

---

# Periodic Survey Evaluation: Ocean View Beach Spring 2025

---

Presented to:

City of Norfolk

*September 2025*

Prepared by:



## Table of Contents

1. Executive Summary .....	1
2. Objective .....	4
3. Data Sources .....	6
4. Methods.....	8
5. Discussion of Periodic Surveying Evaluation.....	9
5.1. Differences in Survey Coverage .....	9
5.2. Key Events during the Reporting Period.....	9
5.2.1. Storm Wave Events .....	9
5.2.2. Engineering Activities.....	20
5.3. General Shoreline Trends .....	20
5.4. Regional Shoreline Trends .....	21
5.4.1. Willoughby Spit .....	21
5.4.2. 800 Block Breakwaters .....	22
5.4.3. West Ocean View .....	23
5.4.4. Central Ocean View Breakwaters .....	24
5.4.5. Central Ocean View .....	24
5.4.6. East Ocean View .....	25
6. Bed Elevations Immediately West of the Willoughby Spit Terminal Groin .....	30
7. Federal Coastal Storm Damage Reduction Project.....	32
7.1. Project History .....	32
7.2. Initial Construction of the Federal Project .....	32
7.3. Shoreline and Beach Berm Contour Changes Relative to the May 2017 Post-Construction Condition of the Federal Project .....	33
7.3.1. Shoreline Change .....	33
7.3.2. Berm Contour Change.....	33
7.4. Federal Project Status Relative to a Renourishment Threshold .....	37

7.5. Volumetric Comparison of November 2024 to May 2017.....	39
8. Summary .....	41

## Appendices

Appendix A: Aerial Photography and Digitized Shorelines

Appendix B: Survey Comparison Plots

Appendix C: Summary of Shoreline Change and Volume Change Tables

Appendix D: Engineering Activities Log

Appendix E: Maps of Elevation Change, November 2024 to April 2025

Appendix F: Maps of Federal Project Condition Change, May 2017 to April 2025

## List of Figures

Figure 3-1: Survey Baseline and Transects.....	7
Figure 5-1: November 2, 2024 Storm .....	10
Figure 5-2: November 9, 2024 Storm .....	11
Figure 5-3: November 13, 2024 Storm .....	11
Figure 5-4: November 15, 2024 Storm .....	12
Figure 5-5: November 21, 2024 Storm .....	12
Figure 5-6: December 5, 2024 Storm.....	13
Figure 5-7: December 11, 2024 Storm.....	13
Figure 5-8: December 19, 2024 Storm.....	14
Figure 5-9: January 4, 2025 Storm.....	14
Figure 5-10: January 7, 2025 Storm.....	15
Figure 5-11: January 15, 2025 Storm.....	15
Figure 5-12: January 22, 2025 Storm.....	16
Figure 5-13: February 19, 2025 Storm.....	16
Figure 5-14: March 2, 2025 Storm.....	17
Figure 5-15: March 18, 2025 Storm.....	17
Figure 5-16: March 21, 2025 Storm.....	18
Figure 5-17: April 8, 2025 Storm.....	18
Figure 5-18: April 12, 2025 Storm.....	19
Figure 5-19: April 17, 2025 Storm.....	19
Figure 5-20: Shoreline Change Rate (ft/yr) at Mean High Water (+0.98 ft NAVD88) for May 2024 to April 2025 (Note: Positive = Accretion, Negative = Erosion).....	26
Figure 5-21: Volume Change Rate Above 0 ft NAVD88 and -15 ft NAVD88 (cy/ft/yr) for May 2024 to April 2025 (Note: Positive = Accretion, Negative = Erosion).....	27

Figure 5-22: Shoreline Change (ft) at Mean High Water (+0.98 ft NAVD88) for November 2024 to April 2025 (Note: Positive = Accretion, Negative = Erosion).....	28
Figure 5-23: Volume Change above 0 ft NAVD88 and -15 ft NAVD88 (cy/ft) for November 2024 to April 2025 (Note: Positive = Accretion, Negative = Erosion).....	29
Figure 6-1: Spring 2018 and Spring 2025 Survey Depths West of the Willoughby Spit Terminal Groin .....	31
Figure 7-1: Position of the Mean Higher High Water (+1.1 ft NAVD88) Contour Relative to Pre- and Post-Construction of the Federal Project .....	35
Figure 7-2: Position of the Bayward Extent of the +3.5 ft NAVD88 Beach Berm Contour Relative to Pre- and Post-Construction of the Federal Project .....	36

## List of Tables

Table 1-1: Regional Shoreline and Volume Change Statistics (May 2024 to Apr. 2025) .....	2
Table 1-2: Regional Shoreline and Volume Change Statistics (Nov. 2024 to Apr. 2025) .....	2
Table 2-1: Surveyors and Collection Dates.....	4
Table 5-1: Monthly Wave Statistics Summary .....	10
Table 5-2: Regional Shoreline and Volume Change Statistics (May 2024 to Apr. 2025) .....	20
Table 5-3: Regional Shoreline and Volume Change Statistics (Nov. 2024 to Apr. 2025) .....	21
Table 5-4: Average Shoreline and Volume Change Rates for Willoughby Spit .....	22
Table 5-5: Average Shoreline and Volume Change Rates for 800 Block Breakwaters.....	23
Table 5-6: Average Shoreline and Volume Change Rates for West Ocean View .....	23
Table 5-7: Average Shoreline and Volume Change Rates for Central Ocean View Breakwaters .....	24
Table 5-8: Average Shoreline and Volume Change Rates for Central Ocean View .....	24
Table 5-9: Average Shoreline and Volume Change Rates for East Ocean View .....	25
Table 7-1: Beach Berm Status Relative to the Federal Project Nourishment Threshold .....	38

## 1. Executive Summary

The fortieth consecutive twice-yearly survey of the Ocean View shoreline was conducted on April 22-23, 2025. The study area extends from the western end of Willoughby Spit to the western edge of Little Creek Inlet in East Ocean View. The periodic surveys are typically collected bi-annually in the spring months (i.e., April/May) and the fall months (i.e., October/November) to monitor the condition of the shoreline and the state of existing shore protection projects. The Federal coastal storm damage reduction project was constructed by Norfolk District U.S. Army Corps of Engineers (USACE) in mid-May 2017. This report documents the sixteenth monitoring survey following the initial adjustment period of the May 2017 Federal Project, illustrating changes in the dry beach and nearshore conditions of the Federal Project approximately eight years post-construction.

In early September 2022, a beach nourishment project was completed in the Toler Place to 10<sup>th</sup> View Street vicinity (between the eastern end of Willoughby Spit and the western end of 800 Block Breakwaters) and in the West Ocean View reach (approximately between Sarah Constant Park and Ship Watch Road). Additional hot spot nourishment events took place along East Beach and near Toler Place in February-March 2024 and June 2025, respectively.

A baseline and transect locations were established with the first survey in September 2005 and have been used for each subsequent survey. Shoreline changes are evaluated at the Mean High Water (MHW) elevation contour and volumetric changes are calculated above the 0 feet NAVD88 and -15 feet NAVD88 elevation contours for each transect. Volume changes calculated in the region above 0 feet NAVD88 indicate changes in the dune and beach berm. Volume changes calculated above -15 feet NAVD88 indicate changes in the full profile at each transect. The difference between the volume changes at the -15 feet NAVD88 contour and the 0 feet NAVD88 contour indicate changes in the nearshore zone. Comparison of surveys collected at the same time of year (i.e., May 2024 to April 2025) eliminates seasonal variation of profiles in volumetric change analyses. Consecutive survey comparisons (i.e., fall to fall and spring to fall) are useful to assess the direct impact of extreme events which have occurred between monitoring surveys. This report documents the data sources, methods, and results of a periodic surveying evaluation performed to compare the April 2025 survey data with previous surveys taken in May 2024 (spring to spring comparison) and November 2024 (most recent periodic survey comparison) in the Ocean View Beach area between Willoughby Spit and Little Creek Inlet.

Comparison	Parameter	Quantity
May 2024 vs. April 2025	Average Shoreline Change Rate at MHW (+0.98 ft NAVD88)	-4.16 ft/yr
	Cumulative Volume Change Rate Above 0 ft NAVD88	98 cy/yr
	Cumulative Volume Change Rate Above -15 ft NAVD88	-84,997 cy/yr
November 2024 vs. April 2025	Average Shoreline Change at MHW (+0.98 ft NAVD88)	-0.75 ft
	Cumulative Volume Change Above 0 ft NAVD88	-9,545 cy
	Cumulative Volume Change Above -15 ft NAVD88	-36,974 cy

The behavior in each of the shoreline reaches for the May 2024 to April 2025 and November 2024 to April 2025 periods are summarized in Table 1-1 and Table 1-2 respectively.

As illustrated in Table 1-1, the Ocean View shoreline has experienced overall landward retreat of MHW from May 2024 to April 2025 with a length-weighted average change rate of -4.16 ft/yr. The dune and beach berm above 0 feet NAVD88 gained sediment at a rate of 98 cy/yr from May 2024 to April 2025. The beach profile above -15 feet NAVD88 lost sediment at a rate of -84,997 cy/yr over the same period.

From November 2024 to April 2025, the Ocean View shoreline experienced overall landward retreat of MHW by -0.75 feet, as shown in Table 1-2. The volumetric change over the same period showed volume loss above 0 feet NAVD88 of -9,545 cy and volume loss above -15 feet NAVD88 of -36,974 cy.

**Table 1-1: Regional Shoreline and Volume Change Statistics (May 2024 to Apr. 2025)**

Region	Average Shoreline Change	Average Volume Change Rate Above 0 ft NAVD88	Cumulative Volume Change Rate Above 0 ft NAVD88	Average Volume Change Rate Above -15 ft NAVD88	Cumulative Volume Change Rate Above -15 ft NAVD88
	(ft/yr)	(cy/ft/yr)	(cy/yr)	(cy/ft/yr)	(cy/yr)
Willoughby Spit (0+00 to 45+00)	3.11	-0.19	-848	-11.17	-50,391
800 Block Breakwaters (45+25 to 87+62)	2.22	0.97	4,413	-1.09	-4,969
West Ocean View (93+41 to 163+49)	-16.94	-2.91	-18,799	-5.51	-35,496
Central Ocean View Breakwaters (169+63 to 195+63)	5.56	0.51	1,756	0.37	1,297
Central Ocean View (206+86 to 323+09)	-2.56	1.22	15,203	1.14	14,275
East Ocean View (329+63 to 383+58)	-7.37	-0.28	-1,628	-1.70	-9,712
OVERALL	Weighted Avg (ft/yr)	Weighted Avg (cy/ft/yr)	Total (cy/yr)	Weighted Avg (cy/ft/yr)	Total (cy/yr)
	-4.16	-0.08	98	-2.38	-84,997

**Table 1-2: Regional Shoreline and Volume Change Statistics (Nov. 2024 to Apr. 2025)**

Region	Average Shoreline Change	Average Volume Change Above 0 ft NAVD88	Cumulative Volume Change Above 0 ft NAVD88	Average Volume Change Above -15 ft NAVD88	Cumulative Volume Change Above -15 ft NAVD88
	(ft)	(cy/ft)	(cy)	(cy/ft)	(cy)
Willoughby Spit (0+00 to 45+00)	4.90	0.04	175	-2.06	-9,303
800 Block Breakwaters (45+25 to 87+62)	0.83	-0.19	-850	-1.18	-5,350
West Ocean View (93+41 to 163+49)	-7.59	-2.09	-15,886	-6.62	-50,358
Central Ocean View Breakwaters (169+63 to 195+63)	4.23	-0.47	-1,640	-0.16	-540
Central Ocean View (206+86 to 323+09)	0.91	0.64	8,000	1.37	17,189
East Ocean View (329+63 to 383+58)	-4.04	0.11	657	1.99	11,388
OVERALL	Weighted Avg (ft)	Weighted Avg (cy/ft)	Total (cy)	Weighted Avg (cy/ft)	Total (cy)
	-0.75	-0.25	-9,545	-0.96	-36,974

The Willoughby and Vicinity Coastal Storm Damage Reduction Project (Federal Project) was constructed in March, April, and May 2017. The Federal Project placed approximately 1.2 million cubic yards material on the Ocean View Beach. Chapter 7 of this Spring 2025 monitoring survey report evaluates the performance of the Federal Project and is intended to help the City and USACE to track project conditions and effectively plan for future renourishment needs.

Prior monitoring reports have identified four reaches within the Federal Project, that were included in the 2017 nourishment, that are potentially in need of renourishment to maintain the USACE Design Template level of protection:

- In the Toler Place vicinity of Willoughby Spit, between 12<sup>th</sup> View Street and 11<sup>th</sup> View Street.
- In West Ocean View spanning from Sarah Constant Beach Park to Ocean View Beach Park.
- The shoreline within the Central Ocean View breakwaters field.
- In East Ocean View within segments of the Bay Oaks and East Ocean View breakwaters area.

The City pursued renourishment at two of these areas, through partnership with the Virginia Port Authority (VPA), to beneficially use sandy dredged material from Thimble Shoals Channel and Meeting Area 2 segments of the Norfolk Harbor Deepening Project being completed by the VPA and USACE. A limited beach nourishment was completed in September 2022 in the Toler Place vicinity and the West Ocean View reach. The September 2022 beach nourishment project is reflected in the analyses presented in the Fall 2022 monitoring report.

In February to March of 2024, the City's contractor placed approximately 12,000 cubic yards of sand between 27<sup>th</sup> Bay Street and the western jetty at Little Creek Inlet. The sand was obtained from nearshore dredging performed by the HRBT expansion contractors and delivered to the beach via truck haul.

In June 2025, the City's contractor placed approximately 12,000 cubic yards of sand in the vicinity of Toler Place, between approximately 12<sup>th</sup> View Street and 11<sup>th</sup> View Street. The sand was backpassed from accretional areas adjacent to the terminal groin and near the 15<sup>th</sup> View Street beach access at the western end of Willoughby Spit. Due to the timing of this construction event, this monitoring report does not include shoreline or volume changes associated with this hot spot nourishment project.

## 2. Objective

The City of Norfolk, Virginia has maintained a program of periodic surveying of the Ocean View shoreline since 2005. The periodic surveying data collection dates are shown in Table 2-1. This report documents the data sources, methods, and results of a periodic surveying evaluation performed to compare the April 2025 survey data with previous surveys taken in May 2024 (spring to spring comparison) and November 2024 (most recent periodic survey comparison) in the Ocean View Beach area between Willoughby Spit and Little Creek Inlet.

**Table 2-1: Surveyors and Collection Dates**

Data Collection Date	Surveyor
September 2005	McKim & Creed
March 2006	McKim & Creed
October 2006	McKim & Creed
March 2007	McKim & Creed
October 2007	McKim & Creed
March 2008	McKim & Creed
October 2008	McKim & Creed
April 2009	McKim & Creed
October 2009	Geodynamics, LLC
March 2010	Geodynamics, LLC
October 2010	Geodynamics, LLC
April 2011	Geodynamics, LLC
October 2011	Geodynamics, LLC
March 2012	Geodynamics, LLC
September 2012	Geodynamics, LLC
April 2013	Geodynamics, LLC
October 2013	Geodynamics, LLC
March 2014	Geodynamics, LLC
October 2014	Geodynamics, LLC
April 2015	Geodynamics, LLC
October 2015	Geodynamics, LLC
May 2016	Geodynamics, LLC
October 2016	Geodynamics, LLC
February 2017	USACE (Great Lakes Dredge & Dock)
May 2017	USACE (Great Lakes Dredge & Dock)
May 2017	Geodynamics, LLC
October 2017	Geodynamics, LLC
April 2018	Geodynamics, LLC
November 2018	Geodynamics, LLC
April 2019	Geodynamics, LLC
November 2019	Geodynamics, LLC
June 2020	Geodynamics, LLC
October 2020	Geodynamics, LLC
June 2021	Geodynamics, LLC
October 2021	Geodynamics, LLC
April 2022	Geodynamics, LLC

**Table 2-1: Surveyors and Collection Dates (Continued)**

Data Collection Date	Surveyor
November 2022	Geodynamics, LLC
May 2023	Geodynamics, LLC
November 2023	Geodynamics, LLC
May 2024	Geodynamics, LLC
November 2024	Geodynamics, LLC
April 2025	Geodynamics, LLC

### 3. Data Sources

Geodynamics, LLC conducted the most recent survey of Ocean View Beach from April 22-23, 2025. The baseline and transects established for the September 2005 survey were used for the most recent survey. Figure 3-1 shows the location of the baseline, transects and the stationing applied by Geodynamics for the Spring 2025 monitoring survey. As shown in Figure 3-1, transects were stationed from west to east along the Ocean View shoreline. The survey data was provided in xyz and shapefile formats allowing for compatibility with multiple programs.

Geodynamics noted that typical vertical survey accuracy along the hydrographic portions of the profiles is approximately  $\pm 1$  cm. This ‘margin of error’, if applied over the entire length of the hydrographic profiles can potentially result in significant volumetric differences, in particular on the shallow-sloped and long profiles near Willoughby Spit. Therefore, volumetric changes discussed herein are analyzed with regard to potential volumetric margins of error.

Chesapeake Bay Helicopters (CBH) captured LiDAR data and aerial photography of the Ocean View shoreline in July 2025. CBH supplied raw LiDAR files (LAS format) and a bare-earth Digital Elevation Model (DEM) along with georeferenced aerial images of the dry beach and dune along the entire Ocean View shoreline. Geodynamics incorporated the LiDAR-derived DEM with their own surveyed data to generate two DEMs – one area above Mean High Water (MHW) and the other one of the area below MHW. Geodynamics also produced digital contours at the MHW elevation and at the apparent dune toe elevation. The July 2025 aerial photos with the shoreline positions from April 2025, November 2024, and May 2024 are shown in Appendix A.

Since the July 2025 photos cover a limited portion of area landward and bayward of the shoreline, a previous image provided by the City (2018) is underlain in all Appendices’ map products for presentation purposes.

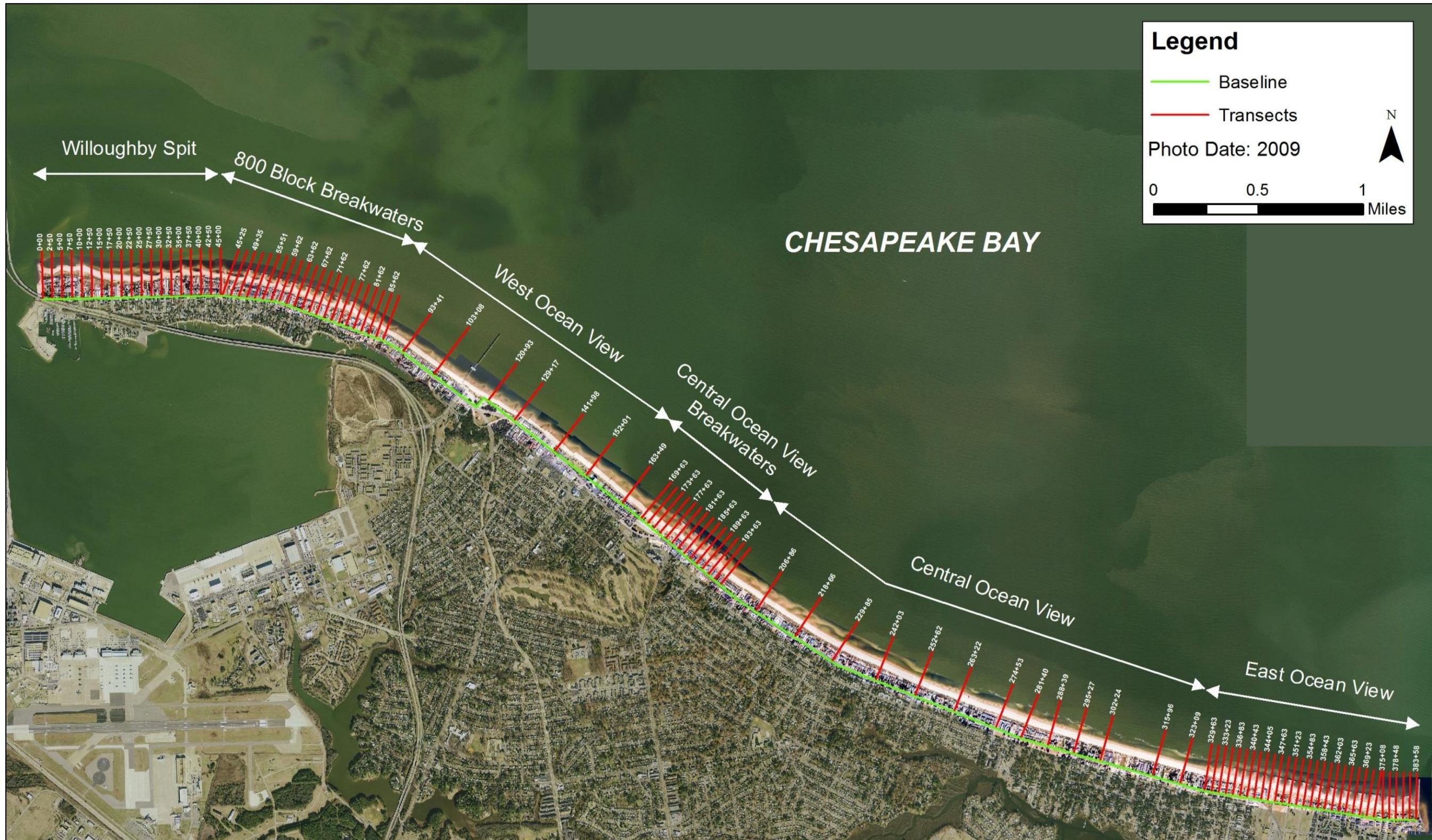


Figure 3-1: Survey Baseline and Transects

## 4. Methods

Survey comparisons and respective analysis were performed using a combination of Microsoft Excel, Golden Software Surfer, ESRI ArcGIS, custom-coded MATLAB routines and the USACE's Beach Morphology Analysis Package (BMAP). Surfer is a contouring and 3D surface mapping program utilized to create 3D surfaces for analysis. BMAP is a program developed by the USACE to analyze morphologic and dynamic properties of beach profiles.

The horizontal coordinate system used was Virginia South State Plane NAD 1983 (HARN 93), US Survey feet with a vertical datum of NAVD88. Individual profile plots showing the survey profile at each transect for each date are presented in Appendix B. From the profiles, shoreline changes and volumetric changes were then calculated at each transect for the following time periods:

1. May 2024 to April 2025 (Entire Shoreline)
2. November 2024 to April 2025 (Entire Shoreline)

First, the change in shoreline based on the survey profiles at mean high water (MHW) was calculated at each transect for each time period mentioned. MHW along Ocean View beaches is defined as +0.98 feet NAVD88 based on tidal benchmark values at the National Oceanic and Atmospheric Administration (NOAA) tide gauge at Sewells Point. The resulting value represents the shoreline change (feet) over the time period between surveys. The shoreline change rate (ft/yr) was then calculated by dividing by the amount of time between survey dates.

Representative volume changes were also calculated at each transect for all time periods. Volume changes were calculated above two different elevation contours to better understand the processes occurring onshore and offshore of the Ocean View beach area. Calculations included volume changes above -15 feet NAVD88 and volume changes above 0 feet NAVD88. The results represent volume change per linear foot of shoreline (cy/ft) over the period of time between surveys. The volume change rate (cy/ft/yr) was then calculated by dividing by the amount of time between survey dates. In addition, the volume changes were converted to cumulative changes over the entire shoreline. This was done by applying the average end area method to the unit volume changes (cy/ft) and unit volume change rates (cy/ft/yr) computed at each transect and summing the total volume changes over the entire shoreline. The resulting value indicated the total loss or gain of material (cy) between surveys based on the applicable profile extents.

Volume changes calculated for portions of the profiles above 0 feet NAVD88 are representative of changes in the amount of material in the subaerial portion of the beach profile (i.e., dune and beach berm). The performance of these areas is highly influenced by the presence of coastal structures and the impact of storm activity. Volume changes calculated for portions of the profiles above -15 feet NAVD88 allow for the tracking of sand movement in the submerged active profile.

## 5. Discussion of Periodic Surveying Evaluation

This section discusses differences observed between the noted surveys, overall shoreline trends, regional shoreline trends and comparison with the pre- and post-construction surveys of the Federal Project. The computed shoreline changes and volume changes at each individual transect for the time periods covered are tabulated in Appendix C.

### 5.1. Differences in Survey Coverage

Variation in profile positions between surveys taken as part of the ongoing program of periodic surveying of the Ocean View shoreline (May 2024, November 2024, and April 2025) were minimal in the topographic portion of the survey due to use of the same baseline and transects put in place for the initial survey in September 2005. Profile extents and alignment were virtually the same when comparing the survey data.

### 5.2. Key Events during the Reporting Period

Beach processes are greatly influenced by both natural and engineered processes. This section describes key events that happened during the present reporting period which likely had an impact on shoreline position changes and volumetric gains and/or losses in the beach profile.

#### 5.2.1. Storm Wave Events

Understanding the wave climate immediately offshore of the Norfolk shoreline is vital for the design, monitoring, and analyzing the performance of the beach. Wave data used was collected from the City's AWAC (Acoustic Wave and Current) gage, which was deployed in 2006 directly offshore of the Norfolk Shoreline in approximately 23 feet of water. Wave data has been collected since initial deployment and continues throughout this survey period.

A summary of the observed conditions from the available wave data from January 17, 2025 to April 30, 2025 (which is the most recent deployment of the wave gage) yields the following general observations:

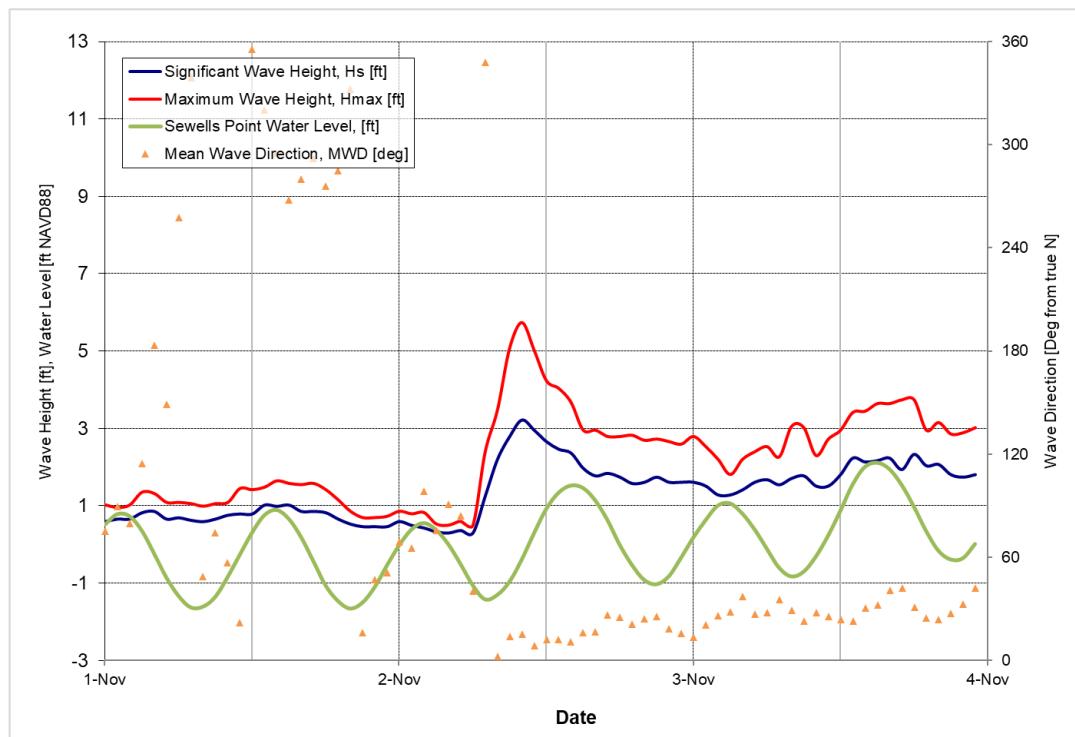
- The average significant wave height and peak period over the measurement period was approximately 1.1 feet and 3.8 seconds.
- The largest significant wave height observed during this deployment was approximately 4.6 feet with a corresponding peak period of approximately 4.9 seconds and mean direction of 20 degrees (March 2, 2025).
- Waves approach from the northwest through southeast sectors, with more than 74.6% approaching from 0 through 120 degrees true North.

The overall trends remained consistent with prior measurement periods with waves during calm periods being predominantly swell traveling into the bay from the ocean and having longer wave periods and lower wave heights. Typically, the larger wave height events are driven by northerly and northeasterly storm winds within the bay and tend to have shorter wave periods. A summary of wave statistics by month from November 2024 through April 2025 is given in Table 5-1.

**Table 5-1: Monthly Wave Statistics Summary**

Wave Statistic	Nov-24	Dec-24	Jan-25	Feb-25	Mar-25	Apr-25
Average Significant Wave Height, $H_s$ (ft)	1.3	1.2	1.2	1.2	1.1	1.2
Average Wave Period, $T_m$ (s)	2.5	2.5	2.4	2.5	2.3	2.3
Average Peak Wave Period, $T_p$ (s)	4.1	3.9	3.8	4.0	3.7	3.5
Maximum Observed Significant Wave Height, $H_s$ (ft)	3.9	4.1	3.7	3.2	4.6	3.1
Maximum Observed Wave Height, $H_{max}$ (ft)	6.8	8.2	6.0	5.6	6.8	5.0

Events with significant wave height reaching or exceeding 3.0 feet between November 2024 and April 2025 are displayed in Figure 5-1**Error! Reference source not found.** through Figure 5-19.

**Figure 5-1: November 2, 2024 Storm**

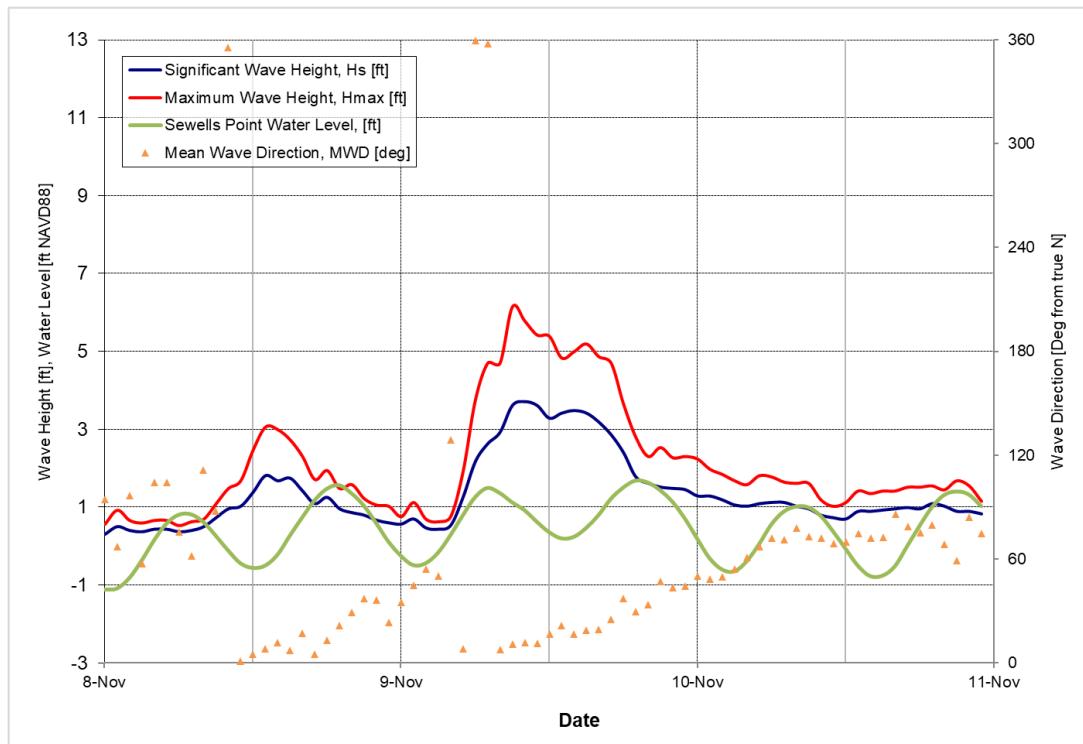


Figure 5-2: November 9, 2024 Storm

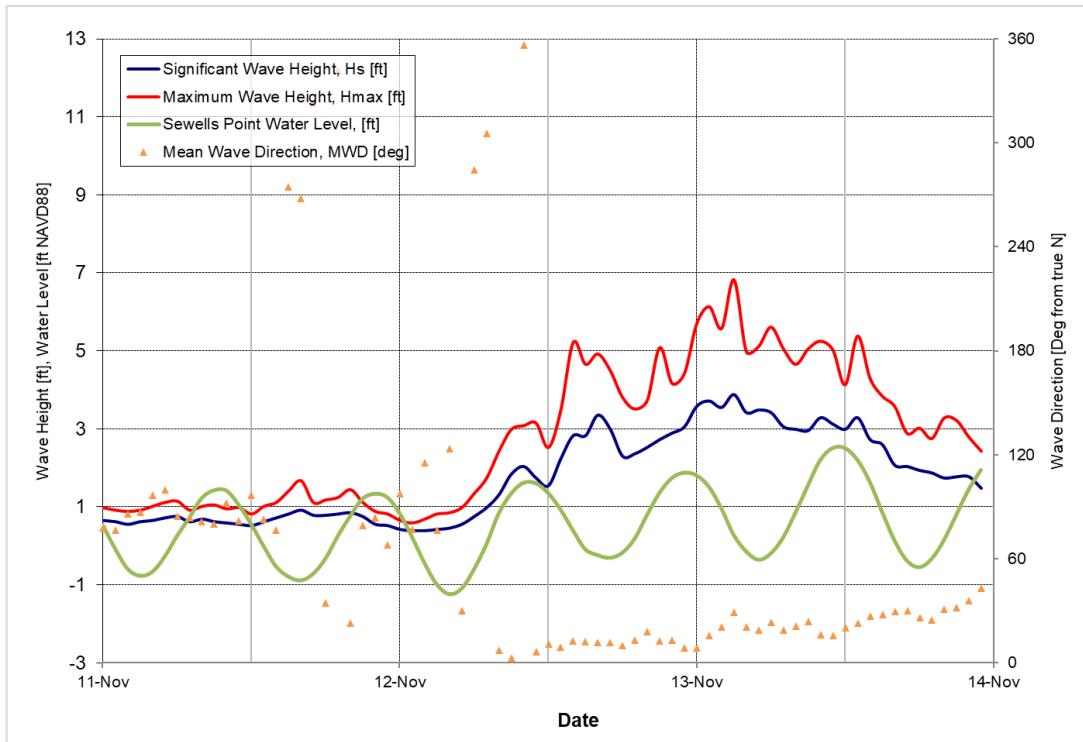


Figure 5-3: November 13, 2024 Storm

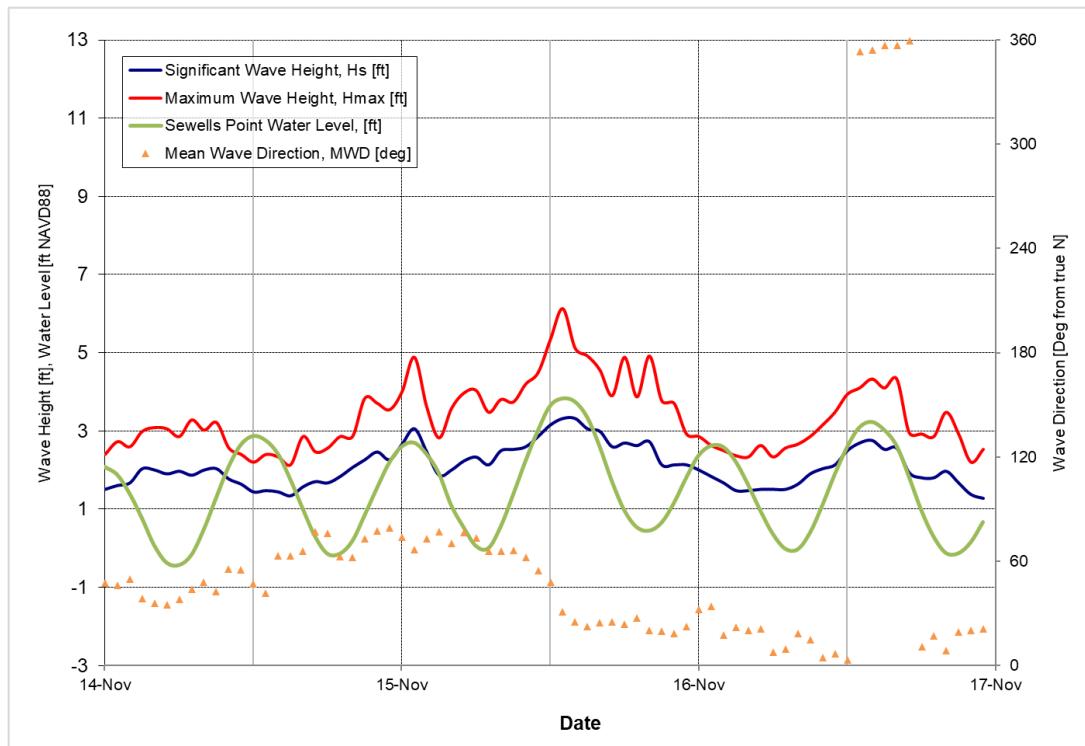


Figure 5-4: November 15, 2024 Storm

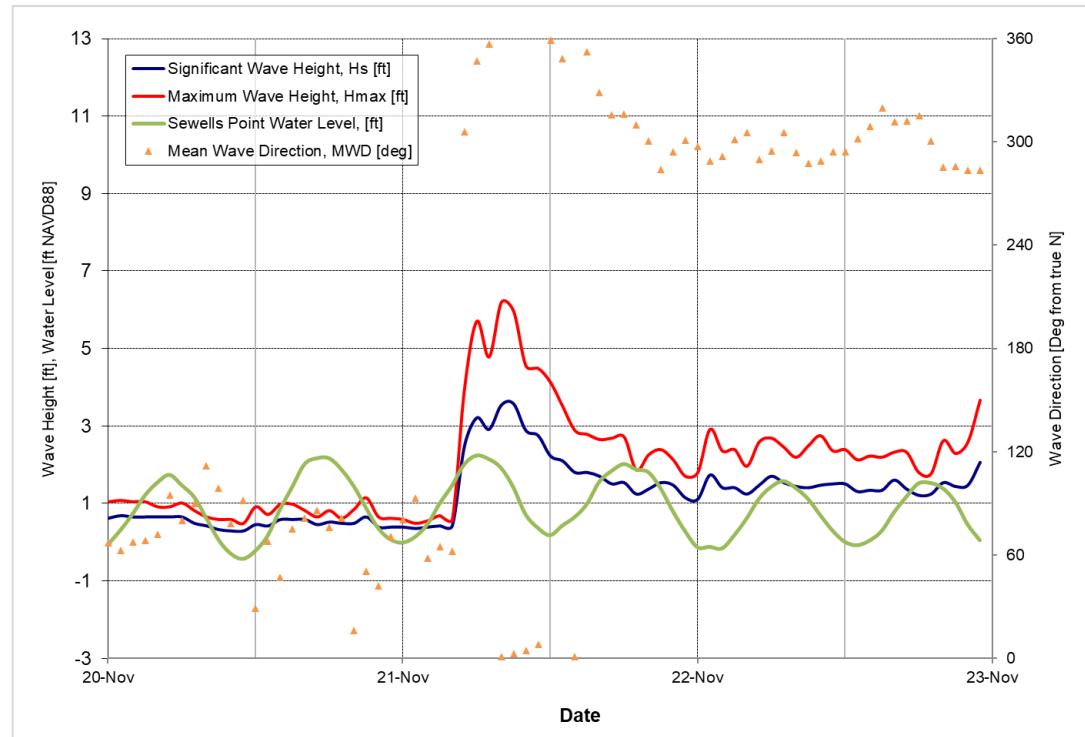


Figure 5-5: November 21, 2024 Storm

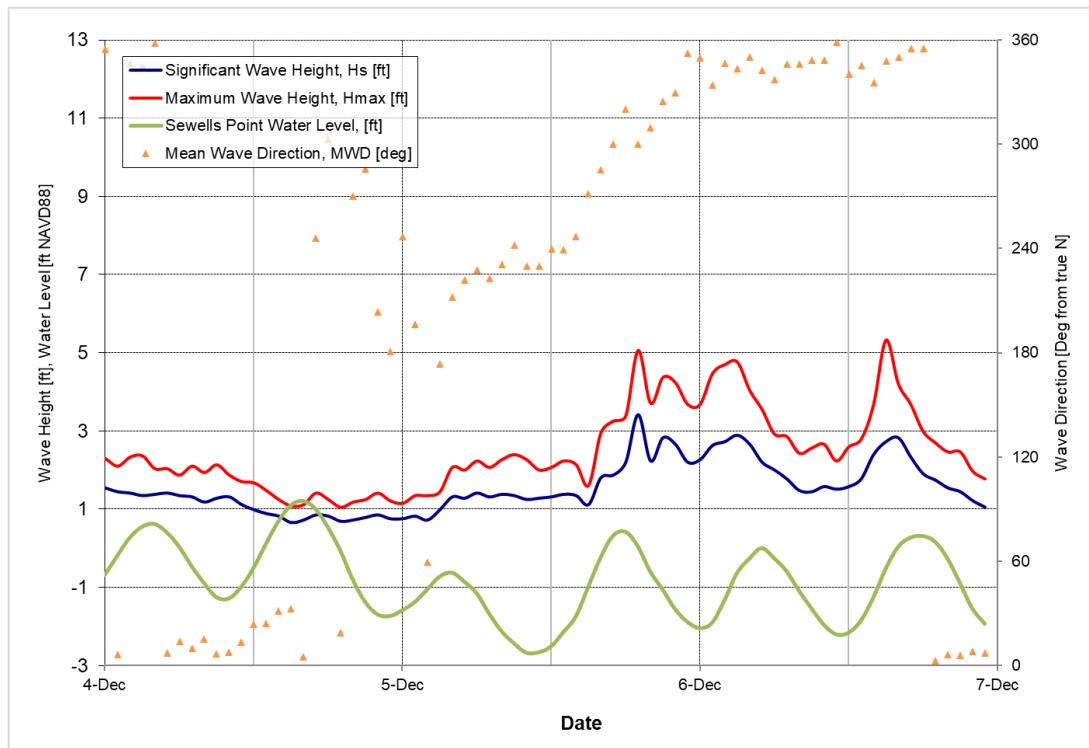


Figure 5-6: December 5, 2024 Storm

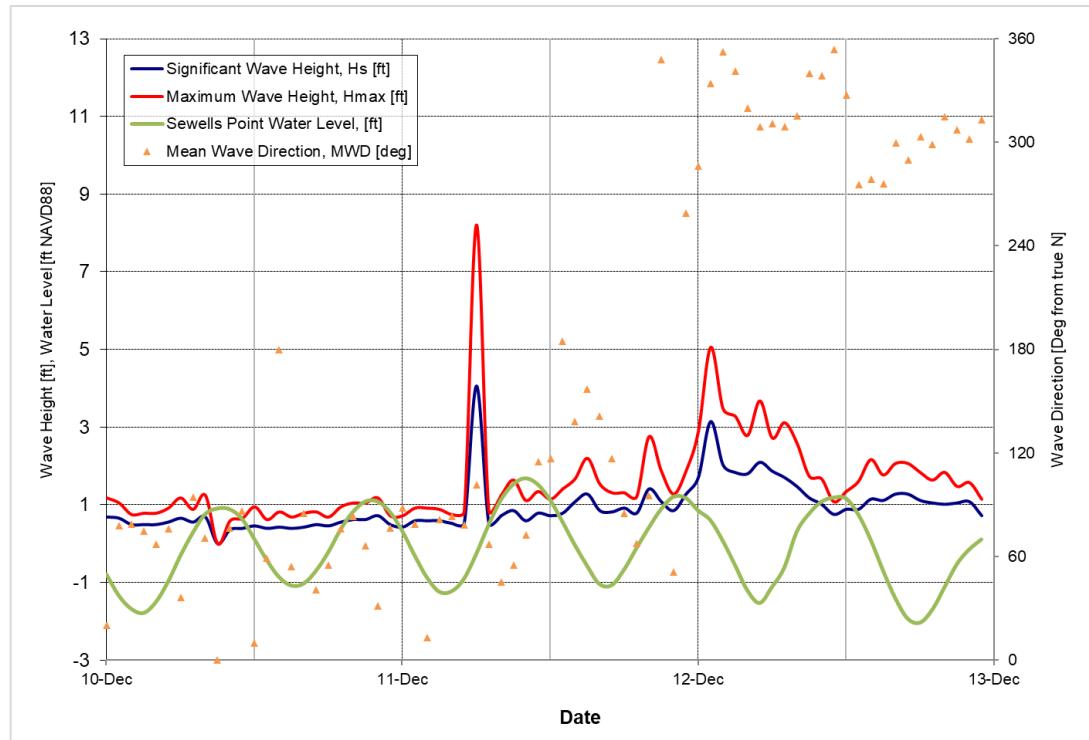


Figure 5-7: December 11, 2024 Storm

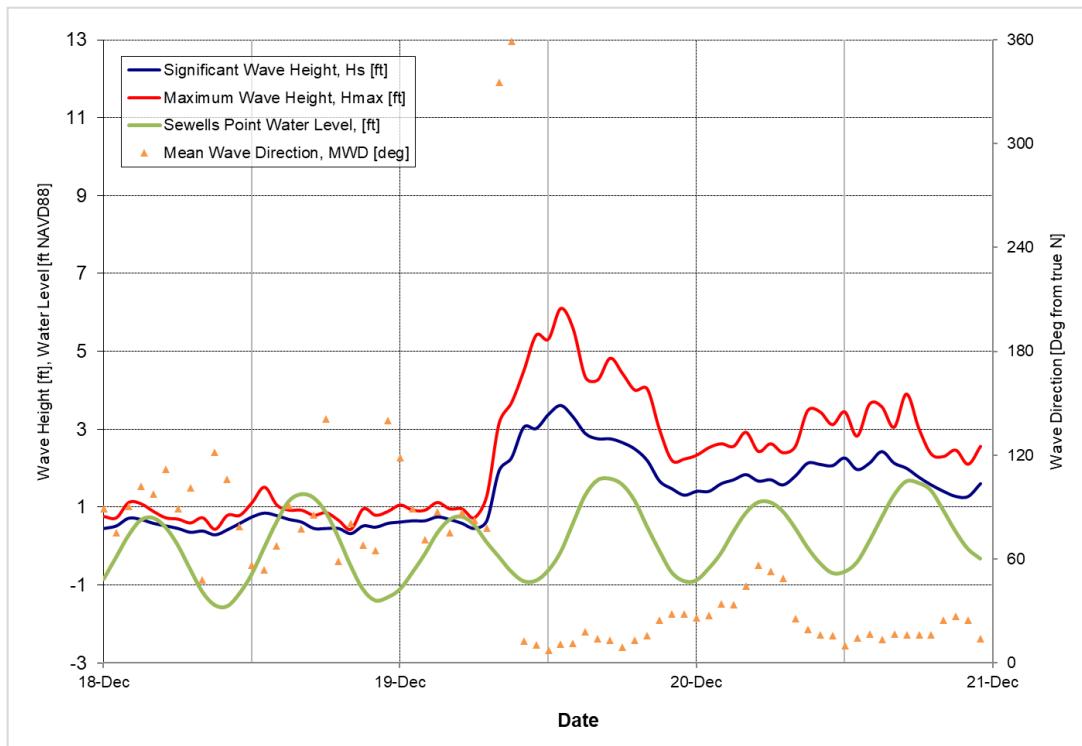


Figure 5-8: December 19, 2024 Storm

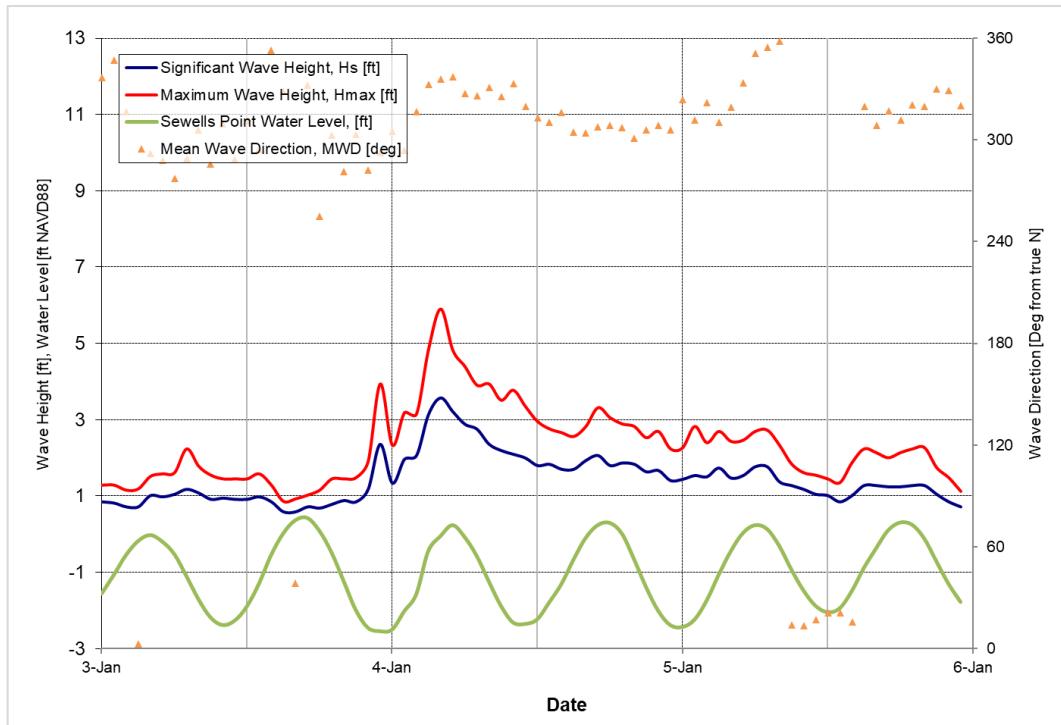


Figure 5-9: January 4, 2025 Storm

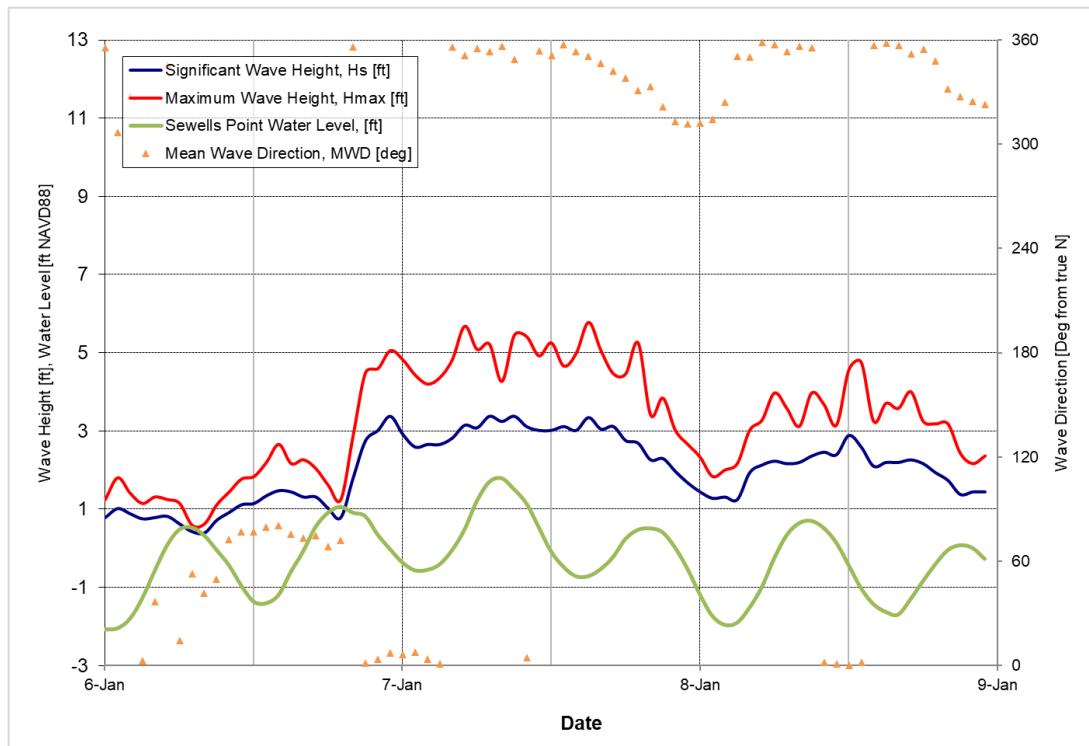


Figure 5-10: January 7, 2025 Storm

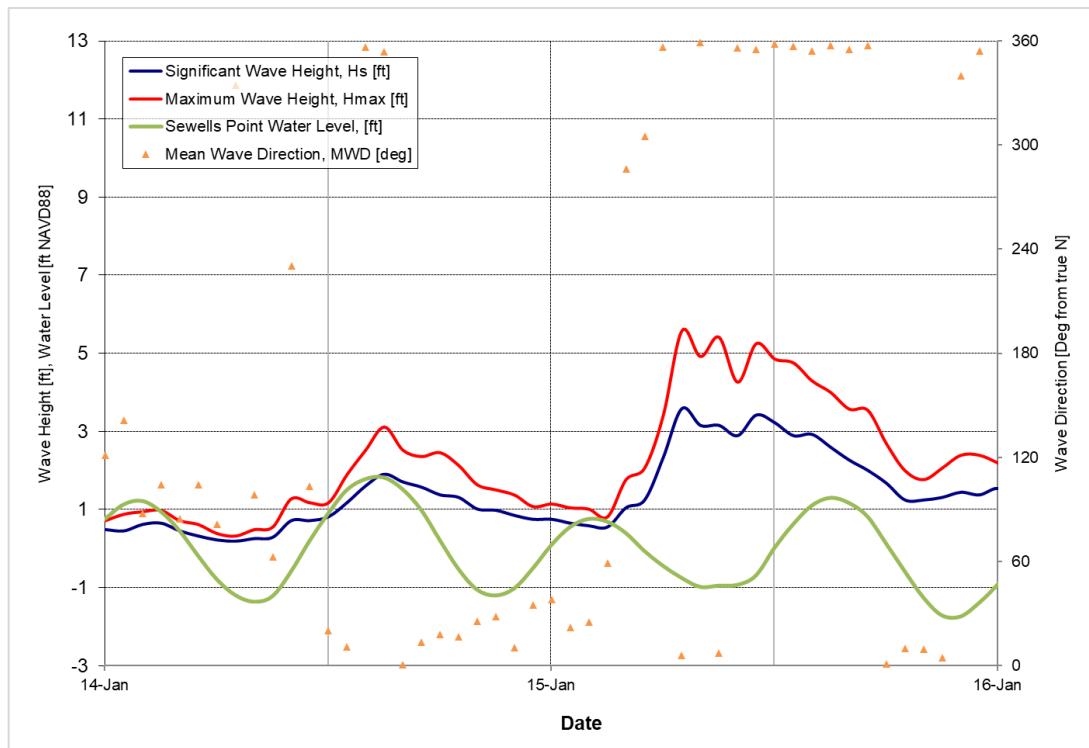


Figure 5-11: January 15, 2025 Storm

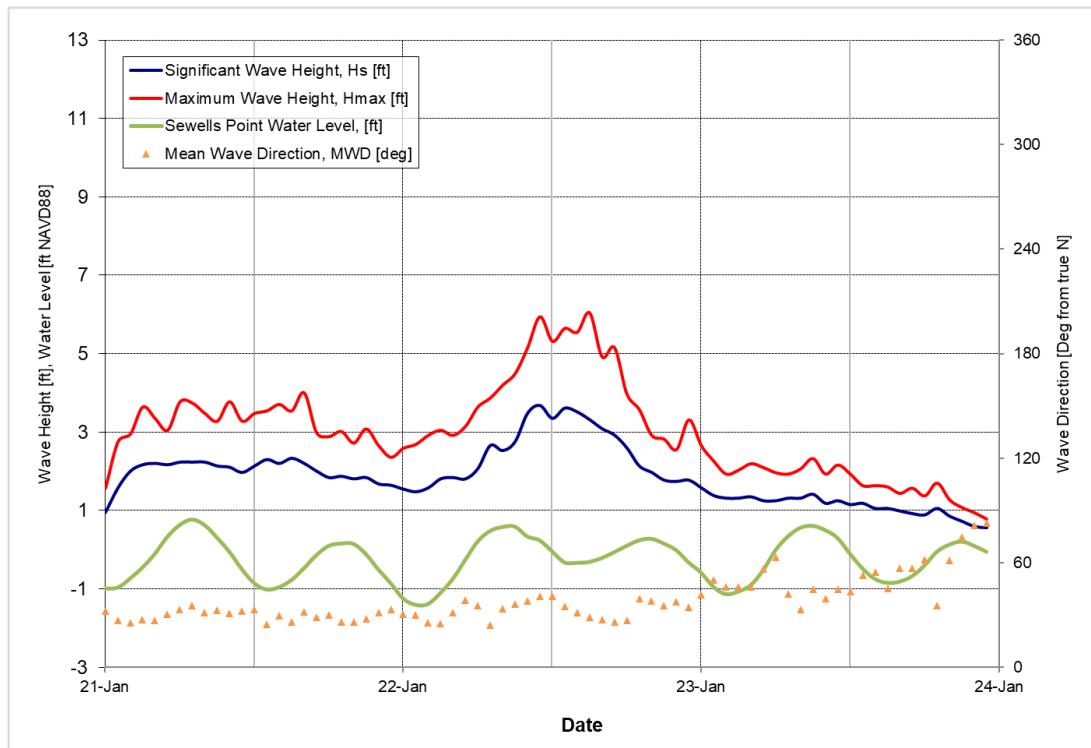


Figure 5-12: January 22, 2025 Storm

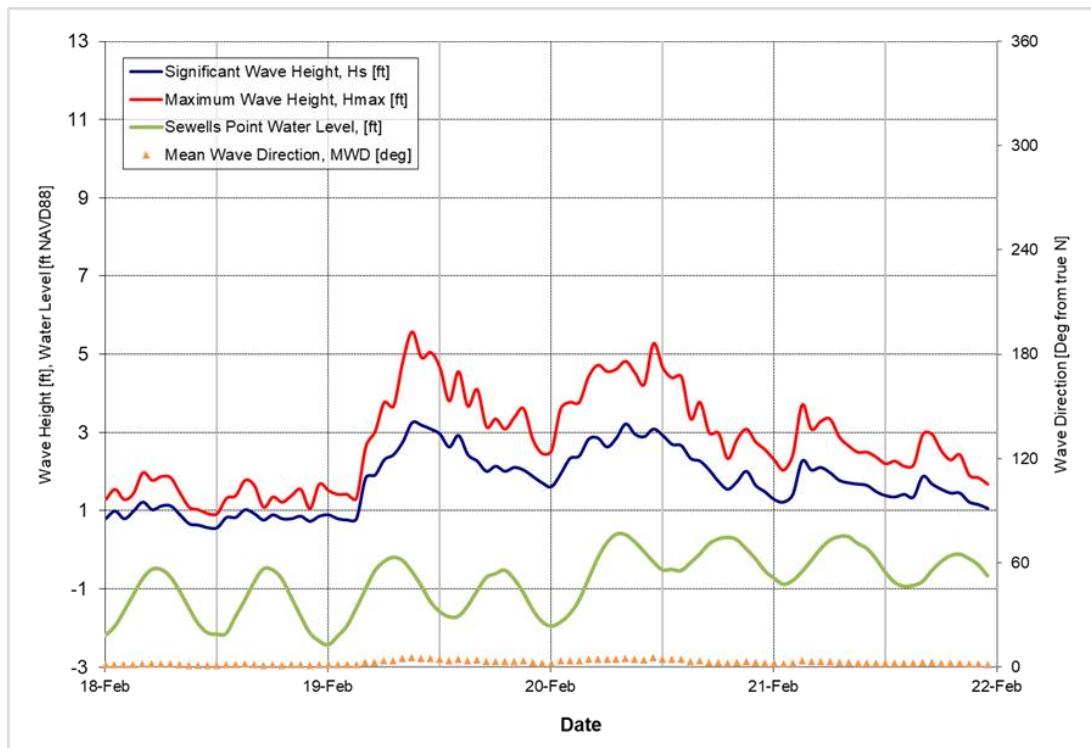


Figure 5-13: February 19, 2025 Storm

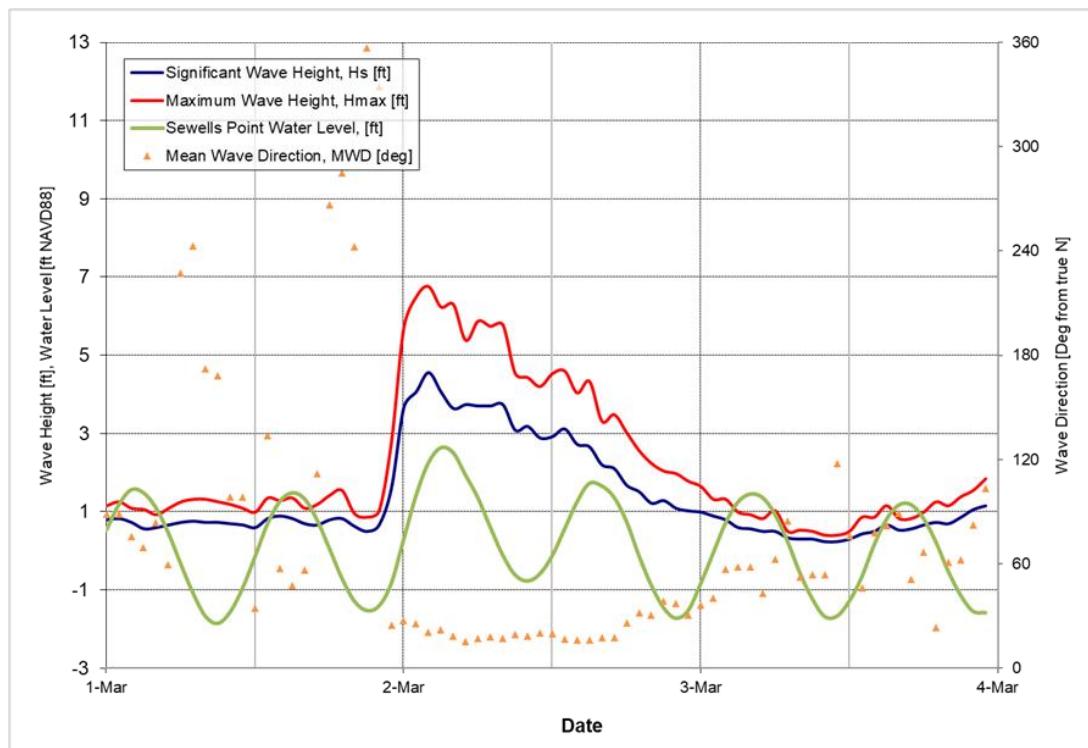


Figure 5-14: March 2, 2025 Storm

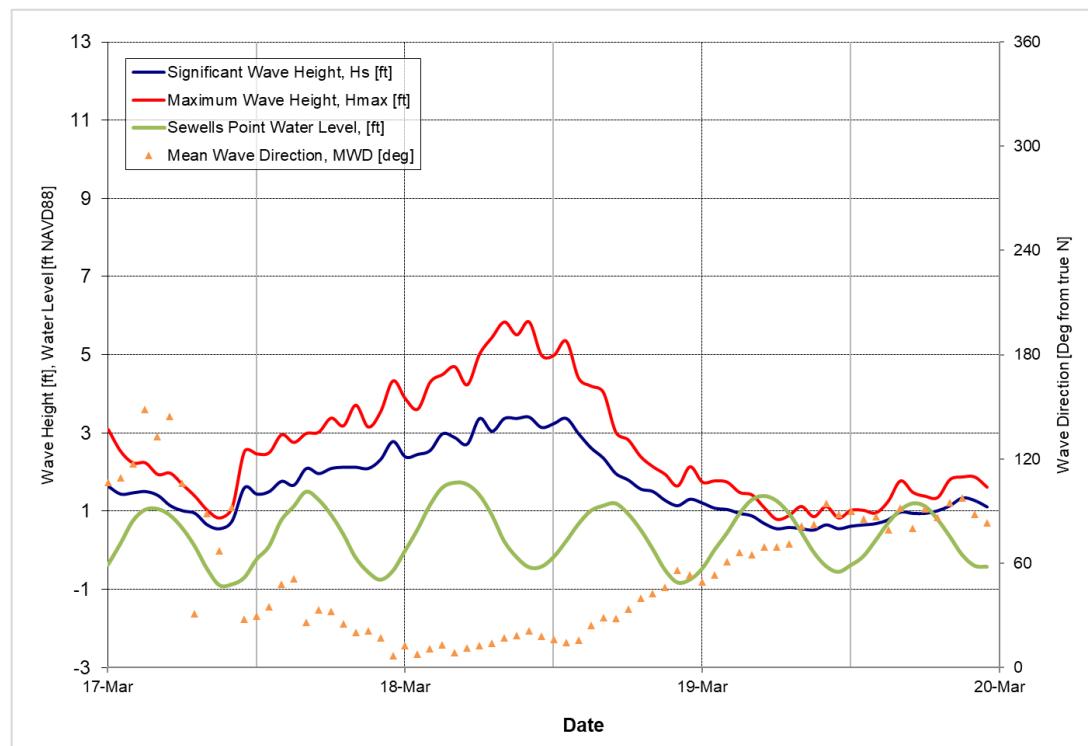


Figure 5-15: March 18, 2025 Storm

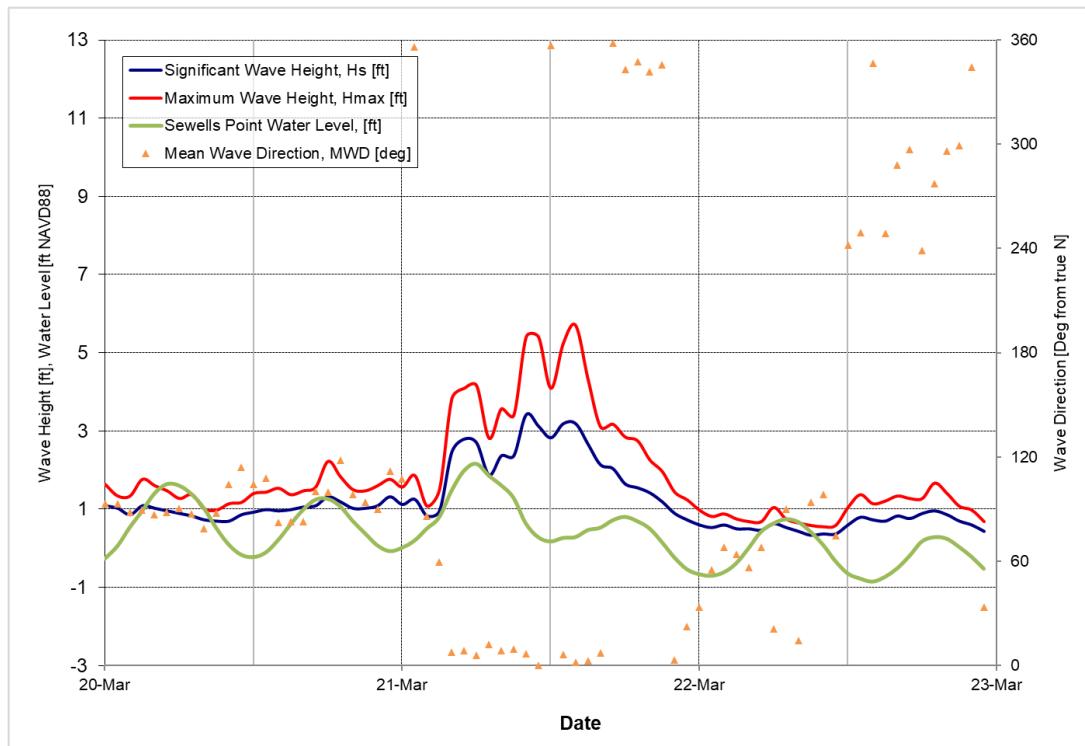


Figure 5-16: March 21, 2025 Storm

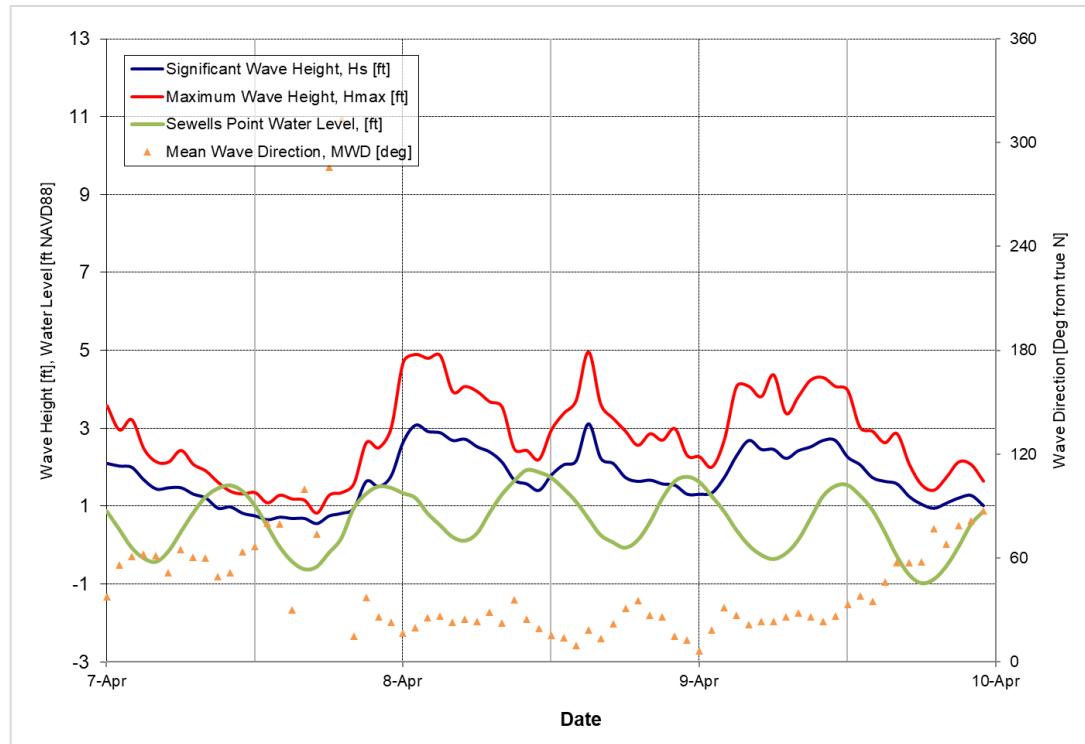


Figure 5-17: April 8, 2025 Storm

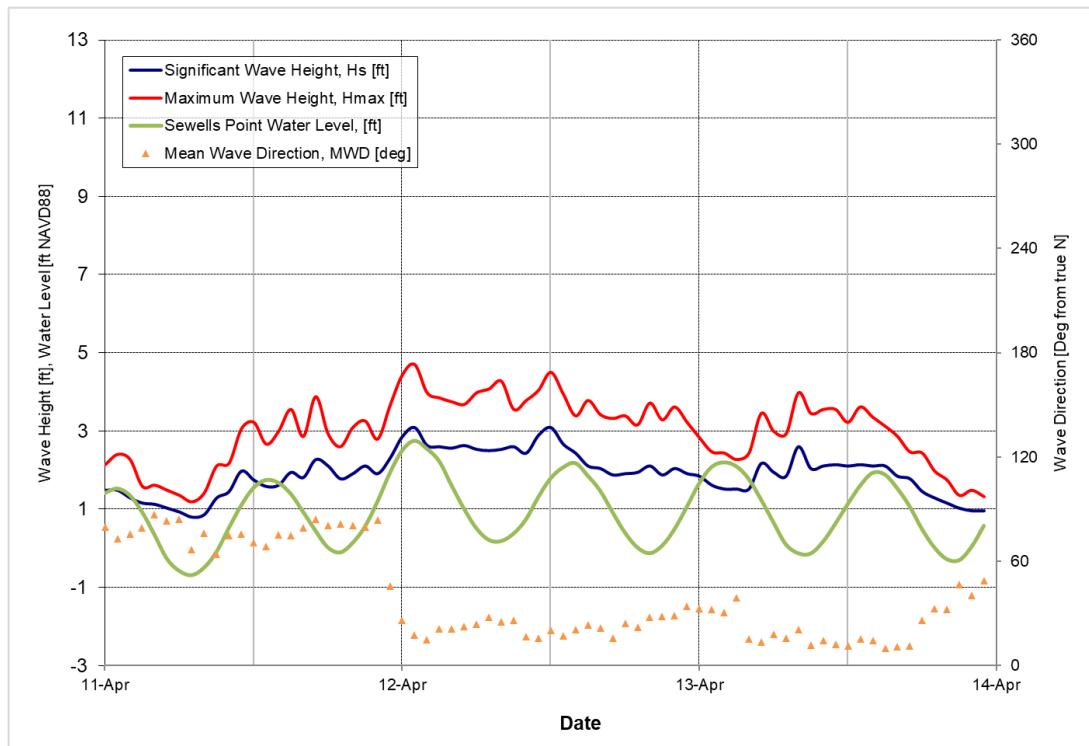


Figure 5-18: April 12, 2025 Storm

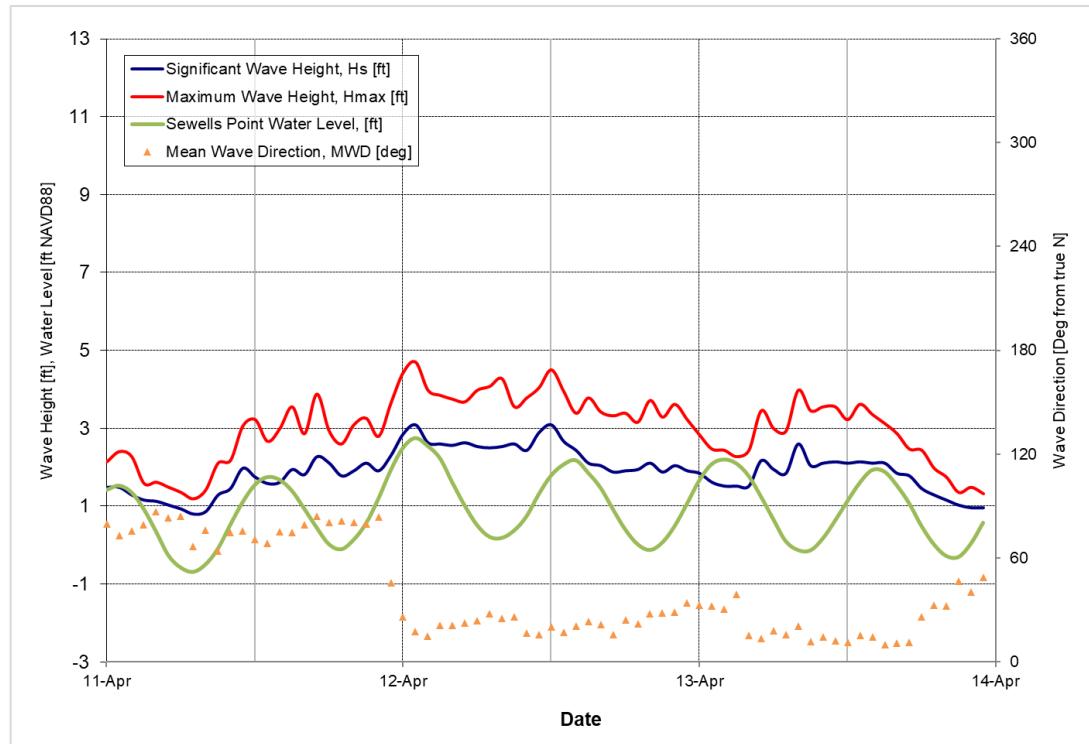


Figure 5-19: April 17, 2025 Storm

## 5.2.2. Engineering Activities

There were no engineering activities between May 2024 and April 2025 along Ocean View Beach.

## 5.3. General Shoreline Trends

Key statistics were calculated to describe the trends of shoreline and volumetric change over the entire project area as well as for each region of the shoreline as defined in Figure 3-1. The computed statistics include average shoreline change, average volume change, and cumulative volume change (e.g. total volume of material lost or gained along a section of shoreline). A summary of the resulting statistics for the May 2024 to April 2025 comparison are presented in Table 5-2. A summary of the resulting statistics for the November 2024 to April 2025 comparison are presented in Table 5-3.

As illustrated in Table 5-2, the Ocean View shoreline has experienced overall shoreline retreat of MHW between May 2024 and April 2025 with a length-weighted average change rate of -4.16 ft/yr. The beach and dune above 0 feet NAVD88 gained sediment at a rate of 98 cy/yr, and above -15 feet NAVD88 lost sediment -84,997 cy/yr, respectively from May 2024 to April 2025.

From November 2024 to April 2025, the MHW shoreline experienced an average shoreline change of -0.75 feet, as shown in Table 5-3. The volumetric change over the same period showed a loss of -9,545 cy above 0 feet NAVD88, and a loss of -36,974 cy above -15 feet NAVD88, respectively.

The overall trends and the behavior of the system are better understood by looking at patterns of change on a reach-by-reach basis, as discussed in more detail in the following section.

**Table 5-2: Regional Shoreline and Volume Change Statistics (May 2024 to Apr. 2025)**

Region	Average Shoreline Change	Average Volume Change Rate Above 0 ft NAVD88	Cumulative Volume Change Rate Above 0 ft NAVD88	Average Volume Change Rate Above -15 ft NAVD88	Cumulative Volume Change Rate Above -15 ft NAVD88
	(ft/yr)	(cy/ft/yr)	(cy/yr)	(cy/ft/yr)	(cy/yr)
Willoughby Spit (0+00 to 45+00)	3.11	-0.19	-848	-11.17	-50,391
800 Block Breakwaters (45+25 to 87+62)	2.22	0.97	4,413	-1.09	-4,969
West Ocean View (93+41 to 163+49)	-16.94	-2.91	-18,799	-5.51	-35,496
Central Ocean View Breakwaters (169+63 to 195+63)	5.56	0.51	1,756	0.37	1,297
Central Ocean View (206+86 to 323+09)	-2.56	1.22	15,203	1.14	14,275
East Ocean View (329+63 to 383+58)	-7.37	-0.28	-1,628	-1.70	-9,712
OVERALL	Weighted Avg (ft/yr)	Weighted Avg (cy/ft/yr)	Total (cy/yr)	Weighted Avg (cy/ft/yr)	Total (cy/yr)
	-4.16	-0.08	98	-2.38	-84,997

**Table 5-3: Regional Shoreline and Volume Change Statistics (Nov. 2024 to Apr. 2025)**

Region	Average Shoreline Change	Average Volume Change Above 0 ft NAVD88	Cumulative Volume Change Above 0 ft NAVD88	Average Volume Change Above -15 ft NAVD88	Cumulative Volume Change Above -15 ft NAVD88
	(ft)	(cy/ft)	(cy)	(cy/ft)	(cy)
Willoughby Spit (0+00 to 45+00)	4.90	0.04	175	-2.06	-9,303
800 Block Breakwaters (45+25 to 87+62)	0.83	-0.19	-850	-1.18	-5,350
West Ocean View (93+41 to 163+49)	-7.59	-2.09	-15,886	-6.62	-50,358
Central Ocean View Breakwaters (169+63 to 195+63)	4.23	-0.47	-1,640	-0.16	-540
Central Ocean View (206+86 to 323+09)	0.91	0.64	8,000	1.37	17,189
East Ocean View (329+63 to 383+58)	-4.04	0.11	657	1.99	11,388
OVERALL	Weighted Avg (ft)	Weighted Avg (cy/ft)	Total (cy)	Weighted Avg (cy/ft)	Total (cy)
	-0.75	-0.25	-9,545	-0.96	-36,974

## 5.4. Regional Shoreline Trends

Regional shoreline trends are discussed below for the defined regions between Willoughby Spit and Little Creek Inlet (see Figure 3-1). A summary of the information in Table 5-2 and Table 5-3 has been created for each region of study.

Figure 5-20 through Figure 5-23, following the discussion of regional shoreline trends, present the shoreline and volume change at each transect within the defined regions.

### 5.4.1. Willoughby Spit

The western end of the Willoughby Spit region has generally been a relatively stable and accreting region since regular monitoring started in 2005.

The eastern end of this region contained an erosional hot spot that was studied in 2010, and that study recommended improvements to manage erosion rates. Prior to December 2012, coastal structures in this region included two offshore breakwaters, a rock terminal groin, and several timber groins. Construction of the Willoughby Spit Shoreline Improvement Project was completed by December 2013, and it included sand nourishment, the removal of the existing timber groin field, relocation of a prior existing breakwater in the 800 Block breakwater field, and addition of seven new detached breakwaters connecting the 800 Block breakwaters with the two prior existing Willoughby Spit breakwaters. Modifications to the 2013 breakwater field were constructed between March and July 2020. In September 2022, a beach nourishment project was completed between stations 35+00 and 45+00. A summary of average shoreline and volume change rates for the Willoughby Spit region between May 2024 and April 2025 and between November 2024 and April 2025 are presented in Table 5-4.

**Table 5-4: Average Shoreline and Volume Change Rates for Willoughby Spit**

Region	Average Shoreline Change	Average Volume Change Above 0 ft NAVD88	Cumulative Volume Change Above 0 ft NAVD88	Average Volume Change Above -15 ft NAVD88	Cumulative Volume Change Above -15 ft NAVD88
<b>May 2024 vs. April 2025 Comparison</b>					
	(ft/yr)	(cy/ft/yr)	(cy/yr)	(cy/ft/yr)	(cy/yr)
Willoughby Spit (0+00 to 45+00)	3.11	-0.19	-848	-11.17	-50,391
<b>November 2024 vs. April 2025 Comparison</b>					
	(ft)	(cy/ft)	(cy)	(cy/ft)	(cy)
Willoughby Spit (0+00 to 45+00)	4.90	0.04	175	-2.06	-9,303

The beach and dune presented minimal, +0.04 cy/ft, volumetric change above 0 feet NAVD88 in the seasonal comparison (November 2024 – April 2025) and -0.19 cy/ft of volumetric loss in the yearly comparison (May 2024 - April 2025). Additionally, this region lost -2.06 cy/ft of volume in the profile above -15 feet NAVD88 over the seasonal comparison (November 2024 – April 2025) and -11.17 cy/ft over the yearly comparison (May 2024 - April 2025). For the yearly comparison, the MHW shoreline advanced at a rate of 3.11 ft/yr and lost volume above 0 feet and -15 feet NAVD88 at a rate of -848 cy/yr and -50,391 cy/yr, respectively.

The seasonal comparison showed seaward advance of the MHW shoreline of 4.90 feet and a cumulative sediment gain of 175 cy above 0 feet and a loss of -9,303 cy above -15 feet NAVD88, respectively. The breakwaters that were part of the 2013 shoreline improvement project that connected to the previously existing 800 Block breakwaters have provided stability to the majority of the Willoughby Spit reach as shown in Figure 5-20 through Figure 5-23. To further stabilize the shoreline from approximately 11<sup>th</sup> View Street to 12<sup>th</sup> View Street along Toler Place, the construction of the Toler Place breakwater modification project near 11<sup>th</sup> View Street began in March 2020 and was completed in July 2020.

#### 5.4.2. 800 Block Breakwaters

The 800 Block Breakwaters region (Sta 45+25 to Sta 87+62) is characterized by a field of eight breakwaters. The easternmost breakwater was relocated in February 2006 along with removal of a pre-existing groin spur and toe extension. This relocated breakwater was placed further offshore to mitigate an excessive salient / tombolo formation, caused by the prior structural configuration that had impaired natural sediment transport to the west. In conjunction with the 2013 Willoughby Spit shoreline improvement project, the second easternmost breakwater in the 800 Block set was also relocated further offshore to enhance natural sediment transport in the region. A summary of average shoreline and volume change rates for the 800 Block Breakwaters region between May 2024 and April 2025 and between November 2024 and April 2025 are presented in Table 5-5.

**Table 5-5: Average Shoreline and Volume Change Rates for 800 Block Breakwaters**

Region	Average Shoreline Change	Average Volume Change Above 0 ft NAVD88	Cumulative Volume Change Above 0 ft NAVD88	Average Volume Change Above -15 ft NAVD88	Cumulative Volume Change Above -15 ft NAVD88
<b>May 2024 vs. April 2025 Comparison</b>					
800 Block Breakwaters (45+25 to 87+62)	(ft/yr)	(cy/ft/yr)	(cy/yr)	(cy/ft/yr)	(cy/yr)
<b>November 2024 vs. April 2025 Comparison</b>					
800 Block Breakwaters (45+25 to 87+62)	(ft)	(cy/ft)	(cy)	(cy/ft)	(cy)

The 800 Block region lost/gained volume over both the seasonal comparison (November 2024 - April 2025) and the yearly comparison (May 2024 - April 2025) above 0 feet NAVD88 and above -15 feet NAVD88. Over the past year, there has been channelward advancement of the MHW shoreline of +2.22 ft/yr as well as an overall volume gain above 0 feet NAVD88 of 4,413 cy/yr and overall volume loss above -15 ft NAVD88 of -4,969 cy/yr, respectively. The seasonal comparison showed there was advancement of the MHW shoreline of +0.83 feet with a loss of sediment volume of -850 cy above 0 feet NAVD88 and a loss of sediment volume above -15 feet NAVD88 of -5,350 cy, respectively.

#### 5.4.3. West Ocean View

The West Ocean View area (Sta 93+41 to Sta 163+49), between the 800 Block and Central Ocean View breakwaters, was characterized prior to 2013 by a series of timber groins. The 2013 West Ocean View Shoreline Improvement Project included the removal of all timber groins located between the Ocean View Fishing Pier and Station 141+98, the reconstruction of a rock groin at station 129+17, and 73,600 cy of sand nourishment placed in front of Sarah Constant Beach Park. A summary of average shoreline and volume change rates for the West Ocean View region between May 2024 and April 2025 and between November 2024 and April 2025 are presented in Table 5-6.

**Table 5-6: Average Shoreline and Volume Change Rates for West Ocean View**

Region	Average Shoreline Change	Average Volume Change Above 0 ft NAVD88	Cumulative Volume Change Above 0 ft NAVD88	Average Volume Change Above -15 ft NAVD88	Cumulative Volume Change Above -15 ft NAVD88
<b>May 2024 vs. April 2025 Comparison</b>					
West Ocean View (93+41 to 163+49)	(ft/yr)	(cy/ft/yr)	(cy/yr)	(cy/ft/yr)	(cy/yr)
<b>November 2024 vs. April 2025 Comparison</b>					
West Ocean View (93+41 to 163+49)	(ft)	(cy/ft)	(cy)	(cy/ft)	(cy)

This region lost beach width and sand volume over the yearly comparison (May 2024 - April 2025) with landward retreat of the MHW shoreline at a rate of -16.84 ft/yr, a volume loss above 0 feet NAVD88 of -18,799 cy/yr and a volume loss above -15 feet NAVD88 of -35,496 cy/yr, respectively. The seasonal comparison (November 2024 - April 2025) showed landward retreat of the MHW shoreline of -7.59 feet, a loss of material above 0 feet NAVD88 of -15,886 cy and a loss of material above -15 feet NAVD88 of -50,358 cy.

#### 5.4.4. Central Ocean View Breakwaters

The Central Ocean View Breakwaters region covers the four offshore breakwaters at Central Ocean View and approximately 800 feet westward (Sta 169+63 to Sta 195+63). A summary of average shoreline and volume change rates for the Central Ocean View Breakwaters region between May 2024 and April 2025 and between November 2024 and April 2025 are presented in Table 5-7.

**Table 5-7: Average Shoreline and Volume Change Rates for Central Ocean View Breakwaters**

Region	Average Shoreline Change	Average Volume Change Above 0 ft NAVD88	Cumulative Volume Change Above 0 ft NAVD88	Average Volume Change Above -15 ft NAVD88	Cumulative Volume Change Above -15 ft NAVD88
<b>May 2024 vs. April 2025 Comparison</b>					
Central Ocean View Breakwaters (169+63 to 195+63)	(ft/yr)	(cy/ft/yr)	(cy/yr)	(cy/ft/yr)	(cy/yr)
<b>November 2024 vs. April 2025 Comparison</b>					
Central Ocean View Breakwaters (169+63 to 195+63)	(ft)	(cy/ft)	(cy)	(cy/ft)	(cy)

This region experienced volume gain above 0 and -15 feet NAVD88 over the yearly comparison (May 2024 – April 2025), and volume loss over the seasonal comparison (November 2024 - April 2025). The yearly comparison showed advancement of the MHW shoreline at an average rate of +5.56 ft/yr and gain of material above 0 feet NAVD88 and -15 feet NAVD88 of +1,756 cy/yr and +1,297 cy/yr, respectively. The seasonal comparison indicated channelward advancement of the MHW shoreline at an average rate of +4.23 ft and a volumetric loss within the beach profile above 0 feet NAVD88 and -15 feet NAVD88 of -1,640 cy and -540 cy, respectively.

#### 5.4.5. Central Ocean View

Central Ocean View (Sta 206+86 to Sta 323+09) is historically a stable region with slight accretion despite the absence of engineering interventions (e.g. beach fill or structures). A summary of average shoreline and volume change rates for the Central Ocean View region between May 2024 and April 2025 and between November 2024 and April 2025 are presented in Table 5-8.

**Table 5-8: Average Shoreline and Volume Change Rates for Central Ocean View**

Region	Average Shoreline Change	Average Volume Change Above 0 ft NAVD88	Cumulative Volume Change Above 0 ft NAVD88	Average Volume Change Above -15 ft NAVD88	Cumulative Volume Change Above -15 ft NAVD88
<b>May 2024 vs. April 2025 Comparison</b>					
Central Ocean View (206+86 to 323+09)	(ft/yr)	(cy/ft/yr)	(cy/yr)	(cy/ft/yr)	(cy/yr)
<b>November 2024 vs. April 2025 Comparison</b>					
Central Ocean View (206+86 to 323+09)	(ft)	(cy/ft)	(cy)	(cy/ft)	(cy)

As shown in Table 5-8, the yearly comparison (May 2024 – April 2025) for the Central Ocean View region showed volume gain above 0 feet NAVD88 of 15,203 cy/yr and volume gain above -15 feet NAVD88 of 14,275 cy/yr. The seasonal comparison (November 2024 - April 2025) indicated volume gain above 0 feet NAVD88 and above -15 feet NAVD88 of 8,000 cy and 17,189 cy, respectively. The average yearly shoreline retreat rate was -2.56 ft/yr while an average shoreline advancement of 0.91 ft occurring over the reach during the current survey period.

#### 5.4.6. East Ocean View

The East Ocean View region (Sta 329+63 to Sta 383+58) is characterized by 15 breakwaters of which the 5 westernmost were built in August 2009. In March 2009, prior to the breakwater construction, a beach renourishment project added approximately 196,000 cy of material to the beach. Table 5-9 summarizes average shoreline and volume change rates for the East Ocean View region between May 2024 and April 2025 and between November 2024 and April 2025.

**Table 5-9: Average Shoreline and Volume Change Rates for East Ocean View**

Region	Average Shoreline Change	Average Volume Change Above 0 ft NAVD88	Cumulative Volume Change Above 0 ft NAVD88	Average Volume Change Above -15 ft NAVD88	Cumulative Volume Change Above -15 ft NAVD88
<b>May 2024 vs. April 2025 Comparison</b>					
East Ocean View (329+63 to 383+58)	(ft/yr)	(cy/ft/yr)	(cy/yr)	(cy/ft/yr)	(cy/yr)
<b>November 2024 vs. April 2025 Comparison</b>					
East Ocean View (329+63 to 383+58)	(ft)	(cy/ft)	(cy)	(cy/ft)	(cy)

This region is normally characterized by a consistent annual erosional pattern due to sediment movement along the shoreline from east to west with no external sand source due to the terminal groin at Little Creek Inlet. Above both the 0 feet NAVD88 and -15 feet NAVD88 contours, the East Ocean View region experienced volumetric loss over the yearly (May 2024 – April 2025) comparison, but experienced volumetric gain over the seasonal (November 2024 - April 2025) comparison. The yearly comparison showed an overall retreat of the MHW shoreline at a rate of -7.37 ft/yr and an overall volume loss above 0 feet NAVD88 and -15 feet NAVD88 at a rate of -1,628 cy/yr and -9,712 cy/yr, respectively. The seasonal comparison showed a MHW shoreline retreat of -4.04 feet, and gain of material above 0 feet NAVD88 of 654 cy and gain of material above -15 feet NAVD88 of 11,388 cy respectively.

In February to March of 2024, the City's contractor placed approximately 12,000 cubic yards of sand between 27<sup>th</sup> Bay Street and the Little Creek Inlet jetty. The sand was obtained from nearshore dredging performed by the HRBT expansion contractors and delivered to the beach through truck haul. The shoreline advancement and volume gain in the East Beach area (Figure 5-20 through Figure 5-23) are due to this sand placement by the City.

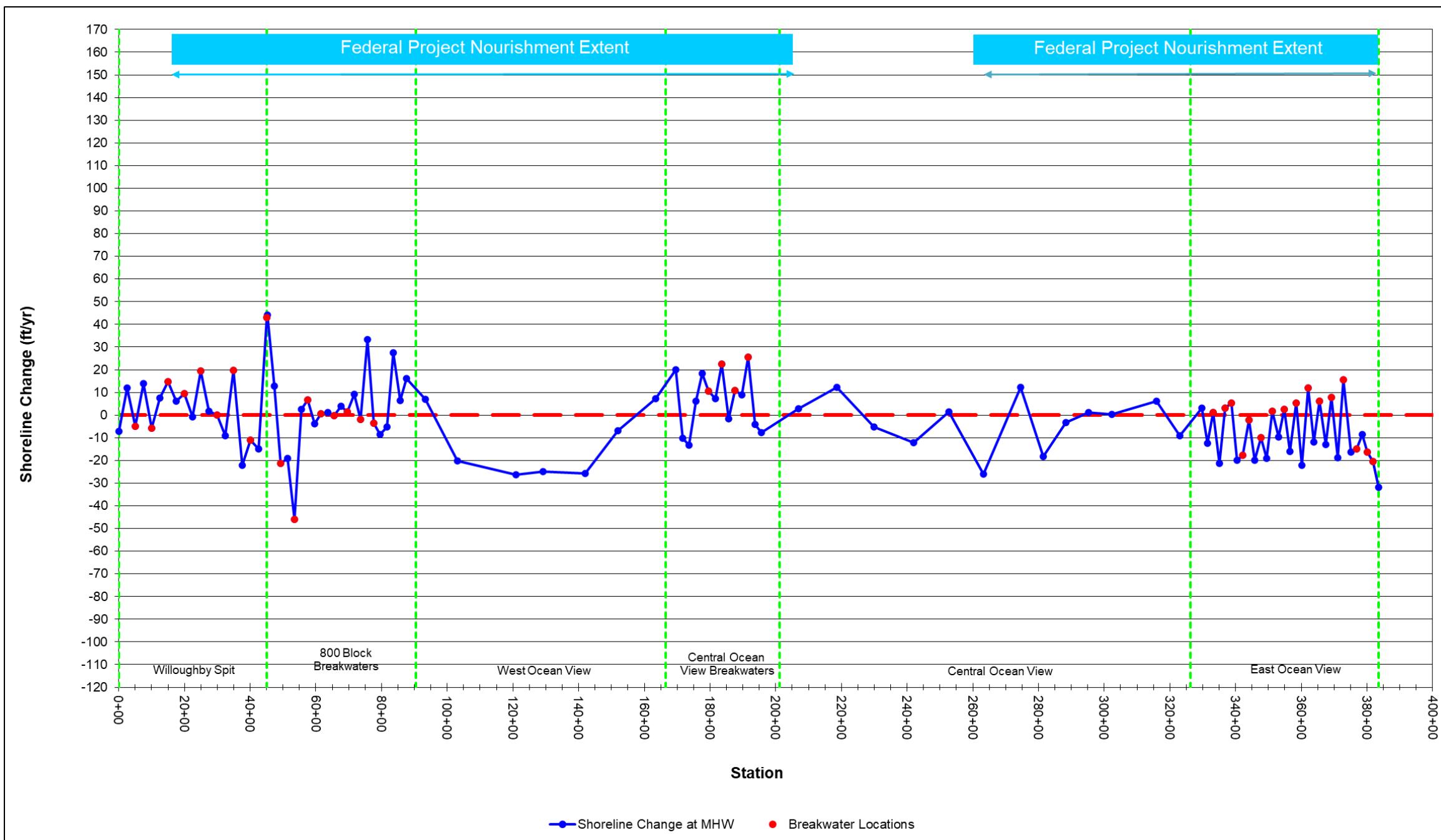


Figure 5-20: Shoreline Change Rate (ft/yr) at Mean High Water (+0.98 ft NAVD88) for May 2024 to April 2025 (Note: Positive = Accretion, Negative = Erosion)

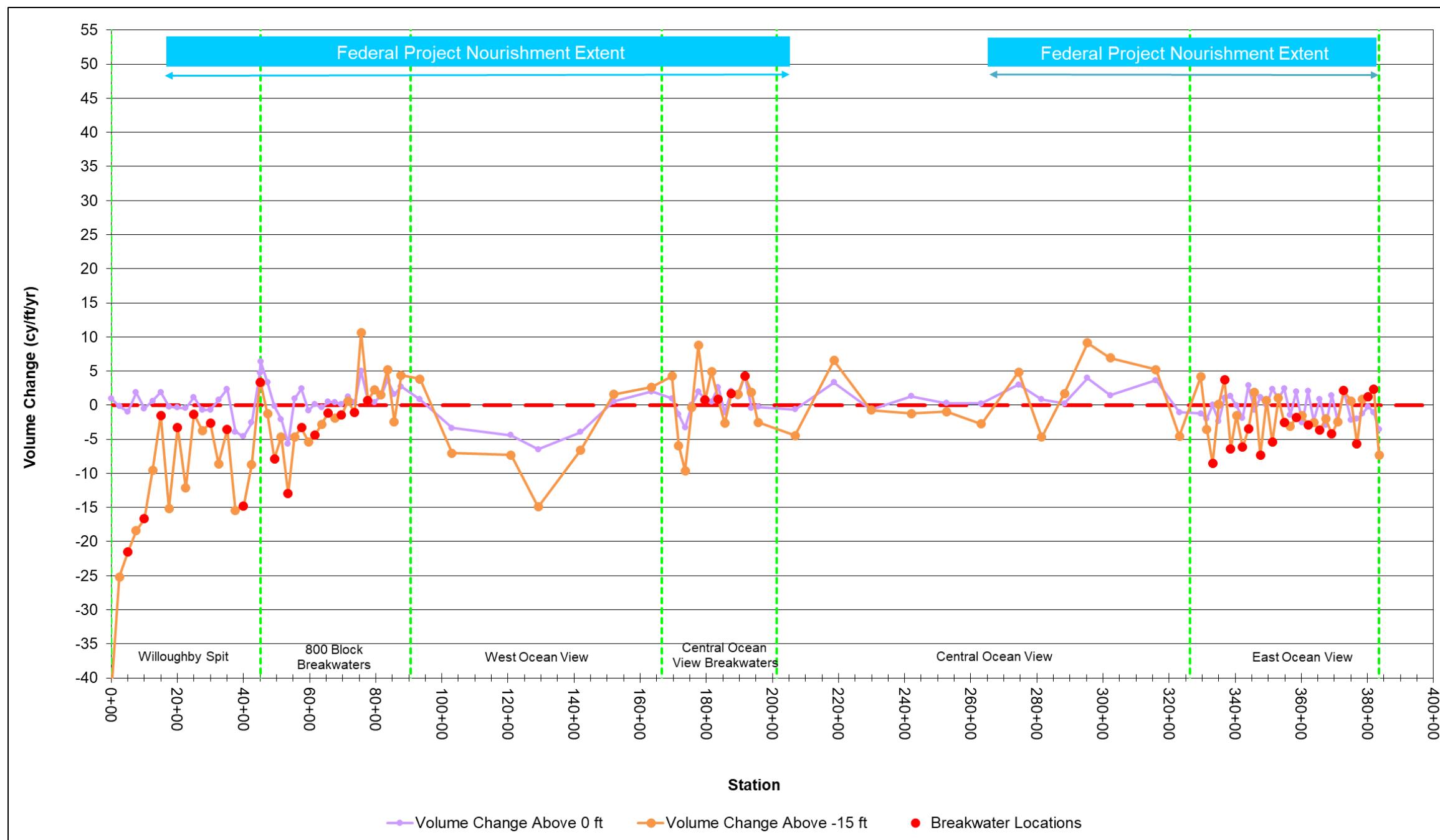


Figure 5-21: Volume Change Rate Above 0 ft NAVD88 and -15 ft NAVD88 (cy/ft/yr) for May 2024 to April 2025 (Note: Positive = Accretion, Negative = Erosion)

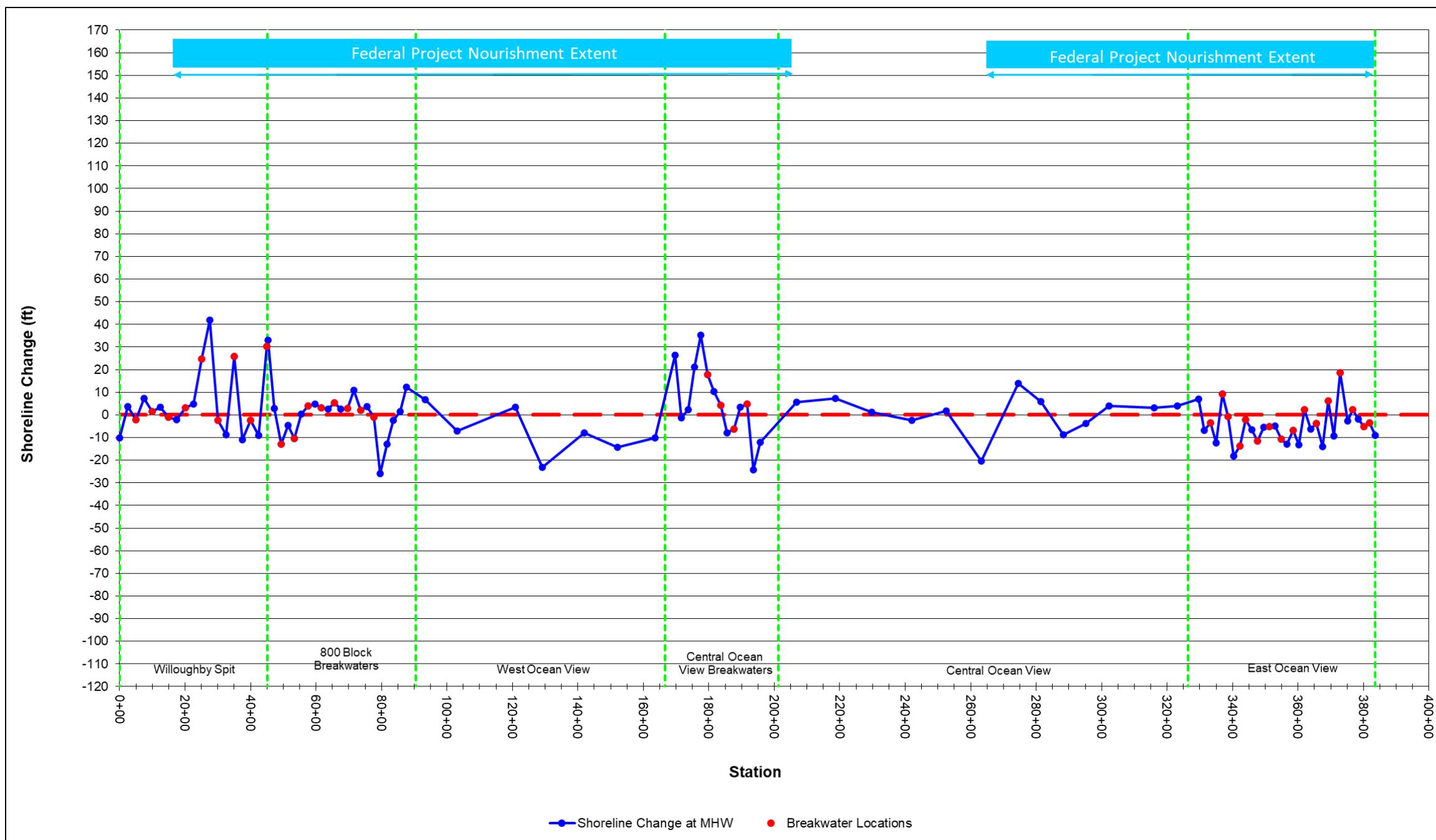


Figure 5-22: Shoreline Change (ft) at Mean High Water (+0.98 ft NAVD88) for November 2024 to April 2025 (Note: Positive = Accretion, Negative = Erosion)

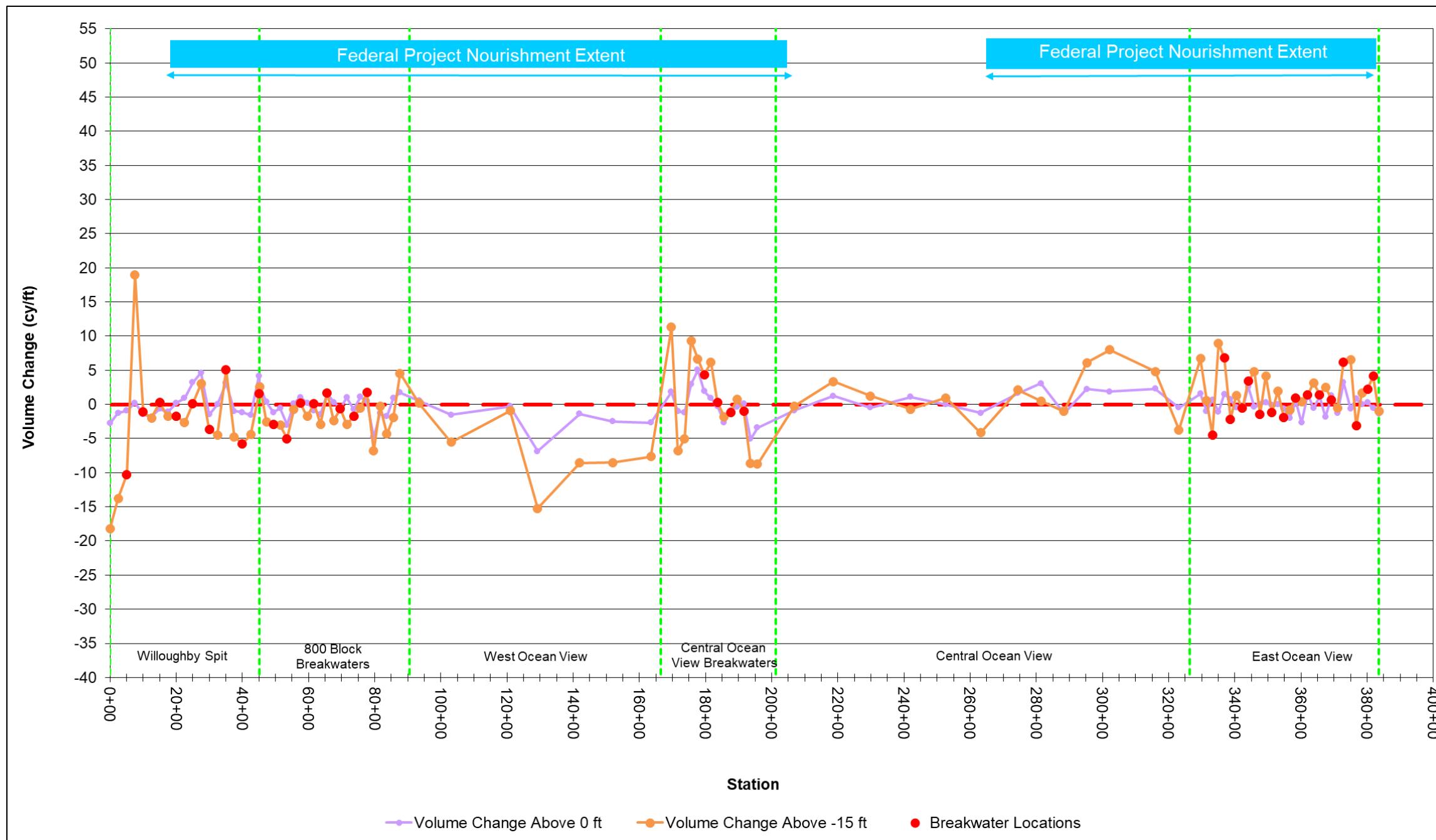


Figure 5-23: Volume Change above 0 ft NAVD88 and -15 ft NAVD88 (cy/ft) for November 2024 to April 2025 (Note: Positive = Accretion, Negative = Erosion)

## 6. Bed Elevations Immediately West of the Willoughby Spit Terminal Groin

Bed elevations immediately west of Willoughby Spit terminal groin were captured in the April 2025 survey of the Ocean View shoreline.

The 2012 design and subsequent construction of the Willoughby Spit Shoreline Improvement projects included elevation of the crest of the terminal groin, along with excavation of sand from the area immediately west of the terminal groin. The excavated sand was used as beach fill borrow material in other reaches of the project to pre-fill the newly constructed Willoughby Spit breakwaters field.

Prior to the 2012 project, a resident had expressed concerns to the City about sand accretion at their pier and boat dock adjacent to the terminal groin. The crest of the terminal groin was raised, and the sand between the groin and the pier was excavated, in order to mitigate some of the potential for sand to migrate over the groin and into the vicinity of the pier.

Two surveys in April 2018 and April 2025 as shown in Figure 6-1 were used to evaluate the depths near the pier. The left and right panels of Figure 6-1 show the April 2018 and April 2025 survey point depths, respectively, between the terminal groin and the pier and the relatively deeper waters near the Hampton Roads Bridge Tunnel. In both surveys, depths near the pier were deeper than -4.0 feet NAVD88, which is approximately 2.5 feet deeper than local Mean Low Water (MLW). Bed elevations were consistently at or deeper than this elevation from the pier to the deeper water at the end of the spit.

In addition, no significant change in bed elevation was seen between the April 2018 and April 2025 survey data. Thus, the surveys indicate that the depths between the terminal groin and the pier were relatively stable between April 2018 and April 2025.

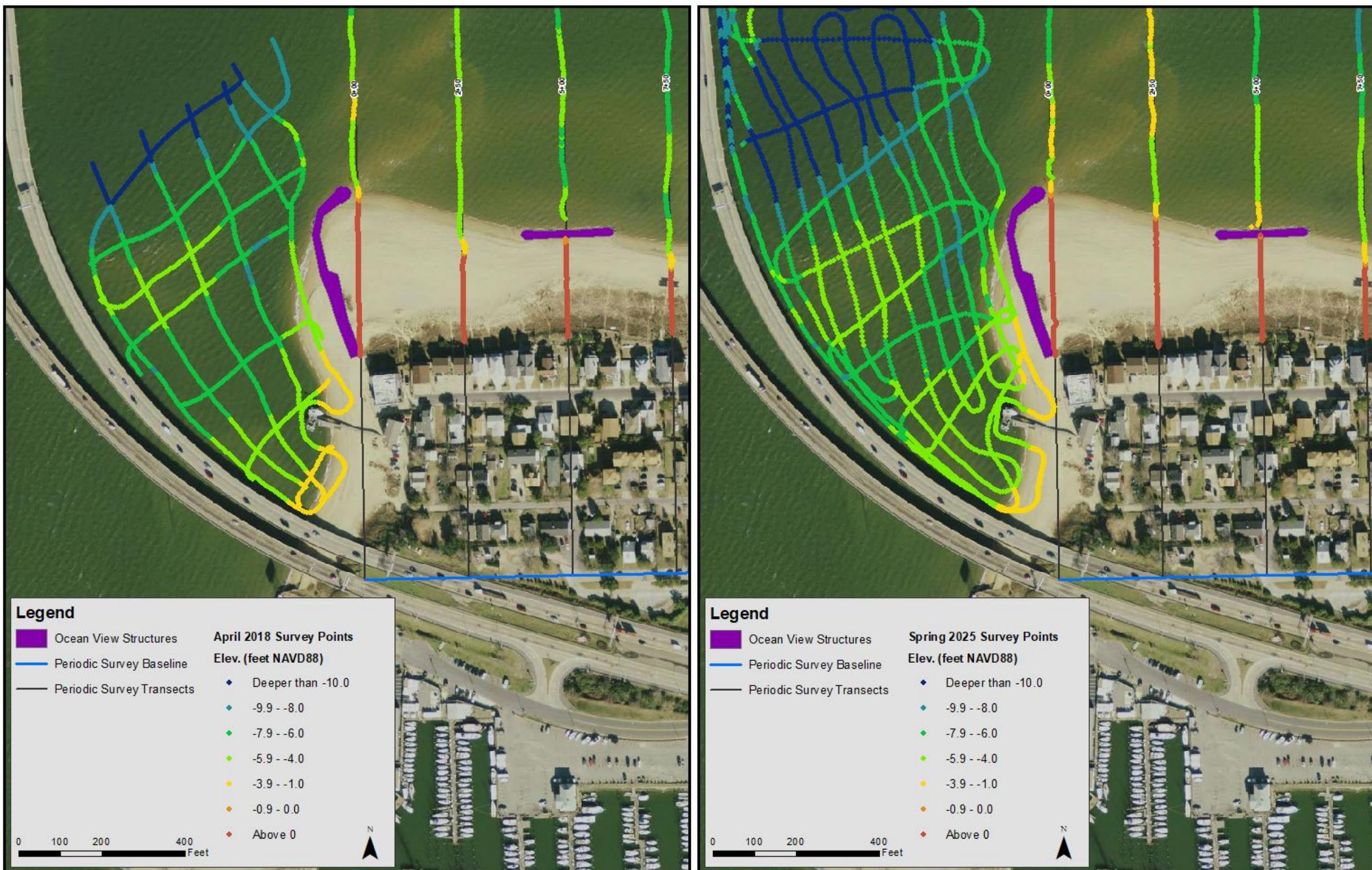


Figure 6-1: Spring 2018 and Spring 2025 Survey Depths West of the Willoughby Spit Terminal Groin

## 7. Federal Coastal Storm Damage Reduction Project

### 7.1. Project History

The U.S. Army Corps of Engineers (USACE) completed a feasibility study in 1983 that recommended an implementable plan for beach nourishment that was authorized in the Water Resources Development Act of 1986 (WRDA 1986). Design and implementation of the Authorized Project did not occur immediately following authorization because of the focus on other shoreline stabilization practices. Because of the damages incurred due to Hurricane Isabel in 2003, there was renewed interest in the Authorized Project.

A Limited Reevaluation Report (LRR) was completed in 2014 and confirmed that the Authorized Project remained economically justified. According to the LRR, the Authorized Project consists of a berm with an average width of 60 feet constructed at an elevation of +3.5 feet NAVD88 with a foreshore slope of 1V:20H extending to the natural bottom along the entire 7.3-mile shoreline where an adequate berm does not presently exist. The LRR indicated that the project would require periodic nourishment of approximately 445,100 cubic yards of material every nine years to maintain the integrity of the protective berm.

The LRR documents a renourishment threshold when the beach berm has eroded to a width of 30 feet, which is half the authorized beach berm width. The published documents presently available relative to the Federal Project do not define a particular baseline, shoreline, or beach berm position in physical space to evaluate the nourishment template.

### 7.2. Initial Construction of the Federal Project

The initial nourishment of the Federal Willoughby and Vicinity Coastal Storm Damage Reduction Project (Federal Project) was constructed in March, April and May 2017. The Federal Project placed approximately 1.2 million cubic yards of sand from the Thimble Shoals Auxiliary Channel along most of the Ocean View shoreline. An exception is that the Federal Project did not place sand between Warwick Avenue (station 206+86) and 1<sup>st</sup> Bay Street (station 274+53). The Spring 2017 survey (collected in late May 2017 after all of the Federal Project beach fill had been placed) captured the project's beach and nearshore condition very soon after construction was completed. The volume gains from October 2016 to May 2017 associated with Federal Project construction, and the initial readjustment of the Federal project post-construction, were discussed in the prior reports for Fall 2017 and Spring 2017 monitoring periods.

Since the initial construction of the Federal Project in May 2017, there has not been a standalone Federal beach renourishment conducted along the Ocean View beaches. However, in August and September 2022 the City partnered with the Virginia Port Authority / USACE Norfolk Harbor Deepening construction contract to place 264,500 cubic yards of sand in two reaches of the project shoreline, as beneficial use of dredged material. This material was placed between the eastern end of Willoughby Spit and the western end of 800 Block Breakwaters (37+50 to 61+62) and at West Ocean View reach (93+41 to 169+63). The Fall 2022 survey (early November 2022) captured the September 2022 project's beach and nearshore condition very soon after construction was completed.

## 7.3. Shoreline and Beach Berm Contour Changes Relative to the May 2017 Post-Construction Condition of the Federal Project

### 7.3.1. Shoreline Change

The most recent April 2025 periodic survey documents the continued evolution of the Federal Project through background erosion / accretion due to coastal processes from May 2017 through April 2025. Figure 7-1 shows the position of the Mean Higher High Water (MHHW) contour line extracted from the profile surveys from the following months:

- October 2016, approximately six months pre-construction
- May 2017, post-construction
- April 2022, 57 months post-construction
- November 2022, 64 months post-construction
- November 2023, 76 months post-construction
- May 2024, 82 months post-construction
- November 2024, 88 months post-construction
- April 2025, 93 months post-construction

The movement of the shoreline is consistent with the shoreline changes tabulated by Ocean View region earlier in this report (Table 1-2). The chart in Figure 7-1 shows shoreline position rather than shoreline change rate as a means of illustrating the beach planform remaining in the project relative to its construction design. The chart illustrates that the MHHW contour changed less in both the six months from November 2024 and April 2025 and over the year from May 2024 to April 2025, compared to the changes observed in the first year post-construction (May 2017 to April 2018). This is consistent with typical expectations of a beach nourishment project's evolution.

The median shoreline change rate from May 2024 to April 2025 among the 106 transects (without any length-weighting) was approximately 0 ft/yr, with 50% of transects having negative change rates with an average rate of -13 ft/yr. Over the more recent six months from November 2024 to April 2025, the median shoreline change rate was -1 ft/yr with 52% of transects having negative change rates with an average rate of -9 ft/yr.

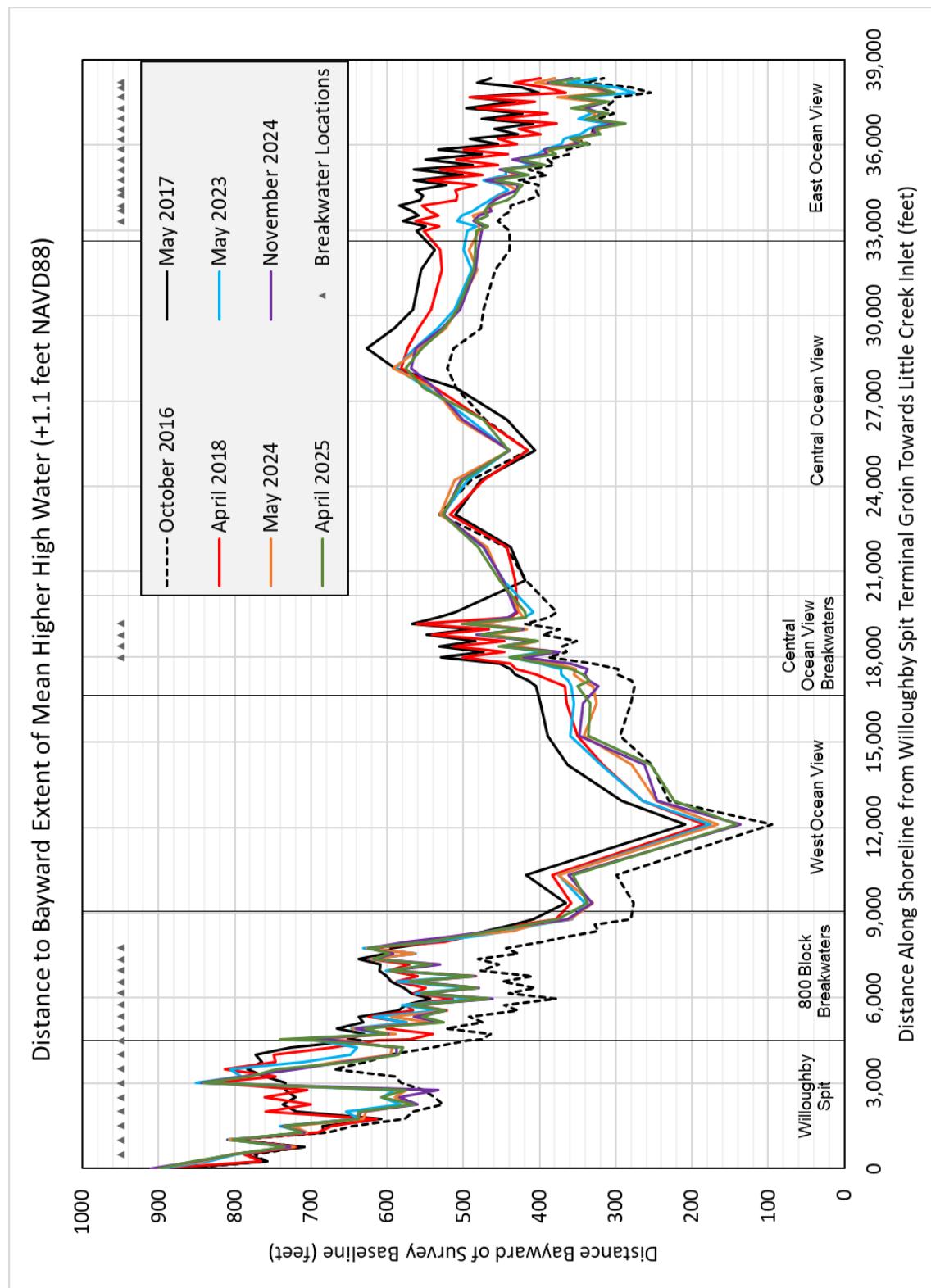
### 7.3.2. Berm Contour Change

The Federal Project's authorized beach template is not defined by the shoreline position, but by the beach width (bayward of the dune toe) at or above a beach berm elevation of +3.5 feet NAVD88. Figure 7-2 shows the position of the most bayward +3.5 ft NAVD88 elevation contour (representing the authorized Federal beach berm elevation) as extracted from the October 2016, May 2017, April 2018, May 2023, May 2024, November 2024 and April 2025 surveys. The median berm contour change since construction of the Federal project (May 2017 through April 2025) is approximately -50 feet, with 77% of the stations having negative change rates with an average rate of -66 ft.

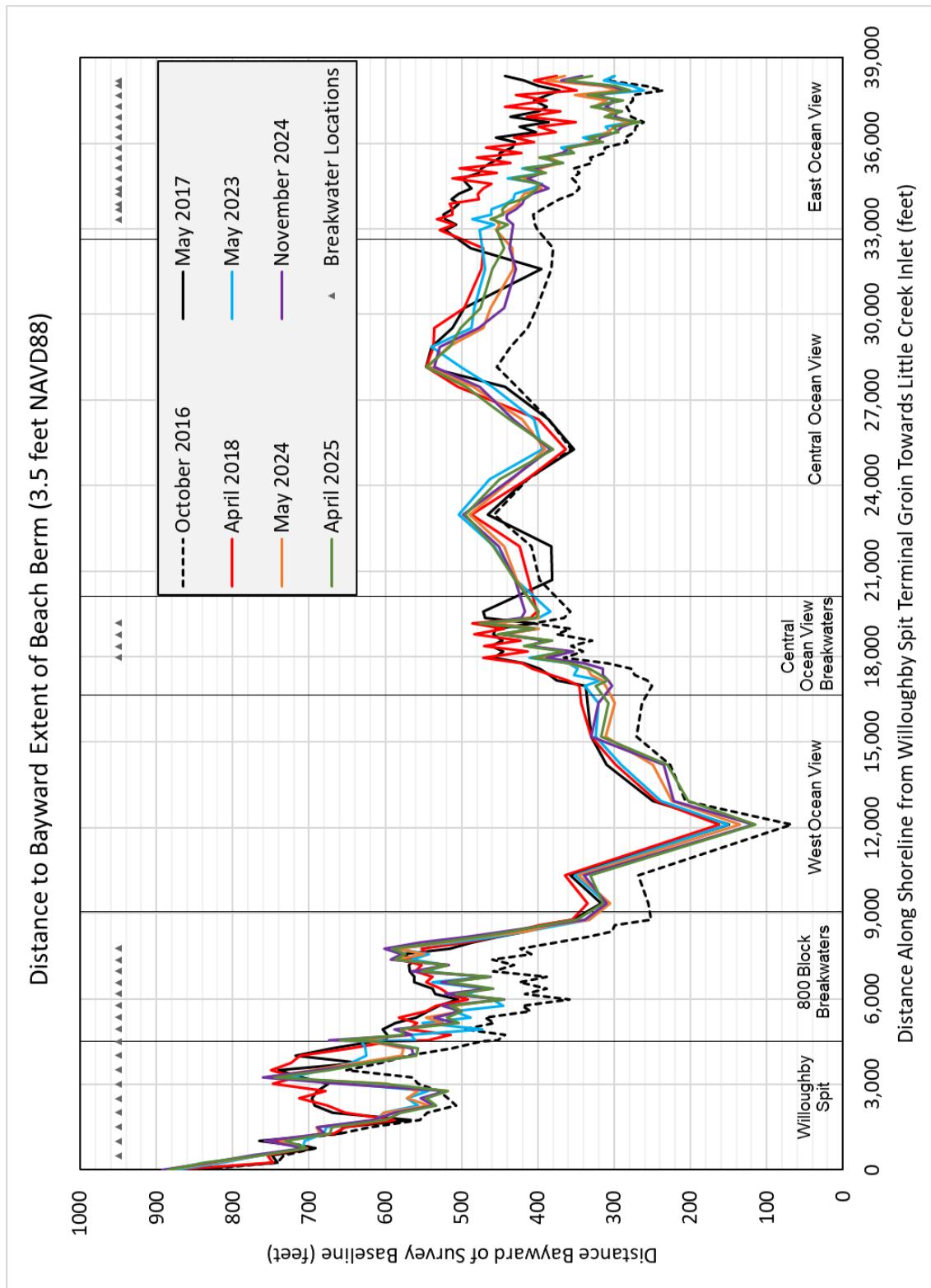
The breakwater at 11<sup>th</sup> View Street was modified and a new breakwater added between this one and the 800 Block breakwaters, with construction taking place between March 2020 and July 2020. The

beginnings of sand accretion in the lee of these breakwaters were observed during a site visit in June 2020. The survey data captured in April 2025 indicates a landward retreat of the MHW shoreline at stations 37+50 through 42+50 from November 2024 to April 2025.

The map plots in Appendix E shows areas of elevation change between the dates indicated in the map legends. Elevation gains (accretion) are shown in green shades, and elevation losses (erosion) are shown in yellow to red shades. The maps were prepared by subtracting elevations in each grid cell within survey Digital Elevation Models (DEMs) between survey dates November 2024 to April 2025.



**Figure 7-1: Position of the Mean Higher High Water (+1.1 ft NAVD88) Contour Relative to Pre- and Post-Construction of the Federal Project**



**Figure 7-2: Position of the Bayward Extent of the +3.5 ft NAVD88 Beach Berm Contour Relative to Pre- and Post-Construction of the Federal Project**

## 7.4. Federal Project Status Relative to a Renourishment Threshold

The USACE Federal Project design studies established a threshold criteria for renourishment of the Federal Project. The published documents presently available relative to the Federal Project do not define a particular shoreline or beach berm position in physical space that represents such a threshold condition. Instead, the threshold is discussed in the Federal Project's authorizing documents which indicate that renourishment would occur when the berm has eroded to a width of 30 feet, which is half of the authorized beach berm width of 60 feet at an elevation of +3.5 feet NAVD88.

For survey stations that are within the limits of the Federal Project's initial construction, the Appendix B survey comparison profiles include a representation of the authorized USACE Design Template (dashed black line), indicating the beach fill outline to achieve a berm width of 60 feet fronting the October 2016 pre-Federal Project monitoring survey data. A USACE Nourishment Threshold is also shown, indicating a berm and slope position 30 feet landward of the authorized 60 ft wide berm. The template outlines provide a way to visually assess the current status of the beach berm with respect to the authorized design and nourishment criteria.

For example, at station 20+00, on page 9 of Appendix B, the survey profiles indicate that the berm edge has retreated to the USACE Design Template and that the berm elevation is approximately equal to the USACE berm template's elevation. Between November 2024 and April 2025, the shoreline at this station has slightly bayward advancement and the berm width decreased. The bayward edge of the berm still remains bayward of the nourishment threshold. Further east at station 40+00, the April 2025 profile shows that the beach has retreated landward of the USACE Design Template, the Nourishment Threshold, and the October 2016 (pre-construction) profile.

It is difficult to find a single statistic that conveys the status of the beach morphology and berm width at each transect station in a graphical or tabular form. Instead, it is recommended that City and USACE staff review the profiles in Appendix B to track the progression of the Federal Project toward an eventual nourishment need. To assist with this review, the map panels in Appendix F and Table 7-1 below summarize characteristics of the April 2025 survey profiles with respect to the USACE Design Template and the Nourishment Threshold. The map panels in Appendix F also show color shading representing transects where the April 2025 berm crest is landward of the USACE Nourishment Threshold and are in need of nourishment, within 0-10 feet and 10-30 feet of the USACE Nourishment Threshold and are approaching the need for nourishment. If nourishment of these profiles does not occur soon, there is an increasing risk of property damage during coastal storm events. There are presently 13 transects that are landward of the USACE Nourishment Threshold, and 5 transects that are within 10 feet of the Nourishment Threshold. This means that 19% of transects that received fill as part of the 2017 Federal Project are either very close to or landward of the Nourishment Threshold and need renourishment as soon as possible. Additionally, 53 of the 93 transects that received fill in 2017 are landward of the USACE Design Template, which represents 57% of the project area.

**Table 7-1: Beach Berm Status Relative to the Federal Project Nourishment Threshold**

Transect Stations	Location Description	Status of the Beach Based on November 2024 Survey Profiles
0+00 to 17+50	Terminal groin to 14 <sup>th</sup> View Street	Outside the limits of initial Federal Project construction.
20+00 to 37+50	14 <sup>th</sup> View Street to east of 12 <sup>th</sup> View Street, midway along Toler Place	Transects 22+50, 27+50, 35+00, 37+50, and 40+00 have retreated landward of the Nourishment Threshold. The May 2025 berm crest location at Transects 27+50 and 40+00 are landward of the October 2016 (Pre-Federal Nourishment) berm crest. Transect 25+00 is within 0-10 feet of the Nourishment Threshold. The beach berm crest at Transects 17+50, 20+00, and 30+00 are within 10-30 feet of the Nourishment Threshold.
40+00 to 55+51	Midway along Toler Place to the 800 Block Breakwaters	The City of Norfolk completed a beach nourishment project along this reach in September 2022. Transects 42+50, 51+41, and 53+46 are within 10-30 feet of the USACE Nourishment Threshold.
57+57 to 87+62	800 Block Breakwaters and eastward adjacent area	Berm edge remained bayward of the USACE Design Template.
93+41 to 120+93	Vicinity of the Ocean View Fishing Pier	The berm crest at Transect 120+93 is within 10-30 feet of the USACE Nourishment Threshold.
129+17 to 152+01	Ocean View Beach Park and adjacent westward area; bulkhead and revetment present at the back of the beach	The City of Norfolk completed a beach nourishment project along this reach in September 2022. Transects 129+17 and 141+98 have retreated landward of the Nourishment Threshold. The May 2025 berm crest location at Transect 152+01 is within 10-30 feet of the Nourishment Threshold.
163+49 to 181+63	From Ocean View Beach Park to west end of the Central Ocean View Breakwaters	Transect 181+63 has retreated landward of the USACE Nourishment Threshold. This transect is located between breakwaters, which will naturally present with a narrower beach compared to transects directly in the lee of the structure. Transects 152+01, 163+49, 171+63, 173+63, 175+63, 177+63, and 179+63 have berm crest locations that are within 10-30 feet of the USACE Nourishment Threshold.
183+63 to 195+63	Central Ocean View Breakwaters and adjacent eastward reach to Atlans Street	The berm crest at Transect 193+63 is less than 10 feet from the USACE Nourishment Threshold. Transects 185+63, 189+63, and 195+63 have berm crests within 10-30 feet of the Nourishment Threshold. Transects located between breakwaters will naturally present with a narrower beach compared to transects directly in the lee of the structure.
206+86 to 263+22	Central Ocean View between Warwick Avenue and Inlet Road	Outside the limits of initial Federal Project construction.

Transect Stations	Location Description	Status of the Beach Based on November 2024 Survey Profiles
274+53 to 331+43	1 <sup>st</sup> Bay Street to west end of the Bay Oaks Breakwaters	The berm crest at Transect 331+43 is within 0-10 feet of the USACE Nourishment Threshold. Transect 329+63 has also retreated, but is within 10-30 feet of the Nourishment Threshold. The remaining transects in this reach remain bayward of the USACE Design Template.
333+23 to 380+18	Bay Oaks Breakwaters and East Ocean View Breakwaters to near Little Creek Inlet	Transects 347+63, 351+23, 354+83, and 376+78 are the only transects that have berm crests located bayward of the USACE Design Template. These transects are located in the lee of a breakwater, which leads to a naturally wider beach compared to adjacent monitoring transects. Transects 636+83, 367+43, 371+03, and 375+08 are located between breakwaters and have berm crests that are landward of the USACE Nourishment Threshold. Transects 331+43, 360+23, 365+63, and 369+23 are located 0-10 feet from the USACE Nourishment Threshold while transects 329+63, 333+23, 336+83, 338+63, 340+43, 342+23, 344+05, 345+85, 349+43, 353+03, 356+63, 358+43, 362+03, 372+83, 378+49, and 380+18 have berm crests that are within 10-30 feet of the USACE Nourishment Threshold.
381+88 to 383+58	Adjacent to Little Creek Inlet west jetty	Transects 381+88 and 383+58 have berm crests that are within 10-30 feet and landward of the USACE Nourishment, respectively. These transects are located adjacent to the western jetty at Little Creek inlet and are highly erosional due to the inlet's disruption of the longshore sediment transport.

## 7.5. Volumetric Comparison of November 2024 to May 2017

The volume of beach fill needed to restore the Fall 2024 condition to the May 2017 post-construction condition was computed in Civil3D. This calculation results in approximately 614,000 cubic yards of material needed to restore the beach to the 2017 immediate post-construction condition, as of the April 2025 beach survey. The LRR noted that the project would require periodic nourishment of approximately 445,100 cubic yards of material every nine years to maintain the integrity of the protective berm.

It should be expected that erosion in the project area will continue at a similar pace until the Federal Project can be renourished. The volumetric comparison between May 2017 and April 2025 identified a current need of 614,000 cubic yards to restore the 2017 Federal Project constructed condition, as noted above. This is equivalent to an average annual need of approximately 77,500 cubic yards per year. Using that average annual need of 77,500 cubic yards per year, if the Federal Project were to be renourished in the summer of 2026 (nine years after initial construction) it is estimated that approximately 697,500 cubic yards of material (in place) would be required. To accomplish this in

place volume, a greater volume of material would need to be identified in the borrow area to provide this volume in place on the beach (to account for dredge losses, inefficiencies in dredging, etc.).

The City of Norfolk proactively addresses areas of high erosion that put properties at risk during coastal storms through the completion of interim “hot spot” nourishment events, such as the September 2022 beach nourishment project. Without these projects conducted by the City, the volumetric need to restore the Federal Project would be greater than indicated by the April 2025 condition.

## 8. Summary

Comprehensive periodic surveying of the entire Ocean View shoreline began with an initial survey in September 2005. The most recent survey was completed in April 2025. The beach and bathymetric surveys performed by Geodynamics utilized baseline and transect positions established in September 2005 which are used for all periodic surveys. For this periodic evaluation, the April 2025 survey was compared with both the prior year and prior six months' surveys (April 2025 compared to May 2024 and November 2024, respectively). The surveys were used to compute shoreline change at MHW and volume change above 0 feet NAVD88 and above -15 feet NAVD88.

Key statistics were computed for defined regions along Ocean View and the entire shoreline for the time period between the May 2024 and April 2025 surveys and between the November 2024 and April 2025 surveys.

Comparison	Parameter	Quantity
May 2024 vs. April 2025	Average Shoreline Change Rate at MHW (+0.98 ft NAVD88)	-4.16 ft/yr
	Cumulative Volume Change Rate Above 0 ft NAVD88	98 cy/yr
	Cumulative Volume Change Rate Above -15 ft NAVD88	-84,997 cy/yr
November 2024 vs. April 2025	Average Shoreline Change at MHW (+0.98 ft NAVD88)	-0.75 ft
	Cumulative Volume Change Above 0 ft NAVD88	-9,545 cy
	Cumulative Volume Change Above -15 ft NAVD88	-36,974 cy

The average shoreline change rate for the entire shoreline at MHW between the May 2024 and April 2025 surveys was -4.16 ft/yr shoreline landward retreat, and the cumulative volume changes above 0 feet NAVD88 and -15 feet NAVD88 were approximately 98 cy/yr and -84,997 cy/yr, respectively.

The average shoreline change for the entire shoreline at MHW between the November 2024 and April 2025 surveys was -0.75 ft, and the cumulative volume changes above 0 feet NAVD88 and -15 feet NAVD88 were approximately -9,545 cy and -36,974 cy, respectively.

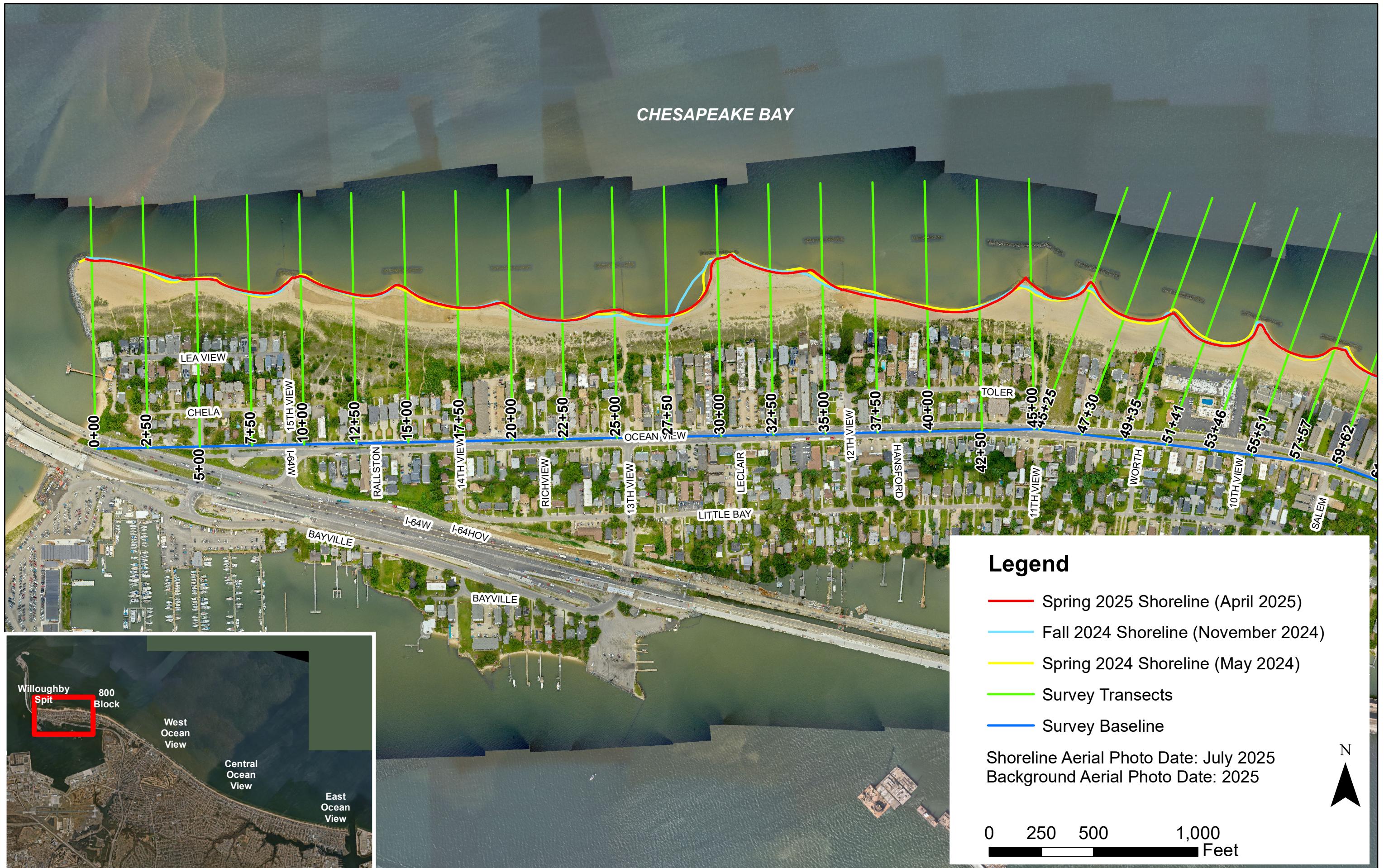
Areas of greater shoreline retreat (compared to average rates along Ocean View as a whole) include: the eastern end of Willoughby Spit (near midway of Toler Place), adjacent to the eastern end of the West Ocean View Breakwaters, and west of the Bay Oaks Breakwaters in East Ocean View.

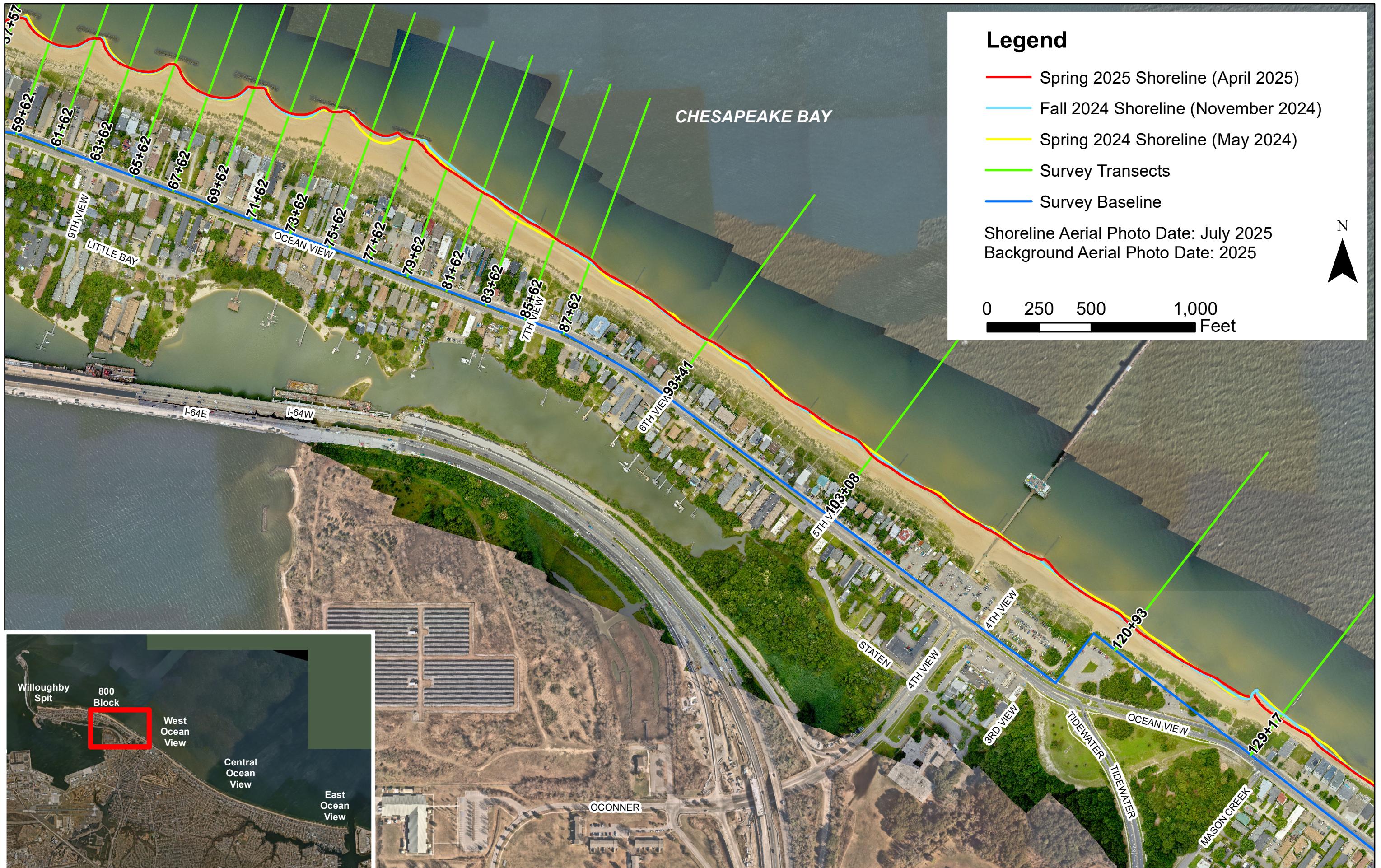
Shoreline change rates varied widely on a transect by transect basis. Since the construction of the Federal project, the median shoreline change among the 106 transects (without any length-weighting) has been approximately -50 feet. Over the past six months 52% of transects had a negative change rate.

This is the fortieth periodic survey report completed to date, and the fortieth evaluation of a consistent survey period utilizing beach and bathymetric surveys. As noted, there are inevitable margins of error associated with the survey data that may reduce the accuracy of volumetric change analyses. Therefore, it is essential to thoroughly review the beach and bathymetric profiles using various analytical techniques and general engineering judgment to ensure that results are not falsely interpreted. Comparison of surveys taken at the same season of the year (i.e. May 2024 to April 2025) mitigates seasonal variation of profiles in volumetric change analyses. Consecutive spring-fall or fall-fall survey comparisons are useful to assess the direct impact of extreme events which may occur during the approximate six-month period between surveys.

Future periodic survey evaluations will continue to track changes in and the condition of the Federal Project and interim City-conducted beach nourishment projects.

## **Appendix A: Aerial Photography and Digitized Shorelines**





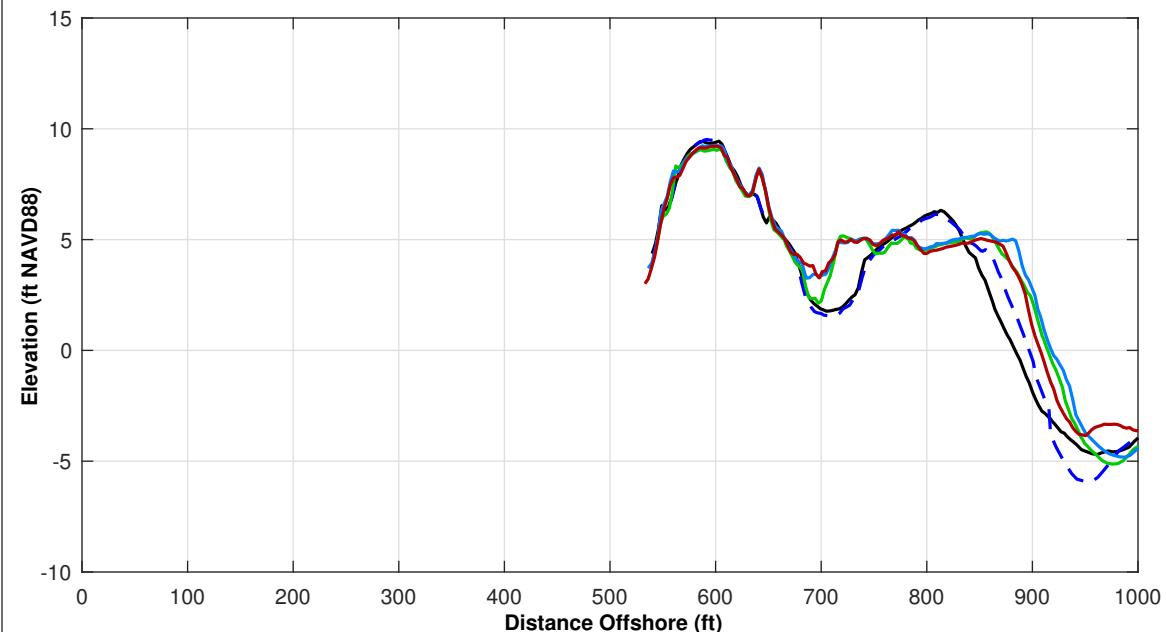
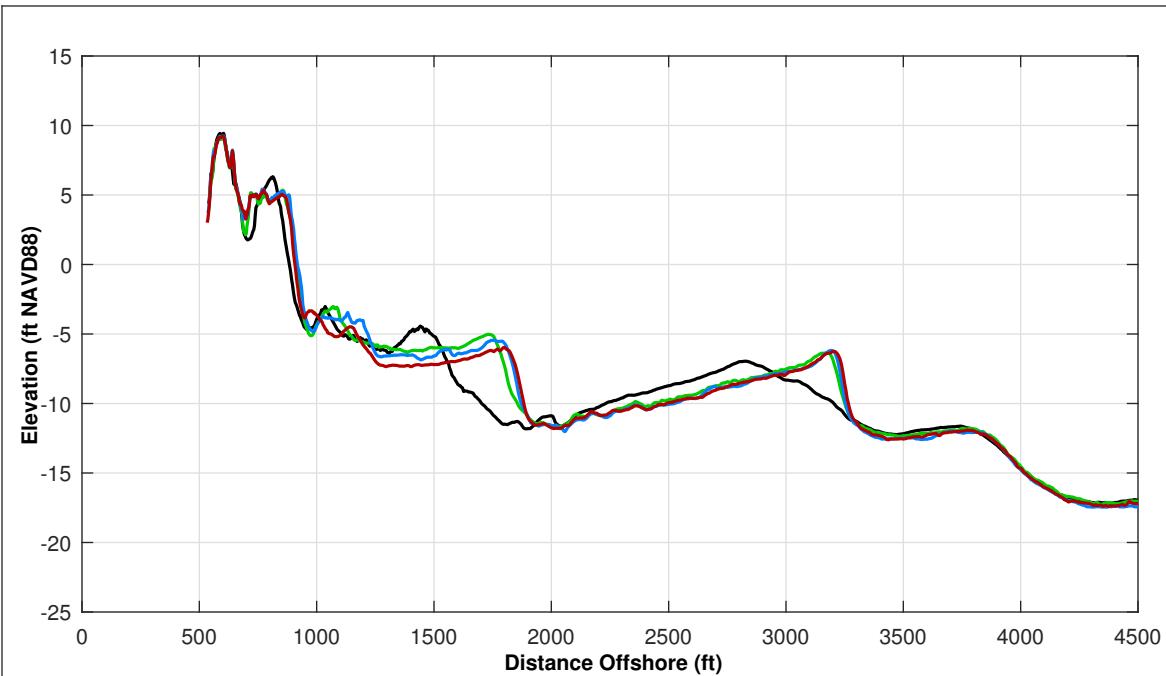








## Appendix B: Survey Comparison Plots



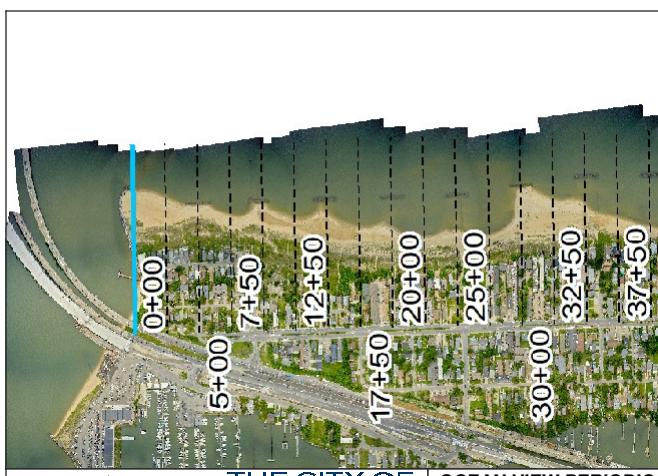
Survey Transect 0+00	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	-6.88 ft	-10.28 ft
Volume Change Above -15 ft NAVD88	-41.55 cy/ft	-18.24 cy/ft
Volume Change Above 0 ft NAVD88	0.97 cy/ft	-2.75 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:		N/A

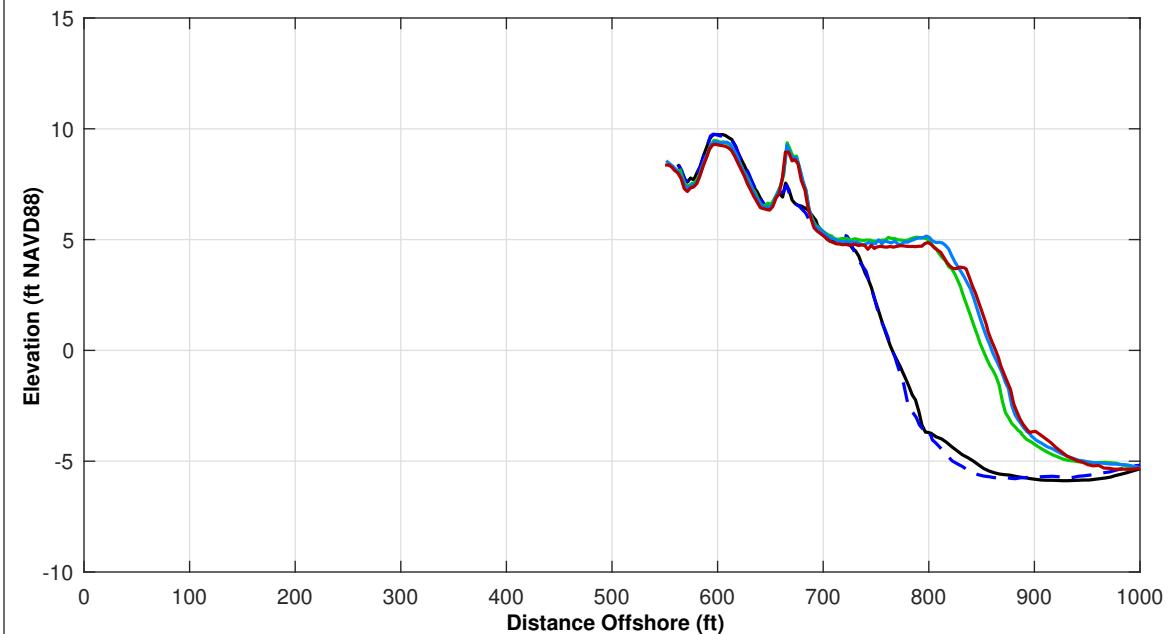
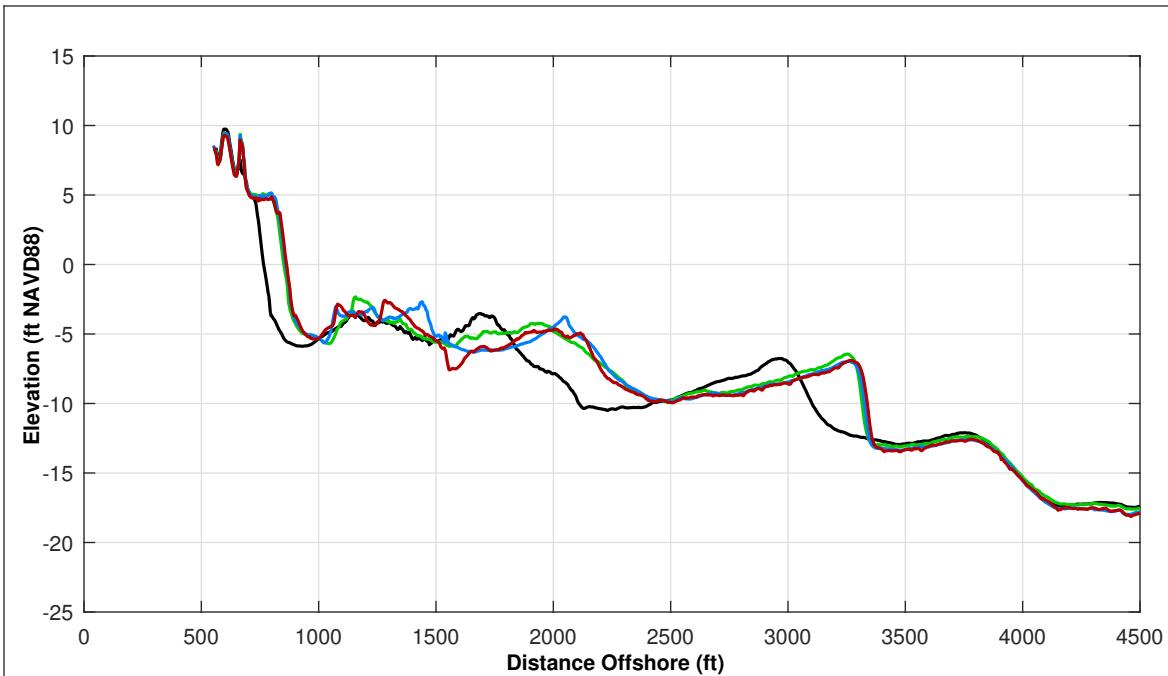
**LEGEND:**

APR 2025 — APR 2017  
NOV 2024 — OCT 2016  
MAY 2024 — —

**Notes:**

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.





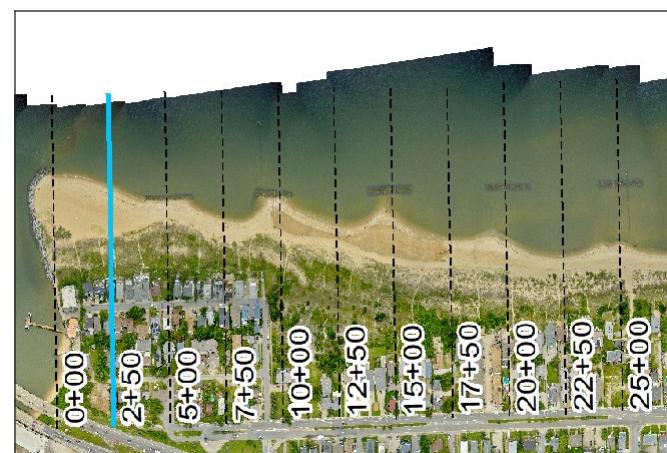
Survey Transect 2+50	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	11.68 ft	3.57 ft
Volume Change Above -15 ft NAVD88	-24.62 cy/ft	-13.78 cy/ft
Volume Change Above 0 ft NAVD88	-0.19 cy/ft	-1.25 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:		N/A

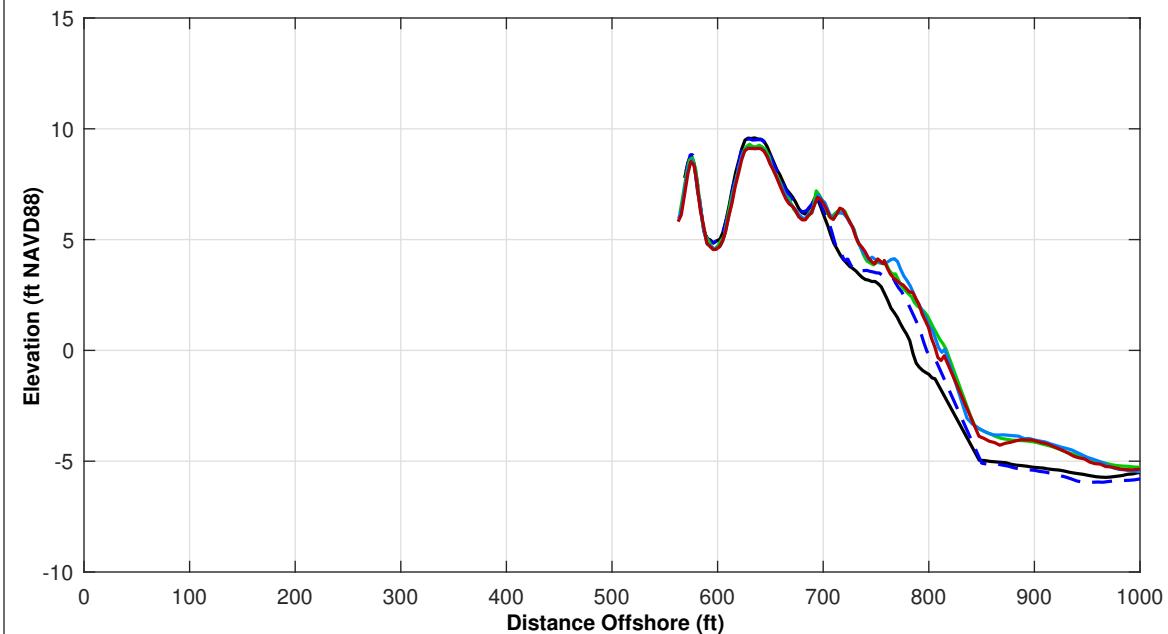
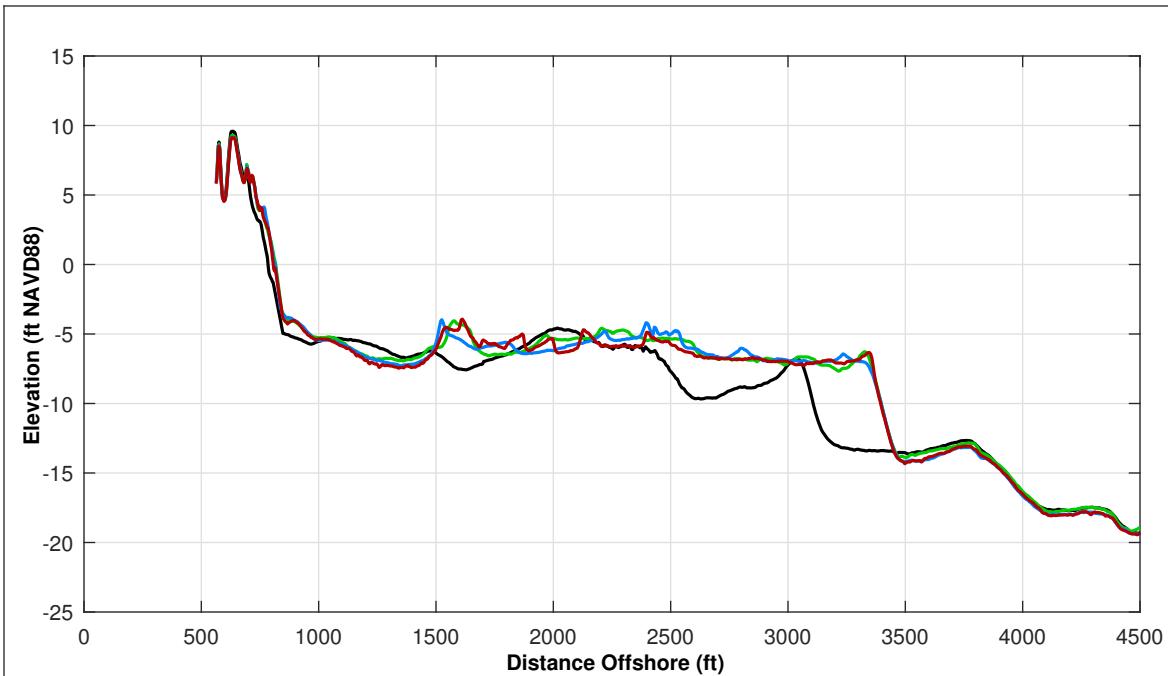
**LEGEND:**

APR 2025 — MAY 2017  
NOV 2024 — OCT 2016  
MAY 2024 — — — — —

**Notes:**

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.





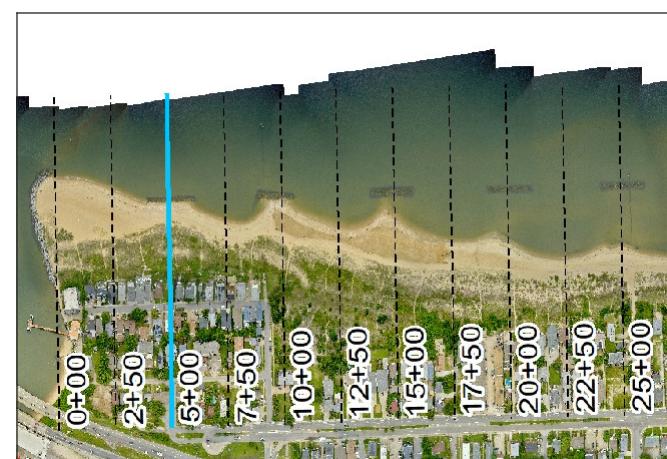
Survey Transect 5+00	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	-4.92 ft	-2.25 ft
Volume Change Above -15 ft NAVD88	-21.03 cy/ft	-10.25 cy/ft
Volume Change Above 0 ft NAVD88	-0.92 cy/ft	-0.94 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:		N/A

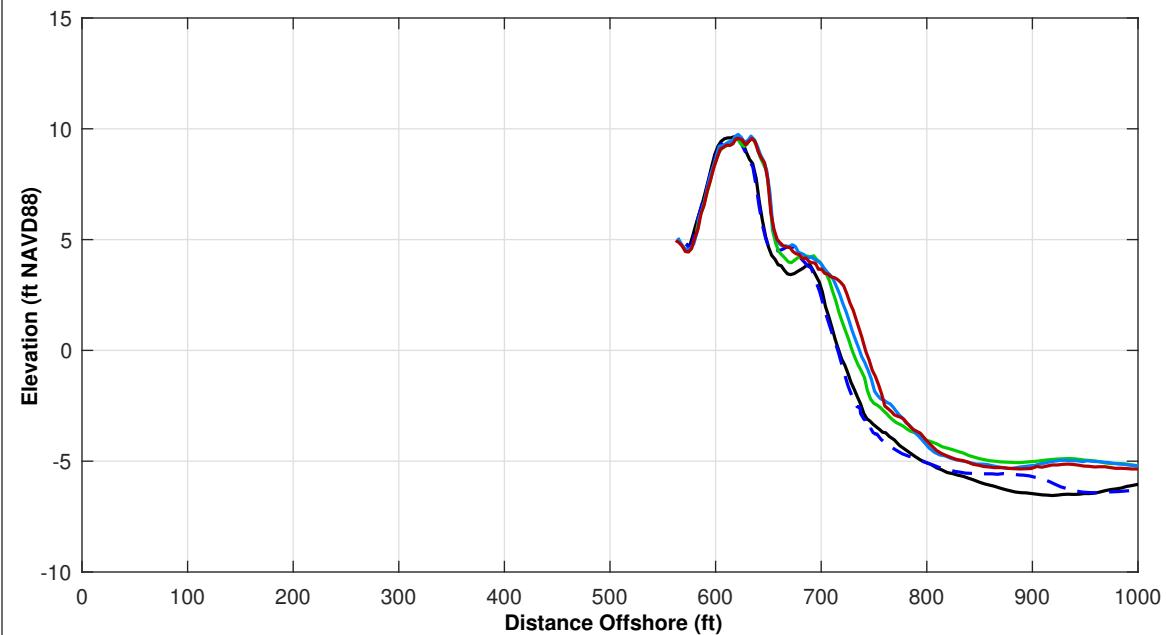
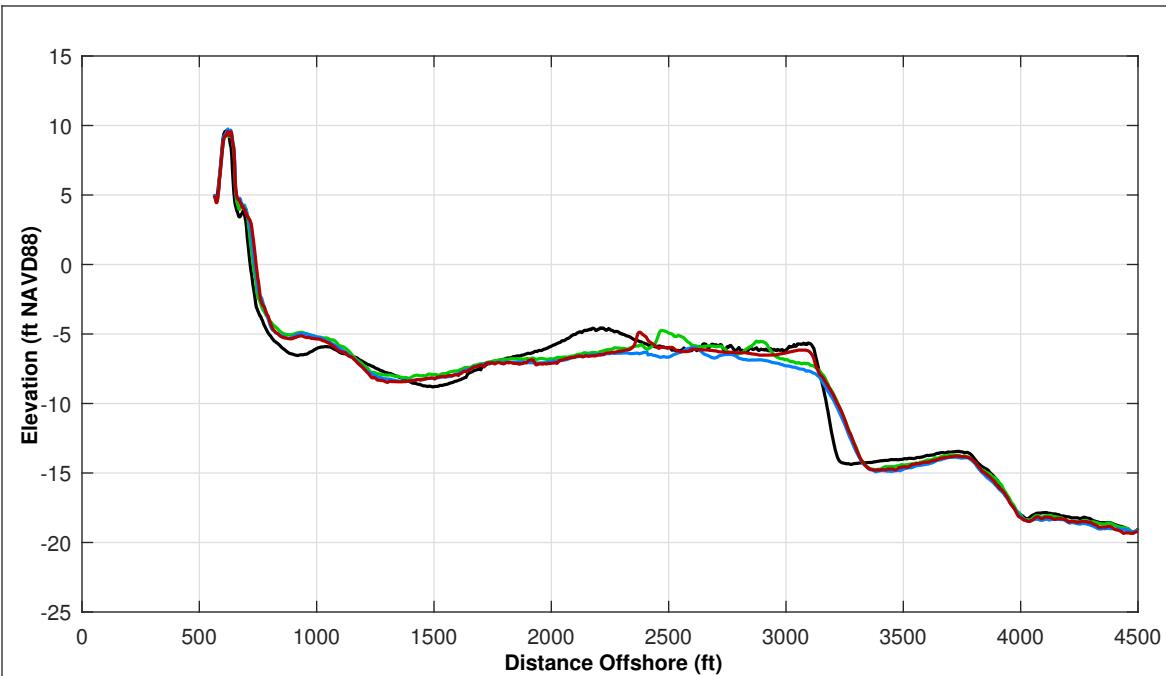
**LEGEND:**

APR 2025 — NOV 2024 — MAY 2017 — OCT 2016 — MAY 2024

**Notes:**

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.





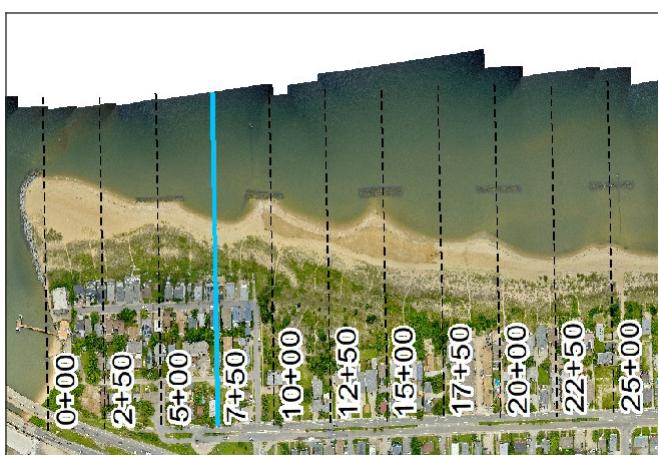
Survey Transect 7+50	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	13.67 ft	7.16 ft
Volume Change Above -15 ft NAVD88	-18.00 cy/ft	18.96 cy/ft
Volume Change Above 0 ft NAVD88	1.82 cy/ft	0.24 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:		N/A

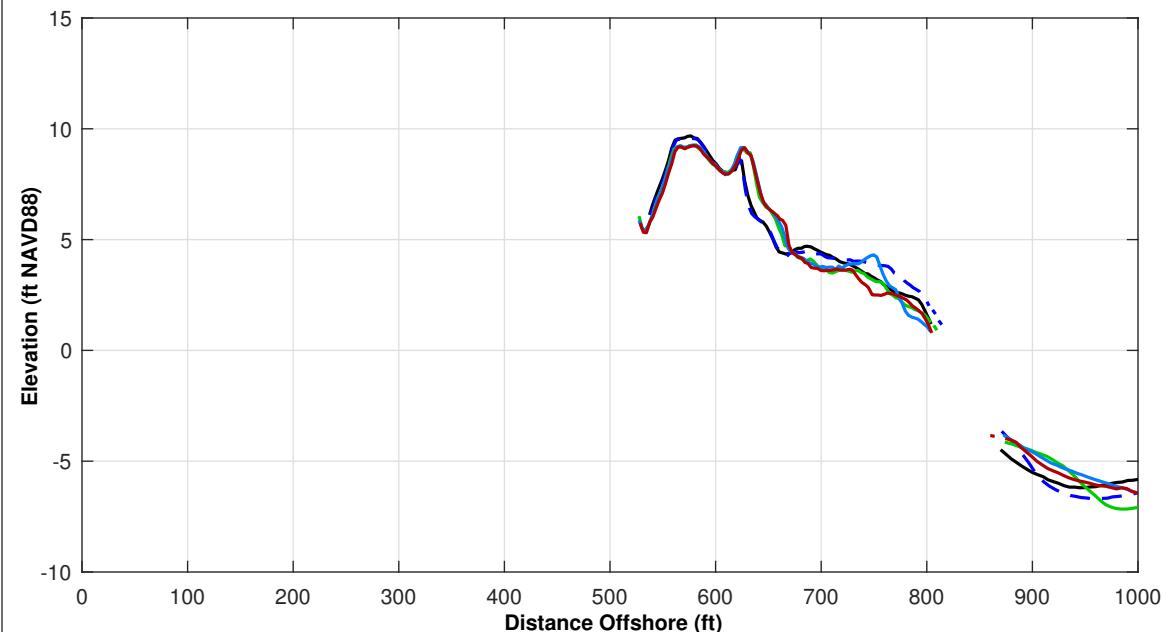
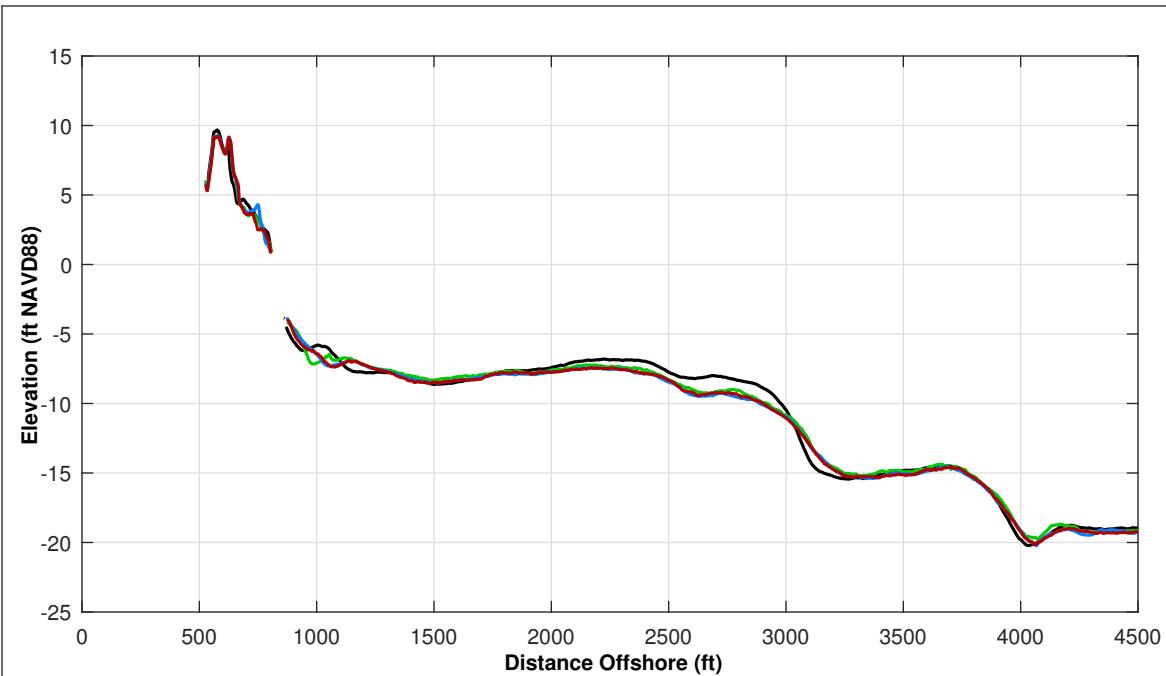
**LEGEND:**

APR 2025 — NOV 2024 — MAY 2017 — OCT 2016 — MAY 2024 —

**Notes:**

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.





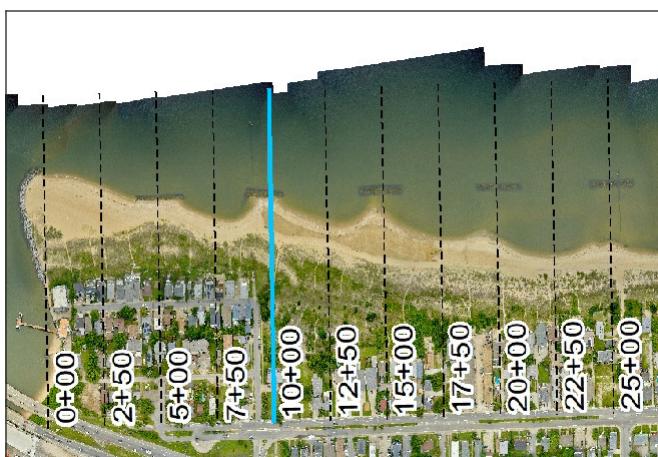
Survey Transect 10+00	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	-5.54 ft	1.38 ft
Volume Change Above -15 ft NAVD88	-16.29 cy/ft	-1.13 cy/ft
Volume Change Above 0 ft NAVD88	-0.50 cy/ft	-1.46 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:		N/A

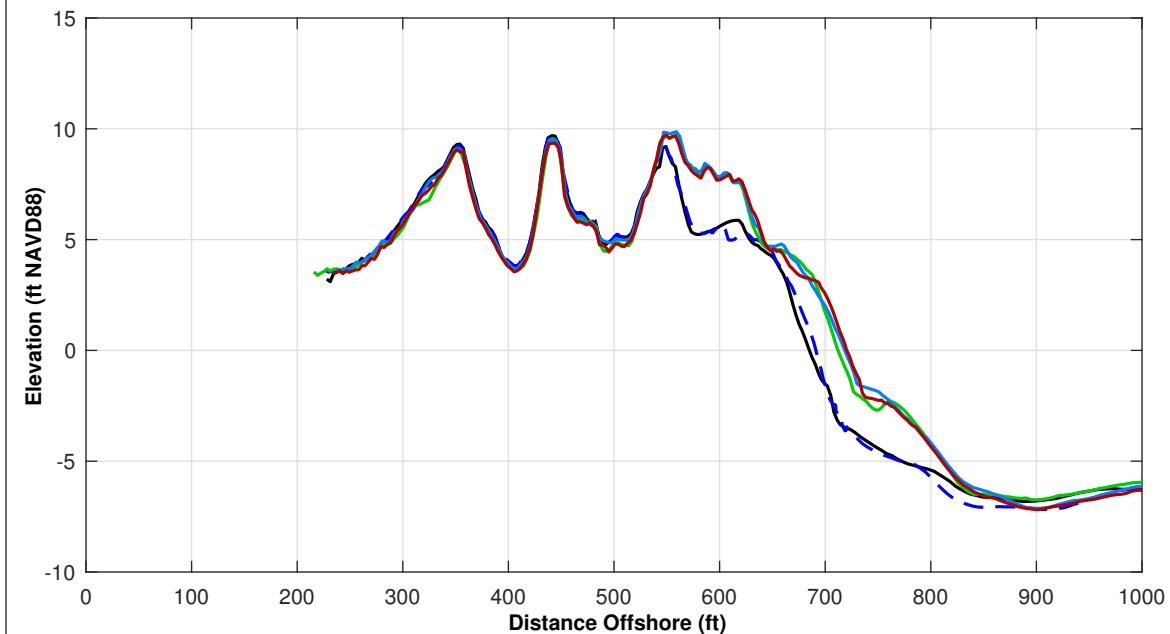
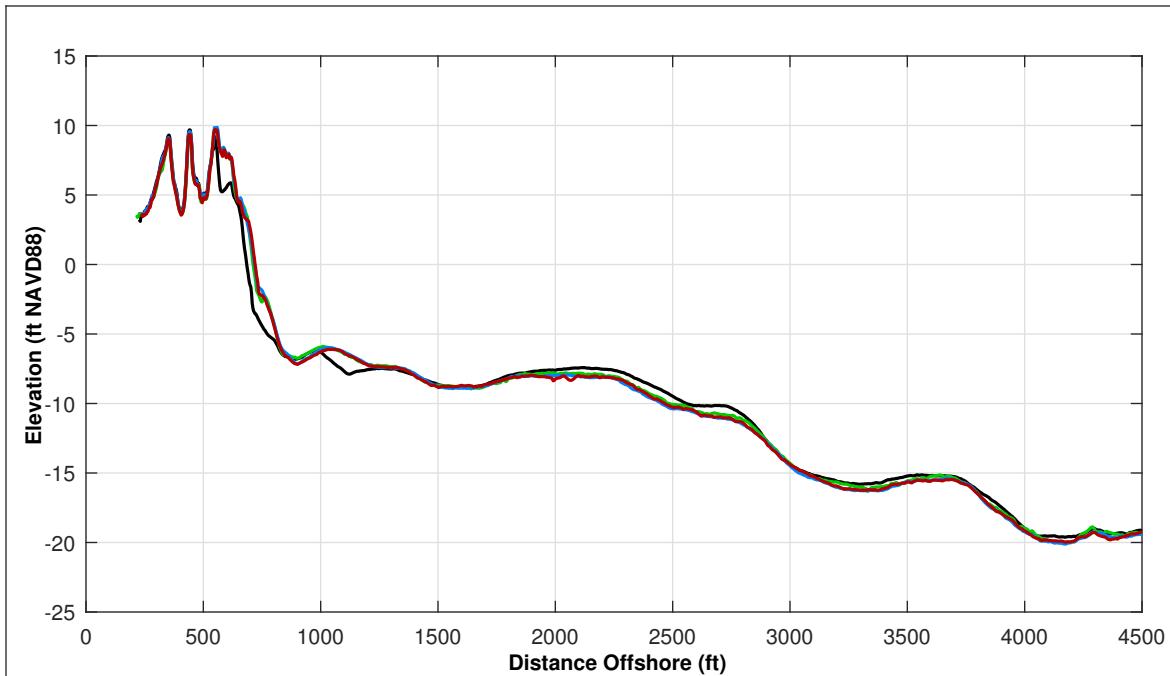
**LEGEND:**

APR 2025 —  
NOV 2024 —  
MAY 2024 —  
MAY 2017 —  
OCT 2016 —

**Notes:**

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.

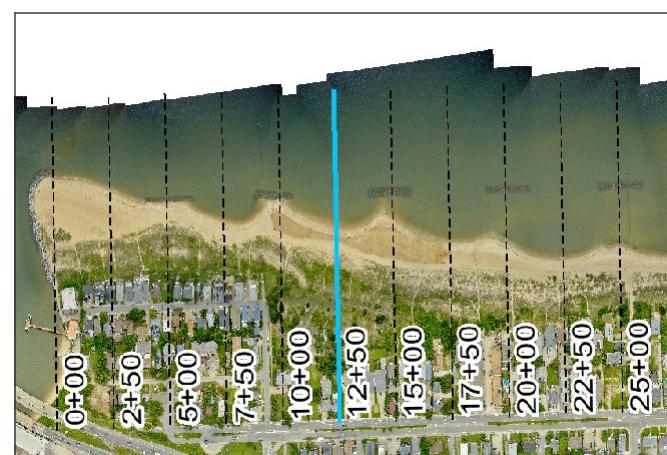


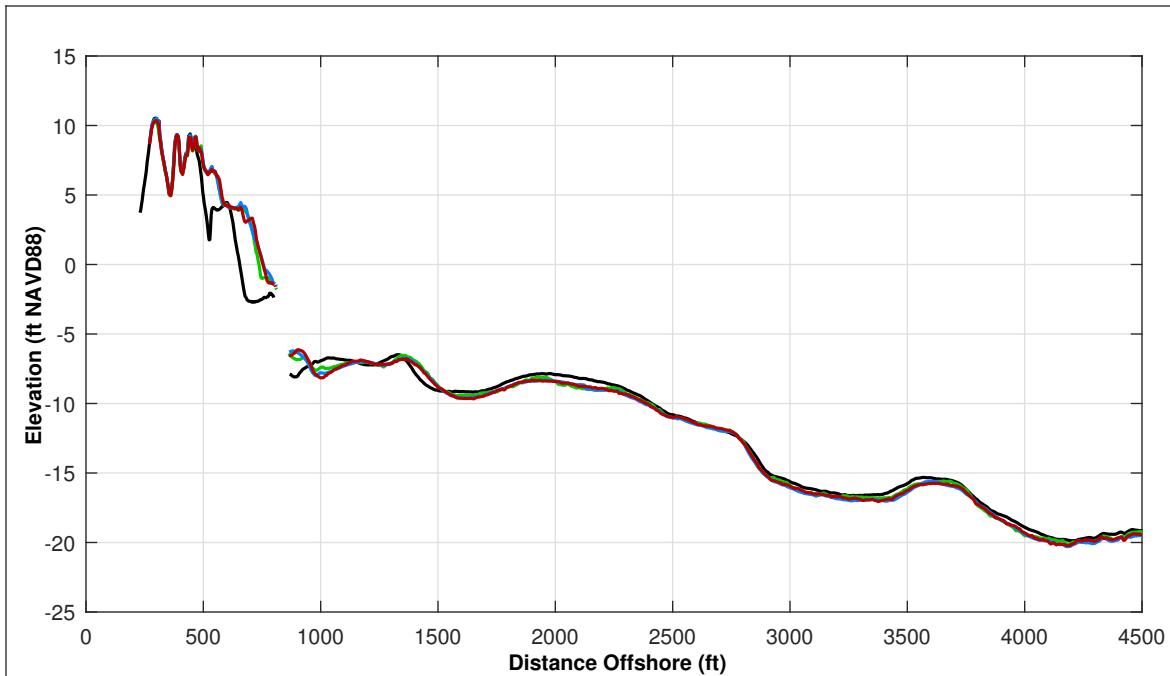


Survey Transect 12+50	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	7.48 ft	3.36 ft
Volume Change Above -15 ft NAVD88	-9.31 cy/ft	-2.01 cy/ft
Volume Change Above 0 ft NAVD88	0.58 cy/ft	-1.81 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	N/A	

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.





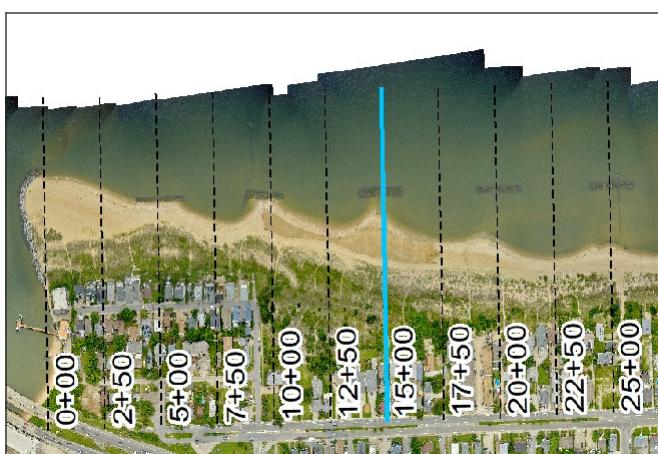
Survey Transect 15+00	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	14.43 ft	-1.09 ft
Volume Change Above -15 ft NAVD88	-1.50 cy/ft	0.28 cy/ft
Volume Change Above 0 ft NAVD88	1.87 cy/ft	-0.65 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:		N/A

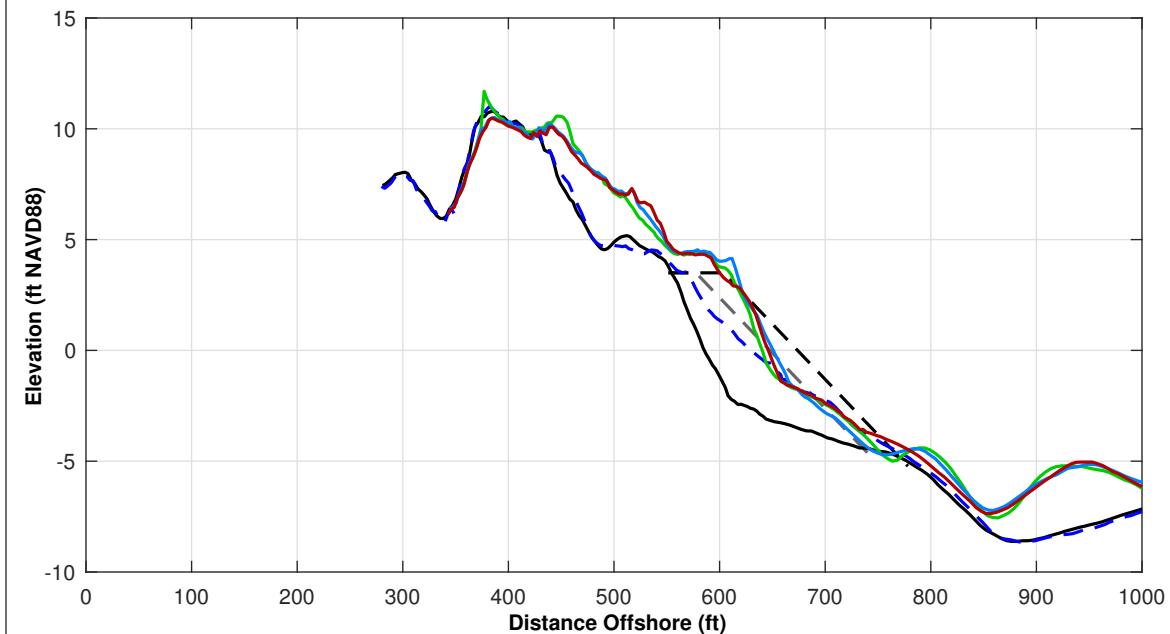
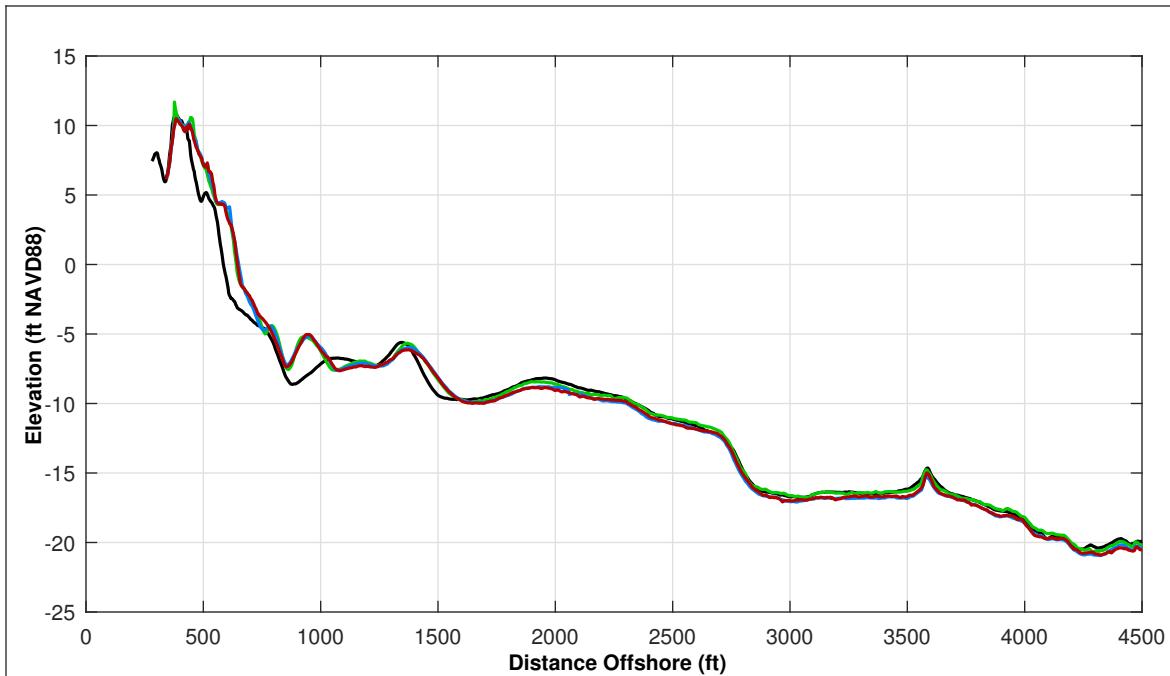
**LEGEND:**

APR 2025 — MAY 2017  
NOV 2024 — OCT 2016  
MAY 2024 — —

**Notes:**

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.

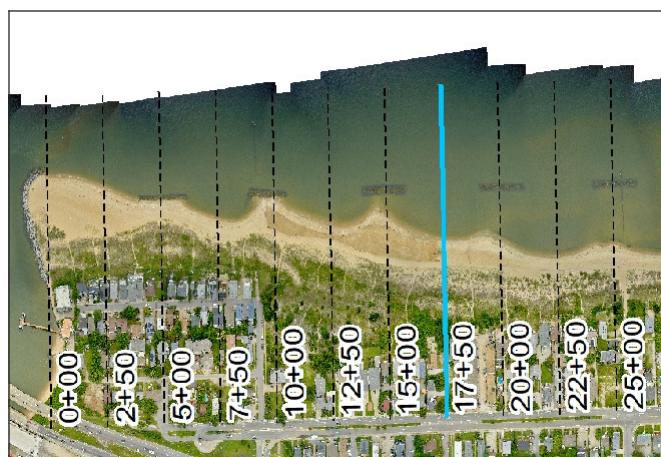


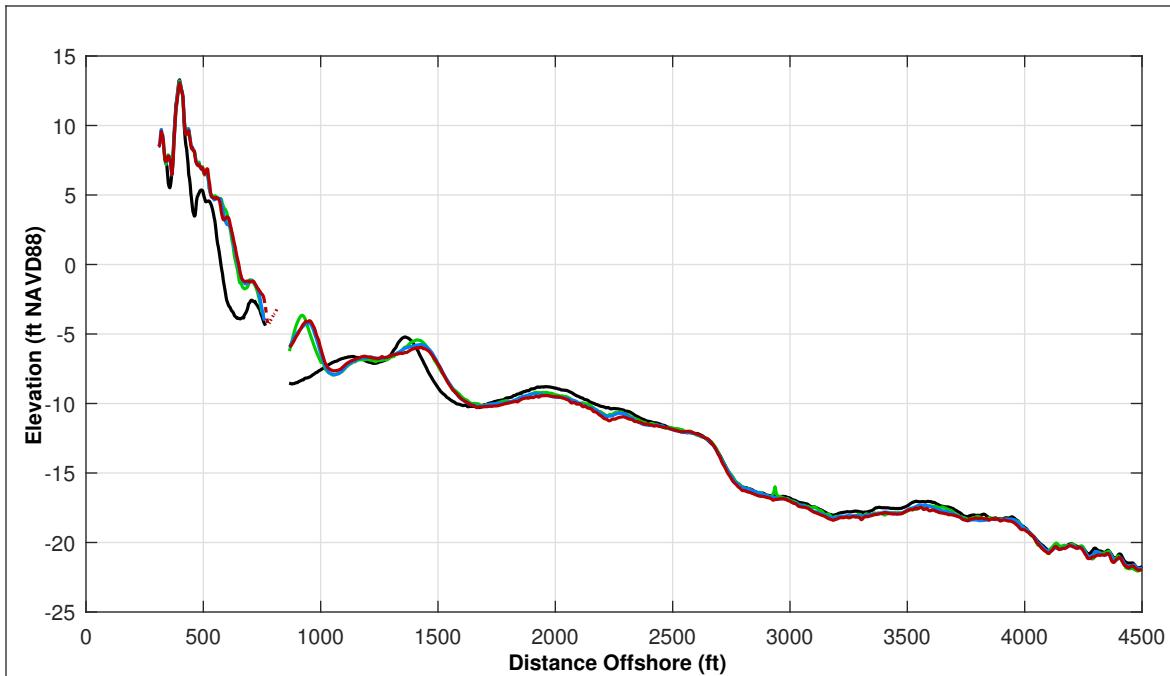


Survey Transect 17+50	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	6.06 ft	-2.12 ft
Volume Change Above -15 ft NAVD88	-14.81 cy/ft	-1.74 cy/ft
Volume Change Above 0 ft NAVD88	-0.22 cy/ft	-1.10 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:		-6.0 ft
<b>LEGEND:</b>		
APR 2025	MAY 2017	—
NOV 2024	OCT 2016	—
MAY 2024	USACE Design Template	—
	USACE Nourishment Threshold	—

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.





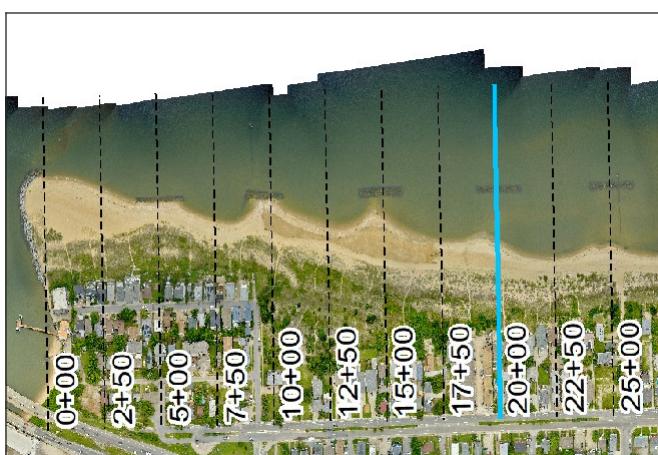
Survey Transect 20+00	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	9.23 ft	3.17 ft
Volume Change Above -15 ft NAVD88	-3.18 cy/ft	-1.73 cy/ft
Volume Change Above 0 ft NAVD88	-0.34 cy/ft	0.20 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	-20.0 ft	

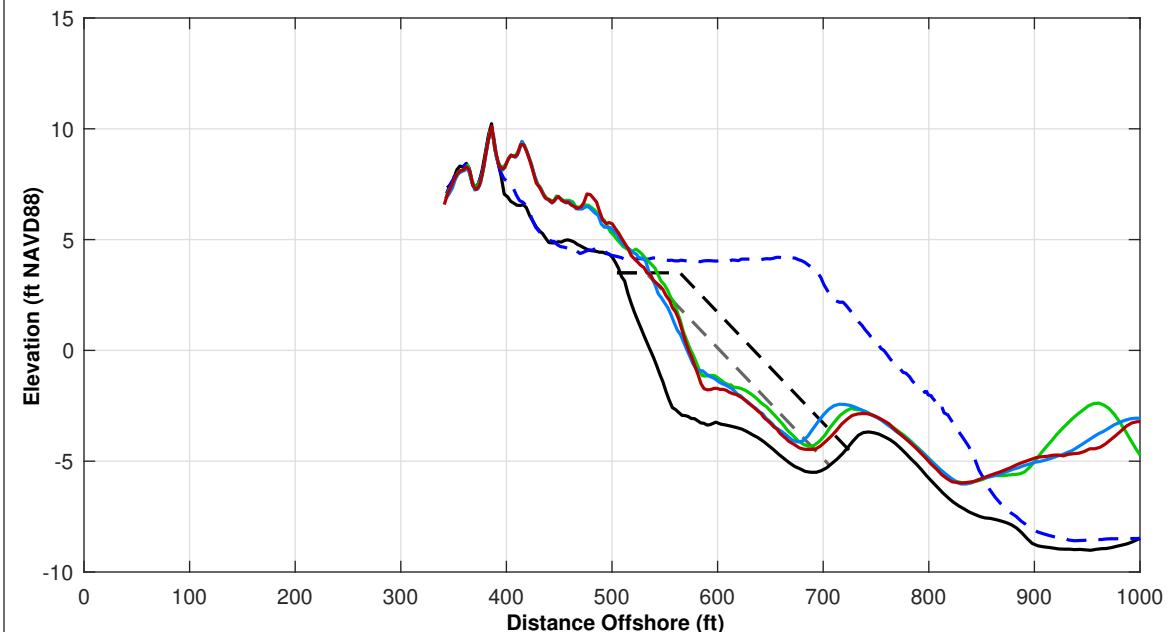
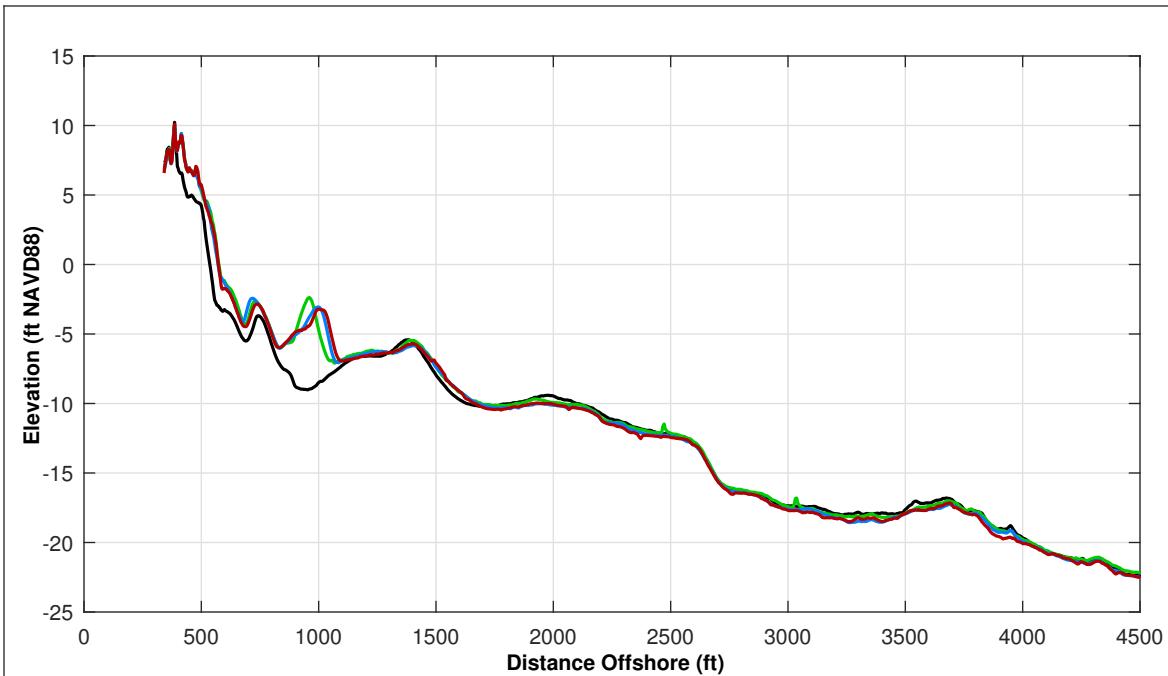
**LEGEND:**

APR 2025	MAY 2017
NOV 2024	OCT 2016
MAY 2024	USACE Design Template
	USACE Nourishment Threshold

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.

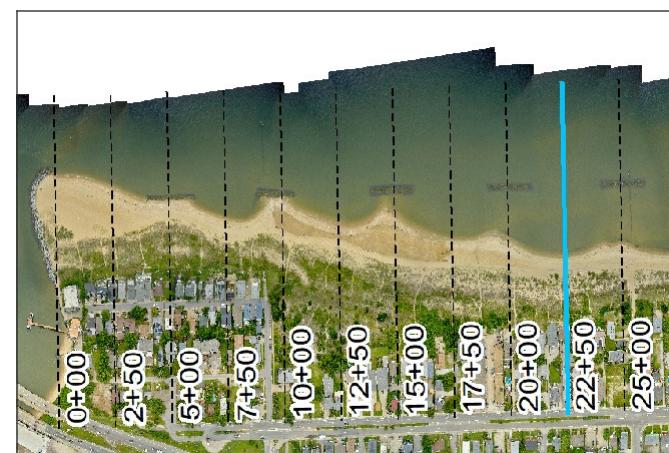


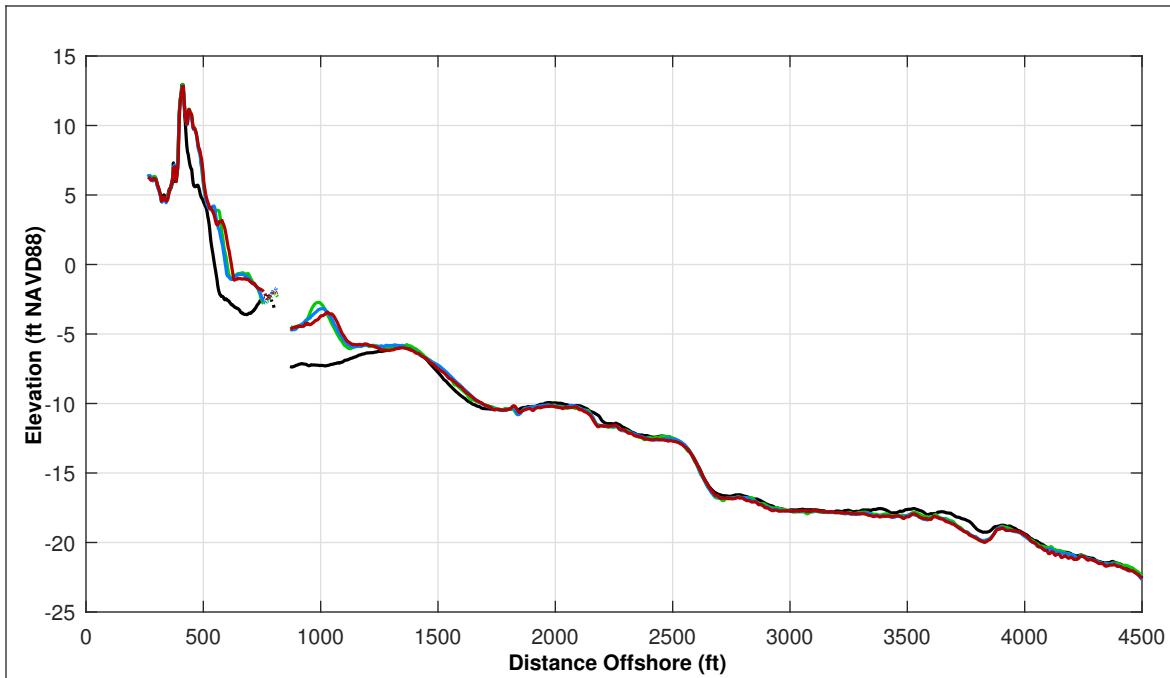


Survey Transect 22+50	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	-0.86 ft	4.68 ft
Volume Change Above -15 ft NAVD88	-11.90 cy/ft	-2.70 cy/ft
Volume Change Above 0 ft NAVD88	-0.44 cy/ft	0.90 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:		-34.0 ft
<b>LEGEND:</b>		
MAY 2017		
APR 2025	—	—
NOV 2024	—	—
OCT 2016	—	—
USACE Design Template	—	—
USACE Nourishment Threshold	—	—

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.





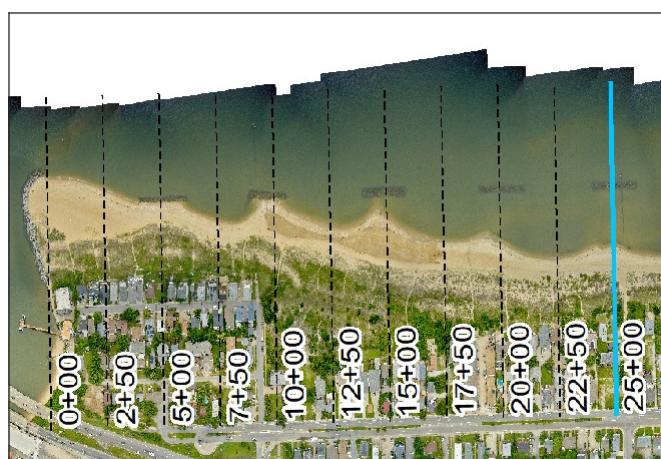
Survey Transect 25+00	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	19.00 ft	24.74 ft
Volume Change Above -15 ft NAVD88	-1.30 cy/ft	0.14 cy/ft
Volume Change Above 0 ft NAVD88	1.14 cy/ft	3.19 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	-28.0 ft	

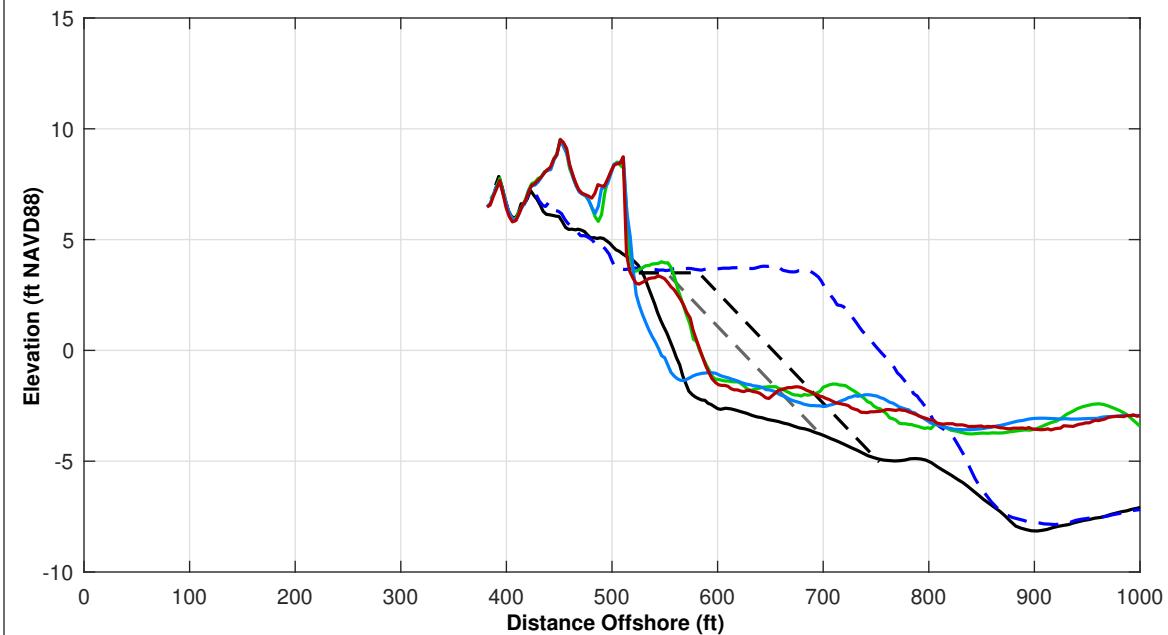
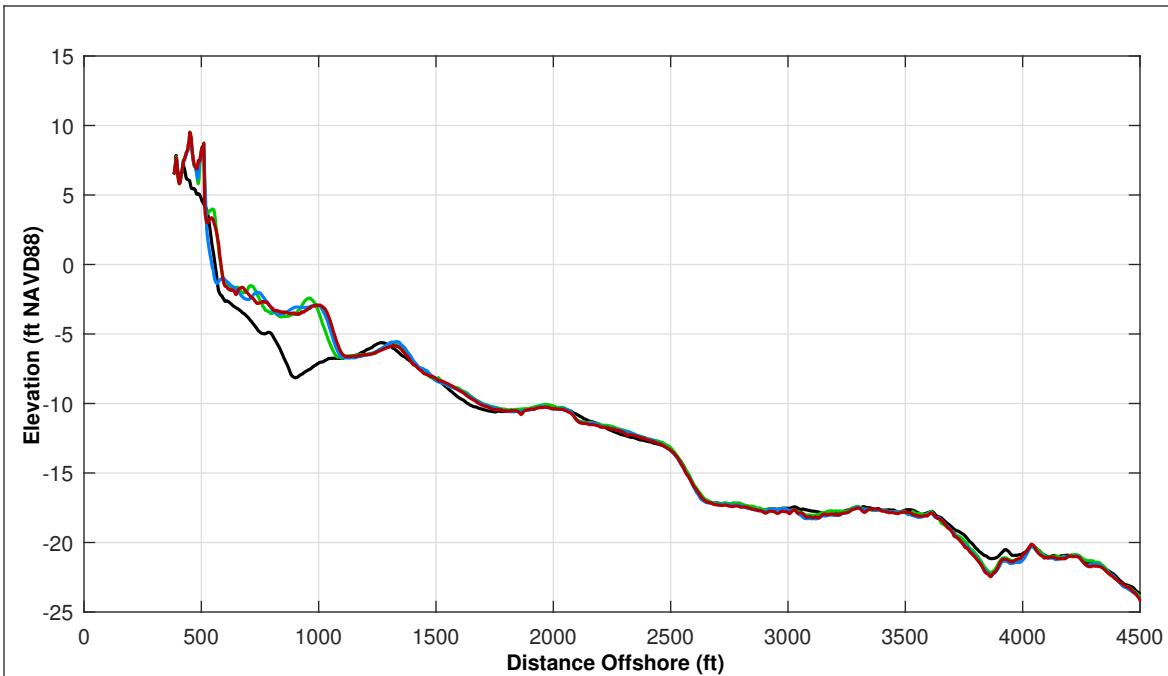
**LEGEND:**

MAY 2017	—
APR 2025	—
NOV 2024	—
MAY 2024	—
USACE Design Template	—
USACE Nourishment Threshold	—

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.

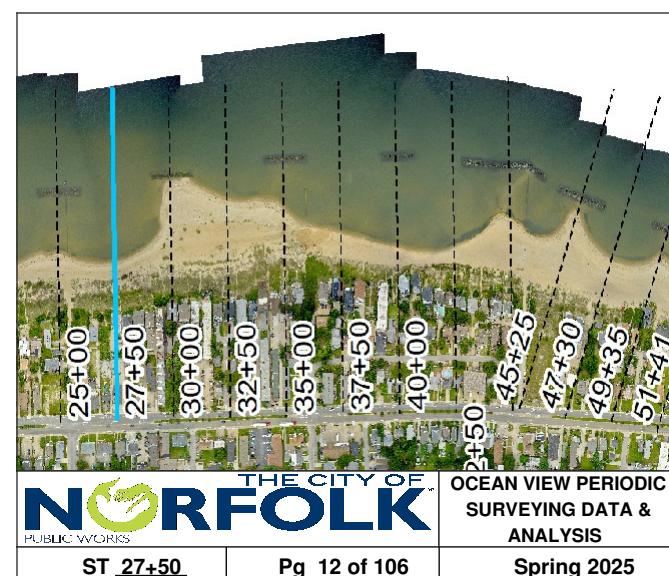


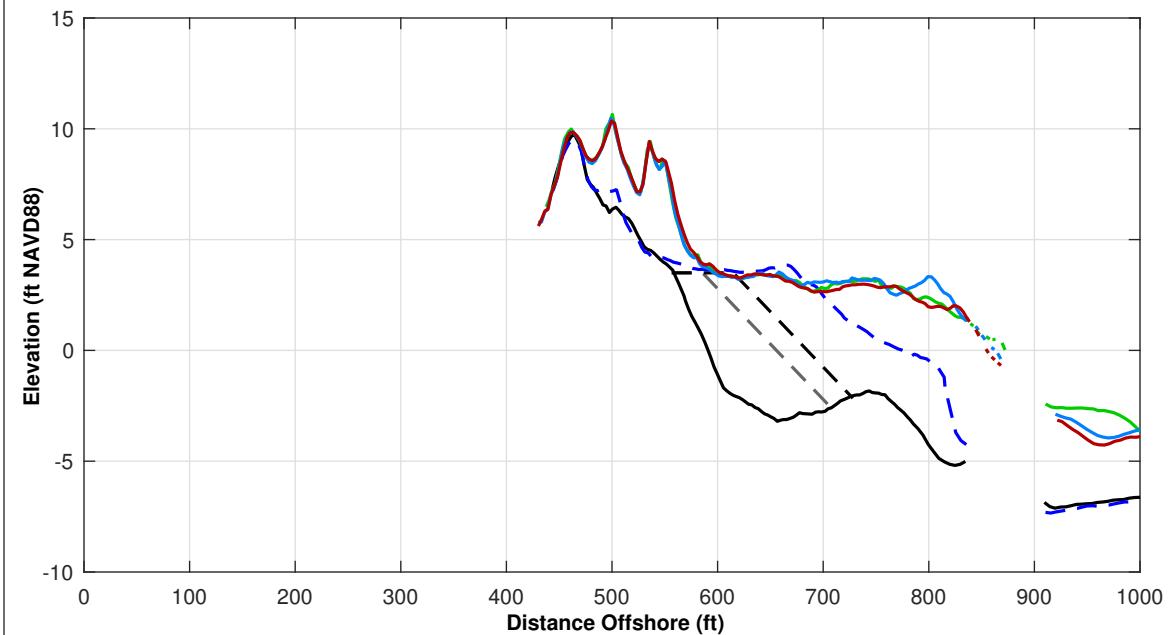
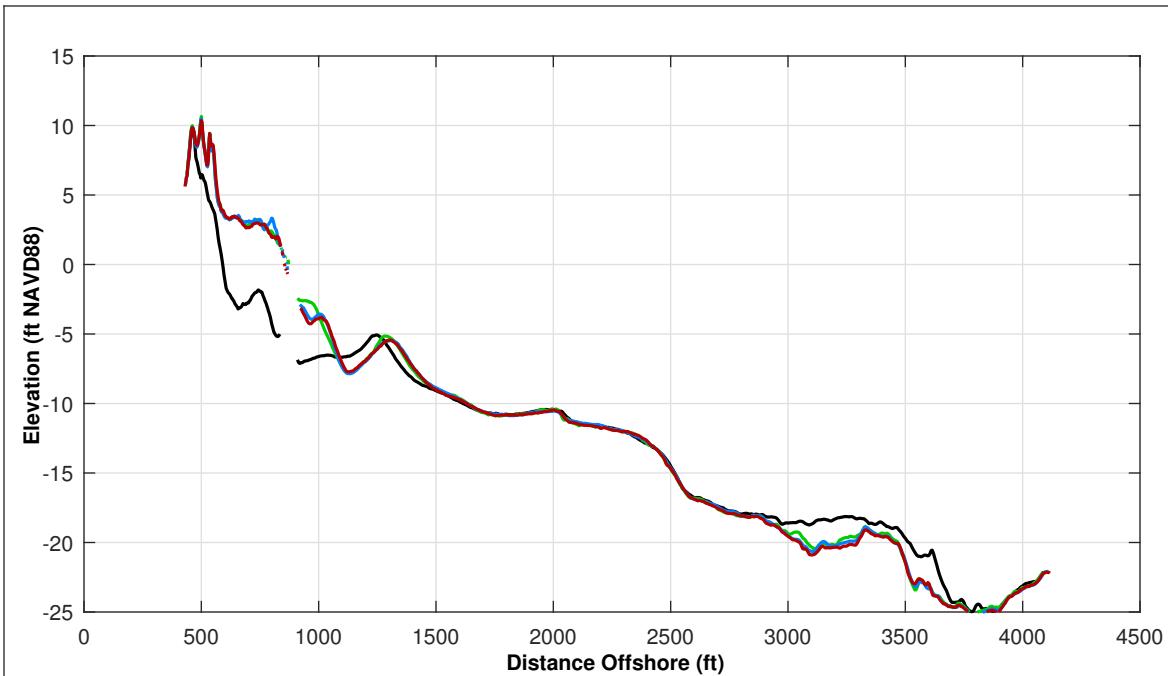


Survey Transect 27+50	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	1.60 ft	42.00 ft
Volume Change Above -15 ft NAVD88	-3.62 cy/ft	3.02 cy/ft
Volume Change Above 0 ft NAVD88	-0.72 cy/ft	4.65 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:		-66.0 ft

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.

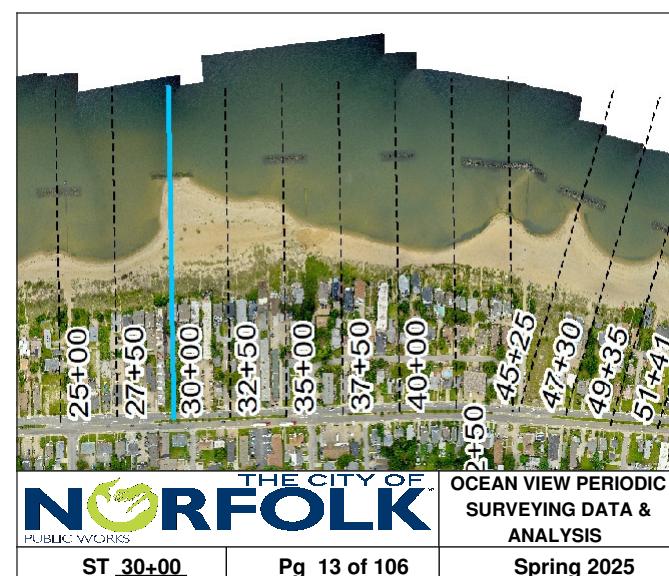


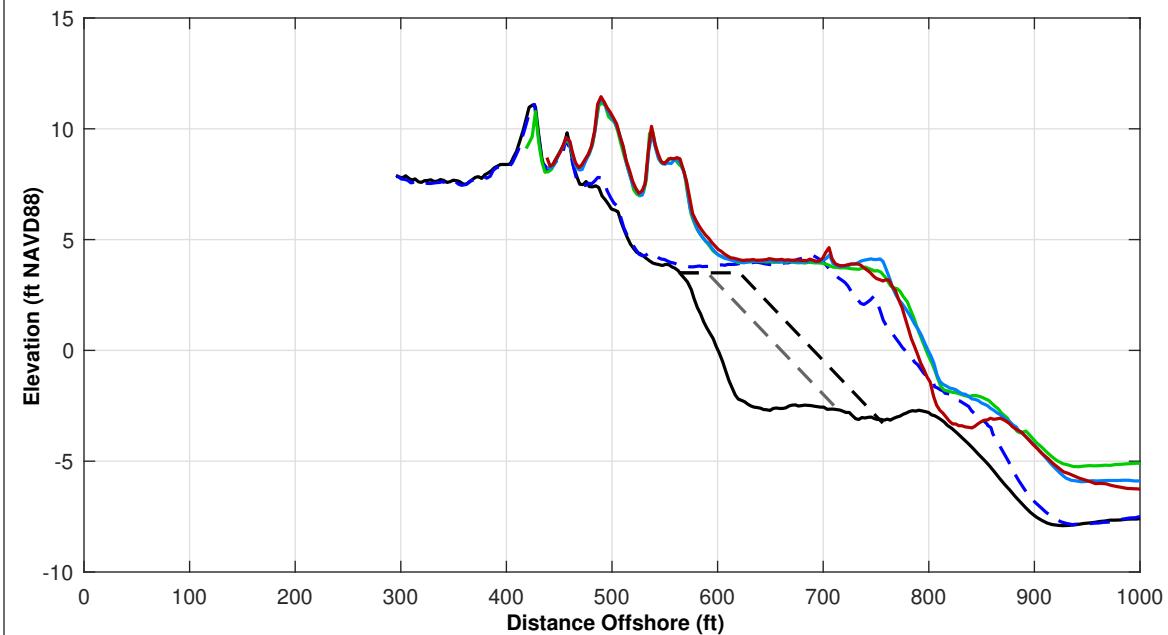
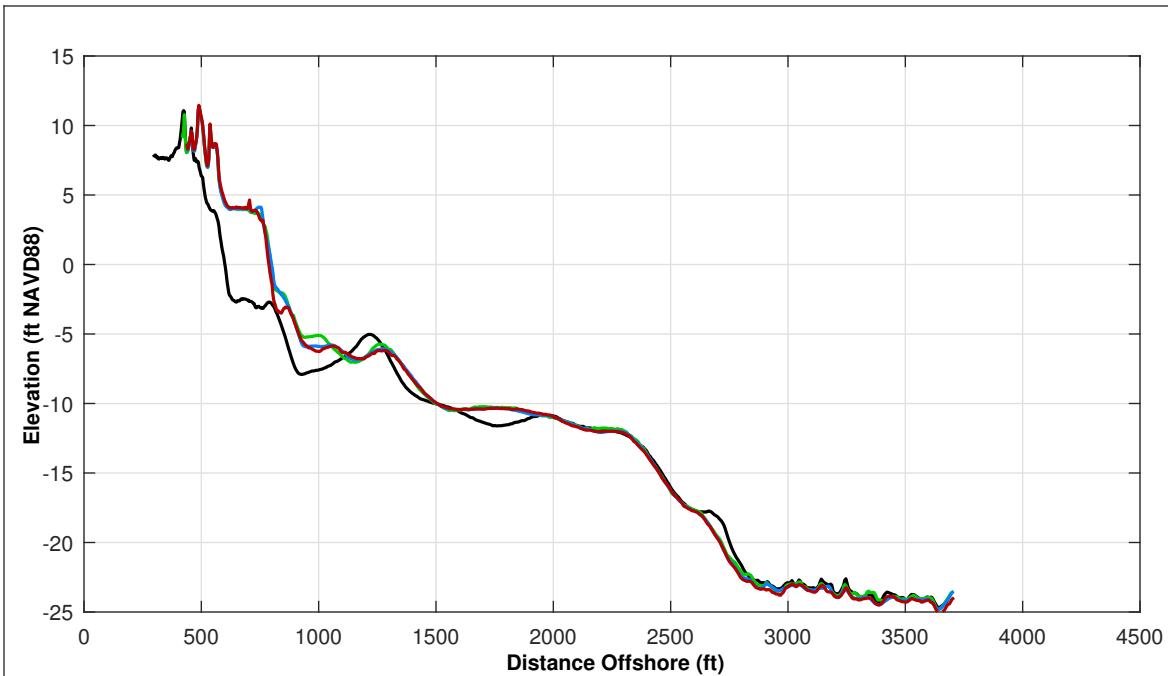


Survey Transect 30+00	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	-0.04 ft	-2.33 ft
Volume Change Above -15 ft NAVD88	-2.61 cy/ft	-3.67 cy/ft
Volume Change Above 0 ft NAVD88	-0.65 cy/ft	-1.50 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	-17.0 ft	

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.





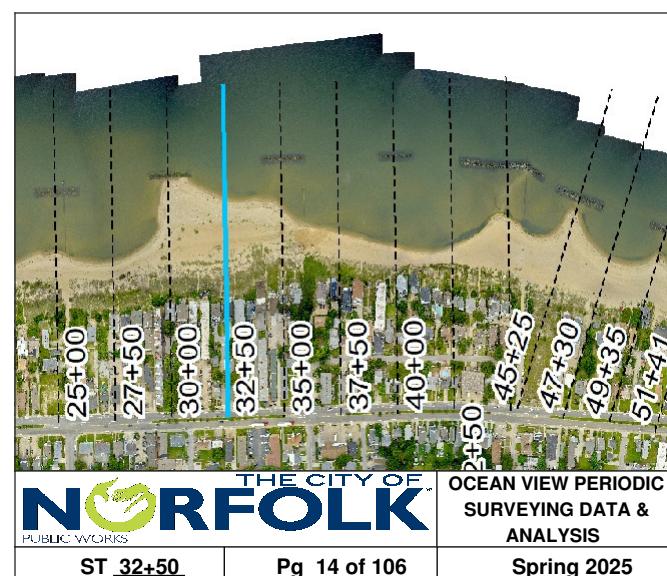
Survey Transect 32+50	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	-8.77 ft	-8.80 ft
Volume Change Above -15 ft NAVD88	-8.41 cy/ft	-4.45 cy/ft
Volume Change Above 0 ft NAVD88	0.72 cy/ft	-0.03 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	+ 124.0 ft	

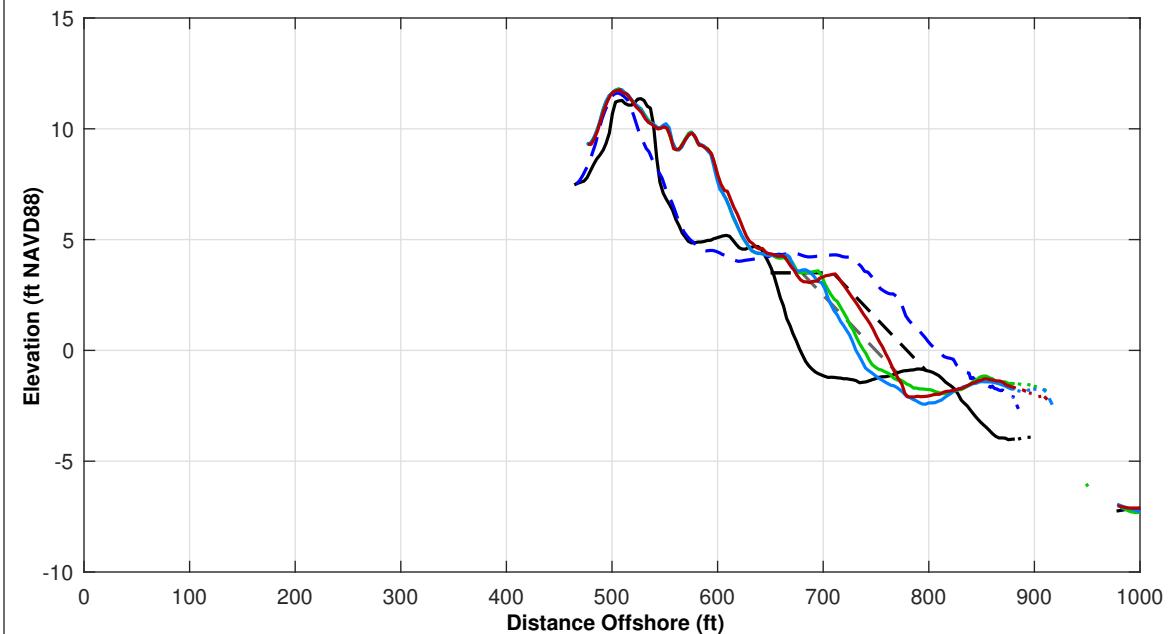
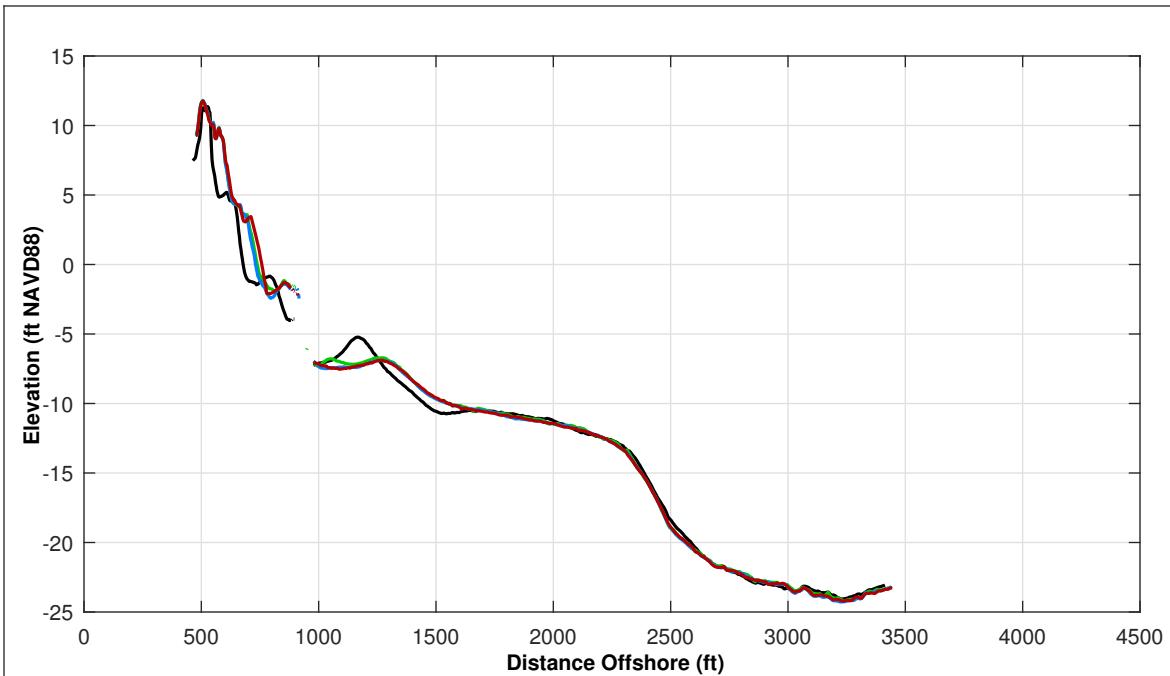
**LEGEND:**

APR 2025	MAY 2017
NOV 2024	OCT 2016
MAY 2024	USACE Design Template
	USACE Nourishment Threshold

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.





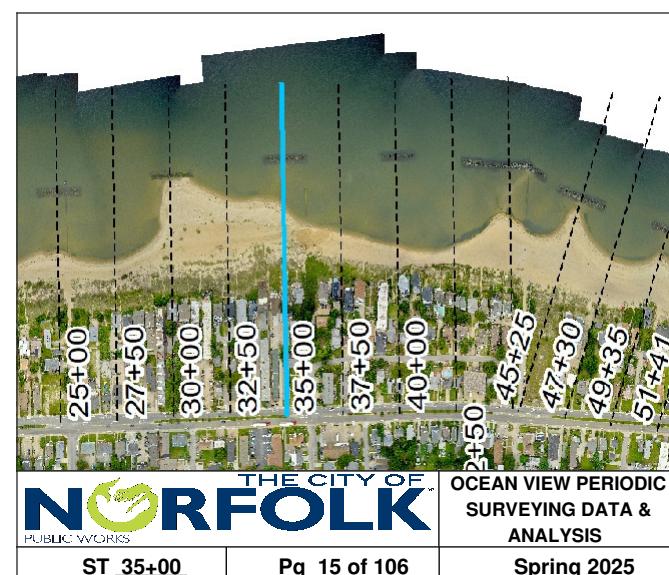
Survey Transect 35+00	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	19.40 ft	25.79 ft
Volume Change Above -15 ft NAVD88	-3.46 cy/ft	5.09 cy/ft
Volume Change Above 0 ft NAVD88	2.32 cy/ft	3.10 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	-37.0 ft	

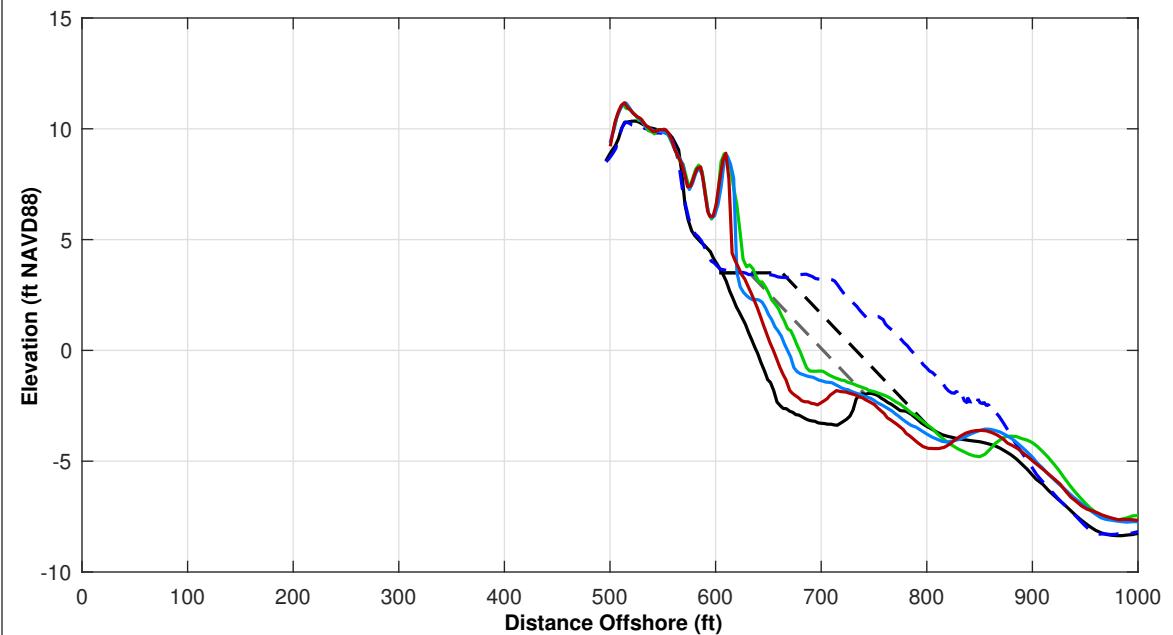
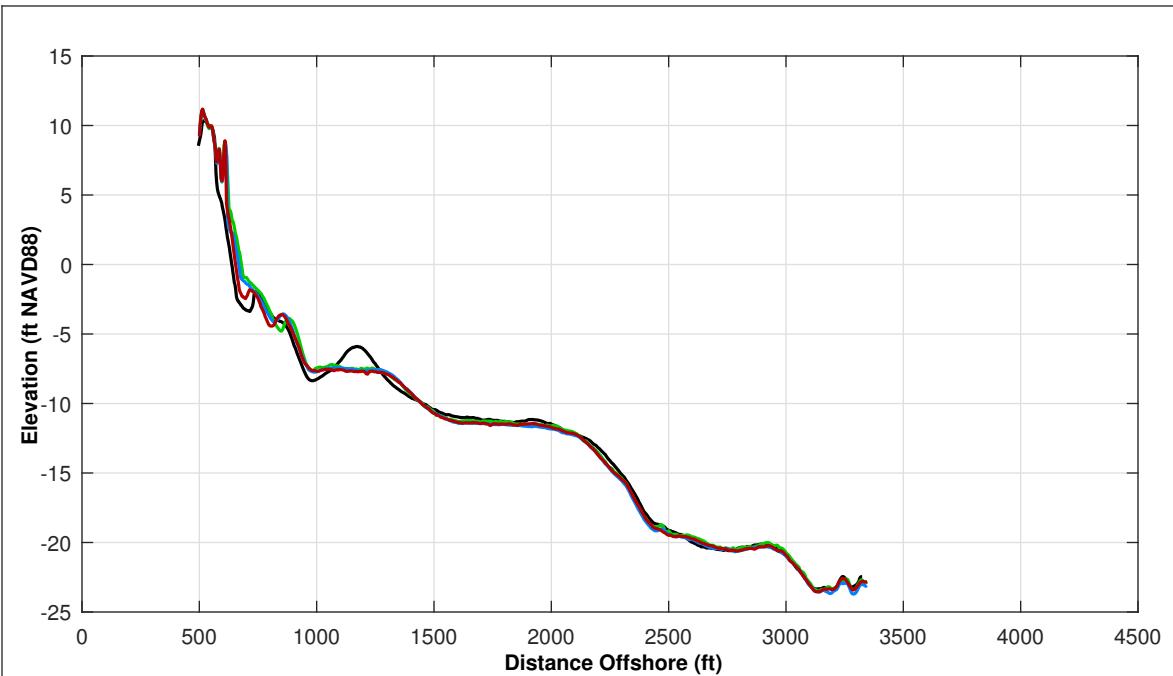
**LEGEND:**

APR 2025	MAY 2017
NOV 2024	OCT 2016
MAY 2024	USACE Design Template
	USACE Nourishment Threshold

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.





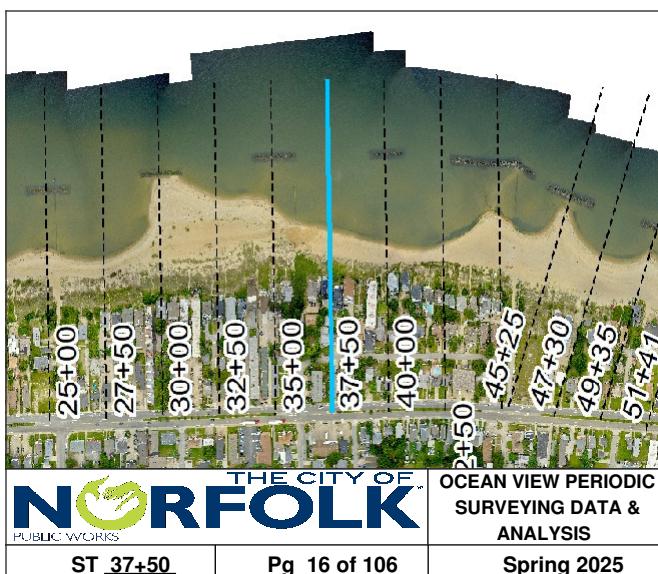
Survey Transect 37+50	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	-21.60 ft	-10.96 ft
Volume Change Above -15 ft NAVD88	-15.12 cy/ft	-4.76 cy/ft
Volume Change Above 0 ft NAVD88	-3.82 cy/ft	-0.99 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	-41.0 ft	

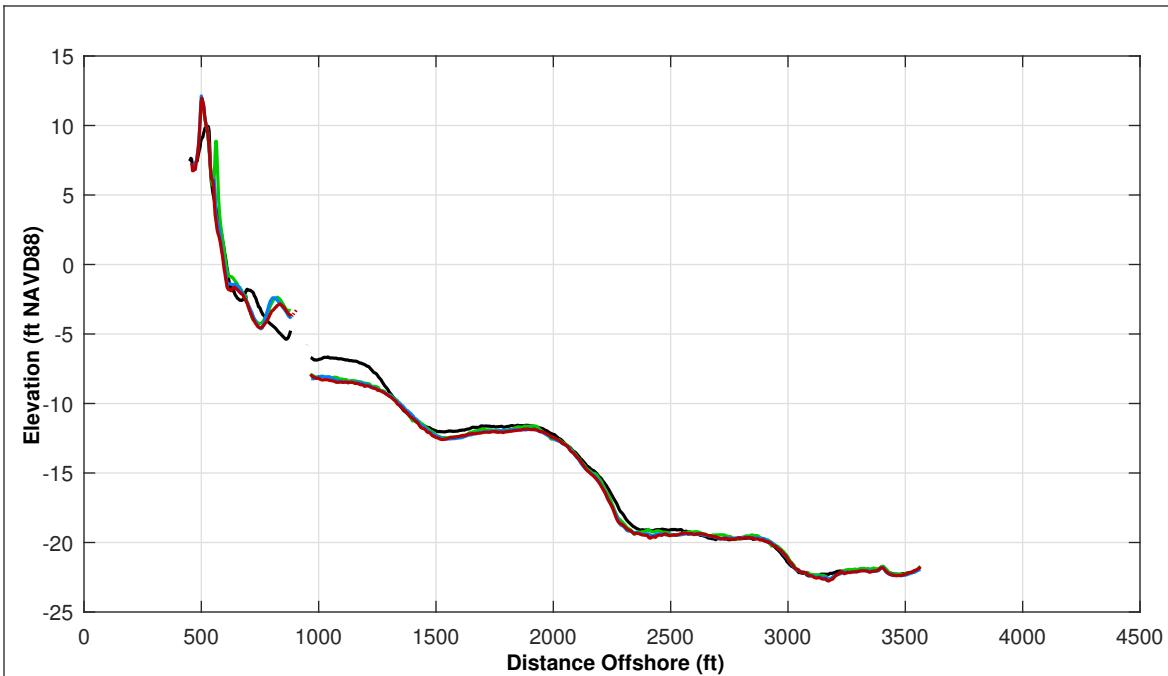
**LEGEND:**

APR 2025	MAY 2017
NOV 2024	OCT 2016
MAY 2024	USACE Design Template
	USACE Nourishment Threshold

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.





Survey Transect 40+00

APR 2025 - MAY 2024

APR 2025 - NOV 2024

Shoreline Change at MHW (0.98 ft NAVD88)

Volume Change Above -15 ft NAVD88

Volume Change Above 0 ft NAVD88

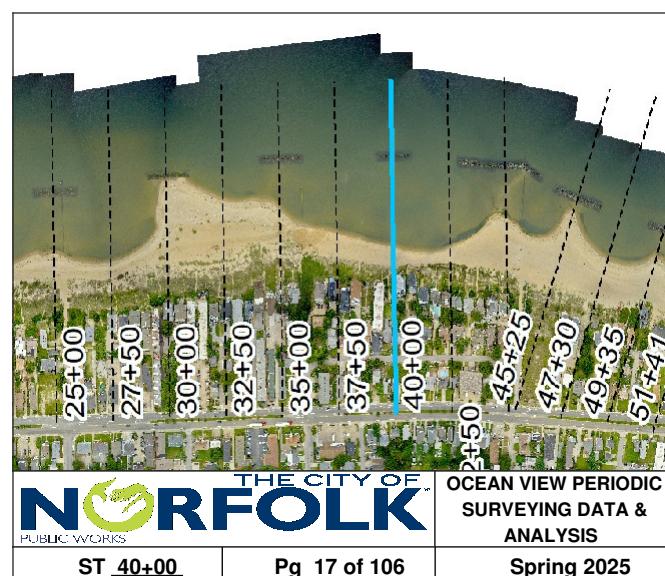
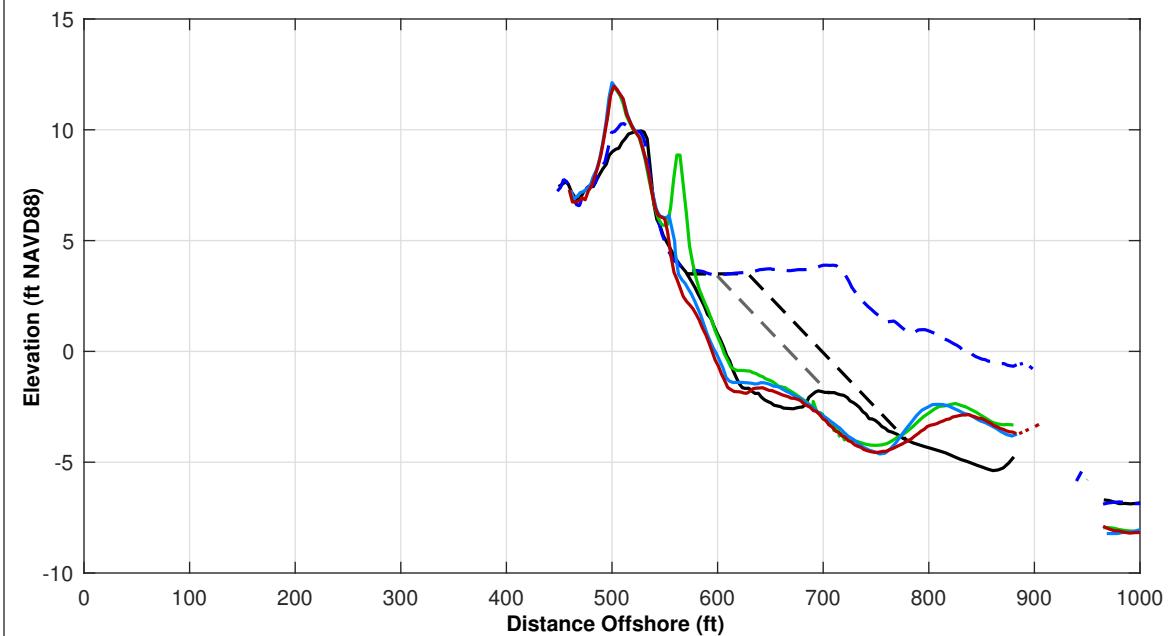
Distance from USACE Design Template @ 3.5 feet NAVD88: -70.0 ft

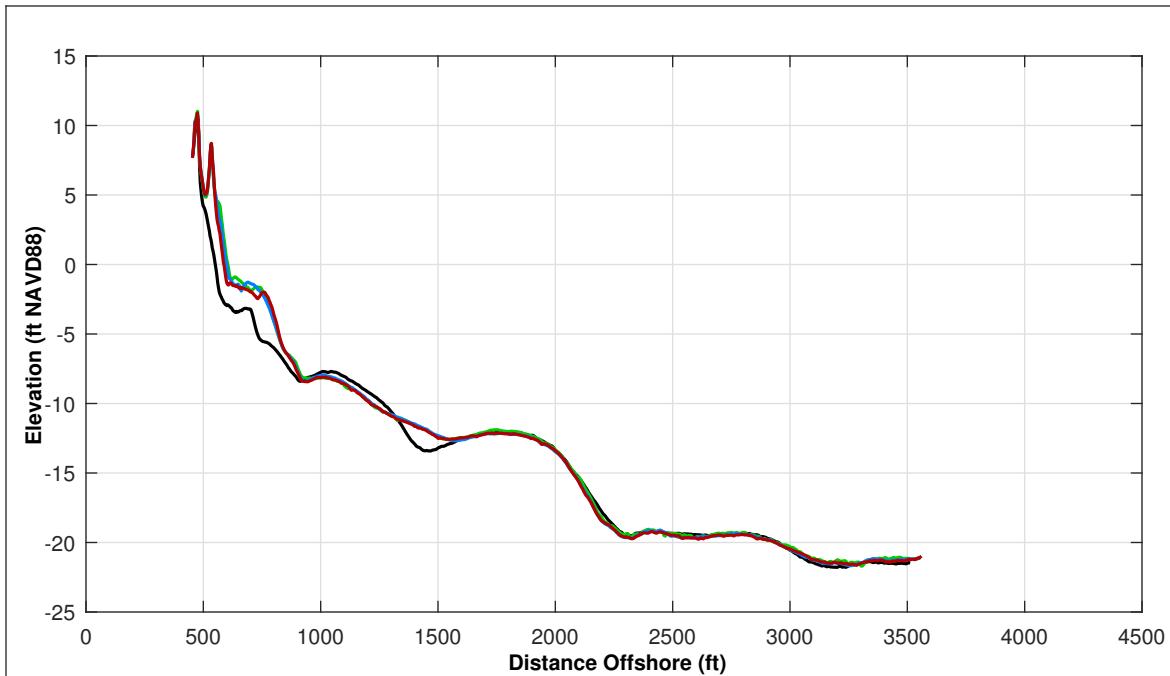
LEGEND:

- MAY 2017 (Blue dashed line)
- APR 2025 (Red solid line)
- OCT 2016 (Black solid line)
- NOV 2024 (Green solid line)
- USACE Design Template (Blue solid line)
- USACE Nourishment Threshold (Black dashed line)

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.





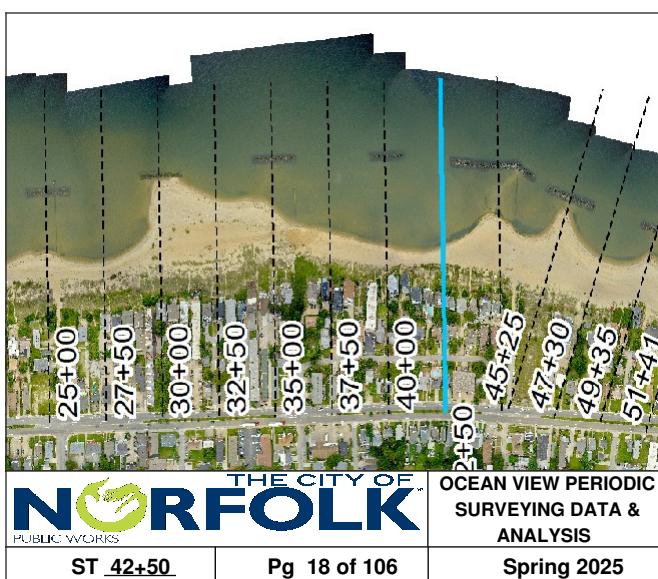
Survey Transect 42+50	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	-14.64 ft	-9.09 ft
Volume Change Above -15 ft NAVD88	-8.52 cy/ft	-4.43 cy/ft
Volume Change Above 0 ft NAVD88	-2.52 cy/ft	-1.59 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	-14.0 ft	

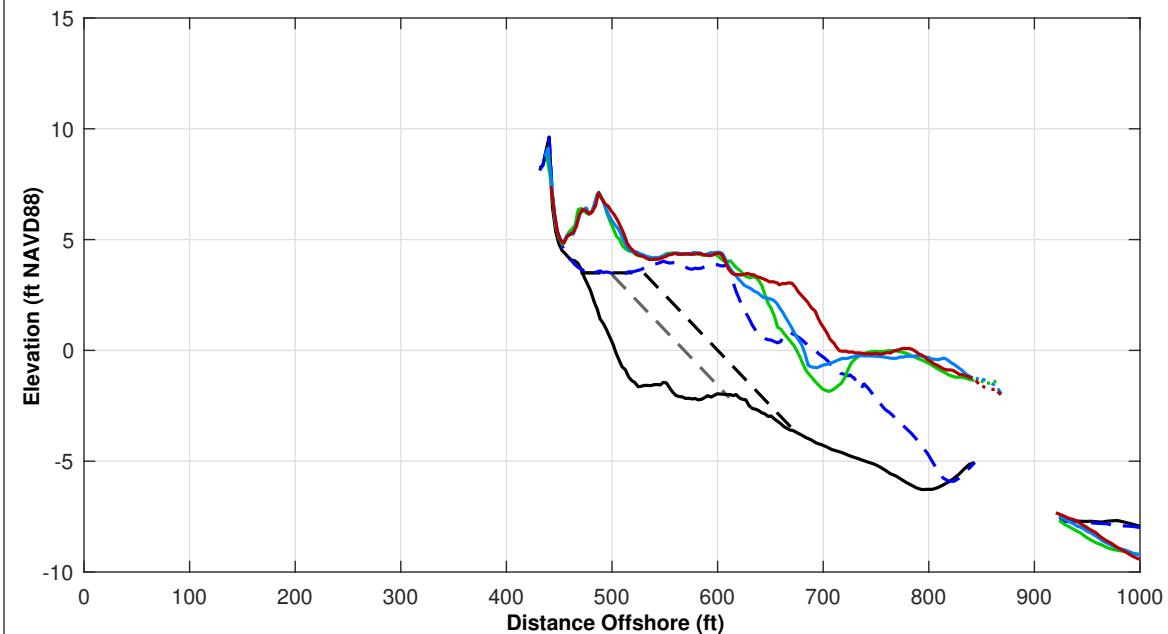
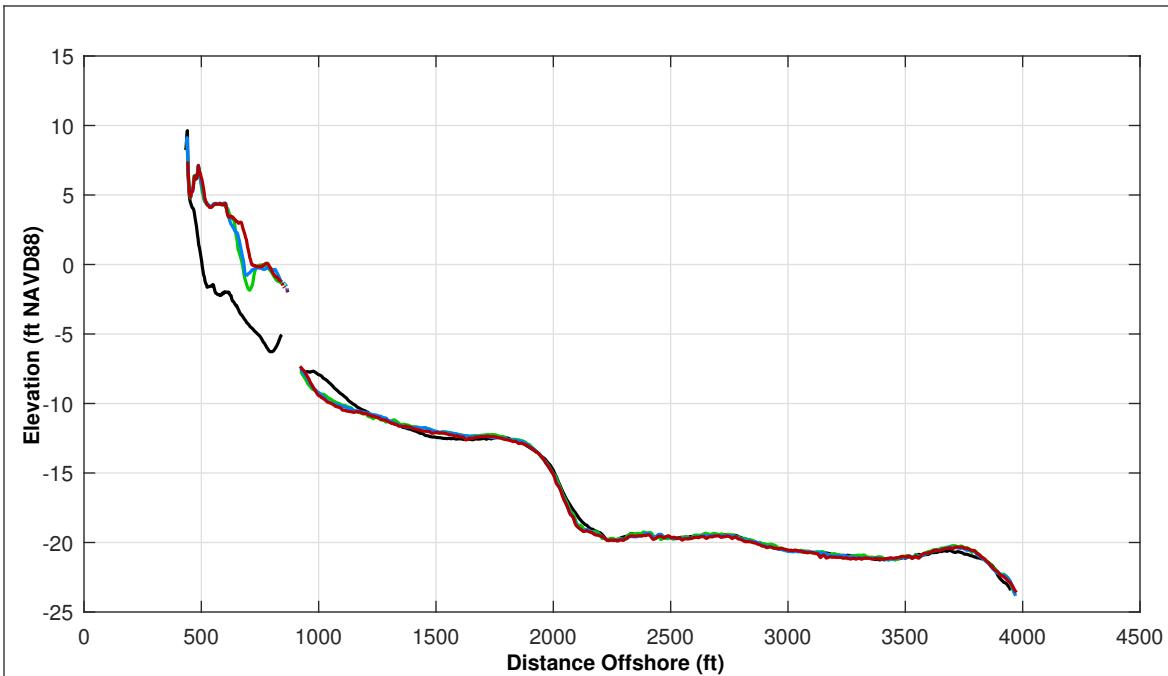
**LEGEND:**

APR 2025	MAY 2017
NOV 2024	OCT 2016
MAY 2024	USACE Design Template
	USACE Nourishment Threshold

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.





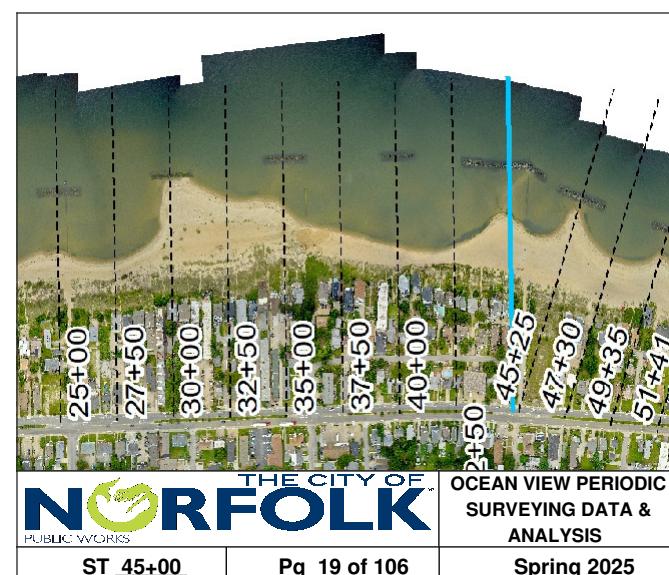
Survey Transect 45+00	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	42.01 ft	30.36 ft
Volume Change Above -15 ft NAVD88	3.29 cy/ft	1.54 cy/ft
Volume Change Above 0 ft NAVD88	4.63 cy/ft	4.12 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:		+ 80.0 ft

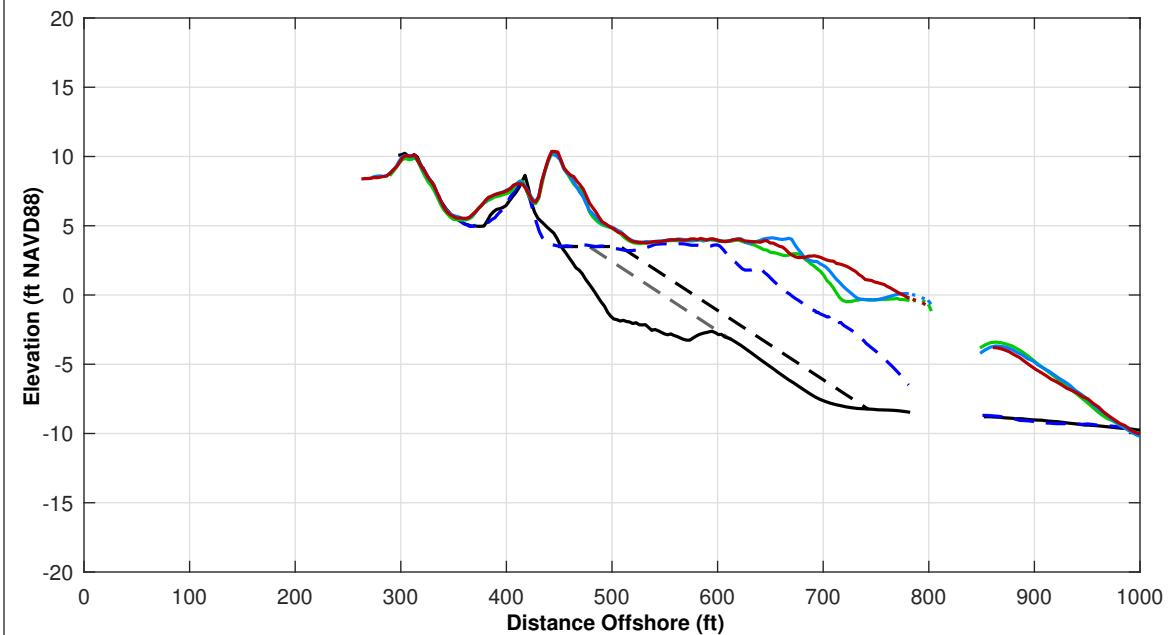
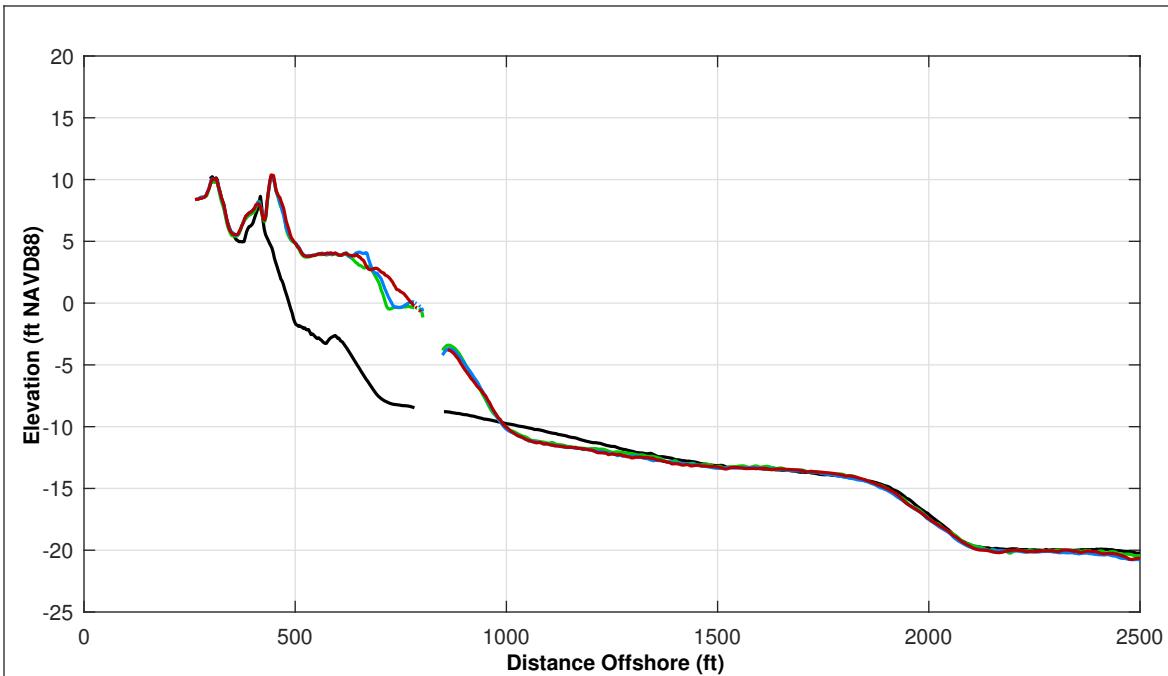
**LEGEND:**

APR 2025	MAY 2017
NOV 2024	OCT 2016
MAY 2024	USACE Design Template
	USACE Nourishment Threshold

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.





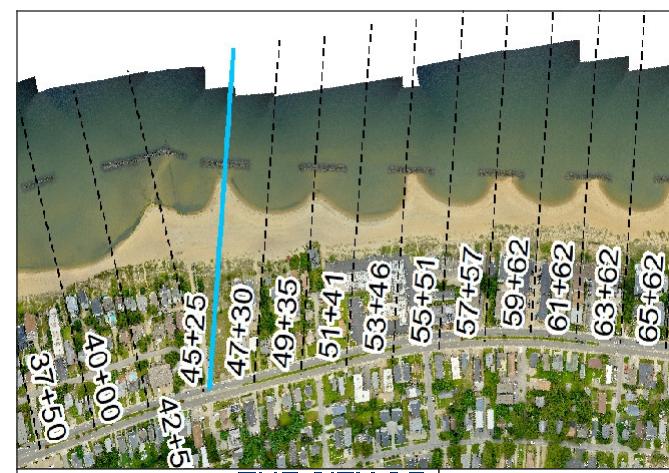
Survey Transect 45+25	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	43.17 ft	32.94 ft
Volume Change Above -15 ft NAVD88	3.23 cy/ft	2.60 cy/ft
Volume Change Above 0 ft NAVD88	6.28 cy/ft	2.64 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	+ 151.0 ft	

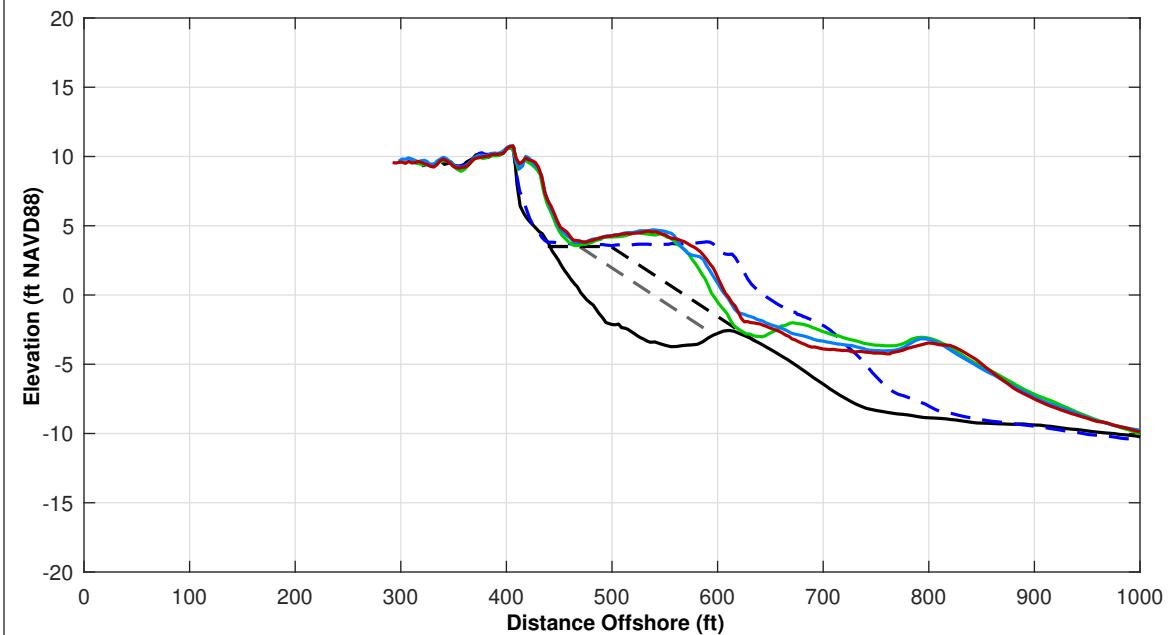
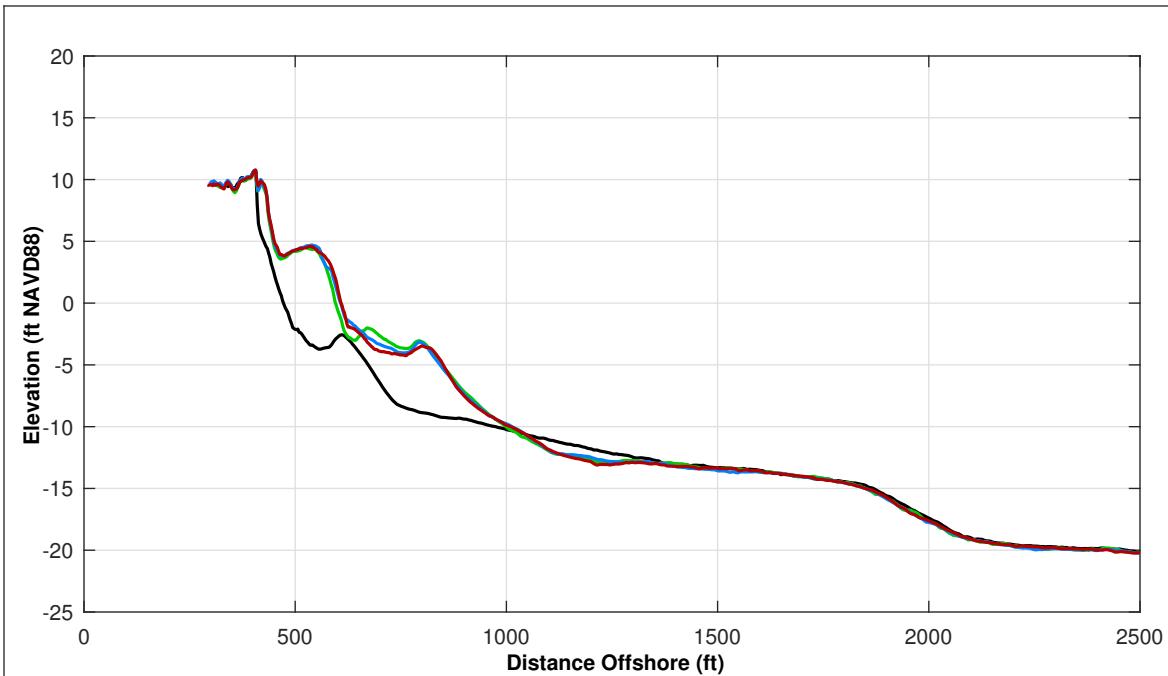
**LEGEND:**

MAY 2017	—
APR 2025	—
OCT 2016	—
NOV 2024	—
USACE Design Template	—
MAY 2024	—
USACE Nourishment Threshold	—

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.

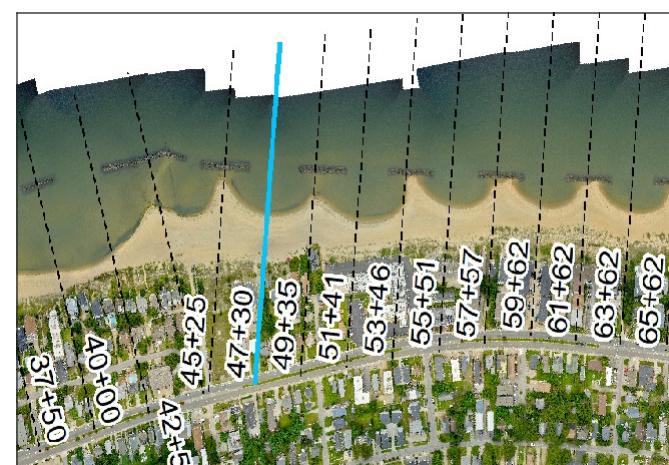


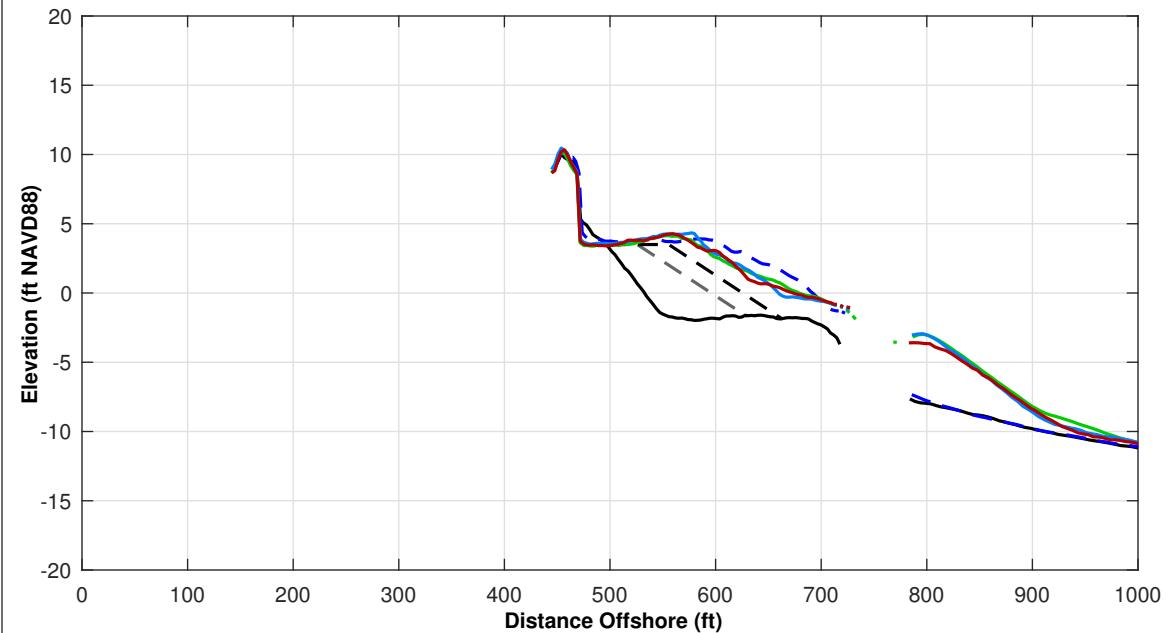
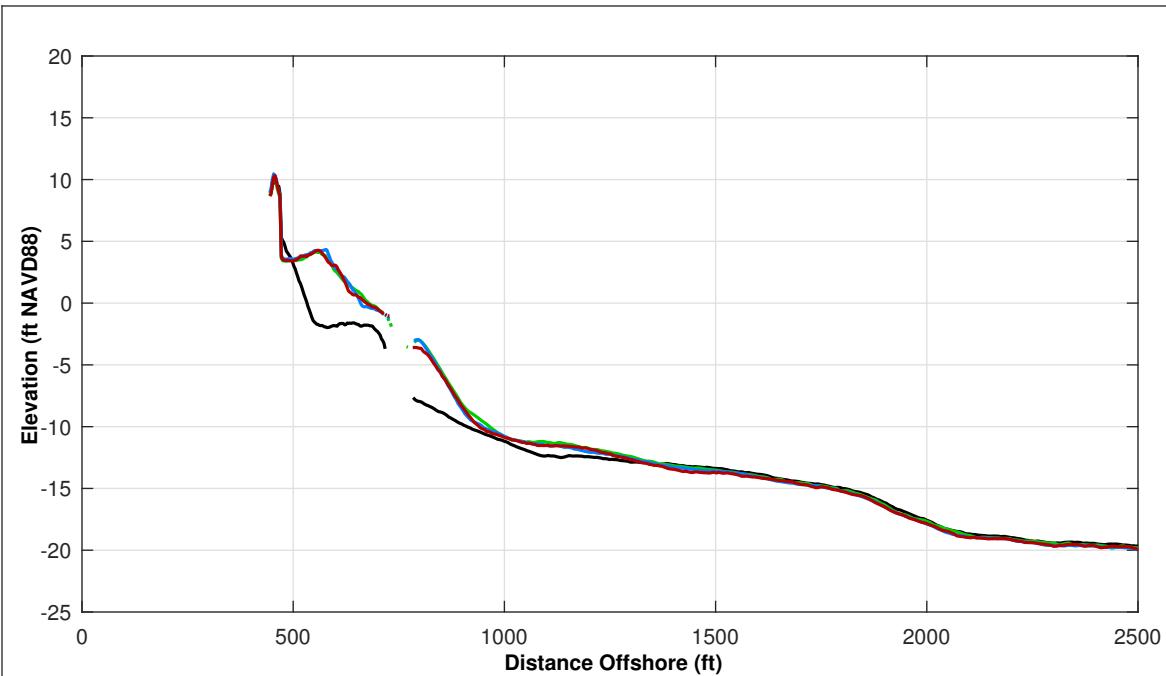


Survey Transect 47+30	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	12.50 ft	2.85 ft
Volume Change Above -15 ft NAVD88	-1.27 cy/ft	-2.52 cy/ft
Volume Change Above 0 ft NAVD88	3.24 cy/ft	0.34 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	+ 75.0 ft	

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.





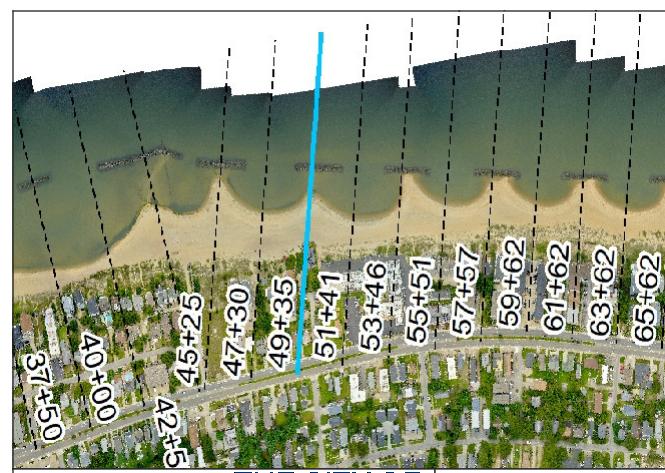
Survey Transect 49+35	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	-20.88 ft	-12.98 ft
Volume Change Above -15 ft NAVD88	-7.68 cy/ft	-2.94 cy/ft
Volume Change Above 0 ft NAVD88	-0.16 cy/ft	-1.18 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:		+ 24.0 ft

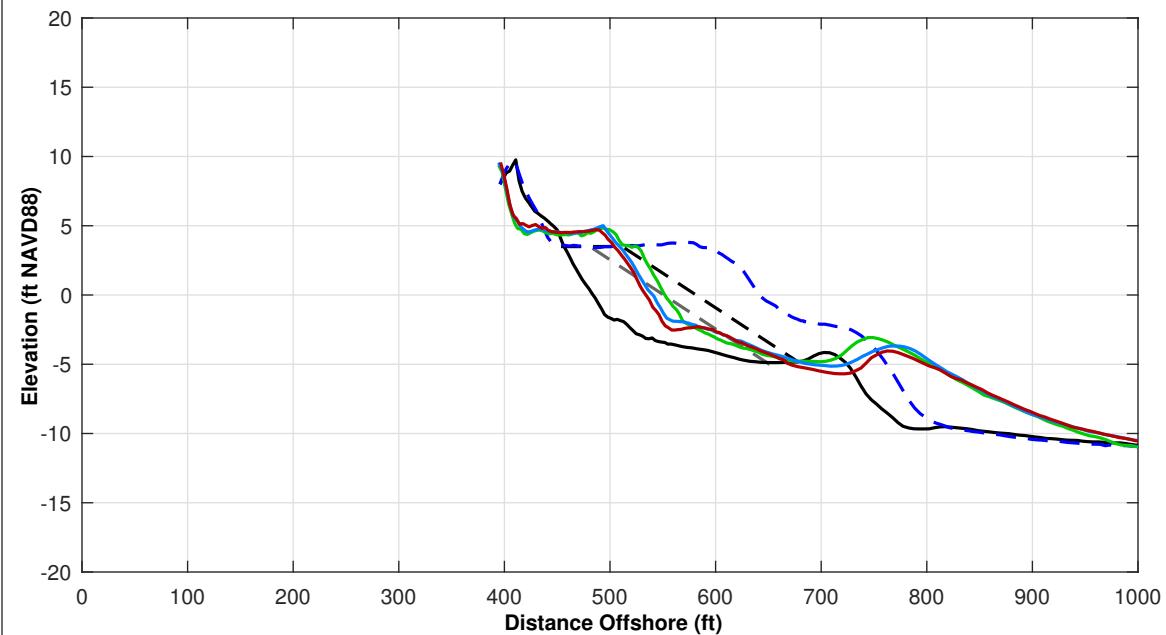
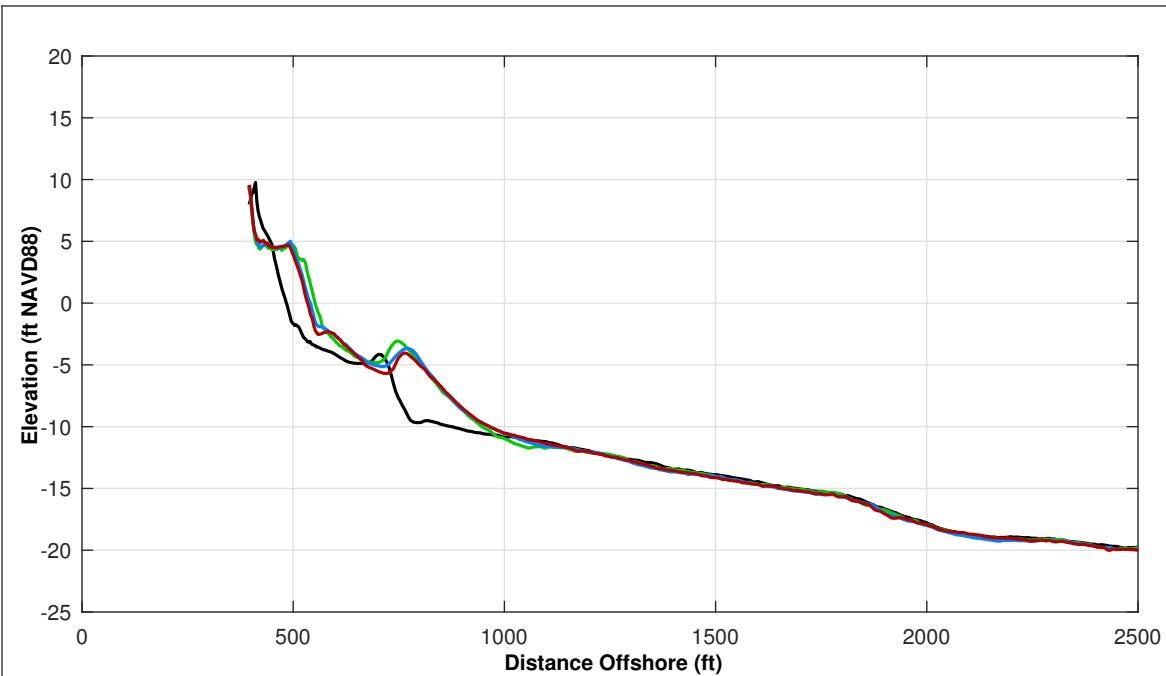
**LEGEND:**

APR 2025	MAY 2017
NOV 2024	OCT 2016
MAY 2024	USACE Design Template
	USACE Nourishment Threshold

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.

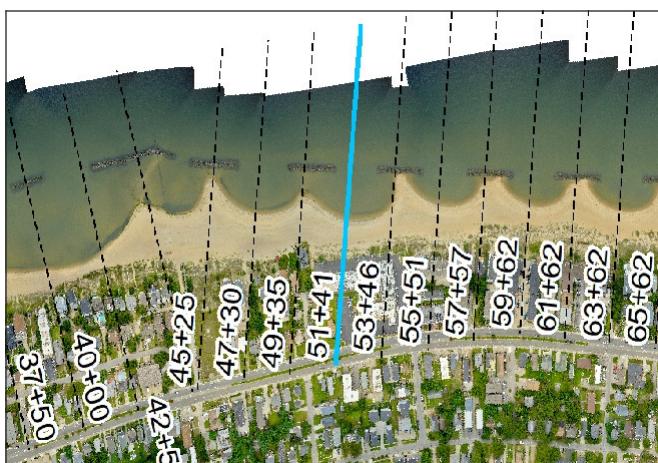


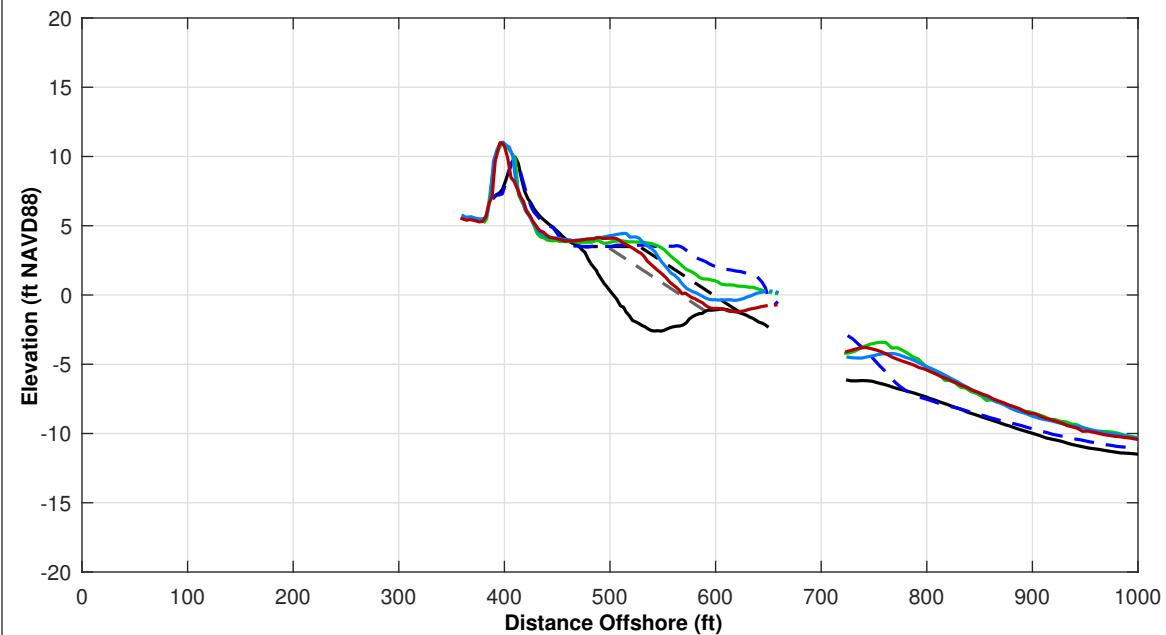
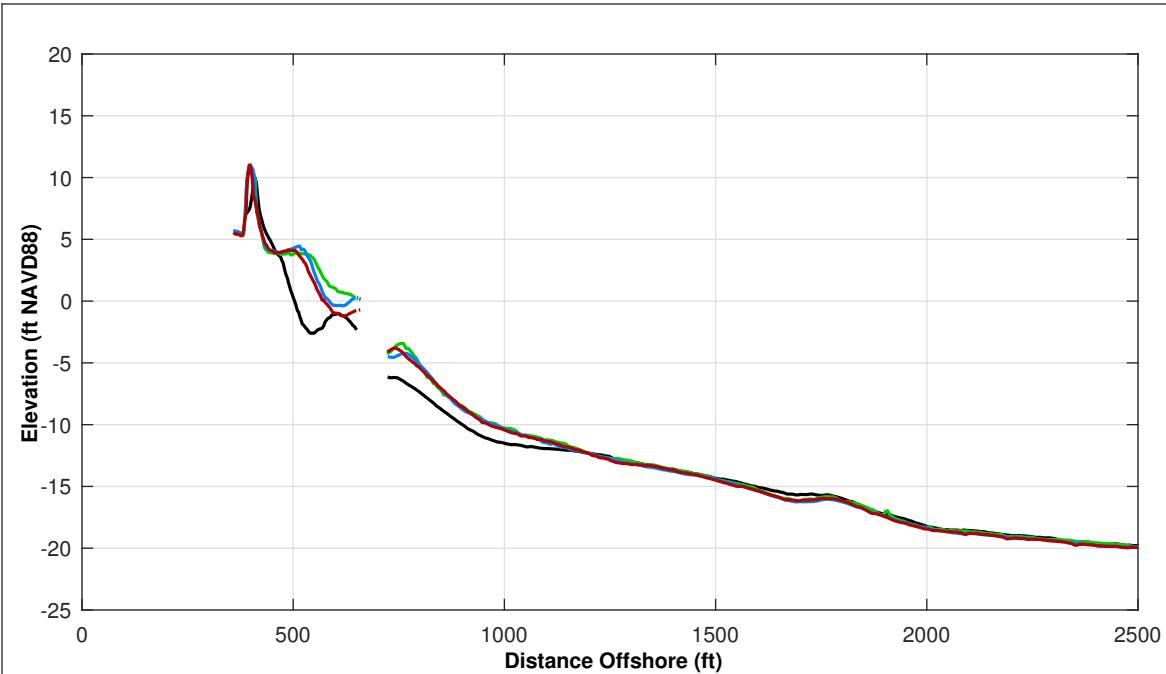


Survey Transect 51+41	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	-18.68 ft	-4.55 ft
Volume Change Above -15 ft NAVD88	-4.55 cy/ft	-3.03 cy/ft
Volume Change Above 0 ft NAVD88	-2.02 cy/ft	-0.54 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:		-10.0 ft
<b>LEGEND:</b>		
APR 2025	MAY 2017	—
NOV 2024	OCT 2016	—
MAY 2024	USACE Design Template	—
	USACE Nourishment Threshold	—

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.

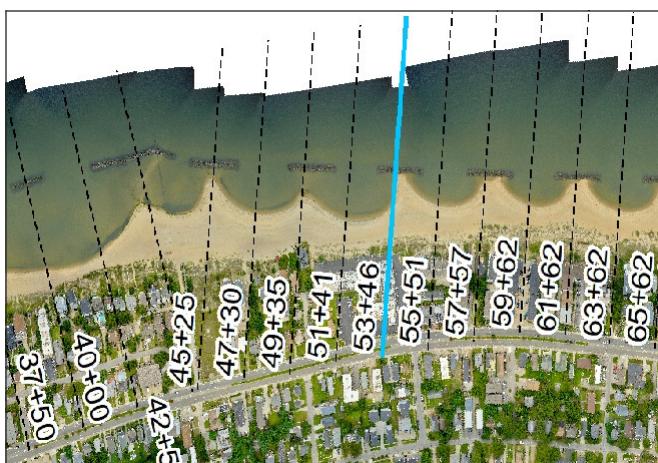


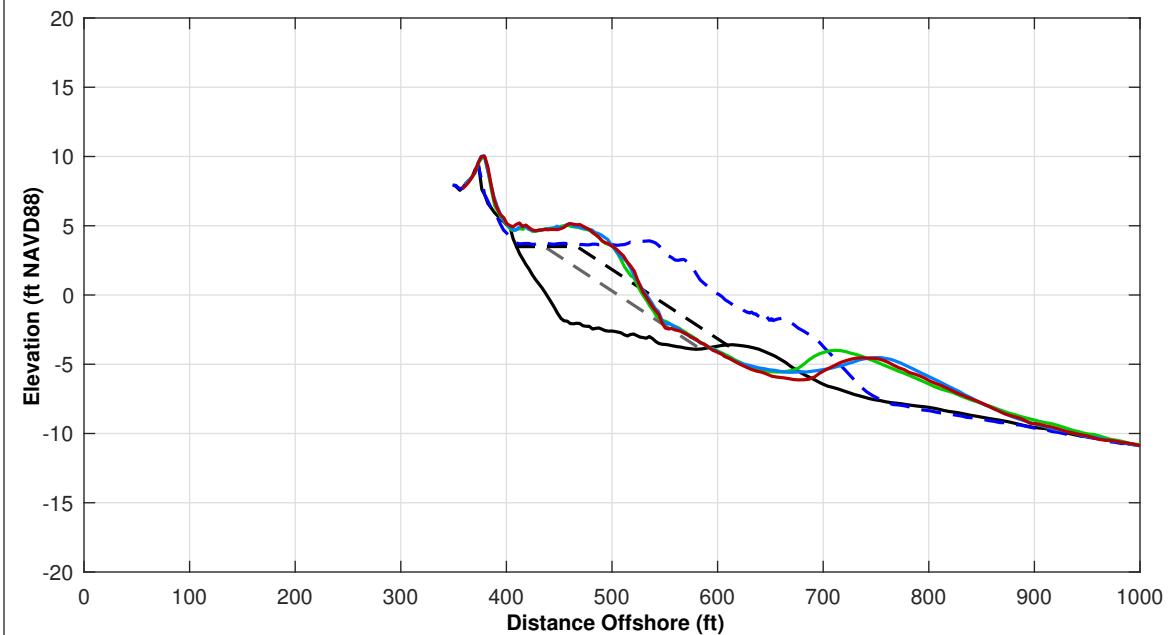
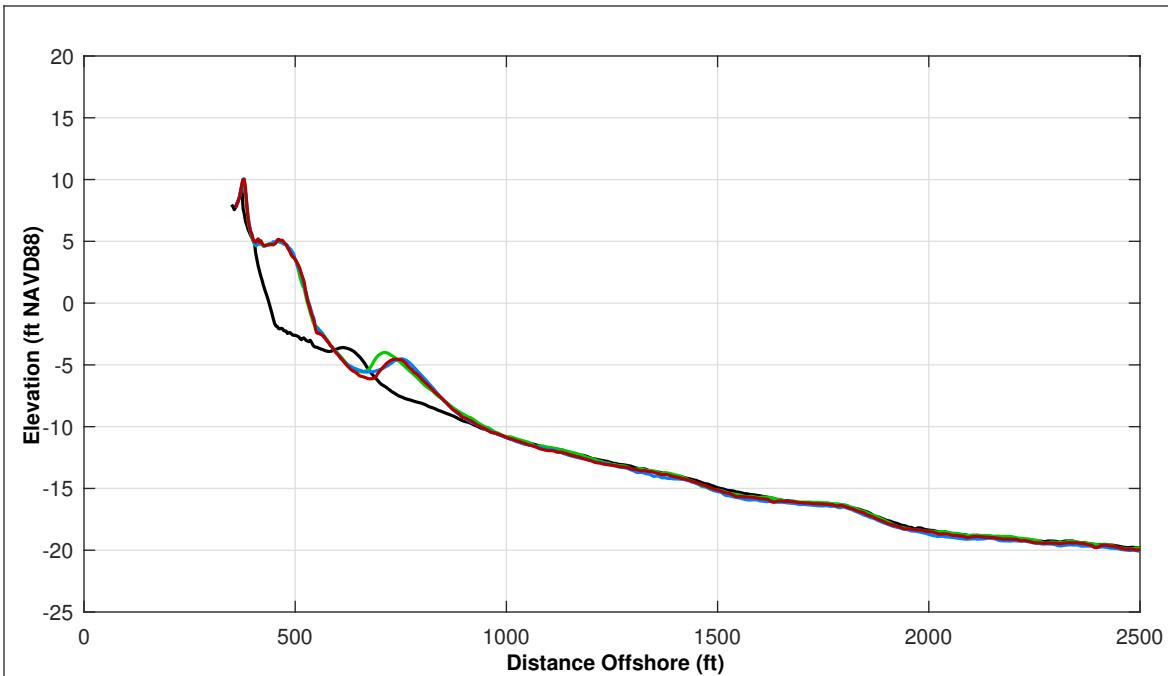


Survey Transect 53+46	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	-45.01 ft	-10.53 ft
Volume Change Above -15 ft NAVD88	-12.68 cy/ft	-5.02 cy/ft
Volume Change Above 0 ft NAVD88	-5.53 cy/ft	-3.00 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	-11.0 ft	

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.





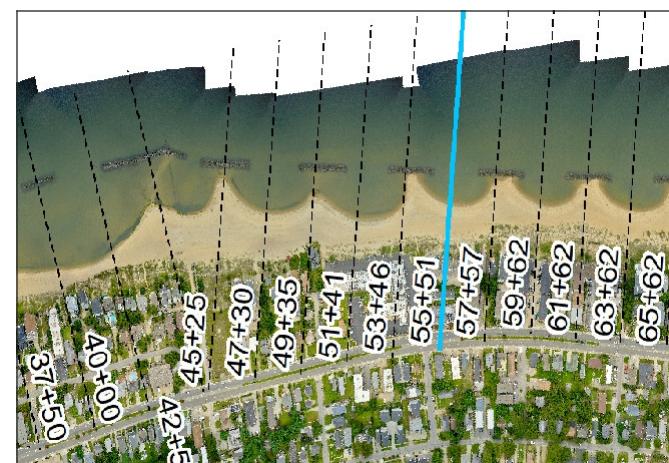
Survey Transect 55+51	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	2.38 ft	0.42 ft
Volume Change Above -15 ft NAVD88	-4.52 cy/ft	-0.71 cy/ft
Volume Change Above 0 ft NAVD88	0.90 cy/ft	0.12 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:		+ 33.0 ft

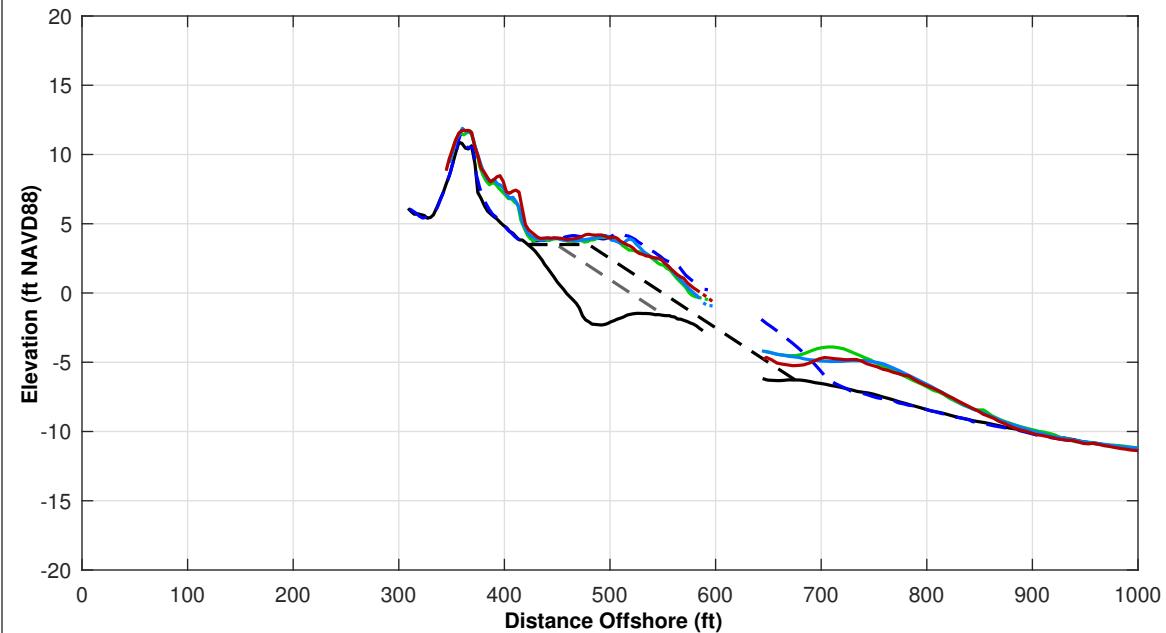
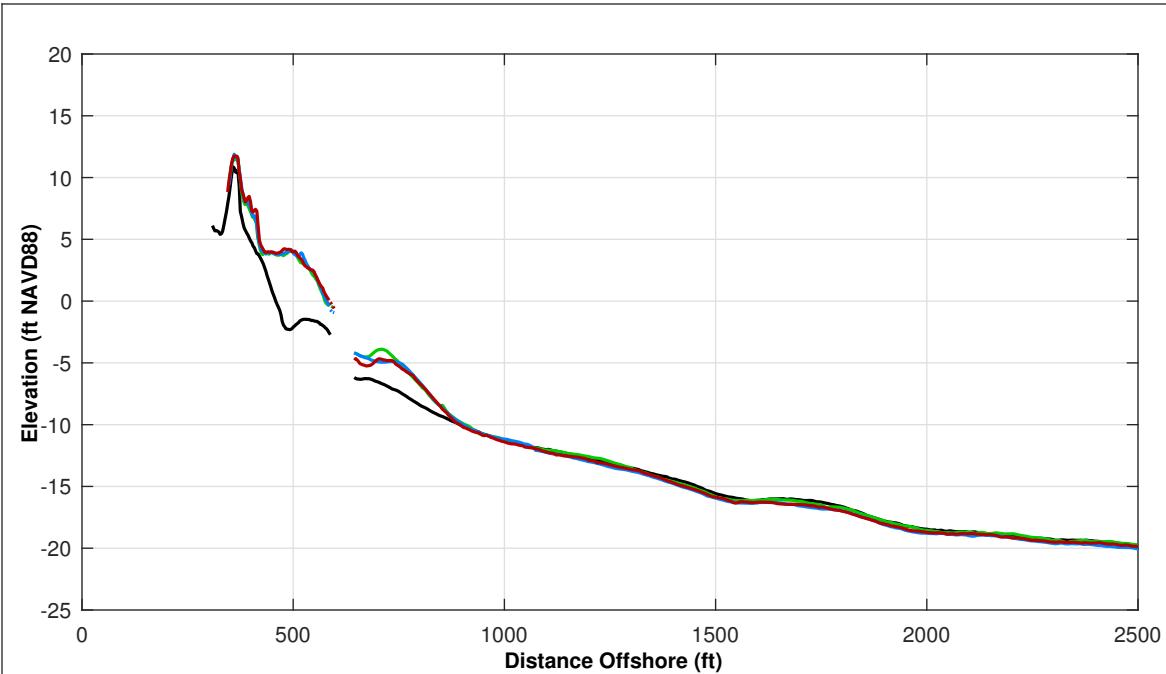
**LEGEND:**

APR 2025	MAY 2017
NOV 2024	OCT 2016
MAY 2024	USACE Design Template
	USACE Nourishment Threshold

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.

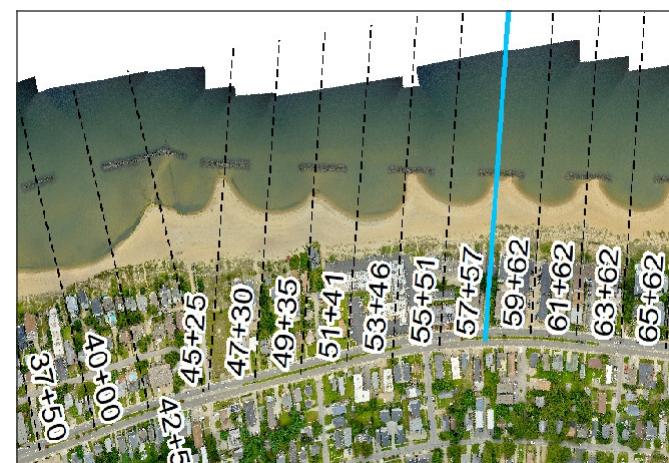


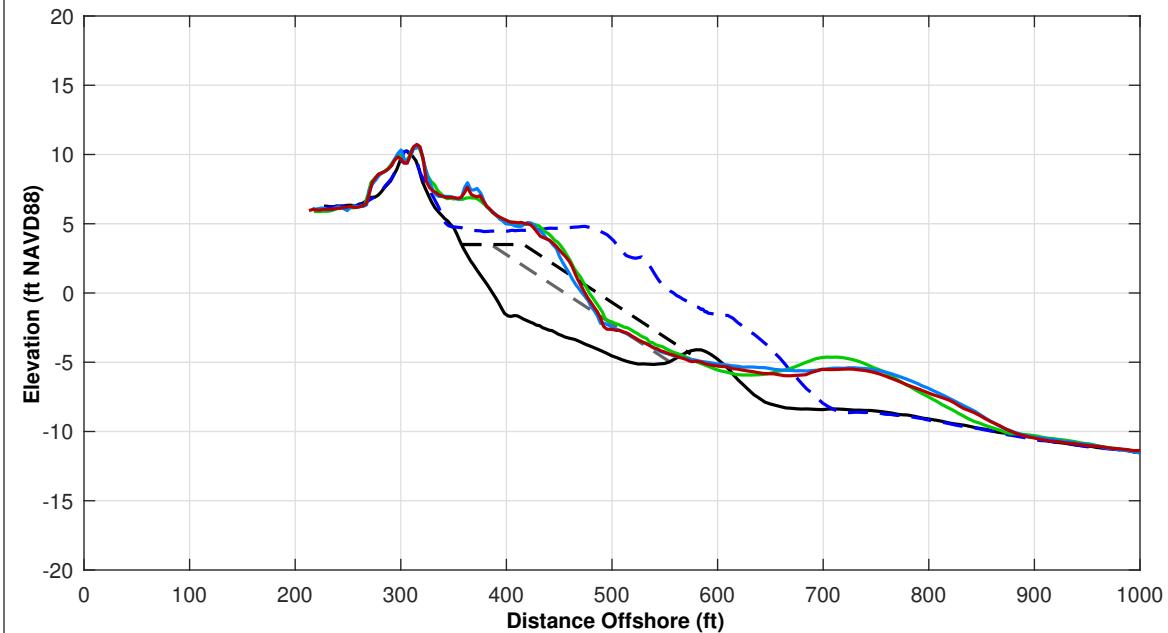
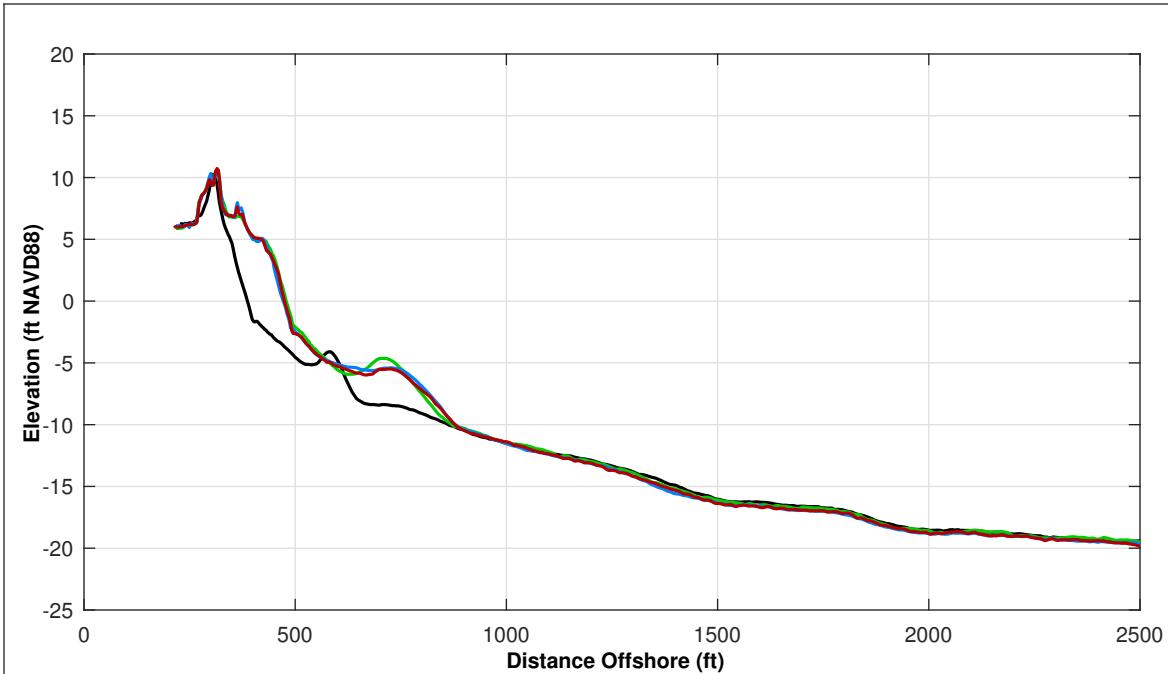


Survey Transect 57+57	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	6.45 ft	4.02 ft
Volume Change Above -15 ft NAVD88	-3.23 cy/ft	0.19 cy/ft
Volume Change Above 0 ft NAVD88	2.34 cy/ft	1.05 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:		+ 33.0 ft

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.





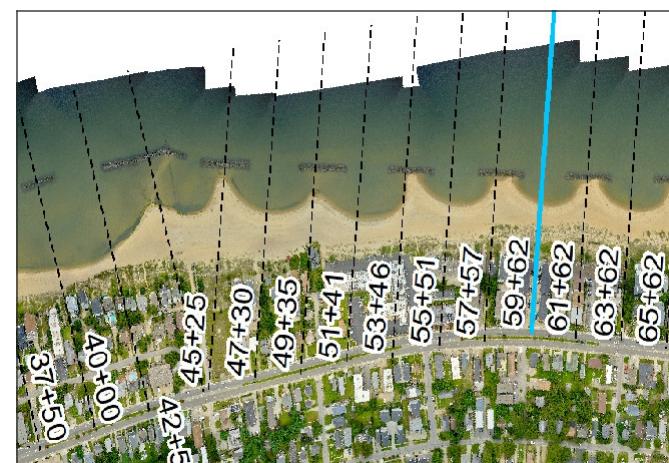
Survey Transect 59+62	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	-3.85 ft	4.90 ft
Volume Change Above -15 ft NAVD88	-5.28 cy/ft	-1.75 cy/ft
Volume Change Above 0 ft NAVD88	-0.77 cy/ft	0.20 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	+ 25.0 ft	

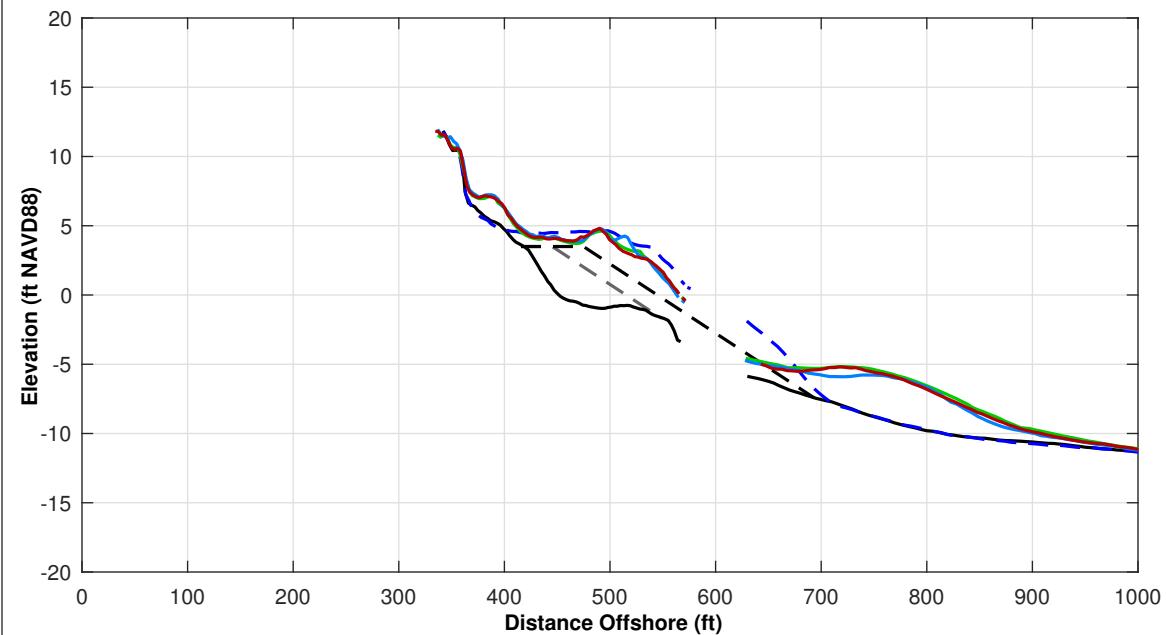
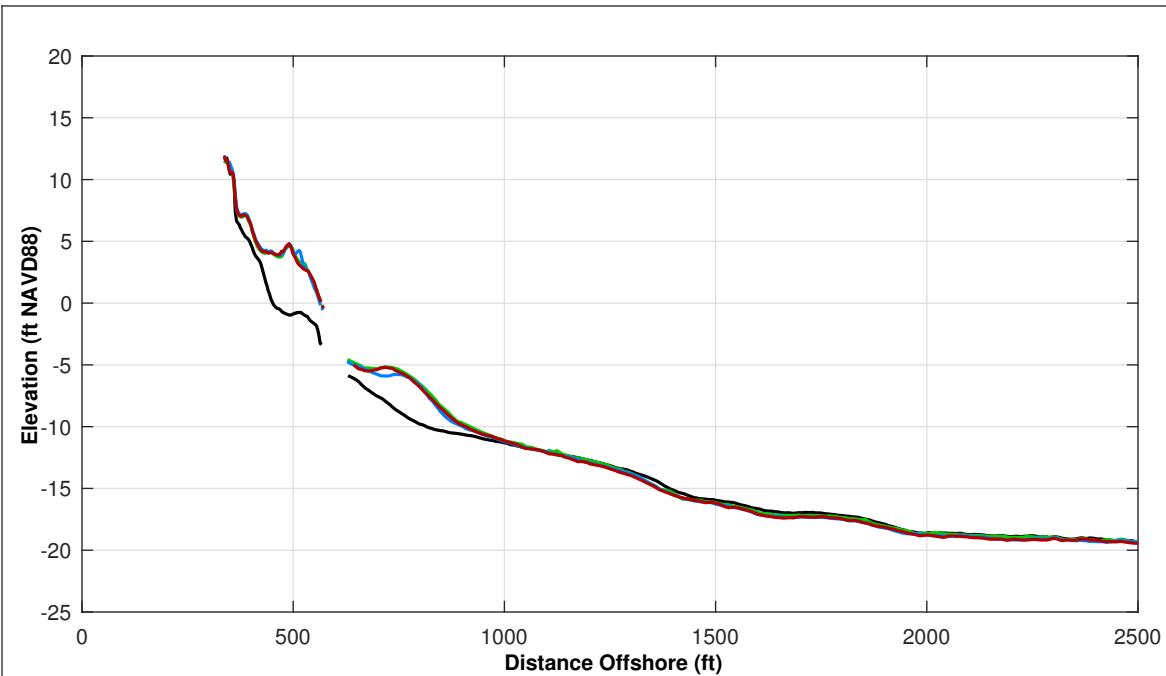
**LEGEND:**

APR 2025	MAY 2017
NOV 2024	OCT 2016
MAY 2024	USACE Design Template
	USACE Nourishment Threshold

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.



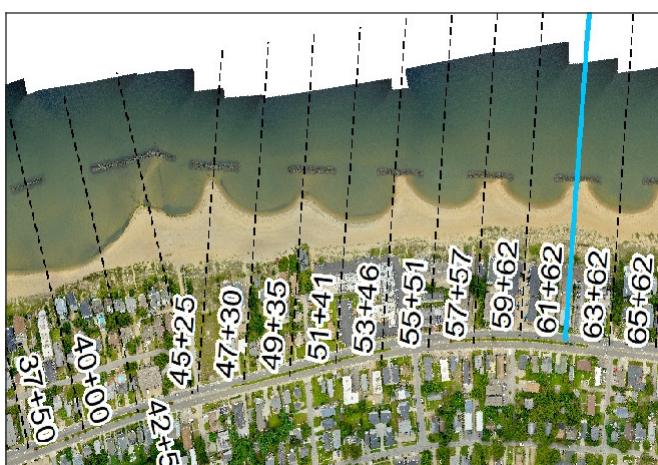


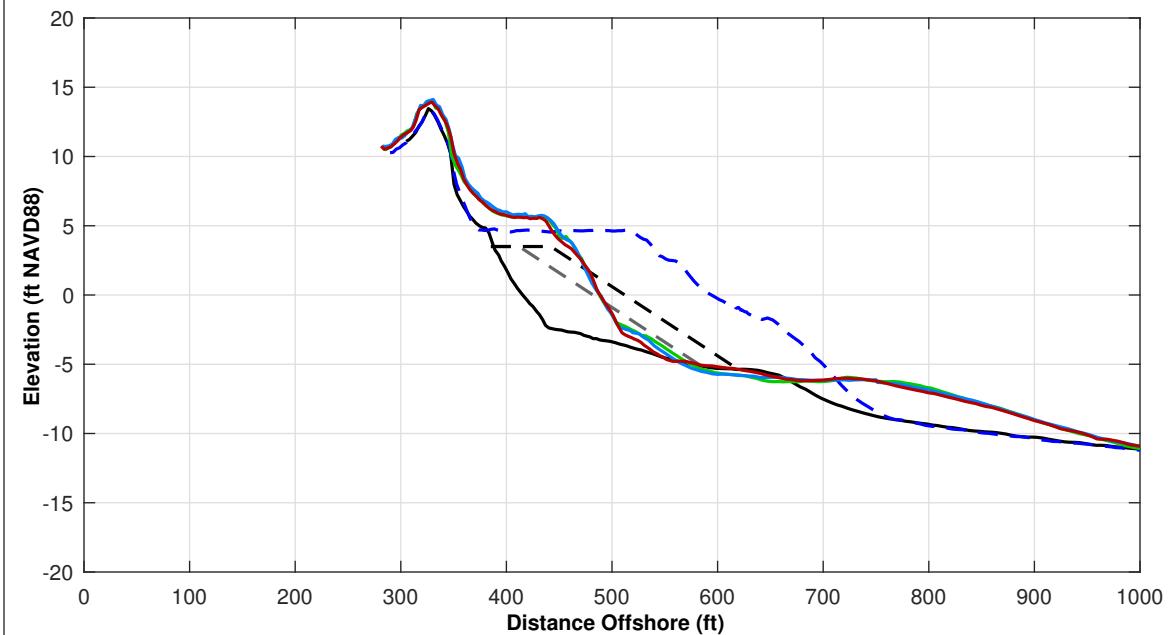
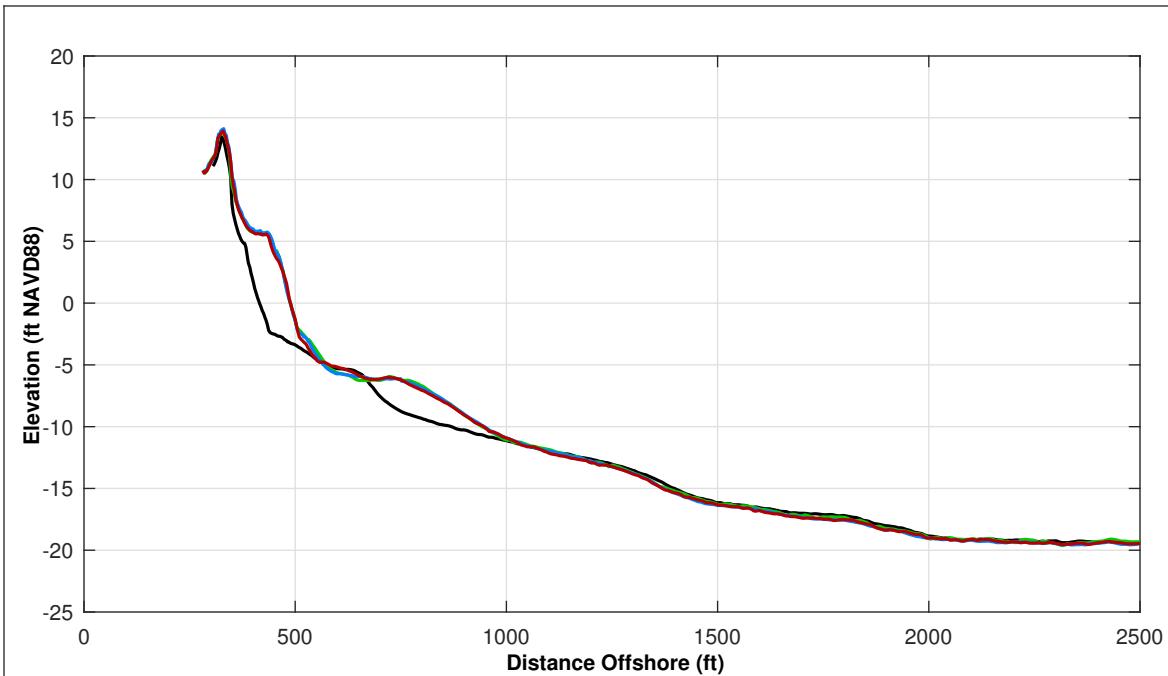
Survey Transect 61+62	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	0.52 ft	3.11 ft
Volume Change Above -15 ft NAVD88	-4.27 cy/ft	0.15 cy/ft
Volume Change Above 0 ft NAVD88	0.15 cy/ft	-0.89 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:		+ 31.0 ft

LEGEND:	MAY 2017	APR 2025	OCT 2016	NOV 2024	USACE Design Template	MAY 2024	USACE Nourishment Threshold
---------	----------	----------	----------	----------	-----------------------	----------	-----------------------------

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.

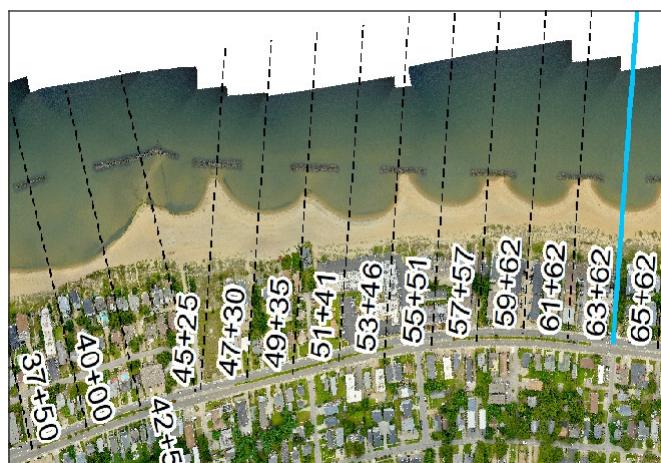


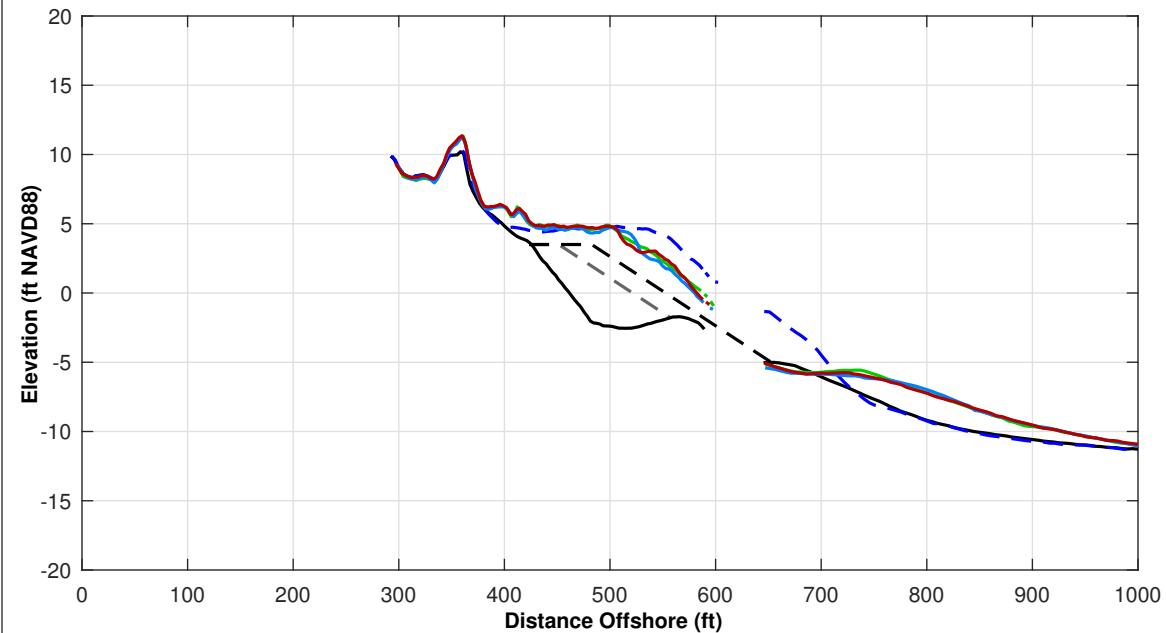
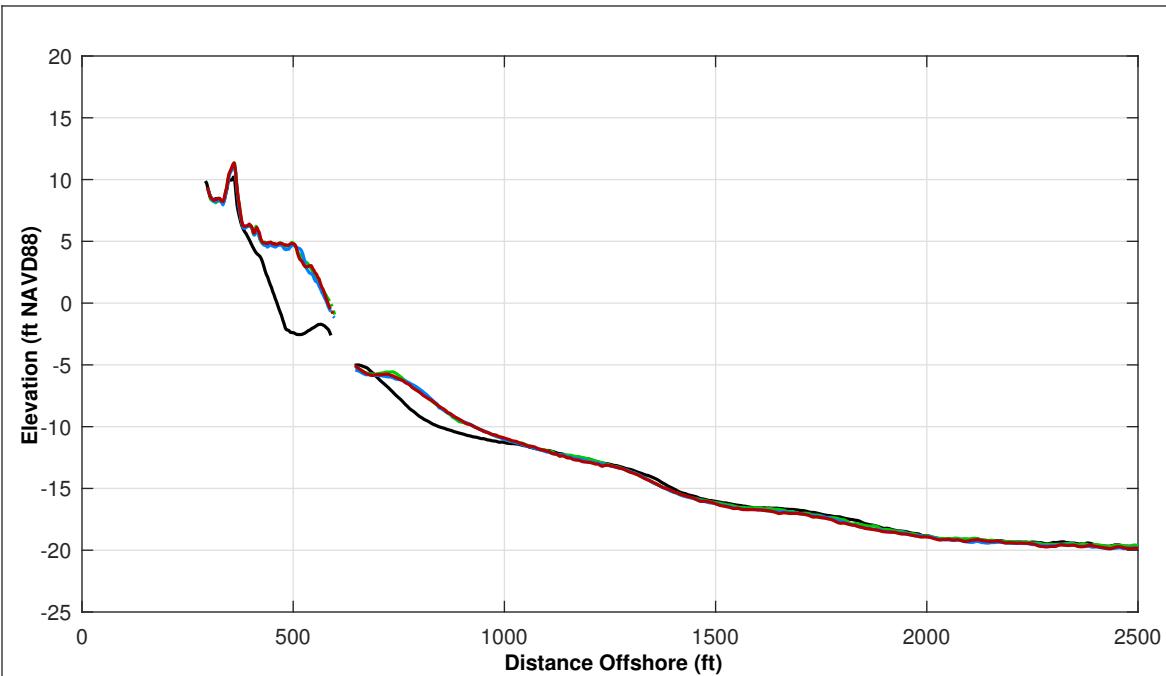


Survey Transect 63+62	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	1.26 ft	2.55 ft
Volume Change Above -15 ft NAVD88	-2.76 cy/ft	-2.93 cy/ft
Volume Change Above 0 ft NAVD88	-0.35 cy/ft	-1.50 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:		+ 16.0 ft
<b>LEGEND:</b>		
APR 2025	MAY 2017	---
NOV 2024	OCT 2016	—
MAY 2024	USACE Design Template	— - -
	USACE Nourishment Threshold	— - - -

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.





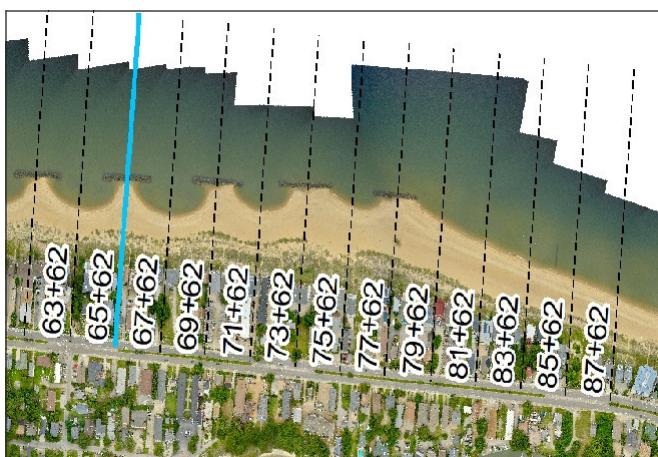
Survey Transect 65+62	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	-0.25 ft	5.38 ft
Volume Change Above -15 ft NAVD88	-1.10 cy/ft	1.67 cy/ft
Volume Change Above 0 ft NAVD88	0.47 cy/ft	1.61 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	+ 34.0 ft	

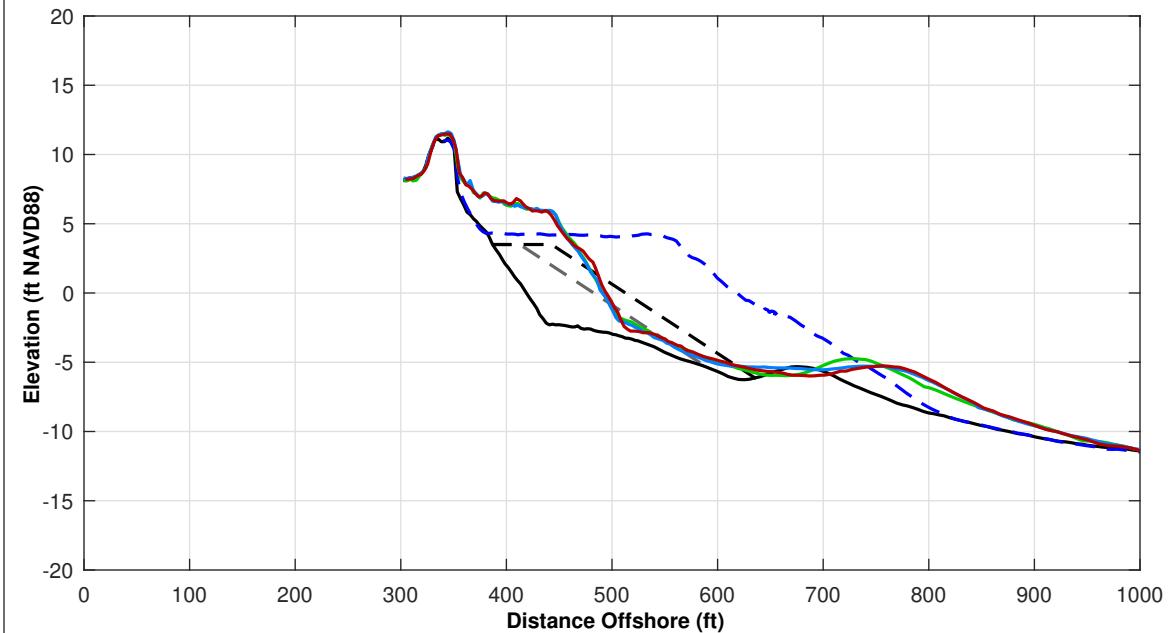
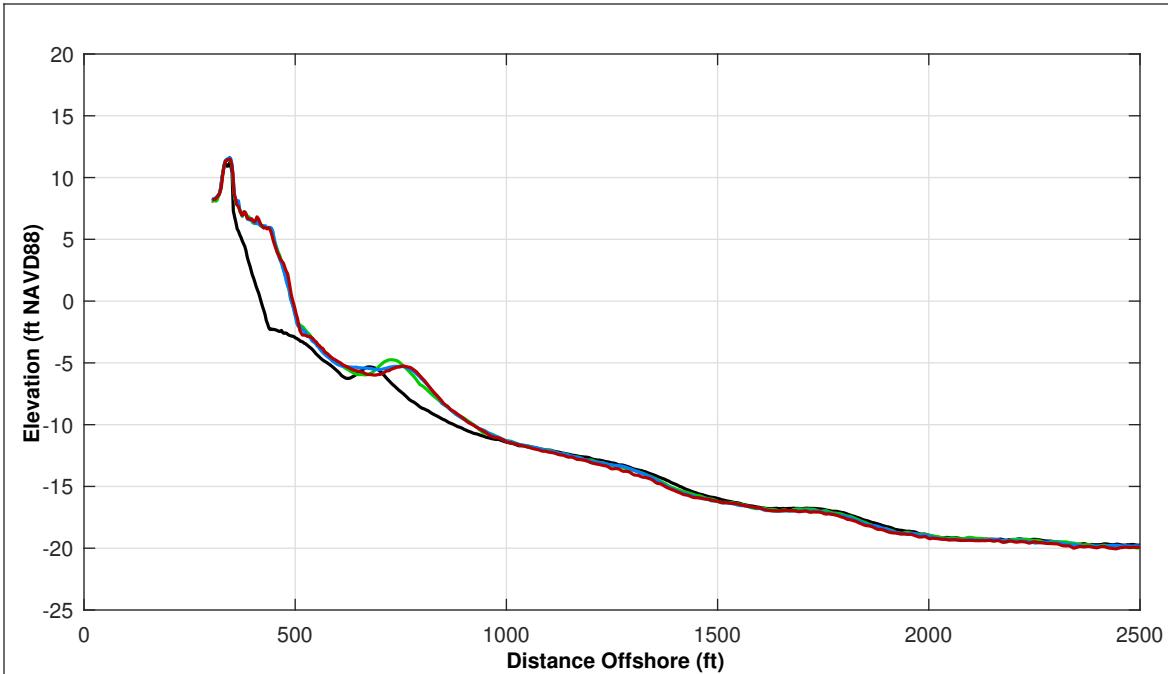
**LEGEND:**

APR 2025	MAY 2017
OCT 2016	USACE Design Template
NOV 2024	USACE Nourishment Threshold
MAY 2024	—

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.



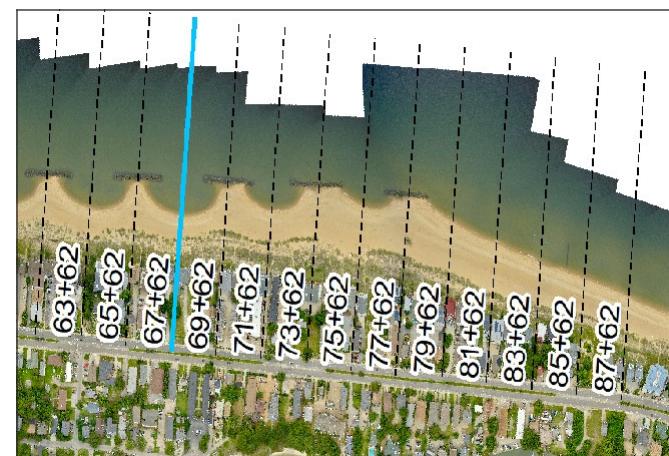


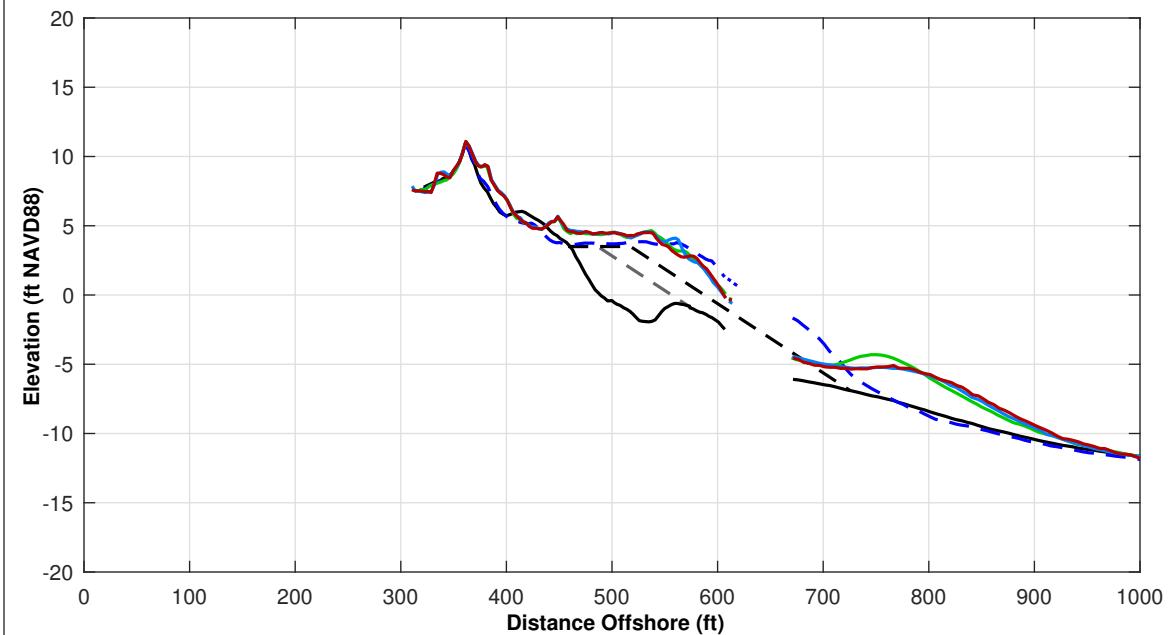
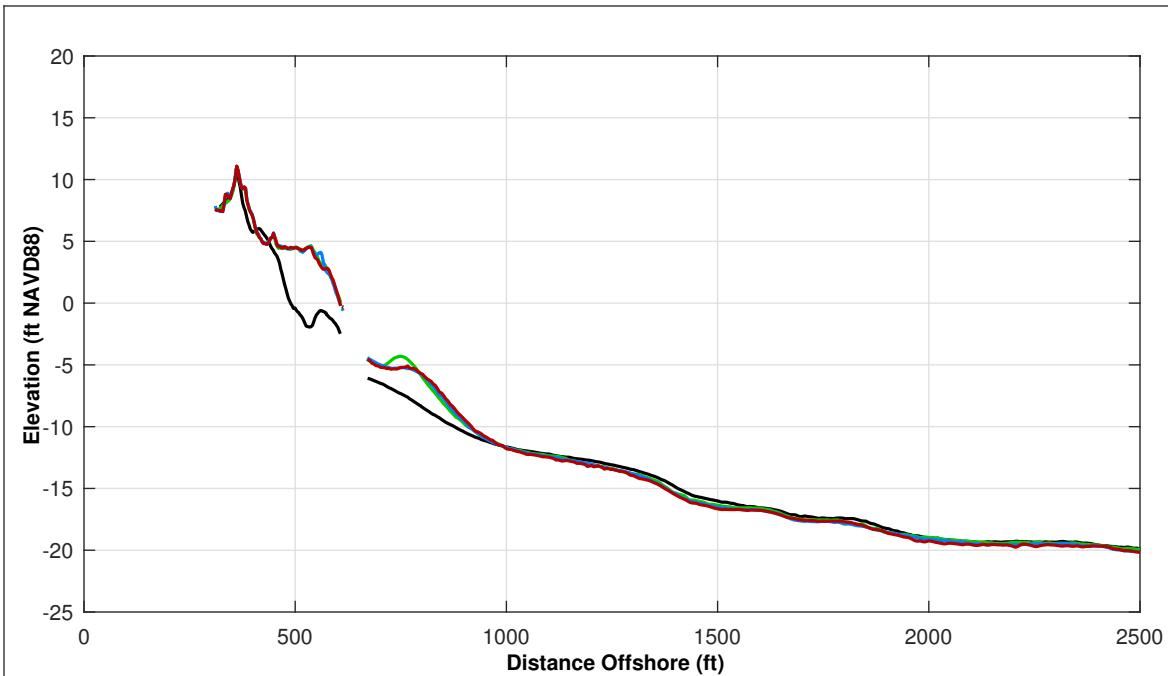
Survey Transect 67+62	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	3.90 ft	2.68 ft
Volume Change Above -15 ft NAVD88	-1.83 cy/ft	-2.37 cy/ft
Volume Change Above 0 ft NAVD88	0.43 cy/ft	0.32 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:		+ 18.0 ft

LEGEND:	
APR 2025	MAY 2017
OCT 2016	—
USACE Design Template	—
USACE Nourishment Threshold	—

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.

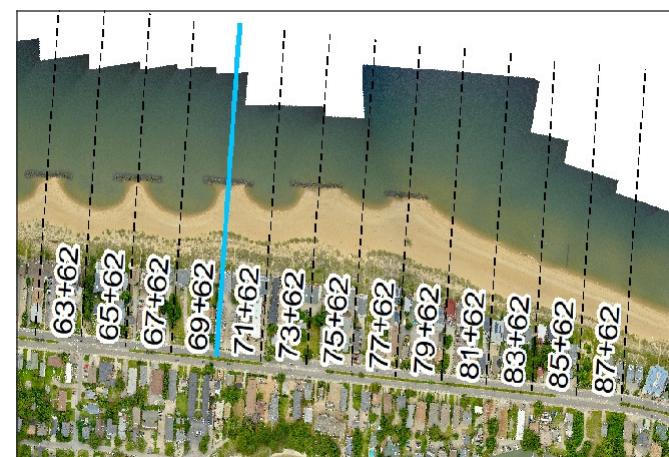


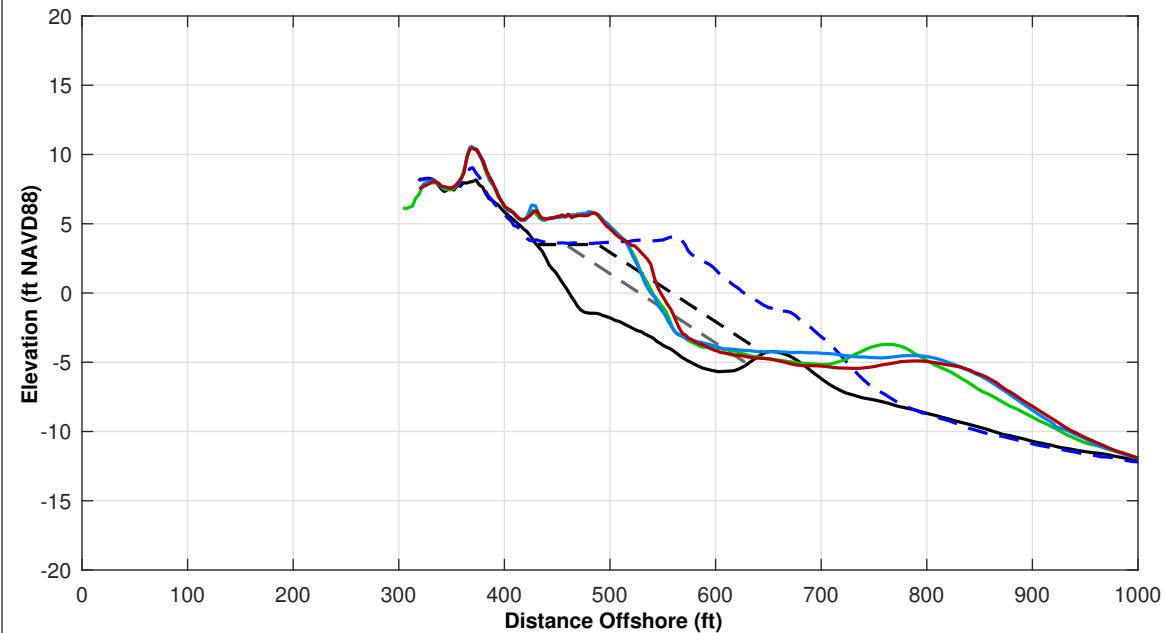
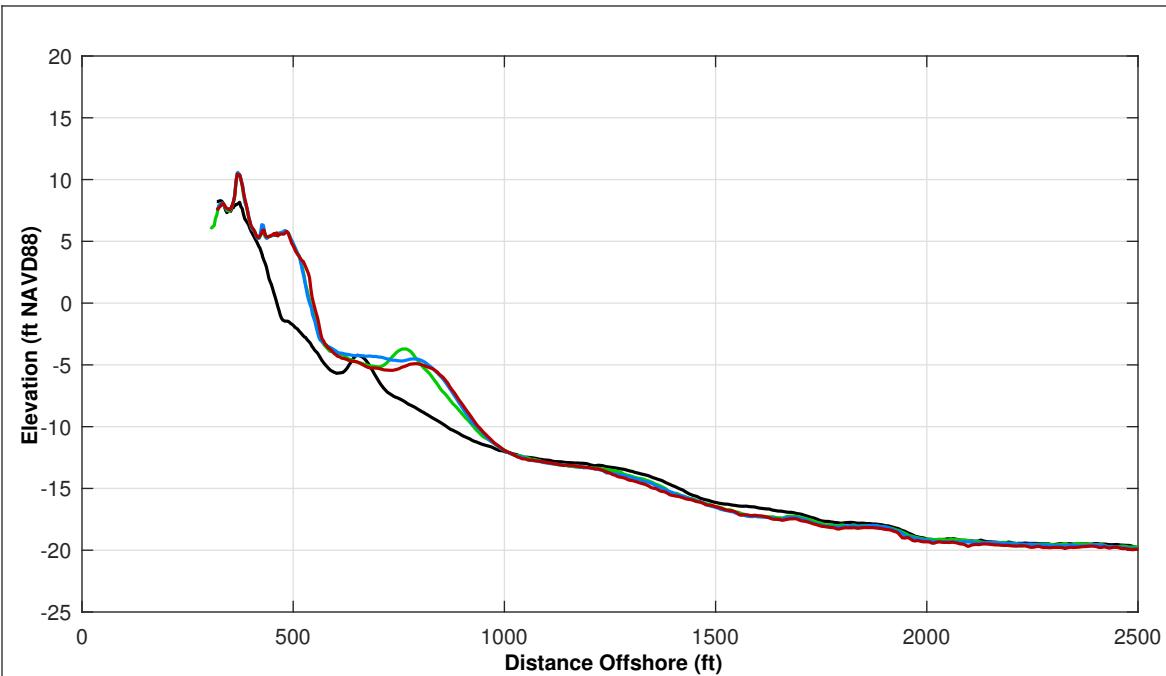


Survey Transect 69+62	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	1.36 ft	2.87 ft
Volume Change Above -15 ft NAVD88	-1.42 cy/ft	-0.67 cy/ft
Volume Change Above 0 ft NAVD88	0.11 cy/ft	-0.45 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:		+ 33.0 ft

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.





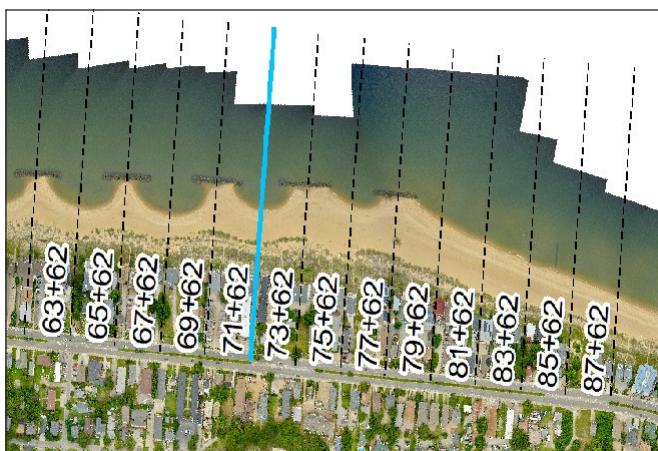
Survey Transect 71+62	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	9.05 ft	10.74 ft
Volume Change Above -15 ft NAVD88	0.57 cy/ft	-2.97 cy/ft
Volume Change Above 0 ft NAVD88	1.22 cy/ft	1.02 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:		+ 29.0 ft

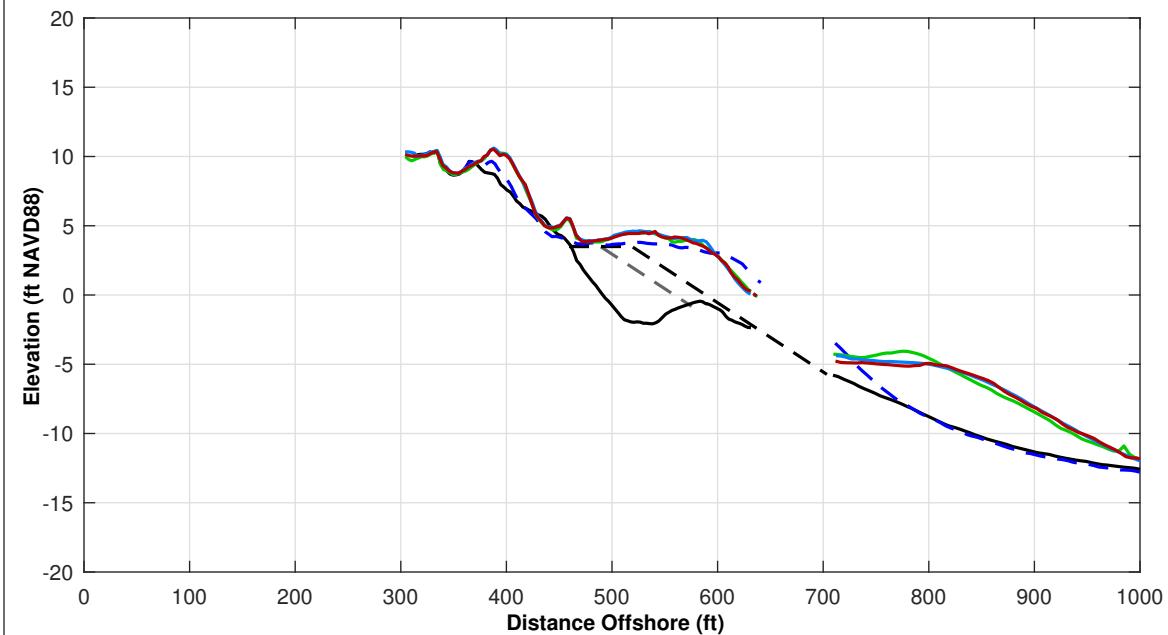
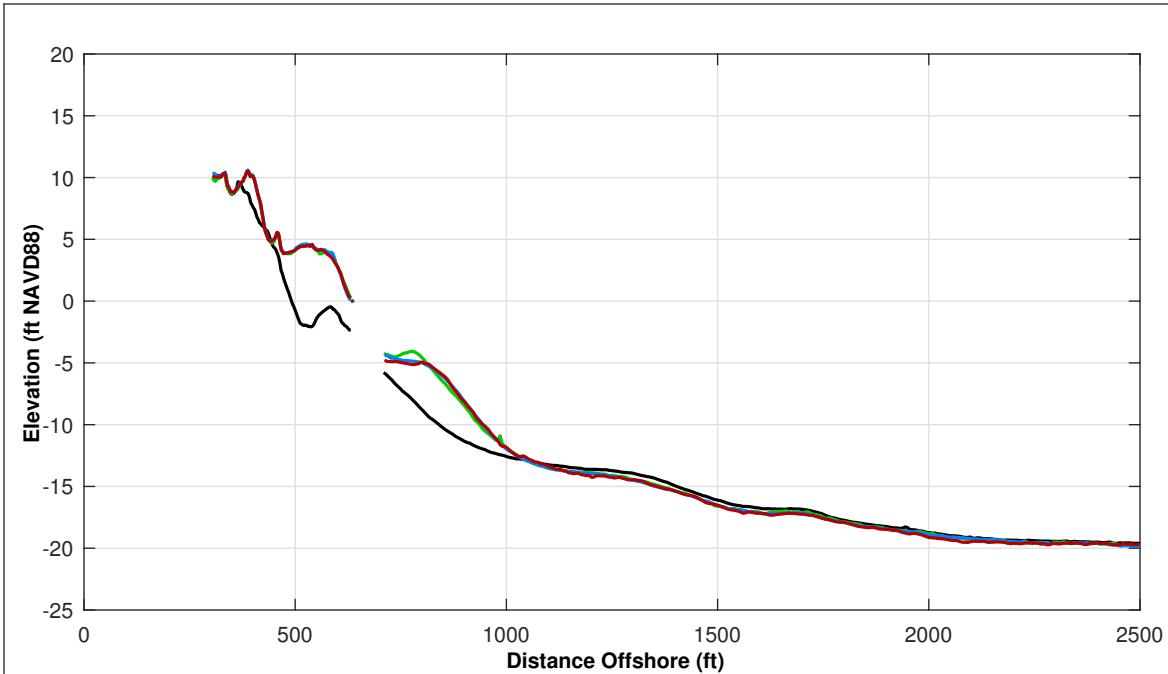
**LEGEND:**

APR 2025	MAY 2017
OCT 2016	USACE Design Template
NOV 2024	USACE Nourishment Threshold
MAY 2024	

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.





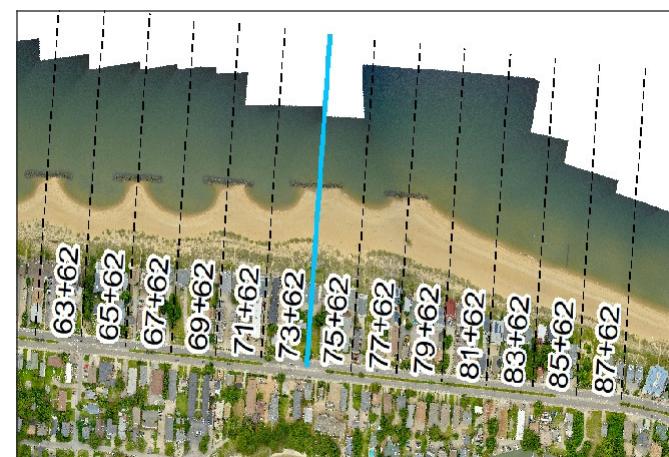
Survey Transect 73+62	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	-1.88 ft	2.02 ft
Volume Change Above -15 ft NAVD88	-1.04 cy/ft	-1.69 cy/ft
Volume Change Above 0 ft NAVD88	0.39 cy/ft	-0.72 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:		+ 67.0 ft

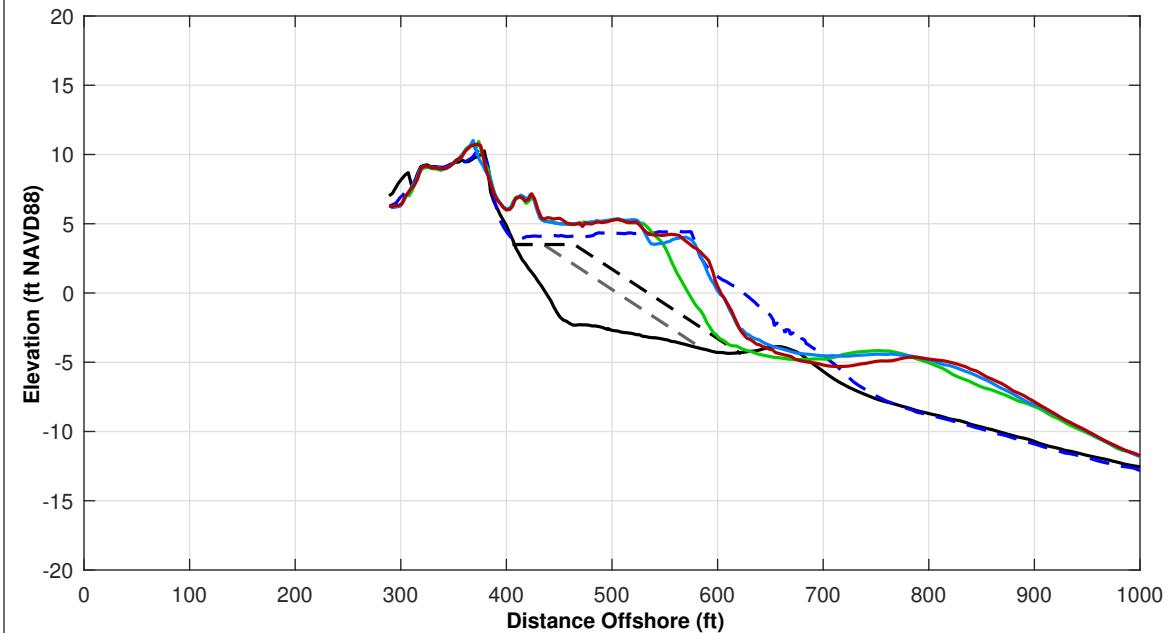
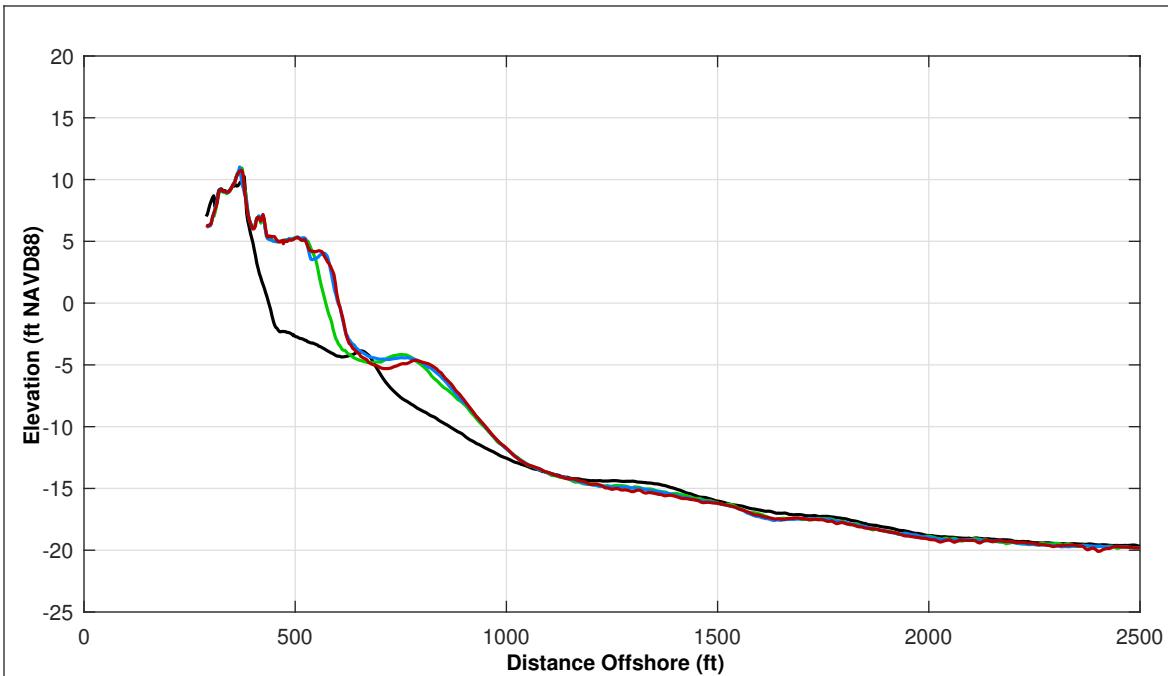
**LEGEND:**

APR 2025	MAY 2017
NOV 2024	OCT 2016
MAY 2024	USACE Design Template
	USACE Nourishment Threshold

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.



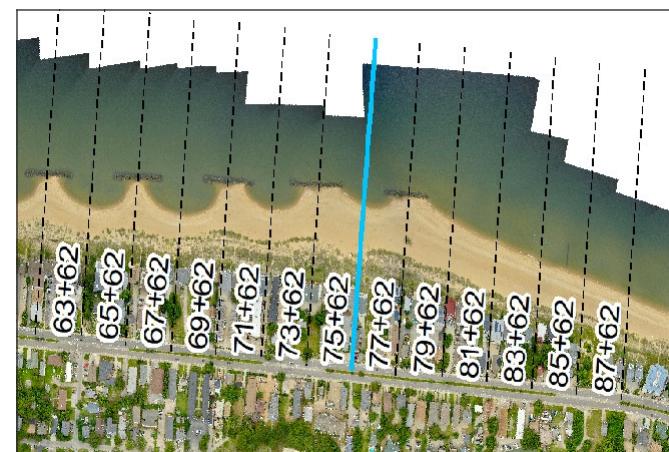


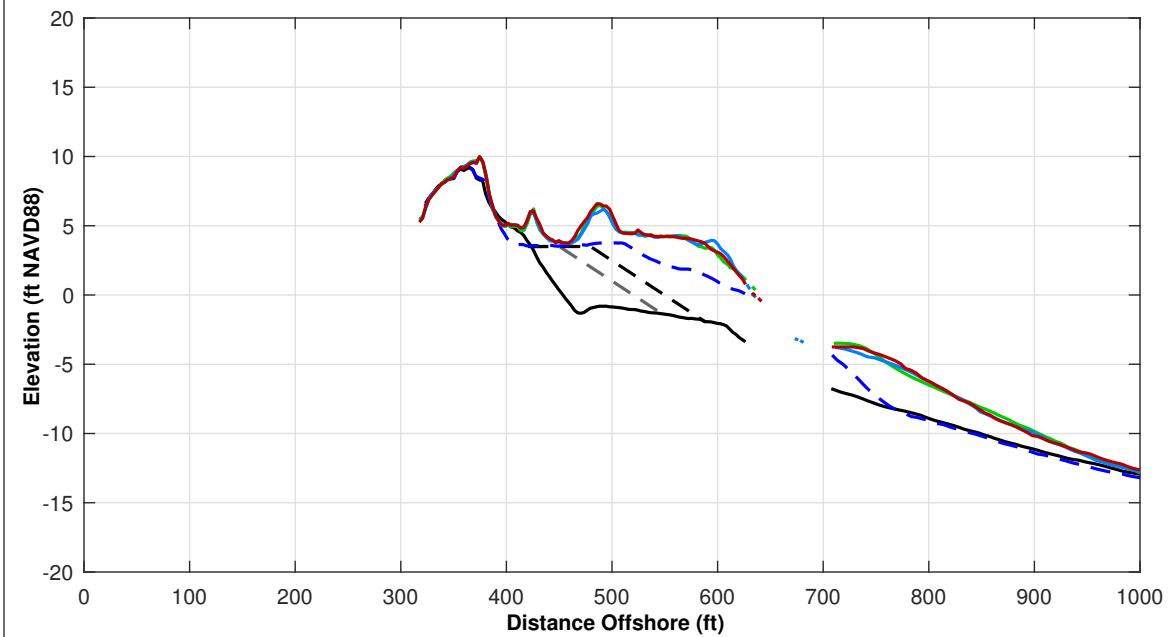
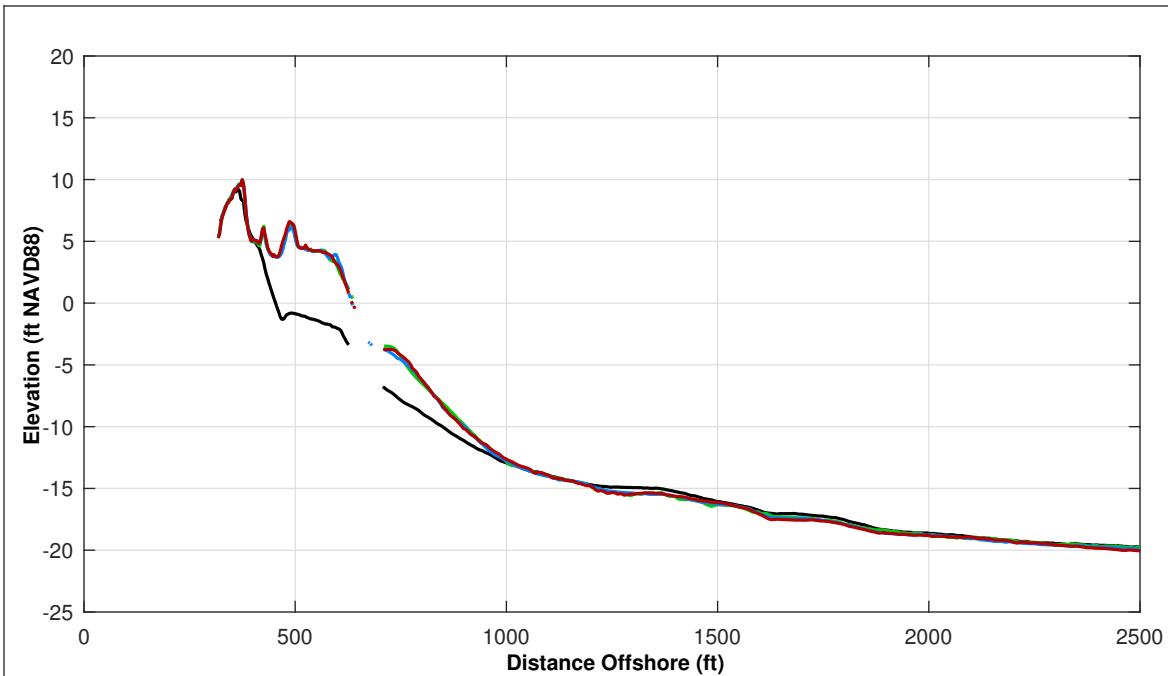
Survey Transect 75+62	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	32.45 ft	3.80 ft
Volume Change Above -15 ft NAVD88	10.43 cy/ft	-0.56 cy/ft
Volume Change Above 0 ft NAVD88	4.86 cy/ft	1.08 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	+ 110.0 ft	

LEGEND:	MAY 2017	OCT 2016	USACE Design Template	USACE Nourishment Threshold
APR 2025	—	—	—	—

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.





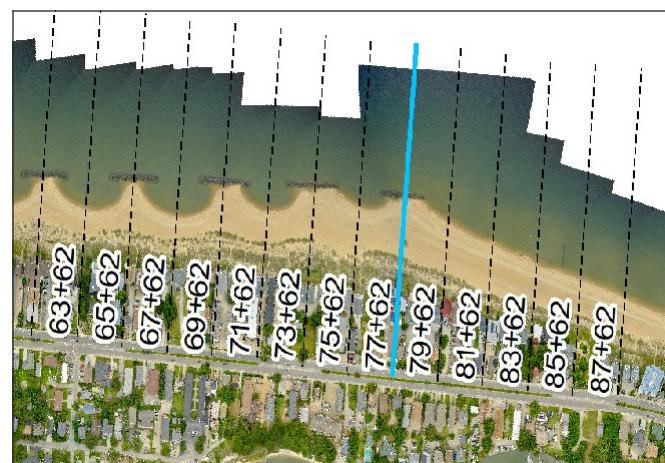
Survey Transect	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	-3.45 ft	-1.05 ft
Volume Change Above -15 ft NAVD88	0.69 cy/ft	1.80 cy/ft
Volume Change Above 0 ft NAVD88	0.70 cy/ft	0.44 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	+ 111.0 ft	

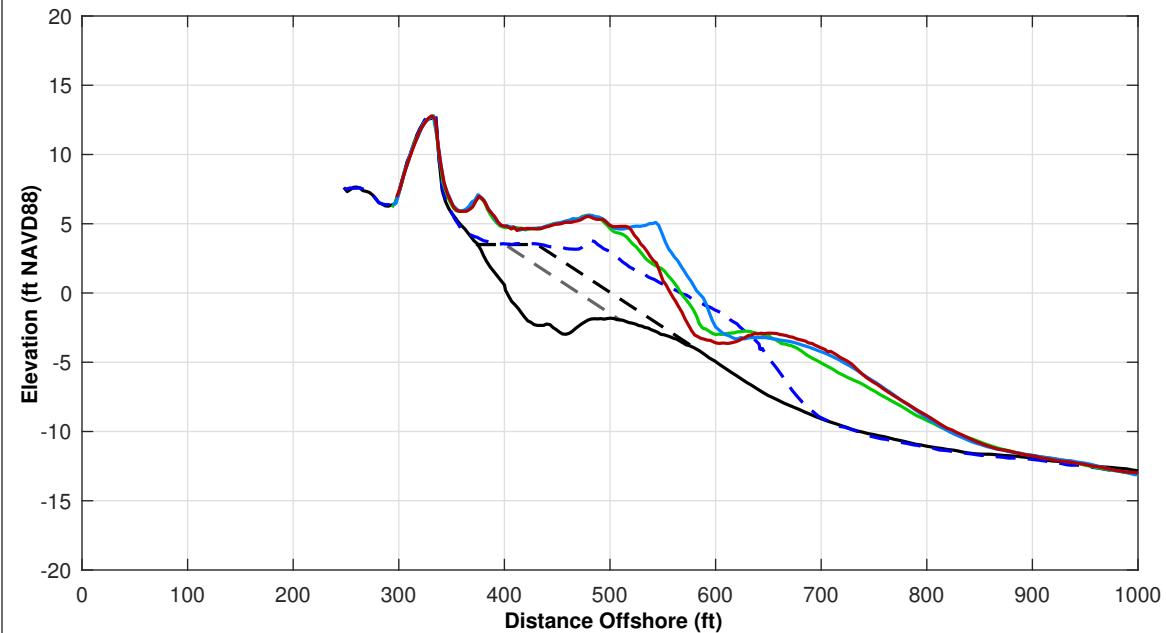
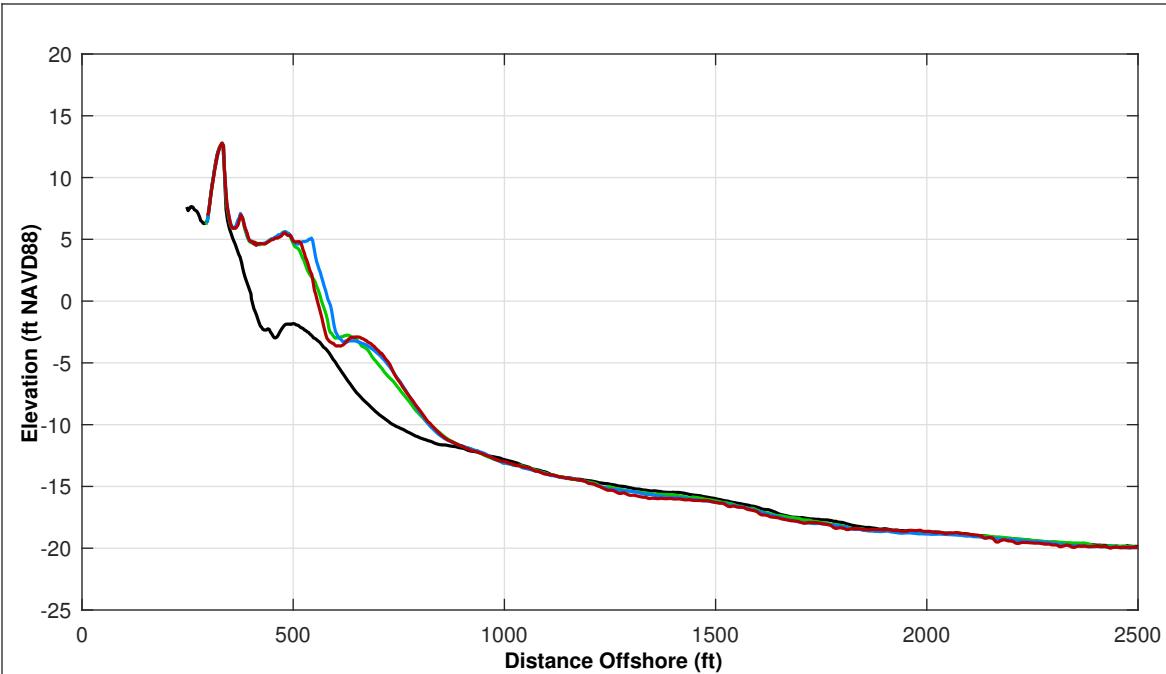
#### LEGEND:

APR 2025 (Red solid)  
 OCT 2016 (Blue solid)  
 NOV 2024 (Green solid)  
 MAY 2017 (Black dashed)  
 USACE Design Template (Blue dashed)  
 USACE Nourishment Threshold (Black dash-dot)

#### Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.



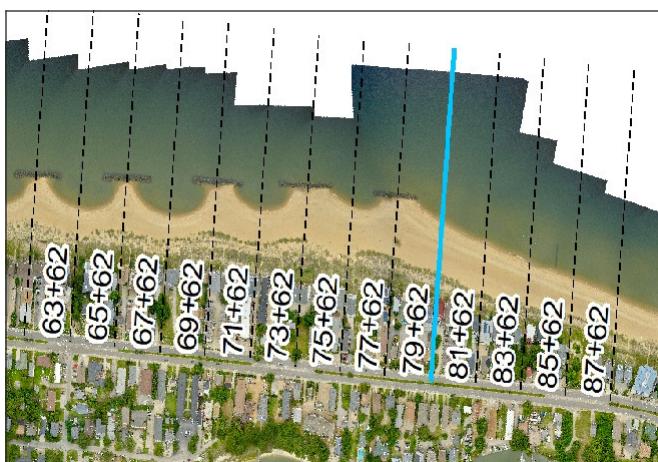


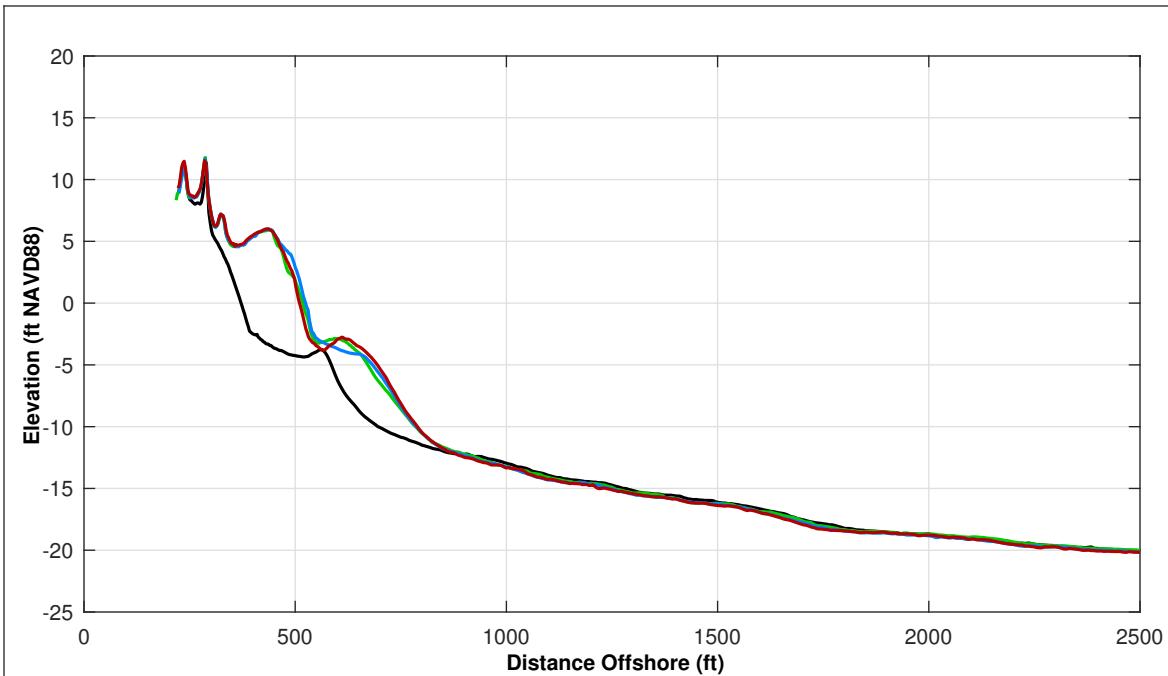
Survey Transect 79+62	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	-8.49 ft	-25.81 ft
Volume Change Above -15 ft NAVD88	2.15 cy/ft	-6.84 cy/ft
Volume Change Above 0 ft NAVD88	0.42 cy/ft	-4.78 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	+ 98.0 ft	

LEGEND:	MAY 2017	—
APR 2025	OCT 2016	—
NOV 2024	USACE Design Template	—
MAY 2024	USACE Nourishment Threshold	—

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.





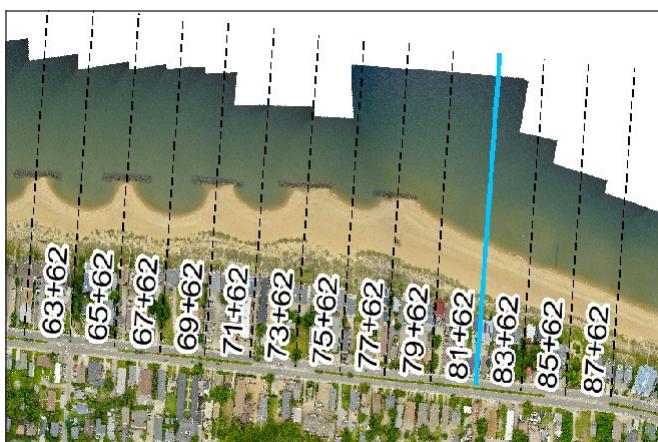
Survey Transect 81+62	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	-5.18 ft	-12.90 ft
Volume Change Above -15 ft NAVD88	1.50 cy/ft	-0.24 cy/ft
Volume Change Above 0 ft NAVD88	1.34 cy/ft	-1.31 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	+ 85.0 ft	

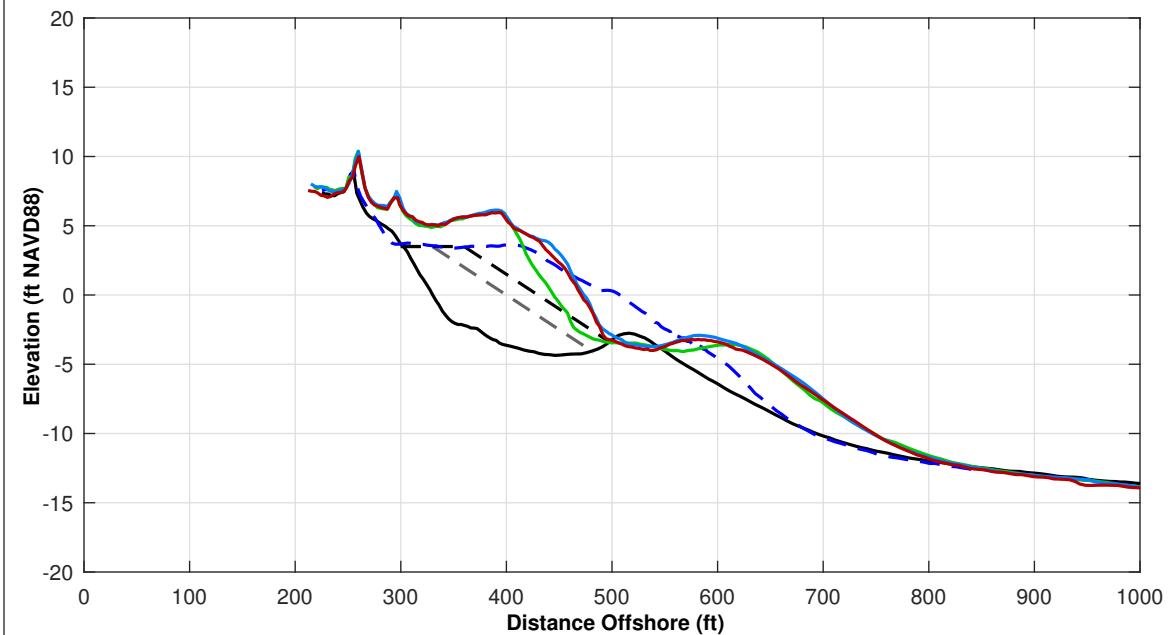
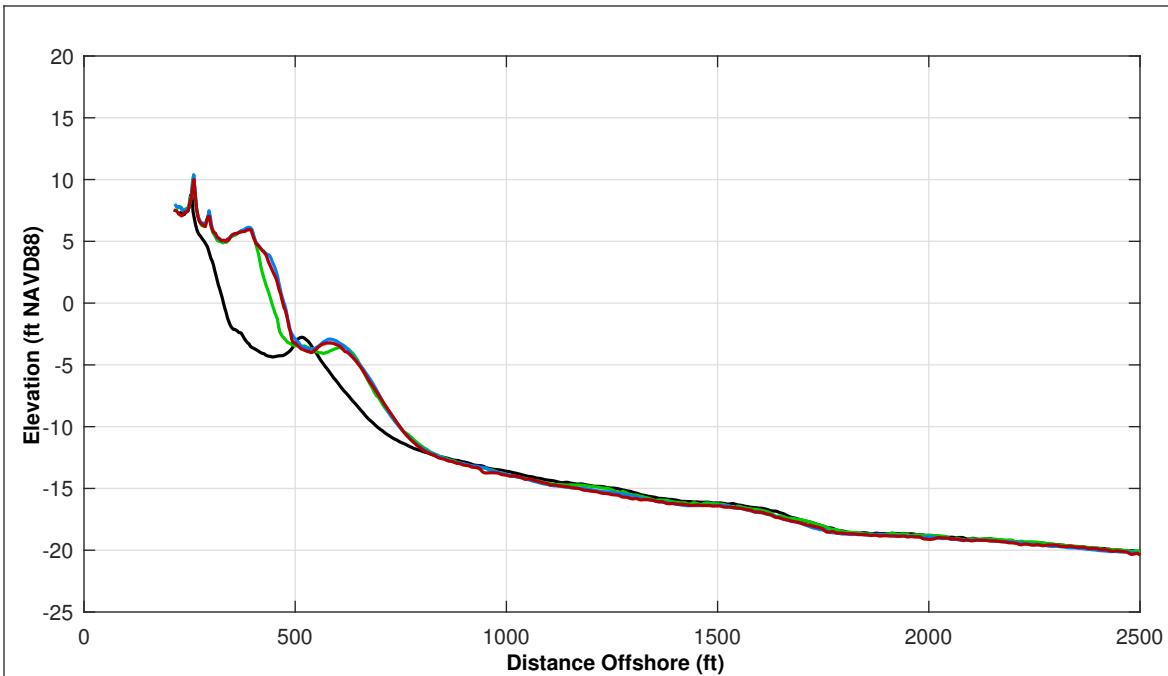
**LEGEND:**

APR 2025	MAY 2017
NOV 2024	OCT 2016
MAY 2024	USACE Design Template
	USACE Nourishment Threshold

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.

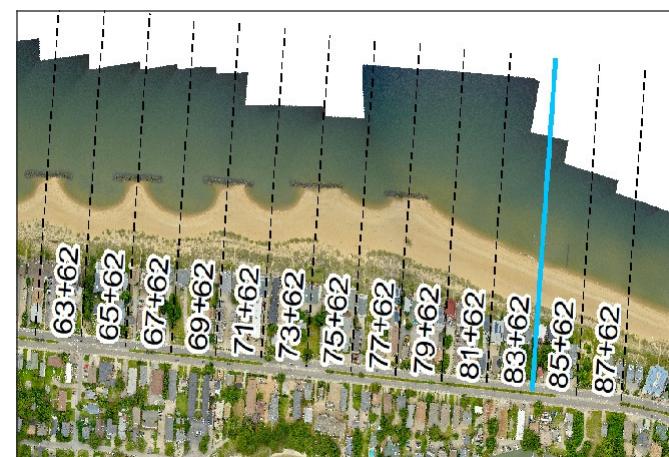


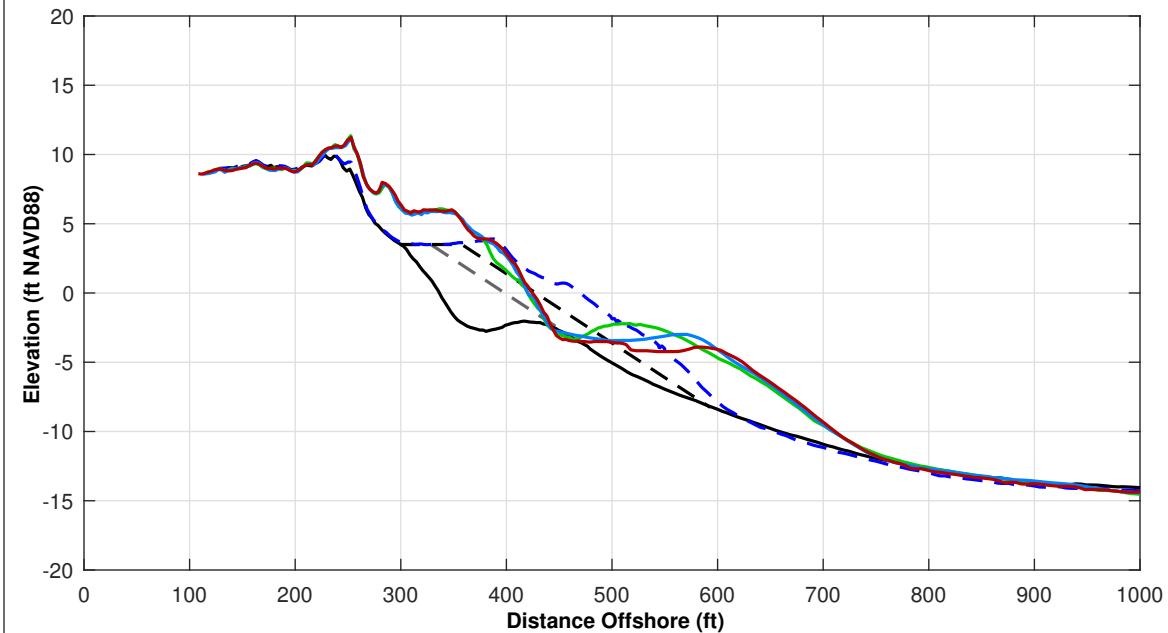
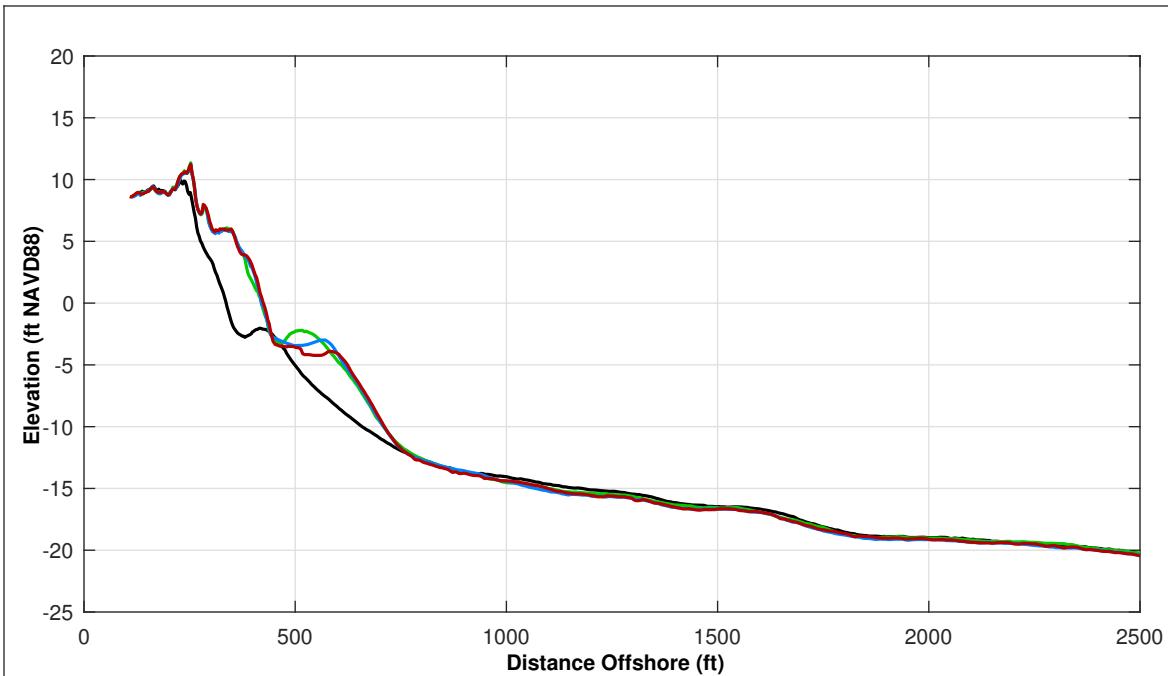


Survey Transect 83+62	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	26.97 ft	-2.52 ft
Volume Change Above -15 ft NAVD88	5.12 cy/ft	-4.32 cy/ft
Volume Change Above 0 ft NAVD88	3.55 cy/ft	-1.78 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	+ 74.0 ft	

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.





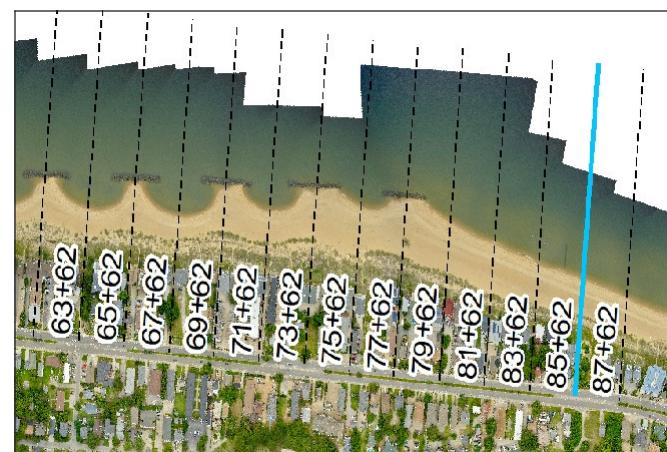
Survey Transect 85+62	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	6.38 ft	1.46 ft
Volume Change Above -15 ft NAVD88	-2.36 cy/ft	-1.93 cy/ft
Volume Change Above 0 ft NAVD88	1.54 cy/ft	0.89 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:		+ 33.0 ft

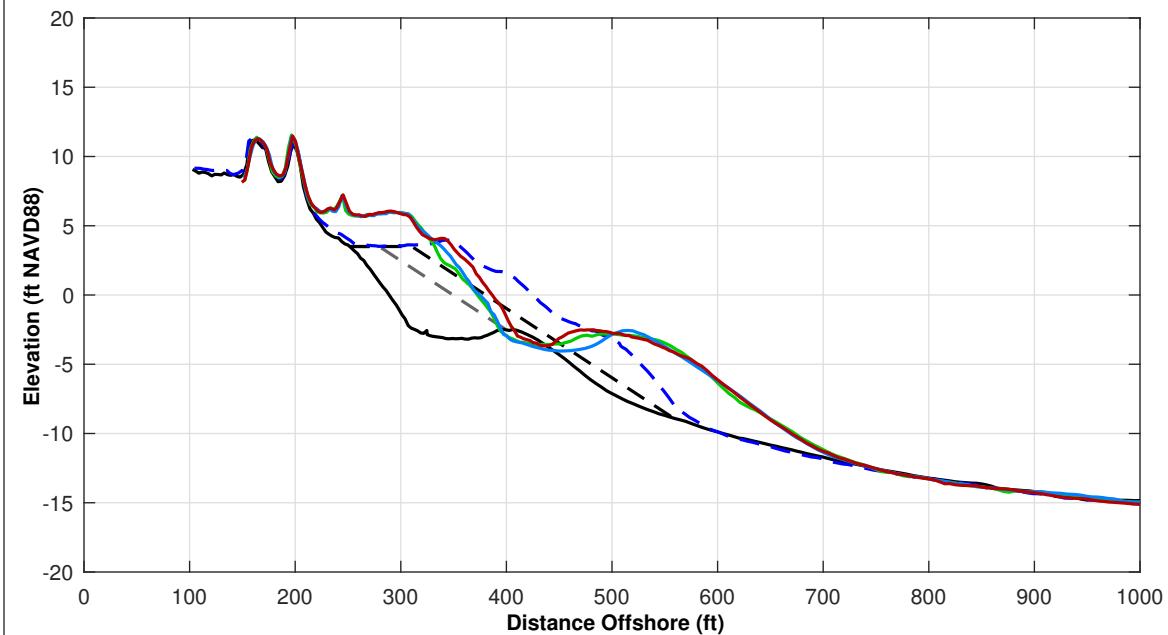
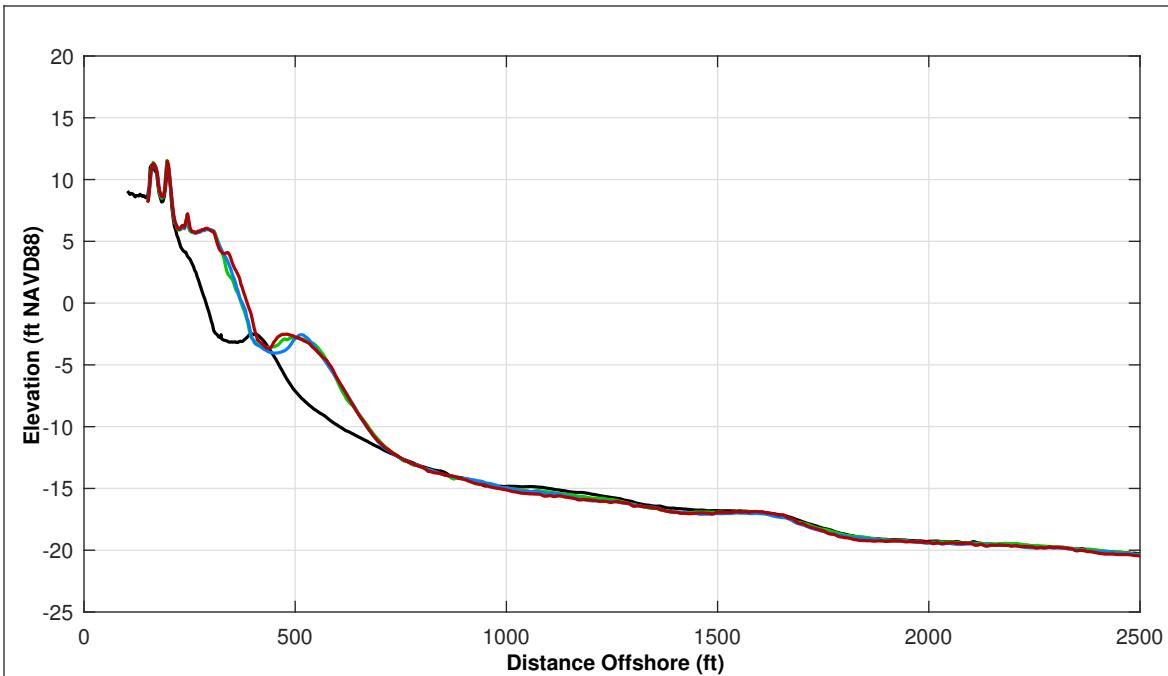
**LEGEND:**

APR 2025	MAY 2017
OCT 2016	USACE Design Template
MAY 2024	USACE Nourishment Threshold

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.





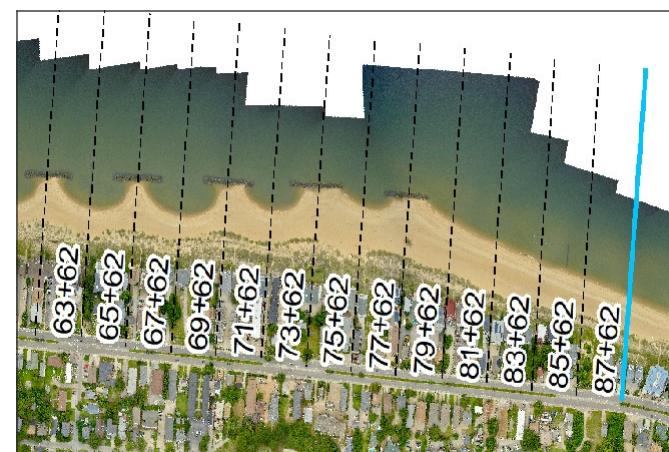
Survey Transect 87+62	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	15.68 ft	12.32 ft
Volume Change Above -15 ft NAVD88	4.28 cy/ft	4.53 cy/ft
Volume Change Above 0 ft NAVD88	2.66 cy/ft	1.74 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:		+ 37.0 ft

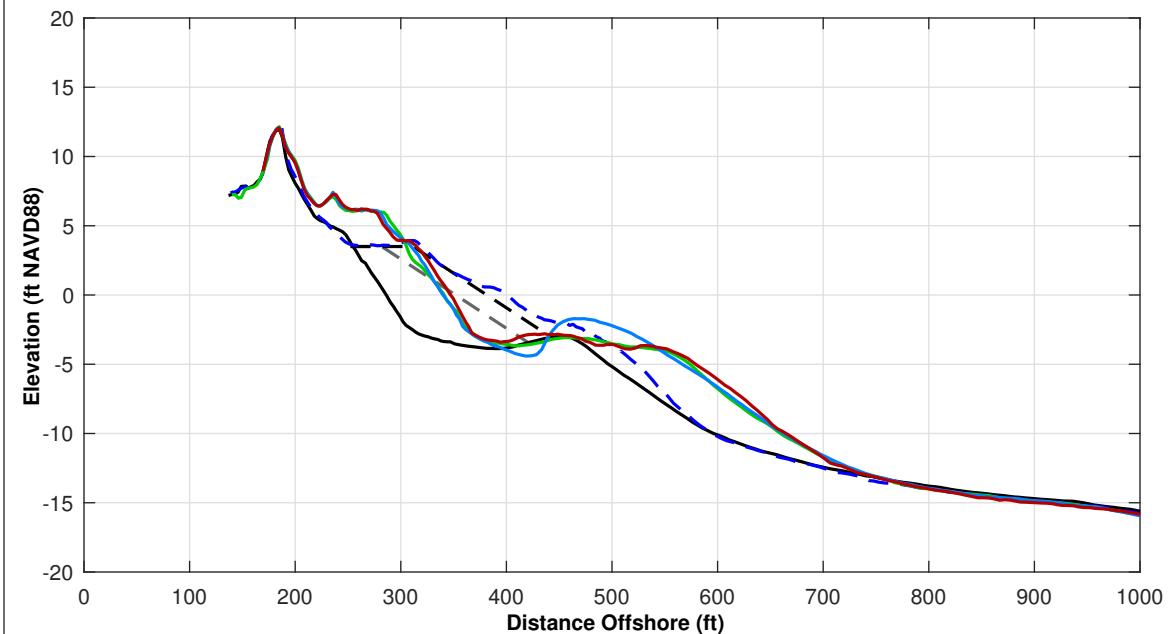
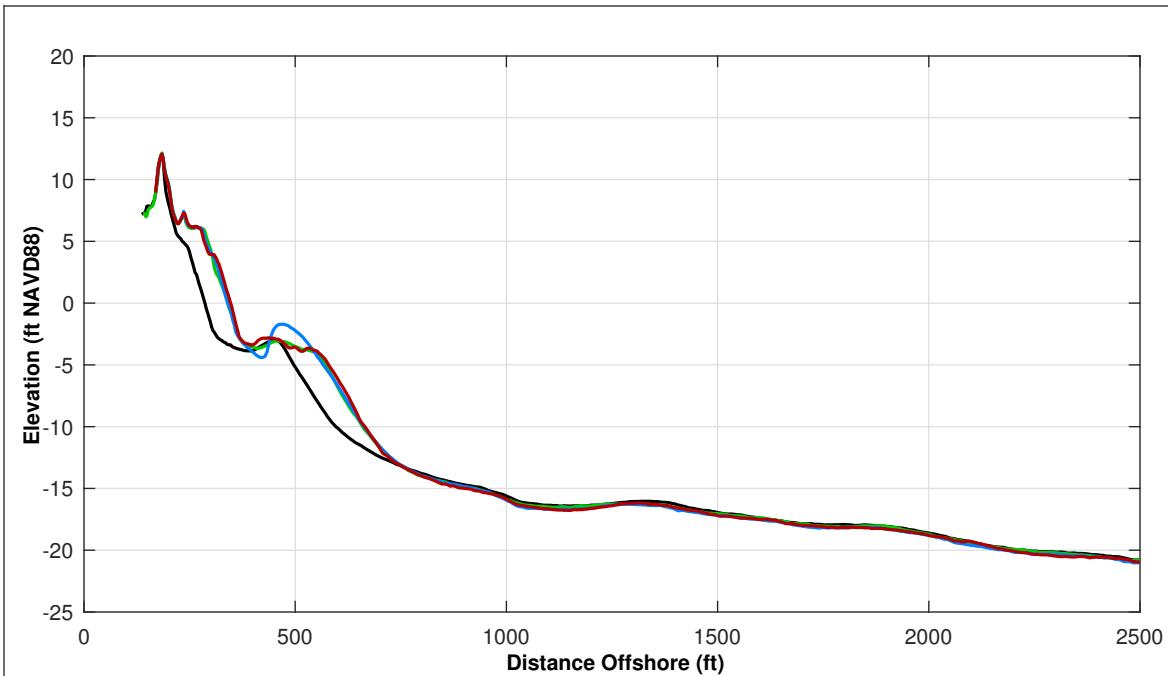
**LEGEND:**

APR 2025	MAY 2017
NOV 2024	OCT 2016
MAY 2024	USACE Design Template
	USACE Nourishment Threshold

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.





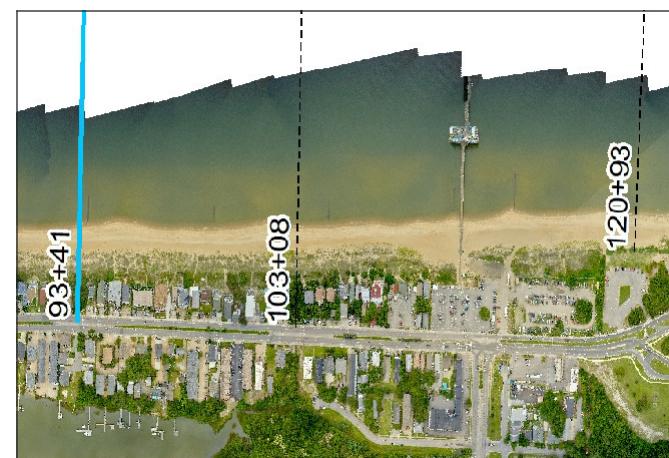
Survey Transect 93+41	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	6.81 ft	6.83 ft
Volume Change Above -15 ft NAVD88	3.76 cy/ft	0.18 cy/ft
Volume Change Above 0 ft NAVD88	0.84 cy/ft	0.55 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:		+ 3.0 ft

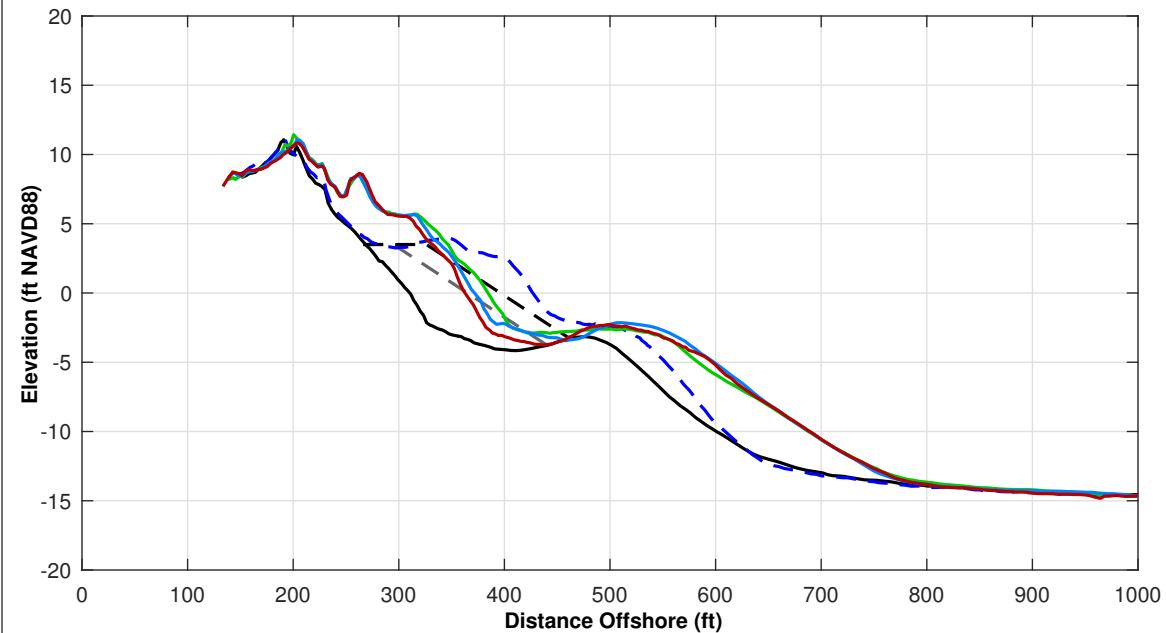
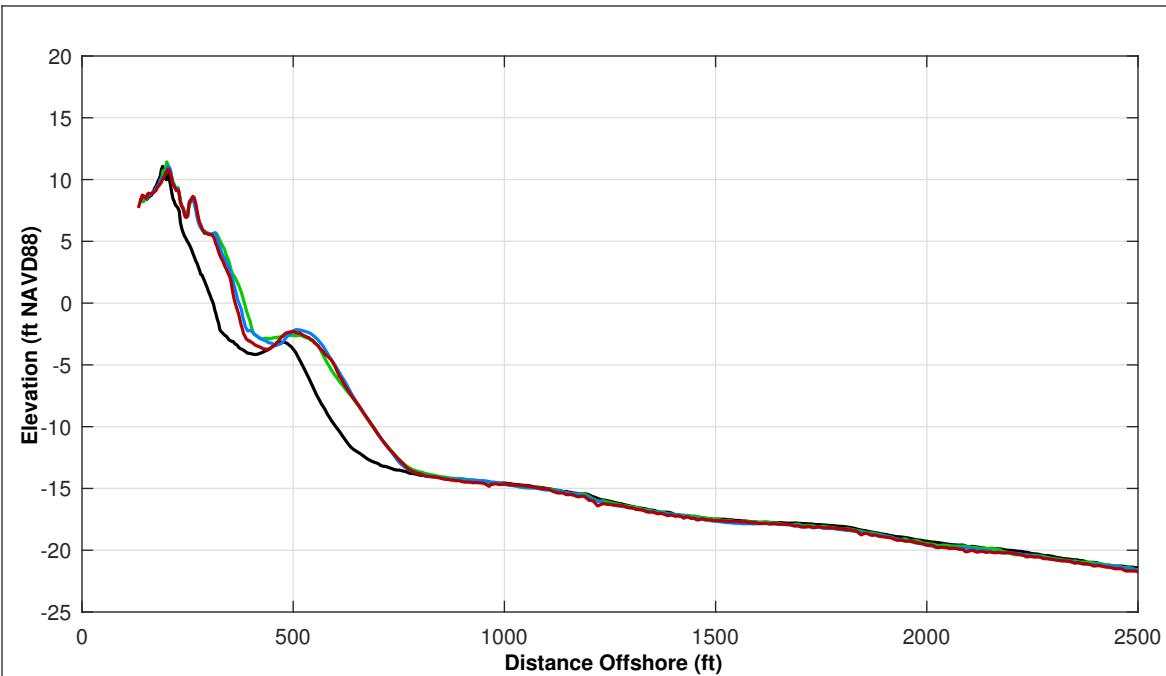
**LEGEND:**

APR 2025	MAY 2017
NOV 2024	OCT 2016
MAY 2024	USACE Design Template
	USACE Nourishment Threshold

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.

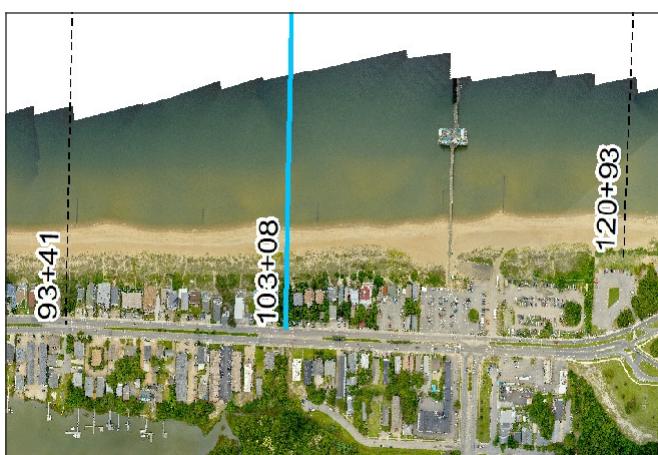


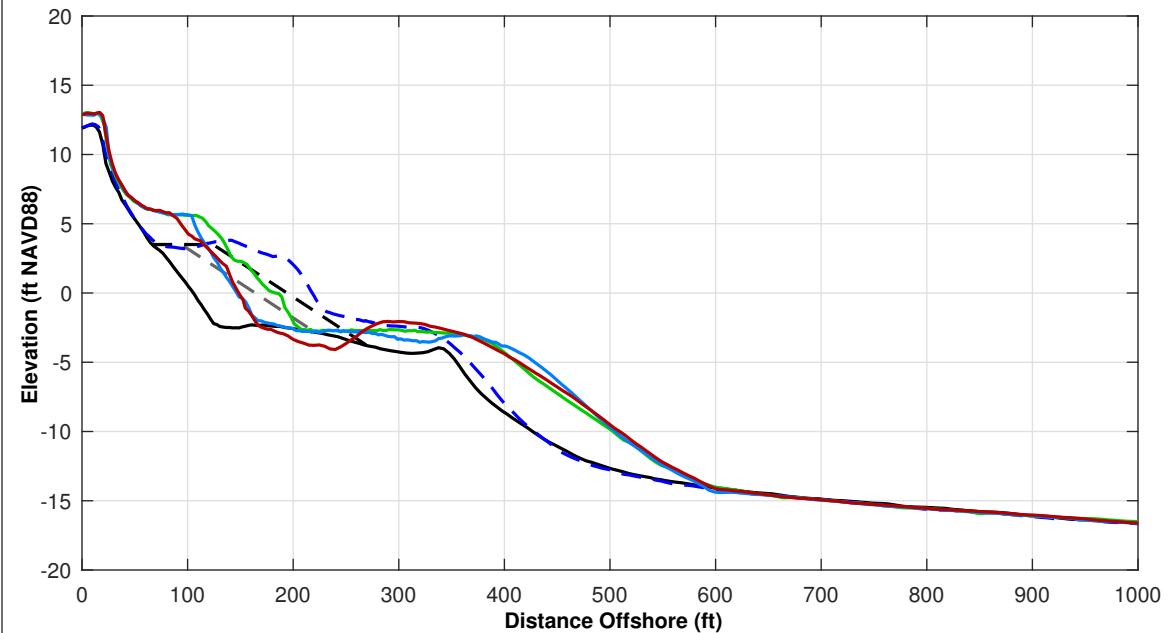
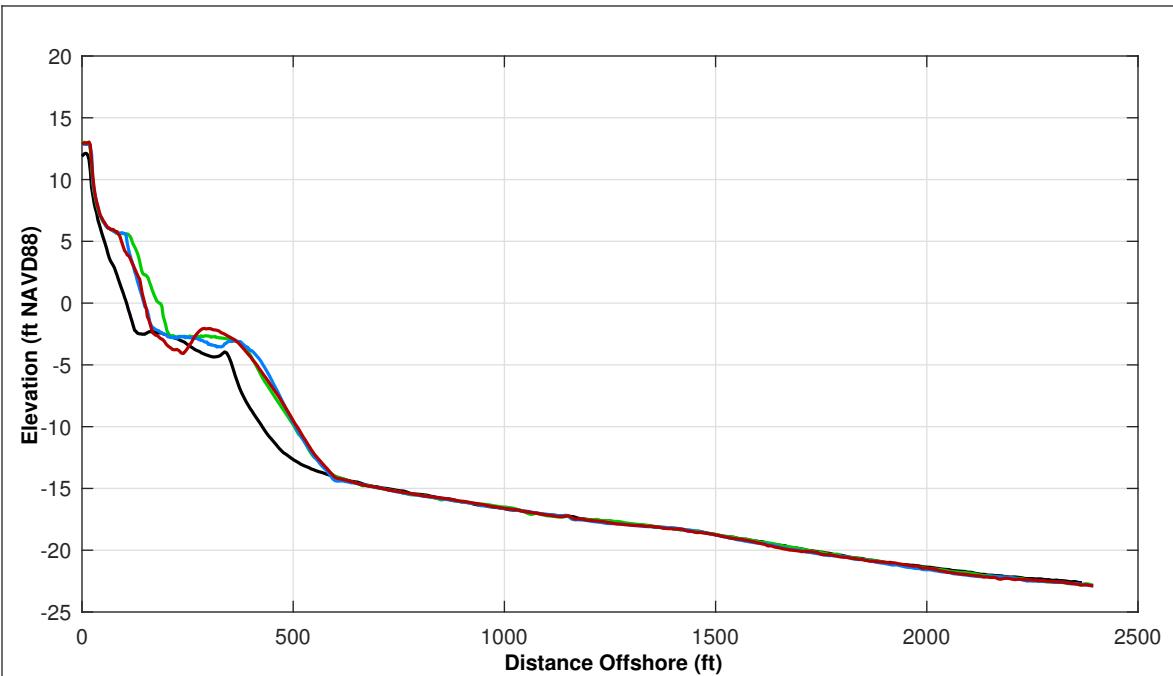


Survey Transect 103+08	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	-19.75 ft	-7.09 ft
Volume Change Above -15 ft NAVD88	-6.90 cy/ft	-5.51 cy/ft
Volume Change Above 0 ft NAVD88	-3.29 cy/ft	-1.51 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:		+ 3.0 ft
<b>LEGEND:</b>		
APR 2025	MAY 2017	---
NOV 2024	OCT 2016	—
MAY 2024	USACE Design Template	—
	USACE Nourishment Threshold	—

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.





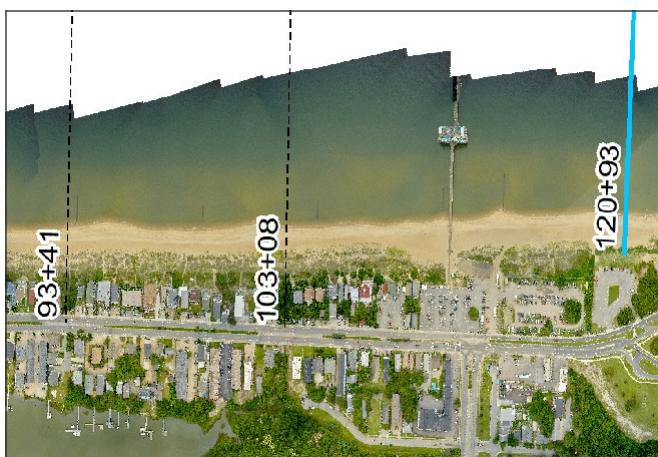
Survey Transect	APR 2025 - MAY 2024	APR 2025 - NOV 2024
120+93		
Shoreline Change at MHW (0.98 ft NAVD88)	-25.58 ft	3.34 ft
Volume Change Above -15 ft NAVD88	-7.17 cy/ft	-0.92 cy/ft
Volume Change Above 0 ft NAVD88	-4.31 cy/ft	-0.27 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	-12.0 ft	

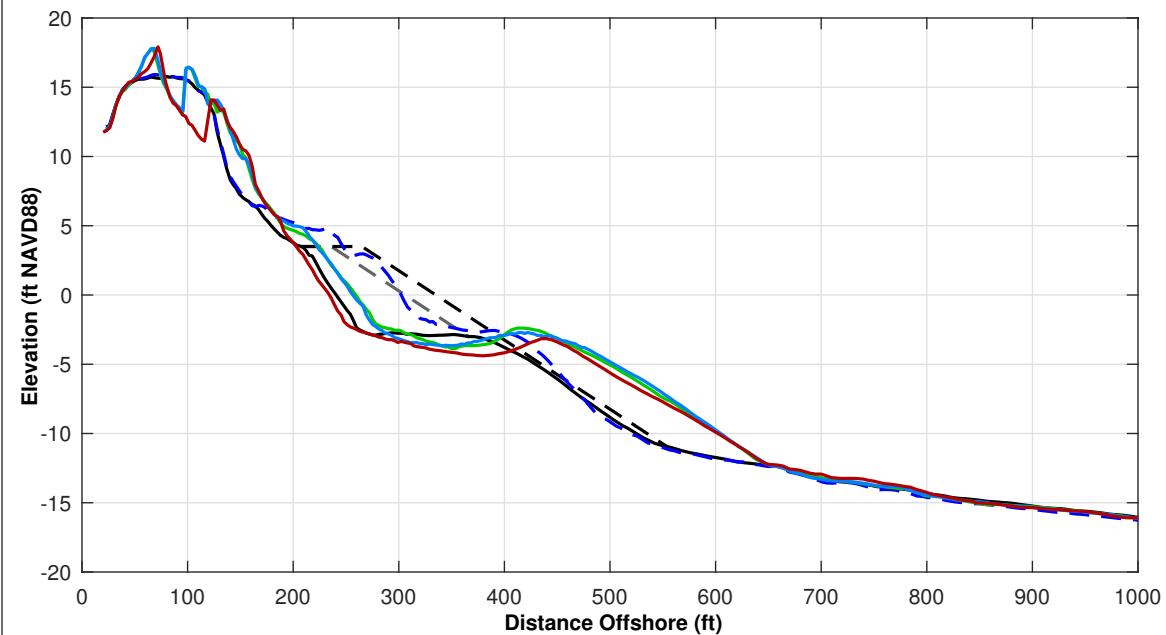
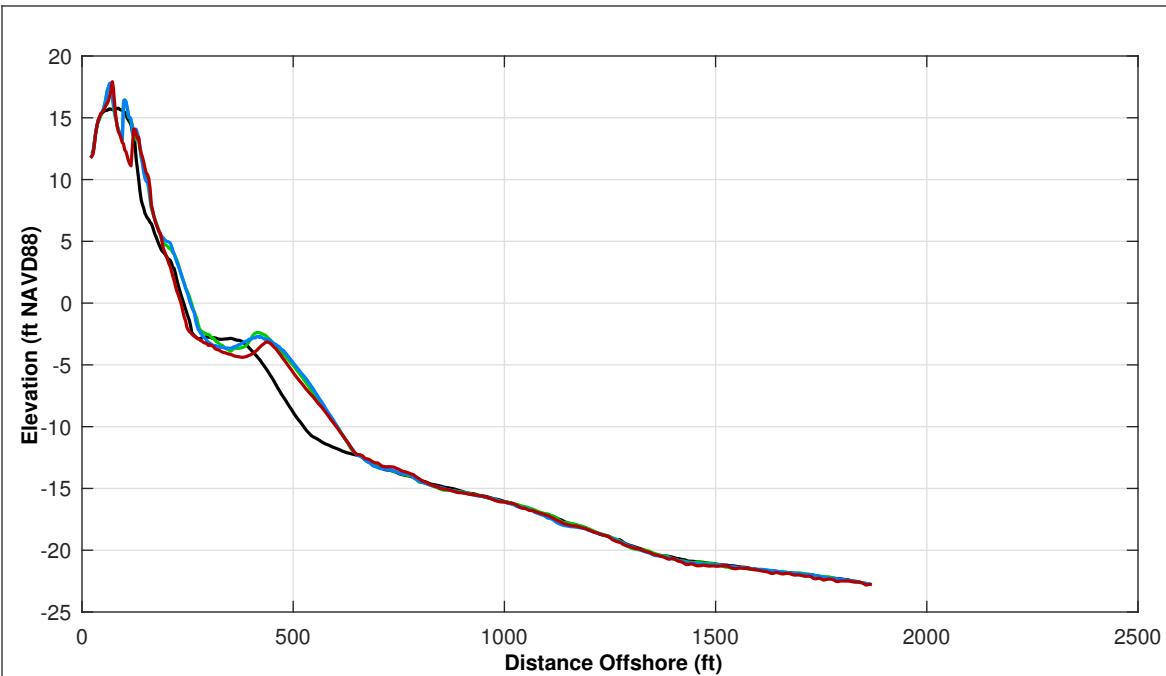
**LEGEND:**

APR 2025	MAY 2017
NOV 2024	OCT 2016
MAY 2024	USACE Design Template
	USACE Nourishment Threshold

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.



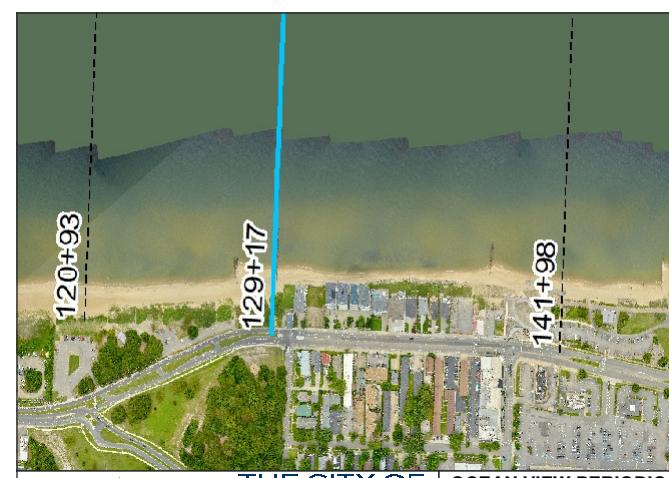


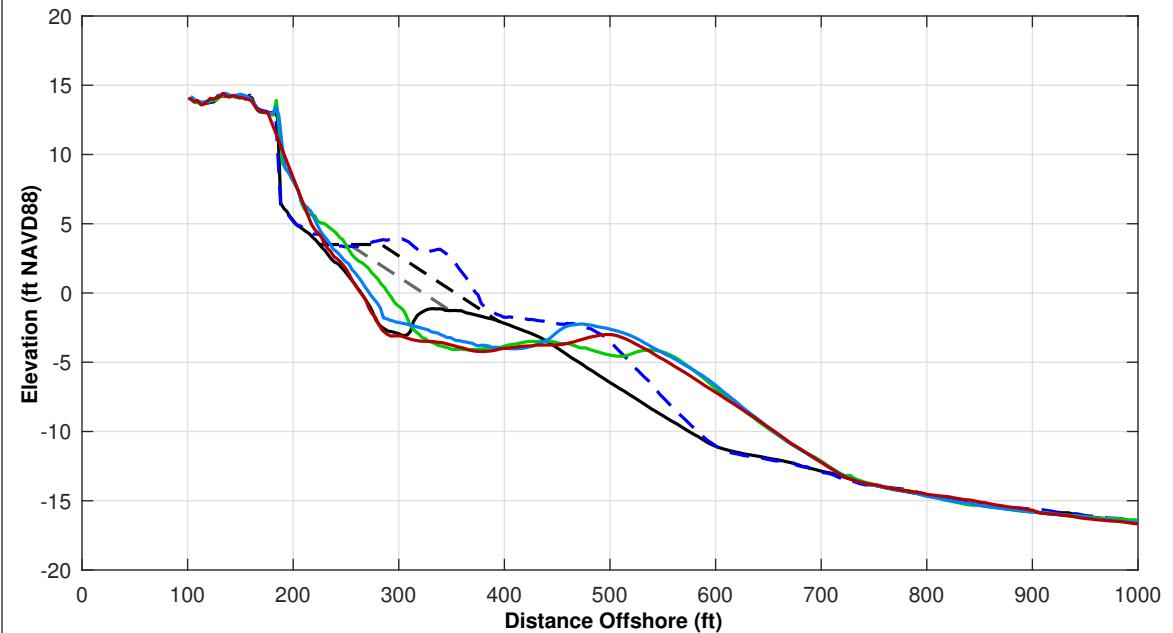
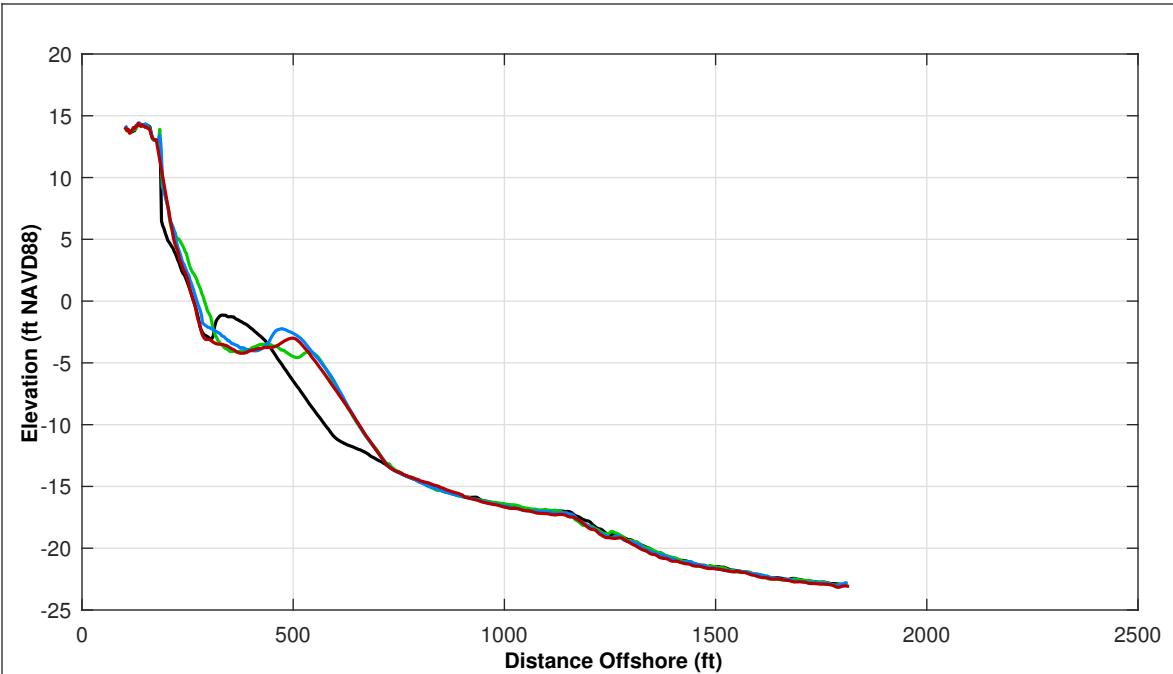
Survey Transect 129+17	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	-24.41 ft	-23.05 ft
Volume Change Above -15 ft NAVD88	-14.57 cy/ft	-15.23 cy/ft
Volume Change Above 0 ft NAVD88	-6.36 cy/ft	-6.87 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	-65.0 ft	

LEGEND:	MAY 2017	APR 2025	OCT 2016	NOV 2024	USACE Design Template	USACE Nourishment Threshold
---------	----------	----------	----------	----------	-----------------------	-----------------------------

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.



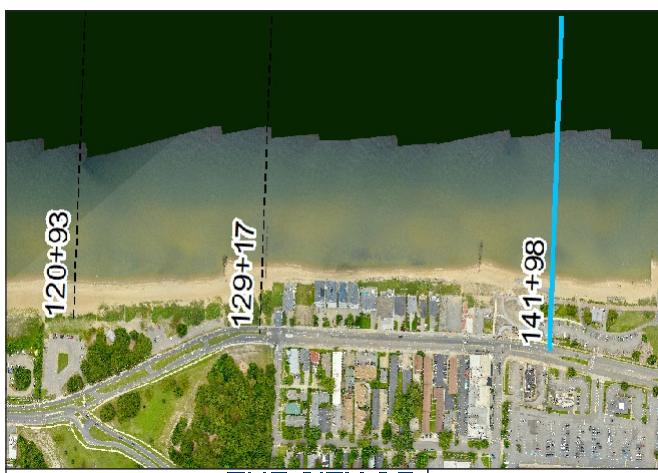


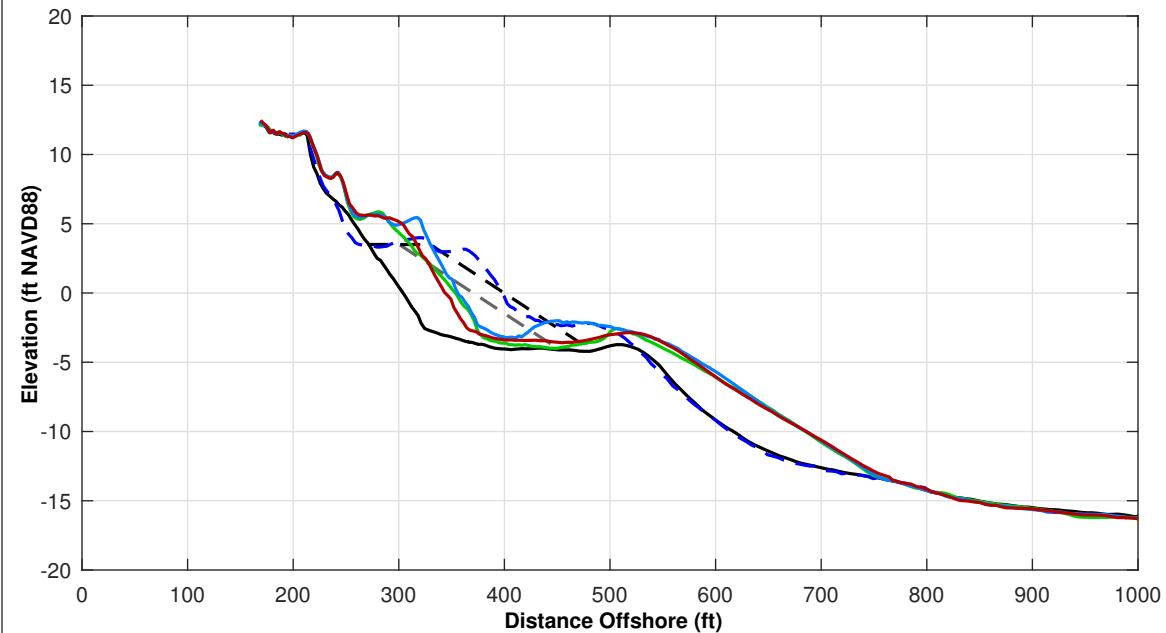
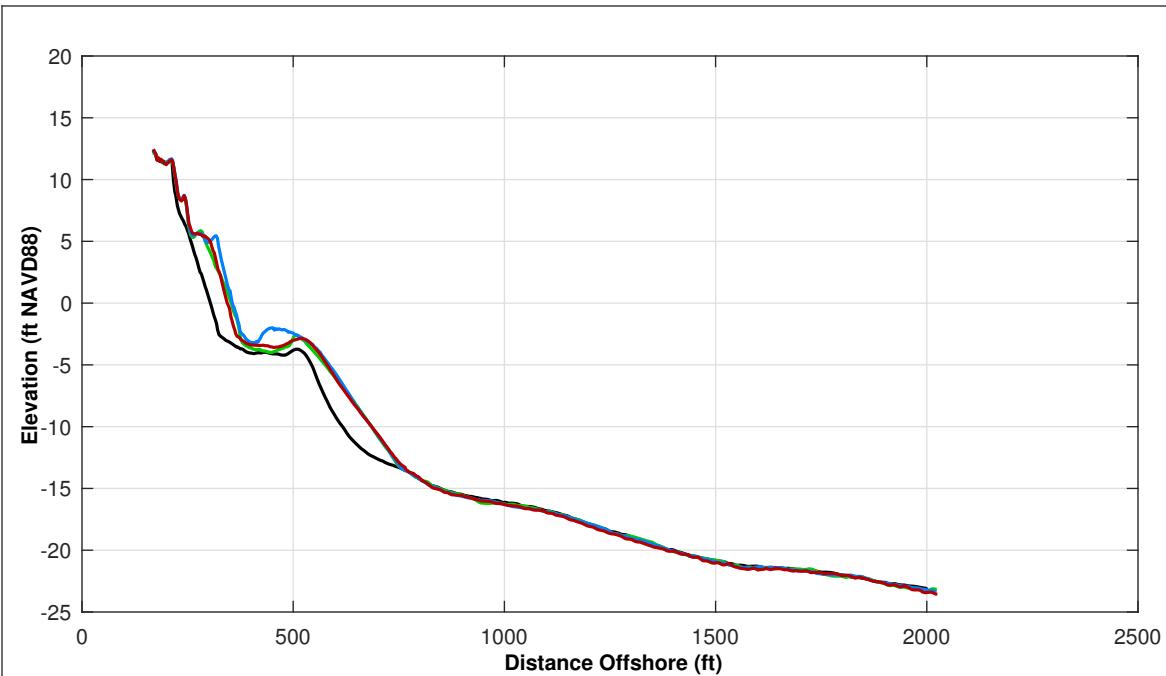
Survey Transect 141+98	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	-25.05 ft	-7.95 ft
Volume Change Above -15 ft NAVD88	-6.43 cy/ft	-8.56 cy/ft
Volume Change Above 0 ft NAVD88	-3.88 cy/ft	-1.40 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:		-54.0 ft

LEGEND:	
APR 2025	MAY 2017
NOV 2024	OCT 2016
MAY 2024	USACE Design Template
	USACE Nourishment Threshold

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.



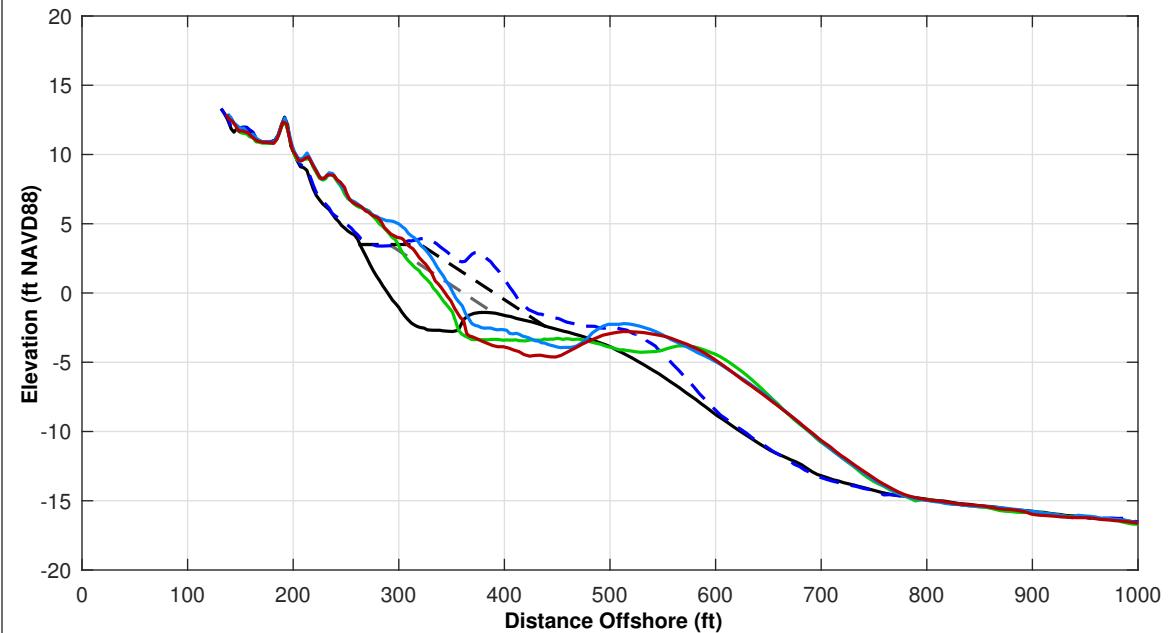
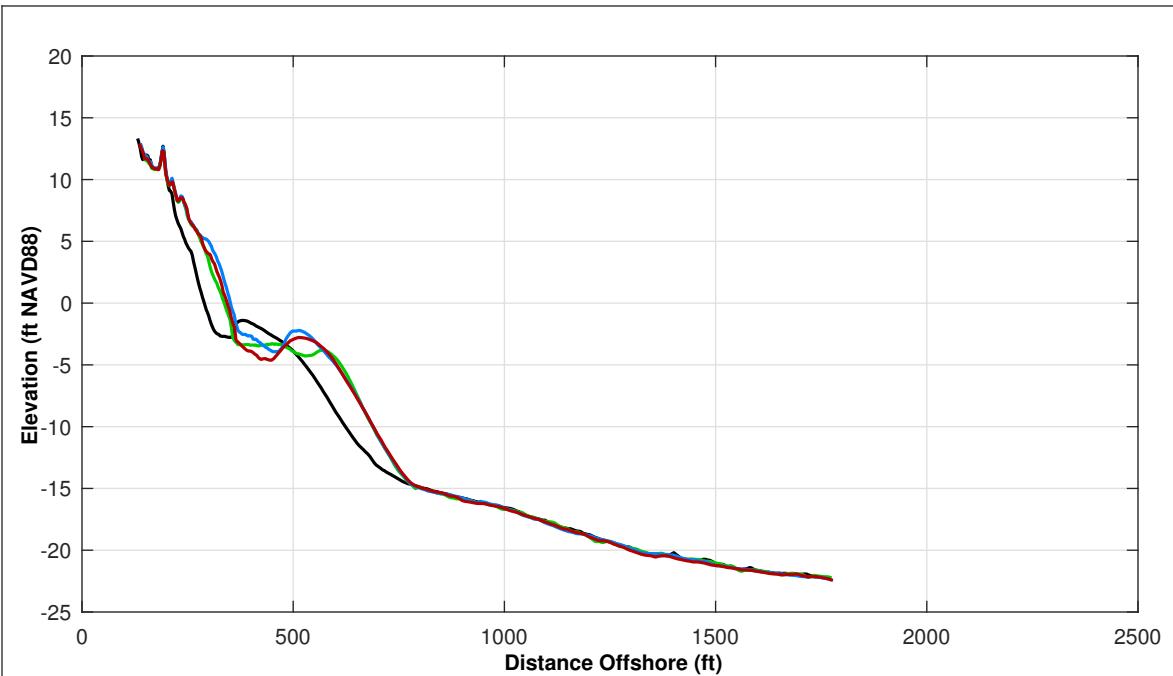


Survey Transect	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	-6.68 ft	-14.26 ft
Volume Change Above -15 ft NAVD88	1.53 cy/ft	-8.51 cy/ft
Volume Change Above 0 ft NAVD88	0.50 cy/ft	-2.51 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:		-14.0 ft
<b>LEGEND:</b>		
APR 2025	MAY 2017	—
NOV 2024	OCT 2016	—
MAY 2024	USACE Design Template	—
	USACE Nourishment Threshold	—

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.



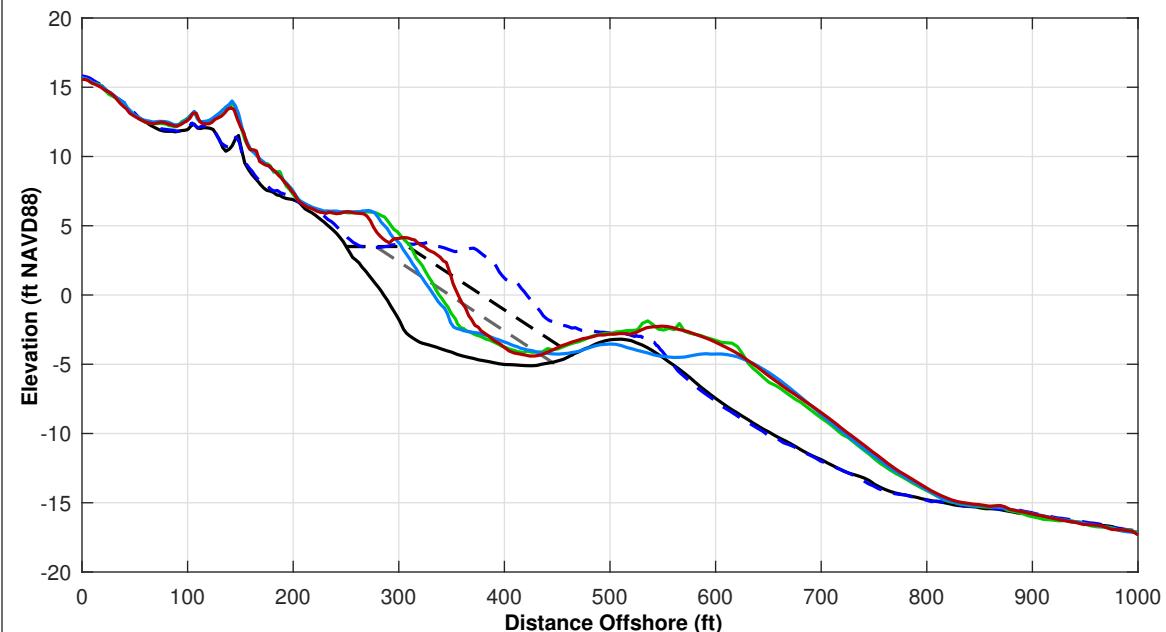
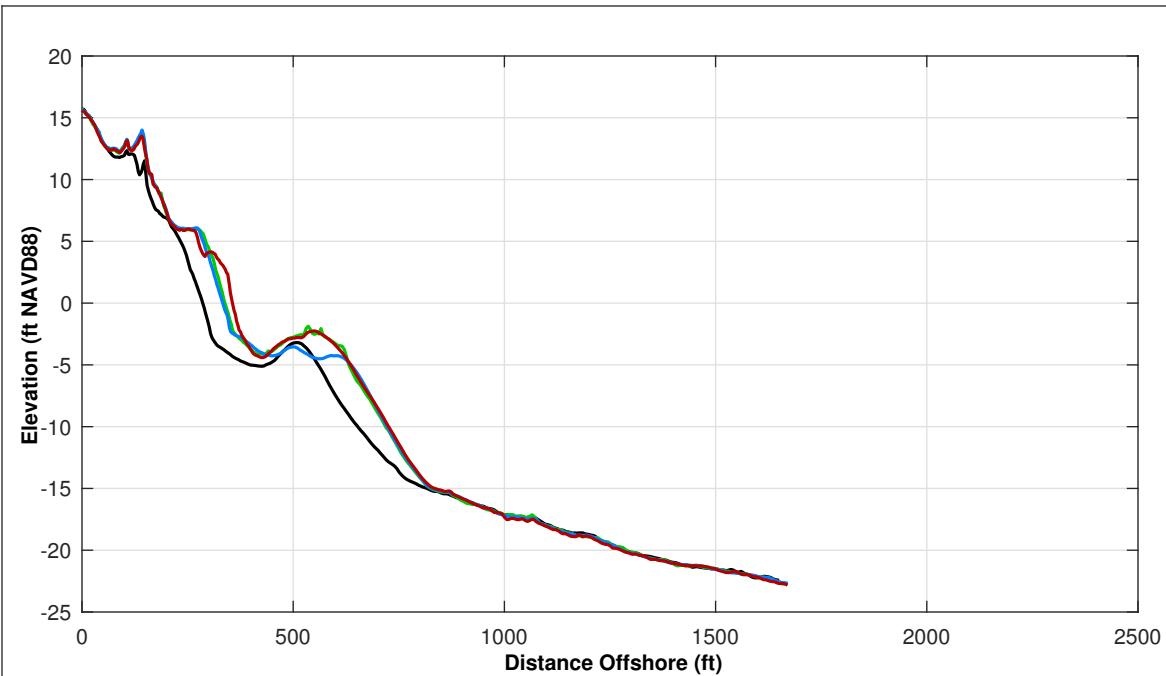


Survey Transect 163+49	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	7.21 ft	-10.14 ft
Volume Change Above -15 ft NAVD88	2.56 cy/ft	-7.67 cy/ft
Volume Change Above 0 ft NAVD88	1.93 cy/ft	-2.67 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	-13.0 ft	

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.



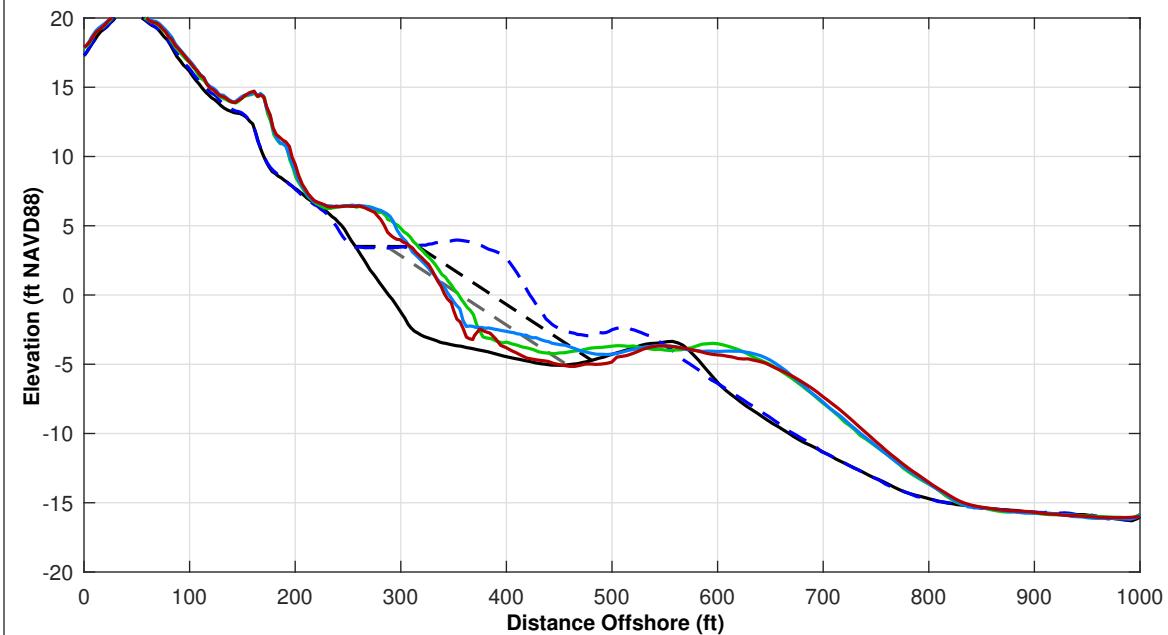
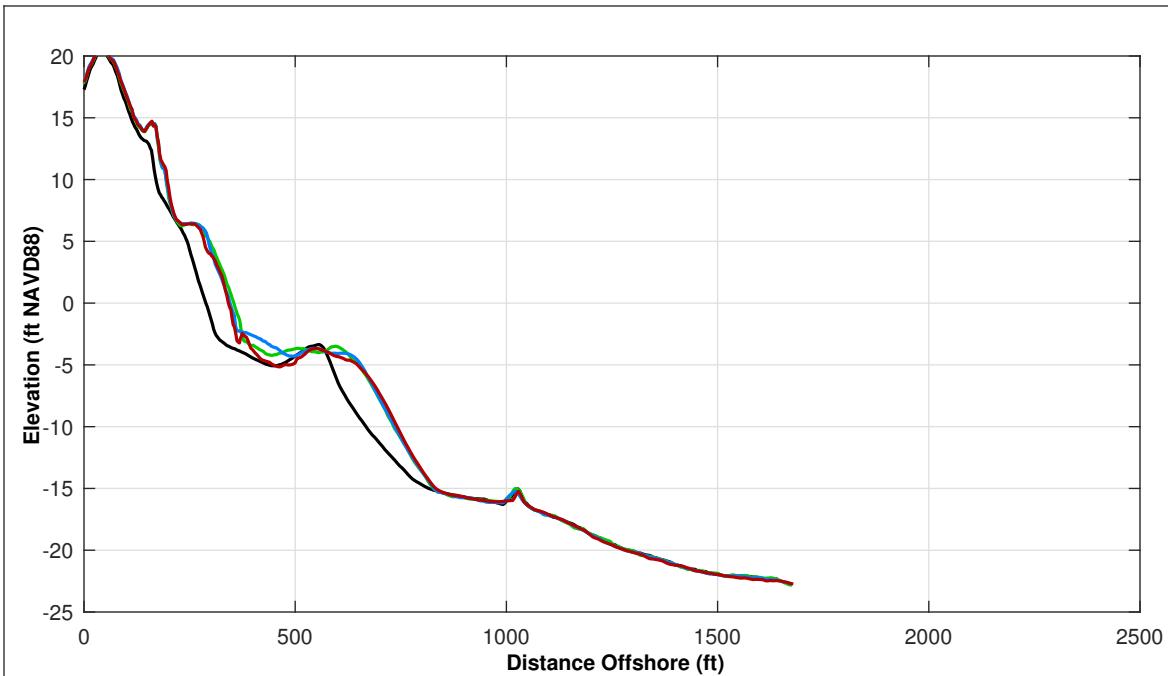


Survey Transect 169+63	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	19.62 ft	26.50 ft
Volume Change Above -15 ft NAVD88	4.14 cy/ft	11.33 cy/ft
Volume Change Above 0 ft NAVD88	0.95 cy/ft	1.82 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:		+ 13.0 ft

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.



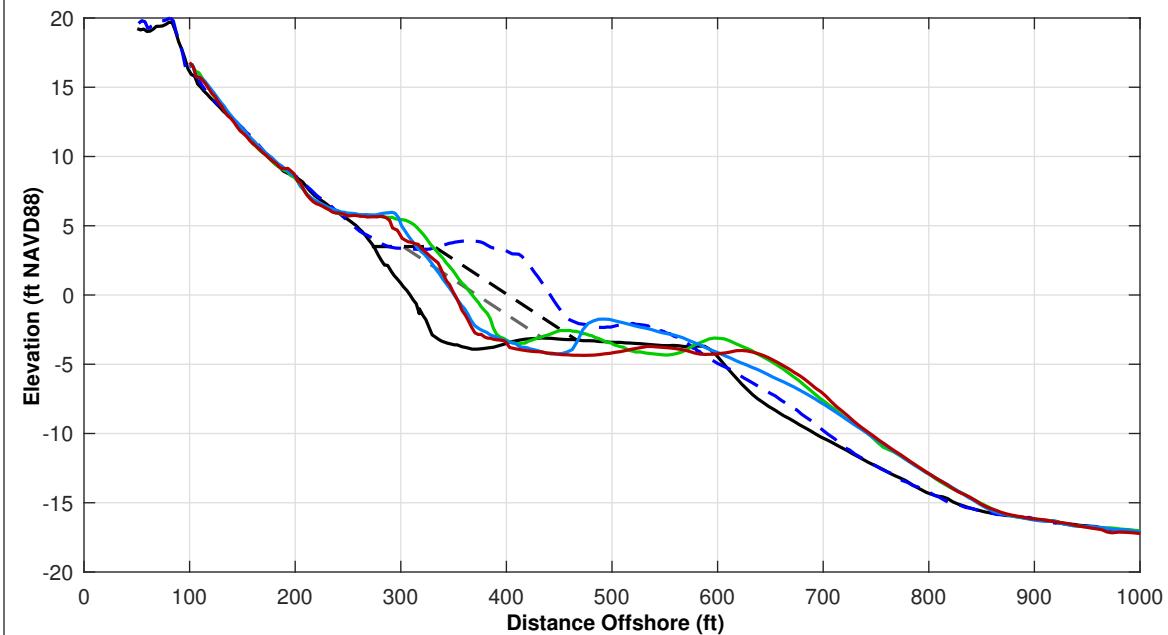
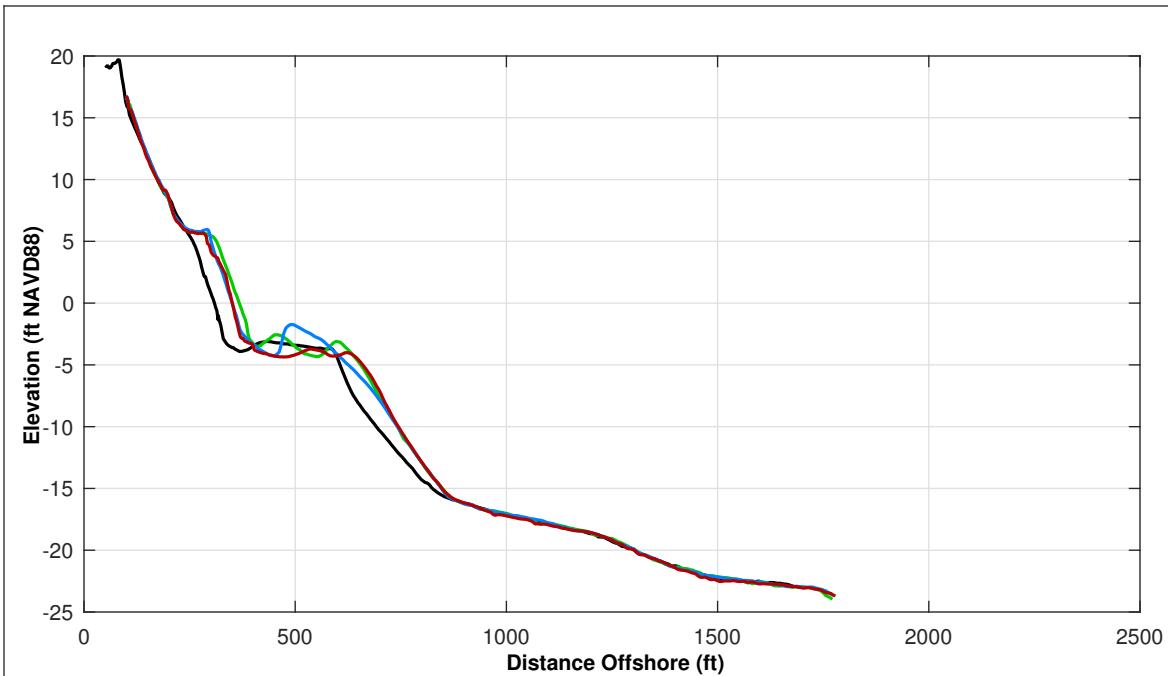


Survey Transect 171+63	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	-9.95 ft	-1.30 ft
Volume Change Above -15 ft NAVD88	-5.79 cy/ft	-6.80 cy/ft
Volume Change Above 0 ft NAVD88	-1.33 cy/ft	-1.01 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	-8.0 ft	

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.

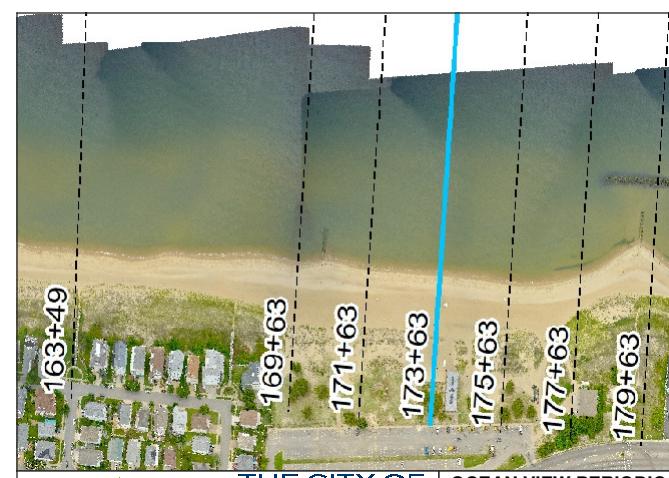


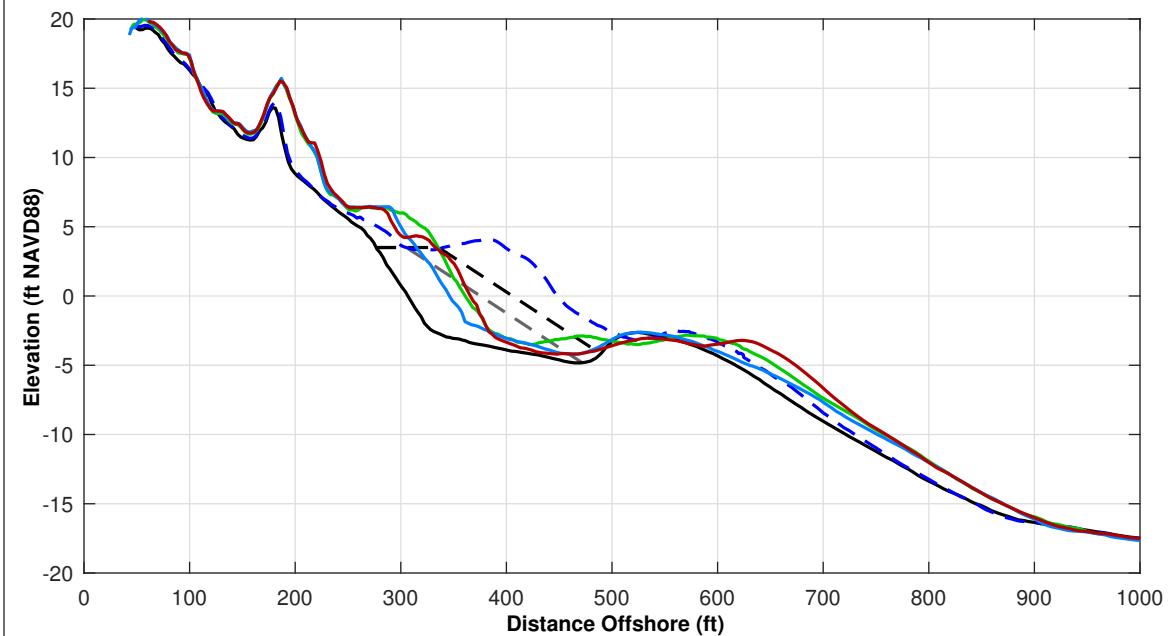
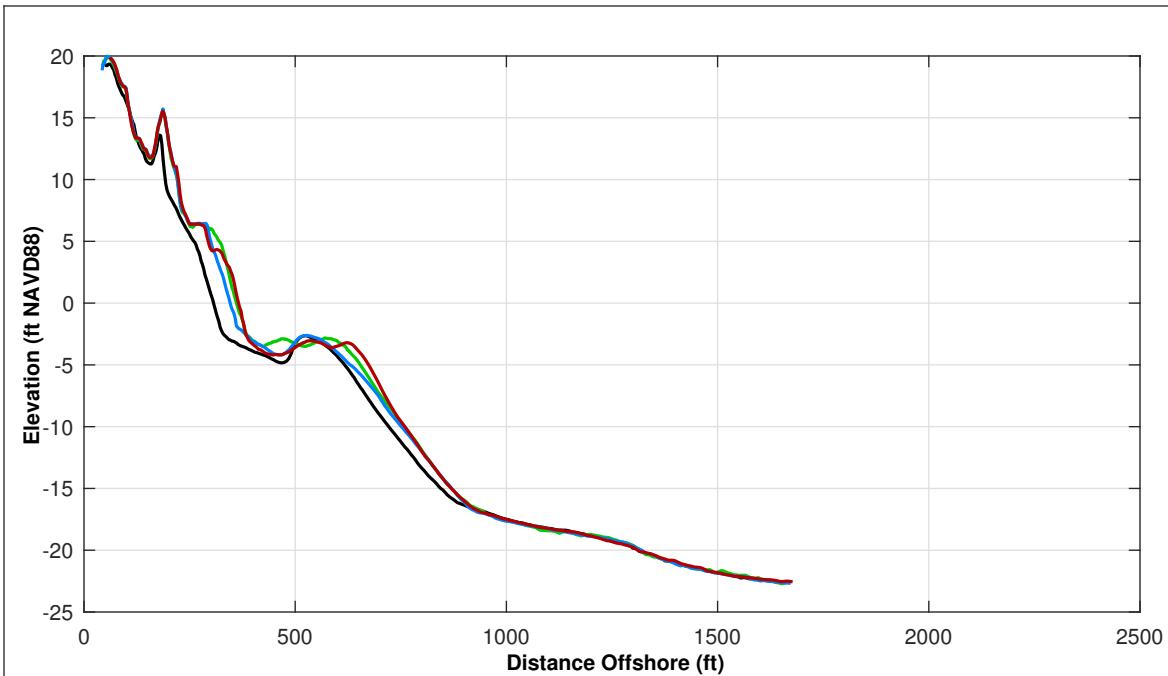


Survey Transect 173+63	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	-12.93 ft	2.27 ft
Volume Change Above -15 ft NAVD88	-9.39 cy/ft	-5.03 cy/ft
Volume Change Above 0 ft NAVD88	-3.23 cy/ft	-1.18 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:		-15.0 ft

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.



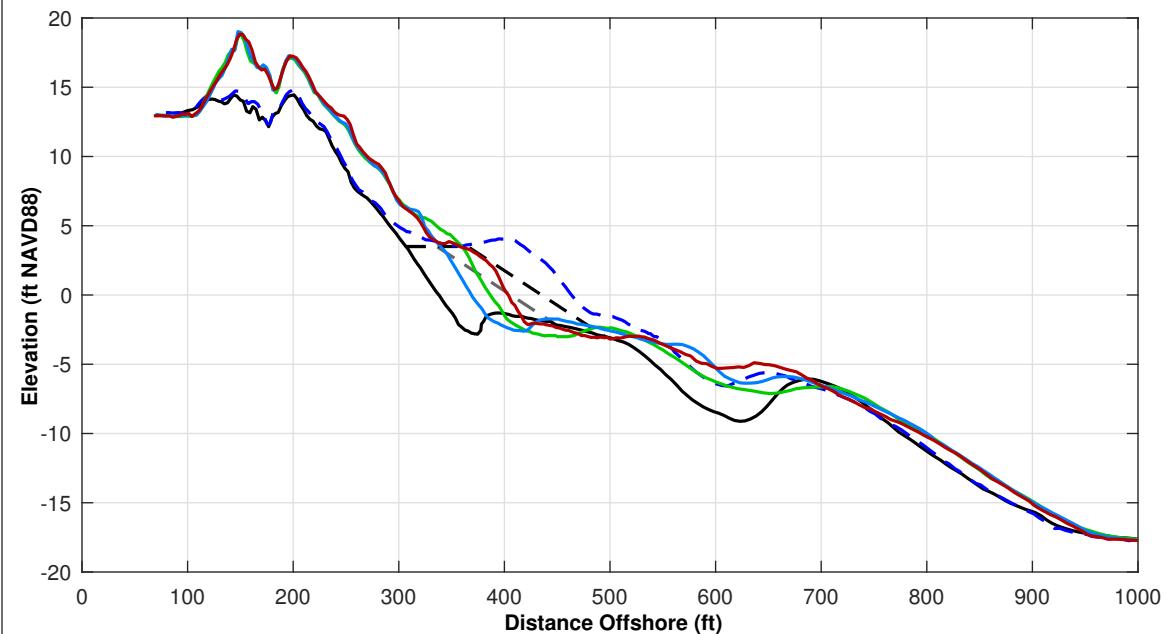
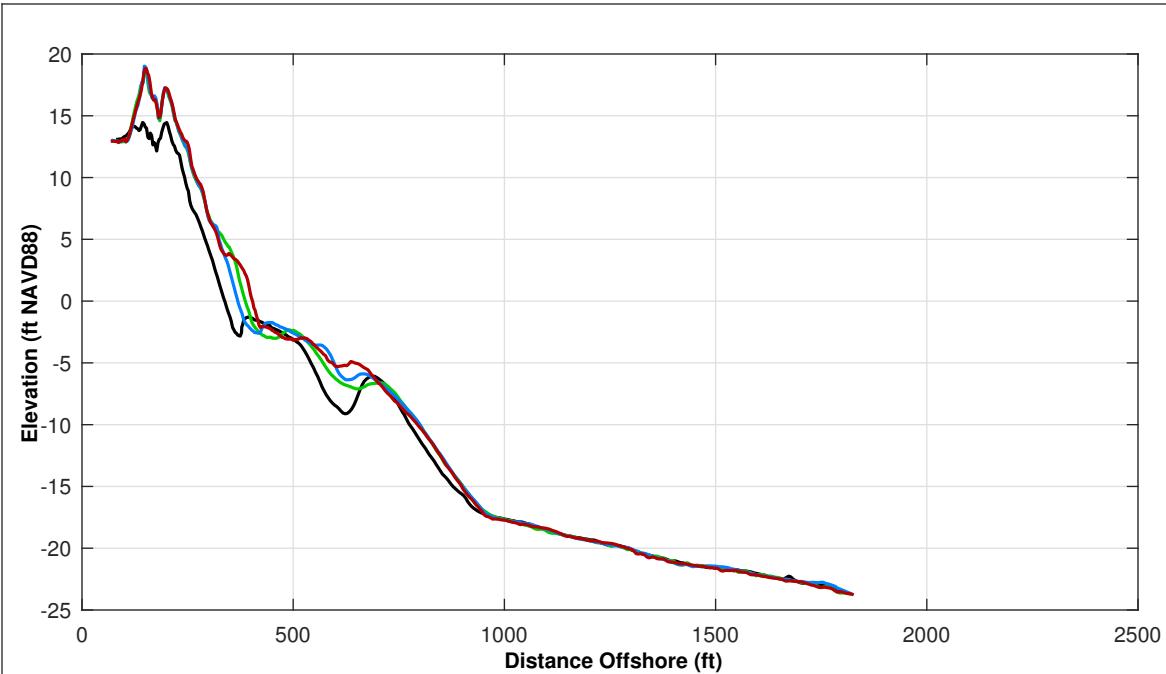


Survey Transect 175+63	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	5.95 ft	21.23 ft
Volume Change Above -15 ft NAVD88	-0.32 cy/ft	9.32 cy/ft
Volume Change Above 0 ft NAVD88	0.06 cy/ft	2.92 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	-3.0 ft	

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.



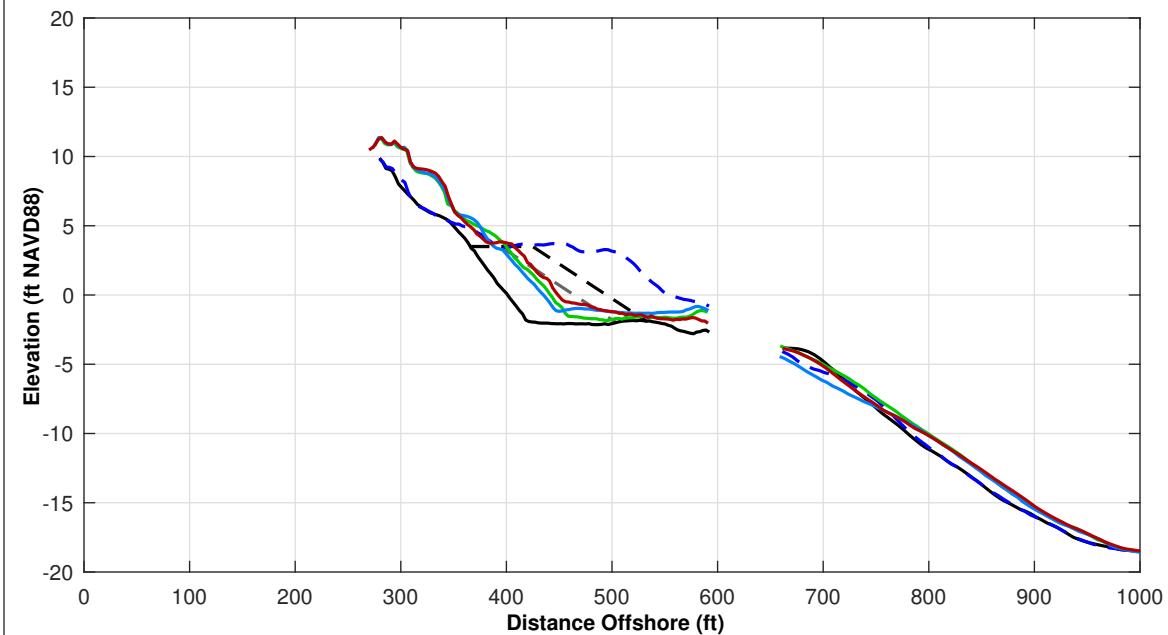
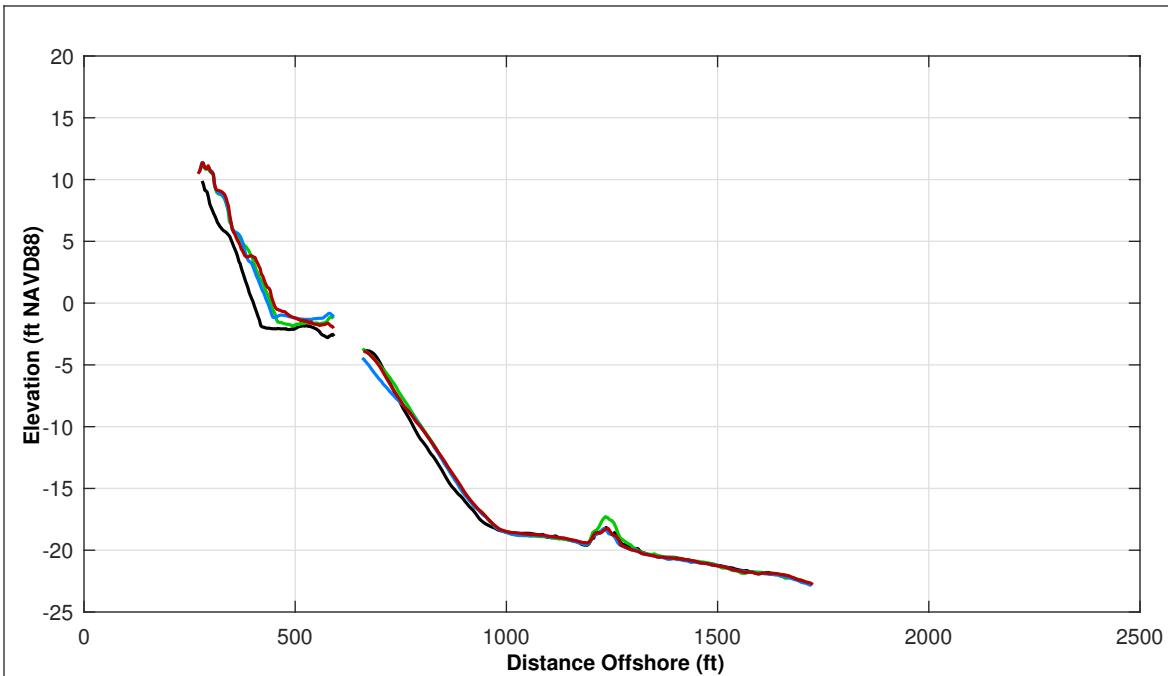


Survey Transect 177+63	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	17.94 ft	35.34 ft
Volume Change Above -15 ft NAVD88	8.57 cy/ft	6.67 cy/ft
Volume Change Above 0 ft NAVD88	1.90 cy/ft	5.05 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	-9.0 ft	

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.





Survey Transect 179+63	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	10.27 ft	17.93 ft
Volume Change Above -15 ft NAVD88	0.71 cy/ft	4.36 cy/ft
Volume Change Above 0 ft NAVD88	1.02 cy/ft	1.90 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	-20.0 ft	

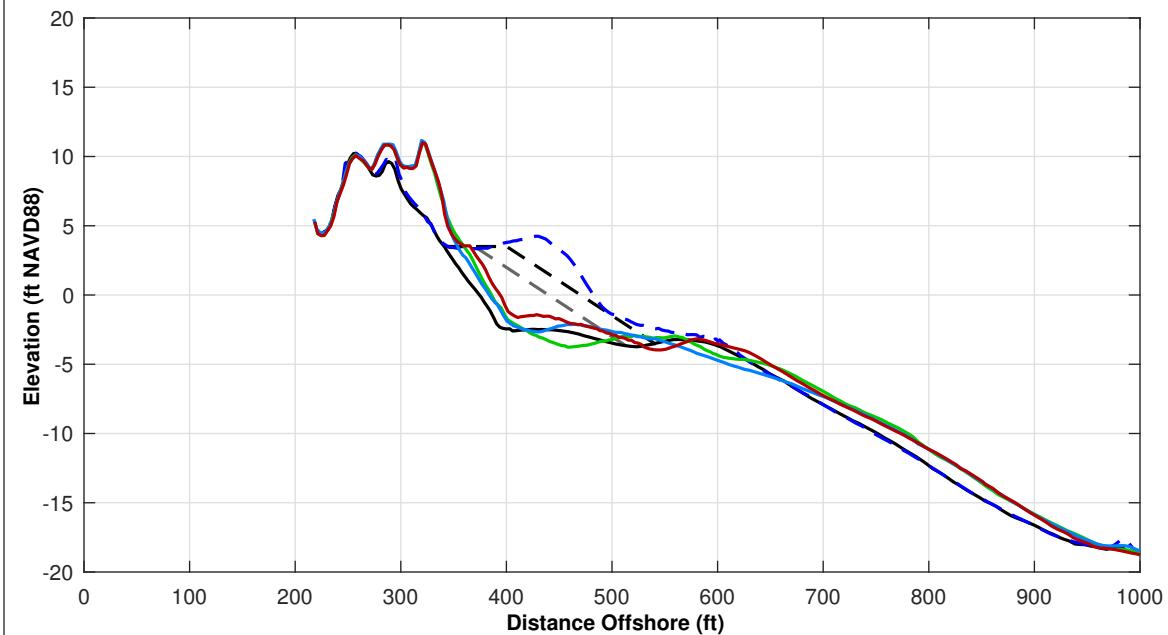
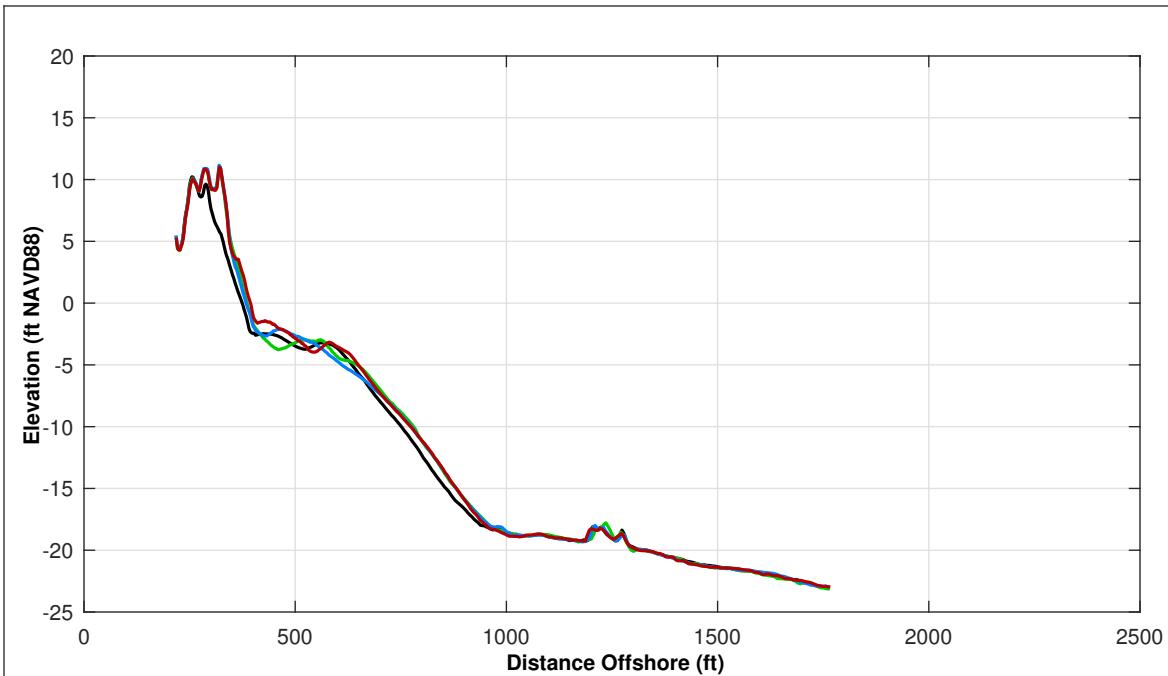
**LEGEND:**

APR 2025	NOV 2024	MAY 2024	MAY 2017	OCT 2016	USACE Design Template	USACE Nourishment Threshold
—	—	—	—	—	—	—

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.



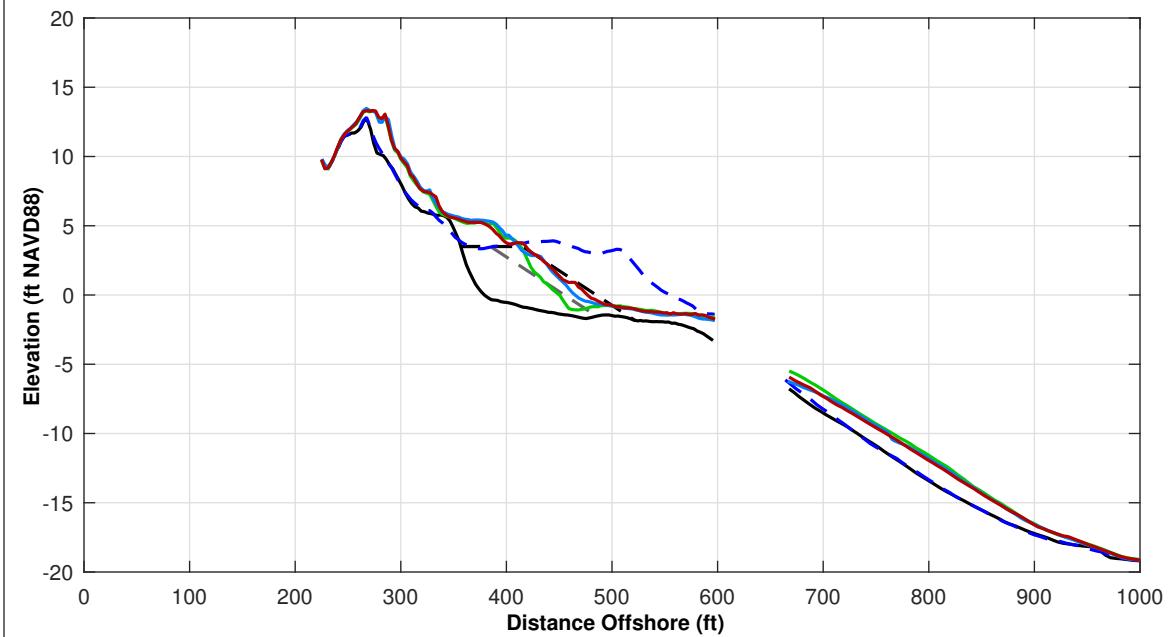
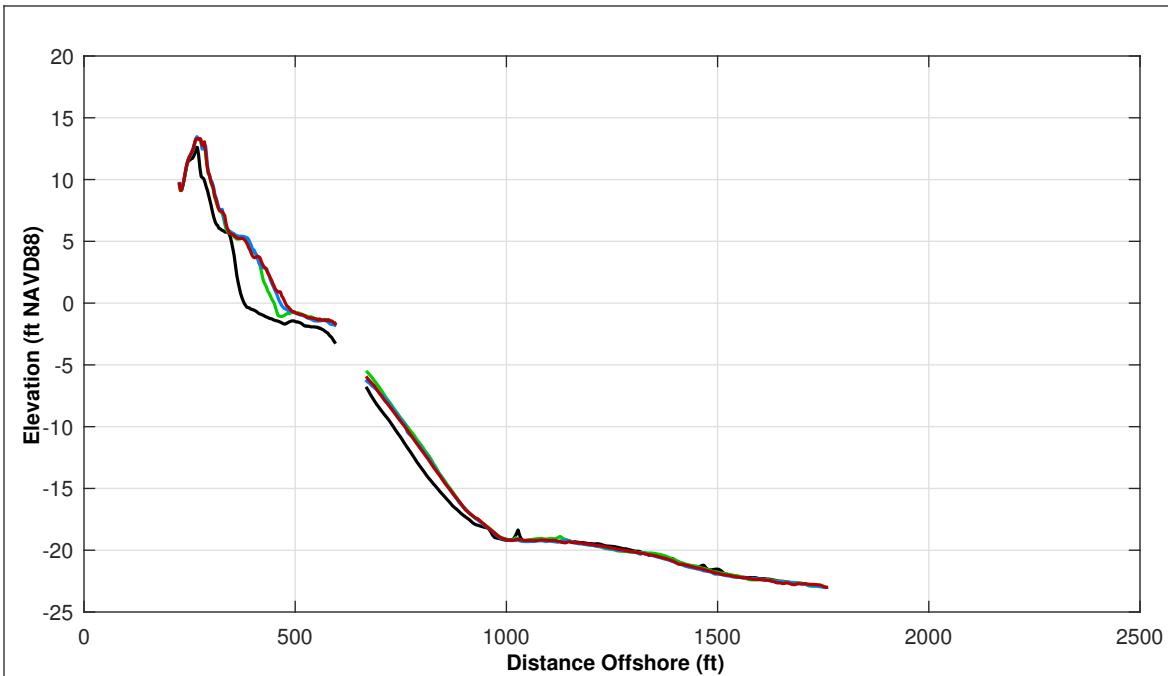


Survey Transect 181+63	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	7.19 ft	10.25 ft
Volume Change Above -15 ft NAVD88	4.83 cy/ft	6.15 cy/ft
Volume Change Above 0 ft NAVD88	0.50 cy/ft	0.90 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	-35.0 ft	

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.





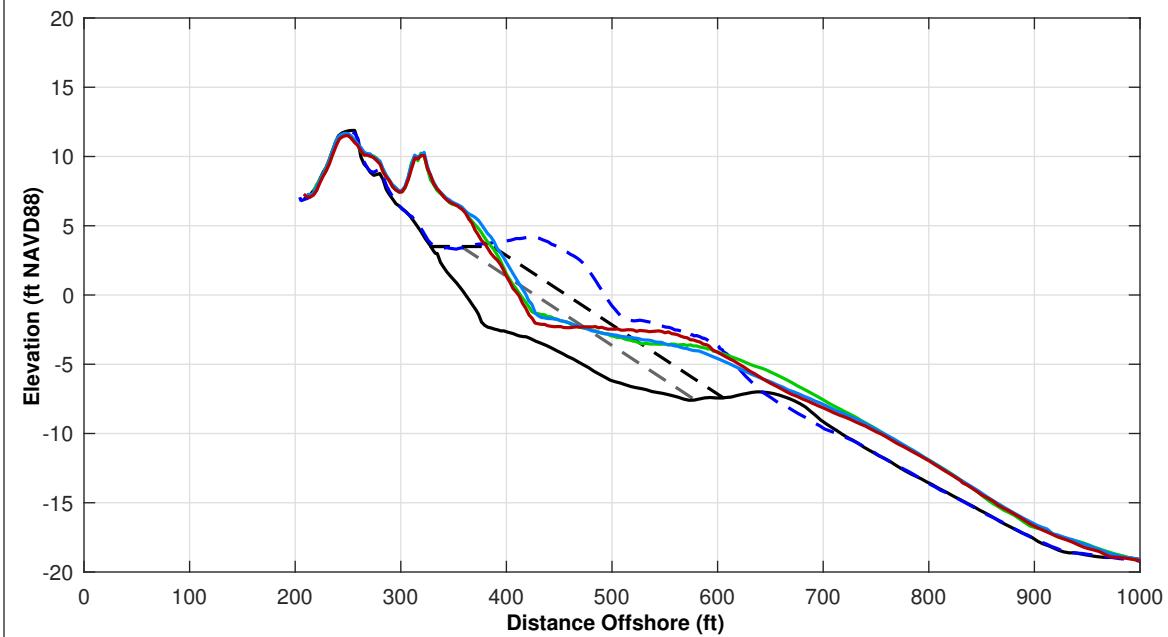
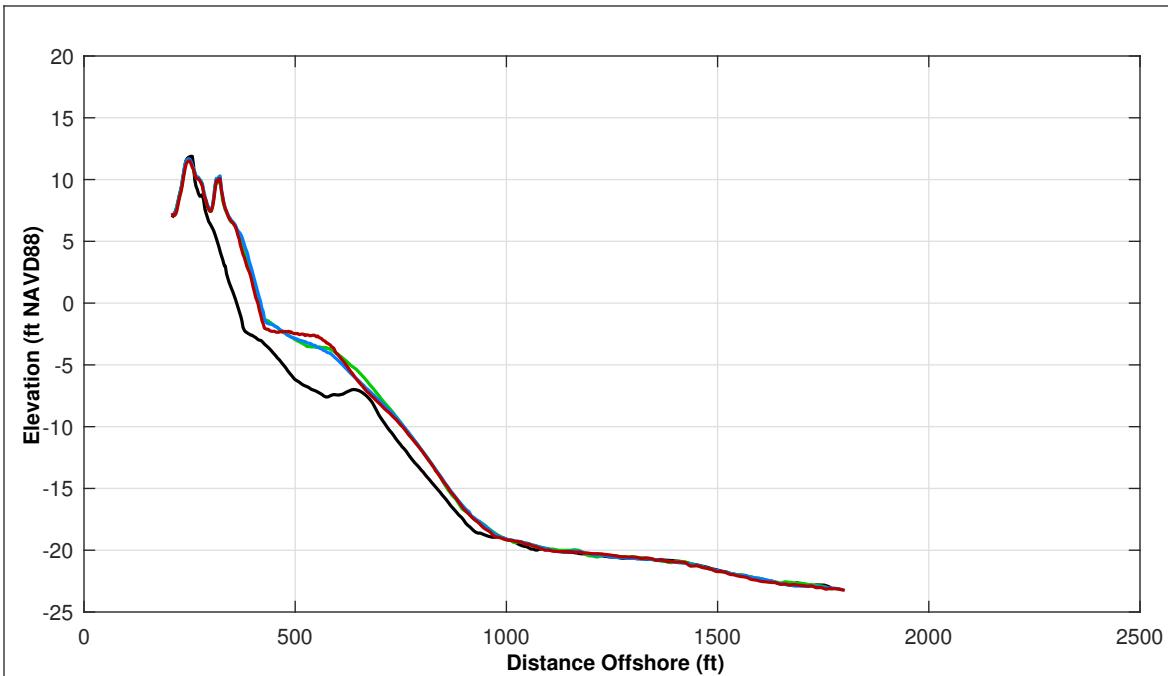
Survey Transect 183+63	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	22.09 ft	4.23 ft
Volume Change Above -15 ft NAVD88	0.82 cy/ft	0.32 cy/ft
Volume Change Above 0 ft NAVD88	2.57 cy/ft	-0.22 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	+ 2.0 ft	

LEGEND:	
APR 2025	MAY 2017
NOV 2024	OCT 2016
MAY 2024	USACE Design Template
	USACE Nourishment Threshold

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.



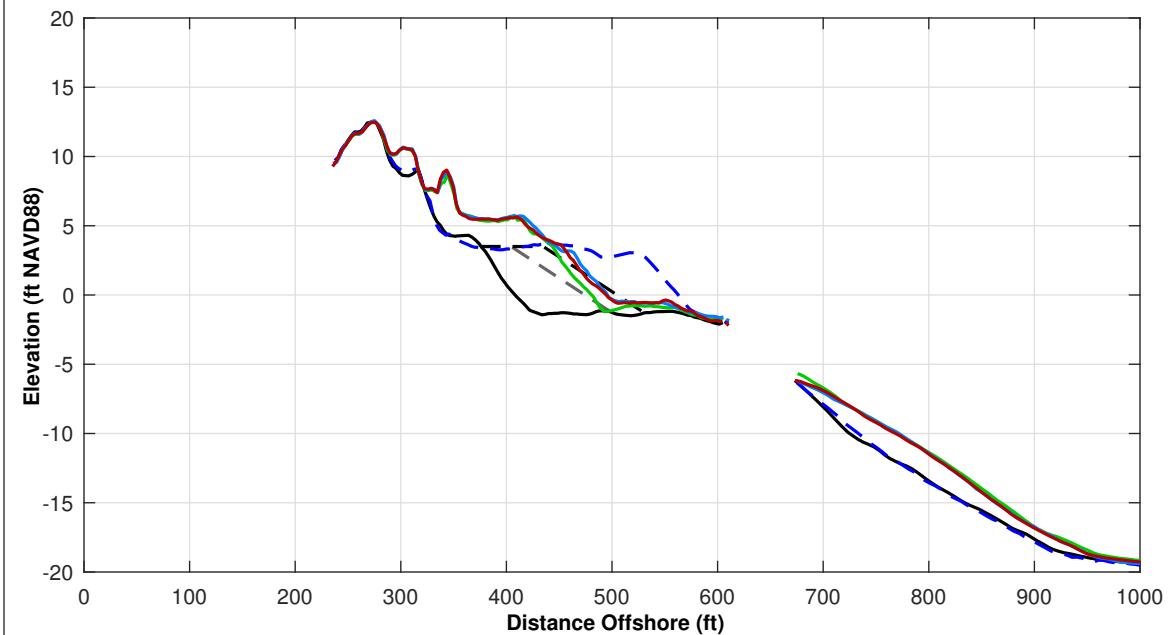
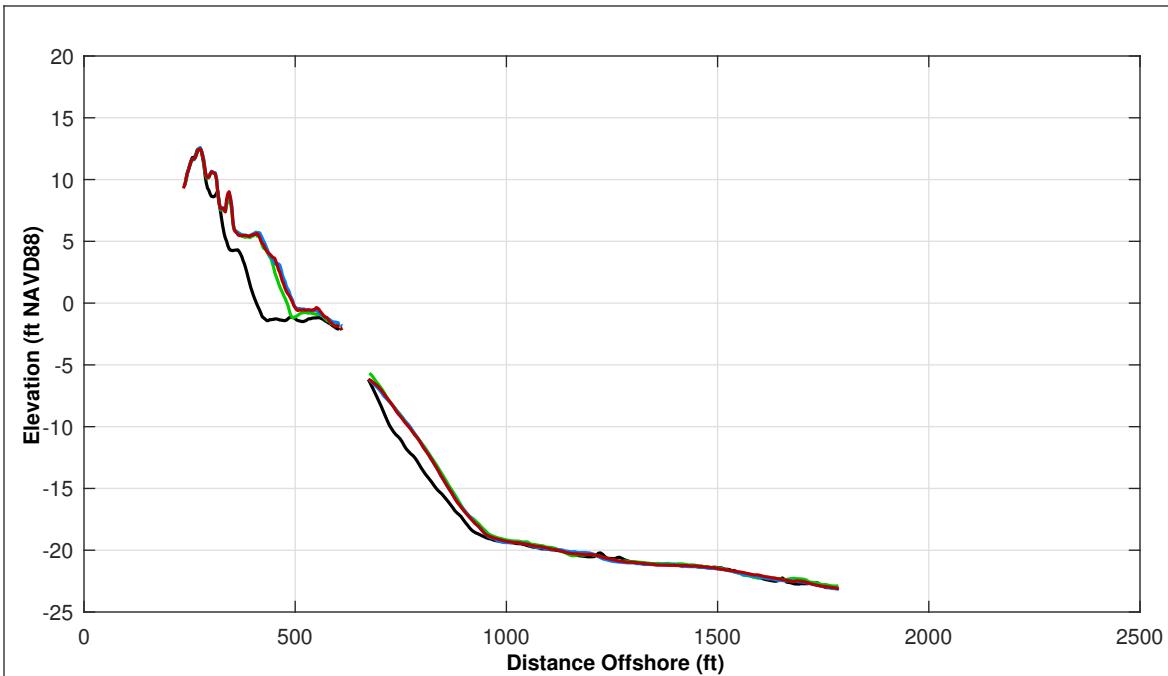


Survey Transect 185+63	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	-1.45 ft	-7.87 ft
Volume Change Above -15 ft NAVD88	-2.61 cy/ft	-1.79 cy/ft
Volume Change Above 0 ft NAVD88	-1.06 cy/ft	-2.65 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:		-7.0 ft

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.





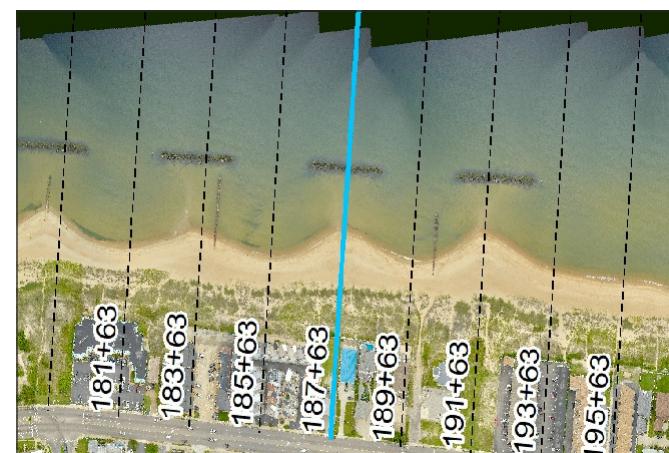
Survey Transect 187+63	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	10.70 ft	-6.35 ft
Volume Change Above -15 ft NAVD88	1.69 cy/ft	-1.18 cy/ft
Volume Change Above 0 ft NAVD88	2.05 cy/ft	-0.88 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	+ 17.0 ft	

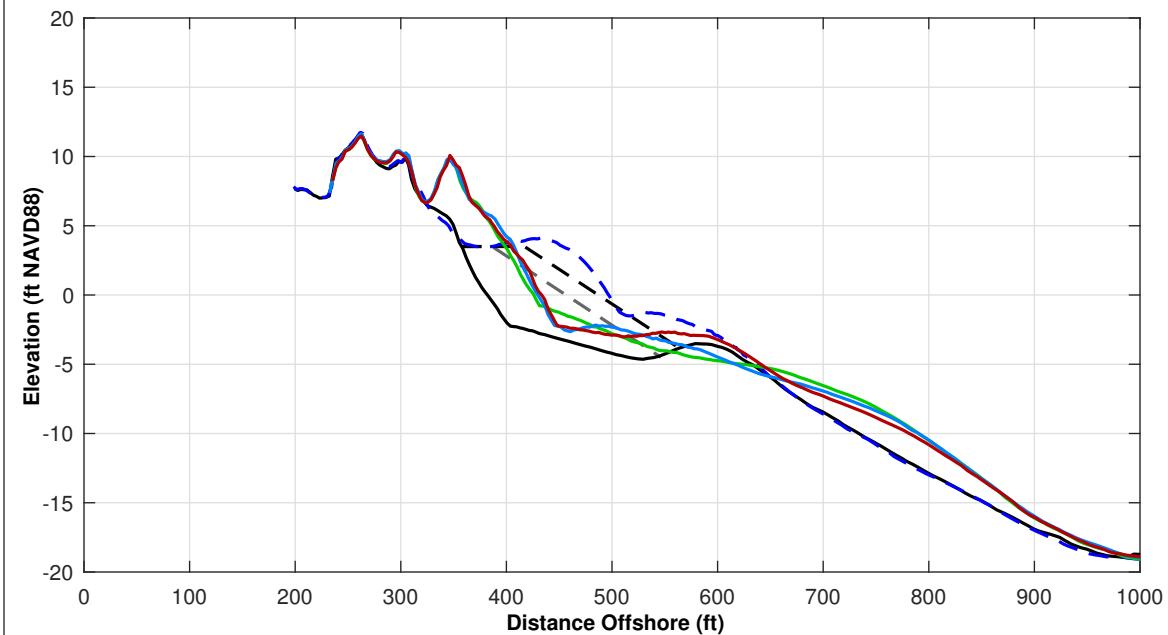
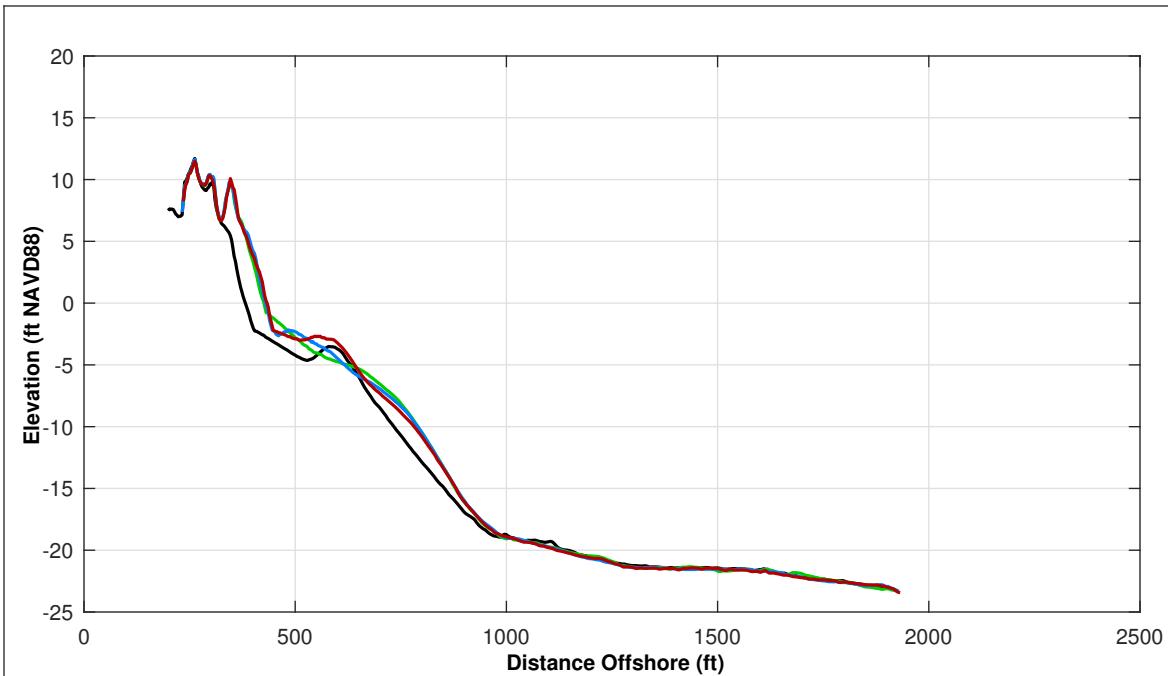
LEGEND:

APR 2025 (Red solid)  
 NOV 2024 (Blue solid)  
 MAY 2017 (Green solid)  
 OCT 2016 (Black solid)  
 USACE Design Template (Blue dashed)  
 USACE Nourishment Threshold (Black dashed)

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.

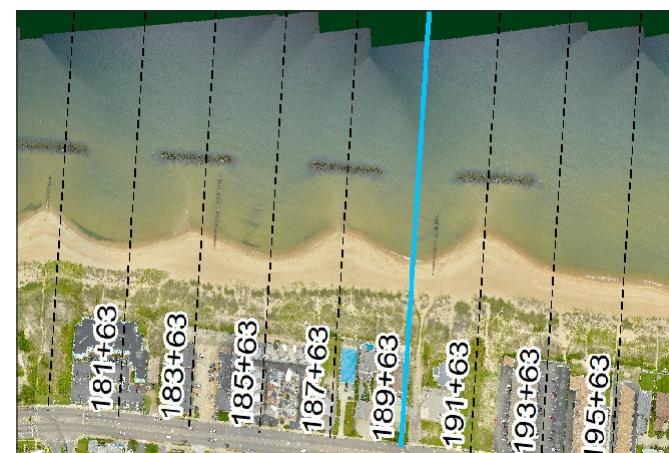


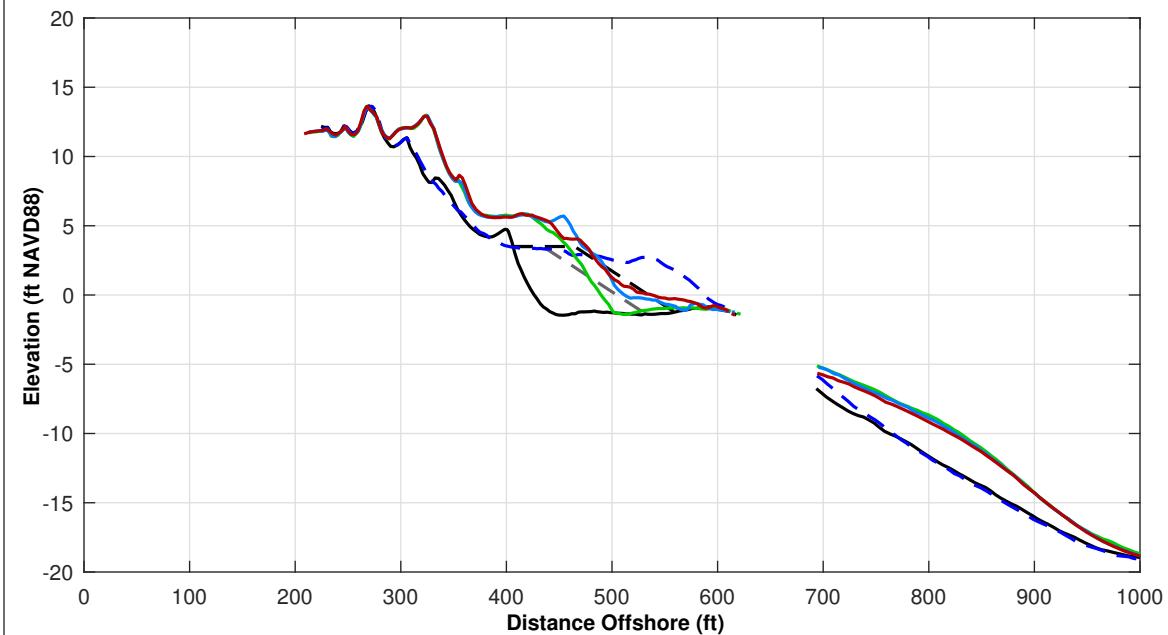
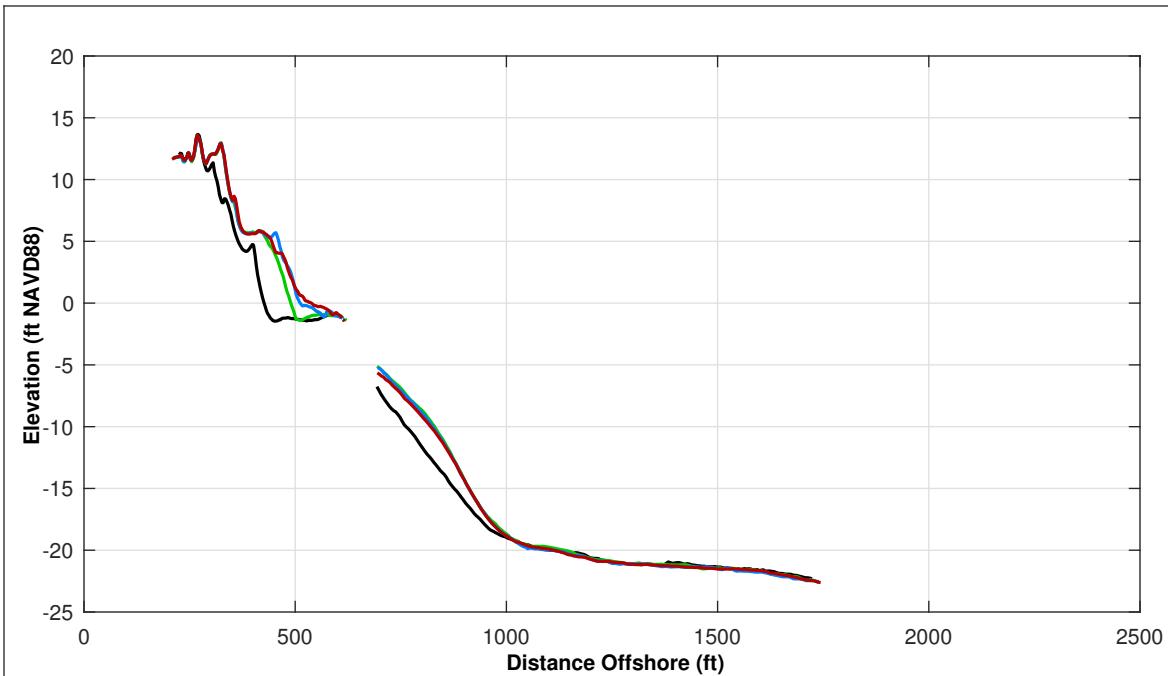


Survey Transect 189+63	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	8.73 ft	3.29 ft
Volume Change Above -15 ft NAVD88	1.59 cy/ft	0.75 cy/ft
Volume Change Above 0 ft NAVD88	1.22 cy/ft	-0.40 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:		-13.0 ft
<b>LEGEND:</b>		
APR 2025	MAY 2017	—
NOV 2024	OCT 2016	—
MAY 2024	USACE Design Template	—
	USACE Nourishment Threshold	—

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.





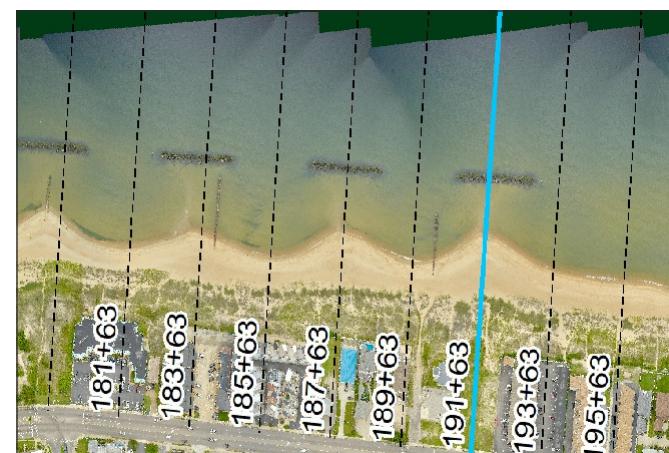
Survey Transect 191+63	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	25.12 ft	4.82 ft
Volume Change Above -15 ft NAVD88	4.21 cy/ft	-0.98 cy/ft
Volume Change Above 0 ft NAVD88	4.26 cy/ft	0.08 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	+ 11.0 ft	

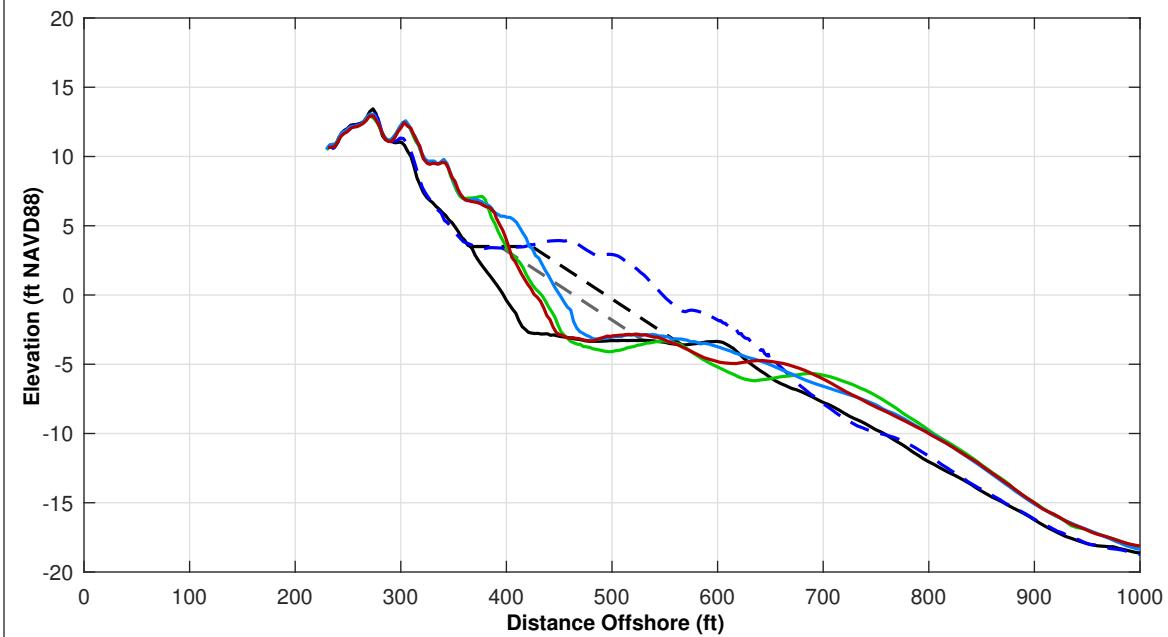
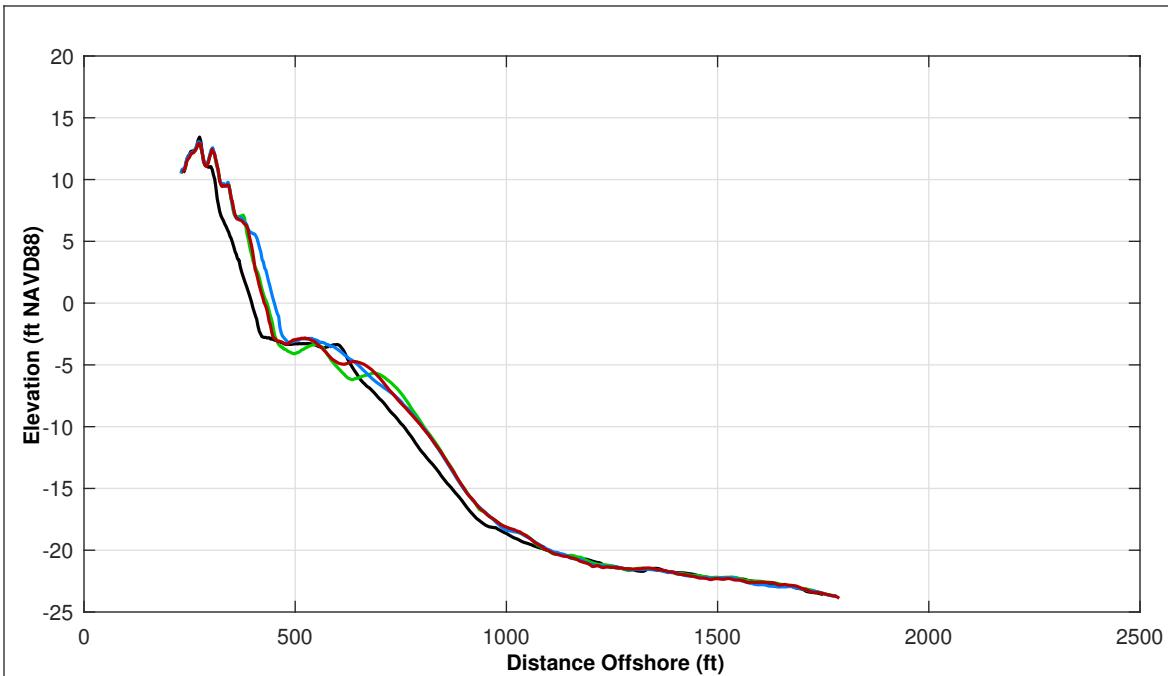
**LEGEND:**

APR 2025	MAY 2017
NOV 2024	OCT 2016
MAY 2024	USACE Design Template
	USACE Nourishment Threshold

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.





Survey Transect 193+63	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	-4.14 ft	-24.31 ft
Volume Change Above -15 ft NAVD88	1.81 cy/ft	-8.67 cy/ft
Volume Change Above 0 ft NAVD88	-0.38 cy/ft	-5.07 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	-25.0 ft	

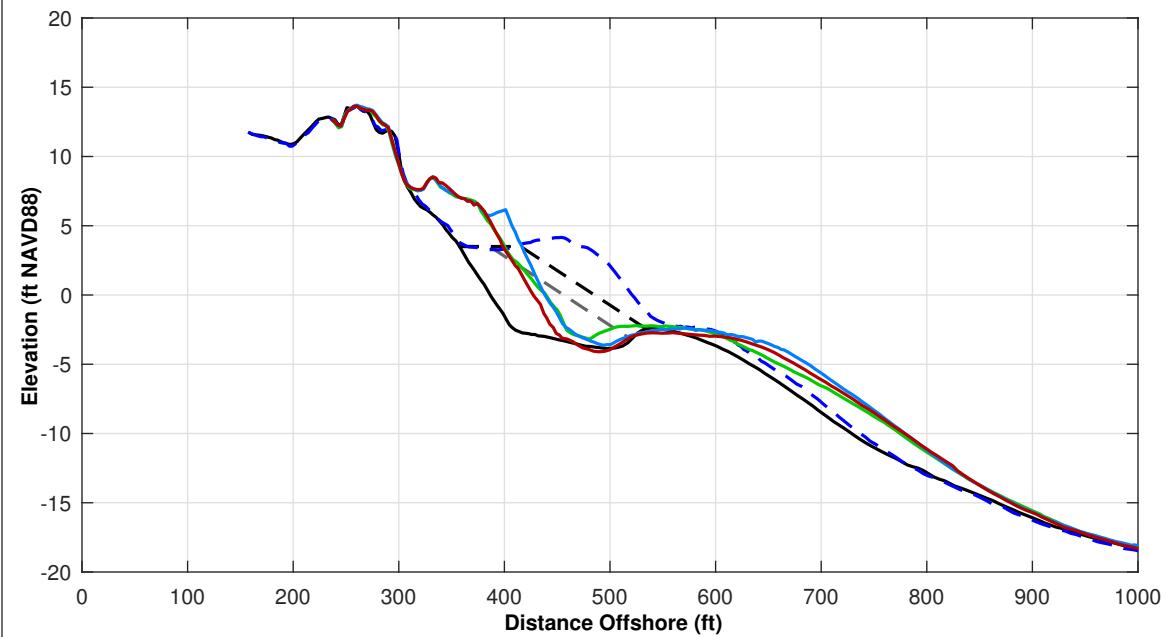
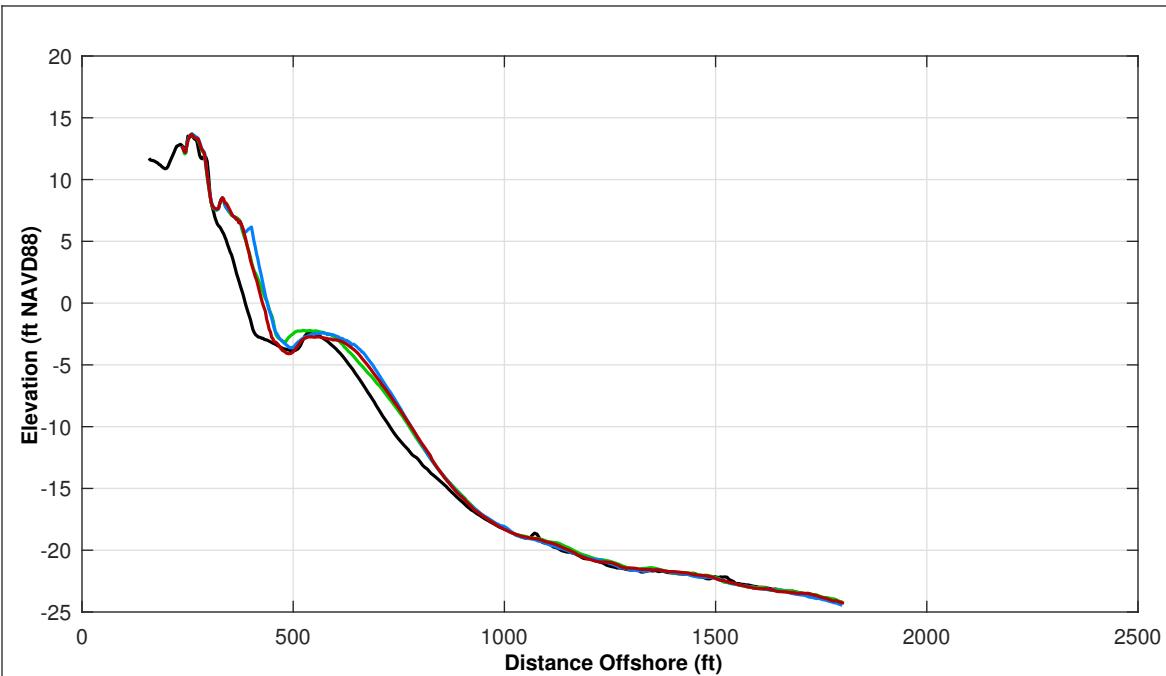
LEGEND:

APR 2025 (Red solid)  
 NOV 2024 (Blue solid)  
 MAY 2024 (Green solid)  
 OCT 2016 (Black dashed)  
 USACE Design Template (Blue dashed)  
 USACE Nourishment Threshold (Black dash-dot)

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.



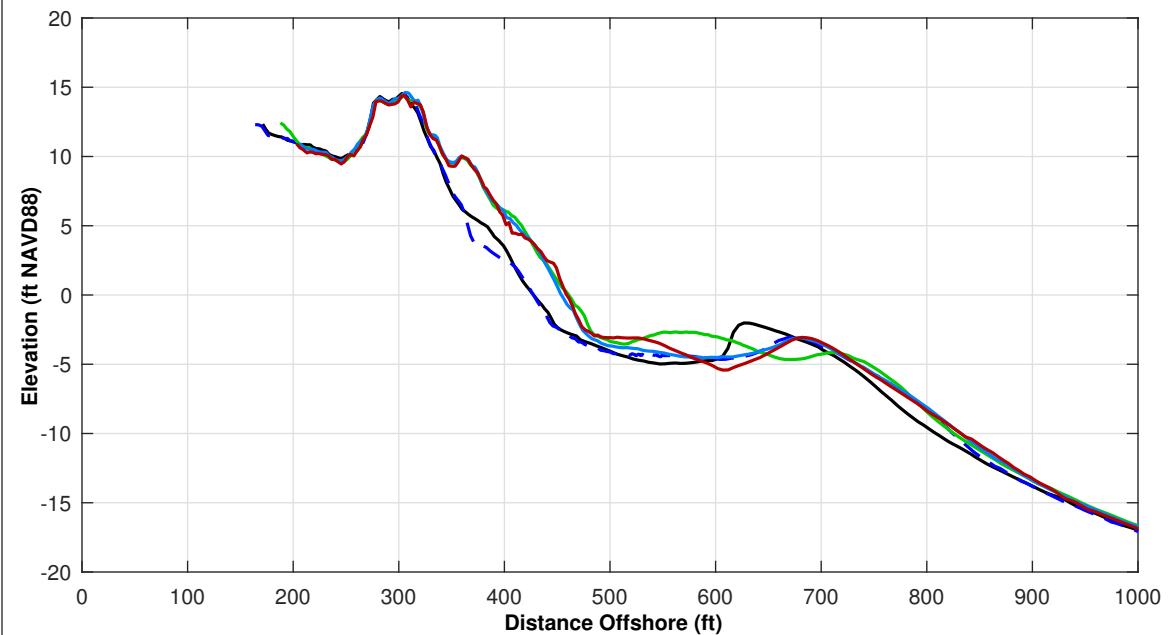
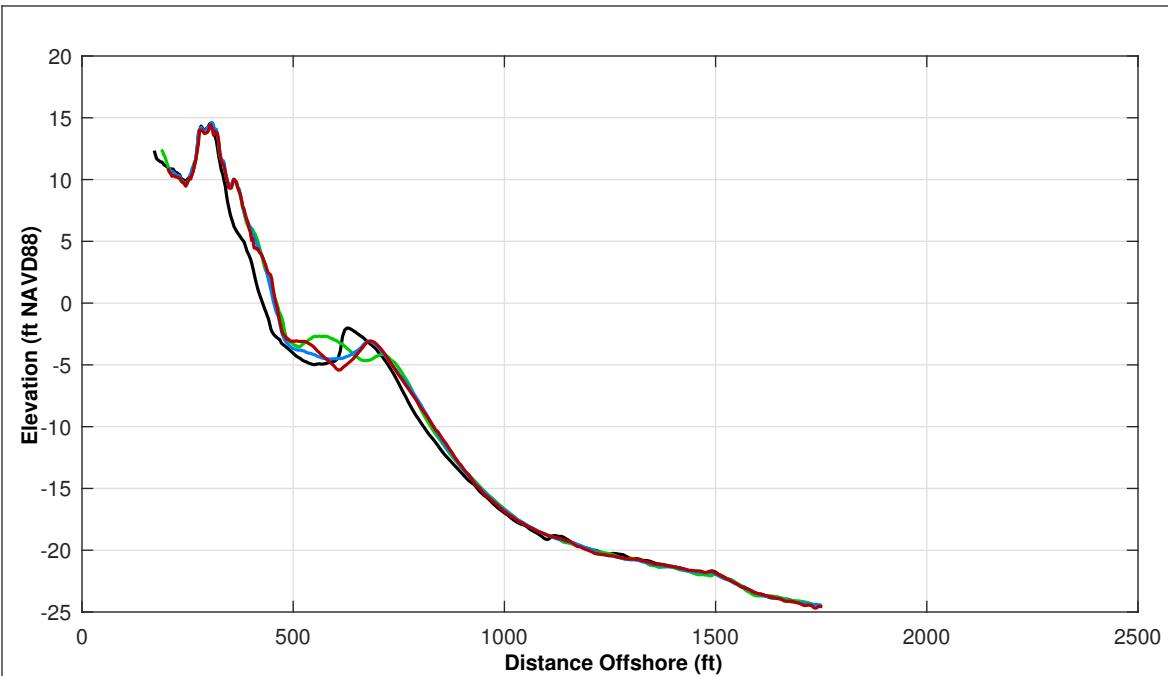


Survey Transect 195+63	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	-7.61 ft	-12.14 ft
Volume Change Above -15 ft NAVD88	-2.48 cy/ft	-8.73 cy/ft
Volume Change Above 0 ft NAVD88	-0.28 cy/ft	-3.43 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:		-17.0 ft
<b>LEGEND:</b>		
APR 2025	MAY 2017	—
NOV 2024	OCT 2016	—
MAY 2024	USACE Design Template	—
	USACE Nourishment Threshold	—

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.



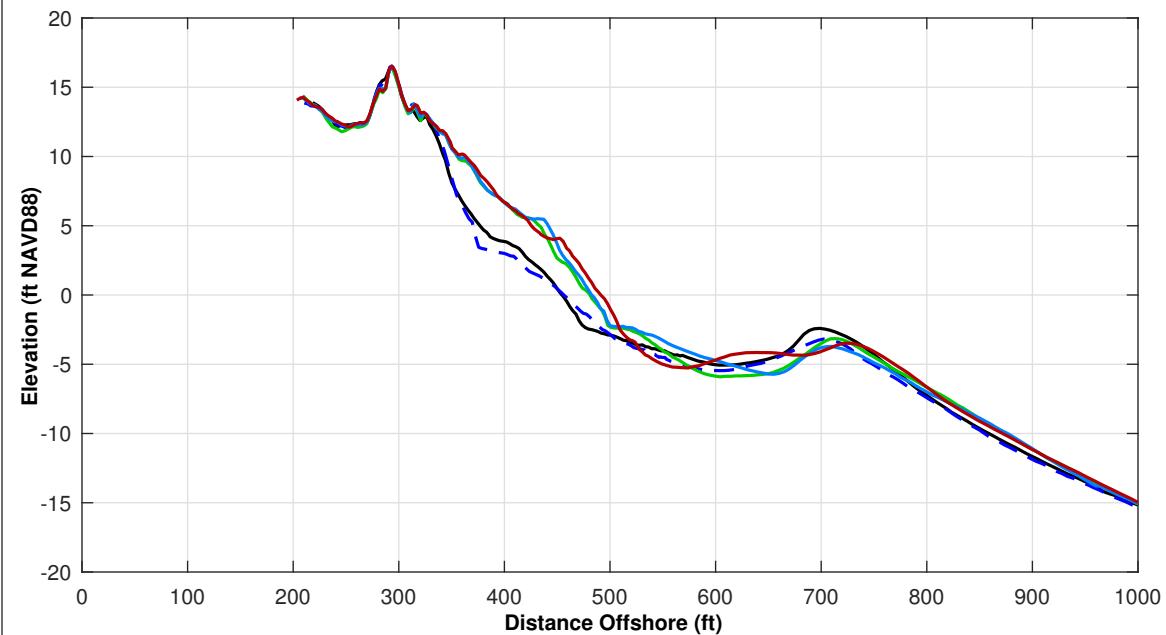
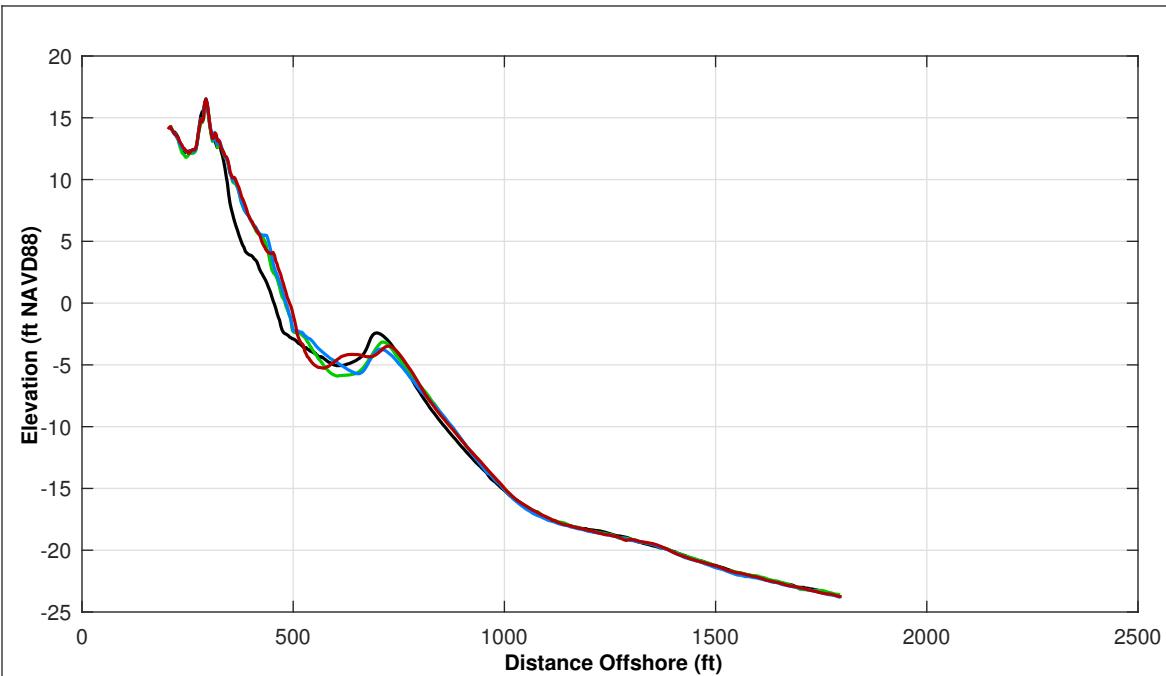


Survey Transect 206+86	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	2.83 ft	5.71 ft
Volume Change Above -15 ft NAVD88	-4.34 cy/ft	-0.26 cy/ft
Volume Change Above 0 ft NAVD88	-0.64 cy/ft	-0.89 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:		N/A

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.

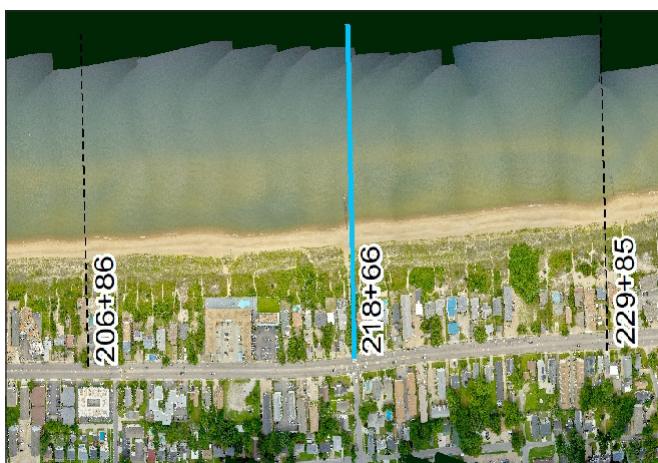


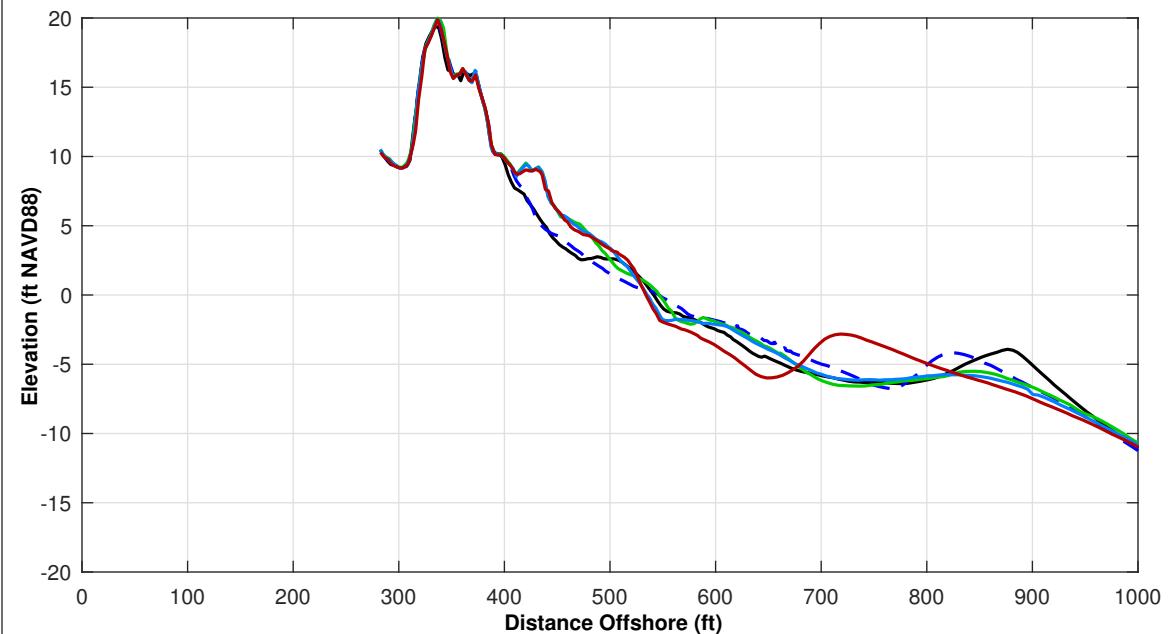
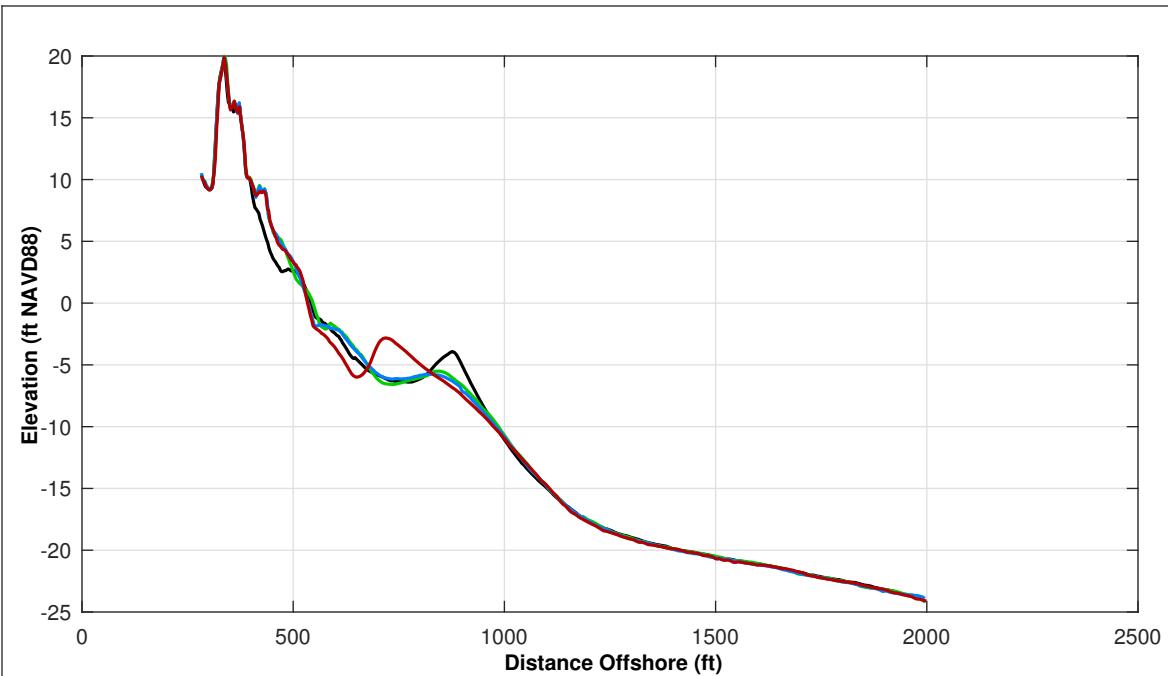


Survey Transect 218+66	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	11.99 ft	7.38 ft
Volume Change Above -15 ft NAVD88	6.42 cy/ft	3.37 cy/ft
Volume Change Above 0 ft NAVD88	3.25 cy/ft	1.22 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	N/A	

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.



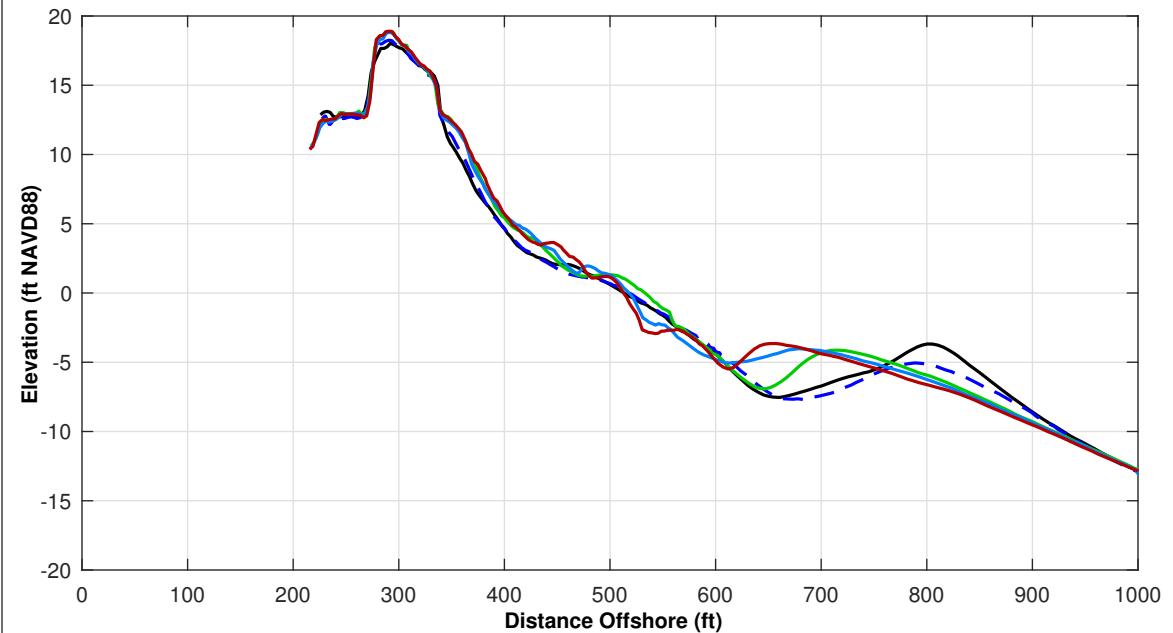
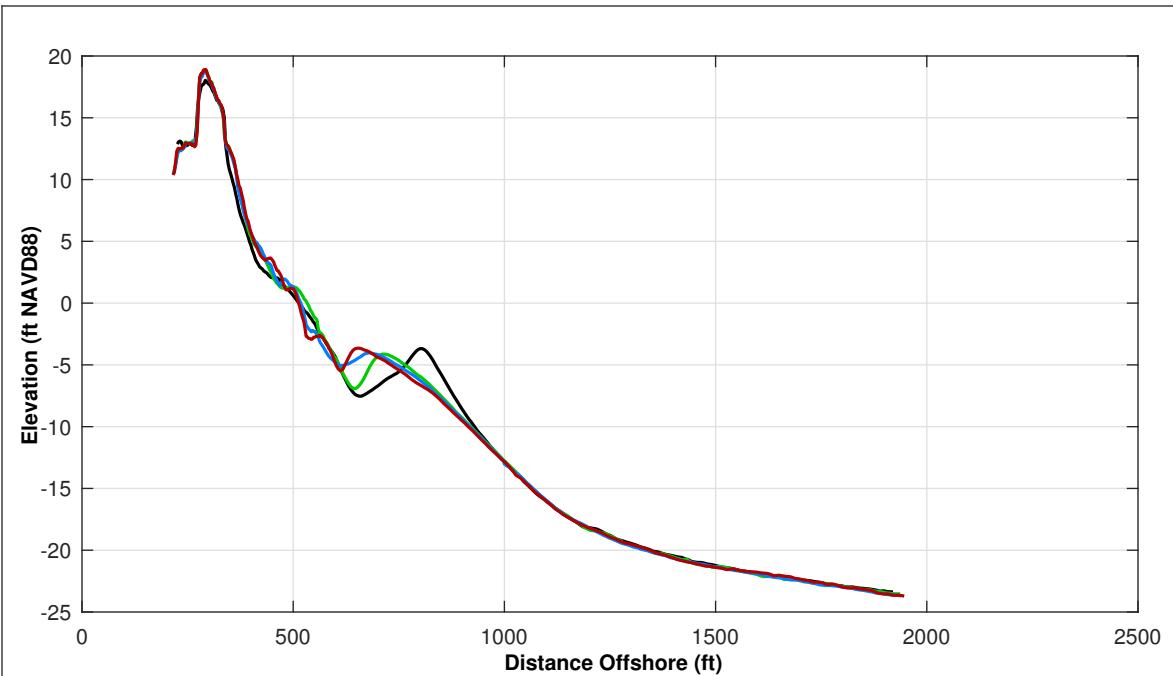


Survey Transect 229+85	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	-5.11 ft	1.24 ft
Volume Change Above -15 ft NAVD88	-0.71 cy/ft	1.22 cy/ft
Volume Change Above 0 ft NAVD88	-0.60 cy/ft	-0.49 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	N/A	

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.





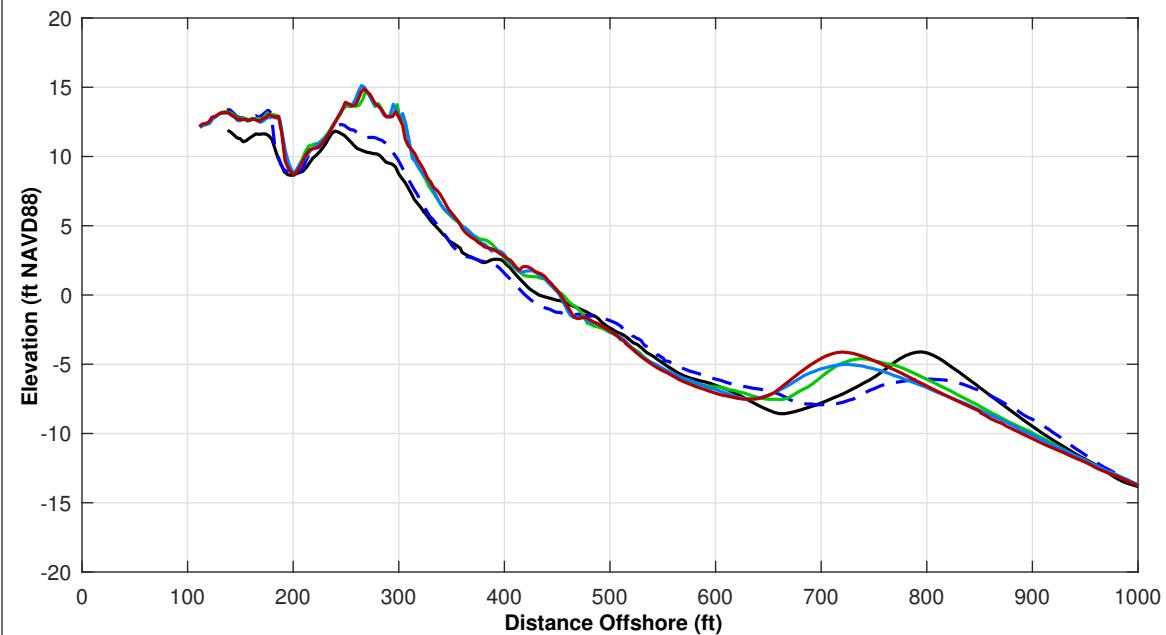
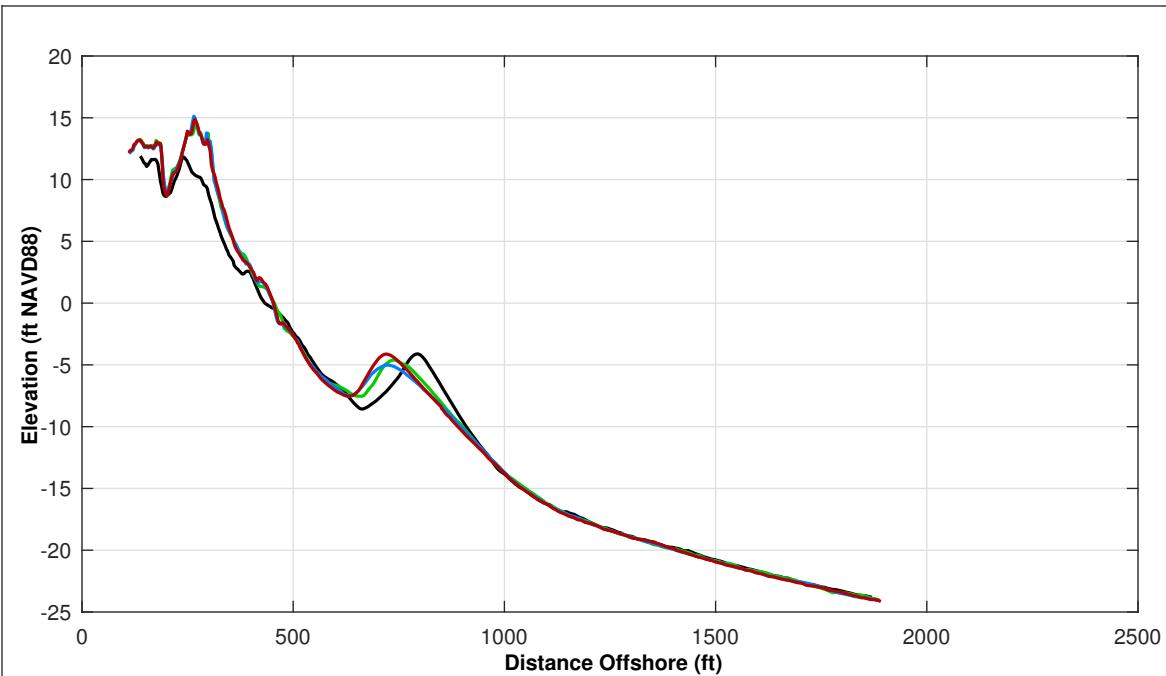
Survey Transect	APR 2025 - MAY 2024	APR 2025 - NOV 2024
242+03		
Shoreline Change at MHW (0.98 ft NAVD88)	-11.77 ft	-2.46 ft
Volume Change Above -15 ft NAVD88	-1.22 cy/ft	-0.69 cy/ft
Volume Change Above 0 ft NAVD88	1.28 cy/ft	1.09 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	N/A	

**LEGEND:**  
 APR 2025 — APR 2017  
 NOV 2024 — OCT 2016  
 MAY 2024 — —

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.





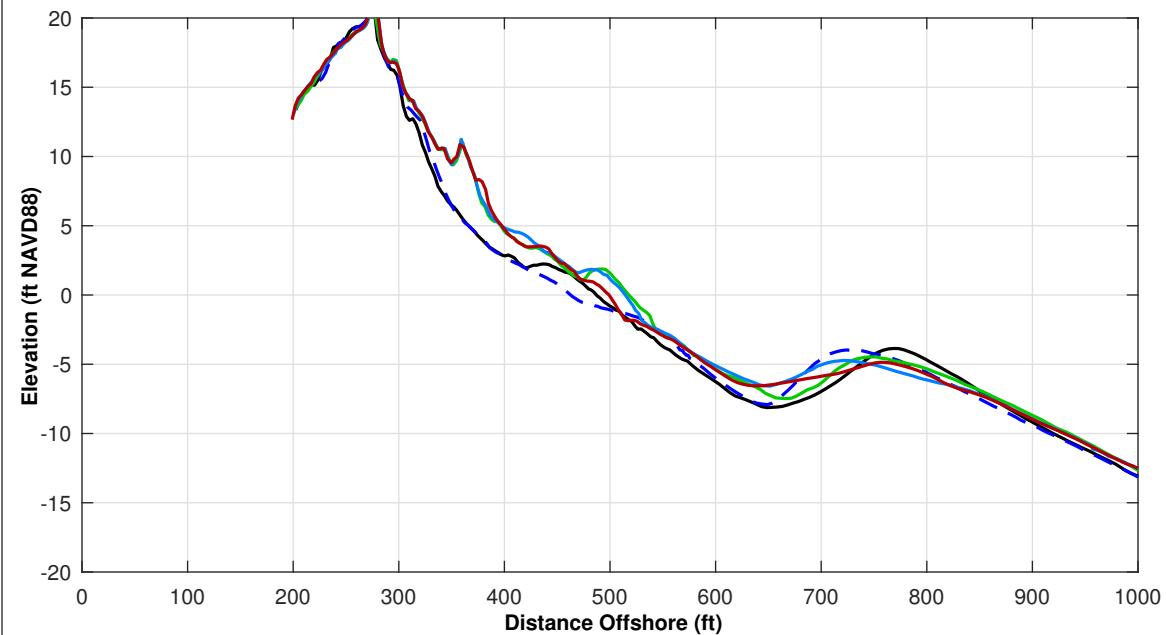
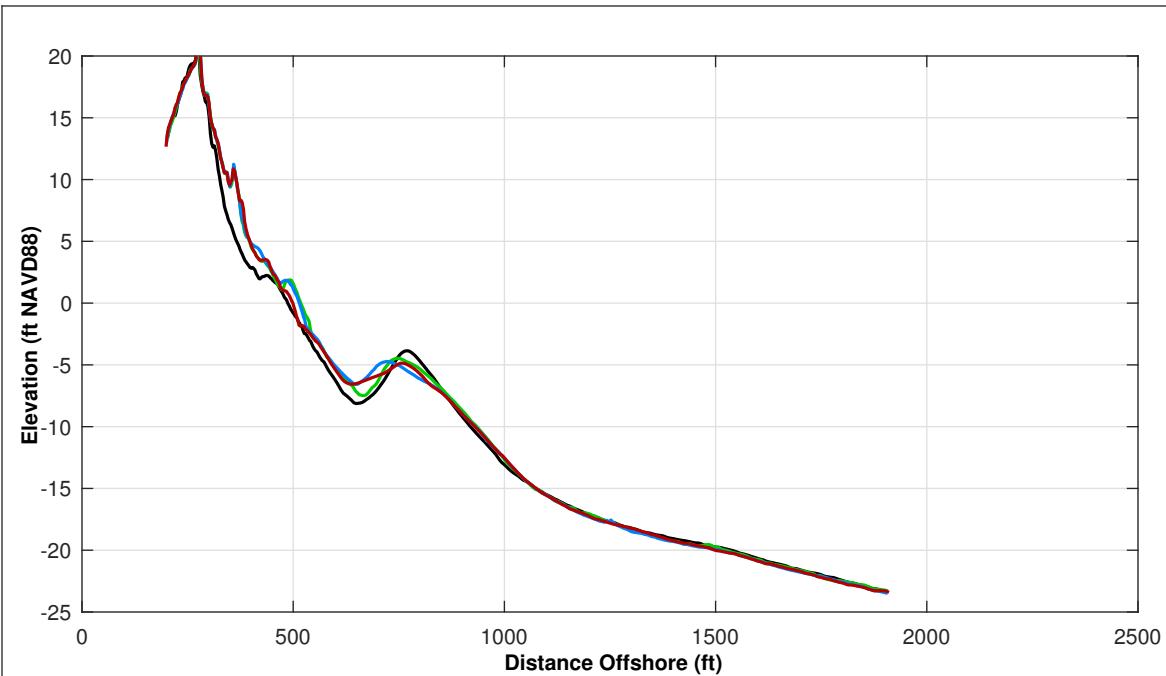
Survey Transect 252+62	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	1.43 ft	1.82 ft
Volume Change Above -15 ft NAVD88	-0.95 cy/ft	0.94 cy/ft
Volume Change Above 0 ft NAVD88	0.26 cy/ft	0.00 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:		N/A

LEGEND:		
APR 2025 — NOV 2024 — MAY 2024 — OCT 2016 —		

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.





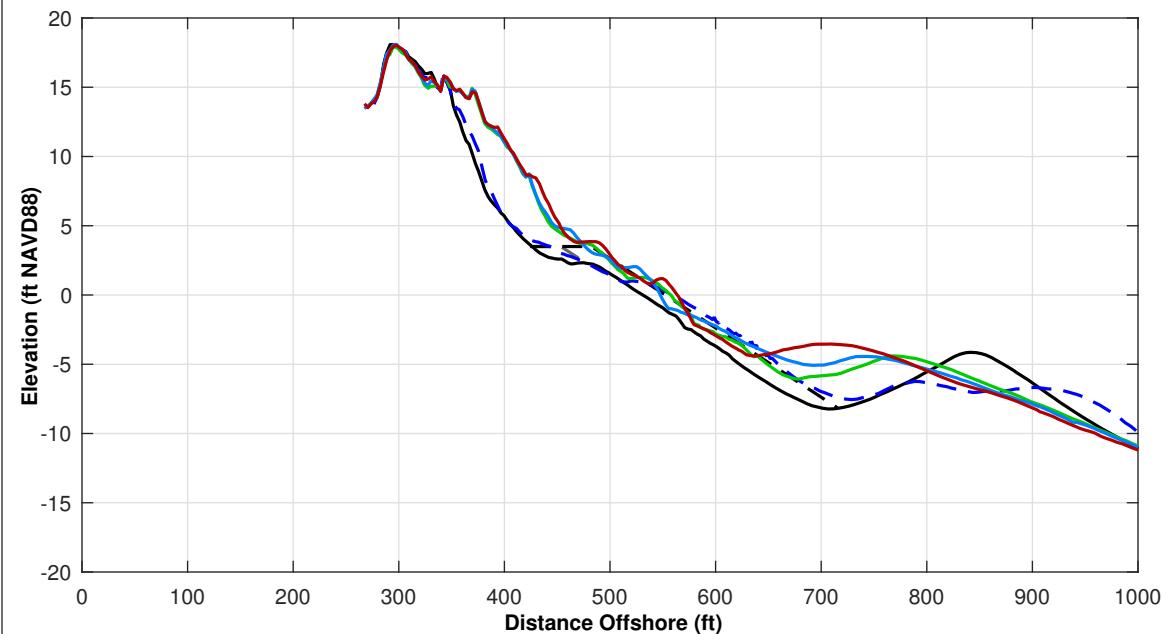
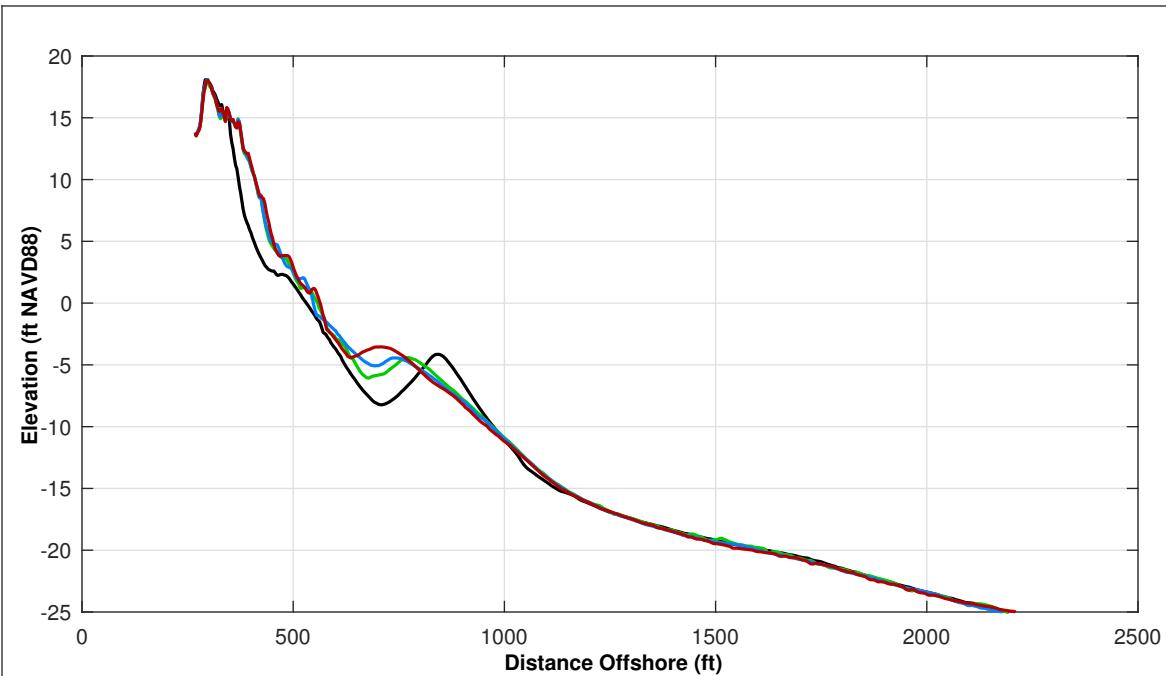
Survey Transect 263+22	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	-25.48 ft	-20.50 ft
Volume Change Above -15 ft NAVD88	-2.71 cy/ft	-4.13 cy/ft
Volume Change Above 0 ft NAVD88	0.24 cy/ft	-1.24 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	N/A	



Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.





Survey Transect 274+53	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	11.90 ft	13.80 ft
Volume Change Above -15 ft NAVD88	4.76 cy/ft	2.10 cy/ft
Volume Change Above 0 ft NAVD88	2.92 cy/ft	1.65 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	+ 10.0 ft	

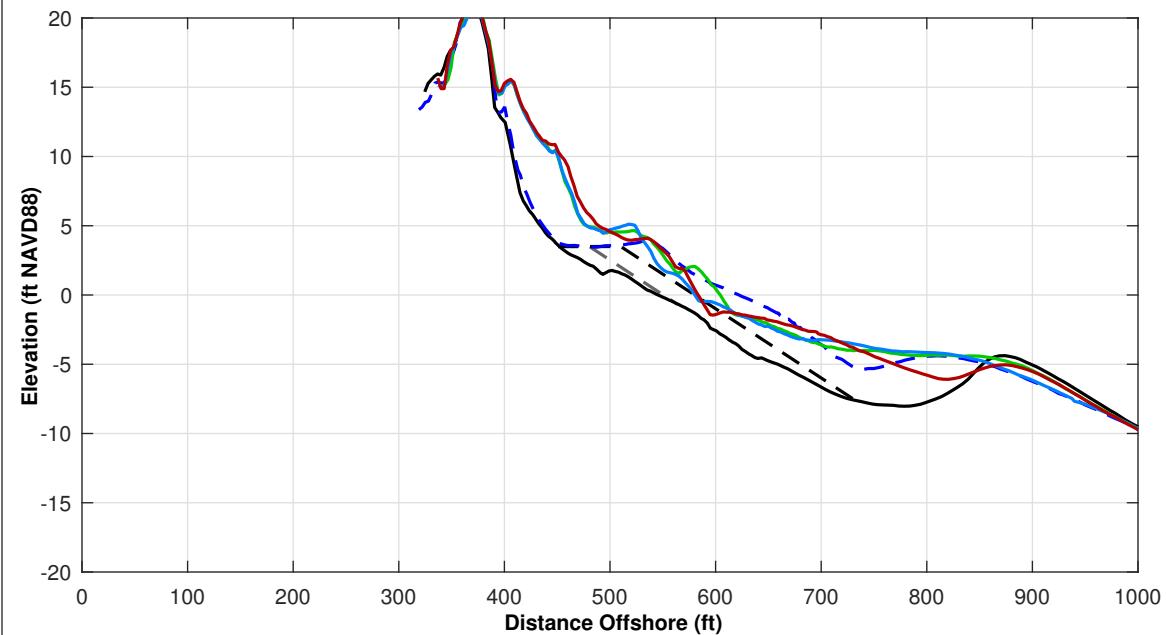
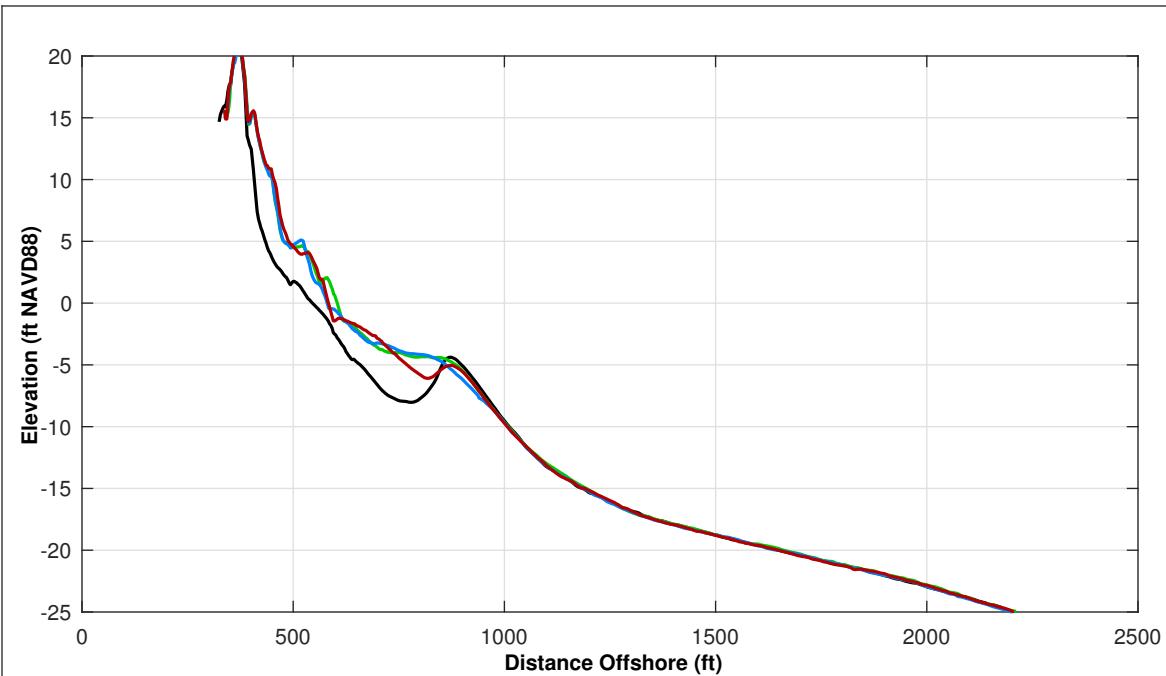
**LEGEND:**

APR 2025	MAY 2017
NOV 2024	OCT 2016
MAY 2024	USACE Design Template
	USACE Nourishment Threshold

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.





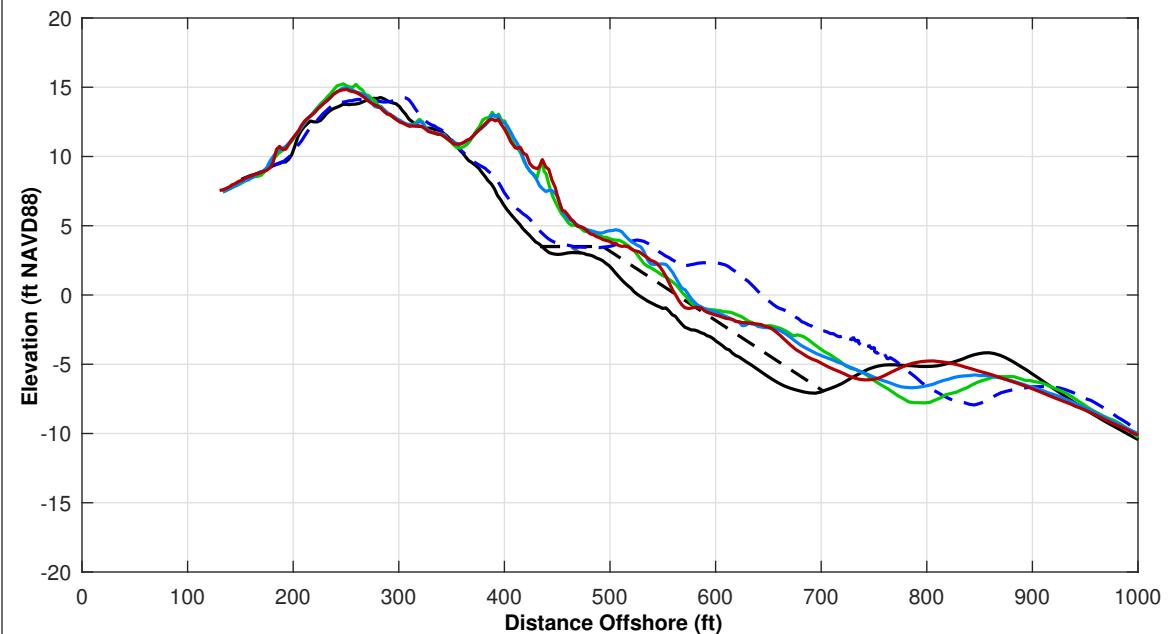
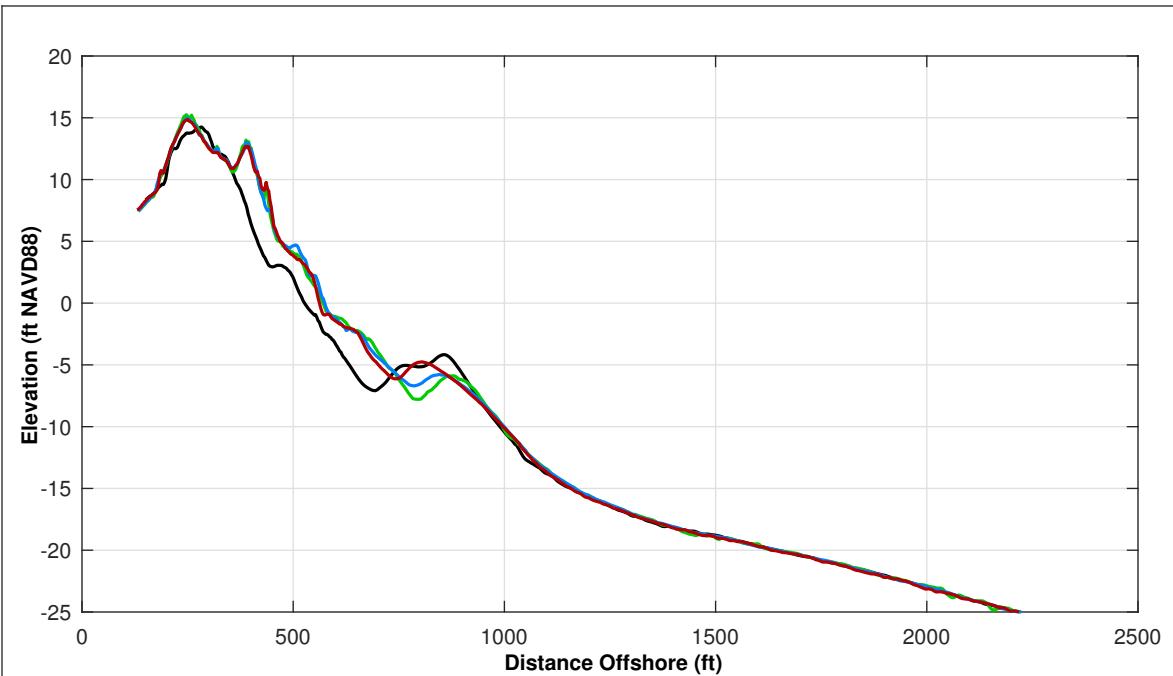
Survey Transect 281+40	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	-17.73 ft	5.88 ft
Volume Change Above -15 ft NAVD88	-4.57 cy/ft	0.48 cy/ft
Volume Change Above 0 ft NAVD88	0.83 cy/ft	3.08 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	+ 34.0 ft	

LEGEND:	MAY 2017	APR 2025	OCT 2016	USACE Design Template
	—	—	—	—
	—	—	—	—

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.





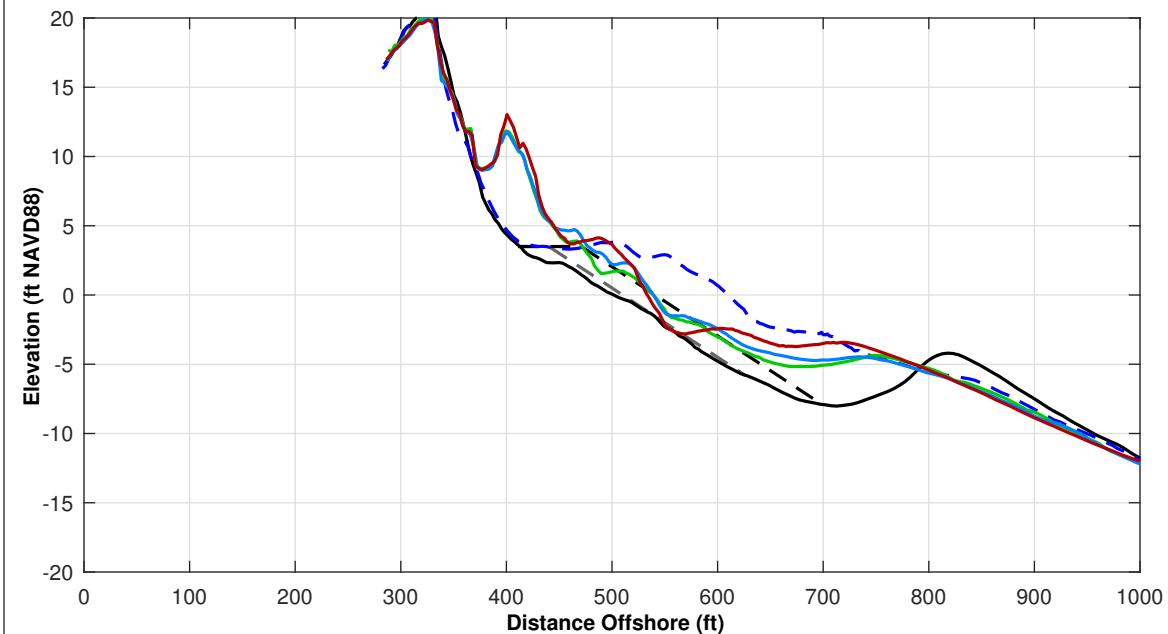
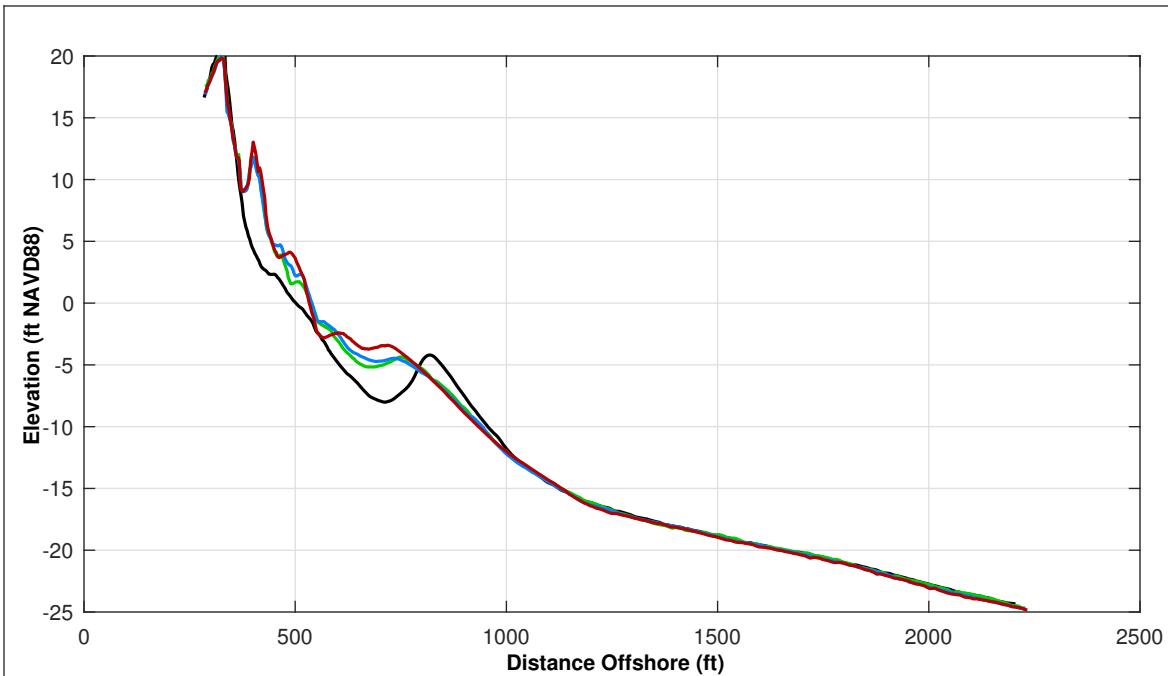
Survey Transect 288+39	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	-3.34 ft	-8.84 ft
Volume Change Above -15 ft NAVD88	1.69 cy/ft	-1.01 cy/ft
Volume Change Above 0 ft NAVD88	0.24 cy/ft	-1.28 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	+ 21.0 ft	

LEGEND:	MAY 2017
APR 2025	—
NOV 2024	—
MAY 2024	—
USACE Design Template	—
USACE Nourishment Threshold	—

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.



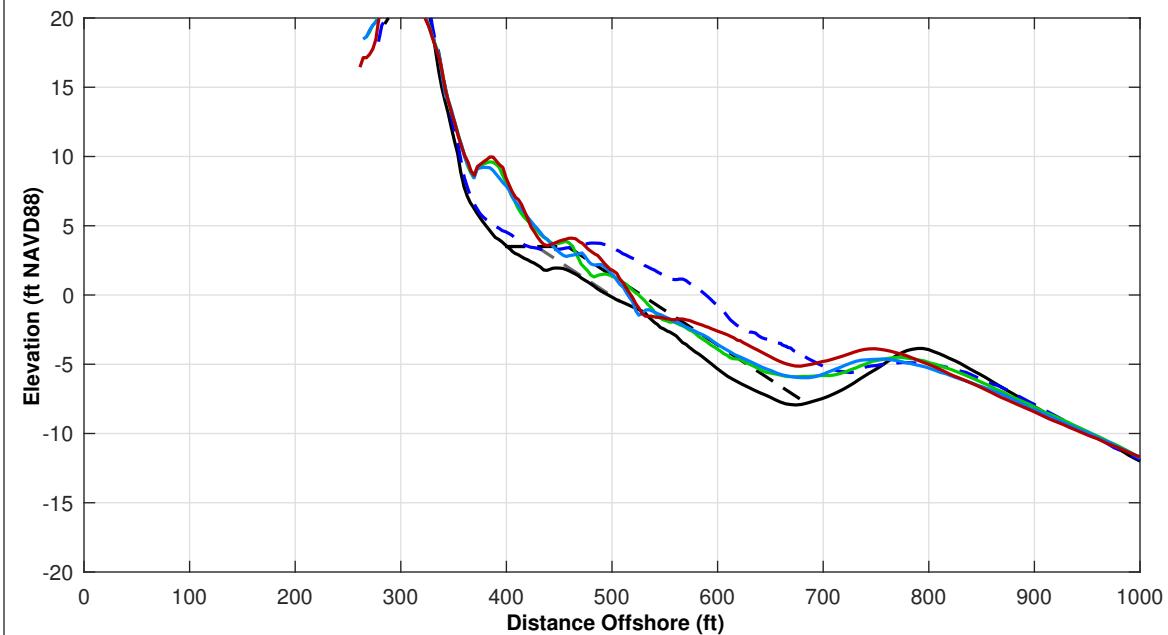
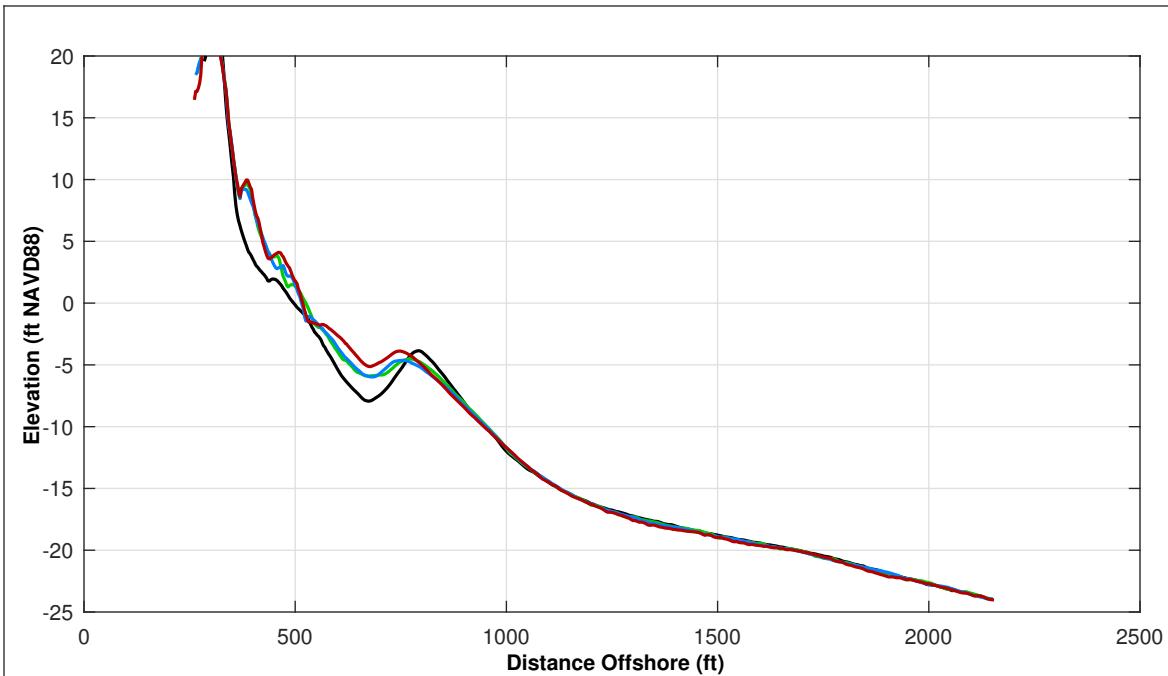


Survey Transect 295+27	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	1.15 ft	-3.65 ft
Volume Change Above -15 ft NAVD88	8.94 cy/ft	6.13 cy/ft
Volume Change Above 0 ft NAVD88	3.90 cy/ft	2.25 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:		+ 29.0 ft

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.





Survey Transect 302+24	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	0.23 ft	4.05 ft
Volume Change Above -15 ft NAVD88	6.77 cy/ft	7.98 cy/ft
Volume Change Above 0 ft NAVD88	1.39 cy/ft	1.87 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:		+ 17.0 ft

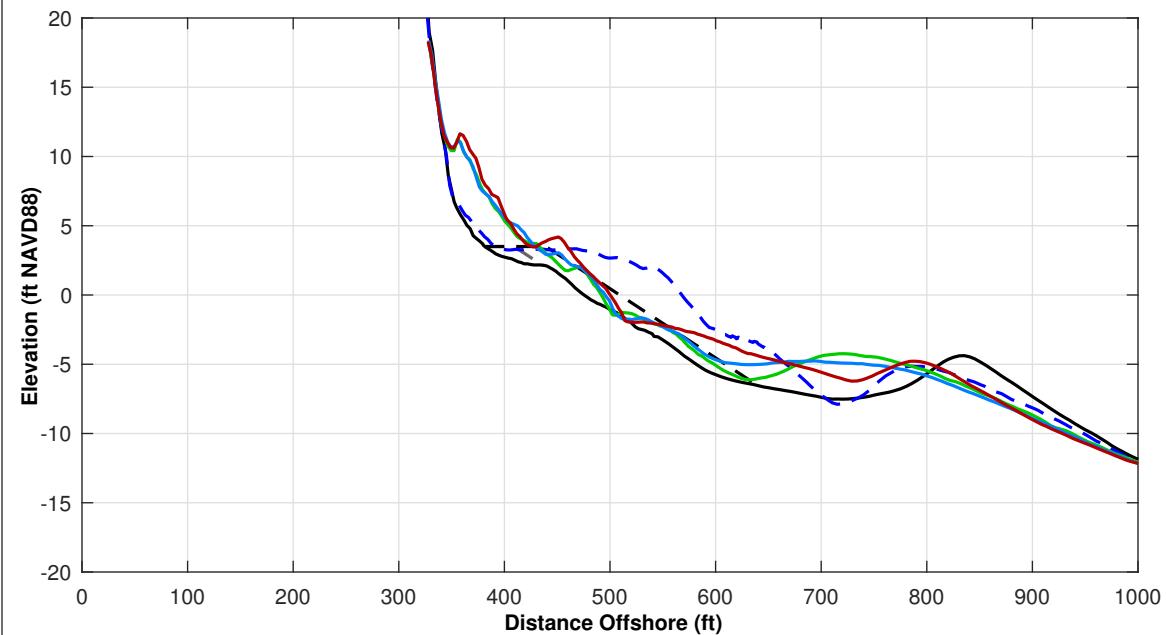
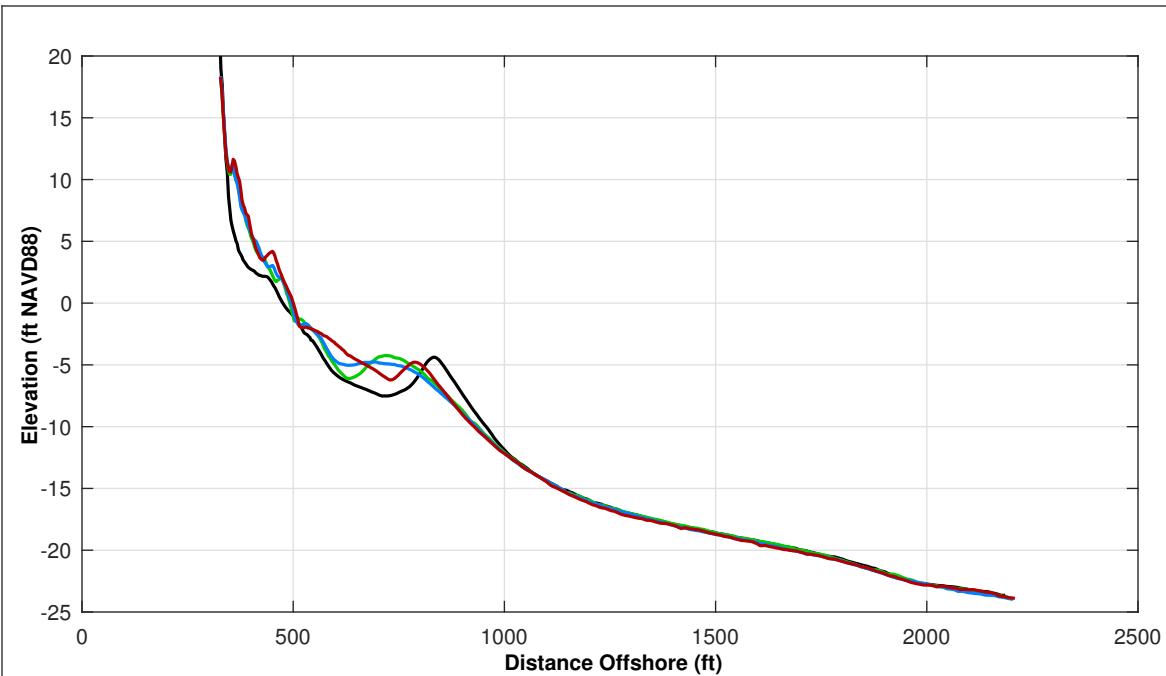
LEGEND:

APR 2025 (Red solid)  
 OCT 2016 (Blue solid)  
 NOV 2024 (Green solid)  
 MAY 2017 (Black dashed)  
 USACE Design Template (Blue dashed)  
 USACE Nourishment Threshold (Black dash-dot)

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.



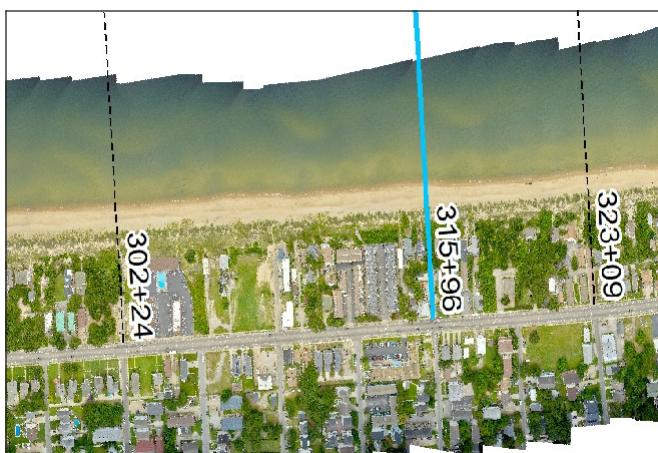


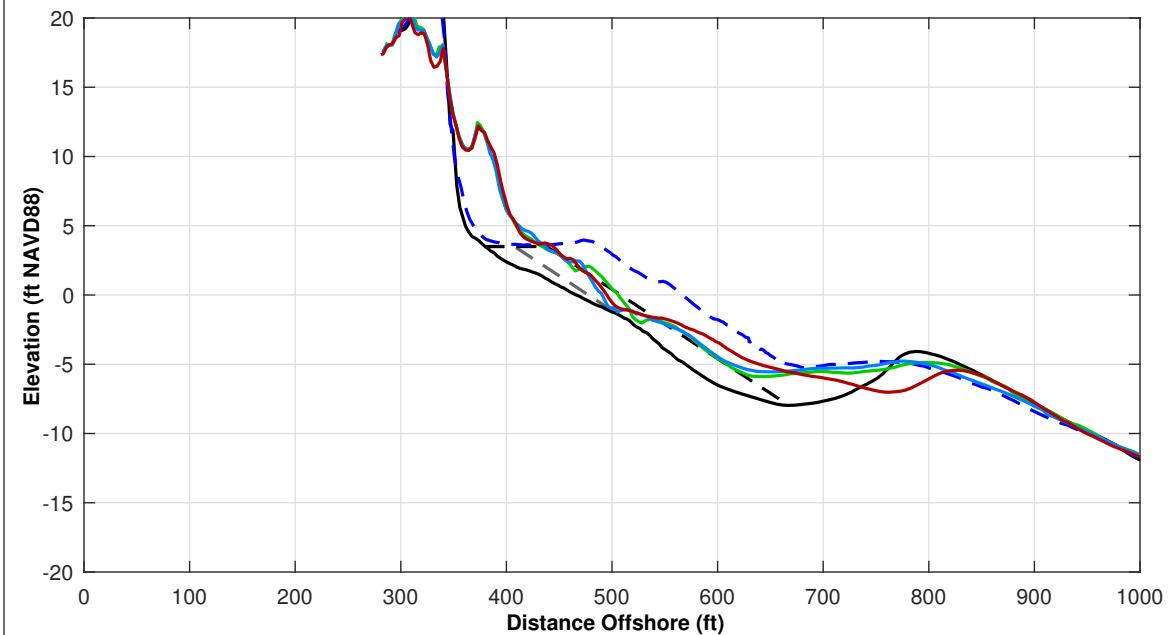
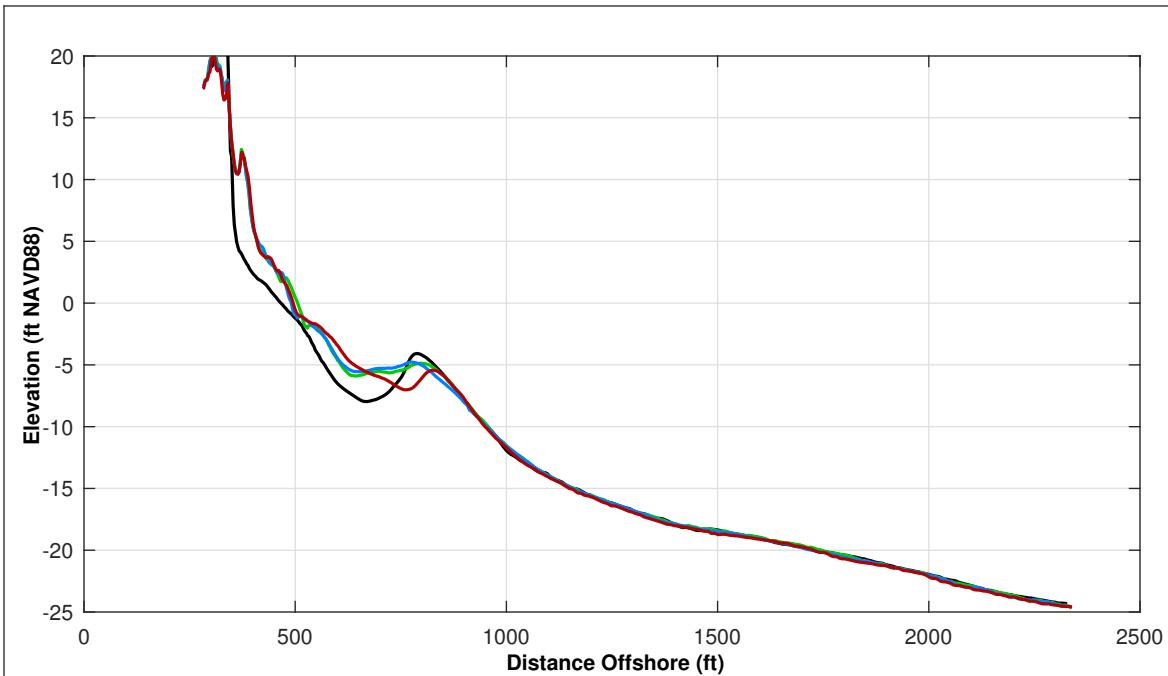
Survey Transect 315+96	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	6.03 ft	3.22 ft
Volume Change Above -15 ft NAVD88	5.08 cy/ft	4.80 cy/ft
Volume Change Above 0 ft NAVD88	3.58 cy/ft	2.29 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	+ 18.0 ft	

LEGEND:	MAY 2017	APR 2025	OCT 2016	NOV 2024	USACE Design Template	USACE Nourishment Threshold
---------	----------	----------	----------	----------	-----------------------	-----------------------------

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.





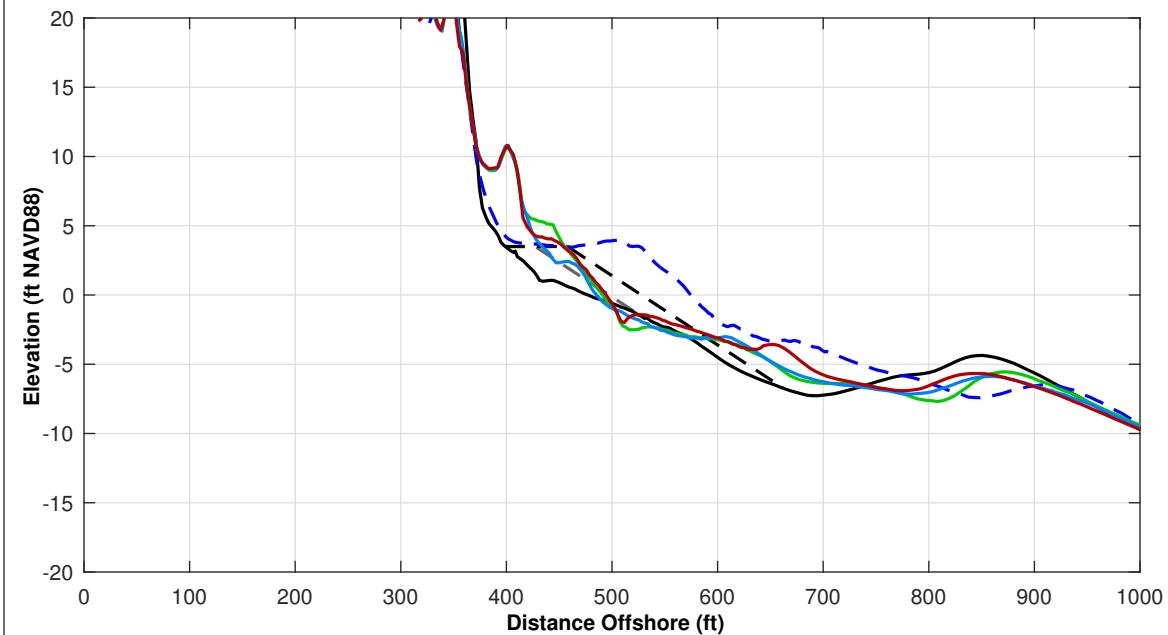
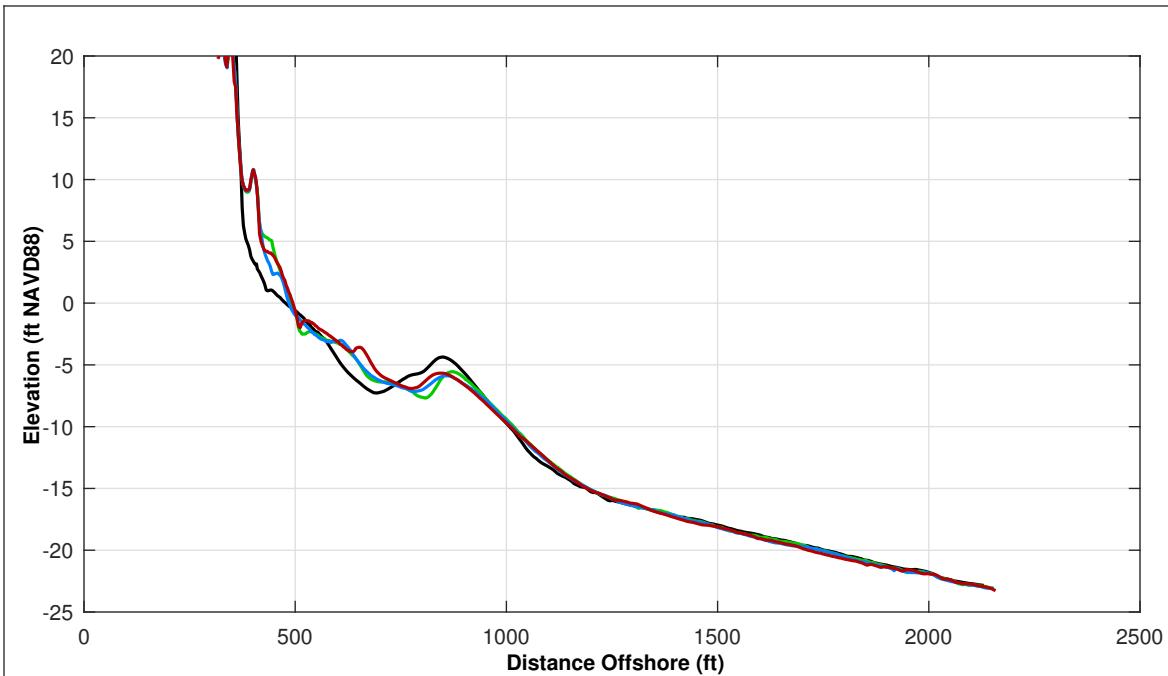
Survey Transect 323+09	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	-8.96 ft	3.95 ft
Volume Change Above -15 ft NAVD88	-4.46 cy/ft	-3.72 cy/ft
Volume Change Above 0 ft NAVD88	-1.01 cy/ft	-0.46 cy/ft

Distance from USACE Design Template @ 3.5 feet NAVD88: + 5.0 ft

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.



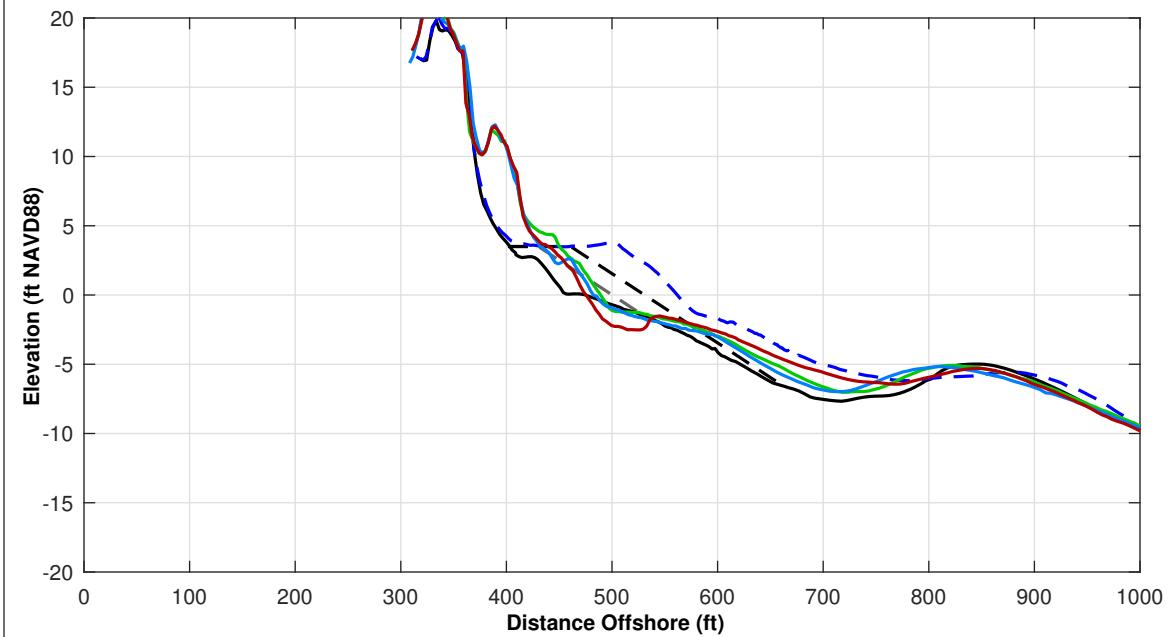
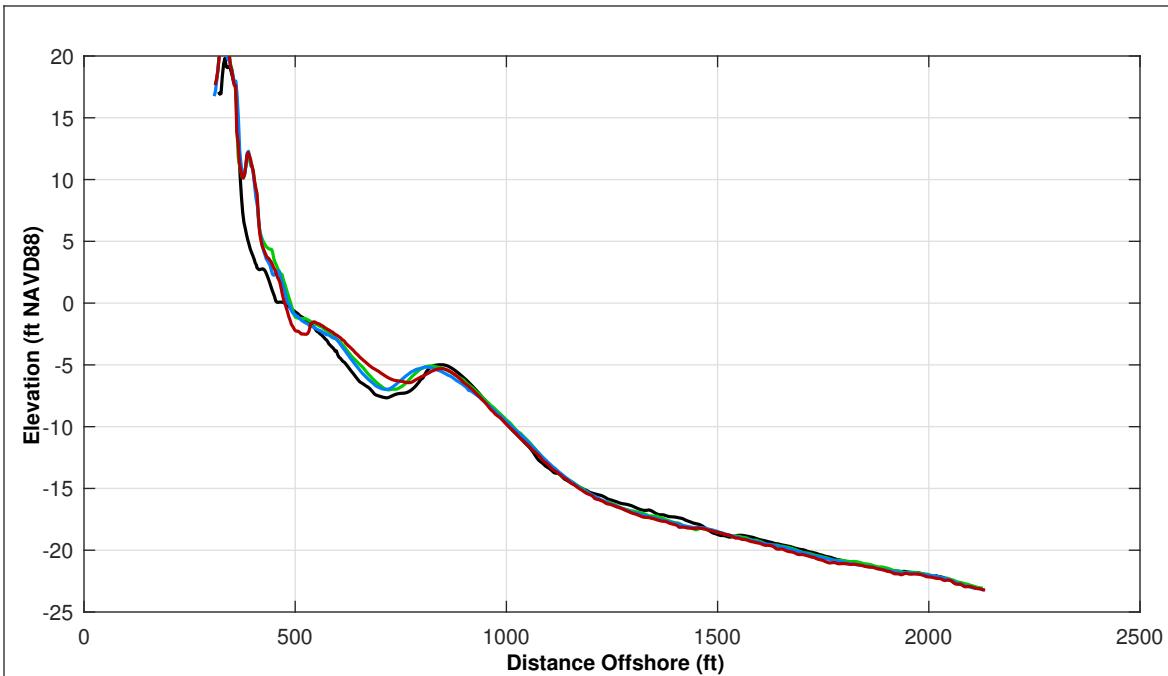


Survey Transect 329+63	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	3.05 ft	6.87 ft
Volume Change Above -15 ft NAVD88	4.07 cy/ft	6.73 cy/ft
Volume Change Above 0 ft NAVD88	-1.21 cy/ft	1.54 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:		-6.0 ft

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.





Survey Transect 331+43	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	-12.19 ft	-6.94 ft
Volume Change Above -15 ft NAVD88	-3.48 cy/ft	0.58 cy/ft
Volume Change Above 0 ft NAVD88	-1.92 cy/ft	-0.98 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	-24.0 ft	

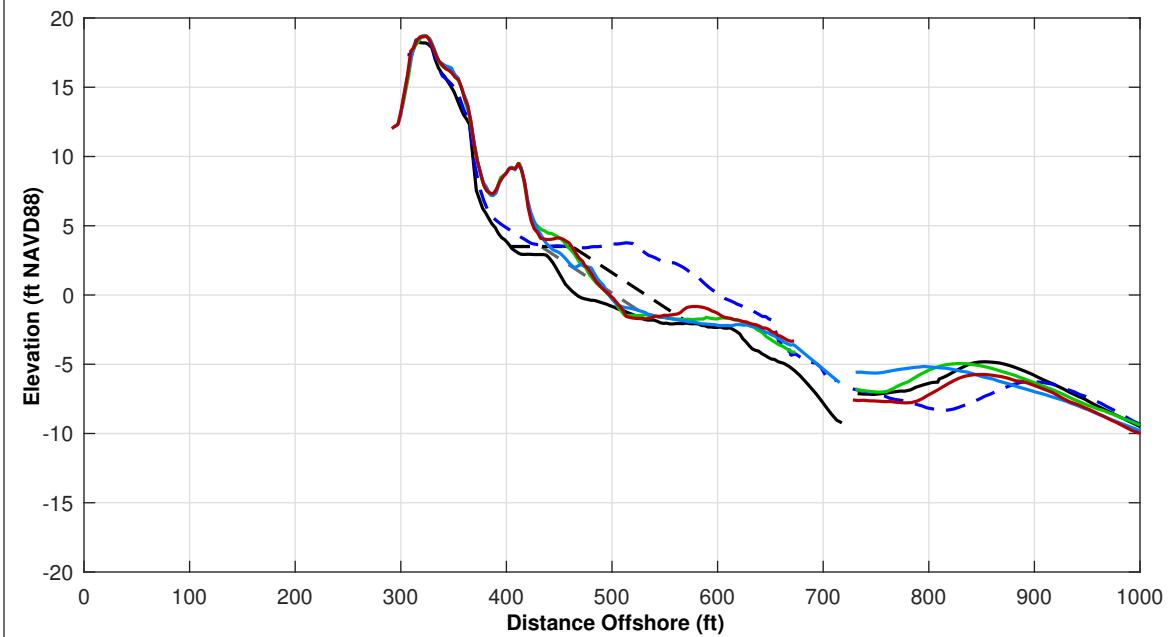
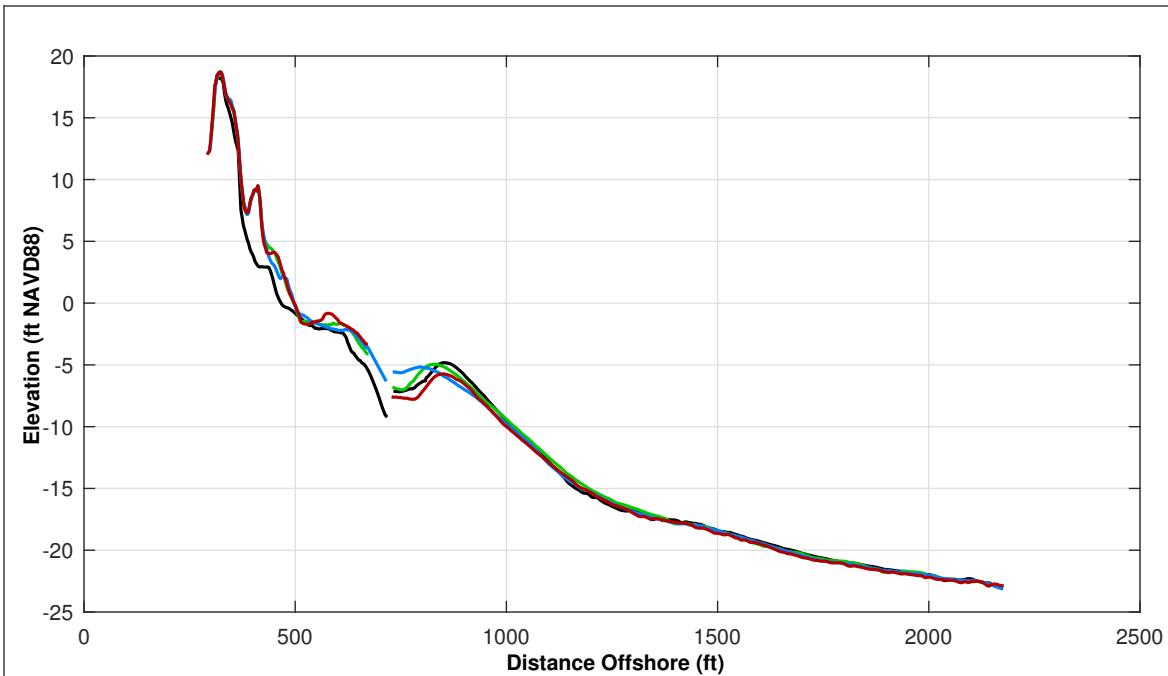
LEGEND:

APR 2025 (Red solid line)  
 NOV 2024 (Blue solid line)  
 MAY 2024 (Green solid line)  
 OCT 2016 (Black dashed line)  
 USACE Design Template (Blue dashed line)  
 USACE Nourishment Threshold (Black dash-dot line)

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.





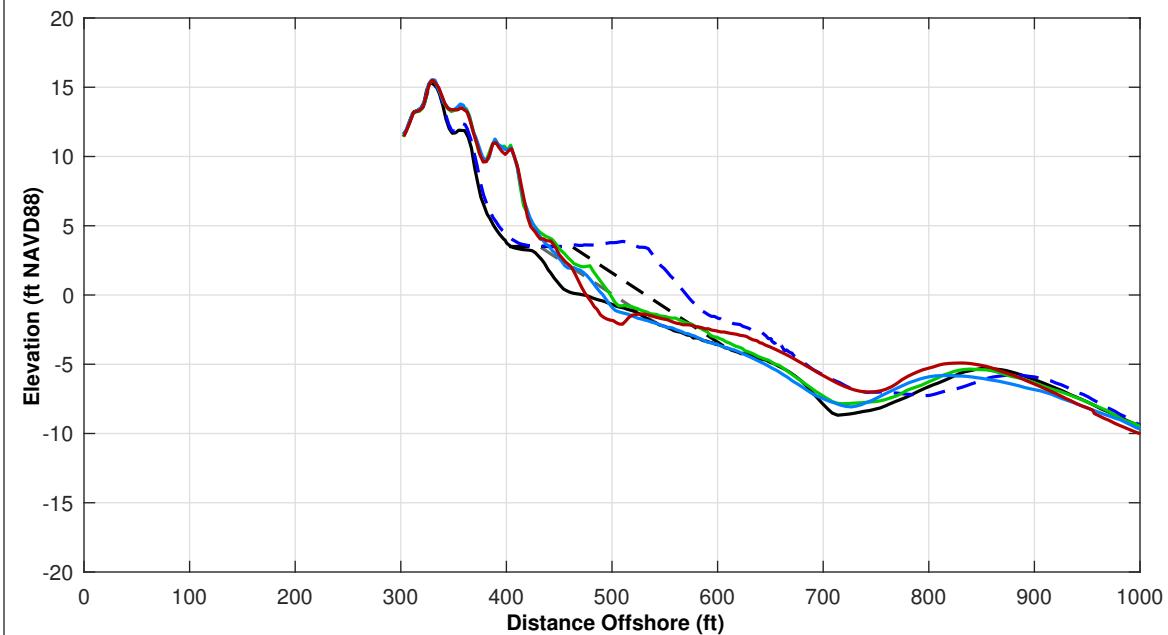
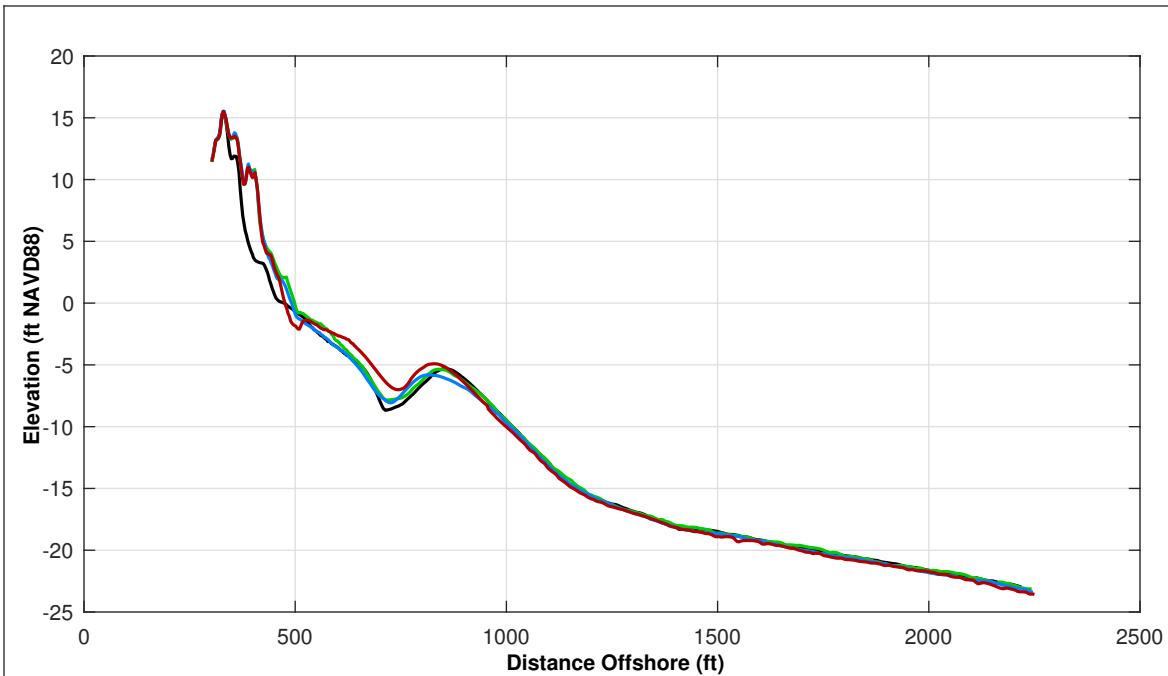
Survey Transect 333+23	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	1.13 ft	-3.41 ft
Volume Change Above -15 ft NAVD88	-8.39 cy/ft	-4.53 cy/ft
Volume Change Above 0 ft NAVD88	0.02 cy/ft	0.69 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	-3.0 ft	

LEGEND:	MAY 2017	OCT 2016	USACE Design Template	USACE Nourishment Threshold
APR 2025	—	—	—	—
NOV 2024	—	—	—	—
MAY 2024	—	—	—	—

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.





Survey Transect 335+03	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	-20.81 ft	-12.34 ft
Volume Change Above -15 ft NAVD88	0.13 cy/ft	8.98 cy/ft
Volume Change Above 0 ft NAVD88	-2.28 cy/ft	-1.06 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	-18.0 ft	

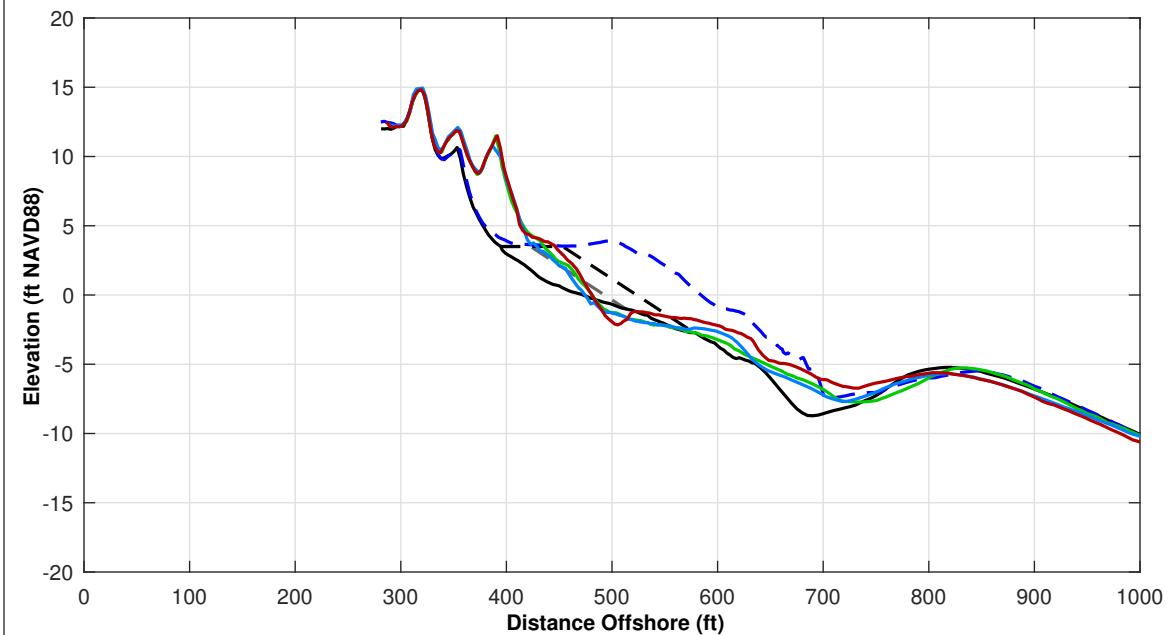
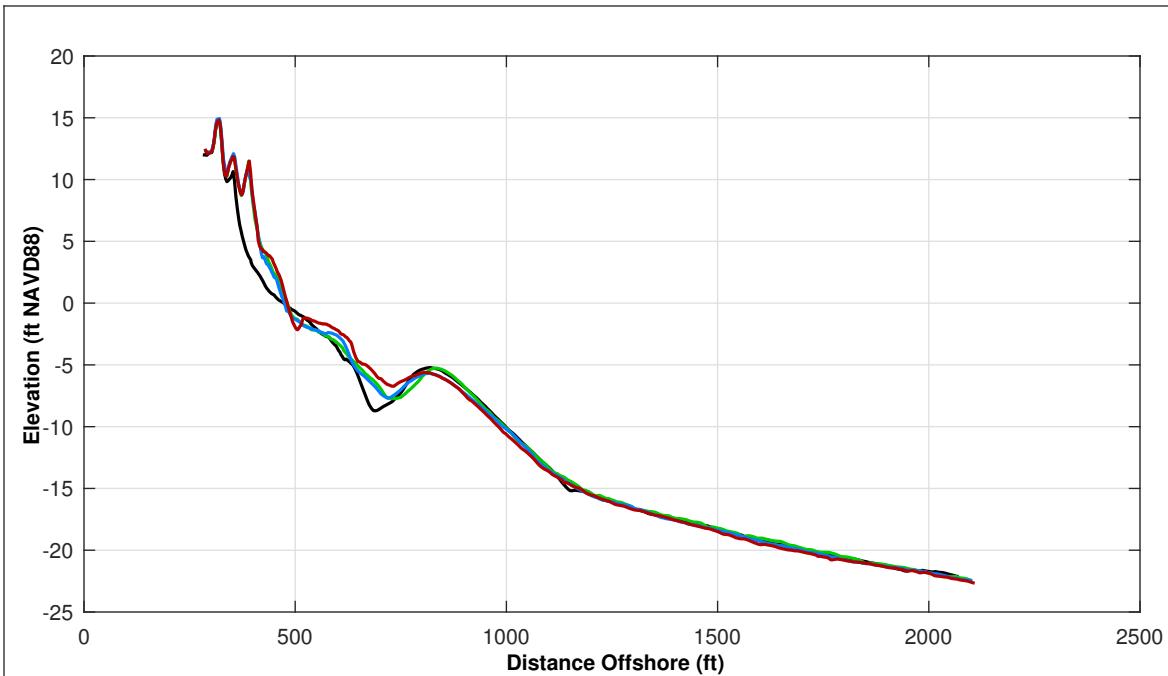
**LEGEND:**

APR 2025	MAY 2017
NOV 2024	OCT 2016
MAY 2024	USACE Design Template
	USACE Nourishment Threshold

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.





Survey Transect 336+83	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	2.98 ft	9.27 ft
Volume Change Above -15 ft NAVD88	3.68 cy/ft	6.81 cy/ft
Volume Change Above 0 ft NAVD88	0.99 cy/ft	1.51 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	-8.0 ft	

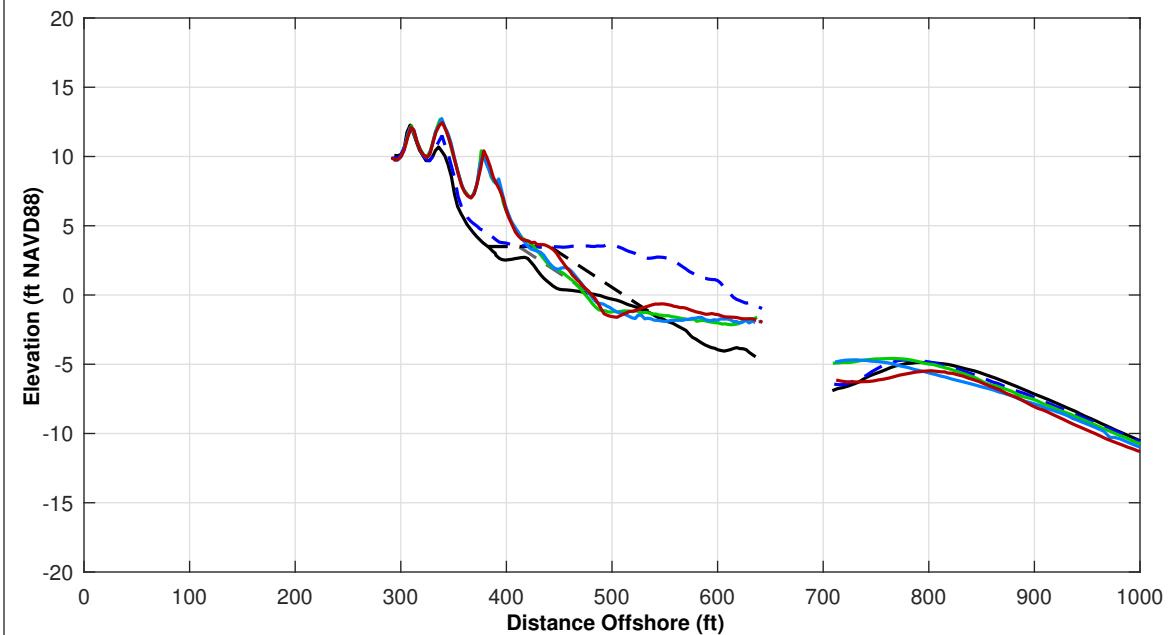
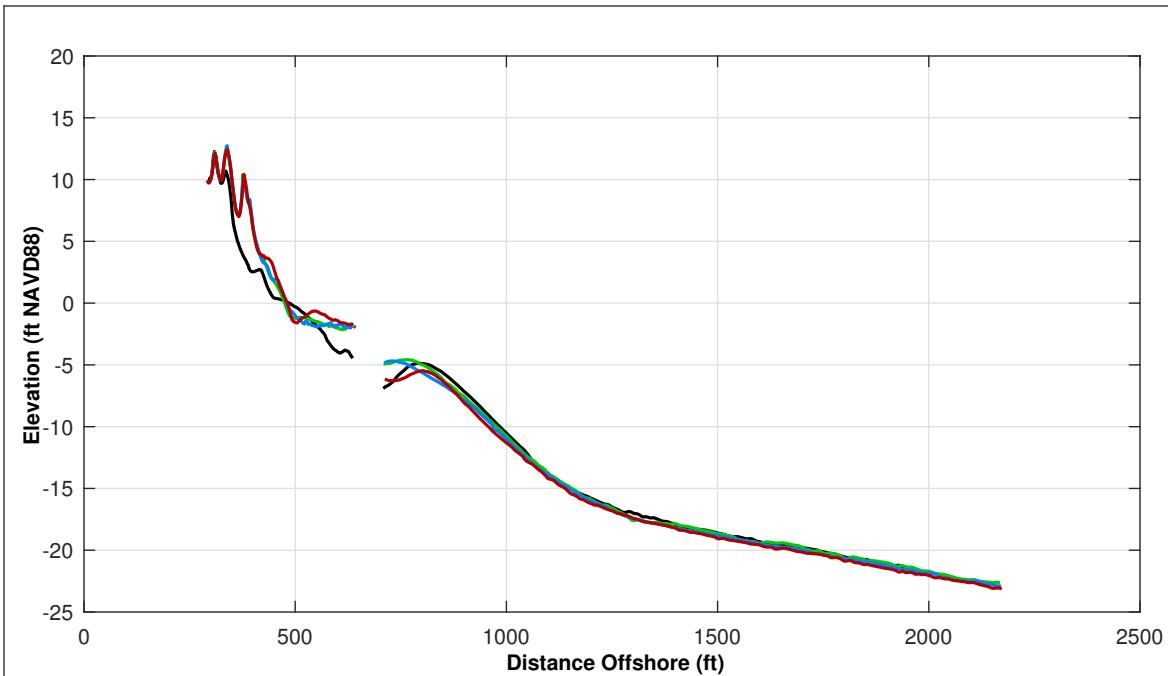
**LEGEND:**

APR 2025	MAY 2017
NOV 2024	OCT 2016
MAY 2024	USACE Design Template
	USACE Nourishment Threshold

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.





Survey Transect 338+63	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	5.14 ft	-0.74 ft
Volume Change Above -15 ft NAVD88	-6.26 cy/ft	-2.15 cy/ft
Volume Change Above 0 ft NAVD88	1.27 cy/ft	0.71 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	-3.0 ft	

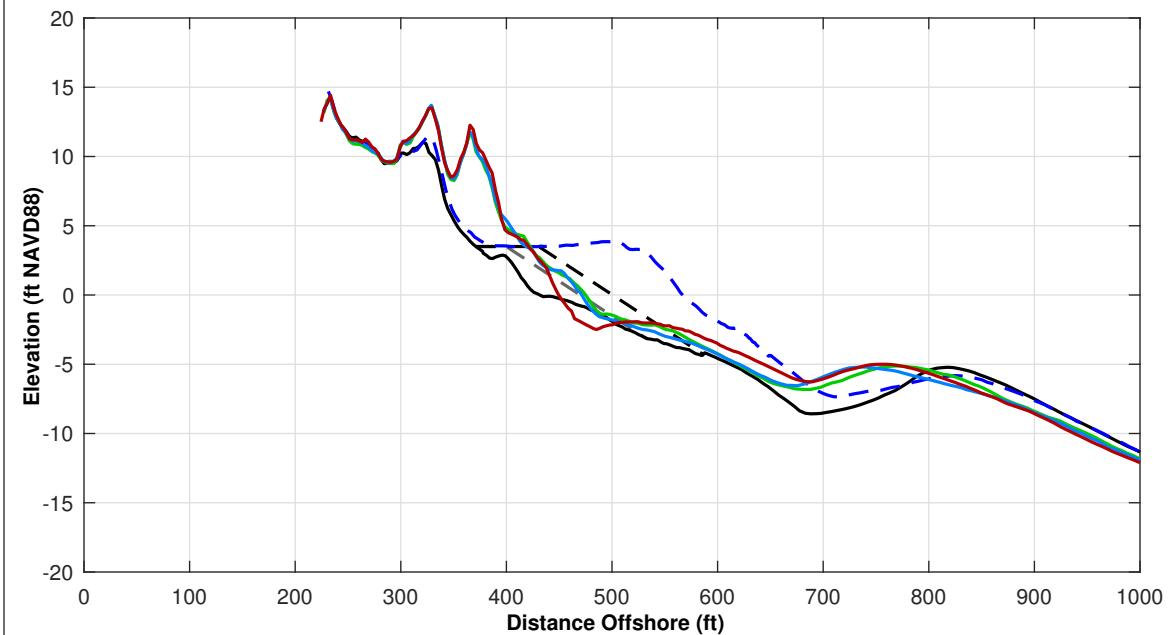
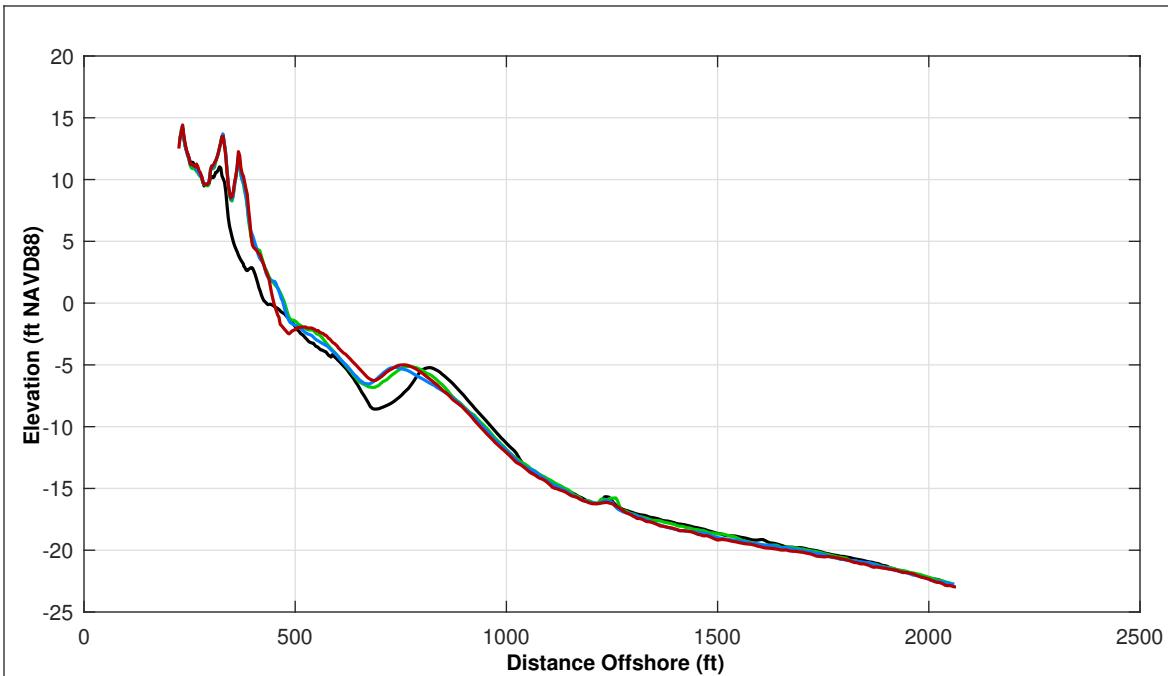
**LEGEND:**

APR 2025	MAY 2017
NOV 2024	OCT 2016
MAY 2024	USACE Design Template
	USACE Nourishment Threshold

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.

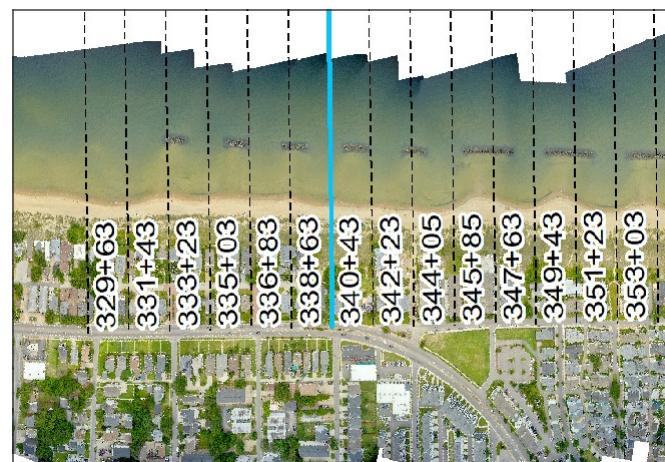


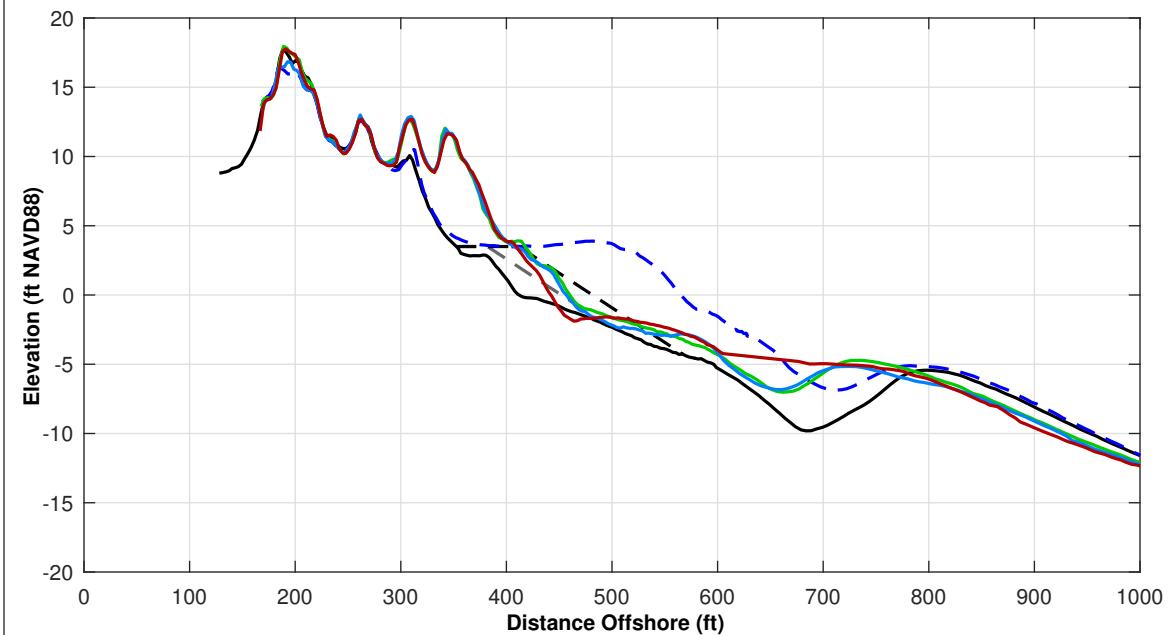
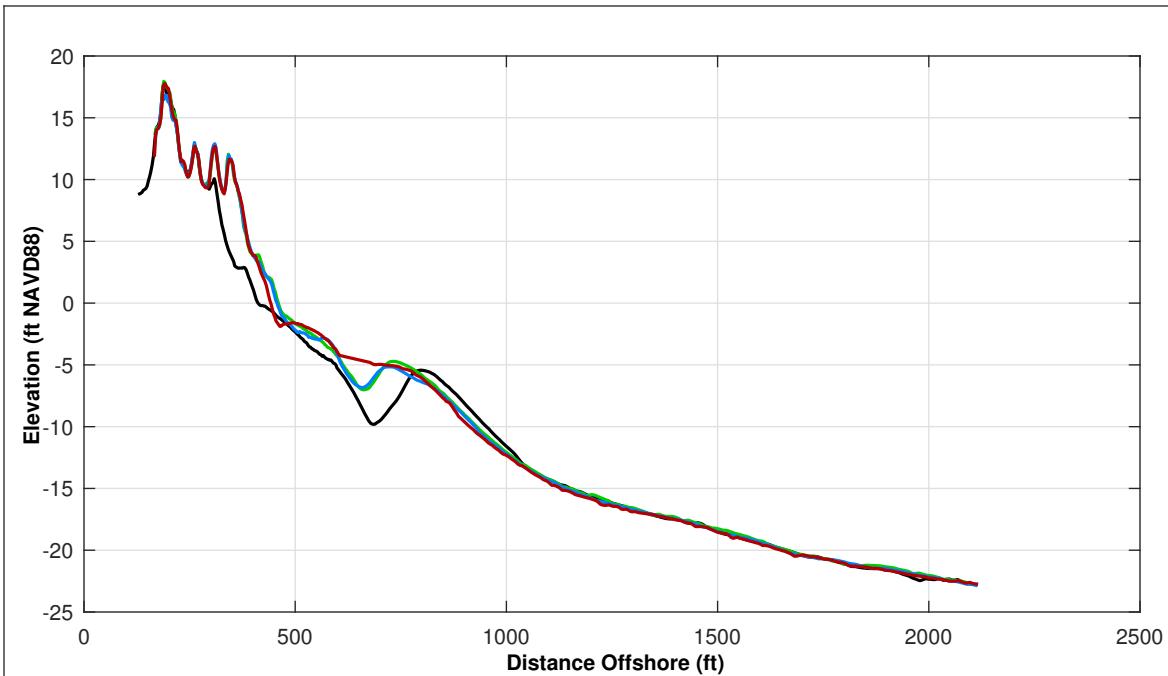


Survey Transect 340+43	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	-19.41 ft	-18.09 ft
Volume Change Above -15 ft NAVD88	-1.50 cy/ft	1.31 cy/ft
Volume Change Above 0 ft NAVD88	-0.10 cy/ft	-0.47 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	-11.0 ft	

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.



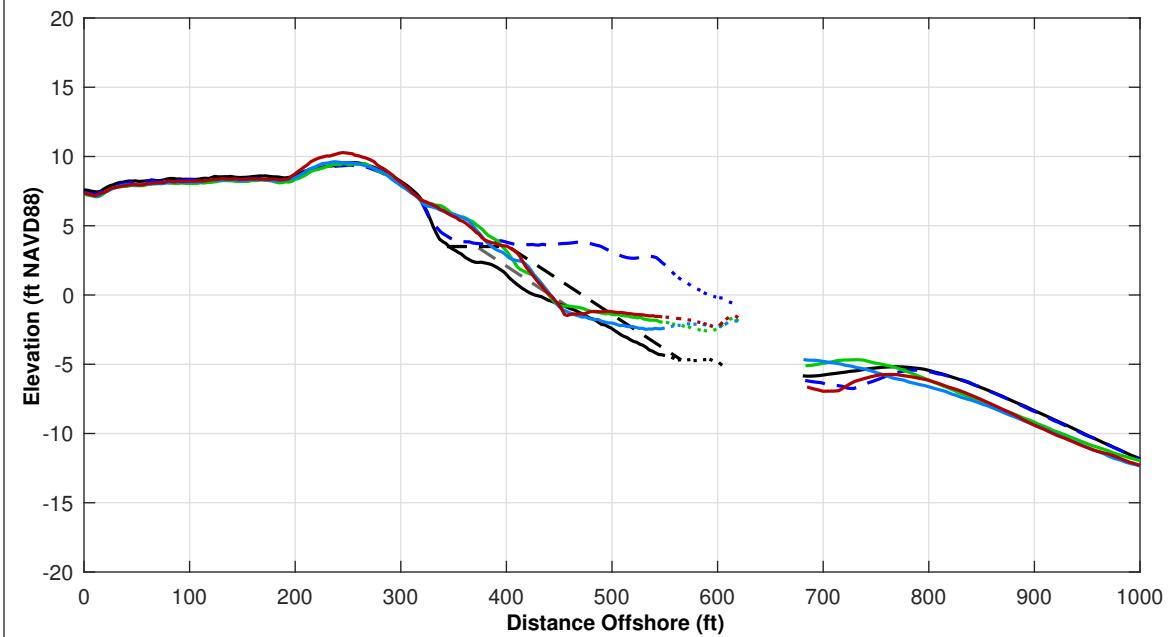
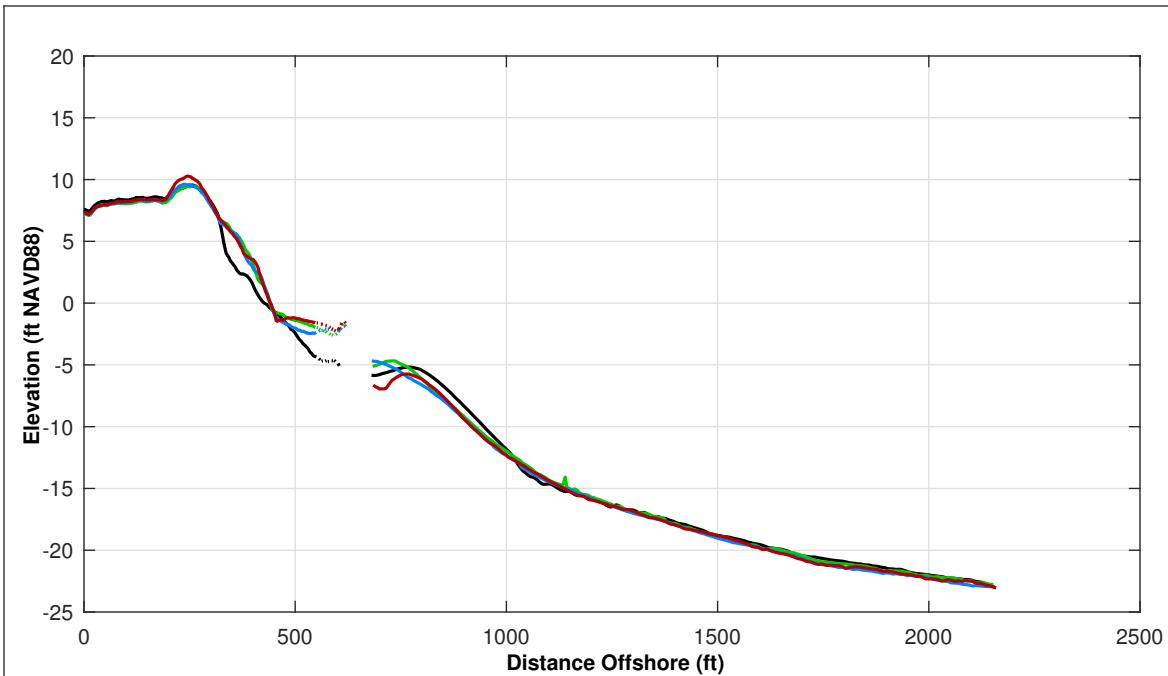


Survey Transect 342+23	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	-17.32 ft	-13.66 ft
Volume Change Above -15 ft NAVD88	-6.03 cy/ft	-0.57 cy/ft
Volume Change Above 0 ft NAVD88	-1.82 cy/ft	-0.79 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	-5.0 ft	

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.





Survey Transect 344+05	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	-2.16 ft	-1.99 ft
Volume Change Above -15 ft NAVD88	-3.40 cy/ft	3.39 cy/ft
Volume Change Above 0 ft NAVD88	2.79 cy/ft	2.61 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	-1.0 ft	

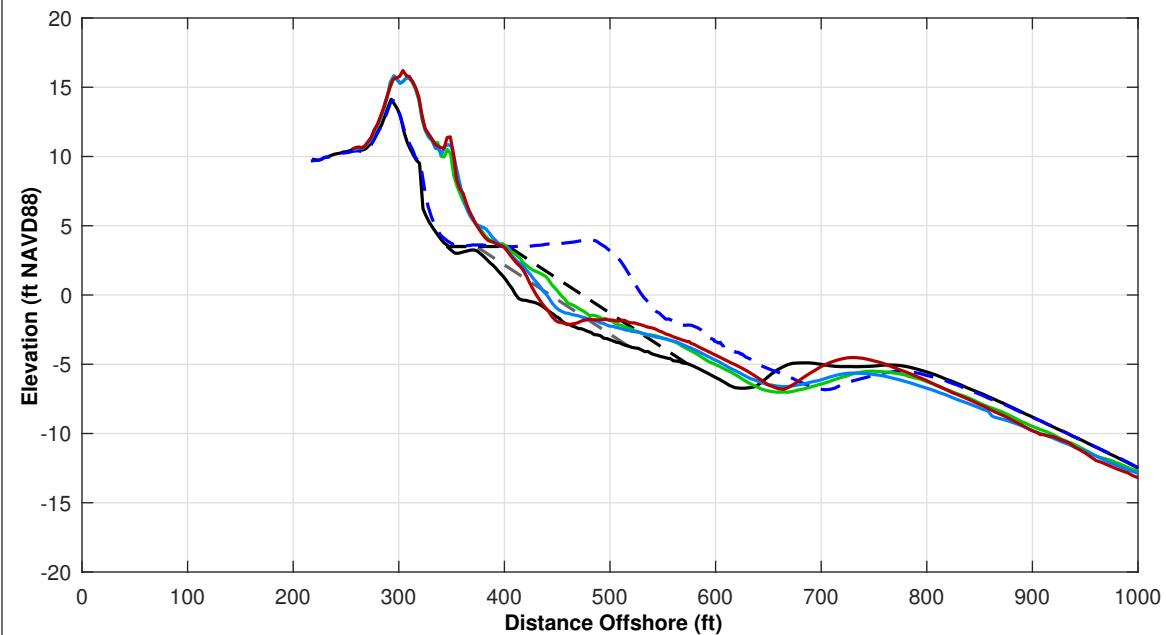
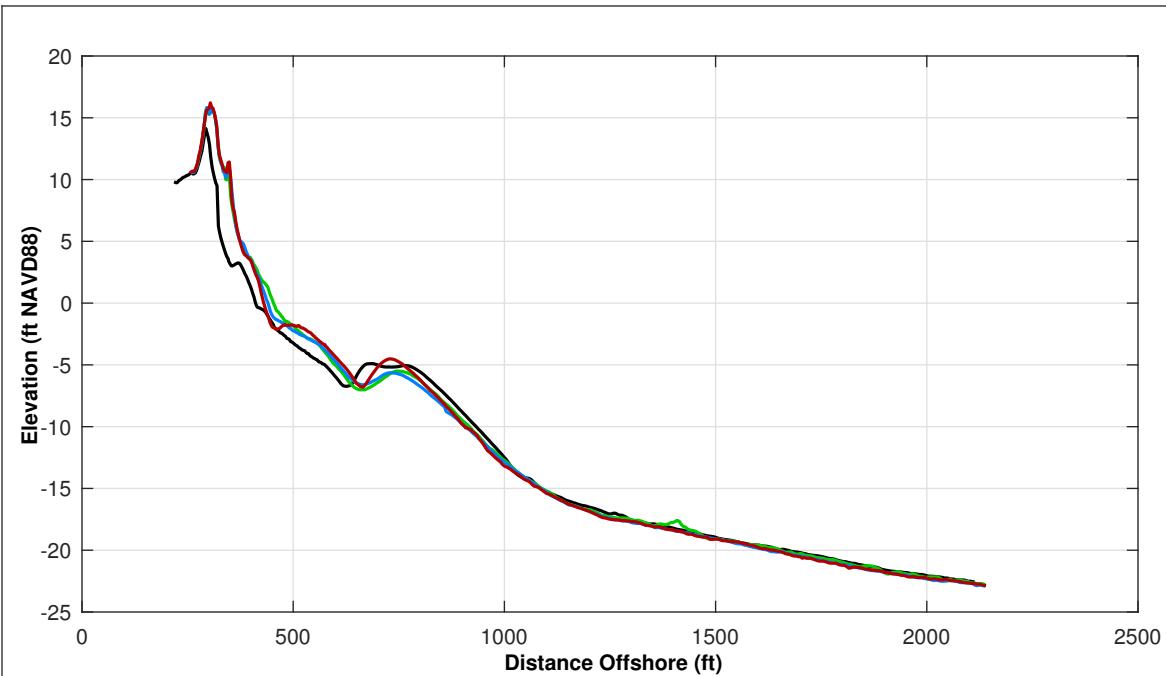
**LEGEND:**

APR 2025	MAY 2017
NOV 2024	OCT 2016
MAY 2024	USACE Design Template
	USACE Nourishment Threshold

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.





Survey Transect 345+85	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	-19.54 ft	-6.48 ft
Volume Change Above -15 ft NAVD88	1.81 cy/ft	4.79 cy/ft
Volume Change Above 0 ft NAVD88	-0.71 cy/ft	-0.40 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	-7.0 ft	

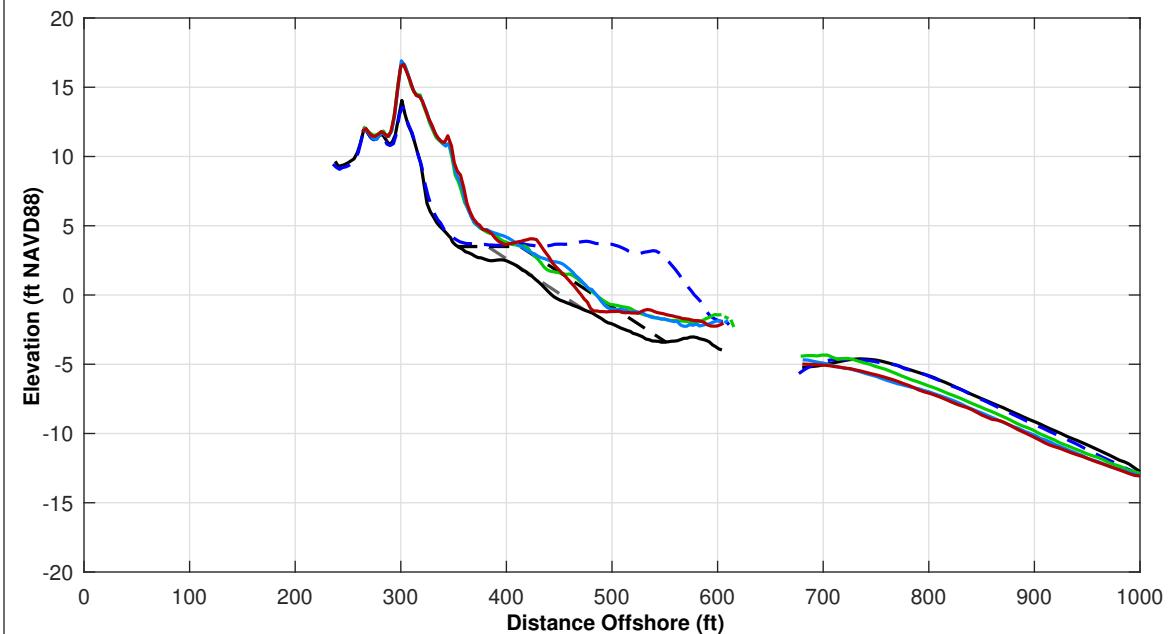
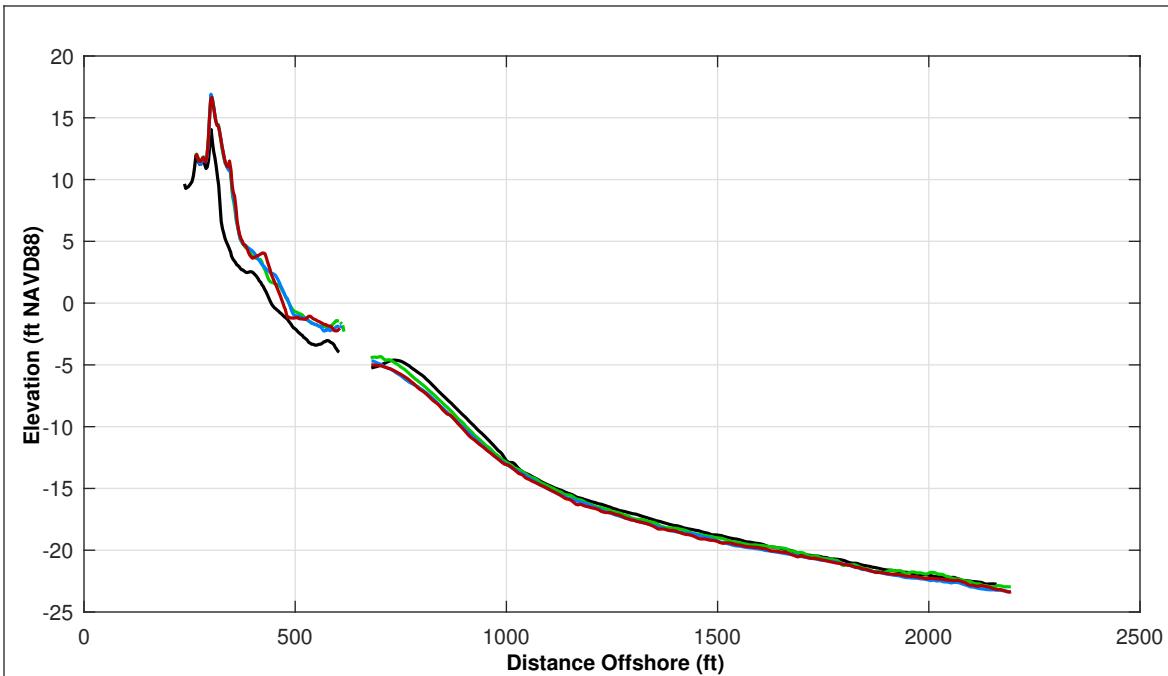
**LEGEND:**

APR 2025	MAY 2017
NOV 2024	OCT 2016
MAY 2024	USACE Design Template
	USACE Nourishment Threshold

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.





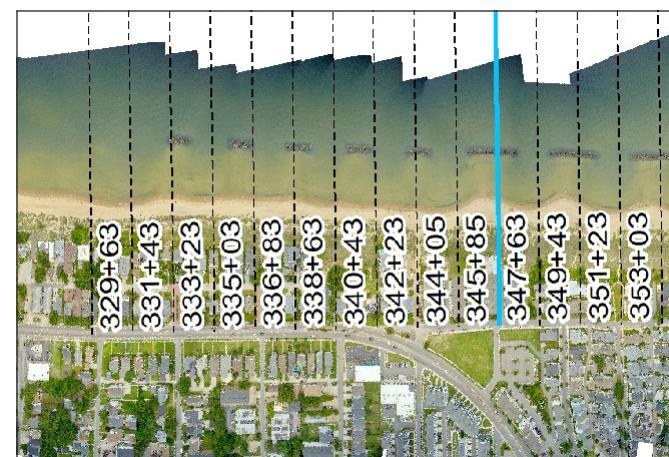
Survey Transect 347+63	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	-9.84 ft	-11.44 ft
Volume Change Above -15 ft NAVD88	-7.20 cy/ft	-1.43 cy/ft
Volume Change Above 0 ft NAVD88	1.10 cy/ft	0.00 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	+ 18.0 ft	

LEGEND:

APR 2025 (Red solid line)  
 OCT 2016 (Blue solid line)  
 NOV 2024 (Green solid line)  
 MAY 2024 (Black solid line)  
 USACE Design Template (Blue dashed line)  
 USACE Nourishment Threshold (Black dashed line)

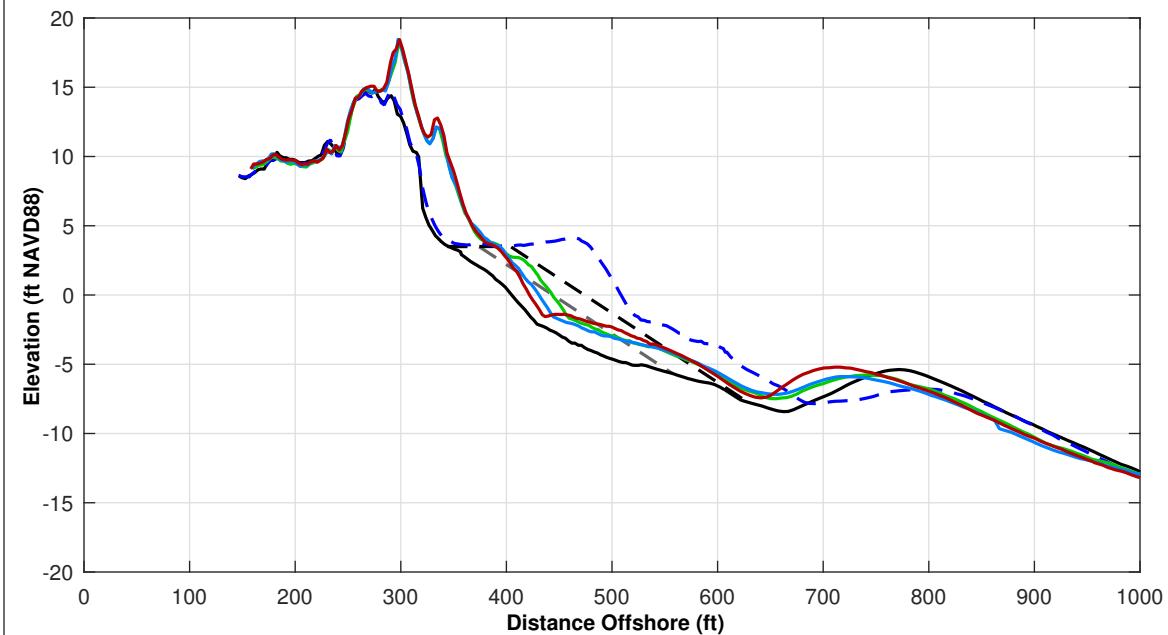
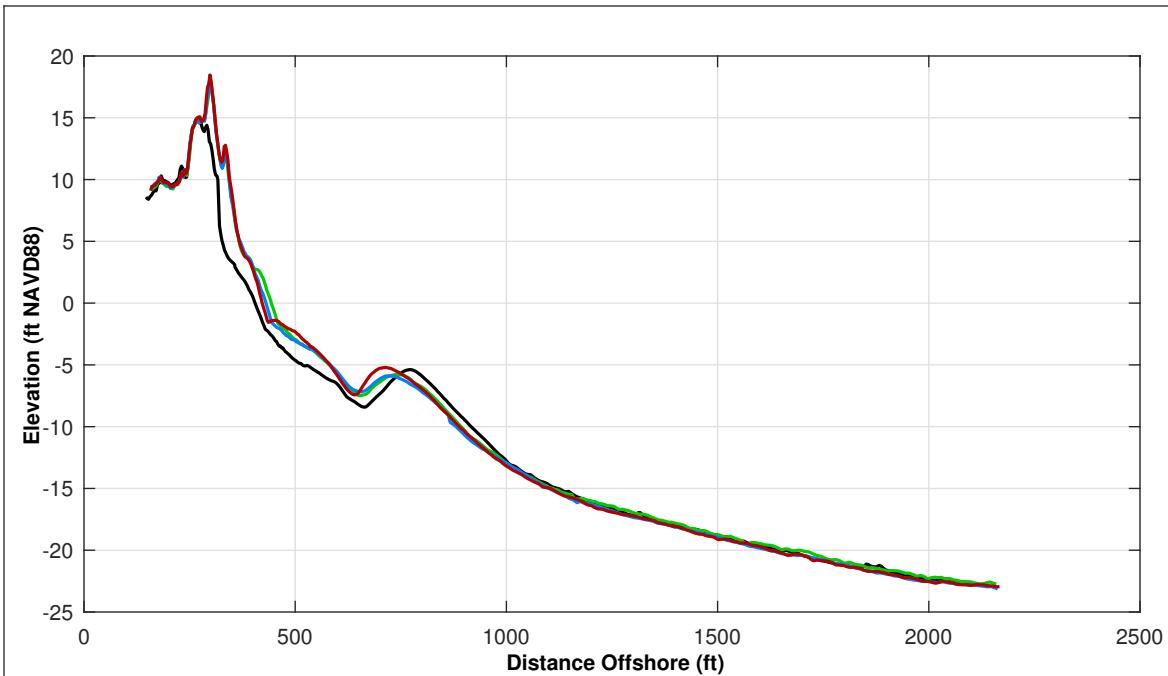
Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.



**NORFOLK**  
 THE CITY OF  
 PUBLIC WORKS

OCEAN VIEW PERIODIC  
 SURVEYING DATA &  
 ANALYSIS



Survey Transect 349+43	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	-18.66 ft	-5.57 ft
Volume Change Above -15 ft NAVD88	0.70 cy/ft	4.16 cy/ft
Volume Change Above 0 ft NAVD88	0.03 cy/ft	0.28 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	-15.0 ft	

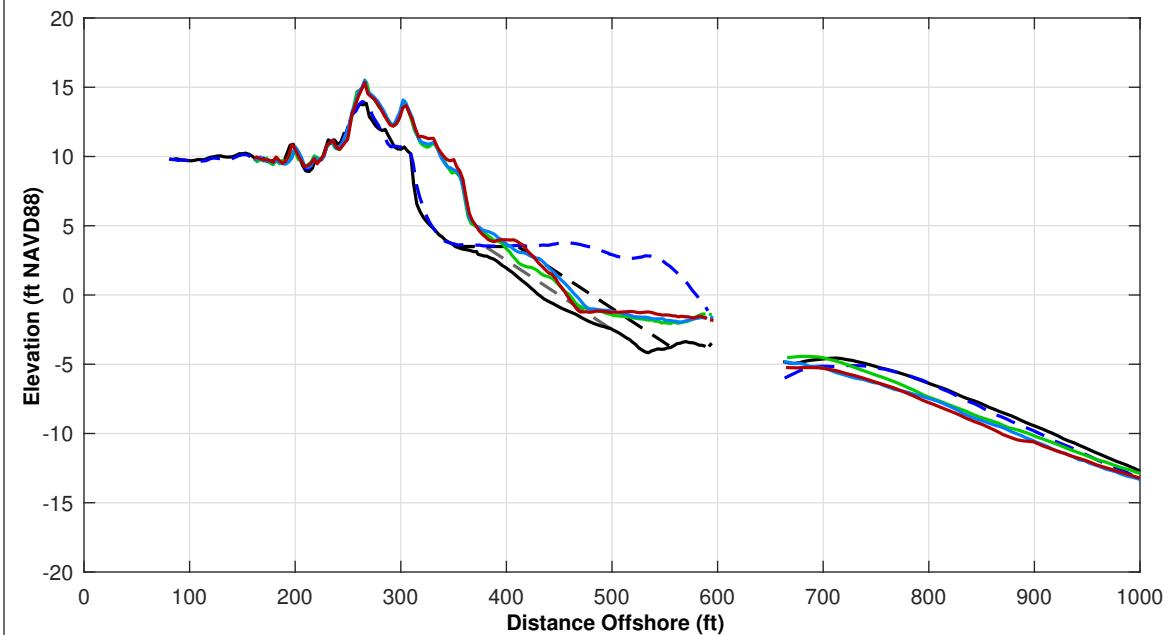
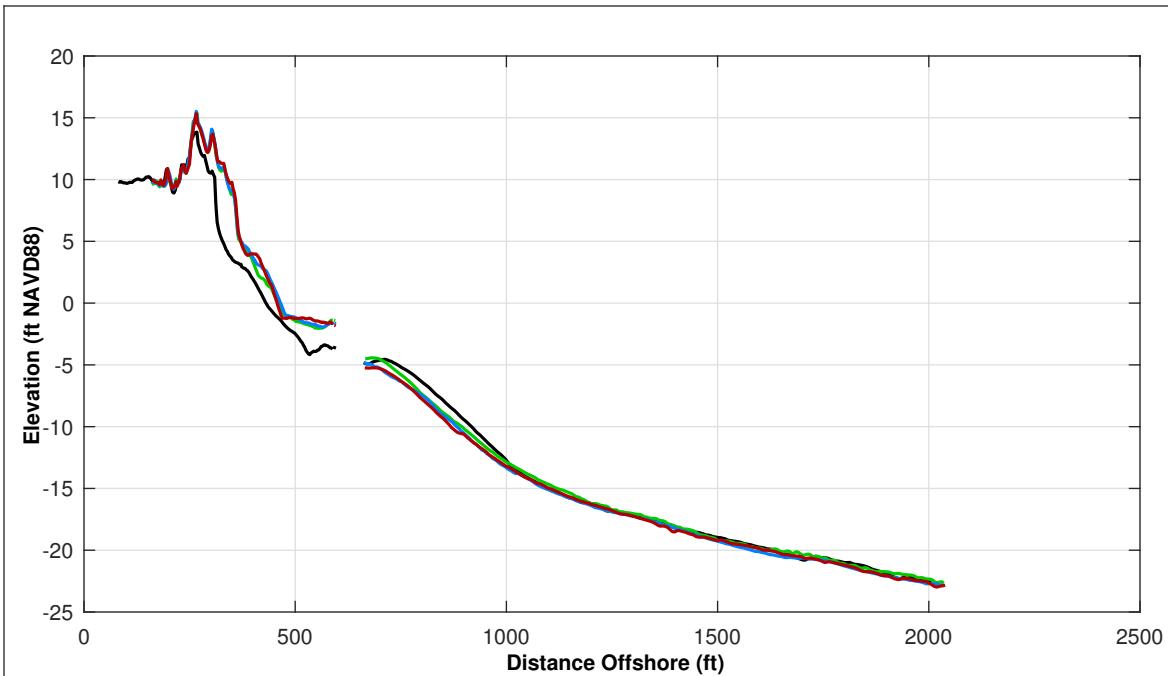
LEGEND:

APR 2025 (Red solid line)  
 OCT 2016 (Blue solid line)  
 USACE Design Template (Dashed blue line)  
 MAY 2024 (Green solid line)  
 USACE Nourishment Threshold (Dashed black line)

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.





Survey Transect 351+23	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	1.60 ft	-5.30 ft
Volume Change Above -15 ft NAVD88	-5.33 cy/ft	-1.14 cy/ft
Volume Change Above 0 ft NAVD88	2.30 cy/ft	-0.08 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	+ 5.0 ft	

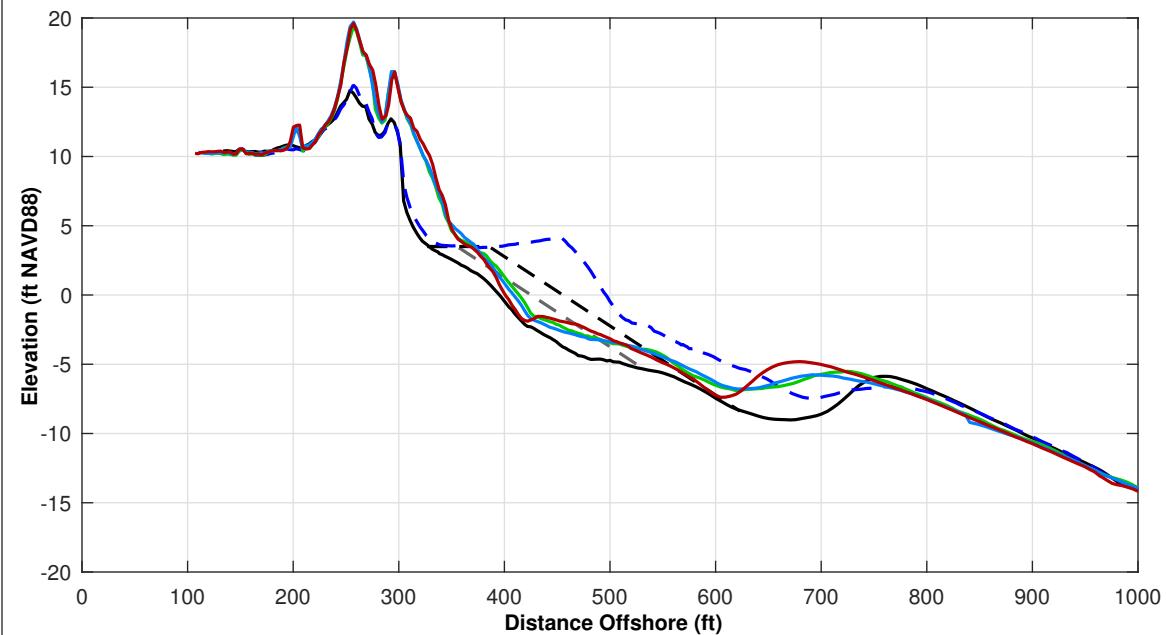
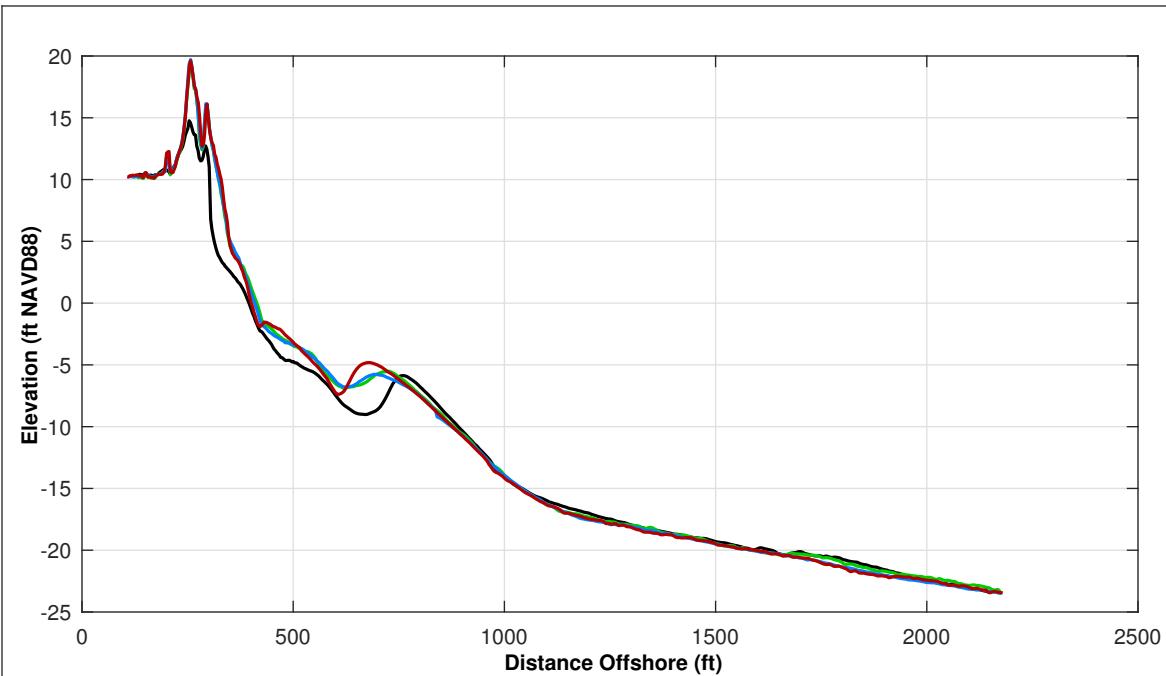
LEGEND:

APR 2025 (Red solid line)  
 OCT 2016 (Blue solid line)  
 NOV 2024 (Green solid line)  
 MAY 2024 (Black solid line)  
 USACE Design Template (Blue dashed line)  
 USACE Nourishment Threshold (Black dashed line)

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.





Survey Transect 353+03	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	-9.49 ft	-4.84 ft
Volume Change Above -15 ft NAVD88	1.01 cy/ft	1.91 cy/ft
Volume Change Above 0 ft NAVD88	0.97 cy/ft	0.02 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	-20.0 ft	

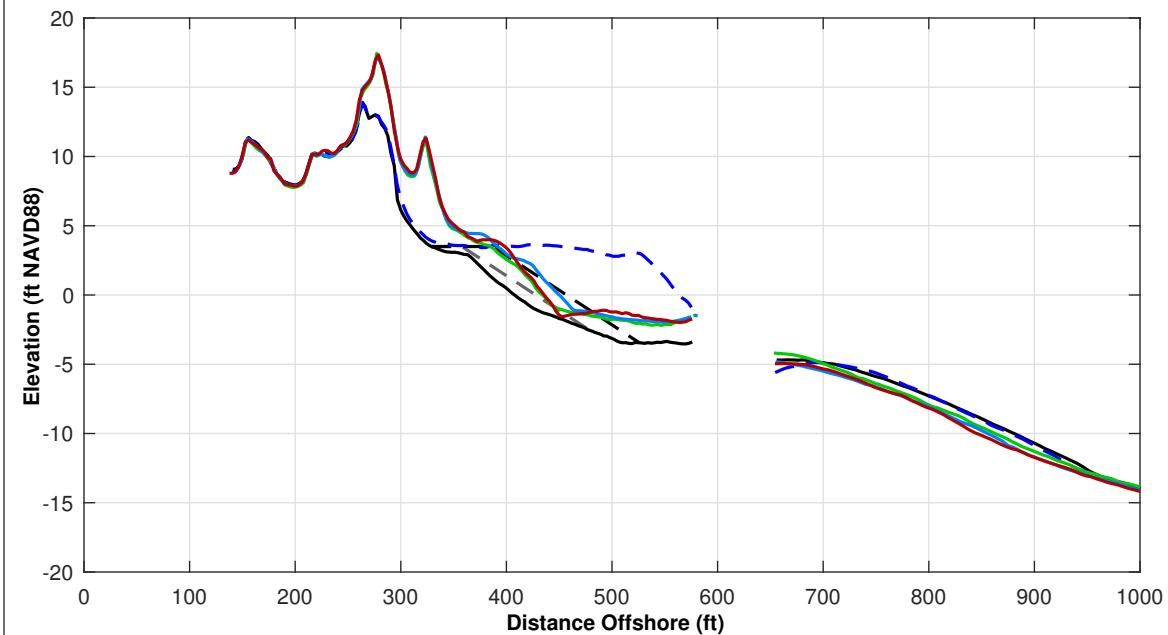
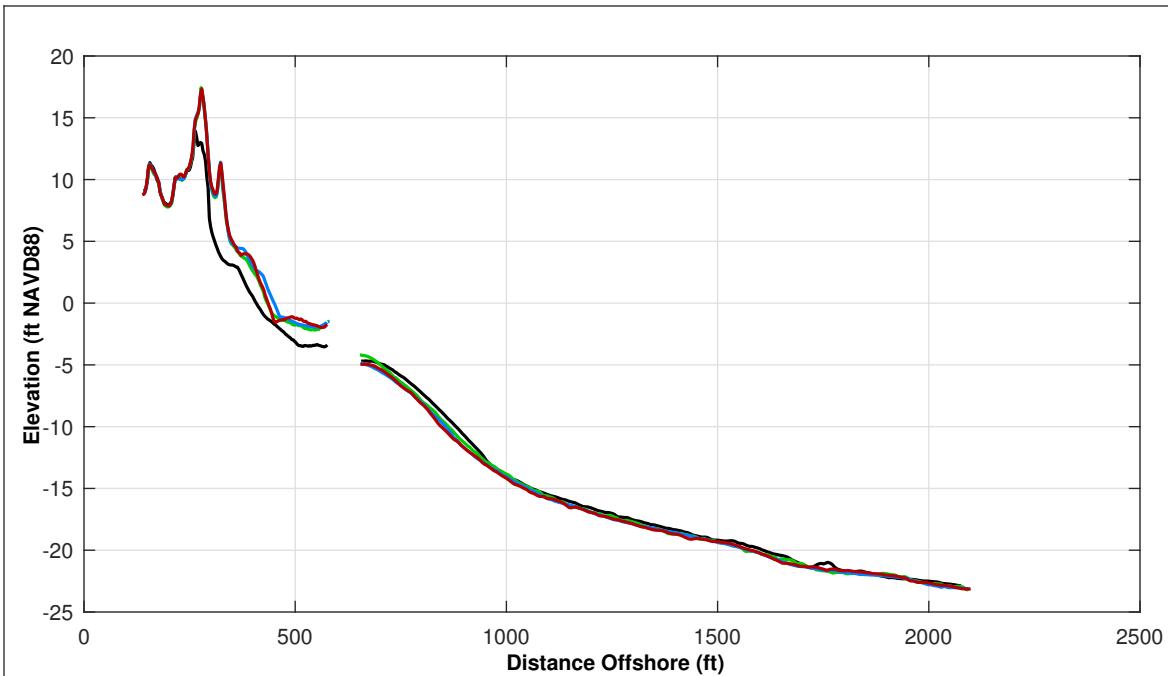
**LEGEND:**

APR 2025	MAY 2017
NOV 2024	OCT 2016
MAY 2024	USACE Design Template
	USACE Nourishment Threshold

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.

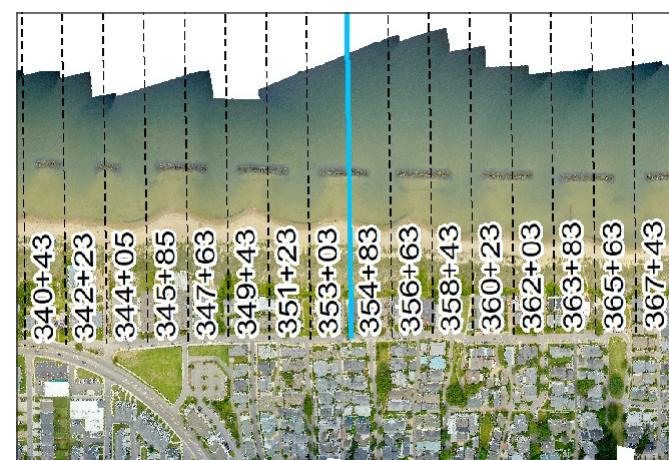


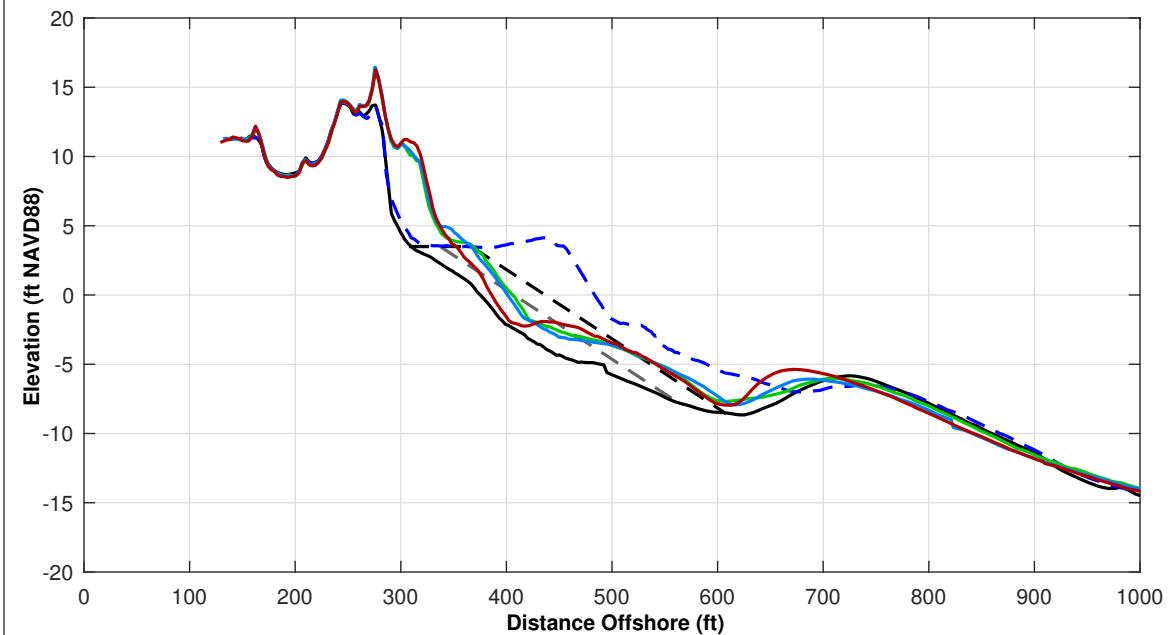
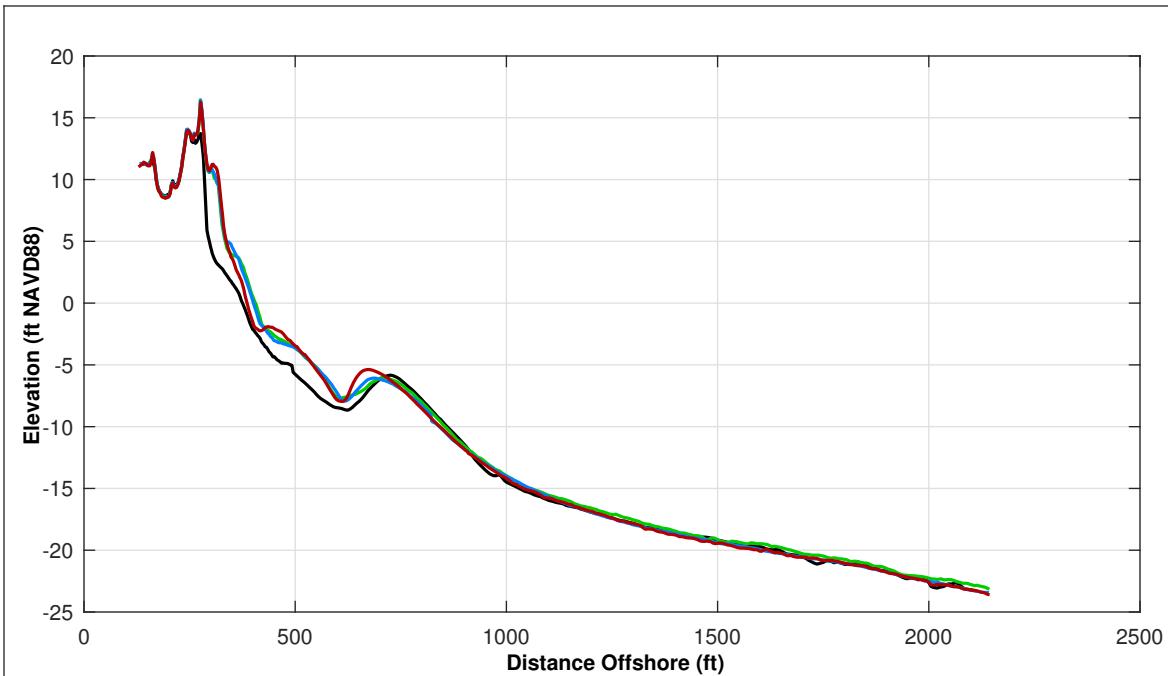


Survey Transect 354+83	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	2.45 ft	-10.72 ft
Volume Change Above -15 ft NAVD88	-2.51 cy/ft	-1.91 cy/ft
Volume Change Above 0 ft NAVD88	2.36 cy/ft	-0.61 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	+ 9.0 ft	

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.



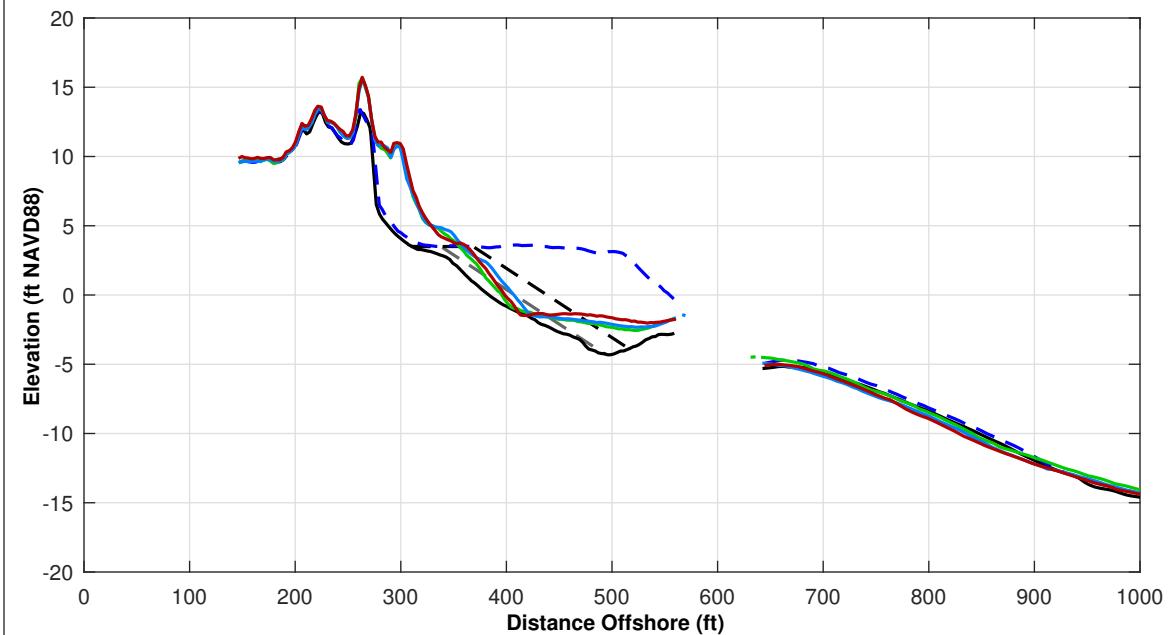
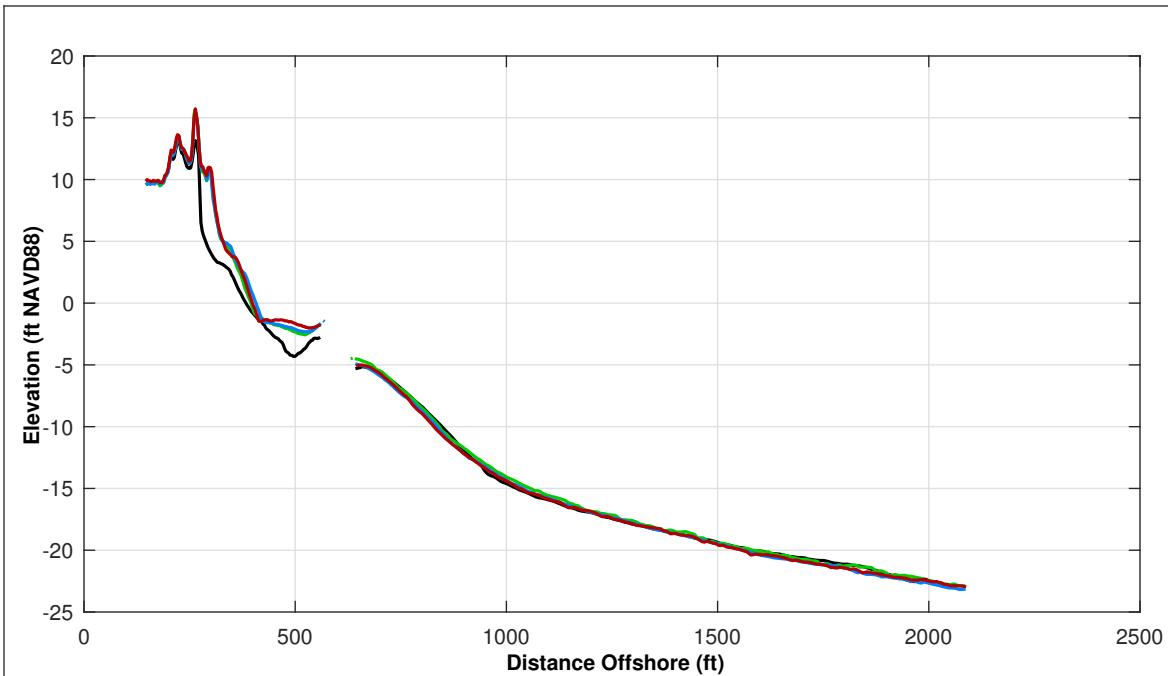


Survey Transect 356+63	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	-15.61 ft	-13.02 ft
Volume Change Above -15 ft NAVD88	-3.06 cy/ft	-0.80 cy/ft
Volume Change Above 0 ft NAVD88	-1.38 cy/ft	-2.00 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	-16.0 ft	

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.

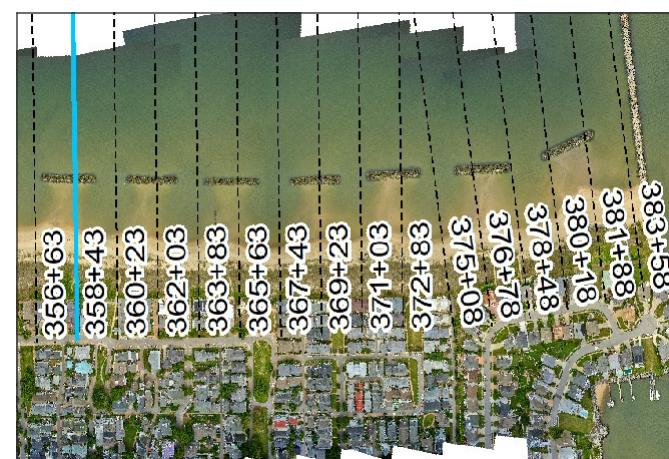


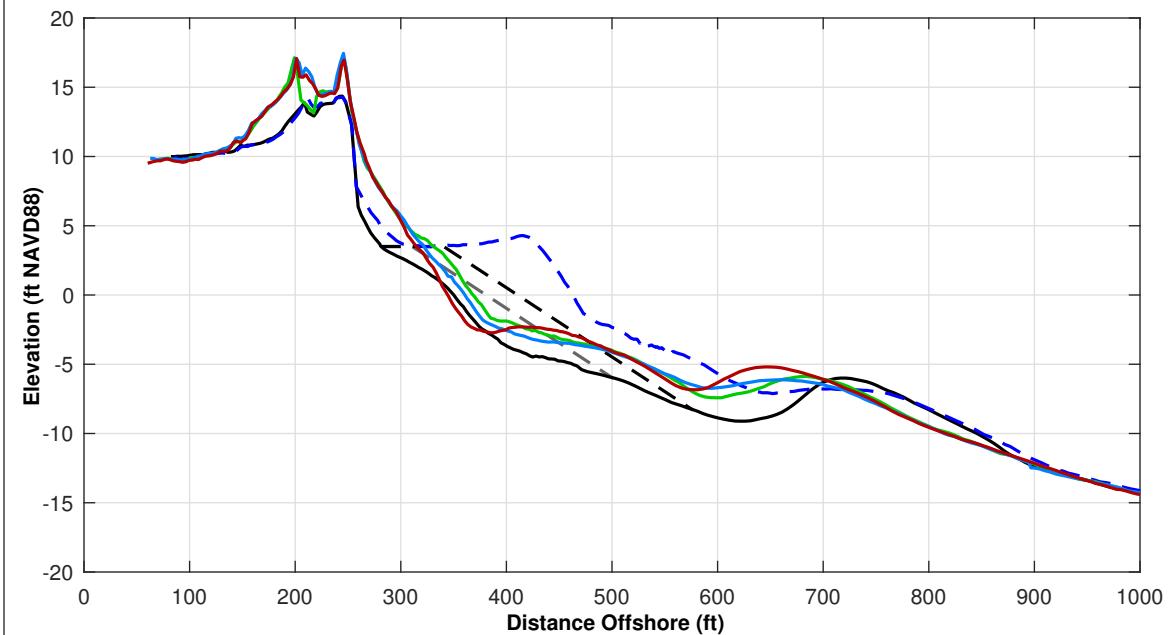
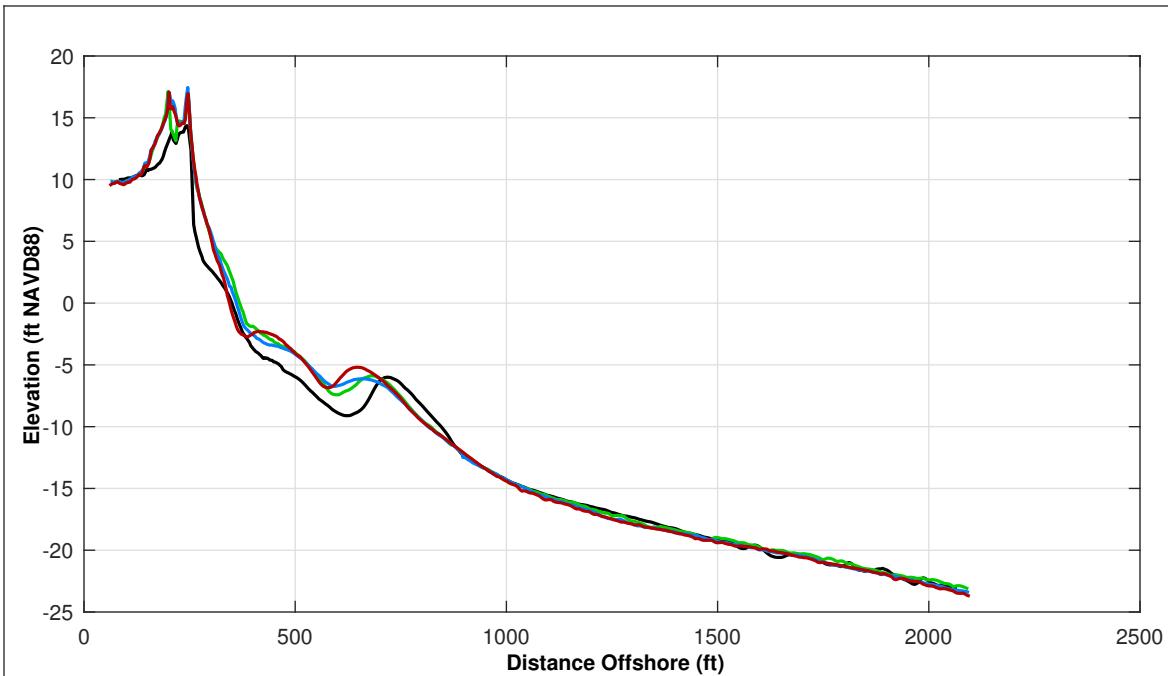


Survey Transect 358+43	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	5.21 ft	-6.92 ft
Volume Change Above -15 ft NAVD88	-1.74 cy/ft	0.89 cy/ft
Volume Change Above 0 ft NAVD88	1.89 cy/ft	0.41 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	-6.0 ft	

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.



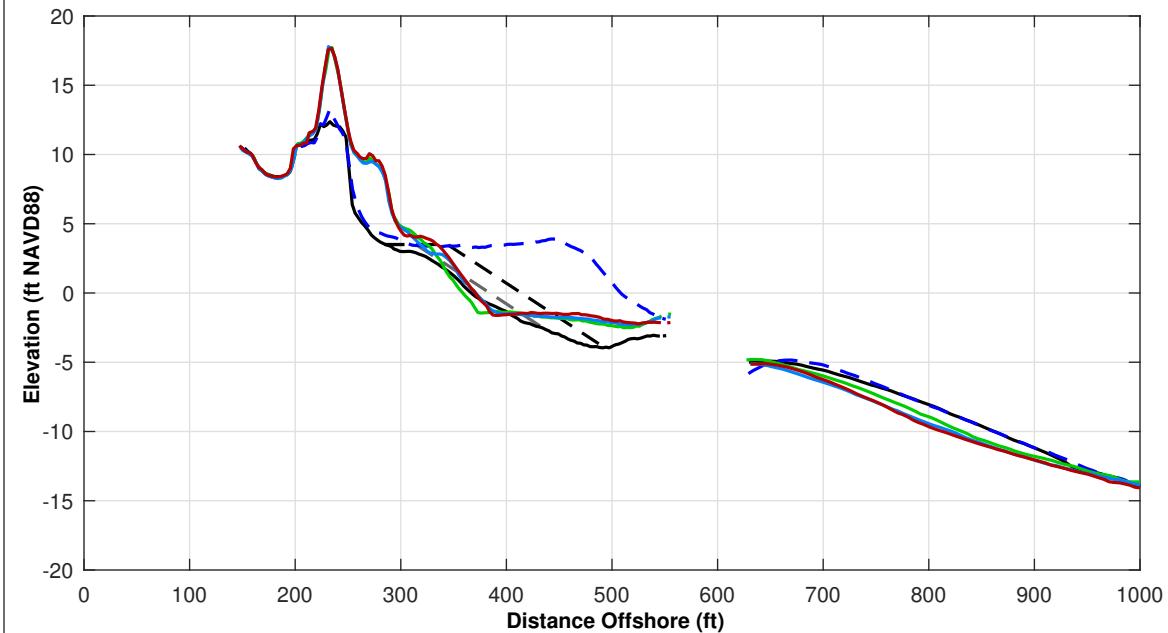
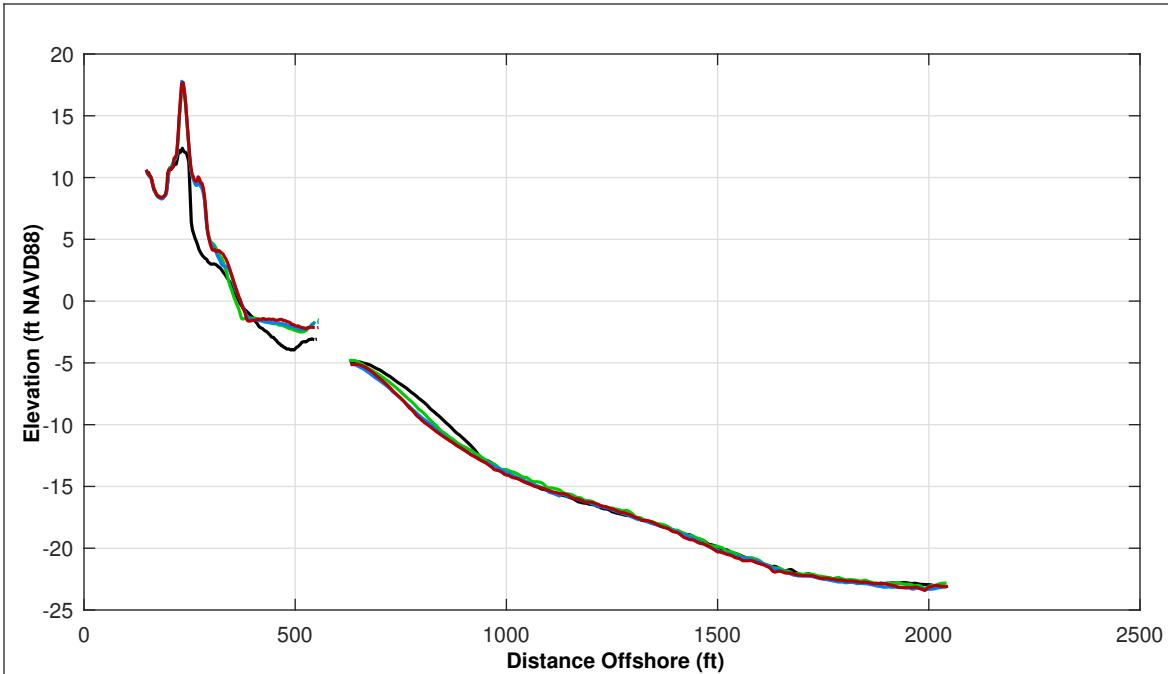


Survey Transect 360+23	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	-21.63 ft	-13.17 ft
Volume Change Above -15 ft NAVD88	-1.54 cy/ft	0.40 cy/ft
Volume Change Above 0 ft NAVD88	-2.50 cy/ft	-2.70 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	-28.0 ft	

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.

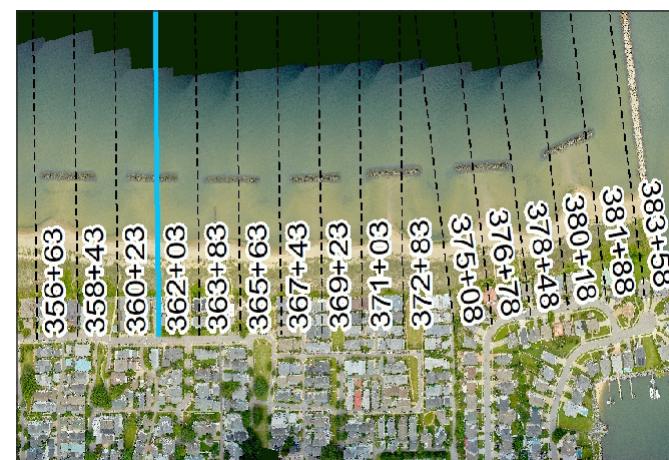


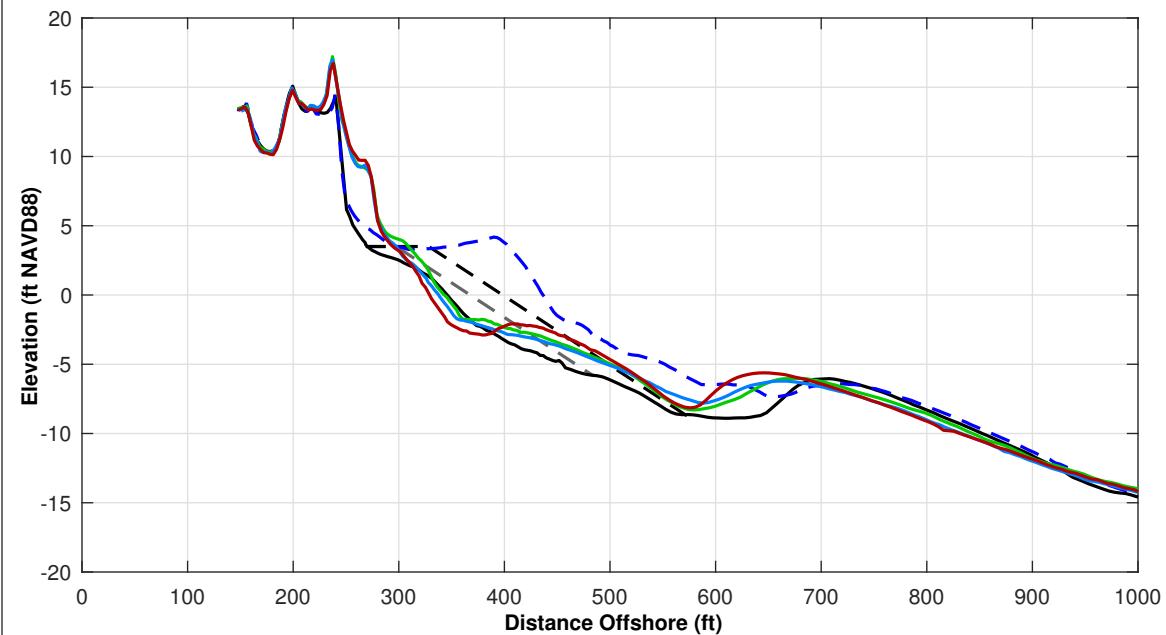
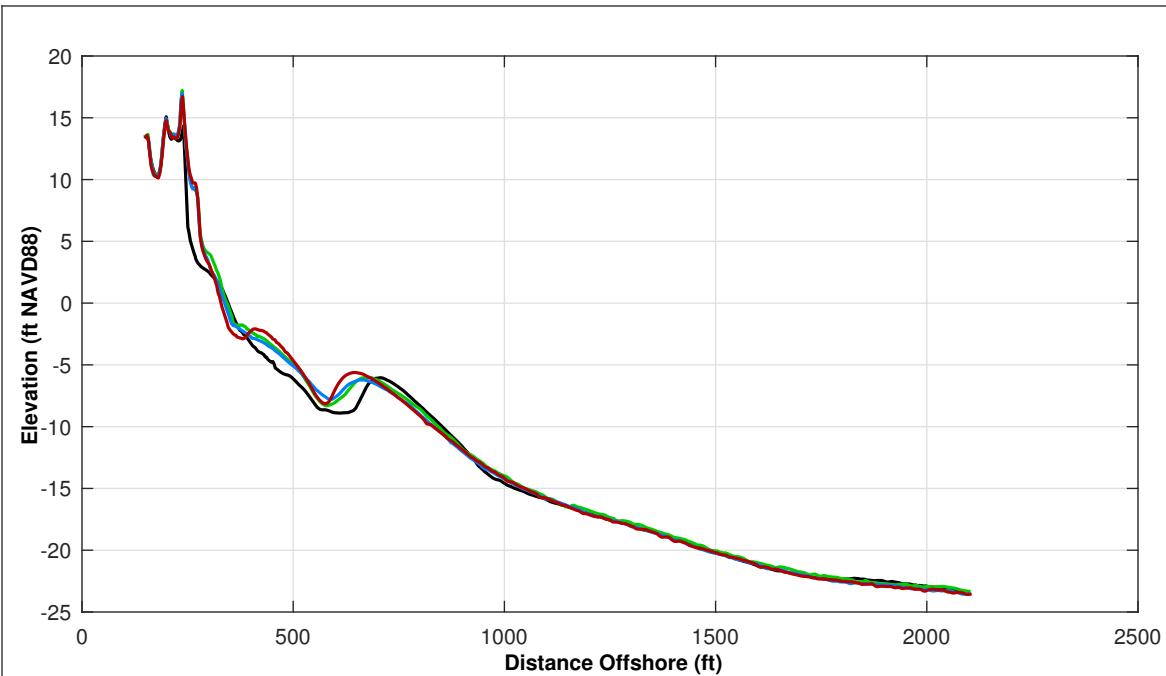


Survey Transect 362+03	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	11.62 ft	2.19 ft
Volume Change Above -15 ft NAVD88	-2.84 cy/ft	1.35 cy/ft
Volume Change Above 0 ft NAVD88	1.98 cy/ft	1.54 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	-11.0 ft	

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.



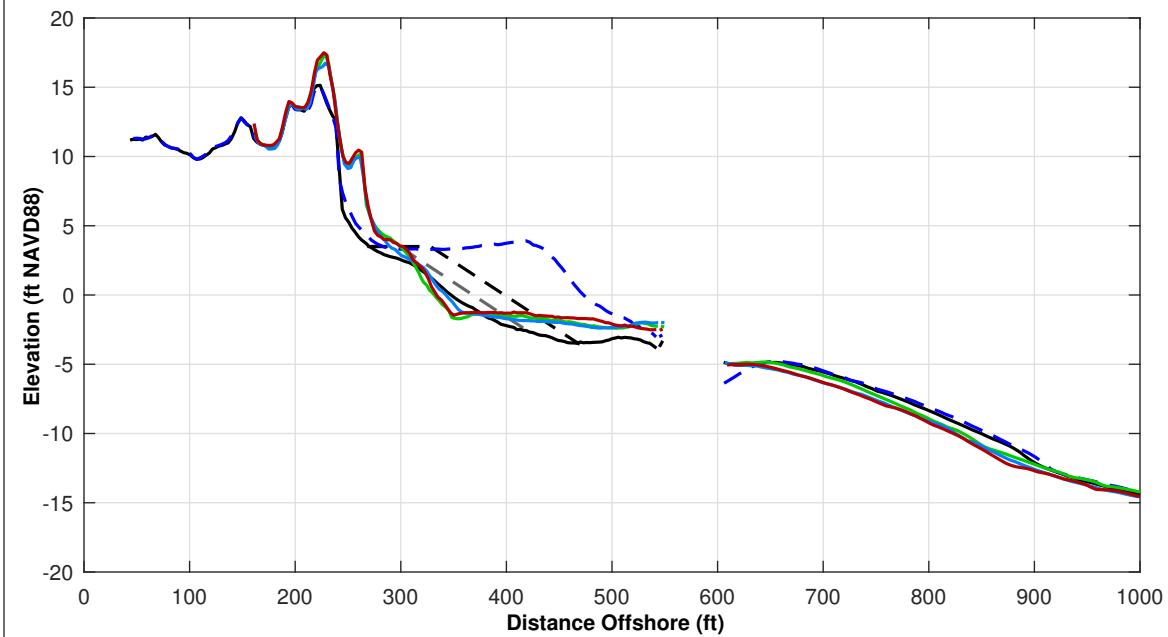
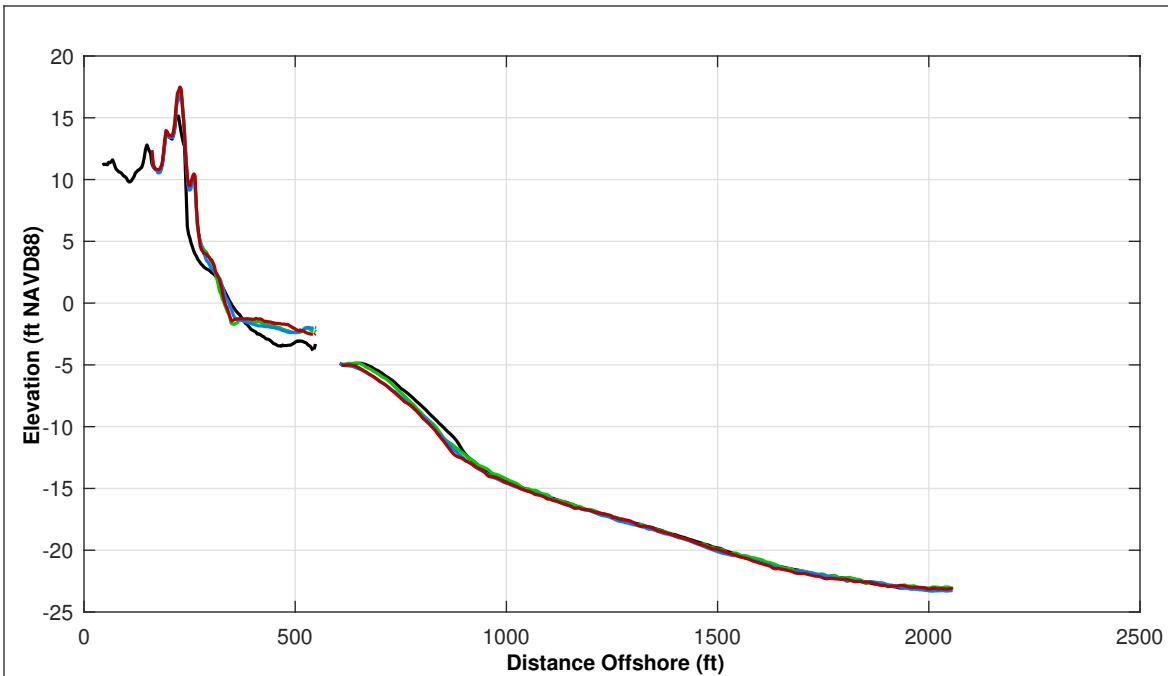


Survey Transect 363+83	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	-11.75 ft	-6.15 ft
Volume Change Above -15 ft NAVD88	-2.52 cy/ft	3.17 cy/ft
Volume Change Above 0 ft NAVD88	-2.27 cy/ft	-0.58 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	-36.0 ft	

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.



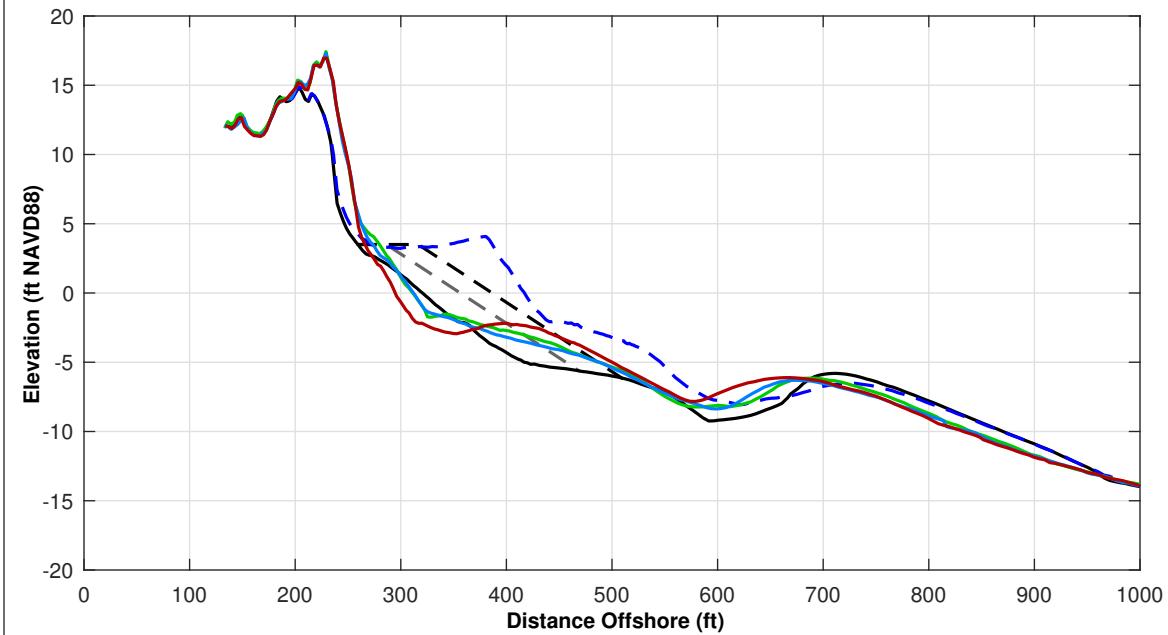
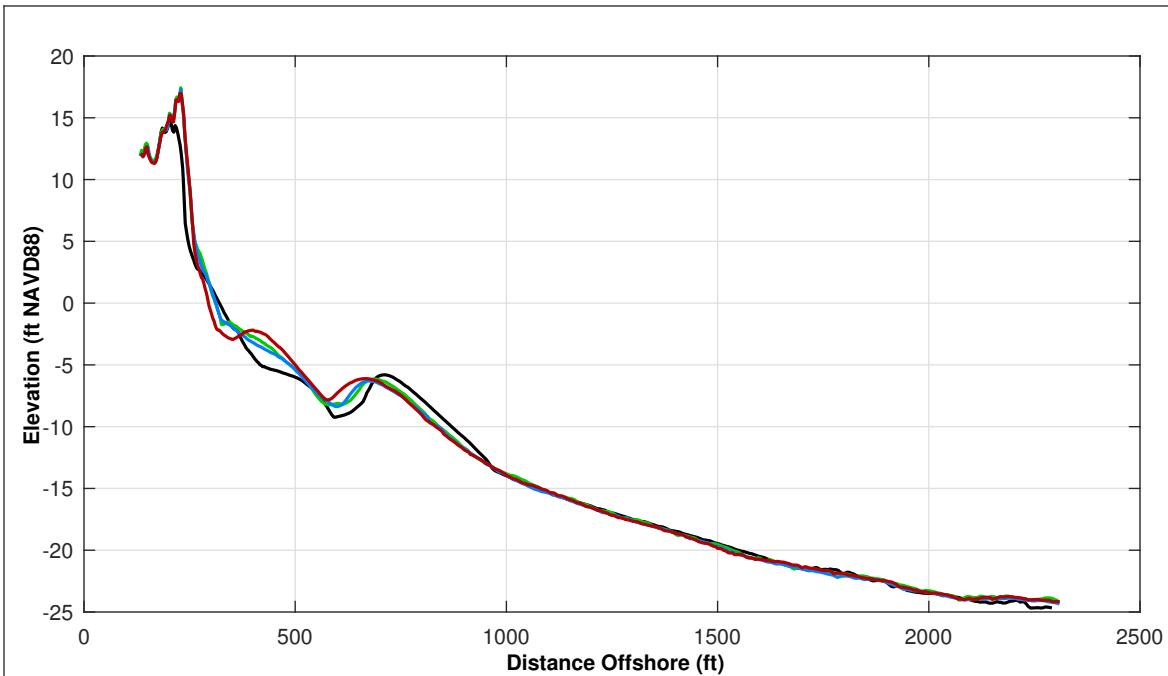


Survey Transect 365+63	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	5.95 ft	-3.89 ft
Volume Change Above -15 ft NAVD88	-3.61 cy/ft	1.42 cy/ft
Volume Change Above 0 ft NAVD88	0.86 cy/ft	1.13 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	-26.0 ft	

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.





Survey Transect 367+43	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	-12.77 ft	-14.02 ft
Volume Change Above -15 ft NAVD88	-1.92 cy/ft	2.53 cy/ft
Volume Change Above 0 ft NAVD88	-2.86 cy/ft	-1.86 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	-51.0 ft	

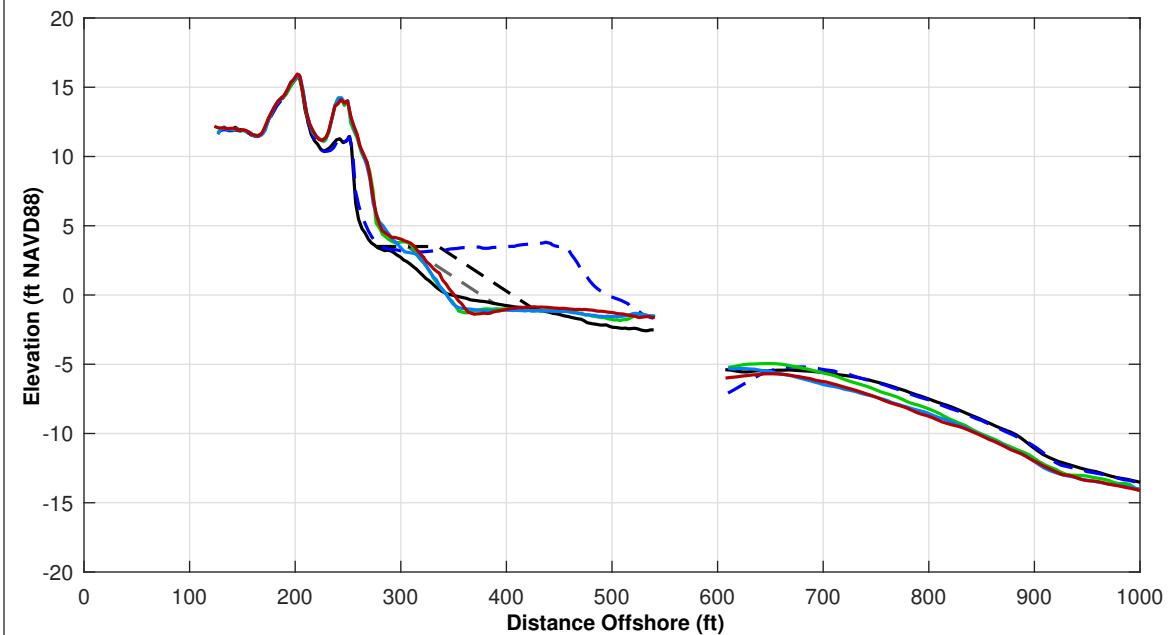
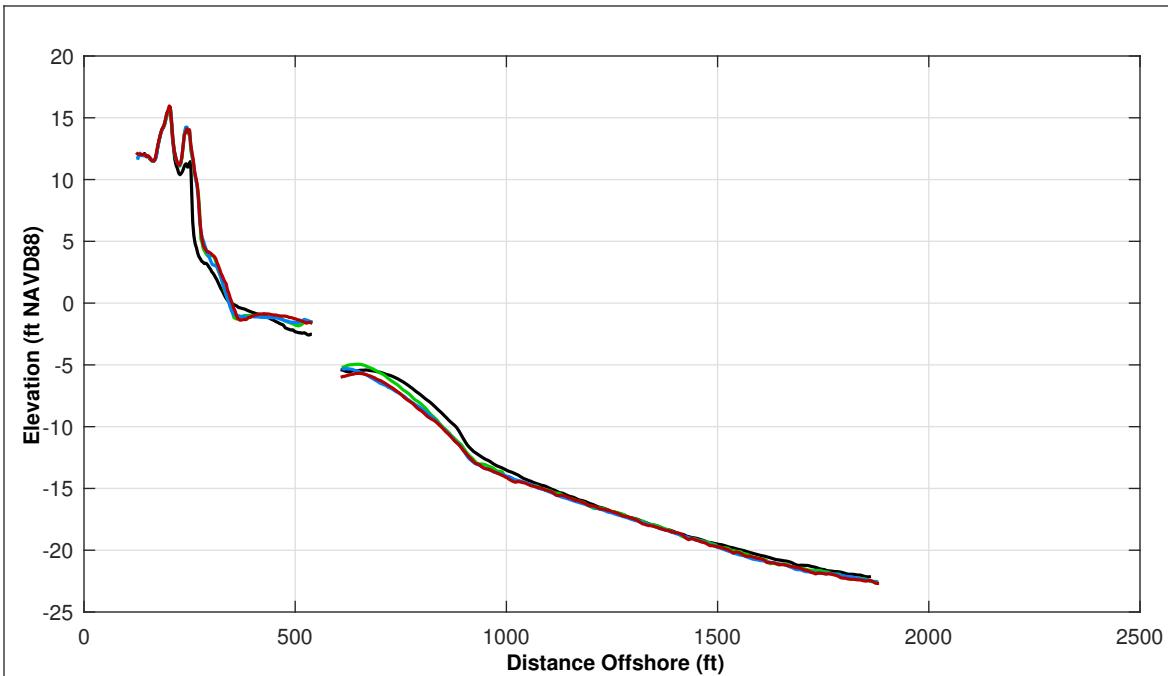
**LEGEND:**

APR 2025	MAY 2017
NOV 2024	OCT 2016
MAY 2024	USACE Design Template
	USACE Nourishment Threshold

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.



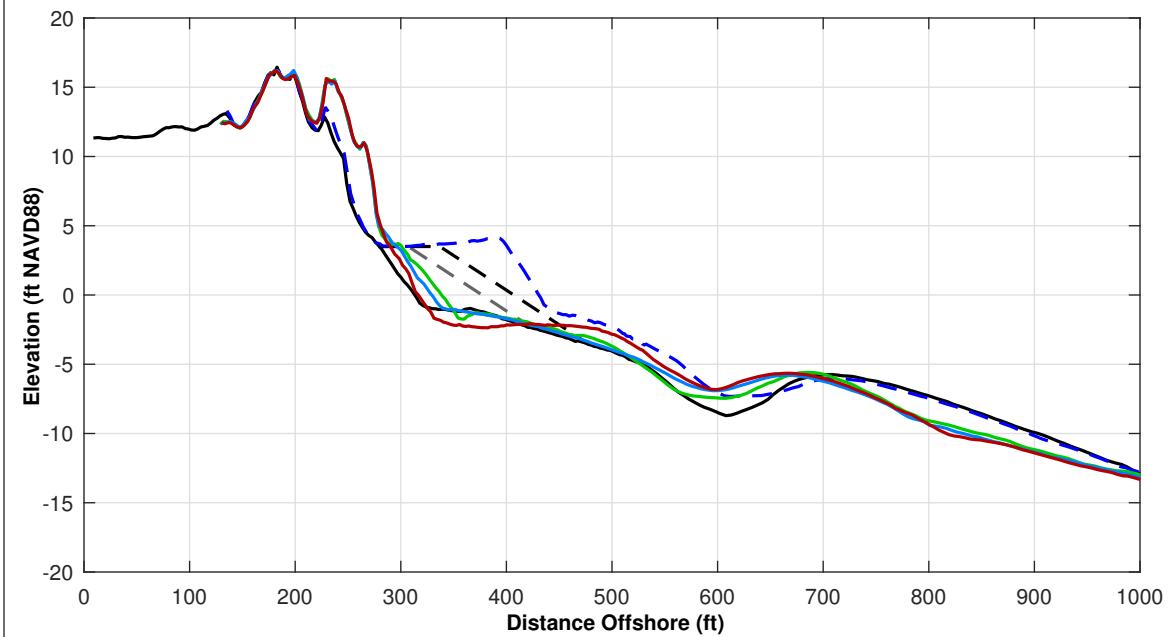
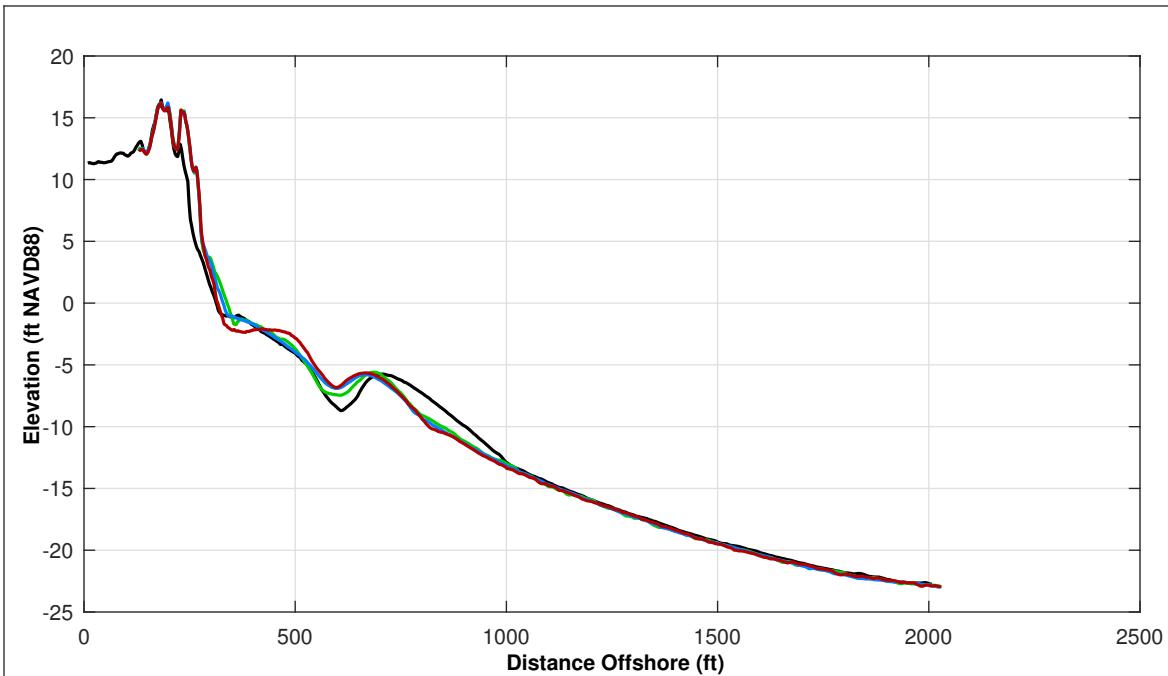


Survey Transect 369+23	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	7.51 ft	6.19 ft
Volume Change Above -15 ft NAVD88	-4.14 cy/ft	0.66 cy/ft
Volume Change Above 0 ft NAVD88	1.42 cy/ft	1.26 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	-23.0 ft	

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.



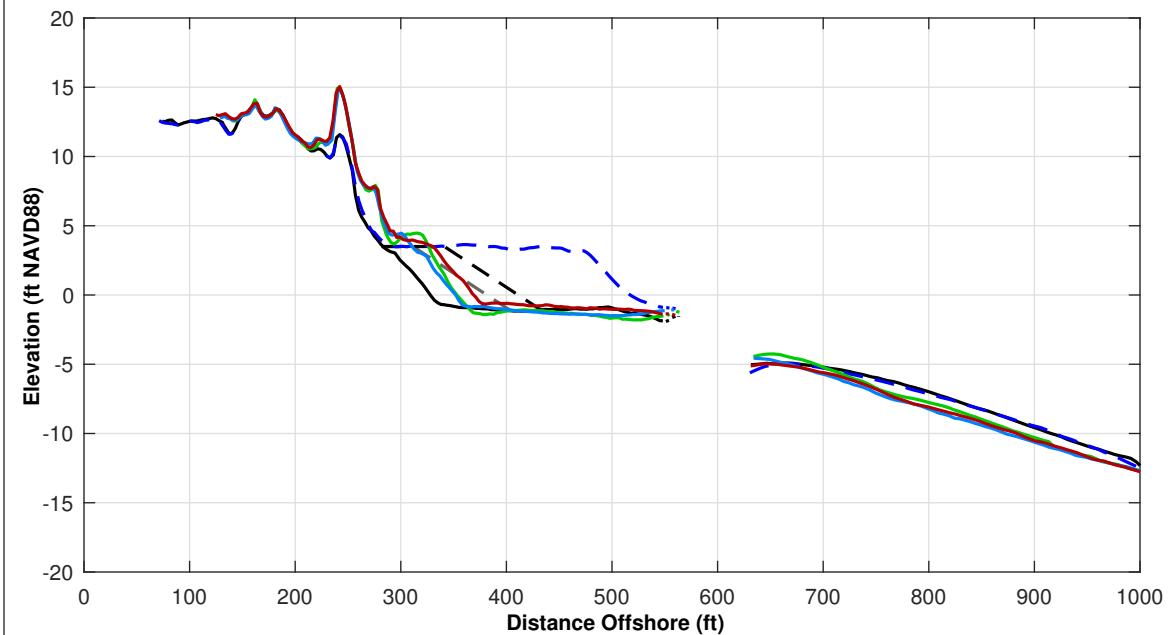
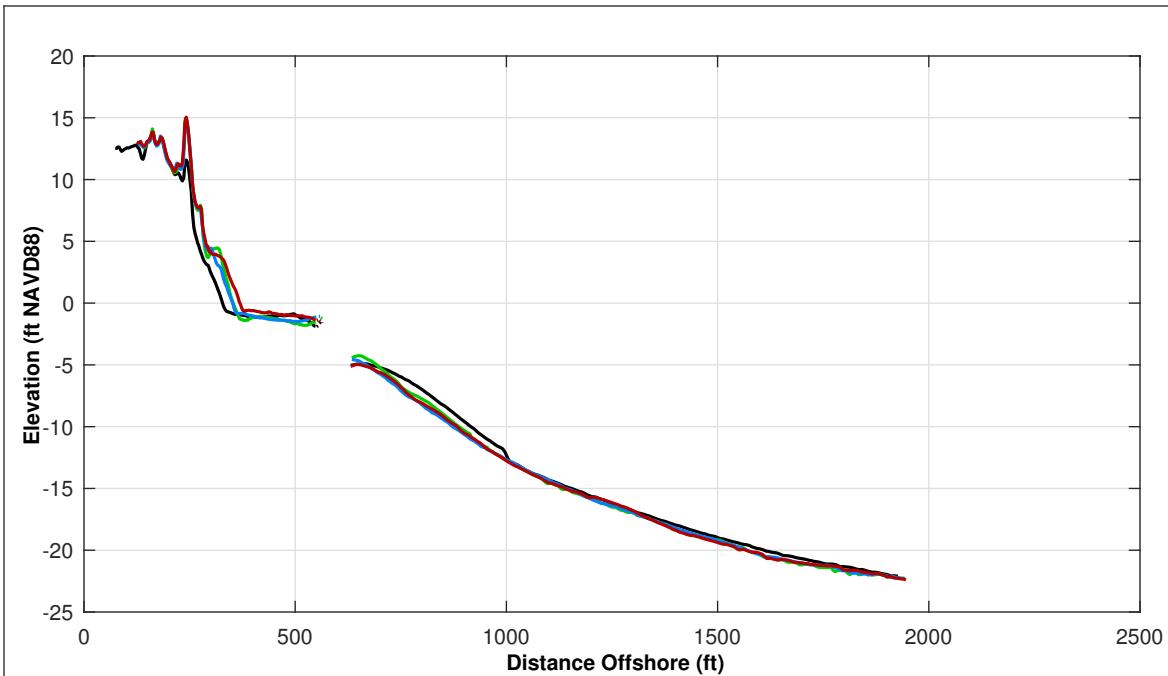


Survey Transect 371+03	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	-18.40 ft	-9.23 ft
Volume Change Above -15 ft NAVD88	-2.36 cy/ft	-0.54 cy/ft
Volume Change Above 0 ft NAVD88	-2.17 cy/ft	-1.32 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	-48.0 ft	

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.





Survey Transect 372+83	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	15.32 ft	18.75 ft
Volume Change Above -15 ft NAVD88	2.08 cy/ft	6.22 cy/ft
Volume Change Above 0 ft NAVD88	1.96 cy/ft	3.19 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	-12.0 ft	

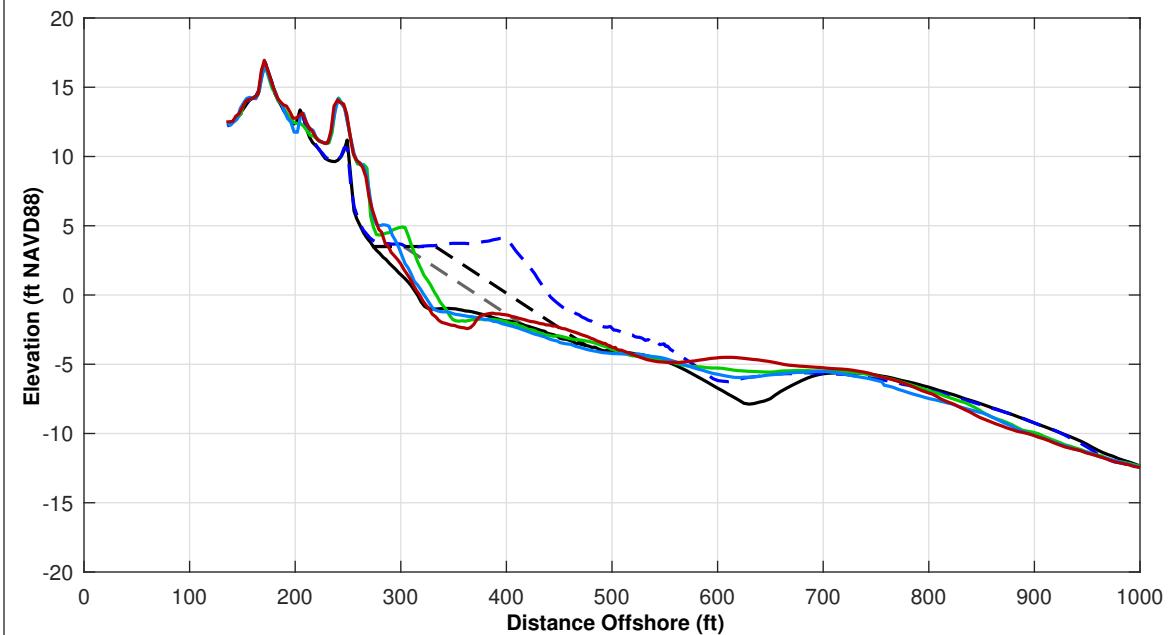
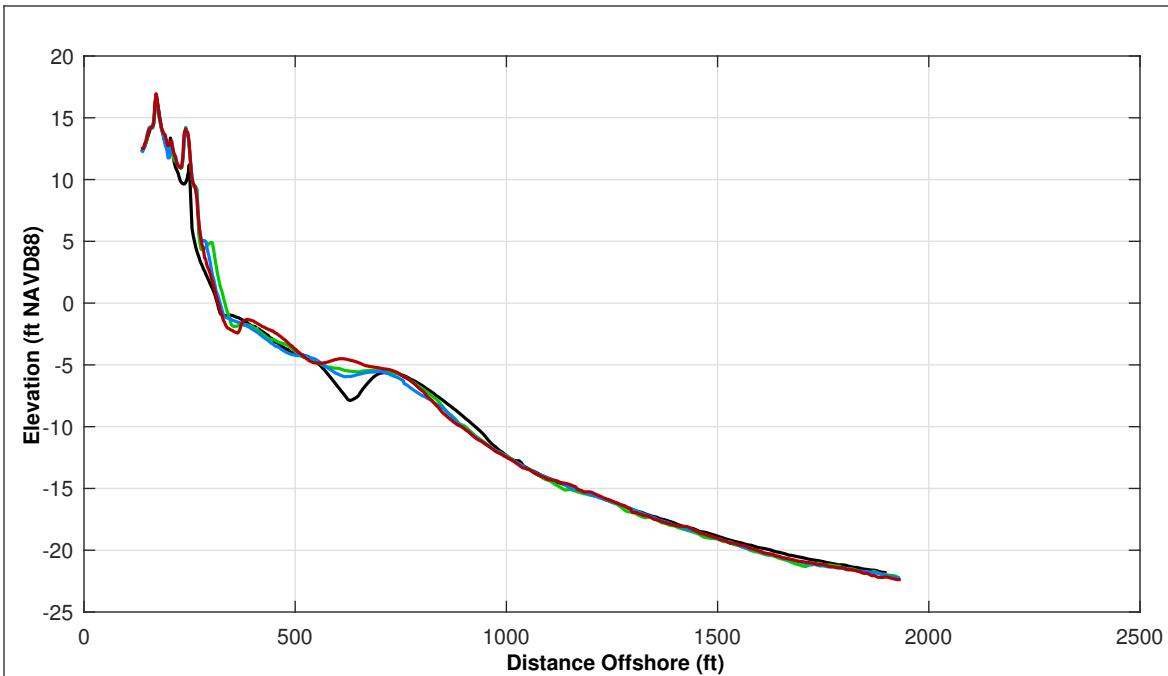
Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.



THE CITY OF  
**NORFOLK**  
PUBLIC WORKS

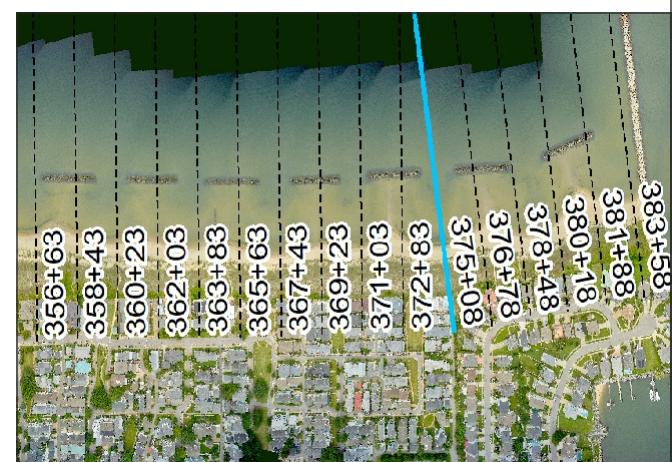
OCEAN VIEW PERIODIC  
SURVEYING DATA &  
ANALYSIS

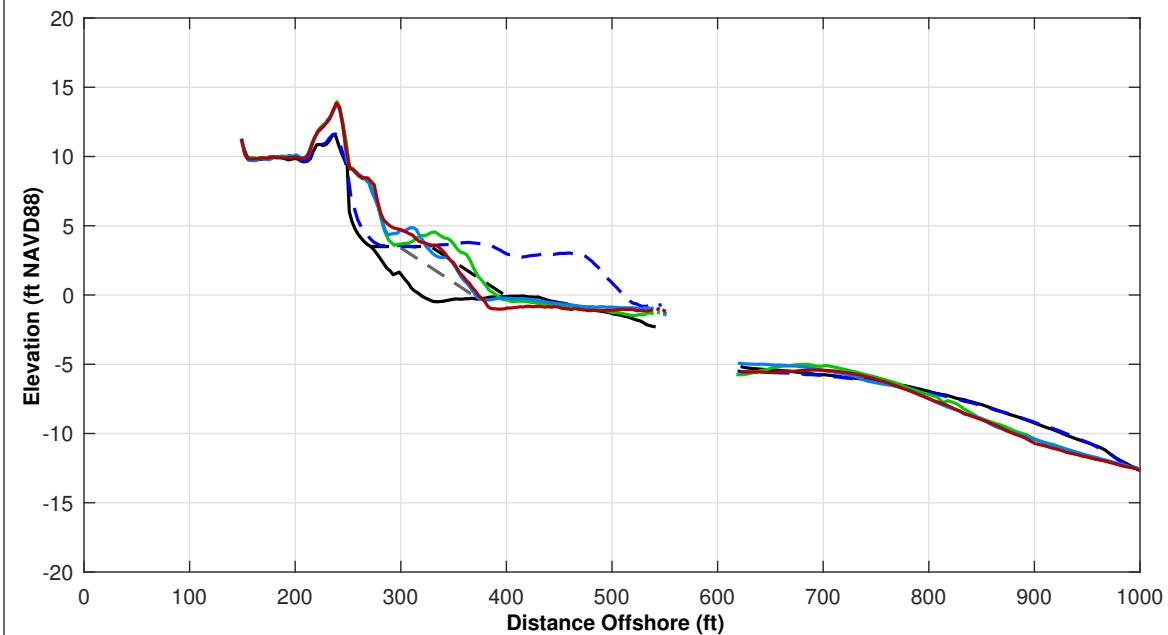
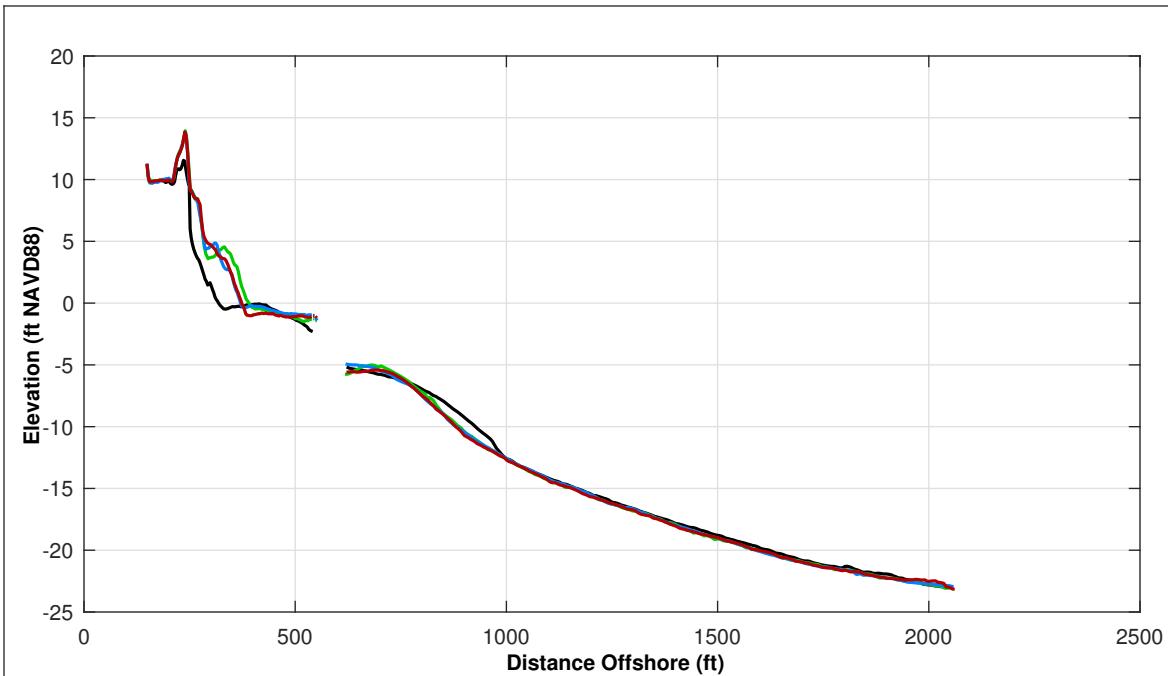


Survey Transect 375+08	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	-15.97 ft	-2.76 ft
Volume Change Above -15 ft NAVD88	0.54 cy/ft	6.59 cy/ft
Volume Change Above 0 ft NAVD88	-2.15 cy/ft	-0.63 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	-45.0 ft	

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.



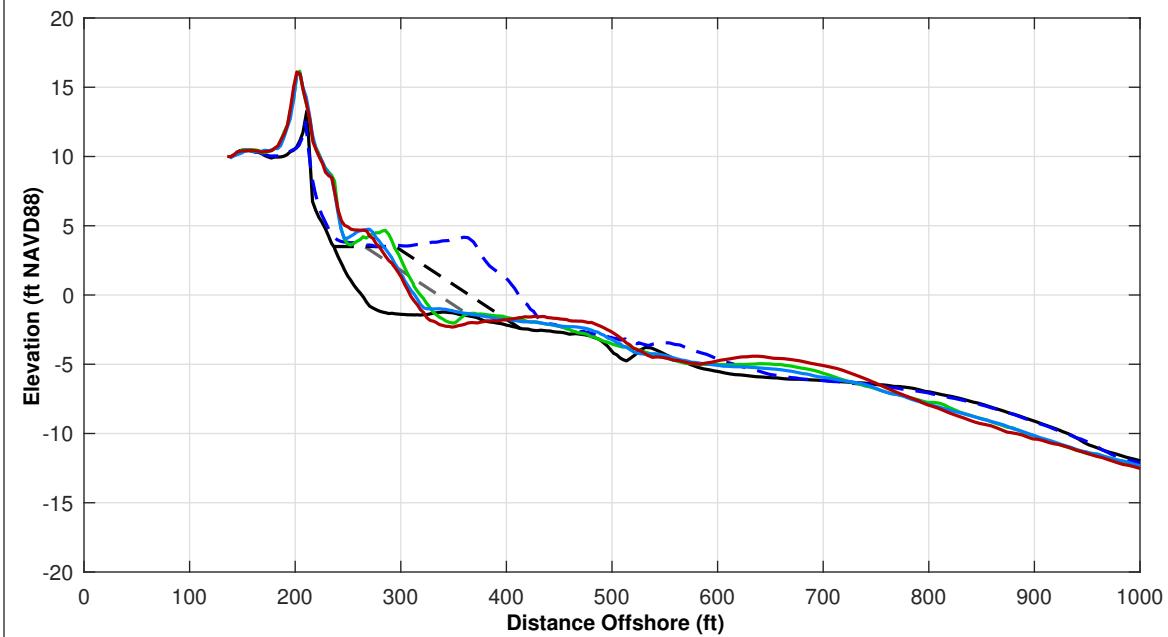
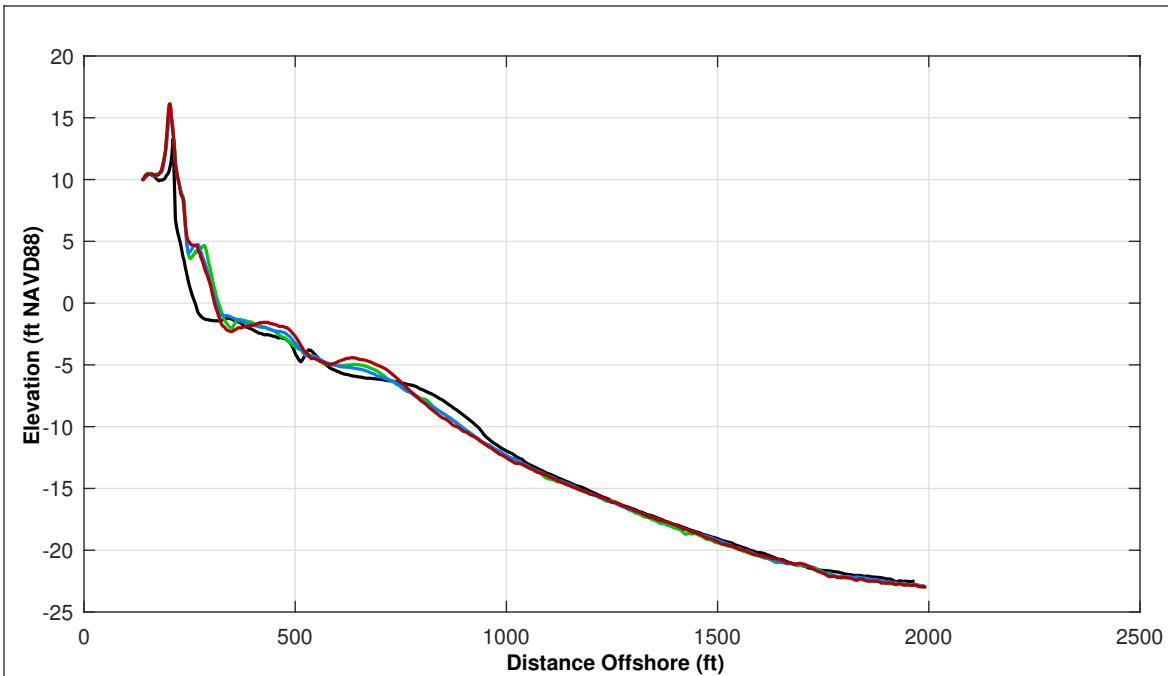


Survey Transect 376+78	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	-14.48 ft	2.23 ft
Volume Change Above -15 ft NAVD88	-5.58 cy/ft	-3.15 cy/ft
Volume Change Above 0 ft NAVD88	-1.96 cy/ft	0.83 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	+ 7.0 ft	

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.





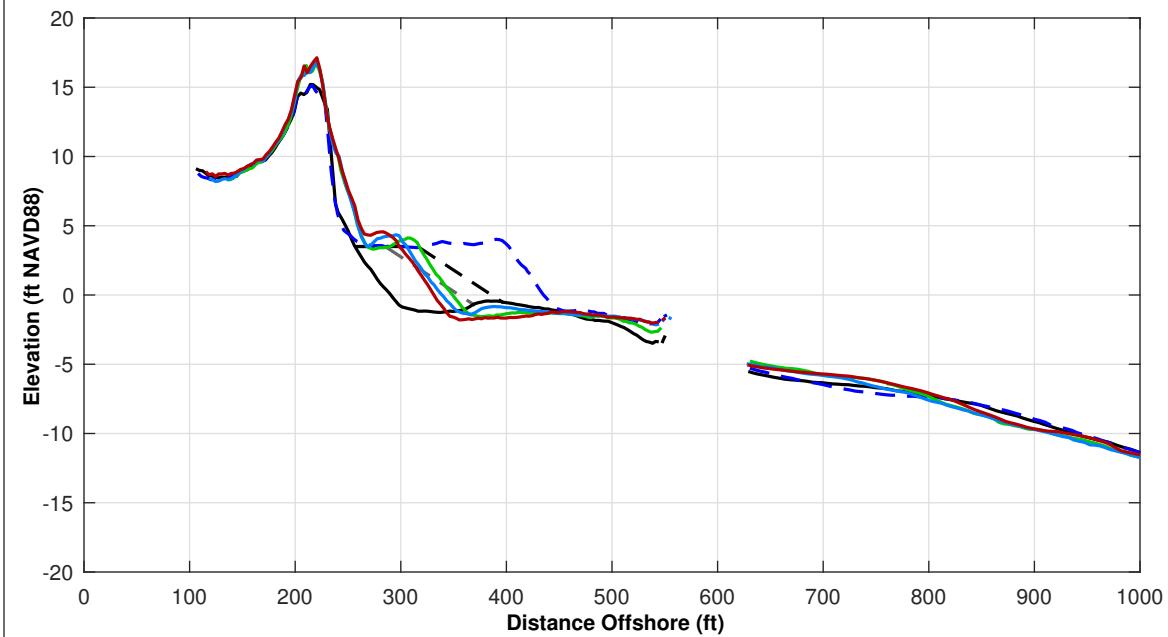
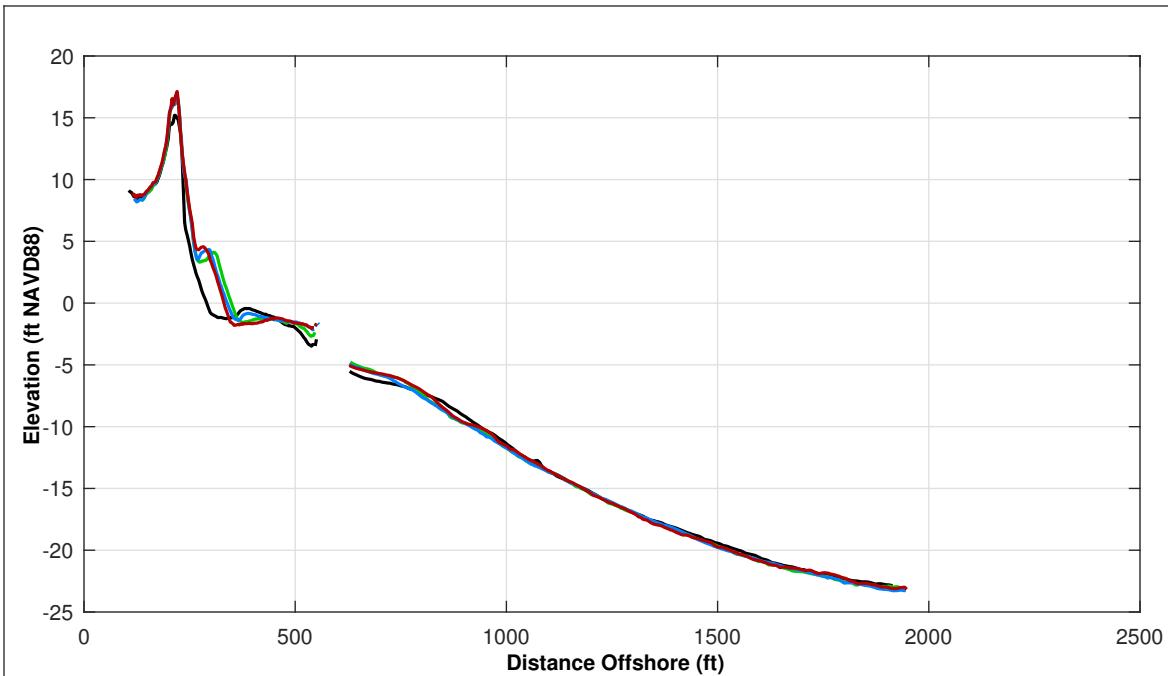
Survey Transect 378+48	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	-8.24 ft	-1.86 ft
Volume Change Above -15 ft NAVD88	0.88 cy/ft	1.68 cy/ft
Volume Change Above 0 ft NAVD88	-1.20 cy/ft	-0.03 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:		-18.0 ft

LEGEND:	
APR 2025	MAY 2017
NOV 2024	OCT 2016
MAY 2024	USACE Design Template
	USACE Nourishment Threshold

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.



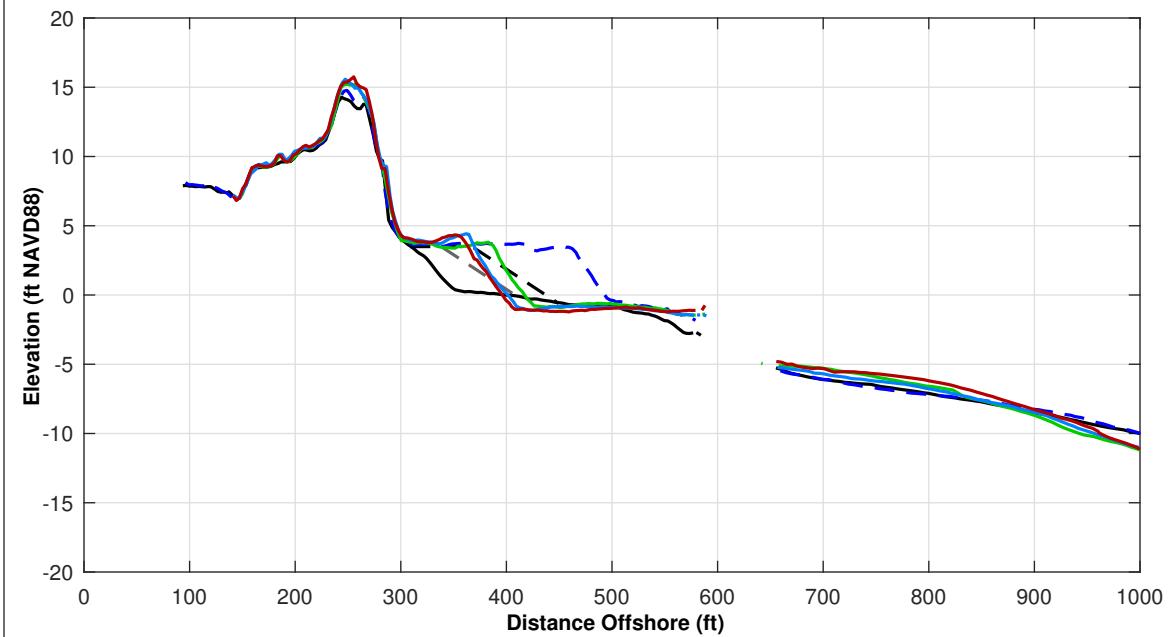
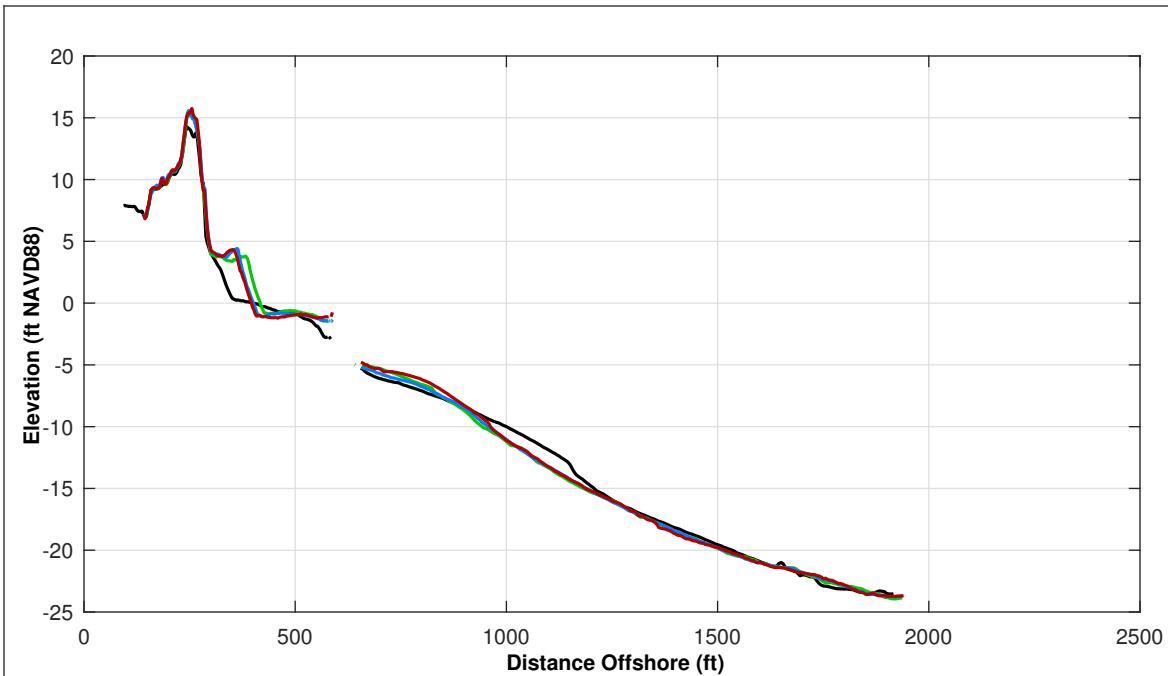


Survey Transect 380+18	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	-16.05 ft	-5.12 ft
Volume Change Above -15 ft NAVD88	1.16 cy/ft	2.26 cy/ft
Volume Change Above 0 ft NAVD88	-0.23 cy/ft	0.33 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	-20.0 ft	

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.



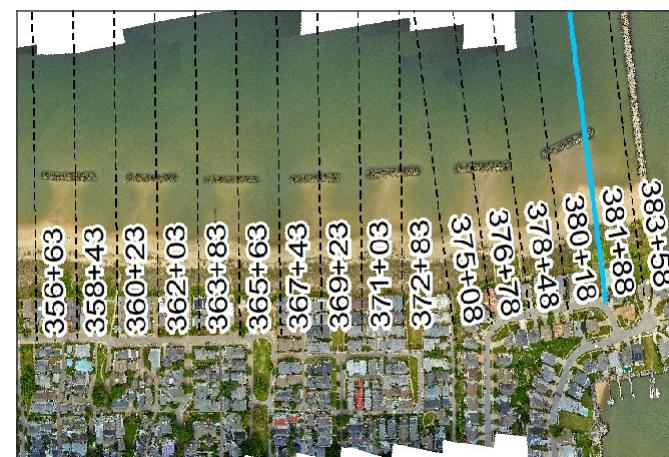


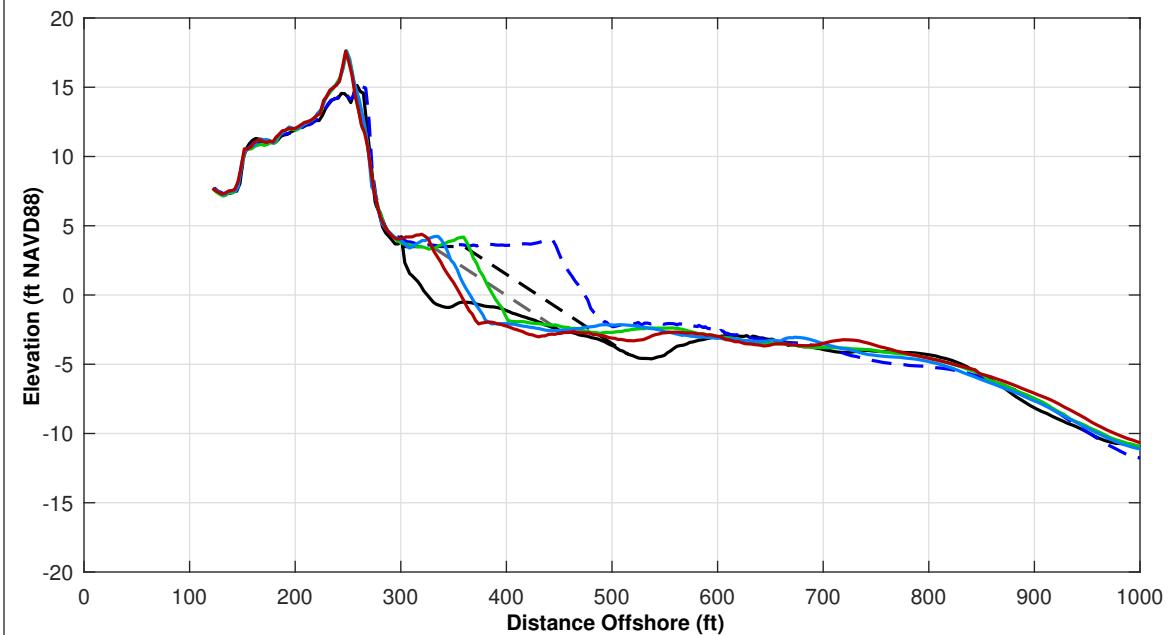
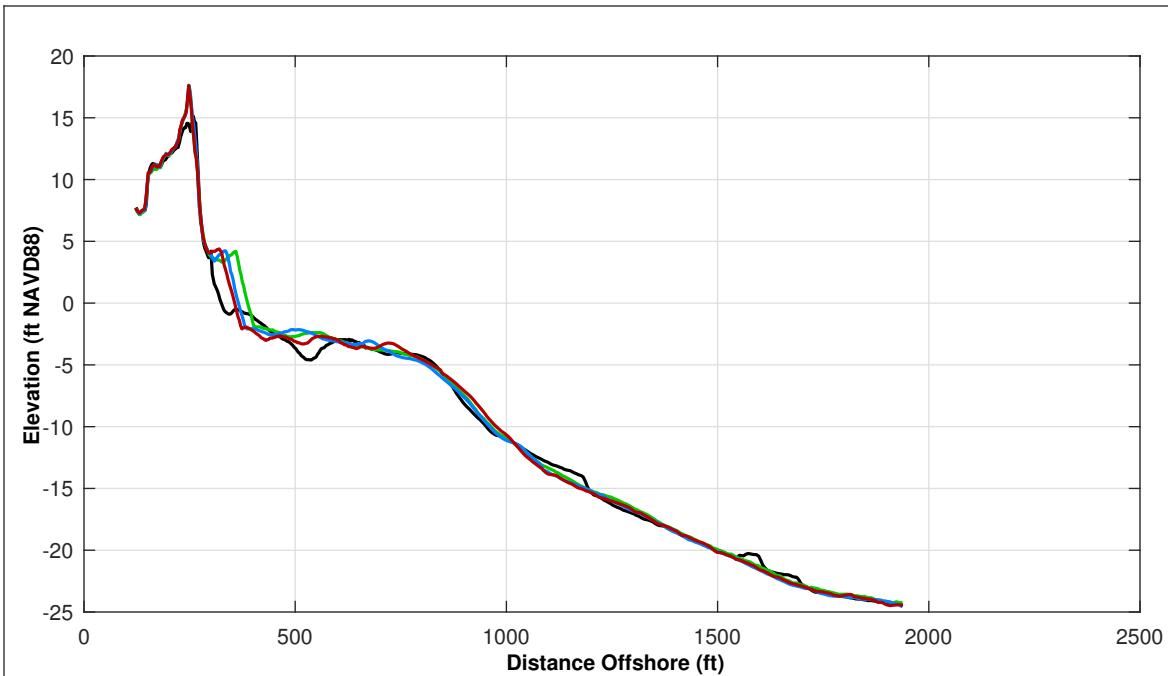
Survey Transect 381+88	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	-19.93 ft	-3.52 ft
Volume Change Above -15 ft NAVD88	2.25 cy/ft	4.13 cy/ft
Volume Change Above 0 ft NAVD88	-1.06 cy/ft	-0.58 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	-4.0 ft	

LEGEND:	
APR 2025	MAY 2017
NOV 2024	OCT 2016
MAY 2024	USACE Design Template
	USACE Nourishment Threshold

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.





Survey Transect 383+58	APR 2025 - MAY 2024	APR 2025 - NOV 2024
Shoreline Change at MHW (0.98 ft NAVD88)	-31.13 ft	-8.94 ft
Volume Change Above -15 ft NAVD88	-7.19 cy/ft	-1.01 cy/ft
Volume Change Above 0 ft NAVD88	-3.51 cy/ft	-1.39 cy/ft
Distance from USACE Design Template @ 3.5 feet NAVD88:	-31.0 ft	

LEGEND:

APR 2025 (Red solid line)  
 NOV 2024 (Blue solid line)  
 MAY 2024 (Green solid line)  
 OCT 2016 (Black solid line)  
 USACE Design Template (Blue dashed line)  
 USACE Nourishment Threshold (Black dashed line)

Notes:

1. Station From West To East At Varying Intervals.
2. Sections Are Viewed Toward Decreasing Stationing.
3. All Survey Elevations In Feet Referenced to NAVD88.
4. For Transects With Offshore Breakwaters, Volume Change Calculations Were Limited To The Portions Of The Profiles Both Landward and Seaward Of The Breakwater.



## **Appendix C: Summary of Shoreline Change and Volume Change Tables**

**Table C-1. Summary of Shoreline Change and Volume Change  
(May 2024 to April 2025)**

**NOTES:**

1. Positive changes indicate accretion or gain in volume along the profile and negative changes indicate erosion or loss of volume along the profile.
2. MHW assumed at +0.98 ft-NAVD88.
3. Shoreline Change and Volume Change is calculated for the period between surveys from May 1, 2024 to April 23, 2025.

Transect Number (Station)	Old Survey Date	New Survey Date	Shoreline Change Rate at MHW (ft/yr)	Volume Change Rate Above 0 ft NAVD88 (cy/ft/yr)	Volume Change Rate Above -15 ft NAVD88 (cy/ft/yr)
0+00	5/1/2024	4/23/2025	-7.03	0.99	-42.48
2+50	5/1/2024	4/23/2025	11.94	-0.19	-25.17
5+00	5/1/2024	4/23/2025	-5.03	-0.94	-21.50
7+50	5/1/2024	4/23/2025	13.98	1.86	-18.40
10+00	5/1/2024	4/23/2025	-5.66	-0.51	-16.66
12+50	5/1/2024	4/23/2025	7.65	0.59	-9.52
15+00	5/1/2024	4/23/2025	14.75	1.91	-1.53
17+50	5/1/2024	4/23/2025	6.20	-0.22	-15.14
20+00	5/1/2024	4/23/2025	9.44	-0.35	-3.25
22+50	5/1/2024	4/23/2025	-0.88	-0.45	-12.17
25+00	5/1/2024	4/23/2025	19.43	1.17	-1.33
27+50	5/1/2024	4/23/2025	1.64	-0.74	-3.70
30+00	5/1/2024	4/23/2025	-0.04	-0.66	-2.67
32+50	5/1/2024	4/23/2025	-8.97	0.74	-8.60
35+00	5/1/2024	4/23/2025	19.83	2.37	-3.54
37+50	5/1/2024	4/23/2025	-22.08	-3.91	-15.46
40+00	5/1/2024	4/23/2025	-11.13	-4.58	-14.82
42+50	5/1/2024	4/23/2025	-14.97	-2.58	-8.71
45+00	5/1/2024	4/23/2025	42.95	4.73	3.36
45+25	5/1/2024	4/23/2025	44.14	6.42	3.30
47+30	5/1/2024	4/23/2025	12.78	3.31	-1.30
49+35	5/1/2024	4/23/2025	-21.35	-0.16	-7.85
51+41	5/1/2024	4/23/2025	-19.10	-2.07	-4.65
53+46	5/1/2024	4/23/2025	-46.02	-5.65	-12.96
55+51	5/1/2024	4/23/2025	2.43	0.92	-4.62
57+57	5/1/2024	4/23/2025	6.59	2.39	-3.30
59+62	5/1/2024	4/23/2025	-3.94	-0.79	-5.40
61+62	5/1/2024	4/23/2025	0.53	0.15	-4.37
63+62	5/1/2024	4/23/2025	1.29	-0.36	-2.82
65+62	5/1/2024	4/23/2025	-0.26	0.48	-1.12
67+62	5/1/2024	4/23/2025	3.99	0.44	-1.87
69+62	5/1/2024	4/23/2025	1.39	0.11	-1.45
71+62	5/1/2024	4/23/2025	9.25	1.25	0.58
73+62	5/1/2024	4/23/2025	-1.92	0.40	-1.06
75+62	5/1/2024	4/23/2025	33.18	4.97	10.66
77+62	5/1/2024	4/23/2025	-3.53	0.72	0.71
79+62	5/1/2024	4/23/2025	-8.68	0.43	2.20
81+62	5/1/2024	4/23/2025	-5.30	1.37	1.53
83+62	5/1/2024	4/23/2025	27.57	3.63	5.23
85+62	5/1/2024	4/23/2025	6.52	1.57	-2.41
87+62	5/1/2024	4/23/2025	16.03	2.72	4.38

**Table C-1. Summary of Shoreline Change and Volume Change  
(May 2024 to April 2025) Cont.**

1. Positive changes indicate accretion or gain in volume along the profile and negative changes indicate erosion or loss of volume along the profile.
2. MHW assumed at +0.98 ft-NAVD88.
3. Shoreline Change and Volume Change is calculated for the period between surveys from May 1, 2024 to April 23, 2025.

Transect Number (Station)	Old Survey Date	New Survey Date	Shoreline Change Rate at MHW (ft/yr)	Volume Change Rate Above 0 ft NAVD88 (cy/ft/yr)	Volume Change Rate Above -15 ft NAVD88 (cy/ft/yr)
93+41	5/1/2024	4/23/2025	6.96	0.86	3.84
103+08	5/1/2024	4/23/2025	-20.19	-3.36	-7.05
120+93	5/1/2024	4/23/2025	-26.15	-4.41	-7.33
129+17	5/1/2024	4/23/2025	-24.96	-6.50	-14.90
141+98	5/1/2024	4/23/2025	-25.61	-3.97	-6.57
152+01	5/1/2024	4/23/2025	-6.83	0.51	1.56
163+49	5/1/2024	4/23/2025	7.37	1.97	2.62
169+63	5/1/2024	4/23/2025	20.06	0.97	4.23
171+63	5/1/2024	4/23/2025	-10.17	-1.36	-5.92
173+63	5/1/2024	4/23/2025	-13.22	-3.30	-9.60
175+63	5/1/2024	4/23/2025	6.08	0.06	-0.33
177+63	5/1/2024	4/23/2025	18.34	1.94	8.76
179+63	5/1/2024	4/23/2025	10.50	1.04	0.73
181+63	5/1/2024	4/23/2025	7.35	0.51	4.94
183+63	5/1/2024	4/23/2025	22.59	2.63	0.84
185+63	5/1/2024	4/23/2025	-1.48	-1.08	-2.67
187+63	5/1/2024	4/23/2025	10.94	2.10	1.73
189+63	5/1/2024	4/23/2025	8.93	1.25	1.63
191+63	5/1/2024	4/23/2025	25.68	4.36	4.30
193+63	5/1/2024	4/23/2025	-4.23	-0.39	1.85
195+63	5/1/2024	4/23/2025	-7.78	-0.29	-2.54
206+86	5/1/2024	4/23/2025	2.89	-0.65	-4.44
218+66	5/1/2024	4/23/2025	12.26	3.32	6.56
229+85	5/1/2024	4/23/2025	-5.22	-0.61	-0.73
242+03	5/1/2024	4/23/2025	-12.03	1.31	-1.25
252+62	5/1/2024	4/23/2025	1.46	0.27	-0.97
263+22	5/1/2024	4/23/2025	-26.05	0.25	-2.77
274+53	5/1/2024	4/23/2025	12.17	2.99	4.87
281+40	5/1/2024	4/23/2025	-18.13	0.85	-4.67
288+39	5/1/2024	4/23/2025	-3.41	0.25	1.73
295+27	5/1/2024	4/23/2025	1.18	3.99	9.14
302+24	5/1/2024	4/23/2025	0.24	1.42	6.92
315+96	5/1/2024	4/23/2025	6.17	3.66	5.19
323+09	5/1/2024	4/23/2025	-9.16	-1.03	-4.56
329+63	5/1/2024	4/23/2025	3.12	-1.24	4.16
331+43	5/1/2024	4/23/2025	-12.46	-1.96	-3.56
333+23	5/1/2024	4/23/2025	1.16	0.02	-8.58
335+03	5/1/2024	4/23/2025	-21.28	-2.33	0.13
336+83	5/1/2024	4/23/2025	3.05	1.01	3.76
338+63	5/1/2024	4/23/2025	5.26	1.30	-6.40
340+43	5/1/2024	4/23/2025	-19.84	-0.10	-1.53
342+23	5/1/2024	4/23/2025	-17.71	-1.86	-6.17

**Table C-1. Summary of Shoreline Change and Volume Change  
(May 2024 to April 2025) Cont.**

**NOTES:**

1. Positive changes indicate accretion or gain in volume along the profile and negative changes indicate erosion or loss of volume along the profile.
2. MHW assumed at +0.98 ft-NAVD88.
3. Shoreline Change and Volume Change is calculated for the period between surveys from May 1, 2024 to April 23, 2025.

Transect Number (Station)	Old Survey Date	New Survey Date	Shoreline Change Rate at MHW (ft/yr)	Volume Change Rate Above 0 ft NAVD88 (cy/ft/yr)	Volume Change Rate Above -15 ft NAVD88 (cy/ft/yr)
344+05	5/1/2024	4/23/2025	-2.21	2.85	-3.48
345+85	5/1/2024	4/23/2025	-19.98	-0.73	1.85
347+63	5/1/2024	4/23/2025	-10.06	1.12	-7.36
349+43	5/1/2024	4/23/2025	-19.08	0.03	0.72
351+23	5/1/2024	4/23/2025	1.64	2.35	-5.45
353+03	5/1/2024	4/23/2025	-9.70	0.99	1.03
354+83	5/1/2024	4/23/2025	2.50	2.41	-2.57
356+63	5/1/2024	4/23/2025	-15.96	-1.41	-3.13
358+43	5/1/2024	4/23/2025	5.33	1.93	-1.78
360+23	5/1/2024	4/23/2025	-22.11	-2.56	-1.57
362+03	5/1/2024	4/23/2025	11.88	2.02	-2.90
363+83	5/1/2024	4/23/2025	-12.01	-2.32	-2.58
365+63	5/1/2024	4/23/2025	6.08	0.88	-3.69
367+43	5/1/2024	4/23/2025	-13.06	-2.92	-1.96
369+23	5/1/2024	4/23/2025	7.68	1.45	-4.23
371+03	5/1/2024	4/23/2025	-18.81	-2.22	-2.41
372+83	5/1/2024	4/23/2025	15.66	2.00	2.13
375+08	5/1/2024	4/23/2025	-16.33	-2.20	0.55
376+78	5/1/2024	4/23/2025	-14.80	-2.00	-5.71
378+48	5/1/2024	4/23/2025	-8.42	-1.23	0.90
380+18	5/1/2024	4/23/2025	-16.41	-0.24	1.19
381+88	5/1/2024	4/23/2025	-20.38	-1.08	2.30
383+58	5/1/2024	4/23/2025	-31.83	-3.59	-7.35

**Table C-2. Summary of Shoreline Change and Volume Change  
(November 2024 to April 2025)**

**NOTES:**

1. Positive changes indicate accretion or gain in volume along the profile and negative changes indicate erosion or loss of volume along the profile.
2. MHW assumed at +0.98 ft-NAVD88.
3. Shoreline Change and Volume Change is calculated for the period between surveys from November 7 2024 to April 23 2025.

Transect Number (Station)	Old Survey Date	New Survey Date	Shoreline Change at MHW (ft)	Volume Change Above 0 ft NAVD88 (cy/ft)	Volume Change Above -15 ft NAVD88 (cy/ft)
0+00	11/7/2024	4/23/2025	-10.28	-2.75	-18.24
2+50	11/7/2024	4/23/2025	3.57	-1.25	-13.78
5+00	11/7/2024	4/23/2025	-2.25	-0.94	-10.25
7+50	11/7/2024	4/23/2025	7.16	0.24	18.96
10+00	11/7/2024	4/23/2025	1.38	-1.46	-1.13
12+50	11/7/2024	4/23/2025	3.36	-1.81	-2.01
15+00	11/7/2024	4/23/2025	-1.09	-0.65	0.28
17+50	11/7/2024	4/23/2025	-2.12	-1.10	-1.74
20+00	11/7/2024	4/23/2025	3.17	0.20	-1.73
22+50	11/7/2024	4/23/2025	4.68	0.90	-2.70
25+00	11/7/2024	4/23/2025	24.74	3.19	0.14
27+50	11/7/2024	4/23/2025	42.00	4.65	3.02
30+00	11/7/2024	4/23/2025	-2.33	-1.50	-3.67
32+50	11/7/2024	4/23/2025	-8.80	-0.03	-4.45
35+00	11/7/2024	4/23/2025	25.79	3.10	5.09
37+50	11/7/2024	4/23/2025	-10.96	-0.99	-4.76
40+00	11/7/2024	4/23/2025	-2.28	-1.15	-5.78
42+50	11/7/2024	4/23/2025	-9.09	-1.59	-4.43
45+00	11/7/2024	4/23/2025	30.36	4.12	1.54
45+25	11/7/2024	4/23/2025	32.94	2.64	2.60
47+30	11/7/2024	4/23/2025	2.85	0.34	-2.52
49+35	11/7/2024	4/23/2025	-12.98	-1.18	-2.94
51+41	11/7/2024	4/23/2025	-4.55	-0.54	-3.03
53+46	11/7/2024	4/23/2025	-10.53	-3.00	-5.02
55+51	11/7/2024	4/23/2025	0.42	0.12	-0.71
57+57	11/7/2024	4/23/2025	4.02	1.05	0.19
59+62	11/7/2024	4/23/2025	4.90	0.20	-1.75
61+62	11/7/2024	4/23/2025	3.11	-0.89	0.15
63+62	11/7/2024	4/23/2025	2.55	-1.50	-2.93
65+62	11/7/2024	4/23/2025	5.38	1.61	1.67
67+62	11/7/2024	4/23/2025	2.68	0.32	-2.37
69+62	11/7/2024	4/23/2025	2.87	-0.45	-0.67
71+62	11/7/2024	4/23/2025	10.74	1.02	-2.97
73+62	11/7/2024	4/23/2025	2.02	-0.72	-1.69
75+62	11/7/2024	4/23/2025	3.80	1.08	-0.56
77+62	11/7/2024	4/23/2025	-1.05	0.44	1.80
79+62	11/7/2024	4/23/2025	-25.81	-4.78	-6.84
81+62	11/7/2024	4/23/2025	-12.90	-1.31	-0.24
83+62	11/7/2024	4/23/2025	-2.52	-1.78	-4.32
85+62	11/7/2024	4/23/2025	1.46	0.89	-1.93
87+62	11/7/2024	4/23/2025	12.32	1.74	4.53

**Table C-2. Summary of Shoreline Change and Volume Change  
(November 2024 to April 2025) Cont.**

1. Positive changes indicate accretion or gain in volume along the profile and negative changes indicate erosion or loss of volume along the profile.
2. MHW assumed at +0.98 ft-NAVD88.
3. Shoreline Change and Volume Change is calculated for the period between surveys from November 7 2024 to April 23 2025.

Transect Number (Station)	Old Survey Date	New Survey Date	Shoreline Change at MHW (ft)	Volume Change Above 0 ft NAVD88 (cy/ft)	Volume Change Above -15 ft NAVD88 (cy/ft)
93+41	11/7/2024	4/23/2025	6.83	0.55	0.18
103+08	11/7/2024	4/23/2025	-7.09	-1.51	-5.51
120+93	11/7/2024	4/23/2025	3.34	-0.27	-0.92
129+17	11/7/2024	4/23/2025	-23.05	-6.87	-15.23
141+98	11/7/2024	4/23/2025	-7.95	-1.40	-8.56
152+01	11/7/2024	4/23/2025	-14.26	-2.51	-8.51
163+49	11/7/2024	4/23/2025	-10.14	-2.67	-7.67
169+63	11/7/2024	4/23/2025	26.50	1.82	11.33
171+63	11/7/2024	4/23/2025	-1.30	-1.01	-6.80
173+63	11/7/2024	4/23/2025	2.27	-1.18	-5.03
175+63	11/7/2024	4/23/2025	21.23	2.92	9.32
177+63	11/7/2024	4/23/2025	35.34	5.05	6.67
179+63	11/7/2024	4/23/2025	17.93	1.90	4.36
181+63	11/7/2024	4/23/2025	10.25	0.90	6.15
183+63	11/7/2024	4/23/2025	4.23	-0.22	0.32
185+63	11/7/2024	4/23/2025	-7.87	-2.65	-1.79
187+63	11/7/2024	4/23/2025	-6.35	-0.88	-1.18
189+63	11/7/2024	4/23/2025	3.29	-0.40	0.75
191+63	11/7/2024	4/23/2025	4.82	0.08	-0.98
193+63	11/7/2024	4/23/2025	-24.31	-5.07	-8.67
195+63	11/7/2024	4/23/2025	-12.14	-3.43	-8.73
206+86	11/7/2024	4/23/2025	5.71	-0.89	-0.26
218+66	11/7/2024	4/23/2025	7.38	1.22	3.37
229+85	11/7/2024	4/23/2025	1.24	-0.49	1.22
242+03	11/7/2024	4/23/2025	-2.46	1.09	-0.69
252+62	11/7/2024	4/23/2025	1.82	0.00	0.94
263+22	11/7/2024	4/23/2025	-20.50	-1.24	-4.13
274+53	11/7/2024	4/23/2025	13.80	1.65	2.10
281+40	11/7/2024	4/23/2025	5.88	3.08	0.48
288+39	11/7/2024	4/23/2025	-8.84	-1.28	-1.01
295+27	11/7/2024	4/23/2025	-3.65	2.25	6.13
302+24	11/7/2024	4/23/2025	4.05	1.87	7.98
315+96	11/7/2024	4/23/2025	3.22	2.29	4.80
323+09	11/7/2024	4/23/2025	3.95	-0.46	-3.72
329+63	11/7/2024	4/23/2025	6.87	1.54	6.73
331+43	11/7/2024	4/23/2025	-6.94	-0.98	0.58
333+23	11/7/2024	4/23/2025	-3.41	0.69	-4.53
335+03	11/7/2024	4/23/2025	-12.34	-1.06	8.98
336+83	11/7/2024	4/23/2025	9.27	1.51	6.81
338+63	11/7/2024	4/23/2025	-0.74	0.71	-2.15
340+43	11/7/2024	4/23/2025	-18.09	-0.47	1.31

**Table C-2. Summary of Shoreline Change and Volume Change  
(November 2024 to April 2025) Cont.**

**NOTES:**

1. Positive changes indicate accretion or gain in volume along the profile and negative changes indicate erosion or loss of volume along the profile.
2. MHW assumed at +0.98 ft-NAVD88.
3. Shoreline Change and Volume Change is calculated for the period between surveys from November 7 2024 to April 23 2025.

Transect Number (Station)	Old Survey Date	New Survey Date	Shoreline Change at MHW (ft)	Volume Change Above 0 ft NAVD88 (cy/ft)	Volume Change Above -15 ft NAVD88 (cy/ft)
342+23	11/7/2024	4/23/2025	-13.66	-0.79	-0.57
344+05	11/7/2024	4/23/2025	-1.99	2.61	3.39
345+85	11/7/2024	4/23/2025	-6.48	-0.40	4.79
347+63	11/7/2024	4/23/2025	-11.44	0.00	-1.43
349+43	11/7/2024	4/23/2025	-5.57	0.28	4.16
351+23	11/7/2024	4/23/2025	-5.30	-0.08	-1.14
353+03	11/7/2024	4/23/2025	-4.84	0.02	1.91
354+83	11/7/2024	4/23/2025	-10.72	-0.61	-1.91
356+63	11/7/2024	4/23/2025	-13.02	-2.00	-0.80
358+43	11/7/2024	4/23/2025	-6.92	0.41	0.89
360+23	11/7/2024	4/23/2025	-13.17	-2.70	0.40
362+03	11/7/2024	4/23/2025	2.19	1.54	1.35
363+83	11/7/2024	4/23/2025	-6.15	-0.58	3.17
365+63	11/7/2024	4/23/2025	-3.89	1.13	1.42
367+43	11/7/2024	4/23/2025	-14.02	-1.86	2.53
369+23	11/7/2024	4/23/2025	6.19	1.26	0.66
371+03	11/7/2024	4/23/2025	-9.23	-1.32	-0.54
372+83	11/7/2024	4/23/2025	18.75	3.19	6.22
375+08	11/7/2024	4/23/2025	-2.76	-0.63	6.59
376+78	11/7/2024	4/23/2025	2.23	0.83	-3.15
378+48	11/7/2024	4/23/2025	-1.86	-0.03	1.68
380+18	11/7/2024	4/23/2025	-5.12	0.33	2.26
381+88	11/7/2024	4/23/2025	-3.52	-0.58	4.13
383+58	11/7/2024	4/23/2025	-8.94	-1.39	-1.01

## Appendix D: Engineering Activities Log

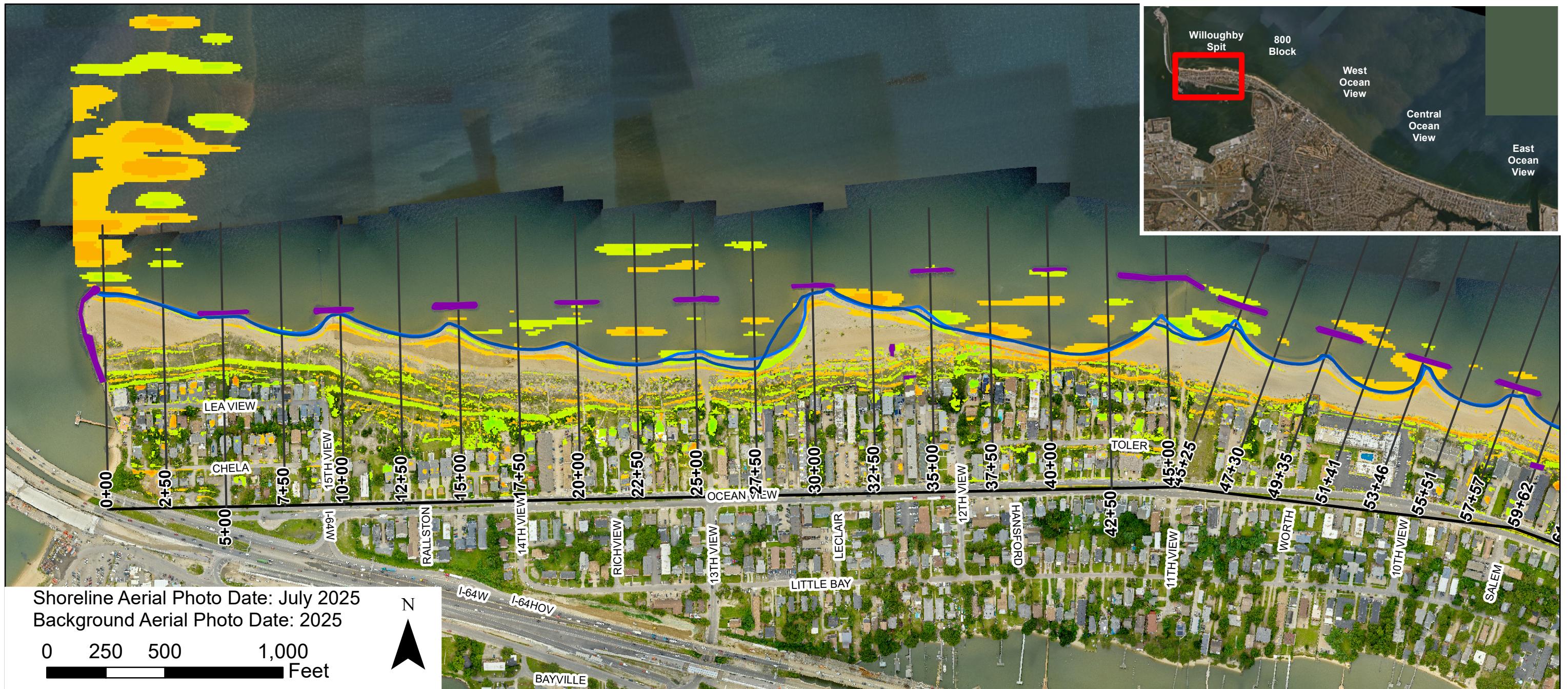
**ENGINEERING ACTIVITIES LOG AND LOG OF SURVEYS FOR ENTIRE OCEAN VIEW SHORELINE**

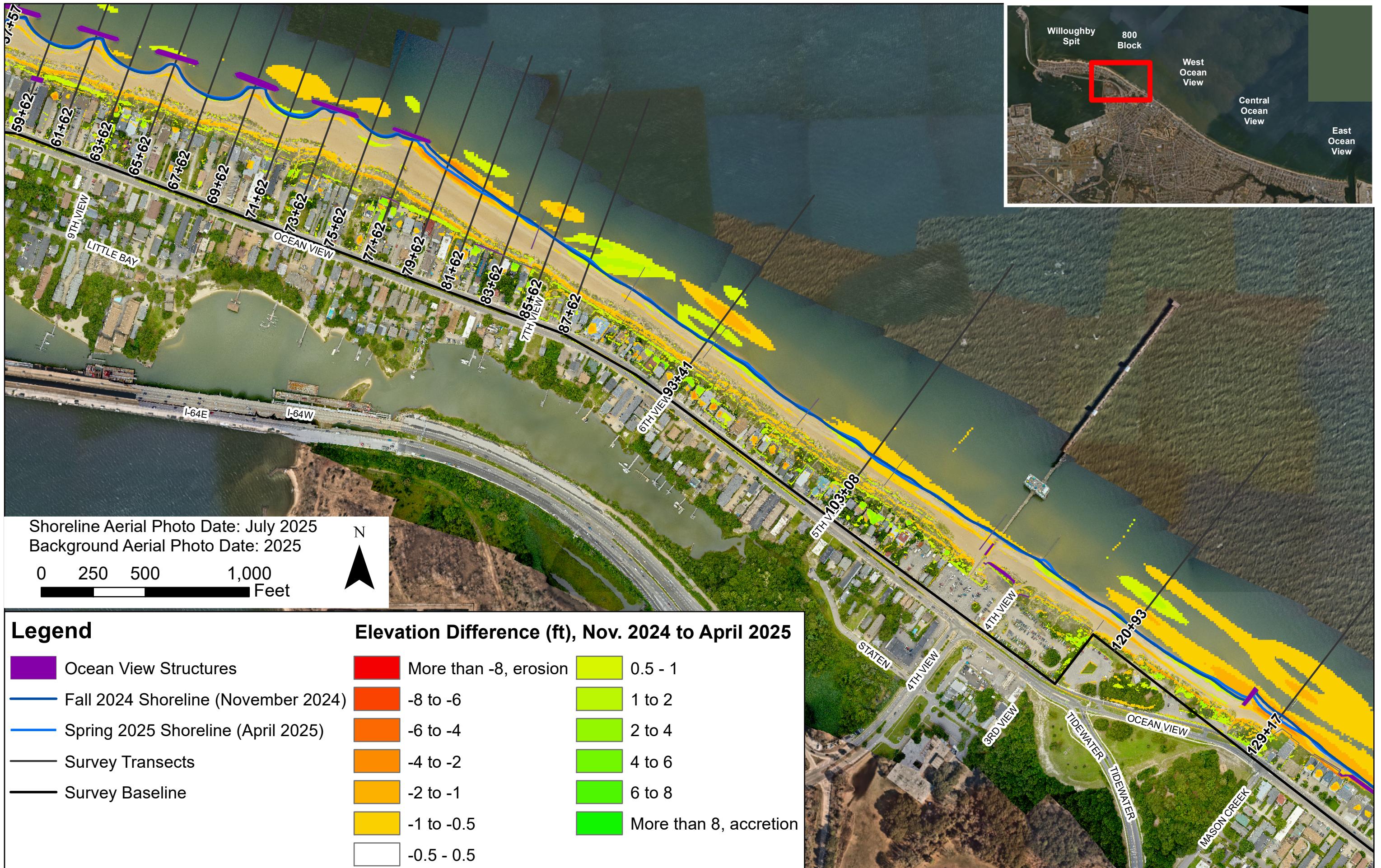
No	Date	Project Type	Location	Description	Vol (cy)	Extent (ft)	Unit Vol (cy/ft)	Sand Source
1	1920-1937	Groin Construction	Willoughby Spit Shoreline	62 groins built by private property owners				
2	Dec 1926-Jan 1928	Jetty Construction	Little Creek Inlet	East Jetty Construction				
3	Dec 1926-Nov 1928	Jetty Construction	Little Creek Inlet	West Jetty Construction				
4	1938	Groin Construction	Between Willoughby Spit and Chesapeake Blvd.	37 timber groins built by City of Norfolk				
5	1953	Beach Nourishment	18th Bay St to 27th Bay St (East Ocean View)	Beach Nourishment	1,260,000	3,000	420	
6	1953	Beach Nourishment	27th Bay St to West Jetty (East Ocean View)	Beach Nourishment	500,000	1,800	278	
7	1960	Beach Nourishment	East End Parking Lot to West Jetty (East Ocean View)	Beach Nourishment	159,000	900	177	
8	1962	Beach Nourishment	Terminal Groin to 9th View St (Willoughby Spit)	Beach Nourishment	176,000	6,900	25	
9	1981	Groin reconstruction	Willoughby Spit area	5 timber groins were reconstructed				
10	1982	Beach Nourishment	East Ocean View	Beach Nourishment	400,000			Pretty Lake
11	1983	Groin Removal	Ocean View Park area	3 groins removed				
12	1983	Groin Construction	Western end of Willoughby Spit	5 groins built by the City of Norfolk				
13	Jan-Apr 1984	Beach Nourishment	Terminal Groin to 5th View St (Willoughby Spit)	Beach Nourishment	537,500	11,000	49	Navy Piers
14	Aug-Nov 1984	Beach Nourishment	21st Bay St to East End Parking Lot (East Ocean View)	Beach Nourishment	400,000	3,000	133	Pretty Lake
15	1985	Beach Nourishment	6th View St to Sarah Constant Shrine Park	Beach Nourishment	50,000			Navy's Willoughby project site
16	1987	Beach Nourishment	5th View St to Mason Creek	Beach Nourishment	50,000	2,000	25	Truck Haul
17	1988	Beach Access Construction	Willoughby and Ocean View	19 pedestrian beach access ways constructed				
18	Spring 1988	Dune Repair	Willoughby Beach	used 10,000 cy of accretion from terminal groin				
19	June, 1989	Dune Repair	Willoughby Beach	used 25,000 cy of accretion from terminal groin				
20	1989	Beach Nourishment	21st Bay St to East End Parking Lot (East Ocean View)	Beach Nourishment	133,000	3,000	44	Cape Henry Channel
21	1990	Breakwater Construction	Western end of Willoughby Spit-Lea View Ave.	2 near shore breakwaters				
22	1990	Terminal Groin Reconstruction	Western end of Willoughby Spit-Lea View Ave.	Original wooden groin raised and extended using rock				
23	1990	Beach Nourishment	Willoughby Spit-Near Terminal Groin	Beach Nourishment	100,000			West of Terminal Groin
24	1990-1991	Dune Stabilization/repair	Various Locations	dune vegetation planting,sand fence construction, elevated public access way, cross-over structures, and timber roads for vehicles				
25	1995	Beach Nourishment	Willoughby Spit	Beach Nourishment	240,000			15th View
26	December, 1995	Beach Nourishment	13th View St to 12 View St (in 4 groin pockets)	Beach Nourishment	4,000			15th View
27	December, 1995	Beach Nourishment	Critical Area 1: 8th View St to 7th View St	Beach Nourishment	30,000	1,000	30	15th View
28	March, 1997	Terminal Groin (trunk) Elevated	Willoughby Spit	terminal groin (trunk) elevated +4 ft				
29	Jan 1997- April 1997	Breakwater Construction	Critical Area 1: Worth St to 8th View	nearshore breakwaters 1-4 constructed				
30	December 1997 - March 1998	Breakwater Construction	Critical Area 1: Worth St to 8th View	nearshore breakwaters 5-7 constructed				
31	<b>October 1998 City Survey</b>		<b>Entire Ocean View Shoreline</b>					
32	December, 1998	Beach Nourishment	Critical Area 1: East of 8th View St-near site of future groin spur	Beach Nourishment	500	175	3	
33	<b>October 1999 City Survey</b>		<b>Entire Ocean View Shoreline</b>					
34	1999	Breakwater Construction	Critical Area 2: Just east of Community Beach	4 nearshore breakwaters constructed				
35	November-December 1999	Groin Spur Construction	Critical Area 1: Worth St to 8th View	groin spur construction				
36	December, 1999	Beach Nourishment	Center of COV breakwaters	Beach Nourishment	4,000			
37	December, 1999	Beach Nourishment	Critical Area 1: East of 8th View St-leeward of newly constructed groin spur	Beach Nourishment	1,000	200	5	15th View
38	<b>July 2000 City Survey</b>		<b>From Approx. 9th View St to Little Creek Inlet</b>					
39	August, 2000	Breakwater Construction	Critical Area 3: 21st Bay to Little Creek Inlet	nearshore breakwaters 2,3,4 constructed				
40	<b>October 2000 City Survey</b>		<b>From Approx. 12th View St to Little Creek Inlet</b>					
41	July, 2001	Beach Nourishment	Critical Area 1: Worth St to 8th View	Beach Nourishment	500			Truck Haul
42	September, 2001	Beach Nourishment	Critical Area 1: East of 8th View St-between breakwater 7 and groin spur	Beach Nourishment	2,000	300	7	15th View
43	<b>October 2001 City Survey</b>		<b>Entire Ocean View Shoreline</b>					
44	November, 2001	Breakwater Construction	Critical Area 3: 21st Bay to Little Creek Inlet	nearshore breakwaters 1,5,6,7 constructed				
45	March - April, 2002	Breakwater Work	Critical Area 1: breakwater 7	work on toe extensions				
46	May, 2002	Beach Nourishment	Critical Area 1: East of 8th View St-between breakwater 7 and groin spur	Beach Nourishment	3,438	300	11	15th View
47	June, 2002	Groin Removal	Critical Area 1: Worth St to 8th View	Removal of timber groin channalward of rock spur				
48	<b>July 2002 City Survey</b>		<b>Entire Ocean View Shoreline - excluding approx. Sherwood Pl. to Warwick Ave.</b>					
49	<b>October 2002 City Survey</b>		<b>Entire Ocean View Shoreline - minimal survey data (no beach or bathymetric survey points)</b>					
50	<b>March 2003 City Survey</b>		<b>East Ocean View Shoreline (19th Bay to Little Creek Inlet)</b>					
51	<b>April 2003 City Survey</b>		<b>East Ocean View Shoreline (17th Bay to Little Creek Inlet)</b>					
52	<b>June 2003 Waterway Survey</b>		<b>East Ocean View Shoreline (17th Bay to Little Creek Inlet)</b>					
53	September, 2003	Beach Nourishment	Critical Area 1: West of 8th View St beach access	Beach Nourishment	1,100	350	3	15th View

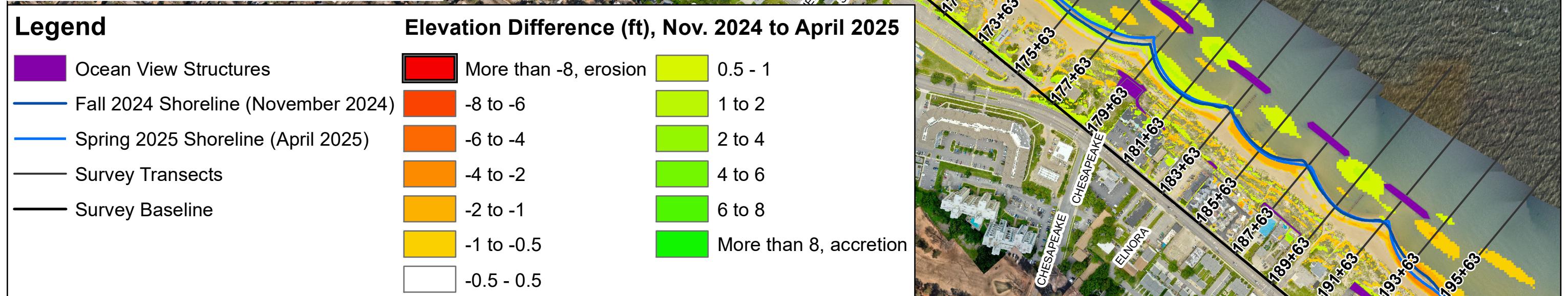
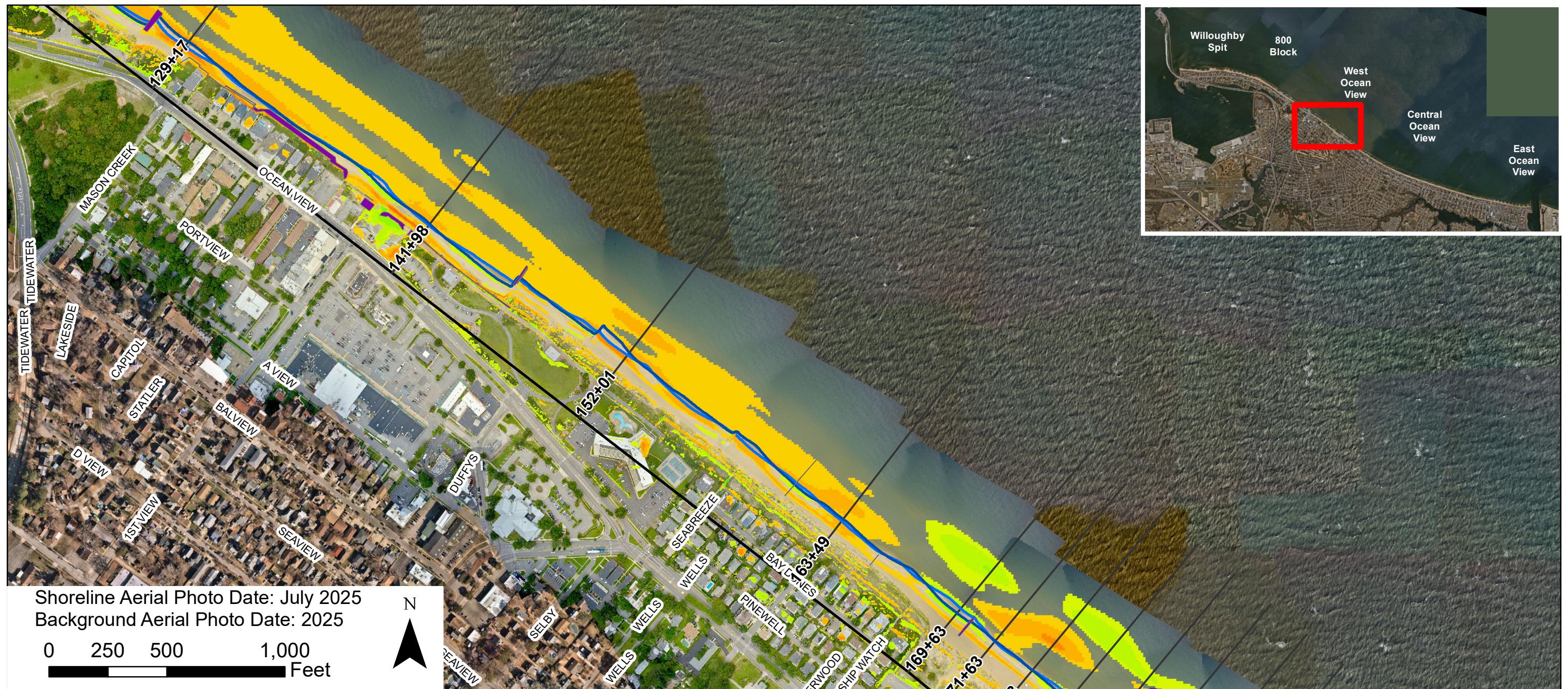
No	Date	Project Type	Location	Description	Vol (cy)	Extent (ft)	Unit Vol (cy/ft)	Sand Source
54	October 2003 Waterway Survey		<i>Post-Isabel Survey - East Ocean View Shoreline (17th Bay to Little Creek Inlet)</i>					
55	October, 2003	Beach Nourishment	Critical Area 3: 19th Bay St	Beach Nourishment	6,000	545	11	upland sand trucked in
56	October, 2003	Beach Nourishment	Critical Area 3: East of 30th Bay St	Beach Nourishment	1,000	150	7	upland sand trucked in
57	December, 2003	Beach Nourishment	Critical Area 3: 17th Bay St to Little Creek Inlet	Beach Nourishment	359,000	5,280	68	Thimble Shoal Channel
58	December, 2003	Beach Nourishment	Critical Area 1: 9th View St to 7th View St (-400 ft)	Beach Nourishment	39,800	1,260	32	
59	Nov-Dec 2003 Post-Fill Survey		<i>East OceanView Shoreline (17th Bay to Little Inlet Creek)</i>					
60	Feb-April, 2004 Waterway Survey		<i>From Approx. Willoughby Spit to 17th Bay St</i>					
61	August, 2004	Beach Nourishment	13th View to 11th View, Behind Western 4 Breakwaters at 800 Block, 1200' East of dogleg	Beach Nourishment	37,000	4,950	7	Truck Haul
62	January-March, 2005	Dune Restoration	Willoughby Spit to Central Ocean View (14th View St to Warwick Ave)	Willoughby Spit to Central Ocean View Dune Restoration Project	504,329	18,300	28	Thimble Shoal Channel
63	January-March 2005 Post-Fill Survey		<i>Willoughby Spit to Warwick Ave.</i>					
64	September 2005 McKim & Creed Periodic Survey		<i>Entire Ocean View Shoreline</i>					
65	January-February, 2006	Groin Spur & Toe Extension Removal	Critical Area 1: East of 8th View	groin spur removal				
66	January-February, 2006	Breakwater Construction	Critical Area 1: East of 8th View	nearshore breakwater 8 constructed				
67	January-February, 2006	Breakwater Construction	Critical Area 3: 29th Bay to Little Creek Inlet	nearshore breakwaters 8, 9, & 10 constructed				
68	March 2006 McKim & Creed Periodic Survey		<i>Entire Ocean View Shoreline</i>					
69	October 2006 McKim & Creed Periodic Survey		<i>Entire Ocean View Shoreline</i>					
70	March 2007 McKim & Creed Periodic Survey		<i>Entire Ocean View Shoreline</i>					
71	October 2007 McKim & Creed Periodic Survey		<i>Entire Ocean View Shoreline</i>					
72	March 2008 McKim & Creed Periodic Survey		<i>Entire Ocean View Shoreline</i>					
73	October 2008 McKim & Creed Periodic Survey		<i>Entire Ocean View Shoreline</i>					
74	March, 2009	Beach Nourishment	East Ocean View and Bay Oaks	Beach Nourishment	196,000			
75	April 2009 McKim & Creed Periodic Survey		<i>Entire Ocean View Shoreline</i>					
76	August-October, 2009	Breakwater Construction	Bay Oaks	5 Nearshore Breakwaters Constructed				
77	October 2009 Geodynamics Periodic Survey		<i>Entire Ocean View Shoreline</i>					
78	November-December 2009 Post-Storm Survey		<i>Entire Ocean View Shoreline</i>					
79	March 2010 Geodynamics Periodic Survey		<i>Entire Ocean View Shoreline</i>					
80	April, 2010	Dune Restoration	Willoughby Spit and 800 Block	Dune restoration using sediment from terminal groin and 800 block breakwaters				
81	October 2010 Geodynamics Periodic Survey		<i>Entire Ocean View Shoreline</i>					
82	April 2011 Geodynamics Periodic Survey		<i>Entire Ocean View Shoreline</i>					
83	October 2011 Geodynamics Periodic Survey		<i>Entire Ocean View Shoreline</i>					
84	March 2012 Geodynamics Periodic Survey		<i>Entire Ocean View Shoreline</i>					
85	October 2012 Geodynamics Periodic Survey		<i>Entire Ocean View Shoreline</i>					
86	January-May, 2013	Breakwater Construction	Willoughby Spit	7 Nearshore Breakwaters Constructed				
87	January-May, 2013	Dune Restoration/Beach Nourishment	Willoughby Spit	Dune Restoration at Lea View Ave and Beach Nourishment from 11th View to 13th View	35,000			Willoughby Spit / Truck Haul
87	January-May, 2013	Breakwater Relocation	800 Block	Breakwater 7 moved further offshore				
88	April 2013 Geodynamics Periodic Survey		<i>Entire Ocean View Shoreline</i>					
89	May-October, 2013	Timber Groin Removal	West Ocean View	7 Timber Groins removed east of the Pier				
90	October, 2013	Rock Groin Construction	West Ocean View	Rock Groin Constructed between Sarah Constant Shrine Park and the 200 Block				
91	October 2013 Geodynamics Periodic Survey		<i>Entire Ocean View Shoreline</i>					
92	November 2013	Beach Nourishment	West Ocean View	Beach Nourishment	73,600			Truck Haul
93	March 2014 Geodynamics Periodic Survey		<i>Entire Ocean View Shoreline</i>					
94	October 2014 Geodynamics Periodic Survey		<i>Entire Ocean View Shoreline</i>					
95	April 2015 Geodynamics Periodic Survey		<i>Entire Ocean View Shoreline</i>					
96	October 2015 Geodynamics Periodic Survey		<i>Entire Ocean View Shoreline</i>					
97	January-February 2016	Beach Nourishment	Toler Place (between 11th View and 12th View Streets)	Emergency nourishemnt placed above MHW	16,400			Willoughby Spit
98	February 2016	Beach Nourishment	Adjacent to Terminal Groin	Emergency nourishemnt placed above MHW	1,500			Truck Haul Upland Source
99	May 2016 Geodynamics Periodic Survey		<i>Entire Ocean View Shoreline</i>					
100	October 2016 Geodynamics Periodic Survey		<i>Entire Ocean View Shoreline</i>					
101	February 2017 Federal Project Ore-Construction Survey (by GLDD)		<i>Entire Ocean View Shoreline</i>					
102	March-May 2017	Beach Nourishment	14th View Street to Warwick Avenue, and 1st Bay Street to Little Creek Inlet	Initial Construction of the Federal Project by USACE	1,200,358		variable	Thimble Shoal Aux. Channel
103	May 2017 Federal Project Post-Construction Survey (by GLDD)		<i>Entire Ocean View Shoreline</i>					
104	May 2017 Geodynamics Periodic Survey		<i>Entire Ocean View Shoreline</i>					
105	October 2017 Geodynamics Periodic Survey		<i>Entire Ocean View Shoreline</i>					
106	April 2018 Geodynamics Periodic Survey		<i>Entire Ocean View Shoreline</i>					
107	November 2018 Geodynamics Periodic Survey		<i>Entire Ocean View Shoreline</i>					
108	April 2019 Geodynamics Periodic Survey		<i>Entire Ocean View Shoreline</i>					
109	November 2019 Geodynamics Periodic Survey		<i>Entire Ocean View Shoreline</i>					
110	March 2020 - July 2020	Breakwater Modification	Toler Place Area in the 11th View Street vicinity	Extension of existing breakwater, addition of one new breakwater, and outfall extension				
111	June 2020 Geodynamics Periodic Survey		<i>Entire Ocean View Shoreline</i>					
112	October 2020 Geodynamics Periodic Survey		<i>Entire Ocean View Shoreline</i>					
113	June 2021 Geodynamics Periodic Survey		<i>Entire Ocean View Shoreline</i>					

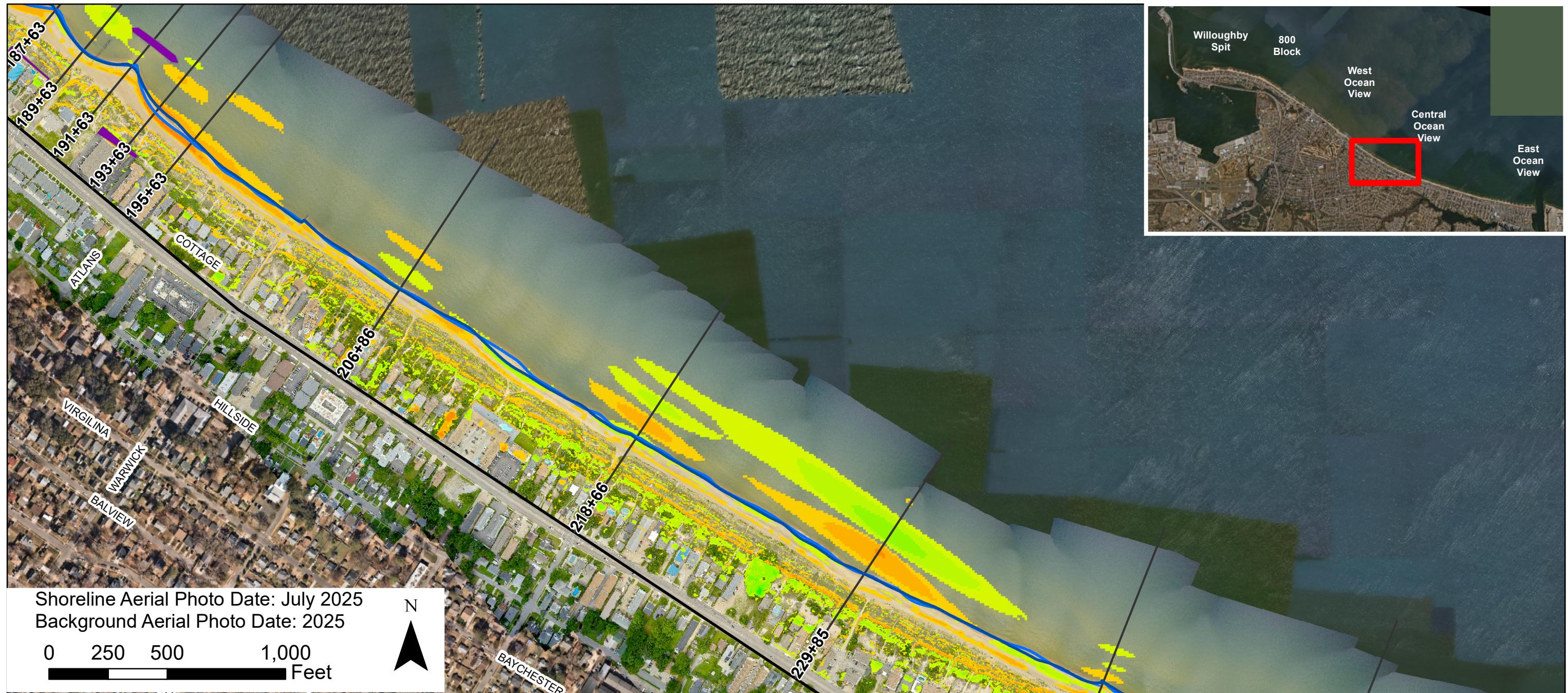
No	Date	Project Type	Location	Description	Vol (cy)	Extent (ft)	Unit Vol (cy/ft)	Sand Source
114	<i>October 2021 Geodynamics Periodic Survey</i>		<i>Entire Ocean View Shoreline</i>					
115	<i>April 2022 Geodynamics Periodic Survey</i>		<i>Entire Ocean View Shoreline</i>					
116	August 2022 - September 2022	Beach Nourishment	<i>Toler Place vicinity and the West Ocean View reach</i>	Beach Nourishment as beneficial use of sediments dredged from navigation channels	264,500		variable	Thimble Shoal Aux. Channel
117	<i>November 2022 Geodynamics Periodic Survey</i>		<i>Entire Ocean View Shoreline</i>					
118	<i>May 2023 Geodynamics Periodic Survey</i>		<i>Entire Ocean View Shoreline</i>					
119	<i>November 2023 Geodynamics Periodic Survey</i>		<i>Entire Ocean View Shoreline</i>					
120	February 2024 - March 2024	Beach Nourishment	<i>East Beach between approximately 27th Bay Street and Little Creek Inlet</i>	Beach Nourishment through truck haul from excavation for HRBT expansion	12,000		variable	HRBT at Willoughby Spit
121	<i>May 2024 Geodynamics Periodic Survey</i>		<i>Entire Ocean View Shoreline</i>					
122	<i>November 2024 Geodynamics Periodic Survey</i>		<i>Entire Ocean View Shoreline</i>					
123	<i>April 2025 Geodynamics Periodic Survey</i>		<i>Entire Ocean View Shoreline</i>					

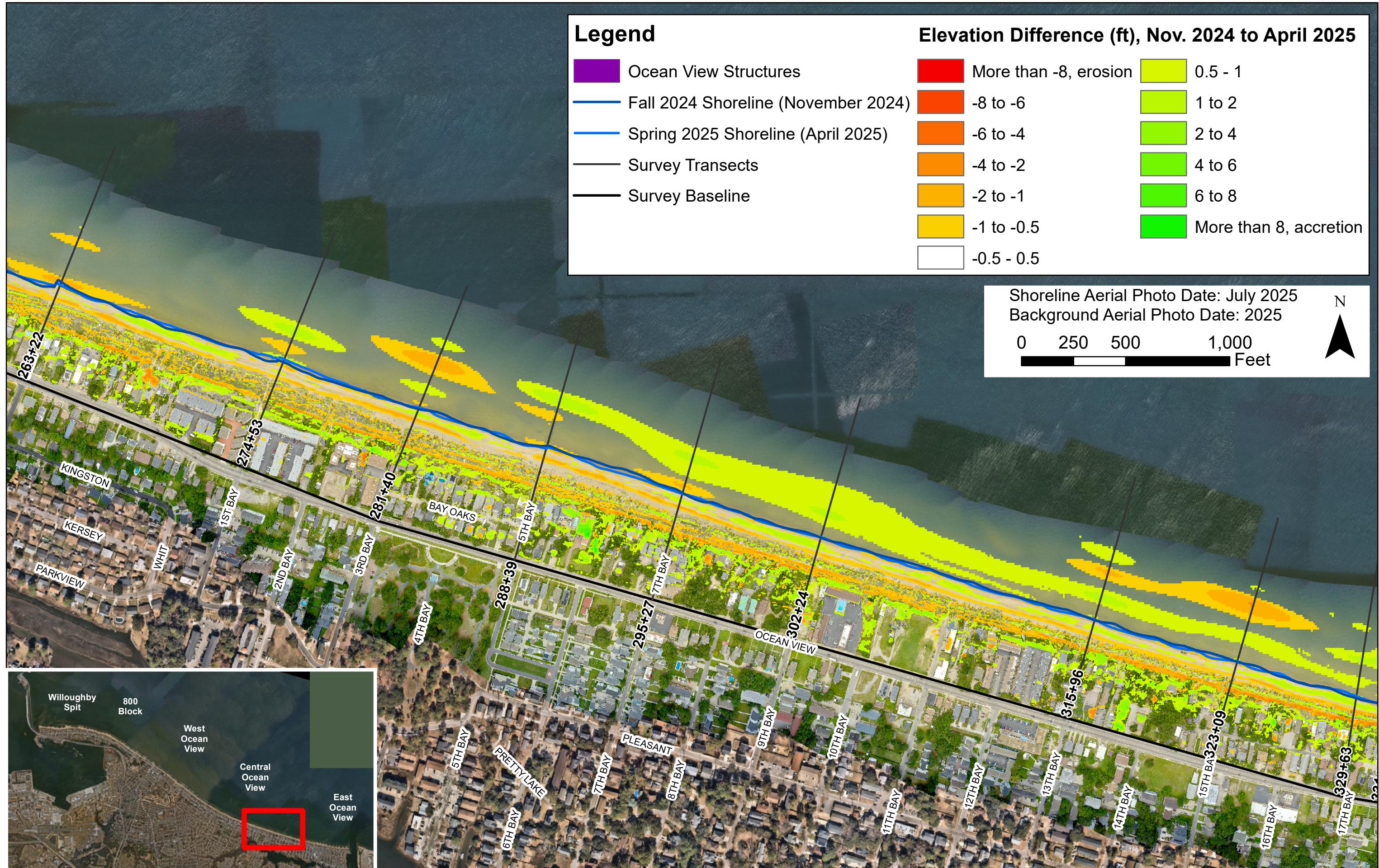
**Appendix E: Maps of Elevation Change,  
November 2024 to April 2025**

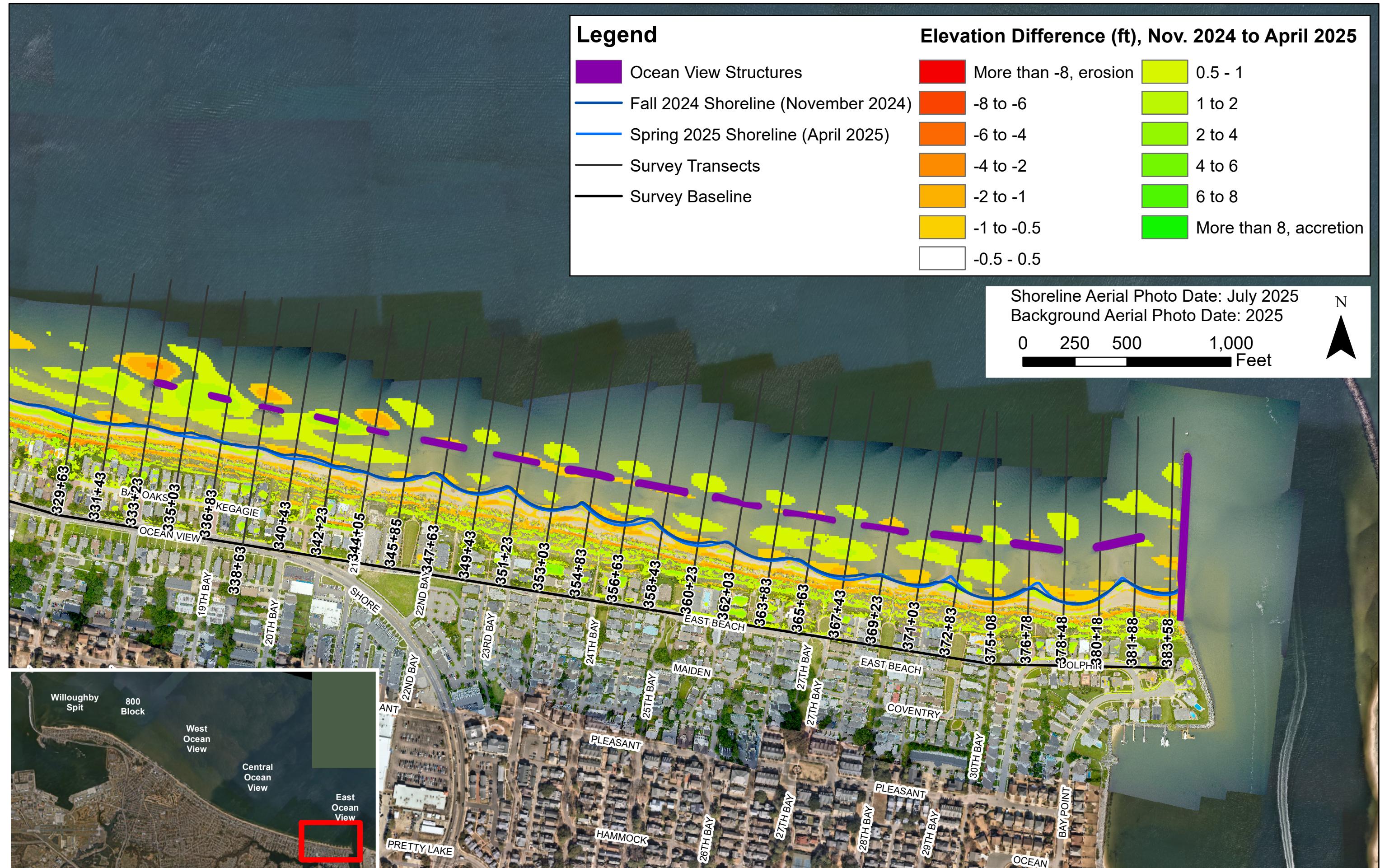












## **Appendix F: Maps of Federal Project Condition Change, May 2017 to April 2025**

## CHESAPEAKE BAY

Transects 22+50, 27+50, 35+00, 37+50, and 40+00 have retreated landward of the Nourishment Threshold. The May 2025 berm crest location at Transects 27+50 and 40+00 are landward of the October 2016 (Pre-Federal Nourishment) berm crest. Transect 25+00 is within 0-10 feet of the Nourishment Threshold. The beach berm crest at Transects 17+50, 20+00, and 30+00 are within 10-30 feet of the Nourishment Threshold.

The City of Norfolk completed a beach nourishment project along this reach in September 2022. Transects 42+50, 51+41, and 53+46 are within 10-30 feet of the USACE Nourishment Threshold.

Outside the limits of initial Federal Project construction.



## CHESAPEAKE BAY

Shoreline Aerial Photo Date: July 2025

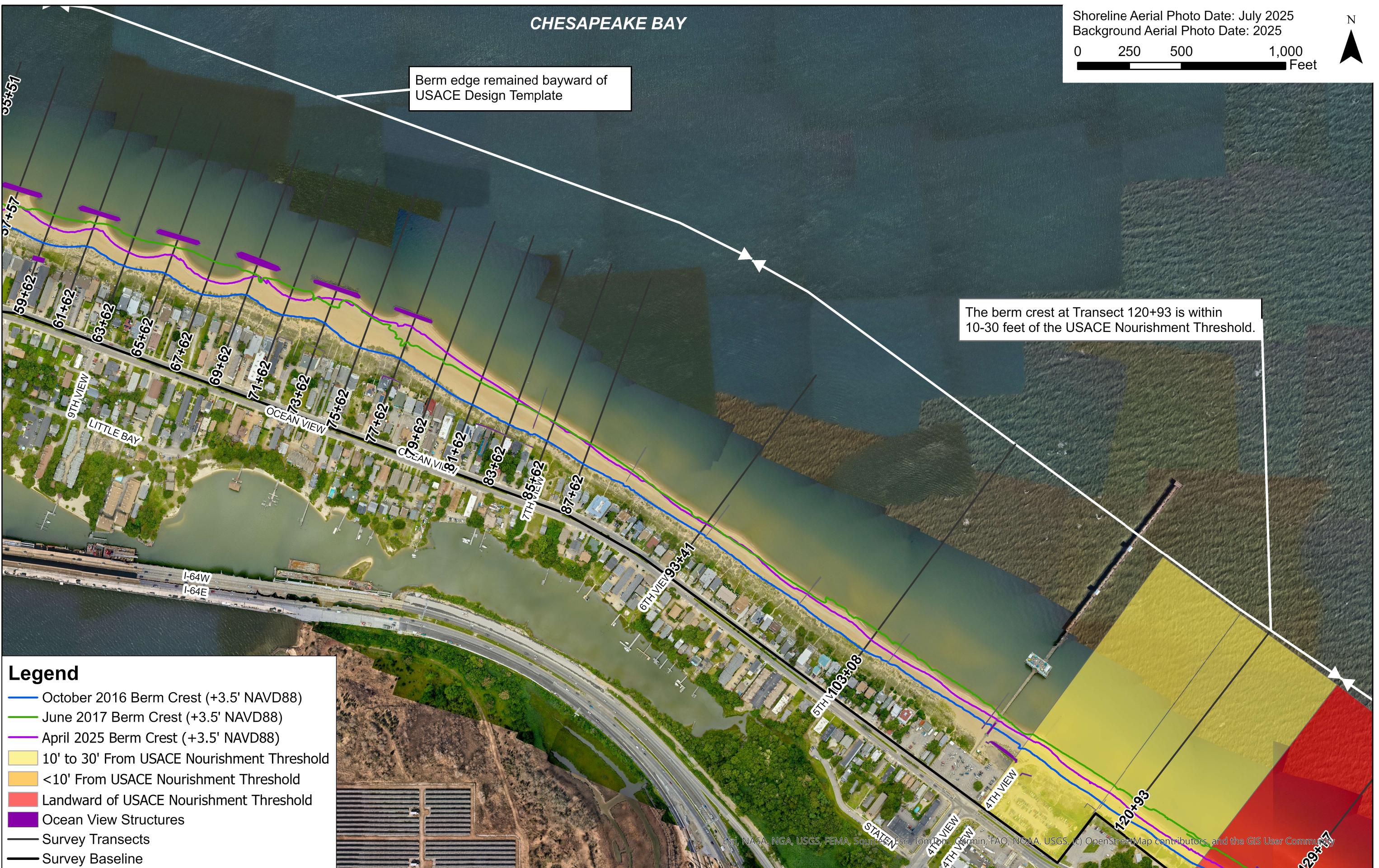
Background Aerial Photo Date: 2025

N

0 250 500 1,000  
Feet

Berm edge remained bayward of  
USACE Design Template

The berm crest at Transect 120+93 is within  
10-30 feet of the USACE Nourishment Threshold.



## CHESAPEAKE BAY

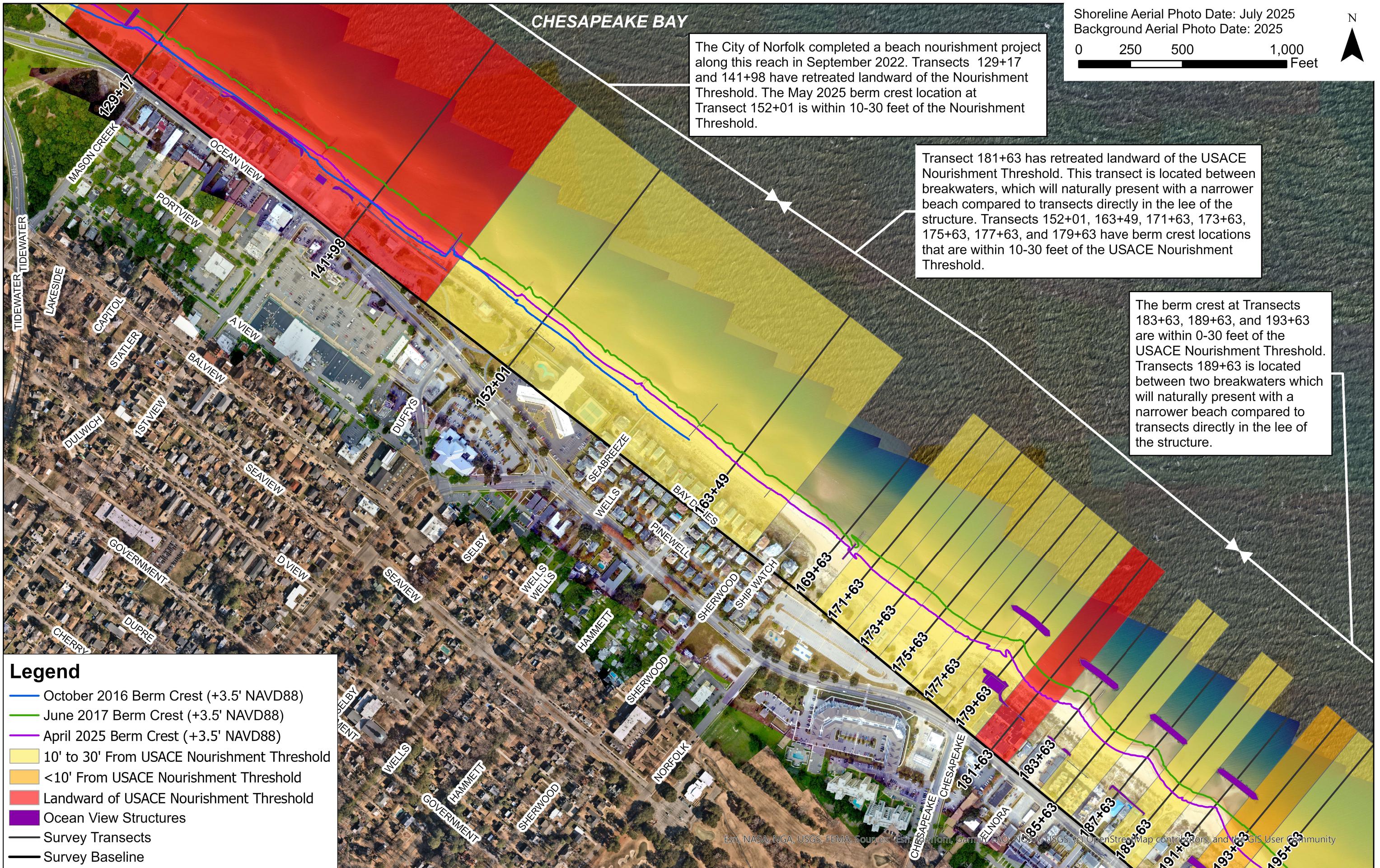
Shoreline Aerial Photo Date: July 2025

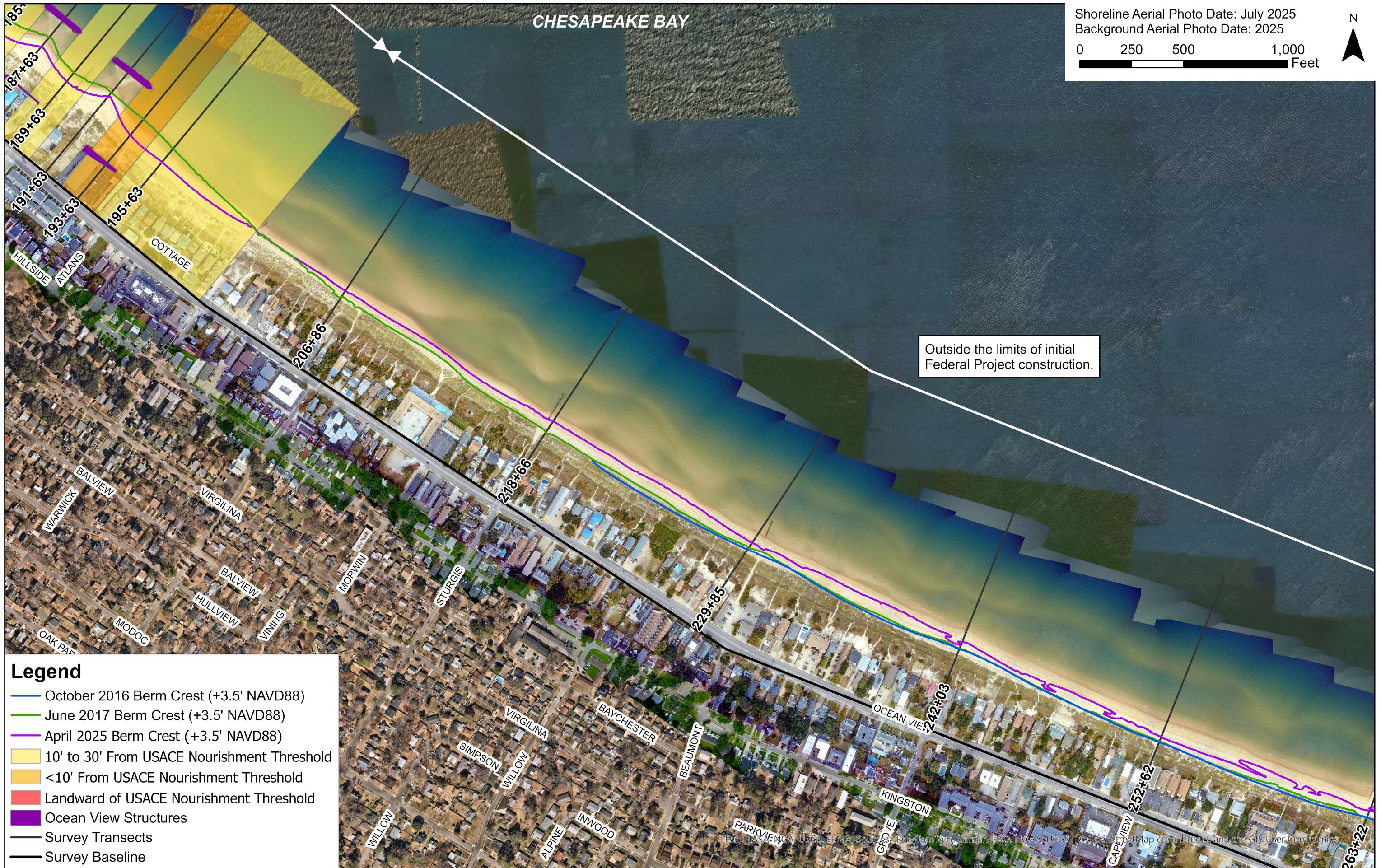
Background Aerial Photo Date: 2025

N

0 250 500 1,000

Feet





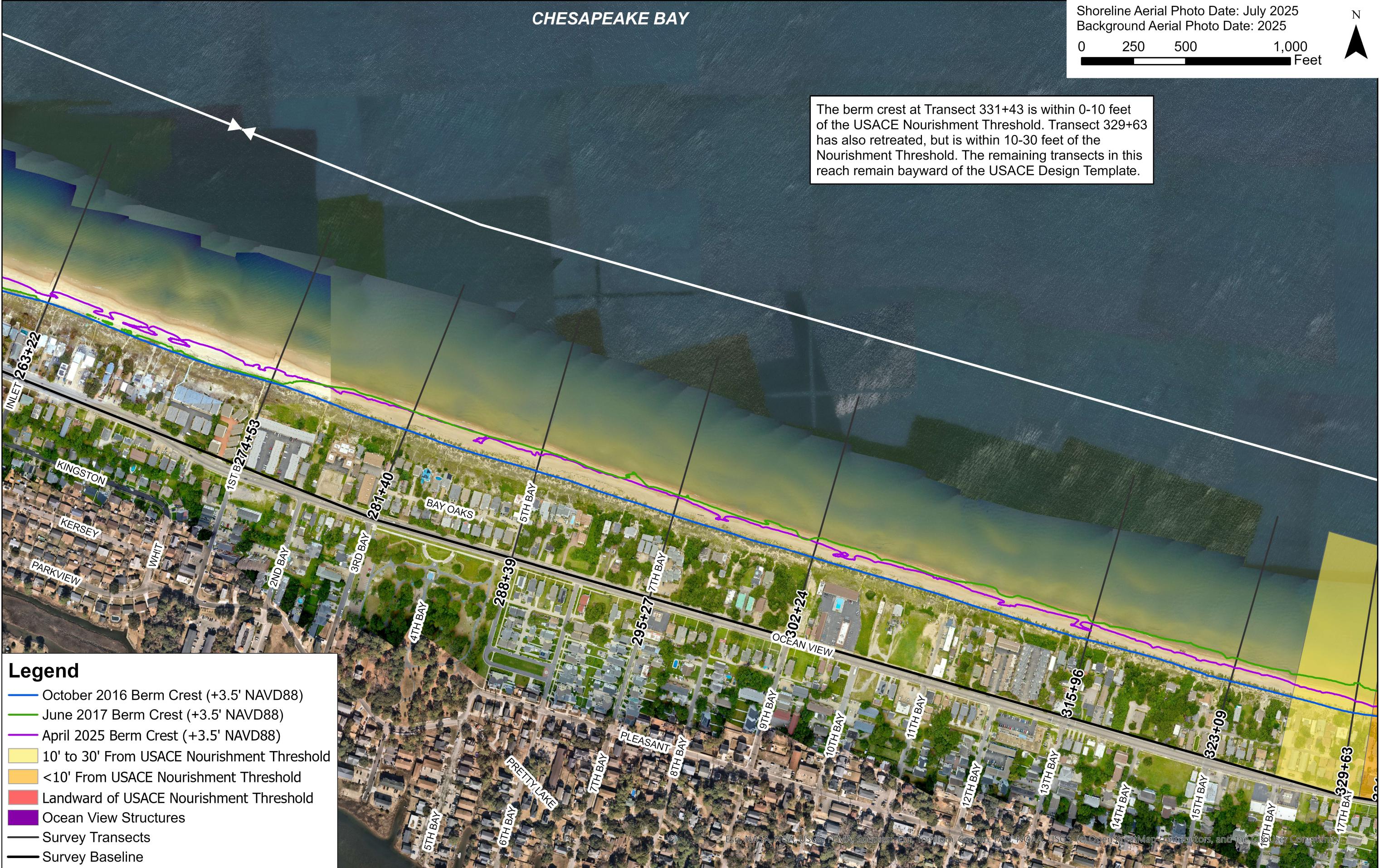
## CHESAPEAKE BAY

Shoreline Aerial Photo Date: July 2025  
Background Aerial Photo Date: 2025

0 250 500 1,000  
Feet

N

The berm crest at Transect 331+43 is within 0-10 feet of the USACE Nourishment Threshold. Transect 329+63 has also retreated, but is within 10-30 feet of the Nourishment Threshold. The remaining transects in this reach remain bayward of the USACE Design Template.



## CHESAPEAKE BAY

Shoreline Aerial Photo Date: July 2025  
Background Aerial Photo Date: 2025

N

0 250 500 1,000  
Feet

The berm crest at Transect 331+43 is within 0-10 feet of the USACE Nourishment Threshold. Transect 329+63 has also retreated, but is within 10-30 feet of the Nourishment Threshold. The remaining transects in this reach remain bayward of the USACE Design Template.

Transects 347+63, 351+23, 354+83, and 376+78 are the only transects that have berm crests located bayward of the USACE Design Template. These transects are located in the lee of a breakwater, which leads to a naturally wider beach compared to adjacent monitoring transects. Transects 636+83, 367+43, 371+03, and 375+08 are located between breakwaters and have berm crests that are landward of the USACE Nourishment Threshold. Transects 331+43, 360+23, 365+63, and 369+23 are located 0-10 feet from the USACE Nourishment Threshold while transects 329+63, 333+23, 336+83, 338+63, 340+43, 342+23, 344+05, 345+85, 349+43, 353+03, 356+63, 358+43, 362+03, 372+83, 378+49, and 380+18 have berm crests that are within 10-30 feet of the USACE Nourishment Threshold.

Transects 381+88 and 383+58 have berm crests that are within 10-30 feet and landward of the USACE Nourishment, respectively. These transects are located adjacent to the western jetty at Little Creek inlet and are highly erosional due to the inlet's disruption of the longshore sediment transport.

