

2022 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 2022

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ABSTRACT

Aptim Environmental and Infrastructure, LLC (APTIM) was contracted by Coastal Protection Engineering of North Carolina, Inc. to provide topographic and hydrographic services. The 2022 topographic and hydrographic data collection consisted of one hundred twenty (120) profile stations spanning across Currituck County. APTIM surveyors conducted the beach and hydrographic data collection from May 13, 2022 through June 15, 2022.

The physical monitoring of Currituck County included topographic and hydrographic data collection 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.

DATA COLLECTION 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).

All hydrographic data collection was conducted under the direct supervision of an American Congress of Surveying and Mapping (ACSM) Certified Hydrographer (CH). Included in this Hydrographic and Topographic Data Acquisition Report are thirty (30) maps containing one (1) project location map, one (1) control data sheet, twenty-four (24) plan view maps, and four (4) surface bathymetric maps. The plan view maps show reduced true position elevation collected during data collection. The location of all published control, as well as control found and used for data collection purposes, is presented in the Monument Information Report provided in **Appendix 1**.

Vertical data were 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 data collection is provided in **Appendix 4**. Copies of all field book pages are provided in **Appendix 5** (digital format only).

Field 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 data collection, reconnaissance of the monuments was conducted to confirm that survey control was in place and undisturbed. Real Time Kinematic Global Navigation Satellite Systems (RTK GNSS) was used, along with RTK GNSS 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 data collection were controlled using 2nd order monuments, specifically CAFFEY, 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 GNSS utilizes statistical methods to ensure accuracy of RTK GNSS 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 GNSS rovers, and standard RTK GNSS rovers. Extended rod RTK GNSS rovers were used to augment RTK GNSS survey capability into the nearshore. The current systems allow surveyors from APTIM to collect the entire beach profile with RTK GNSS technology. Incorporation of RTK GNSS into data collection 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 profile data collection was acquired using an extended rod Trimble R8 or R10 RTK GNSS rover with two (2) surveyors who entered the water wearing personal floatation devices (PFD). Trimble TSC3 data collectors are equipped with Bluetooth technology allowing wireless communication with the GNSS 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 profile commenced at the waterline and extended 250 feet landward of the dune or until an obstacle was encountered. The upland data of the profiles were collected using an RTK GNSS rover. 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 GNSS feature *stakeout point*. *Stakeout point* allows sureyors to maintain the profile azimuth without relying conventional compass bearings.

Phase Three: Nearshore/Offshore Profiles

The Nearshore/Offshore profiles were conducted at each required profile station. Profile data were collected to a range of 3,000 feet beyond the shoreline or to the -30 NAVD88 contour, whichever is more landward. All profiles were collected to a minimum depth of -25 ft. NAVD88 regardless of distance offshore. 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 a Teledyne E20 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 were digitally stored using HYPACK 2022 Software. A Trimble R-8 RTK GNSS and a SBG Ekinox dynamic motion sensor were used onboard the data collection 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 2022 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 2022 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. 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 were collected within two (2) weeks of onshore data collection for each line.

Phase Four: Data Reduction/Submittals

Upon completion of the field work, data were edited and reduced with Trimble Business Center, HYPACK 2022, 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 were viewed and edited in HYPACK 2022's *Single Beam Editor*. The offshore RTK GNSS tide data that was collected was compared to the manually collected RTK GNSS nearshore tide data, local observed, and predicted tides for data verification purposes. Tide corrected offshore data were exported and a comma delimited XYZ file was created. All overlapping profile data were 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.

Upon review of processed hydrographic data, it was found that errant settings were entered into the data collection software. The GNSS antennae height was corrected for phase center offset and the Trimble R10 quick release mount. The SBG motion sensor was corrected for vertical offset in relation to the vessel reference frame. Speed of sound measurements were

also adjusted due to variable thermocline throughout the project area as well as a minor miscalibration of the speed of sound sensor.

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

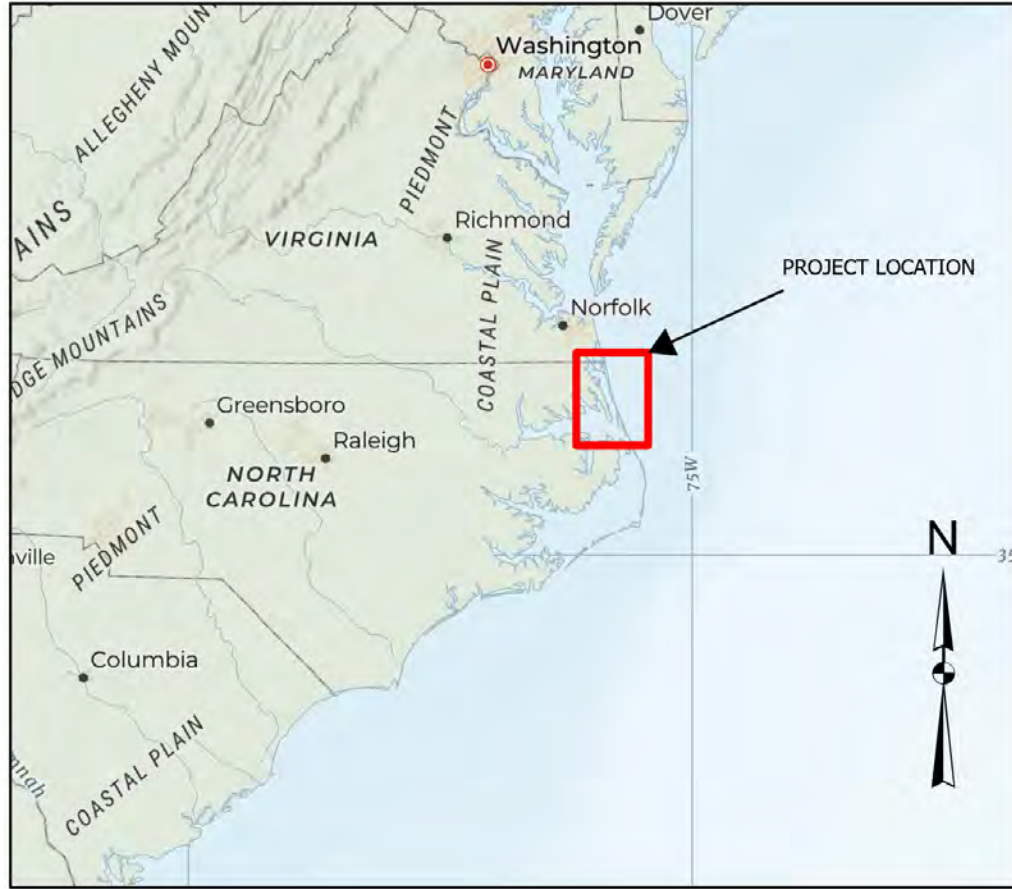
Map Preparation:

Upon completion of the data acquisition and processing, the maps were prepared in ArcGIS PRO. 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 maps display profile data and control monument locations plotted against Esri's background aerial imagery from July 2021. (Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA FSA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community).

Ground Digital Photography:

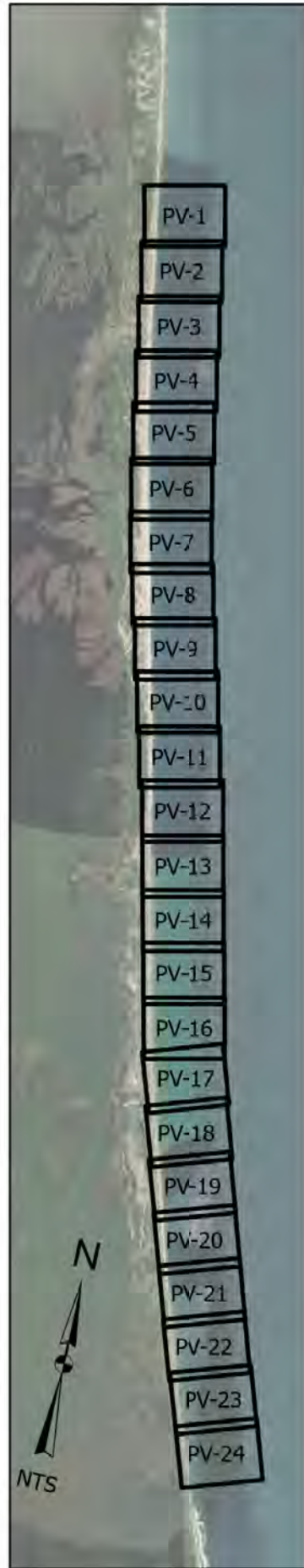
Surveyors from APTIM collected three (3) digital photos at a mid-beach location at each profile location. The three (3) photos included one (1) in each shore-parallel direction and one (1) landward toward the monument. Wherever possible, an additional digital photo was taken of the control identification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

2022 CURRITUCK COUNTY TOPOGRAPHIC AND HYDROGRAPHIC DATA ACQUISITION REPORT



INDEX OF SHEETS	
1	COVER SHEET AND PROJECT LOCATION MAP
2	CONTROL DATA SHEET
3-26	PROJECT PLAN VIEWS

LEGEND	
C-001	PROFILE STATION IDENTIFICATION
ID	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
NTS	NOT TO SCALE



Aptim Environmental & Infrastructure, LLC 6401 CONGRESS AVE, SUITE 140 BOCA RATON, FL 33487 www.apim.com PH. (561) 391-8102 FAX (561) 391-9115	
2022 CURRITUCK COUNTY TOPOGRAPHIC AND HYDROGRAPHIC DATA ACQUISITION REPORT COVER SHEET	DRAWING NO. CS SHEET 1 OF 26
REFERENCE FILES DESIGNED BY: M. LOWIEC DRAWN BY: P. BURDEN DATE: JULY 2022 PLOT SCALE: AS NOTED	CHECKED BY: T. SHAHAN REVIEWED BY: M. LOWIEC SUBMITTED BY: M. LOWIEC COMM. NO.: 651025189
1 10/31/22 REVISED PV FRAMES	NO. DATE DESCRIPTION

2022 CURRITUCK COUNTY TOPOGRAPHIC AND HYDROGRAPHIC DATA ACQUISITION REPORT

Currituck Station Information			
May 2022			
Datums: NAD83 (2011)/ NAVD88 (US Survey Feet)			
STATION	NORTHING	EASTING	AZIMUTH
C-001	1033891.082	2919204.102	79
C-002	1032585.838	2919457.815	79
C-003	1031695.159	2919630.946	79
C-004	1030524.948	2919858.412	79
C-005	1029731.911	2920012.562	79
C-006	1028750.281	2920203.372	79
C-007	1027768.65	2920394.182	79
C-008	1027013.657	2920540.938	79
C-009	1025538.882	2920827.605	79
C-010	1024890.235	2920953.689	79
C-011	1023747.695	2921175.776	79
C-012	1022753.919	2921368.947	79
C-013	1021972.422	2921520.854	79
C-014	1020813.54	2921746.118	79
C-015	1019882.222	2921927.148	79
C-016	1018934.011	2922111.462	79
C-017	1017925.971	2922307.405	79
C-018	1016970.75	2922493.081	79
C-019	1016070.247	2922668.121	79
C-020	1014986.695	2922878.742	79
C-021	1014071.967	2923056.547	79
C-022	1013044.24	2923256.317	79
C-023	1012049.725	2923449.631	79
C-024	1011080.99	2923637.934	79
C-025	1010198.996	2923809.376	79
C-026	1009117.731	2924019.553	79
C-027	1008136.11	2924210.361	79
C-028	1007154.48	2924401.17	79
C-029	1006172.85	2924591.98	79
C-030	1005191.23	2924782.788	79

Currituck Station Information			
May 2022			
Datums: NAD83 (2011)/ NAVD88 (US Survey Feet)			
STATION	NORTHING	EASTING	AZIMUTH
C-031	1004209.599	2924973.597	79
C-032	1003227.969	2925164.407	79
C-033	1002271.662	2925456.765	75
C-034	1001315.359	2925749.136	75
C-035	1000359.05	2926041.51	75
C-036	999402.75	2926333.88	75
C-037	998510.994	2926606.517	75
C-038	997490.141	2926918.623	75
C-039	996515.533	2927216.591	75
C-040	995453.168	2927541.388	75
C-041	994621.229	2927795.738	75
C-042	993664.92	2928088.111	75
C-043	992658.071	2928395.935	75
C-044	991664.723	2928699.633	75
C-045	990796.008	2928965.225	75
C-046	989839.699	2929257.598	75
C-047	988849.489	2929560.336	75
C-048	987854.499	2929864.534	75
C-049	987063.909	2930106.242	75
C-050	986098.733	2930401.326	75
C-051	985058.178	2930719.456	75
C-052	984101.87	2931011.828	75
C-053	983145.569	2931304.199	75
C-054	982189.26	2931596.571	75
C-055	981232.961	2931888.942	75
C-056	980276.652	2932181.315	75
C-057	979320.348	2932473.686	75
C-058	978364.039	2932766.059	75
C-059	977523.892	2933022.918	75
C-060	976430.485	2933302.09	77

Currituck Station Information			
May 2022			
Datums: NAD83 (2011)/ NAVD88 (US Survey Feet)			
STATION	NORTHING	EASTING	AZIMUTH
C-061	975487.846	2933537.117	77
C-062	974518.036	2933778.917	77
C-063	973563.332	2934016.952	77
C-064	972604.577	2934255.996	77
C-065	971511.998	2934528.407	77
C-066	970567.565	2934763.88	77
C-067	969714.762	2934976.508	77
C-068	968754.461	2935215.938	77
C-069	967704.781	2935477.652	77
C-070	966698.847	2935728.46	77
C-071	965808.886	2935950.352	77
C-072	964814.75	2936198.218	77
C-073	963792.959	2936452.979	77
C-074	962853.3	2936687.263	77
C-075	961883.011	2936929.183	77
C-076	960912.709	2937171.106	77
C-077	960035.659	2937389.78	77
C-078	958951.378	2937660.121	77
C-079	957962.058	2937909.027	77
C-080	957025.326	2938195.415	73
C-081	956061.479	2938490.093	73
C-082	955096.614	2938785.082	73
C-083	954201.856	2939058.637	73
C-084	953273.028	2939342.608	73
C-085	952263.999	2939651.099	73
C-086	951276.46	2939953.02	73
C-087	950351.39	2940235.842	73
C-088	949386.414	2940530.865	73
C-089	948438.778	2940820.586	73
C-090	947482.47	2941112.959	73

Currituck Station Information			
May 2022			
Datums: NAD83 (2011)/ NAVD88 (US Survey Feet)			
STATION	NORTHING	EASTING	AZIMUTH
C-091	946526.17	2941405.329	73
C-092	945569.861	2941697.702	73
C-093	944629.369	2941985.239	73
C-094	943657.252	2942282.446	73
C-095	942700.949	2942574.816	73
C-096	941785.117	2942854.815	73
C-097	940788.34	2943159.56	70
C-098	939850.459	2943506.551	70
C-099	938912.57	2943853.546	70
C-100	937974.689	2944200.537	70
C-101	937036.809	2944547.528	70
C-102	936098.919	2944894.523	70
C-103	935161.039	2945241.514	70
C-104	934223.158	2945588.506	70
C-105	933285.281	2945935.496	70
C-106	932347.391	2946282.49	70
C-107	931409.511	2946629.481	70
C-108	930471.63	2946976.472	70
C-109	929533.74	2947323.467	70
C-110	928595.86	2947670.458	70
C-111	927657.979	2948017.45	70
C-112	926720.09	2948364.444	70
C-113	925782.209	2948711.435	70
C-114	924844.329	2949058.427	70
C-115	923906.451	2949405.417	70
C-116	922968.562	2949752.411	70
C-117	922030.681	2950099.402	70
C-118	921092.801	2950446.394	70
C-119	920149.201	2950795.501	70
C-120	919217.031	2951140.38	70

CONTROL USED BY APTIM 2022 SURVEY			
DATUM: NAD83 (2011)/ NAVD88 (US SURVEY FEET)			
STATION	NORTHING	EASTING	ELEVATION
ADRIATIC	974203.77	2933858.46	6.6
TUCKER IRC OPUS_2020	1005574.741	2925817.823	26.306
TEETER IRC OPUS_2020	1033886.521	2919866.552	17.444
SHIP_OCP_AVG_2020	955355.37	2938903.308	23.615
RUDY_OCP_AVG_2020	934755.385	2945624.941	24.404
RUN	926250.145	2947874.972	7.178
RADIO	935113.175	2944087.113	9.219
Q261	975483.22	2933511.61	7.14
CAFFEY	915308.87	2952084.11	1.99

PRESENTED IN NORTH CAROLINA STATE
PLANE
NAD83(2011) U.S. SURVEY FEET
ELEVATIONS IN NAVD 1988 U.S. SURVEY
FEET

Aptim Environmental & Infrastructure, LLC

PH: (867) 391-8102
FAX: (867) 391-9116
C.O.A. #8051

6401 CONGRESS AVE. SUITE 140
BOCA RATON, FL 33487
www.aptim.com

REFERENCE FILES

DESIGNED BY
M. LOWMEC

CHECKED BY
J. ANDREWS

REVIEWED BY
M. LOWMEC

DRAWN BY
P. BURDELL

DATE
JUNE 2022

SUBMITTED BY
M. LOWMEC

COMM. NO.
031025188

NO. DATE

REVISIONS

DESCRIPTION

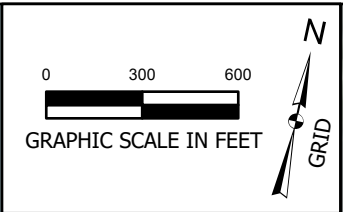
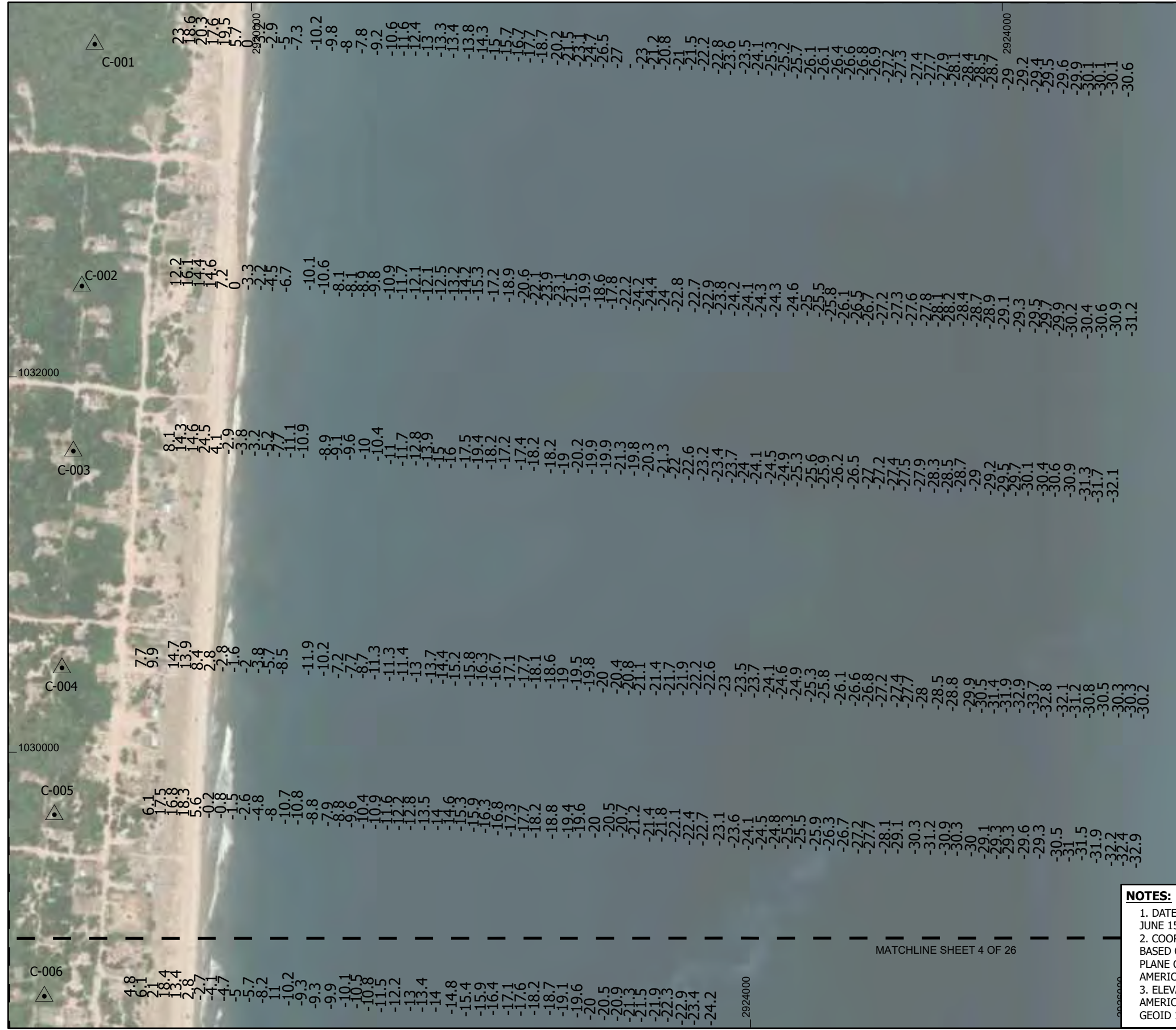
CURRITUCK COUNTY BEACH
MONITORING AND BEACH
STABILITY STUDY

COVER SHEET

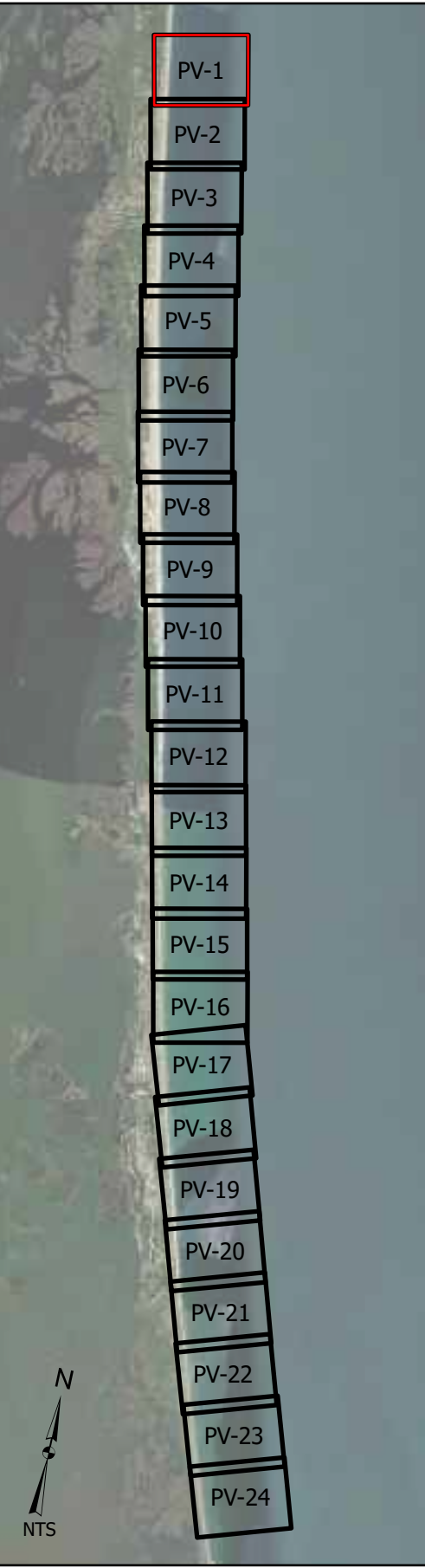
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SHEET 2 OF 26



NOTES:
 1. DATES OF SURVEY: MAY 13, 2022 THROUGH JUNE 15, 2022.
 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.



REFERENCE FILES	DESIGNED BY:	CHECKED BY:	NO.	DATE	DESCRIPTION
	M. LOWIEC	T. SHAHAN	1	10/31/22	REVISED PV FRAMES
	P. BURDEN	M. LOWIEC			
	DATE:	SUBMITTED BY:			
	JULY 2022	M. LOWIEC			
	PLOT SCALE:	COMM. NO.:			
	AS NOTED	631025189			

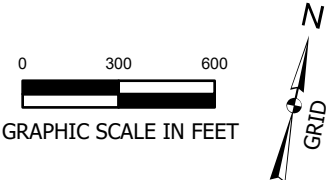
2022 Currituck County Topographic and Hydrographic Data Acquisition Report
PLAN VIEW
 DRAWING NO.
PV-1
 SHEET 3 OF 26

Aptim Environmental & Infrastructure, LLC
 6401 CONGRESS AVE. SUITE 140
 BOCA RATON, FL 33487
 www.aptim.com
 PH: (561) 391-8102
 FAX: (561) 391-9116



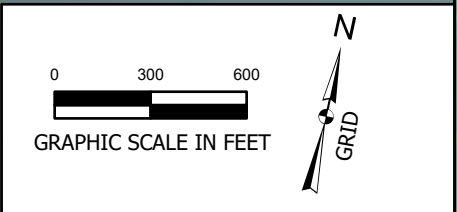
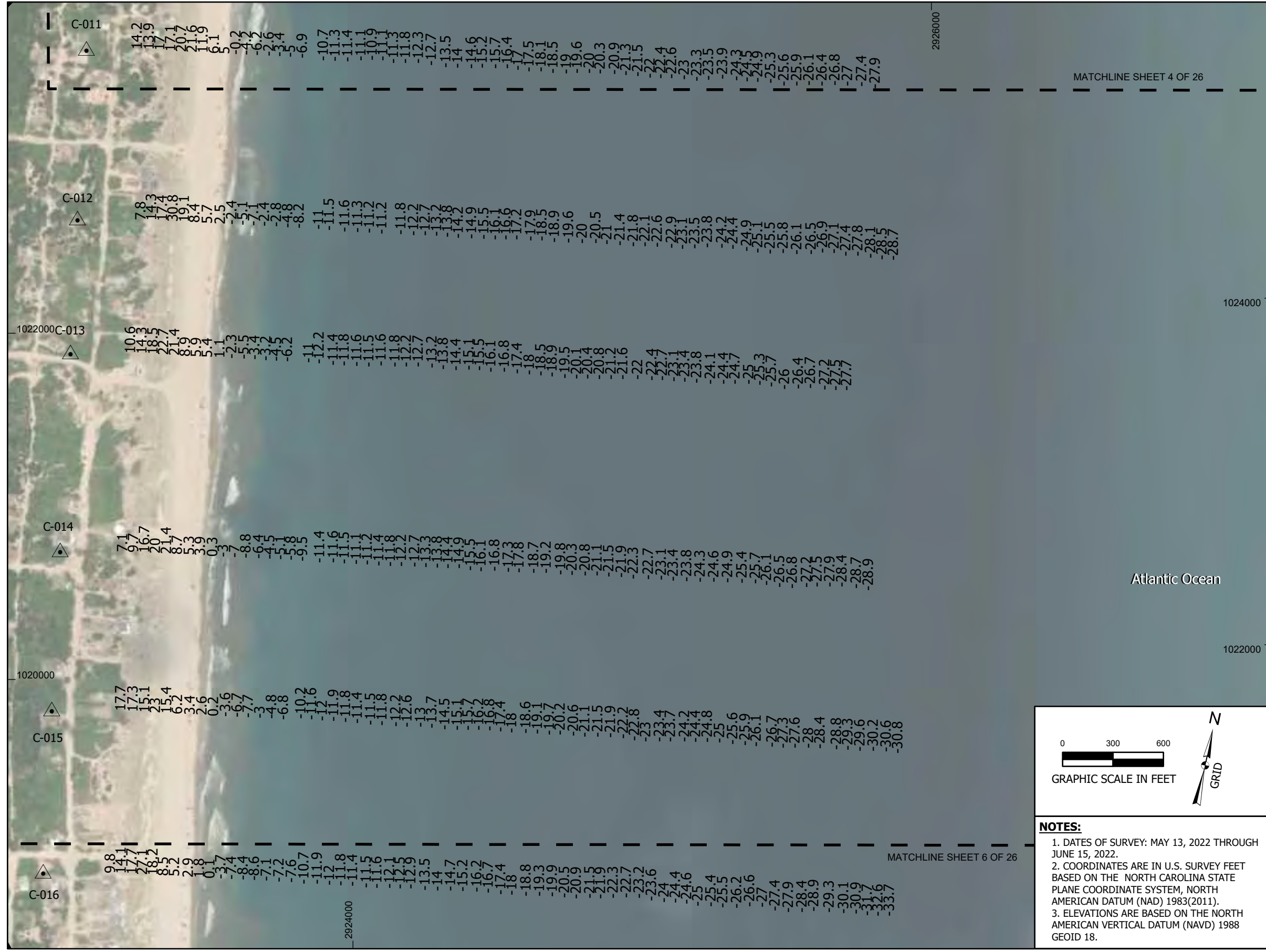
NOTES:

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- 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

Aptim Environmental & Infrastructure, LLC		PH: (561) 391-8102 FAX: (561) 391-9116	
6401 CONGRESS AVE, SUITE 140 BOCA RATON, FL 33487 www.apfim.com			
DESIGNED BY: M. LOWIEC	CHECKED BY: T. SHAHAN	NO. 1	REVISED PV FRAMES
DRAWN BY: P. BURDEN	REVIEWED BY: M. LOWIEC		
DATE: JULY 2022	SUBMITTED BY: M. LOWIEC		
PLOT SCALE: AS NOTED	COMM. NO.:	631025189	
2022 Currutuck County Topographic and Hydrographic Data Acquisition Report		PLAN VIEW	
DRAWING NO.		PV-2	
SHEET 4 OF 26			



NOTES:

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- PV-1
- PV-2
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- PV-10
- PV-11
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- PV-14
- PV-15
- PV-16
- PV-17
- PV-18
- PV-19
- PV-20
- PV-21
- PV-22
- PV-23
- PV-24

REFERENCE FILES	DESIGNED BY:	CHECKED BY:	NO.	DATE	DESCRIPTION
	M. LOWMEC	T. SHAHAN	1	10/31/22	REVISED PV FRAMES
	DRAWN BY:	REVIEWED BY:			
	P. BURDEN	M. LOWMEC			
	DATE:	SUBMITTED BY:			
	JULY 2022	M. LOWMEC			
	PLOT SCALE:	COMM. NO.:			
	AS NOTED	631025189			

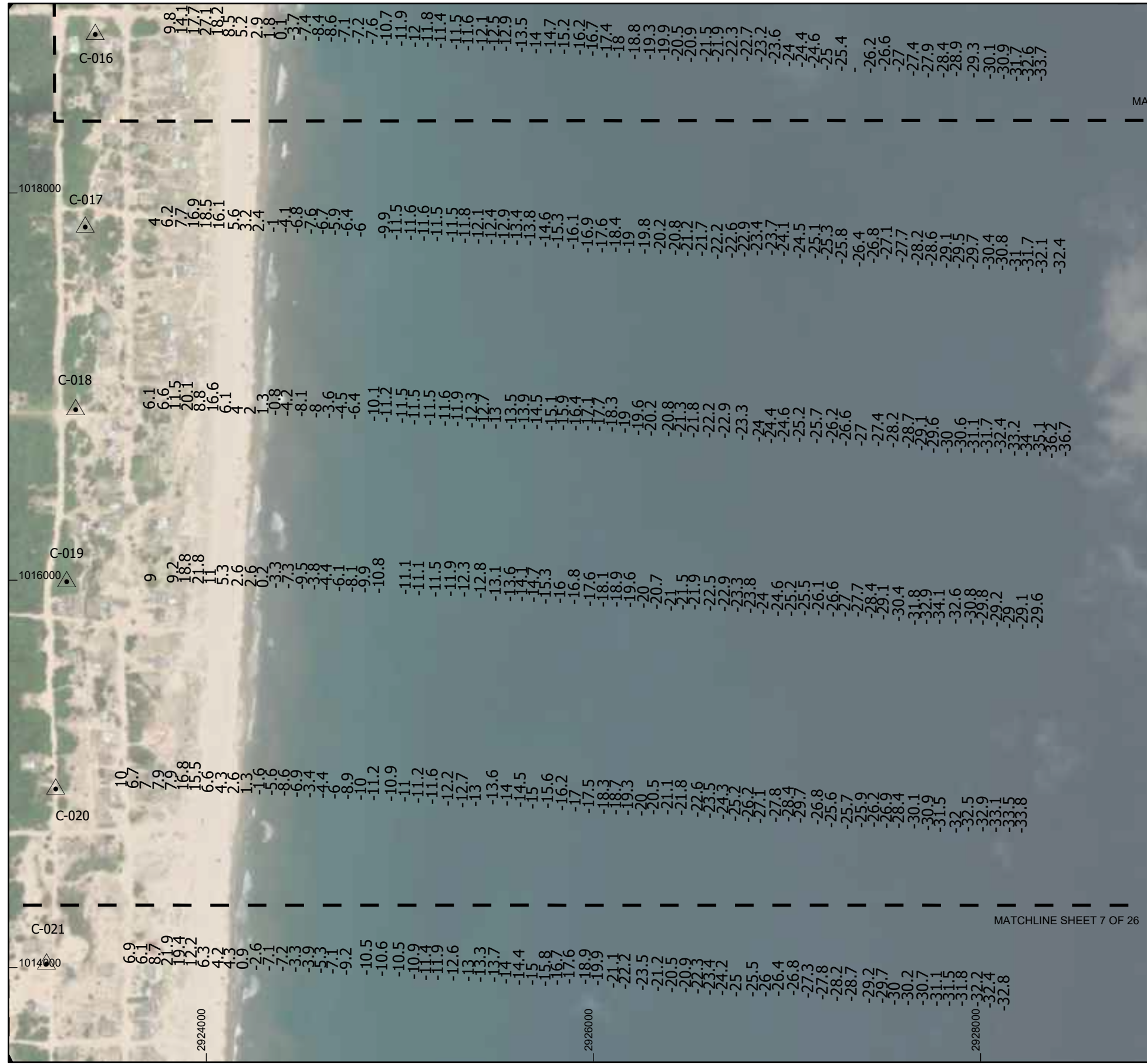
2022 Currituck County Topographic and Hydrographic Data Acquisition Report

PLAN VIEW

DRAWING NO.

PV-3

SHEET 5 OF 26

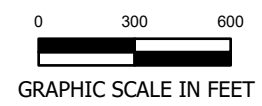


NOTES:

1. DATES OF SURVEY: MAY 13, 2022 THROUGH JUNE 15, 2022.
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.

MATCHLINE SHEET 5 OF 26

MATCHLINE SHEET 7 OF 26



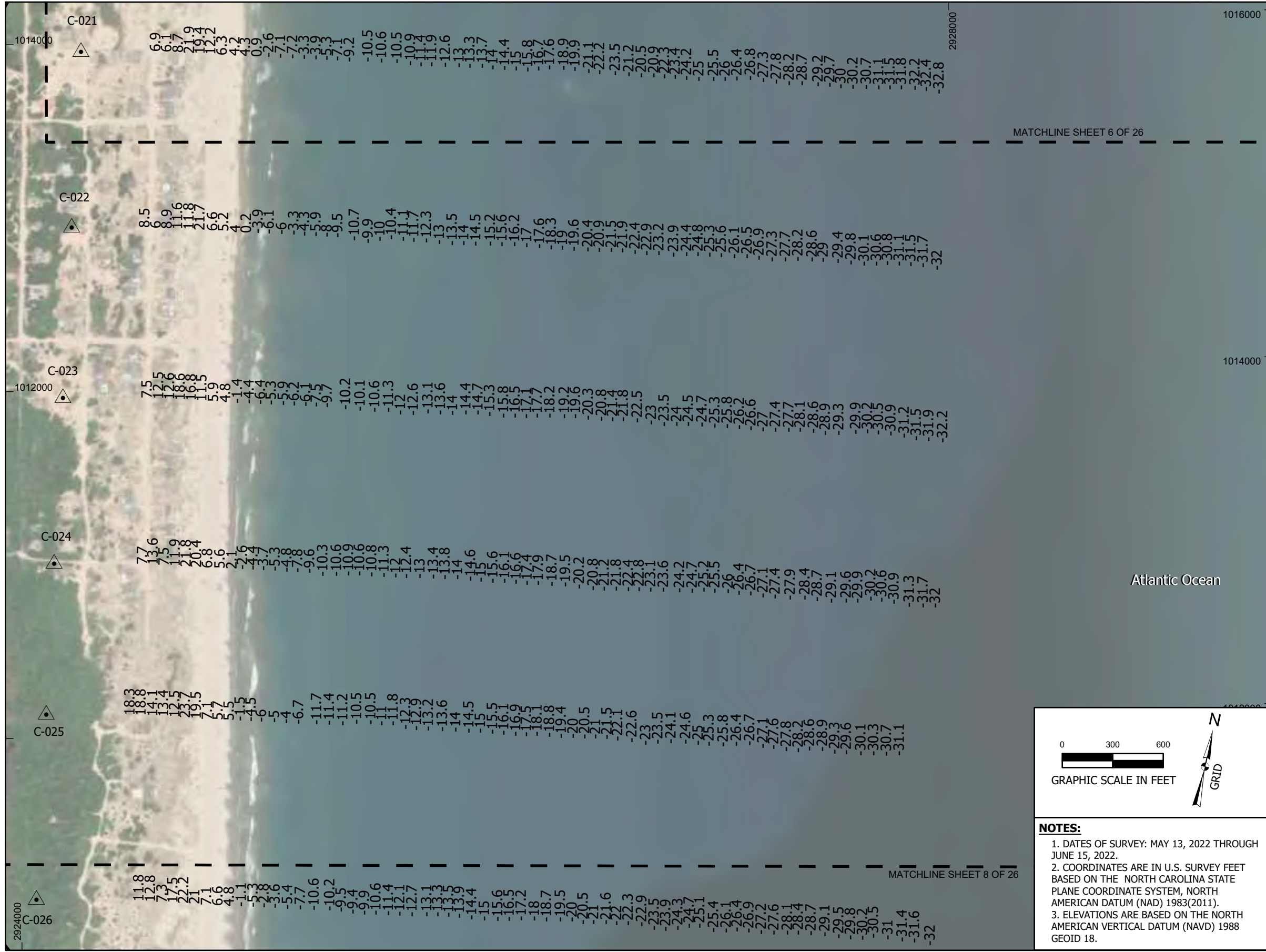
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REFERENCE FILES	DESIGNED BY:	CHECKED BY:	NO. 1	DATE	DESCRIPTION
	M. LOWIEC	T. SHAHAN	1	10/31/22	REVISED PV FRAMES
	DRAWN BY:	REVIEWED BY:			
	P. BURDEN	M. LOWIEC			
	DATE:	SUBMITTED BY:			
	JULY 2022	M. LOWIEC			
	PLOT SCALE:	COMM. NO.:			
	AS NOTED	631025189			

2022 Currituck County Topographic and Hydrographic Data Acquisition Report

PLAN VIEW

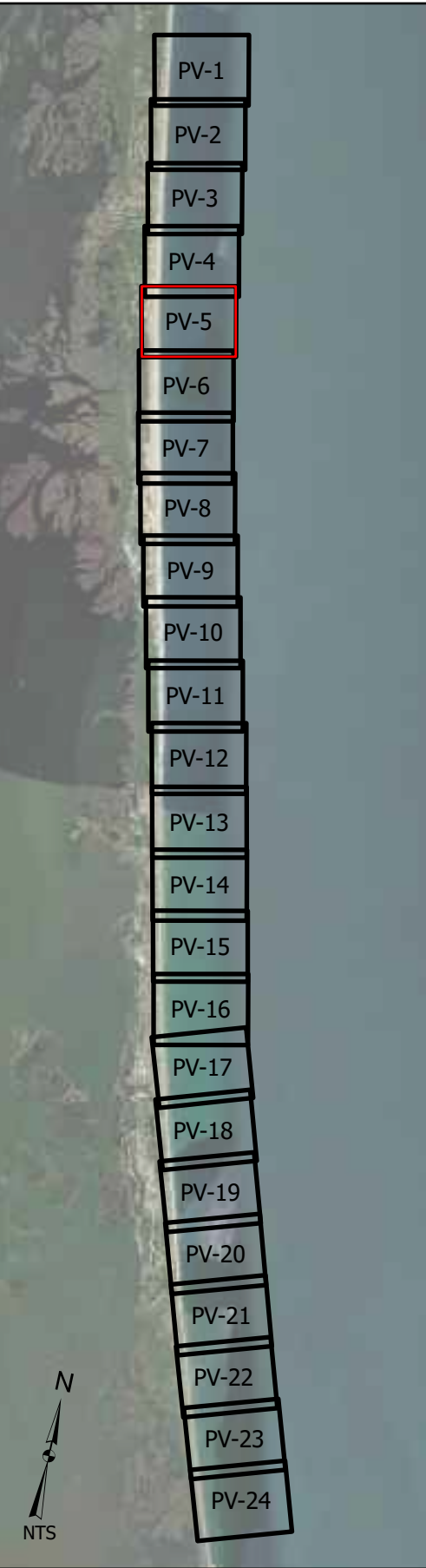
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GRAPHIC SCALE IN FEET

NOTES:

1. DATES OF SURVEY: MAY 13, 2022 THROUGH JUNE 15, 2022.
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	M. LOWIEC	T. SHAHAN	1	10/31/22	REVISED PV FRAMES
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	P. BURDEN	M. LOWIEC			
	DATE:	SUBMITTED BY:			
	JULY 2022	M. LOWIEC			
	PLOT SCALE:	COMM. NO.:			
	AS NOTED	631025189			

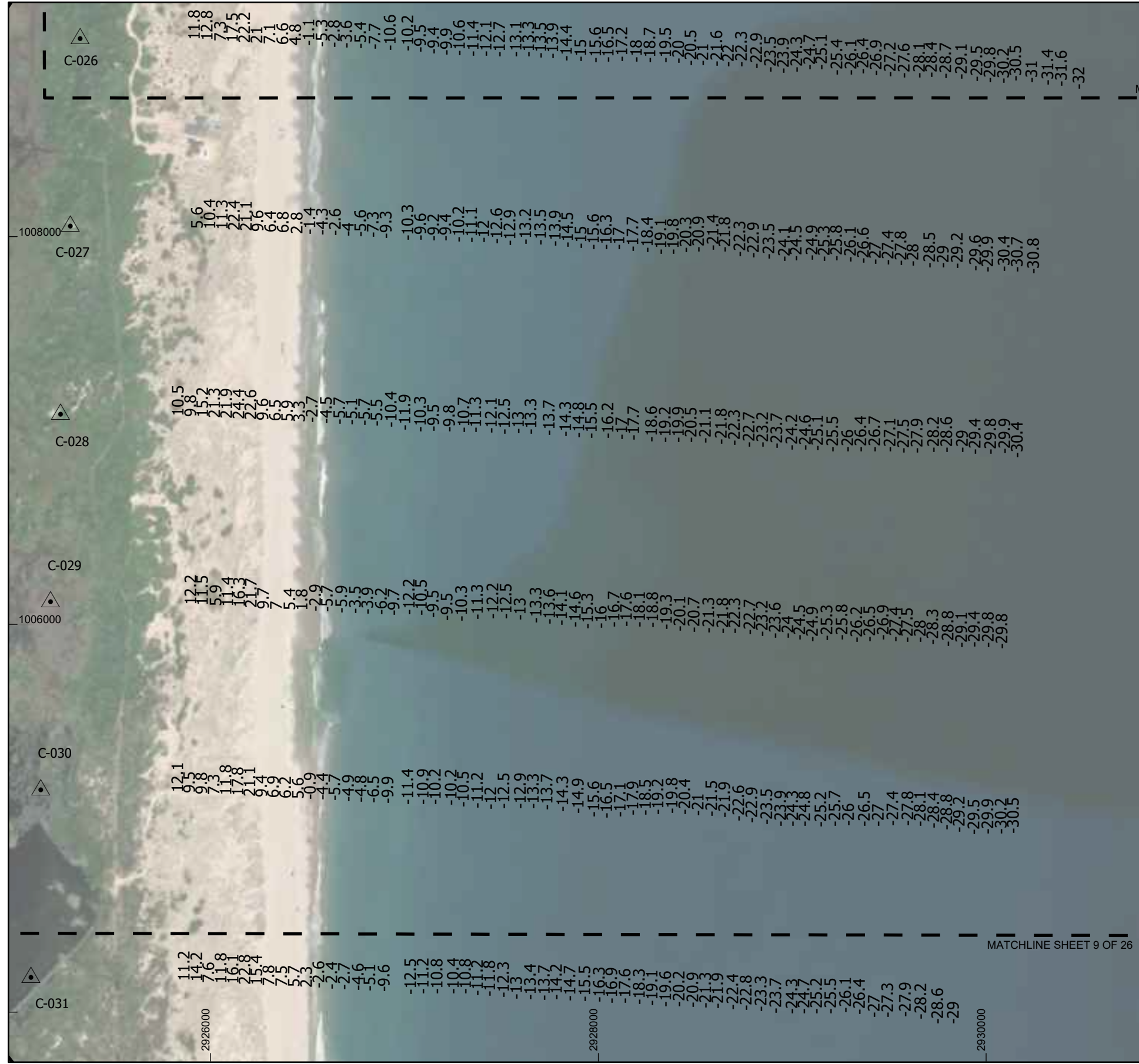
2022 Currituck County Topographic and Hydrographic Data Acquisition Report

PLAN VIEW

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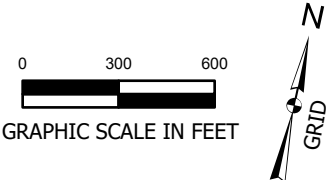
PV-5

SHEET 7 OF 26



NOTES:

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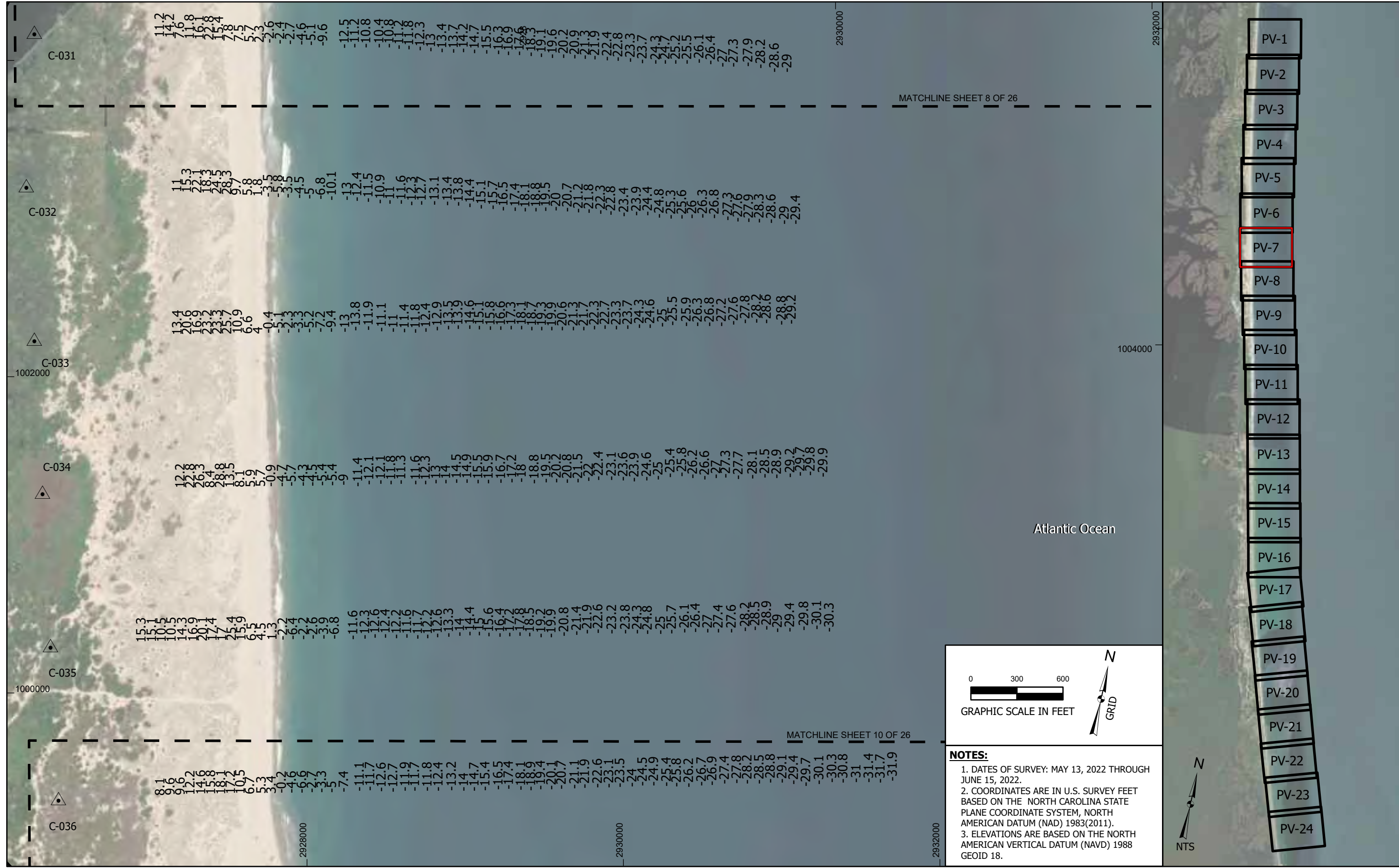
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REFERENCE FILES	DESIGNED BY:	CHECKED BY:	NO.	DATE	DESCRIPTION
	M. LOWIEC	T. SHAHAN	1	10/31/22	REVISED PV FRAMES
	P. BURDEN	M. LOWIEC			
	DATE:	SUBMITTED BY:			
	JULY 2022	M. LOWIEC			
	PLOT SCALE:	COMM. NO.:			
	AS NOTED	631025189			

2022 Currituck County Topographic and Hydrographic Data Acquisition Report

PLAN VIEW

DRAWING NO.



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NOTES:

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REFERENCE FILES	DESIGNED BY:	CHECKED BY:	NO. 1	DATE	DESCRIPTION
	M. LOWIEC	T. SHAHAN	1	10/31/22	REVISED PV FRAMES
	DRAWN BY:	REVIEWED BY:			
	P. BURDEN	M. LOWIEC			
	DATE:	SUBMITTED BY:			
	JULY 2022	M. LOWIEC			
	PLOT SCALE:	COMM. NO.:			
	AS NOTED	651025189			

2022 Currituck County Topographic and Hydrographic Data Acquisition Report

PLAN VIEW



NOTES:

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Atlantic Ocean

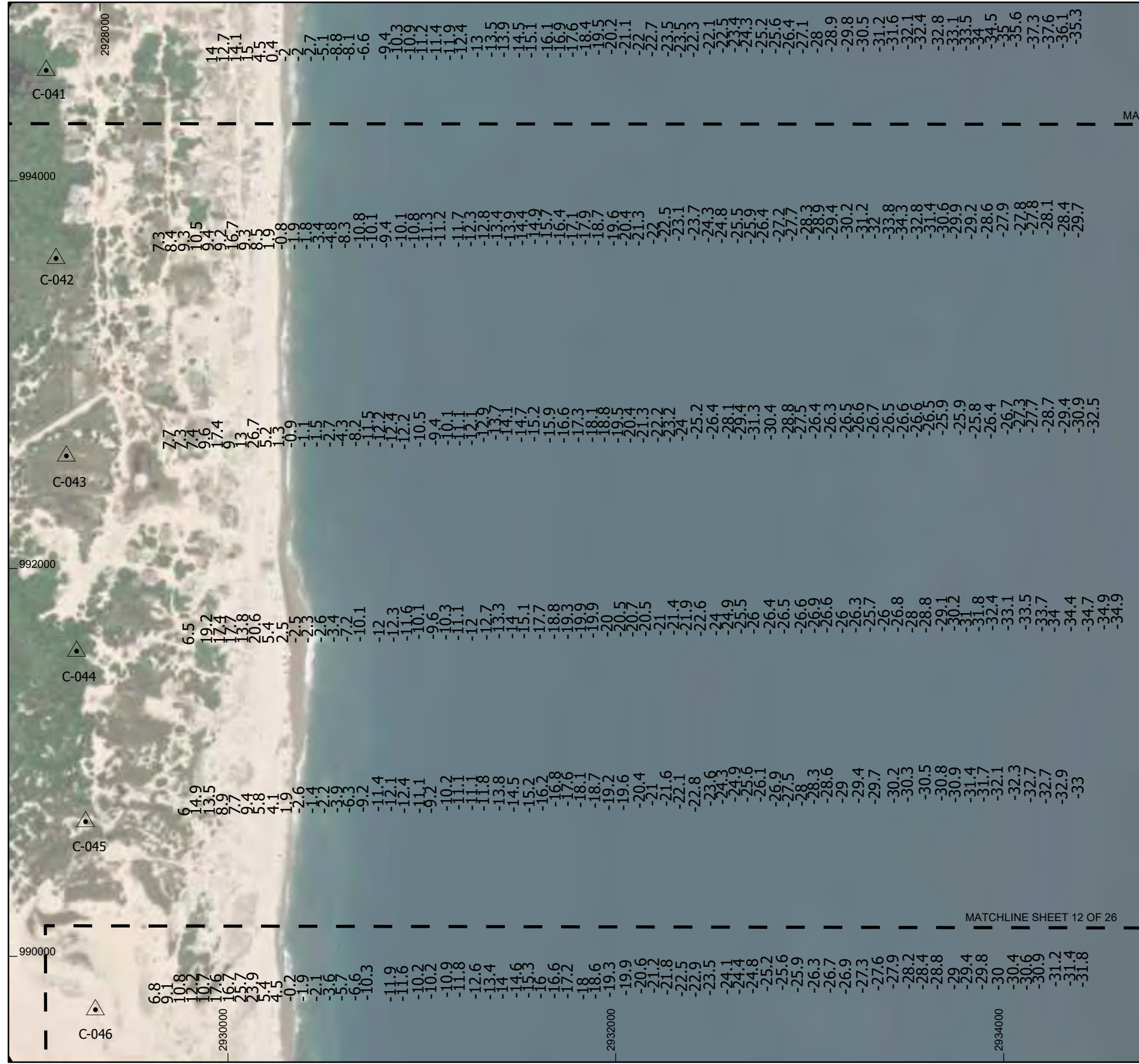


REFERENCE FILES	DESIGNED BY:	CHECKED BY:	NO.	DATE	DESCRIPTION
	M. LOWIEC	T. SHAHAN	1	10/31/22	REVISED PV FRAMES
	DRAWN BY:	REVIEWED BY:			
	P. BURDEN	M. LOWIEC			
	DATE:	SUBMITTED BY:			
	JULY 2022	M. LOWIEC			
	PLOT SCALE:	COMM. NO.:			
	AS NOTED	631025189			

Aptim Environmental & Infrastructure, LLC

6401 CONGRESS AVE, SUITE 140
BOCA RATON, FL 33487
www.aptim.com

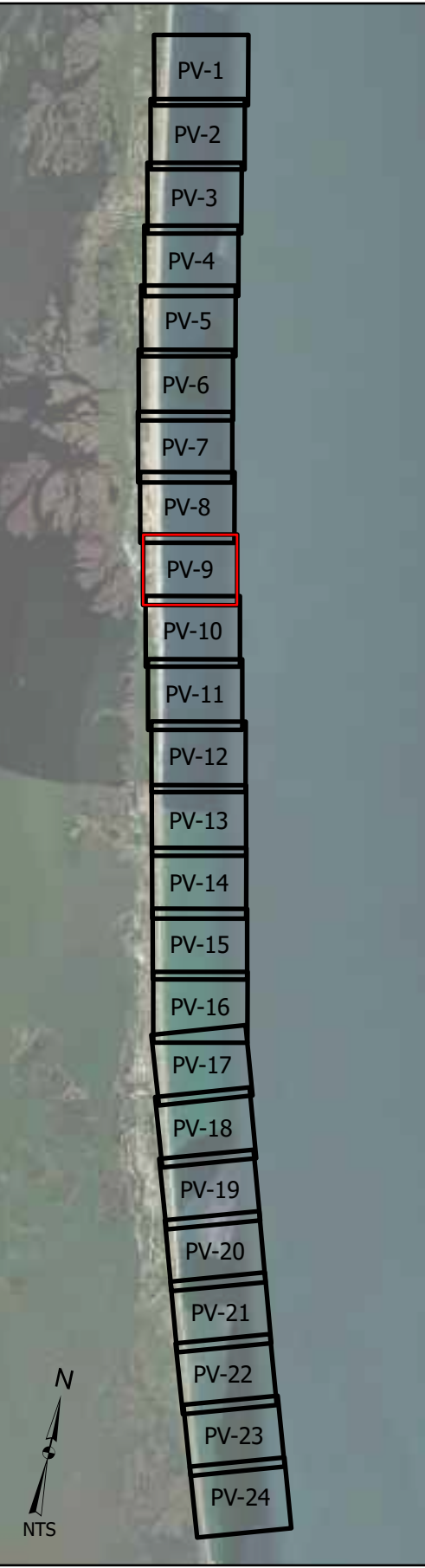
PH: (561) 391-8102
FAX: (561) 391-9116



GRAPHIC SCALE IN FEET

NOTES:

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Atlantic Ocean

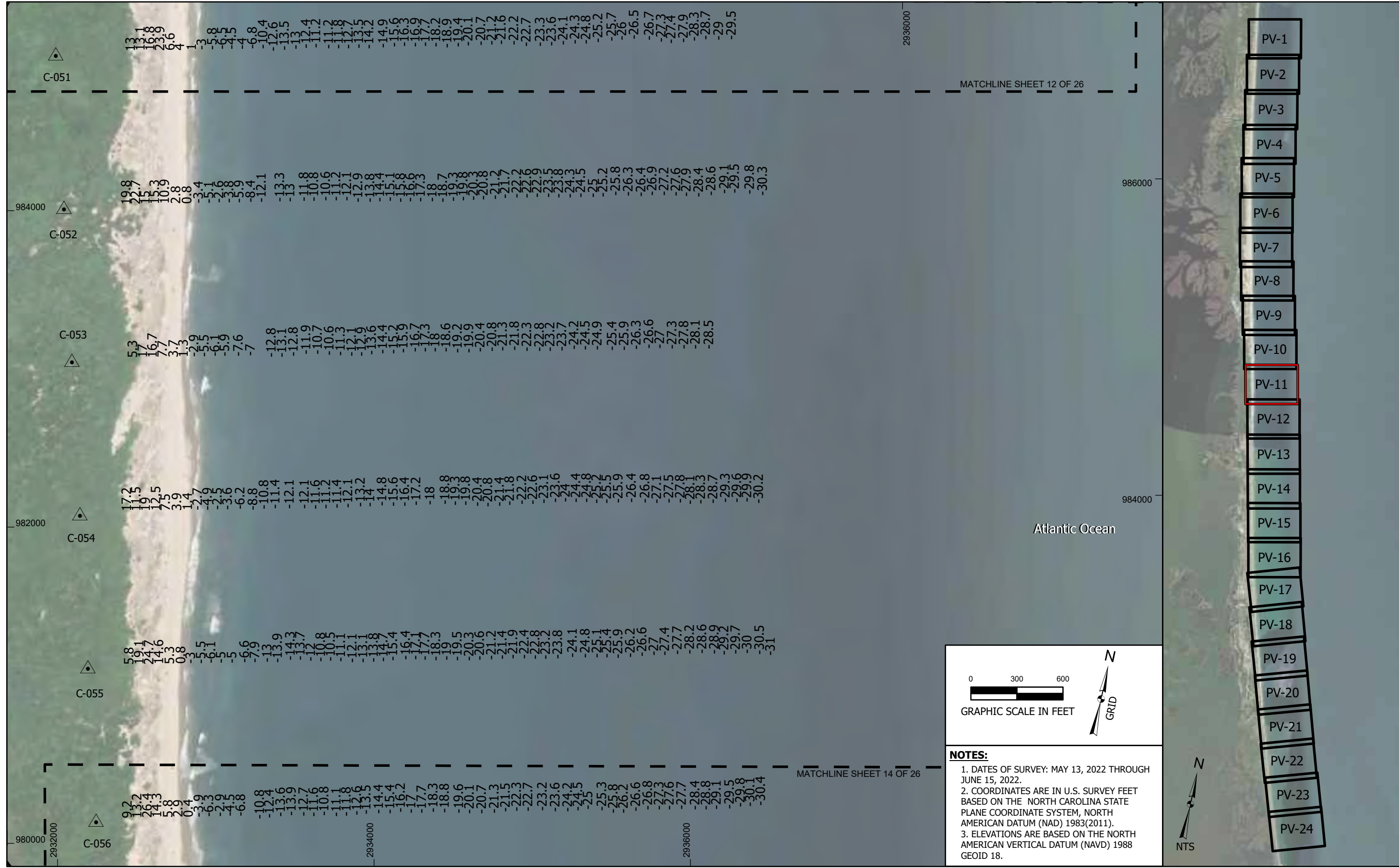
REFERENCE FILES	DESIGNED BY:	CHECKED BY:	NO.	DATE	DESCRIPTION
	M. LOWIEC	T. SHAHAN	1	10/31/22	REVISED PV FRAMES
	DRAWN BY:	REVIEWED BY:			
	P. BURDEN	M. LOWIEC			
	DATE:	SUBMITTED BY:			
	JULY 2022	M. LOWIEC			
	PLOT SCALE:	COMM. NO.:			
	AS NOTED	631025189			

2022 Currituck County Topographic and Hydrographic Data Acquisition Report

PLAN VIEW

DRAWING NO. **PV-9**

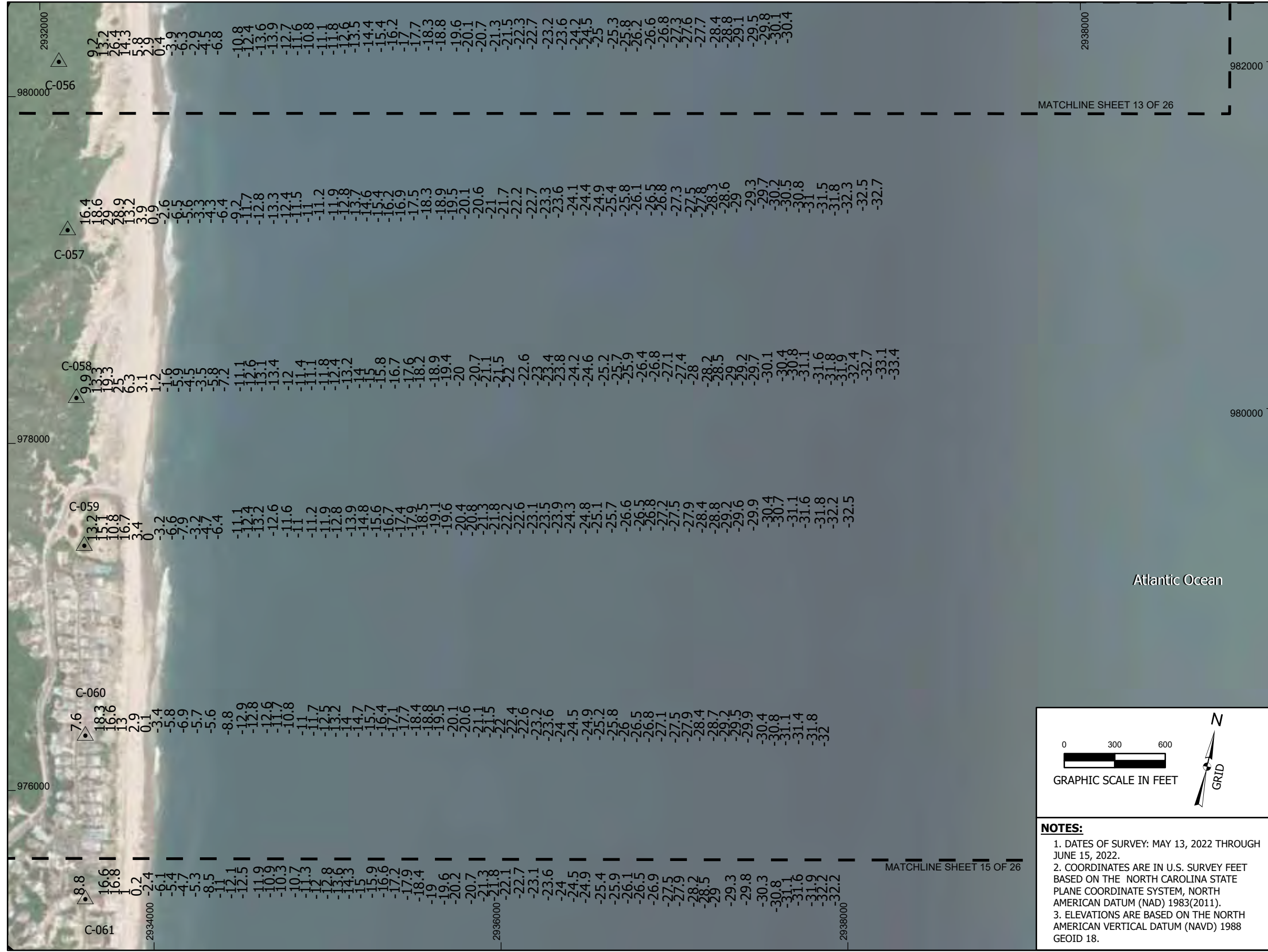
SHEET 11 OF 26



NOTES:

1. DATES OF SURVEY: MAY 13, 2022 THROUGH JUNE 15, 2022.
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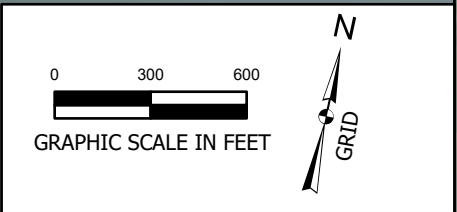
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MATCHLINE SHEET 13 OF 26

MATCHLINE SHEET 15 OF 26

Atlantic Ocean



NOTES:

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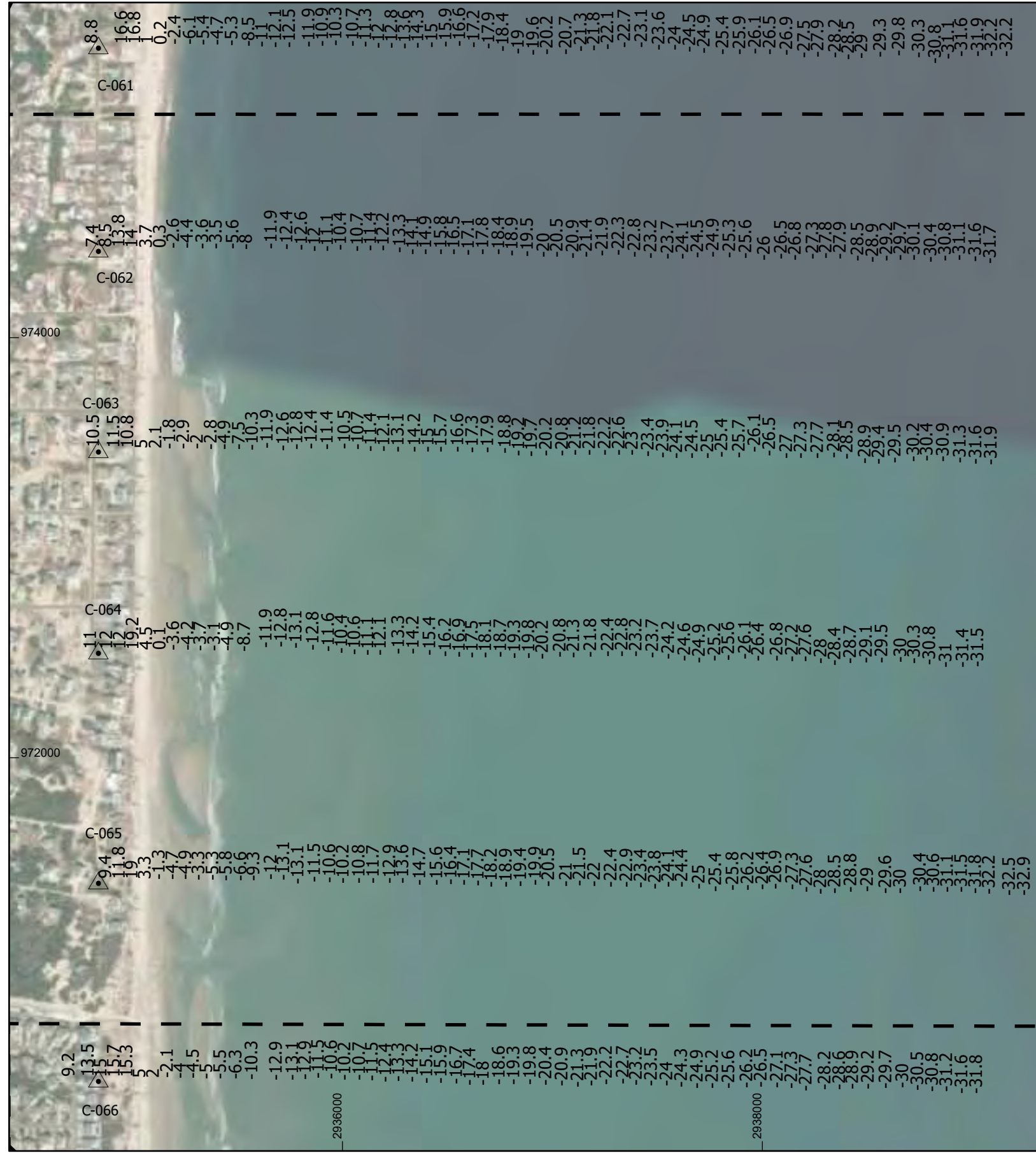
REFERENCE FILES	DESIGNED BY:	CHECKED BY:	NO.	DATE	DESCRIPTION
	M. LOWIEC	T. SHAHAN	1	10/31/22	REVISED PV FRAMES
	P. BURDEN	M. LOWIEC			
	DATE:	SUBMITTED BY:			
	JULY 2022	M. LOWIEC			
	PLOT SCALE:	COMM. NO.:			
	AS NOTED	631025189			

2022 Currituck County Topographic and Hydrographic Data Acquisition Report

PLAN VIEW

DRAWING NO.
PV-12

SHEET 14 OF 26



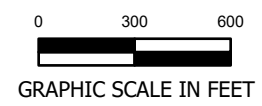
MATCHLINE SHEET 14 OF 26

MATCHLINE SHEET 16 OF 26

Atlantic Ocean

NOTES:

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- PV-1
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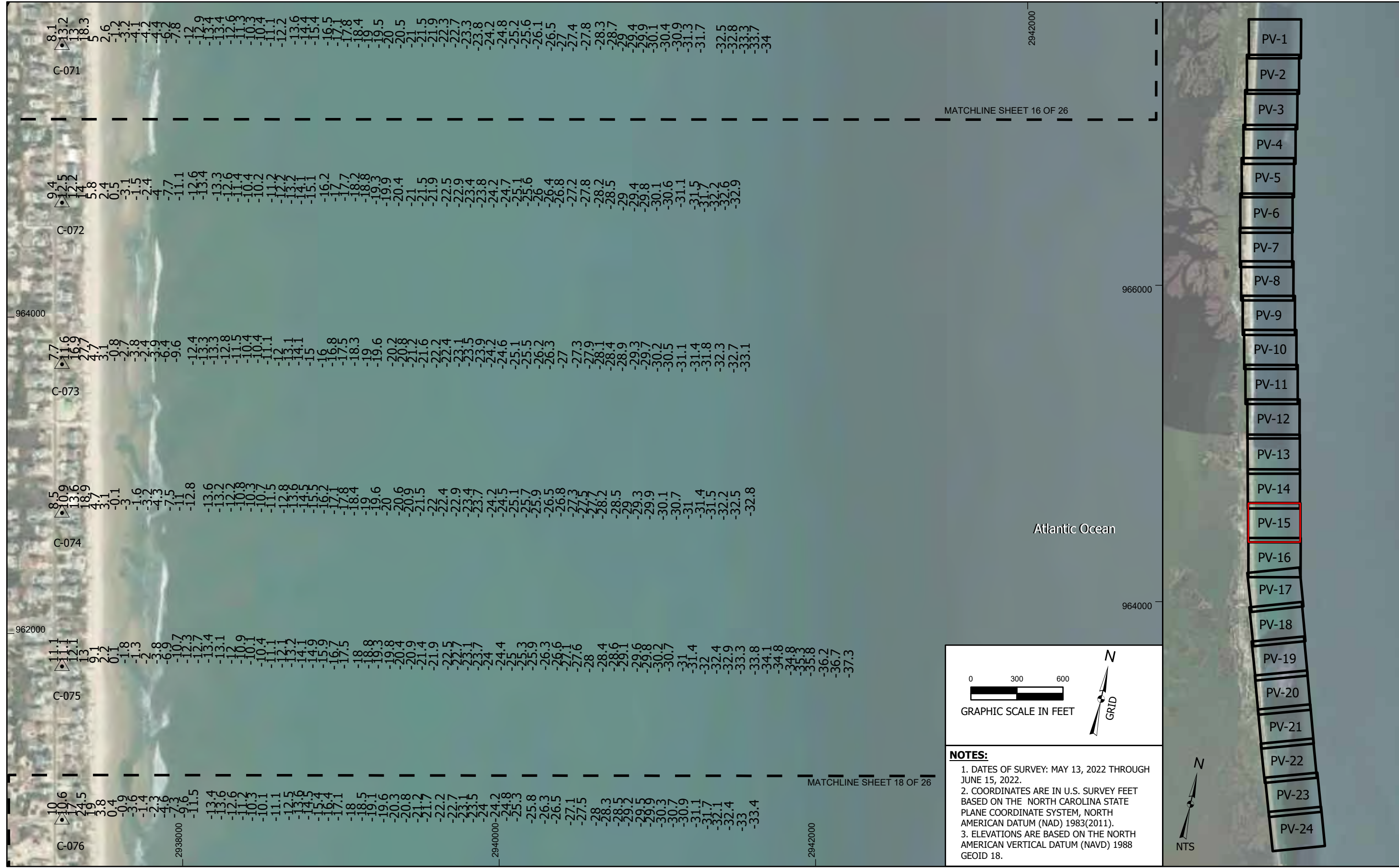
DESIGNED BY: M. LOWIEC	CHECKED BY: T. SHAHAN	NO. 1	10/31/22	REVISED PV FRAMES
DRAWN BY: P. BURDEN	REVIEWED BY: M. LOWIEC			
DATE: JULY 2022	SUBMITTED BY: M. LOWIEC			
PLOT SCALE: AS NOTED	COMM. NO.:	631025189		
			NO. 1	DATE
				DESCRIPTION

2022 Currituck County Topographic and Hydrographic Data Acquisition Report

PLAN VIEW

DRAWING NO.
PV-13
SHEET 15 OF 26

Aptim Environmental & Infrastructure, LLC
 6401 CONGRESS AVE. SUITE 140
 BOCA RATON, FL 33487
 www.aptim.com
 PH: (561) 391-8102
 FAX: (561) 391-9116



REFERENCE FILES	DESIGNED BY:	CHECKED BY:	NO.	DATE	DESCRIPTION
	M. LOWIEC	T. SHAHAN	1	10/31/22	REVISED PV FRAMES
	DRAWN BY:	REVIEWED BY:			
	P. BURDEN	M. LOWIEC			
	DATE:	SUBMITTED BY:			
	JULY 2022	M. LOWIEC			
	PLOT SCALE:	COMM. NO.:			
	AS NOTED	631025189			

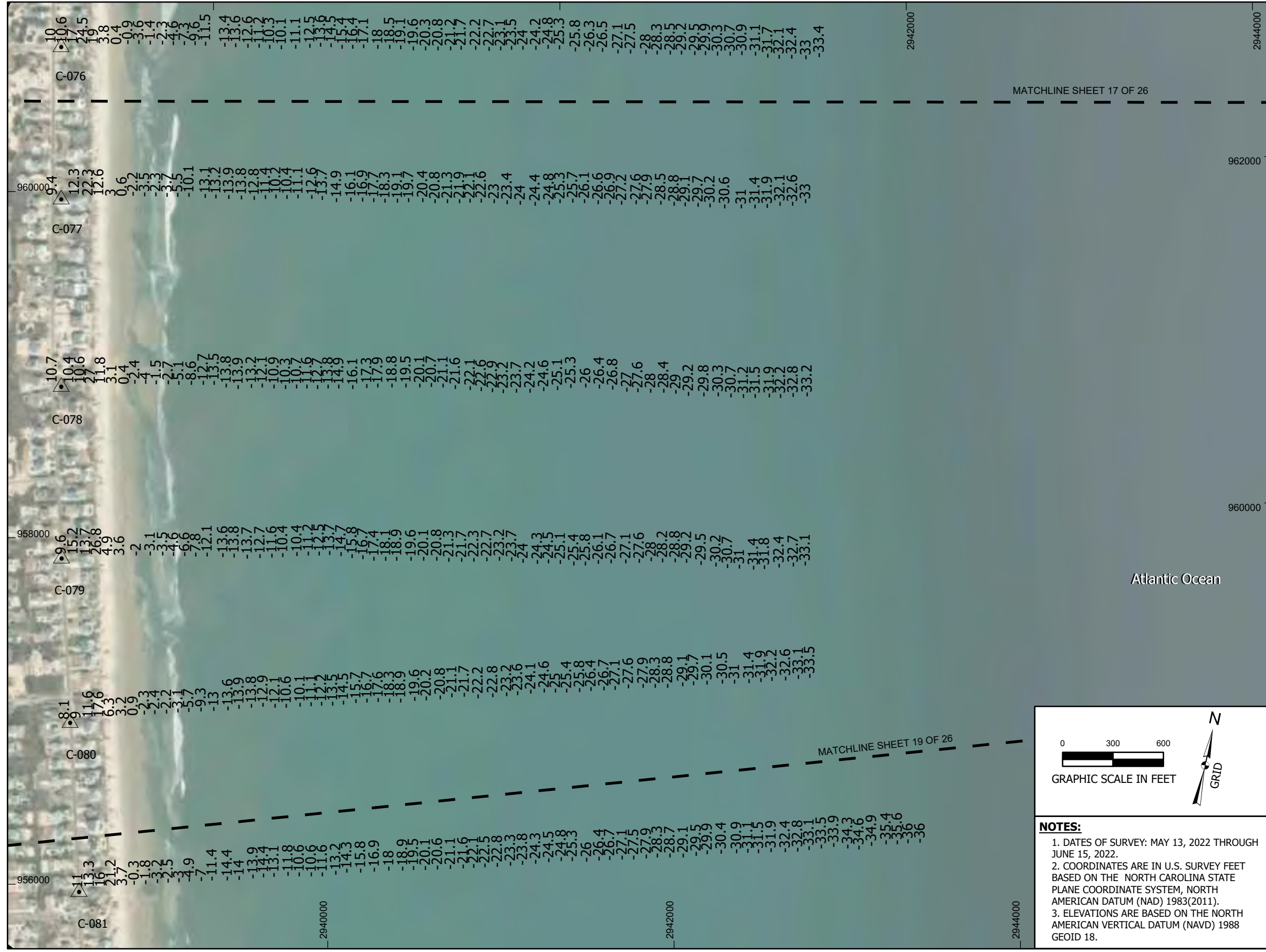
2022 Currituck County Topographic and Hydrographic Data Acquisition Report

PLAN VIEW

DRAWING NO.

PV-15

SHEET 17 OF 26

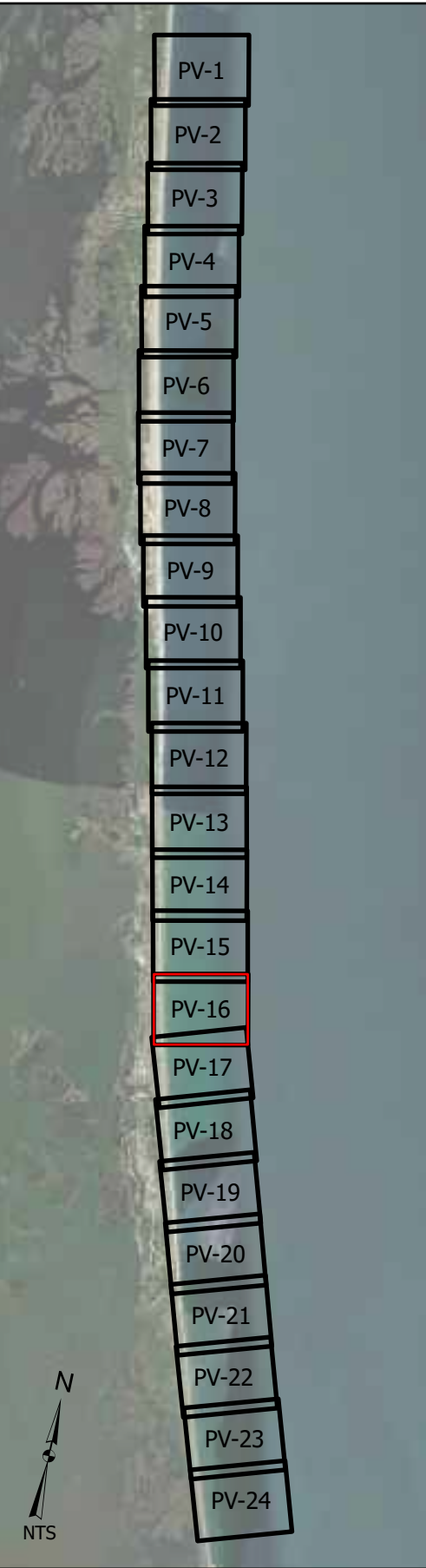


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GRAPHIC SCALE IN FEET

NTS

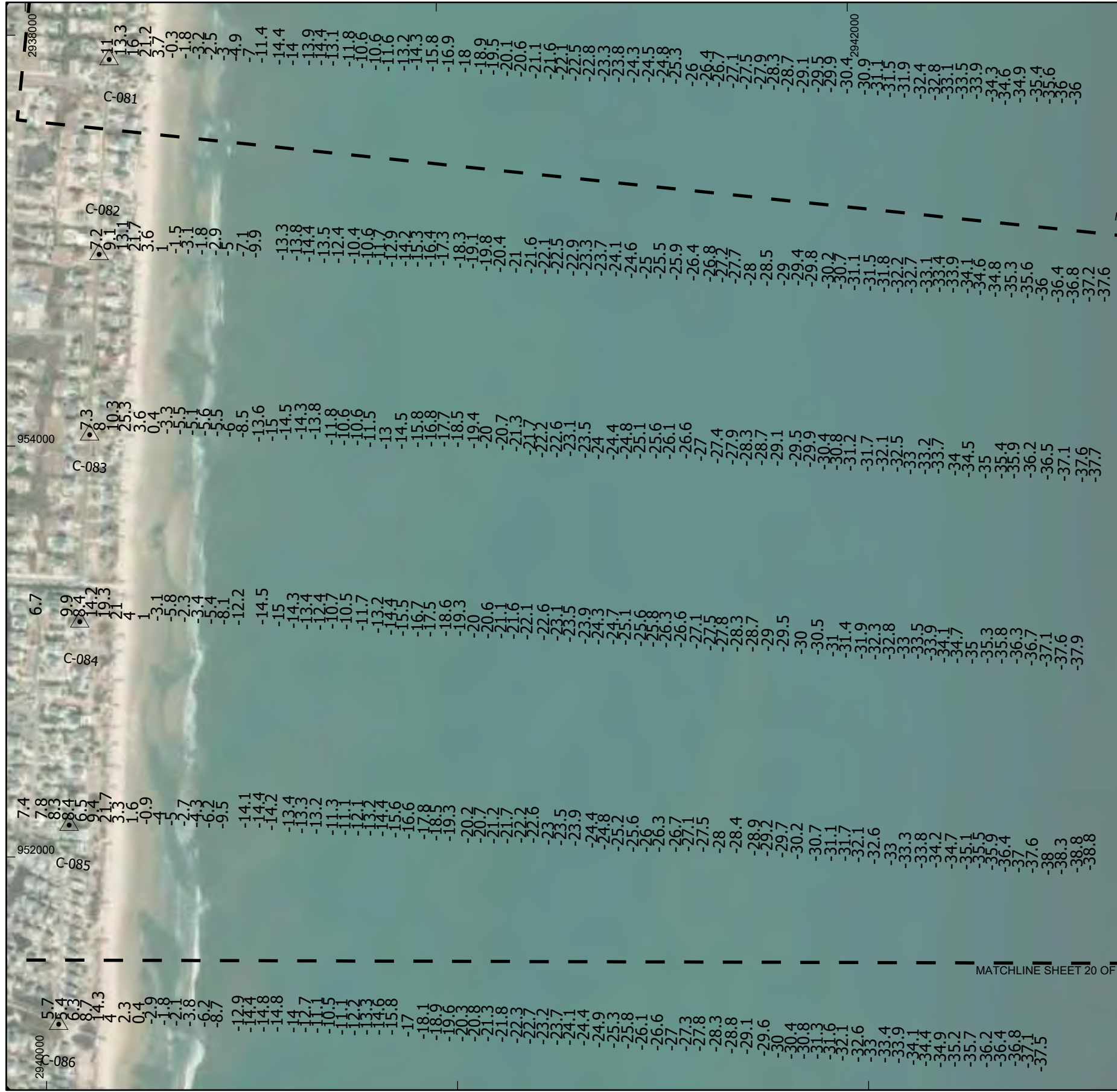


REFERENCE FILES	DESIGNED BY:	CHECKED BY:	NO.	DATE	DESCRIPTION
	M. LOWIEC	T. SHAHAN	1	10/31/22	REVISED PV FRAMES
	DRAWN BY:	REVIEWED BY:			
	P. BURDEN	M. LOWIEC			
	DATE:	SUBMITTED BY:			
	JULY 2022	M. LOWIEC			
	PLOT SCALE:	COMM. NO.:			
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Aptim Environmental & Infrastructure, LLC

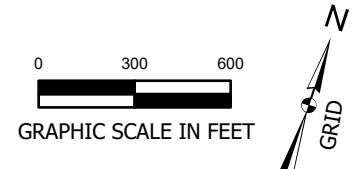
6401 CONGRESS AVE, SUITE 140
BOCA RATON, FL 33487
www.apim.com

PH: (561) 391-8102
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NOTES:

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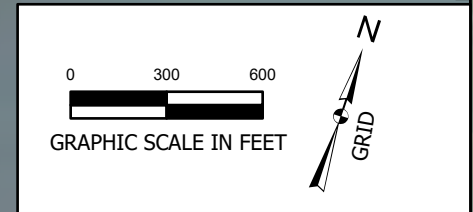
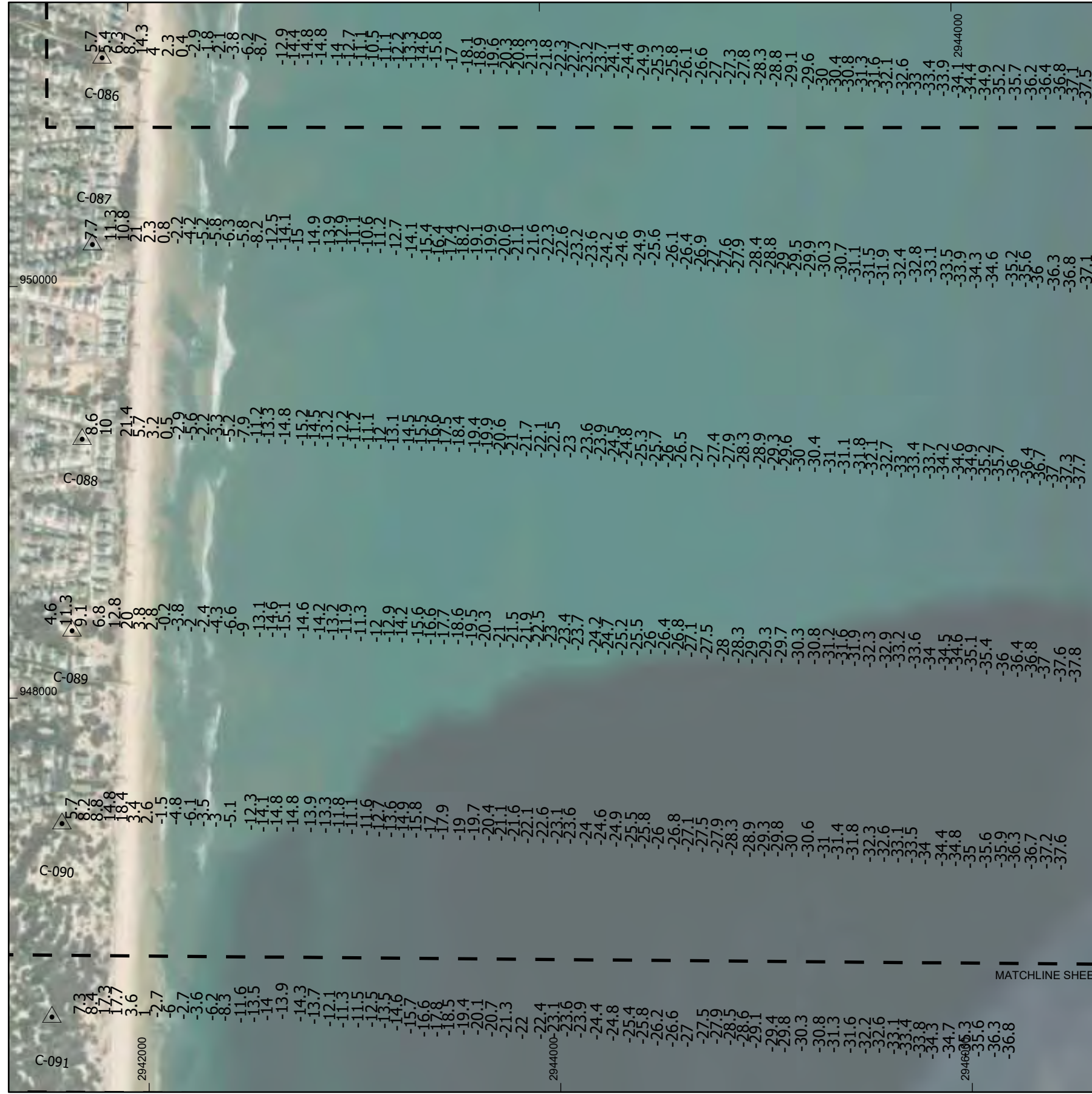
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REFERENCE FILES	DESIGNED BY:	CHECKED BY:	NO.	DATE	DESCRIPTION
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	DRAWN BY:	REVIEWED BY:			
	P. BURDEN	M. LOWIEC			
	DATE:	SUBMITTED BY:			
	JULY 2022	M. LOWIEC			
	PLOT SCALE:	COMM. NO.:			
	AS NOTED	631025189			

2022 Currituck County Topographic and Hydrographic Data Acquisition Report

PLAN VIEW

DRAWING NO.



NOTES:

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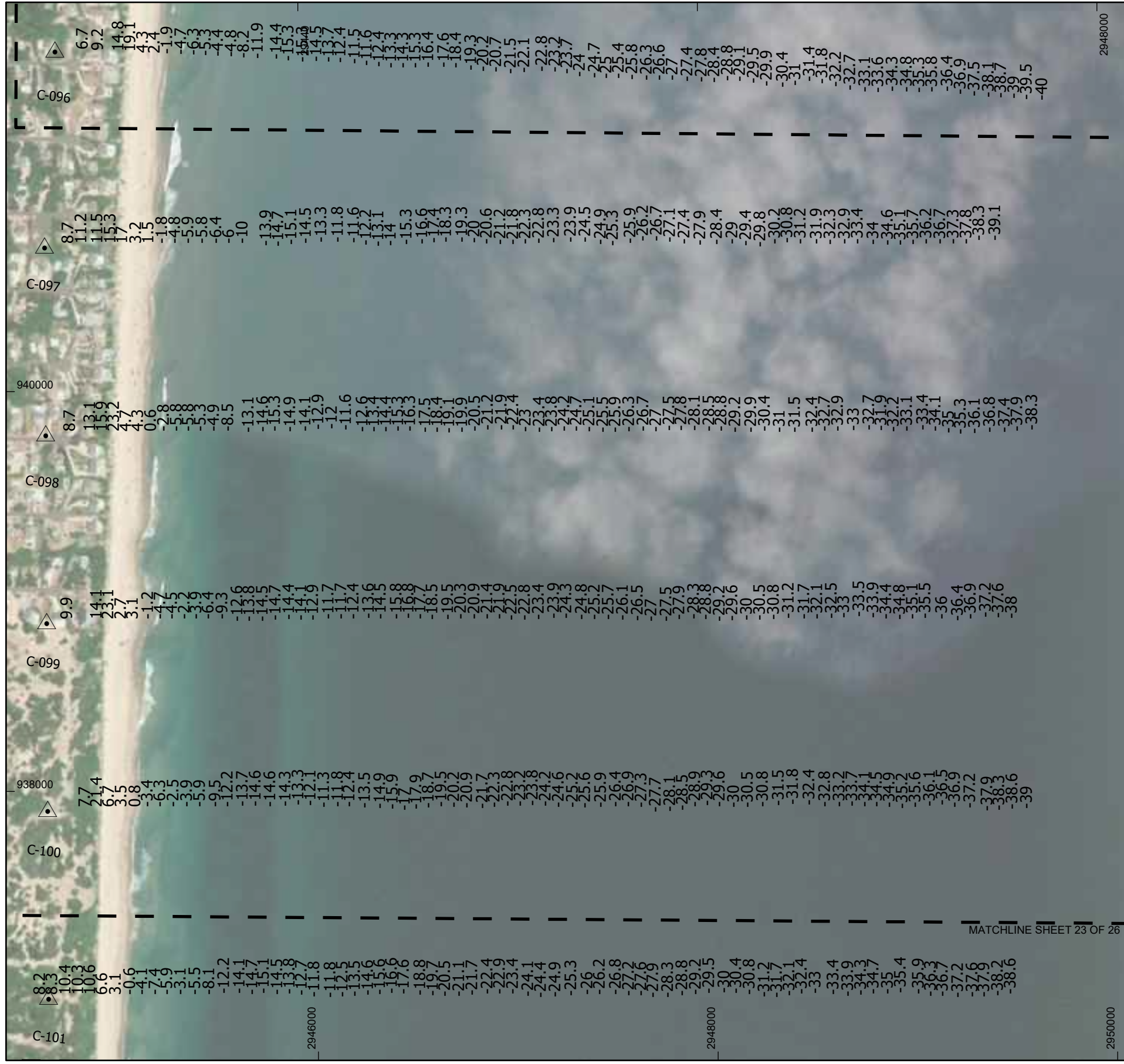
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REFERENCE FILES	DESIGNED BY:	CHECKED BY:	NO.	DATE	DESCRIPTION
	M. LOWIEC	T. SHAHAN	1	10/31/22	REVISED PV FRAMES
	DRAWN BY:	REVIEWED BY:			
	P. BURDEN	M. LOWIEC			
	DATE:	SUBMITTED BY:			
	JULY 2022	M. LOWIEC			
	PLOT SCALE:	COMM. NO.:			
	AS NOTED	631025189			

2022 Currituck County Topographic and Hydrographic Data Acquisition Report

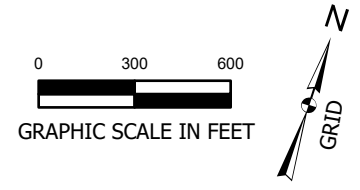
PLAN VIEW

DRAWING NO.



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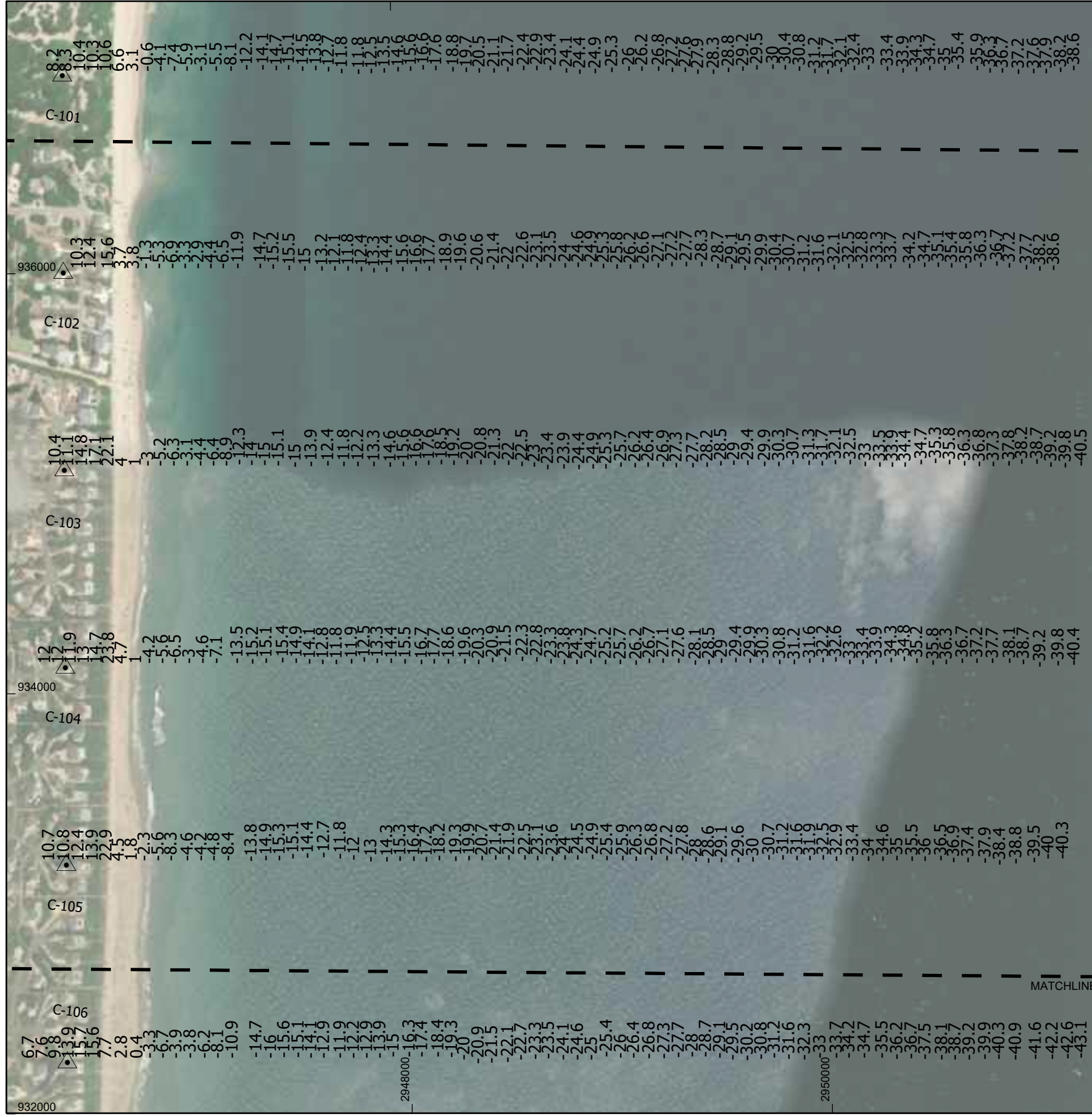


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Aptim Environmental & Infrastructure, LLC

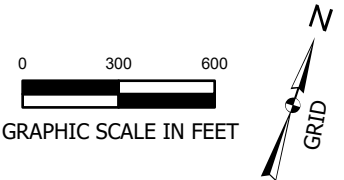
6401 CONGRESS AVE, SUITE 140
BOCA RATON, FL 33487
www.aptim.com

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



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MATCHLINE SHEET 22 OF 26

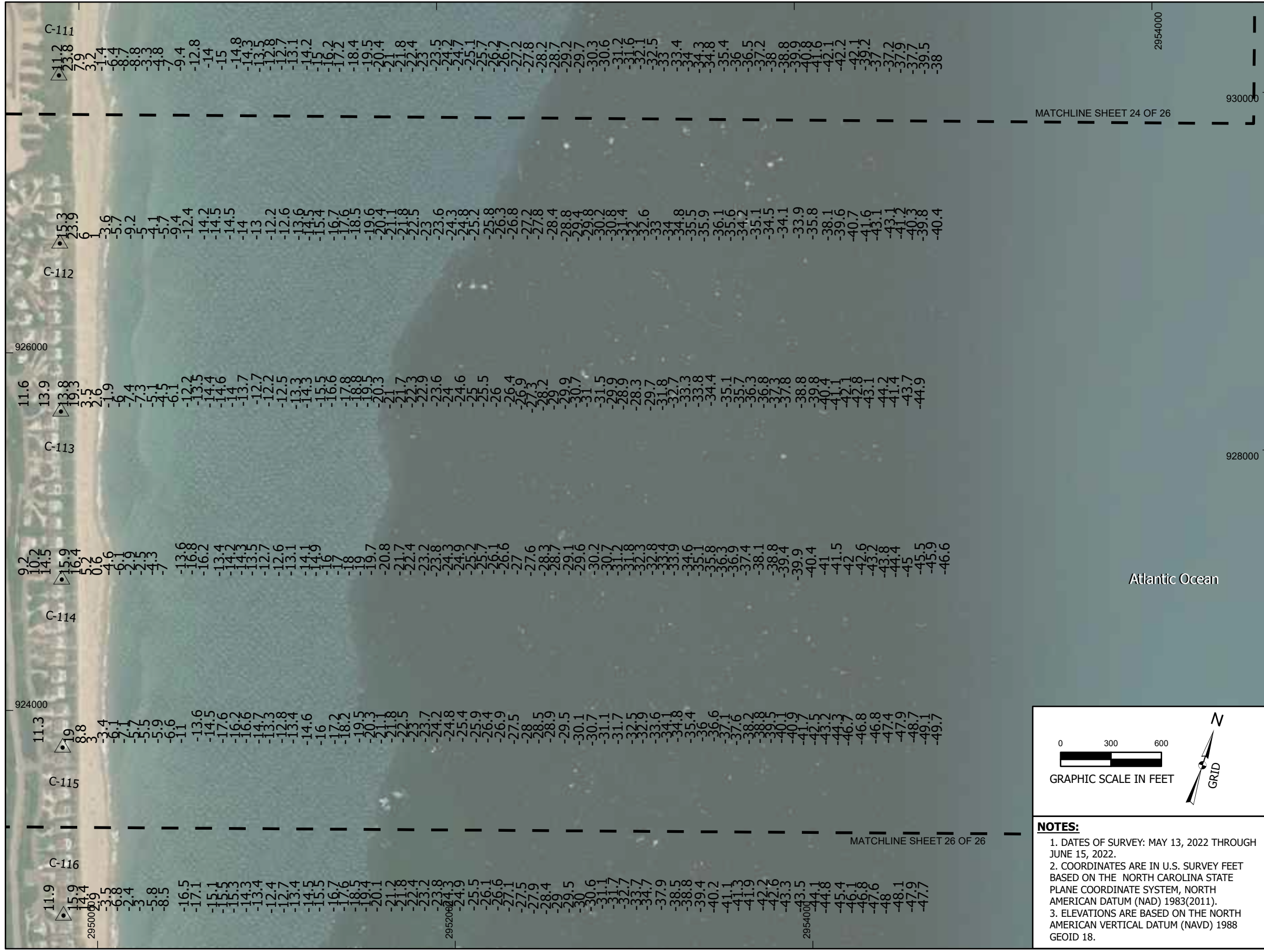
MATCHLINE SHEET 24 OF 26

REFERENCE FILES	DESIGNED BY:	CHECKED BY:	NO.	DATE	DESCRIPTION
	M. LOWIEC	T. SHAHAN	1	10/31/22	REVISED PV FRAMES
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2022 Currituck County Topographic and Hydrographic Data Acquisition Report

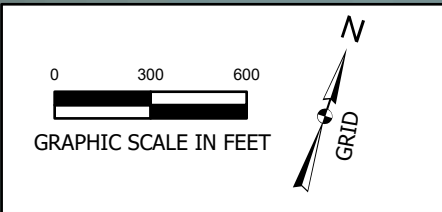
PLAN VIEW

DRAWING NO.



MATCHLINE SHEET 24 OF 26

MATCHLINE SHEET 26 OF 26

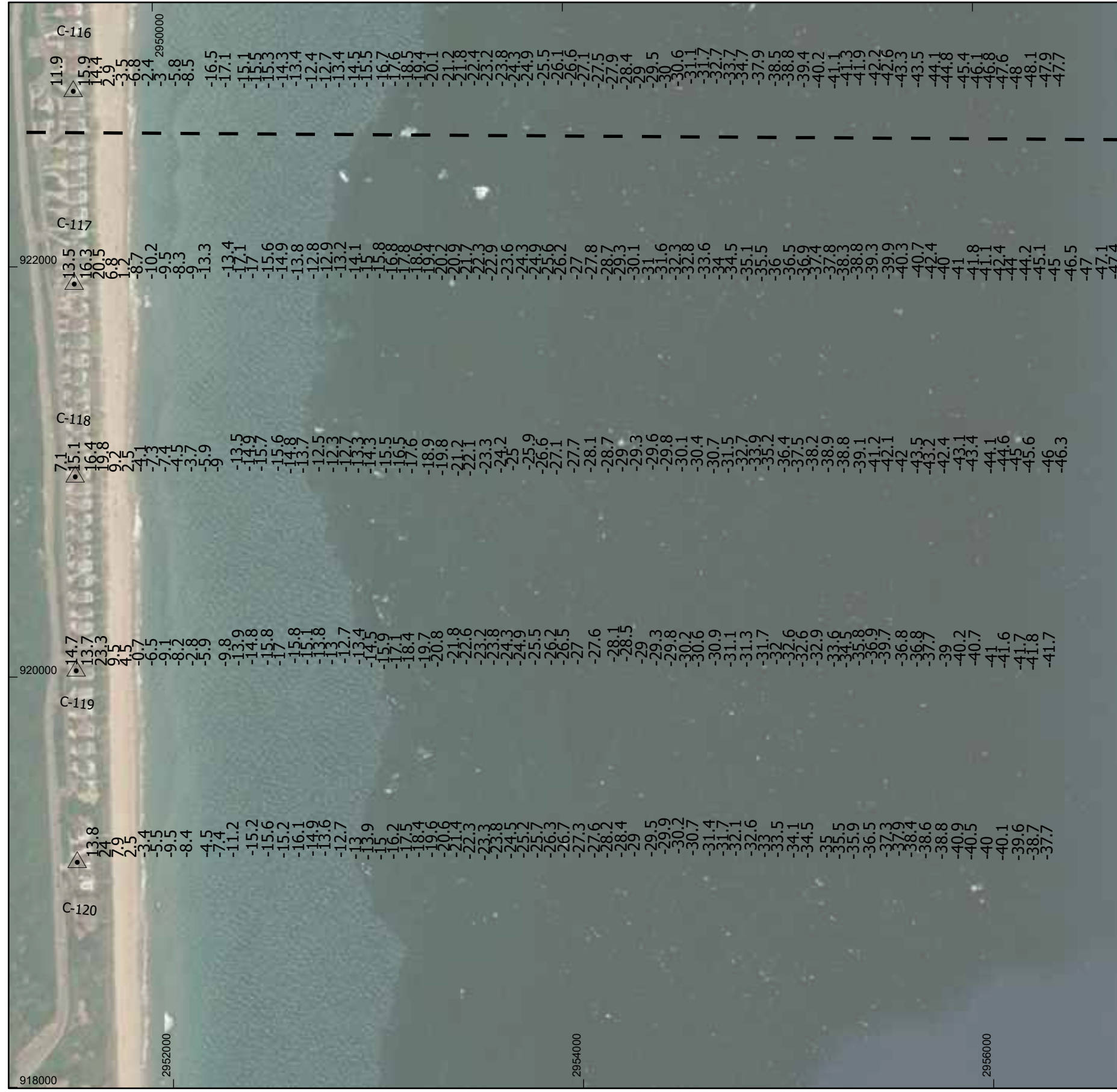


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Aptim Environmental & Infrastructure, LLC 6401 CONGRESS AVE, SUITE 140 BOCA RATON, FL 33487 www.aptim.com PH: (561) 391-8102 FAX: (561) 391-9116																																									
2022 Currituck County Topographic and Hydrographic Data Acquisition Report PLAN VIEW	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>DESIGNED BY:</th> <th>CHECKED BY:</th> <th>NO.</th> <th>DATE</th> <th>DESCRIPTION</th> </tr> </thead> <tbody> <tr> <td>M. LOWMEC</td> <td>T. SHAHAN</td> <td>1</td> <td>10/31/22</td> <td>REVISED PV FRAMES</td> </tr> <tr> <td>DRAWN BY:</td> <td>REVIEWED BY:</td> <td></td> <td></td> <td></td> </tr> <tr> <td>P. BURDEN</td> <td>M. LOWMEC</td> <td></td> <td></td> <td></td> </tr> <tr> <td>DATE:</td> <td>SUBMITTED BY:</td> <td></td> <td></td> <td></td> </tr> <tr> <td>JULY 2022</td> <td>M. LOWMEC</td> <td></td> <td></td> <td></td> </tr> <tr> <td>PLOT SCALE:</td> <td>COMM. NO.:</td> <td></td> <td></td> <td></td> </tr> <tr> <td>AS NOTED</td> <td>631025189</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	DESIGNED BY:	CHECKED BY:	NO.	DATE	DESCRIPTION	M. LOWMEC	T. SHAHAN	1	10/31/22	REVISED PV FRAMES	DRAWN BY:	REVIEWED BY:				P. BURDEN	M. LOWMEC				DATE:	SUBMITTED BY:				JULY 2022	M. LOWMEC				PLOT SCALE:	COMM. NO.:				AS NOTED	631025189			
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DRAWING NO. PV-23 SHEET 25 OF 26																																									



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GRAPHIC SCALE IN FEET

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DRAWN BY: P. BURDEN	REVIEWED BY: M. LOWIEC			
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PLOT SCALE: AS NOTED	COMM. NO.:	631025189		

2022 Currituck County Topographic and Hydrographic Data Acquisition Report

PLAN VIEW

DRAWING NO.

PV-24

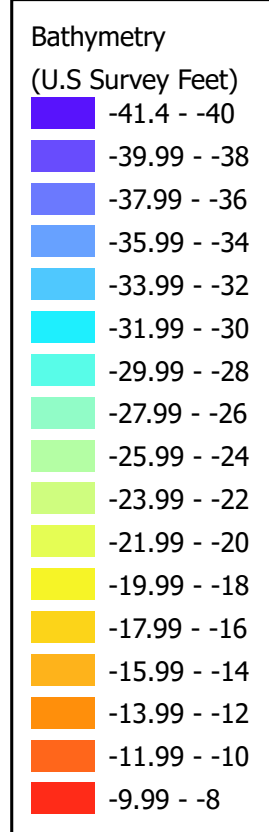
SHEET 26 OF 26

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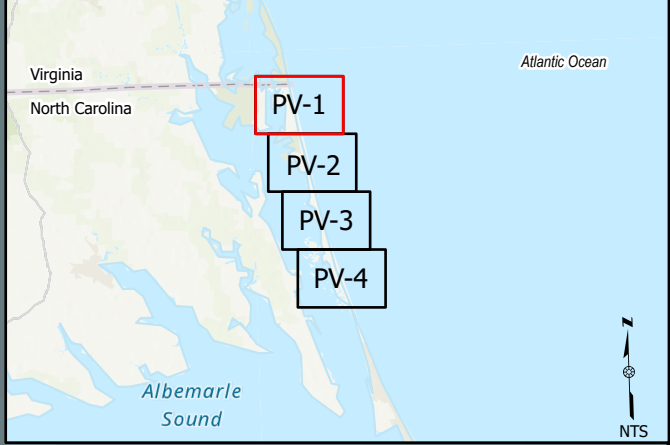
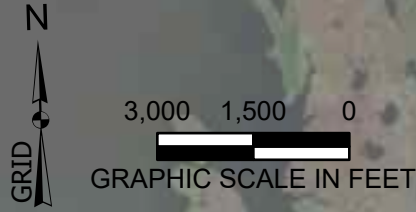
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FAX: (561) 391-9116

2022 CURRITUCK COUNTY TOPOGRAPHIC AND HYDROGRAPHIC DATA ACQUISITION REPORT



LEGEND

U.S.	UNITED STATES OF AMERICA
NAVD	NORTH AMERICAN VERTICAL DATUM OF 1988
NAD	NORTH AMERICAN DATUM
PH.	PHONE
No.	NUMBER
FT	FEET
COMM.	COMMISSION
LS	LICENSE
LLC	LIMITED LIABILITY COMPANY
NTS	NOT TO SCALE



ATLANTIC OCEAN

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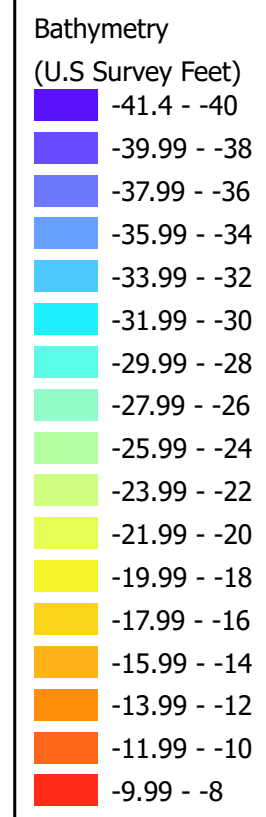
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2022 CURRITUCK COUNTY
TOPOGRAPHIC AND HYDROGRAPHIC
DATA ACQUISITION REPORT
CURRITUCK COUNTY, NORTH CAROLINA

DRAWING NO.
SURFACE

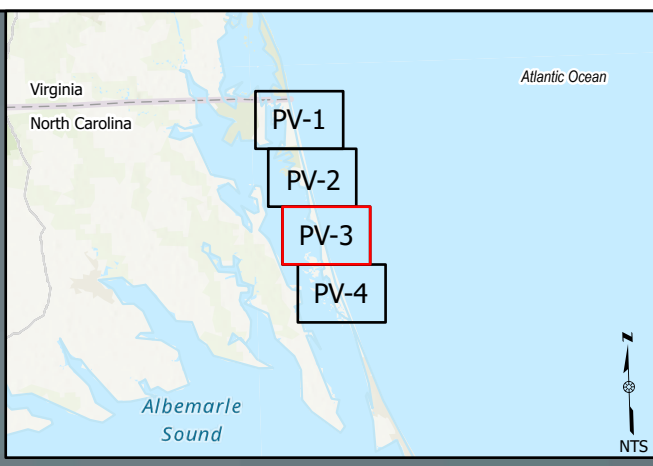
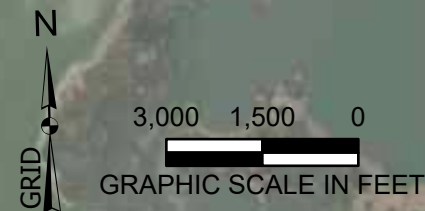
Sheet 1 of 4

2022 CURRITUCK COUNTY TOPOGRAPHIC AND HYDROGRAPHIC DATA ACQUISITION REPORT



LEGEND

U.S.	UNITED STATES OF AMERICA
NAVD	NORTH AMERICAN VERTICAL DATUM OF 1988
NAD	NORTH AMERICAN DATUM
PH.	PHONE
No.	NUMBER
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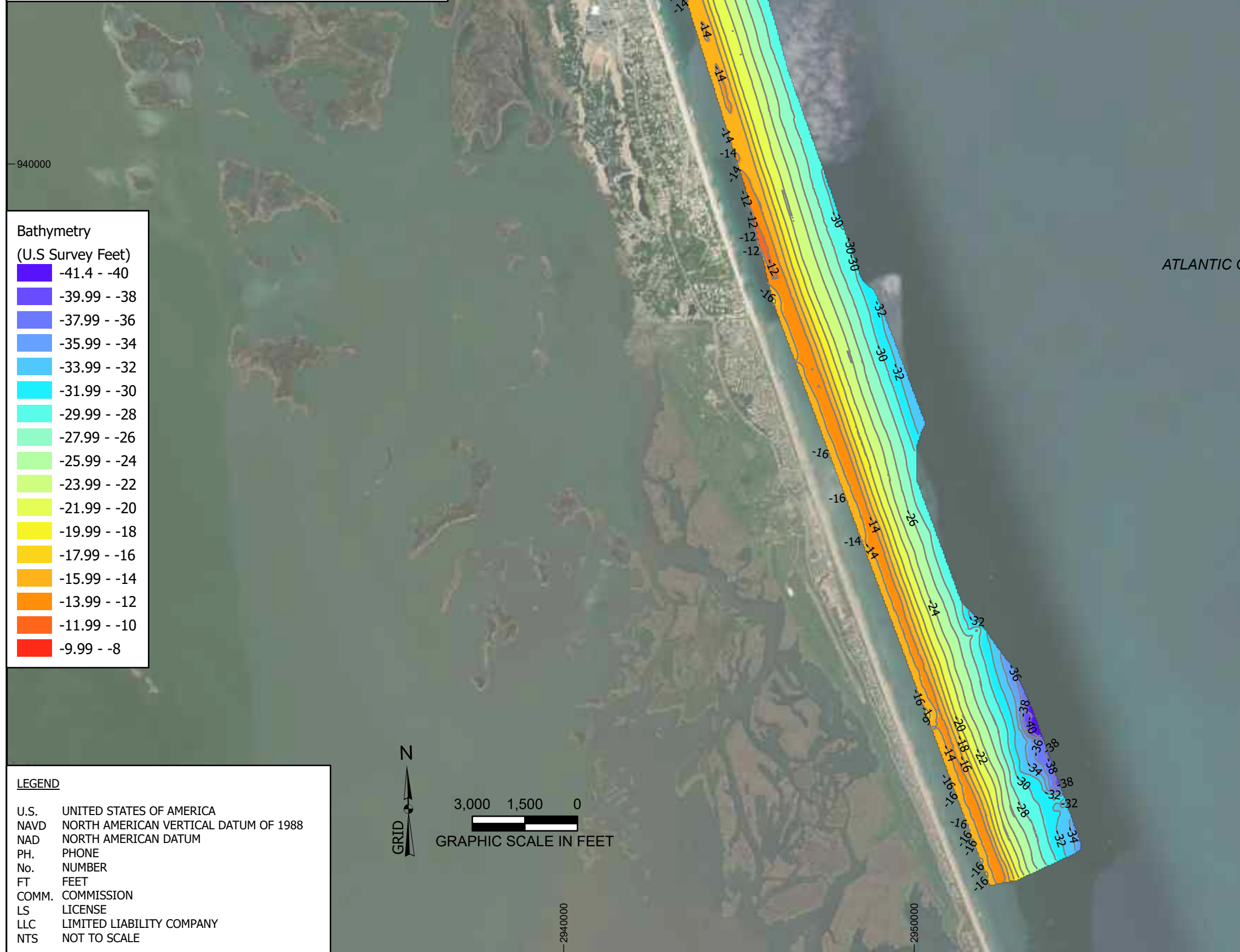
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CHECKED BY: M. LOWIEC DESIGNED BY: M. LOWIEC DRAWN BY: T. SHAHAN DATE: JULY 2022 PLOT SCALE: AS NOTED		REVIEWED BY: M. LOWIEC SUBMITTED BY: M. LOWIEC COMM. NO.: 631025189	
REFERENCE FILES		NO. DATE DESCRIPTION	
2022 CURRITUCK COUNTY TOPOGRAPHIC AND HYDROGRAPHIC DATA ACQUISITION REPORT		CURRITUCK COUNTY, NORTH CAROLINA	
DRAWING NO.		SURFACE	
Sheet 3 of 4		Sheet 3 of 4	

2022 CURRITUCK COUNTY TOPOGRAPHIC AND HYDROGRAPHIC DATA ACQUISITION REPORT

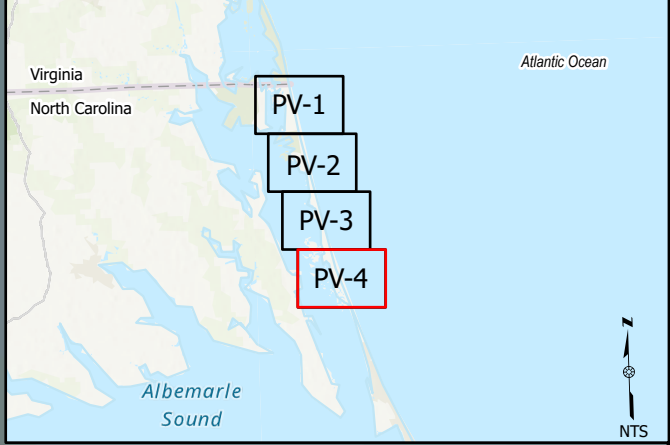
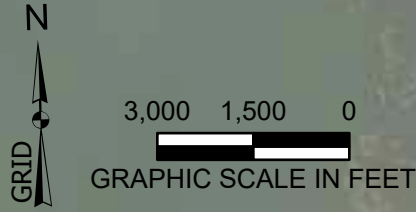


Bathymetry
(U.S. Survey Feet)

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2022 CURRITUCK COUNTY
TOPOGRAPHIC AND HYDROGRAPHIC
DATA ACQUISITION REPORT
CURRITUCK COUNTY, NORTH CAROLINA

DRAWING NO.
SURFACE

Sheet 4 of 4

Survey Report Notes

Survey Title: 2022 Currituck County Topographic and Hydrographic Data Acquisition Report

Prepared Date: September 2022

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

Prepared By: Aptim Environmental & Infrastructure, LLC

Dates of Survey: May 13, 2022 through June 15, 2022

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

Notes:

1. Digital data files encompassing the following have 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 data collection 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, 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. 521 & NC CPE field book for the nearshore and onshore segments and field book No. 100 for the offshore segments.
8. Aids to navigation were not located.
9. Soundings were collected using a Teledyne E20 sounder, Single Frequency, survey grade sounder. The sounder was calibrated prior to the start of the survey following manufacturers recommended procedures.
10. The data acquisition was conducted for Currituck County for use as a topographic and hydrographic study.

APPENDIX OVERVIEW

1) Monument Information Report

Data collected during 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 data were converted into APTIM files. Onshore data were 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 were converted into xyz format. The xyz data is provided in the datum collected (NAVD88) as per state standards.

3) Profile Plots

Profile plots 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. 521 & NC CPE fielbook for the nearshore and onshore segments and navigation field book No. 100 for the offshore survey.

APPENDIX 1

MONUMENT INFORMATION REPORT

CONTROL MONUMENT USED BY APTIM MAY 2022	
DATUMS: NAD83/90 / NAVD1988 (U.S. SURVEY FEET)	
Designation	ADRIATIC
Stamping	ADRIATIC 1996
Northing	974203.77
Easting	2933858.46
Horizontal Root Mean Square Error	0.061
Elevation	6.60
Vertical Root Mean Square Error	0.140
Description	Station is located 14.2 ft east of the centerline of Atlantic Avenue and 6 ft North of the center of a wooden public beach access walkway



Monument: ADRIATIC

Mean of Inverse Shots - Published Versus CPE Found				
Monument	No. of Shots	ΔN	ΔE	ΔZ
ADRIATIC	67	-0.02	0.02	0.09

CONTROL MONUMENT USED BY APTIM MAY 2022	
DATUMS: NAD83/90 / NAVD1988 (U.S. SURVEY FEET)	
Designation	TEETER
Stamping	IRON ROD AND CAP
Northing	1033886.521
Easting	2919866.552
Horizontal Root Mean Square Error	0.060
Elevation	17.444
Vertical Root Mean Square Error	0.082
Description	This iron rod and cap is located approximately 350 feet south of the Northernmost horse fence and 230 feet west of the waterline on Corova Beach.



Monument: TEETER IRC

Mean of Inverse Shots - Published Versus CPE Found				
Monument	No. of Shots	ΔN	ΔE	ΔZ
TEETER IRC	8	0.03	0.01	0.00

CONTROL MONUMENT USED BY APTIM MAY 2022	
DATUMS: NAD83/90 / NAVD1988 (U.S. SURVEY FEET)	
Designation	Q261
Stamping	Q261 1983
Northing	975483.22
Easting	2933511.61
Horizontal Root Mean Square Error	0.079
Elevation	7.14
Vertical Root Mean Square Error	0.133
Description	This monument is found at the cul-du-sac at the Northernmost end of Atlantic Ave. It is located approximately 24 ft. West of the centerline of Atlantic Ave. and 13.5 ft South of the edge of the pavement of the cul-du-sac.



Monument: Q261

Mean of Inverse Shots - Published Versus CPE Found				
Monument	No. of Shots	ΔN	ΔE	ΔZ
Q261	56	-0.06	0.02	0.08

CONTROL MONUMENT USED BY APTIM MAY 2022	
DATUMS: NAD83/90 / NAVD1988 (U.S. SURVEY FEET)	
Designation	RUDY
Stamping	IRON ROD AND CAP
Northing	934755.385
Easting	2945624.941
Horizontal Root Mean Square Error	0.045
Elevation	24.404
Vertical Root Mean Square Error	0.050
Description	This iron rod and cap is found approximately 2 feet north of the octagon landing of the beach access walkway at 453 Pipsis Point Road in Corolla, North Carolina.



Monument: RUDY IRC

Mean of Inverse Shots - Published Versus CPE Found				
Monument	No. of Shots	ΔN	ΔE	ΔZ
RUDY	2	0.00	-0.09	0.05

CONTROL MONUMENT USED BY APTIM MAY 2022	
DATUMS: NAD83/90 / NAVD1988 (U.S. SURVEY FEET)	
Designation	RADIO
Stamping	RADIO 1962
Northing	935113.16
Easting	2944087.11
Horizontal Root Mean Square Error	0.084
Elevation	9.219
Vertical Root Mean Square Error	0.129
Description	Station is located about 7 mi 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

Mean of Inverse Shots - Published Versus CPE Found				
Monument	No. of Shots	ΔN	ΔE	ΔZ
RUDY	2	0.00	-0.09	0.05

CONTROL MONUMENT USED BY APTIM MAY 2022	
DATUMS: NAD83/90 / NAVD1988 (U.S. SURVEY FEET)	
Designation	RUN
Stamping	RUN 1995
Northing	926250.14
Easting	2947874.97
Horizontal Root Mean Square Error	0.051
Elevation	7.178
Vertical Root Mean Square Error	0.228
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

Mean of Inverse Shots - Published Versus APTIM Found				
Monument	No. of Shots	ΔN	ΔE	ΔZ
RADIO	30	0.02	0.06	-0.22

CONTROL MONUMENT USED BY APTIM MAY 2022	
DATUMS: NAD83/90 / NAVD1988 (U.S. SURVEY FEET)	
Designation	CAFFEY
Stamping	CAFFEY 1935
Northing	915308.87
Easting	2952084.11
Horizontal Root Mean Square Error	0.120
Elevation	1.99
Vertical Root Mean Square Error	0.077
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
RADIO	30	0.02	0.06	-0.22

CONTROL MONUMENT USED BY APTIM MAY 2022	
DATUMS: NAD83/90 / NAVD1988 (U.S. SURVEY FEET)	
Designation	SHIP
Stamping	IRON ROD AND CAP
Northing	955355.436
Easting	2938903.319
Horizontal Root Mean Square Error	0.065
Elevation	23.30
Vertical Root Mean Square Error	0.090
Description	This IRC is located approximately 10 feet south of the beach access walkway landing at 837 Lighthouse Drive in Corolla, North Carolina.



Monument: SHIP IRC

Mean of Inverse Shots - Published Versus APTIM Found				
Monument	No. of Shots	ΔN	ΔE	ΔZ
SHIP IRC	18	0.09	0.02	-0.06

CURRITUCK STATION INFORMATION			
MAY 2022			
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			
MAY 2022			
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
C-058	978364.04	2932766.06	75
C-059	977523.89	2933022.92	75
C-060	976430.49	2933302.09	77

CURRITUCK STATION INFORMATION			
MAY 2022			
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			
MAY 2022			
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

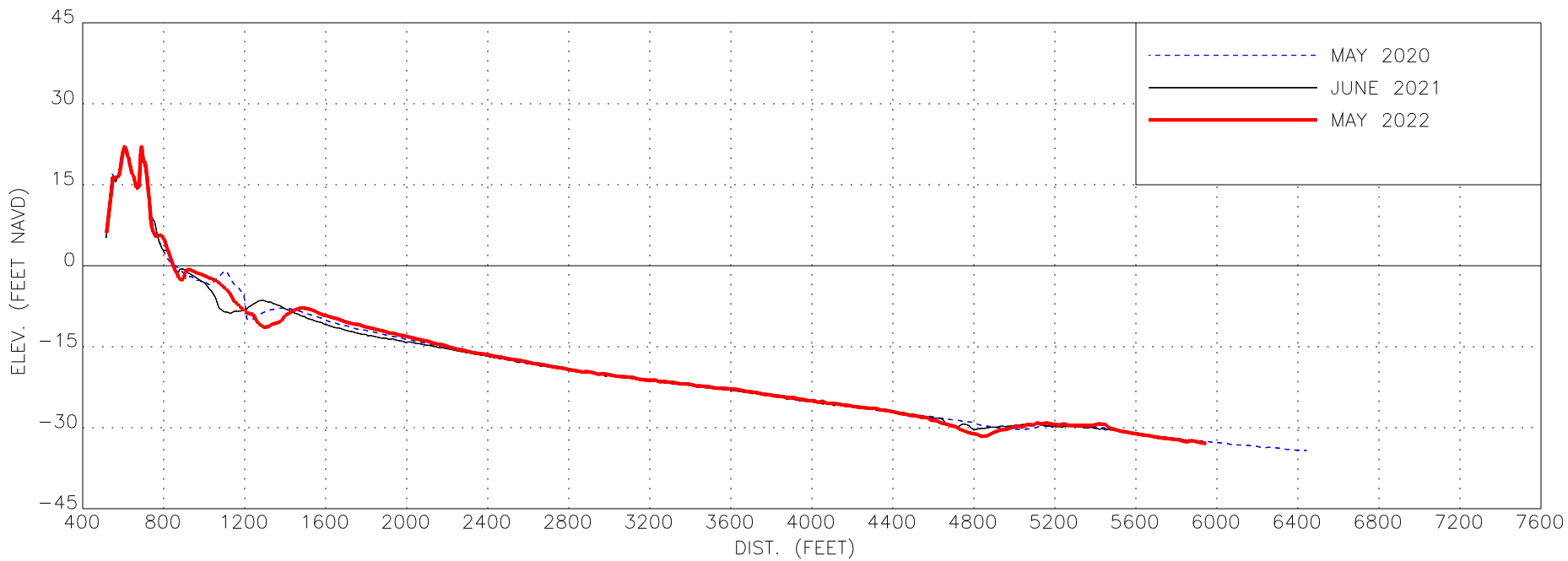
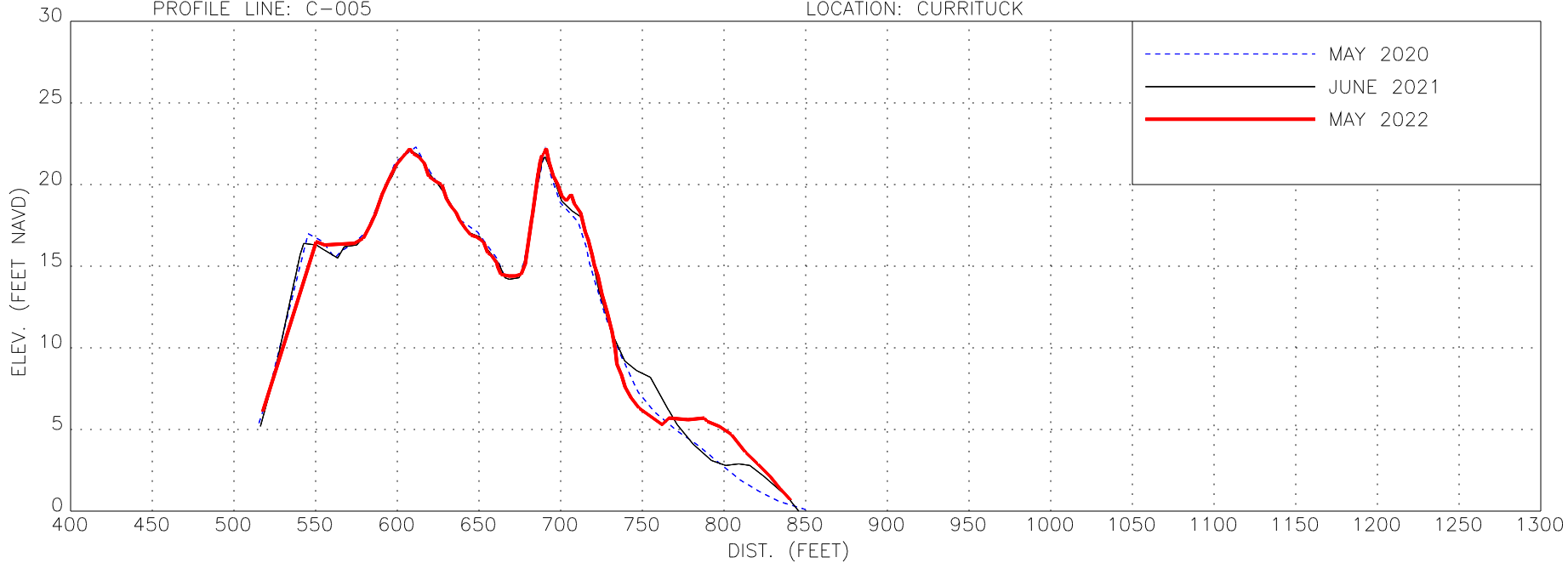
APPENDIX 2: Profile XYZ Data

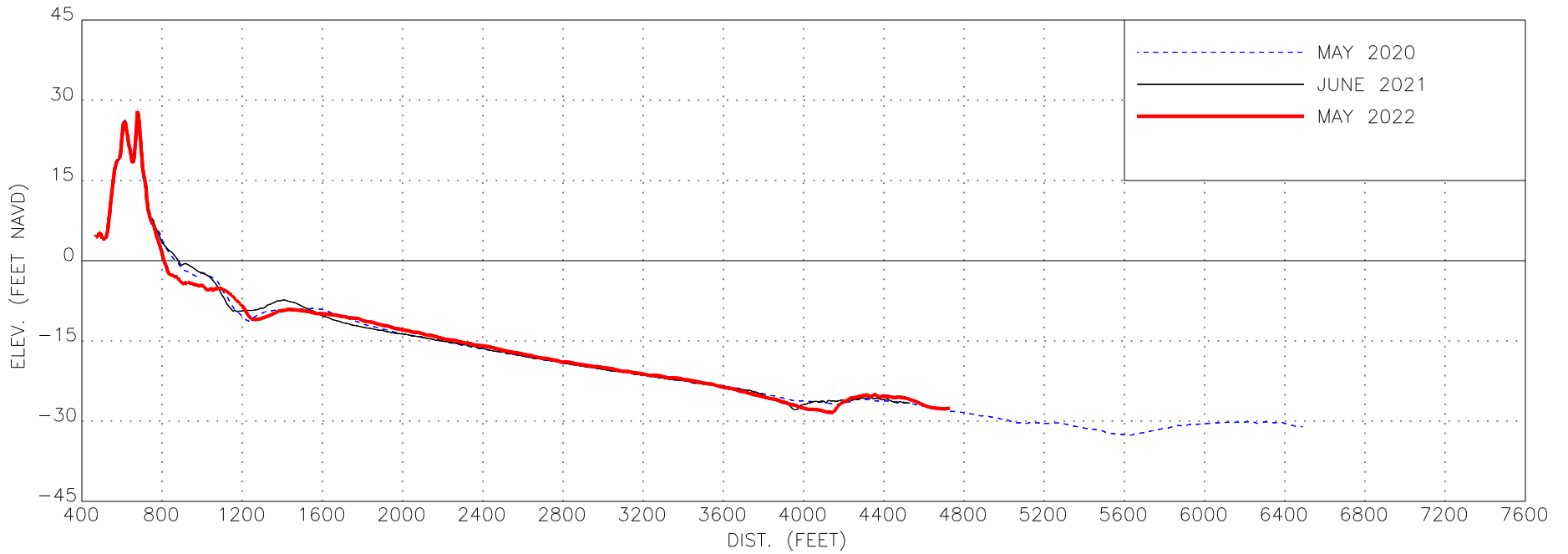
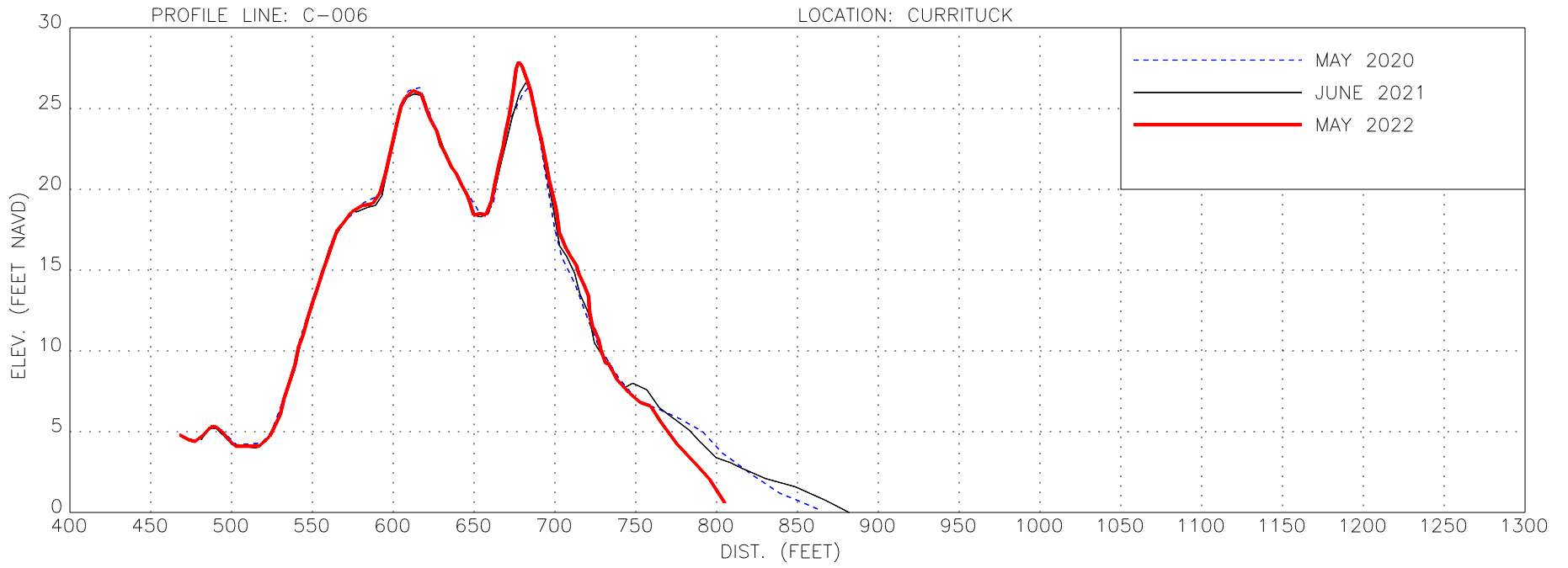
PROFILE XYZ DATA
(Available in digital format only)

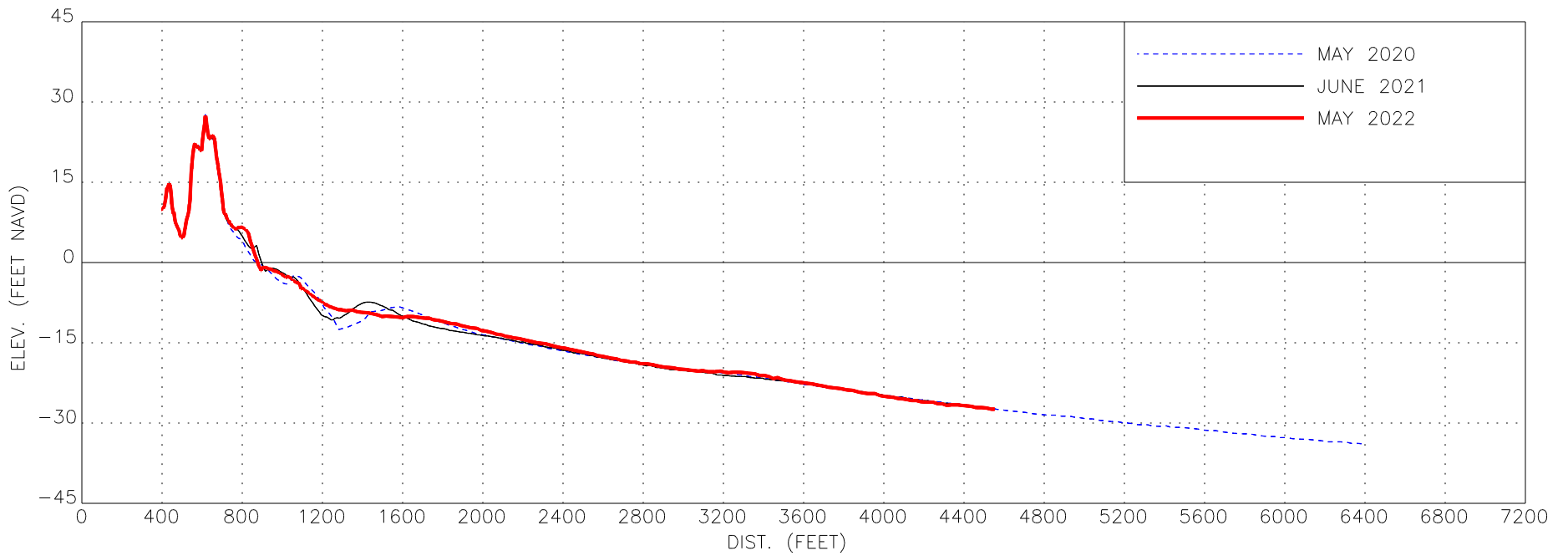
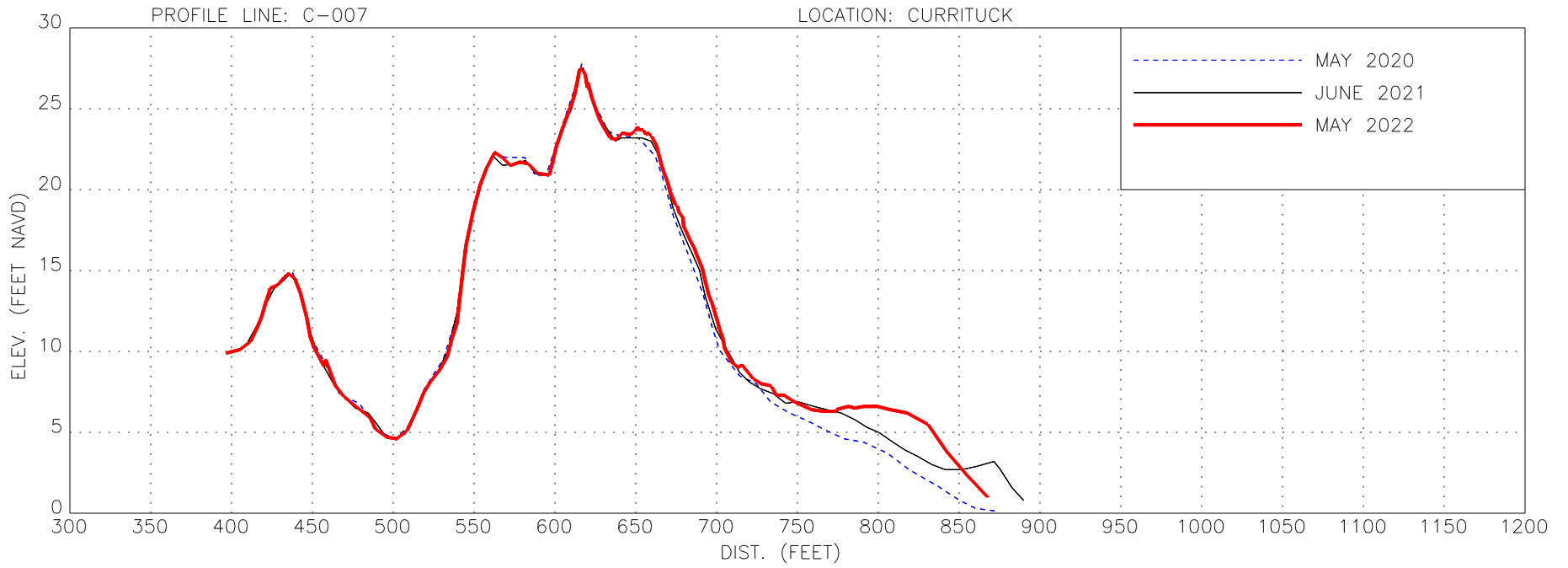
APPENDIX 3
PROFILE PLOTS

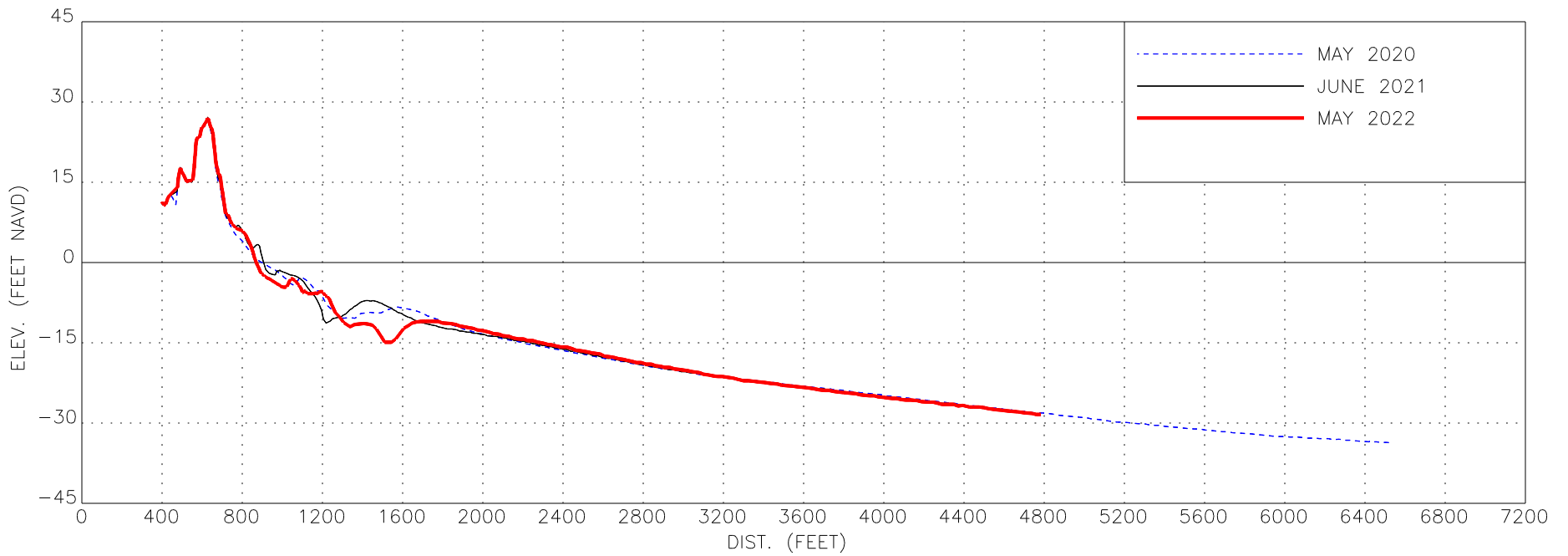
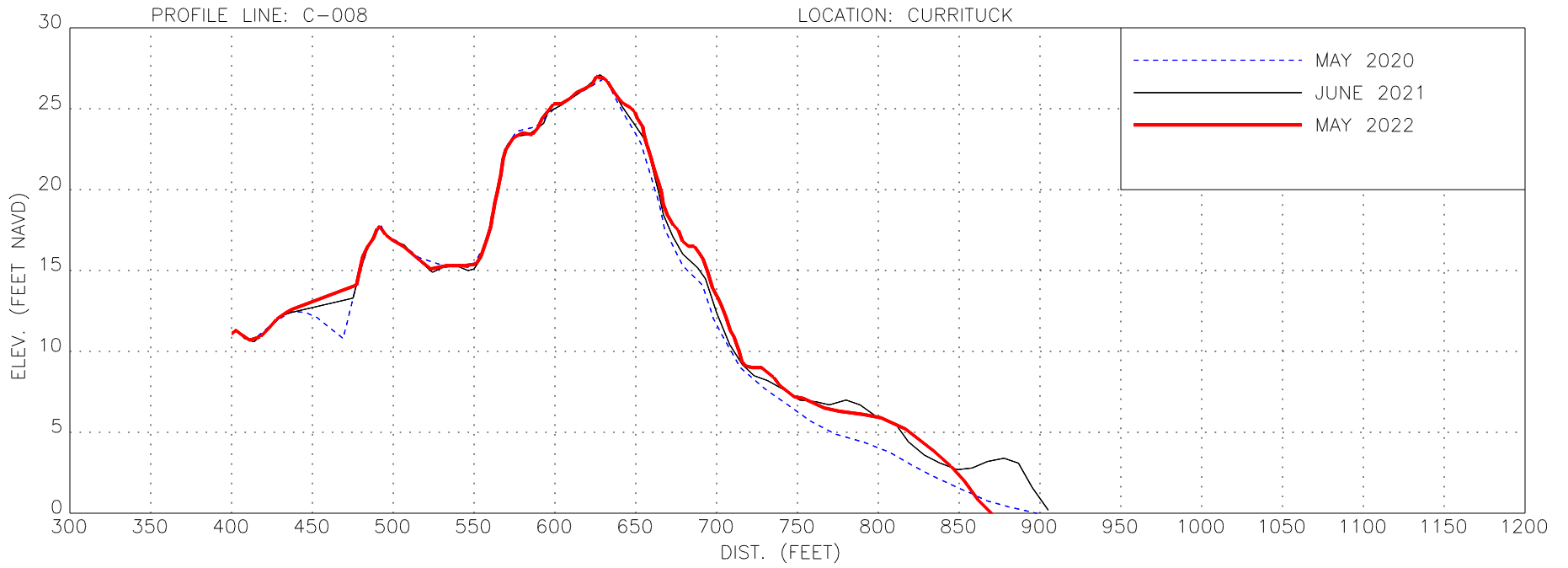
PROFILE LINE: C-005

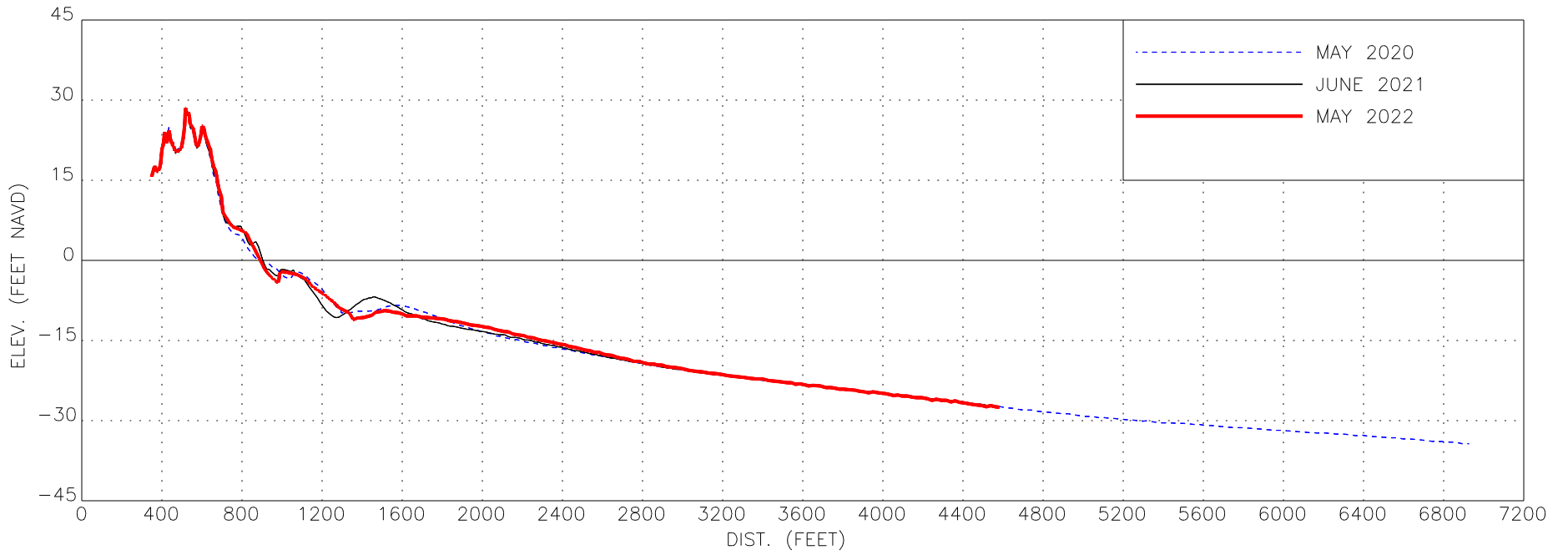
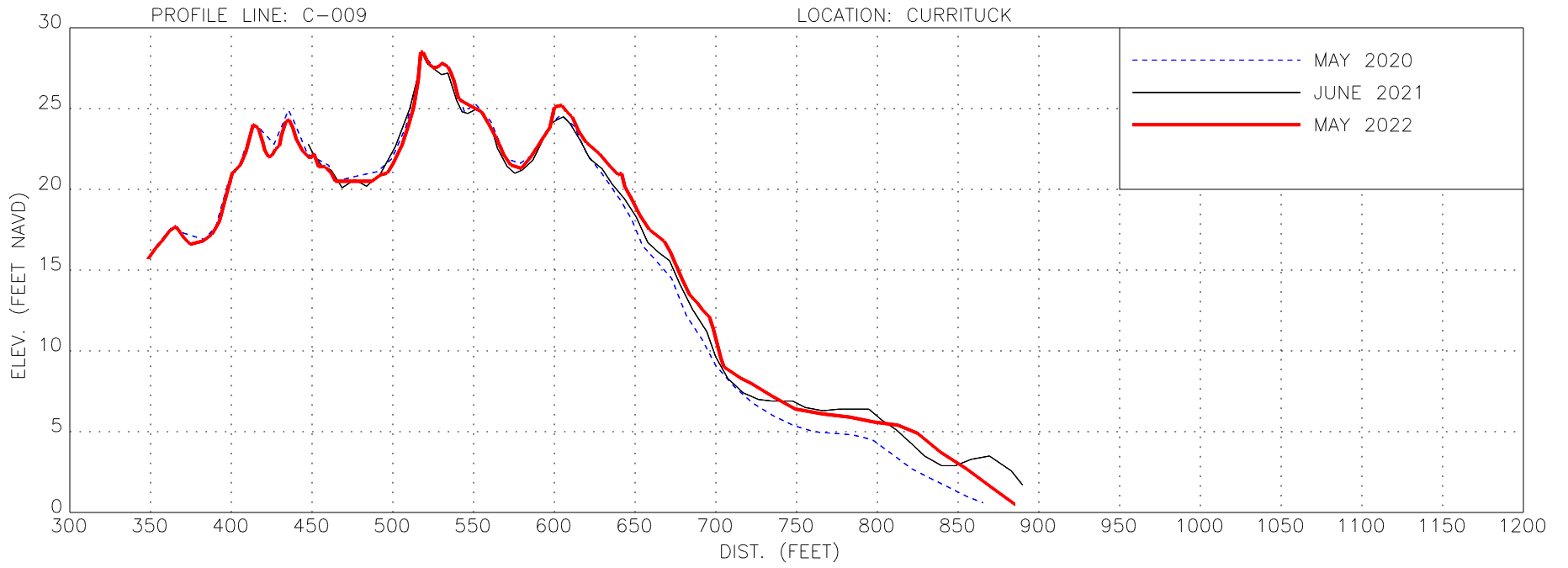
LOCATION: CURRITUCK

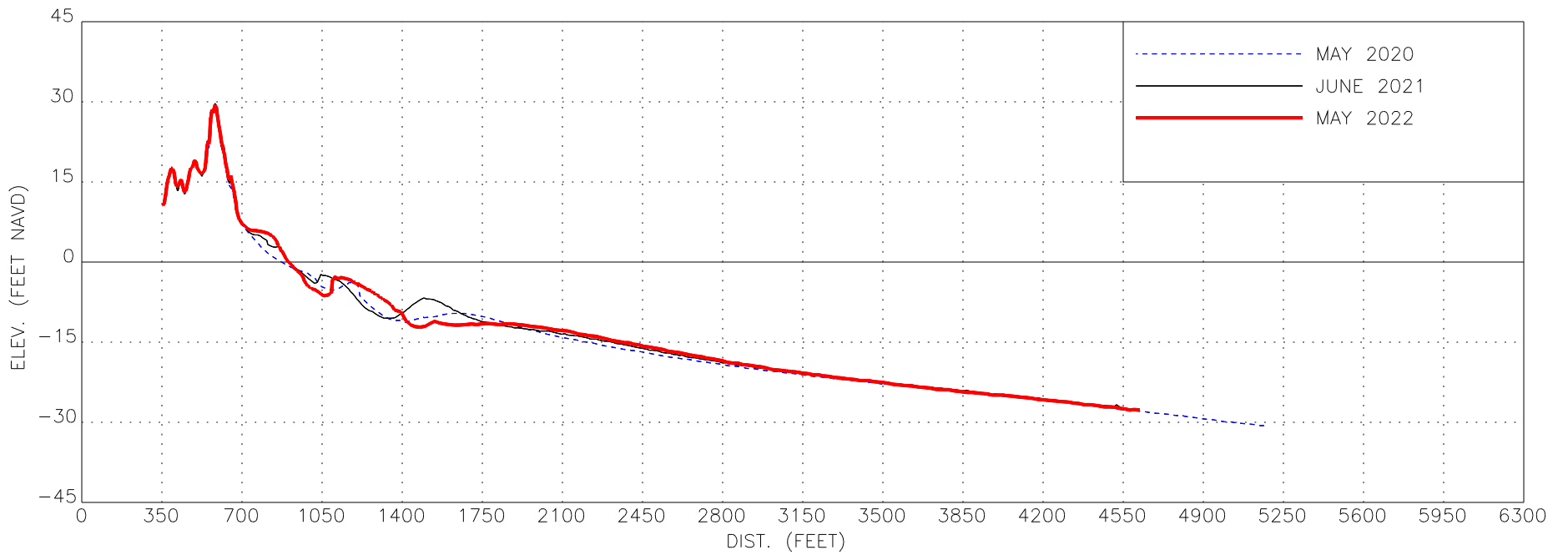
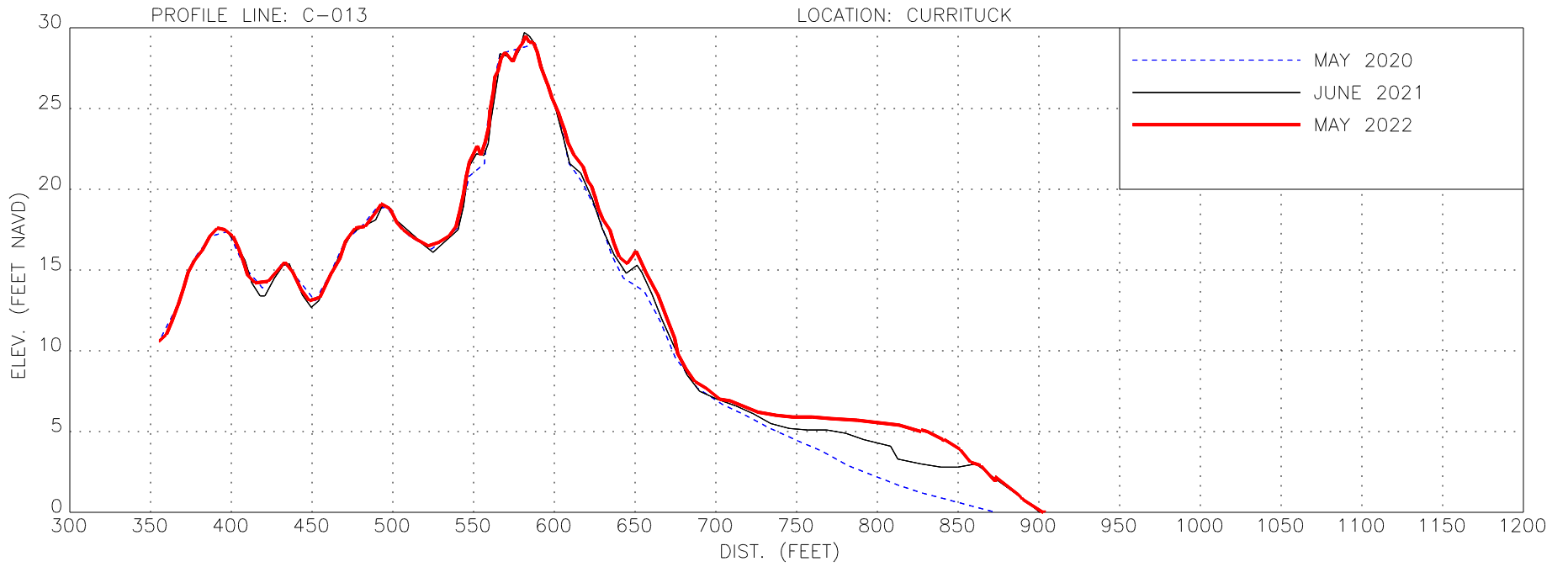


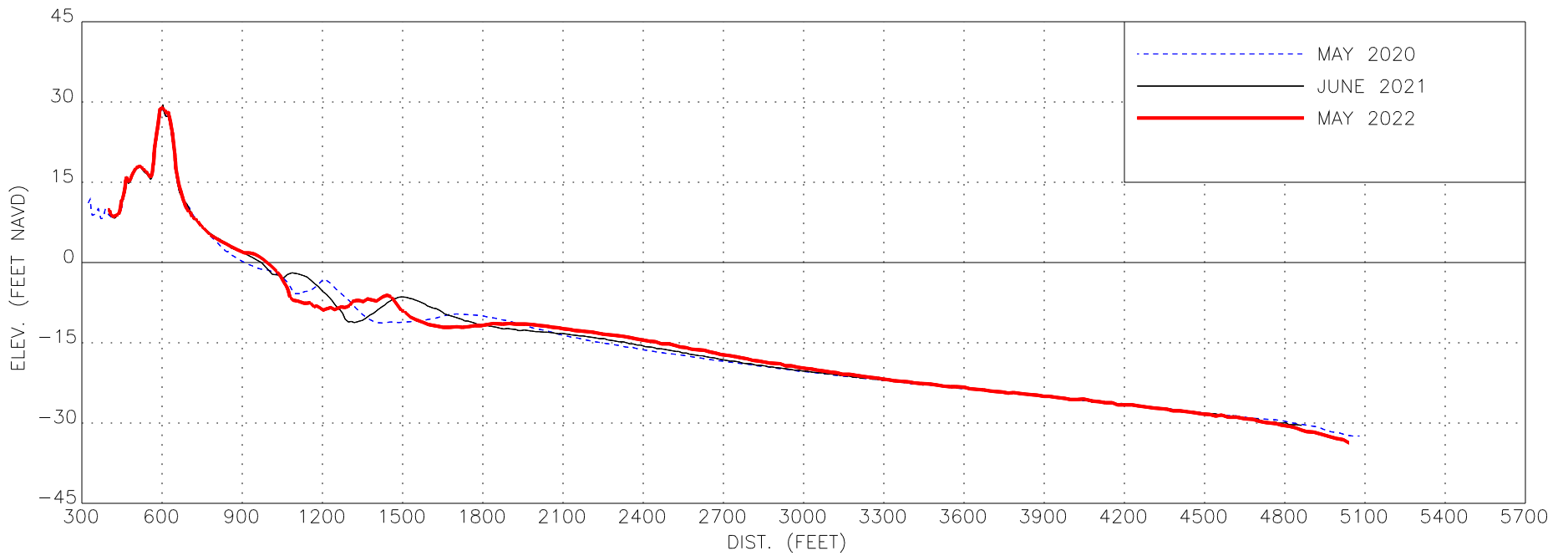
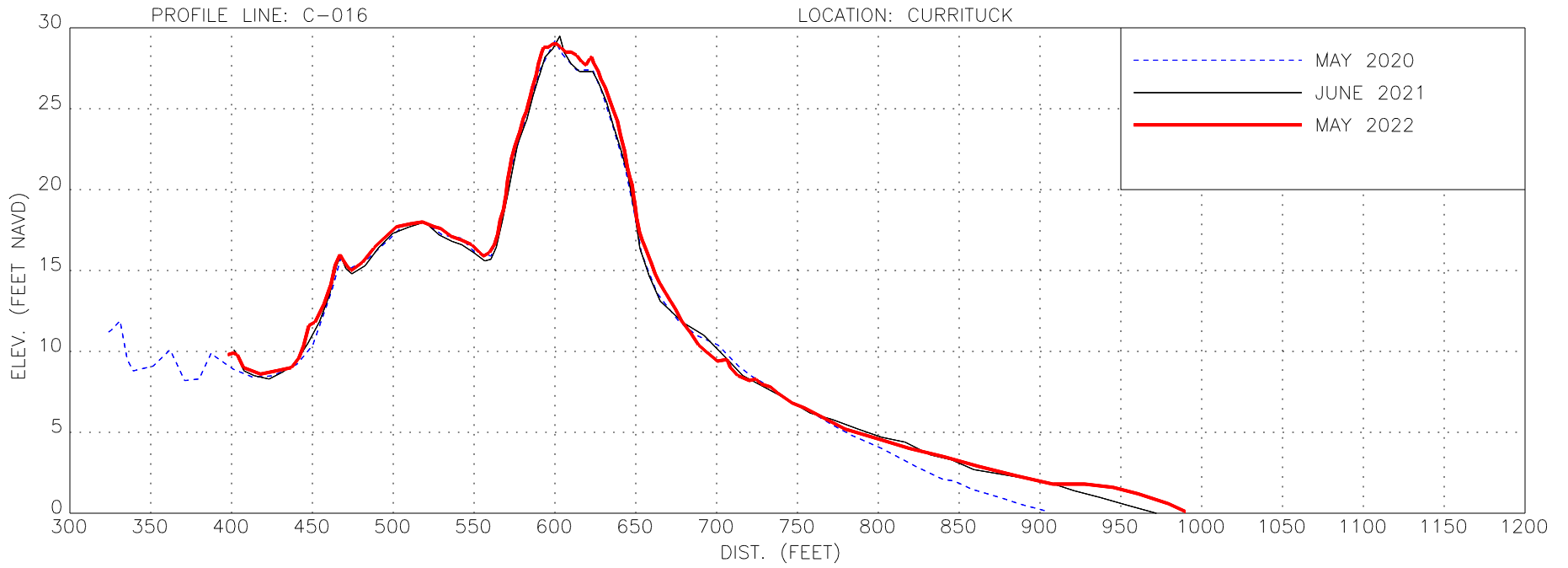


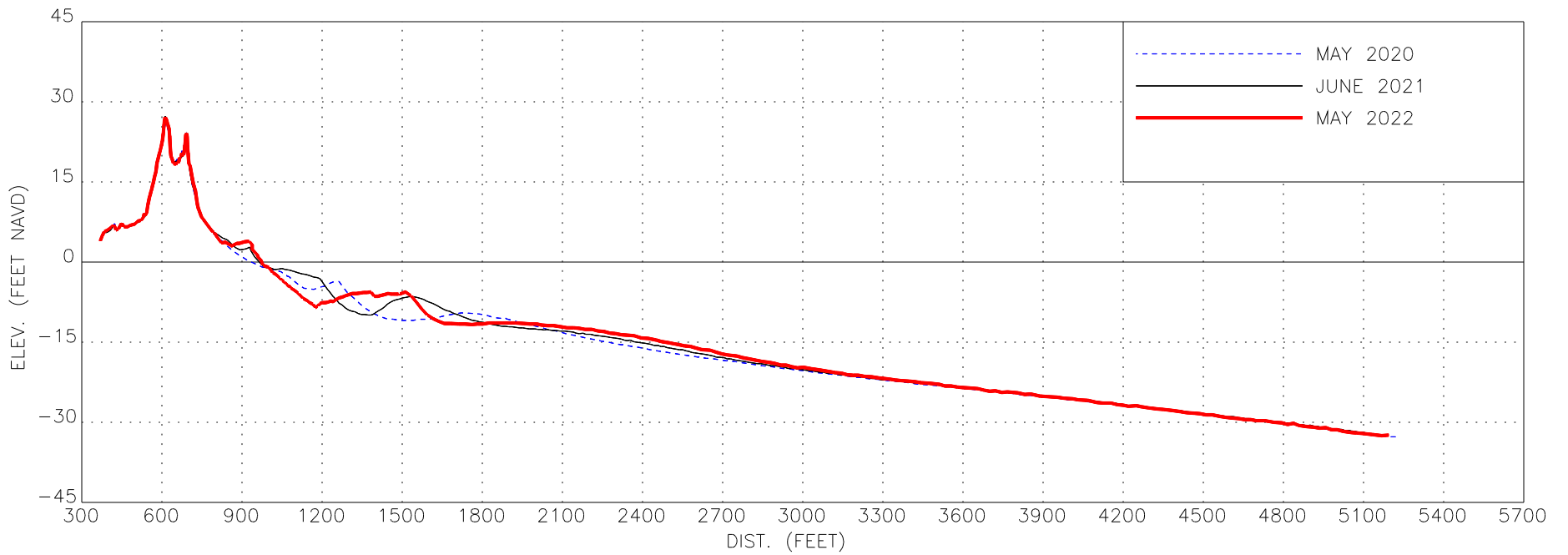
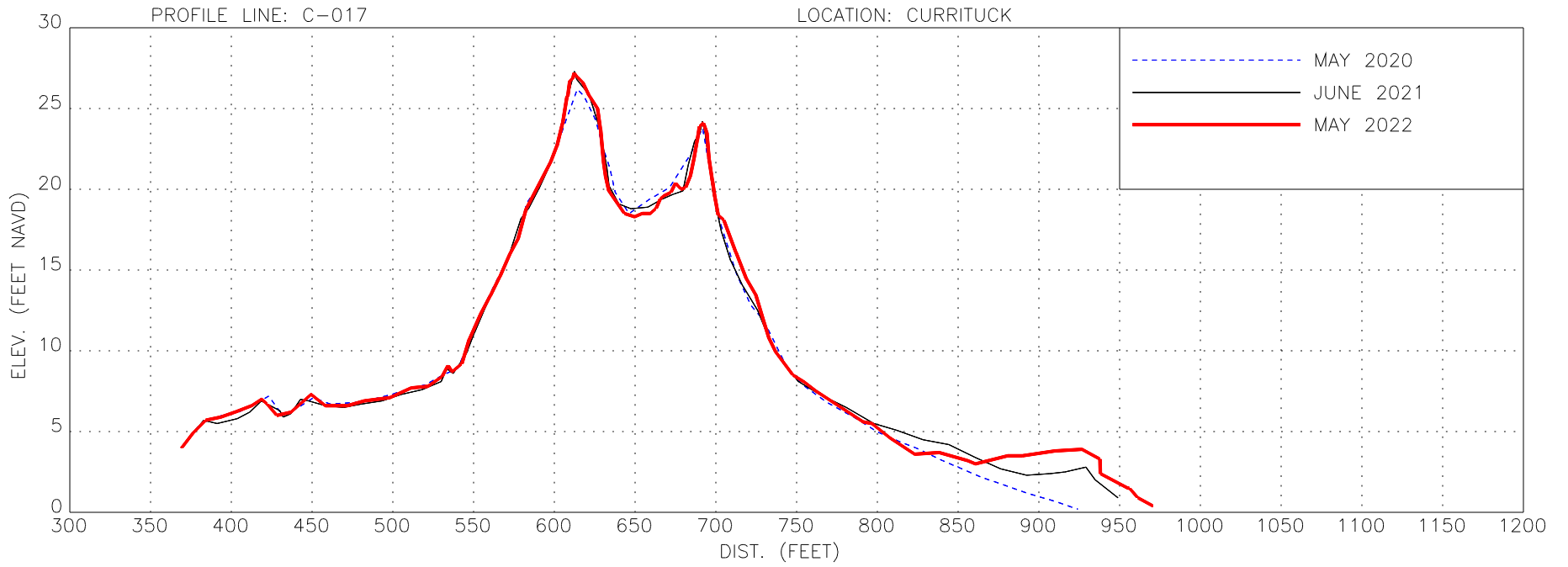


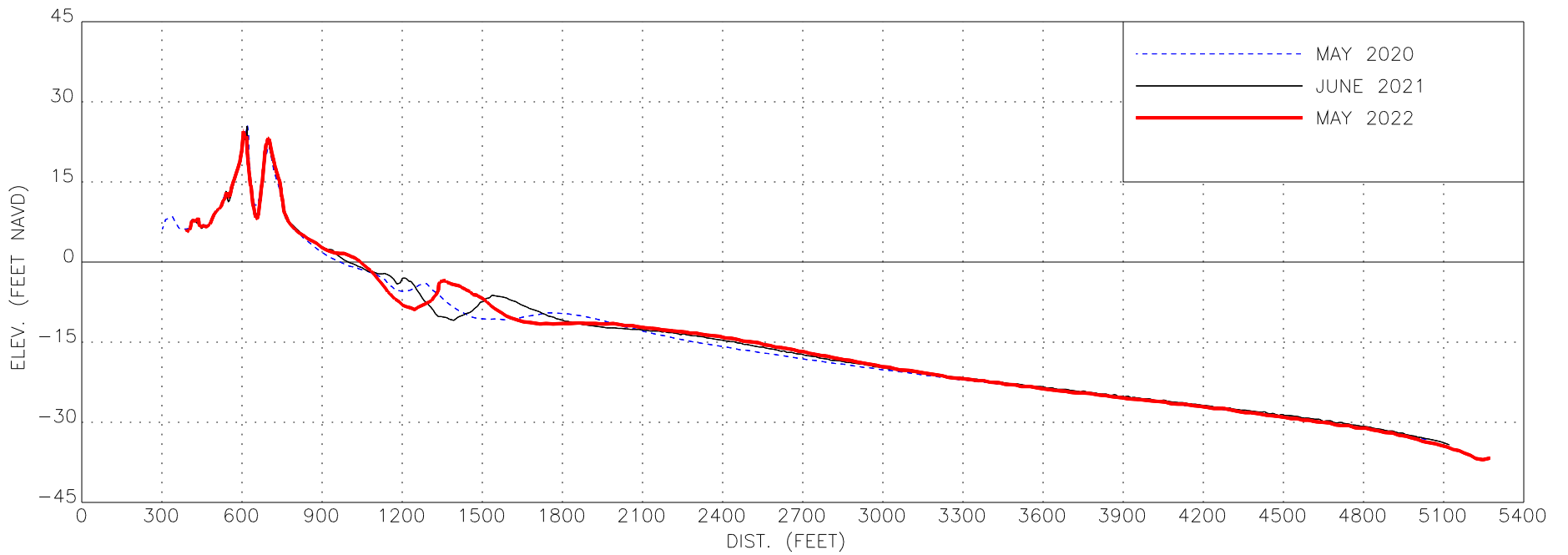
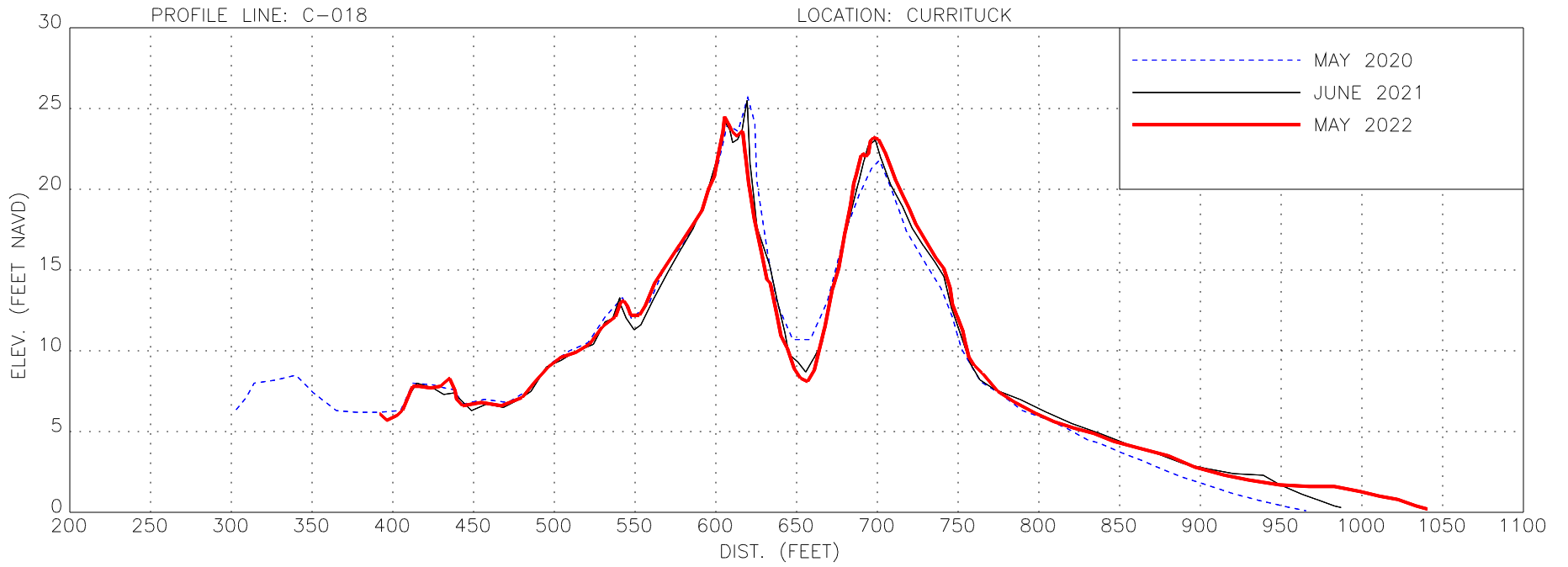


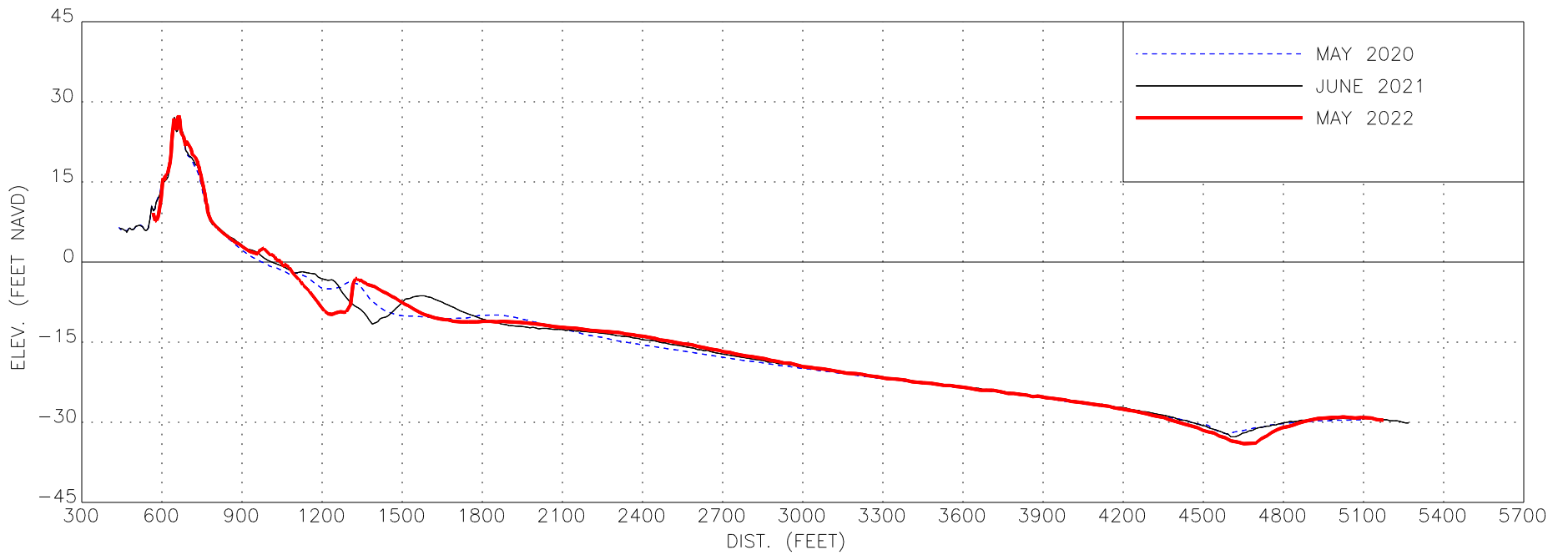
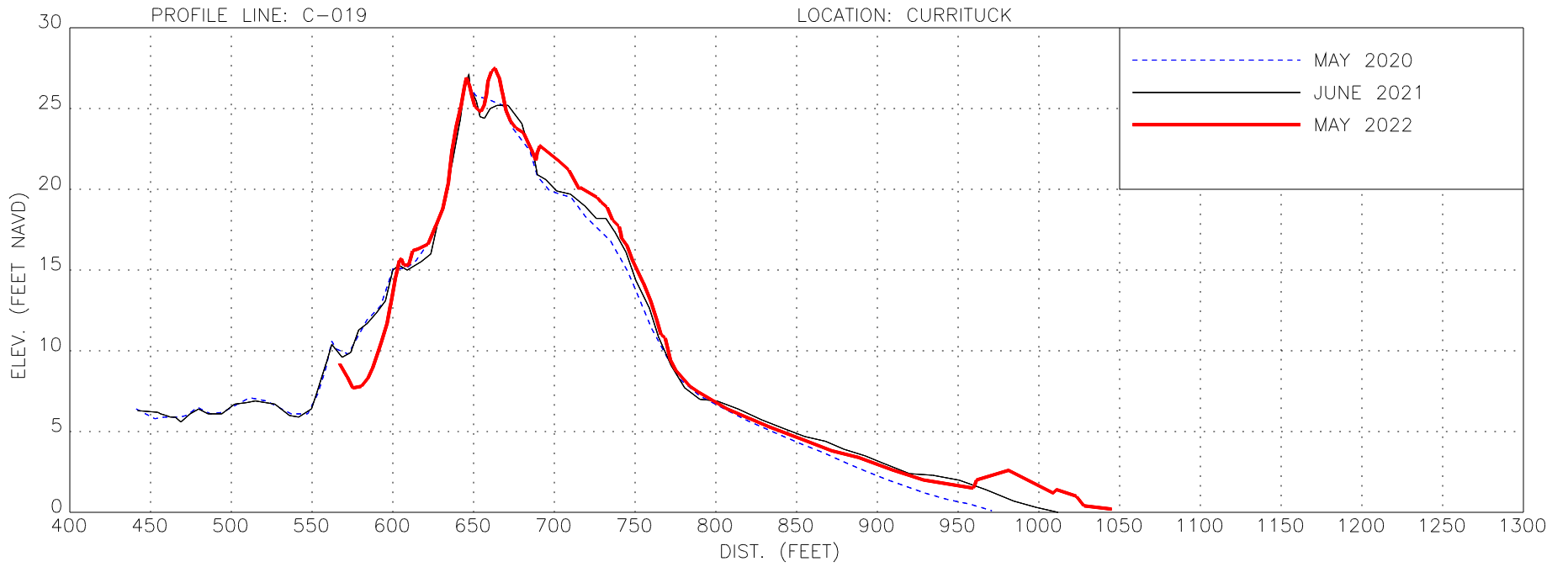


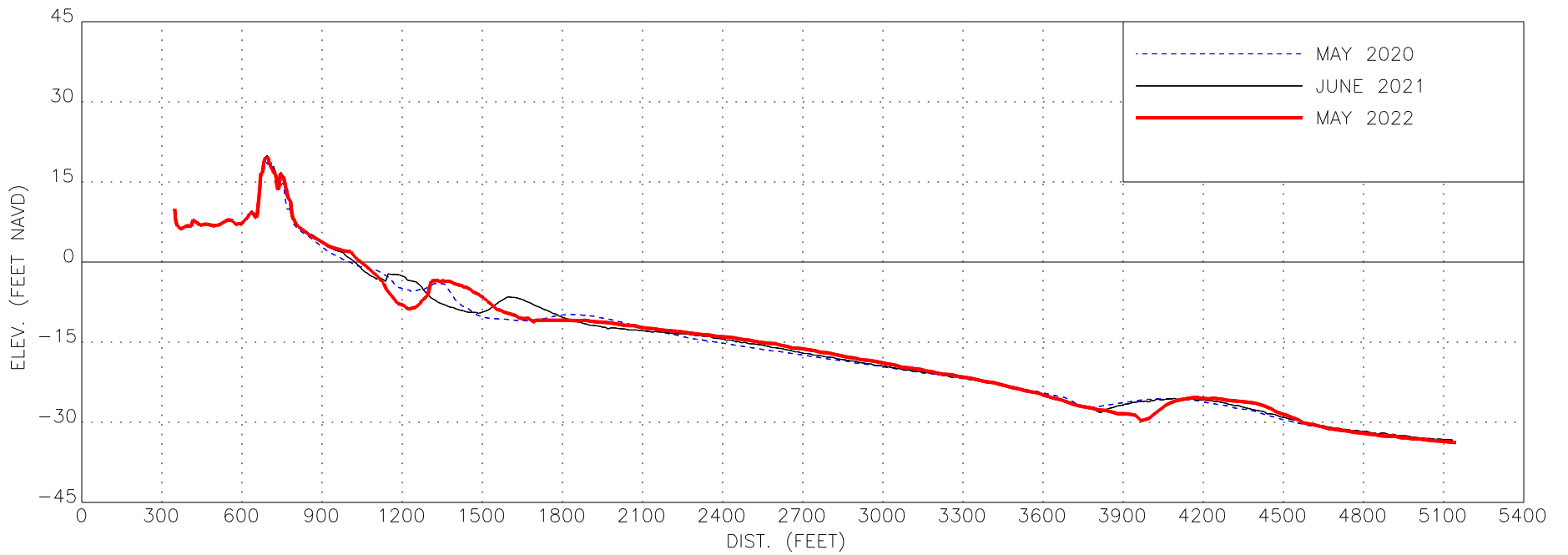
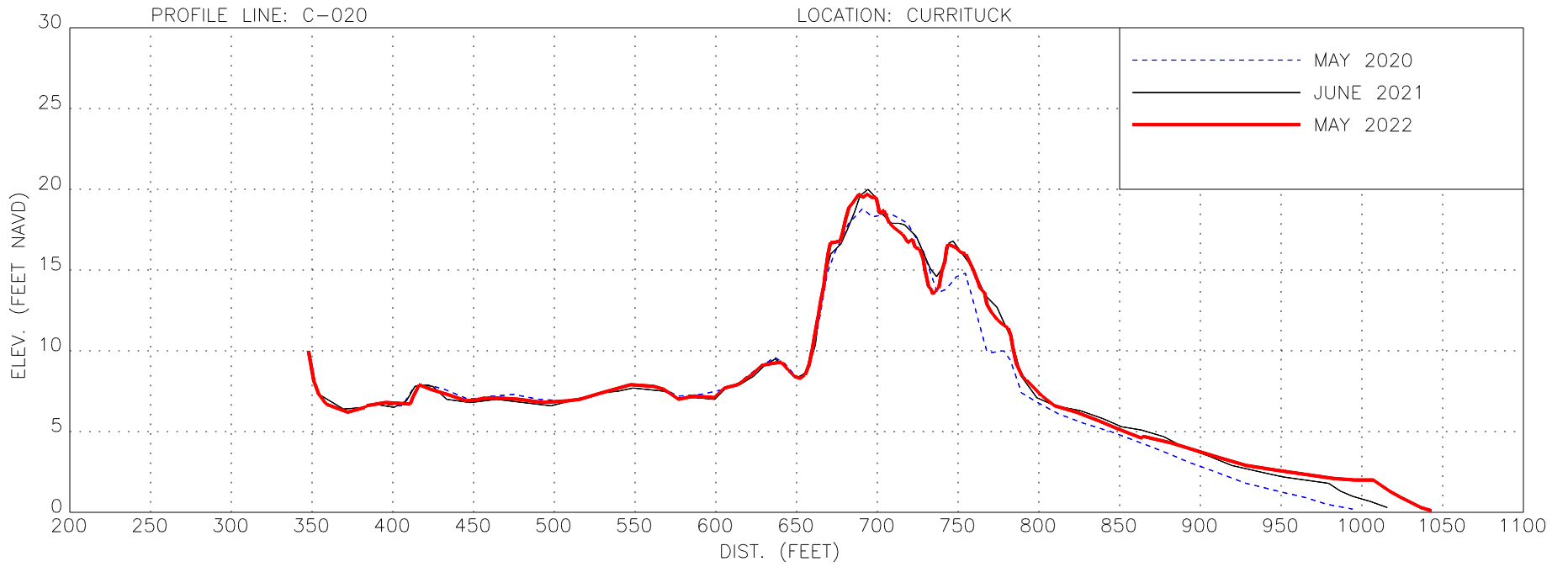


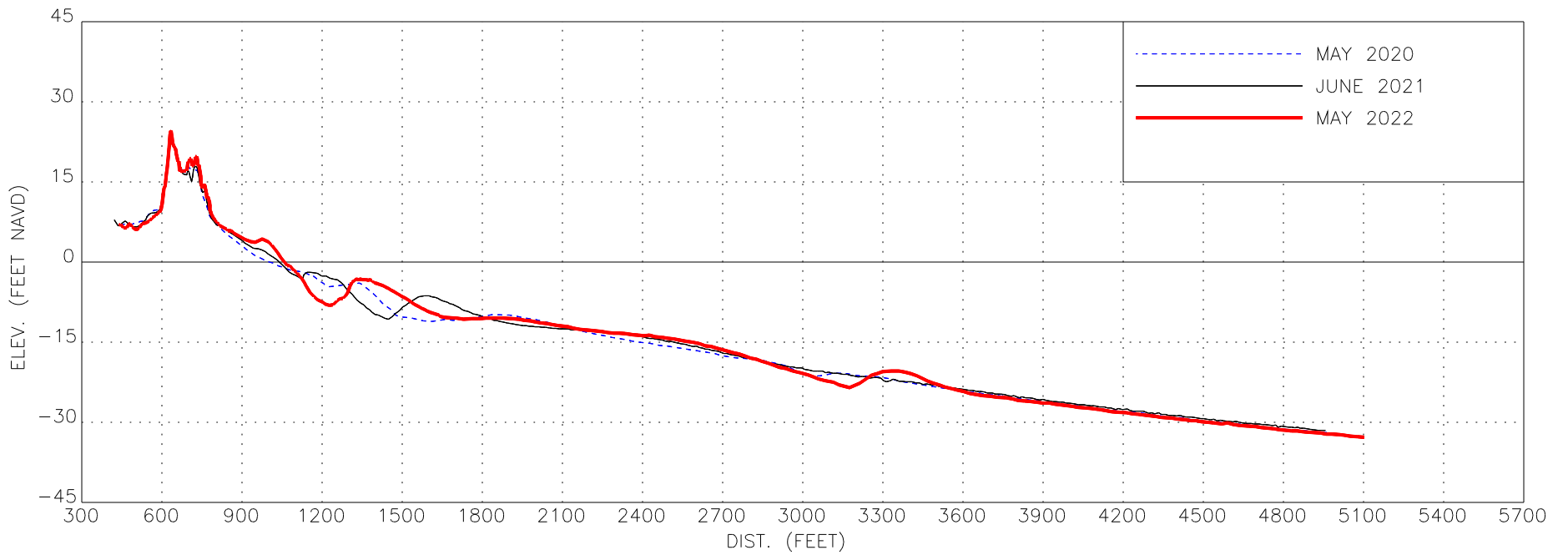
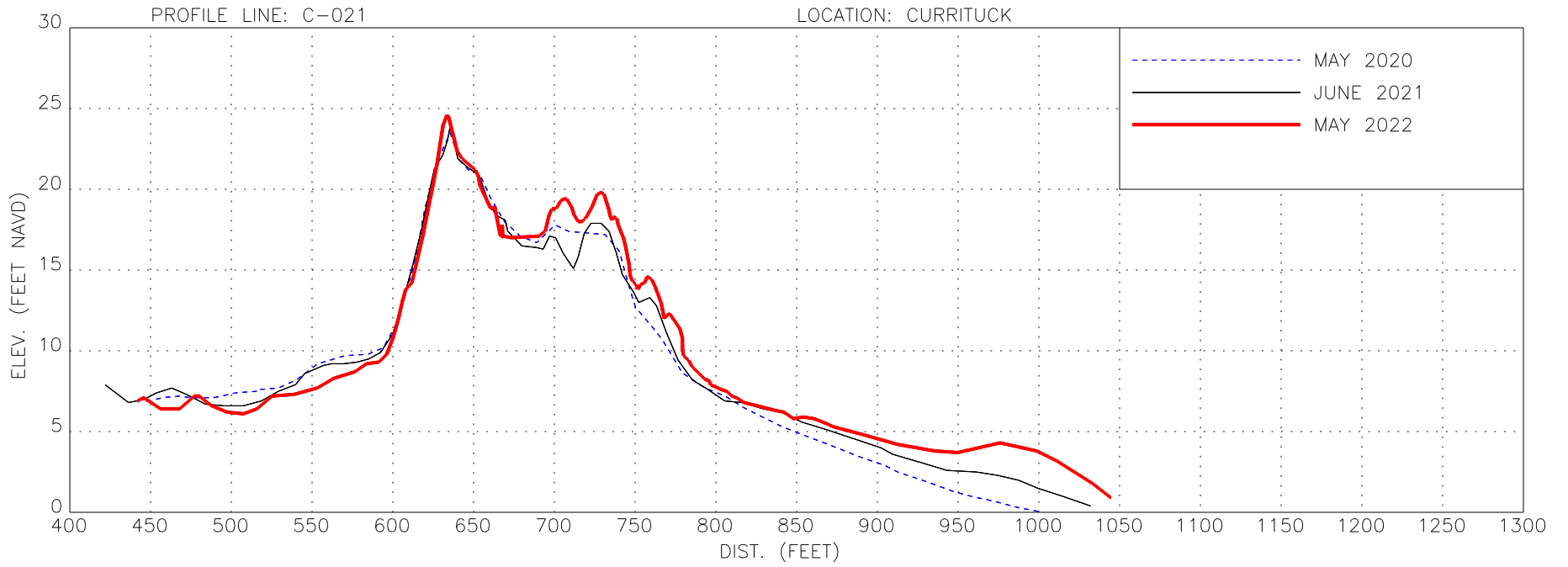


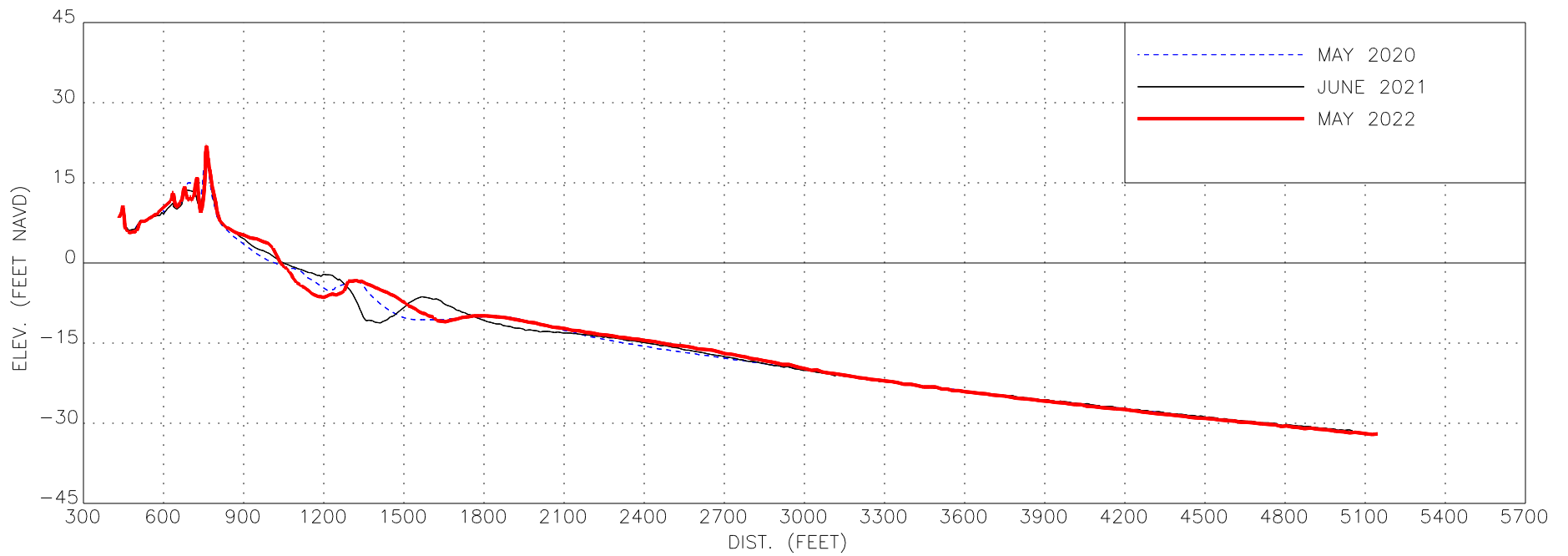
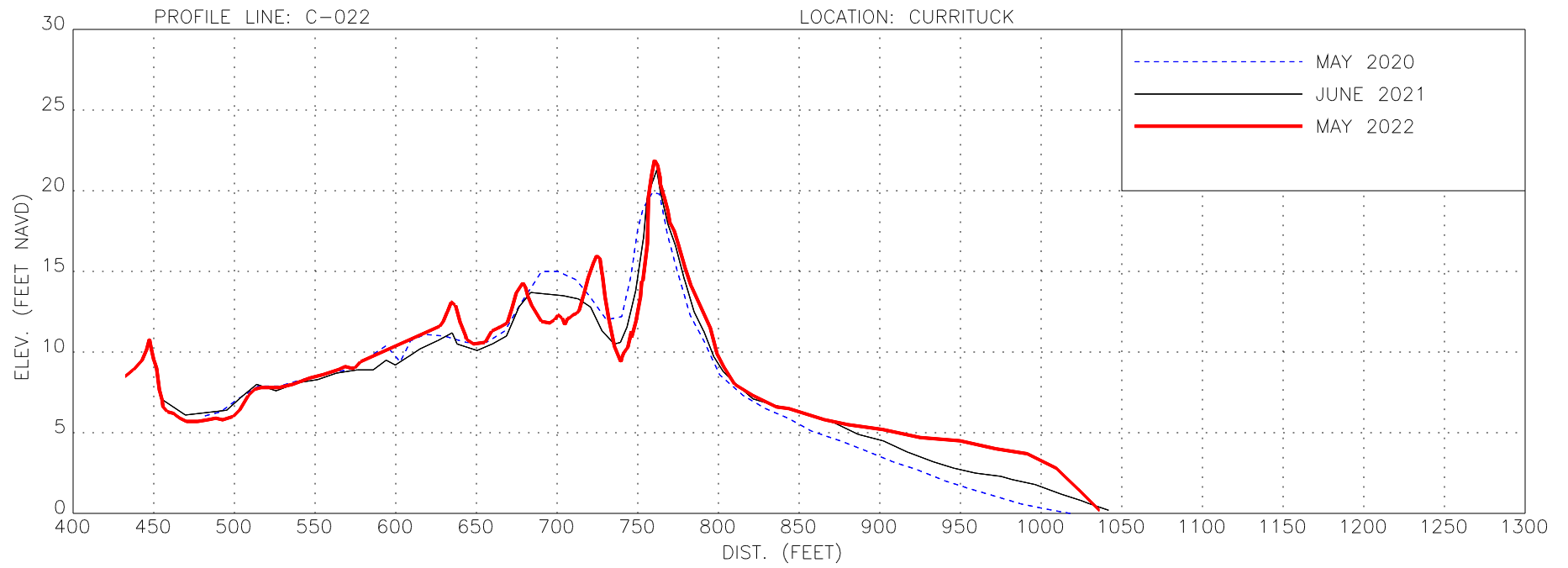


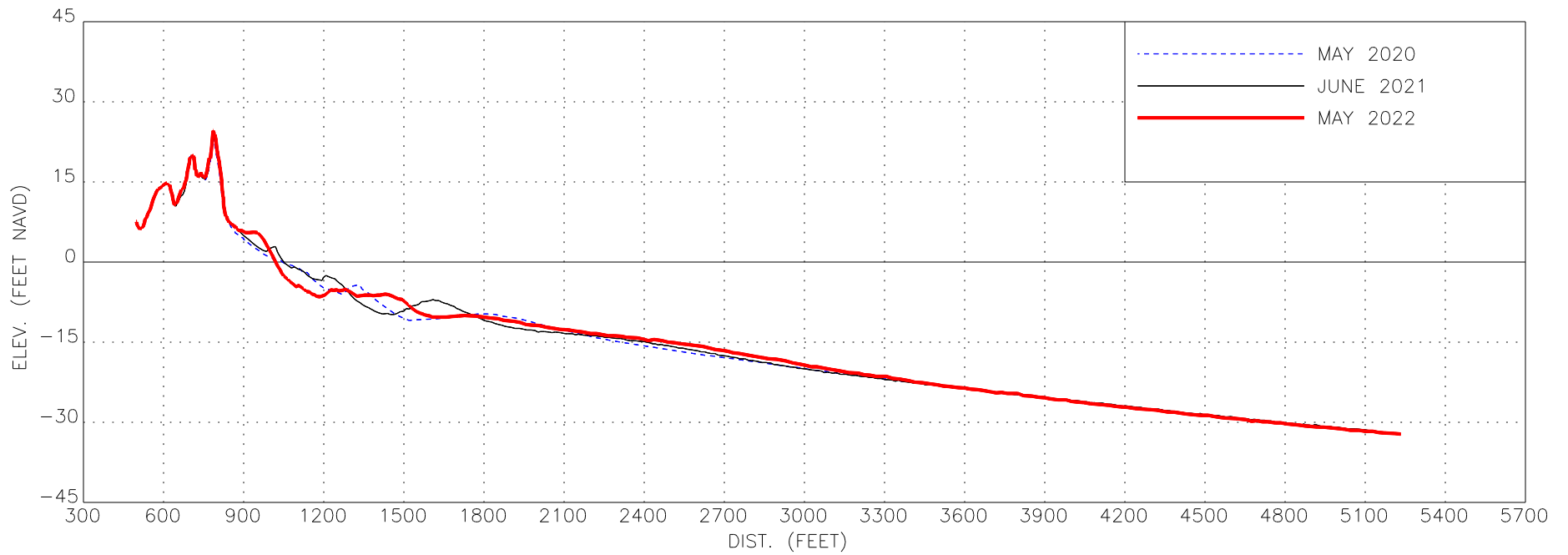
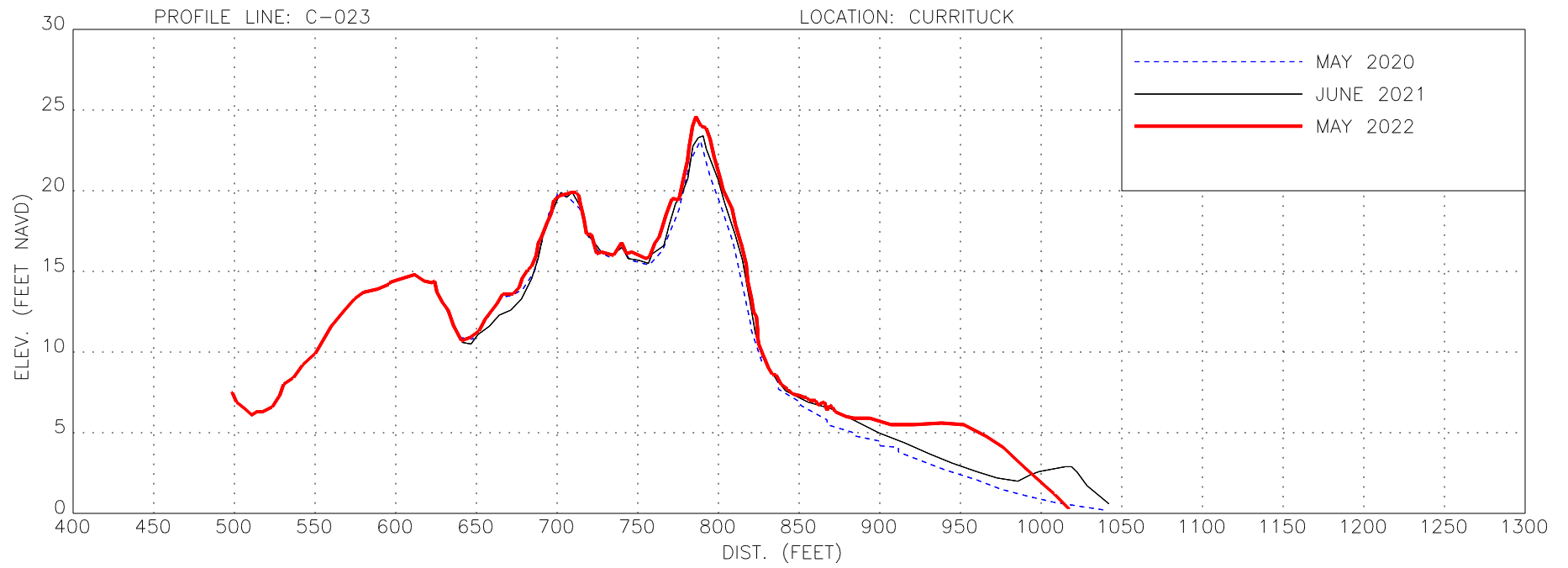


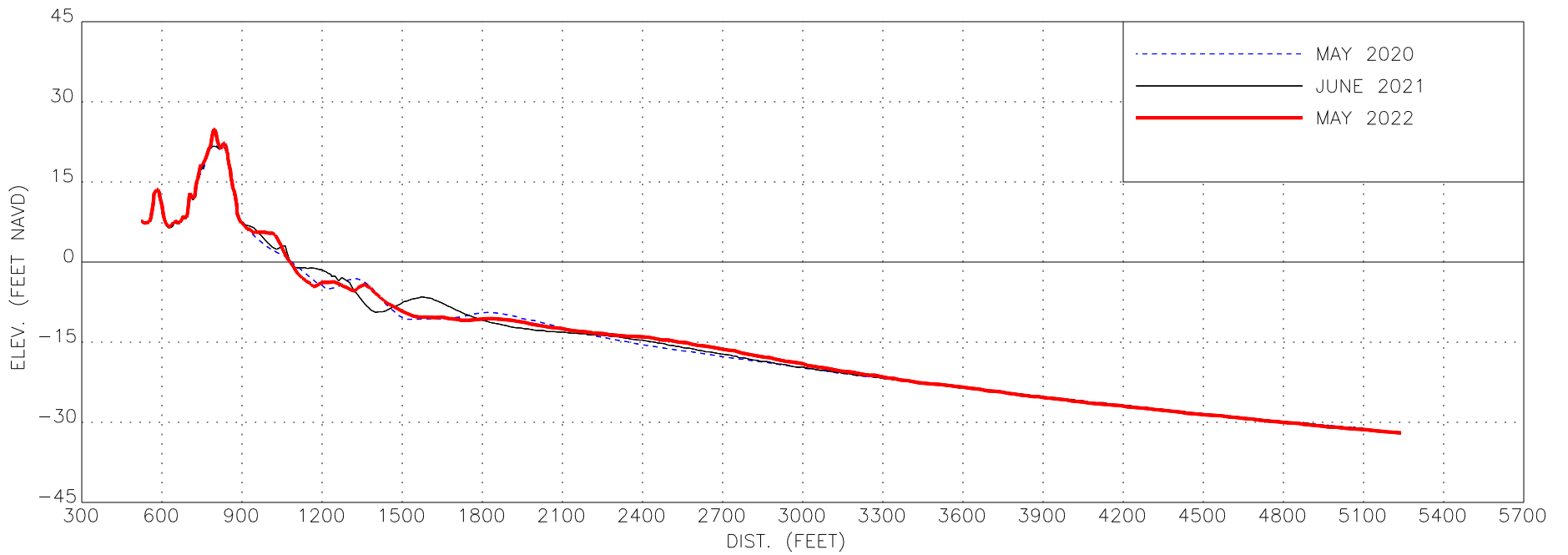
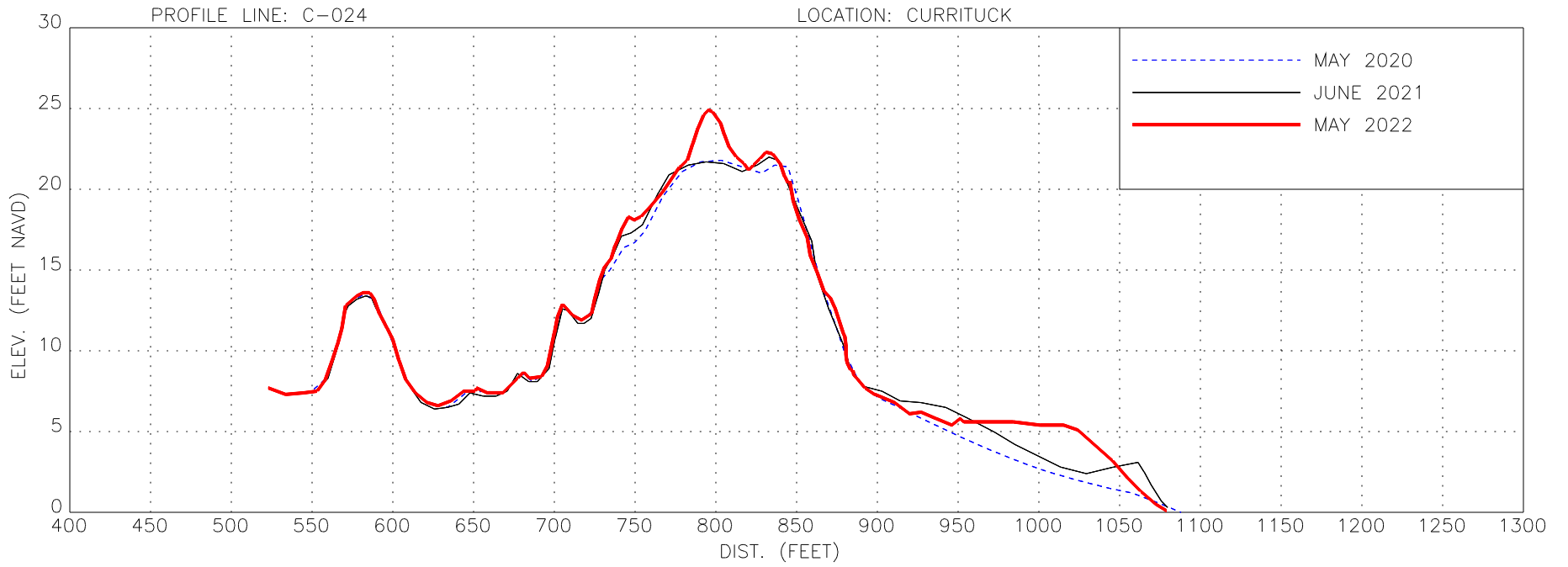


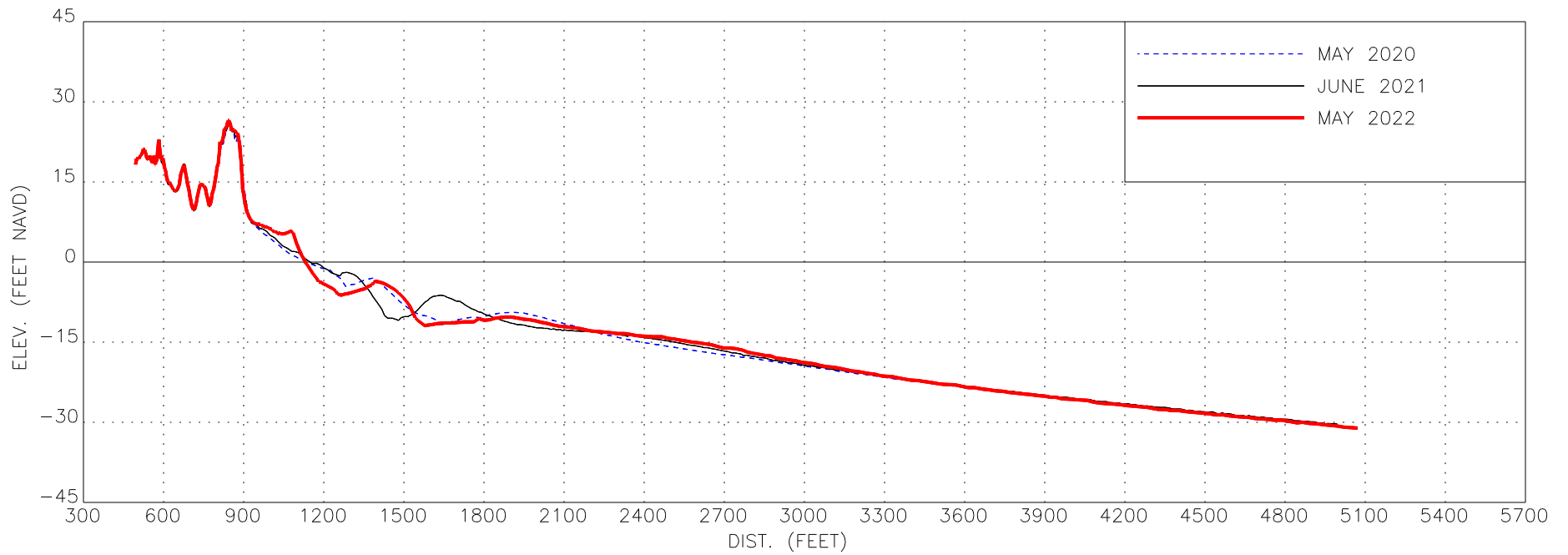
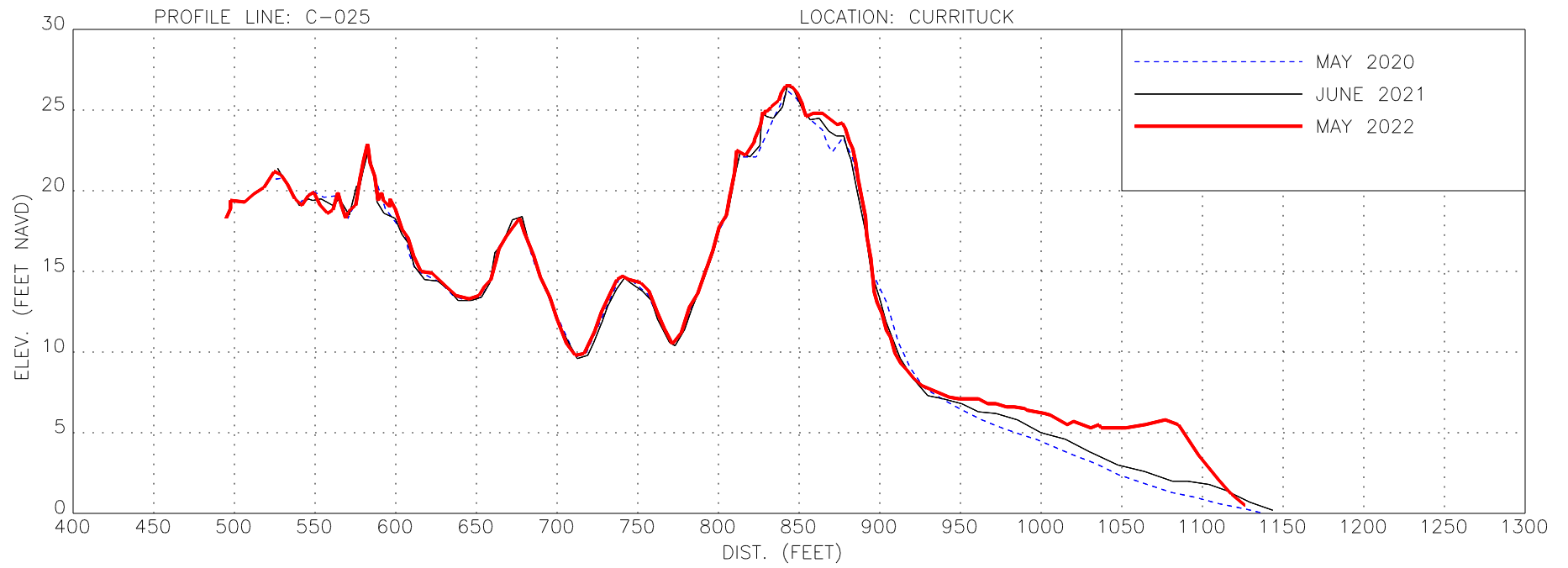






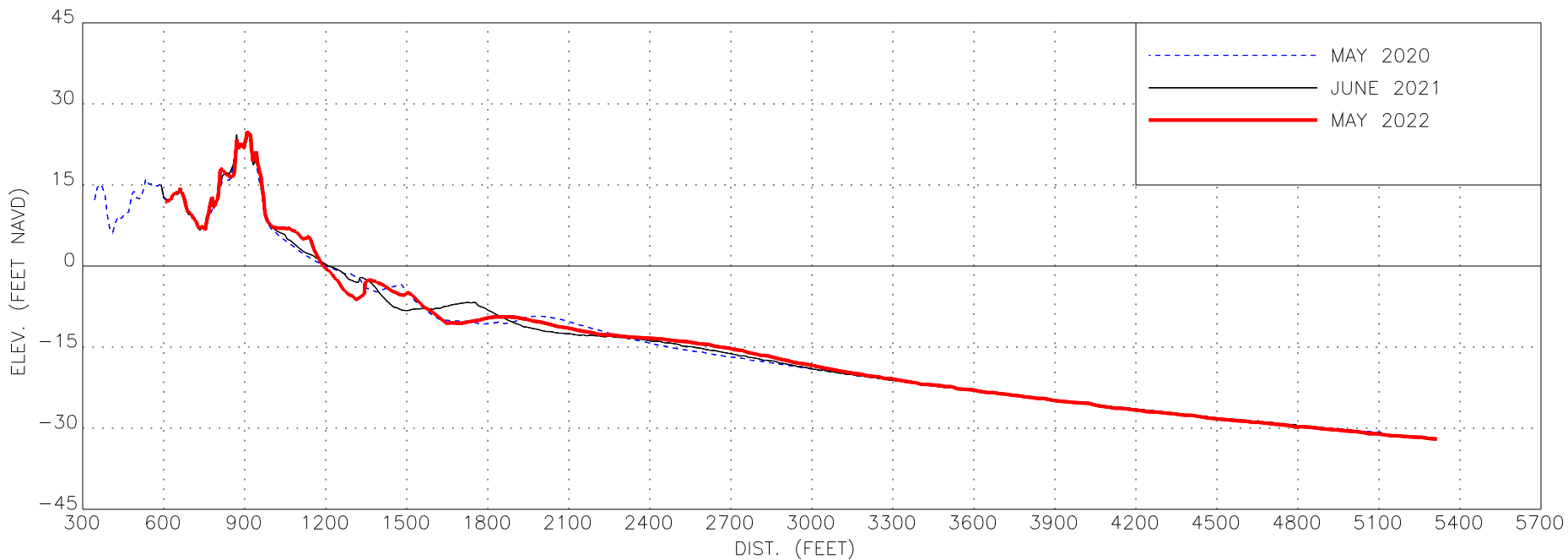
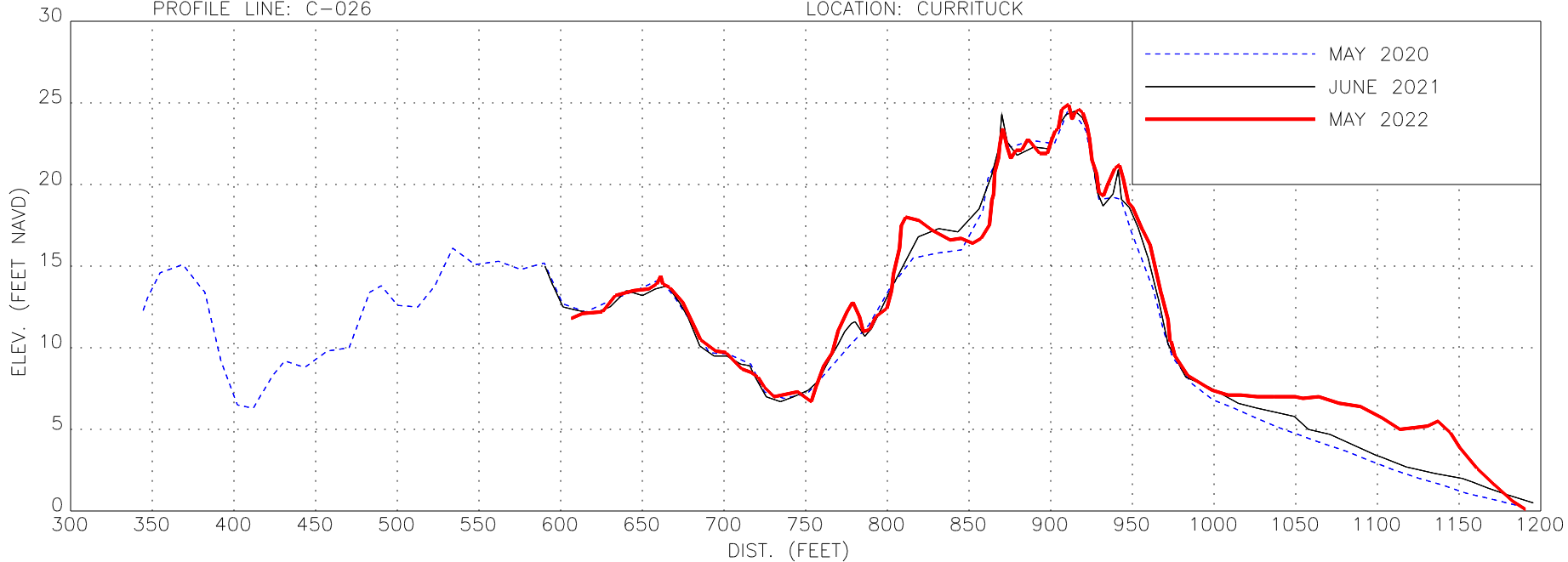


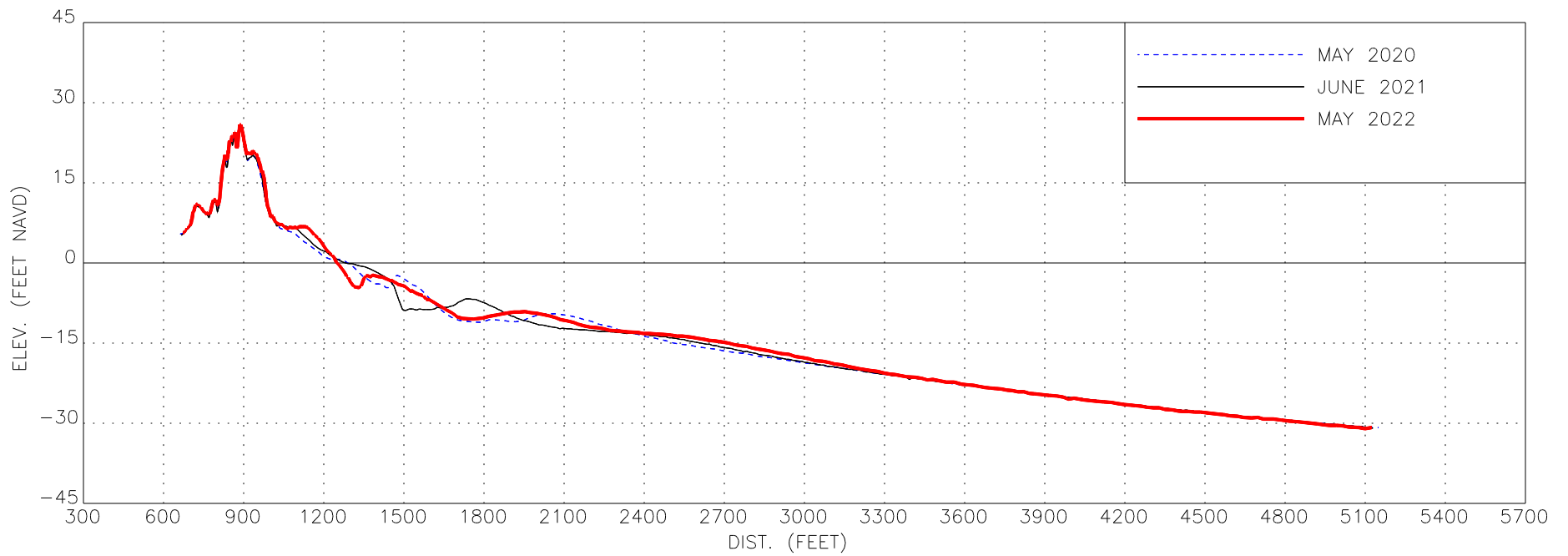
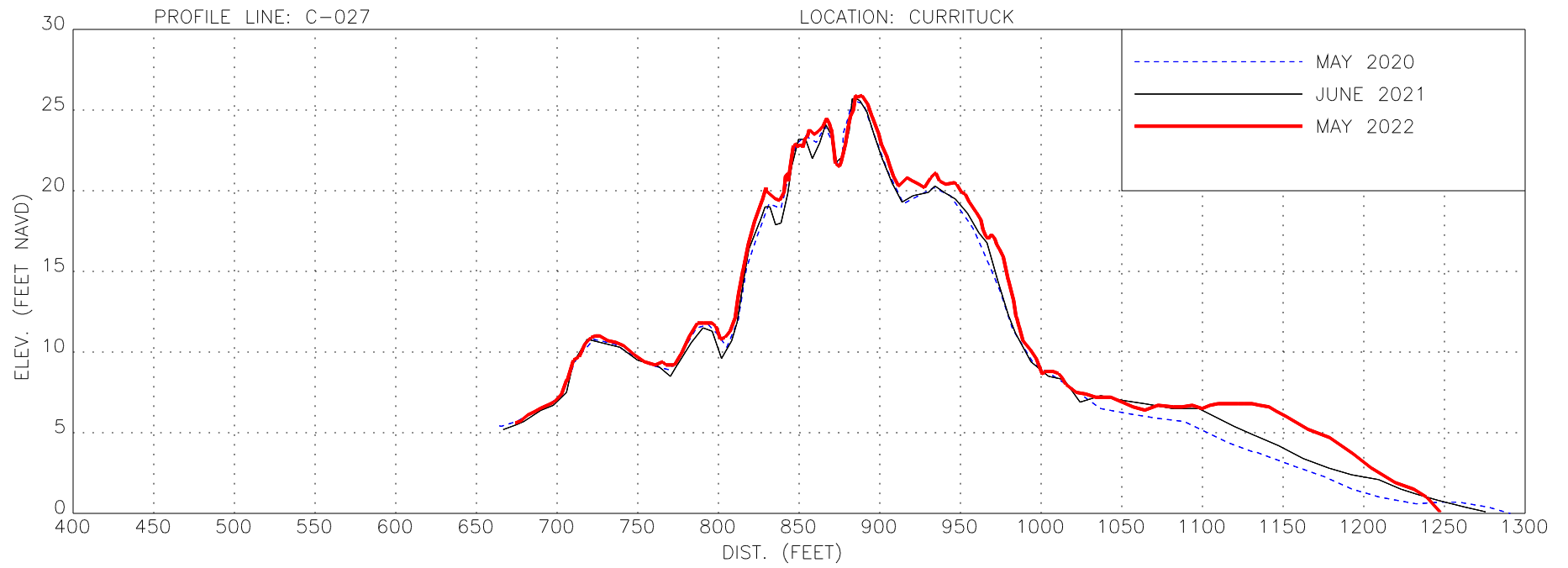


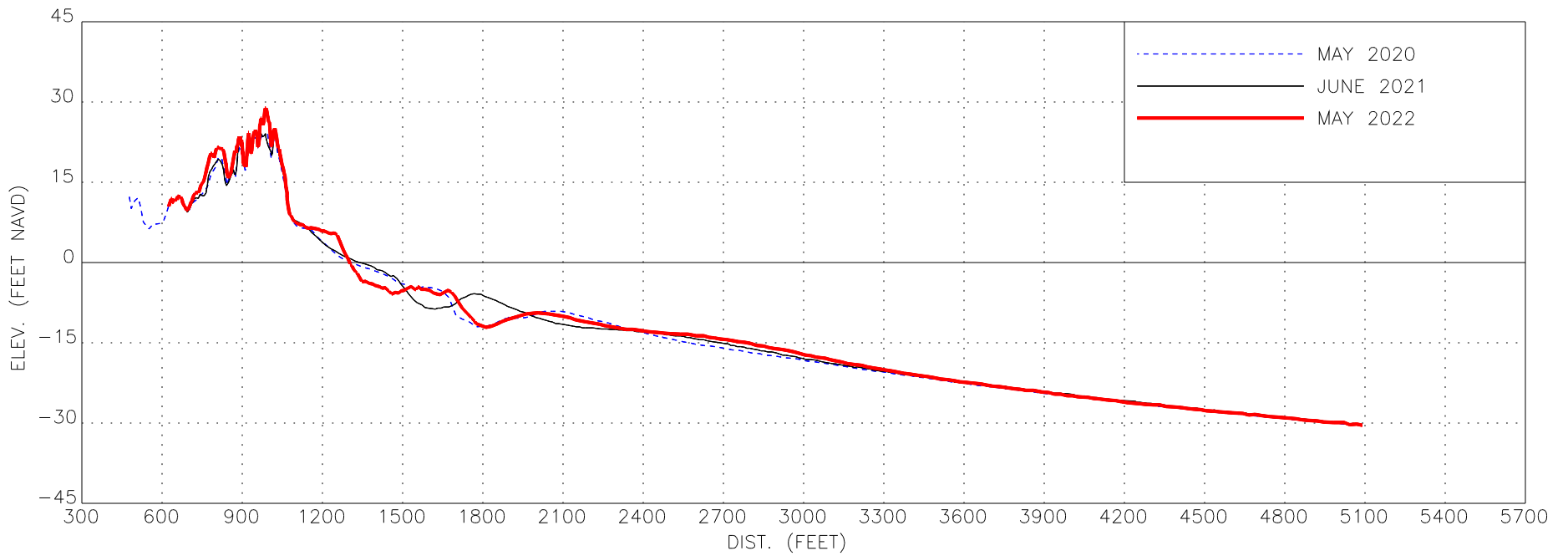
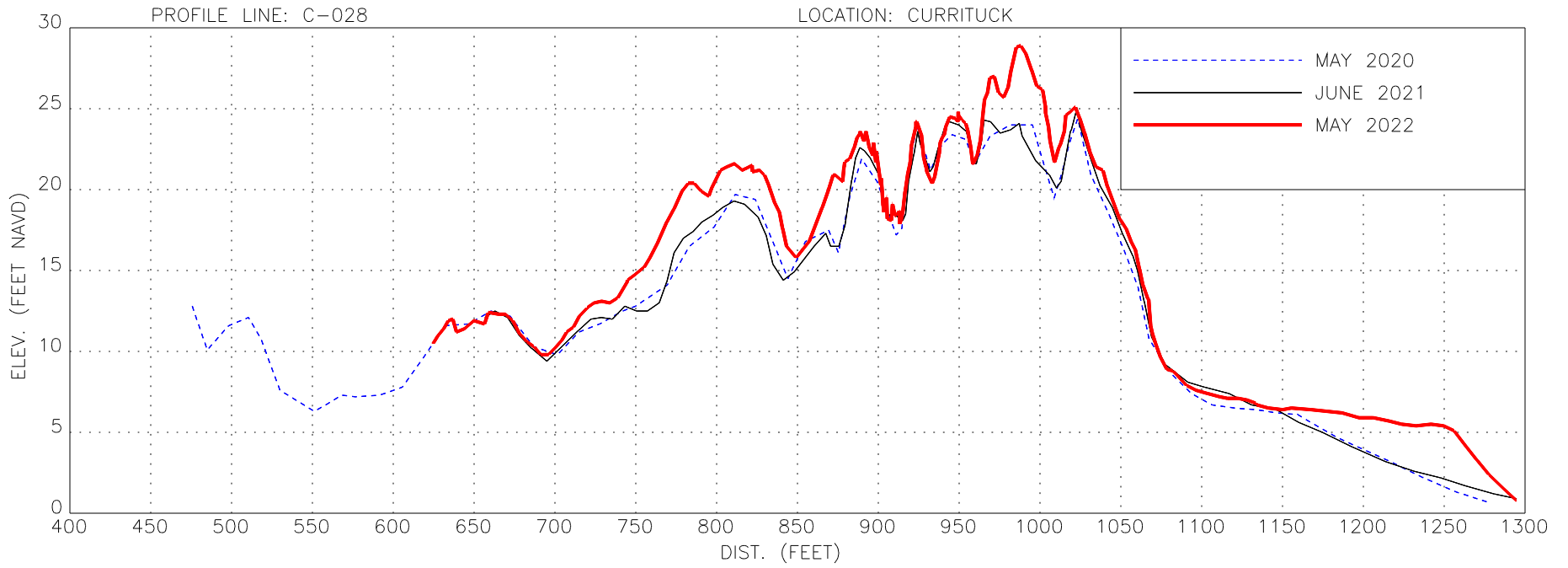


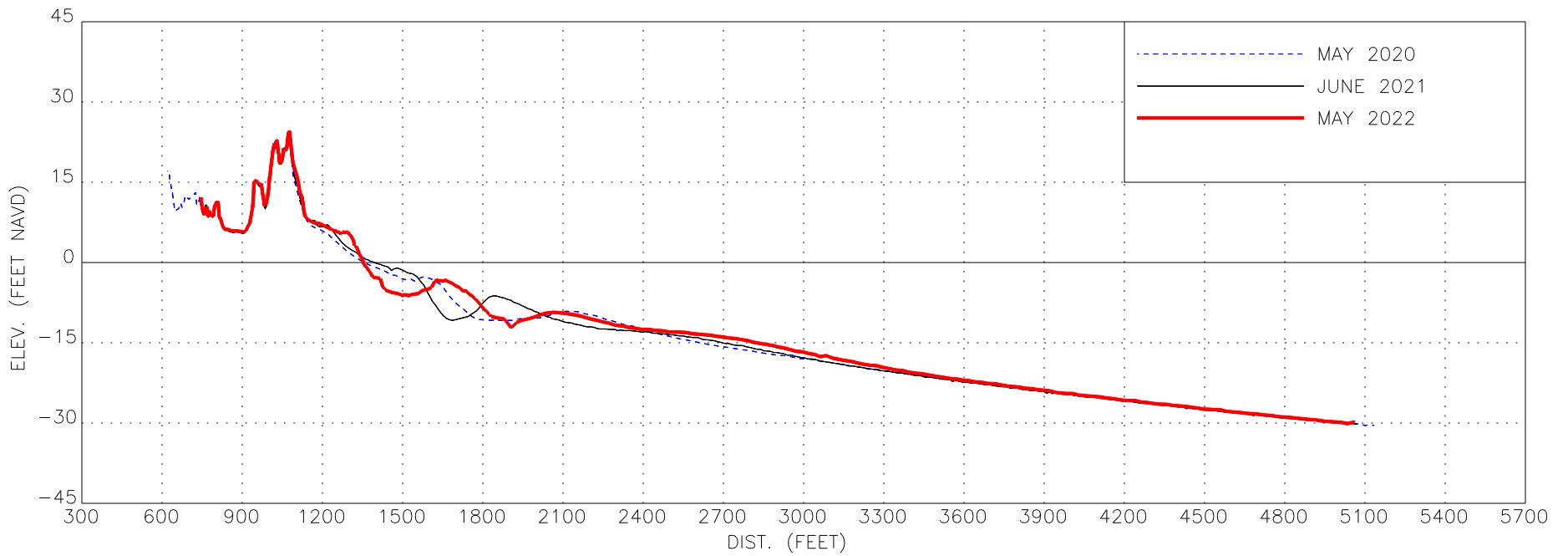
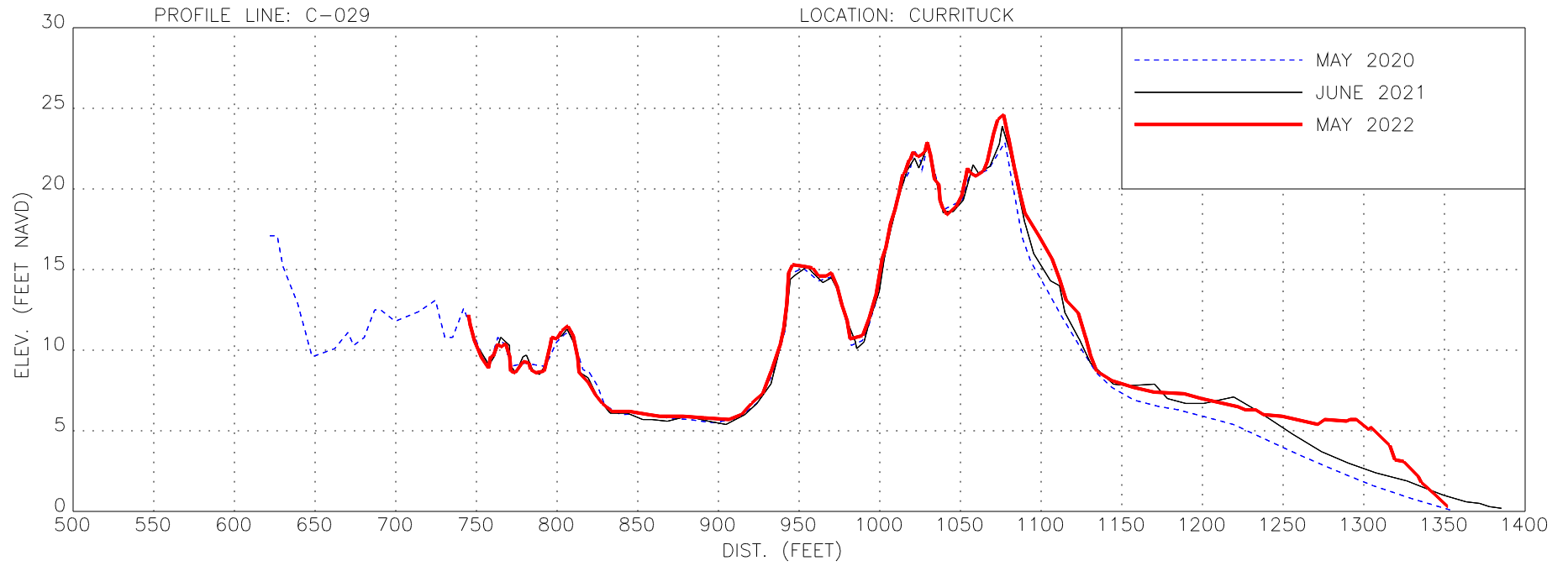
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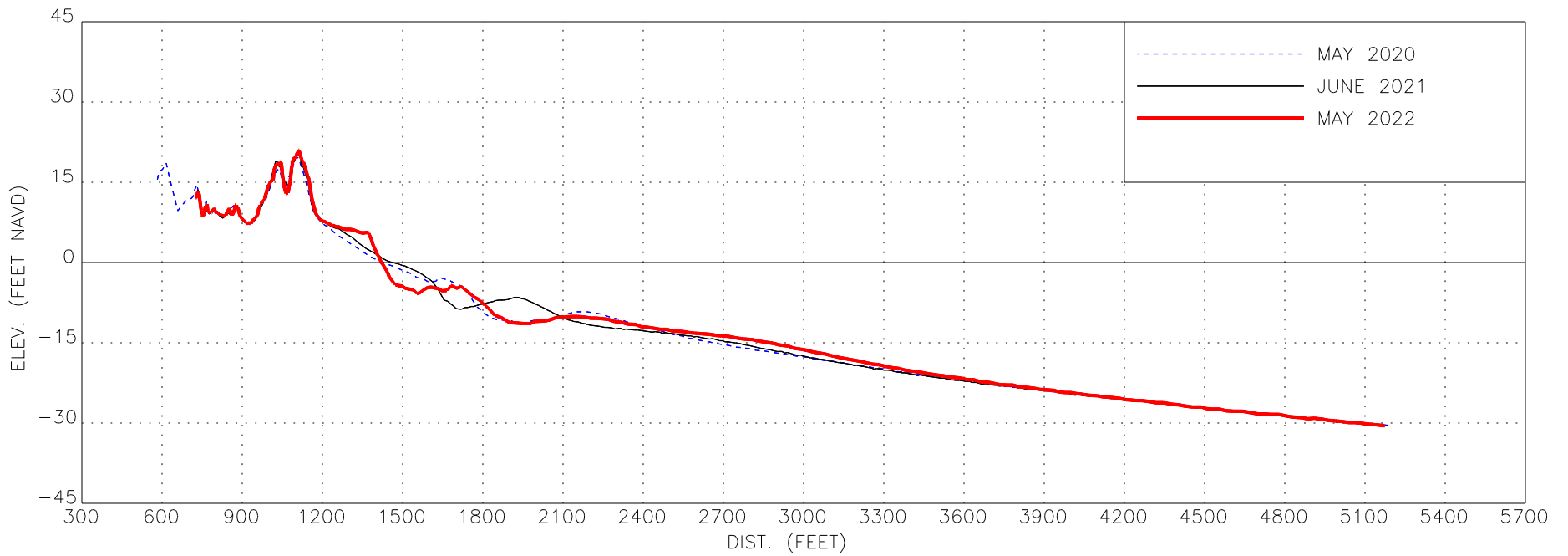
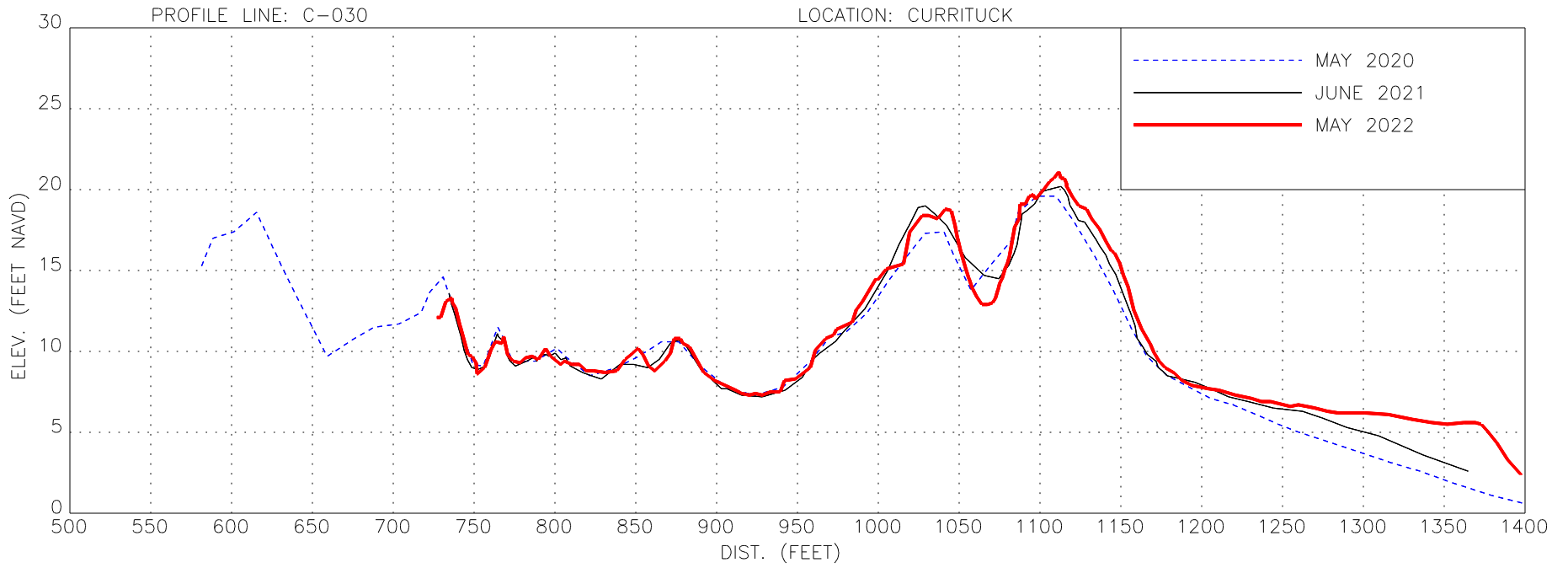
LOCATION: CURRITUCK

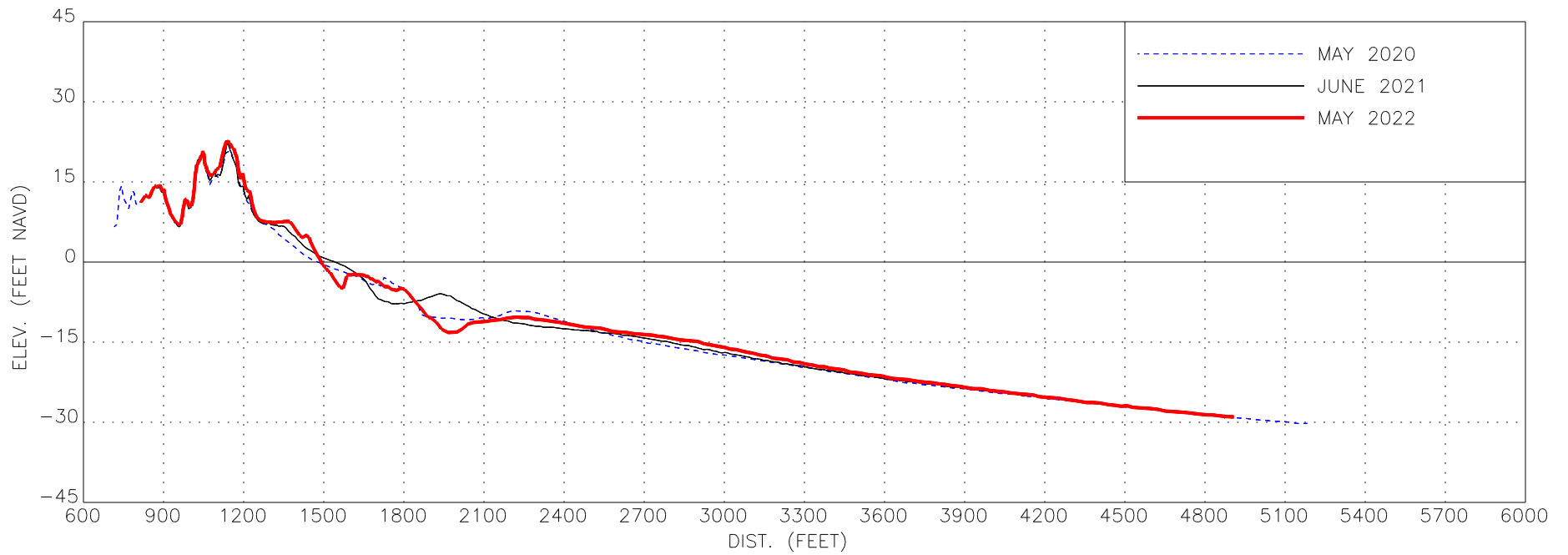
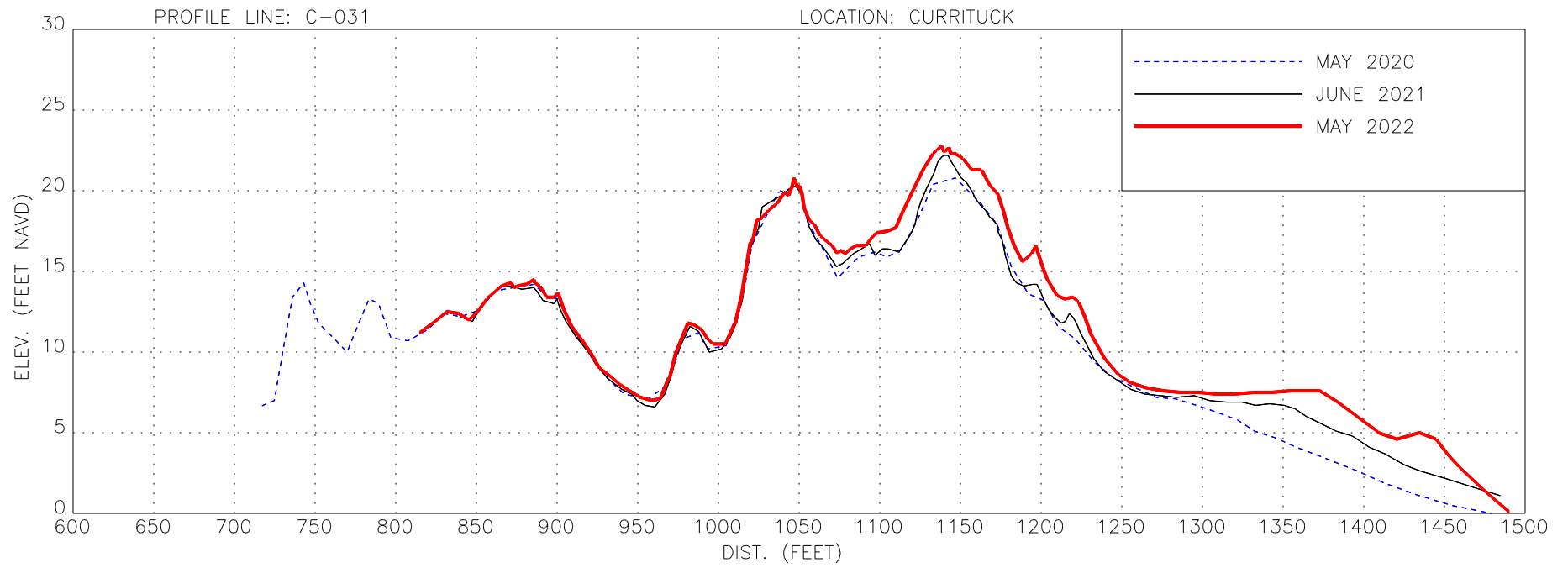


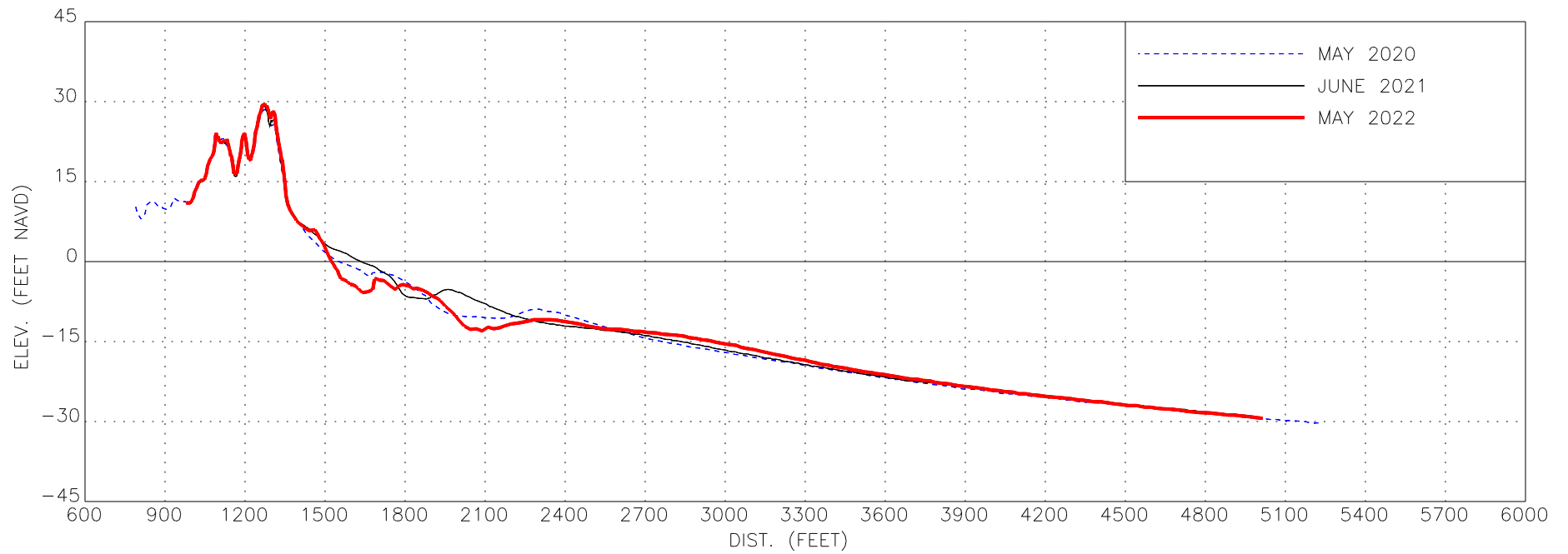
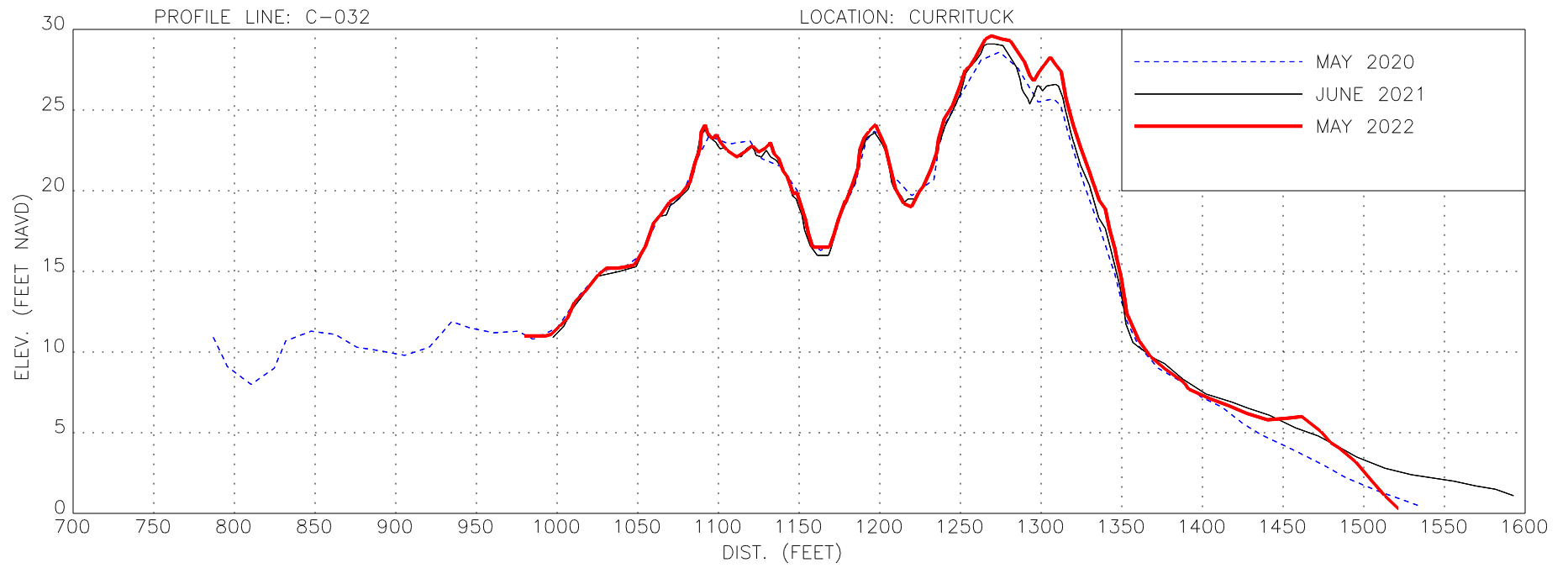


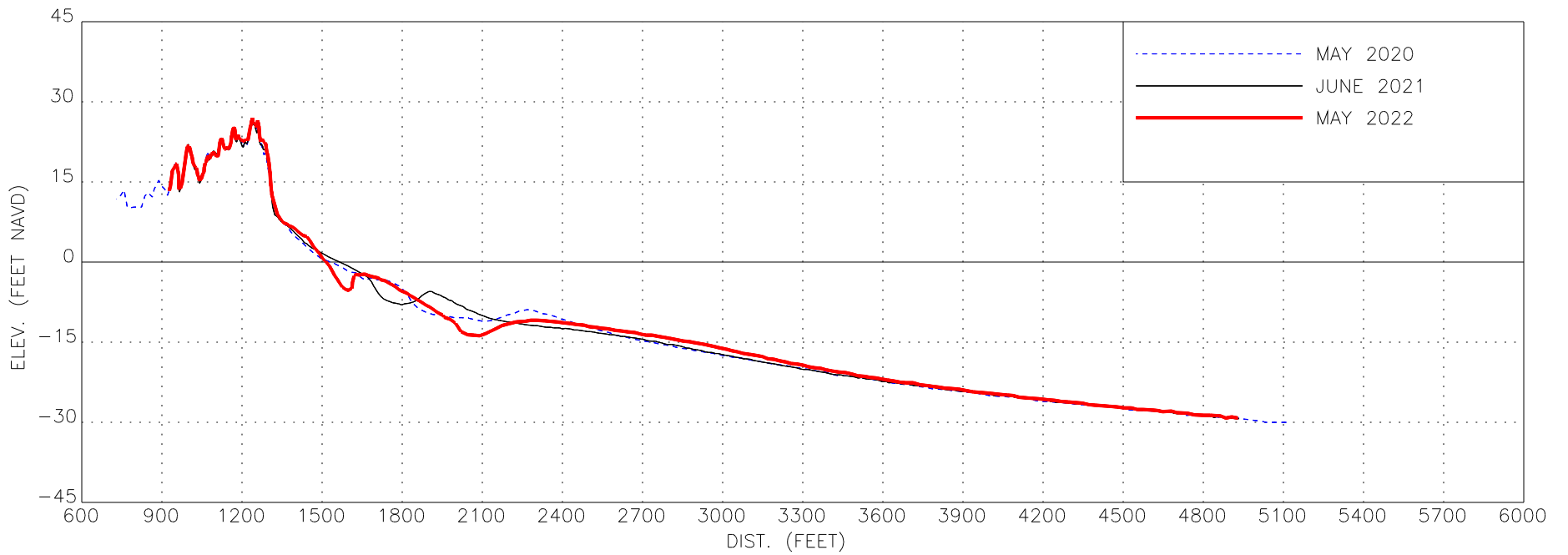
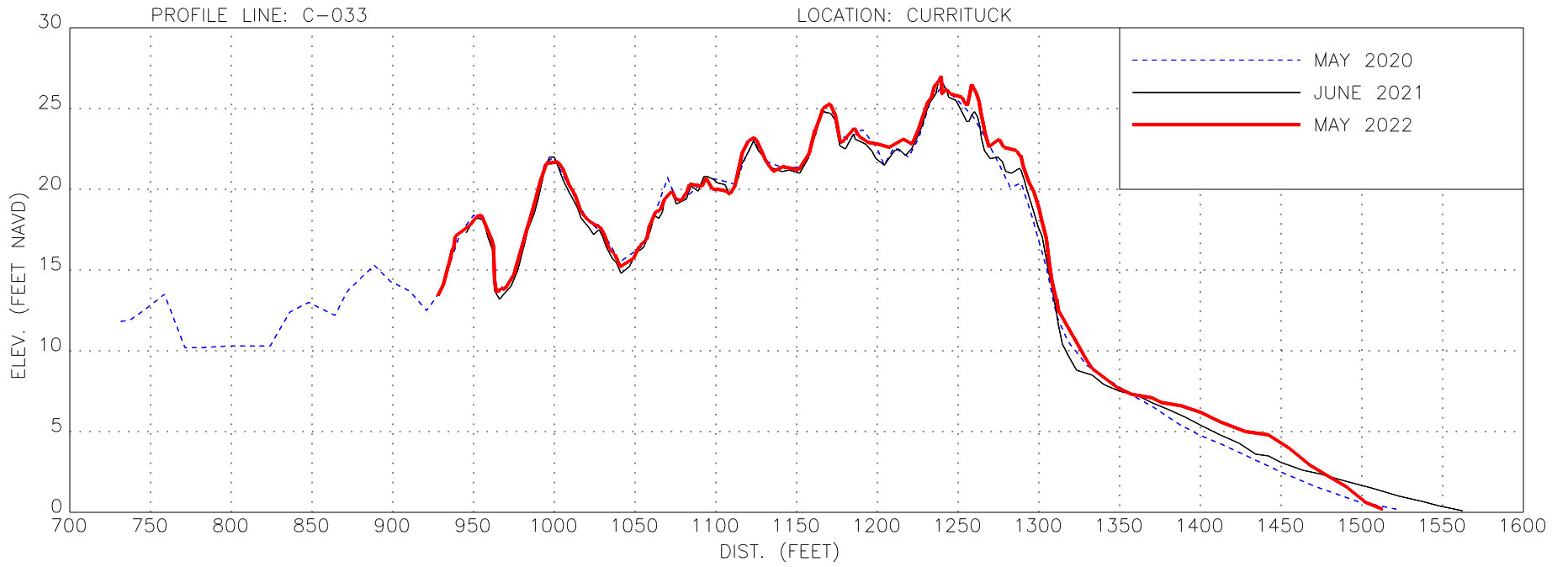


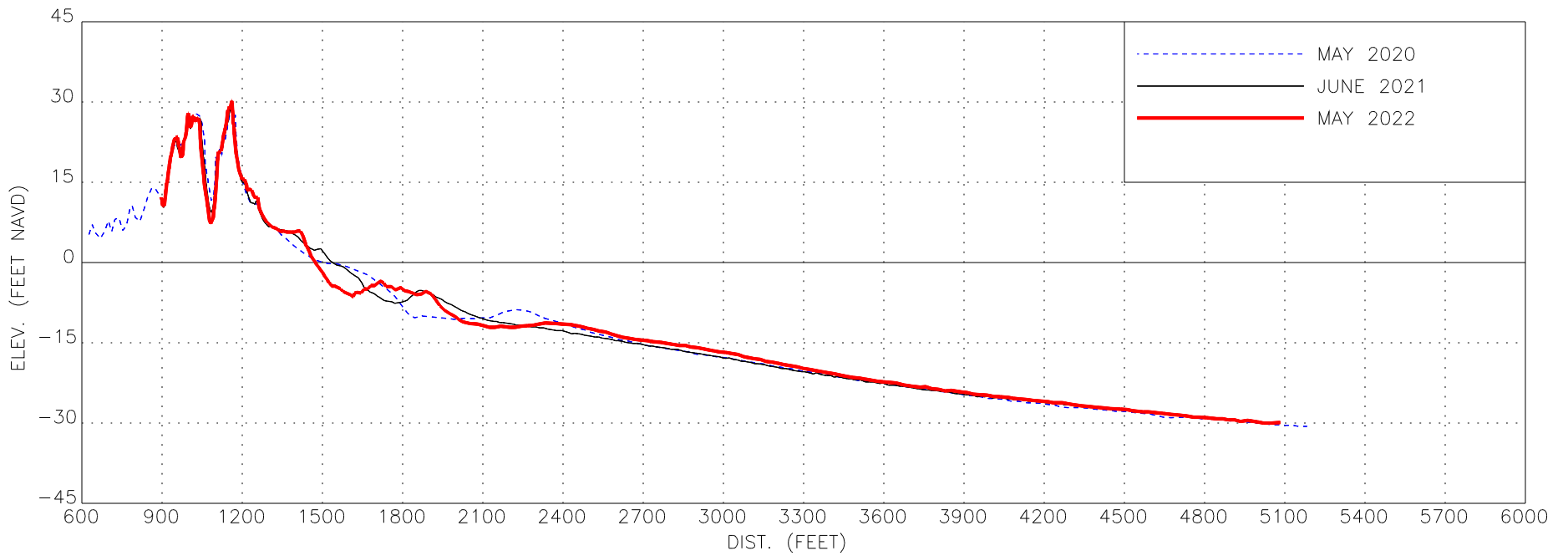
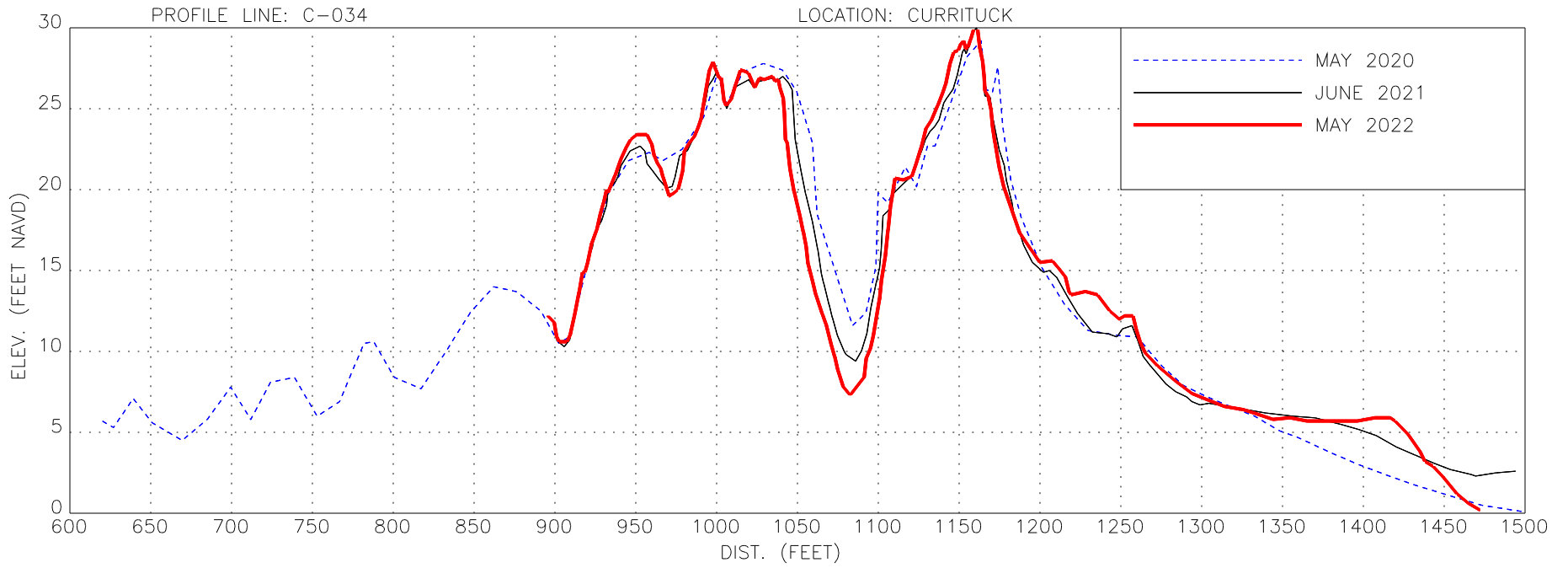


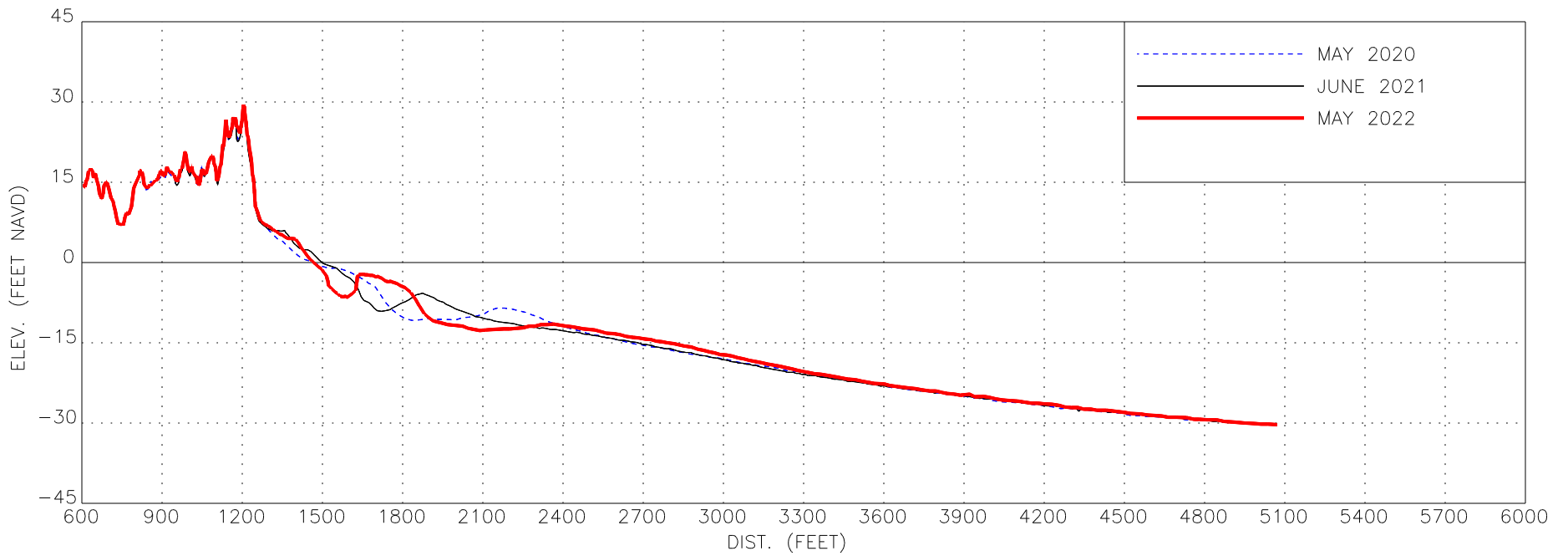
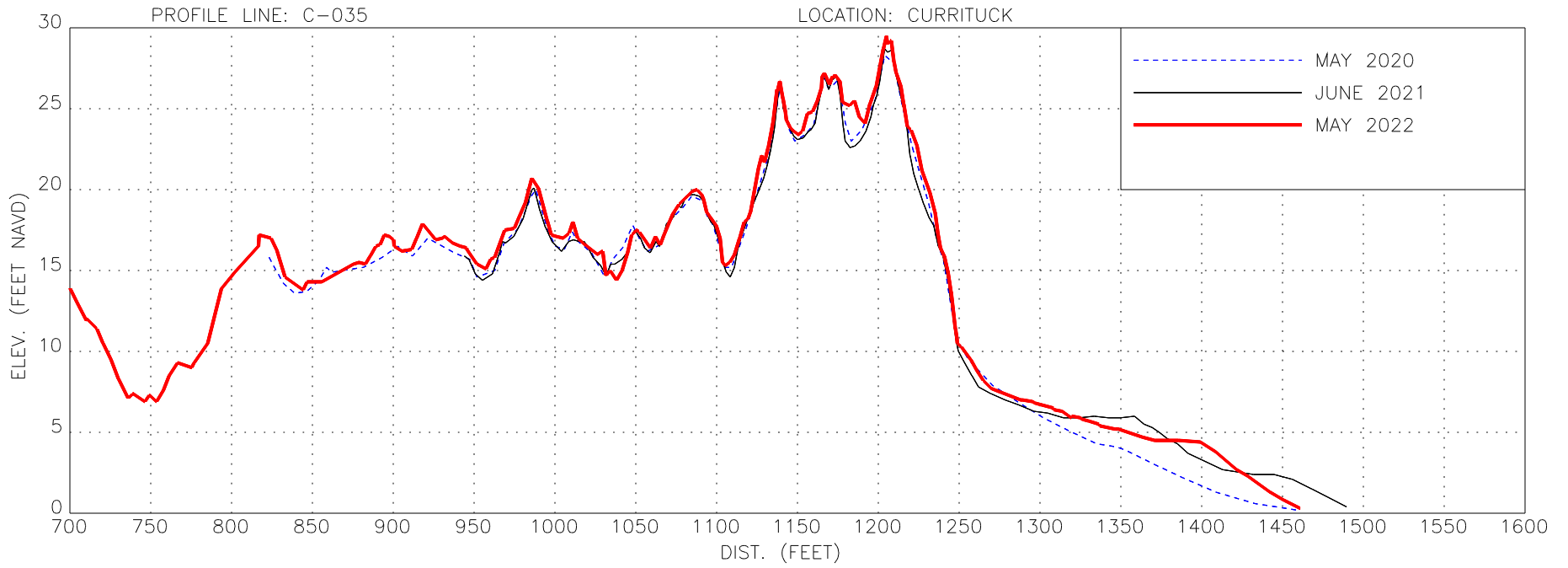


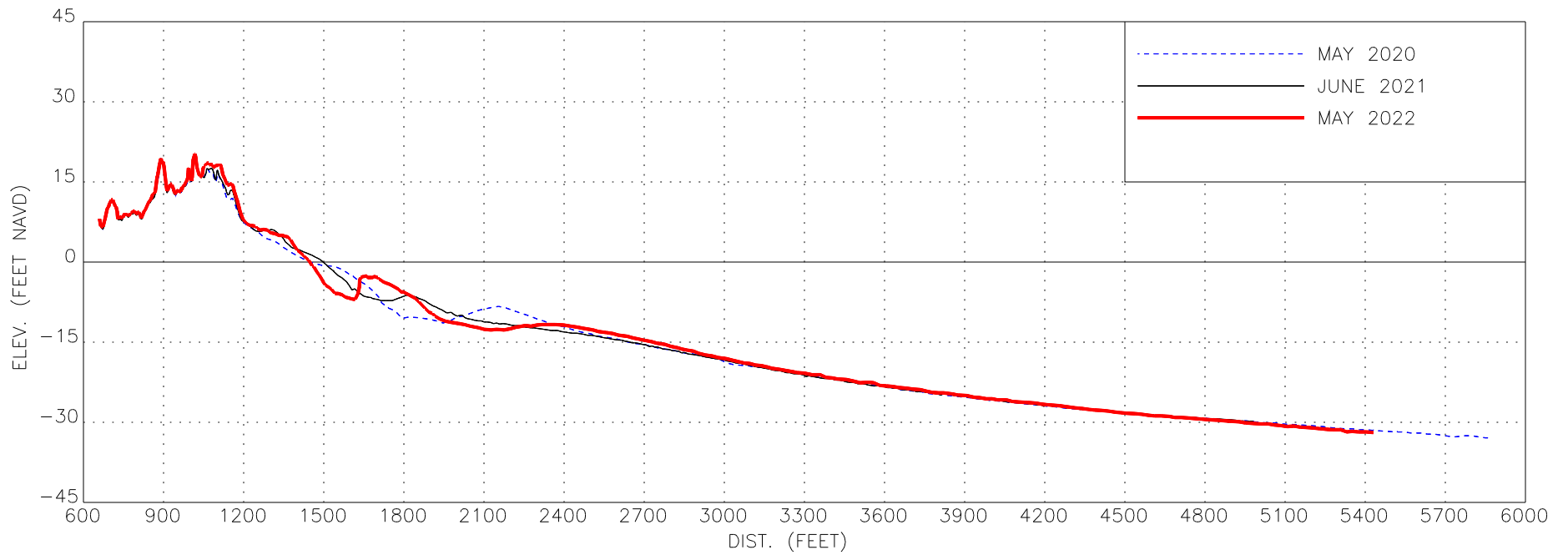
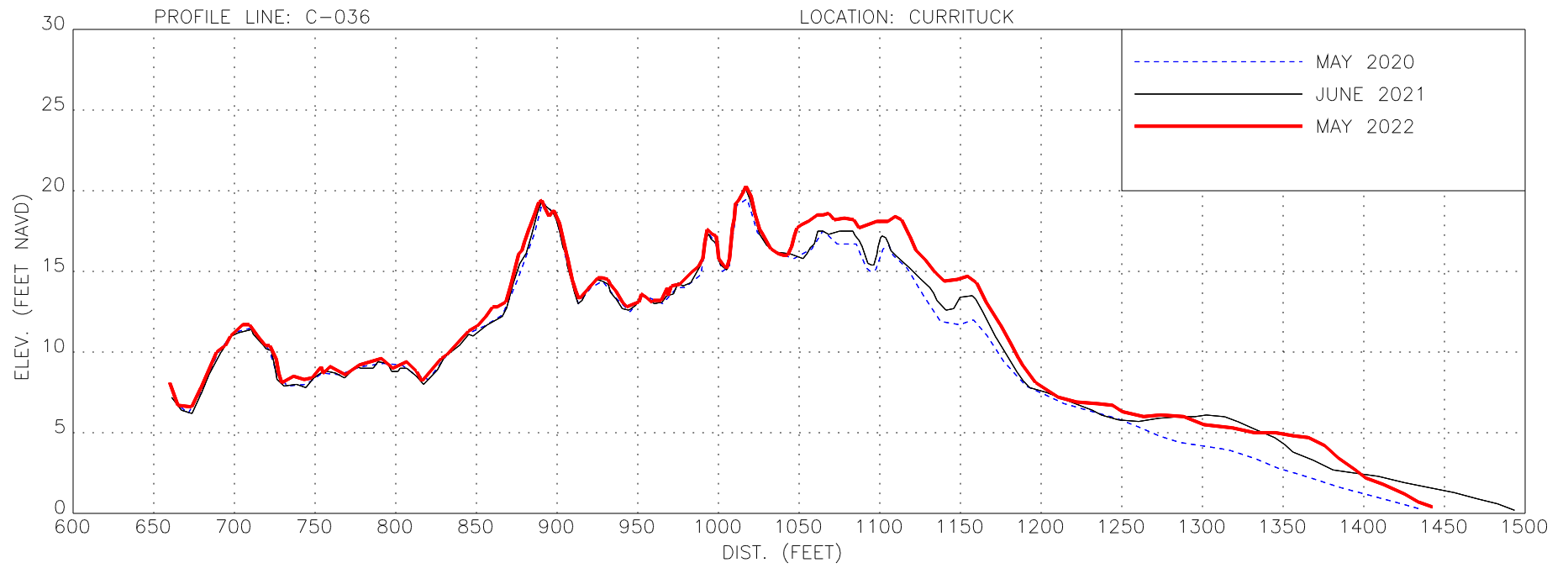


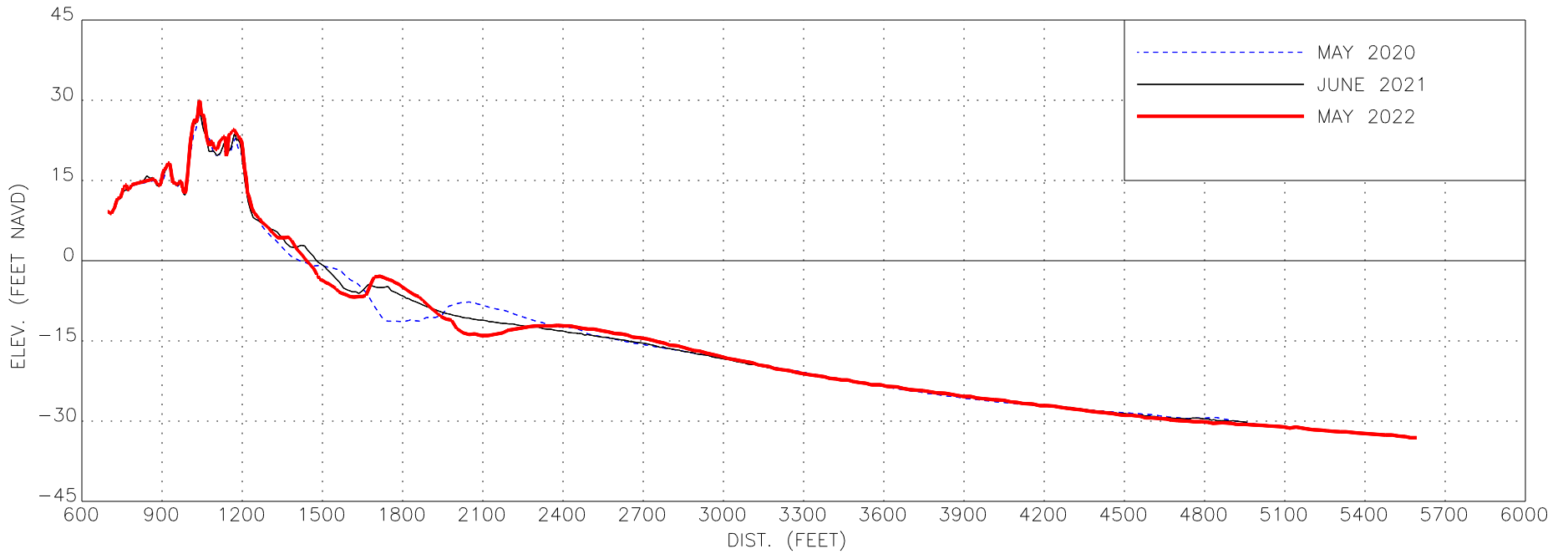
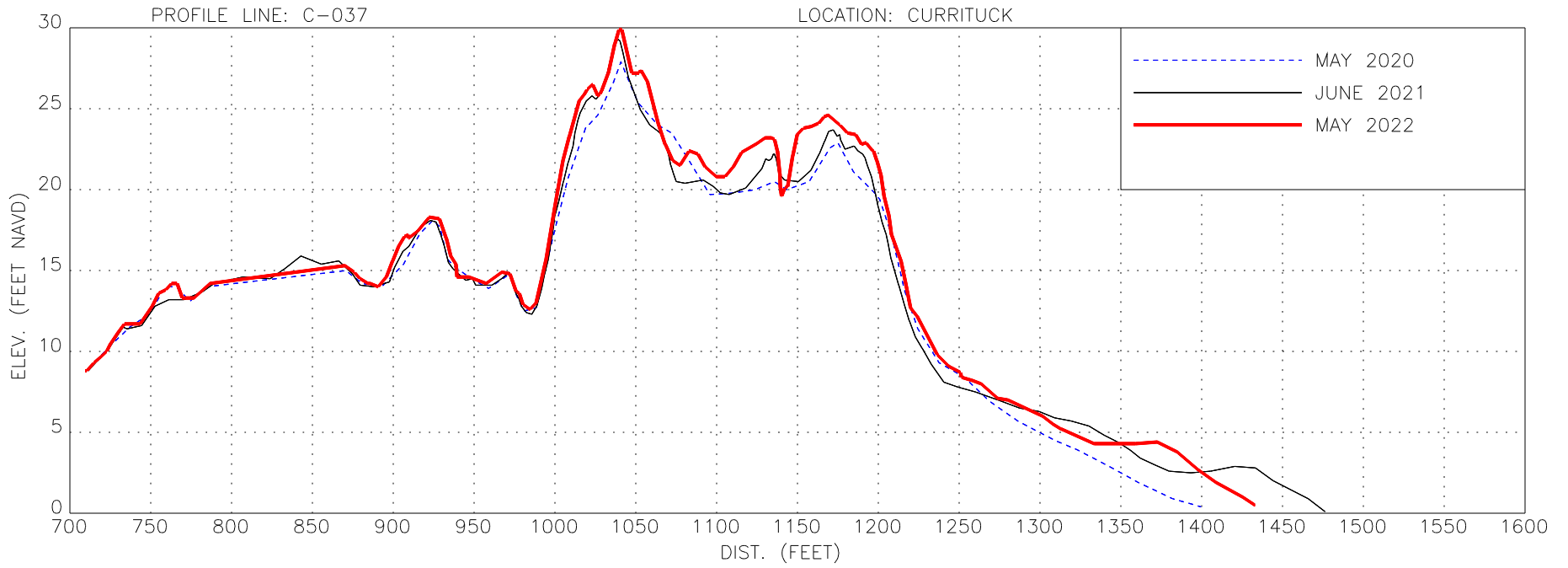


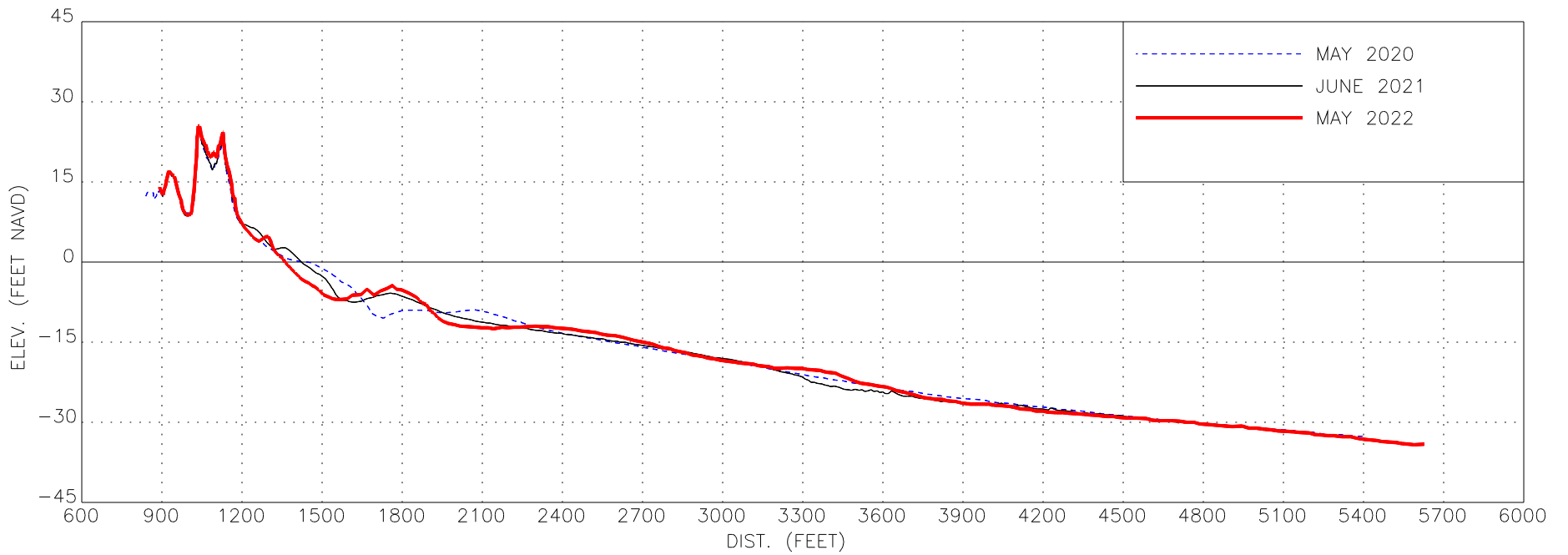
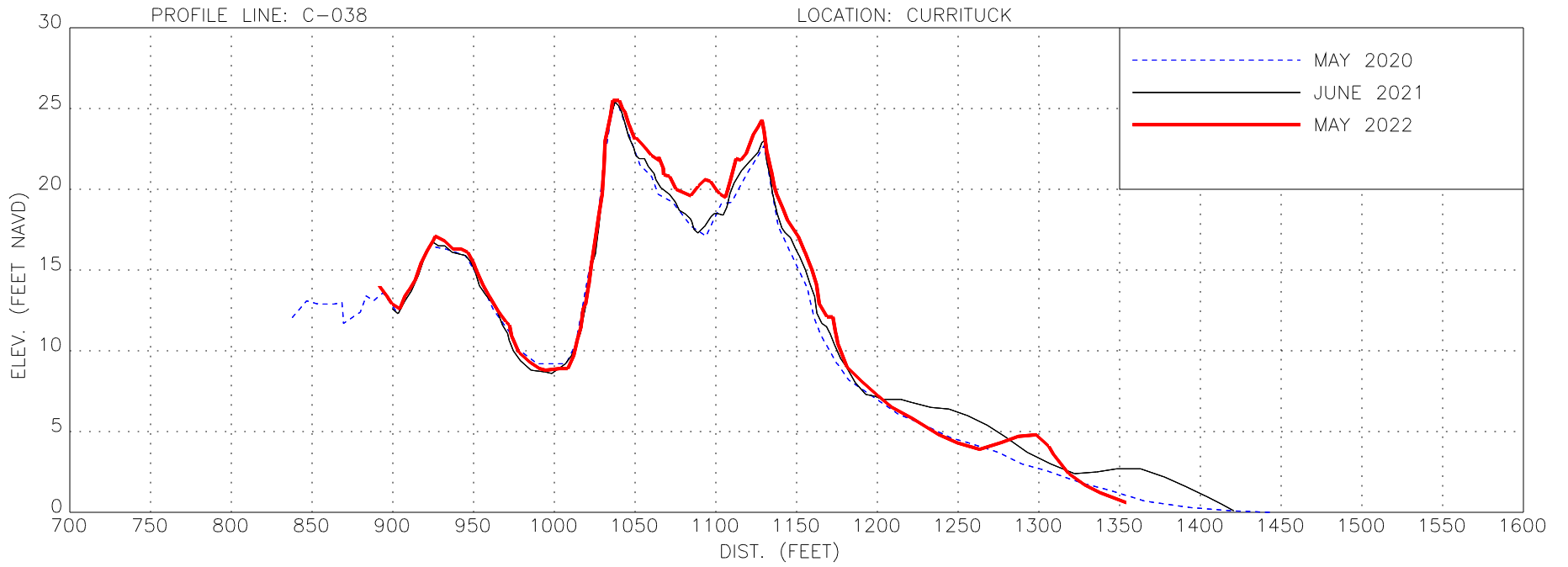


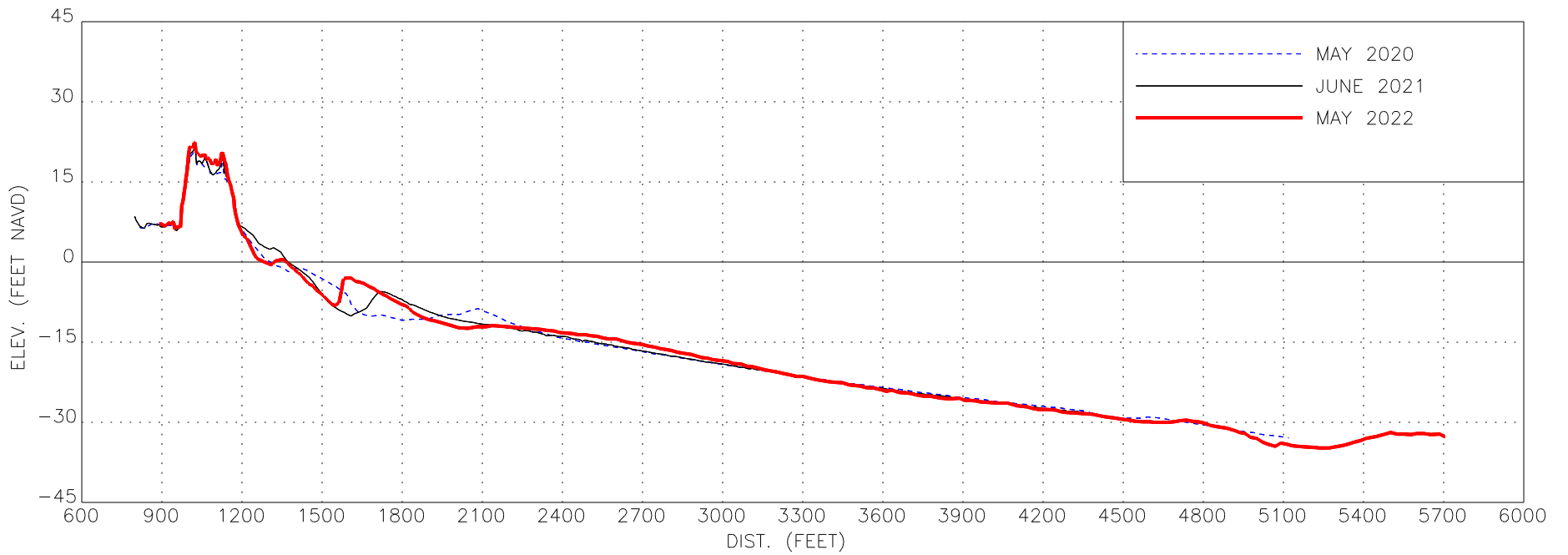
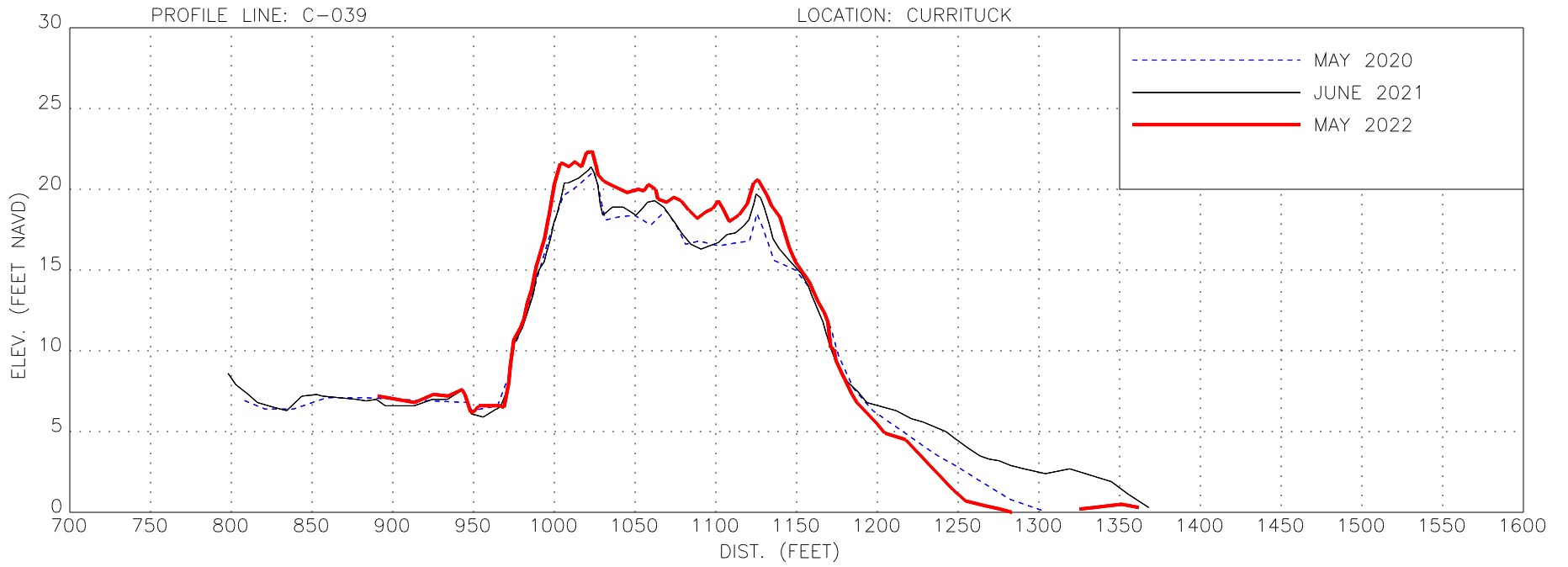


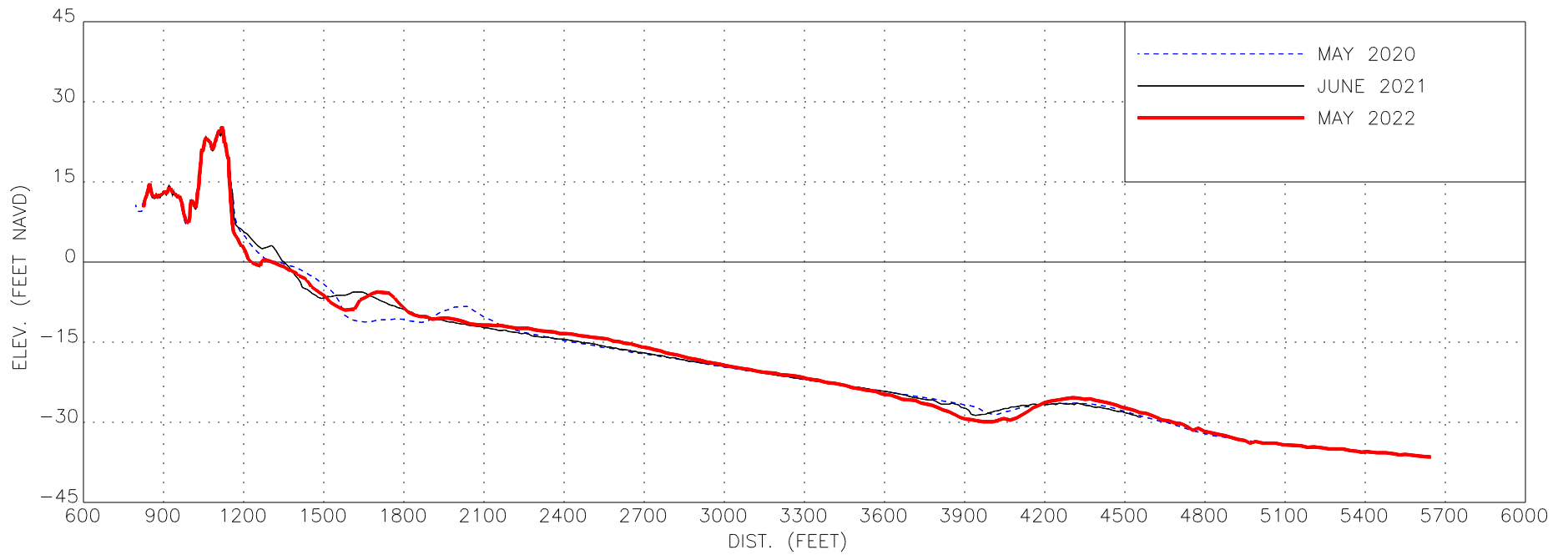
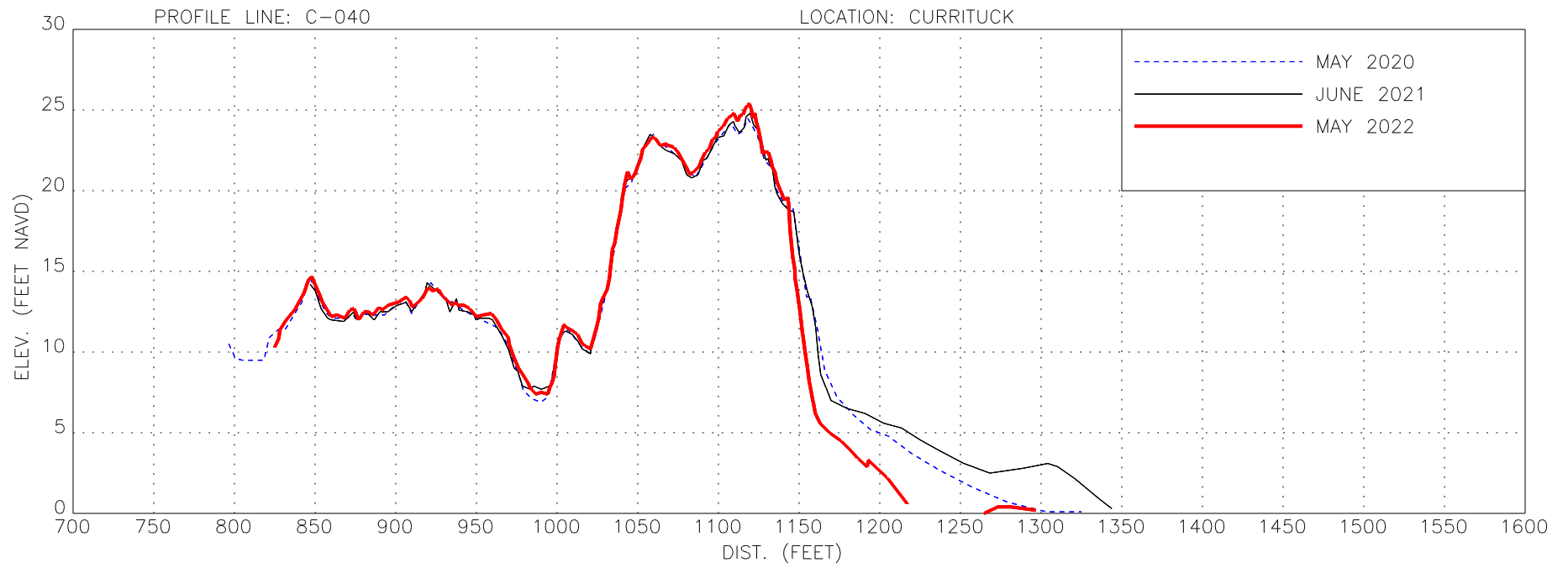


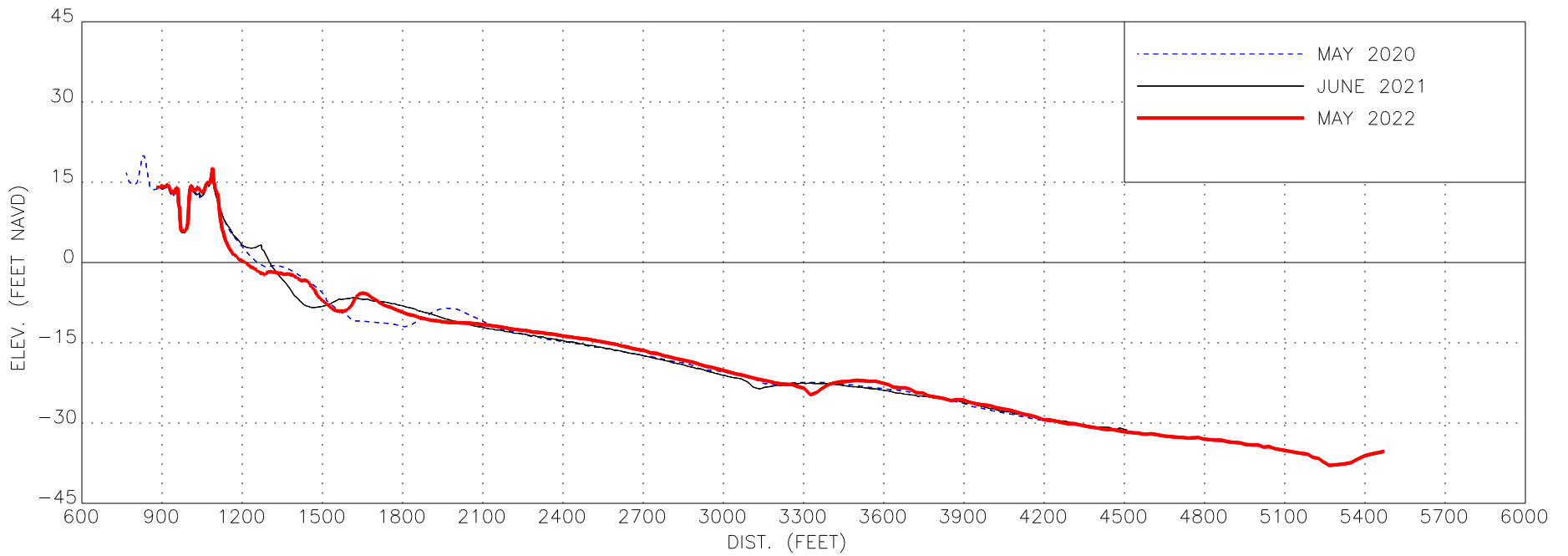
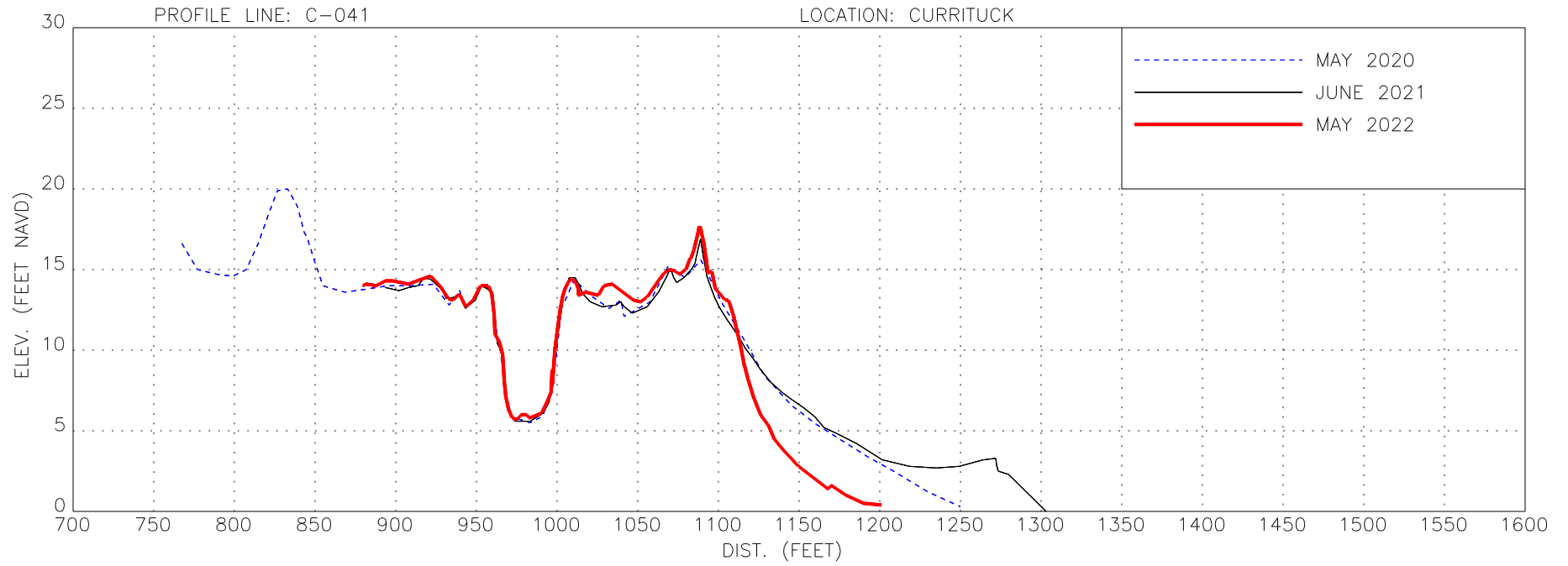


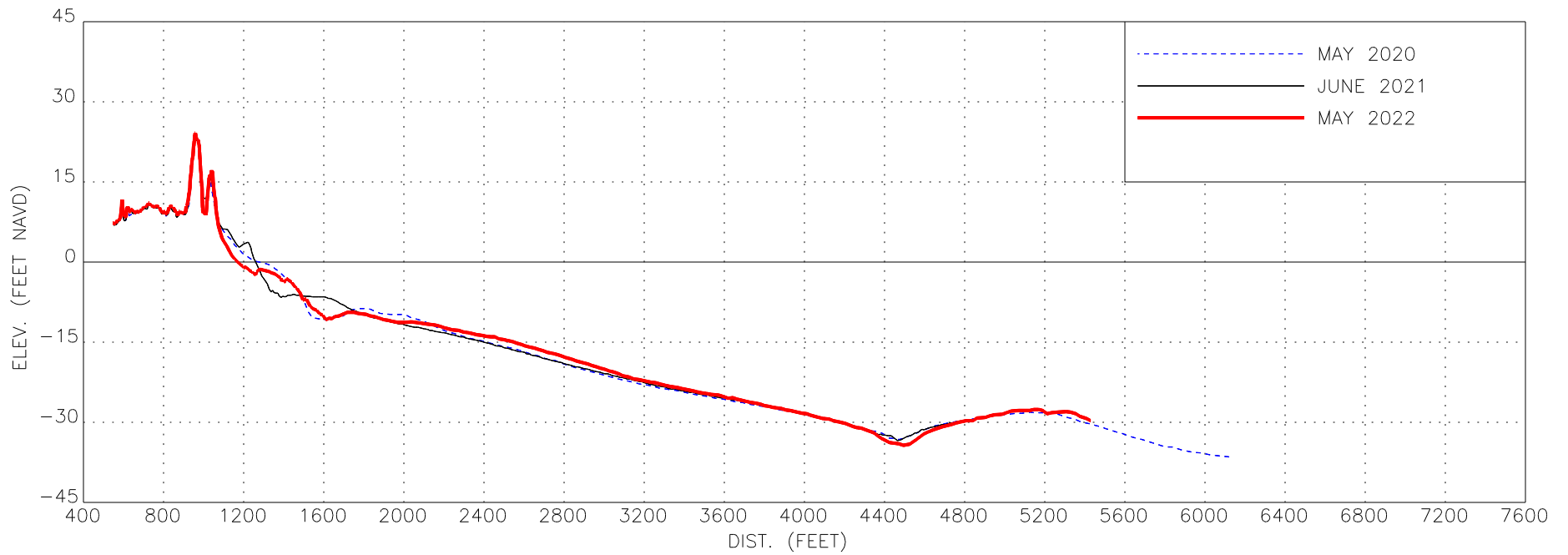
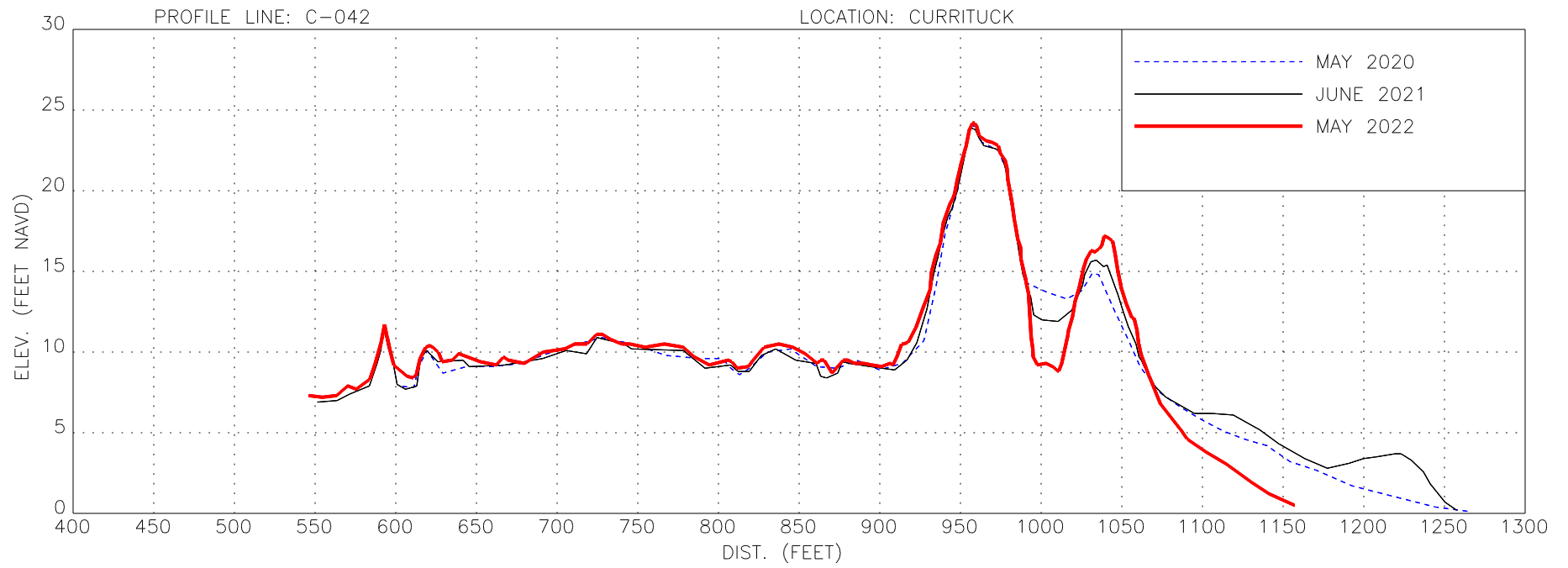


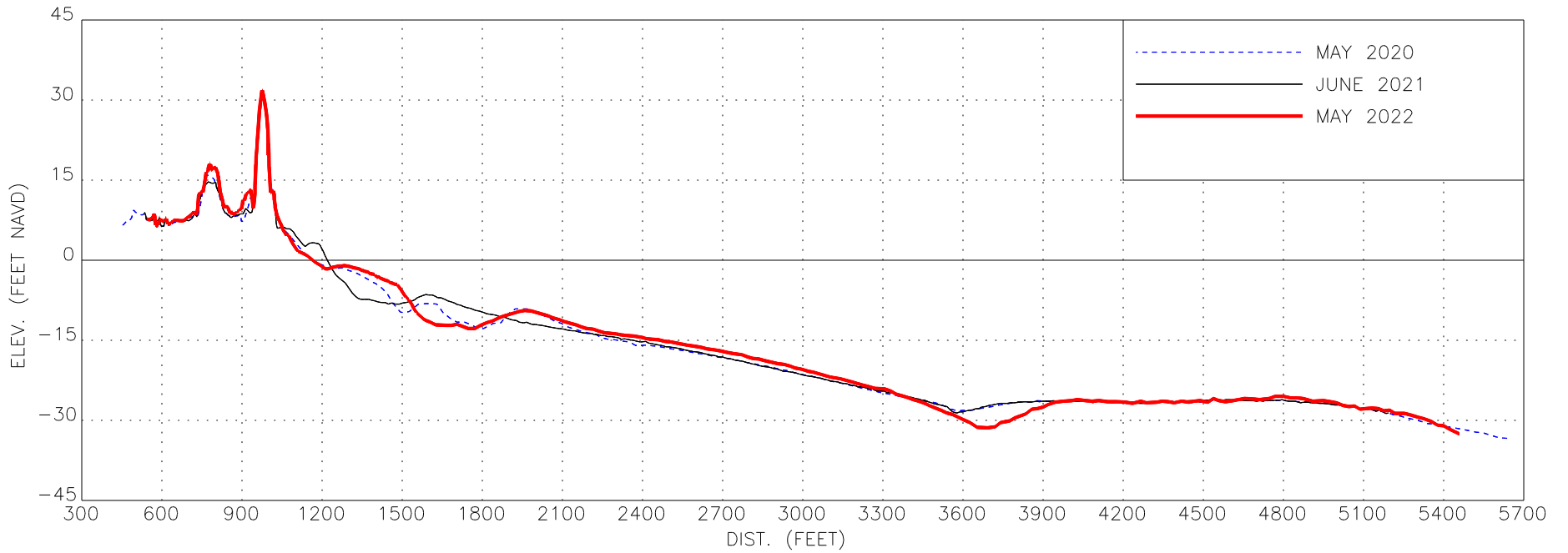
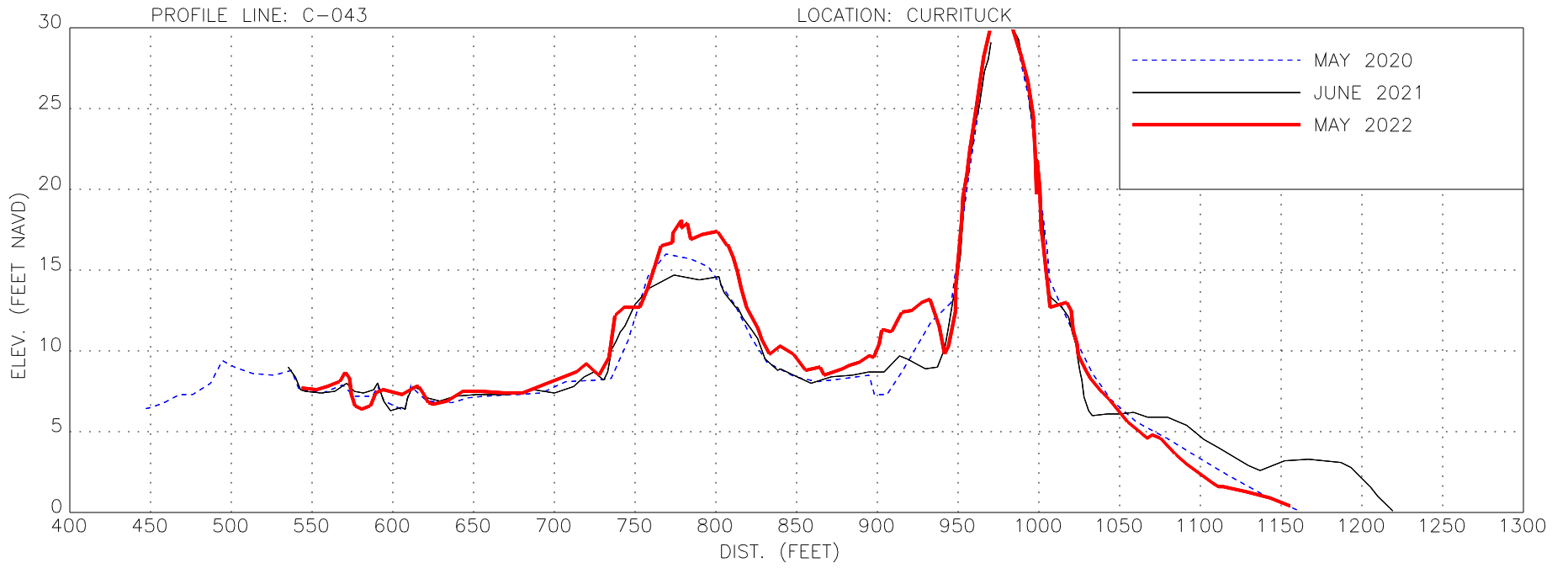






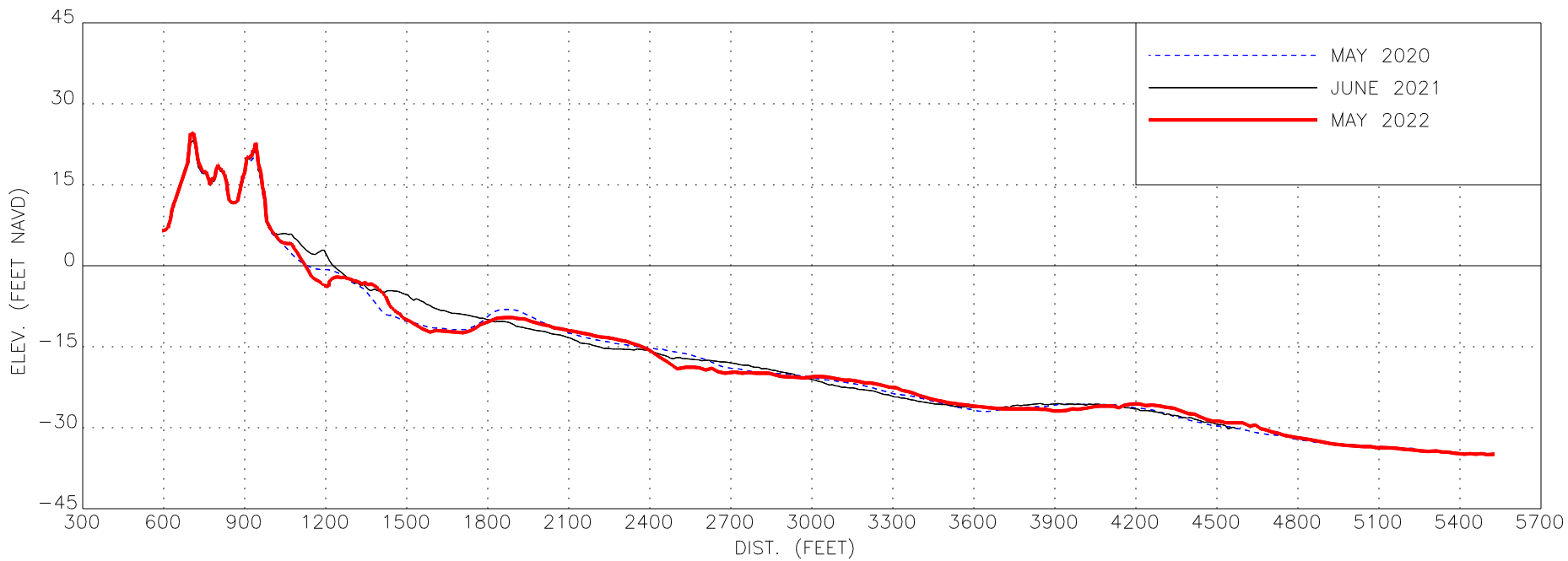
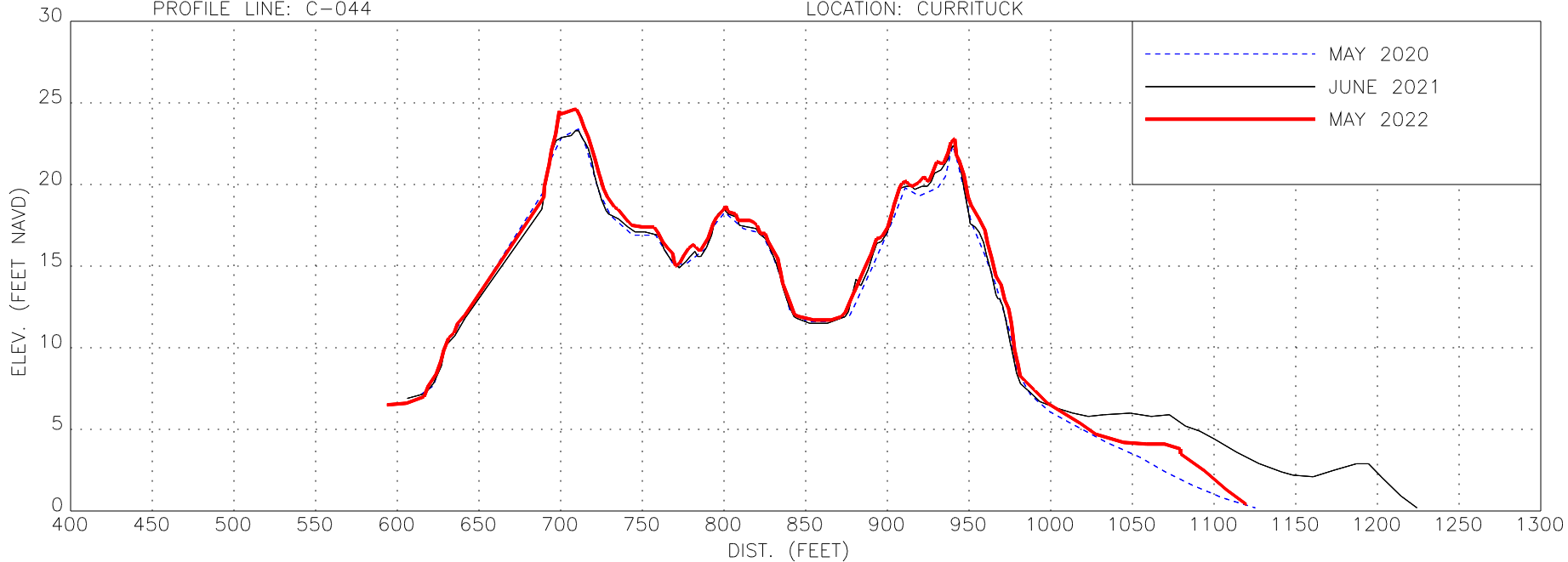


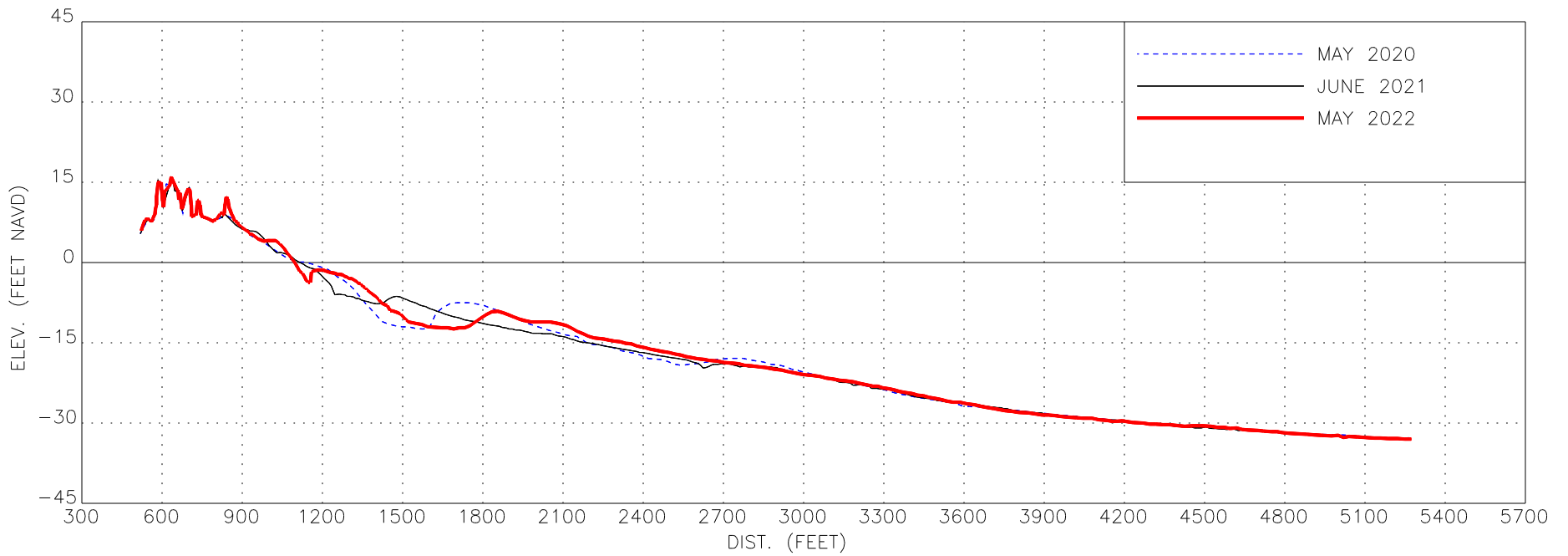
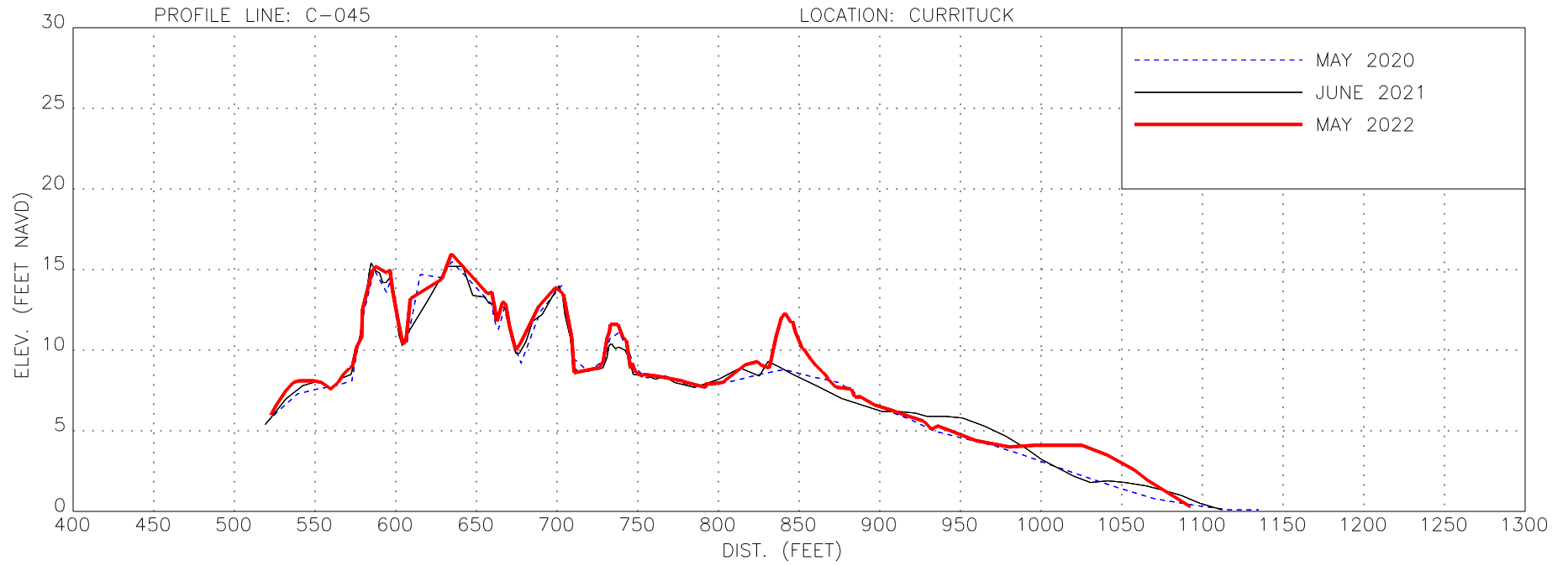




PROFILE LINE: C-044

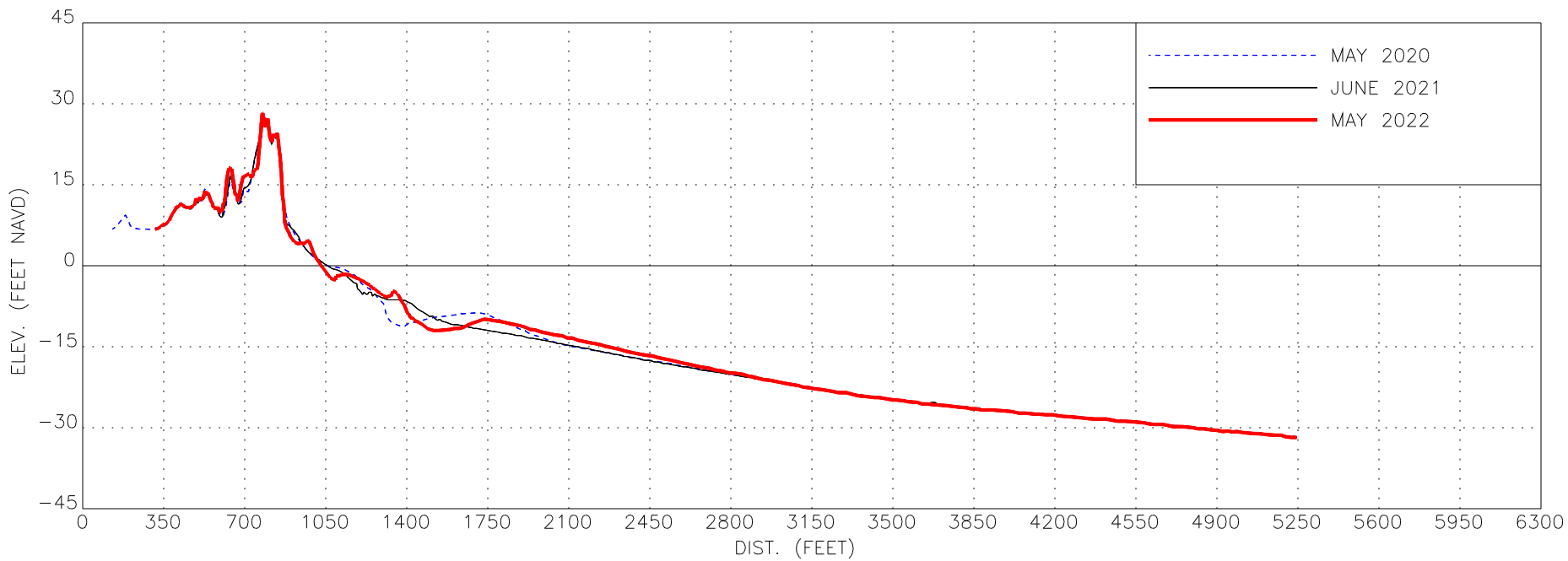
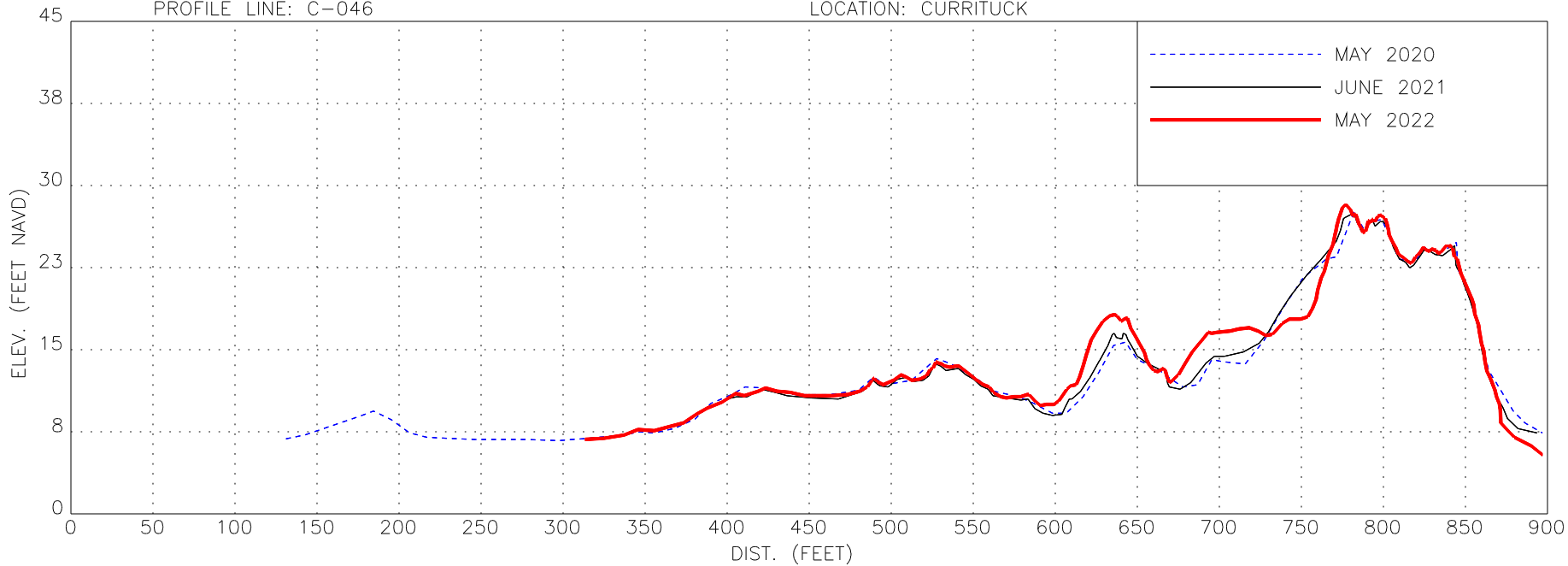
LOCATION: CURRITUCK

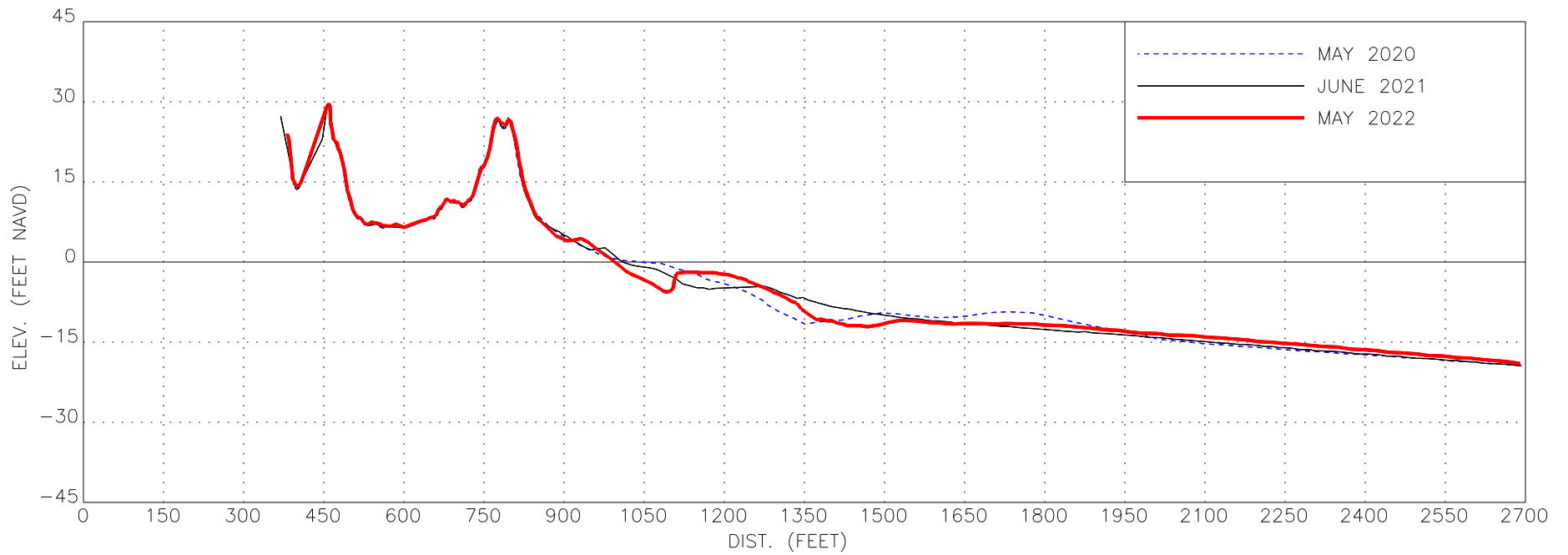
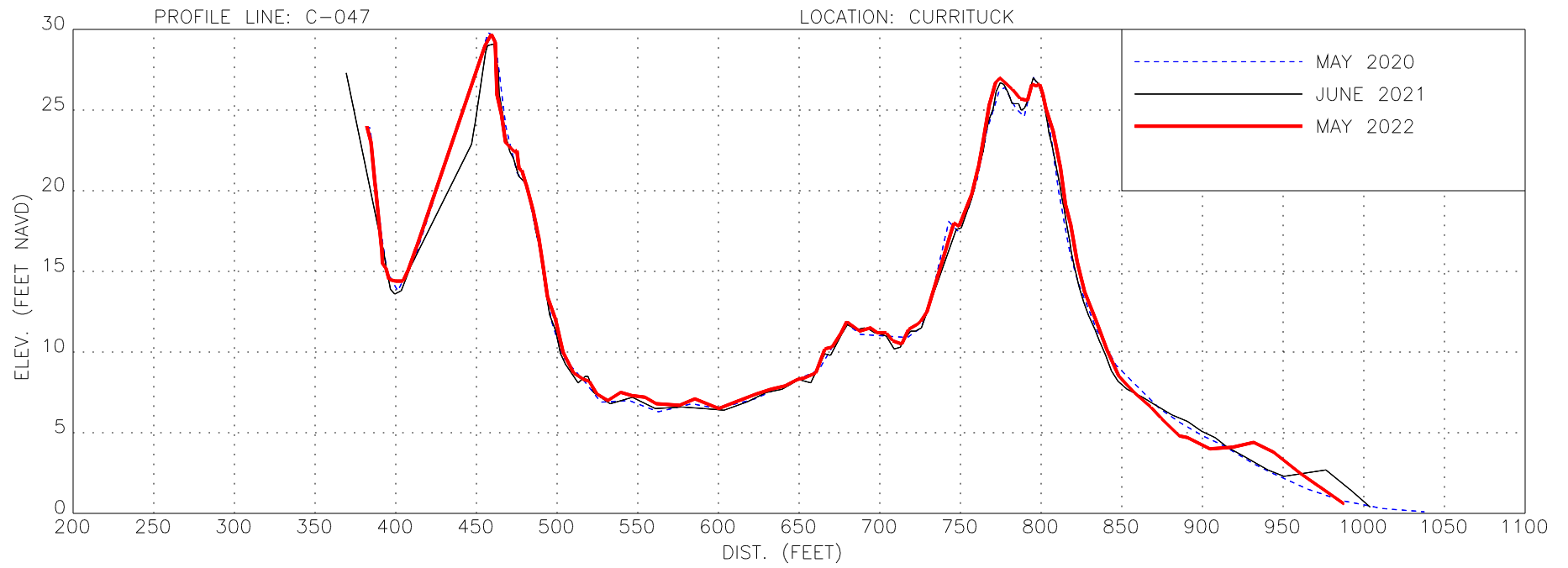




PROFILE LINE: C-046

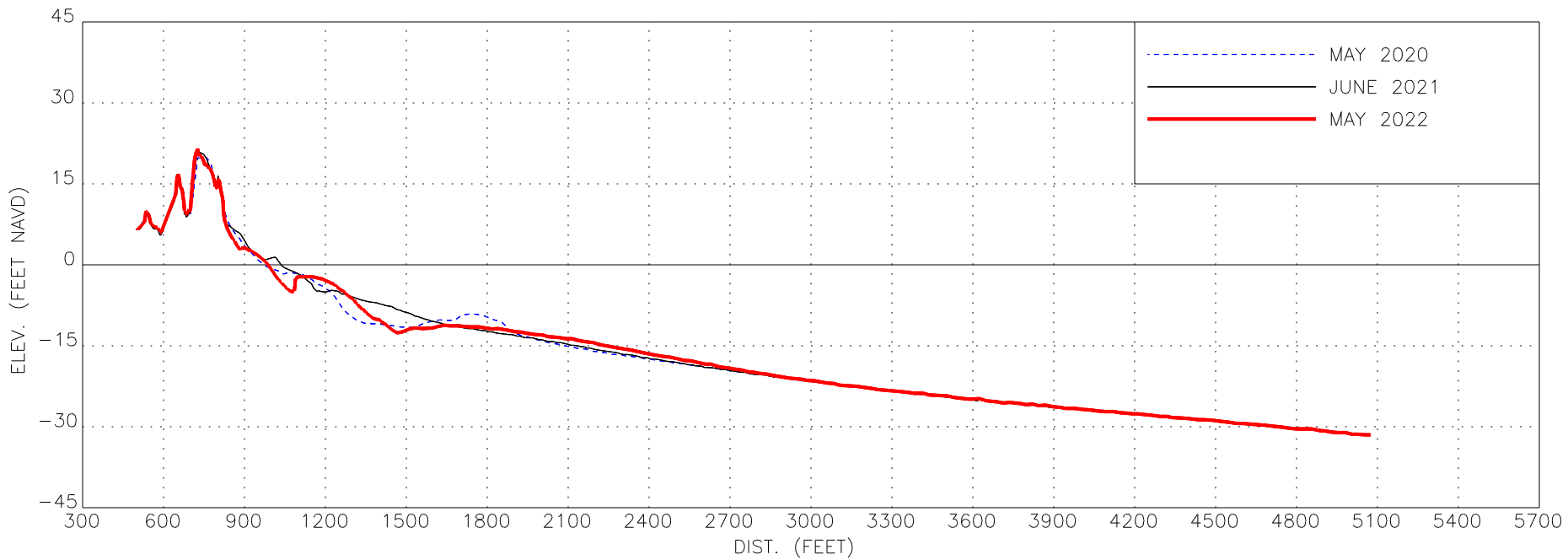
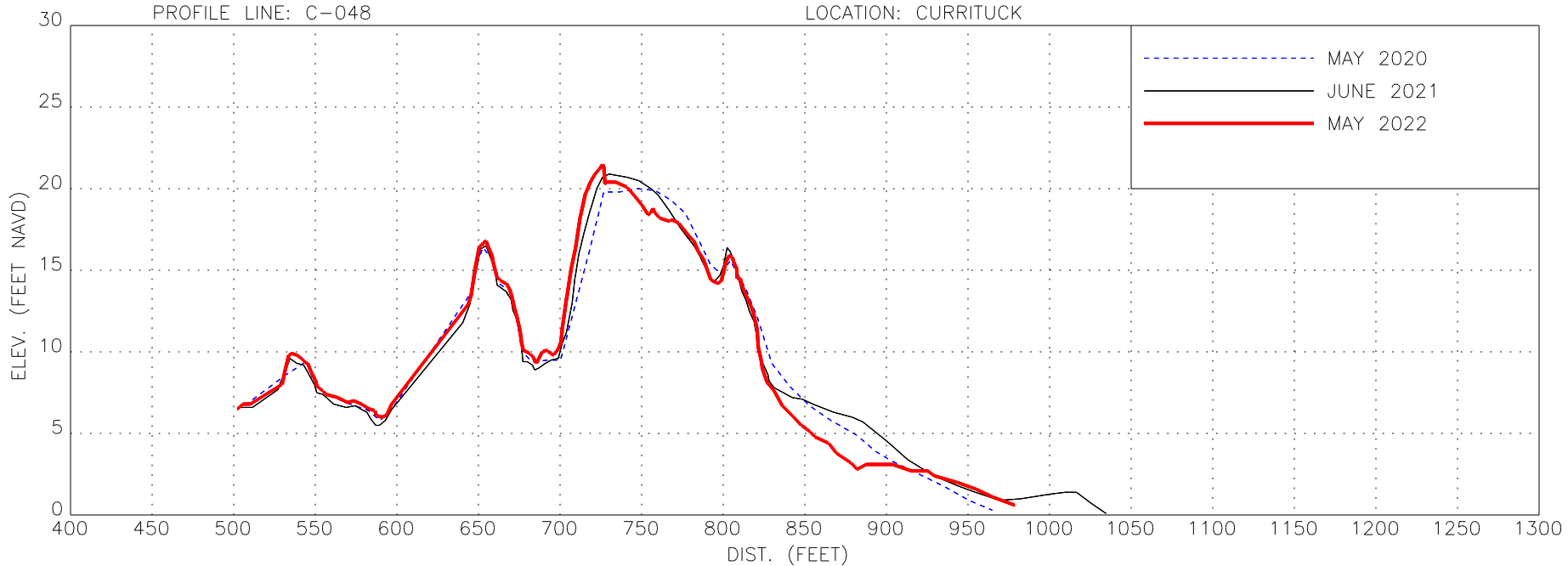
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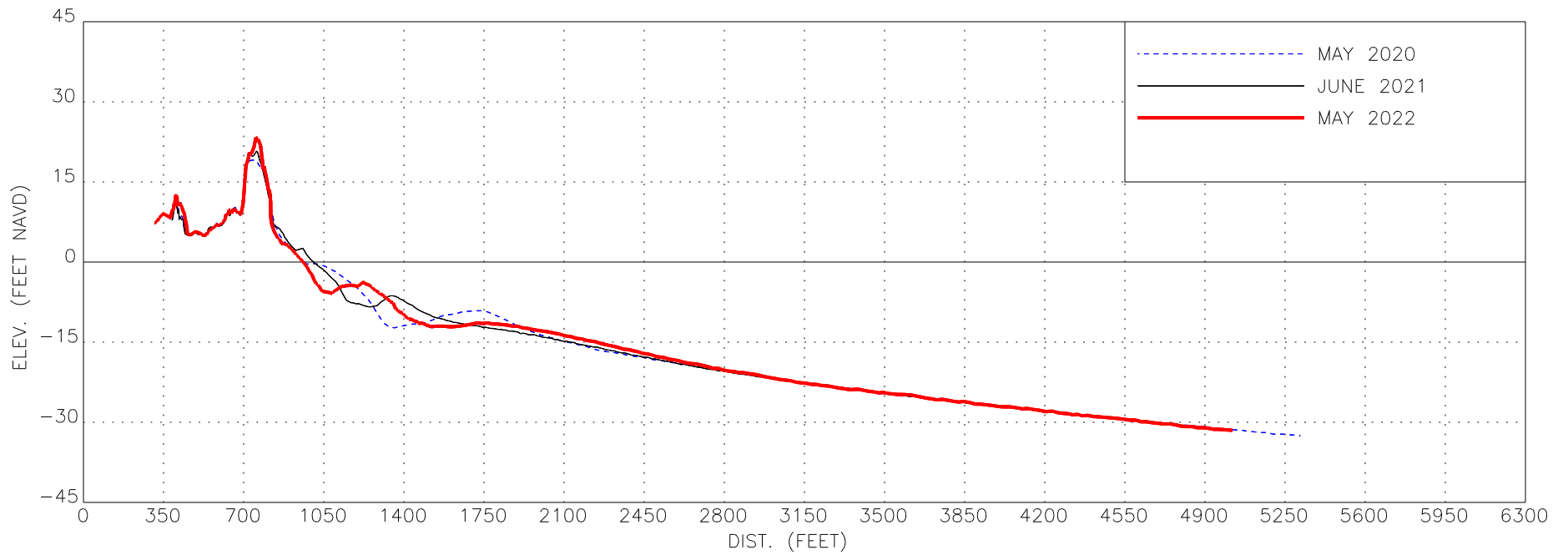
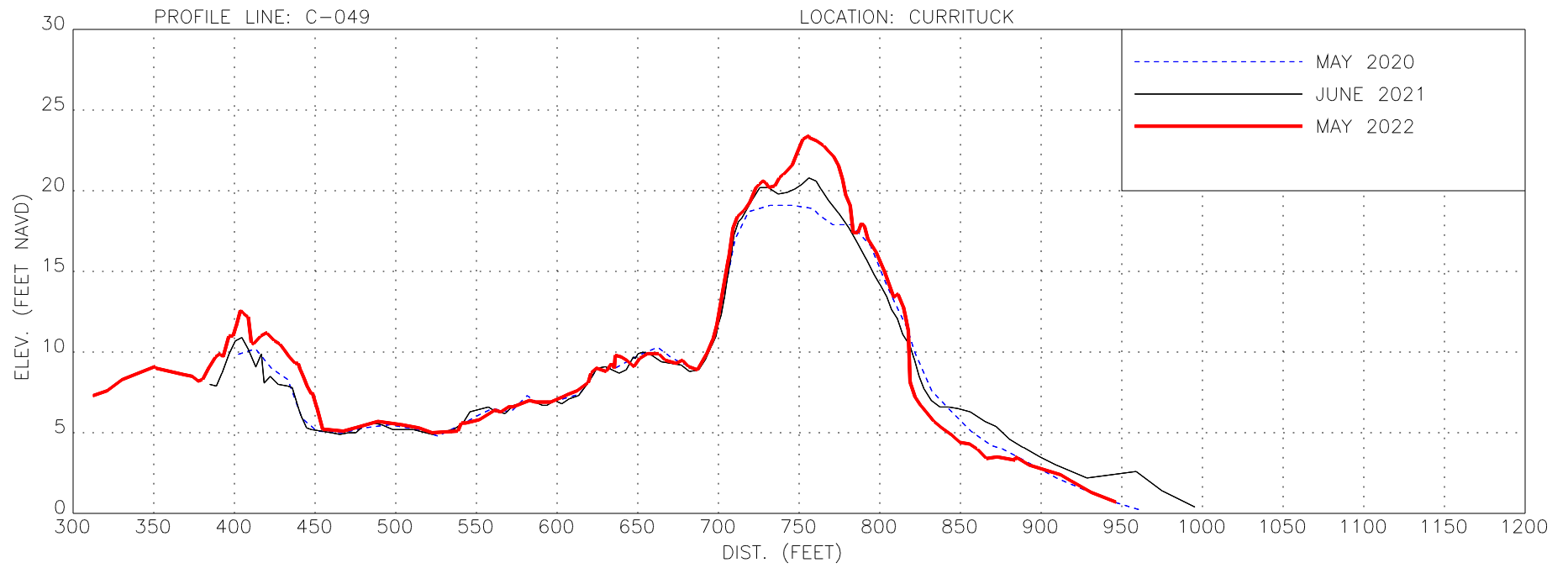


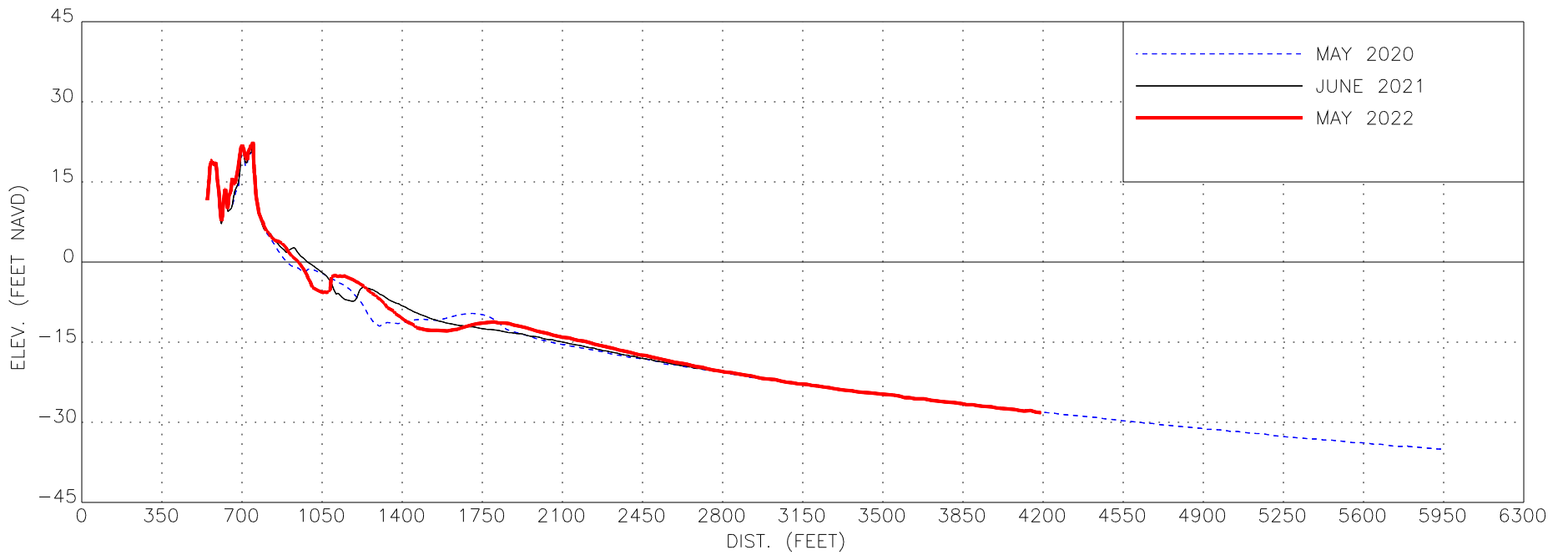
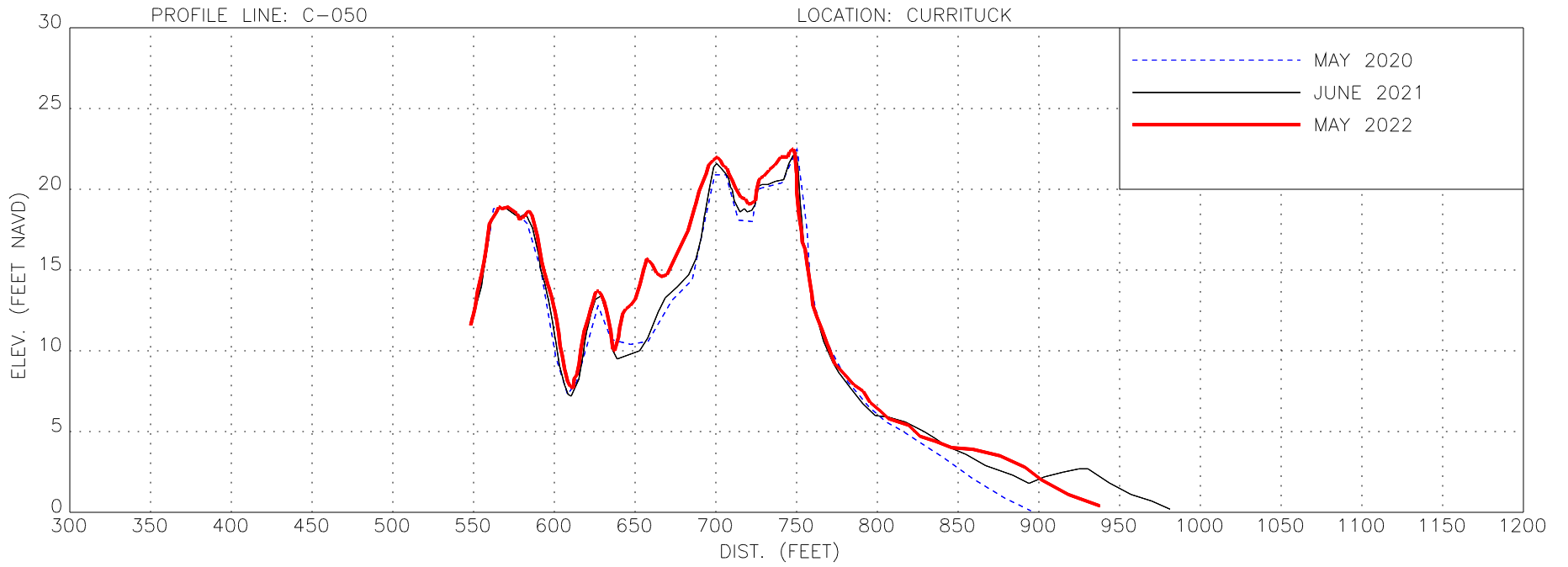


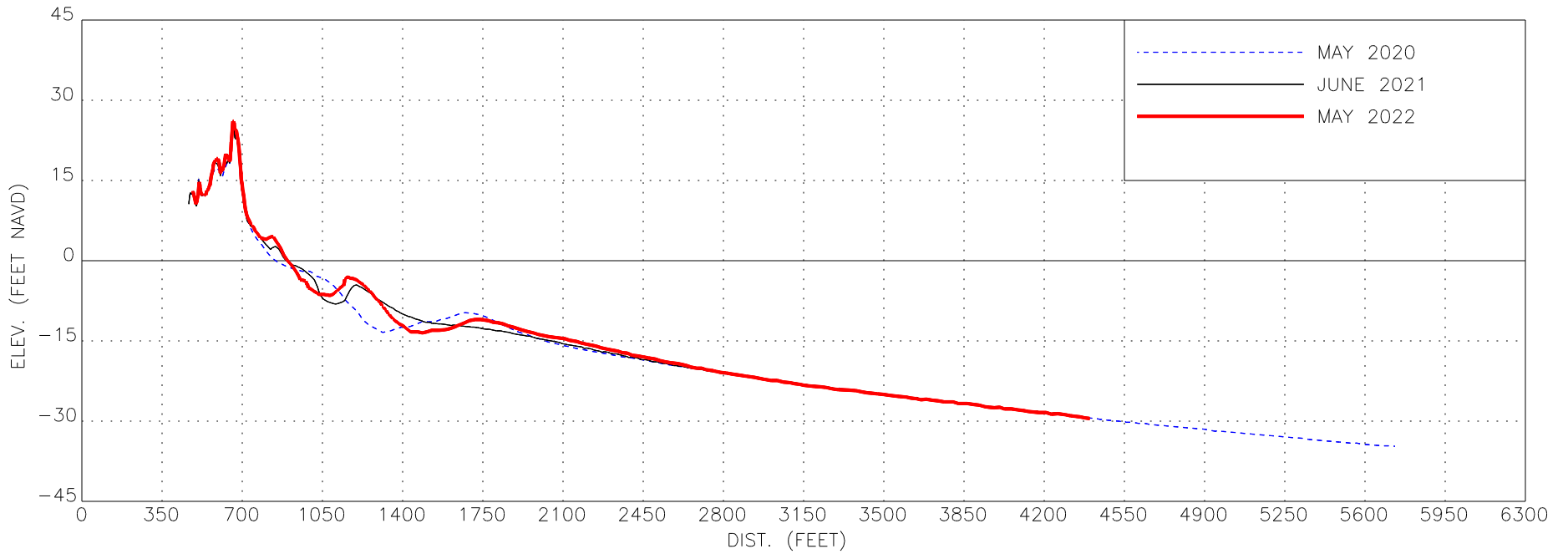
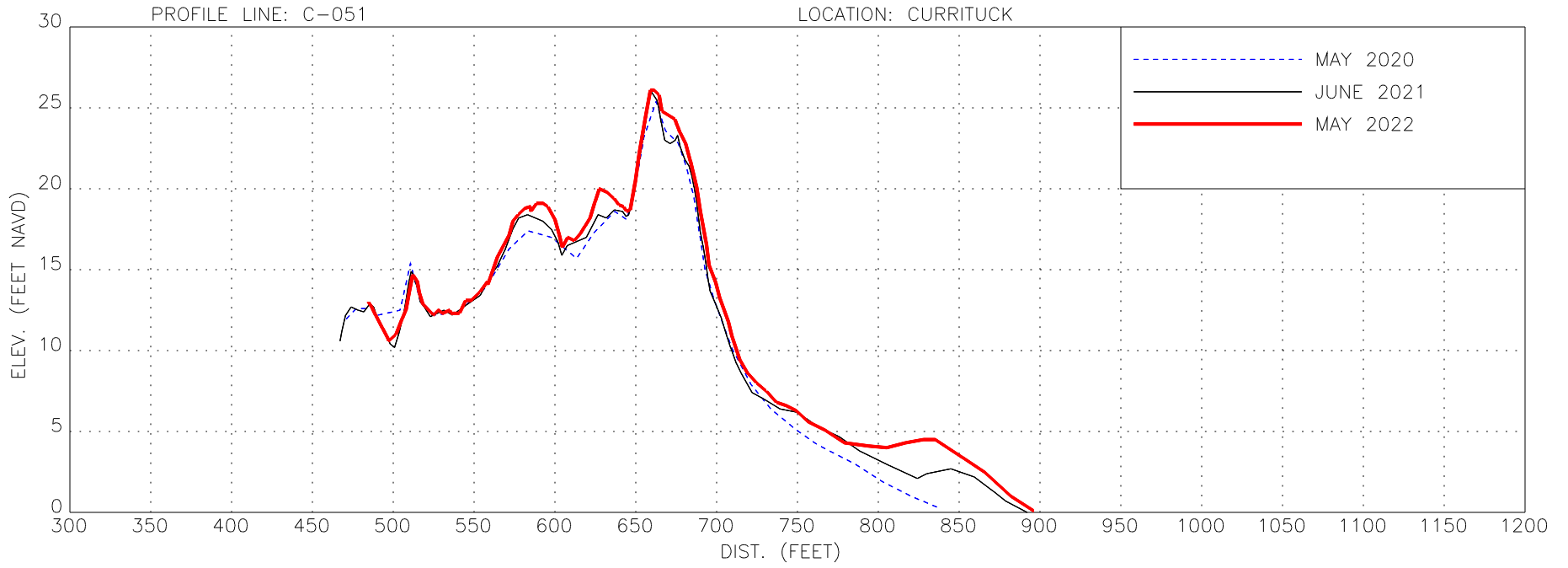
PROFILE LINE: C-048

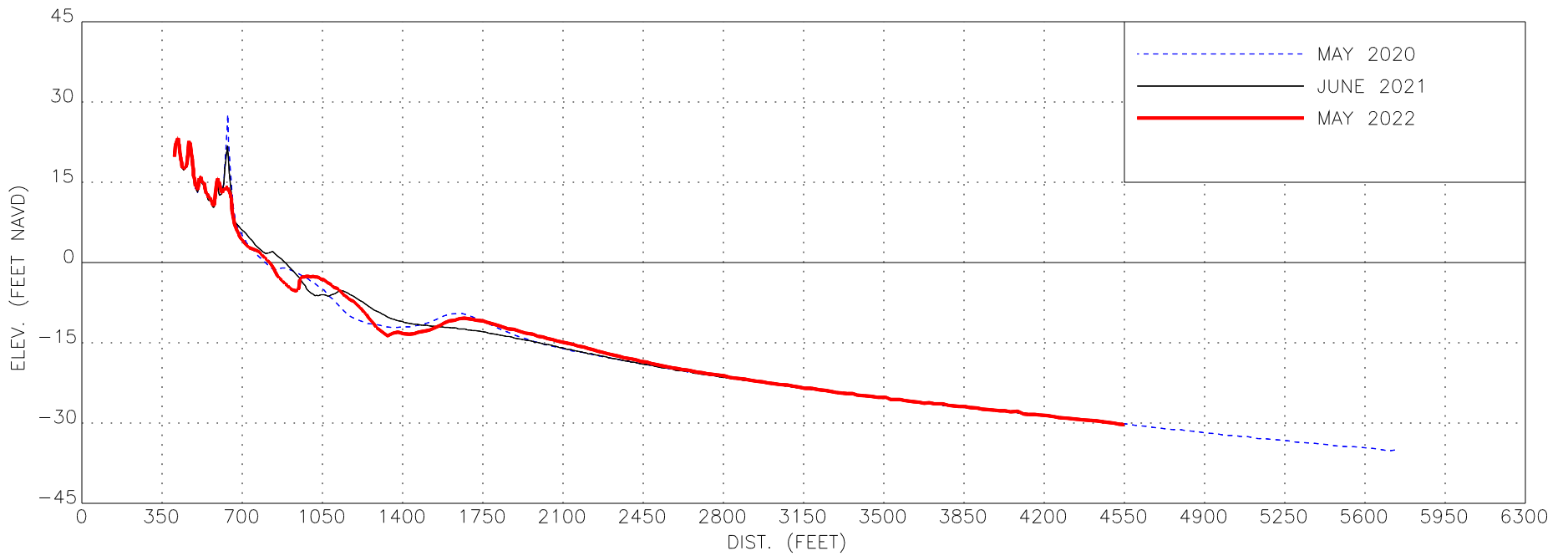
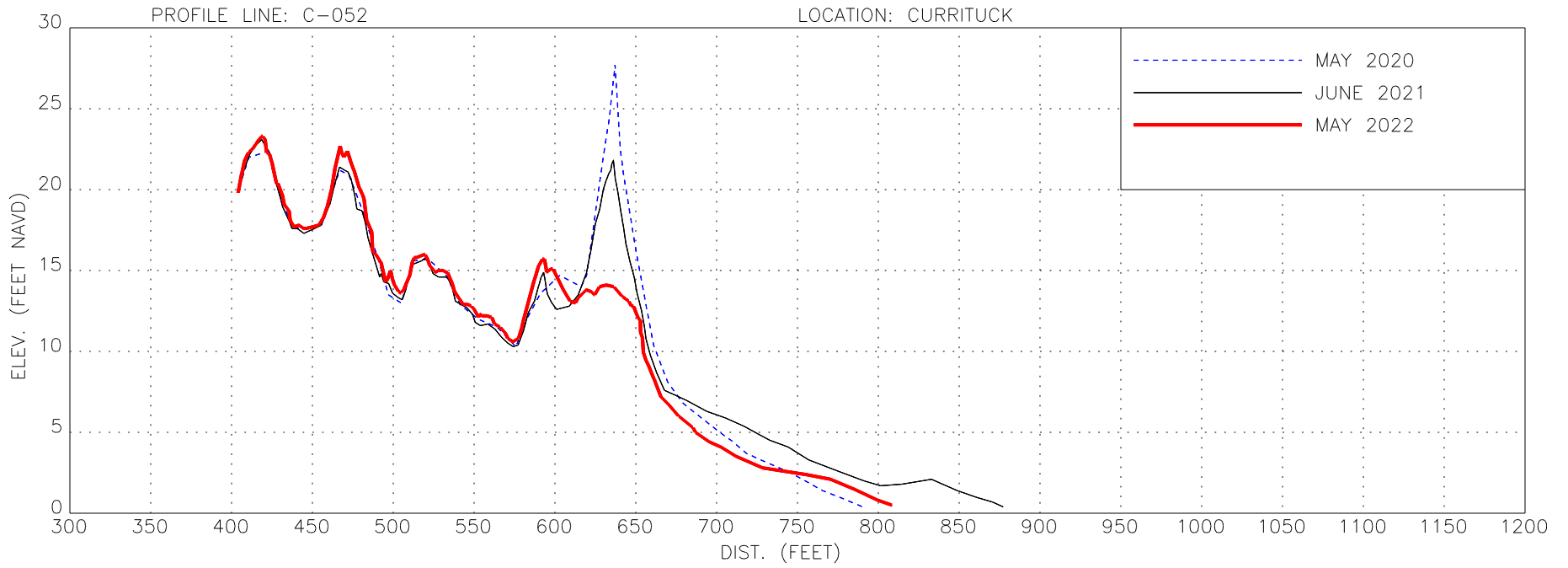
LOCATION: CURRITUCK

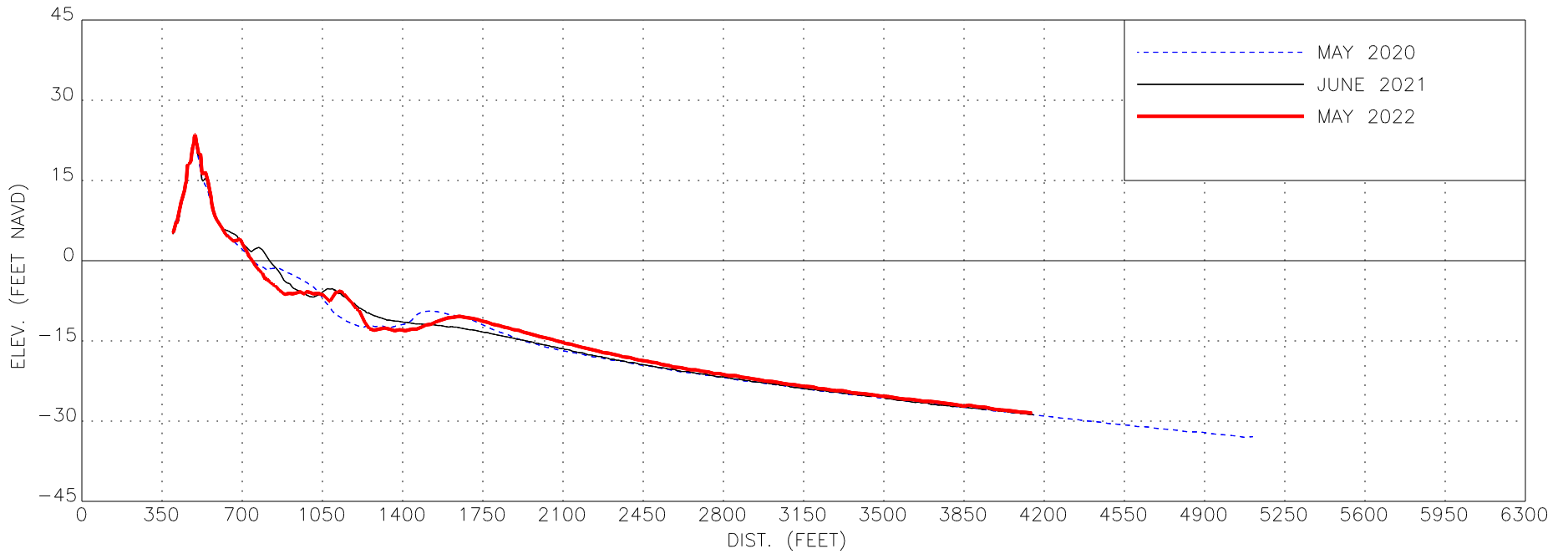
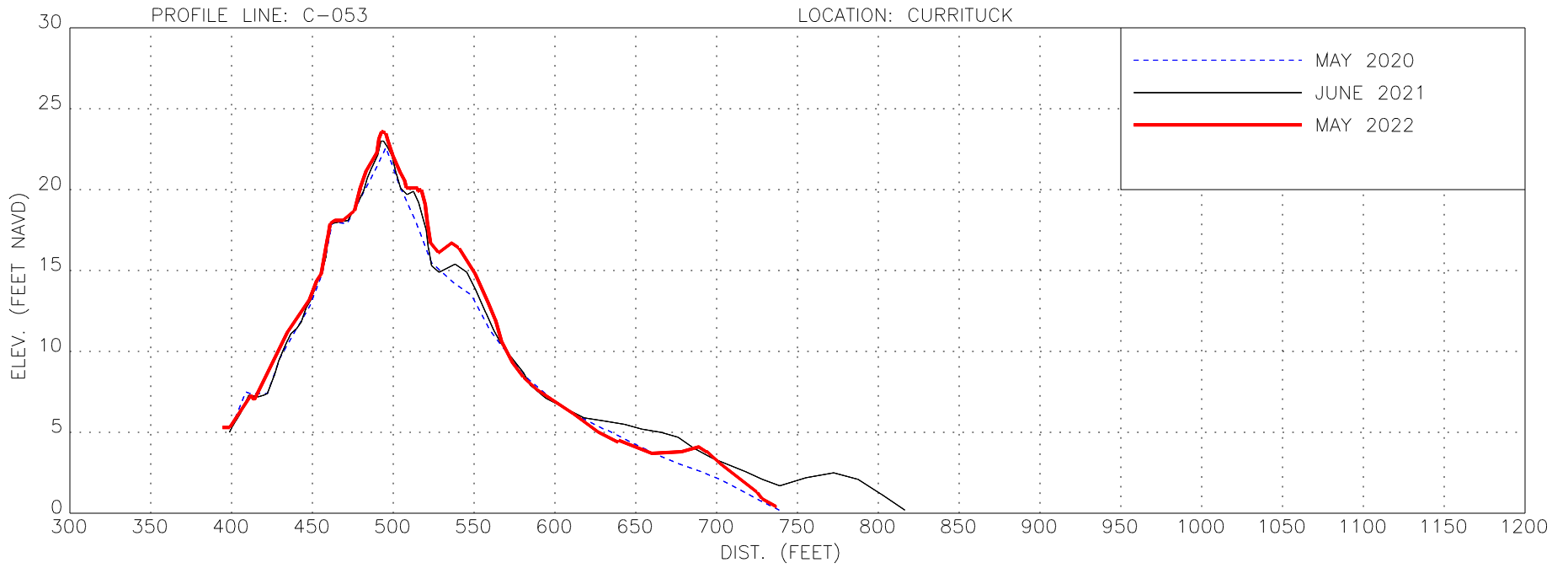






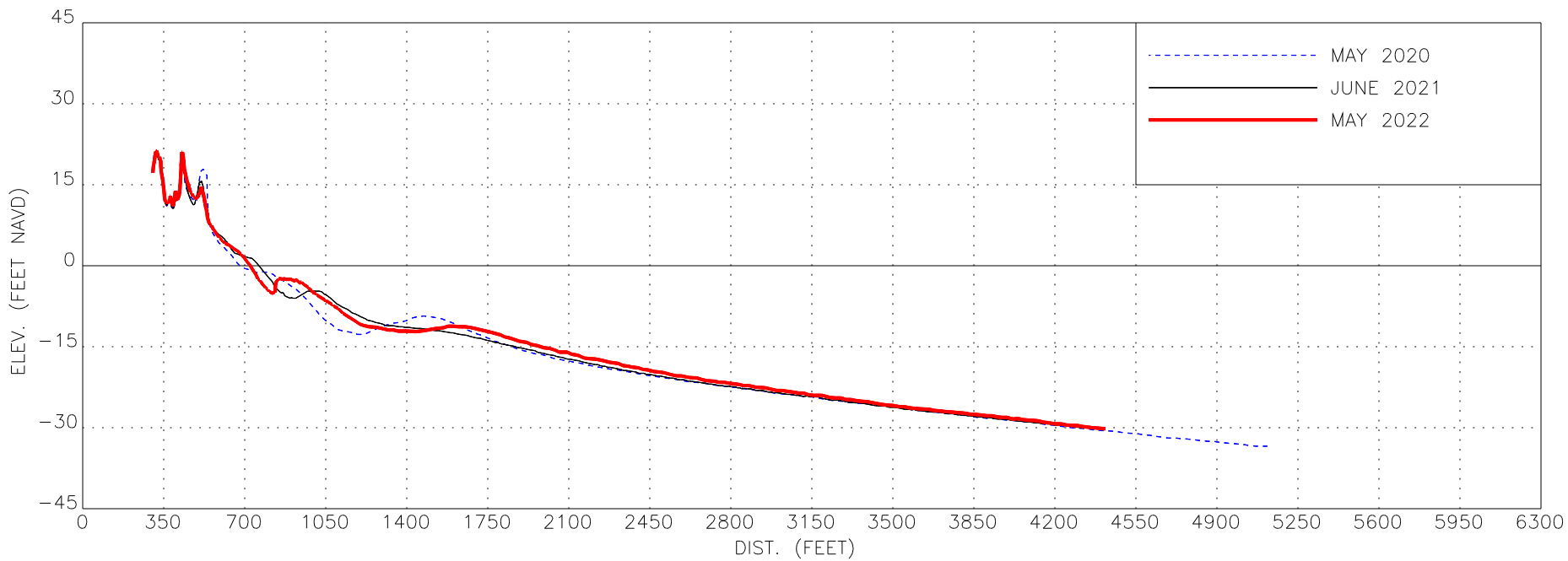
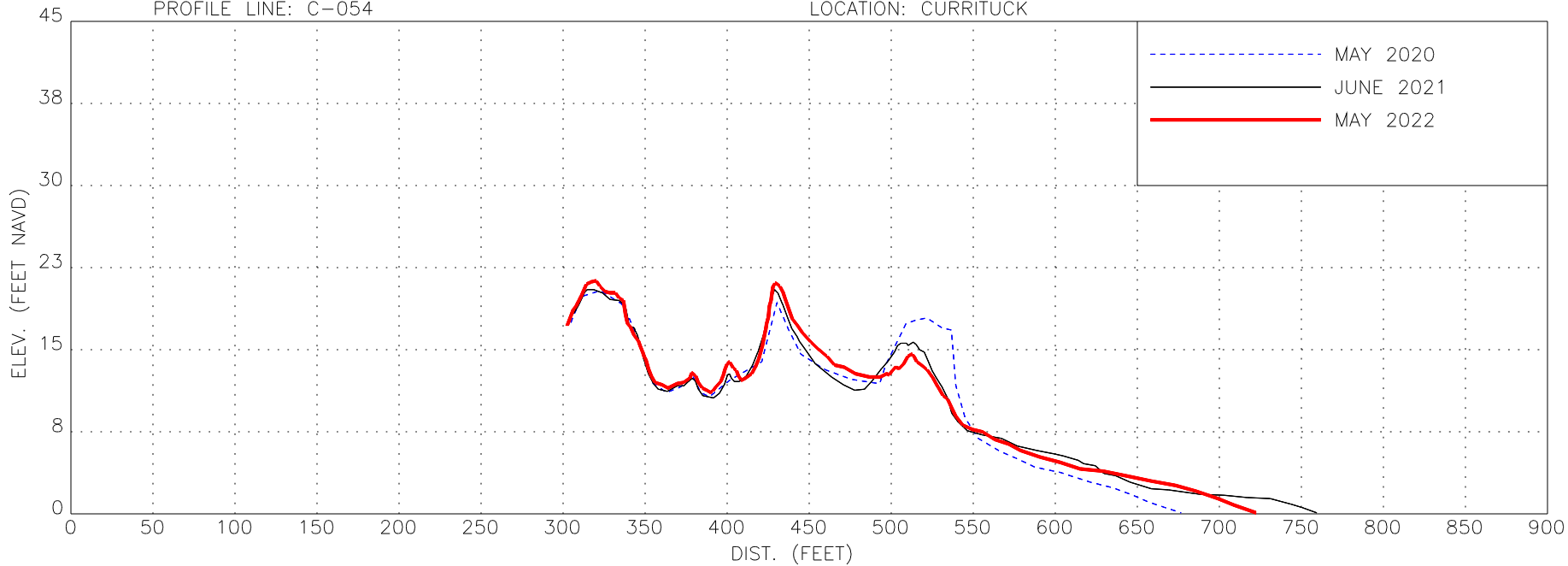


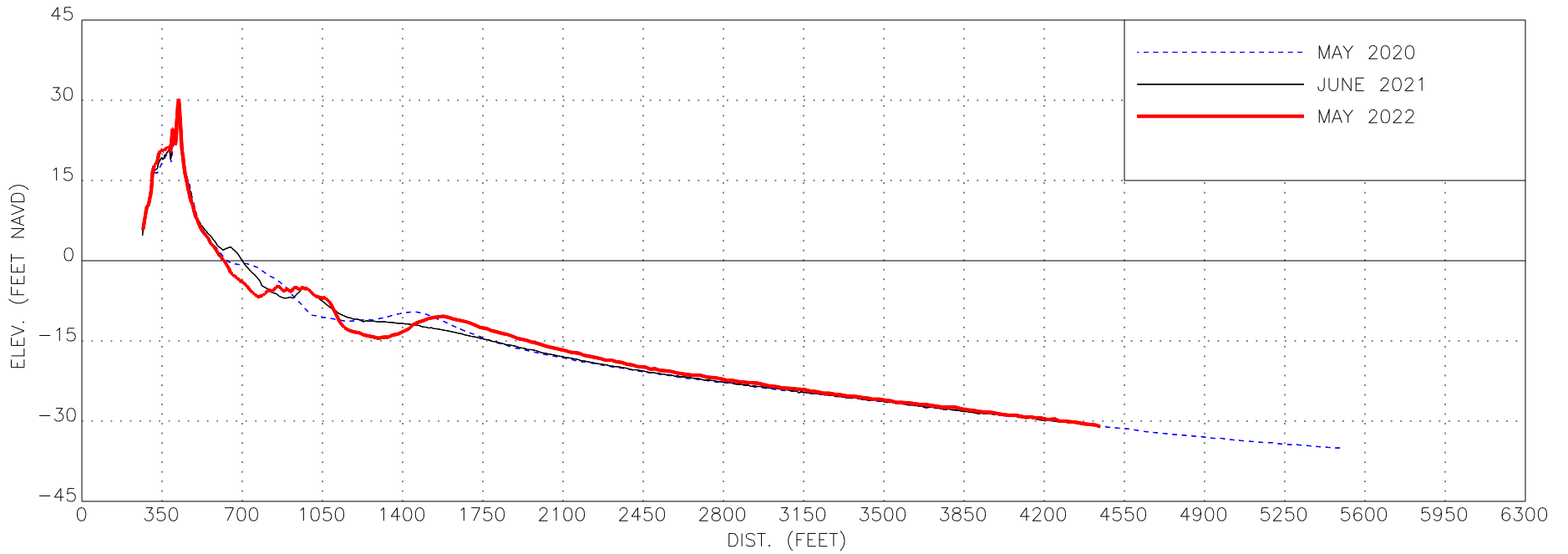
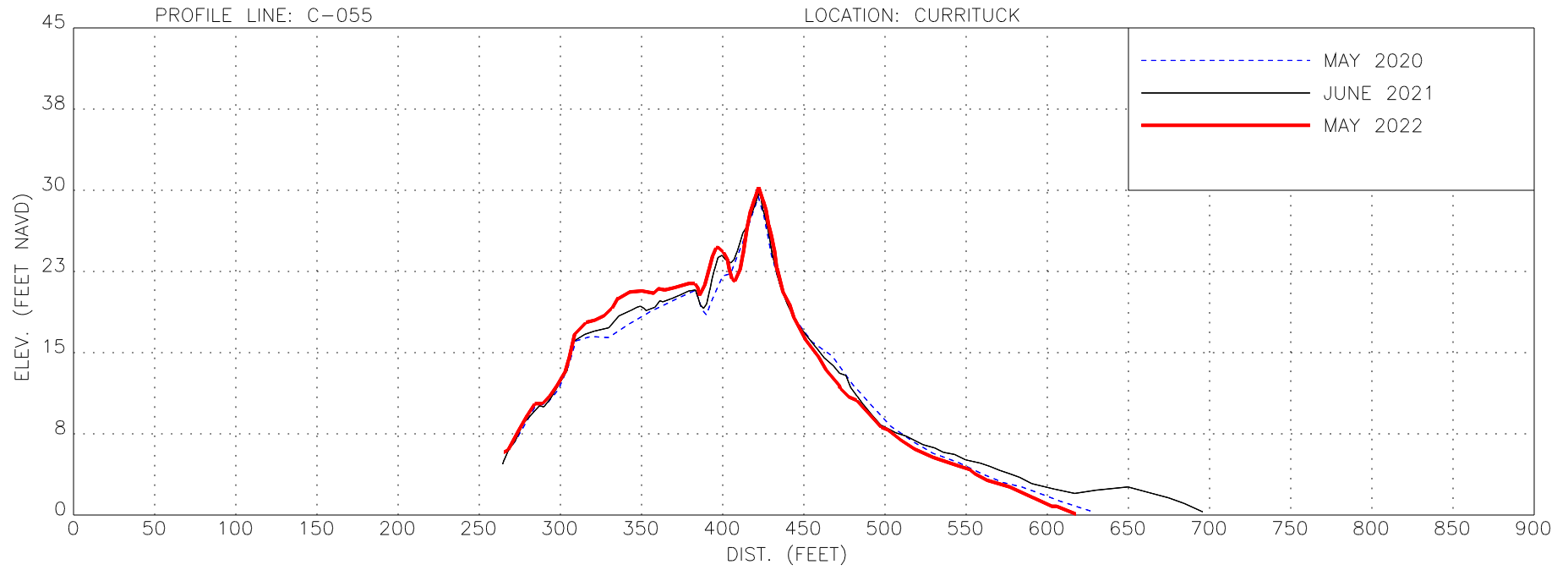




PROFILE LINE: C-054

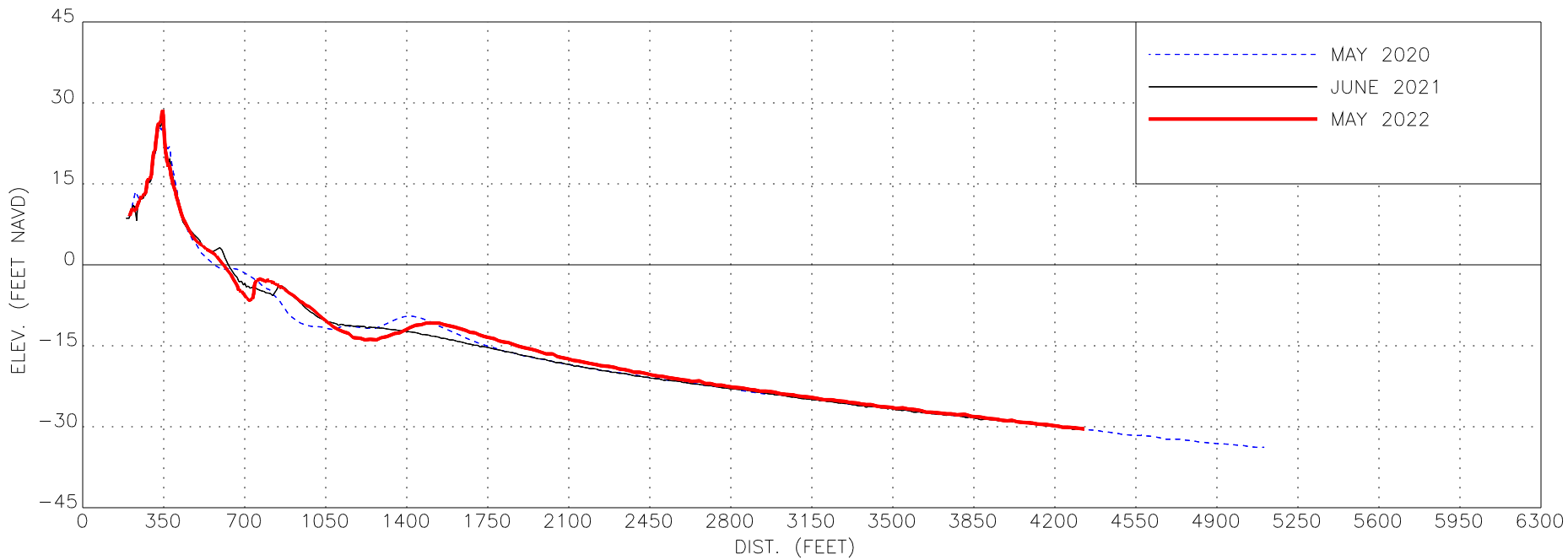
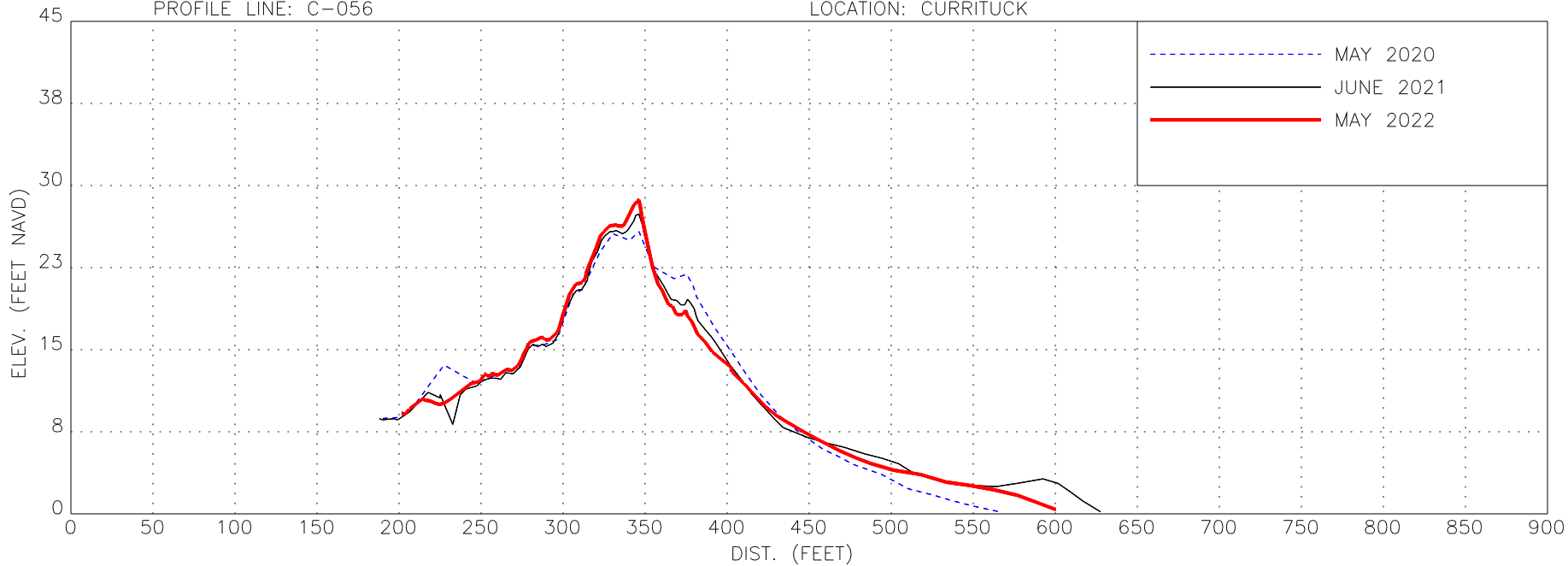
LOCATION: CURRITUCK

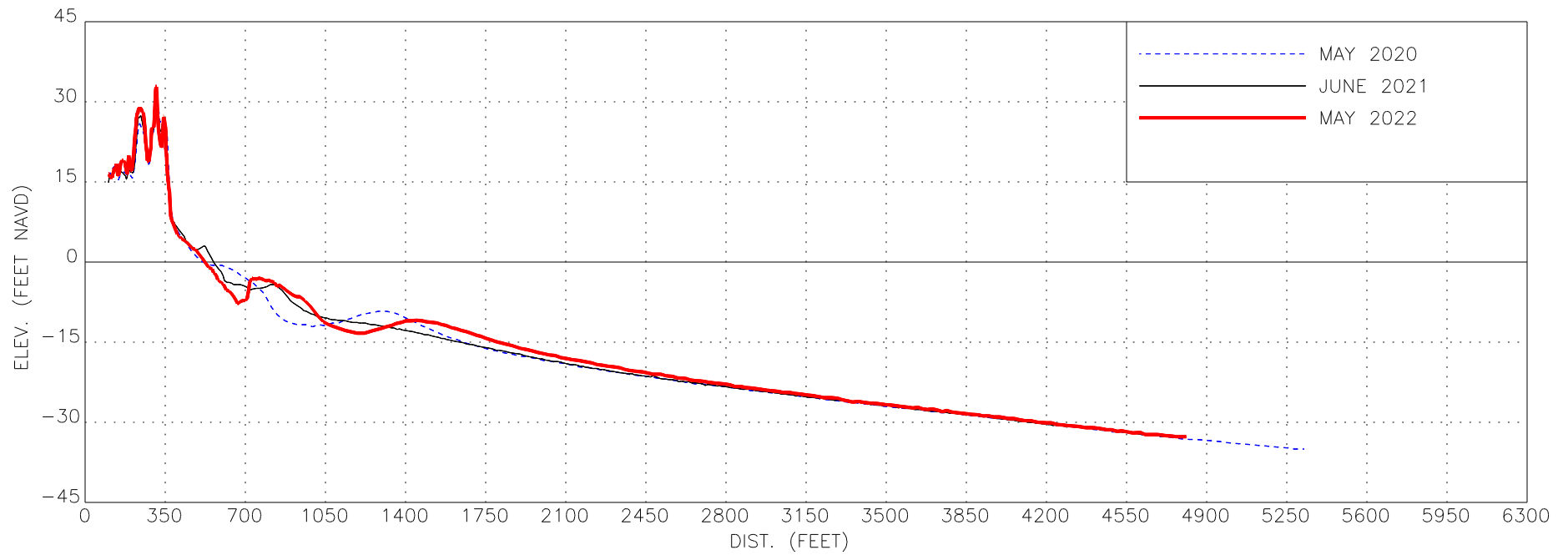
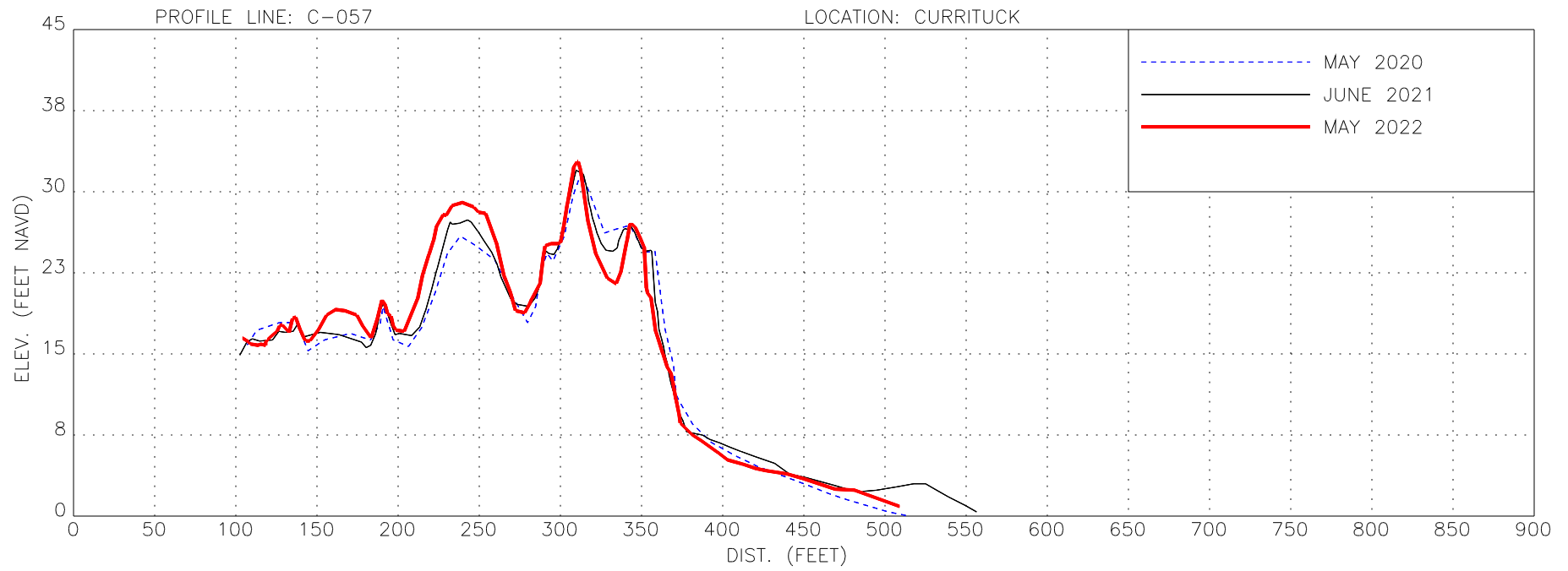




PROFILE LINE: C-056

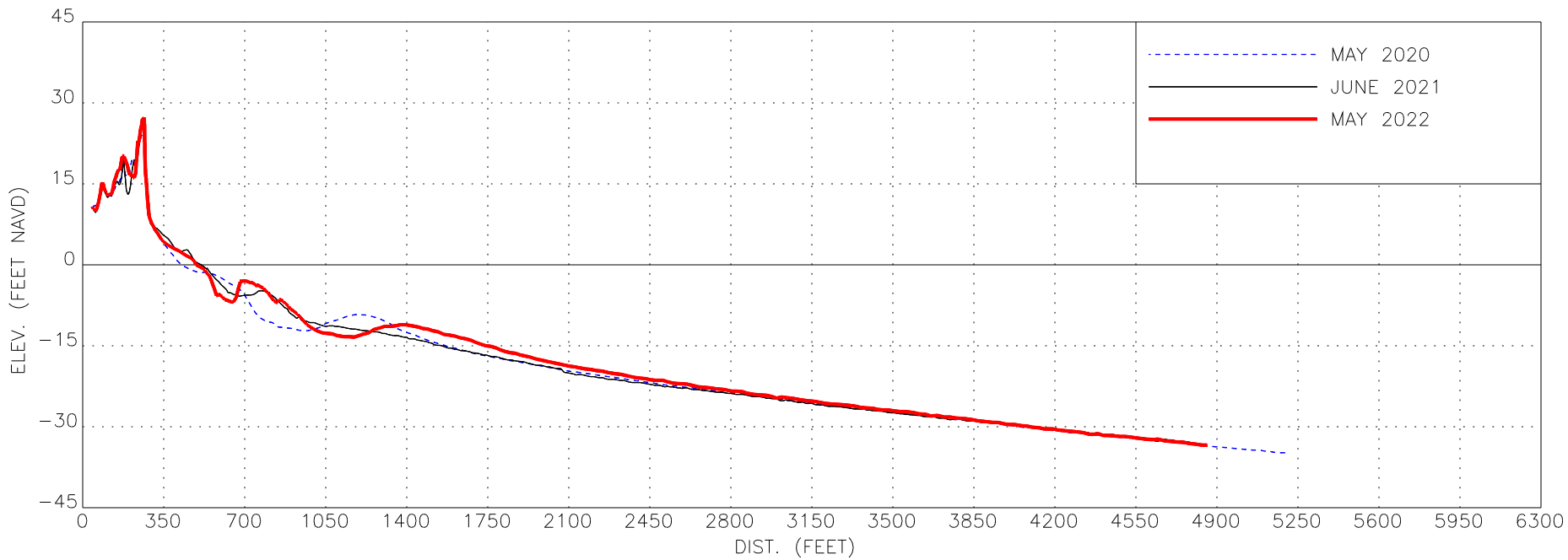
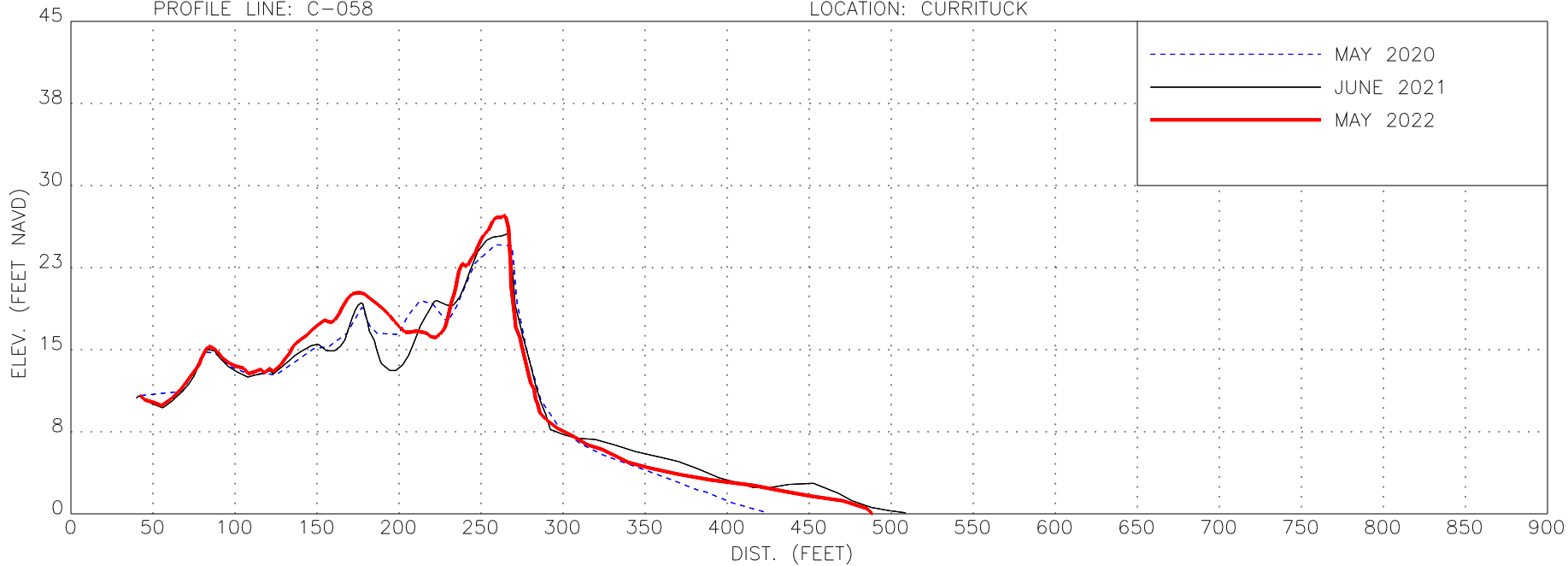
LOCATION: CURRITUCK





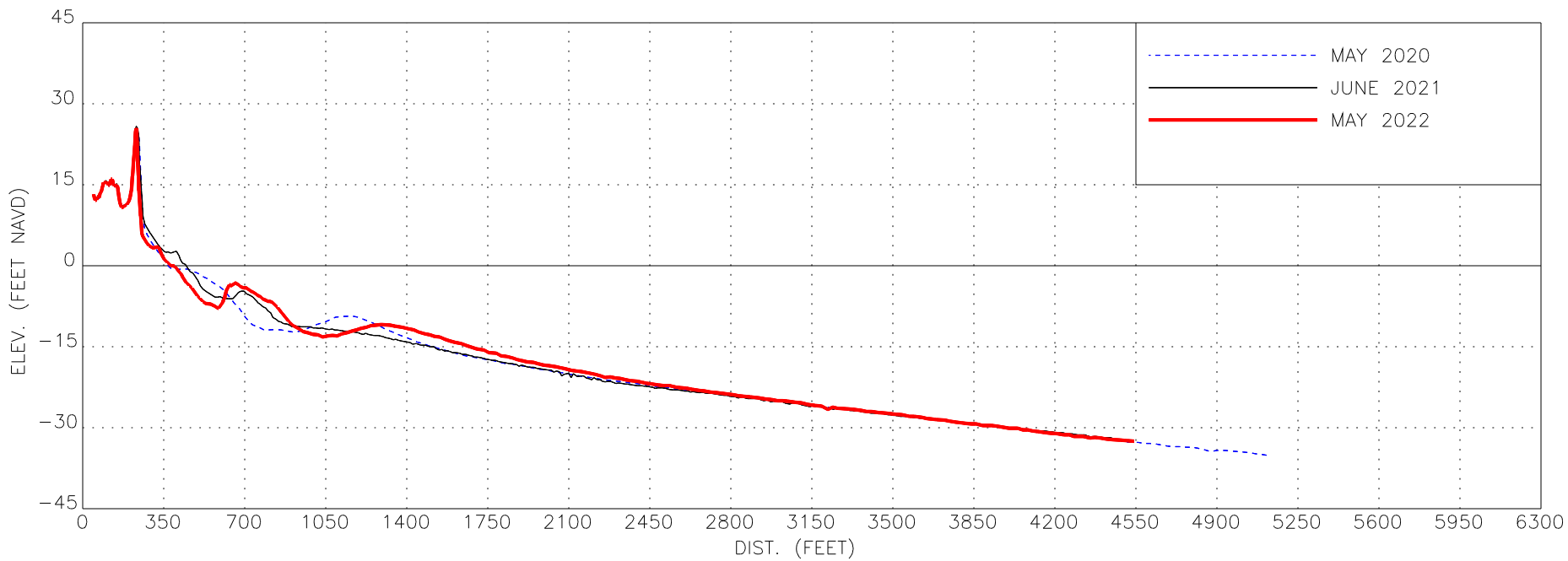
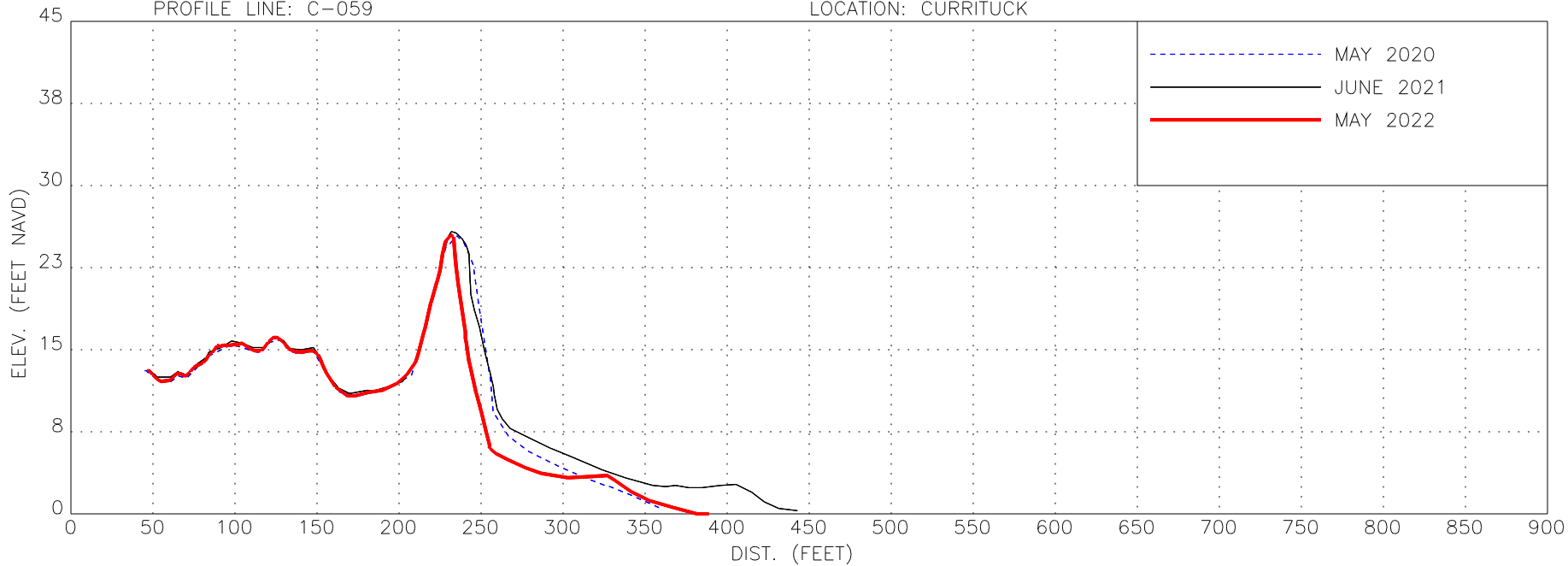
PROFILE LINE: C-058

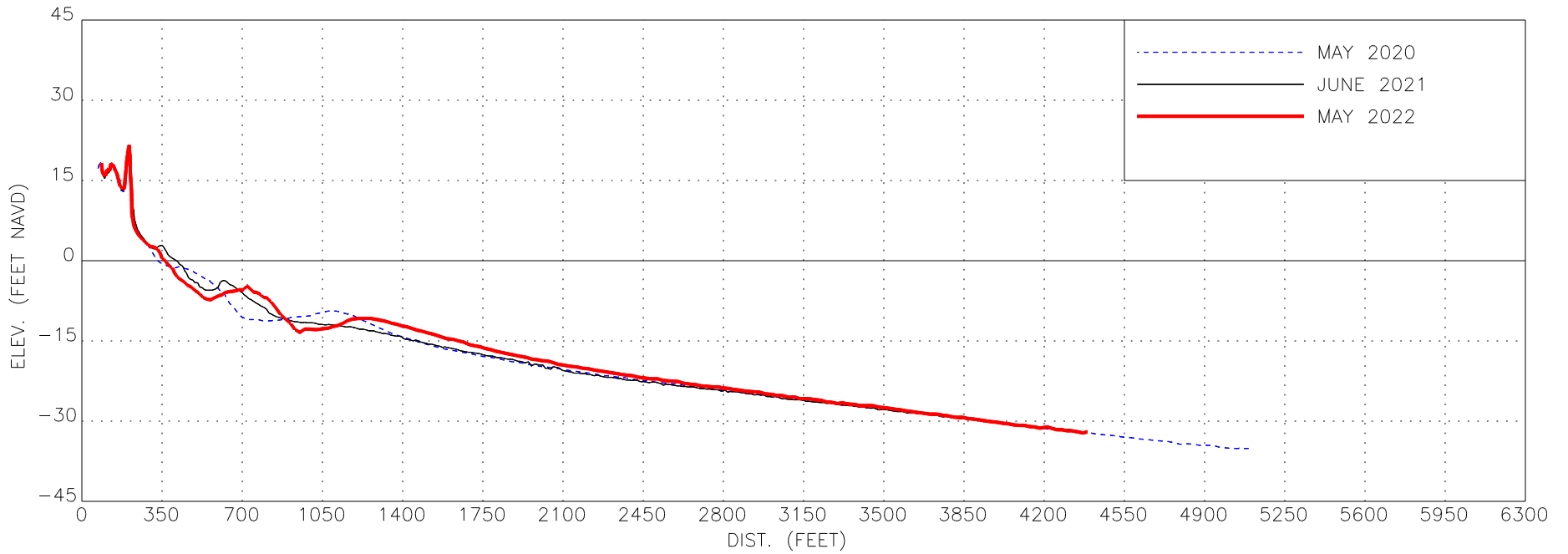
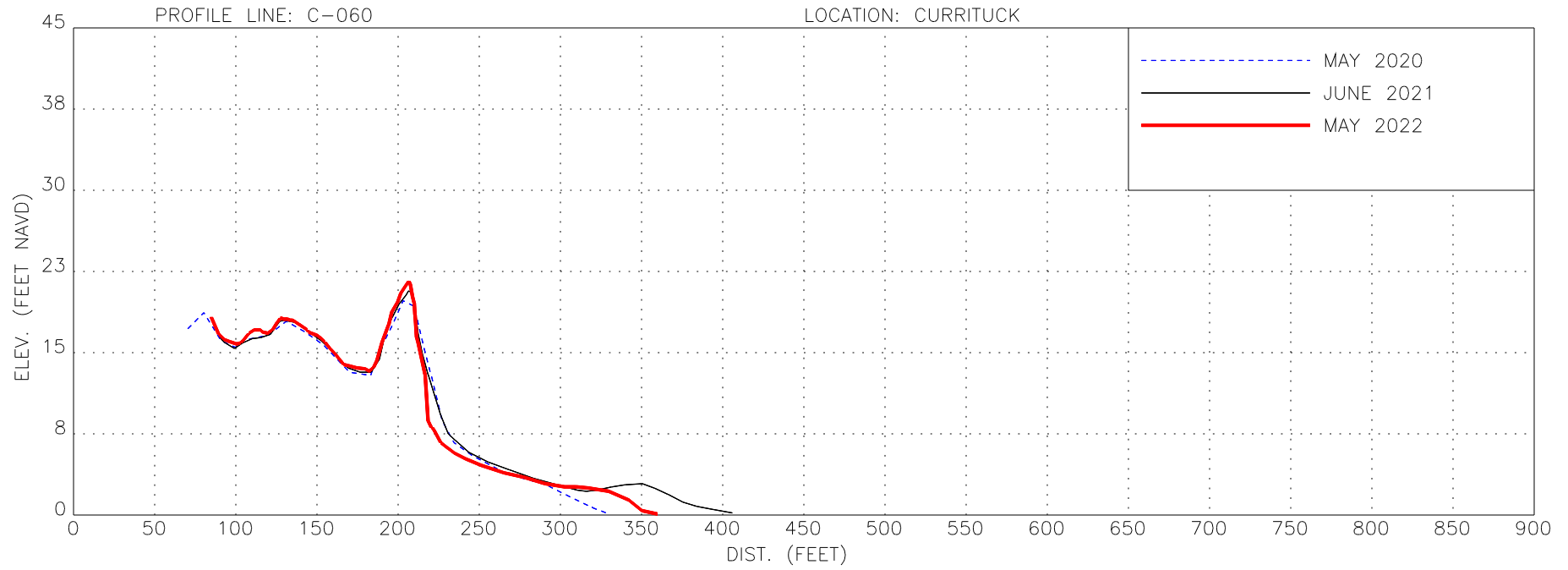
LOCATION: CURRITUCK

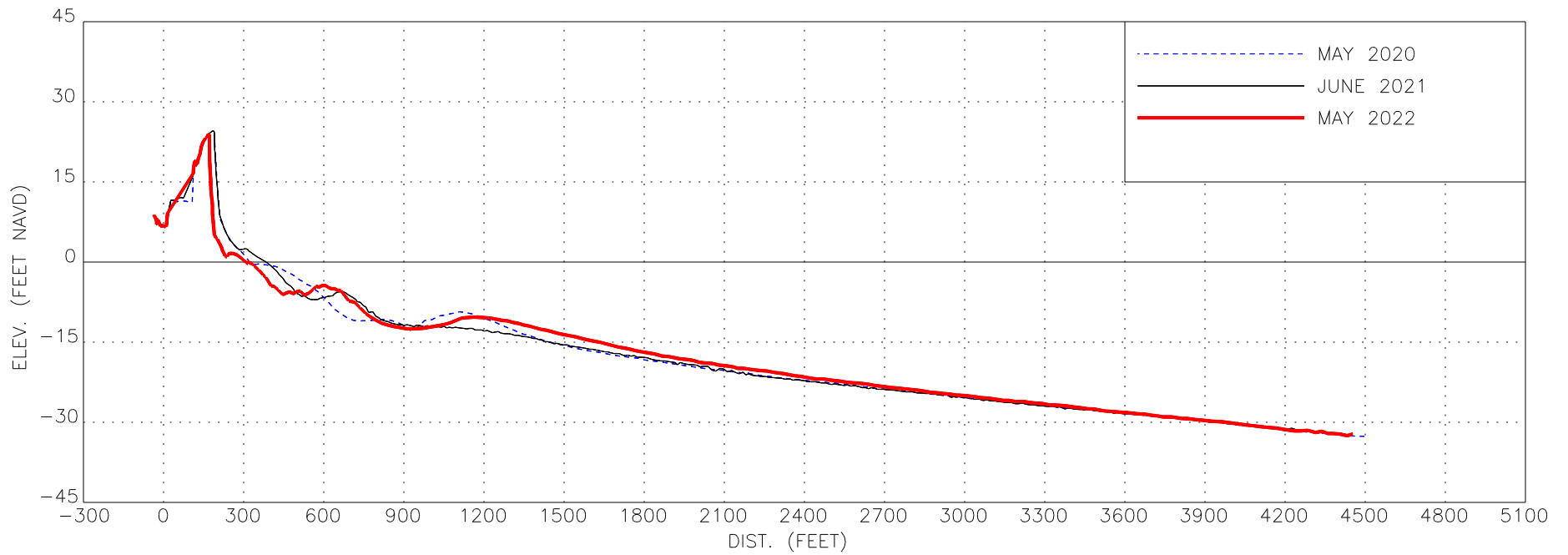
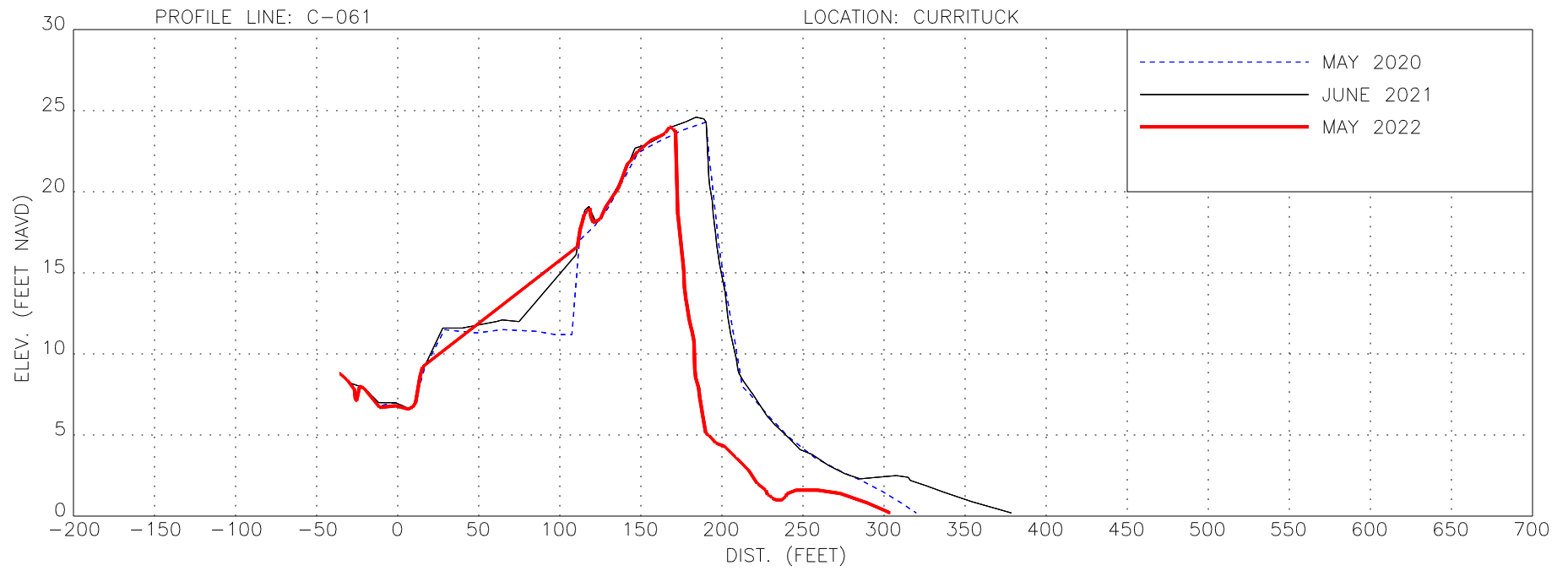


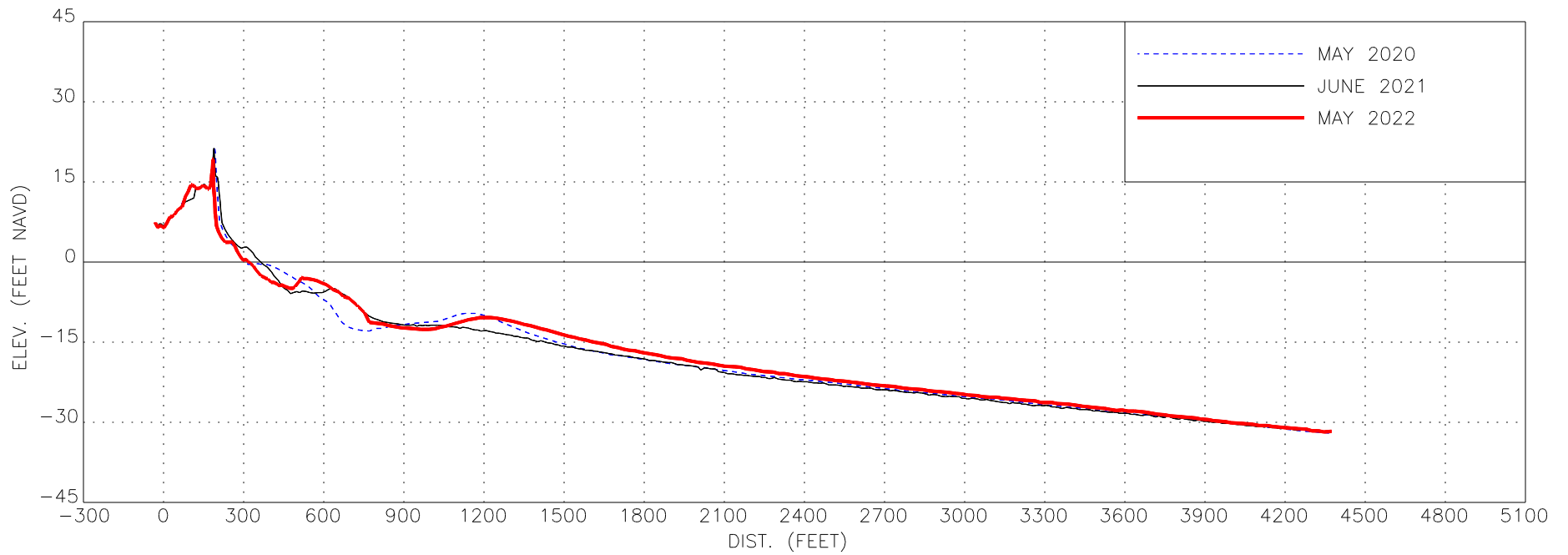
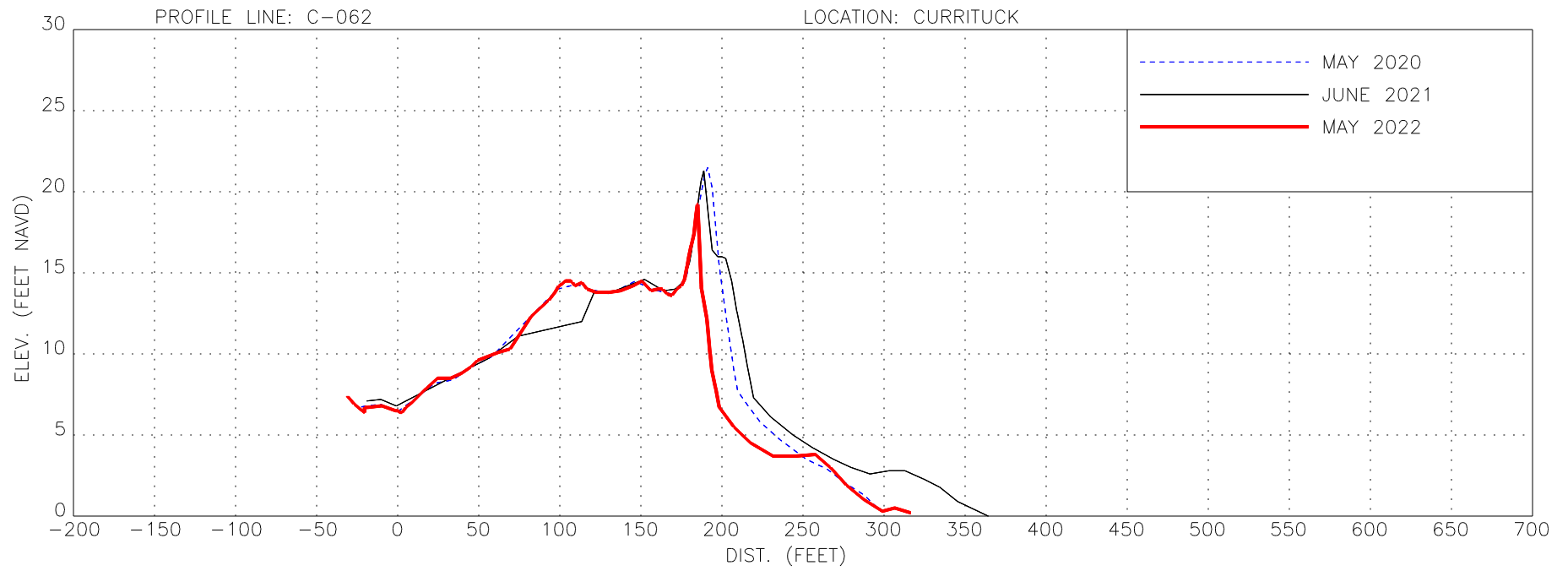
PROFILE LINE: C-059

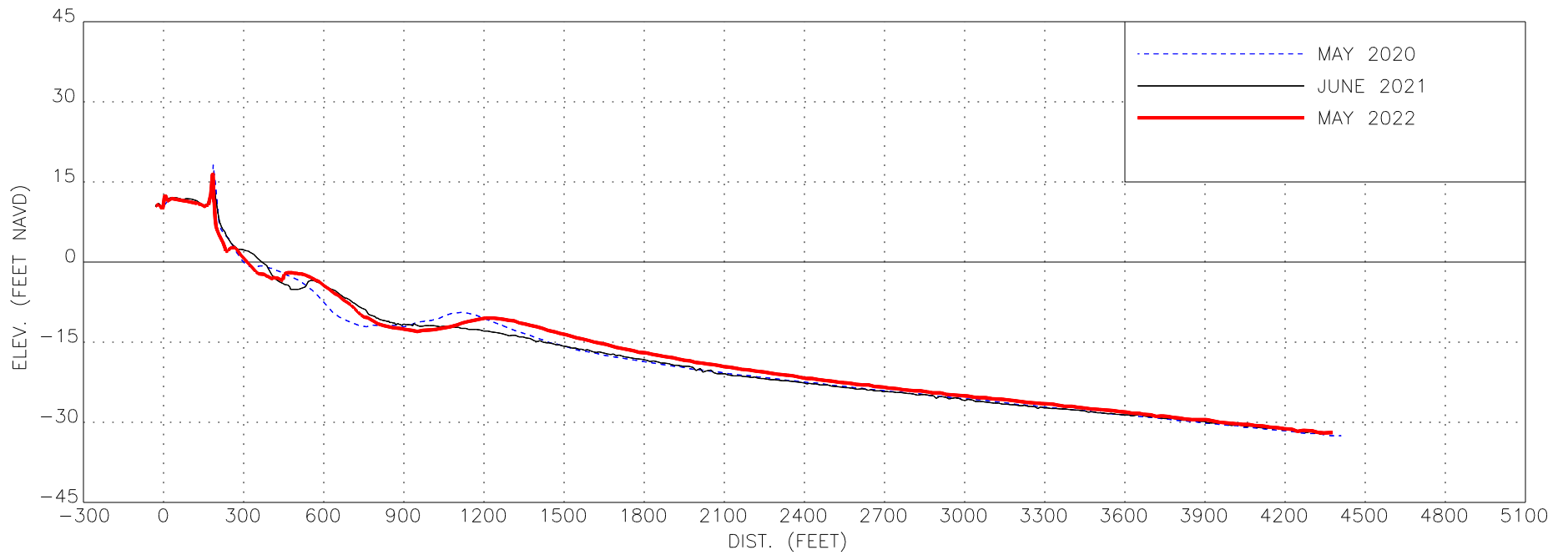
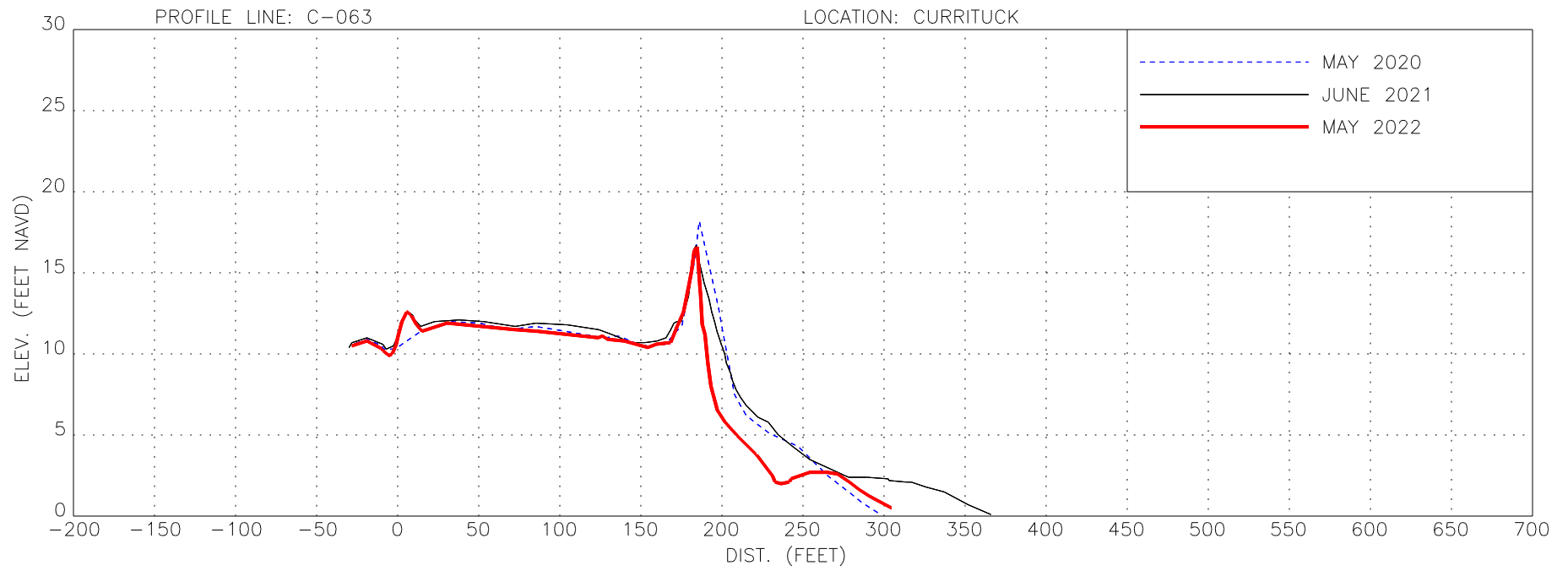
LOCATION: CURRITUCK

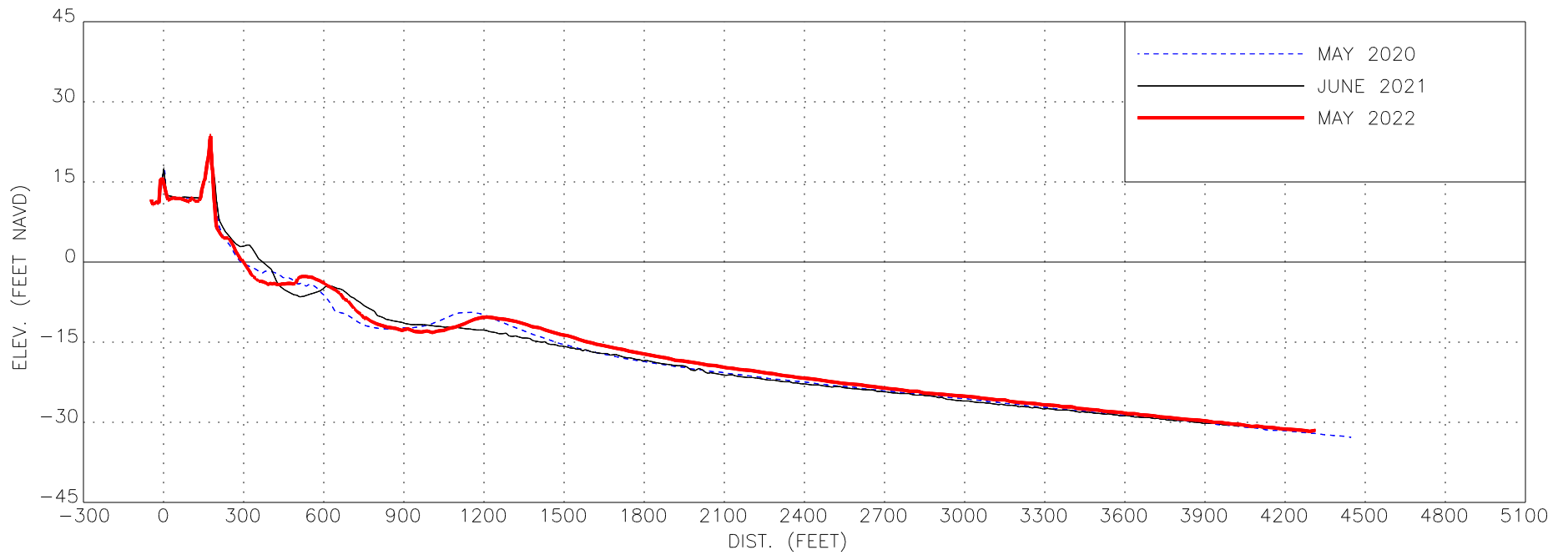
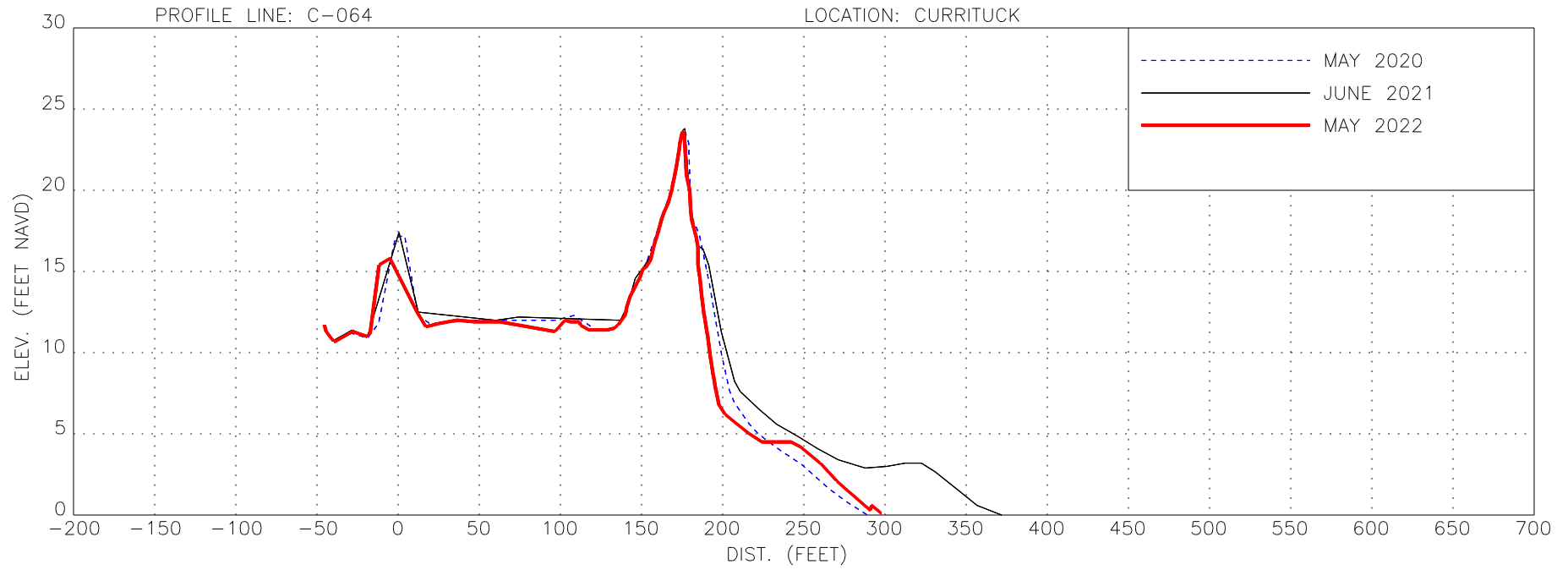


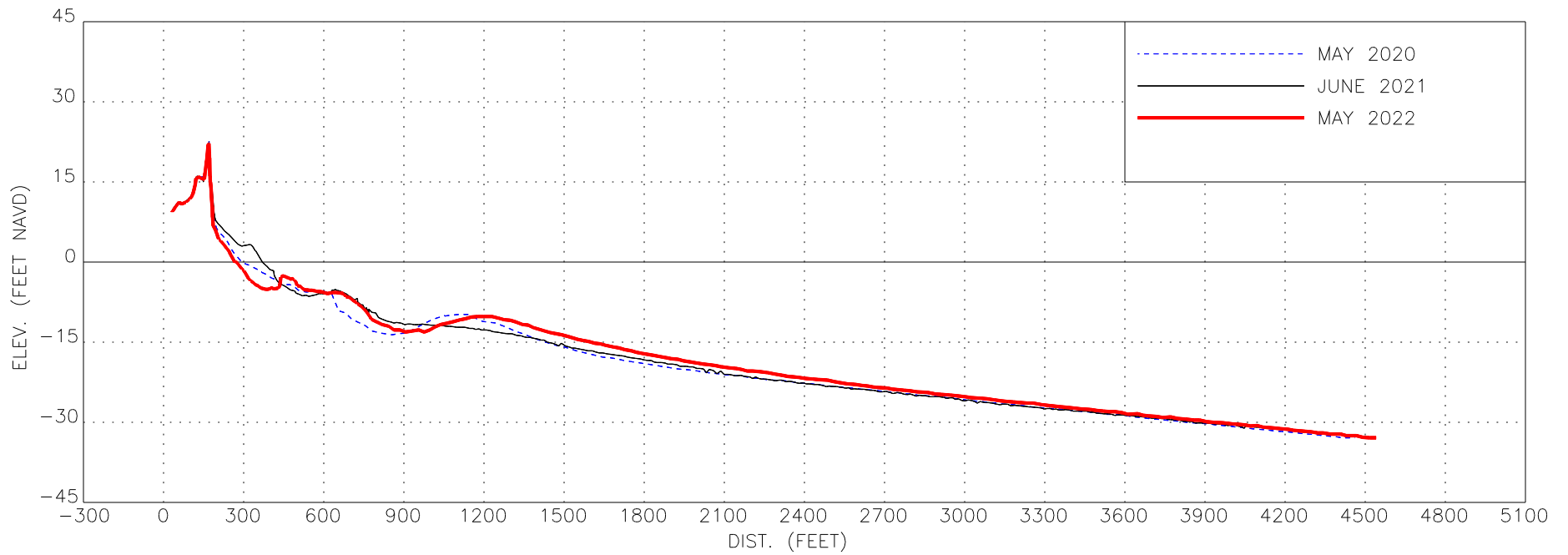
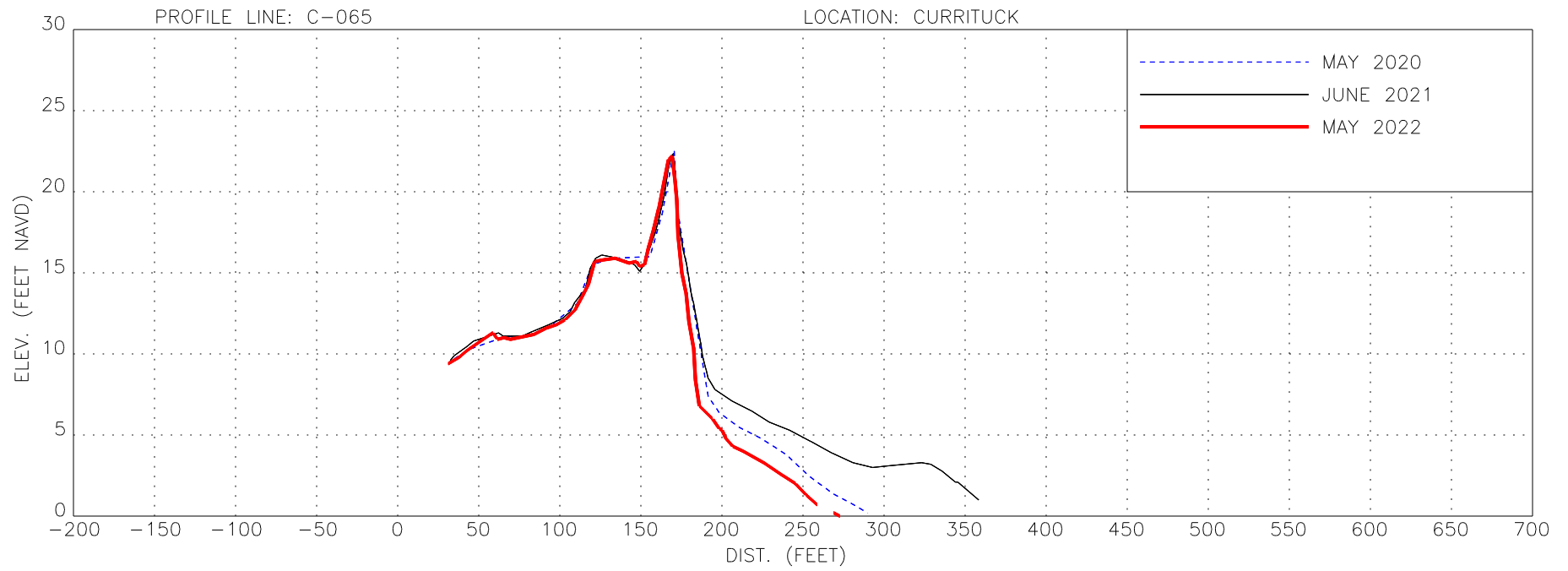


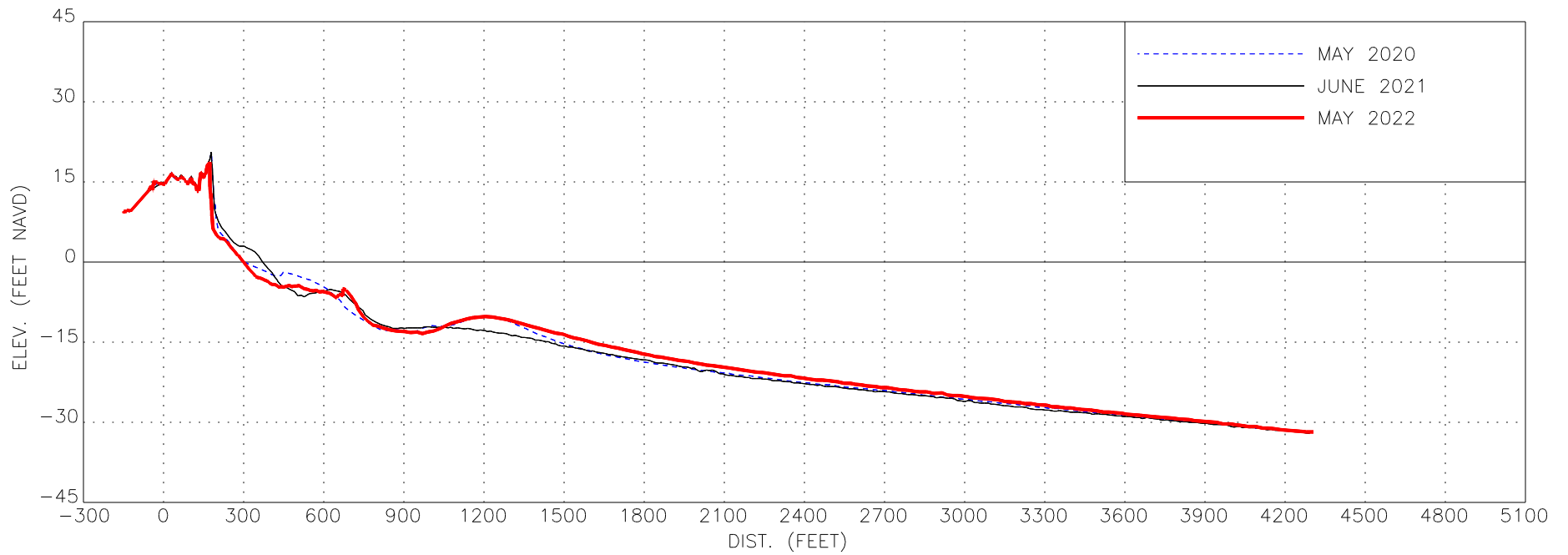
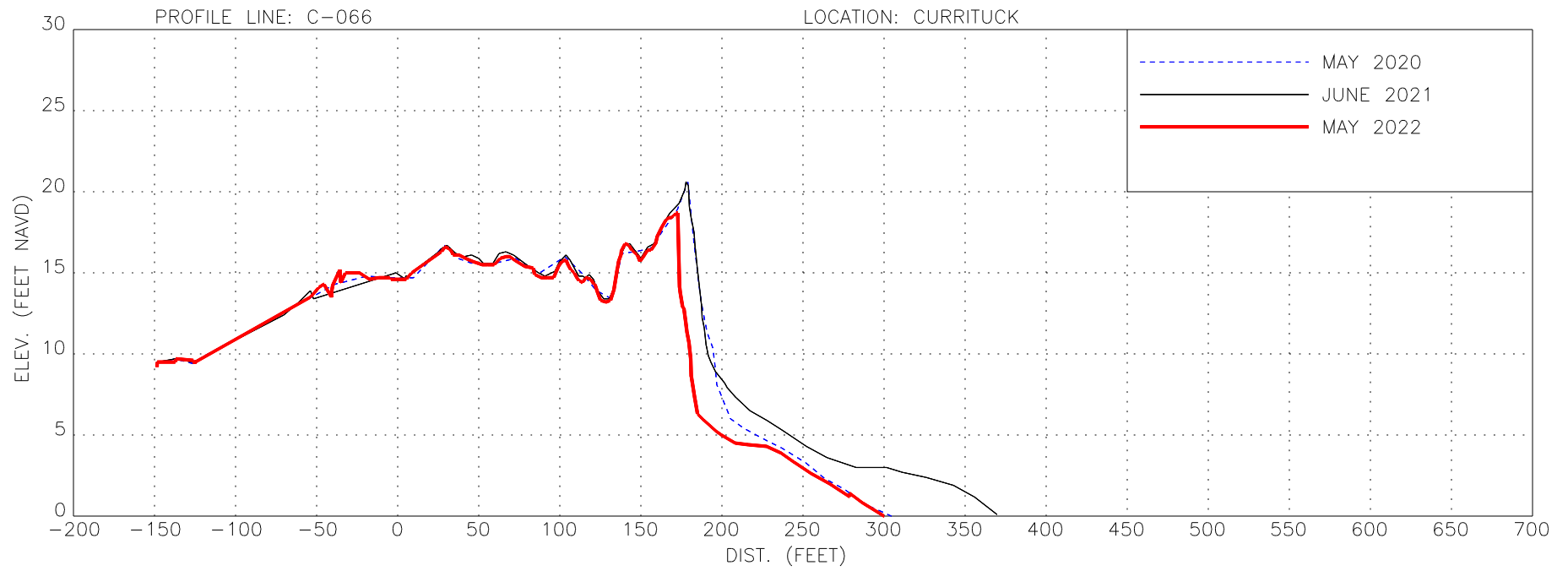


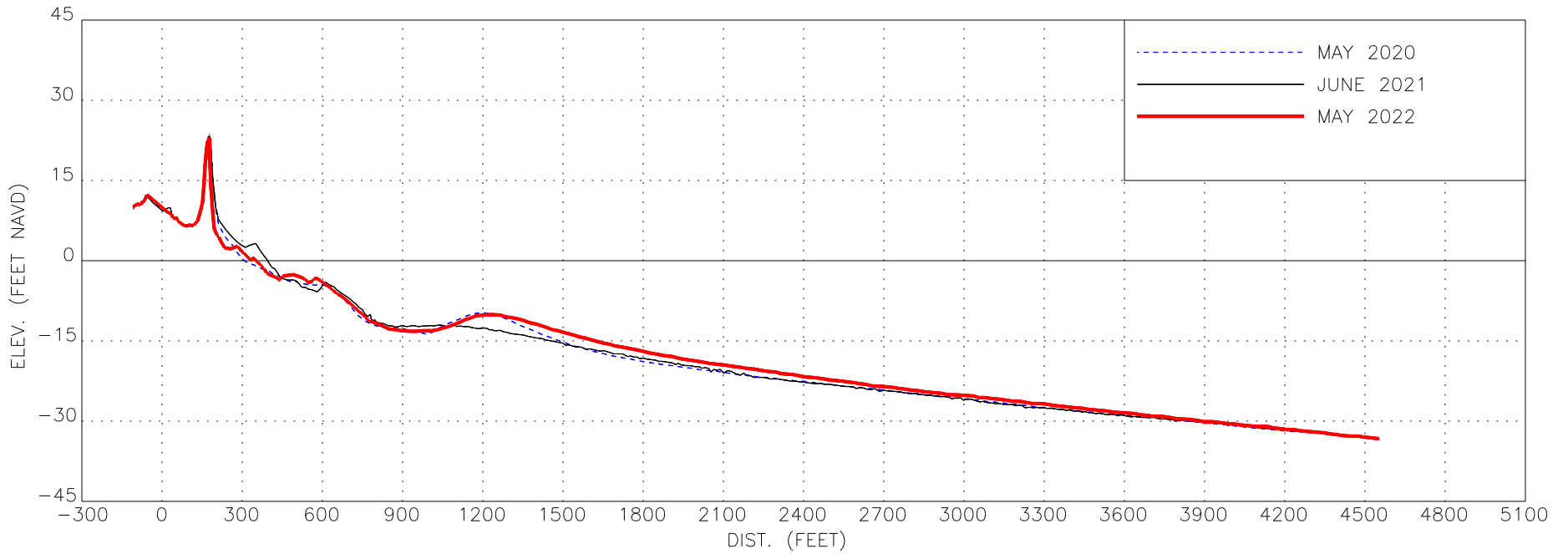
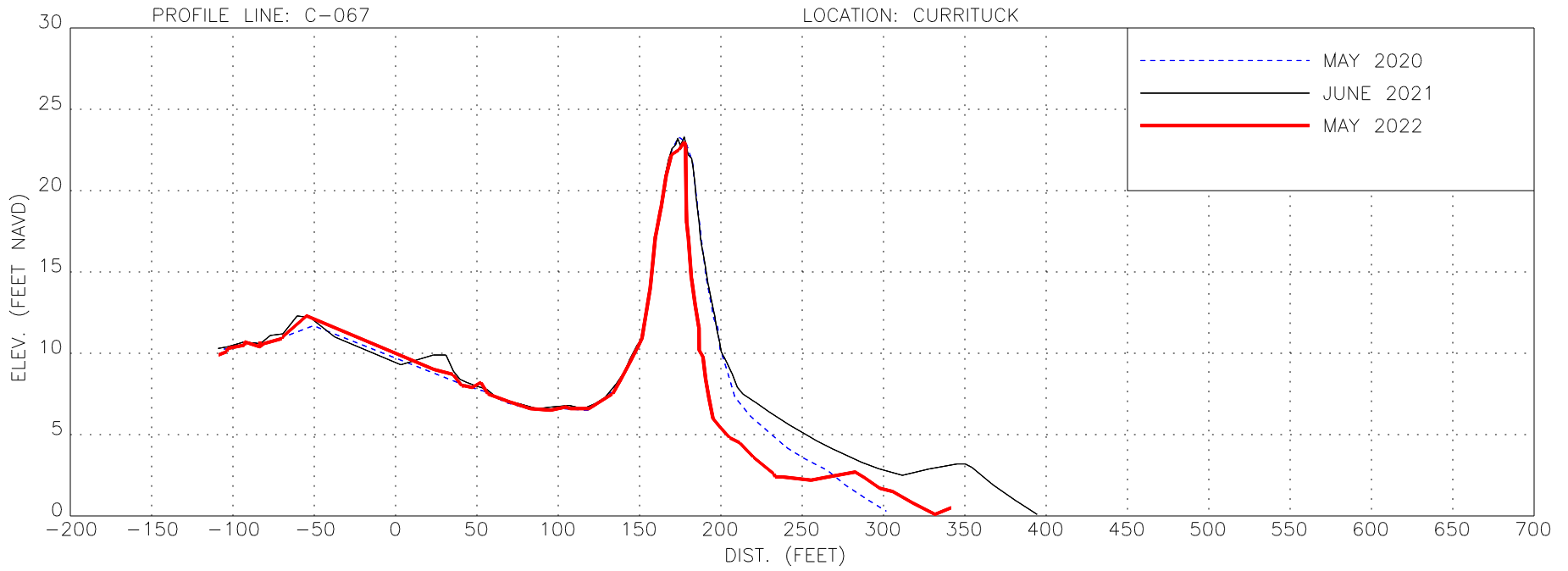


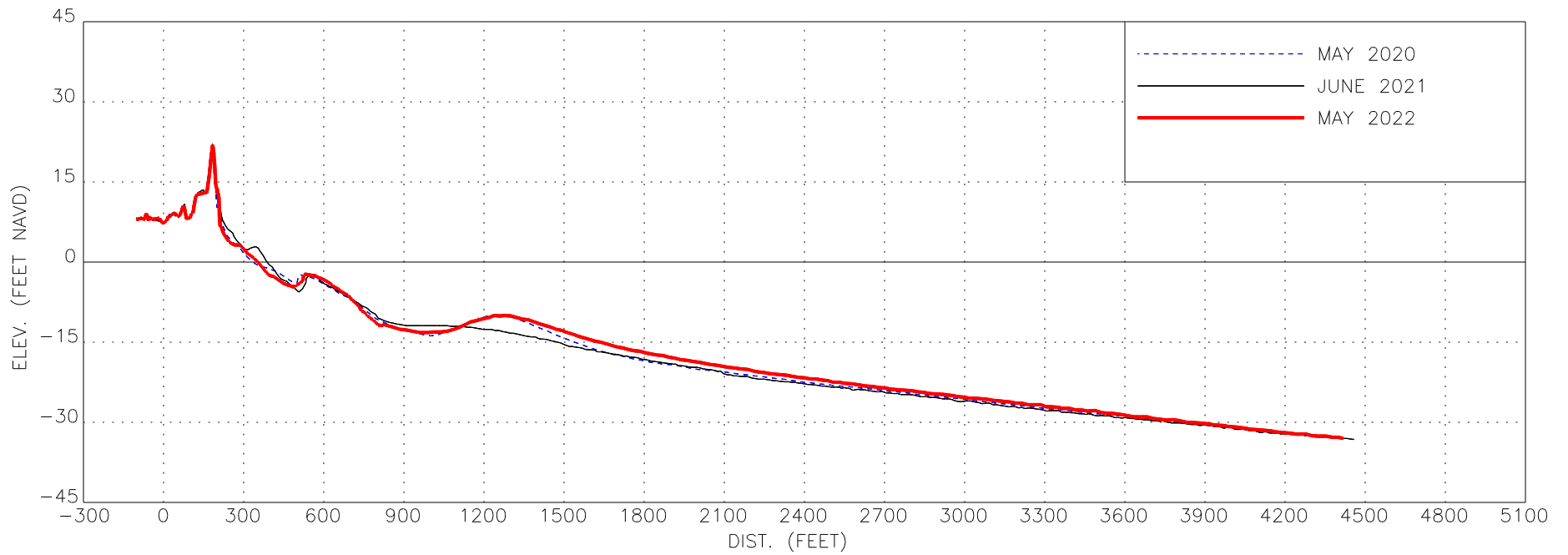
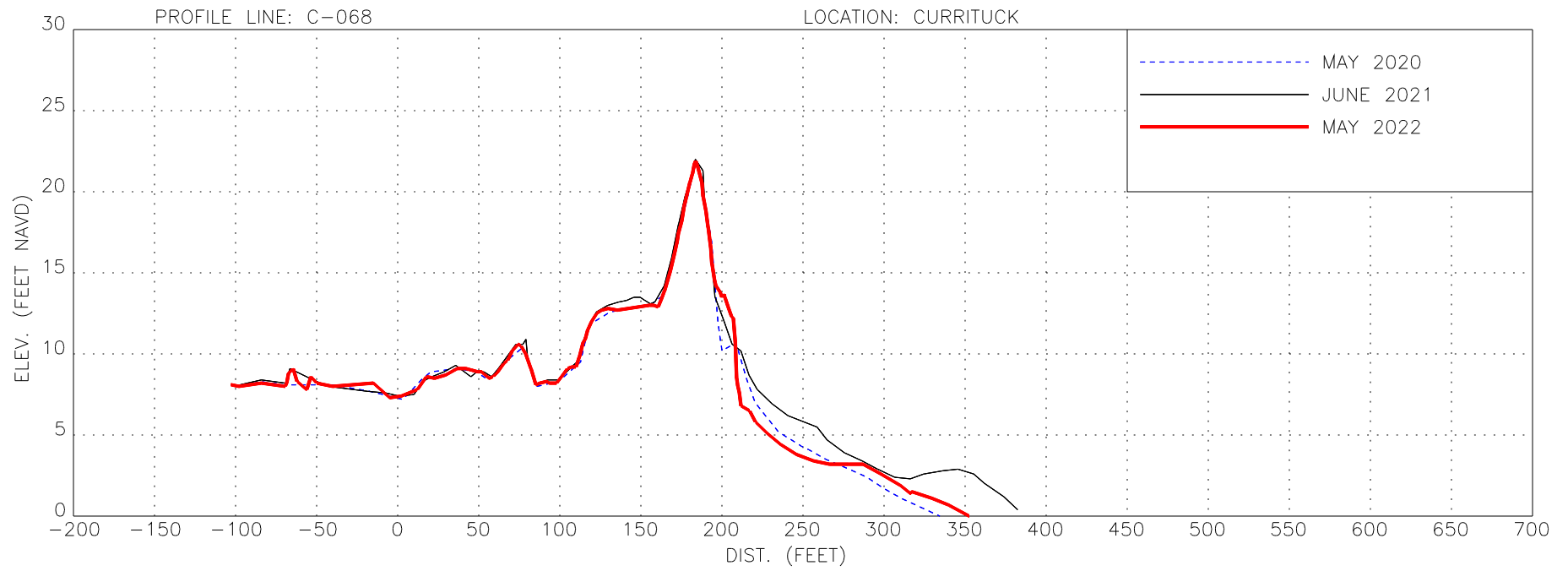


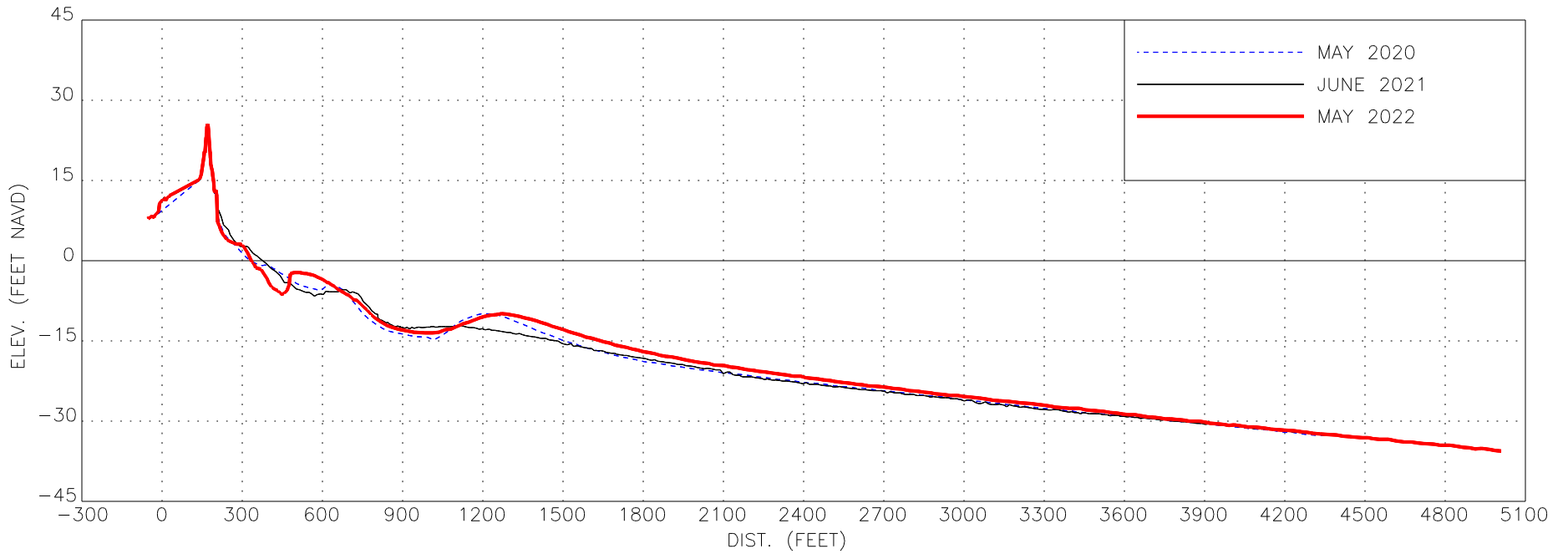
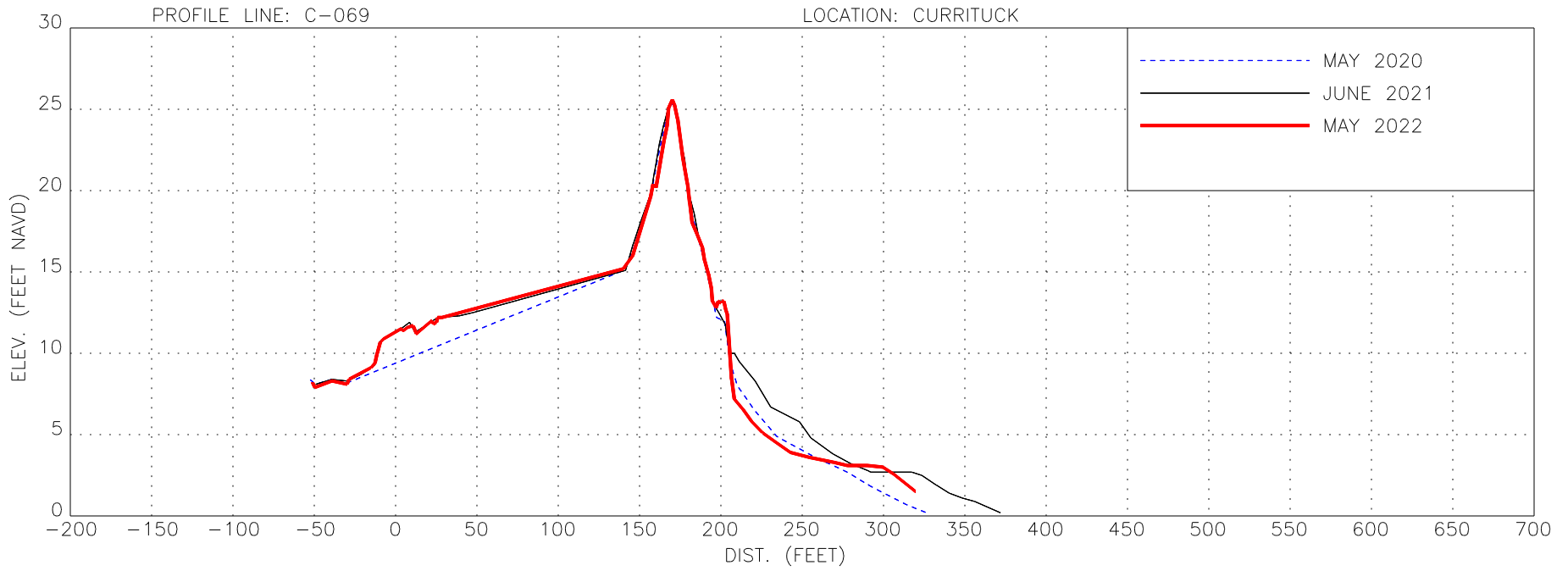


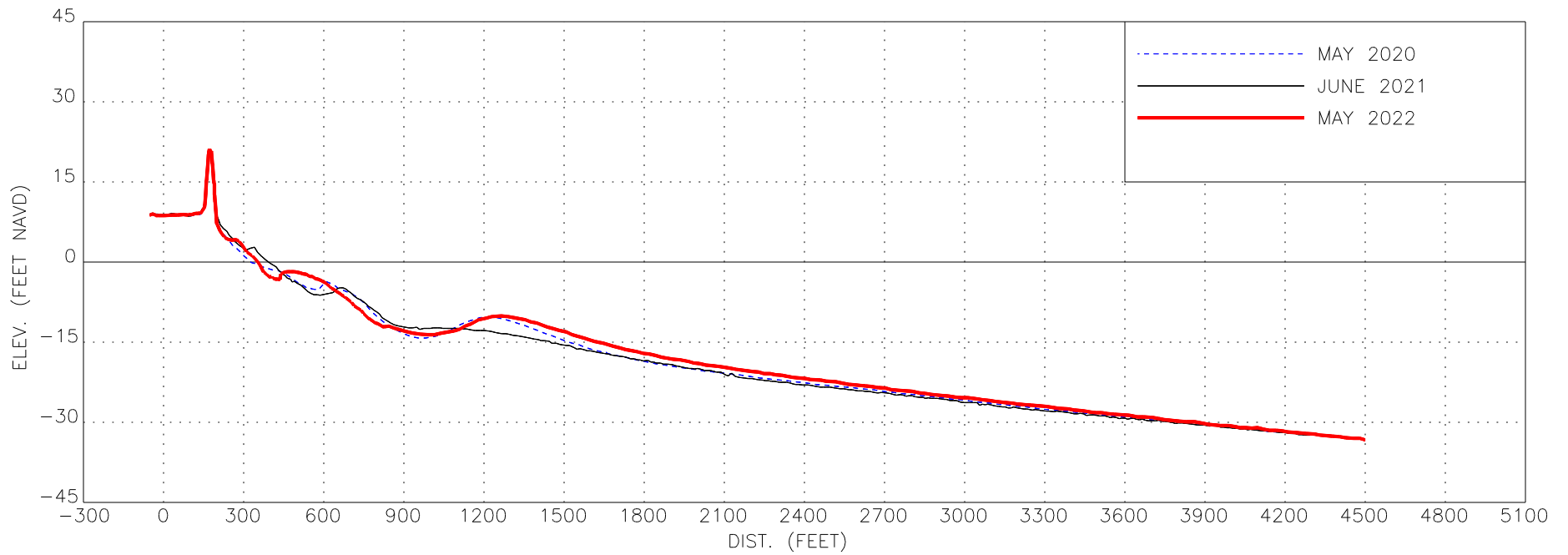
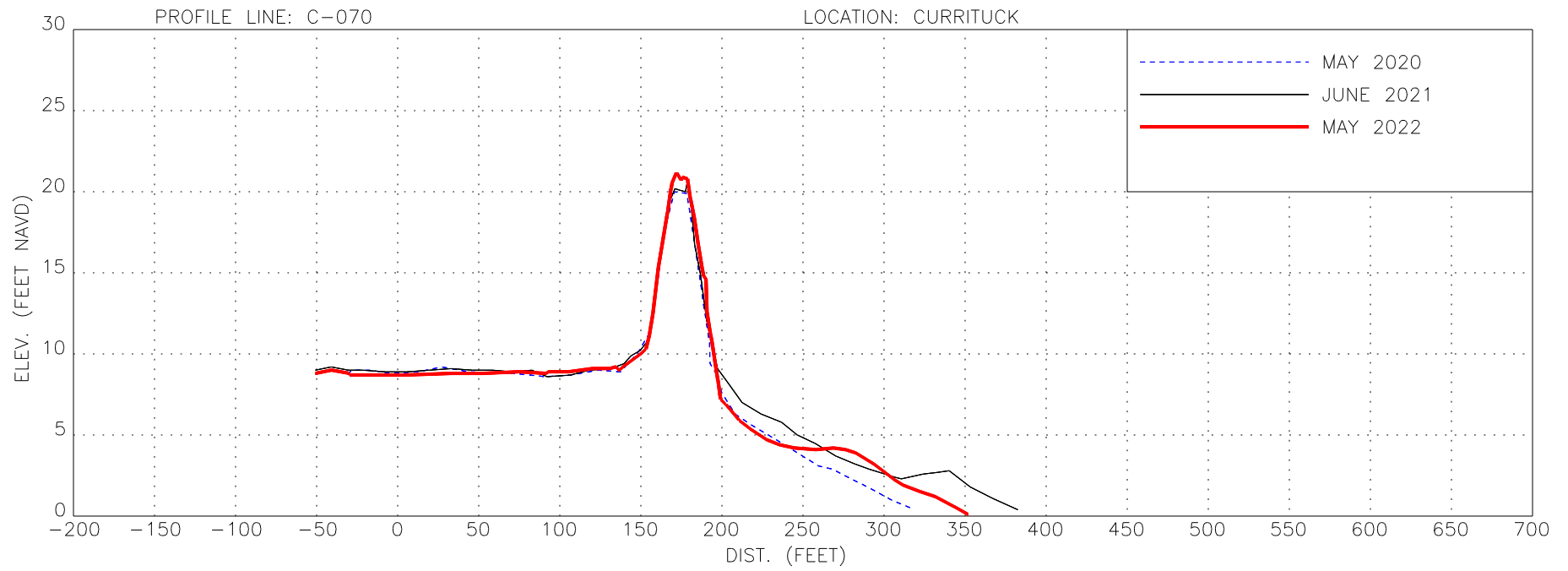


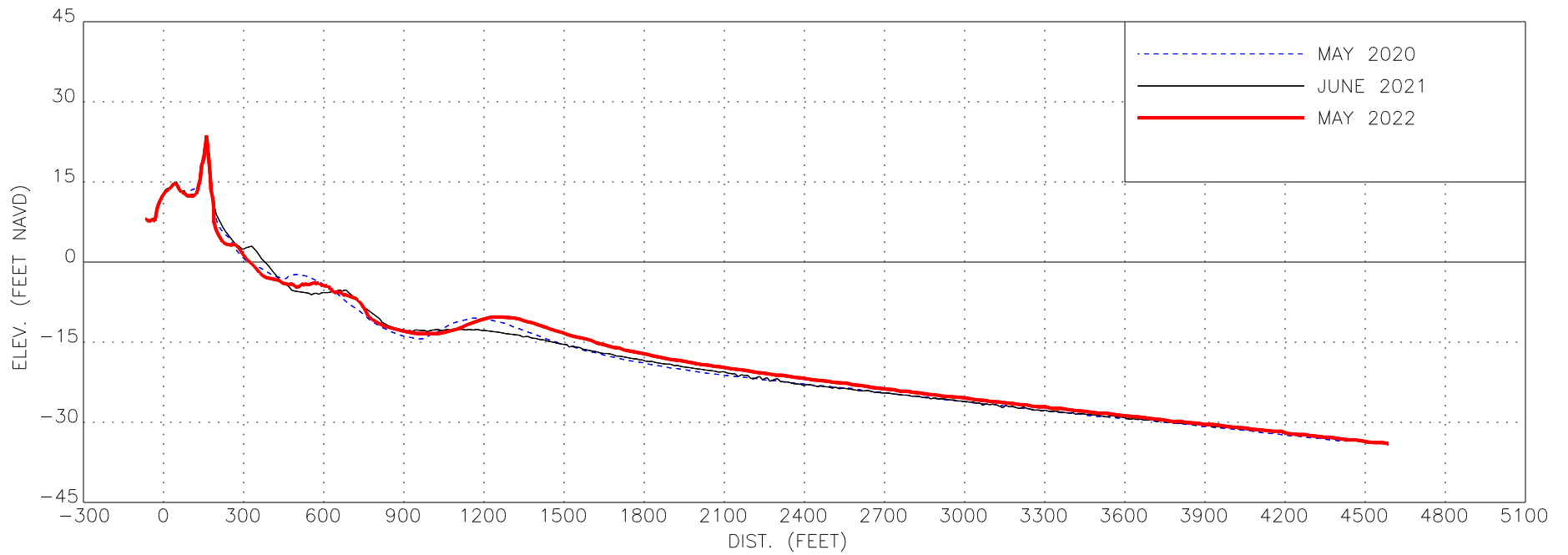
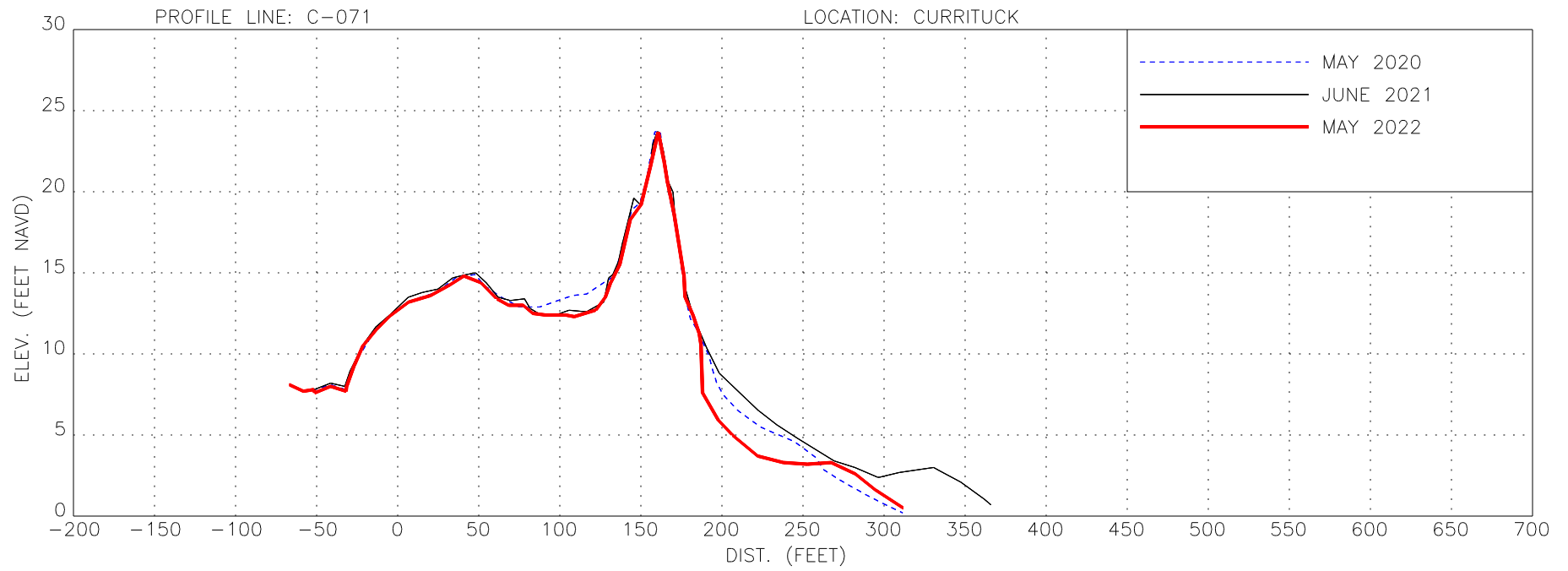


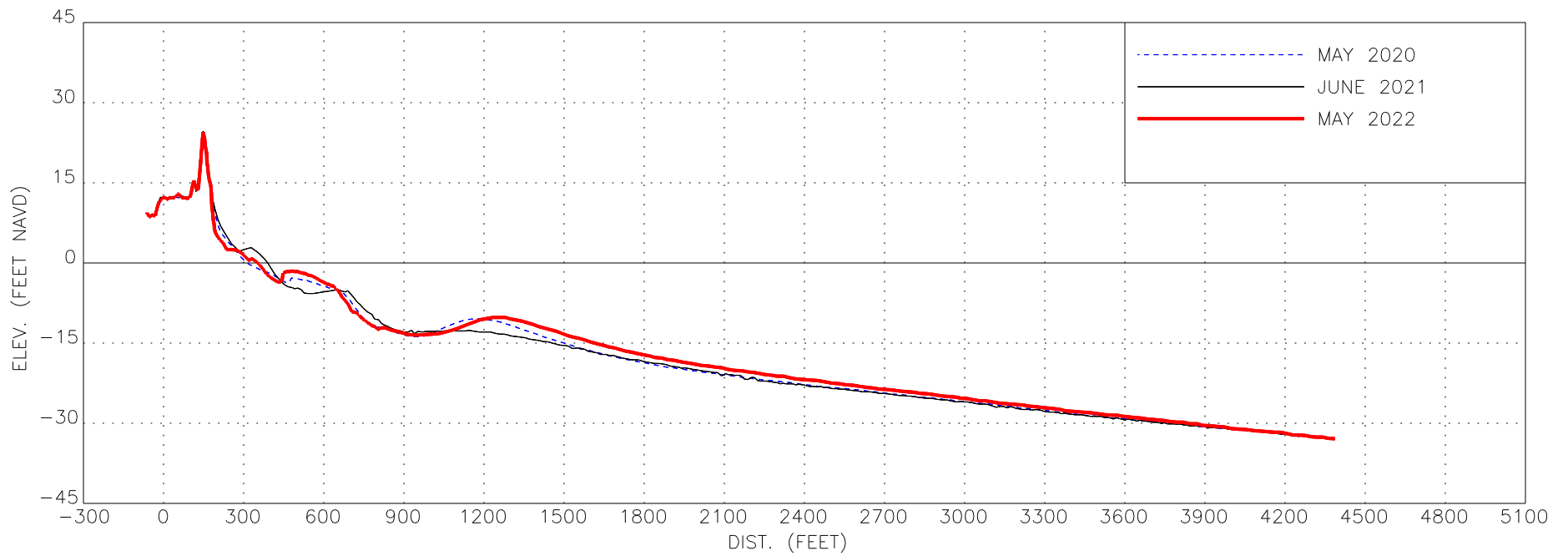
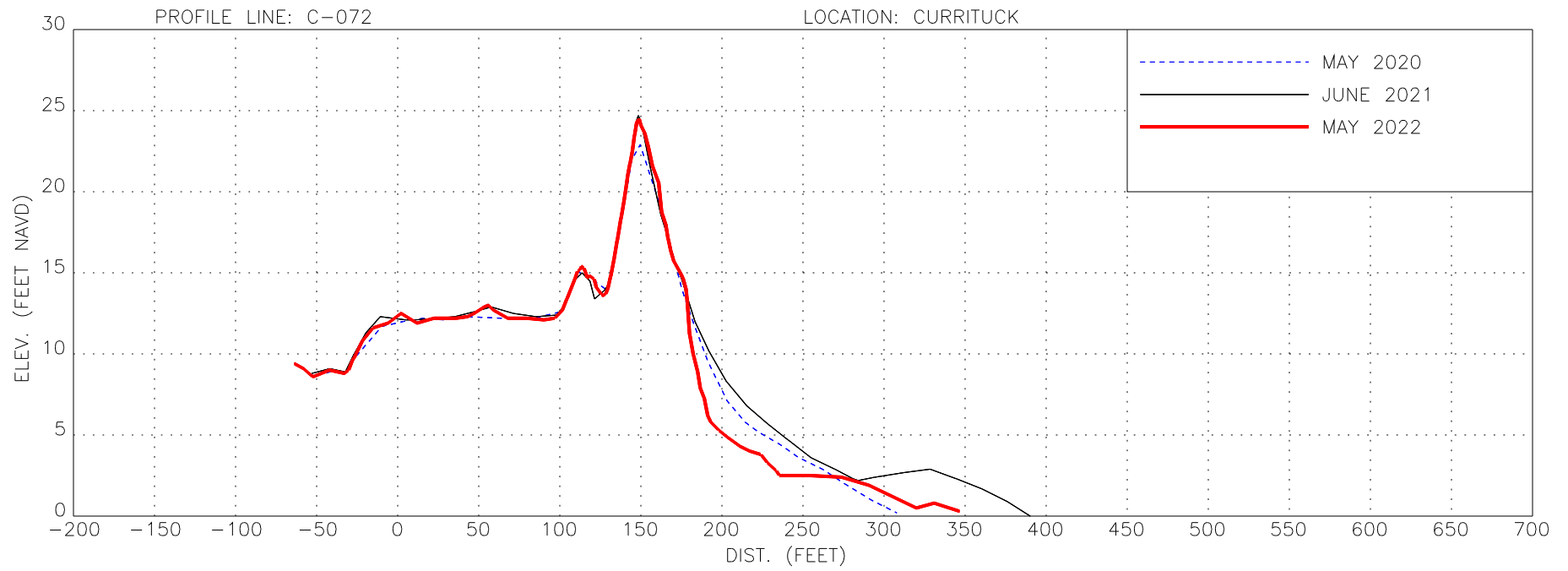


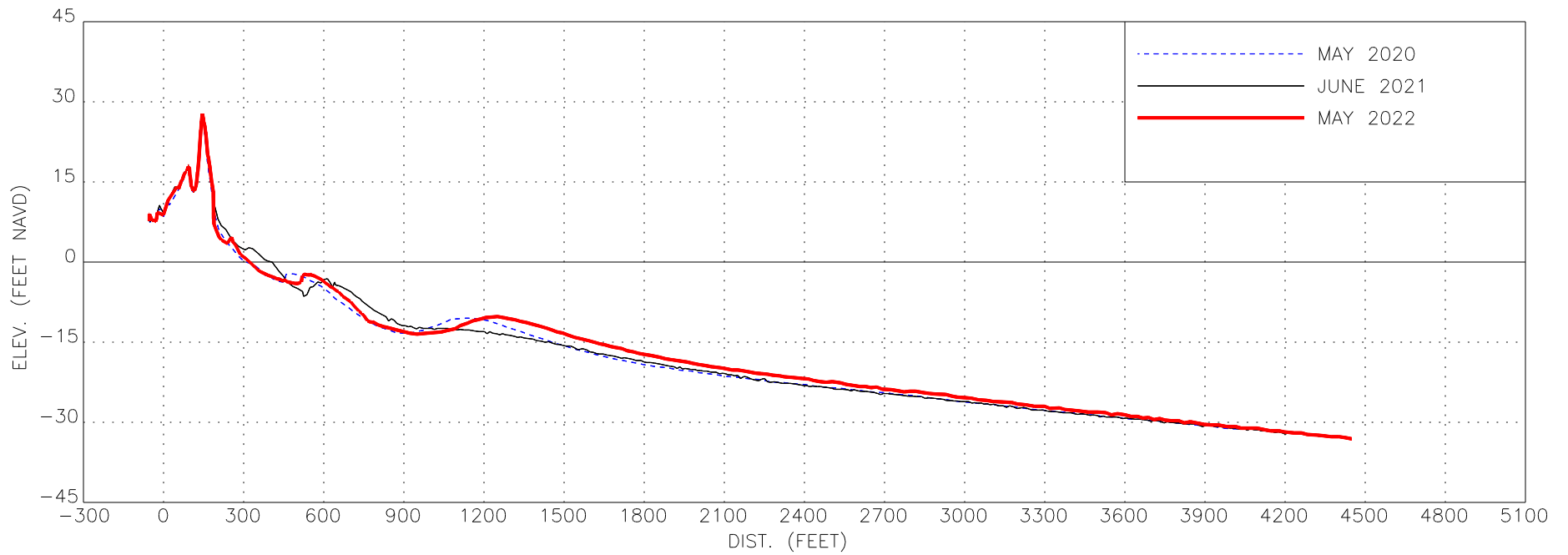
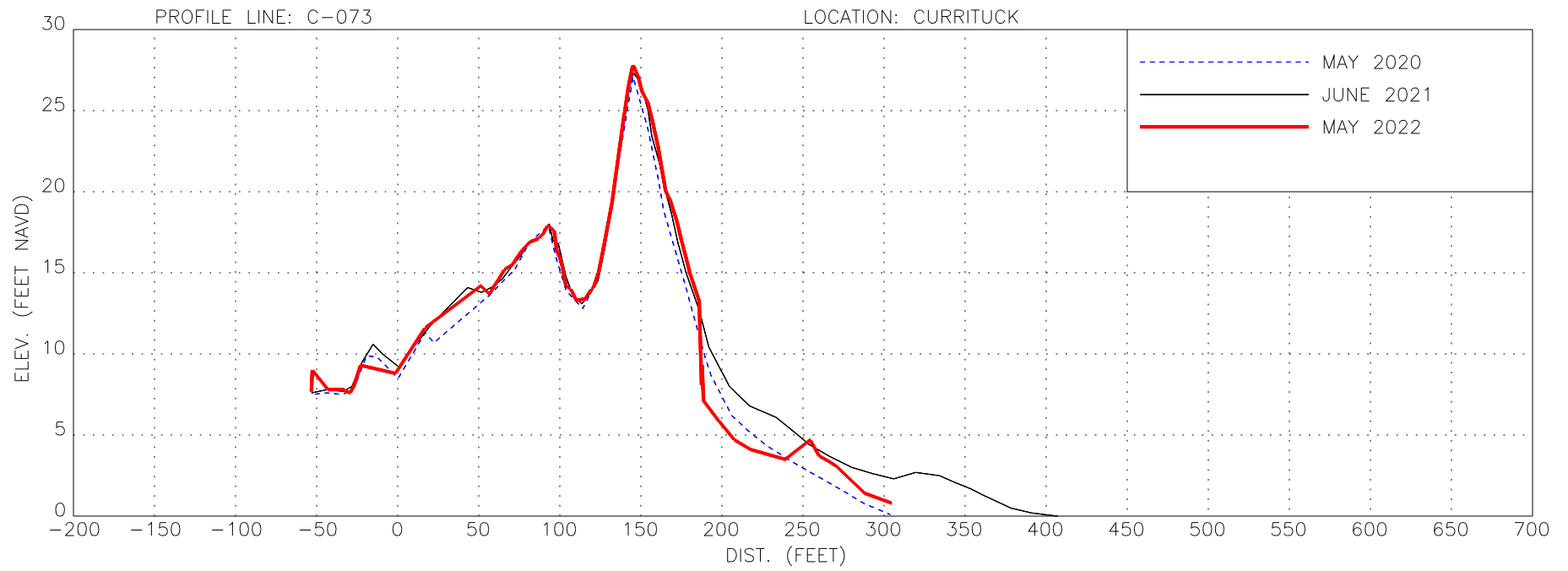


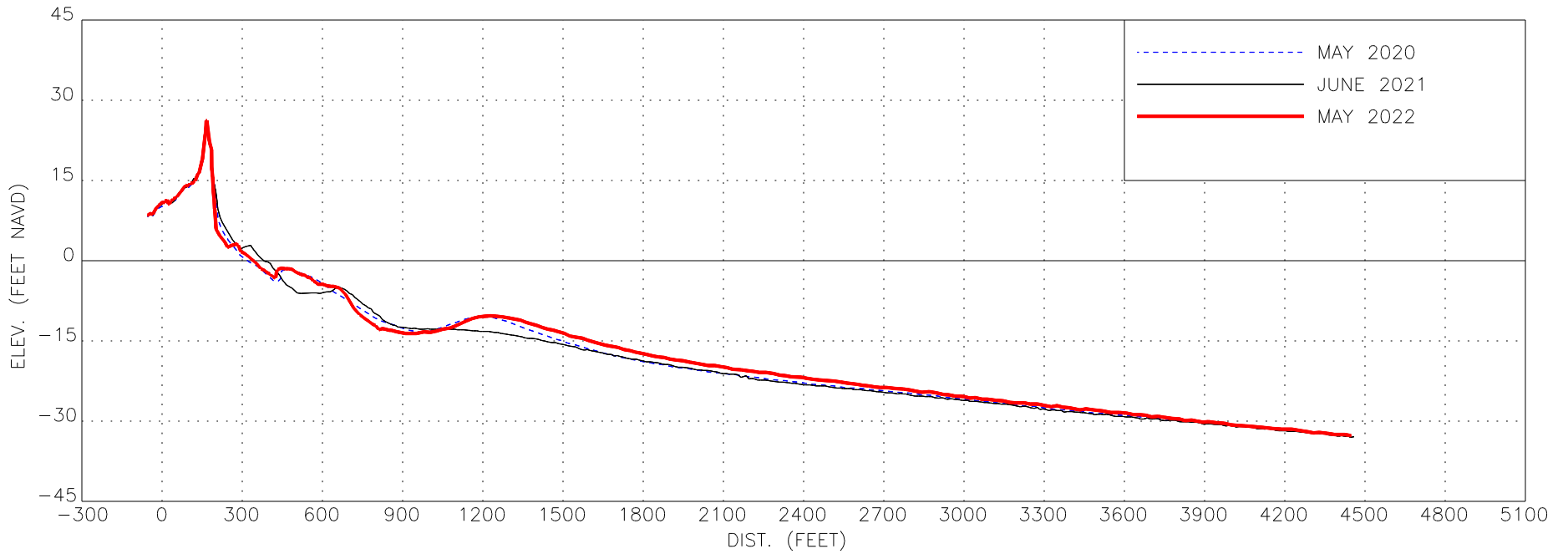
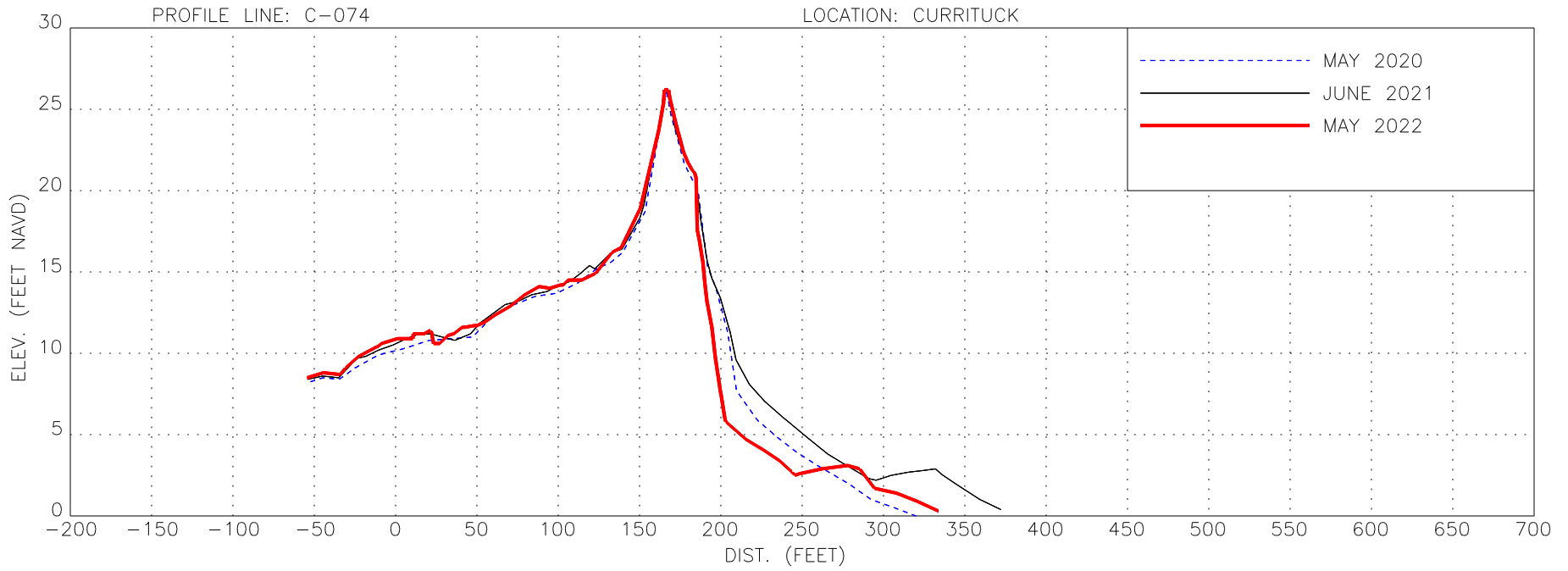


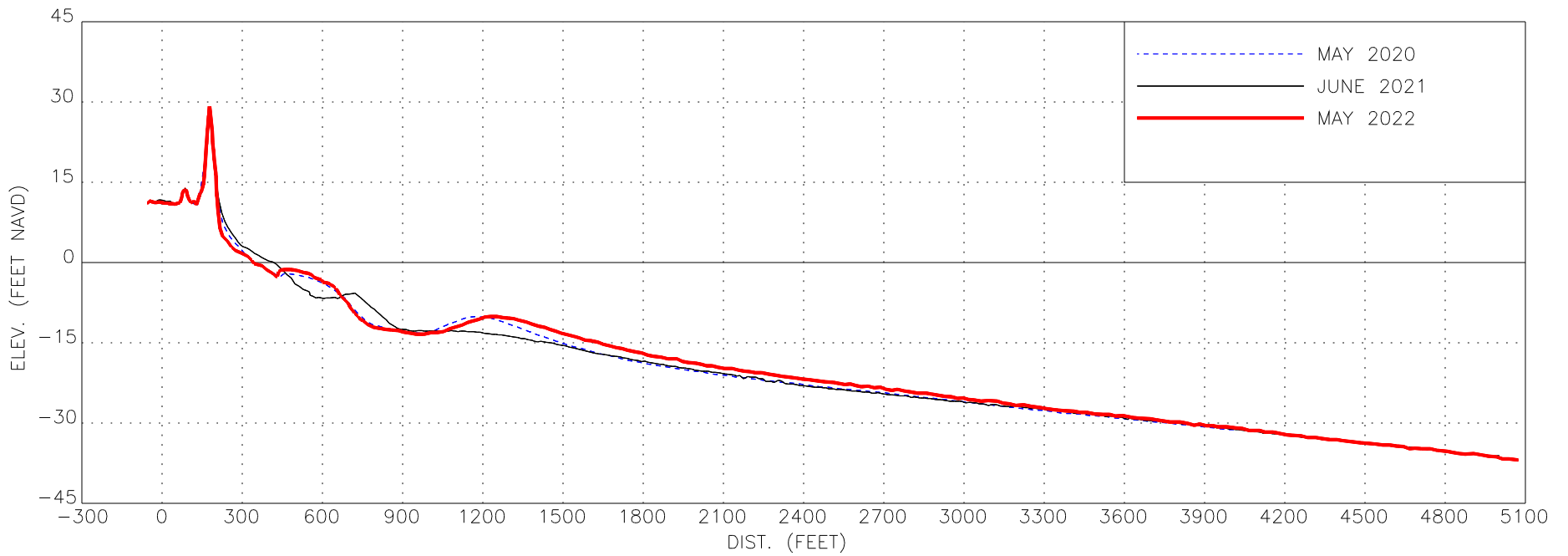
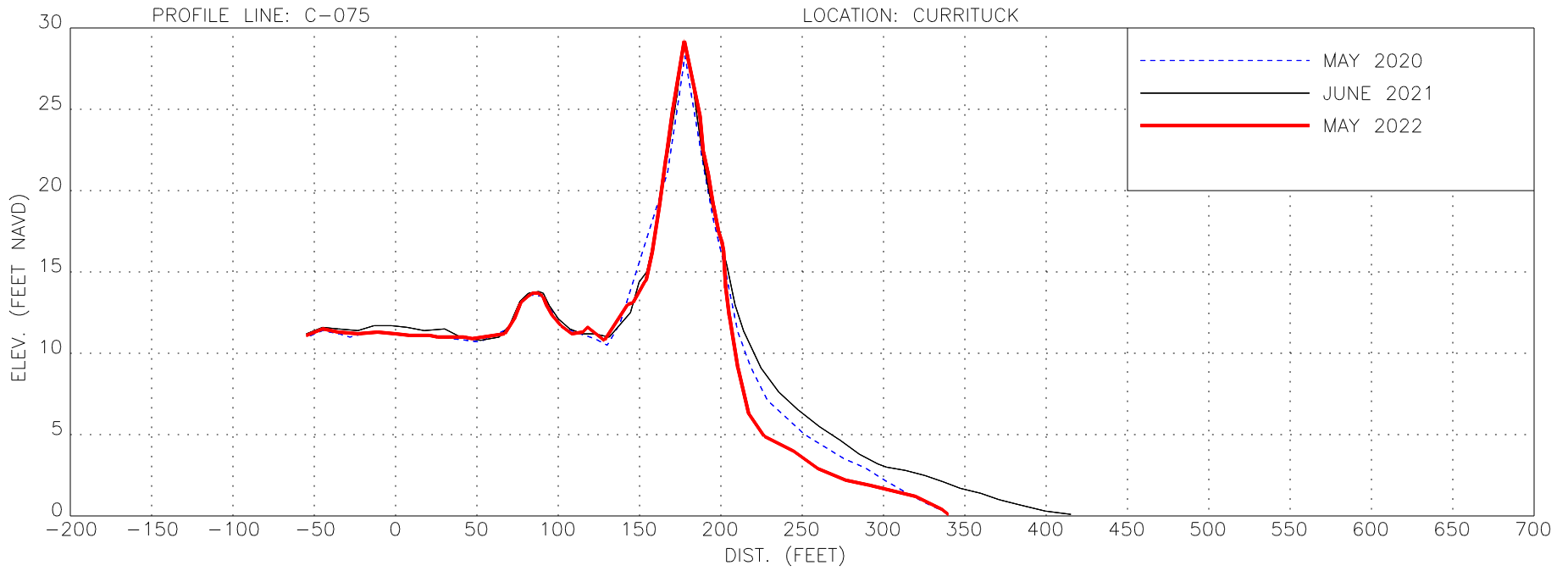


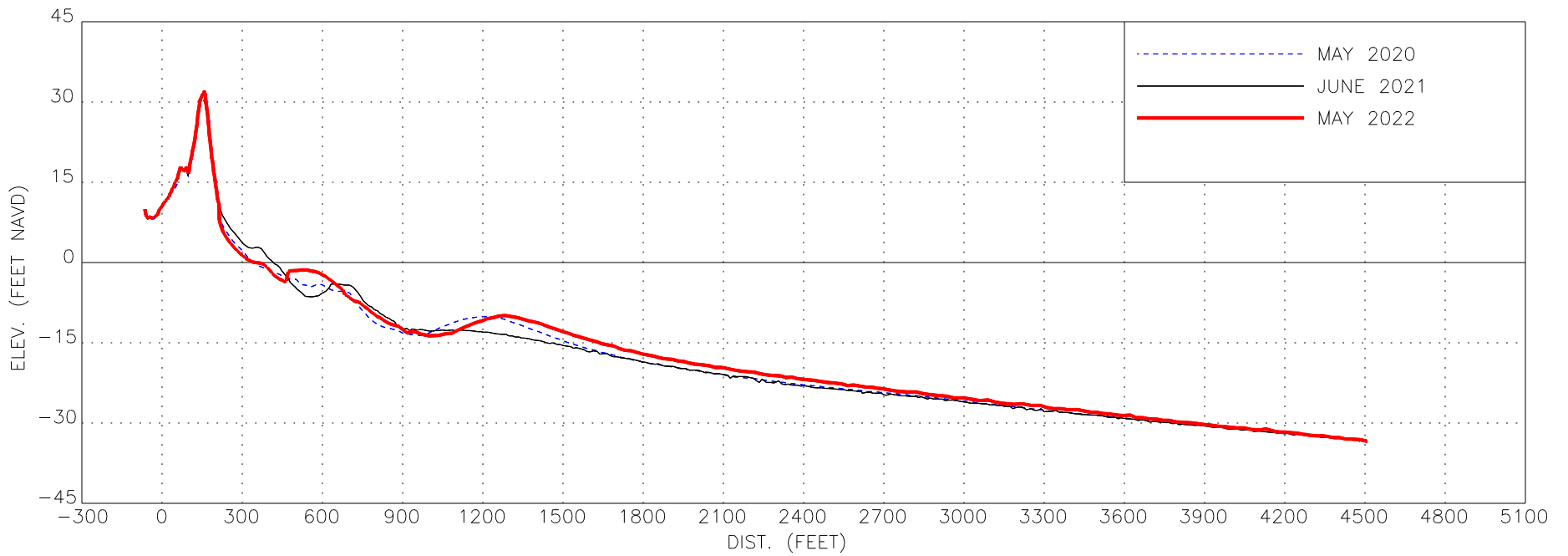
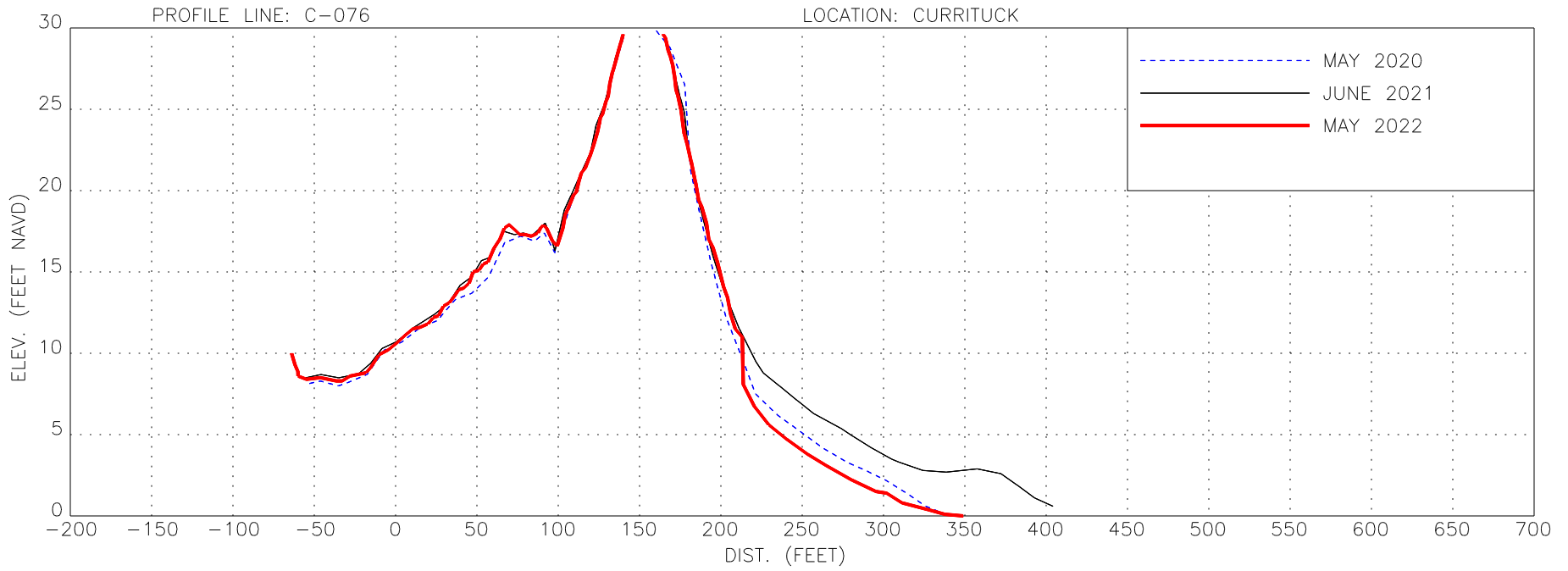


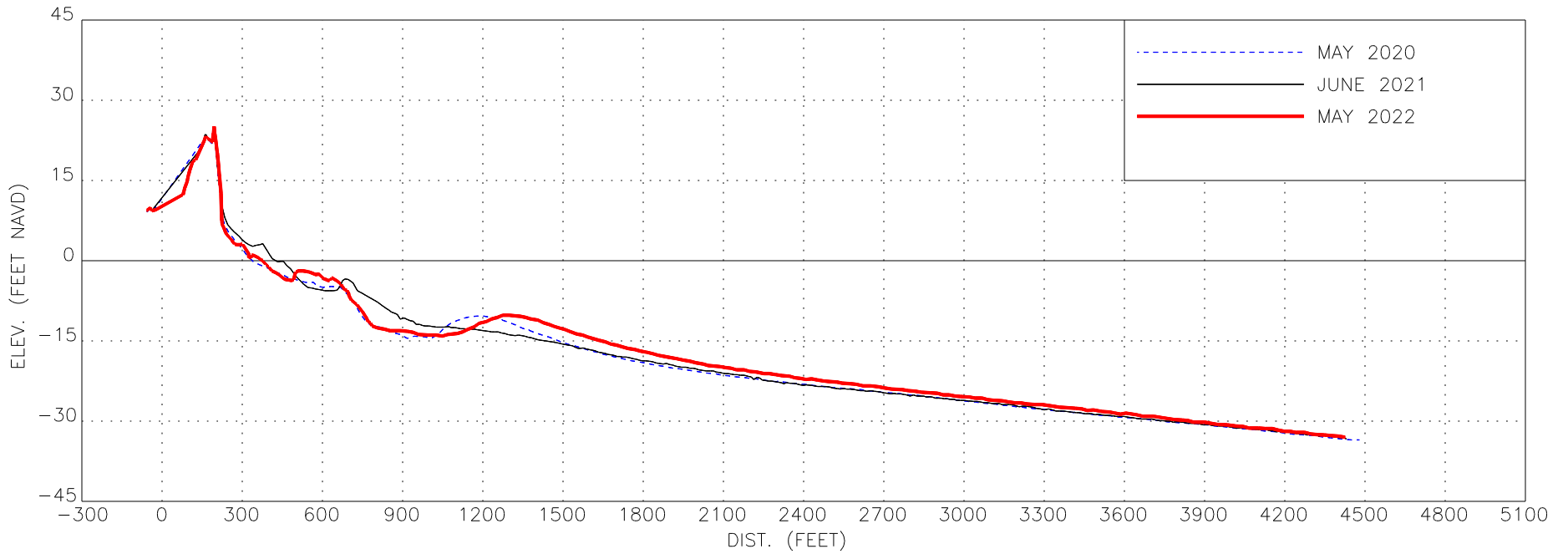
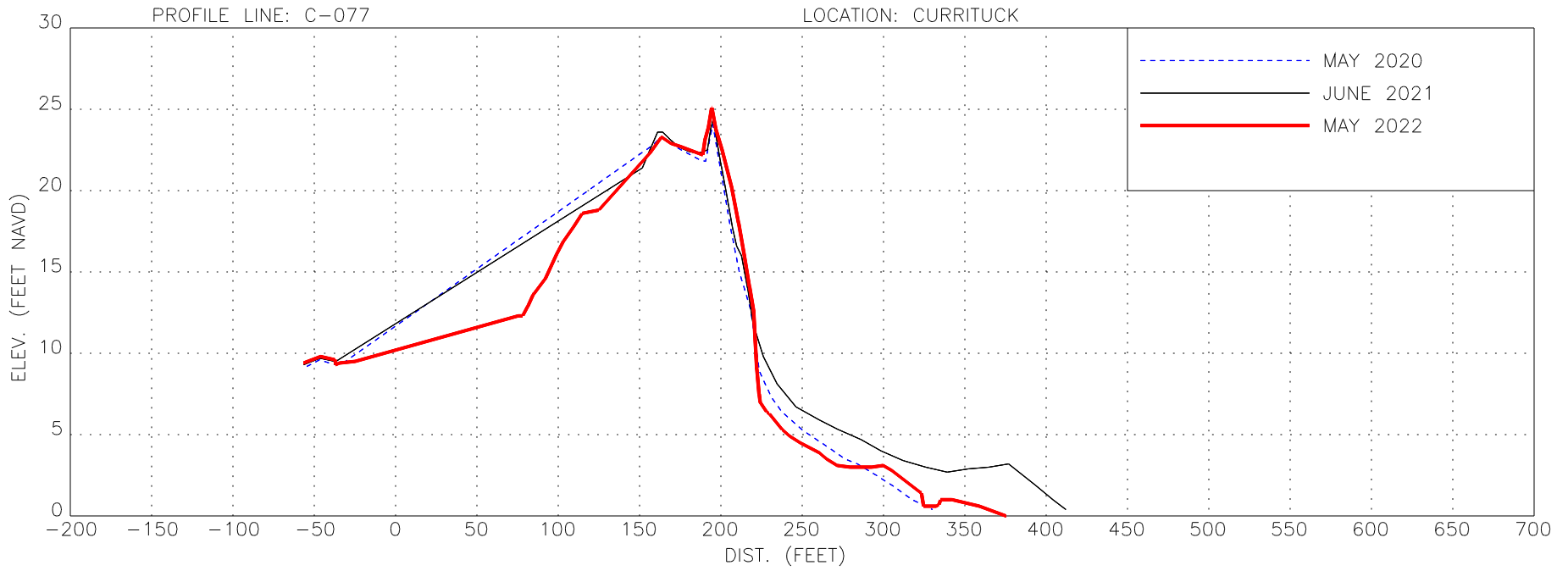


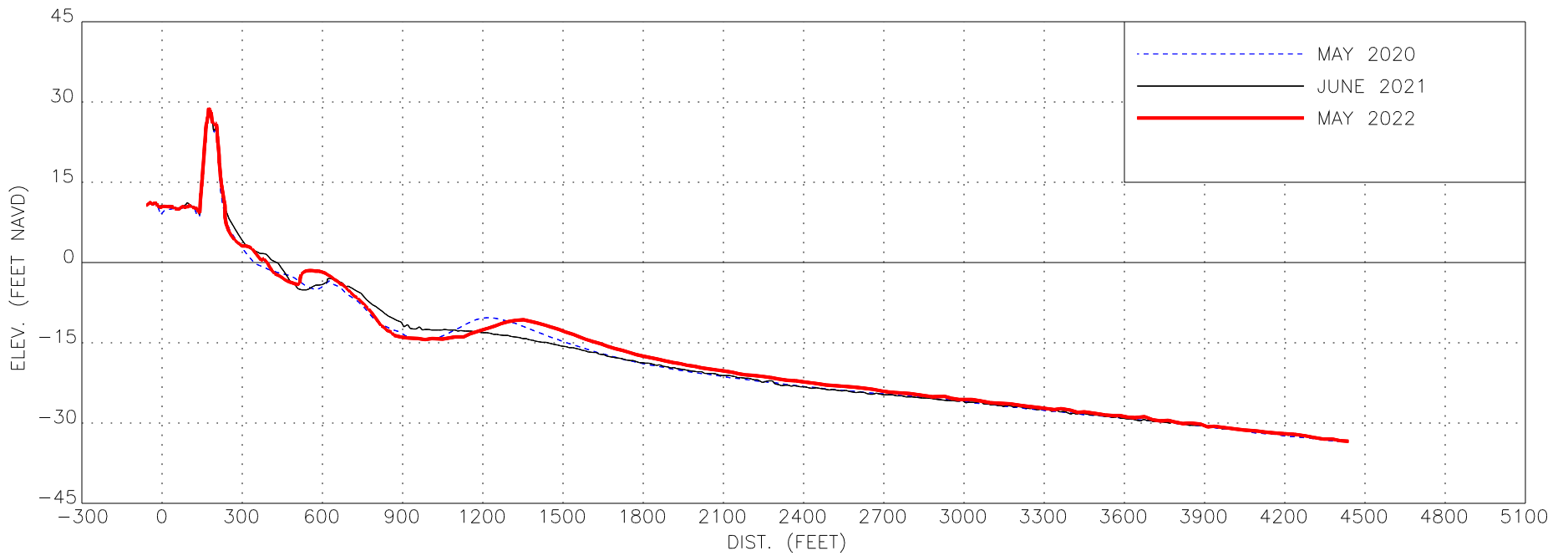
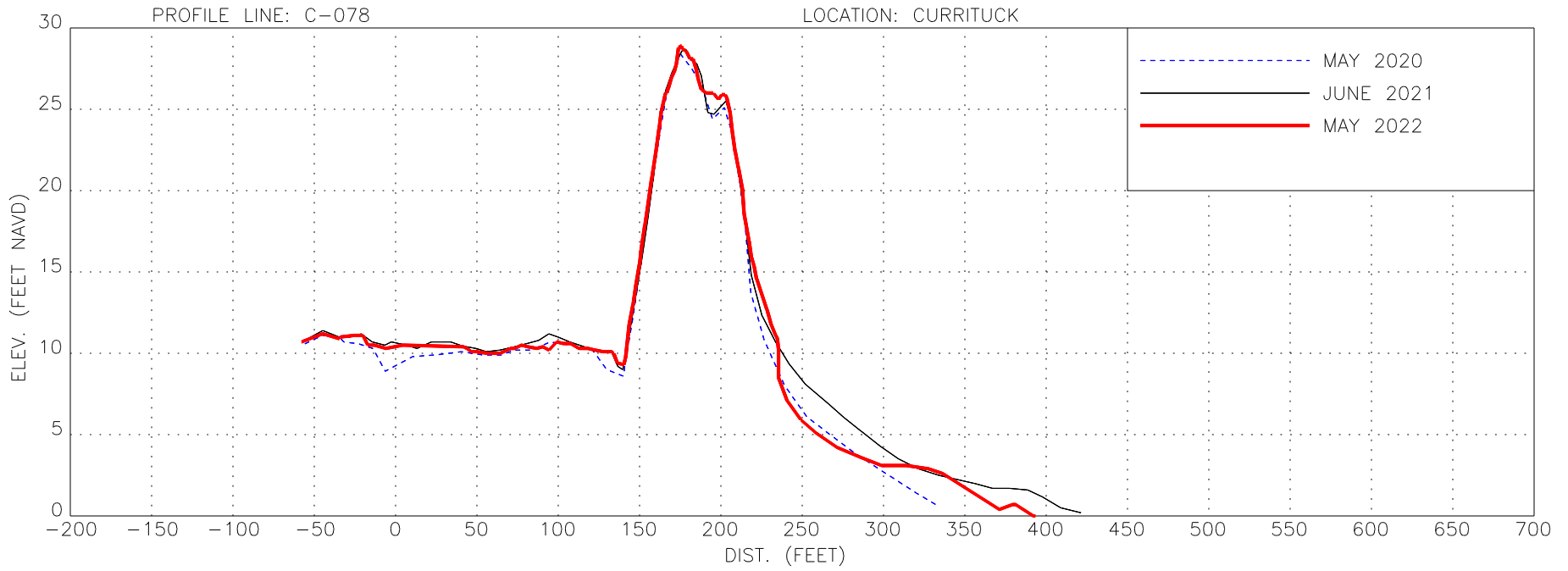


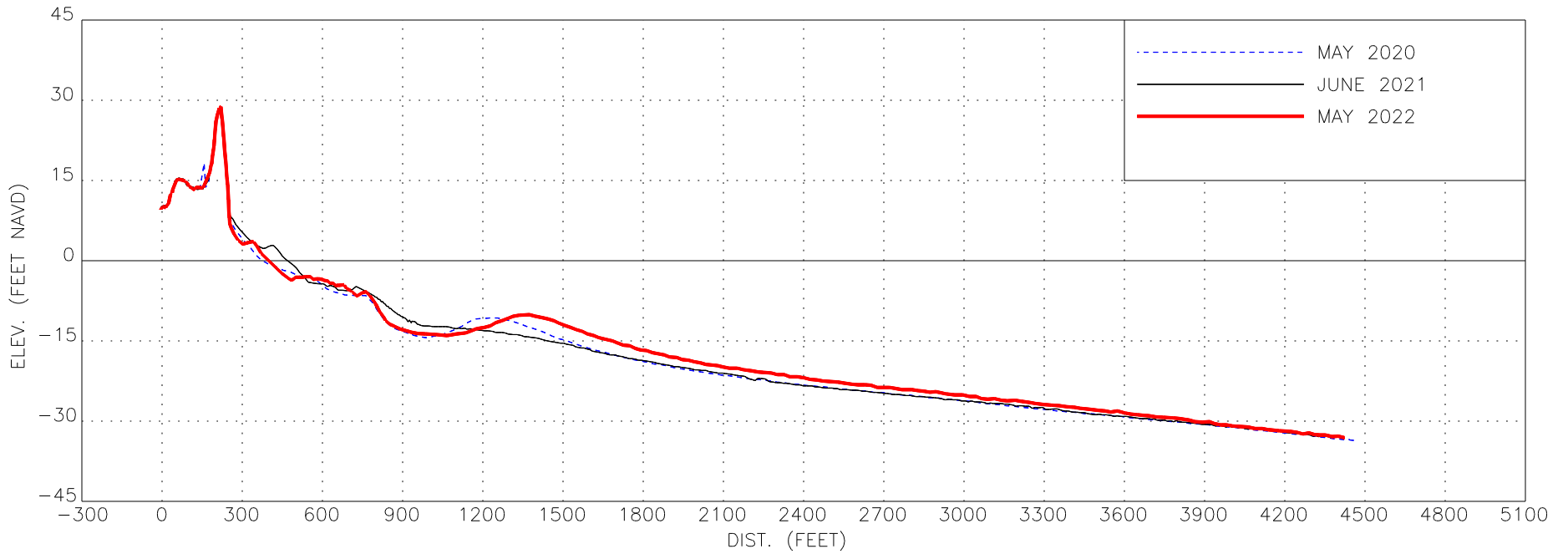
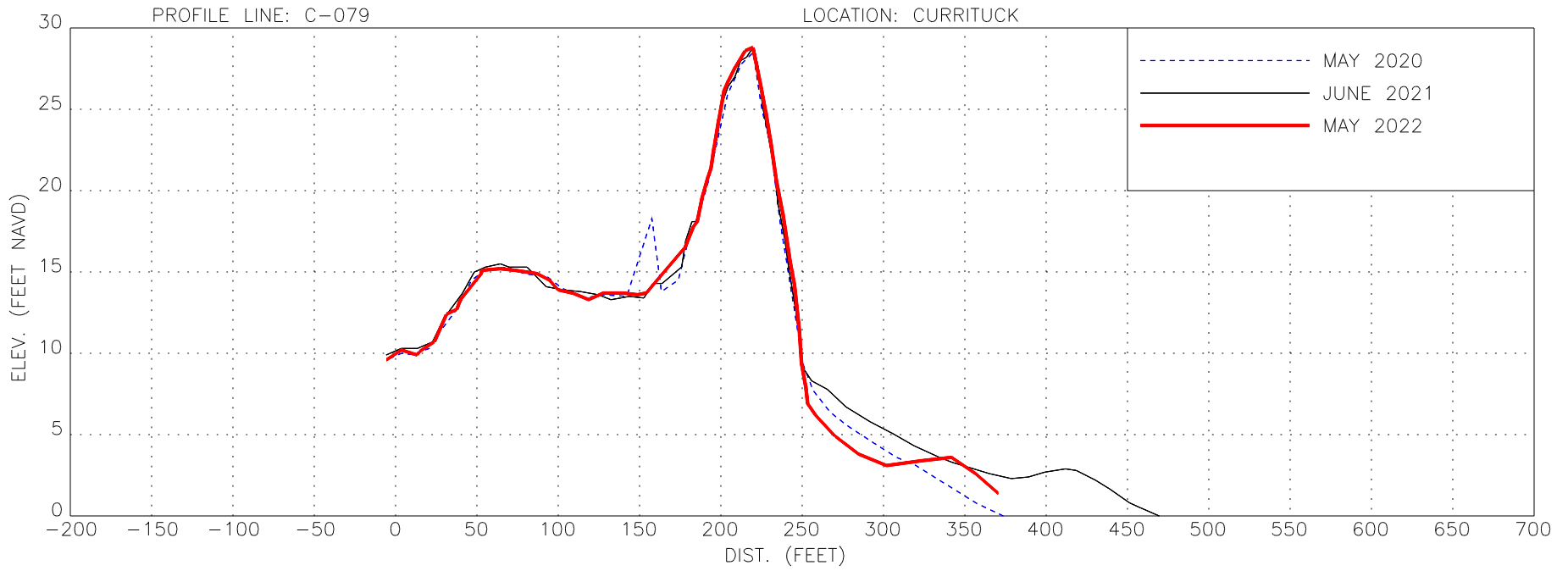


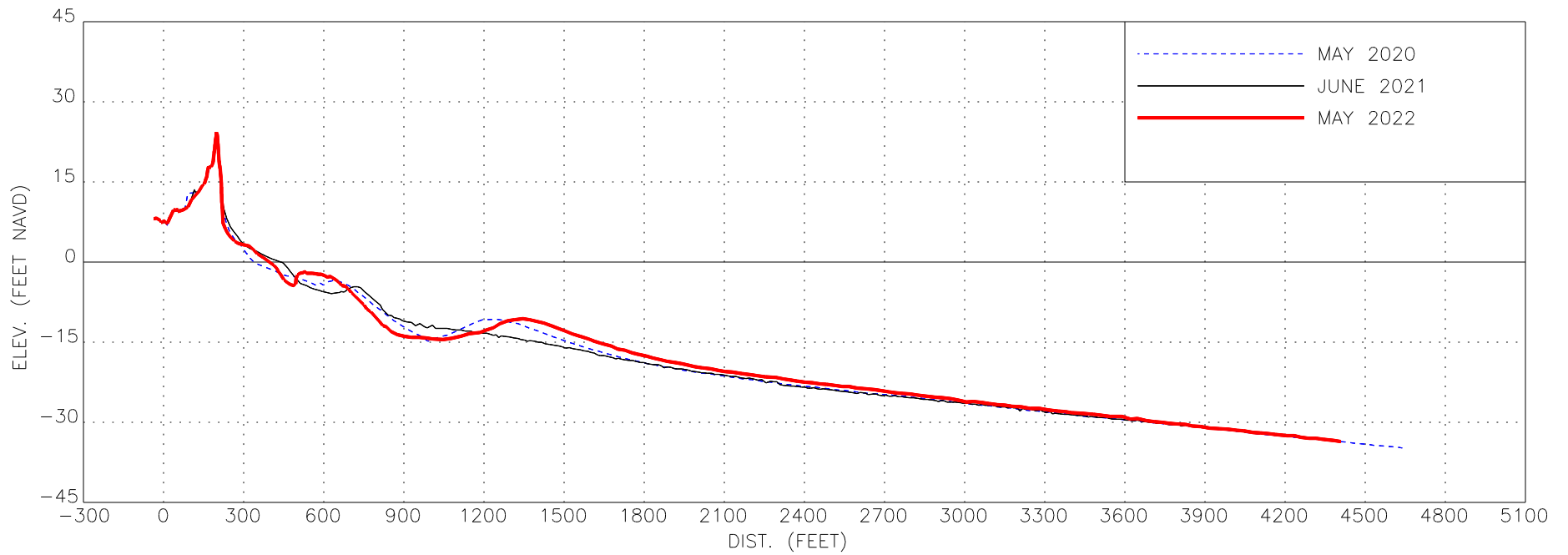
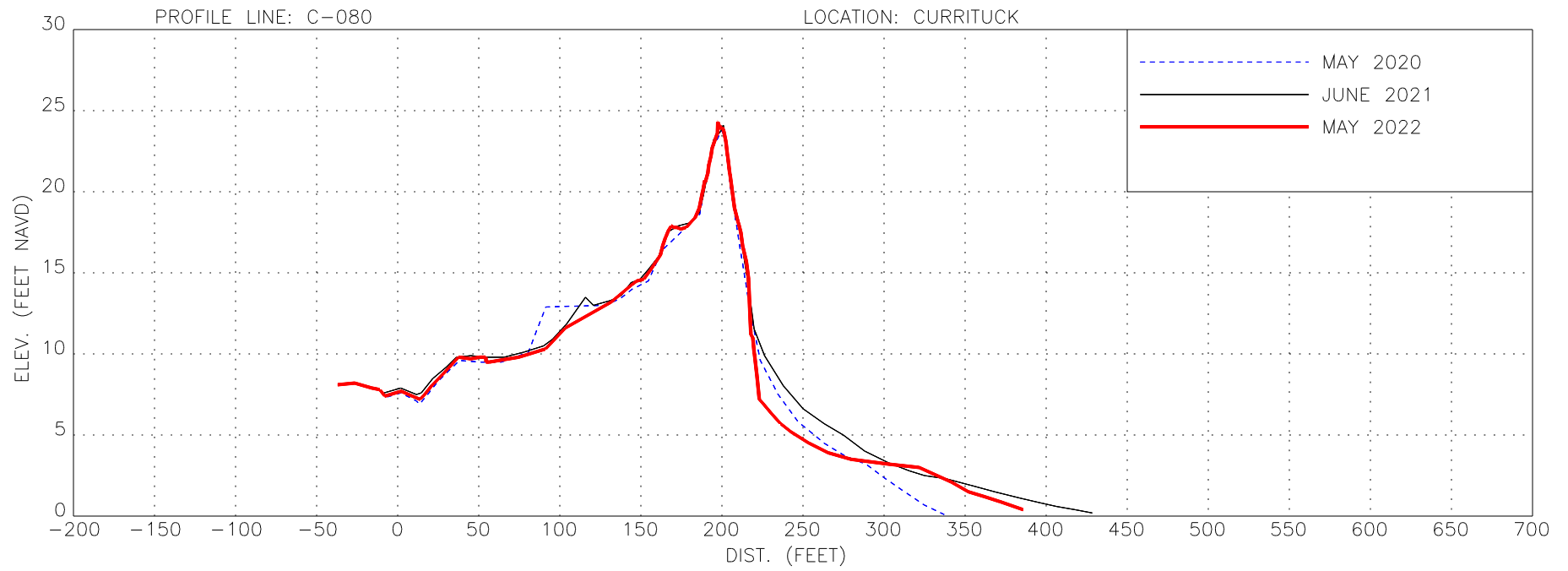


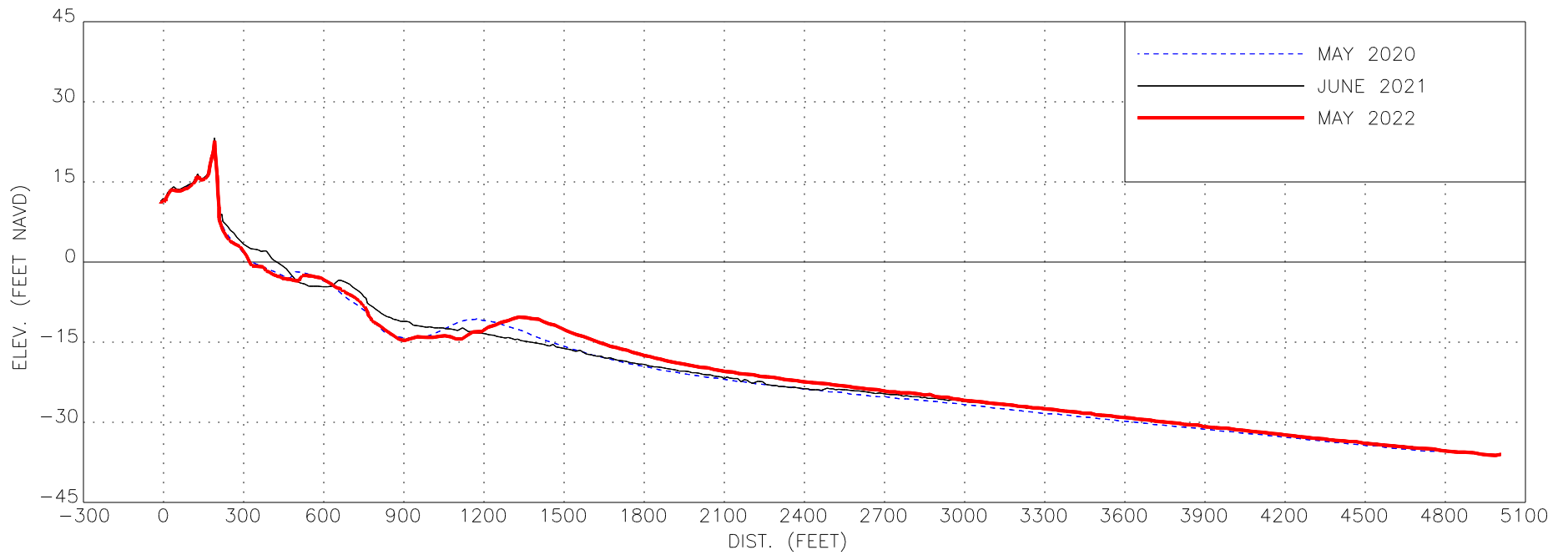
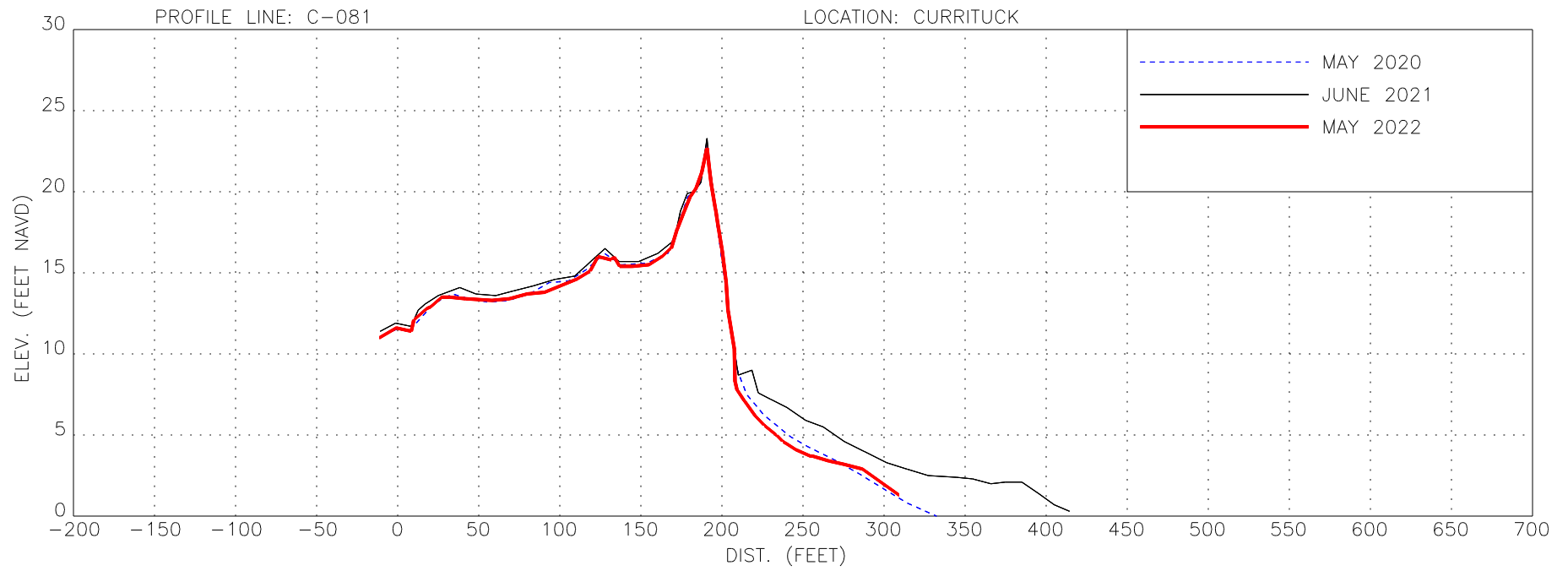


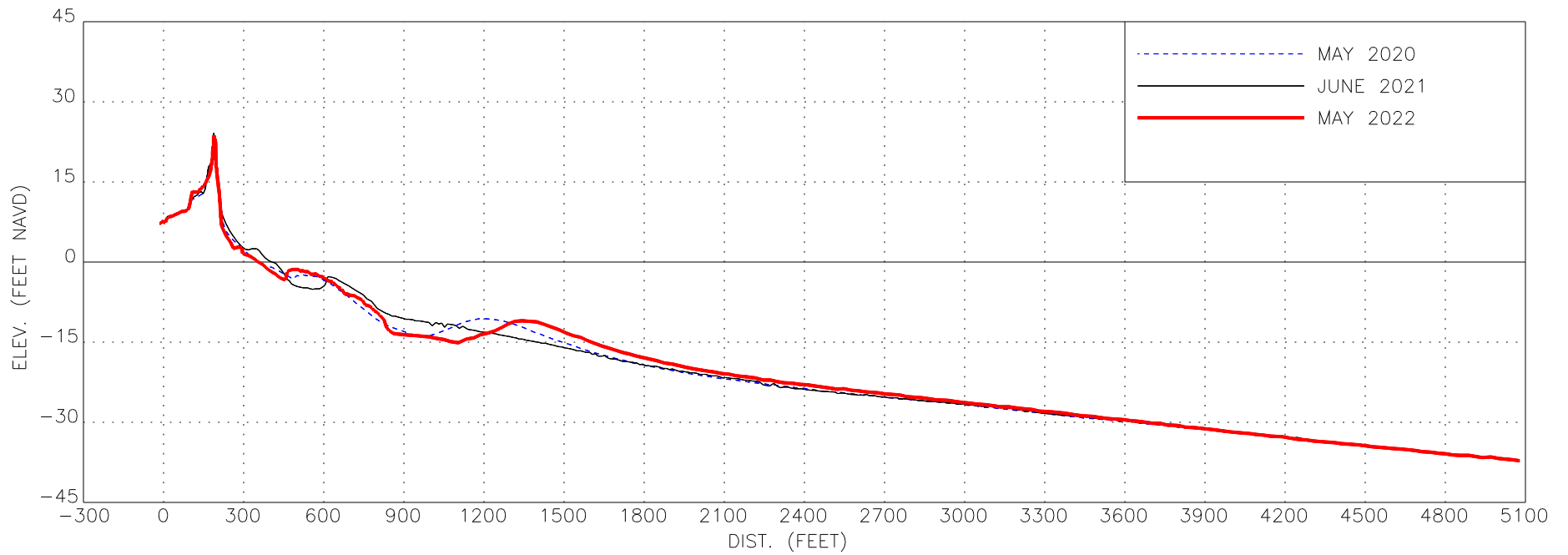
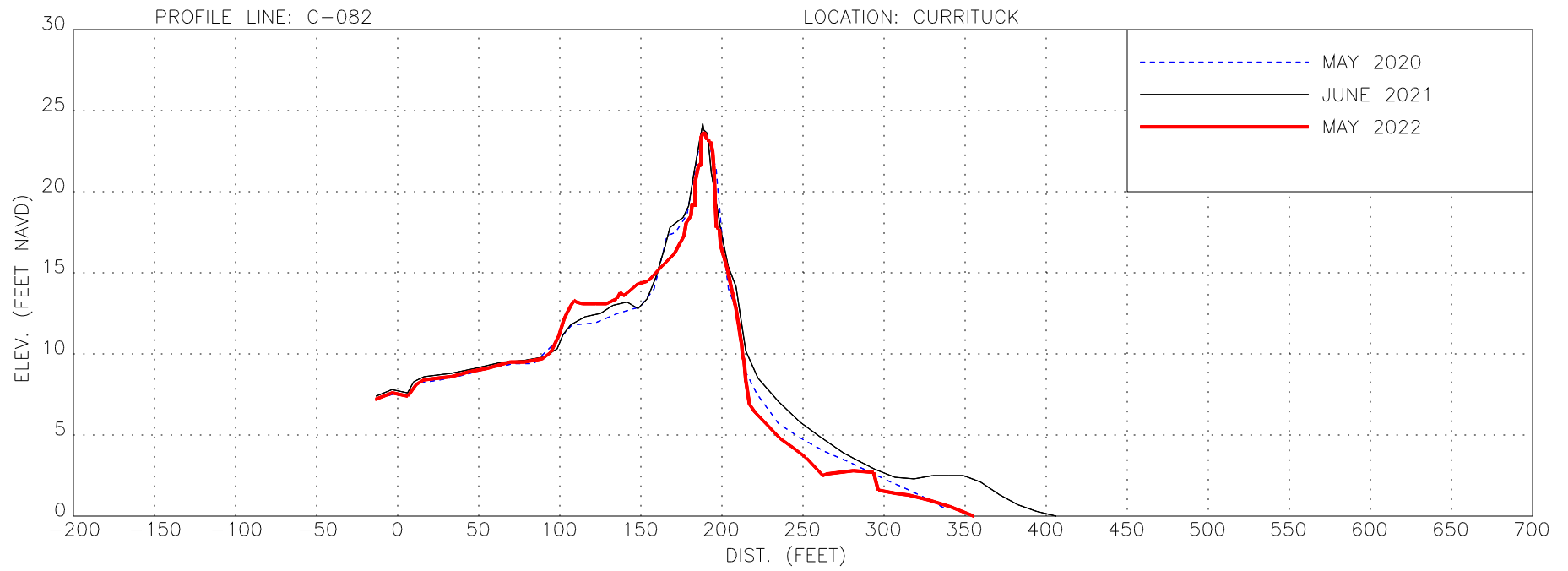


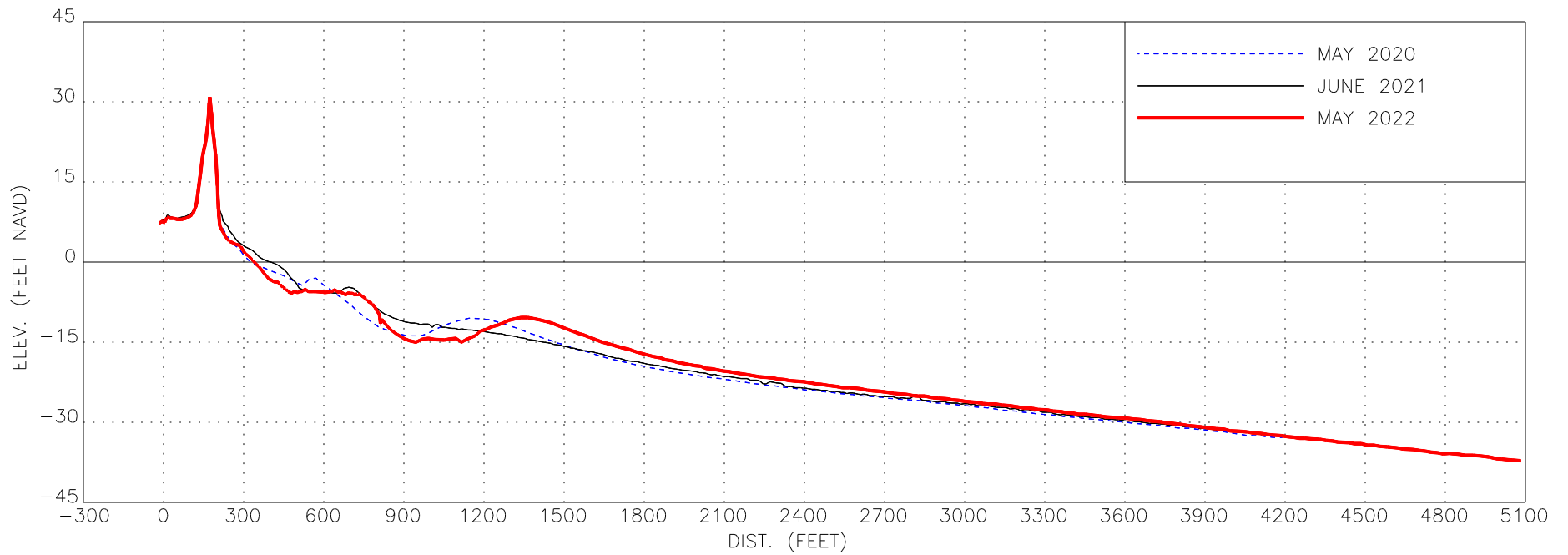
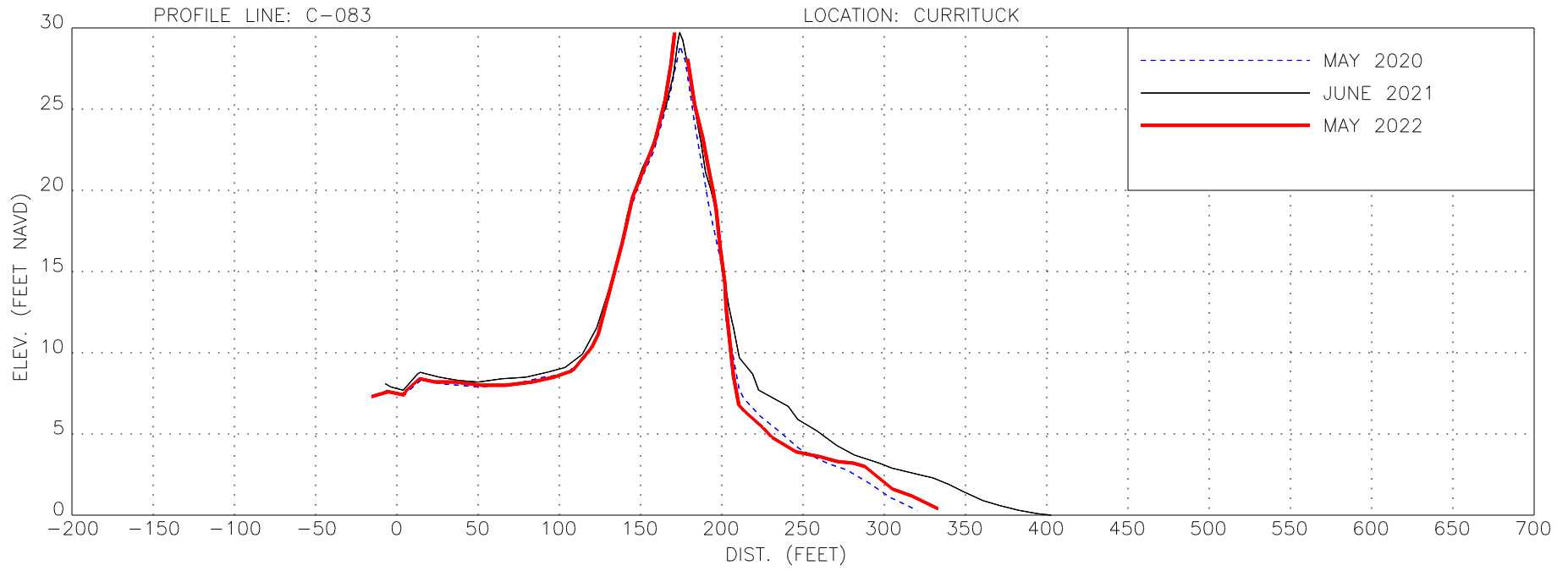


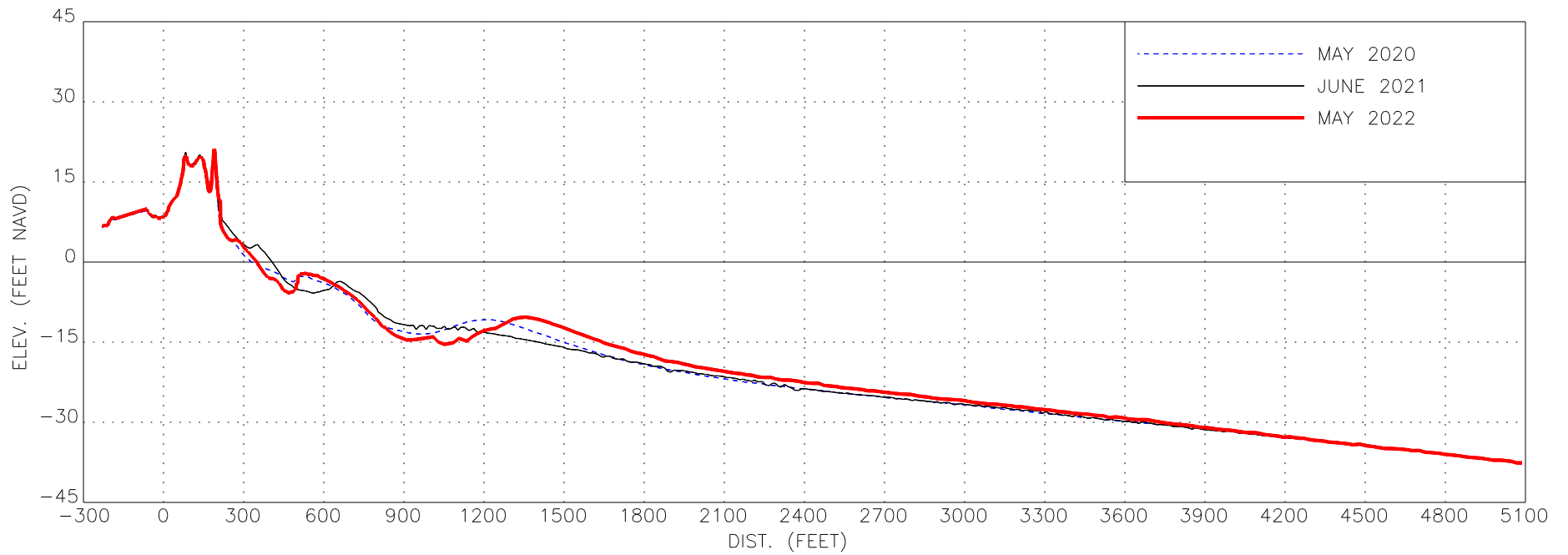
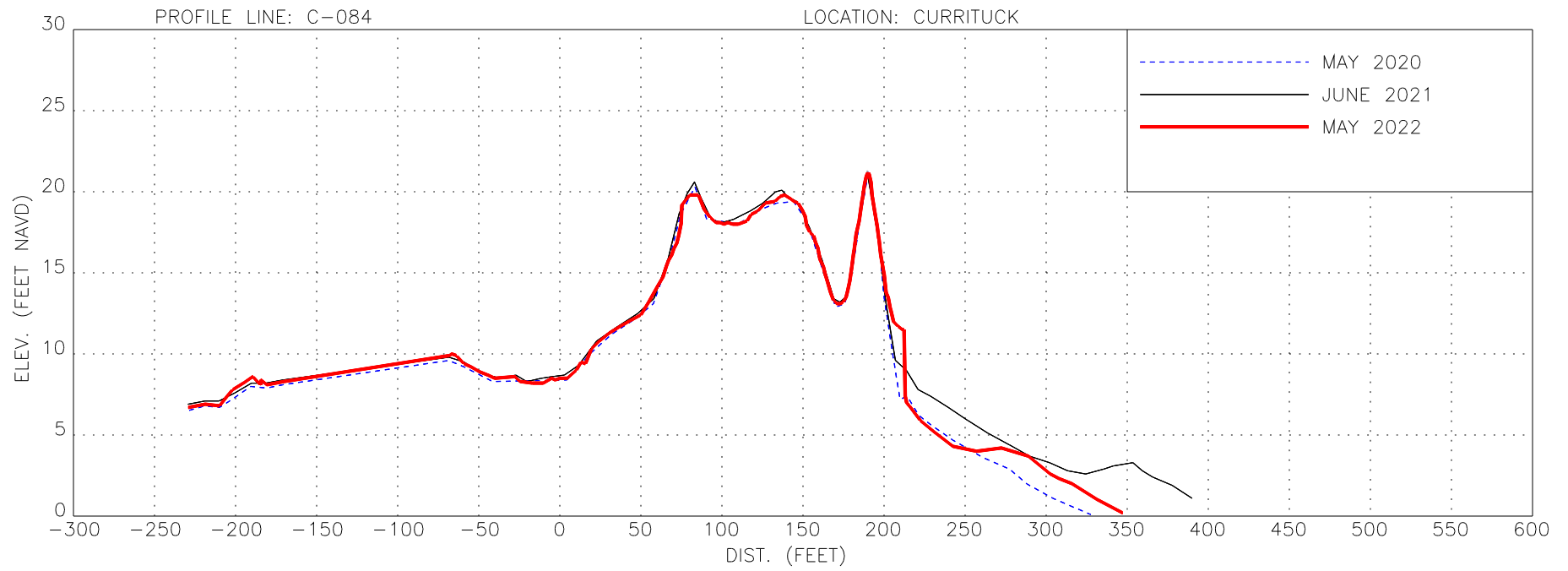


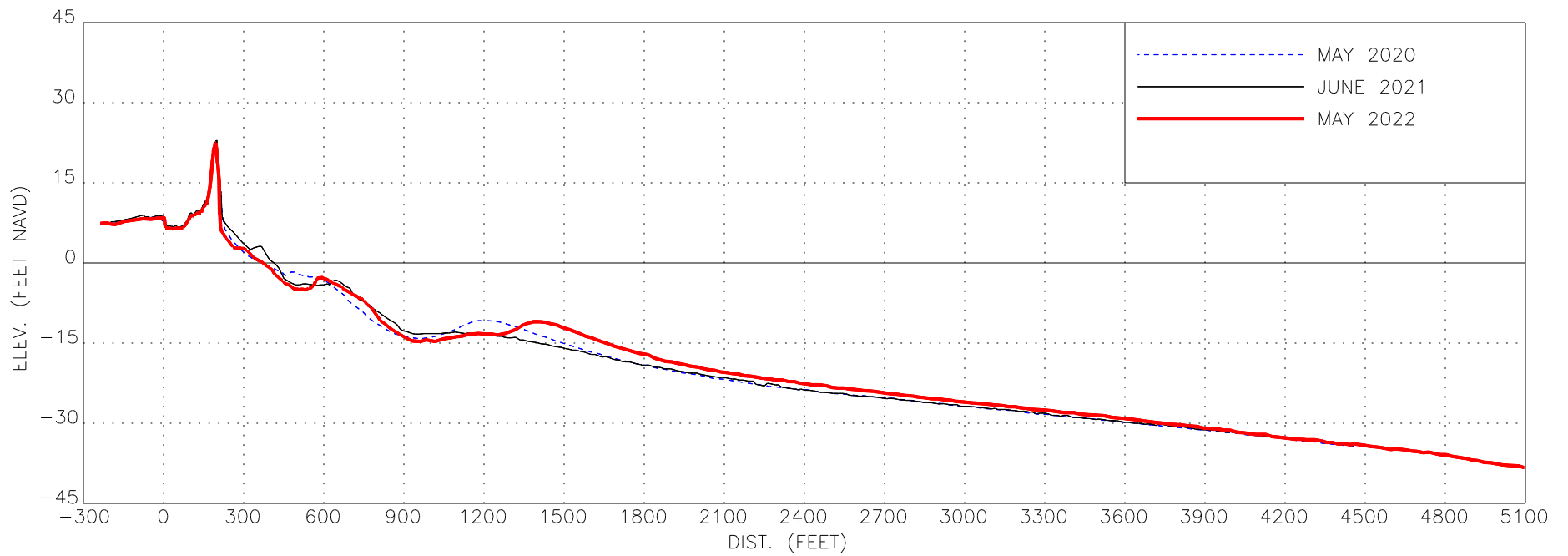
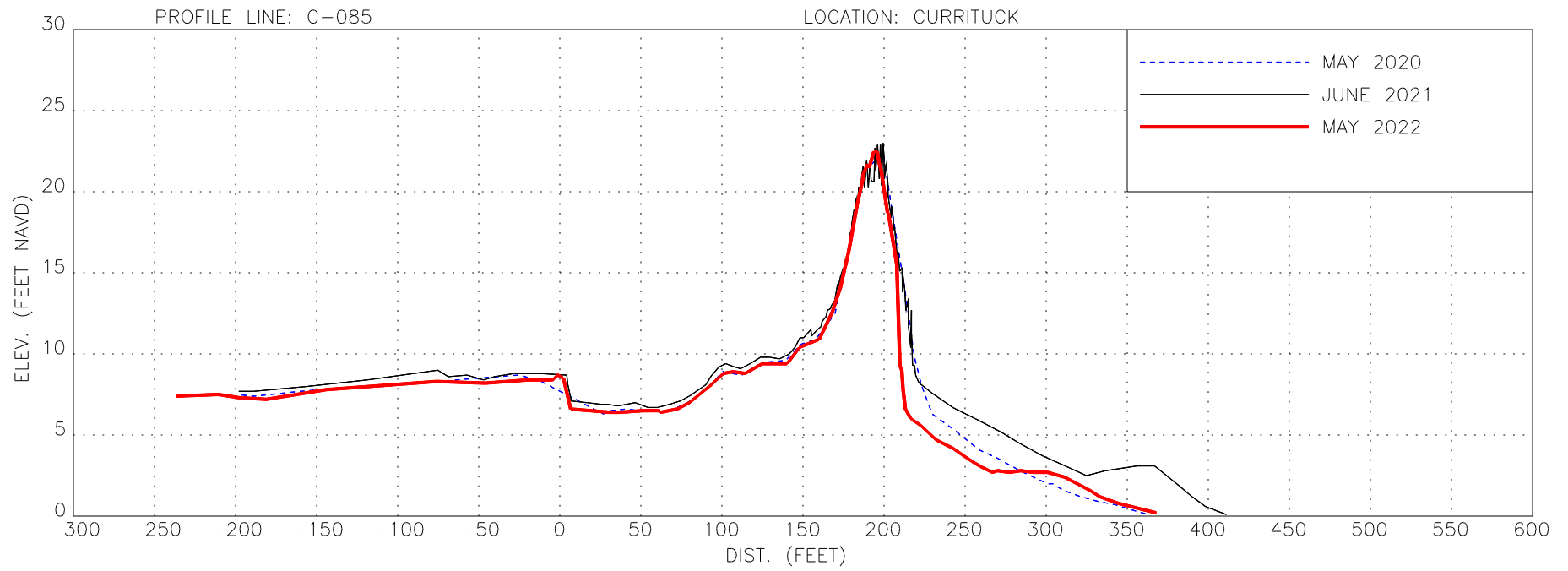


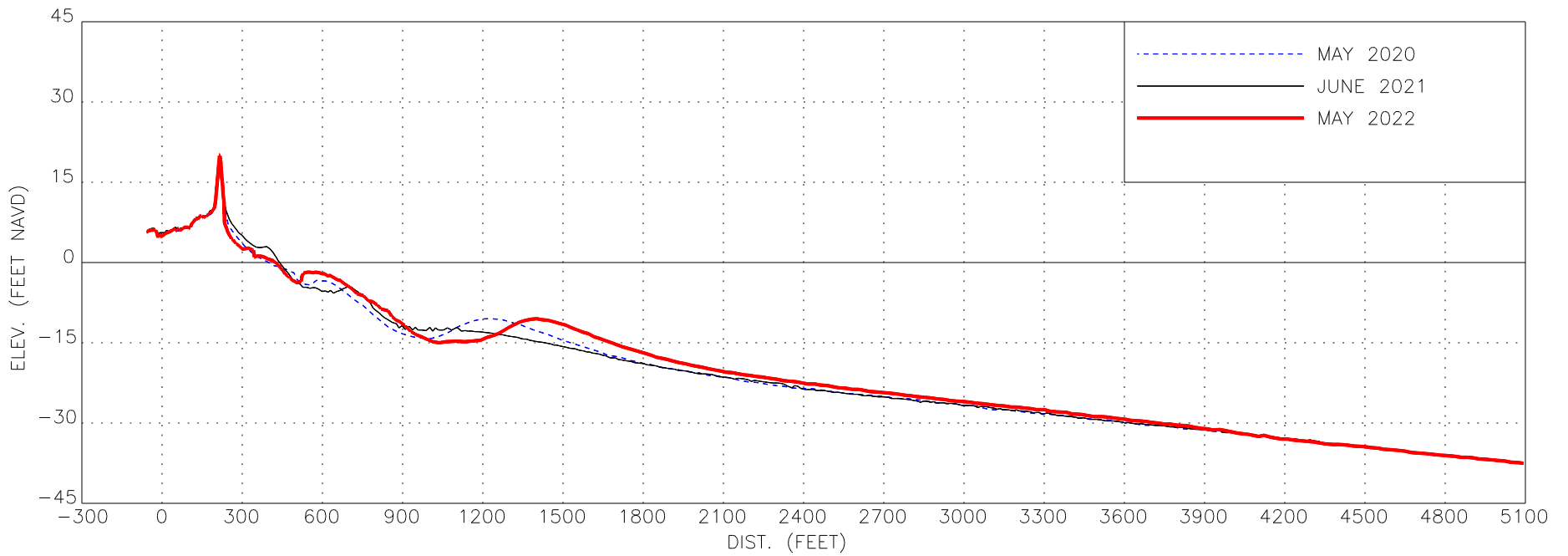
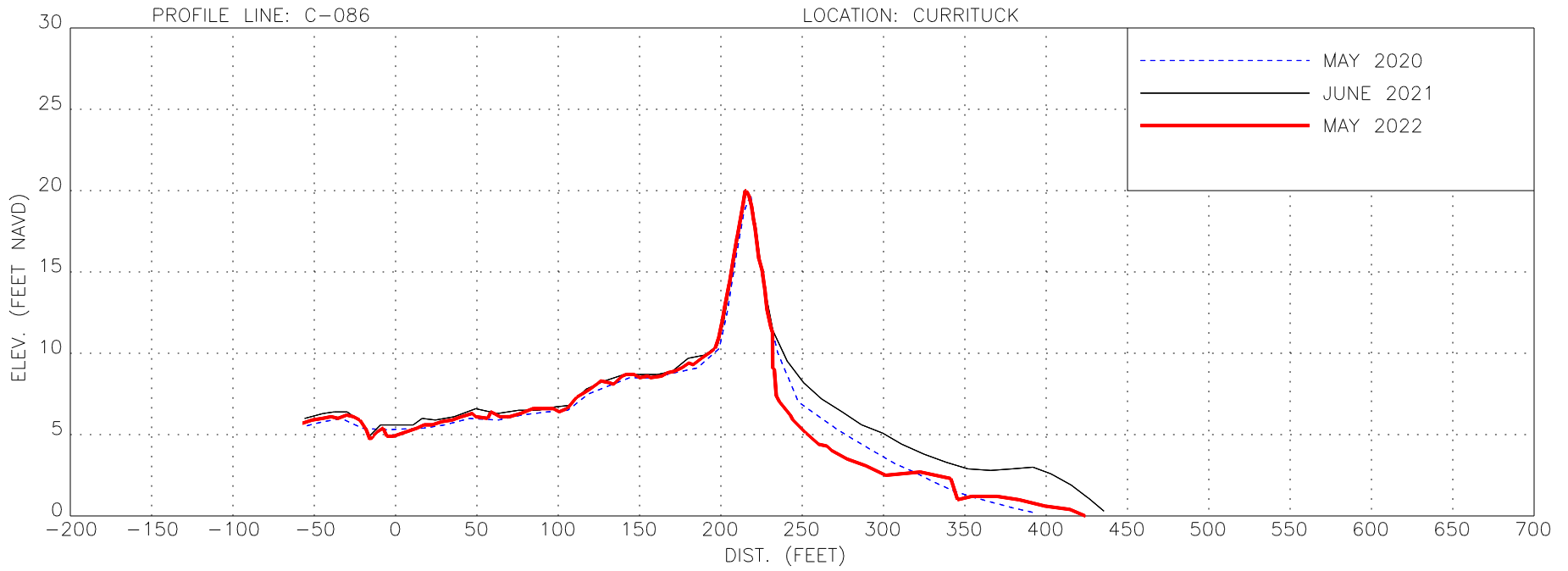


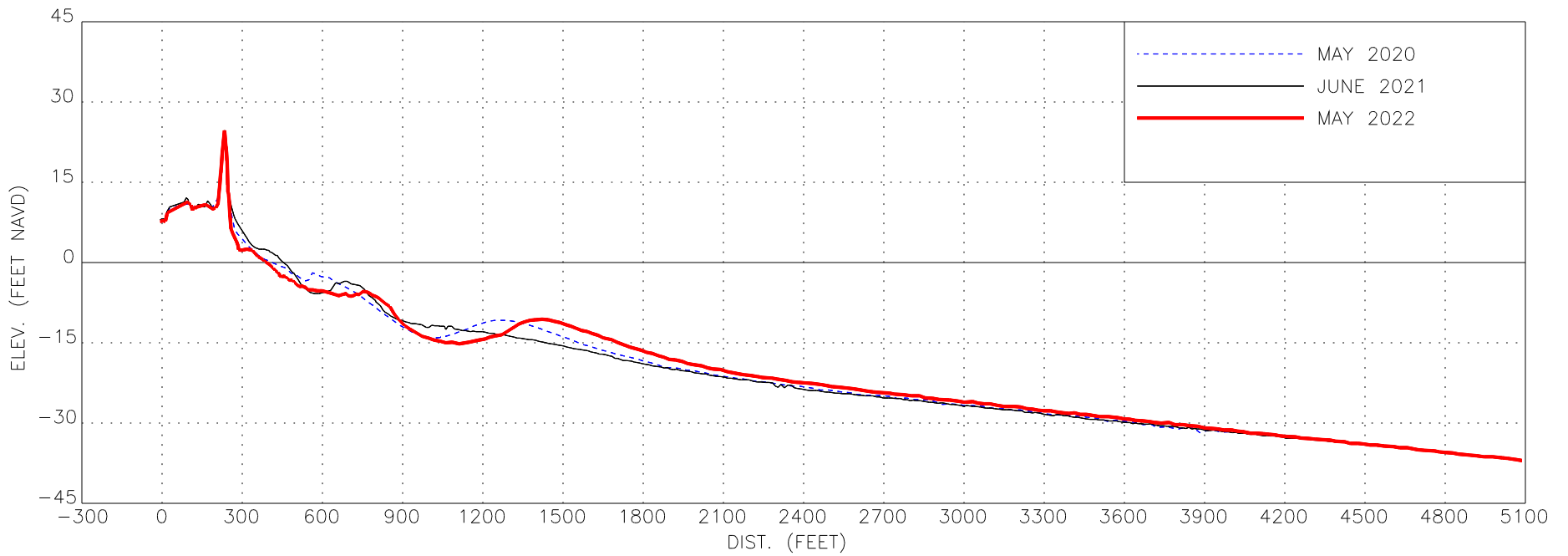
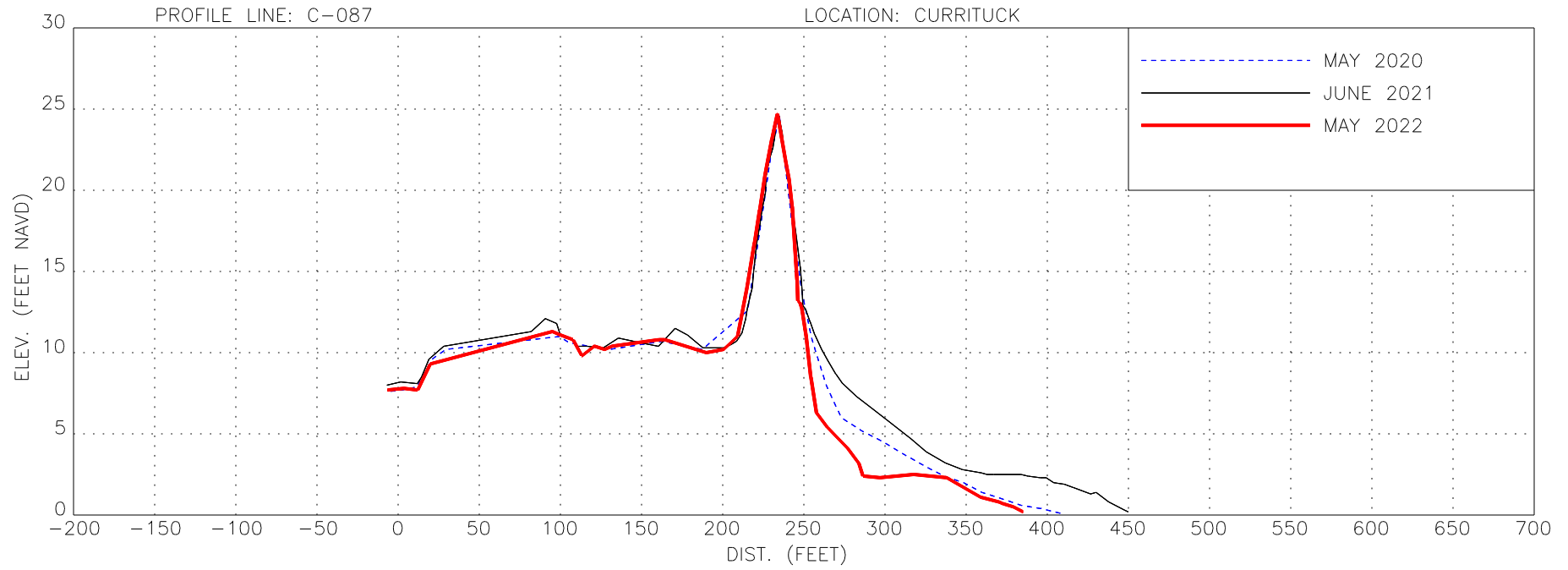


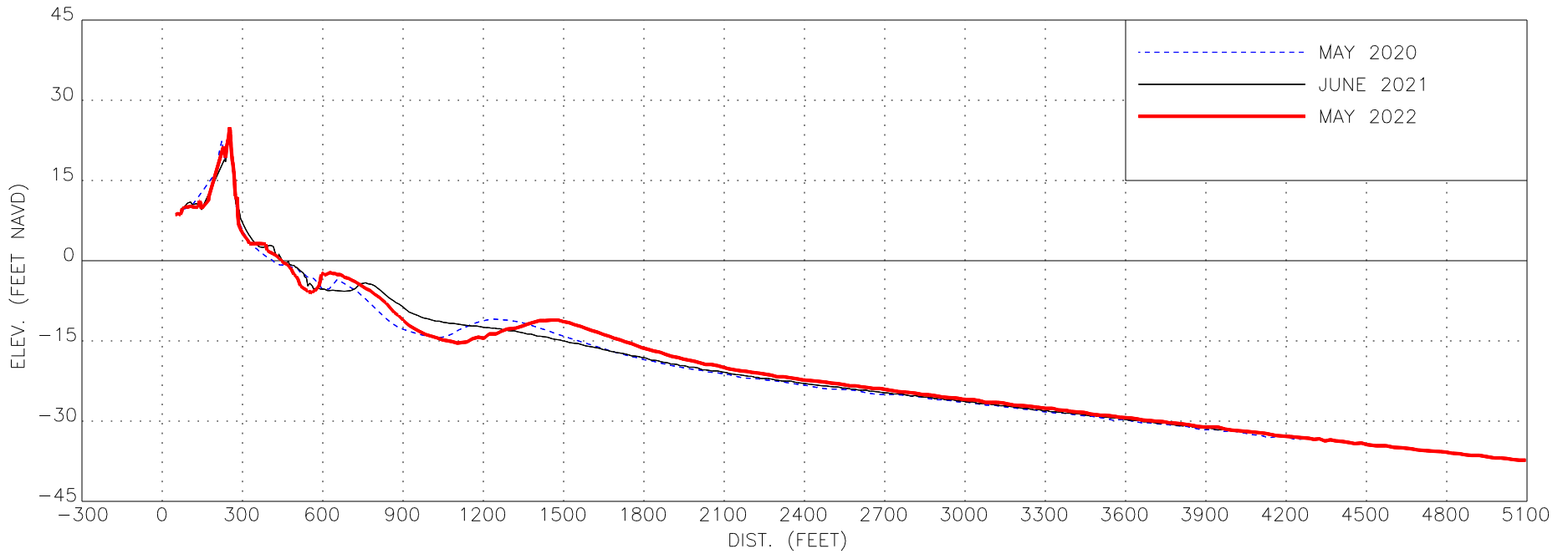
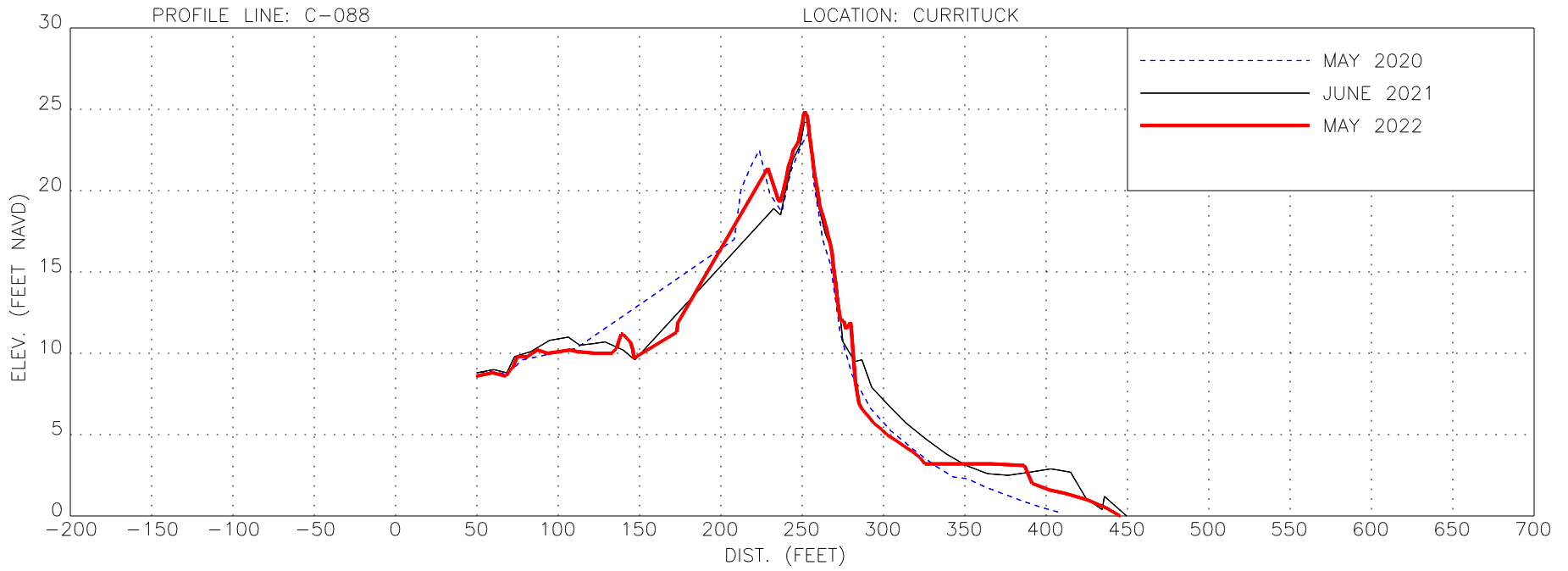


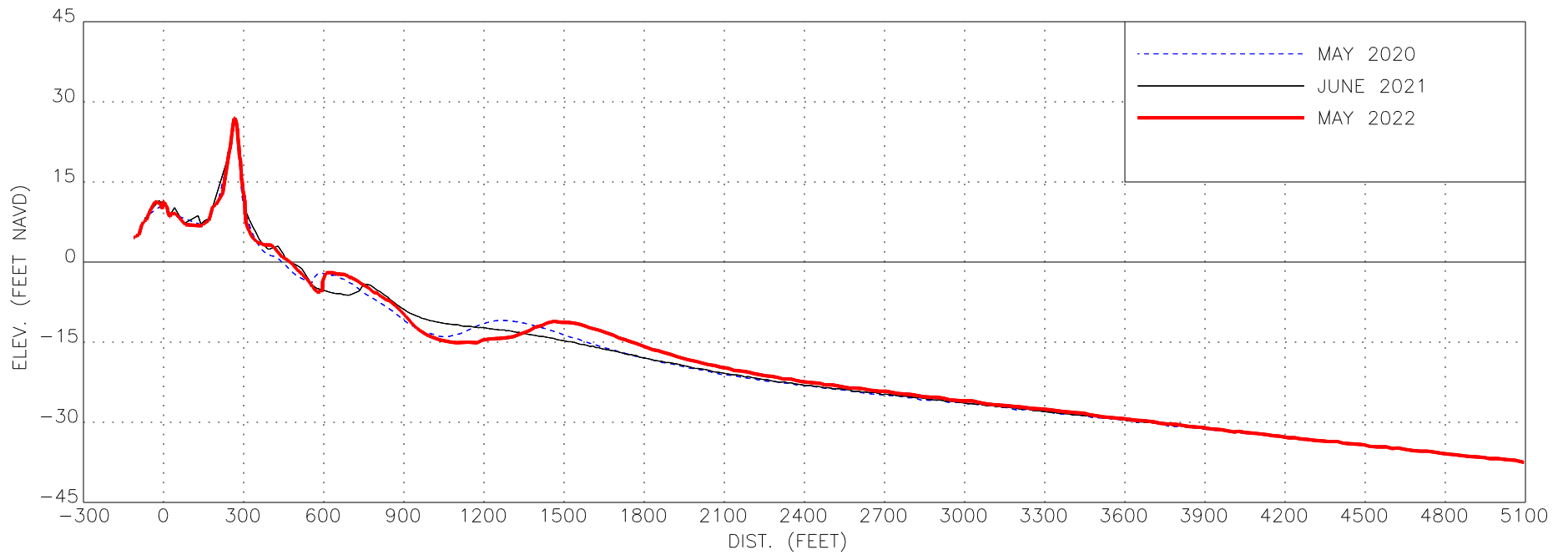
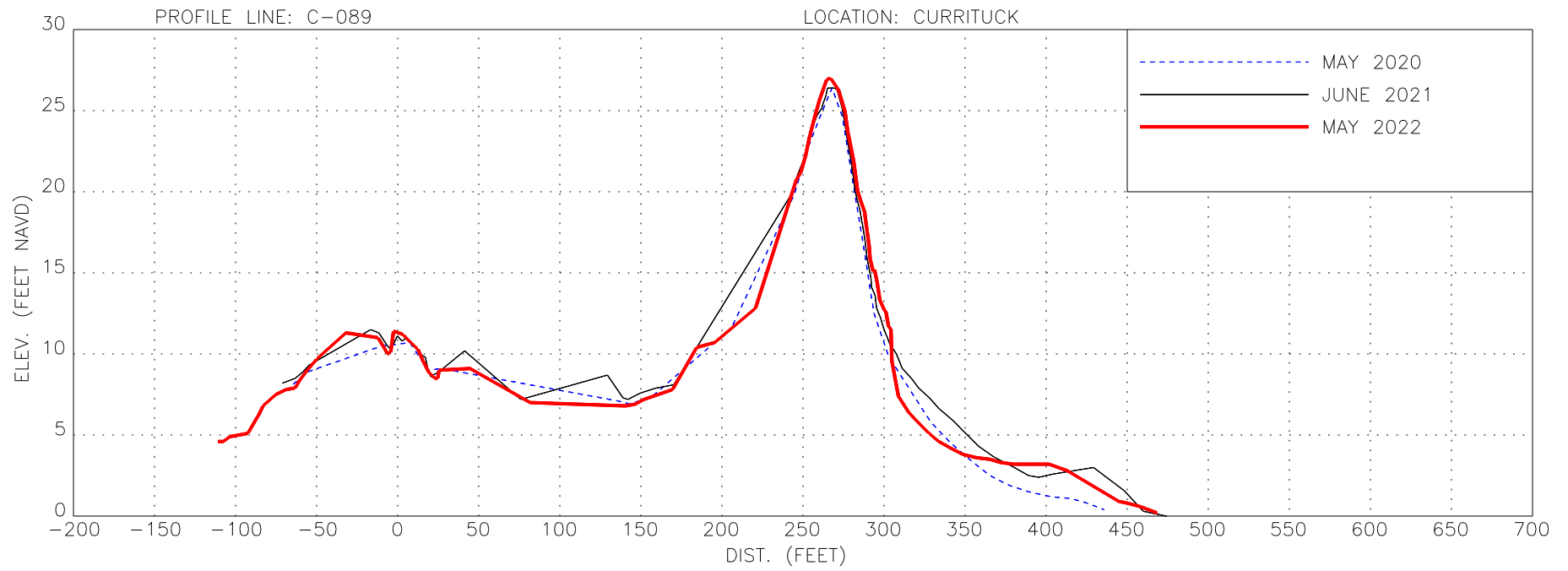


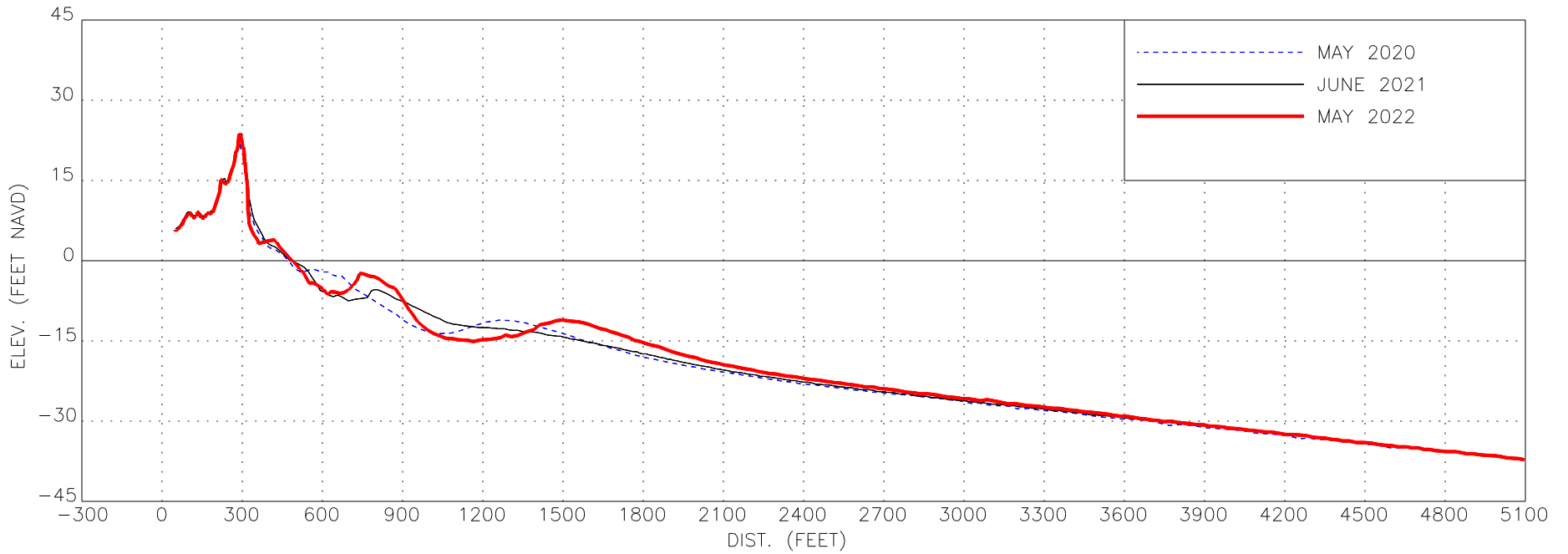
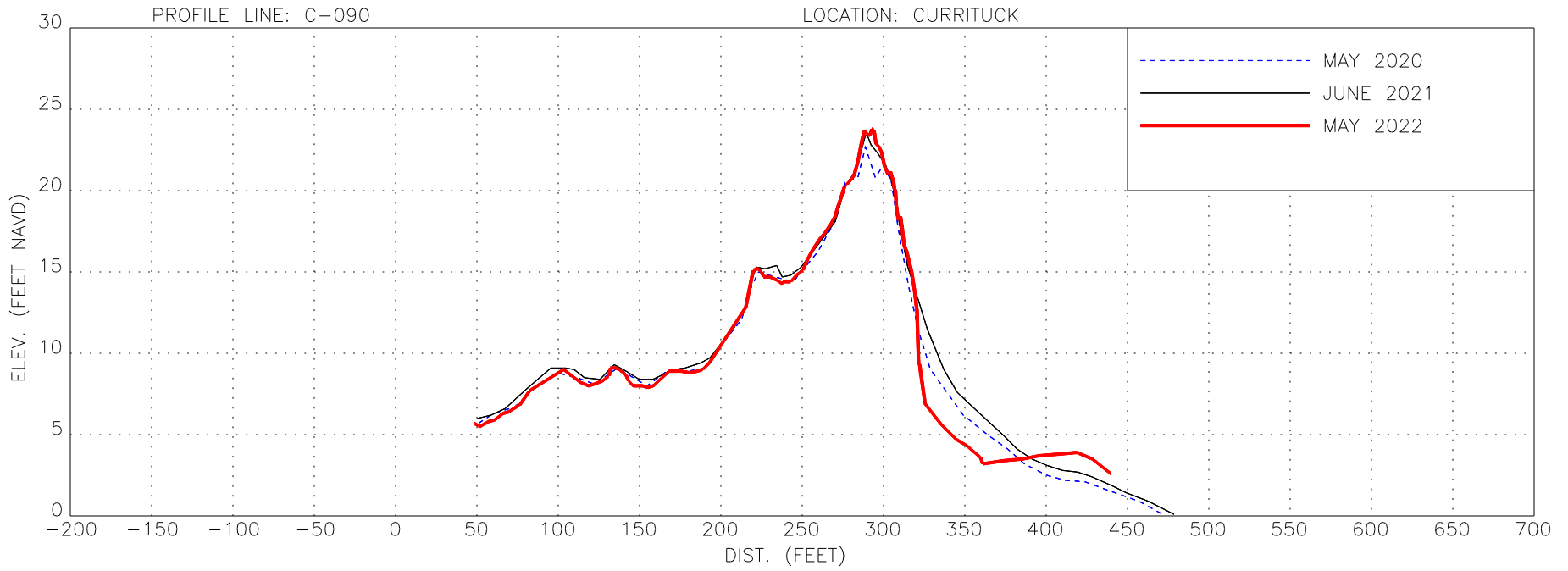


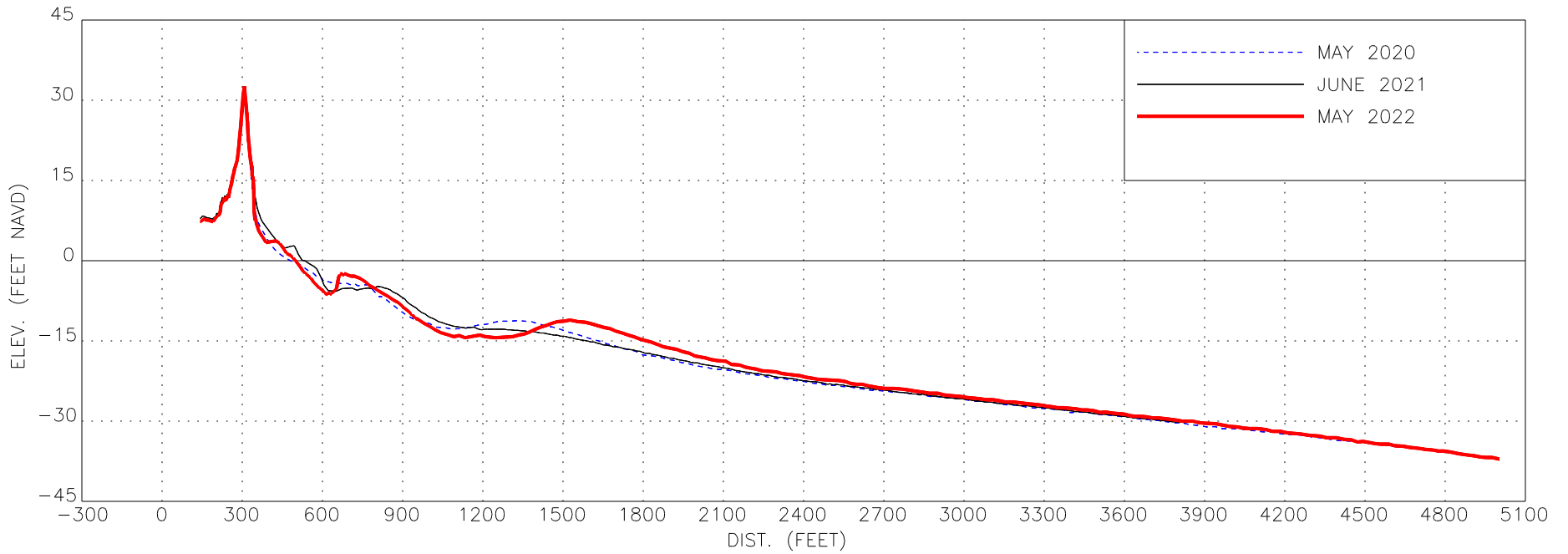
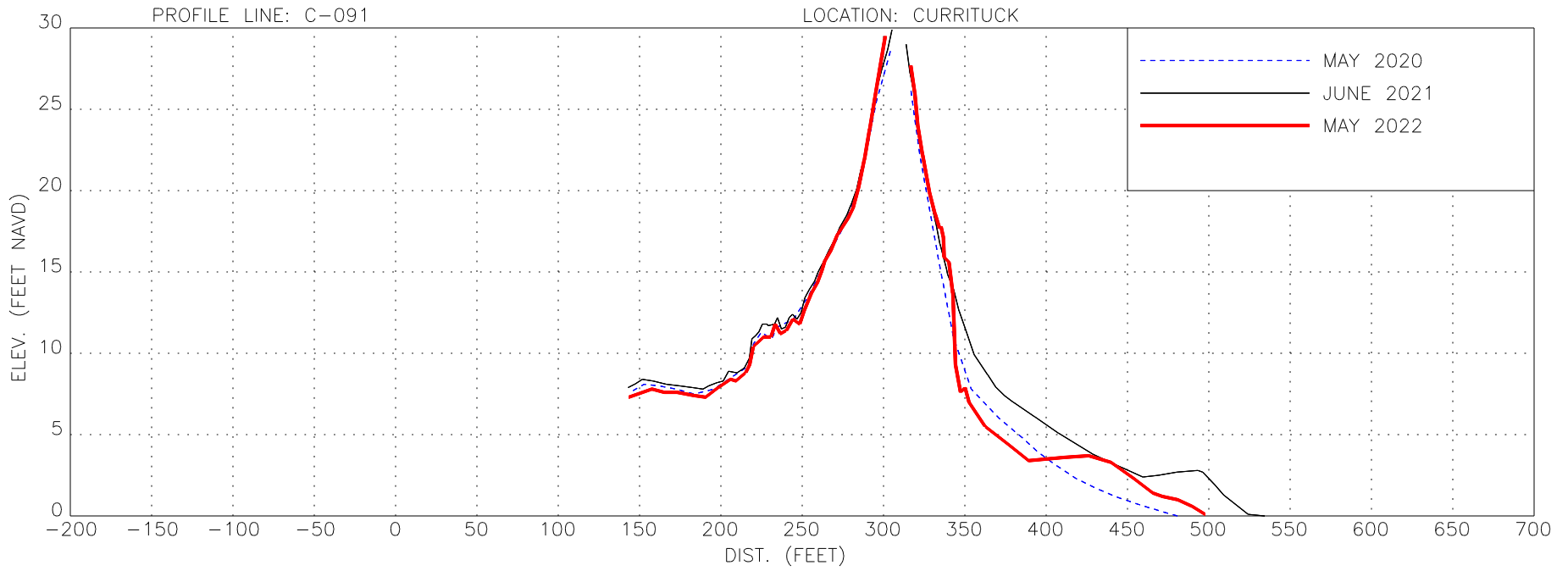


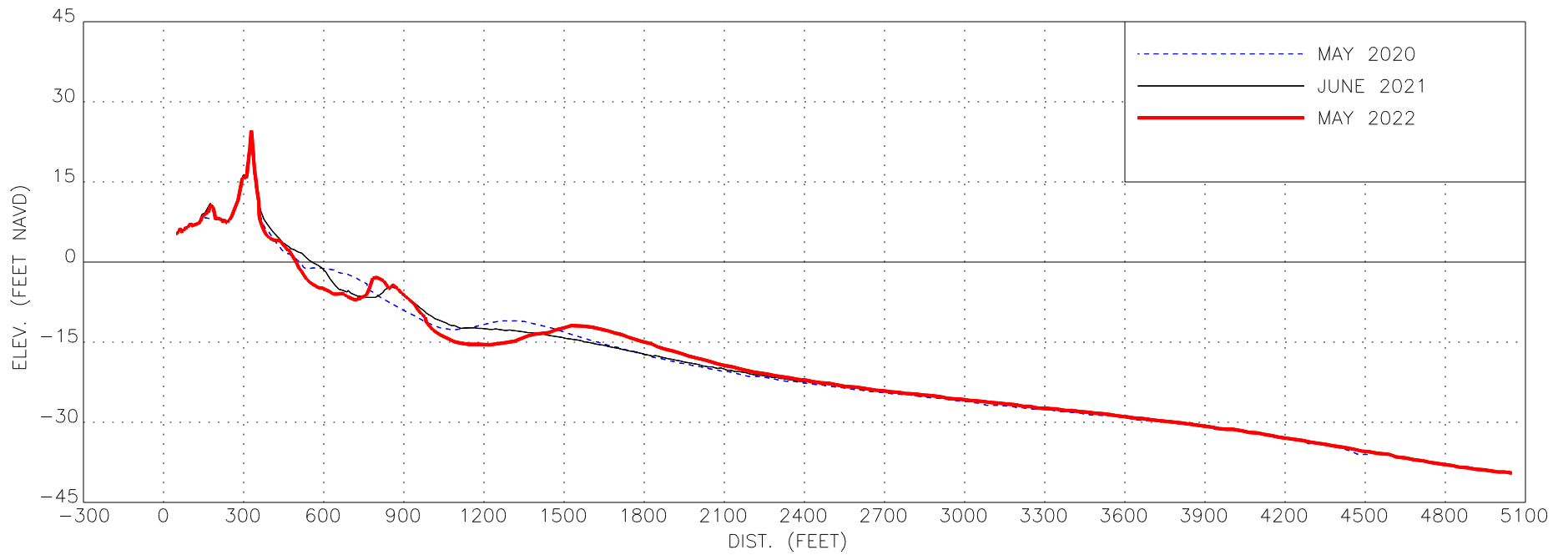
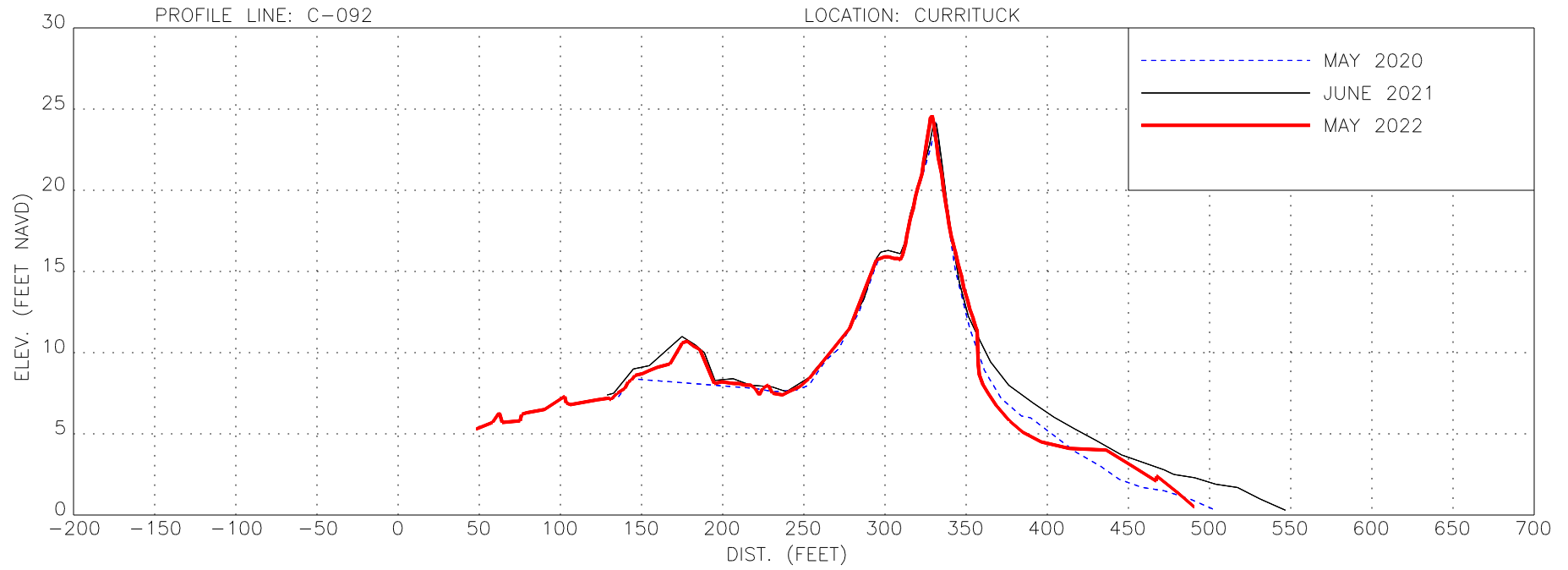


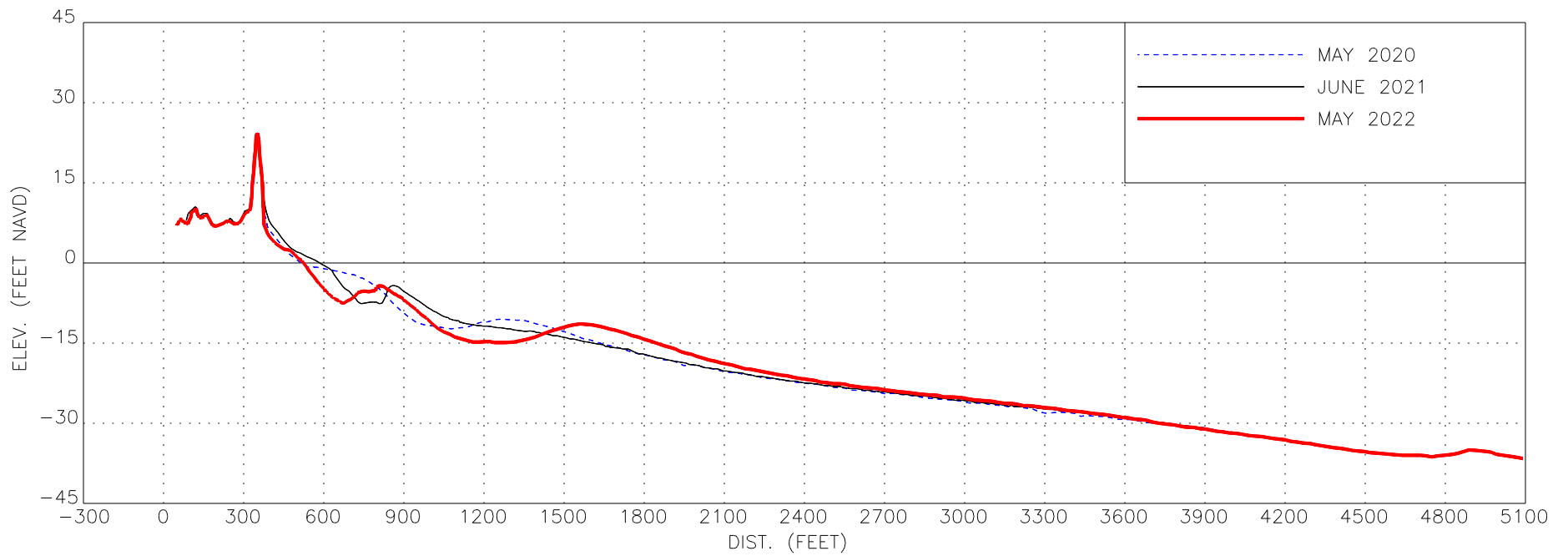
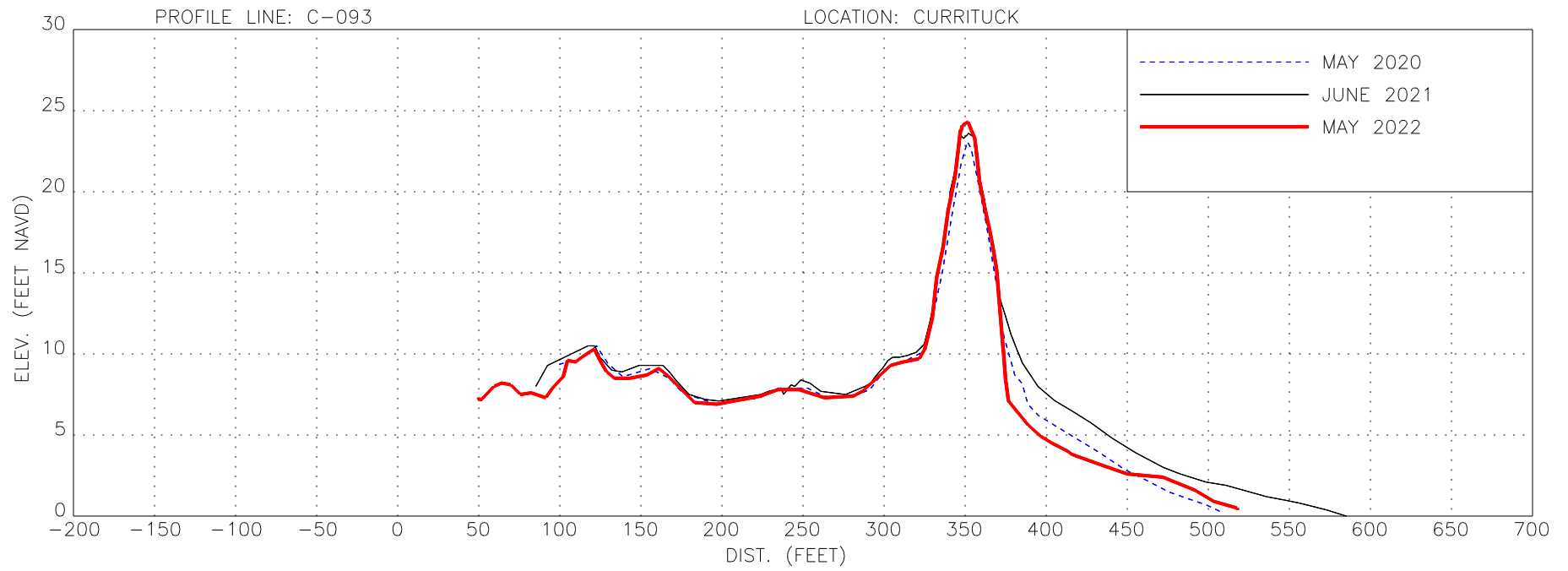


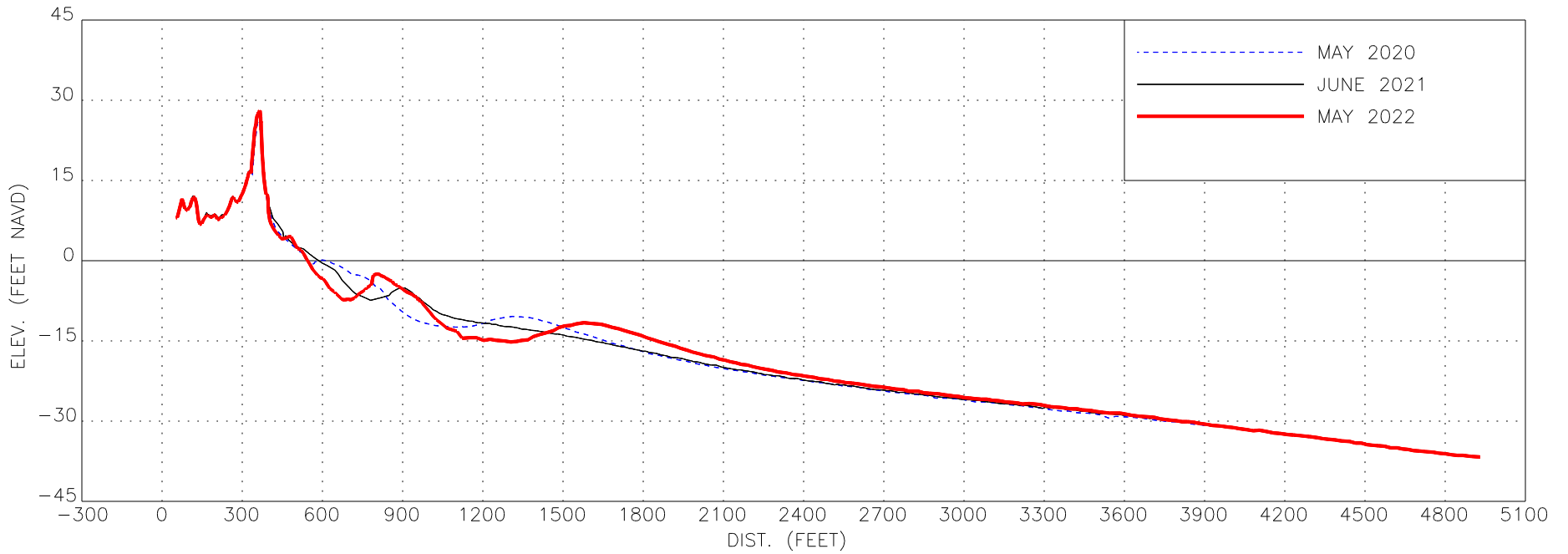
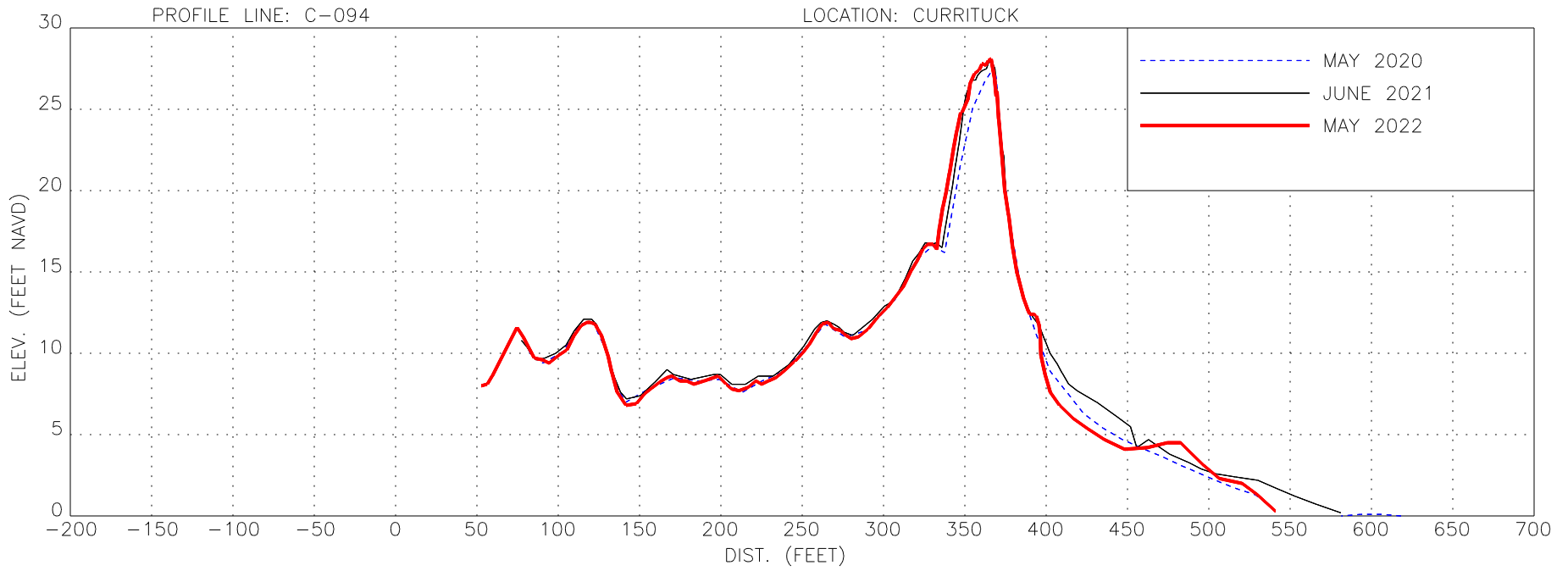


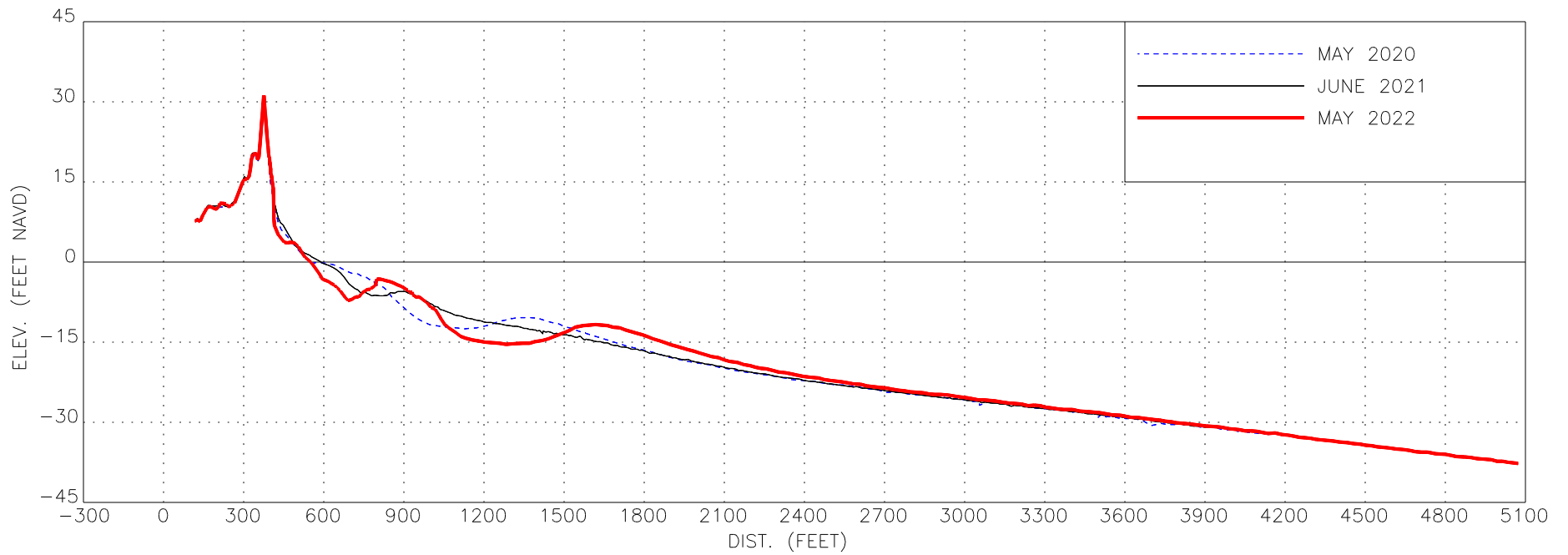
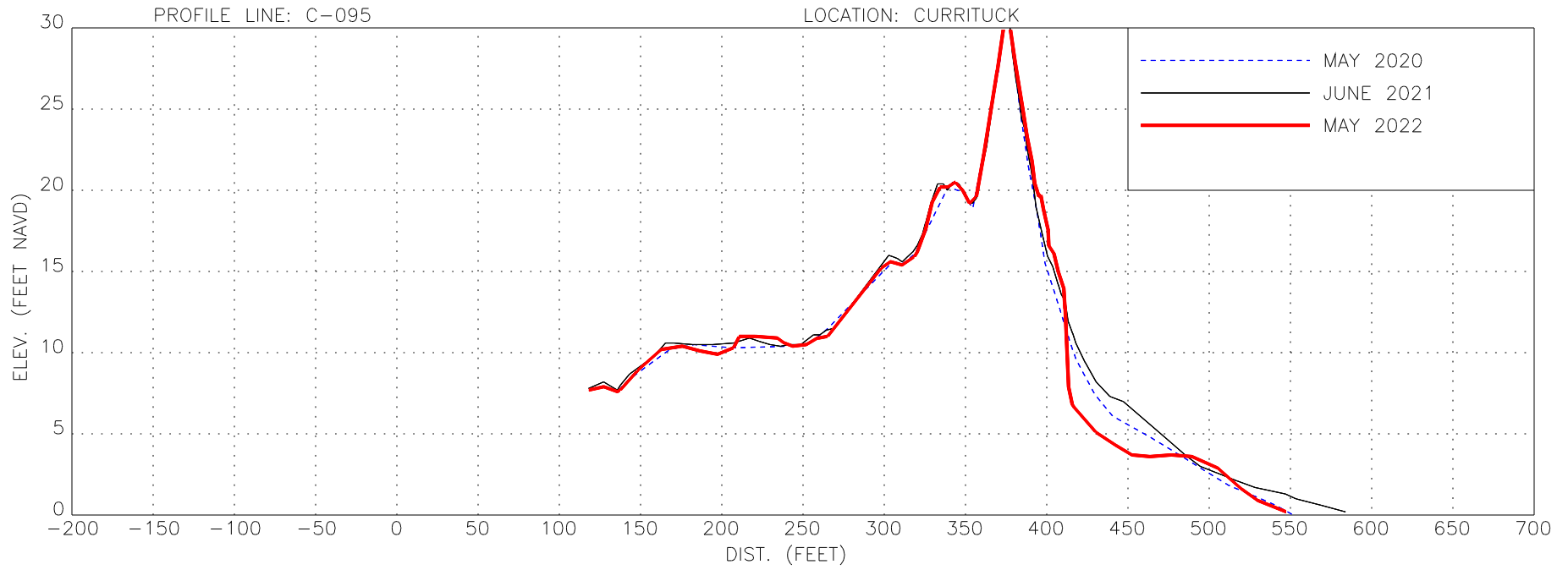


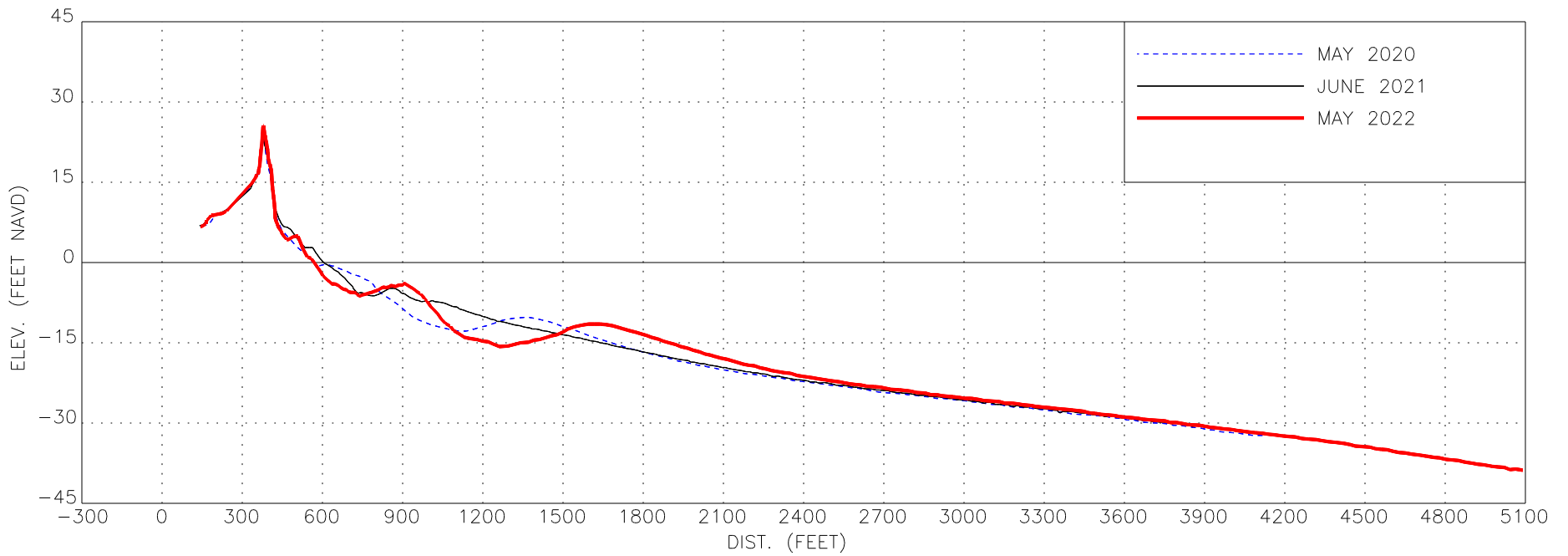
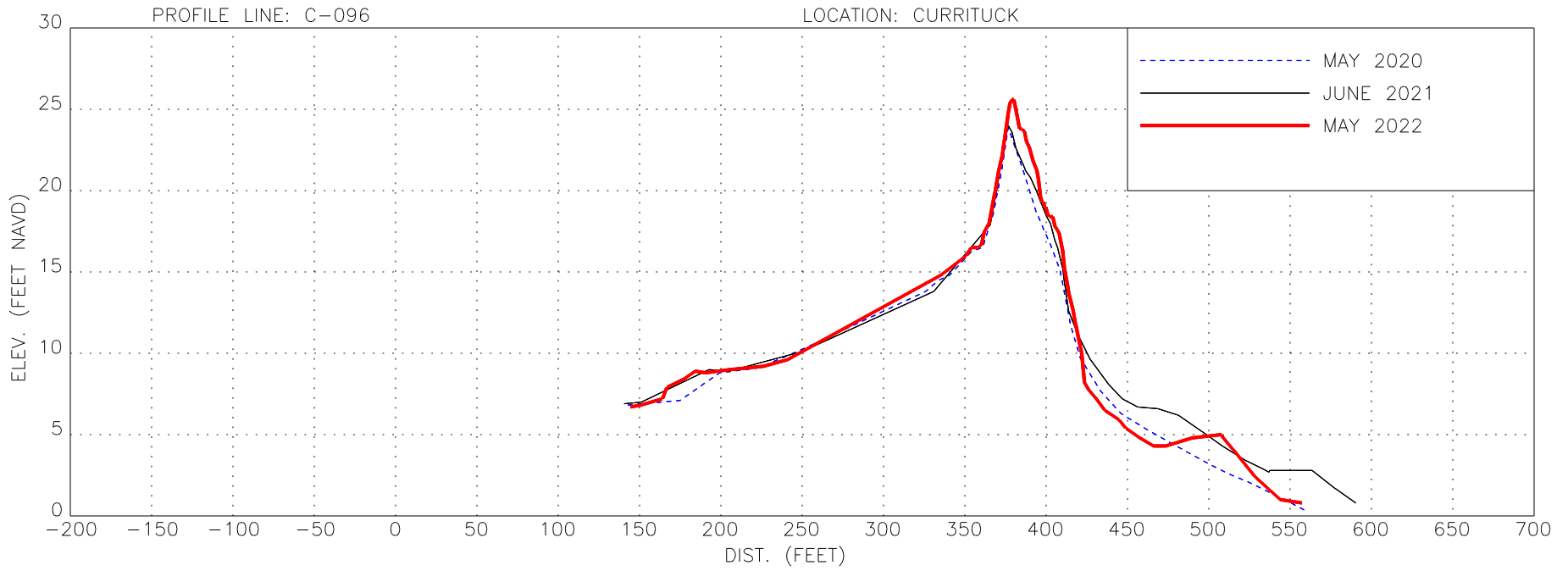


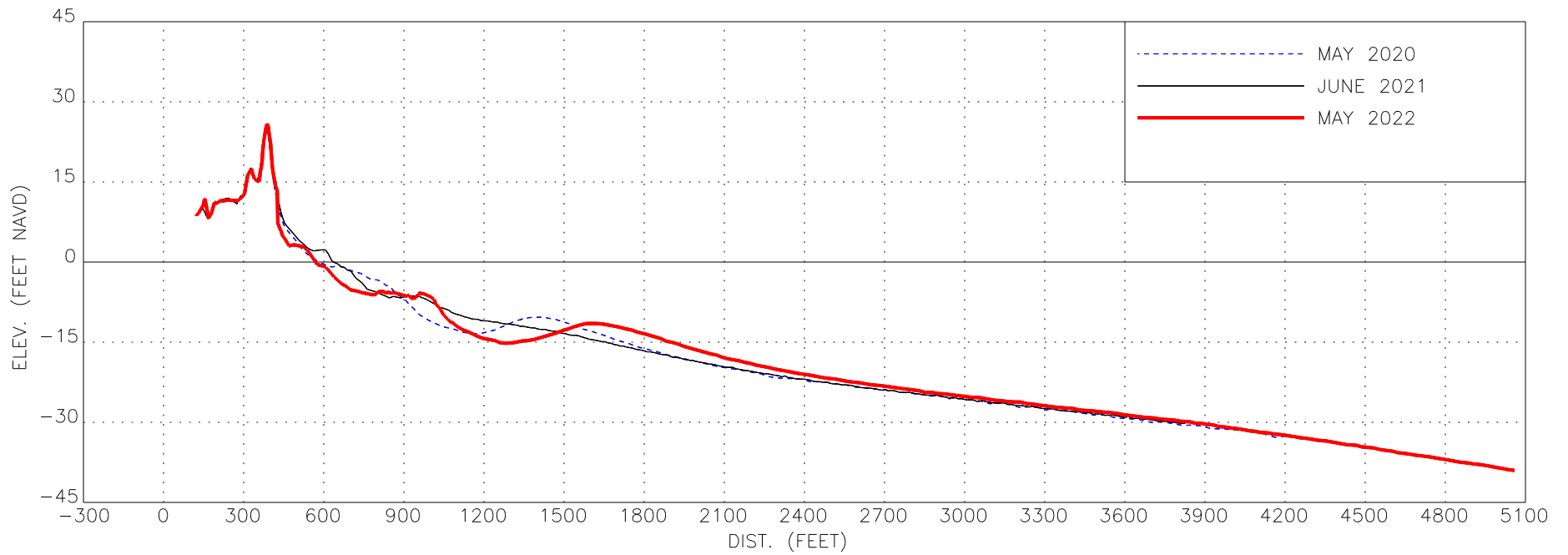
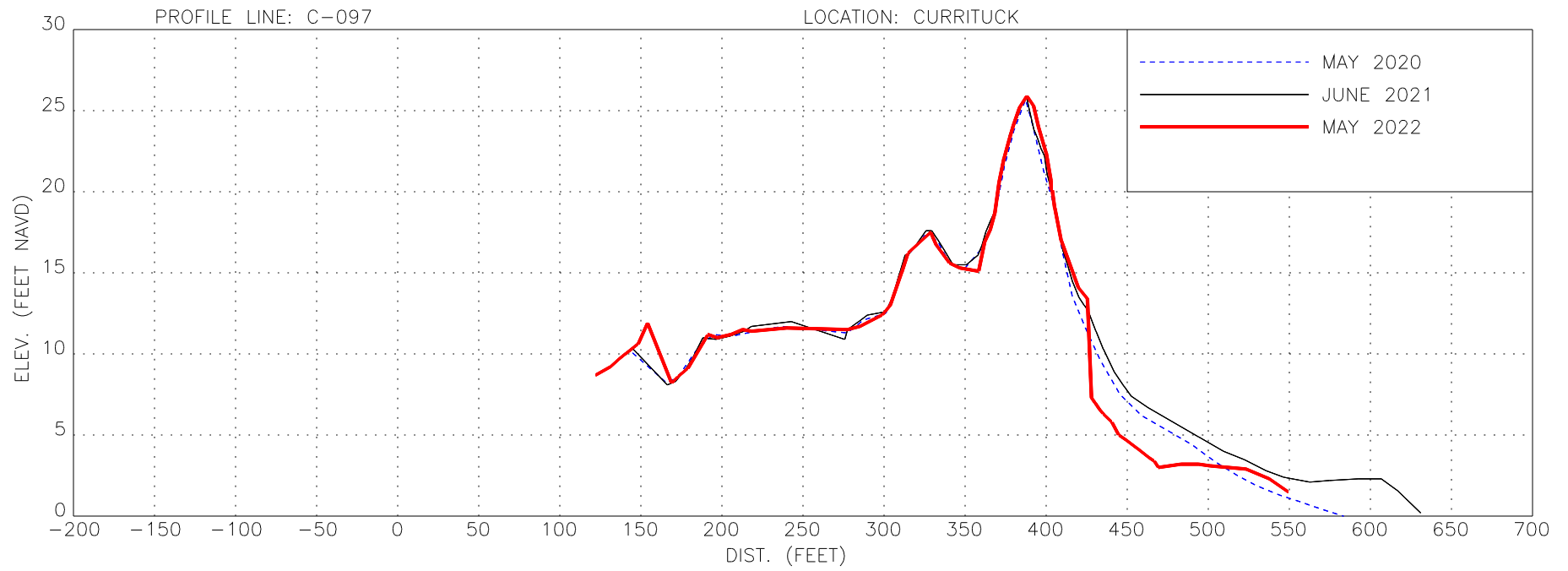


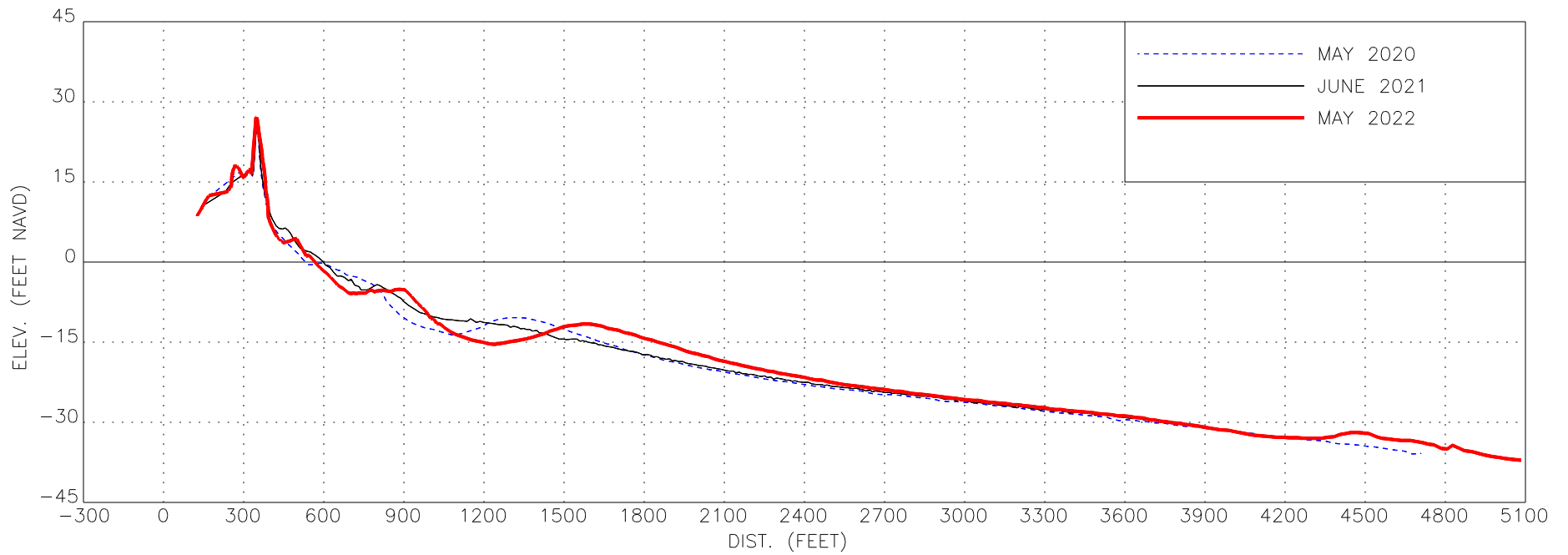
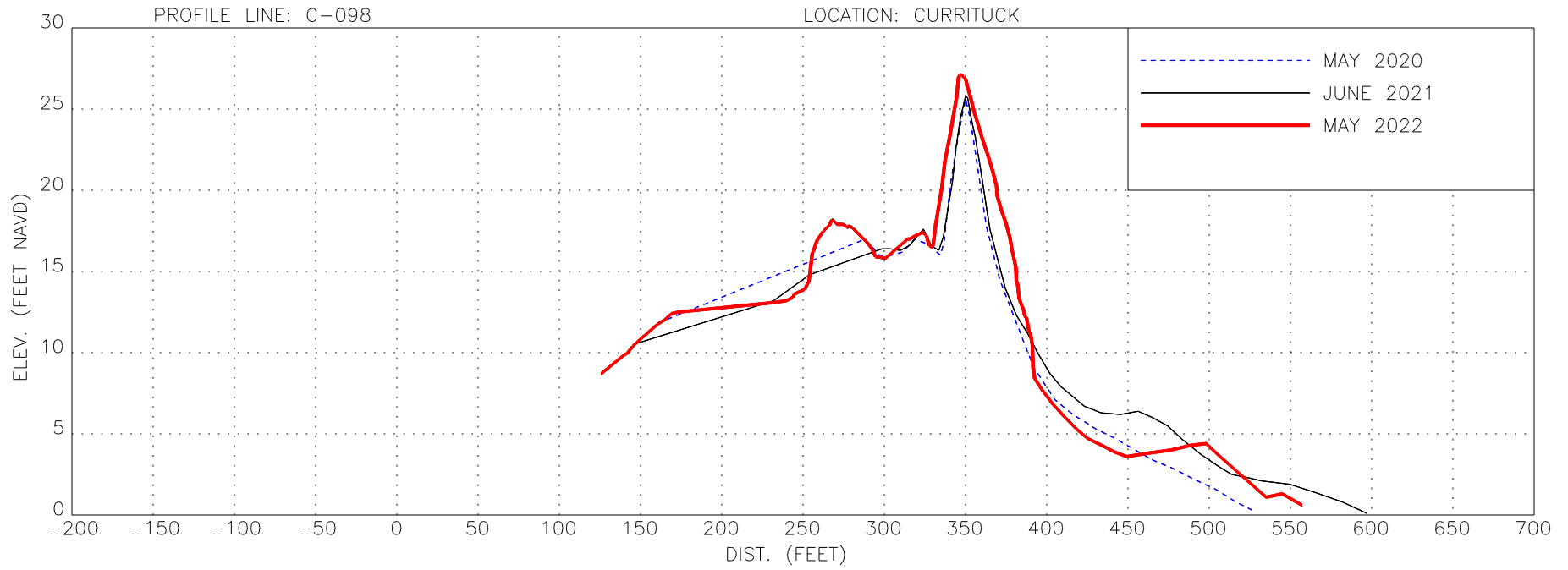


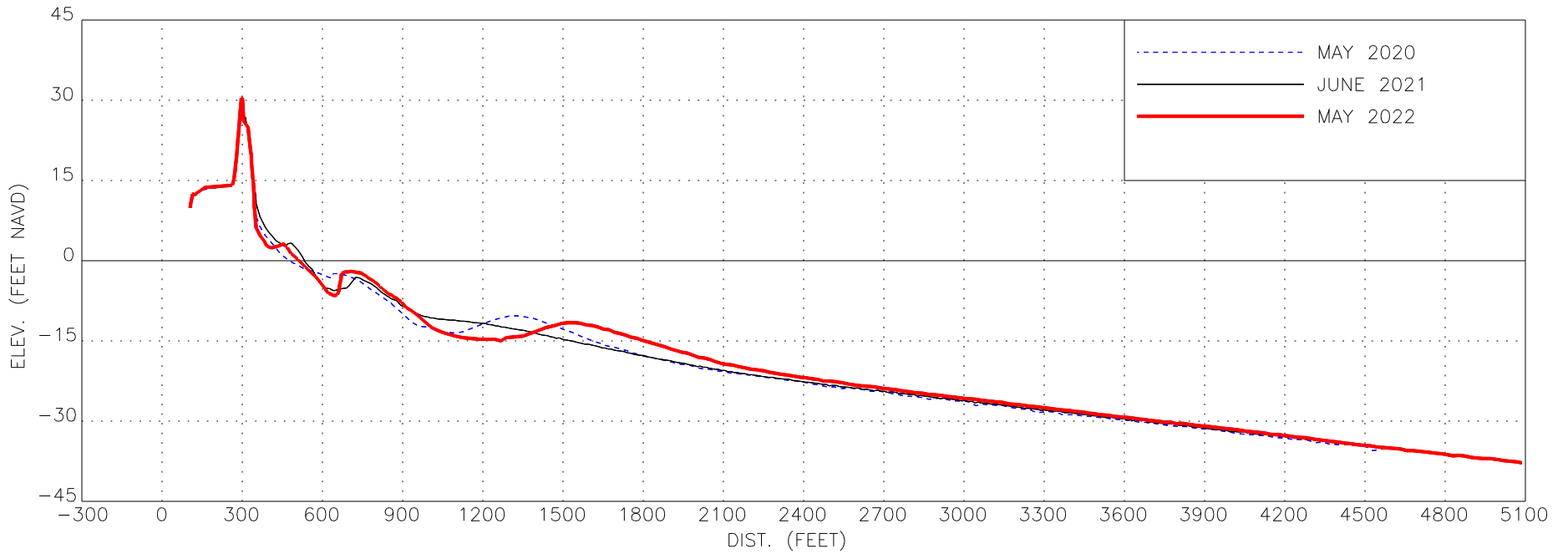
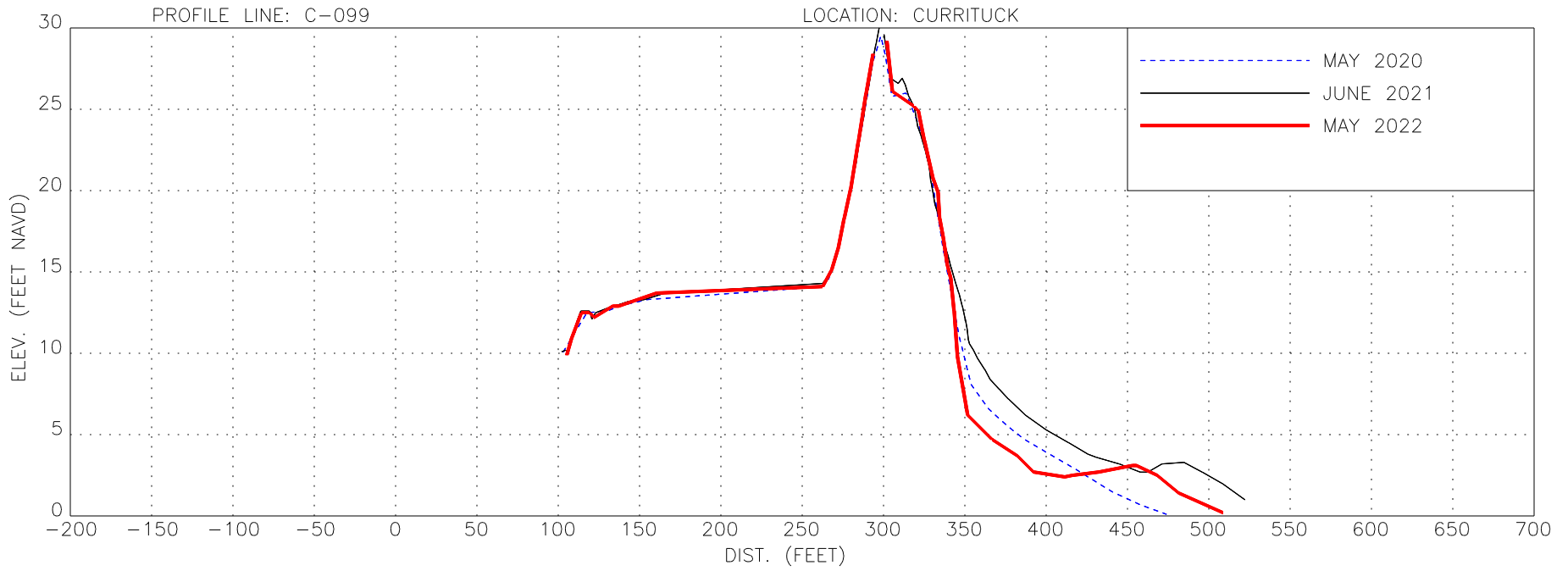


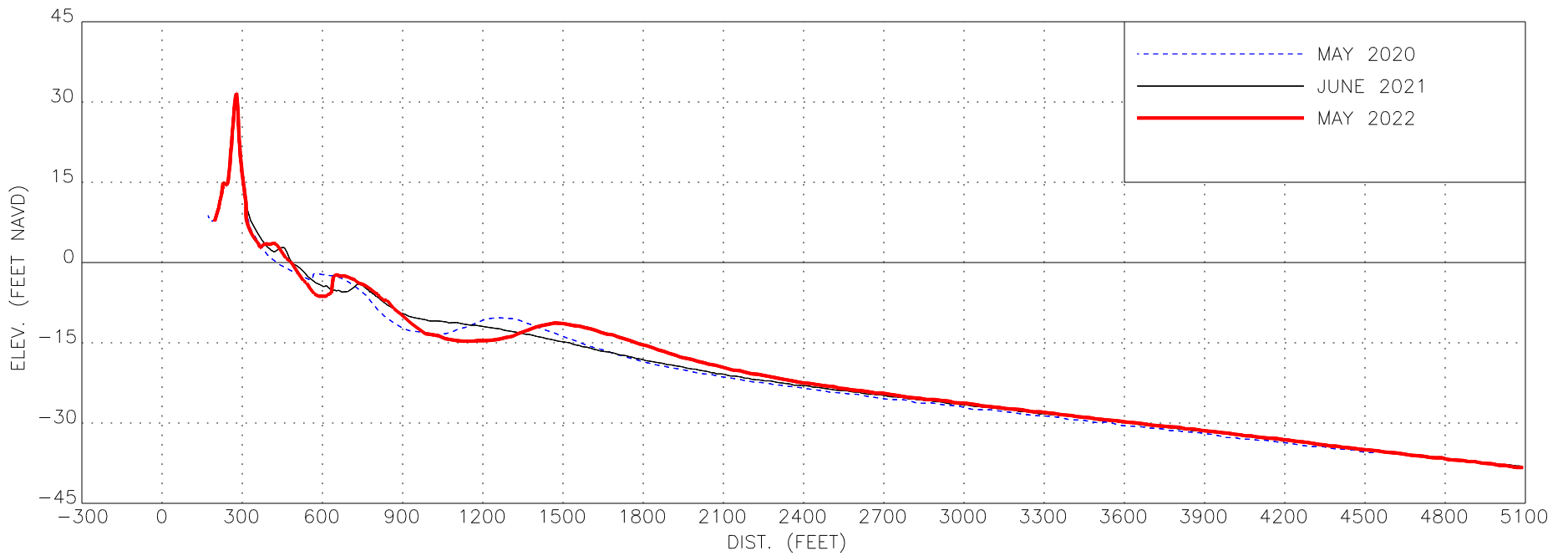
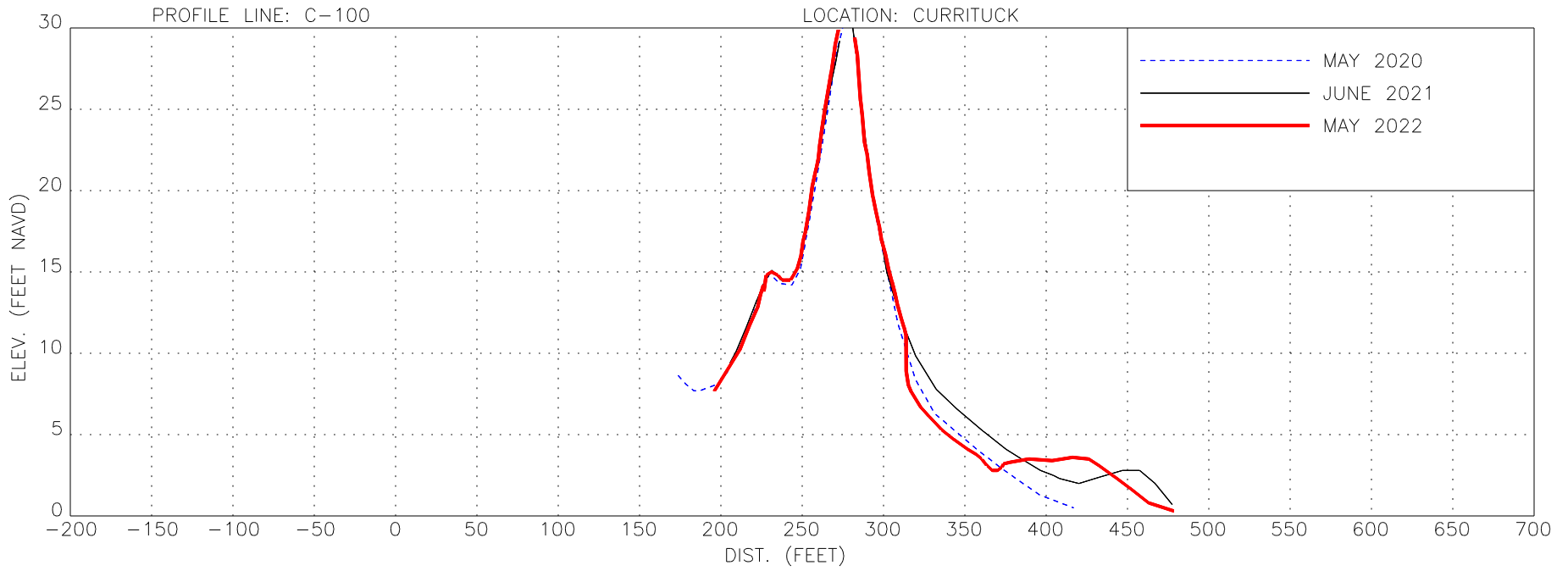


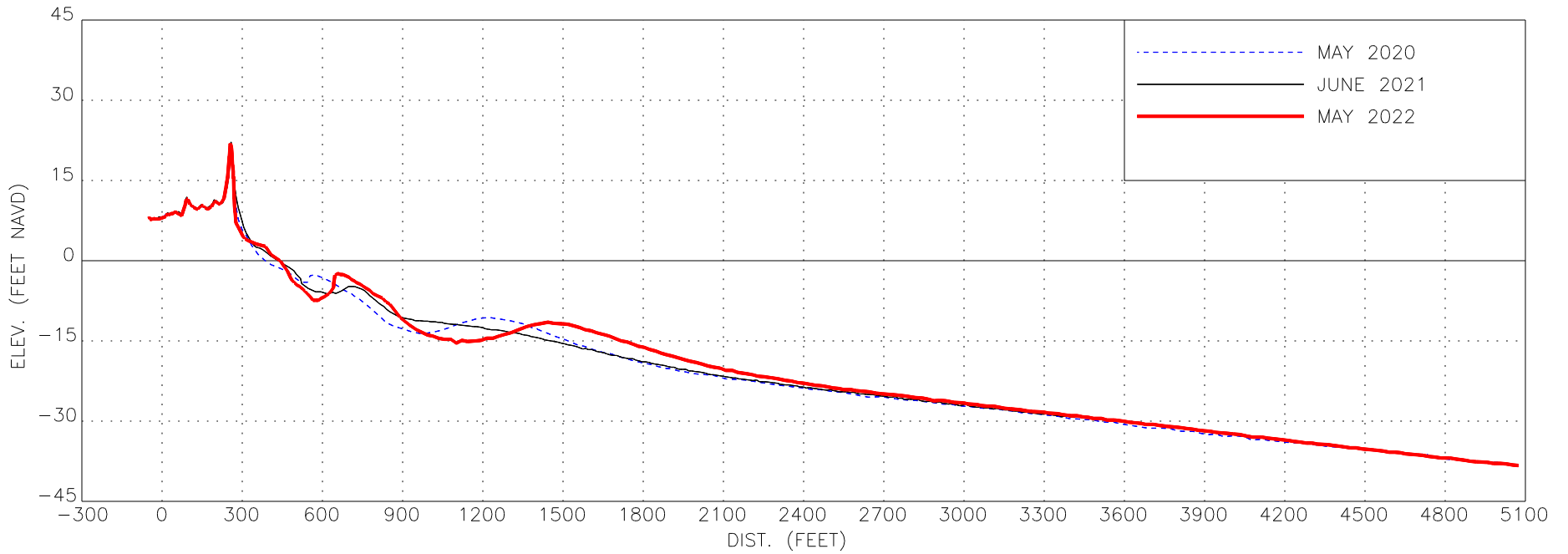
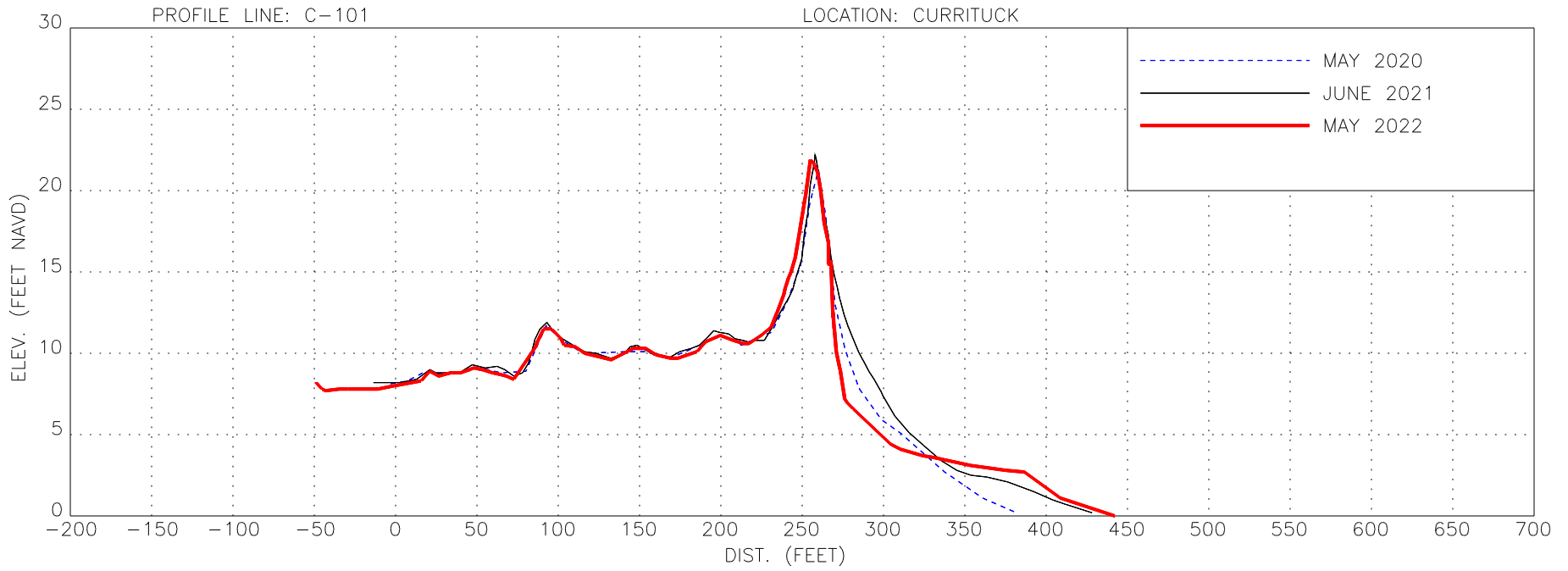


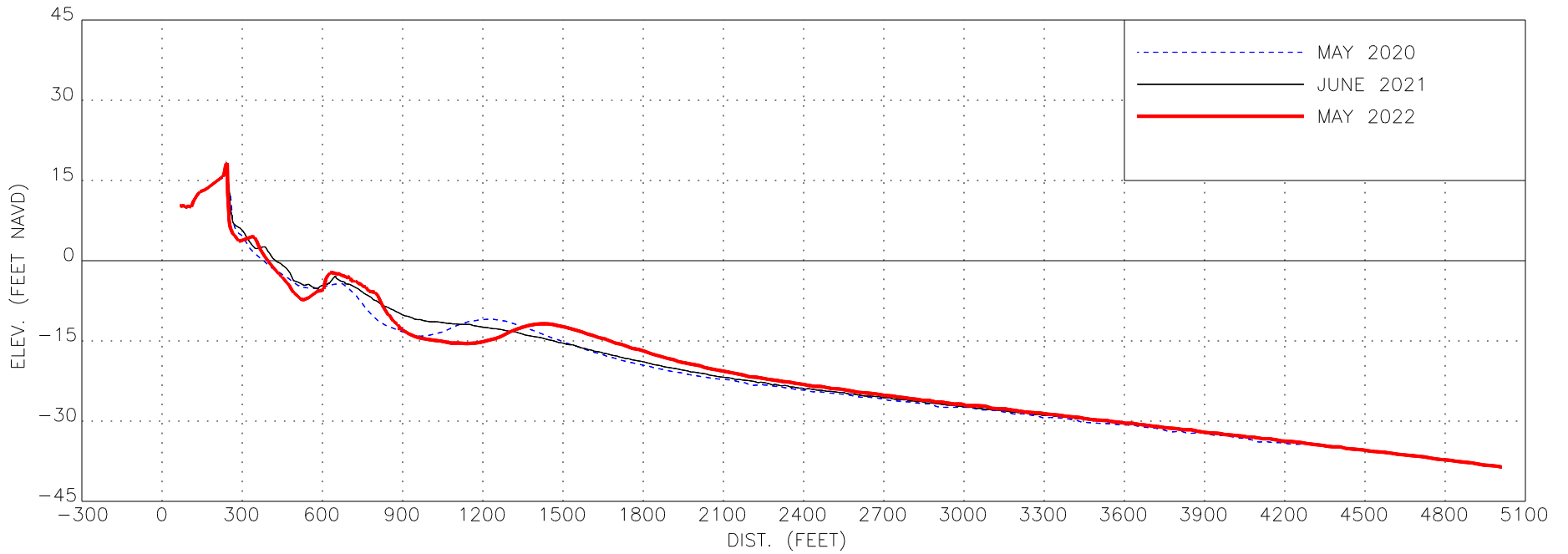
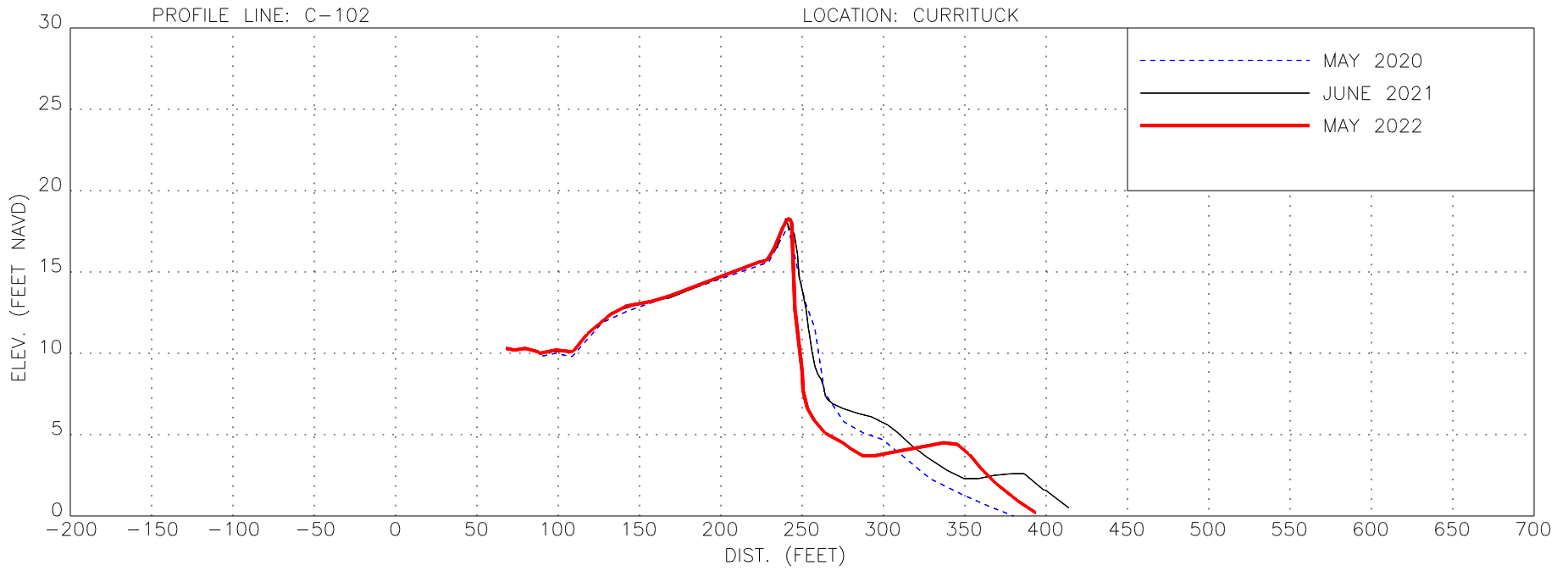


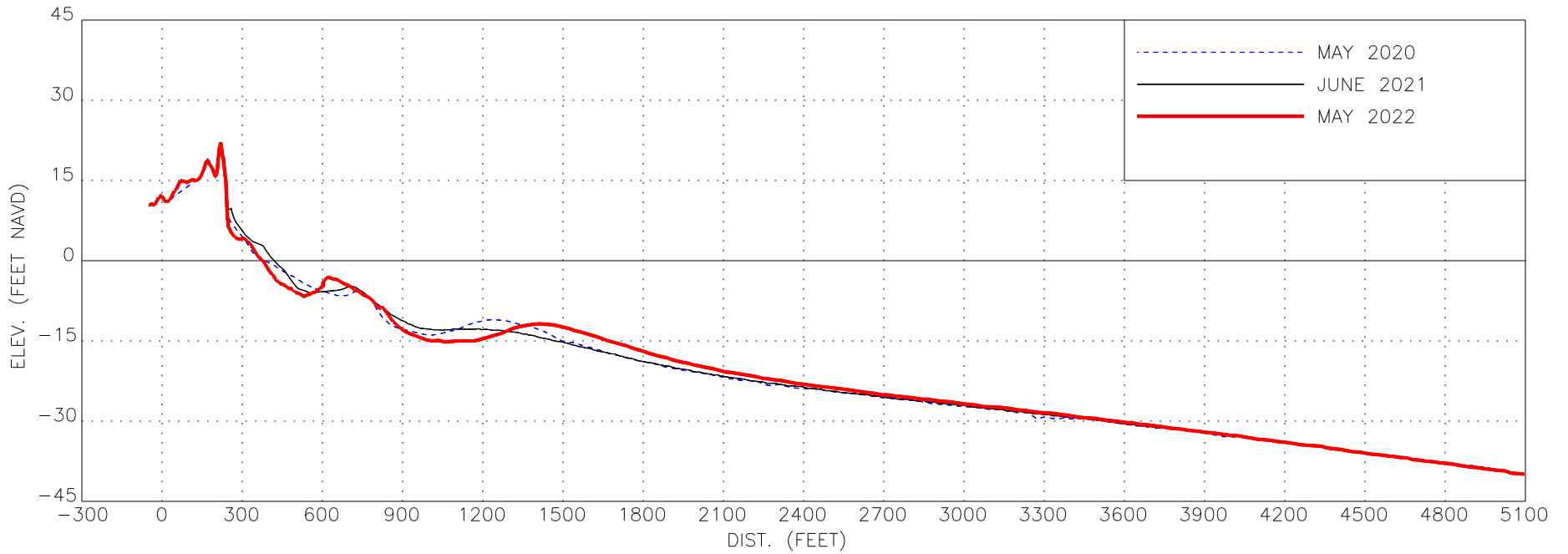
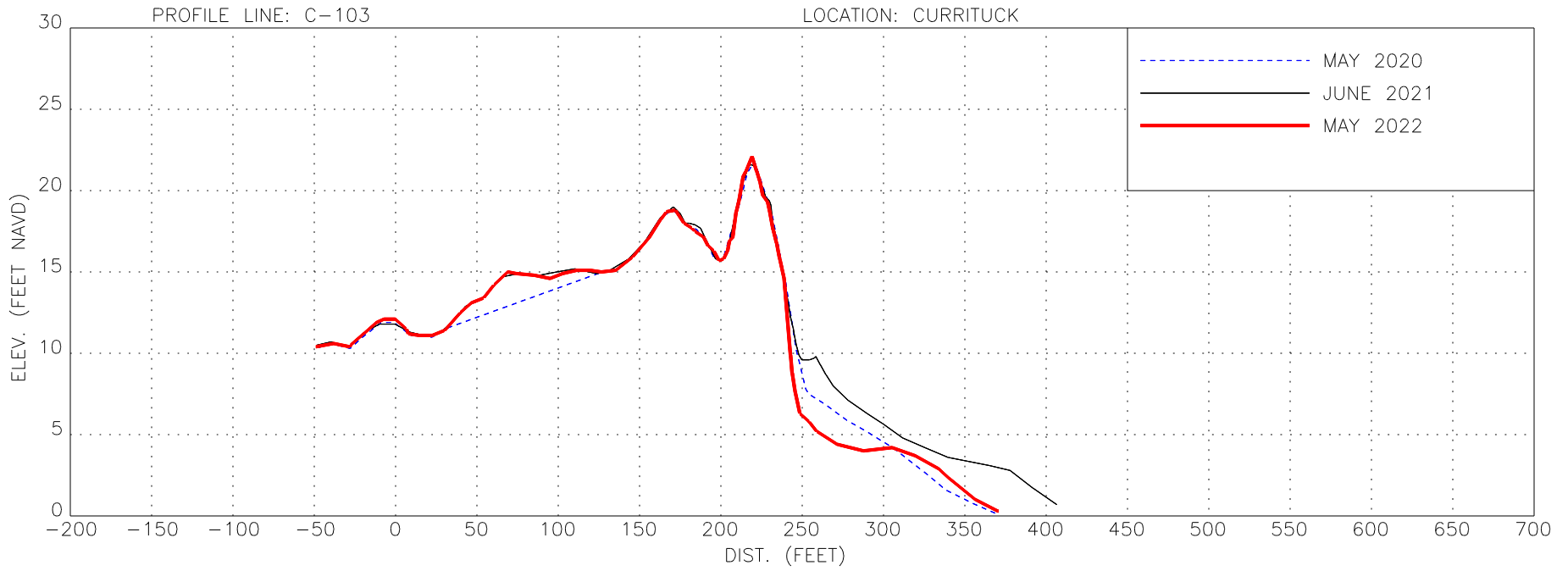


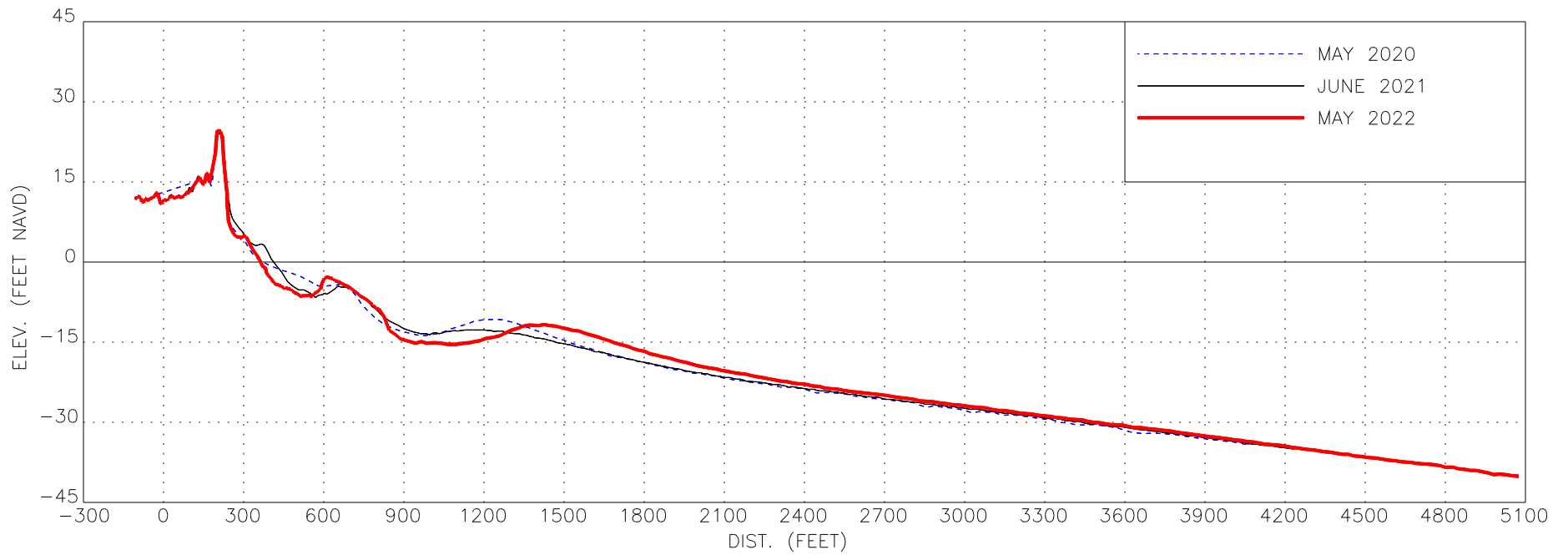
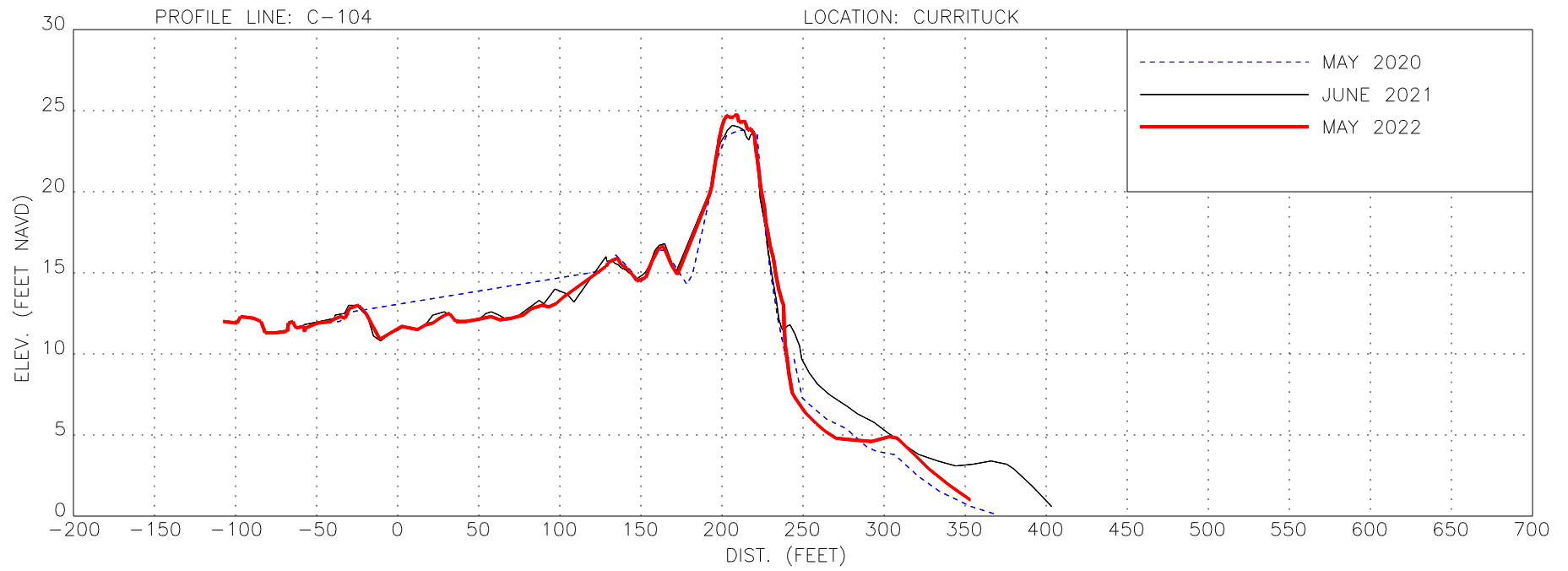


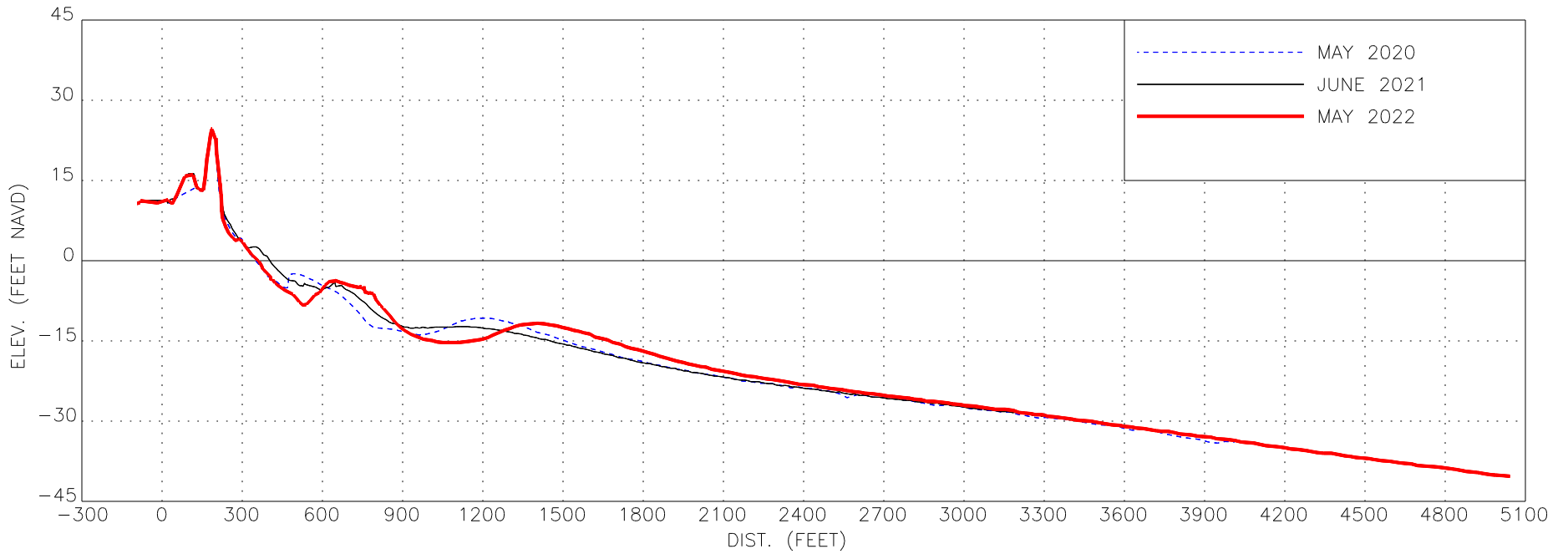
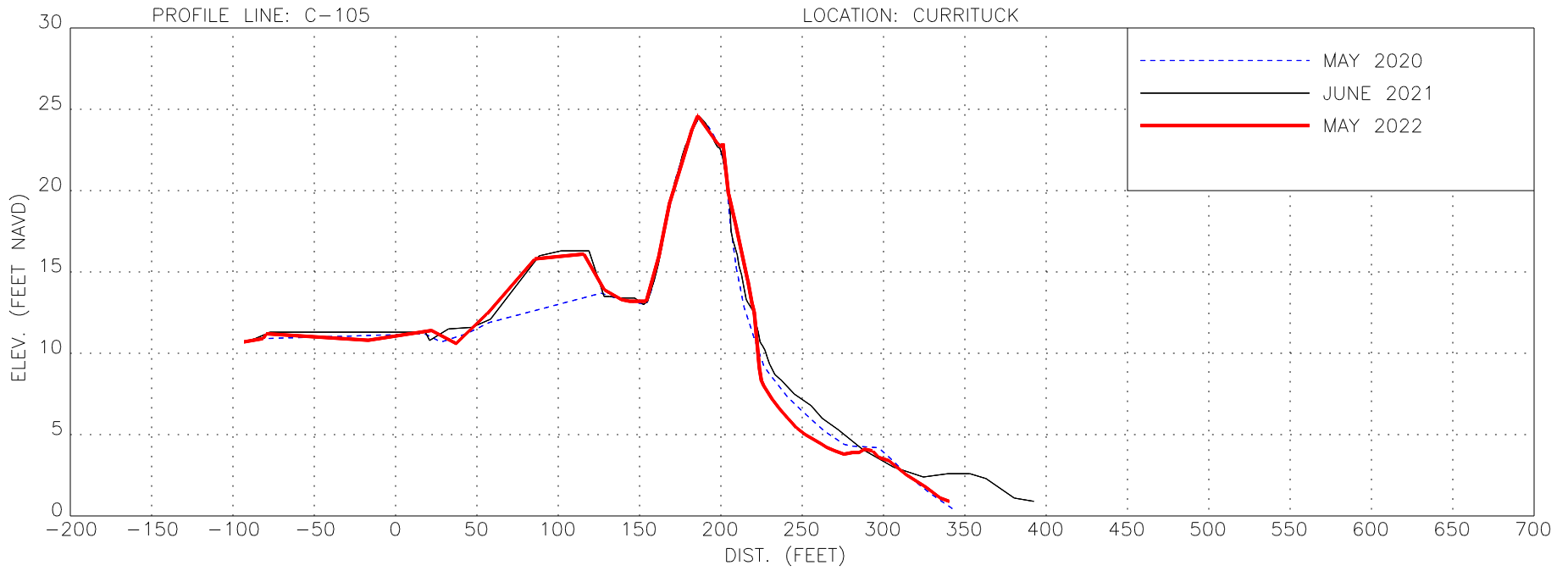


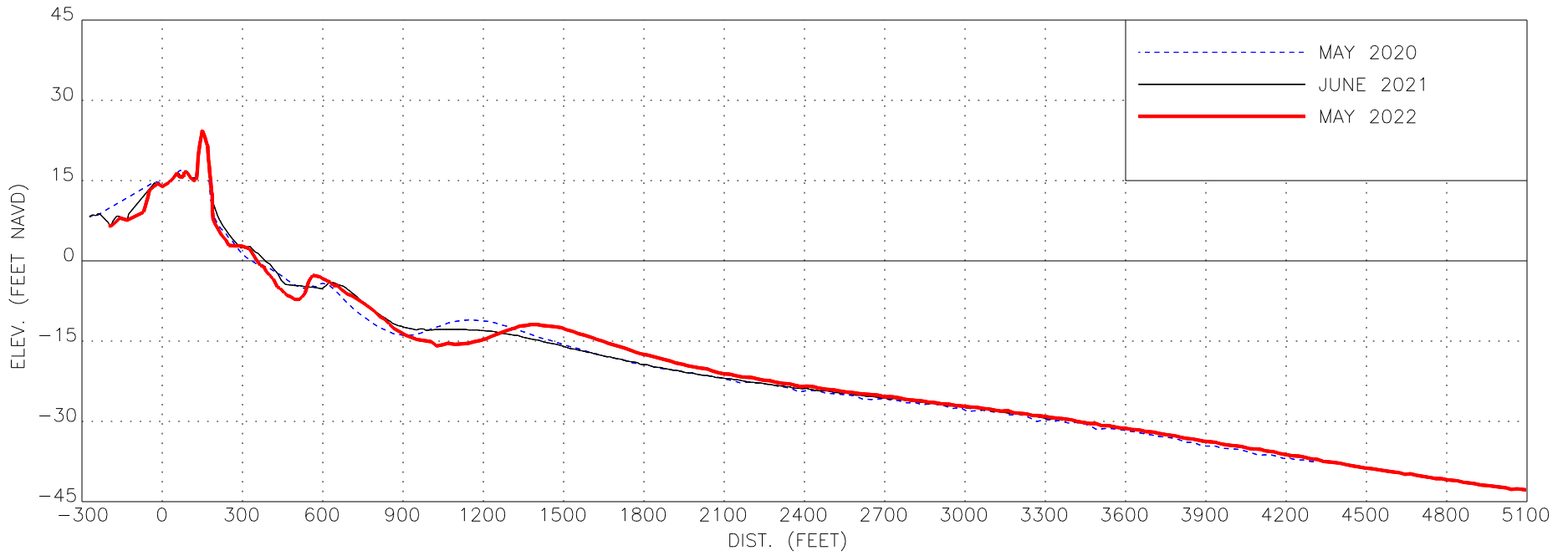
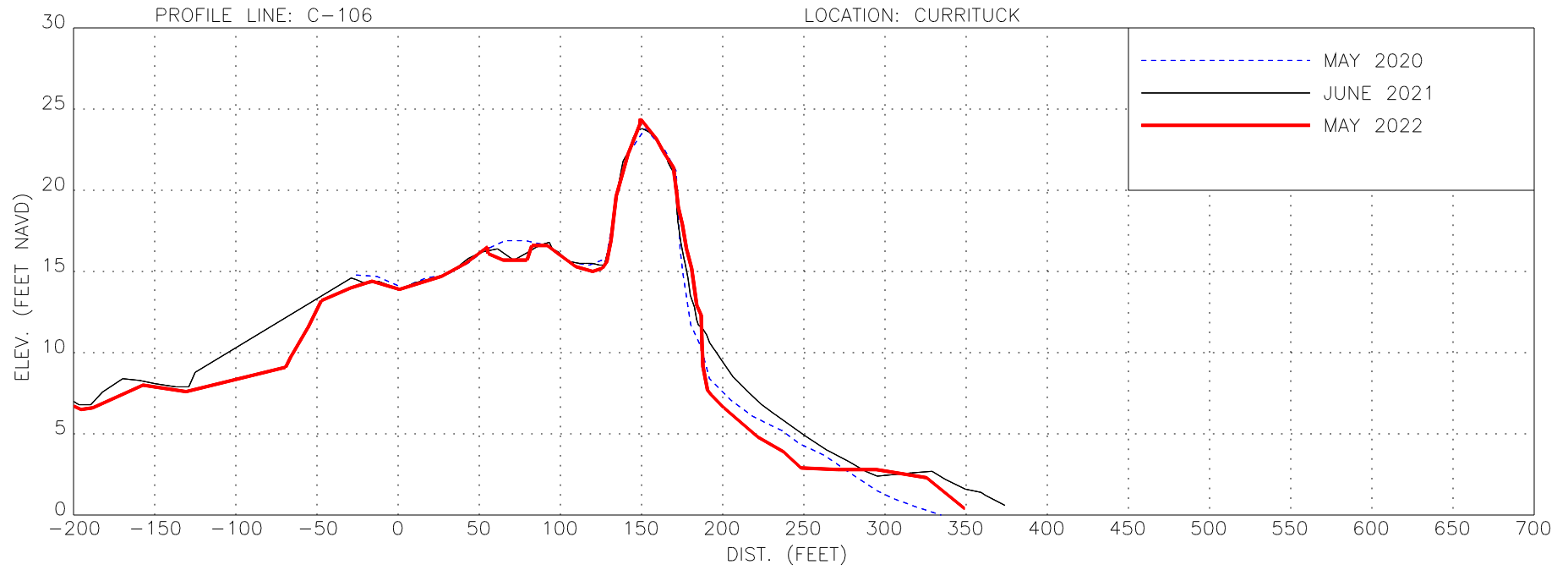


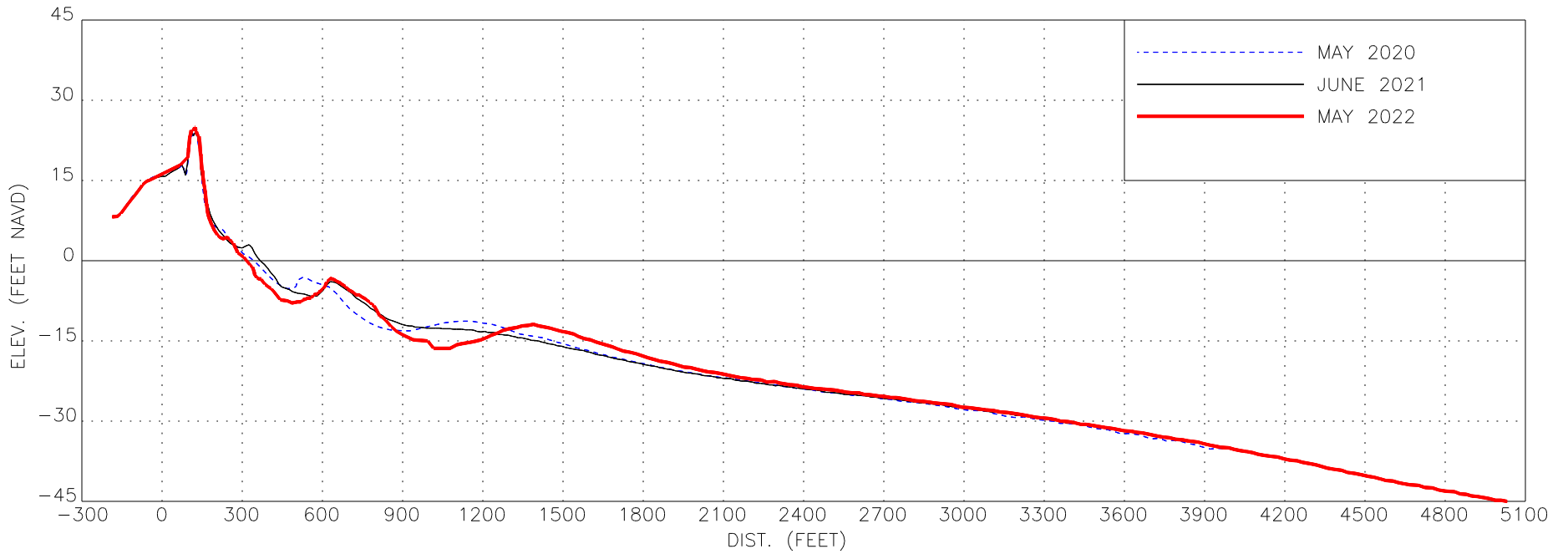
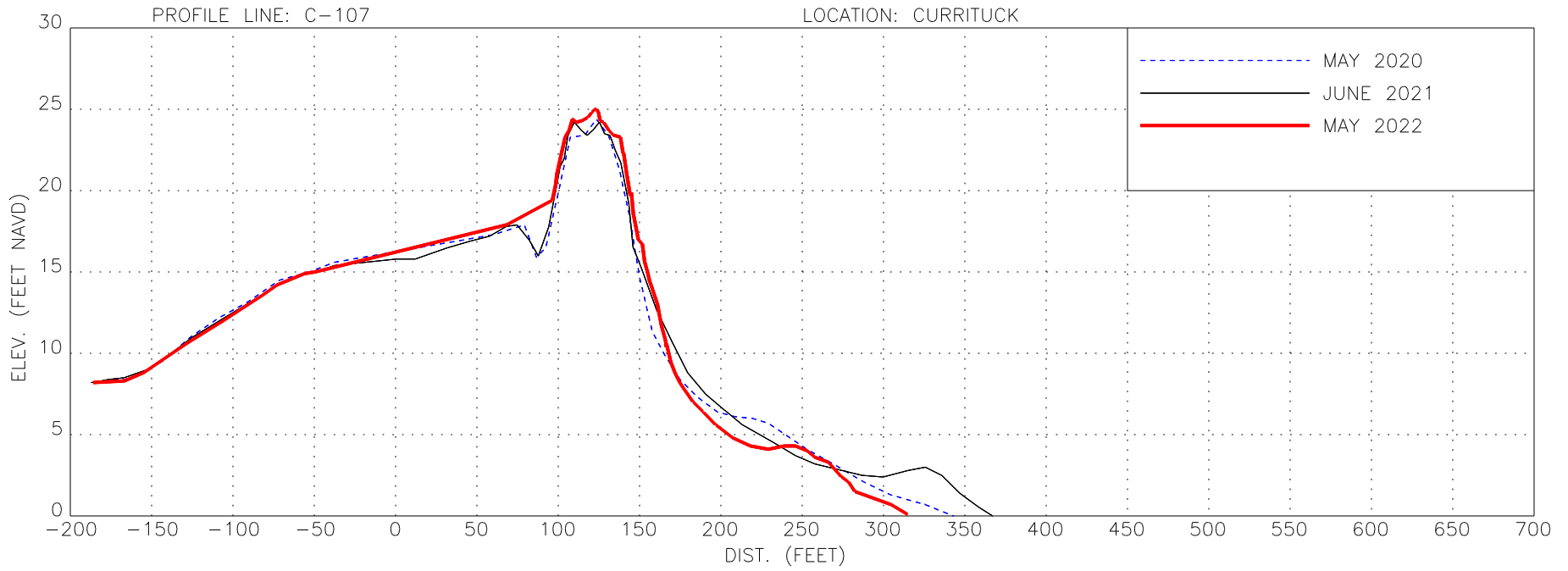


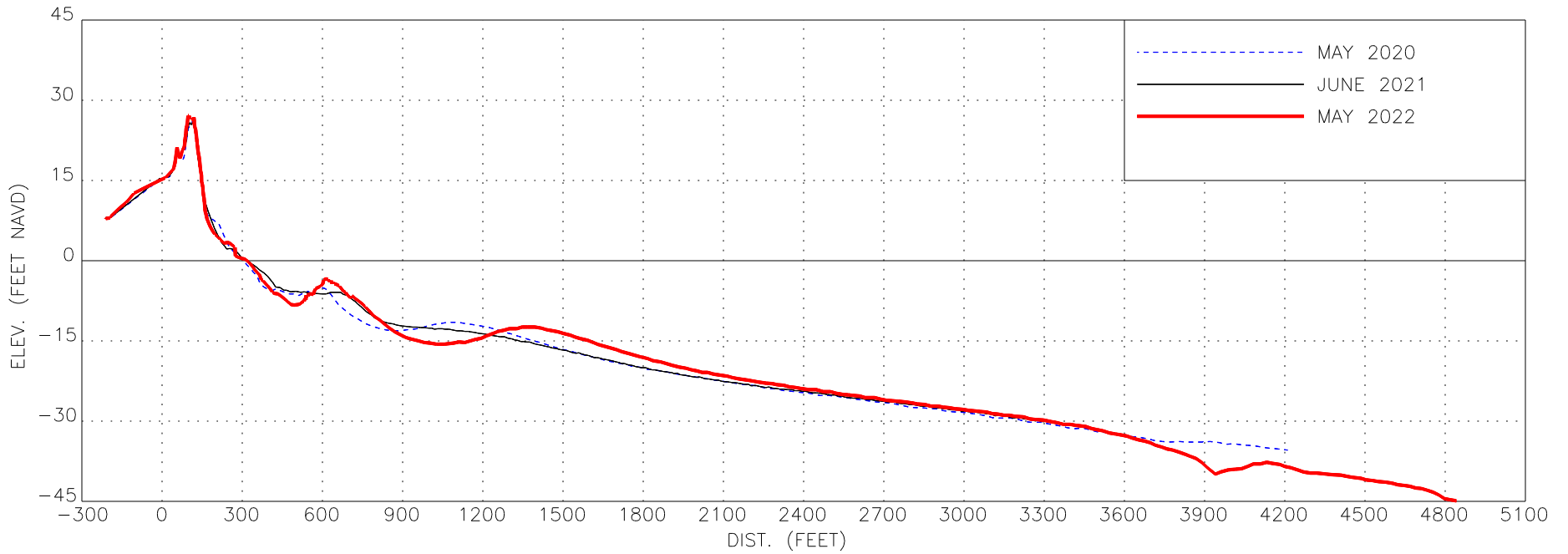
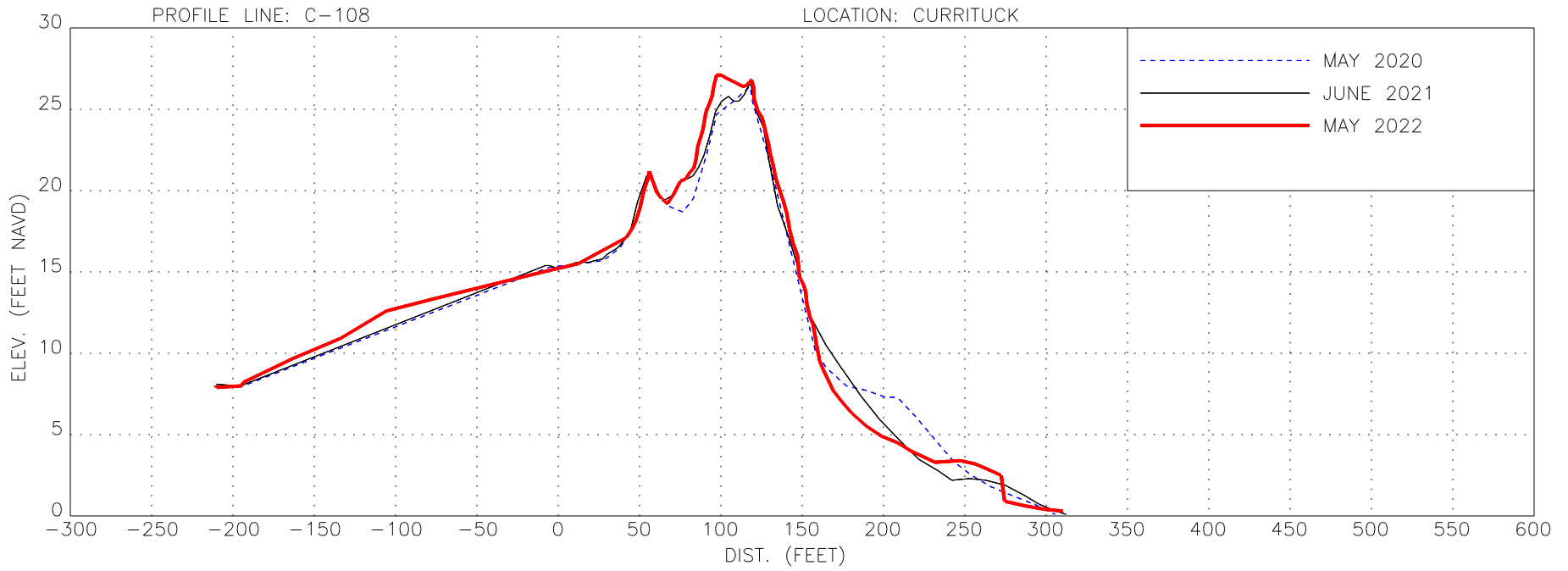


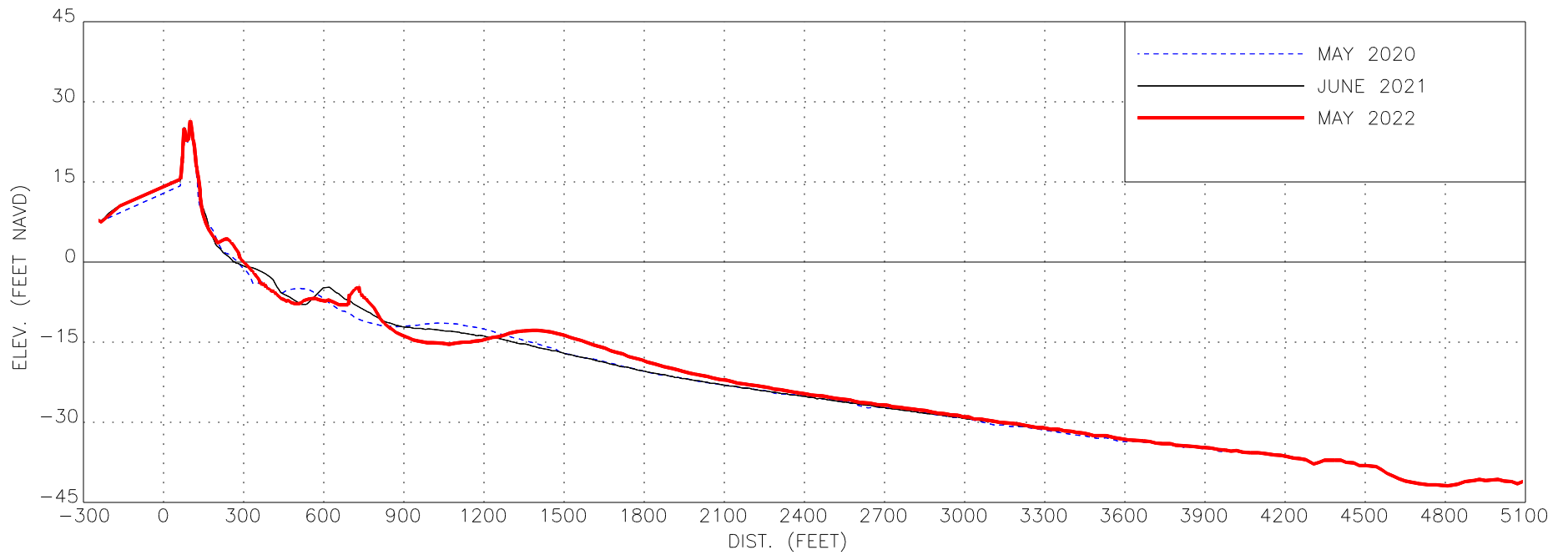
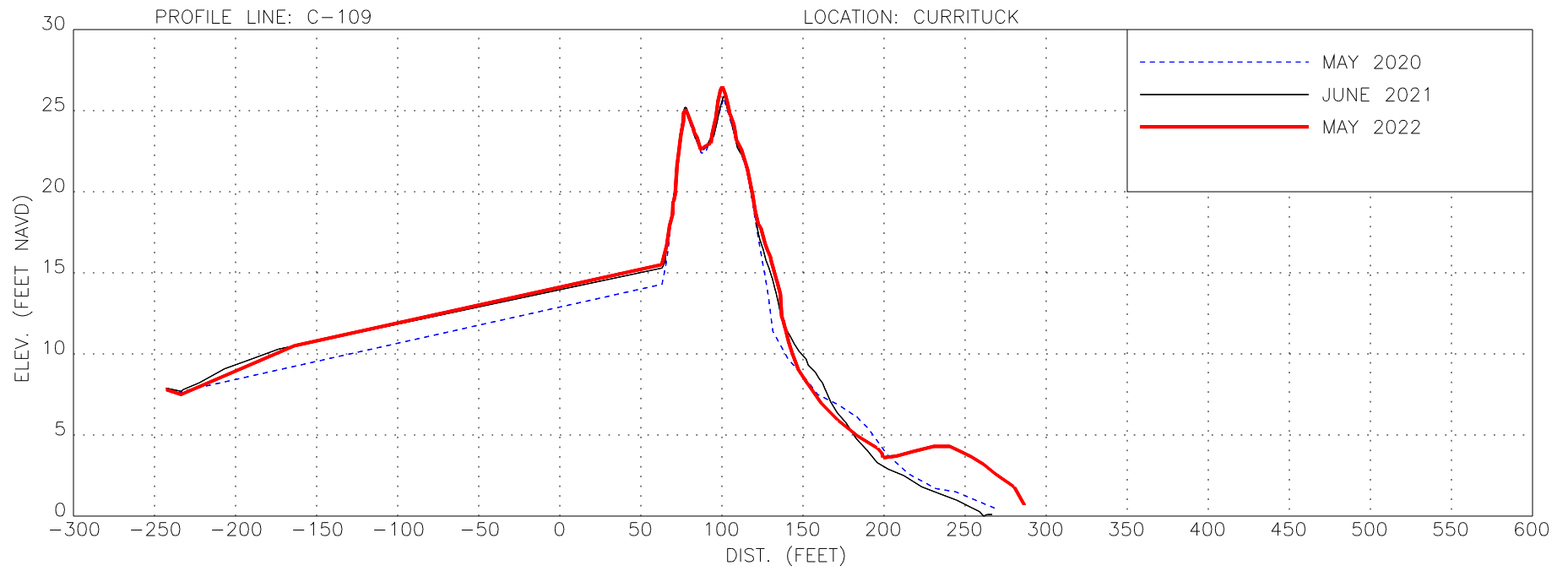


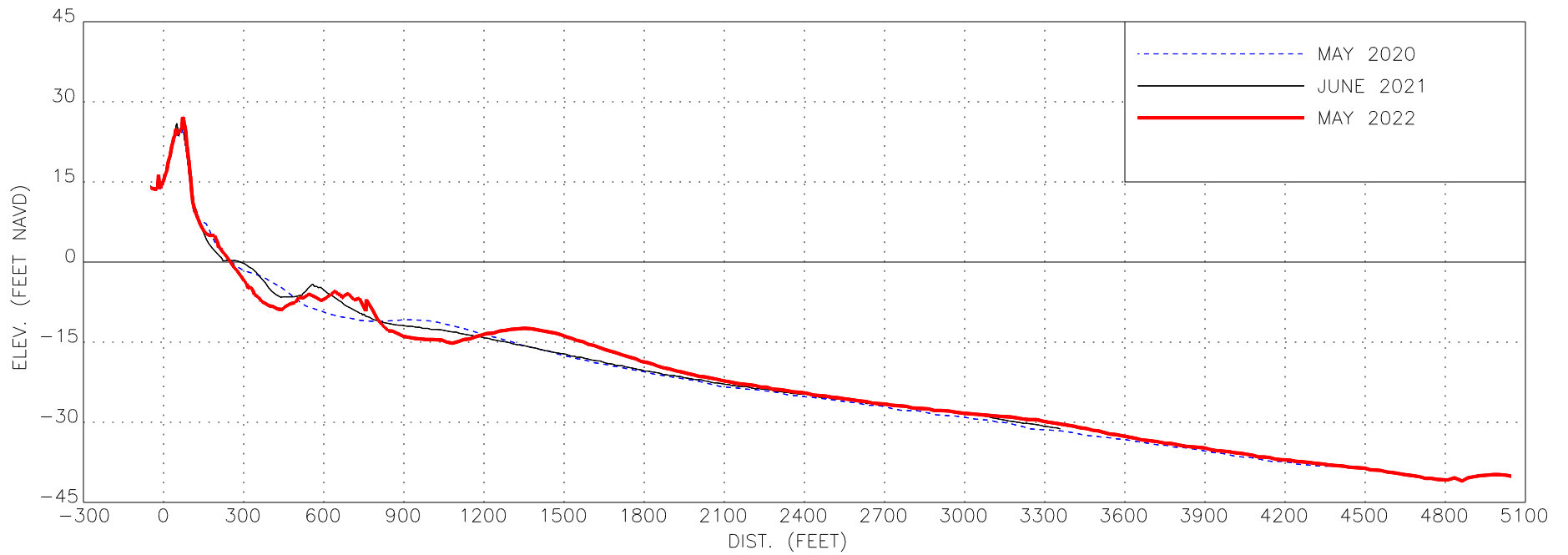
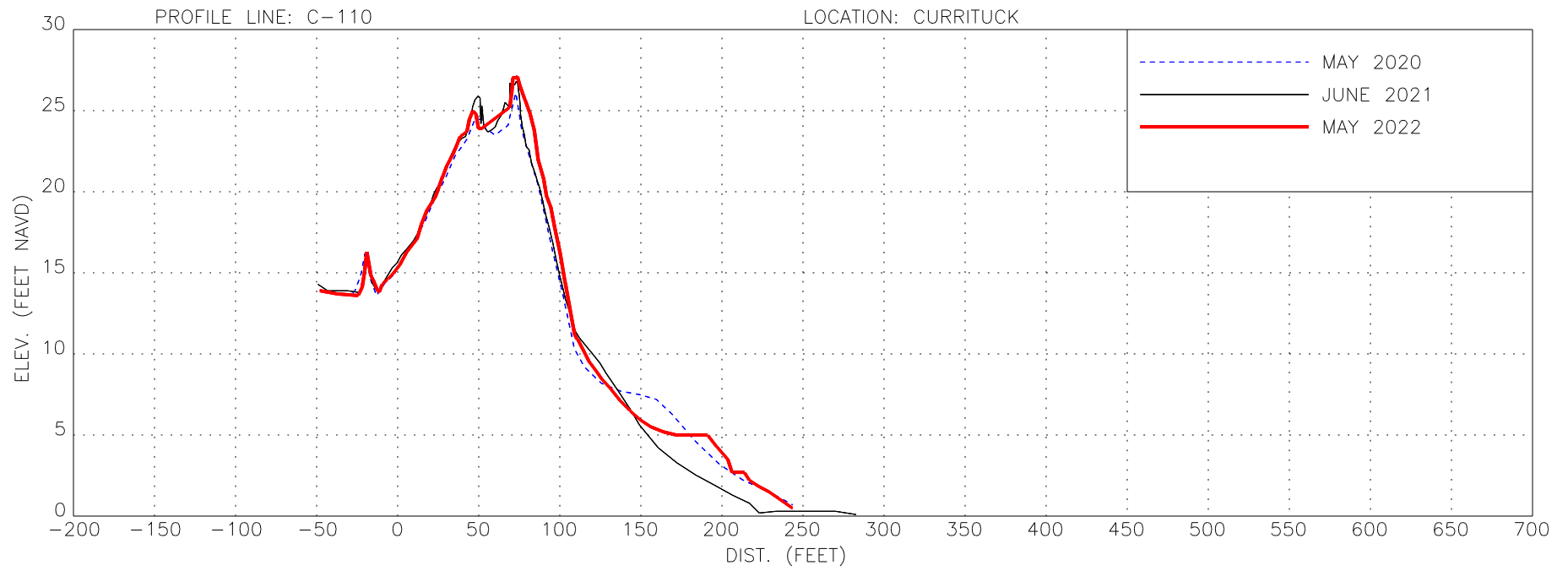


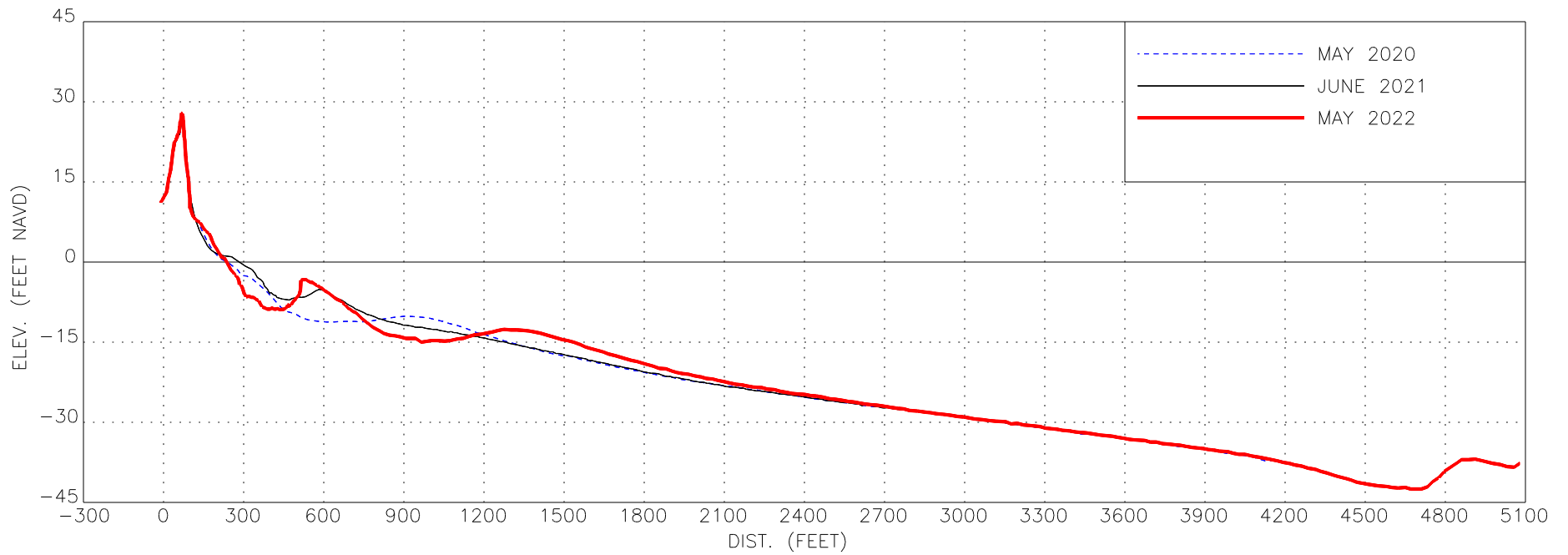
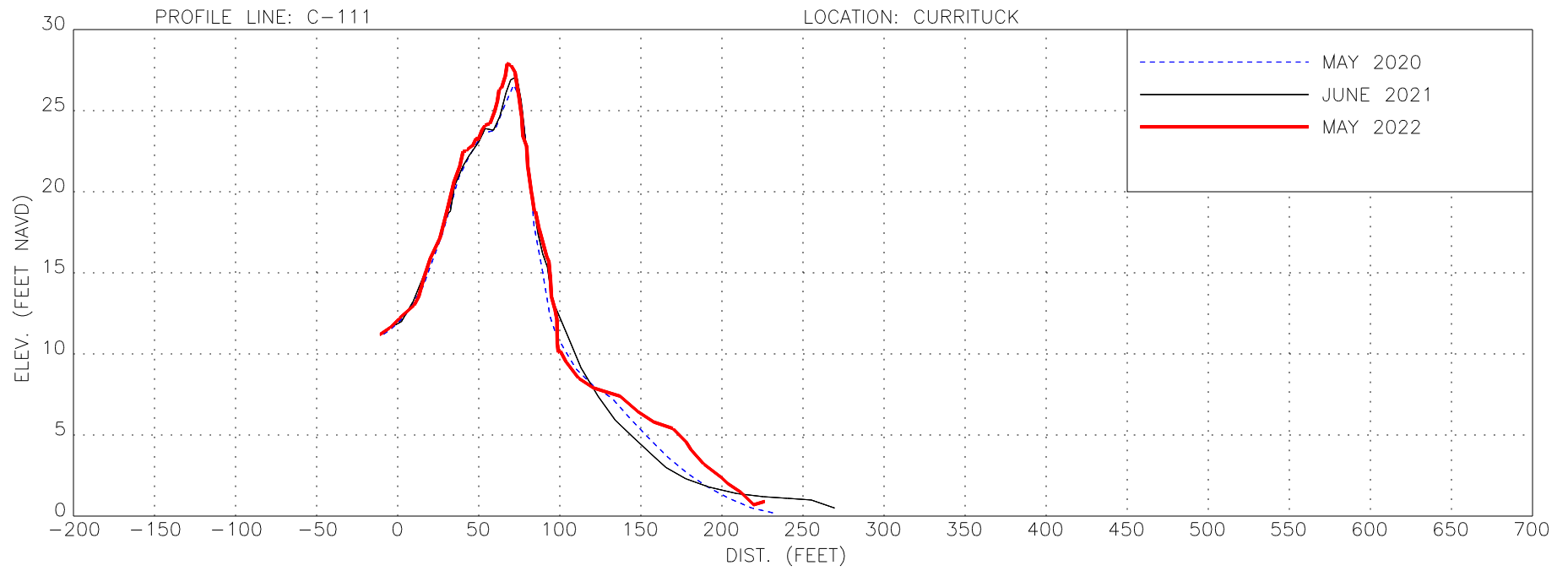


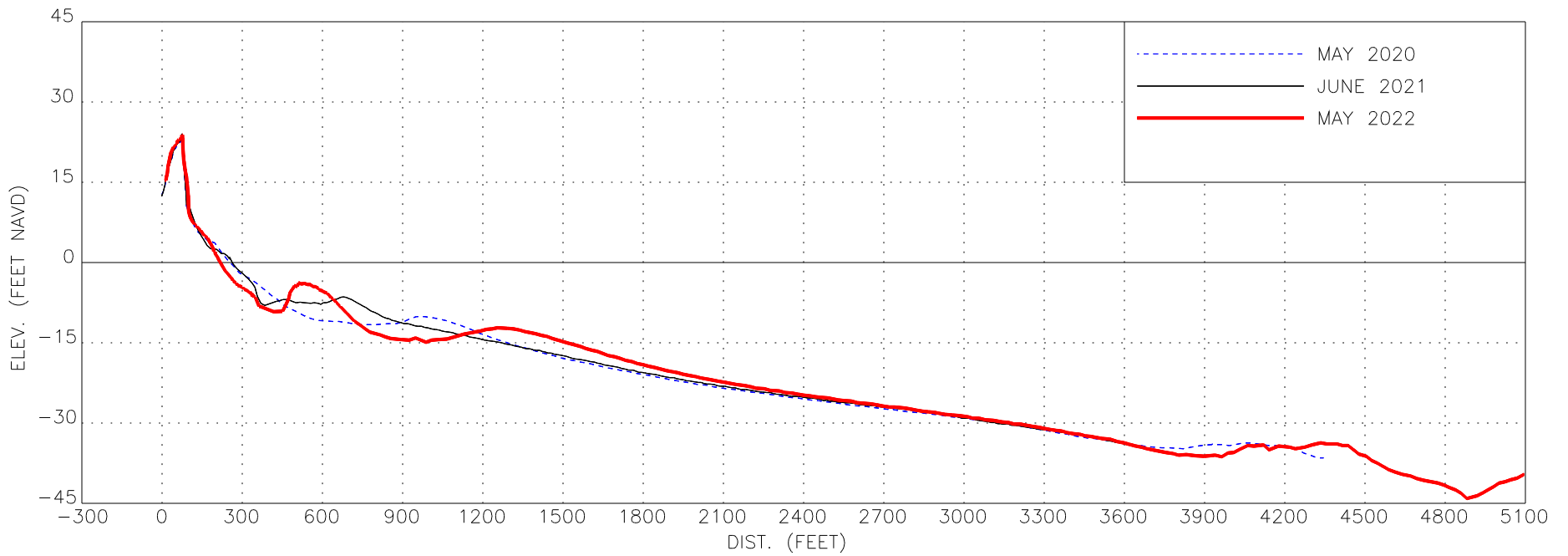
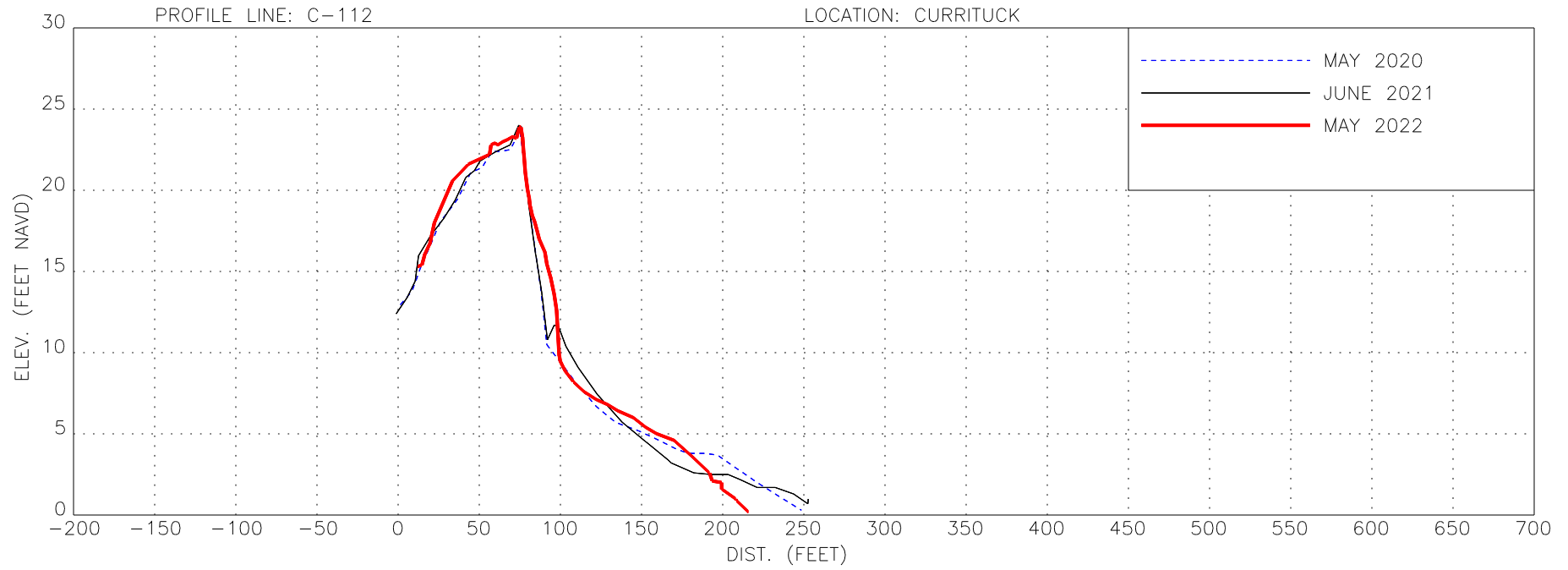






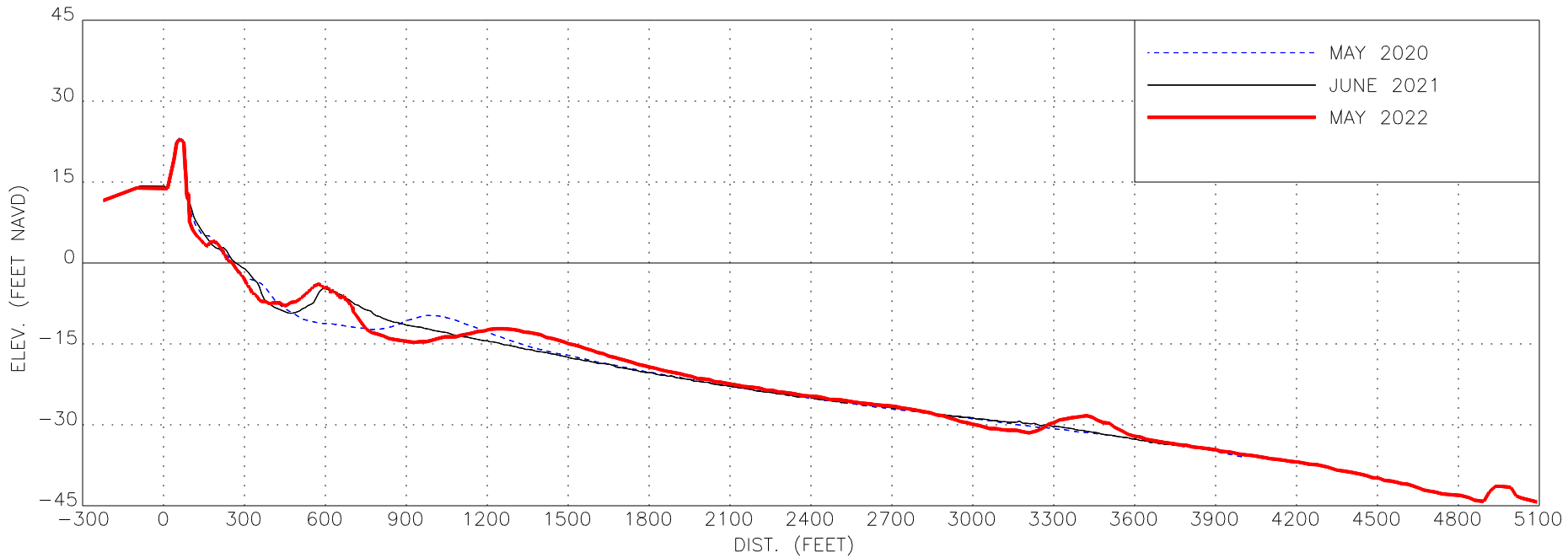
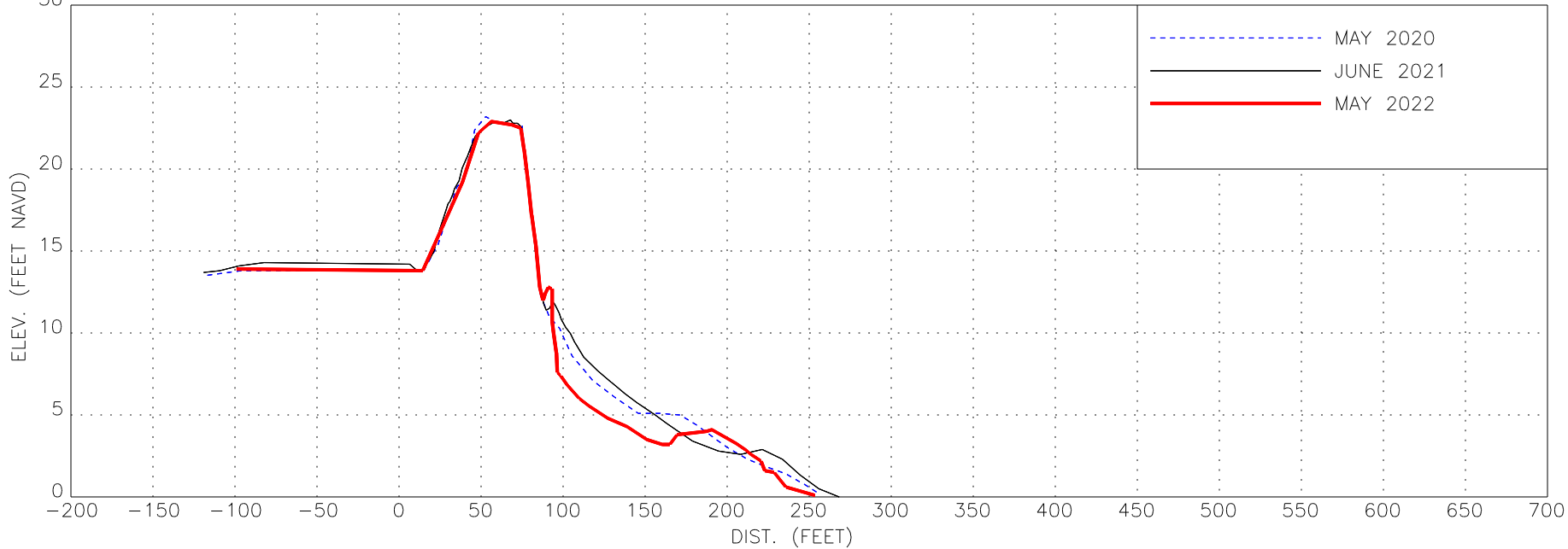


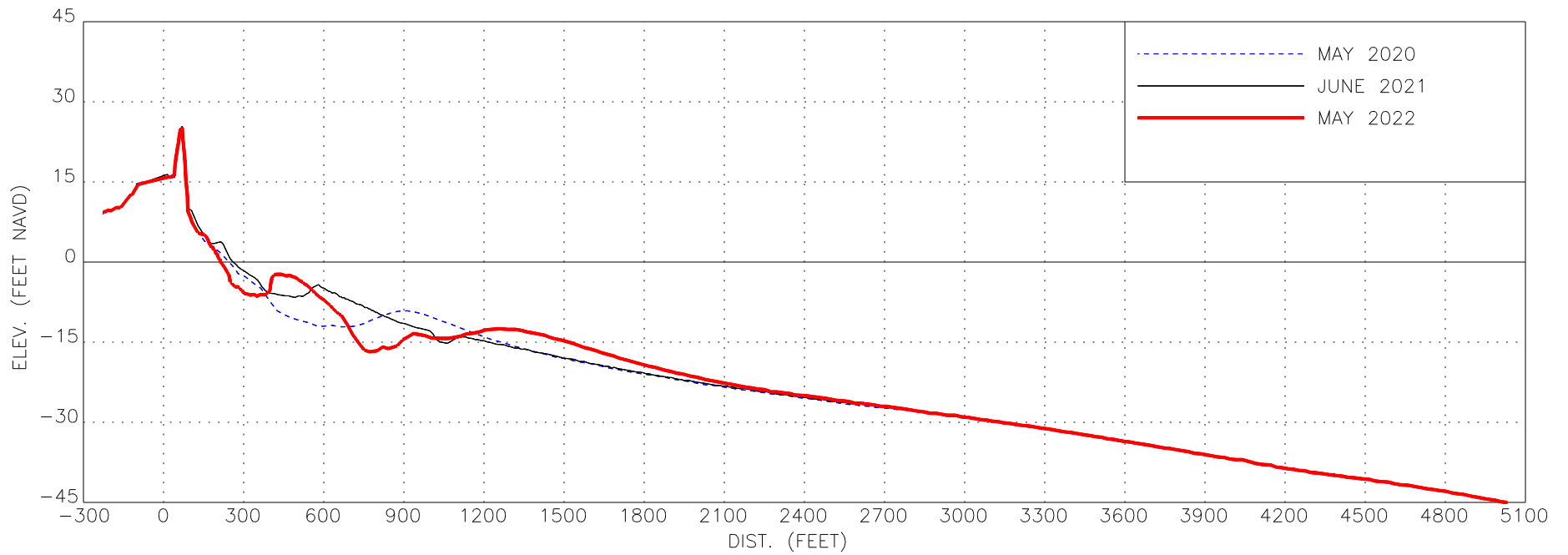
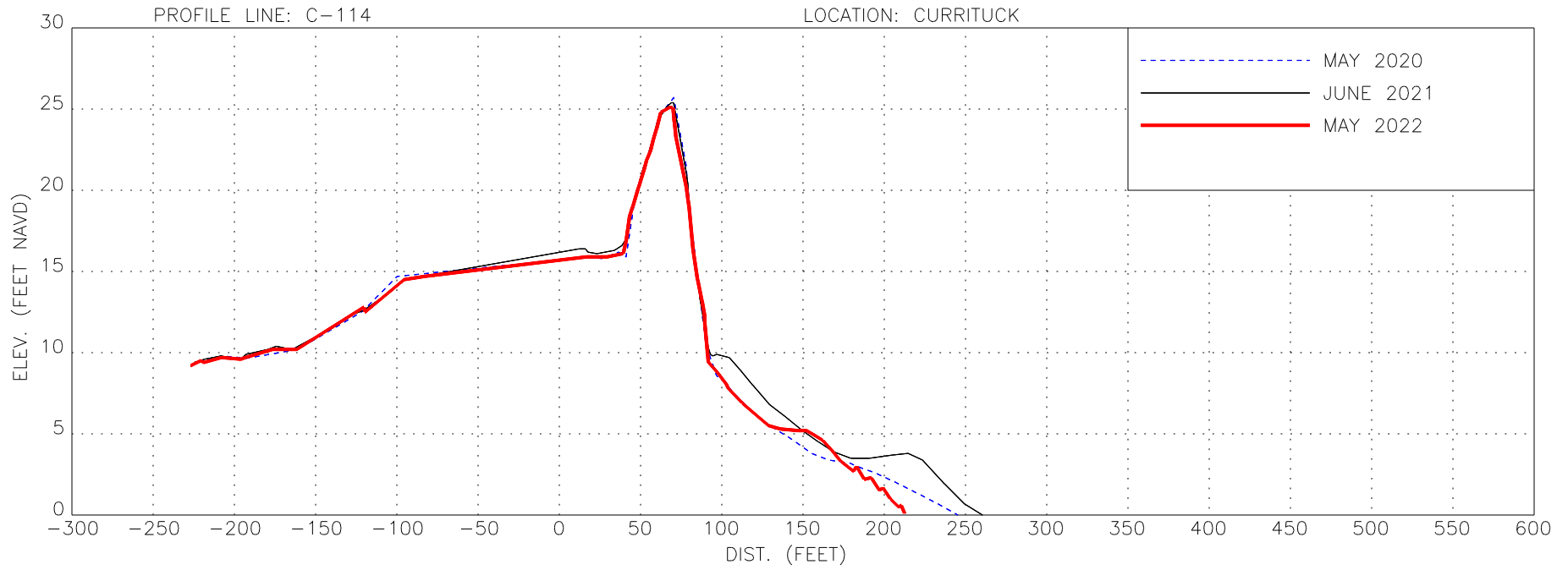


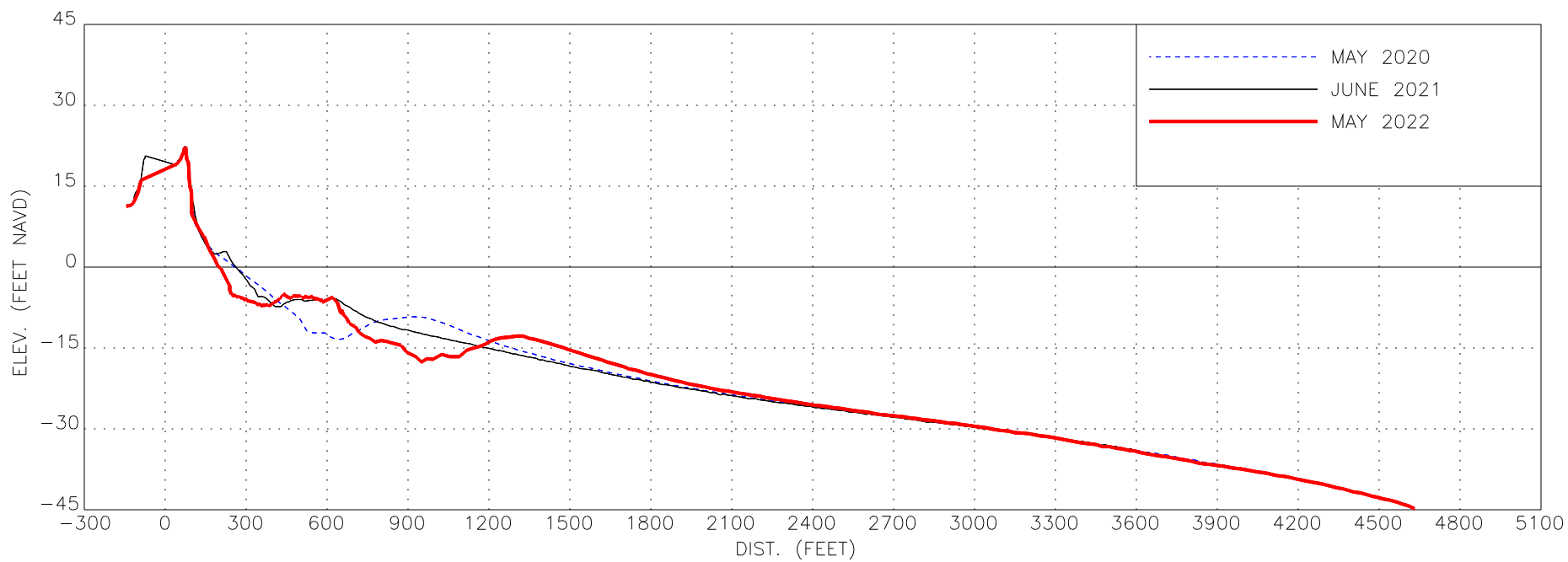
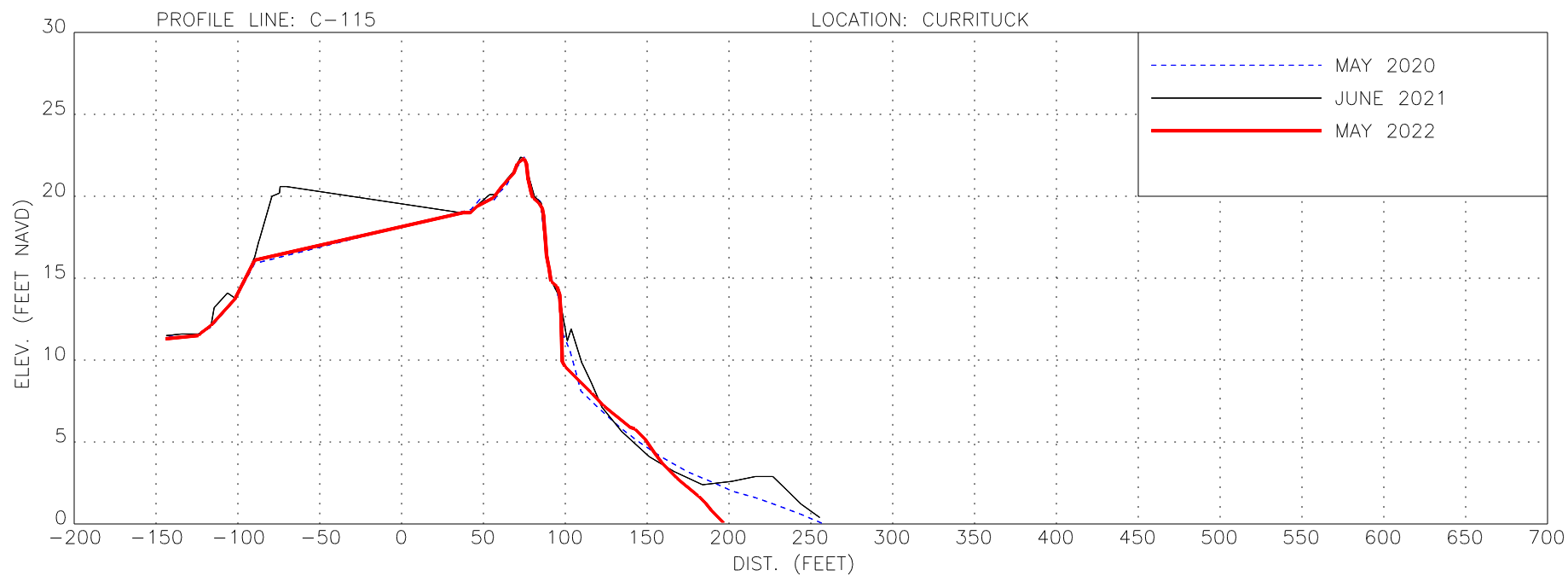


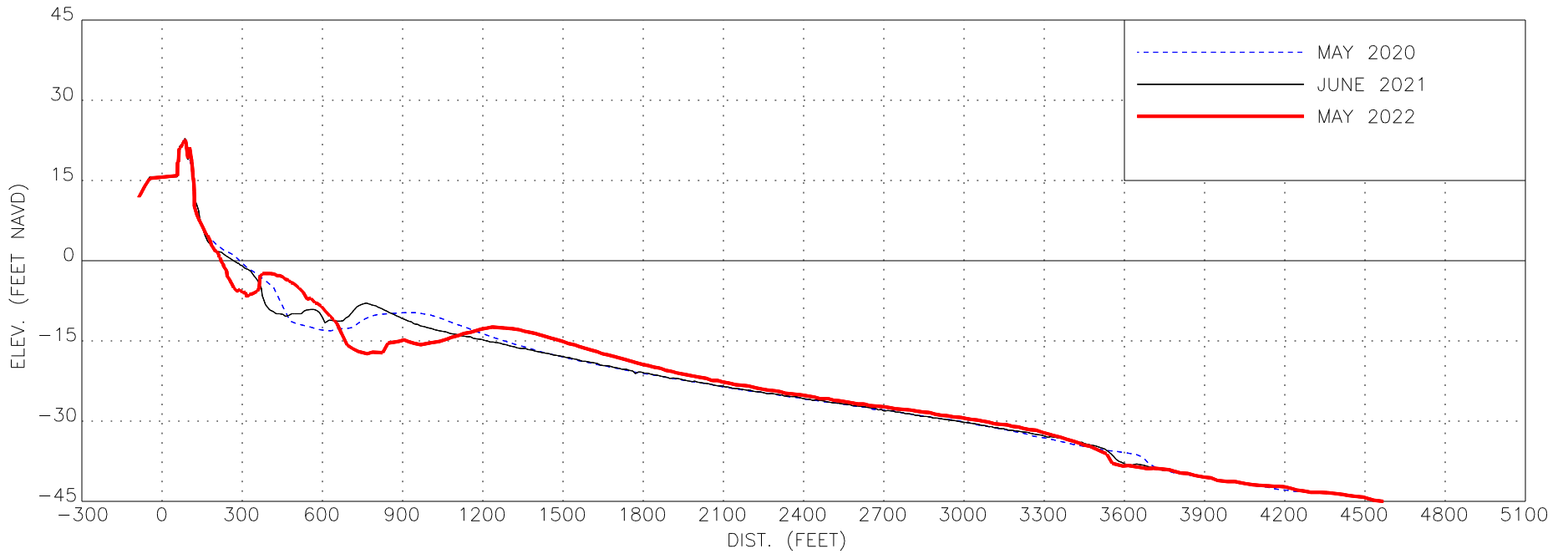
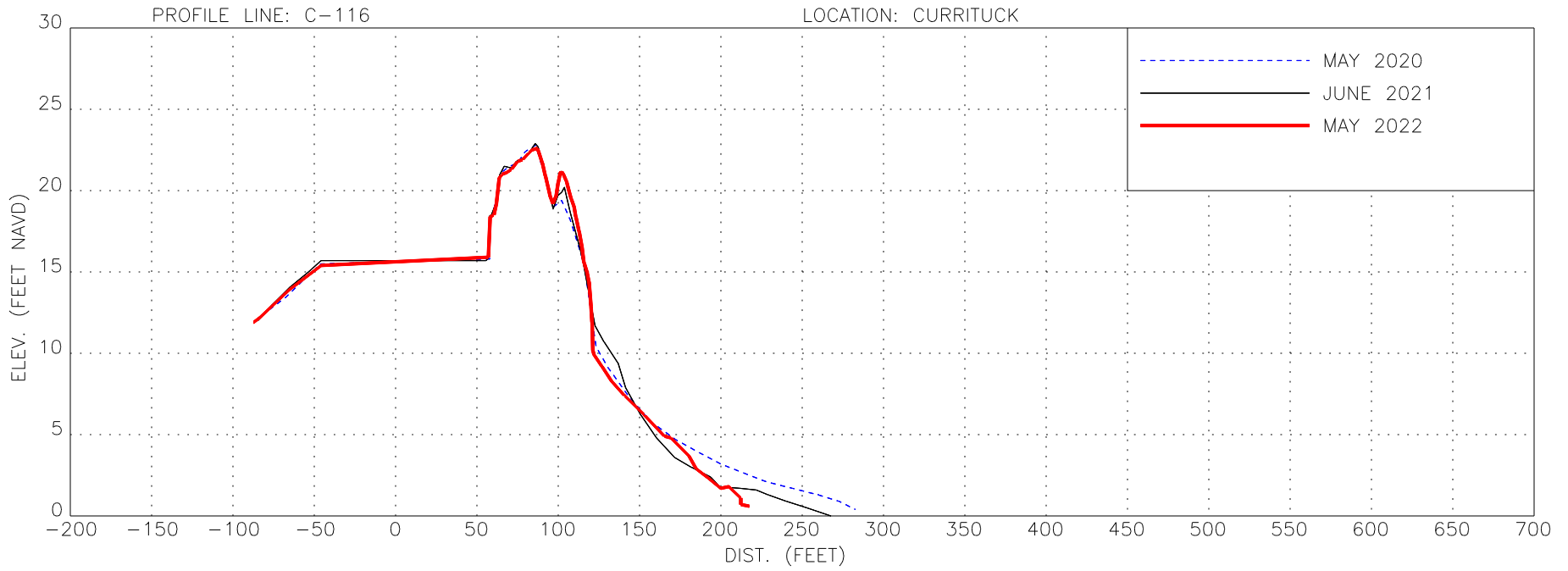
PROFILE LINE: C-113

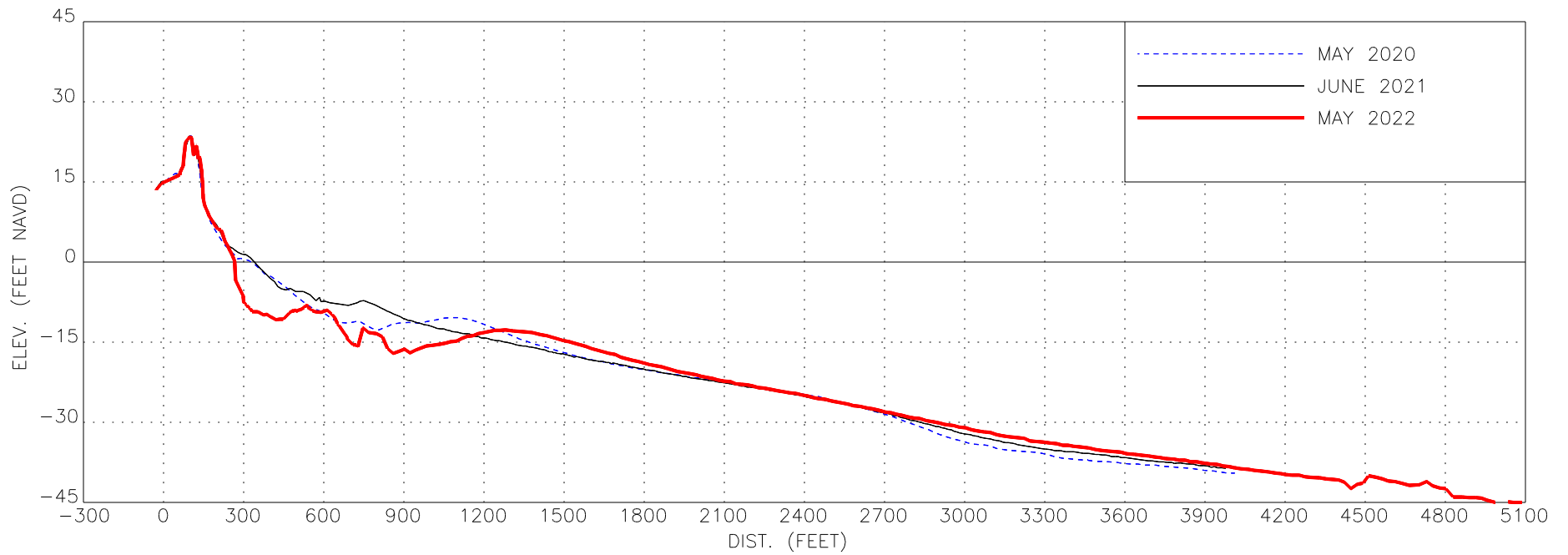
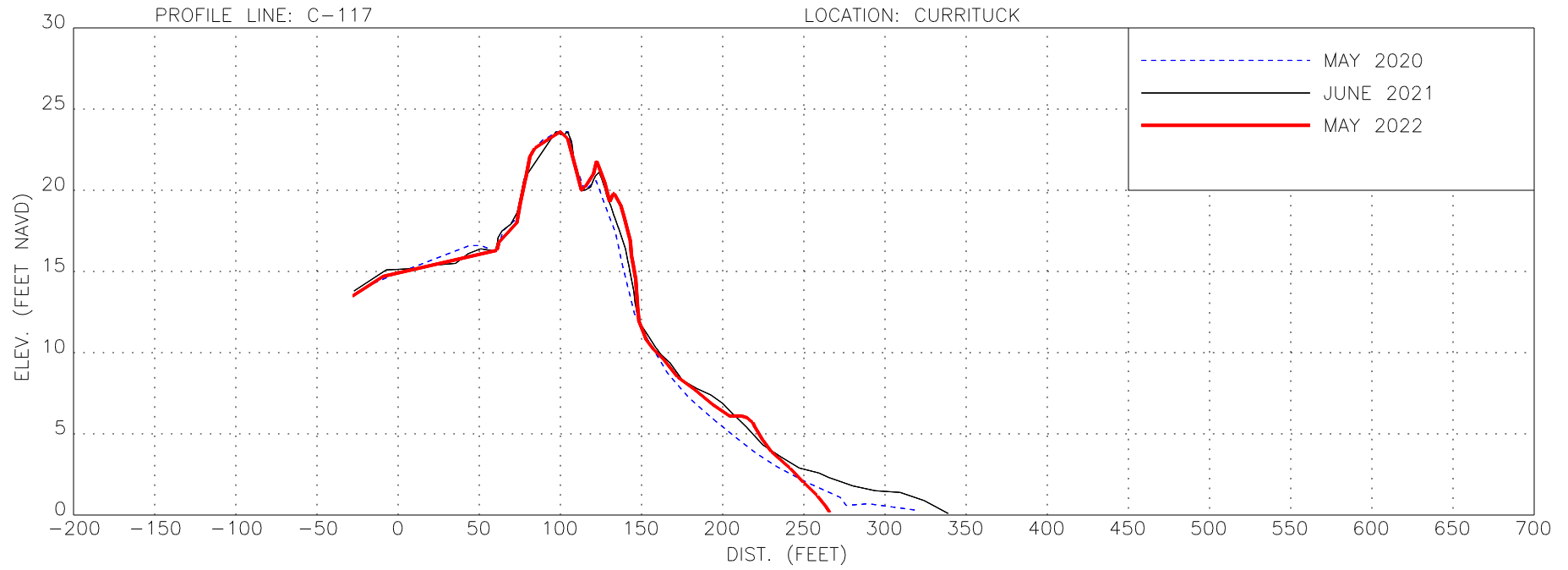
LOCATION: CURRITUCK

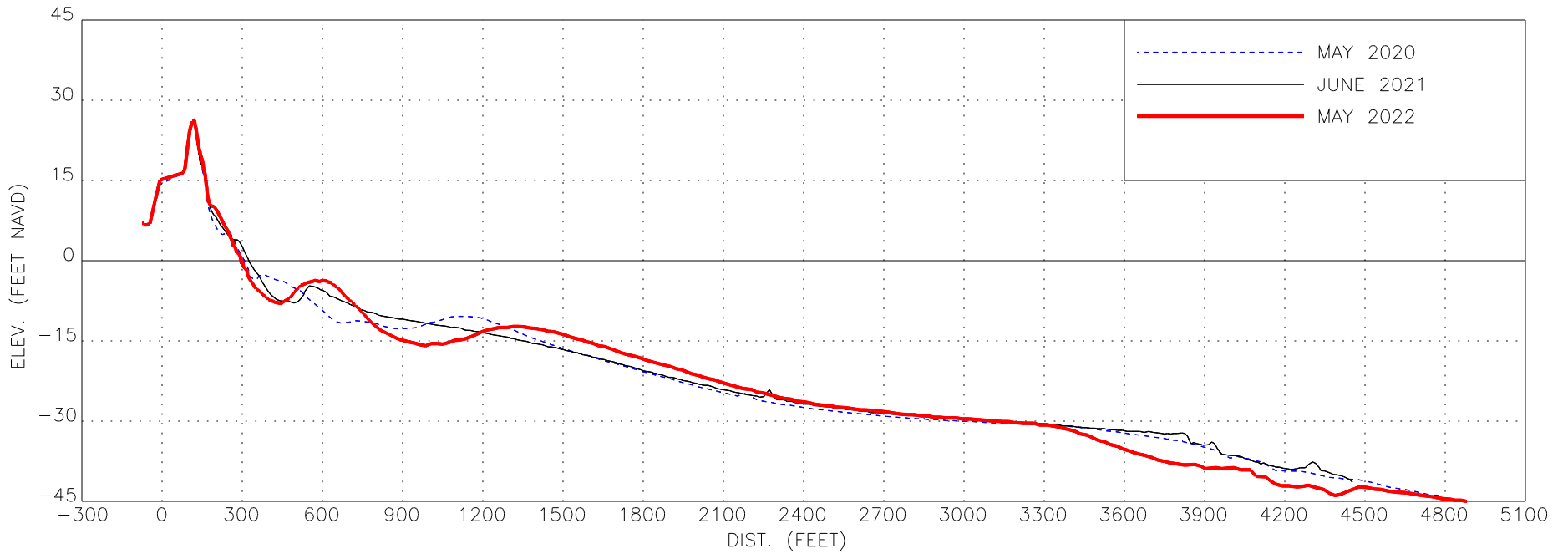
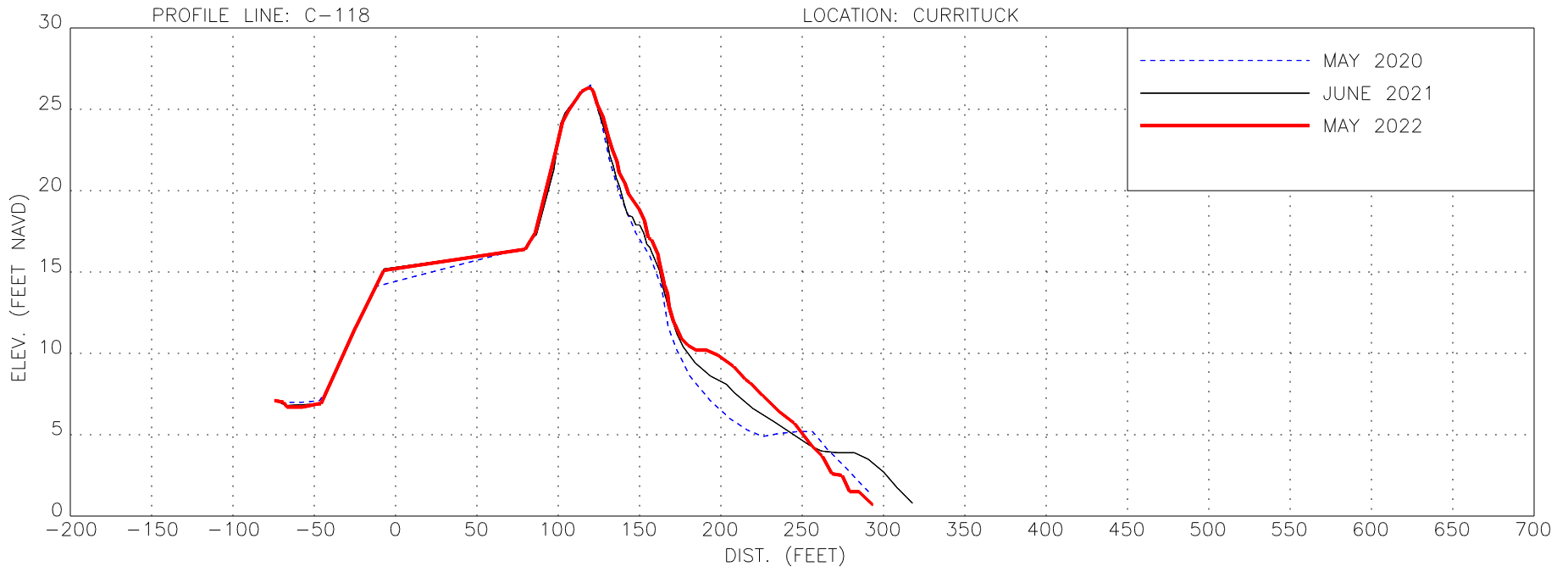


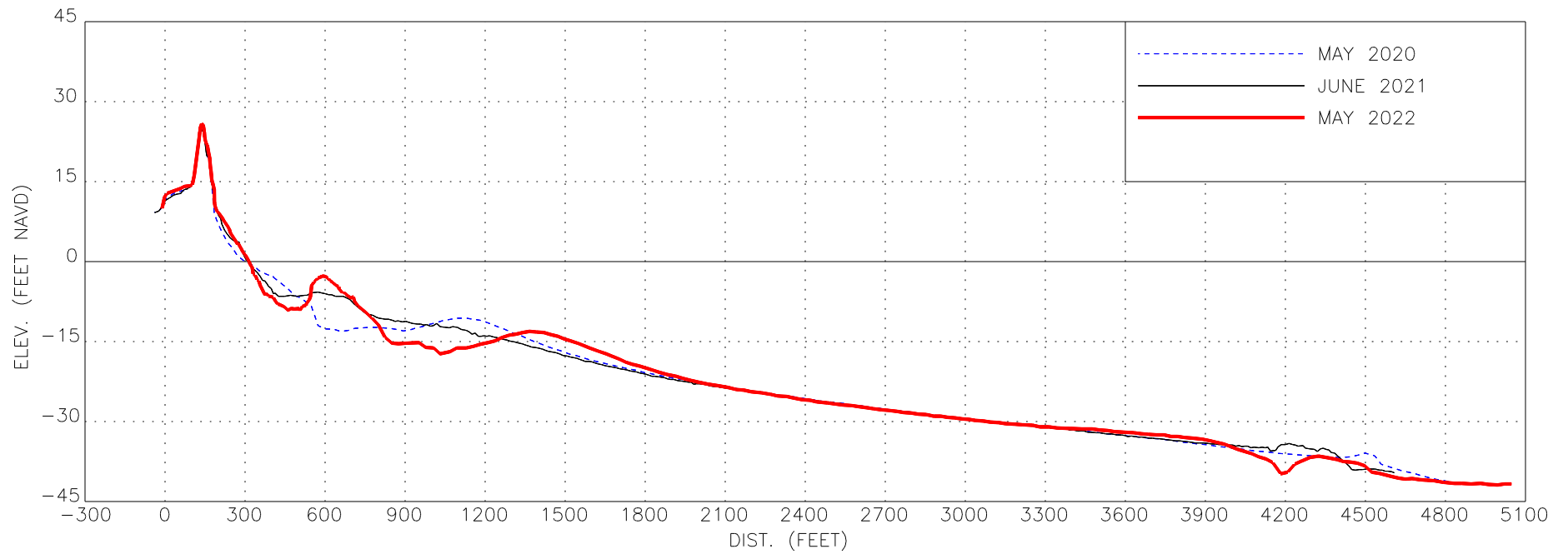
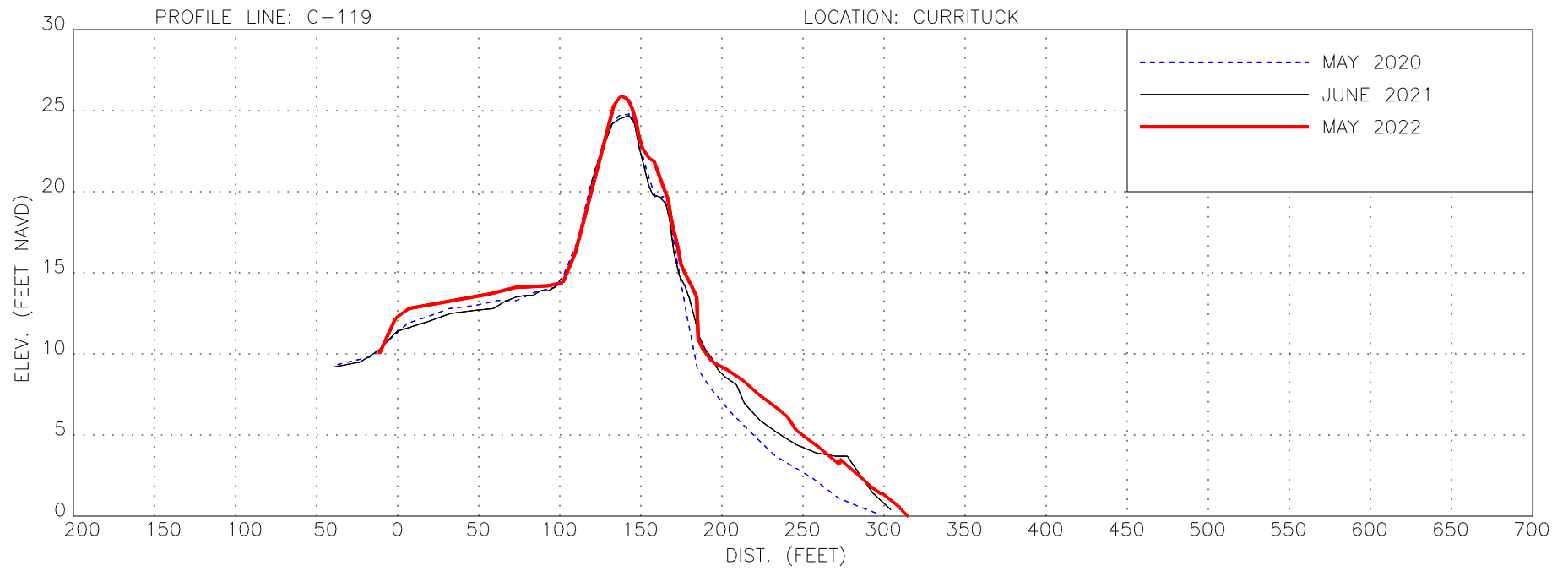


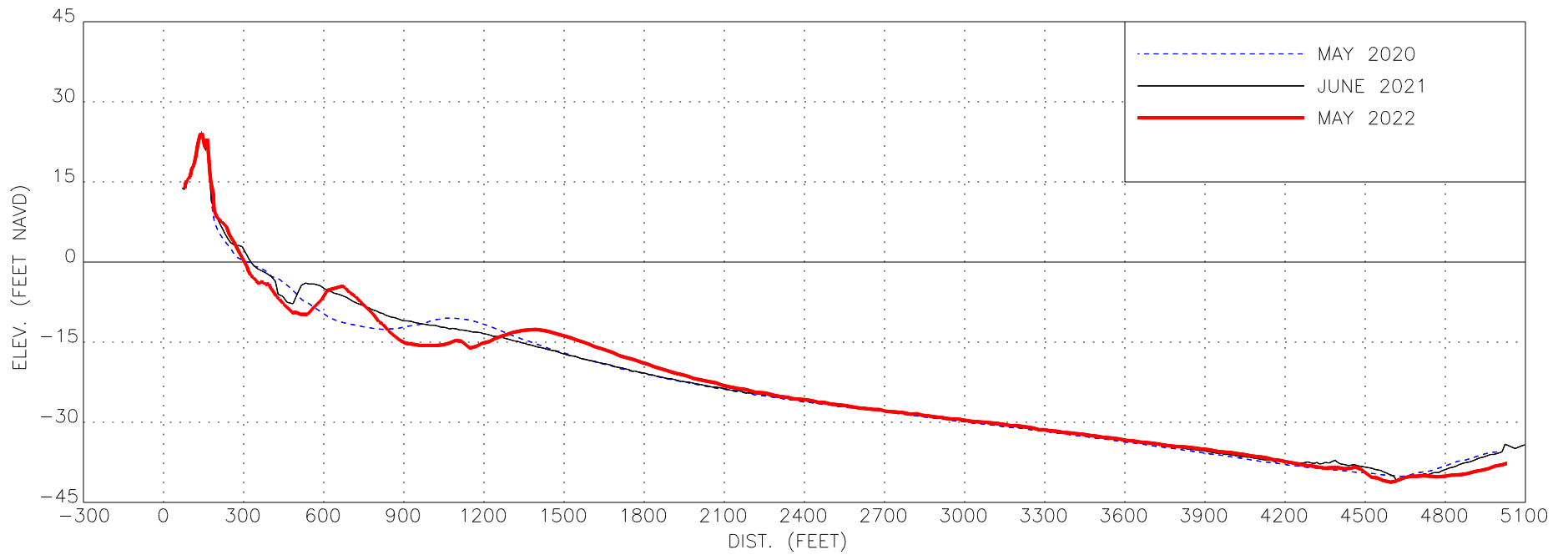
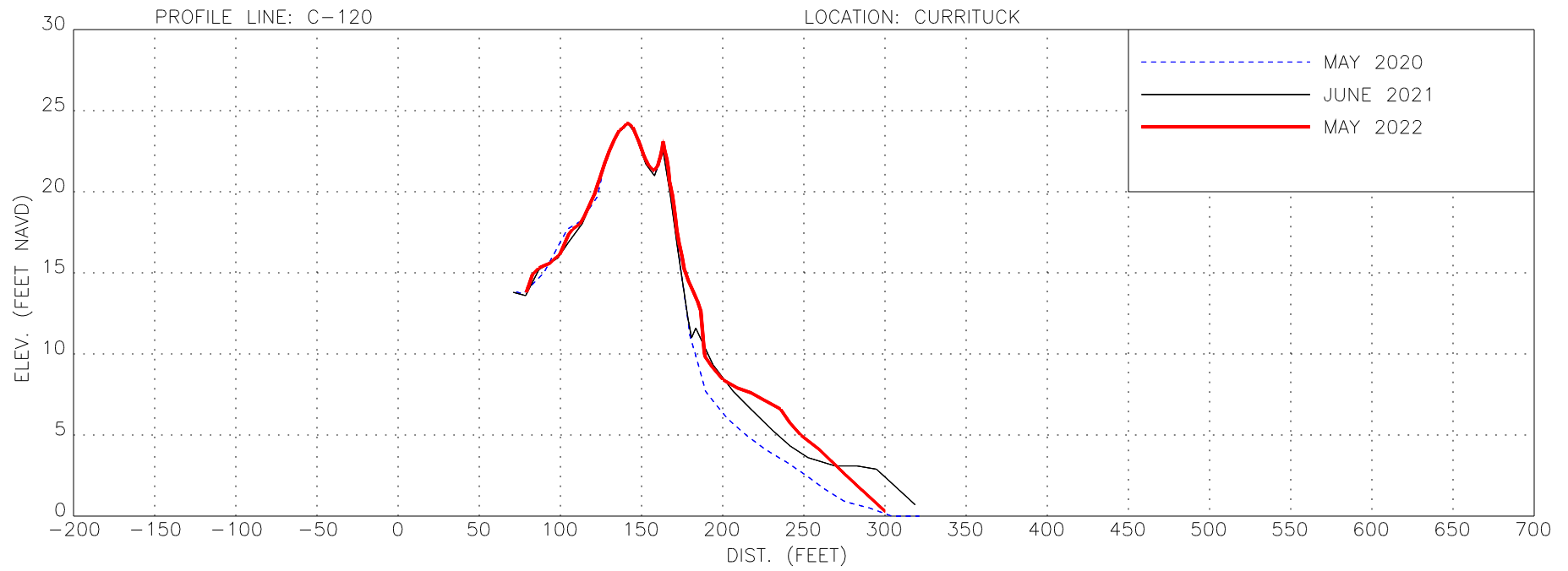












APPENDIX 4

GROUND DIGITAL PHOTOGRAPHY

**Ground Digital Photography
Monument**

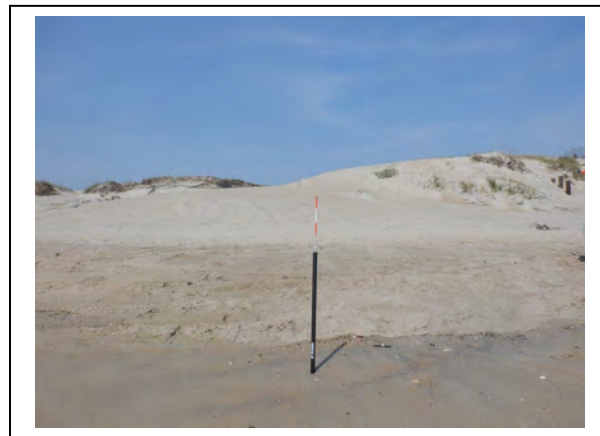
C-001



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-002



North View



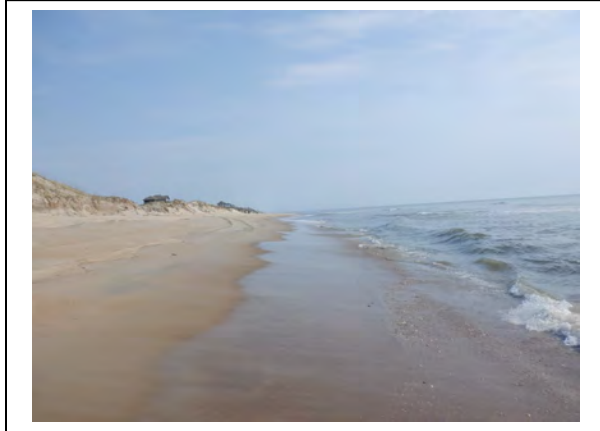
South View



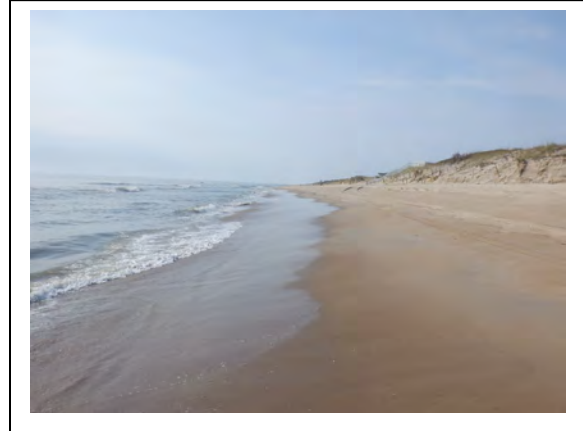
Landward View

**Ground Digital Photography
Monument**

C-003



North View



South View



Landward View

**Ground Digital Photography
Monument**

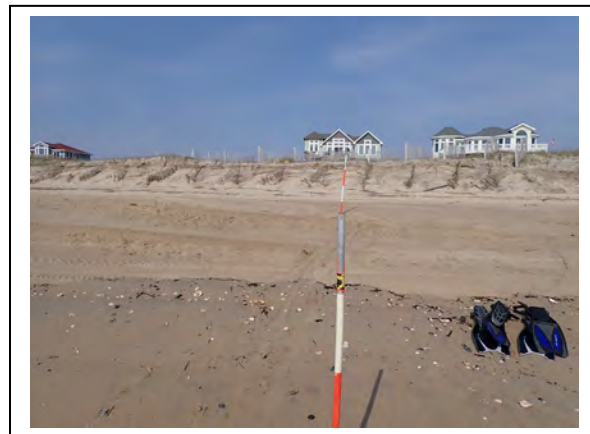
C-004



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-005



North View



South View



Landward View

**Ground Digital Photography
Monument**

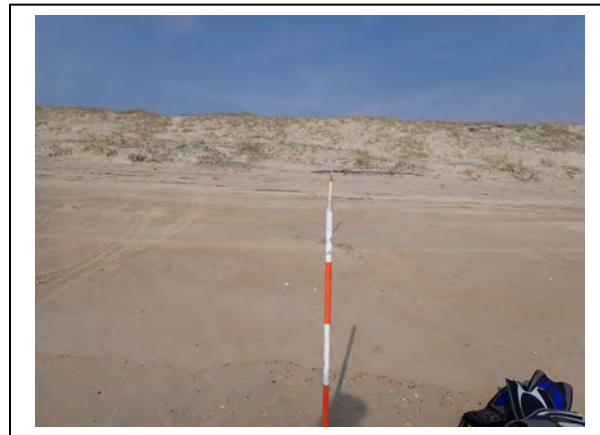
C-006



North View



South View



Landward View

**Ground Digital Photography
Monument**

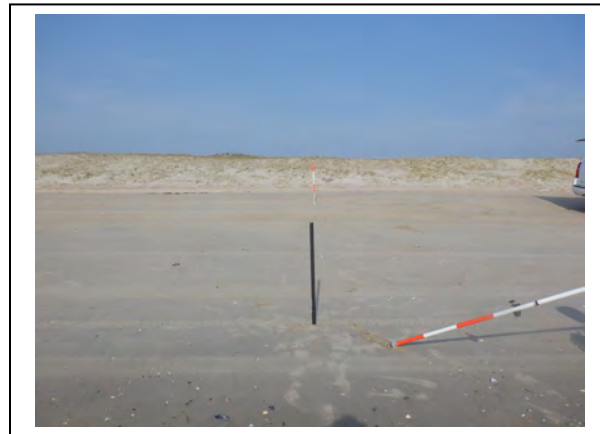
C-007



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-008



North View



South View



Landward View

**Ground Digital Photography
Monument**

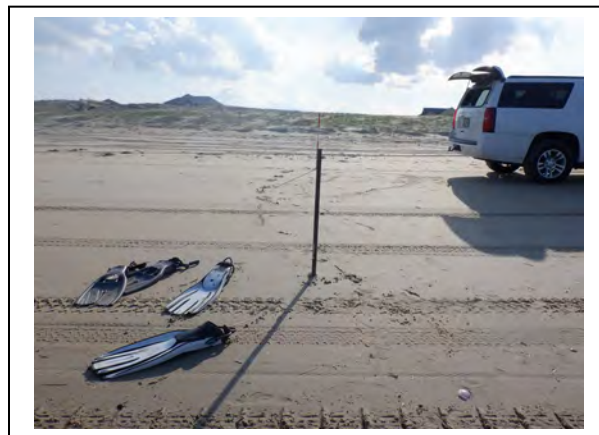
C-009



North View



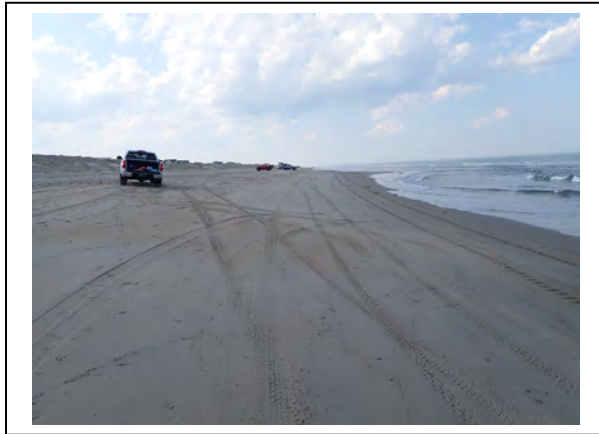
South View



Landward View

**Ground Digital Photography
Monument**

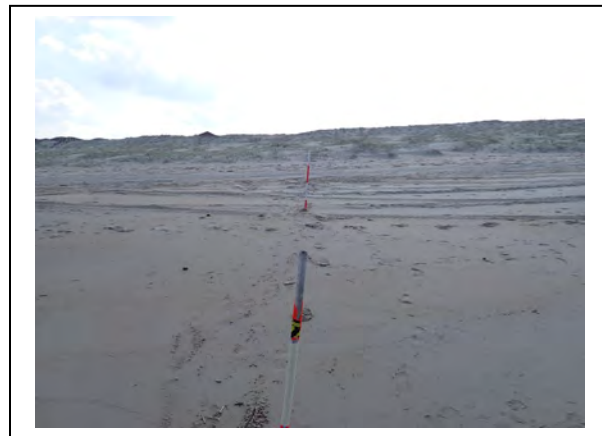
C-010



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-011



North View



South View



Landward View

**Ground Digital Photography
Monument**

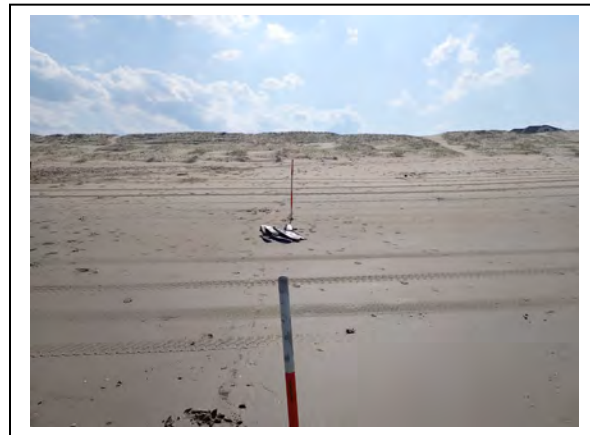
C-012



North View



South View



Landward View

**Ground Digital Photography
Monument**

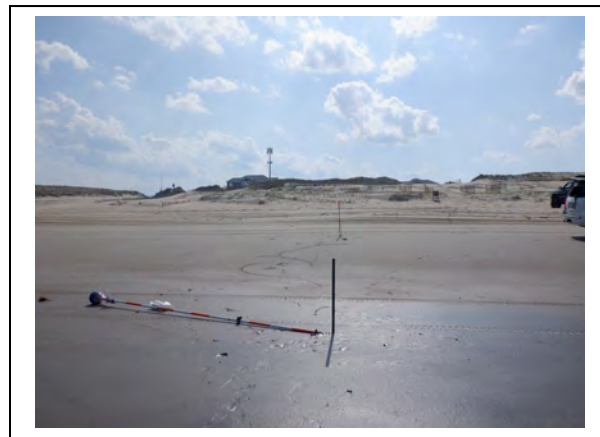
C-013



North View



South View



Landward View

**Ground Digital Photography
Monument**

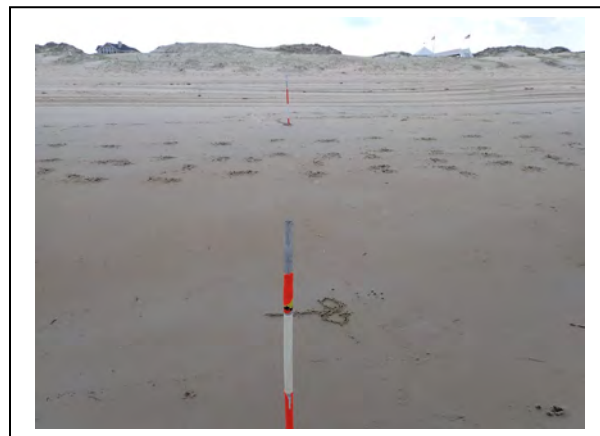
C-014



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**

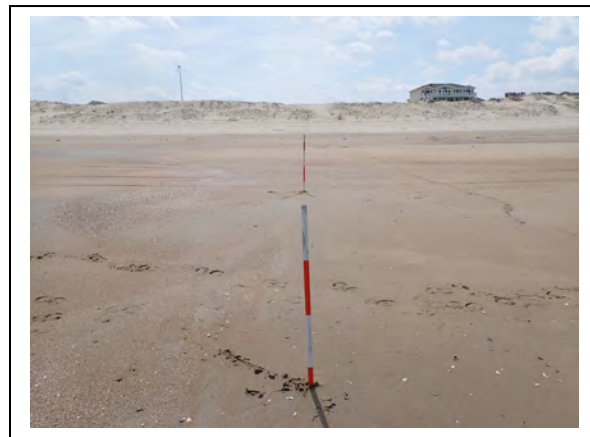
C-018



North View



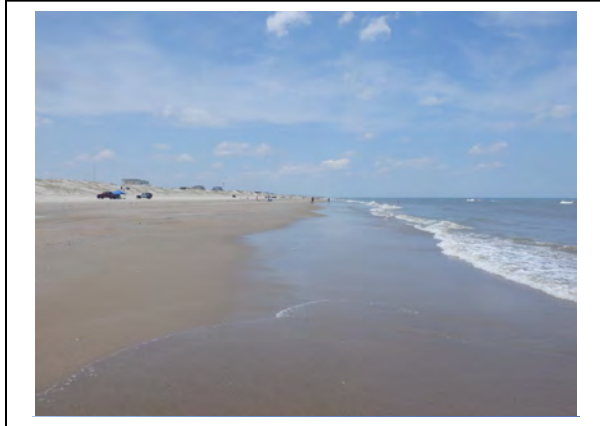
South View



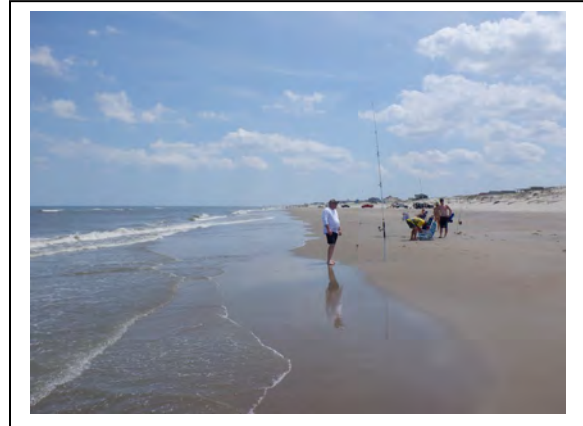
Landward View

**Ground Digital Photography
Monument**

C-019



North View



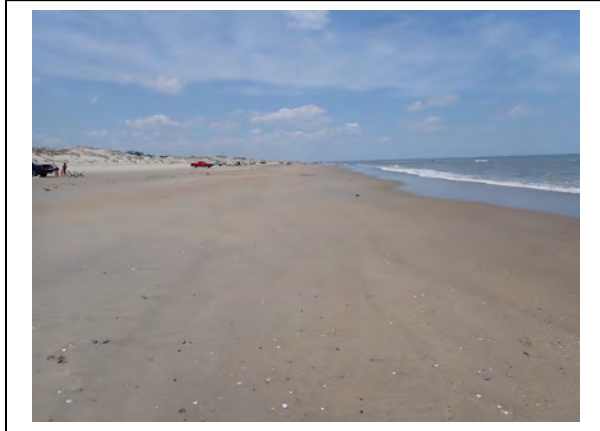
South View



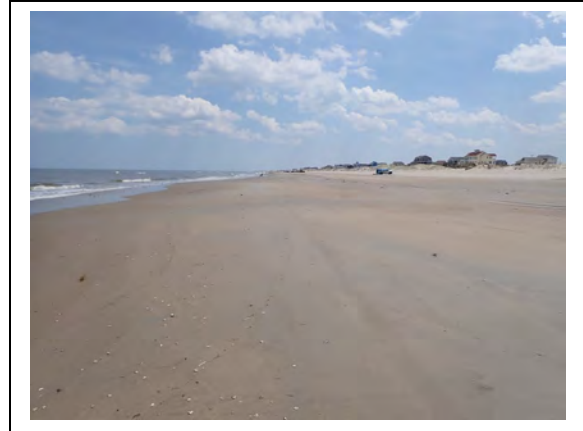
Landward View

**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



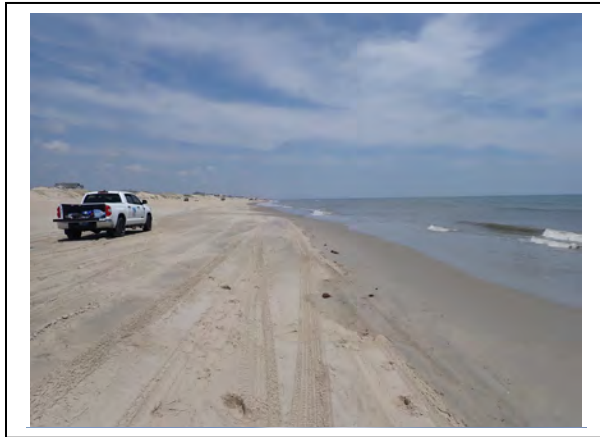
South View



Landward View

**Ground Digital Photography
Monument**

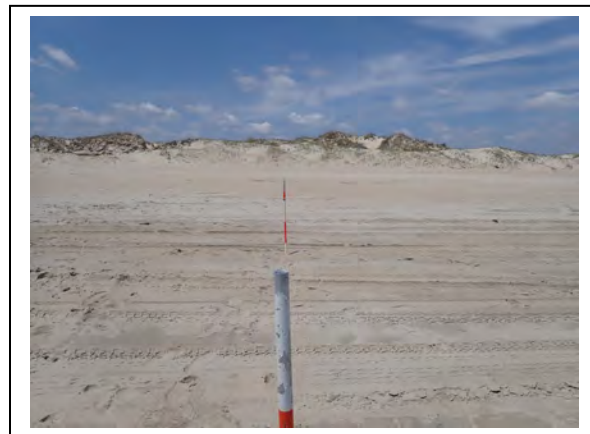
C-026



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-027



North View



South View



Landward View

**Ground Digital Photography
Monument**

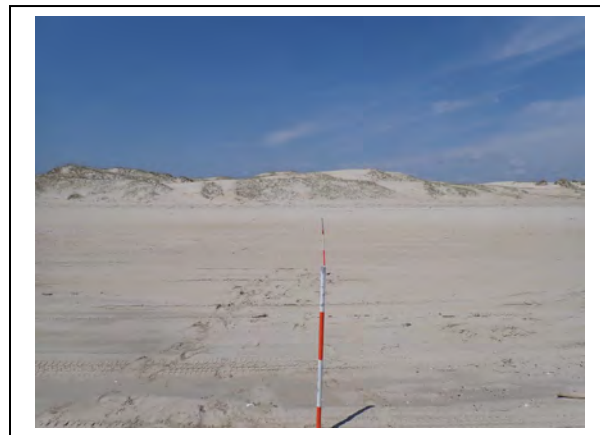
C-028



North View



South View



Landward View

**Ground Digital Photography
Monument**

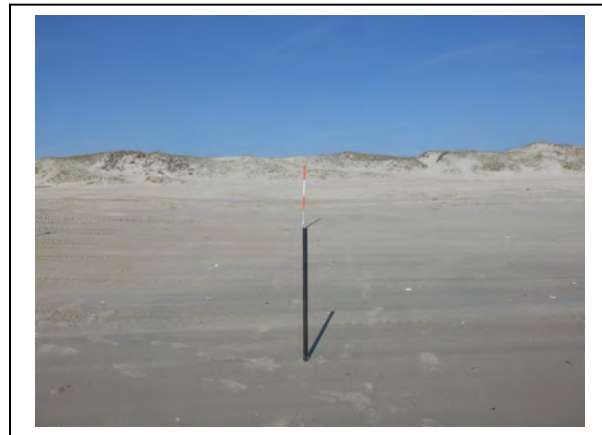
C-029



North View



South View



Landward View

**Ground Digital Photography
Monument**

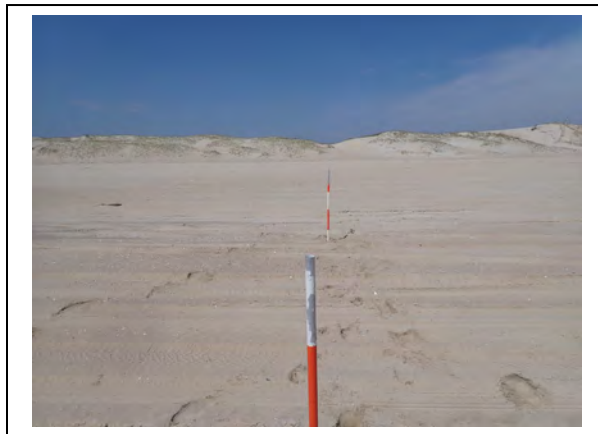
C-030



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-031



North View



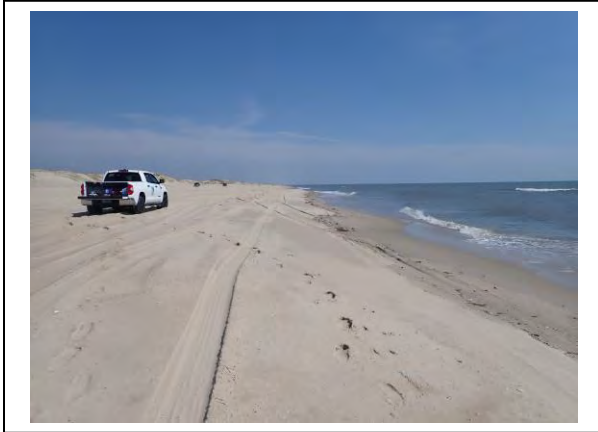
South View



Landward View

**Ground Digital Photography
Monument**

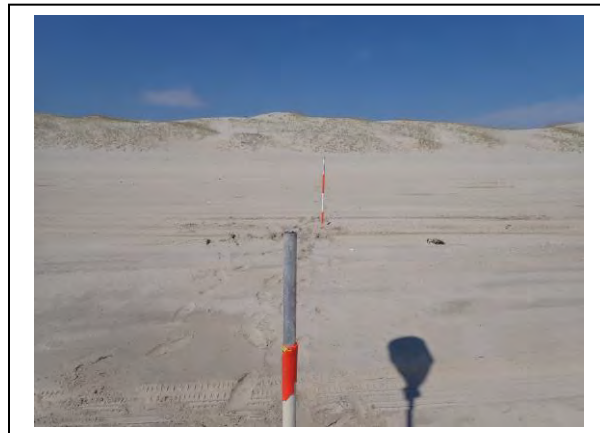
C-032



North View



South View



Landward View

**Ground Digital Photography
Monument**

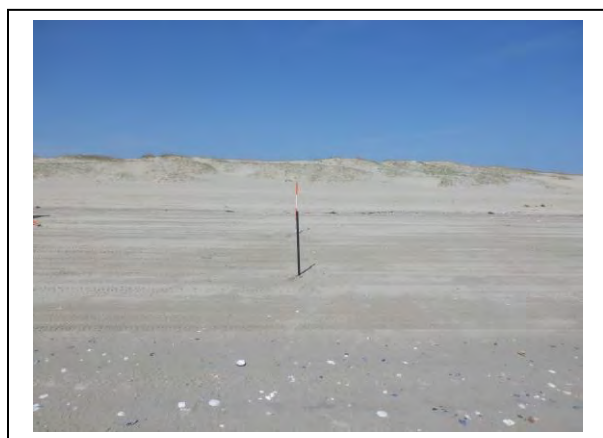
C-033



North View



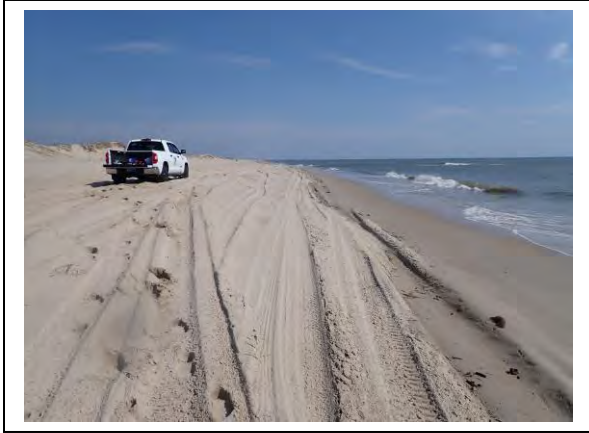
South View



Landward View

**Ground Digital Photography
Monument**

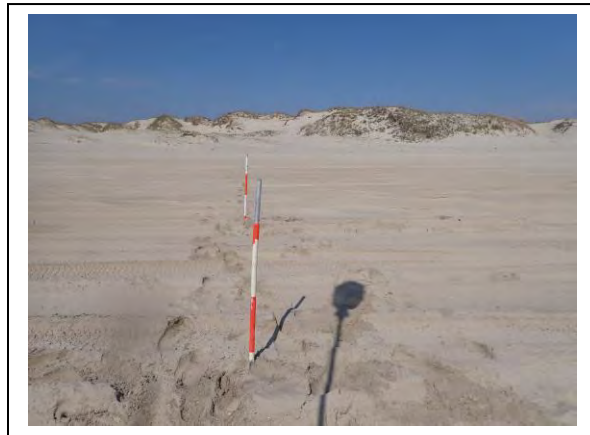
C-034



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-035



North View



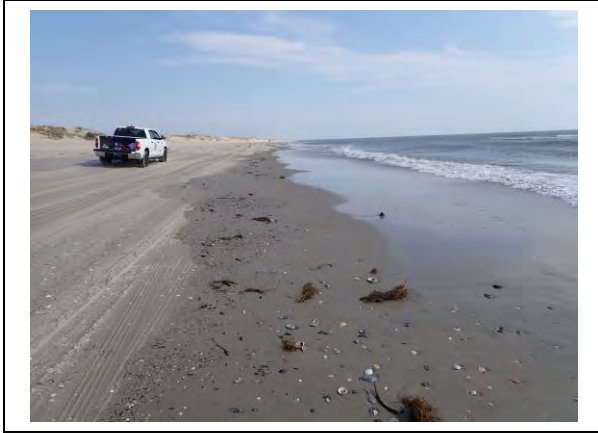
South View



Landward View

**Ground Digital Photography
Monument**

C-036



North View



South View



Landward View

**Ground Digital Photography
Monument**

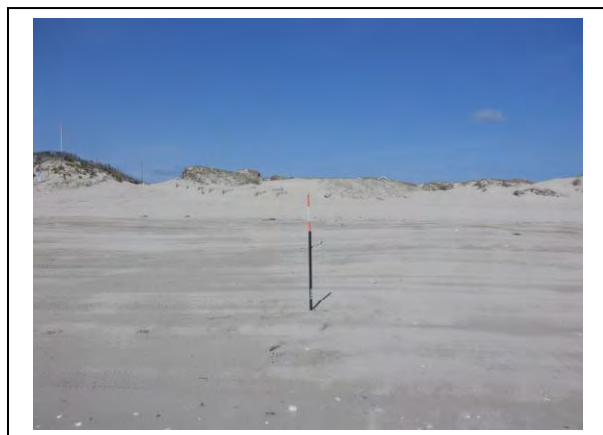
C-037



North View



South View



Landward View

**Ground Digital Photography
Monument**

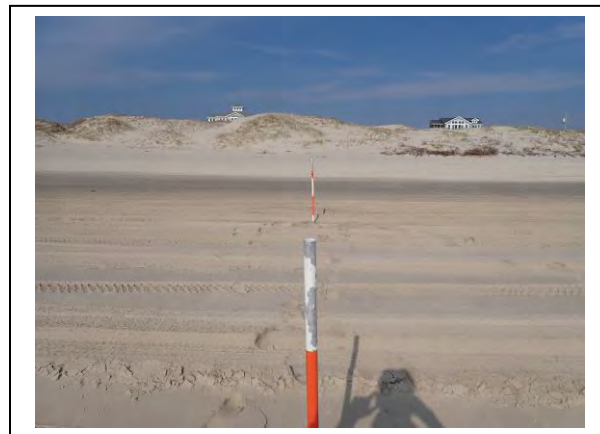
C-038



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-039



North View



South View



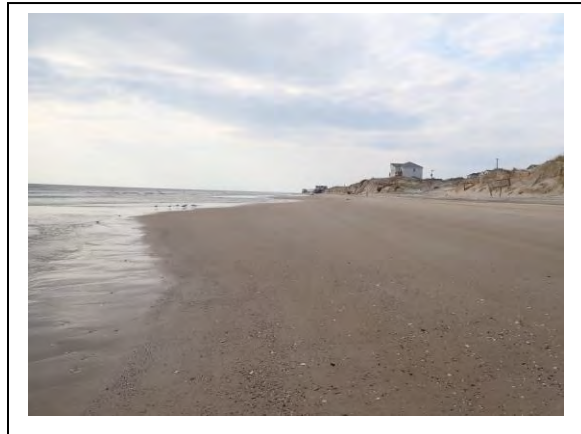
Landward View

**Ground Digital Photography
Monument**

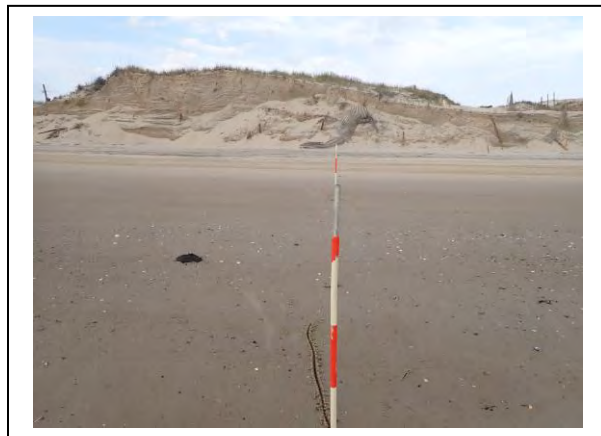
C-040



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**

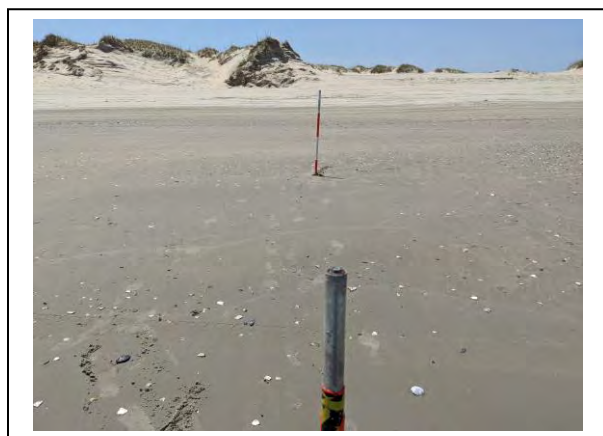
C-044



North View



South View



Landward View

**Ground Digital Photography
Monument**

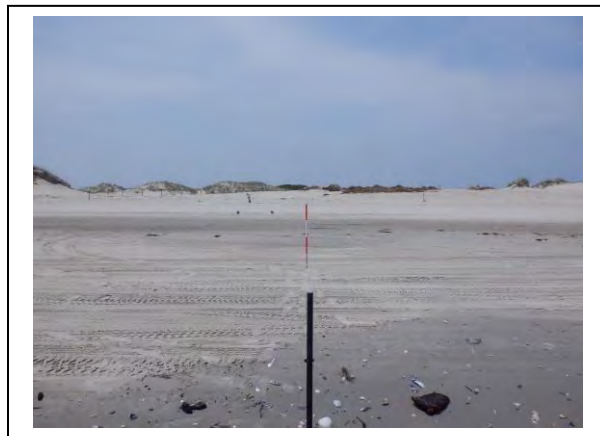
C-045



North View



South View



Landward View

**Ground Digital Photography
Monument**

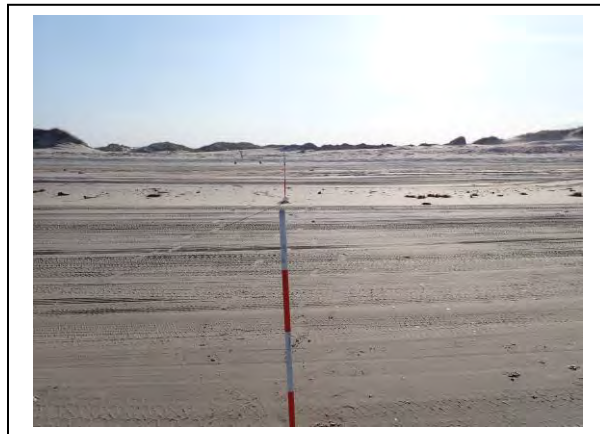
C-046



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**

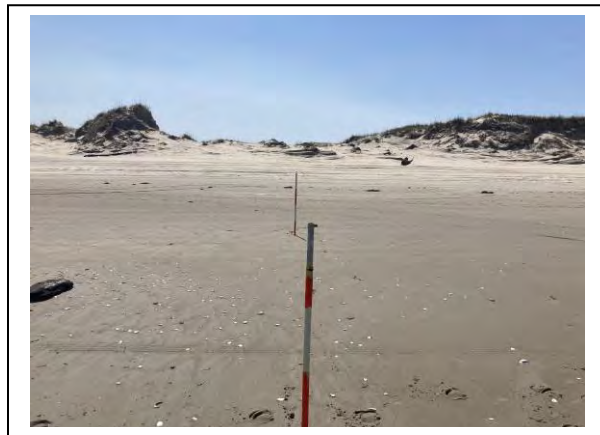
C-052



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-053



North View



South View



Landward View

**Ground Digital Photography
Monument**

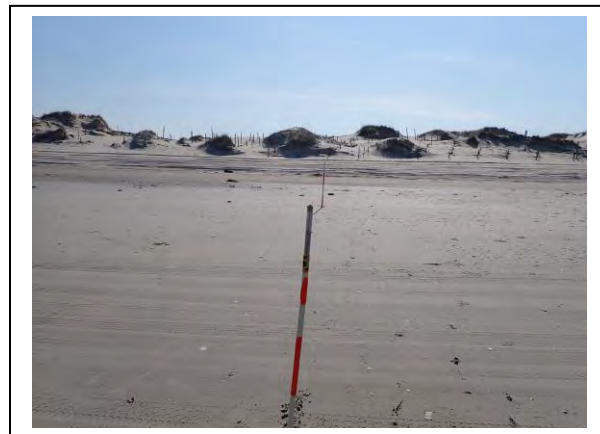
C-054



North View



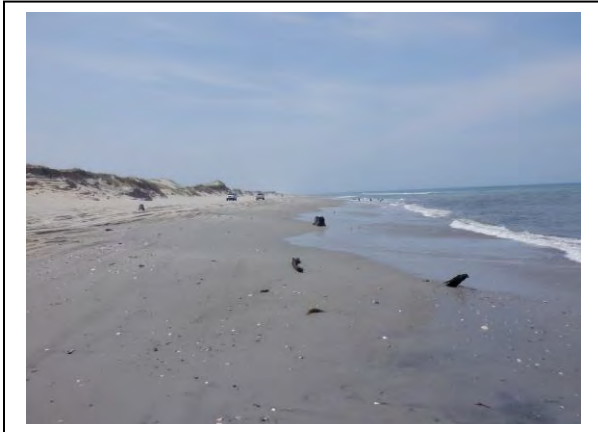
South View



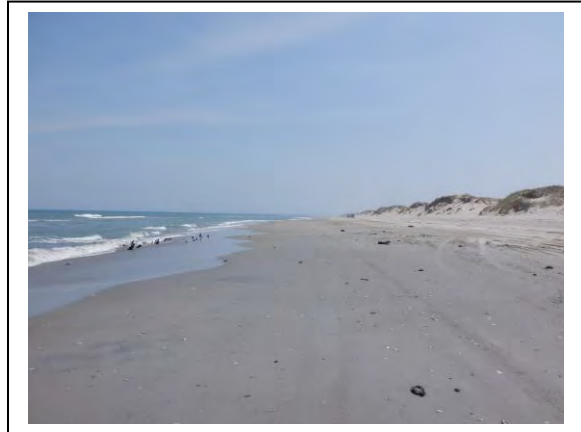
Landward View

**Ground Digital Photography
Monument**

C-055



North View



South View



Landward View

**Ground Digital Photography
Monument**

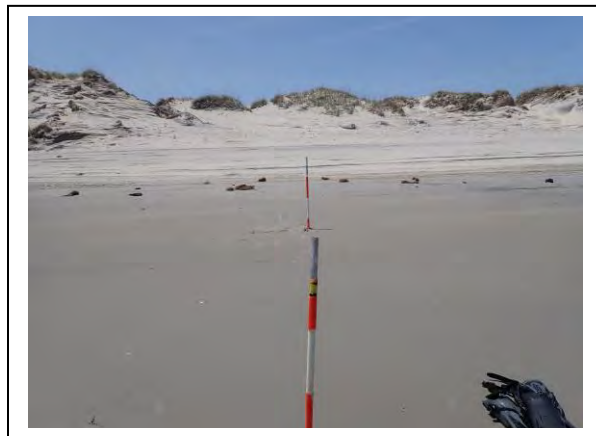
C-056



North View



South View



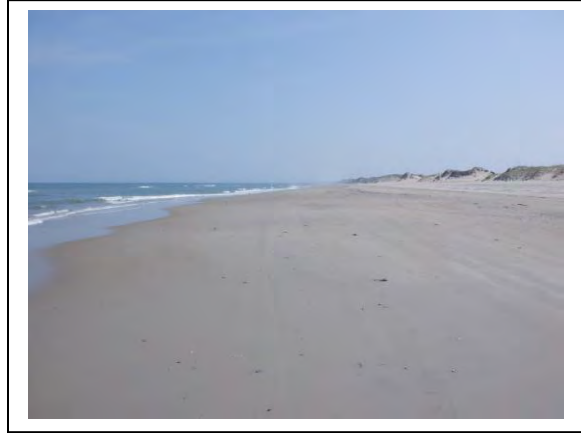
Landward View

**Ground Digital Photography
Monument**

C-057



North View



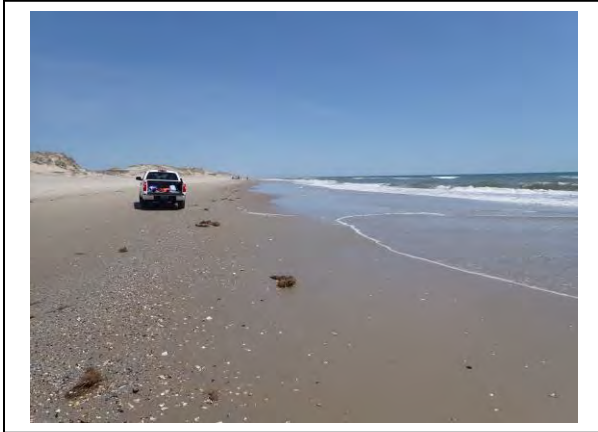
South View



Landward View

**Ground Digital Photography
Monument**

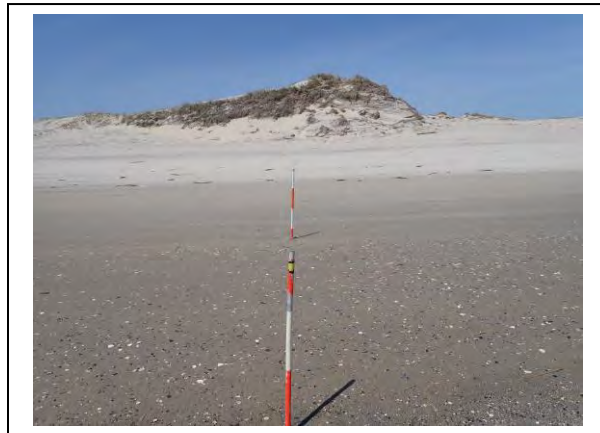
C-058



North View



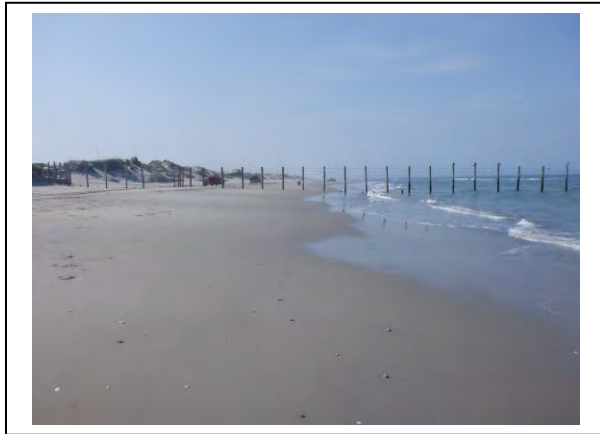
South View



Landward View

**Ground Digital Photography
Monument**

C-059



North View



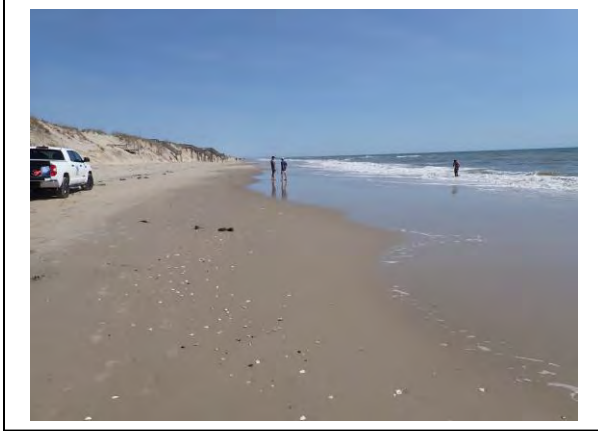
South View



Landward View

**Ground Digital Photography
Monument**

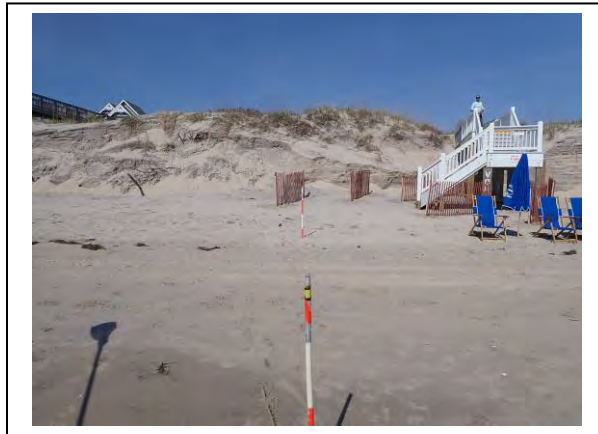
C-060



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



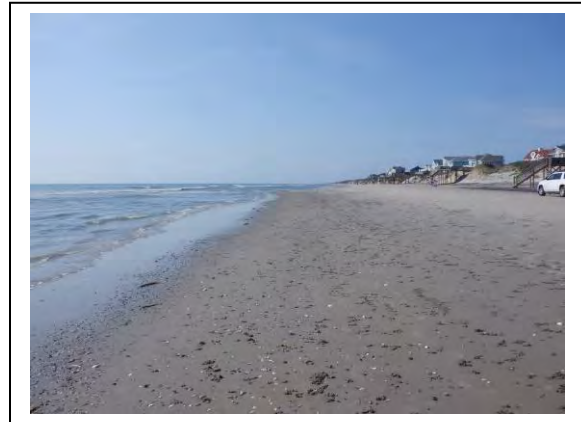
Landward View

**Ground Digital Photography
Monument**

C-063



North View



South View



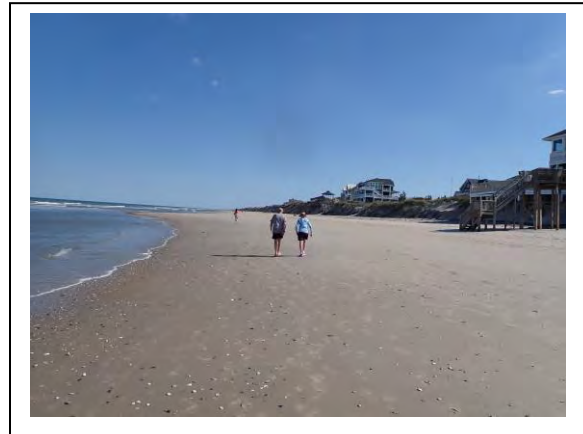
Landward View

**Ground Digital Photography
Monument**

C-064



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-065



North View



South View



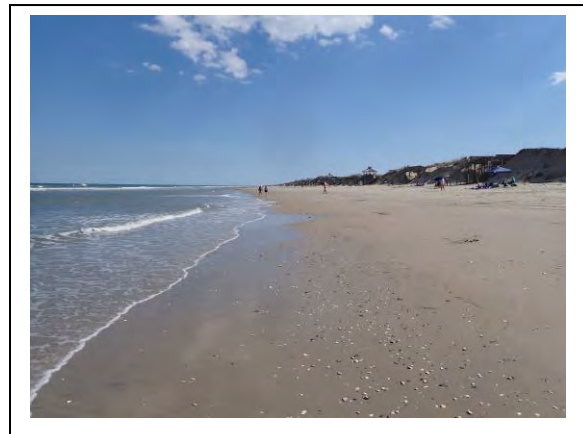
Landward View

**Ground Digital Photography
Monument**

C-066



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-067



North View



South View



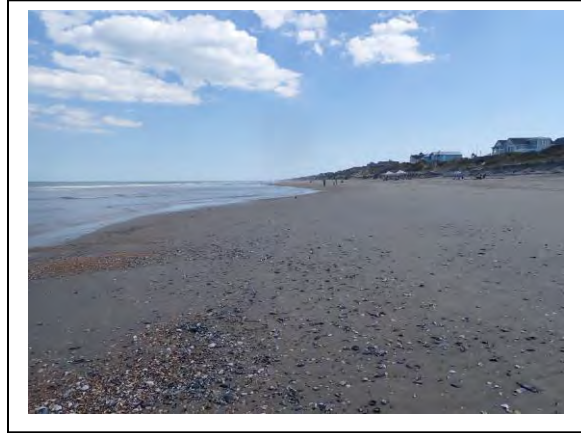
Landward View

**Ground Digital Photography
Monument**

C-068



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-069



North View



South View



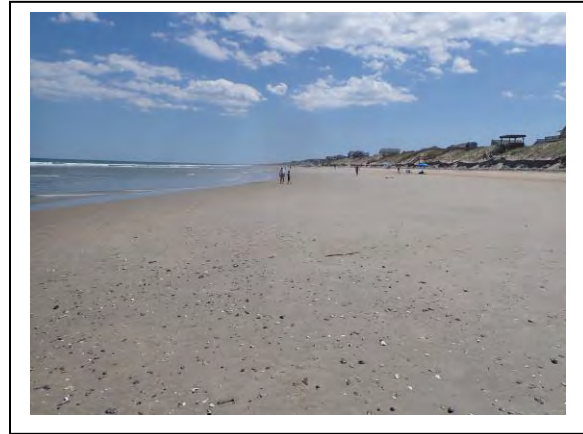
Landward View

**Ground Digital Photography
Monument**

C-070



North View



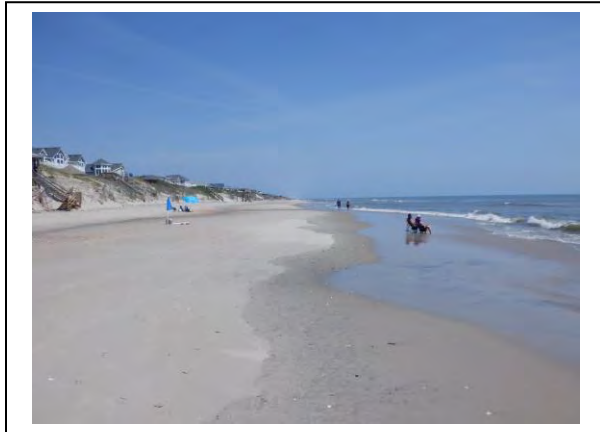
South View



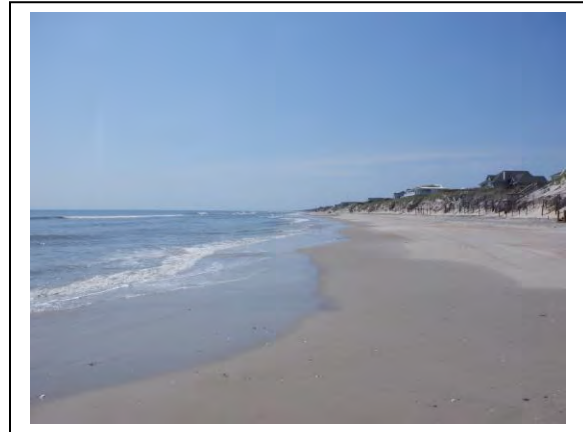
Landward View

**Ground Digital Photography
Monument**

C-071



North View



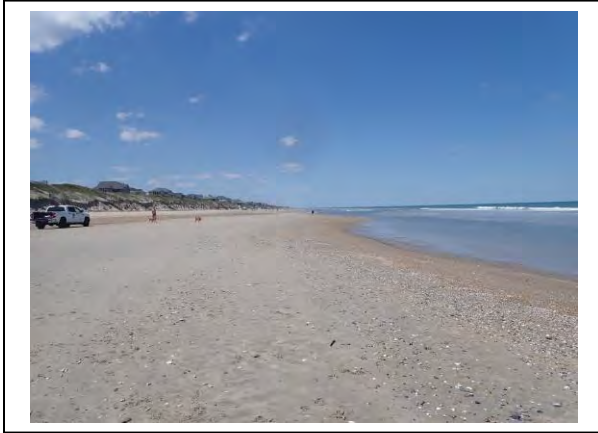
South View



Landward View

**Ground Digital Photography
Monument**

C-072



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-073



North View



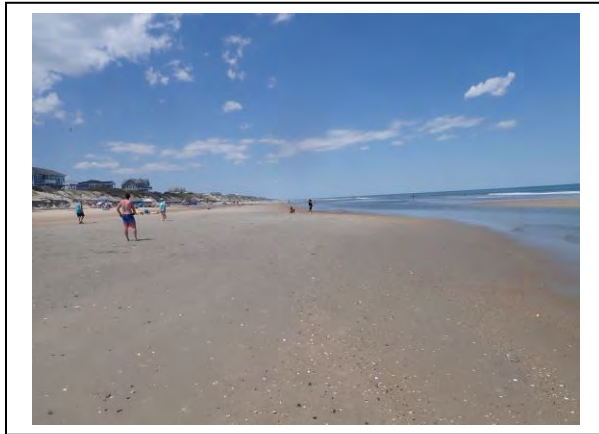
South View



Landward View

**Ground Digital Photography
Monument**

C-074



North View



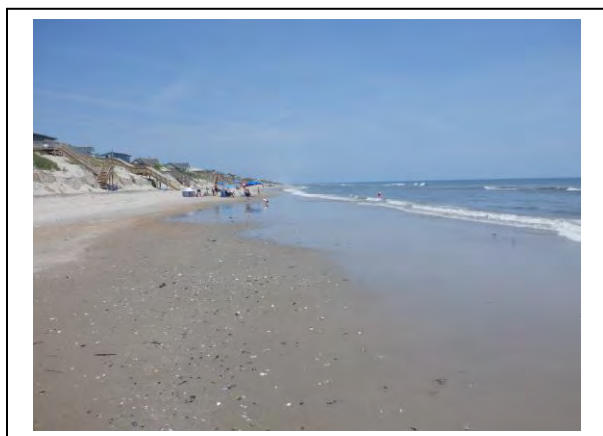
South View



Landward View

**Ground Digital Photography
Monument**

C-075



North View



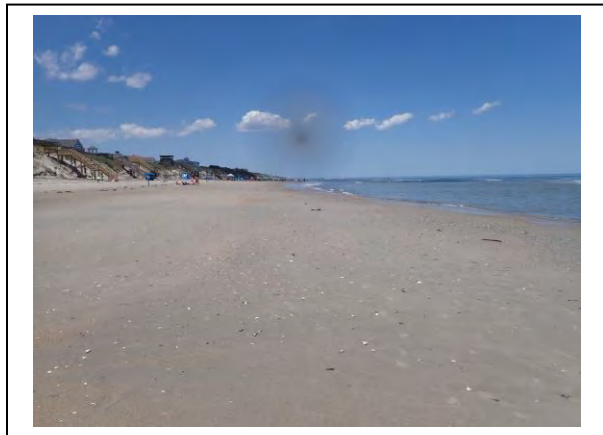
South View



Landward View

**Ground Digital Photography
Monument**

C-076



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-077



North View



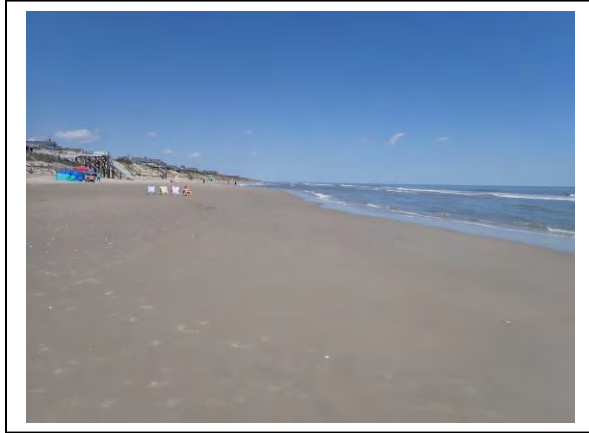
South View



Landward View

**Ground Digital Photography
Monument**

C-078



North View



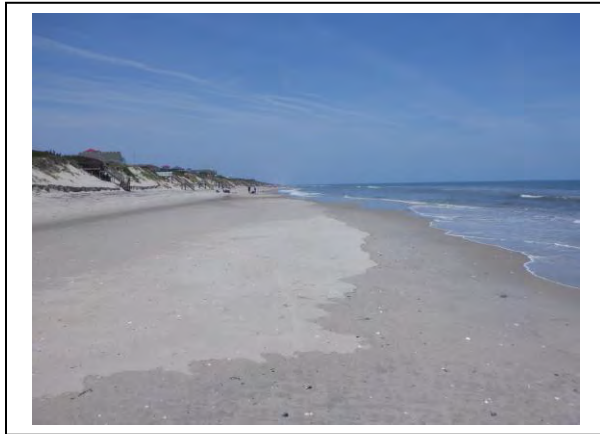
South View



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



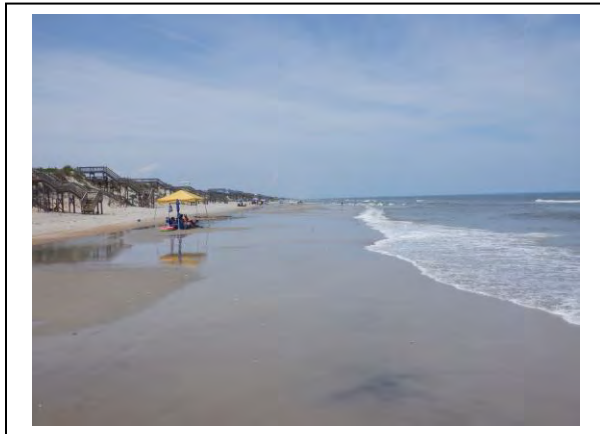
South View



Landward View

**Ground Digital Photography
Monument**

C-085



North View



South View



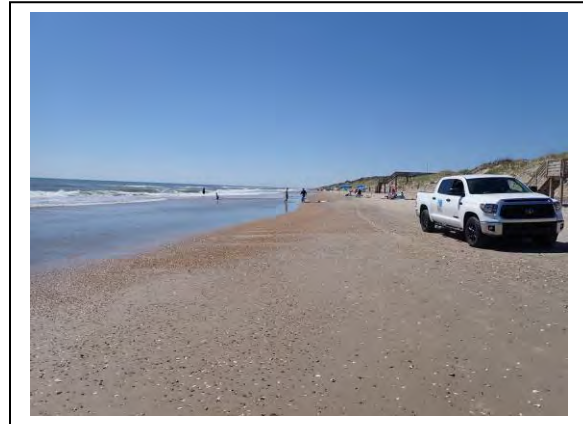
Landward View

**Ground Digital Photography
Monument**

C-086



North View



South View



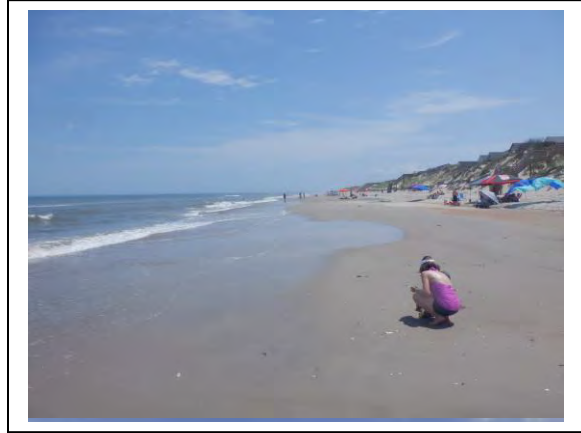
Landward View

**Ground Digital Photography
Monument**

C-087



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-088



North View



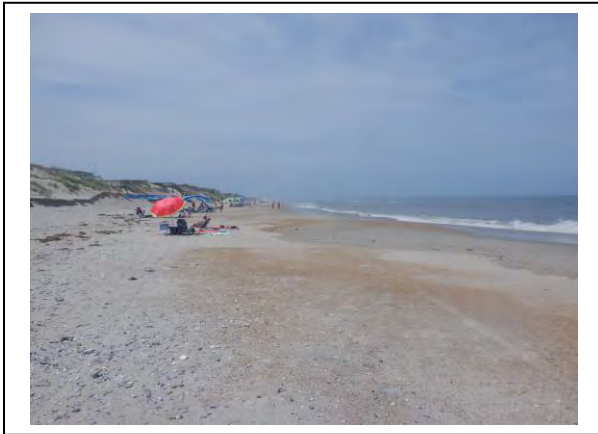
South View



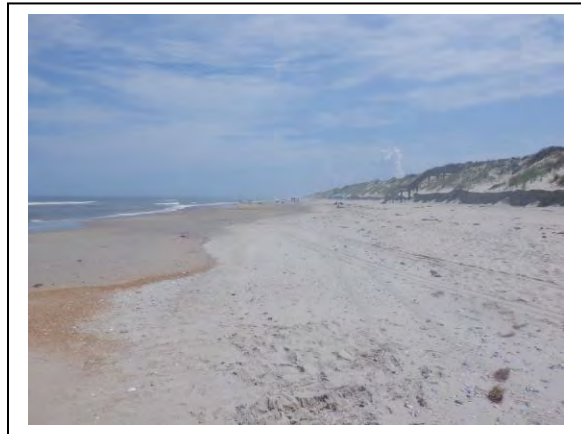
Landward View

**Ground Digital Photography
Monument**

C-089



North View



South View



Landward View

**Ground Digital Photography
Monument**

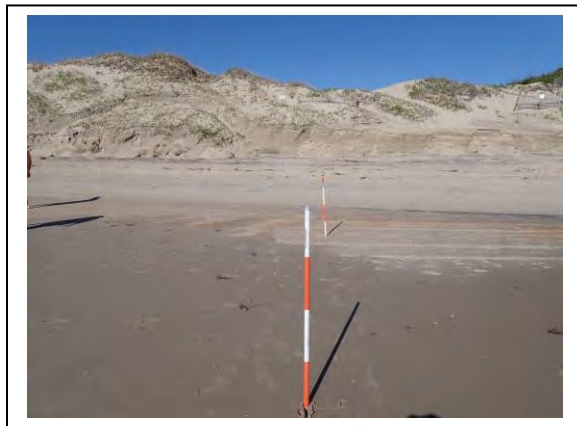
C-090



North View



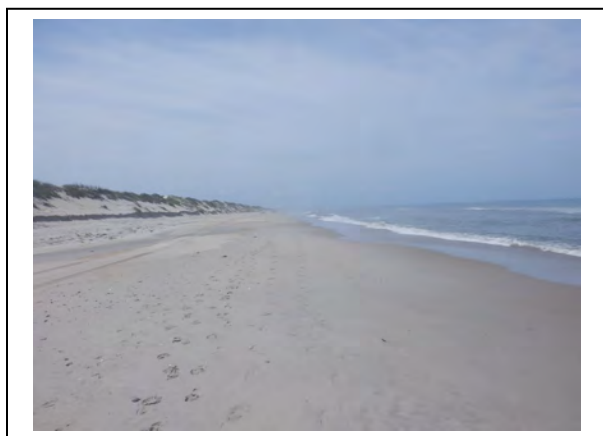
South View



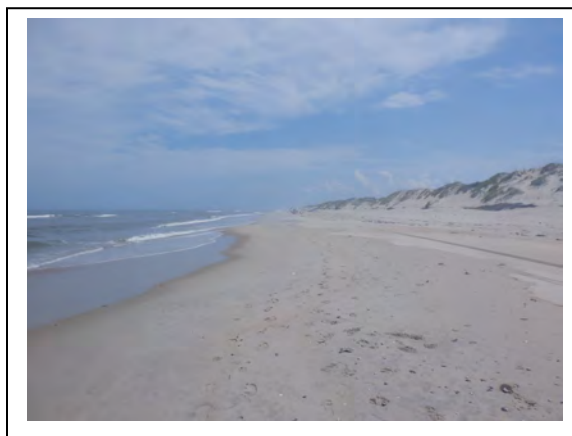
Landward View

**Ground Digital Photography
Monument**

C-091



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-092



North View



South View



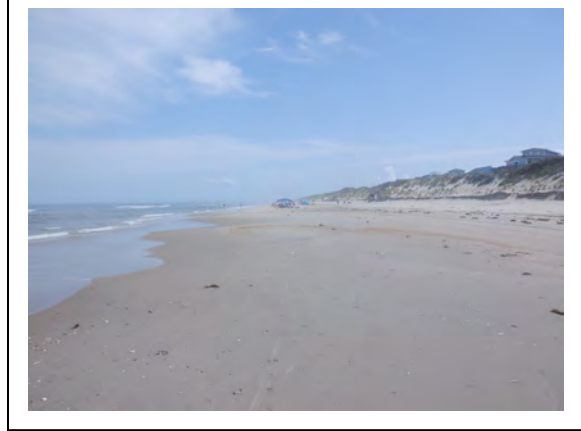
Landward View

**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**

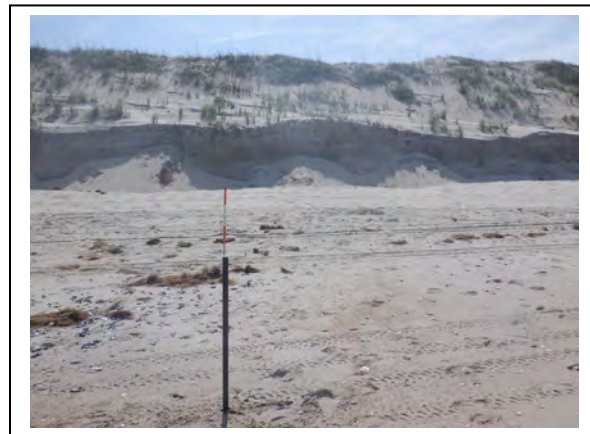
C-095



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-096



North View



South View



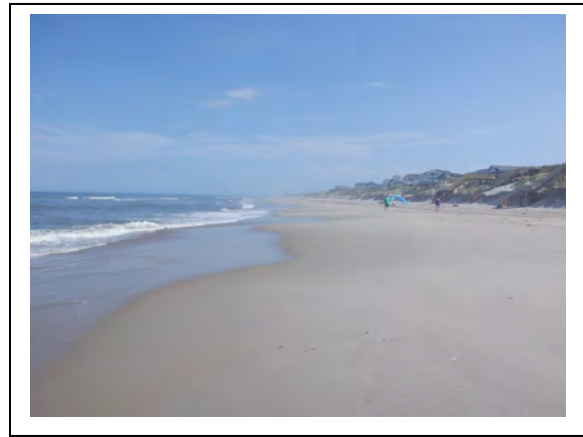
Landward View

**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**

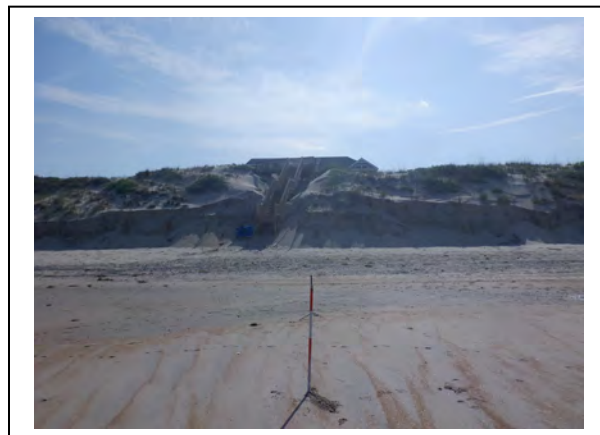
C-099



North View



South View



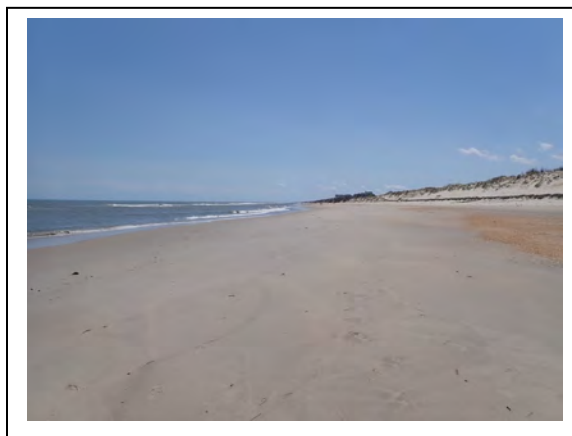
Landward View

**Ground Digital Photography
Monument**

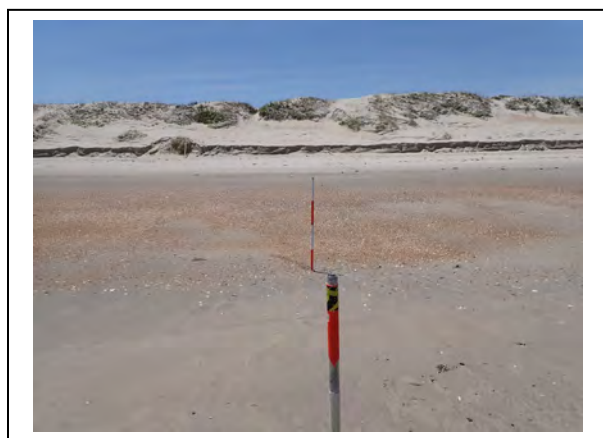
C-100



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-101



North View



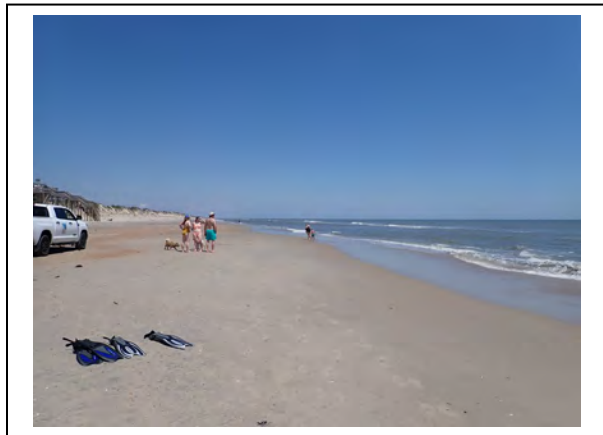
South View



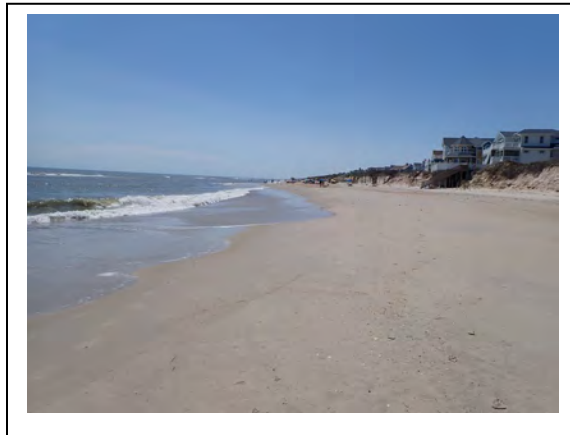
Landward View

**Ground Digital Photography
Monument**

C-102



North View



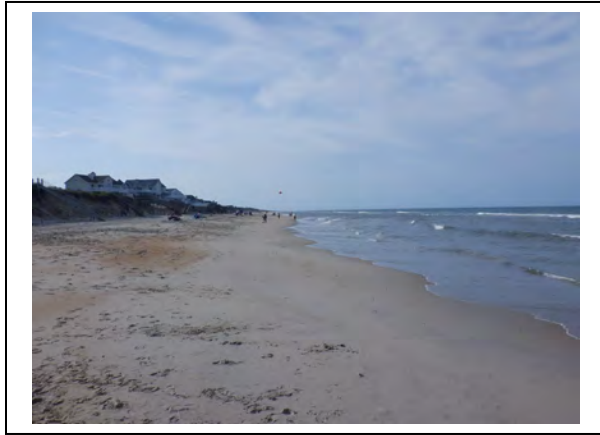
South View



Landward View

**Ground Digital Photography
Monument**

C-103



North View



South View



Landward View

**Ground Digital Photography
Monument**

C-104



North View



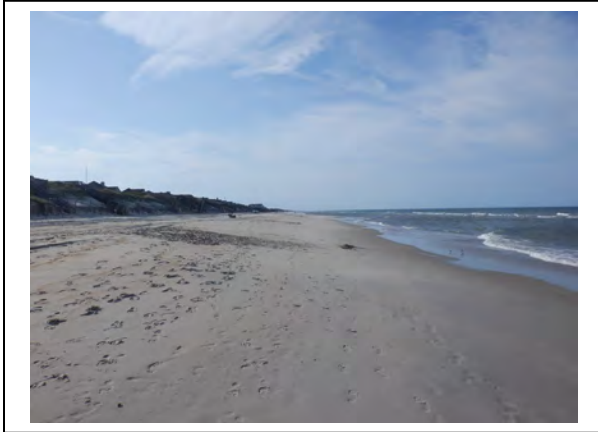
South View



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



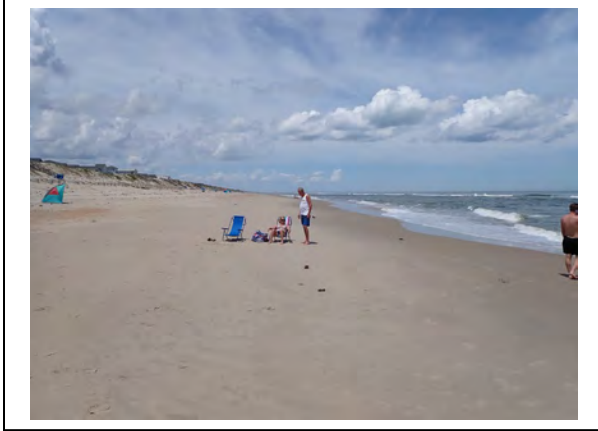
South View



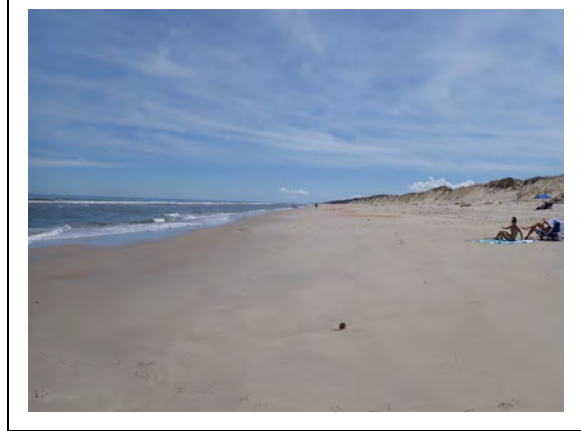
Landward View

**Ground Digital Photography
Monument**

C-110



North View



South View



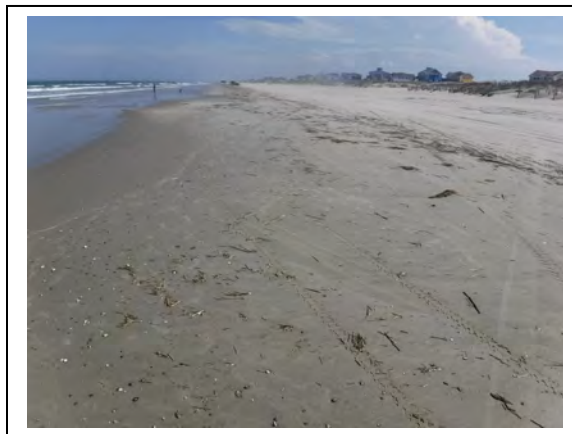
Landward View

**Ground Digital Photography
Monument**

C-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



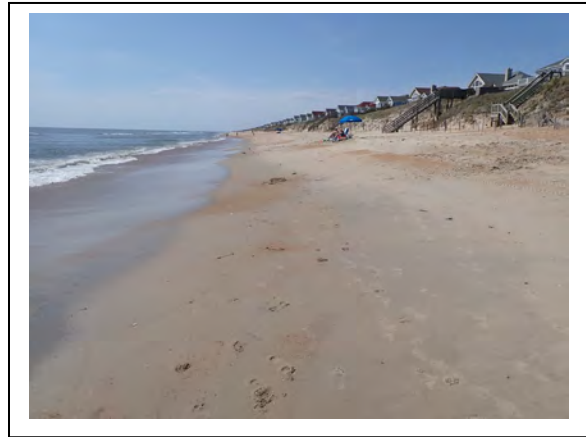
Landward View

**Ground Digital Photography
Monument**

C-115



North View



South View



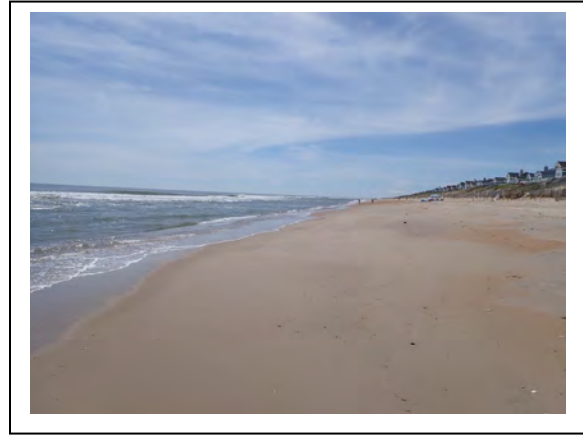
Landward View

**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)