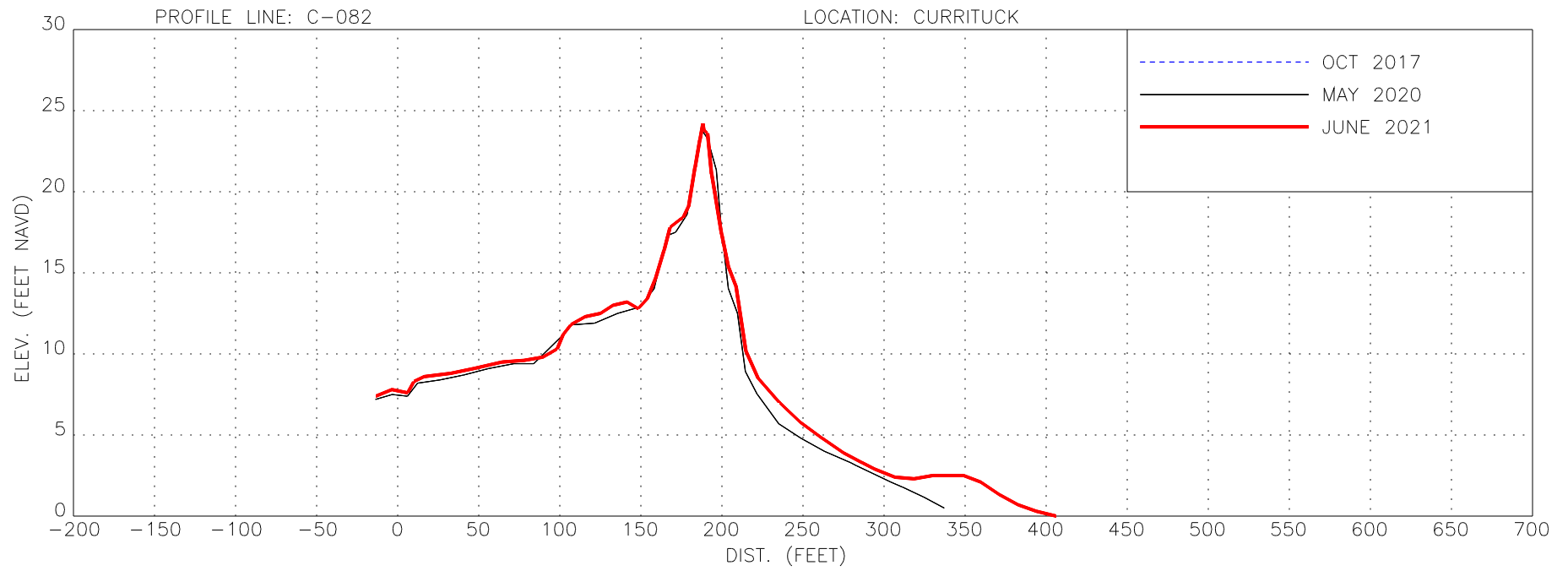


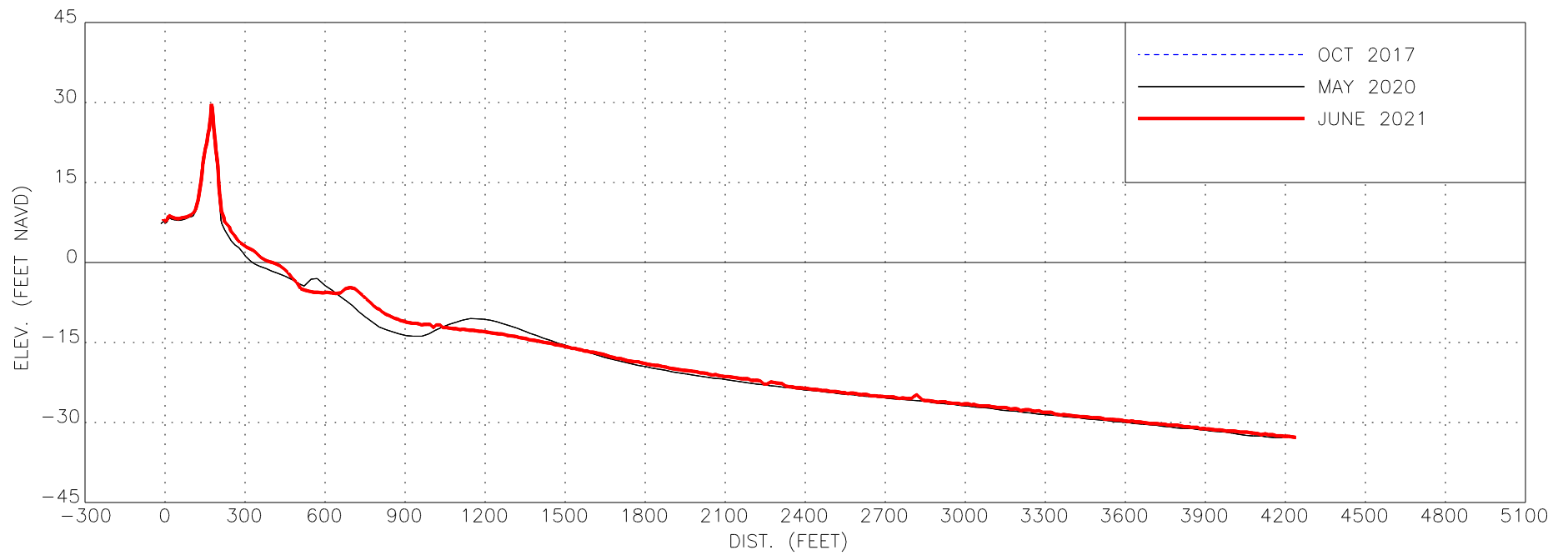
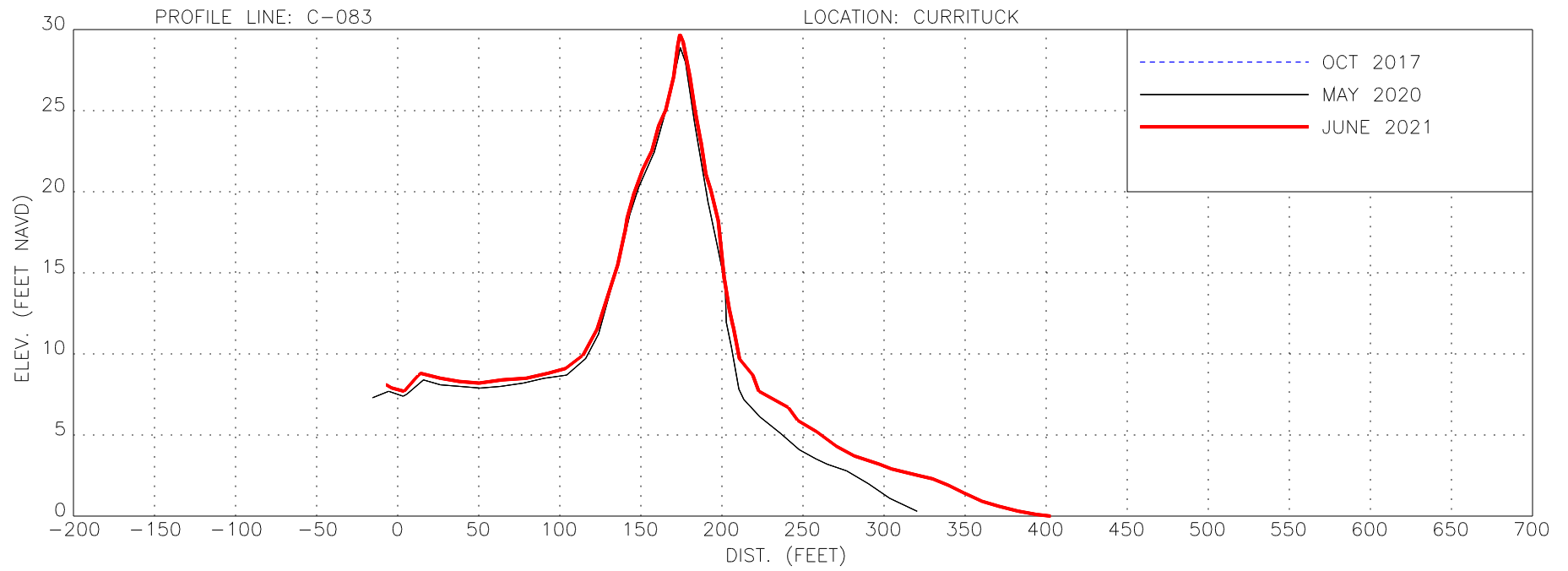


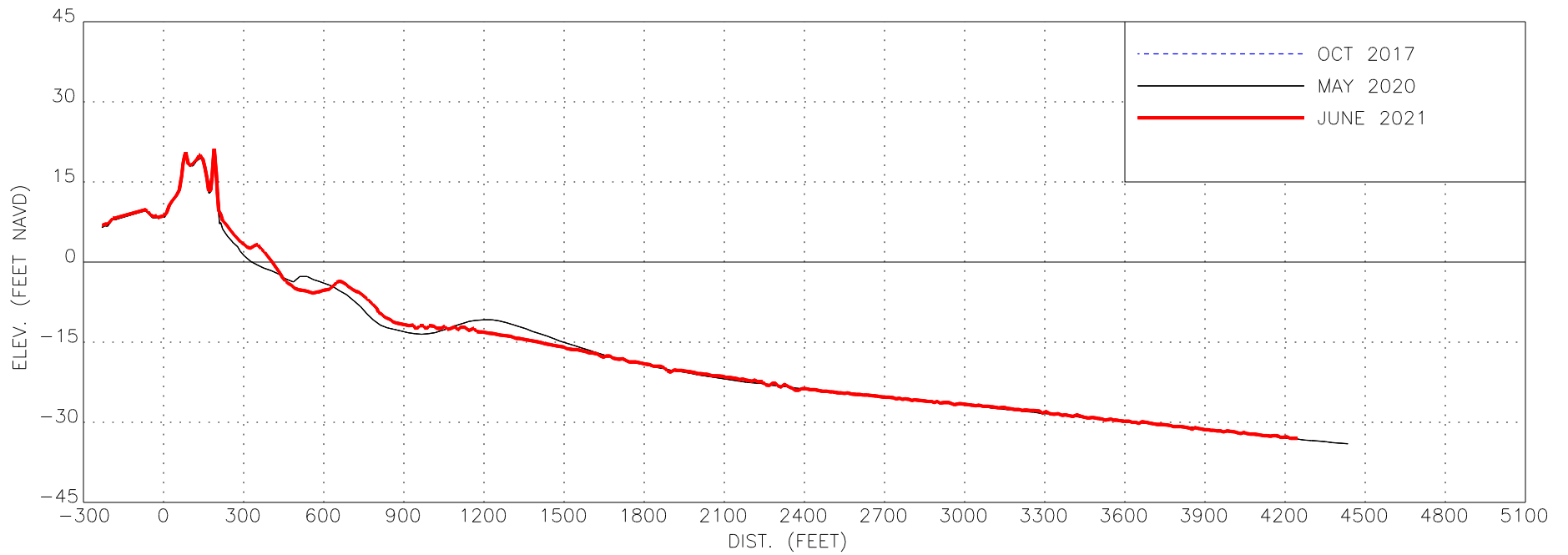
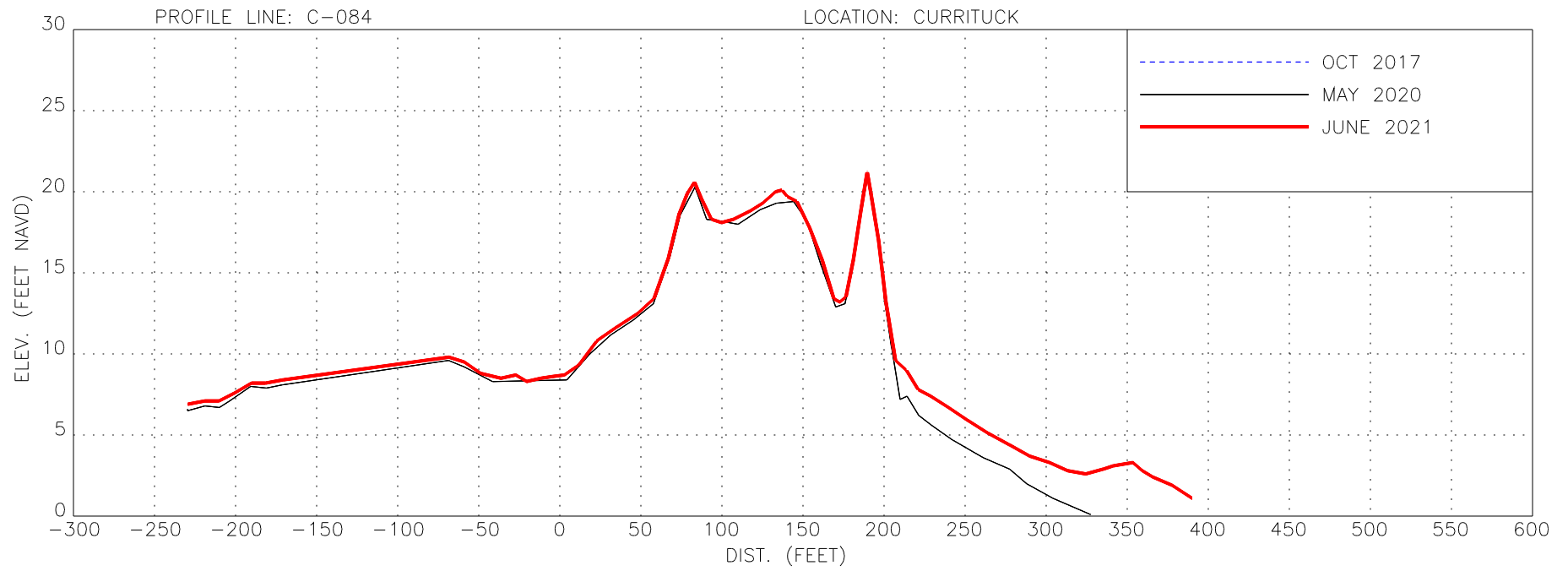


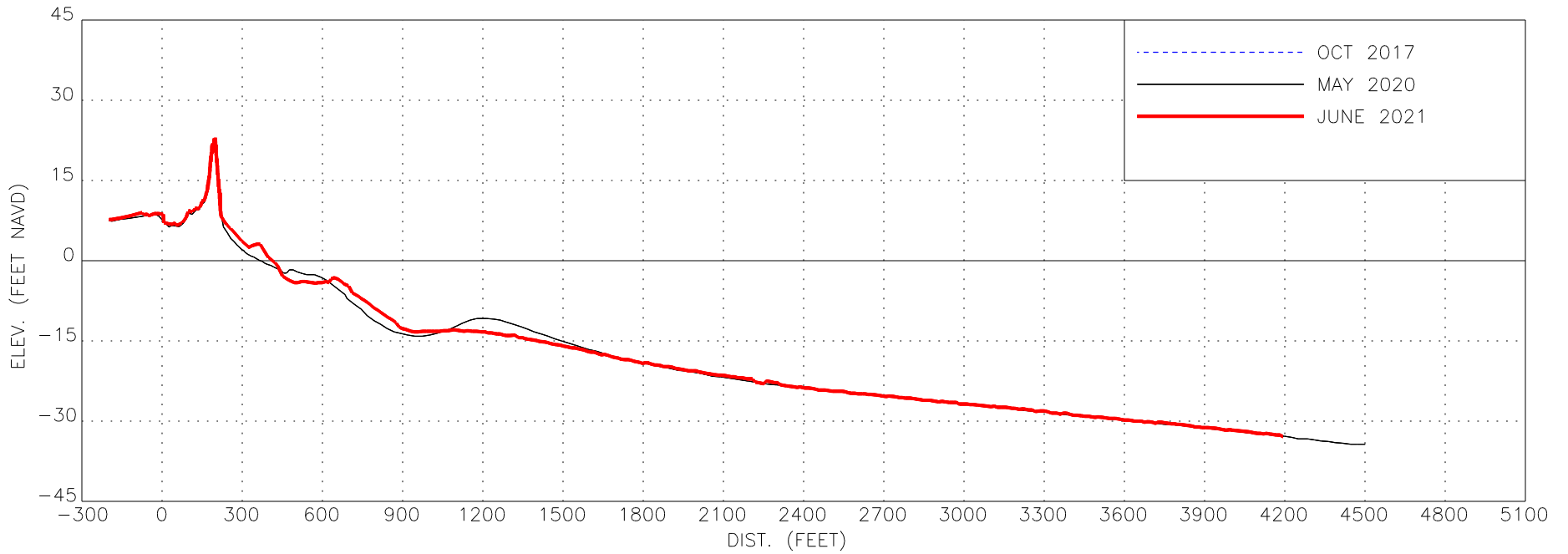
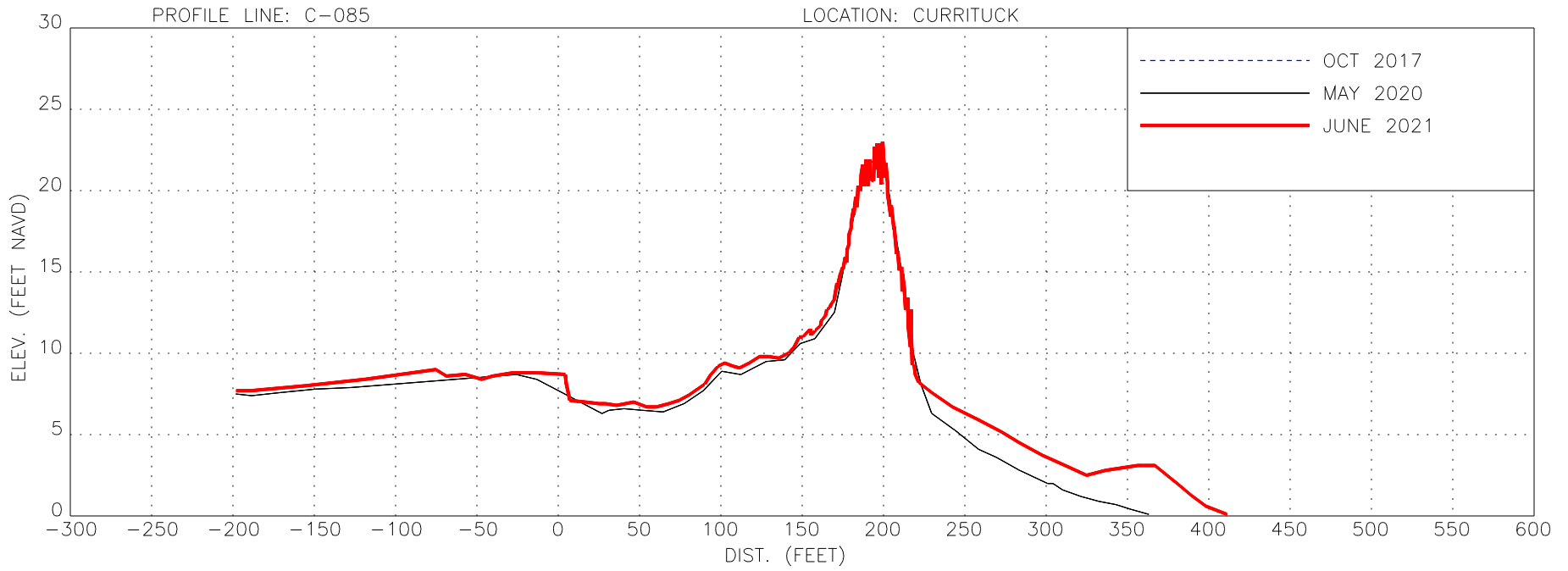


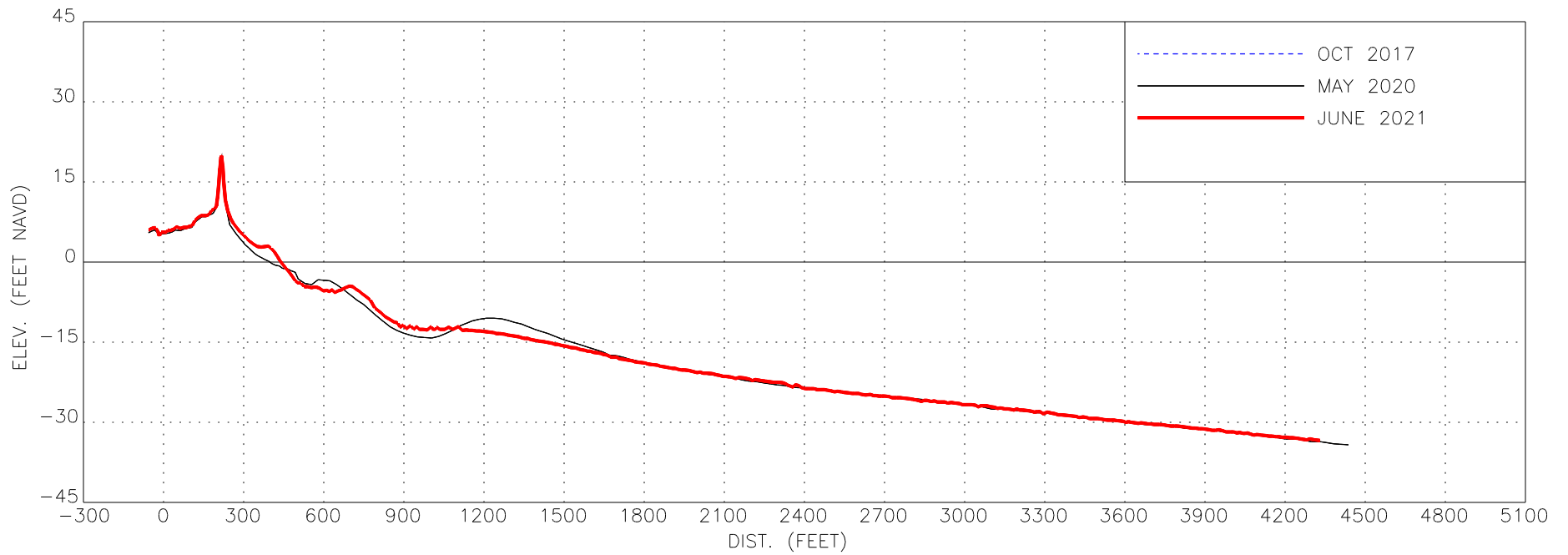
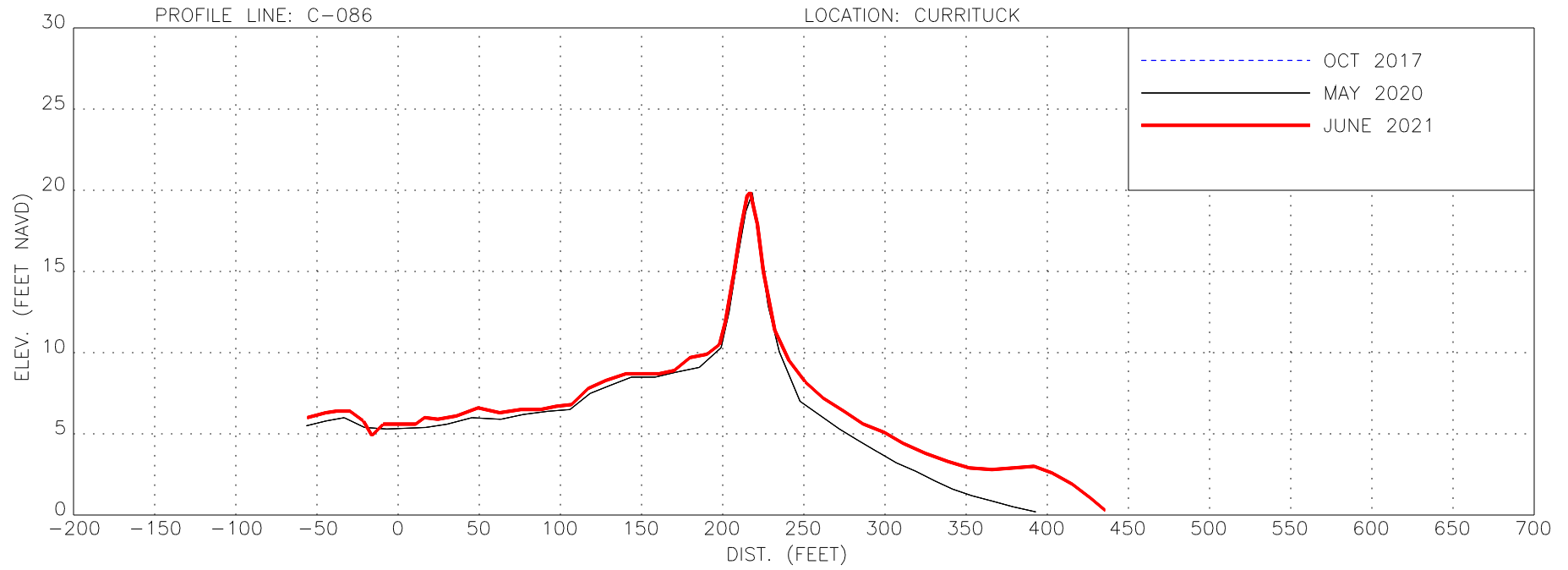


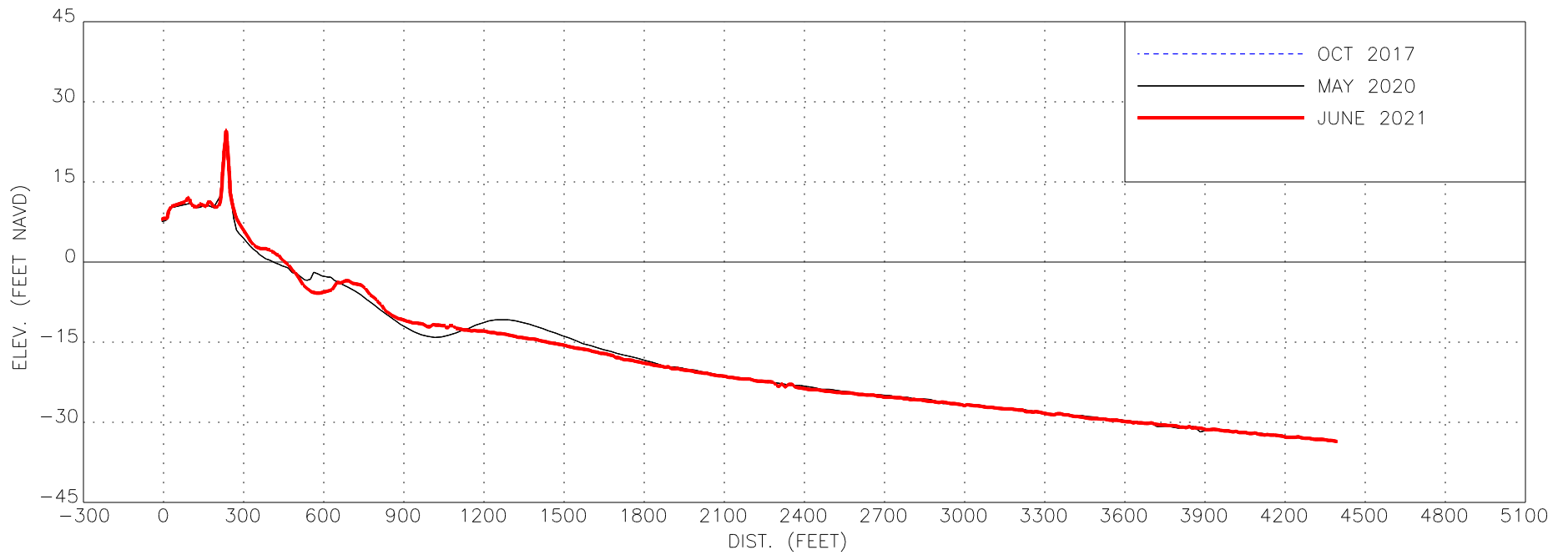
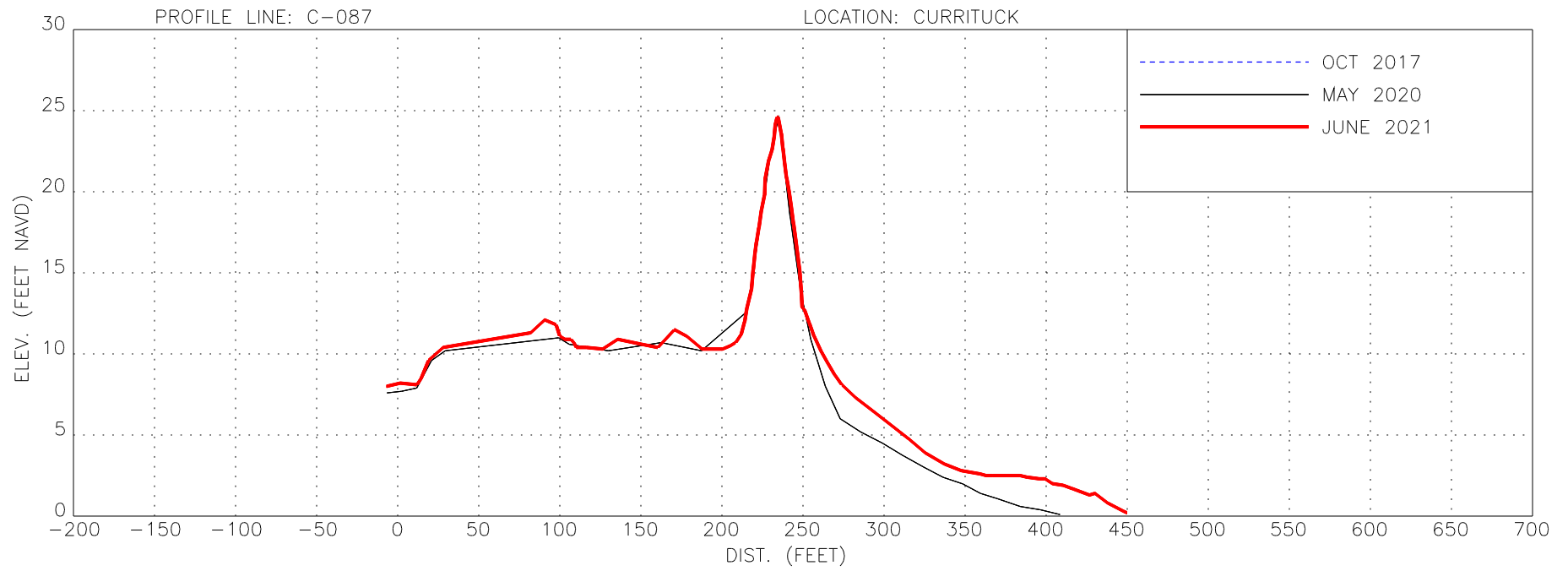


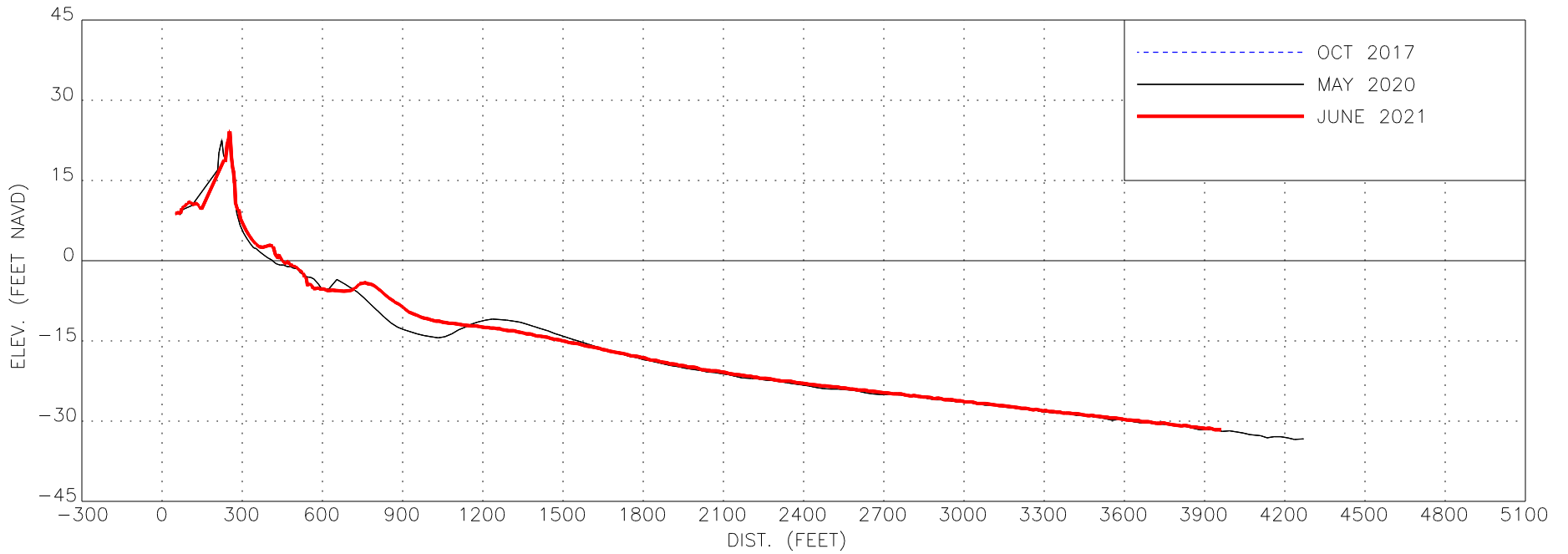
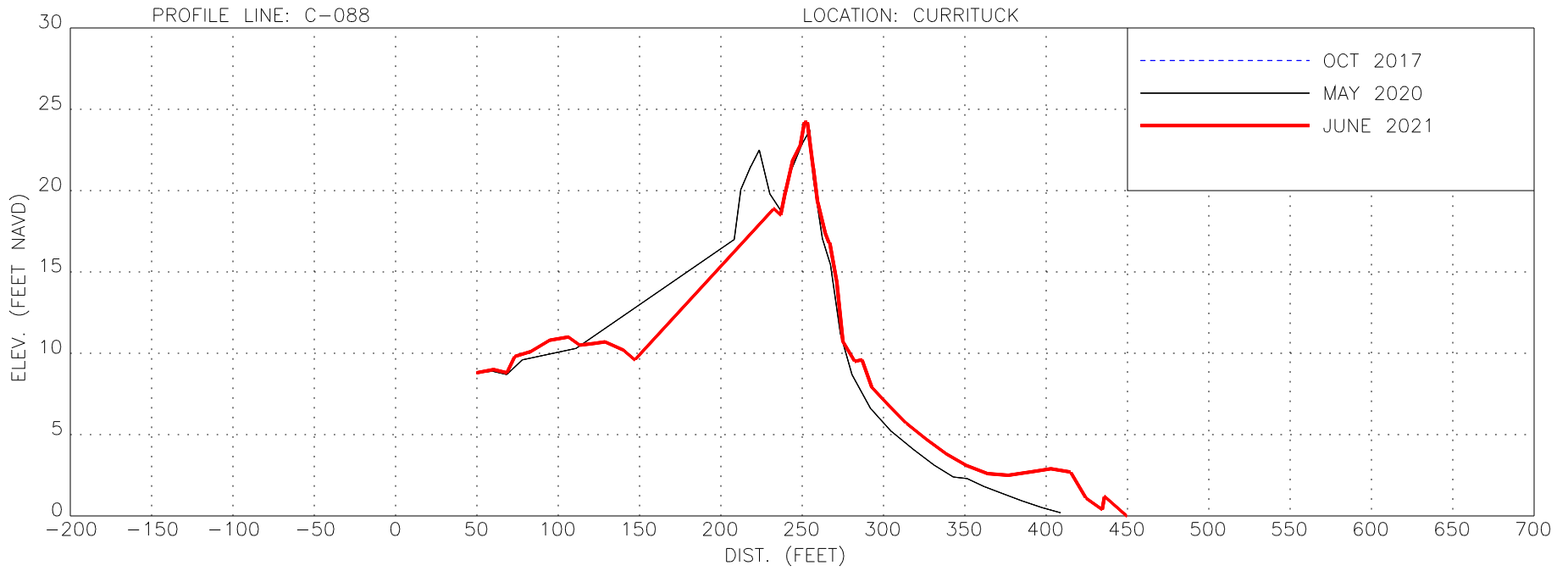


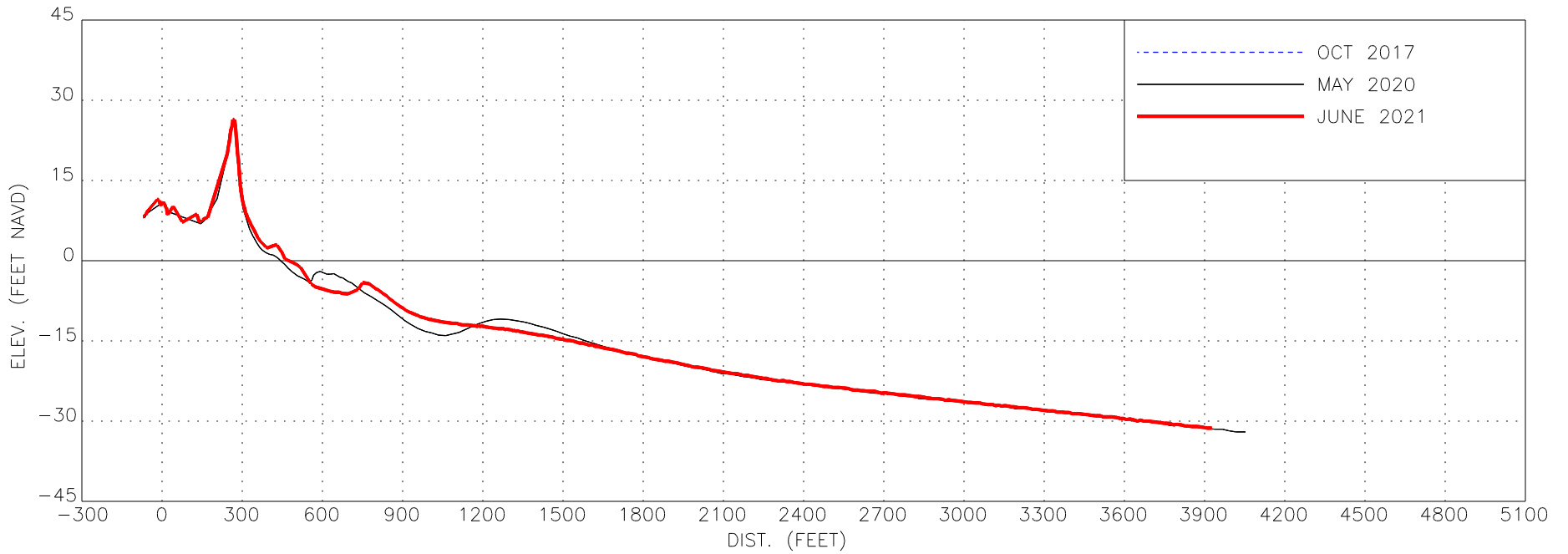
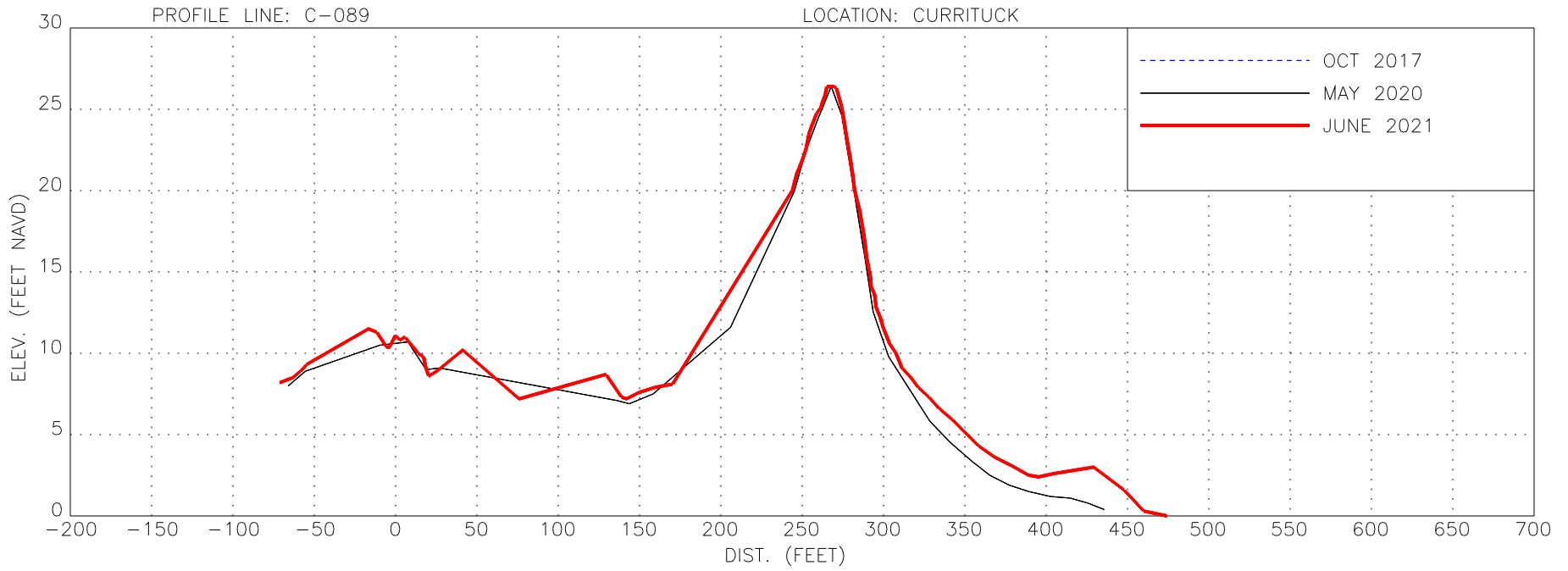


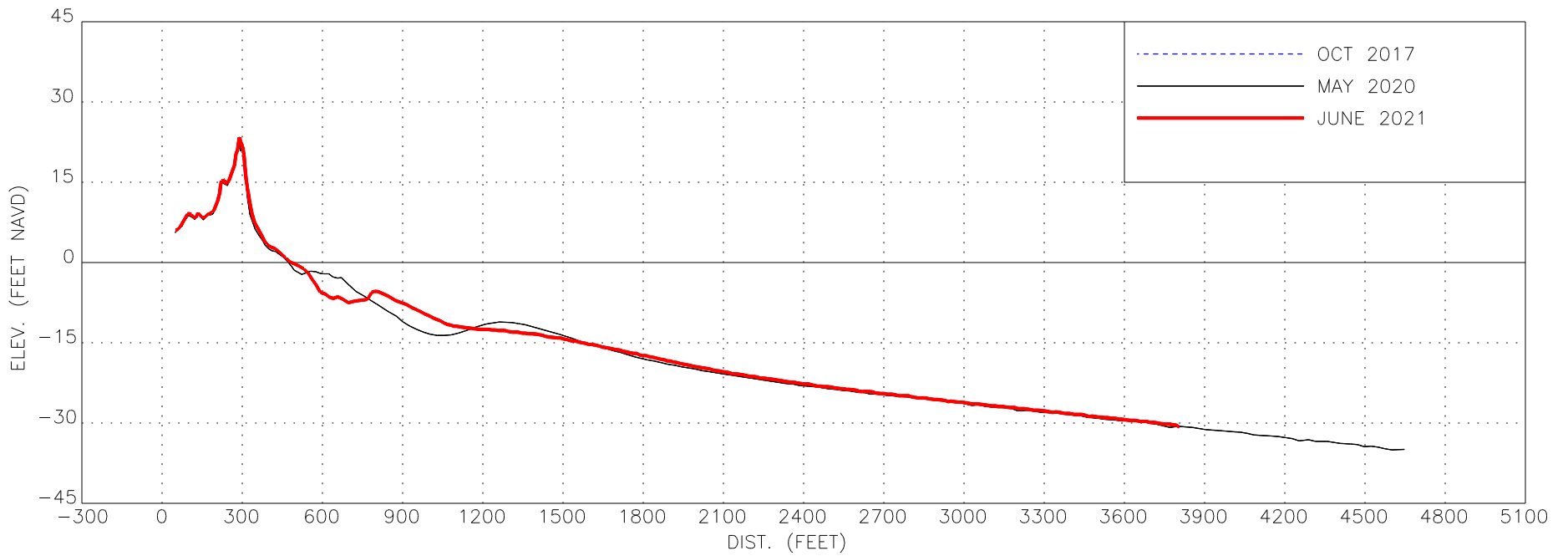
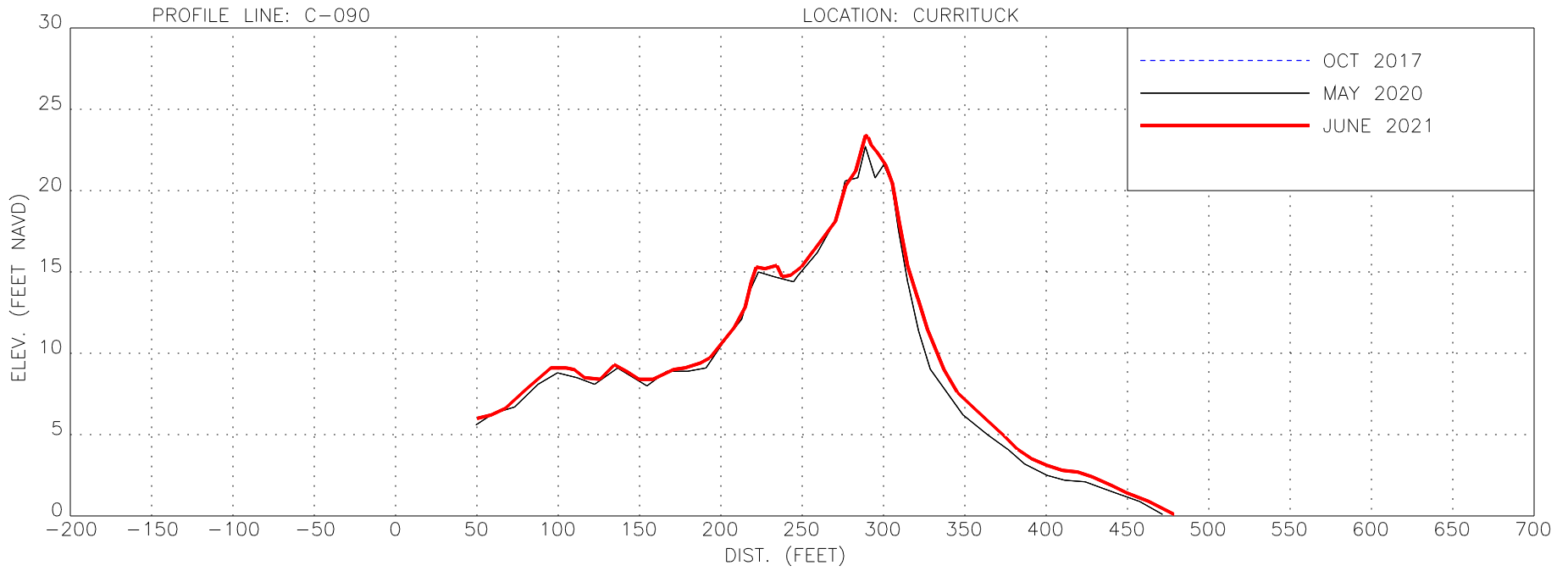


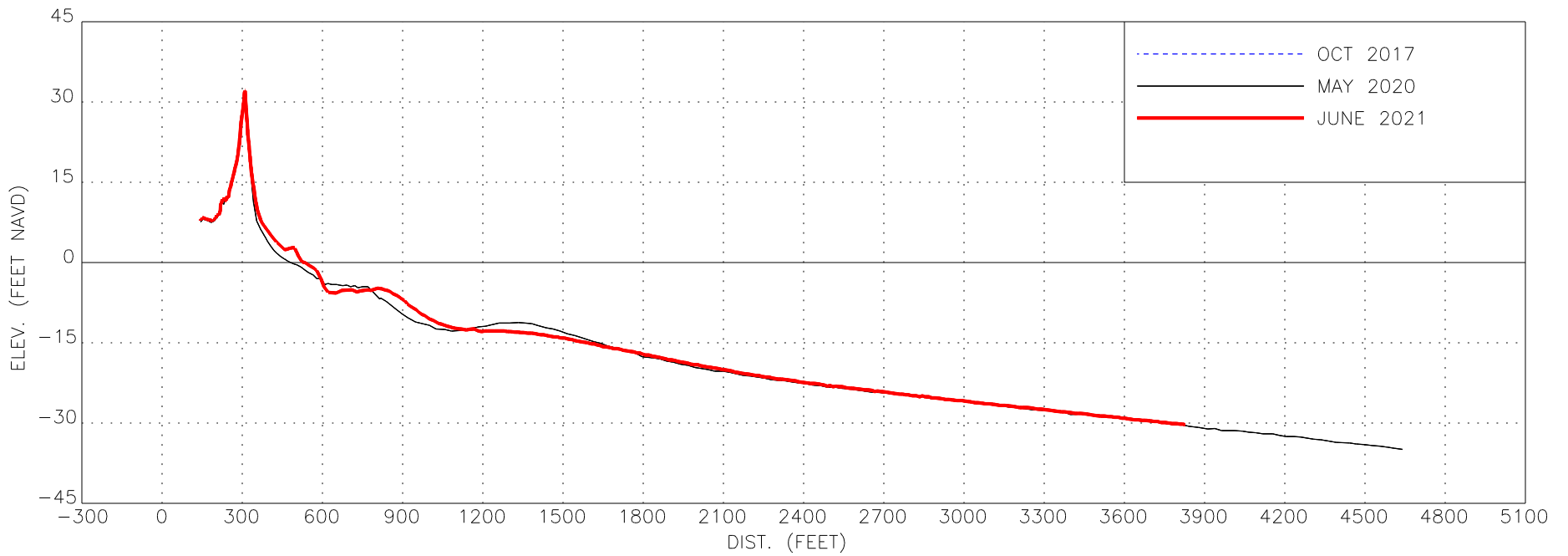
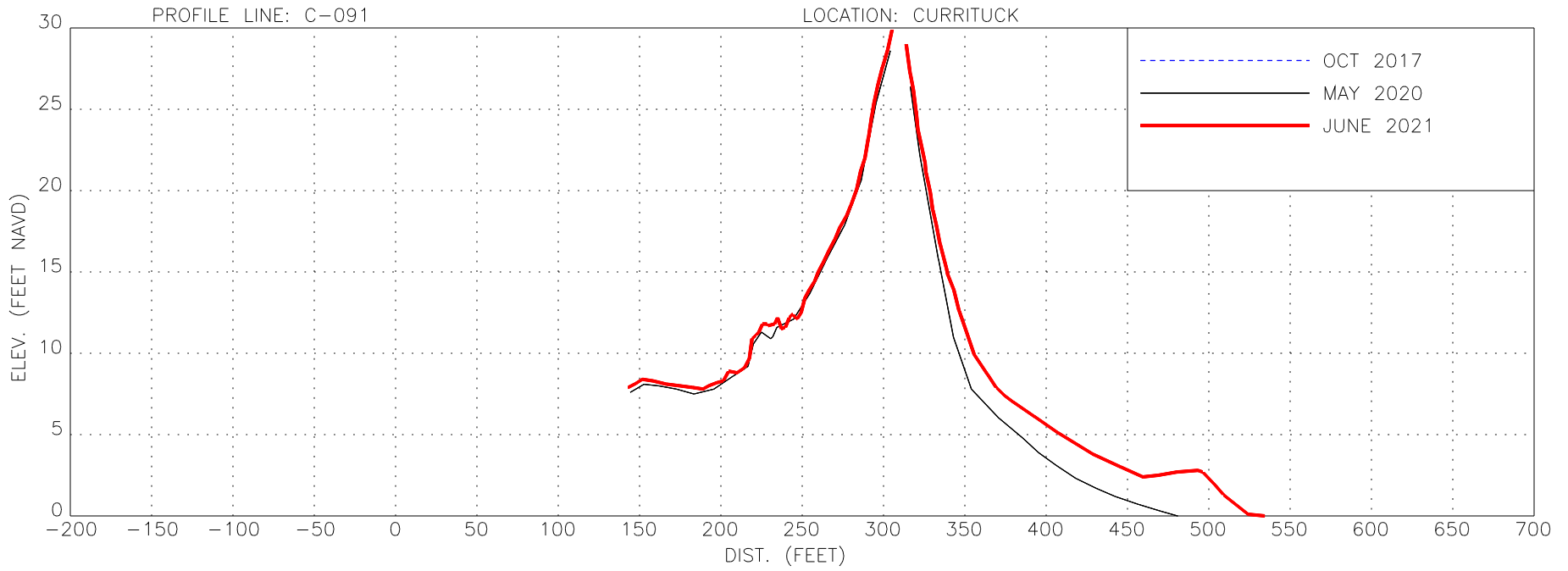


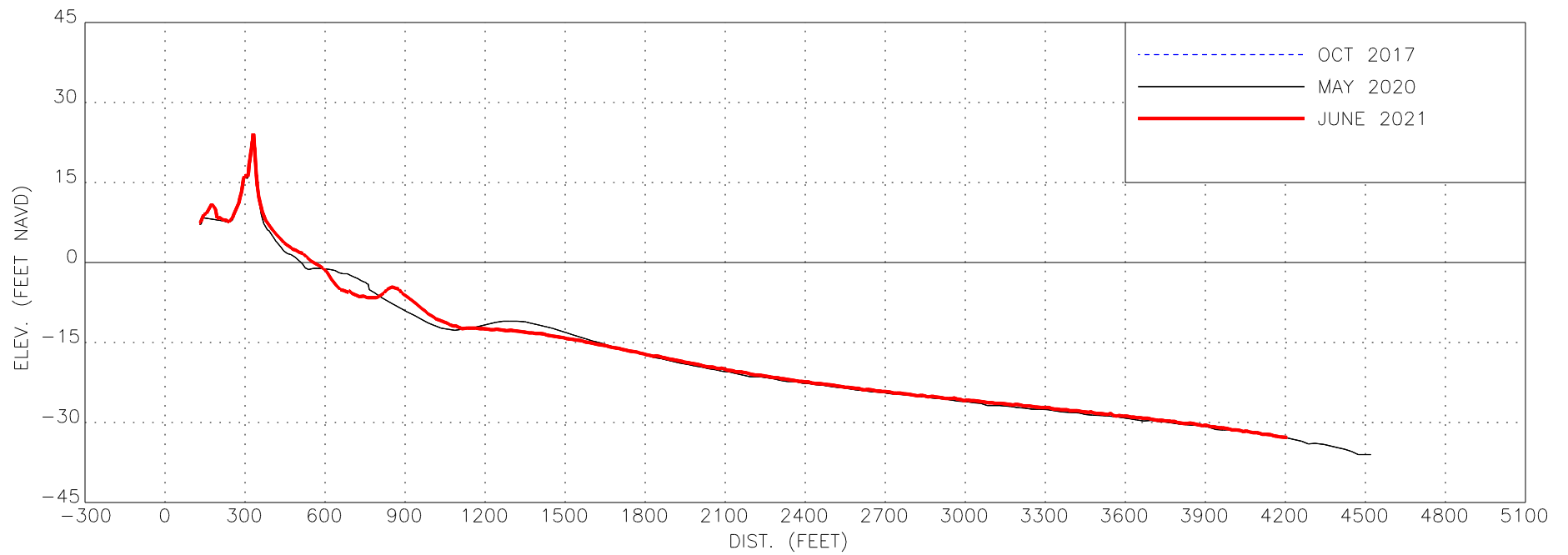
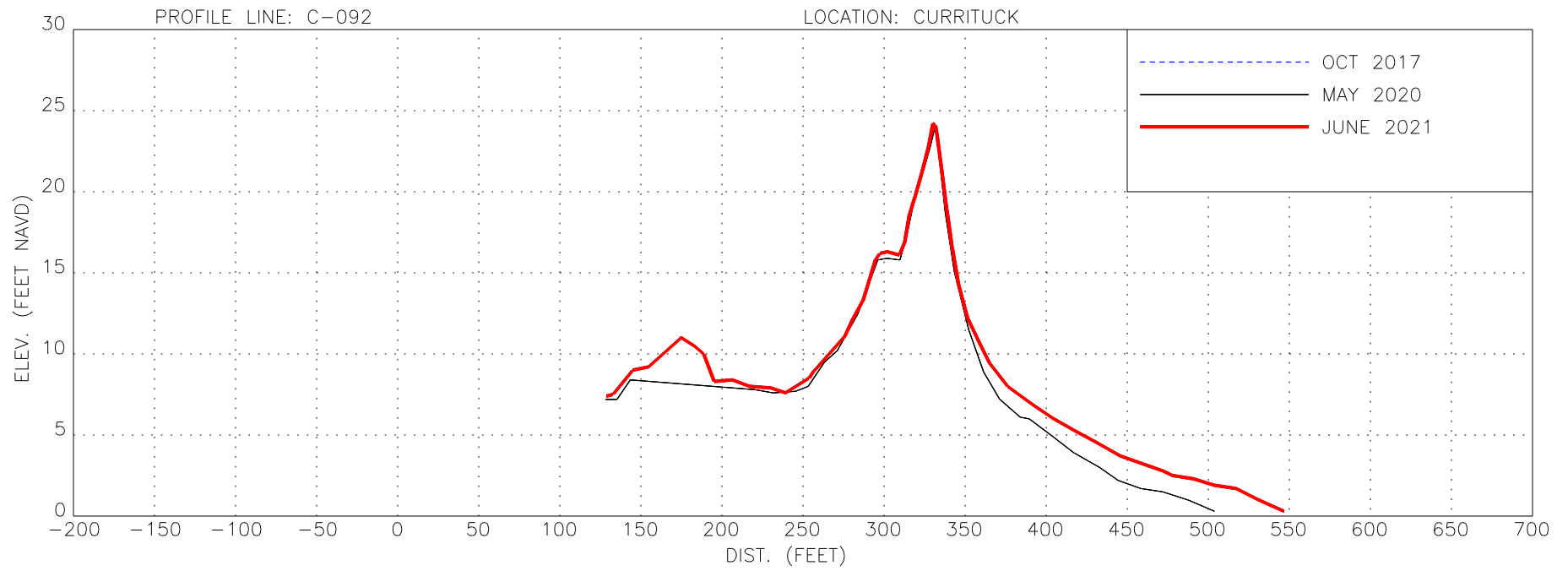


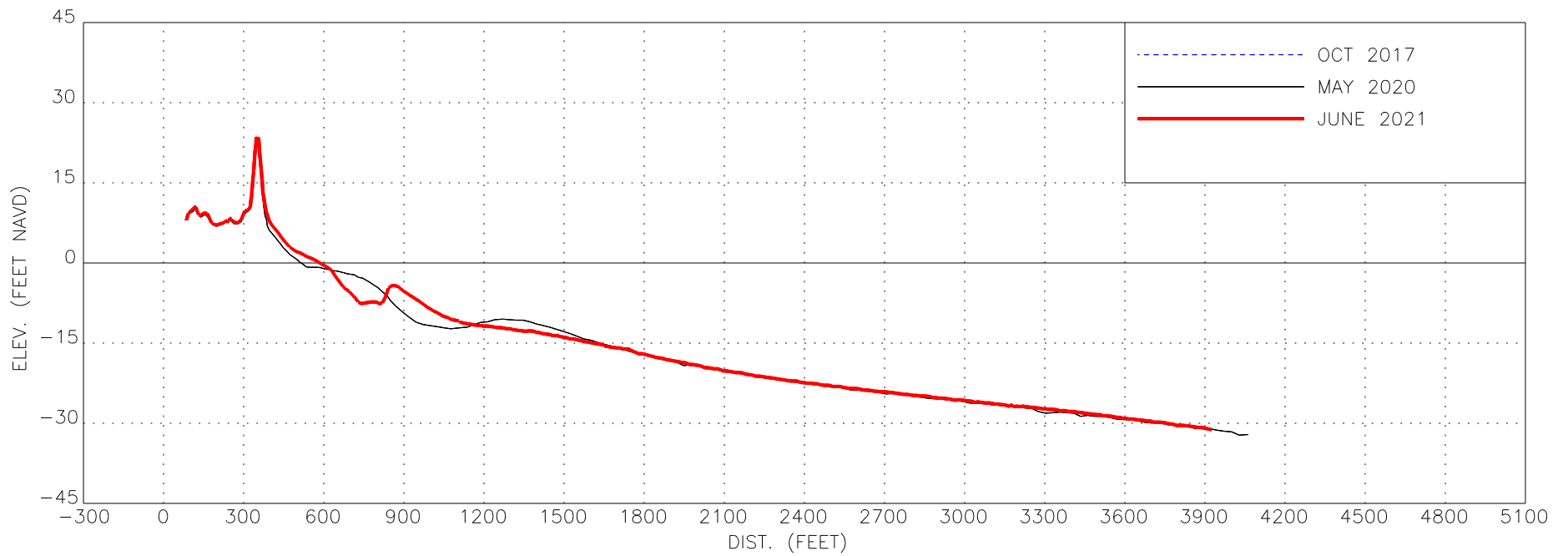
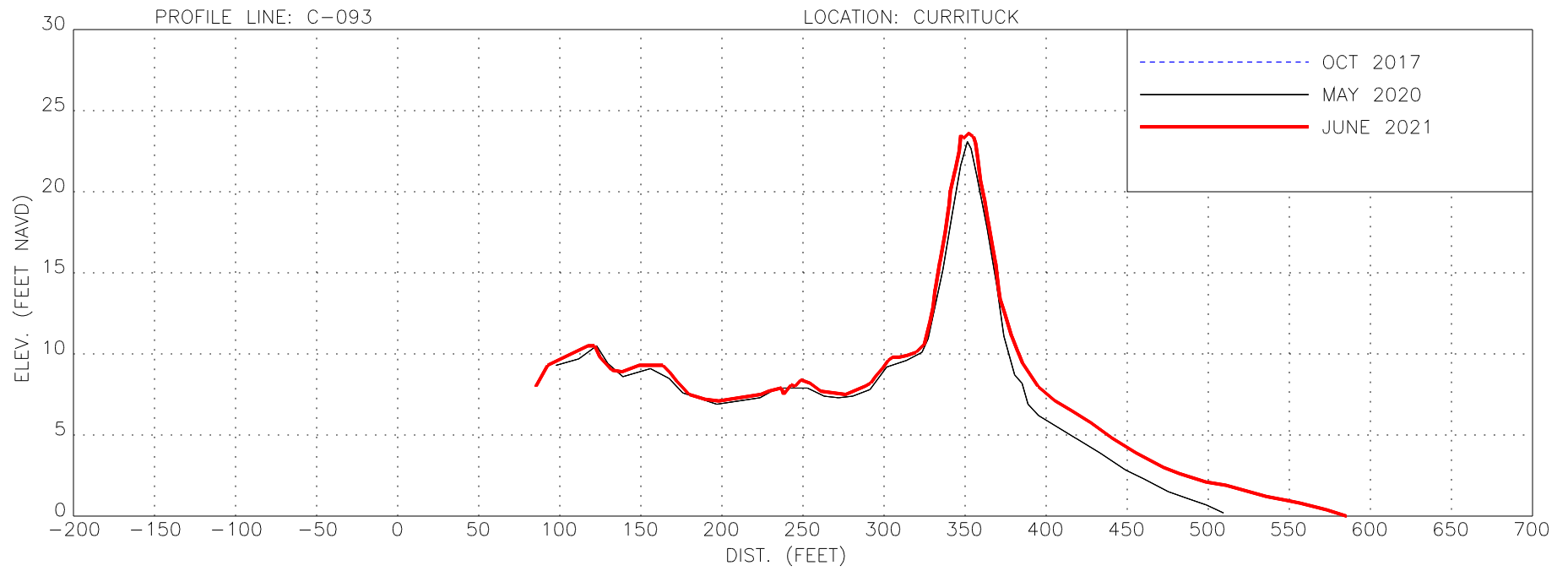


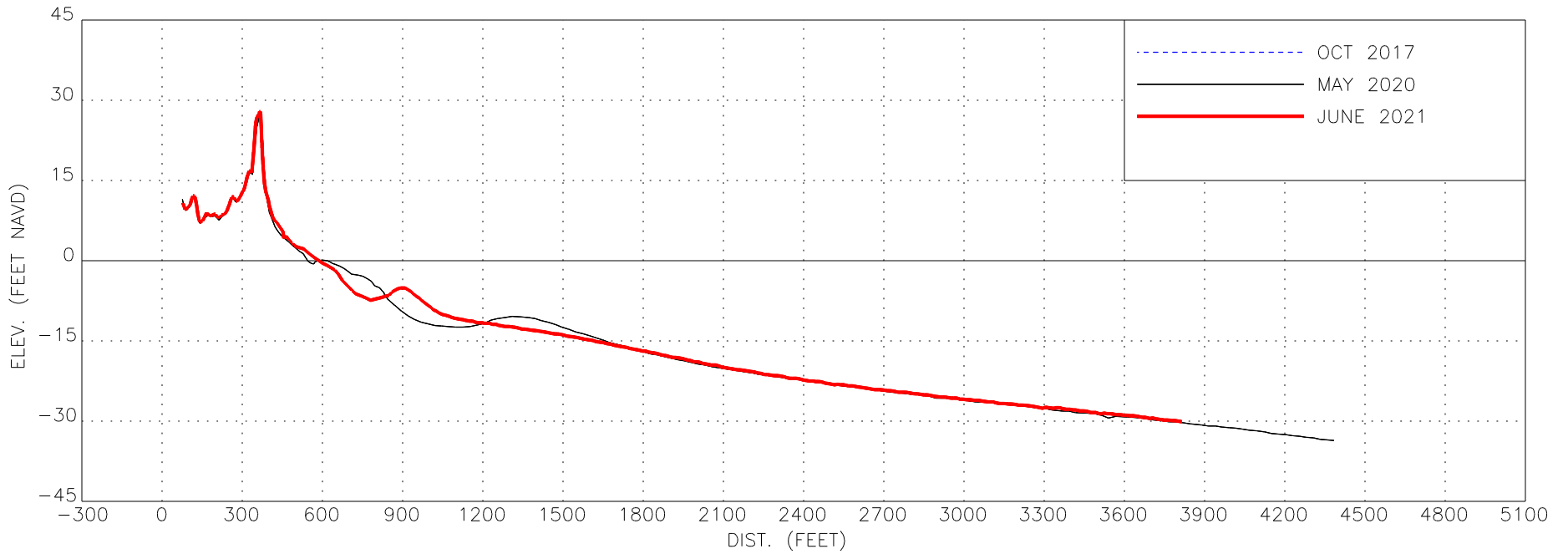
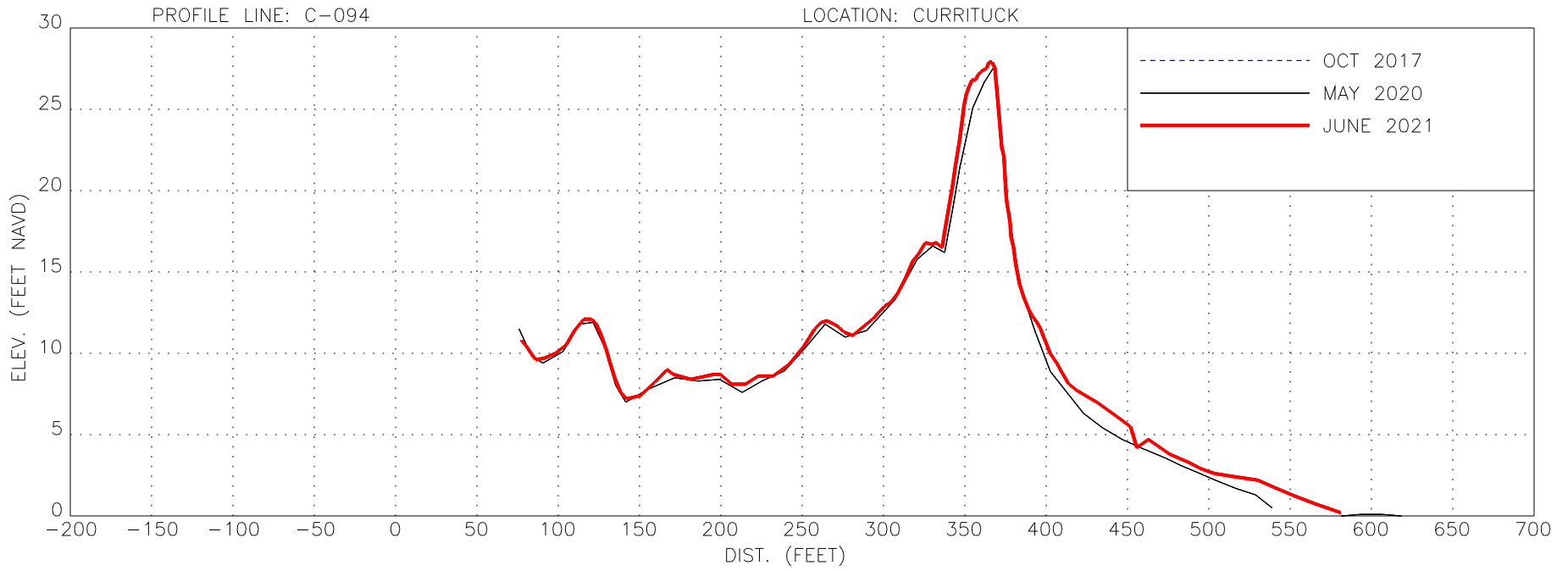


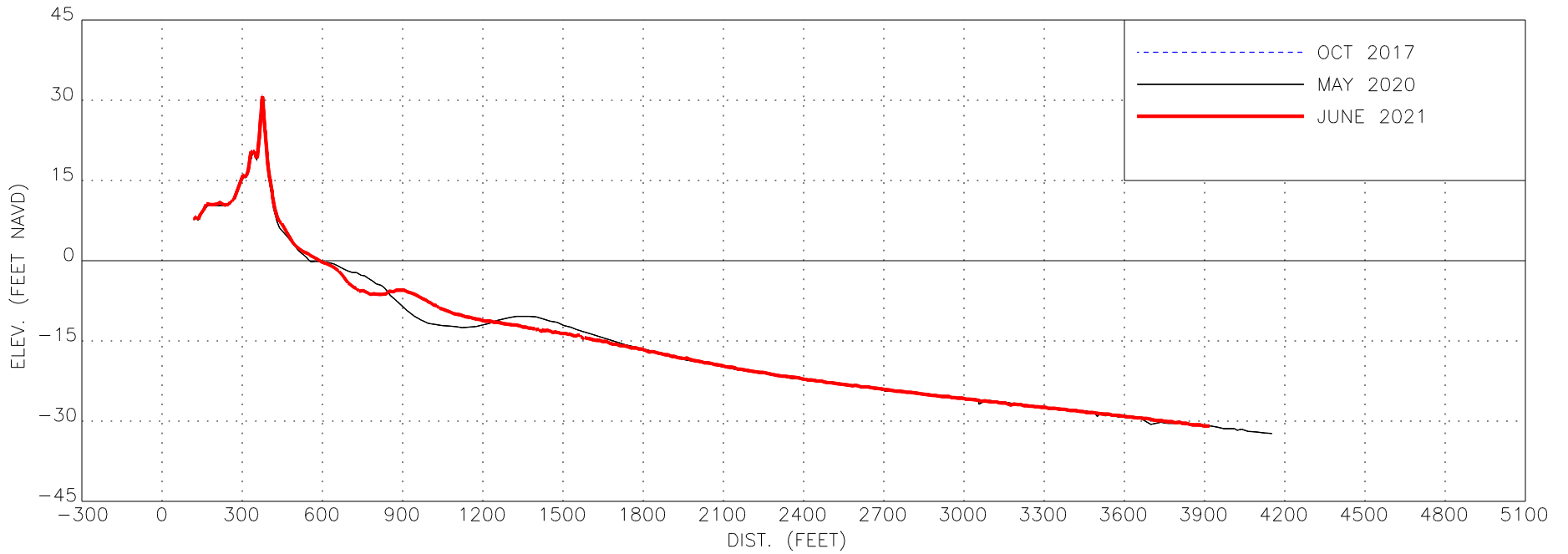
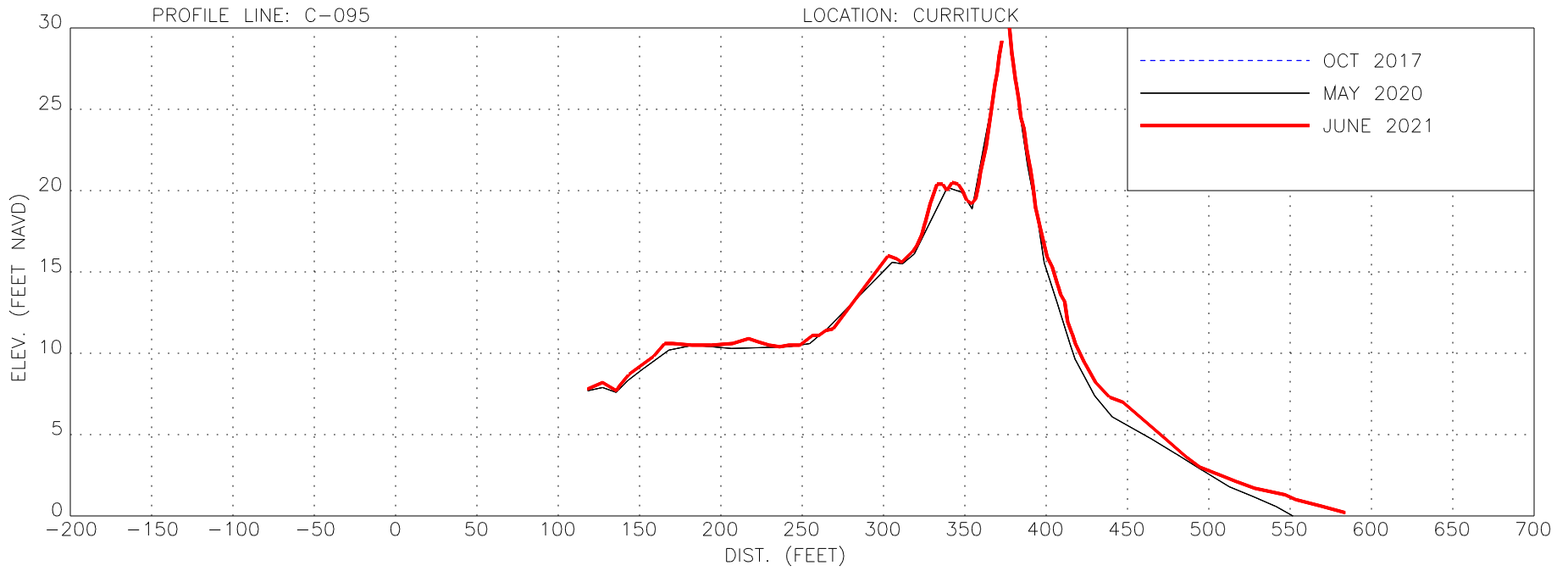


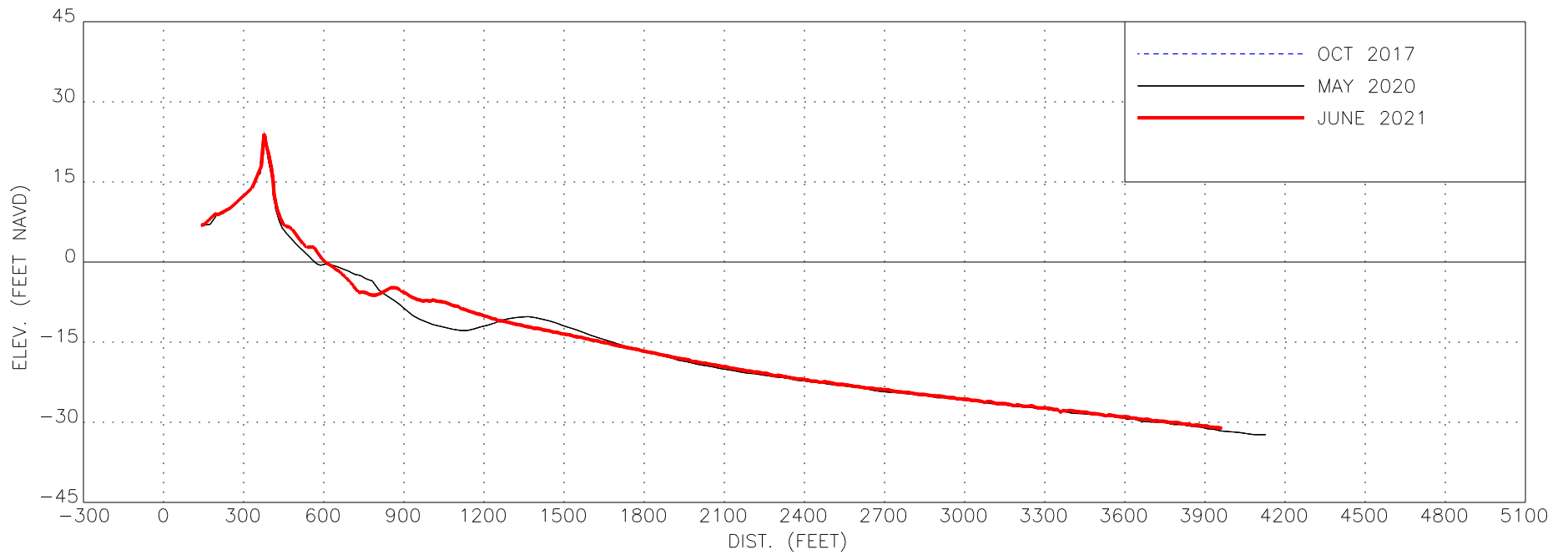
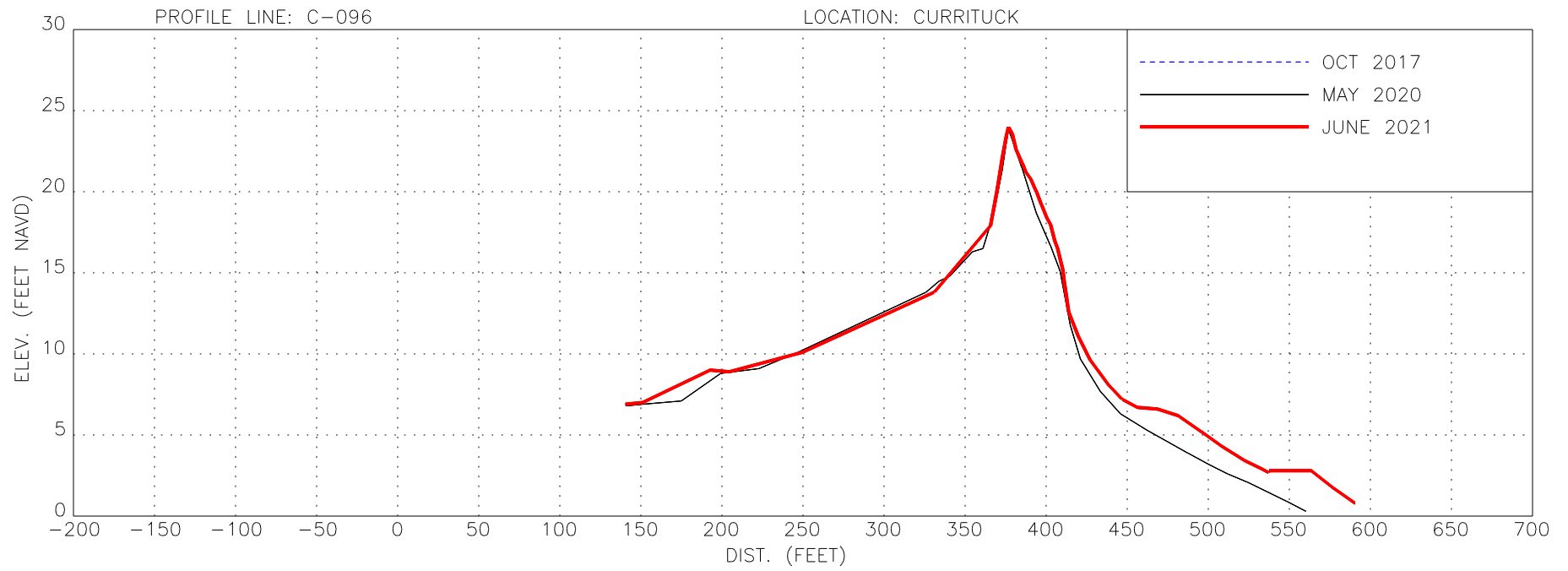


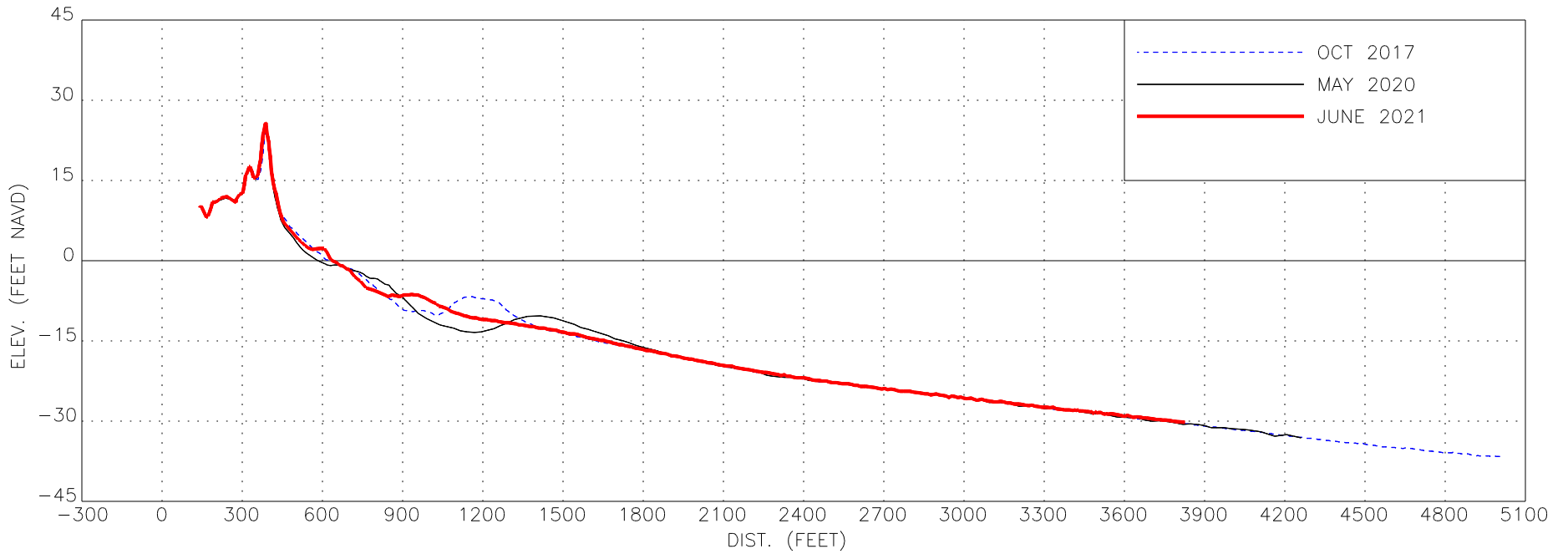
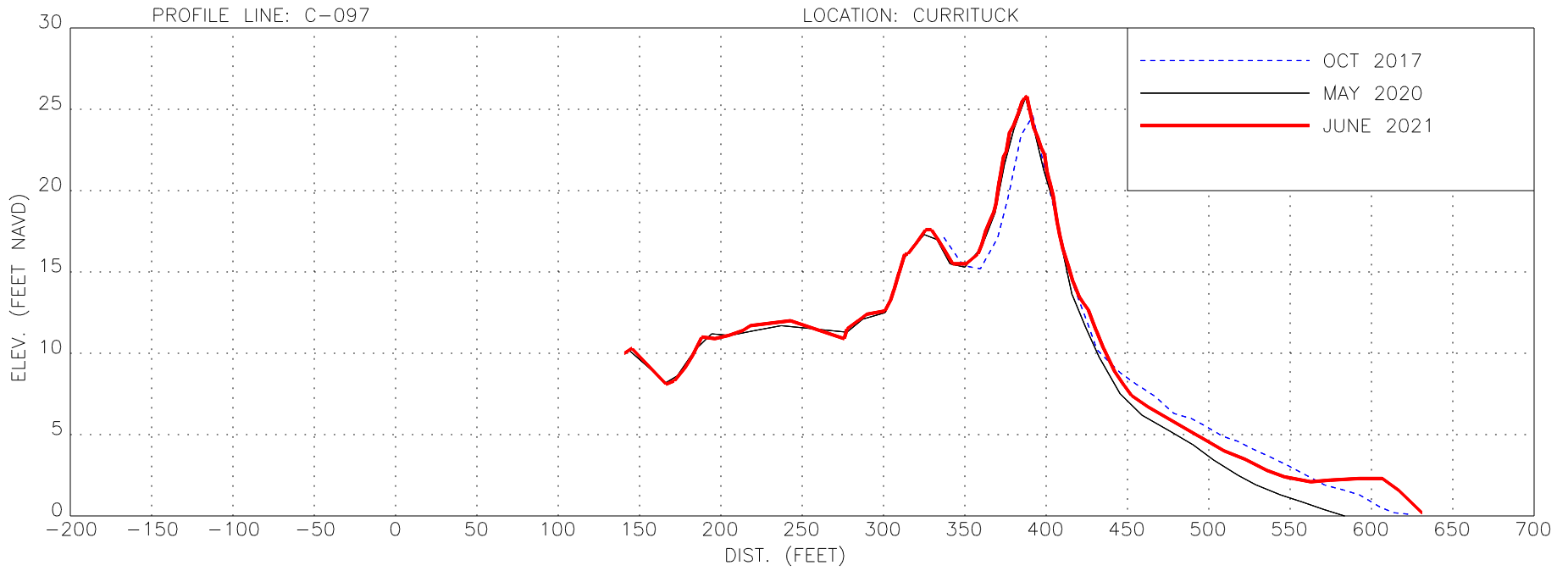


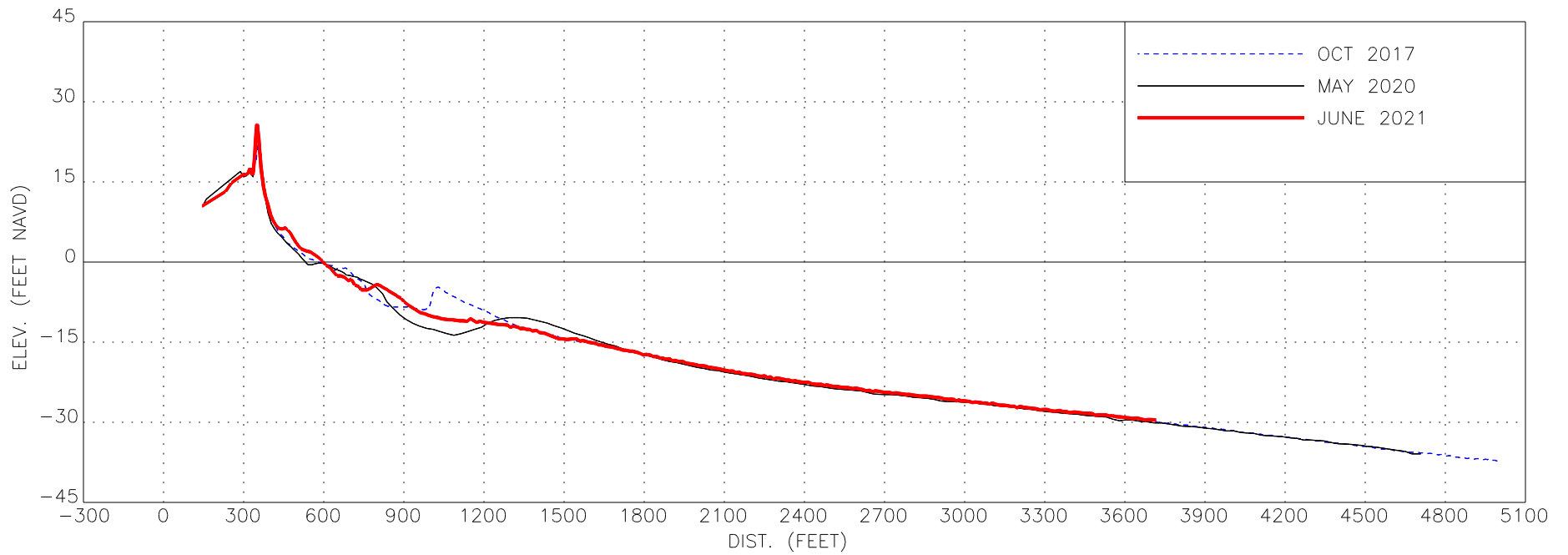
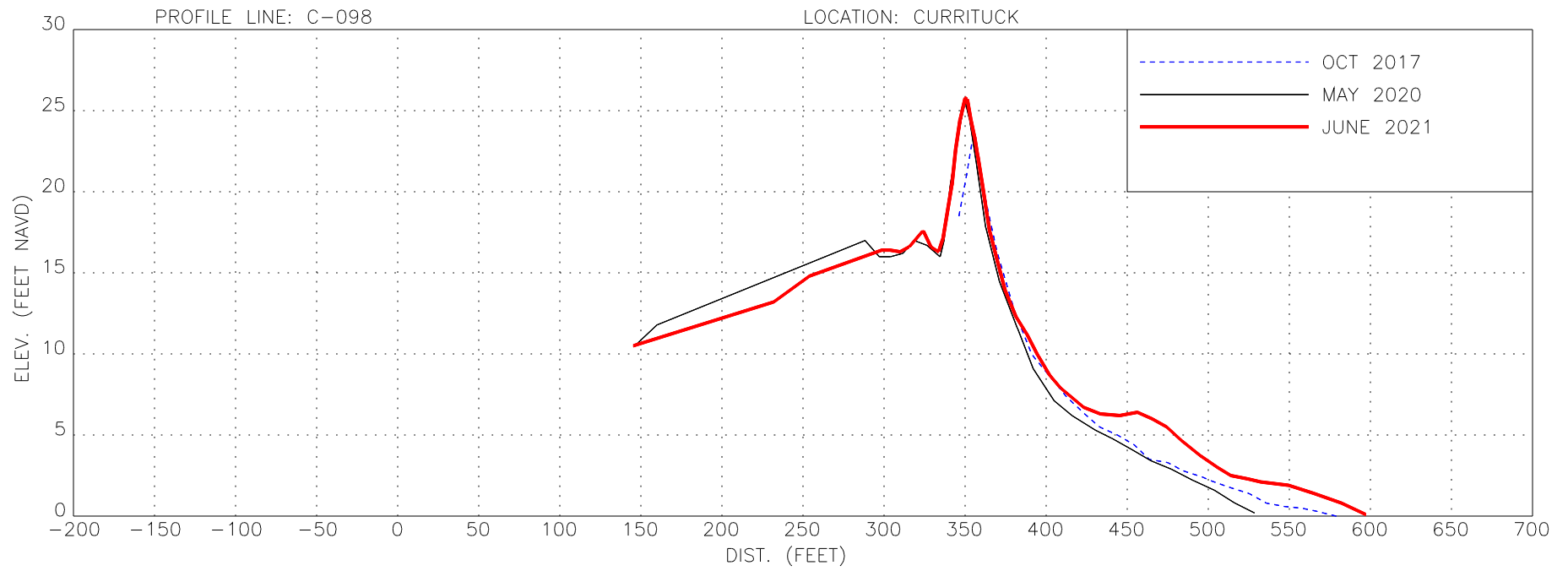


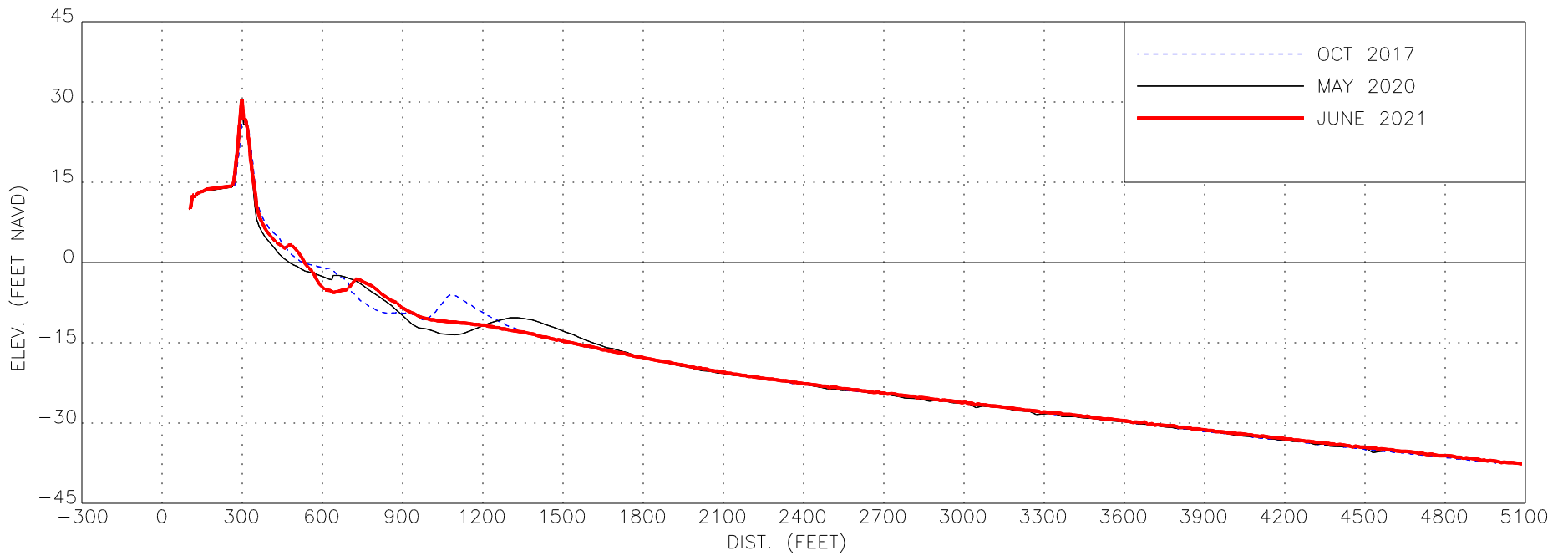
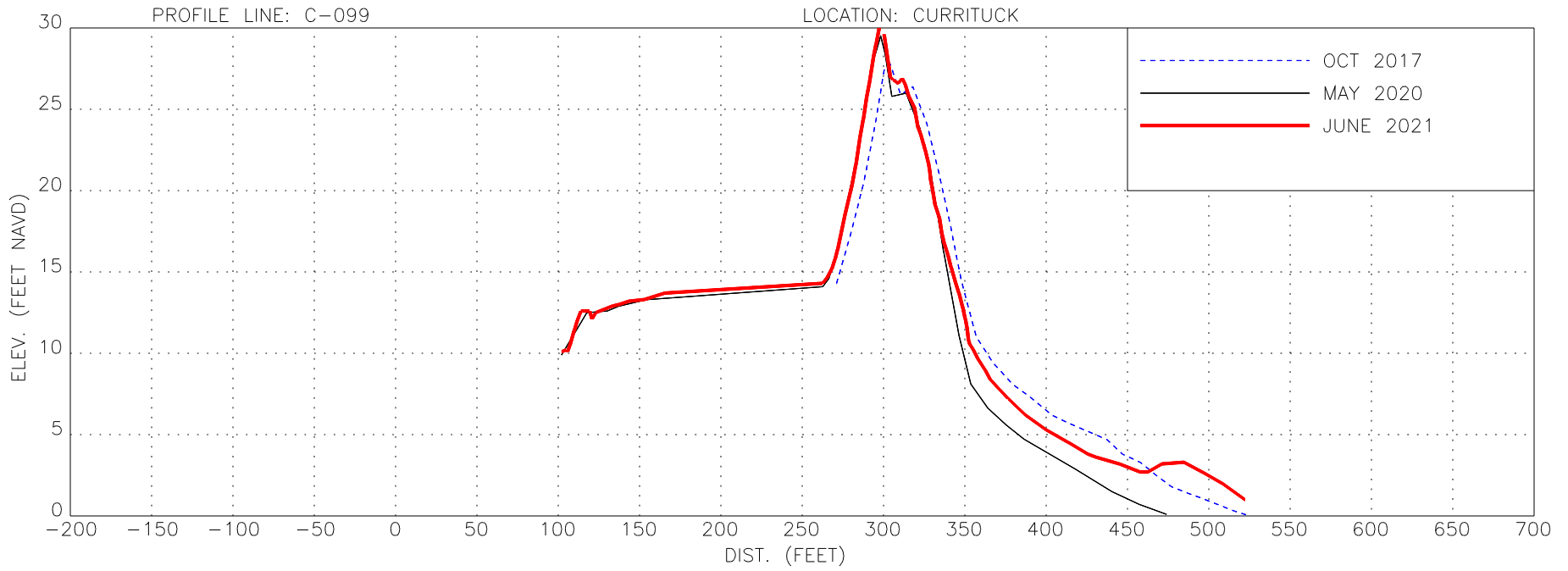


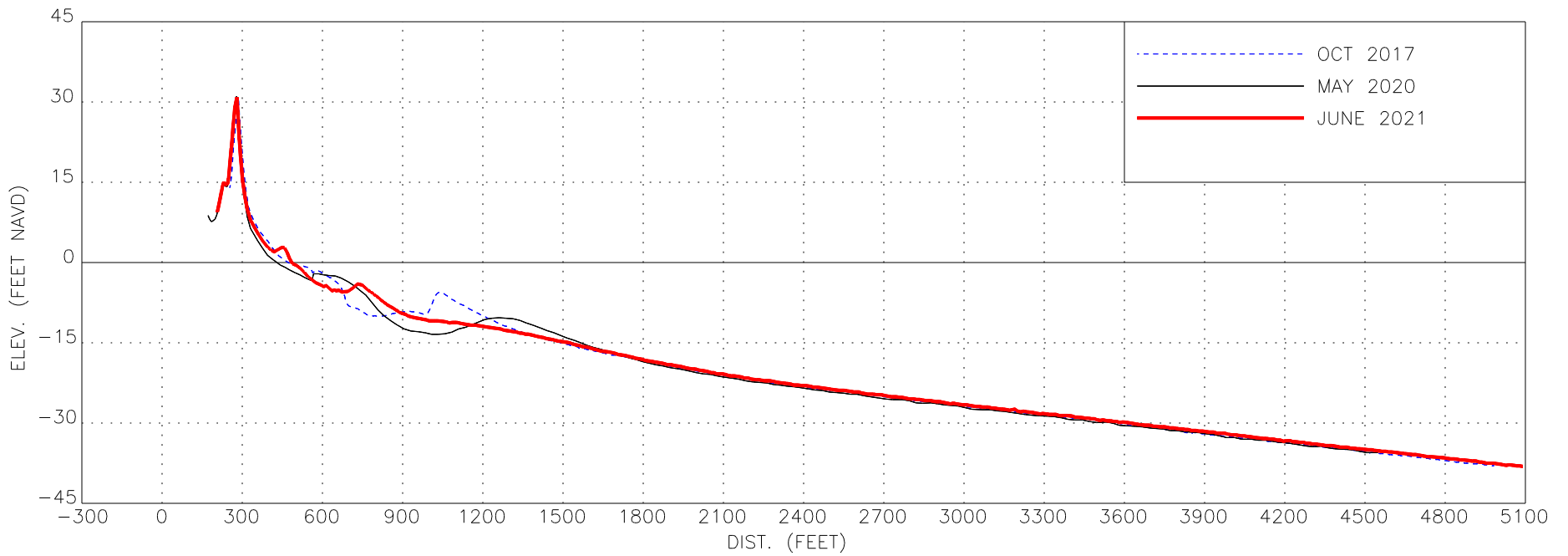
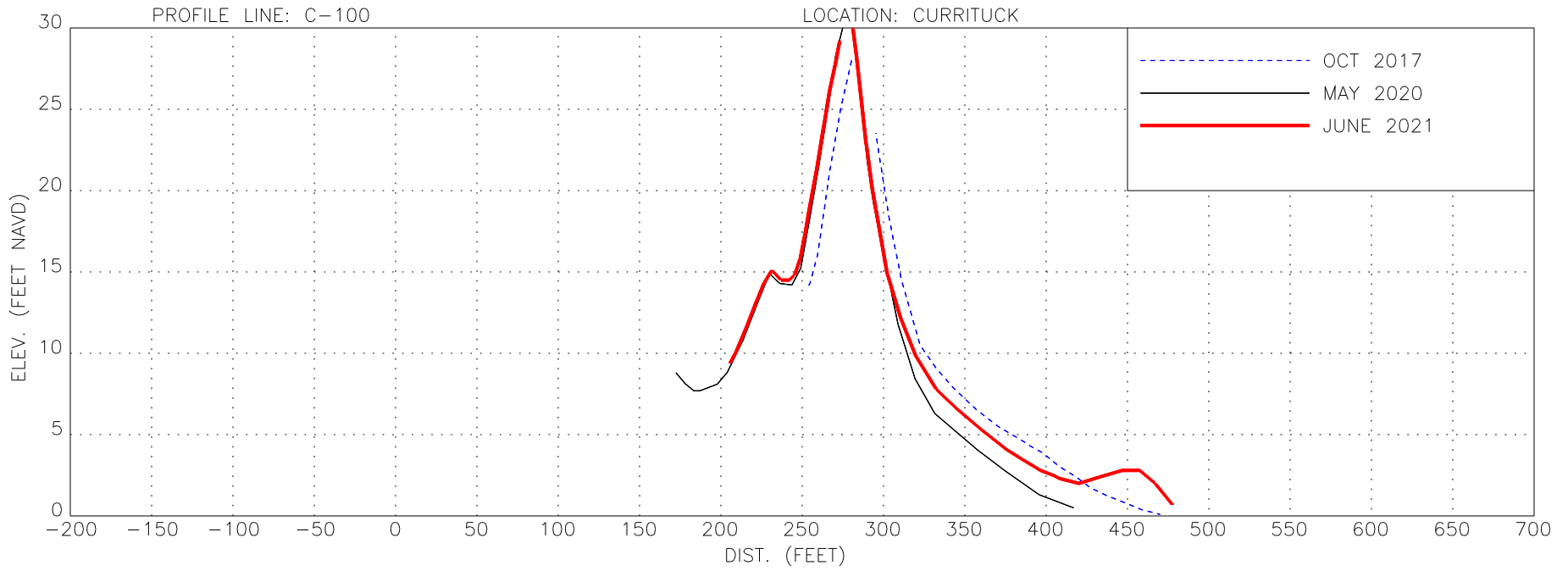


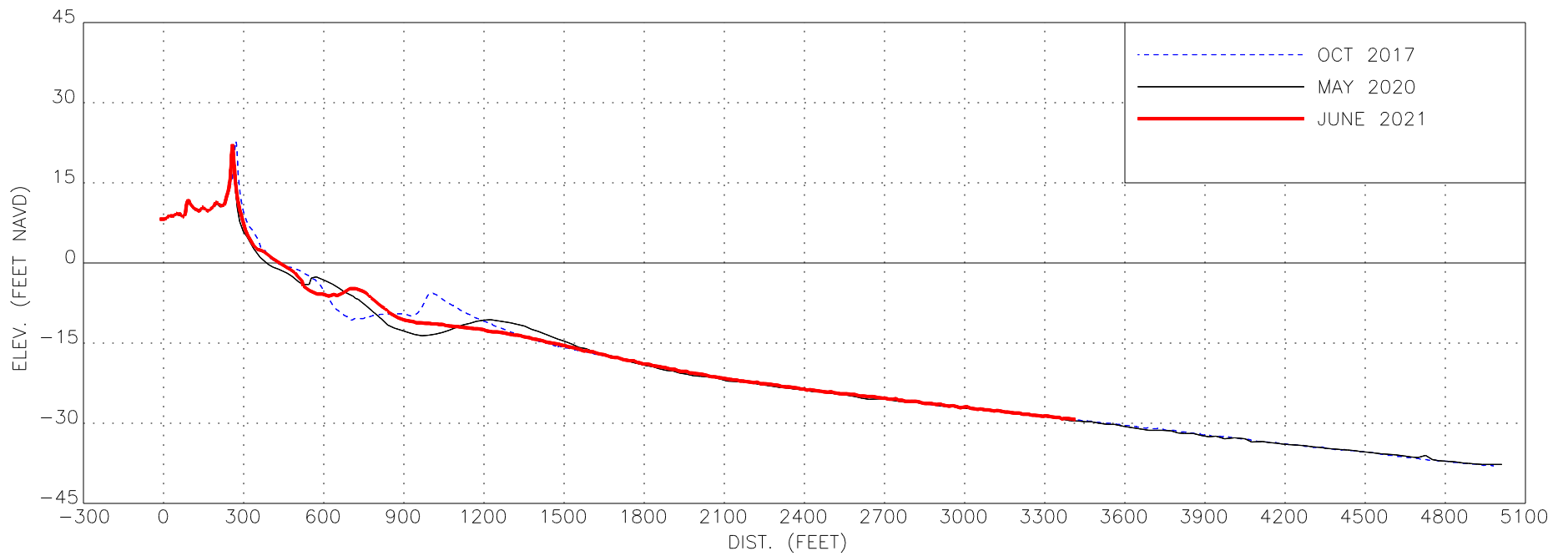
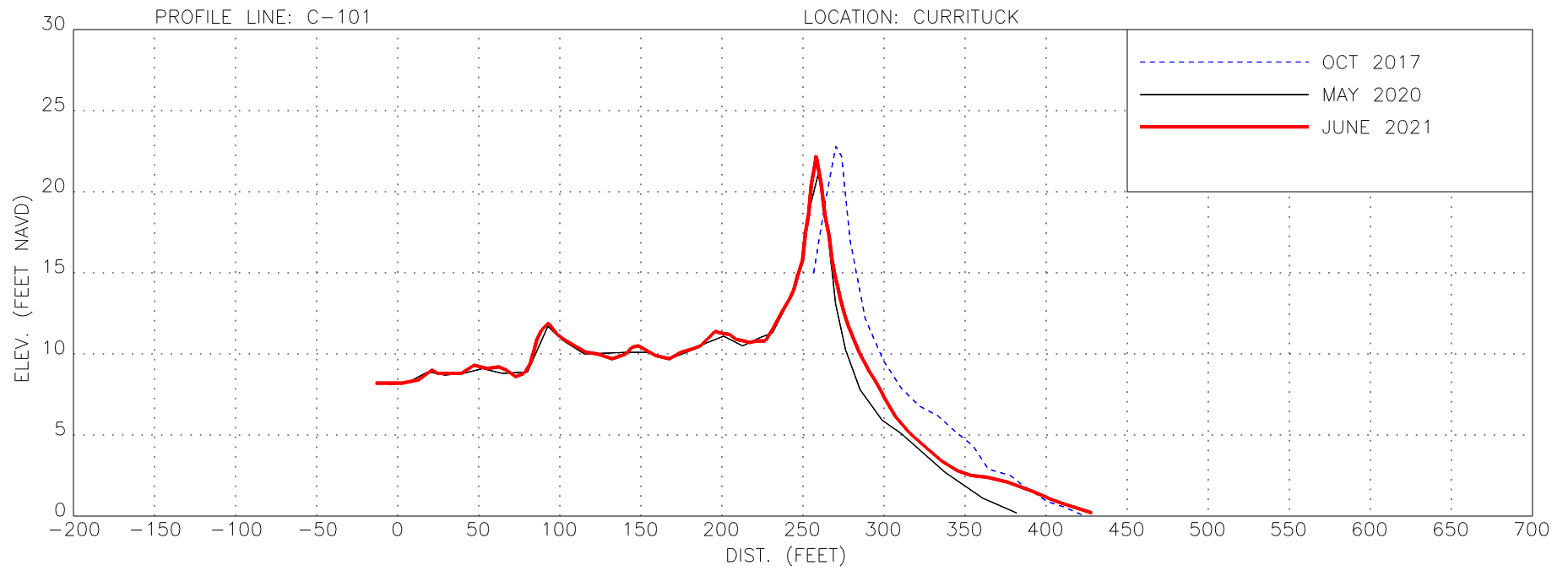


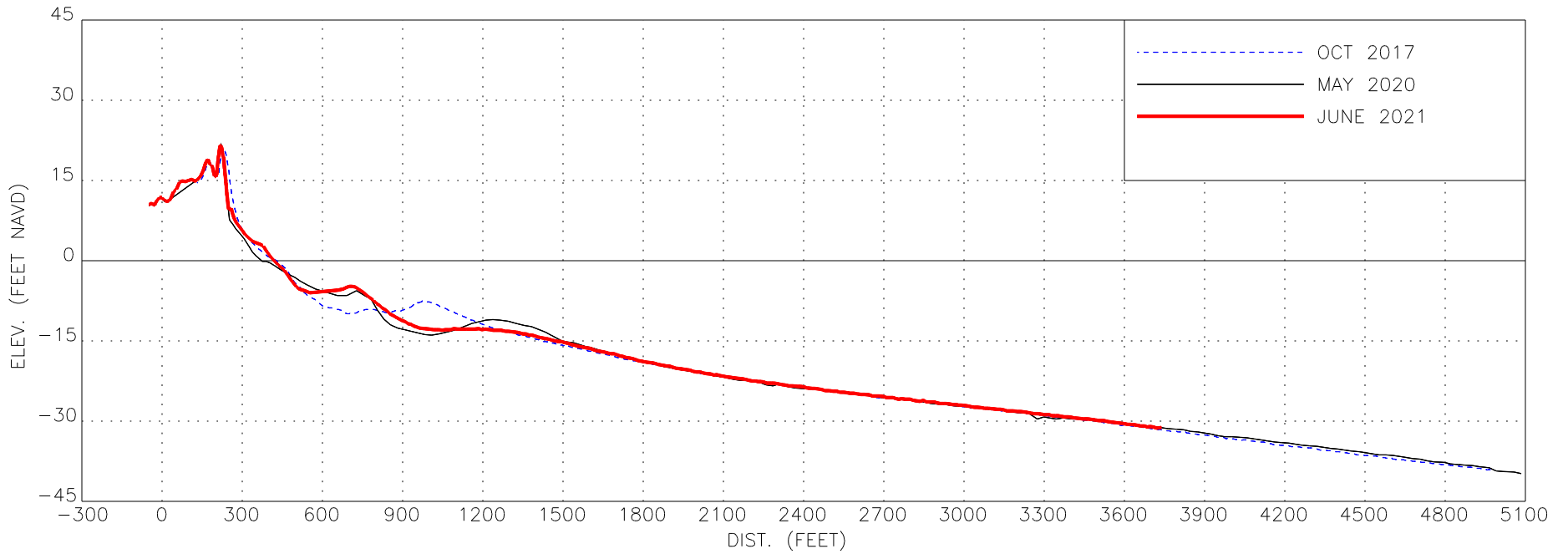
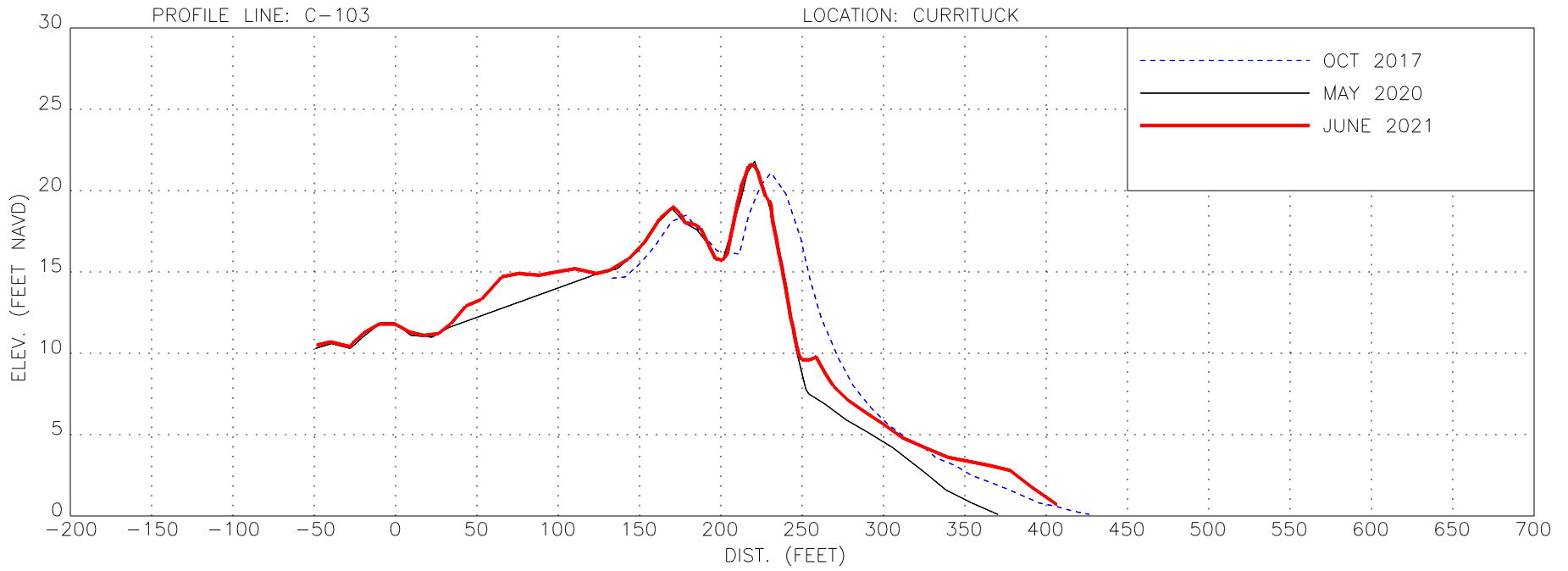


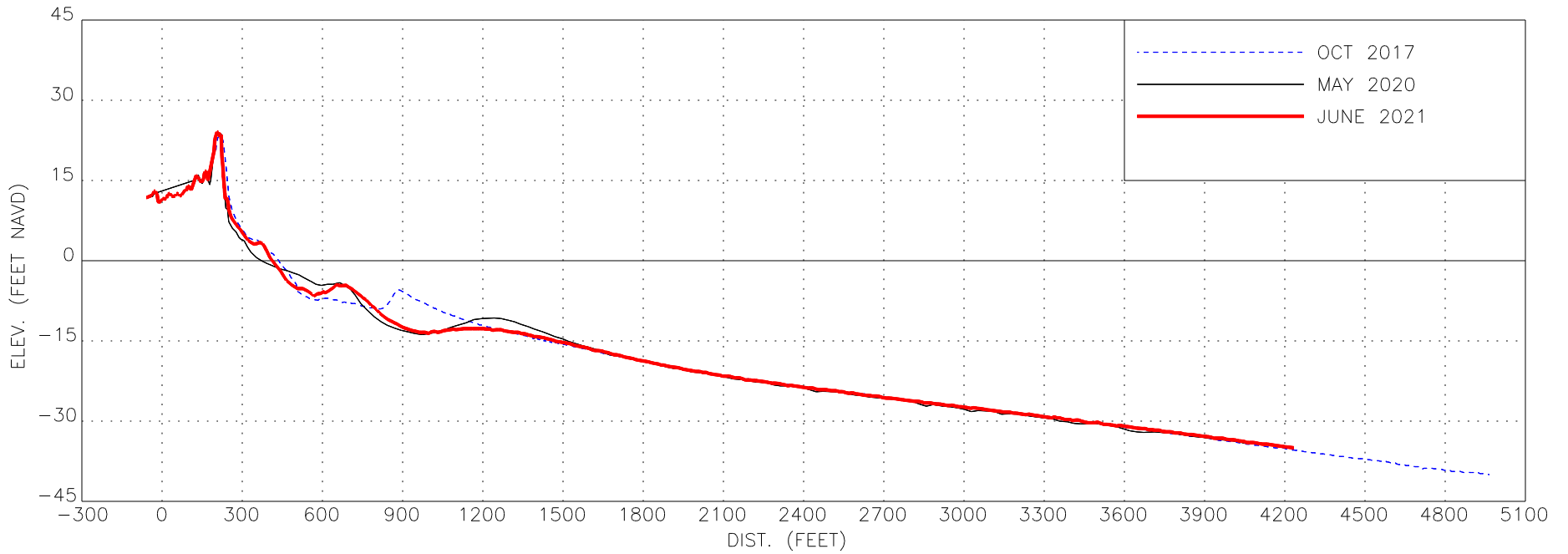
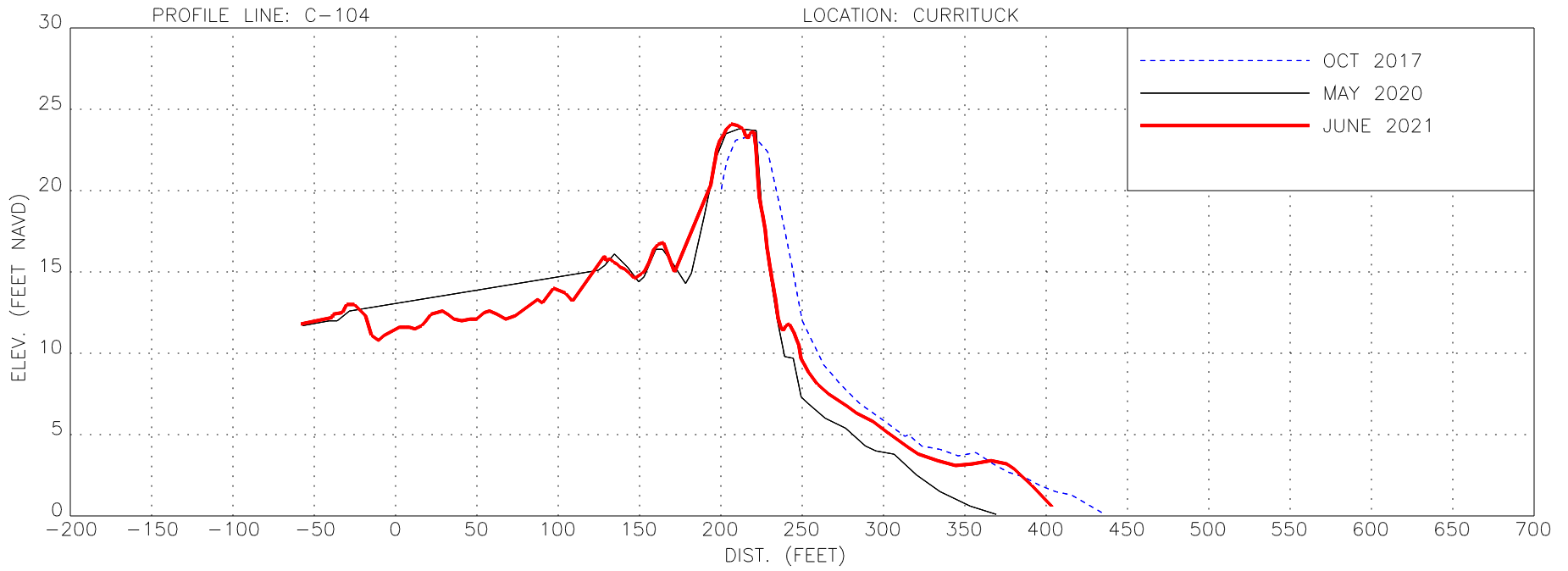


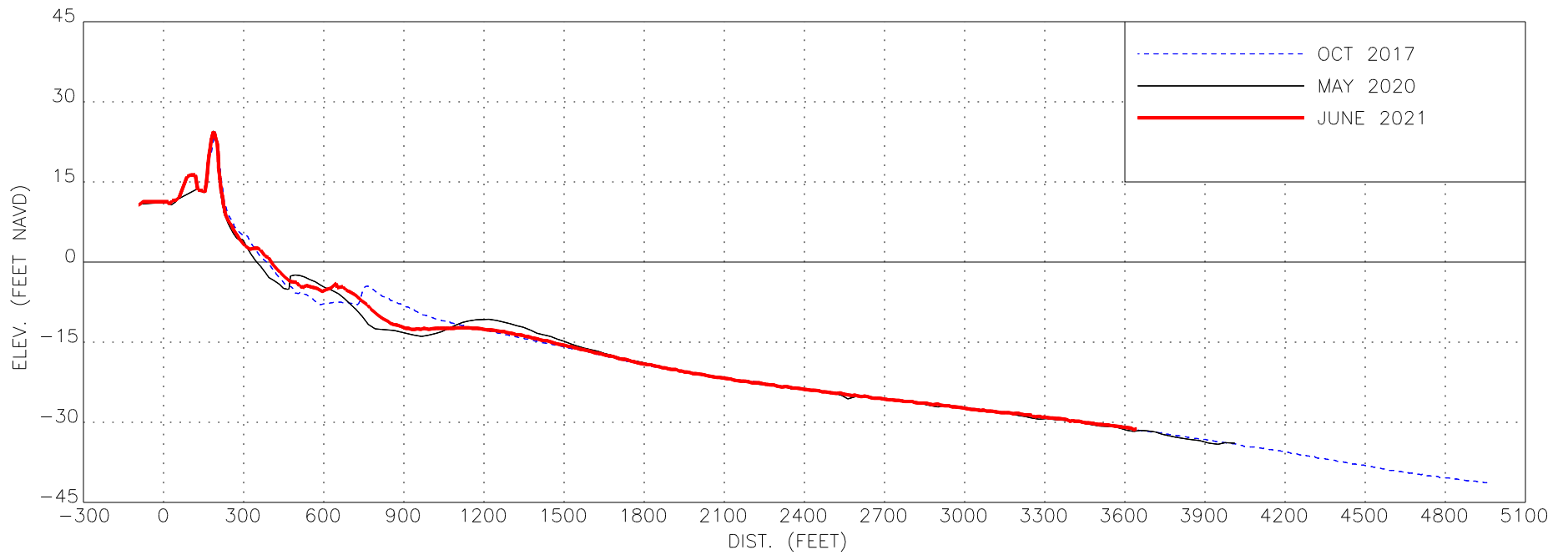
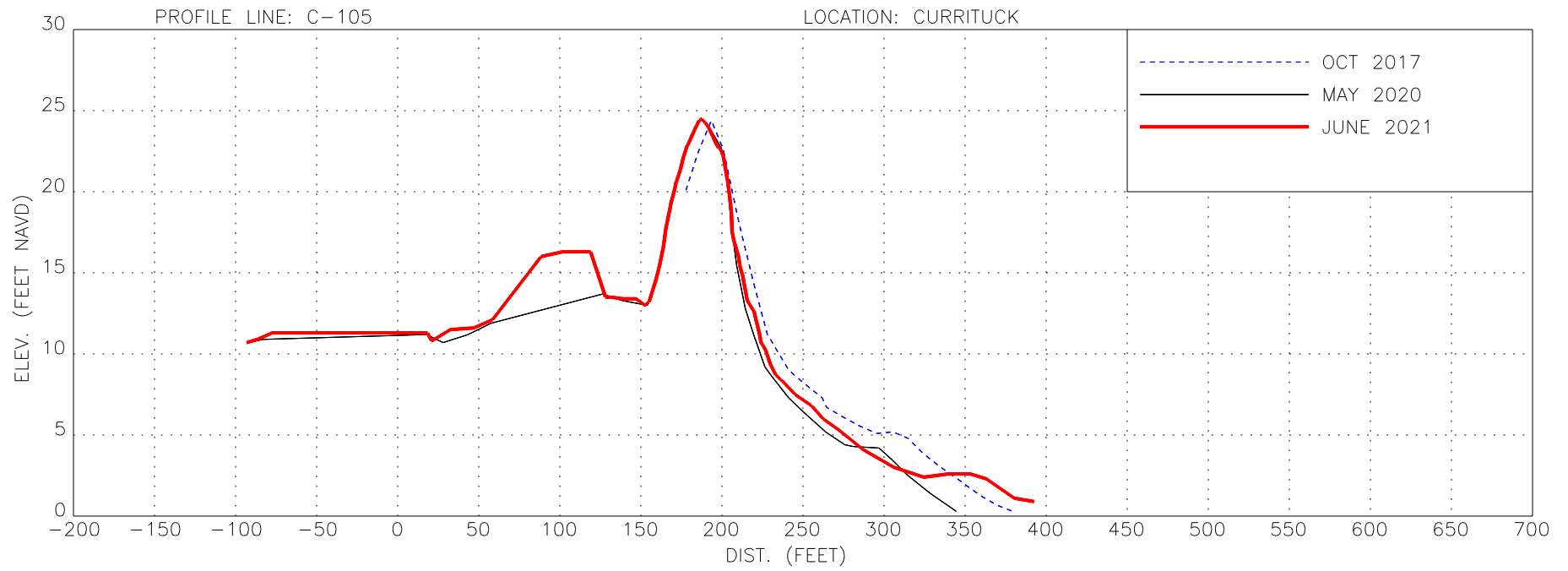


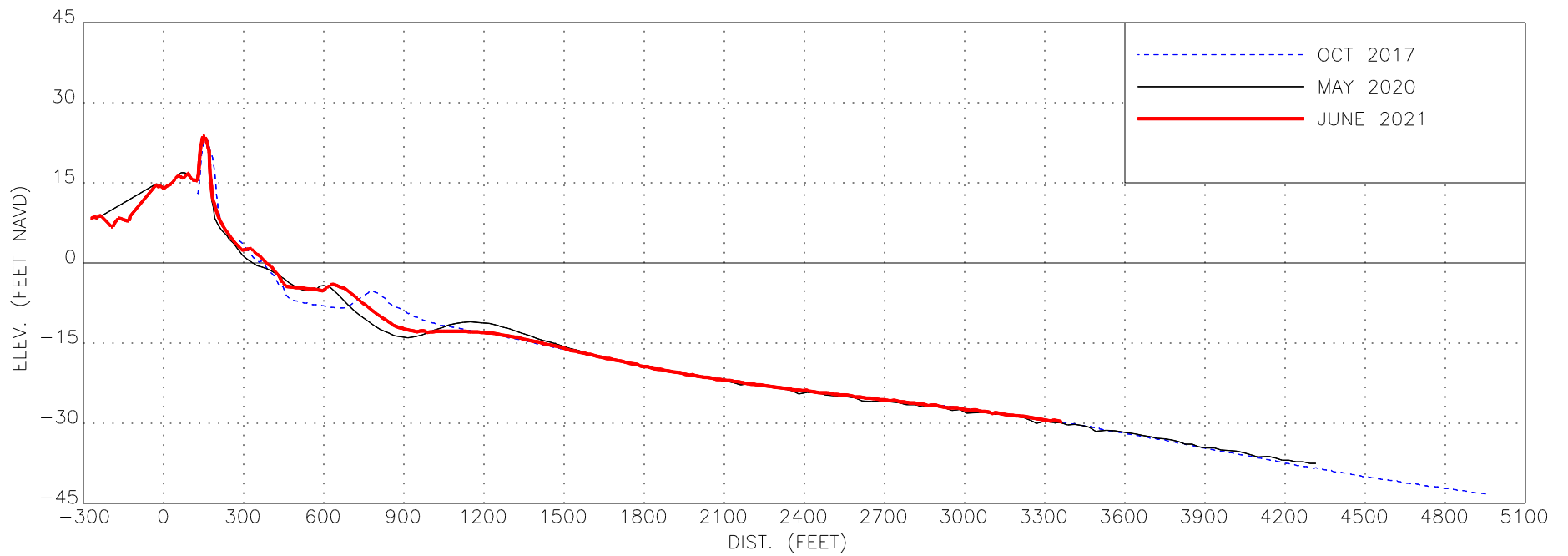
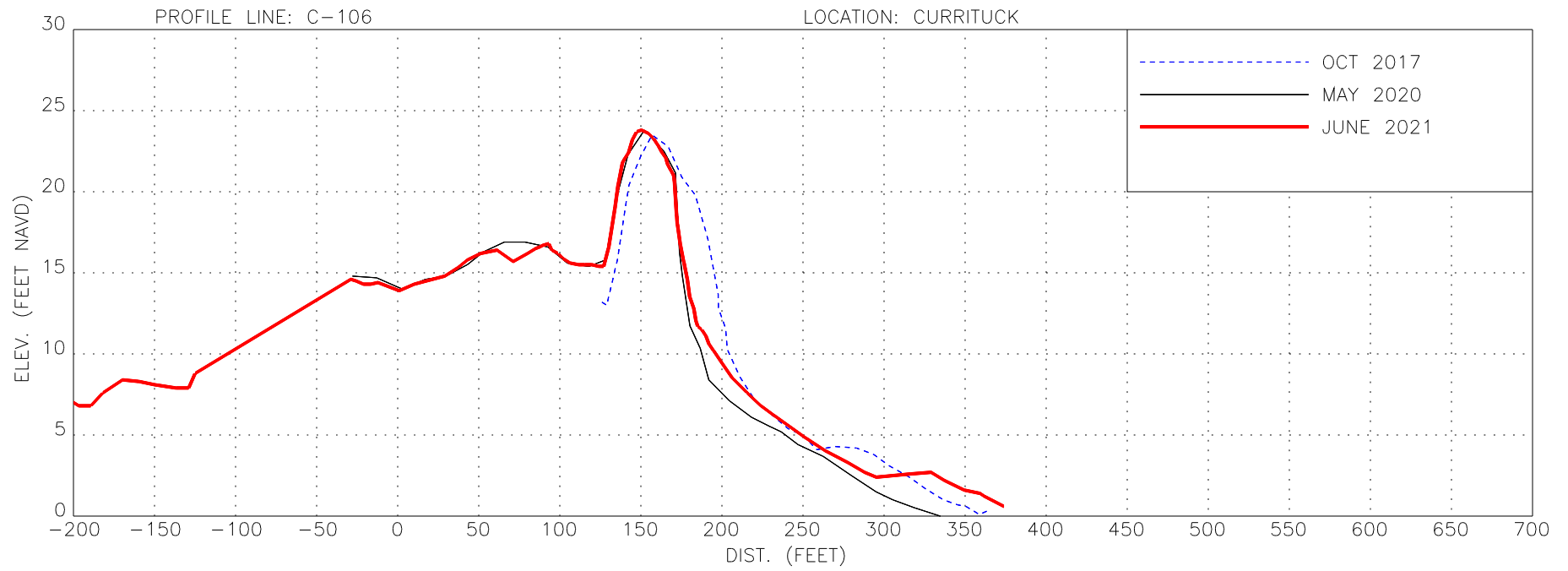


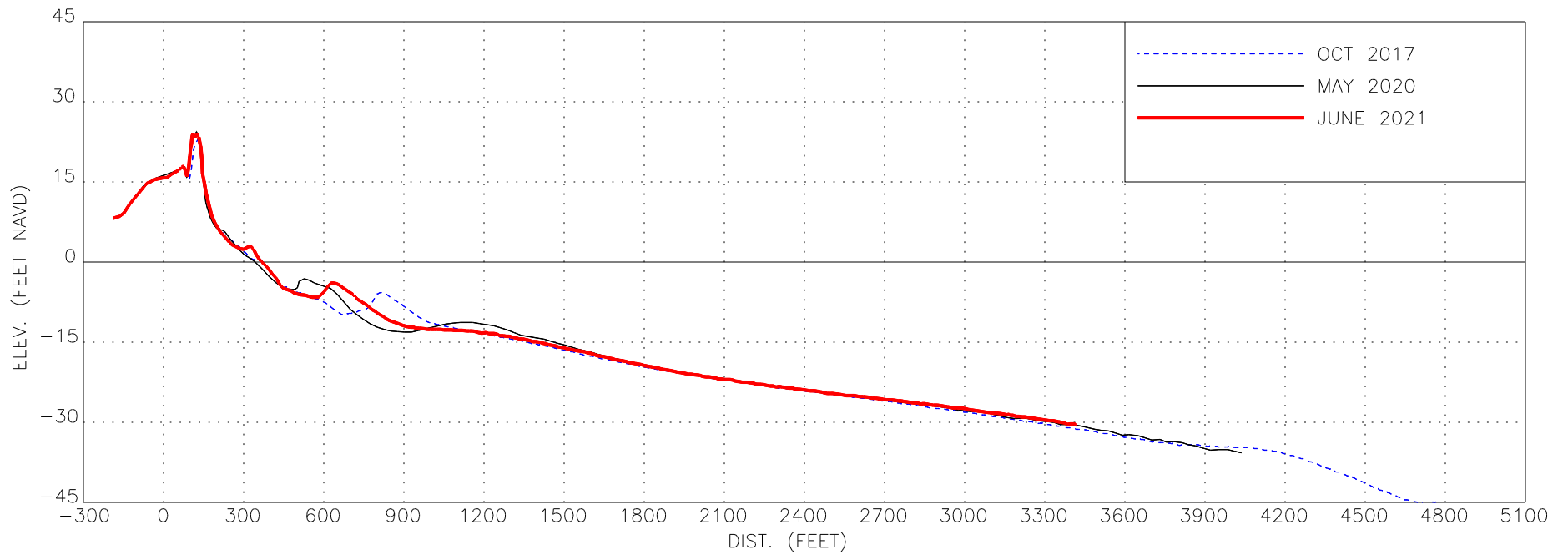
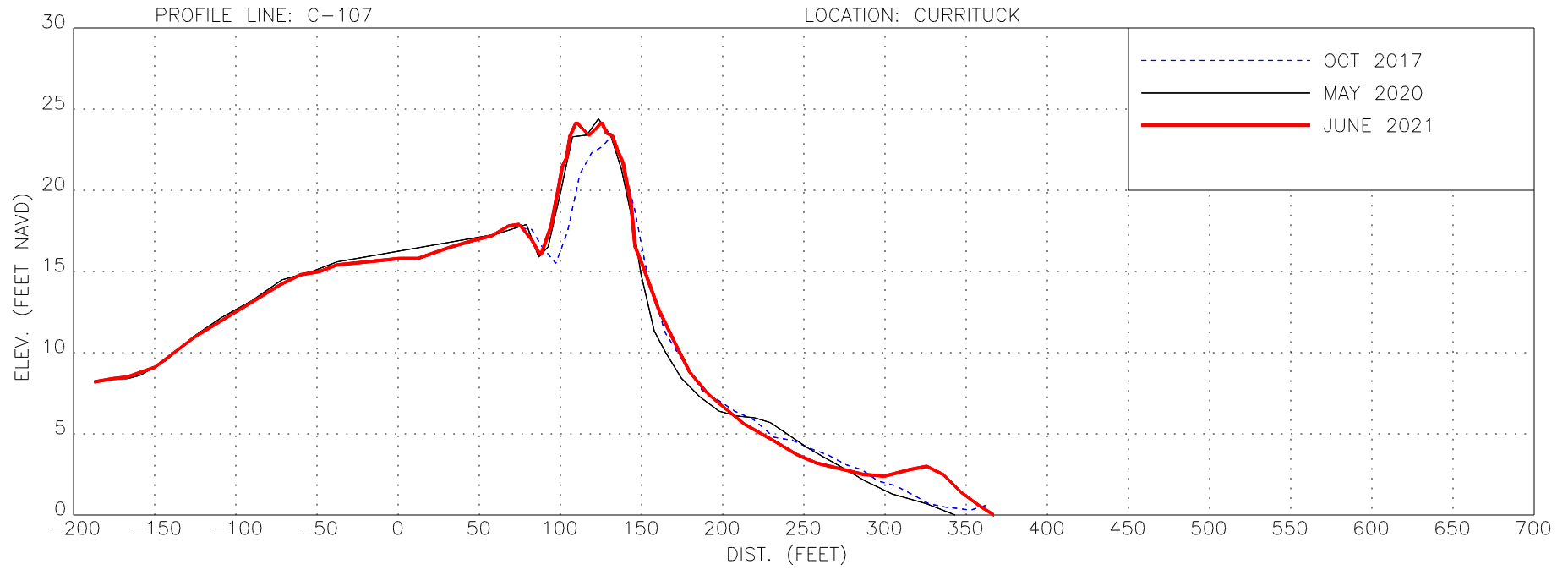


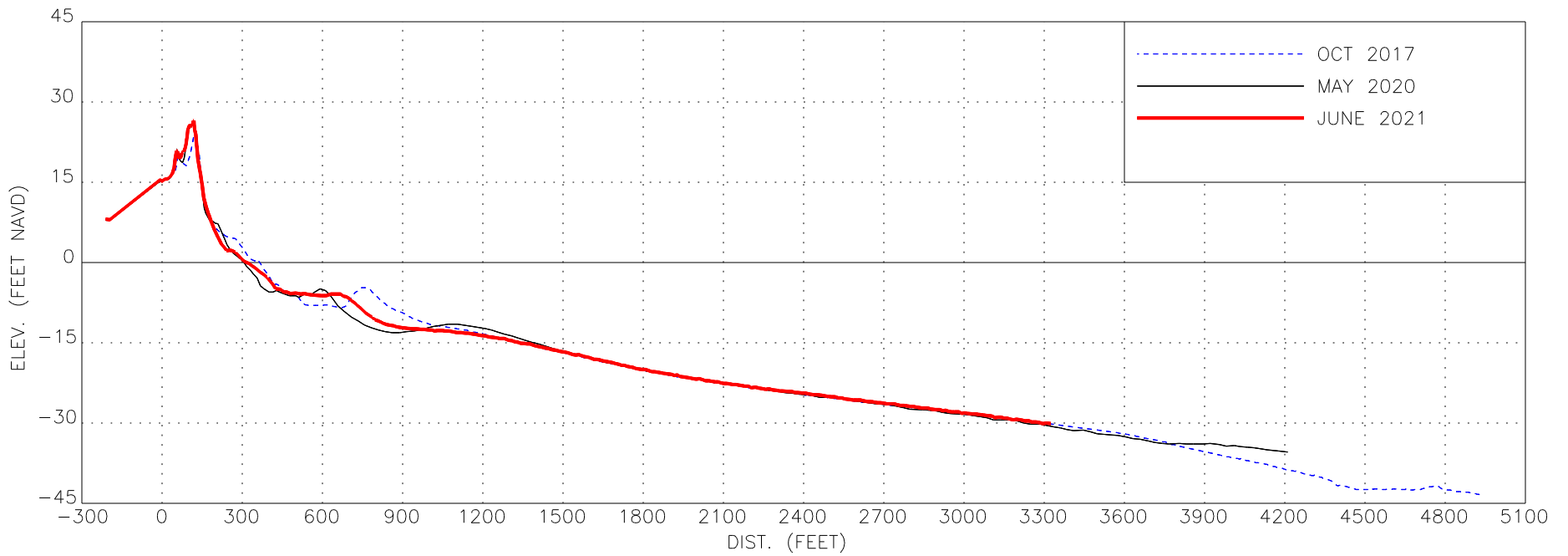
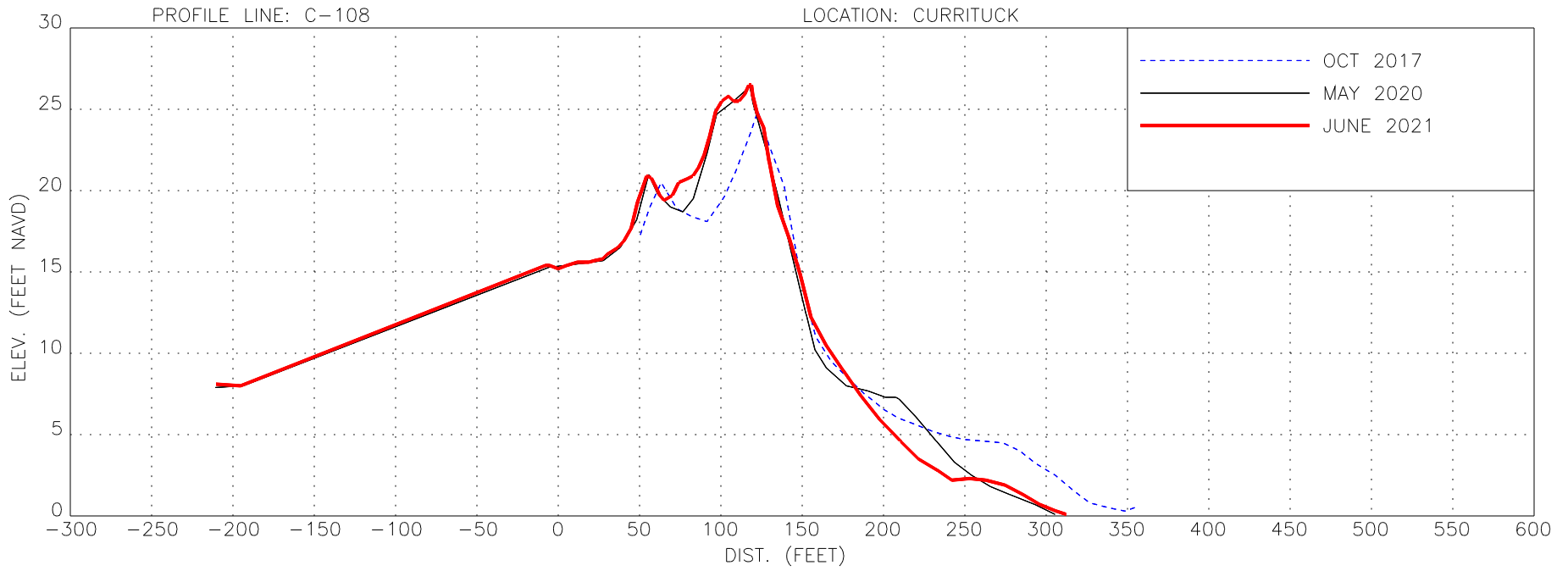


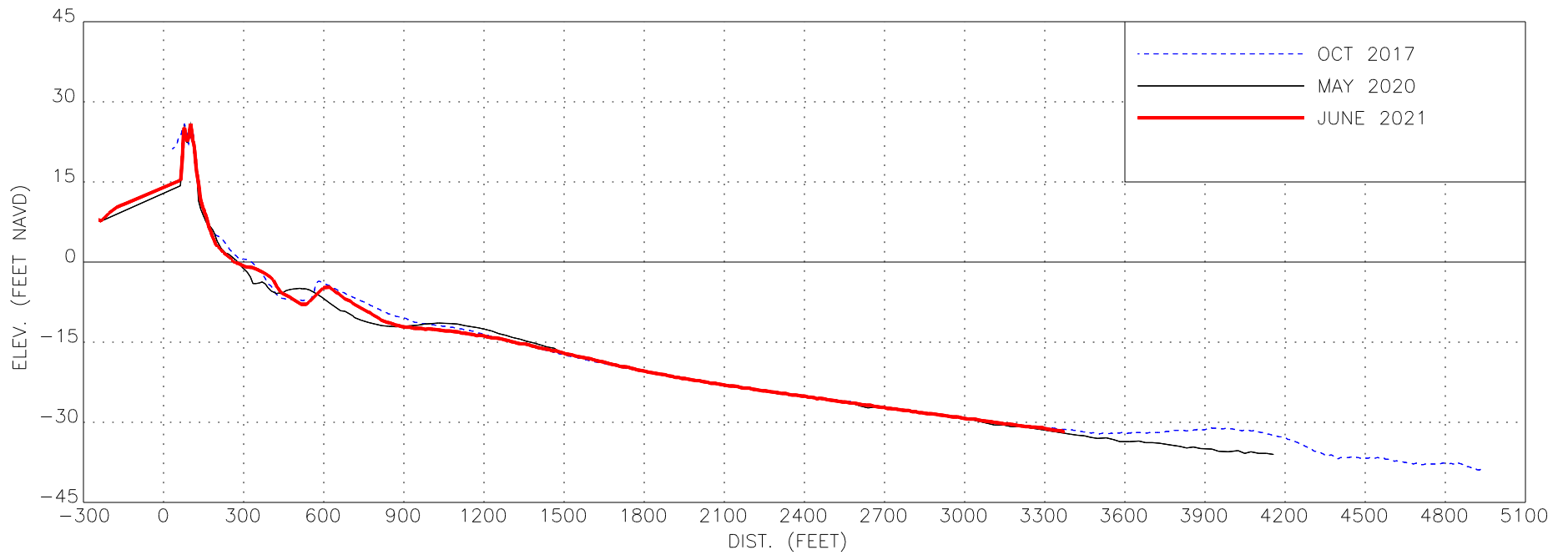
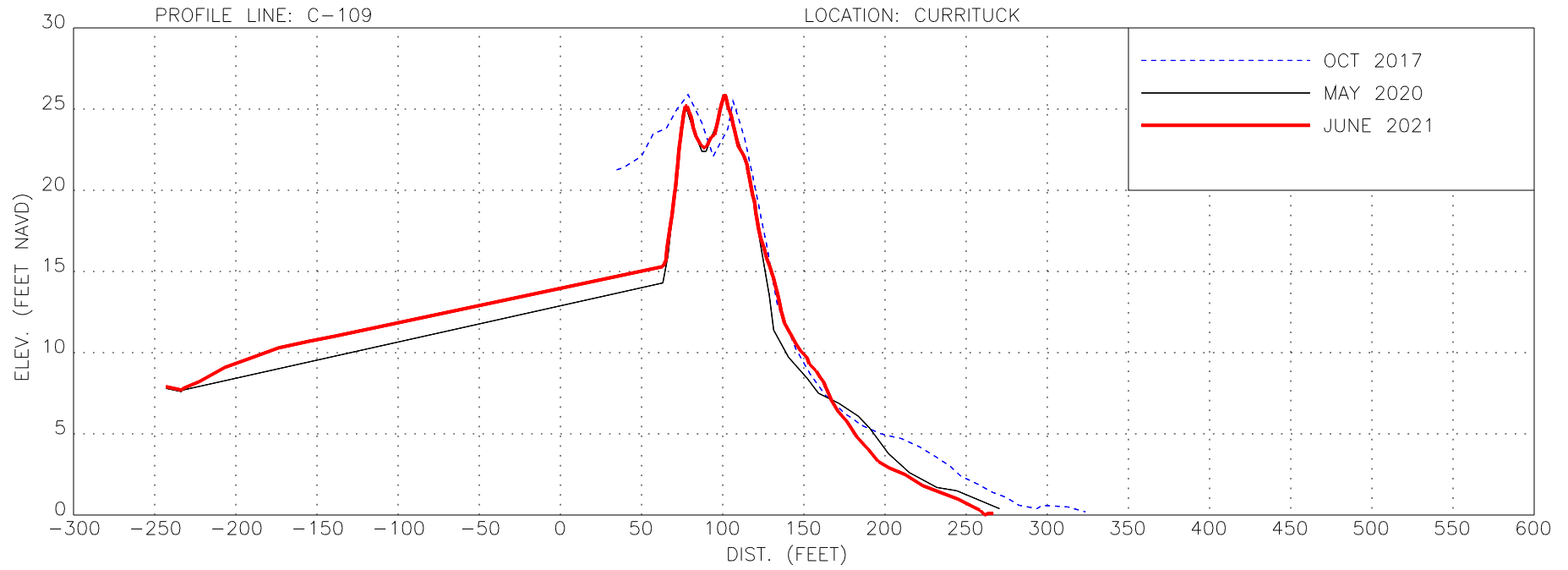


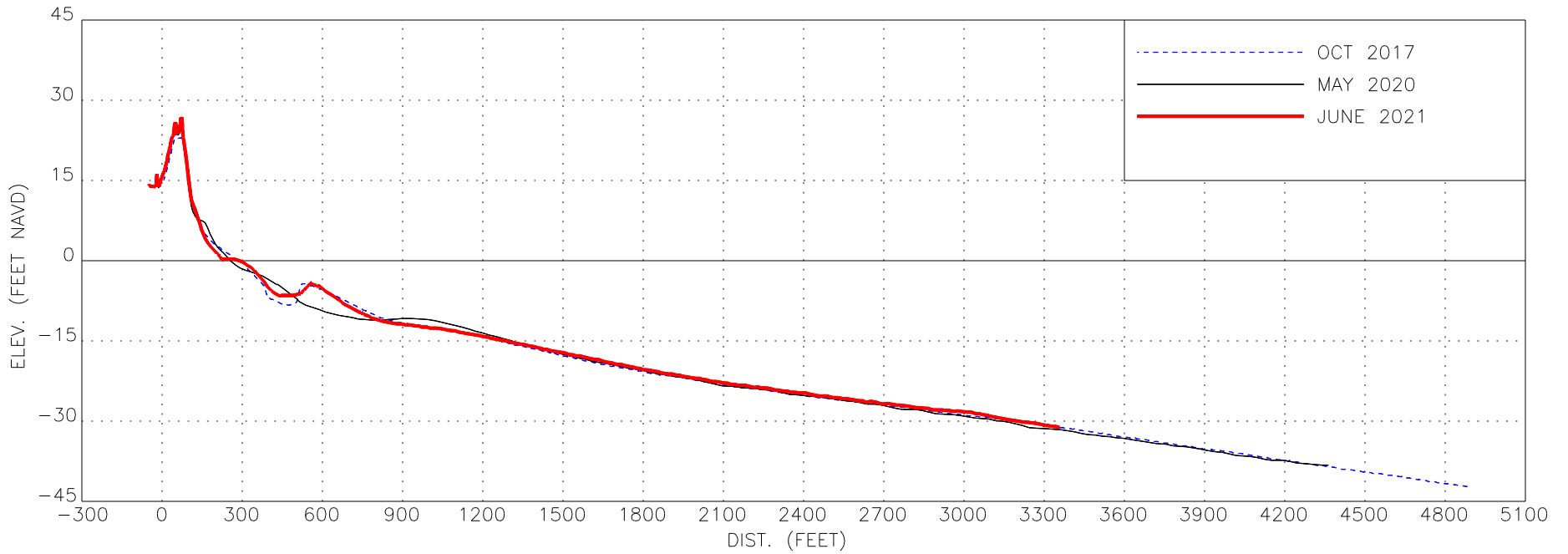
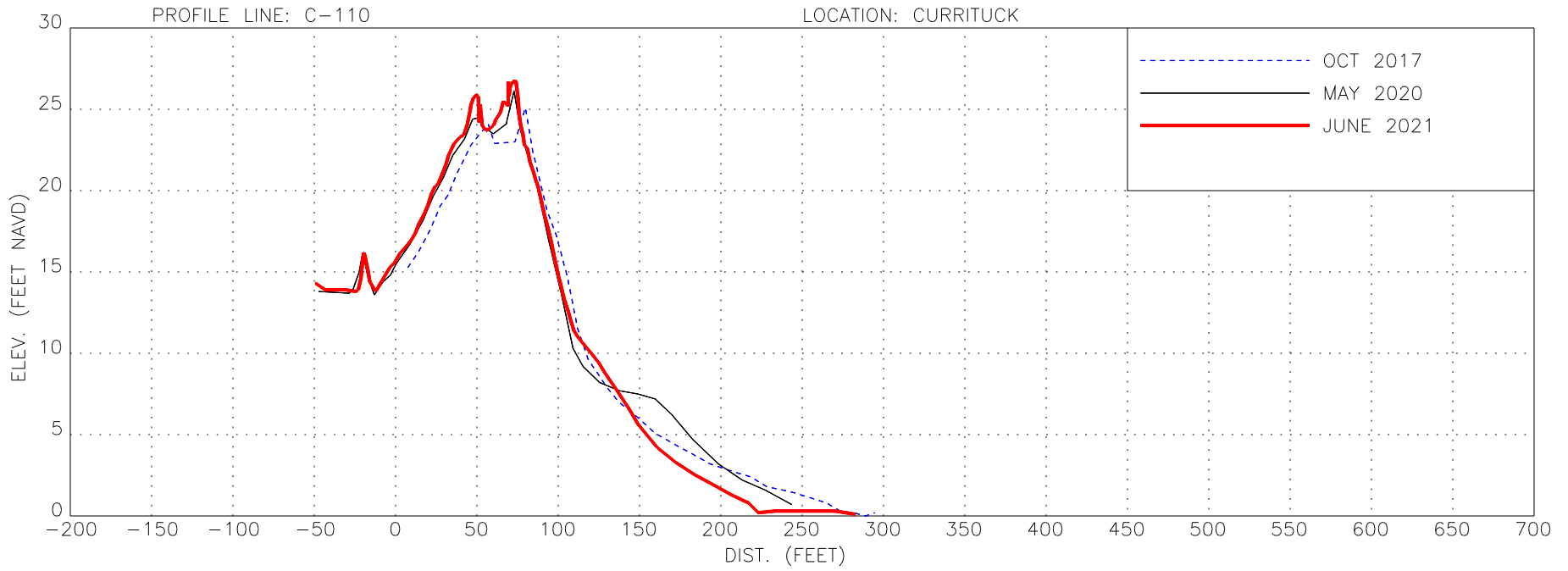


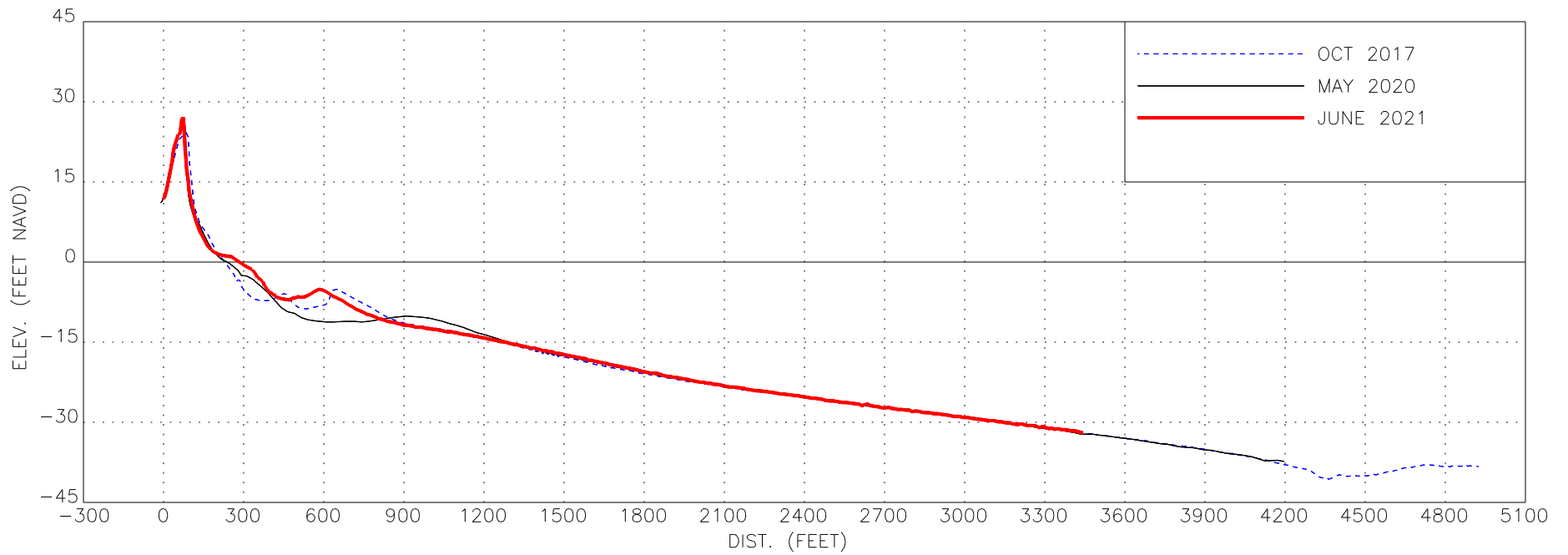
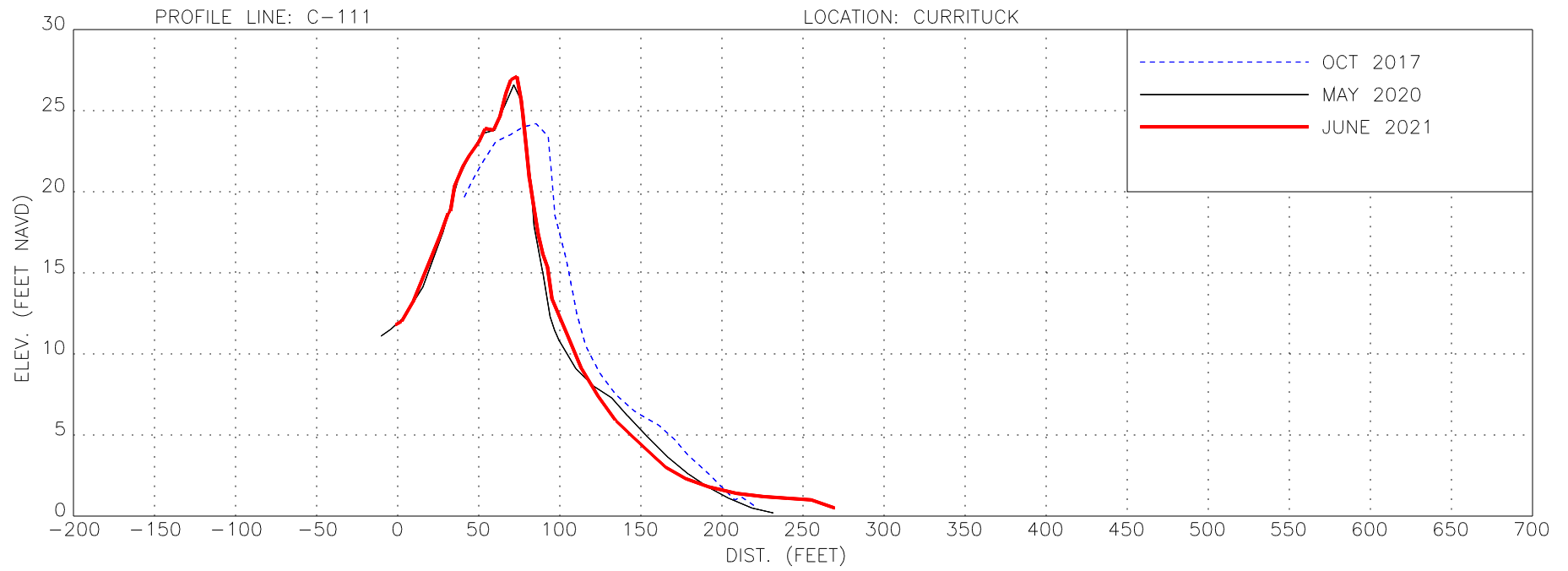


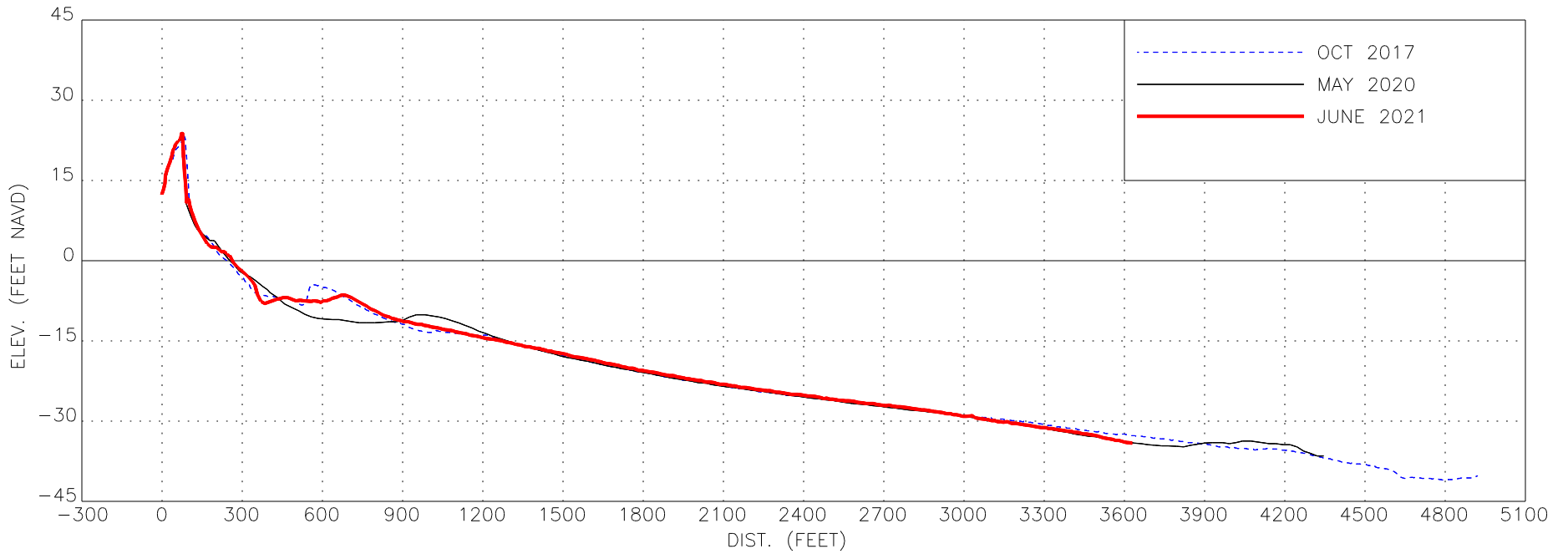
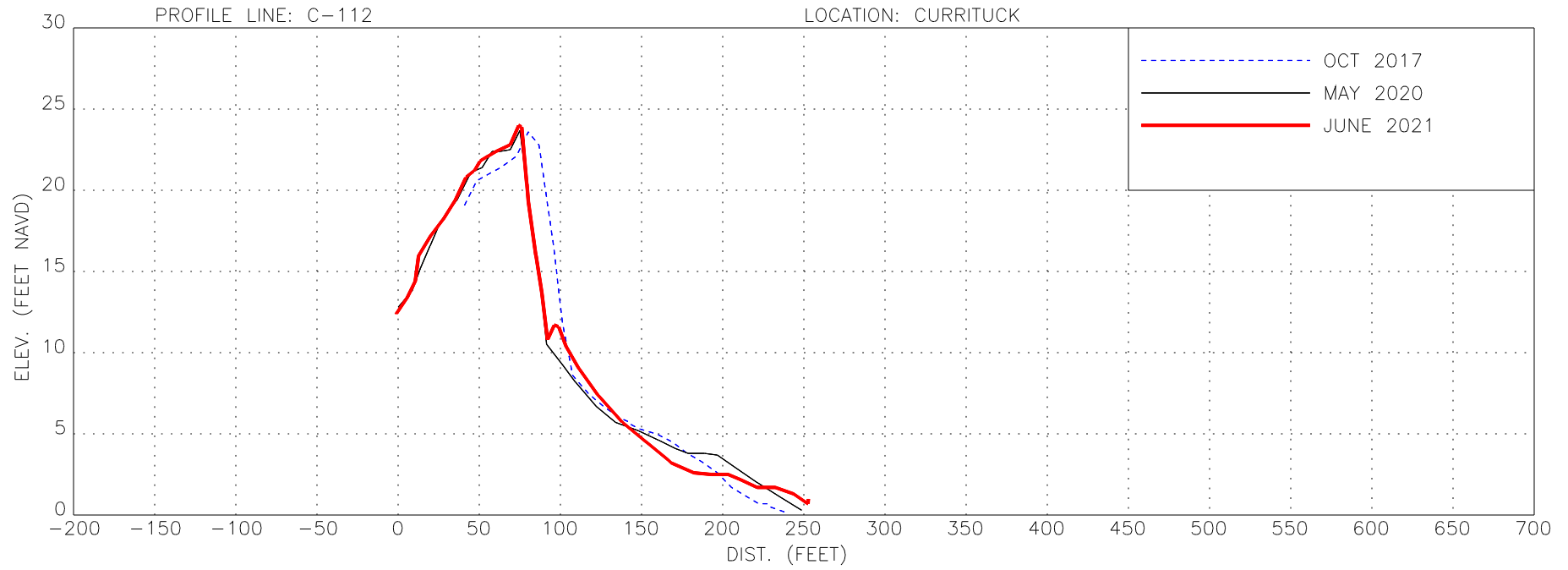






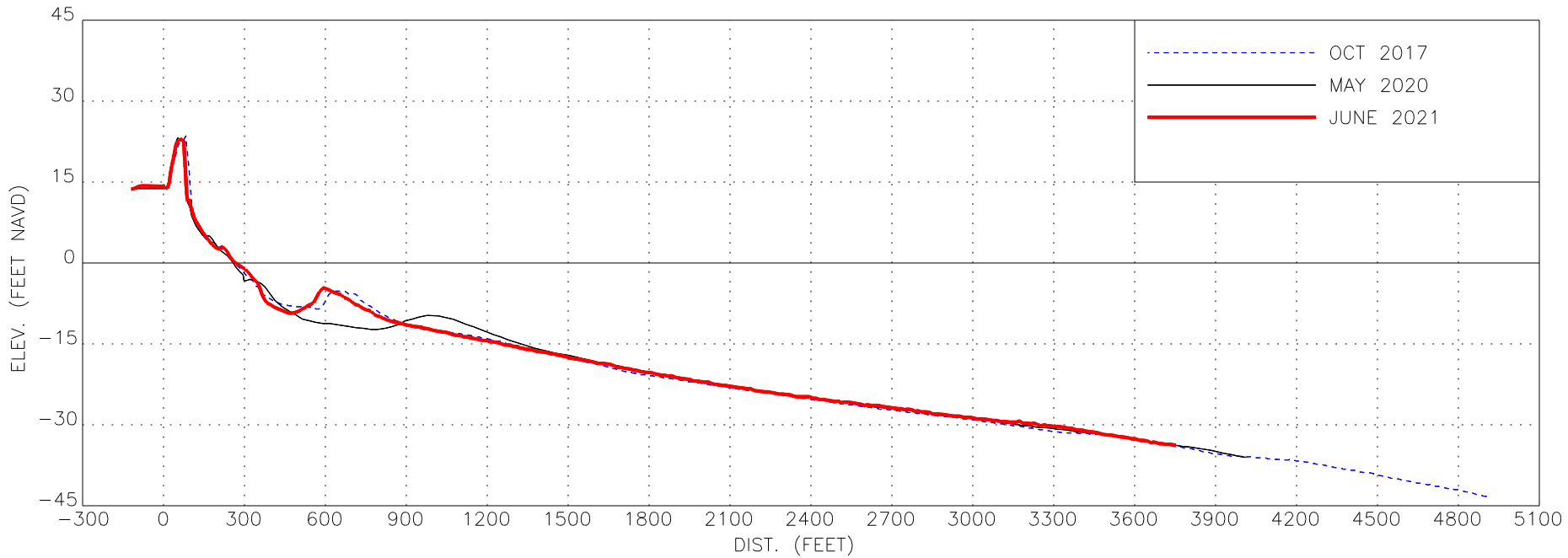
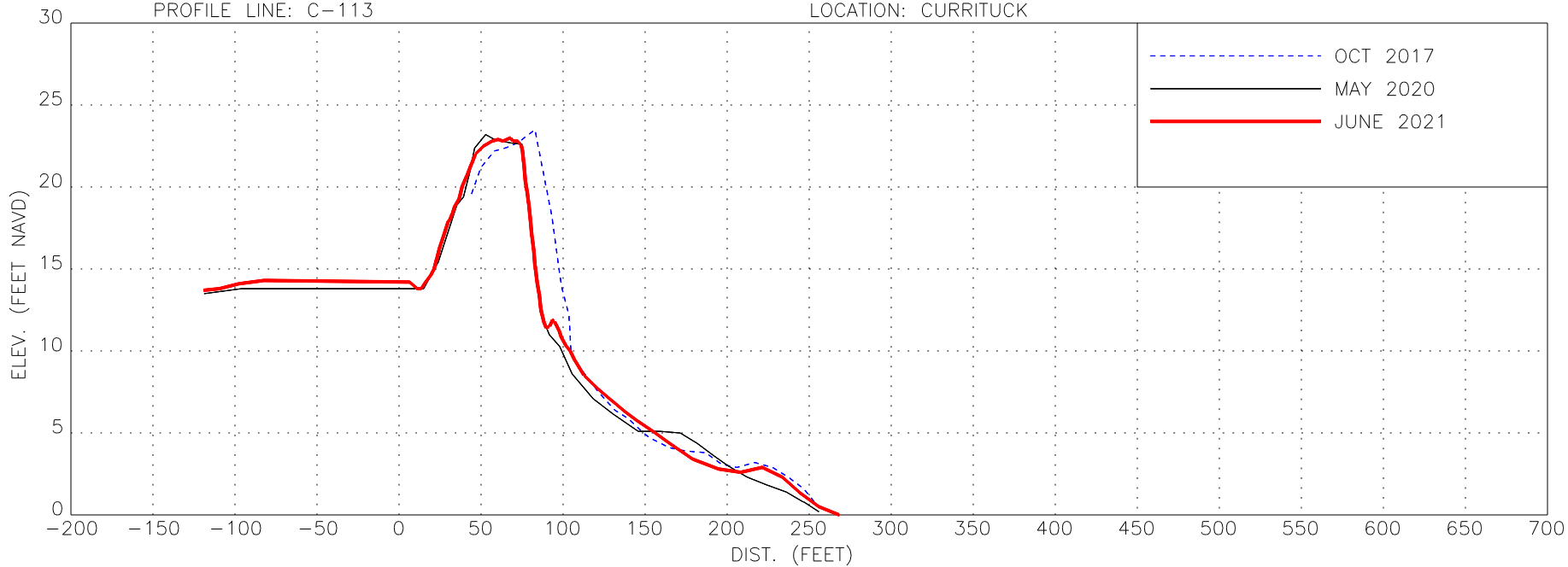


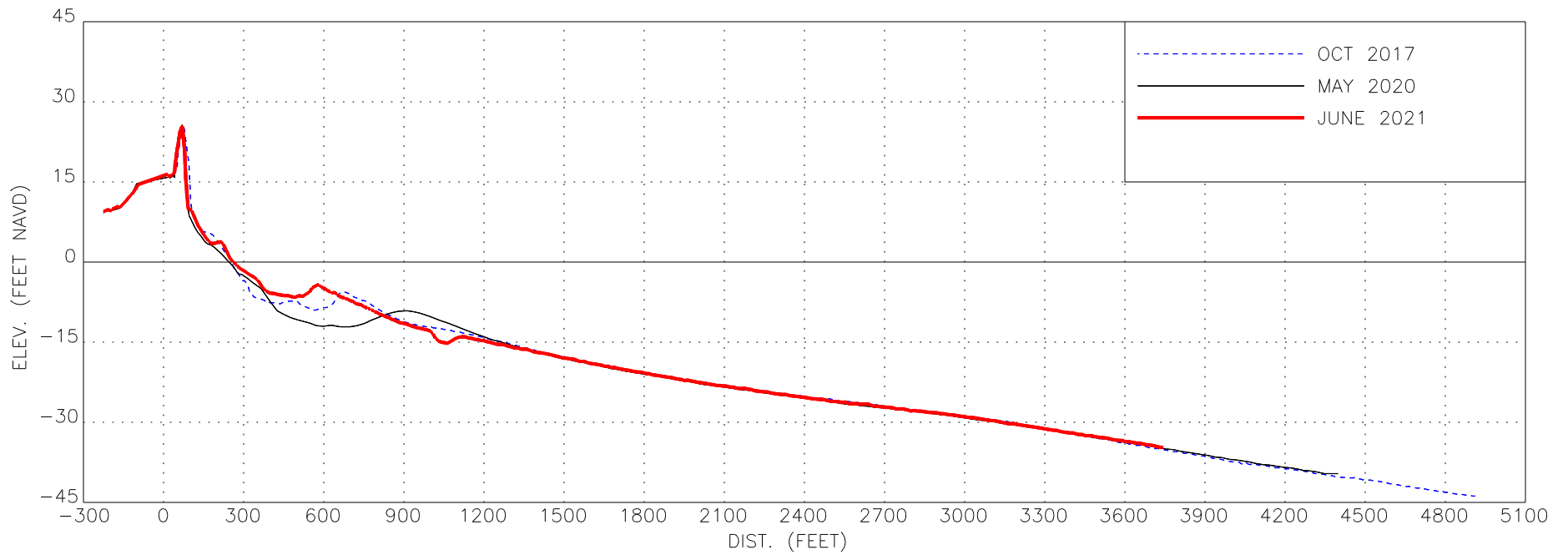
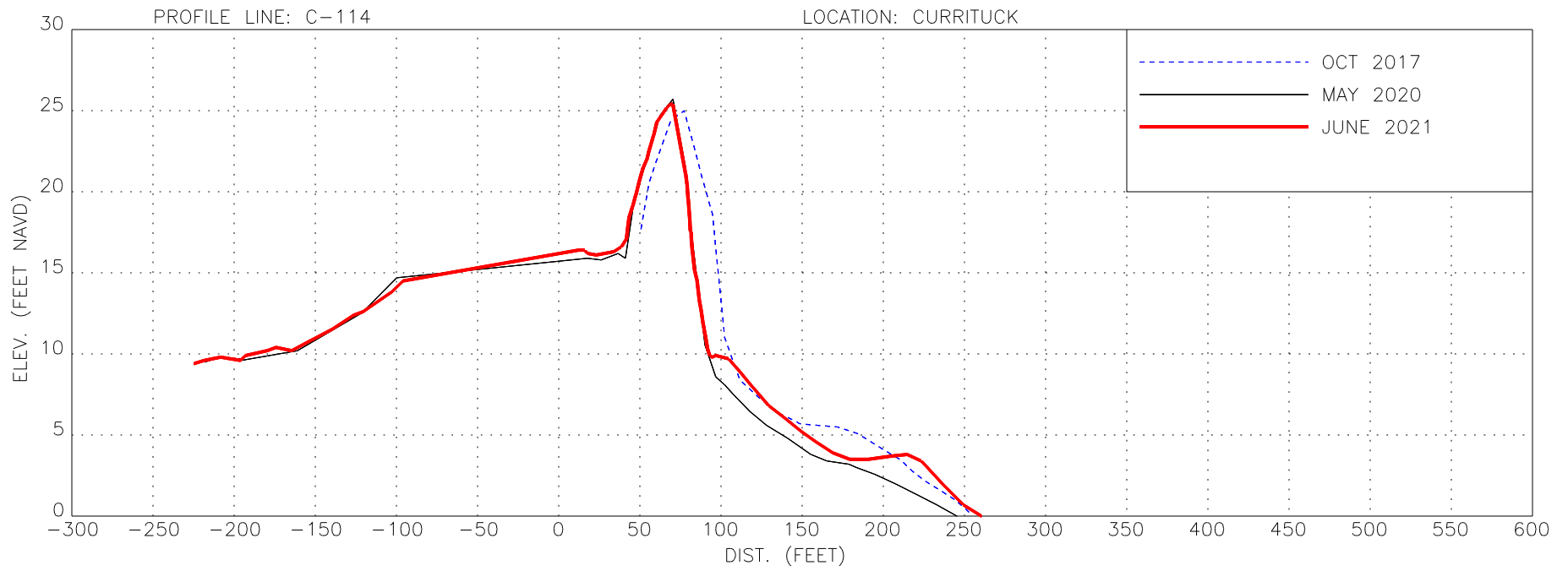


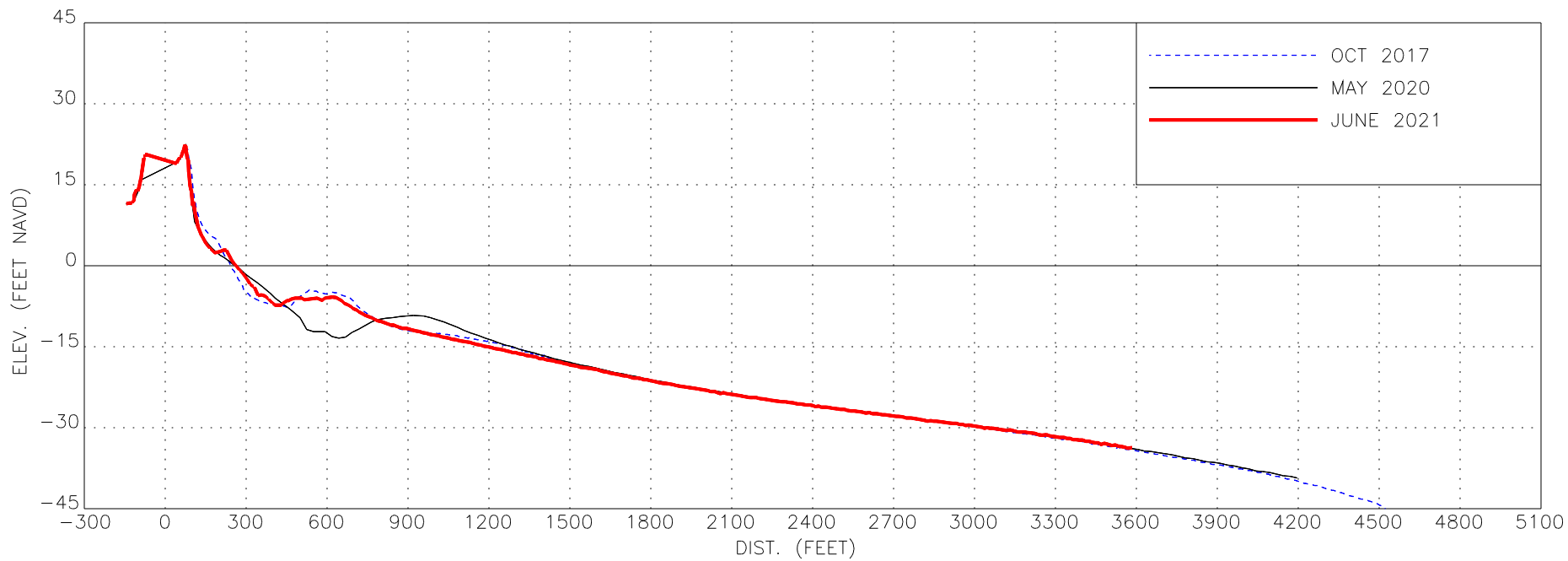
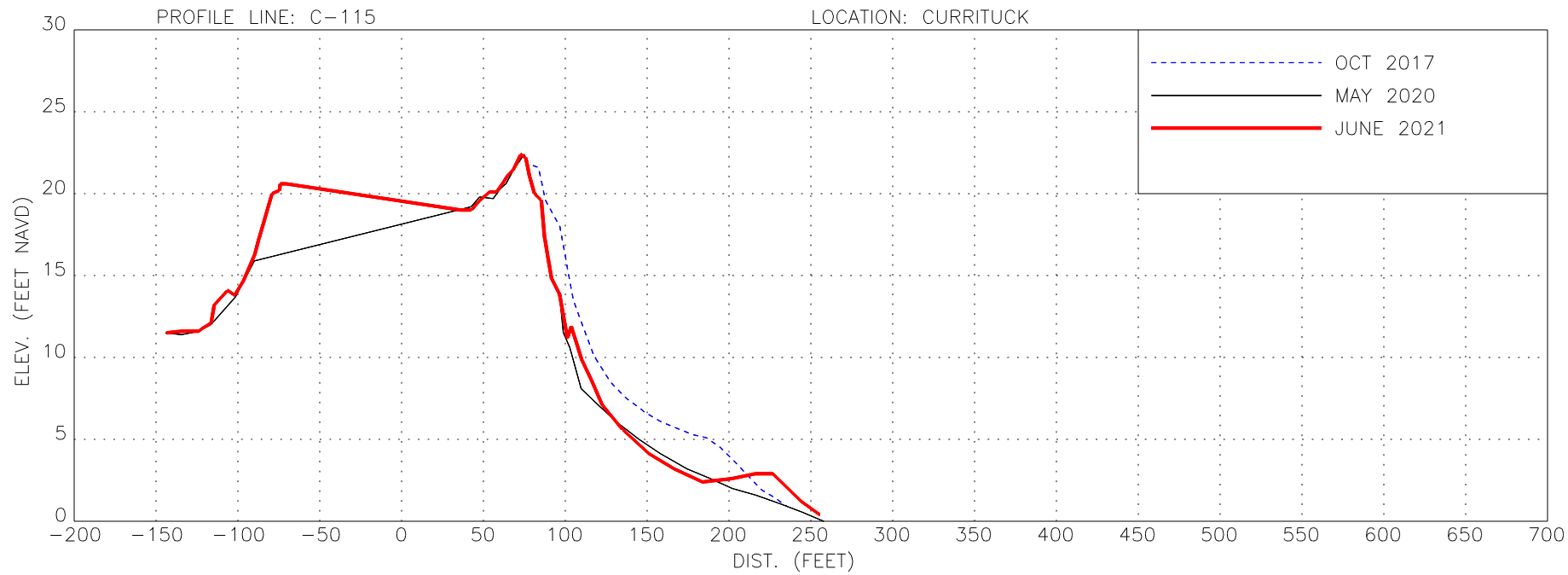


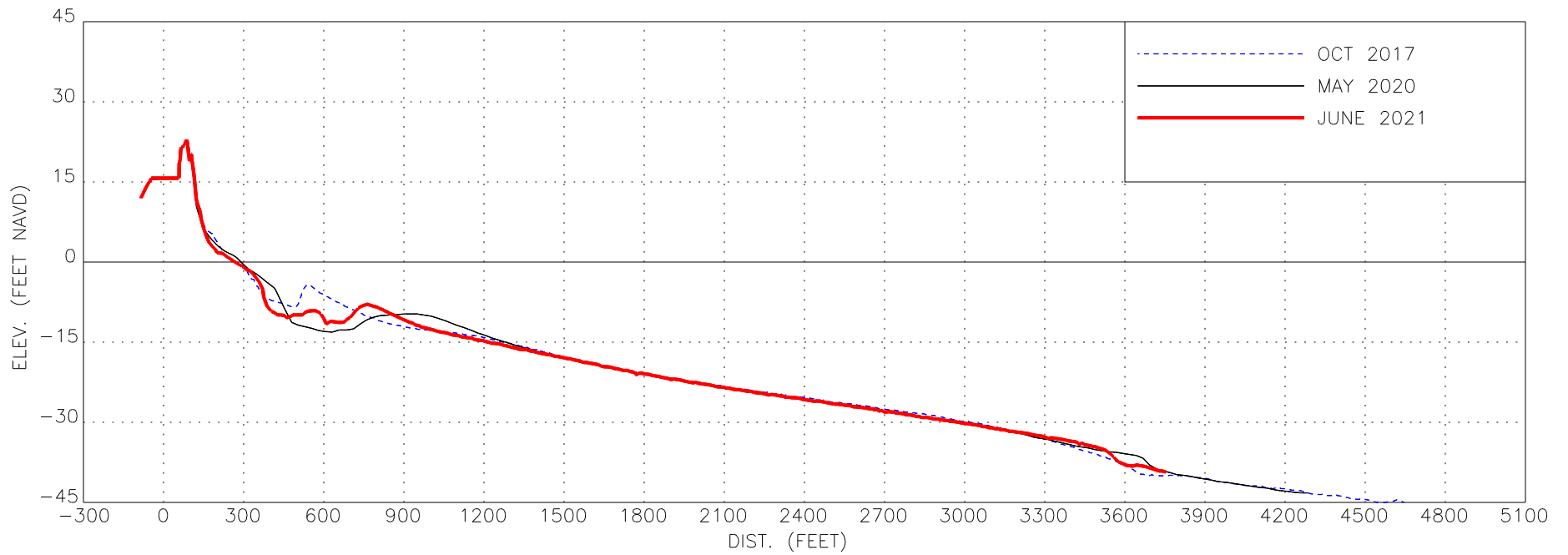
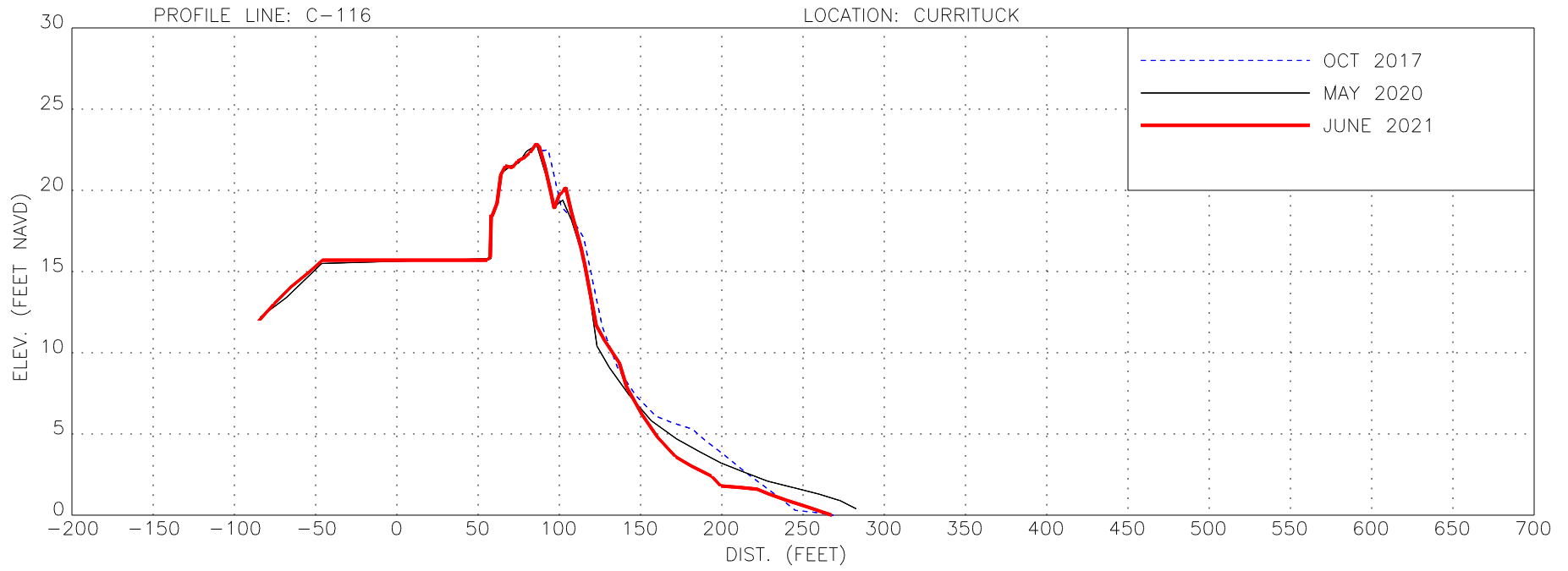
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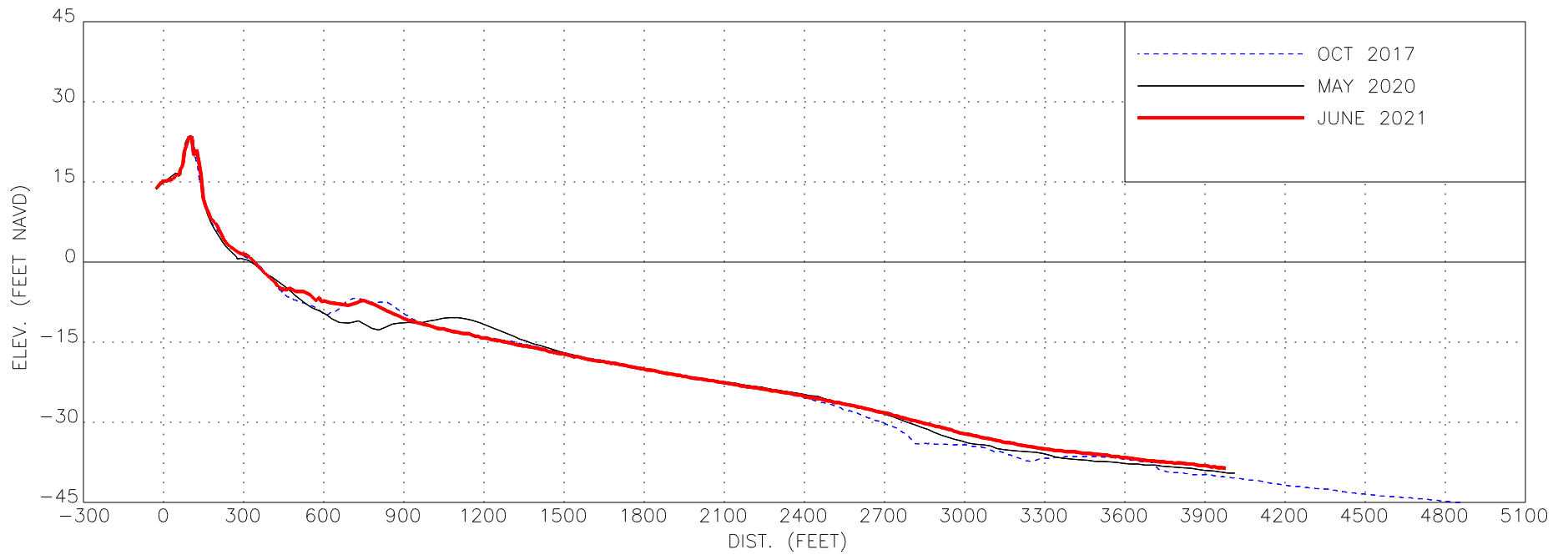
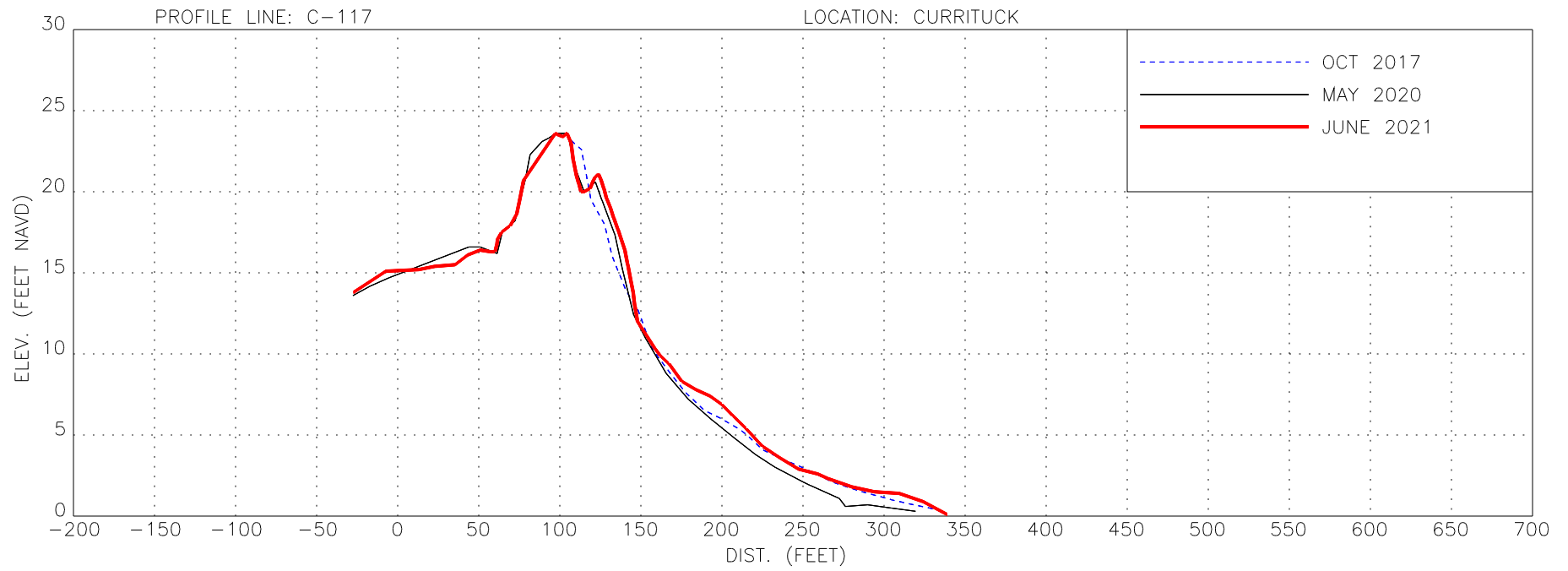
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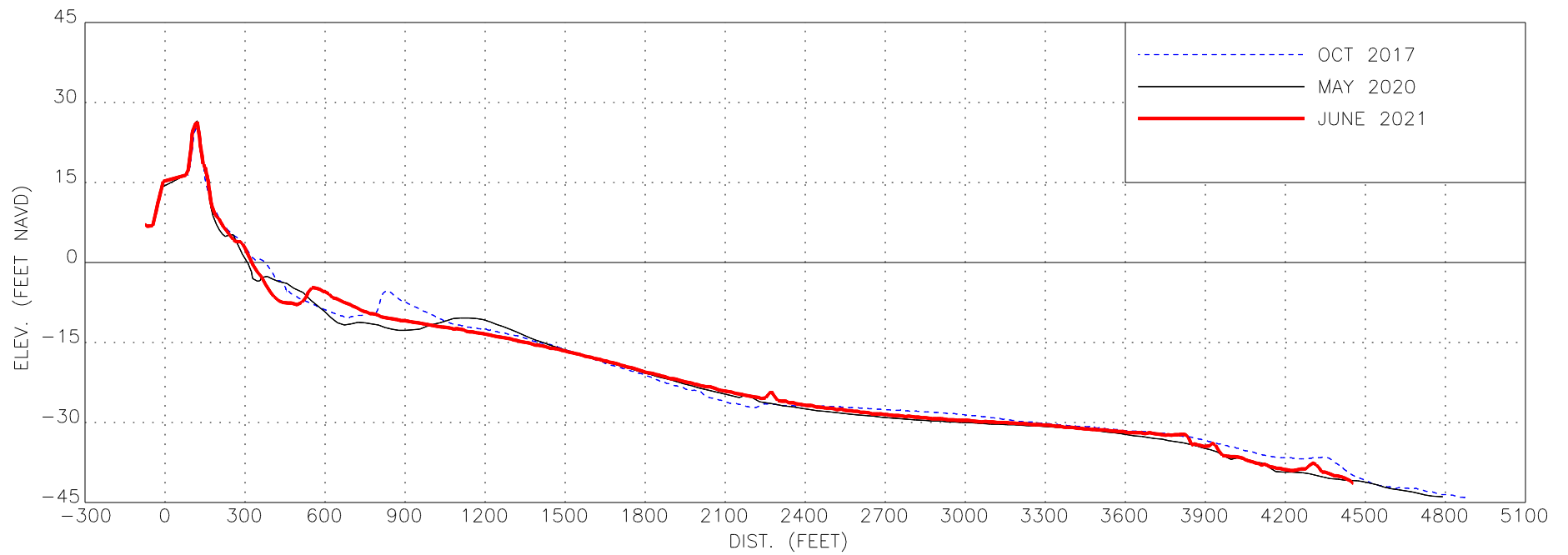
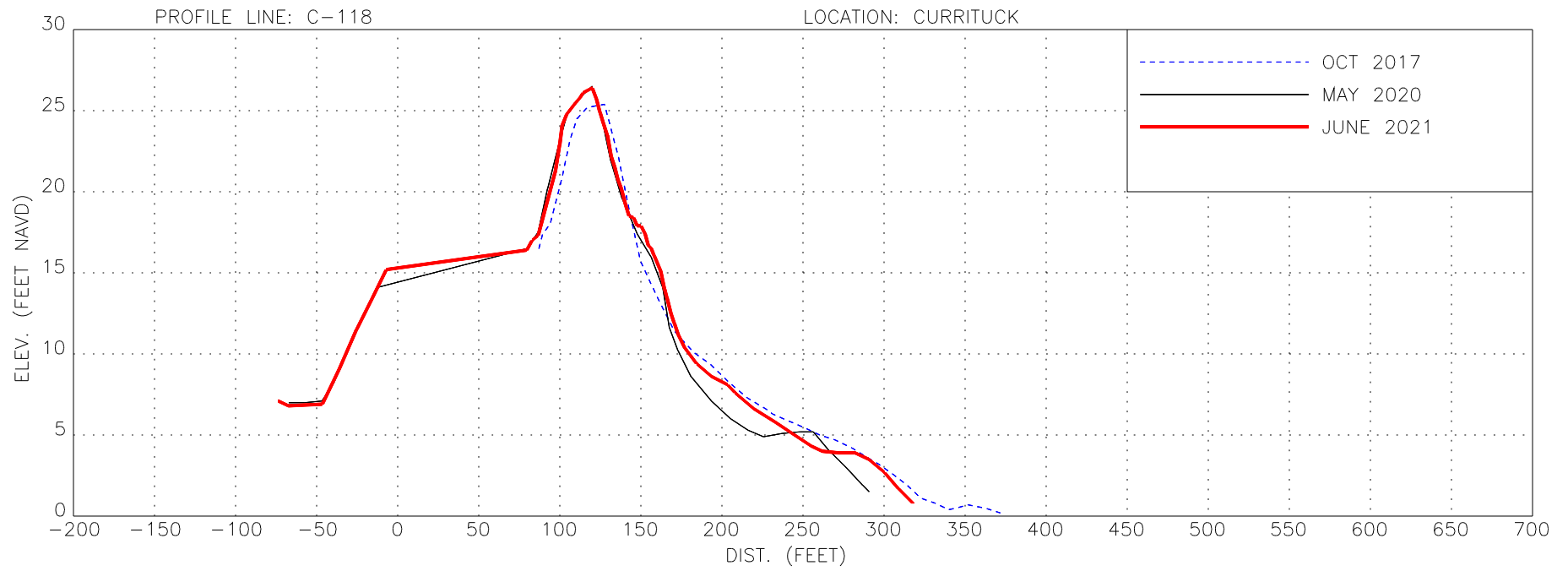


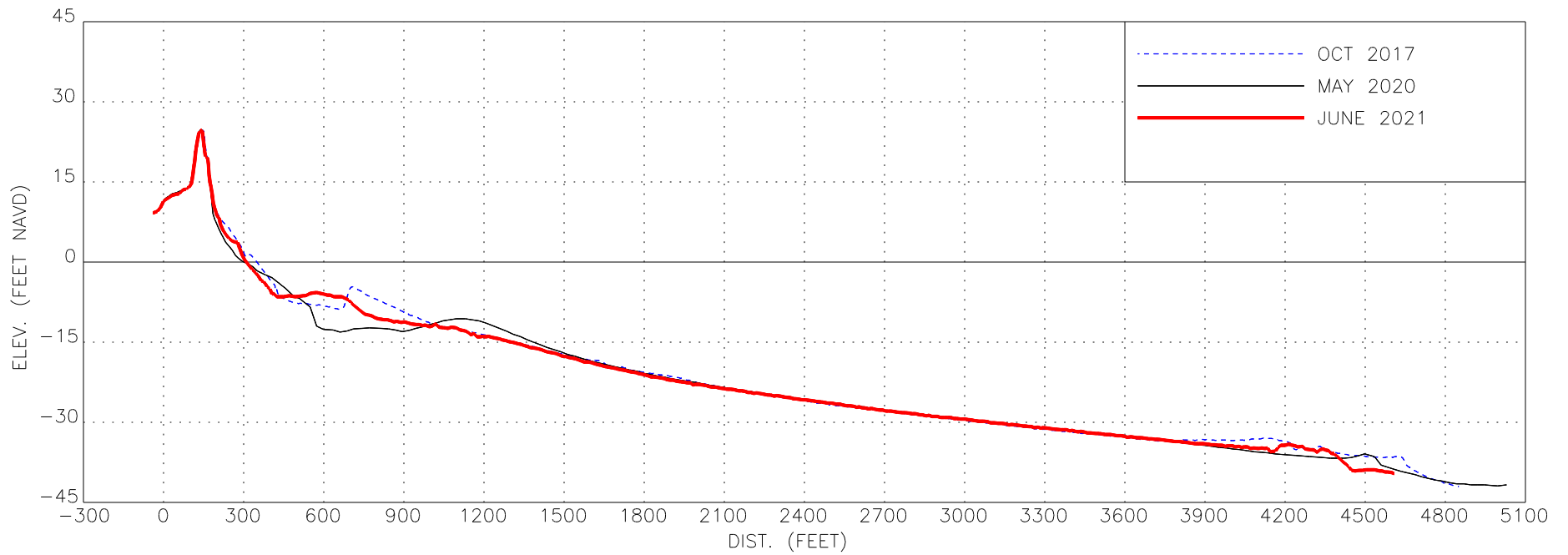
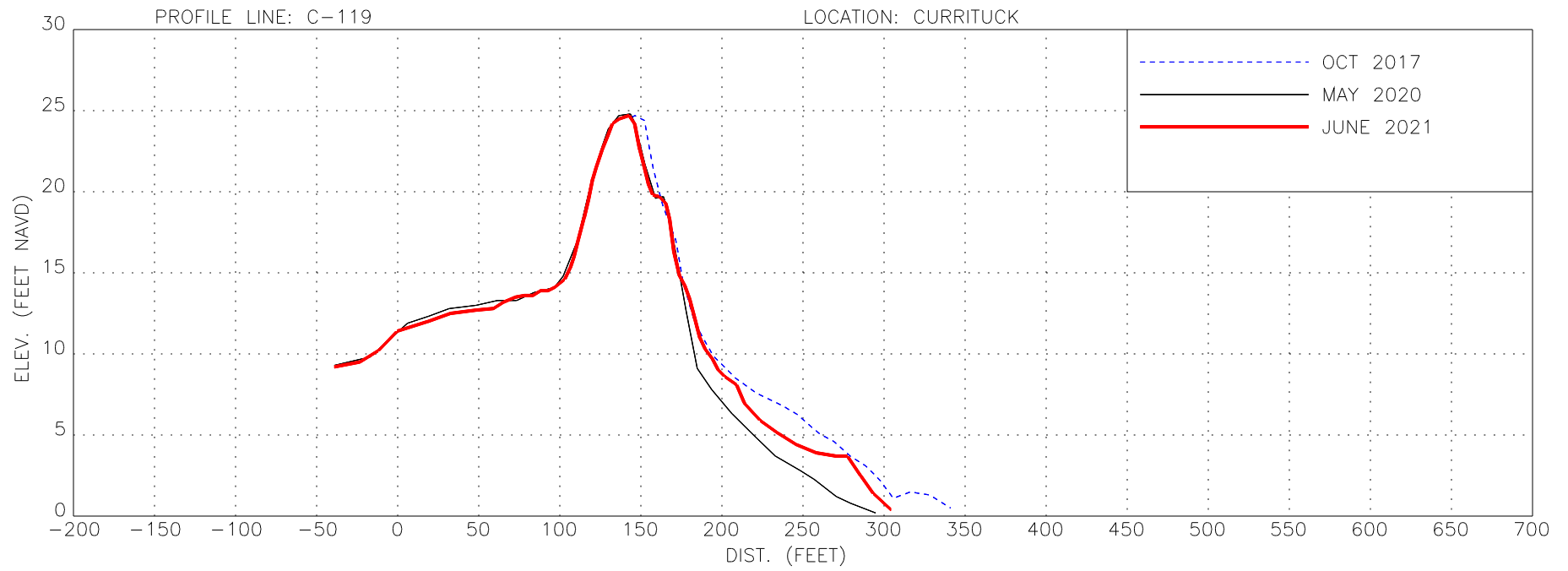


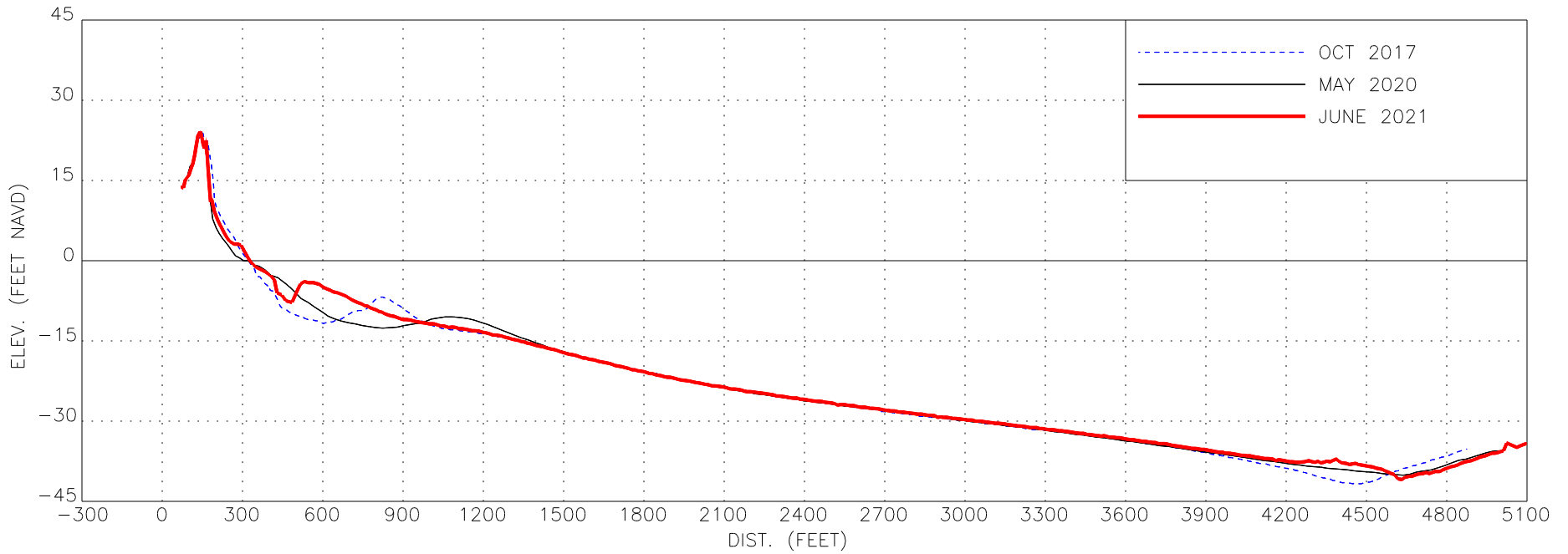
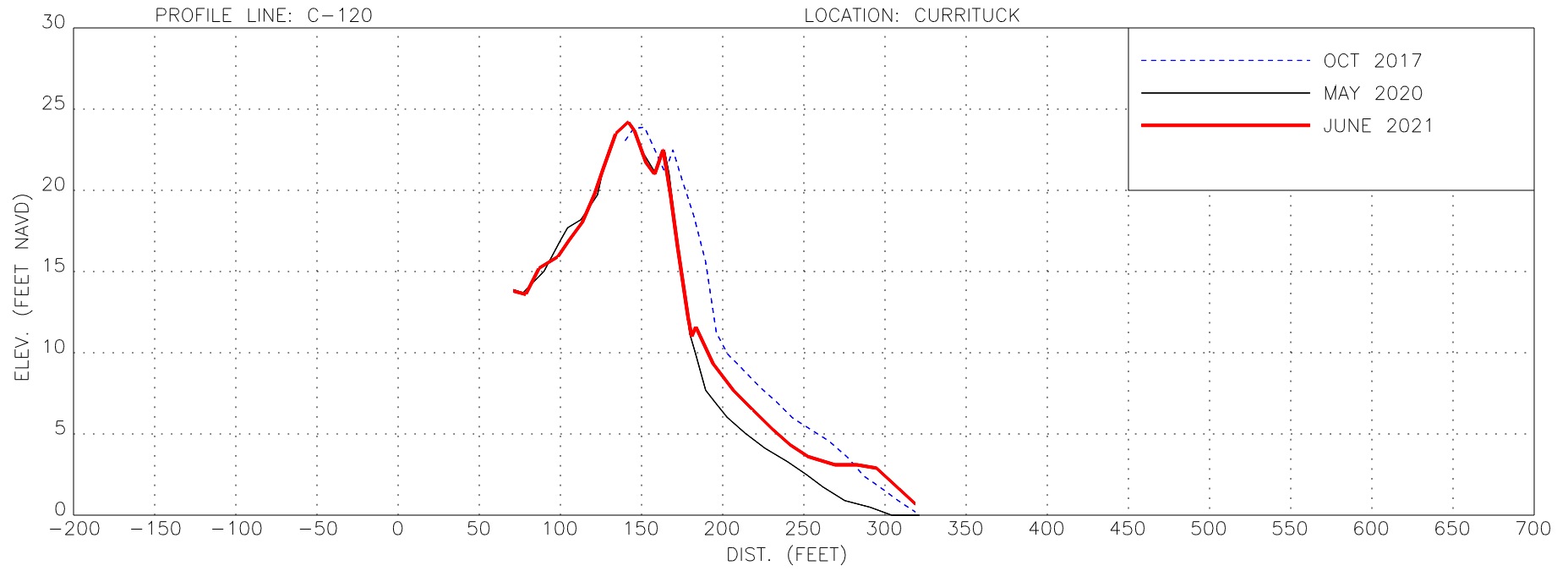












APPENDIX 4

GROUND DIGITAL PHOTOGRAPHY

**Ground Digital Photography
Monument**

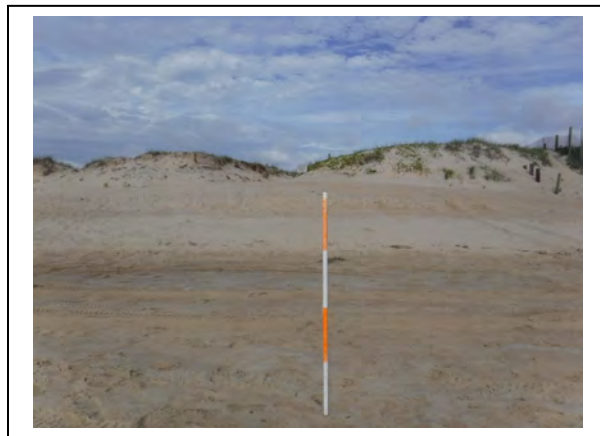
C-001



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-002



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-003



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-004



North View



South View



Landward View

**Ground Digital Photography
Monument**

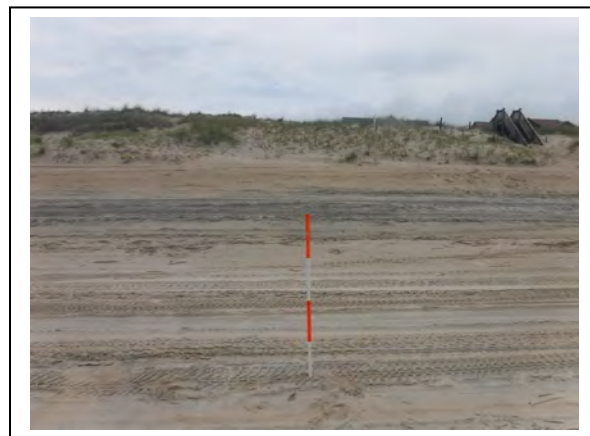
C-005



North View



South View



Landward View

**Ground Digital Photography
Monument**

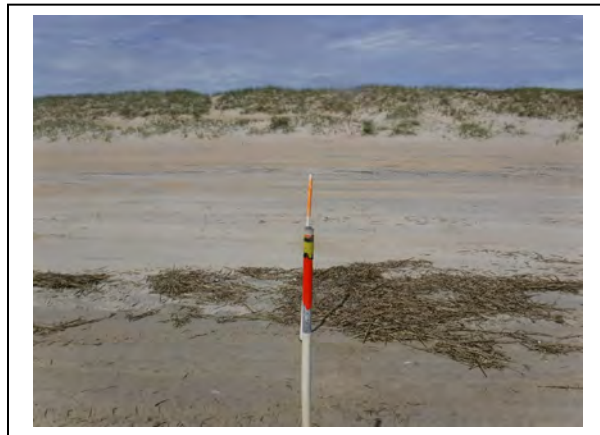
C-006



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-007



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-008



North View



South View



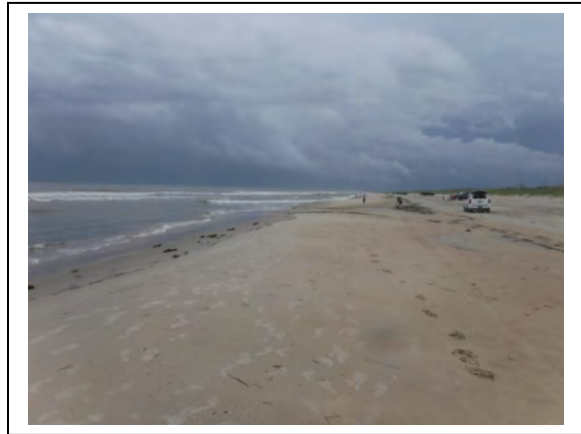
Landward View

**Ground Digital Photography
Monument**

C-009



North View



South View



Landward View

**Ground Digital Photography
Monument**

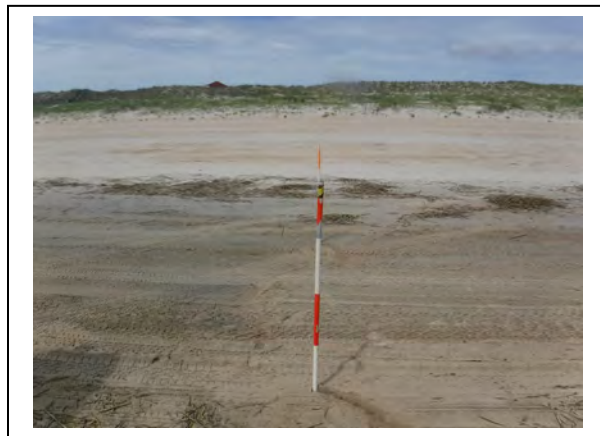
C-010



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-011



North View



South View



Landward View

**Ground Digital Photography
Monument**

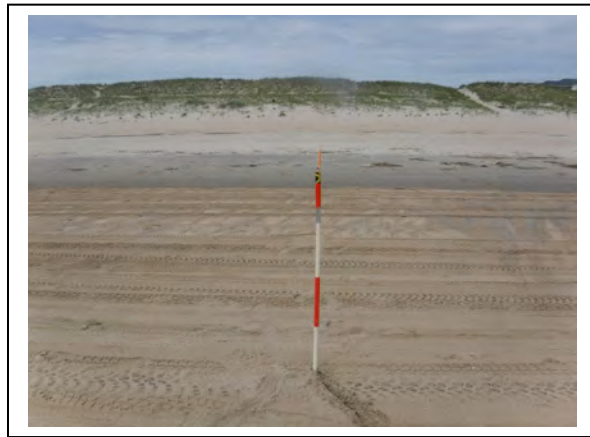
C-012



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-013



North View



South View



Landward View

**Ground Digital Photography
Monument**

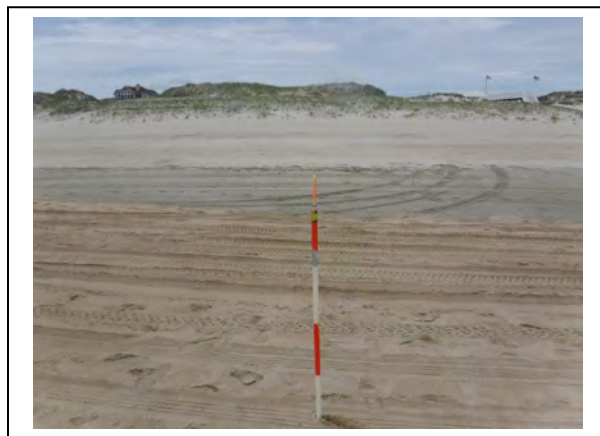
C-014



North View



South View



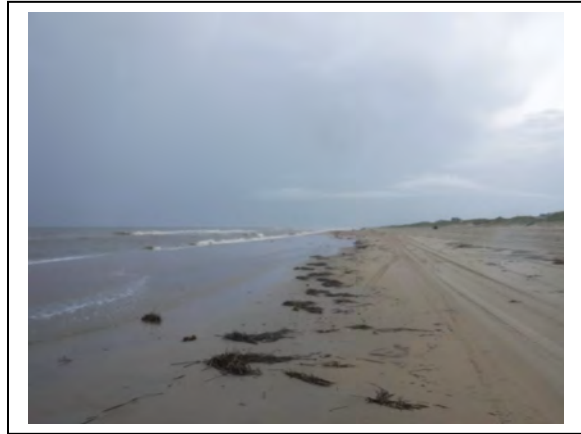
Landward View

**Ground Digital Photography
Monument**

C-015



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-016



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-017



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-018



North View



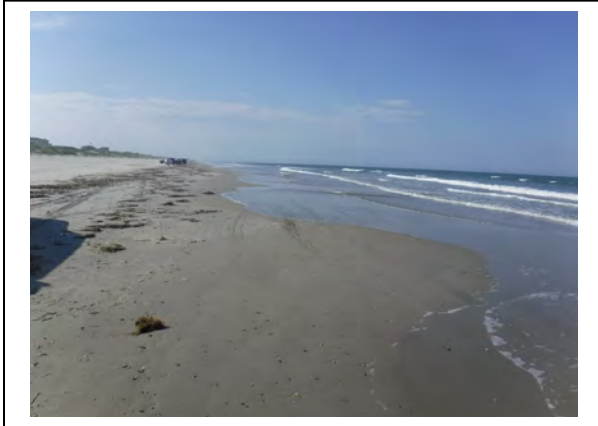
South View



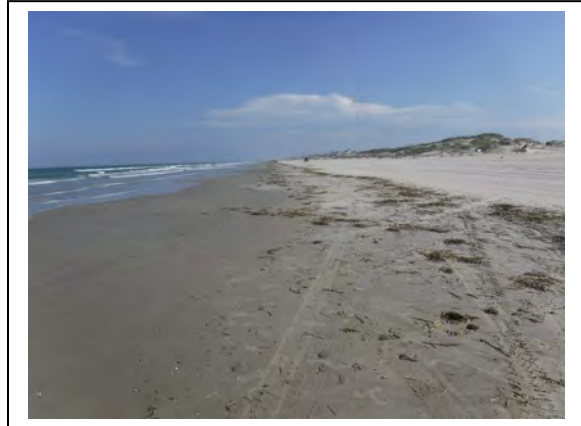
Landward View

**Ground Digital Photography
Monument**

C-019



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-020



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-021



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-022



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-023



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-024



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-025



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-026



North View



South View



Landward View

**Ground Digital Photography
Monument**

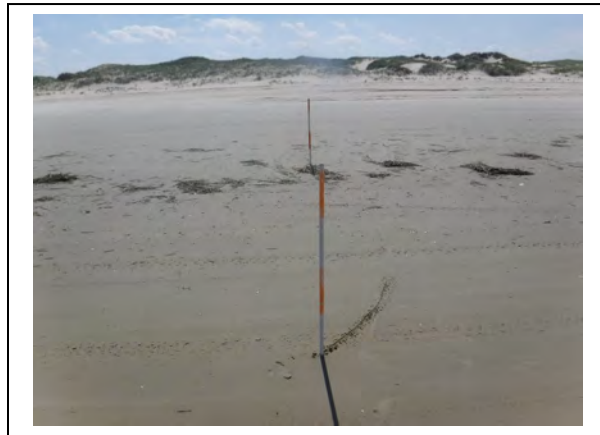
C-027



North View



South View



Landward View

**Ground Digital Photography
Monument**

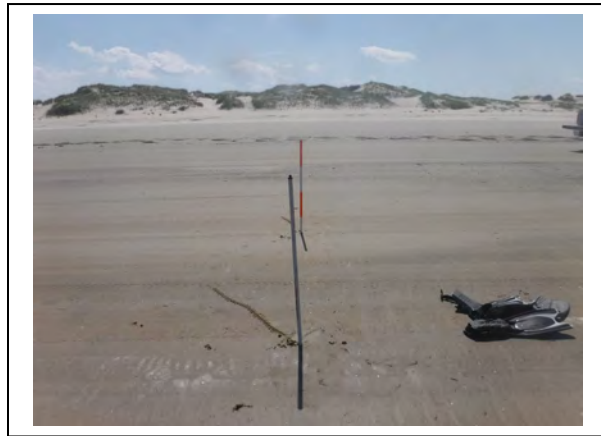
C-028



North View



South View



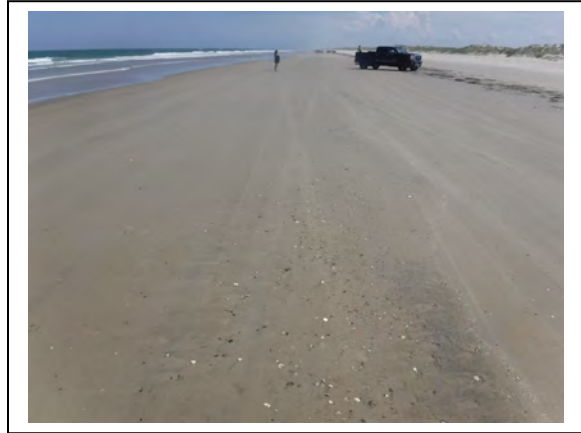
Landward View

**Ground Digital Photography
Monument**

C-029



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-030



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-031



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-032



North View



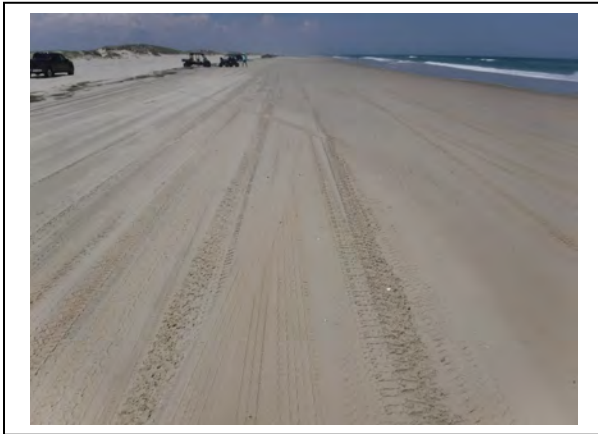
South View



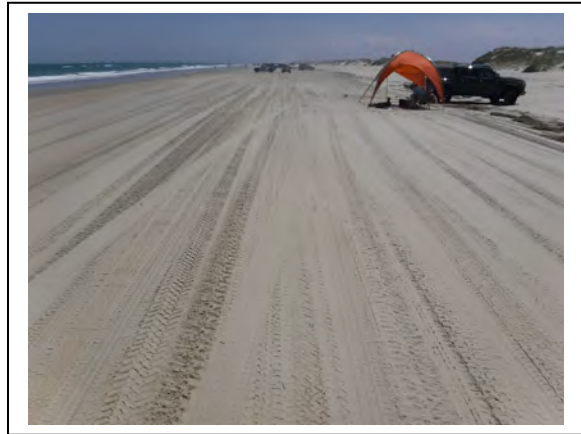
Landward View

**Ground Digital Photography
Monument**

C-033



North View



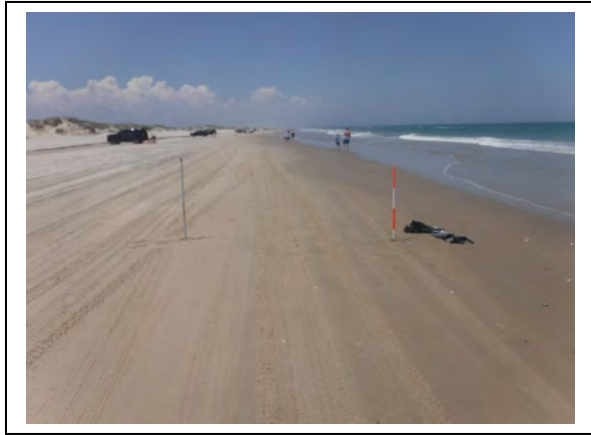
South View



Landward View

**Ground Digital Photography
Monument**

C-034



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-035



North View



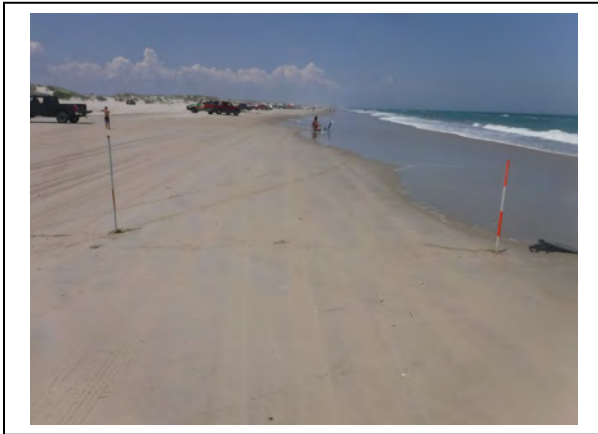
South View



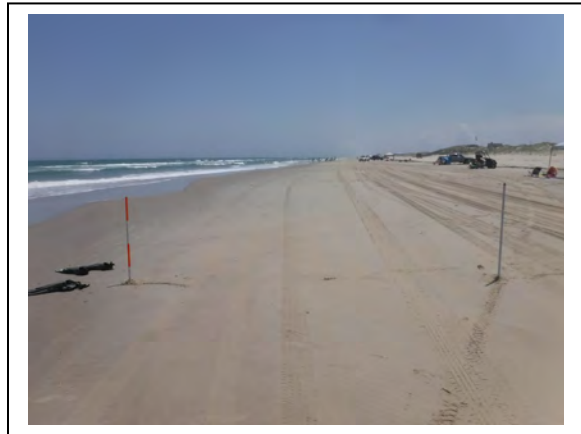
Landward View

**Ground Digital Photography
Monument**

C-036



North View



South View



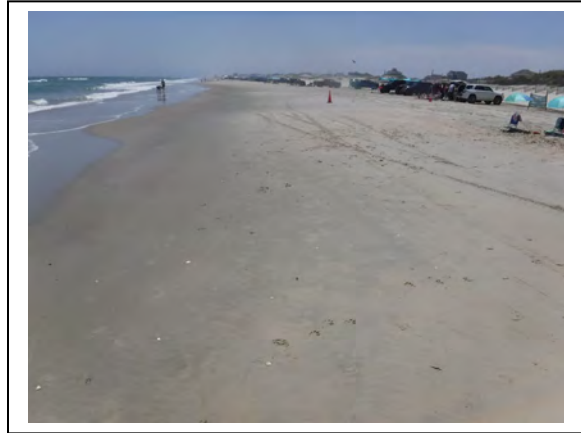
Landward View

**Ground Digital Photography
Monument**

C-037



North View



South View



Landward View

**Ground Digital Photography
Monument**

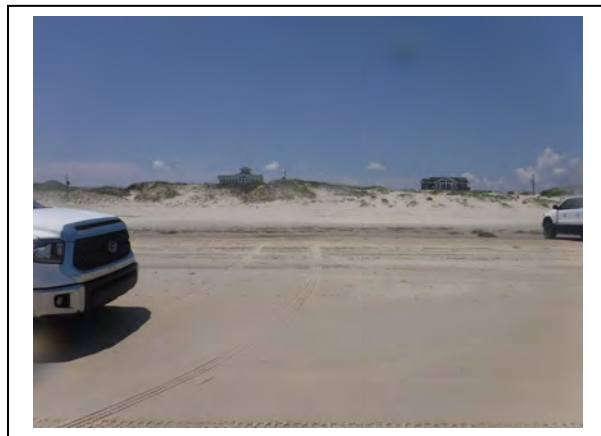
C-038



North View



South View



Landward View

**Ground Digital Photography
Monument**

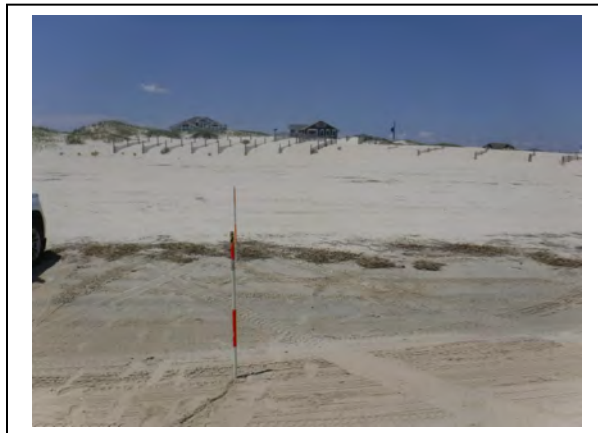
C-039



North View



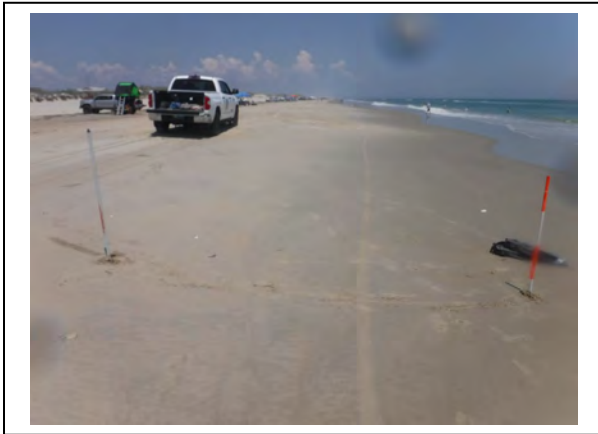
South View



Landward View

**Ground Digital Photography
Monument**

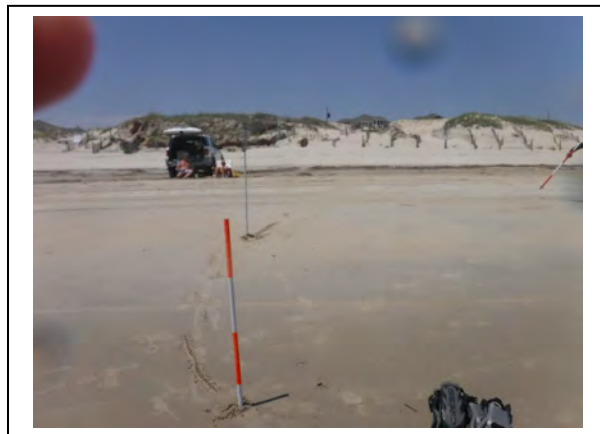
C-040



North View



South View



Landward View

**Ground Digital Photography
Monument**

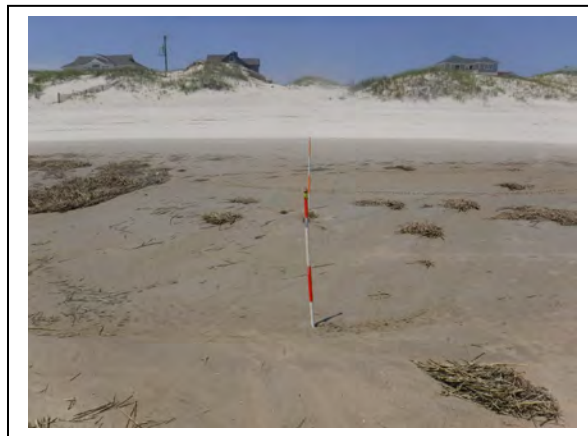
C-041



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-042



North View



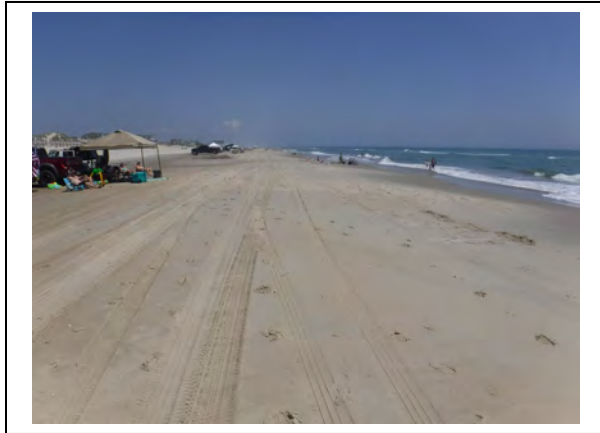
South View



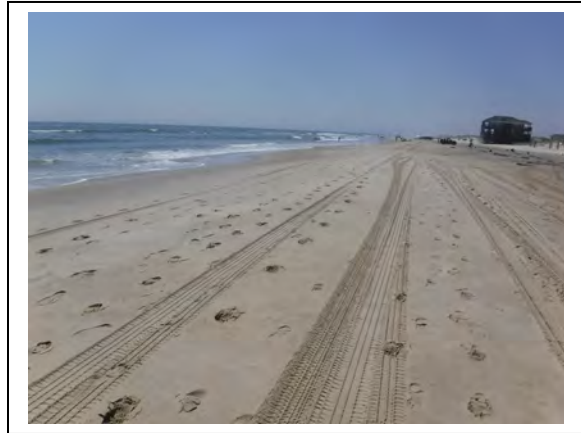
Landward View

**Ground Digital Photography
Monument**

C-043



North View



South View



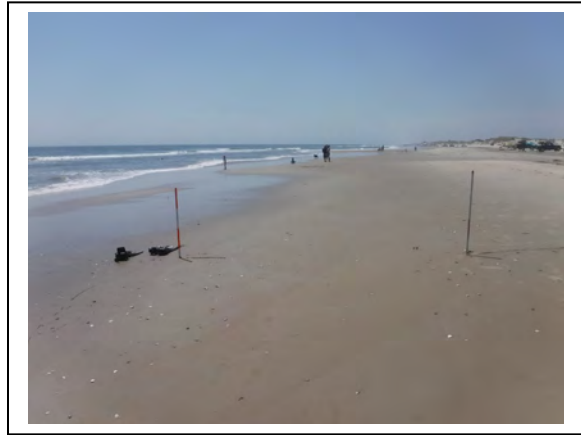
Landward View

**Ground Digital Photography
Monument**

C-044



North View



South View



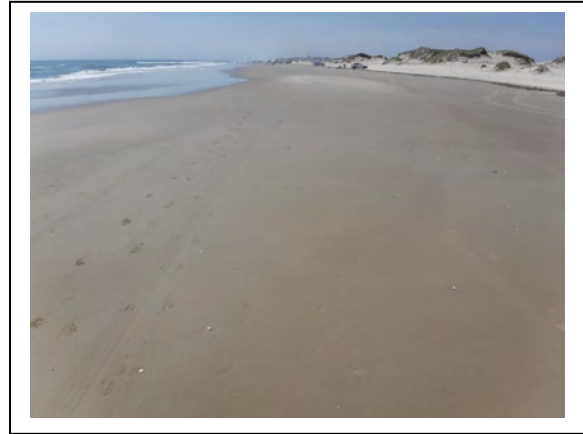
Landward View

**Ground Digital Photography
Monument**

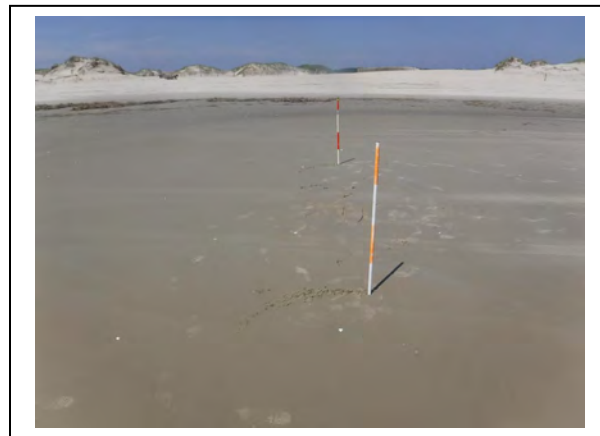
C-045



North View



South View



Landward View

**Ground Digital Photography
Monument**

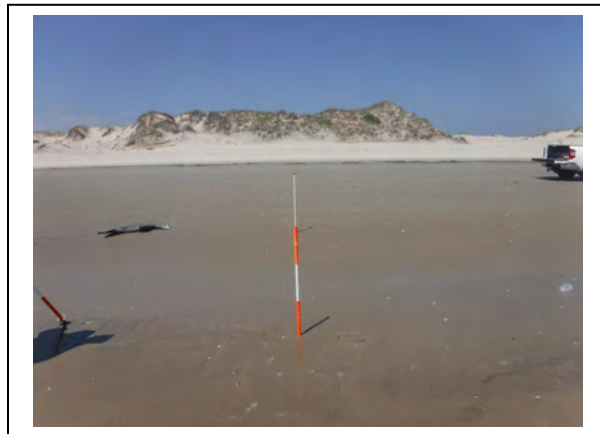
C-046



North View



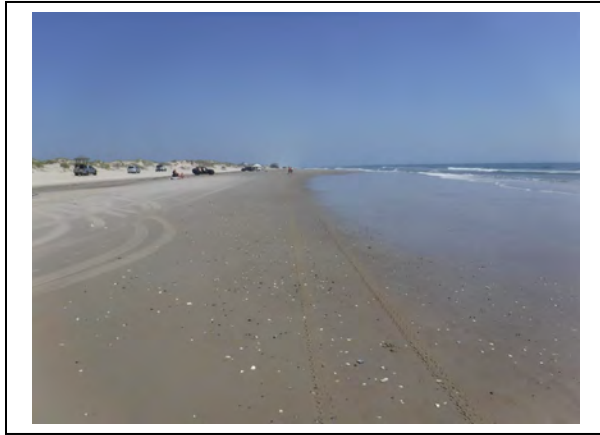
South View



Landward View

**Ground Digital Photography
Monument**

C-047



North View



South View



Landward View

**Ground Digital Photography
Monument**

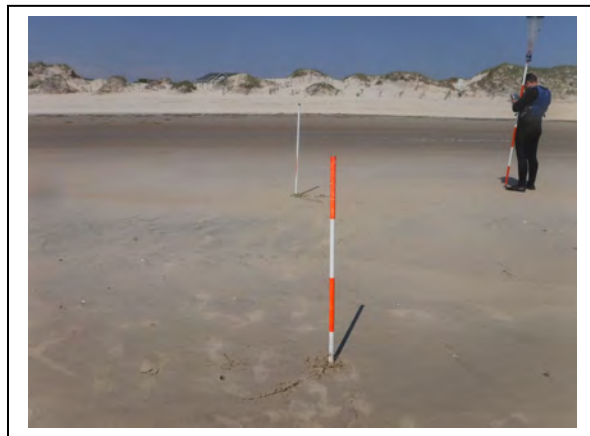
C-048



North View



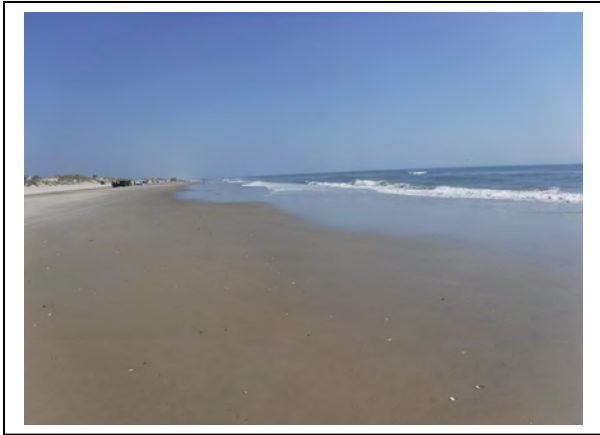
South View



Landward View

**Ground Digital Photography
Monument**

C-049



North View



South View



Landward View

**Ground Digital Photography
Monument**

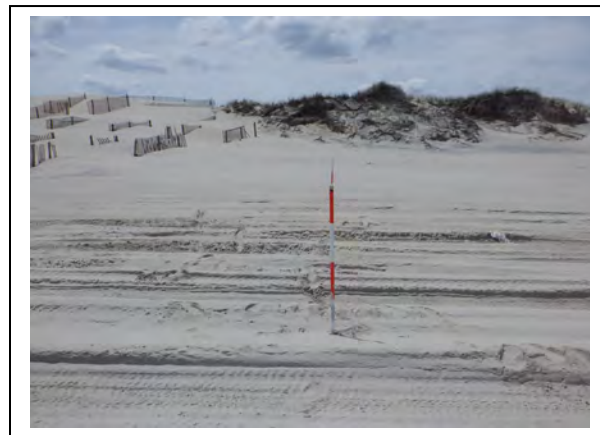
C-050



North View



South View



Landward View

**Ground Digital Photography
Monument**

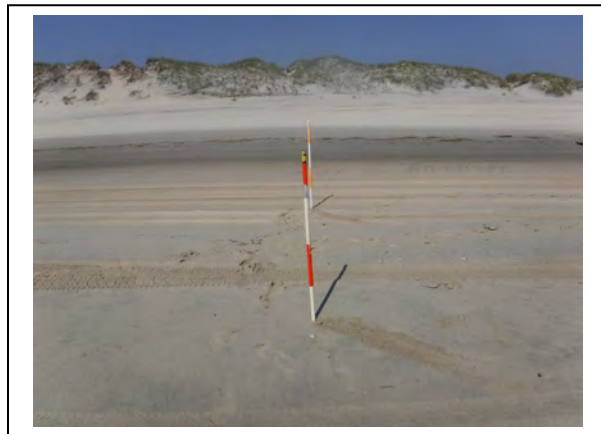
C-051



North View



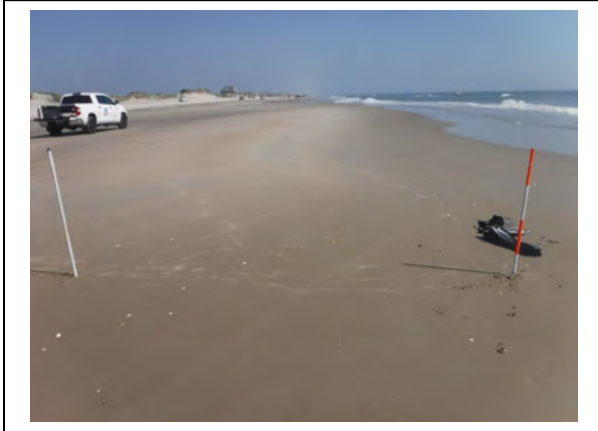
South View



Landward View

**Ground Digital Photography
Monument**

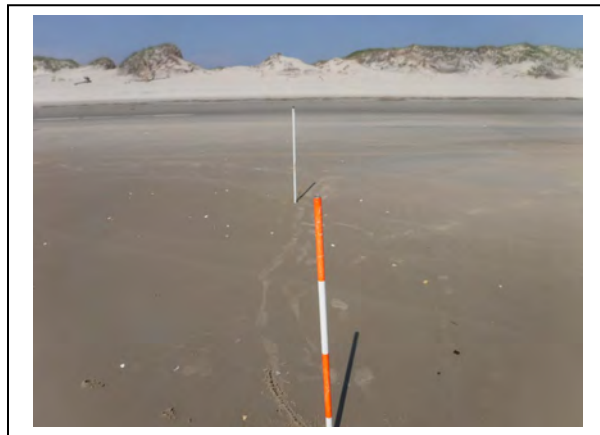
C-052



North View



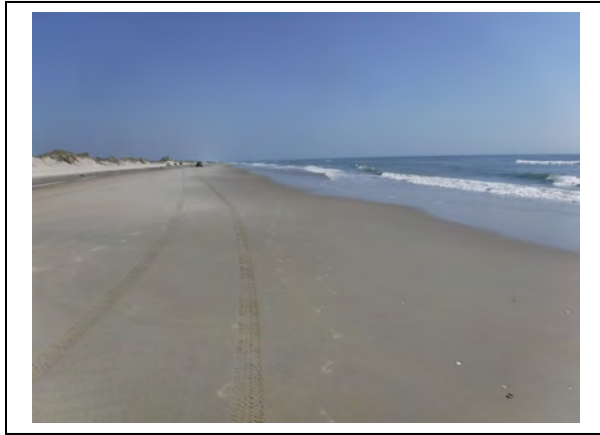
South View



Landward View

**Ground Digital Photography
Monument**

C-053



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-054



North View



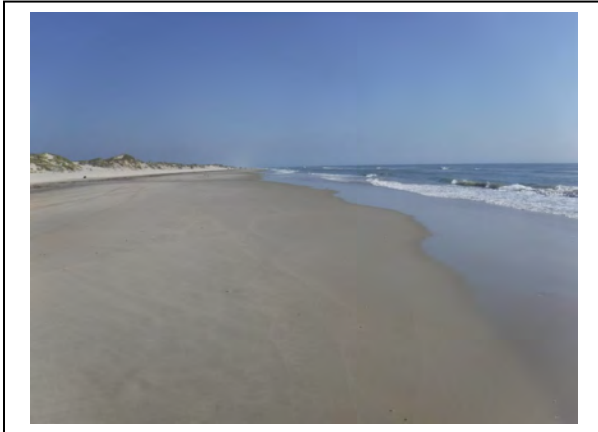
South View



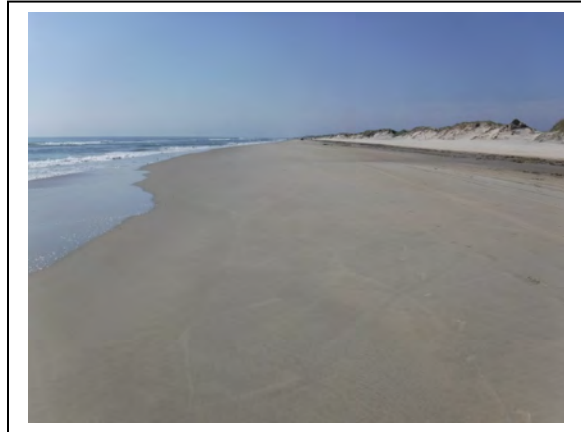
Landward View

**Ground Digital Photography
Monument**

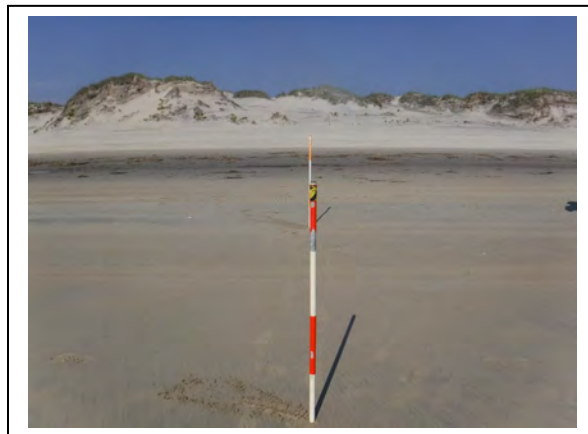
C-055



North View



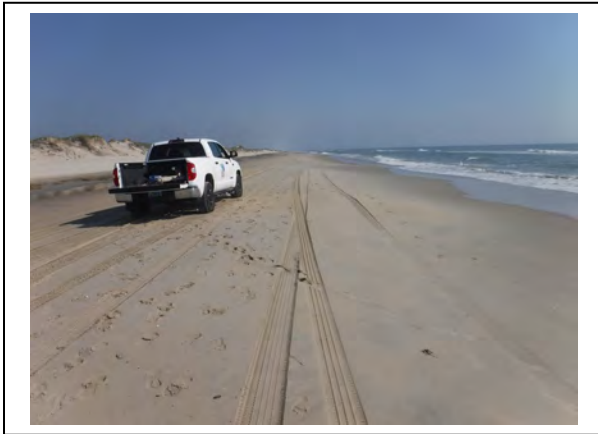
South View



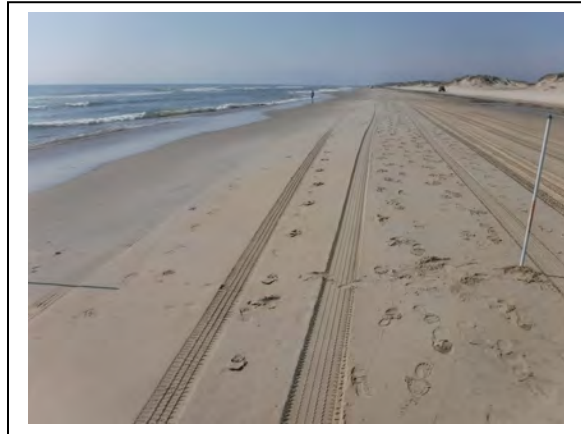
Landward View

**Ground Digital Photography
Monument**

C-056



North View



South View



Landward View

**Ground Digital Photography
Monument**

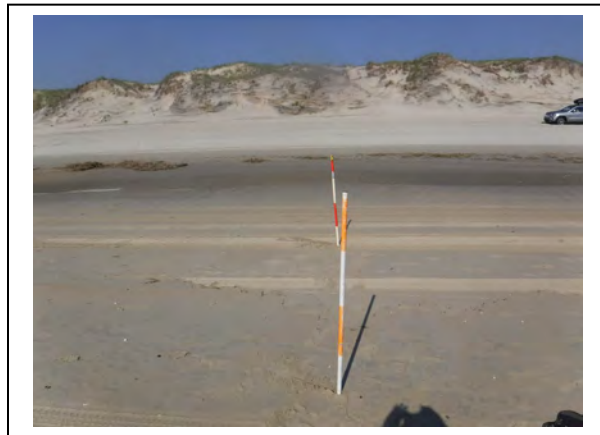
C-057



North View



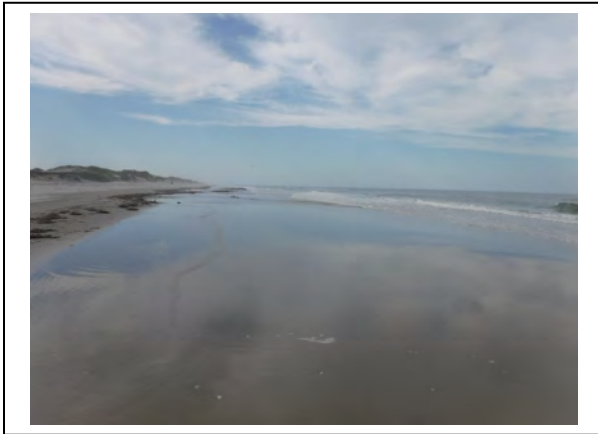
South View



Landward View

**Ground Digital Photography
Monument**

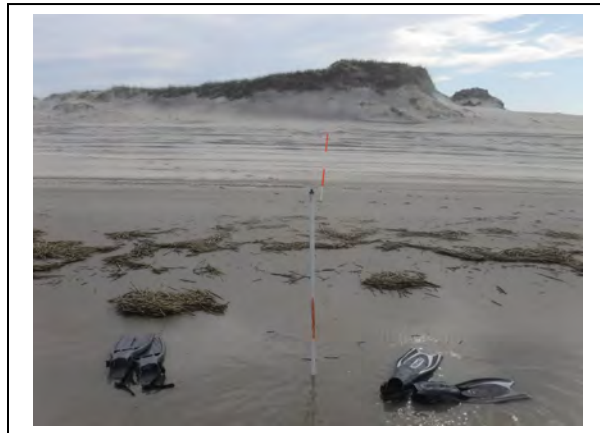
C-058



North View



South View



Landward View

**Ground Digital Photography
Monument**

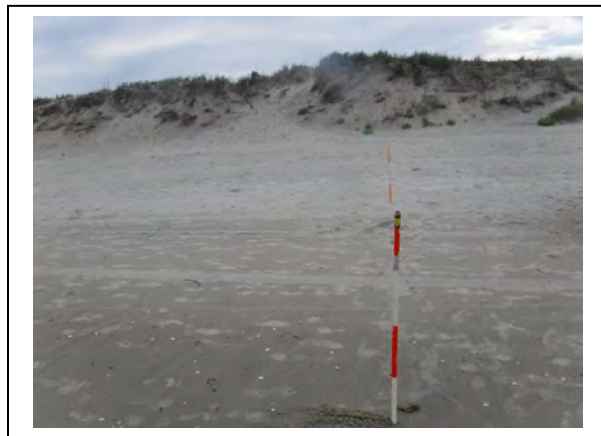
C-059



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-060



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-061



North View



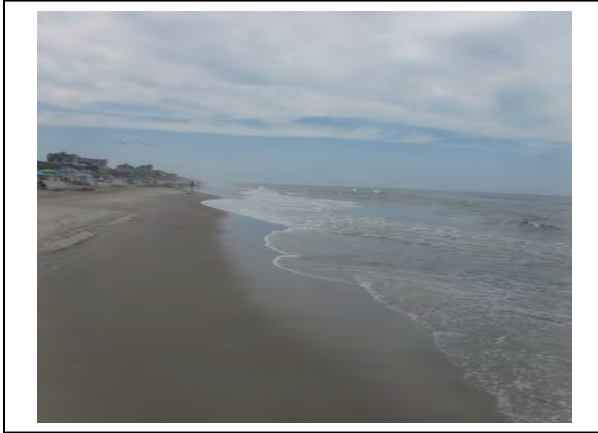
South View



Landward View

**Ground Digital Photography
Monument**

C-062



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-063



North View



South View



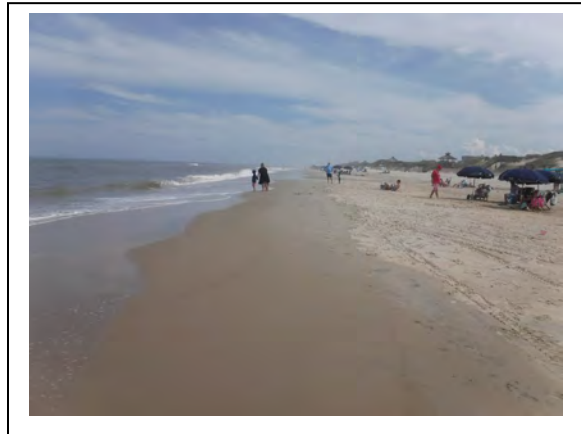
Landward View

**Ground Digital Photography
Monument**

C-064



North View



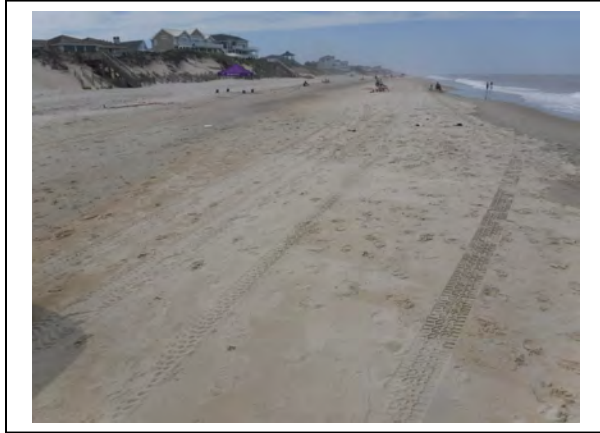
South View



Landward View

**Ground Digital Photography
Monument**

C-065



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-066



North View



South View



Landward View

**Ground Digital Photography
Monument**

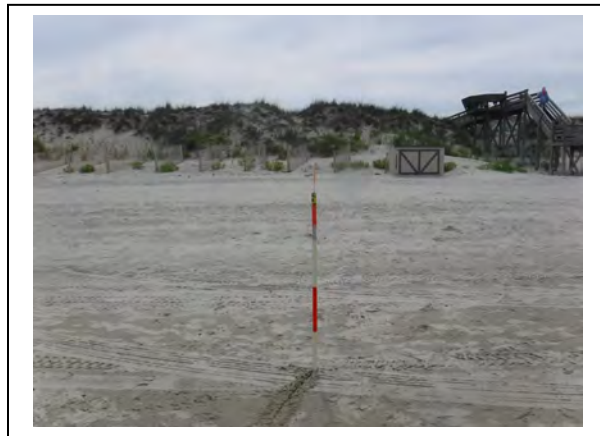
C-067



North View



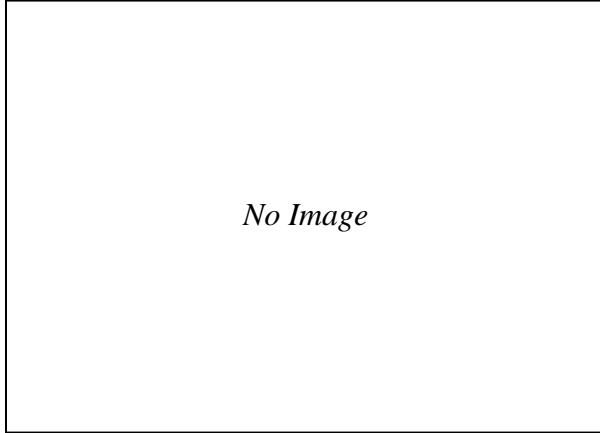
South View



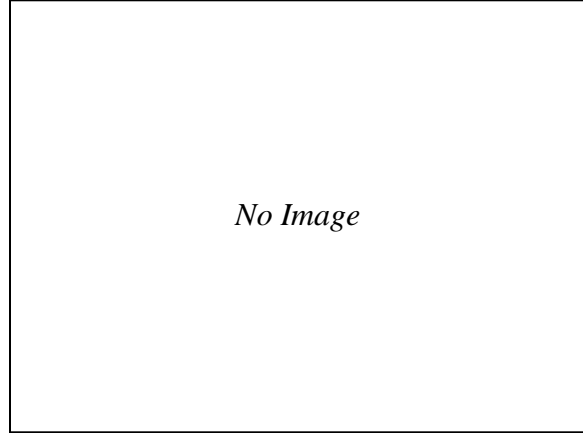
Landward View

**Ground Digital Photography
Monument**

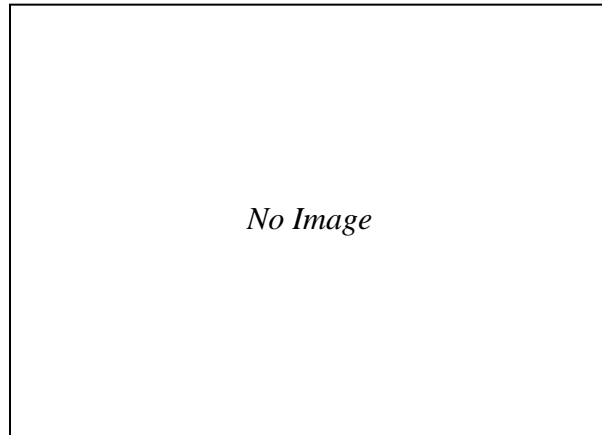
C-068



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-069



North View



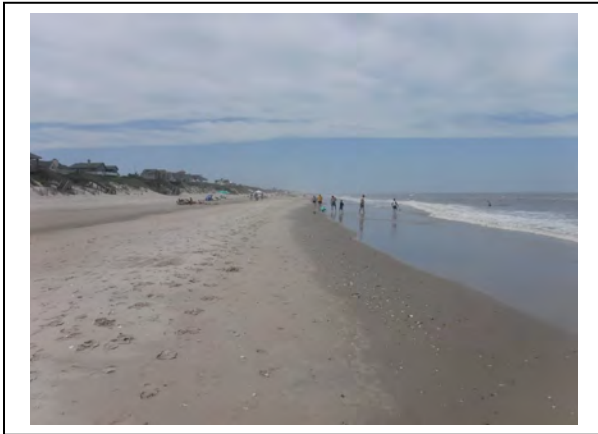
South View



Landward View

**Ground Digital Photography
Monument**

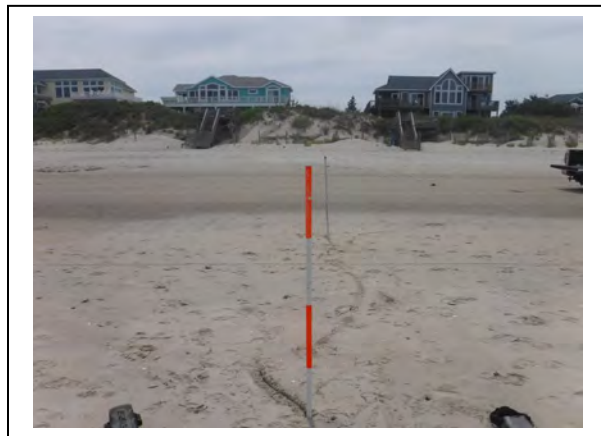
C-070



North View



South View



Landward View

**Ground Digital Photography
Monument**

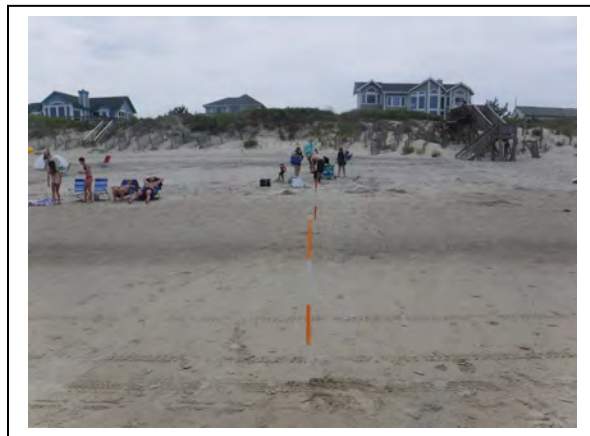
C-071



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-072



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-073



North View



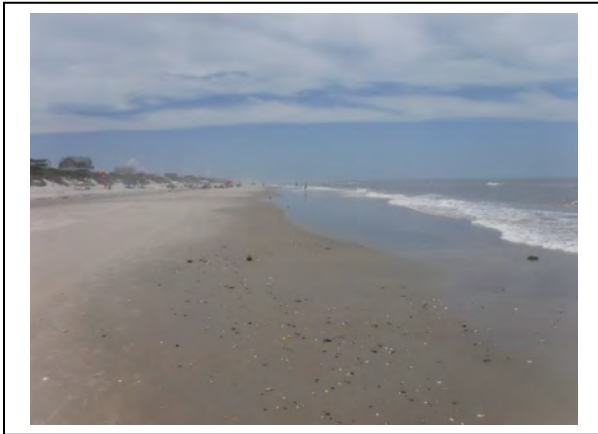
South View



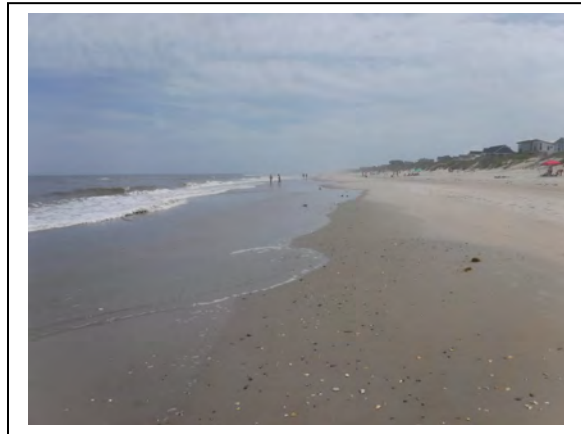
Landward View

**Ground Digital Photography
Monument**

C-074



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-075



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-076



North View



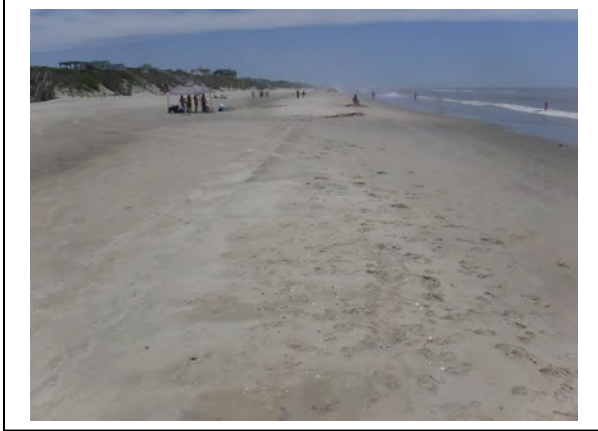
South View



Landward View

**Ground Digital Photography
Monument**

C-077



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-078



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-079



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-080



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-081



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-082



North View



South View



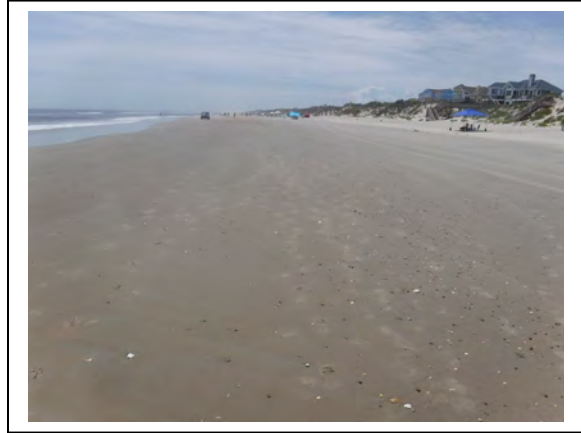
Landward View

**Ground Digital Photography
Monument**

C-083



North View



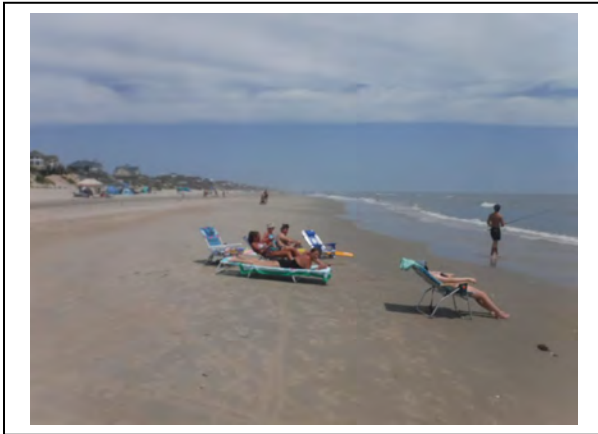
South View



Landward View

**Ground Digital Photography
Monument**

C-084



North View



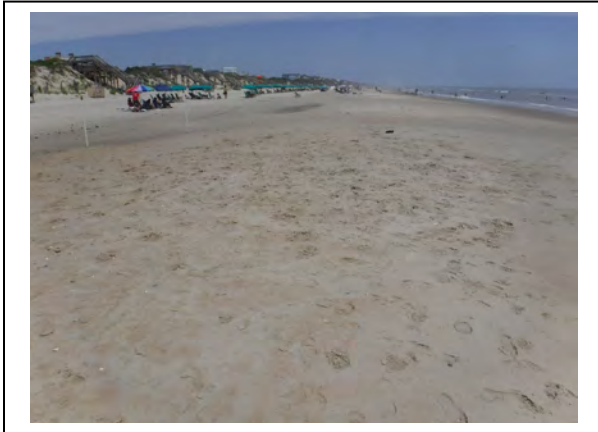
South View



Landward View

**Ground Digital Photography
Monument**

C-085



North View



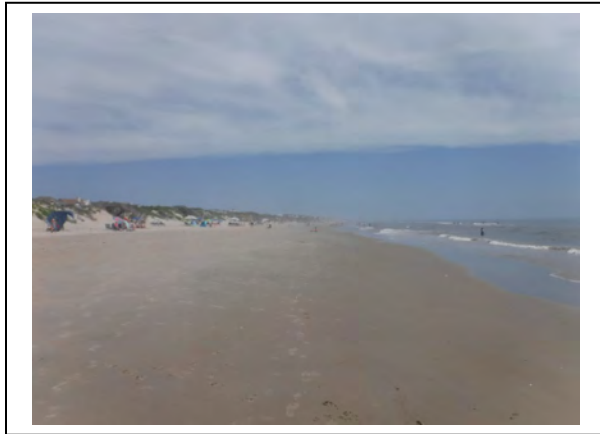
South View



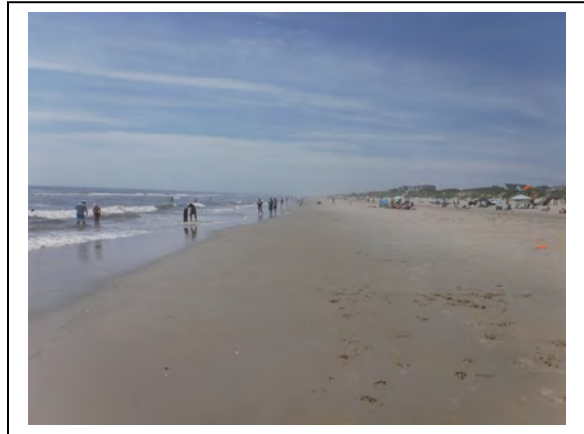
Landward View

**Ground Digital Photography
Monument**

C-086



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-087



North View



South View



Landward View

**Ground Digital Photography
Monument**

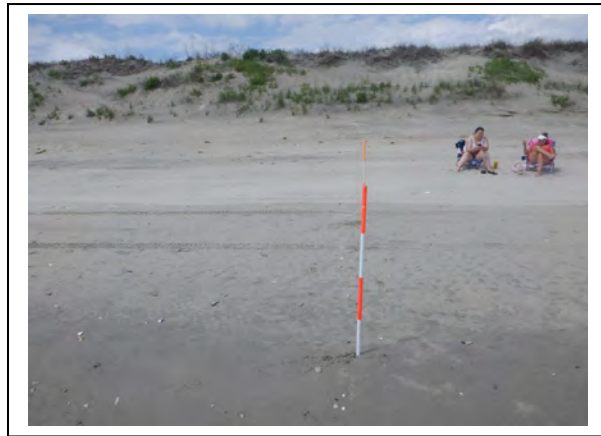
C-088



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-089



North View



South View



Landward View

**Ground Digital Photography
Monument**

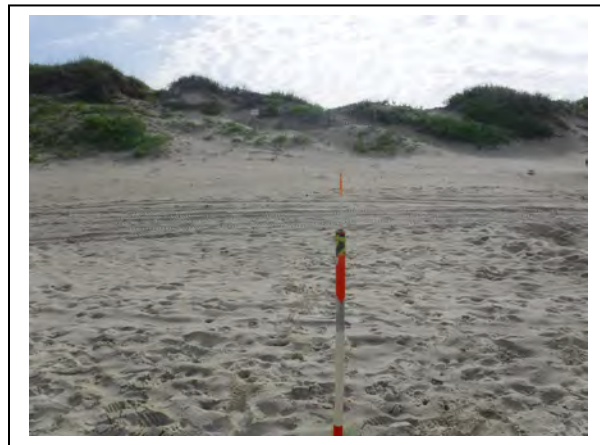
C-090



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-091



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-092



North View



South View



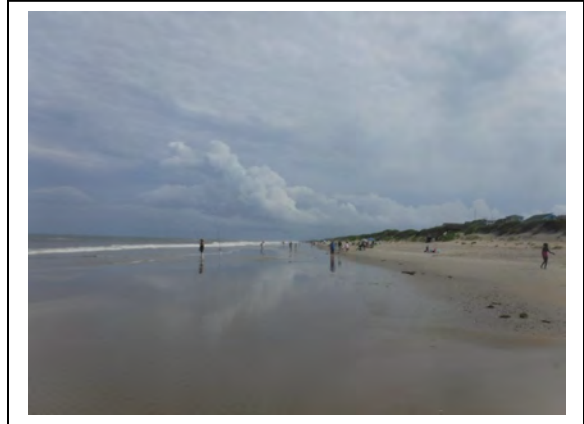
Landward View

**Ground Digital Photography
Monument**

C-093



North View



South View



Landward View

**Ground Digital Photography
Monument**

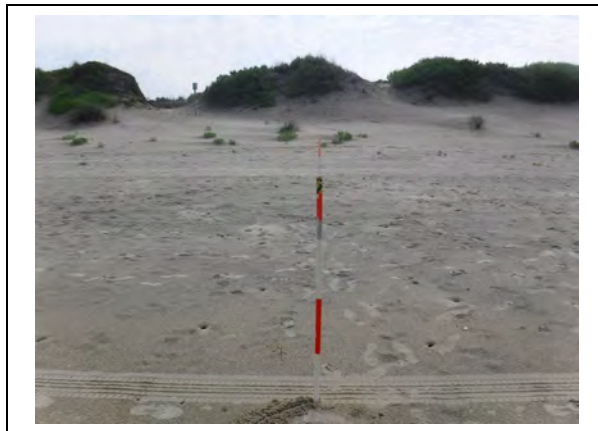
C-094



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-095



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-096



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-097



North View



South View



Landward View

**Ground Digital Photography
Monument**

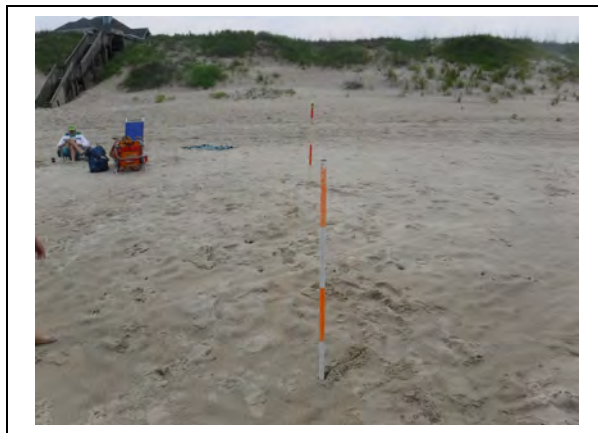
C-098



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-099



North View



South View



Landward View

**Ground Digital Photography
Monument**

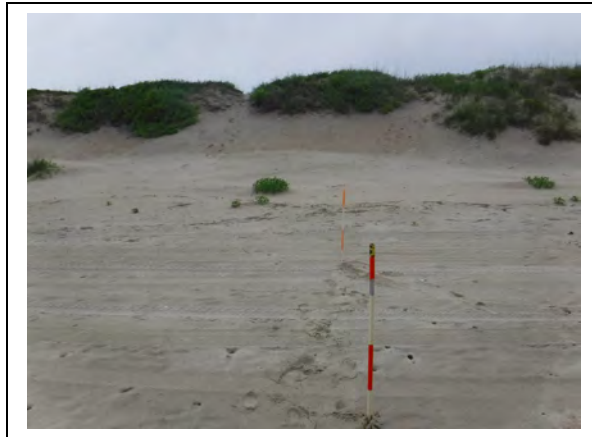
C-100



North View



South View



Landward View

**Ground Digital Photography
Monument**

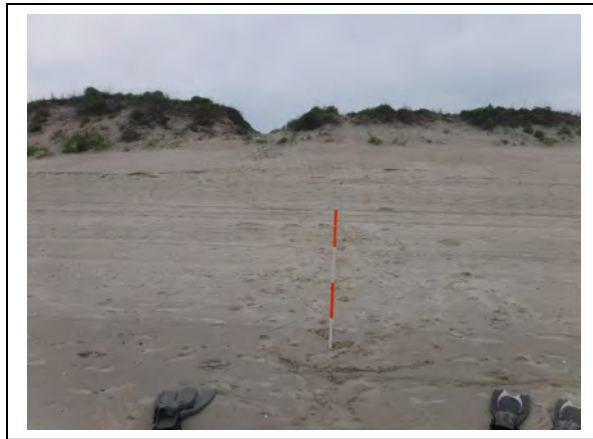
C-101



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-102



North View



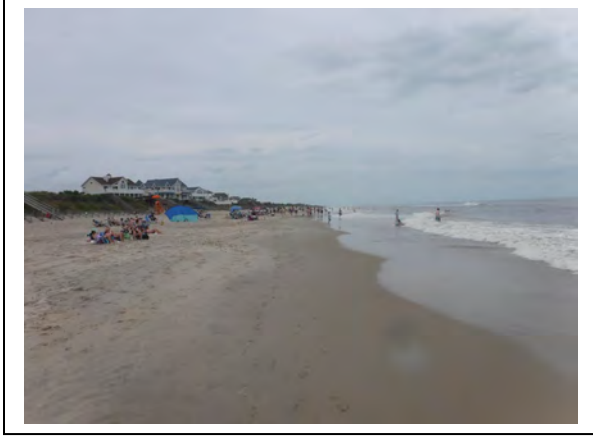
South View



Landward View

**Ground Digital Photography
Monument**

C-103



North View



South View



Landward View

**Ground Digital Photography
Monument**

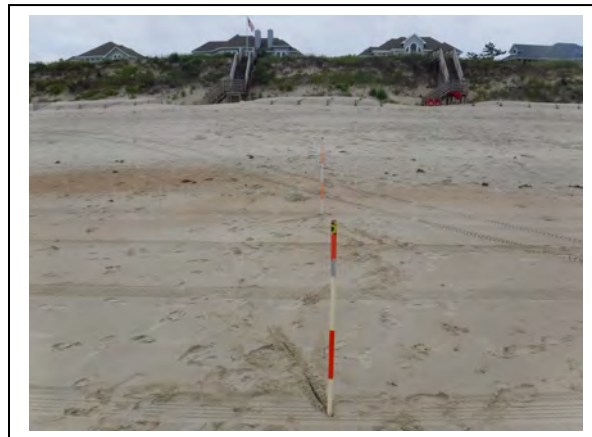
C-104



North View



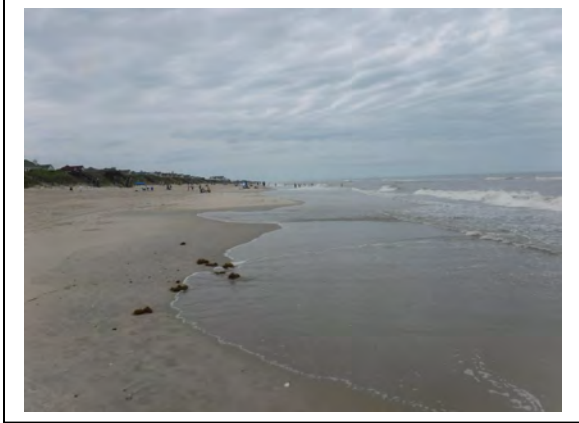
South View



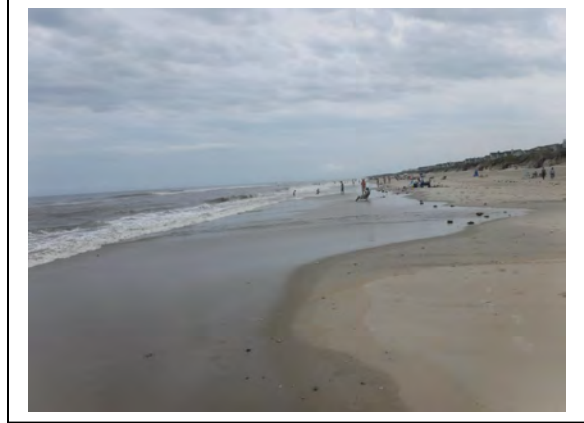
Landward View

**Ground Digital Photography
Monument**

C-105



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-106



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-107



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-108



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-109



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-110



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-111



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-112



North View



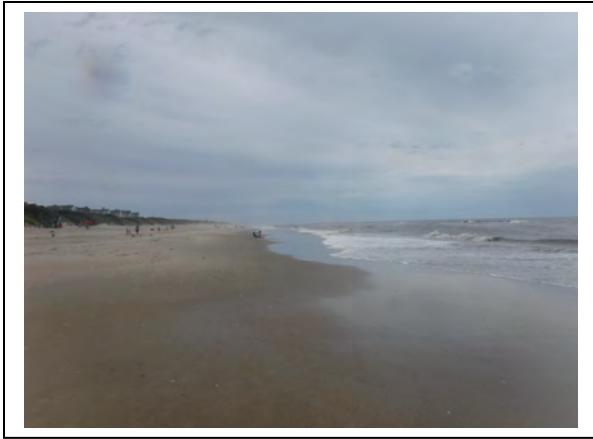
South View



Landward View

**Ground Digital Photography
Monument**

C-113



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-114



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-115



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-116



North View



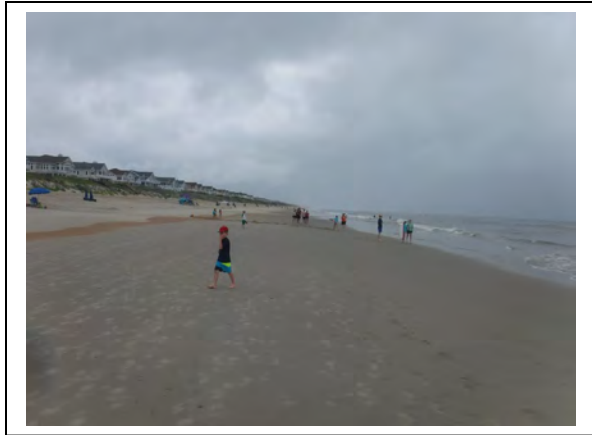
South View



Landward View

**Ground Digital Photography
Monument**

C-117



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-118



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-119



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-120



North View



South View



Landward View

APPENDIX 5

FIELD BOOK PAGES

(Available in digital format only)